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: 1

MANUAL NO.
HW1485654

1/71
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.

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

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.
- Return the programming pendant to a safe place 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 safety signal short circuit connector (optional), and the YRC1000micro Smart Pendant (optional).

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 safety signal short circuit connector</td>
<td>Programming pendant safety signal short circuit 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 TM are omitted.
**Explanation of Warning Labels**

The following warning labels are attached to the hand truck. 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*

![Diagram of Warning Label Locations]

*Nameplate*

![Image of 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.

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.

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 (provided on the CD-ROM which is connected to the USB connector)
- Programming pendant
- Programming pendant safety signal short circuit connector (optional)

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

- Smart Pendant (optional)

When the safety laser scanner option is added, the following manuals are also included.

- Safety laser scanner manual (provided on CD)
- 24V power supply and indicator lamp manual (provided in paper format)

<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>Programming pendant safety signal short circuit connector (optional)</td>
</tr>
<tr>
<td>Complete Set of Manuals</td>
<td>Smart Pendant (optional)</td>
</tr>
<tr>
<td>(in the CD-ROM which is connected to the USB connector)</td>
<td></td>
</tr>
</tbody>
</table>
1. Product Confirmation

1.1 Contents Confirmation

<table>
<thead>
<tr>
<th>Accessories of Hand Truck</th>
<th>Pcs.</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifting jig¹ 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>For lifting the manipulator main body</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. The hand truck and manipulator cannot be lifted while they are connected together. 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(ABS0 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-A, HW1409900-1, and HW1410481-A) 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>64°</td>
<td>30°</td>
<td>0°</td>
<td>64°</td>
<td>0°</td>
</tr>
<tr>
<td>Pulse</td>
<td>0</td>
<td>170964</td>
<td>79422</td>
<td>0</td>
<td>152200</td>
<td>0</td>
</tr>
</tbody>
</table>

*indicates the position of the center of gravity*
2 Transporting
2.2 Transporting Method

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.

**NOTE**

- Before transporting, check that the nuts at the top of adjuster are tightened.
- Weight of hand truck (with manipulator):
  - YHT-1-06VXHC10-1: Approximately 243 kg
  - YHT-1-06VXHC10-2: Approximately 225 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 Transporting
2.2 Transporting Method

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.)
2.3 Using a Crane (Option)

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: 25 mm, 2 screws, 4 places), 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 307 kg
  - YHT-1-06VXHC10-2: Approximately 289 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 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: 25 mm) (2 screws) (4 places)
  - Tightening torque: 5.9 N·m (0.6 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 washers) (4 places)
  - Tightening torque: 12.5 N·m (1.3 kgf·m)

- Hexagon socket head cap screw M8 (length: 20 mm) (2 screws) (4 places)
  - Conical spring washer 2H-8 (2 washers) (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.
- 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 the elevator handle counterclockwise until it 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 leveled. Adjust the four adjusters so that there is no play in the hand truck and the bubble in the level is in the middle.
3 Installation

3.2 Installation of the Hand Truck

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

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 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 the nuts of the 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.
3 Installation
3.3 Location

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

- Ambient temperature during operation: 0 to +40°C\(^1\)
- Ambient temperature during transport and storage: -10 to +60°C
- 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

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 Ohm 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 power source into a grounded socket.

4. Turn ON the hand truck breaker.
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 Power Source

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

The cable between the hand truck and the primary power 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 Power Source Cable (YHT-1-06VXHC10-2: 200-VAC Specification)

The cable between the hand truck and the primary power 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>
<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>Applicable Manipulator</td>
<td>YR-1-06VXHC10-C11</td>
<td></td>
</tr>
<tr>
<td>Applicable Controller: YRC1000micro&lt;sup&gt;1&lt;/sup&gt;</td>
<td>ERBR-100-06VX8-A03</td>
<td></td>
</tr>
<tr>
<td>Mountable Pendant</td>
<td>Programming pendant, Smart Pendant (optional)</td>
<td></td>
</tr>
<tr>
<td>Main Body Mass&lt;sup&gt;2&lt;/sup&gt;</td>
<td>243 kg</td>
<td>225 kg</td>
</tr>
<tr>
<td>Mountable Mass&lt;sup&gt;3&lt;/sup&gt;</td>
<td>20 kg</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>
</tbody>
</table>
| Power Source | 100 VAC, 50 Hz/60 Hz | Three phase: 200 VAC/220 VAC, 50 Hz/60 Hz  
Single phase: 200 VAC/230 VAC, 50 Hz/60 Hz<sup>4</sup> |
| Length of Cable for Primary Power Source | 4 m |  |
| Ambient Conditions |  |
| Temperature | 0°C to 40°C<sup>5</sup> |  |
| Humidity | 20% to 80% RH |  |
| Vibration | 4.9 m/s<sup>2</sup> |  |
| Altitude | 1000 m or less |  |
| Others | - Free from explosive and corrosive gas or liquid  
- Free from dust, soot, or water  
- Free from excessive electrical noise (plasma)  
- Free from strong magnetic field |  |

