User manual
CF8-D/W-IN

General

The sensor ***CF8-D/W-IN*** is used to measure the carbon dioxide concentration inside incubators.
All functions can be modified from a PC with the communication cable.

Functional description
This part describes the function of the configuration of ***CF8-D/W-IN***. Please note that the two outputs may completely or partly have other functions. These functions may be reprogrammed after the installation. To be sure that every unit is correctly programmed, in accordance to the actual application, a check by a PC and the standard UIP software (version 4.0 or higher) is necessary.

OUT1 and OUT2 are used for the measuring signal of carbon dioxide concentration.

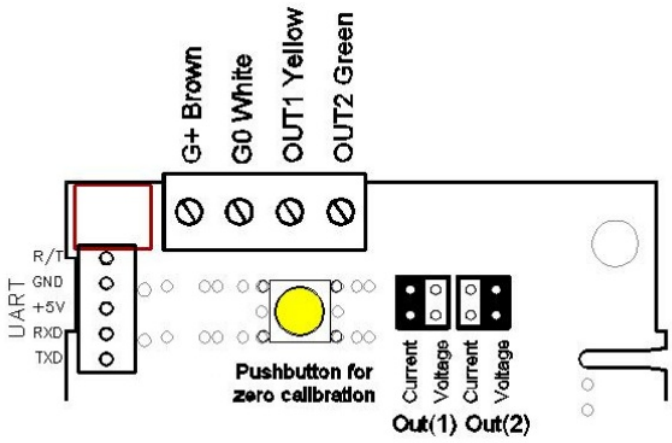
OUT1 = measuring signal of carbon dioxide concentration
OUT2 = measuring signal of carbon dioxide concentration

Terminal	Standard configuration	Standard settings *	Standard function
OUT1	4-20mA	0-3 % CO_2	Measuring signal
OUT2	0-5VDC	0-2 % CO_2	Measuring signal

*Table I. Default configuration of **CF8-D/W-IN***

OUT1	Current	Connection in position “Current” provides 4-20mA output range for OUT1. *See note 1*
	Voltage	Connection in position “Voltage” provides 2-10VDC output range for OUT1. *See note 1*
OUT2	Current	Connection in position “Current” provides 0-10mA output range for OUT2. *See note 1*
	Voltage	Connection in position “Voltage” provides 0-5VDC output range for OUT2 *See note 1*.

*Table II. Configuration jumpers for **CF8-D/W-IN***
Note 1*: During start up the unit may deliver up to 10 VDC or 20 mA for up to half a second.*



Functional test of *CF8-D/W-IN*

The unit has two LED's -one yellow and one red. These LED's indicate the status of the controller.

Yellow LED - "Call for maintenance" is lit, if an error flag is set or the measurement is out of range. The yellow LED flashes in series during Automatic Zero Point Calibration.

Red LED - "Relay active" is lit for eight minutes when a zero point calibration has been executed.

PLEASE NOTE!
The sensor accuracy is defined at continuous operation.

Self diagnostics

The system contains complete self diagnostic procedures. A full system test is executed automatically every time the power is turned on. For ***CF8-D/W-IN*** the internal voltage regulators and outputs are checked. In addition, constantly during operation, the sensor probes are checked against failure by checking the valid dynamic measurement ranges. These different system checks return error bytes to the system RAM. If any error is detected, the yellow LED will be lit until the error has vanished and the error flag is reset. "Warm up" and "Out of Range" are the only bits that are reset automatically after return to normal state. All other error bits have to be reset manually after return to normal state by power off and restart.

Descriptions of the different codes are listed below.

Bit #	Error code	Error description	Suggested action
0	N/A	**Fatal Error** Yellow LED continuously flashes. Push buttons are not operating.	Try to restart sensor by power OFF/ON. Contact local distributor
1	2	**Reserved**	
2	4	**Algorithm Error**. Indicate wrong EEPROM configuration.	Try to restart sensor by power OFF/ON. Check detailed settings and configuration with UIP software version 4.0 and higher. Contact local distributor
3	8	**Output Error** Detected errors during output signals calculation and generation.	Check connections and loads of outputs. Check detailed status of outputs with UIP software version 4.0 and higher.
4	16	**Self Diagnostic Error**. May indicate the need of zero calibration or sensor replacement.	Check detailed self diagnostic status with UIP software version 4.0 and higher. Contact local distributor
5	32	**Out Of Range Error** Accompanies most of other errors. Can also indicate overload or failures of sensors and inputs. Resets automatically after source of error disappearance.	Try sensor in fresh air. Check detailed status of measurements with UIP software version 4.0 and higher. *See Note 1!*
6	64	**Memory Error** Non fatal error during memory operations.	Check detailed settings and configuration with UIP software version 4.0 and higher.
7	128	**Warm Up state** Is always set after power up or power failure. Resets after restart sequence.	If it doesn't disappear in half a minute, check power stability.

Note 1. *Any probe is out of range. Occurs, for instance, during over exposure of CO2 sensor, in which case the error code will automatically reset when the measurement values return to normal. Could also indicate the need of zero point calibration.*
Remark*: If several errors are detected at the same time the different error code numbers will be added together into one single error code!*

Automatic Zero Point Calibration

The ***CF8-D/W-IN*** sensors have a function for easy automatic zero point calibration. The calibration should be done after installation and at least once every year. The calibration can be done on site. It is only necessary to connect the zero gas without any further action required from the operator, but to check the verification signal offered from the system.

