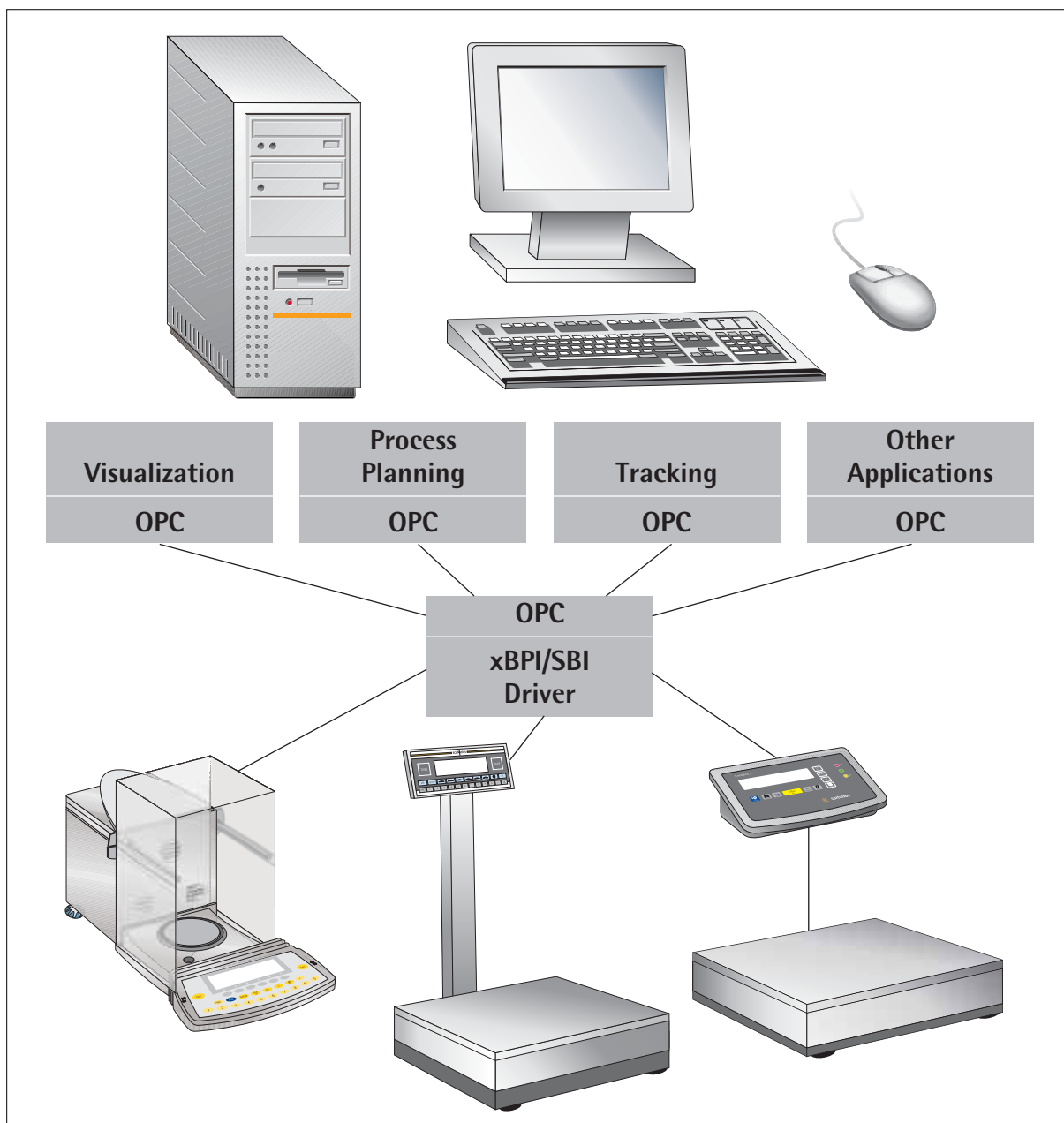


Operating Instructions

Sartorius OPC Scale (62890PC, 6289PC-L)

Sartorius Scale Software Driver



2	Application
3	OPCScale
4	Using OPCSscale
9	Brief Description of OPCSscale Coding for Programmers
9	Version Information
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11	Producer Loop
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13	Read ID
13	Tare, Zero, Clear Tare
14	Exit
16	Timeout
16	Checkweigher Events
20	Exiting the Program

The following symbols are used in these instructions:

- indicates operating instructions
- indicates operating instructions that should only be carried out under specific circumstances
- > describes what occurs after an operation is carried out
- indicates an item in a list
- ⚠ indicates a hazard.

The Sartorius OPC Server is a communications driver. It is used to enter and save data from Sartorius scales according to the OPCDA and OPCXMLDA standards. Up to 10 devices can be configured over the serial interfaces of the scales. Up to three devices can be processed simultaneously. Sartorius scales must be configured in XBPI or SBI mode. The installation and uninstall processes in Windows® are described only briefly in this manual.

Minimum system requirements:

- CPU min. 400 MHz
- Memory min. 256 MB RAM
- Screen resolution 800 × 600 pixels
- Windows® 2000 SP4
- Windows® XP SP1
- Windows® XP SP2

Software operation and data input for connected Sartorius devices are described following the installation instructions.

Functionality

The Sartorius OPC Server provides an OPC-compatible communication interface in accordance with the following standards:

- OPCDA1.0A
- OPCDA2.05
- OPCDA3.0
- OPCXMLDA1.0

Data from up to three Sartorius scales can be processed simultaneously at a rate of 100 ms; in other words, 10 weight values (or other data) per second.

Measurement and testing devices are connected to the PC over scale interfaces (RS-232C, RS-485 or RS-422).

The devices must be set to XBPI or SBI mode.

Measured values can be entered manually (OutProc application) or automatically as a Windows service (OPC XML DA Server).

The software will send the respective data log to specific locations.

Distribution number: 62890PC

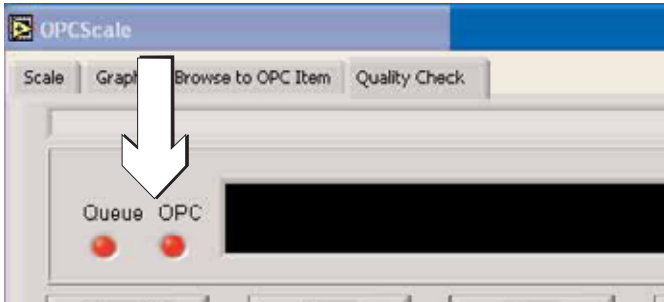
Sartorius OPC driver for the universal connection of Sartorius XBPI or SBI scales to a PC software-supported application.

The package contains Sartorius OPC Scale, a plug & play module for function tests and, if required, for use as a visualization operation module.

When using the OPC driver on additional PC clients:

Distribution number 62890PC-L
Sartorius OPC driver additional license.

Using OPCScale



The “Queue” and “OPC” LEDs are red.
OPCScale is searching for the connection to the server.
This is installed, e.g., on computer 1.
OPCScale can be installed on a different computer.

The connected scales are in XBPI mode and are connected to the computer over the interfaces.

The “Queue” LED is green, no internal error.
The “OPC” LED is red.
OPCScale could not connect to the server.

Definitions

OPC – OLE for process control programming technology used to publish measurement results

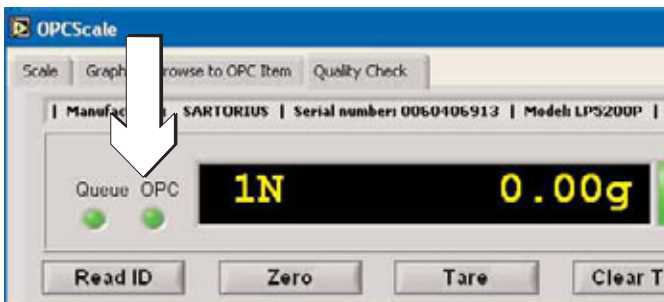
URL – Uniform resource locator

OPC has the URL format:
opc://servername/opcserver/ItemName

Servername – Computer on which the server is installed

opcserver – Server name

ItemName – The detail that is being subscribed (net, gross, etc.)



Browse to OPC Item

The “Queue” and “OPC” LEDs are green.
The network connection has been established between the server and OPCScale. The OPCScale display indicates the display value of the scale currently connected via COM1 to the computer, here 0.00 g.

If this is not the case, the scale can be tared using the [Tare] button or set to zero using the [Zero] button.

- The “OPC” LED is red.
Click on [Browse to OPC Item] in the header.




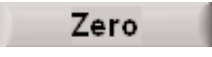





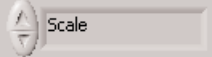
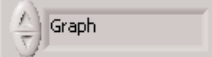
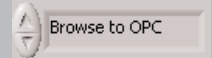
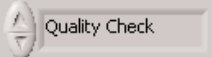
OPCScale

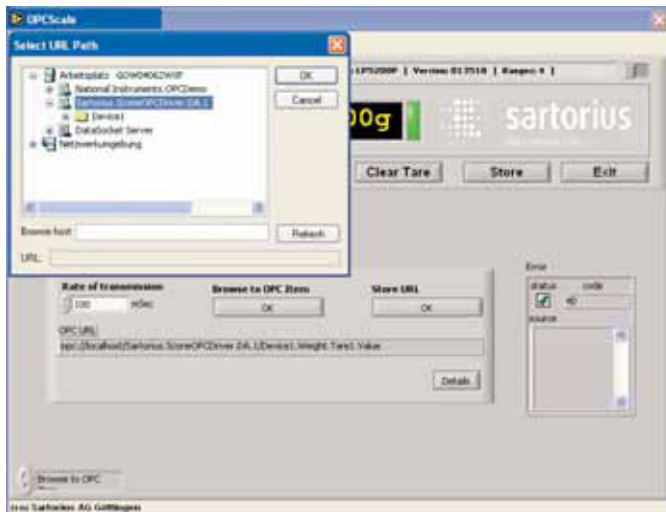


- Start OPCSscale:
 - Using Start / All Programs, or
 - Using the desktop shortcut
- > OPCSscale is displayed.

