



Life Sciences

## Instructions For Use

USD 2755

# Remote Control of the Palltronic® Flowstar IV Integrity Test Instrument Using OPC Communication



## Contents

<b>1. Safety Instructions .....</b>	<b>4</b>
1.1 Installation.....	4
1.2 Filter Assembly .....	4
1.3 Personal Safety.....	4
1.4 Use of Compressed Gas.....	4
1.5 Electrical .....	4
<b>2. Introduction .....</b>	<b>5</b>
2.1 Key Features and Benefits .....	5
2.2 Standard Functions.....	5
2.3 Overview of OPC Server Operation.....	6
<b>3. Installation .....</b>	<b>6</b>
3.1 Installation of the Simple Client demo Software .....	6
3.2 Connecting a Palltronic Instrument to the PC .....	7
<b>4. Remote Operation using the OPC Server .....</b>	<b>7</b>
4.1 Special Considerations regarding Test Parameters .....	7
4.2 Verifying the Operation of the OPC Server .....	7
4.3 Connecting a Client to the OPC Server.....	9
4.4 Commands, Parameters and Data available to the OPC Client.....	9
4.4.1 Additional Information on OPC Server Parameters and Commands.....	11
4.4.2 “Status” codes.....	12
4.4.3 “Result” Codes .....	12
4.4.4 Stored test result retrieved from the instrument .....	14
4.5 General Considerations for OPC Server Operation .....	14
4.5.1 Connection between Instruments and OPC Server .....	14
4.5.2 Data Handling .....	14
4.5.3 Check Procedures .....	14
4.5.4 Use of Multiple OPC Clients.....	15
4.5.5 Recovery Actions in the Event of Communication or Computer Malfunctions .....	15
4.6 Running a Test on the Palltronic Flowstar IV Instrument .....	15
<b>5. Troubleshooting .....</b>	<b>16</b>
5.1 Preliminary Troubleshooting.....	16
5.2 Continued Difficulties.....	16

## Safety Instructions and Symbols

Safety and information is identified in this instruction manual with the following symbols:



*Warning!*

*identifies a dangerous situation where there is a safety risk and personal injury may follow.*



*Important:*

*identifies a potentially dangerous situation, a risk to the equipment or other important information.*



*Please note:*

*identifies user tips and other useful information.*



*Warning!*

*Please read the following instructions carefully and completely before using the OPC Server software with the Palltronic Flowstar IV instrument.*

These instructions must be read in conjunction with the instruction for use for the Palltronic Flowstar IV integrity test instruments to ensure safe use of the OPC Server connection.

Document title	Number
Palltronic Flowstar IV Integrity Test Instrument: Instruction for Use	USD2594

*Please contact your local Pall office or distributor if you require a copy of the latest revision of any of these documents.*

## 1. Safety Instructions



*Warning!*

*Please read following information carefully and completely before using the instrument.*

### 1.1 Installation

The Palltronic Flowstar IV instrument should be handled with care as appropriate for a sensitive measuring instrument.

- Take care when lifting the instrument. Good practice should be used for manual lifting.
- The instrument should be installed in a manner that prevents the accidental draining of fluid back into the instrument.
- Compressed gas exits from the external vent valve (when fitted) and the 'VENT' connection at the end of the test period. The gas may contain aerosolized fluids from the filter assembly.

### 1.2 Filter Assembly

- The test pressure must be less than the maximum operating pressure rating of the filter housing or filter capsule.

### 1.3 Personal Safety

- Appropriate protective clothing should be worn by operators (e.g. gloves and safety goggles) when working with chemicals and compressed air supplies during filter integrity testing.
- After test, check that the pressure in the filter housing has been vented and has reached atmospheric pressure before attempting to use or dismantle the filter assembly.
- Care should be taken when disconnecting pneumatic tubing from pressurized assemblies.

### 1.4 Use of Compressed Gas

- It is the user's responsibility to ensure that an oil-free regulated gas supply is used during operation of the instrument.
- The maximum inlet pressure of 8 bar (116 psi) must not be exceeded.
- All pneumatic tubing used for integrity testing must be rated to withstand the gas pressures used (up to 8 bar [116 psi]).
- The operator should check the tubing and connectors for damage before each use.
- To prevent the possibility of danger from cross-connection of the pneumatic connections, do not use a male-to-male pneumatic tube on the air outlet connection.

