



Instruction manual



FlowDDE

Doc. no.: 9.17.067A Date: 27-05-2011



ATTENTION

Please read this instruction manual carefully before installing and operating the instrument.
Not following the guidelines could result in personal injury and/or damage to the equipment.

Disclaimer

Even though care has been taken in the preparation and publication of the contents of this manual, we do not assume legal or other liability for any inaccuracy, mistake, mis-statement or any other error of whatsoever nature contained herein. The material in this manual is for information purposes only, and is subject to change without notice.

Bronkhorst High-Tech B.V.
May 2011

Symbols



Important information. Discarding this information could cause injuries to people or damage to the Instrument or installation.



Helpful information. This information will facilitate the use of this instrument.



Additional info available on the internet or from your local sales representative.

Table of contents

1	GENERAL PRODUCT INFORMATION	4
1.1	INTRODUCTION	4
1.2	REFERENCES TO OTHER APPLICABLE DOCUMENTS.....	4
1.2.1	Manuals and user guides.....	4
1.2.2	Technical drawings	4
1.2.3	Software tooling	4
1.3	SUPPORTED INSTRUMENTS.....	4
1.4	SYSTEM REQUIREMENTS	5
1.5	INSTALLATION AND START UP.....	5
1.5.1	Start up options	5
2	INTERFACES.....	6
2.1	RS232/FLOW-BUS INTERFACE.....	6
2.1.1	D-connector for RS232.....	6
2.2	RS232 ON MULTIBUS INSTRUMENT	7
2.2.1	Applications, e.g. EL-FLOW.....	7
3	PARAMETER INFORMATION	8
4	OPERATION.....	10
4.1	BASIC: COMMUNICATION TO INSTRUMENTS AND SERVING CLIENT APPLICATIONS	10
4.1.1	Communication settings.....	10
4.1.2	Open communication.....	11
4.1.3	Close communication.....	11
4.2	CONFIGURATION	11
4.3	SETTINGS	12
4.3.1	Poll time.....	12
4.3.2	System settings.....	12
4.4	VIEW AND EDIT PARAMETERS	13
4.4.1	View parameters and values	13
4.4.2	Edit parameters	13
4.5	TEST COMMUNICATION	14
4.5.1	Test FLOW-BUS and DDE	14
4.5.2	Test ProPar.....	15
4.6	SERVICE LOG.....	15
5	DDE COMMUNICATION BY CLIENTS	16
5.1	BASIC PARAMETER COMMUNICATION	16
5.2	SPECIAL OPTIONS.....	16
5.2.1	Channel 0.....	16
5.2.2	Parameter 0.....	16
5.2.3	Server topic.....	17
6	FLOWDDE TECHNICAL DETAILS	18
7	SERVICE	19

1 GENERAL PRODUCT INFORMATION

1.1 INTRODUCTION

This manual will explain the operation of the software tool FlowDDE. It has been written based on FlowDDE V4.67, but should be suited for former (and future) versions as well, although functionality may differ from what is described.

FlowDDE is a Dynamic Data Exchange (DDE) server, an easy connection between Windows applications and digital Bronkhorst¹⁾ instruments. DDE provides a basic level of interprocess communication between Windows applications.

By using DDE commands, sent by software to FlowDDE, data can be sent to or requested from digital instruments. FlowDDE handles all communication to the instruments and provides the data to applications.

Examples of applications with DDE communication are Microsoft Excel and LabVIEW (National Instruments). Several Bronkhorst applications require FlowDDE for communication to the instrument(s), e.g. FlowPlot and FlowView.

¹⁾ *Bronkhorst: This includes Bronkhorst High-Tech B.V. , Bronkhorst Cori-Tech B.V. and M+W Instruments GmbH.*

1.2 REFERENCES TO OTHER APPLICABLE DOCUMENTS

Manuals and guides for digital instruments are modular. General instructions give information about the functioning and installation of instruments. Operational instructions explain the use of the digital instruments features and parameters. Fieldbus specific information explains the installation and use of the fieldbus installed on the instrument.

1.2.1 Manuals and user guides

Operation instructions digital instruments	(document nr. 9.17.023)
FLOW-BUS interface	(document nr. 9.17.024)
Profibus-DP interface	(document nr. 9.17.025)
DeviceNet interface	(document nr. 9.17.026)
Modbus slave interface	(document nr. 9.17.035)
RS232 interface with FLOW-BUS protocol	(document nr. 9.17.027)

1.2.2 Technical drawings

Hook-up diagram laboratory-style MBC RS232 + analog	(document nr. 9.16.062)
Hook-up diagram industrial style MBC RS232 + analog	(document nr. 9.16.051)
Hook-up diagram CORI-FLOW RS232 + analog	(document nr. 9.16.044)
Hook-up diagram LIQUI-FLOW L30 digital RS232 + analog	(document nr. 9.16.073)

1.2.3 Software tooling

FlowPlot	(document nr. 9.17.030)
----------	-------------------------



All these documents can be found at:
<http://www.bronkhorst.com/en/downloads>

1.3 SUPPORTED INSTRUMENTS

All FLOW-BUS instruments and instruments with RS232 communication, with the following limitations:

- RS232/FLOW-BUS interface: 16-bit is not supported and 32-bit firmware >= 4.09 only
- Digital mass flow meters/controllers without RS232 communication: firmware >= V5.xx only
- Digital readout control modules (E-7000): firmware >= V3.xx only

1.4 SYSTEM REQUIREMENTS

Processor	x86 or x64 700 MHz or higher
Memory (RAM)	64 MB
Hard disk	20 MB available disk space
Display	800 x 600 or higher resolution, 256 colors or more
Connections	RS232 port with FIFO buffers
Operating system	Windows 2000, XP, Vista (x86 or x64) or 7 (x86 or x64)



The digit grouping symbol of currency must always differ from the number's decimal symbol. Having equal symbols is not valid (not just in this situation, but also in other situations) and will probably cause other problems as well. See Microsoft's KB198098.



