INSTRUCTION MANUAL

PENDANT CONTROL SWITCH FOR AIR HOIST

PCS-1BV
PCS-2BV1
PCS-2BV2

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WARNING

- **Read this manual before installing, operating, or maintaining the pendant control switch.**
- **Read the air hoist instruction manual that contains general instructions for operation before using the hoist.**
  This manual contains safety instructions and information only about the pendant control switch.
- **Keep this manual and the air hoist instruction manual available.**

ENDO KOGYO CO., LTD.

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SAFETY ALERT SYMBOL AND ALERT SIGNS

Please read this manual carefully and follow its instructions.

The SAFETY ALERT SYMBOL ( ), WARNING, CAUTION, and NOTE carry special messages.

This SAFETY ALERT SYMBOL is used to call your attention to items or operations that could be dangerous to you or other persons using this equipment.
Please read these messages and follow these instructions carefully.

WARNING : WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION : CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury, damage or destruction of the equipment and others.

N O T E : NOTE indicates a special instruction in operation or maintenance.

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CONTENTS

1. ⚠ Safety Instructions ---------- 1

1-1. General Instructions ---------- 1

1-2. Instructions for Safe Operation ---------- 1

1-2-1. General Handling ---------- 1

1-2-2. Operation and Handling ---------- 2

1-2-3. Maintenance ---------- 2

2. Description of Product ---------- 3

2-1. Structure of Pendant Control Switch ---------- 3

2-2. Specifications ---------- 4

3. Checks before Installation ---------- 4

4. Installation ---------- 4

4-1. Attaching Pendant Control Switch to the Hoist ---------- 5

4-2. Installing the Hoist ---------- 6

5. Checks after Installation and Test Run ---------- 6

5-1. Load Chain, Hoisting Operation,

Lifting and Lowering Limit Switches ---------- 6

5-2. Speed Control Using Pendant Control Switch ---------- 6

5-3. Emergency Stop Device ---------- 6

6. Operation ---------- 7

7. Lubrication ---------- 7

8. Disassembly and Reassembly ---------- 8

8-1. Procedures of Disassembly ---------- 8

8-2. Reassembly ---------- 9

9. Parts list ---------- 11

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1. ⚠ Safety Instructions

1-1. General Instructions

⚠ WARNING

- Before installing, operating or maintaining the pendant control switch, carefully read and understand all of the instructions in this manual in order to avoid accidents as a consequence of incorrect handling.
- Keep this manual available to all persons who will install, operate or maintain the pendant control switch.
- Check all of the trade associations', local and national rules and regulations relating to safe operation of the hoist.

1-2. Instructions for Safe Operation

If the hoist is not used correctly, a serious accident may occur, such as dropping the load or the hoist itself.
For safe operation, understand the function of the pendant control switch and observe the following instructions.

Only instructions relating to the pendant control switch are herein described.
Read the air hoist instruction manual that contains general instructions for operation before using the hoist.

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1-2-1. General Handling

⚠ WARNING

- Do not operate the hoist unless the contents of this manual, the air hoist instruction manual and the caution plate (caution label) are completely known.
- Do not operate the hoist if you are not physically fit to do so.
- Install the pendant control switch properly and carefully.
- Always employ qualified or trained personnel for inspection and maintenance requiring disassembly or reassembly.

1-2-2. Operation and Handling

⚠ WARNING

- Check the load chain, hoisting operation, and lifting/lowering limit switches according to the air hoist instruction manual.
- Do not start suddenly, do not stop suddenly, and do not reverse the hoist suddenly.
  Always operate the hoist smoothly.
- Never lock the push button switches.
  The pendant control switch must be operated by the operator himself/herself at all times.
- Never use the emergency stop button as a means to stop normally – this is an emergency device only.
- Rectify any dangerous situation before releasing the emergency stop button when the emergency button is used.
- Do not loosen or remove the emergency stop button.
  Tighten the emergency stop button by hand if loosened.

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1-2-3. Maintenance

⚠ WARNING

- Never alter the pendant control switch.
- Shut off the air supply before performing any maintenance work.
- Inspect the pendant control switch thoroughly at least once a year, and replace any worn or damaged parts.
- Always employ qualified or trained personnel for inspection and maintenance requiring disassembly or reassembly.
- Only use genuine parts.
- Do not do anything if you have any questions about the pendant control switch, please do not hesitate to contact the dealer from whom you purchased the pendant switch, or the nearest dealer shop.

