Spirit^{IT} Flow-Xpert
Flow measurement calculation software

Certified flow and fluid property calculations

Measurement made easy

—
Flow-Xpert interfaces

Introduction

This document is the user manual of the Spirit^{IT} Flow-Xpert software. Spirit^{IT} Flow-Xpert provides flow and fluid property calculations that are commonly used in the oil and gas industry, both in metric and US customary units.

For more information

All publications of Spirit ^{IT} Flow-Xpert are available for free download from:

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Contents

1 Introduction

This document is the user manual of the Spirit^{IT} Flow-Xpert software product. Spirit^{IT} Flow-Xpert provides flow and fluid property calculations that are commonly used in the oil and gas industry and in both metric and US customary units.

The Flow-Xpert calculations are described in
Flow-X Manual IIIb - Function Reference_CM_FlowX_FR

The purpose of the Spirit^{IT} Flow-Xpert is to provide certified, documented and carefully tested calculations that can be used to verify calculations provided by other software and hardware products.

All calculations have been tested extensively against the corresponding API, ISO, AGA, GPA, ASTM and GERG standards and also against other established software products used in the industry for verification of flow and fluid property calculations.

Spirit^{IT} Flow-Xpert is available in three editions. The Basic edition provides the full set of calculations through an intuitive 'fill in the blanks' Windows programs. Calculations can be saved and opened for future reference.

The Excel edition is an Excel add-in that provides a powerful tool to build complete applications to verify flow computer calculations starting from the raw input up to the final flow rates. The add-in provides all calculations as worksheet functions in a similar way to the standard Excel worksheet functions.

The DLL edition allows for integration in any application written in a language that provides support for DLLs. Examples include C++ and Visual Basic.

2 Spirit^{IT} Flow-Xpert editions

Spirit^{IT} Flow-Xpert is available in the following editions

Basic Edition
Basic flow calculation package with our appealing Web interface, for easy access to the flow calculations. The flow calculations include all oil and gas calculations as described and are partially validated by NMi and CEESI.

All flow calculations have been implemented as simple and straightforward web-like pages that are selected with an explorer-like navigation tree. This edition is mostly for customers who have a need of the calculations and want to be instantly up-and-running after installation of the software in a few minutes

Excel Edition
Complete package with all our flow calculations, available as Excel add-in where flow calculation functions can be inserted in your own flow calculation sheets.

All flow calculations have been implemented as simple and straightforward spreadsheet functions that can even be inserted to your own calculation and validation workbooks. From our rich flow calculation functions and sophisticated tables, charts can be easily created. Multiple gas compositions can be easily created to run larger sets of calculations on a single worksheet.

Being integrated in a modern Graphical User Interface environment, the user is offered a rich and powerful 2D and 3D charting environment with which, superb presentations of calculated results can be created.

You will be up-and-running in seconds with our intuitive library. The installation process is simple and straightforward and will take few minutes to complete.

Enterprise Edition
The Enterprise Edition allows you to develop your own software environment with our flow calculation package, based on our Component Object Model (COM) and C++ interface with our LIB/DLL/H interface.

All flow calculations have been implemented in a programming environment offering a Component Object Model (COM) interface as well as a traditional Windows API in .DLL format, complete with Library (.LIB) and Header file (.H). This software model allows for integration of our flow calculations in your corporate software tools and.

3   Software installation

Software requirements

Spirit^{IT} Flow-Xpert Basic edition requires Microsoft Windows 10, Microsoft Windows Server 2012, Microsoft Windows Server 2012 R2 or Microsoft Windows Server 2016.

Spirit^{IT} Flow-Xpert Excel edition requires the 32-bit or 64-bit edition of Microsoft Excel 2010, Microsoft Excel 2013 or Microsoft Excel 2016/2019/365. Make sure you've installed one of these Microsoft Excel versions on your system prior to installing Spirit^{IT} Flow-Xpert.

