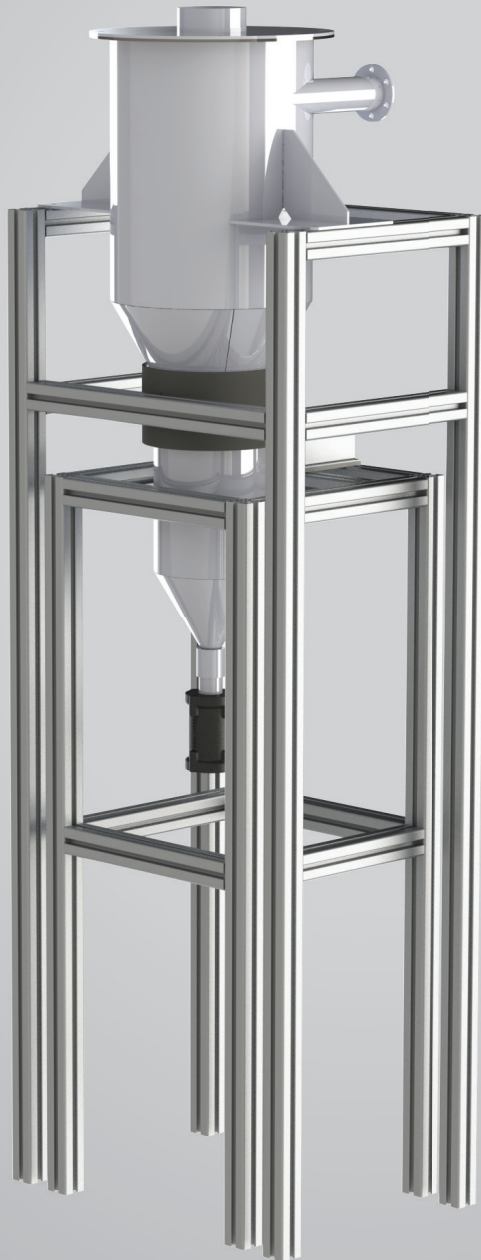


Operating Instructions

Media Flow Management System flux:on



Operating Instructions

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Operating Instructions

1 Function

1.1 Product Description

sentenso's flux:on Media Flow Management system is engineered and designed to provide a convenient way to measure flow rates of your blast nozzles and thus allow the adjustment and calibration of the machine elements that control the media flow rate.

The flux:on system includes a cyclone catching system for media that exits a blast nozzle, a load cell weighing system for the collected media and a PLC control program to control the adjustment and calibration process as well as the permanent flow control through your shot blast nozzles. The intuitive panel menu allows the user to control the adjustment and calibration process of any combination of media flow sensor and actuator (MagnaValve for example). The media can be emptied from the weighing bin into a collecting bucket or fed back into the machine media circulation system. With proper adjustment and calibration the flux:on system will set and maintain the desired flow rate in the shot peening or blast cleaning process.

In this case adjustment means:

1. Selection of setpoints to represent the flow characteristic of the actuator/sensor system
2. Setting a suitable measurement cycle by duration and start the measuring cycle
3. Output of actuator control signals, record of sensor input signals and measurement of the flow rates, resp. measurement of the the weight collected in the weighing bin in one cycle
4. Utilisation of the measured data to adjust the control system's parameter in order to to linearise the flow characteristic of the sensor/actuator combination

In this case calibration means:

1. Setting of one or more desired flow rates
2. Setting a suitable measurement cycle by duration and start the measuring cycle
3. Measurement of the flow rates, resp. measurement of the the weight collected in the weighing bin in one cycle
4. Comparison of set flow rates and measured flow rates by absolute or relative difference
5. Check if the differences are within the allowed tolerance

The installed cyclone media catcher allows you to leave the media flow actuator resp. sensor-actuator installed on the machine and to simulate a normal operation cycle through your nozzles. Please note that in case of a manual nozzle handling specific holders and adaptors will be required that keep your nozzles safely in a fixed position inside the inlet tube of the cyclone.

Operating Instructions

2. Safety

2.1 General Information

The flux:on Media Flow Management system was designed, built and tested to be safe and was shipped in safe condition. Nevertheless persons or objects may be endangered by components of the system if these are operated in an inexperienced manner. Therefore the operational instructions must be read completely and the safety notes must be followed. In case of inexperienced or irregular use, the manufacturer will refuse any liability or guarantee.

2.2 Regular Use

- The flux:on system is designed for indoor use only.
- The media catching system is designed for a recurring but not excessive or permanent use.
- The flux:on system is not designed to work in dusty or humid atmospheres.
- Only original spare parts and accessories of sentenso must be used.

2.3 Identification of Dangers

- Possible dangers when using the measuring system are marked by the following symbol in the operating instructions:

Warning!



- This symbol in the operating instructions marks actions which may represent a danger for life and limb of persons when carried out in an inexperienced manner.

2.4 Operational Safety

- The flux:on system must be installed by trained and authorised personnel only.
- In case of maintenance-work on components of the device make sure that there is no blast nozzle attached to the cyclone.
- Interrupt the power supply for all maintenance, cleaning or inspection works on the components of the flux:on system. Follow the notes of the chapter Maintenance.
- All components and electrical connections must be checked for damages regularly. If a damage is found, it is to be repaired before further operation of the device.

2.5 Technical Progress

- The manufacturer reserves the right to adapt technical data to the technical progress without particular prior notice. If you have any questions sentenso will be pleased to inform you on possible changes or extensions of the operating instructions.

Operating Instructions

3. Installation

3.1 Product Overview

For the main components of the flux:on Media Flow Management system see figure 1 for reference.

System Components

- 1 Cyclone inlet tube
- 2 Media catching cyclone (to be installed to the machine)
- 3 Cover lid
- 4 Air and dust outlet (to be fed back into the machine)
- 5 Carrying frame
- 6 Weighing bin
- 7 Load cell
- 8 On/off valve (not included)
- 9 Earthing point
- 10 Cyclone wear plate
- 11 Cyclone wear detection

