GR-405

Portable RF Signal Generator

- 0 MI2061 -

PROMAX

SAFETY NOTES

Read the user's manual before using the equipment, mainly "**SAFETY RULES**" paragraph.

The symbol ⚠ on the equipment means "**SEE USER'S MANUAL**". In this manual may also appear as a Caution or Warning symbol.

WARNING AND CAUTION statements may appear in this manual to avoid injury hazard or damage to this product or other property.

USER'S MANUAL VERSION

Version	Date
1.1	March 2015

SAFETY REQUIREMENTS ⚠

* **The security can be compromised if not applied the instructions in this manual**.

* Do not place any heavy object on the instrument.

* Avoid severe impact or rough handling that leads to damaging the instrument.

* Do not discharge static electricity to the instrument.

* Use only mating connectors, not bare wires, for the terminals.

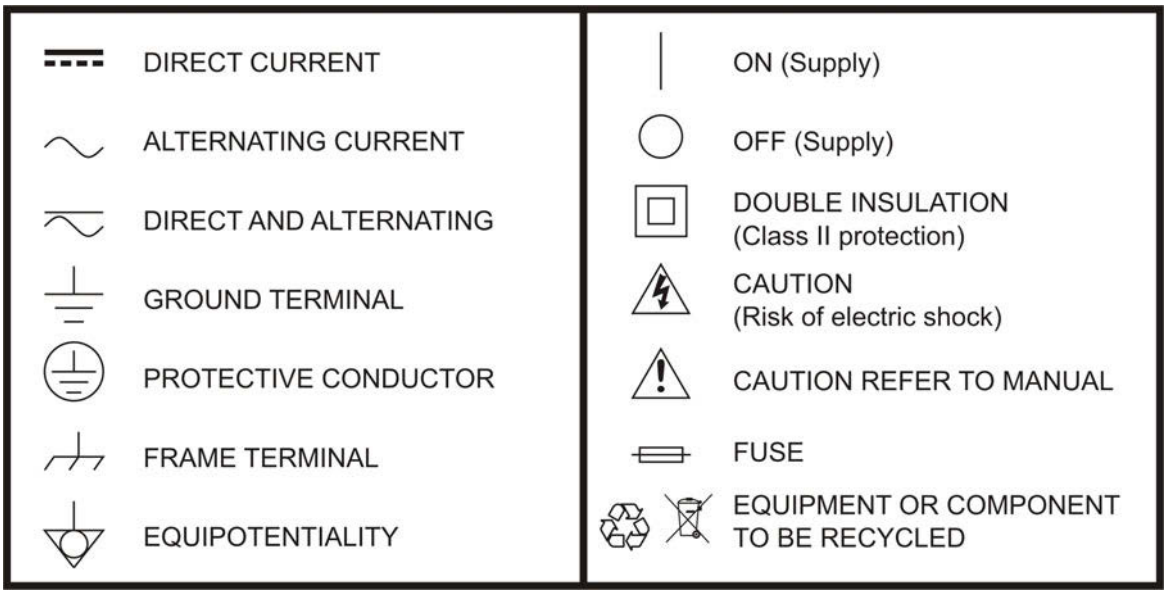
* Do not disassemble the instrument unless you are qualified.

* Ensure reverse power to the USG output terminal does not exceed +30dBm.

* Ensure the DC voltage connected to the USG output terminal does not exceed beyond the range of −25 Vdc to +25 Vdc.

* Follow the **cleaning instructions** described in the Maintenance section.

* Symbols related with safety:



Descriptive Examples of Over-Voltage Categories

Cat I Low voltage installations isolated from the mains.

Cat II Portable domestic installations.

Cat III Fixed domestic installations.

Cat IV Industrial installations.

TABLE OF CONTENTS

Portable RF Signal Generator
GR-405

1 INTRODUCTION

1.1 Description

The **GR-405** is a signal generator that can be operated as standalone continuous wave generator.

The **GR-405** can be configured using any Java supported PC. The device can generate continuous wave, sweep, power sweep and frequency hopping waveforms.

1.2 Main Features

► **Operation**:

- Frequency range from 34,5 MHz to 4,4 GHz.
- 10 kHz resolution.
- -30 dBm to 0 dBm output power.

