MOTOMAN-HC10DT
Hand-Carry Type (Hand Truck)
INSTRUCTIONS

HAND-CARRY TYPE:
YHT-1-06VXHC10-1 (100-VAC SPECIFICATION)
YHT-1-06VXHC10-2 (200-VAC SPECIFICATION)

MANIPULATOR TYPE:
YR-1-06VXHC10-C11

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS
MOTOMAN-HC10DT INSTRUCTIONS
YRC1000micro INSTRUCTIONS
YRC1000micro OPERATOR’S MANUAL
YRC1000micro MAINTENANCE MANUAL
YRC1000micro ALARM CODES (MAJOR ALARMS) (MINOR ALARMS)
YRC1000/YRC1000micro Collaborative Operation Instructions

Please have the following information available when contacting Yaskawa Customer Support:
• System
• Primary Application
• Software Version (Located on Programming Pendant by selecting: {Main Menu} - {System Info} - {Version})
• Robot Serial Number (Located on robot data plate)
• Robot Sales Order Number (Located on controller data plate)

Part Number: 185901-1CD
Revision: 0
**DANGER**

- This instruction manual is intended to explain mainly on the mechanical part of the hand-carry (hand truck) for the application to the actual operation and for proper maintenance and inspection. It describes on safety and handling, details on specifications, necessary items on maintenance and inspection, to explain operating instructions and maintenance procedures. Be sure to read and understand this instruction manual thoroughly before installing and operating the manipulator. Any matter not described in this manual must be regarded as “prohibited” or “improper”.

- General information related to safety are described in “Chapter 1. Safety” of the YRC1000micro INSTRUCTIONS. To ensure correct and safe operation, carefully read “Chapter 1. Safety” of the YRC1000micro INSTRUCTIONS.

**CAUTION**

- In some drawings in this manual, protective covers or shields are removed to show details. Make sure that all the covers or shields are installed in place before operating this product. The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.

- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids the product warranty.

**NOTICE**

- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.

- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.

- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the hand truck.

In this manual, the Notes for Safe Operation are classified as “DANGER”, “WARNING”, “CAUTION”, “MANDATORY”, or “PROHIBITED”.

DANGER
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Safety Signs identified by the signal word DANGER should be used sparingly and only for those situations presenting the most serious hazards.

WARNING
Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury. Hazards identified by the signal word WARNING present a lesser degree of risk of injury or death than those identified by the signal word DANGER.

CAUTION
Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury. It may also be used without the safety alert symbol as an alternative to “NOTICE”.

NOTICE
NOTICE is the preferred signal word to address practices not related to personal injury. The safety alert symbol should not be used with this signal word. As an alternative to “NOTICE”, the word “CAUTION” without the safety alert symbol may be used to indicate a message not related to personal injury.

Even items described as “CAUTION” may result in a serious accident in some situations.

At any rate, be sure to follow these important items.

NOTE
To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “DANGER”, “WARNING” and “CAUTION”.
WARNING

• Maintenance and inspection must be performed by specified personnel.
  Failure to observe this caution may result in electric shock or injury.
• For disassembly or repair, contact your YASKAWA representative.
Before operating the manipulator, make sure the servo power is turned OFF by performing the following operations. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.

- Press the emergency stop button on the programming pendant or on the external control device, etc.
- Disconnect the safety plug of the safety fence.

If operation of the manipulator cannot be stopped in an emergency, personal injury and/or equipment damage may result.

Before releasing the emergency stop, make sure to remove the obstacle or error caused the emergency stop, if any, and then turn the servo power ON.

Failure to observe this instruction may cause unintended movement of the manipulator, which may result in personal injury.

Observe the following precautions when performing a teaching operation within the manipulator’s operating range:

- Be sure to perform lockout by putting a lockout device on the safety fence when going into the area enclosed by the safety fence. In addition, the operator of the teaching operation must display the sign that the operation is being performed so that no other person closes the safety fence.
- View the manipulator from the front whenever possible.
- Always follow the predetermined operating procedure.
- Always keep in mind emergency response measures against the manipulator’s unexpected movement toward a person.
- Ensure a safe place to retreat in case of emergency.

Failure to observe this instruction may cause improper or unintended movement of the manipulator, which may result in personal injury.

Confirm that no person is present in the manipulator's operating range and that the operator is in a safe location before:

- Turning ON the hand truck power (or breaker)
- Moving the manipulator by using the programming pendant
- Running the system in the check mode
- Performing automatic operations

Personal injury may result if a person enters the manipulator’s operating range during operation. Immediately press an emergency stop button whenever there is a problem. The emergency stop button is located on the upper right of the programming pendant.

