

# FRANKA PRODUCTION 3



**Human arm-like  
dexterity**

**Intuitively  
easy**

**Quick time  
to profit**

# NEXT GENERATION ROBOTICS AUTOMATION FOR EVERYONE

At Franka Emika we use our deep-tech competence to create **novel robotics platform technologies** with superior performance and universal accessibility, revolutionizing industrial automation.

Our founders had a vision to make **robotics no longer exclusive to the few but available** on a large scale and accessible to everyone. Key to this endeavor required equipping **robots with human-like force sensitivity** in combination with **intuitive usage**.

Our passionate team has decades of collective experience innovating world-leading robotics technologies, and since 2017 we have delivered thousands Franka Emika Robots to the global market. In that time, our AI-enabled robot quickly became **the reference robotics platform** for research, establishing itself in most renowned Machine Learning and Artificial Intelligence institutes and enterprises, as well as in health care and education.

During this establishing period, a broad spectrum of industry users also gained access to the same empowering technology. These industrial users – ranging from highly-skilled robotics experts to process-skilled factory workers, from small businesses to global enterprises – realized the benefits of Franka Emika's novel easy-to-use, flexible, cost-efficient and scalable approach.

With such strong background we proudly launch **Franka Production 3**, the sensitive and industrially certified robot system for everyone. Designed, developed and manufactured in Germany using mechanical and engineering competence combined with innovative software and platform expertise, the Franka Production 3 is ready to ignite productivity for anyone and everyone who needs industrial robotics automation across the globe.



# EASILY TURN YOUR PROCESS EXPERTISE INTO ROBOTICS AUTOMATION

## Franka Emika´s technology and industry: a perfect match!

While most-known competitors still offer positioning machines designed for classical industrial markets, Franka Emika addresses the modern challenges of industry with a new generation, purposely best-fit machine: Franka Production 3.

## Introducing force sensitive and flexible automation into manufacturing processes

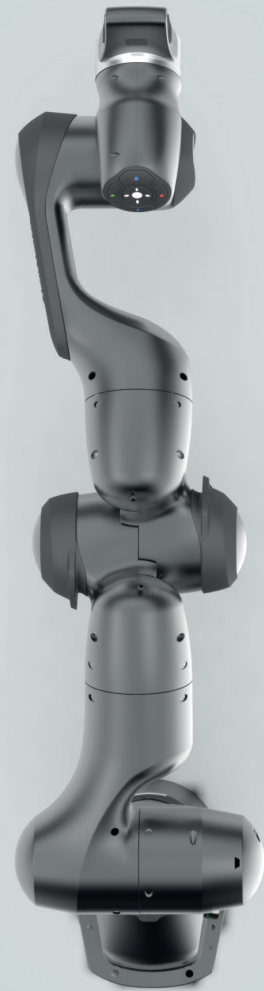
Manufacturing electronics products involves manipulation of core components such as circuit boards, or end-of-line testing of **fragile elements** like touchscreens. These are so delicate and likely to break that their handling can hardly be automated by classic pure positioning robots. Crucially, efficient and scalable automation of such tasks further requires the **flexibility of quickly adapting a given program to any variant workpiece**, which is a recurrent case in the electronics market. There, a family of products comes in slightly different size versions, or versions of a certain product evolve in matter of months.

With our App Workflow-based programming paradigm, not only do workers not require any prior-specific knowledge about programming to commission and operate the robot, but the modularity introduced by the Apps in an App Workflow, and the possibility to easily and quickly change context-relevant parameters enable them to **adapt and re-use tasks, over and over**. This means very low entry barriers and incredibly fast time to production whether for a first use or a re-use of the robot.

## Sensing and interpreting contact forces, the added value

**Every millimeter of uncertainty costs money**, with previous-generations robots getting to frequent stalls, damaging the workpiece, or even not capable of automating a great number of tasks. Inspired by human capabilities and enabled by an advanced sense of touch, our control algorithms can deal with tolerances and misalignments just like a human can. By combining tactile sensing and application of forces, the robot “navigates” the variations in the worksurface: wiggling gently and precisely to identify the edges of a compartment first, and then delicately pushing in the component, **adjusting the movement based on the contact feedback it receives**.

