# T-Skin


TOUCHÉ
SOLUTIONS

CE

# Driving Harmonized Human-Robot Collaboration


## Company Timeline

**2009** — Set out to develop a tactile sensor

**2015** — **Dr. Camus Su unveils T-Skin** for industrial robot safety applications

**2017** — Mechavision Inc. **established** in Taipei

**2018** — **M-Teach Positioning Module released** at the Taipei International Industrial Automation Exhibition with ABB, EPSON, MITSUBISHI ELECTRIC, and FANUC

**2019** — Qisda and ABB announces **Taiwan's first Human-Robot Collaboration production line** powered by MechaVision

**2020** — Mechavision **rebranded** as Touché Solutions

> ***The future of manufacturing is human robot collaboration. Why? Flexibility enables profitability.***
>
> ***DR. CAMUS SU***
> *CHAIRMAN*

Back in 2009, I imagined a future fully automated by robots and the technology required to make it a reality.

As a roboticist, I understand the pressure to set up an automated production line to meet market demands, and the compliance with the complex regulatory and safety requirements for each industry vertical. Being successful, our customers need reliable and efficient solutions, and to be flexible when facing challenges from rapidly changing market.

The reality is: current safety solutions are imperfect and come at a significant operational and capital expense to factory owners; integration of multiple systems results in great cost: loss of productive space, constant maintenance and human resource training. In a world of "small-volume and large-variety" production to satisfy diversified demands, current safety solutions eliminate the most powerful flexible resource on the production line: humans. We believe the future of modern flexible production is human-robot collaboration. Why?

Safety solutions that deliver human-robot collaborative production line flexibility means profitability.

The human-robot interaction creates flexibility on the production line, so factories and their customers can rapidly meet the needs of a changing market. All with the power of touch.

Touché Solutions have set the standards for the industry safety. Our solutions are easy to use, scalable, precise and give factory owners and their customers flexibility. Our T-Skin solutions are the basis for the ISO/TS 15066 standard.

Enabling productivity is a key focus for Touché Solutions' engineers. Our solutions also extend quickly programming the precise placement of a robot arm. Our M-Teach module makes it easy for anyone on the production line to quickly position and scale the production line.
Our solid partnerships with ABB, EPSON, FANUC, KAWASAKI and MITSUBISHI ELECTRIC ensure our product line interoperates with the widest range of robot manufacturers and models in the industry. Safety, speed, and cost-effectiveness are critical for anyone seeking to enable safety for their workers, create production-line flexibility to meet market demand and extend the life of existing assets.

**My team and I welcome you to the human-robot collaborative world!**

# Applications

**Touché Solutions Delivers Safe and Flexible Manufacturing.**

Manufacturers today require production line to be reconfigured easily and quickly to meet diverse demand and the challenge of «small volume and large variety» from the rapidly changing market, our customers need to cope with changing market dynamics without making significant and costly production line modification. Undoubtedly, humans and robots will increasingly work together to ensure a flexible and responsiveness to customer needs.

Therefore, the future of manufacturing is enabling a flexible, safe and user-friendly human robot collaboration environment.

The International Federation of Robots (IFR) 2019 market report noted a strong 23% growth in collaborative installations from 2017 to 2018. The trend suggests that closer and more complex interactions between humans and robots are on the rise. Safety, reliability, scalability and ease of use are critical enablers for cost-effective, flexible and scalable smart production lines.

Previous safety techniques relied on fencing, access controls, cameras, torque sensing or robot arm motion limits to minimize the impact damage on the human body. These inflexible solutions create challenges to production line managers and their customers.

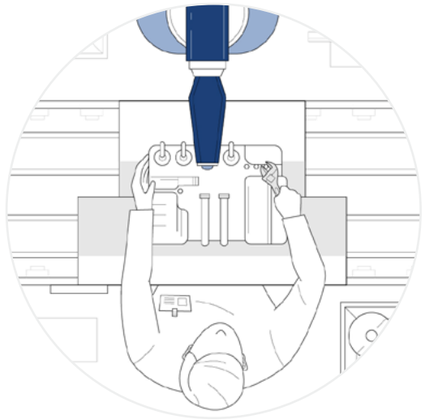
Why? These complex systems impose costly rearrangement of production line and operational cost to accord the changing market demand. In addition, system integration and maintenance costs create additional drag on margins. Most important of all, these kludgy safety systems do not enable the most flexible factory resource: humans.

