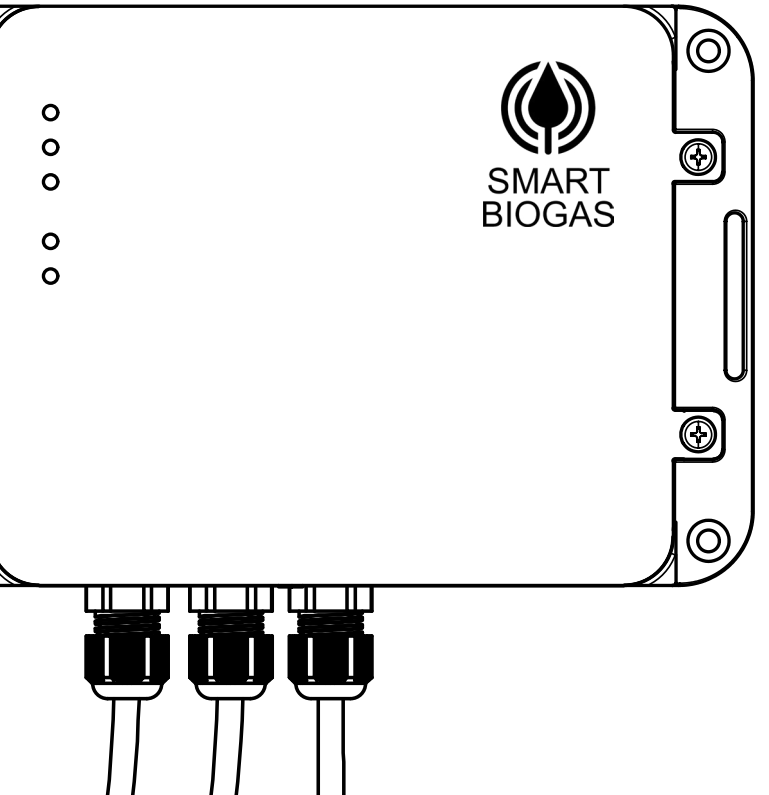
Smart Biogas

Installation manual & data sheet



InclusiveEnergy

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General Information

Safety instructions

Smart Biogas meter should be installed by a qualified gas plumber. Only a trained and suitably qualified biogas technician, engineer or plumber should make changes to biogas pipework. All pipe work should be tested for leaks at a suitable pressure on completion of installation of the meter.

Warranty

This product is subject to a one (1) year manufacturing warranty. This covers any defects or material issues under normal use and conditions for the above stated period from the original invoice date. The manufacturer agrees to repair or replace any defected components of the product within the period. THIS WARRANTY IS VOID IF THE DEVICE IS OPENED WITHOUT THE PERMISSION OF A QUALIFIED BIOGAS TECHNICIAN, ENGINEER OR PLUMBER.

Online support

https://support.inclusive.energy/portal/en/kb

Product Overview

Part list

1. Smart meter (P1, P2 or P3)

2. Venturi

3. Gas valve

4. Tubes

5. Wire connected to PV panel or AC/DC adapter

6. Gas appliance

7. PV panel or AC/DC adapter

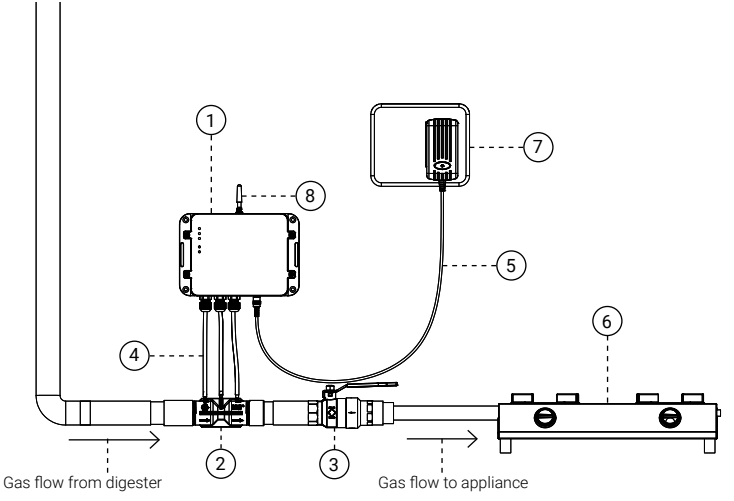
8. Antenna

Smart Meter Models

P1 - Static pressure sensor only

P2 - Flow sensor only

P3 - Both flow and static pressure sensors



Smart Meter Preparation

Location

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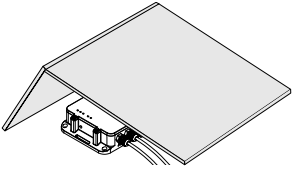
Smart meter is rated as IP65 when installed as per the installation manual which gives protection against low pressure water jets, as well as condensation and water spray.