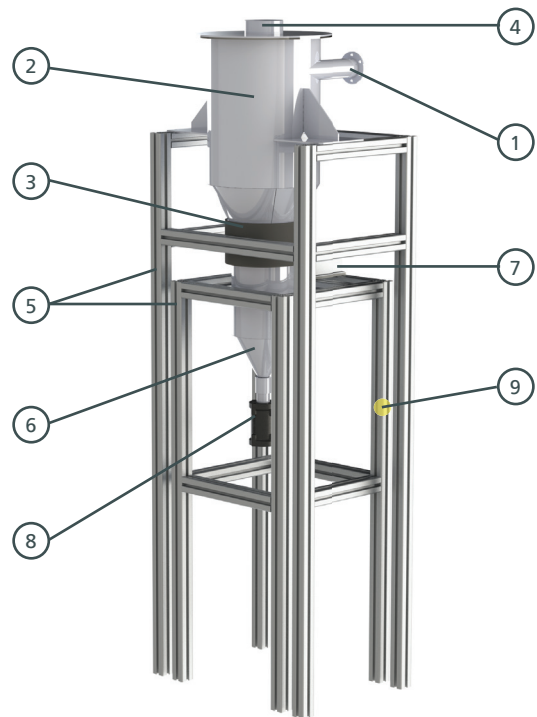


Fig. 1: Overview of the flux:on System

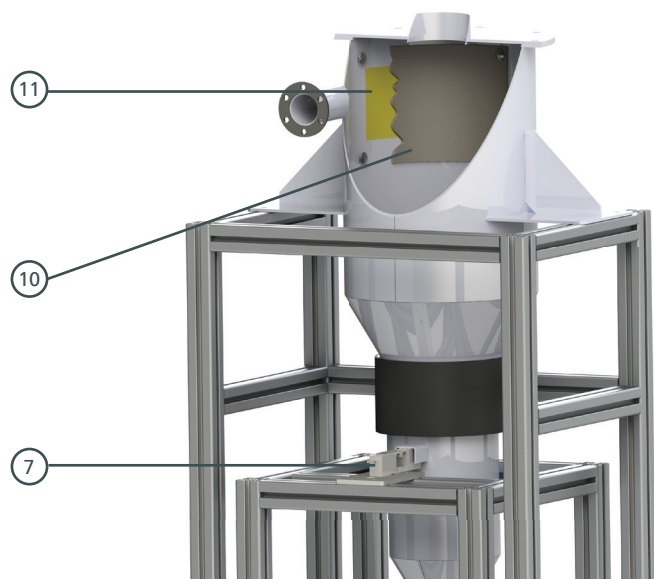




Fig. 2: Wear protection and detection inside cyclone




Operating Instructions

3.2 General Instructions

- The media catching cyclone can be used either inside or outside a blast cabinet.
- For inside use of the cyclone it will have to be protected from abrasion by moving media.
- Make sure the cyclone media catcher is installed in a safe way.
- Move the blast hose in a suitable position to avoid tight curves as these could influence the media flow.
- In case of manual nozzle handling:


Attach the blast nozzle with the blast hose securely to the inlet tube of the cyclone (1) and fix it with a bolted connection or any other suitable and safe fixation system. Make sure you only use suitable holders and adaptors that keep the blast nozzle in a fixed and safe position and which close the inlet tube completely. Contact sentenso in case you need special holders or adaptors.
- The weighing system is not designed to operate inside a blast cabinet during shotblasting. Avoid any contamination by or impact of blast media.
-  Make sure the weighing bin's carrying frame is placed on a solid, flat and horizontal surface.
- Avoid any physical contact of elements with the weighing bin and the carrying frame as this will influence the weight measurements (for example if you install means to catch media from weighing bin's outlet)
- Avoid vibrations as these will influence the weight measurements.
-  In order to avoid static loadings on components of the device make sure that you connect the earthing point (9) of the unit to a safe earthing point of your machinery or of the building.

3.3 Emissions and Personal Protective Equipment


-  Any operator or personnel in the working area must wear proper ear protection due to the noise caused by the air stream out of the nozzle.
-  In case of improper working conditions media may exit the device. For operators or personnel in the working area it is recommended to use proper eye protection.
-  The system is designed to feed back all exhaust air and dust into the machine. If you do not follow this setup you will have to apply additional measures to reduce the emission and/or use additional personal protective equipment.

Operating Instructions

3.4 Setup of the Cyclone Catcher Outside a Blast Cabinet

- Consider all General Instructions.
-  Especially consider the noise emissions and take care of protective measures.

3.5 Setup of the Weighing System Inside a Blast Cabinet

-  Make sure that the cabinet allows you to move the unit in and out safely.
- Make sure that the cabinet provides a proper ventilation for a low-dust atmosphere.
- Do not start shotblasting with the weighing system inside the cabinet.

Operating Instructions

4. Electrical Connections

4.1 Connections Between Control Cabinet and Other Components

All connections between the control cabinet and other components are removable by industrial plugs with numbered cables. See table 1 for explanation.

No.	Component	Cable Connector
1	Wear control for cyclone protection	M8, 3 pins
2	Load cell controller	M12, 8 pins

Table 1: Electrical Connections between control cabinet and other components

Operating Instructions

5. Commissioning

The flux:on Media Flow Management System needs to be configured in detail together with the PLC control system of your shotblast machine. For commissioning please contact sentenso service.

Operating Instructions

6. Operation

6.1 Preparations

The following points explain the core procedure of the adjustment and calibration procedure of a combined media flow sensor/actuator with the flux:on Media Flow Management system. Please refer to Menu Functions for explanation of all functions and to view the corresponding panel screens and input/output dialogs.

1. Put a collecting bucket or container under the outlet of the weighing bin to catch all media or feed back the media into your machine. Make sure that your collecting bucket or container has enough free volume. Alternatively install means to feed back the media into the shotblast machine.
2. Check if the system is properly set acc. to the installation instructions. Connect the blast nozzle securely to the inlet tube of the cyclone (1) as described.
3. Enter all general data and data of your installed sensor/actuator units, MagnaValves for example (Settings screen)..
4. You may identify single units by applying a QR (or other) code if you have a code reader available.
5. Enter all system parameters, if not preset in the system (Parameters screen).
6. Use the Gain Adjust assistance function to adjust the sensor sensitivity, if not preset on your flow sensor or sensor/actuator unit (Gain Adjust screen).

6.2 Adjustment Procedure

The adjustment of a combined media flow sensor/actuator with the flux:on Media Flow Management system is based on the following steps:

1. On the Settings screen select the sensor/actuator unit you like to adjust.
2. Change to the Adjustment screen.
3. Set the desired number of setpoints and the desired number of measurements per setpoint.
4. Set a suitable measurement cycle time, making sure not to exceed the weighing bin's weighing capacity (see Technical Specification).
5. Set a waiting time to cover the delay until stabilisation of air flow through the nozzle and media flow into the weighing bin.
6. Start/allow the adjustment process for the attached nozzle on your machine control.
7. Press Start.
8. If you entered a waiting time the measurement start will be delayed by that value.
3. Set the desired number of setpoints and the desired number of measurements per setpoint.
9. When the measurement starts the On/Off valve below the weighing bin is automatically closed.
10. Watch the displayed flow rate for fairly stable values.
11. Wait until the the measurement procedure is finished.

