

# Welding Force Calibration Transmitter

Type 9831D...

## System for measuring electrode forces in resistance spot welding

The Kistler Type 9831D... with IO-Link technology is the smart measuring system for testing and calibration of electrode forces for spot welding guns and machines. It combines analogue and digital communication technology for connection to PLC and conventional systems.

Most important performance features at a glance:

- Fast analog operation with 6.25 kHz bandwidth
- Fast IO-Link operation at COM 3
- High repetition accuracy
- Interchangeable inserts to fit different electrode shapes and diameters incl. quick-mount adapters
- Min. electrode distance of only 3 mm
- Mass-insulated design for highest safety standards
- Device status LED
- Invertible reset/operate pin mode

IO-Link features:

- Flexible low-pass and applicable high-pass filter
- Device core temperature sensor
- Welding current/voltage detection (Trigger 1)

### Description

The Type 9831D Welding Force Calibration transmitter measures the electrode forces and provides measurement data to the customer system in two different operation modes:

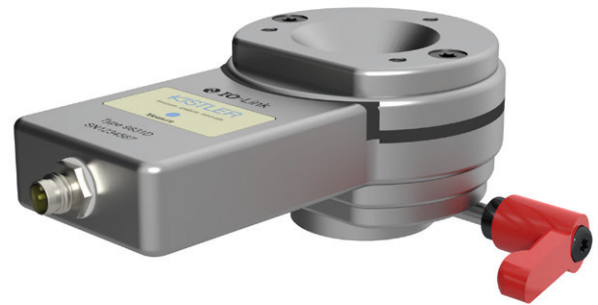
- Analog/Discrete operation
- IO-Link operation

### Application

Resistance spot welding guns and machines

- Commissioning
- Process analysis
- Optimization of processes and cycle times
- Calibration and servicing according ISO 9001

In Analog Mode, the transmitter behaves just as well-known analog charge amplifiers, where reset/operate control is carried out using the digital input pin. Configuration can be done using the IO-Link Interface before final analog installation.



### Technical data

#### Welding Force Transmitter

Measuring range	kN	0 ... 10
Overload	kN	12
Nominal sensitivity (analog) <sup>1</sup>	mV/N	1 ±0,5%
Linearity <sup>1</sup>	% FSO	±1
Max. output voltage range	VDC	±10.3
Reset operate (Default active low)	VDC	<10

#### IO-Link

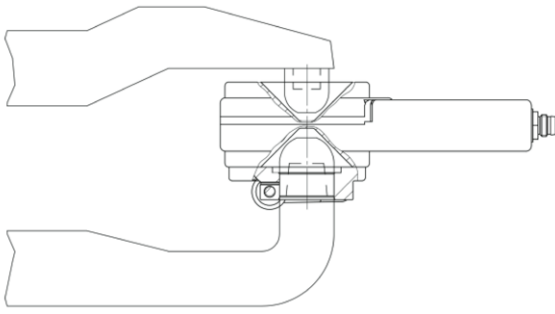
Min. cycle time (Standard Sensor Profile 4.3.1.)	µs	600
Supported data rates		
COM3	kBaud	230.4
Control voltage <sup>2</sup>		
High	VDC	>12 ... 30
Low	VDC	<10 (or open/n.c.)
Pull-down resistor	Ohms	100k ... 250k

#### Data acquisition

ADC Resolution	Bit	16
Group delay analog signal path (AF-ADC-DAC-AAF)	µs	<90
Low pass filter 2 <sup>nd</sup> Ord. (Type Bessel) cut-off frequency (-3 dB)	Hz	1...6 250 in steps 1/2/5/10 per decade Filter Off = 6 250

<sup>1</sup> Measured @23°C with standard test electrode according to ISO 5821 type F, Ø 16 mm.

<sup>2</sup> Operate signal set to «low active» per default, backwards compatibility to Kistler Type Z21747-1.



### Application

In IO-Link Mode, all communication, configuration and user data is transmitted via the IO-Link Interface, making the device easily applicable for machine and equipment builders. No additional software is required but the already known programming interface of the machine control system, or specific IO-Link Masters used.

Integration into the control environment is carried out as with any other IO-Link device using an IO-Link Master interface by loading the IODD file provided by Kistler.

### Installation

To mount the transmitter, following options are available:

- Quick-Mount adapter with tensioning feature incl. reduction sleeves
- Quick-Mount plastic adapters
- Stationary holder with rubber buffers
- 2x M6-threads located on the housing bottom

For handling purposes an optional retrofit handle is available:



### Safety Warning:

The optionally available **Handle** is **only** to be used **for transport**. During electrode-force measurements, personnel shall be in the safety zone, i.e. outside robotic or machine enclosures for example, to avoid serious injuries.