The **ability to detect and interpret contacts** through human-like dexterity is key. Without this kind of sensitivity to contacts, even simple tasks like insertion and palletizing still involve huge and inefficient automation investments, or even fully rely on manual labor!



**FRANKA PRODUCTION 3**  
dedicated to the new generation  
of industry players

Welcome to Franka Emika´s world!

# FRANKA PRODUCTION 3

## The industrial robotic platform.

In pursuit of high-performance and accessibility, and in light of the requirements of most modern and rapidly changing production environments, we have combined **human-centered design** with trustworthy **German engineering** and deep **software competence**, giving rise to a masterpiece of technology and user experience.

- Agile thanks to its 7 axes, with pose repeatability of +/- 0.1mm and negligible path deviation even at high velocities.
- Within its workspace, it can reach and operate far-off (855 mm) as well as very close to its own base, and the geometry of the 7 axes allows for complex poses to reach difficult spaces.
- Ultra-sensitive to contact forces thanks to link-side torque sensors in all 7 axes.
- Fast reaction to contacts and fine tuning of forces thanks to 1kHz control.
- The Arm (18 kg) and the Control (7 kg) can be installed in less than 5 minutes.
- The system can be powered up by general-purpose power outlets.
- Intuitive App Workflow-based programming.

From our highly tuned, high volume series production in Bavaria, Franka Production 3 reaches users worldwide, serving industry sectors with cost-efficient applications that can be deployed within minutes.



**Payload**  
3 kg



**Degrees of freedom**  
7



**Torque sensors**  
in all axes



**Max. reach**  
855 mm



**Workspace efficiency**  
94.5 %



## Safety functions

EN ISO 10218-1:2011 | certified by TÜV SÜD PS  
EN ISO 13849-1:2015 | certified by TÜV SÜD RAIL

# DESIGNED TO BE INTUITIVELY EASY

## Straightforward setup and operation

Convenient to lift and transport, Franka Production 3 has straightforward one-box delivery concept. The Arm and the Control can be installed in less than 5 minutes. The system can be powered up by general-purpose power outlets, and it is plug-and-use: only one cable is needed to connect the Arm and its 19" Control. No dedicated operator device is required: any computer, laptop or tablet can be connected to the robot and run the user friendly web-based interface. Having a web-based interface also means there is no need to download a bunch of additional and bulky software.

## Plug-and-Use

from delivery to first usage in under 30 minutes

## Powerfully intuitive interfaces turn everyone into robot experts

We combine our groundbreaking technology with unprecedented usability. With Desk – a visual, workflow-based programming interface – no prior knowledge of programming is necessary to turn process expertise into robotic automation. Apps represent modular building blocks of processes such as grasping, plugging, insertion and screwing which can be arranged quickly to create App Workflows that tell the robot what to do to realize an entire production process. Apps can be easily parametrized by entering commands conveniently and intuitively with the Pilot interface on the robot arm, and robot poses are taught by means of smooth hand-guiding. Such a modular paradigm enables workers to adapt and reuse robot tasks to varying workpieces over multiple robots, whereas the usable programming approach means that no programming expertise is required, resulting in low training and consulting costs.

