

CyStir



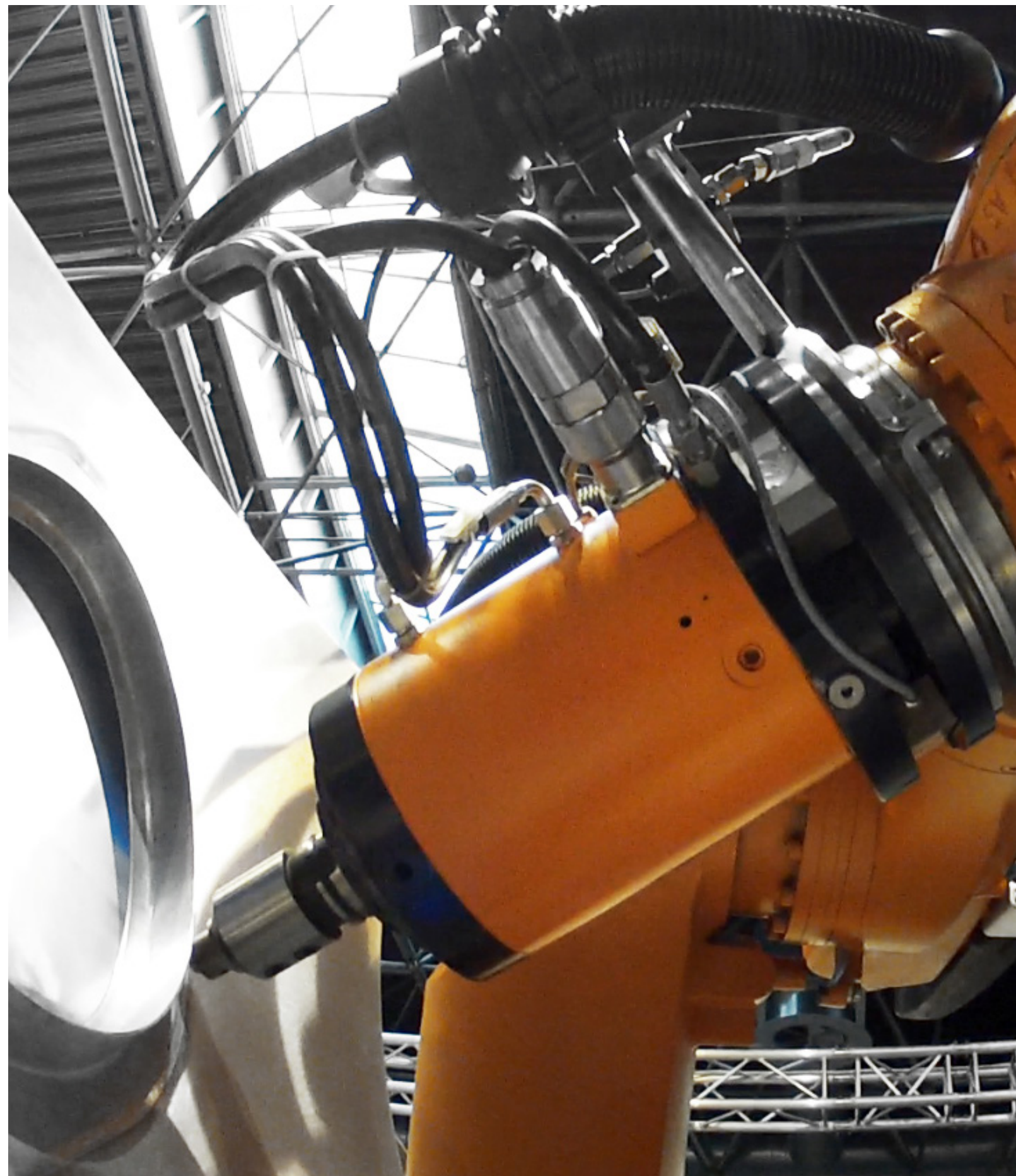
FRICTION STIR WELDING
COMPONENTS

COMPONENTS
PERFECTION



MADE IN GERMANY





Cytec technology inside for excellent friction stir welding

The Cystir motor spindle and the 2-axis welding head are specifically designed for friction stir welding to create a perfectly fused conjunction between similar and non-similar metals. As a result, the Cytec friction stir welding technology achieves a perfect state of plasticity and a strong conjunction between different materials.

Automation

As standard the friction stir welding spindles and heads are equipped with an automatic hydromechanical tool clamping system and Shear force transducer for force regulation during the welding process.

