



METROLOGY SYMPOSIUM
DIGITALIZATION AND AUTOMATION IN MASS METROLOGY

Third Edition: Future and New Solutions



ČESKÝ
METROLOGICKÝ
INSTITUT

Robotic mass measurement stations



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Presenters

Why cooperating robots?

COOPERATING ROBOTS



Versatile



Mobile



Applicable in the laboratory



Tiny footprint



Easy to configure



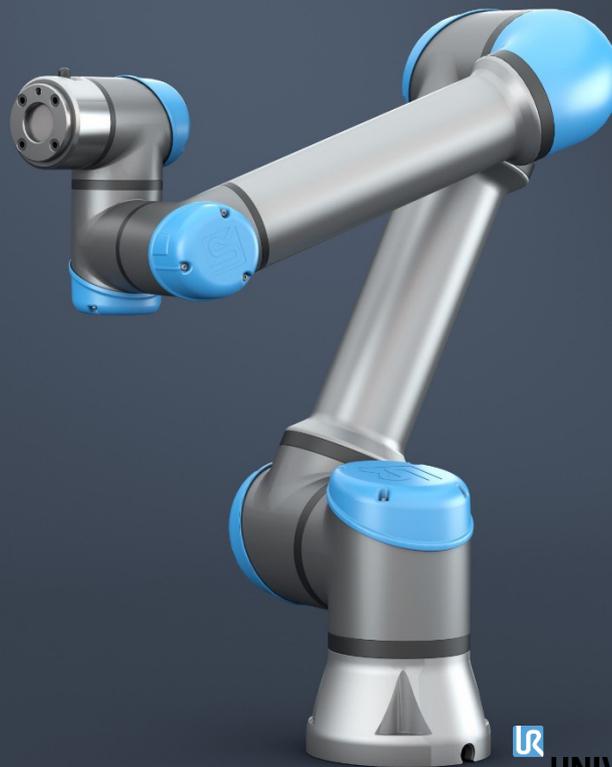
