



**Instruction Manual**  
**ExTox Integral Measuring Concept**  
**IMC-8D(-Biogas)2 and IMC-4D(-Biogas)2**  
**- Abbreviated Version -**

**ExTox Gasmess-Systeme GmbH**  
**Max-Planck-Straße 15 a**  
**59423 Unna**  
**Germany**  
**Telefon: +49(0)2303 33 247 0**  
**Fax: +49(0) 2303 33 247 10**  
**E-mail: kontakt@ExTox.de**  
**Internet: www.ExTox.de**

## 1 Preliminary Remark

This Abbreviated Version should give you a survey on using the Integral Measuring Concepts IMC-8D(-Biogas)2 and IMC-4D(-Biogas)2. Configuration, installation and maintenance are described in the detailed documentation which forms part of the scope of delivery.

## 2 Indications and Facilities

The control unit covering the indication of measured values, alarms and messages as well as keys is installed in the door of the wall mounted housing.

For description of the indications and facilities please see the Instruction Manual of the control unit.

In the survey on measured values of the IMC the volume stream of measured gas and state of fans are indicated instead of date and time.

## 3 Configuration

The menu system parameter serves for factory sided activation of operating modes "IMC" or for the biogas types "BIO" instead of "ET-8" or "ET-4".

**Attention:** Changing of these settings should in no way be done by the user. Changed measuring functions may otherwise lead to loss of safety functions.

The following status monitoring functions are integrated in this version:

- rotary speed monitoring of both fans
- flow rate monitoring: message for over- and under-scale of nominal range
- temperature monitoring of the measured gas cooler (if installed)

In the first two cases a message leads to system fault of the control unit.

As long as the measured gas cooler does not reach its operating temperature, for example during the warm-up phase after initial operation, the gas suction pump remains switched off.

### 3.1 Course of Measurement for IMC-Types

Even the transmitters build into the IMC measure continuously. The IMC-Channels are activated in the menu Channel Configuration by setting the Mode ON.

### 3.2 Course of Measurement for Biogas-Types

In operation mode "BIO" a discontinuous measurement takes place. All channels for biogas measurement are selected in the menu Channel Configuration by setting the mode TIMER. Three phases are run through cyclically:

1. Air: the gas flow is flushed with air that means the magnetic valve has switched to the inlet test gas / flushing air.
2. Flushing: the system switches to the measured gas inlet. The gas concentration is not measured during this time. This phase is needed to transport the sampled gas from the process to the IMC using the gas flow. The gas suction pump is switched off two minutes before end and the gas flow is closed. Measurement in batch mode is prepared.
3. Measuring: the system measures the actual values when changing over to phase measurement. During this phase the gas suction pump remains switched off. Latching alarms can only be reset in the measuring phase.

You can manually interfere in this process. Measurement can be started by pressing simultaneously the keys F8+F3 (IMC-8D-Biogas2) or F6+F3 (IMC-4D-Biogas2). The IMC-Biogas first changes to the phase flushing and starts the measurement later on.

During the phases air and flushing all measured values, alarms and outputs remain frozen on the latest value of the previous measuring phase.

*Remark:* This means, that it is only possible to reset the latching alarms after passing the measuring phase again. If necessary a measurement can be started manually (see above) to reduce the waiting time on longer cycle times.

The times for the individual phases can be adjusted in the menu Timer which can be reached via the menu System Parameter and selection of the menu setting Mode BIO.

*Overload protection for hydrogen sulphide sensors:* To avoid irreversible damages due to permanent application with very high hydrogen sulphide concentrations, the IMC-Biogas switches automatically from phase Measurement to phase Air in case the third alarm level is reached.

## **4 Calibration and Adjustment**

### **4.1 IMC-Types**

Calibration and adjustment is done by application of test gases at the inlet of test gas. From the inlet of measured gas the gas inlet can be changed-over to the inlet test gas/flushing air via magnetic valve. For that purpose you have to select the menu maintenance. You can switch between both gas inlets by pressing the keys SHIFT + F4.

Application of test gas should be done pressure less. During application of test gas you should ensure a flow-through corresponding to the one in measuring operation.

When adjusting please follow the hints in the Instruction Manuals of transmitter and control unit.

### **4.2 Biogas-Types**

Calibration and adjustment of the biogas-types is only done via automatic control.

