AUTOMATIC PLUG ASSEMBLY MACHINE

Model: TP389A-AHSC-1

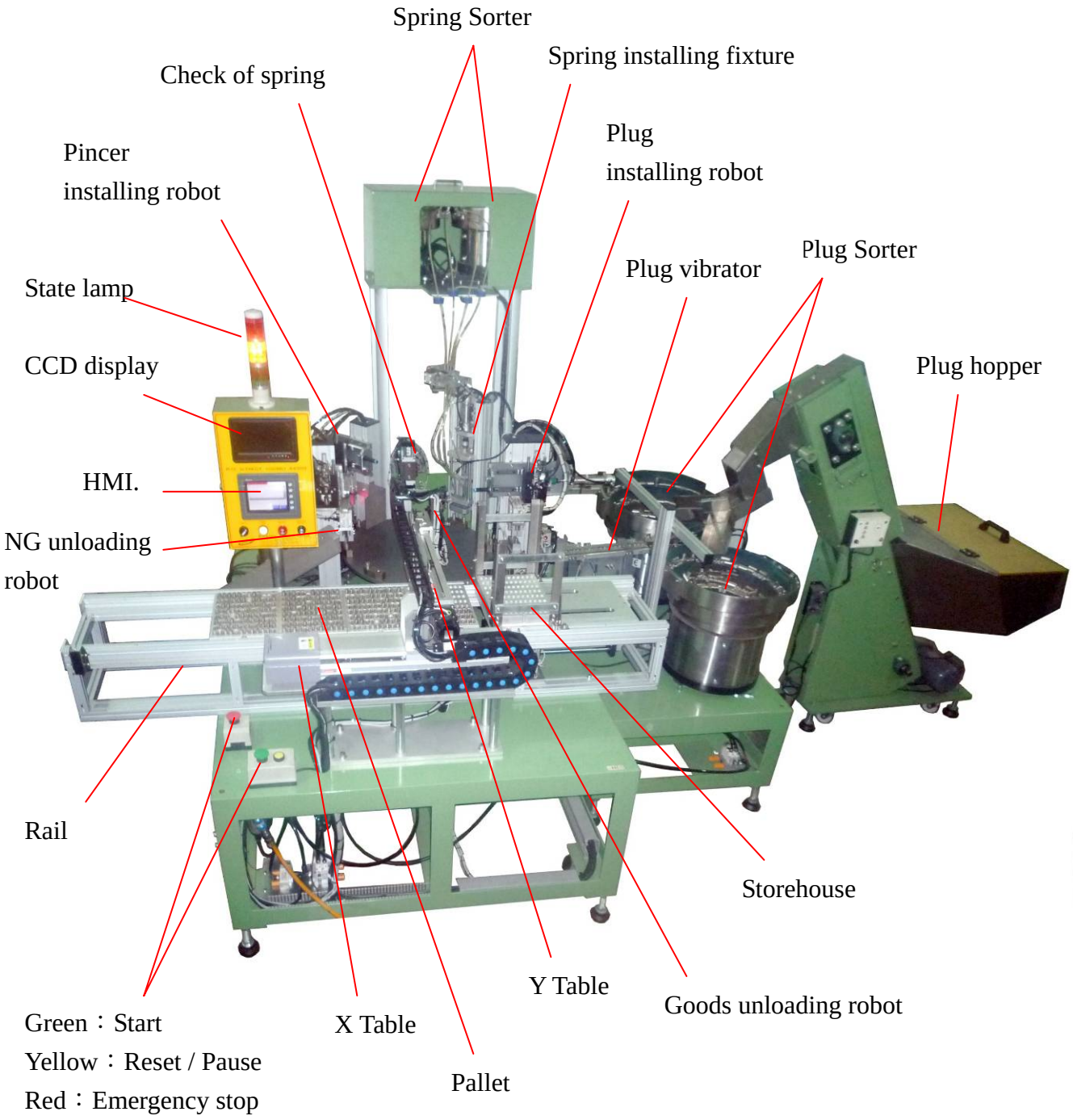
* * *　Instruction Manual　* * *

Plug Assembly Machine

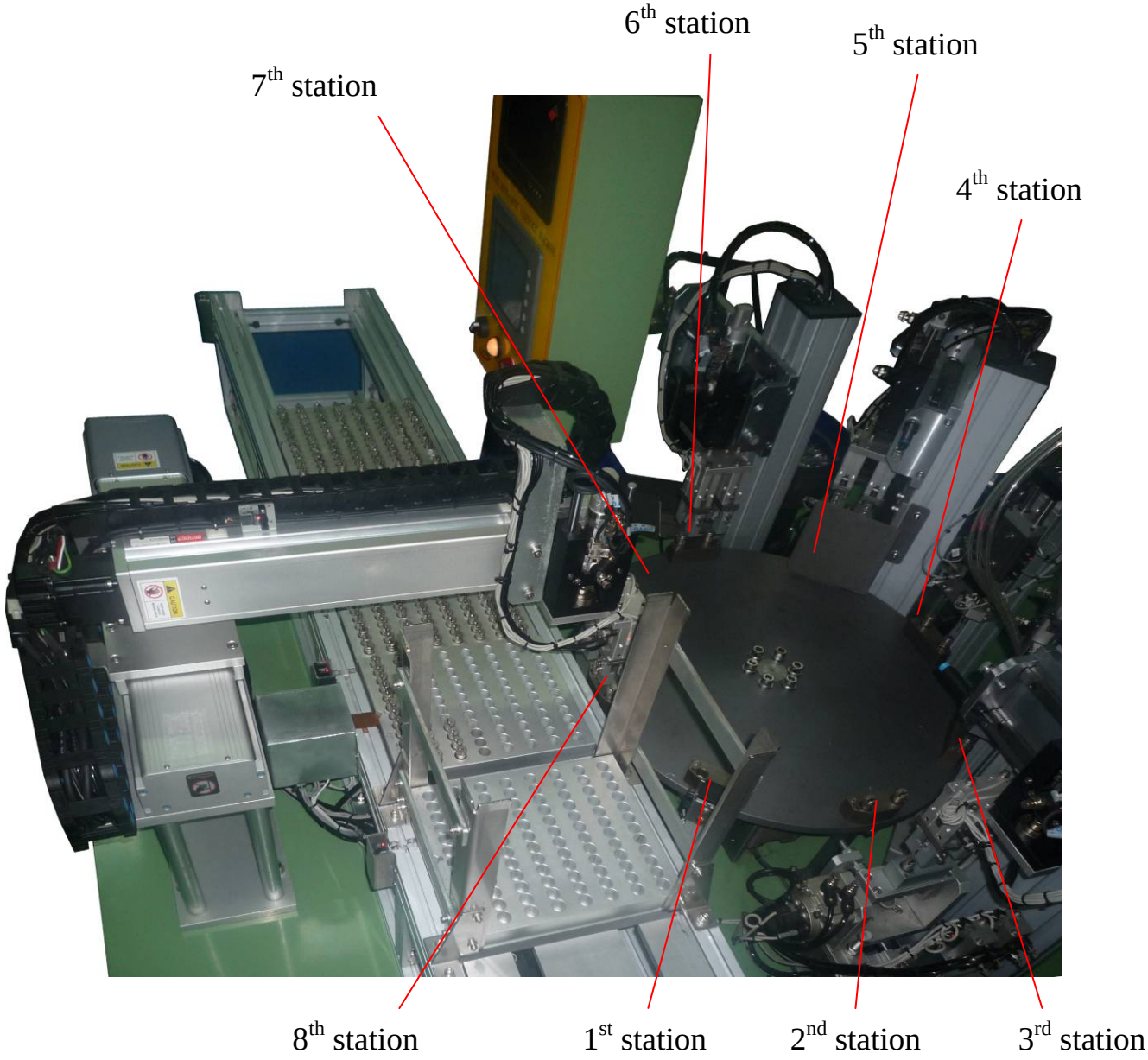
Appendix：

1. Mechanism introduction：

Type : Plug Auto Assembly Machine
Electric Power : 220V 50HZ 1 phase
Pneumatic Source : 5±0.5 kg/cm^2



2. Introduction of each station：



8 stations of index rotary：

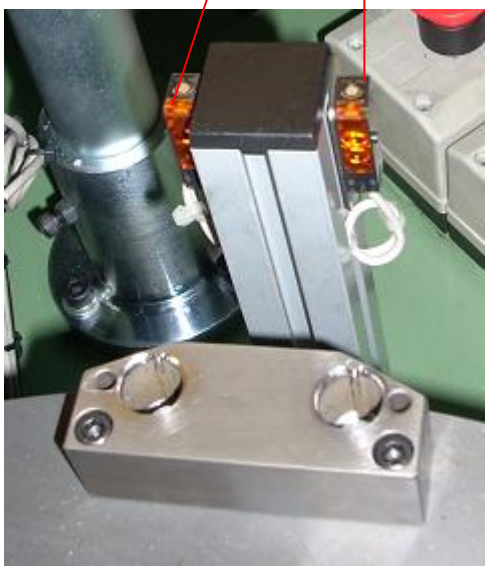
1st：Check of plug body
2nd：Plug installation
3rd：Spring installation
4th：Check of spring
5th：Pincer installation
6th：Unload NG product
7th：Free
8th：Unload goods by XY-Table robot

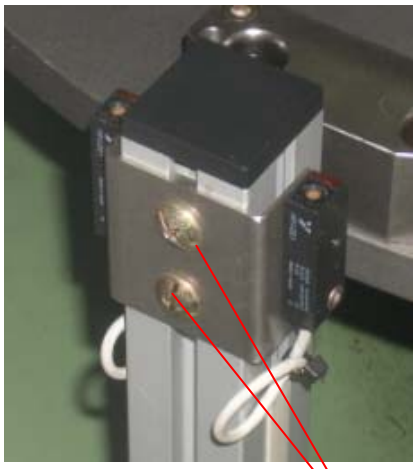
1st station：Check of plug body

Reflex sensor

(Check of plug body, nothing for sensing is right)

(SNR25，SNR24)

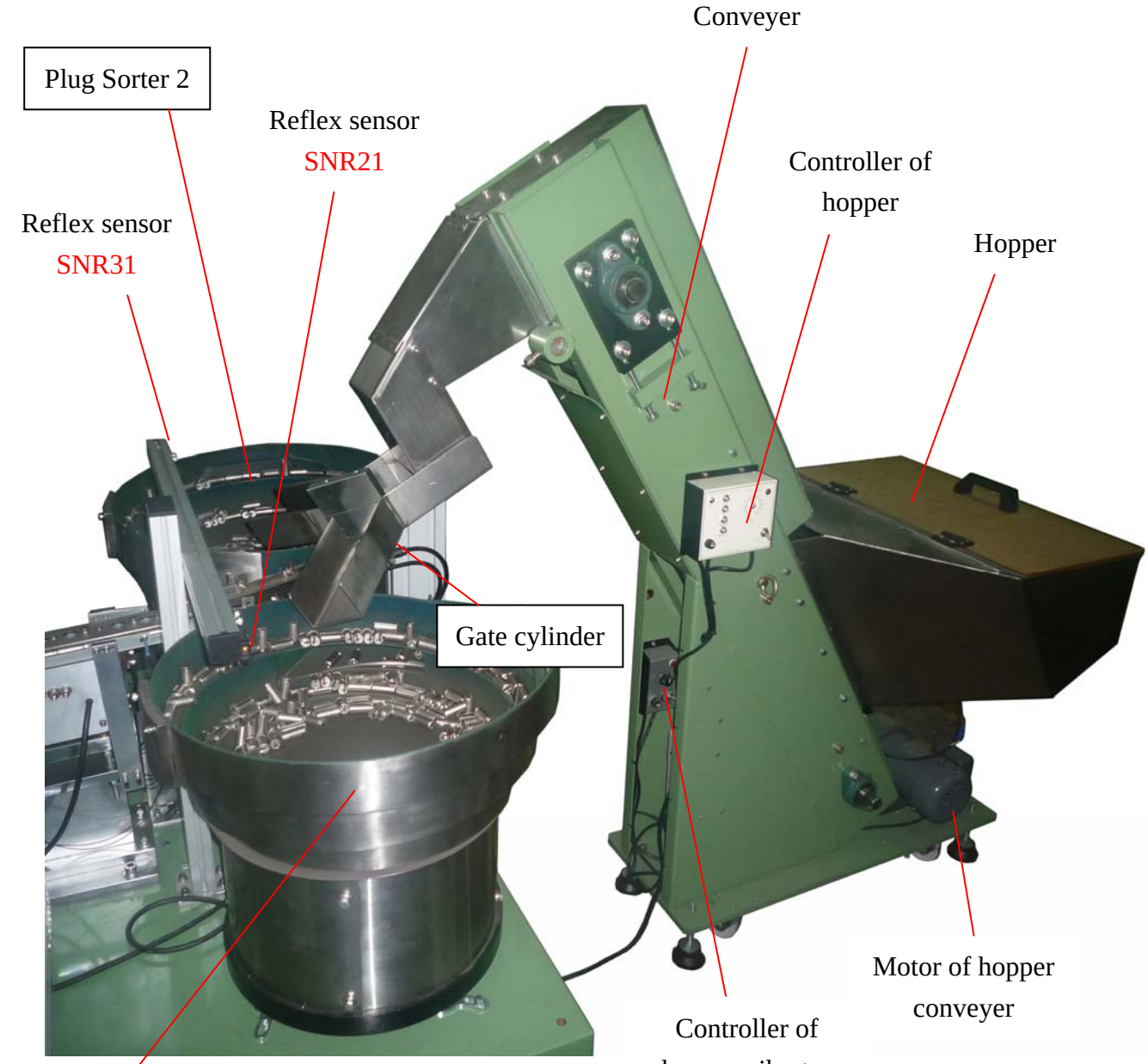




Fixed screw for settling

(To loose screw to adjust height of sensor)

2nd station：Plug installation



Control by PLC
Those adjusters
are useless

Fuse 5A

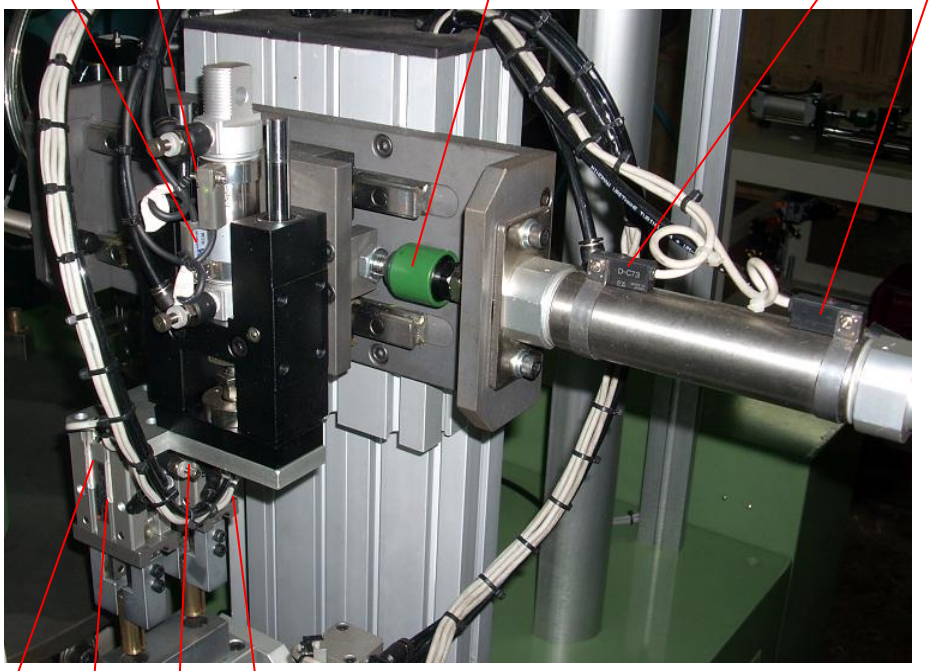
Controller of hopper

Power

Clip up/down cylinder
(LS7，LS8)

Floating connector

Moving cylinder
(LS9，LS10)



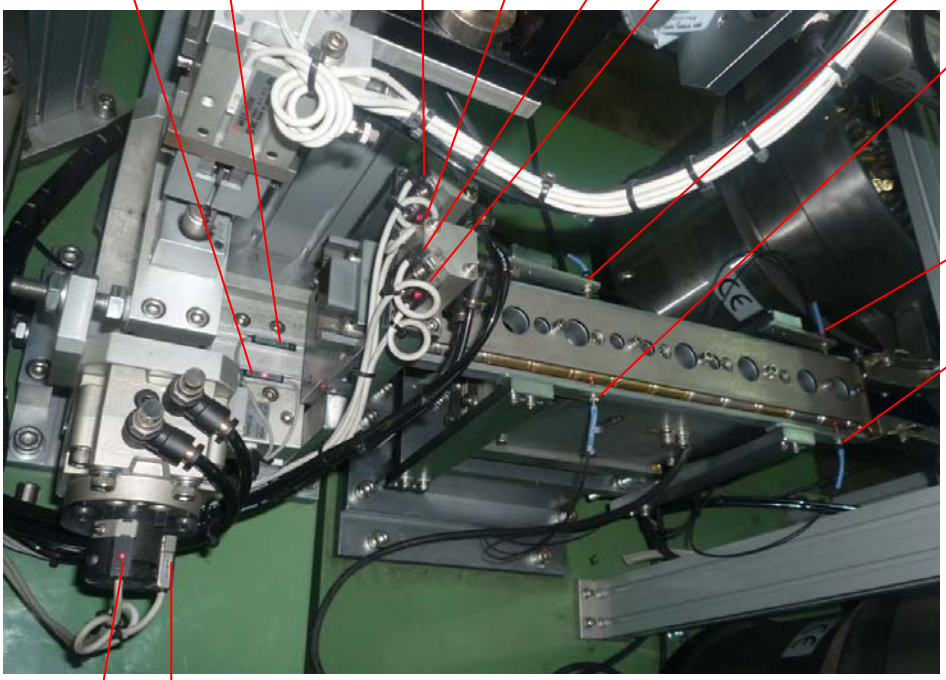
(LS5，LS6，LS3，LS4)
Clipping cylinder

Optical fiber on middle of plug vibrator
Alarm when could not sense Plug
(SNR26，SNR28)

Stopping cylinder
(LS54，LS55，LS56，LS57)

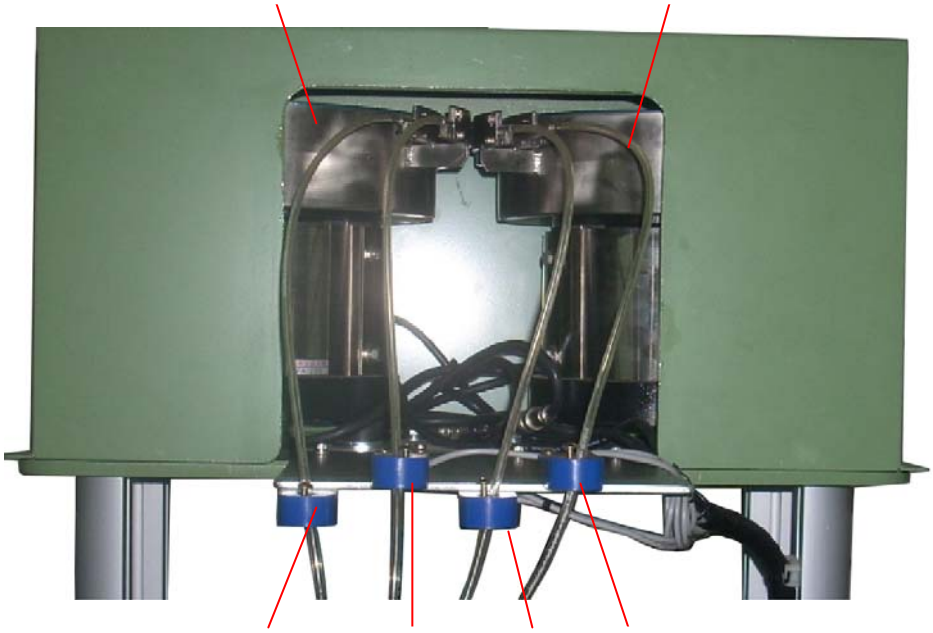
Throttling cylinder
(LS59，LS58)

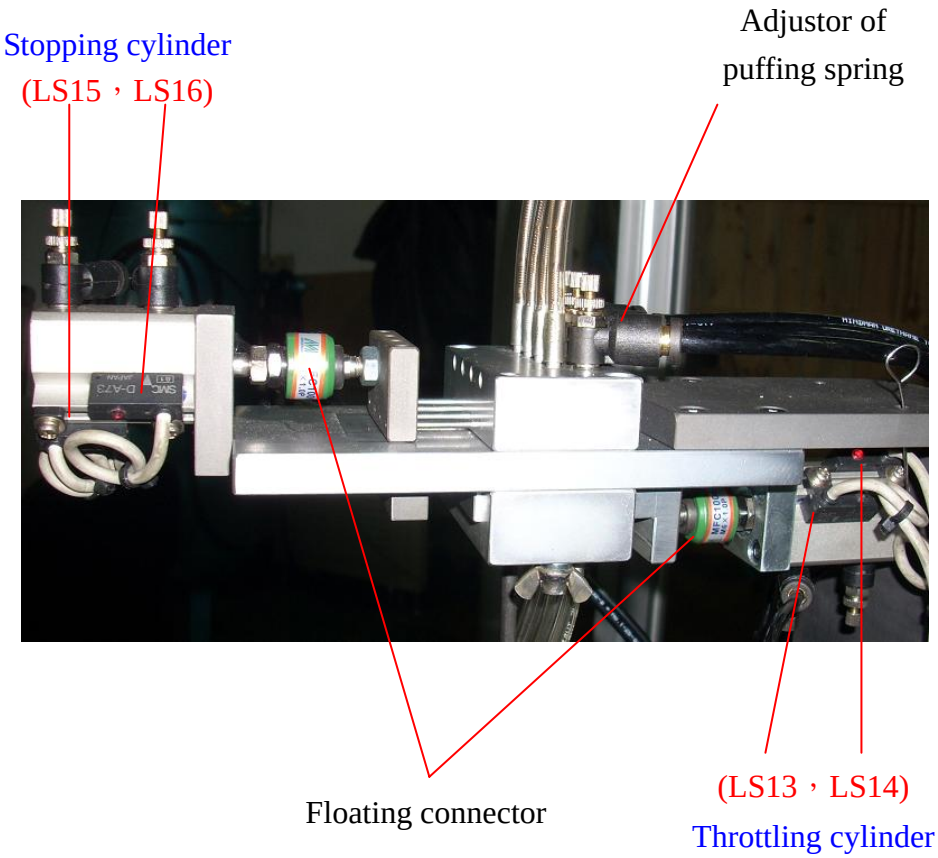
Optical fiber on end of
plug vibrator
To control Plug sorter
(SNR27，SNR29)

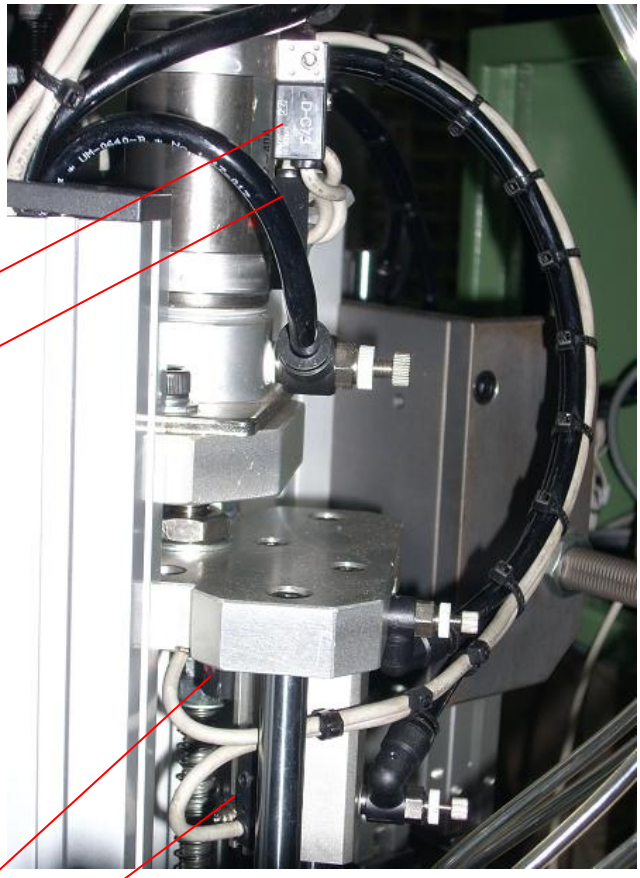


(LS1，LS2)
Turning cylinder

3rd station：Spring installation







(LS12，LS11)

