MCQ INSTRUMENTS

GAS BLENDER NANO (3 Channels)

User Manual - Revision 07

Family name: GB3000 Series

ESSENTIAL INSTRUCTION

Read carefully before proceeding!

MCQ INSTRUMENTS tests its products to meet many national and international standards. These instruments are sophisticated technical products, proper install, use and maintenance are required to ensure their right functioning. The following instructions must be adhered to and integrated into your safety program when installing, using and maintaining MCQ INSTRUMENTS products.

CONTENTS

SECTION 1. ABOUT THIS GUIDE

1. INTRODUCTION

This guide is your operative manual for the MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels), an instrument created for gas mixing solutions. With the MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels) you can:

- **Operate with Dynamic Gas Mixtures with an immediate response time** – the MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels) allows you to work with any desired Gas Mixture composed by non-corrosive gases. The Gas Blender works with three channels, designed for manage dynamically three different gases mixtures preparations. The MCQ INSTRUMENTS Gas Mixture Creator provided with the instrument gives you an easy and quick way to set and control the gas mixture parameters, allowing you to change the mixture composition with a single channel response time for change of setpoint value as reported on APPENDIX C
- **"Lab in a box" solution** - MCQ Instruments devices provide a complete laboratory experience in a single, ready-to-use box. Unlike traditional systems that require a complex tube system, external power supply, and significant space and budget considerations, our devices eliminate these additional requirements).
- **Operate with the touch panel or with your own PC** - the MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels) is a stand-alone device letting you control all the parameters and access to all the main features by the Touch Display. It has also a 2.0 USB port for an easy and quick connection with your PC. You do not need any external control unit since the MCQ INSTRUMENTS Gas Mixture Creator, included in the package, guarantees a full control over the instrument.
- **Easy Integration** - ProfiBus, ModBus, Matlab Simulink compatible and USB and RS485 Bus ready to use.
- **Python ready** – We provide a Python library (from version 3.7 or higher) to control the instrument through serial port.

The Gas Blender can operate at 110-240 V AC and up to 3 bar nominal pressure.

2. USING THIS GUIDE

The guide describes the features, installation, and initial configuration of the MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels). The guide is intended for both first-time and experienced computer network users who want to install and use the MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels). If you are working with a Gas Blender for the first time, it is possible you may make mistakes. We have tried to identify the likely errors you may make and have provided hints and tips to help you recover from error situations.

3. DEFINITIONS USED IN THIS GUIDE

The following terms are used frequently in this guide. They are presented here with their definitions for your information:

- **Setpoint** - The command or control signal supplied to a flow controller is called its setpoint. The controller will maintain the flow at this value.
- **Full scale** - The highest flow that an instrument will meter within its specified accuracy. It is often possible for an instrument to measure a flow beyond its full-scale value, but the accuracy of this measurement may be outside of published specification.
- **Purge** - The MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels) is supplied with the ability to open the valve far beyond the full-scale position to allow them to be cleaned. This is usually accomplished by blowing clean, dry nitrogen through the instrument. When the valve is opened to this cleaning position, it is said to be in the Purge mode.
- **Sccm** - Standard Cubic Centimeters per Minute. It is a common flow measurement unit most used in the flow meters/controllers' field that indicates how many standard cubic centimeters of gas flow by a stationary point in one minute (1 sccm = 1 mL/minute = 0,001 L/minute).

e.g.

Using Sccm	**Using mL per Minute**	**Using Liters per Minute**
Channel 1 = 200 sccm	Channel 1 = 200 mL/min	Channel 1 = 0,2 L/min
Channel 2 = 200 sccm	Channel 2 = 200 mL/min	Channel 2 = 0,2 L/min
Channel 3 = 200 sccm	Channel 3 = 200 mL/min	Channel 3 = 0,2 L/min
Mixture Flow = 600 sccm	Mixture Flow = 600 mL/min	Mixture Flow = 0,6 L/min

- **Non-corrosive gases** - MCQ INSTRUMENTS refers to non-corrosive gases indicating all the gases for which the long-time use does not involve a potential risk of instrument damage. A complete list of non-corrosive gases, compatible with the instrument, is provided in APPENDIX A (see page 55).
- **Gas mixture** - A gas mixture (or gas solution) is a homogeneous mixture composed of two or more gaseous substances. In such a mixture, one or more solutes gases are dissolved in another substance, known as solvent gas. What tells the solute from the solvent is the quantity ratio. In case of a two-component gas mixture, the solvent gas is the component present in the greatest amount.
- **Channels** - The MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels) works controlling from two to three separate modules, one per each gas in use. MCQ INSTRUMENTS refers to these modules as Channels. Gas Blender's ***Channel 1*** is designed for working with the carrier gas, while the other channels are designed for the solute's gases. This instrumental configuration can be changed by the User.
- **Push-in connectors** – All the MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels) inlets and the outlet are equipped with this kind of connectors that provide a fast and easy way to connect the tubes (6 mm diameter) with the instrument, secure a strong locking mechanism and prevent accidental disconnects (for a complete list of compatible tubes and different connectors, please check APPENDIX B, page 56 and APPENDIX D, page 58).
- **MODBUS RS485** – The MODBUS RS485 is a serial communication method for computers and devices. MODBUS RS485 is currently a widely used communication interface in data acquisition and control applications where multiple nodes communicate with each other. Up to 64 gas blenders cascade can be made through the MODBUS RS485 port to obtain High Diluted Gas Mixtures.

SECTION 2. GETTING STARTED

1. INTRODUCTION

This chapter provides instructions for the installation of the Gas Blender.

- **Before you begin the installation**
- **What is in the package?**

2. BEFORE YOU BEGIN THE INSTALLATION

Before installing the instrument, ensure that the installation site conforms to the specific operating parameters recorded on this instrument's User Manual. This is critical because each instrument is configured for a specific application range. Please review the gas or gases, the One Touch Valves, the check valve (if present) mounting orientation, the maximum flow range(s), the inlet and the outlet pressure(s), the operating temperature(s) and all the other parameters listed in the APPENDIX C (page 57). The line pressure should not exceed 3.0 bar (optimal pressure setting around 2.0 bar). The temperature range for a proper working is 15-45°C at standard conditions (100 kPa ambient pressure and 30-50% relative humidity). If your application exceeds any of these parameters, contact your MCQ INSTRUMENTS Sales Agent before installation. You may also contact the MCQ INSTRUMENTS Technical Support Center.

REFERENCES e-mail: support@mcqinst.com

3. WHAT IS IN THE PACKAGE?

Before you install the Gas Blender, check the content of the box with the check list below. If any of the items have been damaged in transit or are missing, please contact the MCQ INSTRUMENTS dealer from whom the equipment was purchased.

- GAS BLENDER NANO (3 Channels) unit
- Power cord
- USB Cable – Type A to B
- Check valves (only for CO2 if present)
- 4 x One Touch valves
- 4 x 6mm Ø tubes of 50cm length (colored by gas type)
- Pen Drive with Gas Mixture Creator Installation software
- Touch pencil with adhesive support
- Calibration certificate
- Getting Started Manual
- EC declaration of conformity

SECTION 3. INSTALLING THE GAS BLENDER

1. INTRODUCTION

In this release of the MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels), we have provided this User Manual to assist in your setting up the instrument and getting started. This chapter provides more information on the process for your assistance:

- **GAS BLENDER NANO (3 Channels) features**
- **Directives applied**
- **Standards applied**
- **Pre-installation check list**
- **Warning and improper use**
- **GAS BLENDER NANO (3 Channels) hardware installation**
- **GAS BLENDER NANO (3 Channels) software installation**
- **GAS BLENDER NANO (3 Channels) console connection**

2. GAS BLENDER NANO (3 Channels) FEATURES

This section provides a quick hardware setup procedure for the Gas Blender. Follow the steps below to learn more about setting up your instrument:

Front Panel Features

Below is a representation of the front panel (Figure 3-1). Familiarizing yourself with the display menu will help in properly setting up your Gas Blender.

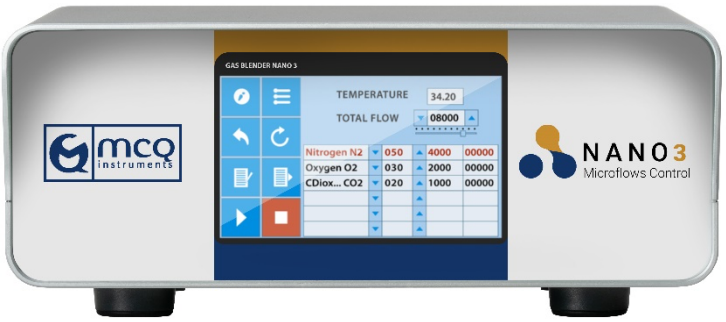

Figure 3-1

- **TOUCH PANEL** - The GAS BLENDER NANO (3 Channels) is a stand-alone device letting you control all the parameters and accessing to all the main features by the Touch Display.

Rear Panel Features

Below is a representation of the rear panel (Figure 3-2). Familiarizing yourself with the connections will help in properly setting up your Gas Blender.

Figure 3-2

- **ON/OFF SWITCH** – This button controls the Gas Blender power supply.
- **POWER INLET** – The power port attaches to a power cord included in your package.
- **USB PORT** – This 2.0 USB port connects the Gas Blender with you PC allowing a full control over the instrument with the MCQ Gas Mixture Creator Software bundled with product.
- **MODBUS RS485 PORTS** – Via these MODBUS RS485 ports, you can pilot the Gas Blender by developing your own software.
- **GAS 1** - Gas inserts connected with the airflow sensor of Channel 1, specifically calibrated for your chosen gas (default carrier gas).
- **GAS 2** - Gas inserts connected with the airflow sensor of Channel 2, specifically calibrated for your chosen gas (solute gas).
- **GAS 3** - Gas inserts connected with the airflow sensor of Channel 3, specifically calibrated for your chosen gas (solute gas).
- **OUT** - Outlet of the gas mixture dynamically obtained.

3. DIRECTIVES APPLIED

2014/30/UE Electromagnetic compatibility

2014/35/UE Low voltage equipment

4. STANDARDS APPLIED

EN 61010-1:2013 - Safety requirements for electrical equipment for measurement, control and laboratory use

Part 1: General requirements

EN 61326-1:2012 - Electrical equipment for measurement, control and laboratory use - EMC requirements

Part 1: General requirements

EN 55011:2017 - Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement

5. PRE-INSTALLATION CHECK LIST

⚠WARNING!

The steps below provide you a quick procedure that must be followed for a proper instrument installation:

1. **Double-check that gas to be measured are compatible with the instrument.**

   MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels) Modules are compatible with non-corrosive gases. A complete list of non-corrosive gases, compatible with the instrument, is provided in APPENDIX A (see page 55). In case you need to work with gases not listed in APPENDIX A, please contact the MCQ INSTRUMENTS Support Center before operating. The use of inappropriate gases can cause an instrument failure.

2. **The use of appropriate tubes is strongly recommended for the right functioning of the instrument.**

   In case you may need further help for this kind of installation, check the Compatible Tubes List in the APPENDIX B (see page 56), where you can find some connection solutions suggested by MCQ INSTRUMENTS.

3. **No need for pipes installation.**

   Because the flow controllers set up a laminar flow condition within the flow body, no straight runs of pipe are required upstream or downstream of the controller.

4. **This instrument has internal filters.**

   The MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels) has internal filters near the inlets. These filters themselves provide a proper working of the instrument. However, the installation of additional external filters is allowed.

5. **The instrument has specific power supply requirements.**

   110-240 Vac / 50-60 Hz.

6. **Do not locate the instrument in areas subject to sudden temperature changes, excessive moisture or near equipment radiating significant amount of heats.**

   Moreover, be sure to allow adequate space for cable connectors and wiring.

7. **⚠The instrument must be used under suction hood.**

   Be sure that the flow rate of the motor suction hood is at least greater than 100m^3/h

8. **⚠Purge.**

   In case of use of any gas different from N2, or He, or AIR it is mandatory to purge all system's pipes with N2 for at least 30 min before and after use, in order to avoid moisture residues that can damage the instrument, activating corrosion effects, etc.

9. **⚠Dry Gases.**

Any gas flowed in the Gas Blender has to be dry.

10. **If you use flammable gases (CH4, H2) be sure that the suction hood is ATEX type.**
11. **Maximum inlet gas pressure is 3 bar.**

6. WARNING AND IMPROPER USE

Do not modify the device or substitute parts
The improper use of the Gas Blender could compromise the expected protection
Service by qualified personnel only
Do not use any type of liquids in the tubes
Do not use corrosive gases (e.g. H2S)
Do not step on the device
Do not power the device with different voltages than those indicated (110-240 Vac 50/60Hz)
Do not operate at pressures higher than the rated maximum pressure
Use flammable gases (e.g. H2, CH4) only under a proper atex ventilation hood
Use dangerous gases (e.g. CO2, CO, NOx) only under a ventilation hood
Do not place fluid containers above the device

7. GAS BLENDER NANO (3 Channels) HARDWARE INSTALLATION

⚠CAUTION!

Before connecting the gas through the equipment, please verify that the gas pressure set on cylinder pressure regulator is compatible with the instrument specifications (see the APPENDIX C, page 57).

⚠INLET PRESSURE MAXIMUM 3 BAR⚠

This section provides a simple step-to-step method for a quick and safe installation of the Gas Blender.

1. **Gas cylinders** - Close the cylinder's main valve. Take a 6 mm external diameter tube and proceed connecting it to the cylinder pressure regulator. For a safe connection, a specific rubber holder adapter is usually required (Figure 3-3). This procedure must be repeated for each gas cylinder in use.

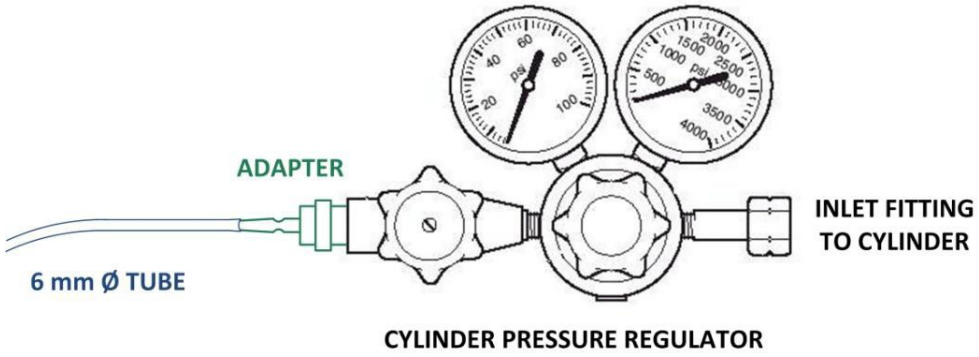

Figure 3-3

2. **One Touch Valves -** Install the One Touch Valves (provided in the package) along the gas line for each of the gas source in use (Except for CO2). In order to do so, take the free end of the tube previously connected to the pressure regulator and insert it in the valve through the push-in connector. In case of different valves type use, please contact the MCQ INSTRUMENTS support center.

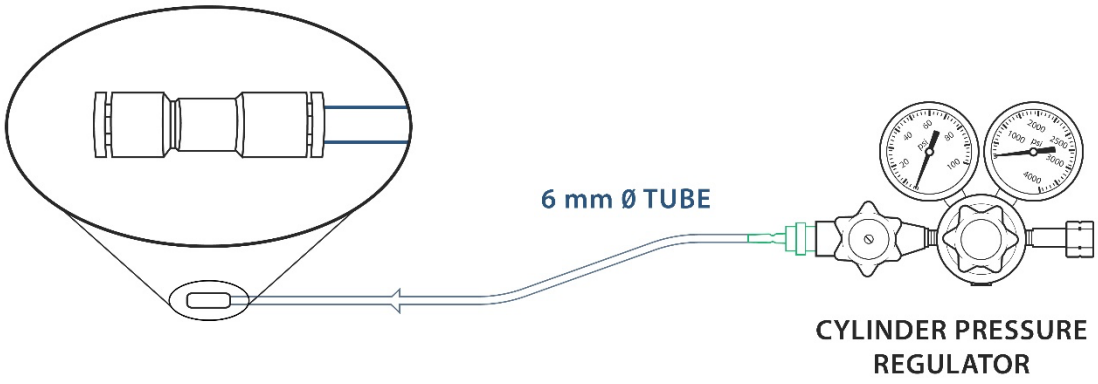

Figure 3-4

3. **Check valves (Only for CO2)** - Install the Check valve (provided in the package) along the gas line of CO2 gas source in use. In order to do so, take the free end of the tube previously

connected to the pressure regulator and insert it in the check valve through the push-in connector. Check valves allows the gas to flow through them in only one direction. Therefore, the check valves must be installed in the direction of flow sense, i.e. form the cylinder to the Gas blender (Figure 3-5). In case of different valves type use, please contact the MCQ INSTRUMENTS support center.