### Technical data (continuation)

#### Group delay (incl. low-pass filter)

LP= Off (6 250 Hz)	ms	<90
LP= 5 000 Hz	ms	<0.15
LP= 1 000 Hz	ms	<0.25

#### Power supply

Supply voltage	VDC	18 ... 30
Power consumption at 24 V	mA	<50
Overvoltage resistance 40 ms/max	V	55
Galvanic isolation from measuring circuit and digital inputs typ. (not safety relevant)	VDC	50

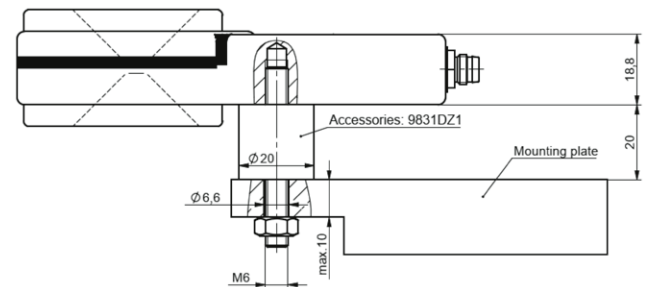
#### Switching signal (Weld signal)

Output (Cyclic Process Data)	PD In	Bit 4
Max. permissible voltage between sensor bottom and top (supply voltage)	VDC	9
	Veff	10
Switching threshold "on"	VDC	>3.0
Switching threshold "off"	VDC	<2.5
Delay (weld signal until set bit)	ms	0.6

