

## Press Force Transmitter

Type 9337A...

0 ... 2 kN to 0 ... 70 kN

This robust universal transmitter with integral fully digital charge amplifier is ideal for measuring dynamic and quasistatic forces on stationary or moving machinery parts.

Its industrial design with a high degree of protection and careful fabrication allow use in extremely dirty and wet environments.

- Compact force sensor ready for easy integration into connecting rods or press punches
- Force measurement from 0 ... 2 kN to 0 ... 70 kN with one and the same sensor
- Two precalibrated measuring ranges (0 ... 50 kN/0 ... 5 kN) allow immediate use for measurement
- Option of custom calibration
- Measuring ranges switchable via digital input (24 V) or RS-232C, even under load
- Individual configuration of parameters and setting of measuring range<sup>1)</sup> possible via serial interface
- Offset voltage of output signal adjustable
- Low-resistance 10 V voltage output thanks to integral charge amplifier
- Suitable as reference sensor for force calibration of existing measuring chains
- Versatile adaptation to suit user's mounting conditions (using double flange)
- Robust industrial design (IP67)

### Description

The press force transmitter is a sensor that has been scaled and calibrated in two ranges for measuring compression forces. The forces acting on the sensor generate in its piezoelectric element a proportional electric charge, which is converted by the integral electronics into an analog voltage signal. A suitable control signal or command can be used to switch between the two independent measuring ranges.

Measurement signal, range switching, communications interface and excitation are controlled via a single cable. The amplifier parameters are fully configured via the integral serial interface. For test purposes measurement data can also be transmitted serially.



Top and bottom flanges lend versatility by easily allowing direct mounting, for example in press punches. If this is not possible, custom adapters can be used. A centering seat at both ends allows very accurate coaxial mounting.

### Applications

- Direct measurement of dynamic and quasistatic compression forces on presses and joining systems
- Measurement of feed and pressing forces
- Recording of force curves involved in product testing
- Use as reference sensor to, for example, perform in-situ calibration of force and strain sensors mounted in a machine structure

<sup>1)</sup> Can be changed via RS-232C with PC program ManuWare

## Technical Data

### Sensor

Measuring ranges <sup>1)</sup> possible from	kN	0 ... 2
to	kN	0 ... 70
Measuring ranges preset and calibrated in factory (standard)		
Measuring range I	kN	0 ... 50
Measuring range II	kN	0 ... 5
Nominal sensitivity (FSO = 10 V)		
Measuring range I (50 kN)	V/kN	≈0,2
Measuring range II (5 kN)	V/kN	≈2
Mechanical overload capacity	kN	-20/75
Shear load $F_{x,y}$ max.		
at $F_z = 50$ kN	kN	12
at $F_z = 0$ kN	kN	4
Bending moment $M_{x,y}$ max.		
at $F_z = 50$ kN	N·m	15
at $F_z = 0$ kN	N·m	160
Torque $M_z$ max.		
at $F_z = 50$ kN	N·m	25
at $F_z = 0$ kN	N·m	30

### Mechanical Properties

Rigidity $C_z$	N/ $\mu$ m	≈2 340
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### Output

Output voltage <sup>1)</sup> FS	V	0 ... 10
Output voltage limit <sup>4)</sup>	V	-10,5 ... 10,5
Linearity	%/FSO	≤±0,5
Current	mA	<±1
Output resistance	$\Omega$	≈10
Noise (0,1 ... 1 MHz)	mV <sub>pp</sub>	<30
Measure jump	mV	<±25
Frequency range (-3 dB)	kHz	≈0 ... 1
Drift, at 20 °C (FSO 10 V)		
at $F_z = 50$ kN	mV/s	0,004
at $F_z = 5$ kN	mV/s	0,04
Offset voltage <sup>1)</sup> selectable between	V	0 ... 9
Resolution	mV	±5

### Control Signals

Control voltage (high)	VDC	2,4 ... 30
Current consumption	mA	<±1
Reset/Measure switching (pin 3)		
Measure	V	0 ... 0,6
Reset	V	2,4 ... 30
Measuring range I/II switching (pin 5)		
Measuring range I (selected with pin open-circuited)	V	2,4 ... 30
Measuring range II	V	0 ... 0,6

