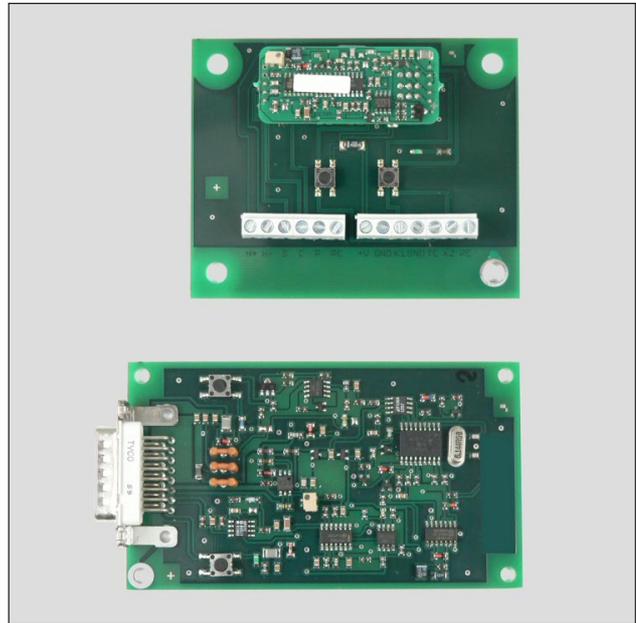


### FEATURES

- Control circuit boards for all XYA series oxygen sensors
- Oxygen partial pressure range  
1...250 mbar or 1...1000 mbar  
(0...25 % or 0...100% oxygen)
- Functional testing and calibration in ambient air
- Linear 0...10 V or 4...20 mA output of measured oxygen content
- High accuracy
- Low power consumption



### SPECIFICATIONS

#### Maximum ratings

Supply voltage  $24 V_{DC} \pm 20 \%$

Heater supply voltage<sup>1</sup>  $4.35 \pm 0.1 V_{DC}$  (1.85 A)  
Stand by  $2.0 V_{DC}$

#### Power consumption (interface)

ZBXYA...M... 250 mW  
ZBXYA...D... 500 mW

#### Temperature limits

Storage  $-10 \dots 50 \text{ } ^\circ\text{C}$   
Operating  $-10 \dots 60 \text{ } ^\circ\text{C}$

#### Note:

1. It is important to measure the heater voltage as close to the sensor as possible due to voltage drops in the supply cable. Heater can also be operated with an equivalent AC or PWM signal.

### PERFORMANCE CHARACTERISTICS

Characteristics		Min.	Typ.	Max.	Unit
Measuring ranges (oxygen partial pressure)	ZBXYA025...	1		250	mbar
	ZBXYA100...	1		1000	
Accuracy				2	%FS
Resolution				0.04	V