FLEXTOOL and **CyStir** motor spindle offers further automation and technology to close the seam when extending.

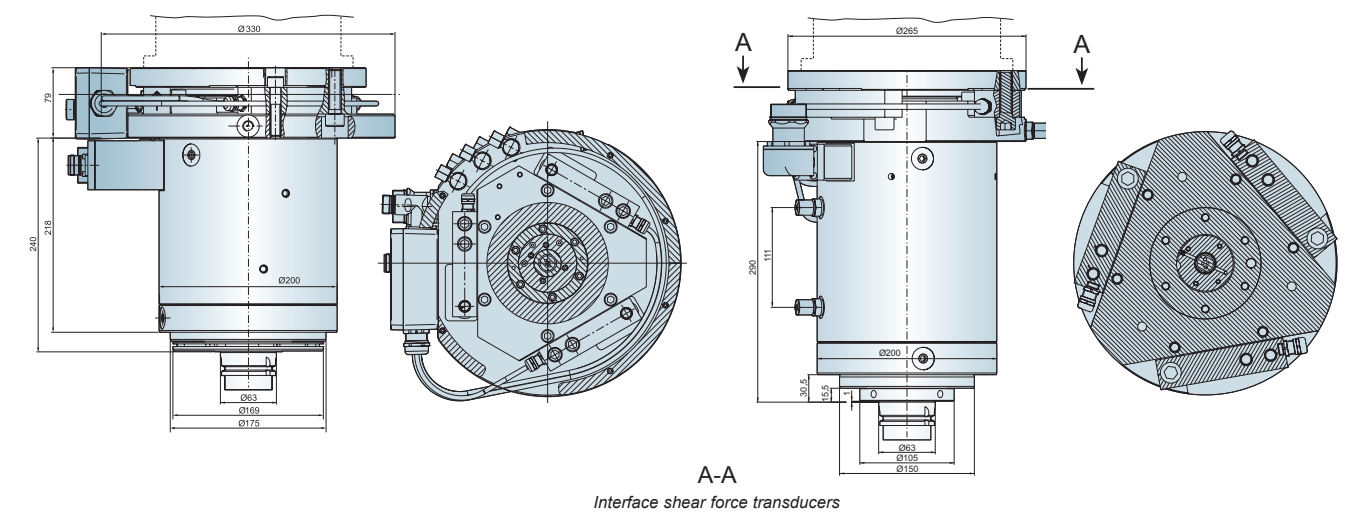
CYFRISCO TOOLS

Tool Pin retreat
Pin and shoulder rotating
Pin retreat

Moving shoulder tool
Pin and shoulder rotating
Pushing shoulder

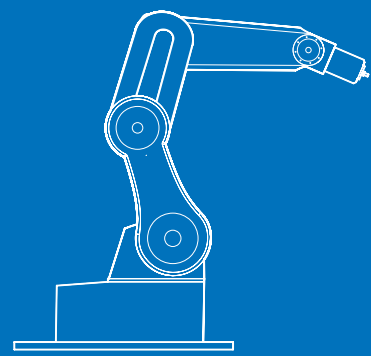


CyStir has developed the **CySpeed** motor spindle designed specifically for friction stir welding.



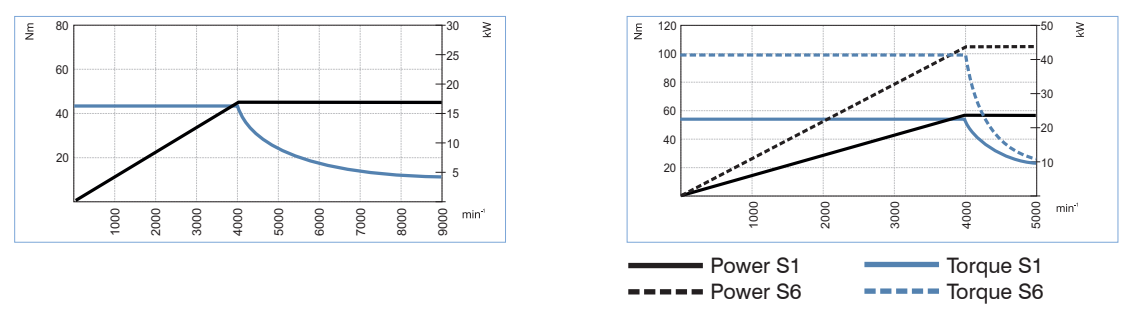
CyTec technology inside

- CYTEC SPINDLE COMPONENTS
- High torque Direct Drive motor
- Clamping technology with high precision
- Sensing for forced controlled production
- Cooling system for long life production
- Control System ready for any Robot and Machine



