

# DATA SHEET<sup>1</sup>

## ROBOT ARM & CONTROL

Release Version: April 2020

### HARDWARE

#### Arm

Degrees of freedom	7
Payload	3 kg
Workspace	see backside
Maximum reach	855 mm
Force/ Torque sensing	link-side torque sensors in all 7 axes
Expected nominal lifetime <sup>3,4</sup>	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 <sup>2</sup>	15 – 25 °C (typical) 5 – 45 °C (extended)
Air humidity	20 – 80 % non-condensing
Power consumption	<ul style="list-style-type: none"> <li>max. ~ 350 W</li> <li>typical application ~ 60 W</li> </ul>
Interfaces	<ul style="list-style-type: none"> <li>ethernet (TCP/IP) for visual intuitive programming with Desk</li> <li>input for external enabling device</li> <li>input for external activation device or safeguard</li> <li>Control connector</li> <li>Connector for end effector</li> </ul>

#### Control

Controller size (19")	355 x 483 x 89 mm (D x W x H)
Supply voltage	100 – 240 V <sub>AC</sub>
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	<ul style="list-style-type: none"> <li>ethernet (TCP/IP) for internet and/or shop-floor connection</li> <li>power connector IEC 60320-C14 (V-Lock)</li> <li>Arm connector</li> </ul>

### SOFT-ROBOT PERFORMANCE

#### Motion

Joint velocity limits	A1, A2, A3, A4: 150°/s A5, A6, A7: 180°/s
Cartesian velocity limits	up to 2 m/s end effector speed
Pose repeatability	<+/- 0.1 mm (ISO 9283)
Path deviation <sup>3</sup>	<+/- 1.25 mm

#### Force

##### Sensing<sup>3</sup>

Force resolution	<0.05 N
Relative force accuracy	0.8 N
Force repeatability	0.15 N
Force noise (RMS)	0.035 N
Torque resolution	0.02 Nm
Relative torque accuracy	0.15 Nm
Torque repeatability	0.05 Nm
Torque noise (RMS)	0.005 Nm

##### 1 kHz Control<sup>3</sup>

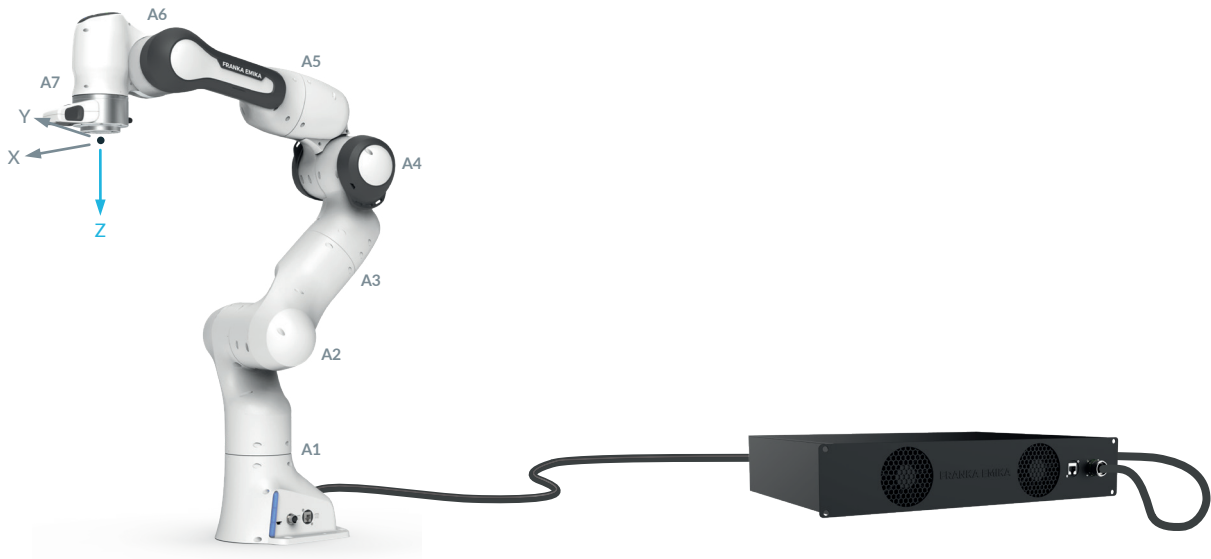
Minimum controllable force (Fz)	0.05 N	
Force controller bandwidth (-3 dB)	10 Hz	
Force range [N]	Nominal case	Local best case
Fx	-125 – 95	-150 – 115
Fy	-100 – 100	-275 – 275
Fz	-50 – 150	-115 – 155
Torque range [Nm]	Nominal case	Local best case
Mx	-10 – 10	-70 – 70
My	-10 – 10	-16 – 12
Mz	-10 – 10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

