

HRL

Hybrid robot

Modular unit

Overview

A high-rigidity guide rod is integrated into the super micro cylinder, creating a single axis unit with a long stroke transport function.

Features

Slim with high rigidity.

Ball bushing is used for bearing section.

Position detection switch, shock absorber and speed controller are equipped as standard.

A position locking mechanism can be mounted if required by the application.



CONTENTS

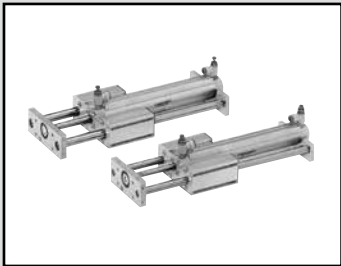
● HRL-1 (single axis unit)	1452
⚠ Safety precautions	1460

Model No.	Load capacity (kg)	Basic cylinder	Stroke (mm)		Page
			Basic body shape	Long body shape	
HRL-1*	5/10/15/25/50/65	SCM	50/75/100/125/ 150/200/250/300	350/400/450/ 500/550/600	1452

The cylinder switches T2YH, T2YV, T3YH, and T3YV are scheduled for end of production at the end of December 2023.

LCM
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LCX
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UCA2
ULK*
JSK/M2
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USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

LCM
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FJ
FK
SpdContr
Ending



Hybrid robot
Single axis unit

HRL-1 Series

● Load capacity: 5/10/15/25/50/65 kg



Specifications

Item		HRL-1□-05	HRL-1□-10	HRL-1□-15	HRL-1□-15H	HRL-1□-25	HRL-1□-50	HRL-1□-65
Load capacity (vertical) *1 kg		5	10	15		25	50	65
Basic cylinder		SCM-00-20D	SCM-00-25D	SCM-00-32D		SCM-00-40D	SCM-00-50D	SCM-00-63B
Bore size mm		20	25	32		40	50	63
Guide rod diameter mm		13	13	16	20	20	25	30
Speed mm/s		50 to 500						
Working pressure MPa		0.3 (≈44 psi, 3 bar) to 0.7 (≈100 psi, 7 bar)						
Adjustable stroke range *2 mm		0 to -10 mm (push)						
Shock absorber *3		NCK-00-0.7		NCK-00-1.2		NCK-00-12		
Product weight kg	Basic	2 + (0.0033 × stroke length)	2.1 + (0.0037 × stroke length)	2.8 + (0.0051 × stroke length)	2.9 + (0.0069 × stroke length)	10.8 + (0.0081 × stroke length)	11.9 + (0.0122 × stroke length)	13.3 + (0.02 × stroke length)
	Long body	2.3 + (0.0033 × stroke length)	2.4 + (0.0037 × stroke length)	3.1 + (0.0051 × stroke length)	3.2 + (0.0069 × stroke length)	12.5 + (0.0081 × stroke length)	13.6 + (0.0122 × stroke length)	15+(0.02 × stroke length)
Movable part weight kg	Basic	0.9 + (0.0025 × stroke length)	0.9 + (0.0027 × stroke length)	1.3 + (0.0041 × stroke length)	1.6 + (0.0059 × stroke length)	4.1 + (0.0066 × stroke length)	5.2 + (0.0102 × stroke length)	6.1 + (0.0137 × stroke length)
	Long body	1.0 + (0.0025 × stroke length)	1.0 + (0.0027 × stroke length)	1.5 + (0.0041 × stroke length)	1.8 + (0.0059 × stroke length)	4.4 + (0.0066 × stroke length)	5.7 + (0.0102 × stroke length)	6.8 + (0.0137 × stroke length)
Speed controller *4		SC3W-6-6				SC3W-6-8	SC3W-8-8	

- *1 : Load capacity varies with air pressure, speed and absorption energy. (Value is for reference.)
 *2 : Adjustable stroke is not available for pulled side.
 *3 : The shock absorber is built into the body. Use within the following allowable shock absorber tolerance values at the working speed and working air pressure.
 · HRL-1□F-05/10/15/15H Pull... 70% or less
 · HRL-1□F-25/50/65 Pull... 65% or less
 · Other than the above: 74% or less
 *4 : The speed controller is included.

Switch specifications

- 1-color/2-color display/for AC magnetic field proof

Item	Proximity 2-wire			Proximity 3-wire			Reed 2-wire				Proximity 2-wire
	T2H/T2V	T2JH/T2JV	T2YH/T2YV	T3H/T3V	T3PH/T3PV	T3YH/T3YV	T0H/T0V		T5H/T5V		T2YD (*4) T2YDT
Applications	Dedicated for programmable controller			For programmable controller, relay			For programmable controller, relay		For programmable controller, relay, IC circuit (no indicator lamp), serial connection		For programmable controller
Output method	-			NPN output	PNP output	NPN output	-				-
Pwr. supp. V.	-			10 to 28 VDC			-				-
Load voltage	10 to 30 VDC			30 VDC or less			12/24 VDC	110 VAC	5/12/24 VDC	110 VAC	24 VDC ±10%
Load current	5 to 20 mA (*3)			100 mA or less		50 mA or less	5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less	5 to 20 mA
Indicator lamp	LED (Lit when ON)		Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)		-		Red/green LED (Lit when ON)
Leakage current	1 mA or less			10 μA or less			0 mA				1 mA or less
Weight	1 m:18 g		1 m:33 g	1 m:18 g		1 m:33 g	1 m:18 g				1 m:61 g
	3 m:49 g		3 m:87 g	3 m:49 g		3 m:87 g	3 m:49 g				3 m:166 g
	5 m:80 g		5 m:142 g	5 m:80 g		5 m:142 g	5 m:80 g				5 m:272 g

- *1 : Refer to Ending Page 1 for detailed switch specifications and dimensions.
 *2 : Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.
 *3 : The max. load current is 20 mA at 25°C. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25°C.
 (5 to 10 mA at 60°C)
 *4 : AC magnetic field proof switch (T2YD/T2YDT) cannot be used in DC magnetic fields.

