ROS SUPPORT
MAKING THE MOST OUT OF THE E-SERIES

Anders Billesø Beck
Innovation Lab Manager

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NEW ROS DRIVER

Clouded landscape

- More than 200 variants of a ROS driver for UR robots exist.
- Instability towards API changes

A lot could be improved

- Many, especially new features are lacking
- Sub-optimal performance
- Only preliminary e-Series support

The new driver

- ROSIN FTP in collaboration with FZI

ROSin FZI

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GOALS

Ease of use

- Easy and plug-and-play to use a UR robot with ROS

Performance

- Full utilization of all features of the robots
- As industrial grade an interface as current ROS practice allows

Stability

- The driver will build on stable and versioned APIs
- The driver will be integrated into the software testing regime of Universal Robots

Community

- The driver will remain open source and relying on future community contributions

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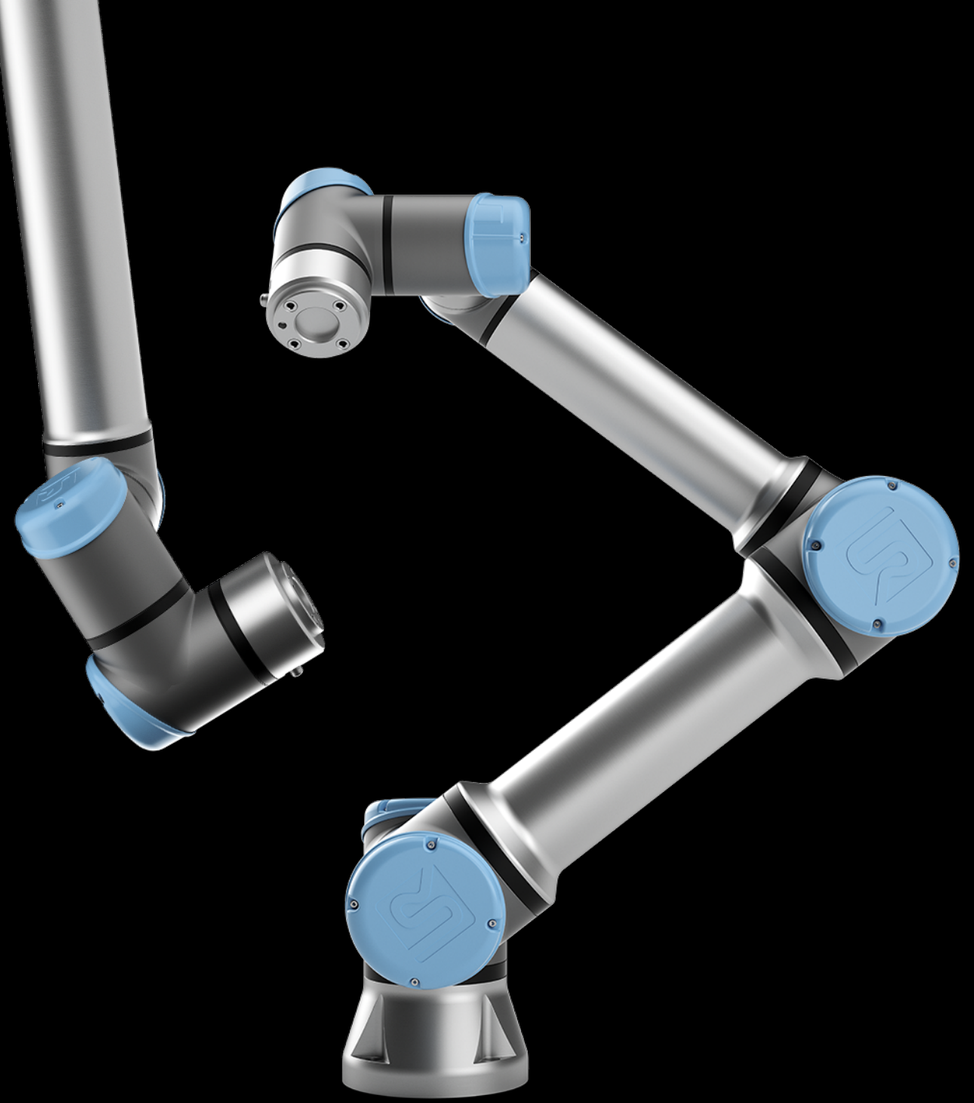
TWO MODES OF OPERATION

Remote control

- **Target audience:** Easy programming research, OEM embedding
- Like classic ROS driver
- **New:** OEM-mode, run completely without the teach-pendant

ROS URCap embedding (New)

- **Target audience:** Vision, F/T control, picking, etc.
- URCap to enable ROS control where needed in a UR Program
- Enables easy integration of ROS components into applications
- Enables commercialization of ROS-based technologies as functionality plug-ins