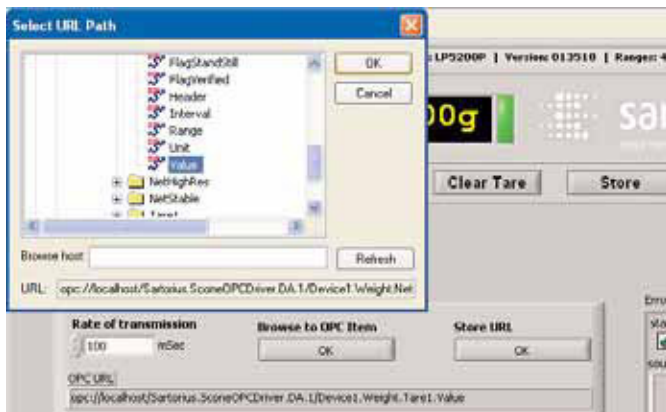


Overview of OPCSscale

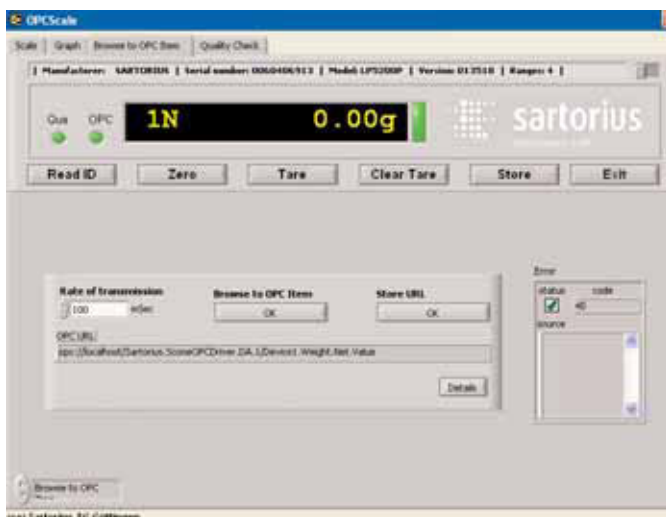
Scale	<ul style="list-style-type: none"> - The large display of OPCSscale appears. Data from the connected scale is displayed. E.g.: status flags, item (manufacturer, serial number, model, version) 	 <ul style="list-style-type: none"> - Flag 0 unstable (dark-green bar) - Flag 1 stable (light-green bar) - Flag 2 Improved adjustment stand stability, scale very stable (light-green bar)
Graph	<ul style="list-style-type: none"> - The large display of OPCSscale appears. Scale data is displayed graphically. 	 <ul style="list-style-type: none"> - Switch to the right, OPCSscale has a more narrow display
Browse to OPC Item	<ul style="list-style-type: none"> - The large display of OPCSscale appears. You can navigate in a browser window to the OPC Server. Recorded data is stored, e.g. in the ... \data directory in the OPCSscale.dat file. - Optionally, on the clipboard and/or in MS Excel 	 <ul style="list-style-type: none"> - Read ID (Scale identification)
Quality Check	<ul style="list-style-type: none"> - The large display of OPCSscale appears. Simulation of a checkweigher (green, yellow, red display) 	 <ul style="list-style-type: none"> - The gross value is set to zero when the scale is stable.
Queue	<ul style="list-style-type: none"> - The green LED indicates that the data of the recognized device is in the queue. 	 <ul style="list-style-type: none"> - Tare of net value when the scale is stable
OPC	<ul style="list-style-type: none"> - The green LED indicates that there is a connection to the OPC Server. 	 <ul style="list-style-type: none"> - Cancel tare command
1N 0.00g	<ul style="list-style-type: none"> - OPCSscale display window (scale display) 	 <ul style="list-style-type: none"> - Save value line date, time, weight value
0.00g	<ul style="list-style-type: none"> - Stability indicator of scale: vertical green bar. The stability of the scale is displayed in the [Scale] overview using status flags in three steps: 	 <ul style="list-style-type: none"> - Close OPCSscale
		 <ul style="list-style-type: none"> - Switch to the right, enlarges OPCSscale display. The arrow keys (up, down) can be used to switch between the following:
		 <ul style="list-style-type: none"> - Scale
		 <ul style="list-style-type: none"> - Graph
		 <ul style="list-style-type: none"> - Browse to OPC (OPC Browser)
		 <ul style="list-style-type: none"> - Quality Check (checkweighing with green, yellow, red display)



- Select server network address.



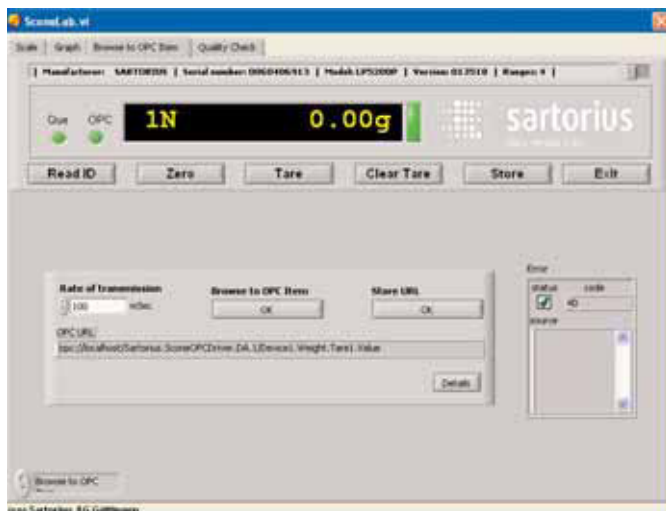
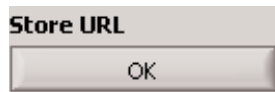
- Select an item, e.g.:
Scale 1 called Device 1 and net value "Weight.Net.Value"



- Click on "OK" to return to the initial screen.

opc://localhost/Sartorius.SconeOPCDriver.DA.1/Device1.Weight.Net.Value

- > The successful connection to the scale is displayed.



```

17.03.2006      12:54:59      "My Test"      ID= 4711

Manufacturer:   SARTORIUS
Serial number:  0060406913
Model:         LP5200P
Version:       013518 | Ranges: 4 |
Number  Time [s]  weight [g]
0       949,656  0,00
1       949,718  0,00
2       949,781  0,00
3       949,843  0,00

```

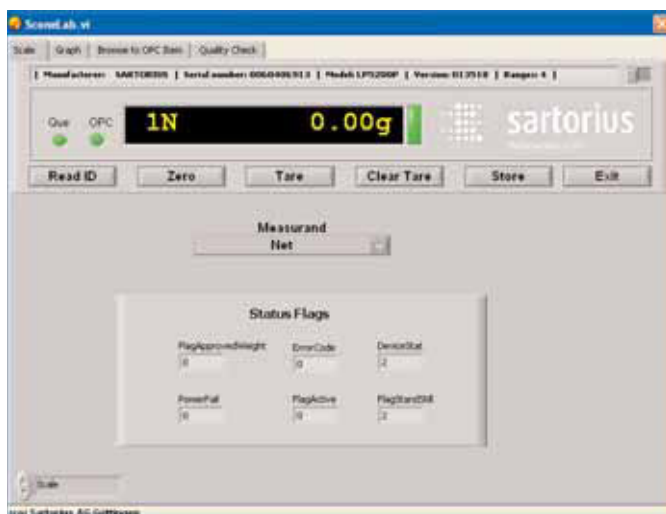
6● Click on [Store URL] [OK].

> The selected connection to the server is saved and automatically selected at startup.
OPCScale is connected to the scale called "Device 1."
The OPC LED is green.

> If required, save the data recorded from the scale.

● Click on [Store].

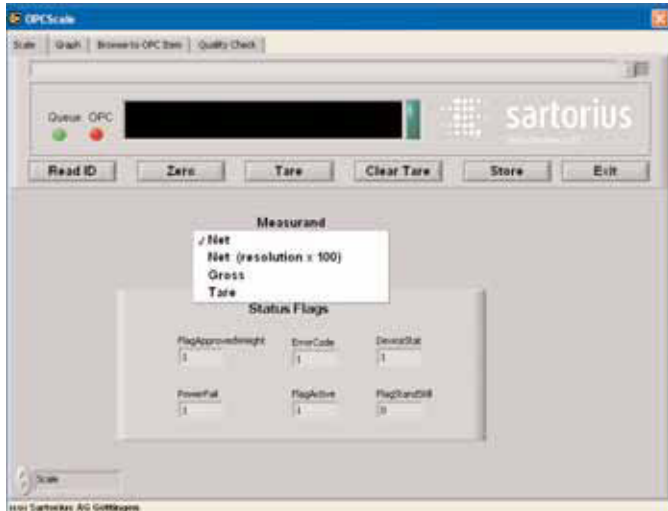
> Result of [Store]:
Entry in file
"Installation directory \ data\ OPCScale.dat"



● Make a selection, click on [Scale].