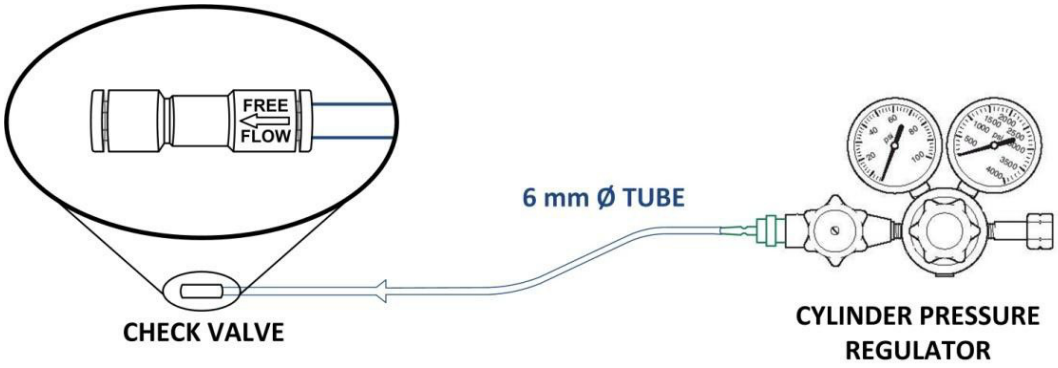

Figure 3-5

4. **Gas Blender Inlets** - Valves must be positioned at a distance of 50 cm from the Gas Blender inlets to secure a proper working of the instrument. For this purpose, three 6mm diameter tubes 50 cm long, on different colors based on the gas type, are provided in the package. Take the 50 cm long tube and connect one end with the valve. Then connect the other end to the instrument inlet with same color, positioned on the Gas Blender rear panel Figure 3-6 his procedure must be repeated for each gas cylinder in use.

   Example: Channel 1 calibrated on N2, channel 2 calibrated on O2, channel 3 calibrated on CO2:

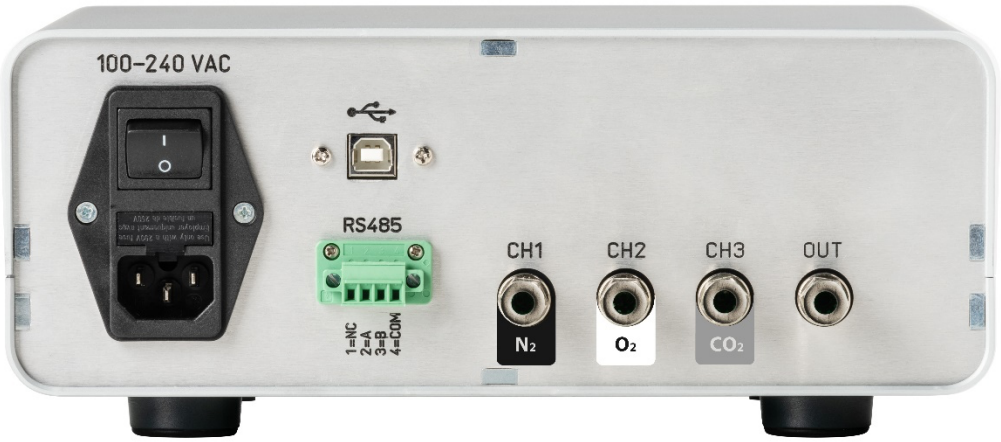

Figure 3-6

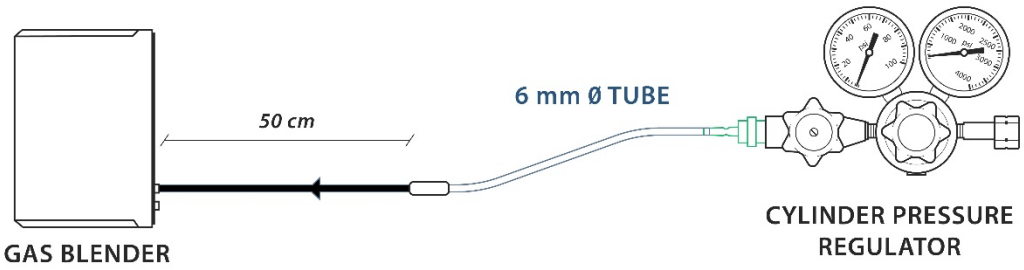

Figure 3-7

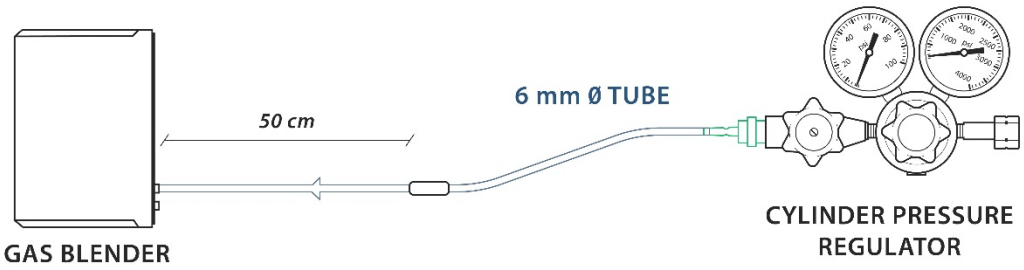

Figure 3-8

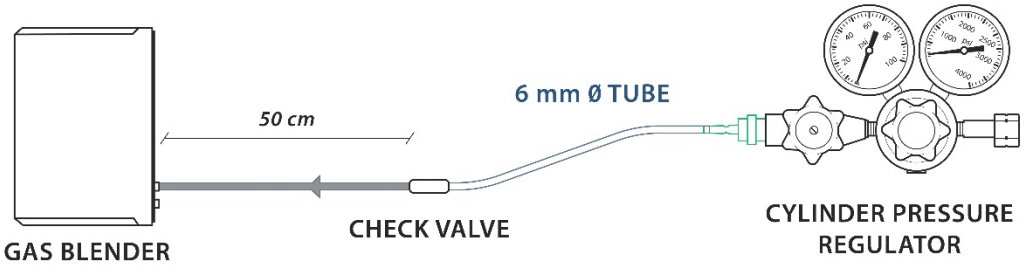

Figure 3-9

Note: Colors:

N2: Black tube

O2: White tube

Air: Green tube

CO2: Grey tube

H2, CH4, Flammable gases: Red tube

Other Gases: Yellow tube

Note: For Swagelok connections, please look at the video provided in the USB pen.

5. **Gas Blender Outlet** - Another One Touch valve must be positioned at a distance of 50 cm from the Gas Blender outlet to secure a proper working of the instrument. Take the 50 cm long tube and connect one end with the valve, then connect the other end to your system, as shown in the pictures below (Figure 3-10).

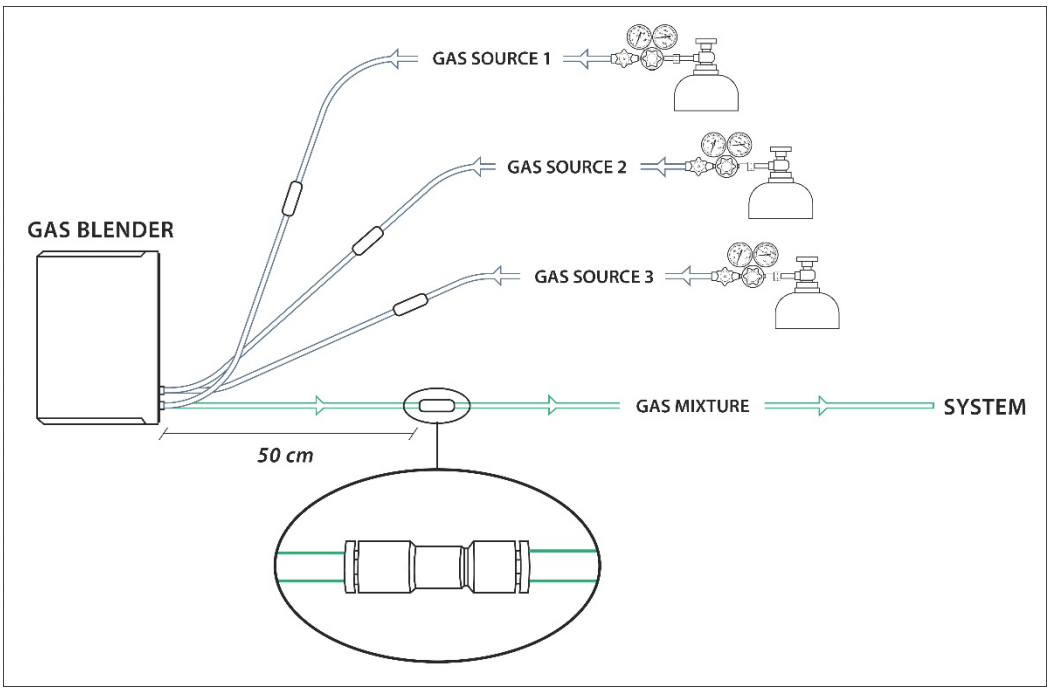
GAS SOURCE 1
GAS SOURCE 2
GAS BLENDER
GAS SOURCE 3
GAS MIXTURE
SYSTEM
50 cm

Figure 3-10

SECTION 4. USING THE GAS BLENDER IN STANDALONE CONFIGURATION

1. INTRODUCTION

The MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels) can be used standalone from the touch screen panel.

In this section a simple and quick guide to the functions available in this configuration are provided.

- **Touch Panel Features**

2. TOUCH PANEL FEATURES

After connecting the bundled power supply cord to the back dedicated socket of the instrument, it is possible to turn on the instrument.

For a few seconds it appears the MCQ INSTRUMENTS then when the startup of the instrument is complete the main window appears (Figure 4-1).

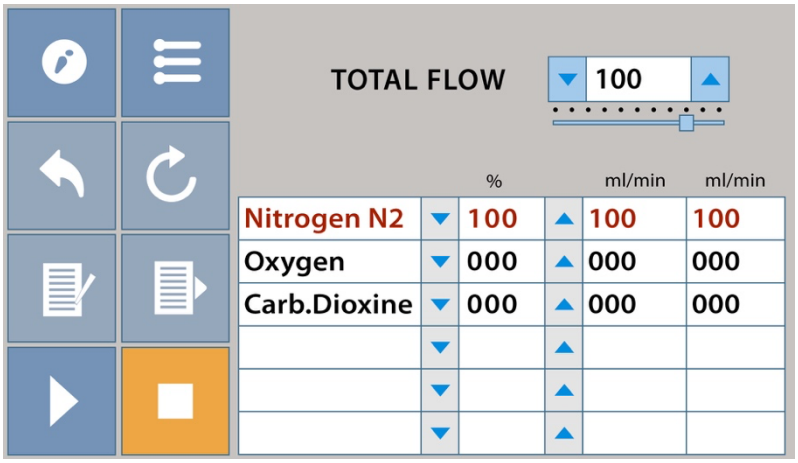

Figure 4-1

Gas Blender Hardware Information

With this button (Figure 4-2) the main hardware information about the instrument are shown divided in two pages.

Figure 4-2

In the first page (Figure 4-3) are listed the following information:

- **Serial Number**: is the number that identifies uniquely the instrument;
- **Purchase Date**: is the calibration date of the instrument;
- **Device Model**: is the instrument model;

- **Firmware Version**: is the version of the motherboard firmware.

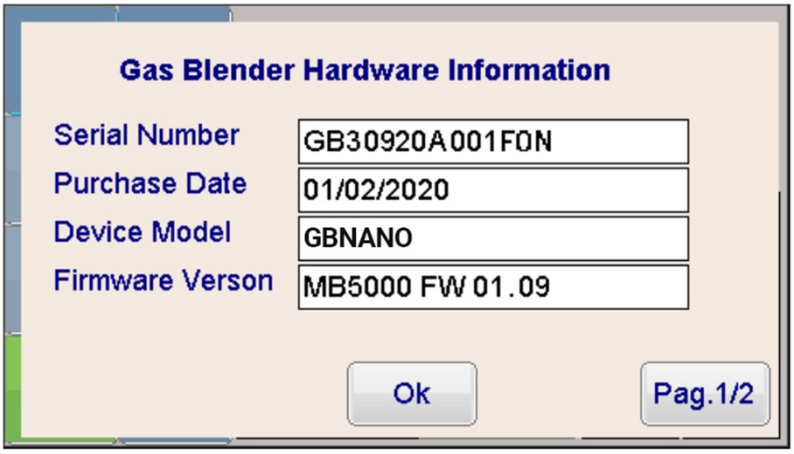

Figure 4-3

Clicking on "**Pag.1/2**" button the second page appears (Figure 4-4). Here are listed the calibration information about each channel, with references to the module firmware version, the calibration gas and its K factor.

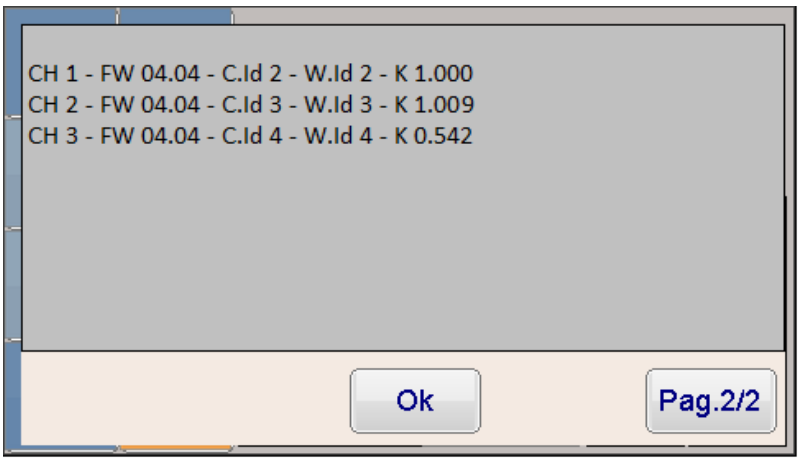

Figure 4-4

Mixture configuration

From the main page of the touch panel it is possible to:

- **Change the total flow** of the mixture both using the small arrows or by moving the slider left or right (Figure 4-5).

Figure 4-5

- **Change the percentage** of the solute gas channels (Figure 4-6). The ***Channel 1*** concentration value, if set as carrier gas, cannot be directly changed by the user, while the other channels' concentration values can be adjusted by using the small arrows. The minimum value that can be changed is 1% (for a smaller step like 0,1% please use the software PC). Increasing a solute gas concentration will involve an automatic decrease in the carrier gas concentration. For that reason, the flow rate concentration value for ***Channel 1*** is automatically adjusted by the software, so that the sum of the three channels concentration is always set at 100%.

Nitrogen N2	▼	100	▲	100	100
Oxygen	▼	000	▲	000	000
Carb.Dioxine	▼	000	▲	000	000

Figure 4-6

On each line it is shown the percentage chosen, the flow set (calculated on the percentage and the total flow of the mixture) and the flow measured by the instrument itself.

When the optimal configuration has been found, the user can start the flowing of the gas mixture through the instrument by pressing the specific Play button (Figure 4-7).

Figure 4-7

While the instrument is flowing gas, the Play button becomes green and the Stop button becomes blue (Figure 4-8)

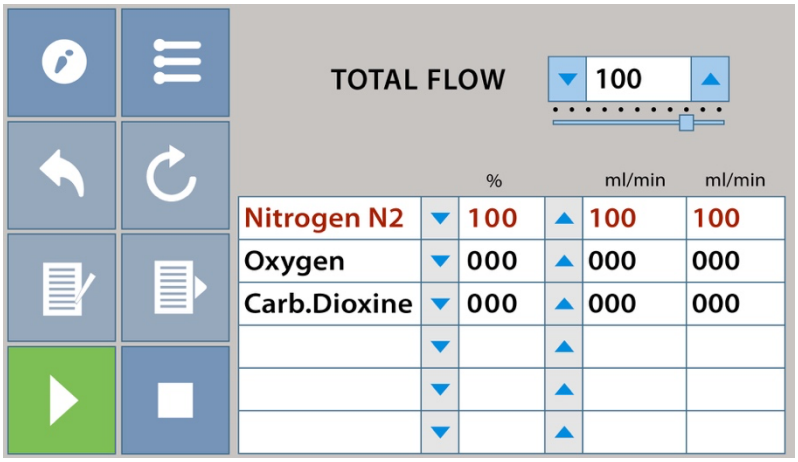

Figure 4-8

To end the flow, press the Stop button (Figure 4-9).

Figure 4-9

The Play button will become again blue and the Stop button will become orange.

Gas Settings

With this button (Figure 4-10) the gas selection page it is opened (Figure 4-11).

Figure 4-10

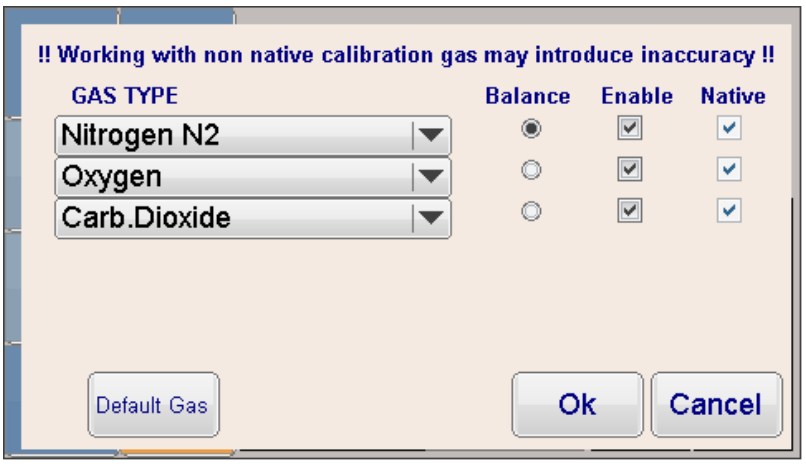

Figure 4-11

At the first startup of the instrument, the channel configuration saved is the default one, with the original calibration gas type and the first channel set as carrier gas.

The user can adjust the configuration with the following parameters:

- **Gas Type** – Allows the user to set the gas source type currently in use for each channel. The Gas Blender channels are calibrated by MCQ Instruments according to the user specific request. The software automatically detects the gas type calibration for each channel and displays the corresponding gas type in the pull-down menu as default. The gas type for which each channel has been calibrated is marked by the check in the "Native" column.