Installing Spirit^{IT} Flow-Xpert on your computer

In order to install the software onto your hard disk, insert the disk in your CD-ROM drive (or browse to the directory containing the setup package), and install the **FlowXpert Setup** package. The following display page appears:
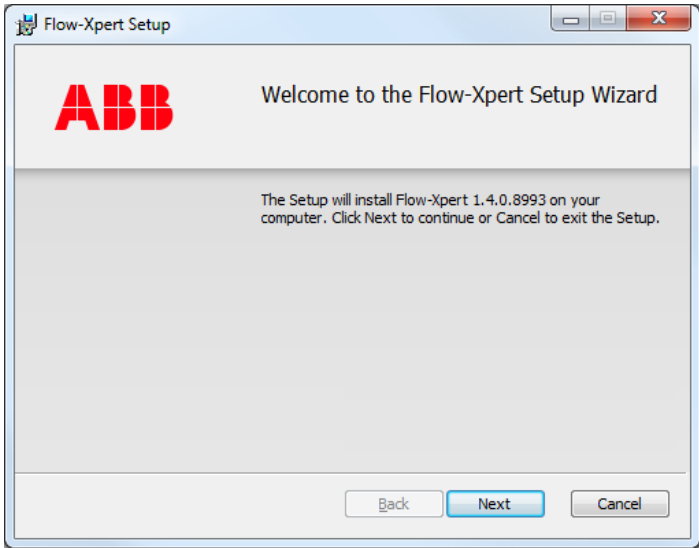

Figure 3-1 Spirit^{IT} Flow-Xpert setup program

This page tells the user which version will be installed, or in case of upgrading which version will be upgraded. The "**Next**"-button may be pressed, after which the End User License Agreement dialog is displayed.

When the user has accepted the end-user license agreement, the install features and location can be selected.
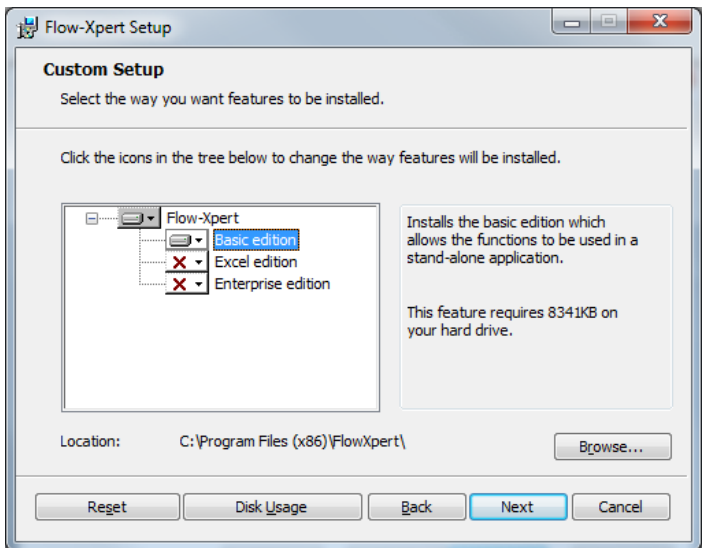

Figure 3-2 Choosing installation options

The default folder on a 32-bit operating system is "C:\Program Files\FlowXpress". On a 64-bit operating system, the default installation folder is "C:\Program Files (x86)\FlowXpress". The user may select another existing program folder, or define a new folder for the program files.

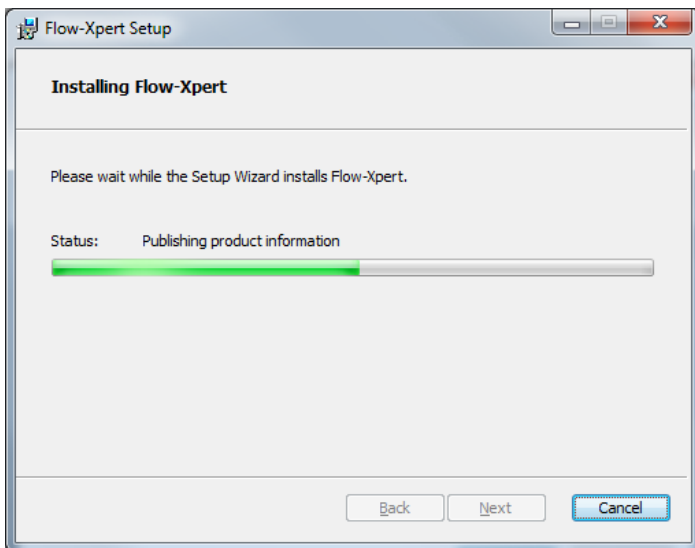Selecting **Next** will install the files to your computer.

