Overview

This document describes the basic features of the software. Functionalities which are not used in your application, or are not available, are also documented. This may affect complete modules or just certain views.

Any sequences, views or configurations which have been specifically programmed for your application, are documented in a separate document.

Ehrler Prüftechnik
Engineering GmbH
Wilhelm-Hachtel-Straße 8
97996 Niederstetten, Germany

Customer Service:
Telephone: (+49) 07932 / 6 06 66 - 0
Fax: (+49) 07932 / 6 06 66 - 11
Email: info@ep-e.com

These documents are intended for use only by purchasers of our systems and may not be copied, distributed or made accessible to third parties without written permission.

1 Table of Contents

OVERVIEW 1

1 TABLE OF CONTENTS 2

2 NAVIGATION & LOGIN 5
- 2.1 Navigation structure 5
- 2.2 Main Screen 6
- 2.3 Navigation bars 6
- 2.4 Login 7

3 GENERAL CONFIGURATION 9
- 3.1 Configuration screen 9
  - 3.1.1 Button bar 9
  - 3.1.2 Dynamic view area 9
  - 3.1.3 Navigation bar 10
- 3.2 Common application 11
- 3.3 Translation 12
- 3.4 User management 13
  - 3.4.1 Roles 13
  - 3.4.2 Users 14
  - 3.4.3 Permissions 15
- 3.5 Logging 17
  - 3.5.1 Logging configuration 18
  - 3.5.2 Log analyze 19
- 3.6 Error messages 20
  - 3.6.1 Error dialogue 20
  - 3.6.2 Error code of the basic software 21

4 CHANNELS 23
- 4.1 Channel diagram 24
- 4.2 Data visualization 26
- 4.3 Analogue inputs 27
  - 4.3.1 Mean value measurement 28
  - 4.3.2 Calibration monitoring 29
  - 4.3.3 Configuration 30
  - 4.3.4 Adjustment 31
  - 4.3.5 Scaling 33
  - 4.3.6 Measurement 35
  - 4.3.7 Calculation Settings 36
  - 4.3.8 Rho settings 37
  - 4.3.9 Autozero 38
  - 4.3.10 Merge settings 39
- 4.4 Analogue outputs 40
  - 4.4.1 Configuration 41
  - 4.4.2 Adjustment 41
  - 4.4.3 Scaling 41
  - 4.4.4 Linearization 42

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

Table of Contents

4.5 Digital inputs 44
4.5.1 Configuration 45
4.5.2 Calculation Settings 46
4.6 Digital outputs 47
4.6.1 Configuration 48
4.7 Channel logging 49

5 CONTROLLERS 51
5.1 Controller Settings 51
5.2 PID controllers 52
5.2.1 Configuration 52
5.2.2 Diagnosis 54
5.3 Two-point controller 56
5.3.1 Configuration 56
5.3.2 Diagnosis 57
5.4 Three-point controller 58
5.4.1 Configuration 58
5.4.2 Diagnosis 59

6 FLOW METERS 60
6.1 Configuration 60
6.2 Measurement 62
6.3 Adjustment 63
6.3.1 Beta sensor 64
6.3.2 Orifice 65
6.3.3 LFE 66
6.3.4 Venturi 67
6.3.5 Ultracritical nozzle 68

7 HARDWARE COMPONENTS 69
7.1 Channel dispatching 69
7.2 Monitored switches 70
7.3 Linear drives 70

8 INTERFACES 71
8.1 History 71
8.2 Serial interfaces 72
8.2.1 Configuration 72
8.2.2 ASCII configuration 72
8.2.3 ASCII diagnosis 72
8.2.4 Modbus configuration 72
8.2.5 Modbus diagnosis 72
8.3 Interfaces network 73

9 TRIGGER SETTINGS 74
9.1 Monitoring 74
9.2 Action 75

10 DATA STORAGE 77

11 ADDITIONAL SOFTWARE LICENSE 78
11.1 LabVIEW copyright notice 78

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

Table of Contents

11.2 G# license conditions 78

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

2 Navigation & login

2.1 Navigation structure

The following figure shows an example of the navigation structure of the system software. Areas that can only be accessed with a specific user level (e.g. administrator) are colour-coded. This illustration refers to the users created as standard on delivery of the system. Different configurations are possible.

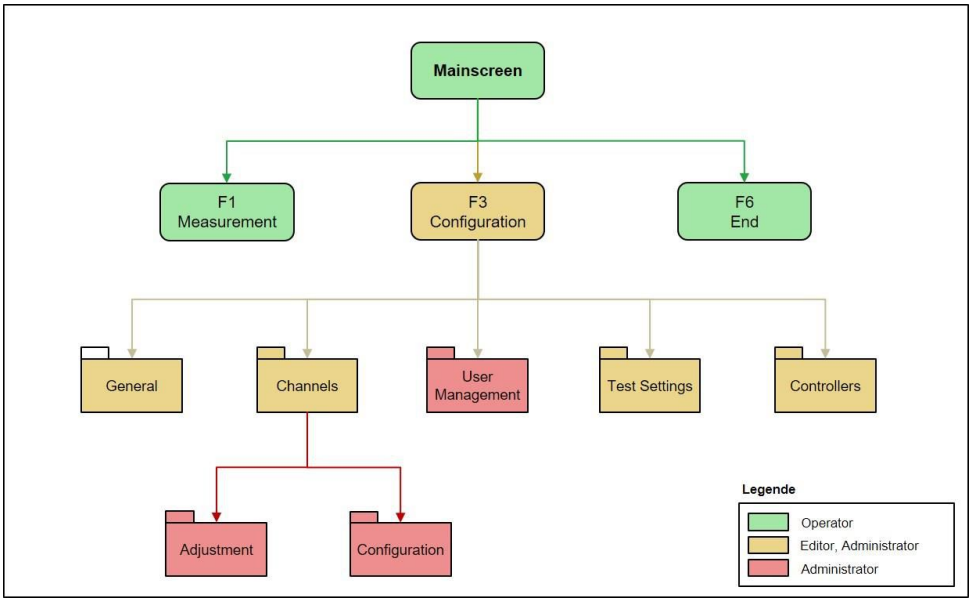


Figure 2.1: Schematic illustration of the navigation structure

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

2.2 Main Screen

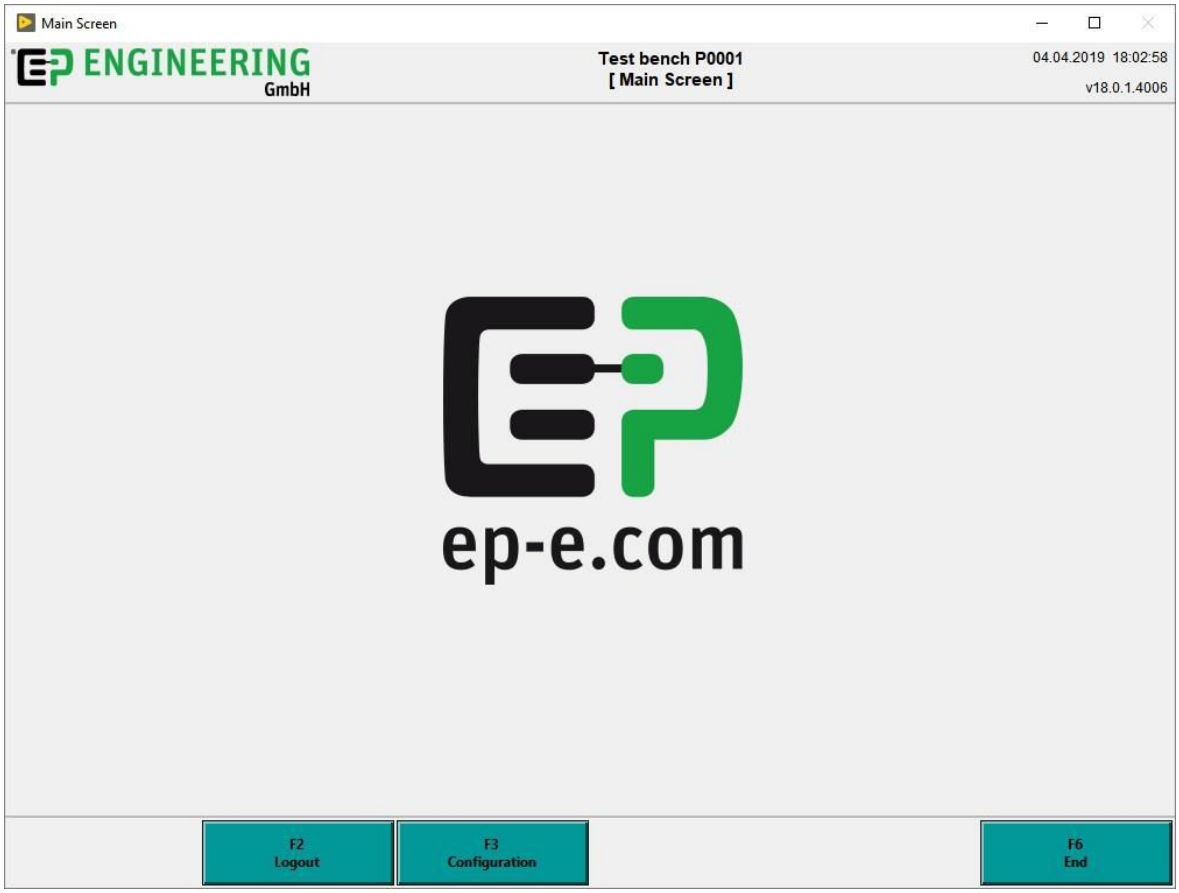


Figure 2.2: "Main Screen"

The main screen appears after the application is started. If the "Autologin" function is activated, a configurable user is automatically logged in after the start-up.
In addition, the software can be configured so that the display switches to a specific view after start-up.

2.3 Navigation bars

The navigation bars are used to reach different areas of the application. Operation is performed using the F keys on the keyboard or the mouse.

Figure 2.3: Main navigation bar (user group: "Administrator", "Setter")

Depending on the user group (operator, setter, administrator), certain menu entries or F buttons may not be available. Disabled keys are not visible.

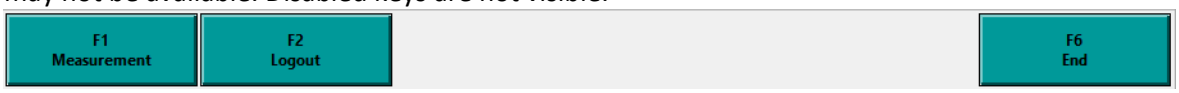


Figure 2.4: Main navigation bar (user group: "Operator")

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

The following functions can be started on the main screen:

[F1] Measurement	Displays of the measurement screen
[F2] Login/logout	User login and logout
[F3] Configuration	Configuration of the system
[F6] End	Ends the software

2.4 Login

There are different user groups in the software.

Automatic login:
If the "Autologin" function is activated in "Configuration", the user configured in 3.2 is automatically logged in when the program is started. This user remains logged in until the next login.

Manual login:
If the "Autologin" function is deactivated, the user has to log in after the software has been started. Press the "Login" menu key on the main screen to display the following window. The user can then log in using the user name and password.

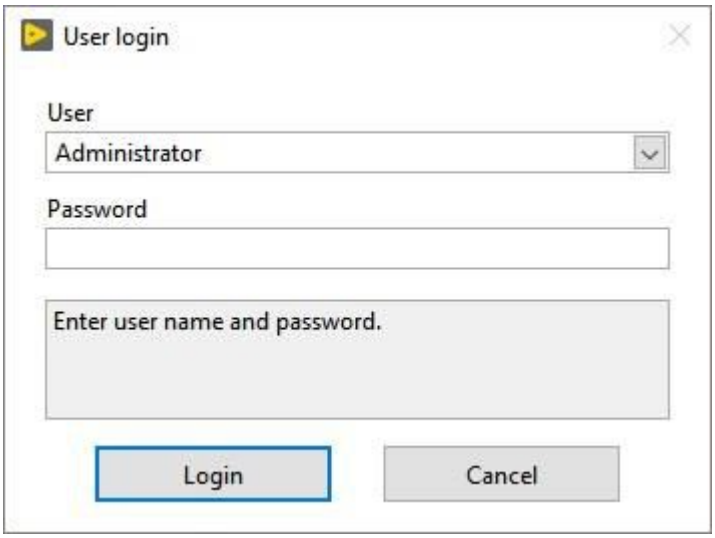


Figure 2.5: Login screen

If the user ID and password are valid, the user is logged in and the navigation buttons are activated in accordance with the permissions of the user group.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

In the case of an error, an error message will be displayed and all authorisation rights will be reset.

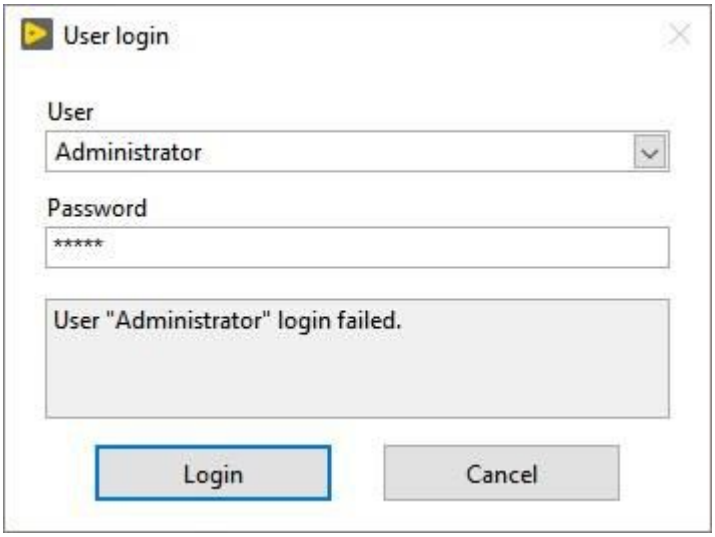


Figure 2.6: Message after unsuccessful login

Condition of the system on delivery includes the following default users.

User	Default permissions
Administrator	Access to all areas of the system.
Operator	Access to measurement only.
Setter	Access to measurement, diagnostics and configuration, but with limited modification permissions.

Access permissions for the individual user groups (roles) can be configured in user management (see section 3.4).

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

3 General configuration

A change to the configuration of the system may cause changes to the measuring results and the system performance, depending on the parameter. Only trained staff should be allowed access to these parameters.

3.1 Configuration screen

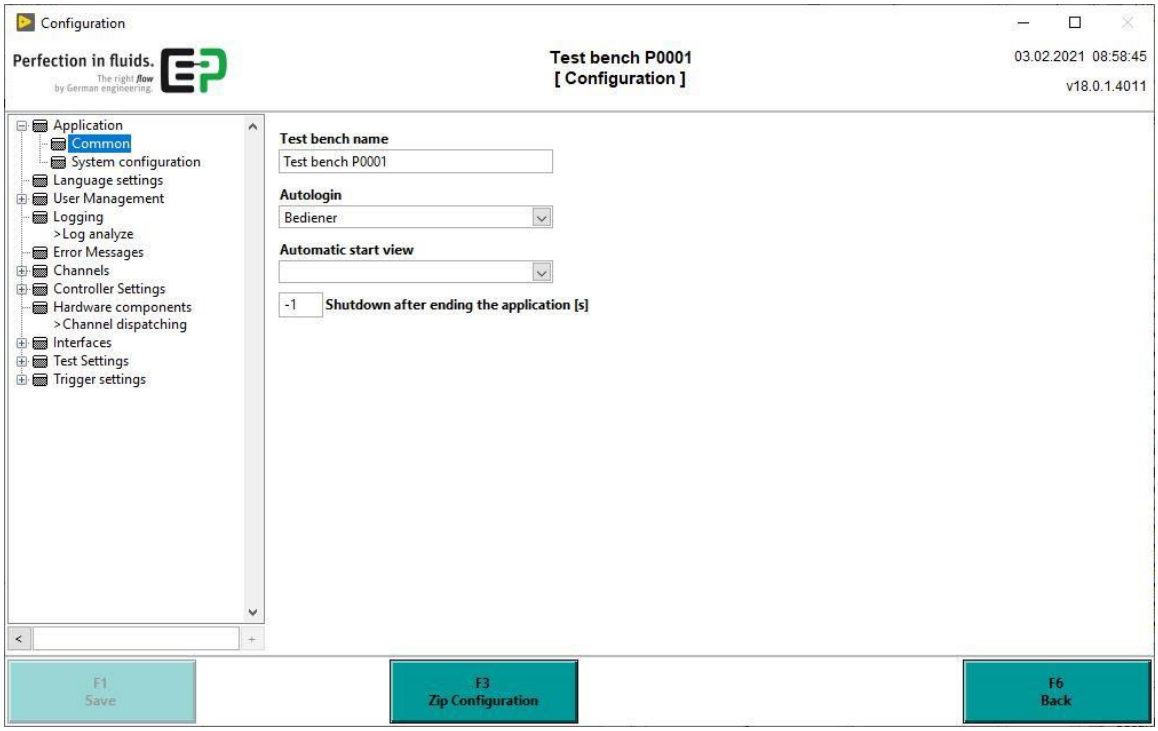


Figure 3.1: "Configuration"

3.1.1 Button bar

The button bar can be adapted dynamically in any screen. In most cases, the following buttons are available:

[F1] **Save**	Saves all modified parameters on the current screen.
[F6] **Back**	Back to the screen from which this screen has been called up. If the view is shown in a separate screen, this screen is closed by this action.

3.1.2 Dynamic view area

This is where the current active view is displayed.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

3.1.3 Navigation bar

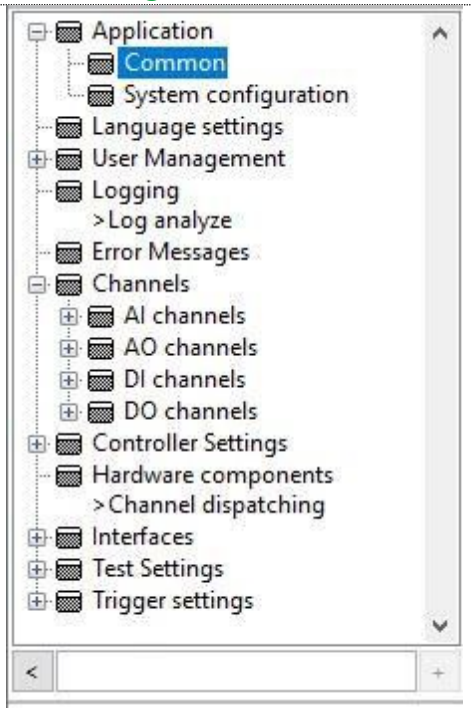


Figure 3.2: Navigation bar

The navigation bar shows a tree structure with all the views available in the software for the various components for which the logged in user has at least viewing permission.

<	Hides the navigation bar
>	Displays the navigation bar
+	Opens the current view in a separate window

Text can be entered in the text field to filter the displayed elements.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

3.2 Common application

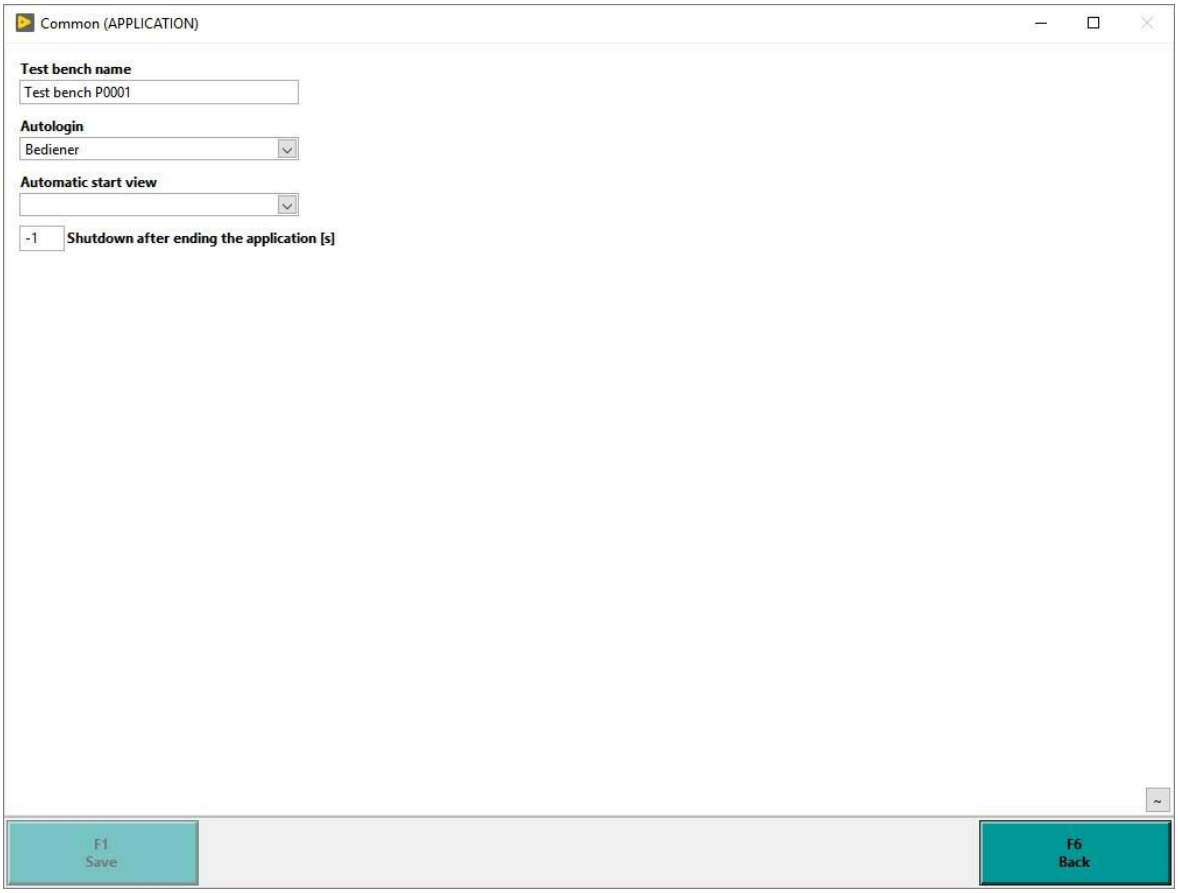


Figure 3.3 Common → application

Test bench name	The identifier for the test bench
Autologin	If "Autologin" is activated, the selected user is logged in when the software is started.
Automatic start view	If "Automatic start view" is activated, the selected display is loaded automatically when the software is started.
Shutdown after ending the application [s]	This is where a time can be entered to determine the time which elapses before the PC is shut down after the system has been stopped. To deactivate the function, enter "-1".

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

3.3 Translation

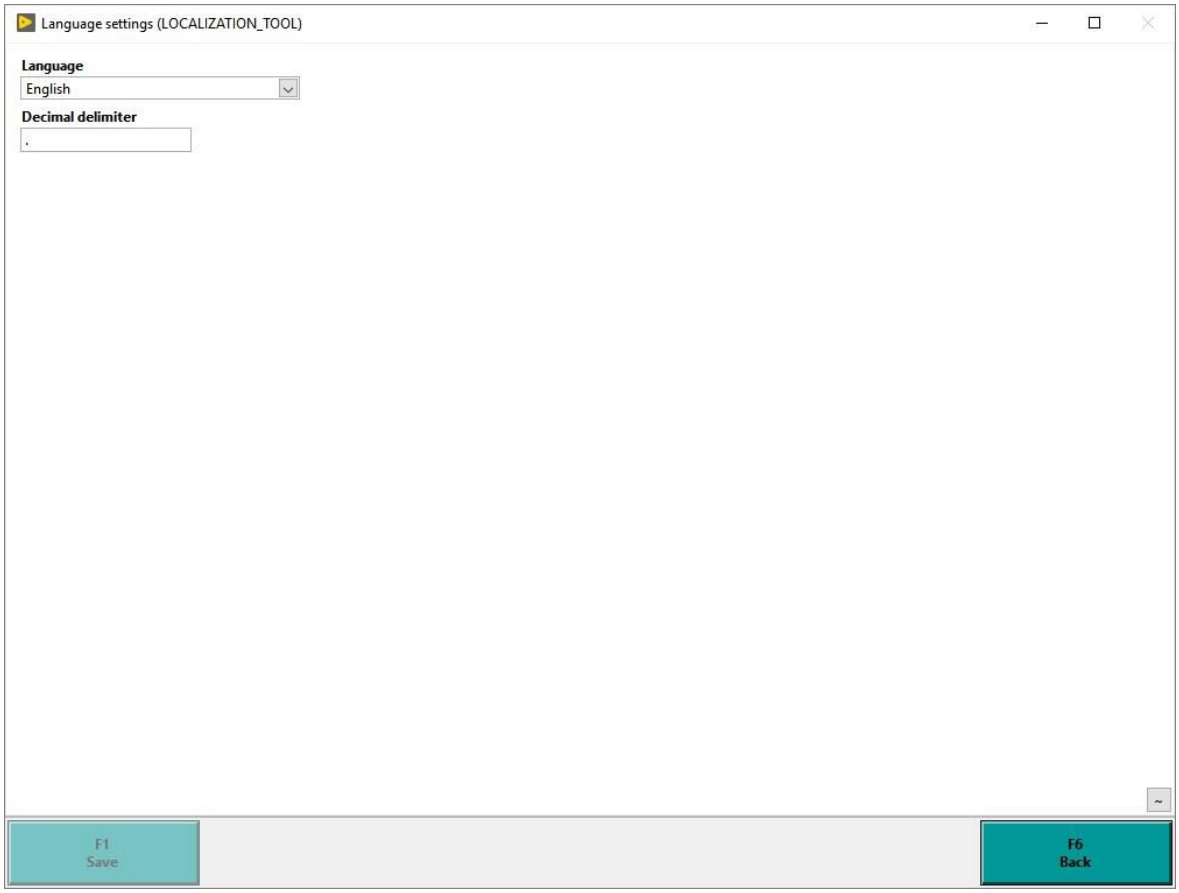


Figure 3.4 Language settings

Language	Selected language of the test bench. (The software has to be re-started for a complete translation)
Decimal delimiter	This is where the decimal delimiter used for saving data can be entered.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

3.4 User management

"User management" is used for saving user names, passwords and the corresponding authorisation levels.

The user administration has 3 layers

User	Every user has a name, a password and any given number of assigned roles.
Role	Each role has specifically assigned permissions.
Rights	The rights define which display elements the user can see and which actions the user is allowed to undertake.