► **Features**:

- Signal generator operation supports a plethora of control devices:
  Any Java-enabled PC: Windows, Mac or Linux PCs.
- Continuous wave, sweep wave, frequency hopping wave, power sweep wave.

► **Included accesories:**

- User manual CD.
- USB A to Mini USB cable.

1.3 Equipment detail

- **Front face**

Figure 1.

1 **RF Output Terminal**

- Output: -30 to 0 dBm.
- Input impedance: 50 Ω.
- Connector: N-type male.

Figure 2.

2 **Mini-USB port**

Used to connect to a PC device for configuration or control.

When connected to power, the mini USB port will be lit red.

1.4 Signal Generator Display

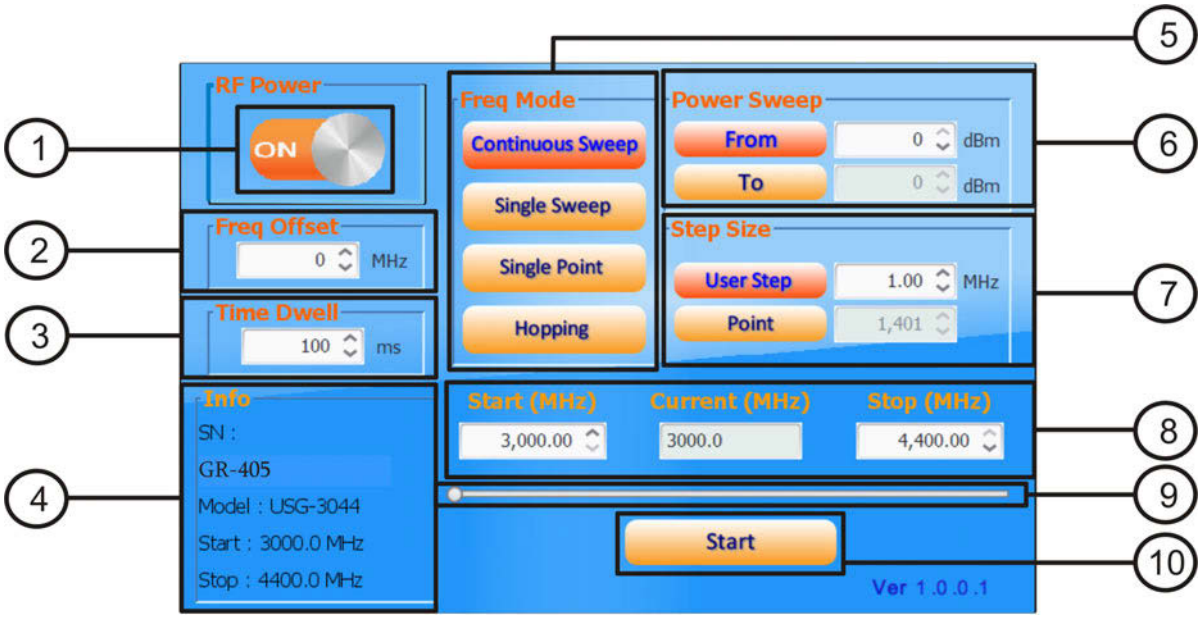


Figure 3.

1 **Power Indicator** — Turns the RF output on or off.

2 **Frequency Offset Settings** — Offsets the frequency by ±50 kHz.

3 **Time Dwell Settings** — The time dwell settings determine how long the signal will stay (dwell) at each frequency point.

4 **System Information** — The system information states the serial number, model and frequency range specifications.

5 **Function Mode** — Chooses the type of function to be performed by the device: Continuous Sweep, Single Sweep, Single Point or Hopping.

6 **Power Sweep** — Sets the Start and Stop power level settings. The *From* setting set the initial power level at the start of the sweep and the *To* setting sets the final power level at the end of the sweep.

7 **Step Size**

Sets the sweep step settings.
The User Step and Point (inversely related) set the step resolution of the single and continuous sweep functions in hertz and number of points, respectively.

8 **Frequency Settings**

Sets the basic start and stop frequency parameter settings. It also displays the instantaneous (current) output frequency, as shown below.