Read and understand the Explanation of the Warning Labels before operating the manipulator.
DANGER

• In the case of not using the programming pendant, be sure to supply the emergency stop button on the equipment. Then before operating the manipulator, check to be sure that the servo power is turned OFF by pressing the emergency stop button. Connect the external emergency stop button to the 4-14 pin and 5-15 pin of the Safety connector (Safety).

• Upon shipment of the YRC1000micro, this signal is connected by a jumper cable in the dummy connector. To use the signal, make sure to supply a new connector, and then input it.

If the signal is input with the jumper cable connected, it does not function, which may result in personal injury or equipment damage.

WARNING

• Perform the following inspection procedures prior to conducting manipulator teaching. If there is any problem, immediately take necessary steps to solve it, such as maintenance and repair.
  – Check for a problem in manipulator movement.
  – Check for damage to insulation and sheathing of external wires.

• Always return the programming pendant to the hook on the YRC1000micro cabinet after use.

If the programming pendant is left unattended on the manipulator, on a fixture, or on the floor, etc., the Enable Switch may be activated due to surface irregularities of where it is left, and the servo power may be turned ON. In addition, in case the operation of the manipulator starts, the manipulator or the tool may hit the programming pendant left unattended, which may result in personal injury and/or equipment damage.
Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the YRC1000micro controller, manipulator cables, the YRC1000micro programming pendant, the YRC1000micro programming pendant dummy connector (optional), and the YRC1000micro smart pendant.

In this manual, the equipment is designated as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>YRC1000micro controller</td>
<td>YRC1000micro</td>
</tr>
<tr>
<td>YRC1000micro programming pendant</td>
<td>Programming pendant</td>
</tr>
<tr>
<td>YRC1000micro smart pendant</td>
<td>Smart pendant (optional)</td>
</tr>
<tr>
<td>Cable between the manipulator and the controller</td>
<td>Manipulator cable</td>
</tr>
<tr>
<td>YRC1000micro programming pendant dummy connector</td>
<td>Programming pendant dummy connector (optional)</td>
</tr>
</tbody>
</table>

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and ™ are omitted.
Explanation of Warning Labels

The following warning labels are attached to the manipulator. Always follow the warnings on the labels.

Also, an identification label with important information is placed on the body of the manipulator. Prior to operating the manipulator, confirm the contents.

Fig. : Warning Label Locations

Nameplate

Nameplate
Fall down hazard label 1
Description
Fasten the hand truck adjuster with a tool. If the power is turned ON and the hand truck is operated without fastening it properly, the hand truck may fall down, which may result in personal injury and/or equipment damage.

Fall down hazard label 2
Description
Install the hand truck on a level surface. If the hand truck is installed on a sloped or uneven surface and the power is turned ON and the hand truck is operated, the hand truck may fall down, which may result in personal injury and/or equipment damage.

Fall down hazard label 3
Description
Move the hand truck only over level surfaces. If the hand truck is moved over a sloped or uneven surface, it may fall down, which may result in personal injury and/or equipment damage.
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1 Product Confirmation

1.1 Contents Confirmation

Confirm the contents of the delivery when the product arrives.

Standard delivery includes the following three (or four) items:

- Hand truck (manipulator (accessories included), YRC1000micro (spare parts included))
- Complete set of manuals (in the CD-ROM which is connected to the USB connector)
- Programming pendant
- Programming pendant dummy connector (optional)

As an option, the programming pendant can be changed to the following pendant.

- Smart pendant (optional)

<table>
<thead>
<tr>
<th>Basic Set</th>
<th>Ordering Another Pendant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand truck (with manipulator)</td>
<td>Programming pendant</td>
</tr>
<tr>
<td>CD-ROM which is connected to the USB connector</td>
<td>Smart pendant (optional)</td>
</tr>
<tr>
<td>Complete Set of Manuals (in the CD-ROM which is connected to the USB connector)</td>
<td></td>
</tr>
</tbody>
</table>

### Accessories of Hand Truck

<table>
<thead>
<tr>
<th>Accessories of Hand Truck</th>
<th>Pcs.</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifting jig(^1) HW1307411-1</td>
<td>1</td>
<td>For lifting the manipulator main body</td>
</tr>
<tr>
<td>Hexagon socket head cap screw M8 (length: 25 mm)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Conical spring washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Anchor bracket HW1409894-1</td>
<td>4</td>
<td>For fastening hand truck anchors</td>
</tr>
</tbody>
</table>

\(^1\) This is a specialized jig for lifting the manipulator main body. It cannot be used for transporting. When transporting this product by crane, use the optional crane shipping bolts and brackets, not the accessory lifting jig.
2 Transporting

**DANGER**

- Perform a risk assessment that matches the customer's usage.