3.4.1 Roles

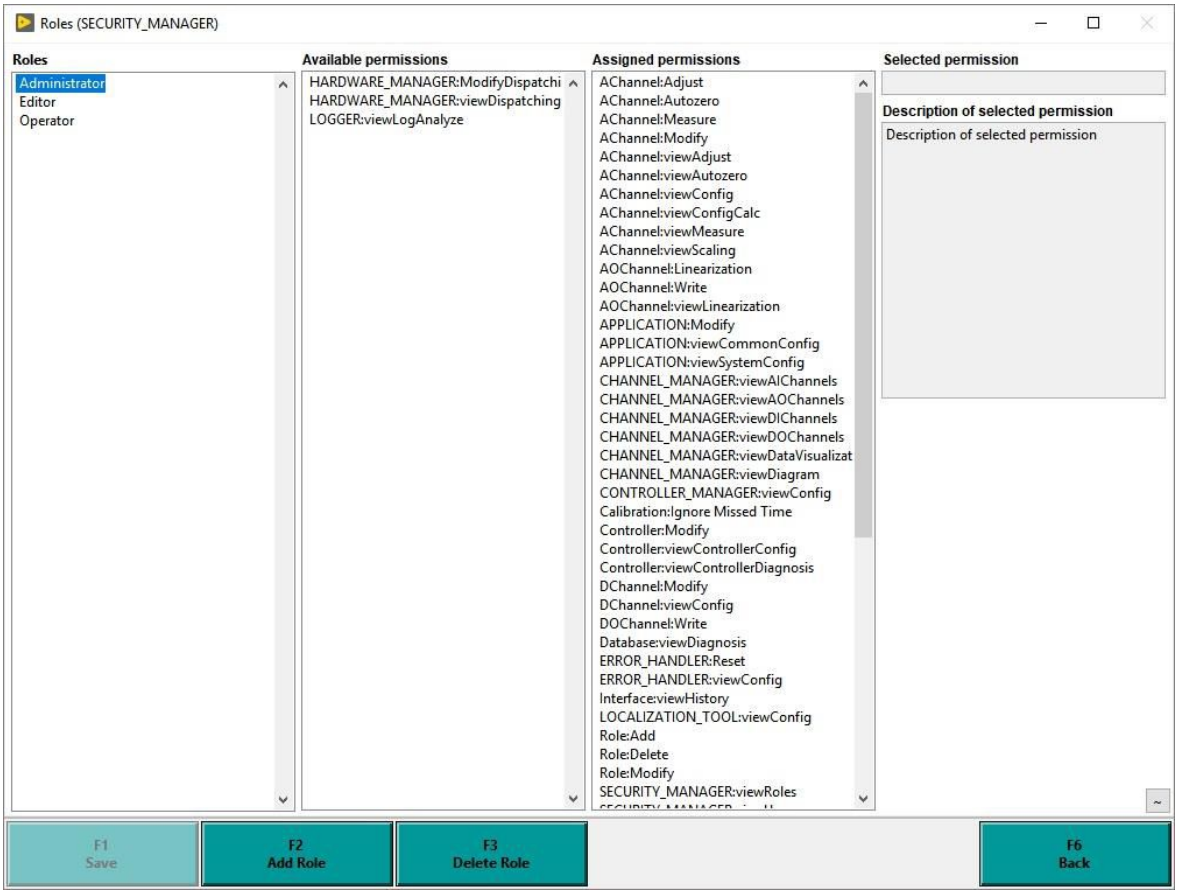


Figure 3.5 User management → Roles

In this view the assigned permissions can be adapted to a role. It is possible to add/remove assigned/available permissions using drag and drop or by double-clicking. A short explanation is made available on the right-hand side for a selected permission, indicating what this permission entails.

[F2] Add role	Opens a dialogue for adding a new role.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

[F3] Delete role	Deletes the selected role.

3.4.2 Users

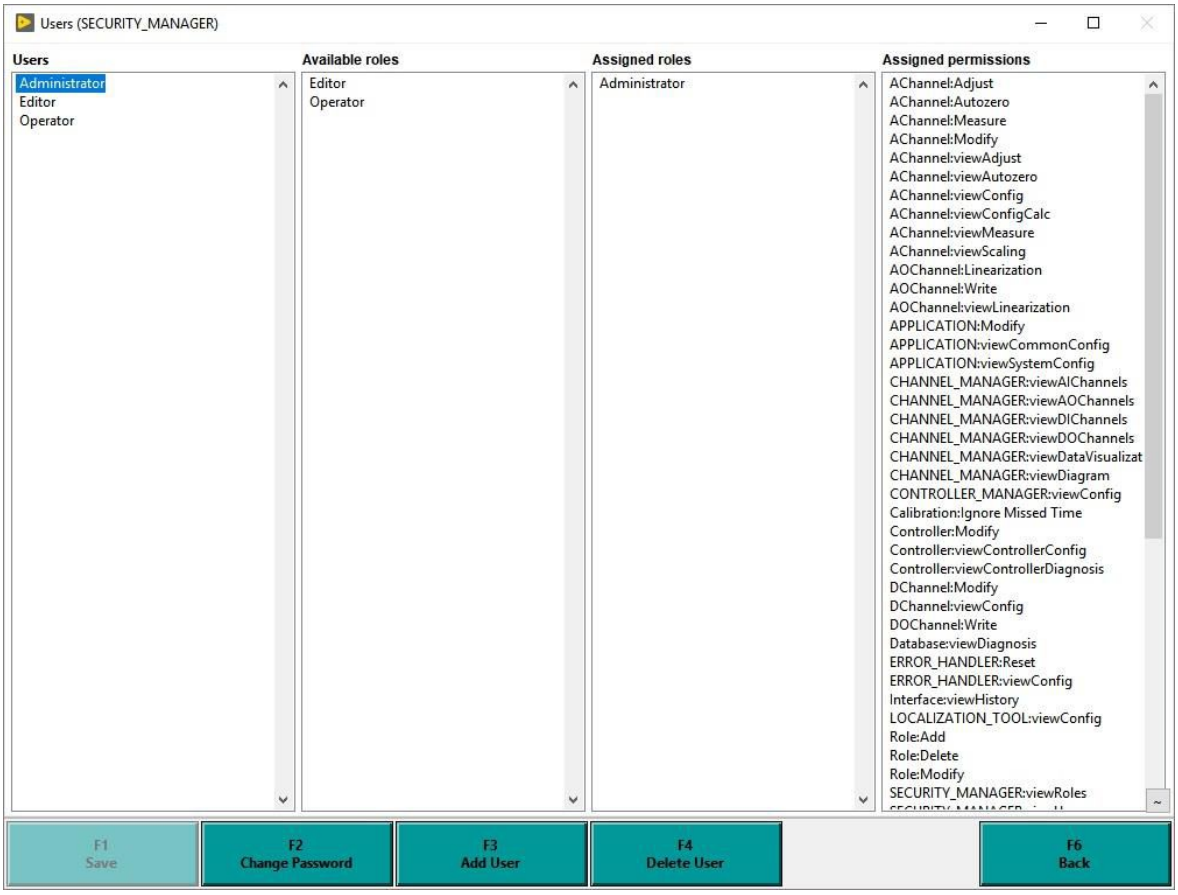


Figure 3.6 User management → Users

In this view the assigned roles can be adapted to a user. It is possible to add/remove assigned/available roles using drag and drop or by double-clicking. All the permissions included with the currently assigned roles are displayed on the right-hand side.

[F2] Change Password	Opens a dialogue in which a new password can be issued.
[F3] Add User	Opens a dialogue for adding a new user.
[F4] Delete User	Deletes the selected user.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

3.4.3 Permissions

Permissions are in English. They are usually made up of the object ID (or object class) and the action. The following is a list of default actions:

view<Config>	Protects the display of a certain view on the respective object.
Modify	Allows modifications of parameters in certain views on an object. (The corresponding view permissions are still necessary!)
Add	The permission to add subcomponents (e.g. users, roles or test plans).
Delete	The permission to delete subcomponents (e.g. users, roles or test plans).

The following table describes the maximum permissions available to the administrator:

Permission	Description
AChannel:Adjust	User is allowed to change adjustment parameters of analog channels.
AChannel:Autozero	User is allowed to run an automatic process to zero differential pressure sensors.
AChannel:Measure	User is allowed to execute a measurement of an analog input channel.
AChannel:Modify	User is allowed to change configuration parameters of analog channels.
AChannel:viewAdjust	User is allowed to view adjustment parameters of analog channels.
AChannel:viewAutozero	User is allowed to view autozero differential pressure sensors.
AChannel:viewConfig	User is allowed to view configuration parameters of analog channels.
AChannel:viewConfigCalc	User is allowed to view calculation setting of analog channels.
AChannel:viewMeasure	User is allowed to view measurement view of analog channels.
AChannel:viewScaling	User is allowed to view adjustment view of analog channels.
AOChannel:Linearization	User is allowed to execute an automatic process to linearize analog output channels.
AOChannel:Write	User is allowed to change the value of an analog output manually at the overview of analog outputs as well as at measurement screen.
AOChannel:viewLinearization	User is allowed to view the linearization of analog outputs.
APPLICATION:Modify	User is allowed to change configuration parameters of the application.
APPLICATION:viewCommonConfig	User is allowed to view the general parameters of the application.
APPLICATION:viewSystemConfig	User is allowed to view the system specific parameters of the application.
CHANNEL_MANAGER:viewAIChannels	User is allowed to view the overview of analog inputs.
CHANNEL_MANAGER:viewAOChannels	User is allowed to view the overview of analog outputs.
CHANNEL_MANAGER:viewDIChannels	User is allowed to view the overview of digital inputs.
CHANNEL_MANAGER:viewDOChannels	User is allowed to view the overview of digital outputs.
CHANNEL_MANAGER:viewDataVisualization	User is allowed to view the data visualization.
CHANNEL_MANAGER:viewDiagram	User is allowed to view the channel diagram.
CONTROLLER_MANAGER:viewConfig	User is allowed to view the controller overview.
Calibration:IgnoreMissedTime	User is allowed to execute the application even while the calibration of one or more components has expired.
Controller:Modify	User is allowed to change configuration parameters of controllers.
Controller:viewControllerConfig	User is allowed to view configuration of controllers.
Controller:viewControllerDiagnosis	User is allowed to view diagnosis of controllers.
DChannel:Modify	User is allowed to change configuration parameters of digital channels.
DChannel:viewConfig	User is allowed to view configuration parameters of digital channels.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

DOChannel:Write	User is allowed to switch digital outputs manually at the overview of digital channels.
Database:viewDiagnosis	User is allowed to view diagnosis functions of databases.
ERROR_HANDLER:Reset	User is allowed to reset error history.
ERROR_HANDLER:viewConfig	User is allowed to view error history.
HARDWARE_MANAGER:ModifyDispatching	User is allowed to change settings of channel dispatching.
HARDWARE_MANAGER:viewDispatching	User is allowed to view settings of channel dispatching.
Interface:viewHistory	User is allowed to view the history of interfaces.
LOCALIZATION_TOOL:viewConfig	User is allowed to view language configuration.
LOGGER:viewLogAnalyze	User is allowed to view logging analysis.
Role:Add	User is allowed to add roles.
Role:Delete	User is allowed to delete roles.
Role:Modify	User is allowed to change roles configuration. (assigning rights)
SECURITY_MANAGER:viewRoles	User is allowed to view roles overview.
SECURITY_MANAGER:viewUsers	User is allowed to view user overview.
Serial:Modify	User is allowed to change configuration setting of serial interfaces.
Serial:SendMessage	User is allowed to send messages via serial interfaces.
Serial:viewSerialConfig	User is allowed to view configuration of serial interfaces.
SerialASCII:viewSerialASCIIConfig	User is allowed to view configurations of serial interfaces which use ACII protocol.
SerialASCII:viewSerialASCIIDiagnosis	User is allowed to view diagnosis functions of serial interfaces which use ASCII protocol.
SerialModbus:viewSerialModbusConfig	User is allowed to view configurations of serial interfaces which use modbus protocol.
SerialModbus:viewSerialModbusDiagnosis	User is allowed to view diagnosis functions of serial interfaces which use modbus protocol.
TEST_MANAGER:viewStepTemplates	User is allowed to view testplan templates.
TEST_MANAGER:viewTestplans	User is allowed to view testplans.
TestPlan:Add	User is allowed to add testplans.
TestPlan:Copy	User is allowed to copy testplans.
TestPlan:Delete	User is allowed to delete testplans.
TestPlan:Modify	User is allowed to change testplan parameters.
Trigger:Modify	User is allowed to change trigger parameters.
Trigger:viewConfig	User is allowed to view trigger configuration.
User:Add	User is allowed to add users.
User:ChangePassword	User is allowed to change user passwords.
User:Delete	User is allowed to delete user.
User:Modify	User is allowed to change user configuration. (assigning roles)
viewScreen:CONFIG_SCREEN	User is allowed to view configuration screen.
viewScreen:MEASUREMENT_SCREEN	User is allowed to view measurement screen.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

3.5 Logging

The software generates a log file which can be found in C:\P<Projektnummer>\Log\Log_YYYY-MM-DD.txt in its condition on delivery. This log file contains information, status, warning and error messages which are generated and logged during operation of the test bench. The number of saved messages depends on the configuration of the component.

If the software does not run as expected, the log file can be helpful for finding the possible causes of errors. This file is requested by Ehrler in order to be able to determine the status of the system at the time of occurrence of the error more exactly.

Example entry:
[7c35f5c4ad67c45d6861d874fe863fc2] [00001][INFO] [2019-02-26 11:27:13] [Administrator] [APPLICATION] [The application was started.]

Each entry comprises seven parts (separated by []):

7c35f5c4ad67c45d6861d874fe863fc2	Checksum of the entry for detecting damage.
00001	Consecutive number of the entry within the file
INFO	Event level of the entry
2019-02-26 11:27:13	Time stamp of the entry
Administrator	Active user at this point in time
APPLICATION	Object which has triggered the entry
The application was started.	Notification of the entry

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

3.5.1 Logging configuration

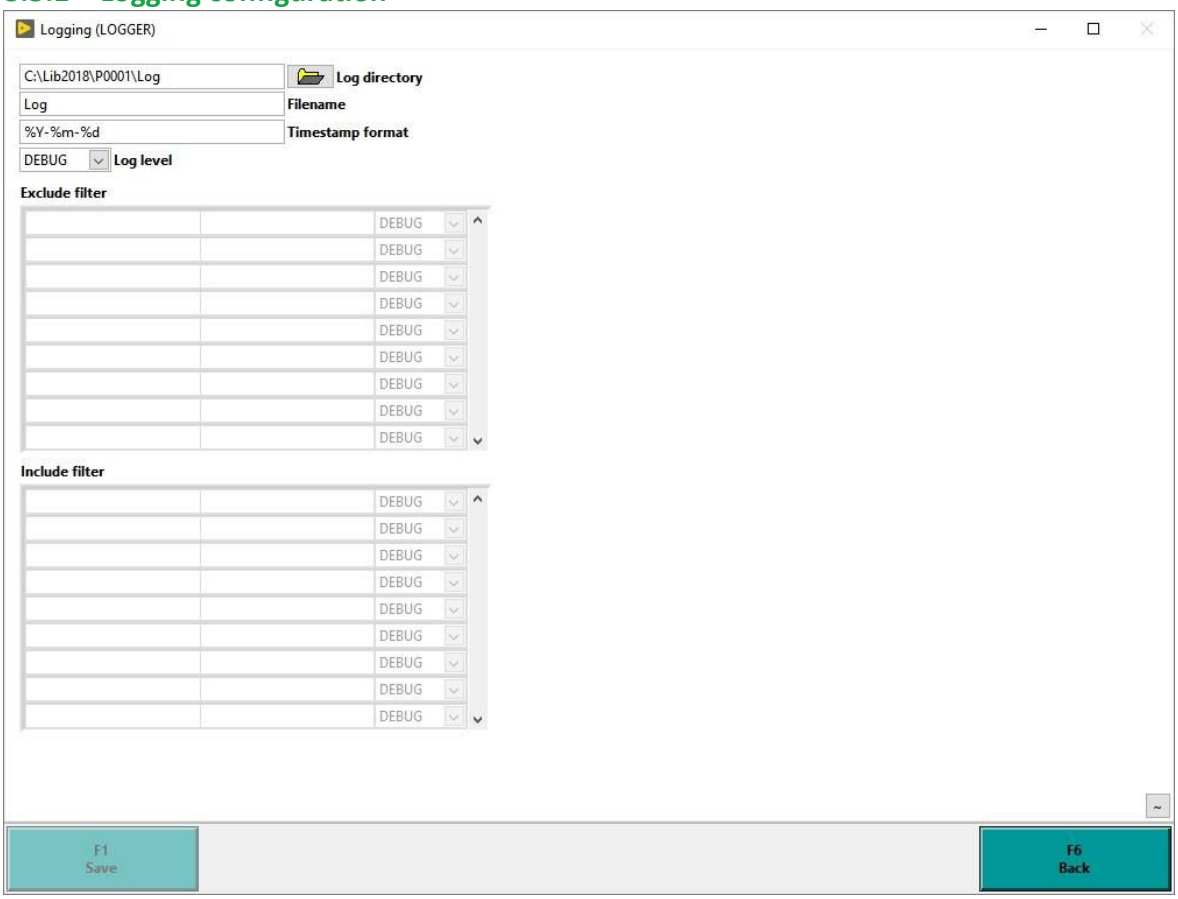


Figure 3.7 Logging

Log directory	Storage path for the log files.
Filename	Name of the automatically generated log file.
Timestamp format	Format of the timestamp in the name of the log file.
Log level	Setting as to which events are to be logged. Possible settings: DEBUG – Messages from components which may be relevant for debugging purposes. (A very high number of notifications). USER – Messages which are generated when the user carries out actions (e.g. selects a button). INFO – Messages which, for instance, describe the status change of components (e.g. connection open/connection closed). CONFIG – Message when the configuration of an object of the software has been changed (e.g. parameter change by the user). WARN – When a component has triggered a warning. ERROR – When an error message has been displayed.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

Exclude filter	This is where component messages can be excluded from the set log level. (E.g. in order to use a log level which generates a large number of notifications, but not log specific components).
Include filter	This is where component messages can be included to be logged regardless of the set log level. (E.g. in order to see DEBUG notifications for specific components only).

3.5.2 Log analyze

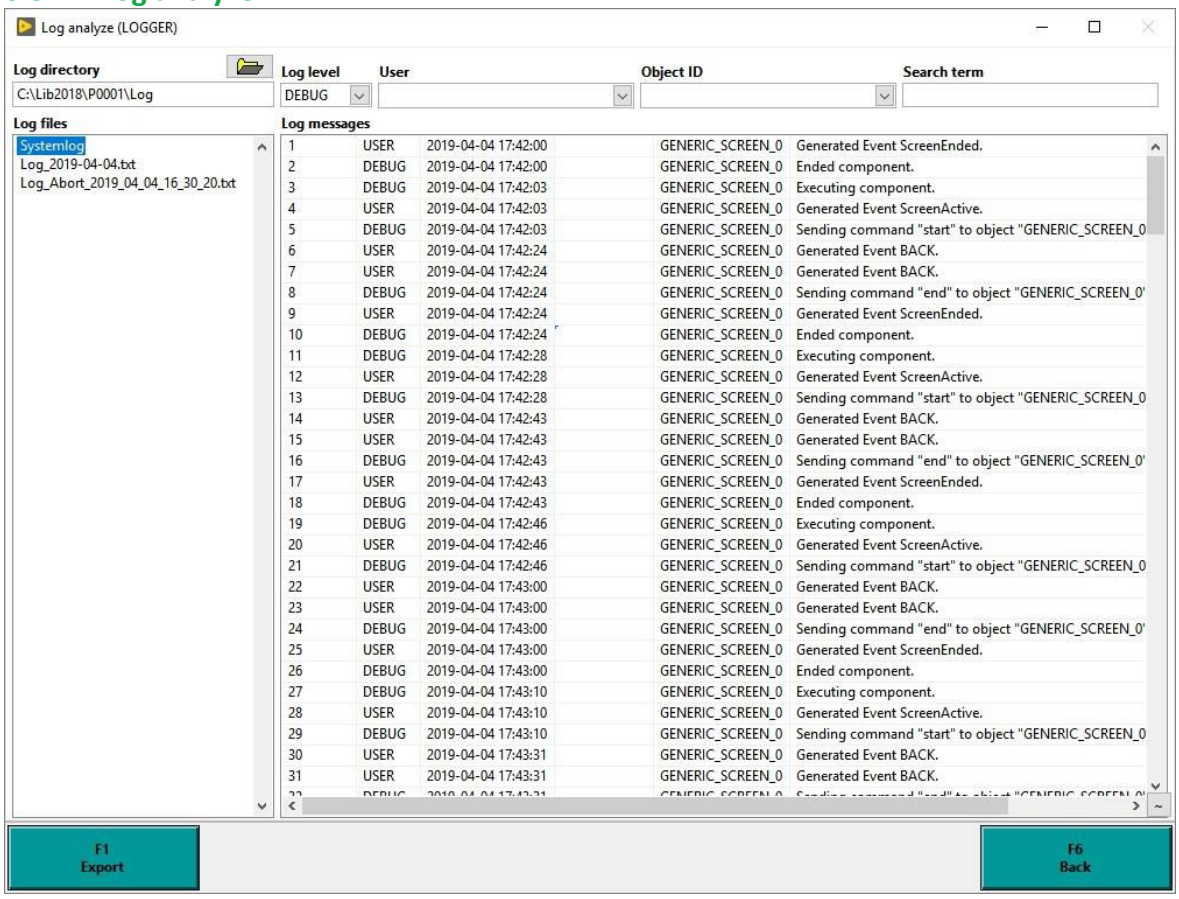


Figure 3.8 Logging → Log analyze

Log directory	Storage path for the log files. All the files found in this directory are displayed in the "Log files" list.
Log files	List of the available log files which can be loaded. Click on a file to load it. If system log is selected, the internal log of the application is loaded.

A loaded log file can be filtered by log level, user, object ID and search term. The current display can be exported using the button F1 Export as a .txt file.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

3.6 Error messages

The software has a central component for display and management of possible errors. The following is a description of basic software errors only. Different/further errors may be generated by the code specific to the respective project. Refer to the documentation specific to the respective project for details of these errors. Not all the errors listed here are relevant to your project because they can only occur if the respective software component is also in use.
The manner in which the system reacts to errors in general depends on the process specific to the respective project. Display and acknowledgement is usually performed by the dialogue shown below. It is also possible that various interfaces will be able to make the active error available, where they can also be acknowledged. Errors which occur are logged using the function described in 3.5.

3.6.1 Error dialogue

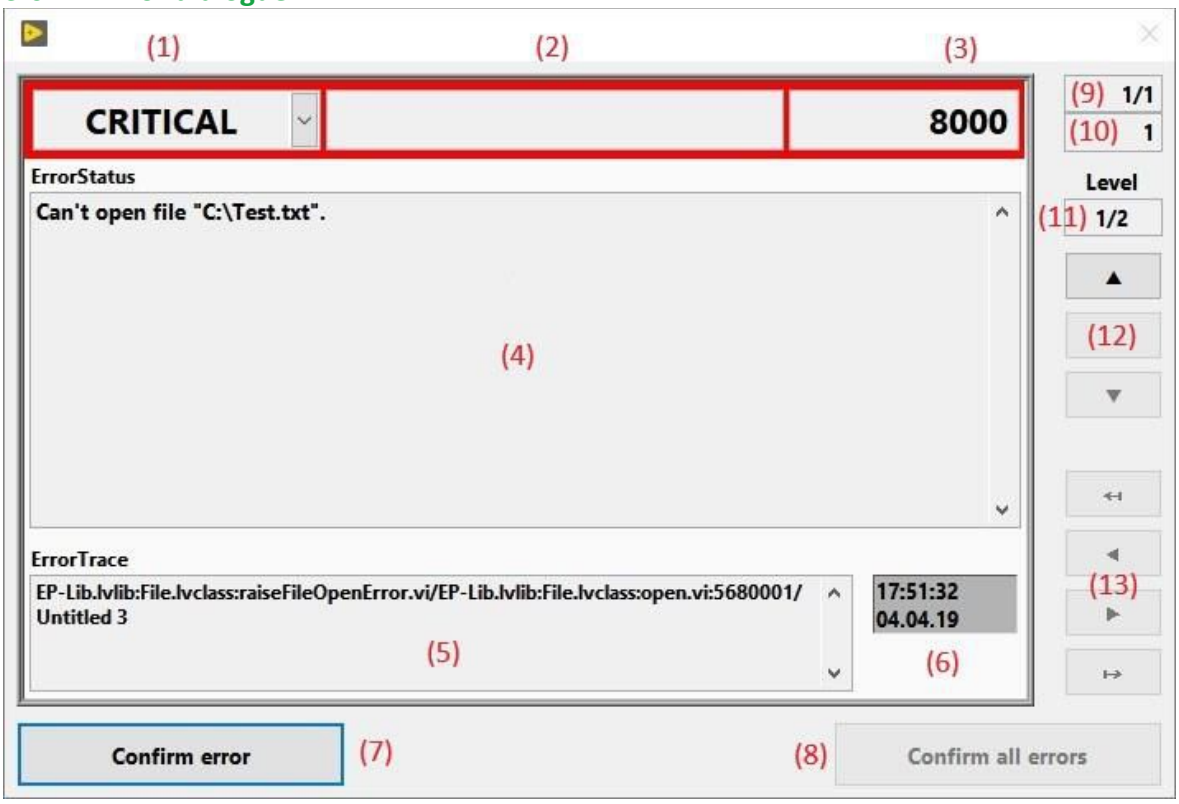


Figure 3.9 Error dialogue

(1)	Error level.
(2)	Object ID on which the error has occurred.
(3)	Error number.
(4)	Text of the error message.
(5)	Method call in which the error has been dealt with.
(6)	Timestamp at which the error has occurred.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

(7)	Button for confirming this single error.
(8)	Button for confirming all active errors.
(9)	Number of the displayed error/quantity of all active errors.
(10)	Frequency of the currently displayed error.
(11)	Position of the currently displayed error in the stack/depth of the stack.
(12)	Navigation within the currently active errors.
(13)	Navigation within the stack of the currently displayed error.

3.6.2 Error code of the basic software

Code	Message
5003	Cannot find data acquisition component with the ID "<1>" for channel "<2>".
5006	The scaled value "<1>" is outside the allowed range ("<2>"-"<3>").
5007	The raw value "<1>" is outside the allowed range ("<2>"-"<3>").
5008	The difference between channel "<1>" (<3>) and channel "<2>" (<4>) is outside the allowed range (<5>).
5009	Channel "<1>": The measured offset (<2>) is outside the allowed range (+/- <3>). The correction was not performed.
5050	NI card cannot be initialized.
5051	Channel "<1>" cannot be configured.
5052	Error initialization of counter on NICard.
5054	Route "<1>" between "<2>" and "<3>" of NI-Card "<4>" cannot be activated.
5055	Route "<1>" between "<2>" and "<3>" of NI-Card "<4>" cannot be deactivated.
5056	Error data processing NICard.
5060	Error in TCP Modbus communication.
5100	No supply voltage at linear drive "<1>".
5101	Halt request active at linear drive "<1>".
5102	No reference at linear drive "<1>".
5103	Unable to move linear drive.
5104	Unable to move linear drive to reference position.
5106	Unable to address linear drive.
5107	Linear drive returned invalid answer.
5108	Invalid position <1> mm for linear drive "<2>". Allowed range: <3> to <4> mm.
5109	Invalid velocity <1> mm/s for linear drive "<2>". Allowed range: <3> to <4> mm/s.
6004	Was not able to load class dynamically. Class name: <1>. This can be caused by faulty configuration or the class was not complied into the application.
6099	Error calculation flow coefficient
6100	Cannot configure test "<1>".
6101	Cannot run test "<1>".
6102	Missing StateHandler object at reeentrant execution of test "<1>".
6110	The license file for your system is missing!