Operating Instructions

12. Change to the Polynomial Fit screen.
13. Start the polynomial fit by pressing Start.
14. Check the polynomials' graphs for fairly smooth shape.
15. Change to the PID Optimisation Screen.
16. Run the PID optimisation.
17. Repeat all steps for the desired flow sensor/actuator units.

6.3 Calibration Procedure

The calibration of a combined media flow sensor/actuator with the flux:on Media Flow Management system is based on the following steps:

1. On the Settings screen select the sensor/actuator unit you like to adjust.
2. Change to the Calibration screen.
3. Set the desired number of setpoints and the desired number of measurements per setpoint.
4. Set a suitable measurement cycle time, making sure not to exceed the weighing bin's weighing capacity (see Technical Specification).
5. Set a waiting time to cover the delay until stabilisation of air flow through the nozzle and media flow into the weighing bin.
6. Start/allow the calibration process for the attached nozzle on your machine control.
7. Press Start.
8. If you entered a waiting time the measurement start will be delayed by that value.
9. When the measurement starts the On/Off valve below the weighing bin is automatically closed.
10. Watch the displayed flow rate for fairly stable values.
11. Wait until the the measurement procedure is finished.
12. Change to the Analysis value.
13. Check for the measured flow rates. Compare the set flow rates and the measured flow rates by absolute or relative difference.
14. Check if the difference is within your allowed tolerance bandwidth (green).
15. If the deviation is within your tolerance band the calibration result is OK. If the deviation is out of your tolerance band the calibration result is not OK (red). In this case take actions to improve the accuracy of your flow rate and restart the calibration procedure.16. Repeat all steps for the desired flow sensor/actuator units.

Operating Instructions

6.4 Active Flow Control

After successful completion of the Adjustment and Calibration Procedure the flux:on Media Flow Management system will utilise the recorded data to actively control the flow rates of all actuators, provided that stable flow conditions can be established by the shotblast machine.

6.5 Operator Panel Menu

The menu on the operator touch panel guides you through the adjustment and calibration procedure of the flux:on Media Flow Management system. All menu screens are described below.

Operating Instructions

7. flux:on Menu Functions

Operator Mode

The Operator Mode (Expert Mode OFF) is used for normal system operations in the flux:on Media Flow Management.

Available Functions

- Settings
- Parameters
- Calibration
- Analysis
- NOTE:

The operator's rights to change data and the available functions are limited. Log in with Expert/Administrator rights and turn on the Expert Mode to be able to change all data and use all available functions.

- NOTE:

The following pages show the screens of the Expert Mode.



OFF Expert Mode User:
MagnaValve 4: MV Y231

1: Settings

2: Parameters

3: Calibration

4: Analysis

Selection of MagnaValve

MagnaValve No. MagnaValve 4: MV Y231

Input Dialog

Temperature	°C
Humidity	%
Air Pressure	hPa
Location	
Date	
Calibration Executive	
Load Cell	

QR-Code Scanner

Read QR:

Device:	
Typ:	
Serial No.	
Media:	
Nominal Flow Rate:	ka/min
Valve Pulse:	Hz
Zero:	Uhr
Gain Select:	Position
Gain Adjust:	Uhr
Upper Limit:	ka/min
Lower Limit:	ka/min

Online Data

Accept Data

Temperature	°C
Humidity	%
Air Pressure	hPa
Location	
Date	
Calibration Executive	
Load Cell	

QR-Code Scanner

Device:	MagnaValve
Typ:	576-24
Serial No.	159144-20
Media:	ASR 110 45-52 HRC
Nominal Flow Rate:	1,60 ka/min ka/min
Valve Pulse:	20 Hz Hz
Zero:	14:30 Uhr Uhr
Gain Select:	3. Position Position
Gain Adjust:	12:30 Uhr Uhr
Upper Limit:	1,60 ka/min ka/min
Lower Limit:	0,30 ka/min ka/min

EN | Revision 2017-09-06 | Specification is subject to change without notice.

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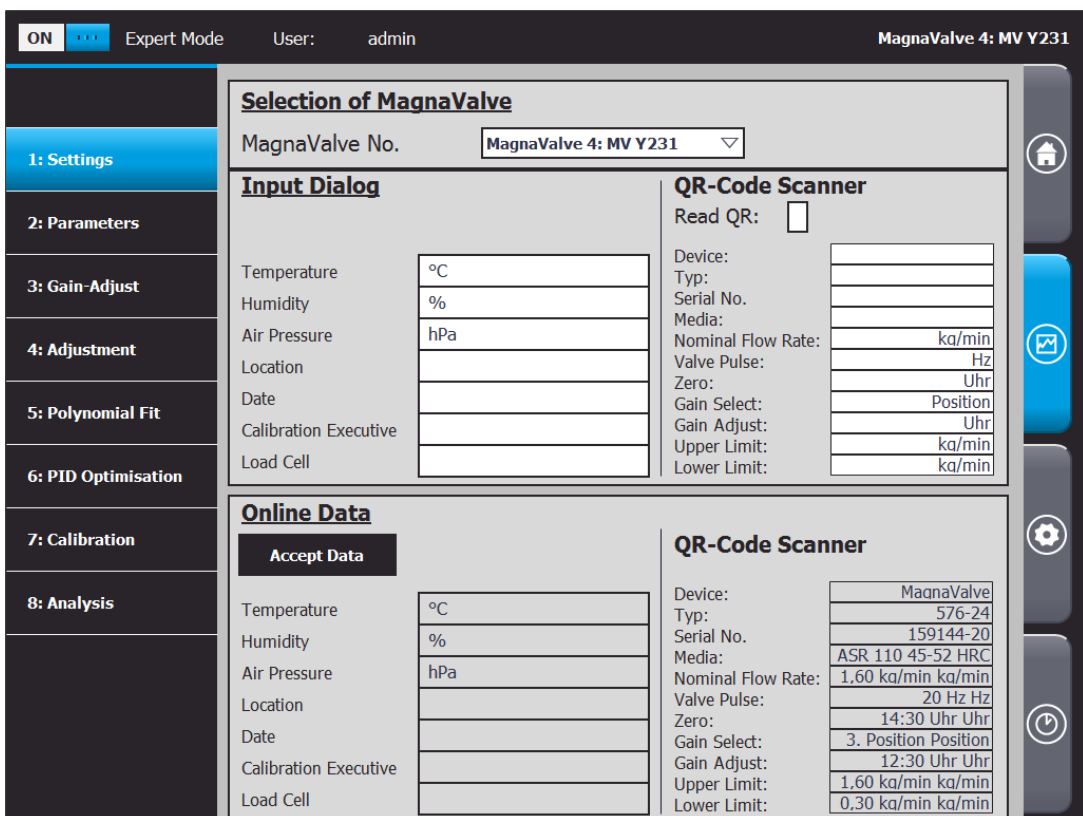
Operator/Expert Mode

Step 1: Settings

Input Screen for Basic Data

Functions

- The desired MagnaValve can be selected in the Drop Down Menu.
- Required data can be typed in in the Input Dialog.
- After completion press 'Accept Data' to take over input data.
- If actual data is available it will be displayed and can be modified in the Input Dialog.
- The actual values of the selected MagnaValve will be displayed.
- If you mark the 'Read QR' field you can identify an individual MagnaValve and load its data by scanning the QR code from a MagnaValve lable (if a scanner is available).
- NOTE:
The operator's rights to change data may be limited. Turn on the Expert Mode to be able to change all data.



