PRONOVA Analysentechnik GmbH & Co. KG

SSM 6000

The SSM 6000 product line was designed specifically for analysing biogenic processes, such as gases from biogas facilities, sewage gas or landfill gas. It is designed to fit the requirements of periodic process inspections directly at the facility or plant. It takes advantage of well-proven sensor technology that has been specially selected for the relevant gases: methane, hydrogen sulphide, oxygen, hydrogen and carbon dioxide.

Additional features enhance the quality of the measurements and allow the devices to be configured for specific circumstances. The analysis is fully automatic and can be carried out at variable time intervals (e.g, every eight hours). It is also possible to continually record the component gases, with the exception of hydrogen sulphide. The SSM 6000 has a clear display and is easy to use. It features a data memory with a history function that records the specific time for all measured values.

Special Features

Pronova has more experience, in terms of years as well as the amount of applications, than any other manufacturer of biogas analysers. The first analyser designed specifically for continuous operation in biogas facilities was from the SSM series. It has been in use since 1998 and there are currently several thousand SSM analysers in use.

The measuring conditions at facilities are demanding and highly variable. Gas analysis equipment must be very reliable and stable enough for long-term usage. Several features, which are quite unconventional when considered together, have been built into the SSM series in order to meet these requirements. The following features are available to best meet the demanding requirements of biogas applications:

- An extended measuring range for hydrogen sulphide that uses a microprocessor-controlled dilution of the sample gas.
- Multi-level preparation of sample gas with filters and gas cooling to 5°C for dehumidification. The dehumidifi-cation prevents sensor malfunctions that could be caused by condensation. It also reduces the risk of corrosion on components exposed to the sample gas.
- Elimination of pressure and temperature influences on the measured values.
- Detonation safety barrier (EN 12874) and housing ventilation for safer operations.
- Second pump used to decouple the pressure conditions in the supply line.

The SSM series provides even more special features:

- Excellent long-term stability during methane and carbon dioxide measurements ensured by Pronova's proCAL technology.
- Automatic single-point calibration for other gas types.
- Large display for all recorded gases.

SSM 6000 Classic

At Pronova, we take advantage of our extensive expertise to design custom solutions for our customers. These innovative solutions are developed to meet new, extended requirements and the needs of our customers' applications.

Areas of application

The SSM 6000 analysers can be used for a wide range of applications in the biogas sector. The product focus is on-line monitoring of facility operations. Pronova offers a wide range of affordable solutions for small facilities, comprehensive analysis for large facilities, and facility variants for supplying biogas power into the public grid. Special versions are available which are adapted for use in research and development.

The SSM 6000 can be used as a stand-alone unit or as a component in complex analysis systems. It can also be used together with analysers from other vendors. It is available in a variety of housing options to fit with different application types. The wall-mounted housing is appropriate for use anywhere on-site in the facility (indoors, non-ATEX). Outdoor applications require protected housings. A portable desktop unit is well suited for lab use. A 19" version is available which can easily be integrated into systems.

The measuring process

An infra-red measuring process is used to detect methane (CH_4) and carbon dioxide (CO_2) with high accuracy and selectivity. This process eliminates any dependencies that pressure and temperature could have on the measured values. Pronova has developed the proCAL function for extending the infra-red measuring process. This function ensures an exceptional long-term stability for the calibration.

PRONOVA Analysentechnik GmbH & Co. KG

Hydrogen sulphide (H_2S) and hydrogen (H_2) are detected by electrochemical sensors. The wide range of available sensors ensures that the measuring range and cross-sensitivity can be optimally matched with your requirements. When working with high concentrations of hydrogen sulphide, a microprocessor-controlled dilution step can be used to extend the measuring range and to protect the sensors. Thermal conductivity sensors are available which can detect hydrogen concentrations in the percent range.

Oxygen (O_2) is predominantly measured using electrochemical sensors. Paramagnetic measuring cells are used for special requirements – particularly in conjunction with processing biogas so that it can be used to supply the public grid.

Controlling the concentration detection

Gas concentrations can be detected discontinuously or (with the exception of hydrogen sulphide) also continuously. The SSM technology is designed for connecting up to eight measurement points. The measurements can be manually controlled through the menu. They can also be automatically controlled using digital contacts, Profibus or CAN-bus.