1. Unscrew one of the filters from the sensor housing and replace it with a hose nipple.
2. Connect the zero gas to the nipple. The sensor automatically enters phase 1 of the calibration procedure when the CO_2 concentration drops sharply. See figure 2. Do not remove the zero gas during calibration.
3. When the calibration starts the yellow LED starts to flash. The sensor continues the procedure until the readings of the sensor are stable enough and are below the limit of Automatic Zero Point Calibration. If the conditions are not good enough for calibration within eight minutes the sensor returns to normal measuring operation without calibration.
4. When the calibration is successfully executed the yellow LED flashes four times, pauses and flashes another four times for an eight minutes acknowledgement period, phase 2. During the acknowledgement period the relay is closed and the red LED is lit.
5. Remove the zero gas during the acknowledgement period. The sensor returns to normal measuring mode as soon as the calibration is ready. The yellow LED continues flashing, the red LED is lit and the relay is closed independent of gas removal.

The zero gas can be generated by passing air through the chemical absorber in the service bag F0005 or by using nitrogen in a gas bottle. Not more than three minutes shall pass before the yellow LED starts to flash. If the yellow LED does not start to flash the zero gas is not good enough or the sensor is not stable enough. Wait ten minutes before another attempt to calibrate the sensor.

If the sensor does not enter phase 1 even if the conditions are good push the push button on the PCB until the red LED is lit to force a manual zero point calibration. Push the push button for at least ten seconds.

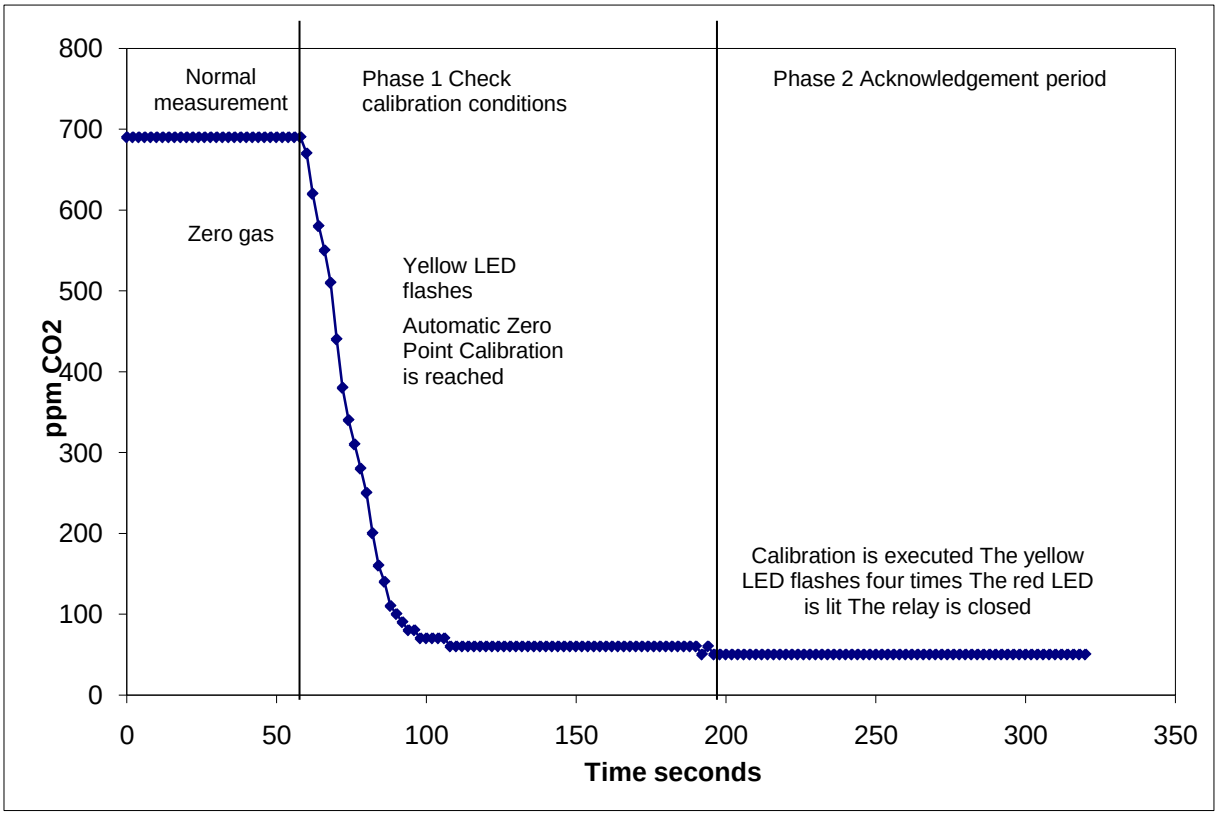


Figure 2. An example of Automatic Zero Point Calibration

The Automatic Zero Point Calibration should be executed after installation and at least once a year.

Trouble shooting
The yellow LED does not start to flash. The sensor does not enter calibration mode within three minutes.

1. The absorber of the zero gas bag is not fresh. Remove the old absorber and refill the bottle with fresh. **The absorber is corrosive! Be careful and wear eye protection goggles**.
2. The flow of the zero gas is too small or air is leaking into the sensor. The gas flow must be about 0,5 l/min.
3. Push the push button on the PCB for ten seconds (until the red LED is lit) to force manual zero point calibration. Please check the gas before pushing the push button since the calibration is executed even if the gas is not good enough.

Contact the dealer if the sensor still does not enter the calibration mode.