Touché Solutions T-Skin embedded and aftermarket technology delivers flexibility to businesses. Reliable in a wide range of factory environments, a wide range of manufacturers and models, Touché T-Skin technology delivers true smart manufacturing.


**Safety Standards**

Collision tests are performed to ensure that impact on the human body is within an acceptable range, compliant with ISO/TS 15066 standards.

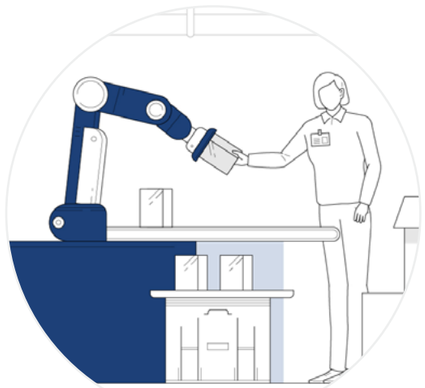
## 1 Maintenance



## 2 Streamlined Assembly Line Human-Robot Cooperation

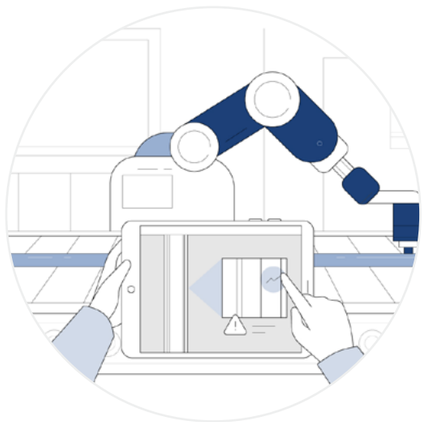
## 3 Independent Human-Robot Operation in the Same Field

## 4 Human-Robot Collaborative Interactions



## 5 Parts Feeding

## 6 Inspection



# Features


## Safety Standards

ISO 13849-1 : Functional Safety
- Cat. 3 (Redundancy design)
- PL d (PFH d 1/h : $\geq 10^{-7}$ and $<10^{-6}$)

CE : Product Safety

ISO/TS 15066 : Power and force limited (Collision measurement report)

### FAST DEPLOYMENT AND SCALABLE

T-Skin can immediately upgrade your production line and improve flexibility

### SEAMLESS INTEGRATION

Does not interfere with robot's full range of motion

### SHIELDED FROM MAGNETIC INTERFERENCE

Unaffected by magnetic interference

### HIGH SENSITIVITY SENSORS

A light touch (approximately 1 kg of force) is enough to trigger shutdown regardless whether it is a conductive or non-conductive object

### RF SHIELDED

Unaffected by radio frequency interference

### BROAD MANUFACTURER AND MODEL SUPPORT

Can be applied to all makes of industrial robot

# ISO/TS 15066 Collision Measurement Certification

**Emerging Safety Standards Require Companies to Prepare.**

When companies say their equipment meets ISO-10218 standards, do they mean ISO 10218-1 or ISO 10218-2? The robot arm itself? Or the entire system?

Current safety regulations only require a basic robot arm to meet ISO 10218-1 standards. But when the robot is combined with peripheral systems, it should meet ISO 10218-2, which regulates an integrated system. And in a human-robot collaboration environment, it is required to pass the collision test stated in ISO/TS 15066 in order for the complete system to meet the safety requirements.

ISO/TS 15066 offers concrete directive when planning human-robot collaboration. It clearly explains the possibility and types of collision, and also how to reduce the risk of incident -- for example, by increasing the contact area, using buffer materials, or controlling power, strength, and speed. A company that prioritizes preparing for ISO/TS 15066 will have an advantage in getting the best results.

But ISO regulations can be complex. Therefore it may be wise to engage the services of companies that offer safety assessment and certification to meet the regulations more effectively.

*Extract from Digitimes / Tim Liu / May 15, 2019 (translated from Chinese).*

**4 STEPS TO UPGRADE YOUR INDUTRIAL ROBOT IN COLLABORATIVE WORKSPACE**

**Industrial Robot Qualified**

*Compliance with ISO 10218-1*

**T-Skin Qualified**

*Compliance with ISO 13849-1 : CAT. 3,PL d, Functional Safety and CE : Product Safety*

**Collaborative Inductrial Robot Ready**

*Industrial robot with T-Skin compliance with ISO/TS 15066 : Power & force limited (Collision Measurement Report)*

**Risk Assessment for Collaborative Workspace**

*Compliance with ISO 10218-2 & ISO/TS 15066*


**Compliant with German Social Accident Insurance (DGUV) Certified by PILZ Collision System PRMS: Standard for Human-Robot Collaboration (HRC).**

We understand certification gives critical reassurance to our customers. Touché Solutions has invested tremendously to overcome these challenging technical hurdles the industry faces. We are proud to be compliant with ISO/TS 15066.