### 1.5 Electrical

- Avoid contact with water and other solvents, particularly at the rear of the instrument.
- The plug must be disconnected from the power source before changing the fuse.
- Repairs must only be done by Pall authorized service personnel. Faulty unqualified repair work may cause accidents or injury to the user.
- Do not open the instrument enclosure under any circumstance, but particularly not with the power on.
- When connecting the instrument, check the electrical cable for damage. If the cable is undamaged then first connect the cable to the instrument, and then connect the cable to the power source. The power source should be grounded.

Because of developments in technology, data or procedures may be subject to change. Consequently, we advise users to review their continuing validity annually.

## 2. Introduction

OPC UA is an existing standard that defines a set of interfaces which allows application interoperability between automation and control applications such as Supervisory Control and Data Acquisitions (SCADA), field systems and instruments (such as the Palltronic Flowstar IV instrument) and mainstream office applications. The Palltronic OPC Server enables any OPC UA-compatible package to be easily configured to control and monitor the operation of Palltronic Flowstar IV instruments. It also allows a developer to design custom Personal Computer (PC) control software, either as a standalone application or as an applet within an application such as Microsoft Excel® software.

The OPC Server is resident on the Palltronic Flowstar IV instruments (Part numbers FFS04S (standard) and FFS04R (wireless), but not model FFS04B (basic)).

The OPC Server provides access to the applicable parameters and control signals in order to enable an OPC Client (i.e. SCADA package or PC application) to initiate and control integrity tests on the Palltronic instrument(s) to which it is connected.

The OPC Client is specific to the application and must be created by the user.

During and after the test process, the OPC Server publishes the status of the test and the measured result (if applicable). The OPC Client can then store this data, along with instrument-specific data such as serial number and last calibration date. Additional information may be entered into a custom-written client and collated into the SCADA as part of a comprehensive electronic batch record; this information cannot be sent to the instrument and stored in it.

The OPC Server is written to the OPC UA specification, version 1.0. Users should confirm that a compatible specification is used for the OPC Client software.

The full specifications for OPC are maintained and made available by the OPC Foundation (<http://www.opcfoundation.org>). Software developers are encouraged to obtain this information and become familiar with the standard before attempting to write custom client software for the Palltronic OPC Server. The OPC Foundation also has made available a Software Development Kit (SDK) which may provide a basis for writing client software.

### 2.1 Key Features and Benefits

The OPC Server allows end-users to integrate Palltronic instruments into a SCADA system, or any custom-designed PC application that is capable of supporting OPC UA Automation. The system calls the Palltronic instruments to perform the tests required and the system receives the results at the end of the test sequence. The main benefits are minimisation of operator involvement, integration of the Palltronic instruments into the normal operation of the plant, and the possibility to incorporate the test results into the batch record. An OPC Client may also access the OPC Server over a network connection, removing the necessity for the test operator to be in the same part of the plant as the OPC Server and the Palltronic instruments. The equipment under test must either be a permanent installation or set-up manually for each test.

### 2.2 Standard Functions

The OPC Server will allow an OPC Client to start the following standard functions on the Palltronic Flowstar IV instrument:

- Forward Flow Test (FF)
- Bubble Point Test (BP)
- Water Intrusion Test (WIT)
- Pressure Decay (PD)
- Leak Test (LT)
- Self Test (ST)

The standard function of a combined Forward Flow Test followed by a Bubble Point Test (FF/BP) is not available to an OPC Client via the OPC server. If this combination of tests is required, then the two tests should be called sequentially from the OPC Client.

## 2.3 Overview of OPC Server Operation

When an OPC UA client connects to the OPC Server inside the Palltronic Flowstar IV instrument, it has access to the data structures provided for Automation purposes. This enables the OPC Client to access automatic updates of readable data. In addition, the OPC client can write data values to certain fields within the data structure and call remote functions (e.g. starting or aborting a test). The full data fields and control mechanism for automation can be found in section 4.4.