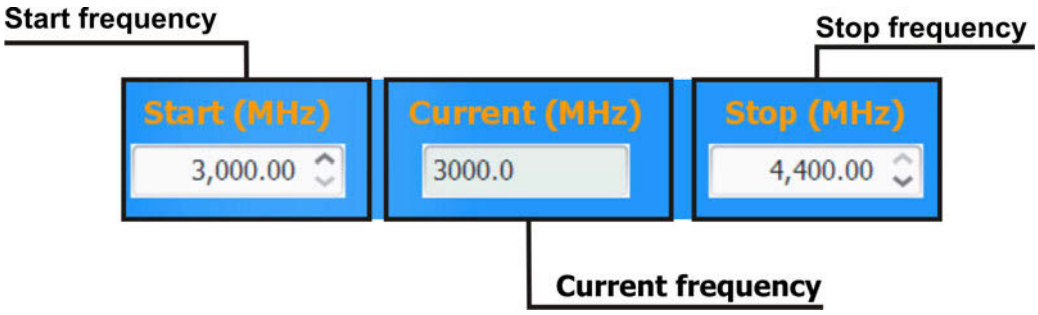


Figure 4.

9 **Frequency Status Bar**

When the output is on, the point on the frequency status bar indicates the instantaneous frequency that is being output. When the output is off, the status bar can set the start and stop frequencies.

10 **Start key**

Pressing Start will output the selected function.

2 FIRST TIME USE INSTRUCTIONS

The following instructions will go over all installation instructions that are required to operate the **GR-405** from a PC.

2.1 Installing the USB Driver

► **Description**:

The device connects via USB to a PC using a virtual COM port driver.

For Linux and OS X systems, the device is recognized as a virtual COM port device automatically. *A device driver does not need to be installed for these systems.*

For Microsoft Windows operating systems, the device will be recognized as a virtual COM port device only after the USB driver is installed.

► **Requirements**:

- Operating System: Windows XP, Vista, 7, 8.

NOTE: Please note that for Windows 8, "Device driver signature enforcement" must first be disabled before the driver can be installed.

► **Steps**:

1. Connect the device to the PC using the USB Type A - Mini-B cable.

   If the PC asks for the driver, please go to step 5.

2. Open the Windows Device Manager. On Windows 7 for example:

   Start ➔ Control Panel ➔ Hardware and Sound ➔ Device Manager

3 From the device tree go to:

Other devices ➔ USB Serial Port.

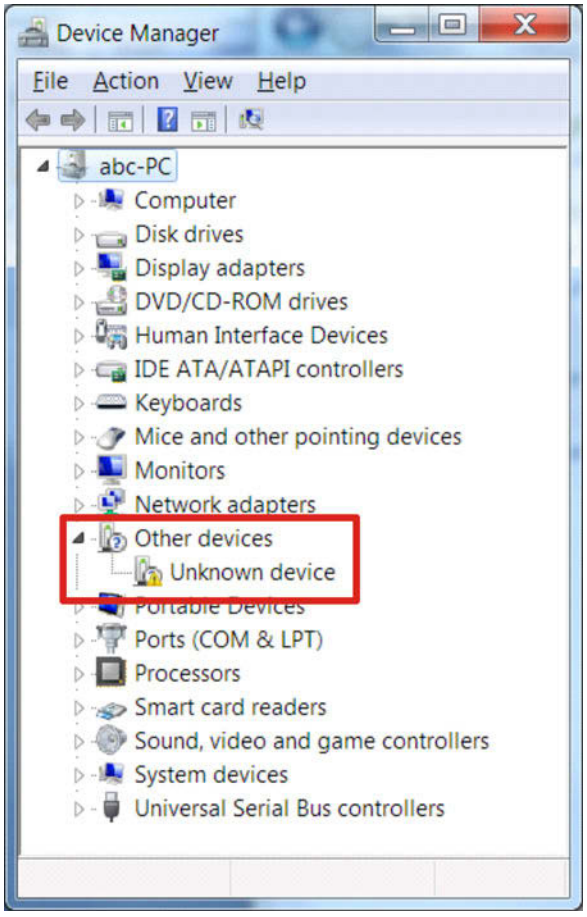


Figure 5. The yellow error sign indicates that a driver has not been installed.

4 Right-click USB Serial Port and select *Update Driver Software*.

5 Select *Browse* my computer for driver software when prompted.

Manually select the *device Driver* from the User Manual CD when prompted. If the Windows Security pop-up appears, choose *Install this driver software anyway*.

