

Glow plug adapter

for cylinder pressure measurement in diesel engines

Type 6542Q..., 6544Q...

The glow plug adapter enables cylinder pressure measurement without separate measuring bore.

- Simple mounting without additional measuring bore
- Design corresponding to existing glow plug bore
- High signal quality: Pressure measurement close to combustion chamber
- Standard sensor for different glow plug geometries
- No reaming the glow plug bore needed

Description

In small modern diesel engines, where there is little space available, it is difficult to mount cylinder pressure sensors. For this reason, substituting the series glow plug with glow plug adapter is an attractive solution.

The glow plug adapter is simply installed into the existing mounting bore of the series glow plug. The cylinder pressure sensor remains in contact with the combustion gas via short, star-shaped bores in the glow plug tip.

Application

Glow plugs are used primarily to optimize engine starting with minimized emissions. However, provided they are not being used in an extremely cold climate, engines can always be readily started without glow plugs. An adapter fitted with a sensor therefore be mounted in place of the original glow plug.

Table 1 shows the possible combinations of glow plug adapters and sensors depending on the existing glow plug bore diameter.

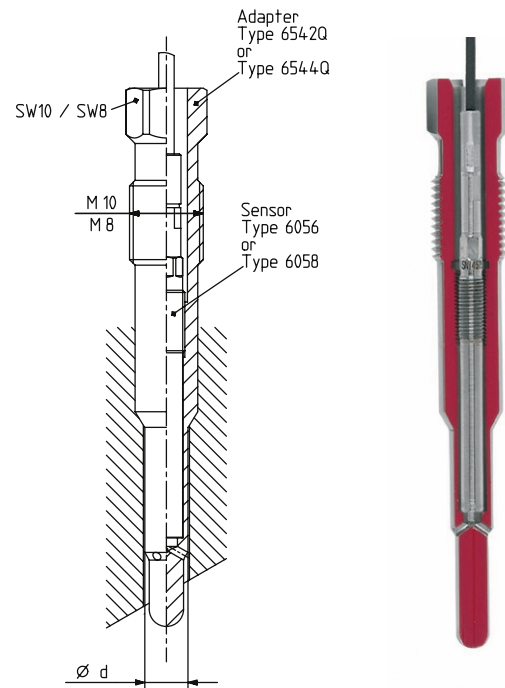


Table 1

| | Type Glow Plug Adapter | | Type Sensor | |
|-------------------------------|------------------------|------|-----------------|------|
| | 6542 | 6544 | 6056 | 6058 |
| Bore | | | | |
| $d \geq 5.1 \text{ mm}$ | x | | x | |
| $4.6 \leq d < 5.1 \text{ mm}$ | | x | | x |
| $d < 4.6 \text{ mm}$ | x | | x ¹⁾ | |

1) Sensor recessed see fig. 1 right

Customized design of the glow plug adapter

The gap between adapter and mounting bore has a significant influence on the measuring performance. Therefore the precise diameter of the mounting bore is necessary to design the glow plug adapter. The ordering form for glow plug adapters is on page 4.

Kistler designs from this data a glow plug for the customer without any additional charge for engineering.

Glow plug adapters are optimized for each particular customer requirement. Endurance test or thermodynamic analysis. Optimization takes account of:

- Purpose of use
- Gas dynamics in the cavity (pipe oscillations)
- Sensor temperature

Pipe oscillations

In modern diesel engines, pipe oscillations may occur due to the high pressure gradients. Pipe oscillations disturb the measuring signal. These superimposed highfrequency oscillations occur from start of combustion. This can lead to errors in determining

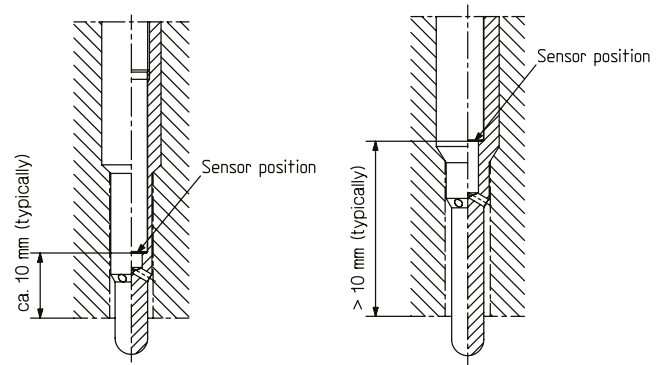


Fig. 1: Left: typical position of a miniature measuring probe for development purposes. Right: a thermally favourable probe position for long service life.

the maximum cylinder pressure. The use of a moving average to smooth the pressure curve or signal filtering reduces this error. Other evaluations such as the mean effective pressure are not influenced by the pipe oscillations.

