



# FRANKA RESEARCH 3

Datasheet

# Datasheet <sup>1</sup>

## Arm & Control

ARM	
Degrees of freedom	7
Payload	3 kg
Maximum reach	855 mm
Force/Torque sensing	link-side torque sensor in all 7 axes
Joint position limits	A1, A3: -166/166 deg A2: -105/105 deg A4: -176/-7 deg A5: -165/165 deg A6: 25/265 deg A7: -175/175 deg
Mounting flange	DIN ISO 9409-1-A50
Installation position	upright
Weight	~ 17.8 kg
Protection rating	IP40
Ambient temperature <sup>2</sup>	+5 °C to +45 °C
Air humidity	20 – 80 % non-condensing
<b>INTERFACES</b> <ul style="list-style-type: none"> <li>• ethernet (TCP/IP) for visual intuitive programming with Desk</li> <li>• safety-rated input for external enabling device</li> <li>• 2 configurable safety-rated inputs for emergency stop devices, safeguards or other protective devices (OSSD devices via external OSSD converter connectable)</li> <li>• hardware prepared for: 2x DI &amp; 2x DO (24V, isolated, EN 61131-2 type 3 characteristics, 100 Hz sampling rate)</li> <li>• Control connector</li> <li>• connector for end effector</li> </ul>	
<b>USER INTERFACES AT THE ARM'S PILOT GRIP</b> <ul style="list-style-type: none"> <li>• integrated safety-rated guiding enabling switch</li> <li>• guiding button</li> <li>• guiding mode selector</li> </ul>	
<b>USER INTERFACES AT THE ARM'S PILOT DISC</b> <ul style="list-style-type: none"> <li>• status light</li> <li>• Pilot mode selector</li> <li>• arrow keys, teach, confirm, delete</li> </ul>	
CONTROL	PERFORMANCE
Controller size (19")	355 x 483 x 89 mm (D x W x H)
Supply voltage	100 – 240 V <sub>AC</sub>
Mains frequency	50– 60 Hz
Power consumption	~ 80 W
Active power factor correction (PFC)	yes
Weight	~ 7 kg
Protection rating	IP20
Ambient temperature <sup>2</sup>	+5 °C to +45 °C
Air humidity	20 – 80 % non-condensing
Permitted mounting orientation	horizontal
Interfaces	<ul style="list-style-type: none"> <li>• ethernet (TCP/IP) for internet and/or shop-floor connection</li> <li>• power connector IEC 60320C14 (V-Lock)</li> <li>• Arm connector</li> </ul>
<b>MOTION</b>	
Joint velocity limits	A1-A4: 150 °/s A5-A7: 301 °/s (at FCI use A6: 239 °/s)
Cartesian velocity limits	up to 2 m/s end effector speed
Pose repeatability <sup>3</sup>	< +/- 0.1 mm (ISO 9283)
<b>INTERACTION</b>	
Guiding force	~ 2.5 N
Adjustable translational stiffness	10 – 3000 N/m
Adjustable rotational stiffness	1 – 300 Nm/rad
Monitored signals	joint position, velocity, torque cartesian position, force
<b>ADD-ONS</b>	
Fully integrated end effectors	<ul style="list-style-type: none"> <li>• 2-finger gripper</li> <li>• Vacuum gripper</li> </ul>
Fieldbuses	<ul style="list-style-type: none"> <li>• Modbus/TCP</li> <li>• OPC UA</li> </ul>
EXCLUSIVE	
Research interface	1kHz Franka Control Interface (FCI)

## SAFETY

### Certification

EN ISO 13849-1:2015 safety of machinery - safety-related parts of control systems	certified by TÜV SÜD RAIL
EN ISO 10218-1:2011 Robots and robotic devices - safety requirements for industrial robots Part1: Robots	certified by TÜV SÜD Product Service

### Collaborative operation modes

Safety-rated monitored stop	fully integrated in PL d Cat. 3
Hand-guiding	fully integrated in PL d Cat. 3
Safety-rated speed and separation monitoring	realizable in combination with external protective devices up to PL d Cat. 3

### Safety parametrization & validation

Watchman	user interface to set and validate safety-related parameters
User management	role based access management

### Safety Functions

Emergency Stop (X3.1)	PL d / Cat. 3	
External Enabling Device (X4)	PL d / Cat. 3	
Enabling Button	PL d / Cat. 3	
Two configurable safe inputs (X3.2 and X3.3)	PL d / Cat. 3	
SLP-C: Safely limited Cartesian position	PL d / Cat. 3	note: FCI cannot control the robot while SLP-C is active
SLS-C: Safely limited Cartesian speed	PL d / Cat. 3	note: FCI cannot control the robot while SLS-C is active
SLP-J: Safely limited joint angle	PL d / Cat. 3	note: FCI cannot control the robot while SLP-J is active
SLS-J: Safely limited joint speed	PL d / Cat. 3	
SLD: Safely limited distance	PL d / Cat. 3	
SEEPO: Safe End Effector Power off	PL b / Cat. b	