Operating Instructions

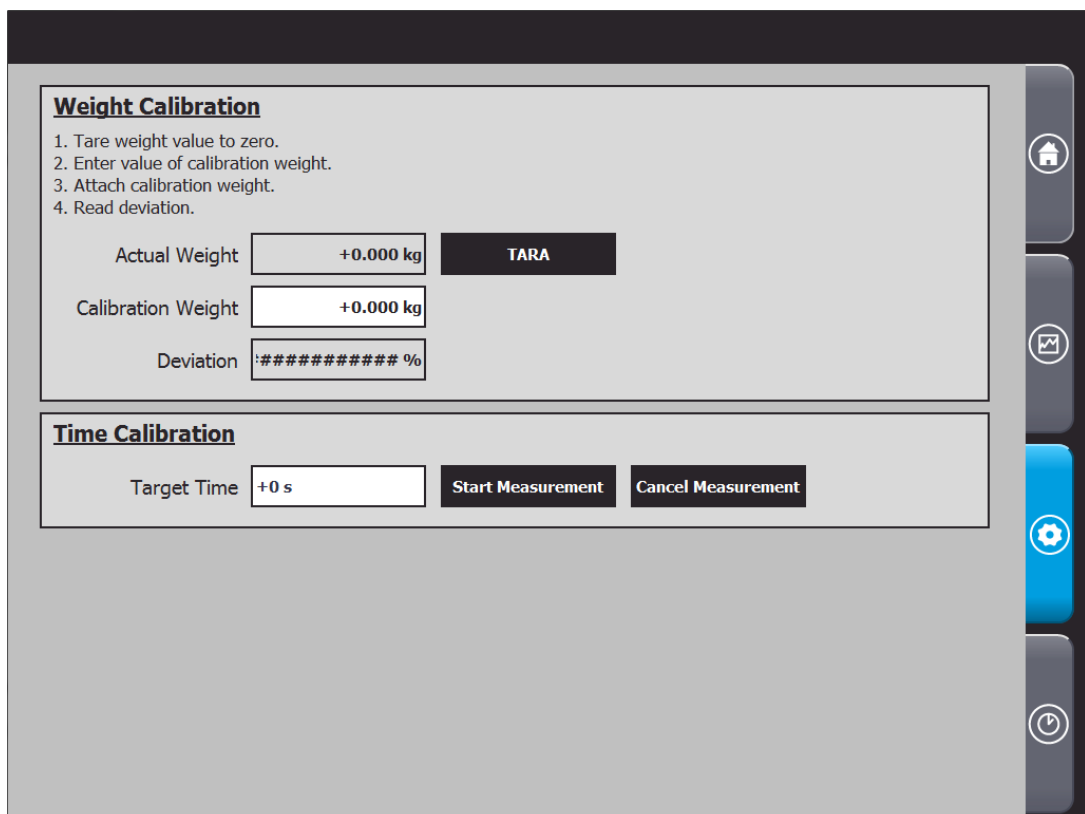
Operator/Expert Mode

Step 1: Settings

Calibration Screen for Weight and Time Calibration

Functions

- To check the accuracy of the weighing bin's load cell follow the instructions on the screen (a reliable dedicated calibration weight is required).
- The deviation is displayed. Check if the deviation is within the limits that your specifications allows.
- NOTE:
If the deviation exceeds your specified limits repeat the calibration procedure. If the result does not change you may have to send in the load cell for service and readjustment. Readjustment is not supported within the flux-on Media Flow Management because the load cell is a critical system element.
- To check the accuracy of the internal system timer attach and activate an external timer (a reliable dedicated calibration timer is required).
- Start Measurement. After completion the result is displayed. Check if the deviation is within the limits that your specifications allows.
- NOTE:
If the deviation exceeds your specified limits repeat the calibration procedure. If the result does not change then contact your supplier for service.