The OPC server allows:

- The type of test – FF, BP, WIT, LT, PD or ST to be selected
- Test set-up information to be sent to the instrument – e.g. Test pressure, max. flow, etc.
- The test to be started on the instrument
- The test to be aborted on the instrument
- The screen to be locked or unlocked on the instrument
- The retrieval of a complete test record in XML format from the instrument where the “test record id” is known

The number of test parameters to set up a test prior to start is restricted. Additional details which can be included in manual operation, such as housing type, production line reference and batch number should be handled by the OPC Client or other software.



*Please note: The OPC Server does not take any action as a result of checks carried out on communication status and instrument status. It is recommended that status checks and confirmation that commands have been activated are carried out by the OPC Client.*

## 3. Installation

The OPC Server is provided as an integral part of the Palltronic Flowstar IV instrument (Part numbers FFS04S (standard) and FFS04R (wireless)) from version 1.0e and above and does not require special installation.



*Important: Configuring or creating an OPC Client is beyond the scope of this document and as such should only be carried out by a suitably qualified programmer.*

### 3.1 Installation of the Simple Client demo Software

The Simple Client demo software is provided to demonstrate and test the OPC Server operation. It does not require any installation and may be copied to a PC from the USB flash drive, supplied with the Palltronic Flowstar IV instrument, and executed from the PC connected to the Palltronic Flowstar IV instrument.

The Simple Client demo software is provided solely to demonstrate the operation of the OPC UA Server. It is not provided or suitable for use in a production environment. A custom client suited to the end-user requirements must be used.

Installation of the Simple Client demo software requires that the Microsoft .NET 4.0 Framework and the Microsoft Visual C++ 10 redistributable libraries are installed. These are provided on the USB flash drive with the Simple Client demo software. Administrator privileges will be required for this operation. Please contact your system administrator for more information.

### 3.2 Connecting a Palltronic Instrument to the PC

The Palltronic instrument and the client can be connected over a network. This will enable a test to be started from the client and the test result to be read by the client.

User Rights do not need to be switched off on the instrument. If the Palltronic instrument receives an instruction to run a test from the OPC Client, then the instrument will assign the Operator name "Automation" for that test. The test results remain stored on the instrument and can be accessed by the operator in front of the instrument (e.g. to view, print or electronically sign the test). The stored test results can additionally be retrieved by the client. When retrieved from the client, the data will be in the XML format in the same way as the test results export from the Backup Menu.

## 4. Remote Operation using the OPC Server



*Important: Configuring or creating an OPC Client is beyond the scope of this document and as such should only be carried out by a suitably qualified programmer.*

### 4.1 Special Considerations regarding Test Parameters

The OPC Server allows a custom-written OPC Client to transfer test parameters to a Palltronic instrument in order to specify and run integrity tests. As the test is controlled remotely, only the test parameters mandatory to the running of the test are supported (e.g. test pressure, test time, maximum flow rate or minimum bubble point – as appropriate to the type of test). Other information (e.g. product name, batch number, filter type) must be collated on the OPC Client or higher-level SCADA system and cannot be transferred to the Palltronic instrument.



*Important: The OPC Server will not perform validity checks on parameters sent to the Palltronic instrument. If a parameter is set outside the range of the instrument, no error will be generated but the test may not start.*

When operated remotely, the Palltronic instrument can only accept pressure settings in millibar. The OPC client software must convert all pressure parameters to millibar (mbar) using the following conversion factors

1 psi = 68.95 mbar

1 kp/cm<sup>2</sup> = 980.67 mbar

1 kPa = 10.00 mbar

### 4.2 Verifying the Operation of the OPC Server

The OPC Server software is provided with a Simple Client demo application which can be found on the USB flash drive which is supplied with the instrument (see section 3.1).

It is recommended to run the Simple Client demo software to confirm that a correctly written client can communicate with the Palltronic instrument. To do this, double-click on the UaSimpleClient.exe file. The screen shown in Figure 1 will be displayed.

**Figure 1:**  
*OPC Simple Client screen*

Enter the IP address of the Palltronic Flowstar IV instrument into the “IP Address” field (see Palltronic Flowstar IV Integrity Test Instrument: Instruction for Use (latest version) and click the button <Connect>, the screen shown in Figure 2 will be displayed.