Touché Solutions employs the German PILZ robot measurement system PRMS (approved by the national social accident insurance program Deutsche Gesetzlich Unfallversicherung, a.k.a. DGUV), to test T-Skin in line with ISO/TS 15066 specifications. The PRMS system can measure the force that occurs in collisions involving robots equipped with T-Skin so factories can ensure efficient production as well as safety.

*Source: Pilz GmbH & Co. KG*


**PILZ Collision Measurement Report**

# Product

ABB series

**ABB**
TAB001A-S

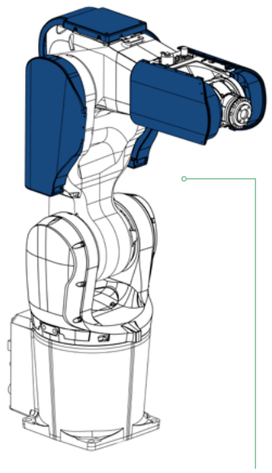


**ABB**
TAB001A-P

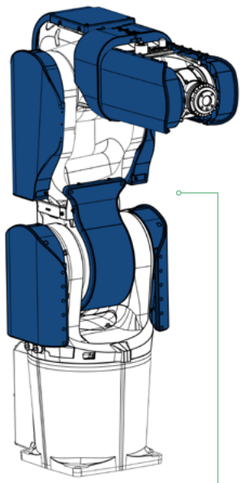


**ABB**
TAB002A-S

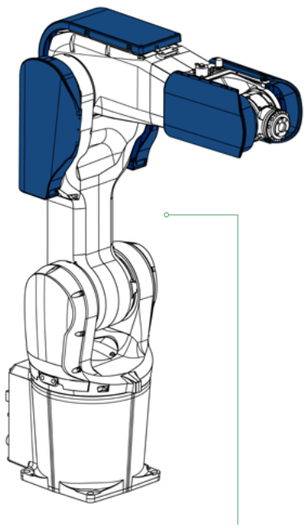
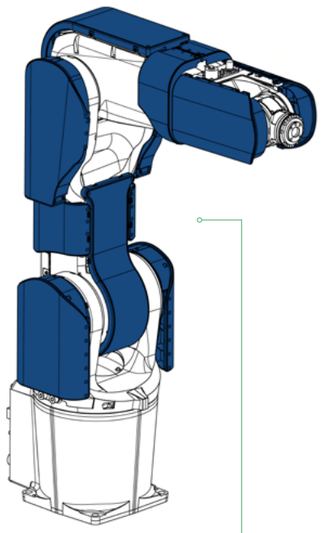


**ABB**
TAB002A-P



| Skin Model | TAB001A-S | TAB001A-P | TAB002A-S | TAB002A-P |
|---|---|---|---|---|
| Robot Brand | ABB | ABB | ABB | ABB |
| Series | 1200 | 1200 | 1200 | 1200 |
| Robot Model | IRB 1200-7/0.7 | IRB 1200-7/0.7 | IRB 1200-5/0.9 | IRB 1200-5/0.9 |
| Robot Payload(kg) | 7 | 7 | 5 | 5 |
| Robot Reach(m) | 0.7 | 0.7 | 0.9 | 0.9 |
| Skin Cover Range | J3 ~ J5 | J1~ J5 | J3 ~ J5 | J1 ~ J5 |
| Skin + Robot Work Range | | | | |
| J1 | ±170° | ±170° | ±170° | ±170° |
| J2 | +135°~-100° | +115°~-95° | +135°~-100° | +125°~-98° |
| J3 | +67°~-185° | +60°~-185° | +70°~-188° | +65°~-188° |
| J4 | ±270° | ±270° | ±270° | ±270° |
| J5 | +130°~-115° | +130°~-115° | +130°~-115° | +130°~-115° |
| J6 | ±400° | ±400° | ±400° | ±400° |
| Skin Spec. | | | | |
| Power | 24V DC | 24V DC | 24V DC | 24V DC |
| Output | NC (Normal Closed) | NC (Normal Closed) | NC (Normal Closed) | NC (Normal Closed) |
| IP Level | 54 | 54 | 54 | 54 |