How to order

Without switch *1

HRL-1 **L** - **05** - **350** - **Q**

With switch

HRL-1 **L** - **05** - **350** - **Q** - **T0H3** - **R**

A Basic shape

F Switch quantity

B Load capacity

C Stroke length

D Position locking mechanism
*2

E Switch model No.
* indicates the lead wire length.

⚠ Precautions for model No. selection

*1 : When without switch is selected, with/without cylinder switch rail depends on whether position locking is selected.
Without position locking mechanism: Without switch rail
With position locking mechanism: With switch rail

*2 : The position locking mechanism can be installed on the head side of the cylinder only.

[Example of model No.]

HRL-1L-05-350-Q-T0H3-R

Model: Hybrid robot HRL-1 Series

A Basic shape : Long body

B Load capacity : 5 kg

C Stroke length : 350 mm

D Position locking mechanism : With

E Switch model No. : Reed T0H switch, lead wire 3 m

F Switch quantity : 1 on rod side

Specifications for rechargeable battery

(Catalog No. CC-1226A)

● Design compatible with rechargeable battery manufacturing process.

HRL-1 - ... - **P4***

Code	Description					
A Basic shape						
Blank	Basic					
L	Long body					
F	Basic front flange					
LF	Long body front flange					
B Load capacity (vertical)						
05	5 kg					
10	10 kg					
15	15 kg					
15H						
25	25 kg					
50	50 kg					
65	65 kg					
C Stroke length (mm)						
[Basic body shape]						
50, 75, 100, 125, 150, 200, 250, 300						
[Long body shape]						
350, 400, 450, 500, 550, 600						
D Position locking mechanism						
Blank	Without					
Q	With					
E Switch model No.						
Axial lead wire	Radial lead wire	Contact	Voltage		Display	Lead wire
			AC	DC		
T0H*	T0V*	Reed	●	●	1-color display	2-wire
T5H*	T5V*		●	●	Without indicator lamp	
T2H*	T2V*	Proximity		●	1-color display	2-wire
T3H*	T3V*			●		3-wire
T3PH*	T3PV*			●	1-color display	3-wire
T2YH*	T2YV*			●	2-color display	2-wire
T3YH*	T3YV*			●		3-wire
T2YD*	-			●	2-color display	2-wire
T2YDT*	-			●	AC magnetic field	
T2JH*	T2JV*			●	1-color display off-delay	2-wire
* Lead wire length						
Blank	1 m (standard)					
3	3 m (option)					
5	5 m (option)					
F Switch quantity						
R	1 on rod side					
H	1 on head side					
D	2					
T	3					

