TRANSMITTER^{EVO}
Instructions for use

Contents

1 For your safety

The mounting, installation and start-up of a gas warning system with a TRANSMITTER^{EVO} must only be undertaken by suitably trained personnel.

- Read the relevant instructions before using the product
- Observe the instructions precisely. The user must fully understand the instructions and follow the instructions exactly. The product must only be used in accordance with the intended use.
- Do not dispose of the instructions. Hand the instructions over to the operator for safe-keeping.
- Work on a gas warning system assumes detailed knowledge of the instructions for use provided with the transmitter.
- Statutory requirements and guidelines that relate to this product must be followed.

Meaning of warning signs

The following warning signs are used in this document to indicate the relevant warning text.

CAUTION!

Indicates a potential hazardous situation. If this is not avoided, injuries or damage to the product or environment may occur.
Also warns against improper use.

NOTE

Information on the use of the product

2 Intended use

The transmitter is a device for the stationary, continuous monitoring of gas concentrations in the ambient air in accordance with the installed sensor.

3 TRANSMITTER^{EVO} installation

CAUTION!

The TRANSMITTER^{EVO} must only be installed by trained experts!
Select the TRANSMITTER^{EVO} based on the applicable regulations so that the gas escaping in the area to be monitored is detected reliably and in good time by the system.

The maximum protective effect is only achieved if the correct mounting location is selected. The TRANSMITTER^{EVO} monitors a point, not an area. If the escaping gas does not reach the sensor, an alarm will not be triggered.
The transmitter should be mounted as close as possible to the potential leakage point.
In the case of gases that are heavier than air, the transmitter is to be mounted as close to the ground as possible for monitoring purposes. It must be ensured that the sensor is protected against excessive exposure to dust and is not positioned in an area used for washing.
In the case of gases that are lighter than air, the transmitter is to be mounted above the anticipated leakage point for monitoring purposes. The transmitter should be positioned on the ceiling or a maximum of 30 cm below the ceiling. If it is possible that elevated temperatures may cause warm air to accumulate below the ceiling and act as a barrier, the sensors are to be positioned on the wall below the anticipated barrier.

In the case of gases with a similar density to air, the sensor should be positioned at head height at approx. 1.5 m.
The local airflow conditions must be taken into account. The mounting location must be selected so that the maximum concentration is detected.
The mounting location needs to be selected so that easy access for maintenance purposes is possible.
Position a sensor near to the airflow created by mechanical or natural ventilation. On doing so, the sensor should not be mounted within a strong airflow.
The following ways are recommended for installation in cooling rooms and machine rooms without detectable exhaust airflow:

- Position the transmitter as close as possible to potential leakage points, e.g. near to compressors, expansion valves, mechanical fittings
- Perimeter detection: the sensors are positioned across the entire area or around the device to be monitored.
- Pits, stairwells and trenches must be monitored.

- If a pressure-relief vent pipe is present, a transmitter should be positioned to monitor this pipe.
- A distance of 1.5–2 m should be observed between high-pressure components so that gas clouds can form. If the distance is too small, there is a risk that the gas will flow past the transmitter as a concentrated jet.

A build-up of concentrate must be avoided under all circumstances.

If a detectable exhaust airflow is present, a transmitter needs to be installed so that the exhaust airflow can be monitored as well. On doing so, make sure that the exhaust airstream flow does not impair the operation of the transmitter.

4 Mounting

4.1 Tools required

Slotted screwdriver (size 3) to open the transmitter.
Slotted screwdriver to connect the supply line.
Tools for attaching the transmitter.
Drilling template
4 screws for fastening, appropriate dowels if necessary.

4.2 Opening the transmitter

Insert the slotted screwdriver into the slot and lever the screwdriver outwards.
The cover can either be opened to the left or the right at the hinges. The cover can be removed by opening both hinges.

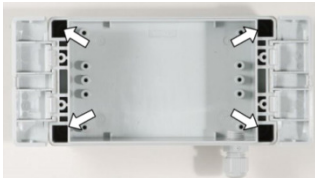
CAUTION!

The cover is not secured against falling! When opening both hinges, hold on to the cover and secure it from falling!

NOTE

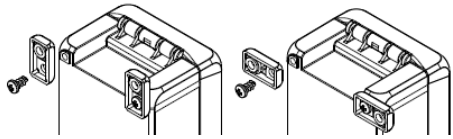
The cable should be inserted from below. If the transmitter is mounted vertically, the cable entry can be routed to the side. In this case, remove the filler plug from the side. Unscrew the PG screwed connection and screw it on the side. Reseal the mounting opening of the former PG screwed connection with the blanking plug. Make sure it is sealed tightly.