To avoid communication errors, it is advised to use a serial (RS232) port with hardware buffer overrun detection. Few USB-RS232 converters have this feature, but e.g. the Digitus part no. DA-70156 has.

1.5 INSTALLATION AND START UP

Follow on-screen instructions when installing FlowDDE.

FlowDDE will be installed in **C:\Program Files\Bronkhorst\FlowDDE32**.

Start FlowDDE through the Start menu: **Start >> (All) Programs >> Bronkhorst >> FlowDDE V4.67**.



***C:\Program Files** is a system folder and is followed by **(x86)** on 64-bit Windows versions and may differ on non-English Windows versions.*

1.5.1 Start up options

In some situations, it is convenient that FlowDDE behaves differently or performs an action after startup. The following start up options are available:

- FlowDDE /o open communication to FLOW-BUS
- FlowDDE /s start simulation mode
- FlowDDE /d accept all FLOW-BUS configuration changes on open communication
- FlowDDE /q disable pop up message boxes
- FlowDDE C:\client.exe start the client application C:\client.exe (usually in combination with /o)

2 INTERFACES

2.1 RS232/FLOW-BUS INTERFACE

The RS232/FLOW-BUS interface is an interface between the FLOW-BUS and the RS232 V24 serial (computer) port. It will either be supplied as a separate enclosed unit with a FLOW-BUS connector and a RS232 connector or as an integral 14TE module of your E-7000 readout and control system. The converter offers communication with a baud rate up to 38400 baud. Communication software support is available. Communication settings are: 38400, n, 8, 1.



2.1.1 D-connector for RS232

The female RS232 (x) (sub miniature 9-pin) D-connector has the following pin configuration:

Pin number	Description
1	not connected
2	TXD
3	RXD
4	not connected
5	0 Vd
6	DTR
7	CTS
8	RTS
9	Shield

2.2 RS232 ON MULTIBUS INSTRUMENT

The RS232 interface on a multibus instrument can be connected to any RS232 V24 serial (computer) port. Make sure to respect the hook-up diagram. Bronkhorst offers special cables for communication, separating the RS232 lines from the power and analog in- and output. On the 9-pin male D-sub connector of the instrument RX and TX are available on pin 6 and pin 1.

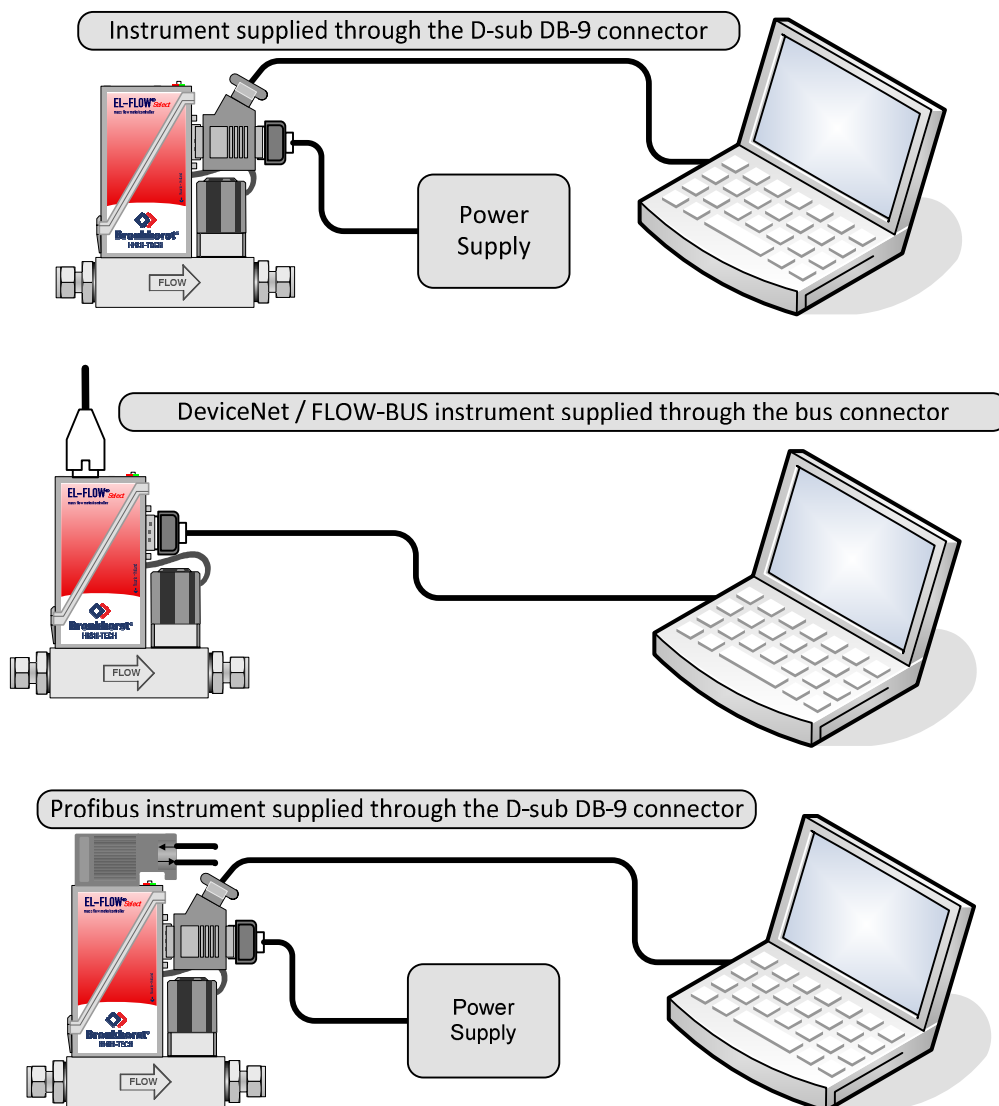
Serial RS232 communication on a multibus instrument with RS232 can be treated as a FLOW-BUS system with one instrument and a FLOW-BUS/RS232 interface. In case a FLOW-BUS fieldbus connection is present, other instruments connected to the FLOW-BUS can be communicated with as well.

