Rated Welding Output:
WGⅢ: 350 A @ 80 % duty cycle (CV), 350 A @ 60 % duty cycle (pulse).
WGHⅢ: 450 A @ 100 % duty cycle (CV/pulse).

Through-Arm Type
Focused on reducing cable interference

External Type
Focused on wire feedability

Superior wire feedability and reduced cable interference

Power cable interference can occur depending on the welding position.

An example of circumferential welding
Gentle curve of flexible conduit between wire feeder and torch body achieves stable wire feeding.

Reduced interference

A variety of features specialized for arc welding

Structure Specialized for Welding
Cantilever Structure
Increased Motion Speed makes arm compact and improves accessibility to workpieces.
TM-1400: Speed of main 3 axes increased by 22 % on average.
(approx. 42°/s more than TA type)

Extended Reach
TM-1400: 1437 mm (63 mm more than TA type)

Arm Specialized for Welding

Feature 1
External Flexible Conduit

Feature 2
Through-Arm Power Cable

Reduces target position error at weld start and end points!
Through-arm power cable reduces cable interference.
Suppresses twist of wire!

Flexible conduit (TS/TM)
(TM/TL)

Internal Flexible Conduit (for wire feed)**

For use with drum packing wire only.

Manipulator-Controller cable (motor power)
Manipulator-Controller cable (control)

Clean Cable Management!

Robot Systems with Integrated Welding Power Source Technology

Torch type selectable to fit your application!

TM-series
Separate Type
Through-Arm Type
External Type

Superior wire feedability and reduced cable interference
Focused on reducing cable interference
Focused on wire feedability

TS-series
External Type
Through-Arm Type

Long-arm & high payload!

TL-series
External Type

Manipulator Lineup (as of January 2020)

<table>
<thead>
<tr>
<th></th>
<th>TS series</th>
<th>TM series</th>
<th>TL series</th>
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<tbody>
<tr>
<td></td>
<td>800 950</td>
<td>1100 1400</td>
<td>1800 2000</td>
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<tr>
<td>Separate</td>
<td>– –</td>
<td>O O O O O</td>
<td>– –</td>
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<td>Through-Arm</td>
<td>O O</td>
<td>O O O O</td>
<td>– –</td>
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<td>External</td>
<td>O O</td>
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<td>O O</td>
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<tr>
<td>Payload</td>
<td>8 kg</td>
<td>6 kg 4 kg 6 kg</td>
<td>8 kg 6 kg</td>
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</table>

Rated Welding Output:
WGⅢ: 350 A @ 80 % duty cycle (CV), 350 A @ 60 % duty cycle (pulse).
WGHⅢ: 450 A @ 100 % duty cycle (CV/pulse).
A variety of features specialized for arc welding

**Feature 1 (TM/TL)**
Enhanced Basic Performance

**Increased Motion Speed**
TM-1400: Speed of main 3 axes increased by 22% on average.
(approx. 42°/s more than TA type)

**Extended Reach**
TM-1400: 1,437 mm (63 mm more than TA type)

**Feature 2 (TS/TM)**
Arm Specialized for Welding

Cantilever Structure
makes arm compact and improves accessibility to workpieces.

In addition to Through-Arm Type and External Type,
A third choice—Separate Type (TM series)

Revolutionary new type of arc welding robot with advantages of both Through-Arm Type and External Type.

**Feature 3 (TM/TL)**
Structure Specialized for Welding

Clean Cable Management!

- [Option] Internal Flexible Conduit (for wire feed)**
- Manipulator-Controller cable (control)
- Manipulator-Controller cable (motor power)
- Welding power cable
- Gas hose (with valve)

**For use with drum packing wire only.**

**High Wire Feedability**
Less Cable Interference

**Feature 1**
External Flexible Conduit

- [Conventional Type]
- R=small
- Flexible conduit

- [Separate Type]
- Gentle curve of flexible conduit between wire feeder and torch body achieves stable wire feeding.

**Feature 2**
Through-Arm Power Cable

- [Conventional Type]
- Power cable interference can occur depending on the welding position.

- [Separate Type]
- Through-arm power cable reduces cable interference.