**Figure 2:**  
*OPC Simple Client screen*

If communication is established, the current instrument information and status will be pulled

from the instrument and displayed on the screen.

The Simple Client screen will display “Measure” (last measured flow value – if applicable, or a pressure value if the last test performed was a Bubble Point test), “Status”, “Result” (of the last performed test – if applicable) and “ActTestTime” (time remaining for the currently operating test – if applicable). These values will be regularly updated from the instrument.

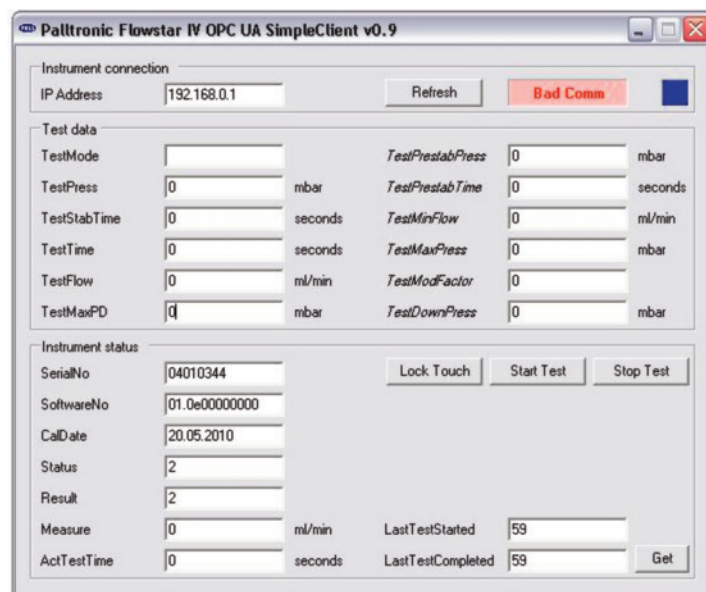


Tests can now be started by entering the correct test code in the “TestMode” field and filling the appropriate parameters in the “Test data” section of the screen. Clicking <Start Test> will only start a test if no other test is currently running on the Palltronic instrument. Clicking <Stop Test> will abort any tests currently running on the instrument.

The remote operation of the Palltronic instrument does not include feedback on the validity of test parameters: incorrect values will result in the test not starting – this can be monitored through the “Status” field. Similarly, tests should only be started when the “Status” field shows ‘2’ – indicating that the Palltronic instrument is waiting for input.

If the communication link cannot be established (or is lost) between the client and the instrument, a “Bad Comm” message will occur as shown in Figure 3.

**Figure 3:**  
“Bad Comm” message



To resolve the problem, ensure that the Palltronic instrument is switched on, that it is correctly configured and connected to the network. If the connection is re-established the “Bad Comm” message will disappear.

### 4.3 Connecting a Client to the OPC Server

The OPC Server can be accessed through OPC Transmission Control Protocol (TCP) at port 4841. The IP address of the instrument can be read from the network status bar at the bottom of the screen on the instrument.

An example Uniform Resource Locator (URL) to be entered into a client could be “opc.tcp://192.168.1.1:4841”. When using the Simple Client demo software, only the IP address is required; the simple client software will automatically use OPC TCP protocol at port 4841.



*Please note: It may be necessary to configure any network firewall to ensure that port 4841 can be accessed in a secure fashion. No configuration is required for the Palltronic Flowstar IV instrument itself.*

### 4.4 Commands, Parameters and Data available to the OPC Client

This section has been written with the OPC Client in mind: parameters that are “read”-enabled are retrieved from the OPC Server; parameters that are “write”-enabled are sent to the OPC Server. The numbers in the data type column refer to OPC Automation data type identifiers.

