

## 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 dehumidification 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<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>) 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.

Hydrogen sulphide (H<sub>2</sub>S) and hydrogen (H<sub>2</sub>) 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<sub>2</sub>) 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                            |
|--|---|---|--|--|--|--|--|---|-------------------------------------|
| <b>Methane</b><br>CH <sub>4</sub>            | 100 vol. %                                  | 0.1 vol. %                                  | ±1 vol. % *                                      | 50 vol. %  | Continuous                               | IR dual beam   | proCAL   | Classic/LT                                  | Thermostatic, pressure compensation |
| <b>Carbon dioxide</b><br>CO <sub>2</sub>     | 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 |
| <b>Carbon monoxide</b><br>CO                 | 5 vol. %                                    | 0.01 vol. %                                 | ±0.1 vol. % *                                    | 2.5 vol. %   | Continuous                               | IR dual beam   | proCAL   | Optional                                    | Thermostatic, pressure compensation |
| <b>Oxygen</b><br>O <sub>2</sub>              | 25 vol. %<br>5 vol. %                       | 0.1 vol. %<br>0.01 vol. %                   | < 0.2 vol. % *<br>< 0.1 vol. % **                | Zero point ****<br>Zero point *****                                  | Continuous<br>Continuous                 | Electrochemically<br>Paramagnetic  | Single point<br>Single point                                 | Classic/LT<br>Optional                      | Thermostatic                        |
| <b>Hydrogen sulphide</b><br>H <sub>2</sub> S | 5,000 ppm<br>1,000 ppm<br>200 ppm<br>25 ppm | 1 ppm, 5 ppm<br>1 ppm<br>0.2 ppm<br>0.1 ppm | < 2 % ***<br>< 2 % ***<br>< 2 % ***<br>< 2 % *** | Measured value<br>Measured value<br>Measured value<br>Measured value | 1 hour<br>1 hour<br>1 hour<br>Continuous | Electrochemically<br>Electrochemically<br>Electrochemically<br>Electrochemically | Single point<br>Single point<br>Single point<br>Single point | Classic<br>LT<br>Optional LT<br>Optional LT | Low hydrogen cross-sensitivity      |
| <b>Hydrogen</b><br>H <sub>2</sub>            | 4,000 ppm<br>1,000 ppm<br>50 vol. %         | 5 ppm<br>1 ppm<br>0.1 vol. %                | < 2 % ***<br>< 2 % ***<br>± 2 % *****            | Measured value<br>Measured value<br>Measurement range                | 1 hour<br>1 hour<br>Continuous           | Electrochemically<br>Electrochemically<br>Thermal conductivity                   | Single point<br>Single point                                 | Classic/LT<br>Classic/LT<br>LT              |                                     |
| <b>Others</b>                                | 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.

**GENERAL INFORMATION**

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

**REQUIREMENTS FOR THE INSTALLATION SITE**

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

**MEASUREMENT INLET AND OUTLET CONDITIONS,  
TESTING GASES**

|  |  |
|--|--|
| <b>Inlet dew point of the sample gas:</b>                | Without gas cooler: at least 5 K<br>below the ambient temperature<br>Optionally: max. 40 °C using gas cooler                     |
| <b>Sample gas temperature:</b>                           | Max. 80 °C with standard polyamide fitting   |
| <b>Pressure at the sample gas inlet:</b>                 | -200 to + 200 hPa  |
| <b>Outlet dew point of the sample gas:</b>               | Exhaust air should be<br>de-pressurized when it leaves the system<br>using an outlet with a wide cross-section                   |
| <b>Sample gas mixture<br/>for calibration (example):</b> | 50 vol.% CO <sub>2</sub> / 300 ppm H <sub>2</sub> S<br>0 vol.% O <sub>2</sub> / 800ppm H <sub>2</sub> / residual CH <sub>4</sub> |

**ELECTRICAL CONNECTION DATA**

|  |   |
|--|---|
| <b>Electrical connection for<br/>power supply:</b> | Power cable 3x0.75 mm <sup>2</sup><br>with earthed plug   |
| <b>Fuses/overload protection:</b>                  | Two miniature fuses 4x20 mm (internal),<br>1 A slow   |
| <b>Supply/feed:</b>                                | Discontinuous measurement procedures: 85 to 264 VAC / 47 to 63 Hz<br>Continuous measurement procedures: 230 VAC / 50 Hz<br>optional 115 VAC / 60 Hz |
| <b>Power consumption:</b>                          | Max. 100 VA, depending on the device version  |

**GAS CONNECTIONS**

|   |   |
|---|---|
| <b>Gas and condensate connections,<br/>type / version:</b>                      | Compression fitting PA for hoses<br>d <sub>a</sub> x s = 6 x 1 mm   |
| <b>Gas inlet / safety facilities for<br/>the wall-mounted and ECO versions:</b> | Detonation safety barrier F 501<br>according to EN 12874 / ATEX<br>Stainless steel V4A (outdoors installations) |