RS232 communication is possible by:

- 9-pin Sub D-connector (non-IP65 instruments, e.g. EL-FLOW)
- 8-pin DIN connector (IP65 instruments, e.g. CORI-FLOW)

For the exact connections please advise your hook-up diagram.

2.2.1 Applications, e.g. EL-FLOW



By default, the interface offers communication at a baud rate of 38400 baud. On instruments that offer the possibility to change the RS232 baud rate, the baud rate may be configured differently. See the technical documentation of your instrument which baud rates are supported.

3 PARAMETER INFORMATION

FLOW-BUS is used for parameter value exchange between instruments and operation modules (keyboard or PC-interface). Parameter information consists of several properties for behaviour within the FLOW-BUS system. In the 'parameter properties' table you will find a list of parameters and their properties. In the 'parameter values' table, the values are described more detailed. This list consists mostly of parameters for mode settings.

Property description in parameter properties table	
Item	Description
Parameter(DDE)	Unique parameter number (also used for DDE-communication: P(x)).
Name	Name of the parameter, used for parameter identification.
Process	Process where parameter is used on FLOW-BUS module, used for communication directly through RS232. When empty in the table, the process has to be determined from the FLOW-BUS system information (for parameters located in more than one process, e.g. setpoint, measure).
FBnr(parameter)	Parameter number in process on FLOW-BUS module, used for communication directly through RS232.
Type	Variable type of the parameter <ul style="list-style-type: none"> • c (unsigned) char 1 byte value 0..255 when StrLen is 0 • c string Multiple bytes when StrLen is other than 0 • i (unsigned) integer 2 bytes value 0..65535 • f float 4 bytes value +-1.18E-38..+-3.39E+38 (IEEE-floating point notation) • l (unsigned) long 4 bytes value 0..4294967295 data types > 1 byte are MSB first.
StrLen	Length of string in bytes (characters) used in combination with Type c for strings <ul style="list-style-type: none"> • -2 indicates that a string is zero-terminated, not defined in length, but until the first 0-char. • X indicates a string with a length of X bytes • 0 means no info required (not a string type parameter)
Min	Minimum value of parameter allowed when parameter is read/written. The value will be checked on this limit (error when out of limit).
Max	Maximum value of parameter allowed when parameter is read/written. The value will be checked on this limit (error when out of limit).
Read	Indication if parameter is allowed to be read via FLOW-BUS.
Write	Indication if parameter is allowed to be written via FLOW-BUS.
Poll	Indication if parameter should be polled continuously by FlowDDE in order to keep the (changing) parameter value up to date.
Advanced	Indication if parameter is for advanced users only. These are mainly parameters for maintenance/service.
Secured	Indication if parameter is secured for use through FLOW-BUS. Reading this parameter is possible, but changing it needs special handling.
High security	Indication if parameter is highly secured (only few parameters). Reading this parameter is possible, but changing it needs special handling.
Description	Short description about the meaning of parameter or where it is used for.
DDE str	Parameter DDE string (max. 10 characters). This becomes the DDE value when parameter is not available on instrument. Also: until FlowDDE V4.58 used for parameter identification.



Changing parameter values is possible when a parameter is not read-only and not secured. The range and type of parameters are described in the tables. When parameter values are out of range they will be either 'clipped' on the nearest value allowed or you will get an error message: 'parameter value error'.

(FlowDDE) Parameter numbers:

All parameter information is referenced to the parameter number. This is a unique number for a parameter to avoid redundancy. These numbers are needed for DDE communication only.

For communication with FLOW-BUS through other ways than DDE, directly via RS232 ASCII-strings or via C-libraries, use the parameter numbers for the FLOW-BUS modules (in column FBnr of Parameter properties table). Also you will

need to know the node address of the instrument on the FLOW-BUS, the process number and the parameter number on the instrument.

The node address is the node address of the instrument on the FLOW-BUS. RS232 interfaces accept node address 128. When sending messages to node address 128, the message will always be accepted, regardless the true node address of the instrument on the bus.

The process can be found in the parameter table or has to be determined when nothing is filled in. In that case, the process number most often is 1, but on devices with e.g. multiple sensor channels, the process will be 1 for the first channel, 2 for the second, and so on up to 32. On these modules also process 33, 65 and 65 are multiplied in this way.