**Table 1:**  
*Commands, Parameters and Data*

Parameter	Description	Data type	Access
LifeBeat	A counter that increments with each seconds; runs from 0 to 255 and then restarts from 0.	Integer	Read
DeviceType	Indicates the type of instrument connected ('14' = FFS04)	Integer	Read
SerialNo	Instrument serial number	String (max. 20 chars)	Read
SoftwareNo	Instrument software version number	String (max. 20 chars)	Read
CalDate	Instrument date of last calibration	String (max. 20 chars)	Read
TestMode	Test mode (1 = FF, 2 = WIT, 3 = BP, 4 = ST, 5 = LT, 6 = PD)	Integer	Write
TestPress	Defines the test pressure (mbar) or minimum bubble point (mbar) in BP tests	Integer	Write
TestTime	Defines the test time (sec) ('0' = Automatic test time)	Integer	Write
TestFlow	Defines the flow-rate (mL/min)	Floating Point	Write
TestMinFlow	Defines the minimum flow-rate where the instrument is configured to accept this field	Floating point	Write
TestMaxPD	Defines the maximum pressure decay limit for PD test (mbar)	Integer	Write
TestModFactor	Defines the module factor for BP test	Floating Point	Write
TestMaxPress	Defines the maximum pressure for BP test (mbar)	Integer	Write
TestStabTime	Defines the stabilisation time for PD test (sec)	Integer	Write
TestDownPress	Defines the downstream pressure limit where the device is configured to accept this field (sec)	Integer	Write
TestRunning	Indicates whether a test is running (i.e. "true" when "Status" is not '2')	Boolean	Read
TestPassed	Indicates whether a test has passed on completion (i.e. "true" when "Result" is '7', '12', '15', '26', '30' or '36')	Boolean	Read
Status	Indicates the current operational status of the instrument – see section 4.4.2	Integer	Read
Measure	Indicates the current measured value of the test flow-rate (mL/min) or bubble point (mbar)	Floating point	Read
Measure. Engineering.Units	Provides the units for the "Measure" value (either "mL/min" or "mbar" depending on the test phase in progress)	EUInformation object	Read
Result	Indicates the result code for the test including error codes. – see section 4.4.3	Integer	Read
ActTestTime	Indicates the remaining time for the current test (sec)	Integer	Read
LockTouchScreen	Locks the touch-screen to limit direct user interaction on instrument. Read indicates the status of the touch-screen lock	Boolean	Read / Write
TestStartCmd	Requests the instrument to start a test according to the parameters provided	Method	n/a
TestStopCmd	Requests the instrument to abort any test currently running	Method	n/a
RequestInfoCmd	Requests serial number, software version, last calibration date to be updated. Also updates DeviceType and "Lock-TouchScreen" fields.	Method	n/a
RequestTestRecord	Requests the data for a specific test result record according to a supplied test record identifier. Returns in XML format.	Method	n/a



*Important: The OPC Server will not perform validity checks on parameters sent to the Palltronic instruments. If a parameter is set outside the range of the instrument, no error will be generated but the test may not start. At all times, monitoring the “Status” field will enable this to be handled.*



*Please note: When operated remotely, the Palltronic instruments can only accept pressure settings in millibar. The measured Bubble Point value returned by the instrument will also be in millibar. Section 4.1 provides conversion factors for common pressure units.*



*Please note: The value written to an integer boolean type is ‘0’ for false and any other value for true, but a value of 1 is recommended to indicate ‘true’.*

#### 4.4.1 Additional Information on OPC Server Parameters and Commands

##### **“TestStartCmd”**

Changing “TestStartCmd” to “true” will request that the Palltronic instrument starts the test defined by TestMode, TestPress, TestFlow and TestTime parameters. The test instrument will only respond to the command if stopped and waiting for input, i.e. if “Status” is equal to ‘2’. The request to start is sent once only.

This means that the next test will not be queued and will not start if the instrument is already busy.

For this reason it is recommended that instrument status and communication status are checked by the OPC Client, and that the action is confirmed, i.e. “Status” becomes not equal to ‘2’.

Following confirmation that the test has started, the “TestStartCmd” should be reset to false.

##### **“TestStopCmd”**

“TestStopCmd” will stop a test started by the OPC Server that is currently running on the Palltronic instrument. If a test is started manually on the instrument this can be stopped by the OPC Server.

As with the “TestStartCmd”, it is recommended that the OPC Client is used to implement status checks and confirm the action.

##### **“LockTouchScreen”**

“LockTouchScreen” set to “true” will lock the touchscreen on the Palltronic instrument.

