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TDC Sensor System

Type 2629DK

for high-accuracy, dynamic determination of the top dead centre position

The TDC Sensor System is used for the dynamic determination of the top dead centre position (TDC) in reciprocating piston engines. It consists of the TDC probe with integrated signal amplifier and TDC electronic.

- Dynamic TDC measurement
- Flexible installation adapters
- Standard voltage signal output

TDC Sensor System Type 2629DK

Description
This system uses a capacitive displacement current as the measuring signal, the resulting signal output is a function of the piston movement and thus of the crank angle. The TDC signal amplifier is integrated in the TDC probe. It converts the position-dependent sensor capacitance into a voltage signal. This is connected to the TDC electronics which provides the necessary power supply and signal interfaces (with a maximum distance of up to 10 m).

As soon as the engine starts to rotate, a change in the probe capacitance occurs, this is inversely proportional to the distance between the TDC probe tip and the piston top.

The signal output is normally recorded against crank angle position and then can be evaluated to determine the exact TDC position. This process requires a crank angle encoder and a combustion analysis system (e.g. KiBox) for the purpose of recording and evaluating the TDC signal.

Application
The TDC Sensor System Type 2629DK is used for dynamic TDC determination in the motored engine cylinder. The device is installed in the nozzle holder or spark plug hole of the engine.

In general, the TDC calibration process can be executed via a motored engine mode, or by using the pressure signal from an unfired cylinder (often achieved by interrupting ignition/fuel in the spark ignition engine or by disabling fuel injection in a Diesel engine).

It is important to note that knowledge of the exact top dead centre position is of great importance for investigating energy conversion processes occurring inside engines. This is due to the fact that all measurements are recorded against crank angle and with respect to TDC.

With some thermodynamic quantities such as mean indicated pressure (IMEP), a deviation of only 0,1° crank angle from the true top dead location will result in an error of one percentage point in the final IMEP value.

The main advantage of direct determination of mechanical TDC, compared with determining the position of pressure maximum from the motored-engine pressure curve, is that the uncertainty due to thermodynamic losses which affects the relationship between the peak of the pressure curve and the mechanical TDC is completely eliminated (known as the Thermodynamic loss angle).

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Technical data

TDC probe with integrated signal amplifier, Types 2629D10/2629D11

Principle		Capacitive-voltage converter
Signal delay (@ bandwidth 200 kHz)	µs	<3
Output (short circuit proof)	V	0 ... 10
Protection class	IP	65
Operating temperature		
Probe (immersion part)	°C	<300
Signal amplifier	°C	<80
Probe length		
Type 2629D10	mm	285,5
Type 2629D11	mm	410
Probe diameter	mm	6
Installation adapter size		M10x1 M12x1,25 M14x1,25
Longitudinal adjustment range		
Type 2629D10	mm	<50
Type 2629D11	mm	<175
Cable length	m	10
Weight	kg	0,19

TDC electronic Type 2629D20

Power supply	VAC Hz VA	100 ... 115/200 ... 240 50 ... 60 3,2
Fuse	mA	0,5
Protection class	IP	60
Operating temperature, max.	°C	<80
Connection		
Power plug		IEC 320 C 14
Signal output		BNC (neg.)
Sensor input		5 pin interface
Dimensions (LxBxH)	mm	108x59x57
Weight	kg	0,29