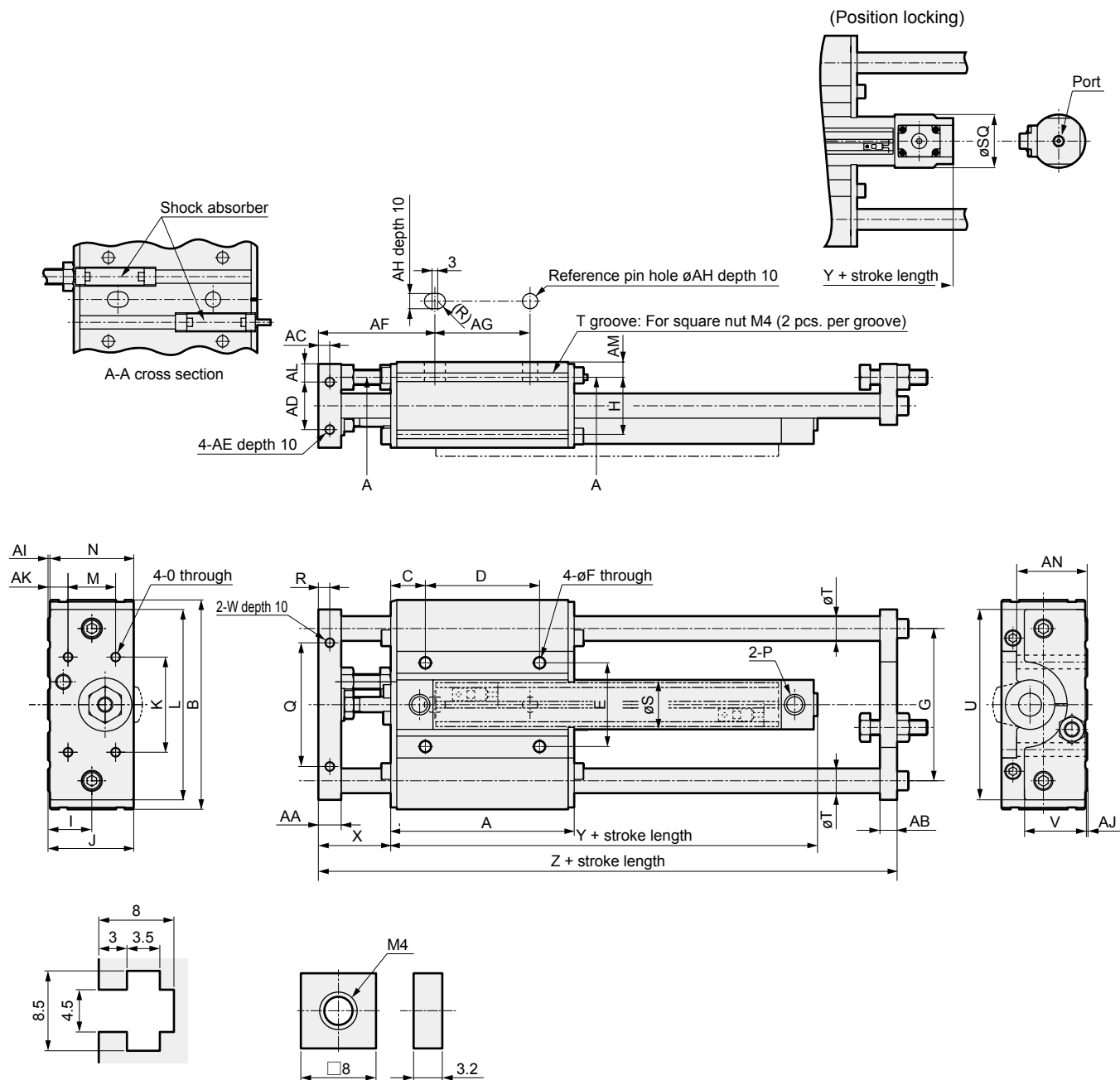
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UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
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LML
HCM
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SpdContr
Ending

HRL-1 Series

Dimensions



● HRL-1-05 to 15H (basic body)