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

6111	The license file for your system has an invalid format!
6112	The license for your system is invalid (Code: <1>)!
6150	Parameter set "<1>" at PIDController was not found.
7130	Error opening connection.
7131	Error closing connection.
7132	Error transfering data at interface.
7133	Error calling modbus funtion at adress <1> over serial interface.
8000	Can't open file "<1>".
8001	Can't close file "<1>".
8002	Can't write to file "<1>".
8003	Can't read from file "<1>".
8004	Can't save file "<1>".
8005	Filepath "<1>" is too long.
8006	Can't execute macro "<1>" at file "<2>".
8020	Can't parse XML file "<1>" (<2>).
8030	SQL query error.
9251	No component with the ID "<1>" was found.
9252	The control command "<1>" is not valid for an "<2>" object.
9253	No controller input object with the ID "<1>" for target "<2>" was found.
9254	No controller output object with the ID "<1>" for target "<2>" was found.
9257	Configuration error: Invalid value "<1>" for parameter "<2>" at component "<3>"! Allowed values: <4>
9258	Configuration error: the component "<1>" (<2>) cannot be configured.
9259	Initialization error: the component "<1>" (<2>) cannot be initialized.
9261	Timeout waiting for component "<1>" (<2>) to reach state.
9262	Component with ID "<1>" was not manufactured.
9263	Timeout while ending component "<1>".
9280	Physical quantity "<1>" not found!
9281	Unit "<1>" for physical quantity "<2>" not found!

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4 Channels

All software inputs and outputs are reproduced by channels:

- Analogue input (e.g. sensor value, feedback from a control valve)
- Analogue output (e.g. setpoint value for fan or control valve)
- Digital input (e.g. feedback from a valve or switch)
- Digital output (e.g. switching of a valve, output of status)

Not every channel displayed on the interface reproduces a physical hardware component. Channels in the software can be used which perform a calculation of other channels (e.g. calculation of the density based on the pressure, the temperature and the humidity), or are used to depict calculated variables from other components (e.g. volumetric flow rate of a differential-pressure-dependent measuring element).

Each channel has a raw value and a scaled value. The raw value is the physical value visible externally. The software operates with the scaled value:

	Raw value	**Scaled value**
Analogue input	4 to 20 mA	800..1200 hPa
Analogue output	0..10 V	0,100%

Digital channels also have a raw value and a scaled value. The only useful available operation in this case is inversion.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.1 Channel diagram

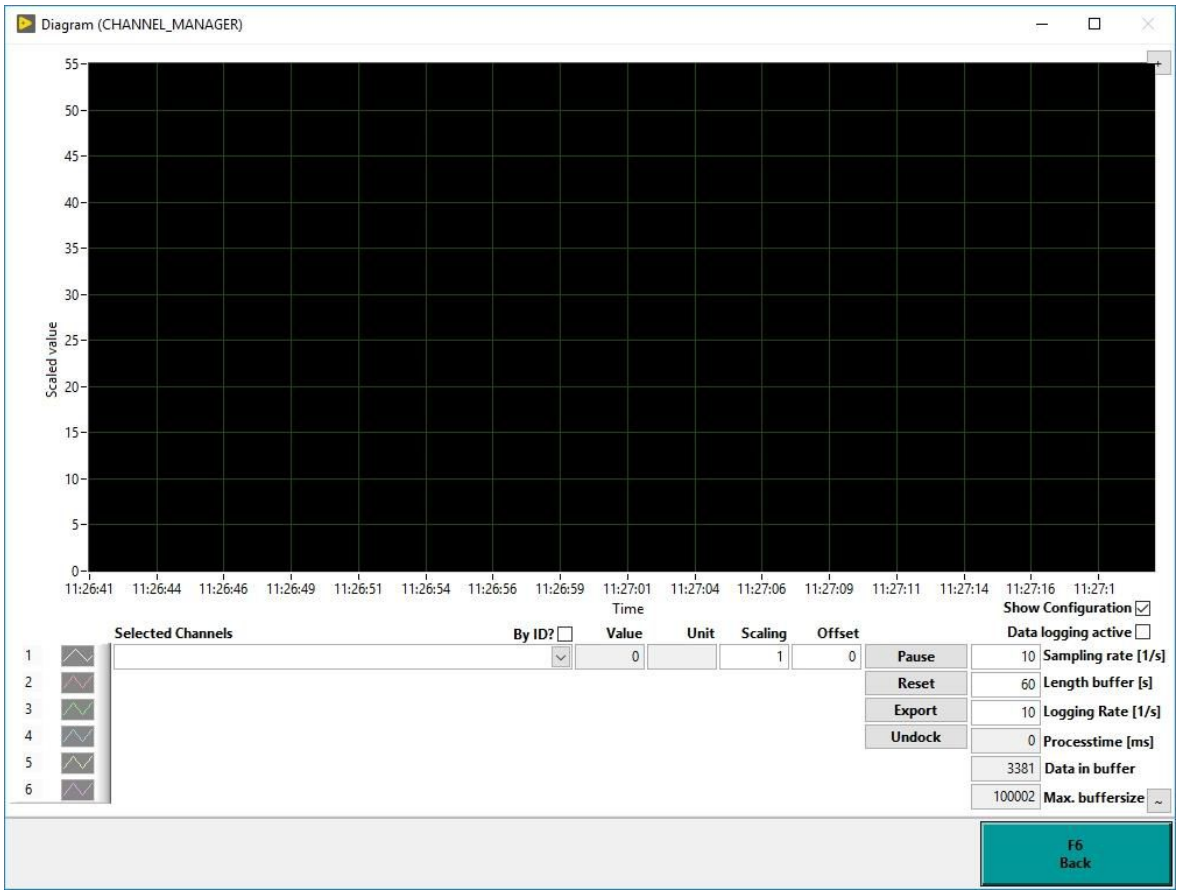


Figure 4.1 Channels → Channel diagram

You can click on the "Show configuration" checkbox to show the configuration of the display.

Data logging active	This is where the saving of the current actual values of all (not only the displayed) channels can be activated in a .csv file. A file with the name "Sensorvalues_YYYY_MM_DD_HH_MM_SS.csv" is created in the program directory in the subfolder "Log". The speed of the capture can be set using the "Log Rate [1/s]" parameter.
Selected Channels	Select up to six channels which are to be shown in the diagram. The designation of the available channels follows the scheme "[channel type] [channel description] [channel ID]". To no longer display a channel, either the top empty entry can be selected or the name can be deleted using the keyboard.
By ID?	This option can be used to set whether the channels are to be listed by description or by channel ID.
Value	Shows the current value of the selected channel.
Unit	Indicates the unit of the currently selected channel.
Scaling	Shows the scaling factor for this channel. It can be used to scale the channel values to the same range.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

Offset	Shows the offset of this channel. It can be used to shift the channel values to the same range.
Sampling rate [1/s]	Defines the data rate at which the channel values are read.
Length Buffer [s]	Defines the period of the shown data.
Logging Rate [1/s]	Defines the resolution with which the data is saved.
Processing time [ms]	Shows the time required for capturing all the values.
Data in buffer	Number of entries currently used in the buffer.
Max. buffer size	Maximum number of entries in the buffer. If the buffer is full, the data rate [1/s] is automatically lowered to be able to capture sufficient data as per the "Buffer length [s]" parameter.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.2 Data visualization

In this view, it is possible to read and visualize again which files have been generated by the channel diagram (4.1) or by the channel logging (4.7).

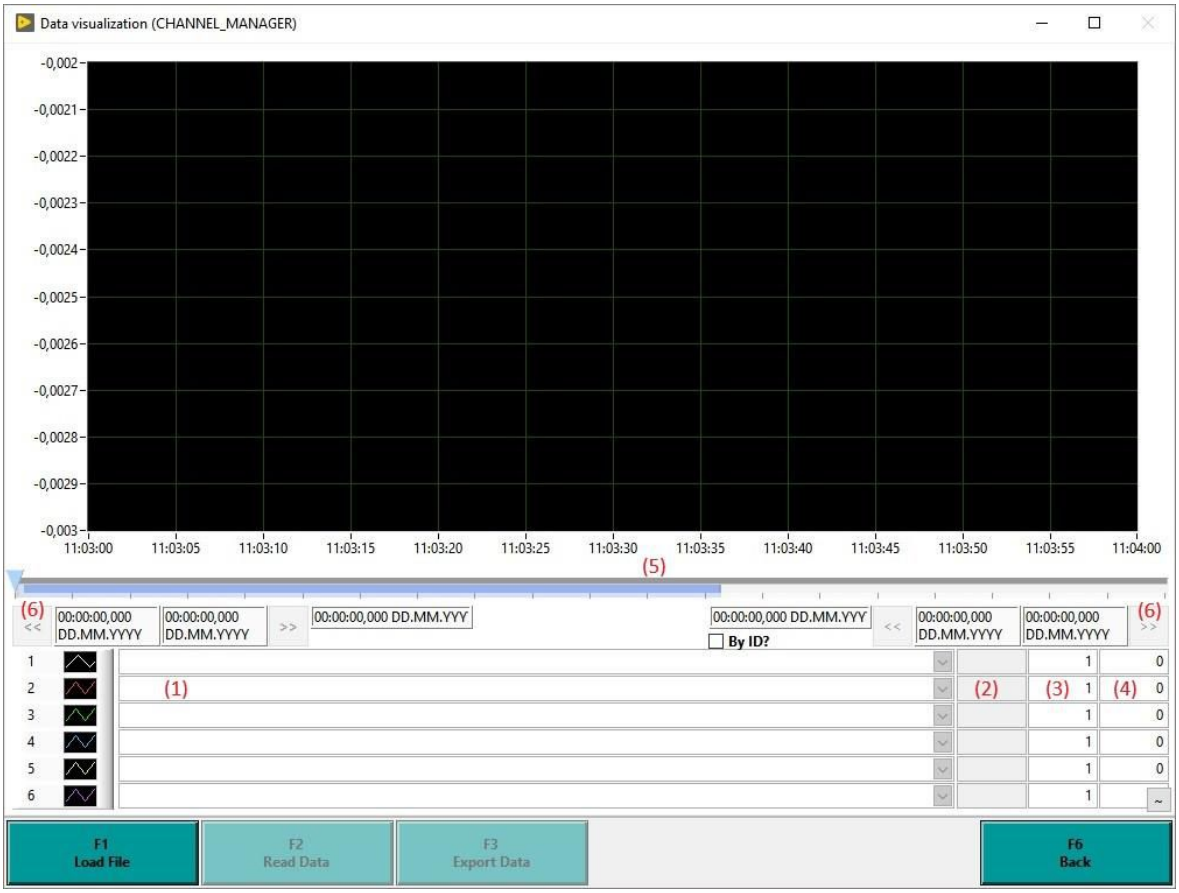


Figure 4.2 Channels → Data visualization

(1)	Selection of channels for display.
(2)	Unit of the selected channel.
(3)	Scaling of the selected channel.
(4)	Offset of the selected channel.
(5)	Slider with which the displayed time range is adjusted.
(6)	This can be used to load further files to the diagram which are directly before or after it in time.

[F1]	Opens the dialogue for selection of the file being loaded.
[F2]	Given that the display only loads a certain number of points regardless of the size of the file, the file can be read in again here after the time axis has been changed in order to achieve a more exact resolution, if available.
[F3]	Exports the currently loaded data.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.3 Analogue inputs

The overview of analogue inputs lists all the configured analogue input channels with their current values.

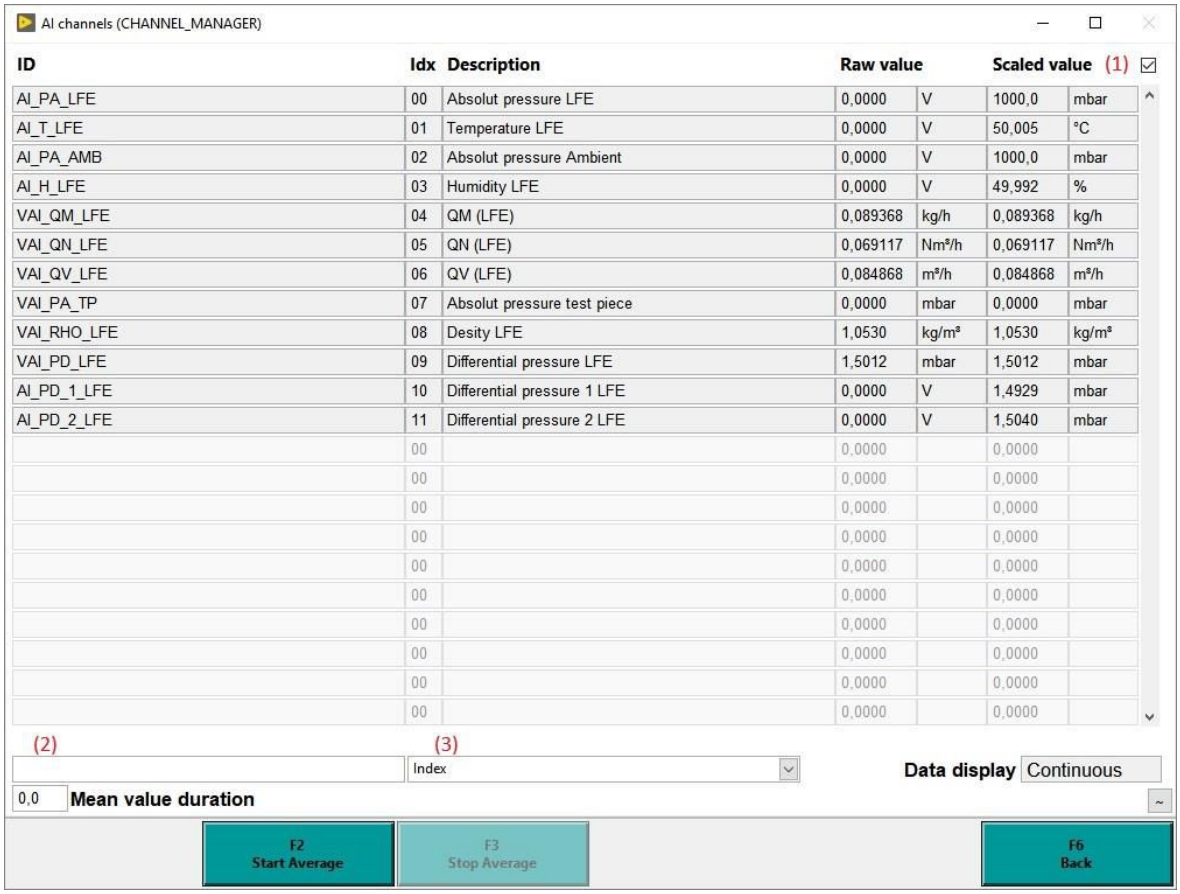


Figure 4.3 Channels → AI channels

ID	A unique, internal identifier for the channel, e.g. "AI_PA_LFE"
Idx	Internal sequence of the channels
Description	A description of the input, e.g. "Absolute pressure LFE"
Raw value	The raw value on the input, e.g. "5 V"
Scaled	The scaled, physical value on the input, e.g. "500 hPa"
Data display	Mode of the display: Current value or mean value
Mean value duration	Duration in seconds over which a mean value measurement started using the buttons is to run. (If this value is 0, the measurement runs until the user cancels it.)

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

(1)	Display or hide virtual channels.
(2)	The list of the channels is filtered in accordance with the text entered here.
(3)	The display of the channels can be sorted in accordance with the following criteria: • ID — Name • Index — Sequential number • Description • DAQ+ChannelID — Hardware assignment
[F2]	Starts mean value measurement.
[F3]	When mean value measurement is in progress: the measurement is stopped. If mean value management is not in progress: back to the display of current values. I.e. if a mean value measurement is currently in progress, <F3> must be pressed twice in order to display the current values.

4.3.1 Mean value measurement

The mean value measurement is a global function which calculates the mean values of all channels over a certain time, regardless of the view or window from which it has been started. The measurement is started as a separate process so that tests running parallel to it are not affected.
If no measuring time is specified, the mean value measurement runs until it is stopped with the stop button.
If a measuring time is specified, the remaining measuring time is displayed in the remaining time field, if available, and the measurement stops automatically once this time has elapsed.
After a mean value measurement has been completed, the standard deviation, minimum and maximum value can be read in the measuring views (→ 4.3.6) of the individual channels.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.3.2 Calibration monitoring

The testing software has a component for monitoring system calibration. The validity of the calibration of sensors and measuring elements is monitored.

Calibration monitoring is based on the date of the last calibration and the calibration cycle configured in the factory. The date of last calibration can be set on the adjustment screen for analogue channels (sensors) and measuring elements. To do so, calibration staff should select the "Calibration complete" button after calibration of a sensor or measuring element in order to save the current date. The date of the last calibration is displayed in the "Last calibration" field.
When the software is started, the status of the calibration is checked and, if necessary, the system operator is warned.
If the next necessary calibration for one or more components is within a configured warning period (normally 90 days), the respective warning appears when the software is started.

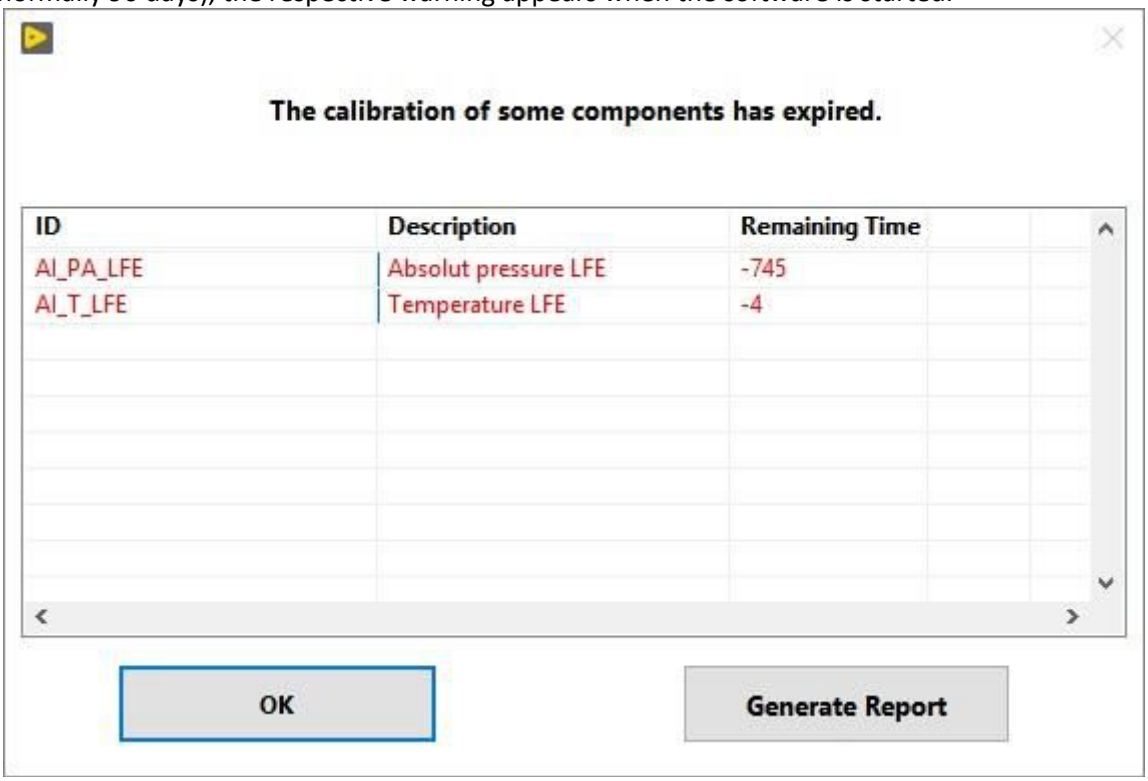


Figure 4.4 Calibration dialogue

This dialogue lists components whose calibration has elapsed or will soon elapse. Elapsed calibrations are highlighted in red. The time until the calibration elapses or the time since calibration elapsed is displayed in each case. Operation of the system without valid calibration is only permitted with the respective permissions. Users without the respective permissions can only log off again.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.3.3 Configuration

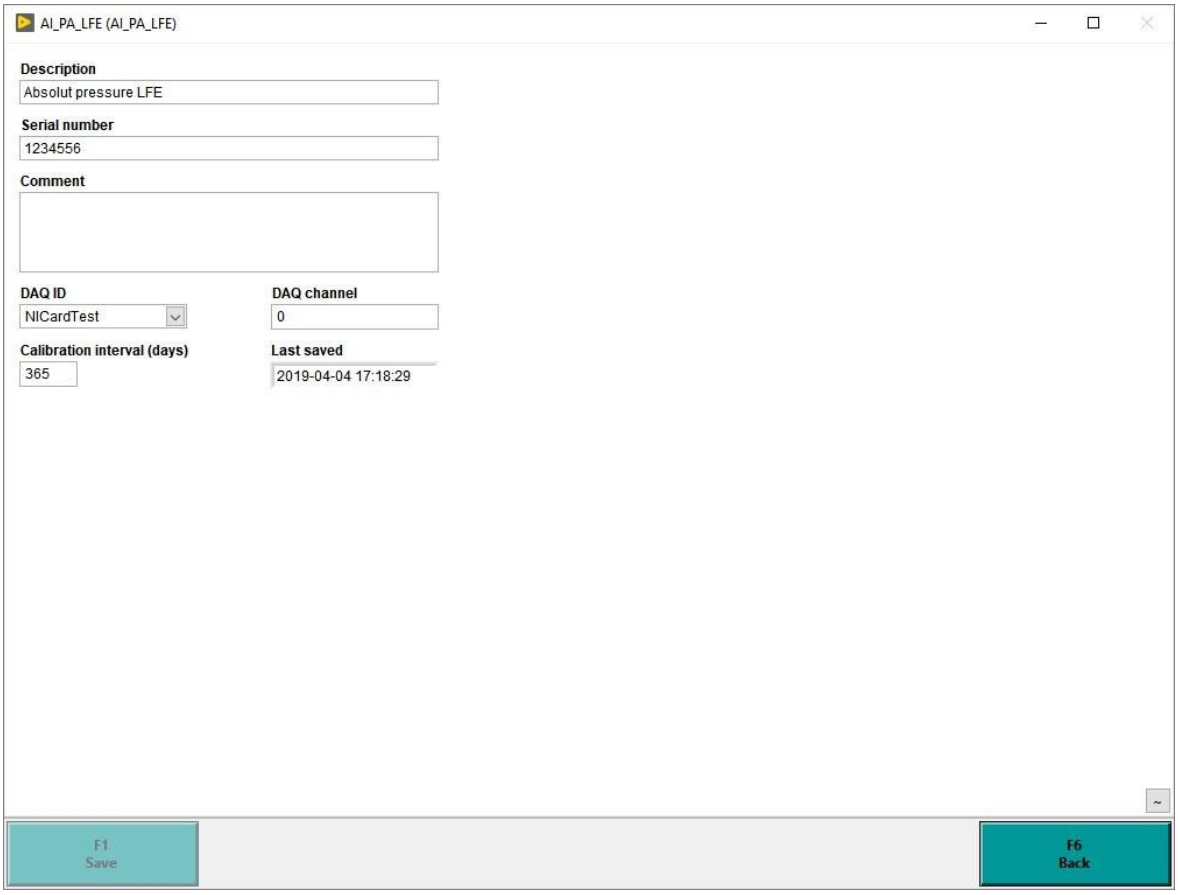


Figure 4.5 Channels → AI channels → [Object ID]

Detailed information on the selected channel can be seen in the configuration view:

Description	A description of the channel, e.g. "Differential pressure test piece".
Serial number	The serial number of the device (e.g. sensor) which is connected to the channel.
Comment	Optional comments.
DAQ ID	ID of the data acquisition hardware that is allocated to this channel.
DAQ channel	Name of the channel on the data acquisition hardware that is allocated to this channel.
Calibration interval (days)	Number of days in the period after which calibration is recommended.
Last saved	Date of last save.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.3.4 Adjustment

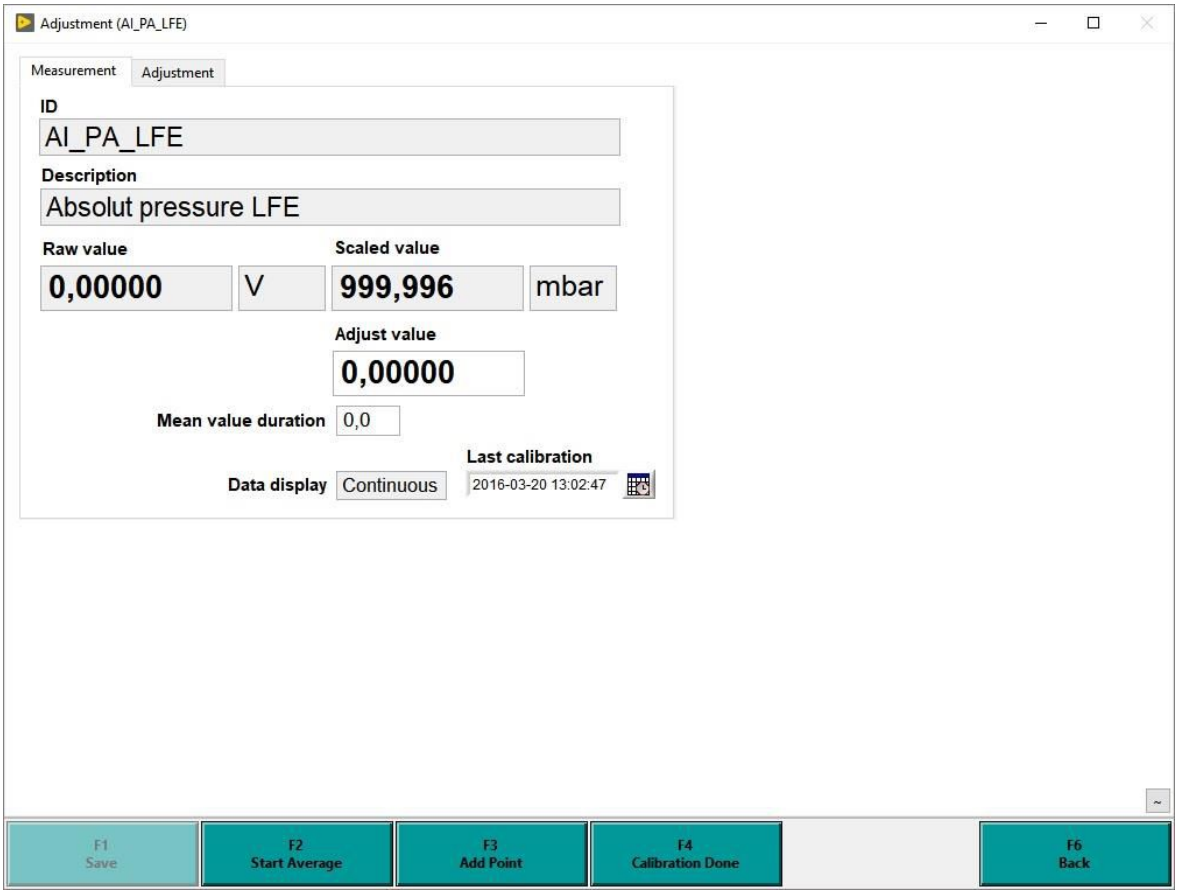


Figure 4.6 Channels → AI channels → [Object ID] → Adjustment. Measurement tab

In the adjustment view of an analogue channel, the conversion of raw value to scaled value is defined. If the channel is assigned to a physical sensor, this is where the calibration data is entered.