2. Description of Product

2-1. Structure of Pendant Control Switch

- The pendant control switch consists of a cylinder assembly, control tube unit and control valve assembly as shown in Fig. 1.
- The control valve assembly is equipped with an emergency stop device according to the requirement of 1.2.4. “Stopping” of Annex I, the EC-Machinery Directive 2006/42/EC.
- The caution plate contains the safety instructions for operating the hoist.

> ⚠ **WARNING:** Do not operate the hoist unless the contents of this manual, the air hoist instruction manual and the caution plate (caution label) are completely known.

- A model name of the product is indicated on the name plate. Please specify the model name when ordering the product or parts.

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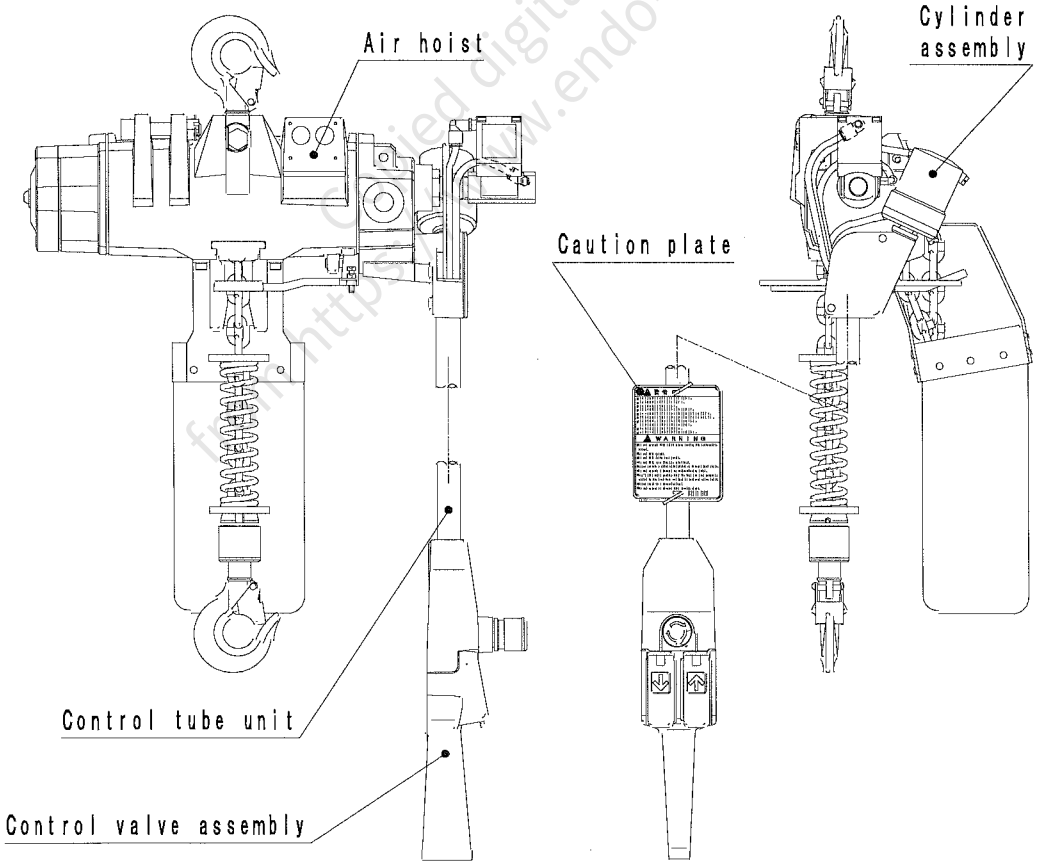

Fig. 1

2-2. Specifications

Model	Air pressure MPa {kgf/cm²}	Applicable air hoist model	Mass kg
PCS-1BV	0.4 - 0.6 { 4 - 6 }	EHL-025TS EHL-05TS EHL-1TW	3.2
PCS-2BV1	0.4 - 0.6 { 4 - 6 }	EHL-1TS EHL-2TW	3.5
PCS-2BV2	0.4 - 0.6 { 4 - 6 }	EHL-3TS EHL-6TW	3.5

3. Checks before Installation

- Check the delivered product is what you ordered (check the name plate).
- Check there was no damage to the pendant control switch during transportation.
- Check the model of the pendant control switch corresponds to the model of the hoist (see Chapter 2-2 “Specifications”).