Holding cylinder

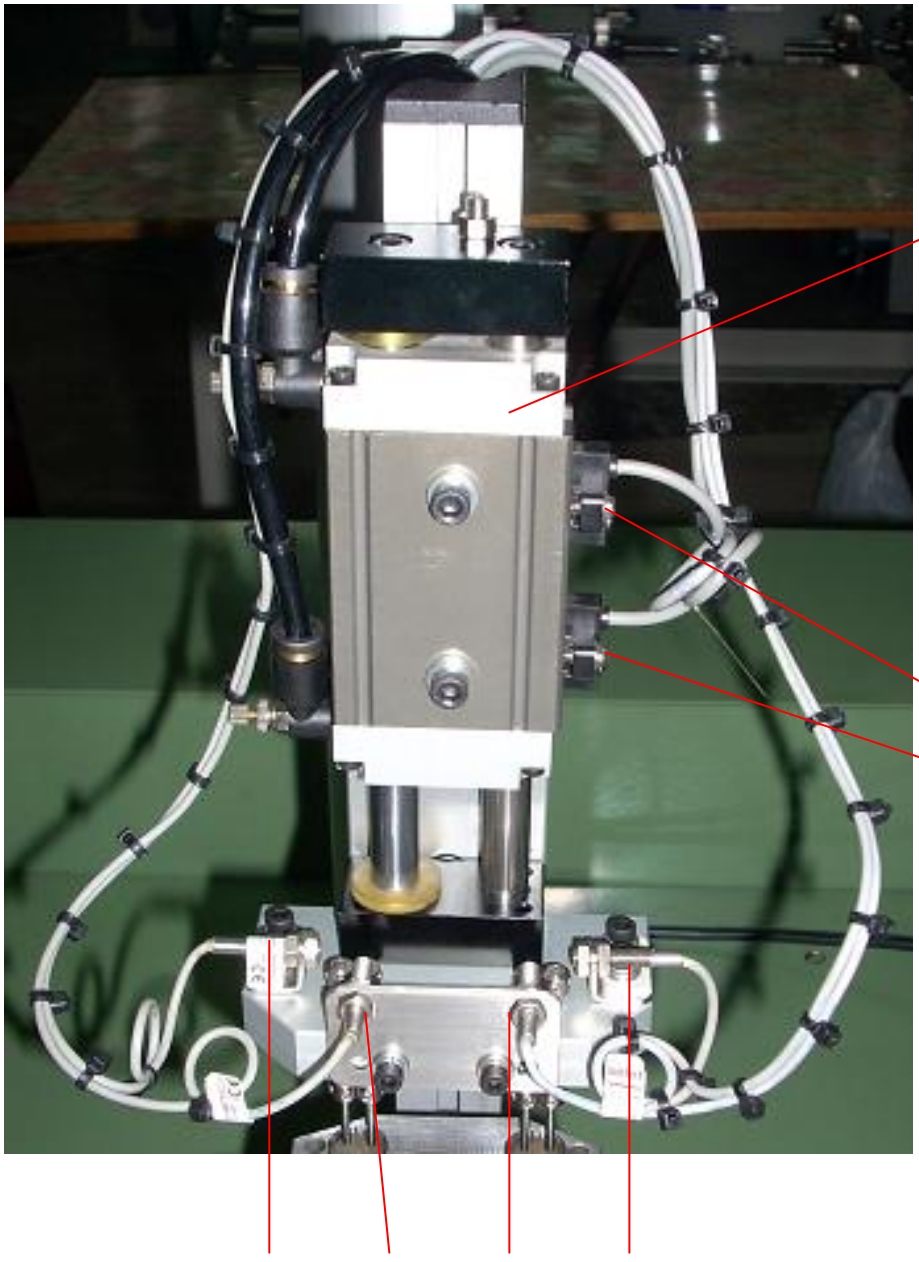
(LS18，LS17)

Separating cylinder

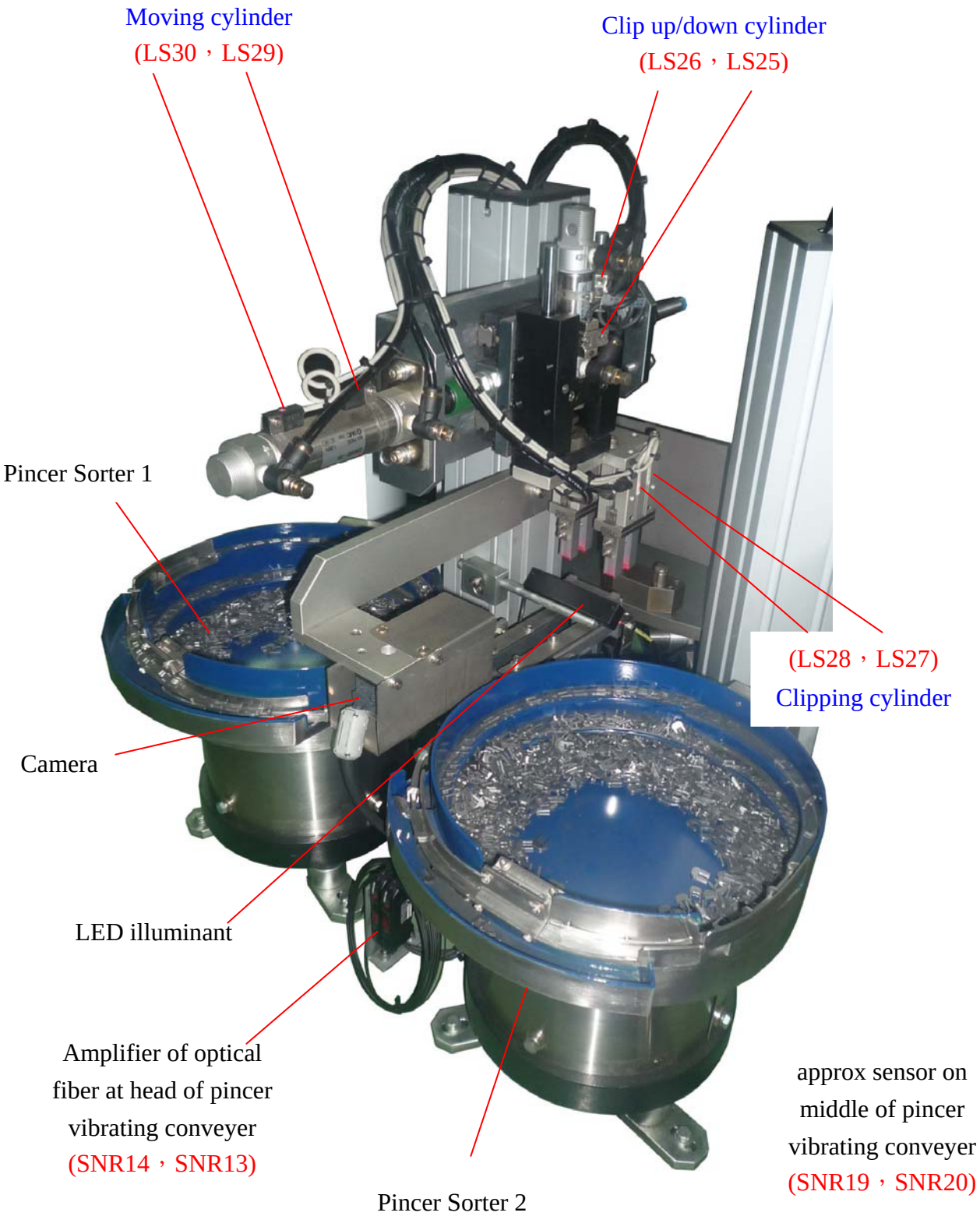
※ Notice：

Do not use manual operation to feed spring if whichever hole of mold is without plug at 3rd station. That could avoid spring to stick in pipe.

4th station：Check of spring

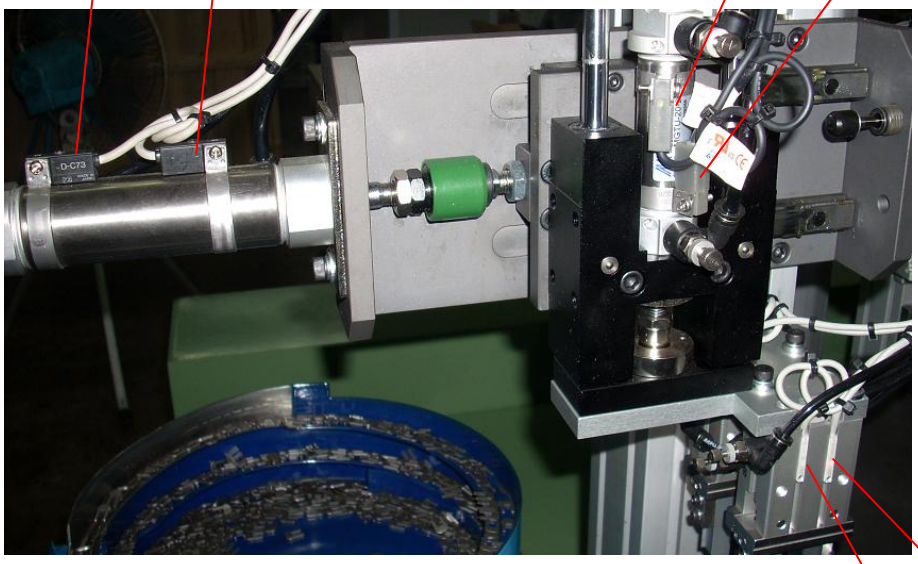


5th station：Pincer installation



Moving cylinder
(LS30，LS29)

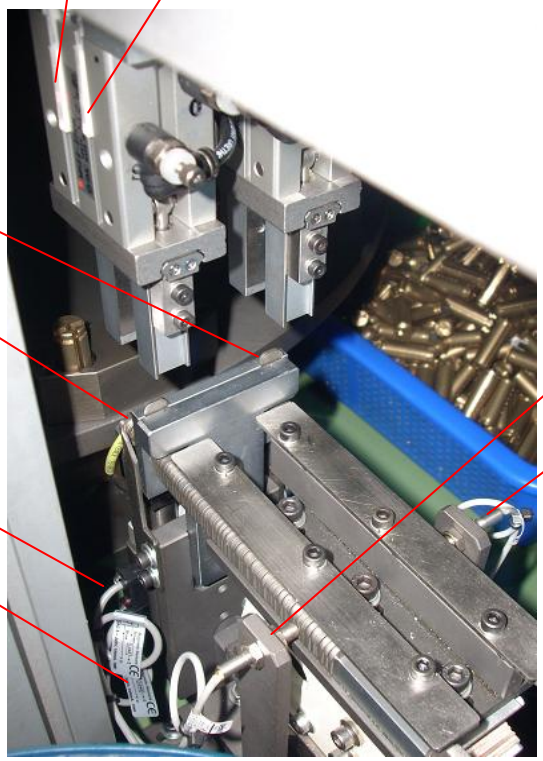
Clip up/down cylinder
(LS26，LS25)



(LS28，LS27)
Clipping cylinder

Clipping cylinder
(LS33，LS34)

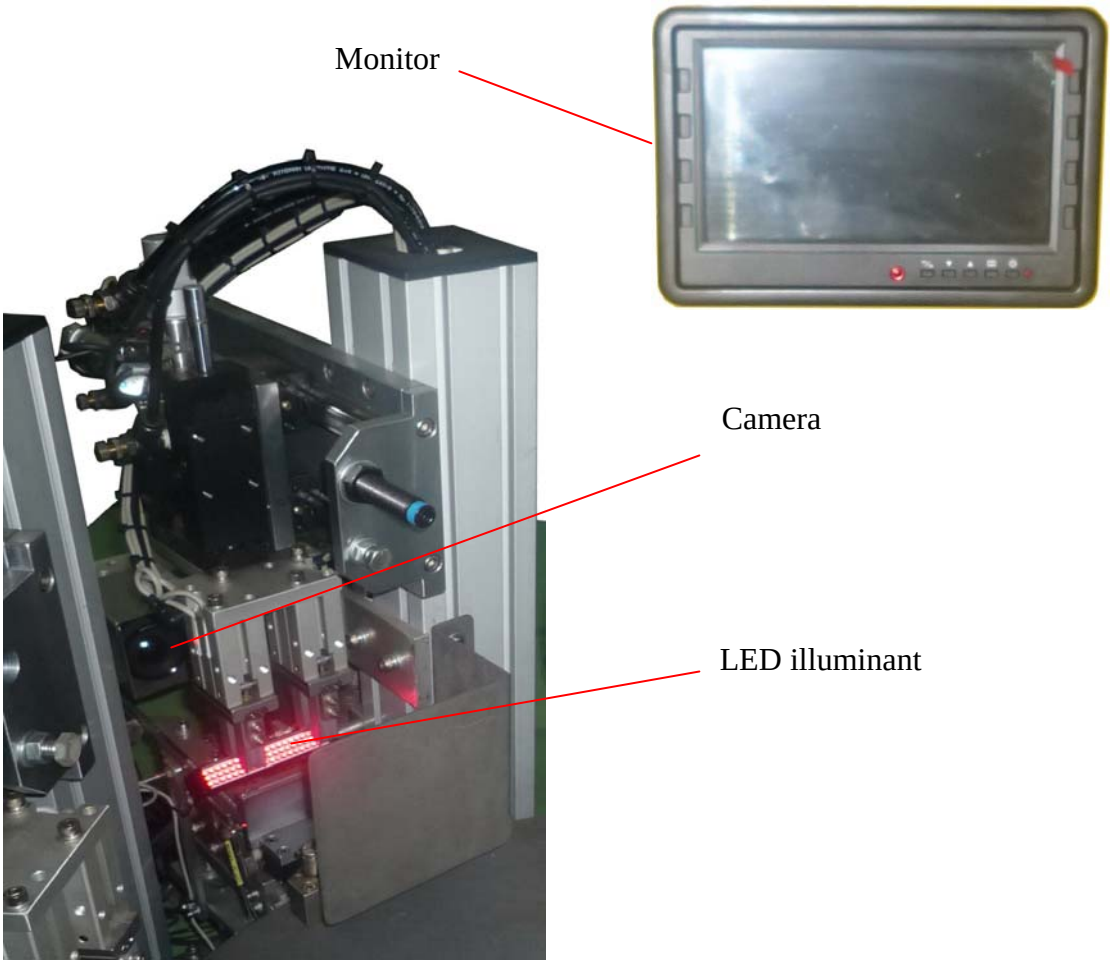
Optical fiber at
head of pincer
vibrating conveyer
(SNR14，SNR13)

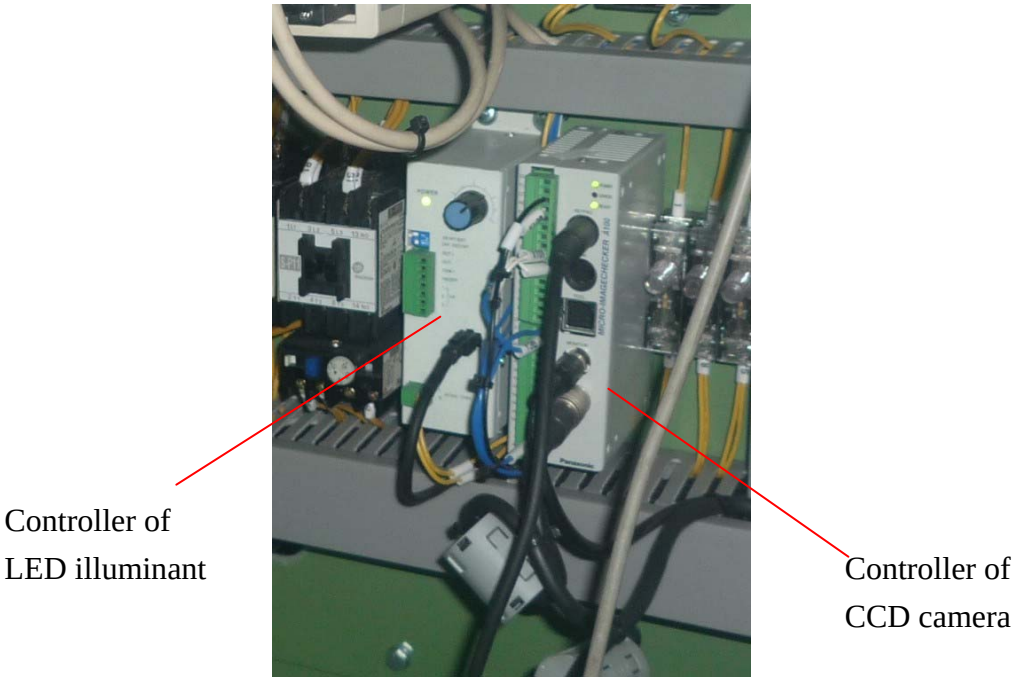


approx sensor on
middle of pincer
vibrating conveyer
(SNR19，SNR20)

throttling cylinder
(LS31，LS32)

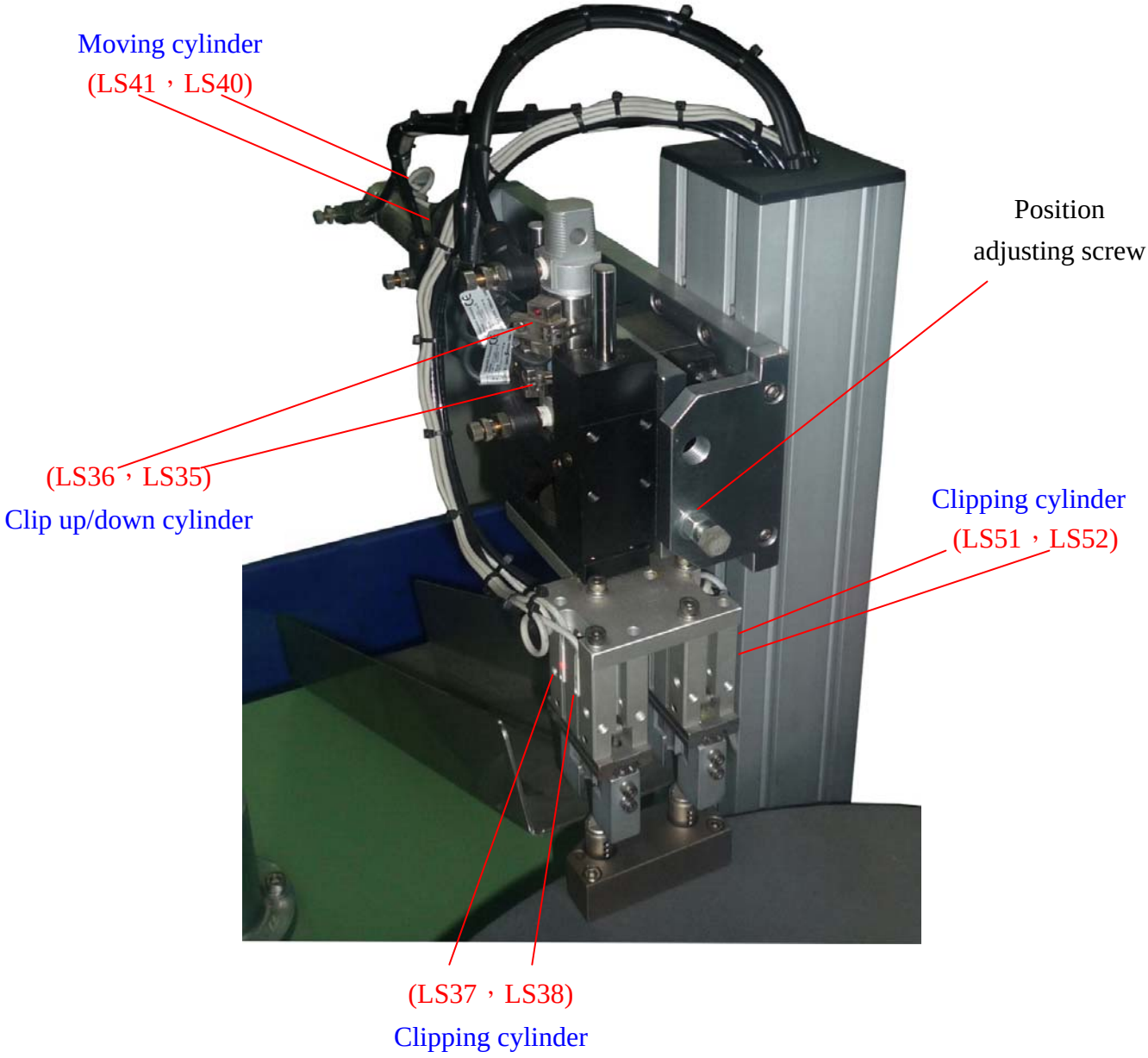
CCD Camera (Image processing device)



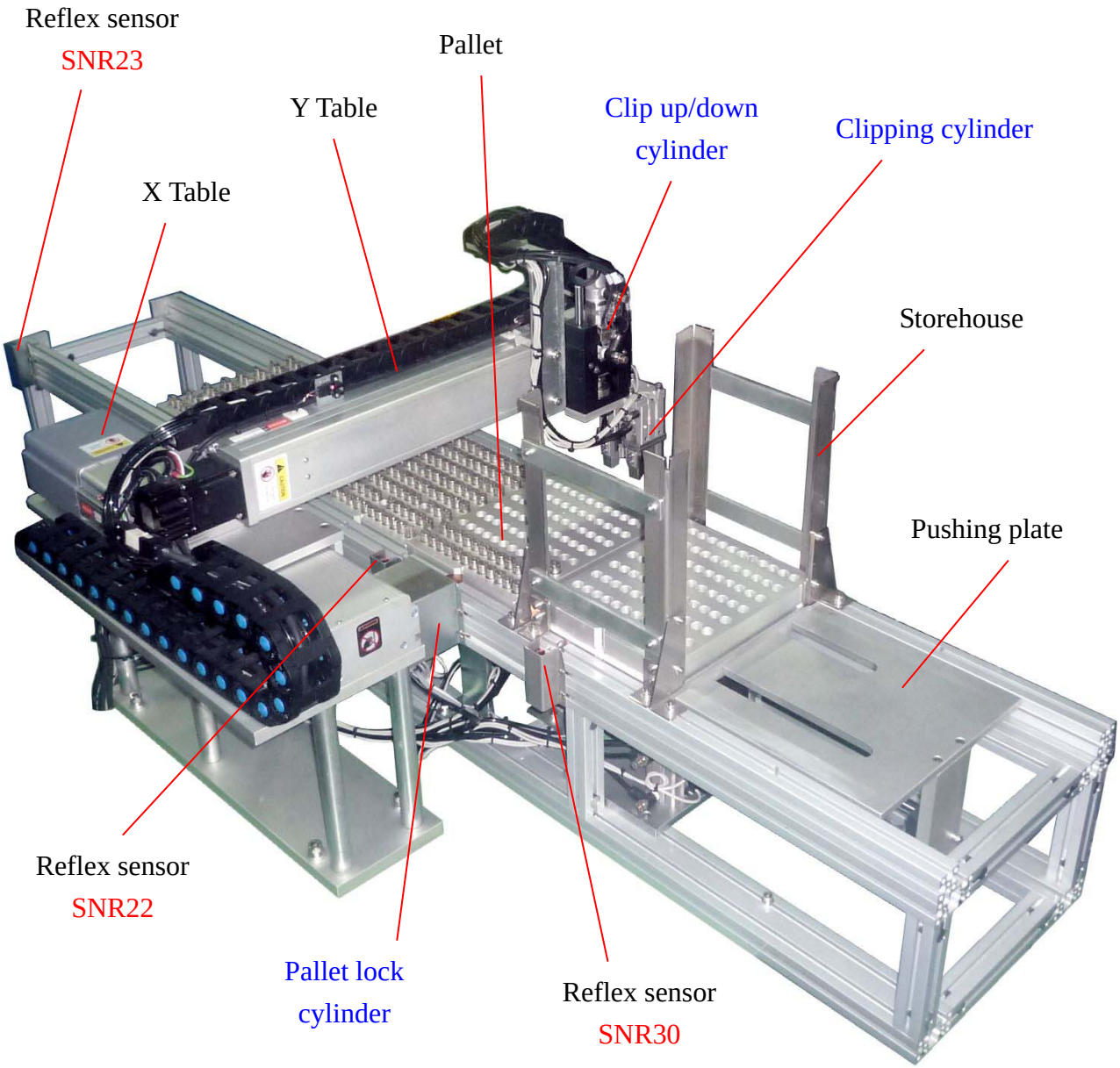


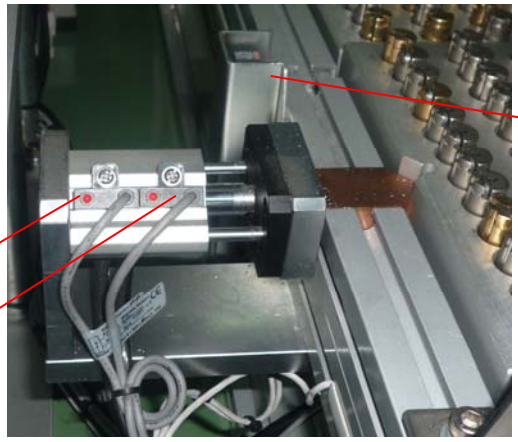
Electric control box

6th station：Unload NG product



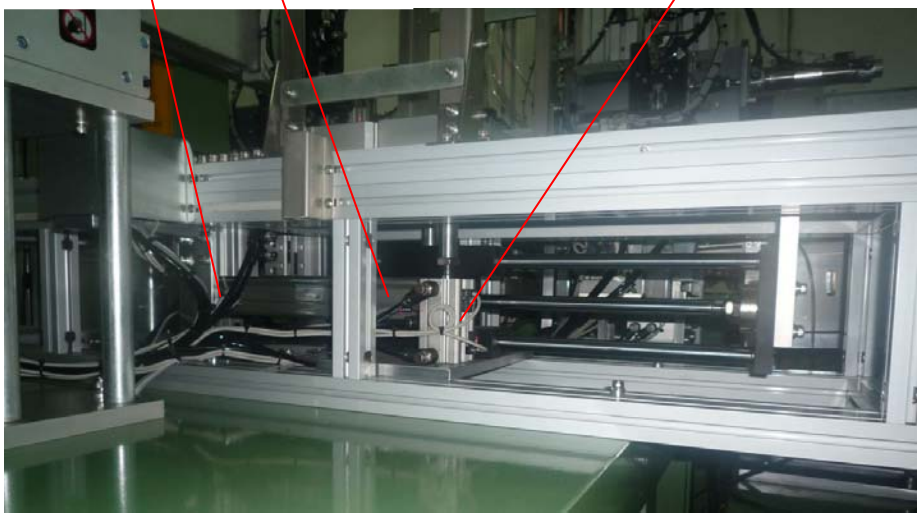
8th station：Unload goods by XY-Table robot