Figure 3-3 Copying files at installation

When the setup process has been completed, the following dialog may or may not appear on your display. This depends on the files that were already installed on your machine.

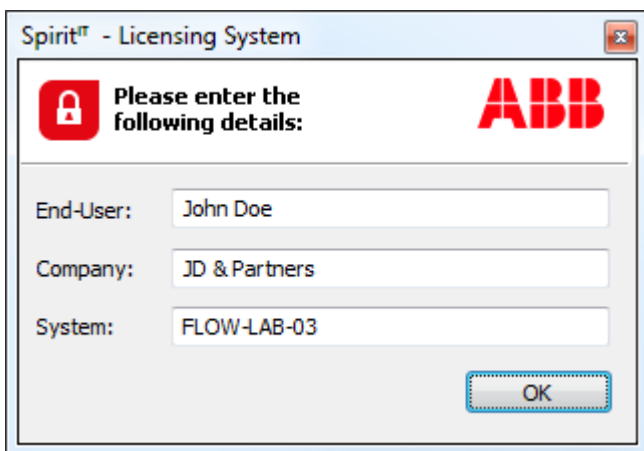When the copying process has been completed, the user is presented with a dialog containing license information.

Figure 3-4 Entering license information

End-user   Your full name, or the name of your department using the Spirit^{IT} Flow-Xpert software, for example: "John Doe", or "Flow Analytics".

Company   The name of your organization to which the license will be granted, for example "JD & Partners"

System   The name of the computer or system on which the software will be running, for example "FLOW-LAB-03" or "Greenfield metering station"

When you have installed the software, a temporary license is automatically installed on your machine, with which you may run most portions of the software for a period of 15 days.

If you already have an installed permanent license, this license remains active. During product upgrades, no additional licenses have to be installed at all.

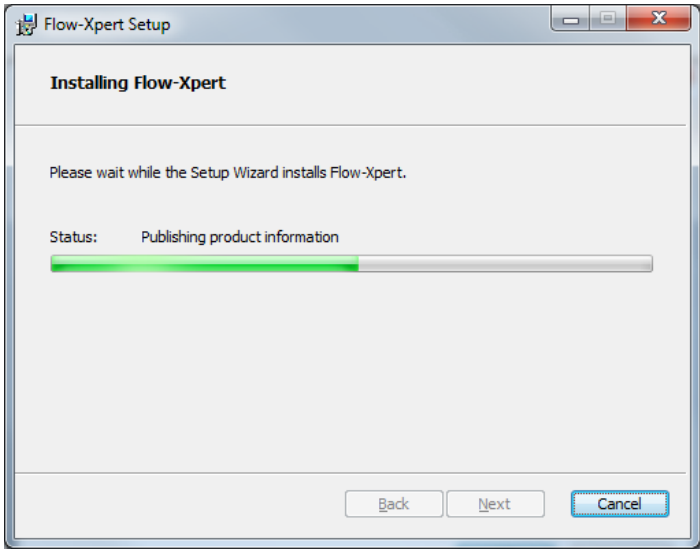When the following dialog appears, the computer must be restarted prior to using the software:

Figure 3-5 Setup has been completed

Please restart the computer if this message is displayed, after which the installation process is completed.

Using the License Manager

Spirit^{IT} Flow-Xpert uses a software based license system by default. Alternatively you can order a hardware dongle instead. The software license is based on the data that you have entered, as well as on the machine that the software is installed on.

If the machine on which the software is installed is replaced with another machine, you may request for a new authorization code, which will be generated and sent to you by ABB.