> OPCScale displays the large view.

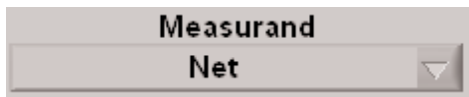
The "Status Flags" of the device are shown in the "Scale" view.



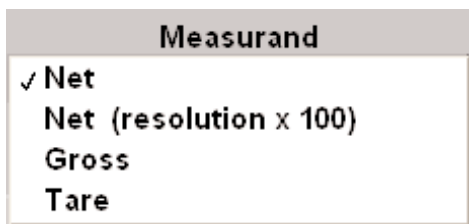
- Make a selection, click on [Scale].

> OPCScale displays the large view.

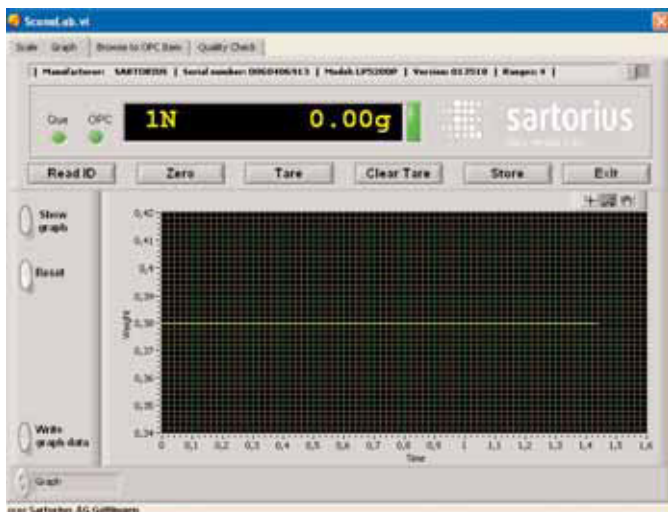
The “Status Flags” of the device are shown in the “Scale” view.



- The data to be recorded by the connected scale is selected in the middle of OPCScale under “Measurand:”



- Net values
- Net values x 100
- Gross values
- Tare values



- The data can be displayed graphically using the [Show graph] button; in this example, after the scale is tared.

The recorded measurement data can be saved using the [Store] button

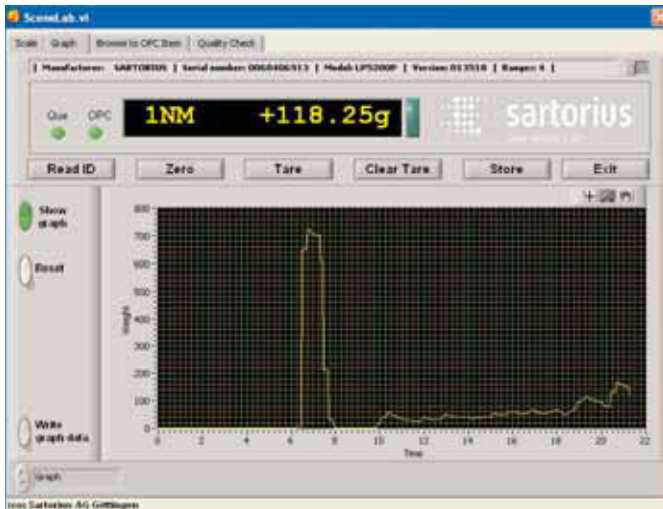
- to a file on the hard drive
 - to the clipboard
 - as an Excel file
- A three-line data record is created.

Example:

Number	Time [s]	Weight [g]
0	0.000	429.36

Using the [Write graph data] button, you can list all visible data in the graph; for example, the comment stored as My Comment:

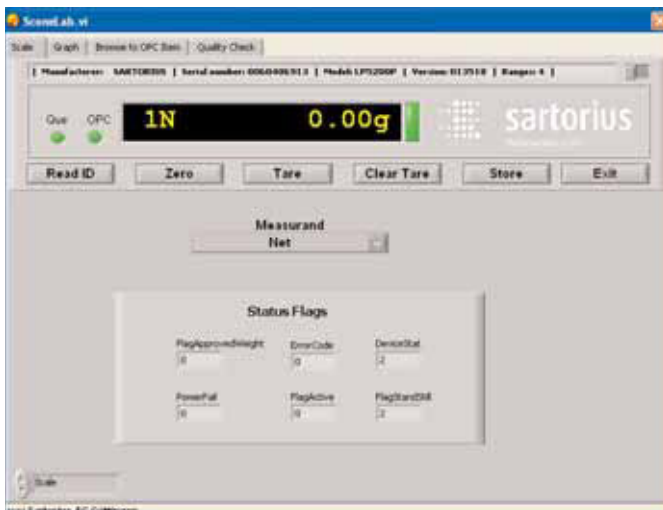
Number	Time [s]	Weight [g]
0	71.902	429.36
1	71.965	429.36
2	72.022	429.36
..		
etc. to		
100	77.245	999.91



> The different weight values are displayed here.

Note:

You also have the option of saving data from the [Write graph data] button to the clipboard and then inserting it into Excel. The output to Excel does not contain a data header. The data in the file is strictly localized. Therefore, the decimal point should be set as the default setting and the decimal comma should be set as the decimal separator.



● The [Quality Check] button activates a checkweigher function.

The weight value is displayed in a green, yellow or red bar depending on the weight on the scale.

The overload or underload are set in the statistics windows. The program then calculates the statistics using the data of the associated parts.

Example:

Target weight 1 kg Bar green

Target weight 1 kg \pm 100 g Bar yellow
The weight must be reworked if required.

Target weight 1 kg \pm 200 g Bar red
The weight is too heavy.
The result is saved to the data file using the [Write] button.

Note:

This is not intended for output to Excel or the clipboard.

Brief Description of OPCScale Coding for Programmers

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Checkweigher Events	16
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Version Information

This application was created using LabView version 7.1.
It runs on the following Windows operating systems: NT, Win 2000 or XP.