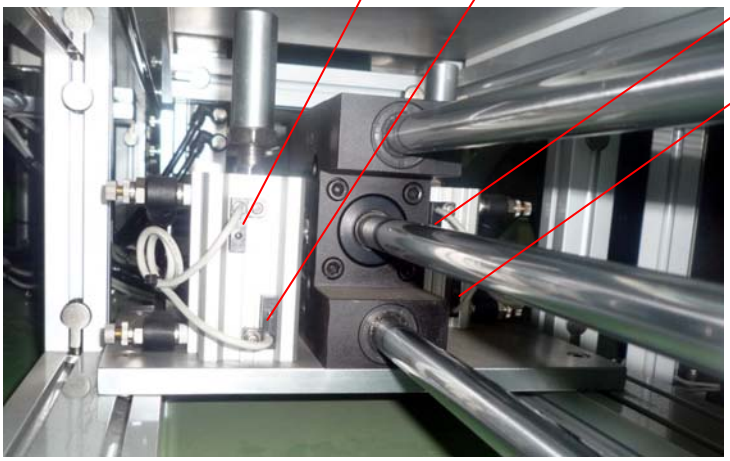
Pallet pushing cylinder
(LS19，LS20)

Pallet up cylinder 1

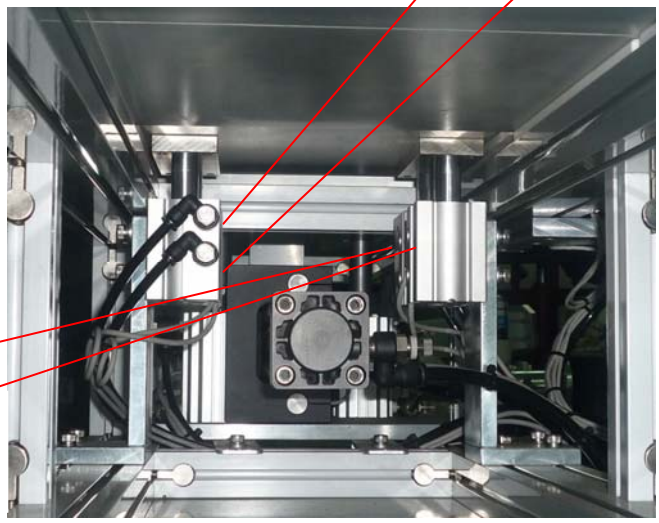


Pallet up cylinder 1
(LS47，LS48)

Pallet up cylinder 2
(LS49，LS50)

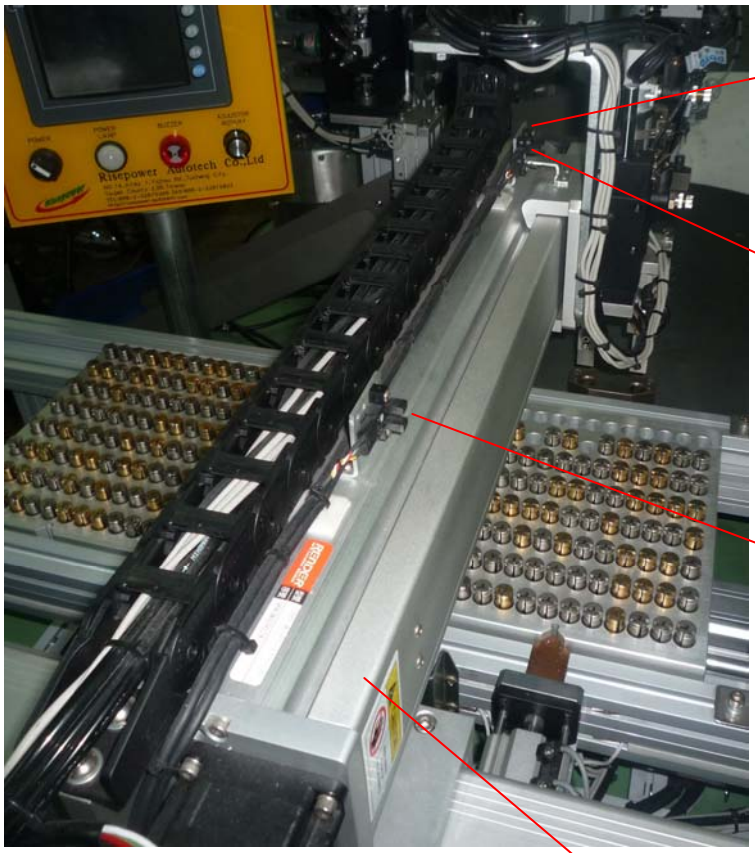


Pallet position cylinder 2
LS62，LS63

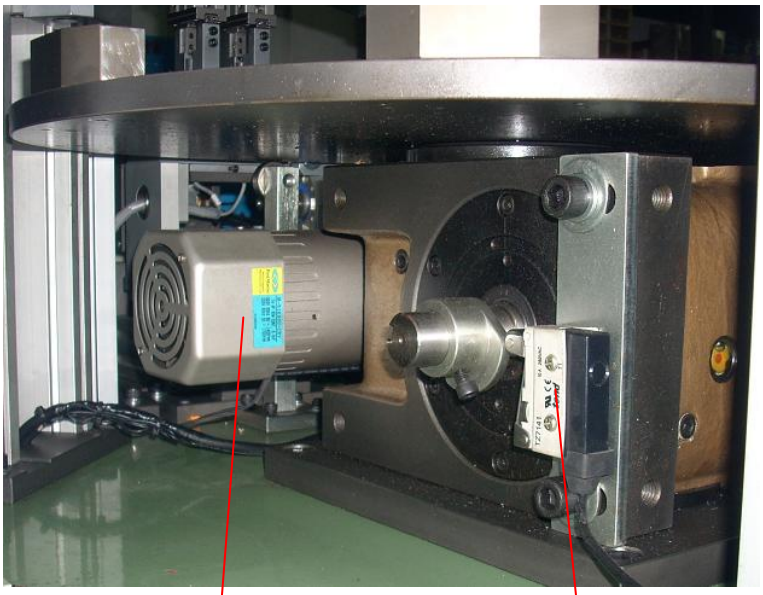


LS60，LS61
Pallet position cylinder 1


Limit position sensor
SNR5
Home sensor
Limit position sensor
SNR6
X-Table

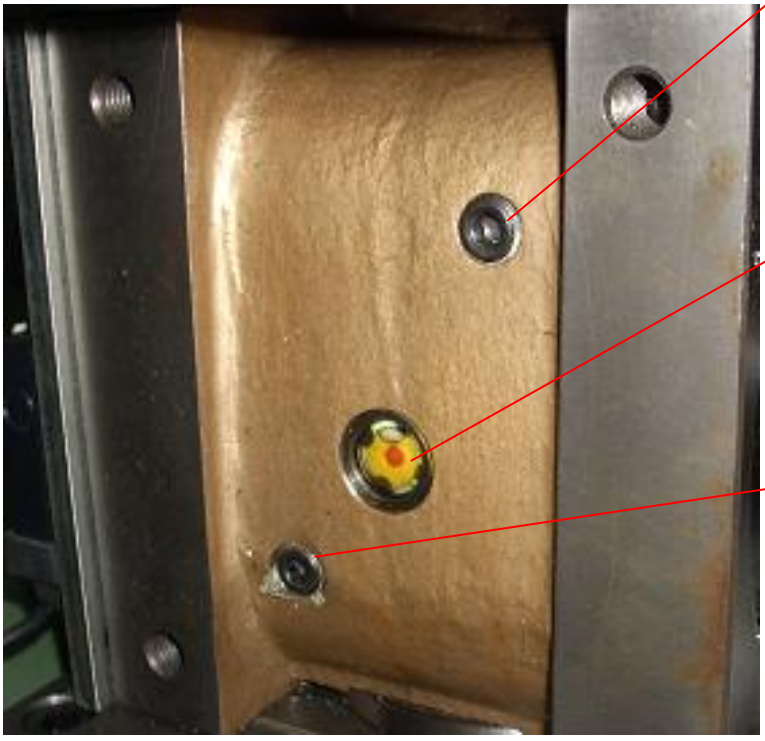

Limit position sensor
SNR10
Home sensor
Limit position sensor
SNR7
Y-Table

3. Index rotary



Motor of index

LS53
Limit switch



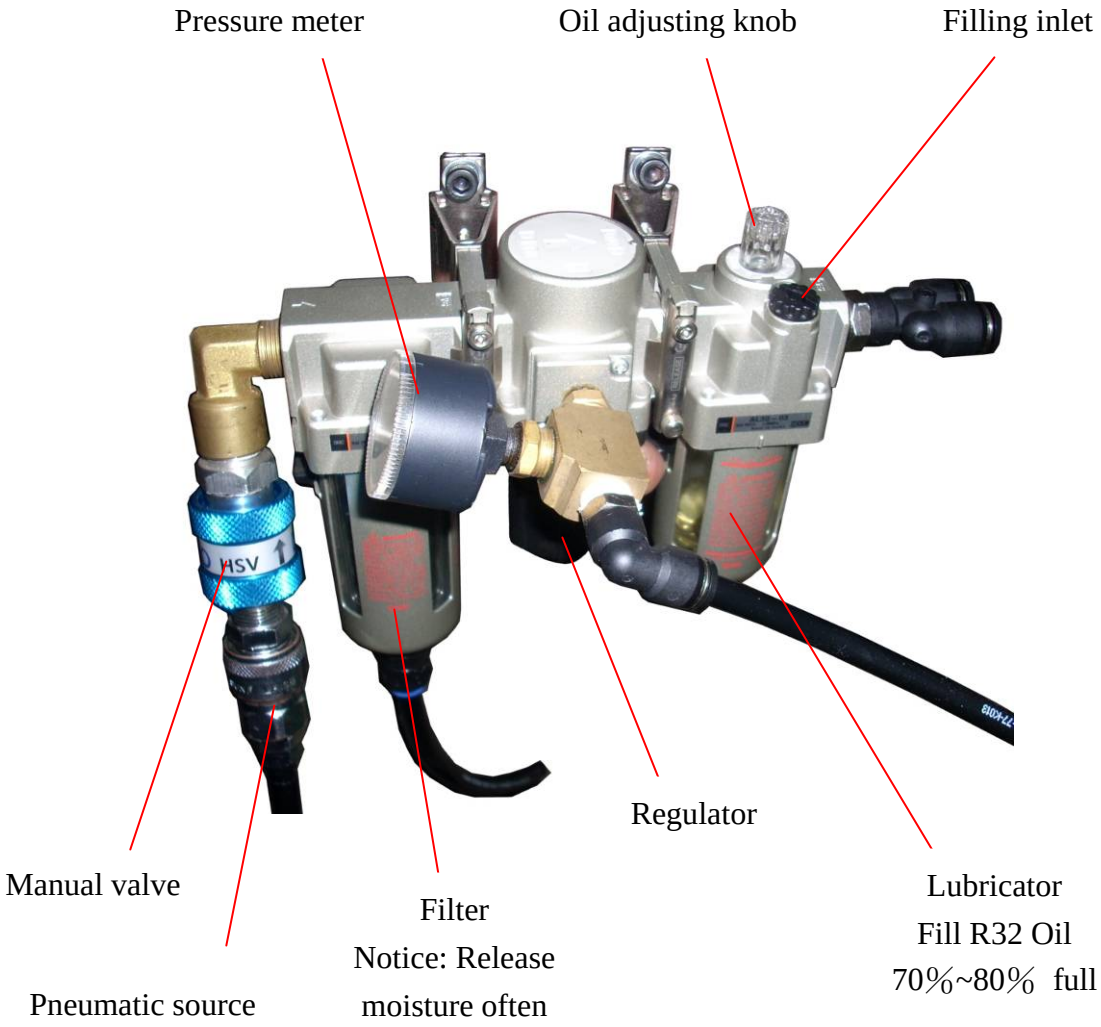
Inlet of lubricant

Window for
checking lubricant

Outlet of lubricant

※ Notice：
To check the oil mark of R68 lubricant at random.
Resupply it when oil is lower than red mark.

4. F.R.L (Filter + Regulator + Lubricator)



Using method：

Turn knob "A" to micro adjustment (counter clockwise) to drop oil about 10 drops then tight (clockwise) knob "A", weekly.
The oil R32 need fill around 70-80% and release the moisture often.

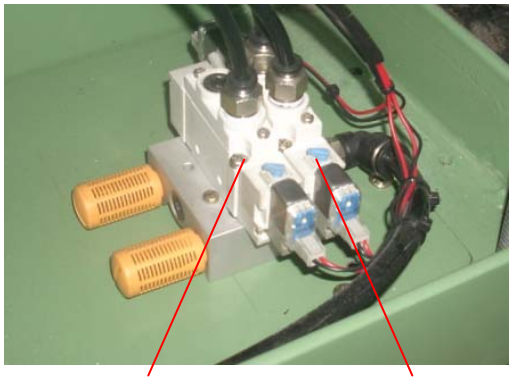
5. Solenoid valve

※To described solenoid valve in sequence from up to down as below:

1. Probe up/down cylinder at 4th station
2. Holding cylinder at 3rd station
3. Stopping cylinder at 3rd station
4. Throttling cylinder at 3rd station
5. Separating cylinder at 3rd station
6. Stopping cylinder at 2nd station
7. Clipping cylinder at 2nd station
8. Clip up/ cylinder at 2nd station
9. Moving cylinder at 2nd station
10. Throttling cylinder at 2nd station
11. Turning cylinder at 2nd station

1. Moving cylinder at 5th station
2. Moving cylinder at 6th station
3. Throttling cylinder at 5th station
4. Clip up/down cylinder at 5th station
5. Clipping cylinder at 5th station
6. Clip up/down cylinder at 6th station
7. Clipping cylinder at 6th station
8. Clip up/down cylinder at 8th station
9. Clipping cylinder at 8th station
10. Pallet pushing cylinder at 8th station
11. Pallet lock cylinder at 8th station
12. Pallet up cylinder at 8th station

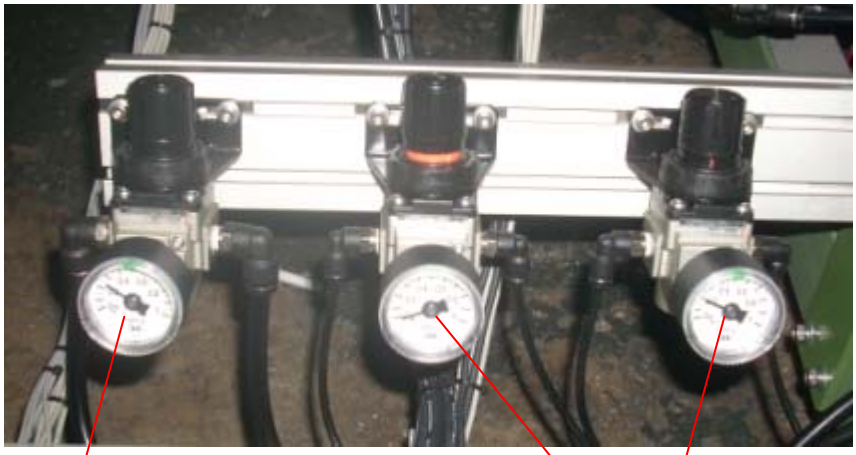
Puffing spring at 3rd station



1：Puffing Plug at Plug sorter

2：Gate cylinder at Hopper

1　　2



Regulator of pressure for plug turning cylinder at 2nd station

0.15MPa

Regulator of pressure for throttling cylinder at 3rd station

0.15MPa

6. Operating procedure

a. To set machine on ground firmly.

b. To join pneumatic pipe to joint of F.R.L and adjust air source pressure over $5\pm0.5kg/cm^2$.

c. Connect electric power; watch the voltage is 220VAC 50HZ 1 phase.

d. To install ground wire certainly.

e. Put parts of work piece into each bowl feeder.

f. Turn on the non-fuse power switch from inner of electric control box.

g. Turn on the power switch on operating panel then the work pieces were lined up.

h. Change suitable spacer into each hole of mold at index plate.(as page 14)

i. Change suitable spacer at head of plug vibrating conveyer

j. Turn to un-lock red button before push start button (green) on the bench.

k. Push green button to start machine

l. Push yellow button to pause machine.

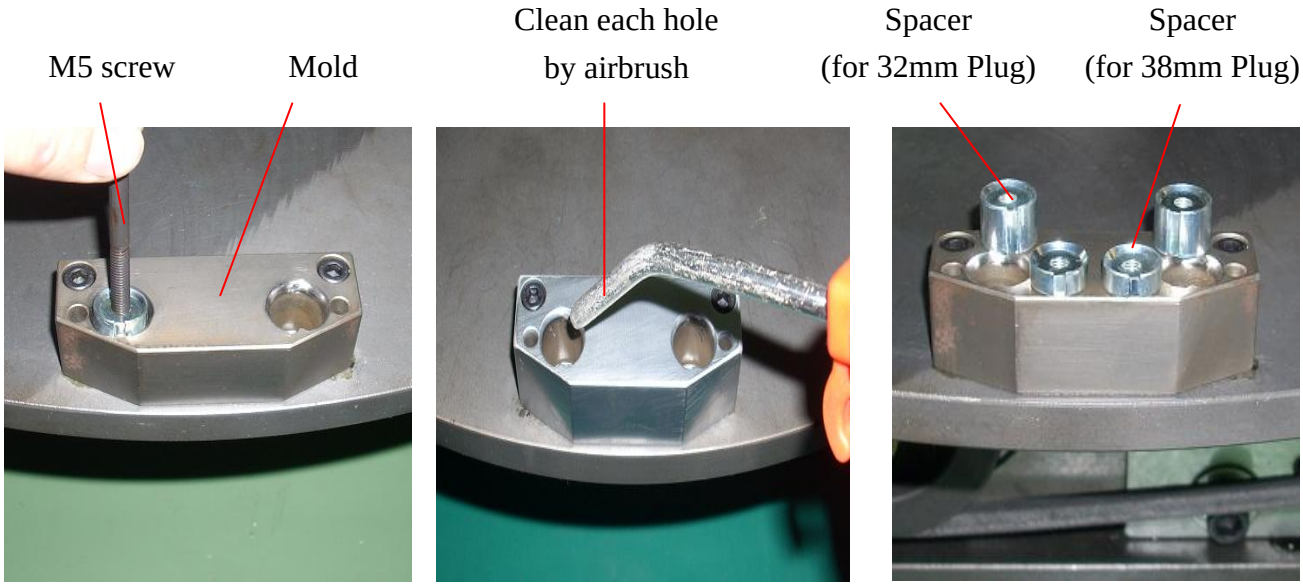
m. Push red button to emergency stop machine.

n. There is warning alarm within machine running, to check machine and then push yellow button to reset.

o. Push green button to re-start after shut fault out.

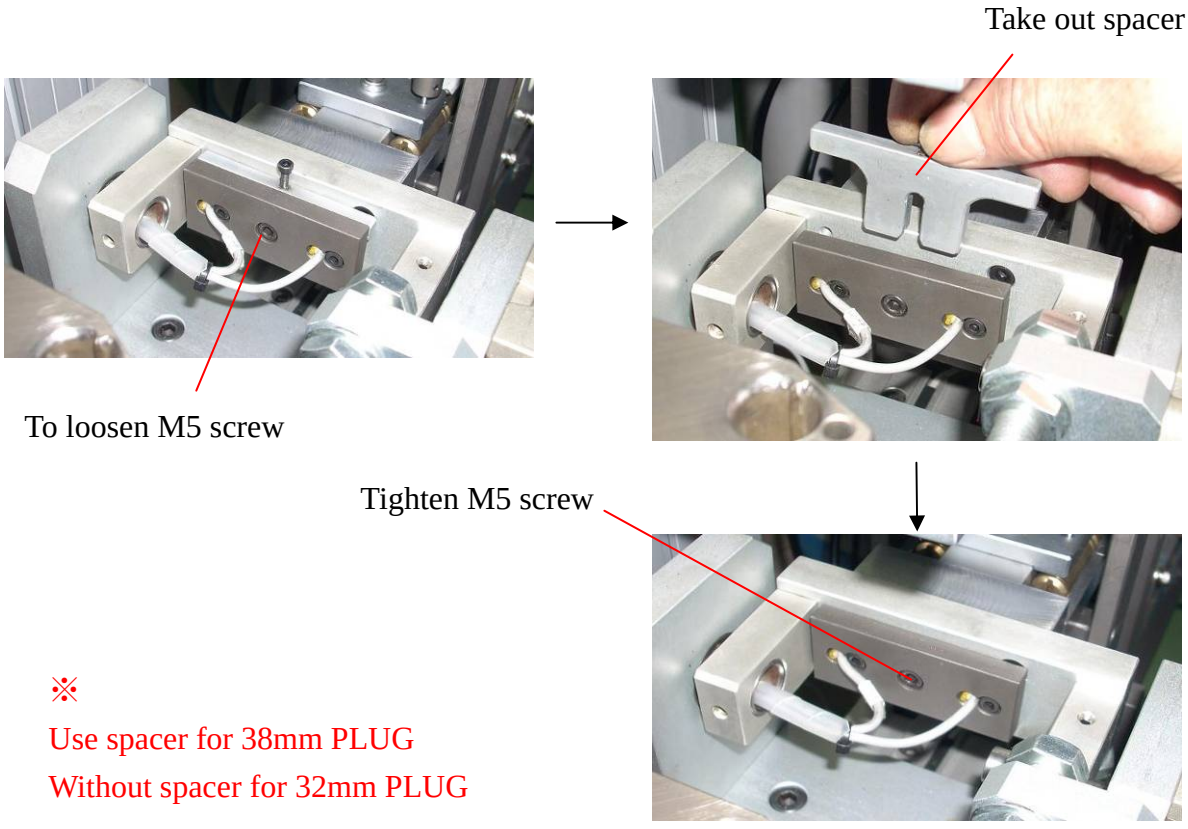
7. Change Plug type

a. Change suitable spacer into each hole of mold at index plate.



※ Use M5 screw to take out spacer in each hole. Clean each hole and spacer before installation.

b. Change suitable spacer at head of plug vibrating conveyer



※

Use spacer for 38mm PLUG

Without spacer for 32mm PLUG

8. Operating panel

a. Power：Power switch for electric power ON/OFF control.

b. Power lamp：The lamp was light when power ON.

c. Buzzer：The buzzer could sound when machine action was wrong or NG stops.

d. Adjustor rotary：The adjustor control speed of index rotary. Turn clockwise is quick speed.

e. Red lamp：The lamp is light when machine is stop due wrong.

f. Yellow lamp：The lamp is light when machine run normally.

g. Green lamp：The lamp is light when machine is working standby.

h. HMI：Manual and auto screen that is controller of every cylinder motion.
It can show error information when electric control produce wrong.

i. CCD Monitor：Display CCD inspecting image and condition.

9. Operation of automatic state

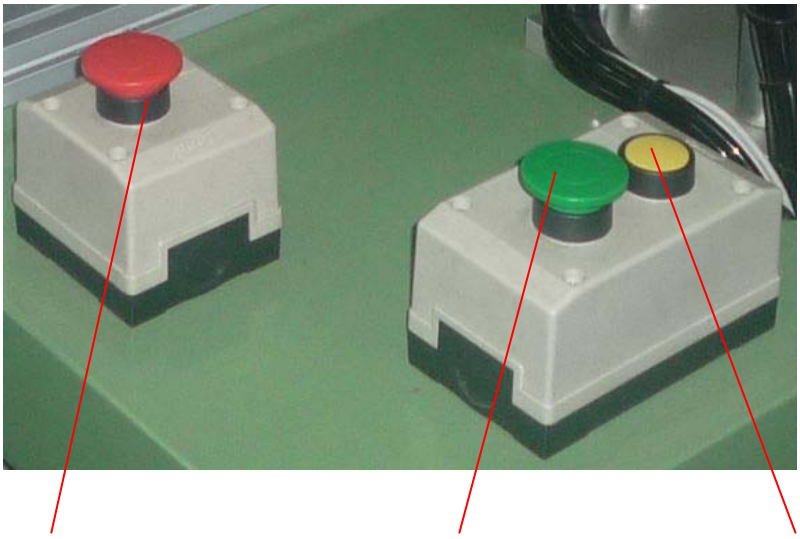
a. Green button：Push green button to start or re-start machine running.

b. Yellow button：The button has two kinds of function, one is Reset another is Pause.

Reset function：When error or alarm or NG product occurs within running, push yellow button to stop alarm sound and reset machine.

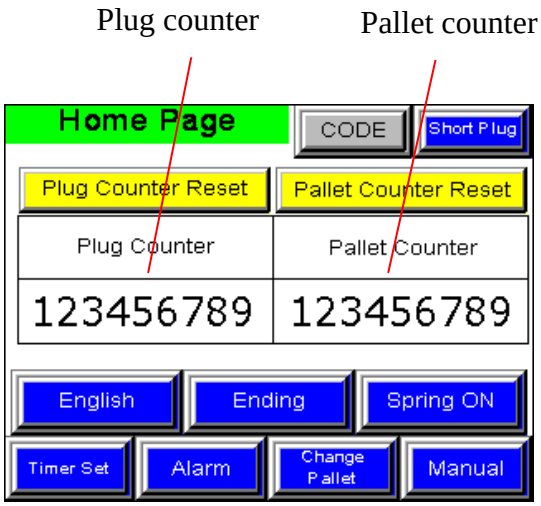
Pause function：Each station finished all action before stop when push yellow button any time.

c. Red button：Push the red button to emergency stop. All of actions were stop immediately. All of semi-finished goods were NG at every station at the moment. To turn the head of button to right then push green button to re-start machine.



Red button　　Green button　　Yellow button

10. The frame of HMI (Human Machine Interface)



(Fig. A)

「The frame is AUTO state」

※ Push key of “

※ Push key “Short/Long Plug” to change type

※ Push key of “Plug Counter Reset” to set zero for counter of Plug

※ Push key of “Pallet Counter Reset” to set zero for counter of Pallet

※ Push key of “中文/English” to change language.