Fastening through the housing using four type 4 x 25 screws:



You will find a drilling template on the last page of these instructions

Mounting with enclosed wall brackets:



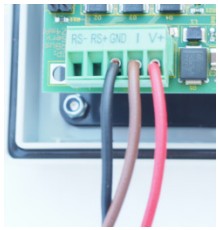
Screw the wall brackets to the back of the plastic housing before mounting on the wall. The device is then fastened to the wall using the four wall brackets.

5 Electrical installation

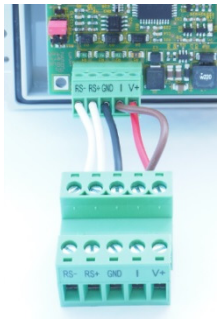
All wiring must conform to the applicable local regulations regarding the installation of electrical devices.

CAUTION!

The laying of electrical cables and the connection of the transmitter must be carried out by trained experts in accordance with the applicable standards and regulations.



A three-wire, shielded connection cable is recommended (shielding braid with degree of coverage ≥ 80 %)
Cables with a cable cross-section of 0.5 mm² to 1.5 mm² solid wire, strands with a maximum cross-section of 1 mm² with wire end ferrules such as LiYCY 3 x 1 mm² can be wired directly to the 5-pin plug on the connection board.

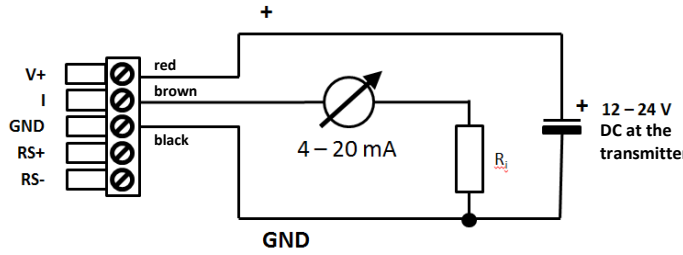


Cables with a cross-section up to a maximum of 2.5 mm² single-wire or 1.5 mm² strand such as LiYCY 3 x 1.5 mm² can be connected via the adapter plug supplied.

CAUTION!

The clamping range of the PG cable screwed connection is 6–12 mm. If cables with a smaller or larger outside diameter are used, the IP protection is no longer guaranteed!
Double earthing can cause EMC problems. Lay shielding only on one side of the earth potential. We recommend a connection to the PE terminal of the junction box.
Do not supply power to the transmitter before the wiring is completed and tested.

5.1 Connection diagram



CAUTION!

The power supply conductors must have a resistance low enough to prevent the supply voltage at the transmitter from falling below 12 V at all times.

Example:

Cable cross-section	Maximum resistance LiYCY
0.75 mm²	26 ohms/km
1.0 mm²	19 ohms/km
1.5 mm²	13 ohms/km

Connection cable 175 m from transmitter to the control unit with 1.5 mm² cable cross-section
Connection cable = 2 x 175 m = 350 m wire length.
Transmitter consumption 110 mA
Resistor cable
Cable resistance = length of connection cable (in km) * resistance of cable cross-section per km = 0.35 km * 13 ohms/km = 4.55 ohms
To ensure a safe function, the transmitter must never drop below 10 V during operation!
Minimum supply voltage: 10 V + 110 mA*4.55 ohms V = 10.5 V

CAUTION!

The maximum resistance of the current loop (sum total of the internal resistance of the control unit and the cable resistance of the signal line) must not exceed 500 ohms!

6 Closing the housing

Push the hinges back and press forcefully against the upper section. The hinges must audibly click into place.

CAUTION!

Make sure that the flat ribbon cable does not get caught between the cover and the housing.

7 Start-up

CAUTION!

Making unauthorised changes to the settings can result in a safety-related malfunction of the transmitter.
The transmitter must only be mounted and started up by trained experts. Only spare parts that have been approved by the manufacturer may be used for servicing and repair.

CAUTION!

The transmitter is not suitable for use in harsh ambient conditions. Use in potentially explosive atmospheres is not permitted.
Liability for the function of the gas transmitter is transferred in all cases to the owner or operator if the transmitter is serviced, repaired improperly or if the transmitter is not installed or operated in compliance with these instructions or industry guidelines.
These instructions aim solely to provide information on starting up the device. The manufacturer assumes no liability for the installation or operation of the transmitter.