### OUTLINE DRAWING & ELECTRICAL CONNECTION

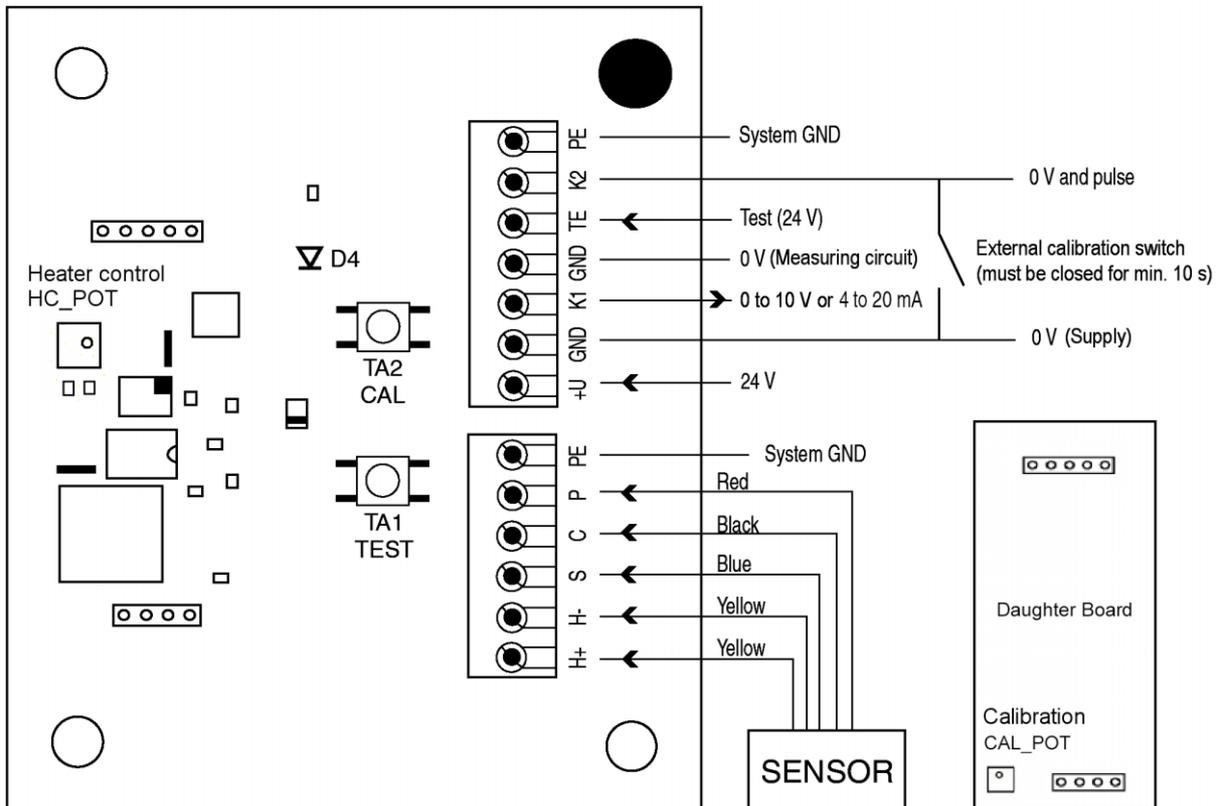
#### ZBXYA...D...

**Dimensions:**

80 x 100 mm,  
Ø 6.5 mm mounting holes

**Connector:**

Screw connector block



### OPERATING AND CALIBRATION NOTES

#### ZBX YA...D

##### **Heater adjustment:**

1. Check the sensor heater settings: Using a volt meter measure the voltage across H+ and H-. The heater voltage should be  $4.35 \pm 0.1 V_{DC}$ . If using long cables (>1m) measure this voltage as close to the sensor as possible.
2. If the heater voltage needs to be altered then follow the next steps.
3. With the power off, remove the daughter board, and expose the heater voltage setting pot.
4. Apply power to the board.
5. Using a volt meter measure the heater voltage across H+ and H- and adjust the pot (HC\_POT) until the voltage is  $4.35 \pm 0.1 V_{DC}$ .
6. Switch the power off and re-assemble the daughter board.

##### **Auto-calibration of the sensor and board (only available for ZBX YA025D...):**

**Note:** Auto-calibration assumes that the sensor is in a normal atmosphere with 1013 mbar pressure and typical humidity levels giving an O<sub>2</sub> concentration of 20.7 %. The board adjusts its output to 20.7 %/25 % of full-scale.

1. Ensure the sensor is in ambient air (typically 20.7 % O<sub>2</sub>). Remove or purge application environment.
2. Switch the power on and leave for 10 minutes and allow to stabilise.
3. The green LED should be blinking, this indicates normal operation.
4. **Voltage output devices:** Measure the voltage at the K1 output and the 0 V (measuring circuit) terminal.  
The reading should be approx. 8.28 V.  
**Current output devices:** Measure the current at K1 output terminal through an external load resistor (typ. 200 Ω).  
The reading should be approx. 17.25 mA.
5. If the reading is not correct then press and hold the calibration button (TA2) for a minimum of 10 s until the reading is correct. This may also be achieved using an external calibration switch (normally open) placed across GND (0 V supply) and K2 (see outline drawing) or by externally pulling K2 low.
6. Once released the green LED should start blinking again to indicate normal operation.
7. The system is now calibrated. (Please note that system calibration is lost on power loss and steps 1-8 must be repeated).
8. Note that the auto-calibration will only work if the output is within 20 % of the correct target value. If this is not the case, the PCB will not attempt to calibrate and will indicate this by setting the green LED constantly on (until removal of power). If this occurs it may be necessary to manually calibrate the system as described below.

##### **Manual calibration of the sensor and board:**

Manual calibration may be performed at any known O<sub>2</sub> content including normal air.