## Apps, your building blocks

easiest, most efficient workflow-based programming

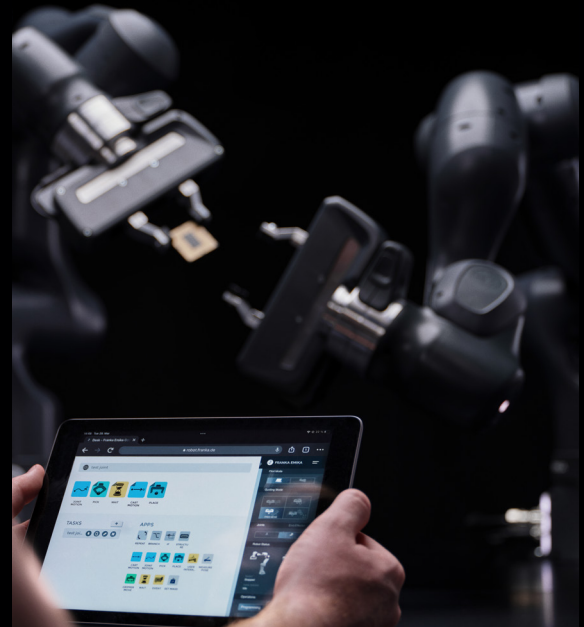
## Franka App Store

easy access to Apps

## Effortless, smooth hand-guiding and interaction

Adjustable guiding modes compensate gravity and friction to reduce the perceived weight up to a factor of 60, ensuring smooth and elegant interaction between human and machine. And the Pilot interface is conveniently at hand on the robot arm, allowing for remote control of the user interface.

## Intuitive usage and interaction



A. Get the Apps you need, your pre-programmed building blocks.

B. Arrange the Apps into a sequence to recreate the intended App Workflow.



C. Teach the robot by manual guidance and parameterize each App via dialog-based interaction.



# HUMAN ARM-LIKE DEXTERITY

## Sensitive manipulation and force-enabled applications

Everyday life offers a plethora of instances where humans use the sense of touch to successfully explore surfaces and manipulate objects.

It is mainly thanks to the sense of touch that we can quickly zip up our jackets in the morning, mindlessly interlocking the two teeny-tiny elements of our zip. A few minutes later, it is again thanks to the sense of touch that we insert our key to start our car – without having to look at the keyhole – as we frantically dash to the office. All day, every day, we humans do these complex dexterous things without even thinking about it.

Likewise, a robot that is able to measure contact forces at the interface between the object and its end effector – is empowered to recognize edges and shapes, and can operate accordingly. Equipped with more than a hundred sensors of various types, including in-house designed, industry-leading torque sensors in all 7 axes, our robot is unique in its ability to mimic these human-like, dexterity-based skillsets.

## The best of both worlds

Franka Emika robots represent a breakthrough for a novel generation of robotics, and help you push the frontiers of automation by means of revolutionary, exclusive sense of touch-enabled dexterity.

Will you have to sacrifice position accuracy in the name of sensitive manipulation? NO. With our technology, elegant combination of industrial-grade revolutionary sensing and industrial-grade position control can be achieved.

Our robots are agile thanks to their 7 axes, with pose repeatability of +/- 0.1 mm and negligible path deviation even at high velocities. They enable precise, robust and fast execution of production processes, even in complex constrained environments, within their reach of 855 mm.