6 The USG will now become available in the device tree under PORTS (COM & LPT).

2.2 Disabling the Device Driver Signature Enforcement in Windows 8

► **Description**

To install the USG USB driver on Windows 8 systems, you must first disable "Device driver signature enforcement". This procedure is shown below.

NOTE: Applicable to Windows 8 only!

► **Steps**:

1. Go to the *Charms* bar
2. Click on *Settings*.
3. Click on *Power*.
4. Hold the *SHIFT* key and click Restart
5. Click on:

Troubleshoot → Advanced Options → Startup Settings → Restart → Select 7) Disable driver signature enforcement.

6. The PC will now restart.
7. After the PC restarts, it will now be possible to install the device USB driver on Windows 8 using the procedure shown previously.

3 SIGNAL GENERATOR

The signal generator function can be controlled with PC using a Java program (using Windows, Mac OS X or Linux operating systems).

3.1 PC Configuration

► Description

The following chapter will show how to run the Java based application and the how to connect the device to the PC.

Any Windows, Mac OS X or Linux PC that can install the Java runtime library can be used to operate the signal generator function.

NOTE: The Java runtime needs to be installed before continuing. Visit www.Java.com to download and install the Java Runtime.

NOTE: For Windows, the device USB driver must first be installed. Mac OS X and Linux systems do not need to install this driver.

► Connection

1. Connect the device to the RF port of the **AE-366B**.
2. Connect the PC to the device using a Type A-mini USB cable.

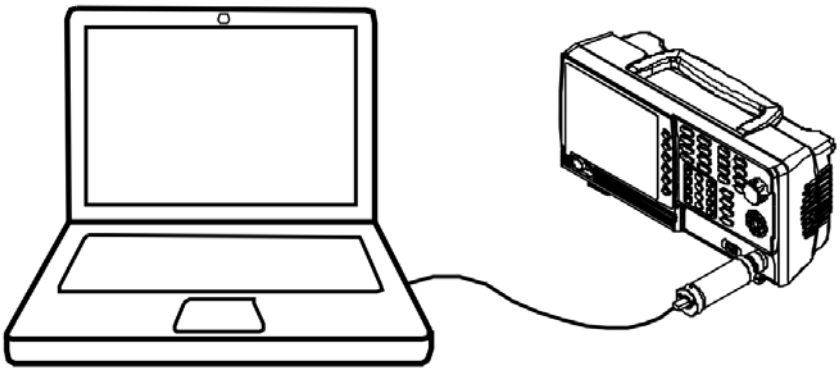


Figure 6.

3 Open USG_GUI_v1001.jar file (accessible on the User Manual CD).

- The USG_GUI_v1001 file doesn't need to be installed.

4 If it is not already, turn the RF power on for the device.

Figure 7.

3.2 Frequency Function Mode

► **Description**

There are four different frequency modes that can be selected.

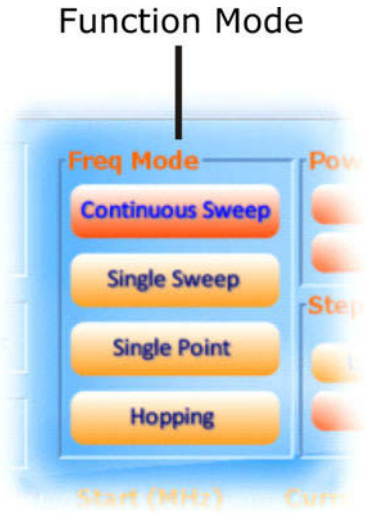


Figure 8. Function mode menu.

► **Steps**:

1 In the *Freq Mode* panel, select the frequency function mode:

- **Continuous Sweep**: Outputs a continuous sweep

- **Single Sweep**: Outputs a single sweep.
- **Single Point**: Outputs a single frequency.
- **Hopping**: Frequency hops between two frequencies.

3.3 Selecting the Frequency

► **Description**

Sets the Start and Stop frequency for the device.