T groove section dimension

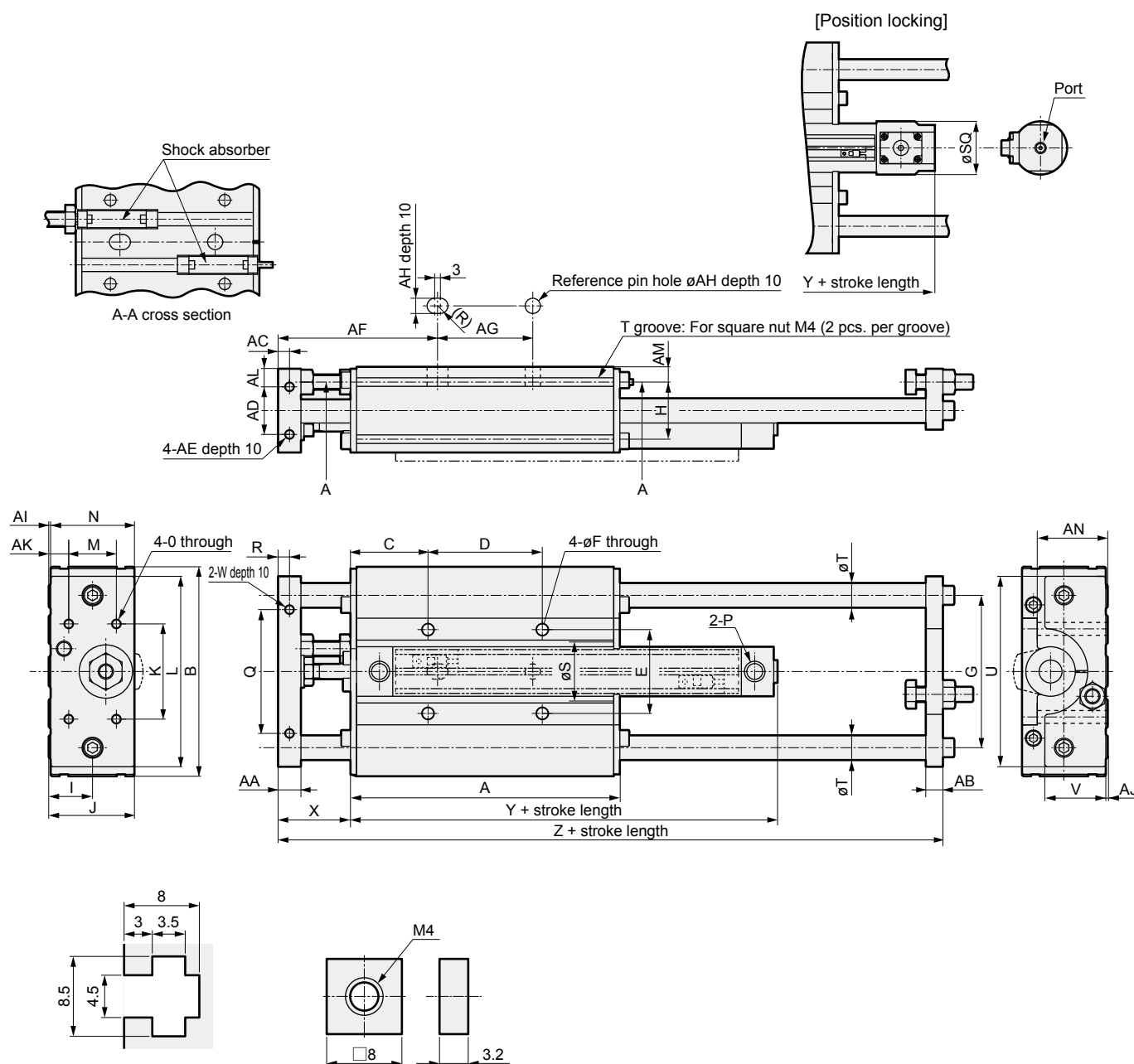
Integrated square nut dimension

Model No.	Stroke range (mm)		A	AA	AB	AC	AD	AE	AF	AG	AH		AI	AJ	AK	AL	AM	AN	B	C	D	E	F		
HRL-1-05	50,75		96.4	12	9	6	25	M5	61.2	50	8 ^{+0.03} ₀		1	1	10.5	9.5	8	37	110	18.2	60	44	6		
-10	100,125																		130			52	7		
-15	150,200																								
-15H	250,300																								
Model No.	G	H	I	J	K	L	M	N	O	P	Q	R	S	SQ	T	U	V	W	X	Y		Z			
HRL-1-05	80	30	23	45	50	100	25	44	M5	Rc1/8	65	6	26	30	13	100	32	M5	38	No position locking	74.2	94.2	154		
-10					60	120							31	35						With position locking	96.2				
-15													38	38.1	16	120	38								
-15H													94	75	38	20									

Dimensions



- HRL-1L-05 to 15H (long body)



T groove section dimension

Integrated square nut dimension