After initial installation you have a temporary license. A permanent license can be requested through the License Manager, which can be found in the Start menu of Windows:
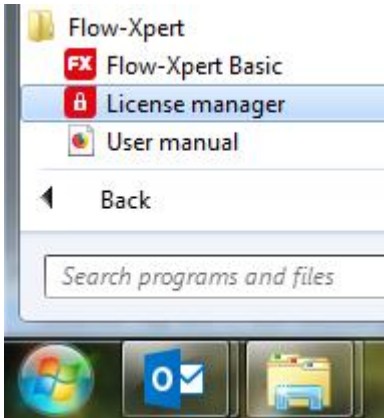

Figure 3-6 Using the License Manager

You may use standard Windows Copy (<Ctrl-C>) and Paste (<Ctrl-V>) keys to create an e-mail message containing the above four fields: End-User, Company, System and the Machine Identification Code ("TK6NQ-9LQKN-LK3QA" in the example above).

Alternatively, you may generate a text file, which may be sent as a file attachment. To achieve this, select "Export" in the dialog.
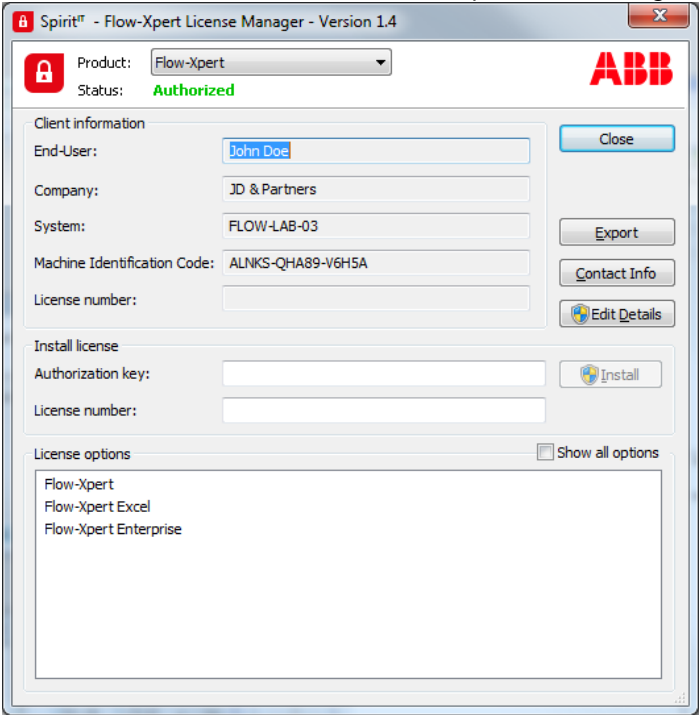

Figure 3-7 License manager utility

Please send the e-mail with this data to: nl-spiritit-support@abb.com, after which you will obtain your authorization key and license number.

The 24-character authorization key consists of five fields, separated with a dash '-' character, as in the format: "AAAAA-BBBBB-CCCCC-DDDDD-EEEE".

Both the authorization key and the license number should be exactly entered in the dialog box above, in the 'Authorization key'. The Install button verifies the authorization information and installs it to your computer.
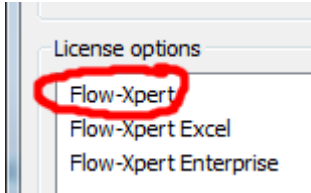
When this process has been complete without error messages, the license installation process has been completed.

Congratulations! You are now up and running!

4　Spirit^{IT} Flow-Xpert Basic Edition

Starting the application

In order to use the Basic mode the Spirit^{IT} Flow-Xpert Basic license needs to be authorized

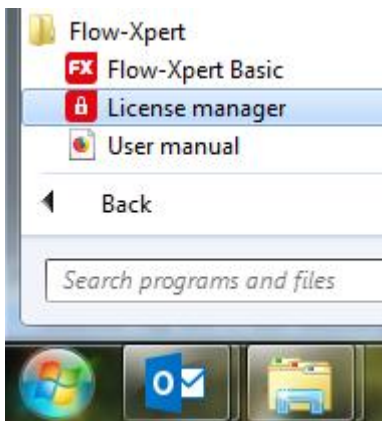The Spirit^{IT} Flow-Xpert Basic Edition can be started from the Windows Task bar.