### RS-232C serial interface

EIA standard		RS-232C
Baud rate	bps	115 200
Data bits		8
Stop bits		1
Parity		none
Software handshake		no
Max. cable length	m	5

### General Technical Data

Excitation voltage (Exct)	VDC	18 ... 30
Excitation current (no load)	mA	<70
Operating temperature range	°C	-10 ... 70
Storage temperature range	°C	-20 ... 80
Weight (without cable)	g	≈520
Degree of protection (DIN40050) <sup>2)</sup>		IP67
Connector <sup>3)</sup>		M12x1 8-way, shielded

<sup>1)</sup> Can be changed via RS-232C with PC program ManuWare

<sup>2)</sup> With connected cable

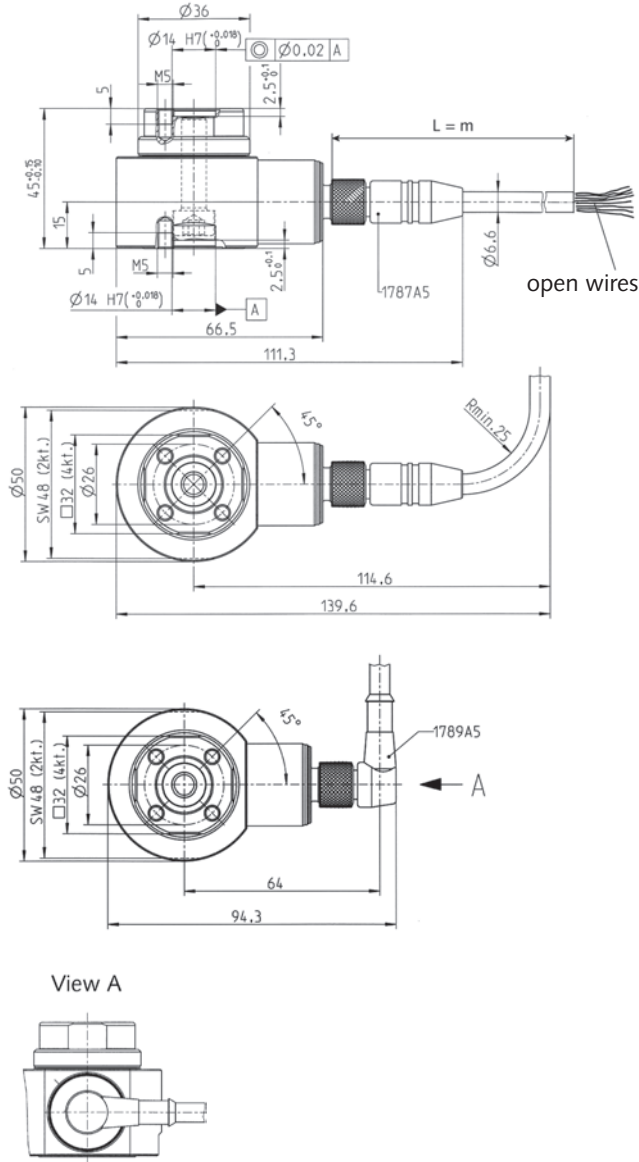
<sup>3)</sup> Compatible with connectors and cables from following suppliers: LUMBERG, Escha, Binder, Hirschmann and Lemo

<sup>4)</sup> Also for tension forces up to -20 kN, but calibrated in the compression force range (0 ... 10 V) only

The transmitter conforms to EMC standards EN61000-6-3 (emission) and EN61000-6-2 (immunity).

### Dimensions

Press force transmitter with connecting cable Type 1787A... and Type 1789A...



### General Mounting Notes

Where possible the force should be applied concentrically with the axis. Eccentrically applied forces, bending moments, torques and shear forces are only permitted as specified in the technical data. The contact surfaces through which the force is transmitted to the transmitter must be flat, rigid and clean. The centering seats on each end of the transmitter allow very accurate coaxial mounting using the supplied centering rings.