SSM 6000 Classic
SSM 6000 LT, similar

SSM 6000 ECO

Devices in the SSM 6000 product line

SSM 6000 Classic

This is a multi-channel measuring instrument with built-in gas processing for the analysis of methane, oxygen, hydrogen, carbon dioxide and hydrogen sulphide – specially designed to work with high concentrations of harmful gases. It allows both discontinuous and continuous operating modes and can control up to eight measurement points.

With the aid of microprocessor-controlled, concentration-based dilution of the sample gas, the concentration of hydrogen sulphide is maintained below 30 ppm before the measurement takes place. This results in several advantages:

- A wide measurement range up to 5,000 ppm – with high accuracy even at low concentrations of 20 ppm.
- Use of electrochemical sensors in the optimal range. This results in a longer lifespan for the sensors and improved reliability for the measured values.

Additional steps are required for avoiding measuring errors whenever there are excessively high or low pressure levels at the gas sampling point, or when there is high flow resistance in the supply of gas to the analyser. The SSM 6000 Classic comes with an additional pump at the input to ensure proper measurement conditions.

SSM 6000 LT

The SSM 6000 LT provides a simple and affordable means for monitoring facilities which have less demanding measurement conditions. Compared to the SSM 6000 Classic, this standard version does not have a sample gas cooler or a mechanism for optimizing hydrogen sulphide measurements by controlled dilution.
Thus the standard range of measurement is 0 to 1,000 ppm for hydrogen sulphide.

SSM 6000 ECO
This is a measuring instrument for specific applications that do not require gas processing: such as the control and monitoring of filters for hydrogen sulphide or methane content at a combined thermal power plant.

SSM 6000 Lab

This is a special version of the SSM 6000 specifically designed for laboratory applications. The SSM 6000 Lab is optimized for measuring small sample volumes.

POINT MEASURING RANGES

	Measurement range	Resolution	Stability	Reference	Interval	Measuring process	Auto. calibration	Availability	Comments
Methane CH_4	100 vol.%	0.1 vol.%	±1 vol.% *	50 vol.%	Continuous	IR dual beam	proCAL	Classic/LT	Thermostatic, pressure compensation
Carbon dioxide CO_2	100 vol.%	0.1 vol.%	±1 vol.% *	50 vol.%	Continuous	IR dual beam	proCAL	Classic/LT	Thermostatic, pressure compensation
	10 vol.%	0.01 vol.%	±0.1 vol.% *	5 vol.%	Continuous	IR dual beam	proCAL	Optional	Thermostatic, pressure compensation
Carbon monoxide CO	5 vol.%	0.01 vol.%	±0.1 vol.% *	2.5 vol.%	Continuous	IR dual beam	proCAL	Optional	Thermostatic, pressure compensation
Oxygen O_2	25 vol.%	0.1 vol.%	< 0.2 vol.% *	Zero point*****	Continuous	Electrochemically	Single point	Classic/LT	
	5 vol.%	0.01 vol.%	< 0.1 vol.% **	Zero point*****	Continuous	Paramagnetic	Single point	Optional	Thermostatic
Hydrogen sulphide H_2S	5,000 ppm	1 ppm, 5 ppm	< 2 % ***	Measured value	1 hour	Electrochemically	Single point	Classic	
	1,000 ppm	1 ppm	< 2 % ***	Measured value	1 hour	Electrochemically	Single point	LT	
	200 ppm	0.2 ppm	< 2 % ***	Measured value	1 hour	Electrochemically	Single point	Optional LT	
	25 ppm	0.1 ppm	< 2 % ***	Measured value	Continuous	Electrochemically	Single point	Optional LT	Low hydrogen cross-sensitivity
Hydrogen H_2	4,000 ppm	5 ppm	< 2 % ***	Measured value	1 hour	Electrochemically	Single point	Classic/LT	
	1,000 ppm	1 ppm	< 2 % ***	Measured value	1 hour	Electrochemically	Single point	Classic/LT	
	50 vol.%	0.1 vol.%	± 2 % ****	Measurement range	Continuous	Thermal conductivity		LT	
Others	On request								

* In 6 months

** With automatic calibration interval

*** Per month: specified by the sensor manufacturer when used in discontinuous operations

**** Per year

***** For biogas plants operating under normal facility conditions, the oxygen levels are significantly below a volume %. Thus the precision of the zero point is the key factor when taking the measurement.