SIM Card

In most cases a SIM card will come supplied and already fitted into the meter but if it is not or you need to install a different SIM or replace the SIM for any reason, you will need:

- Nano SIM
- 2G enabled SIM
- Minimum of 8MB per month data pack
- Recurring data pack

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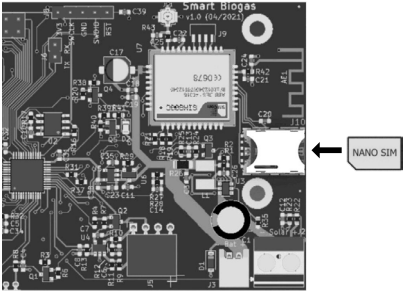

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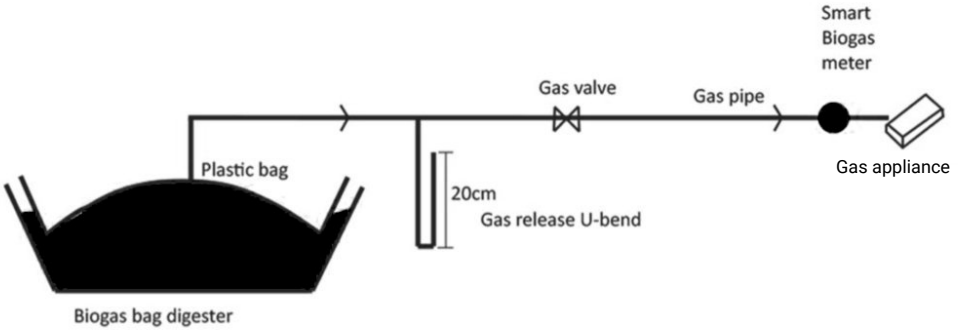
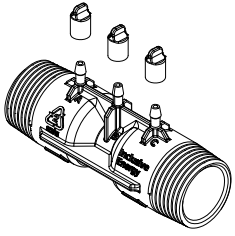
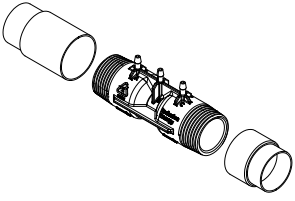


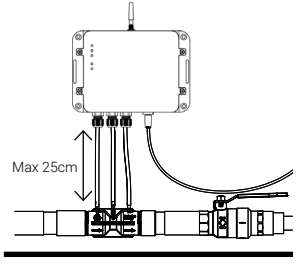
Venturi & Meter Installation

1 — 2 — 3

A







Venturi to be placed parallel to the ground

Check the venturi before installation

• Remove the venturi caps and check internal bores are smooth and that there are no blockages in the bore or the teets off the top of the venturi. Teets can usually be unblocked with a paperclip if there is a small blockage. More stubborn blockages in the teet can be drilled out but is important to ensure that all teets have the same internal diameter.

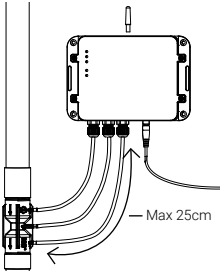
Prepare the pipework for installation

• Prepare the threaded ends with gas thread tape as appropriate.
• The thread on the venturi is a taper thread and is designed to seal against parallel female fittings.
• The pipe may need adaptors to screw the ends of the venturi into the pipe. These will need to be bought locally.
• The installation should be undertaken by a qualified gas plumber, as is the case for any pipe fitting.
• Glues are not required.

Install the venturi in horizontal pipework

• Ideally the venturi should be approximately level/horizontal but allow water to drain in the pipe work towards a water trap or an exit point.
• Step 3A shows the ideal position of the venturi in horizontal pipework but if necessary the venturi can be installed in vertical pipework as step 3B.
• The venturi will need to 'point' (see arrow on the venturi) in the direction of the gas flow.
• The teets should always point roughly upwards to allow condesation to drain back into the pipe.

B



Install the venturi in vertical pipework

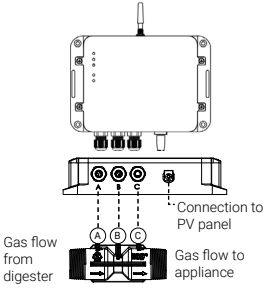
• (Refer to step 3A for general principles) If the gas pipe is installed in the vertical orientation, you can install the venturi vertically as shown.

Position smart meter appropriately above the venturi

• Position the smart meter above the venturi (never below). Maximum 25cm above.
• Ensure that the tubes connected between the venturi and the smart meter are positioned so that any condensation will return to the pipe.