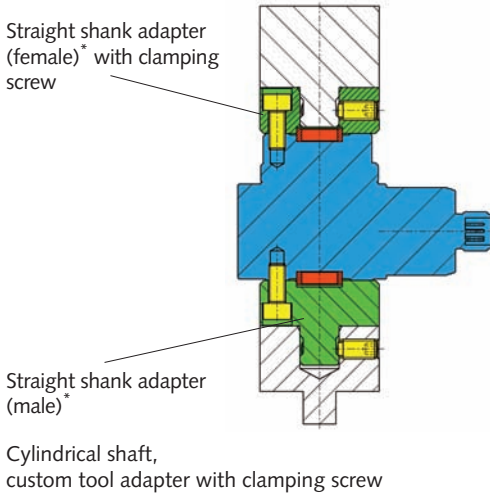
The transmitter can be mounted in a moving connecting rod, in a press punch or stationary on the bed of the machine. The integral adapter flanges at each end or special custom adapter modules can be used.

Fig. 1: Mounting dimensions

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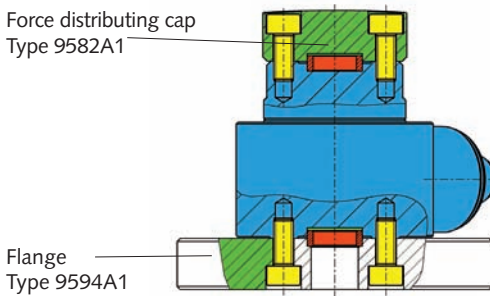
### Mounting in Press Punch

#### Example A: Mounting using a straight shank adapter



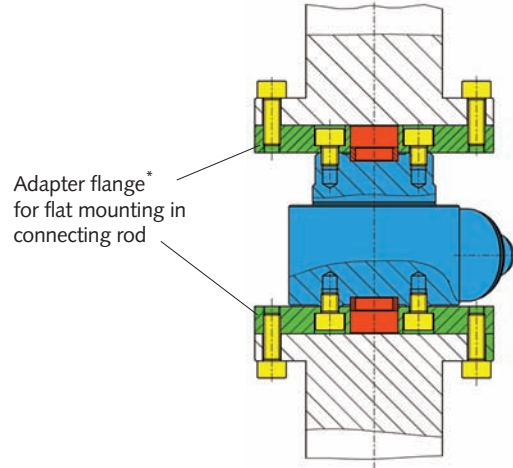
### Bed Mounting

#### Example B: Calibration element with force distributing cap and flange

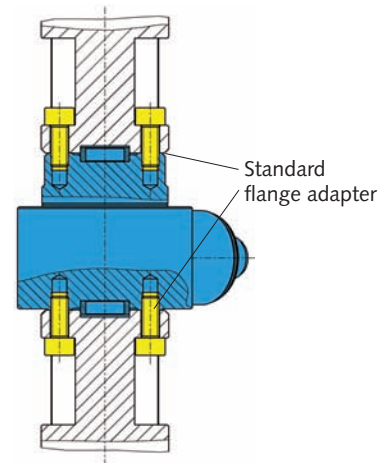


### Mounting in Connecting Rod

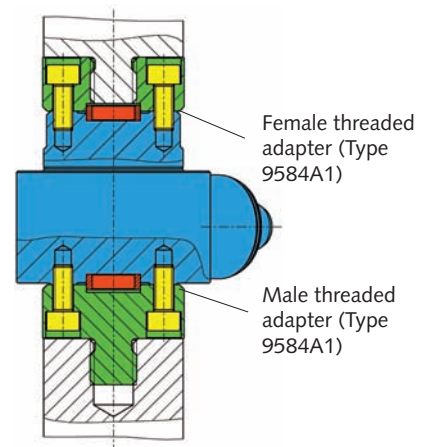
#### Example C: Mounting using adapter disk/flange



#### Example D: Direct mounting using integral flange



#### Example E: Mounting using threaded adapter



\*) No standard accessory

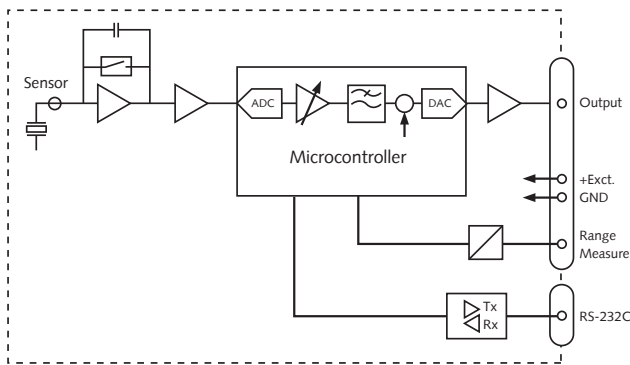


Fig. 2: Block circuit diagram

### Configuring Charge Amplifier

The transmitter's parameters are configured entirely via the integral serial interface using the included program **ManuWare** (see Fig. 3). The user-friendly interface of this software readily allows convenient configuration of the transmitter to suit existing measurement requirements. For test purposes it is also possible to transmit digital measurement data and display it graphically.