Hand-in-hand cooperation



Fast to implement

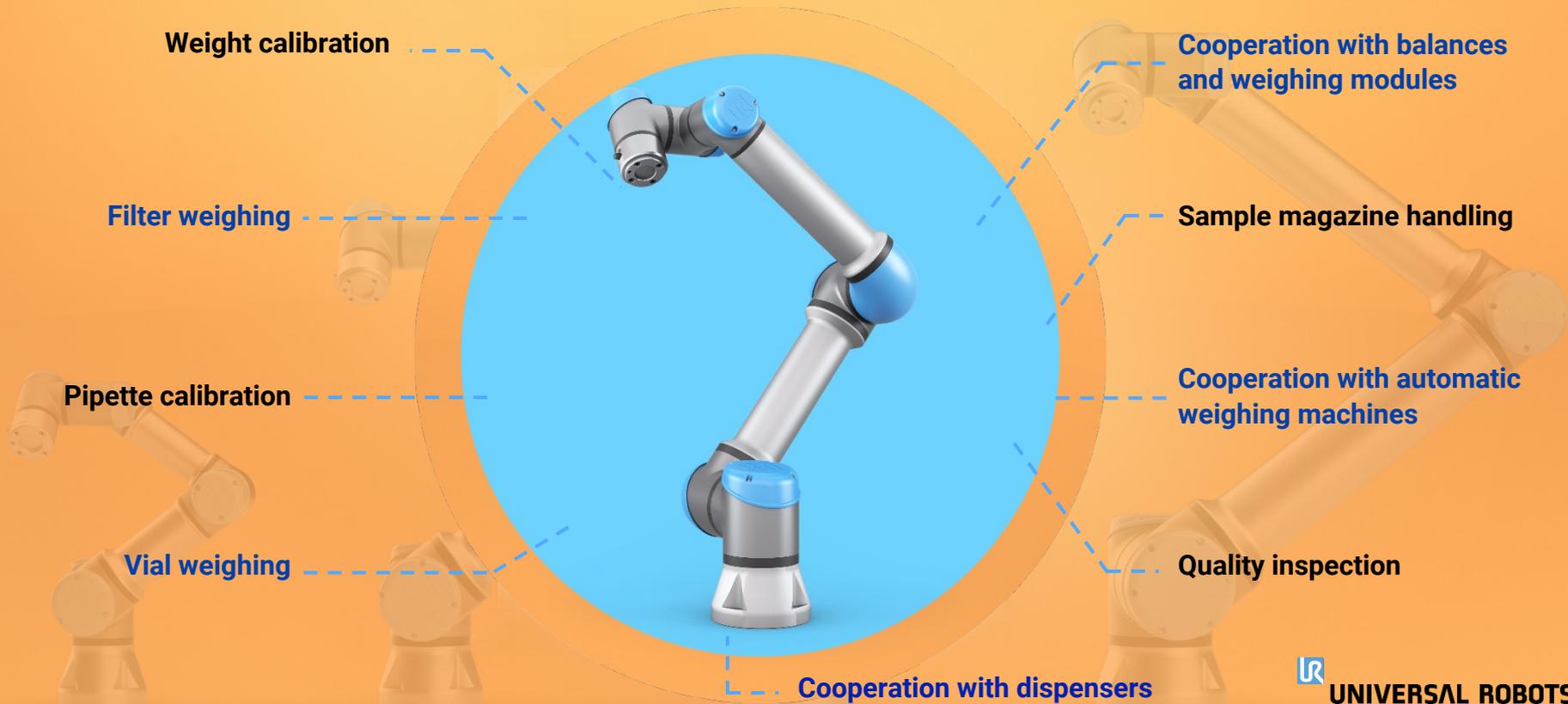


Cost-efficient

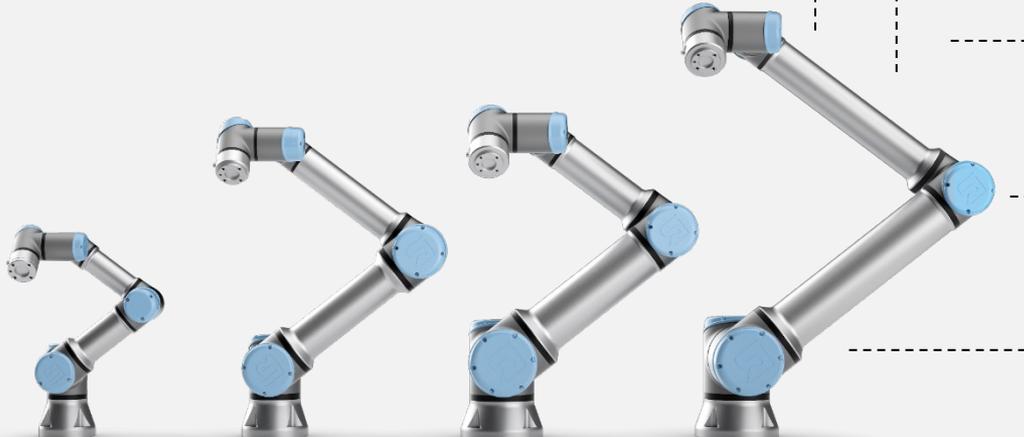


UNIVERSAL ROBOTS

Intended use



Basic parameters of UR robots

- 
- **Load capacity from 3 to 30 kg.**
 - **Reach from 50 to 175 cm.**
 - **Movement repeatability up to 0,03 mm.**
 - **Direct cooperation with operator.**
 - **Integrated with RADWAG terminals.**



