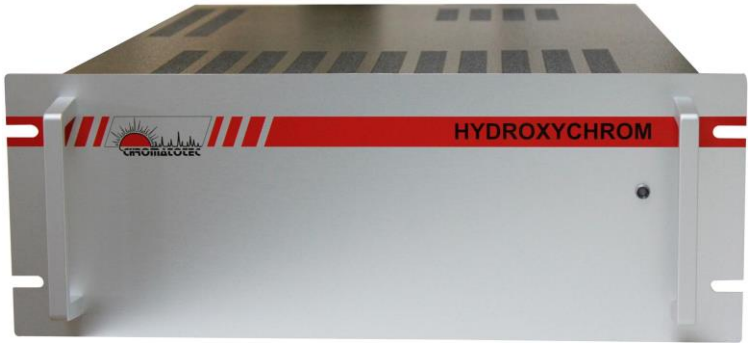
Gas-Detection
LAUPER INSTRUMENTS

Lauper Instruments AG
Irisweg 16 B
CH-3280 Murten
Tel. +41 26 672 30 50
info@lauper-instruments.ch
www.lauper-instruments.ch

HYDROXYCHROM



Historic

Revision N°	Modification nature	Application date	Modified chapters
0	Creation	24/10/2012	All
1	Revision	25/10/2012	Ch.3 & 4
2	Revision	22/04/2015	Ch.4.6.2
3	Revision	14/12/2018	Ch. 3.1 & 4.3

Editor: S. GUTIERREZ, JP.AMIET, K.TRAULLE	**Checked by:**	**Approved by:**
Visa :	**Visa :**	**Visa :**

CONTENTS

WARNING

The described material in this manual contains one or several confidential computer programs that are the property of CHROMATO-SUD.

CHROMATO-SUD authorize the instrument owner to use the program (s) for what it has been designed to the exclusive of any other use.

The total or partial copyright, the dismantle, the retro-compilation or transcription or the above mentioned program for the use of the owner of a third party are strictly forbidden.

GENERAL WARRANTY

CHROMATO-SUD guarantees these instruments against the manufacturing defaults during a twelve month period from the delivery date. The replacement of the defective components will be free except the transport or travel fees that will be invoiced according the current tariffs.

CHROMATO-SUD accepts no liability for damages or possible incurred losses.

CHROMATO-SUD provides a spare part service and After Sales Service. Please contact the service engineer responsible for the repair or the spare part repair. The serial number of the instrument as well as the description of the trials done and the estimated reasons of the breakdown should be given to provide you the quickest service.

CHROMATO-SUD reserves the right to modify the prices and the characteristics of these products.

In case of warranty particular conditions, the general warranty will not be applied.

CHAPTER 1. INTRODUCTION

This document provides all necessary information for the installation and operation of your HYDROXYCHROM High Purity Hydrogen generator; it also describes the simple maintenance operations, alarms as well as troubleshooting.

It is applicable to the below generation models and software *HYDROXYCHROM Viewer* Version 1.0 produced since October 2012:

- HYDROXYCHROM-100
- HYDROXYCHROM-160

The operating manual considers and describes an instrument generally equipped with the most complex configuration ; should the explanation concerning the most complex instrument be too different from the simpler instrument, both cases will be described.

CHAPTER 2. GENERAL INFORMATION & COMPATIBILITY TO NORMALISATIONS

2.1. CE CONFORMITY

This equipment was built in compliance and is compatible with EC recommendations concerning electrical safety and electromagnetic emissions. It complies with 89/336/EWG, 93/98/EWG, standards EN 50 081-1, in 50 081-2, EN 50 082 - 1 and EN 50 082 - 2.

Note

Any modifications on the instrument which have not been approved in writing by the manufacturer will automatically cancel the manufacturer warranty. If such modifications are nevertheless undertaken, they are under the user responsibility; the manufacturer will under no circumstances be responsible for any damages direct or indirect which they would cause

2.2. W.E.E.E. PRODUCT RECYCLING DECLARATION

In agreement with the European EC/2002/96 directive on electrical and electronic equipment recycling, this product may not be disposed in the garbage. For recycling information, contact the company who sold this product. If you want to get rid of this instrument, identify it as such and direct it to a certified recycling centre.

2.3. SECURITY INSTRUCTIONS AND CORRECT USE

This Hydrogen generator has been designed in order to produce small quantities of Hydrogen for instrumentation applications. This device must only be used for such applications respecting the specifications and recommendations for its proper use described in this operating manual. The main recommendations are:

- Instrument can only be use indoors, at temperatures above 4°C and in a well-ventilated room.
- In case of maintenance inside the instrument, always unplug it before opening the casing(s). HIGH VOLTAGE inside.

CHAPTER 3. SPECIFICATIONS AND DESCRIPTION

3.1. SPECIFICATIONS

Models	**HYDROXYCHROM-100** **HYDROXYCHROM-160**
H_2 Outflow @ 1013/20°C	HYDROXYCHROM-100 = 100 Nml/min HYDROXYCHROM-160 = 160 Nml/min
H_2 purity	**Maximum Hydrocarbon content: 0.1ppm**
Dew point	-40°C / -40°F
Outlet Pressure	From 0.5 to 7 bar (7 to 102 psig), adjustable by software.
Pressure resolution	10 mbar
Pressure stability	Better than ±10 mbar
H_2 generation technology	Proton Exchange Membrane (PEM), Solid Polymer Membrane
Drying technology	No maintenance static dryer
Water quality	High purity distilled & filtered water. TOC free. Conductivity < 0.20 µS/cm
Water capacity	5L tank outside, 0.4L tank inside.
Water consumption	5L water generates about 6000L Hydrogen
Safety	Low H_2 stored volume; over pressure valve; internal leak test; automatic shut down; maximum current limit, water quality.
Manual control	ON-OFF power switch
Display	By *Hydroxychrom Viewer*
Communications	USB
H_2 outlet fitting	Stainless steel 1/8" OD compression
Functioning conditions : • Temperature • Humidity	 +10°C to +35°C max 80%, non condensing
Transport and storage conditions: • Temperature • Humidity • Duration	 +4°C to +40°C Max 90% Maximum 30 days. Instrument should run 5 minutes every month
Power supply	Automatic switching from 90VAC to 260VAC, 47 to 63 Hz
Power consumption (max at full flow)	HYDROXYCHROM-100 and HYDROXYCHROM-160: maximum 150W
Sound pressure	< 40dB (A)

Dimensions	W=482mm/19ins, H=180mm/7.1ins, D=600mm/23.6ins
Net weight (Kg)	10 kg
Certification	CE

3.2. INSTRUMENT PRESENTATION

The front panel contains a functioning LED (see chapter 5 for the signification).

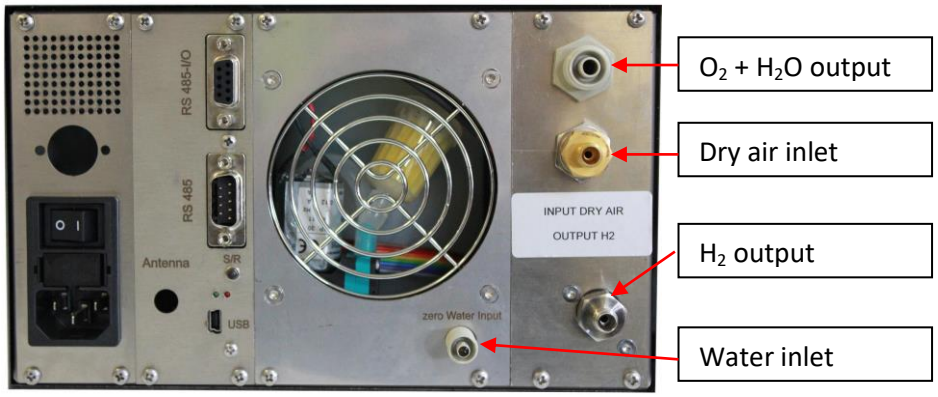
The rear panel' left side has:

- Mains plug with fuse and switch
- DB9 interface connectors for RS485, remote control USB, dry relay.