※ Push key of “Ending”, the 2nd station don’t supply

※ PLUG right now. But other stations are working till finish.

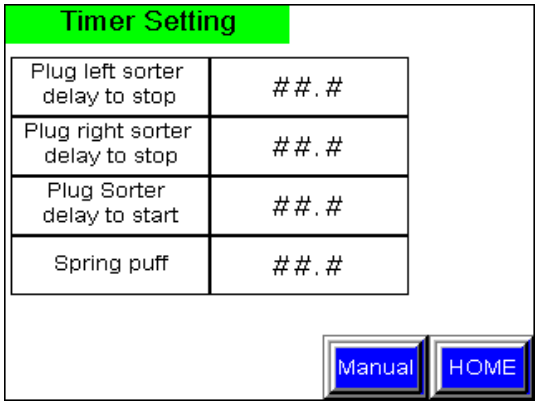
※ Push key of “Spring ON/OFF” to change spring installing option.

※ Push key of “Timer Set” to jump to frame of (Fig. B)

※ Push key of “Alarm” to jump to frame of (Fig. K)

※ Push key of “Change Pallet” to change new pallet

※ Push key of “Manual” to jump to frame of (Fig. C)



(Fig. B)

「The frame is timer setting page」

---------- Example ----------

※ Plug left sorter delay to stop set 5sec：The left plug sorter was stopped if the optical fiber senses plug to exceed 5 sec on end of vibrator.

※ Plug right sorter delay to stop set 5sec：The right plug sorter was stopped if the optical fiber senses plug to exceed 5 sec on end of vibrator.

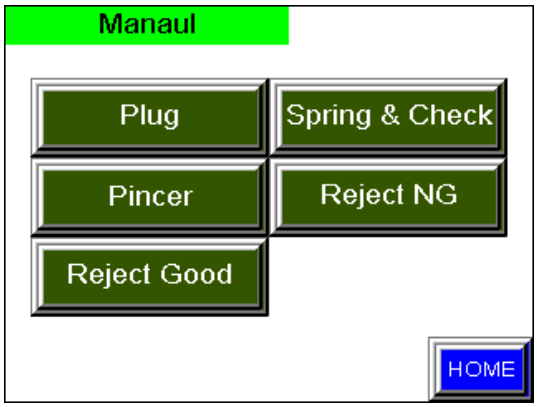
※ Plug sorter delay to start set 5sec：The both plug sorters were start if the optical fiber senses no plug to exceed 5 sec on end of vibrator.

※ Spring puff：The timer control time of spring puff into plug.

※ Push key of “Manual” to jump to frame of (Fig. C)

※ Push key of “Home” to jump to frame of (Fig. A)

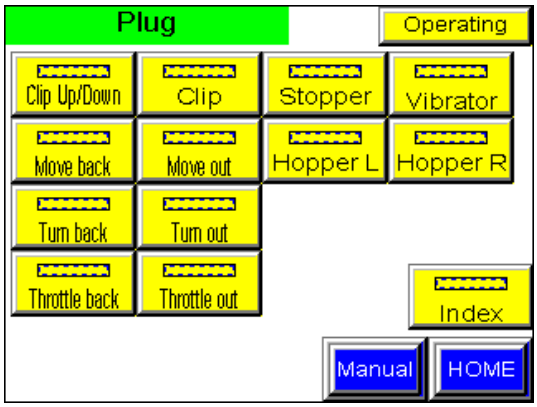
PS. Above bring up 5 sec is for example that is not correct setting.



(Fig. C)

「The frame is Manual state」

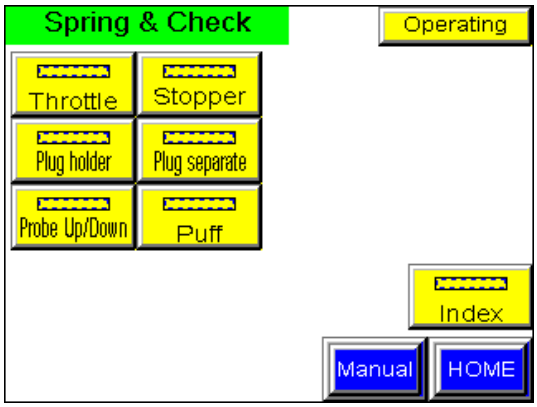
※ Push key of “Plug” to jump to frame of (Fig. D)
※ Push key of “Spring & Check” to jump to frame of (Fig. E)
※ Push key of “Pincer” to jump to frame of (Fig. F)
※ Push key of “Reject NG” to jump to frame of (Fig. G)
※ Push key of “Reject NG” to jump to frame of (Fig. H)
※ Push key of “Home” to jump to frame of (Fig. A)



(Fig. D)

「The frame is manual operation of Plug installation at 2nd station」

※ “Operating”：The operating lock if any button key was pushed and without reset. Push “Manual” and “Home” key is useless in this moment.
※ The keys function is as below：
“Clip up/down”→Clip up/down cylinder control
“Clip”→Clipping cylinder control
“Move back”→Moving cylinder control to move back
“Move out”→Moving cylinder control to move out
“Turn back”→Turning cylinder control to move back
“Turn out”→Turning cylinder control to move out
“Throttle back”→Throttling cylinder control to move back
“Throttle out”→Throttling cylinder control to move out
“Stopper” →Stopping cylinder control
“Vibrator” →Vibrator start control to feed Plug
“Hopper L”→Gate cylinder control to feed left sorter
“Hopper R”→Gate cylinder control to feed right sorter
※ Push key of “Index” once then rotary turn one station.
※ Push key of “Manual” to jump to frame of (Fig. C)
※ Push key of “Home” to jump to frame of (Fig. A)



(Fig. E)

「The frame is manual operation of Spring installation and Check at 3rd and 4th station」

※ The keys function is as below：

"Throttle"→Throttling cylinder control

"Stopper"→Stopping cylinder control

"Plug holder"→Holding cylinder control

"Plug separate"→Separating cylinder control

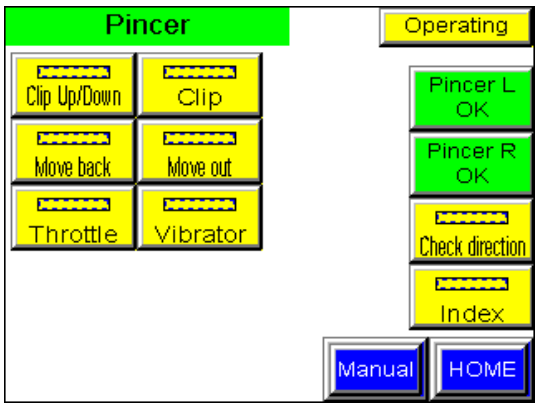
"Probe up/down"→ Probe up/down cylinder control at 4th station

"Puff"→Puffing solenoid valve control

※ Push key of "Index" once then rotary turn one station.

※ Push key of "Manual" to jump to frame of (Fig. C)

※ Push key of "Home" to jump to frame of (Fig. A)



(Fig. F)

「The frame is manual operation of Pincer installation at 5th station」

※ The keys function is as below：

"Clip up/down"→Clip up/down cylinder control

"Clip"→Clipping cylinder control

"Move back"→Moving cylinder control to move back

"Move out"→Moving cylinder control to move out

"Throttle"→Throttling cylinder control

"Vibrator"→ Vibrator start control to feed Pincer

※ Pincer L OK/NG" →Display CCD checking result at left side.

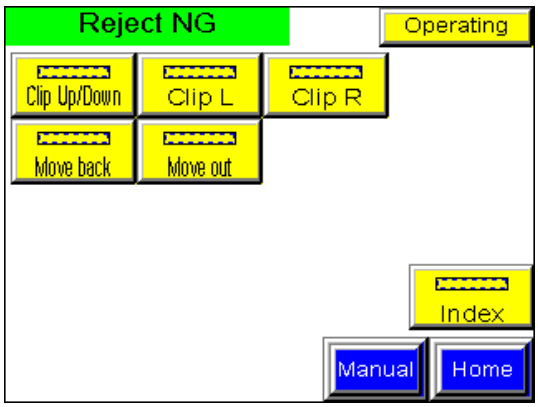
※ Pincer R OK/NG" →Display CCD checking result at right side.

※ Push key of "Checking direction" once then CCD camera check Pincer once and show the result on above lattice.

※ Push key of "Index" once then rotary turn one station.

※ Push key of "Manual" to jump to frame of (Fig. C)

※ Push key of "Home" to jump to frame of (Fig. A)



(Fig. G)

「The frame is manual operation of Reject NG products at 6th station」

※ The keys function is as below：

"Clip up/down"→Clip up/down cylinder control

"Clip L"→Left clipping cylinder control

"Clip R"→Right clipping cylinder control

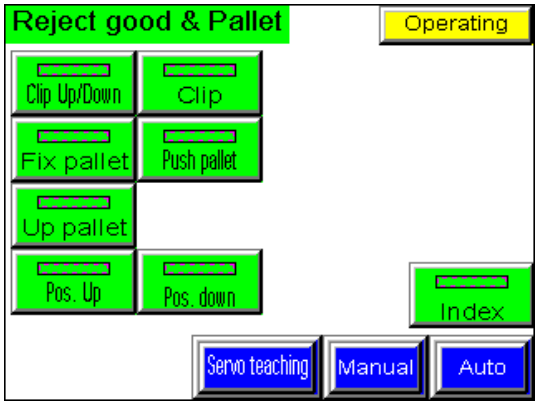
"Move back"→Moving cylinder control to move back

"Move out"→Moving cylinder control to move out

※ Push key of "Index" once then rotary turn one station.

※ Push key of "Manual" to jump to frame of (Fig. C)

※ Push key of "Home" to jump to frame of (Fig. A)



(Fig. H)

「The frame is manual operation of Reject good products and Pallet motion at 8th station」

※ The keys function is as below：

"Clip up/down"→Clip up/down cylinder control

"Clip"→Clipping cylinder control

"Fix pallet"→Fix pallet cylinder control

"Push pallet"→Push pallet cylinder control

"Up pallet"→Up pallet cylinder control

"Pos. up"→Position cylinder control to change type let pallet position move up.

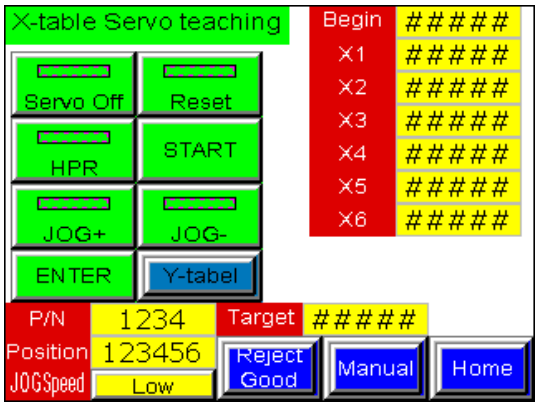
"Pos. down"→Position cylinder control to change type let pallet position move down.

※ Push key of "Index" once then rotary turn one station.

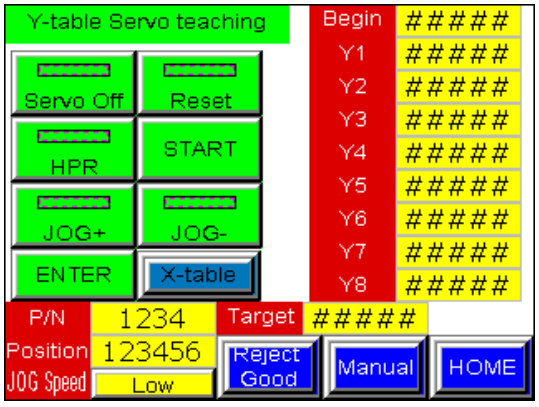
※ Push key of "Servo teaching" to jump to (Fig. I)

※ Push key of "Manual" to jump to frame of (Fig. C)

※ Push key of "Home" to jump to frame of (Fig. A)



(Fig. I)



(Fig. J)

「The frame is manual operation of X-Table /Y-Table Servo teaching at 8th station」

※ The keys function is as below：

"Servo off"→To turn off power of servo motor

"Reset" →Push the key when servo motor error

"HPR"→Home position return

"START"→To start X-table move to target position.

"JOG+"→Push the key to let robot move along plus direction by JOG speed.

"JOG-"→ Push the key to let robot move along minus direction by JOG speed.

"Enter"→To store the setting data in memory of PLC

"Y-Table/X-Table" →To jump between frame of (Fig. J) and (Fig. I)

"P/N"→ The position number at present

"Position"→ The digital position at present

"JOG Speed"→ To change mode of Low or High speed for motor running.

"Target"→ To set the target position number.

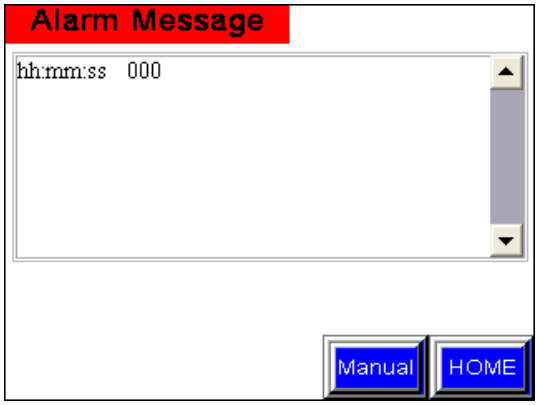
"Begin " →The digital position of begin that is position of jig of index rotary.

"X1,X2…Y1,Y2…"→The digital position of each hole of pallet.

※ Push key of "Reject Good" to jump to (Fig. H)

※ Push key of "Manual" to jump to frame of (Fig. C)

※ Push key of "Home" to jump to frame of (Fig. A)



(Fig. K)

「The frame is Alarm message」

※ The words display mean sensors would not sense in suitable position.

Alarm message

HMI display	Explain
S2-LS1 NG	Error of LS1 mag sensor of turning cylinder at outlying pos. at 2nd station
S2-LS2 NG	Error of LS2 mag sensor of turning cylinder at home pos. at 2nd station
S2-LS3 or LS5 NG	Error of LS3 or LS5 mag sensor of clipping cylinder at home pos. at 2nd station
S2-LS4 or LS6 NG	Error of LS4 or LS6 mag sensor of clipping cylinder at outlying pos. at 3rd station
S2-LS7 NG	Error of LS7 mag sensor of clip up/down cylinder at outlying pos. at 2nd station
S2-LS8 NG	Error of LS8 mag sensor of clip up/down cylinder at home pos. at 2nd station
S2-LS9 NG	Error of LS9 mag sensor of moving cylinder at outlying pos. at 2nd station
S2-LS10 NG	Error of LS10 mag sensor of moving cylinder at home pos. at 2nd station
S2-LS54 or LS56 NG	Error of LS54 or LS56 mag sensor of stopping cylinder at outlying pos. at 2nd station
S2-LS55 or LS57 NG	Error of LS55 or LS57 mag sensor of stopping cylinder at home pos. at 2nd station
S2-LS58 NG	Error of LS58 mag sensor of throttling cylinder at outlying pos. at 2nd station
S2-LS59 NG	Error of LS59 mag sensor of throttling cylinder at home pos. at 2nd station

S3-LS11 NG	Error of LS11 mag sensor of Plug holding cylinder at outlying pos. at 3rd station
S3-LS12 NG	Error of LS12 mag sensor of Plug holding cylinder at home pos. at 3rd station
S3-LS13 NG	Error of LS13 mag sensor of throttling cylinder at outlying pos. at 3rd station
S3-LS14 NG	Error of LS14 mag sensor of throttling cylinder at home pos. at 3rd station
S3-LS15 NG	Error of LS15 mag sensor of stopping cylinder at outlying pos. at 3rd station
S3-LS16 NG	Error of LS16 mag sensor of stopping cylinder at home pos. at 3rd station
S3-LS17 NG	Error of LS17 mag sensor of Plug separating cylinder at outlying pos. at 3rd station
S3-LS18 NG	Error of LS18 mag sensor of Plug separating cylinder at home pos. at 4th station
S4-LS23 NG	Error of LS23 mag sensor of probe up/down cylinder at outlying pos. at 4th station
S4-LS24 NG	Error of LS24 mag sensor of probe up/down cylinder at home pos. at 4th station
S5-LS25 NG	Error of LS25 mag sensor of up/down cylinder at outlying pos. at 5th station
S5-LS26 NG	Error of LS26 mag sensor of up/down cylinder at home pos. at 5th station
S5-LS27 or LS33 NG	Error of LS27 or LS33 mag sensor of clipping cylinder at outlying pos. at 5th station
S5-LS28 or LS34 NG	Error of LS28 or LS34 mag sensor of clipping cylinder at home pos. at 5th station
S5-LS29 NG	Error of LS29 mag sensor of moving cylinder at outlying pos. at 5th station
S5-LS30 NG	Error of LS30 mag sensor of moving cylinder at home pos. at 5th station
S5-LS31 NG	Error of LS31 mag sensor of throttling cylinder at outlying pos. at 5th station
S5-LS32 NG	Error of LS32 mag sensor of throttling cylinder at home pos. at 5th station
S6-LS35 NG	Error of LS35 mag sensor of up/down cylinder at outlying pos. at 6th station

S6-LS36 NG	Error of LS36 mag sensor of up/down cylinder at home pos. at 6th station
S6-LS37 or LS51 NG	Error of LS37 or LS51 mag sensor of clipping cylinder at outlying pos. at 6th station
S6-LS38 or LS52 NG	Error of LS38 or LS52 mag sensor of clipping cylinder at home pos. at 6th station
S6-LS39 NG	Error of LS39 mag sensor of moving cylinder at outlying pos. at 6th station
S6-LS40 NG	Error of LS40 mag sensor of moving cylinder at home pos. at 6th station
S8-LS41 NG	Error of LS41 mag sensor of up/down cylinder at outlying pos. at 8th station
S8-LS42 NG	Error of LS42 mag sensor of up/down cylinder at home pos. at 8th station
S8-LS43 or LS45 NG	Error of LS43 or LS45 mag sensor of clipping cylinder at outlying pos. at 8th station
S8-LS44 or LS46 NG	Error of LS44 or LS46 mag sensor of clipping cylinder at home pos. at 8th station
S2-SNR7 or SNR8 NG	Error of SNR7 or SNR8 sensor due to no Plug at top pos. of vibrator at 2nd station
S5-SNR19 or SNR20 NG	Error of SNR19 or SNR20 sensor due to no Pincer from sorter at 5th station
S2-SNR21 or SNR31 NG	Error of SNR21 or SNR31 sensor due to no Plug from hopper at 2nd station
S3-SNR15、16、17 or 18 NG	Error of SNR15 、16、17 or 18 sensor due to no spring from sorter at 3rd station
S1-SNR24 or SNR25	Error of SNR24 or SNR25 sensor due to finished plug could not take out at 1st station
S2-SNR26、27、28 or 29 NG	Error of SNR26、27、28 or 29 sensor due to no Plug at vibrator at 2nd station
S5-SNR13 or SNR14 NG	Error of SNR13 or SNR14 sensor due to no Pincer at top pos. of vibrator at 5th station
S8-SNR23 NG	Error of SNR23 sensor due to full pallet on rail at 8th station
S8-SNR30 NG	Error of SNR30 sensor due to no pallet on storehouse at 8th station
Error due to XY-Table begin	Error due to XY-Table could not at begin position at 8th station

S4-SNR9 NG	Error of SNR9 sensor due to no Spring in Plug at 4th station
S4-SNR10 NG	Error of SNR10 sensor due to no Spring in Plug at 4th station
S4-SNR11 NG	Error of SNR11 sensor due to no Spring in Plug at 4th station
S4-SNR12 NG	Error of SNR12 sensor due to no Spring in Plug at 4th station
S8 -LS21 NG	Error of LS21 mag sensor of pallet lock cylinder at outlying pos. at 8th station
S8 -LS22 NG	Error of LS22 mag sensor of pallet lock cylinder at home pos. at 8th station
S8-LS19 NG	Error of LS19 mag sensor of pallet pushing cylinder at outlying pos. at 8th station
S8-LS20 NG	Error of LS20 mag sensor of pallet pushing cylinder at home pos. at 8th station
S8-LS47 or LS49 NG	Error of LS47 or LS49 mag sensor of pallet up cylinder at outlying pos. at 8th station
S8-LS48 or LS50 NG	Error of LS48 or LS50 mag sensor of pallet up cylinder at home pos. at 8th station
S8-LS60 or LS62 NG	Error of LS60 or LS62 mag sensor of pallet position cylinder at outlying pos. at 8th station
S8-LS61 or LS63 NG	Error of LS61 or LS63 mag sensor of pallet position cylinder at home pos. at 8th station
S8-SNR2 NG for X-Table	Error of SNR2 sensor was at front limit position of X-Table
S8-SNR3 NG for X-Table	Error of SNR3 sensor was at back limit position of X-Table
S8-SNR5 NG for Y-Table	Error of SNR5 sensor was at front limit position of Y-Table
S8-SNR6 NG for Y-Table	Error of SNR6 sensor was at back limit position of Y-Table
S8-SNR22 NG	Error of SNR22 sensor due to no pallet on lock pos. at 8th station

The list of market finished products

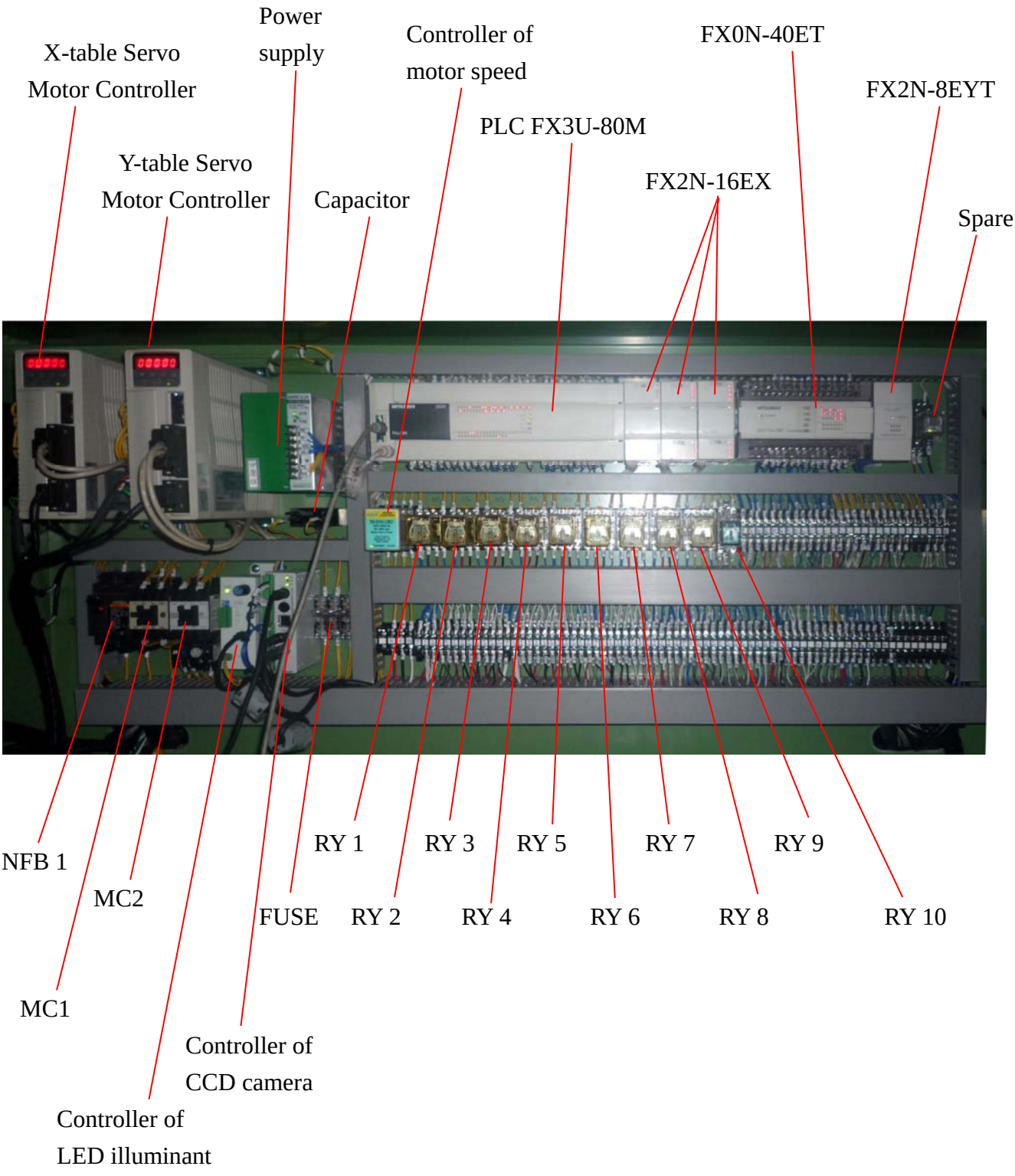
	Appellation	Model	Supplier	Q'TY
1st station	Reflex sensor	HPJ-D21	YAMATAKE	2
2nd station	Sorter	Plug	YI SHING	2
	Vibrator	C-180	YI SHING	2
	Controller of Sorter	POC-305	YI SHING	2
	Controller of vibrator	POC-305	YI SHING	1
	Optical fiber	FU-35FA	KEYENCE	4
	Amplifier of Optical fiber	FS-M1	KEYENCE	4
	Moving cylinder	CDM2F32-100A-C73	SMC	1
	SENSOR	D-C73	SMC	2
	Buffer of moving cylinder	SC1415-2-NC	DOYO	1
	Turning cylinder	CDRB1BW50-180S-R73	SMC	1
	SENSOR	D-R73	SMC	2
	Floating connector	KG1010T	STARAIR	1
	Throttling cylinder	MGPM40-25 -Z73L	SMC	1
	SENSOR	D -Z73L		2
	Clip up/down cylinder	MGTU-25-25-RP	Mindman	1
	SENSOR	DY-21R	SMC	2
	Clipping cylinder	MHZ220DN-M9BL	SMC	2
	SENSOR	D- M9BL	SMC	4
	Fixed position screw	PUST1060		2
	Approx sensor	B02G6515N0	SELET	2
	Bearing	TA2015		1
	Linear guideway	BR15X220	ABBA	2
	Block	BRH15B-Z0N	ABBA	2
	Stopping cylinder	CDQ2A16-10DM-A73L	SMC	2
	SENSOR	D-A73L	SMC	4
	Gate cylinder	CDRQ2BS20-90-A93L	SMC	1
	Regulator of pressure	AR20K-01BG	SMC	3