Failure to observe this instruction may result in injury or damage.

**WARNING**

- Operation of the crane, sling, or forklift must be performed only by authorized personnel.

Failure to observe this instruction may result in personal injury and/or equipment damage.

**NOTICE**

- Avoid excessive vibration or shock while transporting or moving the product.

Failure to observe this instruction may adversely affect performance of the product because it consists of precision components.

- When the product arrives, after completing transport with a forklift and casters, the "OUT OF RANGE(ABSO DATA)" (Alarm 4107) or the "OUT OF RANGE(DROPVALUE)" (Alarm 4511) may occur when the power is turned ON, but this is normal.

The alarm can be released with the Reset button. After releasing the alarm, turn ON the servo power, return the arm to the second home with axis operation and check the positioning operation.
2.1 Robot Posture for Transport

**WARNING**

- When transporting this product by crane, use the optional crane shipping bolts and brackets (HW1409899-1 and HW1409900-1) not the accessory lifting jig (HW1307411-1).

If the jig is used incorrectly, there is a danger of the product falling, which can cause personal injury and equipment damage.

- When using a forklift, casters, or a crane, set the robot to the posture as shown below.

Operating with the manipulator extended may result in equipment damage and may make it impossible to mount the crane shipping bolts and brackets. Also, to ensure stability during transport, always transport the product in the following posture.

**NOTICE**

- Before transporting, turn OFF the power and disconnect the power cable from the hand truck.

Failure to do so may result in the cable becoming entangled or lines being cut.

*Fig. 2-1: Transporting Position and Shipping Posture*

<table>
<thead>
<tr>
<th>Axis</th>
<th>S</th>
<th>L</th>
<th>U</th>
<th>R</th>
<th>B</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle</td>
<td>0°</td>
<td>-73°</td>
<td>30°</td>
<td>0°</td>
<td>-103°</td>
<td>0°</td>
</tr>
<tr>
<td>Pulse</td>
<td>0</td>
<td>-195005</td>
<td>70422</td>
<td>0</td>
<td>-166772</td>
<td>0</td>
</tr>
</tbody>
</table>
2.2 Transporting Method

2.2.1 Using a Forklift

In principle, a forklift should be used when unpacking the hand truck and transporting it over a long distance.

In this case, always transport the manipulator in accordance with fig. 2-1 “Transporting Position and Shipping Posture”.

Always fasten the hand truck with the adjusters before transporting using a forklift. For the fastening method, refer to chapter 3.2.1.1 “Installation Using Adjusters”.

Refer to fig. 2-2 “Using a Forklift” and use the forklift claw entries at the bottom of the hand truck to transport the hand truck.

Transport the hand truck slowly with due caution in order to avoid overturning or slippage.

- Before transporting, check that the nuts at the top of adjuster are tightened.
- Weight of hand truck (with manipulator):
  - YHT-1-06VXHC10-1: Approximately 240 kg
  - YHT-1-06VXHC10-2: Approximately 222 kg
- Use a forklift suitable for the weight being transported.
- When inserting the forklift claws, check carefully that the forklift and forklift claws do not interfere with the hand truck.

Fig. 2-2: Using a Forklift
2.2.2 Using Casters

**WARNING**

- Casters are mounted on the bottom of the hand truck for pushing it and moving it short distances, but do not use the casters when moving the hand truck a long distance. Failure to follow this instruction would pose a danger of the hand truck falling over.
- When moving the hand truck by pushing it, always have this done by at least two people. Failure to follow this instruction would pose a danger of the hand truck falling over or colliding with the surroundings.
- When moving the hand truck by pushing it, pay careful attention to the state of the road surface and move slowly. Moving the hand truck over an uneven or soft surface would pose a danger of the hand truck falling over.
- The hand truck has no brake mechanism. When transporting using casters, always check that the road surface is not sloped. Do not move the hand truck on a sloped surface. Also, even when pausing at a location that seems level, take preventive measures to prevent the hand truck from moving, for example by fastening it in place with the adjusters. Incorrect handling poses the danger of the hand truck starting to move on its own and colliding with the surroundings or being trapped.

When moving the hand truck short distances, the casters that are mounted on the hand truck can be used. In this case, always move the hand truck in accordance with fig. 2-1 “Transporting Position and Shipping Posture”.
2 Transporting
2.2 Transporting Method

When moving the hand truck, lower the casters according to the following procedures.

1. Turn the elevator handle clockwise to lower the casters.

2. Lower the casters until the bottoms of the adjusters are about 20 mm off the floor. (Keep the exposed portion of the adjuster threads 70 mm to 80 mm.)
2.2 Transporting Method

2.2.3 Using a Crane (optional)

Transporting this product with a crane requires the optional crane shipping bolts and brackets.