Figure 4-1 Starting the Spirit^{IT} Flow-Xpert Basic Edition

This will open the web-based user interface of the Spirit^{IT} Flow-X Basic Edition showing the calculations.
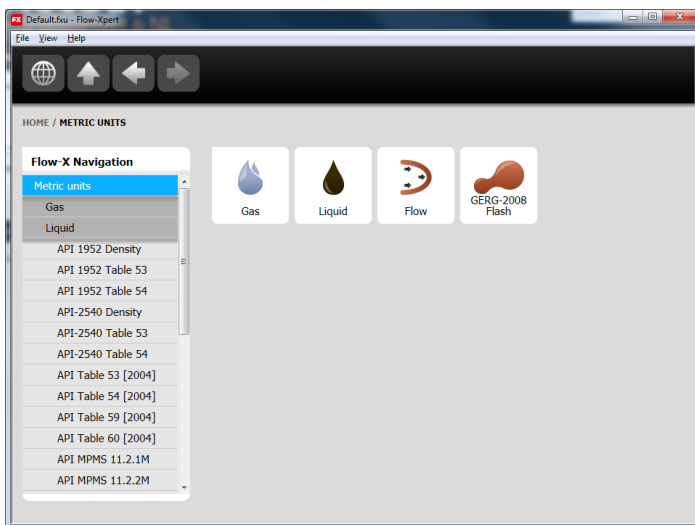

Figure 4-2 Spirit^{IT} Flow-Xpert User Interface

The calculations are grouped in US Customary and Metric units, each having the sub-groups 'Gas properties', 'Liquid properties' and 'Flow calculations'.

Each calculation is grouped in two sections: the 'Inputs' and the 'Results'.

Entering data

Input values that can be changed is identified with a pencil icon behind it.

To edit an input value, click on the value and enter the new value

By using the up and down arrows or the TAB you can quickly go over all the input data.
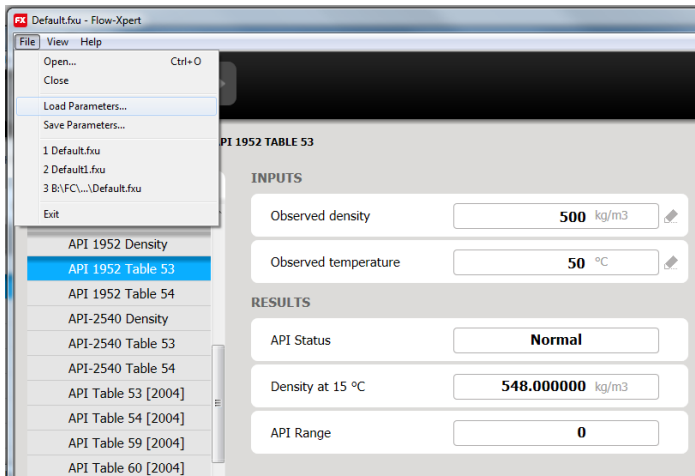

Figure 4-3 Apply multiple input values

When an input value is outside its minimum and maximum limits a warning will appear and the value will not be accepted.

Saving your work

The actual input values (parameters) can be saved to a file and be re-used later on.

To save the input values to a file select File, Save Parameters

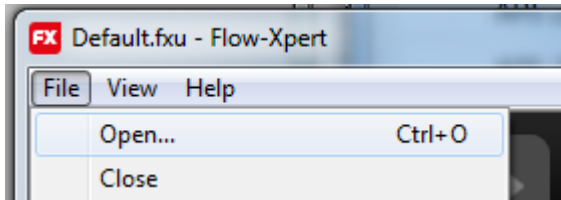The restore a set of parameters, select File, Load Parameters and select the file.
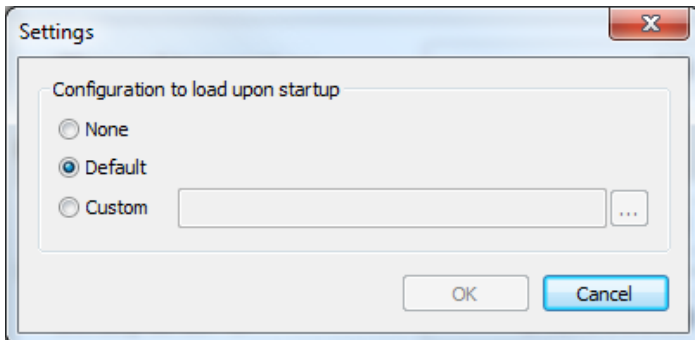
Working with application files

⚠ This feature is reserved for future use !