---

1 Refer to the YRC1000micro INSTRUCTIONS (RE-CTO-A222) or YRC1000micro supplementary instructions for details.  
2 The mass of the main body is the mass with the manipulator, controller, pendant, and transformer (only YHT-1-06VXHC10-1) mounted.  
3 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)).  
4 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).  
5 The primary power source cable must be prepared by the customer. (Connector type: NET-32-4-RM, mating connector type: NET-32-4-PF)  
6 0°C to +35°C when the soft cover for covering the manipulator (optional) is mounted for reducing the contact/collision impact.
5 Basic Specifications
5.2 Names of the Parts

Fig. 5-1: Names of the Parts

Fig. 5-2: Names of the Parts (When the Cover is Removed)

- Adjuster (4 places)
- Caster (rear wheels, free)
- Caster (front wheels, fixed)
- Elevator handle
- Ball screw
- Transformer (only YHT-1-06VHC10-1)
- Indicator lamp
- Terminal block
- Controller YRC1000micro
- Without Safety Laser Scanner
- With Safety Laser Scanner
- Programming pendant
- Level
- Handle for moving handtruck
- Breaker
- Caster (rear wheels, free)
- Adjuster (4 places)
5.3 **Dimensions and P-Point Maximum Envelope**

*Fig. 5-3: 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.

| The allowable current for cables | 2.0 A or less for each wire (connector for the power of the external axis, connector for the encoder of the external axis) |
| The total current value for connectors | 12.0 A or less (connector for the power of the external axis) |
| The maximum pressure for the air lines | 490 kPa (5 kgf/cm²) or less. (The inside diameter: 2.5 mm) |
| The allowable temperature range of the air lines | 0°C - +40°C |
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

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"

Details of A

Connector for internal user I/O wiring harness: 51227-0800 "MOLEX"
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 the power supply of the external axis:
HR10A-7R-6P "HIROSE"
Prepare the connector HR10A-7P-6S "HIROSE"

Connector for the encoder of the external axis:
LF07WBR-6P "HIROSE"
Prepare the connector
LF07WBP-6S "HIROSE"

Connector for the power cable of the external axis: 51216-0600 "MOLEX"
Prepare the connector RM21WTP-20S "HIROSE"

Connector for the encoder cable of the external axis: 51227-0700 "MOLEX"
Prepare the connector LF07WBP-6S "HIROSE"

Connector for the encoder of the external axis:
LF07WBR-6P "HIROSE"
Prepare the connector
LF07WBP-6S "HIROSE"

Connector for the encoder of the external axis:
LF07WBR-6P "HIROSE"
Prepare the connector
LF07WBP-6S "HIROSE"

Connector for the encoder of the external axis:
LF07WBR-6P "HIROSE"
Prepare the connector
LF07WBP-6S "HIROSE"

Connector for the encoder of the external axis:
LF07WBR-6P "HIROSE"
Prepare the connector
LF07WBP-6S "HIROSE"

Connector for the encoder of the external axis:
LF07WBR-6P "HIROSE"
Prepare the connector
LF07WBP-6S "HIROSE"

Connector for the encoder of the external axis:
LF07WBR-6P "HIROSE"
Prepare the connector
LF07WBP-6S "HIROSE"

Connector for the encoder of the external axis:
LF07WBR-6P "HIROSE"
Prepare the connector
LF07WBP-6S "HIROSE"

Connector for the encoder of the external axis:
LF07WBR-6P "HIROSE"
Prepare the connector
LF07WBP-6S "HIROSE"
6 System Application
6.1 Internal User I/O Wiring Harness and Air Line

Fig. 6-2: Details of the Connector Pin Numbers

The figure shows the state seen from the fitting side (connection side of mating connector) of the manipulator side connector.

Connector Base Side

End Flange Side
6.2 Mounting Seat

Required equipment can be installed using the mounting seat holes.

For details on installation dimensions and mounting holes, refer to fig. 6-3 “Mounting Seat (mm)”. The load is up to 20 kg.

Mounting seat 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 Seat (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
L1 N1
HC10DT
Hand truck
L1
L1 N1
L2
A B C D E
L1 N.C.
L3 P.E.
Controller
YRC1000micro
Transformer
Input cable
(100 VAC/200 VAC)
Output socket 200 V
2P15A 250 V

100 VAC
L E N
X Y G
L N E
L1 N1 E E E
L1 N1 E E E
L2 N2
A B C D E
L1 N.C. L3 P.E.
Fig. 7-2: 200V-Specification Wiring Diagram

Three-phase, 200 VAC

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

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

Controller
YRC1000micro

Hand truck
HC10DT manipulator

L1 L2 L3 P.E.

