AIR BALANCER

Mr. Catchman

Operating Instructions

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■ Introduction

Thank you for choosing Mr. Catchman. To use the product mosteffectively, be sure to read the Operating Instructions carefully to understand the air hoist mechanism, the optional balancer mechanism, and their features and performance for ensuring the safe and efficient use of the product. In addition, for installation and adjustment work, be sure to execute the correct installation, adjustment, and inspection work based on the Installation Procedures while checking the precautions stated in this manual.

■ Table of Contents

1. Features and Operating Principle

■ Features

(1) Mr. Catchman is activated by feeding air from the air pipe (or air compressor) in the factory. *No electric power is required.

(2) Since the machine is activated only by air control, it is easy to control the output (decompression valve is required) and adjust the up- and down-moving speeds.

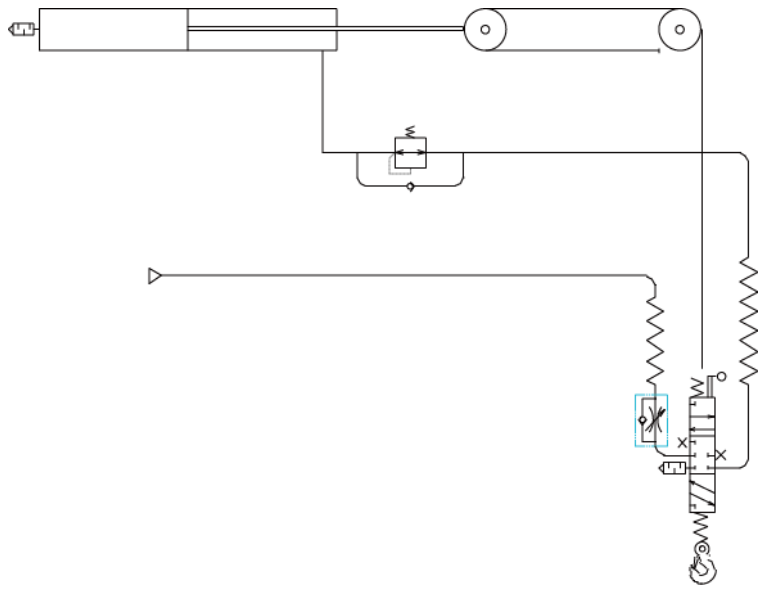
(3) The up and down movement can be done quite silently since no motor is used.
*The operation will be more silent when the exhaust route is provided.

(4) The air cylinder absorbs the operation shocks on the transferring articles, thereby ensuring safer transfer work.

■ Operating Principle

The basic operating principle of Mr. Catchman is based on the extremely simple structure that the compressed air is supplied or exhausted to or from the hoist cylinder by the weight valve provided on the up- and down-moving unit (See the following chart).

Therefore, the speed setup is easy by adjusting the airflow to be supplied or the exhaust flow with the speed controller provided at the operation unit (weight valve) side. The adjustable range is from 30 mm/s to 150 mm/s.



2. Operation Precautions

Before using Mr. Catchman, pay attention to the following items and use the machine correctly and safely. Incorrect use may result in problems or accidents. Always use the machine while giving the highest priority to safety.

■ Operating Environment

(1) Use the machine indoors. When you use the machine outdoors by necessity, be sure to accommodate it indoors after use.

(2) The operating temperature range is from -10°C to +40°C (no condensing). When the machine is used beyond the temperature range, the materials of packing or gaskets, etc., will deteriorate, resulting in a malfunction or failure of the machine.

(3) In case the atmosphere is different from normal in the chemical plant, etc., for example, you are requested to discuss the situation with us.

■ Installation Precautions

(1) Ensure the levelness of the machine by using a level, plumb bob, etc. The inclined level may result in the stray movement of the arm, which may make the machine hard to use.

(2) Install the machine in a place where the floor strength is sufficient.

(3) The air to be supplied must be clean, and never supply water or oil.

(4) Obstacles, etc., in the air tube of the primary-side pipe or the spiral tube at the arm mount should be removed.

(5) For the primary-side air tube, the internal diameter should be φ8 or over, and a steel pipe or the pipe having high-pressure resistance should be used. Avoid using a meshed tube, etc.

(6) The installation work should be executed based on the furnished Installation Procedures.

■ Operation Precautions

(1) Do not hoist a load, which is heavier than the rated load.

(2) Avoid using the machine in an area that is outside the operation range (where the wire will not be perpendicular). Neglecting this precaution may result in over-turning of the machine or wire cutting.

(3) The supply air for the power source should be set in the range from 0.6 MPa to 0.7 MPa (6 kg/cm^2 to 7 kg/cm^2)

*When the supply air pressure increases, the output of the main unit will proportionately increase, resulting in the possible overturning of the machine, etc., due to excessive weight.

(4) Adjust the swing brakes of the main shaft and the middle shaft. (See page 13)

(5) Do not put any part of your hand, leg, or body into the area below the hoisted load or near movable parts.

(6) Do not expose the hoisted load to sudden shocks during the hoisting operation.

(7) When hoisting the load, do the work after sufficiently checking that the load will not drop.

(8) If there is a dedicated hoisting jig, do not hoist articles other than the intended articles.

(9) Do not hoist eccentric loads or at an oblique angle or direction.

(10) Several seconds will be required from the moment of landing to exhausting the residual pressure. (It is proportional to the weight of the work.)
*The compressed air pressure still exists in the hoist cylinder at the moment of landing. Move the load down until the hoisted part descends.

(11) Use the machine with working clothes that are suitable for the work.

(12) To move the machine, relocate it after detaching the first and the second arms.
*The installed-carriage type, the arm should be folded in, and insert the forks of forklift, etc., from the opposite side of the protruded arm side to move the machine.

(13) In case the operation unit is of the grip controller, do not apply the wire to the hook, but apply it on the grip (handle) while the unit is not in use. (It is dangerous because a repulsive force on the load is generated when the wire is applied to the hook.)

(14) Do not leave the freight in the hoisted state for a long period of time. Because the machine is activated by an air cylinder, descending may slightly occur due to a subtle amount of air leakage.