PRONOVA Analysentechnik GmbH & Co. KG • Groninger Straße 25 • 13347 Berlin • Telefon ++49(0)30/455 085-0 • Telefax ++49(0)30/455 085-90 • info@pronova.de

PRONOVA Analysentechnik GmbH & Co. KG

GENERAL INFORMATION

Analogue outputs:	4–20 mA (one output per measured component); active outputs with common reference potential, load max. 550 Ω
Data storage:	With history function of approximately 6,500 values; output via RS 232; also readable on the display
Digital outputs:	12 units / functions, such as status signals, limit alarms, configurable measuring point switching; Transistor type: open collector, external power supply: max. 24 VDC / 6 W
Flow display/regulation:	Flow meter 7–70 l/h, gas connections viton/polyamide needle valve
Digital inputs:	4 units / functions, such as start/cancel a measurement, configurable measuring point switching; Optocoupler typical switching threshold: 10 VDC, external power supply max. 24 VDC
Interfaces:	RS 232, digital output of the measured values and program updates Option: Profibus DP/CAN-bus (CANopen device profile 401)
Measuring gas pump/valve:	Diaphragm pump/solenoid valve Measuring point switching option, additional solenoid valves SSM 6000 Classic: second membrane pump
Display and measured value displays:	4-digit LED display of measured values, status indicators for each reading 4-digit illuminated LCD for each measured value

REQUIREMENTS FOR THE INSTALLATION SITE

Operating temperature:	+10 to +40 °C
Rel. humidity:	<= 75 % RH annual average, mild or seldom-occurring condensation permitted when switched off
Storage temperature:	-25 to +50 °C
Air pressure:	850 to 1,100 hPa

MEASUREMENT INLET AND OUTLET CONDITIONS, TESTING GASES

Inlet dew point of the sample gas:	Without gas cooler: at least 5 K below the ambient temperature Optionally: max. 40 °C using gas cooler
Sample gas temperature:	Max. 80 °C with standard polyamide fitting
Pressure at the sample gas inlet:	-200 to +200 hPa
Outlet dew point of the sample gas:	Exhaust air should be de-pressurized when it leaves the system using an outlet with a wide cross-section
Sample gas mixture for calibration (example):	50 vol.% CO_2/300 ppm H_2S 0 vol.% O_2/800ppm H_2/residual CH_4

ELECTRICAL CONNECTION DATA

Electrical connection for power supply:	Power cable 3x0.75 mm² with earthed plug
Fuses/overload protection:	Two miniature fuses 4x20 mm (internal), 1 A slow
Supply/feed:	Discontinuous measurement procedures: 85 to 264 VAC/47 to 63 Hz Continuous measurement procedures: 230 VAC/50 Hz optional 115 VAC/60 Hz
Power consumption:	Max. 100 VA, depending on the device version

GAS CONNECTIONS

Gas and condensate connections, type / version:	Compression fitting PA for hoses d_a x s = 6x1 mm
Gas inlet / safety facilities for the wall-mounted and ECO versions:	Detonation safety barrier F 501 according to EN 12874/ATEX Stainless steel V4A (outdoors installations)

GAS COOLER
(optional for wall-mount and desktop versions)

Cooler type:	Peltier cyclone cooler, Duran glass
Inlet dew point/Inlet temperature:	Max. +40 °C /+80 °C
Outlet dew point:	+5 °C (factory set)
Condensate pump:	Discontinuous measurement procedures: Peristaltic pump 54 ml/min, Novoprene hose Continuous measurement procedures: Peristaltic pump 5 ml/min, Novoprene hose
System monitoring:	Status indicators (LED), alarm bei +3 °C/+8 °C)