## Compliant behavior

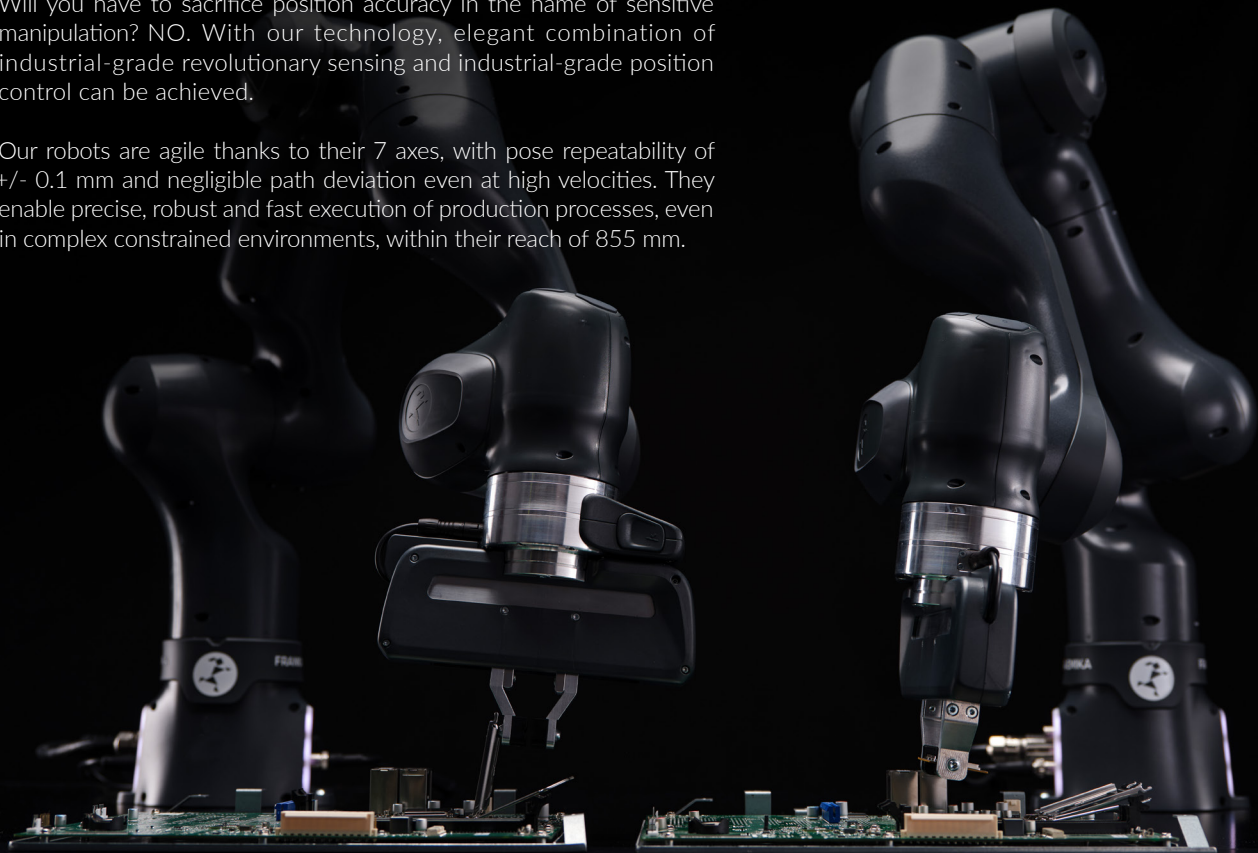
precisely and reliably adapts to work surfaces and environments