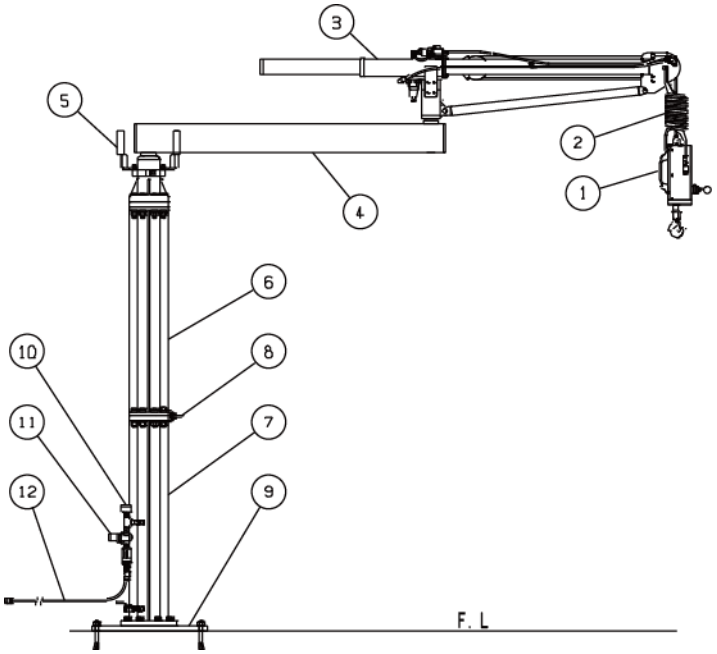
(15) If the balance circuit (optional) is installed, do not leave the machine under the balance ON state for a long period of time. Descending may occur after a certain period of time due to the decrease in the pilot signal pressure for the balance valve side.

(16) For the balance setup type (optional/the type without balance button), do not touch the limit valve that is provided at the hoisting jig side. Simultaneous operation of the ON button for the hoisting jig and the limit valve ON will generate the preset output.
*For the case type, be sure to enable the [Jumping Prevention Device], which is installed on the second arm. (See page 18)

(17) The specifications are subject to change without prior notice for improvement.

(18) The warranty for free-of-charge repair of the main unit is one year after purchase.

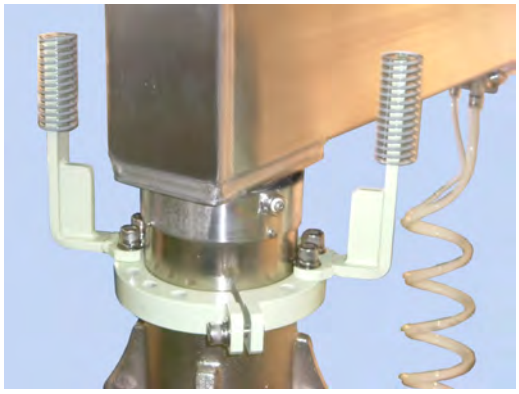
3. Name and Function of Each Part



	Part Name	Function
(1)	Weight valve (Grip controller)	The valve is used to execute up and down movement by feeding and exhausting air to and from the hoist cylinder with the lever.
(2)	Spiral hose	The hose connects the round-trip paths of air to the weight valve from the arm.
(3)	Cylinder arm	The output generated by the hoist cylinder. The wire will move back and forth inside the arm, thereby making the vertical stroke two times the cylinder stroke. In addition, the safety mechanism to prevent jumping is provided (jumping prevention device).
(4)	Z-arm	The 360-degree free rotation mechanism. Both of the main and the middle shafts are provided with the rotation adjustment brake. At the time of the delivery of the product, the brake is tightened. Adjust the brake with a hexagonal wrench after completing assembly.
(5)	Rotation control stopper for main shaft (Optional)	Use the device to limit the rotation angle of the main shaft. Random angles can be set to prevent collisions with the wall or obstacles.
(6)	Upper pole	Retain the height of the machine body.
(7)	Lower pole	Retain the height of the machine body.
(8)	Hook stocker	The hooking position when the machine is not in use.
(9)	Floor fixing base	Connect the pole of the machine to secure it to the floor.
(10)	Manometer	For checking the air supply pressure.
(11)	Regulator	For adjusting the decompression of the air supply pressure. (Set the pressure to 0.65 MPa or less.)
(12)	Urethane tube	For supplying the primary air.

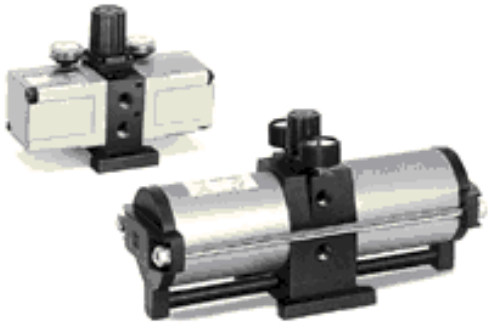
4. Major Optional Devices

Rotation control stopper for the main shaft



Mr. Catchman has upper and the lower arms like human beings, and the respective joints are designed to rotate freely. (The rotation torque can be adjusted with the adjustment brake.) Therefore, when the main unit is installed alongside a wall or when obstacles exist around the unit, they may interfere with the rotation and lead to disruptive accidents. To prevent such problems, the anti-rotation stopper for the main shaft is provided to limit the rotation angle. The angle can be set freely.

Pressure Booster (Booster)



When the air pressure of the plant is less than 0.6 MPa (6 kg/cm^2), the booster is used to boost the air pressure (up to two times) to secure the required air pressure.

Air Filter/Mist Separator

Air Filter: Use the air filter when the supply air is contaminated.
Mist Separator: The mist separator is furnished when the balance circuit (optional) is provided or for clean room specifications.

Vacuum Pump

The vacuum pump is necessary for vacuum hoisting of the work when the air leakage is substantial. Models of 0.75 kW, 1.1 kW, 2.2 kW, and 3.7 kW are available according to the air leakage amount of work.