CyStir 17 kW CyStir 24 kW

Power:	17 kW (S1)	24 kW (S1)
Nom. speed:	4.000 r.p.m.	5.000 r.p.m.
Max. torque:	43 Nm (S1)	55 Nm (S1)
Max. speed:	9.000 r.p.m.	5.000 r.p.m.
Tool system:	HSK-E63	
Clamping system:	hydr. operated	
Clamping force:	12 kN/50 bar	
Clamping monitoring:	CyCon K 11	
Max. pressure:	120 bar	
Max. axial load:	15 kN	
Max. radial load:	5 kN	
Motor cooling:	Liquid coolant (Antifrogen N/Tyfocor)	





The 2 axis fork head incorporates the finest technology produced by CyTec.

Besides the powerful 42kW motor spindle with an HSK-A 100 tool-interface, the is equipped with 6 spherical arranged shear force transducers. These sensors are used to detect the radial and axial forces during the welding process.

The well-engineered CyTec FSW fork-head. Specially designed for gantry systems.

Allows to add optional devices within the control panel to monitor the welding process.

These devices can be for example:

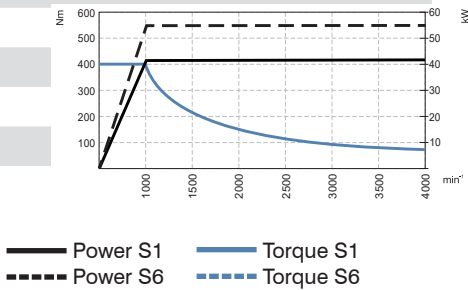
- Cameras
- Lasers
- Mechanical auxiliaries



Head	C-Axis	A-Axis Fork
Max. swivel torque:	5.100 Nm	8.100 Nm
Clamping torque:	14.000 Nm (50 - 70 bar)	12.000 Nm (50 - 70 bar)
Swivel angle:	+/-360° (option continuously)	+/-90°
Power dissipation:	5 kW (10 l/min)	
Positioning accuracy:	± 2"	± 2,5"

Drive

Power:	42 kW (S1)	53 kW (S6)
Nom. speed:	1000 r.p.m	
Max. torque:	400 (S1) Nm	510 (S6) Nm
Max. speed:	4000 r.p.m	
Tool system:	HSK A100	
Clamping system:	hydr. operated	
Clamping force:	40 kN /75 bar	
Clamping monitoring:	CyCon K11	
Max. pressure:	120 bar	
Max. axial load:	40 kN	
Max. radial load:	20 kN	



Characteristic spindle components

HSK-tool interface with positive locking hydromechanical tool clamping system

Spindle-torque motor, can be combined with all common control systems

pre-loaded hybrid bearings

Shear force transducer for force regulation during welding process

Rotary union for transmission of clamp- and release-hydraulic

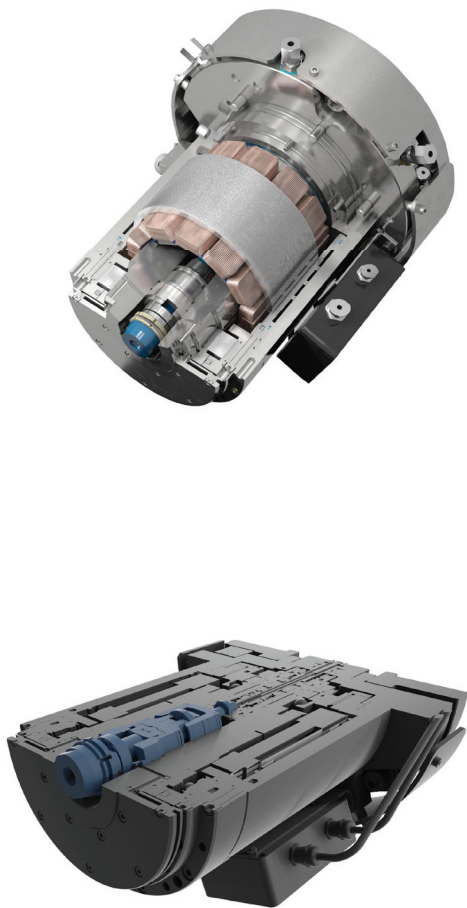
Clamping system & Control signal processing

Automatic Tool Clamping system

Cytec Friction stir welding spindles and heads are equipped with an automatic hydromechanical tool clamping system and shear force transducer for an optimal force regulation during the welding process. The Flextool and CyStir motor spindle offers further automation solutions to seal the weld seam.