  NOTE: A channel calibrated for a specific gas can still be used to work with another gas type. In case, for example, you need to work with Air in a channel calibrated for Oxygen, just select "Air" in the channel pull-down menu list (Figure 4-12***). The channel calibration curve will be automatically adjusted to work with the new selected gas type. Nevertheless, the adjustment process is just a mathematical calculation that can determine a small measure accuracy loss.***

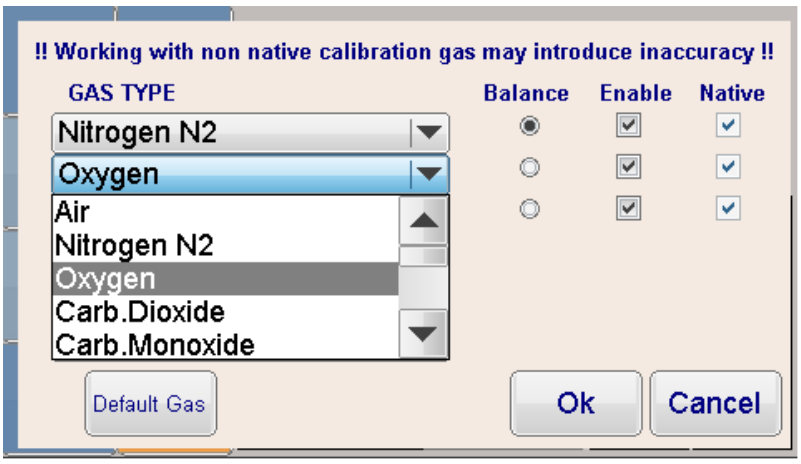

Figure 4-12

- **Balance** - Allows the user to set the balance gas (carrier gas) over the available channel list. The balance gas is assigned to the ***Channel 1*** as default.
- **Enable** - Allows the user to manage the different channels. You can enable the channels or block them (e.g. in case you need to work with less than 3 channels) using the check marks and the related ballot boxes.

By clicking the "**Ok**" button all the changes are saved.

Save Mixture

This function, available with the following button (Figure 4-13), is useful to save one good configuration (gas type, percentage of each channel and total flow) that will be available on every future startup of the instrument.

Figure 4-13

There is a double check, with a message box that ask twice if the user is sure to save a new data configuration (Figure 4-14).

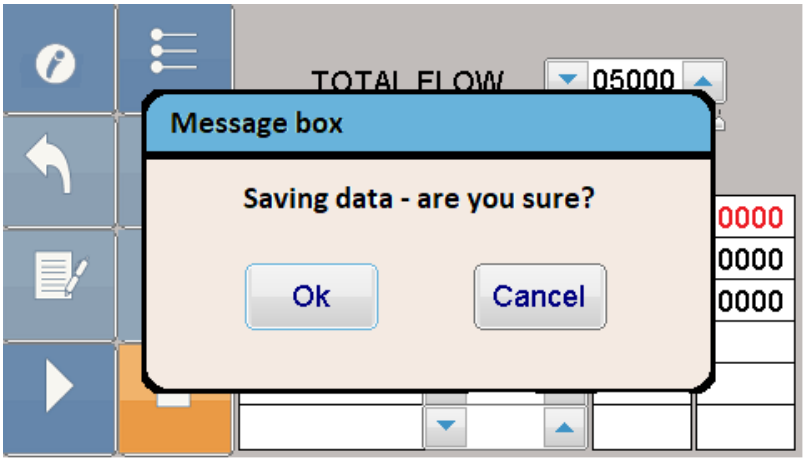

Figure 4-14

Program

From the touch screen it is possible to handle one program, previously written on the software pc (see the "GAS MIXTURE CREATOR EDIT/RUN PROGRAM" section) and then downloaded on the motherboard of the instrument.

With the following button (Figure 4-15) a brief summary of the program saved on the motherboard is displayed (Figure 4-16).

Figure 4-15

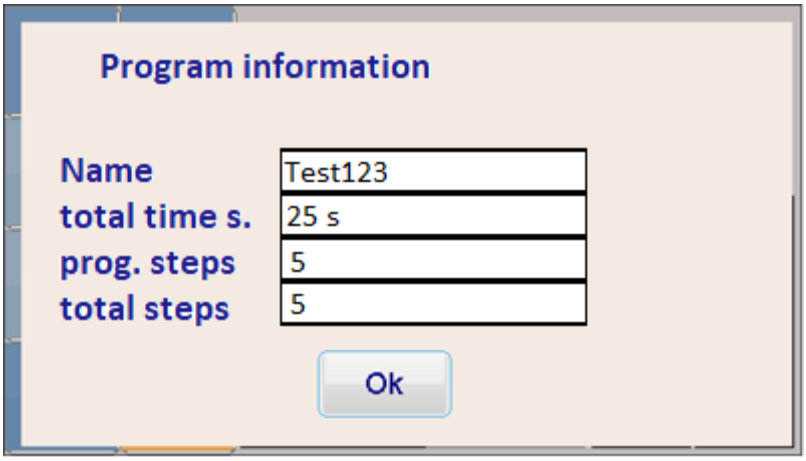

Figure 4-16

To execute the program, use the following button (Figure 4-17) which will become green.

Figure 4-17

While the program is executed, on the upper part of the screen a recap of every single step is presented (Figure 4-18) until the program is finished.

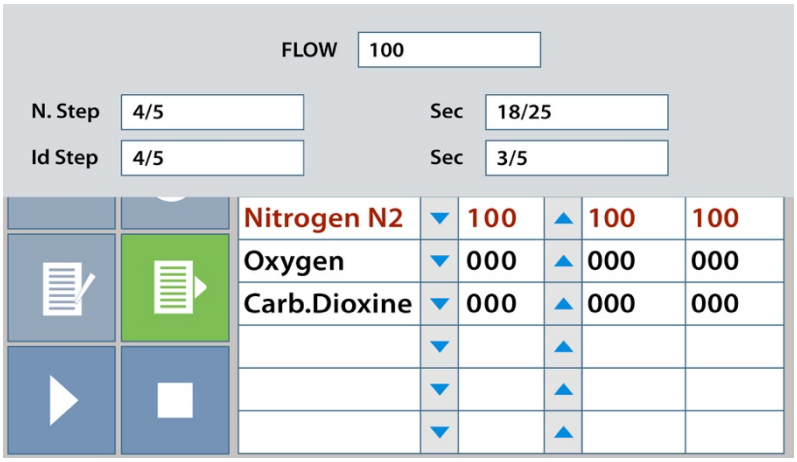

Figure 4-18

To end the program before its execution is complete or to return to the main page of the screen after the execution of the program, please use the stop button (Figure 4-19).

Figure 4-19

SECTION 5. SMART INTEGRATED ALARM SYSTEM

1. INTRODUCTION

GAS BLENDER NANO (3 Channels) has four different Alarms System

2. ALARM NO-FLOW

In case the measured flow (fourth column) is 0, while the desired flow (third column) is different from 0, on one of the GAS BLENDER NANO (3 Channels) a red ALERT will appear on Touch Display with the code A01 and the number of the channel that caused the error (Figure 5-1).

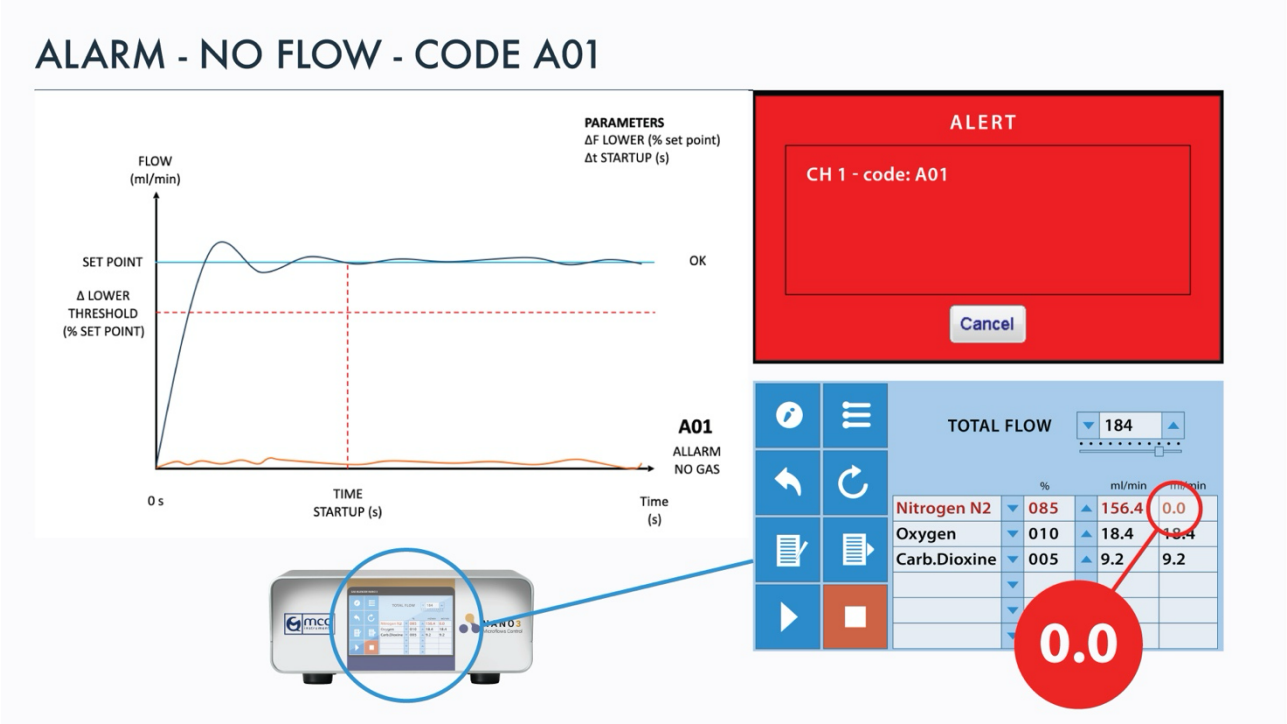

Figure 5-1

3. ALARM UNDER-FLOW

In case the measured flow (fourth column) is 20% lower than the desired flow (third column), a red ALERT will appear on Touch Display with the code A02 and the number of the channel that caused the error (Figure 5-2).

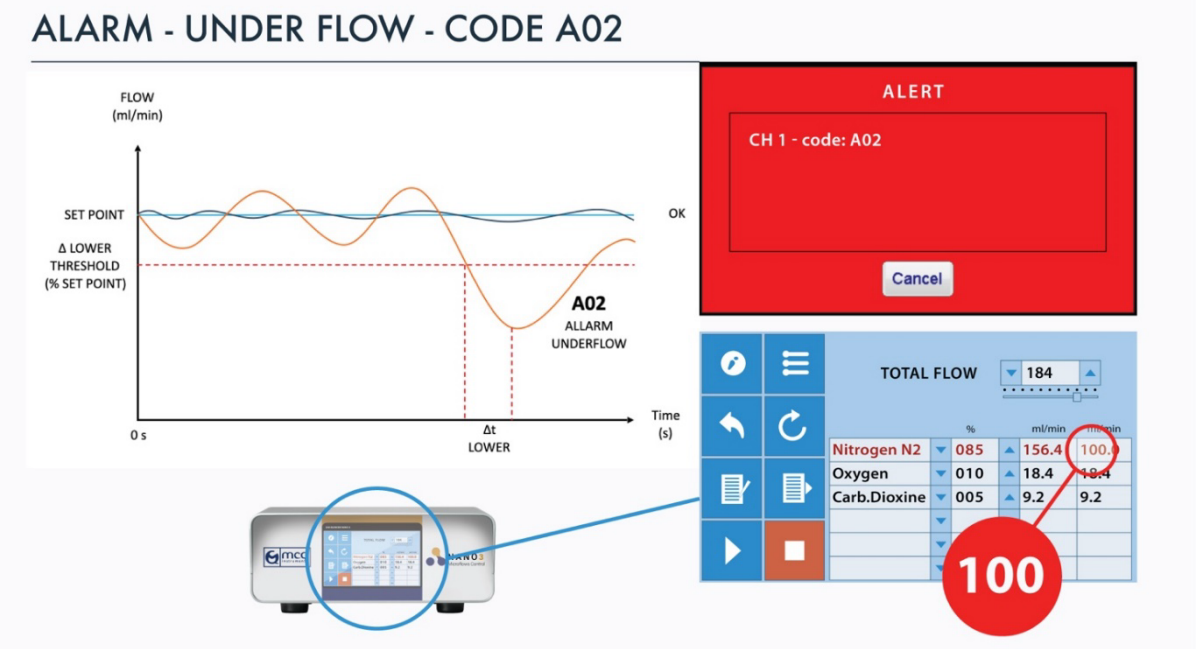

Figure 5-2

4. ALARM OVER-FLOW

In case the measured flow (fourth column) is 20% higher than the desired flow (third column), a red ALERT will appear on Touch Display with the code A03 and the number of the channel that caused the error (Figure 5-3).

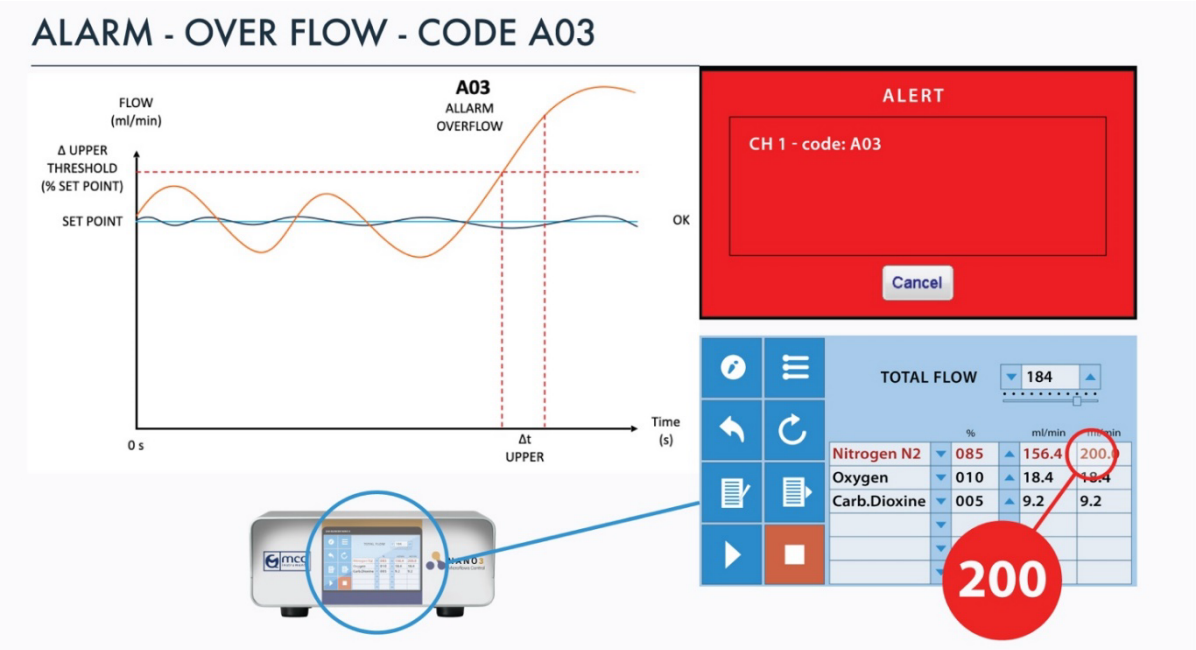

Figure 5-3

5. ALARM INSTABILITY

In case the measured flow (fourth column) is fluctuating with values 20% lower and higher than the desired flow (third column), a red ALERT will appear on Touch Display with the code A04 and the number of the channel that caused the error (Figure 5-4).

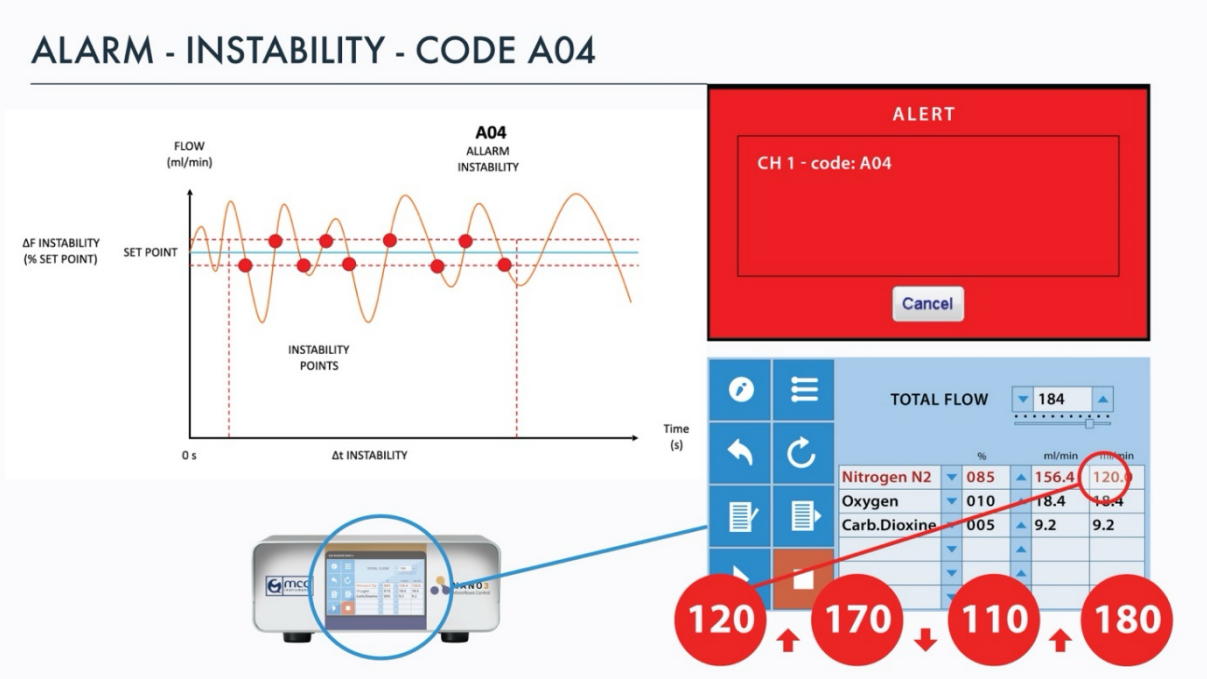

Figure 5-4

SECTION 6. USING THE GAS BLENDER WITH THE PC SOFTWARE

1. INTRODUCTION

MCQ INSTRUMENTS Gas Mixture Creator is a user-friendly tool that provides a complete control over the MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels). In this section a simple and quick guide to the MCQ INSTRUMENTS Gas Mixture Creator software is provided.