**ABB**
TAB003A-P

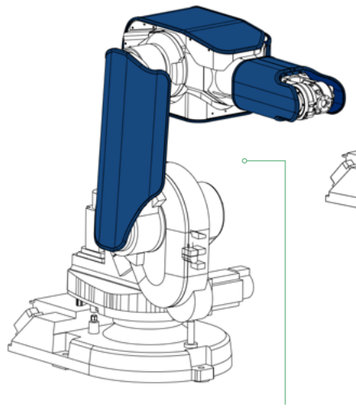


**ABB**
TAB005A-P

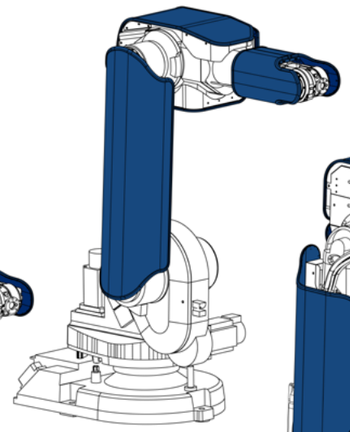


**ABB**
TAB103A-P

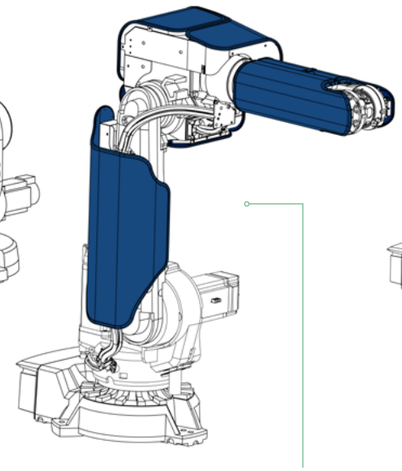
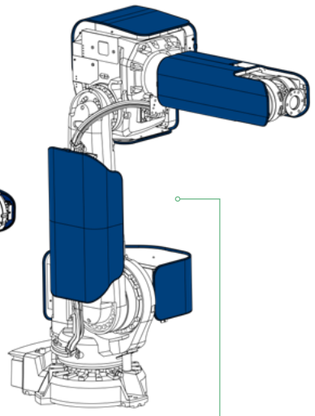


**ABB**
TAB307A-P

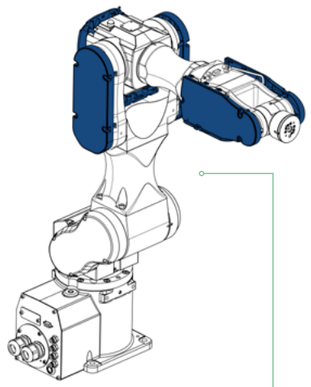


| Skin Model | TAB003A-P | TAB005A-P | TAB103A-P | TAB307A-P |
|---|---|---|---|---|
| Robot Brand | ABB | ABB | ABB | ABB |
| Series | 1600 | 1600 | 2600 | 4600 |
| Robot Model | IRB 1600-X/1.2 | IRB 1600-X/1.45 | IRB 2600-X/1.65 | IRB 4600-X/2.05 |
| Robot Payload(kg) | 6/10 | 6/10 | 12/20 | 45/60 |
| Robot Reach(m) | 1.2 | 1.45 | 1.65 | 2.05 |
| Skin Cover Range | J2 ~ J5 | J2 ~ J5 | J2 ~ J5 | J2 ~ J5 |
| Skin + Robot Work Range | | | | |
| J1 | ±180° | ±180° | ±180° | ±180° |
| J2 | +136°~-58° | +150°~-90° | +155°~-95° | +150°~ -90° |
| J3 | +55°~-225° | +55°~-245° | +75°~-180° | +75°~-180° |
| J4 | ±200° | ±200° | ±400° | ±400° |
| J5 | ±115° | ±120° | ±120° | ±120° |
| J6 | ±400° | ±460° | ±400° | ±400° |
| Skin Spec. | | | | |
| Power | 24V DC | 24V DC | 24V DC | 24V DC |
| Output | NC (Normal Closed) | NC (Normal Closed) | NC (Normal Closed) | NC (Normal Closed) |
| IP Level | 54 | 54 | 54 | 54 |