4. Installation

⚠ WARNING: Shut off the air supply before installing the pendant control switch if the hoist is already in service.

⚠ CAUTION

- Do not perform installation work on unstable ground. Always secure a safe place for working.
- Always employ qualified or well trained personnel for installation.
- Careless mistakes during installation may cause damage to the hoist and pendant control switch or personal injury.

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4-1. Attaching Pendant Switch to the Hoist (See fig. 2)

When the pendant control switch is delivered separately from the hoist, attach the pendant control switch to the hoist using the following procedure.

-1) Remove Cover(B) from Valve housing(A).
-2) Remove Cover(61) from Cylinder holder(20).
-3) Install Cylinder(10) and Cylinder holder(20) together, and install Cover(29) on Valve housing(A).
-4) Install Nipple(68) and Valve(69) to the air suply port of valve housing(A). Also install elbows(70)(71) to the valve(69).
-5) Connect Nylon tubes according to the coloring.
-6) Install Cover(61).

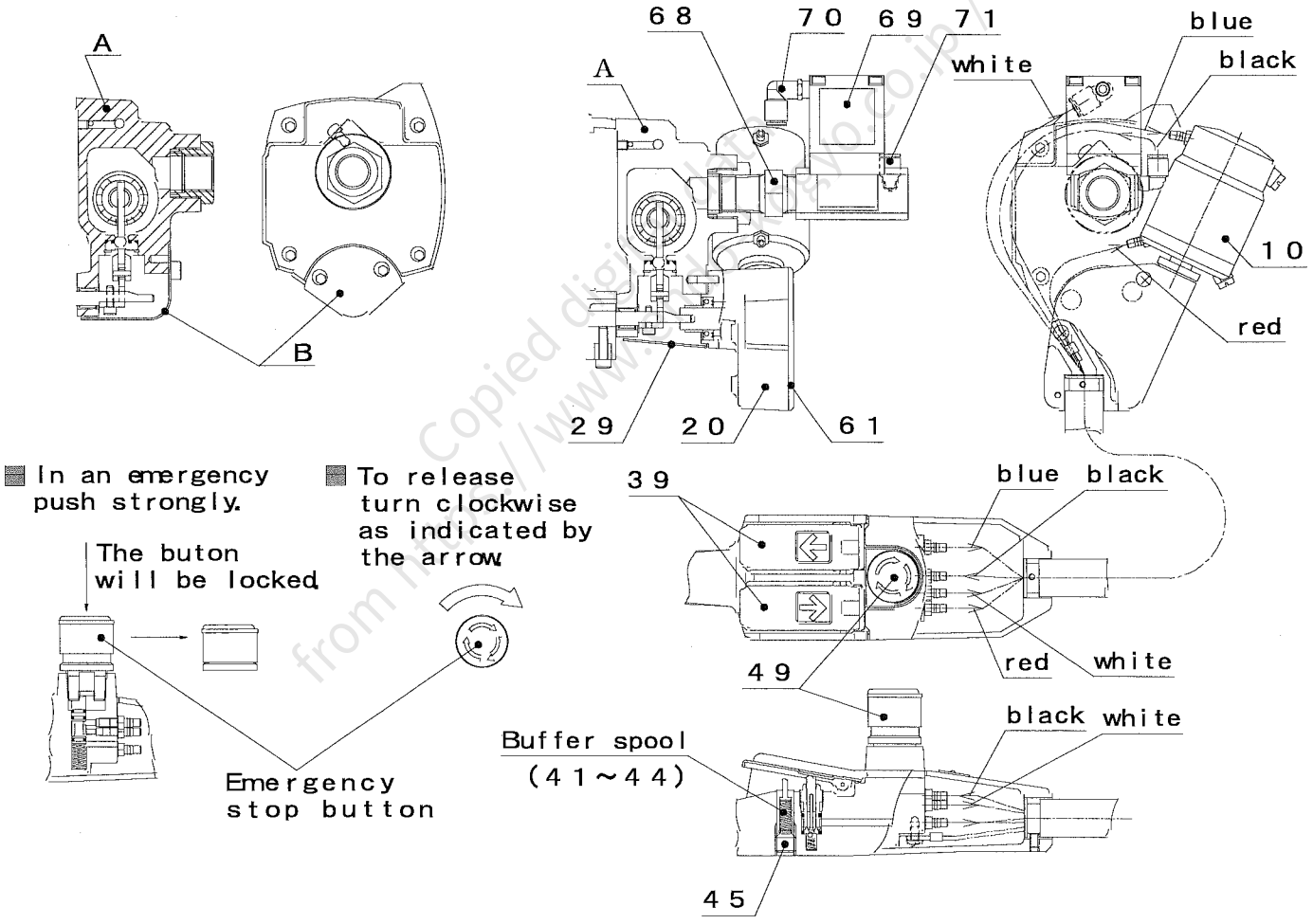

Fig. 2

4-2. Installing the Hoist

Install the hoist according to the air hoist instruction manual.

5. Checks after Installation and Test Run

5-1. Check Load chain, hoisting operation and lifting/lowering limit switches according to the air hoist instruction manual.

5-2. Speed Control Using Pendant Control Switch (See. Fig. 2)

- When Push button(39) is pressed slightly, Push button (39) first touches Buffer spool(41 ～ 44).
  The hoist will start lifting/lowering at low speed in this state.
  As Push button(39) is pressed, the hoist will increase speed from low to the maximum.
- Buffer spool is set before delivery so that the hoist will start lifting the rated load at low speed when the air pressure is 0.4 MPa {kgf/cm^2}.
  If necessary, the starting speed can be adjusted by resetting the Buffer spool position. Turn Set screws(45) counterclockwise to increase, turn clockwise to decrease.

5-3. Emergency Stop Device

- Push Emergency stop button(49) strongly while pressing Push button(39) during the lifting and lowering operation.
  Check the emergency stop device securely stops the lifting/lowering operation.
- Loosen Push button(39), then release Emergency stop button(49) by turning clockwise as indicated by the arrow.

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⚠ WARNING

- Never release Emergency stop button(49) while pressing Push button(39).
  The hoist will operate suddenly, causing serious danger.
