

TECHNICAL DATASHEET  
Friction Welding Machine

manufacturer	<b>KUKA</b>
type	<b>RS 12</b>
built	<b>2010</b>



**Working area**

Max. friction force	81 kN at 100 bar
Min. friction force	5,7 kN at 7 bar
Max. upsetting force	120 kN at 148 bar
Max. spindle speed	2.500 Min <sup>-1</sup>
Max. slide stroke	400 mm
Spindle drive power	147 kW
(frequency controlled three phase motor)	

**Electrical supply data**

Nominal voltage	400 V/50 Hz
Total connected load	250 kVA
Medium power requirement	50 kW
Medium power	250 A
Fuse	630 A slow
Cable cross section	240 mm <sup>2</sup>

## CNC control

### Electrical control:

- SIEMENS S7 - CPU 317-PN/DP (with Profibus and Ethernet)
- Control programmed in STEP 7 with GRAPH 7 step chains
- Hydraulic system: make REXROTH
- Main pump: make PARKER
- Spindle drive: make LENZE incl. inverter (147 kW)

### Basic equipment:

- Active TFT color display 12 inch
- Foil keyboard with full character set
- menu choice
- Display during monitoring. During the welding process, the actual values are both digital as well as analogue in curve display. This device allows a visual Control of the welding process of the machine and the monitoring device.
- Machine and monitoring values for 128 programs (additional programs on floppy disk possible)
- Interface for printer. All set machine parameters can be set with the printer, monitoring limit values and all actual values for each weld are recorded.
- All welds are identified by consecutive numbers. In addition, the Counter readings for good parts, rejected parts and aborted welding tests, too short or too long components are print out.
- Single cell printout and/or curve printout
- Storage of the actual values of the last 16 parts
- Floppy disk drive for archiving the 128 welding programs per disk
- Printout of the program overview of all 128 programs
- Printout of the message buffer (last 200 messages)

### Expansion stages:

- fault diagnosis
- User administration, freely definable access rights for 2 key switches and other users via password
- Database archiving - all program and actual value data can be archived in a scalable Access database (local or network)
- Computer coupling - coupling of the PCD 314 to a third-party computer via serial interface or network card

### Control unit:

- Panel PC 677B with step chain diagnosis
- The Panel PC 677B can be used to switch between the PCD surface and machine visualization.
- With the aid of the standard software WinCC-flexible and ProAgent, the current status of the individual machine sequence program is displayed on the monitor of the operating unit. This simplifies a fault diagnosis in case of an emergency stop.

### Remote diagnosis:

- The machine is equipped for remote diagnosis of PLC and PCD.
- A telephone line from the customer is required.

### Safety features:

- in accordance with EC Machinery Directive, Declaration of Conformity CE.
- Saving the process data

### Camless slide control

Die Maschine besitzt einen numerisch gesteuerten hydraulischen Schlittenvorschub. Über leistungsfähige Reglerstrukturen und –algorithmen erfolgt die Positionier-, Geschwindigkeits- und Druckregelung, die ein optimales und reproduzierbares Fahrverhalten gewährleisten.

The machine owns a numerically controlled hydraulic slide feed. Powerful controller structures and algorithms are used to control positioning, speed and pressure control that ensure optimum and reproducible driving performance.

The numerical slide control is in such a way integrated into the control system of the friction welding machine. so that it is easy for the user to operate.

All parameters relating to the welding process are integrated in the user interface of the PCD system as welding program parameters.

Advantages:

- Very simple parameterization of the slide feed rate
- when converting the machine to a different workpiece, no manual adjustments are necessary with regard to the slide control
- all setting values relating to the slide control are stored together with all other welding parameters in the data record of the welding program and are thus automatically documented and archived.
- considerably more precise than conventional cam control and jerk-free sled travel

### KUKA parameter monitoring system

This system serves to monitor the welding parameters on friction welding machines and, together with conventional testing methods, is an instrument for ensuring the quality of production to a high degree.

The PCD 314 consists of a PC-based real-time system and a SIEMENS Panel PC for displaying the user interface.

The panel PC is also used for machine operation. The user interface is based on the "Windows XP" operating system.

Control and monitoring of welding parameters during the welding process (sampling rate <1 ms) in basic configuration, including:

- Measuring transducer
- power supply
- Connection with the machine control system
- Printer interface for documentation of welding data.

The following tolerance limits are freely adjustable:

- max. and min. common relative output length, the so-called output position of the two components in 0.01 mm
- max. and min. spindle speed during the friction phase in min<sup>-1</sup>
- max. and min. friction pressure during the friction phase in bar
- max. and min. friction stroke (friction reduction) at the end of the friction phase in 0.01 mm
- max. and min. time of the friction phase in 0.001 sec
- max. and min. upset pressure during the upsetting phase in bar
- max. and min. total reduction after welding in 0.01 mm
- Brake phase monitoring (time and average pressure)
- if necessary max. and min. angular position after positioned friction welding
- max. and min. common relative end length, the so-called end position in 0.01 mm

Together with the parameter monitoring system PCD 314, the programmable logic controller enables the control and monitoring of complex production tasks for friction welding machines. Programming and storage of production sequences is simplified. Machine and component-related actual values can easily be called up, checked and printed out. This means that different welds can be reproduced as often and accurately as required.

### Clamping tools rotary - fixed

Collet chuck for the rotating part in special design for max. shaft length 160 mm at max. diameter 28 mm

Special clamping block with centering movement for the fixed part, designed for diameters 32 - 70 mm, head length max. 40 mm

### Equipment, accessories

- KUKA friction welding machine RS 12 - short version
- Machine control with electrical cabinet
- Control unit Panel PC 677B with step chain diagnosis
- Parameter monitoring device PCD 314
- remote diagnosis
- Camless slide control
- Clamping tools rotary - fixed
- safety device
- Automatically operated control door
- Heating for the hydraulic system
- fluid grease lubrication
- Scanner integrated in RS 12
- Special drive 147 kW
- CE declaration of conformity

The cooling of the main motor as well as the switch cabinet was carried out by decentralized service water cooling and must be ensured by a new cold water chiller if necessary.