#### Interaction

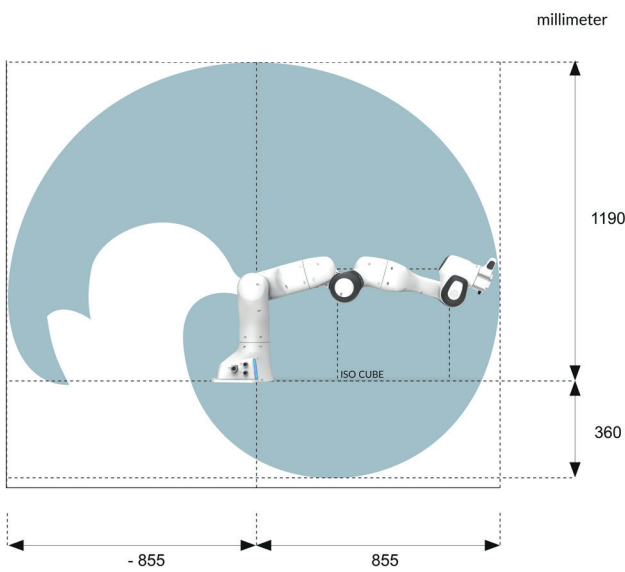
Guiding force	~ 2 N
Collision detection time	<2 ms
Nominal collision reaction time <sup>3,4</sup>	<50 ms
Worst case collision reaction time <sup>3</sup>	<100 ms
Adjustable translational stiffness	0 – 3000 N/m
Adjustable rotational stiffness	0 – 300 Nm/rad
Monitored signals	joint position, velocity, torque cartesian position, velocity, force

### ADD-ONS

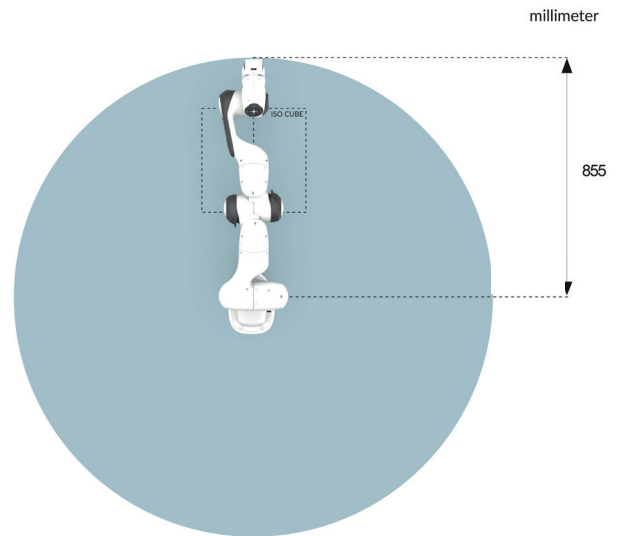
Safety retrofit option with safety-rated PLC	PLd Cat. 3 <ul style="list-style-type: none"> <li>Safe torque off (STO)</li> <li>Safe OSSD inputs</li> </ul>
Fully integrated end effectors	<ul style="list-style-type: none"> <li>2-finger gripper</li> <li>Vacuum gripper</li> </ul>
Fast mounting	Clamping Adapter
Demonstration	Pop-up Box
Research interface	1kHz Franka Control Interface (FCI)
Fieldbuses	Modbus/TCP, OPC UA



**Arm & Control**



Side-view: reachable space for the end effector flange



Top-view: reachable space for the end effector flange

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).