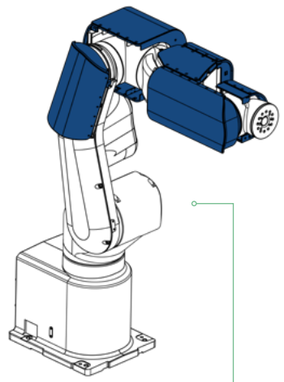
# Product

EPSON series

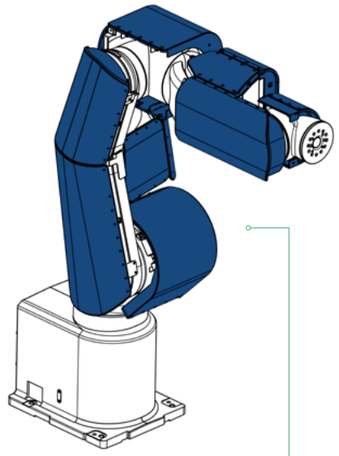
**EPSON**
TES001A-S



**EPSON**
TES004A-S

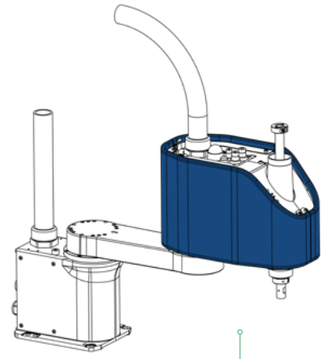


**EPSON**
TES004A-P

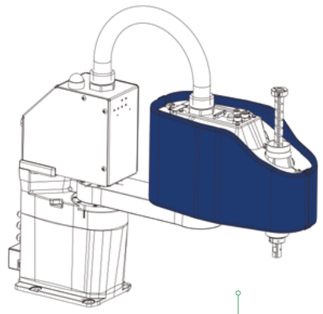


| Skin Model | TES001A-S | TES004A-S | TES004A-P |
|---|---|---|---|
| Robot Brand | **EPSON** | **EPSON** | **EPSON** |
| Series | C | VT | VT |
| Robot Model | C4-A901(C4L) | VT6-A901S, /A901SR, /A901SW | VT6-A901S, /A901SR, /A901SW |
| Robot Payload(kg) | 4 | 6 | 6 |
| Robot Reach(m) | 0.9 | 0.9 | 0.9 |
| Skin Cover Range | J3 ~J5 | J3~J5 | J1~J5 |
| Skin + Robot Work Range | | | |
| J1 | ±170° | ±170° | ±170° |
| J2 | +65°~-160° | + 65° ~-160° | + 65° ~-160° |
| J3 | +225°~-51° | + 190°~-46° | + 190°~-46° |
| J4 | ±200° | ± 200° | ± 200° |
| J5 | ±135° | ± 125° | ± 125° |
| J6 | ±360° | ± 360° | ± 360° |
| Skin Spec. | | | |
| Power | 24V DC | 24V DC | 24V DC |
| Output | NC (Normal Closed) | NC (Normal Closed) | NC (Normal Closed) |
| IP Level | 54 | 54 | 54 |

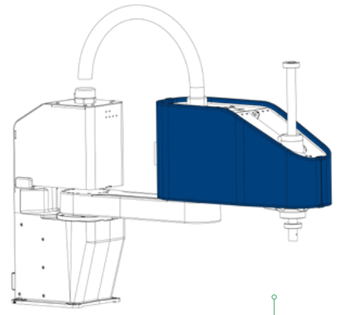
**EPSON**
TES005A-S



**EPSON**
TES006A-S



**EPSON**
TES007A-S

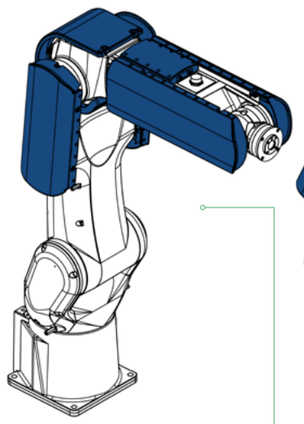


| Skin Model | TES005A-S | TES006A-S | TES007A-S |
|---|---|---|---|
| Robot Brand | **EPSON** | **EPSON** | **EPSON** |
| Series | LS | T | T |
| Robot Model | LS3-401S | T3-401S | T6-602S |
| Robot Payload(kg) | 3 | 3 | 6 |
| Robot Reach(m) | 0.4 | 0.4 | 0.6 |
| Skin Cover Range | J2 | J2 | J2 |
| Skin + Robot Work Range | | | |
| J1 | ± 132° | ± 132° | ± 132° |
| J2 | ± 141° | ± 141° | ± 150° |
| J3 | 150mm | 150mm | 200mm |
| J4 | ± 360° | ± 360° | ± 360° |
| J5 | x | x | x |
| J6 | x | x | x |
| Skin Spec. | | | |
| Power | 24V DC | 24V DC | 24V DC |
| Output | NC (Normal Closed) | NC (Normal Closed) | NC (Normal Closed) |
| IP Level | 54 | 54 | 54 |