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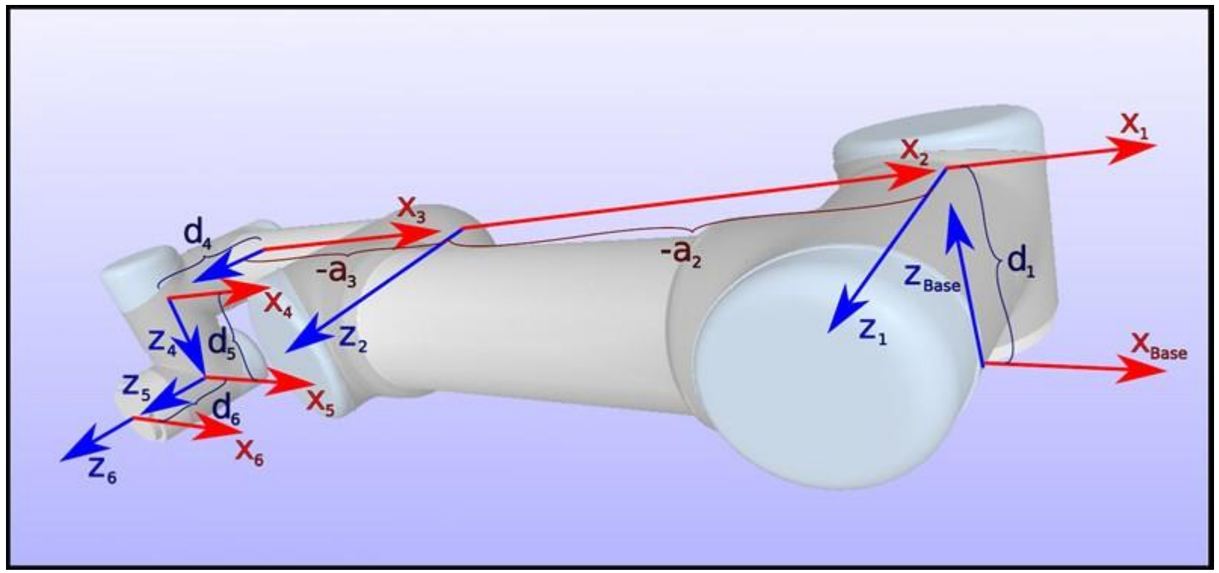
CALIBRATION

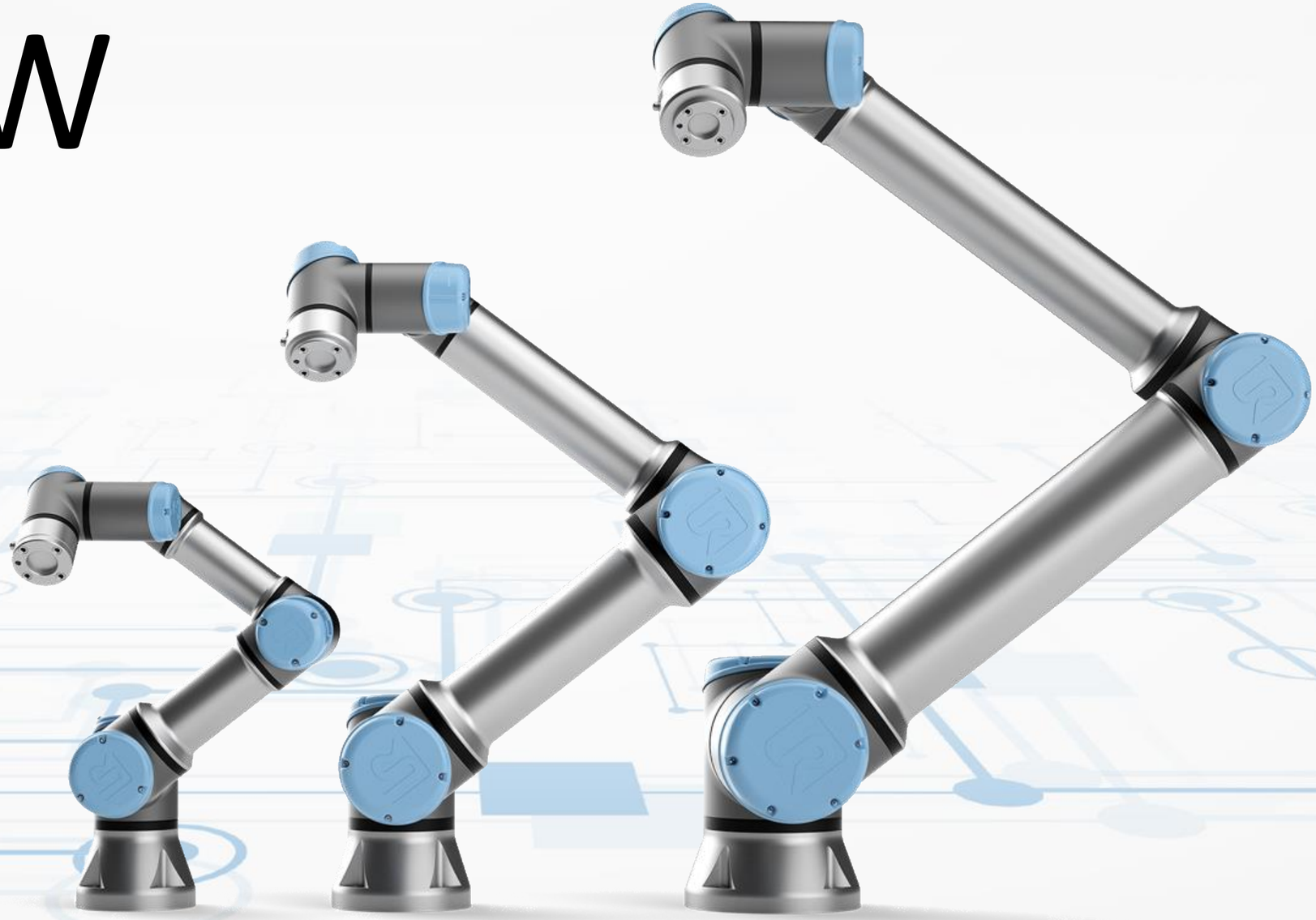
- All UR robots are individually calibrated for absolute accuracy
- This is commonly ignored in the existing ROS drivers

New driver

- Will read calibration upon connect
- Updates Xarco for valid URDFs
- Allows for accurate IK calculations and linear motions



THE NEW e-Series



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MEET THE e-Series FAMILY

A COLLABORATIVE SOLUTION FOR EVERY NEED

UR3e

Automate tasks up to: 3 kg
Working radius: 500 mm

(Best deployed in tight spaces or on table tops)