ID	A unique, internal identifier for the channel, e.g. "AI_PA_LFE"
Description	A description of the input, e.g. "Absolute pressure LFE"
Raw value	The raw value on the input, e.g. "5 V"
Scaled value	The scaled, physical value on the input, e.g. "500 hPa"
Data display	Mode of the display: Current value or mean value
Mean value duration	Duration in seconds over which a mean value measurement started using the buttons is to run. (If this value is 0, the measurement runs until the user cancels it.)
Last calibration	Date on which the last calibration was carried out. You can use the F4 button to set the current date. The date can also be selected directly in this field.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

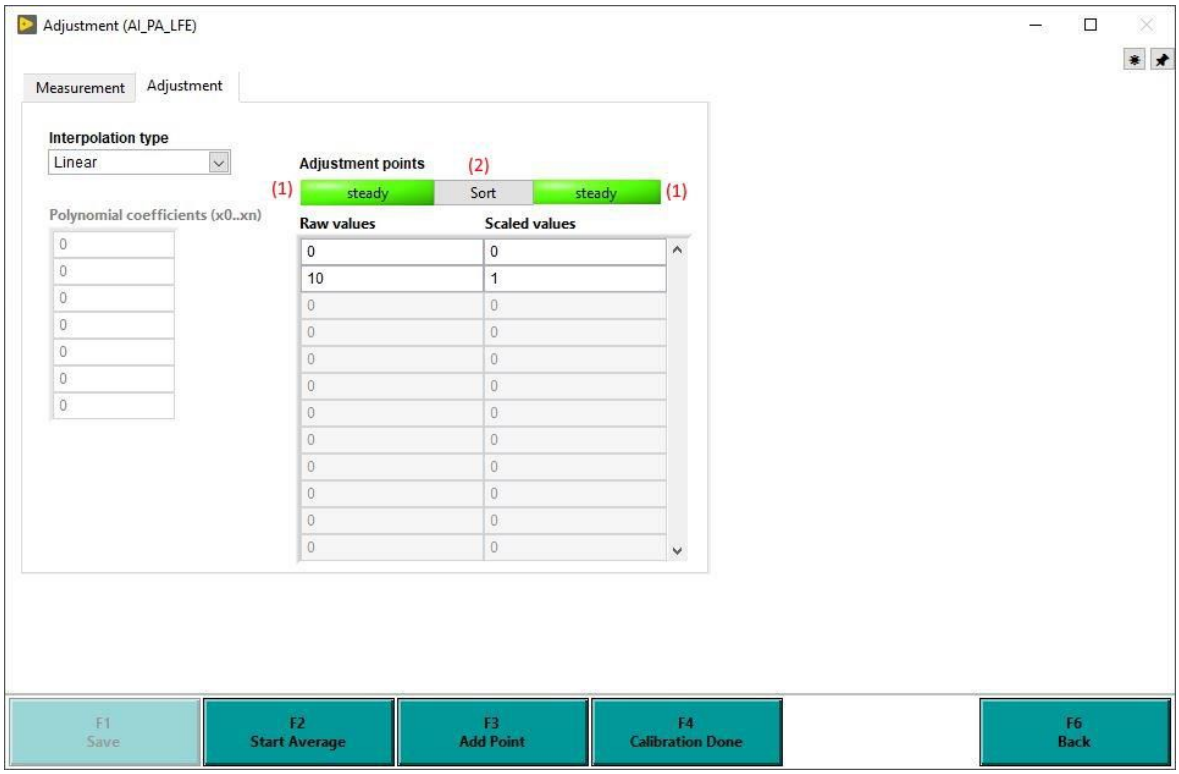


Figure 4.7 Channels → AI channels → [Object ID] → Adjustment. Measurement tab

Interpolation type	Type of interpolation for the correction calculation: • Linear Linear interpolation • Polynomial Interpolation using a polynomial
Polynomial coefficients	Coefficients of a polynomial for the "Polynomial" interpolation calculation.
Adjustment points	Adjustment points for a "Linear", point-to-point interpolation calculation.
(1)	Show whether or not the respective values are sorted in ascending order.

(2)	Sorts the adjustment points in ascending order of the raw values.
[F2]	Starts and stops the mean value measurement.
[F3]	Adds the current raw value and correction value to the adjustment points as a pair of points.
[F4]	Ends calibration → Updates the date of the last calibration.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.3.5 Scaling

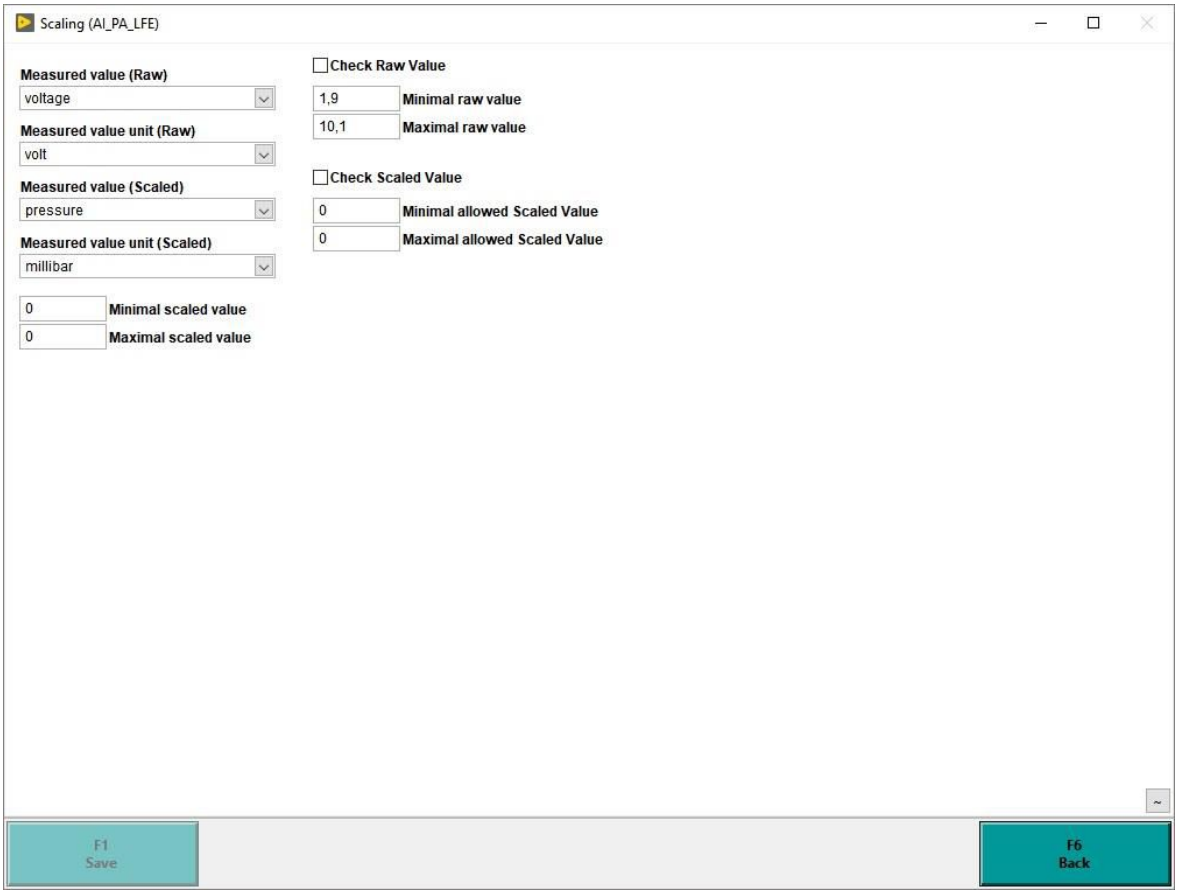


Figure 4.8 Channels → AI channels → [Object ID] → Scaling

In this view, basic settings for scaling can be changed.

Measured variable (Raw)	The input variable for the channel. This is the raw value for an input channel.
Measured value unit (Raw)	The unit of the raw value.
Measured value (Scaled)	The output variable for the channel. This is the scaled value for an input channel.
Measured value unit (Scaled)	The unit for the output variable.
Minimal scaled value	Minimum value for the scaled value of the channel. This value is used, e.g. for standardisation on PID controllers.
Maximal scaled value	Maximum value for the scaled value of the channel. This value is used, e.g. for standardisation on PID controllers.
Permitted raw value check	If active, an error is signalled if the raw value is outside the limits.
Minimal allowed Raw value	Minimum value for the raw value of the channel. This is the lower limit for the permitted measurement range.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

Maximal allowed Raw value	Maximum value for the raw value of the channel. This is the upper limit for the permitted measurement range.
Check scaled value	If active, an error is signalled if the scaled value is outside the limits.
Minimal allowed Scaled value	Minimum value for the scaled value of the channel. This is the lower limit for the permitted measurement range.
Maximal allowed Scaled value	Maximum value for the scaled value of the channel. This is the upper limit for the permitted measurement range.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.3.6 Measurement

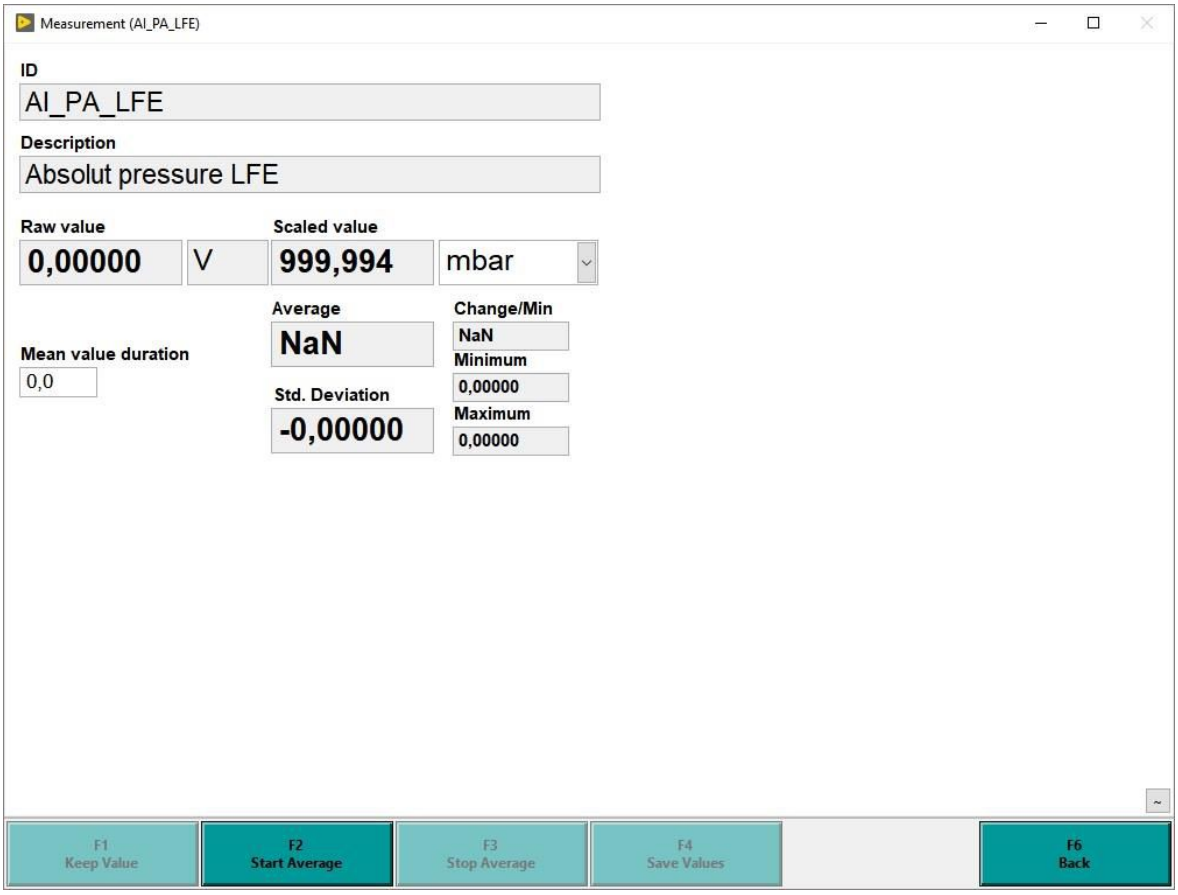


Figure 4.9 Channels → AI channels → [Object ID] → Measurement

In the measurement view of an analogue channel, the raw value and scaled value are displayed, and you have the option of changing the displayed unit of the scaled value.

ID	A unique, internal identifier for the channel, e.g. "AI_PA_LFE"
Description	A description of the input, e.g. "Absolute pressure LFE"
Raw value	The raw value on the input, e.g. "5 V"
Scaled value	The scaled, physical value on the input, e.g. "500 hPa"
Average	Average of measurement for forming mean value
Std. Deviation	Standard deviation of measurement for forming mean value
Change/Min	Change in value per minute
Minimum	Minimum of measurement for forming mean value
Maximum	Maximum of measurement for forming mean value

(1)	Selection of the unit for the scaled value.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

Mean value duration	Measurement time for mean value measurement in seconds.
[F1]	Notes measured value.
[F2]	Starts mean value measurement.
[F3]	Stops mean value measurement.
[F4]	Saves the noted measured values.

4.3.7 Calculation Settings

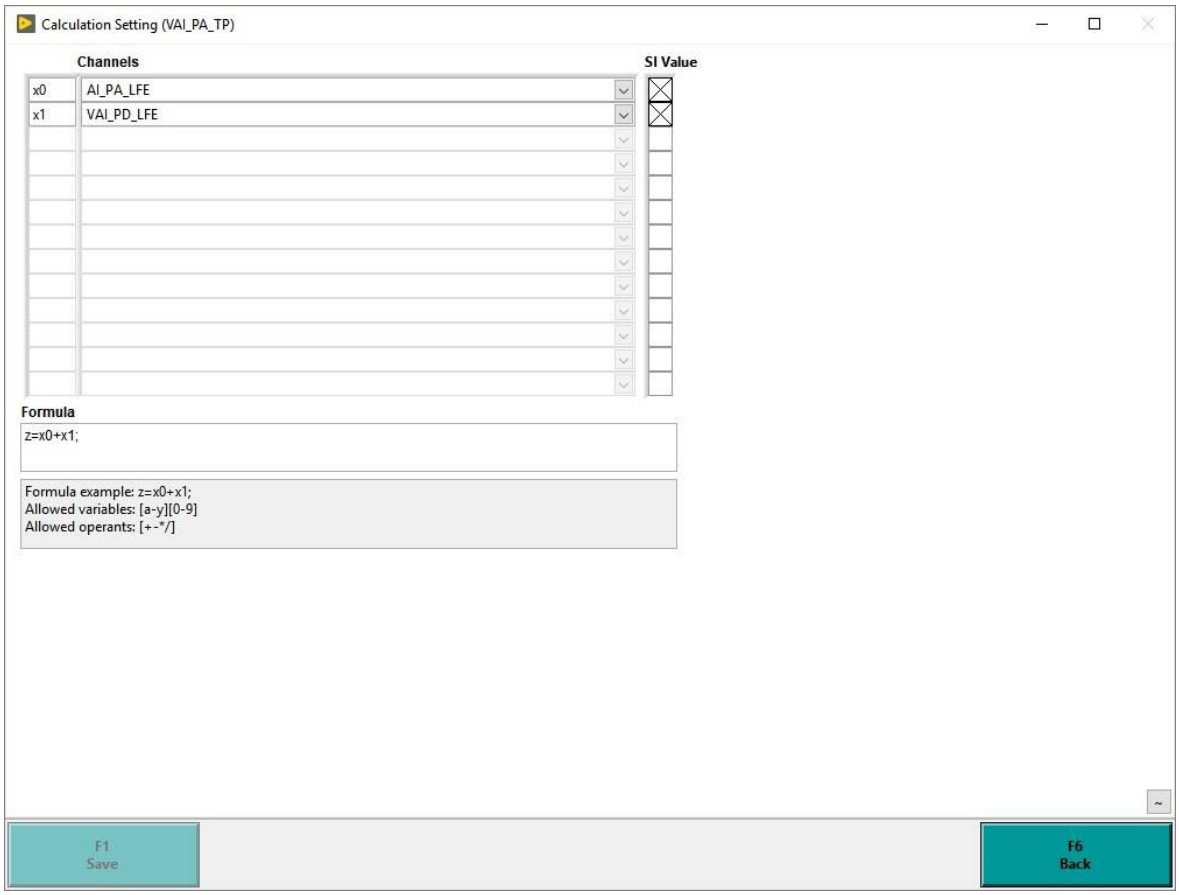


Figure 4.10 Channels → AI channels → [Object ID] → Calculation Setting

This view is only available for specific types of channels. This is a channel which only calculates other channels, e.g. in order to calculate an absolute pressure in a position in which no absolute pressure sensor is installed.

(1)	Variable assignment to the selected channel.
Channels	Channel selection (every channel available in the software is listed here). In the case of digital channels 0 and 1 is used as the value in the formula.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

SI Value	This setting can be used to switch over to determine whether the value of an analogue channel is used in the unit of the channel or whether the value in the SI unit is to be used.
Formula	The formula used for the calculation.

4.3.8 Rho settings

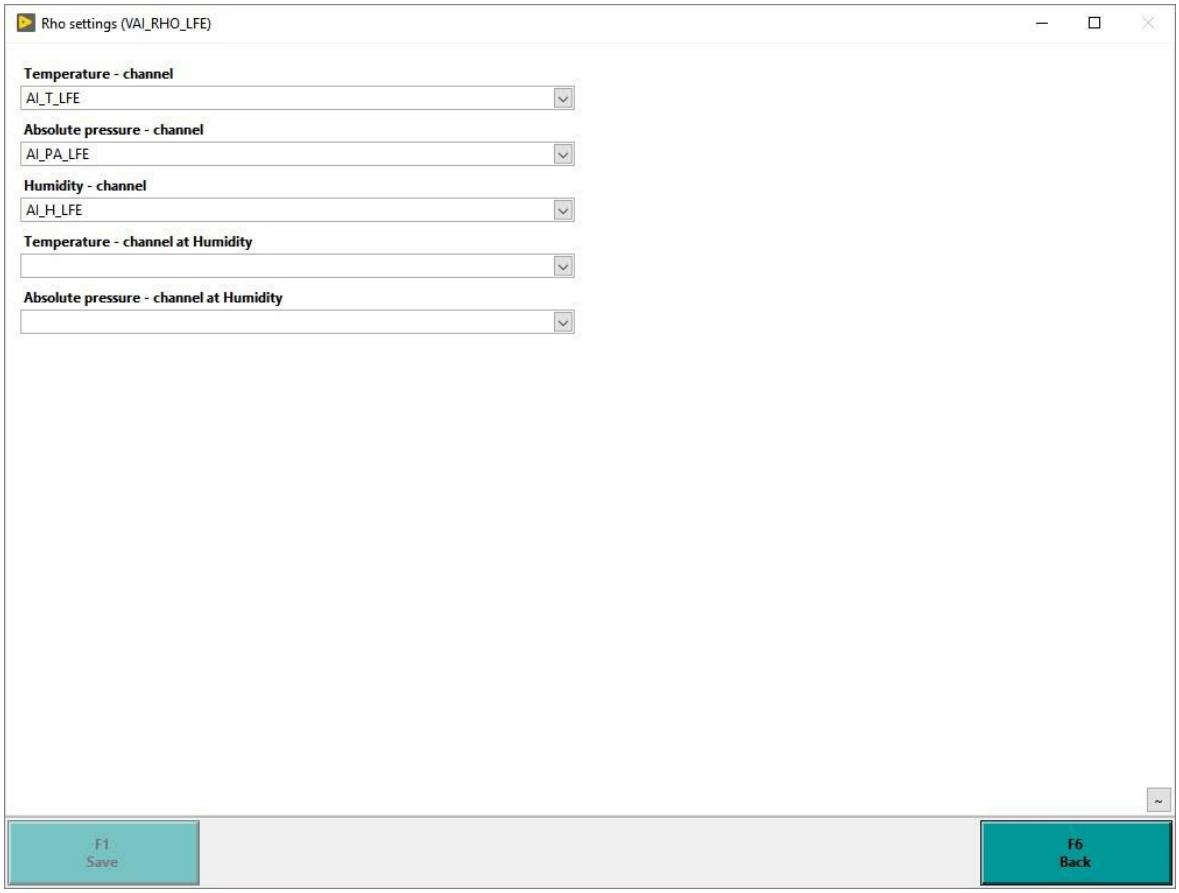


Figure 4.11 Channels → AI channels → [Object ID] → Rho settings

This view is only available for specific types of channels. This is a channel which can calculate the density for air from the available pressure, temperature and humidity channels.

Temperature - channel	The temperature channel for use. [Required]
Absolute pressure - channel	The absolute pressure channel for use. [Required]
Humidity - channel	The humidity channel for use. [Required]
Temperature - channel at Humidity	The temperature at which the humidity measurement is performed. [Optional]
Absolute pressure - channel at Humidity	The absolute pressure at which the humidity measurement is performed. [Optional]

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.3.9 Autozero

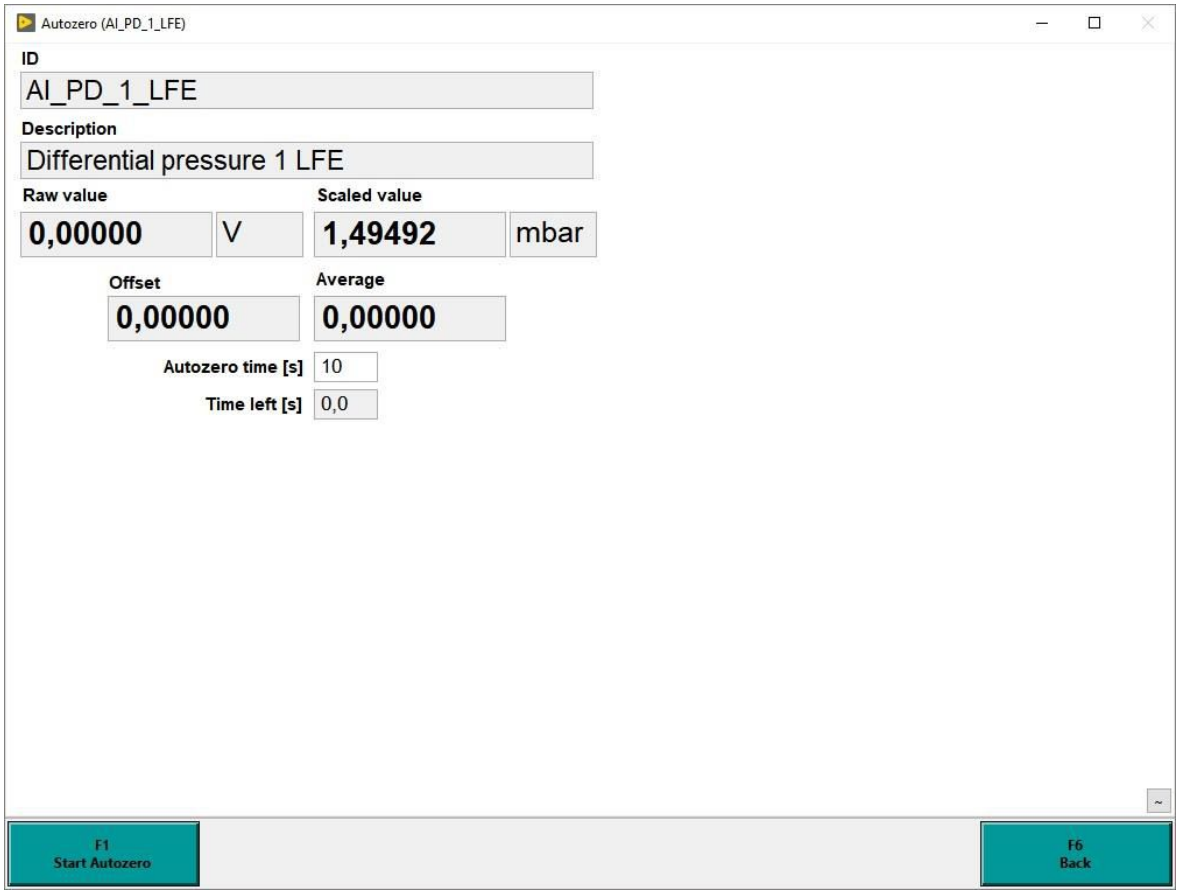


Figure 4.12 Channels → AI channels → [Object ID] → Autozero

This view is only available for specific types of channels. During zeroing, the currently measured value is averaged and the difference added to the zero point as an "offset".

ID	A unique, internal identifier for the channel, e.g. "AI_PD_LFE"
Description	A description of the input, e.g. "Absolute pressure LFE"
Raw value	The raw value on the input, e.g. "5 V"
Scaled value	The scaled, physical value on the input, e.g. "500 hPa"
Offset	Current saved offset for the zero point. This value is updated automatically when zeroing has been carried out.
Average	Mean value of measurement.
Autozero time [s]	The duration of the average value measurement for the zeroing can be entered in this field.
Time left [s]	Remaining time for average value measurement for the zeroing.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.3.10 Merge settings

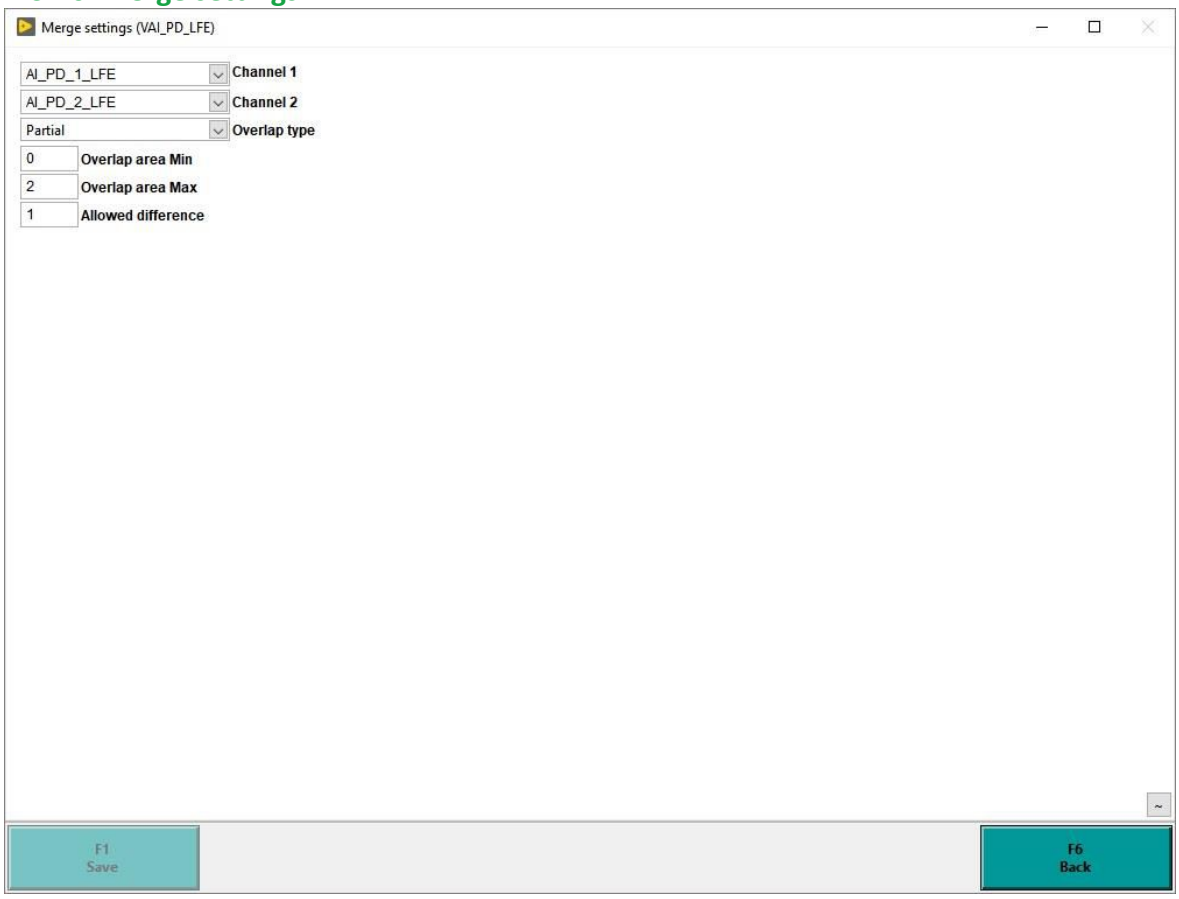


Figure 4.13 Channels → AI channels → [Object ID] → Merge settings

This view is only available for specific types of channels. This channel is used to merge two channels together, e.g. to use two differential pressure sensors with different ranges in order to achieve higher accuracy in the lower range.