Model No.	Stroke range (mm)		A	AA	AB	AC	AD	AE	AF	AG	AH		AI	AJ	AK	AL	AM	AN	B	C	D	E	F		
HRL-1L-05	350,400		141.4	12	9	6	25	M5	83.7	50	8 ^{+0.03} ₀	1	1	10.5	9.5	8	37	110	40.7	60	44	6			
-10	450,500		151.4						88.7																
-15	550,600																								
-15H																									
Model No.	G	H	I	J	K	L	M	N	O	P	Q	R	S	SQ	T	U	V	W	X	Y		Z			
HRL-1L-05	80	30	23	45	50	100	25	44	M5	Rc1/8	65	6	26	30	13	100	32	M5	38	No position locking	With position locking	199			
-10																				31	35				
-15																									
-15H					94									60						120				75	38

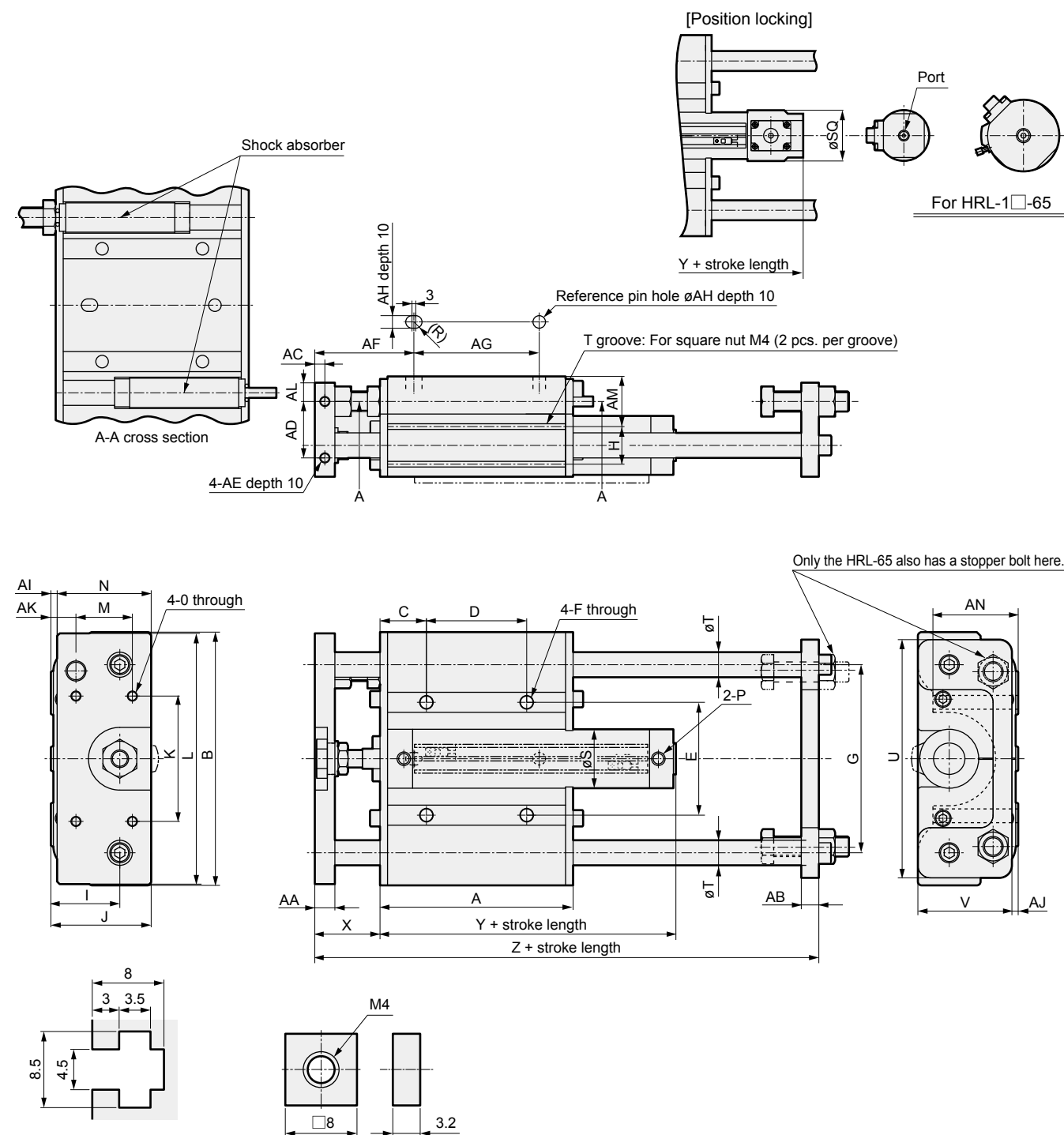
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UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
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Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