A

If gas flows from left to right

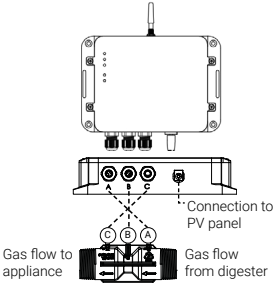


Connect tubes in the correct order

• The tubes need to be connected from the smart meter to the venturi with the tubes connecting the ports of the meter to the corresponding port of the venturi (A to A, B to B, etc.).
• Ensure that the tube lengths are cut to size to avoid excessive bends or sags whilst also not stressing the teets.
(If you are using a version of the meter which only has either a flow or pressure sensor, then ensure that the venturi teets that are not connected to the pipes are tightly closed with the caps that came with it.)

B

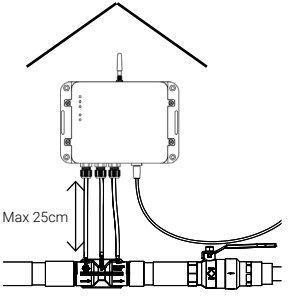
If gas flows from right to left



Connect tubes in the correct order

• Note that in this case the teet A on the venturi will not be underneath port A of the meter as the venturi orientation is flipped. The tubes still need to connect the meter ports to the corresponding venturi ports (A to A, B to B etc.) so in this case the tubes will criss-cross as per the diagram above.

5



Quality assurance

☐ The Smart Meter is installed above the venturi.

☐ The Smart Meter is weather protected.

☐ The venturi does not impede flow of condensation back to the water drain.

☐ The venturi teets are pointing upwards.

☐ The venturi flow arrow points in the direction of gas flow.

☐ The tubes allow free flow of condensation away from the meter and back into the gas pipe.

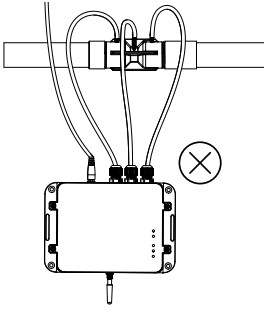
☐ The tubes connect the meter ports to the corresponding venturi ports.

☐ Any unused teets are capped with the rubber cap provided (P1 and P2 models only).

☐ The whole installation has been checked for leaks under pressure (main gas valve open) using soapy water.

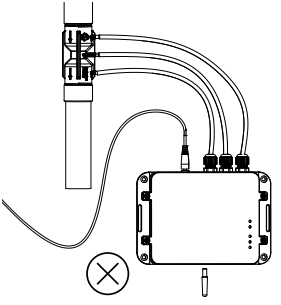
Wrong Installation Orientation Examples

1



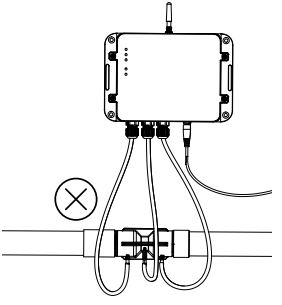
• The smart meter must be installed above the venturi.

2



• The smart meter must be installed with the antenna pointing upwards.

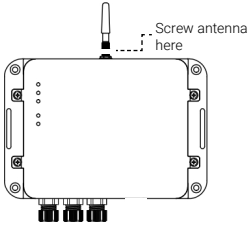
3

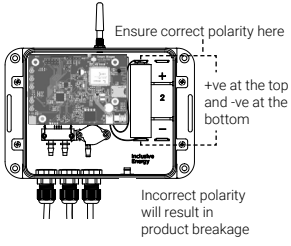


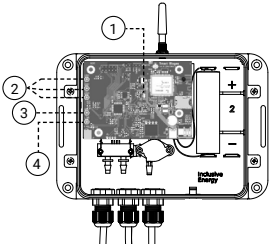
• The tubes must not have any sags.

Set Up

1 2 3







Connect antenna

• The antenna needs to be screwed on to the smart meter as shown here.
• NOTE: Installation in a metal box e.g. a corrugated metal house, will significantly reduce signal strength.

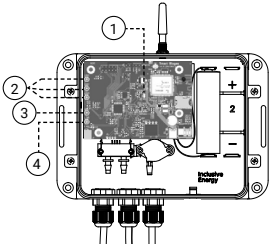
Insert battery

• Once the meter and venturi is installed, open the top cover of the smart meter to connect the battery.
• Before connecting battery, observe the polarity marked on the cell and ensure that it is inserted in the right way around as marked at the bottom of the battery holder.
• The battery will be connected once you plug the connector coming out of battery into the white socket on the bottom right corner of the board.
• **Note** - The battery should always be installed before the solar panel is plugged in.
• Once the battery is plugged in, the device will power up and all LEDs will light up for a second and you will then see that only the power LED and the battery level LEDs will be ON.

Connect to network

• If the SIM is inserted and the battery is connected, you will observe the following pattern on the tiny red LED (1) when the device is powered up for the first time or if restarted during a service.
1. Flashes every 1 second - It indicates that the device is searching for a network.
2. Flashes rapidly - After about 2 minutes or so, the red LED will start flashing rapidly and followed by the green data LED (3) which indicates that the device has established connection to a network and is sending data.
3. Flashes every 3 seconds - After the above step, the red LED (1) will flash every 3 seconds and the data LED (3) will always stay ON which indicates that the device is registered to the network and is able to connect to the server. LED (3) will flash rapidly everytime data is sent.