## Adaptive assembly

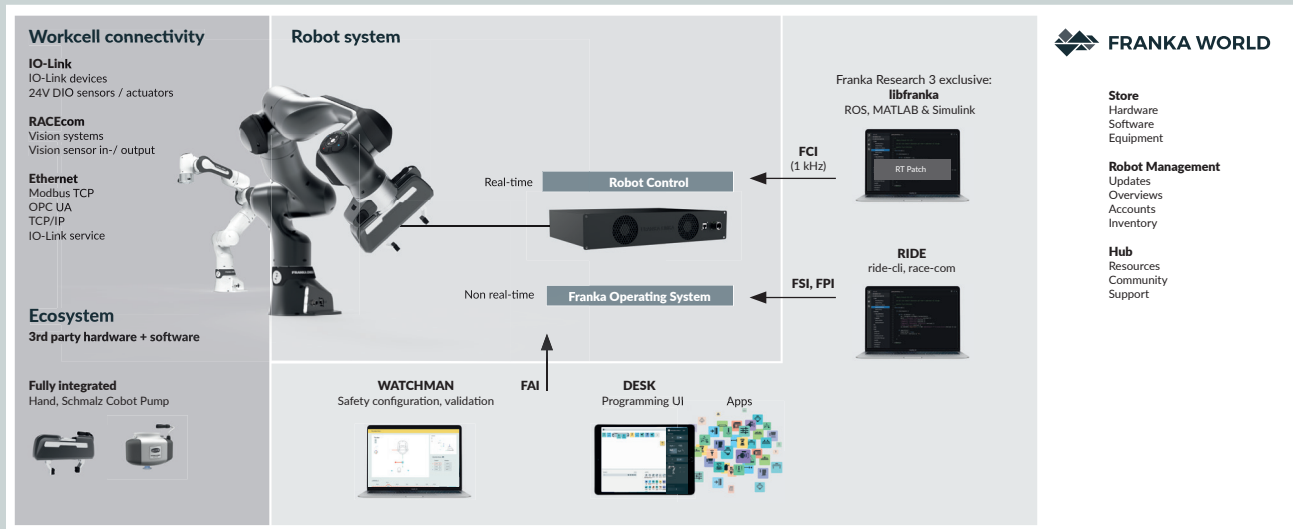
engineered with human-like skillset

## Robust processes

handle inconsistencies easily and use force data for quality assurance



# QUICK TIME TO PROFIT & PRODUCTIVITY



## Turn your process expertise into robotic automation

Whether you are new to robots or have been automating your production processes for years, with Franka Production 3 you will experience process automation in a whole new way – fast, straightforward and intuitive like never before.

The system is immediately ready for installation and commissioning in your industrial environment. Low space requirements, uncomplicated plug-and-use installation and various interfaces for peripheral devices make the system ready for use within a few minutes and unbeatably easy to configure.

The intuitive teach-in Pilot interface directly on the Arm and the App Workflow-based paradigm via pre-programmed task modules enable flexible setup and effective scalability of entire production lines.

And doors to connectivity are more open than ever before, with the online platform Franka World. This established platform provides customers with centralized and remote management of their fleets of Franka Emika robots, and the possibility to access the Ecosystem Store to browse a continuously growing portfolio of accredited software and hardware extensions.

### Low initial invest

for low barriers to entry

### Low expertise required

for less training and more flexibility

### Easily adaptable to demands

ideal for rapidly changing production environments

## Productive and cost-efficient

Franka Production 3 has a low initial invest, achieved thanks to our high-volume, efficient and lean production in Germany.

Low expertise is required. With Apps and the Store, existing talents can intuitively and quickly learn. The ease of installation and operation eliminates the need for a dedicated team of robot experts, resulting in significantly more flexibility in your production and less training for your staff.

Additionally, App Workflows allow for prompt reconfiguration of tasks, therefore for easy and quick adaptation to the demands of dynamic factories.

## A thriving network of partners and customers

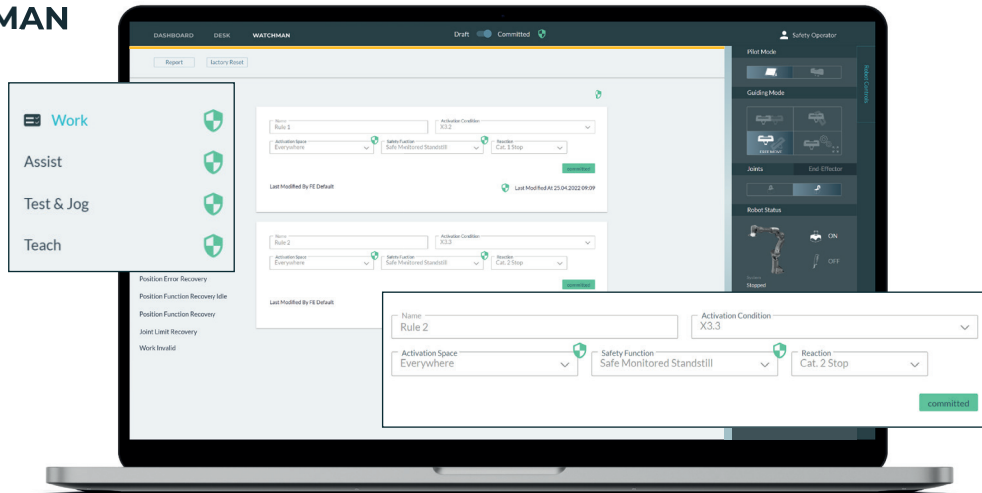
We have established a global partner network of software and hardware developers, distributors and solution providers who brilliantly transfer our technology into elegant, robust and profitable robot-assisted automation solutions.