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

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

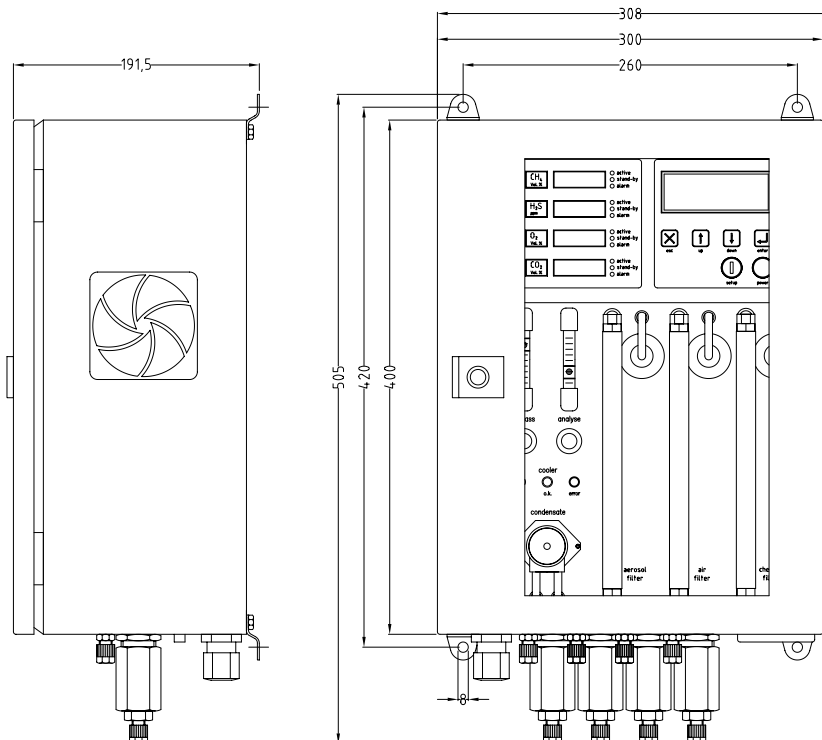
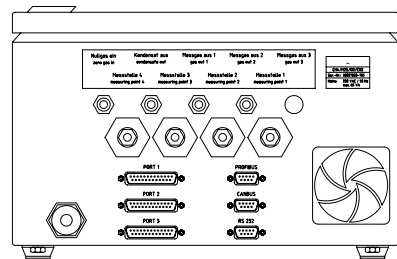
### Housing/dimensions of SSM 6000 Classic /LT, wall construction