UR5e

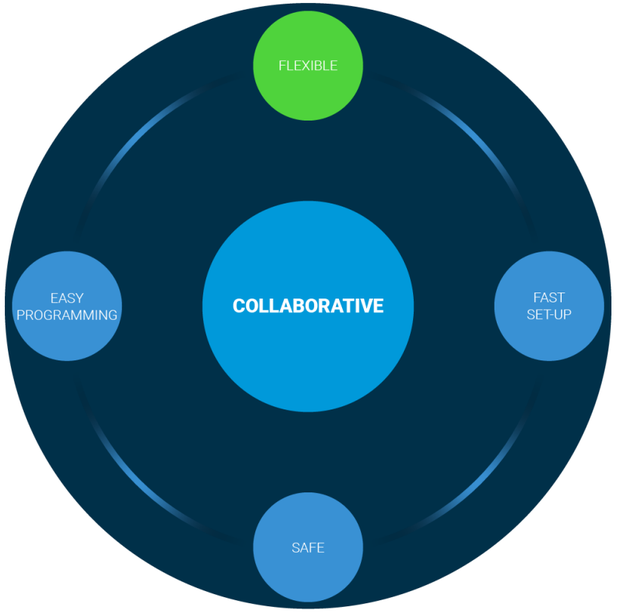
Automate tasks up to: 5 kg
Working radius: 850 mm

UR10e

Automate tasks up to: 10 kg
Working radius: 1300 mm

(For tasks across large areas)