Controller YRC1000micro
8 Safety Laser Scanner (Option)

This chapter describes the safety laser scanner option.

8.1 Overview of Safety Laser Scanner

The safety laser scanner detects diffusely-reflected infrared laser beams for detecting objects within a configured protection range. A rotating mirror is used to irradiate the infrared laser beam within the configured protection range, and the diffusely-reflected beam that is reflected by the object is detected by the photosensor unit of the safety laser scanner.

At delivery, the MOTOMAN-HC10DT hand truck where the safety laser scanner is mounted uses temporary settings for the safety laser scanner installation and wiring, and the scanning area. To change the settings for the safety laser scanner based on the operating environment, prepare the items shown in Table 8-1 "Items Required for Setting of Safety Laser Scanner".

<table>
<thead>
<tr>
<th>Item</th>
<th>PC</th>
<th>USB Micro Type-B cable</th>
<th>CD-R of SLS Project Designer (Software for setting the safety laser scanner)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remarks</td>
<td>A DVD/CD drive is required.</td>
<td>The USB cable for charging cannot be used.</td>
<td>This is included as an accessory.</td>
</tr>
</tbody>
</table>

For further details about the information below, refer to the "SE2L Safety Laser Scanner User's Manual (SE92-B1866: IDEC Corporation)" which can be found in the CD included.

- Recommended PC environment
- Installation procedure for the "SLS Project Designer" safety laser scanner function setting software
- Installation procedure for the device driver

**NOTE**

The device driver installation procedure may vary depending on the user's Windows version.
8 Safety Laser Scanner (Option)

8.2 Locations of Master and Slave

Two safety laser scanners are installed. The locations of the safety laser scanners designated as master and slave are shown in Table 8-2 “Locations of Master and Slave”.

Table 8-2: Locations of Master and Slave

<table>
<thead>
<tr>
<th>Master (LS1)</th>
<th>Slave (LS2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8.3 Names of Safety Laser Scanner Parts

The names of the parts of the safety laser scanner are shown below. For further details about the following items, refer to the "SE2L Safety Laser Scanner User's Manual (SE9Z-B1866: IDEC Corporation)":

- Description of LED indicators (status when lit, lit colors)
- Description of 7-segment display

Fig. 8-1: Names of Safety Laser Scanner Parts
8.4 Basic Specifications

8.4.1 Safety Laser Scanner Specifications

The basic specifications of the safety laser scanner are shown below.

### DANGER

- Some of the specifications below differ from the functions and specifications shown in the "SE2L Safety Laser Scanner User's Manual (SE9Z-B1866: IDEC Corporation)". Some functions and specifications are limited for the MOTOMAN-HC10DT hand truck. When using the safety laser scanner outside the recommended scope of YASKAWA, the customer must implement a full risk assessment.

- Protection range: Max. 5 m
- Detection angle: 270°
- Minimum response time: 60 ms
- Number of scanning areas: Max. 4
- Number of scanning area setting modes: 1
- Dual protection ranges
- External device monitoring (EDM) function
- SE2L status indicator using LEDs
- Status indicator using 7-segment display
- Master and slave (1 each) function
- Setting of scanning area using SLS Project Designer (PC)

8.4.2 Indicator Lamp Specifications

The specifications of the indicator lamps provided with the hand truck are shown below.

<table>
<thead>
<tr>
<th>Indicator Lamp</th>
<th>Robot State</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>Collaborative operation disabled</td>
</tr>
<tr>
<td>Green</td>
<td>Collaborative operation enabled</td>
</tr>
<tr>
<td>Orange</td>
<td>Collaborative operation enabled</td>
</tr>
</tbody>
</table>

For details on collaborative operation, refer to the "YRC1000/ YRC1000micro Collaborative Operation Instructions (HW1484764)".
8 Safety Laser Scanner (Option)

8.5 Area

An example of the detection range of the safety laser scanner is shown in fig. 8-2: “Example of Detection Range for Safety Laser Scanner”. Protection ranges 1 and 2 are set by the “SLS Project Designer” setting software included with the safety laser scanner. When an object enters the configured protection range, the OSSD signal*1 switches from the ON state to the OFF state. When the OSSD signal switches to the OFF state, robot collaborative operation is enabled, and either the robot operation speed is limited or operation is stopped.

*1 OSSD: Output Signal Switching Device

Fig. 8-2: Example of Detection Range for Safety Laser Scanner
8 Safety Laser Scanner (Option)
8.5 Area

8.5.1 Protection Range

The protection range refers to the range directly connected to the OSSD signal. When an object is detected within the protection range, the OSSD signal is switched from the ON state to the OFF state by the safety laser scanner.

The scanning area of the safety laser scanner consists of protection range 1 and protection range 2. Scanning areas can be set in four different ways for protection ranges 1 and 2. This enables flexible switching of the scanning areas even if the layout of the factory or the work conditions in the area around the robot are changed.