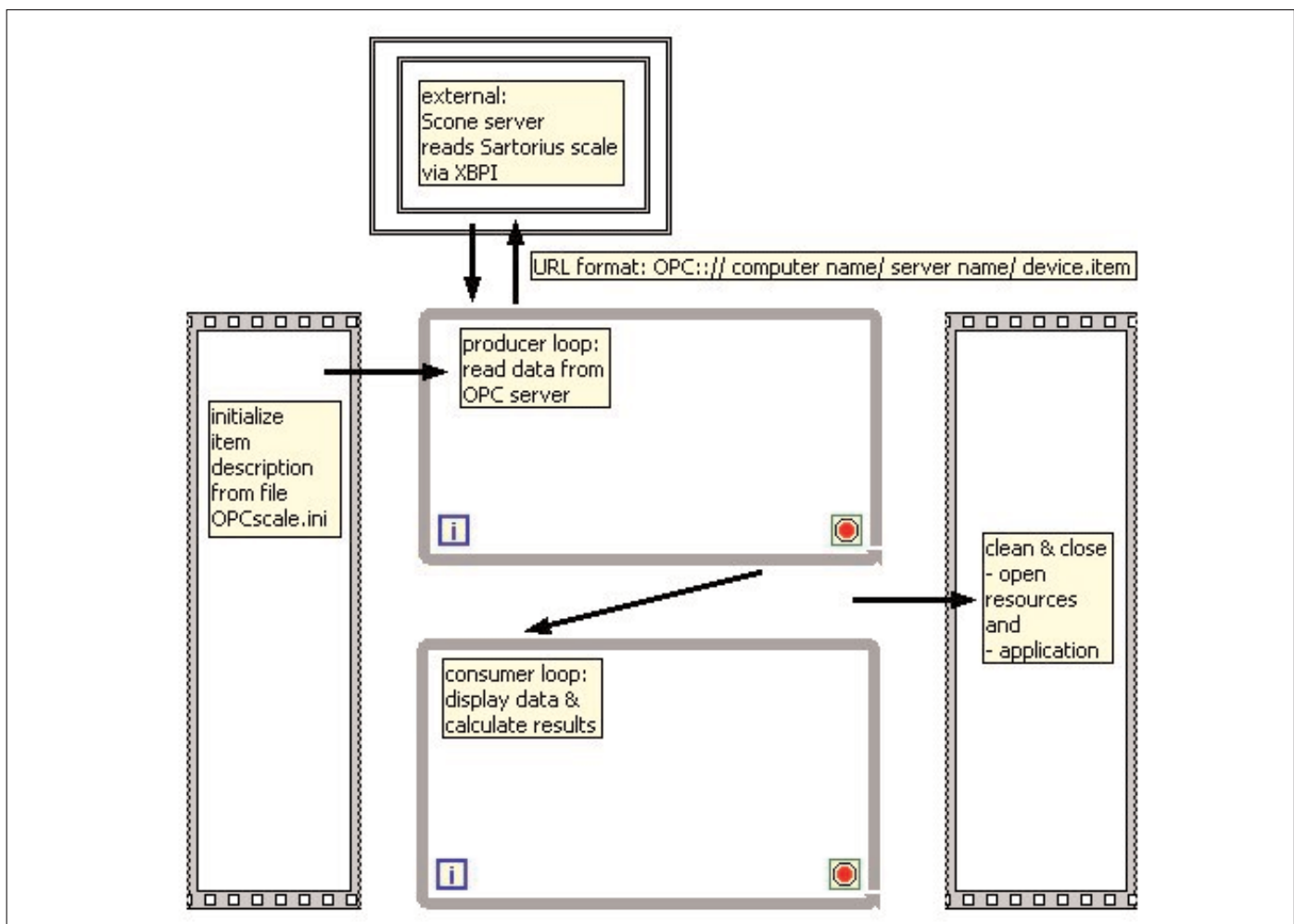
Principle of Program Process

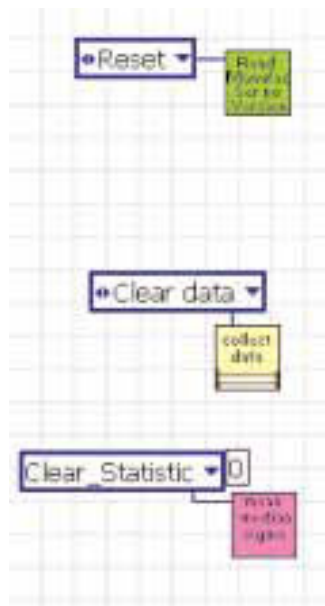
The program consists of 4 blocks. First, the initialization block is run. Then the producer loop reads the data from the server. This loop sends the data to the consumer loop where it is edited and displayed. When the program is closed, the section shown on the right is run.

Grouping into two loops has major advantages:

- Both loops can be run in separate threads.
- All data is collected in the producer loop.
If required, data can be saved in the queue.
- The consumer loop processes the queue according to its settings, i.e. user activities or computer requirements are taken into account.
- The consumer loop does not use any CPU resources while it is waiting for data.

This program description focuses on the producer loop.





Initialization

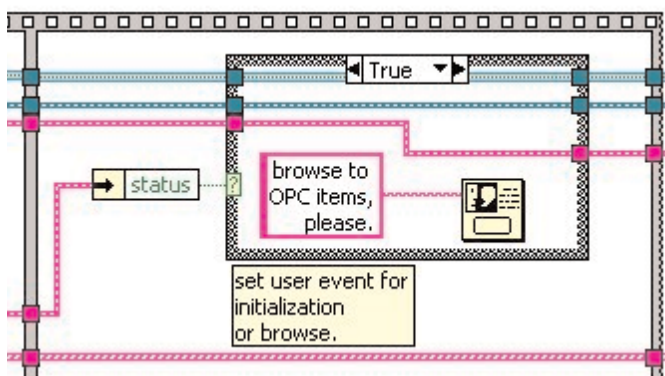
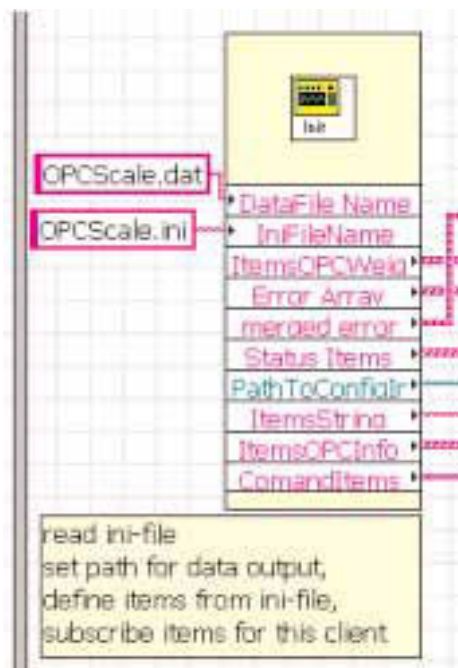
First, the displays are pre-set, the size of the application is pre-set and sub vi's used to note data are initialized. The three sub vi's note the following data:

- Highest (green): Device ID (serial number, etc.)
- Middle (yellow): Data to be saved in the file, Excel or the clipboard
- Lowest (purple) Data to determine statistical characteristics in the producer loop

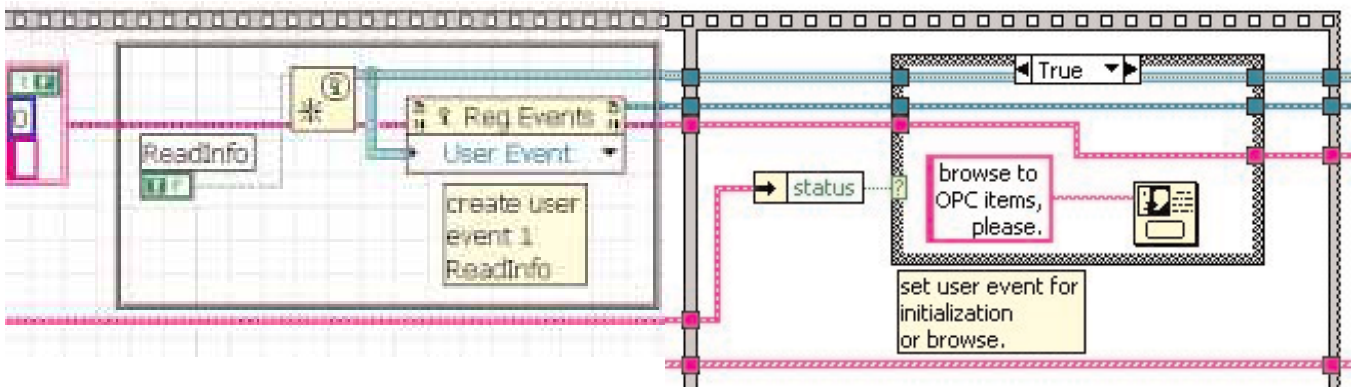
The initialization data is read from the OPCScale.ini file in a second initialization step. This sets up the OPCScale.dat output file.

Items that were saved are taken from the "OPCScale.ini" initialization file. Other groups of items are formed from this information and these groups are registered with the server. The outputs include:

- ItemsOPCWeight: Array with float and string sizes such as net weight value and display string
- ErrorArray: Associated array with error structures
- Merged Error: Global sum of registration errors for all items.
- Status Items: The five integer "Status Flag" values from the Scale page such as ErrorCode or DeviceStat
- PathTo ConfigIniFile: Path to OPCScale.ini file
- ItemsString: Contains string information required to display the most important items
- ItemsOPCInfo: Required to display the highest line with the device ID
- ComandItems: Items with the commands such as Tare or Zero. These items are not registered with the server, but rather opened and then closed upon demand.



If no items are noted in OPCScale.ini, then the noted server or device is not available. This results in an error that is noted in the "Merged Error" output. This initiates a display in the next step in which you are required to perform a search for the server.



When the server and the device have been found, this triggers a user event that triggers the reading of the device ID in the producer loop.

On the left, the "ReadInfo" event is registered and on the right, it is set in the case structure.

Note:

If there are no errors, the "False" situation (=error free) applies.

An additional user event called "CalcStatistic" is registered in the lower part of the initialization. When it is triggered, it initiates the calculation of statistical measurements in the consumer loop.

Producer Loop

This loop incorporates an event structure with 7 events:

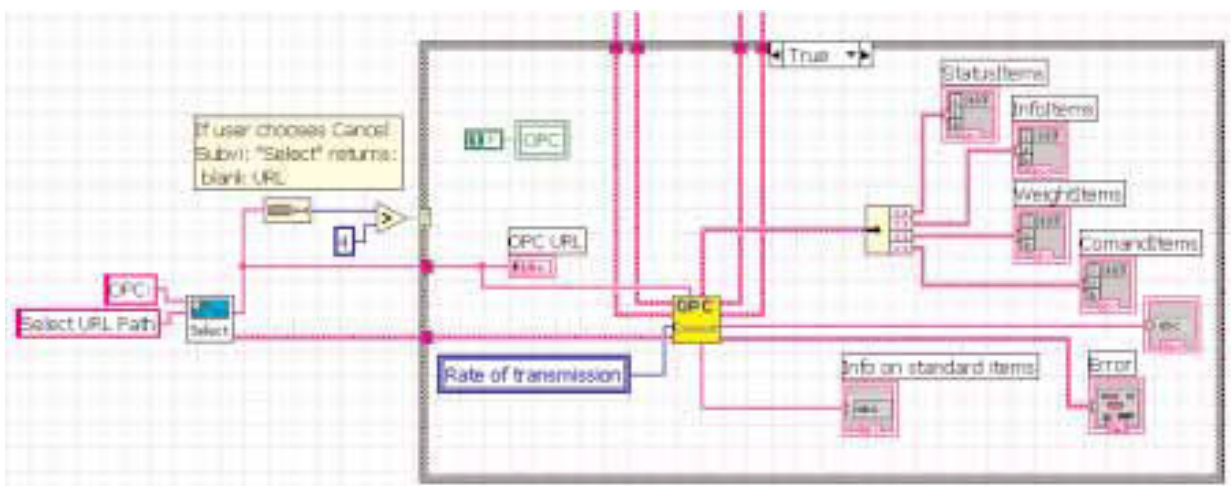
- Timeout
- Exit
- Read ID
- Browse
- Zero
- Rate of transmission
- Store URL

Browse to OPC Item

First, the browser is opened (blue icon *DS Select*).