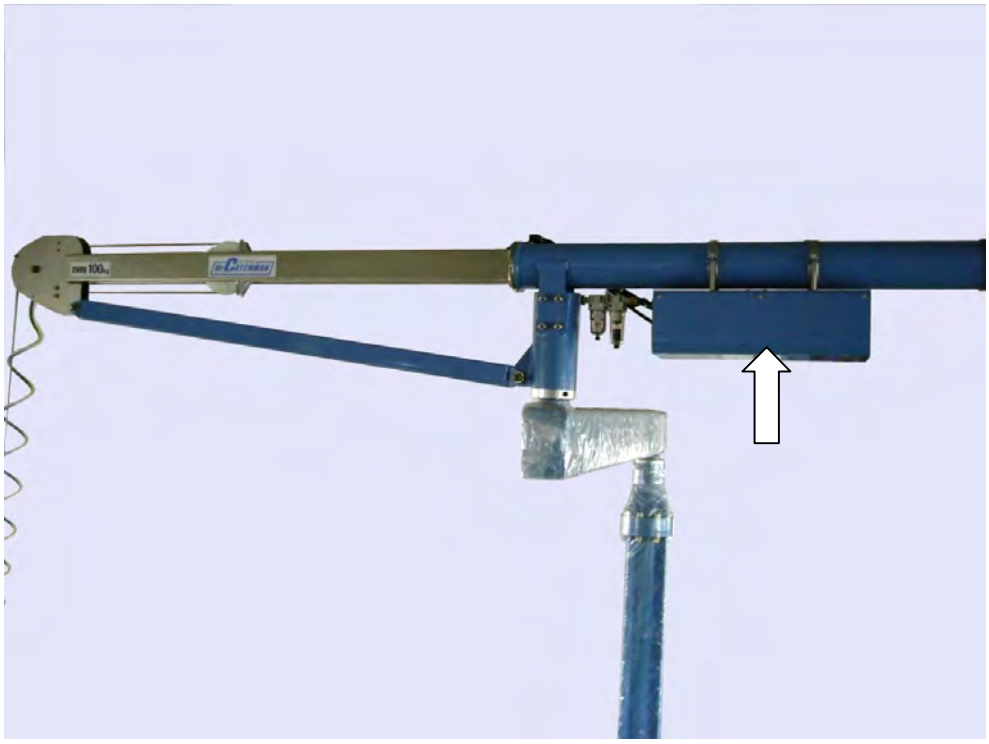
Silent Box

This is the noise-prevention box for the vacuum pump. The noise level can be suppressed to 55 dB (decibels) or below.

Pendant Switch

Use the pendant switch when operations using the up and down movement lever are difficult. The possible uses include when the highest up position is high or the size of work is large.

Balance Circuit

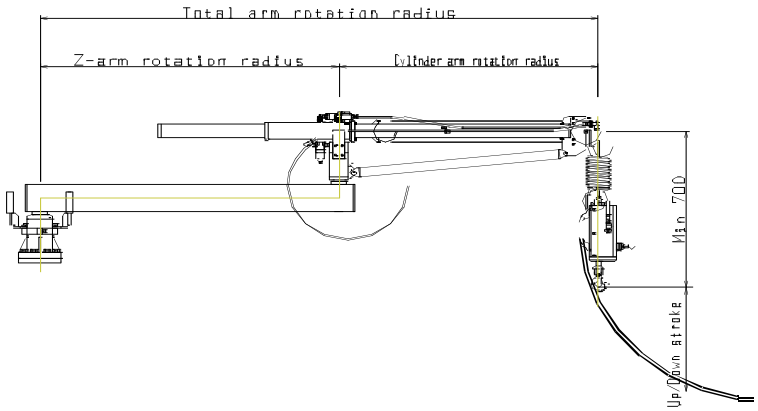


Installation of the balance control and pressing the balance button on the portable operation unit ensure perfectly balanced work. Under the balanced state, you can manually move the target article up or down or secure the up and down speed of movement by the feel of your hand. The device is suitable for the assembly process of equipment and gentle transfer work.

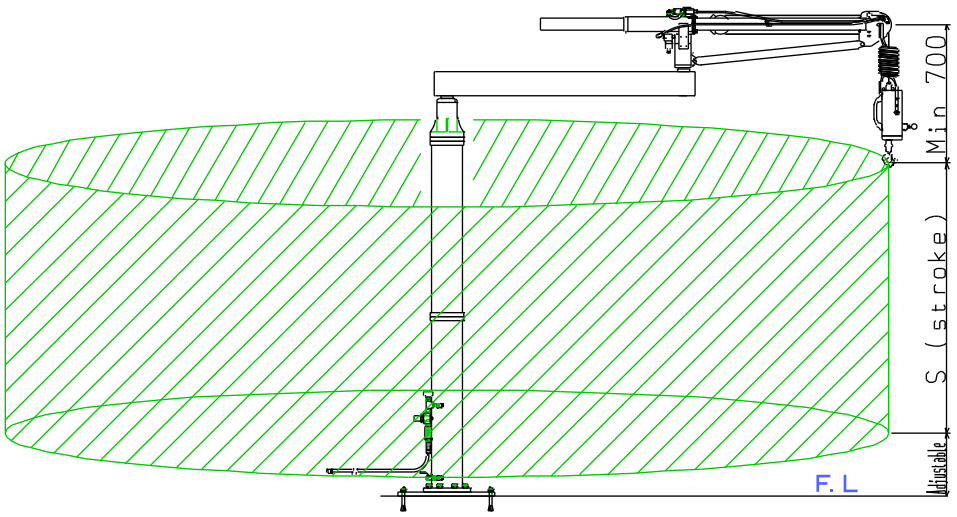
Grip Controller (Not Optional: You can choose either the grip controller or a weight valve.)

By moving the grip lever up or down, the controller will move up or down. The speed can be varied smoothly by adjusting the lever-gripping force. The device is suitable for transshipment work, etc., whose cycle time is comparatively fast.

5. Arm Length and Up/Down Stroke



The machine can be operated within the cylindrical space created by operation radius R3 and stroke S shown in the above figure. In addition, the distance of Min 700 mm can be adjusted to the positive side according to the wire binding position. As a structural problem, the movement toward the center direction will not be smooth when the machine is used with the arm extended to the outermost position (when the two arms line up in a straight line). To prevent such problems, we recommend using the machine with the arm always bent in a dogleg. Please examine the installation position while ensuring the appropriate allowance.