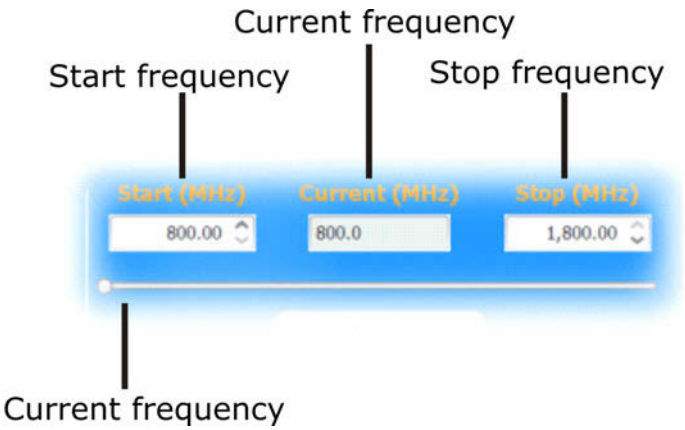


Figure 9. Frequency slide bar.

► **Steps**:

1 At the bottom of the screen set the Start and Stop frequencies for the continuous sweep, single sweep and hopping frequency modes.

For the Single Point frequency mode, only the Start frequency can be set.

NOTE: The settable frequency range is limited by the device model type.

3.4 Selecting the Frequency Step Size

► **Description**

The step size settings determine the number of frequency points for the sweep modes.

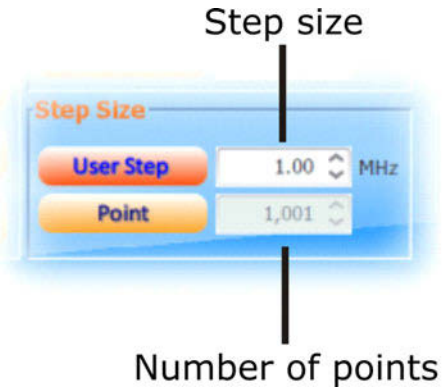


Figure 10. Step size settings.

► **Steps**:

1. To set the span of each step of a sweep, press *User Step*.
2. To set the number of discrete steps in a sweep, press *Point*.
   - The number or points or the frequency span of each step depends on the device model.

User Step range	0.01 MHz ~ 100 MHz
Point range	(Frequency span of device model / User Step range) + 1 = Point range

3.5 Time Dwell

► **Description**

The Time Dwell setting determines the amount of time between each point in a sweep.

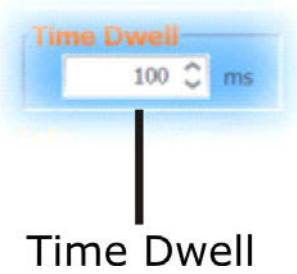


Figure 11. Time dwell setting.

► **Steps**:

1 Press *Time Dwell* to set the amount of time between each step in milliseconds.

- The *Time Dwell* setting range depends on the on the device model.

Time Dwell	1 ms ~ 1000 ms

NOTE: The minimum step time is automatically set by the PC software. A 1ms Time Dwell can only be achieved with a fast system.

3.6 Frequency Offset

► **Description**

The *Frequency Offset* setting will offset the frequency by ±0.05 MHz.

Figure 12. Frequency offset setting.

► **Steps**:

1 Press Freq Offset to set an offset to the frequency settings.

Offset	**±** 0.05 MHz

3.7 Selecting the Power Sweep

► **Description**

Sets the power level for the start and stop frequencies.

For the sweep functions, sets the power level from the Start frequency to the Stop frequency.

For the *Single Point* function, the *From* setting sets the initial power level and the To setting, if needed, sets the final power level.

For the *Hopping* function, the *From* setting sets the power level of the Start Frequency and the To setting set the power level at the Stop frequency.

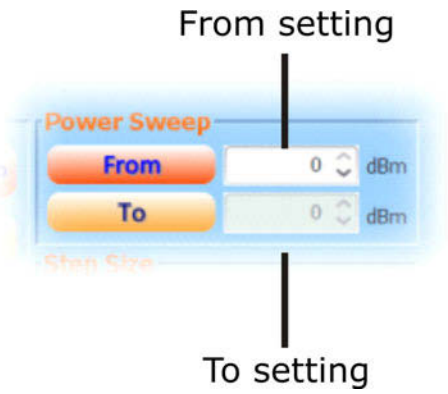


Figure 13. Power sweep setting.

► **Steps**:

1 To set the initial power level, press *From*.

2 To set the final power level press *To*.

- If you only want one power level, only set the *From* setting.

Power level range 0 dBm ~ -30 dBm

3.8 Turning the Output On

► **Steps**

1 After all the settings have been set press Start to turn on the output on.

For the single sweep function, press Start for each single sweep.