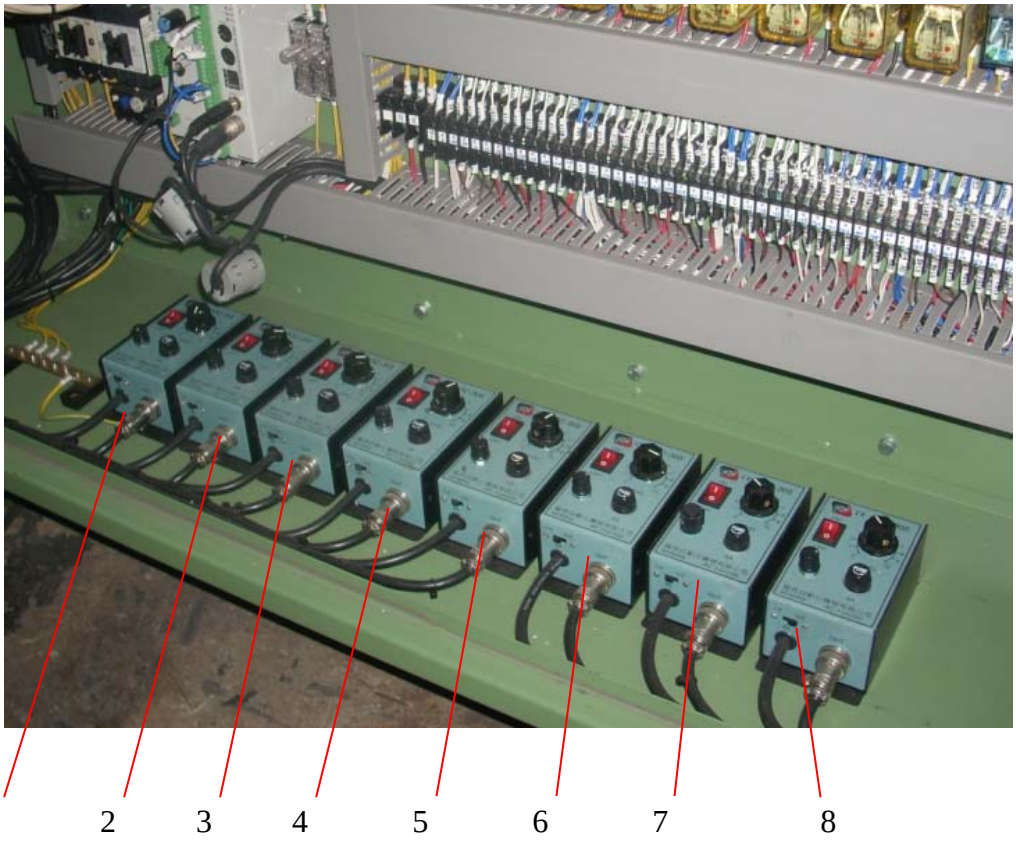
	Appellation	Model	Supplier	Q'TY
3rd station	Holding cylinder	CDM2F32-50A-C73L	SMC	1
	SENSOR	D-C73L	SMC	2
	DU	DU1515	OIL	1
	Spring	WL2040	Tohatsu	1
	Bearing	LM-12UU	GHT	4
	Bearing	LMK-12LUU	GHT	2
	Stopping cylinder	CDQ2A16-10D-A73L	SMC	1
	SENSOR	D-A73L	SMC	2
	Throttling cylinder	CDQ2A16-10D-A73L	SMC	1
	SENSOR	D-A73L	SMC	2
	Floating connector	KG1010T	STARAIR	2
	Separating cylinder	CDQ2A16-30D-A73L	SMC	1
	SENSOR	D-A73L	SMC	2
	Sorter	Spring	YI SHING	2
	Controller of Sorter	POC-305	YI SHING	2
	Approx sensor	B01AN15N0	SELET	4
4th station	Probe up/down cylinder	JASMB4-20-37	JAFU	1
	SENSOR	DY-11R	DOYO	2
	Approx sensor	MB526NFA	SELET	4
	Fixed ring	PSCCN3-6	MISUMI	8
	Spring	WR4-20	MISUMI	4
5th station	Optical fiber	FU-66T2	KEYENCE	2
	Amplifier of Optical fiber	FS-N11N	KEYENCE	2
	Throttling cylinder	JASMB4-20-25	JAFU	1
	SENSOR	DY-11R	DOYO	2
	Approx sensor	MB526NFA	SELET	2
	Sorter	Pincer	YI SHING	2
	Vibrator	C-80	YI SHING	1
	Controller of Sorter	POC-305	YI SHING	2
	Controller of vibrator	POC-305	YI SHING	1
	Moving cylinder	CDM2F32-75A-C73L	SMC	1
	SENSOR	D-C73L	SMC	2

	Appellation	Model	Supplier	Q'TY
5th station	Buffer of moving cylinder	SC1415-2-NC	DOYO	1
	Floating connector	KG1010T	STARAIR	1
	Clip up/down cylinder	MGTU-25-25	Mindman	1
	SENSOR	DY-21R	DOYO	2
	Clipping cylinder	MHZ220D- M9BL	SMC	2
	SENSOR	D- M9BL	SMC	4
	Linear guideway	BR15x160	ABBA	2
	Block	BRH15B-Z0N	ABBA	2
	TFT LCD Monitor	RA70	YAU-YIH	1
	LED illuminant	HB20-80/15	YAU-YIH	1
	CCD camera	ANM832CE	Panasonic	1
6th station	Moving cylinder	CDM2F32-75A-C73L	SMC	1
	Floating connector	KG1010T	STARAIR	1
	Clip up/down cylinder	MGTU-25-25	mindman	1
	SENSOR	DY-21R	DOYO	2
	Clipping cylinder	MHZ220DN-M9BL	SMC	2
	Linear guideway	BRH15B-1N-Z0-L160	ABBA	2
8th station	XY-Table	X200*Y300	RENDER	1
	Key wicker	TKP0320W24(2B)R50	PE-EI	20
	Chain	TKP0320W24(2B)PIA	PE-EI	1
	Chain	TKP0320W24(2B)PKA	PE-EI	1
	Servo motor	6CC401G-30EBWAS	TECO	2
	Driver	TSTA15C	MIRLE	2
	Clip up/down cylinder	MGTU-25-25	mindman	1
	SENSOR	DY-21R	DOYO	2
	Clipping cylinder	MHZ220DN-M9BL	SMC	2
	Pallet up cylinder	CDQ2B32-50DM-A73L	SMC	2
	Pallet pushing cylinder	MGTU40-250-PR	mindman	1
	SENSOR	RCI-3M	DOYO	2
	Pallet lock cylinder	MCGJ-12-25*15	mindman	1
	SENSOR	DY-12R	DOYO	2
	Reflex sensor	HPJ-D21	YAMATAKE	3
	Pallet position cylinder	MGPM25-20-Y59B	SMC	2

	Appellation	Model	Supplier	Q'TY
Else	Index rotary	80DF-8N-240R	KAOLU	1
	Motor of index	M5IK90U-CRV	PE-EI	1
	Speed reducer	G5U25K	PE-EI	1
	Speed controller	SS2I6X-CB	PE-EI	1
	Limit switch	TZ7141	TEND	1
	Driving pulley			1
	Passive pulley			1
	Belt			1
	F.R.L.	AC30-03DG	SMC	1
	Solenoid valve	SY7120-5LZE-02	SMC	21
	Solenoid valve	SY7220-5LZE-02	SMC	6
	Fixed base	SS5Y7-20-11	SMC	1
	Fixed base	SS5Y7-20-12	SMC	1
	Fixed base	SS5Y7-20-13	SMC	1
	PLC connecting wire	5CC8152	Delta	1
	HMI	DOP-A57CSTD	Delta	1

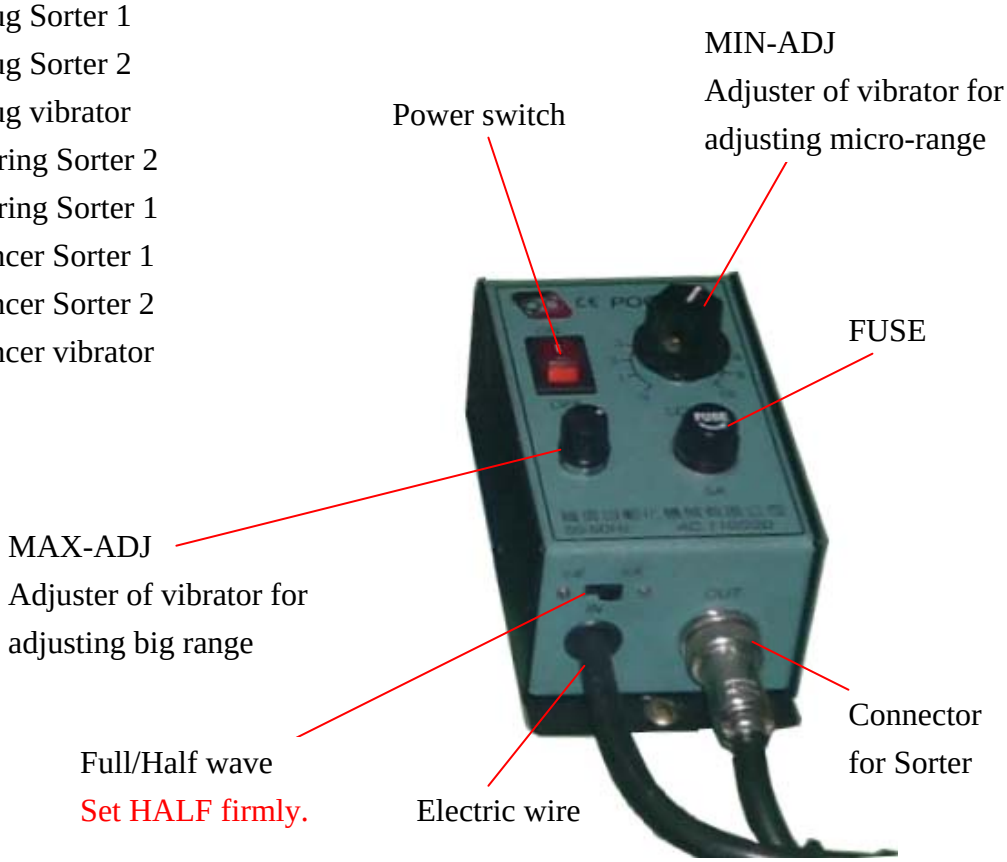
Electric control box



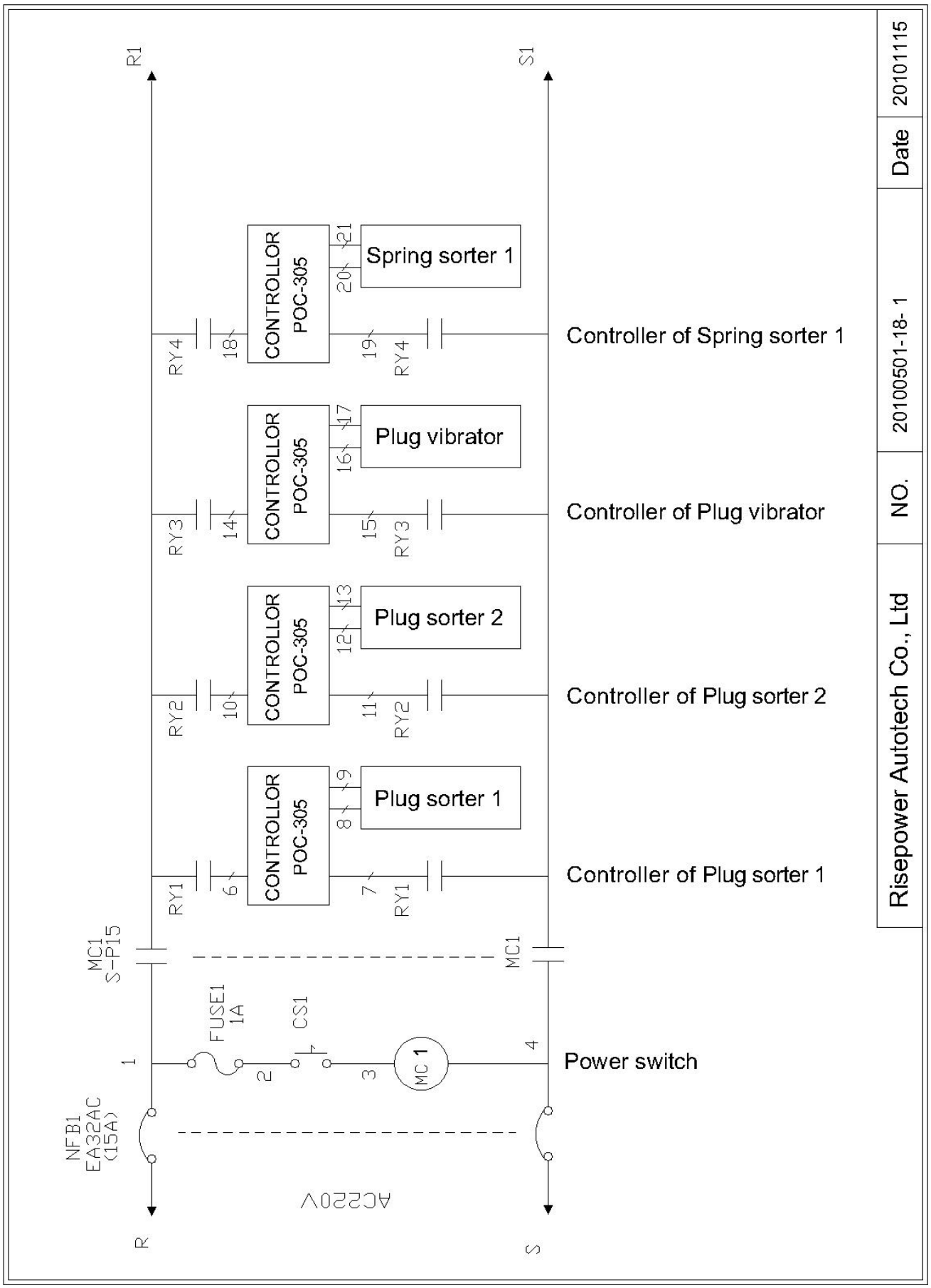


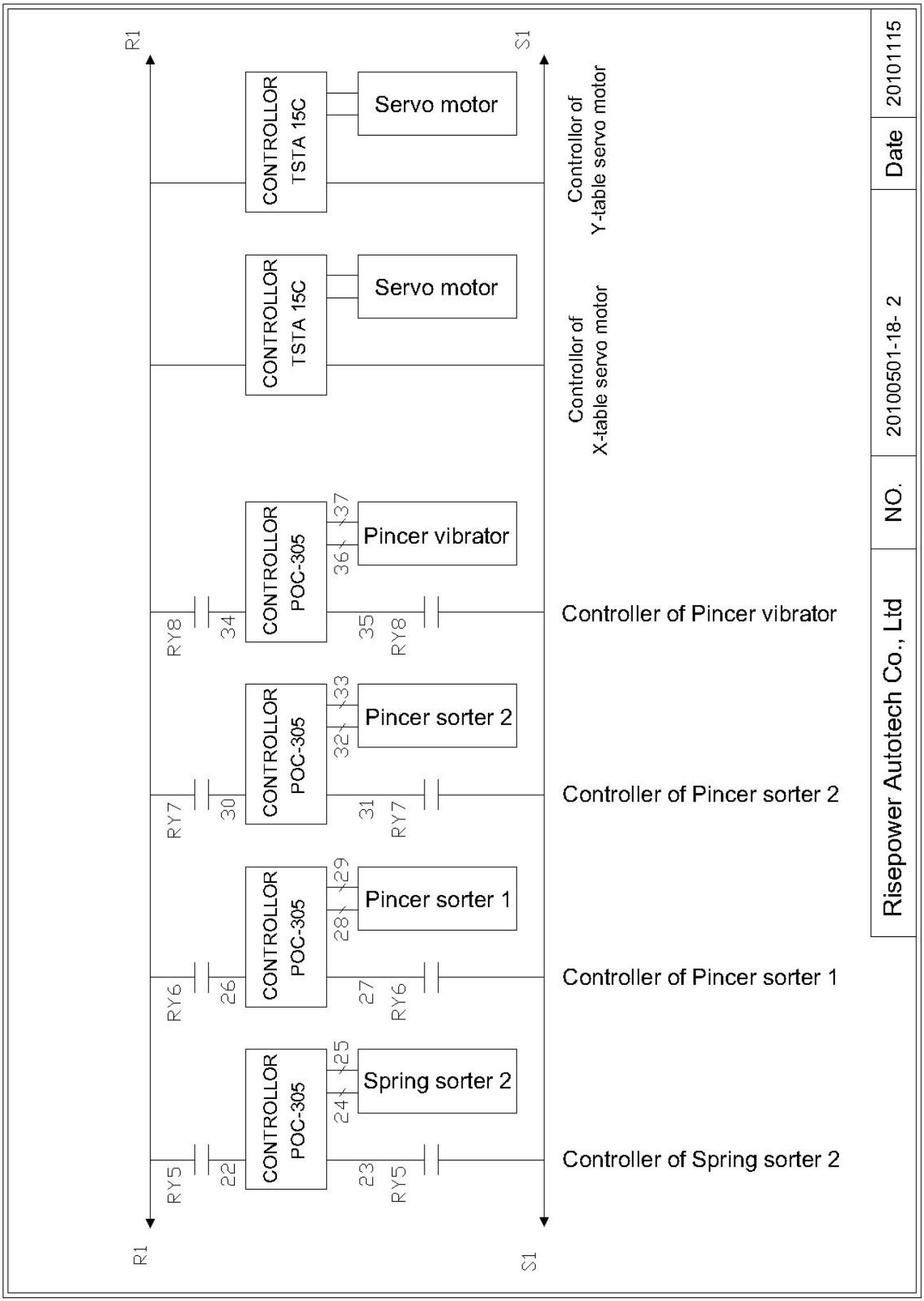
※To described Controller in sequence from left to right as below:

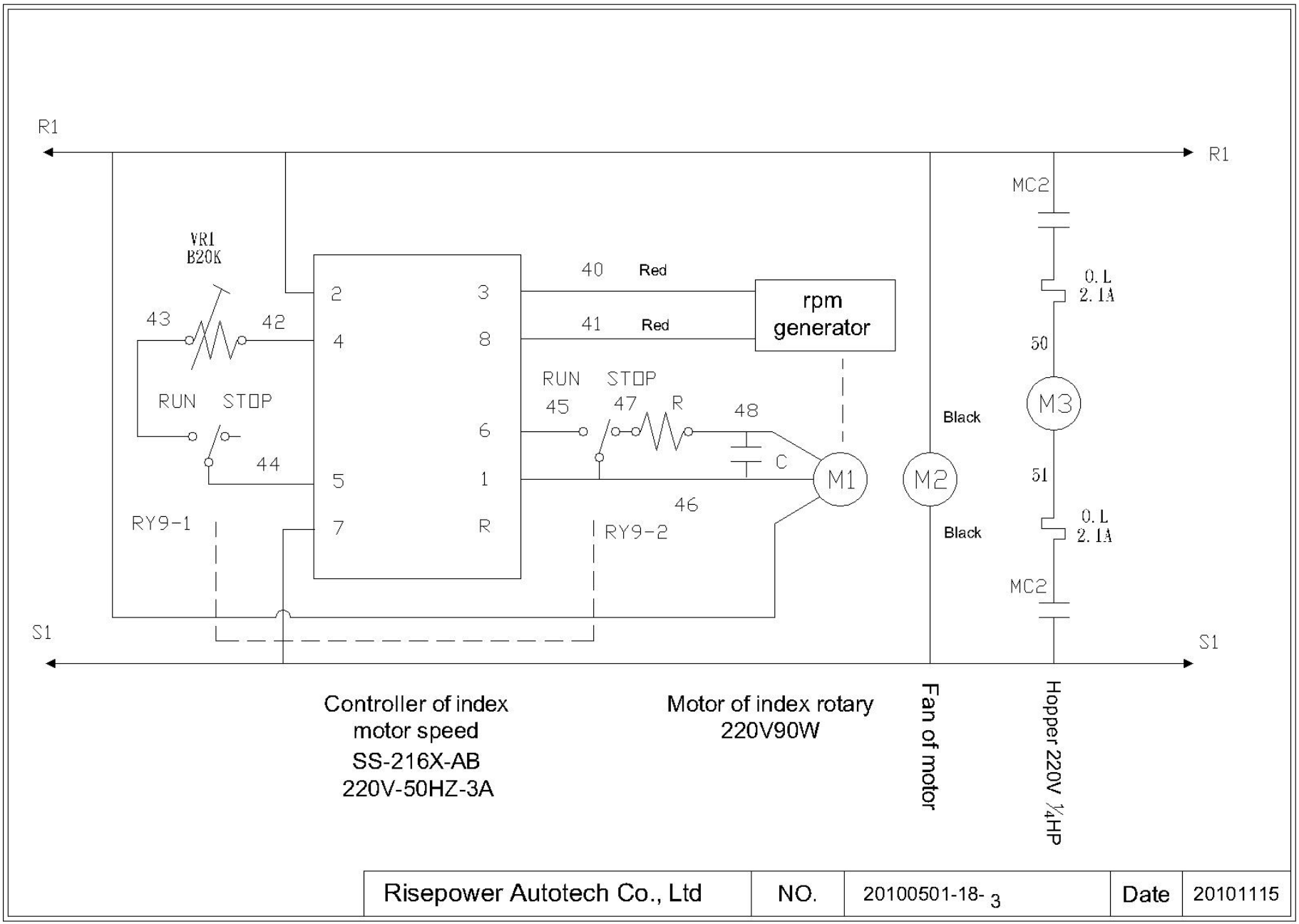
1. Controller of Plug Sorter 1
2. Controller of Plug Sorter 2
3. Controller of Plug vibrator
4. Controller of Spring Sorter 2
5. Controller of Spring Sorter 1
6. Controller of Pincer Sorter 1
7. Controller of Pincer Sorter 2
8. Controller of Pincer vibrator



PLC I/O circuit




R1
S1
CONTROLLOR TSTA 15C
Servo motor
Controllor of Y-table servo motor
CONTROLLOR TSTA 15C
Servo motor
Controllor of X-table servo motor
CONTROLLOR POC-305
Pincer vibrator
37
36
34
35
RY8
RY8
Controller of Pincer vibrator
CONTROLLOR POC-305
Pincer sorter 2
33
32
30
31
RY7
RY7
Controller of Pincer sorter 2
CONTROLLOR POC-305
Pincer sorter 1
29
28
26
27
RY6
RY6
Controller of Pincer sorter 1
CONTROLLOR POC-305
Spring sorter 2
25
24
22
23
RY5
RY5
Controller of Spring sorter 2
R1
S1
Risepower Autotech Co., Ltd
NO.
20100501-18- 2
Date
20101115



