Compact infrared gas module

Nova*gas*2 is an innovative gas sensor for the measurement of CO_2, CO, CH_4, HC and N_2O gas concentrations with automatically temperature compensation. Based on client needs, it can be easily integrated into existent measurement systems or monitoring instruments. It's a smart sensor characterized by native chips for wireless transmission, charging systems, energy recovery and sensor fault diagnostics.

Technical Data

Detection Method	Dual channel Non-Dispersive InfraRed (NDIR)
Dimensions	depending on the sensor model (type of gas and range)
Source drive freq.	1 to 2Hz
Data refresh rate	5 to 10 seconds
Response time (t_{90})	15 to 40s @20°C ambient and @1l/min
Warm up time	<30s @20°C operational <30 minutes @20°C (full spec)
Operating conditions	Temperature 0°C to 50°C linear compensated
	Humidity 0-95% RH (non-condensing) not compensated
	Pressure 800-1150hPa not compensated
Pressure dependency	+1.5% reading per kPa deviation from normal pressure of 100kPa
Analog Output	4-20mA, 0-5V
Analog Input	2 available for third-party devices
Digital I/O	4 OUT: Open collector, ground referred, protected 4 IN: 0-5 V protected up to 24Vdc
Pipe connection	For tube with diameter ø4/ø2.5mm
Interface connection	UART (TTL level), baud rate: 9600 (default) - 19200 - 38400
Power supply	9-24V DC, reverse protected
Power consumption	max 90mA @ 9VDC, excluding pump power absorption

Connector type	Power Supply:	On module connector	Mating connector
		Weidmüller SL3.5/2/180G3.2	Weidmüller BL3.5/2
	Analog I/O:	Weidmüller SL3.5/2/180G3.2	Weidmüller BL3.5/6
	Pump:	Weidmüller SL3.5/2/180G3.2	Weidmüller BL3.5/2
	Digital I/O:	TE Connectivity* 215307-5	TE Connectivity 826656-5
	Analog Out (0-5V):	TE Connectivity* 8-215464-6	TE Connectivity 8-215079-6
	Power Supply & UART TTL level (0-5V):	TE Connectivity 7-215464-6	TE Connectivity 7-215079-6
Storage temperature	-40°C to 85°C		
MTBF	>5 years		

* not mounted, available on request

Specifications

Gas	Measurement Range *	Accuracy**	Zero Res. (ppm)	Full Scale Res.	Zero Repeatability (ppm)	Full Scale Repeatability (ppm)	Model
CO_2	0-1000ppm****	±1% FS	1	1% FS	±5	±10	NG2-A-7
	0-2000ppm	±1% FS	1	1% FS	±10	±25	NG2-A-8
	0-5000ppm	±1% FS	1	2% FS	±10	±50	NG2-A-1
	0-1%	±2% FS	1	2% FS	±25	±200	NG2-A-9
	0-5%	±2% FS	1	2% FS	±25	±250	NG2-A-6
	0-10%	±2% FS	1	2% FS	±25	±250	NG2-A-2
	0-25%	±2% FS	1	1% FS	±50	±500	NG2-A-3
	0-100%	±1% FS	1	1% FS	±1000	±5000	NG2-A-4
	0-100% biogas***	±1% FS	1	1% FS	±1000	±5000	NG2-A-11I
CO	0-2000ppm	±1% FS	5	1% FS	±10	±70	NG2-B-1
	0-4000ppm****	±1% FS	5	1% FS	±20	±70	NG2-B-3
	0-2%****	±1% FS	5	1% FS	±20	±400	NG2-B-4
	0-5%****	±1% FS	5	1% FS	±20	±600	NG2-B-5
	0-10%****	±1% FS	5	1% FS	±30	±600	NG2-B-6I
	0-15%****	±1% FS	5	1% FS	±30	±1000	NG2-B-7I
CH_4	0-2000ppm	±4% FS	5	4% FS	±15	±100	NG2-C-1
	0-4000ppm****	±4% FS	5	4% FS	±20	±100	NG2-C-6
	0-100% LEL	±2% FS	15	4% FS	±50	±500	NG2-C-2