- **GAS BLENDER NANO (3 Channels) SOFTWARE INSTALLATION Gas Mixture Creator**
- **GAS BLENDER NANO (3 Channels) CONSOLE CONNECTION**
- **Gas Mixture Creator Configuration**
- **Gas Mixture Creator Features**
- **Channel and Gas Settings**
- **Save and Load Mixture**
- **GAS MIXTURE CREATOR EDIT/RUN PROGRAM**

2. GAS BLENDER NANO (3 Channels) SOFTWARE INSTALLATION GAS MIXTURE CREATOR

BEFORE YOU BEGIN:

Gas Mixture Creator compatibility

The MCQ INSTRUMENTS Gas Mixture Creator is compatible with the following Microsoft Operative Systems:

- **Windows ® XP Home edition with Service Pack 3 or more**
- **Windows ® XP Professional with Service Pack 3 or more**
- **Windows ® Vista**
- **Windows ® 7**
- **Windows ® 8**
- **Windows ® 8.1**
- **Windows ® 10**

NET Framework 3.5 installation required

To use the MCQ INSTRUMENTS Gas Mixture Creator, the Microsoft .NET Framework 3.5 (or higher) must be installed on your computer. Visit the Microsoft official website, download and install the .NET Framework 3.5 (or higher) version. Installing the .NET Framework libraries will let you work with the Gas Mixture Creator and with all the software designed for the .NET Framework platform.

Gas Mixture Creator Software installation

The MCQ INSTRUMENTS Gas Mixture Creator is a unique and fundamental tool provided by MCQ INSTRUMENTS for the GAS BLENDER NANO (3 Channels) control.

In order to install the software, put the MCQ INSTRUMENTS Gas Mixture Creator Installation USB (provided in the package) in your USB port, navigate to the USB directory, double click on it and then follow the simple installation steps. (Figure 6-1-Figure 6-2-Figure 6-3)

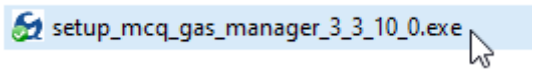

Figure 6-1

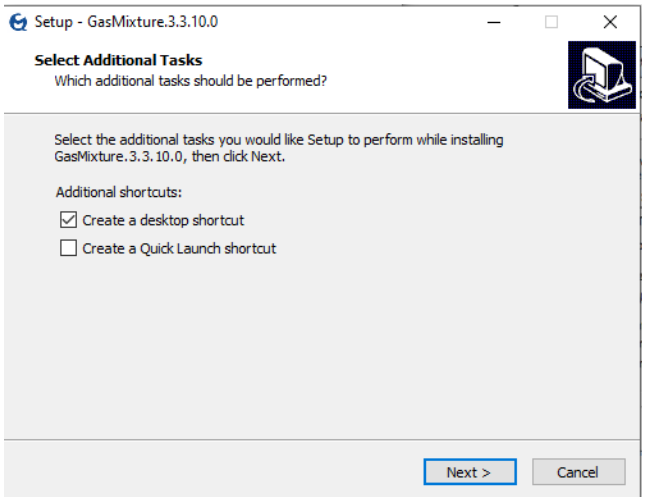

Figure 6-2

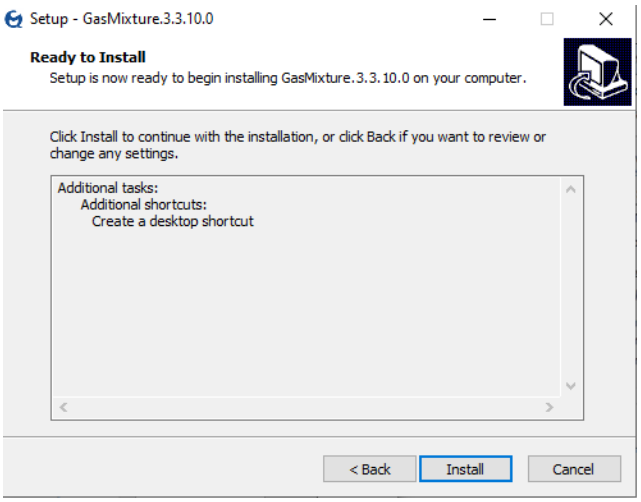

Figure 6-3

3. GAS BLENDER NANO (3 Channels) CONSOLE CONNECTION

After the MCQ INSTRUMENTS Gas Mixture Creator installation, select the proper driver for your computer (Figure 6-4).

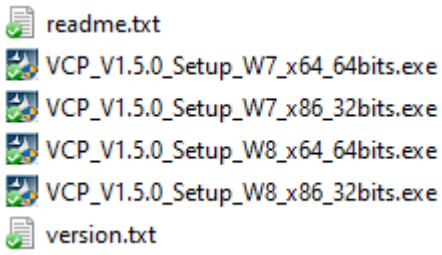

Figure 6-4

In order to install the driver, follow the simple step-to-step guide (optimized for **Windows 10** users) provided in this section (Figure 6-5-Figure 6-6-Figure 6-7).

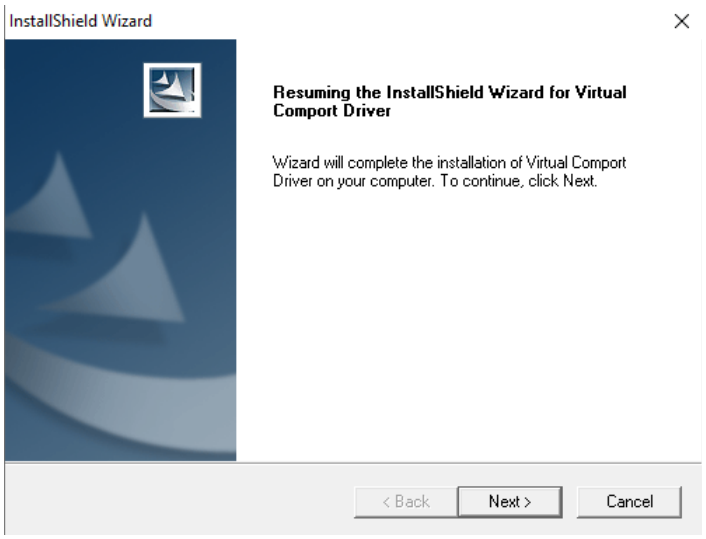

Figure 6-5

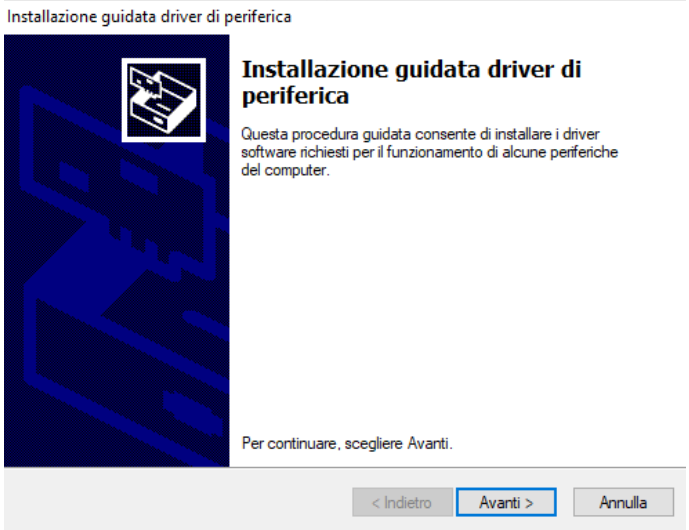

Figure 6-6

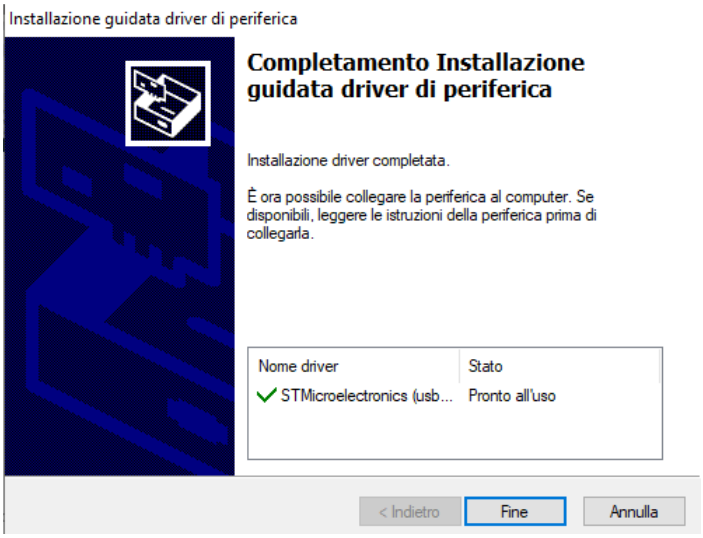

Figure 6-7

After the MCQ INSTRUMENTS Gas Mixture Creator installation the Gas Blender must be connected to your console.

- **Power Supply** - Connect the bundled power supply cord to the back dedicated socket of the instrument, then turn on the instrument.
- **USB** - Connect the instrument to your console via the USB cable provided in the package. After this operation, you can use the instrument and the Gas Mixture Creator Software.

4. GAS MIXTURE CREATOR CONFIGURATION

The operations described below must be performed after the hardware installation (see the "INSTALLING THE GAS BLENDER" section). Working with the Gas Blender through a PC requires the configuration of the software instrument connection. The following steps will guide you through the configuration path of the Gas Mixture Creator software.

1. Launch the software double-clicking on the MCQ INSTRUMENTS Gas Mixture Creator's shortcut icon located on your desktop. (Figure 6-8)

Figure 6-8

2. Insert the KEY PRO SOFTWARE provided in the USB Pen inside the package (Figure 6-9)

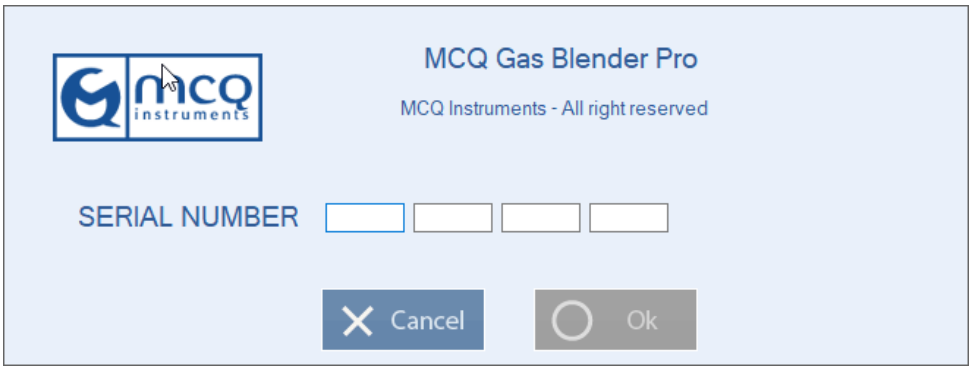

Figure 6-9

3. After the launch, the Gas Mixture Creator's start screen will be displayed as shown in the example below. (Figure 6-10)

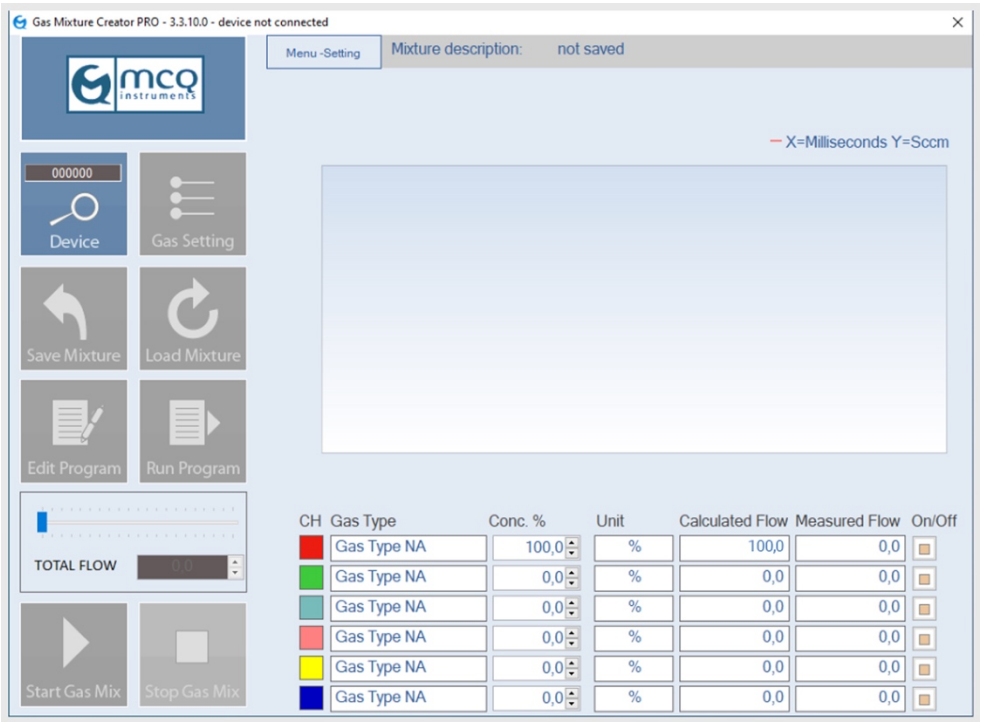

Figure 6-10

4. In case you have not done it before, connect the instrument to your PC with the USB cable provided in the package. The serial number of the Gas Blender in use will be displayed in the button "**Device**". (Figure 6-11)

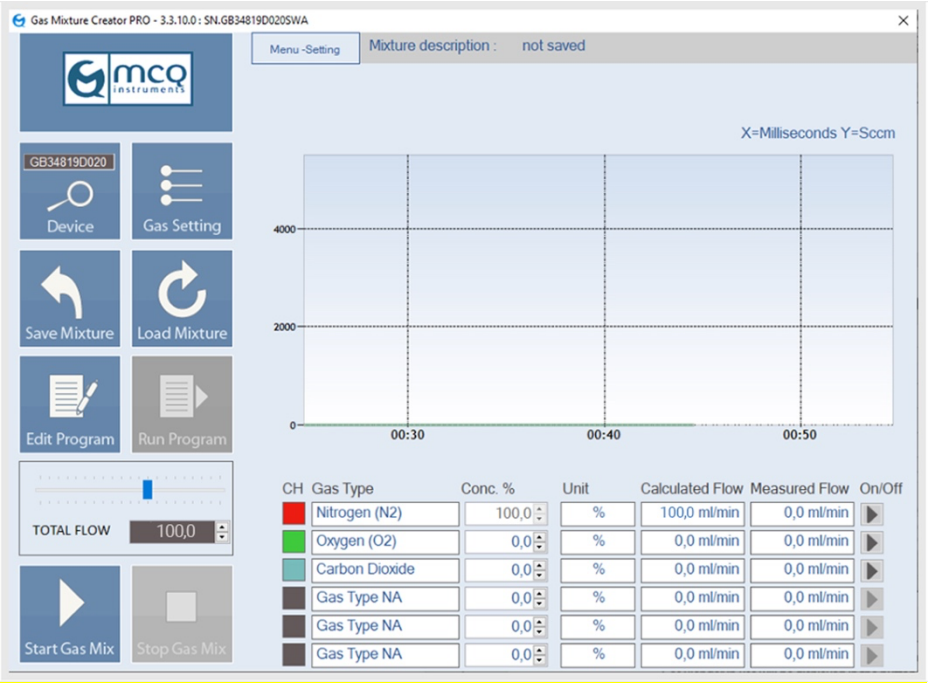

Figure 6-11

5. Click on the **System Info** button (Figure 6-12) into **Menu-Settings** window to access the Gas Mixture Creator Info panel. The panel is divided in three sections: **General Info** (Figure 6-13), where basic hardware information about the instrument is provided; **Modules Info** (Figure 6-14), where basic hardware information and configuration settings of each module is provided; **Device Software** (Figure 6-15), where basic information about the software itself is provided.

