

## Oxygen sensor module

## FCX-M Data sheet

### ■Features

- High accuracy
- Long life (More than 3 years in normal air) \*1
- Continues calibration and maintenance not required \*2
- Calibration gas not required
- From ppm to 95%O<sub>2</sub>, wide measurement range
- No interfariance to media
- No pressure dependence

Models:	FCX-M series
-F: sensor mounted on PCB (for diffusion)	
-F-AC: sensor mounted in flow housing (for forced flow) 	

RoHS compliance

### ■Specifications

Item	FCX-MP-F-AC	FCX-MQ-F-AC	FCX-MV-F FCX-MV-F-AC	FCX-MW-F FCX-MW-F-AC	FCX-MWGP-2A-F	FCX-MEP2-F FCX-MEP2-F-AC
Measurement range	50 to 1000ppmO <sub>2</sub>	0.05 to 1 %O <sub>2</sub>	0.1 to 25 %O <sub>2</sub>	0.1 to 95 %O <sub>2</sub>	75 to 95 %O <sub>2</sub>	0.1 to 25 %O <sub>2</sub>
Accuracy	+/-5%FS	+/-5%FS	+/-1%FS	+/-0.5%FS	+/-2%O <sub>2</sub>	+/-1%FS
Output (Logarithmic)	50 to 1000 mV	50 to 1000 mV	1 to 256 mV	1 to 2669 mV	1235 to 2669 mV	4 to 20 mA
	$V_{out} = -999.5 \times 10^3 \times \ln \left[ 1 - \frac{\text{ppmO}_2}{10^6} \right]$	$V_{out} = -99.5 \times 10^3 \times \ln \left[ 1 - \frac{\% O_2}{100} \right]$		$V_{out} = -891 \times \ln \left[ 1 - \frac{\% O_2}{100} \right]$		Output= $-57x \ln \left[ 1 - \frac{\% O_2}{100} \right] + 4$
Response time *3	90sec. (for 90% value)		30sec. (for 90% value)		30sec. (for 90% value)	
Power supply *4		DC5+/-0.2V			DC5+0.1/-0.25V	DC12+/-3V
Power consumption		5W max.			4W max.	3W
Operating temperature		-10 to 50 deg.C			0 to 60 deg.C	-10 to 50 deg.C
Operating humidity *5		0 to 85%RH			40 to 85%RH	0 to 85%RH
Dimensions		50x16x104 mm			40x23x80 mm	45x20x52 mm
Weight		Approx. 65grams			Approx. 40grams	Approx. 40grams

Item	FCX-MVL-F FCX-MVL-F-AC	FCX-MWL-F FCX-MWL-F-AC
Measurement range	0.1 to 25 %O <sub>2</sub>	0.1 to 95 %O <sub>2</sub>
Accuracy	+/-1%FS	+/-1%FS
Output (Linear)	1 to 250 mV	1 to 950 mV
	$V_{out} = 10mV \times O_2\%$	
Response time *3	30sec. (for 90% value)	
Power supply *4	DC5+/-0.2V	
Power consumption	5W max.	
Operating temperature	-10 to 50 deg.C	
Operating humidity *5	0 to 85%RH	
Dimensions	50x38x104 mm	
Weight	Approx. 120grams	

\*1 Depends on operating environment.

\*2 Annual calibration or maintenance still recommended.

\*3 From 10 to 90% step change.

\*4 Regulated DC power supply. The current capacity must be 1A.

\*5 Without vapour condensation.

Note ; Please read above instructions before using the sensor.  
Fujikura reserves right to change specifications without notice.

If you have any questions regarding technical issues or specifications, please contact us.