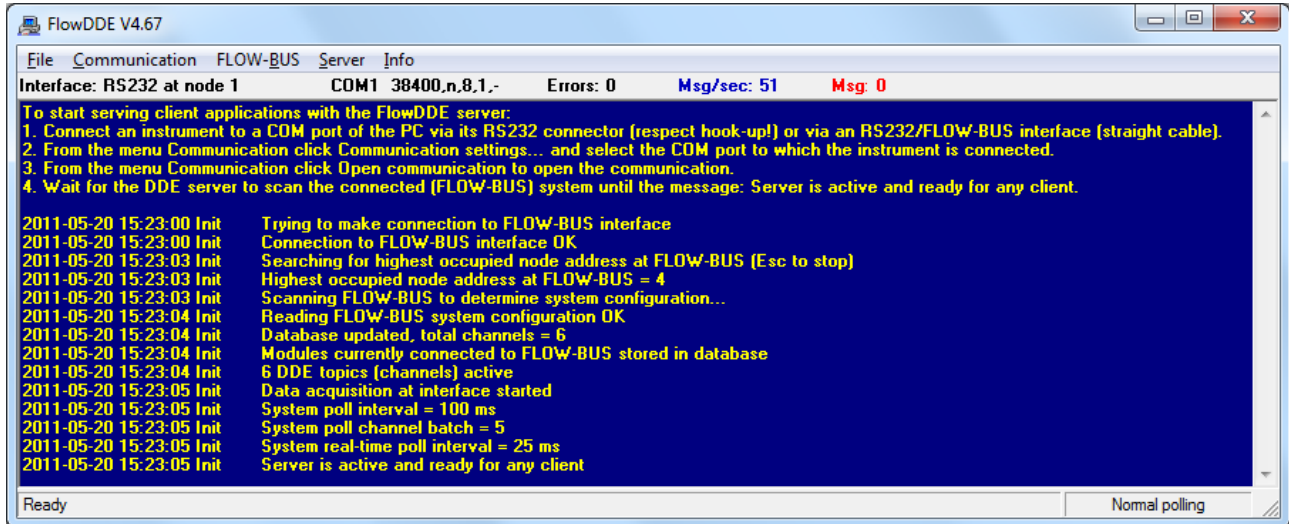


It is important to know that not all parameters are available on all (FLOW-BUS) instruments. For more details about parameters and their use see also the technical documentation of your instrument. The Bronkhorst software application FlowDDE also gives an overview of which parameters are available on which devices.

4 OPERATION

4.1 BASIC: COMMUNICATION TO INSTRUMENTS AND SERVING CLIENT APPLICATIONS

Once FlowDDE has been started, the main window will appear. It consists of a menu bar, an information line and a messages section.



In the messages section the general procedure to start serving client applications with the FlowDDE server is described in four steps:

1. Connect an instrument to a COM port of the PC
2. Set the communication settings
3. Start the communication
4. Wait until FlowDDE is ready

Using the information of chapter 2 and/or the hook-up diagram, physically connect the instrument to the COM port of the PC.

4.1.1 Communication settings

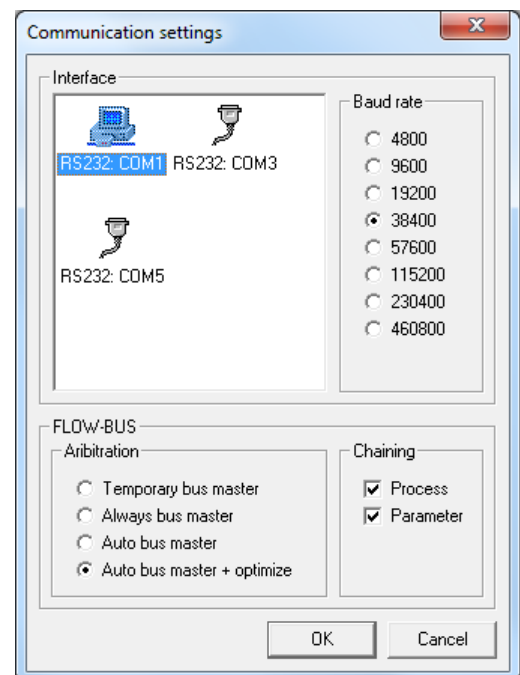
Before communication to the instrument(s) can be made, the communication settings have to be correctly configured. Open the communication settings from the menu **Communication >> Communication settings...** or by pressing **F2**. The window shown at the right hand side pops up.

At **Interface**, the COM port and the baud rate can be selected. For most interfaces, the default baud rate is 38400.

At **FLOW-BUS** some settings for the FLOW-BUS interface can be set. The default values (Auto busmaster + optimize and both process and parameter chaining enabled) should only be changed in case these options are not supported, i.e. only for legacy interfaces.

On **OK** the settings are accepted, whereas on **Cancel** FlowDDE retains its settings.

In the main window, the actual communication settings are shown below the menu bar, next to the interface status.



4.1.2 Open communication

Once the communication settings are correctly configured, the communication to the instruments can be started and instrument values can be used by client applications.

From the menu, click **Communication >> Open communication** or press **F3**. Now FlowDDE will try to make a connection to the FLOW-BUS interface. Once a connection is established, FlowDDE will initialize the interface when needed and scan the connected FLOW-BUS when present. When the FLOW-BUS configuration is different than the previous configuration, FlowDDE shows a warning. To all connected instruments a channel number is assigned and for each channel the applicable parameter DDE items are created. These parameter DDE items are to be used by client applications.

After all DDE items are created, FlowDDE starts polling several parameters from all instruments periodically. The DDE values of these parameters are updated after each poll, so clients don't need to actively refresh these before using.

From now on, FlowDDE is ready for any client. FlowDDE can be minimized and acts as silently as a server until the communication is closed.

4.1.3 Close communication

Communication to the instrument can be stopped by, from the menu, **Communication >> Close communication** or **F4**. Polling is stopped, all DDE items are terminated and clients can no longer set or get parameter values.