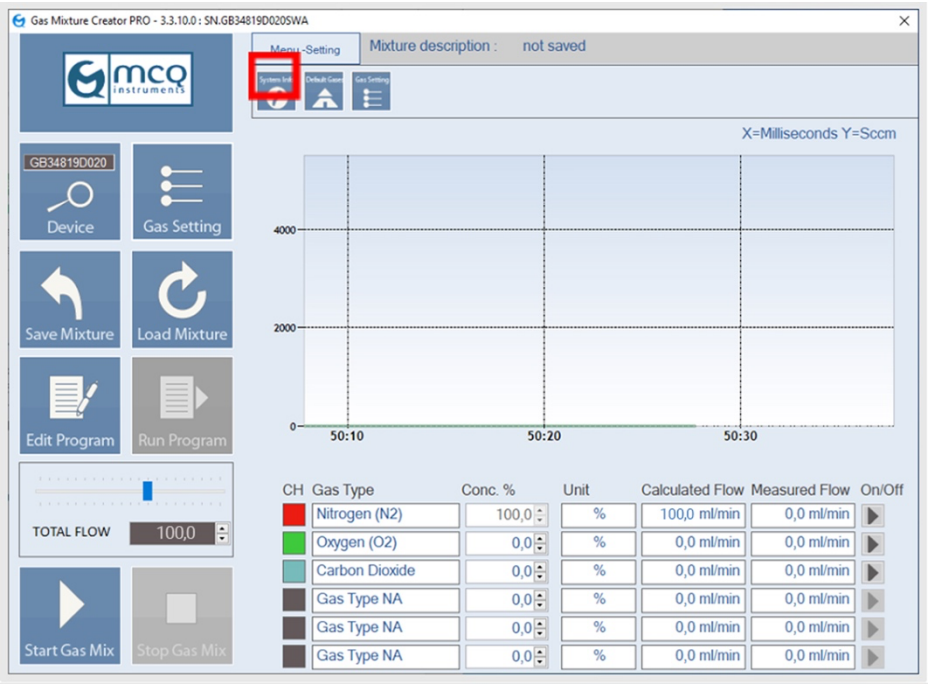

Figure 6-12

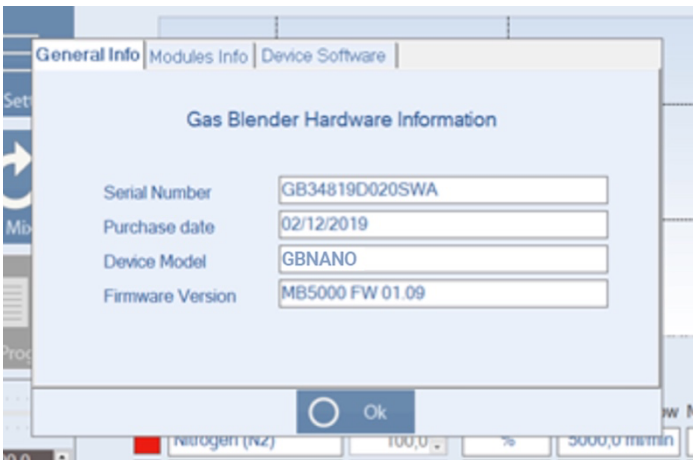

Figure 6-13

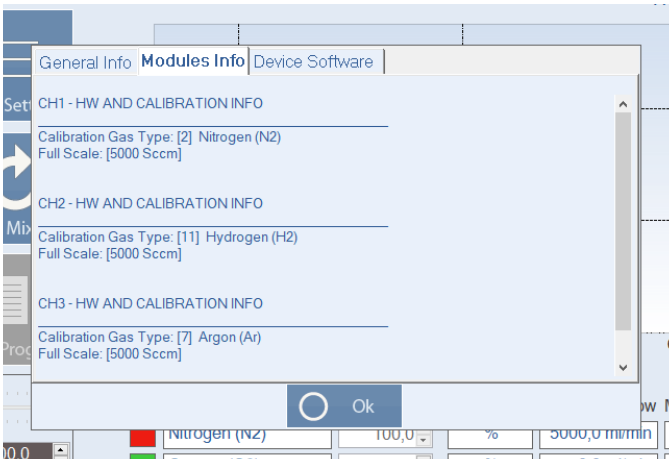

Figure 6-14

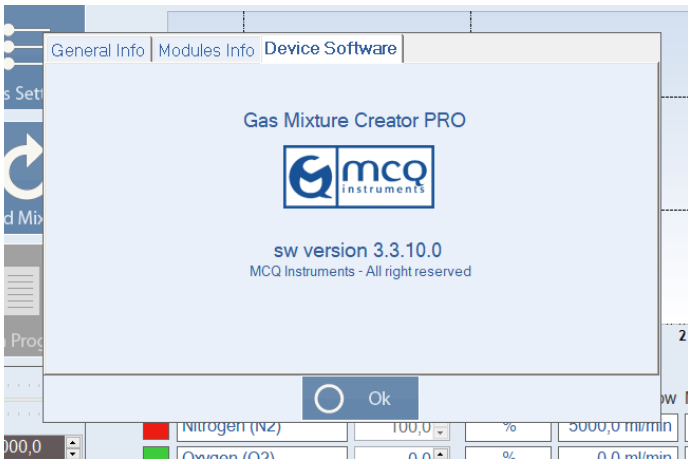

Figure 6-15

INSTALLATION COMPLETE

Your MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels)

is now ready to work!

The instrument settings are configured following your desired customization. For further customization or to change the default settings, keep reading the description from CHANNEL AND GAS SETTINGS section.

5. GAS MIXTURE CREATOR FEATURES

In this section, the Gas Mixture Creator main features and the basic commands are shown. The picture below (Figure 6-16) shows the Gas Mixture Creator main screen divided in three sections: **Monitoring Section**, **Gas Mixture Control** and **Channels' Control**.

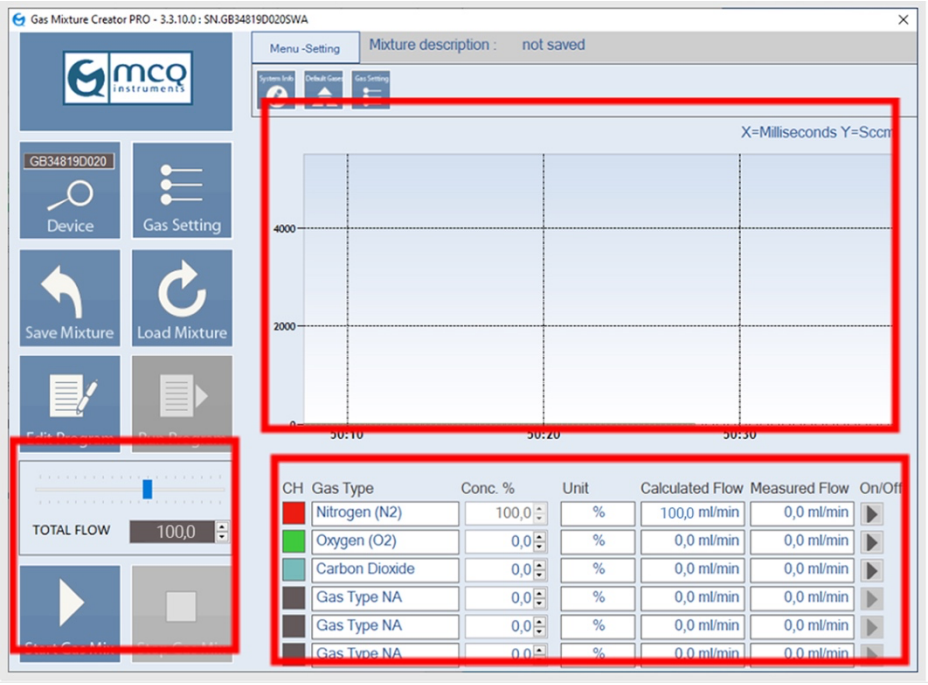

Figure 6-16

Monitoring Section

The monitoring section provides an array of real time information about the Gas Blender working status. As shown in the picture below (Figure 6-17) the **Flow Rate Plot** shows the flow rate vs. time trend for each channel. Values are plotted in sccm (y axis) vs. milliseconds (x axis).

Figure 6-17

Gas Mixture Control

This section provides the user the gas mixture flow rate control commands. As shown in the picture below (Figure 6-18), the available commands are:

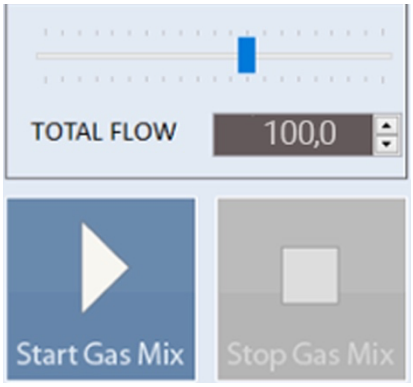

Figure 6-18

- **Mixture Flow Rate Digital Regulation** – Allows the user to set the gas mixture total flow rate (sccm). The mixture flow rate is the sum of the single channels flow rates. Since the single channel standard working range is up to 200 sccm, the working range for the gas mixture is up to 600 sccm. The mixture flow rate max value depends on the channels flow rate regulation and cannot exceed the sum of the single channels outcome.

  e.g.

  The three channels have been regulated to supply the same amount of gas flow. Since each channel max flow rate value is 200.0 sccm, the mixture max available outcome is 600.0 sccm (Case A). Using the digital mixture flow rate regulation, the user sets 120.0 sccm as the total outcome. The software automatically adjusts the single channels flow rate to obtain 120.0 sccm as a sum of them. The single channel flow rate for each channel is then set to 2500.0 sccm (Case B).

Case A	***Case B***
Mixture max outcome = 600.0 sccm	***Mixture max outcome = 120.0 sccm***
Channel 1 = 200.0 sccm	***Channel 1 = 40.0 sccm***
Channel 2 = 200.0 sccm	***Channel 2 = 40.0 sccm***
Channel 3 = 200.0 sccm	***Channel 3 = 40.0 sccm***

- **Mixture Flow Rate Analog Regulation** – By moving the blue slider the user can set the gas mixture total flow rate percentage. The functioning principle of the slider is the same of the digital regulation, with the exception that the gas mixture flow rate max value is displayed as a percentage.

e.g.

Working with the same conditions as before, in Case A the user sets the total mixture flow rate at 100.0%, obtaining 600.0 sccm of mixture outcome; in Case B the user sets the total mixture flow rate at 50.0%, obtaining 300.0 sccm of mixture outcome.

Case A	*Case B*
Mixture total flow rate = 100.0%	*Mixture total flow rate = 50.0%*
Mixture max outcome = 600.0 sccm	*Mixture max outcome = 300.0 sccm*
Channel 1 = 200.0 sccm	*Channel 1 = 100.0 sccm*
Channel 2 = 200.0 sccm	*Channel 2 = 100.0 sccm*
Channel 3 = 200.0 sccm	*Channel 3 = 100.0 sccm*

- **Mixing commands –** The **Start Gas Mix** and the **Stop Flow** buttons give the user the control over the gas supply. While the instrument is flowing the Start Button turns grey and the Stop Button turns orange.

Channels' Control

This section provides the user the basic information and the flow rate control commands for each channel (example with a 3 channels Gas Blender) (Figure 6-19).

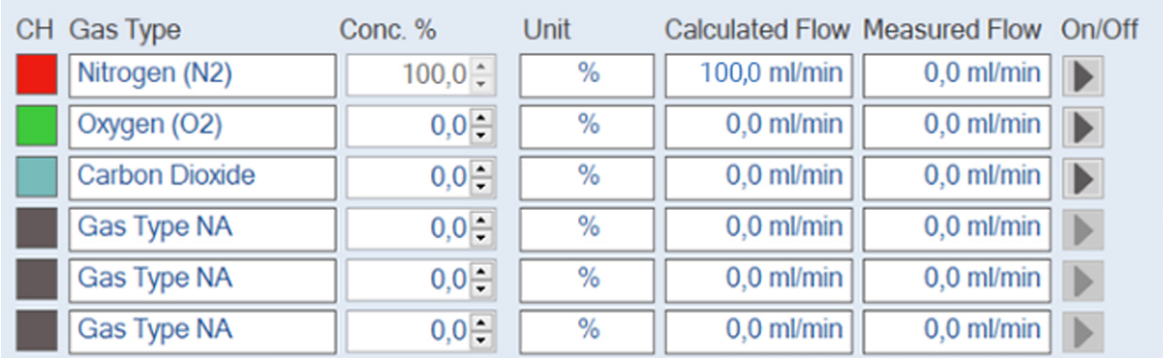

Figure 6-19

- **Gas Type Display** – Indicates the gas type assigned to each channel.

  The ***Channel 1*** is assigned to the carrier gas as default, while the others are assigned to the solute gases. These settings can be changed in Gas Mixture Creator Setup Panel.

- **Concentration & Unit Regulation** – Allow the user the set the desired flow rate for each channel. The flow rates are displayed in percent unit.

  The ***Channel 1*** concentration value cannot be directly changed by the user, if set as carrier gas, while the ***Channel 2***, ***Channel 3*** - and so on - concentration values can be adjusted by using the small arrows or directly typing the desired amount in the related boxes. The minimum value that can be changed is 0,1%. Increasing a solute gas concentration will involve an automatic decrease in the carrier gas concentration. For that reason, the flow rate concentration value for ***Channel 1*** is automatically adjusted by the software, so that the sum of the three channels concentration is always set at 100.0%.

e.g.

Case A. The Channel 2 (Carbon Dioxide) concentration is set at 35.0%, while the Channel 3 (Oxygen) concentration is set at 20.0%. The Channel 1 concentration is then automatically adjusted at 45.0% (45+35+20=100).

Case B. The Channel 2 concentration is then decreased to 15.0% while the Channel 3 concentration is increased up to 25.0%. The Channel 1 concentration is then automatically adjusted at 60.0% (60+15+25=100).

Case A	*Case B*
Channel 1 concentration = 45.0%	*Channel 1 concentration = 60.0%*
Channel 2 concentration = 35.0%	*Channel 2 concentration = 15.0%*
Channel 3 concentration = 20.0%	*Channel 3 concentration = 25.0%*
Channels concentration sum = 100.0%	*Channels concentration sum = 100.0%*

- **Calculated Flow Display** – Indicates the flow rate (sccm) set for each channel. Once the user has selected the desired flow rate concentration for each channel and the desired total flow outcome (whose control is in the **Gas Mixture Creator Setup Panel**) these values are automatically calculated by the software.
- **Measured Flow Display** – Indicates the flow rate (sccm) measured real-time by the instrument for each channel.
- **On/Off Display** – Indicates the status for each channel. Three different statuses are available for the channels:

	CHANNEL STOPPED	At the software start up all the channels are stopped. While in this status the channels do not deliver gas.
	STOP CHANNEL	Once you have clicked on the Start Gas Mix button the channels are activated and you can see this icon. Clicking on the icon the specific channel goes in the stopped status.
	START CHANNEL	Clicking on the icon the specific channel goes in play status.

6. CHANNEL AND GAS SETTINGS

Click in the "**Gas Settings**" icon (Figure 6-20) to access the Gas Mixture Creator Setup Panel. The panel "**Gas Settings**" can be open also clicking on "**Menu-Setting**" in the upper side of the software.

Once in the panel you can choose between three different sections for the management of the instrument gas sources: **Channels and Gas Settings**, **Gas Properties Table** and **Custom Cylinder**.

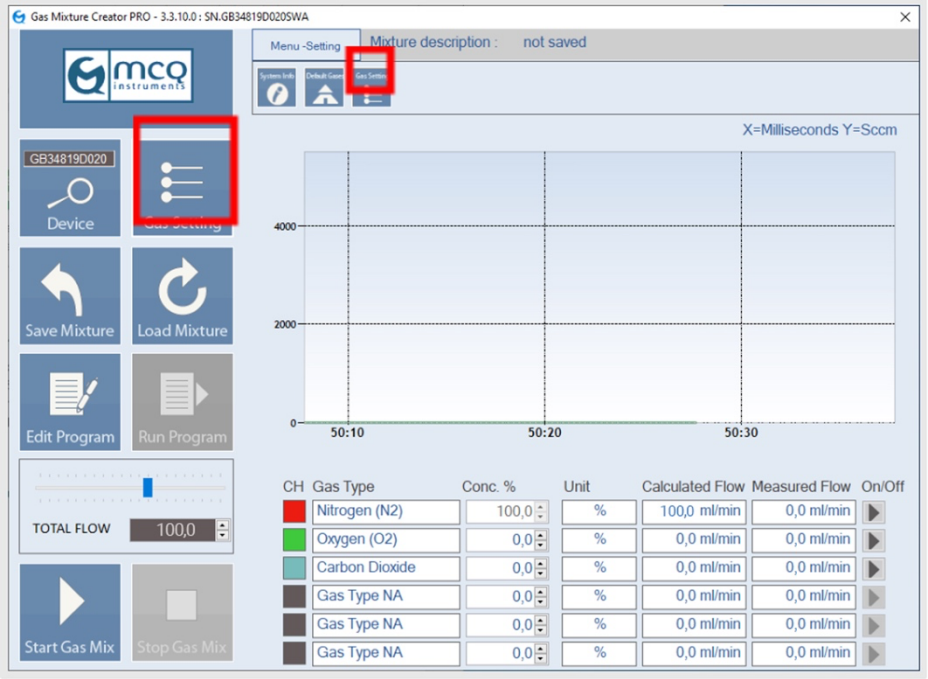

Figure 6-20

Channels and Gas Settings

In this section (Figure 6-21) it is possible to set different parameters for each channel.