### Instruction for use ;

1. Sensor modules are calibrated with N2-O2 balance gases. Other gases may affect the sensor performance by increase errors.
2. Do NOT separate the sensing element from the circuit board and lead wires length must be remained unchanged.
3. Do NOT use in harsh environmental conditions containing halogen atoms(F,Cl,Br) , SOx ,Nox or H2S which make the sensor inferior in a short time.
4. Flammable gases ,such as H2 ,CO ,methane or Alcohol make a big error. And please note that the temperature at the sensing part goes up to 450 degrees C during the operation,which may exceed the flash point and cause explosion.
5. Silicone gas or vapour including Siloxane also make the sensor inferior in a short time.
6. Dust or oil mist cause failures of the products,errors or a slow response. They must be eliminated with a filter.
7. Water drop's contact may give a damage to sensor. It must be eliminated with a filter.
8. Temperature at the sensor mesh surface reach 50~80 degrees C during operation. Please take precautions against burning yourself.
9. A strong shock such as drop may cut internal wires or break the sensor pellet which is made of ceramic. Do NOT apply a shock of 10G or more to the sensor.
10. The warranty period is one year from the ex-factory date. This warranty does NOT apply to the sensors as follows ;
  - 1) There are any defects to faults caused by an improper dealing during the transpotation after Fujikura has delivered the sensor to place where the buyer had instructed.
  - 2) There are any defects or faults caused by the buyer's misuses ,abuse or neglect.
  - 3) The buyer fixed or remake the sensors.
  - 4) There are any indentical or consequential damages which are given in the usage.
  - 5) There are any defects or faults caused by natural disasters such as fire ,earthquake, flood or thunder.
11. Fujikura's oxygen sensors are NOT developed ,designed ,manufactured ,sold ,intended or authorized for use as components in systems intended for the surgical implant into the body ,other applications intended to support or sustain life ,fail-safe applications in which the failures ,breakages or where misused of the sensors could create a situation where personal injury or death ,explosion or fire ,or serious social damage may occur. Fujikura and its subcontractors and distributors accept NO responsibility the buyer's selection and use of Fujikura's oxygen sensors without Fujikura's written approval in any such unintended or unauthorized and situation where personal injury or death ,explosion or fire ,or serious social damage may occur.
12. A fail-safe design is strongly required when customers use the sensor in medical applications or alarm systems for oxygen shortage even except above.





## Caution!

**Please carefully read the followings before using the oxygen sensor products.**

### **1. Applications for medical appliances, life-support equipment and low oxygen detectors**

- (1) Fujikura products are not designed, intended or approved for use as components of surgical or life support systems, or other applications that may cause injury or death as a result of failure. In unapproved applications or uses where the customer implies, directly or indirectly, resultant injuries or deaths are due to Fujikura, Fujikura affiliates and agencies (citing for example, a design or manufacture fault), Fujikura, Fujikura affiliates and agencies shall be free from responsibility relating to any claims, costs, losses, and compensation.
- (2) When a Fujikura product is to be used in medical appliances and oxygen detectors other than those mentioned above, it is strongly advised that fail-safe designs are established. Fujikura should be consulted for the necessary information.

### **2. Service life and guarantee period**

- (1) The end of service life shall be defined as the time when the output no longer meets the specified precision.
- (2) The guarantee period is for one year from the date of shipment. During the guarantee period, should defects occur under normal conditions of use as specified in the manual and within the service life, the product will be repaired or replaced without charge. However, a repair or replacement fee will be charged in the following cases.

Defect or damage due to inappropriate transportation or handling after delivery.

Defect or damage caused by misuse, abuse or careless handling.

Defect or damage due to unauthorized repairs or changes in configuration

Damage to the cosmetic appearance caused during use

Damage from fire, earthquake, flood or other natural disasters and abnormal voltage.

### **3. Operational precautions**

#### **3.1 Measurement of atmospheric gases**

##### **(1) Calibration gas**

The sensor should be adjusted with a calibration gas that is a mixture of nitrogen, N<sub>2</sub> (or Argon, Ar) and oxygen, O<sub>2</sub>. Other balance gases may result in incorrect measurements.



#### (2) Combustible gases

An atmosphere continuing combustible gases such as methane, alcohol, hydrogen, carbon monoxide and nitrogen oxides (NOx) may cause errors in measurement. Since the sensor element functions at 450°C, gases that ignite below that temperature must not be used.

#### (3) Silicon gases

Never use silicon gases containing siloxane, as these gases react with the sensor and produce oxides, destroying the performance of the sensor over a very short period.

#### (4) Fluorocarbons

Do not use freons and others that contain halogens (F, Cl and Br), as these gasses react with materials inside the sensor and damage the performance.

#### (5) Sulfur oxides and hydrogen sulfide

Never use sulfur oxides (SOx) and hydrogen sulfide (H<sub>2</sub>S), as they react with the sensor and destroy the performance of the sensor over a very short period.

### 3.2 Operating conditions

#### (1) Dust and oil mist

Employ a filter system to eliminate dust and oil mists that clog the sensor and analyzer filter, resulting in problems, measurement errors and incorrect responses.

#### (2) Water and condensation moisture

Contact of the sensor with water may destroy the sensor. Exclude water from the system.

### 3.3 Others

- (1) Do not touch the sensor mesh while in operation, since the sensor mesh is heated to 50 - 80°C.
- (2) Do not subject the sensor to a shock of 10G or greater which may cause breaks in the wiring and cracks in the sensor chip.
- (3) The sensor element is made of a ceramic material. Never expose it to heat suddenly as this could destroy the element.

### 4. Others

Any product described in the catalogues may be altered without prior notice to improve reliability, function or design. Fujikura is not responsible for any incidents due to application of products and circuits described in the catalogues. No Fujikura patents or rights are licensed to a third party.

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## We are here for you. Addresses and Contacts.

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