This command can be used to prevent manual intervention on the instrument when a test is in progress.

“LockTouchScreen” set to “false” will unlock the touchscreen on the Palltronic instrument.

In the event of a computer failure, the screen can be unlocked by turning the power to the instrument off and then on again. Please note that if a local power failure occurs the touch screen will be unlocked when power is restored.

#### 4.4.2 “Status” codes

The “Status” output codes give the current status of the instrument. Possible values of the codes are shown in Table 2.

**Table 2:**  
“Status” Codes

Status	Description	“Measure” field valid?		
		Flow	Pressure	Test <sup>1</sup>
1	Not used	✗	✗	
2	Instrument is idle, waiting for input	✗	✗	
3	Printer is active	✗	✗	
8	Pre-stabilization phase is active	✗	✗	FF, WIT, LT, BP
9	Vent phase active	✗	✗	
10	Not used	✗	✗	
11	Self test is active	✗	✗	ST
12	Pressurization phase is active	✗	✗	FF, WIT, LT, PD, BP
13	Stabilization phase is active	FF only	✗	FF, WIT, LT, PD
14	FF measurement phase is active	✓	✗	FF
15	WIT measurement phase is active	✓	✗	WIT
16	BP measurement phase is active	✗	✓	BP
19	FC measurement phase is active	not obtainable via remote control		
21	LT measurement phase is active	✓	✗	LT
22	PD measurement phase is active	✗	✓	PD
81	Wet clean is active	✗	✗	
82	Air clean 1 is active	✗	✗	
83	Air clean 2 is active	✗	✗	

<sup>1</sup> The “Test” column indicates specific events that only occur in certain tests; a blank entry indicates system-wide events. It is meant as a guide to likely events that can occur during a test process, but is not exclusive.

#### 4.4.3 “Result” Codes

At the end of the test process, the “TestRunning” signal will change from true (non-zero) to false (zero). Also the “Status” field will change to ‘2’ indicating that the instrument is waiting for input. The OPC Client can monitor either of these parameters to determine when the “Measure” and “Result” fields become valid.

The possible “Result” values are shown in Table 3.

**Table 3:**  
“Result” Codes

Result	Description <sup>1</sup>	“Measure” field valid?		
		Flow	Pressure	Test <sup>2</sup>
0	Instrument is Active or no test has been run (when “Status” = 2)	✓	✓	FF, WIT, BP
1	Internal error	✗	✗	
2	“Line pressure too low”	✗	✗	FF, WIT, BP, LT, PD
3	“Pressure not obtainable” (pressurising phase)	✗	✗	FF, WIT, BP, LT
4	“Line pressure unstable”	✗	✗	FF, WIT, LT
5	“Flow too high”	✗	✗	FF, WIT, LT
6	“Flow too low”	✗	✗	FF, WIT, LT
7	“Flow within limits” – test pass (actual flow < max)	✓	✗	FF, WIT, LT
8	“Flow outside limits” – test fail (actual flow > max)	✓	✗	FF, WIT, LT
9	“Manual abort”	✗	✗	
10	“Flow measurement unstable” (measurement phase)	✗	✗	FF, WIT, LT
11	not used	✗	✓	
12	“BP within limits” – test pass (bubble point > min)	✗	✓	BP
13	“BP outside limits” – test fail (bubble point < min)	✗	✗	BP
14	“BP not obtainable” – pressure not obtainable	✗	✗	BP
15	“Self test passed”	✗	✗	ST
16	“Self test failed”	✗	✗	ST
17	not used	✗	✗	
18	not used	✗	✗	
19	“Manual abort” – Self test aborted	✗	✗	ST
24	“Downstream pressure too high”	✗	✗	
25	“Maximum pressure reached”	✗	✗	BP
26	“No Leak detectable” – test pass	✗	✗	LT
30	“Pressure Decay within limits” – test pass	✗	✓	PD
31	“Pressure Decay outside limits” – test fail	✗	✓	PD
32	“Leak test failure” – BP test – test fail	✗	✗	BP
33	“Pressure increase detected” – test fail	✗	✓	PD
35	“Setup error”	✗	✗	
36	“Low flow – CHECK SYSTEM” – test pass	✓	✗	FF
40	“Ext. PT Error” (Downstream PT not connected)	✗	✗	
41	“Ext. valve Error” (External vent valve not connected)	✗	✗	

<sup>1</sup> Quotes indicate instrument message in English

<sup>2</sup> The “Test” column indicates specific events that only occur in certain tests; a blank entry indicates system-wide events. It is meant as a guide to likely events that can occur during a test process, but is not exclusive. While a FF, WIT or BP test is in the measurement phase the “Measure” field contains the current measured value for monitoring purposes (see Section 4.4).