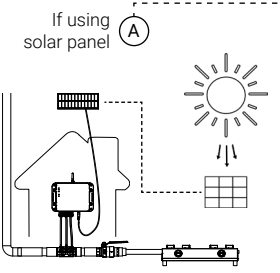
4



Check the LEDs

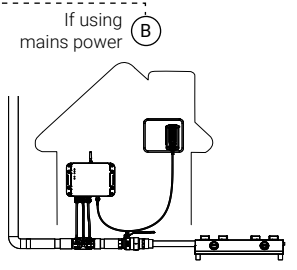
• Yellow LEDs (2) indicate the battery level. When one of the LEDs flash, it means that the battery is charging. If it is not flashing during the day time, check the PV panel connection and/or if there is shade or dust on the panel.
• The top green LED (3) represents data activity. It will flash when sending data or performing an Over The Air update (OTA). It will stay on after successfully sending data. It will turn off if the device fails to connect with the data network or server.
• The bottom green LED (4) is to indicate that the device is on and has power.

5



Install PV panel

• The PV panel should be installed in a location with good access to sunlight and in an unshaded spot.
• The PV should be installed at an angle to allow water run off and be accessible for regular cleaning.
• In some circumstances the PV cable may need to be extended to reach an optimum location.

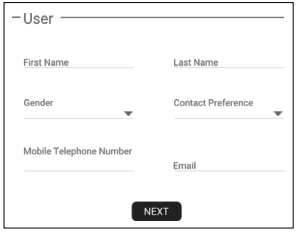


Connect adapter

• If you connect the AC/DC adapter instead of the PV Panel, then it should be connected as shown above.
• The AC/DC adapter provided is of 9V, 1A and comes with an European type-C, 2-pin plug.
Note - Depending upon the type of socket available at the installation site, you may have to use an extra conversion plug with an European 2-pin plug socket.

Software Registration

1 2 3

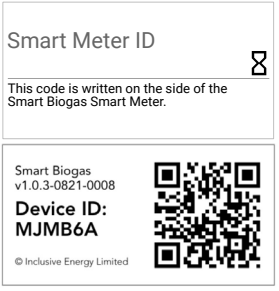


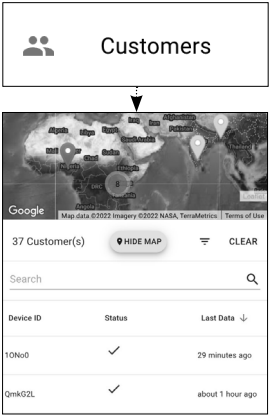
Go to http://www.smartbiogas.io or scan the QR code.

Login and click to Register a New Customer.
If you don't have a Smart Biogas login, please contact your supplier or Inclusive Energy.

Fill in all the details required and click next to progress through the forms.

4 5 6





IMPORTANT: Take a note of the meter ID that is written on the side of the Smart Biogas meter. This needs to be entered during the registration process.

Once you have completed the form you can check out the Customers page on the website and the meter that you have registered should now be present on the list.

For more details about the software you can view the Smart Biogas platform walkthrough video by scanning the QR code.

SB Home

SB HOME

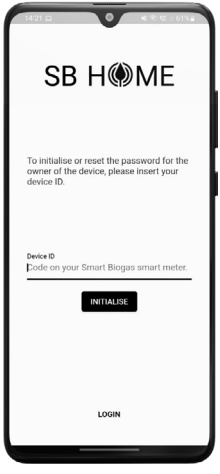
SB Home is an Android and iOS application. It is designed for people who have Smart Biogas meters installed with their biogas digesters. It not only gives access to their data but also tracks their payments and gives access to direct support and help.

(NOTE: The application won't work until the device has been registered to a customer on the main SB platform)

1

To download, follow link - http://onelink.to/sbhome or scan the above QR code.

2



To get started, the customer will need to enter the device ID that is written on the side of their smart biogas meter and click initialize.

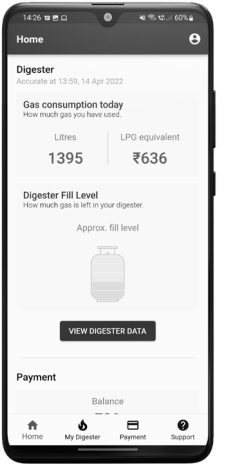
3

An email or SMS will be sent to the contact details that are connected to your customer. It will contain their log in details and a link to set their password.

4

Once they have their new login credentials, they can now log into the app.

5



After logging in, the customer can view their digester fill level, gas consumption, payment history if available and have access to direct support.