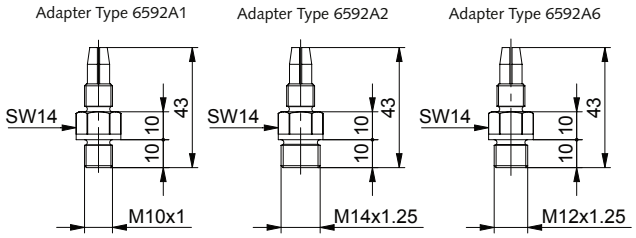

Fig. 1: Installation adapters Type 6592A... for TDC probe Type 2629D10/2629D11

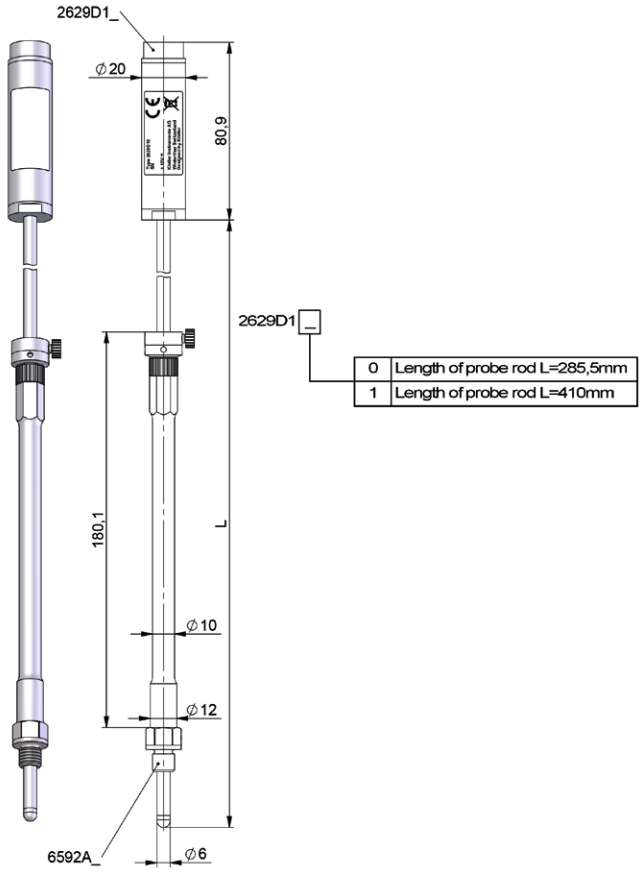

Fig. 2: Dimensions of TDC probe Type 2629D10/2629D11

Fig. 3: Connections of TDC electronic Type 2629D20

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Determining TDC with the TDC Sensor System

In order to determine the exact TDC position, the maximum amplitude of the TDC sensor signal must be evaluated. Because of the high degree of symmetry of the signal, this evaluation can be carried out with great accuracy.

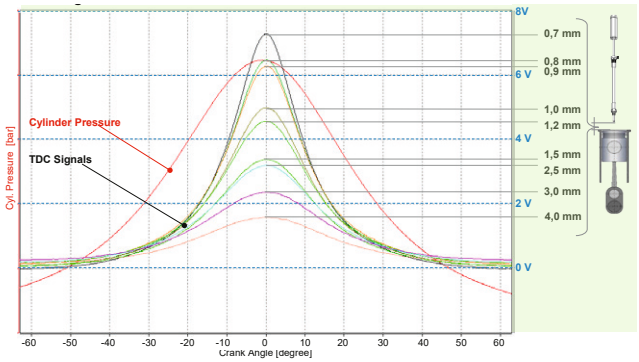

Fig. 4: TDC signal versus crank angle depending on the probe distance

Included accessories	Type/Art. No.
• TDC probe with integrated signal amplifier, probe length l = 285,5 mm, only for Type 2629DK0 (not with Type 2629DK1)	2629D10
• TDC probe with integrated signal amplifier, probe length l = 410 mm, only for Type 2629DK1 (not with Type 2629DK0)	2629D11
• TDC electronic for TDC probe	2629D20
• Cable for TDC probe, l = 10 m	2629D30A10
• Installation adapter M10x1	6592A1
• Installation adapter M12x1,25	6592A6
• Installation adapter M14x1,25	6592A2

Optional accessories	Type/Art. No.
• Tubular socket wrench hex 14 mm/18 mm, length 250 mm, suitable for installation adapter Type 6592A...	1377

Ordering key

TDC Sensor System **Type 2629DK** ☐
for dynamic determination
of top dead center

With probe length l = 285,5 mm	**0**
With probe length l = 410 mm	**1**

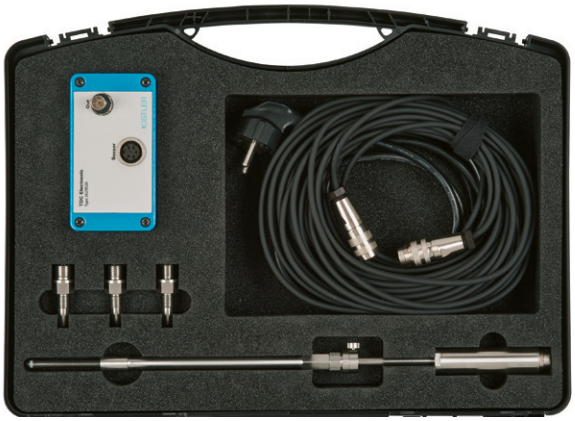

Fig. 5: Scope of delivery Type 2629DK

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