Warranty and liability terms of the sales and delivery conditions of smartGAS shall not be extended by the above-mentioned directions.

7.1 Configuration

The transmitter is preconfigured for the target gas and measurement range. The target gas and measurement range are affixed to the rating plate on the housing and on the sensing head. When replacing the sensing head ensure that the target gas and measurement range are in agreement. When it is started up for the first time, a zero point adjustment and test of the end point/sensitivity adjustment must be carried out with a suitable test gas.

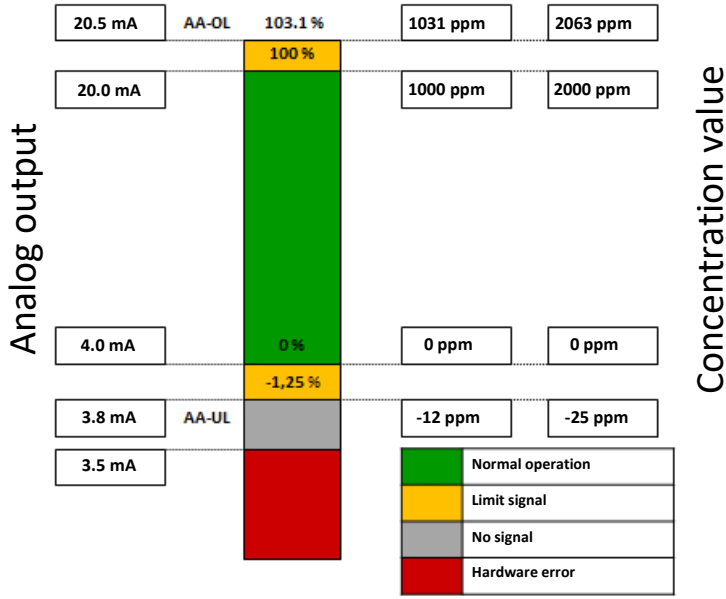
The current output of the transmitter is set to 4–20 mA NAMUR NE 43 at the factory. NAMUR NE 43 is a standard which defines the analog output lower limit (AO-LL) and the **A**nalog **O**utput **U**pper **L**imit (AO-UL). The transmitter can deliver a current signal greater than 4 – 20 mA. In order to comply with NAMUR NE 43, AO-LL is limited to 3.8 mA and AO-UL to 20.5 mA.

NOTE

An LED that flashes red indicates that the current value has exceeded AO-LL or AO-UL and the current value is limited to 3.8 mA or 20.5 mA. A red flashing display is **not a sensor error** and simply indicates that the current value no longer corresponds with the actual concentration.

The transmitter generates an output signal that is proportional to the measured gas concentration.

4–20 mA output signals according to NAMUR NE 43:



7.2 Service and adjustment

Visual inspection

At least once every 3 months, to determine operational availability.

Repeat testing

smartGAS recommends having the system tested by a service technician at least once a year. Service and test intervals may be more frequent in order to comply with regulations. To ensure the long-term function of the system, the conclusion of a service contract is recommended.

Zero point and sensitivity adjustment

The zero point and sensitivity can be adjusted via the transmitter keypad. For a proven gas supply, the use of the smartGAS feed adapter is recommended. The control unit alarm should be deactivated to prevent false alarms.

CAUTION!

Always adjust the zero point before the sensitivity.

CAUTION!

The built-in sensor's operating point is stabilised during the initial break-in phase of up to 15 minutes. The sensor is initialised within 2 minutes after activation. The concentration value is 0 ppm, a non-varying readout, during this interval. If a measurement range of 4 – 20 mA is selected, a steady flow of 4 mA is read out.
An error message or an exposure of the sensor to gas is not signaled during this interval!

The sensor integrated in the transmitter is stabilised following the 2-minute initialisation. The measurement value still does not correspond to the actual concentration during this interval. An error in the sensor is, as during the course of operation, indicated by an error signal ≤ 3.5 mA.

The transmitter is ready to measure after 15 minutes.

The full specification is achieved 30 minutes after the transmitter is activated. No adjustment to the transmitter or threshold settings on the control unit may be made prior to this time. Safety-related measurements may be taken after 30 minutes of operating time only

If the transmitter has been disconnected from the supply voltage, even if only temporarily, the initial break-in phase starts all over again.