Product Datasheet

Inside the box

• Smart Biogas Meter
• Flow sensor and/or pressure sensor
• Venturi pipe fitting (3/4" or 1") - HDPE
• Measurement tubes
• 3.7 V 18650 Lithium ion battery (1x battery or optionally 2x batteries)
• 3 W 6 V solar panel with 3m cable or AC/DC adapter
• Global SIM card (optional)
• Caps for venturi
• Antenna

Specifications

• Flow and pressure as per table
• Voltage range 5 - 15 volt DC input
• Operating temperature 0ºC to 60ºC
• 3 days battery life without sunshine or electricity
• Weather resistant enclosure
• 170 x 117 x 44mm enclosure size
• Enclosure has various mounting options for situational flexibility

Data and Network

Data collected every minute and sent at set intervals (e.g. hourly) :
• Average pressure for the previous 1 minute (if pressure sensor is fitted).
Data collected every 1 hour (configurable)
• Gas consumption total since the beginning of the device's existence (if flow rate sensor is fitted).

Model Number	Venturi Size and Bore	Flow Rate	Max Static Pressure
P1	3/4", bore=8mm 1" , bore=16mm	NA NA	10kPa 10kPa
P2	3/4", bore=8mm 1" , bore=16mm	2m3/hr 20m3/hr	NA NA
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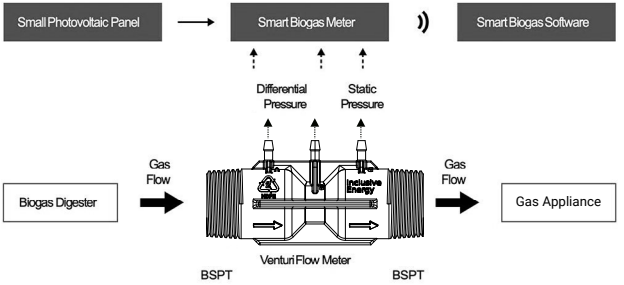
System Overview



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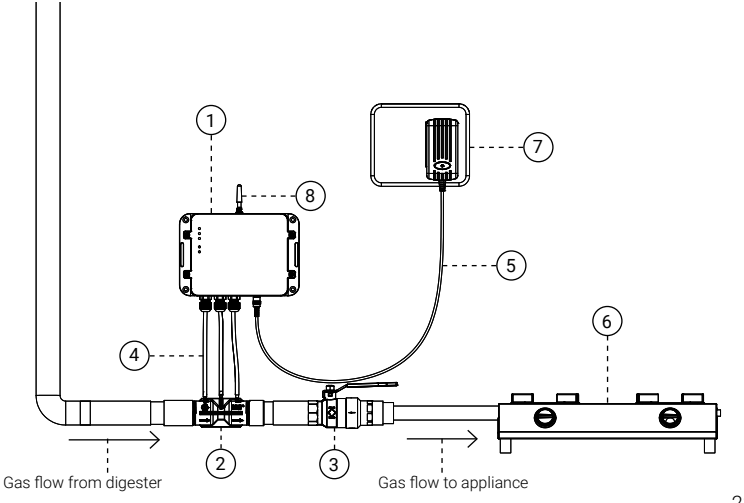

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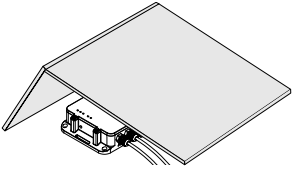

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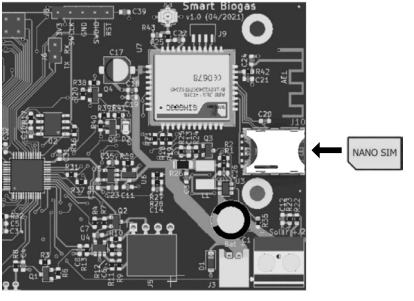

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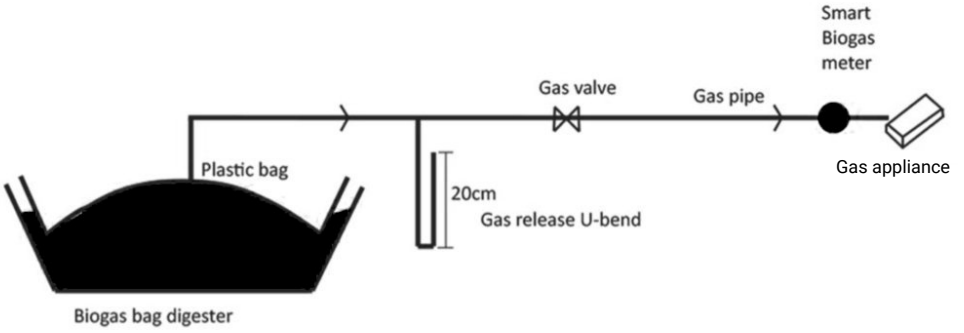