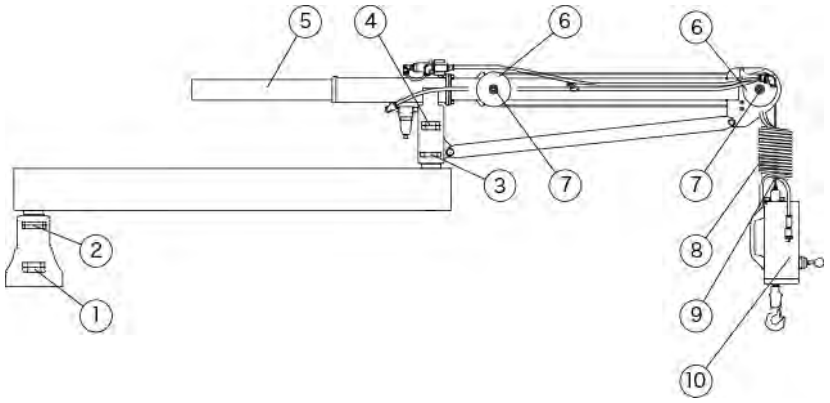


単位(mm)

	Short Type				Long Type			
	R1	R2	R3	S	R1	R2	R3	S
No.50	1220	1060	2280	1400	1600	1400	3000	1800
No.100	1340	1160	2500	1400	1600	1400	3000	1800
No.200					1600	1453	3053	1800

6. Service Life of Each Part

The parts for Mr. Catchman are comparatively free of high-speed rotation or high-speed sliding operations, and materials appropriate for the respective functions are used. As a result, some operators use the device without executing the maintenance service for a long period of time. However, using the device without executing maintenance services may result in shortening the service life of parts, eventually resulting in accidents; therefore, we recommend asking the manufacturer for maintenance and an inspection about once every three years. (*You are not legally obligated to do this because the product is a crane with a rated capacity of 0.5 tons or less.) In addition, avoid using the device outdoors. The service life of the consumable parts shown in the following table is for use of the device indoors where the temperature ranges from -10°C to +40°C (no condensing). Note, however, that the service life will vary significantly depending on the operating conditions and the maintenance condition.



List of Major Consumable Parts

No.	Name	Qty	Type	Life
1	Bearings	2	6008ZZ (6010ZZ)	40 million times
2	Bearings	1	6811ZZ (NA4913R)	40 million times
3	Bearings	1	6908ZZ (6009ZZ)	30 million times
4	Bearings	2	6006ZZ (6008ZZ)	30 million times
5	Low-friction cylinder	1	No. 50 → CG1BQ55-M5031-* No. 100 → CG1BQ80- M5803-* No. 200 → XCA-00-100D-*-FL198006	2,500,000 times
6	Sheave	2	No. 50 → CACY-50-23 No. 100 → CACY100-18 No. 200 → CACY200-18	8,000,000 times
7	Bearings	2	6200ZZ	20 million times
8	Spiral hose	1	No. 50 or 200 → S - 41084 No. 200 → S - 50792	2,500,000 times
9	Wire rope	1	No. 50 or 100 → CACY-50-1 No. 200 → CACY-200-S3	3,000,000 times
10	Manual valve Grip Controller	1	RB54CN2HC 50kg. / 100kg. / 200kg.Type	2,500,000 times

7. Daily Maintenance/Inspection Work

To ensure that the use of Mr. Catchman is always under normal operating conditions, be sure to inspect the following items on a regular basis:

(1) Check that there is no air leakage from the joint insertion for the air pipe. Also check that the tubes do not expand;
(2) Check that the air supply pressure is 0.6 MPa (6 kg/cm^2) or over;
(3) Check that no twisting is generated on the air tubes in the vicinity of rotating parts.
(4) Check that the fixing screws of parts are not loose;
(5) Check that the hooking position will retain the same height both in the no-load and loaded state;
(6) Check that no damage occurs on the upper hoist cylinder due to shocks, etc. Also, check that there is no air leakage from the cylinder. Is the operation smooth?
(7) Check that there is no unusual wear on the pulley for hoisting the wire.
(8) Check that the tightening force of the arm swing brake is adequate.
(9) Check that the machine is installed on a level surface. (If not, the arm will be subjected to stray movement.)
(10) Check that no fluff (wear), etc., is generated on the wire.
(11) Check that there are no cracks or damage to the spiral tube.
(12) Check that no cracks are generated on the pad when using the suction pad.
(13) Check that there is no damage to the joint for connecting air.
(14) Check that there is no air leakage from the pole connection and the arm connection of the main unit.
(15) Check that the wire clip is not loose.
(16) Check that the resin and rubber parts of the attachment are not worn.
(17) Check that no water has accumulated inside the lower pole. (Water drops can be discharged through the ball valve at the lower part of the lower pole.)
(18) Check that the machine moves smoothly up and down without jamming the jumping prevention device.

* With the standard specification product, when the machine is left for a long period of time, the operation unit will slightly go down due to a slight amount of air leakage from the main cylinder of the second arm. (This is not a failure because it occurs due to air leakage that is inherent in the low-friction cylinder specification.)
* Do not leave the machine for a long period of time under the balanced hoisting state (optional).

8. Problems and Countermeasures

No.	Problem	Estimated Cause	Countermeasures
1	The arm is subjected to stray movement regardless of whether a load is applied or not.	Defective level adjustment (level) during installation.	Ensure a precise level adjustment to 1/1000 by using a plumb bob.
2	Horizontal movements cannot be done successfully, and the arm can hardly be folded into a dogleg shape.	Defective adjustment of swing brake.	Adjust the two brakes so that, during horizontal movement, the outside cylinder arm will fold first and then the Z-arm will follow.
3	The machine will not move up smoothly even though air is supplied.	Insufficient supply pressure or excessive weight	Set the air supply pressure to 0.6 MPa (6 kg/cm^2).
4	The weight valve (hook) goes down naturally.	Air leakage from the air pipe route. Wear of packing of air devices used.	Replacement of air devices or packing.
5	The wire is worn rapidly.	The wire is not applied correctly on the sheave.	Correct the wire loading on the sheave.
6	The machine will not move up and down.	Activation of the jumping prevention device mounted on the second arm due to abrupt upward movement.	Continue the downward movement (for 10 seconds or longer) to put slack in the wire, and the jumping prevention device will automatically cancel. Alternately, pull the wire downward to cancel the jumping prevention device.