**An example of circumferential welding**

Suppresses twist of wire!

- Reduces target position error at weld start and end points!

New type welding robot achieves even higher quality welds.
"Weld Navigation" allows easy parameter setting (Standard)

Easy setting with Teach Pendant

Rich welding parameter database developed through our long experience

"Weld Navigation" reduces parameter setting time.

WGⅢ controller with high performance

- Compared to the conventional model, 6 times faster main CPU and 4 times more memory capacity reduce start-up time by 50% to about 30 seconds.

Improved maintainability

- Swivel rack in the case makes maintenance easy and saves space.
- Cables with connectors on both ends reduce Cable exchange time.
TAWERS Technology—
Various Welding Processes

- SP-MAG II for short-circuit mixed gas welding on thin plates
- HD-Pulse for high-speed and low-spatter in high-current pulsed mixed gas welding
- MTS-CO₂ for CO₂ welding

### TAWERS Welding Process Guide

#### MAG welding

- **Super Active MAG**
  - Active MAG
- **SP-MAG II**
- **HD-Pulse**
- **Normal-Pulse**

- **Weld current (A)**
  - 80
  - 180
  - 220
  - 280
  - 320

- **Weld speed (cm/min)**
  - 40
  - 80

Note: 1.2 mm mild steel wire used for this guide.

- **SP-MAG II**
  - Secondary switching and SP/HS control achieve stable arc and low spatter welding.
  - **Low spatter in low-current range**

- **HD-Pulse**
  - Short-circuit transfer (1 pulse-1 dip) minimizes undercuts in high speed welding.
  - **Low spatter and high speed in high-current range**

- **Normal-Pulse**
  - Droplet transfer (1 pulse-1 drop) achieves low spatter.
  - **Low spatter in high-current range**

#### CO₂ welding

- **Super Active CO₂**
  - Active CO₂
- **MTS-CO₂**
- **Normal CO₂**

- **Weld current (A)**
  - 80
  - 180
  - 260
  - 320

- **Weld speed (cm/min)**
  - 40
  - 80

Note: 1.2 mm mild steel wire used for this guide.

- **MTS-CO₂**
  - MTS control added to SP-MAG technology reduces spatter of CO₂ welding.
  - **Low spatter in low-current range**

### APPLICATION TYPE

**Super Active Wire Feed Process**

Achieves even lower spatter with high-precision control of wire feed speed.

- **Super Active MAG**
- **Super Active CO₂**

See the page of “Super Active TAWERS” for details.
**SP-MAG II**  
(Super-imposition Control)

Greatly reduces spatter in mixed gas (MAG) welding on thin plates

Welding waveform control achieves low spatter in short-circuit transfer range.

**Spatter comparison (1 minute at 200 A)**

- Conventional welder (350GB2)
- TAWERS (SP-MAG II)

![Spatter reduction](image)

**SP-MAG II current waveform**

- Initial short-circuit control
  - Detects initial short-circuit and then the secondary switching circuit reduces weld current rapidly to prevent micro-short circuit that causes spatter.
- Neck control
  - Detects a neck of the droplet and then the secondary switching circuit reduces weld current rapidly to prevent fuse effect that causes spatter.
- HS control
  - Suppresses weld pool oscillation and prevents micro-short circuit that causes spatter.
- SP control
  - Superimposes the current immediately after a short-circuit release and allows for smooth transitions between arc and short circuit.

*Secondary switching is the spatter reduction process that rapidly reduces weld current immediately before and after short-circuit and allows for smooth transitions between arc and short circuit.*

**MTS-CO₂**  
(Metal Transfer Stabilization Control)

Reduces spatter by up to 75% using inexpensive CO₂ gas

MTS control added to SP-MAG technology reduces spatter of CO₂ welding.

**Spatter generation (CO₂)**

- Conventional CO₂ process (350GB2)
- MTS-CO₂

**Penetration comparison**

- Joint: Fillet  
  - Base metal: 2.3 mm mild steel SPCC  
  - Weld current: 120 A  
  - Weld speed: 0.3 m/min  
  - Wire: YGW12 (1.2 mm)  
  - Shielding gas: CO₂
HD-Pulse

Achieves high-speed pulsed welding

Short and narrow arc prevents undercuts during high-speed welding.