At this time, always set the manipulator into the posture shown in fig. 2-1 “Transporting Position and Shipping Posture” and mount the crane shipping bolts and brackets before lifting the hand truck.

The hand truck should be lifted by a crane with four wire ropes through 50 dia. holes on the top of the crane shipping bolts and brackets.

The length of the wire rope must be 2000 mm or longer.

- The crane shipping bolts and brackets are painted yellow.
- As shown in fig. 2-3 “Using a Crane”, the crane shipping bolts and brackets are fixed with the ultra low head hexagon socket head cap screws M8 (length: 20 mm, 2 screws, 4 places) and hexagon socket head cap screws M8 (length: 20 mm, 2 screws, 4 places).

**NOTE**

- Carefully check that the installation bolts for the crane shipping bolts and brackets are tight before transporting the hand truck.
- Lifting weight:
  - YHT-1-06VXHC10-1: Approximately 295 kg
  - YHT-1-06VXHC10-2: Approximately 277 kg
  Use a wire rope strong enough to withstand the weight.
- The crane shipping bolts and brackets are designed to withstand the weight. Do not use these shipping bolts and brackets to transport anything other than a hand truck.
- When transporting with a crane, always install the crane shipping bolts and brackets.
- Avoid applying external force on the manipulator or motor unit when transporting with equipment other than a crane or forklift.
- After installation, remove the crane shipping bolts and brackets. Store these crane shipping bolts and brackets for future use in the event that the hand truck must be moved or transported with a crane again.
2 Transporting

2.2 Transporting Method

Fig. 2-3: Using a Crane

Ultra low head hexagon socket head cap screw M8 (length: 20 mm)(2 screws)(4 places)
Tightening torque: 12.5 N·m (1.3 kgf·m)

Crane shipping bolts and brackets

Hexagon socket head cap screw M8 (length: 20 mm)(2 screws)(4 places)
Conical spring washer 2H-8 (2 screws)(4 places)
Tightening torque: 12.5 N·m (1.3 kgf·m)

→ indicates the position of the center of gravity
3 Installation

DANGER

- Perform a risk assessment that matches the customer’s usage.
Failure to observe this instruction may result in injury or damage.

WARNING

- Do not perform the welding operation for a pedestal or etc. when the power cable is being connected.
Failure to observe this instruction may result in damage to an electric device due to the current of welding.
- Install the manipulator in a location where the tool or the workpiece held by its fully extended arm will not reach the wall, the safety fence, etc.
Failure to observe this warning may result in injury or damage.
- Make sure to firmly anchor the manipulator before turning ON the power and operating the manipulator.
Failure to observe this instruction may cause the manipulator to turn over, which may result in personal injury and/or equipment damage.
- Do not install the hand truck on a tilted floor, uneven floor, soft floor, or any other unstable surface.
Failure to observe this instruction may cause the hand truck to turn over or otherwise move inappropriately, which may result in personal injury and/or equipment damage.
- The installation conditions depend on the operation method.
Always install in the way that matches the operation method.
Failure to observe this instruction may allow the hand truck to move out of place, which may result in personal injury and/or equipment damage.
- Do not install or operate a damaged hand truck or one that is missing any of its components.
Failure to observe this instruction may cause improper operation, which may result in personal injury and/or equipment damage.

NOTICE

- After completing the installation, remove the crane shipping bolts and brackets before turning ON the power for the first time.
Failure to observe this instruction may result in damage to the main drive unit.
3.1 Installation of the Safety Fence

To insure safety, be sure to install safety fence. They prevent unforeseen accidents with personnel and damage to equipment. The following is quoted for your information and guidance.

**Responsibility for Safeguarding (ISO10218)**

When designing a robot system in which an operator and a robot collaborate in the environment of no safeguarding, sufficient risk assessment should be carried out to avoid damages to the equipment or unexpected injury to the operator or people around the system during the operation.

3.2 Installation of the Hand Truck

3.2.1 Hand Truck Installation Method

Always use adjusters when operating the manipulator.

When operating the manipulator in any mode other than collaborative operation mode, install the hand truck with the adjusters, then always fasten the hand truck in place with anchor brackets.

Install the hand truck with the method that matches the operation mode before turning ON the power.

<table>
<thead>
<tr>
<th>Operation mode</th>
<th>Fastening tools (product accessories)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative operation mode</td>
<td>Adjuster</td>
</tr>
<tr>
<td>Mode other than collaborative operation mode</td>
<td>Adjuster and anchor bracket</td>
</tr>
</tbody>
</table>

3.2.1.1 Installation Using Adjusters

When using the manipulator in collaborative operation mode, fasten the hand truck in place with adjusters.

