

# Cylinder Pressure Sensor

Type 6613CG1/6613CG2

## for On-Line Combustion Control

Piezoelectric pressure sensor with galvanic isolated 4 ... 20 mA output signal for continuous cylinder pressure measurement for medium and low speed diesel and gas engines.

- Robust design, with excellent long term stability
- Suitable for knock detection
- Very good thermodynamic behaviour

### Description

The shoulder sealed M10x1 sensor and the in-line charge amplifier are connected by a robust Fluorelastomer-cable. The patented "antistrain" design, makes the measuring element insensitive to varying mounting conditions. The Quartz-measuring element is extremely stable and provides a very accurate and repeatable output signal over the whole life time. The sensor has been designed so that a life of several thousand operating hours can be achieved in a diesel and gas engine, but individual sensor life time is strongly depending on application.

### Application

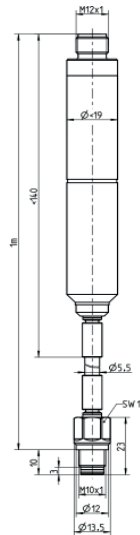
Closed loop combustion control and monitoring tasks for e.g. knock detection, cylinder balancing,  $p_{mi}$  calculation, etc.

### Typ 6613CG1

For 4-stroke engines type 6613CG1 is recommended, this type has a time constant of >10 s, which is fully sufficient for all kind of measurements for 4-stroke engines with >300 1/min.

### Typ 6613CG2

This type is especially suitable for 2-stroke engines <300 1/min, the in-line charge amplifier runs with a time constant of >100 s which provides a fully suitable frequency bandwidth for all kind of measuring tasks.



### Technical Data

|   | Type   | 6613CG1     | 6613CG2   |
|---|--------|-------------|-----------|
| Measuring range                                   | bar    | 0 ... 250   | 0 ... 250 |
| Sensitivity                                       | mA/bar | 0,05        | 0,05      |
| Overload  | bar    | 300         | 300       |
| Linearity   | % FSO  | ≤±0,5       |           |
| Operating temperature range                       |        |             |           |
| Sensor front                                      | °C     | -50 ... 350 |           |
| at cable connection                               | °C     | -20 ... 200 |           |
| at charge amplifier                               | °C     | -20 ... 100 |           |
| Thermal shock at 1 500 1/min,<br>$p_{mi} = 9$ bar | bar    | ≤±0,5       |           |
| Change in sensitivity                             |        |             |           |
| 200 ±150 °C                                       | %      | ≤±2         |           |
| 200 ±50 °C  | %      | ≤±1         |           |
| Upper cut-off frequency (-3 dB)                   | kHz    | 10          | 10        |
| Time constant                                     | s      | >10         | >110      |
| Output current                                    | mA     | 4 ... 20    |           |
| Signal range                                      | mA     | 12,5        |           |
| Zero line (no pressure)                           | mA     | 6,5         |           |
| Supply voltage                                    | VDC    | 18 ... 32   |           |
| Load resistance                                   | Ω      | 100 ... 600 |           |
| max. voltage*                                     | VDC    | 500         |           |
| Plug DIN (mated)                                  | M12x1  | IP67        |           |
| Weight  | g      | 140         |           |
| Tightening torque                                 | N·m    | 15          |           |
| Connector   | 8 pole | M12x1       |           |

\* between case, signal output or power supply

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**Mounting**

*4-stroke engines*

The sensor should be installed close to the combustion chamber. The length of the bore between sensor and combustion chamber depends mainly on the engine speed, a too long bore may generate pipe oscillations disturbing the measuring signal. An installation at the indicator valve is not recommended for continuous measuring because the operating temperature may exceed the admissible temperature range.

*2-stroke engine*

The sensor should be installed with patented Kistler adapter Type 7523B ... direct at the cylinder cover. The sensor is flush

mounted into the flat pressure canal of the adapter with no pockets or corners. This significantly reduces the build-up of combustion depositon at the sensor membrane.

The indicator valve should be placed right on top of the adapter to minimise the dead volume.

Depending on the amount of combustion residuals the indicator valve should be opened to blow out the combustion residuals from time to time for one single stroke.

For any questions about the installation please contact Kistler.