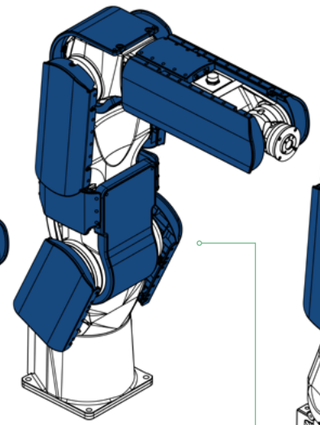
# Product

FANUC series

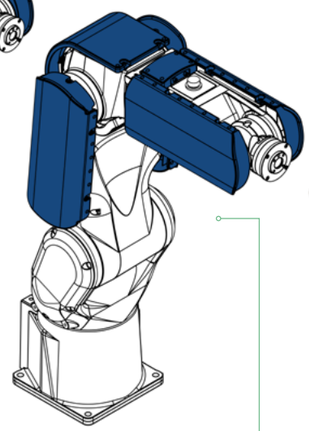
**FANUC**
TFN001A-S



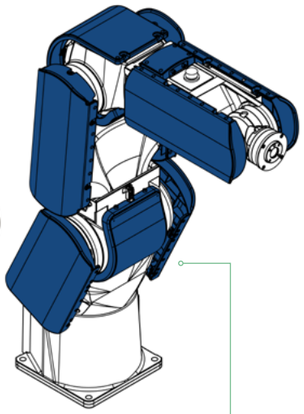
**FANUC**
TFN001A-P



**FANUC**
TFN003A-S

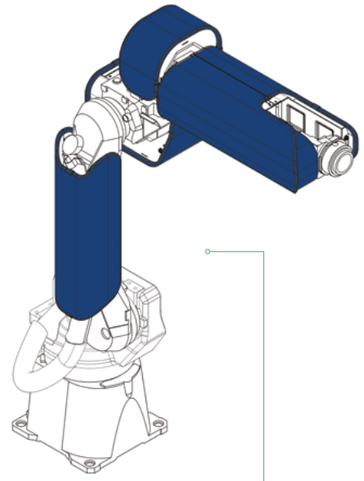


**FANUC**
TFN003A-P

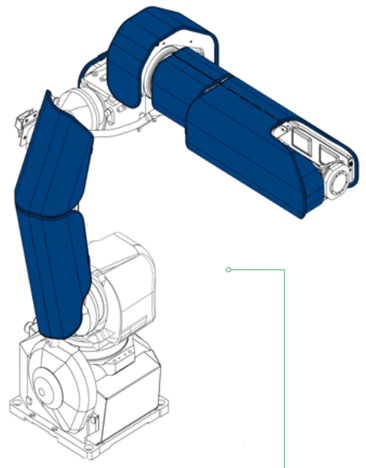


| Skin Model | TFN001A-S | TFN001A-P | TFN003A-S | TFN003A-P |
|---|---|---|---|---|
| Robot Brand | **FANUC** | **FANUC** | **FANUC** | **FANUC** |
| Series | LR Mate 200iD | LR Mate 200iD | LR Mate 200iD | LR Mate 200iD |
| Robot Model | 7L, /7LC | 7L, /7LC | 200iD, /7C, /7WP, /7H | 200iD, /7C, /7WP, /7H |
| Robot Payload(kg) | 7 | 7 | 7 | 7 |
| Robot Reach(m) | 0.911 | 0.911 | 0.717 | 0.717 |
| Skin Cover Range | J3 ~J5 | J1 ~J5 | J3 ~J5 | J1~J5 |
| Skin + Robot Work Range | | | | |
| J1 | ±180° | ±180° | ±180° | ±180° |
| J2 | +145°~-100° | +130°~-78° | +145°~-100° | +126°~-77° |
| J3 | +199°~-57° | +190°~-57° | +199°~-57° | +199°~-57° |
| J4 | ±190° | ±190° | ±190° | ±190° |
| J5 | ±125° | ±125° | ±125° | ±125° |
| J6 | ±360° | ±360° | ±360° * | ±360° * |
| Skin Spec. | | | | |
| Power | 24V DC | 24V DC | 24V DC | 24V DC |
| Output | NC (Normal Closed) | NC (Normal Closed) | NC (Normal Closed) | NC (Normal Closed) |
| IP Level | 54 | 54 | 54 | 54 |