1. Ensure the sensor is in an atmosphere with known O<sub>2</sub> content (see table below for examples of calibration values).
2. Switch the power on and leave for 10 minutes and allow to stabilise.
3. The green LED should be blinking, this indicates normal operation.
4. **Voltage output devices:** Measure the voltage at the K1 output and the 0 V (measuring circuit) terminal.  
**Current output devices:** Measure the current at K1 output terminal through an external load resistor (typ. 200 Ω).
5. If the reading is not correct then adjust the calibration setting pot (CAL\_POT on daughter board) until the desired output is produced. Turn the pot clock-wise to decrease the output value and counter-clock-wise to increase it. Because it takes some time for the output signal to stabilise following an adjustment, make small calibration changes and allow to settle for 30 seconds each time. See table for examples of calibration values.
6. If the board is calibrated manually it will retain its calibration after the power is switched off.

O <sub>2</sub> concentration in normal atmosphere (1013 mbar pressure)	Calibration values			
	ZBX YA025...0	ZBX YA100...0	ZBX YA025...4	ZBX YA100...4
20.7 %	8.28 V <sub>DC</sub>	2.07 V <sub>DC</sub>	17.25 mA	7.34 mA
90 %	-	9.0 V	-	18.4 mA
25 %	10.0 V <sub>DC</sub>	-	20 mA	-
5 %	2.0 V <sub>DC</sub>	0.5 V <sub>DC</sub>	7.2 mA	4.8 mA

##### **Board Test:**

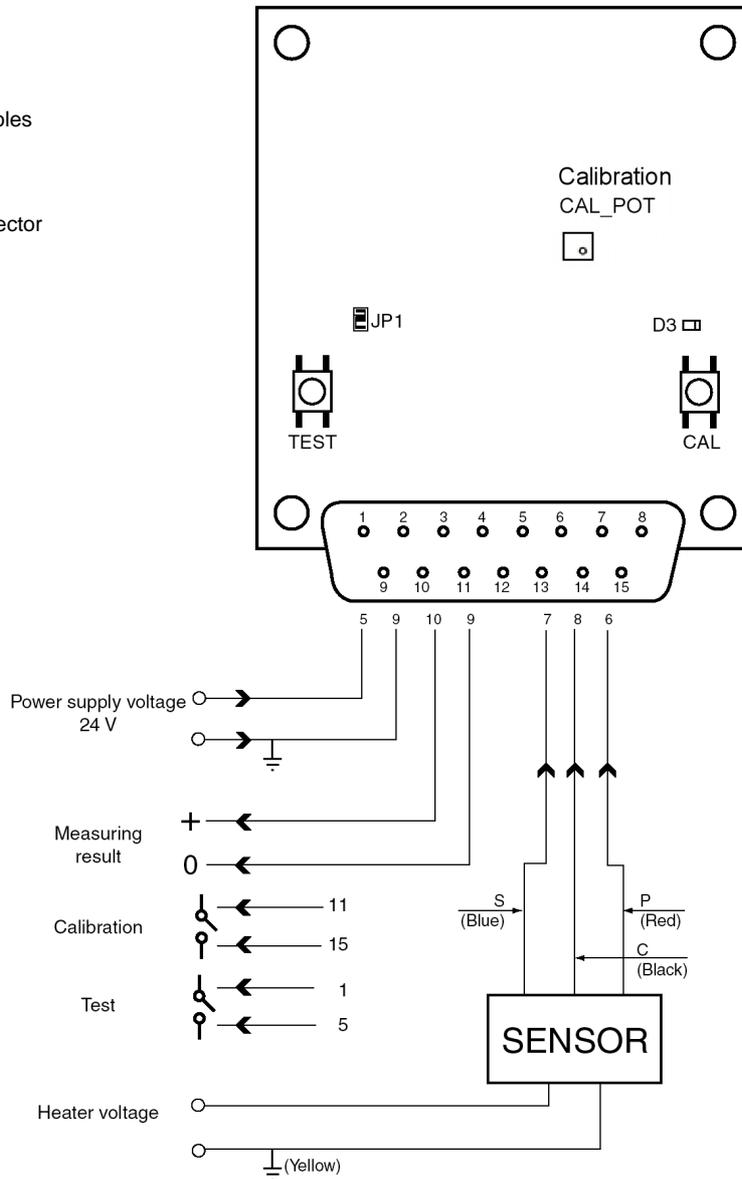
1. The green LED should be blinking to indicate normal operation.
2. If the Test button is pressed a 20 % drop in the reading indicates normal operation.