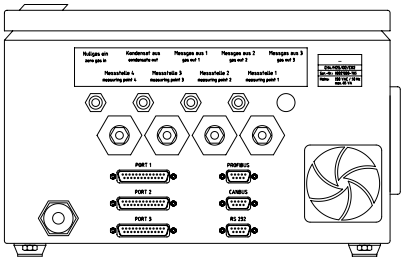
PRONOVA Analysentechnik GmbH & Co. KG

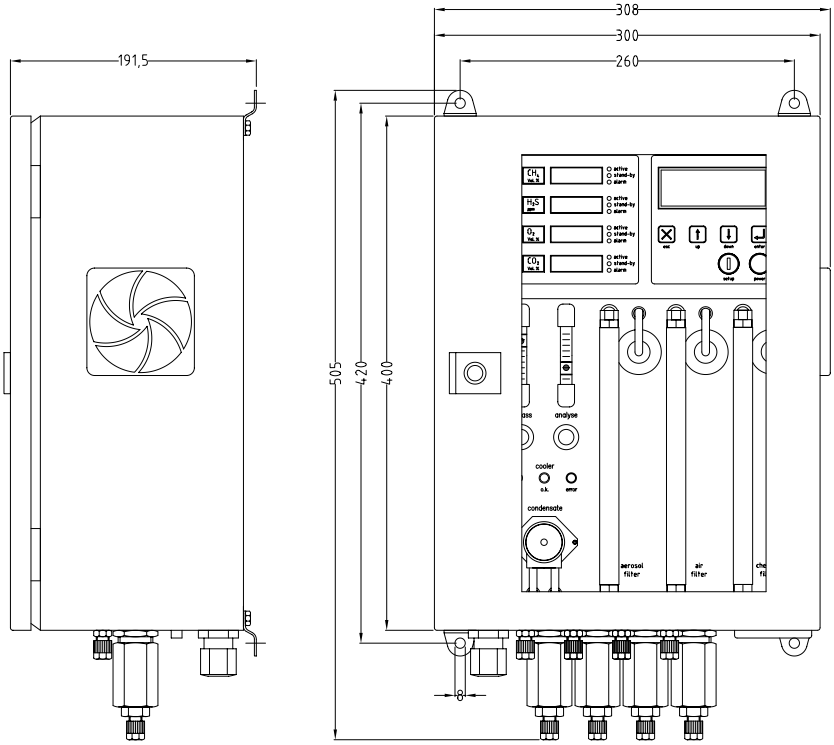
Housing /dimensions of SSM 6000 Classic / LT, wall construction

TECHNICAL SPECIFICATIONS

System housing:	Sheet metal housing with a front door and viewing window
Housing dimensions (W x H x D), without connections:	300 x 400 x 195 mm
Installation dimensions (W x H x D):	500 x 700 x 500 mm
Weight:	Approx. 14 kg
Protection degree:	IP 20
Housing colour/door frame:	Housing body RAL 7012 (grey basalt) Housing door RAL 7035 (light grey)
Forced ventilation / housing purge:	Housing fan 12 VDC / 56 m³/h free blowing Optionally with monitoring for fan