The rear panel' in the center has:

- ZEROWATER input from external tank, fitting for 6mm tube
- Output hydrogen by dual ring fitting stainless steel 1/8"
- Dry air inlet, fitting brass 1/8"
- O_2 output fitting, fitting for 8mm tube
- Mild Air outlet after cooling internal structures

View of rear's face:



3.3. FUNCTIONING PRINCIPLE

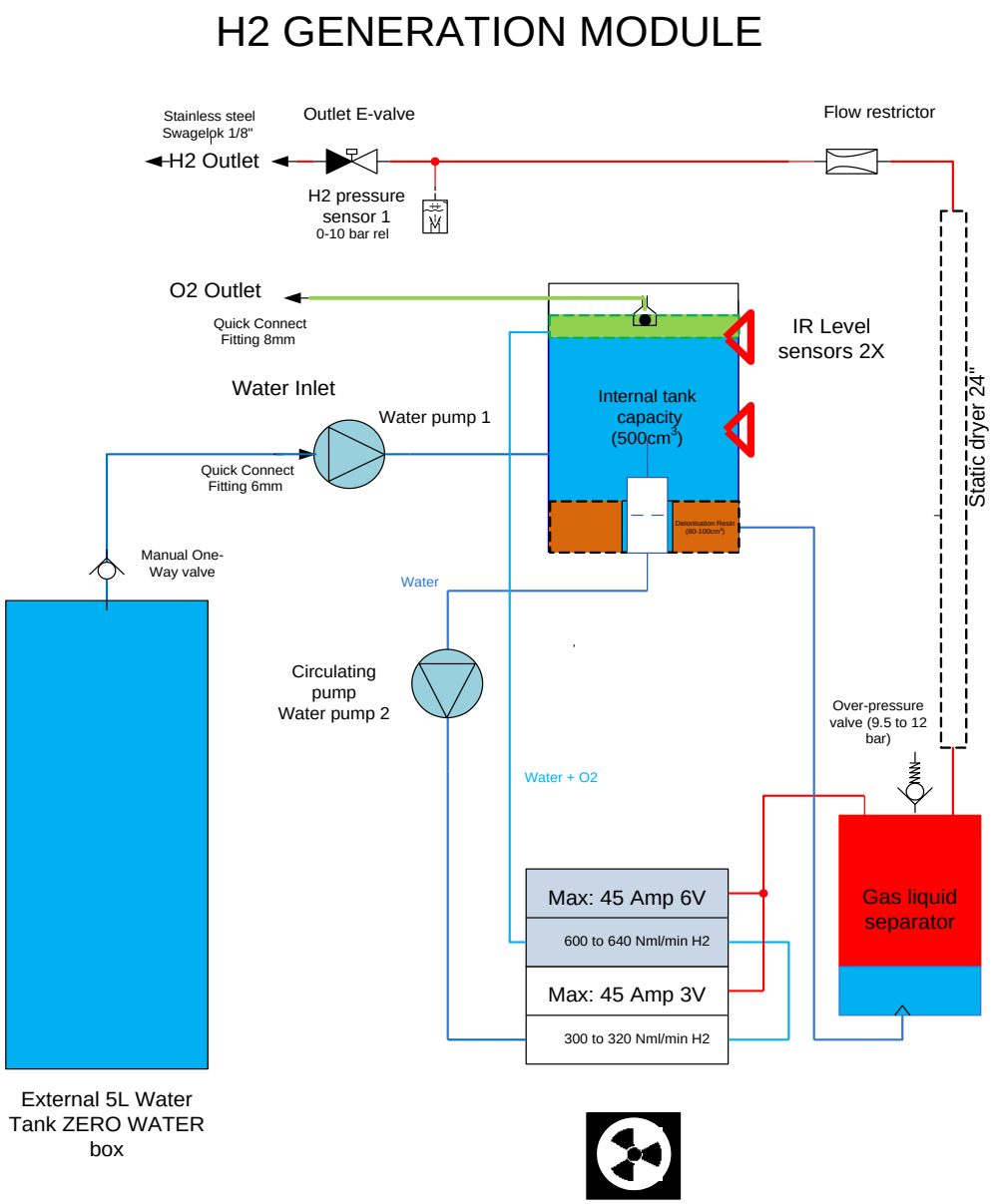
The self-priming water pump1 sucks water from the ZEROWATER tank (external tank), and keep the internal tank filled up between the two Infra-Red water level detectors. The internal tank contains a circular deionization cartridge with minimum 1 year lifetime.

The circulating water pump2 aspires ZERO WATER from the internal tank, and make water circulating through the electrolysis cell with PME membrane. Mixed with oxygen generated by electrolysis, the water return to the internal tank. O_2 is separated and flows outside the instrument through a 8mm exhaust fitting.

After creation during the electrolysis, hydrocarbon free wet hydrogen passes through the membrane and is dried a first time in the liquid-gas separator, then a second time by a static dryer without maintenance.

The Hydrogen pressure is measured and regulated to the desired value by a current feedback to the H_2-cell.

HYDROXYCHROM-100 and HYDROXYCHROM-160 are equipped with a single layer H_2-cell.



CHAPTER 4. INSTALLATION AND OPERATION

4.1. RECEIPT OF INSTRUMENT AND CHECK

Each instrument is inspected and packaged prior to transport with great attention. Immediately after receipt, we recommend to perform a quick visual inspection of the package. If the package is damaged, report it in writing to the carrier at the time of delivery.

The HYDROXYCHROM is packed in a wood box with protection and maintaining foams placed above and below the instrument.

The HYDROXYCHROM packaging extraction begins with the opening of the wood box; at this stage, it is possible to verify the visual integrity of the instrument.

Any damages must be immediately identified and photographed; it should be reported to the carrier as well as to your local Distributor or to CHROMATOTEC.

For major damages, the HYDROXYCHROM shall be returned to the manufacturer after synchronization with the service department, which can be reached by e-mail at:
support@chromatotec.com.

In case of non-respect of this procedure, CHROMATOTEC cannot be kept in charge of the caused damage and cost will be charged to the customer.

It is well recommended to keep the wood box for future shipments.

4.2. DELIVERY CONTENT

Quantity	Description
1	Hydrogen Generator HYDROXYCHROM with its factory communication option assembled
1	Connection tube from ZEROWATER tank to HYDROXYCHROM.
1	ZEROWATER tank (5L)
1	USB key including operating manual and *HYDROXYCHROM Viewer* software. If the generator is supplied with an analyzer, these elements are supplied with the USB key of the analyzer.
1	QC and verification certificate
1	USB cable for connecting the device to a PC
1	Power cable 230V, CE or according to your country
1	Shipping box

4.3. GENERATOR INSTALLATION

- The HYDROXYCHROM generator must be installed on a flat surface, without vibrations, avoiding potential shocks and excessive heat source; it should not be in contact with other devices on any of its walls.
- Operate the instrument in an open and well-ventilated area, in which the temperature does not go below +4°C. Good functioning of the instrument is guaranteed for a temperature between +10 and +35°C.
- **To ensure proper ventilation, a clear space of at least 5 cm is required on the top of the instrument and around the ventilation outlet. The cooling air intake is located directly on the top and the rear of the instrument; under no circumstances this part should be obstructed.**

4.4. CONNECTIONS

4.4.1. FLUIDIC CONNECTIONS

ZEROWATER Inlet:

- Disconnect the tube assembly which connects the inlet and outlet of the water circulation circuit. This assembly is made for transport.
- Place the ZEROWATER tank close to the H_2-generator
- Connect the tube to the device. Lubricate the end of tube with distilled water and introduce it in the fitting, (labeled ZEROWATER INLET), push it firmly and screw the nut.