Operating Instructions

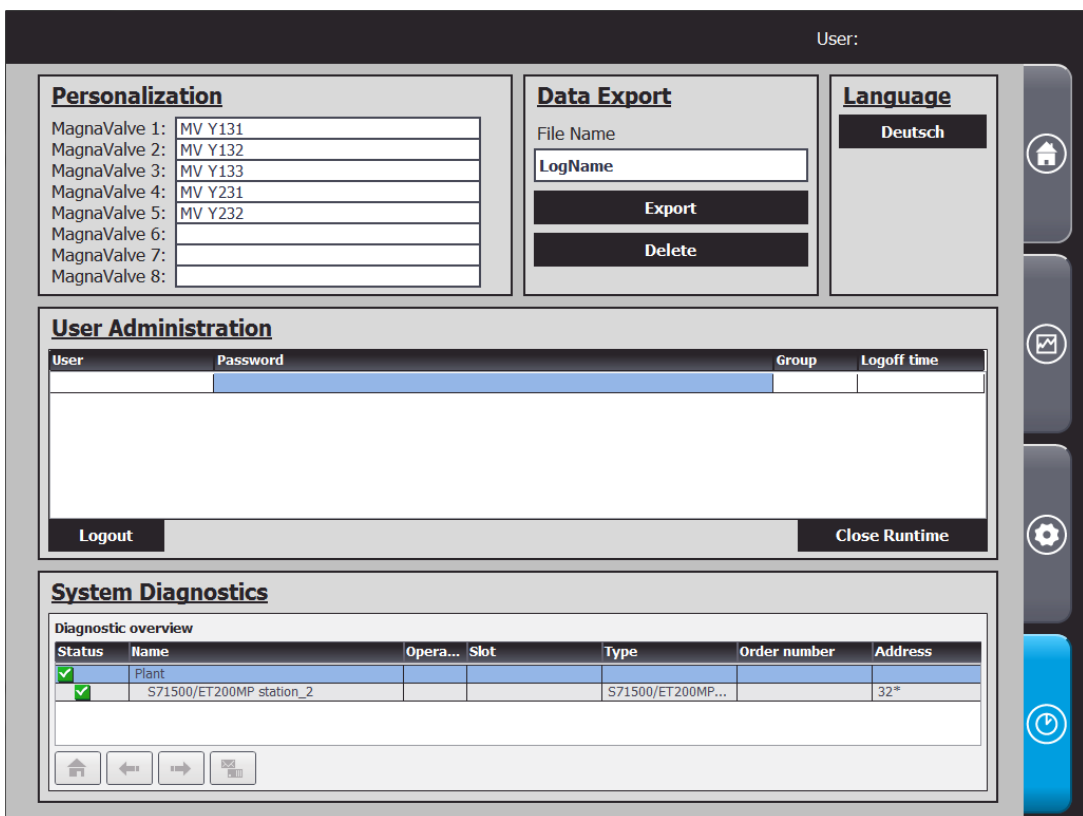
Operator/Expert Mode

Step 1: Settings

Administration Screen

Functions

- Use the Personalization window to name the available MagnaValves.
- Use the Data Export window to export calibration data.
- Use the Language window to change the screen language.
- Use the User Administration window to create user accounts, assign the user to the groups Operator and Expert and logout/login from/into the flux:on Media Flow Management.
- Use the System Diagnostics window to check the status of the PLC system.



Operating Instructions

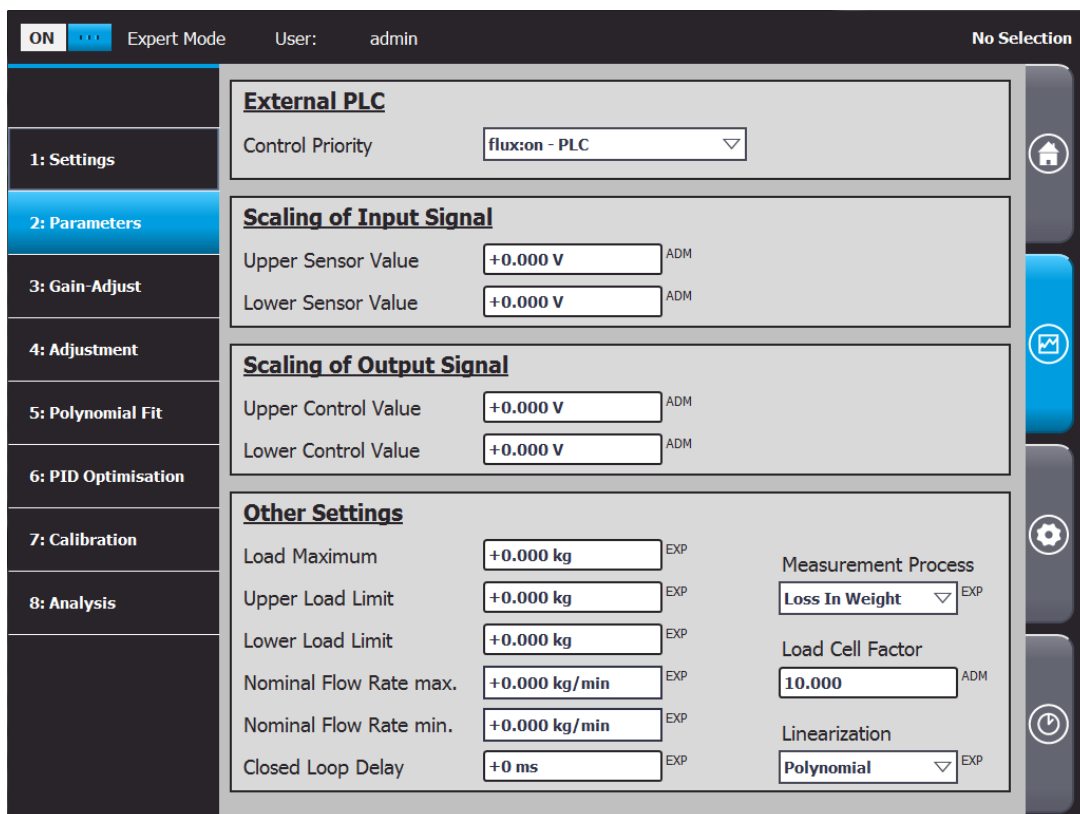
Operator/Expert Mode

Step 2: Parameters

Input Screen for System Parameters

Functions

- Use the External PLC window to switch the Control Priority between machine PLC and flux:on PLC.
- Use the Scaling of Input Signal to change the limits of the sensor voltage (0-10 V).
- Use the Scaling of Output Signal to change the limits of the control voltage (0-10 V).
- Other Settings Menu
 - Load Maximum to limit the weighing bin load (load cell capacity less bin weight).
 - Upper and Lower Load Limit to control automatic emptying of the weighing bin.
 - Nominal Flow Rate to limit the permissible flow rates of the actual machine system.
 - Closed Loop Delay to approach setpoint before closed loop control becomes active.
 - Measurement Process to be selected between 'Gain In Weight' (with cyclone media catcher) and 'Loss In Weight' (MagnaValve to be attached to the weighing bin).
 - Load Cell Factor.
 - Linearization to be selected between 'Polynomial Fit' and 'Lookup Table'.
- NOTE:
Log in with Expert/Administrator rights and turn on the Expert Mode to be able to change all data.