Install the hand truck on a level surface.

1. Check that the exposed portion of the adjuster threads is 70 mm to 80 mm.
3 Installation

3.2 Installation of the Hand Truck

2. Turn counterclockwise until the elevator handle steers easily and make the adjusters contact the floor.

3. Use a spanner, etc. to turn the adjuster until the caster is at least 1 mm from the floor.

4. While watching the level on the hand truck, adjust the hand truck to be level. Adjust the four adjusters so that there is no play in the hand truck and so that the bubble in the level is in the middle.
3.2.1.2 Installation Using Anchor Brackets

When operating the manipulator in any mode other than collaborative operation mode, always fasten the hand truck in place with anchor brackets.

1. Refer to chapter 3.2.1.1 “Installation Using Adjusters” and fasten the hand truck with the adjusters.

2. Install the accessory anchor brackets on the adjusters. (4 places)
   At this time, install the anchor brackets at about a 90° angle to the hand truck as shown in the figure below and insert the anchor brackets until they come up against the adjuster bottom nuts.

3. Drill the anchor bolt installation holes in the ground in alignment with the position of the anchor bracket holes and drive in the anchor bolts.

4. Fasten the anchor brackets with anchor bolts M12.
   Tighten the anchor bolts firmly so that they will not come loose during the operation.

NOTE
If anchor brackets are not used when using the manipulator in any mode other than collaborative operation mode, there is a danger that the hand truck will move out of place due to the robot’s counterforce operation.

5. After the level has been adjusted, sufficiently tighten the nuts at the top of the adjusters.
3.3 Location

When installing the hand truck, it is necessary to satisfy the following environmental conditions:

- Ambient Temperature: 0 to +40°C\(^1\)
- Humidity: 20 to 80%RH (non-condensing)
- Free from water, explosive gas or liquid, or corrosive gas or liquid.
- Free from excessive vibration (Vibration acceleration: 4.9 m/s\(^2\) [0.5G] or less)
- Free from large electrical noise (plasma)
- Free from the strong magnetic field
- Altitude: 1000 m or less
- Flatness for installation: 0.5 mm or less

NOTE
When the operation is started after the manipulator has been out of operation and left in the low temperature (almost 0°C) for a long period, the alarm may occur since the resistance of the drive unit is large. If the alarm occurs, perform the break-in for few minutes.

1 0 to +35°C when the soft cover for covering the manipulator (optional) is mounted for reducing the contact/collision impact.
4 Turning Power ON and OFF

DANGER

• Perform a risk assessment that matches the customer's usage.
Failure to observe this instruction may result in injury or damage.

WARNING

• Ground resistance must be 100 Ω or less.
Failure to observe this warning may result in fire and/or electric shock.
• Before wiring, make sure to turn the breaker OFF, and put up a warning sign (for example: DO NOT TURN THE POWER ON).
Failure to observe this warning may result in electric shock or injury.
• Wiring must be performed by authorized or certified personnel.
Failure to observe this warning may result in fire and/or electric shock.
4. Turning Power ON and OFF
4.1 Power Supply

The manipulator requires a power source with a capacity of 1.0 kVA. Use a power source with a capacity margin.

4.2 Turning Power ON

1. Open the breaker cover.

2. Always confirm that the hand truck breaker is OFF.

3. Plug the grounded power plug on the cable between the hand truck and the primary source into a grounded socket.

4. Turn ON the hand truck breaker.
4. Turning Power ON and OFF
4.3 Turning Power OFF

1. Turn OFF the hand truck breaker.

2. Remove the power plug from the socket.

4.4 Cable for Primary Source

4.4.1 Primary Source Cable (YHT-1-06VXHC10-1: 100-VAC Specification)

The cable between the hand truck and the primary source is provided with the hand truck. The cable is equipped with a grounded power plug, so insert into a grounded socket.

4.4.2 Primary Source Cable (YHT-1-06VXHC10-2: 200-VAC Specification)

The cable between the hand truck and the primary source must be prepared by the customer. Refer to fig. 7-2 “200V-Specification Wiring Diagram” and prepare the cable. Also, always wire with grounded power connectors.
## 5 Basic Specifications