#### 4.4.4 Stored test result retrieved from the instrument

The Palltronic Flowstar IV OPC Server allows the retrieval of stored test results from the instrument.

Any test result currently stored on the instrument can be retrieved as long as the test identifier<sup>1</sup> is known.

The test result can be recalled by using the "RequestTestRecord" method, passing the test identifier as the only parameter. The test identifier can be retrieved from the instrument through the "LastTestCompleted" or "LastTestStarted" fields. The test result record will be returned in XML format and can be stored to an external location. If the test result record does not exist, or the test identifier was invalid, an error will be returned from the "RequestTestRecord" method.

### 4.5 General Considerations for OPC Server Operation

#### 4.5.1 Connection between Instruments and OPC Server

The connection between individual Palltronic instruments and the OPC UA client can be achieved in a number of ways over wired or wireless network. It is the responsibility of the user to ensure that this communication is effective and robust and is not prone to errors or other communication difficulties. Any network or routers used should be checked to ensure sufficient capacity is available.

Details of such communication strategies are beyond the scope of this document, but for additional information, please contact your local Pall office or distributor.

#### 4.5.2 Data Handling

The only data supplied to the instrument from the OPC Client are a subset of the complete test parameters. This subset only includes the parameters that actually control how the test operates and does not include informational parameters such as filter type or production area. These other data where still relevant to the test should be collated with test results and stored by the OPC Client or other software.

It is recommended that the OPC Client or other software maintains a set of operational data describing the current state of the instrument. This is to allow recovery in the event of problems with communication between the Client and the instrument, or in the event of a computer crash or hardware problem.

Test results should be read and stored as appropriate by the OPC Client on completion of each test. If a new test is started on the instrument, the previous test result will no longer be accessible through the OPC Server unless the test record is specifically requested by the client.

#### 4.5.3 Check Procedures

Palltronic instruments are only capable of receiving and implementing a remote command to start a test when waiting for input with no test running. This means that if a start command is sent to a Palltronic instrument, the server will ignore the command if a test is already running. The client should therefore include checking on communication and instrument status as appropriate and the capability to confirm that a command sent to the OPC Server has been carried out on the Palltronic instrument.

Once a test is started from the OPC Server on a Palltronic instrument, the test will run to completion unless stopped from the OPC Client via the OPC Server. If the instrument is switched off while the test is running, the test will abort immediately and communication with the client will be lost.

<sup>1</sup>The test identifier increments by one for each test queued on the instrument, but deleting test results or setting the unit back to factory defaults does not reset this back to 1. The test identifier is a 32-bit unsigned integer, meaning up to 4.3 billion test results can be accessed on the instrument

#### 4.5.4 Use of Multiple OPC Clients

The use of more than one OPC Client is permissible, but the OPC Server cannot distinguish one client connection from another. It is highly recommended that if multiple clients are used, only one client is designed to control the instruments via the OPC Server. The other clients must be configured to be passive, read-only software.

#### 4.5.5 Recovery Actions in the Event of Communication or Computer Malfunctions

If a test is started from the OPC Server, the Palltronic instrument will run the test to completion, even if the communication is interrupted between the client and the server.

The advantage of this mode of operation is that when the communication is restored, it is possible to retrieve test data from the instrument, provided that no other operation or loss of power has occurred on the instrument. The requirement for recovery of data following this type of event should be considered when the OPC Client is written.

If communication between the client and an instrument is interrupted, a properly written client should be able to detect the loss of communication and may be able to reconnect automatically when the communication is available again.