At our customers, a broad range of users – from highly-skilled robotics experts to process-skilled factory workers – are benefiting from our outstanding technology and pioneering ease of use.

**Together, we are pushing the frontiers of robotics and automation, and keep pursuing our dream to improve the next generations' quality of life, one robot cell at a time.**

# SAFETY SIMPLIFIED

## WATCHMAN



### Set up & validate your Safety

Safety settings become intuitive and easy to customize thanks to our **browser-based user interface** Watchman.

- A. Start with pre-validated safety scenarios and customize them if necessary.
- B. Set up or modify scenarios by configuring rules, which consist of:
  - Activation Condition
  - Activation Space
  - Safety Function
  - Reaction (Cat.1 or Cat.2 Stop)
- C. Validate functions, rules and scenarios through a guided process.

### Configurable safety functions and scenarios

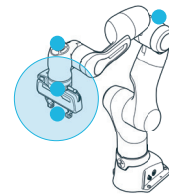
Franka Production 3 complies to ISO 10218-1 and ISO 13849, and provides safety functions.

**SLP-C and SLS-C:** Safely limited Cartesian position and speed (PL d / Cat. 3)  
Monitoring of Flange, Wrist, Elbow and Tool (which can be defined with up to 5 spheres).

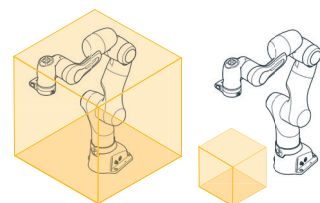
**SEEPO:** Safe End Effector Power off (PL b / Cat. b)  
Safely switches off the power provided to the end effector (48 V power line). Behavior can be configured (e.g. power is switched off when an emergency stop is triggered).

**Safely Monitored Standstill** (PL d / Cat. 3)  
When activated, the robot stops safely, and monitors standstill while the function is active.

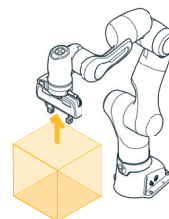
**Assist Mode** (fully integrated using PL d / Cat. 3 safety functions)  
Assist Mode is designed to allow hand-guiding as defined by ISO 10218-1 while running tasks in execution mode. The user can start hand-guiding from a safely monitored standstill during execution by pressing the Enabling Button on the Pilot-Grip. The safety operator can customize the velocity limit of Assist mode, add further rules or disable it completely in the safety settings.



Cartesian position and speed can be monitored at Flange, Wrist, Elbow and Tool.



Cartesian spaces can be defined as zones that the robot is not allowed to leave, or enter.



During Assist Mode, the robot provides haptic feedback of the virtual walls defined by the safe zones.



# FRANKA RESEARCH 3

## The reference robotic platform for AI & Robotics research, globally.

Franka Research 3 is the reference world-class, force sensitive robot system that empowers researchers with easy-to-use robot features as well as with low-level access to robot's control and learning capabilities.

### ✓ Robot System

Franka Research 3's robot system includes the Arm and its Control. The force sensitive and agile Arm features 7 DOF with torque sensors at each joint, industrial-grade pose repeatability of +/- 0.1 mm and negligible path deviation even at high velocities. It comes with a payload of 3 kg, a reach of 855 mm and a workspace coverage of 94.5 %.

### ✓ FCI (Franka Control Interface)

FCI is the ideal interface to explore low-level programming and control schemes, providing the current status of the robot and enabling its direct torque control, at 1 kHz. On top of the C++ interface libfranka, integration with the most popular ecosystems ROS, ROS2 and MATLAB & Simulink is available!