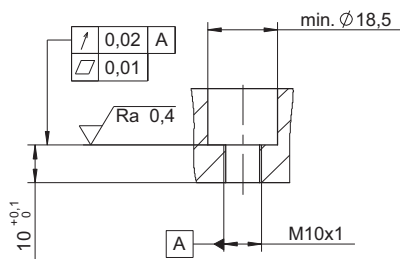


Fig. 1: Mounting bore (4-stroke application) for flush mounting

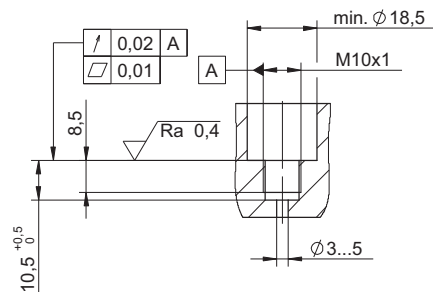


Fig. 2: Mounting bore (4-stroke application) for recessed mounting with additional gas channel. Admissible bore length depends on the application. Too long bore may interfere the quality of the measuring results

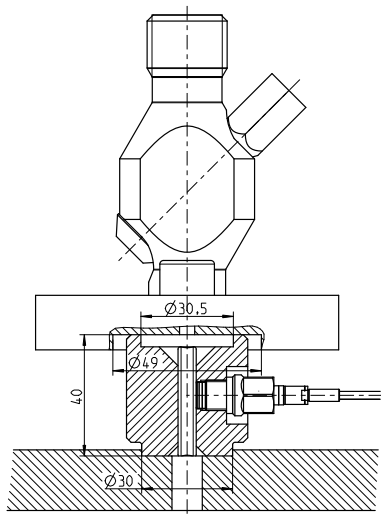


Fig. 3: Mounting with ring adapter Type 7523B10 on MAN 2-stroke engine

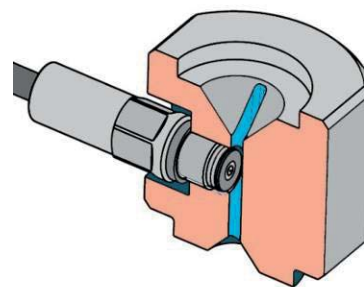


Fig. 4: Schematic view of sensor Type 6613CG... installed in patented ring adapter

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## General Specifications

|                 |                           |
|-----------------|---------------------------|
| ATEX            | II 3G Ex nA IIC T3 Gc     |
| IECEX           | IECEX nA IIC T3 Gc        |
| Marine approval | GL, ABS, BV, LR, DNV, CSS |

## Connector

- 1 **Exct GND**
- 2 don't connect
- 3 don't connect
- 4 don't connect
- 5 **Signal output**
- 6 don't connect
- 7 don't connect
- 8 **+ Exct (18 ... 32 V)**

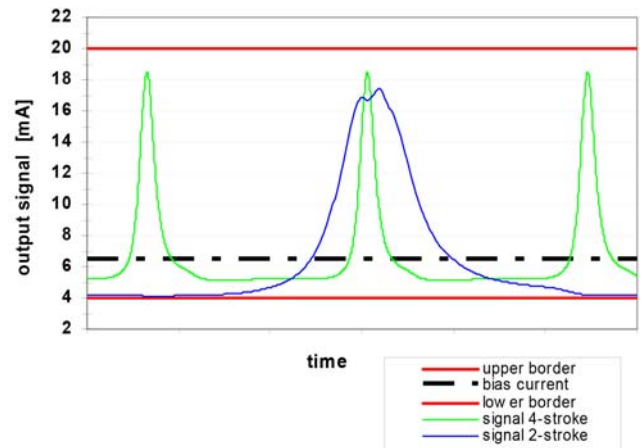
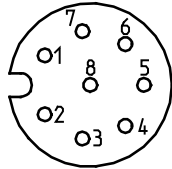
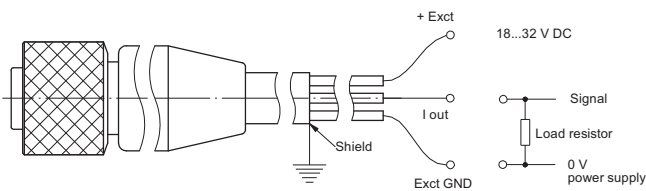


Fig. 5: Example of output signal from 2- and 4-stroke engine with signal span 12,5 mA

## Connection of Types 7614CG.../6613CG... to data acquisition system with connecting cable Type 1700B69A...



### Important:

Shield must be connected to the case/shield of the data acquisition system (or engine control).

Shield and Exct GND must not be connected!

## Optional Accessories

- Torque wrench 8 ... 40 N·m
- Fork wrench SW 12 for Type 1300A11
- Tubular socket
- Connecting cable, l = 10 m
- Connecting cable, l = 20 m
- Connecting cable, l = 30 m
- Connecting cable, l = 3 m
- Connecting cable, l = 1,5 m
- Connecting cable, l = 15 m
- Adapter for MAN-ME engines\*
- Adapter for RTA-engines\*

## Type/Art. No.

- 1300A11
- 1300A13
- 1300B6
- 1700B69A10
- 1700B69A20
- 1700B69A30
- 1700B69A3
- 1700B69A1,5
- 1700B69A15
- 7523B10
- 7523B11

\*dimensions needs to be checked by the customer

## Ordering Code

- 4-stroke engine >300 1/min
- 2-stroke engine <300 1/min

## Type

- 6613CG1
- 6613CG2