The relationship between the protection ranges and robot states is shown in Table 8-4 “Safety Laser Scanner Detection State and Robot State”.

Table 8-4: Safety Laser Scanner Detection State and Robot State

<table>
<thead>
<tr>
<th>Object detection state of safety laser scanner</th>
<th>Robot state</th>
<th>Color of indicator lamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside the protection range</td>
<td>Normal operation</td>
<td>White</td>
</tr>
<tr>
<td>Protection range 1</td>
<td>Deceleration operation</td>
<td>Green</td>
</tr>
<tr>
<td>Protection range 2</td>
<td>Stop</td>
<td>Orange</td>
</tr>
</tbody>
</table>

The speed limit function of the functional safety functions is used for the deceleration operation of protection range 1 and the stop operation of protection range 2.

In the speed limit function, upper limit values are set for the robot group control point (TCP: Tool Center Point) speed and flange center point (FCP) speed, and monitoring is performed using software to ensure that the setting speed at each point is not exceeded.

- For details on the speed limit function, refer to the “YRC1000micro OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY FUNCTION (HW1484544)”.
- For details on the setting procedure for the speed limit function, refer to “Basic Settings for Collaborative Operation” in the “YRC1000/YRC1000micro Collaborative Operation Instructions (HW1484764)”. 
8.5.2 Changing the Area Settings

This section describes the procedure when changing the default settings of the safety laser scanner detection area.

- To change the settings of the safety laser scanner, a PC, USB cable, and other items are required. For details, refer to chapter 8.1 “Overview of Safety Laser Scanner” in this manual.
- For details on the setting procedure for the scanning area, refer to the explanation for “Area Configuration” in the “SEZL Safety Laser Scanner User’s Manual (SE9Z-B1866: IDEC Corporation)”.

1. Open the protective cover on the front right side of the safety laser scanner.
2. Install SLS Project Designer to the PC. Connect the safety laser scanner where the setting will be changed by a micro USB cable.
3. Start SLS Project Designer from the Desktop.
4. Select the serial port, and click “Connect”.

![Illustration of SLS Project Designer interface]
8. Safety Laser Scanner (Option)

8.5. Area

5. The following screen appears while connecting.

6. If a connection is established normally, the Monitor screen is displayed. Click "Configuration", then a confirmation dialog box for switching to edit mode appears. Click "Yes".

7. Enter the 8-digit password.

The default password is "12345678". If the setting was changed by the user after shipping, enter the changed password.
8. The General screen appears. No setting items appear in this screen. Click “Function”.

9. The Function screen appears. No setting items appear in this screen. Click “Area”.

---

8-9 HW1485654
10. The Area screen appears.

To enable the physical location of the hand truck and safety laser scanner and the positional relationship with the protection ranges to be intuitively visible, change the display angle to "45.00°".
11. The display angle is changed.
Click the protection range that will be changed.

12. Select the target area, and enter the XY coordinates under the "Coordinates" tab. An example shown below is a screen where the following XY coordinates were entered for target area 1.

<table>
<thead>
<tr>
<th>Before change</th>
<th>After change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt 1 X: 3600 mm Y: 0 mm</td>
<td>Pt 1 X: 3600 mm Y: 0 mm</td>
</tr>
<tr>
<td>Pt 2 X: 3604 mm Y: 2997 mm</td>
<td>Pt 2 X: 3604 mm Y: 3302 mm</td>
</tr>
<tr>
<td>Pt 3 X: -2997 mm Y: 2997 mm</td>
<td>Pt 3 X: -2997 mm Y: 3300 mm</td>
</tr>
<tr>
<td>Pt 4 X: -2996 mm Y: -3602 mm</td>
<td>Pt 4 X: -2996 mm Y: -3602 mm</td>
</tr>
<tr>
<td>Pt 5 X: 0 mm Y: -3600 mm</td>
<td>Pt 5 X: 0 mm Y: -3600 mm</td>
</tr>
</tbody>
</table>
13. The results that were set are applied to the area display screen and area preview screen. After the settings are completed, click "Confirm".

14. The General screen appears. Click "Function".
15. The Function screen appears. Click "Area".

16. Click the right arrow key to proceed to area 4. After confirming up to area 4, "Transmit to sensor" is enabled.
8. Safety Laser Scanner (Option)

8.5 Area

17. Click “Transmit to sensor”.

18. When a confirmation dialog box appears, click “Yes”.
19. The setting values are transferred to the safety laser scanner, and the following screen appears.

20. Once the transfer of all setting values is completed, the following screen appears. Click "OK". Once transfer is completed, the settings are applied.

21. When the following screen appears, remove the microUSB cable from the safety laser scanner, and close the protective cover.
8.5.3 Switching Areas

8.5.3.1 Signals for Specifying Area

To specify the scanning area to be used, the general-purpose output signals OT#0009 to 0012 are used.