e-Series AT A GLANCE

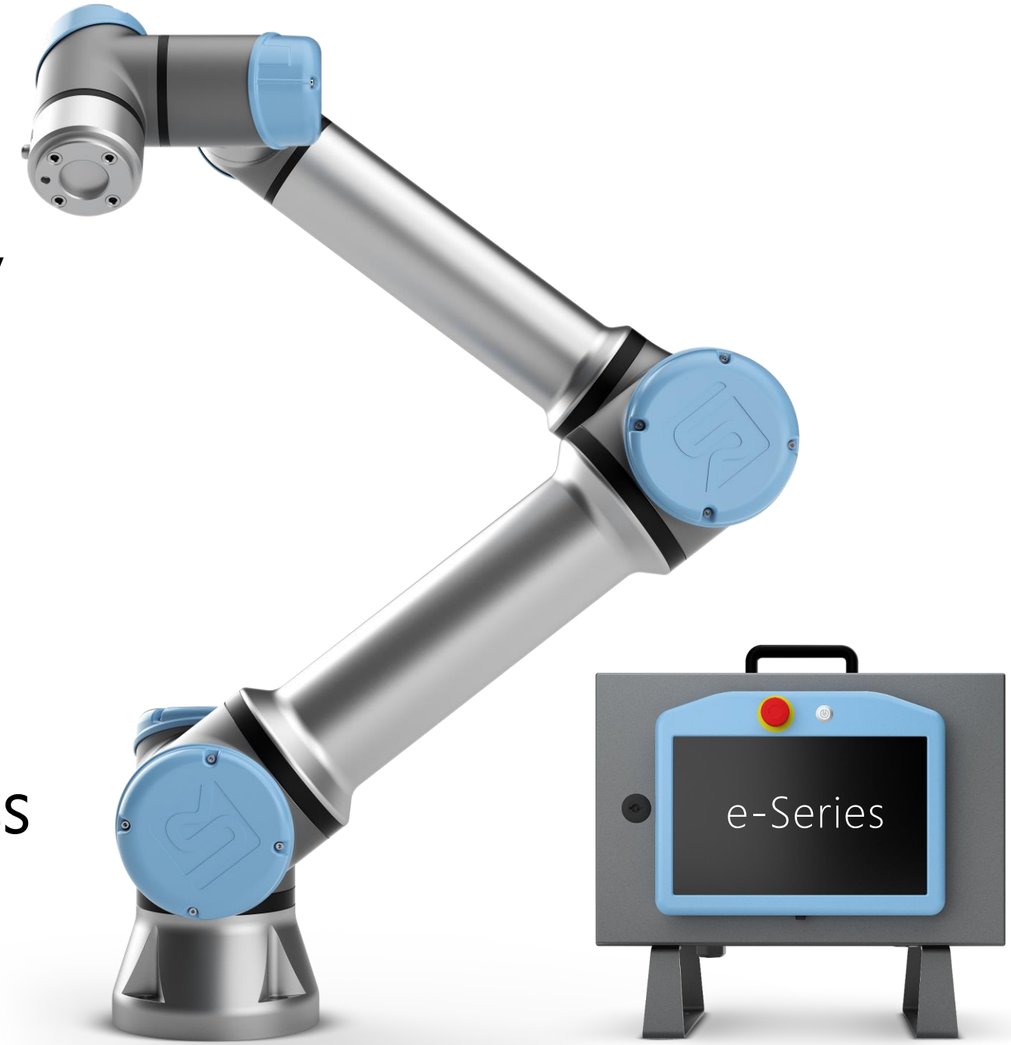


IMPROVED SENSITIVITY

Built-in F/T sensor
Utilizing ROBOTIQ technology

500Hz SYSTEM BUS

4x faster than CB3



IMPROVED REPEATABILITY

+/- 0.03mm UR3e/UR5e
+/- 0.05mm UR10e

Economically address more applications

REDUCED NOISE

10dBA reduction in audible noise

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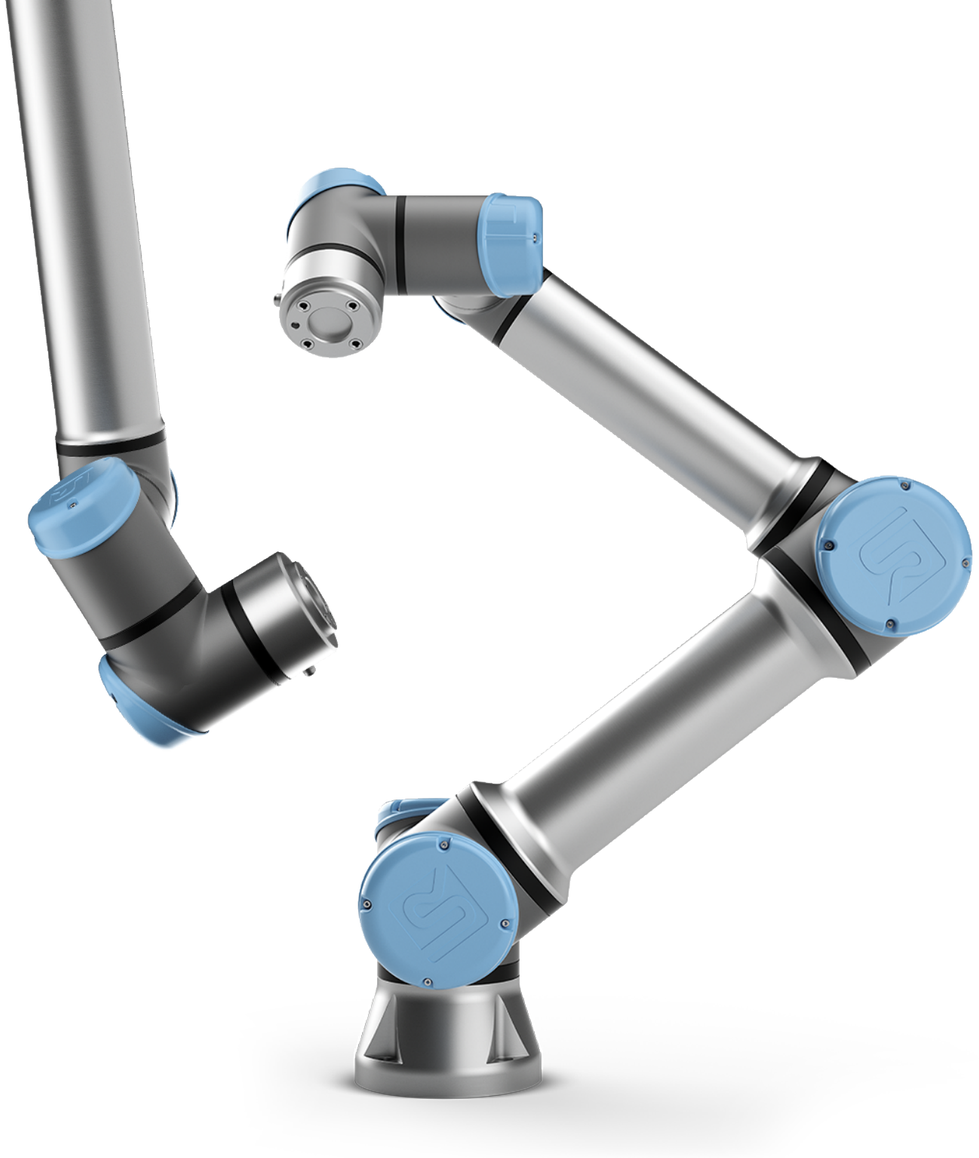
e-Series PERFORMANCE IN ROS



Improved control frequency

- 500 Hz controller frequency
- Full control bandwidth to the limit of robot torque and safety limits
- High-dynamics control and fast reactions
- High demand on the real-time implementation

Force / Torque sensor

- Tool mounted for process-centric control
- Very high bandwidth > 500 Hz
- Available as wrench topic in ROS @ 500 Hz

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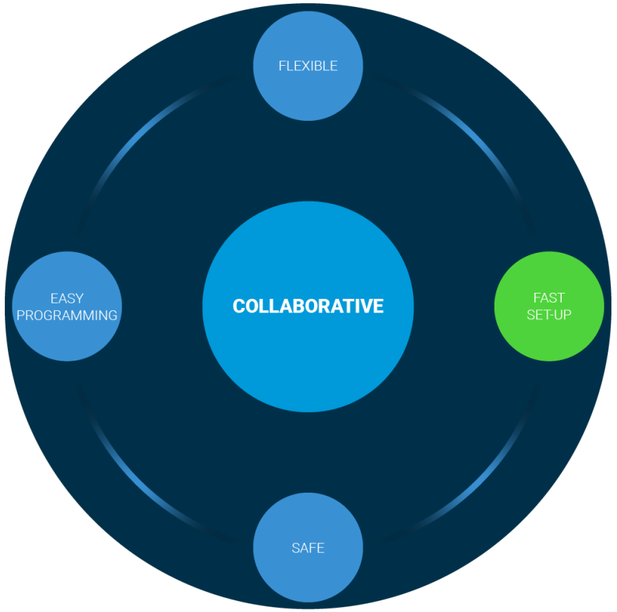
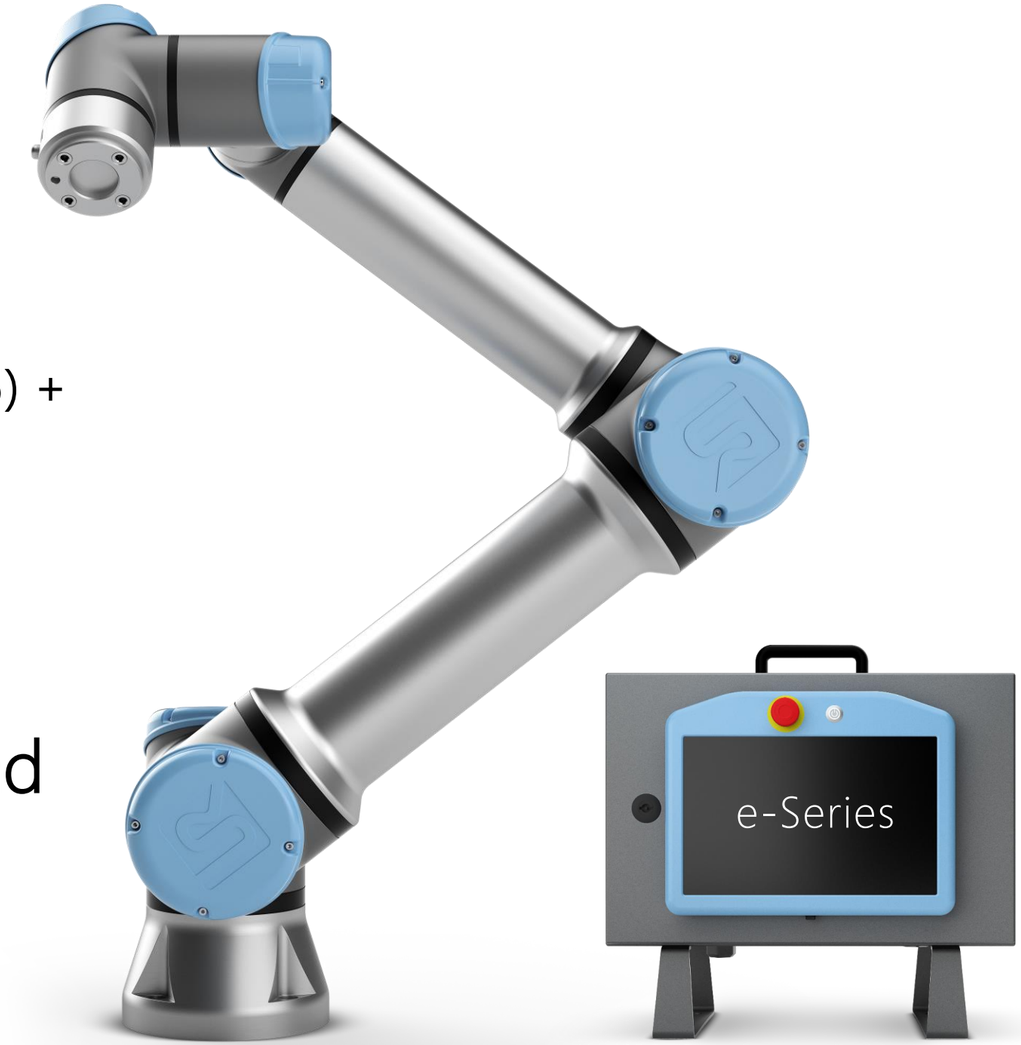
e-Series AT A GLANCE