Operating Instructions

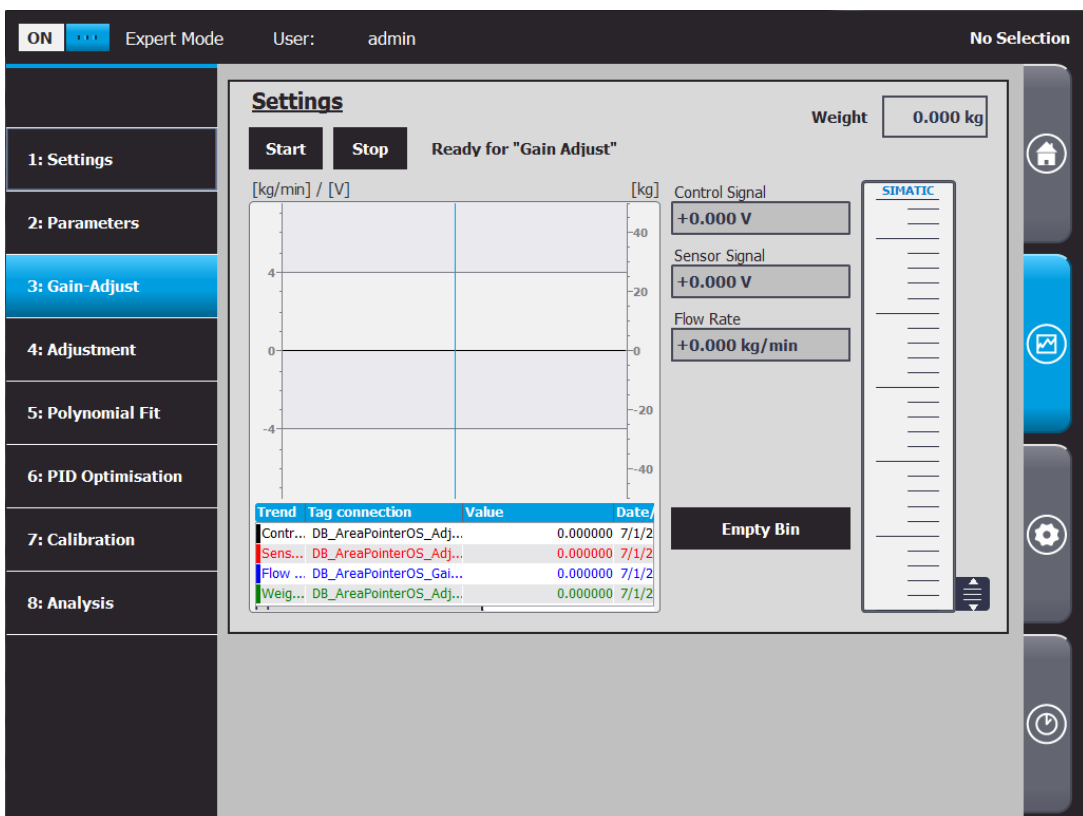
Expert Mode

Step 3: Gain-Adjust

Assistance Screen to Adjust MagnaValve Sensor Sensitivity

Functions

- Start controlled full scale media flow by pressing 'Start' button. The full scale flow rate of each MagnaValve is automatically selected from the previous system settings.
- Adjust the sensor sensitivity by turning the MagnaValve's 'GAIN ADJUST' potentiometer while watching the scale behaviour. Adjust the pot to use the a signal capacity of 9.5 V.
- More than 10 V sensor signal will be interpreted as overflow or media flow disturbance respectively.
- Empty bin to start a new adjustment with maximum bin capacity.
- NOTE:
This adjustment will normally be taken during commissioning and is thus not required afterwards.



Operating Instructions

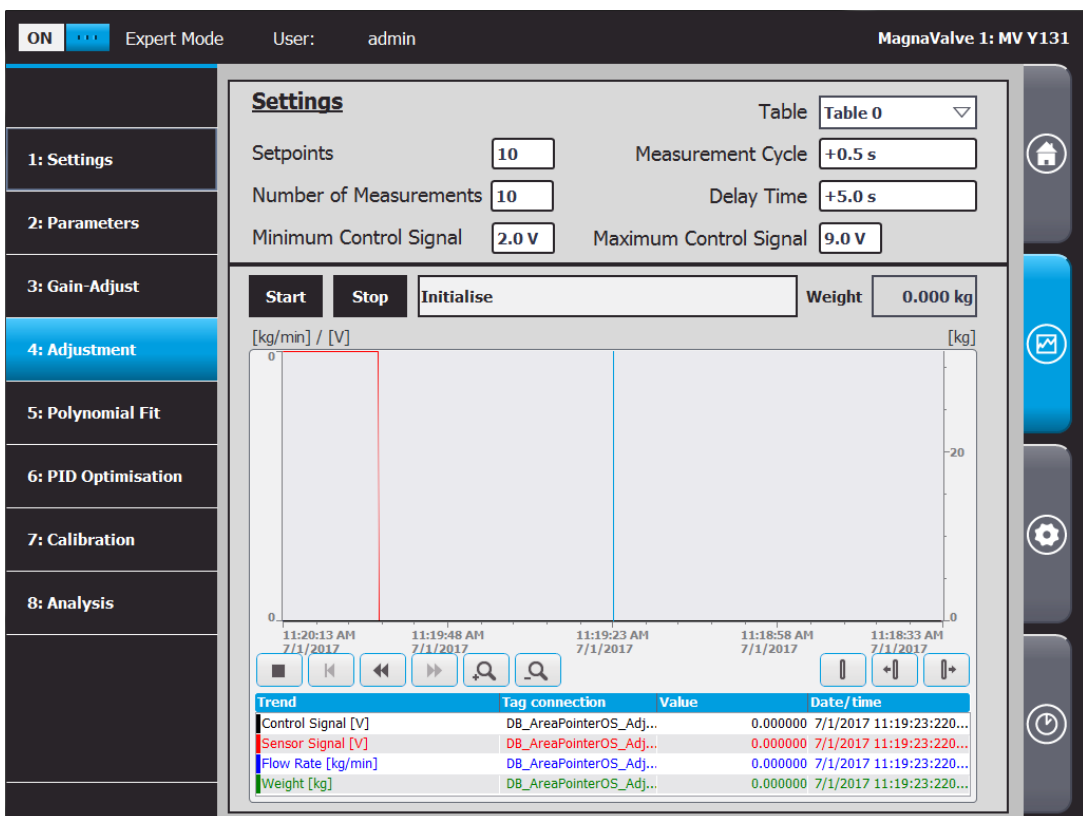
Expert Mode

Step 4: Adjustment

Assistance Screen to Control MagnaValve Adjustment Procedure

Functions

- Selection of Table (use multiple tables for different media types)
- Number of Setpoints for MagnaValve linearization.
- Number of Measurements per Setpoint.
- Measurement Cycle Time.
- Delay Time before measurement starts (use to wait for flow equalization).
- Minimum and Maximum Control Signal for Adjustment.
- Press 'Start/Stop' to start and stop the adjustment procedure.
- The parameter graphs over elapsing time are plotted in the diagram window.
- NOTE:
The fields are filled with standard values.