<table>
<thead>
<tr>
<th>GENERAL PURPOSE OUTPUT</th>
<th>CGW#012</th>
<th>1-DEC, 01-HEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT#0009</td>
<td>#0009</td>
<td>#0009</td>
</tr>
<tr>
<td>OUT#0010</td>
<td>#0010</td>
<td>#0010</td>
</tr>
<tr>
<td>OUT#0011</td>
<td>#0011</td>
<td>#0011</td>
</tr>
<tr>
<td>OUT#0012</td>
<td>#0012</td>
<td>#0012</td>
</tr>
<tr>
<td>OUT#0013</td>
<td>#0013</td>
<td>#0013</td>
</tr>
<tr>
<td>OUT#0014</td>
<td>#0014</td>
<td>#0014</td>
</tr>
<tr>
<td>OUT#0015</td>
<td>#0015</td>
<td>#0015</td>
</tr>
<tr>
<td>OUT#0016</td>
<td>#0016</td>
<td>#0016</td>
</tr>
</tbody>
</table>

If multiple area switching signals are ON or if all area switching signals are OFF, the following error number appears in the 7-segment display of the safety laser scanner.

Master: 57 "Area input connection error"
Slave: 80 "Master unit error"

When an error is displayed, be sure to set so that one of the area switching signals is ON.

8.5.3.2 Area Specifying Procedure

The following two methods are available for switching areas.

1. Switching area from the programming pendant
   ① In the programming pendant, select [IN/OUT] - [GENERAL PURPOSE OUTPUT] to open the GENERAL PURPOSE OUTPUT window.
   ② Align the cursor with the ○ or ● of the signal whose ON/OFF state will be changed.
   ③ Press the programming pendant [INTERLOCK] + [SELECT] keys to change the state of the area switching signal.

2. Switching area from a job
   ① In the JOB window of the programming pendant, press [INFORM LIST], and select the DOUT instruction.
   ② Select the general-purpose output number where the state will be changed, and set the state (ON or OFF). When the instruction is executed, the signal state is changed.
8 Safety Laser Scanner (Option)

8.6 Default Settings for Safety Laser Scanner Option

8.6.1 Safety Laser Scanner Settings

The default settings of the safety laser scanner are shown below.

8.6.1.1 General

Table 8-5(a): General Default Settings (Master)

<table>
<thead>
<tr>
<th>Major Item</th>
<th>Setting Item</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product information</td>
<td>Product identity</td>
<td>Initialsettingmaster</td>
</tr>
<tr>
<td></td>
<td>User name</td>
<td>handcarry</td>
</tr>
<tr>
<td>Ethernet information</td>
<td>IP address</td>
<td>192.168.0.10</td>
</tr>
<tr>
<td></td>
<td>Subnet mask</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td></td>
<td>Default gateway</td>
<td>192.168.0.254</td>
</tr>
</tbody>
</table>

Table 8-5(b): General Default Settings (Slave)

<table>
<thead>
<tr>
<th>Major Item</th>
<th>Setting Item</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product information</td>
<td>Product identity</td>
<td>Initialsettingslave</td>
</tr>
<tr>
<td></td>
<td>User name</td>
<td>handcarry</td>
</tr>
<tr>
<td>Ethernet information</td>
<td>IP address</td>
<td>192.168.0.10</td>
</tr>
<tr>
<td></td>
<td>Subnet mask</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td></td>
<td>Default gateway</td>
<td>192.168.0.254</td>
</tr>
</tbody>
</table>

Fig. 8-3: General (Default Settings)
# Safety Laser Scanner (Option)

## Default Settings for Safety Laser Scanner Option

### 8.6.1.2 Function

#### Sensing

Default Settings (Same for Master and Slave)

<table>
<thead>
<tr>
<th>Major Item</th>
<th>Setting Item</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing settings</td>
<td>Minimum detection width</td>
<td>70 mm</td>
</tr>
<tr>
<td></td>
<td>Active areas</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Area input delay</td>
<td>30 ms</td>
</tr>
<tr>
<td></td>
<td>Laser off mode</td>
<td>Not selected</td>
</tr>
<tr>
<td></td>
<td>(Disabled)</td>
<td></td>
</tr>
<tr>
<td>Operation mode</td>
<td></td>
<td>Protection 1, 2</td>
</tr>
<tr>
<td>7 segment display</td>
<td>Upside down configuration</td>
<td>(Disabled)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not selected</td>
</tr>
</tbody>
</table>

![Fig. 8-4: Sensing (Default Settings)](image)

#### EDM

EDM (external device monitoring) is set for the master only.