HRL-1 Series

Dimensions



● HRL-1-25 to 65 (basic body)



T groove section dimension

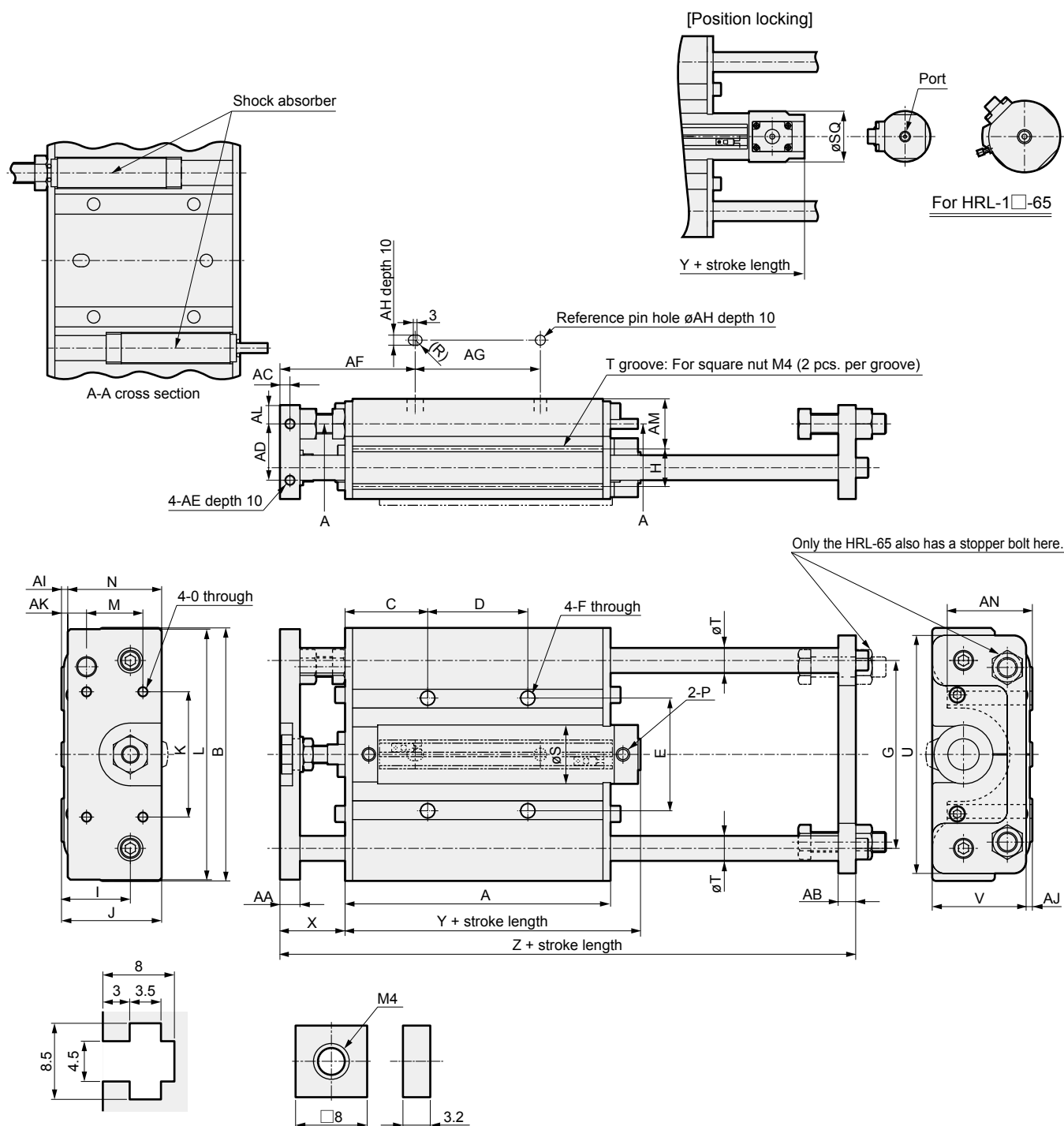
Integrated square nut dimension

Model No.	Stroke range (mm)		A	AA	AB	AC	AD	AE	AF	AG	AH		AI	AJ	AK	AL	AM	AN	B	C	D						
HRL-1-25	50,75,100		154	16	14	8	45	M8	79	100	10 ^{+0.03} ₀	5	5	20	15	40	68	202	37	80							
-50	125,150,200			19		9.5			82				2														
-65	250,300																										
Model No.	E	F	G	H	I	J	K	L	M	N	O	P	S	SQ	T	U	V	X	Y		Z						
HRL-1-25	90	11	150	30	55	80	100	200	45	75	M8	Rc1/8	47	51	20	190	75	52	86	121	252						
-50						92						Rc1/4	58	60	25			55	98	138	255						
-65													72	72.1	30												

Dimensions



- HRL-1L-25 to 65 (long body)



T groove section dimension

Integrated square nut dimension

Model No.	Stroke range (mm)		A	AA	AB	AC	AD	AE	AF	AG	AH		AI	AJ	AK	AL	AM	AN	B	C	D					
HRL-1L-25	350,400		212	16	14	8	45	M8	108	100	10 ^{+0.03} ₀		5	5	20	15	40	68	202	66	80					
-50	450,500			19		9.5			111					2												
-65	550,600																									
Model No.	E	F	G	H	I	J	K	L	M	N	O	P	S	SQ	T	U	V	X	Y		Z					
HRL-1L-25	90	11	150	30	55	80	100	200	45	75	M8	Rc1/8	47	51	20	190	75	52	86	121	310					
-50						92						Rc1/4	58	60	25			55	98	138	313					
-65													72	72.1	30											

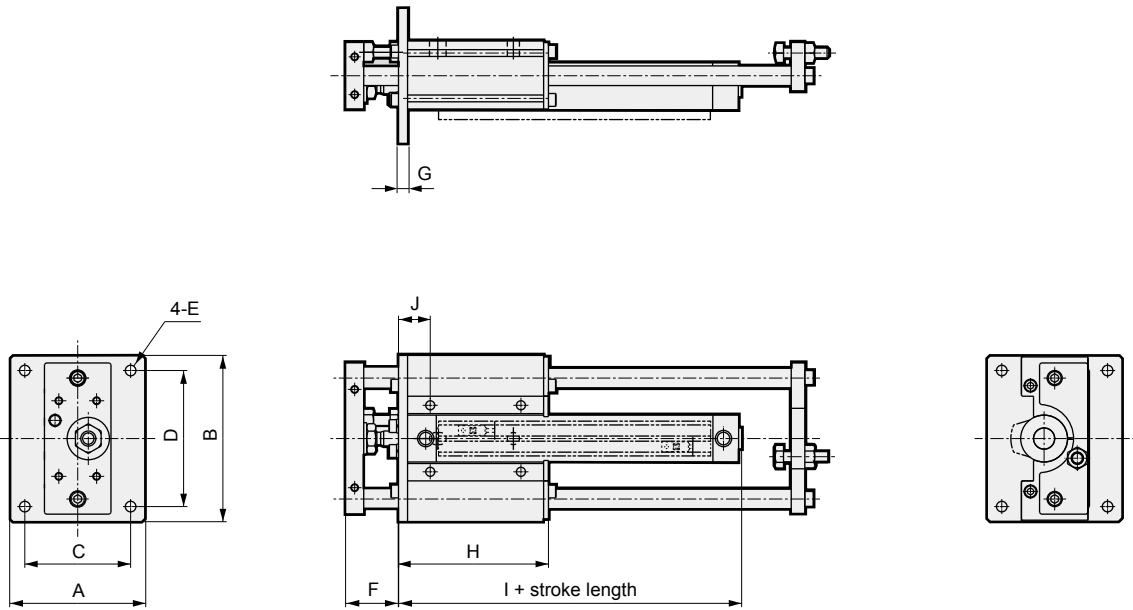
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Ending