IMPROVED TOOL CONNECTIVITY

Serial comm. (UART RS-485) +
2A peak current



EASY-REPLACEABLE JOINTS

2-6 min to replace joints

ALL SW UPDATED VIA .URUP

PolyScope, joints, screenboard, SCB

NEW SCB WITH 20 DI, 16 DO

Embedded motherboard

Quickly integrate and deploy solutions

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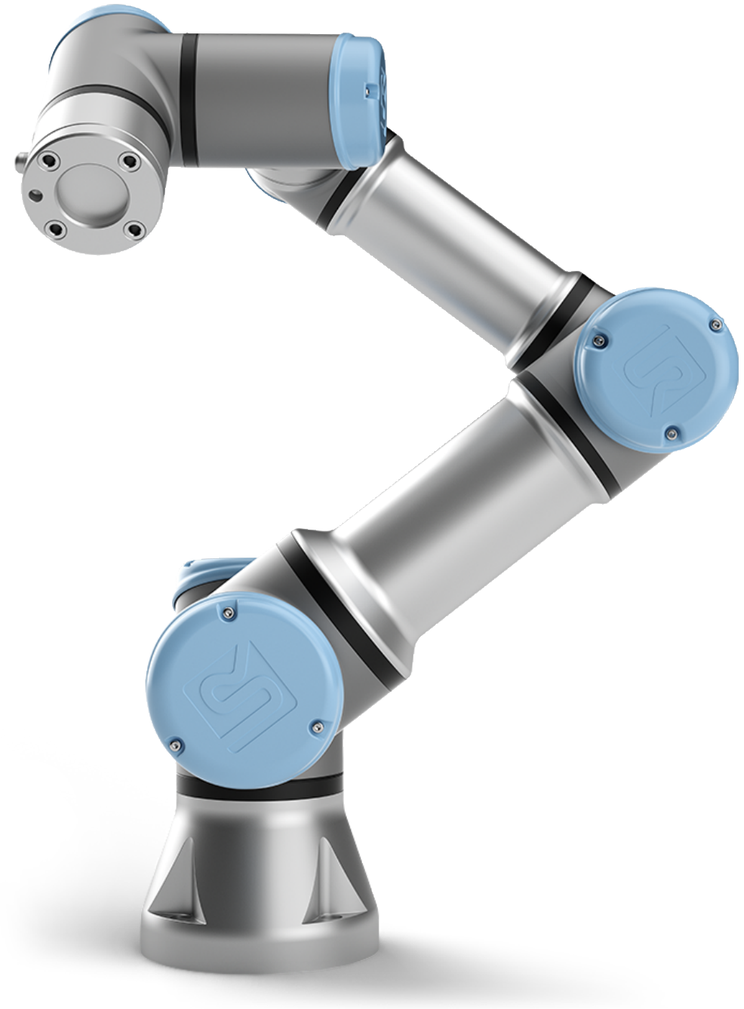
e-Series TOOL COMMUNICATION IN ROS

Tool communication connector

- Push, Pull and Push/Pull I/Os
- 2A power supply
- RS485 Software UART, up to 10 Mbps
- Decoupled on the tool side of F/T sensor

UART in ROS

- Forwarded as virtual serial port to ROS machine
- Re-use of existing drivers for serial devices in ROS



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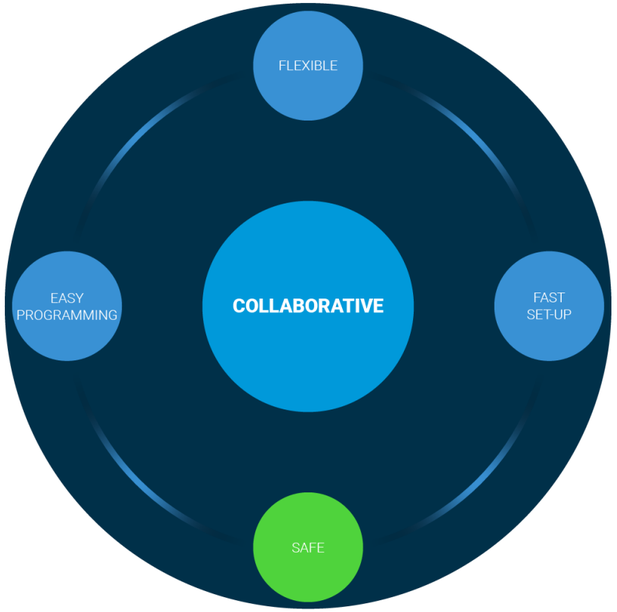
e-Series AT A GLANCE