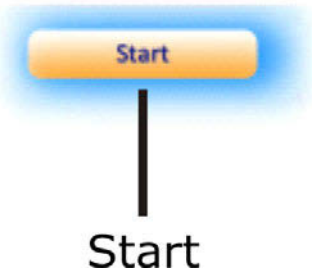


Figure 14. Start key.

4 FAQ

4.1 The USG will not connect to the PC

If you are running a Windows system, make sure that the device USB driver has been installed correctly. If you are running Windows 8, please make sure that "Device driver signature enforcement" is disabled before installing the driver.

4.2 The performance does not match the specification

Make sure the device is powered On for at least 30 minutes, within 20°C to 30°C. This is necessary to stabilize the unit to match the specification.

For more information, please contact your local distributor.

5 SPECIFICATIONS

The specifications apply when the USG is powered on for at least 30 minutes to warm-up to a temperature of 20°C to 30°C, unless specified otherwise.

Parametres	Value
Frequency Range	34.5 MHz to 4.4 GHz
Output Power	-30 dBm to 0 dBm in 1 dB steps
Accuracy	± 100 Hz at 100 MHz, 0 dBm Output
Resolution	10 kHz
Output Control	On / Off
On / Off Isolation	≤ -75 dBc
Mode Control	Fixed Frequency, Single Sweep CW Sweep and Hopping
Frequency Offset	50 kHz to 50 kHz steps 10 kHz
Amplitude Absolute Accuracy	0 dBm ± 1 dB typical at 2200 MHz, 0 dBm Output
Output Flatness	± 3.5 dB, ref. to 2200 MHz, at 0 dBm Output
Phase noise	
< 97 dBc/Hz	10 kHz offset @ 1.0 GHz, typical
< 107 dBc/Hz	100 kHz offset @ 1.0 GHz, typical
2nd Harmonics	0 dB Attenuation
≤ -15 dBc, typical	34.5 MHz to 2.0 GHz, fundamental
≤ -10 dBc, typical	2.0 GHz to 3.0 GHz, fundamental
≤ -25 dBc, typical	3.0 GHz to 4.4 GHz, fundamental
3nd Harmonics	0 dB Attenuation
≤ -5 dBc, typical	34.5 MHz to 2.0 GHz, fundamental
≤ -20 dBc, typical	2.0 GHz to 3.0 GHz, fundamental
≤ -40 dBc, typical	3.0 GHz to 4.4 GHz, fundamental
Software for PC	
Java device Control Panel	Windows 2000 / XP / Vista / 7 / 8 / Linux / OS X
Interface	USB 2.0
USB Conector type	Mini-B
Power Supply	
Supply voltage	5 V nominal
RF Connector Type	
Type	N male
Impedance	50 Ω nominal
VSWR Output	
< 1.5:1	Output level -30 dBm
Max. DC voltaje connected to output	± 25 VDC
Max. Reverse Power	+30 dBm
Mechanical Features	
Dimensions	W 102 mm x H 29 mm x D 28 mm
Size	91 g
Included accesories	
CD with user manual and software	
USB A to Mini USB cable	

Operating Environment	
Altitude Altitud	Up to 2000 m
Temperature range	5 °C to 40 °C
Maximum relative Humidity	80% (up to 31 °C), decreasing linearly to 50% at 40 °C
NOTE: Equipment specifications are set in these environmental operating conditions. Operation outside these specifications are also possible. Please check with us if you have specific requirements.	
Packing Recommendations	
You should retain all packaging materials on a permanent basis if necessary to return the equipment to the Technical Assistance Service.	

6 MAINTENANCE

6.1 Cleaning Recommendations

CAUTION:	Disconnect all cables or devices from the instrument before cleaning.

CAUTION:	Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any liquid.

CAUTION:	Do not use chemicals containing harsh material such as benzene, toluene, xylene, and acetone.

7 DIMENSIONS

7.1 Dimensions

Scale: mm

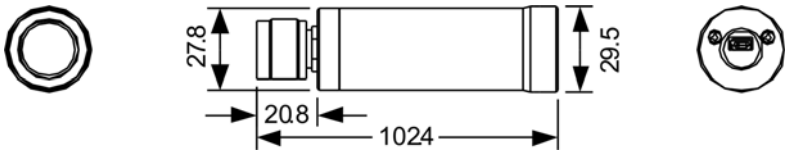


Figure 15.

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