Title:	N2_O2 Adjustment Procedure		ID:
			123
05.03.13	Response:	Model:	Author:
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Instructions

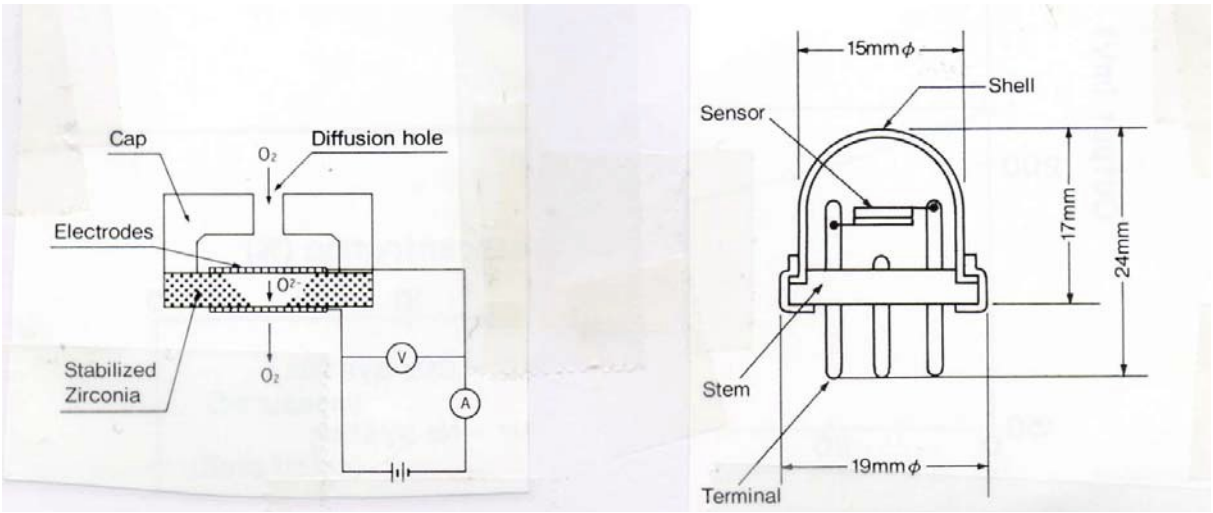
Oxygen Module

FCX-MCxx-CH

1.0 Summary / Principle of function

The sensor module is a complete solution for measuring oxygen within the range of 0,05...25% or 0,1… 95%. The sensor and the elecronics are united on one board. The microcontroller linearizes the sensor signal and puts it out as analogical current. (Current-Loop Interface.)

Principle sketch of the O_2 Limiting-current sensor



The zirconia is pervious to oxygen ions when heated up to approx. 450°C. Therefore the oxygen gets pumped off a cavity by a current attached to the sensor. During a constant gas pressure the amount of pumped-off oxygen equals the amount of the through the capillaries post-diffunded oxygen molecules and within a certain range independent of the current attached between the electrodes. The measure current is proportional to the amount of the pumped-off oxygen molecules. The link between oxygen partial pressure and sensor current is according to the following formula:

$I_s = c\ I_n\ (1 - pO_2 / pt)$

means:

I_s = sensor current
c = constant (sensor specific)
pO_2 = oxygen partial pressure
pt = gas pressure (total)

The sensor module takes care of two jobs:

- Linearizing of the link between oxygen partial pressure and sensor current
- Regulation of the heating performance of the sensor