TOOL SPHERE MONITORING

User defined tool spheres

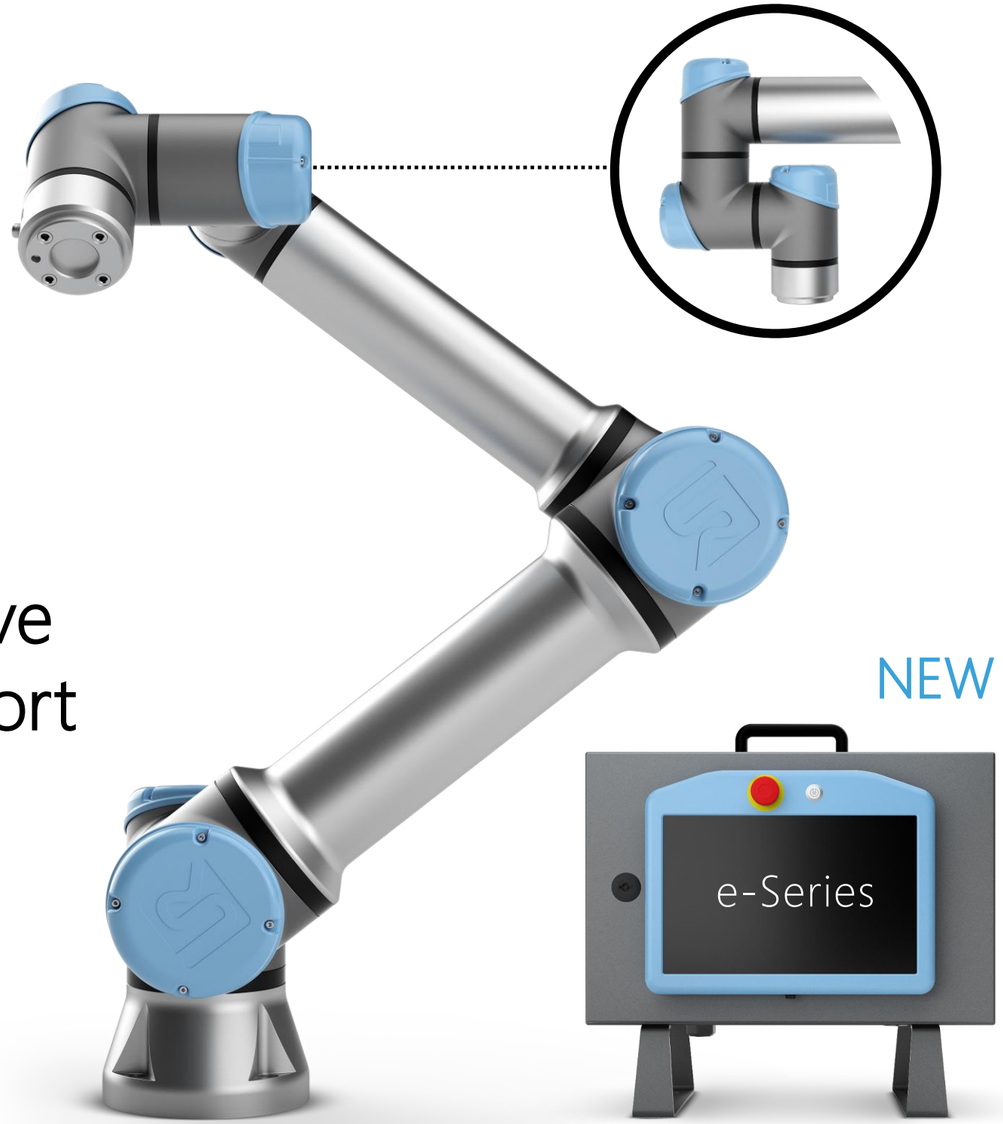
FULL ISO 10218-1 Compliant
ISO 13849-1, Cat. 3 PLd

Certified by TÜV Nord

Deliver more collaborative applications with less effort

NEW UNIFORM BASE DESIGN

Increases clearance from potential pinching hazards



HIGHER FLEXIBILITY

Wrist 2 extension

NEW ELBOW SAFETY FUNCTIONS

Elbow force limiting, safety plane monitoring

2 NEW SAFETY FUNCTIONS

Stopping time, stopping distance

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e-Series SAFETY IN ROS

Safe control

- ROS Control inputs are protected by the safety system
- Certifiable safe if unintended behavior are protected by safety system
- Motions can be scaled and must be handled accordingly

ISO 10218 – Single point of control

- Remote control mode -> Operation in "Remote Control" mode
- URCap Integration mode -> Start of the program on the TP

