# DATA SHEET

## ROBOT ARM & CONTROL

Release Version: April 2020

### HARDWARE

<table>
<thead>
<tr>
<th>Arm</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Degrees of freedom</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Payload</td>
<td>3 kg</td>
<td></td>
</tr>
<tr>
<td>Workspace</td>
<td>see backside</td>
<td></td>
</tr>
<tr>
<td>Maximum reach</td>
<td>855 mm</td>
<td></td>
</tr>
<tr>
<td>Force/ Torque sensing</td>
<td>link-side torque sensors in all 7 axes</td>
<td></td>
</tr>
</tbody>
</table>

**Expected nominal lifetime** | 20,000 h

**Joint position limits**
- A1, A3, A5, A7: -166°/166°
- A2: -101°/101°
- A4: -176°/4°
- A6: -1°/215°

**Mounting flange**
- DIN ISO 9409-1-A50

**Installation position**
- upright

**Weight**
- ~ 17.8 kg

**Moving mass**
- ~ 12.8 kg

**Protection rating**
- IP30

**Ambient temperature**
- 15 – 25 °C (typical)
- 5 – 45 °C (extended)

**Air humidity**
- 20 – 80 % non-condensing

**Power consumption**
- max. ~ 350 W
- typical application ~ 60 W

**Interfaces**
- ethernet (TCP/IP) for visual intuitive programming with Desk input for external enabling device
- input for external activation device or safeguard
- Control connector
- Connector for end effector

### CONTROL

**Controller size (19")**
- 355 x 483 x 89 mm (D x W x H)

**Supply voltage**
- 100 – 240 VAC

**Mains frequency**
- 47 – 63 Hz

**Power consumption**
- ~ 80 W

**Active power factor correction (PFC)**
- yes

**Weight**
- ~ 7 kg

**Protection rating**
- IP20

**Ambient temperature**
- 15 – 25 °C (typical)
- 5 – 45 °C (extended)

**Air humidity**
- 20 – 80 % non-condensing

**Interfaces**
- ethernet (TCP/IP) for internet and/or shop-floor connection
- power connector IEC 60320-C14 (V-Lock)
- Arm connector

### SOFT-ROBOT PERFORMANCE

#### Motion
- Joint velocity limits
  - A1, A2, A3, A4: 150°/s
  - A5, A6, A7: 180°/s
- Cartesian velocity limits
- Pose repeatability
  - up to 2 m/s end effector speed
- Path deviation
  - +/- 0.1 mm (ISO 9283)

#### Force
- **Force resolution**
  - <0.05 N
- **Relative force accuracy**
  - 0.8 N
- **Force repeatability**
  - 0.15 N
- **Force noise (RMS)**
  - 0.035 N

#### Sensing
- **Force resolution**
  - <0.05 N
- **Relative force accuracy**
  - 0.8 N
- **Force repeatability**
  - 0.15 N
- **Force noise (RMS)**
  - 0.035 N

#### 1 kHz Control
- **Minimum controllable force (Fz)**
  - 0.05 N
- **Force controller bandwidth (-3 dB)**
  - 10 Hz
- **Force range [N]**
  - Nominal case
  - Local best case
  - Fx: -125 – 95
  - -150 – 115
  - Fy: -100 – 100
  - -275 – 275
  - Fz: -50 – 150
  - -115 – 155
- **Torque range [Nm]**
  - Nominal case
  - Local best case
  - Mx: -10 – 10
  - -70 – 70
  - My: -10 – 10
  - -16 – 12
  - Mz: -10 – 10
  - -12 – 12

#### Interaction
- **Guiding force**
  - ~ 2 N
- **Collision detection time**
  - <2 ms
- **Nominal collision reaction time**
  - <50 ms
- **Worst case collision reaction time**
  - <100 ms
- **Adjustable translational stiffness**
  - 0 – 3000 N/m
- **Adjustable rotational stiffness**
  - 0 – 300 Nm/rad
- **Monitored signals**
  - joint position, velocity, torque cartesian position, velocity, force

### ADD-ONS

- **Safety retrofit option**
  - with safety-rated PLC
  - PLd Cat. 3
  - Safe torque off (STO)
  - Safe OSSD inputs
- **Fully integrated end effectors**
  - 2-finger gripper
  - Vacuum gripper
- **Fast mounting**
  - Clamping Adapter
- **Demonstration**
  - Pop-up Box
- **Research interface**
  - 1kHz Franka Control Interface (FCI)
- **Fieldbuses**
  - Modbus/TCP, OPC UA

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1. Technical data are subject to change.
2. Lifetime and performance can potentially be reduced when operating outside the typical temperature range.
3. Based on ISO 9283 (Annex A), specified values refer to a workspace of 0.4 x 0.4 x 0.4 m centered at [0.515, 0.0, 0.226] m, with the Z-Axis of the flange oriented parallel to earth-gravity and the elbow positioned upwards.
4. Nominal conditions (66% load).