- HD-Pulse advantages:
  - Preventing undercuts during high speed welding.
  - Dip (Short circuit) transfer enabling lower heat input with better gap handling capability.
  - Precisely controlled dip timing reducing spatter.

- High speed welding

  - HD Pulse
  
<table>
<thead>
<tr>
<th>Gap: 0.4 mm</th>
<th>Undercut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base metal thickness: 2.3 mm</td>
<td>Weld current: 300 A</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Gap: 1.5 mm</th>
<th>Undercut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base metal thickness: 2.3 mm</td>
<td>Weld current: 300 A</td>
</tr>
</tbody>
</table>

Preventing undercuts with ideal penetration!

- Type of the droplet transfer

  - HD Pulse
    1 dip by 1 pulse (Short-circuit transfer)
    Short Narrow Concentrated arc

  - Normal Pulse
    1 drop by 1 pulse (Drop transfer)
    Long Wide Drop

- Spray transfer range: 280 A or more

<table>
<thead>
<tr>
<th>Weld process</th>
<th>SP-MAG II</th>
<th>Normal-Pulse</th>
<th>HD-Pulse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weld speed</td>
<td>good</td>
<td>good</td>
<td>excellent</td>
</tr>
<tr>
<td>Spatter</td>
<td>good-fair</td>
<td>excellent</td>
<td>good</td>
</tr>
<tr>
<td>Penetration pattern</td>
<td>fair</td>
<td>good-fair</td>
<td>excellent</td>
</tr>
<tr>
<td>Undercut</td>
<td>fair</td>
<td>fair</td>
<td>good</td>
</tr>
<tr>
<td>Heat input</td>
<td>fair</td>
<td>fair</td>
<td>good</td>
</tr>
<tr>
<td>Gap handling</td>
<td>fair</td>
<td>fair</td>
<td>good</td>
</tr>
<tr>
<td>Overall</td>
<td>fair</td>
<td>fair</td>
<td>excellent</td>
</tr>
</tbody>
</table>

- SP-MAG II disadvantage:
  Spatter in high-current range.

- Normal-pulse disadvantage:
  Undercuts in high-speed welding.

HD-Pulse process is ideal for high-current and high-speed welding.
Detecting a failure of arc start, the robot automatically starts arc ignition again.

The LAN connection allows you to share welding data with other robots and improve production and quality control.

**External Communication (Ethernet)**

**Production and Quality Control on LAN**

The LAN connection allows you to share welding data with other robots and improve production and quality control.

**Flying Start**

Executes arc-on/off programs a little before the torch reaches the weld start/end point to reduce cycle times.

**Standard Arc Start**

- Weld start point
- Wire feed start
- Arc start

**Flying Start**

- Wire feed start
- Weld start point
- Arc start

**Cycle Time Reduction**

Arc is struck the moment torch reaches weld start point.

**Wire Auto Retract**

As the robot moves to weld start points, the wire is retracted automatically; thereby, improving arc start.

**Wire Stick Auto Release (for CO₂/MAG)**

Automatically detects a wire stuck at the end of a weld and re-ignites the arc to release the wire.

**Pitch Movement ("Jog settings")**

This function enables robot movement at a pre-set distance by every click of the jog dial. This is useful when working in narrow, constricted spaces or in fine-tuning robot position.

**Lift Start / Lift End**

**Quality Weld Starts and Ends. Spatter and Cycle Time Reduction.**

The robot lifts up the welding torch quickly at the start and end of the weld. By coordinating the robot motion with the welding waveform and wire feed control, quality and cycle time are improved.

(Much quicker than wire retraction.)

**Arc Start Retry (for CO₂/MAG)**

Detecting a failure of arc start, the robot automatically starts arc ignition again.

**Torch Angle Display (Teach Pendant)**

Torch angle is displayed on the screen, making it possible to reduce teaching time and obtain consistent bead appearance.

**Program Test**

In Teach mode, operator can safely verify taught program including welding without switching to Auto mode.
Detecting a failure of arc start, the robot automatically starts arc ignition again. The LAN connection allows you to share welding data with other robots and improve production and quality control. Automatically detects a wire stuck at the end of a weld and re-ignites the arc to release the wire.