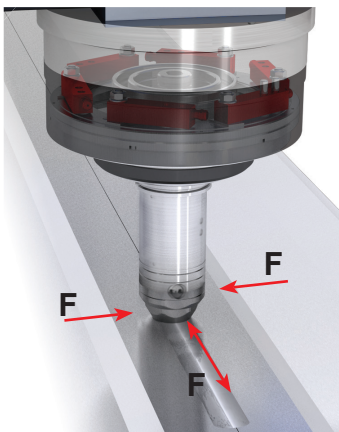
The tools are inserted either manually or by a pickup station into the tool interface.

The PLC triggers the hydraulic operation to lock the tool high clamping force. The tool clamping is controlled by an analog volume flowmeter combined with an electronic evaluation device integrated in the control cabinet.



Force regulation with shear force transducers

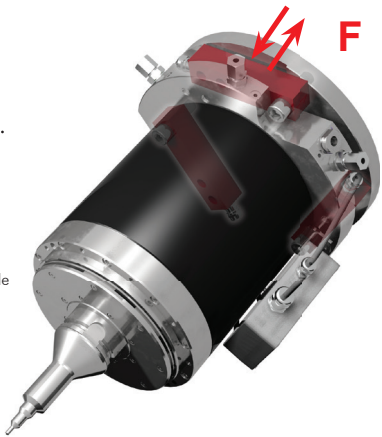
The force measurement is carried out by three shear force transducers which are arranged in tilt position by 120° each around the longitudinal axis. They detect any axial deflexion during welding over the full range of 360°. As a result in every situation a reliable and safe regulation of the processing force is guaranteed.



Shear force transducers (4-20mA analog), 6 pcs. and 3 pcs.