Channel 1	First channel for use. The more exact sensor is normally installed here.
Channel 2	Second channel for use.
Overlap type	Type of merge "Full": Sensor 1 is completely within the range of sensor 2 ➔ Sensor 2 is used outside the limits "Partial": Sensor 1 is within the starting range of sensor 2 ➔ Sensor 1 is used below the min. limit ➔ Sensor 2 is used above the max. limit
Overlap area Min	Lower limit for sensor 1.
Overlap area Max	Upper limit for sensor 1.
Allowed difference	Permitted absolute deviation within the merge range.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.4 Analogue outputs

The overview of analogue outputs lists all the configured analogue output channels with their current values. With the **respective permission** it is possible to change the value of the analogue output in the "scaled" column directly.

Changing analogue outputs can cause dangerous behaviour. This should only be carried out by staff with the appropriate training. If the control value is changed during an active test, this can cause unpredictable behaviour.

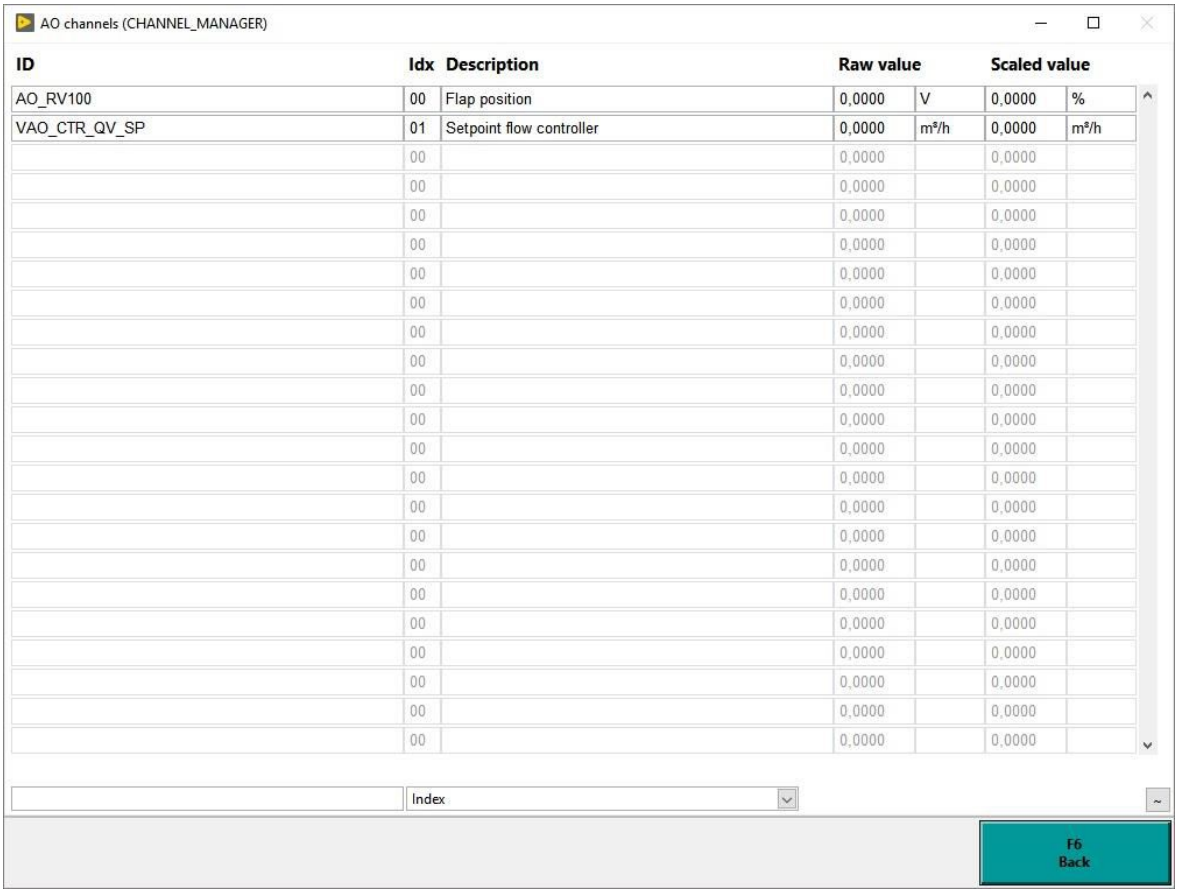


Figure 4.14 Channels → AO channels

ID	A unique, internal identifier for the channel, e.g. "AO_RV100"
Idx	Internal sequence of the channels
Description	A description of the input, e.g. "Flap position"
Raw value	The raw value of the output with unit, e.g. "5 V"
Scaled	The scaled, physical value on the output, e.g. "500 hPa"

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

(1)	The list of the channels is filtered in accordance with the text entered here.
(2)	The display of the channels can be sorted in accordance with the following criteria: • ID — Name • Index — Sequential number • Description • DAQ+ChannelID — Hardware assignment

4.4.1 Configuration

➔ See 4.3.3

4.4.2 Adjustment

➔ See 4.3.4

4.4.3 Scaling

➔ See 4.3.5

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.4.4 Linearization

The automatic adjustment of the scaling of an output by this function can affect the control behaviour. It is **imperative** that the automatic correction is checked manually for plausibility.

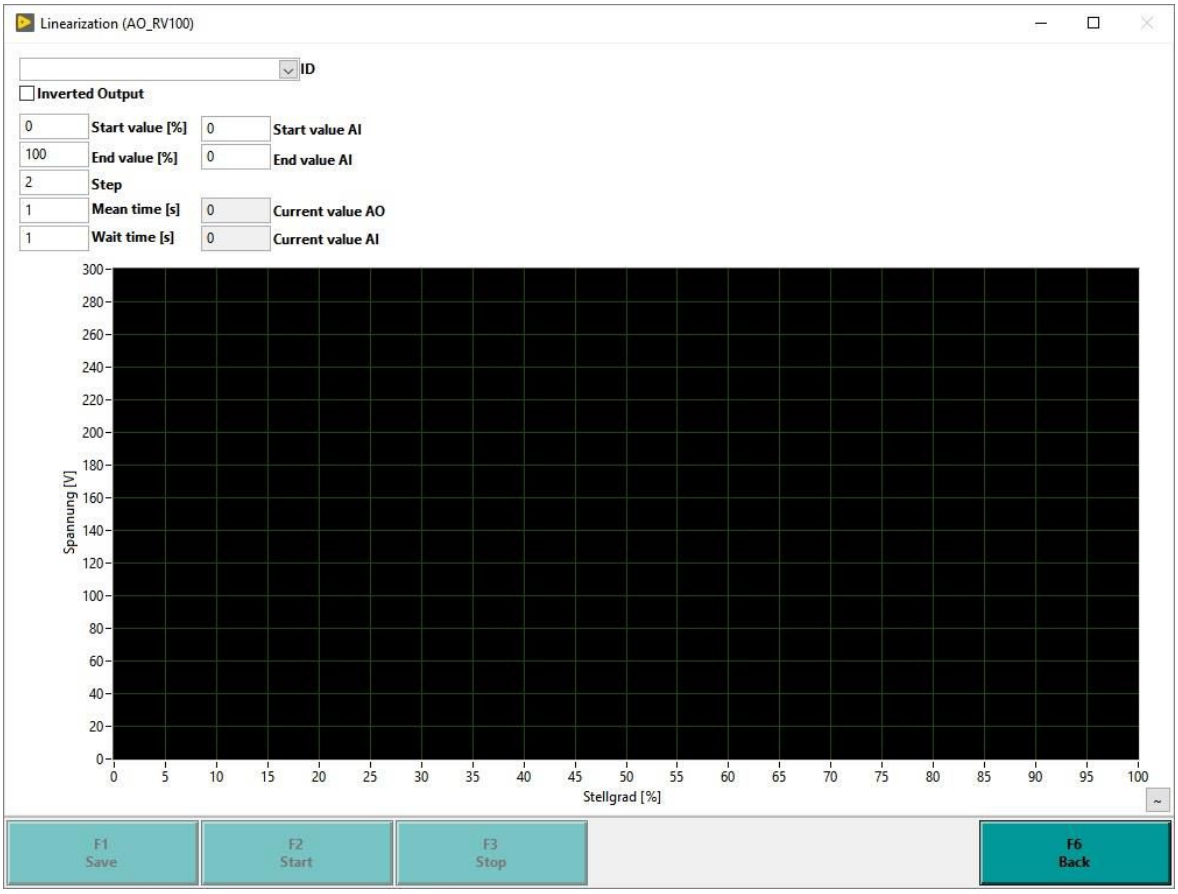


Figure 4.15 Channels → AI channels → [Object ID] → Linearization

In this view, it is possible to adjust the scaling of an analogue output to the behaviour of an analogue input. This is used to achieve a response behaviour which is as linear as possible so that, for instance, a PID controller can control more quickly/simply.
During the process, the current curve of the output and the input is shown in the diagram. After a linearization has been performed, it is advisable to repeat the process and to check whether the displayed curves show a better linearity.

ID	ID of the analogue input which is to be used for linearization.
Inverted Output	Is used if the scaled values of the output are inverse to the raw values.
Start value	Start value for the output. The process starts with this value.
End value	Final value for the output. The process stops when this value has been reached.
Step	Distance between individual measuring points.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

Mean time [s]	Time it takes for values to be captured at each measuring point in order to calculate a mean value.
Wait time [s]	The time of the delay after the output has been set before the averaging process starts.
Start value AI	Expected value of the input when the output is at the start value. [This value is required for correct calculation!]
End value AI	Expected value of the input when the output is at the final value. [This value is required for correct calculation!]
Current value AO	Display of current value of the analogue output.
Current value AI	Display of current value of the analogue input.

F1:	Saves the values determined previously as new scaling on the analogue output.	
		The saved values must be checked manually for plausibility.
	Starts linearization.	
	Cancels a linearization that is currently in progress.	

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.5 Digital inputs

The overview of digital inputs lists all the configured digital input channels with their current values.

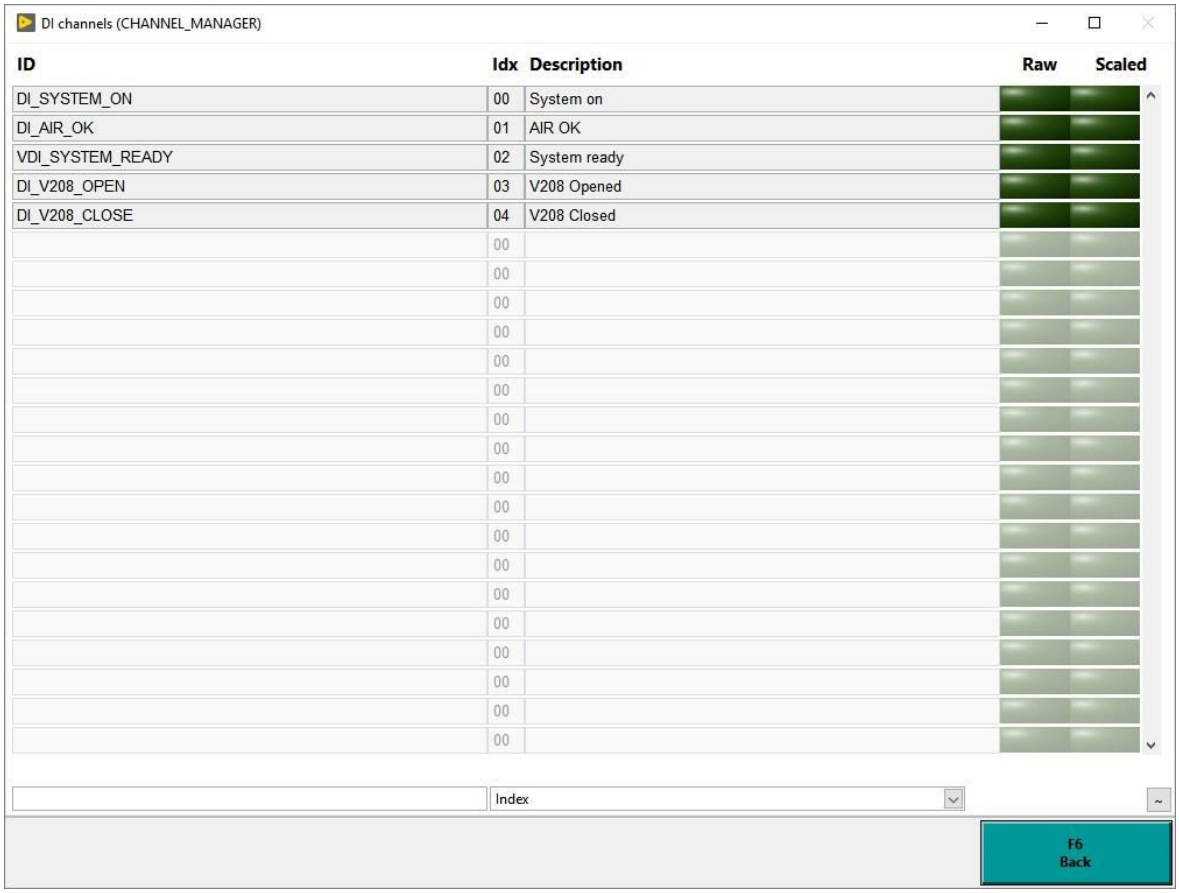


Figure 4.16 Channels → DI channels

ID	A unique, internal identifier for the channel, e.g. "DI_SYSTEM_ON"
Idx	Internal sequence of the channels
Description	A description of the input, e.g. "System switched on"
Raw	The raw value of the input.
Scaled	The scaled value of the input (may be inverse to the raw value)

(1)	The list of the channels is filtered in accordance with the text entered here.
(2)	The display of the channels can be sorted in accordance with the following criteria: • ID — Name • Index — Sequential number • Description • DAQ+ChannelID — Hardware assignment

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.5.1 Configuration

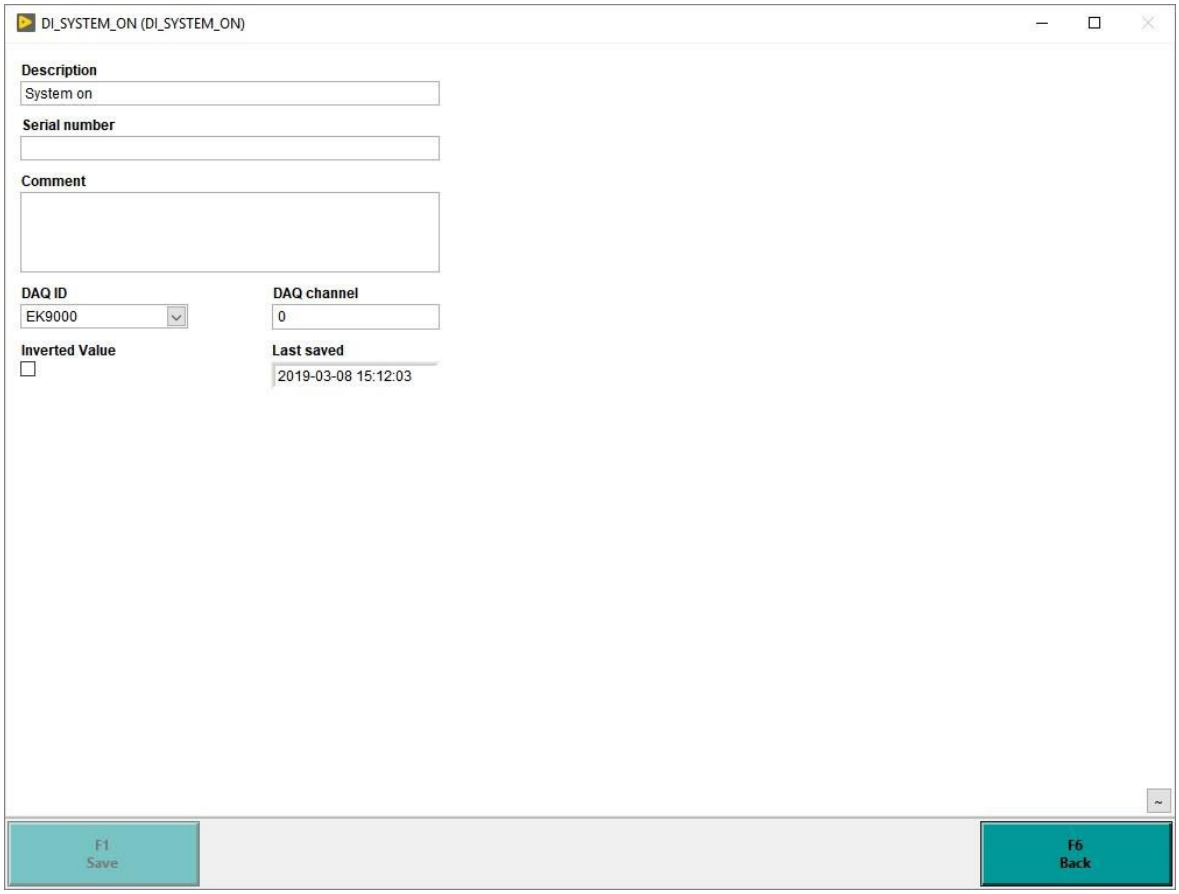


Figure 4.17 Channels → DI channels → [Object ID]

Detailed information on the selected channel can be seen in the configuration view:

Description	A description of the channel, e.g. "System switched on".
Serial number	The serial number of the device which is connected to the channel.
Comment	Optional comments.
DAQ ID	ID of the data acquisition hardware that is allocated to this channel.
DAQ channel	Name of the channel on the data acquisition hardware that is allocated to this channel.
Inverted Value	Setting which determines whether the raw value and scaled value are inverted.
Last saved	Date of last save.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.5.2 Calculation Settings

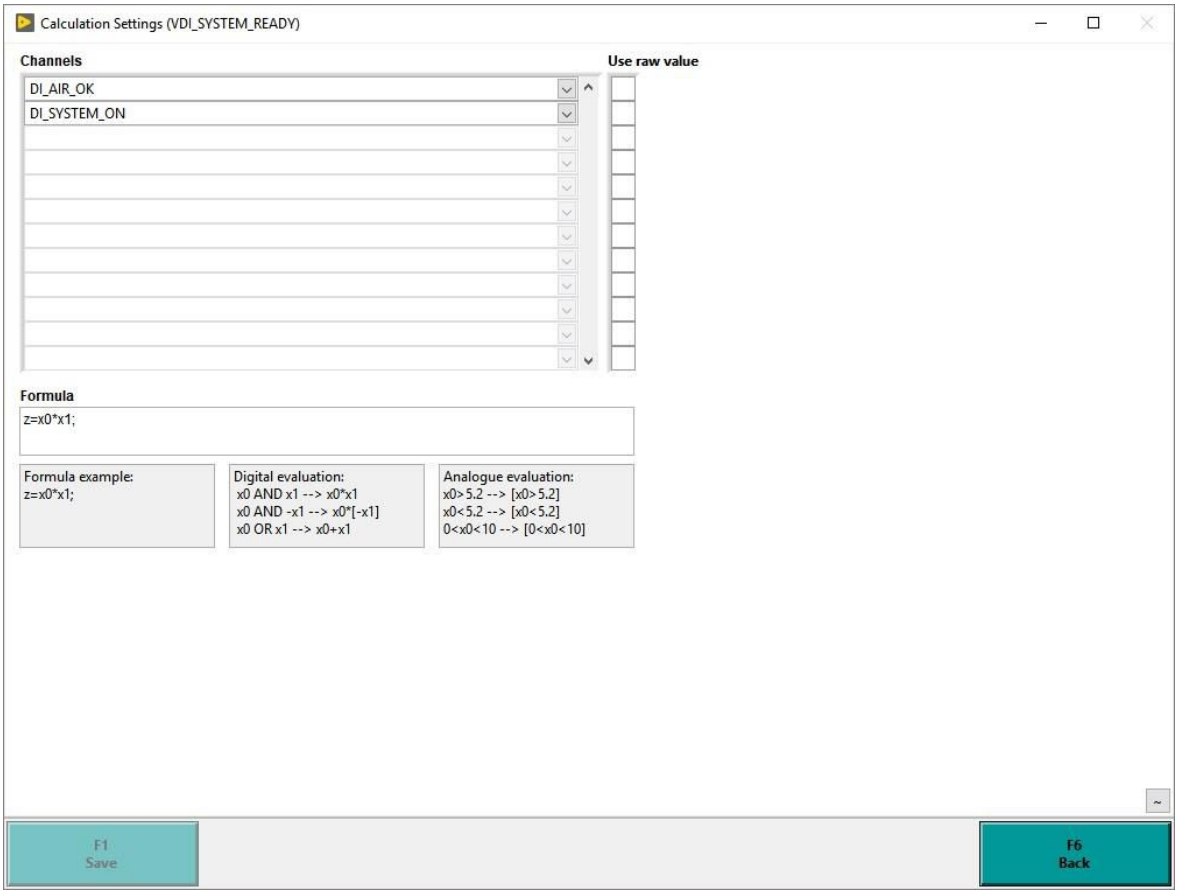


Figure 4.18 Channels → DI channels → [Object ID] → Calculation Settings

This view is only available for specific types of channels. This is a channel which only calculates other channels using logical operations.

Channels	Channel selection (every channel available in the software is listed here). Analogue channels are only useful in this case if the respective entry is available in the formula to check the value for ranges.
Use raw value	This setting can be used to switch over to determine whether the scaled value or the raw value of a channel is to be used.
Formula	The formula used for the calculation.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.6 Digital outputs

The overview of digital outputs lists all the configured digital output channels with their current values. With the **respective permission** it is possible to change the value of the digital output in the "scaled" column directly.

Changing digital outputs can cause dangerous behaviour. This should only be carried out by staff with the appropriate training. If the switching value is changed during an active test, this can cause unpredictable behaviour.

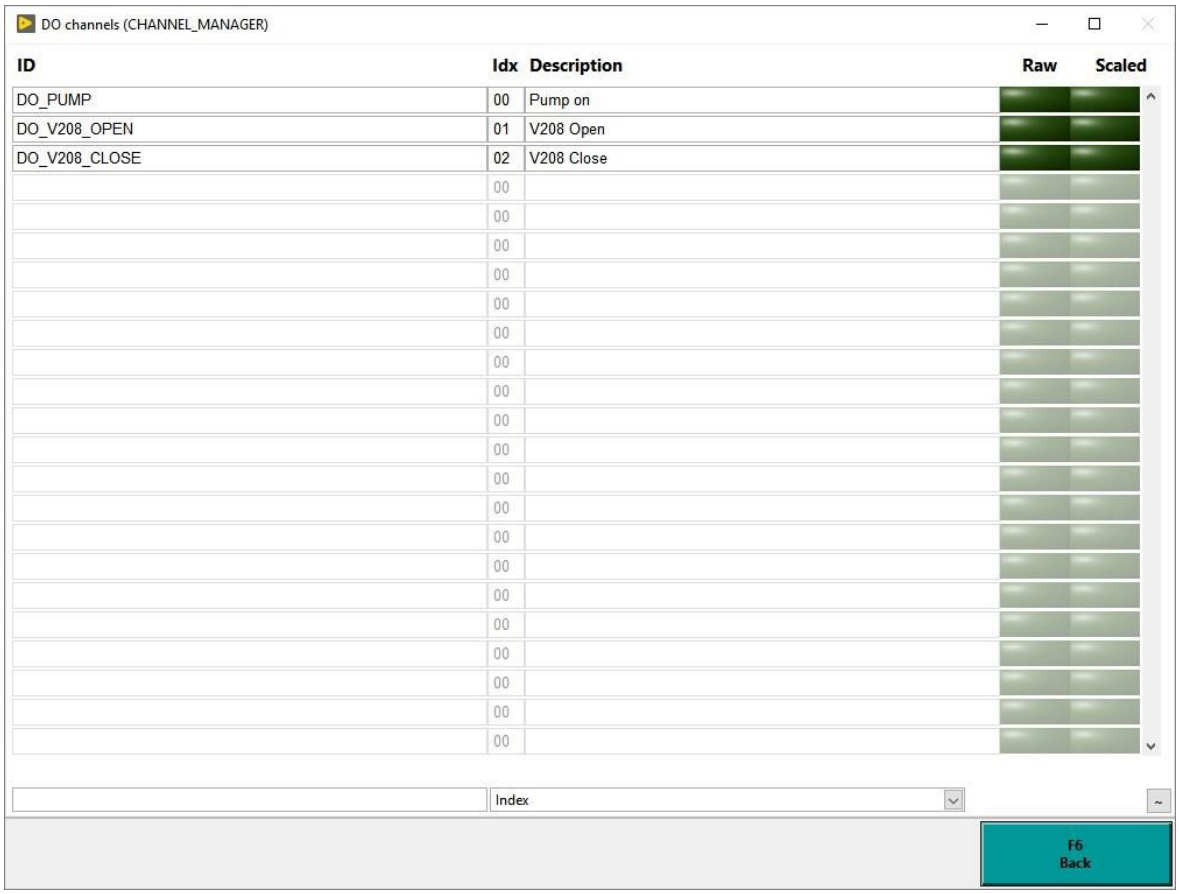


Figure 4.19 Channels → DO channels

ID	A unique, internal identifier for the channel, e.g. "DI_SYSTEM_ON"
Idx	Internal sequence of the channels
Description	A description of the output, e.g. "Switch on pump"
Raw	The raw value of the output
Scaled	The scaled value of the output (may be inverse to the raw value)

(1)	The list of the channels is filtered in accordance with the text entered here.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

(2)	The display of the channels can be sorted in accordance with the following criteria: • ID — Name • Index — Sequential number • Description • DAQ+ChannelID — Hardware assignment

4.6.1 Configuration

➔ See 4.5.1

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

4.7 Channel logging

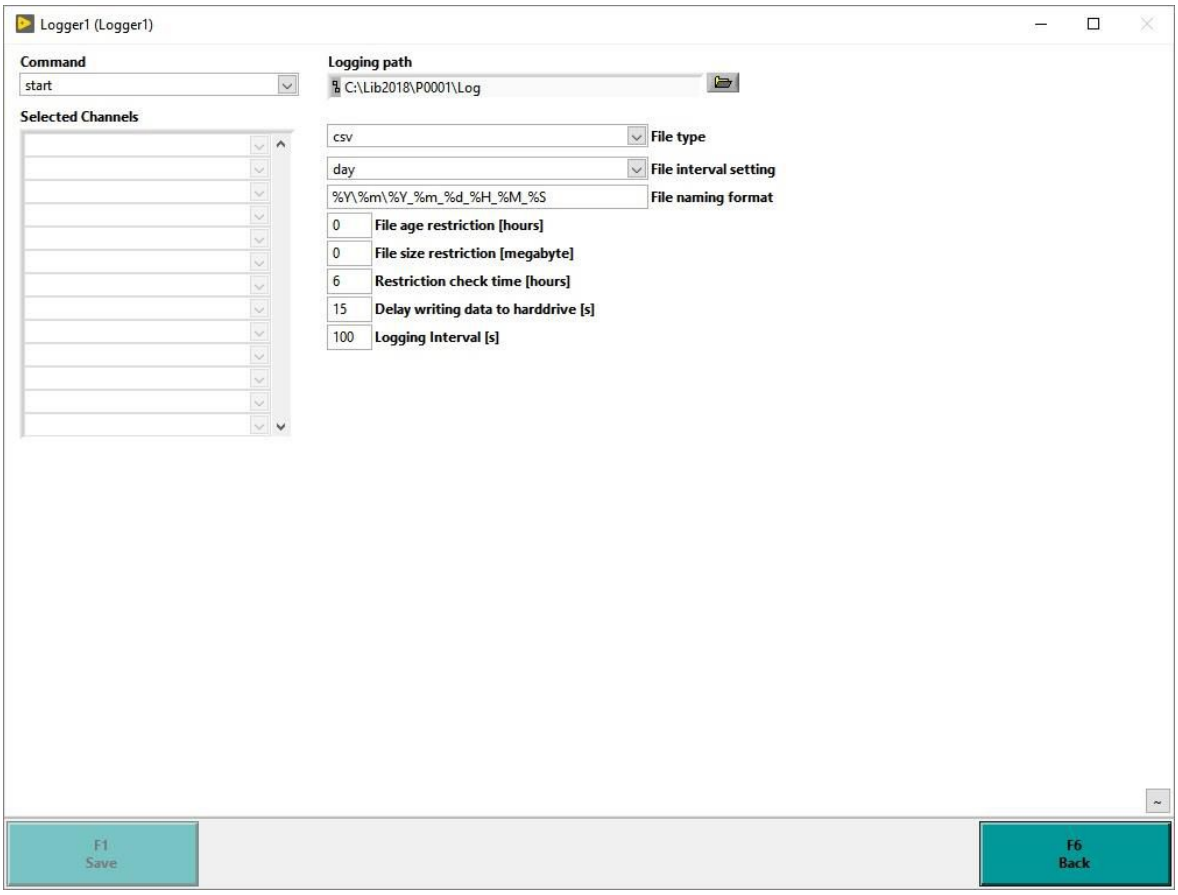


Figure 4.20 Channels → [Object ID]

Command	This can be used to start or stop logging. If this component is started manually, a new file is started.
Selected Channels	Setting as to which channels are to be logged. If this list is empty, all channels are logged.
Logging path	Directory in which the generated files are to be saved.
File type	Selection of the file type which is to be used when saving. - .csv: relatively large volume, but can be opened simply, e.g. Excel - .tdms: more compact than csv, but requires the respective viewer - .bin: very compact because the data is simply saved in binary. The generated files can be viewed using the visualization in chapter 4.2 and converted into other formats.
File interval setting	Setting to determine how frequently new files are generated. This can be specified per minute, per hour, per day or per month
File naming format	Format/save hierarchy of the automatically generated files. Default setting: „%Y\%m\%Y_%m_%d_%H_%M_%S“ In this case a subfolder with the current year, in which there is a folder for each month, is generated. In each of the month folders, files are generated with the timestamp of generation as the name.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

File age restriction [hours]	Files which are older than this parameter are deleted automatically (if the value is 0, the function is inactive)
File size restriction [megabyte]	If the set overall size is exceeded, the oldest files are deleted automatically (if the value is 0, the function is inactive)
Restriction check time [hours]	Setting to determine how frequently a check is to be made as to whether old files have to be deleted.
Delay writing data to harddrive [s]	In order to minimise write accesses to the data medium, the data is only written from the random access memory to the data medium in accordance with this parameter.
Logging Interval [ms]	Frequency at which data is to be captured. This parameter should not be lower than the execution speed of the installed data capture devices.