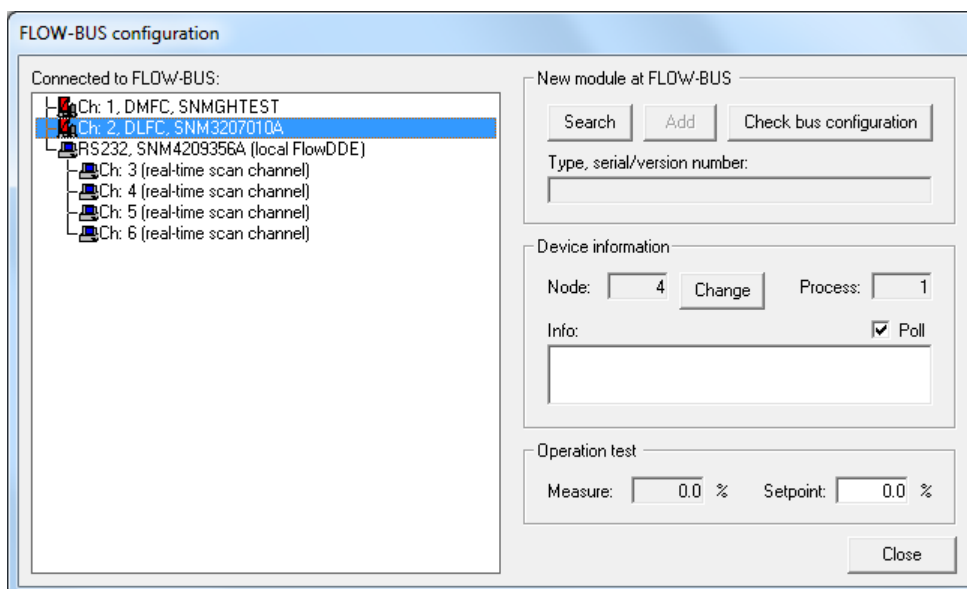


Communication closes automatically when FlowDDE is closed.

4.2 CONFIGURATION

When communication is opened and FlowDDE has scanned the FLOW-BUS system, the FLOW-BUS configuration can be viewed: **FLOW-BUS >> Configuration** or **F5**.

The following window is shown.



On the left hand side, all instruments connected to the FLOW-BUS are shown, ordered by their assigned channel. In this example, two digital controllers (channel 1 and 2) and one RS232/FLOW-BUS interface with 4 real-time channels (channel 3 to 6) are connected.

On the right hand side, the top frame is meant to add legacy modules to the FLOW-BUS. To add such a module, connect the module to the FLOW-BUS, press **Search** and follow on-screen instructions.

At **Device information** information about the selected channel in the list on the left hand side is shown. **Node** shows the current node address of the instrument. The node address of an instrument can be changed by pressing **Change** and entering the new node address. For multi-channel devices, e.g. an RS232/FLOW-BUS interface, the process of the channel is shown at **Process**.

The checkbox **Poll** indicates that selected parameters – those marked Poll in the parameter list – from this channel are polled by FlowDDE when the communication is open.

Any comments about the instrument can be entered in the **Info** field. These comments are stored between FlowDDE sessions as long as the FLOW-BUS configuration is not changed.

The configuration window allows basic testing of a selected instrument. The **Measure** is polled and a **Setpoint** can be written at **Operation test**.

4.3 SETTINGS

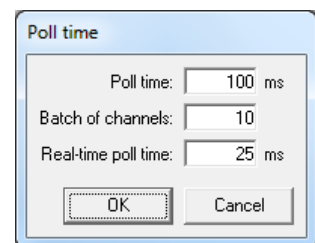
To optimize FlowDDE for your application or to control resources, the behaviour of FlowDDE can be configured. The settings are divided into two categories: poll time and system settings.

4.3.1 Poll time

Parameters of which the value may change frequently are read by FlowDDE periodically. Those parameters are marked Poll in the parameter list. How often these parameters are polled, is determined by the poll time. The lower the poll time, the more often the parameters are read, but the higher the CPU load becomes.

The poll time can be changed at **Server >> Poll time**. The window at the right hand side pops up. It contains three settings:

- **Poll time:** the time between two poll requests.
- **Batch of channels:** the number of channels that are polled at once. The next poll time the next batch is polled. This prevents high CPU loads due to many channels being polled, but reduces the actual poll time per channel as the total number of channels is divided by the batch of channels.
- **Real-time poll time:** the poll time for the real time channels in case an RS232/FLOW-BUS interface box is used with real-time polling enabled. This requires special configuration, used by e.g. FlowPlot.

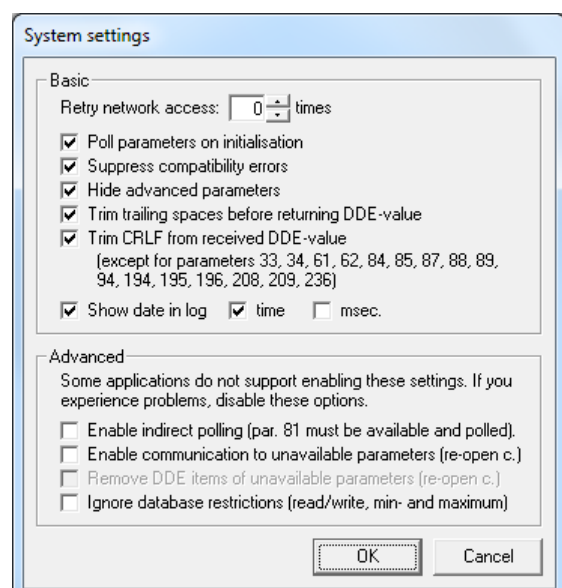


4.3.2 System settings

Other settings than related to the poll time are available by **Server >> Settings**.