- Do not turn Emergency stop button counterclockwise (opposite to the arrow).
  If turned, Emergency stop button will become loose and air may leak, causing serious danger.
  Tighten Emergency stop button by hand if loosened.

- Check the lifting/lowering operation is normal after releasing Emergency stop button.

6. Operation

⚠ WARNING

- Do not start suddenly, do not stop suddenly, and do not reverse the hoist suddenly.
  Always operate the hoist smoothly.
- Never lock the push button switches.
  The pendant control switch must be operated by the operator himself/herself at all times.
- Never use the emergency stop button as a means to stop normally – this is an emergency device only.
- Rectify any dangerous situation before releasing the emergency stop button when the emergency button is used.
- Do not loosen or remove the emergency stop button.
  Tighten the emergency stop button by hand if loosened.

⚠ CAUTION

- Do not knock the pendant control switch against the suspended load or the surrounding structure.
- Never pull the pendant control switch when using a trolley.

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7. Lubrication

- Thoroughly clean and lubricate the following portions every time when disassembling the pendant control switch for maintenance or inspection.
- Apply lithium saponified silicon grease corresponding to the No. 2 class of NLGI (National Lubrication Grease Institute) to Piston rod(1), the inside surface of Cylinder(10) and Valve cone(47).
- Apply EP type grease to other sliding surfaces.

See “Recommended Lubricants” described in the Chapter titled “Lubrication” in the air hoist instruction manual.

8. Disassembly and Reassembly

⚠ WARNING

- Shut off the air supply before disassembly or reassembly.
- Always employ qualified or trained personnel for maintenance.

⚠ CAUTION

- Careless mistakes during maintenance may cause damage to the hoist and pendant control switch or personal injury.
  Therefore, take care during maintenance.
- Whenever grasping a part in a vice, always use copper-covered vice jaws to protect the surface of the part and help prevent distortion.

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8-1. Procedures of Disassembly

- For removing the hoist from the supporting member and disassembling the hoist, see the air hoist instruction manual.
- Referring to the disassembly drawing (on page 13), disassemble the pendant control switch using the following procedure.
  When replacing worn parts, only disassemble the necessary portion.