**Torch Angle Display (Teach Pendant)** As the robot moves to weld start points, the wire is retracted automatically; thereby, improving arc start.

**Lift Start / Lift End** External Communication (Ethernet) Program Test

**In Teach mode,** operator can safely verify taught program including welding without switching to Auto mode.

**Pitch Movement ("Jog settings")** Moving toward next weld point End of a weld Wire retraction Next weld point

**Flying Start** Executes arc-on/off programs a little before the torch reaches the weld start/end point to reduce cycle times.

**Wire Stick Auto Release (for CO₂/MAG)** Arc Start Retry (for CO₂/MAG) Quality Weld Starts and Ends. Spatter and Cycle Time Reduction. The robot lifts up the welding torch quickly at the start and end of the weld. By coordinating the robot motion with the welding waveform and wire feed control, quality and cycle time are improved. (Much quicker than wire retraction.)

**Contact Lifting up** Cycle time reduction Lift Start Lift End

**Torch angle is displayed on the screen, making it possible to reduce teaching time and obtain consistent bead appearance.**

**This function enables robot movement at a pre-set distance by every click of the jog dial. This is useful when working in narrow, constricted spaces or in fine-tuning robot position.**

**Production and Quality Control on LAN**

**Standard Arc Start**

**Arc start** Wire feed start Weld start point

**Flying Start** Wire feed start Weld start point Arc start

Arc is struck the moment torch reaches weld start point.

**Cycle Time Reduction**

At arc end Spatter Reduction At arc start

**Weld Monitor** Standard Monitors data such as weld current, voltage and wire feed speed constantly and warns when abnormality is detected.

**Weld Data Management**

Big progress toward ideal production and quality control. Samples weld data with a interval of up to 50 micro seconds, allowing high-precision monitoring and status/error output. The data can be stored and used for quality control.

**Weld Monitor** Standard

**Weld Data Management** Optional Software

- **Weld Monitoring (Expanded function)**
  Up to 50 weld monitoring conditions can be defined.

- **Weld Data Logging/Recording**
  Data such as weld current, voltage and wire feed speed can be logged according to the preset triggers. The log data can be graphed on the teach pendant and recorded on SD memory card.

**Welding Data Log** Optional Software

Logs data of weld sections. The log data can be saved for analysis.

**Example of log data analysis**

Wire target position misalignment caused by production lot change

Changes of average current/voltage

Available for defect rate reduction

**More advanced welding system available** Utilize features such as external communication and large capacity memory.

**Auto Extension Control** Optional Software

Compensates heat distortion or teaching error of odd-shaped work. Robots detects changes in wire extension and compensates automatically.

**Synchronous Weaving Low Pulse (Spiral Weaving Included)**

- **Spiral weaving movement**
  Torch movement

  - Weld current
  - Wire feed speed

  - Synchronizes weld current, wire feed speed and weaving completely.

  - Alternates condition A/B during weaving, which is ideal for welding of different thickness plates. (One for thin plate, the other for thick plate)

**Cooperative Multi-Robot Control**

Allows cooperative control between two robots.
Succeed TAWERS’ welding performance

- Various welding styles
  Super Active TAWERS / TAWERS-TIG / TAWERS or others
  [TW axis: Hollow arm] Torch type selectable between through-arm and external

Improves small work productivity

- Space saving
  48% smaller footprint (example of one customer, compared with our TM-1100)
  Floor/Wall/Ceiling mount (Ceiling mount type is special specification.)