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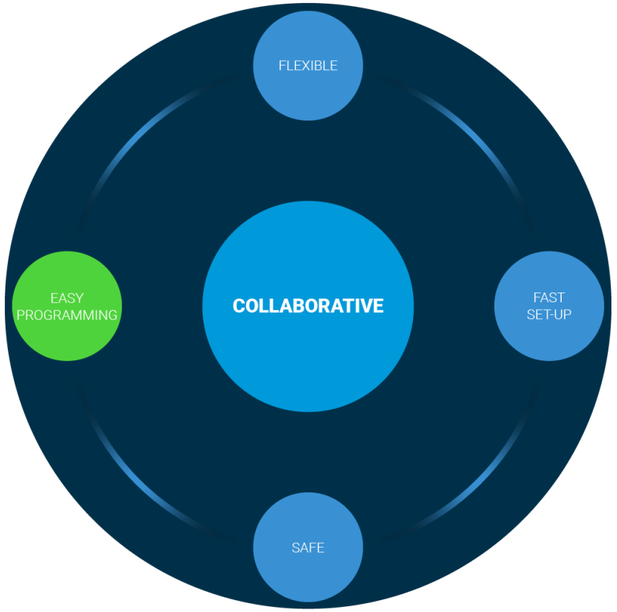
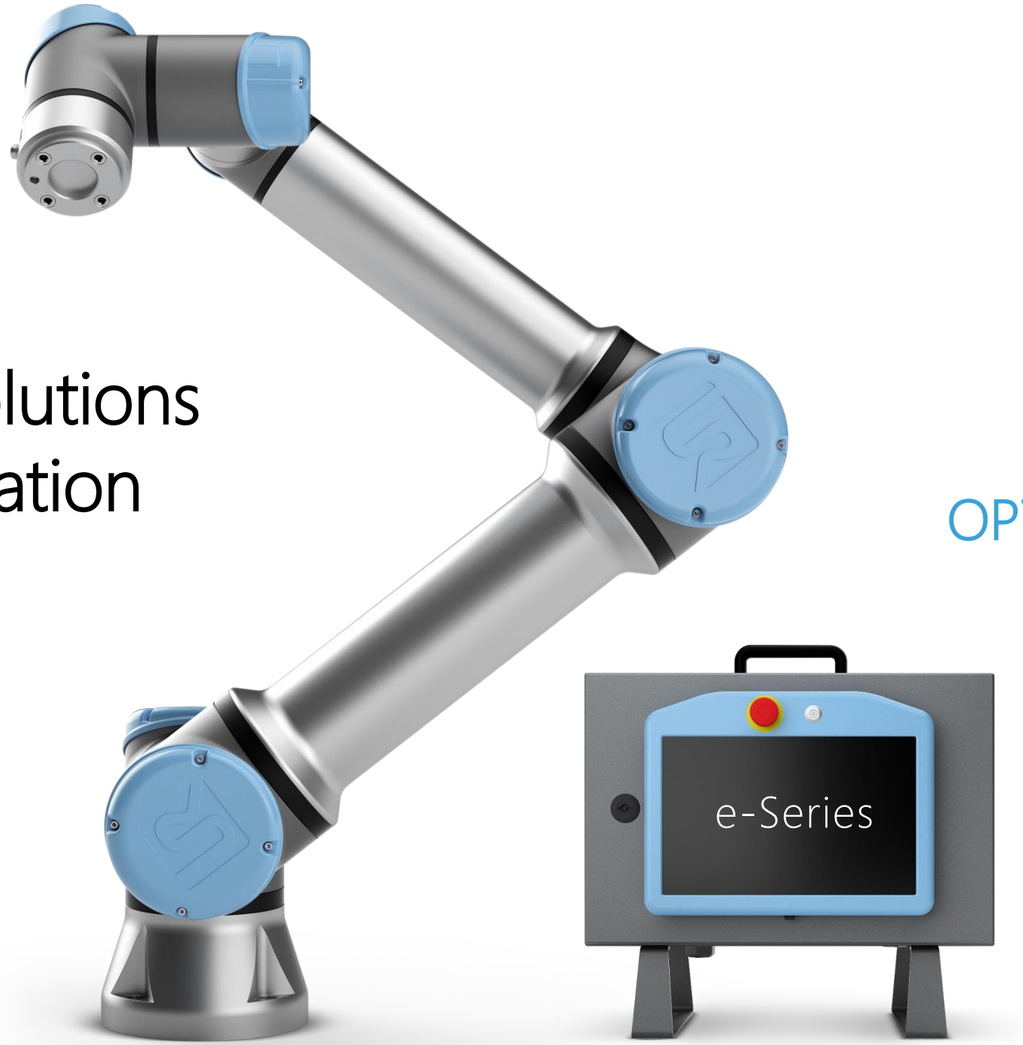
e-Series AT A GLANCE