<table>
<thead>
<tr>
<th>Major Item</th>
<th>Setting Item</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection 1 - EDM settings (Enabled)</td>
<td>On delay</td>
<td>90 ms</td>
</tr>
<tr>
<td></td>
<td>Off delay</td>
<td>300 ms</td>
</tr>
<tr>
<td>Protection 2 - EDM settings (Enabled)</td>
<td>On delay</td>
<td>90 ms</td>
</tr>
<tr>
<td></td>
<td>Off delay</td>
<td>300 ms</td>
</tr>
</tbody>
</table>
8 Safety Laser Scanner (Option)
8.6 Default Settings for Safety Laser Scanner Option

Fig. 8-5: EDM (Default Settings)

Table 8-8(a): Master-Slave Default Settings (Master)

<table>
<thead>
<tr>
<th>Major Item</th>
<th>Setting Item</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master slave settings</td>
<td>Current device</td>
<td>Master</td>
</tr>
<tr>
<td>(Enabled)</td>
<td>Slave count</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 8-8(b): Master-Slave Default Settings (Slave 1)

<table>
<thead>
<tr>
<th>Major Item</th>
<th>Setting Item</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master slave settings</td>
<td>Current device</td>
<td>Slave</td>
</tr>
<tr>
<td>(Enabled)</td>
<td>Slave count</td>
<td>-</td>
</tr>
</tbody>
</table>

Fig. 8-6: Master-Slave (Default Settings)
8.6.1.3 Area

Display of protection 1

Table 8-9: Protection 1 Default Settings

<table>
<thead>
<tr>
<th>Major Item</th>
<th>Setting Item</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scan skip count</td>
<td>On</td>
<td>300 ms</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>120 ms</td>
</tr>
<tr>
<td>Response time</td>
<td>Pt 1</td>
<td>X 2546 [mm]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y -2546 [mm]</td>
</tr>
<tr>
<td></td>
<td>Pt 2</td>
<td>X 4667 [mm]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y -429 [mm]</td>
</tr>
<tr>
<td></td>
<td>Pt 3</td>
<td>X 0 [mm]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y 4239 [mm]</td>
</tr>
<tr>
<td></td>
<td>Pt 4</td>
<td>X -4665 [mm]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y -429 [mm]</td>
</tr>
<tr>
<td></td>
<td>Pt 5</td>
<td>X -2546 [mm]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y -2546 [mm]</td>
</tr>
</tbody>
</table>

*The default setting values for areas 1 to 4 are identical.
The numerical values that are actually displayed may be shifted by several millimeters.

Fig. 8-7: Protection 1 (Default Settings)
8 Safety Laser Scanner (Option)
8.6 Default Settings for Safety Laser Scanner Option

Display of protection 2
Table 8-10: Protection 2 Default Settings

<table>
<thead>
<tr>
<th>Major Item</th>
<th>Setting Item</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scan skip count</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>On</td>
<td>300 ms</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>120 ms</td>
</tr>
<tr>
<td>XY coordinates</td>
<td>Pt 1</td>
<td>X 1131 [mm]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y -1131 [mm]</td>
</tr>
<tr>
<td></td>
<td>Pt 2</td>
<td>X 1839 [mm]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y -424 [mm]</td>
</tr>
<tr>
<td></td>
<td>Pt 3</td>
<td>X 0 [mm]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y 1413 [mm]</td>
</tr>
<tr>
<td></td>
<td>Pt 4</td>
<td>X -1830 [mm]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y -424 [mm]</td>
</tr>
<tr>
<td></td>
<td>Pt 5</td>
<td>X -1131 [mm]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y -1131 [mm]</td>
</tr>
</tbody>
</table>

*The default setting values for areas 1 to 4 are identical. The numerical values that are actually displayed may be shifted by several millimeters.

Fig. 8-8: Protection 2 (Default Settings)
8.6.2 Safety Logic Circuit

The safety logic circuit at shipping is shown below. The safety logic circuit is a function where a logic circuit is created in the programming pendant using safety signals, and it can be used by the operator to stop the robot or set servo ON signal output.

For details on the safety logic circuit, refer to the “YRC1000micro INSTRUCTIONS (RE-CTO-A222)”.