### Stopping Functions

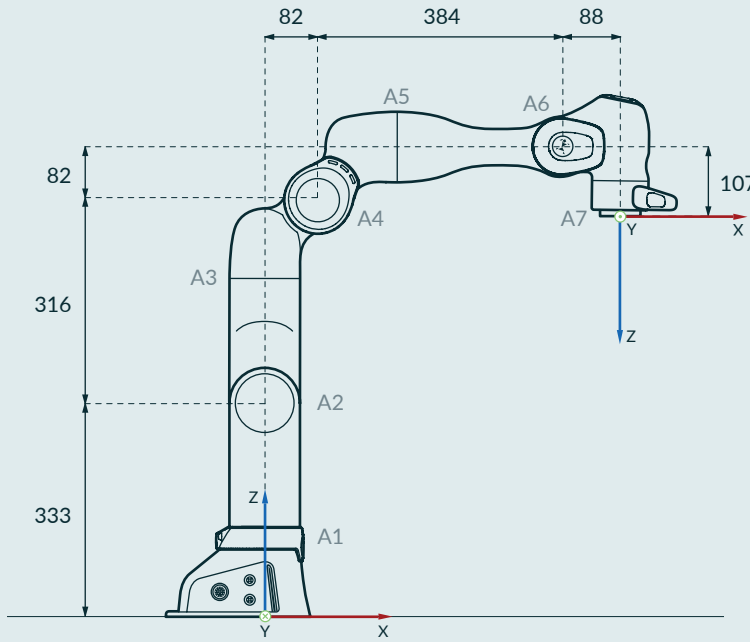
Category 0 stop	PL d / Cat. 3
Category 1 stop	PL d / Cat. 3
Category 2 stop	PL d / Cat. 3
Worst case safe Cartesian position accuracy for stopping functions	50 mm

### Safety values according to EN ISO 13849-1

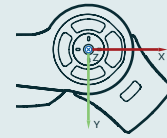
PFH of PL d / Cat. 3 safety functions (Probability of Failures per Hour)	$< 1 \times 10^{-7}$
PFH of PL b / Cat. b safety functions (Probability of Failures per Hour)	$< 1 \times 10^{-7}$

1. Technical data are subject to change.
2. For more details see Product Manual Franka Production 3.
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 [0.498, 0.0, 0.226] m, with the Z-Axis of the flange oriented parallel to earth-gravity and the elbow positioned upwards.

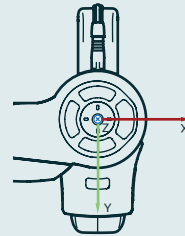
**DIMENSIONS & WORKSPACE**



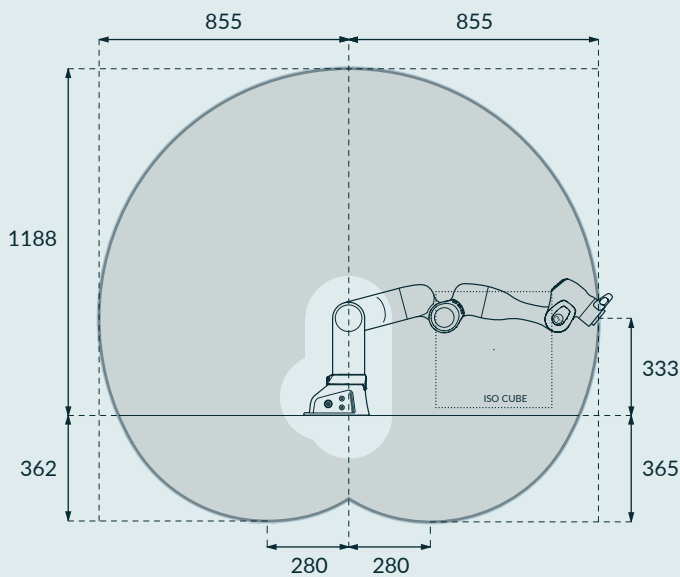
Axes names with link distances [mm]



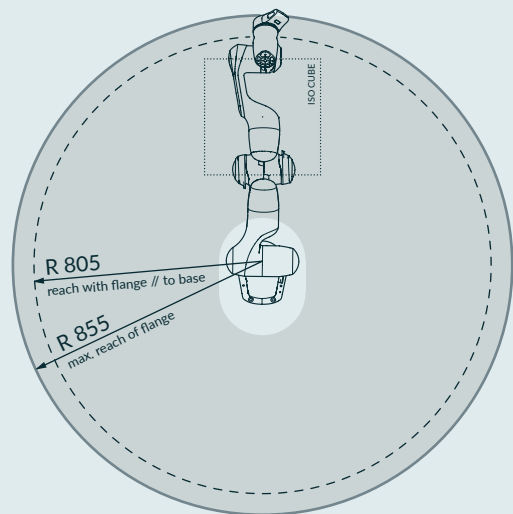
Alignment axes 7 without end effector



Alignment axes 7 with Franka Hand



Workspace | side view [mm]



Workspace | top view [mm]