7.3 Preparing for adjustment

Open the transmitter at one side. Insert the slotted screwdriver into the slot and lever the screwdriver outwards.
The cover can either be opened to the left or the right at the hinges.

CAUTION!
The cover is not secured against falling! When opening both hinges, hold on to the cover and secure it from falling!

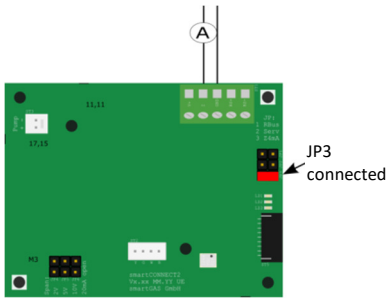
Move the transmitter cover to the side; it must still be possible to operate the keypad. The setting can be made at the transmitter if the current of the signal line is measured at the junction box or with a looped ammeter. Alternatively, a 4 – 20 mA clamp-on ammeter can be used or the gas concentration can be read off an output unit connected.

7.3.1 Voltage supply test

Use a voltmeter to test the supply voltage at the transmitter's terminal block. A supply voltage of at least 10 V and no more than 28 V must be present between V+ and GND.

7.3.2 Current interface setting check

The 4–20 mA current loop setting is made via jumper JP3. JP3 must be connected for the 4–20 mA current output. Additional jumpers **must not** be connected.
The measurement range of the transmitter is defined by the part number.



NOTE

JP3 must be connected to switch on the supply voltage! If JP3 is connected, the transmitted must be restarted. A restart is performed by disconnecting and reconnecting the supply voltage.
The transmitter has an initial break-in phase of 15 minutes and then works with the calibration set. No settings can be made during the initial break-in phase. The full specification is achieved after 30 minutes of operating time

7.4 Zero point and sensitivity adjustment

Nitrogen, synthetic air or fresh air can be used to adjust the zero point. If fresh air is used, it must be ensured that the air does not contain any of the gas for detection and has low relative humidity.

Commercially available test gas can be used to adjust the sensitivity. Optimum levels of accuracy are achieved with a test gas concentration > 90% of the upper range value.

CAUTION!

Never breathe in the test gas – risk to health.
Observe the hazard warnings in the relevant safety data sheets. If necessary, provide for removal in a fume cupboard or outside.

Precise adjustment is only possible with the optionally available feed adapter and a test gas flow of 0.5–2 l/min. A test gas flow of 0.5 l/min is recommended. If the flow is too low or too high, correct adjustment will not be possible! It must be ensured that the feed adapter is fitted correctly.

7.5 Switching on service mode

Action	Status display	Meaning
Switch off alarm notification on the control unit		
Switch to service mode Press  in this order within 6 seconds		
Service mode	Status display switches to yellow	Switchover from measurement mode to service mode level 1
	Status display flashes red for 3 seconds	Code entered was incorrect or was not entered within 6 seconds

7.6 Zero point adjustment

Action	Status display	Meaning
Prepare transmitter for zero point adjustment. Transmitter **must** be in operation for at least 30 minutes before zero point adjustment; the power supply must not be disconnected during the course of this. Switch transmitter to service mode.		
Transmitter is in service mode	Status display lights up yellow	
Attach feed adapter Channel nitrogen or synthetic air to the sensor at 0.5 l/min. Minimum 0.5 l/min, maximum 2 l/min.		
Make sure that the sensor is fully purged with the selected zero gas.		
Press ZERO for three seconds	Status display flashes yellow Zero LED flashes yellow	Adjustment mode switched on. Measured value outside the permitted adjustment range.
Maintain exposure to gas with selected zero gas.	Status display flashes yellow Zero LED flashes yellow	Measured value still not within the adjustment limit/stability
Adjustment limit/stability reached	Status LED flashes yellow Zero LED lights up yellow	
Set zero point. Use buttons ↑ or ↓ to set the concentration value of the zero point to an output current of 0 or 4 mA.[1]		
Press ZERO for 3 seconds to acknowledge the zero point	Status LED flashes green for 3 seconds then Status LED yellow. Zero LED goes out	Zero point adjustment successful. Caution: Value has not yet been saved. Service mode level 1 is still active.

[1] Caution: NAMUR NE 43 limits the current to 3.8 mA. If the concentration value of the zero point is lower, at least 3.8 mA will be output. Hold down the key until the current value increases above 3.8 mA.