Operating Instructions

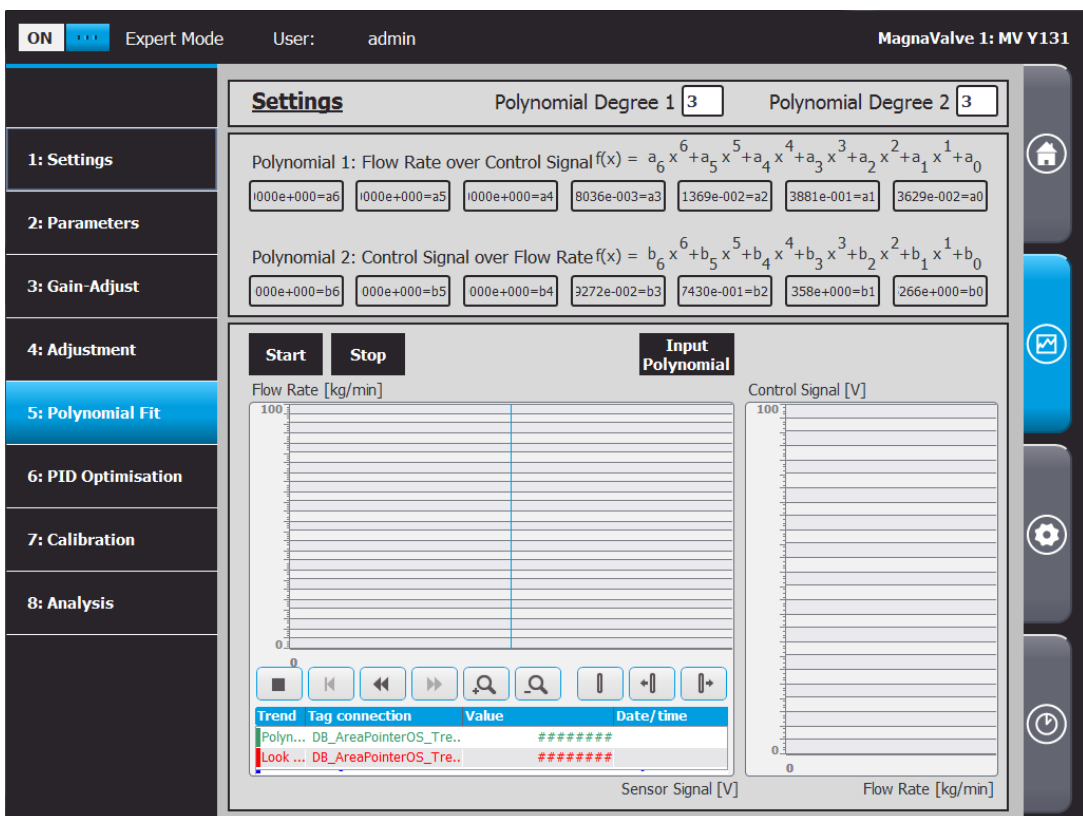
Expert Mode

Step 5: Polynomial Fit

Assistance Screen to Control Polynomial Variables

Functions

- The characteristic curves from the adjustment procedure
 - flow rate over sensor signal
 - control signal over flow rate
 will be calculated as polynomials.
- The polynomial 'flow rate over sensor signal' serves to display the actual flow rate.
- The polynomial 'control signal over flow rate' serves to allow an immediate approach to the desired setpoint.
- The optimized coefficients can be manually modified if needed.



The screenshot shows the 'Expert Mode' interface for 'MagnaValve 1: MV Y131'. The user is 'admin'. The interface is divided into several sections:

- Settings:** Polynomial Degree 1 is set to 3, and Polynomial Degree 2 is set to 3.
- Polynomial 1:** Flow Rate over Control Signal $f(x) = a_6 x^6 + a_5 x^5 + a_4 x^4 + a_3 x^3 + a_2 x^2 + a_1 x^1 + a_0$. Coefficients are: $a_6 = 0000e+000$, $a_5 = 0000e+000$, $a_4 = 0000e+000$, $a_3 = 8036e-003$, $a_2 = 1369e-002$, $a_1 = 3881e-001$, $a_0 = 3629e-002$.
- Polynomial 2:** Control Signal over Flow Rate $f(x) = b_6 x^6 + b_5 x^5 + b_4 x^4 + b_3 x^3 + b_2 x^2 + b_1 x^1 + b_0$. Coefficients are: $b_6 = 000e+000$, $b_5 = 000e+000$, $b_4 = 000e+000$, $b_3 = 9272e-002$, $b_2 = 7430e-001$, $b_1 = 358e+000$, $b_0 = 266e+000$.
- Graphs:** Two empty graphs are shown. The left graph is labeled 'Flow Rate [kg/min]' and the right graph is labeled 'Control Signal [V]'. Below the graphs are control buttons for 'Start', 'Stop', and 'Input Polynomial'.
- Table:** A table with columns 'Trend', 'Tag connection', 'Value', and 'Date/time'. It shows two entries: 'Polyn... DB_AreaPointerOS_Tre..' with value '#####' and 'Look ... DB_AreaPointerOS_Tre..' with value '#####'.

Operating Instructions

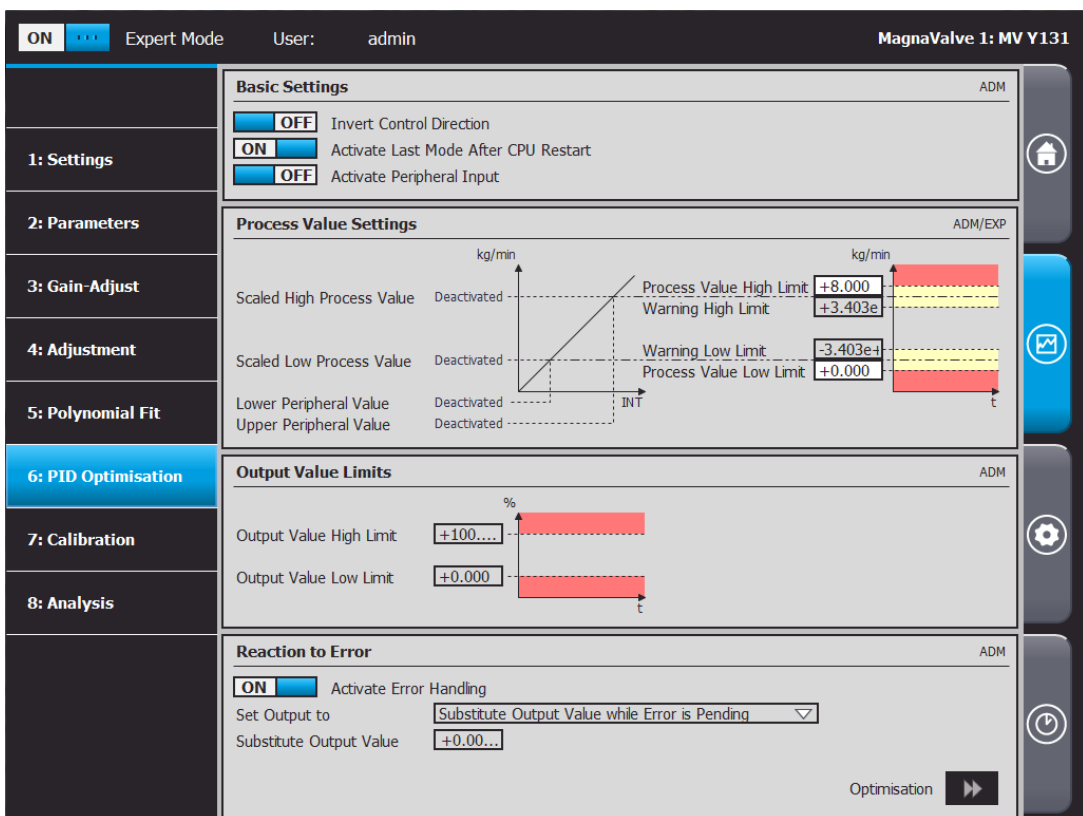
Expert Mode

Step 6: PID Optimisation (Basic Settings)

Assistance Screen to Select Basic Settings for PID Closed Loop Flow Control

Functions

- NOTE:
Modifications of the preselected settings are not recommended.