REMARK

The ZEROWATER tank has been designed to be placed on the floor at a maximum distance of 1.2 m from the generator. It can, nevertheless, be placed at the same level or above the instrument. The maximum difference in height between the generator and the ZEROWATER tank is 1m.

Hydrogen Outlet: Hydrogen pressure is available at the OUTLET H_2 output on the back of the instrument. This outlet is equipped with a stainless steel Swagelok 1/8" fitting.

Oxygen outlet: remove the 8mm tube from the transport tube assembly and connect it to the O_2 Outlet. The O_2 outlet must be kept at atmospheric pressure and without restriction. Some droplets of water condensation are sometime present at the tube's end. This is normal; water could be collected by a small plastic glass.

Air inlet: Air inlet must be dry air at 3 bar.

Warnings: **1) Oxygen outlet must be maintained at atmospheric pressure.**

2) If H_2 outlet under pressure is suddenly opened, in certain circumstances H_2 could be mixed with water. Switch OFF device before disconnecting H_2 Outlet.

CAUTION: your HYDROXYCHROM generator has been tested for several hours at the factory and all its tubes have been cleaned of ambient air contaminants. After a break of several days to several weeks of operation, Air ambient has slightly dirt the circuit of the instrument. The walls of the tubes need again to be cleaned. Before connecting to the consumer, please let your H2-generator running during a couple of hours to the atmosphere.

4.4.2. ELECTRIC CONNECTIONS

Mains: Connect the HYDROXYCHROM generator with the electrical cable provided; if it was not possible, verify that the cable use has a sufficient section and has a ground wire (3X1 mm^2 minimum). Make sure laboratory differential circuit breaker can absorb an inrush current of at least 6A without switching off.

4.5. FACTORY SETTINGS

During one of the last phases of QC, your HYDROXYCHROM has been programmed with a set of values called “factory settings”. Those settings will help you to start the generator without troubles:

- Set H_2 Pressure: 2000mbar
- Timeout Pressure Alarm: 0 second (timeout disabled)
- Functioning Mode: Continuous on

At this step, the HYDROXYCHROM is ready for startup.

- Switch power ON
- After a few seconds due to generator initialization, the water pump1 sucks ZEROWATER and fill up the internal tank
- When upper water level is reached, current is applied to the hydrogen cell. Electrolysis process is initiated and some H_2 is available at the H_2 outlet.

The H_2 generator’s configuration could be modified according to your needs via its USB connection and a PC with *HYDROXYCHROM Viewer* software.

4.6. REMOTE CONTROL SOFTWARE: HYDROXYCHROM VIEWER FOR USB

OVERVIEW

HYDROXYCHROM Viewer software provides User Interface to control Gas Generator Network through USB interface

4.6.1. SPECIFICATIONS

Requirements

PC or Laptop under WinXP SP2 or higher / Win Vista / Win 7

At least 5Mb of free space on the Hard drive

USB port

Performance

Reporting Instrument Status, Parameters and Settings

Connection

The Instrument is connected to a PC using USB port.

4.6.2. INSTALLATION PROCEDURE

HYDROXYCHROM VIEWER :

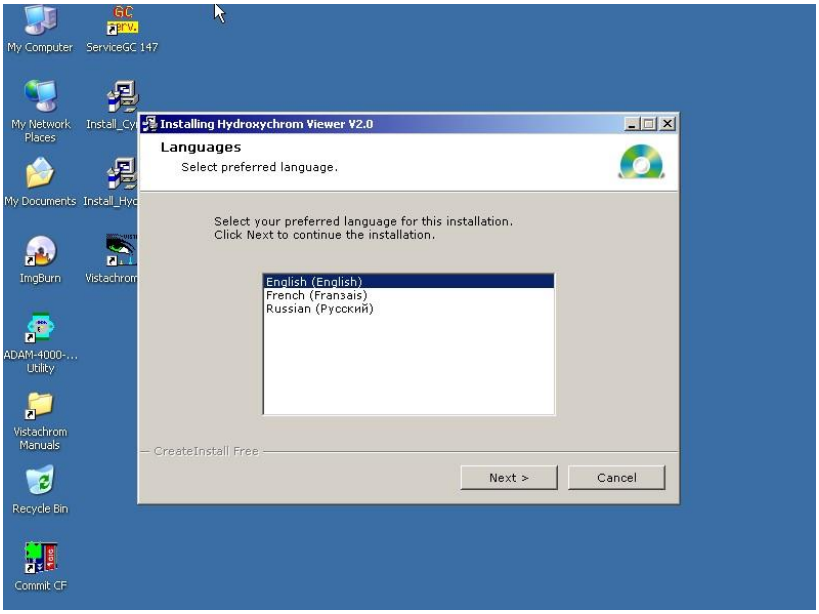
To install HYDROXYCHROM Viewer you must log the computer in “administrator”

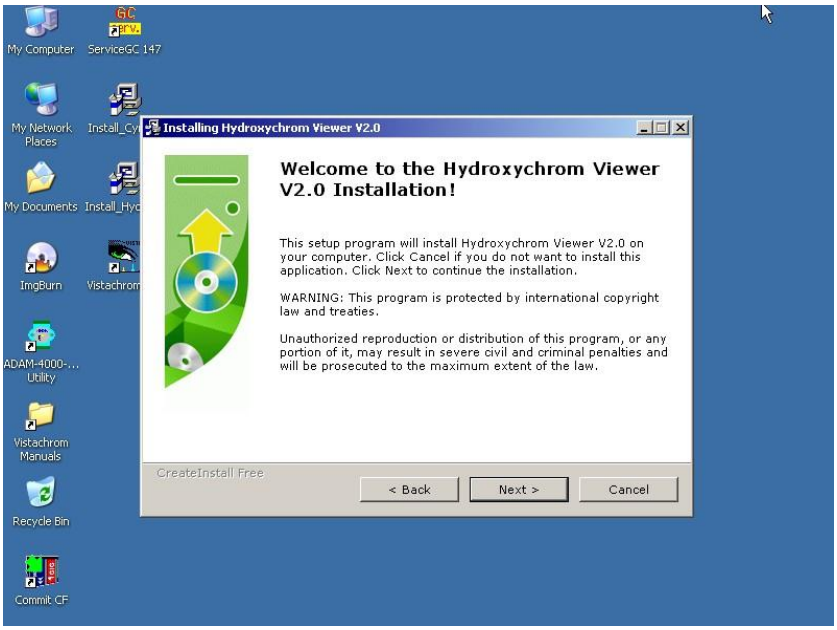
Remark:

If you want work with HydroxychromViewer in Russian start by installing the “Cyrillic code page” (procedure below) and then come back here (only available with HydroxychromViewer V2.0).

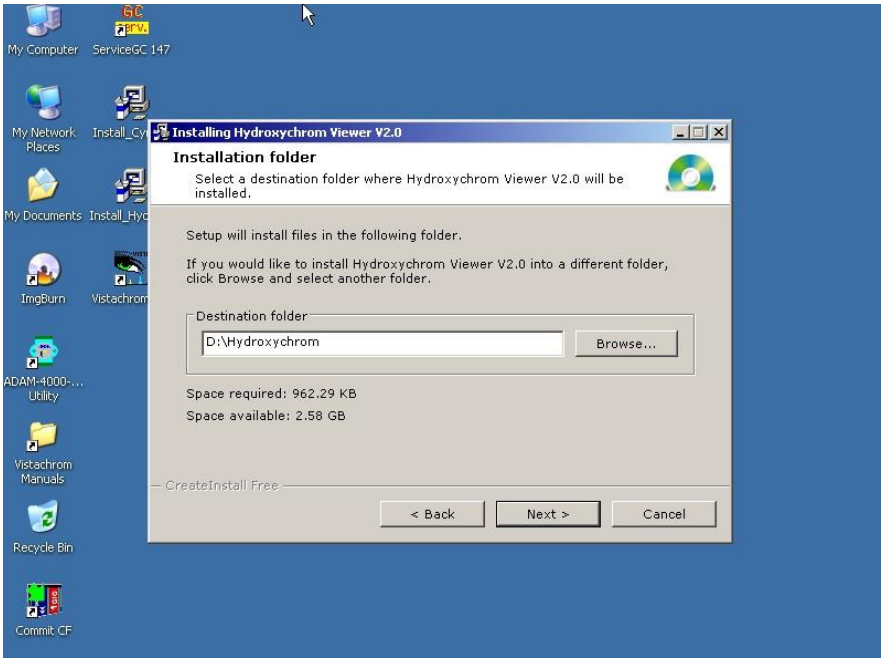
Step 1: Run “install_hydroxychromviewer.exe”