**TECHNICAL SPECIFICATIONS**

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



SSM 6000 Classic  
 SSM 6000 LT, similar

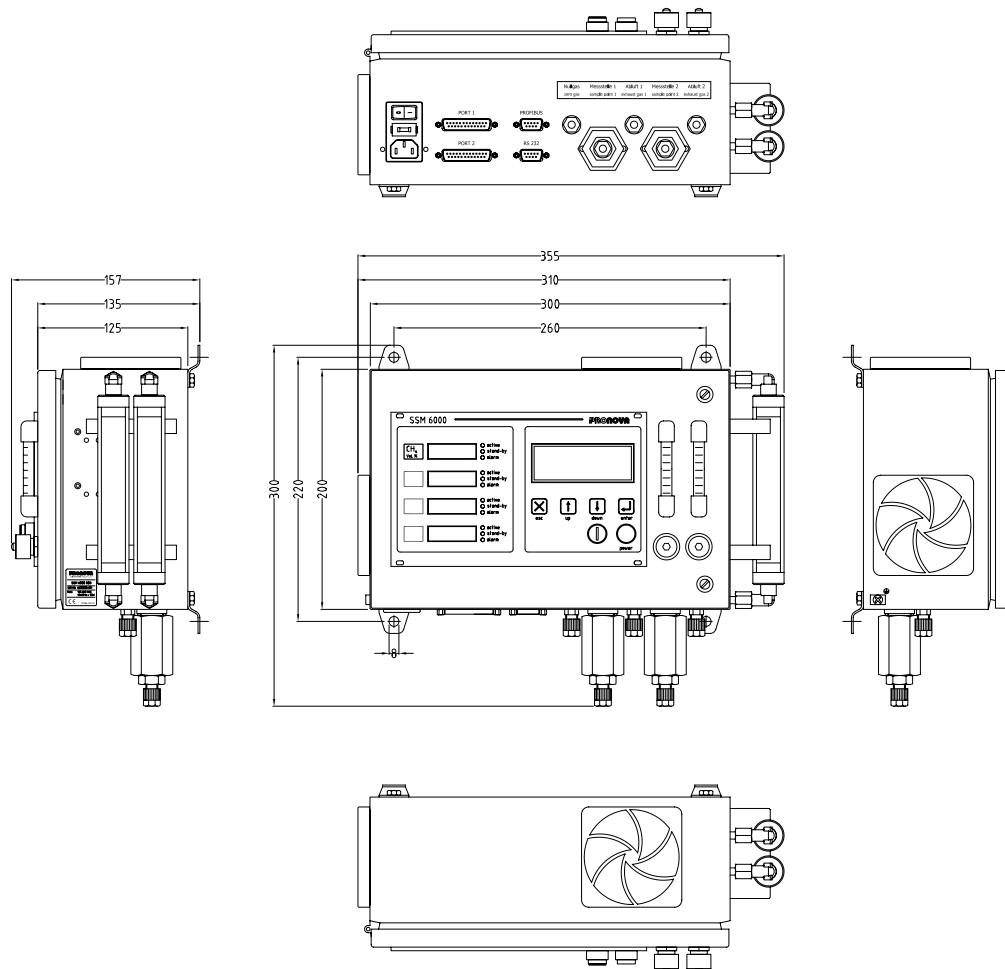


Subject to technical modifications 6/2012

## Housing/dimensions SSM 6000 ECO

### TECHNICAL SPECIFICATIONS

|   |   |
|---|---|
| <b>System housing:</b>  | Steel sheet housing   |
| <b>Housing dimensions (W x H x D),<br/>without connections:</b> | 300 x 200 x 135 mm  |
| <b>Installation dimensions (W x H x D):</b>                     | 550 x 400 x 500 mm  |
| <b>Weight:</b>  | Approx. 6 kg  |
| <b>Protection degree:</b>                                       | IP 20   |
| <b>Housing colour/door frame:</b>                               | Housing body RAL 7012 (grey basalt)<br>Housing door RAL 7035 (light grey)                     |
| <b>Forced ventilation/housing purge:</b>                        | Housing fan 12 VDC/25 m <sup>3</sup> /h<br>free blowing<br>Optionally with monitoring for fan |



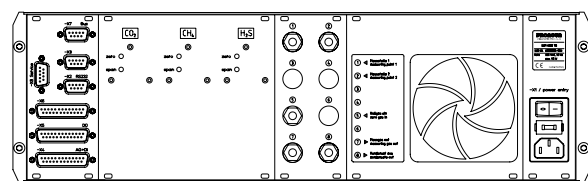
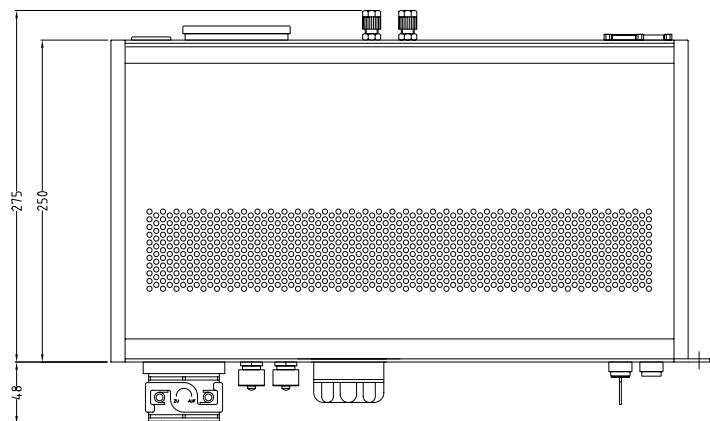
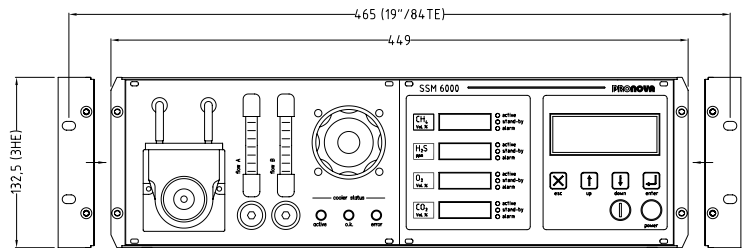
## Housing/dimensions SSM 6000, desktop housing

### TECHNICAL SPECIFICATIONS

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



SSM 6000, table unit



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

**TECHNICAL SPECIFICATIONS**

|   |   |
|---|---|
| <b>System housing:</b>  | 19" sub-rack 3 height units, aluminium      |
| <b>Housing dimensions (W x H x D),<br/>without connections:</b> | 485x230 x 135 mm                            |
| <b>Installation dimensions (W x H x D):</b>                     | See drawing                                 |
| <b>Weight:</b>  | Approx. 4 kg                                |
| <b>Protection degree:</b>                                       | IP 20                                       |
| <b>Housing colour/door frame:</b>                               | Anodized aluminium                          |
| <b>Forced ventilation/housing purge:</b>                        | Housing fan 12 VDC/56 m³/h,<br>free blowing |
| Note: Integrated gas cooler is not possible                     |   |



Example of use