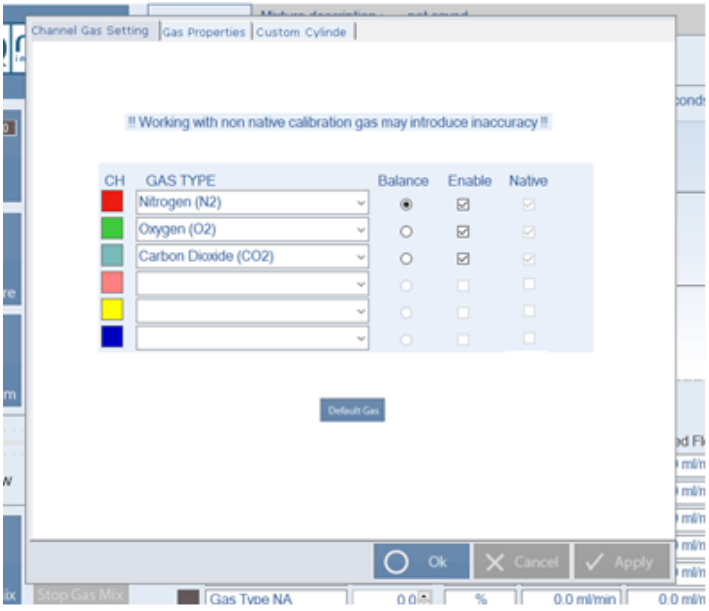

Figure 6-21

The adjustable parameters available are (going from left to right):

- **CH** - Indicates the color assigned to each channel. The colors refer to the Gas Blender modules (***Channel 1*** controls module 1, ***Channel 2*** controls module 2 and so on) and therefore cannot be changed.
- **Gas Type** - Allows the user to set the gas source type currently in use for each channel. The Gas Blender channels are calibrated by MCQ Instruments according to the user specific request. The software automatically detects the gas type calibration for each channel and displays the corresponding gas type in the pull-down menu as default. The gas type for which each channel has been calibrated is marked by the check in the "Native" column.

  NOTE: A channel calibrated for a specific gas can still be used to work with another gas type. In case, for example, you need to work with Air in a channel calibrated for Oxygen, just select "Air" in the channel pull-down menu list. The channel calibration curve will be automatically adjusted to work with the new selected gas type. Nevertheless, the adjustment process is just a mathematical calculation that can determine a small measure accuracy loss.

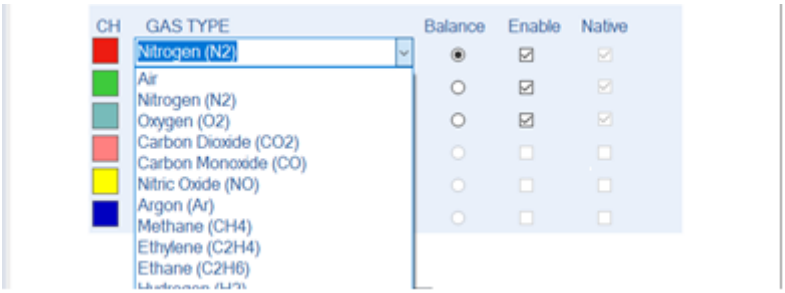

Figure 6-22

- **Balance** - Allows the user to set the balance gas (carrier gas) over the available channel list. The balance gas is assigned to the ***Channel 1*** as default.
- **Enable** - Allows the user to manage from two to three different channels. You can enable the channels or block them (e.g. in case you need to work with less than 3 channels) using the check marks and the related ballot boxes.

Gas Properties Table

In this section (Figure 6-23) the basic information about a wide variety of gas types commonly used for lab experiments are gathered. The K factor, calculated from each gas Cp, Cv, density and temperature values, is also provided.

Figure 6-23

The K factor is used by the software to mathematically adjust the channel calibration curve in case you need to work with gases the channels have not been calibrated for.

Custom Cylinder

In this section (Figure 6-24) you can create your own cylinder composition and maximize the accuracy of the instrument.

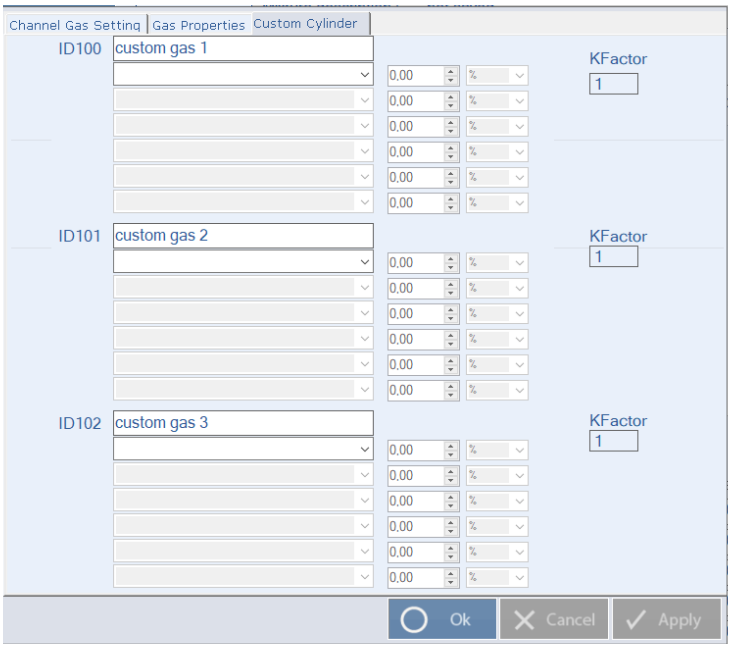

Figure 6-24

Custom cylinder function allows you to create a no-pure gas cylinder and to calculate the correct K-Factor. After chosen the name of your own cylinder you can set the main component and the percentage in %, ppm or ppb of the minor gases and visualize the calculated K-Factor.

The adjustable parameters are (going from up to down):

- **ID100,101,102** – Here (Figure 6-25) you can indicate the name you will choose for your custom cylinder.

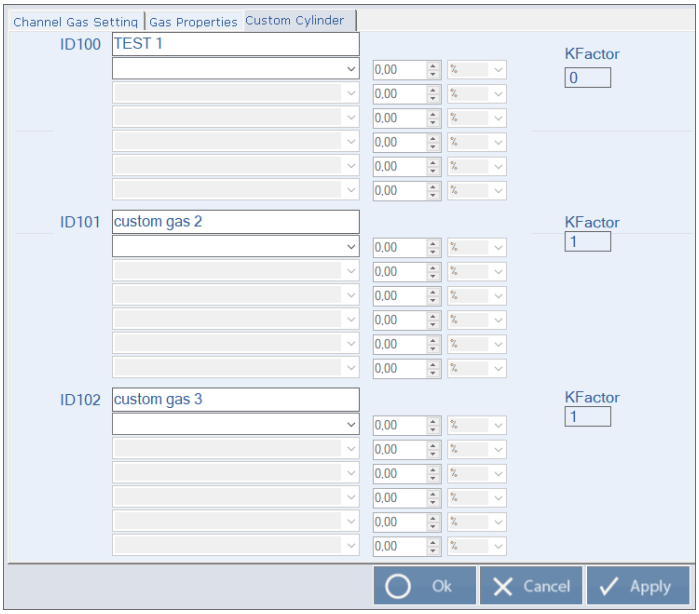

Figure 6-25

- **Pull Down Gas Menu** – Here (Figure 6-26) you can indicate the gas type you will choose for your custom cylinder.

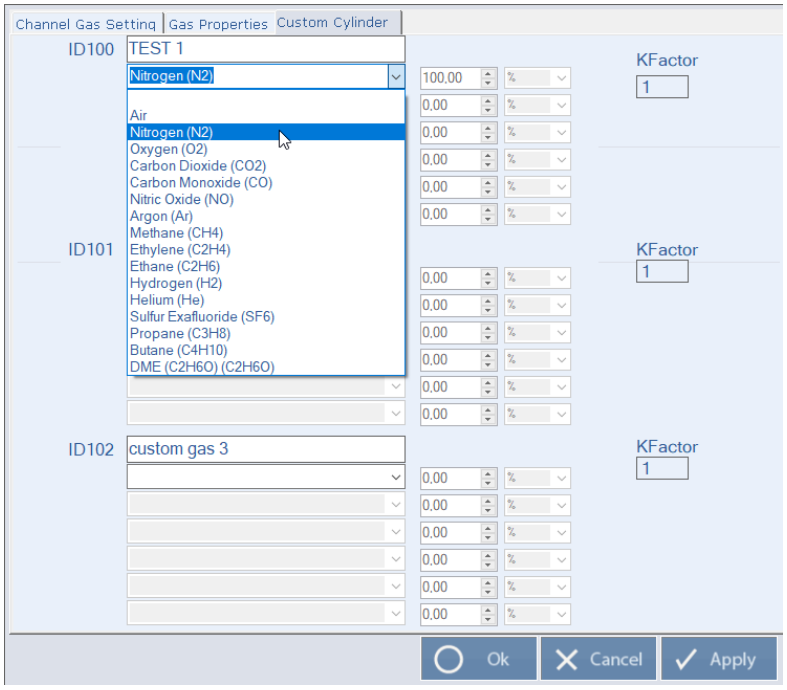

Figure 6-26

- **Concentration and Unit** – Here (Figure 6-27) you can indicate the concentration you need for each component and the measure unit (ppb, ppm or %).

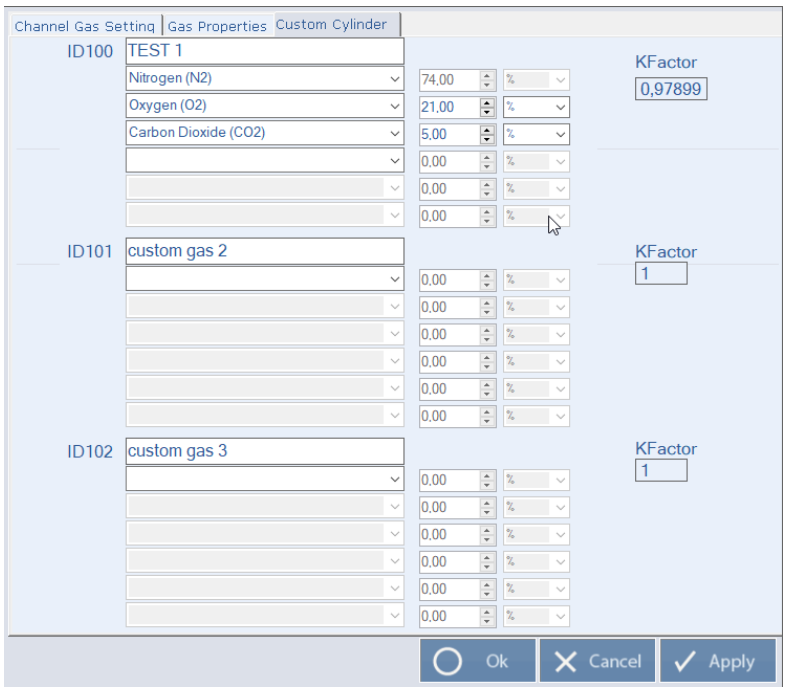

Figure 6-27

Once you have chosen the percentage for each component a new k-factor is calculated, then click "Apply" to save the created Custom Cylinder.

You can select your created custom cylinder in the panel "**Channel Gas Setting**" by select the Custom gas you have previously created (i.e. TEST 1). (Figure 6-28)

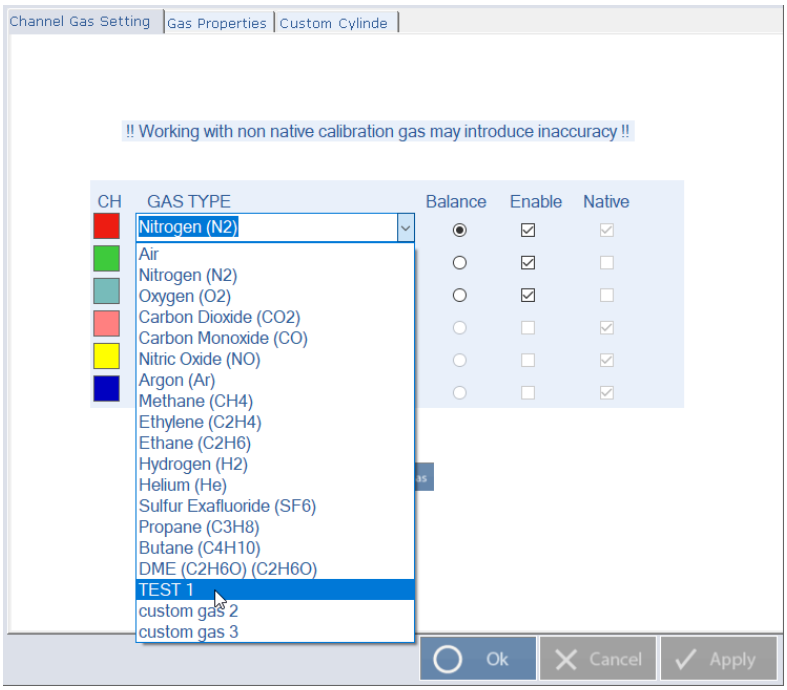

Figure 6-28

Click on the "Apply" button and then the "Yes" button to make the adjustments effective. (Figure 6-29)

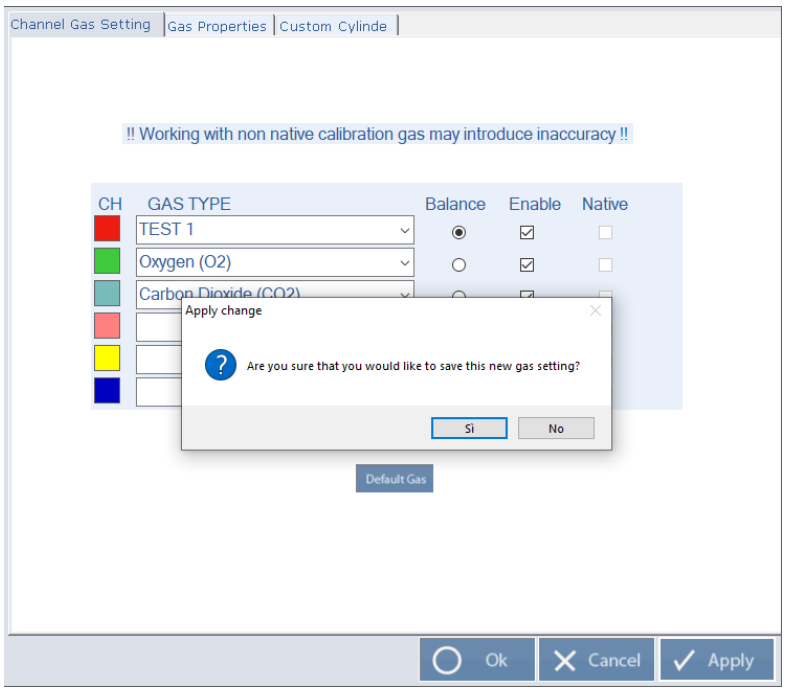

Figure 6-29

7. SAVE AND LOAD MIXTURE

The panel commands allow to save and store the desired instrument configurations in case you may need to recall them for future applications.

The GAS BLENDER NANO (3 Channels) allows you to work with dynamic gas mixture. Nevertheless, the frequent use of a specific mixture (i.e. a specific instrument configuration) may be required. (Figure 6-30)

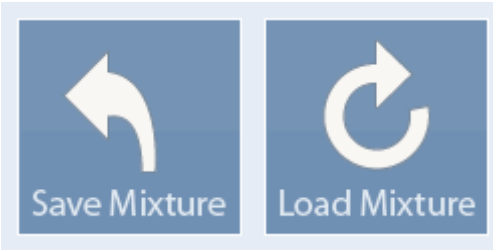

Figure 6-30

Use the **Save Mixture** command to store any desired mixture configuration in the PC memory and the **Load Mixture** command to recall it whenever you need it.

8. GAS MIXTURE CREATOR EDIT/RUN PROGRAM

In this menu, you can create, save and load your automatic mixture program.

Set the percentage of each channel, the total flow of the mixture and the time work (h, min, s). You can add, delete, copy and paste all the lines you need. Once the program will be created you can choose to save it in an external file and to recall it when you need it.

