ACU – Basic product presentation
Air control unit

Why ACU and basic info

- **Weight:**
  - ACU 3,2 kg (7 pound)
  - PPRU 6,05 kg (13 pound)

- **Response time:**
  - ACU < 90 msec
  - PPRU > 130 msec

- **Reduced internal pressure drop**
  - ACU 1000 Nl/min: 1,2 bar
  - PPRU 1000 Nl/min: 3,4 bar

- **Mounted on robot arm**
  - **ACU** integrated in the rear part of the IRB 5500, which is the main reason for the improved response time, short distance to the atomizer

- **6 bar supply:**
  - More stable bell control with less air pressure needed
Air control unit
Basic layout

- Air inlet Shape 1 & 2
- Air inlet Turbine
- Air pressure sensors and venturi (p1-p2 & ΔP)
- Air out Shape 1
- Air out Shape 2
- Air out Turbine
Air Control Unit
Cross section
Air Control Unit

Working principle

Motor axis

Purged area

Supply pressure chamber

Membrane sealing

Valve opening
Air Control Unit
Flow Regulator

\[ Q = A_1 \frac{2 (p_1 - p_2)}{\sqrt{\rho \left( \frac{A_1}{A_2} \right)^2 - 1}} = A_2 \frac{2 (p_1 - p_2)}{\sqrt{\rho \left( 1 - \left( \frac{A_2}{A_1} \right)^2 \right)}} \]

\[ Q_v = K_v \sqrt{\frac{\Delta p}{\rho}} \]
Air control unit – Dynamic behavior
Paint material On / Off

2K Clear coat
40 mm Bell cup
Shape air inner 650 Nl/min
Shape air outer 650 Nl/min
Supply pressure 5,5 bar

Speed reduction with paint at (600 ml/min) less than 500 1/min (< 1 %)
Speed drop approximately 1 sec. \[t_1:1,2\text{ sec. } V_1: 500 \text{ rpm}\]
Air control unit – Dynamic behavior
Atomizer test

2K Clear coat
70 mm Bell cup
Inner shape 600 Nl/min
Outer shape 600 Nl/min
Paint flow 400 ml/min
Supply pressure 5,5 bar
Air control unit – Dynamic behavior

Atomizer test

2K Clear coat
40 mm Bell cup
Inner shape 650 Nl/min
Outer shape 650 Nl/min
Paint flow 600 ml/min
Supply pressure 5,5 bar

- 40000 1/min to 50000 1/min
  <1 sec to set point

- 50000 1/min to 60000 1/min
  <1 sec to set point

- 60000 1/min to 70000 1/min
  <1 sec to set point