Safe to operator



**Force and moment sensors
built into the flange**



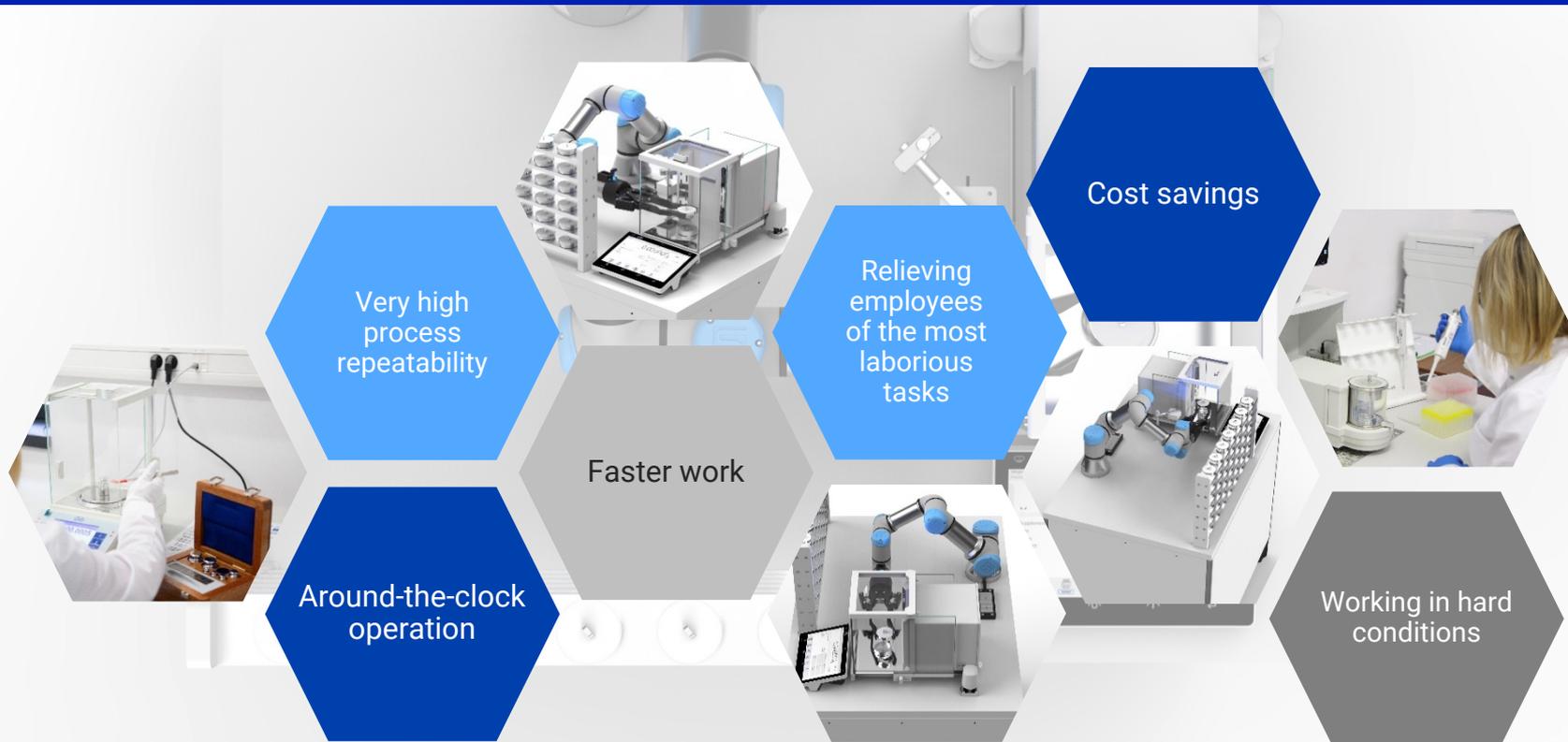
**Movement repeatability
+/- 0,03 - 0,05 mm**