The basic settings are:

- **Retry network access:** number of times a read or write request is retried after a failure.
- **Poll parameters on initialization:** after opening communication all parameters of all devices are read, so the initial DDE value is filled.
- **Suppress compatibility errors:** older instrument don't have the latest parameters. Read errors related to non-existing parameters are suppressed.
- **Hide advanced parameters:** hide advanced parameters in parameters lists and FlowDDE windows. For normal instrument operations, the hidden parameters are not needed. For maintenance or service, these parameters may be needed visible and this option can be disabled. Although these parameters are hidden, they can still be reached via DDE.
- **Trim CRLF from received DDE value:** some Windows applications send a carriage return and line feed with each DDE command. FlowDDE can remove them. For binary parameters, this will not happen.



- **Show date, time, msec.** in main window of FlowDDE for each line.

Several advanced settings are available for troubleshooting purposes. Some applications do not support enabling these settings. If you experience problems, disable these options:

- **Enable indirect polling:** each FLOW-BUS instrument keeps track of which parameters are changed by itself or any other instrument. Parameter 81 shows the process in which a parameter is changed. When this option is enabled, FlowDDE reads parameter 81 and polls the processes that are changed, so applications don't need to poll the parameters themselves. Note: this option slows down communication, as much more data is read from the FLOW-BUS.
- **Enable communication to unavailable parameters:** DDE items are created for parameters above number 237 when the instrument does not contain the parameter. Close and open the communication after changing this setting.
- **Ignore database restrictions:** FlowDDE doesn't generate errors based on the parameter information in its database (see chapter 3 and 6), but reads and writes all command to the instrument. When the instrument returns an error, that error is shown.

4.4 VIEW AND EDIT PARAMETERS

All parameters any Bronkhorst instrument can have are stored in the database of FlowDDE, which is used for correct communication to the instruments. The contents of this database can be viewed and edited.

4.4.1 View parameters and values

The list of parameters and its properties as described in chapter 3 can be viewed by **Info >> Parameter list**. The meaning of the values of several parameters, can be viewed by **Info >> Parameter value list**.

To view the parameters that a module (instrument) can have, open the **View modules/parameters** window from the FLOW-BUS menu. **Select** the correct module and click the **View parameters** button.

4.4.2 Edit parameters

At the **Parameters** section, all properties of parameter can be viewed and changed. It is not advised to change anything, but for performance improvement it can be useful to remove a parameter from the poll list or from DDE at all. These two options are described here.

To change a property of a certain parameter, find the correct parameter number, either by the **Select** buttons or by entering its number in the field below it and pressing **Search**. The properties are shown now.

To stop FlowDDE polling the parameter in its poll sequence, uncheck the **Poll** checkbox. (To start polling a parameter, check it.) To store the new value, change the parameter number or close the window and answer the question by **Yes**.

Removing a parameter from DDE means that client applications cannot reach it and FlowDDE does not read the parameter value from the instrument. To remove a parameter from DDE, uncheck the **Available at DDE** checkbox. By default all parameters are available (checked).



*Changing parameter information cannot be undone other than by reinstalling FlowDDE!
Unless you are fully aware of the effect, please do NOT make any changes!*

4.5 TEST COMMUNICATION

For maintenance and service operations, it is often required to read from or write to a certain parameter. FlowDDE contains two test facilities: one to test FLOW-BUS and DDE communication and one to test lower level ProPar communication.

4.5.1 Test FLOW-BUS and DDE

Open the FlowDDE test form from the menu **FLOW-BUS >> Test FLOW-BUS and DDE** or **F6**. The following window appears.

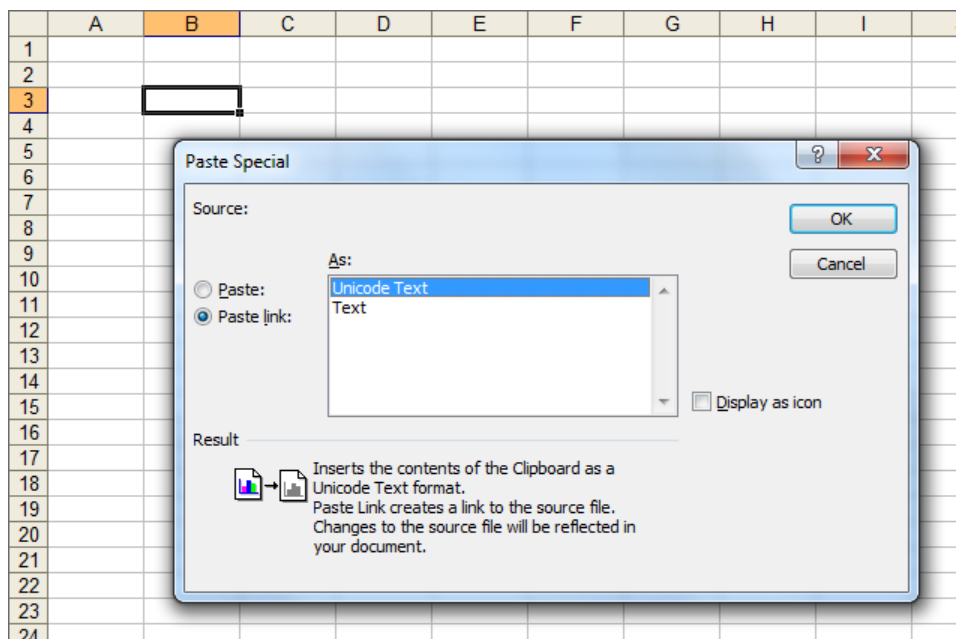
The window consists of two sections. At the **Test FLOW-BUS** section parameters can be read and written directly to the instrument, regardless of the DDE behaviour that a separate poll command is required to read a parameter value and only changes are written to the instrument. The DDE value is updated on read, but not on write.