Action	Status display	Meaning
	Status LED flashes red for 3 seconds, then status LED lights up yellow. Zero LED goes out	Error during zero point adjustment. Zero point adjustment must be performed again.
Cut off zero gas. Detach feed adapter.	Status LED lights up yellow.	
Once zero point adjustment is complete and if sensitivity adjustment is not required, the zero point value still has to be saved.		
Leave service mode and save adjustment values	Status LED lights up yellow.	
Hold down  for 3 seconds	Status LED flashes green for 3 seconds	Adjustment values saved
	Status LED flashes red for 3 seconds	Adjustment values not saved. Repeat save procedure
Once adjustment is finished: switch the alarm notification on the control unit back on		

7.7 Sensitivity adjustment

A sensitivity adjustment should only be made under the following circumstances:
zero point adjustment within the last hour. The concentration of the test gas used must be

Measurement range	Minimum concentration	Maximum concentration
1000 ppm	500 ppm	1000 ppm
1500 ppm	750 ppm	1500 ppm
2000 ppm	1000 ppm	2000 ppm

as shown above.
Calculate the test gas concentration using the appropriate current value for the measurement range

Measurement range	4–20 mA
1000 ppm	0.016 mA/ppm
1500 ppm	0.0106 mA/ppm
2000 ppm	0.008 mA/ppm

For 4 – 20 mA, also add the value of the zero point of 4 mA. The current value must be set at the current output.

Example for 2000 ppm measurement range:
1987 ppm (test gas concentration) * 0.008 mA = 15.896 mA
Zero value = 4 mA
Current to be set: 15.896 mA + 4 mA = 19.896 mA

Action	Status display	Meaning
Prepare transmitter for sensitivity adjustment. Transmitter must be in operation for at least 30 minutes before sensitivity adjustment; the power supply must not be disconnected during the course of this. Switch transmitter to service mode. A zero point adjustment must have been performed within the last hour.		
Transmitter is in service mode	Status display lights up yellow	
Attach feed adapter Conduct test gas with a concentration of 0.5 l/min to the sensor. Minimum 0.5 l/min, maximum 2 l/min.		

Action	Status display	Meaning
Make sure that the sensor is fully purged with the selected test gas.		
Press SPAN for three seconds	Status display flashes yellow Span LED flashes yellow	Sensitivity adjustment mode switched on. Measured value outside the permitted adjustment range.
Maintain exposure to gas with test gas.	Status display flashes yellow Span LED flashes yellow	Measured value still not within the adjustment limit/stability
Adjustment limit/stability reached	Status LED flashes yellow Span LED lights up yellow	
Set measuring point. Use ↑ or ↓ to set the current value in line with the concentration value of the test gas.[2]		
Press SPAN for 3 seconds to acknowledge the sensitivity value	Status LED flashes green for 3 seconds then Status LED yellow. Span LED goes out.	Sensitivity adjustment successful. Caution: Value has not yet been saved. Service mode level 1
	Status LED flashes red for 3 seconds, then status LED lights up yellow. Span LED goes out	Error during sensitivity adjustment. Sensitivity adjustment must be performed again.
Cut off zero gas. Detach feed adapter.	Status LED lights up yellow.	

[2] Caution: NAMUR NE 43 limits the current to 20.5 mA. If the sensitivity concentration value is higher, no more than 20.5 mA will be output. Hold down the key until the current value falls to below 20.5 mA.

Action	Status display	Meaning
Once sensitivity adjustment is complete, the sensitivity value still has to be saved.		
Hold down  for 3 seconds	Status LED flashes green for 3 seconds	Adjustment values saved
	Status LED flashes red for 3 seconds	Adjustment values not saved. Repeat save procedure
Once adjustment is finished: switch the alarm notification on the control unit back on		

7.8 Cancelling zero point and sensitivity adjustment

Action	Status display	Meaning
Cut off test gas and detach feed adapter. Service mode can only be exited when the yellow status LED is on.		
Press  for 3 seconds	Status LED flashes red for 3 seconds	Device has detected cancellation by user and acknowledges this
	Status LED switches to status display (green, flashing red, red)	Measurement mode is activated with the previous settings for zero point or end point.
Once adjustment is finished: switch the alarm notification on the control unit back on		

7.9 Errors during adjustment

Action	Status display	Meaning
Switching to service mode	Status LED flashes red for 3 seconds	Code entered was incorrect or was not entered within 6 seconds
Zero point adjustment	Status LED flashes red for 3 seconds, then status LED lights up yellow.	Error during zero point adjustment. Zero point adjustment must be performed again.
Sensitivity adjustment	Status LED flashes red for 3 seconds, then status LED lights up yellow.	Error within the sensitivity adjustment must be performed again.