1. Click on the Gas Mixture Creator's icon named "**Edit Program**". (Figure 6-31)

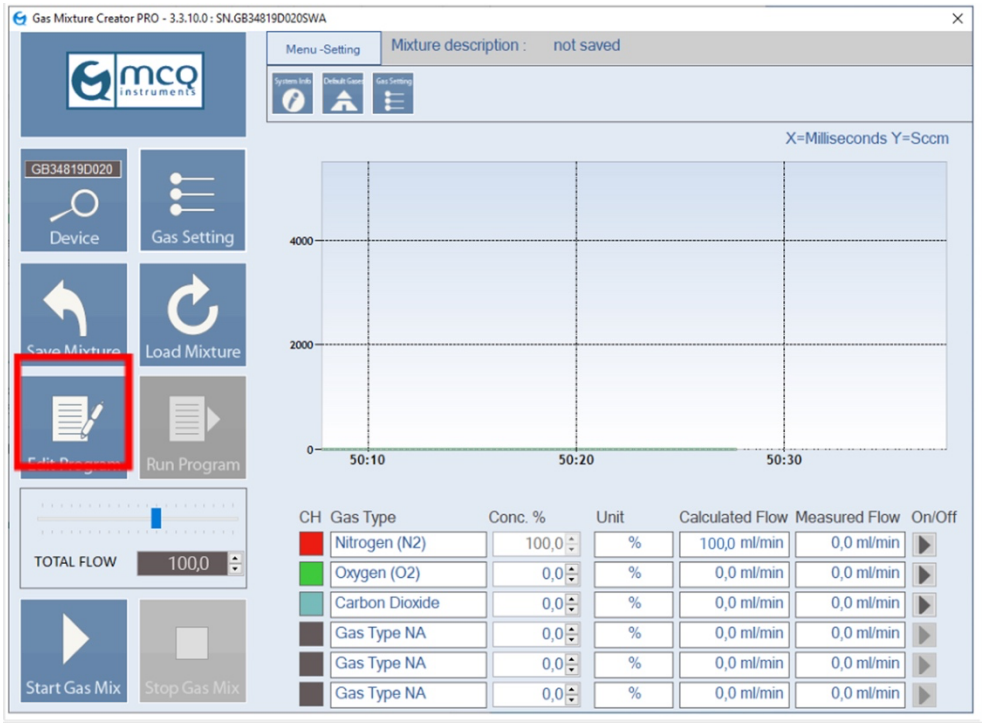

Figure 6-31

2. After the launch, the "**Job program editing**" start screen will be displayed as shown in the example below. (Figure 6-32)

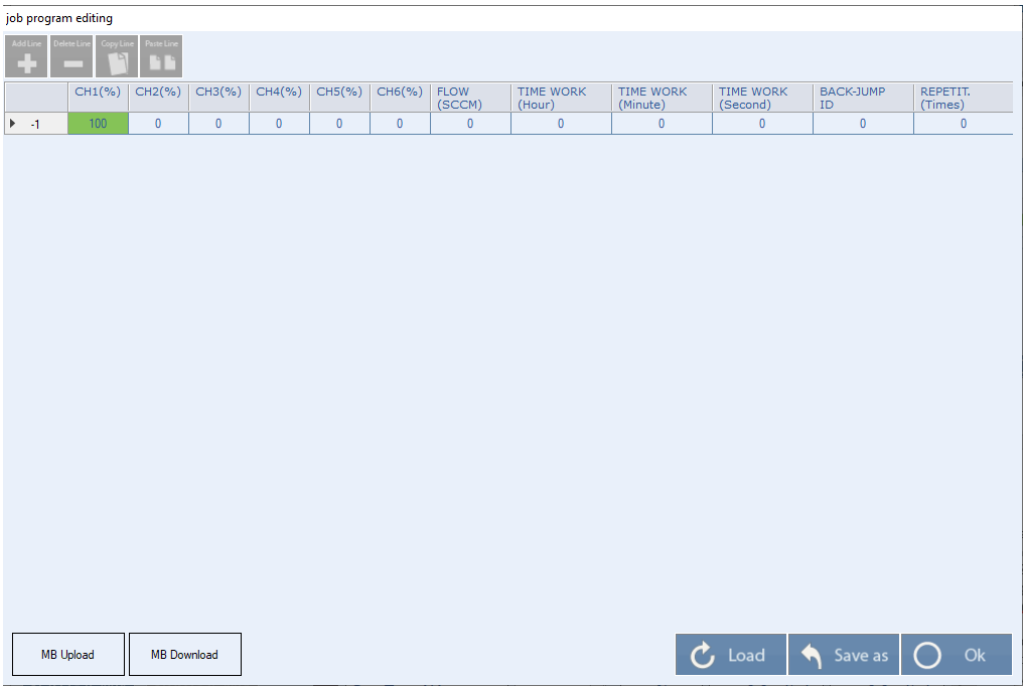

Figure 6-32

From this window there are different parameters (going from left to right) that can be adjusted:

- **CH (%)** - Indicates the percentage of gas assigned to each channel. The numbers refer to the Gas Blender modules (***Channel 1*** controls module 1, ***Channel 2*** controls module 2 and so on) and therefore cannot be changed.
- **Flow (sccm)** – Indicates the Flow in sccm you want to set for the total mixture of that line.
- **Time work (Second/Minute/Hour)** – Indicates the duration of the line.
- **Back-jump ID** – Represent the line number that the program must execute after the actual line; from there the program will continue sequentially.
- **Repetit. (Times)** – Represent the number of times the program execute the command "Back-jump ID" (i.e. 2 times means that the program jump to the ID lines once and then keep executing the lines sequentially from there).
- **Add Line** – Allows you to add a new line for a new mixture.
- **Delete Line** – Allows you to delete a created line.
- **Copy/Past Line** – Allows you to Copy and/or Past one or more created lines.

NOTE: ***New lines can be added only once you have inserted all the parameters for the previous lines: Percentage for each channel, Total Flow and Time Work. Without these parameters, a new line cannot be added, copy or pasted.***

3. Once you have created your "program job" you can click the button "**Save as**" to memorize the program in an external file on the computer with your desired name (i.e. TEST 123). (Figure 6-33)

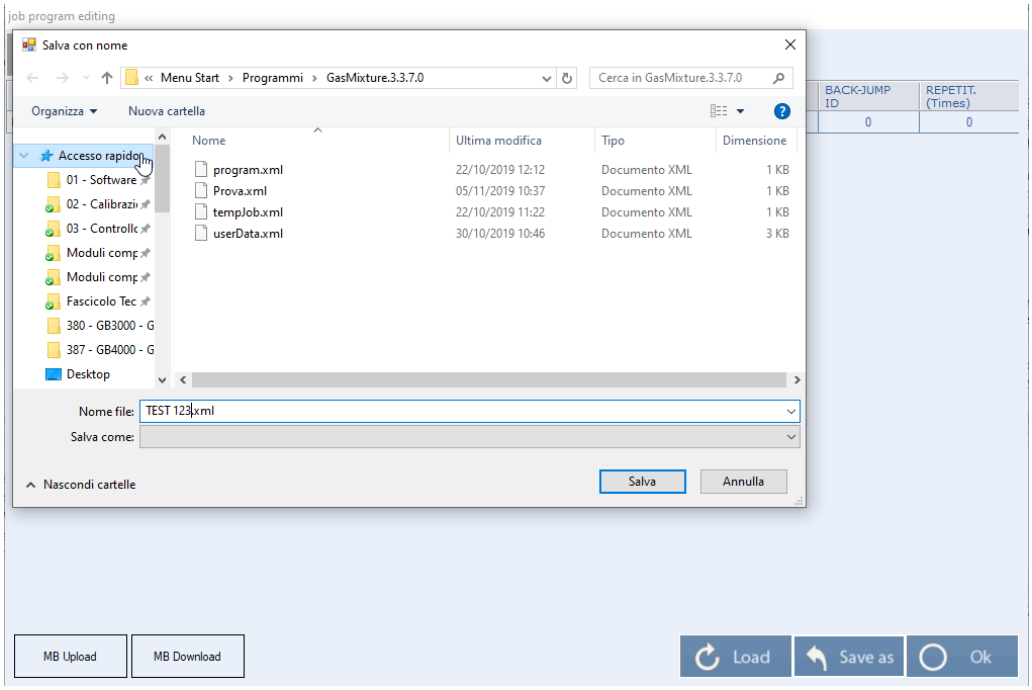

Figure 6-33

4. If you have previously created your programs and you want to recall it, click on the button "**Load**". Select the folder you have created to save your program, double click on your desired program and open it. (Figure 6-34)

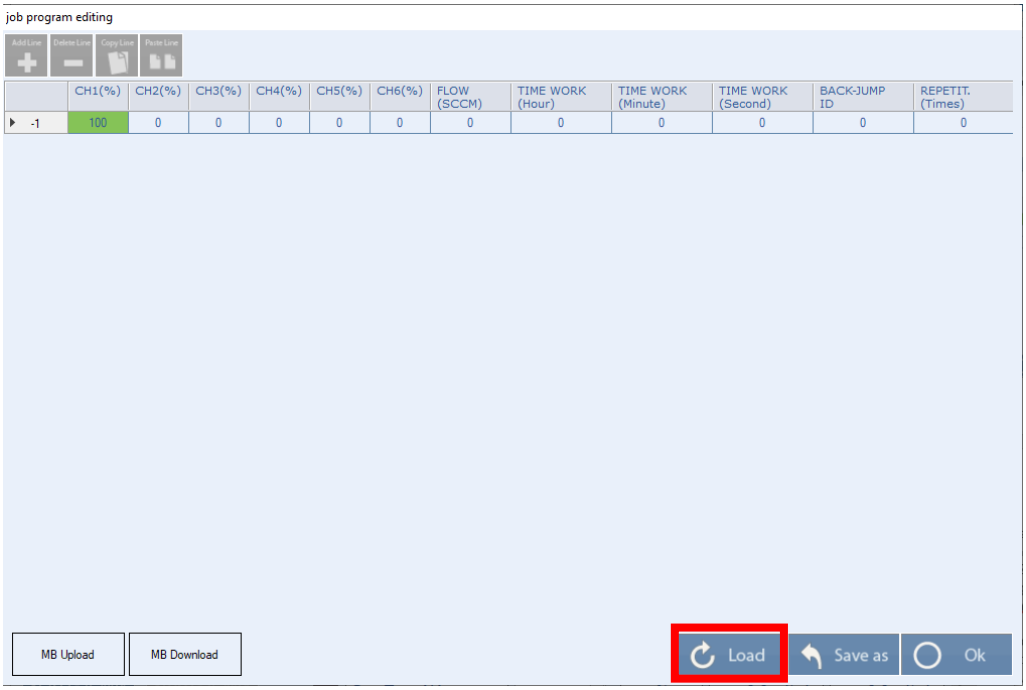

Figure 6-34

5. If you press the "**Ok**" button and click "**Yes**" in the confirmation windows the "job program editing" will close and it will be possible to run the program written from the software PC. (Figure 6-35)

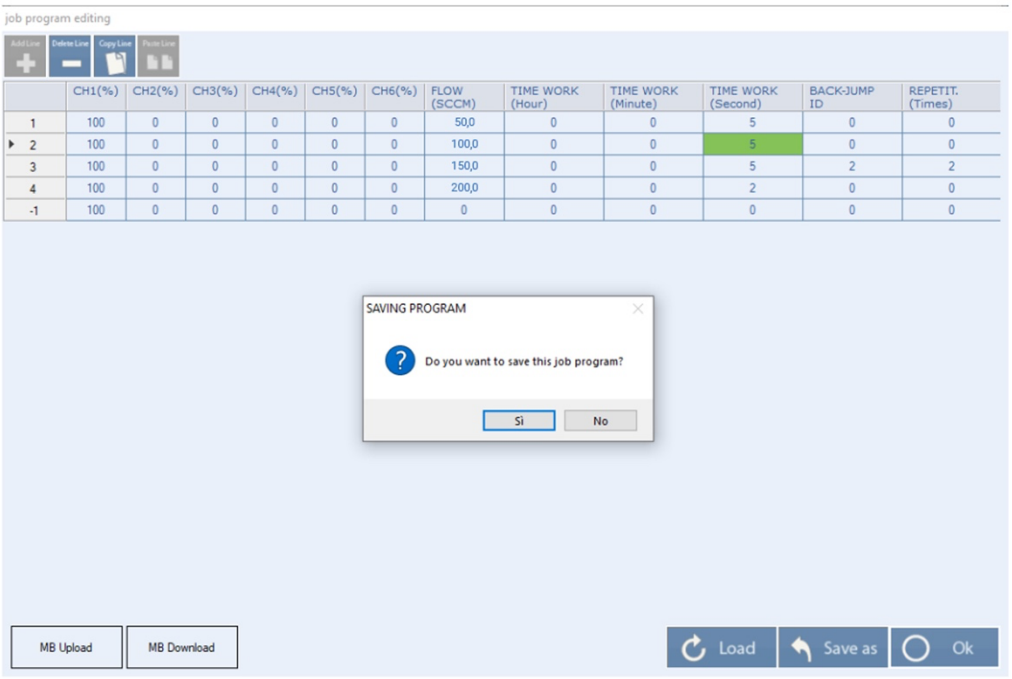

Figure 6-35

6. With the "**MB Upload**" button is possible to read the last program saved on the instrument. (Figure 6-36)

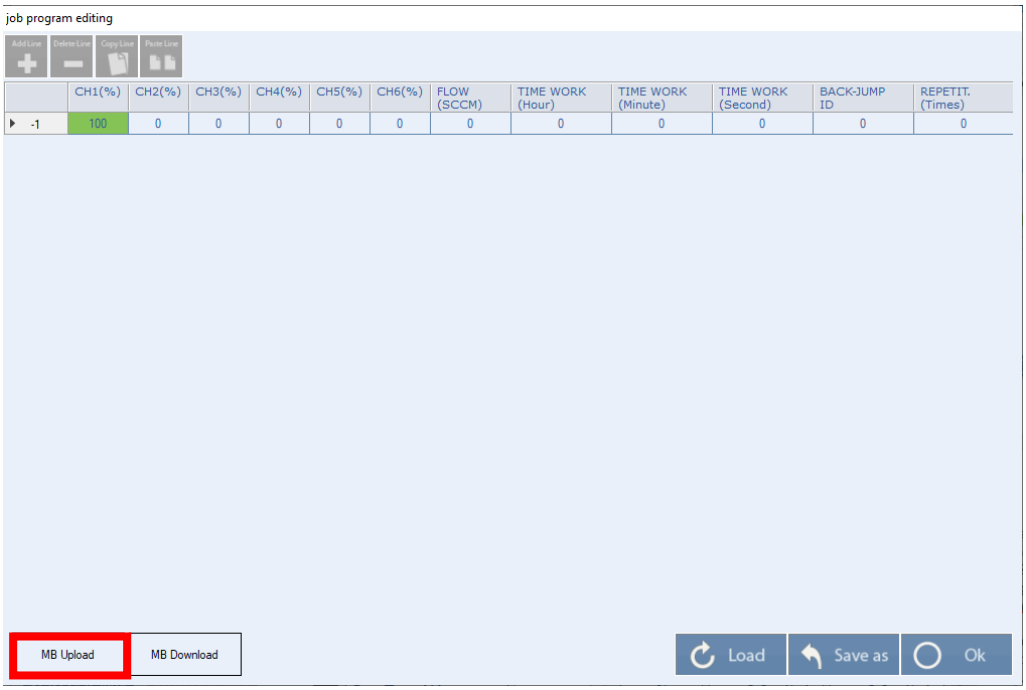

Figure 6-36

7. With the "**MB Download**" button is possible to download the program written on the instrument to use it standalone. (Figure 6-37)

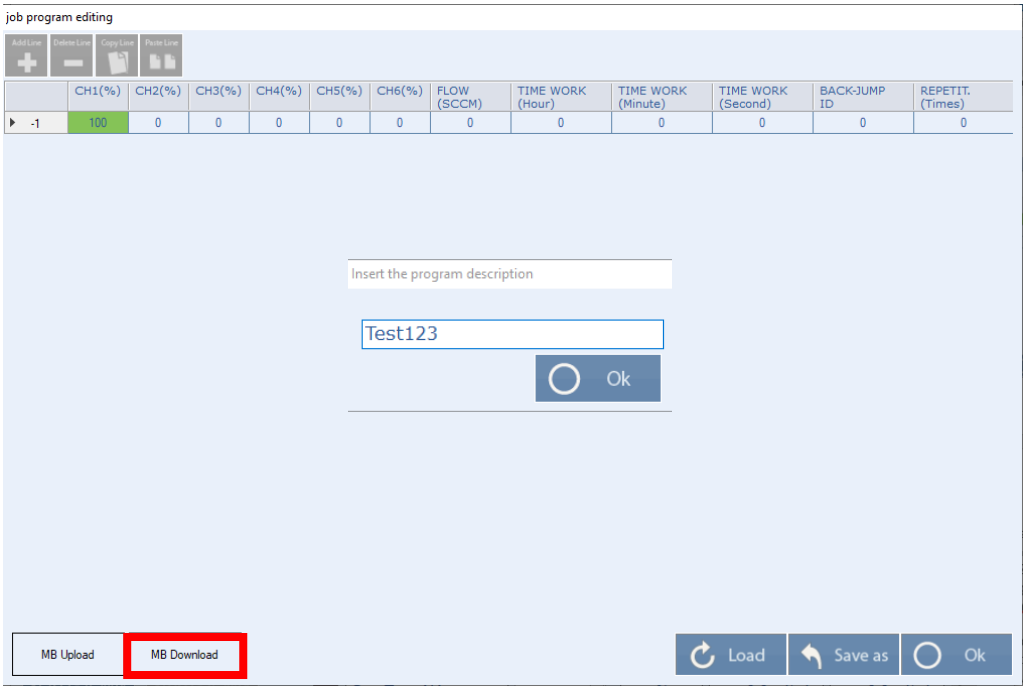

Figure 6-37

8. To RUN your created program, once you have load it, click on the button "**Run Program**" in the main screen of the software. A confirmation windows will be open and then click "**yes**". (Figure 6-38)

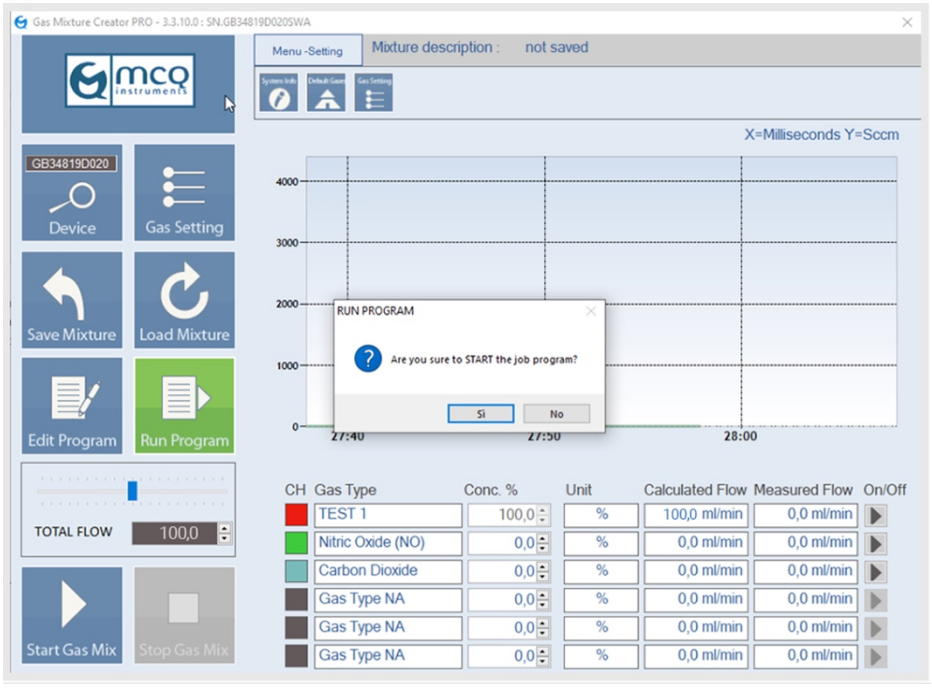

Figure 6-38

If a program isstarted, the icon "**Run Program**" change its color in **orange** and its name in "**Stop program**" and you can control the steps you have memorized in the upper part of the main window. (Figure 6-39)