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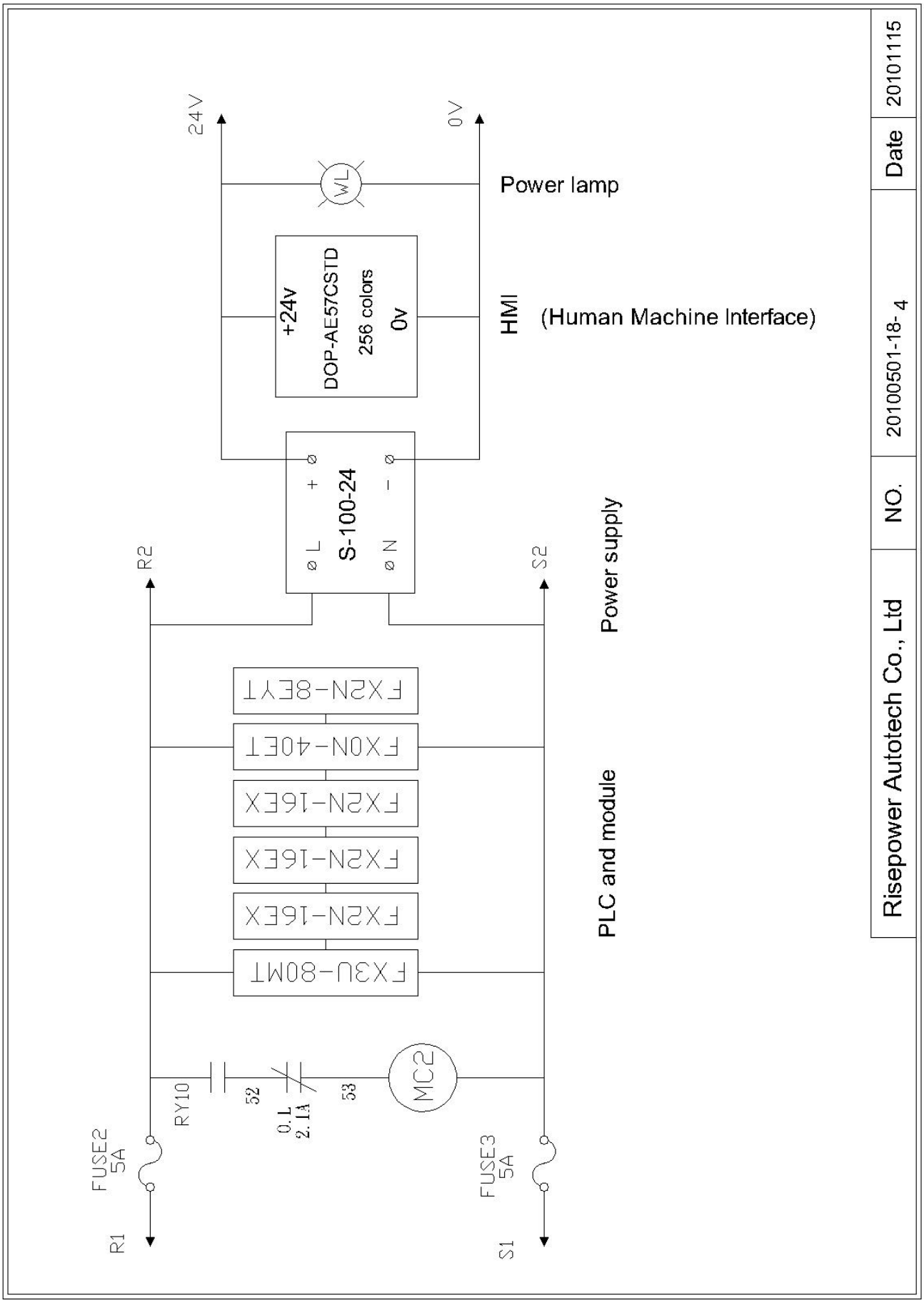
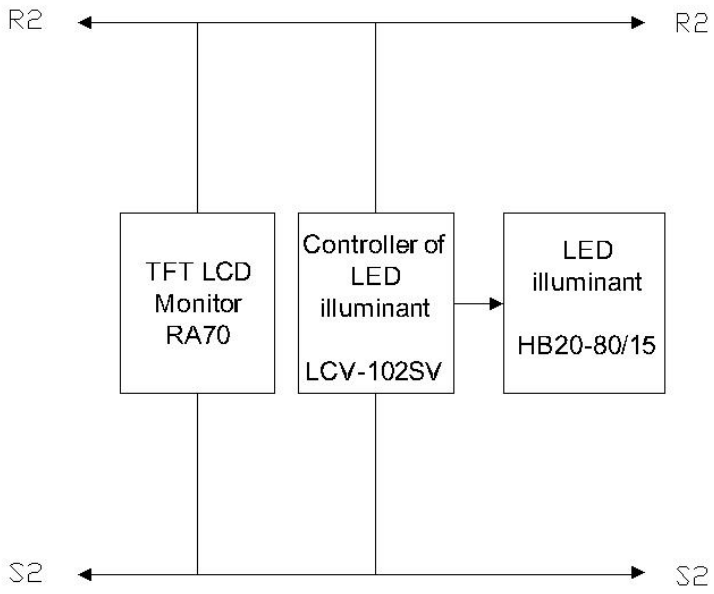
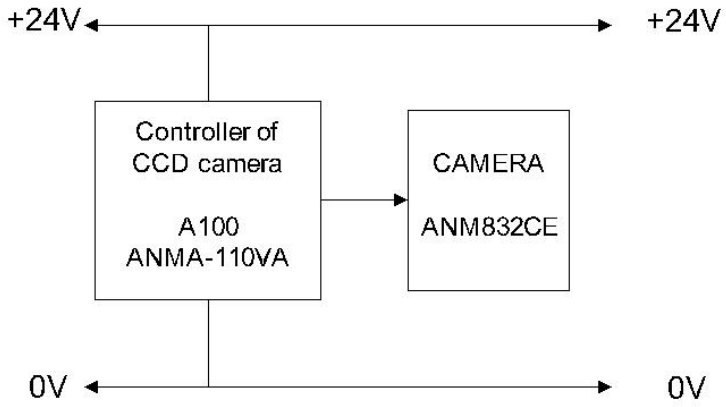

24V
0V
WL
Power lamp
+24v
DOP-AE57CSTD
256 colors
0v
HMI
(Human Machine Interface)
S-100-24
ø L
ø N
+ ø
- ø
Power supply
R2
S2
FX2N-8EYT
FX0N-40ET
FX2N-16EX
FX2N-16EX
FX2N-16EX
FX3U-80MT
PLC and module
MC2
RY10
52
53
0.1
2.1A
FUSE2
5A
FUSE3
5A
R1
S1
Risepower Autotech Co., Ltd
NO.
20100501-18-4
Date
20101115



Monitor



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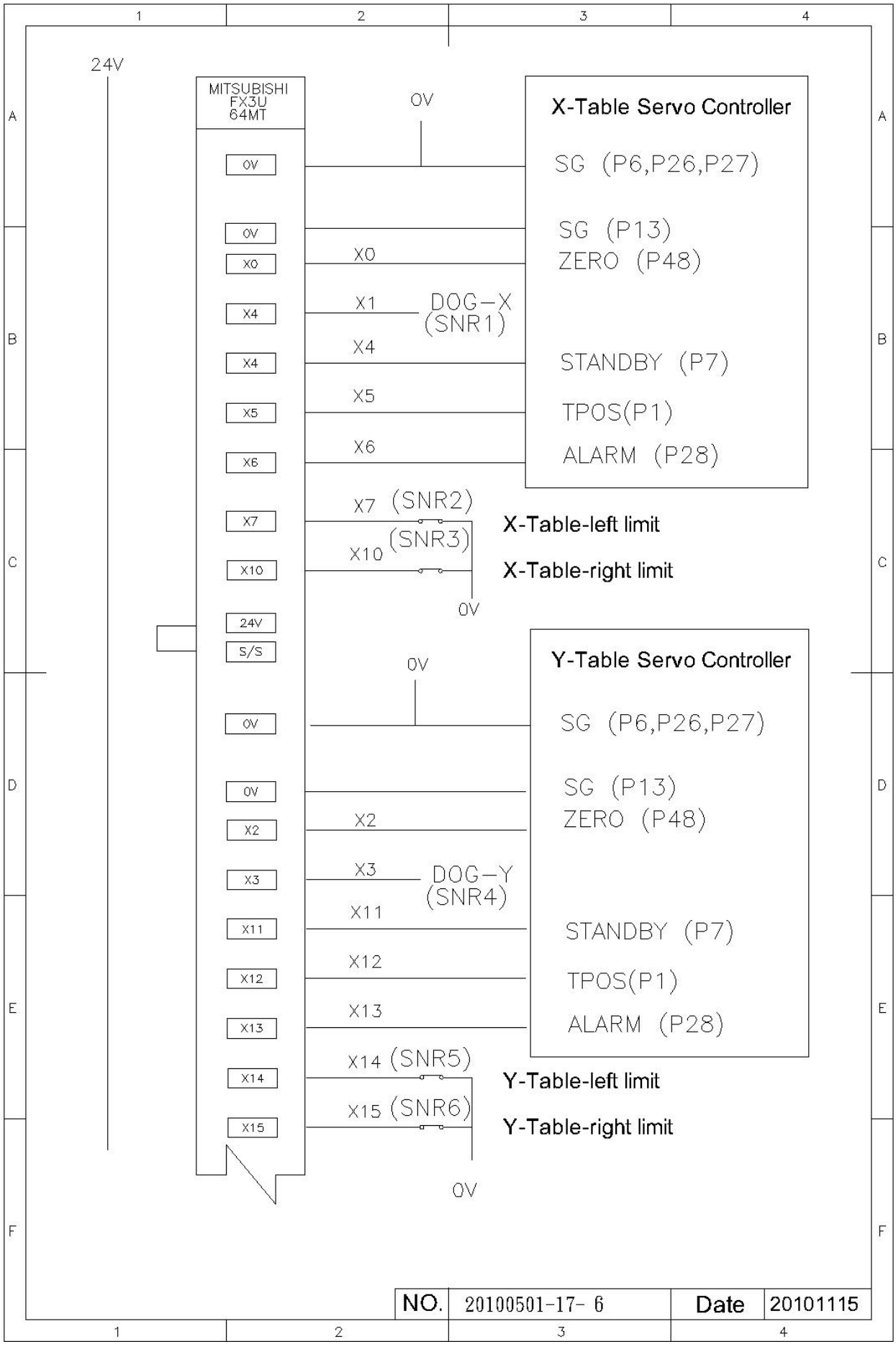
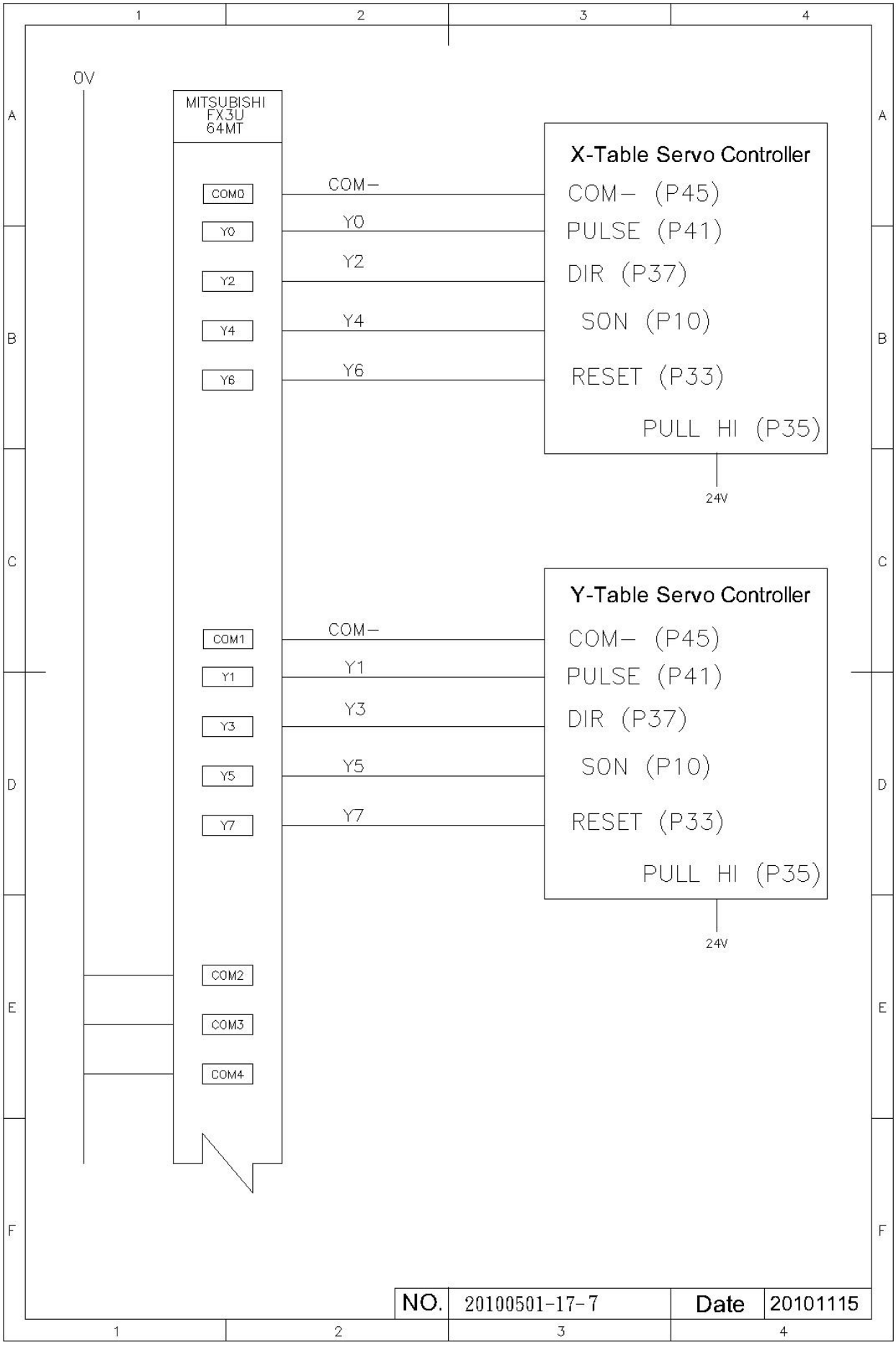
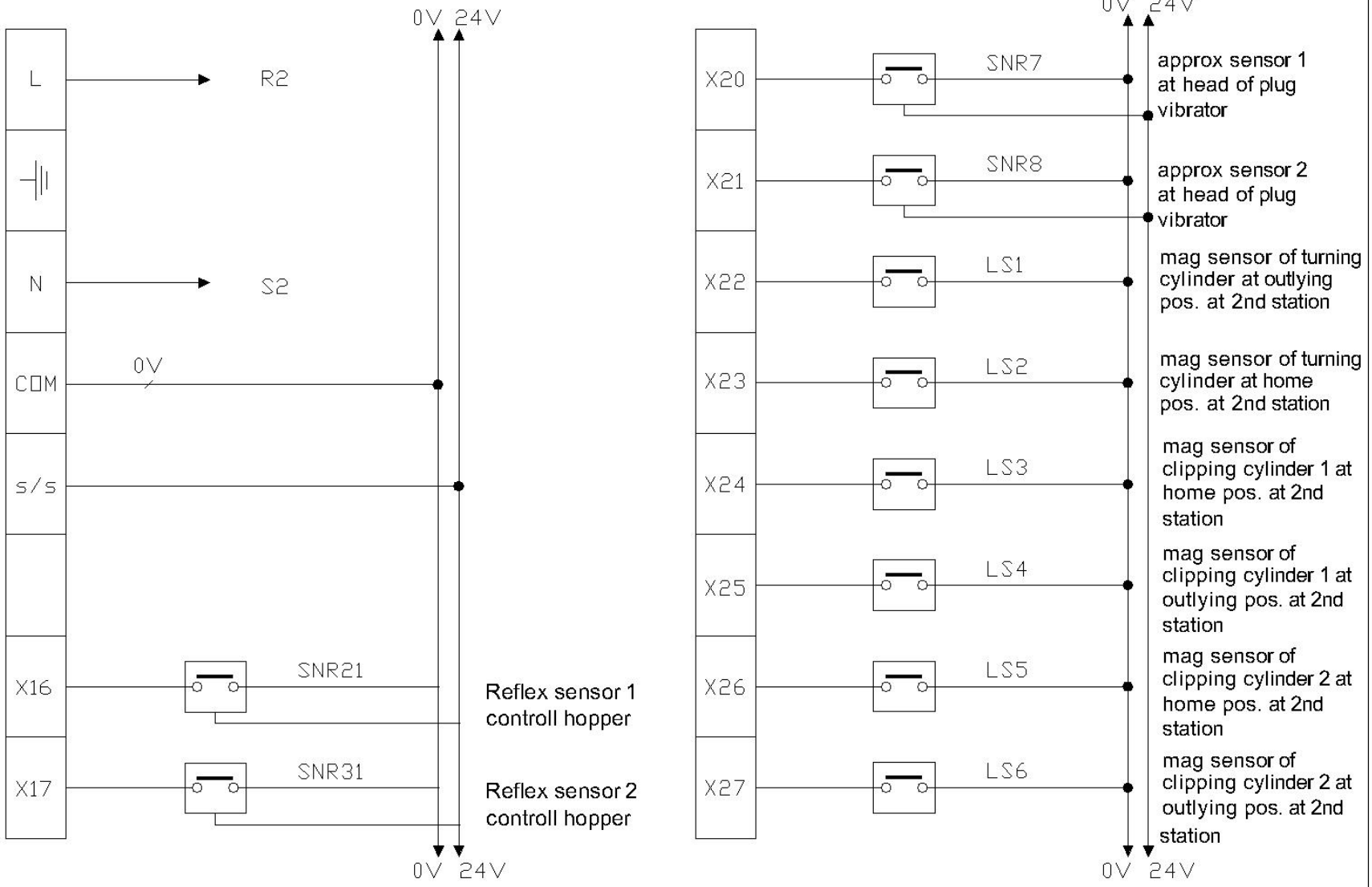
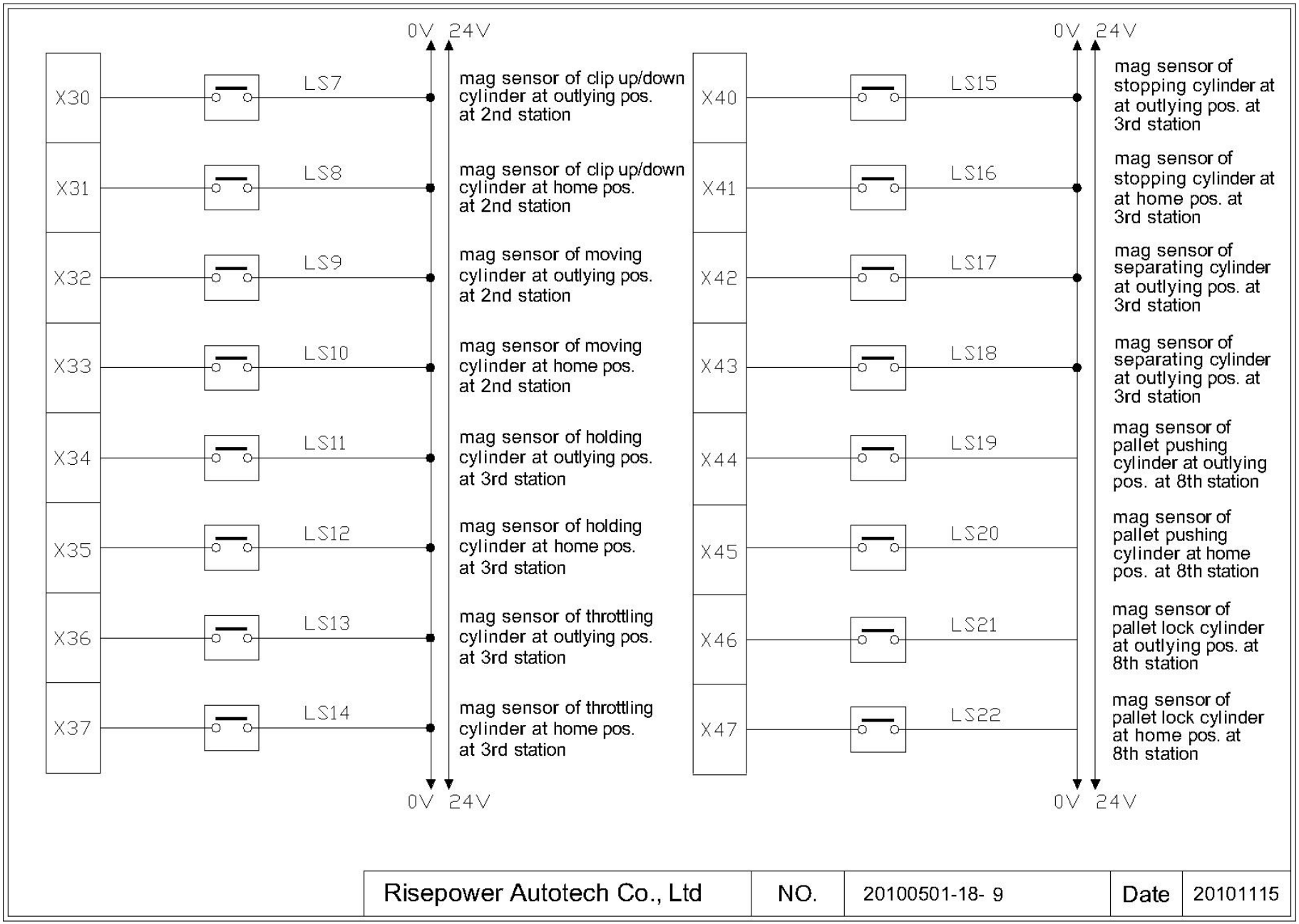
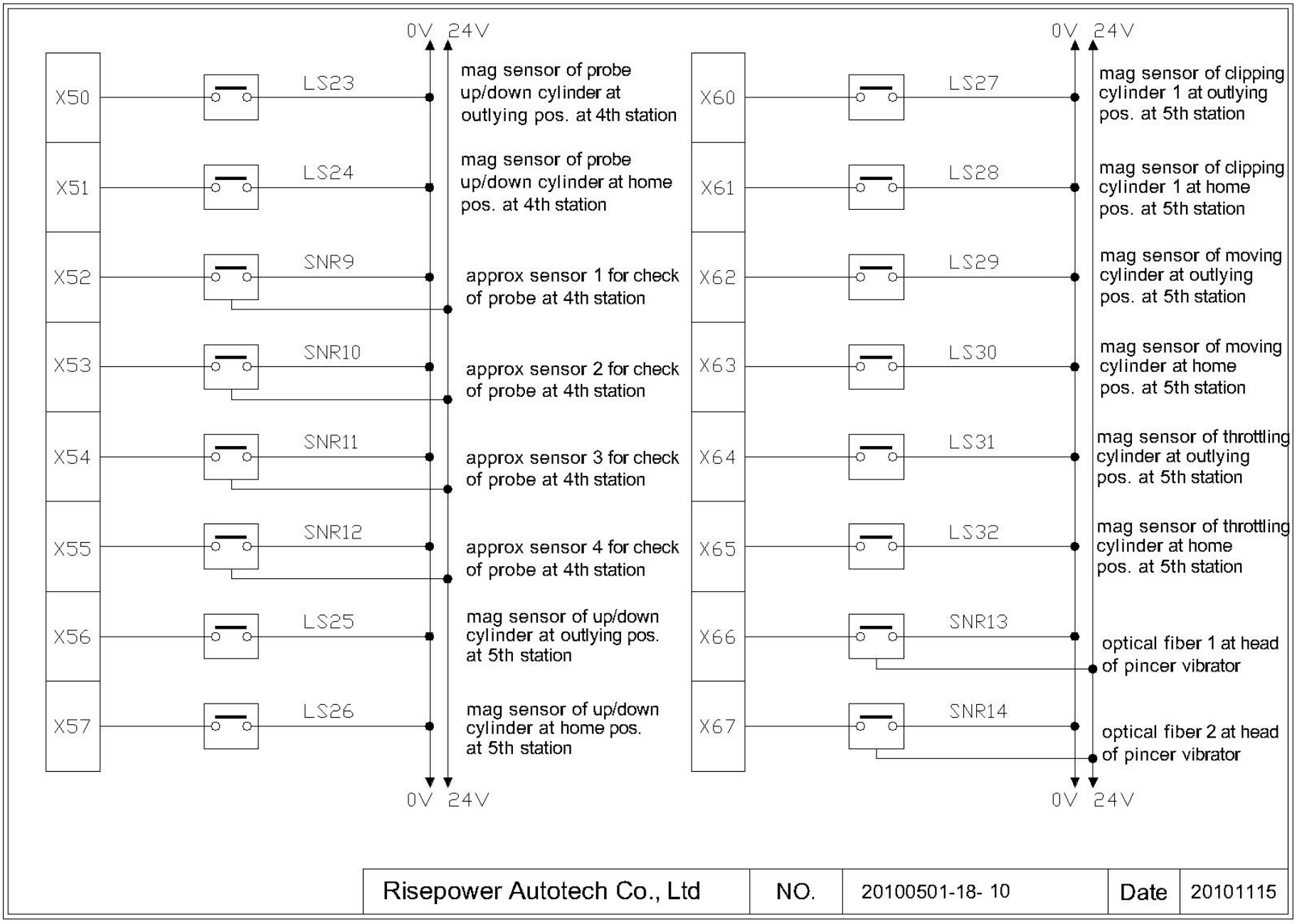

24V
MITSUBISHI
FX3U
64MT
0V
X-Table Servo Controller
SG (P6,P26,P27)
SG (P13)
ZERO (P48)
STANDBY (P7)
TPOS(P1)
ALARM (P28)
X0
X1
DOG-X
(SNR1)
X4
X5
X6
X7 (SNR2)
X10 (SNR3)
X-Table-left limit
X-Table-right limit
24V
S/S
Y-Table Servo Controller
SG (P6,P26,P27)
SG (P13)
ZERO (P48)
STANDBY (P7)
TPOS(P1)
ALARM (P28)
X2
X3
DOG-Y
(SNR4)
X11
X12
X13
X14 (SNR5)
X15 (SNR6)
Y-Table-left limit
Y-Table-right limit
NO. 20100501-17- 6
Date 20101115


0V
MITSUBISHI
FX3U
64MT
COM0
Y0
Y2
Y4
Y6
COM1
Y1
Y3
Y5
Y7
COM2
COM3
COM4
COM−
Y0
Y2
Y4
Y6
X-Table Servo Controller
COM− (P45)
PULSE (P41)
DIR (P37)
SON (P10)
RESET (P33)
PULL HI (P35)
24V
COM−
Y1
Y3
Y5
Y7
Y-Table Servo Controller
COM− (P45)
PULSE (P41)
DIR (P37)
SON (P10)
RESET (P33)
PULL HI (P35)
24V
NO.
20100501-17-7
Date
20101115



Risepower Autotech Co., Ltd	NO.	20100501-18- 8	Date	20101115


0V 24V
X30
LS7
mag sensor of clip up/down cylinder at outlying pos. at 2nd station
X31
LS8
mag sensor of clip up/down cylinder at home pos. at 2nd station
X32
LS9
mag sensor of moving cylinder at outlying pos. at 2nd station
X33
LS10
mag sensor of moving cylinder at home pos. at 2nd station
X34
LS11
mag sensor of holding cylinder at outlying pos. at 3rd station
X35
LS12
mag sensor of holding cylinder at home pos. at 3rd station
X36
LS13
mag sensor of throttling cylinder at outlying pos. at 3rd station
X37
LS14
mag sensor of throttling cylinder at home pos. at 3rd station
0V 24V
0V 24V
X40
LS15
mag sensor of stopping cylinder at at outlying pos. at 3rd station
X41
LS16
mag sensor of stopping cylinder at at home pos. at 3rd station
X42
LS17
mag sensor of separating cylinder at outlying pos. at 3rd station
X43
LS18
mag sensor of separating cylinder at outlying pos. at 3rd station
X44
LS19
mag sensor of pallet pushing cylinder at outlying pos. at 8th station
X45
LS20
mag sensor of pallet pushing cylinder at home pos. at 8th station
X46
LS21
mag sensor of pallet lock cylinder at outlying pos. at 8th station
X47
LS22
mag sensor of pallet lock cylinder at home pos. at 8th station
0V 24V
Risepower Autotech Co., Ltd
NO.
20100501-18- 9
Date
20101115