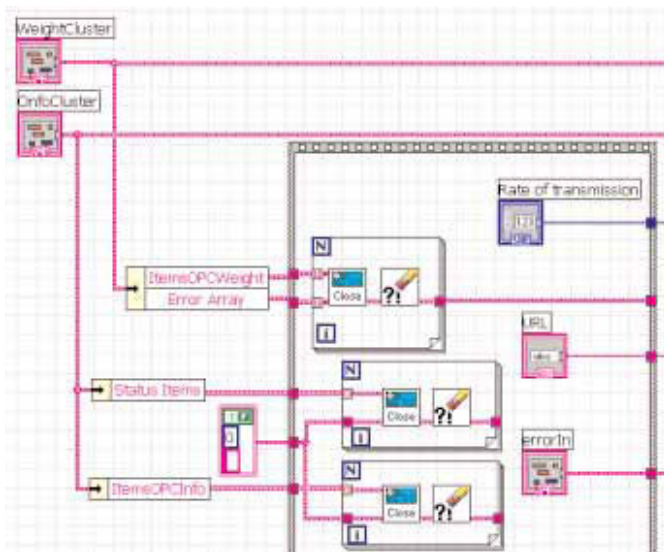
Then, the length of the selected items is checked.

If this is larger than 4, the selection is successful and the selected item is displayed in the "OPC URL" field. The existing connections are then closed in the "OPC Connect" sub-vi and the required items of the current selection are subscribed.



Any of three groups of items that are registered are unregistered in the "OPC Connect" sub-vi.

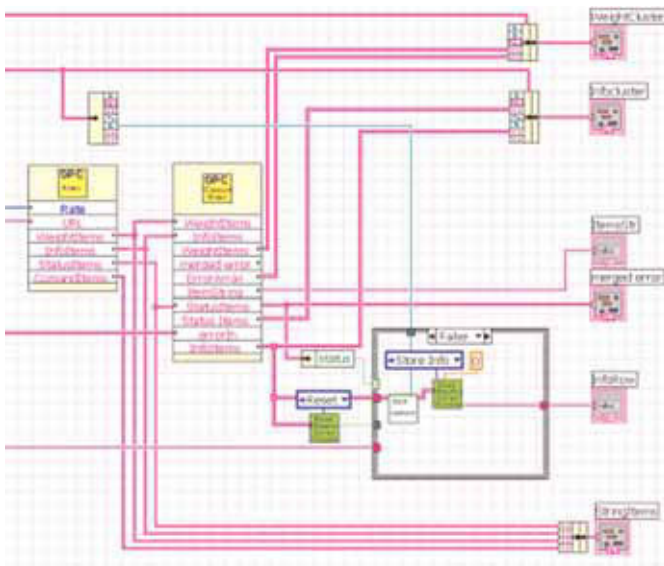
This is carried out in the three For loops with Close DataSocket (DS Close icon). Existing errors are deleted.



The operator selection of “DS Select” is used in the “OPC Items” sub-vi to compile the required four groups of items.

This data is then transmitted to the “OPC Connect Items” sub-vi. Three groups of items are opened there:

- WeightItems
- StatusItems
- InfoItems



The Infoltems are then used immediately to read the ID information from the connected device.

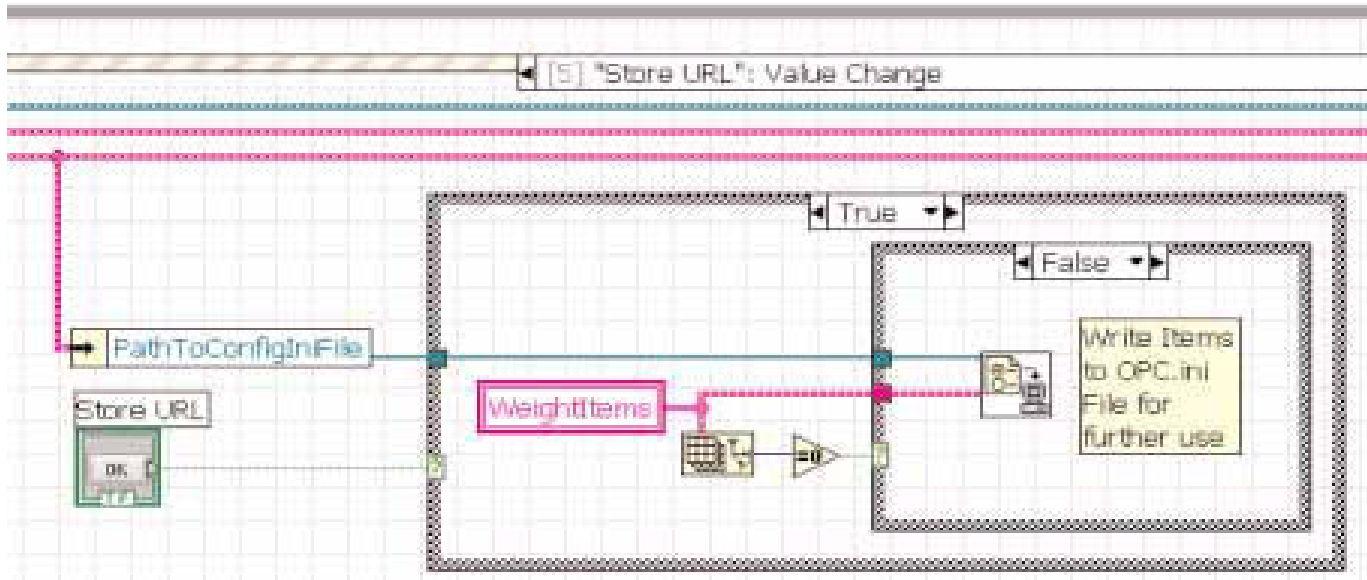
First, the noted information is erased (green icon with the Reset input).

Then contact is established with the server (white icon called “first contact”).

The identification measurements are read. Then these are saved in the “ReadInfoRow” sub-vi (green icon) and later displayed on the front panel.

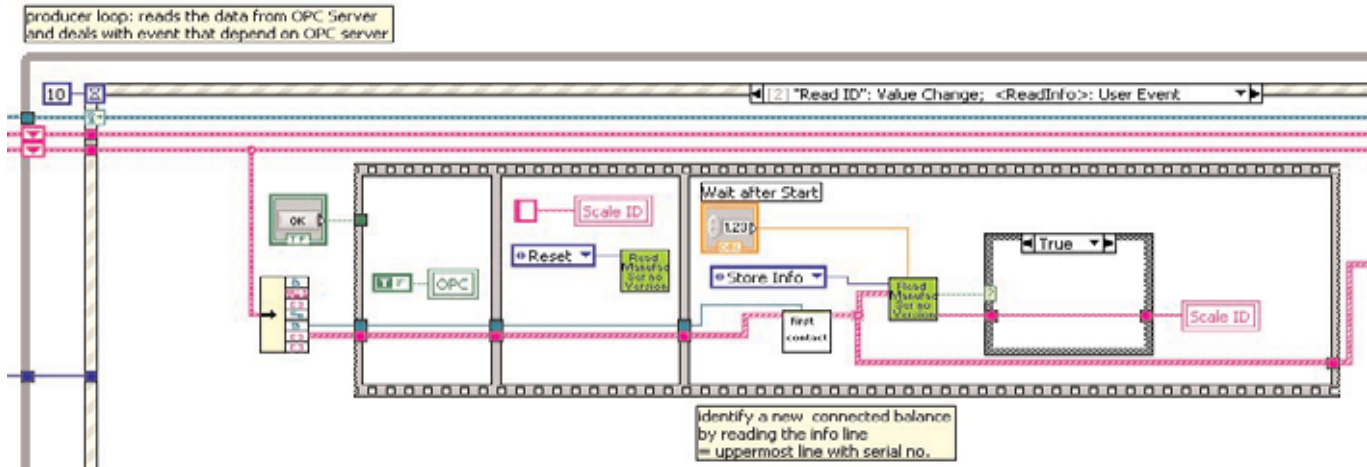
Store URL

This event writes the "Weight Items" to the ini file. Then they can be read and used with the initialization. The path to the "OPCScale.ini" file is defined with the initialization and used here.



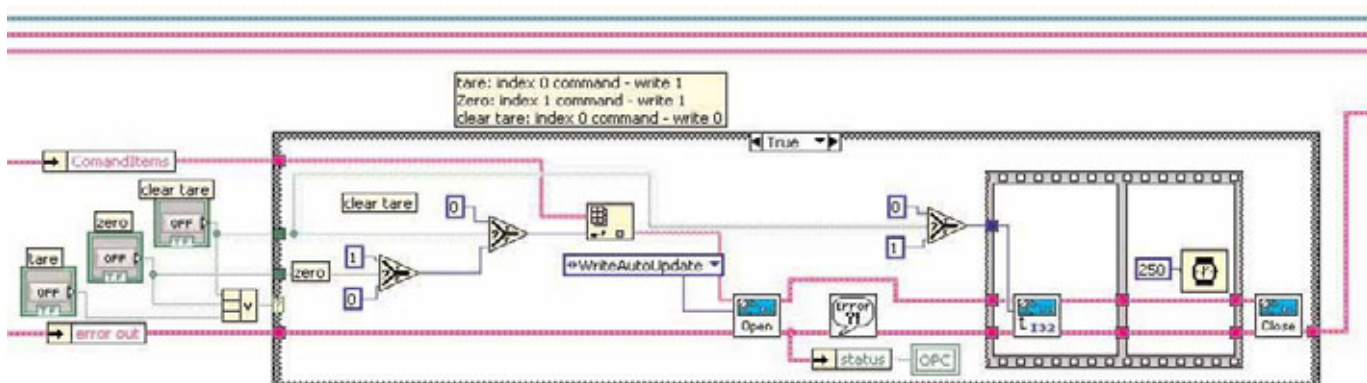
Read ID

This event can be triggered by a keystroke from the operator. In addition, it is also triggered as a "ReadInfo" user event in the initialization phase. The process corresponds largely to the last part of the browse event. The "Wait after Start" input is for debugging purposes only and is not in the visible part of the front panel.