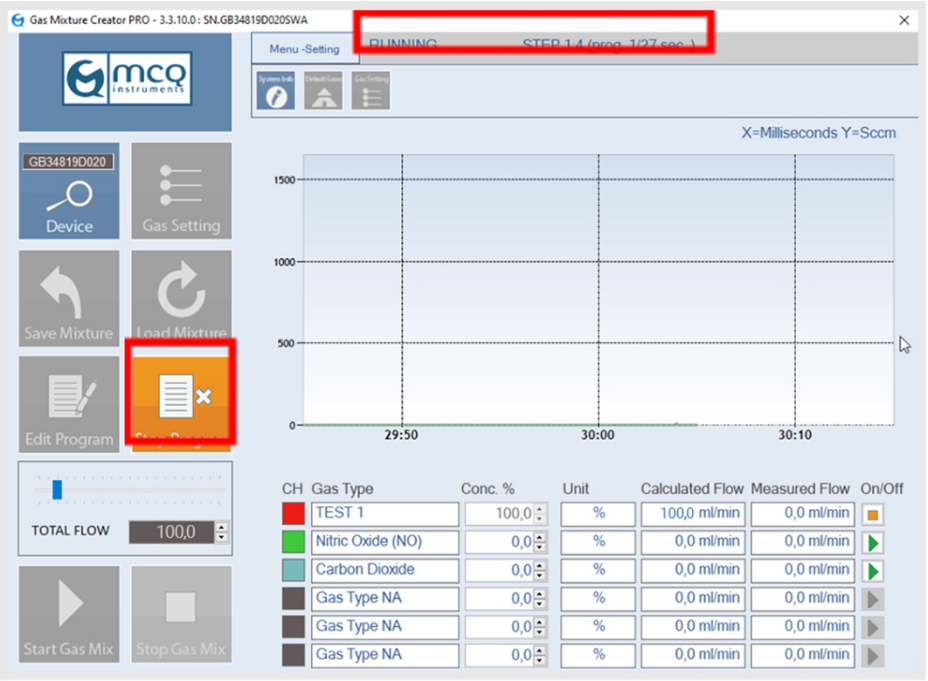

Figure 6-39

SECTION 7. MAINTENANCE REQUIREMENTS

1. INTRODUCTION

This section will provide the general guidelines for the proper maintenance of the GAS BLENDER NANO (3 Channels) and its external components. This section is divided in the following 3 areas:

- **Gas Blender maintenance**
- **External Tubes maintenance**
- **Valves maintenance**

2. GAS BLENDER MAINTENANCE

The MCQ INSTRUMENTS secures the proper functioning of the GAS BLENDER NANO (3 Channels) without the need of any specific routine maintenance. In case of improper use, all the MCQ INSTRUMENTS products must be maintained, cleaned and repaired only through the MCQ INSTRUMENTS Support Center.

MCQ INSTRUMENTS reminds you that the calibration of each channel is considered expired after 1 year. MCQ INSTRUMENTS does not secure declared accuracy for a channel with an expired calibration. Please contact the MCQ INSTRUMENTS Support Center for the annual calibration service.

3. EXTERNAL TUBES MAINTENANCE

The polyurethane tubes provided with the instruments do not require any routine maintenance. In case of switch between different working gases, MCQ INSTRUMENTS suggest a purge (at least 30 minutes with pure nitrogen) to clean any possible gas trace from the tubes.

4. VALVES MAINTENANCE

The valves bundled with the instrument are proportional. The manufacturer itself does not suggest any specific maintenance for this kind of product.

SECTION 8. WARRANTY TERMS AND CONDITIONS

1. INTRODUCTION

The following terms and conditions shall discipline the warranty recognized by the manufacturer on "GAS BLENDER NANO (3 Channels)" and/or any other product sold by MCQ s.r.l. in addition to the clauses, terms and conditions contained in the individual contracts, without any exception, offers and acceptances of orders, invoices and/or any other negotiation papers and documents.

2. SUBJECT

MCQ ensures that the Products are free from material and/or production defects occurring during normal use of them (the "Defects"). Should any alleged Defect occurs within the Term (as defined below) and the Purchaser submits the Notice (as defined below) according with Art. 5, MCQ has the right, at its sole discretion, to either replace or repair the Product, after the performance of a technical assessment of the actual existence of the Defect (the "Warranty"). If MCQ decides for replacing the product, MCQ has the right, at its sole discretion, to deliver to the Purchaser either a new product or a functionally equivalent product. If MCQ chooses the replacement option, the Product shall be promptly returned to MCQ.

Any tampering of the warranty seal on the Products will forfeit the Warranty.

3. WARRANTY PERIOD

The warranty set forth in paragraph 2 shall remain valid for a period of one year from the date of purchase. In order to ascertain if the Product is covered by the Warranty, the Purchaser shall submit to MCQ the invoice which was originally released at the time of sale that includes the date of purchase, the model and serial number of the Product for which an assistance covered by the warranty is requested.

4. EXCLUSIONS AND LIMITATIONS

MCQ s.r.l. shall not guarantee for:

- Uninterrupted operation;
- Uninterrupted or error-free operation of the product;

Product repair and/or replacement, as provided under this warranty, do not involve the extension or renewal of its starting date. both the Product's repair and replacement, performed under coverage of the Warranty, can also be realized using parts or units not identical but functionally equivalent to that of the Product subject to repair or replacement; the Warranty shall not be extended to cases other than the Defects;

The Warranty shall not apply and it is expressly excluded, where the alleged Damages, result from damage, misuse, tampering, negligence, alterations or repairs of the Products which have been performed by unauthorized persons; the Warranty shall not apply and, therefore, it is expressly excluded, in case of inspections, maintenance, repair and replacement of parts of the Products

resulting from natural wear and tear. In particular, but not limited to, this warranty shall not be recognized in case of defects or damages arising from:

- Using product under conditions other than usual;
- Using product under environmental conditions other than those listed in the user manual;
- Misuse and/or improper and/or unauthorized use other than that provided in the user manual;
- Performing, in general, any alteration and/or change to the product;
- Performing incorrect and/or improper maintenance;
- Performing incorrect controls and/or any improper operation;
- Performing an improper and/or inadequate calibration, and not executed and/or authorized by MCQ s.r.l.;
- Performing an improper and/or inadequate calibration, and/or executed with gases other than those specified in the user manual;
- Performing an improper or inadequate removal and/or intervention on the product, and not executed and/or authorized by MCQ s.r.l.;
- Repairs and/or opening of the product performed by people not authorized by MCQ s.r.l.;
- Abuse or misuse, including but not limited to, the inability to use the product for common purposes or in accordance with provisions listed in the instructions for use and maintenance provided by MCQ s.r.l.
- Using product together with accessories not approved by the MCQ s.r.l. as suitable and/or compatible with it.
- Using not dry gases.
- Corrotion, Oxydation or any chemical modification process.
- Malfunction of the product arising from incorrect installation or use not conform to technical or safety standards currently in force, or made in violation of instructions contained in the user manual;
- Force majeure events such as, for example, natural disasters and/or any other extreme weather conditions and/or external causes, which are beyond MCQ's control, even if caused by lightning, water, fire, terrorist activity, riots, improper ventilation, acts of any governmental authority, site or building blockades, transport or work interruptions or work slowdowns and lock out, machine breakdown, accidents and interruptions of business operations or any delay in the provision to MCQ of parts, goods or services ordered to third parties;
- Moisture, liquid and any infiltration including those of beverages and/or food;
- Normal and/or natural wear and tear;
- Shipment of the product for whatever reason and purpose;

This warranty shall not be recognized at any rate, and therefore not applied and expressly excluded, in case of inspections, maintenance, repair and replacement of parts resulting from natural wear and tear.

The information in this document constitutes the sole and exclusive warranty provided and recognized by MCQ s.r.l. and replaces and excludes any other expressed and/or implied, oral and/or written applicable warranty and/or general condition. It shall be in particular considered unrecognized and excluded, for implicit or explicit defects including, but not limited to, warranties of marketability, satisfactory quality, suitability for use and specific purposes. Subject to any limit provided by law applicable to sales of the product and validity of any specific legislation protecting consumers.

In no event, MCQ s.r.l. can be and shall be liable for any direct, special, indirect or related damage arising and/or related and/or carried forward to any defect in the product, even if under warranty solved, as well as for any breach of warranty and/or any other agreement and/or arrangement and/or obligation, even if recognized and/or recognizable by law. In the exemption referred to in the preceding paragraph shall be considered including, but not limited to, damages resulting from loss of annual turnover, loss of anticipated or immediate revenue (including loss of profits arising out of contract), loss of liquidity, loss of savings, loss of business, loss of opportunity, loss of goodwill, damage to the image, loss and/or damage and/or alteration of data, any other damages even indirect and/or consequential and/or otherwise related, including equipment replacement costs and property in general, costs of recovery and/or programming and/or reproducing any program or data stored. Should MCQ be held liable for any payment of any amount for any reason to the Purchaser in relation to or in connection with the Purchaser, MCQ's liability shall not exceed a sum equal to the purchase price paid by a Purchaser.

MCQ expressly disclaims (i) any damages caused by MCQ's employees, consultants, contractors or any third parties in providing the Products; and (ii) any and all legal warranties to the maximum extent permitted by the applicable law.

5. REQUEST INTERVENTION UNDER WARRANTY

A) To request warranty, the buyer shall promptly send an intervention application by e-mail at support@mcqinst.com, enclosing the form No.1 to this document completed in its entirety.

B) Under the provisions of the preceding paragraph, MCQ, after the performance of a technical assessment of the alleged Defect, MCQ will evaluate at its own discretion and assessment, in the time and manners deemed appropriate, a possible return of the Product..

C) If a return of the product is deemed necessary, the buyer shall receive by M.C.Q. the RMA (Return Materials Authorization) form.

D) The buyer shall promptly complete the RMA form and return it to MCQ s.r.l.

E) Executing all specific information provided by MCQ s.r.l., the Purchaser shall be required to return the Product by using the same carrier who performed the initial delivery of the Product, anticipating all costs, taking care to prepare all the necessary customs documentation required by the legislation of the sending nation and fulfilling any other incumbent may be required to perform the shipment.

F) After the receipt of the Product, on time and in the manner deemed most appropriate for the specific case, MCQ shall perform and verify the existence of the alleged Defect and shall investigate the possible causes that produced it.

G) Once checks referred to in paragraph F shall ascertain the validity of the warranty coverage, M.C.Q. s.r.l. shall:

- repair and/or replace and/or recondition the product, choosing, at its sole discretion, the solution deemed most appropriate;
- return the Product to the Purchaser, being understood that the cost of shipping shall be borne by the Purchaser;
- reimburse the buyer of any shipment cost sustained in advance for the product return;

H) In the event, checks referred to in paragraph F shall not ascertain the validity of the warranty coverage, MCQ s.r.l. shall:

- formulate a repair estimate showing an effective date;
- communicate the estimate to the buyer.

The Purchaser, within the period of validity of the estimate, shall reply sending an e-mail at support@mcqinst.com, expressly declaring its approval of the estimate received or, alternatively, submitting a request to having the Product returned without the performance of any intervention on it.

Either in case of acceptance of the estimate or request for a product return, the shipping costs shall be borne by the Purchaser. In case the Purchaser does not respond to the repair estimate within 6 (six) months from the receipt of the estimate, the Product shall be retained by MCQ becoming a property of the same company. The purchase and use of the product by the buyer shall be expressly subject to acceptance of the warranty set forth herein.

SECTION 9. APPENDIX A

GAS MEDIA COMPATIBILITY

The MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels) incorporates components made of non-reactive material that are compatible with a wide variety of gaseous media. This Appendix provides a list of non-corrosive gases compatible with the instrument.

Gas Media	MCQ GAS BLENDER NANO (3 Channels)
Air	●
Nitrogen	●
Oxygen	●
Argon	●
Natural Gas	●
Nitrous Oxide	●
Anesthetic Gasses	N/A
Carbon Dioxide	●
Hydrogen	●
Helium	●
Methane	●
Ethylene	●
Ethane	●
Sulfur Exafluoride	●
Propane	●
Butane	●
DME (C2H6O)	●
Tetrafluoropropene HFO1234ze	●
Nitrous Oxide	Dry Gas Only
Nitric Oxide	Dry Gas Only
Sulfur Oxide	Dry Gas Only
Water Vapor	Non-condensing
Ammonia Gas	Dry Gas Only, <0,1%
Chlorine Gas	<0,1%
Hydrogen Sulfide	<0,1%

SECTION 10. APPENDIX B

COMPATIBLE TUBES LIST

This appendix provides you a list of tube compatible with the MCQ INSTRUMENTS GAS BLENDER NANO (3 Channels). For your laboratory applications involving the Gas Blender the following type of tube can be used:

- **Polyurethane (SMC TU Series)**
- **Fluorinated Ethylene Propylene (FEP)**
- **Stainless Steel (only with Swagelok)**

SECTION 11. APPENDIX C

PERFORMANCE SPECIFICATIONS

In this appendix, the GAS BLENDER NANO (3 Channels) internal and external working specifications are listed. Use this performance specifications to ensure a safe and proper use of the Gas Blender. MCQ INSTRUMENTS is not responsible for any instrument damage caused by an inappropriate use of the instrument itself.

Internal specifications

	N2, 20°C, 101.325 KPa (1 atm)
Accuracy	10-100% FS: 0,2% of FS <10% FS: 1% of FS
Repeatability	0.10% of reading
Response time (for each channel)	200 ms
Channel step regulation	1% from touch panel 0,1% from software PC
Power Supply Requirements	Internal, power cord in bundle 110-240 Vac / 50-60 Hz
Main Supply Voltage Fluctuations	±10%
Operating Pressure	Max 3 bar
Working Temperature	15-45 °C

Environmental specifications

Operating Temperature Range	15-45 °C
Optimal Pressure	100 kPa (1 bar)
Optimal Humidity	30 to 50 % relative humidity
Maximum Operative Altitude	2000 m

Size and Weight

Length	25,5 cm
Height	10,5 cm
Depth	28,7 cm
Weight	3,2 kg

SECTION 12. APPENDIX D

OPERATING SPECIFICATIONS

In this appendix, the GAS BLENDER NANO (3 Channels) operating specifications are listed. These specifications must be followed to ensure the proper use of the Gas Blender. MCQ INSTRUMENTS is not responsible for any instrument damage caused by an inappropriate use of the instrument itself.

Mass Flow Rates (for each channel)	0,2-200 sccm on N2 (standard)
Total Output Mass Flow Rate	up to 600 sccm depending on the concentration on the channels
Gases *	N2, O2, CO2, CH4, Air, He, H2, etc.
Inlet Gas Channel	3 Input
Outlet Gas Channel	1 Output of mixed gases
Channel's Fittings **	NPT Swagelok or push-in fittings, for 6 mm OD tubes or ¼ inch tubes.
Input Channel	USB PC Interface, RS485
User Interface	Touch display, Gas Mixing Software

***** Additional gases supported on request

** Additional on request

SECTION 13. APPENDIX E

DECLARATION OF CONFORMITY

MCQ Instruments
Via delle Quattro Fontane 33
00184 Roma (RM)
ITALY

Email: info@mcqinst.com
http://www.mcqinst.com

Partita IVA / VAT Number:
IT05312981003

EU DECLARATION OF CONFORMITY

MCQ s.r.l. with headquarter in Roma (Italy) - Via delle Quattro Fontane 33, as manufacturer,

DECLARE UNDER ITS OWN RESPONSIBILITY THAT THE PRODUCT:

GAS BLENDER		
MODELL:		
☐	GB100	
☒	GB100 Plus	SERIAL NUMBER:
☐	GB2000	xxx
☐	GB3000	
☐	GB4000	
☐	GB6000	

described above is in conformity with the relevant Union harmonisation legislation

- 2014/30/UE Electromagnetic Compatibility Directive (EMC)
- 2014/35/UE Low Voltage Directive (LVD)

The declaration is based on TUV Certificate Type Approved n° R60137853.

MCQ s.r.l. declare also that the product described above is in conformity with the below harmonised standards:

- EN 61010-1: 2013 - IEC 61010-1: 2013
- EN 61326-1: 2013

Roma 19/03/2020

MCQ srl
legal representative
Giuseppe Canuti

SECTION 14. STATEMENTS

CE

TÜVRheinland US

TÜVRheinland CERTIFIED

Type Approved
Safety
Regular Production
Surveillance

www.tuv.com
ID 1111218183

SECTION 15. CONTACTS

In case you need technical assistance do not hesitate to contact MCQ INSTRUMENTS:

- **E-mail: support@mcqinst.com**