### ✓ DESK

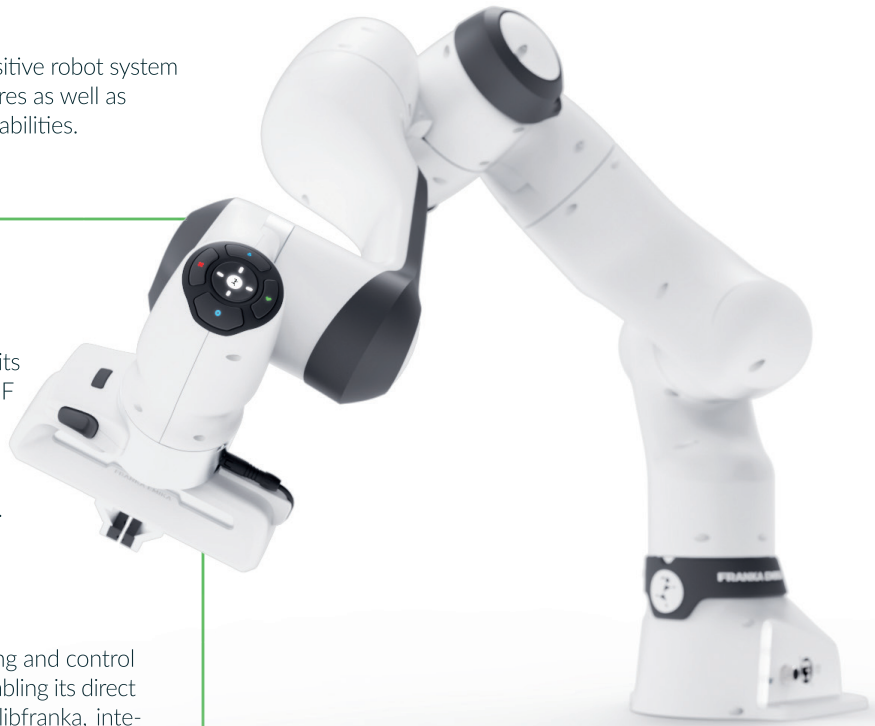
Desk is the browser-based user interface that offers quick robot control options, and where Apps can be dragged and dropped into a sequence to create entire tasks in no time. Ideal for rapid prototyping of robot behaviors, setup of experiments, simple human-robot interaction studies and demos.

### ✓ Watchman

Easy to use and fast to implement safety. Thanks to browser-based user interface Watchman, typically complex safety setups are greatly simplified to ensure that your lab and lab workers are protected.

### ✓ Resources and Community

An open and global research ecosystem enabled by a powerful robotics platform for quicker time to results and publishing. Franka Research 3 is the reference platform to integrate existing research, share breakthroughs and collaborate on projects, replicate studies and promote papers within the community.



## End effectors and additional software

### + Franka Hand

A 2-finger gripper with exchangeable fingertips, fully integrated with the software of Franka Research 3, therefore plug-and-use.

### + App Package for FR3

A selection of Apps, modular building blocks that can be combined into App Workflows to prototype robot behaviors rapidly.

### + RIDE

A development interface for writing custom Apps and connecting third-party HW and external resources. The ideal tool for customizing and extending the system's capabilities.



# FRANKA PRODUCTION 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
Interfaces	<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>
User Interfaces at the Arm's Pilot Grip	<ul style="list-style-type: none"> <li>• integrated safety-rated guiding enabling switch</li> <li>• guiding button</li> <li>• guiding mode selector</li> </ul>
User Interfaces at the Arm's Pilot Disc	<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 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
ADD-ONS	
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>

## SAFETY

### Certifications

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

### 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
SLS-C: Safely limited Cartesian speed	PL d / Cat. 3
SLP-J: Safely limited joint angle	PL d / Cat. 3
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