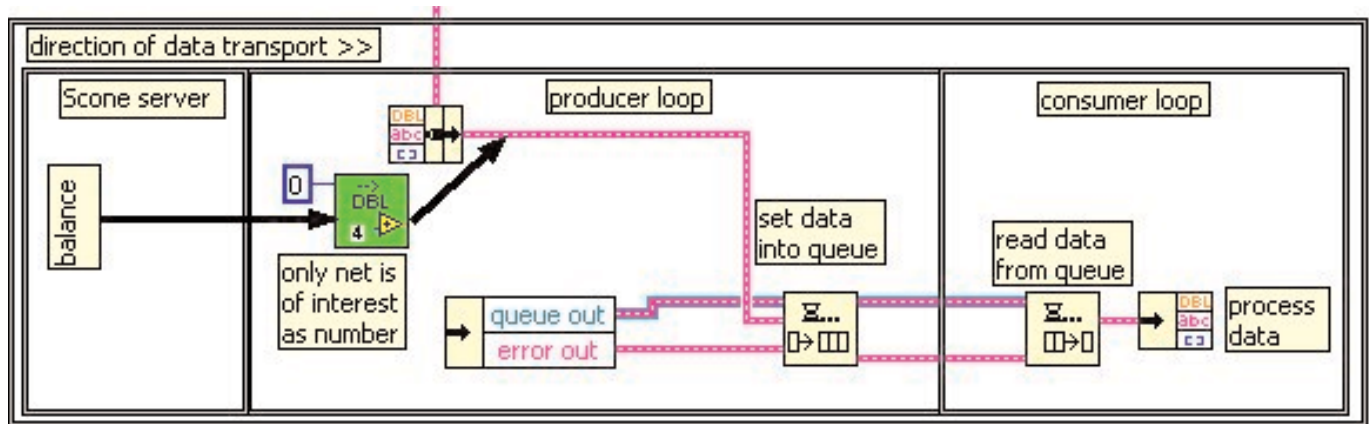


Tare, Zero, Clear Tare

These three commands are registered, executed and then unregistered. Depending on which key is pressed, the suitable item is then removed from the vector with the command. The item is opened for the server and either a one or a zero is written. The one activates the command, the zero cancels it. The item is then re-closed after a short standby time (250 milliseconds).



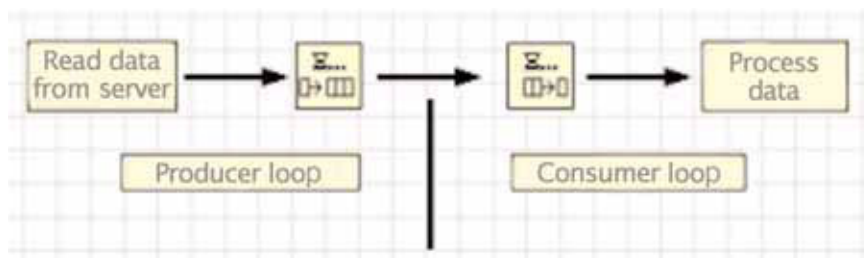
The producer loop is closed here and the closing of the consumer loop is started. The event is triggered by clicking on either the “Exit” key or the closing X on the window (top right).



Because of the Panel Close option, the “Exit” key is set to “True” via the corresponding local variable. A signal is sent via “queue” to the consumer loop. This “wakes up” the consumer loop, which reads the local variable “Exit” that now is set to “True”: the consumer loop is then closed in this way. Therefore, the “Exit” event of the producer loop waits a short period of time and then transmits “True” to the conditional loop terminal (stop if “True”).

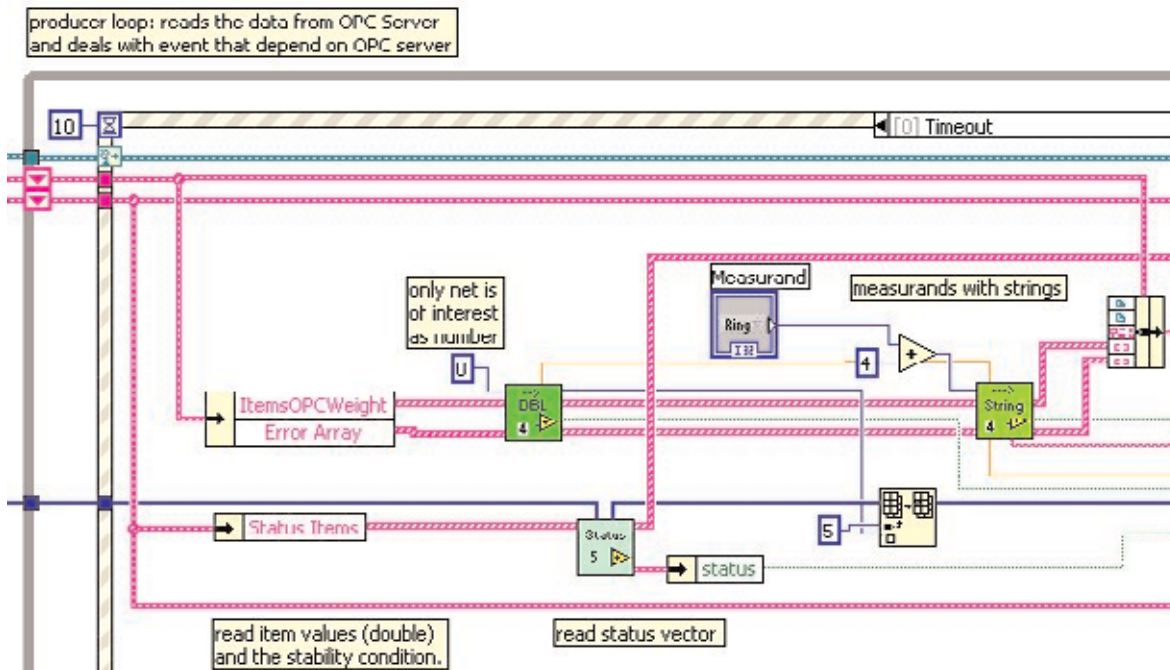
Timeout

If none of the previously mentioned events are activated, the timeout event is executed. This event is the central location for data transport, which retrieves data from the Scone Server and forwards it to the consumer loop. The principle is recognized from the pseudo-code.

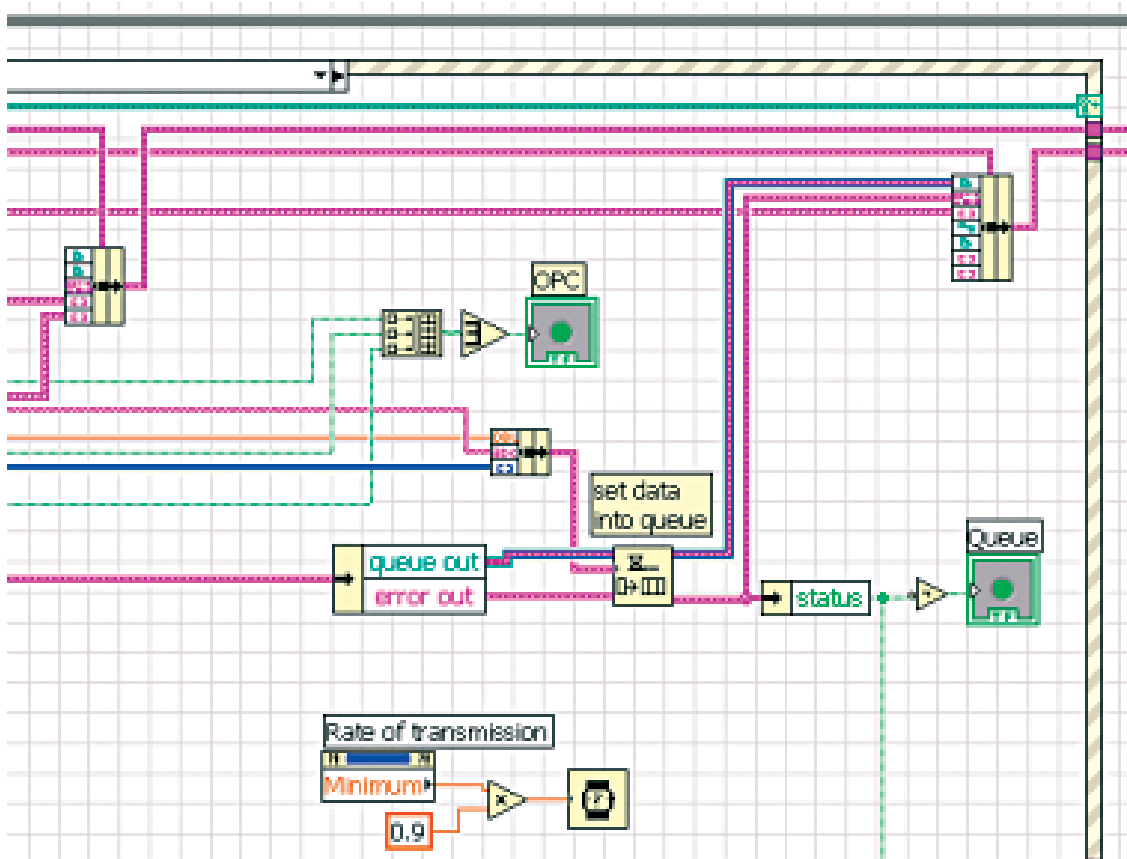


In order to transmit data, it must be set in a queue (queue icon). The consumer loop waits in its “timeout event” for the receipt of new data. During this wait period no CPU time is required. In addition, events in the consumer or producer loops can be executed asynchronously.