HRL-1 Series

Dimensions



● With front flange

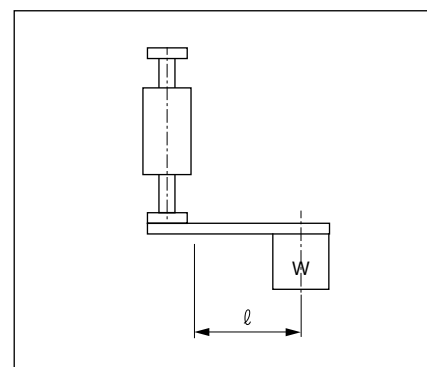
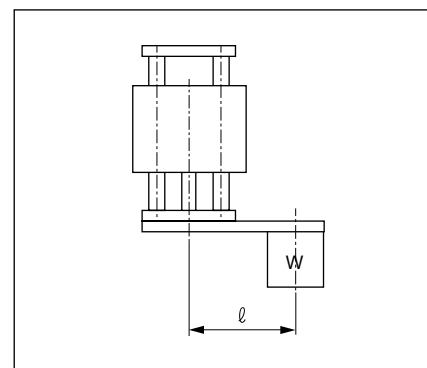
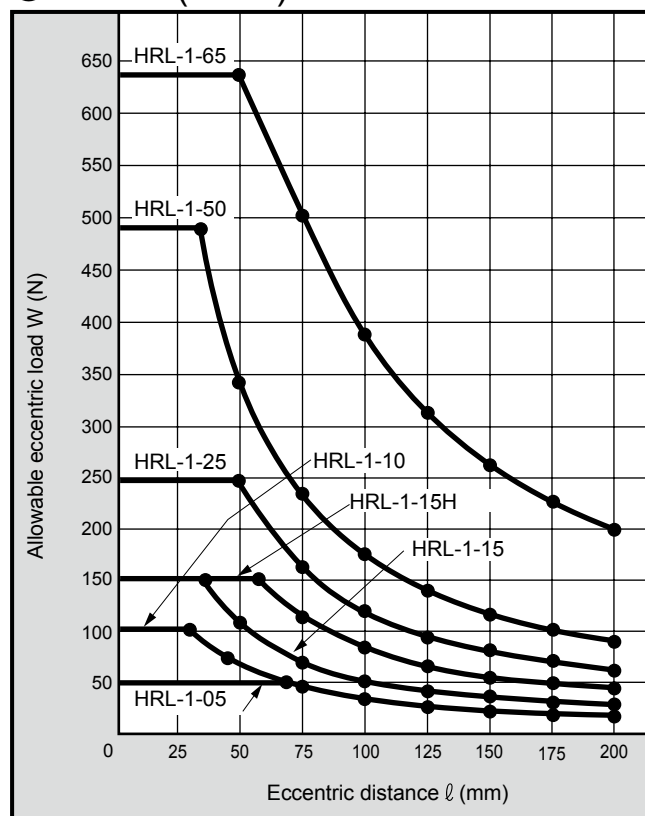


* Other dimensions are the same as those of the basic.

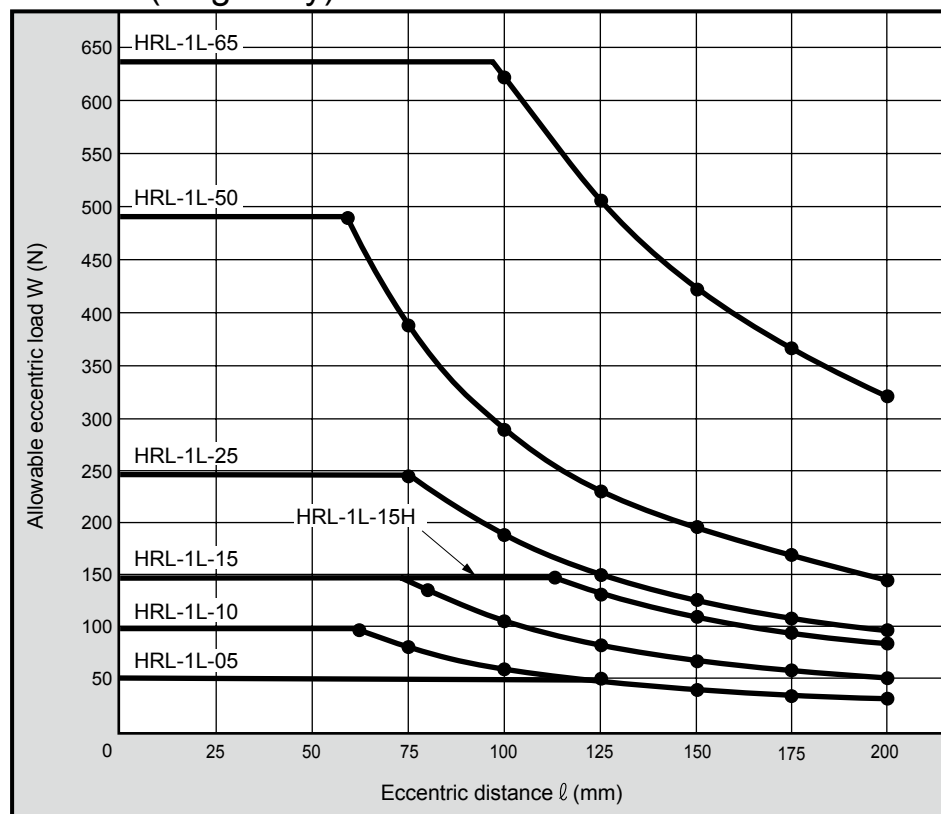
Model No.	A	B	C	D	E	F	G	H		I	J	
								Basic	Long body		Basic	Long body
HRL-1□F-05	90	110	70	90	7	35	6	99.2	144.2	77	21	43.5
-10		130		100					154.2	79		48.5
-15												
-15H												
-25	140	200	110	170	11	46	12	160	218	92	43	72
-50						49				104		
-65												

Allowable eccentric load

● HRL-1 (basic)



HRL-1L (long body)



LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
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Ending



Pneumatic components

Safety Precautions

Be sure to read this section before use.

Refer to Intro Page 73 for general information of the cylinder, and to Intro Page 80 for general information of the cylinder switch.