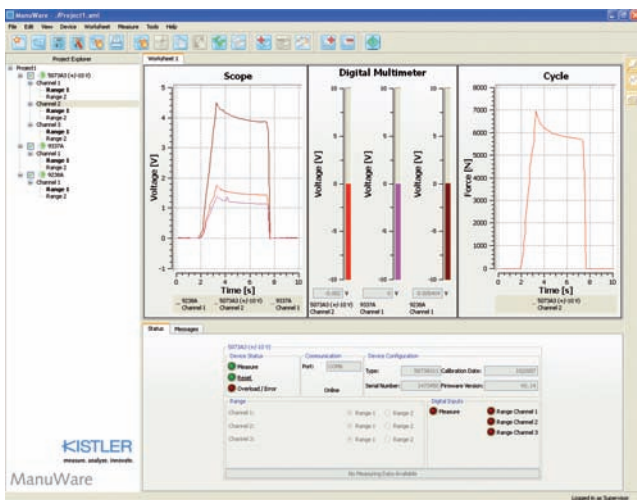
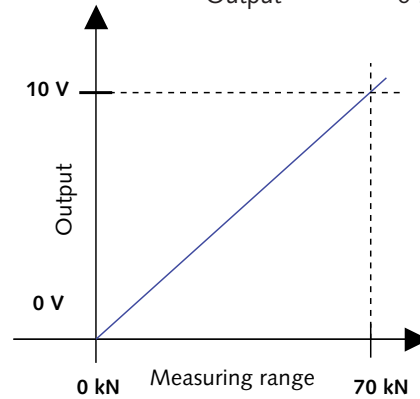


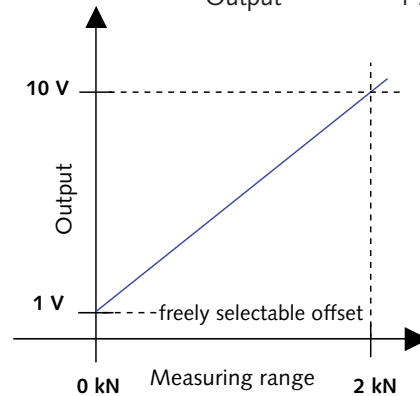
Fig. 3: Parameter configuration with ManuWare

### Scaling

Example 1: Measuring range 0 ... 70 kN  
Output 0 ... 10 V



Example 2: Measuring range 0 ... 2 kN  
Output 1 ... 10 V



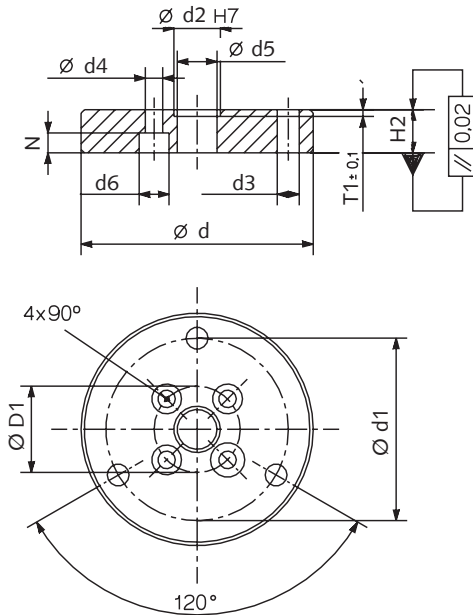
### Typical Application



Fig. 4: Monitoring press-fitting forces on a knuckle-joint press

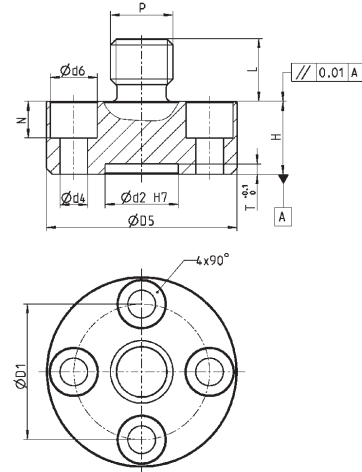
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### Flange Type 9594A1