- High speed despite 8 kg payload
  Maximum motion speed: 540°/s (average for all axes)

Dimensions & Work Envelope

For working envelope of point O, consult us.
(Unit: mm)

Model | TS-800 | TS-950
---|---|---
Type | Short arm | Short arm
Payload | 8 kg | 8 kg
Maximum Reach | 841 mm | 971 mm
Minimum Reach | 159 mm | 190 mm
Working Range | 682 mm | 781 mm

Max. Motion Speed

- RT (Rotating Trunk): 326°/s
- UA (Upper Arm): 326°/s
- FA (Forearm): 510°/s
- RW (Rotating Wrist): 518°/s
- BW (Bending Wrist): 518°/s
- TW (Twisting Wrist): 1,040°/s

Position Repeatability: ±0.05 mm

Motors

- Total Power: 2,100 W
- Brakes: All axes

Mounting

- Floor/Ceiling*1/Wall*2

Weight

- 55 kg
- 56 kg

---

*1: Ceiling mount type is factory optional.
*2: Setting by service personnel is necessary. *Working range of RT axis is limited.
### Manipulator General Specifications

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Type</td>
<td>Short arm</td>
<td>Standard arm</td>
<td>Middle arm</td>
<td>Long arm</td>
<td>Long arm</td>
<td>Long arm</td>
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<tr>
<td>Structure</td>
<td>6 axis articulated</td>
<td>6 axis articulated</td>
<td>6 axis articulated</td>
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<tr>
<td>Payload</td>
<td>6 kg</td>
<td>4 kg</td>
<td>6 kg</td>
<td>8 kg</td>
<td>6 kg</td>
<td>8 kg</td>
<td>6 kg</td>
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<tr>
<td>Maximum Reach</td>
<td>1 163 mm</td>
<td>1 437 mm</td>
<td>1 639 mm</td>
<td>1 809 mm</td>
<td>2 011 mm</td>
<td>1 801 mm</td>
<td>1 999 mm</td>
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<tr>
<td>Minimum Reach</td>
<td>418 mm</td>
<td>404 mm</td>
<td>513 mm</td>
<td>430 mm</td>
<td>550 mm</td>
<td>383 mm</td>
<td>491 mm</td>
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<tr>
<td>Working Range</td>
<td>745 mm</td>
<td>1 033 mm</td>
<td>1 126 mm</td>
<td>1 379 mm</td>
<td>1 461 mm</td>
<td>1 418 mm</td>
<td>1 508 mm</td>
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<tr>
<td>Max. Speed RT (Rotating trunk)</td>
<td>225°/s</td>
<td>210°/s</td>
<td>195°/s</td>
<td>195°/s</td>
<td>190°/s</td>
<td>195°/s</td>
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<tr>
<td></td>
<td>UA (Upper arm)</td>
<td>225°/s</td>
<td>210°/s</td>
<td>195°/s</td>
<td>190°/s</td>
<td>195°/s</td>
<td>190°/s</td>
</tr>
<tr>
<td></td>
<td>FA (Forearm)</td>
<td>225°/s</td>
<td>215°/s</td>
<td>205°/s</td>
<td>205°/s</td>
<td>205°/s</td>
<td>205°/s</td>
</tr>
<tr>
<td></td>
<td>RW (Rotating wrist)</td>
<td>425°/s</td>
<td>425°/s</td>
<td>425°/s</td>
<td>425°/s</td>
<td>425°/s</td>
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<tr>
<td></td>
<td>BW (Bending wrist)</td>
<td>425°/s</td>
<td>425°/s</td>
<td>425°/s</td>
<td>425°/s</td>
<td>425°/s</td>
<td>425°/s</td>
</tr>
<tr>
<td></td>
<td>TW (Twisting wrist)</td>
<td>629°/s</td>
<td>629°/s</td>
<td>629°/s</td>
<td>629°/s</td>
<td>629°/s</td>
<td>629°/s</td>
</tr>
<tr>
<td>Position Repeatability</td>
<td>±0.08 mm</td>
<td>±0.10 mm</td>
<td>±0.08 mm</td>
<td>±0.15 mm</td>
<td>±0.08 mm</td>
<td>±0.15 mm</td>
<td>±0.15 mm</td>
</tr>
<tr>
<td>Motors Total Power</td>
<td>3 400 W</td>
<td>4 700 W</td>
<td>5 050 W</td>
<td>6 400 W</td>
<td>6 700 W</td>
<td>7 000 W</td>
<td>7 000 W</td>
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<td>Brakes All axes</td>
<td>Floor / Ceiling*</td>
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<tr>
<td>Weight</td>
<td>156 kg</td>
<td>170 kg</td>
<td>180 kg</td>
<td>215 kg</td>
<td>217 kg</td>
<td>215 kg</td>
<td>216 kg</td>
</tr>
</tbody>
</table>