8 Disposal

This product must not be disposed of as municipal waste. It is therefore labelled with the corresponding symbol. smartGAS will take this product back free of charge. The national sales organisations and smartGAS can provide information on this

9 Declaration of conformity

EG-Konformitätserklärung
EC-Declaration of conformity

smartGAS
MIKROSENSORIK

Wir,
We,

smartGAS Mikrosensorik GmbH
Hünderstraße 1
74080 Heilbronn

erklären als Hersteller, dass das Produkt
declare as manufacturer, that the product

TRANSMITTER^{EVO}

mit den folgenden EG-Richtlinien unter Anwendung der aufgeführten Normen übereinstimmt:
is in conformance with the following EC-Directives by application of the listed standards:

Bestimmungen der Richtlinie *provisions of directive*		**Nummer sowie Ausgabedatum der Norm** *Number and date of issue of standard*
2014/30/EU	**EMV-Richtlinie** *EMC Directive*	EN 50270:2015+AC:2016 (device type 1)
2011/65/EU	**RoHS-Richtlinie** *RoHS Directive*	EN 50581:2012

Diese Konformität gilt für alle Geräte, die auf Basis der gültigen Fertigungsunterlagen hergestellt wurden, und wird durch das angebrachte CE-Zeichen sichtbar gemacht.

This conformance applies for all equipment that was manufactured according to the valid production documents and is visible by the attached CE mark.

Diese Erklärung wird abgegeben durch
This declaration is made by

Jörg A. Ronde, Dipl.-Kfm. / MBA
Geschäftsführer
CEO

Heilbronn, 24.06.2020

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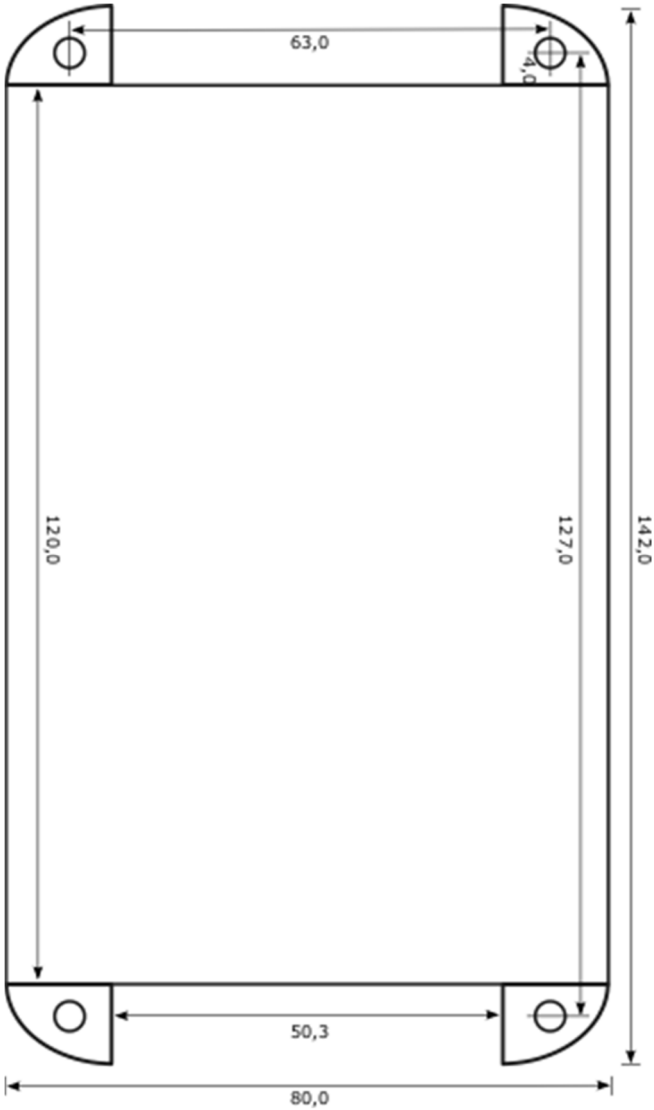
10 Drilling template



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