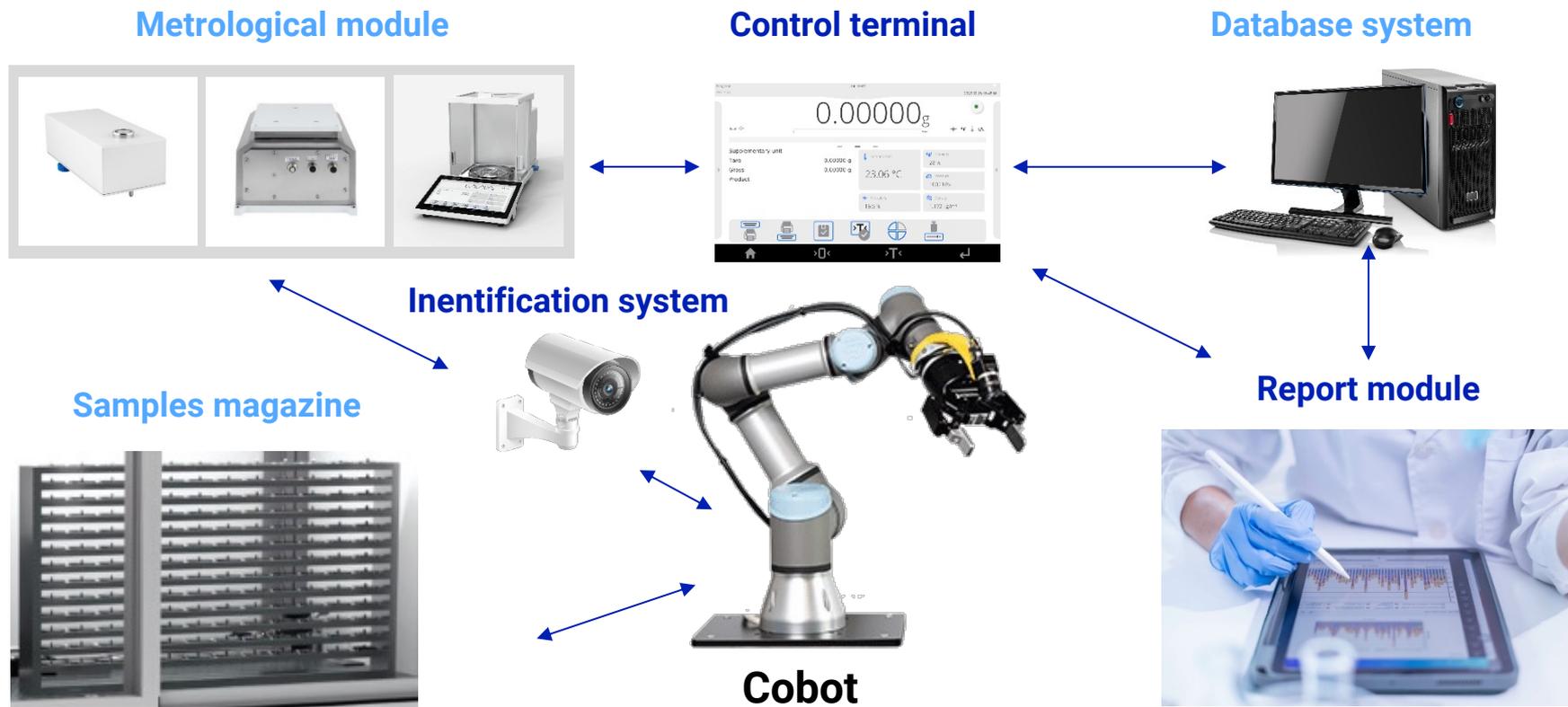
**17 certified safety
functions**



Benefits of robotisation of weighing applications



Operational procedure for the robotic measurement station



Implementations



The station for a 47-mm filter weighing robot



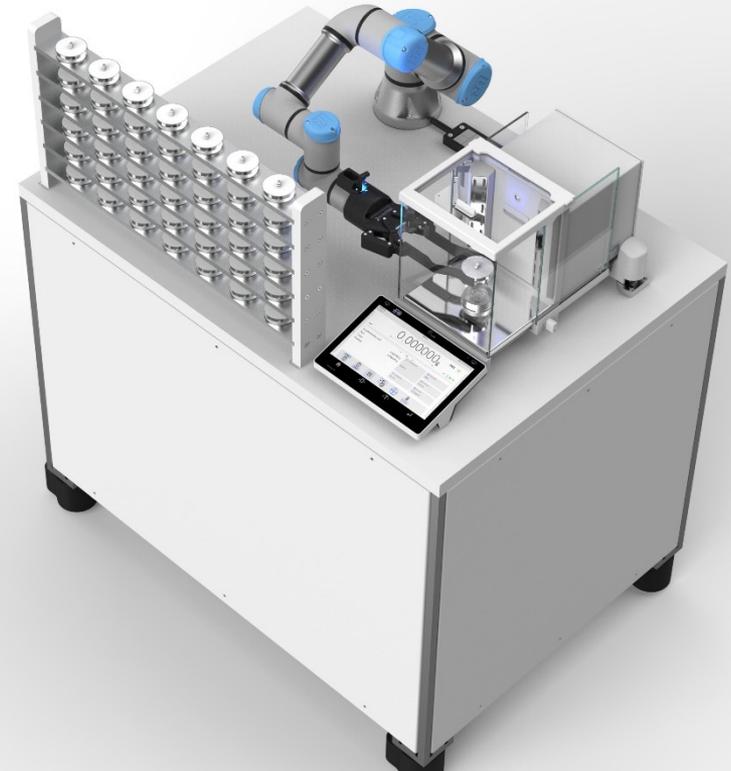
RW 5Y.F42 Robotic Weighing System

The station for a 47-mm filter weighing robot

RW 5Y.F42 Robotic Weighing System

Fully automated filter weighing system

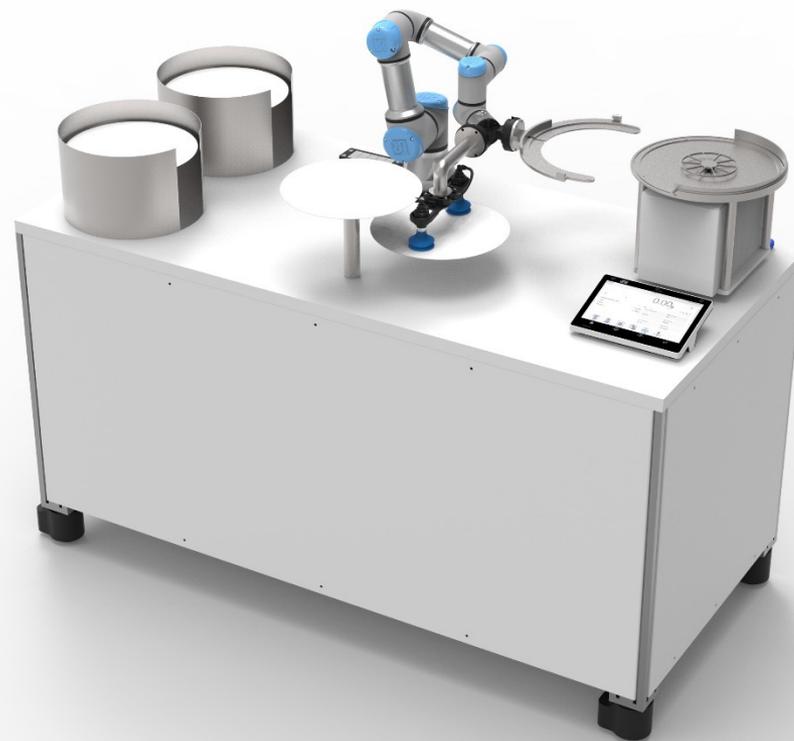
- Filters stored in cassettes marked with QR codes
- Automatic sample identification
- Excluding of human factor as the cause of measurement errors
- Managing the process thanks to RMCS Filter software
- Automatic data recording, ability to create reports and statistics
- 42 – up to 126 stock items
- 24 hours work
- High resolution balance Radwag XA 6.5Y.MA, $d = 1 \mu\text{g}$
- Compliance with OIML, EU, US requirements regarding mass measurement accuracy
- Can be used in tests related to the assessment of ambient air quality or when testing engines or components in the automotive industry
- Compliance with the EN 12341:2014 standard
- Ergonomics and flexibility of application



Robotic station for weighing discs with diameter of 300mm

RW 5Y.FQ Robotic Weighing System

- Capacity [Max] 210 g
- Readability [d] 0.01 mg
- Repeatability $sd = 20 \mu g$
- Sample diameter up to $\varnothing 300 \text{ mm}$