### 5.1 Basic Specifications

#### Table 5-1: Basic Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>YHT-1-06VXHC10-1</th>
<th>YHT-1-06VXHC10-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>For moving and installing collaborative robots</td>
<td></td>
</tr>
<tr>
<td>Mountable Manipulator</td>
<td>MOTOMAN-HC10DT</td>
<td></td>
</tr>
<tr>
<td>Mountable Controller</td>
<td>YRC1000micro</td>
<td></td>
</tr>
<tr>
<td>Mountable Pendant</td>
<td>Programming pendant, smart pendant (optional)</td>
<td></td>
</tr>
<tr>
<td>Main Body Mass(^1)</td>
<td>240 kg</td>
<td>222 kg</td>
</tr>
<tr>
<td>Mountable Mass(^2)</td>
<td>20 kg</td>
<td></td>
</tr>
<tr>
<td>Protected Structure</td>
<td>IP20</td>
<td></td>
</tr>
<tr>
<td>Mounting Method</td>
<td>Floor-mounted</td>
<td></td>
</tr>
<tr>
<td>Installation Method</td>
<td>Accessory adjuster installation (fastened with anchor bolts)</td>
<td></td>
</tr>
<tr>
<td>Power Source</td>
<td>100 VAC, 50 Hz/60 Hz</td>
<td>Three phase: 200 VAC/220 VAC, 50 Hz/60 Hz, Single phase: 200 VAC/230 VAC, 50 Hz/60 Hz(^3)</td>
</tr>
<tr>
<td>Length of Cable for Primary Power Source</td>
<td>4 m</td>
<td></td>
</tr>
<tr>
<td>Ambient Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>0°C to 40°C(^5)</td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>20% to 80% RH</td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>4.9 m/s(^2)</td>
<td></td>
</tr>
<tr>
<td>Altitude</td>
<td>1000 m or less</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free from corrosive gas or liquid, or explosive gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free from dust, soot, or water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free from excessive electrical noise (plasma)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free from strong magnetic field</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 The mass of the main body is the mass with the manipulator, controller, pendant, and transformer (only YHT-1-06VXHC10-1) mounted.
2 The mountable mass is the mass excluding the standard components mounted on the hand truck (manipulator, controller, pendant, and transformer (only YHT-1-06VXHC10-1).
3 Customers can select from three phase (200 VAC/220 VAC, 50 Hz/60 Hz) or single phase (200 VAC/230 VAC, 50 Hz/60 Hz).
4 The primary source cable must be prepared by the customer.
5 0°C to +35°C when the soft cover for covering the manipulator (optional) is mounted for reducing the contact/collision impact.
5.2 Names of the Parts

*Fig. 5-1: Names of the Parts*

- **Manipulator**
- **Mounting seat**
- **Programming pendant**
- **Level**
- **Handle for moving hand truck**
- **Breaker**
- **Ball screw**
- **Elevator handle**
- **Caster (rear wheels, free)**
- **Adjuster (4 places)**
- **Ethernet connector**
- **Power connector**
- **Caster (front wheels, fixed)**
- **Power connector**
- **Controller YRC1000micro**
- **Transformer (only YHT-1-06VXHC10-1)**

*When the Cover is Removed*
5.3 Dimensions and P-Point Maximum Envelope

Fig. 5-2: External Dimensions (mm)
6 System Application

6.1 Internal User I/O Wiring Harness and Air Line

Internal user I/O wiring harness (0.2 mm² × 8 wires), the cable of the external 1 axis (0.3 mm² × 3 cables, 0.2 mm² × 8 cables) and two air lines are incorporated in the manipulator for the drive of the peripheral devices mounted on the upper arm as shown in fig. 6-1 “Internal User I/O Wiring Harness and Air Line”.

The connector pins are assigned as shown in fig. 6-2 “Details of the Connector Pin Numbers”. Wiring should be performed by the user. The operating conditions are shown in the following table.

<table>
<thead>
<tr>
<th>The allowable current for cables</th>
<th>2.0 A or less for each wire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(connector for the power of the external axis, connector for the encoder of the external axis)</td>
</tr>
<tr>
<td></td>
<td>2.5 A or less for each wire</td>
</tr>
<tr>
<td></td>
<td>(connector for the internal user I/O wiring harness)</td>
</tr>
<tr>
<td>The total current value for connectors</td>
<td>12.0 A or less</td>
</tr>
<tr>
<td></td>
<td>(connector for the power of the external axis)</td>
</tr>
<tr>
<td></td>
<td>12.0 A or less</td>
</tr>
<tr>
<td></td>
<td>(connector for the encoder of the external axis)</td>
</tr>
<tr>
<td></td>
<td>40.0 A or less</td>
</tr>
<tr>
<td></td>
<td>(connector for the internal user I/O wiring harness)</td>
</tr>
<tr>
<td>The maximum pressure for the air line</td>
<td>490 kPa (5 kgf/cm²) or less.</td>
</tr>
<tr>
<td></td>
<td>(The inside diameter: 2.5 mm)</td>
</tr>
<tr>
<td>The allowable temperature range of the air line</td>
<td>0°C - + 40°C</td>
</tr>
</tbody>
</table>
6 System Application
6.1 Internal User I/O Wiring Harness and Air Line