#### **4.2.1 Preparation**

You have to enter the concentrations of the used calibration gases in the menu "System Parameter/Mode/Bio/Timer". On the right side of the display you could enter the concentrations for CH<sub>4</sub>, O<sub>2</sub>, CO<sub>2</sub> and H<sub>2</sub>S. These values are necessary for automatic calibration. You will normally find this information on the test gas bottle. In case the test gases are filled in different pressure gas bottles, you have to follow the instructions following below for all used test gases. For calibration of the O<sub>2</sub>-Measuring Channel you have to apply a test gas which does not contain any oxygen.

#### **4.2.2 Course**

You have to select the menu point "Calibration" in the menu "Setup". For that purpose you have to activate minimum Access Level 2 before. The calibration menu appears and the internal magnetic valve switches to flushing air. In case the system should not be calibrated you could leave the menu via "Esc". In case the system should be calibrated, please connect the test gas bottle at the measured gas inlet. By means of "Start" the automatic calibration is started. The analogue outputs of the type IMC-4DA-Biogas keep the measured values of the last measurement.

Calibration is done in five phases:

Phase	Indication in Display (IMC-8D/IMC-4D)	Course
1	RINSING AIR / RINS AIR	The system is flushed with air for three minutes.
2	READING ZERO / READ ZERO	The gas suction pump is switched off. The system waits one minute until stabilisation of measured values. Then the measured values are stored (zero point values for CH <sub>4</sub> , CO <sub>2</sub> , H <sub>2</sub> S or 20.9 Vol.-% for O <sub>2</sub> ).
3	RINSING GAS / RINS GAS	The gas suction pump is switched on again and the system is flushed with connected test gas for four minutes. <b>Attention:</b> During this phase the test gas bottle has to be open and the extraction quantity has to be approx. 30 l/h. The indication of flow-through in the display of the control unit can be used for controlling.
4	READING SENSITIVITY / READ SENS	The gas suction pump is switched off and measurement in batch mode is performed within two minutes.
5	READY/ RREADY	Calibration is completed and a plausibility check of the new values for zero point and sensitivity takes place. Offset for the zero point may not exceed $\pm 2$ mA. The gain factor for sensitivity has to be between 0.5 and 2 (see comments on adjustment of the control units). Calibration values outside these limits are rejected, in the calibration menu the message "ERROR" is issued after completed calibration and the previous settings are kept.  <i>Remark:</i> The message "ERROR" for channels with measuring components which are <u>not</u> part of the test gas does not indicate a malfunction of the measuring channel. These measuring channels will be calibrated and adjusted later on or have already been calibrated and adjusted on application of other test gases.

When using several test gases please change now the bottle and start another calibration cycle by pressing "Start".

Calibration is definitely completed with "Esc".

## 5 Operation of the Integral Measuring Concept

The operation of the control unit is described in the Instruction Manual of the Series ET-8D and ET-4D2.

Furthermore the following remarks are valid for the additional functions and options.

### 5.1 Flow Rate Monitoring

The flow rate monitoring transfers the measured value serially to the control unit. It is detailed indicated on the display ("FLOW"). In case the alarm levels are reached the indication on the display switches between measured value and the message "ERROR" every second. In case the serial data link between control unit and flow rate monitoring interrupted for more than 15 s, the message "COMERROR" is issued. A fault of control unit is indicated at the control unit.

*Remark:* in the Biogas-Types the gas suction pump is switched off during some operation phases, so that no gas flow takes place. During these planned phases the flow rate monitoring is inactive.

### 5.2 Dust Filter

A dust filter is installed directly after the inlet flushing air/test gas.

The condition of the filter can optically be checked in an easy way. This test should be done regularly in intervals which depend on the dust load of the measured gas.

For the exchange of a used filter the filter has to be pulled off and replaced by a new one. Then tightness of the gas flow should be controlled.

### 5.3 Fans

The housing fans are equipped with a dust protection mat which should be cleaned regularly from dust. Therefore remove plug cover and clean mat.

The state of the fans is detailed indicated on the display of the control unit ("FAN"). In case even one of the fan fails the status indication changes from "OK" to "FAULT" and a fault of control unit is indicated at the control unit.

### 5.4 Dehumidification

Only draining of the manual condensate trap has regularly to be done. The trap and the hose lines should be cleaned on demand. It has to be ensured that the measured gas flow is not interfered.

During the warm-up phase a fault message is issued until the cooler reaches operation temperature.

Please make sure that the condensate can drain off failure free and safe from the connection at the bottom of the housing.

### 5.5 Flame Arrestor

It has to be ensured that the flame arrestors are not clogged with dust or condensate. In other aspects they are maintenance free.

### 5.6 Heating for Enclosure with Thermostat Control

The nominal temperature can be adjusted in a range of +5°C to +30 °C by means of a regulator. The temperature should be that high that no formation of condensate inside the housing will occur.