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	0-100% vol. biogas***	±2% FS	500	2% FS	±1000	±5000	NG2-C-3I
	0-100% vol.****	±2% FS	300	2% FS	±500	±3000	NG2-C-4
HC	0-2000ppm	±4% FS	5	4% FS	±15	±100	NG2-D-1
	0-100% LEL	±2% FS	15	4% FS	±50	±500	NG2-D-2
N$_2$O	0-100ppm****	±2% FS	1	2% FS	±3	±3	NG2-F-3
	0-1000ppm****	±1% FS	1	2% FS	±10	±20	NG2-F-2
	0-2000ppm	±1% FS	1	1% FS	±10	±20	NG2-F-1
	0-5000ppm****	±1% FS	1	1% FS	±10	±20	NG2-F-9
	0-2000ppm (diffusion)	±1% FS	1	1% FS	±10	±20	NG2-F-6
	0-1% vol. ****	±2% FS	50	2%FS	±500	±1000	NG2-F-7
	0-10% vol. ****	±2% FS	50	2%FS	±500	±1000	NG2-F-4
	0-100% vol. ****	±1% FS	50	2%FS	±1000	±5000	NG2-F-5

* Other measurement ranges available on request; ** Stated accuracy excludes calibration gas tolerance of ± 1%;
*** Corrosion-proof gas cell; **** Delivery time depends on gas availability and quantity

Sensor dimensions

Model	Dimensions (LxWxH)
NG2-A-1, NG2-A-2, NG2-A-3, NG2-A-4, NG2-A-6, NG2-A-7, NG2-A-8, NG2-A-9, NG2-A-11I, NG2-C-2, NG2-C-3I, NG2-C-4, NG2-D-2, NG2-F-4, NG2-F-5, NG2-F-7	56mm x 48mm x 38mm
NG2-B-1, NG2-B-3, NG2-B-4, NG2-B-5, NG2-B-6I, NG2-B-7I, NG2-C-1, NG2-C-6, NG2-D-1, NG2-F-1, NG2-F-2, NG2-F-3, NG2-F-6, NG2-F-9	306mm x 48mm x 43mm

Options

- **Connector kit and USB interface cable**

In order to speed up the sensor integration, it is available a connector kit (NCK WIRED) - useful to easily power the sensor - and a UART TTL - USB interface cable to connect the sensor to a PC using the USB port (NIC). Furthermore, in order to easily calibrate the sensor, Novagas NCAL kit is the option. It includes the NIC kit, a pneumatic pump (0.5 l/min), two soft polyurethane tubing (OD 6mm, ID 4mm), two soft polyurethane tubing (OD 4mm, ID 2.5mm), a straight union fitting 6mm – 4mm and an additional connector for the pump. Novagas let the client also the choice to calibrate the zero/span levels using a digital input that can be wired for instance to buttons in an electrical cabinet. For this option, a dedicated I/O connector and configuration can be requested with the NDI code.
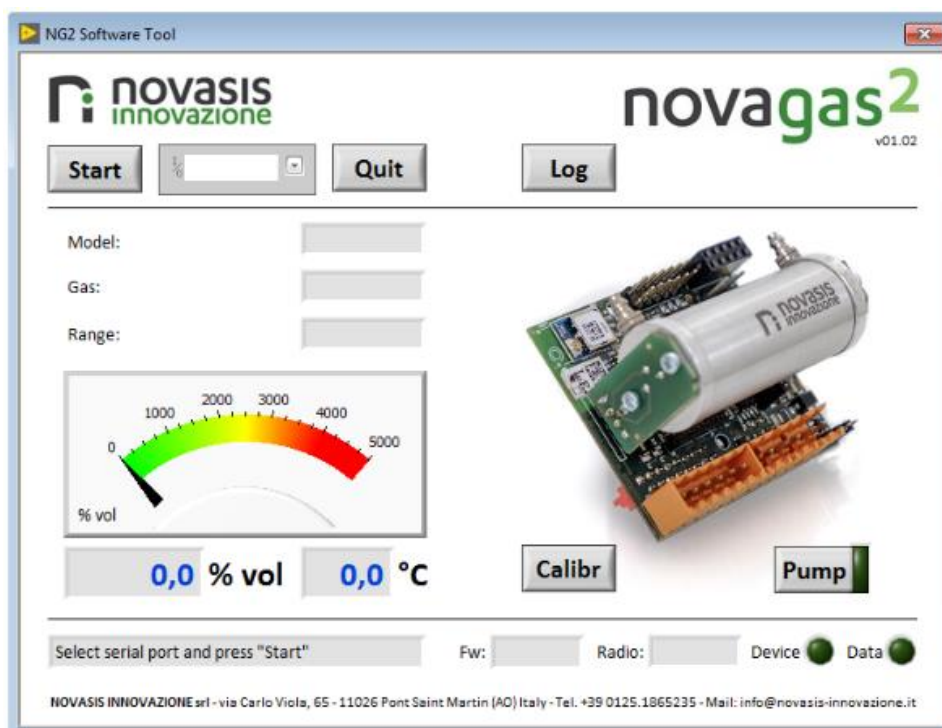
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Optional kit	Code
Novagas Interface Cable (USB)	NIC
Novagas Connector Kit Wired	NCK WIRED
Novagas Calibration Kit	NCAL
Novagas digital I/O calibration	NDI

- **Corrosion-proof gas cell**

A dedicated rugged gas cell to reduce the effects of corrosion in harsh industrial environments is available (I code in the sensor model). The detector element and the optical source have been protected by using calcium fluoride (CaF2) optical glass lids whereas the optical cavity has been realized using AISI 316 stainless steel.