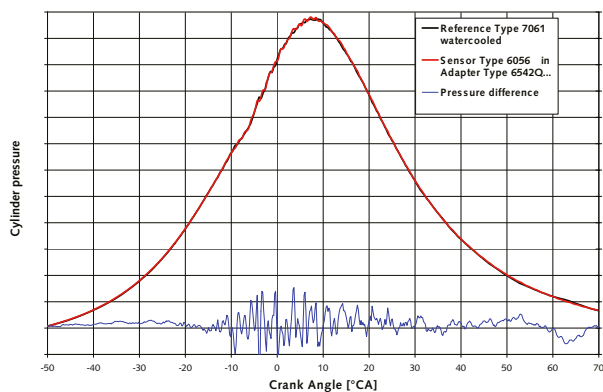


Fig. 2: Cylinder pressure measured with a pressure sensor mounted deep in the glow plug adapter. Low pipe oscillations.

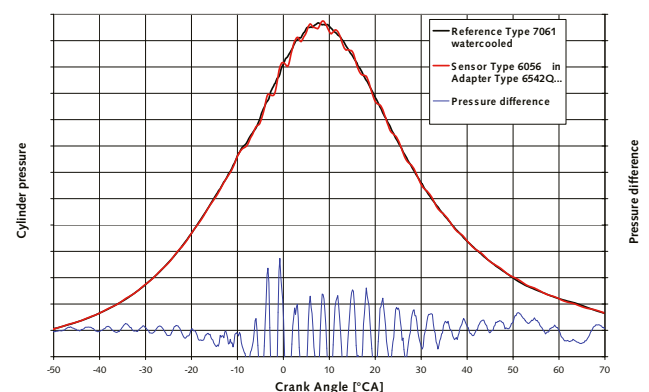


Fig. 3: Cylinder pressure measured with a pressure sensor set back in the glow plug adapter. Increased pipe oscillations.

Glow plug adapter and sensor dimensions

The following sensors can be used depending on the contour of the original glow plug; see also table 1:

- Type 6056...
- Type 6058...

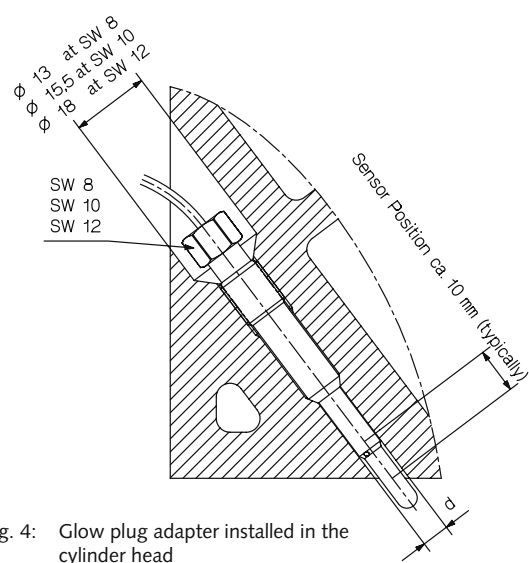


Fig. 4: Glow plug adapter installed in the cylinder head

Mounting examples

Pressure sensor Type 6056 in glow plug adapter Type 6542Q...

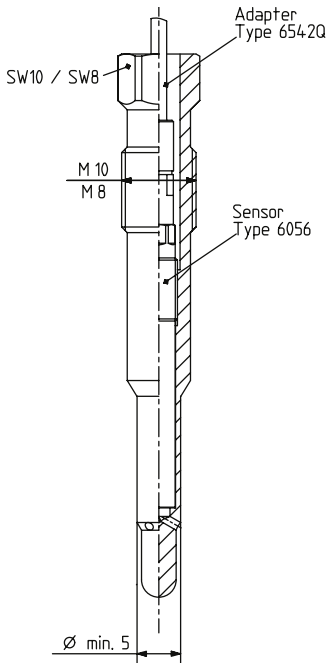


Fig. 5: Glow plug adapter Type 6542Q...

| | |
|--------------------|---------------------------|
| Bore diameter: | min. \varnothing 5.1 mm |
| Tightening Torque: | |
| M8 | 10 N·m |
| M10 | 12 N·m |

Pressure sensor Type 6058 in glow plug adapter Type 6544Q...

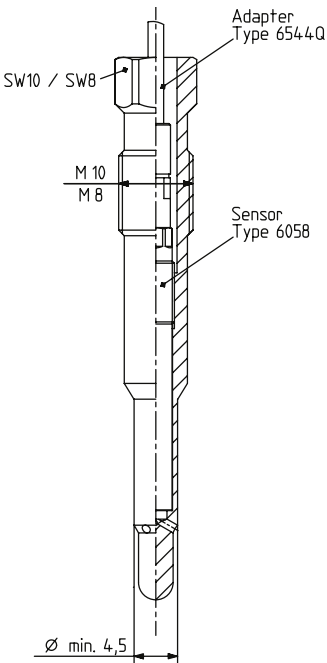


Fig. 6: Glow plug adapter Type 6544Q...

| | |
|--------------------|---------------------------|
| Bore diameter: | min. \varnothing 4.6 mm |
| Tightening Torque: | |
| M8 | 10 N·m |
| M10 | 12 N·m |

Pressure sensor Type 6056 in glow plug adapter Type 6542Q...