-1) Remove Cover(61), disconnect Nylon tubes(54, 55, 56, 67) from Cylinder(10) and the hoist body.
-2) Remove elbow(70) and remove Nipple(68) and valve(69) from the air supply port.
-3) Remove Wire rope(52) from Cylinder holder(20).
-4) Remove Cylinder(10) and Cylinder holder(20) together.
-5) Remove Retaining ring(27), and remove pin(26) through the hole at the back of Cylinder holder(20).
-6) Measure the distance between Bearing nut(16) and Cylinder cover(11) (see Fig. 3).
   Note) This distance is necessary for reassembly.
   Be sure to measure it.
-7) Loosen Bearing nut(16), and remove Cylinder unit from Cylinder holder(20).
-8) Cylinder unit
   ① Remove Cap screws(12) and Cylinder(10).

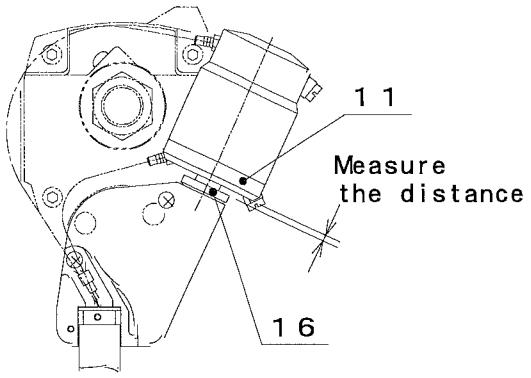

Fig. 3

② Remove Lock nut(9), Piston(7), Spacers(4, 6), Spring(5) and Ring(3).
③ Remove Retaining ring(2) and Cylinder cover(11).

-9) Cylinder holder unit

① Check Shaft(24) rotates smoothly and there is no wear on the fitting portion.
If there are no problems, disassembly is not required.

② If disassembly is required, remove Shaft(24) by pushing from the Sleeve(25) side using a protective buffer and hand press.
Do not reuse removed Sleeve because the fitting portion becomes loose.
Replace with a new one.

-10) Valve housing unit

① Remove Valve cover(59), Nylon tubes and Wire rope.
② Remove Pin(40) and Push buttons(39).
③ Remove Valve knobs(38) and Pins(37).
④ Remove Liners(36), Seats(35), Steel balls(33) and Springs(32).
⑤ Turn Emergency stop(49) button counterclockwise and remove.
⑥ Remove Valve cone(47) and Spring(46).

8-2. Reassembly

⚠ CAUTION

- Before reassembly, thoroughly clean all disassembled parts and check for cracks, flaws, deformation and wear.
- Never use acidic solvents for cleaning.
- Replace any damaged or excessively worn parts.
  Also replace burred or damaged screws.
- Only use genuine parts.

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NOTE:
- Never use solvents to clean rubber parts, such as O-rings, or plastic parts.
- Whenever grasping a part in a vice, always use copper-covered vice jaws to protect the surface of the part and help prevent distortion.
- Always press on the inner ring of a ball-type bearing when installing the bearing on a shaft.
- Always press on the outer ring of a ball-type bearing when pressing the bearing into a bearing recess.

Reassemble the pendant control switch in reverse order, and note the following points:

-1) Always replace Retaining ring(2) with a new one.
-2) Assembly direction for Retaining ring (See Fig. 4)
Set up Retaining ring so that the non-chamfered face bears the load.