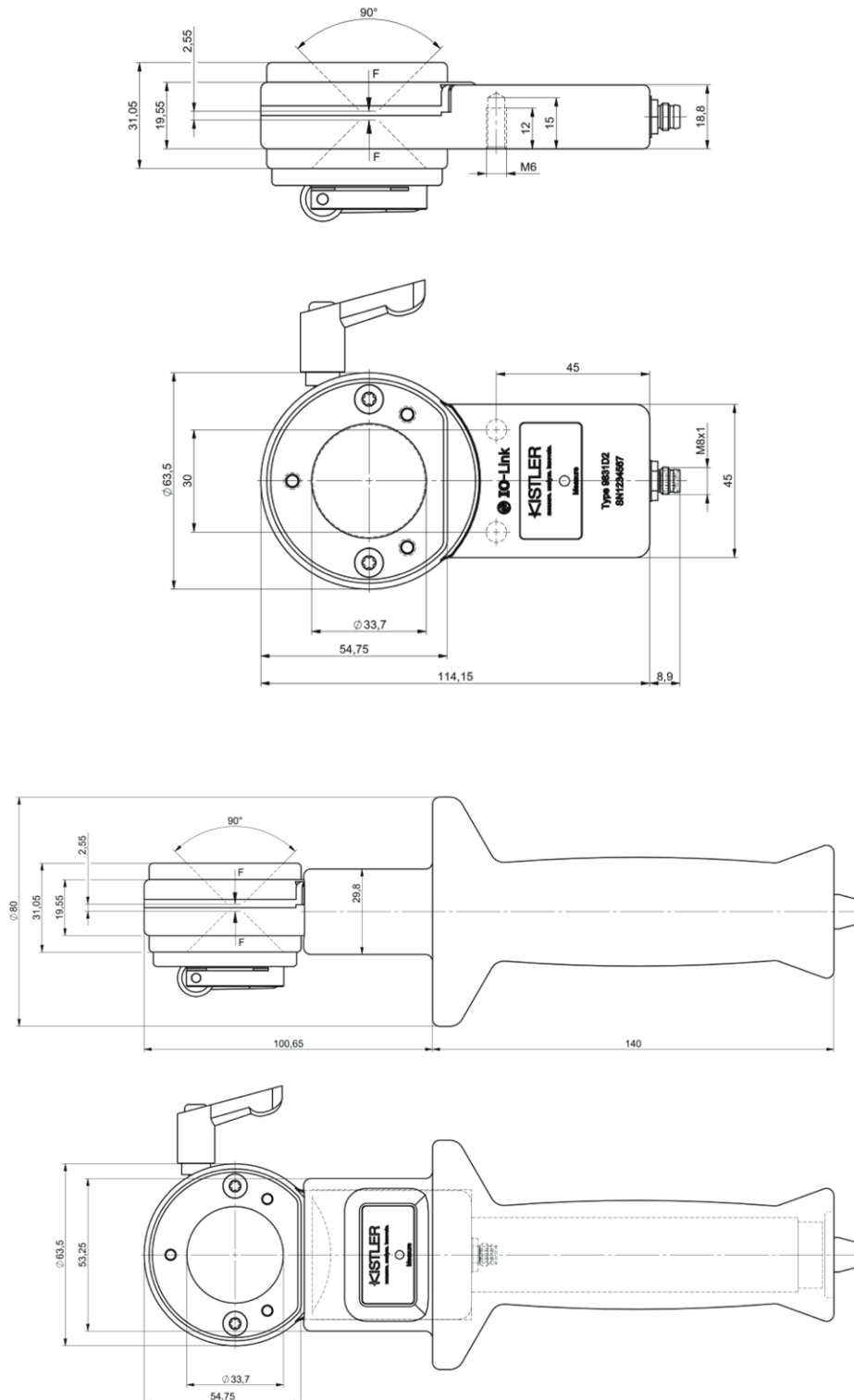
#### General data

Operating temperature range	°C	0 ... 60
Weight	g	765 ±5%

### Stationary holder



**Dimensions**



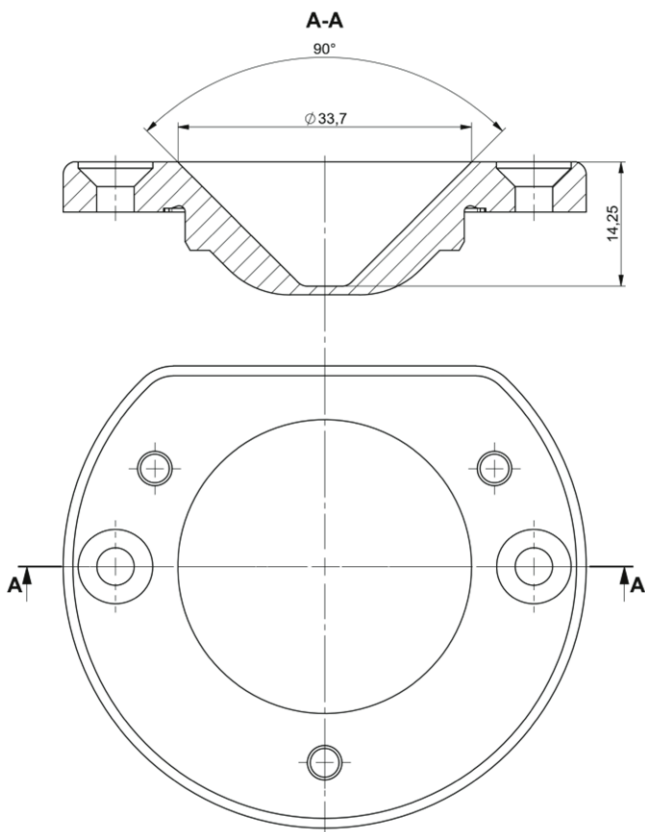
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## Electrode Inserts

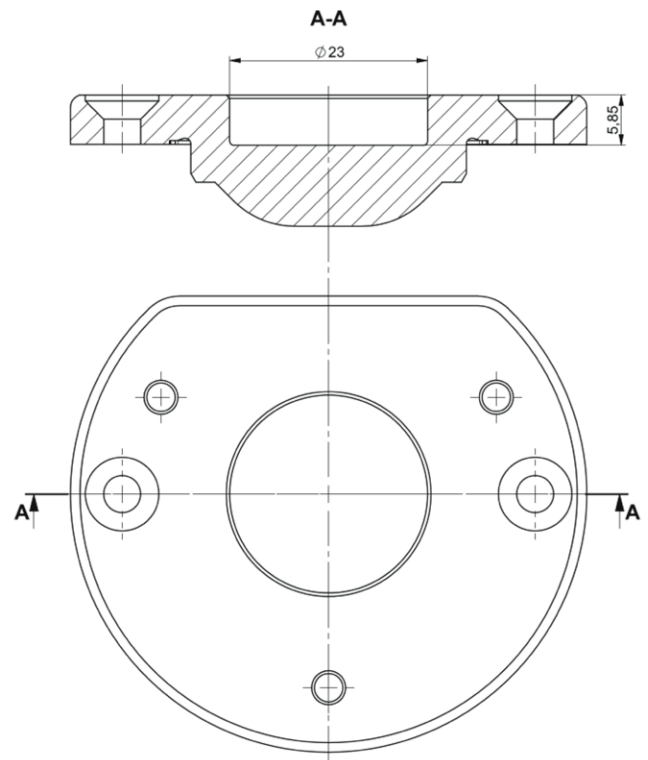
The welding force sensor is equipped with 2 electrode inserts. The design of the welding force sensor makes it very easy to change the electrode inserts. When inserts of the same type are replaced, measuring accuracy is unaffected. If a change is made to a different type of electrode insert, for which the