Data is read from the server in three blocks. Then “float items” are addressed. From these, only index 0 “Net” are required (dark green “DBL” icon). The number of decimal places is also read in this sub-vi (blue integer output).



Then the 5 status information records are read. The output array is defined in the initialization so that processing here can be as rapid as possible. The status values are replaced in an available array. The number of decimal places is now entered in index 5. The "Measurand" terminal transmits the index of selected measurement parameters that had been selected for display (net, gross ...). This index is switched by 4 so that it corresponds to the associated items. Then the selected string sizes are read (light green "String 4" icon). In the second part, the data is bundled into a structure and sent.



Even the error flags are bundled and displayed in the "OPC" LED. The status of the queue is displayed in the "Queue" LED. In addition, a standby time is activated that is a little less than the set sensor rate ("Rate of transmission" in the Browse to OPC Item page).

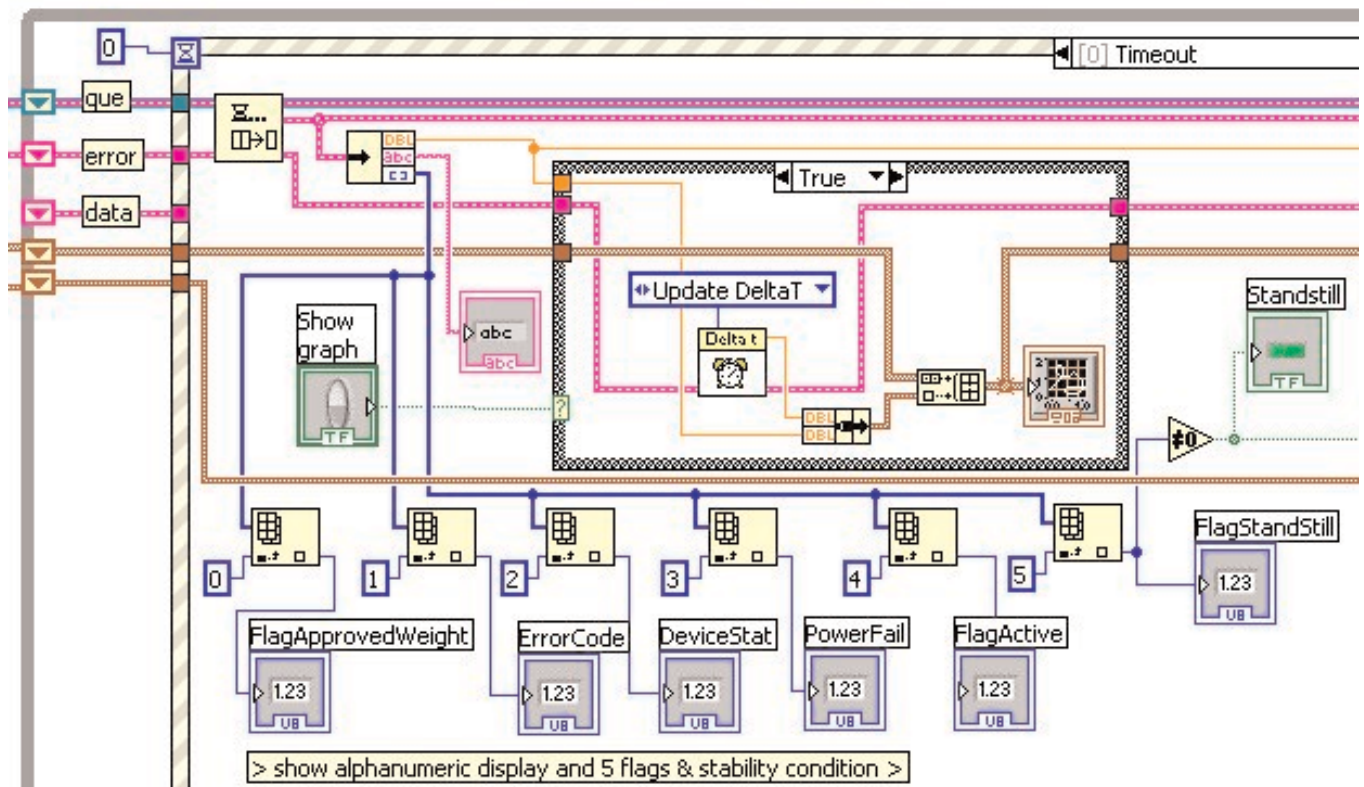
Consumer Loop

The consumer loop has an embedded event structure with 11 events.

Not all events will be discussed here.

As in the producer loop, the most important event is the timeout event.

consumer loop, deals with all user events & data interpretation, such as dump, graph...



Timeout

Here the wait is for an incoming message. When it is received, the queue is read.

The data are taken from the output structure and displayed: scale display and 6 flags.

If the "Show graph" switch on the "Graph" page is activated, the current time in milliseconds will be read and attached

together with the weight value float at the array for the graphical display (brown line). In addition, the "StandStill" flag is processed.

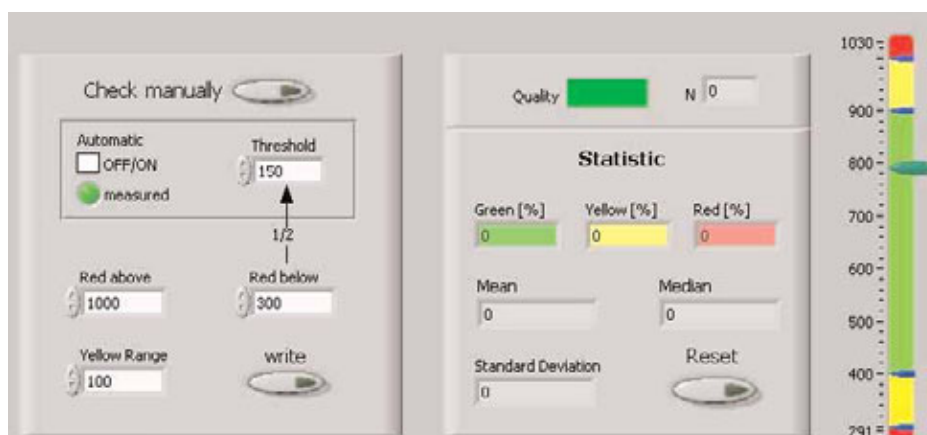
This flag can display the values "0," "1" or "2" whereby "0" indicates no stability, "1" stability and "2" improved stability for adjustment.

The stability display behind the display is switched to light green when the "StandStill" flag is not equal to zero.

The right page of the timeout event is used for the implemented application "Checkweigher" (discussed below).

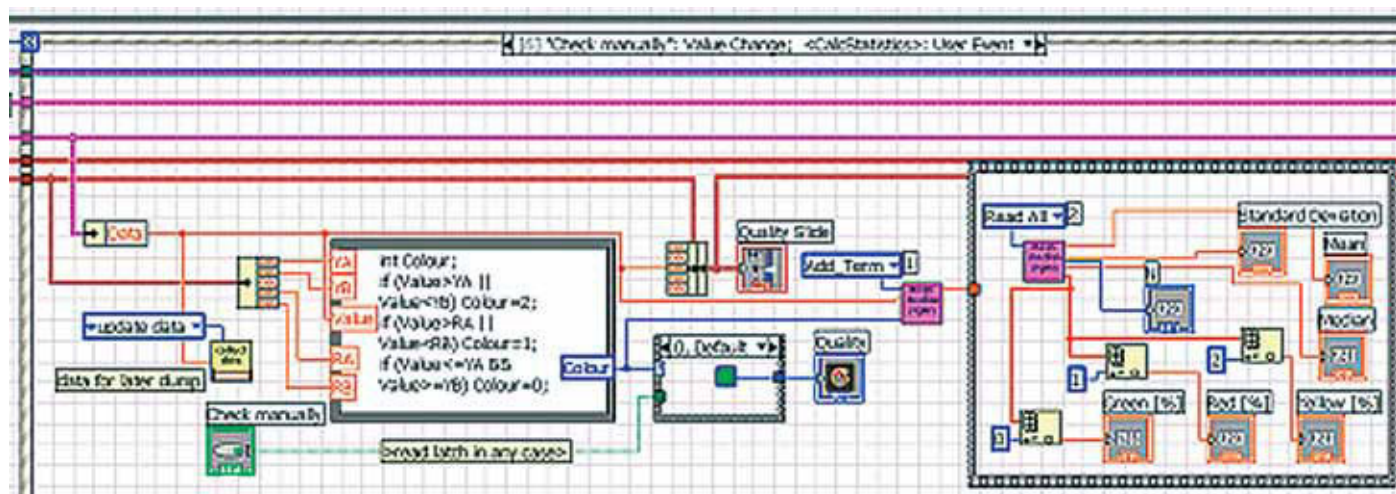
Checkweigher Events

The screen page belonging to the checkweigher defines the required events:



-
- The screenshot displays a LabVIEW block diagram for a control system. At the top, a comment box states: "consumer loop, deals with all user events & data interpretation, such as dump, graph...". The diagram includes a "Quality Slide" control connected to a "Slide (strict)" block. A "Data" block is also present. Three input ranges are defined: "Red above" (1.23 to 2.81), "Red below" (1.23 to 0.90), and "Yellow Range" (1.23 to 0.90). The logic calculates several variables: $YA = RA \cdot Y_{pc}$, $YB = RB + Y_{pc}$, $Min = RB \cdot 0.97$, $Max = RA \cdot 1.1E3$, and $AT = RB \cdot 0.5$. The output is a "Threshold" value.