On the contrary, at the **Test DDE** section parameters can be read and written like any DDE client would do. Pressing **Read** shows the current value at the DDE level, but the actual instrument value is not read and may be different. At **Write** the value is written to the DDE level and, because of the nature of DDE, only if it is different than the previous value, the value is written to the instrument.

At the **Test DDE** section links to client applications, e.g. Microsoft Excel, can be easily made. Select the channel and parameter to which a link is to be made.

Press **Copy link** to copy the link to the clipboard. In the client application, use the **Paste Special** option and select **Paste link** to paste the link (e.g. Paste Special in Microsoft Excel, see image). Any parameter value change will be sent to the client application.

The other way around is possible as well. Copy a link from any application (e.g. copy a cell from Excel). In the test form, press **Paste**. Any change in the application's field result in the parameter value in FlowDDE to be updated. Note that when the communication is closed, all links will be terminated and will not be restored when the communication is opened again.



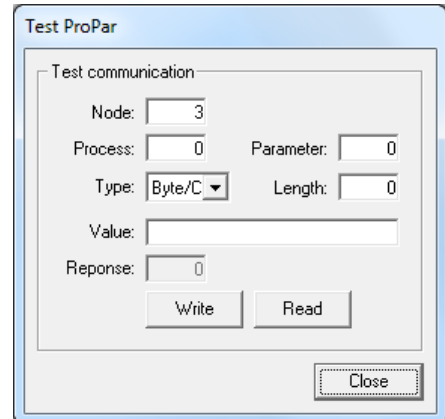
Disable standard polling temporarily stops FlowDDE from polling the selected parameters and only the read actions in this test form (or any client) are performed on the instrument.

4.5.2 Test ProPar

For low level testing purposes, FlowDDE contains the **Test Propar** form, in which individual FLOW-BUS messages may be read and written to an instrument. This form replaces the former DLL test application.

This form can only be opened when the communication is closed by **Communication >> Test Propar** or **Shift+F6**. Using this form, messages can be sent at the node/process/parameter level, so even parameters that are not in the FlowDDE database can be read and/or written.

As soon as the **Read** or **Write** button is pressed for the first time, the communication is opened. When the window is closed, the communication is closed as well.



The screenshot shows a dialog box titled "Test ProPar". Inside, there is a section labeled "Test communication" with the following controls: "Node:" with a text box containing "3"; "Process:" with a text box containing "0"; "Parameter:" with a text box containing "0"; "Type:" with a dropdown menu showing "Byte/C"; "Length:" with a text box containing "0"; "Value:" with a large empty text box; and "Reponse:" with a text box containing "0". Below these are two buttons: "Write" and "Read". At the bottom right of the dialog is a "Close" button.

4.6 SERVICE LOG

In case of problems with your instrument(s) and you need to contact an expert (e.g. Bronkhorst Support), all parameter values of your instrument can be logged to a file. To create such a service log, click **File >> Service log** or **Ctrl+L** and enter the file name.

5 DDE COMMUNICATION BY CLIENTS

5.1 BASIC PARAMETER COMMUNICATION

Client applications communicate to the FlowDDE server by using DDE messages. Before messages can be exchanged, a DDE link had to be made. A DDE link consists of three parts: the server, the topic and an item. For separation the characters '|' and '!' may be used, so a DDE link in e.g. Microsoft Excel becomes **Server|Topic!Item**.

For standard instrument parameters and the FlowDDE server, these are:

- Server: FlowDDE or FlowDDE2
- Topic: C(X) for channel X
- Item: P(Y) for parameter Y

An example of a DDE link in a Microsoft Excel cell is **=FlowDDE|'C(1)!'P(8)** to read parameter 8 of channel 1.

5.2 SPECIAL OPTIONS

5.2.1 Channel 0

Special commands can be sent to FlowDDE by means of the command channel 0, C(0). This channel is not related to any FLOW-BUS instrument, but is for FlowDDE control only. Channel 0 contains P(0), P(1) and P(2) items only.

P(0) is the command parameter. Write a number to P(0) will trigger FlowDDE to read all parameter values from one or more channels and update the parameter values at the DDE level. To read a smaller amount of parameters, parameter groups can be read. Which parameters are in which group can be found in the parameter list.

- C(0)!P(0) = X read values of all parameters of channel X
- C(0)!P(0) = X.Y read values of all parameters in group Y of channel X
- C(0)!P(0) = -1 read values of all parameters of all channels

Other special actions can be triggered by P(0):

- C(0)!P(0) = -2 open a log file, read all parameter values on all channels, and close the file.
- C(0)!P(0) = -3 bring the main window to the front
- C(0)!P(0) = -4 bring the FLOW-BUS configuration window to the front
- C(0)!P(0) = -6 bring the Poll time window to the front
- C(0)!P(0) = -7 bring the System settings window to the front
- C(0)!P(0) = -8 restart the communication
- C(0)!P(0) = -9 terminate FlowDDE
- C(0)!P(0) = -10 minimize FlowDDE

P(1) is the read status information channel. When FlowDDE is reading data from the FLOW-BUS, all status/error messages will be send to this parameter. When the value of this parameter is 0, everything is OK, otherwise will contain the status/error message.

P(2) is the write status information channel. When a client application sends data to FlowDDE and FlowDDE sends the values to the FLOW-BUS, any status/error messages will be send to this parameter. When the value of this parameter is 0, everything is OK, otherwise will contain the status/error message.