Effortlessly create solutions with no prior automation experience



OPTIMIZED PROGRAMMING FLOW

Easier navigation, fewer clicks

NEW TEACH PENDANT

Capacitive touch, wide screen 1200x800, low weight

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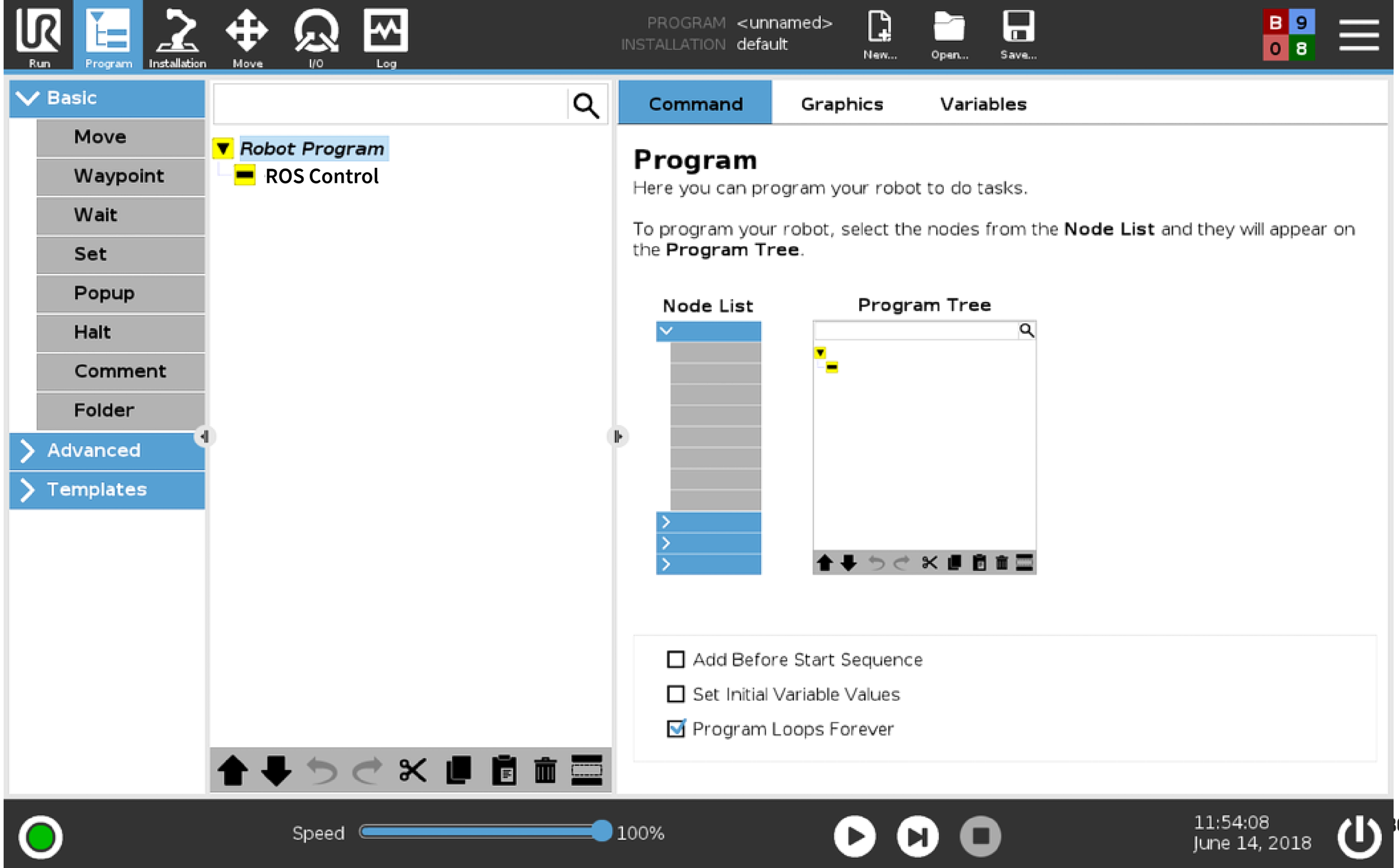
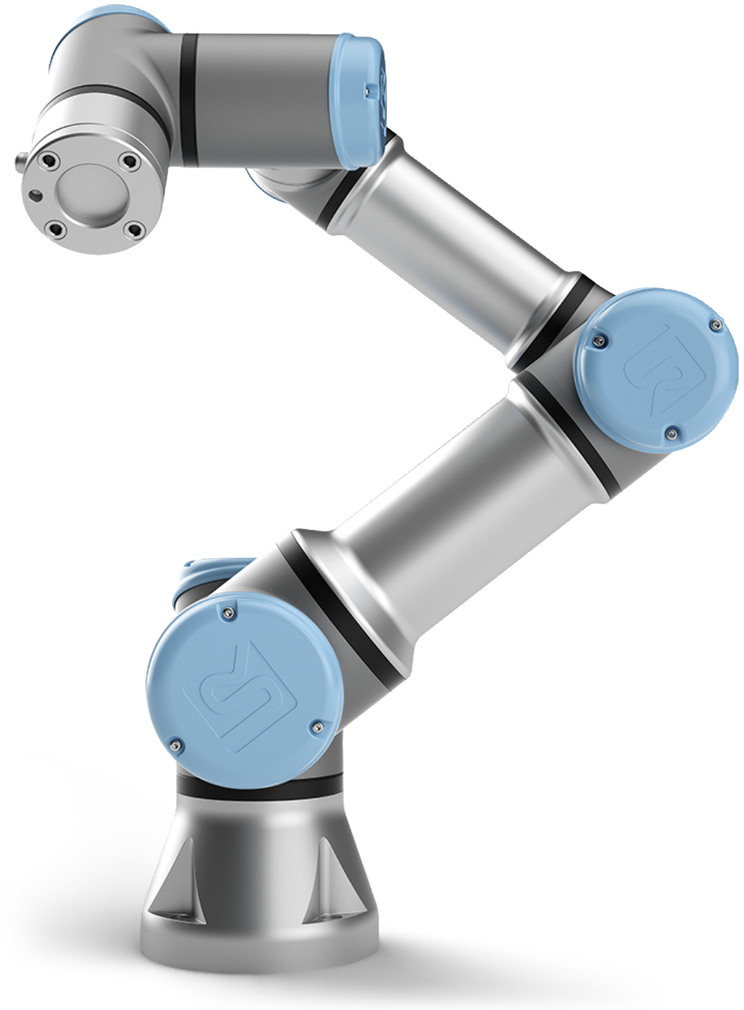

Run
Program
Installation
Move
I/O
Log
PROGRAM <unnamed>
INSTALLATION default
New...
Open...
Save...
Basic
Move
Waypoint
Wait
Set
Popup
Halt
Comment
Folder
Advanced
Templates
Robot Program
ROS Control
Command
Graphics
Variables
Program
Here you can program your robot to do tasks.
To program your robot, select the nodes from the Node List and they will appear on the Program Tree.
Node List
Program Tree
Add Before Start Sequence
Set Initial Variable Values
Program Loops Forever
Speed
100%
11:54:08
June 14, 2018

TOWARDS ROS FOR INDUSTRIAL APPLICATIONS

A reliable driver are just **one step** on the way of creating industrial grade technologies using ROS.

We need

- Easier general use
- Proper handling of the hard / soft real-time boundary
- Supporting more control in edge devices



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FEEDBACK AND BETA-TESTING

Your feedback are highly appreciated

Please contact us with feature-ideas or comments on the ROS interface.

and

We WILL be running a beta program, so sign-up if you are interested in testing and providing feedback.

For both, write ros@universal-robots.com

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THANKS!
DON’T FORGET TO SIGN UP
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