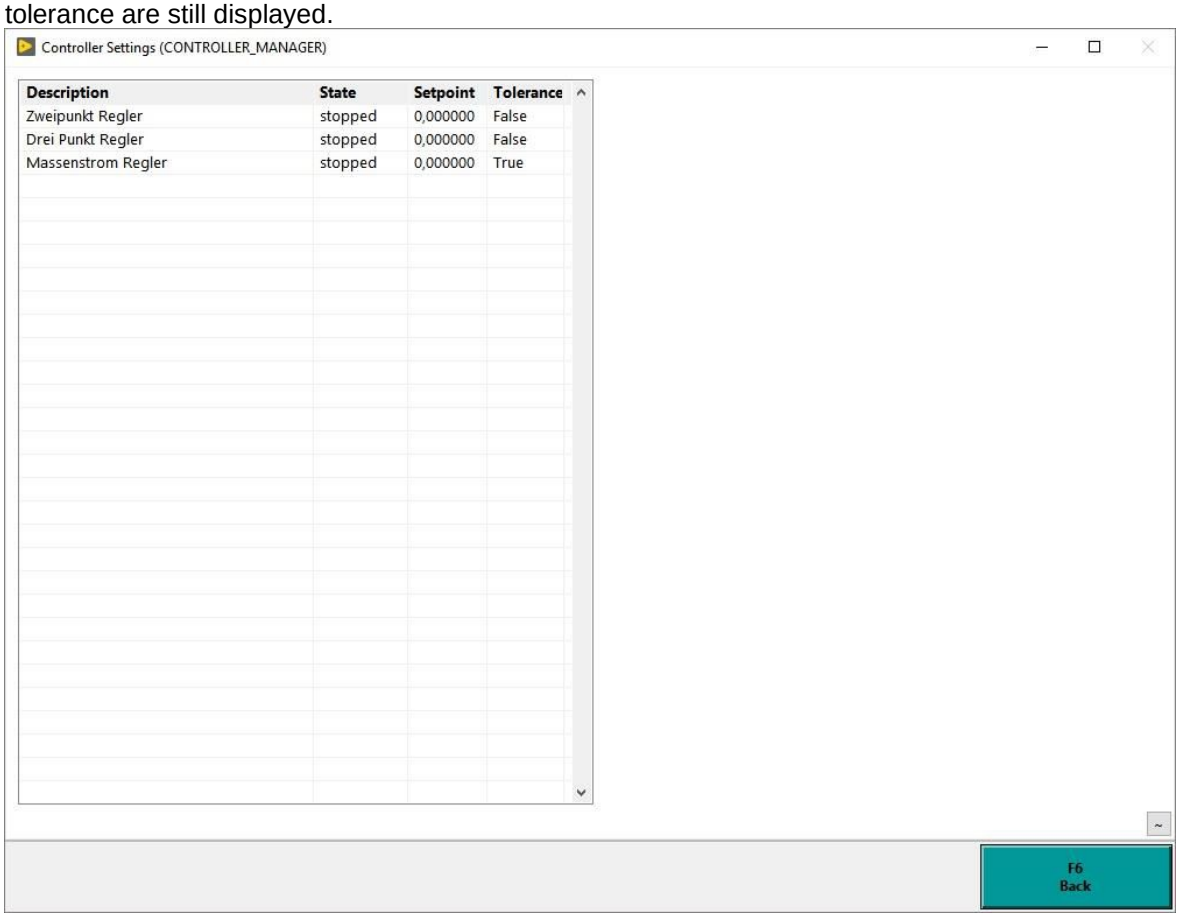
© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

5 Controllers

The configuration for all the controllers available in the software can be viewed and modified here. The current controller status can also be displayed.

5.1 Controller Settings

This view displays a brief overview of all controllers. The controllers are listed by the designation which can be set in the respective configuration. The current setpoint value and the status of the tolerance are still displayed.



Description	State	Setpoint	Tolerance
Zweipunkt Regler	stopped	0,000000	False
Drei Punkt Regler	stopped	0,000000	False
Massenstrom Regler	stopped	0,000000	True

Figure 5.1 Controller Settings

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

5.2 PID controllers

The following describes the available views for a PID controller. (This also affects PID controllers which do not use all the parameters (e.g. purely P or I controllers))

5.2.1 Configuration

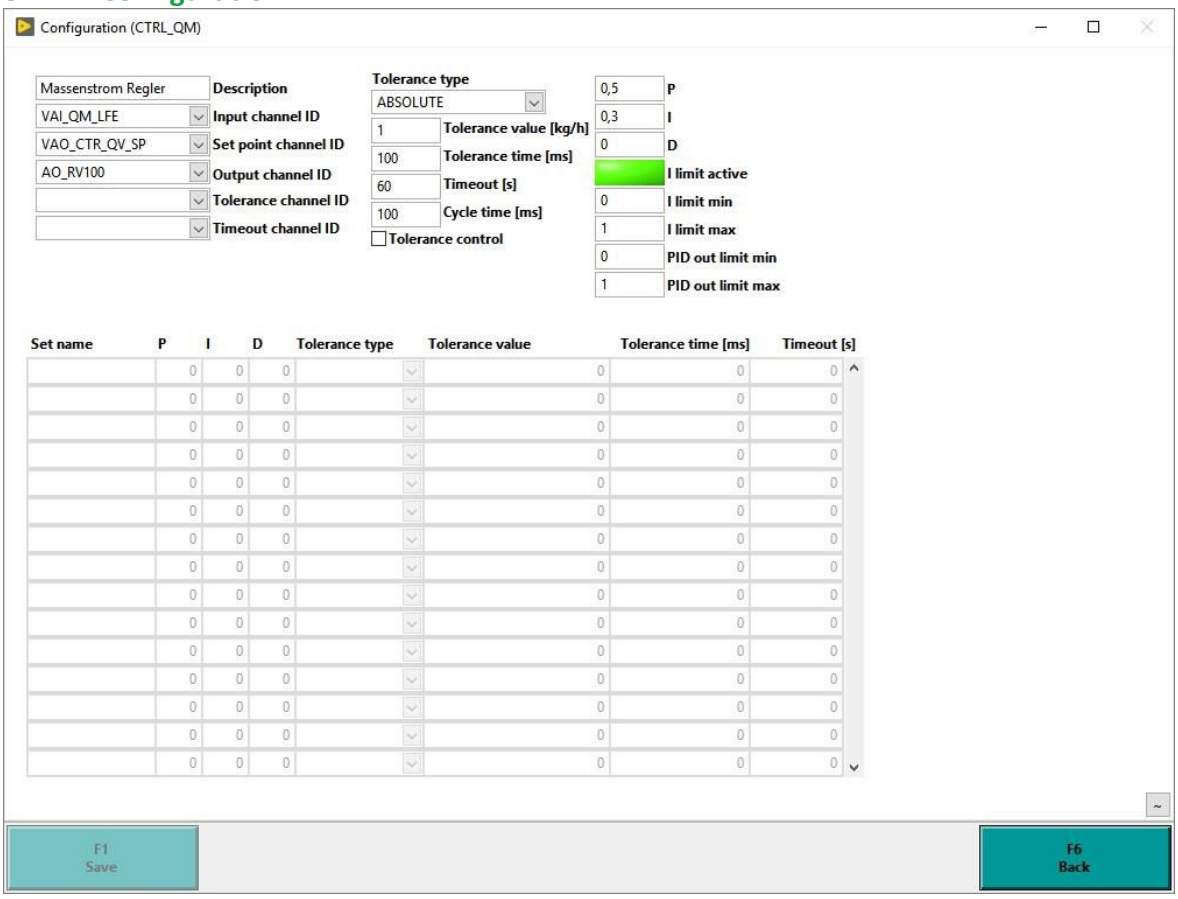


Figure 5.2 Controller Settings → [Object ID] → Configuration

Description	The designation for the controller, e.g. "Mass flow controller"
Selected Channels	Setting as to which channels are to be logged. If this list is empty, all channels are logged.
Input channel ID	ID of the analogue input which provides the "actual value" for the controller.
Set point channel ID	ID of the virtual, analogue output which provides the "setpoint value" for the controller.
Output channel ID	ID of the analogue output which provides the "control value" for the controller.
Tolerance channel ID	ID of the virtual, digital input which displays the "tolerance status" of the controller. (Optional)
Timeout channel ID	ID of the virtual, digital input which displays the "timeout status" of the controller. (Optional)

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

Tolerance type	Type of tolerance monitoring. ABSOLUTE – Absolute deviation from the setpoint value. RELATIVE – Relative deviation from the setpoint value. FULLSCALE – Percentage deviation from the measuring range.
Tolerance value	Deviation value for tolerance monitoring.
Tolerance time [ms]	Stability time for tolerance monitoring.
Timeout [s]	Duration from the start of the controller or setpoint value change until a timeout is triggered. This information can be used together with the tolerance display for assessment of the controller status.
Cycle time [ms]	Periodic execution duration of the controller.
Tolerance control	If the "Tolerance control" is active, the controller is stopped as soon as the actual value is within the tolerance.
P	P component.
I	I component.
D	D component.
I limit active	Determines whether the I proportion limitation is active.
I limit min	Minimum limit for I proportion limitation.
I limit max	Maximum limit for I proportion limitation.
PID out limit min	Minimum limit for PID value limitation.
PID out limit max	Maximum limit for PID value limitation.

The table also provides the option of managing parameter sets from the listed individual parameters:

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

5.2.2 Diagnosis

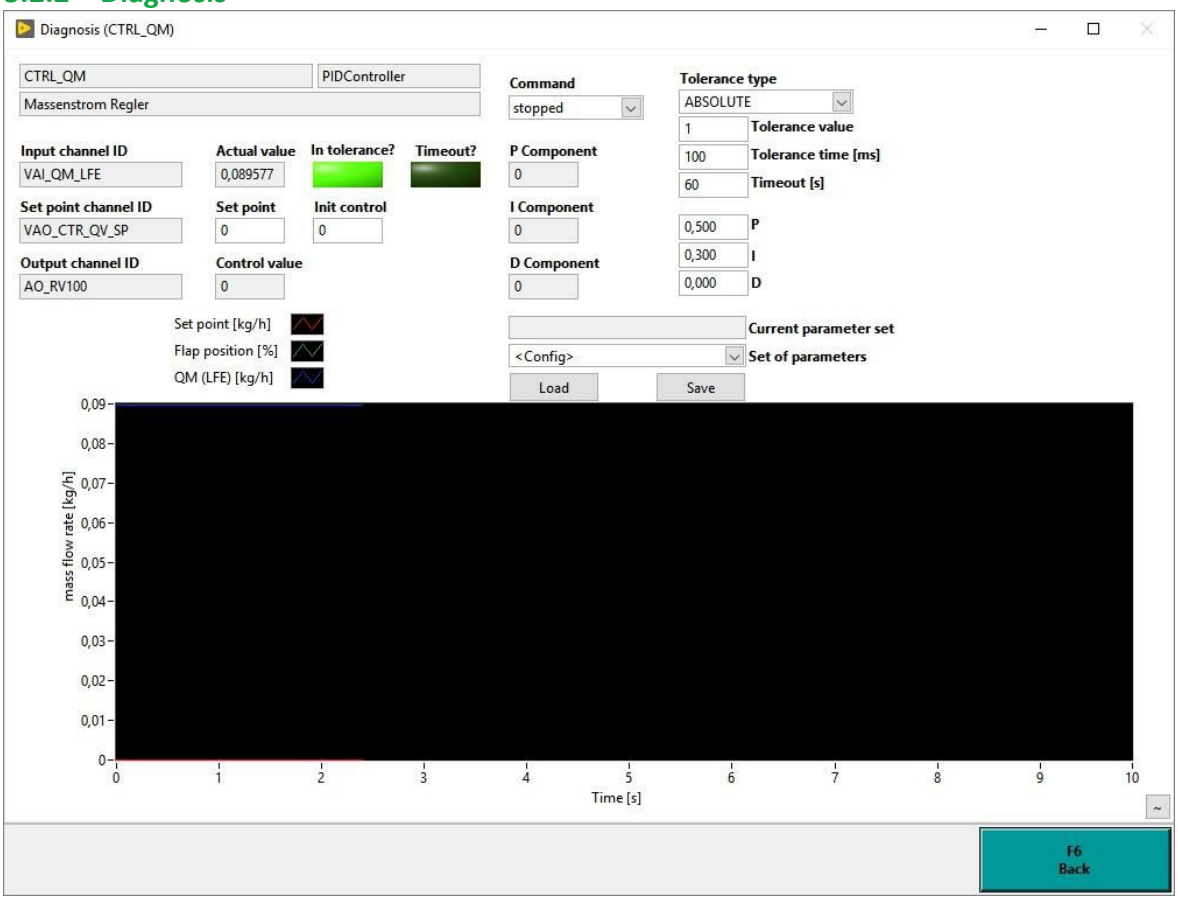


Figure 5.3 Controller Settings → [Object ID] → Diagnosis

For parameters not listed here → see 5.2.1Configuration

Actual value	The actual value (blue line in the diagram).
Set point	The setpoint value for the controller (red line in the diagram).
Control value	Control value which the controller has calculated (green line in the diagram).
In tolerance?	Display showing whether the actual value is within the tolerance.
Init control	The initialisation value for the controller. Switches the set control value channel directly if changed!
Timeout?	Display showing whether the set time has elapsed.
Command	Control command for the controller: started – Activates the controller. halted – Pauses the controller. The current value is held. stopped – Stops the controller. There is no control.
P Component	Value of the proportionally controlled proportion of the control value.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

I Component	Value of the integrally controlled proportion of the control value.
D Component	Value of the differentially controlled proportion of the control value.
Current parameter set	Indicates the parameter set last loaded.
Set of parameters	Name of the selected parameter set. <Config> means that the general controller parameters can be accessed.
Load	Loads the selected parameter set. (<Config> selects the general controller parameters.)
Save	Saves the selected parameter set or the general configuration (<Config>) or generates a parameter set if the entered name is not yet in use.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

5.3 Two-point controller

5.3.1 Configuration

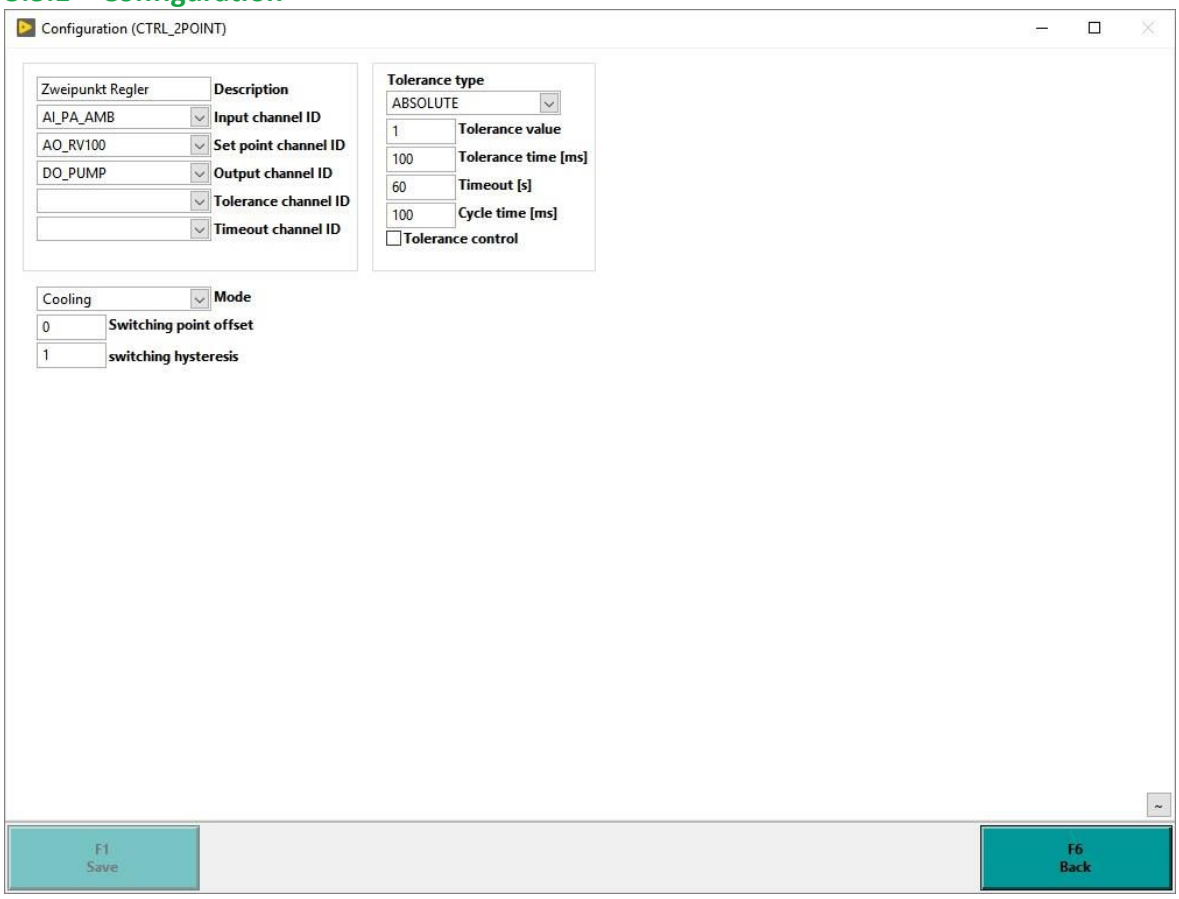


Figure 5.4 Controller Settings → [Object ID] → Configuration

For parameters not listed here → see 5.2.1

Mode	Type of controller which defines its reaction when the switching point is exceeded. (Heating/Cooling)
Switching point offset	The actual value must exceed/undershoot this value at least so that the controller switches the control value.
switching hysteresis	Hysteresis at the switching point. Prevents the controller from wavering at the switching point.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

5.3.2 Diagnosis

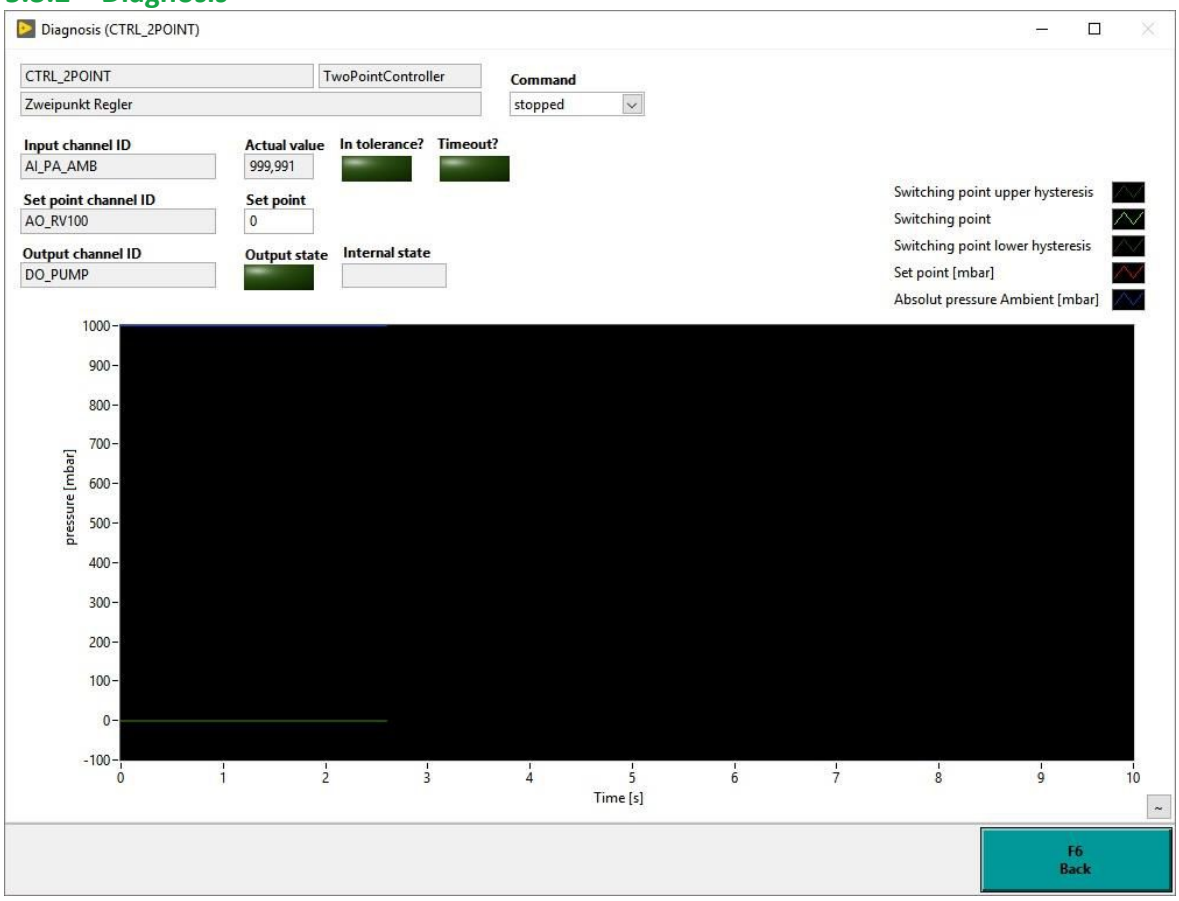


Figure 5.5 Controller Settings → [Object ID] → Diagnosis

For parameters not listed here → see 5.2.1 / 5.2.2

Internal state	The internal status of the controller (Low or High).
Actual value	The actual value (blue line in the diagram).
Output state	The control value of the controlled digital output.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

5.4 Three-point controller

5.4.1 Configuration

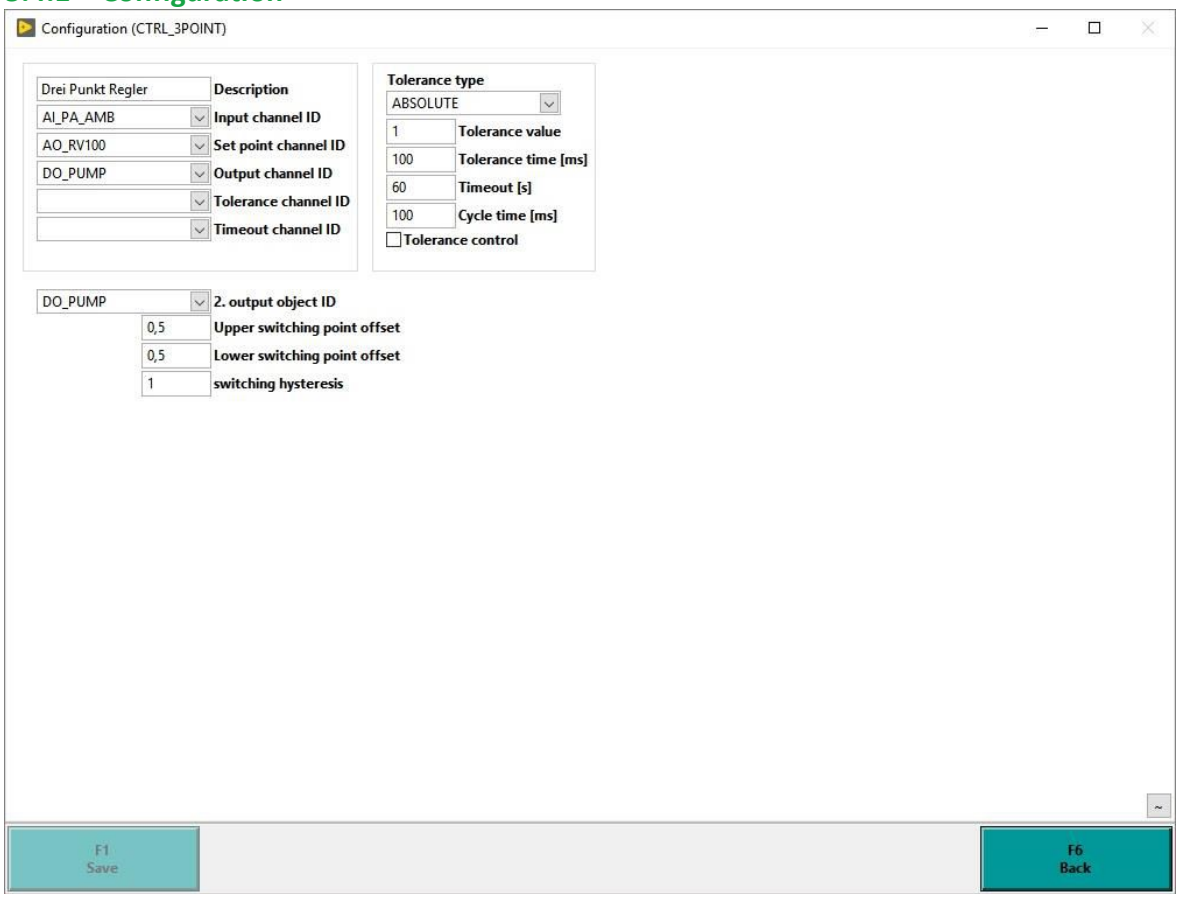


Figure 5.6 Controller Settings → [Object ID] → Configuration

For parameters not listed here → see 5.2.1 / 5.3.1

2. output object ID	ID of the second digital output which provides the "control value" for the controller.
Upper switching point offset	The actual value must undershoot/exceed this value at least so that the controller switches the control value.
Lower switching point offset	The actual value must be undershoot/exceed this value at least so that the controller switches the second control value.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