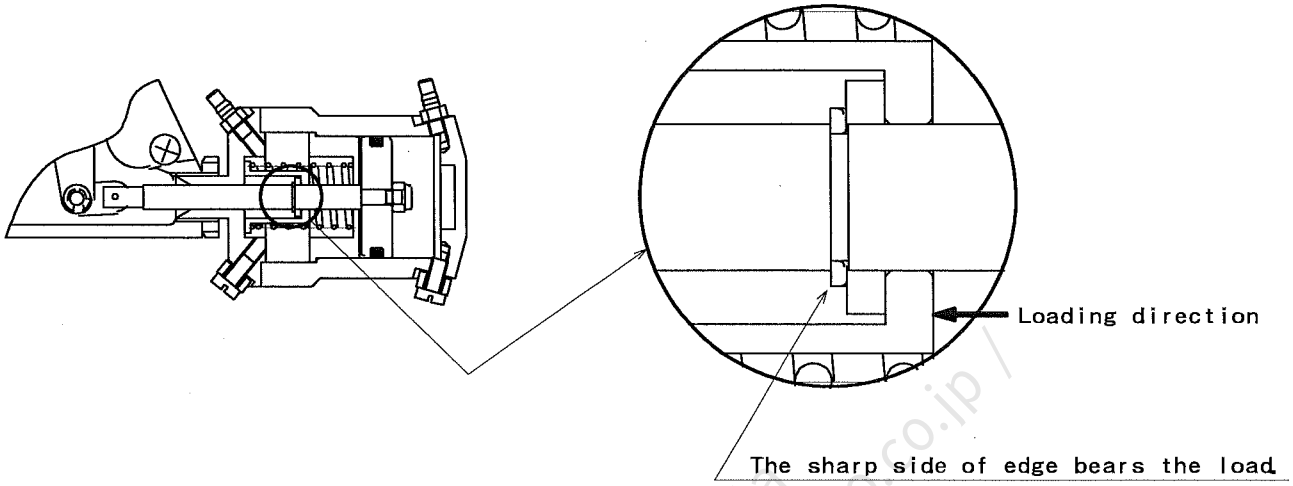

Fig. 4

-3) Assemble Cylinder(10) and Cylinder holder(20) so that the distance between Bearing nut(16) and Cylinder is the same as the distance measured during disassembly.
-4) Install Spring(32) as shown in Fig. 5.
Take care not to drop Steel ball(33) from the top of Spring(32) when installing Seat(35).

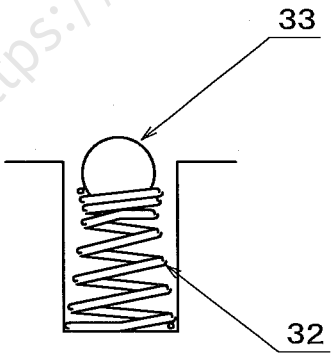

Fig. 5

-5) Seal to the Nipple(68) and elbow(71), then install to the air supply port.

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9. Parts list

Remarks When Purchasing Parts

- Specify part No., part name and model name of the product.
- State SERIAL NO. (product No.) clearly if attached.
- Parts without part Nos. can not be supplied individually. Please purchase a set or complete unit.

■ How to read parts list

Ref. No.	Part No.	Quantity PCS-1BV	PCS-2BV1	PCS-2BV2	Description
—	LHP000612a	1	1	1	Control valve assembly
31	P2H100054	1	1	1	— Valve housing
28	KA16110508	6	6	6	— Set screw
32	P2H300158	2	2	2	— Spring
⋮	⋮	⋮	⋮	⋮	⋮
—	—	2	2	2	— Buffer spool compl.
41	—	2	2	2	— — Spring case
42	—	2	2	2	— — Spool
43	—	2	2	2	— — Spring
44	—	2	2	2	— — Retaining ring
⋮	⋮	⋮	⋮	⋮	⋮
60	KA10220510	2	2	2	— Machine screw

The mark indicates the range of the set or the complete unit.