Venturi & Meter Installation

1 — 2 — 3

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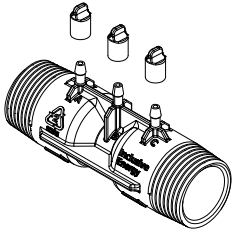

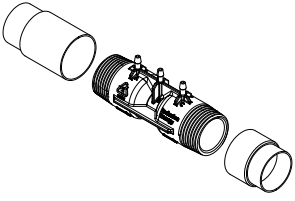

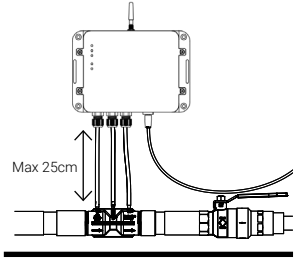

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Prepare the pipework for installation

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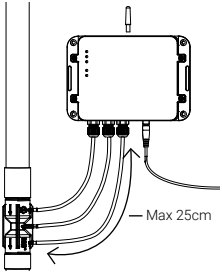
• The thread on the venturi is a taper thread and is designed to seal against parallel female fittings.
• The pipe may need adaptors to screw the ends of the venturi into the pipe. These will need to be bought locally.
• The installation should be undertaken by a qualified gas plumber, as is the case for any pipe fitting.
• Glues are not required.

Install the venturi in horizontal pipework

• Ideally the venturi should be approximately level/horizontal but allow water to drain in the pipe work towards a water trap or an exit point.
• Step 3A shows the ideal position of the venturi in horizontal pipework but if necessary the venturi can be installed in vertical pipework as step 3B.
• The venturi will need to 'point' (see arrow on the venturi) in the direction of the gas flow.
• The teets should always point roughly upwards to allow condesation to drain back into the pipe.

B



Install the venturi in vertical pipework

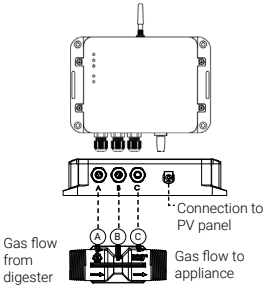
• (Refer to step 3A for general principles) If the gas pipe is installed in the vertical orientation, you can install the venturi vertically as shown.

Position smart meter appropriately above the venturi

• Position the smart meter above the venturi (never below). Maximum 25cm above.
• Ensure that the tubes connected between the venturi and the smart meter are positioned so that any condensation will return to the pipe.

A

If gas flows from left to right

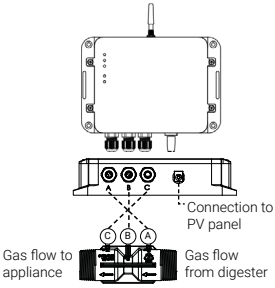


Connect tubes in the correct order

• The tubes need to be connected from the smart meter to the venturi with the tubes connecting the ports of the meter to the corresponding port of the venturi (A to A, B to B, etc.).
• Ensure that the tube lengths are cut to size to avoid excessive bends or sags whilst also not stressing the teets.
(If you are using a version of the meter which only has either a flow or pressure sensor, then ensure that the venturi teets that are not connected to the pipes are tightly closed with the caps that came with it.)

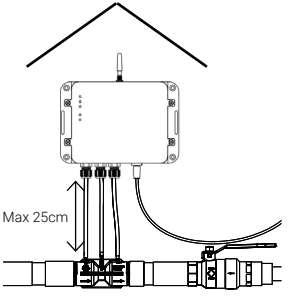
B

If gas flows from right to left



Connect tubes in the correct order

• Note that in this case the teet A on the venturi will not be underneath port A of the meter as the venturi orientation is flipped. The tubes still need to connect the meter ports to the corresponding venturi ports (A to A, B to B etc.) so in this case the tubes will criss-cross as per the diagram above.



Quality assurance

☐ The Smart Meter is installed above the venturi.

☐ The Smart Meter is weather protected.

☐ The venturi does not impede flow of condensation back to the water drain.

☐ The venturi teets are pointing upwards.

☐ The venturi flow arrow points in the direction of gas flow.

☐ The tubes allow free flow of condensation away from the meter and back into the gas pipe.

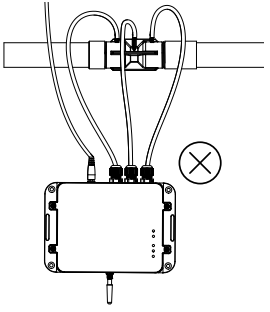
☐ The tubes connect the meter ports to the corresponding venturi ports.

☐ Any unused teets are capped with the rubber cap provided (P1 and P2 models only).

☐ The whole installation has been checked for leaks under pressure (main gas valve open) using soapy water.