welding force sensor has not been calibrated, the sensitivity will vary within a range of  $\pm 2$  %. The recalibration of the sensor to a new type of electrode insert, (a service offered by Kistler) improves the accuracy to the value for the measuring range stated in the table under "Technical Data".

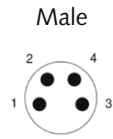
Mat. No.: 55156497



Mat. No.: 55171001



LED	Indication
	Reset: blue blinking (1 Hz)
	Operate: blue
	Overload: red

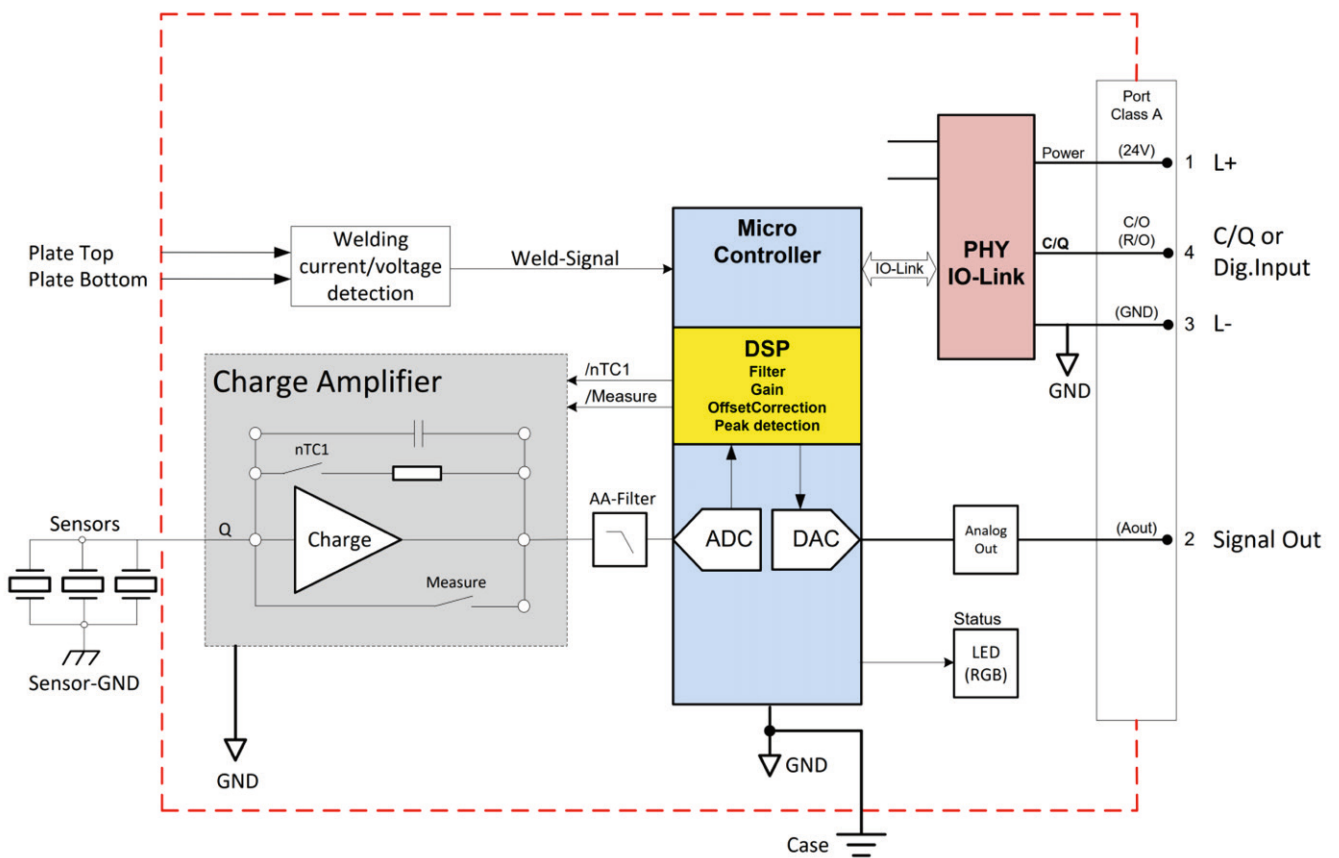


Pin	Function
1	L+ Power Supply Us, +24V
2	Analog Signal Output +/-10V
3	L- Power Supply GND / Signal GND
4	C/Q IO-Link Communication or digital Input : Operate