5.2.2 Parameter 0

Similar to the way parameter 0 of channel 0 can be used to read parameters from any channel, parameter 0 of any channel can be used to read parameters from that channel:

- C(X)!P(0) = Y read value of parameter Y of channel X
- C(X)!P(0) = Y-Z read values of parameters Y to Z of channel X
- C(X)!P(0) = GROUPY read values of all parameters in group Y of channel X
- C(X)!P(0) = ALL read values of all parameters of channel X

Any combination of the above is valid by separating the parts by a comma, e.g. C(X)!P(0) = 1-10,20,GROUP3 will read parameters 1 to 10, 20 and all parameters in group 3 of channel X.

5.2.3 *Server topic*

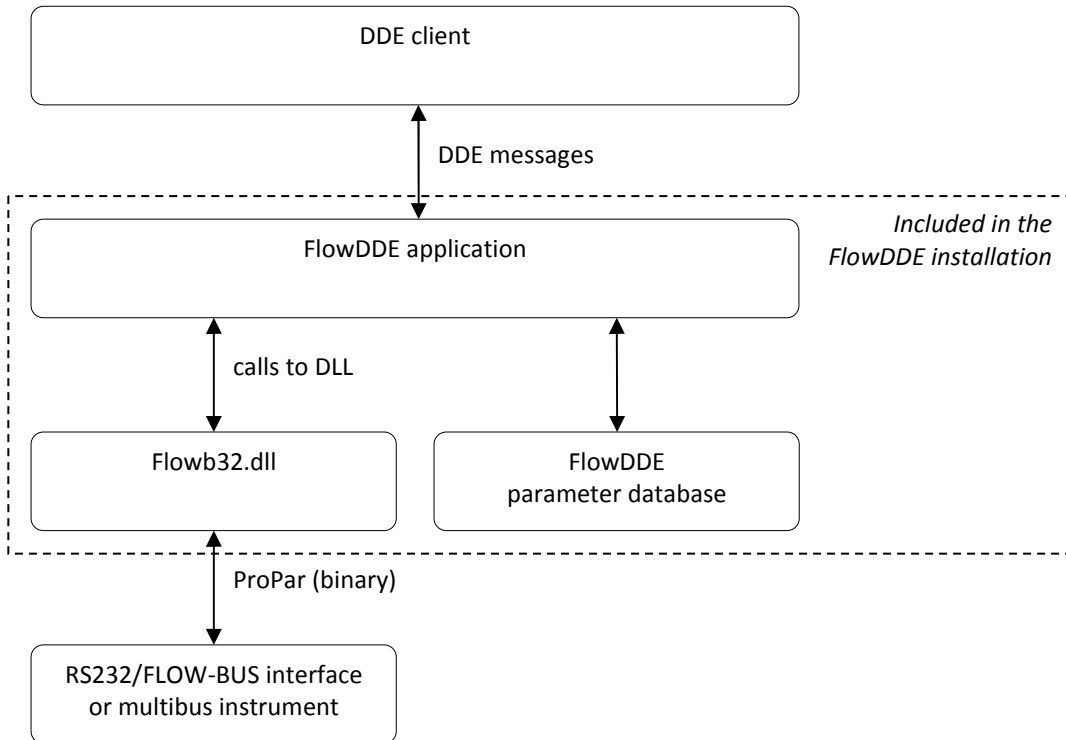
Information about the FlowDDE server, several settings and FLOW-BUS configuration information can be obtained by clients through the server topic.

The server topic has several items:

- Server!ProductName FlowDDE or FlowDDE2
- Server!FlowDDEVersion Version of FlowDDE
- Server!DatabaseVersion Version of FlowDDE database (FlowDDE.mdb)
- Server!FLOWBUSDLLVersion Version of Flowb32.dll
- Server!Status Status of FlowDDE
- Server!ComStatus Status of FlowDDE – Idle, Normal polling, Simulation, Scanning FLOW-BUS
- Server!OpenCom Communication status/command – 0 = close, 1 = open
- Server!MaxChan Maximum channel number in FLOW-BUS configuration
- Server!MaxNode Maximum node address in FLOW-BUS system
- Server!MaxPar Maximum parameter number in FlowDDE database
- Server!SelChan Select channel for changing polling mode – 0 = all channels
- Server!Polling Polling status/command for channel set by SelChan – 0 = dis-, -1 = enabled
- Server!PollTime Poll time interval for polled parameters (not real-time)
- Server!PollBatch Number of channels to poll
- Server!RTPInterval Poll time interval for real-time channels
- Server!InterfaceChan Channel number of instrument which communicates with FlowDDE
- Server!Interface Communication interface, e.g. COM1
- Server!Baudrate RS232 communication baud rate

6 FLOWDDE TECHNICAL DETAILS

In the following diagram, the communication from a DDE client to the instrument is schematically drawn. The FlowDDE application makes use of the Flowb32.dll and the parameter database.



A DDE client communicates to FlowDDE using DDE messages. FlowDDE uses the parameter database for parameter information and the Flowb32.dll to perform the low level communication to the FLOW-BUS. The Flowb32.dll has methods to easily send or request a parameter value to a certain node, process and parameter and to get the answers. From the calls to these methods, it constructs the required FLOW-BUS messages in the binary ProPar protocol, sends these messages and receives and interprets the answers from the instruments.

7 SERVICE

For current information on Bronkhorst and service addresses please visit our website:

 <http://www.bronkhorst.com>


Do you have any questions about our products? Our Sales Department will gladly assist you selecting the right product for your application. Contact sales by e-mail:

 sales@bronkhorst.com

For after-sales questions, our Customer Service Department is available with help and guidance. To contact CSD by e-mail:

 support@bronkhorst.com

No matter the time zone, our experts within the Support Group are available to answer your request immediately or ensure appropriate further action. Our experts can be reached at:

 **+31 573 45 88 39**