- **NG2 software tool**

Novasis Innovazione developed a user friendly software tool specially designed to quickly test and calibrate Novagas2 sensor. It automatically recognizes the sensor model and let the user to read concentration level. It is available on request.

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- **Gas supply**

In most of the applications, NOVAgas2 sensor module is operated using a sampling pump coupled to hydrophobic/anti-condensing filters. The NAC option offer clients a starting kit.

Item	Code
Air filter 5um (pore size) auto drain	NAC
Soft tubing (OD 6mm, ID 4mm),	
Soft tubing (OD 4mm, ID 2.5mm)	

- **Wireless TX connectivity**

NOVAgas2 sensor module could integrate surface mount modules incorporating a RF transceiver chip suitable for low power wireless applications. The module is provided with a RF connector so that an approved antenna ranging from near omni-directional to shaped front/back patterns could be used. By means of the NOVAgas2 analog input, it is also possible to use the sensor board to broadcast data output of other sensors.

RF transceiver frequency		Antenna	Model
433MHz		monopole whip/ dipolar/directive	WTX1
868MHz			WTX2
915MHz			WTX3
2.4GHz			WTX4

- **Wireless RX connectivity (gateway)**

The receiving unit, or gateway, let the user to build up a wireless sensor network. The gateway is a NOVAgas2 electronic board specially programmed as a master. The gateway can receive wireless data from 1 up to 8 NOVAgas2 sensors and could be connected to other devices using its UART interface port.

RF transceiver frequency	Antenna	Model
433MHz	monopole whip/ dipolar/directive	BRX1
868MHz		BRX2
915MHz		BRX3
2.4GHz		BRX4

The following image shows one example of network topology based on NOVAgas2 sensors.
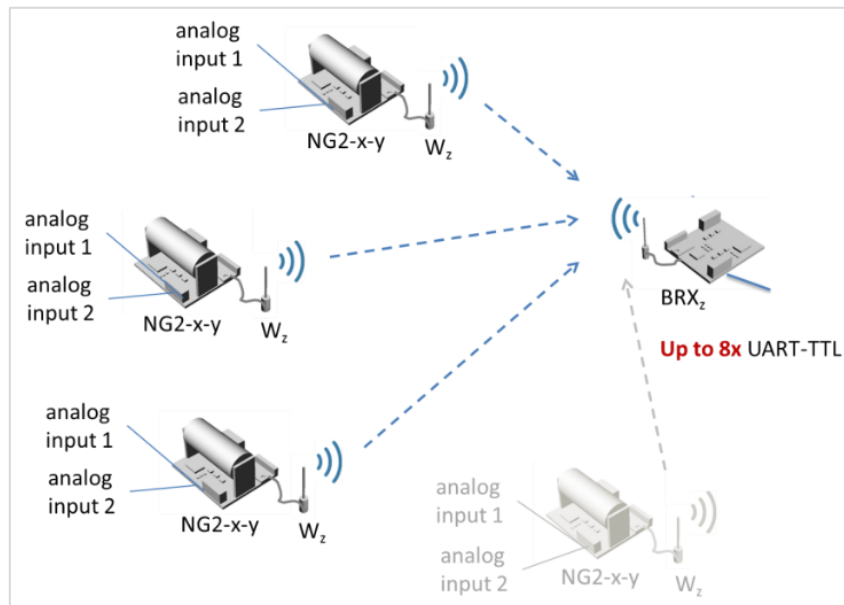
- **Energy harvesting power-management**

In this option NOVAgas2 sensor integrates a switch-mode battery charge controller for photovoltaic, wind, piezoelectric energy harvesting. The controller provides input voltage regulation and energy storage. Typical configuration deploys a 12V solar panel and a rechargeable lithium-ion battery (output 8.4V max – 0.5A).

Solar panel	Battery	Model
5W around 200x200mm	PCM 7.4V 2600mAh	S

NOTE: This document provides preliminary information that may be subject to change without notice. Alterations according to customer specifications possible.

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