User's manual

XIR 4 WS 21 Analyzer

V1.01.00

On line moisture measurement

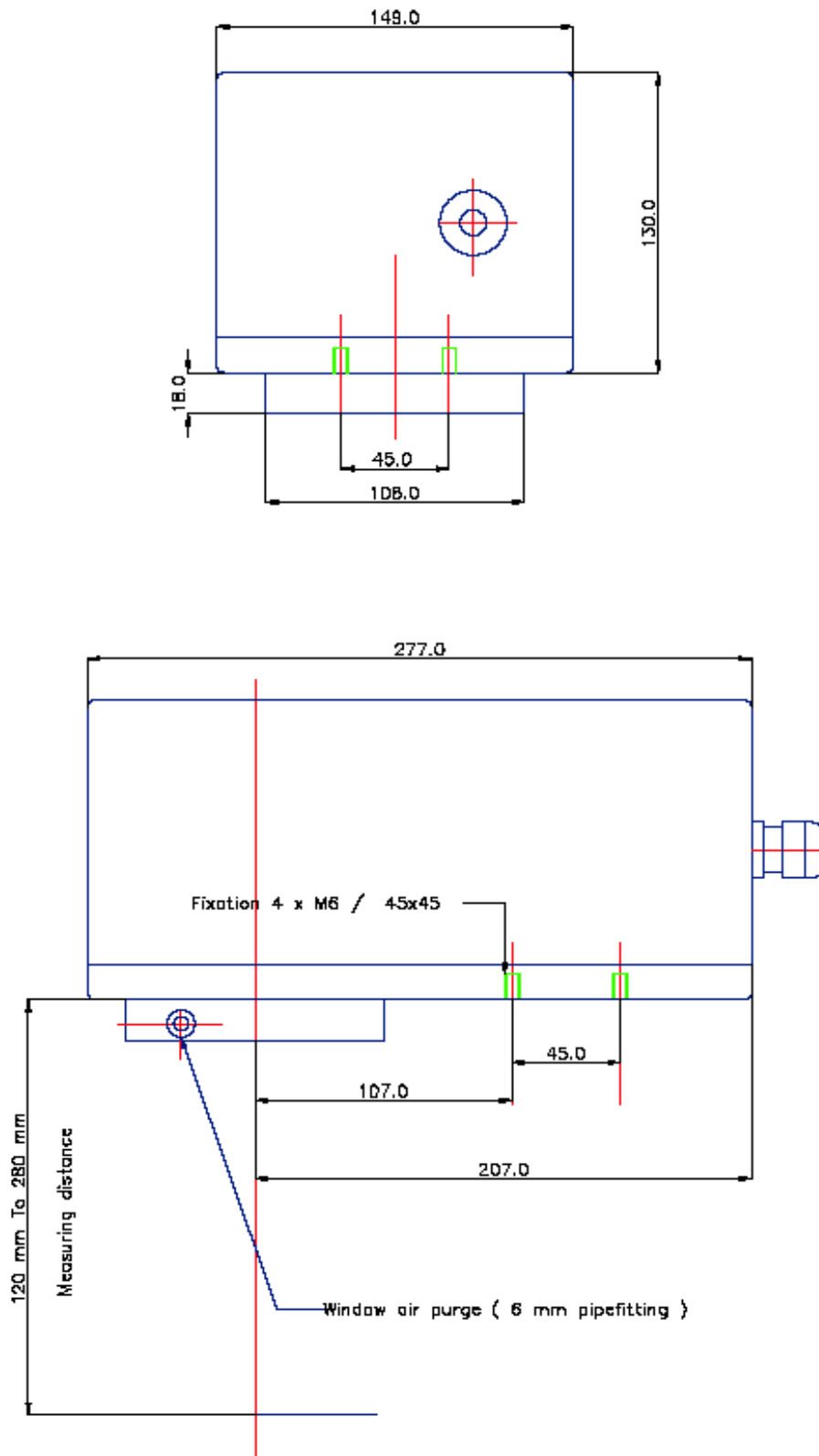## Sommaire

1. Dimensions of the analyzer

Figure 1 : Dimensions of the analyzer

2. Installation

2.1. Measurement distance

Measurement distance from product must be 180 mm (possible between 120 mm and 300 mm). Measurement diameter is 60 mm (for a 180 mm distance): be sure that there is product all over the measurement area.

For powders and grain products, the analyzer can be fixed with an incidence angle of 90°.

For sheet products, the analyzer must be tilted of 18° to be not disturbed by specular reflectance.

2.2. Air purge

To clean the analyzer window in dusty or steamy atmosphere, connect the air purge on the window flange: 6 mm – diameter tube. Air must be filtered and without oil. Pressure must be adjusted between 0.5 and 1 bar.

2.3. Fixing and vibrations

The analyzer is fixed below with 4 M6 screws on a 45 mm - square. It does not must be fixed on a vibrating part of the installation.

2.4. Temperature

Ambient temperature must be between 0°C and 40°C. Between 40°C and 50°C, use an air cooling system or fixe the analyzer a support which moves off calories. Beyond 50 °C use a water cooling system.

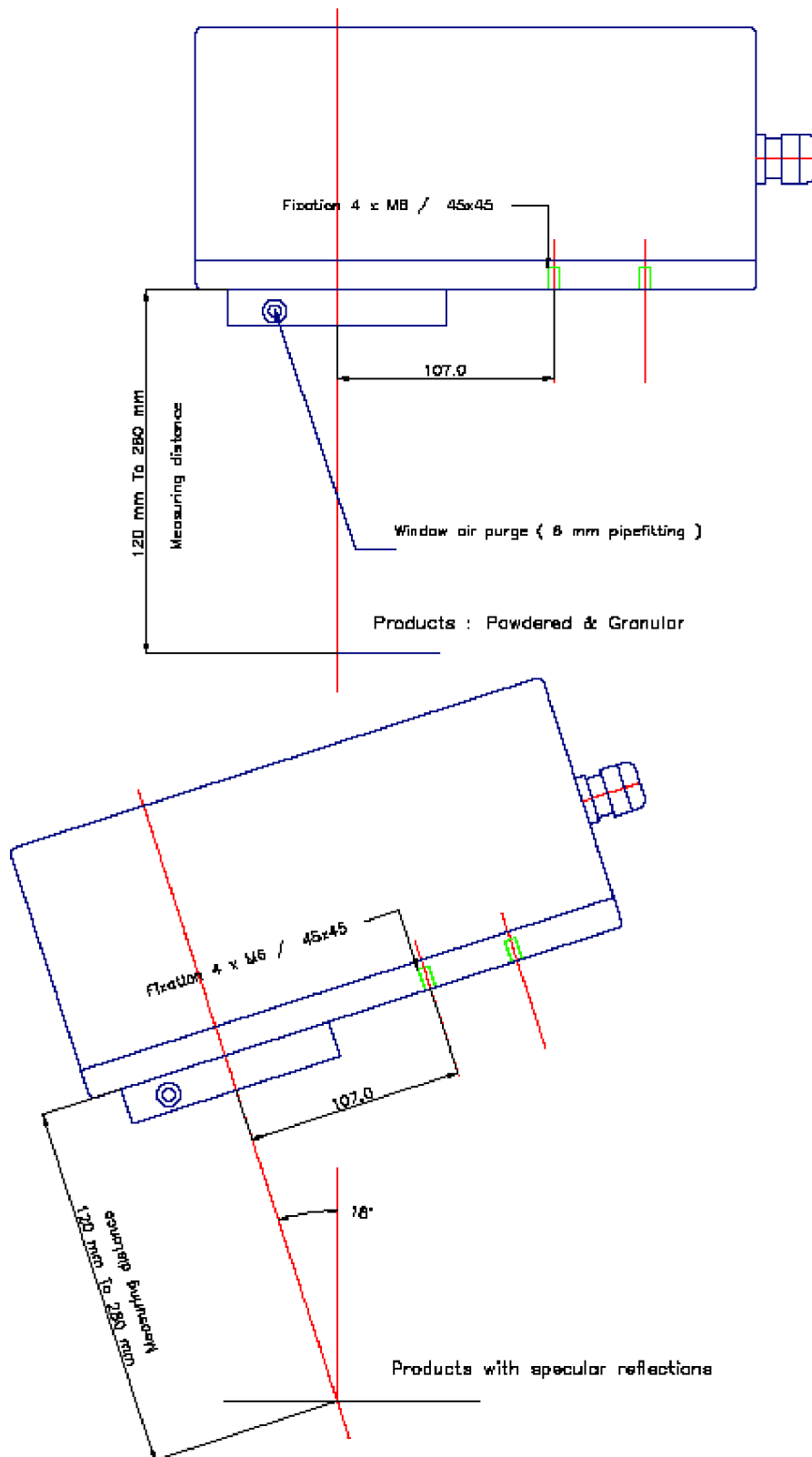Figure 2 : Installation drawing according to the product

3. Connections

- power supply 24 VDC (22 V à 28V) 50VA
- active analog output 0(4)-20mA : load 500 Ohms maximum
- 2 RS485 output (RS485-0 and RS485-1)
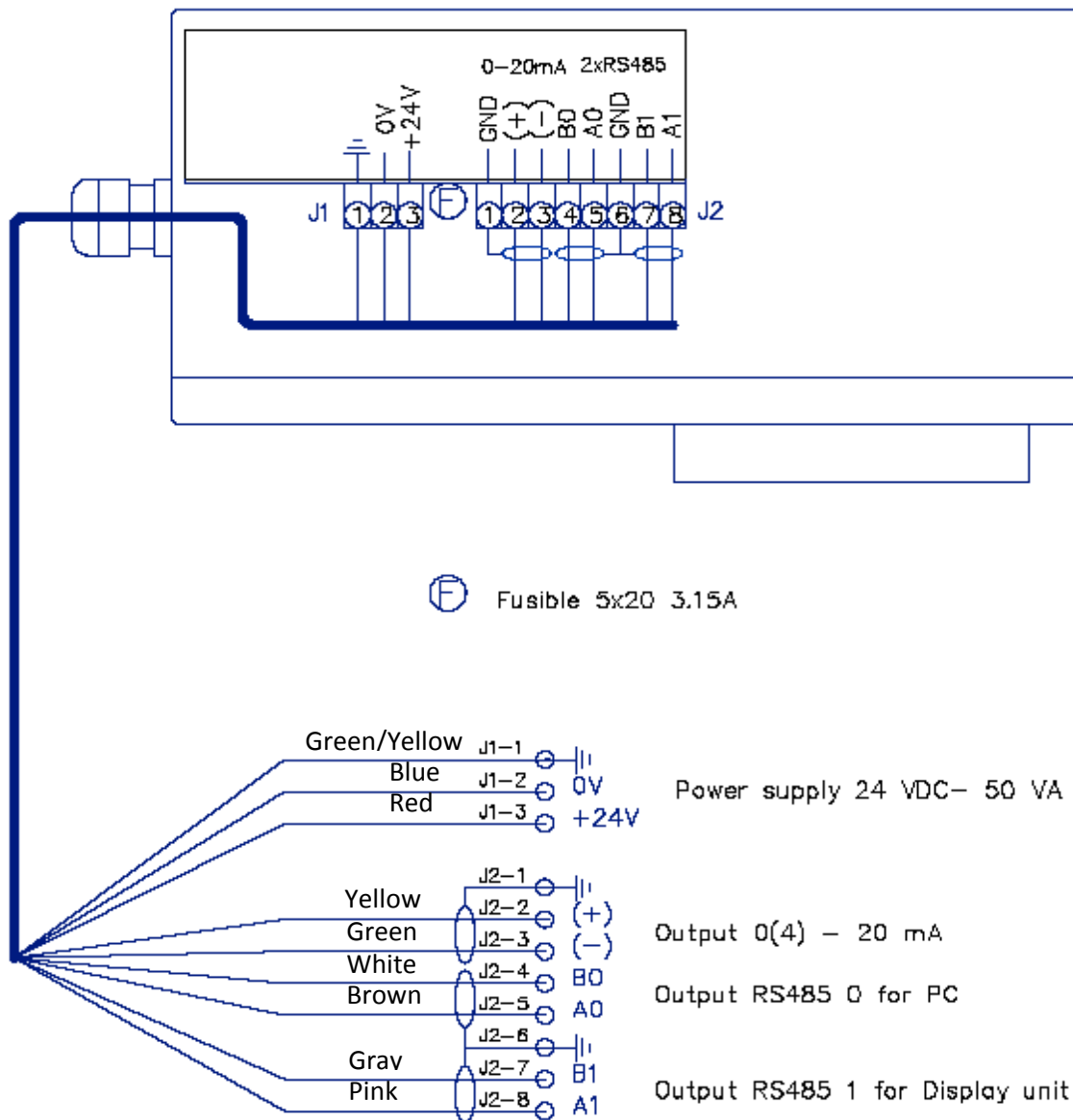
Figure 3 : Electrical connections

4. Starting up the software

Connect the RS485-0 output of the analyzer to the PC (choice of the COM port : see appendix A).
Starting software, the displayed panel is :
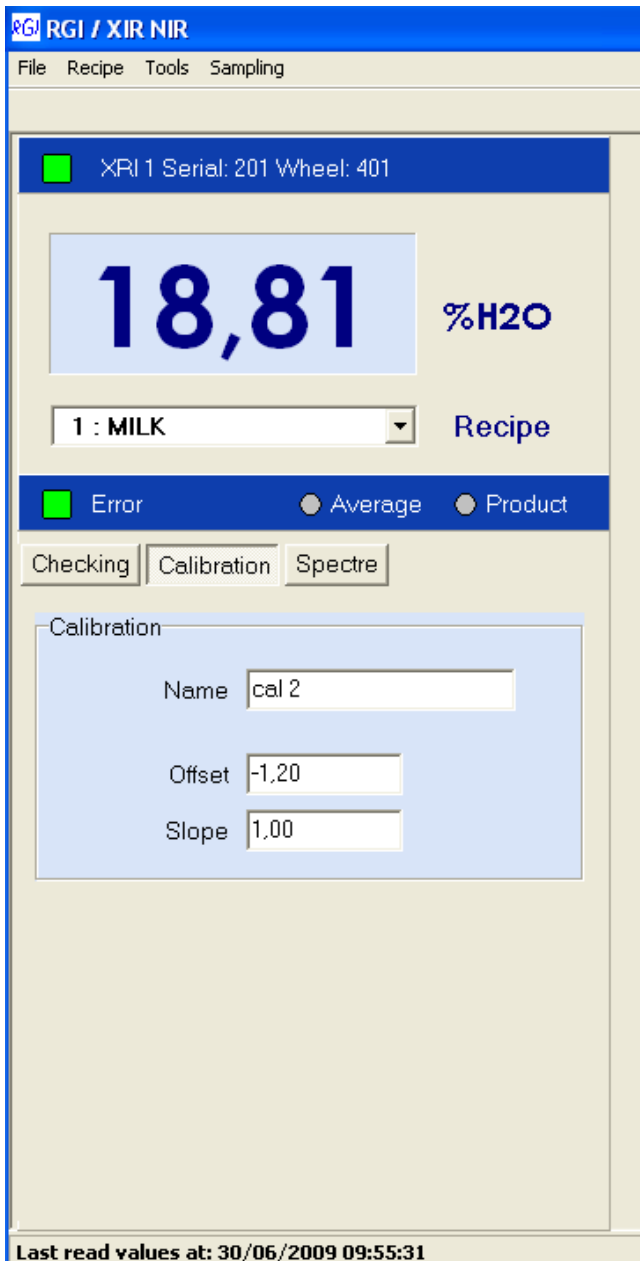
- Warning light of connection between the PC and the analyzer and display of the apparatus type and its serial number

- Display of the measurement and the unit

- Display of the active recipe « number : name »

- Error warning light : shows a serious malfunctioning of the analyzer (see appendix B)

- Indicates the calibration used by the active recipe and its correction (offset and slope)

The choice of the active recipe is modified using the combo box « Recipe »

5. Starting with a new product

To start with a first product or add a new product to measure, carry out the following operations :

5.1. Recipe creation

First step : create a recipe to choose the calibration to link to this product, and to enter few parameters : target value, limit values, type of analog output and the average type (see § 6.1).

5.2. Sampling

Sampling allows correcting the offset and the slope of the calibration. For each product sample, you have to measure real moisture in laboratory and to memorize infrared absorbance values given by the software (see § 7).

5.3. Offset and slope correction

Enter laboratory values in the sample panel. Then the software allows to calculate the offset and the slope of the chosen calibration and to see results. You can apply the correction to all current calibration curves and choose the one which gives the best results (see § 8).

6. Recipe management

6.1. Create a recipe

To create a new recipe, select « Recipe → New » in the principal menu. The list of the existing recipes is displayed and the software suggests the first free recipe number. Keep or modify this number and click on the « New Recipe » button to create the recipe.

Now, you can enter the parameters of the new recipe :
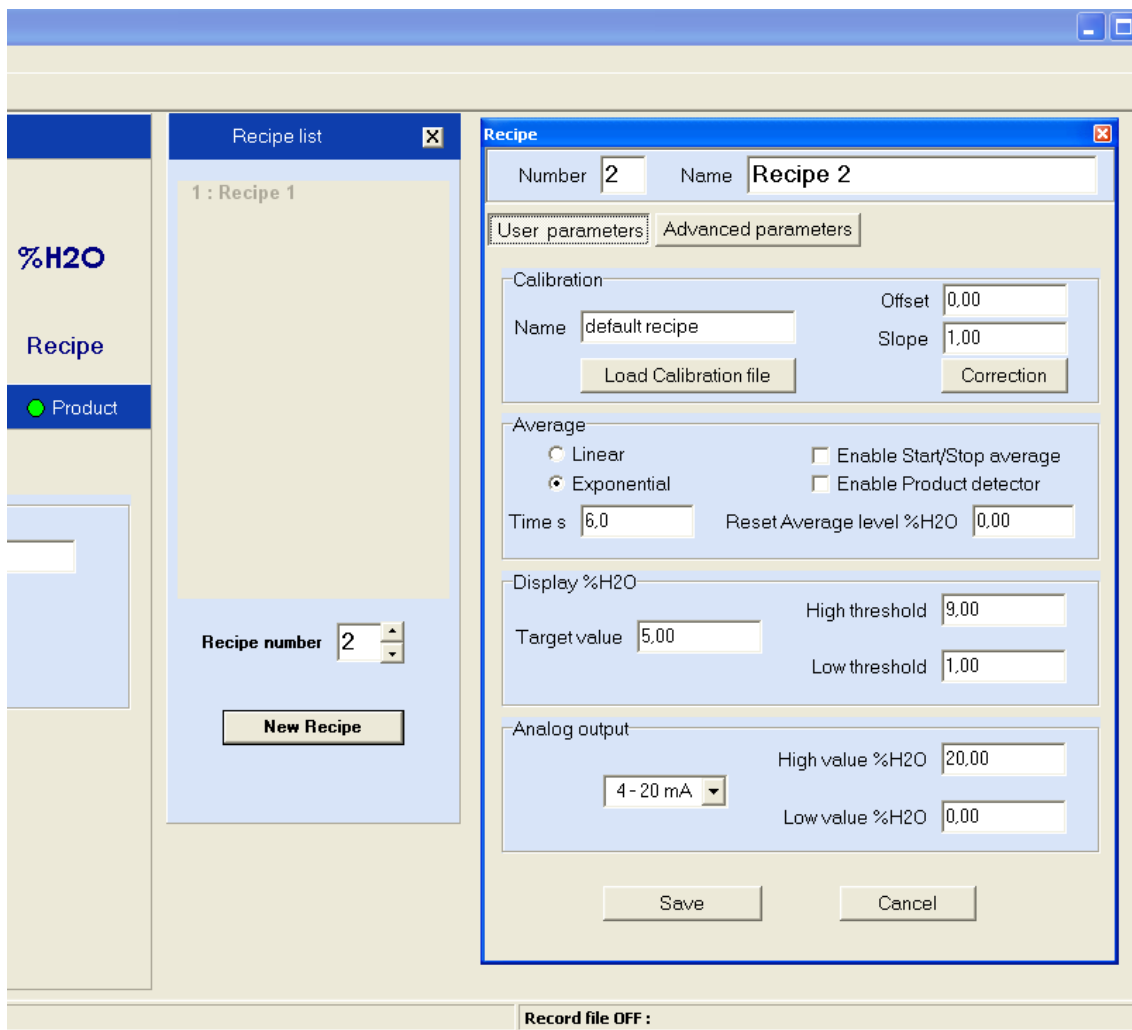
Recipe panel

o Give a name to the recipe (usually the product name).
  Choose the calibration.
  Click on the button « Load Calibration file » : a combo box appears. Then, choose the calibration (file .cal). Each time a calibration is loaded, the corrections applied to the recipe are : offset = 0.0

and slope=1.0 (it means that there is no correction applied to the calibration). Enter the wanted values (see § 8.2 and 8.3 for offset and slope correction).

o   Choose the average type applied to the measurement, linear or exponential, and the average time.
Choose the value « Reset Average level »: the average is reset when the difference between measurement and average is higher than the value « Reset Average level ».
« Reset Average level » = 0 disable this action.

o   Choose the target value, and high and low threshold of production

o   Choose the type of analog output (0-20 mA or 4-20mA) and the high and low values.

Click on the button « Save » to transfer the new recipe in the analyzer.

6.2. Modify a recipe

To modify an existing recipe, select « Recipe->Edit » in the principal menu. Then modify the recipe. Click on the button « Save » to record the modifications in the analyzer.

(See § 8.2 and 8.3 for offset and slope correction).

Nota : the active recipe is directly available by a double click on the label « Recipe ».

6.3. Delete a recipe

To delete a recipe, select « Recipe->Delete » in the principal menu. The list of the recipes appears. Select the recipe to be deleted and click on the button « Delete Recipe ».

7. Sampling

To take samples select « Sample → Sampling » in the principal menu. The sampling panel appears.

Click on the button « New » to create a new sample file. Choose a name for this file (file.spl)
In the panel « Sampling » choose the measurement time for sampling.

To take samples, click on « Start Sampling » : a scrollbar appears during all the measurement time. In process you can take product during all this time so the laboratory measurement will perfectly fit to the analyzer one.
The panel « Sampling info » shows the measured absorbances for each wavelenght.
Click on « Save » to record the sample in the table.

The samples are identified by the date and hour, but you can also enter a name for each sample.

Leaving the sampling panel, the table is automatically saved.
Le button « Close » closes and saves the sampling file but doesn't close the panel.
To take new samples or write laboratory values click on the button « Open » and choose your file.

Line	Date/Time	Sample name	Moisture	Filter 1	Filter 2	Filter 3	Filter 4	Temp.	Energy
1	27/05/2009 15:01:44	Milk 0.5	0,5	1,00000	1,00253	1,15169	1,37883	0,0	2126,6
2	27/05/2009 15:02:02	Milk 0.5	0,5	1,00000	1,00571	1,15186	1,36959	0,0	2083,8
3	27/05/2009 15:03:23	Milk 0.5	0,5	1,00000	1,00284	1,15541	1,39076	0,0	2331,0
4	27/05/2009 15:03:44	Milk 0.5	0,5	1,00000	1,00260	1,14994	1,37772	0,0	2179,1
5	27/05/2009 15:04:50	Milk 1.1	1,1	1,00000	1,00328	1,23158	1,41575	0,0	2337,2
6	27/05/2009 15:05:18	Milk 1.1	1,1	1,00000	1,00422	1,23009	1,41642	0,0	2331,8
7	27/05/2009 15:05:36	Milk 1.1	1,1	1,00000	1,00513	1,22842	1,40727	0,0	2318,5
8	27/05/2009 15:06:00	Milk 1.1	1,1	1,00000	1,00782	1,23396	1,40094	0,0	2199,9
9	27/05/2009 15:07:47	Milk 2.0	2,0	1,00000	1,00913	1,35750	1,44632	0,0	2242,2
10	27/05/2009 15:09:01	Milk 2.0	2,0	1,00000	1,00903	1,33885	1,42425	0,0	2160,3
11	27/05/2009 15:09:32	Milk 2.0	2,0	1,00000	1,00616	1,34782	1,45200	0,0	2248,6
12	27/05/2009 15:10:05	Milk 2.0	2,0	1,00000	1,00287	1,33199	1,43349	0,0	2223,0
13	27/05/2009 15:11:14	Milk 3.1	3,1	1,00000	1,00740	1,49785	1,49962	0,0	2290,5
14	27/05/2009 15:11:49	Milk 3.1	3,1	1,00000	1,00527	1,49109	1,48804	0,0	2312,0
15	27/05/2009 15:12:23	Milk 3.1	3,1	1,00000	1,01035	1,49713	1,49578	0,0	2378,8
16	27/05/2009 15:13:06	Milk 3.1	3,1	1,00000	1,00869	1,47506	1,46321	0,0	2339,3
17	27/05/2009 15:15:22	Milk 3.3	3,3	1,00000	1,01268	1,52920	1,49959	0,0	2148,5
18	27/05/2009 15:15:57	Milk 3.3	3,3	1,00000	1,01062	1,52216	1,48966	0,0	2180,3

8. Calibration correction

8.1. Choice of the best calibration

Select « Tools->Calibration correction » in the principal menu to open the correction panel.

- First, in the panel « Sample file », click on the button « Open » to open the desired sample file.

- Then, in the panel « Calibration », click on the button « Load Calibration » to load the desired calibration.

The correction values of the offset and slope are displayed in the calibration panel. For each sample, the laboratory values and prediction and the deviation are indicated.

The correlation coefficient R and the standard error of prediction SEP are displayed in the panel « Linear regression ».
By default a linear regression « Inverse » is used for the correction. The linear regression « Classical » must be used only if you see that the slope is to in process after an « Inverse » regression.
To choose the best available correction, load one by one all the calibrations and select the one with the lower SEP (control the curve too).
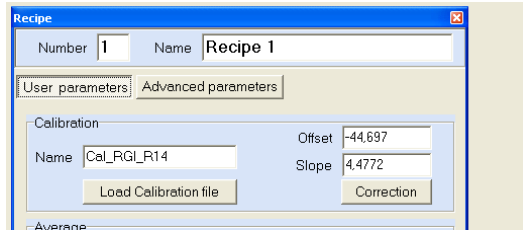
Close the panel and open the recipe to update manually the values of the offset and slope and eventually to change the calibration.

8.2. Manual correction of slope and offset in the recipe

Normally, this method is only used to quickly correct the offset of the measured value.
Open the recipe and enter the wanted values for offset and slope.

In the panel « Recipe », click on « Save » to record the correction.

8.3. Automatic correction of slope and offset in the recipe

Open the recipe and click on « Correction » to open the panel of calibration correction.

Click on « Open » in the panel « Sample file » to open the file where are recorded the samples for the correction.

By default, only offset is corrected (the slope is seldom corrected).

To correct slope and offset, click in the check box « Inverse (Offset + Slope) ». Do not correct the slope if the correlation coefficient is not near 1 or if there is not enough samples and not in all the measure range.

To record the correction, click on « Save » in the panel « Calibration», otherwise click on « Cancel ».

Getting back in the panel « Recipe », click on « Save ».

9. Recording measurements

To realize a continuous recording of measurement, select « File->Record » in the principal menu. The following panel is opened :
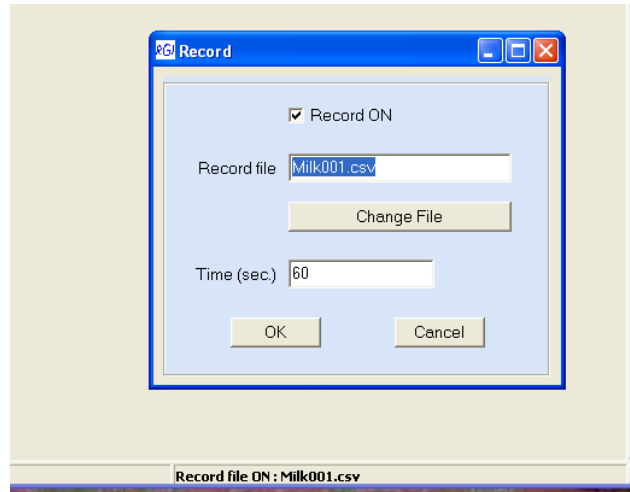
Click on « Change File » to create a new recording file, or to load an existing file to add measurements.
Define the recording time in seconds.
Tick « Record ON » or « Record OFF » to start or stop recording.

The status bar always shows if the recording is on and the file name.
The recording file is a text file (file.csv) readable by EXCEL.

In order, the records are : Date/Hour ; Moisture % ; Filter 2 ; Filter 3 ; Filter 4

	A	B	C	D	E	F	G	H	I
1	28/06/2009 10:11:58	0,92	0,9972	1,0038	1,0063				
2	28/06/2009 10:12:58	0,919	0,9983	1,0042	1,0076				
3	28/06/2009 10:13:58	0,918	0,998	1,0042	1,0075				
4	28/06/2009 10:14:58	0,922	0,9983	1,0043	1,0077				
5	28/06/2009 10:15:58	0,924	0,9982	1,0043	1,0076				
6	28/06/2009 10:16:58	0,921	0,9983	1,0041	1,0077				
7	28/06/2009 10:17:58	0,922	0,9981	1,0043	1,0076				
8	28/06/2009 10:18:58	0,922	0,9983	1,0043	1,0079				
9	28/06/2009 10:19:58	0,921	0,9985	1,0042	1,0079				
10	28/06/2009 10:20:58	0,921	0,9982	1,0039	1,0079				
11	28/06/2009 10:21:58	0,92	0,9981	1,0038	1,0076				
12	28/06/2009 10:22:58	0,923	0,9983	1,004	1,0081				
13	28/06/2009 10:23:58	0,921	0,9981	1,0039	1,0076				

Appendix A : Initialisation file

The initialization file « XIRNIR1.INI » is in the installation directory of the software.

```
[MODBUS]
PORT=COM1
PS=1
[Form]
NDigit=2
user=user
unit=%H2O
[Save]
onoff=1
File=C:\Records\Milk002.csv
Time=60
```
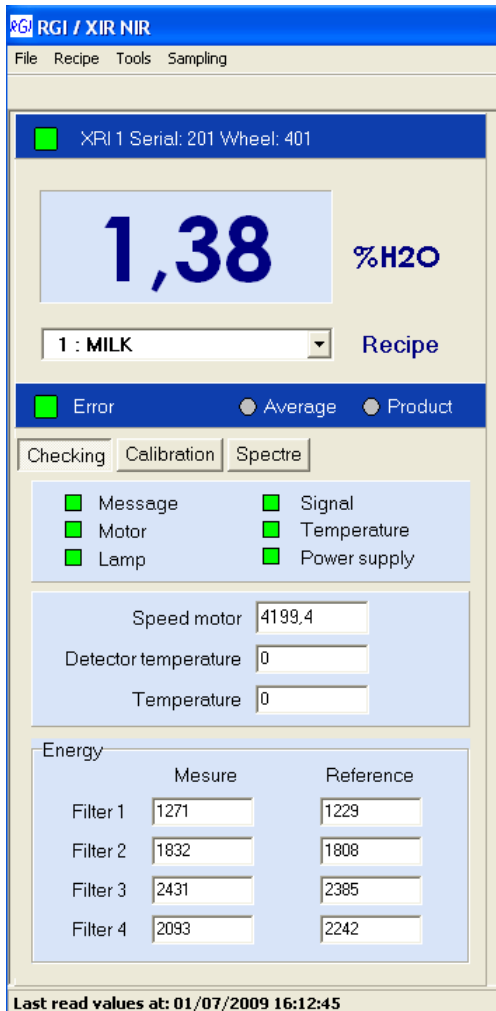
To change the number of the communication port of the PC, modify PORT=COM1

To change the number of digits used to display moisture, modify NDigit=2

Appenix B : Checking display

Click on « Checking » to display controls.

Six warning lights green/red indicate the serious default of the analyzer operation : lamp off, abnormal speed of motor, saturation or missing signal of measurement…

The speed motor and the inside temperatures are displayed, so the received energy at the four wavelengths.

Appendix C : Software installation and directories

The installation is made by copying the directory «XIRNIR1». The software uses the initialization file « XIRNIR1.IN I» which is in this directory.

The installation directory has four working subdirectories :

- Calibrations

Contains all the calibrations provided with the analyzer and ready to be used (.cal)

- Samples

Contains by default the sampling files (.spl)

- Records

Contains by default the recording files (.csv)

- Images

Contains all the software icons.