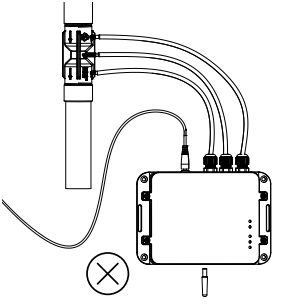
Wrong Installation Orientation Examples

1



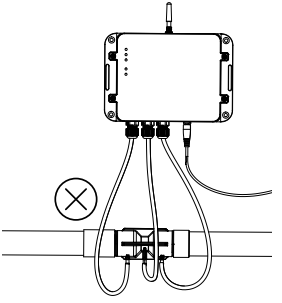
• The smart meter must be installed above the venturi.

2



• The smart meter must be installed with the antenna pointing upwards.

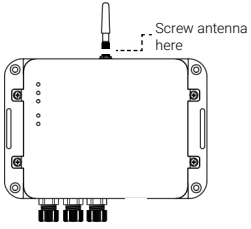
3

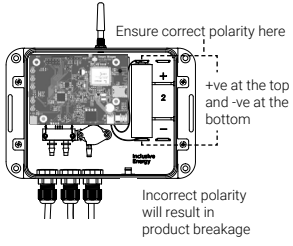


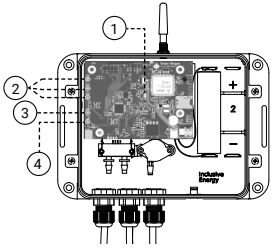
• The tubes must not have any sags.

Set Up

1 2 3







Connect antenna

• The antenna needs to be screwed on to the smart meter as shown here.
• NOTE: Installation in a metal box e.g. a corrugated metal house, will significantly reduce signal strength.

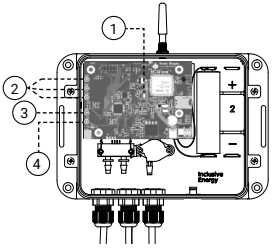
Insert battery

• Once the meter and venturi is installed, open the top cover of the smart meter to connect the battery.
• Before connecting battery, observe the polarity marked on the cell and ensure that it is inserted in the right way around as marked at the bottom of the battery holder.
• The battery will be connected once you plug the connector coming out of battery into the white socket on the bottom right corner of the board.
• **Note** - The battery should always be installed before the solar panel is plugged in.
• Once the battery is plugged in, the device will power up and all LEDs will light up for a second and you will then see that only the power LED and the battery level LEDs will be ON.

Connect to network

• If the SIM is inserted and the battery is connected, you will observe the following pattern on the tiny red LED (1) when the device is powered up for the first time or if restarted during a service.
1. Flashes every 1 second - It indicates that the device is searching for a network.
2. Flashes rapidly - After about 2 minutes or so, the red LED will start flashing rapidly and followed by the green data LED (3) which indicates that the device has established connection to a network and is sending data.
3. Flashes every 3 seconds - After the above step, the red LED (1) will flash every 3 seconds and the data LED (3) will always stay ON which indicates that the device is registered to the network and is able to connect to the server. LED (3) will flash rapidly everytime data is sent.

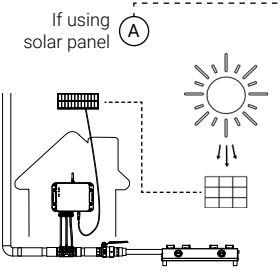
4



Check the LEDs

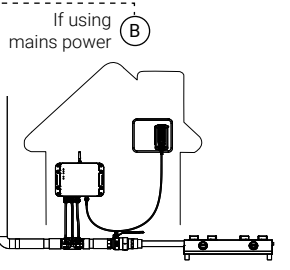
• Yellow LEDs (2) indicate the battery level. When one of the LEDs flash, it means that the battery is charging. If it is not flashing during the day time, check the PV panel connection and/or if there is shade or dust on the panel.
• The top green LED (3) represents data activity. It will flash when sending data or performing an Over The Air update (OTA). It will stay on after successfully sending data. It will turn off if the device fails to connect with the data network or server.
• The bottom green LED (4) is to indicate that the device is on and has power.

5



Install PV panel

• The PV panel should be installed in a location with good access to sunlight and in an unshaded spot.
• The PV should be installed at an angle to allow water run off and be accessible for regular cleaning.
• In some circumstances the PV cable may need to be extended to reach an optimum location.

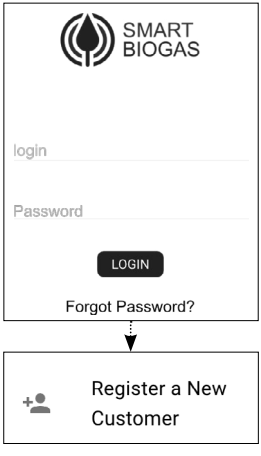


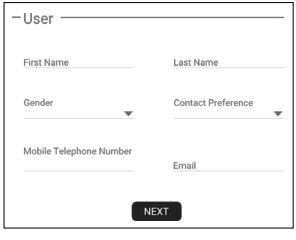
Connect adapter

• If you connect the AC/DC adapter instead of the PV Panel, then it should be connected as shown above.
• The AC/DC adapter provided is of 9V, 1A and comes with an European type-C, 2-pin plug.
Note - Depending upon the type of socket available at the installation site, you may have to use an extra conversion plug with an European 2-pin plug socket.