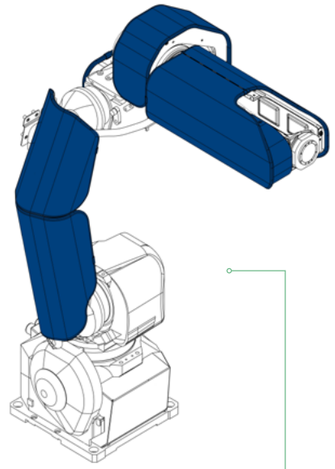
**FANUC**
TFN104A-P



**FANUC**
TFN005A-P



**FANUC**
TFN101A-P

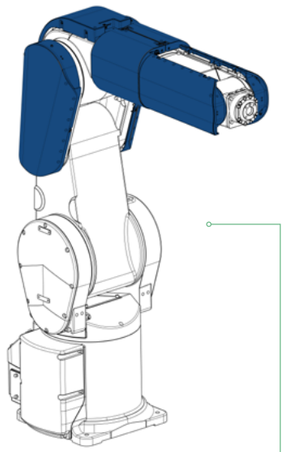


| Skin Model | TFN104A-P | TFN005A-P | TFN101A-P |
|---|---|---|---|
| Robot Brand | **FANUC** | **FANUC** | **FANUC** |
| Series | M-10iA | M-10iD | M-10iD |
| Robot Model | M-10iA/12 | M-10iD/10L | M-10iD/12 |
| Robot Payload(kg) | 12 | 10 | 12 |
| Robot Reach(m) | 1.42 | 1.636 | 1.441 |
| Skin Cover Range | J2 ~J5 | J2 ~J5 | J2 ~J5 |
| Skin + Robot Work Range | | | |
| J1 | ±190° | ±170° | ±170° |
| J2 | +160°~ -90° | +140°~ -80° | +140°~ -80° |
| J3 | -90°~ +200° | +150°~-85° | +150°~-85° |
| J4 | ±190° | ±190° | ±190° |
| J5 | ±140° | ±140° | ±140° |
| J6 | ±360° | ±450° | ±450° |
| Skin Spec. | | | |
| Power | 24V DC | 24V DC | 24V DC |
| Output | NC (Normal Closed) | NC (Normal Closed) | NC (Normal Closed) |
| IP Level | 54 | 54 | 54 |