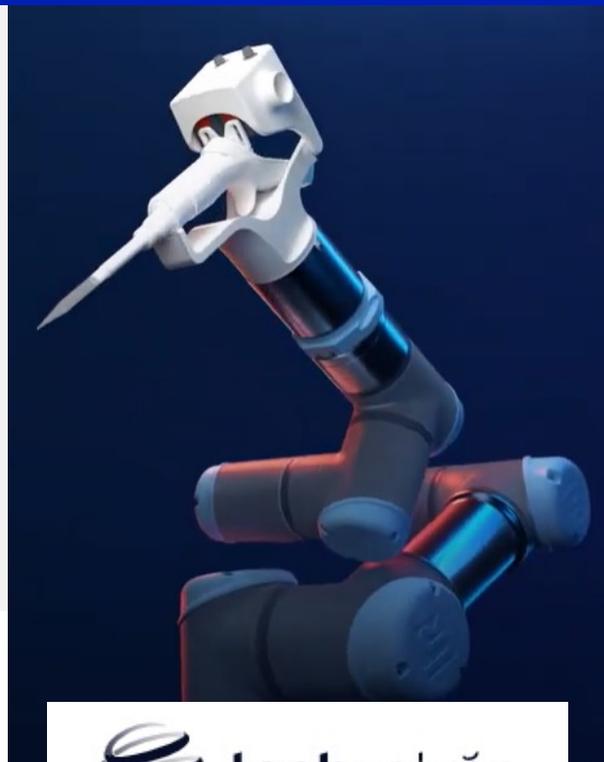
Liquids and powders dosing



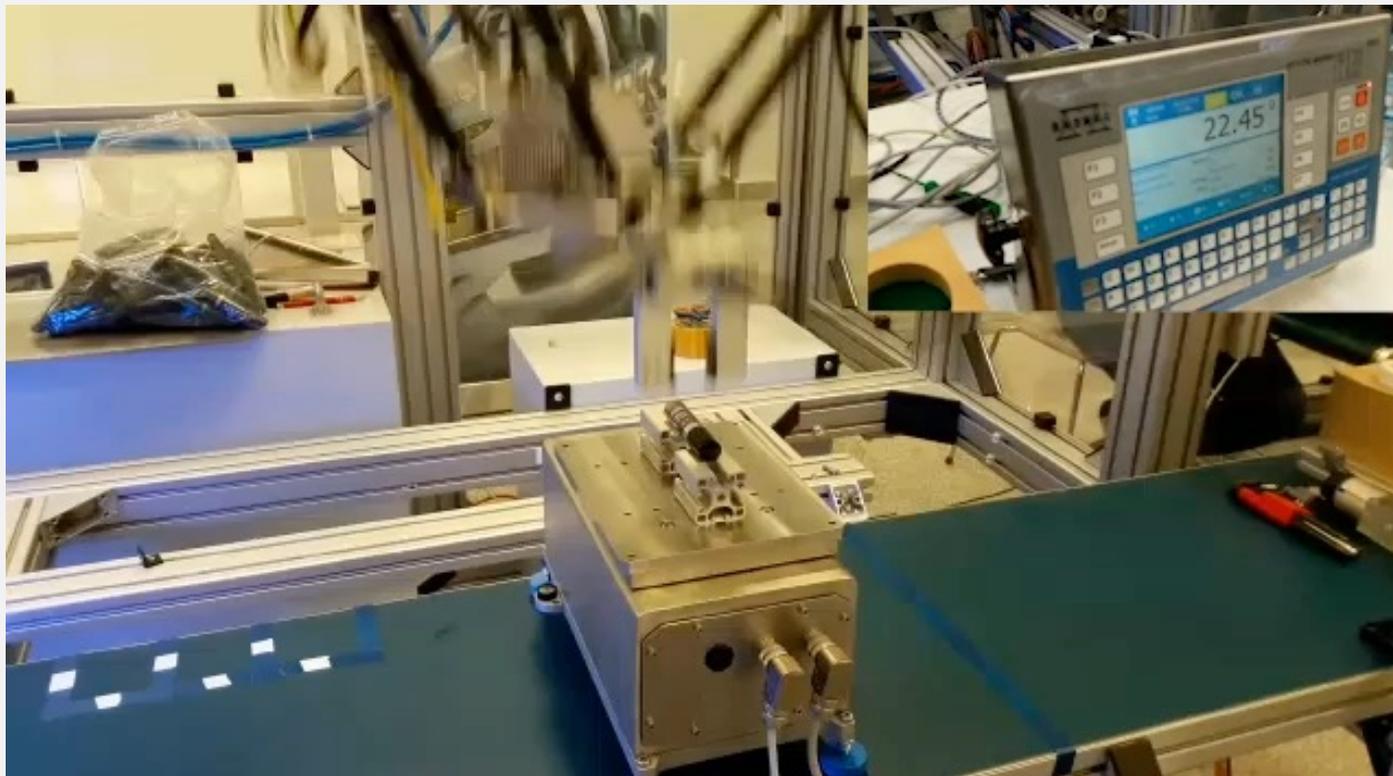
Adjustment and calibration of the pipettes



Automatic pipette calibration



Module weighing performance test Robot cooperation of the MWMH



XA 160.5Y Weighing module



- **Maximum capacity [Max] 210 g**
- **Readability [d] 0.01 mg**
- **Standard repeatability for 5% Max
sd = 0.005 mg (for sample of \varnothing 300 mm)**
- **Standard repeatability for Max sd = 0.020 mg
(for sample of \varnothing 300 mm)**
- **Weighing chamber size \varnothing 313×23 mm**

Module designed for weighing the flat elements of 300mm diameter

Laboratory weighing modules



MAS 82/220

[Max]: 82 / 220 g
[d]: 0,01 / 0,1 mg



MPS 2000

[Max]: 2000 g
[d]: 1 mg – 10 mg



MUYA 2

[Max]: 2,1 g
[d]: 0,1 µg

Industrial weighing modules



MWSH 6000

[Max]: **6000 g**
[d]: **0,01 g**



MWMH 1000

[Max]: **10 kg**
[d]: **0,1 g**



MWLH 35

[Max]: **35 kg**
[d]: **0,1 g**



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**Thank you for
your attention**

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