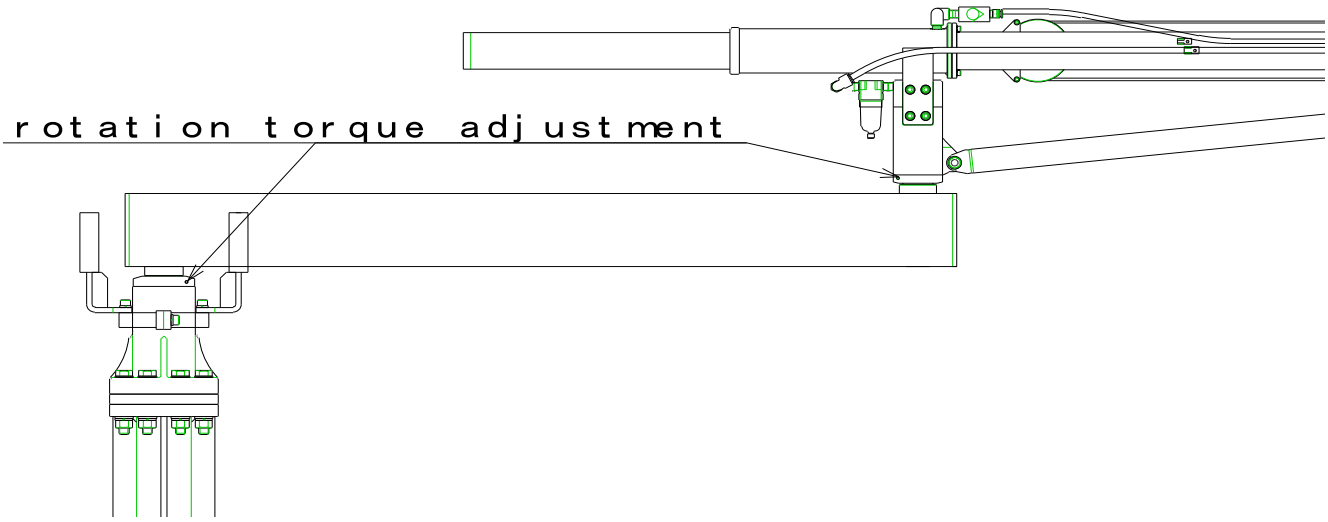
When a problem occurs, but the cause is unknown, contact the manufacturer.

9. Adjusting the Parts

i. Adjusting the Rotation Torque

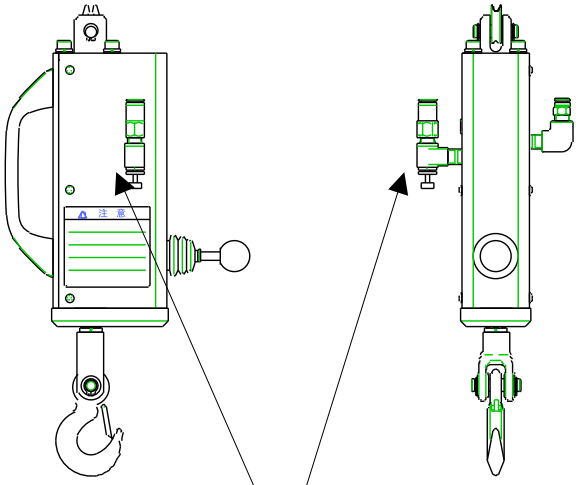
During horizontal movement, the arm will follow when the main and middle shafts rotate. Arm trackability at the time of rotation can be easily adjusted by adjusting the part [bolt with hole] identified by the arrow shown in the following drawing. No standard values are specified for the adjustment because the values are different depending on the operating conditions of the users. Adjust the torque to the optimum setting according to the operating conditions.

*The [bolt with the hole] is tightened at the factory to prevent rotation.

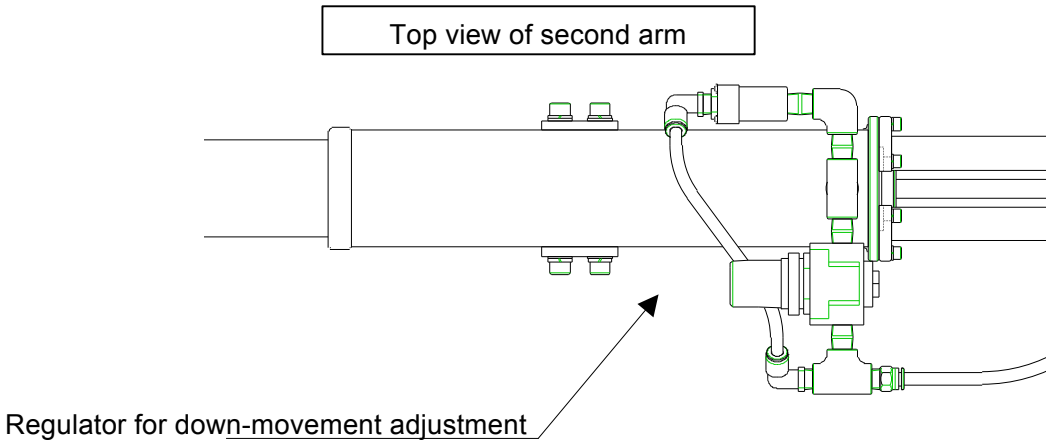


ii. Adjusting the Up/Down Speeds

Ii - (1). *Operation unit is of the [valve lever] type.*



Upward speed adjustment speed controller



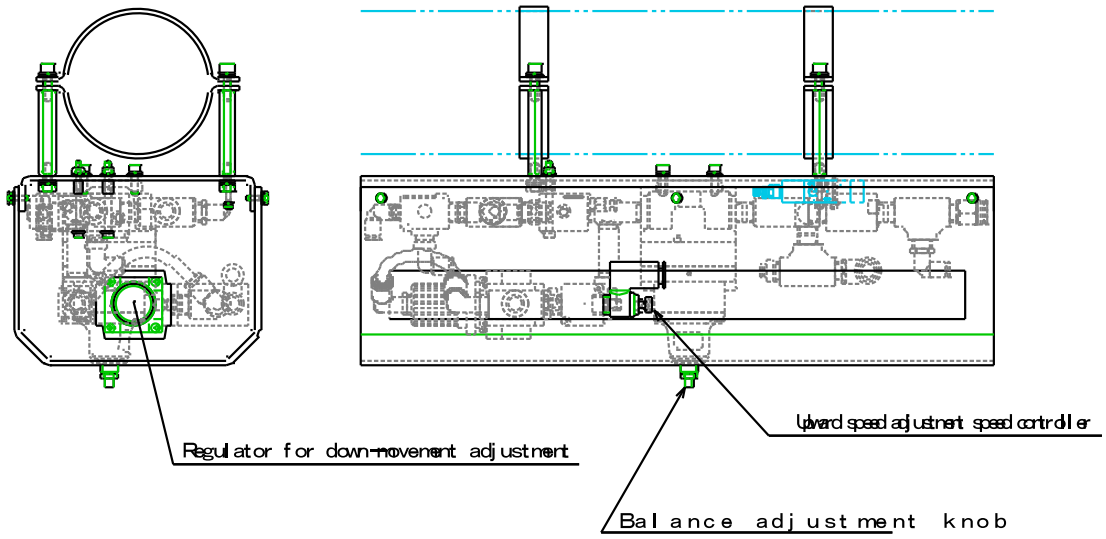
Default Settings of Up/Down Speeds

UP	285 to 550 mm/s
DOWN	170 to 200 mm/s

*When hoisting the work, a much greater time difference will be generated for hoisting the work because the load is closer to the rated load. In addition, during upward movement, the hoisting speed will be lower because the load is heavier.