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■ PARTS LIST PCS-1BV, PCS-2BV1, PCS-2BV2 PENDANT SWITCH

	Ref. No.	Part No.	Description	Quantity		
				PCS-1B	PCS-2BV1	PCS-2BV2
	-	LHP000016	Cylinder assembly	1	-	-
	-	LHP000017	Cylinder assembly	-	1	1
	-	LHP000202	-Cylinder compl.	1	-	-
	-	LHP000203	-Cylinder compl.	-	1	1
	1	P2H400215	--Piston rod	1	1	1
●	2	KA40110007	--Retaining ring	1	1	1
	3	P2H400216	--Ring	1	1	1
	4	P2H400217	--Spacer	1	1	1
	5	P2H400218	--Spring	1	1	1
	6	P2H400219	--Spacer	1	1	1
	7	P2H400220	--Piston	1	1	1
●	8	KA50100315	--O-ring	1	1	1
●	9	P2H400221	--Lock nut	1	1	1
	10	P2H300156	--Cylinder	1	1	1
	11	P2H300157	--Cylinder cover	1	1	1
	12	KA00910410	--Cap screw	4	4	4
●	13	P2H400214	--Seal	4	4	4
	14	P2H400222	--Silencer	2	2	2
	15	P2H400223	--Bolt	2	2	2
	16	KA64101002	--Bearing nut	1	1	1
	17	P2H400224	--Link	1	-	-
	17	P2H400208	--Link	-	1	1
	18	P2H400865	--Pin	1	1	1
	19	P2H400257	--Nipple	2	2	2
	-	LHP000204	-Cylinder holder compl.	1	-	-
	-	LHP000205	-Cylinder holder compl.	-	1	1
	20	P2H200058	--Cylinder holder	1	-	-
	20	P2H200057	--Cylinder holder	-	1	1
	21	KA43200412	--Parallel pin	1	1	1
	22	KA60102012	--Ball bearing	2	-	-
	22	KA60103032	--Ball bearing	-	2	2
	23	P2H400265	--Spacer	1	-	-
	24	LHP000076	--Shaft	1	-	-
	24	LHP300150	--Shaft	-	1	1
	25	P2H400165	--Sleeve	1	-	-
	25	P2H400209	--Sleeve	-	1	1
	26	P2H400228	--Pin	1	1	1
	27	KA40310040	--Retaining ring	1	1	1
	28	KA16110508	--Set screw	1	1	1
	30	KA00910642	--Cap screw	2	-	-
	30	KA00910844	--Cap screw	-	2	2
	61	P2H300162	--Cover	1	-	-
	61	P2H300152	--Cover	-	1	1
	60	KA10220510	--Machine screw	2	2	2
	29	P2H400229	-Cover	1	-	-
	29	P2H300151	-Cover	-	1	1
	-	LHP002432	Control valve assembly	1	1	1
	31	P2H100054	-Valve housing	1	1	1
	28	KA16110508	-Set screw	5	5	5
	32	P2H300158	-Spring	2	2	2
	33	KA63100304	-Steel ball	2	2	2
●	34	KA50100080	-O-ring	4	4	4
	35	P2H400247	-Seat	2	2	2
	36	P2H300159	-Liner	2	2	2
	37	P2H400248	-Pin	2	2	2
	38	P2H400249	-Valve knob	2	2	2
	39	LHP000210	-Push button set	1	1	1
	40	P2H400251	-Pin	1	1	1

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Ref. No.	Part No.	Description	Quantity		
			PCS-1B	PCS-2BV1	PCS-2BV2
-	LHP000053	-Buffer spool compl.	2	2	2
41	-	--Spring case	2	2	2
42	-	--Spool	2	2	2
43	-	--Spring	2	2	2
44	-	--Retaining ring	2	2	2
45	P2H400256	-Set screw	2	2	2
46	P2H400939	-Spring	1	1	1
47	P2H300571	-Valve cone	1	1	1
● 48	P2H400937	-O-ring	3	3	3
49	P2H400938	-Emergency stop button	1	1	1
● 13	P2H400214	-Seal	6	6	6
19	P2H400257	-Nipple	4	4	4
59	P2H200169	-Valve cover	1	1	1
60	KA10220510	-Machine screw	2	2	2
-	LHP002433	Control tube compl.	1	1	1
50	-	-Protection hose	1	1	1
51	-	-Inner	2	2	2
52	-	-Wire rope	1	1	1
53	-	-Lock tube	2	2	2
54	-	-Nylon tube(black)	1	1	1
55	-	-Nylon tube(red)	1	1	1
56	-	-Nylon tube(blue)	1	1	1
67	-	-Nylon tube(white)	1	1	1
66	KA86100220	-Hose clip	2	2	2
57	KA30220500	Plain washer	2	2	2
58	KA10120508	Machine screw	2	2	2
62	P2H402984	Name plate	1	-	-
62		Name plate	-	1	-
62		Name plate	-	-	1
63	KA14549803	Drive screw	2	2	2
64	P2H300274	Caution plate	1	1	1
65	P2H400465	Convex belt	2	2	2
68	KA81012100	Nipple	1	1	-
68	KA81012700	Nipple	-	-	1
69	P2H301409	Valve	1	1	-
69	P2H301410	Valve	-	-	1
70	P2H402978	Elbow	1	1	1
71	P2H402405	Elbow	1	1	1