### OUTLINE DRAWING & ELECTRICAL CONNECTION (cont.)

#### ZBXYA...M...

**Dimensions:**  
63 x 108 mm,  
Ø 4 mm mounting holes

**Connector:**  
15 pin male D connector



### OPERATING AND CALIBRATION NOTES (cont.)

#### ZBX YA...M

##### **Auto-calibration of the sensor and board (only available for ZBX YA025M...):**

Note: Auto-calibration assumes that the sensor is in a normal atmosphere with 1013 mbar pressure and typical humidity levels giving an O<sub>2</sub> concentration of 20.7 %. The board adjusts its output to 20.7 %/25 % of full-scale.

1. Ensure the sensor is in ambient air (typically 20.7 % O<sub>2</sub>). Remove or purge application environment.
2. Switch the power on at the board and heater supply and leave for 10 minutes and allow to stabilise.
3. The green LED should be blinking, this indicates normal operation.
4. Voltage output devices: Measure the voltage between pin 10 and pin 9.  
The reading should be approx. 8.28 V.
- Current output devices: Measure the current between pin 10 and pin 9 through an external load resistor (typ. 200 Ω).  
The reading should be approx. 17.25 mA.
5. If the reading is not correct then press and hold the calibration button (TA2) for a minimum of 10 s until the reading is correct. This may also be achieved using an external calibration switch (normally open) placed between pin 11 and pin 15 (see outline drawing) or by externally pulling K2 low.
6. Once released the green LED should start blinking again to indicate normal operation.
7. The system is now calibrated. (Please note that system calibration is lost on power loss and steps 1-8 must be repeated).
8. Note that the auto-calibration will only work if the output is within 20 % of the correct target value. If this is not the case, the PCB will not attempt to calibrate and will indicate this by setting the green LED constantly on (until removal of power). If this occurs it may be necessary to manually calibrate the system as described below.

##### **Manual calibration of the sensor and board:**

Manual calibration may be performed at any known O<sub>2</sub> content including normal air.

1. Ensure the sensor is in an atmosphere with known O<sub>2</sub> content (see table below for examples of calibration values).
2. Switch the power on at board and heater supply and leave for 10 minutes and allow to stabilise.
3. The green LED should be blinking, this indicates normal operation.
4. Voltage output devices: Measure the voltage between pin 10 and pin 9.  
Current output devices: Measure the current between pin 10 and pin 9 through an external load resistor (typ. 200 Ω).
5. If the reading is not correct then adjust the calibration setting pot (CAL\_POT) until the desired output is produced. Turn the pot clock-wise to decrease the output value and counter-clock-wise to increase it. Because it takes some time for the output signal to stabilise following an adjustment, make small calibration changes and allow to settle for 30 seconds each time. See table for examples of calibration values.
6. If the board is calibrated manually it will retain its calibration after the power is switched off.

O <sub>2</sub> concentration in normal atmosphere (1013 mbar pressure)	Calibration values			
	ZBX YA025...0	ZBX YA100...0	ZBX YA025...4	ZBX YA100...4
20.7 %	8.28 V <sub>DC</sub>	2.07 V <sub>DC</sub>	17.25 mA	7.34 mA
90 %	-	9.0 V	-	18.4 mA
25 %	10.0 V <sub>DC</sub>	-	20 mA	-
5 %	2.0 V <sub>DC</sub>	0.5 V <sub>DC</sub>	7.2 mA	4.8 mA

##### **Board Test:**

1. The green LED should be blinking to indicate normal operation.
2. If the Test button is pressed a 20 % drop in the reading indicates normal operation. This may also be achieved using an external test switch (normally open) placed across pins 1 and 5 (see outline drawing).

# ZBXYA

## Oxygen sensor interface boards

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### ORDERING INFORMATION

Options		Series	Measuring range	Type	Type
	ZBXYA	025:	1...250 mbar (oxygen partial pressure)	M:	requires external power supply for sensor heating element
		100:	1...1000 mbar (oxygen partial pressure)	D:	includes power supply for sensor heating element
				0:	0...10 V
				4:	4...20 mA

Example:	ZBXYA	025		D		0
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**Note: Custom specific options are available. Please contact First Sensor for further information.**

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