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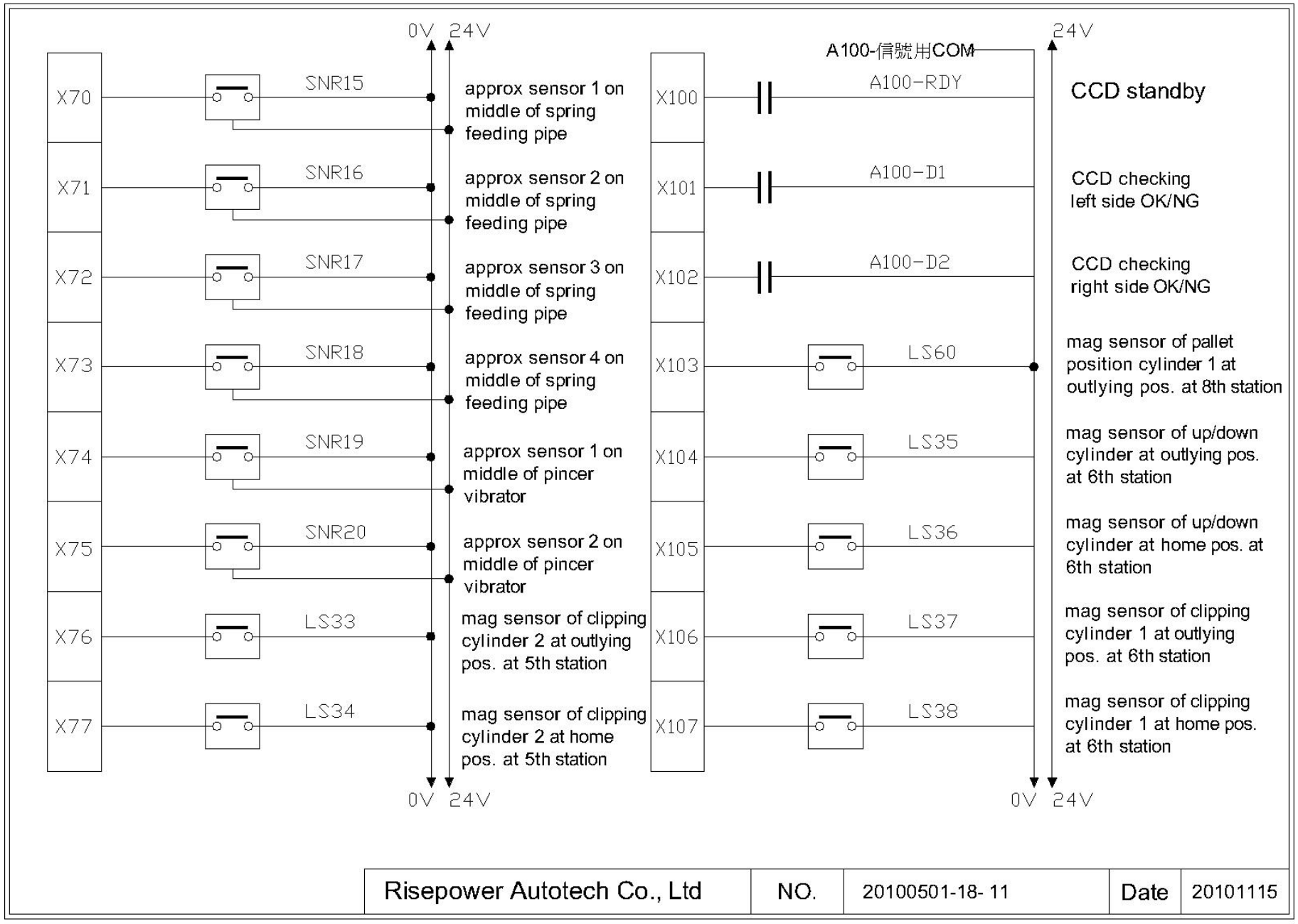

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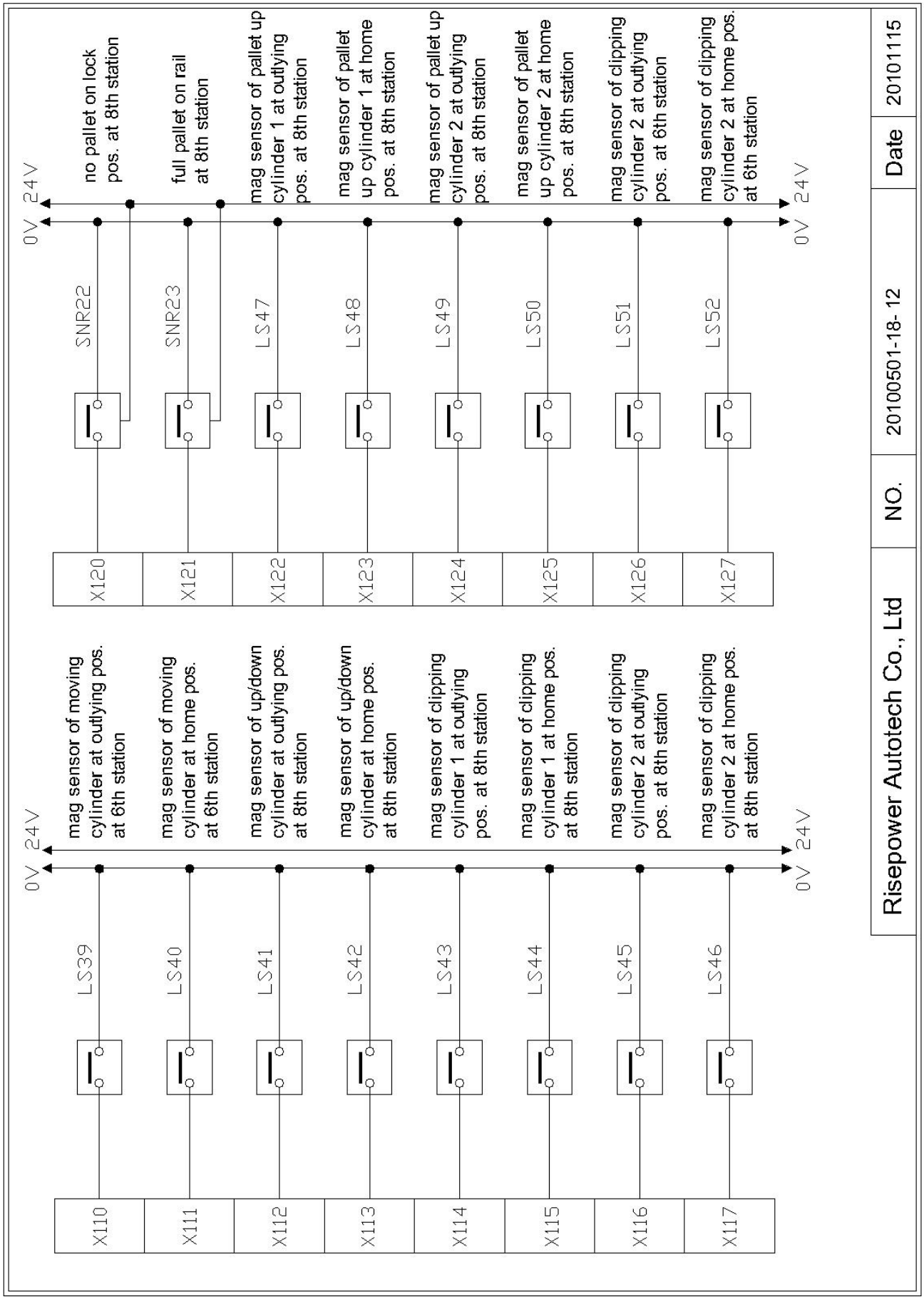
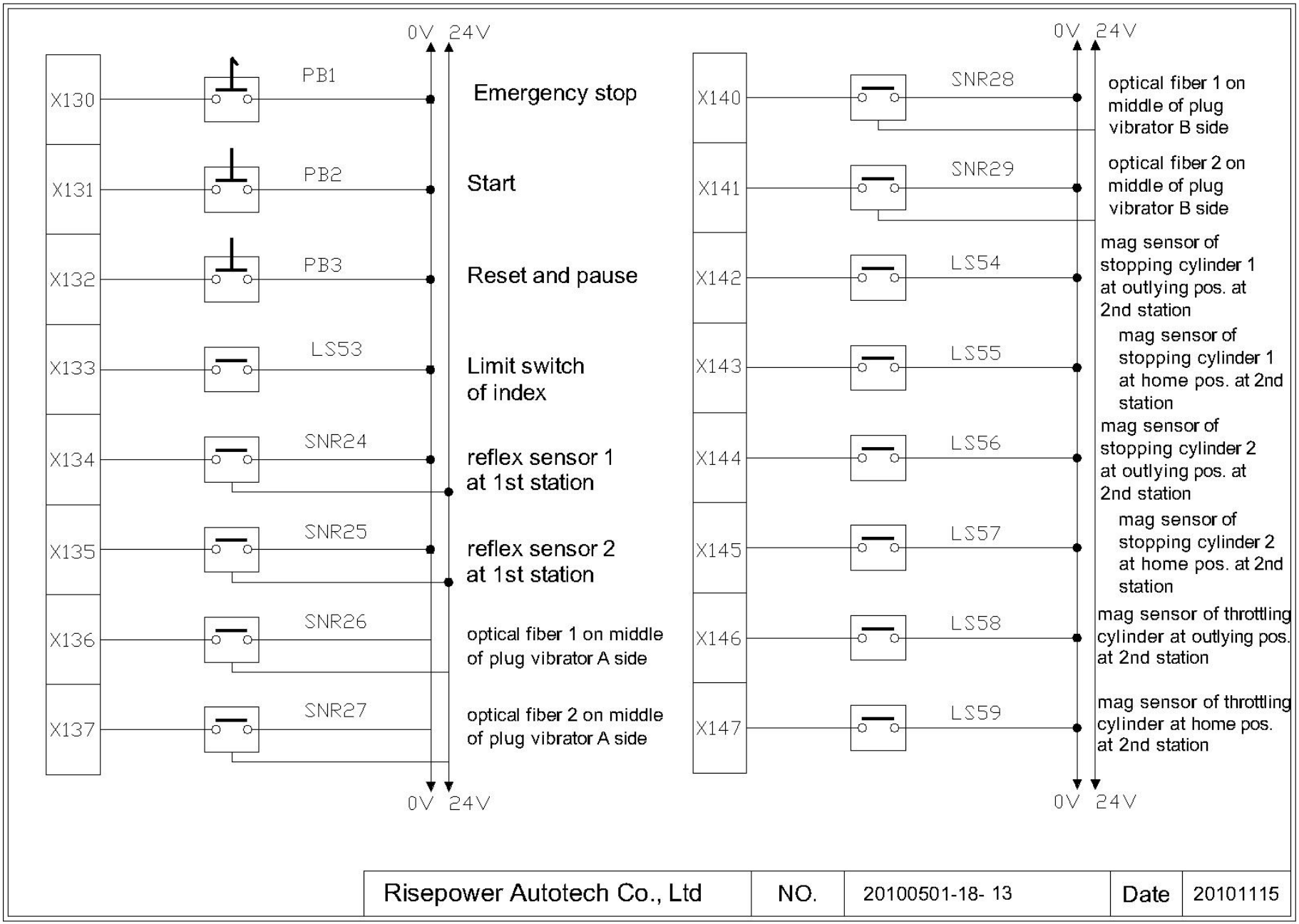
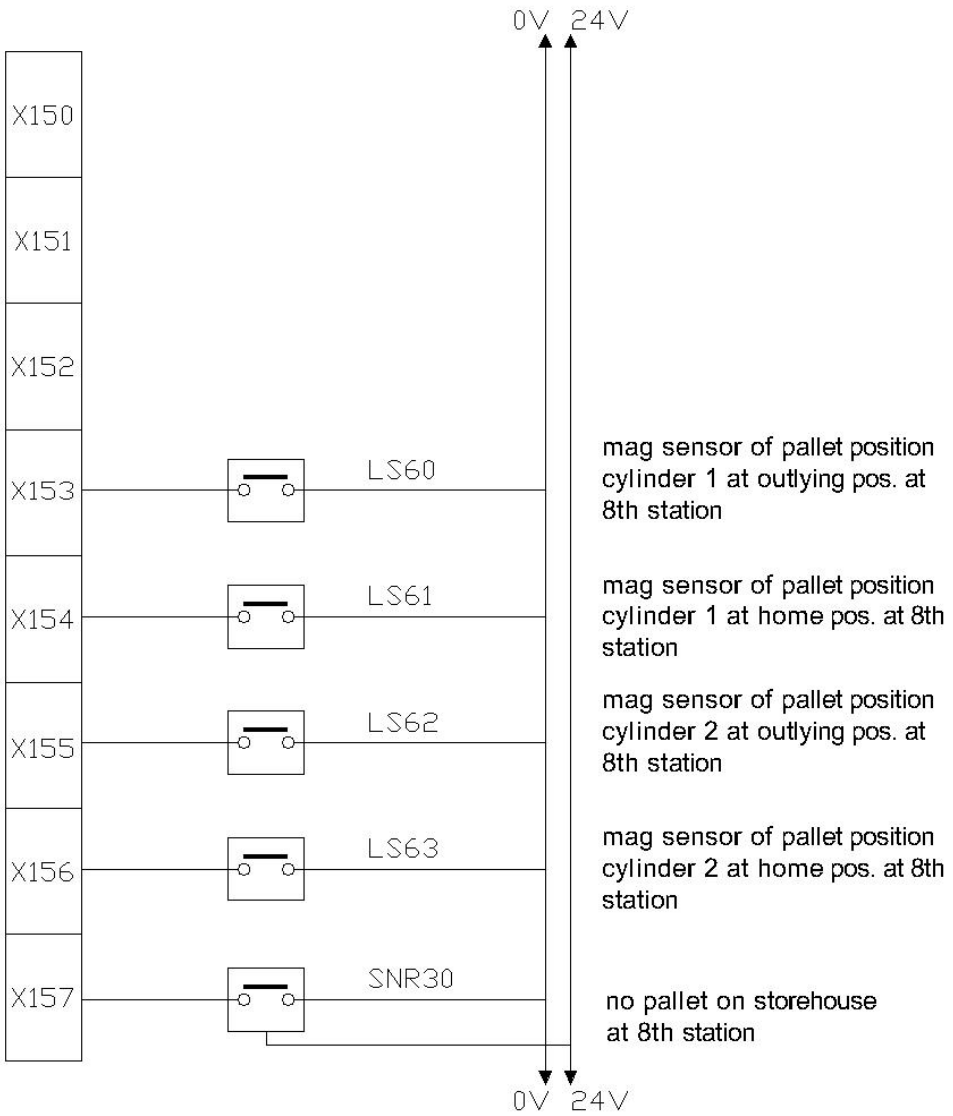

0V 24V
mag sensor of moving cylinder at outlying pos. at 6th station
mag sensor of moving cylinder at home pos. at 6th station
mag sensor of up/down cylinder at outlying pos. at 8th station
mag sensor of up/down cylinder at home pos. at 8th station
mag sensor of clipping cylinder 1 at outlying pos. at 8th station
mag sensor of clipping cylinder 1 at home pos. at 8th station
mag sensor of clipping cylinder 2 at outlying pos. at 8th station
mag sensor of clipping cylinder 2 at home pos. at 8th station
LS39
LS40
LS41
LS42
LS43
LS44
LS45
LS46
X110
X111
X112
X113
X114
X115
X116
X117
no pallet on lock pos. at 8th station
full pallet on rail at 8th station
mag sensor of pallet up cylinder 1 at outlying pos. at 8th station
mag sensor of pallet up cylinder 1 at home pos. at 8th station
mag sensor of pallet up cylinder 2 at outlying pos. at 8th station
mag sensor of pallet up cylinder 2 at home pos. at 8th station
mag sensor of clipping cylinder 2 at outlying pos. at 6th station
mag sensor of clipping cylinder 2 at home pos. at 6th station
SNR22
SNR23
LS47
LS48
LS49
LS50
LS51
LS52
X120
X121
X122
X123
X124
X125
X126
X127
Risepower Autotech Co., Ltd
NO.
20100501-18- 12
Date
20101115


0V 24V
X130
PB1
Emergency stop
X131
PB2
Start
X132
PB3
Reset and pause
X133
LS53
Limit switch of index
X134
SNR24
reflex sensor 1 at 1st station
X135
SNR25
reflex sensor 2 at 1st station
X136
SNR26
optical fiber 1 on middle of plug vibrator A side
X137
SNR27
optical fiber 2 on middle of plug vibrator A side
0V 24V
0V 24V
X140
SNR28
optical fiber 1 on middle of plug vibrator B side
X141
SNR29
optical fiber 2 on middle of plug vibrator B side
X142
LS54
mag sensor of stopping cylinder 1 at outlying pos. at 2nd station
X143
LS55
mag sensor of stopping cylinder 1 at home pos. at 2nd station
X144
LS56
mag sensor of stopping cylinder 2 at outlying pos. at 2nd station
X145
LS57
mag sensor of stopping cylinder 2 at home pos. at 2nd station
X146
LS58
mag sensor of throttling cylinder at outlying pos. at 2nd station
X147
LS59
mag sensor of throttling cylinder at home pos. at 2nd station
0V 24V
Risepower Autotech Co., Ltd
NO.
20100501-18- 13
Date
20101115



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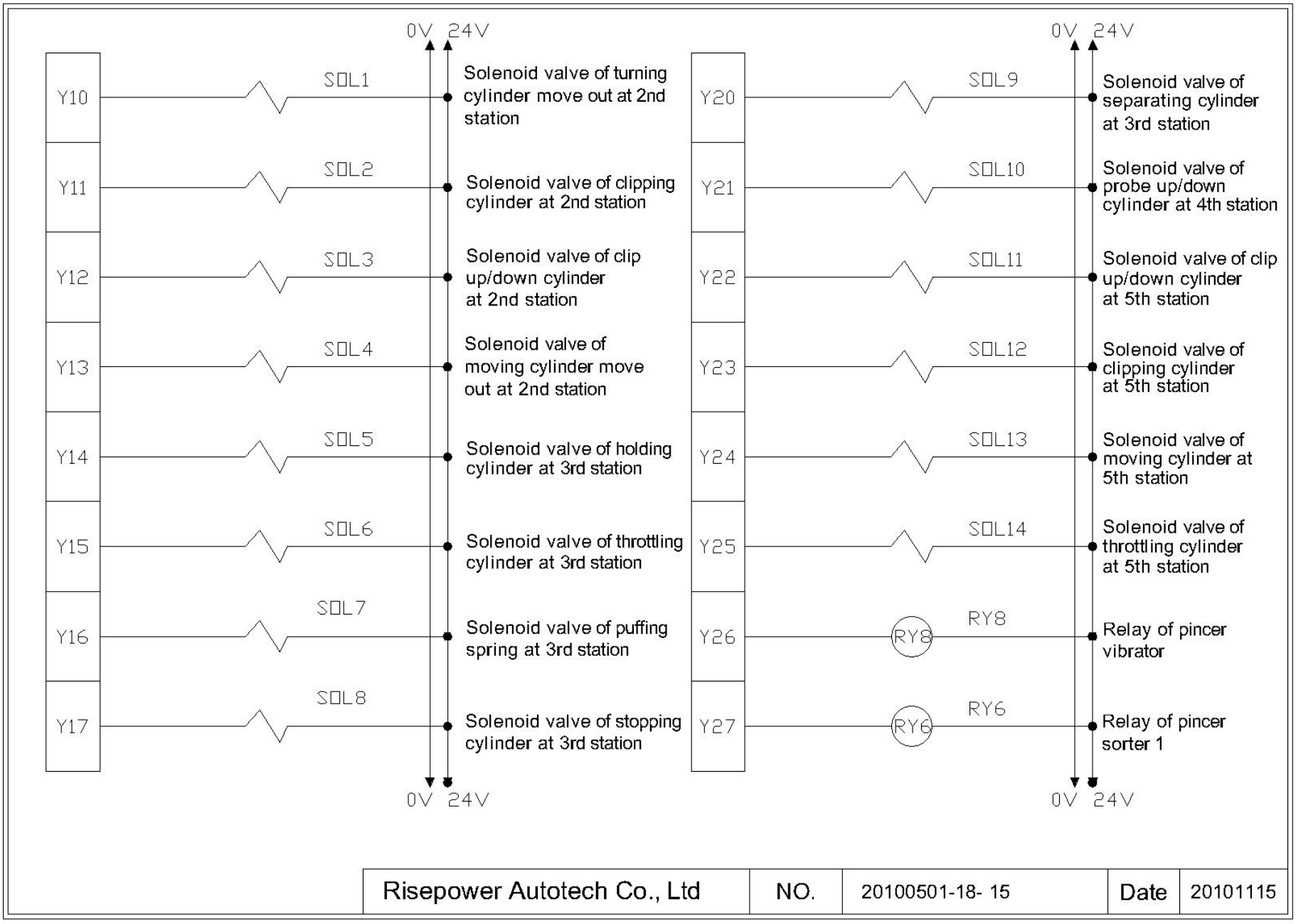
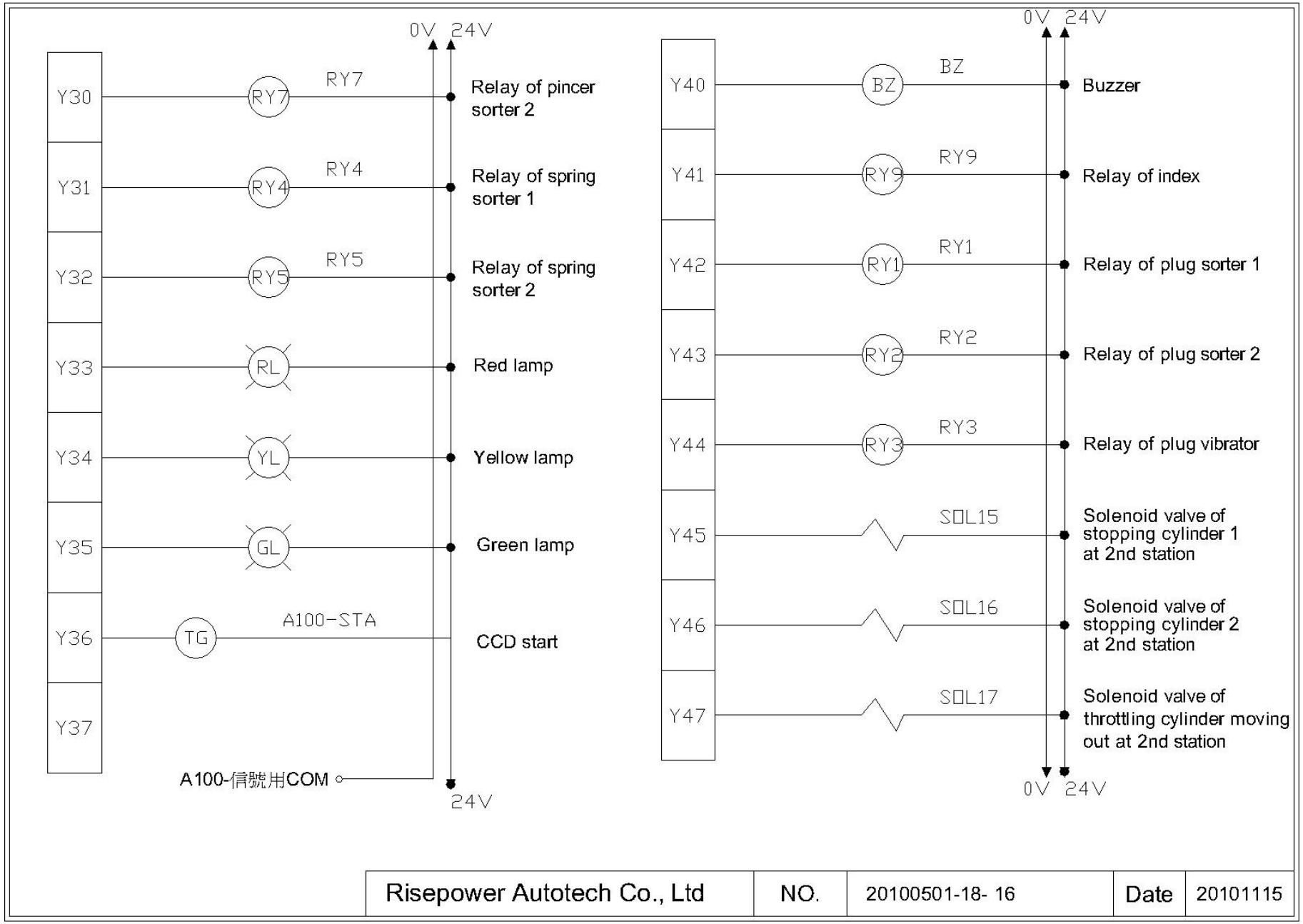