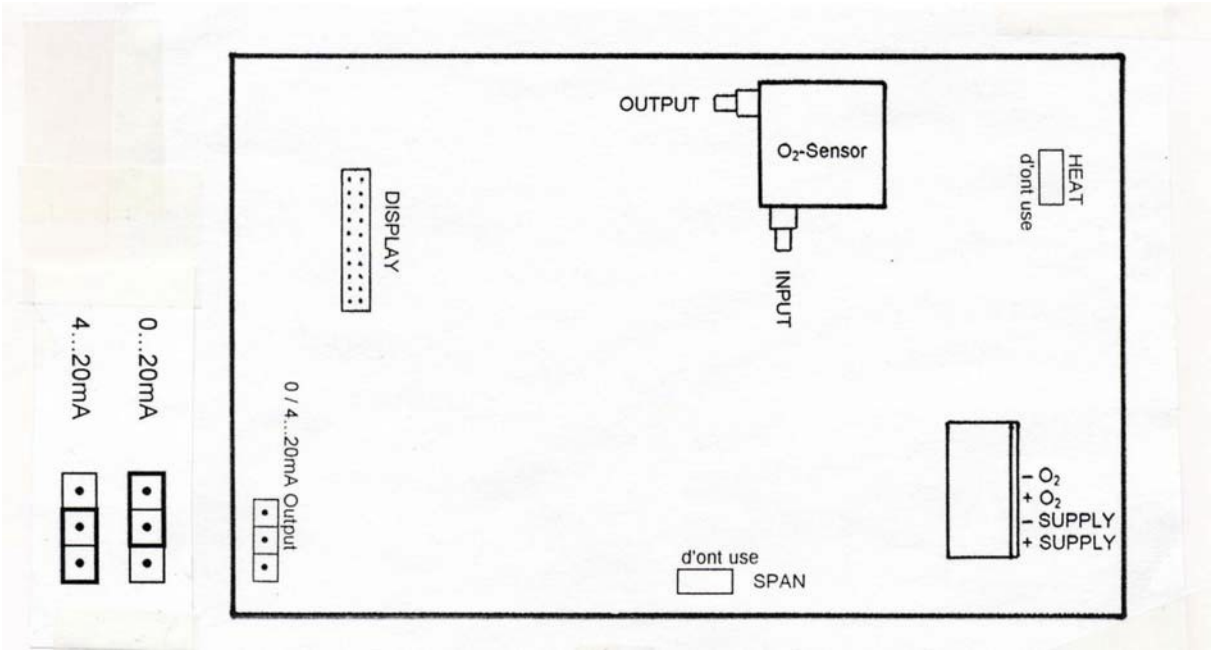
2.0 Operation Information

2.1 Environment Conditions
Note the specifications, especially for the range of temperature and humidity (non-condensing).

2.2 Supply
The module gets supplied with 11,5...28VDC through the clamps 1 (+) and 2 (-), approx. 250mA (24VDC).

2.3 Signal Output
The module can be run by an output of 4...20mA or 0...20mA (3-pin plug). For the output signal the clamps 3 (+) and 4 (-) can be used. The load resistance has to be dosed so that the output current doesn't exceed 9V.

Tip:
- Load resistance 250Ω
- Pass the cables twisted



Plug DIN 41612-F

Supply + 32 d, b, z
Supply - 30 d, b, z
Output + 28 d, b, z
Output - 26 d, b, z

2.4 Warm-up Time

The module takes 5-10 minutes to warm up.

2.5. Gas Flow

The flow case has 2 tubes with a diam. of 5mm.
Please note the following points:

- **The flow shouldn't exceed 0,5l/min.**
- **Pressure drift can lead to incorrect readings**
- **Polution within the gas flow can shorten the life span of the sensor tremendously**
- **Avoid condensation (H_2O) within the sensor case**

2.6 Calibration

All necessary adjustments and calibrations are being done at the production site.
The output signal is to be read as followed:
0...20mA pO_2 (%) = 25 I_{out} (mA) / 20
4...20mA pO_2 (%) = 25 (I_{out} [mA] - 4) / 16
means:
pO_2: oxygen partial pressure in % of the total pressure
I_{out}: output current in mA

2.6 Re-calibration

It is recommended to check the device periodically by running it under regular lab conditions and rinse the sensor with regular air (20,95% O_2).

Tip: Flush with air approx. 0,5l/min.. The result of the measuring at an invironmental temperature of 25°C should be 20,95% O_2 ±0,2% O_2. Should there be higher differencies, please send the device in for checking and possible re-calibration.

Warning:
The potentiometers on the boards must not be tempered with.

Authorized users may adjust through the display-box SPAN and ZERO as followed:

Attach the display to the board.
press button + and - for 6 sec.
note the number (typical value 100)
O_2 ZERO + or - adjust
press button + and - next step
note the number ((indivual between 0 and 200)
O_2 SPAN + or - adjust
press button + and - end of adjustment

3.0 Important advise

3.1 Restrictions

Gas mix with admixtures which react with oxygen can lead to incorrect readings. Pressure drifts can lead to incorrect readings. Especially periodical pressure drifts result in readings that are systematically too high.

3.2 Danger

WARNING: The temperature of the sensor is 450°C. Be aware of possible dangers while handling sensitive gas mixtures temperature of the sensor is 450°C. Be aware of possible dangers while handling sensitive gas mixtures.

4.0 Specifications

Measuring range: **0,05...25% or 0,1…95%O_2**
Supply voltage: **24VDC nominally (11,5...28VDC)**
Supply current: **typ. 250mA (24VDC), switch-on point approx. 0,7A**
Output signal: **eligible 0 / 4...20mA current loop**
load resistance for operation max. 9V
Resolution: **input side : 10bit AD**
output side : 11bit DAC
Accuracy: **<2%FS**
Temperature influence: **measuring faults [in % pO_2] ~ pO_2 [% x (T_e[°C] -25°C) / 500**
T_e = invironmental temperature of the sensors
Response time: **<30 sec. T_{90}**
Gas temperature: **-10...+50°C**
Humidity: **non-condensating**
Dimensions : 125 x 100 x 25mm (L x W x H)