8.6.2.1 Procedure for Checking the Safety Logic Circuit

1. In the programming pendant, select (SAFETY FUNC.) - (SAFETY LOGIC CIRCUIT).

2. The input and output signals of the safety logic circuit and the logic settings are displayed.

**SAFETY LOGIC CIRCUIT: User section**

<table>
<thead>
<tr>
<th>SAFETY LOGIC CIRCUIT</th>
<th>STD</th>
<th>DONE</th>
<th>INPUT1</th>
<th>INPUT2</th>
<th>OUTPUT</th>
<th>TIMER</th>
<th>CMNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>002</td>
<td>MT</td>
<td>TSTOP2</td>
<td>002</td>
<td>PLAY</td>
<td>PAUT</td>
<td>001</td>
<td></td>
</tr>
<tr>
<td>003</td>
<td>PT</td>
<td>TSTOP1</td>
<td>003</td>
<td>POUT</td>
<td>TSTOP1</td>
<td>001</td>
<td></td>
</tr>
<tr>
<td>004</td>
<td>SF</td>
<td>TSTOP2</td>
<td>004</td>
<td>POUT</td>
<td>TSTOP2</td>
<td>001</td>
<td></td>
</tr>
<tr>
<td>005</td>
<td>SF</td>
<td>TSTOP3</td>
<td>005</td>
<td>POUT</td>
<td>TSTOP3</td>
<td>001</td>
<td></td>
</tr>
<tr>
<td>006</td>
<td>SF</td>
<td>TSTOP4</td>
<td>006</td>
<td>POUT</td>
<td>TSTOP4</td>
<td>001</td>
<td></td>
</tr>
<tr>
<td>007</td>
<td>SF</td>
<td>TSTOP5</td>
<td>007</td>
<td>POUT</td>
<td>TSTOP5</td>
<td>001</td>
<td></td>
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<tr>
<td>008</td>
<td>SF</td>
<td>TSTOP6</td>
<td>008</td>
<td>POUT</td>
<td>TSTOP6</td>
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<tr>
<td>009</td>
<td>SF</td>
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<td>POUT</td>
<td>TSTOP7</td>
<td>001</td>
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<tr>
<td>010</td>
<td>SF</td>
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<td>010</td>
<td>POUT</td>
<td>TSTOP8</td>
<td>001</td>
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<tr>
<td>011</td>
<td>SF</td>
<td>TSTOP9</td>
<td>011</td>
<td>POUT</td>
<td>TSTOP9</td>
<td>001</td>
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<td>012</td>
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<td>TSTOP10</td>
<td>012</td>
<td>POUT</td>
<td>TSTOP10</td>
<td>001</td>
<td></td>
</tr>
<tr>
<td>013</td>
<td>SF</td>
<td>TSTOP11</td>
<td>013</td>
<td>POUT</td>
<td>TSTOP11</td>
<td>001</td>
<td></td>
</tr>
</tbody>
</table>

COMMENT:

Page
8 Safety Laser Scanner (Option)

8.6 Default Settings for Safety Laser Scanner Option

**SAFETY LOGIC CIRCUIT: System section (rows 1 to 13)**

<table>
<thead>
<tr>
<th>Node</th>
<th>Input</th>
<th>Logic</th>
<th>Output</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>002</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>003</td>
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<td>004</td>
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<tr>
<td>012</td>
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**SAFETY LOGIC CIRCUIT: System section (rows 14 to 16)**

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<th>Input</th>
<th>Logic</th>
<th>Output</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>013</td>
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<tr>
<td>026</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Diagram of SAFETY LOGIC CIRCUIT]

[Diagram of SAFETY LOGIC CIRCUIT]
8.6 Default Settings for Safety Laser Scanner Option

8.6.3 I/O List

The I/Os used by the robot controller when the optional safety laser scanner is installed in the MOTOMAN-HC10DT Hand-Carry Type are shown below.

8.6.3.1 General-Purpose Output

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>10027</td>
<td>10026</td>
<td>10025</td>
<td>10024</td>
<td>10023</td>
<td>10022</td>
<td>10021</td>
<td>10020</td>
</tr>
<tr>
<td>OUT#0016</td>
<td>OUT#0015</td>
<td>OUT#0014</td>
<td>OUT#0013</td>
<td>OUT#0012</td>
<td>OUT#0011</td>
<td>OUT#0010</td>
<td>OUT#0009</td>
</tr>
<tr>
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<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AREA4</td>
<td>AREA3</td>
</tr>
</tbody>
</table>

8.6.3.2 External Output

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>30017</td>
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<td>30014</td>
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</tr>
</tbody>
</table>

8.6.3.3 Specific Input

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>40787</td>
<td>40786</td>
<td>40785</td>
<td>40784</td>
<td>40783</td>
<td>40782</td>
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<td>40780</td>
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<tr>
<td>SIN#024</td>
<td>SIN#023</td>
<td>SIN#022</td>
<td>SIN#021</td>
<td>SIN#020</td>
<td>SIN#019</td>
<td>SIN#018</td>
<td>SIN#017</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

8.6.3.4 Internal Control Status Signal

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
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<tbody>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8.7 Wiring

This section describes the wiring for peripheral devices installed inside the hand truck.

8.7.1 Device Configuration Within Hand Truck

When the side cover of the hand truck is removed, power distribution and wiring devices such as relays and terminal blocks are installed on the DIN rails. The configuration of each device is shown in fig. 8-9 “Device Configuration Within Hand Truck”. For details on the procedures for removing and reattaching the side cover, refer to chapter 2 “Removing and Reattaching the Covers” in the "MOTOMAN-HC10DT Hand-Carry Type (Hand Truck) MAINTENANCE MANUAL (HW1485656)".