Spirit^IT Flow-Xpert has the option to load a different application that contains a user-defined set of calculations.

To open a different application select File, Open

To automatically load a specific application at program startup select View, Settings
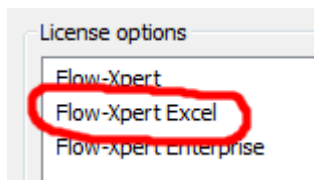

Select Custom and select the application that needs to be opened automatically at startup.

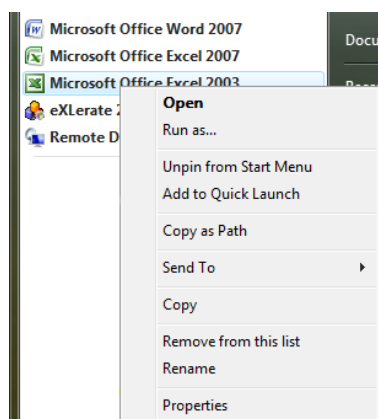# 5   Using Spirit^{IT} Flow-Xpert functions in Excel

⊘ In order to use the Spirit^{IT} Flow-Xpress in Excel the
    Spirit^{IT} Flow-Xpert Excel license needs to be authorized

Windows User Account Control Consideration

When User Account Control is active, Excel is required to be run in Administrator mode in order to use the Spirit^{IT} Flow-Xpert functions. If User Account Control is not active, this paragraph does not apply.

To run Excel in Administrator mode, press and hold the shift key, right click the Excel icon, and select 'Run as …'. When asked, provide the password and click OK. If asked whether you want to continue this action, select 'yes'.

Using Spirit^{IT} Flow-Xpert functions in Excel sheets

In Spirit^{IT} Flow-Xpert a large number of worksheet functions is available to implement the required functionality for your application.

Most worksheet functions may be inserted using the 'Insert Function' button while in design-mode, or via the 'Function' option from the 'Insert' menu.
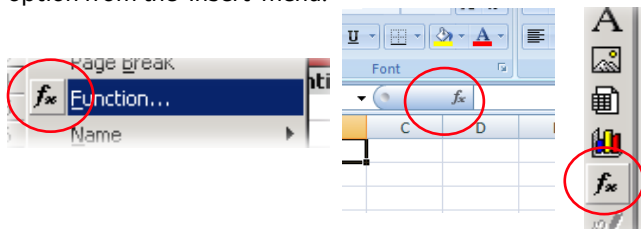

Figure 5-1 Various examples of the Insert function button

You may insert any type of worksheet function, Spirit^{IT} Flow-Xpert and non- Flow-Xpert specific. You may also create you own worksheet functions that may be inserted in a Spirit^{IT} Flow-Xpert application, or in any other type of Excel workbook. For Spirit^{IT} Flow-Xpert functions, make sure to select the category 'Flow-Xpert' in the drop down box.
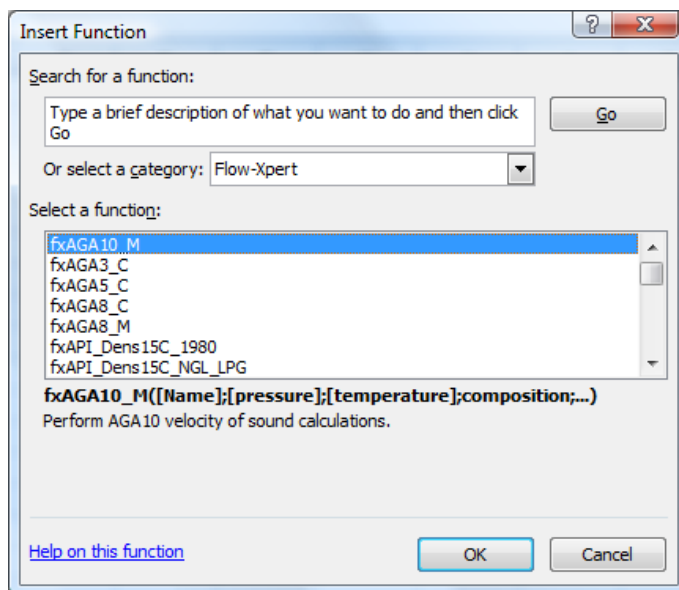