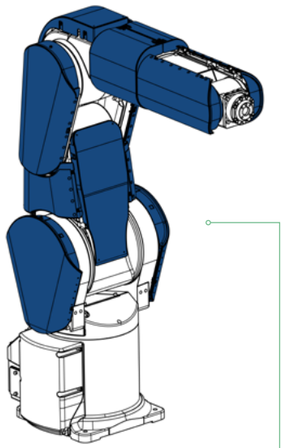
# Product

MITSUBISHI ELECTRIC series

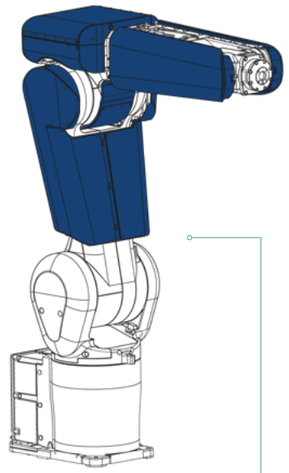
## MITSUBISHI ELECTRIC
TMB002A-S



## MITSUBISHI ELECTRIC
TMB002A-P



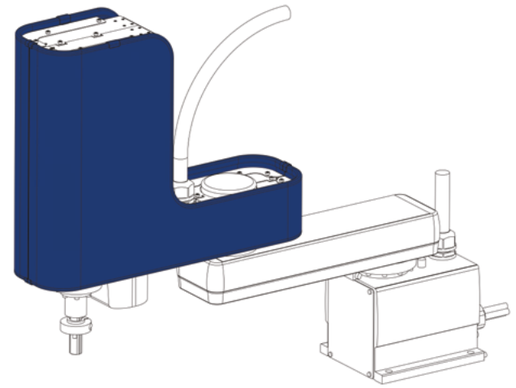
## MITSUBISHI ELECTRIC
TMB003A-P



| Skin Model | TMB002A-S | TMB002A-P | TMB003A-P |
|---|---|---|---|
| Robot Brand | MITSUBISHI ELECTRIC | MITSUBISHI ELECTRIC | MITSUBISHI ELECTRIC |
| Series | RV-FR | RV-FR | RV-CR |
| Robot Model | RV-7FRL(M)(C) | RV-7FRL(M)(C) | RV-8CRL |
| Robot Payload(kg) | 7 | 7 | 8 |
| Robot Reach(m) | 0.908 | 0.908 | 0.931 |
| Skin Cover Range | J3 ~ J5 | J1 ~ J5 | J3 ~ J5 |
| Skin + Robot Work Range | | | |
| J1 | ±240° | ±240° | ±170° |
| J2 | +130°~-110° | +115°~-100° | ±110° |
| J3 | +157°~0° | +150°~0° | +165°~+16° |
| J4 | ±200° | ±200° | ±200° |
| J5 | ±120° | ±120° | ±120° |
| J6 | ±360° | ±360° | ±360° |
| Skin Spec. | | | |
| Power | 24V DC | 24V DC | 24V DC |
| Output | NC (Normal Closed) | NC (Normal Closed) | NC (Normal Closed) |
| IP Level | 54 | 54 | 54 |

Yamaha

## Yamaha
TYM001A-S



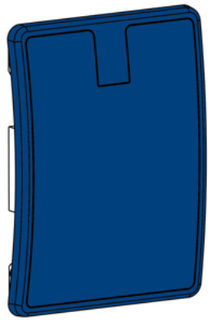
| Skin Model | TYM001A-S |
|---|---|
| Robot Brand | Yamaha |
| Series | YK-XG |
| Robot Model | YK600XG-200 |
| Robot Payload(kg) | 10 |
| Robot Reach(m) | 0.2 |
| Skin Cover Range | J2 |
| Skin + Robot Work Range | |
| J1 | ±130° |
| J2 | +145° |
| J3 | 200mm |
| J4 | ±360° |
| J5 | x |
| J6 | x |
| Skin Spec. | |
| Power | 24V DC |
| Output | NC (Normal Closed) |
| IP Level | 54 |

# Product

Applicable to All Models

## Applicable to All Models

T-Skin Pad Module

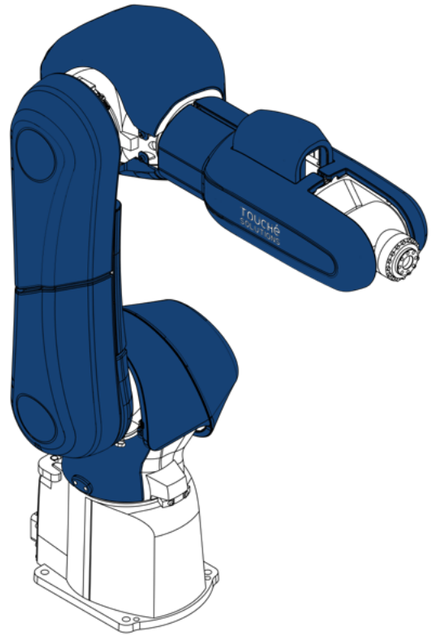



| Skin Model | CT01A | CT02A |
|---|---|---|
| Robot Brand | Applicable to All Models | Applicable to All Models |
| Dimension | 8 x 5 x 3 cm (External Structure) | 14 x 10 x 2 cm (External Structure) |
| Skin Spec. | | |
| Power | 24V DC | 24V DC |
| Output | NC (Normal Closed) | NC (Normal Closed) |
| IP Level | 54 | 54 |


KAWASAKI

## KAWASAKI

TKS001A-P



| Skin Model | TKS001A-P |
|---|---|
| Robot Brand | KAWASAKI |
| Series | R |
| Robot Model | RS007L |
| Robot Payload(kg) | 7 |
| Robot Reach(m) | 0.93 |
| Skin Cover Range | J1~J5 |
| Skin + Robot Work Range | |
| J1 | ± 180° |
| J2 | ± 100° |
| J3 | ± 140° |
| J4 | ± 200° |
| J5 | ± 125° |
| J6 | ± 360° |
| Skin Spec. | |
| Power | 24V DC |
| Output | NC (Normal Closed) |
| IP Level | 54 |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