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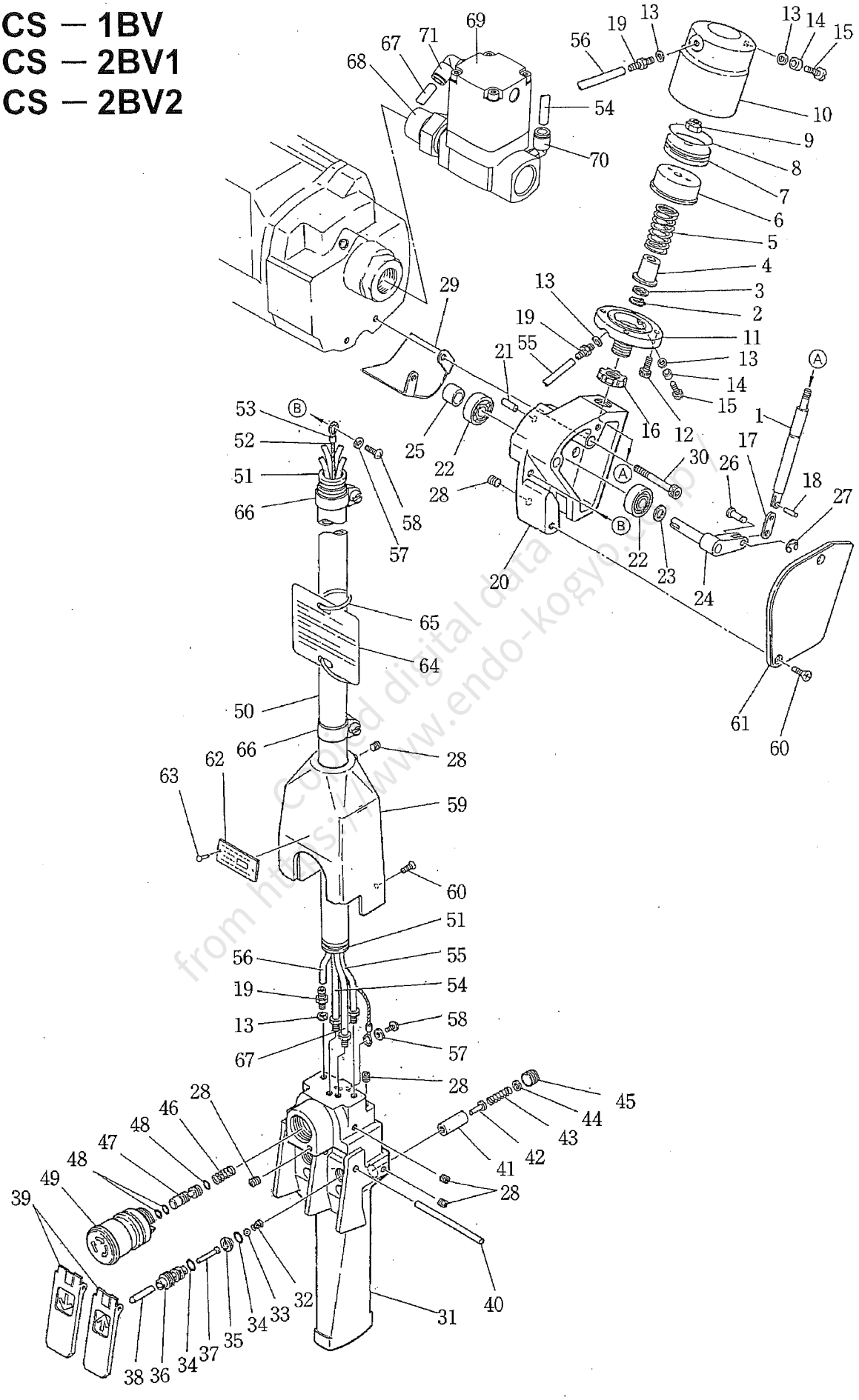
We recommend that you stock parts indicated by a bullet(●).
Parts without a part number cannot be supplied individually .
When ordering spare parts, specify the part number(not the reference number), description and model name of the trolley.

■PCS – 1BV
PCS – 2BV1
PCS – 2BV2



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