5.4.2 Diagnosis

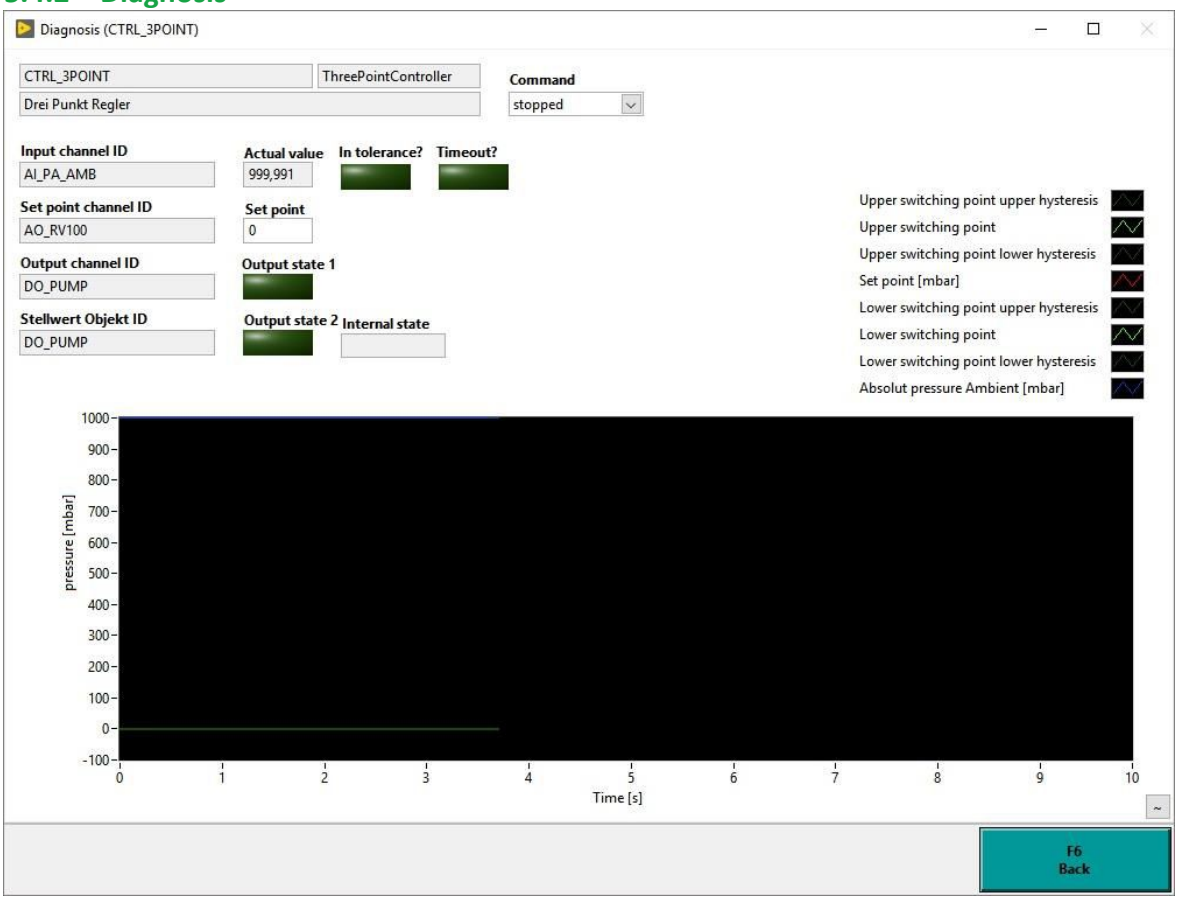


Figure 5.7 Controller Settings → [Object ID] → Diagnosis

For parameters not listed here → see 5.2.1 / 5.2.2 / 5.3.1 / 5.3.2

Set point	The setpoint value for the controller (red line in the diagram).
Internal state	The internal status of the controller (Low, Middle or High).
Actual value	The actual value (blue line in the diagram).
Output state 1	The control value of the first controlled digital output.
Output state 2	The control value of the second controlled digital output.

The light green lines in the diagram represent the upper switching point (setpoint value + upper switching point offset) and the lower switching point (setpoint value – lower switching point offset). The dark green lines represent the respective hysteresis at the switching points.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

6 Flow meters

6.1 Configuration

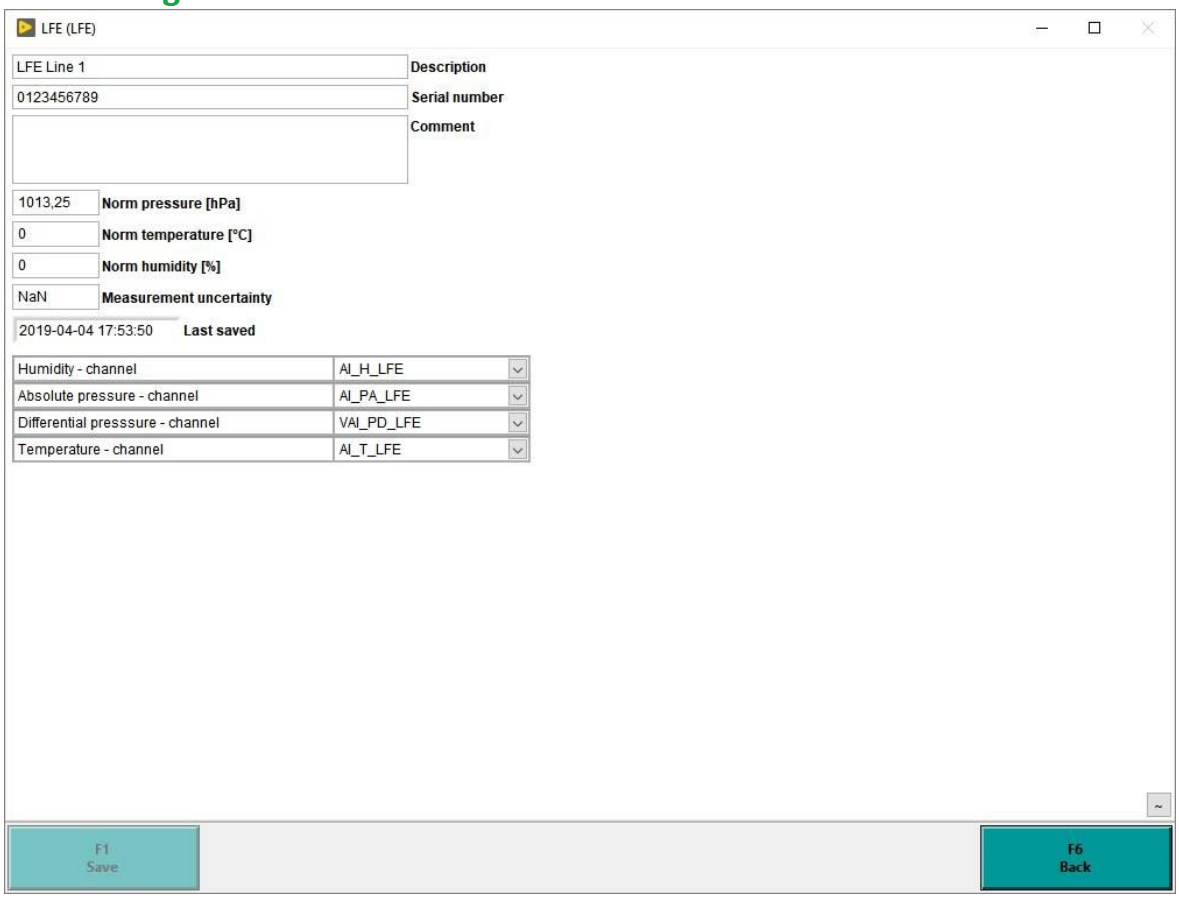


Figure 6.1 Flow meters → [Object ID]

Not all the parameters listed here are available for every type of flow meter.

Description	A description of the channel, e.g. "Differential pressure test piece".
Serial number	The serial number of the device (e.g. sensor) which is connected to the channel.
Comment	Optional comments.
Norm pressure [hPa]	Pressure in hPa for calculating the standard volume flow.
Norm temperature [°C]	Temperature in °C for calculating the standard volume flow.
Norm humidity [%]	Humidity in % for calculating the standard volume flow.
Measurement uncertainty	Measuring uncertainty of this measurement instrument (for information purposes only!)

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

Last saved	Time the configuration was last saved.
Humidity - channel	Analogue input channel which displays the humidity on the measuring element.
Absolute pressure - channel	Analogue input channel which displays the absolute pressure on the measuring element.
Absolute pressure - channel at vacuum side	Analogue input channel which displays the absolute pressure on the vacuum side of the measuring element.
Differential pressure - channel	Analogue input channel which displays the differential pressure over the measuring element.
Temperature - channel	Analogue input channel which displays the temperature on the measuring element.
Absolute pressure - channel at humidity	Analogue input channel which displays the absolute pressure in the humidity measuring location for the measuring element.
Temperature - channel at humidity	Analogue input channel which displays the temperature in the humidity measuring location for the measuring element.
DO_Channel_ID	Digital output for switching a measuring element to active. (Is used, e.g. for critical nozzles to control the valve being opened.)

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

6.2 Measurement

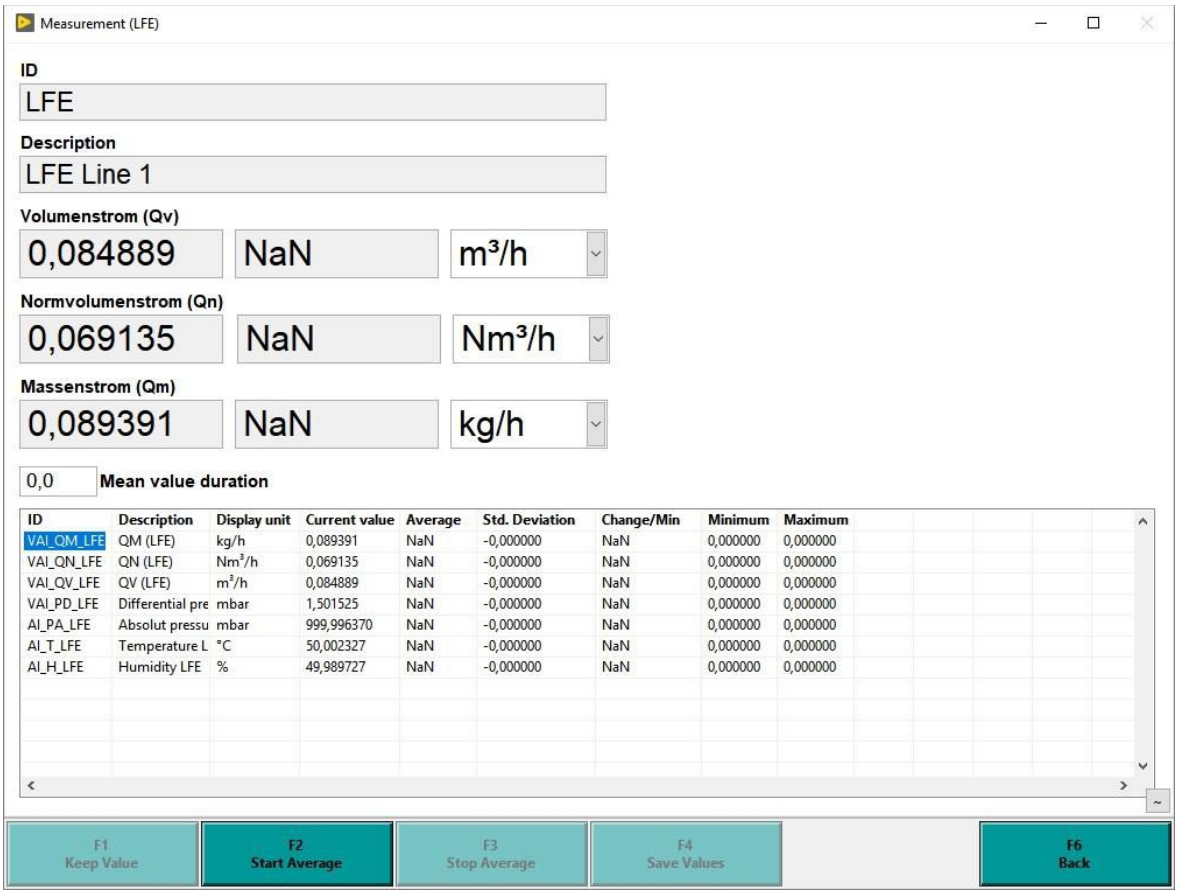


Figure 6.2 Flow meter → [Object ID] → Measurement

The mean value measurement available on the measuring elements uses the same functionality as the analogue inputs described in 4.3.1 and 4.3.6.
More or fewer channels are listed in the table overview depending on the type of measuring element.
The standard flow rate and/or the mass flow for the current selected measuring element is displayed depending on the configuration of the system.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

6.3 Adjustment

In the adjustment view for the individual measuring instruments, parameters can be set in accordance with the respective type to determine the calculation of the flow. Calibration values can also be entered if the type of measuring element supports it.

The following function buttons are normally available:

[F1]	Saves the current settings.
[F4]	Ends calibration → Updates the date of the last calibration.

The following parameters are normally available:

Last saved	Date on which the parameters were last saved.
Last calibration	Date on which the last calibration was carried out. You can use the F4 button to set the current date. The date can also be selected directly in this field.
Device diameter [m]	Cross section of the measuring element [m].
Pipe diameter [m]	Diameter of the pipe [m].
Calculation type	Calculation type which is to be used. If not otherwise specified, the following calculation types are available: "**Norm**" Calculates the measuring element in accordance with the respective standard (further parameters may be available for different standards). "**Norm_Adjusted**" Calculates the measuring element in accordance with the respective standard and allows a subsequent adjustment of the values in accordance with the Reynolds number and alpha factor. "**Custom**" Calculation is performed using the stored Reynolds number and alpha factor only.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

6.3.1 Beta sensor

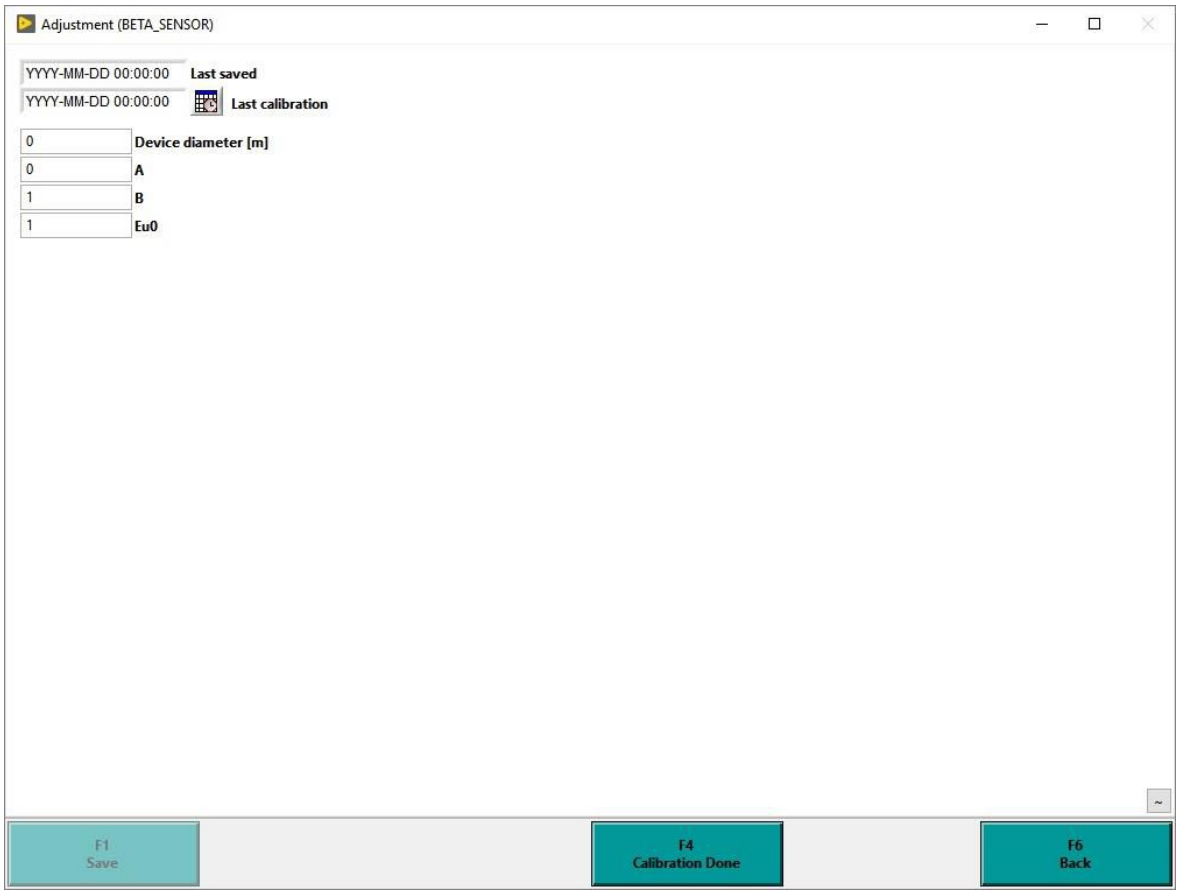


Figure 6.3 Flow meter → [Object ID] → Adjustment

A	Coefficient A
B	Coefficient B
Eu0	Coefficient Eu0

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

6.3.2 Orifice

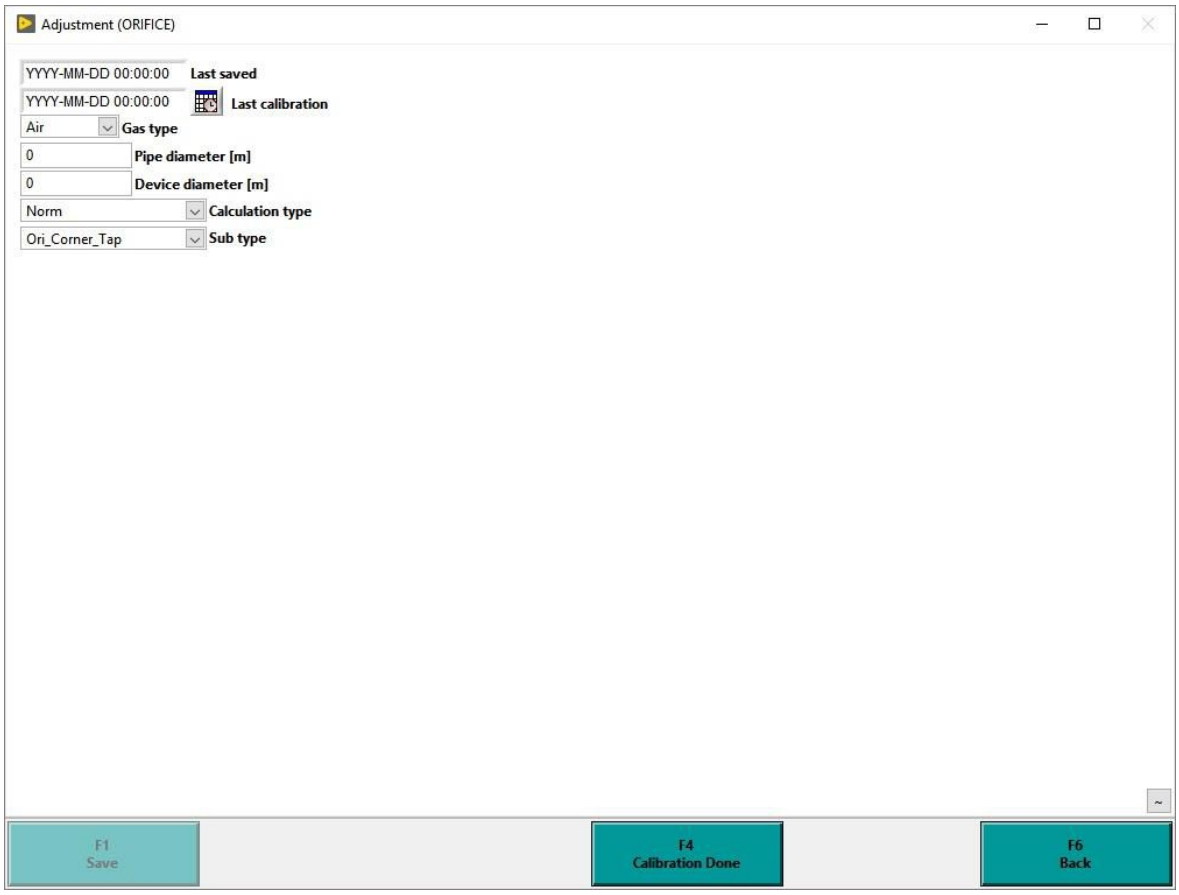


Figure 6.4 Flow meter → [Object ID] → Adjustment

Sub type	Sub type of the measuring element. (For calculation types "Norm" and "Norm_Adjusted" only.) Possible sub types: "**Ori_Corner_Tap**" "**Ori_DD2_Tap**" "**Ori_Flange_Tap**"

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

6.3.3 LFE

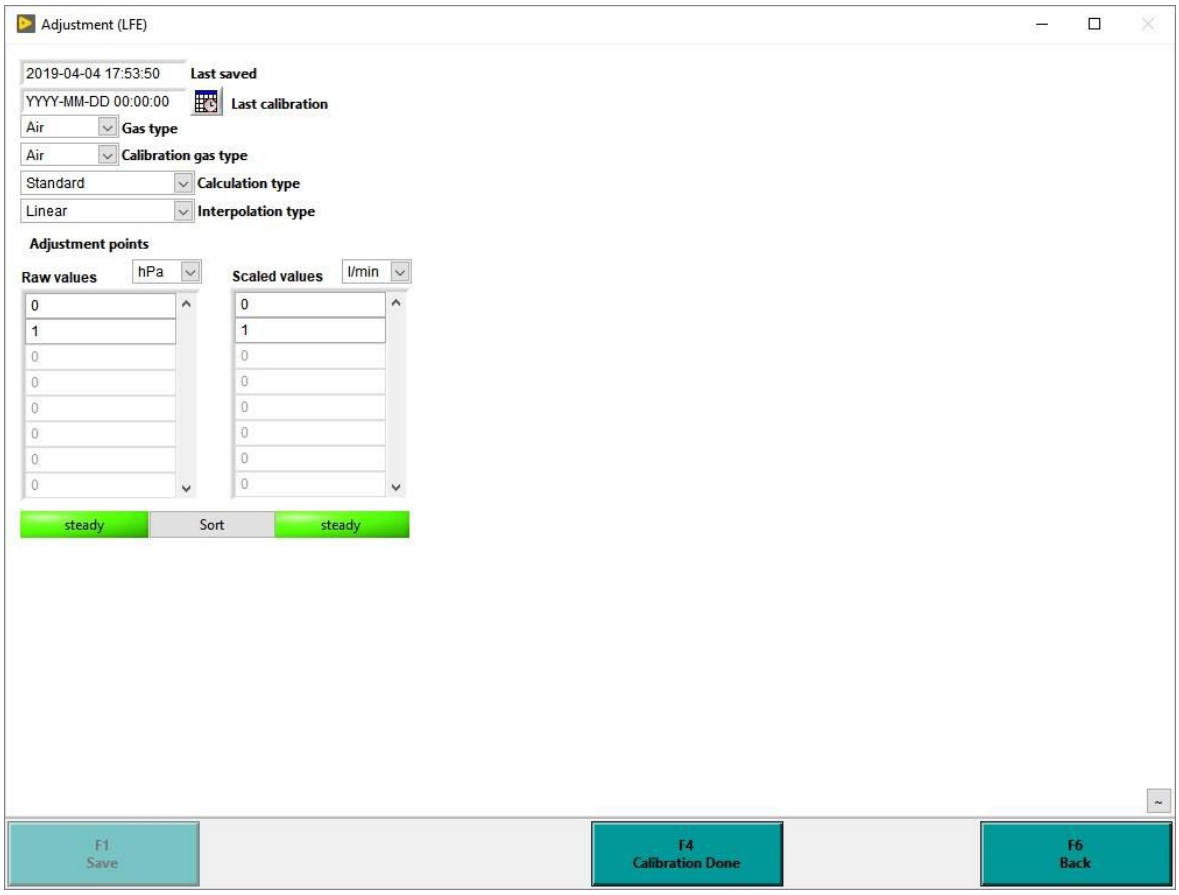


Figure 6.5 Flow meter → [Object ID] → Adjustment

Calibration gas type	Gas type with which the calibration was carried out.
Calculation type	Type of LFE calculation: standard or uniflow.
Interpolation type	Linear or polynomial.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