Fig. 6-1: Internal User I/O Wiring Harness and Air Line

Details of A
- Connector for the encoder cable of the external axis: 51216-0700 *MOLEX*
- Connector for the power cable of the external axis: 51216-0600 *MOLEX*
- Connector for internal user I/O wiring harness: 51216-0800 *MOLEX*
- AIR 1 outlet: air line (red) (outside dia.:4)
- AIR 2 outlet: air line (blue) (outside dia.:4)

Details of B
- Connector for the power supply of the external axis: HR10A-7R-6P *HIROSE*
  Prepare the connector HR10A-7P-6S (73) *HIROSE*
- Air inlet 1: Tapped hole M5 (pitch: 0.8) with pipe plug
- Position of the main key
- Connector for internal user I/O wiring harness: RM21WTR-20P *HIROSE*
  Prepare the connector RM21WTP-20S (81) *HIROSE*
- Connector for the power cable of the external axis: 51227-0600 *MOLEX*
- Connector for the encoder cable of the external axis: 51227-0700 *MOLEX*
- Connector for internal user I/O wiring harness: 51227-0800 *MOLEX*
- Connector for the encoder of the external axis: LF07WBR-6P *HIROSE*
  Prepare the connector LF07WBP-6S (31) *HiROSE*
Fig. 6-2: Details of the Connector Pin Numbers

- **Pin used**
  - Pin 1: (0.2 mm²) 8 systems
  - Pin 2: (0.2 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.2 mm²)
  - Pin 6: (0.2 mm²)
  - Pin 7: (Open)
  - Pin 8: (Open)
  - Pin 9: (Open)
  - Pin 10: (Open)
  - Pin 11: (Open)
  - Pin 12: (Open)
  - Pin 13: (Open)
  - Pin 14: (Open)
  - Pin 15: (Open)
  - Pin 16: (Open)
  - Pin 17: (Open)
  - Pin 18: (Open)
  - Pin 19: (Open)
  - Pin 20: (Open)

- **Pin used**
  - Pin 1: (0.2 mm²) 6 systems
  - Pin 2: (0.2 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.2 mm²)
  - Pin 6: (0.2 mm²)
  - Pin 7: (Open)
  - Pin 8: (Open)
  - Pin 9: (Open)
  - Pin 10: (Open)
  - Pin 11: (Open)
  - Pin 12: (Open)
  - Pin 13: (Open)
  - Pin 14: (Open)
  - Pin 15: (Open)
  - Pin 16: (Open)
  - Pin 17: (Open)
  - Pin 18: (Open)
  - Pin 19: (Open)
  - Pin 20: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²) 3 systems
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²)
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²)
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²)
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²)
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²)
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²) 3 systems
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²) 3 systems
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²) Shielded cable
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²) Shielded cable
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²) Shielded cable
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²) Shielded cable
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)

- **Pin used**
  - Pin 1: (0.3 mm²) Shielded cable
  - Pin 2: (0.3 mm²)
  - Pin 3: (0.2 mm²)
  - Pin 4: (0.2 mm²)
  - Pin 5: (0.3 mm²)
  - Pin 6: (Open)
6.2 Mounting Seats

Required equipment can be installed using the mounting seat holes. For details on installation dimensions and mounting holes, refer to fig. 6-3 “Mounting Seats (mm)”. The load is up to 20 kg.

Mounting seats can be processed.

When processing mounting seats, remove installation screws and remove the mounting seats before processing.

**NOTE**
Be careful when operating. There is a danger of mounted equipment colliding with the manipulator.

Fig. 6-3: Mounting Seats (mm)
7 Electrical Equipment Specification

7.1 Hand Truck Wiring Diagrams

Fig. 7-1 “100V-Specification Wiring Diagram” and fig. 7-2 “200V-Specification Wiring Diagram” are hand truck wiring diagrams.

Fig. 7-1: 100V-Specification Wiring Diagram

```
100 VAC
L E N

L N E
X Y G

L N
L1 N1 E E E
L1 N1 E E E

Transformer
Input cable
(100 VAC/200 VAC)
Output socket 200 V
2P15A 250 V

L2 N2 E E
A B C D

Controller
YRC1000micro

Hand track
HC10(DT) manipulator
```
7 Electrical Equipment Specification
7.1 Hand Truck Wiring Diagrams

Fig. 7-2: 200V-Specification Wiring Diagram

Three-phase, 200 VAC

Power source side connector type: NET-32-4-PF
Hand truck side connector type: NET-32-4-RM

Note:
• This is provided by the customer.
• When using with single-phase 200 V, connect to the R and S phases.