ii. Adjusting the Up/Down Speeds

ii - (2). *The balance circuit is featured.*



上下スピードの初期設定値

UP	285 ～ 550mm/sec
DW	170 ～ 200mm/sec

*When hoisting the work, a much greater time difference will be generated for hoisting the work because the load is closer to the rated load. In addition, during upward movement, the hoisting speed will be lower because the load is heavier.

10. Replacing the Wire

i. Be sure to start the work after shutting down the primary-side air supply and reducing the residual air pressure of the machine to zero. (Be sure to check the zero reading on the manometer for the inlet valve.)

ii. Detach all wire clips shown in Fig. (1) to detach the operation unit.

iii. Remove the M6 nuts shown in Fig. (2) and remove the two fixing screws shown in Fig. (7). Detach the wire end shown in Fig. (4) by gently tapping it downward. If the wire end will not detach, try to detach it by tapping it again after slightly loosening the two nuts shown in Fig. (5).

iv. The wire shown in Fig. (3) contacts only the pulley. Before detaching the wire shown in Fig. (3), check that the wire can correctly pass through after replacing the wire.

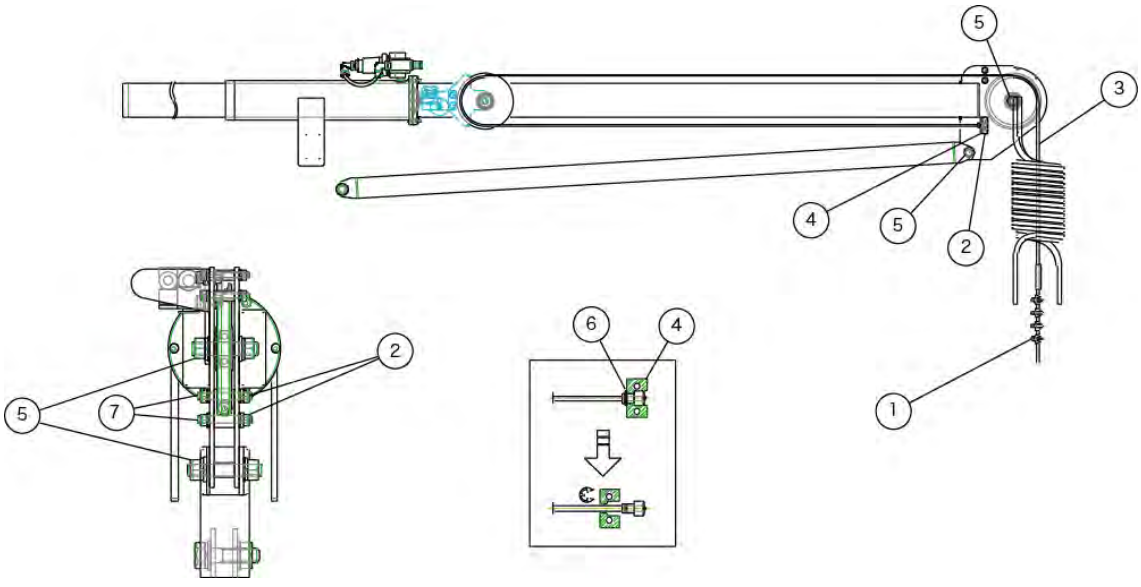
v. When the wire end shown in Fig. (4) is detached, pull out the wire shown in Fig. (3) in that condition.

vi. Remove the stopper ring shown in Fig. (6) and replace the wire shown in Fig. (3) with a new one.

vii. Install the wire following the reverse procedures.

viii. Tighten the nubs robustly.

ix. Secure all wire clips up to the one shown in Fig. (1). If the wire end shown in Fig. (3) is longer, cut the wire with a wire cutter and treat the end appropriately.

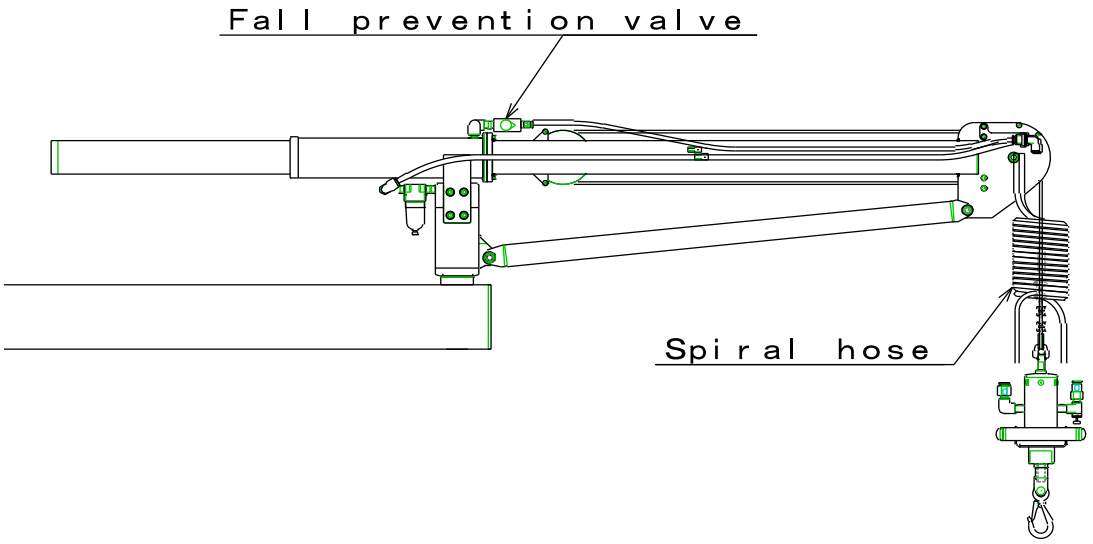


11. Safety Devices

11-i. Fall Prevention Valve

(Only when the grip controller is chosen. When other operations are chosen, the machine will descend at the preset descending speed.)