Fig. 8-9: Device Configuration Within Hand Truck
8.7.2 Wiring Diagram for Safety Laser Scanner Option

The wiring diagram for the YRC1000micro within the hand truck, safety laser scanner, and peripheral devices is shown in fig. 8-10 “Wiring Diagram for Safety Laser Scanner Option”.
8 Safety Laser Scanner (Option)

8.7 Wiring

Fig. 8-10: Wiring Diagram for Safety Laser Scanner Option

*Check whether the power supply specifications of the product are 100 VAC or 200 VAC.
8 Safety Laser Scanner (Option)
8.8 Troubleshooting

This section describes the troubleshooting procedures when using the safety laser scanner.

For further details about the following items displayed in the safety laser scanner, refer to the "SE2L Safety Laser Scanner User’s Manual (SE9ZB1866: IDEC Corporation)"

- Description of LED indicators (status when lit, lit colors)
- Description of 7-segment display

Check the items in the table below if no error is indicated by the 7-segment display on the safety laser scanner and the programming pendant or robot collaborative operation is abnormal.

Table 8-11: Troubleshooting

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-SAF GENERAL INPUT SIG ERROR2 (Machine Safety General-Purpose Input Signal Mismatch 2) error is displayed on the programming pendant.</td>
<td>The default settings for the safety laser scanner that were recommended by YASKAWA were changed.</td>
<td>Start the &quot;SLS Project Designer&quot; setting software for the safety laser scanner, and check that the default settings have not been changed. For details about the default settings for the safety laser scanner, refer to chapter 8.6 &quot;Default Settings for Safety Laser Scanner Option&quot;.</td>
</tr>
<tr>
<td>The robot switches to operation where collaborative operation is enabled even though there are no objects in the area around the MOTOMAN-HC10DT hand-carry type (hand truck).</td>
<td>The microUSB cable or pendant cable connected to the MOTOMAN-HC10DT hand-carry type (hand truck) has been falsely detected by the safety laser scanner as an object.</td>
<td>Organize the cables, such as by binding them, so that they are not detected by the safety laser scanner.</td>
</tr>
</tbody>
</table>

If the robot or safety laser scanner performs an unexpected action, check that the settings are correct by referring to chapter 8.6 "Default Settings for Safety Laser Scanner Option".
9 Maintenance and Inspection

9.1 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 9-1 “Inspection Items”.

In Table 9-1, 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.

- 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 the YASKAWA representative.

**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.
### 9.1 Inspection Schedule

<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. Working area and hand truck</td>
<td>Visual</td>
<td>Clean the work area if dust is present. Check for damage and outside circle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Anchor bracket</td>
<td>Spanner Wrench</td>
<td>Tighten loose bolts. Replace if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Visible section cover screws</td>
<td>Driver</td>
<td>Tighten loose bolts. Replace if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Elevator section mechanism</td>
<td>Manual Visual</td>
<td>Operate the elevator handle to move the elevator to its stroke end and check that there is no abnormality.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Casters</td>
<td>Manual Visual</td>
<td>Check that the casters can turn front and rear, and left and right without resistance. Check for loose nuts at the caster rotation center sections.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Safety laser scanner</td>
<td>Visual</td>
<td>Check that the OSSD signal is switched from the ON state to the OFF state when a test piece is placed within the protection range.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visual</td>
<td>Check that the OSSD signal remains in the OFF state even when the test piece is moved within the protection range.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visual</td>
<td>Check that the OSSD signal is switched from the OFF state to the ON state when the test piece is removed from the protection range.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visual</td>
<td>Check that the 7-segment display of the safety laser scanner shows the correct information when the specified scanning area is changed by a general-purpose output signal.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Inspection No. correspond to the numbers in fig. 9-1 “Inspection Items”.

Note: For manipulator inspections, refer to the MOTOMAN-HC10GT INSTRUCTIONS (HW1485083).
9 Maintenance and Inspection

9.1 Inspection Schedule
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

**NOTE**

For replacing parts in rank B or rank C, contact your YASKAWA representative.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Parts No.</th>
<th>Name</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Qty per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 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 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 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 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 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 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 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 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 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 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 11</td>
<td>Cable between hand truck and primary power source</td>
<td>HW1409815-1</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>Only YHT-1-06VXHC10-1</td>
<td></td>
</tr>
<tr>
<td>C 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 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 10-1: 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 per Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>14</td>
<td>Washer</td>
<td>WSBB25-10-2</td>
<td>YASKAWA Electric Corporation</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 Corporation</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>16</td>
<td>Crank lever</td>
<td>NOCH12</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>17</td>
<td>Transformer</td>
<td>NTBO-EK330</td>
<td>YASKAWA Electric Corporation</td>
<td>1</td>
<td>Only YHT-1-06VXHC10-1</td>
</tr>
</tbody>
</table>
MOTOMAN-HC10DT
Hand-Carry Type (Hand Truck)
INSTRUCTIONS