0V 24V
Y10
SOL1
Solenoid valve of turning cylinder move out at 2nd station
Y11
SOL2
Solenoid valve of clipping cylinder at 2nd station
Y12
SOL3
Solenoid valve of clip up/down cylinder at 2nd station
Y13
SOL4
Solenoid valve of moving cylinder move out at 2nd station
Y14
SOL5
Solenoid valve of holding cylinder at 3rd station
Y15
SOL6
Solenoid valve of throttling cylinder at 3rd station
Y16
SOL7
Solenoid valve of puffing spring at 3rd station
Y17
SOL8
Solenoid valve of stopping cylinder at 3rd station
0V 24V
0V 24V
Y20
SOL9
Solenoid valve of separating cylinder at 3rd station
Y21
SOL10
Solenoid valve of probe up/down cylinder at 4th station
Y22
SOL11
Solenoid valve of clip up/down cylinder at 5th station
Y23
SOL12
Solenoid valve of clipping cylinder at 5th station
Y24
SOL13
Solenoid valve of moving cylinder at 5th station
Y25
SOL14
Solenoid valve of throttling cylinder at 5th station
Y26
RY8
RY8
Relay of pincer vibrator
Y27
RY6
RY6
Relay of pincer sorter 1
0V 24V
Risepower Autotech Co., Ltd
NO.
20100501-18- 15
Date
20101115


0V 24V
Y30
RY7
Relay of pincer sorter 2
Y31
RY4
Relay of spring sorter 1
Y32
RY5
Relay of spring sorter 2
Y33
RL
Red lamp
Y34
YL
Yellow lamp
Y35
GL
Green lamp
Y36
TG
A100-STA
CCD start
Y37
A100-信號用COM
24V
0V 24V
Y40
BZ
Buzzer
Y41
RY9
Relay of index
Y42
RY1
Relay of plug sorter 1
Y43
RY2
Relay of plug sorter 2
Y44
RY3
Relay of plug vibrator
Y45
SOL15
Solenoid valve of stopping cylinder 1 at 2nd station
Y46
SOL16
Solenoid valve of stopping cylinder 2 at 2nd station
Y47
SOL17
Solenoid valve of throttling cylinder moving out at 2nd station
0V 24V
Risepower Autotech Co., Ltd
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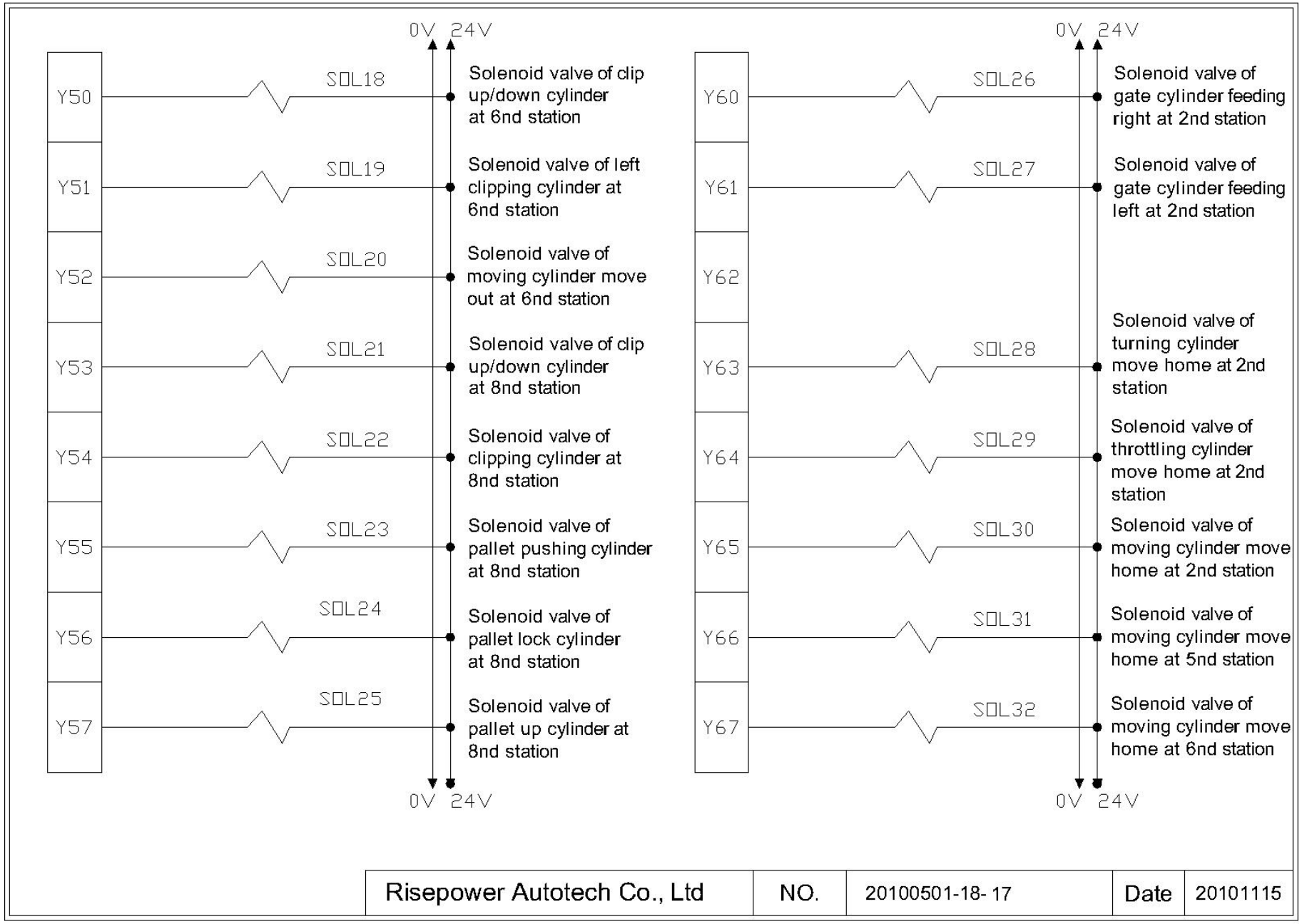
Date
20101115


0V 24V
Y50
SOL18
Solenoid valve of clip up/down cylinder at 6nd station
Y51
SOL19
Solenoid valve of left clipping cylinder at 6nd station
Y52
SOL20
Solenoid valve of moving cylinder move out at 6nd station
Y53
SOL21
Solenoid valve of clip up/down cylinder at 8nd station
Y54
SOL22
Solenoid valve of clipping cylinder at 8nd station
Y55
SOL23
Solenoid valve of pallet pushing cylinder at 8nd station
Y56
SOL24
Solenoid valve of pallet lock cylinder at 8nd station
Y57
SOL25
Solenoid valve of pallet up cylinder at 8nd station
0V 24V
0V 24V
Y60
SOL26
Solenoid valve of gate cylinder feeding right at 2nd station
Y61
SOL27
Solenoid valve of gate cylinder feeding left at 2nd station
Y62
Y63
SOL28
Solenoid valve of turning cylinder move home at 2nd station
Y64
SOL29
Solenoid valve of throttling cylinder move home at 2nd station
Y65
SOL30
Solenoid valve of moving cylinder move home at 2nd station
Y66
SOL31
Solenoid valve of moving cylinder move home at 5nd station
Y67
SOL32
Solenoid valve of moving cylinder move home at 6nd station
0V 24V
Risepower Autotech Co., Ltd
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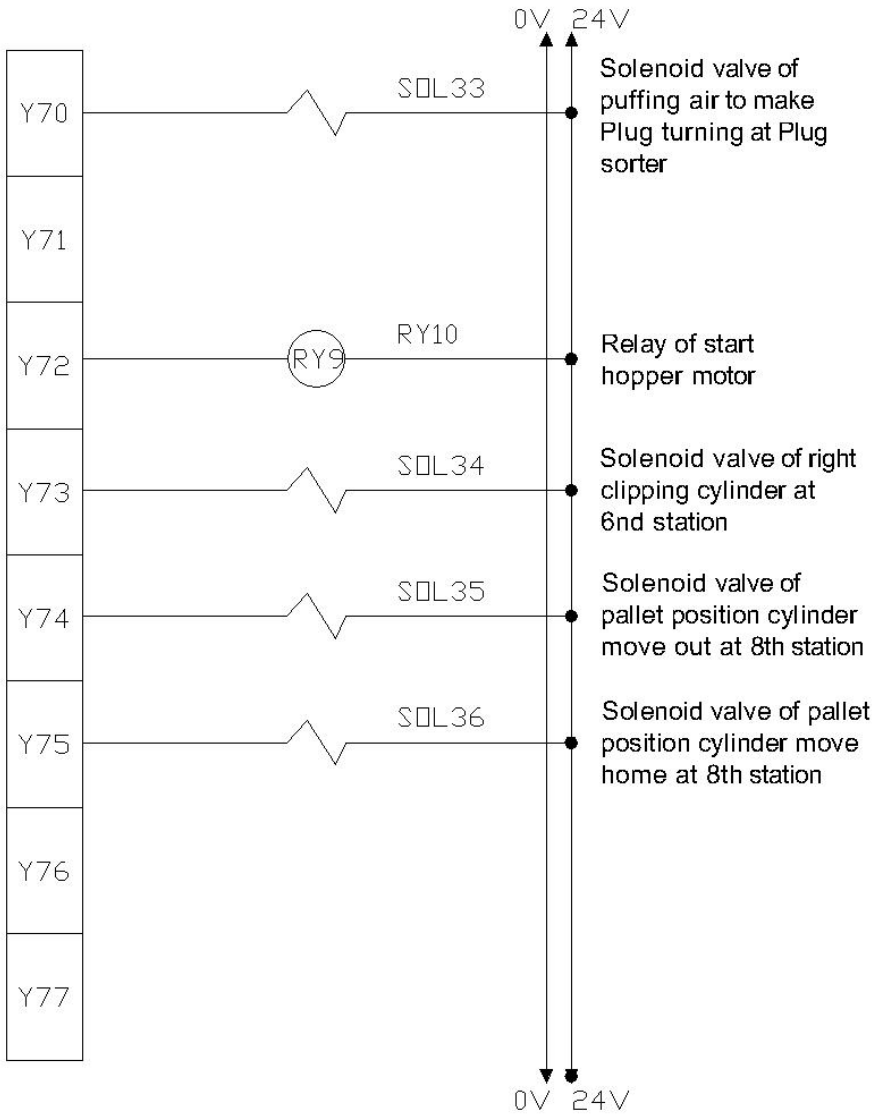
20100501-18-17
Date
20101115



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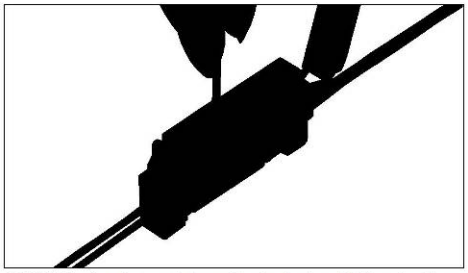
Instruction manual for amplifier of optical fiber

KEYENCE **NPN / PNP**

Manual-Calibration Fiberoptic Sensor

FS-M1(P)/M2(P)/M0

Instruction Manual

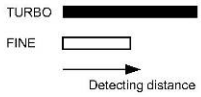


A "P" following the model number indicates PNP-output type.

MAJOR FEATURES AND FUNCTIONS

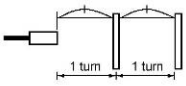
1. Ultra-long detecting distance

When the selector switch is set to TURBO, the FS-M series provides approximately double the detecting distance.



2. Fine adjustment

The detecting distance changes linearly according to the number of trimmer turns.



3. Simple wiring

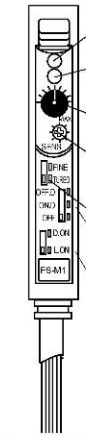
- The expansion unit needs no power supply cable.
- Up to 16 expansion units can be connected to a single main unit.

⚠ WARNING

- The FS-M1(P)/M2(P) are intended for target detection. Do not use these products in a safety circuit for protecting the human body.
- The FS-M1(P)/M2(P) are not explosion-proof. Do not use these products in an atmosphere where inflammable gas, liquid or powder is present.

STRUCTURE AND PART NAMES

FS-M1(P)
(Main unit)



Operation indicator (Red LED):
Lights when the control output is activated.

Stable operation indicator (Green LED):
Lights when a sufficient light quantity is received.

Indicator:
Indicates the current position of the sensitivity adjustment trimmer.

Sensitivity adjustment trimmer:
8-turn trimmer. Turning the trimmer clockwise increases the sensitivity.

FINE/TURBO selector switch
FINE: Ultra-high accuracy
TURBO: Ultra-long detecting distance

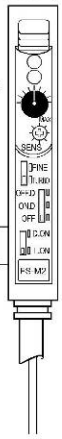
Output selector switch
DARK ON
LIGHT ON

Output timer selector switch
Output OFF-delay: 40 ms
Output ON-delay: 40 ms
Output timer OFF

4-conductor cable

FS-M2(P)
(Expansion unit for one-line bus system)

Every control/ indicator functions the same as a main unit.



Expansion connector

Output cable only.

FS-M0
(Expansion unit for zero-line bus system)

* There is no control output cable for the FS-T0.
* Use the FS-R0 (Output port unit) as the main unit. The FS-T1(P)/M1(P) cannot be used as the main unit.

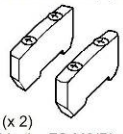
Accessories

Instruction manual (x 1)

Sticker
[included in the FS-M2(P) only]

Resin screw-driver (x 1)

Mounting bracket (x 1)
[included in the FS-M1(P) only]



End unit (x 2)
[included in the FS-M2(P) only]

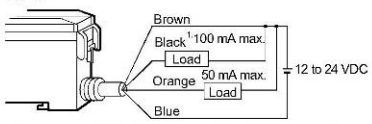
SPECIFICATIONS

Model	NPN output	FS-M1	FS-M2	FS-M0
	PNP output	FS-M1P	FS-M2P	
Light source		Red LED		
Sensitivity adjustment/ Mode selection		8-turn trimmer (with indicator)/ FINE/TURBO switch-selectable		
Response time		250 µs (FINE), 500 µs (TURBO)		410 µs to 1.2 ms [1]
Operation mode		LIGHT ON/DARK ON (switch-selectable)		
Indicators		Output indicator: Red LED, Stable operation indicator: Green LED		
Timer function		ON-delay: 40 ms, OFF-delay: 40 ms, Timer OFF (switch-selectable)		
Output	Control output	NPN or PNP open-collector 100 mA max. (40 V max.) Residual voltage: 1 V max. [2]		
	Stability output	NPN or PNP open-collector 50 mA max. (40 V max.) [3] Residual voltage: 1 V max.		
Protection circuit		Reverse polarity protection, Over-current protection, Serge absorber		
Power supply voltage		12 to 24 VDC ±10%, Ripple (P-P) 10% max.[4]		
Current consumption		35 mA max.		
Ambient illumination		Candescent lamp: 10,000 lx max. Sunlight: 20,000 lx max.		
Ambient temperature		-10 to +55°C [5]		
Relative humidity		35 to 85%		
Vibration		10 to 55 Hz, 1.5 mm double amplitude in X, Y and Z directions for two hours		
Shock immunity		500 m/s² {Approx. 50 G} in X, Y and Z directions, three times each		
Housing material		Body/Cover: Polycarbonate		
Weight (including 2 m cable)		Approx. 75 g	Approx. 40 g	Approx. 20 g

1. The response speed varies depending on the number of units connected.
2. There is no control output cable for the FS-M0. Control output for the FS-M0 is sent from the FS-R0.
3. Stability output is only provided by the FS-M1(P). Stability output for the FS-M2(P)/M0 is sent from the FS-T1(P)/R0.
4. Power for the FS-M2(P)/M0 is supplied through the FS-M1(P)/R0.
5. When several units are connected, the ambient temperature requirement varies depending on the total number of units connected.
   When 3 to 10 units are connected: -10 to +50°C
   When 11 to 16 units are connected: -10 to +45°C
   When connecting several units, be sure to mount the units to a metallic DIN rail. Make sure that the output current does not exceed 20 mA.

CONNECTIONS

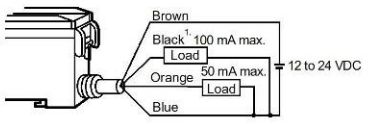
NPN



- To connect the FS-M1 to a voltage input device, provide a 4.7 kΩ resistor between the brown and black cables.
- When the stability output is not used, cut the orange cable at the root, or connect this cable to the 0 V terminal of the power supply.

1. The FS-M2 has the black cable only.

PNP



- To connect the FS-M1P to a voltage input device, provide a 4.7 kΩ resistor between the blue and black or orange cables.
- When the stability output is not used, cut the orange cable at the root, or connect this cable to the positive terminal of the power supply.

1. The M2P has the black cable only.

detection is done the stable operation indicator (green LED) is turned on.

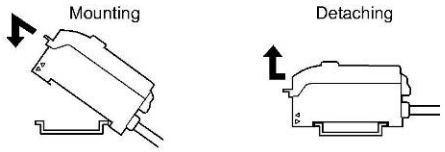
Stability output

Note When several units are connected, the stability outputs of all the units are output from the FS-M1(P) main unit based on OR logic.

MOUNTING AMPLIFIER

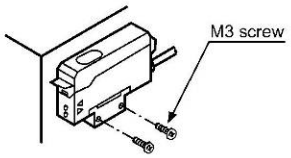
■ Mounting/Detaching the amplifier to/from a DIN rail or the mounting bracket.

Hook the claw located at the amplifier cable side onto the DIN rail, and then hook the front side claw to the rail while pressing the amplifier forward. To detach the amplifier, unhook the front claw by lifting the amplifier front side while pressing it forward.



■ Side mounting

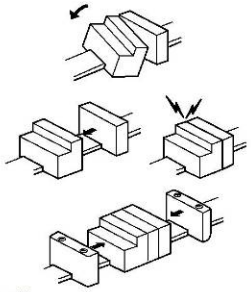
Using the side holes of the supplied mounting bracket, fix the amplifier with the screws. [For FS-M1(P) only]



MOUNTING SEVERAL AMPLIFIERS

■ Mounting several units

1. Mount amplifiers to a DIN rail one by one.
2. Slide one expansion unit toward another. Align the front claws of the amplifiers and push the amplifiers together until they click.
3. Fix the amplifiers together by pushing an end unit onto each end (The end units are included in the expansion unit).

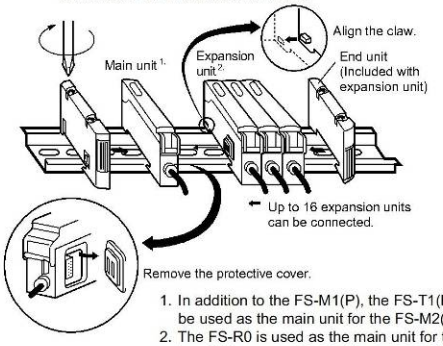


■ Detaching amplifiers from DIN rail

1. Remove the end units.
2. Slide the expansion units apart, and detach them individually. (Do not detach multiple amplifiers connected together with end units.)

Note
- When several units are connected, confirm the ambient temperature. (See "Specifications" on p. 1.)
- To connect several units, be sure to use a DIN rail and end units.
- To mount or detach several units, be sure to turn the power off.

- Do not remove the protective cover of the expansion connector on the outermost unit.

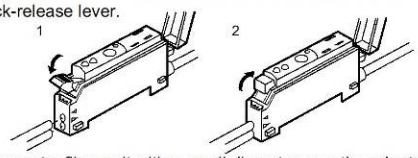


1. In addition to the FS-M1(P), the FS-T1(P) can also be used as the main unit for the FS-M2(P).
2. The FS-R0 is used as the main unit for the FS-M0. In addition to the FS-M2(P), the FS-T2(P) can also be used as the expansion unit.

The sticker on the right is included in the expansion unit. Apply this sticker near the sensor.

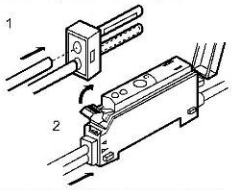
CONNECTING FIBER UNIT

Tilt the quick-release lever, insert the fiber unit until it stops, and then lift the quick-release lever.



- To connect a fiber unit with a small diameter, use the adaptor included with the FU series.

  Attach the adaptor to the fiber unit, fully insert the adaptor into the mounting holes of the amplifier, and then lift the quick-release lever.

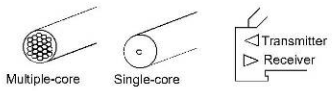


Note If the fiber unit is improperly connected, the sensor cannot meet the specifications.

- The required adaptor is included in each model of the FU series. If an inadequate adaptor is used, the fiber unit cannot be properly installed.

Type	Shape	Applicable fiber unit
Adaptor A (OP26500)	For 1.3 mm diameter	FU-32/35FA/4F/43/63/63T/66/78/91/93
Adaptor B (OP26501)	For 1 mm diameter	FU-31/37/38/38V/48/59/68/75F/79/95

- To connect the coaxial reflective type fiber unit to the amplifier, connect the single-core fiber to the transmitter side, and connect the multiple-core fiber to the receiver side.
  (Connect the fibers according to the marking on the amplifier lateral side.)



● Mutual Interference Suppression Function

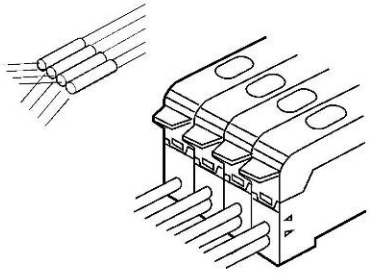
Up to four sensors can be connected without being affected by light beams from the adjacent units.

(When the TURBO mode is selected, up to 8 sensors enable stable detection without mutual interference.)

When several units are connected, the FS-M series alternates the light emission timing with up to four sensors so that the adjacent sensors' light beams do not affect detection.

- The FS-M series can be used together with the FS-T series (manual-calibration type).

Note When only a single unit is used, the mutual interference suppression function cannot be used.



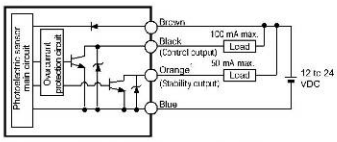
HINTS ON CORRECT USE

- To extend the cable length, use a cable with at least a 0.3 mm² cross-section area. Limit the length of cable extension to no more than 100 m. (To connect several units, contact Keyence for further information.)
- If the amplifier cable is placed together with power lines or high-voltage lines in the same conduit, detection error may occur due to noise interference, or the sensor may be damaged. Isolate the amplifier cable from these lines.
- When using a commercially available switching regulator, ground the F.G. terminal and ground terminal.
- Do not use the FS-M series outdoors, or in a place where extraneous light can enter the light receiving surface directly.
- During maximum sensitivity setting, the detecting distance may vary due to the difference in characteristics of each unit.
- If the wiring is incorrect, the unit may heat up, or the sensitivity setting may fluctuate. (See "Connections" on p. 1.)

I/O CIRCUIT

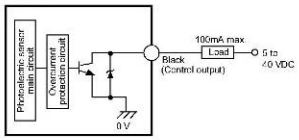
NPN

FS-M1



1. When the stability output is not used, cut the orange cable at the base, or connect this cable to the 0 V terminal of the power supply.

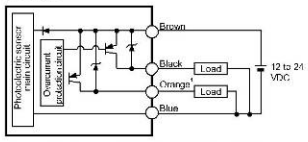
FS-M2



- Power to the FS-M2 is supplied through the FS-M1/T1.

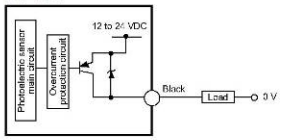
PNP

FS-M1P



1. When the stability output is not used, cut the orange cable at the base, or connect this cable to the positive terminal of the power supply.

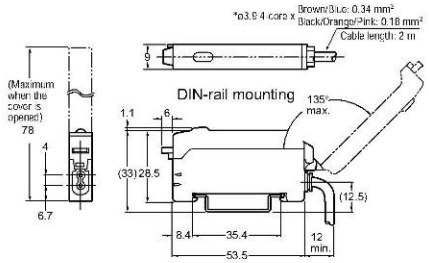
FS-M2P



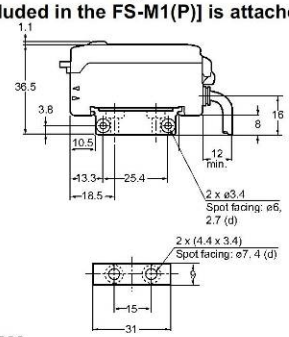
- Power to the FS-M2P is supplied through the FS-M1P/T1P.

DIMENSIONS

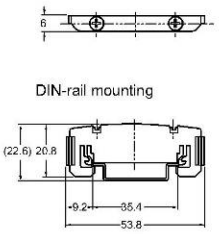
FS-M1(P)



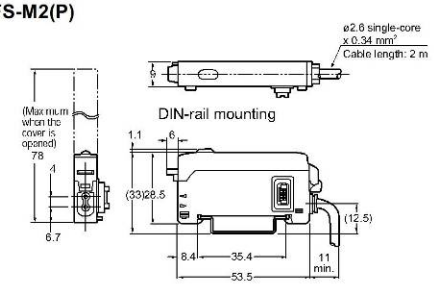
When the mounting bracket [included in the FS-M1(P)] is attached



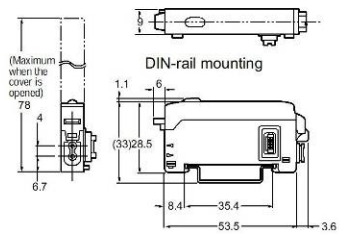
End unit [Included in the FS-M2(P)]



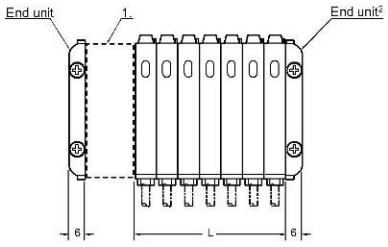
FS-M2(P)



FS-M0



When several units are connected:



1. The FS-T1(P)/M1(P)/R0 is mounted in [ ]¹.
2. When using expansion units, be sure to use the end unit [accessory to the FS-R0, T2(P), M2(P)].

No. of units	L
1	9
2	18
3	27
4	36
5	45
6	54
7	63
8	72
9	81
10	90
11	99
12	108
13	117
14	126
15	135
16	144

When expanding an FS-R3, refer to the FS-R3 dimensional drawing.

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