Table 1: LED codes

Table 2: Transmitter pinout

### Block diagram



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### Cyclic process data

PD In (Device to Master) bit 48  
Process Data Input structure:  
Measurement value (IntT32)  
Vendor specific. (16 bit)

PD Out (Master to Device) bit 8  
Process Data Output structure:  
Vendor specific. (bit 1-7) | Disable (bit 0)

Name	Data Type	Length (Byte)
Measurement Value	Float32T (Fraction32bit   Exp.8bit   Sign1bit)	4
Vendor Specific	Bitfield 0. Operate (Bit 0) 1. Overload (Bit 1) 2. Switch Point 1 (Bit 2) 3. Switch Point 2 (Bit 3) 4. Trigger1 (Bit 4) (Welding Signal) 5. Service calibration (Bit 5) (future option) 6. ... 15. Reserved (Bit 6 ... 15)	2

Name	Data Type	Length (Byte)
Control	Bitfield 1. Reset (Disable) 2. Vendor Specific 3. Vendor Specific 4. Vendor Specific 5. Vendor Specific 6. Vendor Specific 7. Vendor Specific 8. Vendor Specific	1

### Acyclic User and Configuration Data

Parameter-Name	Parameter Type			Default	IO-Link Index
User Sensitivity	Float (Fraction32bit   Exp.8bit   Sign1bit)	byte	4	3.6	index: 256
User Range	Float (Fraction32bit   Exp.8bit   Sign1bit)	byte	4	10000	index: 257
Switch Point 1 Level	Float (Fraction32bit   Exp.8bit   Sign1bit)	byte	4	0	index: 258
Switch Point 2 Level	Float (Fraction32bit   Exp.8bit   Sign1bit)	byte	4	– User Range Default	index: 259
Switch Point Mode	UIntegerT8	byte	1	0	index: 260
Operating Hours (ro)	UIntegerT16	byte	2	–	index: 261
Low-Pass Filter	UIntegerT8	byte	1	0 – Deactivated	index: 262
Time Constant	UIntegerT8	byte	1	0 – Deactivated	index: 263
Temperature Case Actual (ro)	Float (Fraction32bit   Exp.8bit   Sign1bit)	byte	4	–	index: 264
Temperature Case +Max (ro)	Float (Fraction32bit   Exp.8bit   Sign1bit)	byte	4	–	index: 265
Temperature Case -Max (ro)	Float (Fraction32bit   Exp.8bit   Sign1bit)	byte	4	–	index: 266
Measure High or Low Active	UIntegerT8	byte	1	0	index: 267
Switch Point Hysteresis	Float (Fraction32bit   Exp.8bit   Sign1bit)	byte	4	0	index: 268
Product Type (ro)	Ostring	byte	15	–	index: 269
Calibration Date (ro)	Ostring	byte	15	–	index: 270
Units	UIntegerT8	byte	1	N	index: 271
Range Analog Output	Float (Fraction32bit   Exp.8bit   Sign1bit)	byte	4	10	index: 272
Reset to Measure Jump Correction	UIntegerT8	byte	1	0 – Deactivated	index: 273
Corresponding Output Voltage (ro)	Float (Fraction32bit   Exp.8bit   Sign1bit)	byte	4	–	index: 274

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Included accessories	Type/Mat. No.	No.
Transport Case	55256782	1
Cable M8 4p to M12 4p L=2m	55246156	2
Mounting Adapters		
• Ø20, 0°, short	55171190	3
• Ø16, 0°, short	55171195	4
• Ø13, 0°, short	55181082	5
Quick-Mount Adapter Ø20 incl. Reduction Sleeves	55170946	6
• Ø16	55171099	7
• Ø13	55181080	8
Electrode Insert		
• flat	55171001	9
Allen key FUTURO Torx T20, L=57mm	65007981	10

Optional accessories	Type/Mat. No.	No.
Stationary holder	9831DZ1	
Plastic Handle with Cable Kink Protection	9831DZ2	11

### Ordering key

#### Calibrated measure range

10 kN / 1 000 daN

Type 9831D

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