*Ceiling mount type is factory optional.*
Dimensions & Work Envelope

<table>
<thead>
<tr>
<th>Model</th>
<th>WGIII</th>
<th>WGHIII</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions*</td>
<td>W 553 mm x D 550 mm x H 1181 mm</td>
<td>W 553 mm x D 550 mm x H 1407 mm</td>
</tr>
<tr>
<td>Weight**</td>
<td>135 kg</td>
<td>171 kg</td>
</tr>
<tr>
<td>Memory Capacity</td>
<td>40 000 points</td>
<td></td>
</tr>
<tr>
<td>Position Control</td>
<td>Software servo control</td>
<td></td>
</tr>
<tr>
<td>External Memory</td>
<td>Teach Pendant: one SD memory card slot, two USB 2.0 ports (USB 2.0. Hi-Speed not supported)</td>
<td></td>
</tr>
<tr>
<td>Control Axes</td>
<td>6 axes simultaneously (Max. 27 axes)</td>
<td></td>
</tr>
<tr>
<td>Input and Output</td>
<td>Input: 40 points (Optionally expandable up to 2048 points)</td>
<td>Output: 40 points (Optionally expandable up to 2048 points)</td>
</tr>
<tr>
<td>Input Power</td>
<td>3 phase, 200 V AC±20 V AC, 22 kVA, 50/60 Hz</td>
<td>3 phase, 200 V AC±20 V AC, 30.5 kVA, 50/60 Hz</td>
</tr>
<tr>
<td>(Max. current at servo on: 246 A/5.6 ms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welding Process</td>
<td>CO₂ / MAG / Stainless steel MIG / Pulse MAG / Stainless pulse MIG</td>
<td></td>
</tr>
<tr>
<td>Output Current Range</td>
<td>30 to 350 A DC</td>
<td>30 to 450 A DC</td>
</tr>
<tr>
<td>Output Voltage Range</td>
<td>12 to 36 V DC</td>
<td>12 to 42 V DC</td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>CV: 80 % @ 350 A</td>
<td>Pulse: 60 % @ 350 A</td>
</tr>
<tr>
<td></td>
<td>100 %</td>
<td></td>
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</tbody>
</table>

*Protruding portions not included. **Teach pendant and connection cable not included.

Note: For details on the power connection, refer to "Connecting primary power source" in the arc welding robot controller manual.
Large Robot Series (GⅢ Controller)

Great material handling capability!

Coordinated multi-robot movement for flexible system without jig.

- Coordinated movement with WGⅢ/GⅢ robot(s)
  Allows to build flexible system without jig.
  Maximum configuration:  
  - Arc welding robot x 2  
  - Large robot x 1

- GⅢ controller for large robots
  Same operation, maintenance and options as conventional robots

### Manipulator General Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>YS-080GⅢ</th>
<th>HS-220GⅢ</th>
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<tbody>
<tr>
<td>Type</td>
<td>6 axis articulated robot</td>
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<tr>
<td>Payload</td>
<td>80 kg</td>
<td>220 kg</td>
</tr>
<tr>
<td>Working Range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RT (Rotating trunk)</td>
<td>±180°</td>
<td>+178°</td>
</tr>
<tr>
<td>UA (Upper arm)</td>
<td>-80° ~ +155°</td>
<td>-65° ~ +80°</td>
</tr>
<tr>
<td>FA (Forearm)</td>
<td>140° ~ +230°</td>
<td>-130° ~ +230°</td>
</tr>
<tr>
<td>RW (Rotating wrist)</td>
<td>±360°</td>
<td>±360°</td>
</tr>
<tr>
<td>BW (Bending wrist)</td>
<td>±125°</td>
<td>±128°</td>
</tr>
<tr>
<td>TW (Twisting wrist)</td>
<td>±360°</td>
<td>±360°</td>
</tr>
<tr>
<td>Position Repeatability</td>
<td>±0.15 mm</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>645 kg</td>
<td>955 kg</td>
</tr>
</tbody>
</table>