When the communication is restored with the instrument, provided that the test has not been aborted or a second test started manually on the Palltronic instrument:

- If the test is still running, the “Status” parameter will show the current status, and the “Measure” parameter will show the last measured flow value or pressure value as applicable. The operation and data exchange will continue as normal
- If the test has completed, the “Status” parameter will show a value of ‘2’, indicating that the instrument is waiting for input, the “Measure” parameter will show the final measured flow value or pressure value as appropriate, and the “Result” parameter will show the applicable pass/fail result or an error code.

#### 4.6 Running a Test on the Palltronic Flowstar IV Instrument

The following sequence contains the steps required for an OPC Client application to control and monitor a test on the Palltronic Flowstar IV instrument through the OPC Server software.



*Please note: In order to ensure correct operation, the OPC Server software must be functioning correctly on the Palltronic Flowstar IV instrument and the instrument must be switched on and should be showing the ‘Main Menu’ screen before executing the following sequence. This may require operator intervention.*

1. Ensure that communication with the Palltronic Flowstar IV instrument is working.
2. Ensure that the “Status” field is ‘2’ indicating that the instrument is waiting for input.
3. Set “TestMode” to the required test method and supply the test parameters “TestPress”, “TestFlow” (not required for a Bubble Point test) and “TestTime” as applicable to the test. Set other non mandatory test parameters as applicable
4. Call the “TestStartCmd” method to initiate the test on the instrument. The serial number, software version and calibration date can be read from the instrument by the client at this point.
5. The “Result” field will show ‘0’ indicating the test is active and “Status” will reflect the current phase of testing.
6. When “Status” shows ‘2’ the instrument has completed the test and is ready to accept new test data. “Result” will show the applicable end result and “Measure” will hold the measured value. See Section 4.4.3 for details on the result codes and the contents of the “Measure” parameter

## 5. Troubleshooting

### 5.1 Preliminary Troubleshooting

If any difficulties are experienced with communication, please try the following:

- Check the operation of the network at both the instrument and the PC.
- Check that the test parameters used are within the valid ranges of the Palltronic instrument (see the Instruction for Use for details of the valid ranges)
- Check the Palltronic Flowstar IV Instruction for Use for instrument related troubleshooting.

### 5.2 Continued Difficulties

If following the steps in Section 5.1 has not solved the problem, check that the same failure occurs under the same conditions with the Simple Client software provided on the USB flash drive. If the Simple Client exhibits the same behaviour, contact Pall Corporation for support with further investigation. If the Simple Client does not exhibit the failure, please check the conformance of your client software to the OPC specification UA version 1.0.

If you require technical support please contact your local Pall office or distributor, this may be as a charged service if on-site technical support is required. Supplying a detailed written description of the problem will facilitate a quick response.



Life Sciences

#### United States

1.800.717.7255 toll free (USA)  
1.516.484.5400 phone  
1.516.801.9548 fax  
biotech@pall.com E-mail

#### Europe

+41 (0)26 350 53 00 phone  
+41 (0)26 350 53 53 fax  
LifeSciences.EU@pall.com E-mail

---

**Visit us on the Web at [www.pall.com/biopharm](http://www.pall.com/biopharm)**


**E-mail us at [biopharm@pall.com](mailto:biopharm@pall.com)**

---

#### International Offices

Pall Corporation has offices and plants throughout the world in locations such as: Argentina, Australia, Austria, Belgium, Brazil, Canada, China, France, Germany, India, Indonesia, Ireland, Italy, Japan, Korea, Malaysia, Mexico, the Netherlands, New Zealand, Norway, Poland, Puerto Rico, Russia, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, the United Kingdom, the United States, and Venezuela. Distributors in all major industrial areas of the world.

The information provided in this literature was reviewed for accuracy at the time of publication. Product data may be subject to change without notice. For current information consult your local Pall distributor or contact Pall directly.

© 2011, Pall Corporation. Pall, , and Palltronic are trademarks of Pall Corporation. ® indicates a trademark registered in the USA and TM indicates a common law trademark. **Filtration.Separation.Solution.sm** is a service mark of Pall Corporation. \*Microsoft, Excel and Windows are trademarks of Microsoft Corporation. OPC is a trademark of the OPC Foundation