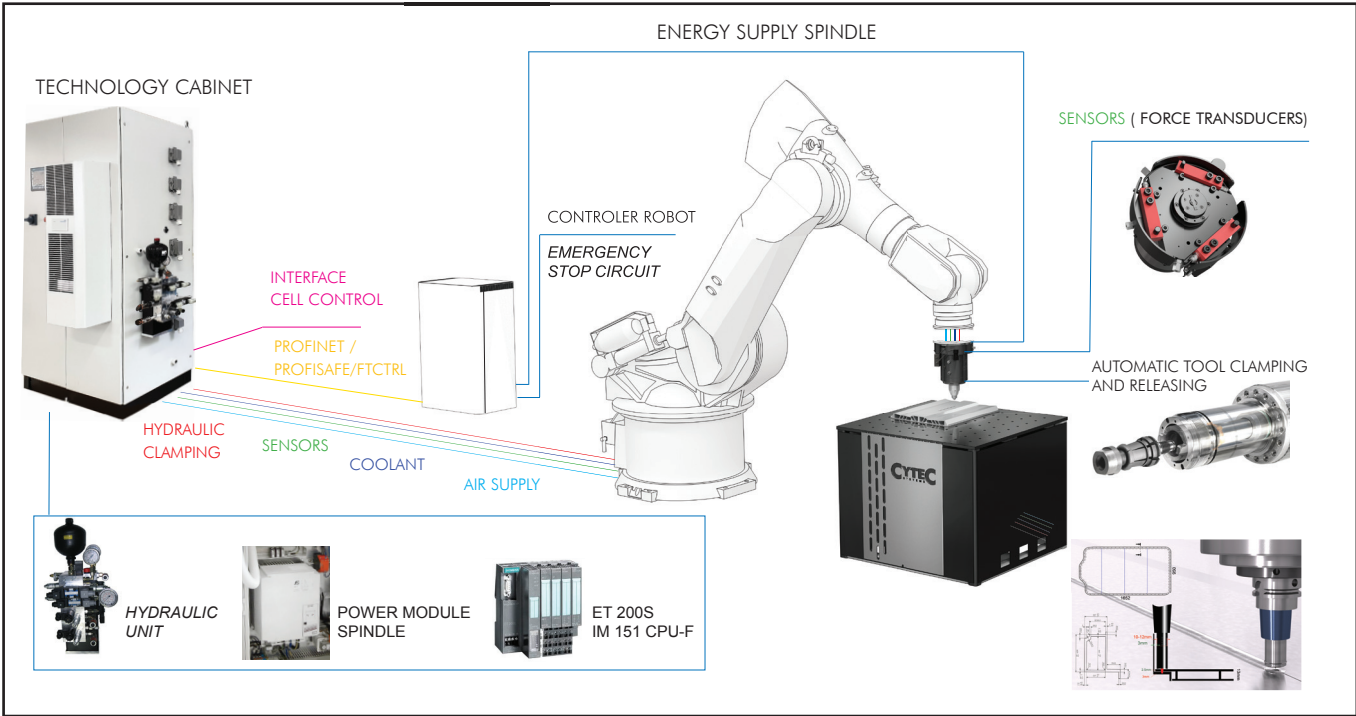
Evaluation electronic (Sum signal) Σ

6 force sensors as standard feature of the 2 axis FSW head
3 force sensors as standard feature of the robot FSW Spindle

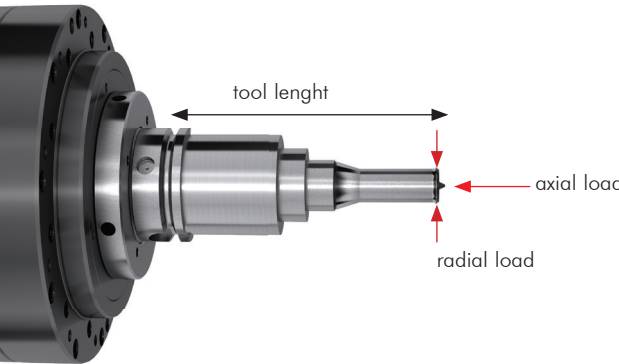


The zero point is adjusted to 12 mA so that a deflexion in both axial directions can be detected. For determination of the force that impacts the FSW-tool, the evaluation electronic reports a summation of all three sensor values.

So radial influences can be filtered out. As a result a purely axial value is available for the regulation of the pressing force.



FSW Tool	
Max. tool length:	250 mm
Axial load:	< 10.000 N
Radial load:	< 5.000 N
Tool length:	100 mm
Max. axial load:	< 40.000 N
Max. radial load:	< 20.000 N
Shear force transducers	
Nom. load:	20 kN
Accuracy:	0,1 % f. s.
Initial signal:	12 +/- 8 mA
Zero point:	12 mA

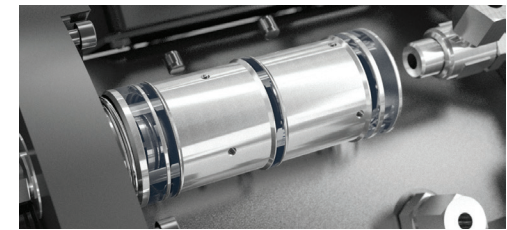


FLEXTOOL

High surface finish, less process force and heat, highly dynamic welding enabled by non-rotating tool shoulder separate retraction of the Pin or separate pushing shoulder.

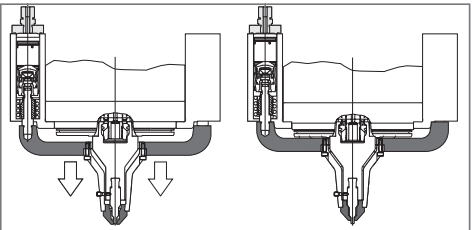
This special join process is more sensitive and a good alternative to great better surface finish. The friction pin rotates into the material. The non rotating shoulder gives a slight pressure to the welding surface. This process create less force and heat. This type of FSW tool is often used on thin workpieces. With the Flextool an axial shoulder compression at the end of the welding process is possible. During the shoulder stay on the surface the Pin returns from the material.

Mounting ring with feed and clamping units (3 pcs.)



Tool and pin

Axial moving shoulder



CyStir Robot Welding

FlexTool



FlexTool

Max. axial load:	15 kN
Max. radial load:	5 kN
Stroke feed:	6 mm
Preloaded spring force feed unit:	430 N
Max. clamping force of the clamping system:	3 x 11 kN
Max. clamping pressure of the clamping system:	70 bar
Weight tool pin:	1,2 kg
Weight moving shoulder:	8,2 kg
Total weight:	28,4 kg

CyFrisCo Tools

Tool Pin retreat
Pin and shoulder rotating
Pin retreat



Moving shoulder tool
Pin and shoulder rotating
Pushing shoulder





CYTEC WORLD WIDE

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