Figure 5-2 Insert Function dialog

After selecting the required function, a dialog similar to the one below is shown:
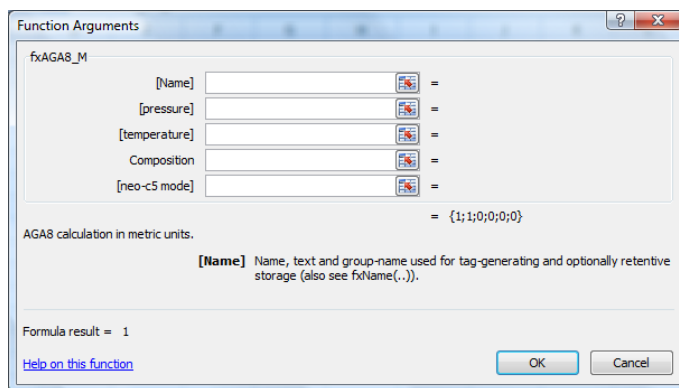

Figure 5-3 Function arguments dialog

This dialog helps in providing correct arguments to the function. It is allowed to provide values or cell references; If a value is located in another cell, the colored button may be pressed to allow the selection of the cell that contains the value for the argument.

A number of functions use [Name] as first argument. For Excel, this argument may be left blank, or an empty string, indicated by 2 double quotes with nothing in between ("").

A special case in above example is Composition. A composition is not a single value, but rather an array of numbers holding the values for all applicable components (methane, ethane, propane etc.).

All functions of Spirit^{IT} Flow-Xpert that need a composition as an argument use the same component ordering, even if the specific function does not use all available components (such as NX19).

Nr	Component
1	Methane
2	Nitrogen
3	Carbon Dioxide
4	Ethane
5	Propane
6	Water
7	Hydrogen Sulphide
8	Hydrogen
9	Carbon Monoxide
10	Oxygen
11	i-Butane
12	n-Butane
13	i-Pentane
14	n-Pentane
15	n-Hexane
16	n-Heptane
17	n-Octane
18	n-Nonane
19	n-Decane
20	Helium
21	Argon
22	Neo-Pentane

The composition is one parameter, an array parameter, in the function call; See the Spirit^{IT} Flow-Xpert demo Excel application for an example how to handle compositions in function calls.

Some functions do not return a single value as result, but an array of values as well. This is also true for above example. Spirit^{IT} Flow-Xpert excel functions return arrays as columns. In order to enter a function returning an array, select the cells where the output should go. Enter the function with its parameters as you would always do, but to complete the action do not just press 'Enter', but Ctrl-Shift-Enter. The fact that the function now returns an array rather than one function is indicated by curly brackets around the formula. E.g. {fxAGA8_C(E35;E37;…;G67)}. Do not enter these curly brackets yourself, Excel does this. For more information on working with arrays in Excel, please see Excel help, keyword 'arrays'.

6   Revisions

Revision A

Date   November 2017
- Update to new ABB lay-out
- New document code: CM/FlowX/FR-EN
- Reintroduce revisions chapter

Revision B

Date   March 2018
- Moved calculations to function reference document

Revision C

Date   October 2018
- Windows 8 removed from software requirements.

Revision D

Date   February 2020
- Added 64-bit Excel and versions 2019/365 to software requirements. Removed Windows 7, Windows Server 2008 and Excel 2007.

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