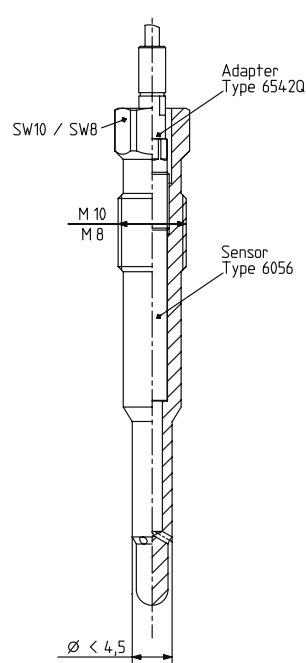


Fig. 7: Glow plug adapter Type 6542Q...

| | |
|--------------------|-----------------------|
| Bore diameter: | $<\varnothing$ 4.6 mm |
| Tightening Torque: | |
| M8 | 10 N·m |
| M10 | 12 N·m |

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Order form for glow plug adapter types 6542Q..., 6544Q...

Note: Minimum order quantity = 4 pieces

Customer: _____

Ordered by: _____

Engine Type: _____

Original _____

Glow Plug Type _____

Purpose

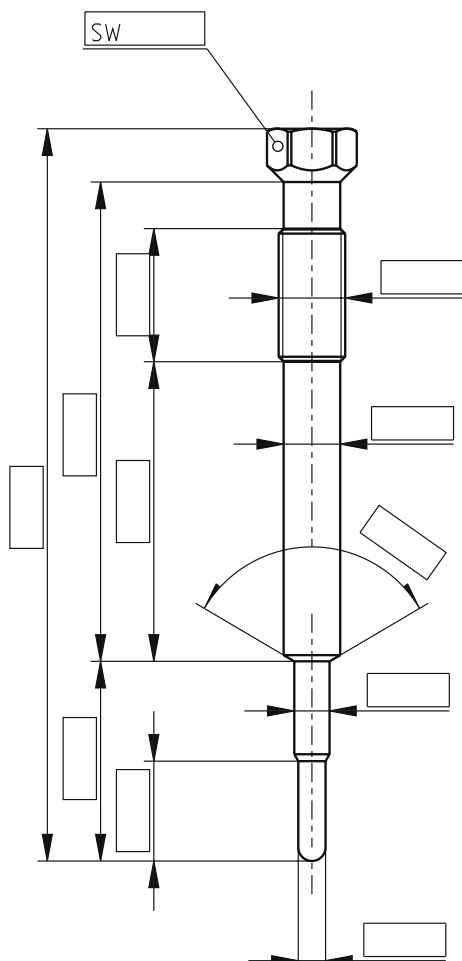
Thermodynamic

Analysis ☐

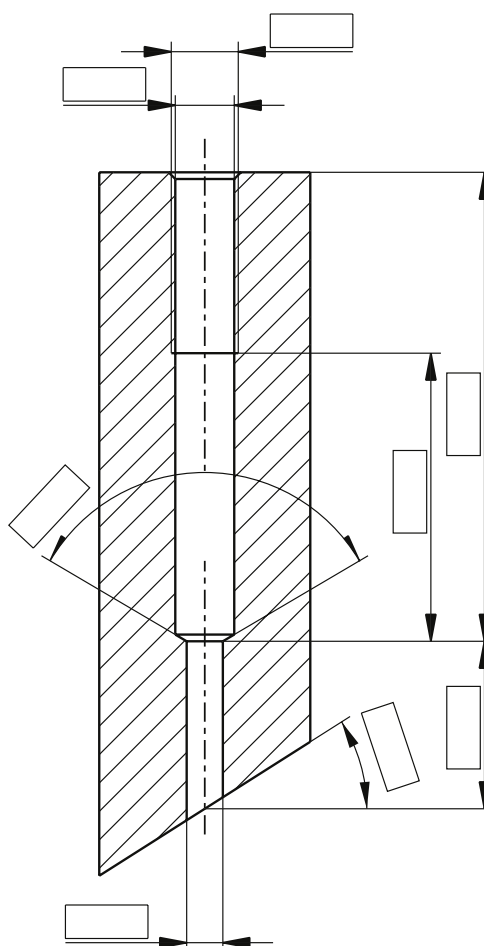
Endurance test ☐

Other informations: _____

Original glow plug



Mounting bore with tolerances



Note: Without exact dimensions of the mounting bore, Kistler can not guarantee signal quality and service life.

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