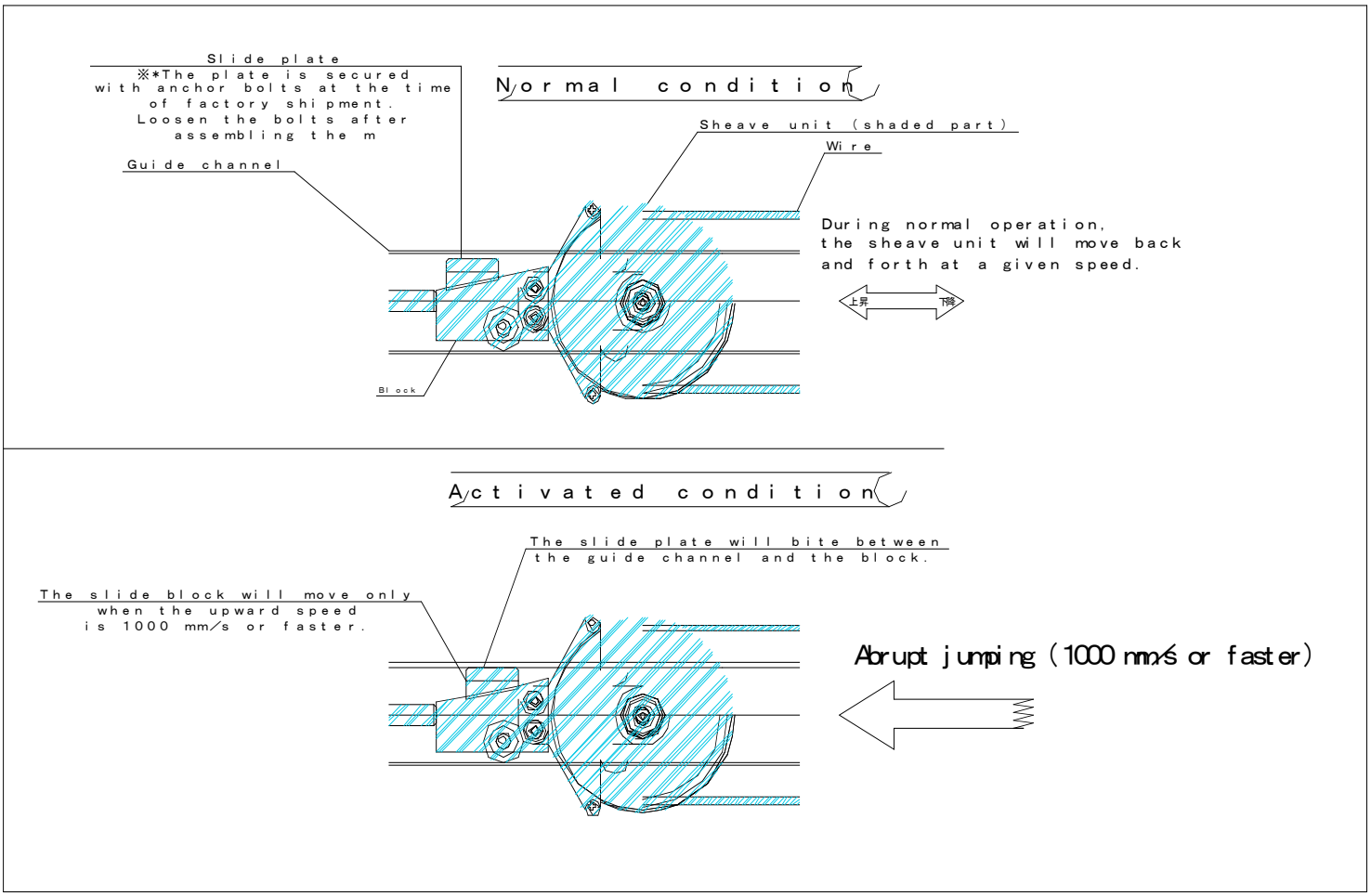
Mr. Catchman is operated only with air. Output is generated by feeding air into the cylinder installed on the second arm. Leakage of air from the cylinder will directly result in descending or falling. Although the air route is made up of a nylon material, the spiral hose shown in the figure is provided for the machine. In preparation for cases when the air leakage exceeds the given flow rate from any cause, a fall prevention valve is installed. (This is a special valve that shuts off the air only when the air is discharged at a given flow rate or higher. Registered Utility Model: No. 30923290)



11-ii. Jumping Prevention Device

Mr. Catchman is designed to hoist a load by supplying compressed air to the cylinder. Therefore, if the load falls for any reason during the hoisting work, there is a possible risk that the operation unit will jump momentarily. In addition, for a preset type balance circuit (optional), there is the same risk when the loaded balanced output is made under the worst conditions even though the limit valve is provided for safety.

To prevent such problems, the [Jumping Prevention Device] shown in the figure below is provided as a standard feature. The device is locked at the factory prior to shipment to prevent a malfunction. Use the machine by enabling the device according to the safety requirements. The locking function will be enabled when an abrupt upward movement occurs at a speed exceeding 1000 mm/s. The lock can be automatically cancelled by executing a downward movement. (A few seconds will be required before the downward movement starts after initiating the downward movement operation.)



● Brief Operations

(i) During up/down movement, the sheave unit will make a reciprocating operation on the guide channel.

(ii) Under normal conditions, the slide plate that is mounted on the sheave unit is stationary at the home position.

(iii) Only when an upward movement occurs at a speed exceeding 1000 mm/s will the slide plate slide in the direction of the leading end.

(iv) The slide plate will bite between the guide channel and the block.

(v) In that condition, the jumping of the operation unit will be forcibly locked.

(vi) The lock can automatically be cancelled by executing the downward movement operation for several seconds.

* The downward movement operation should be made for several seconds. Several more seconds will be required because the load at the time of applying the lock is greater.