Product-specific cautions: New handling system / hybrid robot

Design/selection

1. Lubrication

⚠ CAUTION

■ Cylinder

This cylinder is no-lubrication. If lubrication is required, use turbine oil class 1 ISO VG32. Packing may be damaged if a different lubricant is used, and operation faults may occur. Take care to avoid lubrication shortages when reapplying lubricant. If lubricant runs out, operation will become unstable.

■ LM guide

Lubricate from the grease nipple every 100 km of travel distance. Use one of:
Lithium grease (JIS 2)
Urea grease (JIS 2)
for lubrication.



2. Service life

⚠ CAUTION

■ The life of the unit is greatly affected by the life of pneumatic components.

General components are used for pneumatic components, so life is 3 to 5 million operations or a travel of approx. 1,000 km.
(Usage conditions and operating environment greatly affects the service life, so the above values are not guaranteed)

Mounting, installation and adjustment

1. Mounting orientation

⚠ WARNING

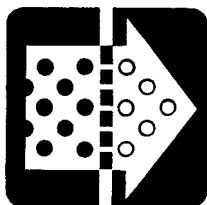
- Units other than HRL-1(L) are all horizontally mounted only. Damage will result if mounted upside-down. Select the vertical transfer (Z-axis direction) load capacity according to the inner cylinder's thrust.



2. Quality of air

⚠ CAUTION

- The compressed air supplied to drive the unit must be clean and have low moisture.
Install a filter, etc., on the pneumatic circuit. Note the filter's nominal filtration rating, flow rate, and installation (near the direction valve). Thoroughly discharge drainage from the filter. (Regularly inspect to prevent drainage reaching the element.)
 - If supplying a toxic compressed gas, the service life of repair parts (packings and gaskets) for the equipment (filters, direction control valves, cylinders, etc.) will be drastically reduced, causing faulty operation.
- Ultra-dry air will shorten the life of pneumatic components, so should not be used.



3. Piping

⚠ CAUTION

- Before piping to the cylinder, be sure to carefully flush out (blow with compressed air) the inside of the pipes. Cutting chips, sealing tape or rust from piping construction process may enter the pipes, causing faulty operation such as air leaks.



4. Centering adjustment

⚠ CAUTION

When a 3-position all ports closed drive valve is used or if the block valve assembled slider table is slid with external force, negative pressure will be generated on the drive valve, and the seal belt may drop off, leading to air leakage; therefore, adjust with the block released.

Use/maintenance

1. Position locking

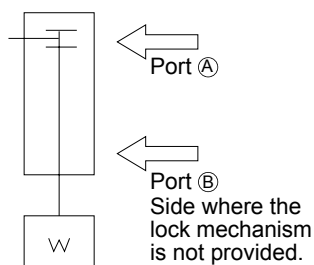
⚠ WARNING

- Make sure to supply pressure to port ②, and before unlocking, check that load is not applied to the lock mechanism.

If pressure is supplied to port ① when both ports ① and ② are exhausted and the piston is locked, the lock may not be released or the piston rod may pop out. This can be extremely hazardous.

- Keeping the cylinder with pressure applied to the lock mechanism may cause the stopper pin to come off. Do not use 3-position closed center and 3-position P/A/B connection solenoid valves.

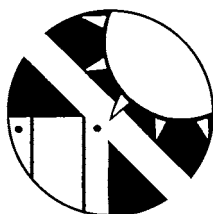
- If back pressure is applied in the locked state, the lock may be released. Use a discrete solenoid valve or use an individual exhaust manifold.



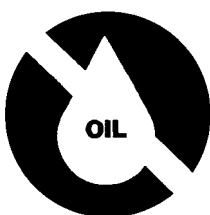
2. External environment

⚠ CAUTION

- Install the unit and other equipment (filter, directional control valve, cylinder, etc.) where they will not be subject to rain or direct sunlight. Also, do not use this product outdoors.



- Do not use this product where it will be subject to cutting chips, oil, coolant, oil mist, etc. If this type of environment is unavoidable due to installation, provide a protective cover, etc.



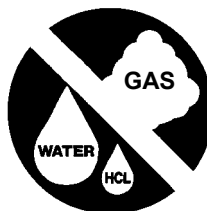
- Do not use this product where foreign matter such as cutting chips, dust, or spatter, etc., will contact or enter the units.

If this type of environment is unavoidable due to installation, provide a protective cover, etc.



- Do not use this product in an environment where it may be corroded.

Do not use in this kind of environment, or damage and/or misoperations may occur.



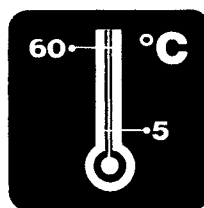
3. Operating ambient temperature

⚠ CAUTION

- The range of the ambient temperature within which the unit can be used is 5°C to 60°C.

Do not use the unit if the temperature exceeds 60°C, or damage and/or misoperations may occur.

If the temperature is less than 5°C, moisture in the circuit may freeze and lead to damage or faults. Take measures to prevent freezing.



4. Repair parts

⚠ CAUTION

The cylinder, valve packings, O-rings, gaskets, cushioning rubber and shock absorbers used by this unit are repair parts. Refer to device catalogs for details on model No. In particular, using a product with an ineffective shock absorber will increase vibrations/shocks and decrease stopping accuracy, potentially damaging the guide or other components; therefore, if it stops working well it should be replaced.

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MedHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending