

Process Maintenance Program

User Guide



Bellingham
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Process Maintenance Program User Guide (Eng)

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Program Overview

The 'Process Maintenance Program', code number 27-310 has been designed to allow easy access to the Process Refractometers calibration and configuration parameters. The program allows these settings to be viewed, archived and altered. The program is written for use with Windows 95, 98, NT 4.0 and XP.

This manual covers Process Maintenance Program version 14.0 and above. When available, upgrade versions of this program are freely available on the B+S website at www.bellinghamandstanley.com

Program Installation

The installation program will copy all the necessary files on to the computer. The installation program will also give the user a number of installation options, such as which directory the program is installed to. Before running the installation program make sure that no other programs are running.

Place the CD-ROM disk supplied in the CD drive

- Place the disk provided in the CD drive of the PC.
- The disk should after a few seconds auto-start the installation program.
- The installation program will now start copying some temporary files. From now on follow the on screen prompts.

The installation program will create two new short cuts in the Windows Start button, one for the program, and one for the user guide.

Hardware Installation

If the 'Process Maintenance Program' was installed onto a computer already connected to a Process Refractometer system then no further hardware installation will be necessary. Alternatively connect the computer to the Refractometer using a PC Interface 27-J21 or 27-J22. Refer to the Refractometer Manual for installation details.

Starting the Program

In order to use the program follow the instruction below. Note that if a version of the 'Process Data Capture Software' is running it should be closed prior to starting the 'Process Maintenance Program'. This is necessary because both programs cannot share the same serial port.

- Find the program's shortcut in the location specified when installing. By default this will be in a folder in the 'Programs' section of the Window Start button menu.
- Click on the 'Process Maintenance Program' shortcut.
- After a short wait the 'Process Maintenance Program' window will appear.

Process Maintenance Program Window

The window is split into three sections: Process Communication Settings, Process Sensor Configuration, Process Functions and Status. For more detail see Appendix A.

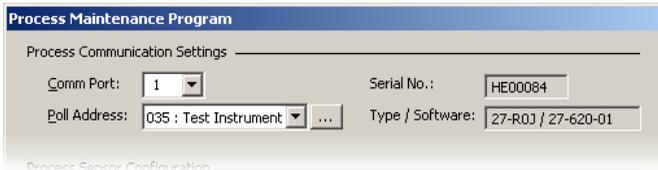
The screenshot shows the 'Process Maintenance Program' window with the following sections:

- Process Communication Settings:** Comm Port: 1, Serial No.: HE00084, Poll Address: 035 : Test Instrument, Type / Software: 27-R0J / 27-620-01.
- Process Sensor Configuration:** A list of parameters (Operation Mode, Selected Scale, Temperature Compensation, UDTC Constant, UDTC Reference Temperature, Reading Display Resolution, User Defined Scale - Const A through F) is shown next to a 'Setting:' dropdown. To the right are buttons for 'Upload', 'Download', 'Import...', 'Export...', and 'Summary'.
- Process Functions:** Buttons for 'Read', 'Zero', 'Span', 'Change Poll', and 'Calib. Wizard'. Below these are two input fields showing values 1.33299 and 1.38115.
- Status:** A section for displaying status information.
- Buttons for 'About' and 'Quit' are located at the bottom right.

- **Process Communication Settings** covers Refractometer identity and the link between the program and the hardware
- **Process Sensor Configuration** deals with the operational set-up of the Refractometer. Parameters covering the mode, scale, resolution, etc of the instrument may altered and archived from here
- **Process Functions** and **Status** gives access to calibration controls and an area for displaying reading data/status information sent from the Refractometer

Process Communication Settings

When the program is running it must be set-up to operate the hardware installation. There are two aspects to this process: firstly, the program needs to know which serial port the PC Interface is connected to and secondly, the identity or 'poll address' of the Refractometer you wish to work with. The poll address is a number in the range of 32 to 127, and uniquely identifies a Refractometer in a system.



Set up the program

- Click on the 'Comm Port' selection arrow and pick from the serial port that the PC Interface is connected to. Alternatively delete the existing value in the box and type in the appropriate value. Serial ports on PC's are often referred to as 'Comm ports' and are identified by a number, for example, Com1.
- Setup the Poll Address. The poll address is used to specify which instrument fitted on the RS485 network is being communicated with. Each process sensor will have the poll address set before leaving the factory and this may be found in the back of the Refractometer Manual.

If only one process sensor is connected to the RS485 network

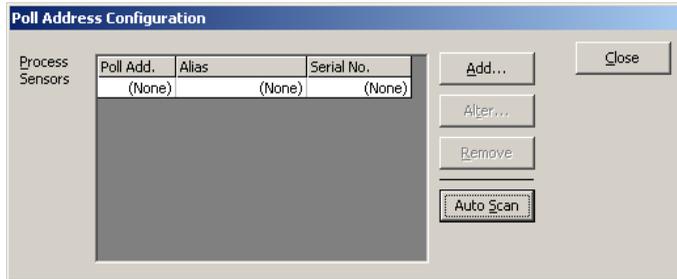
All B+S Process Refractometers respond to a Poll Address of '000', therefore set the Poll Address drop-down list to '000 : Any Instrument'. Using an address of '000' is permissible if working with only one instrument. When working with two or more refractometers on a network the '000' address must not be used.

When using the generic poll address of '000' the instruments actual poll address is shown beneath the 'Type / Software' field after an upload, this can be a useful tool in case the poll address has been lost.

See the following page if more than one process sensor is connected to the RS485 network.

If more than one process sensor is connected to the RS485 network

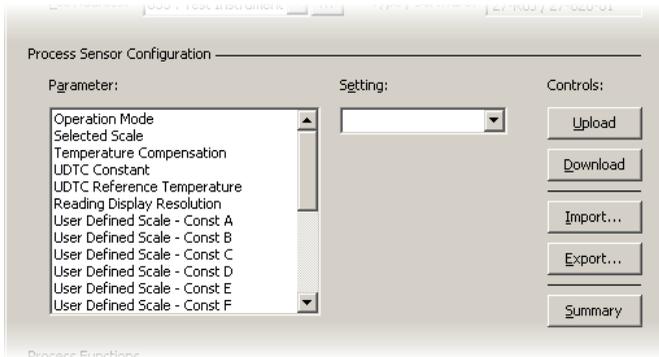
When using more than one process sensor the Poll Address Configuration window must be used, click the ellipsis (...) next to the Poll Address drop-down list to display it.



Sensors can either be setup manually by clicking 'Add...' or alternatively automatically by clicking 'Auto Scan'. An Auto Scan this will automatically scan through the accepted range of poll address to automatically find all attached sensors. This however should only be carried out if the RS485 network the sensors are connected to only have B+S process sensors on it. The Auto Scan could cause unexpected results if other manufactures equipment is online.

Process Sensor Configuration

The method of changing the operational configuration of the Refractometer is a simple procedure of three steps: Upload the current parameters, alter the parameters and Download the updated parameters.



Upload current Refractometer parameters

- Click on the 'Upload' button. The 'Serial No.' and 'Type / Software' boxes (shown in the previous section) will now indicate the Refractometer's serial number and software code.

Alter the parameters

- Click on the parameter within the list that is to be altered, for example 'Reading Limits – Lower'.
- The current setting for that parameter will now be displayed in the 'Setting' box.
- Alter the setting value in the 'Setting' box. (See Appendix C)

Download altered Refractometer parameters

- Click on the 'Download' button
- Confirm the action when prompted

Functions are also available that enable the user to keep and manage backup copies of Refractometer configurations on disk. The 'Export' button saves the currently uploaded data to a PCF file (process configuration file). The 'Import' button allows the user to read data from disk for reference or to download to a Refractometer. Using the import function presents the user with a choice of either a PCF file (as exported) or a USC (user scale constants) file. Note that the import/export functions only work when a Refractometer is connected to the system and has had its data 'uploaded'. Clicking on the 'Summary' button provides a detailed list of the current configuration from where it may be printed.

Exporting configuration data

- Click on 'Upload' to read the current Refractometer configuration.
- Now click on 'Export'. The program will then display a window allowing the location and the file's name to be changed. By default the file will be placed in the working directory, with the Refractometer serial number as the filename.
- When the file location and name are set click on 'Save'. The program will finally display a window to indicate that the export has been completed.
- Click on 'OK'.

Importing configuration data

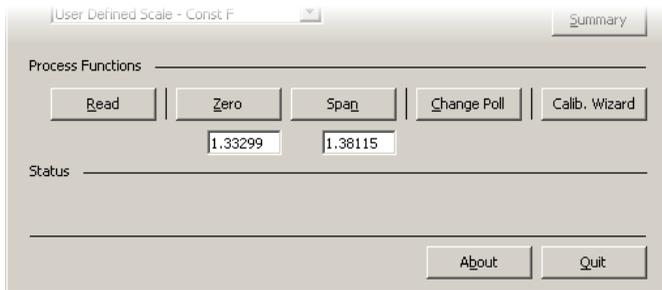
- Click on the 'Import' button. The program will now display a window verifying that you want to overwrite the current parameters.
- Click on the button labelled 'Yes'. The program will then display a window allowing you to select a PCF or USC file. Make sure the 'File of Type' box is set correctly.
- Click on the file and then on 'Open'. The program will then show a window to indicate that the import has been completed.
- Click on 'OK'. The new configuration will now be set in the program. To transfer the data from the program to the Refractometer click on 'Download'.

Configuration summary

- Click on 'Summary'
- Click on 'Print' if a paper copy is required
- Click on 'OK' to exit

Process Functions and Status

This area enables the user to calibrate the refractometer, change poll address and get reading data.



Get a reading

- Click on 'Read', after a brief period reading data will be displayed in the 'Status' area.

Zero the Refractometer

- Place the zero sample on the prism and allow approximately 20 seconds for the temperature to stabilise.
- Make sure that the aim value for the zero function is correct. The aim value should be in the units that the Refractometer measurements are displayed. For example, if set to display brix readings, a distilled water sample would have an aim value of 0, should it be set to refractive index the value will be 1.33299.
- Click on the 'Zero' button. The program will then display a window to verify that you want to zero the instrument. To confirm the operation click on the 'Yes' button. The program will now inform the Refractometer to carry out a zero operation. After a few seconds the zero calibration will be complete.

Span the Refractometer

- Place the span sample on the prism and allow approximately 20 seconds for the temperature to stabilise.
- Verify that the aim value for the span function is correct. The aim value should be in the units that the Refractometer measurements are displayed. For example, if set to display brix readings, a 50% sucrose sample would have an aim value of 50, should it be set to refractive index the value would be 1.42006.
- Click on the 'Span' button. The program will then display a window to verify that you want to span the instrument. Click on 'Yes' to initiate the span. The program will now inform the Refractometer to carry out a span operation. After a few seconds the span calibration will be complete.

Changing the poll address

The 'Change Pol' button enables the user to change the poll address of a Refractometer to prevent addressing conflicts with other Refractometers in a system.

- Select the instrument's current poll address.
- Click on 'Change Poll'
- Enter the new address as prompted and click on 'OK'

For future reference note the change of address in the back of the Refractometer Manual

Calibration Wizard

The 'Calibration Wizard' has been designed to simplify the calibration process. As different calibration fluids require different measurement scale and temperature compensation settings the 'Calibration Wizard' will automatically deal with these aspects.

Calibration Wizard

Process Sensor Details Done

Serial No.: HE00084 Accuracy: ±0.05 Brix, ±0.00005 RI Measurement Range: 0-95% Brix

Zero

Preset: Water Add... Remove Check Zero

Scale: Refractive Index 1.33299 RI, no error, reading OK

TC: Sugar Zero Auto-Check

Aim: 1.33299 Last zeroed today at 10:27.

Span

Preset: AG40 Add... Remove Check Span

Scale: Brix 40.06 Brix, 0.06 Brix high, suggest re-span

TC: AG Fluid Span Auto-Check

Aim: 40.00 Last spanned today at 10:34.

Status: Idle

The window has been split into a Zero and Span sections. Select the calibration fluid that is to be used in the Preset drop-down list, this will automatically set the scale, TC, and aim. Simple apply the selected sample to the clean prism. The calibration can be checked, or reset where necessary. When finished using the calibration wizard click 'Done' to return.

Closing the Program

When use of the Process Maintenance Program is complete it must be closed.

- Click on the Quit button.

Reset Quality

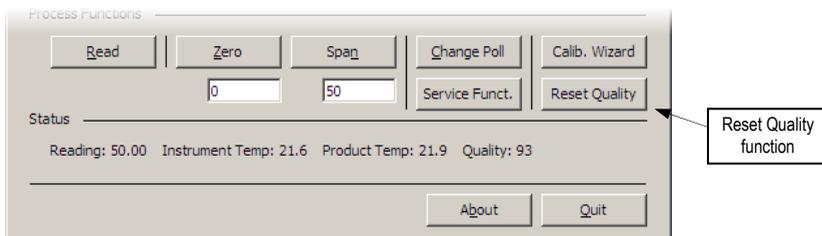
The Reset Quality feature is only available on sensors with software 27-622 to 27-626 version 3 and above. To view the software click 'Upload' and the software code number and version will be displayed within the Process Communication Settings area.

The quality measurement is an indicator of the quality of the concentration measurement (reading). The better the sensor can measure the concentration, the higher the quality value. However as the quality value is only an arbitrary value, it can differ from sensor to sensor.

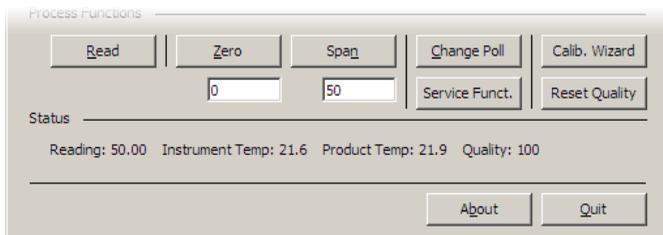
Usually the quality value is reset (calibrated) when a zero is carried out, so that it returns a quality of 100 when the zero sample is applied. Should the product that the sensor is measuring have a different quality value to that of the zero sample then it can be adjusted independently to that of the concentration measurement.

In situations where more than one sensor is being used and similar quality measurements of the product are required then the quality measurement alone can be reset.

- First upload the instruments configuration by clicking on 'Upload'. If the feature is available on the sensor a 'Reset Quality' button will become visible.
- With the product on the prism click 'Read', the quality in this example shows 93.



- Still with the product on the prism click 'Reset Quality'. The sensor will automatically measure the product, reset the quality and automatically save the new quality setting.
- Finally click 'Read' once more, the quality value will now show 100.



Appendix A

Process Maintenance Program Window

The screenshot shows the 'Process Maintenance Program' window with the following components and callouts:

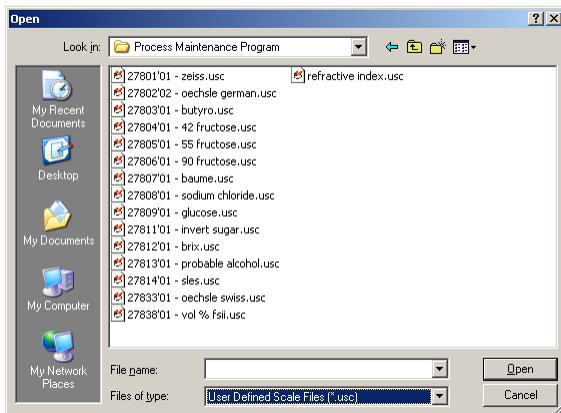
- Comm port box:** Points to the 'Comm Port:' dropdown menu showing '1'.
- Poll Address box:** Points to the 'Poll Address:' dropdown menu showing '035 : Test Instrument'.
- Manage poll addresses button:** Points to the '...' button next to the Poll Address dropdown.
- Parameter list:** Points to the list of parameters in the 'Parameter:' section, including 'Operation Mode', 'Selected Scale', 'Temperature Compensation', 'UDTC Constant', 'UDTC Reference Temperature', 'Reading Display Resolution', and six 'User Defined Scale - Const' items.
- Direct Calibration buttons:** Points to the 'Read', 'Zero', and 'Span' buttons in the 'Process Functions' section.
- Reading button:** Points to the 'Read' button.
- Instrument Status:** Points to the 'Status' label and the numerical values '1.33299' and '1.38115' displayed below the 'Zero' and 'Span' buttons.
- Serial no. and Instrument Details:** Points to the 'Serial No.:' field (HE00084) and 'Type / Software:' field (27-R0J / 27-620-01).
- Parameter value:** Points to the 'Setting:' dropdown menu.
- Configuration upload / download buttons:** Points to the 'Upload' and 'Download' buttons in the 'Controls' section.
- Configuration import / export buttons:** Points to the 'Import...' and 'Export...' buttons.
- Displays a summary of the parameters:** Points to the 'Summary' button.
- Calibration Wizard:** Points to the 'Calib. Wizard' button.
- Calibration aim values:** Points to the numerical values '1.33299' and '1.38115'.

At the bottom of the window, there are 'About' and 'Quit' buttons.

Appendix B

Importing User Define Scales

The 'Process Maintenance Program' is supplied with a number of user defined scales (UDS). They can be imported by clicking on the 'Import' button, then setting the 'Files of Type' drop-down list to 'User Defined Scale Files (*.usc)', this will display the available UDS.



Select the scale that you wish to import, and click 'Open'. The program will next display a window stating that the scale has been successfully imported.

To use the UDS, ensure that the 'Selected Scale' parameter is set to 'User Define Scale'.

Offsetting the Concentration Measurement

Using the 'Process Maintenance Program' it is possible to offset the concentration measurement. The offset effect is created by slightly modifying a UDS. Firstly import the UDS that you wish to offset using the instructions above.

To offset the UDS recalculate constant A of the UDS using the following formula.

$$\text{Const A} = \text{Const A} + \text{offset}$$

Example

To offset the Brix UDS by 1.5, firstly upload the instruments settings. Next import the Brix scale into the program. Select the 'User Defined Scale – Const A', to view the UDS constant A and recalculate.

$$\begin{aligned}\text{Const A} &= -2.105086 + 1.5 \\ \text{Const A} &= -0.605086\end{aligned}$$

Enter the new constant A into the program, ensure that selected scale is set to 'User Defined Scale' and download the new settings. From now on the Brix UDS will be offset by 1.5.

Appendix C

Configuration Parameter Description

Name	Setting	Description
Alternate Reading Display	Options	Determines whether an alternate value will be displayed on the 7 Segment display, as well as the measurement.
Analogue Output – Concentration to give 4mA (scale dependent)	Number	The reading at which the analogue output will be 4mA.
Analogue Output – Concentration to give 20mA (scale dependent)	Number	The reading at which the analogue output will be 20mA.
Communication Delay Period ^{*1}	Number	Specifies the number of milliseconds the refractometer waits between receiving data and responding.
Humidity Limit		Not implemented in this version
Operation Mode	Options	The reading mode of the instrument. Selectable as either Continuous or Polled. Polled is primarily used for service diagnostic work. 'Continuous' should always be selected for operational use.
Quality Blanking Threshold ^{*4}	Number	Sets the threshold value for the quality blanking. If a measurements quality is less than the threshold, the instrument will display "----". Setting to 0 will disable the quality blanking.
Reading Display Resolution	Options	Set the resolution mode for the measurement output. Selectable as High, medium or low. Higher resolutions are inhibited on low accuracy refractometers.
Reading Limits – Hysteresis ^{*1/2}	Number	An additional limit offset added to the low limit and subtracted from the high limit, used to stop alarm chattering when the reading fluctuates about a limit.
Reading Limits – Lower	Number	Value that will activate the low alarm.
Reading Limits – Switch	Options	Enables or disables the limits alarm facility. Also selects whether concentration, quality or temperature drives the alarm.
Reading Limits – Upper	Number	Value that will activate the high alarm.
Selected Scale	Options	Select the measurement scale units, Refractive Index, Brix or User Defined Scale
Temperature Compensation	Options	Specifies which temperature compensation equation is used to calculate the measurement. The user may select Off, Sugar, User, or AG Fluid compensation ^{*5} .
UDTC Constant	Number	The constant used when the User Compensation is selected. Expressed in RI/°C
UDTC Reference Temperature ^{*2/3}	Number	The reference temperature used when User Compensation is selected, in °C.
User Defined Scale - 1st ID Byte		Not implemented in this version Setting 1 st ID Byte to 114 and the 2 nd ID Byte to 105 will result in the sensor formatting the concentration measurement as if RI scale was selected. ^{*5}
User Defined Scale – 2nd ID Byte		
User Defined Scale - Const A	Number	The 6 user defined scale polynomial constants.
User Defined Scale - Const B		
User Defined Scale - Const C		
User Defined Scale - Const D		
User Defined Scale - Const E		
User Defined Scale - Const F		

Notes

^{*1} – only instruments fitted with 27-612-04 and 27-613-04 or greater

^{*2} – only instruments fitted with 27-602-09 and 27-603-09 or greater

^{*3} – only instruments fitted with 27-612-03 and 27-613-03 or greater

^{*4} – only instruments fitted with 27-612-08 and 27-613-08 or greater

^{*5} – only instruments fitted with 27-620 or greater