

TDC Sensor System

Type 2629C

for dynamic determination of the top dead centre position

The TDC system consists of the TDC sensor with integrated TDC signal amplifier and TDC power supply. It is used for the dynamic determination of the top dead centre position (TDC) in piston engines.

- Dynamic TDC measurement
- Adapter for various nozzle holders or spark plugs
- Voltage or charge output

Description

This system produces a capacitive displacement current as the measuring signal, which is a function of the piston movement and thus of the crank angle. The TDC amplifier is integrated in the TDC sensor. It converts the position-dependent sensor capacitance into a voltage signal. This can be connected, over a distance of up to 10 m, to the TDC power supply or to another measuring instrument, which provides the necessary supply voltage.

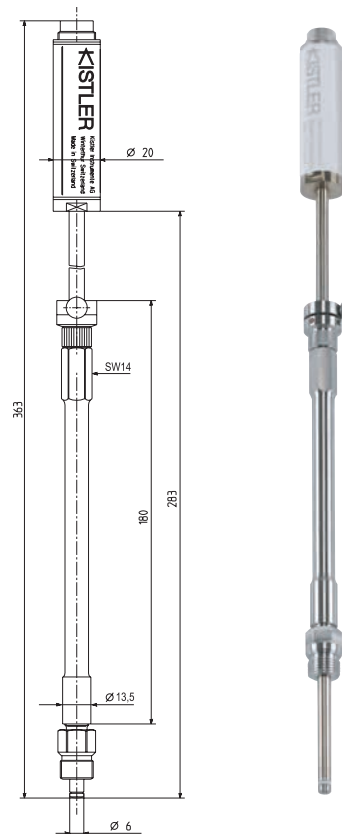
The TDC power supply provides a choice at a BNC-socket between voltage output and electric charge output. The signal output is recorded against crank angle position and then evaluated to determine the exact TDC position. This process requires a crank angle encoder and a digital measuring instrument, e.g. a digital oscilloscope, for the purpose of recording and evaluating the TDC signal.

This can be done either by using the motored engine mode or by preventing combustion in the cylinder undergoing such measurements and is achieved by interrupting ignition in the spark ignition engine or by preventing fuel injection in a diesel engine.

As soon as the engine is running, a change in the sensor capacitance occurs that manifests itself as a signal with amplitude, which is inversely proportional to the distance between the TDC sensor tip and the piston top.

Application

The TDC sensor 2629C is used for dynamic TDC determination in the motored engine unfired pressure mode. The device is installed in the nozzle holder or spark plug hole of the engine.



Knowledge of the exact top dead centre is of great importance for investigating processes occurring inside engines, since all measurements are recorded against crank angle and with respect to TDC. With some thermodynamic quantities such as average indicated pressure (p_{mi}), a deviation of only $0,1^\circ$ crank angle from the true top dead location already results in an error of several percentage points in the p_{mi} value.

The advantage of direct determination of TDC, compared with determining the position of pressure maximum from the motored-engine pressure curve, is that there is then no need for a correction involving the degree of the thermodynamic loss angle.

Technical Data

TDC Power Supply

Power supply	VAC	230/115 ±10 %
	Hz	50 ... 60
	VA	3,2
Connections	–	Power plug
TDC amplifier	–	Socket 4-pin
OT-Signalausgang	–	BNC-socket
Dimensions (LxBxH)	mm	125x80x57
Weight	kg	0,5

TDC Signal Amplifier

Principle	–	Capacitance-voltage converter
Sensitivity	V/pF	4
Output		
Charge output	pC	0 ... 5 000
Voltage output (short circuit proof)	V	0 ... 10
Power supply	VDC	12 ... 15
	mA	50
Cable length max.	m	10

TDC Sensor

Principle	–	Capacitive
Assembly tapped hole size	–	M10x1 M14x1,25
Longitudinal adjustment range	mm	≈80

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.

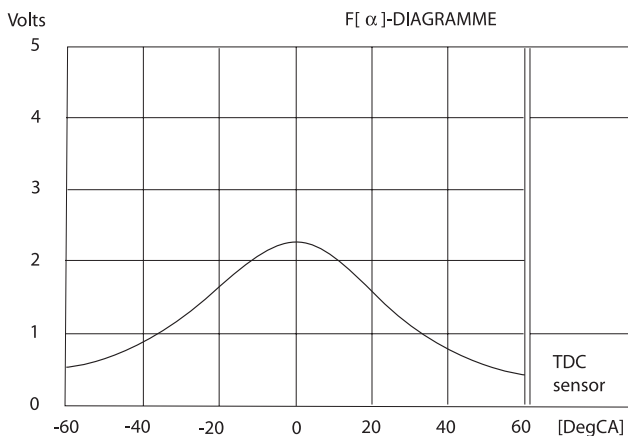


Fig. 1: TDC signal versus crank angle

Connectors TDC Power Supply

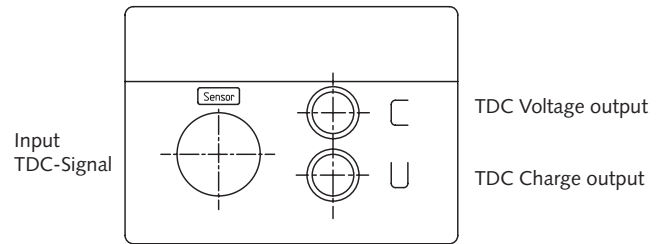


Fig. 2: Connectors TDC Power Supply

GND	Ground power supply
SGND	Signal ground
TDC	TDC signal
VS	Power supply
Case	Shield

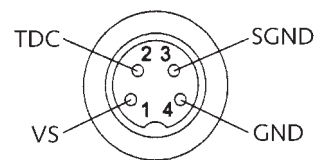


Fig. 3: Pin layout of Input TDC-signal

Assembling the TDC Sensor

The TDC sensor instrument rod assembly is screwed into the tapped hole in the cylinder head normally used for the spark plug or the pressure sensor.

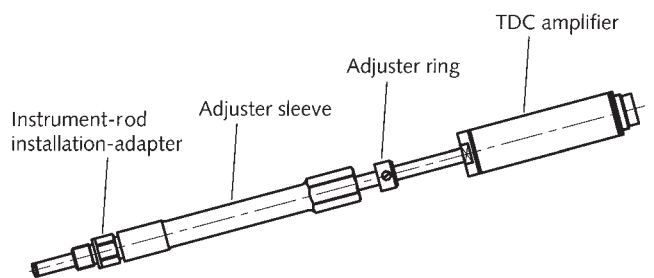


Fig 4: Assembling

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Included Accessories

- Installation adapter M10x1
- Installation adapter M14x1,25
- Installation adapter M14x1,25 conical
- TDC Power supply
- TDC connecting cable
TDC-Sensor/Power supply

Type/Art. No.

6592A1
6592A2
6592A3
2629A2
5.015.070

Optional Accessories

- Longer sensor with guide
- Installation adapter on request

Type

2629C1Q01
6592A...

Ordering Code

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Fig. 5: Scope of delivery Type 2629C