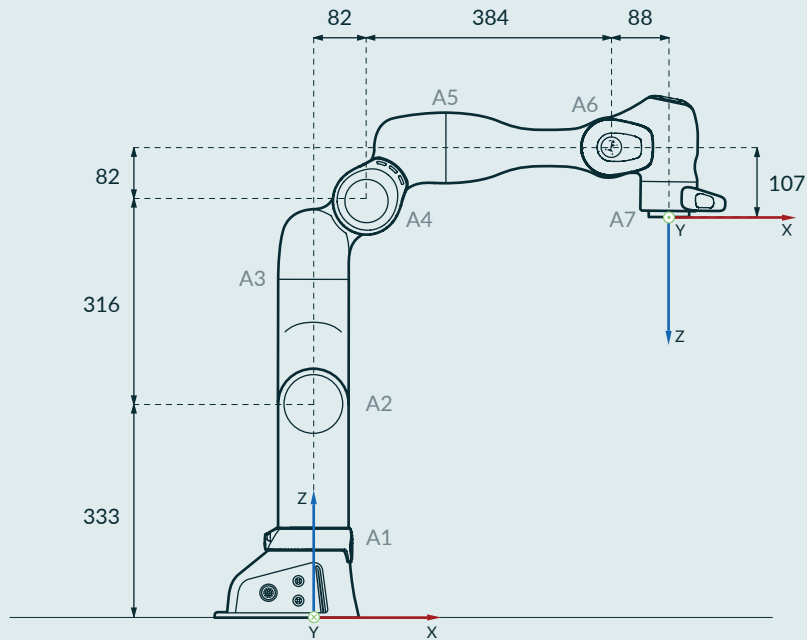
Category 0 stop	PL d / Cat. 3
Category 1 stop	PL d / Cat. 3
Category 2 stop	PL d / Cat. 3
Worst case safe Cartesian position accuracy for stopping functions	50 mm

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

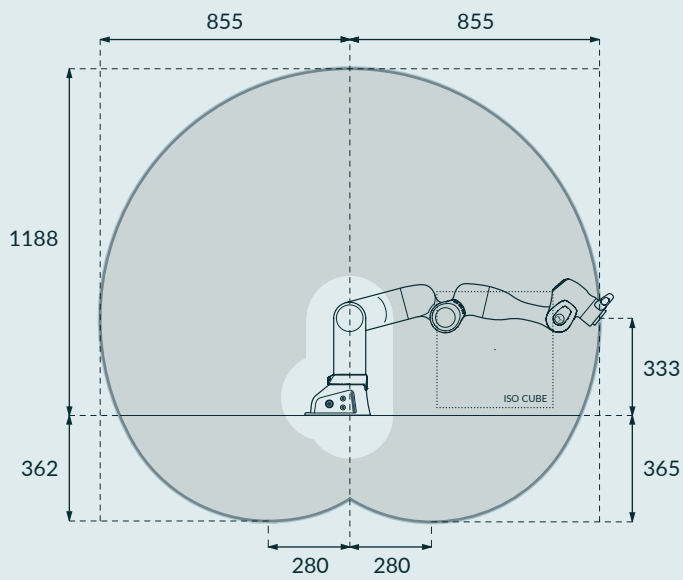
PFH of PL d / Cat. 3 safety functions (Probability of Failures per Hour)	$< 1 \times 10^{-7}$
PFH of PL b / Cat. b safety functions (Probability of Failures per Hour)	$< 1 \times 10^{-7}$

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.

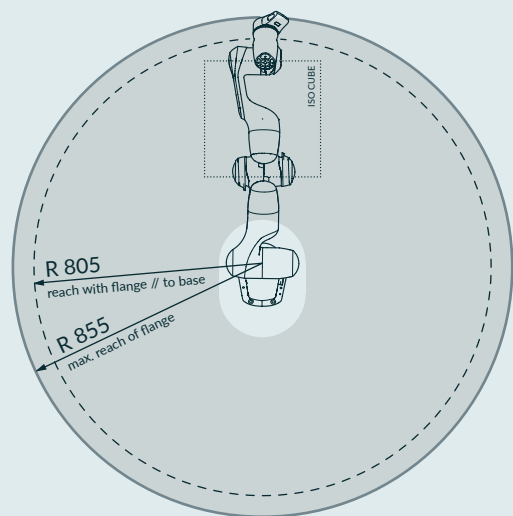
DIMENSIONS & WORKSPACE



Axes names with joint lengths [mm]



Workspace | side view [mm]



Workspace | top view [mm]