Software Registration

1 2 3



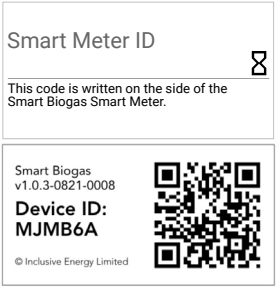


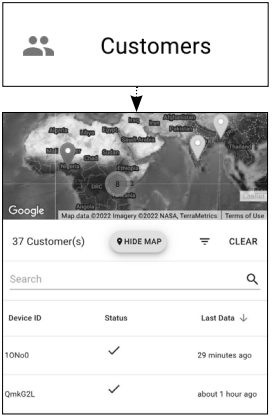
Go to http://www.smartbiogas.io or scan the QR code.

Login and click to Register a New Customer.
If you don't have a Smart Biogas login, please contact your supplier or Inclusive Energy.

Fill in all the details required and click next to progress through the forms.

4 5 6





IMPORTANT: Take a note of the meter ID that is written on the side of the Smart Biogas meter. This needs to be entered during the registration process.

Once you have completed the form you can check out the Customers page on the website and the meter that you have registered should now be present on the list.

For more details about the software you can view the Smart Biogas platform walkthrough video by scanning the QR code.

SB Home

SB HOME

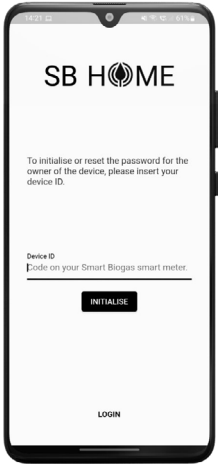
SB Home is an Android and iOS application. It is designed for people who have Smart Biogas meters installed with their biogas digesters. It not only gives access to their data but also tracks their payments and gives access to direct support and help.

(NOTE: The application won't work until the device has been registered to a customer on the main SB platform)

1

To download, follow link - http://onelink.to/sbhome or scan the above QR code.

2



To get started, the customer will need to enter the device ID that is written on the side of their smart biogas meter and click initialize.

3

An email or SMS will be sent to the contact details that are connected to your customer. It will contain their log in details and a link to set their password.

4

Once they have their new login credentials, they can now log into the app.

5

After logging in, the customer can view their digester fill level, gas consumption, payment history if available and have access to direct support.

Product Datasheet

Inside the box

• Smart Biogas Meter
• Flow sensor and/or pressure sensor
• Venturi pipe fitting (3/4" or 1") - HDPE
• Measurement tubes
• 3.7 V 18650 Lithium ion battery (1x battery or optionally 2x batteries)
• 3 W 6 V solar panel with 3m cable or AC/DC adapter
• Global SIM card (optional)
• Caps for venturi
• Antenna

Specifications

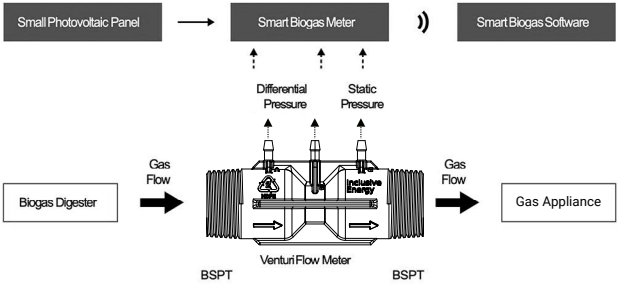
• Flow and pressure as per table
• Voltage range 5 - 15 volt DC input
• Operating temperature 0ºC to 60ºC
• 3 days battery life without sunshine or electricity
• Weather resistant enclosure
• 170 x 117 x 44mm enclosure size
• Enclosure has various mounting options for situational flexibility

Data and Network

Data collected every minute and sent at set intervals (e.g. hourly) :
• Average pressure for the previous 1 minute (if pressure sensor is fitted).
Data collected every 1 hour (configurable)
• Gas consumption total since the beginning of the device's existence (if flow rate sensor is fitted).

Model Number	Venturi Size and Bore	Flow Rate	Max Static Pressure
P1	3/4", bore=8mm 1" , bore=16mm	NA NA	10kPa 10kPa
P2	3/4", bore=8mm 1" , bore=16mm	2m3/hr 20m3/hr	NA NA
P3	3/4", bore=8mm 1" , bore=16mm	2m3/hr 20m3/hr	10kPa 10kPa

System Overview




SMART
BIOGAS