12. Standard Specifications

	50 kg Type		100 kg Type		200 kg Type
	Short	Long	Short	Long	Long Only
Air Consumption (1 stroke)	11.1 L (ANR)	14.3 L (ANR)	23.9 L (ANR)	30.7 L (ANR)	45 L (ANR)
Required Air Volume (For work of 6 times per minute)	67 L/min	86 L/min	145 L/min	185 L/min	270 L/min
Supply Air Pressure	0.6 MPa (6 kg/cm^2) to 0.7 MPa (7 kg/cm^2)				
Supply Air Pipe Diameter	Inner diameter: φ8 or over				
Rotation Range	2280 mm	3000 mm	2500 mm	3000 mm	3053 mm
Up / Down Stroke	1400 mm	1800 mm	1400 mm	1800 mm	1800 mm
Max. Output (at 0.6 MPa)	67.85 kgf		146.1 kgf		214.3 kgf
Wire Gauge (Breaking Load)	φ4 (970 kg)		φ5 (1520 kg)		φ6 (2190 kg)
Painting	HIPON 50 FINE Munsell No. 6.25PB5/10				

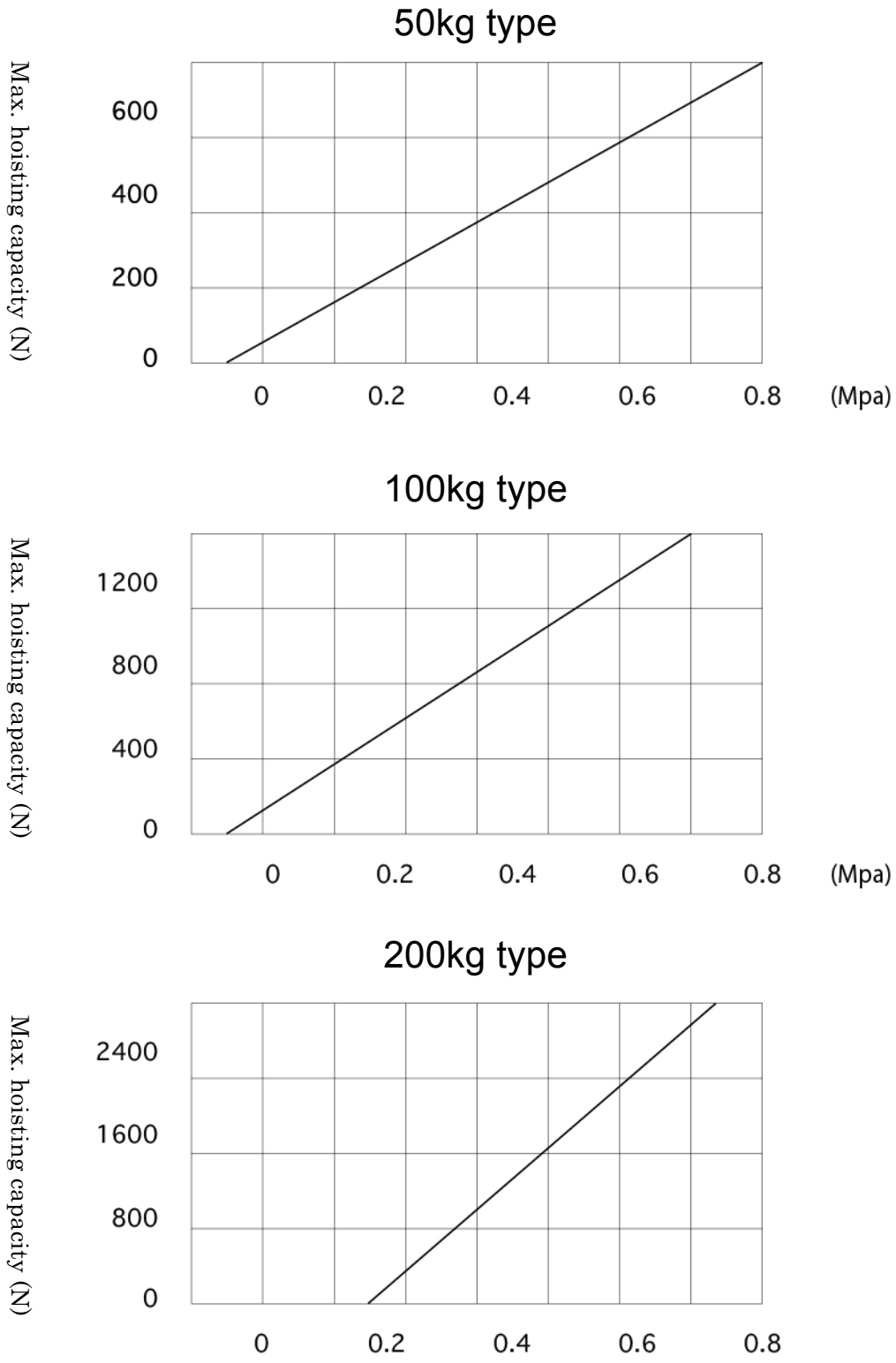
* The air volume shows the value that is converted into atmospheric pressure. (For activation at 0.6 MPa)

* The product is activated only with air. (The compressor, vacuum pump, and pressure switch for attachment are excluded.)

* The air consumption shows the value for the main unit only. The value does not include consumption of the attachment.

* The rotation range and the up/down stroke are subject to change according to the customer's requirement.

13. Hoisting Capacity Chart



14. Establishment / Revision History

No.	Date	Est./Rev. Category	Description	Made by:
-	October 13, 2004	Establishment	Create new	Yoshida
1	September 14, 2008	Addition	P. 9: No. 200 dimension chart added.	Yoshida
2	September 14, 2008	Addition	P. 12: Six problem items described.	Yoshida
3	September 14, 2008	Addition	P. 8: Balance circuit described.	Yoshida
4	September 14, 2008	Addition	P. 8: Grip controller described.	Yoshida
5	October 30, 2008	Addition	P. 3: Items (13) to (16) described	Yoshida
6	October 30, 2008	Addition	P. 4: Statement in (11) ( ) described.	Yoshida
7	October 30, 2008	Addition	P. 6: Mist separator described.	Yoshida
8	October 30, 2008	Correction	P.12: For three items, 0.5 Mpa → 0.6 Mpa	Yoshida
9	October 30, 2008	Addition	P. 13 to 15: All added anew	Yoshida
10	October 30, 2008	Addition	P. 16: All added anew	Yoshida
11	October 30, 2008	Addition	P. 17: All added anew	Yoshida
12	October 30, 2008	Correction	P. 18: Hipon 50 → Hipon 50 Fine	Yoshida