Hand track
HC10(DT) manipulator

Controller
YRC1000micro

Note:

Power source side connector type: NET-32-4-PF
Hand truck side connector type: NET-32-4-RM

Controller
YRC1000micro

Note:
8 Maintenance and Inspection

8.1 Inspection Schedule

Proper inspections are essential not only to assure that the mechanism will be able to function for a long period, but also to prevent malfunctions and assure safe operation.

Inspection intervals are classified into six levels as shown in table 8-1 “Inspection Items”.

In table 8-1, the inspection items are categorized by types of operations: operations which can be performed by personnel authorized by the user, operations to be performed by trained personnel, and operations to be performed by service company personnel.

Only specified personnel shall perform the inspection work.

WARNING

- Maintenance and inspection must be performed by specified personnel.

Failure to observe this caution may result in electric shock or injury.

- For disassembly or repair, contact your YASKAWA representative.

- Before maintenance or inspection, be sure to turn the main power supply OFF, and put up a warning sign. (ex. DO NOT TURN THE POWER ON.)

Failure to observe this warning may result in electric shock or injury.

NOTE

- The inspection interval must be based on the servo power supply on time.

- The following inspection schedule is based on the case where the manipulator is used for the cooperation with the working people.

If the manipulator is used for other application or if it is used under special conditions, a case-by-case examination is required. The inspection may be conducted at shorter intervals if the manipulator is used very frequently for the application such as handling, in this case, contact your YASKAWA representative.
### Table 8-1: Inspection Items

<table>
<thead>
<tr>
<th>Items</th>
<th>Schedule</th>
<th>Method</th>
<th>Operation</th>
<th>Inspection Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily</td>
<td>1000 H Cycle</td>
<td>6000 H Cycle</td>
<td>12000 H Cycle</td>
</tr>
<tr>
<td>1</td>
<td>Working area and hand truck</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Anchor bracket</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Visible section cover screws</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Elevator section mechanism</td>
<td>●</td>
<td>Manual Visual</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Casters</td>
<td>●</td>
<td>Manual Visual</td>
<td></td>
</tr>
</tbody>
</table>

1) Inspection No. correspond to the numbers in fig. 8-1 “Inspection Items”.

Note: For manipulator inspections, refer to the MOTOMAN-HC10DT INSTRUCTIONS (HW1485083).
8 Maintenance and Inspection
8.1 Inspection Schedule

Fig. 8-1: Inspection Items
9 Recommended Spare Parts

It is recommended to keep the parts and components in the following table in stock as spare parts for the hand truck.

To purchase lead wires of the wire harness or etc., check the order/ manufacture no. and contact your YASKAWA representative.

Product performance cannot be guaranteed when using spare parts from any company other than YASKAWA. The spare parts are ranked as follows:

- Rank A: Expendable and frequently replaced parts
- Rank B: Parts for which replacement may be necessary as a result of frequent operation
- Rank C: Drive unit

Table 9-1: Spare Parts for the YHT-1-06VXHC10-* (Sheet 1 of 2)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>Adjuster</td>
<td>FBR60-12-100</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>Left cover</td>
<td>HW1308293-A</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>3</td>
<td>Right cover</td>
<td>HW1308294-A</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>4</td>
<td>Bottom cover (right)</td>
<td>HW1308295-1</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>5</td>
<td>Bottom cover (left)</td>
<td>HW1308295-2</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>Caster (front wheels)</td>
<td>SKH-100VAH</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td>Caster (rear wheels)</td>
<td>STH-100VAH</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td>Bearing</td>
<td>HW1409803-1</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>9</td>
<td>Hinge pin</td>
<td>HCCGH20-38</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>10</td>
<td>Link</td>
<td>HW1409802-1</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>11</td>
<td>Cable between hand truck and primary source</td>
<td>HW1409915-1</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>1</td>
<td>Only YHT-1-06VXHC10-1</td>
</tr>
<tr>
<td>C</td>
<td>12</td>
<td>Trapezoidal thread screw</td>
<td>HW1409898-1</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>13</td>
<td>Stop pin</td>
<td>BSTEH17</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Table 9-1: Spare Parts for the YHT-1-06VXHC10-* (Sheet 2 of 2)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>14</td>
<td>Washer</td>
<td>WSSB25-10-2</td>
<td>YASKAWA Electric</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>15</td>
<td>Trapezoidal thread nut</td>
<td>MTRFR20</td>
<td>YASKAWA Electric</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>16</td>
<td>Crank lever</td>
<td>NOCH12</td>
<td>YASKAWA Electric</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>17</td>
<td>Transformer</td>
<td>NTBO-EK330</td>
<td>YASKAWA Electric</td>
<td>1</td>
<td>1</td>
<td>Only YHT-1-06VXHC10-1</td>
</tr>
</tbody>
</table>