SSM 6000 Classic
SSM 6000 LT, similar





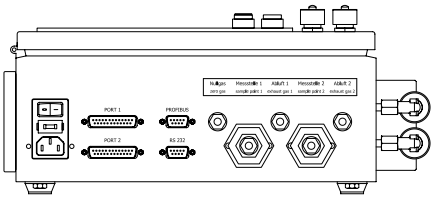
PRONOVA Analysentechnik GmbH & Co. KG

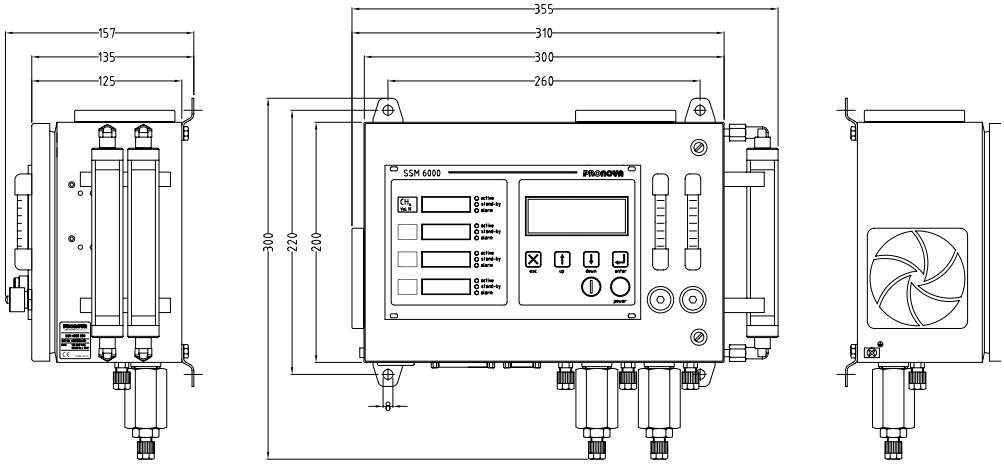
Housing/dimensions SSM 6000 ECO

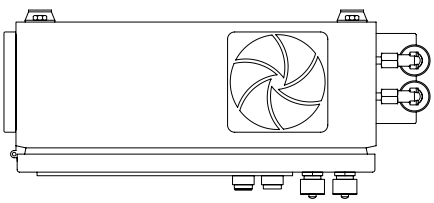
TECHNICAL SPECIFICATIONS

System housing:	Steel sheet housing
Housing dimensions (W x H x D), without connections:	300 x 200 x 135 mm
Installation dimensions (W x H x D):	550 x 400 x 500 mm
Weight:	Approx. 6 kg
Protection degree:	IP 20
Housing colour/door frame:	Housing body RAL 7012 (grey basalt) Housing door RAL 7035 (light grey)
Forced ventilation / housing purge:	Housing fan 12 VDC / 25 m³/h free blowing Optionally with monitoring for fan

SSM 6000 ECO







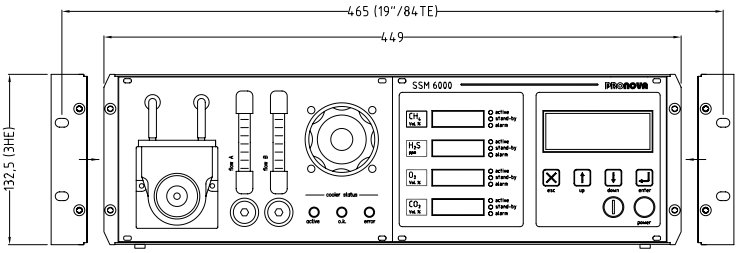
PRONOVA Analysentechnik GmbH & Co. KG

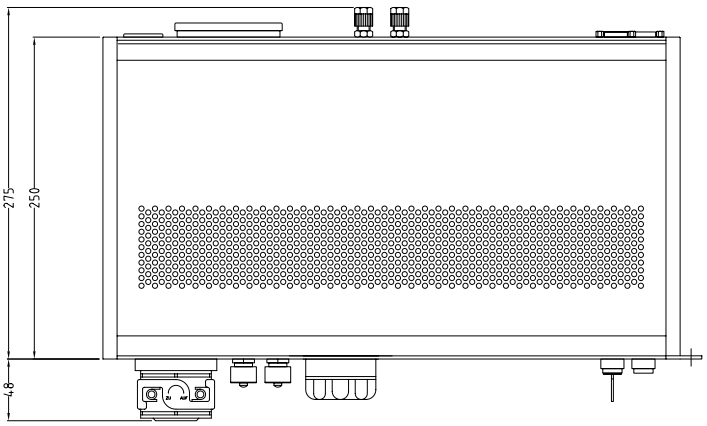
Housing/dimensions SSM 6000, desktop housing

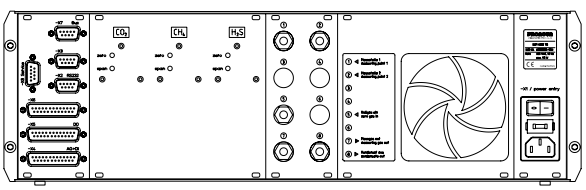
TECHNICAL SPECIFICATIONS

System housing:	19" desktop housing (3 height units), aluminium/steel sheet
Housing dimensions (W x H x D), without connections:	450 x 250 x 135 mm
Installation dimensions (W x H x D):	See drawing
Weight:	Approx. 5 kg
Protection degree:	IP 20
Housing colour/door frame:	RAL 7035 (light grey)
Forced ventilation / housing purge:	Housing fan 12 VDC / 56 m³/h, free blowing Optionally with monitoring for fan

SSM 6000, table unit







Subject to technical modifications 6/2012

PRONOVA Analysentechnik GmbH & Co. KG

Housing/dimensions SSM 6000, 19"/3 height units, sub-racks 84 partial units

TECHNICAL SPECIFICATIONS

System housing:	19" sub-rack 3 height units, aluminium
Housing dimensions (W x H x D), without connections:	485x 230 x 135 mm
Installation dimensions (W x H x D):	See drawing
Weight:	Approx. 4 kg
Protection degree:	IP 20
Housing colour/door frame:	Anodized aluminium
Forced ventilation / housing purge:	Housing fan 12 VDC / 56 m³/h, free blowing Note: Integrated gas cooler is not possible

Example of use