6.3.4 Venturi

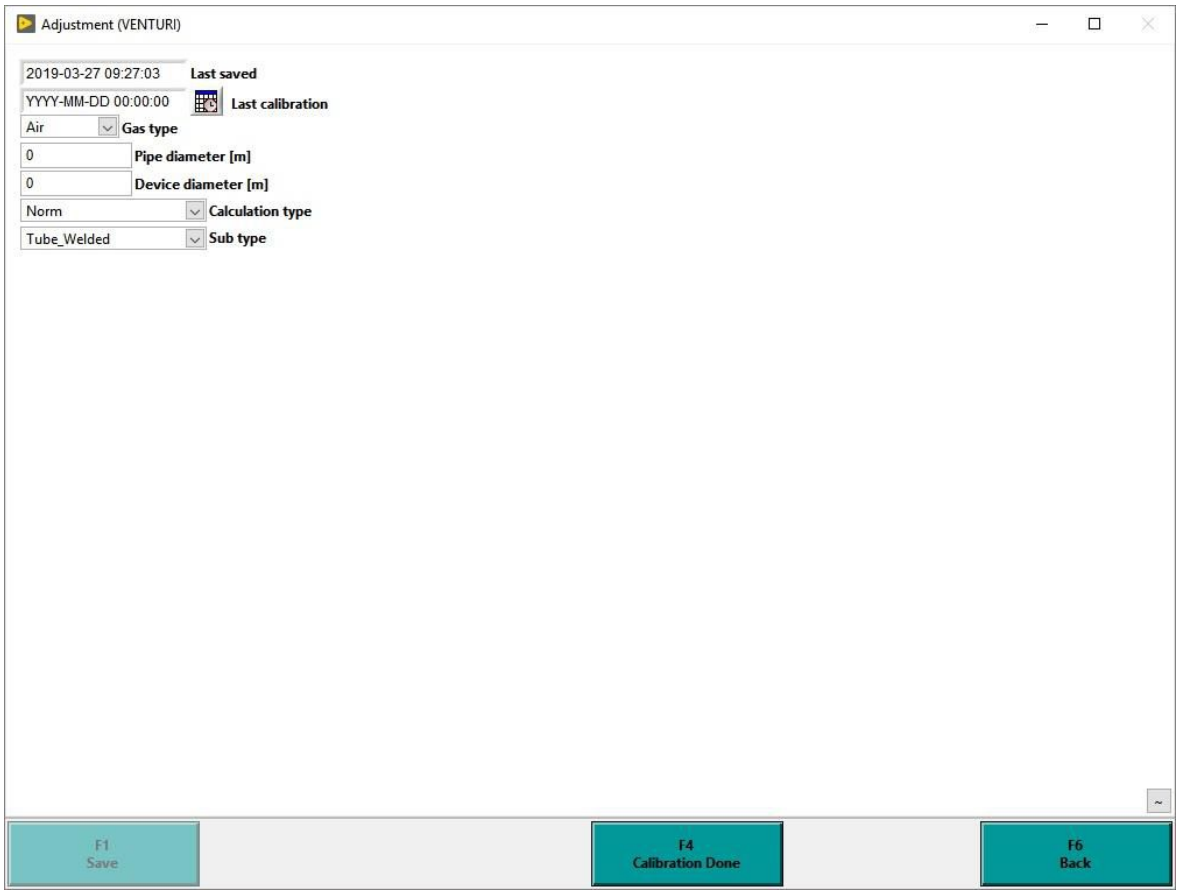


Figure 6.6 Flow meter → [Object ID] → Adjustment

Sub type	Sub type of the measuring element. (For calculation types "Norm" and "Norm_Adjusted" only.) Possible sub types: "**Tube_Ascast**" "**Tube_Machined**" "**Tube_Welded**"

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

6.3.5 Ultracritical nozzle

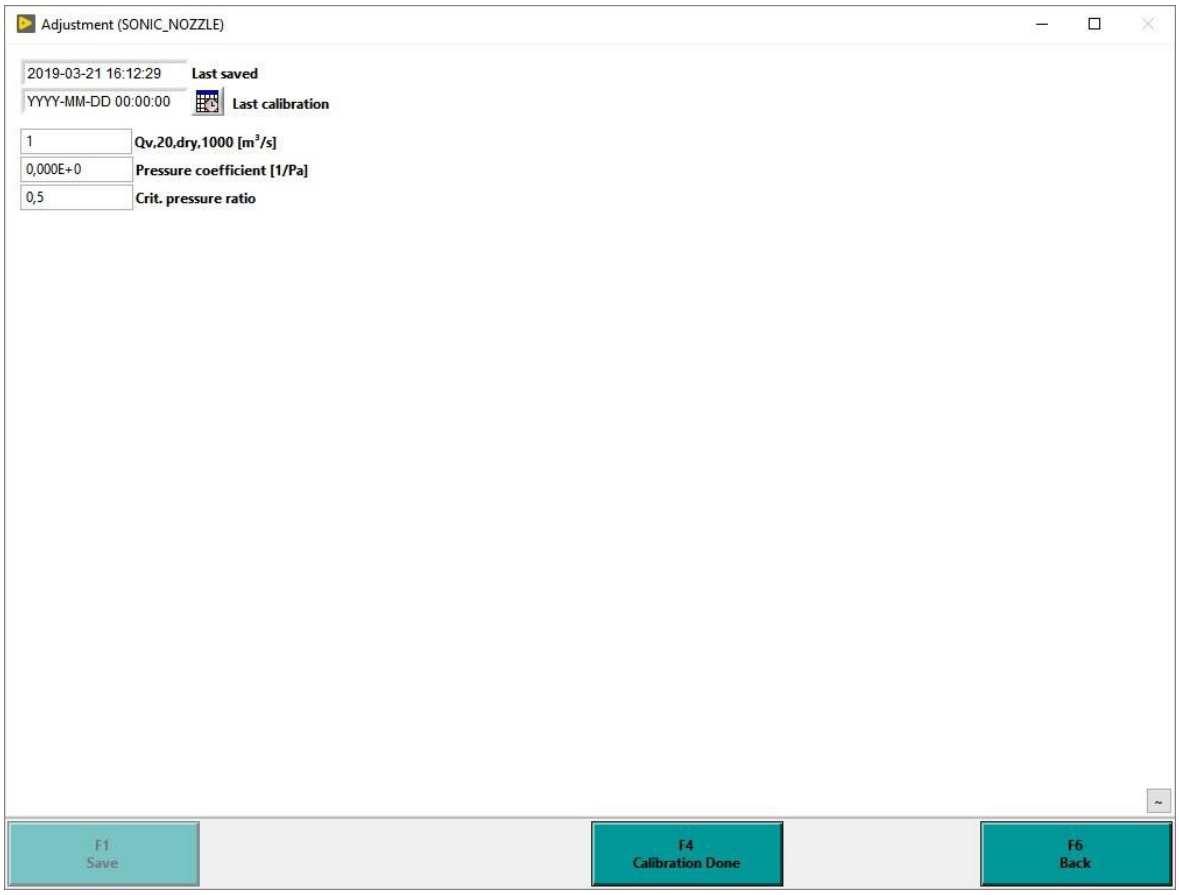


Figure 6.7 Flow meter → [Object ID] → Adjustment

Qv,20,tr,1000 [m³/s]	Volumetric flow rate at 20 °C, dry air and 1000 hPa in m³/s
Pressure coefficient [1/Pa]	Adjustment factor for input pressure dependency in [1/Pa]
Crit. pressure ratio	Critical pressure ratio of the ultracritical nozzle

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

7 Hardware components

This category provides all additional views of further hardware components. This can include, e.g. monitored switches, linear drives, climate chambers, frequency converters or similar.

7.1 Channel dispatching

In channel dispatching, the software can be configured in order to dispatch the value of an analogue input channel to an analogue output. In the process, it is possible to select between the raw value and the scaled value of the analogue input.

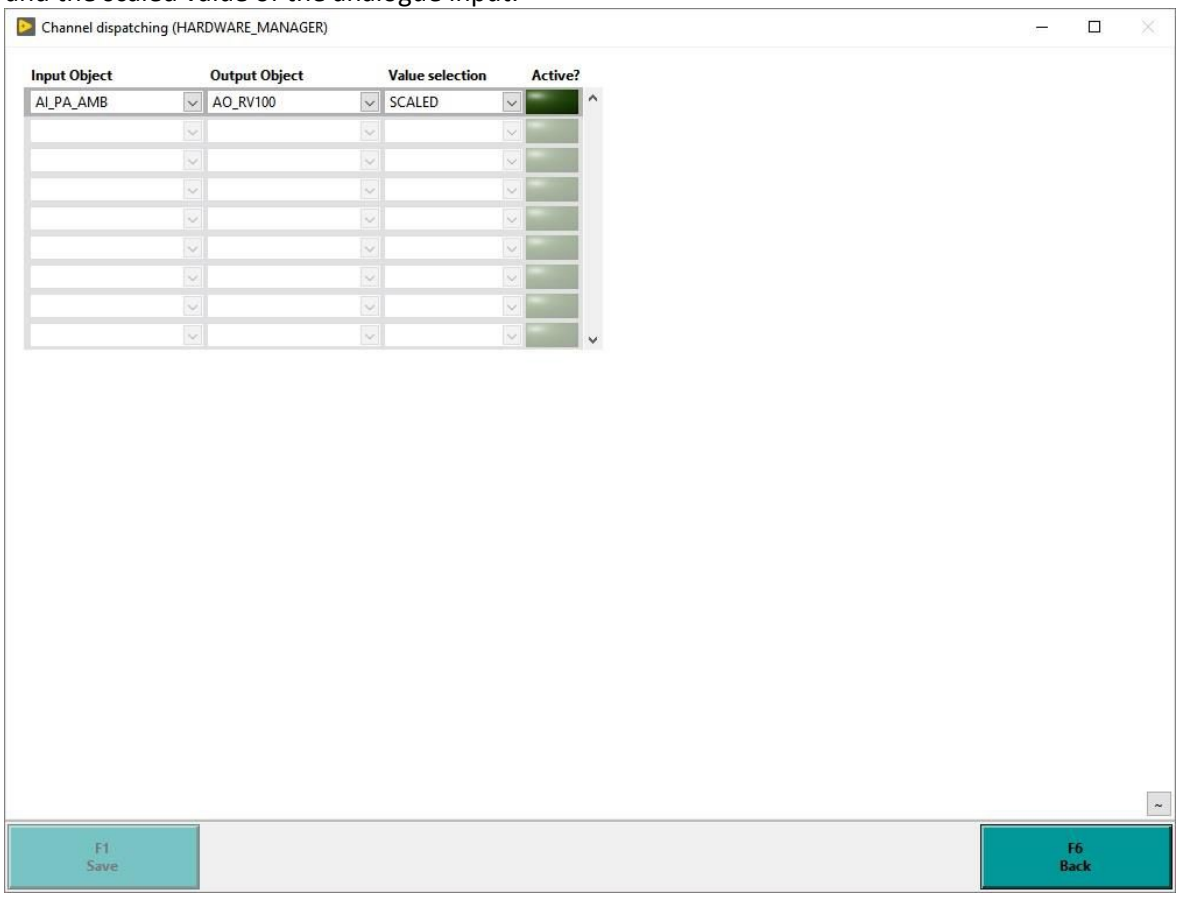


Figure 7.1 Hardware components → Channel dispatching

Input Object	ID of the channel which supplies the input value.
Output Object	ID of the channel to which the value is to be written.
Value selection	Selection as to whether the raw value or the scaled value of the input object is used.
Active?	Switches the dispatching to active/inactive.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

7.2 Monitored switches

A monitored switch is used, e.g. in order to switch valves with position feedback and check them for correct switching behaviour. In the process, there can be both switches which are actuated on both sides and have position feedback on both sides, and switches which are actuated on one side (with spring reset) and have only one feedback, or a combination of these.

The manual switching of digital outputs can lead to dangerous behaviour. This should only be carried out by staff with the appropriate training. If the switching value is changed during an active test, this can cause unpredictable behaviour.

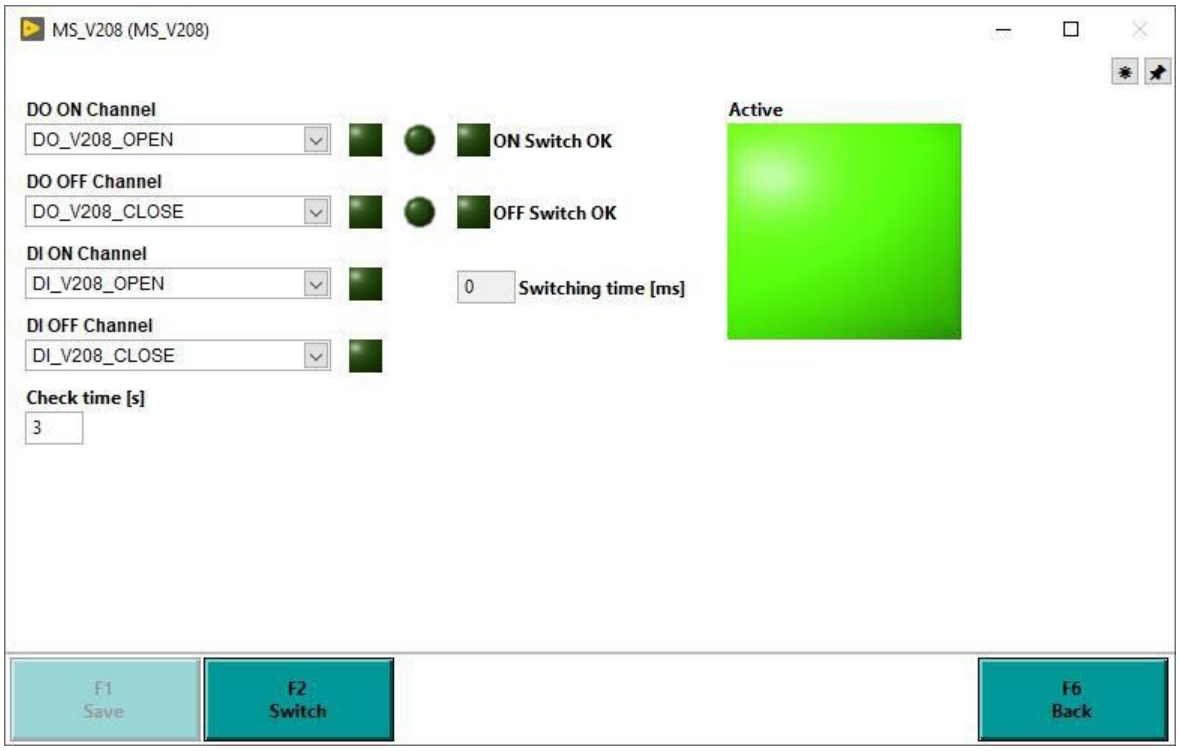


Figure 7.2 Hardware components → [Object ID]

DO ON Channel	Digital output which is switched to open the valve.
DO OFF Channel	Digital output which is switched to close the valve.
DI ON Channel	Digital input which is active when the valve is open.
DI OFF Channel	Digital input which is active when the valve is closed.
Check time [s]	Permitted delay after the digital outputs have been switched by which time the valve must reach a valid status.

7.3 Linear drives

<No specific views available yet>

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

8 Interfaces

In this category, the interfaces of the software to other systems are listed. In the process, a distinction is made between serial and Ethernet interfaces. In addition, each of these interfaces can implement different reports (ASCII, Modbus etc.).

Changing the configuration or manually sending notifications via an interface can cause dangerous behaviour. This should only be carried out by staff with the appropriate training. If the interface is used by an active test, any change to it can cause unpredictable behaviour.

8.1 History

A history of the most recent notifications can be viewed for most interfaces. These may be more or less legible, depending on the log.

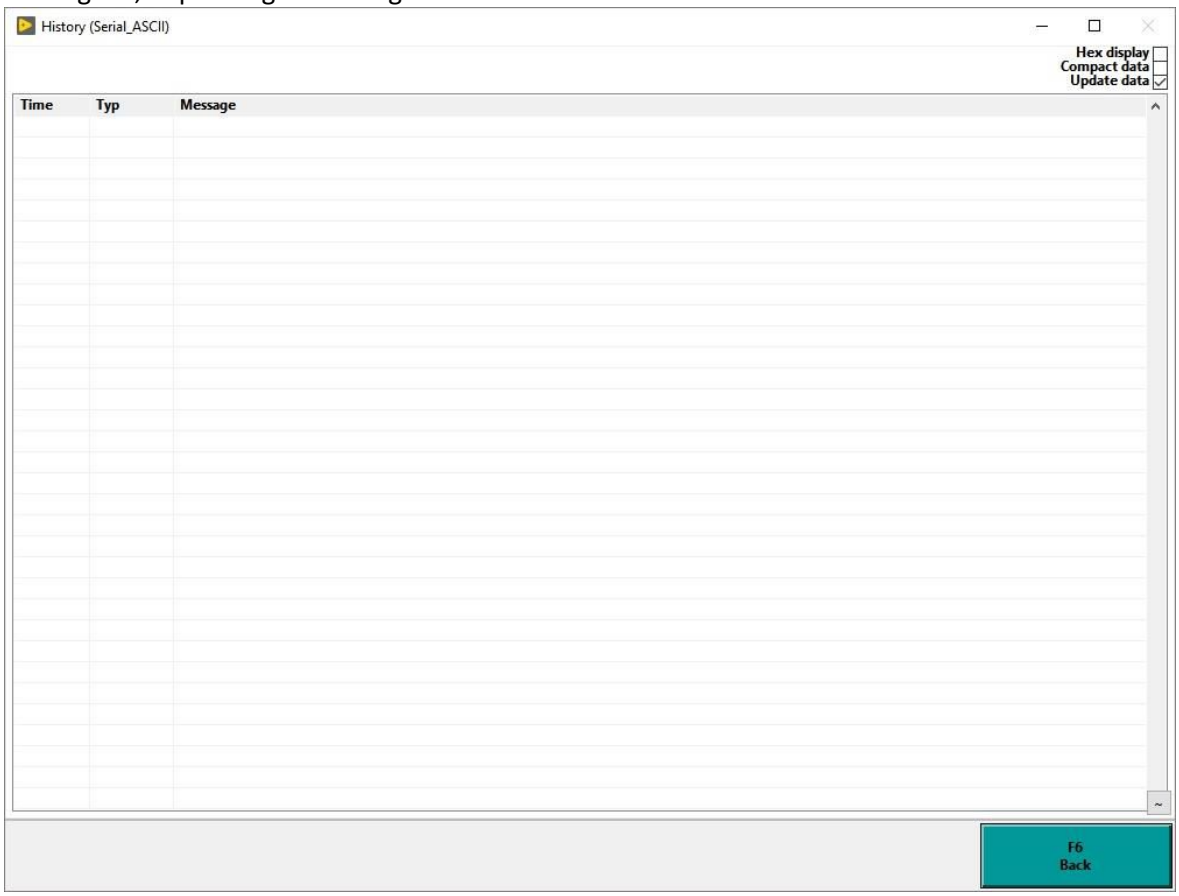


Figure 8.1 Interfaces → [Object ID] → History

Hex Display	Displays the notifications in the history in HEX format.
Compact data	Flag as to whether an attempt should be made to display only different notifications.
Update data	Flag as to whether live data is to be displayed.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

8.2 Serial interfaces

<No specific views available yet>

8.2.1 Configuration

8.2.2 ASCII configuration

8.2.3 ASCII diagnosis

8.2.4 Modbus configuration

8.2.5 Modbus diagnosis

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

8.3 Interfaces network

<No specific views available yet>

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

9 Trigger settings

In the application, triggers can be configured which facilitate simple monitoring of the statuses of digital and/or analogue channels purely by way of configuration. If the configured condition arises, a number of actions can be carried out.

9.1 Monitoring

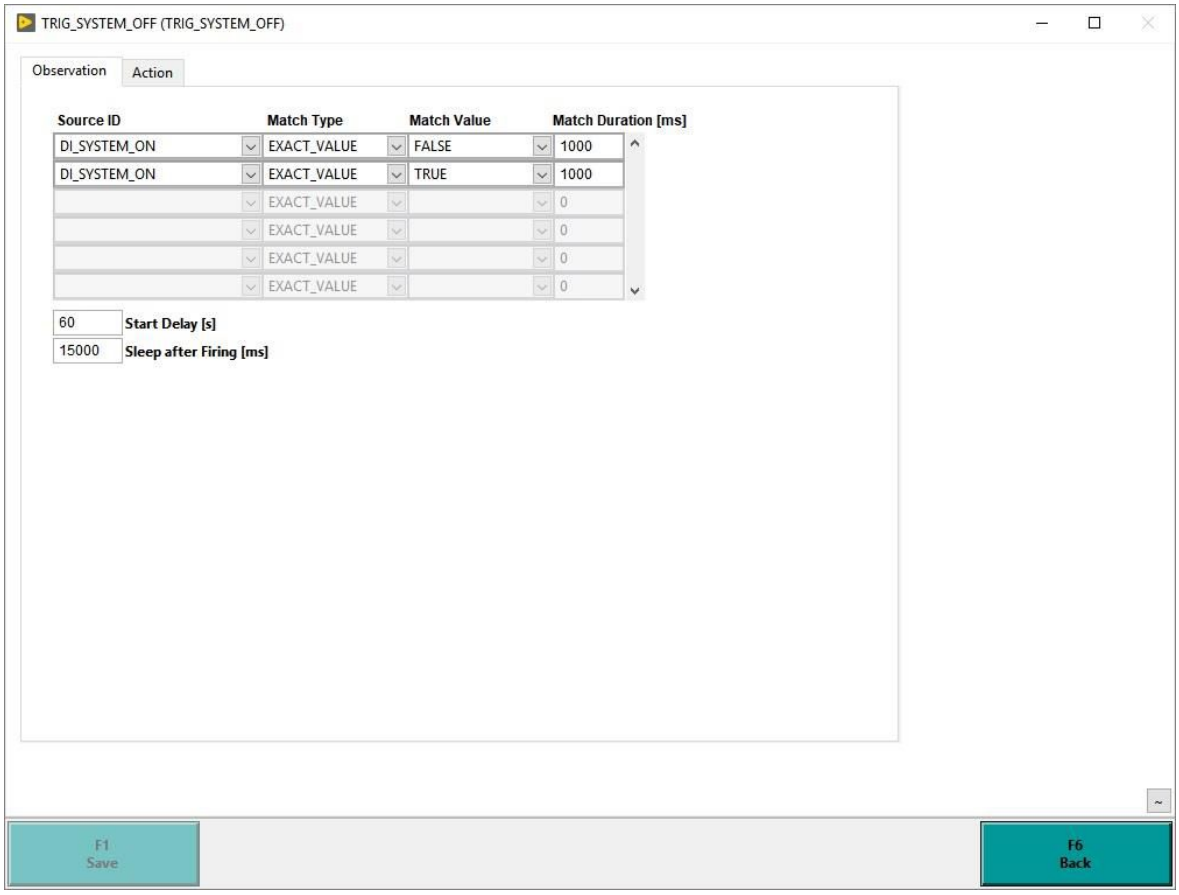


Figure 9.1 Trigger settings → [Object ID] → Observation tab

Source ID	ID of the object (channel) which is to be monitored.
Match Type	Type of monitoring: **[EXACT_VALUE]**: exact value match. **[OUTER_RANGE]**: value outside the specified limits. **[IN_RANGE]**: value inside the specified limits.
Match Value	Value specification for the **match type**. TRUE, FALSE for digital channels. For analogue channels, the specification has to be made in the format "0.123-4.56".
Match Duration [ms]	Duration for which the value must match the match type before the action is triggered.

Any number of monitoring instances can be switched in series to be processed in sequence.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

Start Delay [s]	Delay when starting the software before monitoring is active.
Sleep after Firing [ms]	Time delay after triggering the configured actions before the actions are performed again (if monitoring has not yet triggered)

9.2 Action

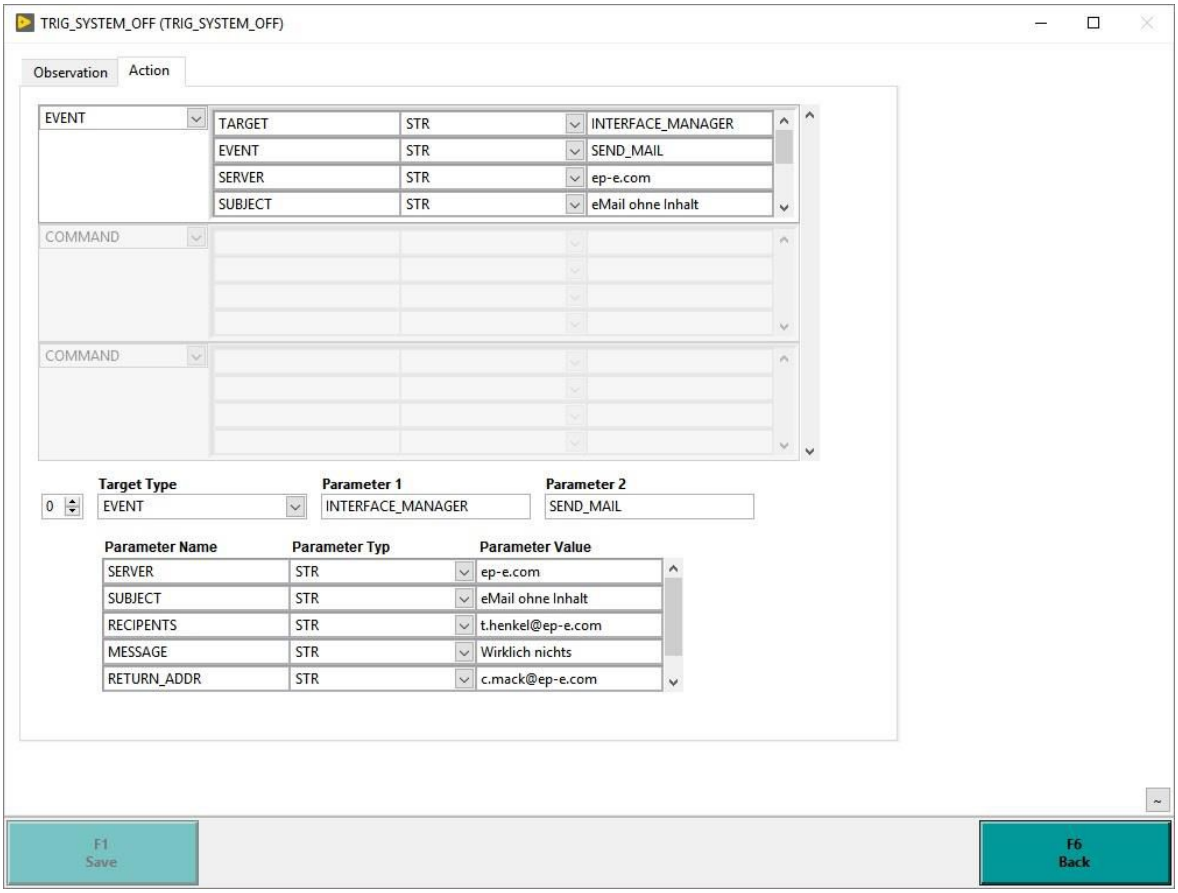


Figure 9.2 Trigger settings → [Object ID] → Action tab

Any number of actions can be switched in series to be processed in sequence. Depending on the **Target Type** there is a different number of parameters with different meanings.

Target Type	Type of action which is to be performed.

[COMMAND] This can be used to send a command to a component of the software.

Parameter 1	Target of the command (e.g. APPLICATION)
Parameter 2	Type of command (e.g. "start", "stop", "end")

[MESSAGE] This can be used to display a message.

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

Parameter 1	Content of the message

[LOG] This can be used to log a notification.

Parameter 1	Log level of the notification [DEBUG, WARN, INFO, USER, ERROR]
Parameter 2	Content of the logging notification

[ERROR] This can be used to generate an error message

Code	Error number which is generated.

[SYSTEM_CMD] This can be used to execute code in the command line.

Parameter 1	Text which is transferred to the system exec.

[EVENT] This can be used to send an event to a component.

Parameter 1	Target of the event (object of the software, e.g. TEST_MANAGER)
Parameter 2	Name of the event

With this target type, any number of further parameters can be transferred using a name, a type and a value.

For example, if the INTERFACE_MANAGER supports the sending of an email with the following parameter:

Target Type: [EVENT]
Parameter 1: [INTERFACE_MANAGER]
Parameter 2: [SEND_MAIL]

Parameter Name	Parameter Typ	Parameter Value
SERVER	STR	Address of the server being used
SUBJECT	STR	Subject of the email
RECIPENTS	STR	Recipients (separated by semicolon)
MESSAGE	STR	Content of the email
RETURN_ADDR	STR	Sender address

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

10 Data storage

<No specific views available yet>

© All rights reserved by Ehrler Prüftechnik Engineering GmbH. We retain all rights of disposal, including, but not limited to, rights of reproduction and dissemination.

11 Additional software license

11.1 LabVIEW copyright notice

Copyright © 2020 National Instruments Corporation. All rights reserved.

11.2 G# license conditions

Copyright (c) 2020, AddQ <http://www.addq.com>, Author: Mattias Ericsson <mattias.ericsson@addq.se>

All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. Neither the name of the copyright holder nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.