(2) Manual check of quality using the “Check manually” switch in the event of the same name. This event can also be controlled by the program by triggering the “CalcStatistic” event.



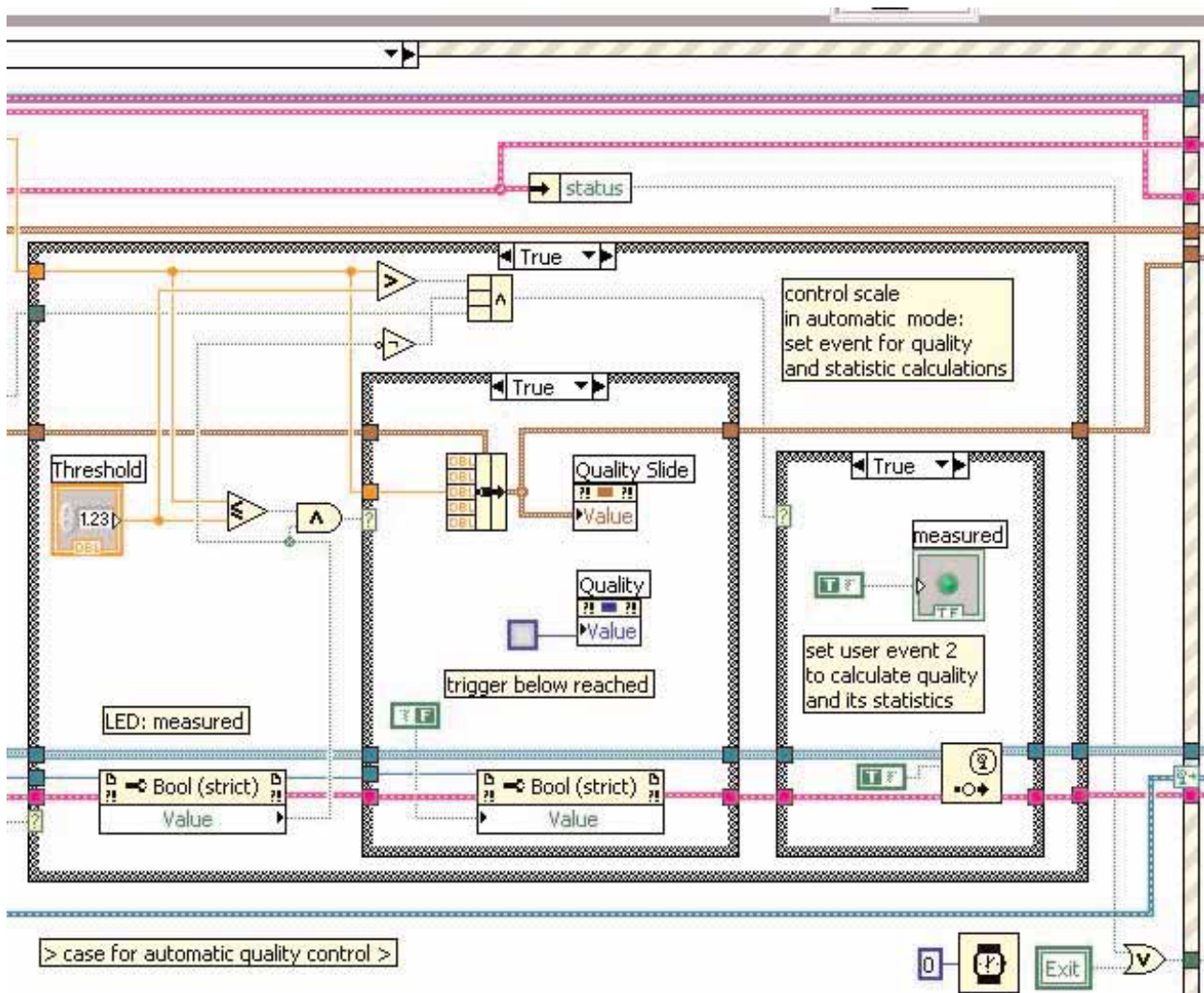
(3) All marked data and the events are reset using the “Reset” key.
The event associated with this sets the displays to zero, erases the statistics entries as well as the data in memory (possibly for saving).

Then the statistical events are read and specified in the For loop and output together with the header to the file.

The following entry is for the data above:

07.03.2006	15:19:12	Mean	621.58
07.03.2006	15:19:12	StdDev	256.31
07.03.2006	15:19:12	Median	690.17
07.03.2006	15:19:12	Quality % green	50.00
07.03.2006	15:19:12	Quality % red	16.67
07.03.2006	15:19:12	Quality % yellow	33.33

The checkweigher can be triggered manually or work in automatic mode. For this purpose, there is an “Automatic” checkbox and a “Threshold” for detecting the load change. In automatic mode, it will be checked whether or not the threshold has been exceeded. Then the stability is checked. If this is reached, the program triggers the “CalcStatistic” event. This activates the “Check manually” switch, i.e. carries out the calculations described above. This process is carried out in the right section of the timeout event:



The basic conditions are checked in the “and node” (top center) (Value > threshold and stability, the event is not yet triggered). The last condition comes from the display value of the “measured” LED.

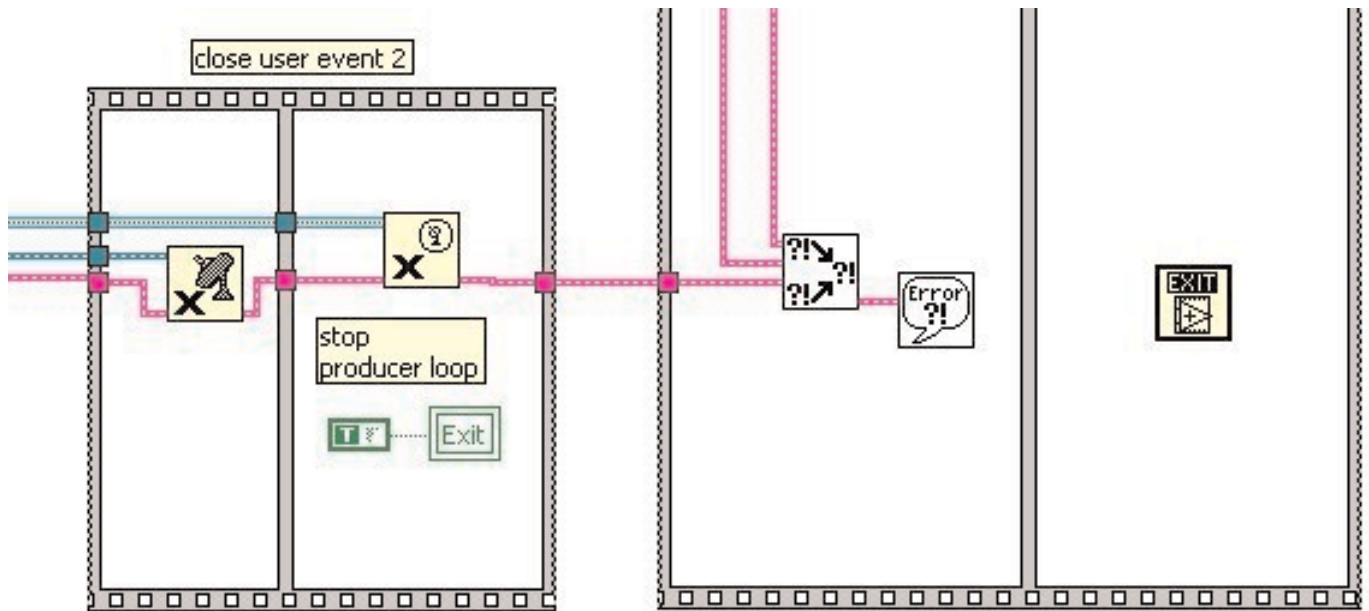
If the condition is true, the LED is set. The basic condition can then no longer become true unless the LED is turned off. This can happen in the center case structure. This applies when the weight value falls short of the threshold value. Then the quality color is grayed and the smaller weight value is displayed in the slide.

Note:

The slide value has 5 components. The weight value is the center one.

Exiting the Program

When both loops are ended, the program carries out a phase consisting of cleanup procedures until the application is closed. An excerpt of this is shown in the figure.



Here the user event of the consumer loop is erased and closed.
Then an accumulated error is calculated and the total error is displayed if necessary.
Then the application is closed.

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