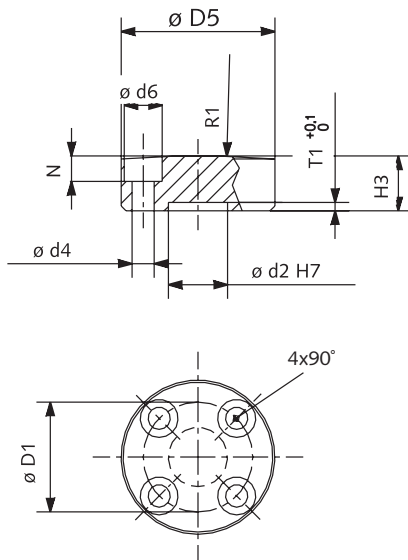
D1	d	d1	d2	d3	d4	d5	d6	H2	T1	N
26	80	65	14	6,6	5,3	12	9	13	2	6

### Male Threaded Adapter Type 9586A1



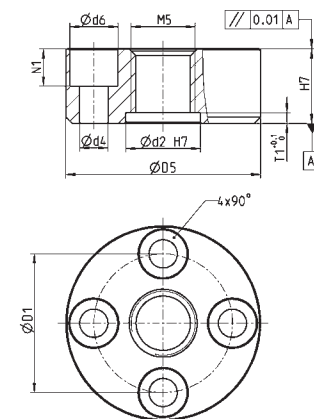
D1	D5	d2	d4	d6	H	N	P	L	T
26	36,5	14	5,3	9	14	7	M12	12	2

### Force Distributing Cap Type 9582A1



D1	D5	d2	d4	d6	H3	T1	N	R1
26	36,5	14	5,3	9	13	2	6	300

### Female Threaded Adapter Type 9584A1



D1	D5	d2	d4	d6	H	N	P	L	T
26	36,5	14	5,3	9	14	7	M12	12	2

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## Pin Allocation

Pin allocation of connection for press force transmitter for connecting cable Type 1787A... or Type 1789A...



Viewing female connector of the transmitter

Pin	Signal	Wire color
1	Exct GND	white
2	Signal GND	brown
3	/ Measure	green
4	Signal Out	yellow
5	/ Range II	gray
6	RS-232C_Rx	pink
7	RS-232C_Tx	blue
8	+Exct	red

Included Accessories	Art. No.
• Protective cap	5.211.409
• Installation CD with:	
- ManuWare parameter configuration program	
- flash loader for firmware updates	

Optional Accessories	Type
• Flange	9594A1
• Force distributing cap	9582A1
• Female threaded adapter	9584A1
• Male threaded adapter	9586A1
• USB 1.1 to RS-232C converter	2867

Shielded cable connection to machine control system:

• Connecting cable M12 8-way female connector – straight, flying leads, cable length 5 m	1787A5
• Connecting cable M12 8-way female connector – right-angled, flying leads, cable length 5 m	1789A5

## Ordering Key

Type 9337A

### Standard

Range I = 0 ... 50 kN	40
Range II = 0 ... 5 kN	

### Custom <sup>5)</sup>

Range I = 0 ... 70/50*/20/10/5*/2 kN	U
Range II = 0 ... 70/50*/20/10/5*/2 kN	

5) Please specify a custom measuring range for Range 1 and for Range 2 when ordering.  
Tip: Always set Range 1 of the transmitter to your preferred measuring range.  
Range 1 is selected when pin 5 (gray) for range switching is open or "high".

\*) The standard 50 kN and 5 kN measuring ranges are always listed on the calibration certificate in addition to the custom ranges. The customer can also allocate the settings to transmitter measuring Range 1 or Range 2 itself later (using the PC program ManuWare)

## Ordering Examples

Ordering Examples	Type
• Force Transmitter (one pce.) Range 1 = 20 kN, Range 2 = 5 kN	9337A40U
• Force Transmitter (one pce.)	9337A40

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