Step 2: Select your preferred language for this installation

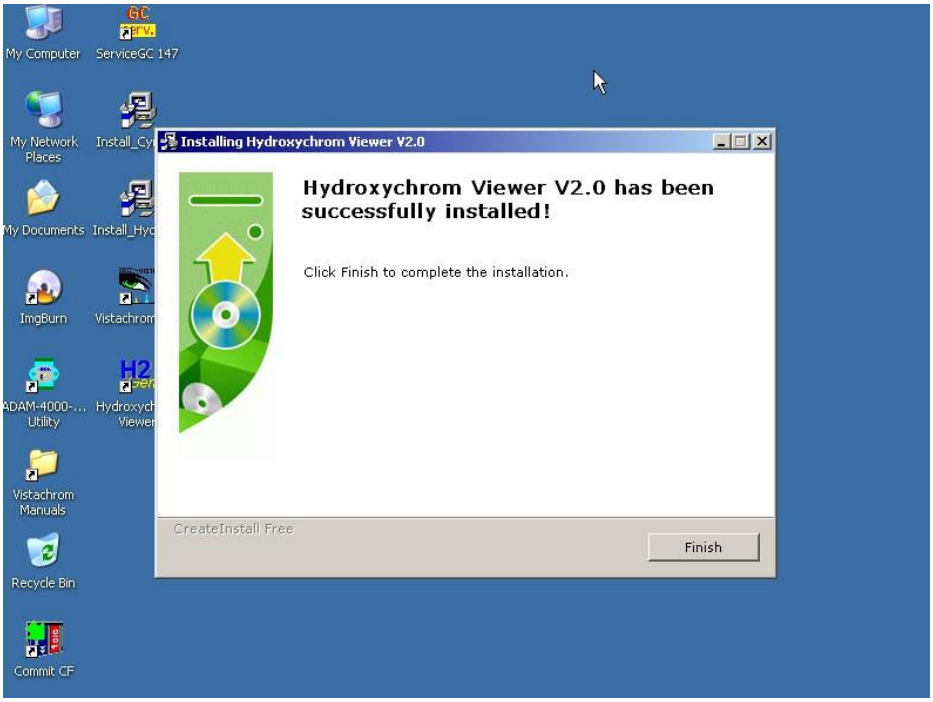




Step 3: Choose destination folder or use default.

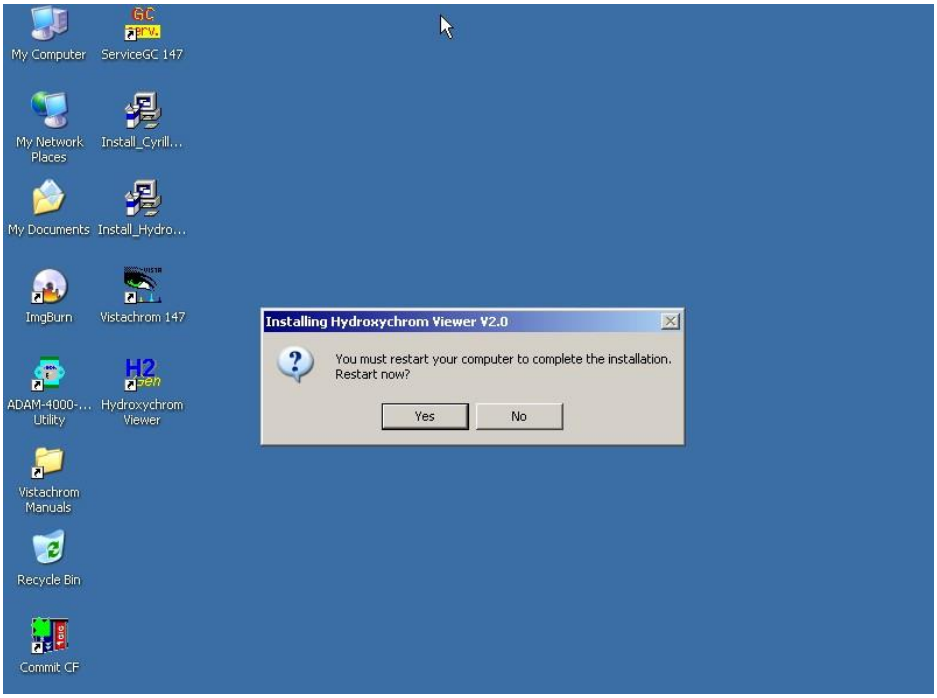


Step 4: Complete installation



Remarks:

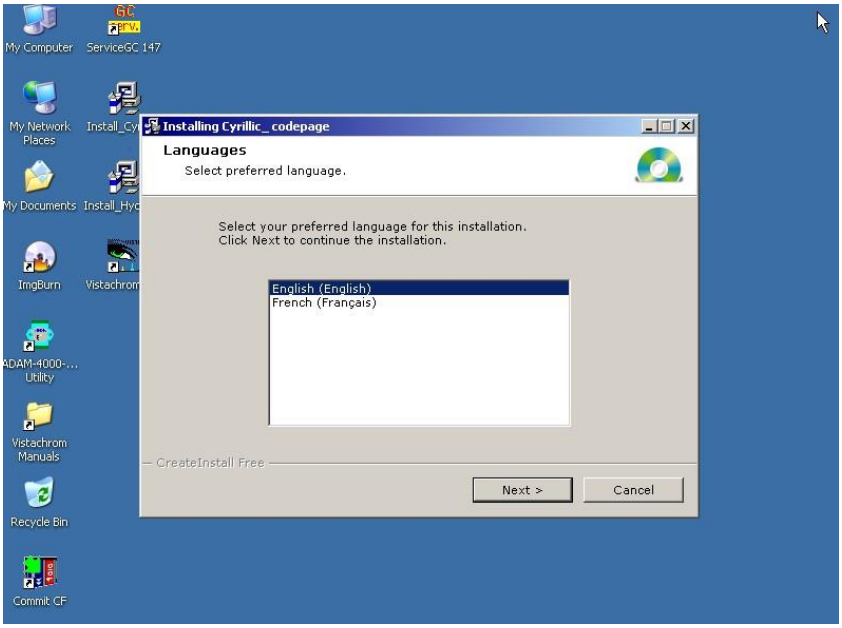
- If you just installed Hydroxychrom Viewer V1.0, when the installation is complete you have to do a “commit cf” (procedure below).
- If you just installed Hydroxychrom Viewer V2.0, when the installation is complete, this window will appear: click on “yes”, the computer will restart automatically saving the modification you just made.



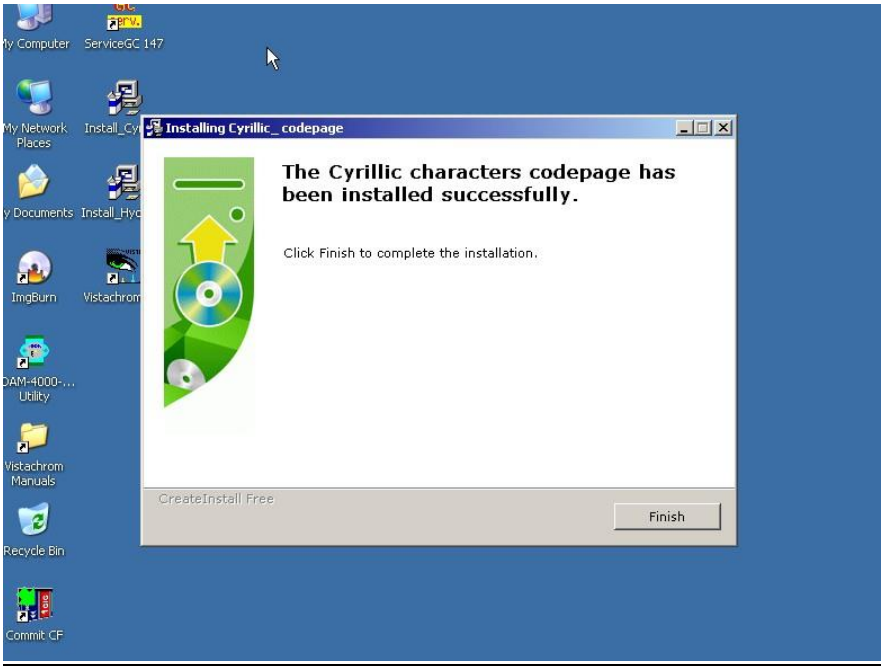
CYRILLIC CODE PAGE INSTALATION:

Step 1: Run “install_cyrillic_codepage.exe”

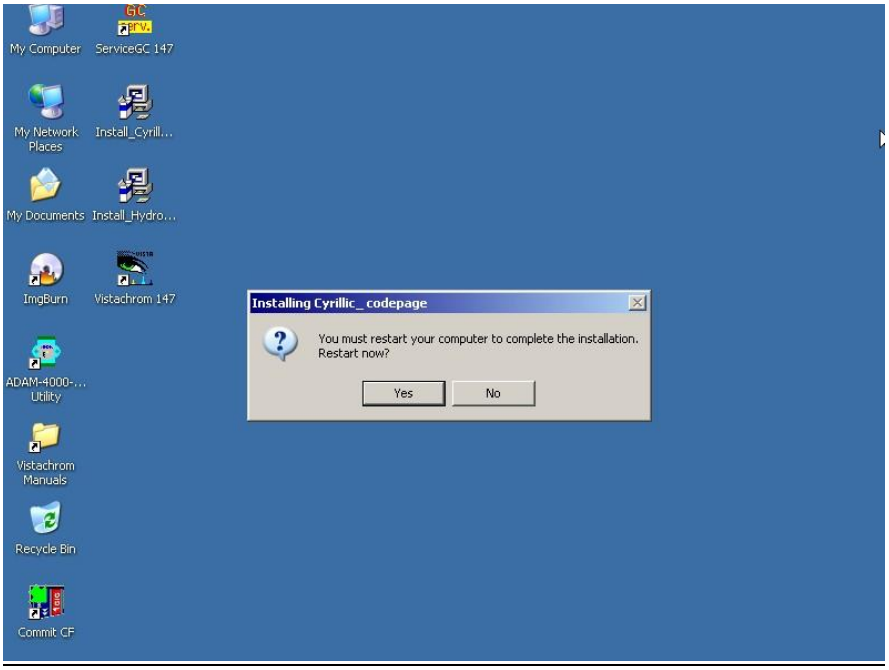
Step 2: Select your preferred language for this installation



Step 3: Complete installation



When the installation is complete, this window will appear: clic on “yes”, the computer will restart automatically saving the modification you just made.

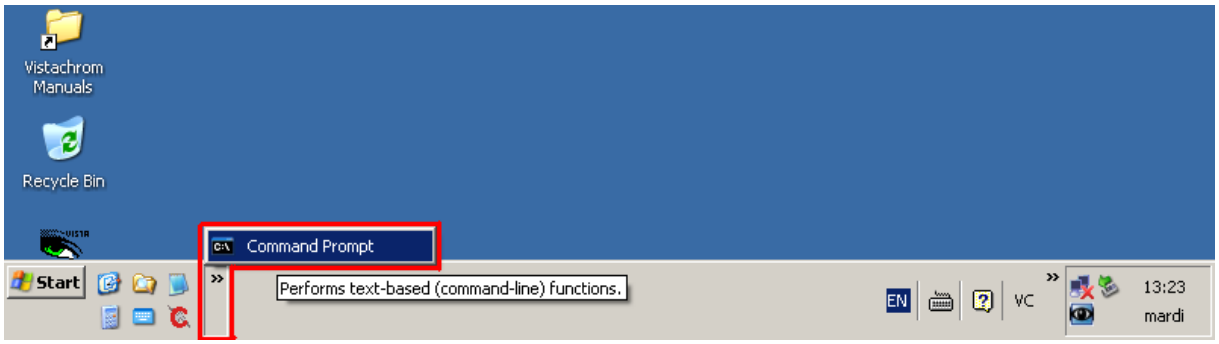


Remark:

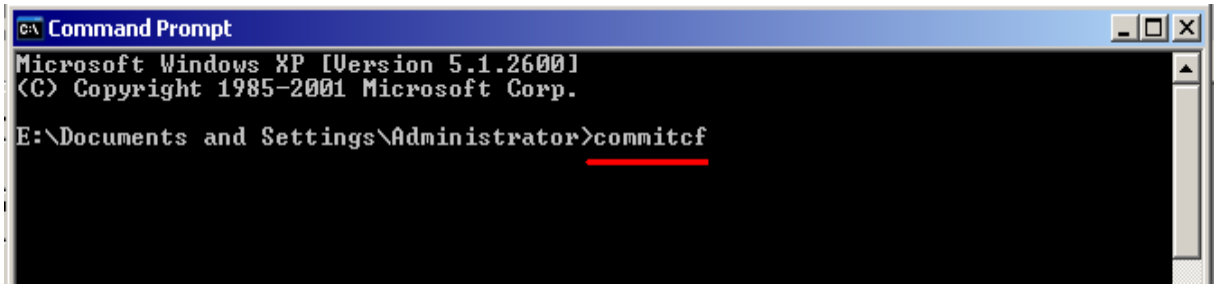
After the computer restarted you can install the HydroxychromViewer software (go back to the procedure above).

COMMIT CF PROCEDURE FOR COMPUTER UNDER EMBEDDED WINDOWS:

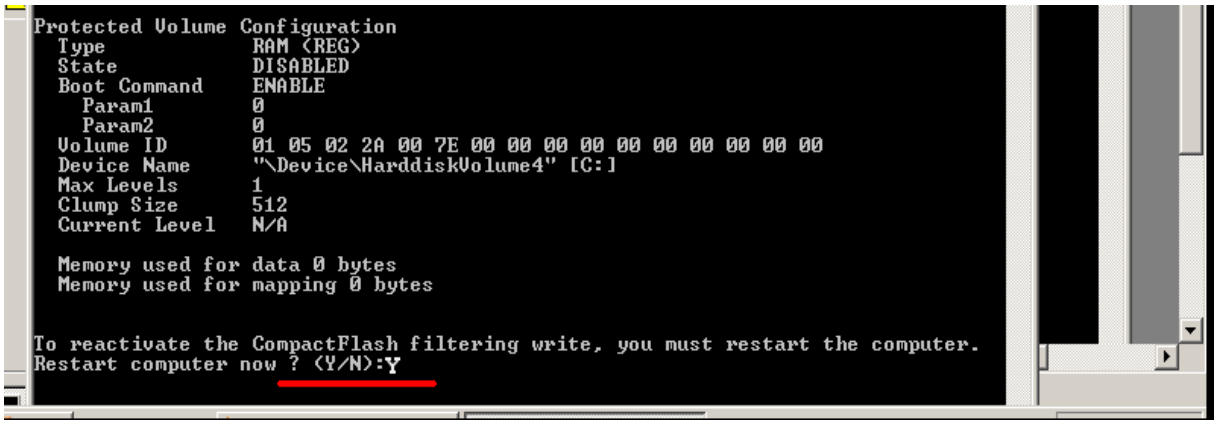
Open the program named “command prompt” in the toolbar



In this program, write “commitcf” as shown in the picture below and press enter.

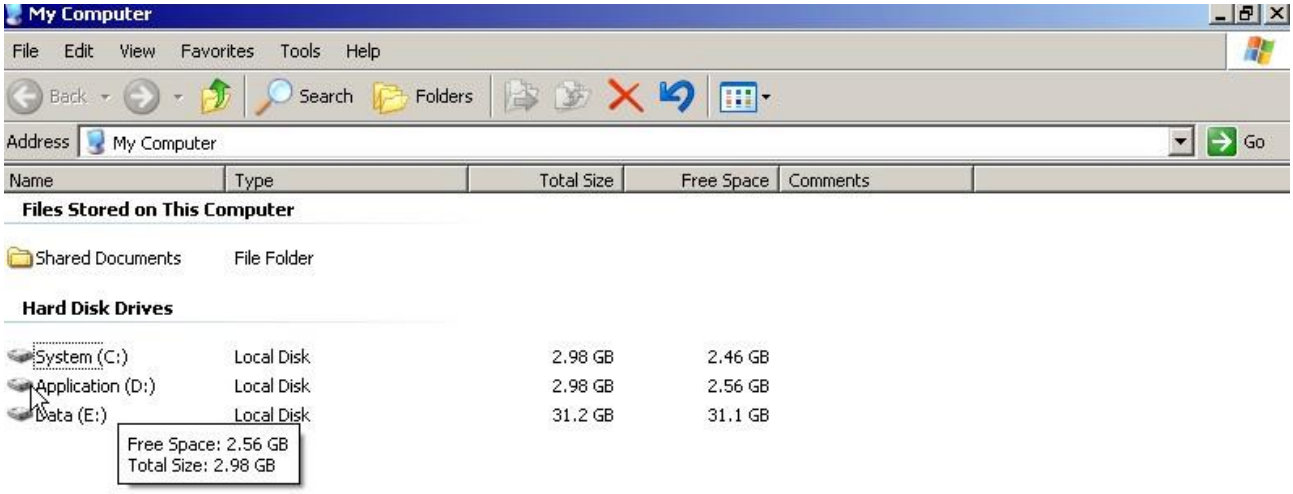


The program asks you to restart, write “Y” for yes as shown in the picture below and press enter.

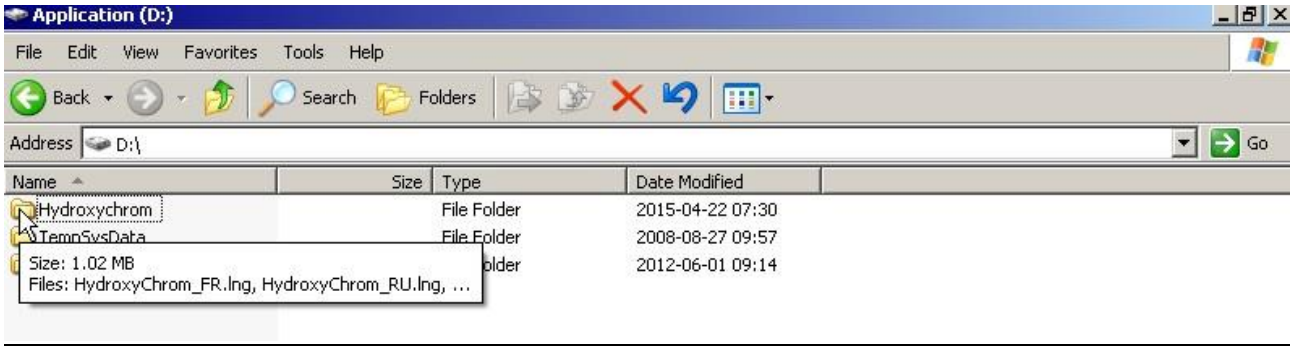


CHANGING LANGUAGE:

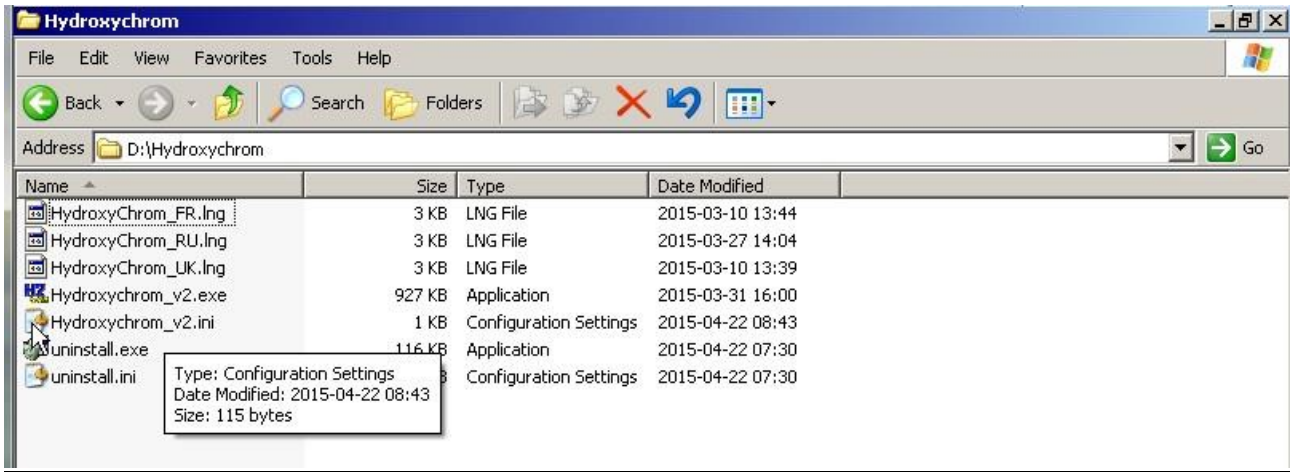
Step 1: Open Application partition.



Step 2: Open Hydroxychrom folder.

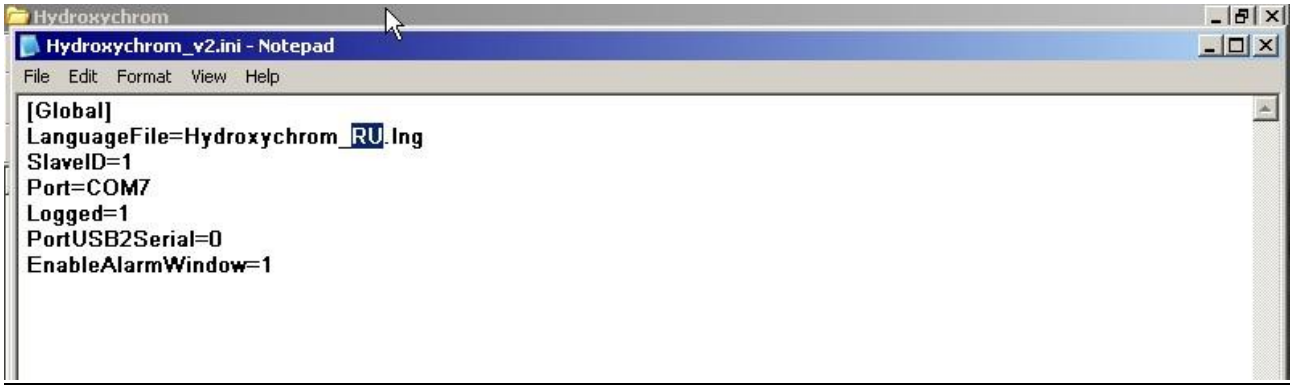


Step 3: Open Hydroxychrom_v2.ini file with “Notepad”.

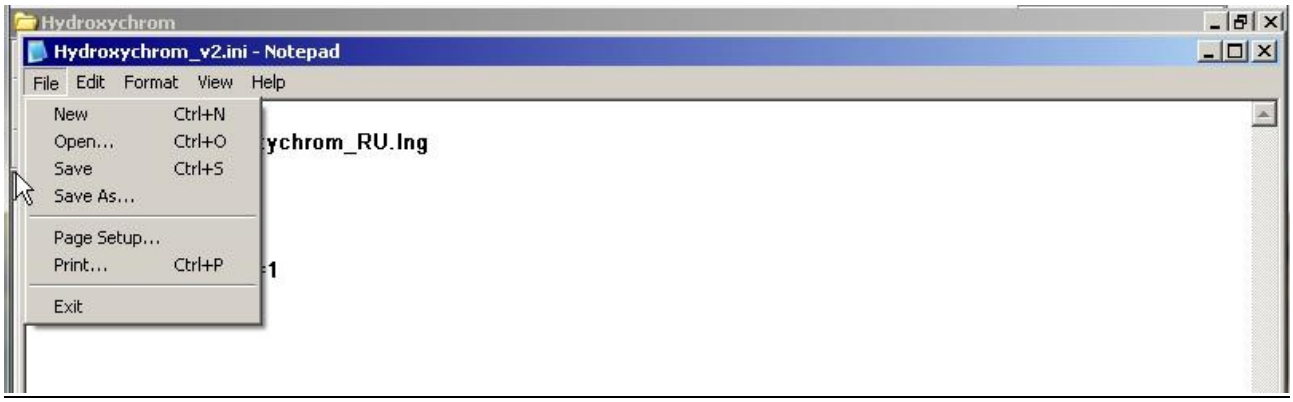


Step 4: Modify the second line of the code:

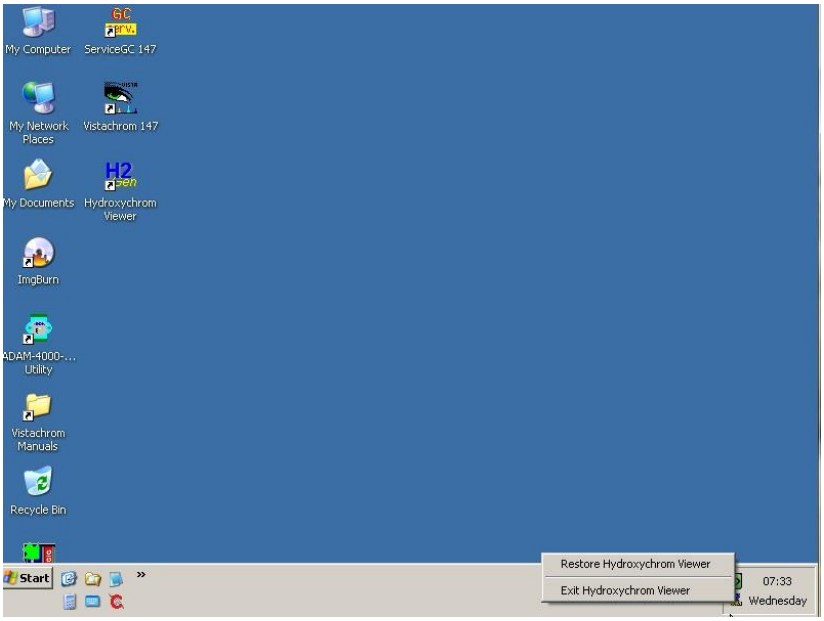
- LanguageFile=Hydroxychrom_UK.lng for English language
- LanguageFile=Hydroxychrom_FR.lng for French language
- LanguageFile=Hydroxychrom_RU.lng for Russian language



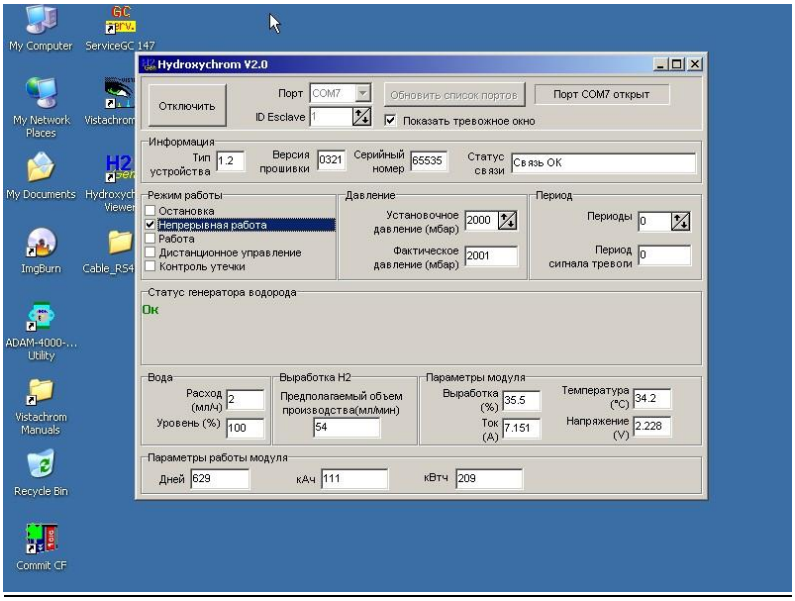
And then save the file.



Step 5: Exit Hydroxychrom viewer:



And open it again:

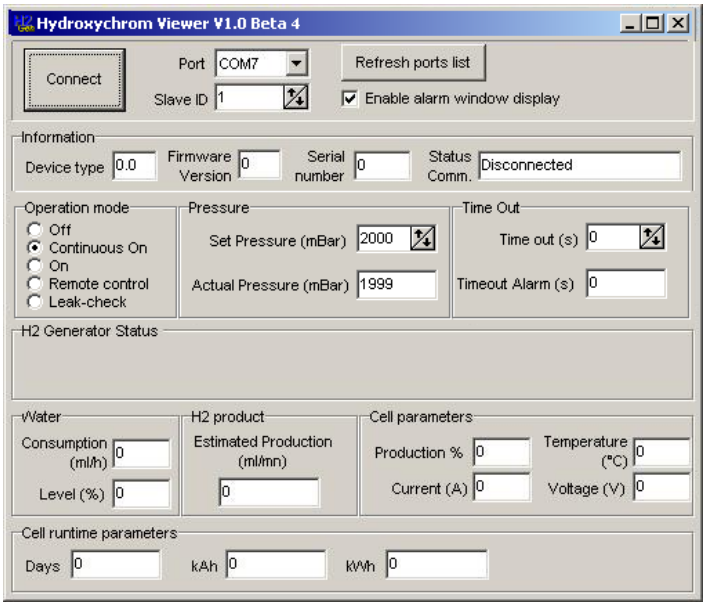


USAGE:

Step 1: Connect USB

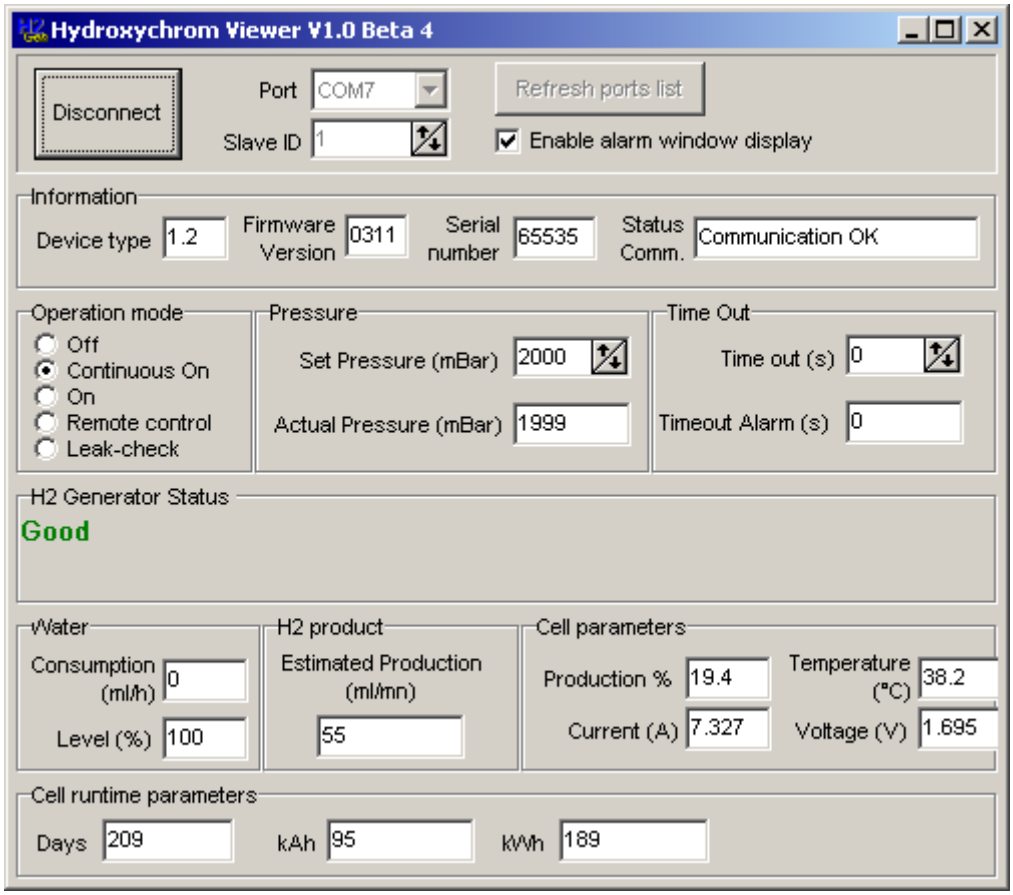
Step 2: Start HYDROXYCHROM Viewer

Step 3: Adjust the COM port number that is associated with USB port



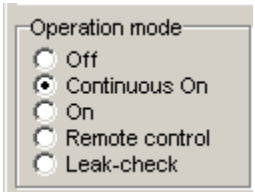
Step 4: Left Click on Connect

4.6.3. INSTRUMENT INFORMATION STATUS AND OPERATION MODE



MODE:

Instrument working mode could be chosen from one of following:



Off – No gas generation;

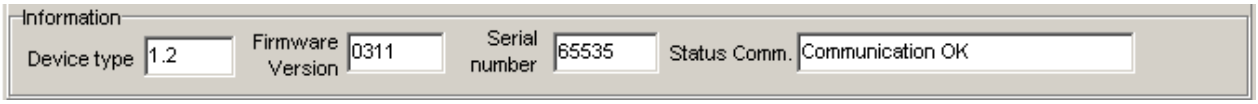
On – Gas generation is running but will be stopped after power off;

Continuous On – Gas generation is running but will be automatically started every time after power on;

Remote control– Gas generation Started/Stopped depending on the Digital Input signal at the rear side of the instrument.

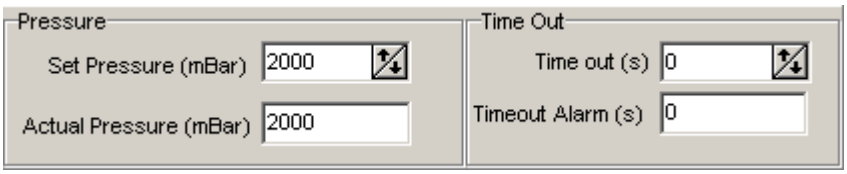
Leak check – allows to check internal H_2 leaks

INSTRUMENT INFORMATION:



Instrument information section provides Firmware Version, Instrument Serial Number, Run time and Cell total current.

PRESSURE INFORMATION AND SETTINGS:



Actual Pressure shows the pressure measured at the outlet of the instrument;

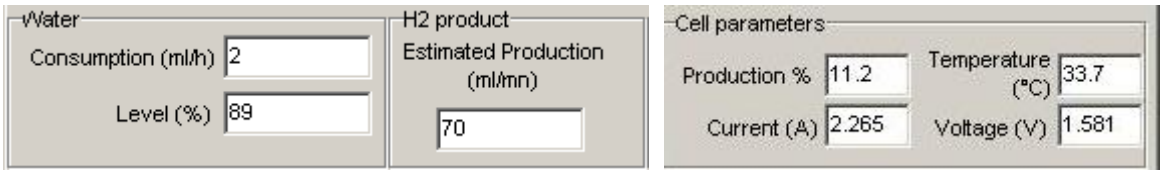
Set Pressure is a parameter, where user could see and/or modify desired value of the pressure;

Timeout is time in seconds showing for how long the **Actual Pressure** does not match the **Set Pressure**;

Timeout Alarm is time in seconds given to the instrument after start to reach the **Set Pressure**.

IMPORTANT NOTE: For security reasons, the Instrument stops generation when the **Timeout** value became equal to **Timeout Alarm**.

FLOW INFORMATION:



Consumption shows current water consumption in ml/h;

Production shows actual production of H_2 in percentage from the maximum capacity;

Estimated Flow shows actual H_2 flow in ml/min. Please note that this value is not directly measured but calculated inside the instrument. Use it only for estimation purposes.

CELL INFORMATION:

Cell information section provides Run time and Cell total current.

CHAPTER 5. MAINTENANCE, ALARMS + TROUBLESHOOTING

5.1. REGULAR MAINTENANCE

The Hydrogen generator HYDROXYCHROM does not need regular maintenance; it needs ZEROWATER and electrical power. If the instrument is used according to recommendations made by the constructor, the deionizing bags (internal and external tanks) should be exchanged once every 1 year and the internal tank filter should be exchanged once every 3 years. In order to keep the instrument in its original conditions, please use exclusively distilled and filtered water.

5.2. LED AND BUZZER INDICATIONS

Green	Red	Buzzer	
ON	OFF	OFF	STBY (by user), REMOTE – STBY, ON, CONTINEOUS ON, REMOTE – ON
FAST	OFF	OFF	STBY with Warning
FAST	OFF	FLASH	ON with Warning, CONTINEOUS ON with Warning, REMOTE – ON with Warning
OFF	FAST	FAST	STBY with Error
FLASH	OFF	SLOW	LeakTest in process
FLASH	OFF	OFF	LeakTest success
FLASH	SLOW	FAST	LeakTest Fail
FAST	FAST	OFF	USB-CABLE-CONNECTED
Variable	OFF	OFF	H2 Flow Production indication versus maximum capacity

STBY = STAND-BY

5.3. ALARMS + TROUBLESHOOTING

Alarm #	Alarm Name	Cause	Cure
1	Water Level	• Internal tank could not be filled up to maximum level detector. • Tube between external tank and device is leaky.	• External tank is empty, add water. • Push tube in the INLET WATER quick connector.
2	H_2 Output pressure	• Actual H_2 pressure could not reach set value, because there is a leak inside your generator or on the line between generator and GC. • H_2 flow consumed by your GC is superior to the generator's capacity.	• Proceed to a leak check with *HYDROXYCHROM Viewer* software and verify if fittings are screwed correctly. • Volume between H_2 generator and consumer too big. Pressure value could not be reached on time. Increase value of timeout. • Verify capacity and consumption, reduce consumption of GC.
3	H_2-Cell Voltage	• Bad quality of water. • Deionisant bags inside internal and external tank are not any more efficient. • H_2-cell is dry.	• Replace actual water exclusively by distilled and filtered water. • Exchange deionisant bags. • Verify if water is correctly circulating. Circulating pump should not be stopped.
4	Internal communication	• One or several cable(s) inside device is(are) disconnected or damaged • One board inside device is damaged.	• If a cable is simply disconnected due to vibrations during shipment, please switch of the device and reconnect simply the cable. • If one board is damaged, please call your local distributor for repair.