The screenshot displays the 'Expert Mode' interface for 'MagnaValve 1: MV Y131'. The user is 'admin'. The interface is divided into several sections:

- Basic Settings (ADM):**
 - OFF Invert Control Direction
 - ON Activate Last Mode After CPU Restart
 - OFF Activate Peripheral Input
- Process Value Settings (ADM/EXP):**
 - Scaled High Process Value: Deactivated
 - Scaled Low Process Value: Deactivated
 - Lower Peripheral Value: Deactivated
 - Upper Peripheral Value: Deactivated
 - Process Value High Limit: +8.000
 - Warning High Limit: +3.403e
 - Warning Low Limit: -3.403e
 - Process Value Low Limit: +0.000
- Output Value Limits (ADM):**
 - Output Value High Limit: +100...
 - Output Value Low Limit: +0.000
- Reaction to Error (ADM):**
 - ON Activate Error Handling
 - Set Output to: Substitute Output Value while Error is Pending
 - Substitute Output Value: +0.00...

The interface includes a sidebar with navigation icons (Home, Graph, Settings, Power) and an 'Optimisation' button at the bottom right.

Operating Instructions

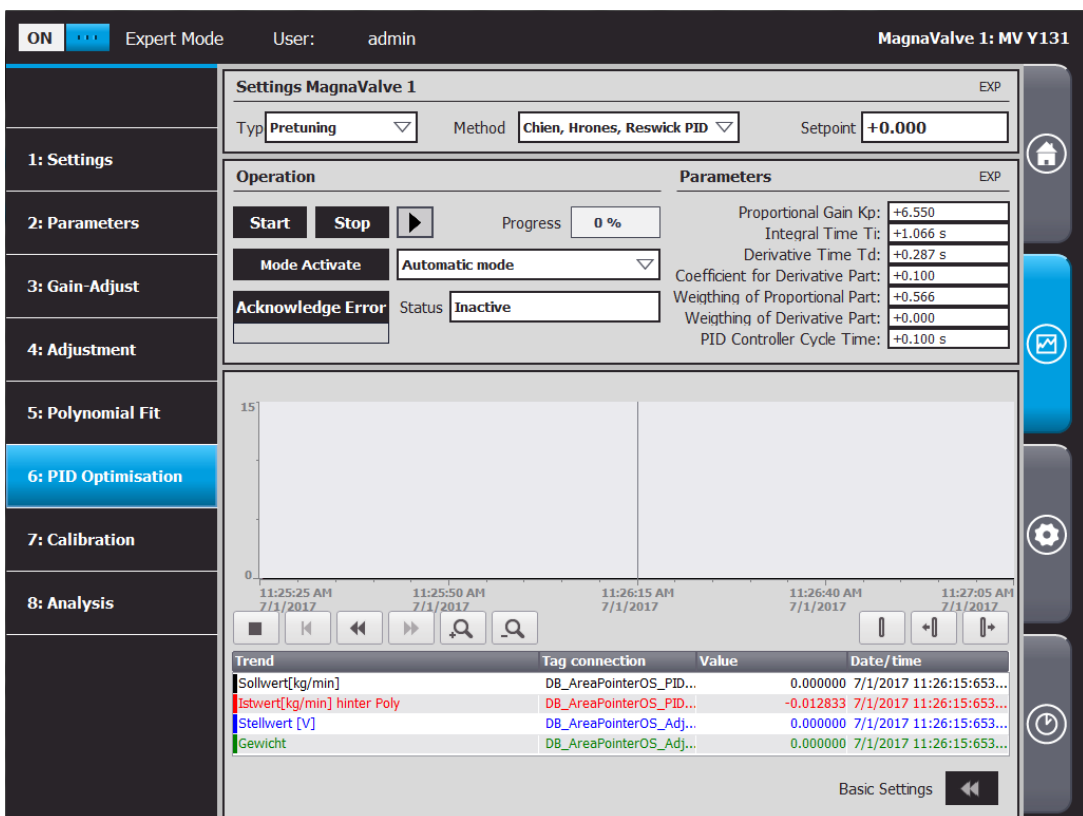
Expert Mode

Step 6: PID Optimisation (Optimisation)

Assistance Screen to Control to Optimise Settings for PID Closed Loop Flow Control

Functions

- Select 'Pretuning' and press 'Start' to run the optimisation procedure.
- After completion start 'Fine Tuning' to finish optimisation procedure.
- NOTE:
Modifications of the preselected settings are not recommended.



The screenshot shows the 'Settings MagnaValve 1' interface. The top bar indicates 'ON', 'Expert Mode', 'User: admin', and 'MagnaValve 1: MV Y131'. The left sidebar lists navigation options: 1: Settings, 2: Parameters, 3: Gain-Adjust, 4: Adjustment, 5: Polynomial Fit, 6: PID Optimisation (highlighted), 7: Calibration, and 8: Analysis.

The main area is divided into 'Settings MagnaValve 1' and 'Operation Parameters'. The 'Settings' section includes a dropdown for 'Typ' (set to 'Pretuning'), a dropdown for 'Method' (set to 'Chien, Hrones, Reswick PID'), and a text input for 'Setpoint' (set to '+0.000'). The 'Operation' section features 'Start', 'Stop', and 'Progress' (0%) buttons, a 'Mode Activate' dropdown (set to 'Automatic mode'), and an 'Acknowledge Error' button with a status of 'Inactive'. The 'Parameters' section lists various PID parameters: Proportional Gain Kp (+6.550), Integral Time Ti (+1.066 s), Derivative Time Td (+0.287 s), Coefficient for Derivative Part (+0.100), Weighing of Proportional Part (+0.566), Weighing of Derivative Part (+0.000), and PID Controller Cycle Time (+0.100 s).

Below the parameters is a trend graph with a y-axis from 0 to 15 and an x-axis showing time from 11:25:25 AM to 11:27:05 AM on 7/1/2017. At the bottom, a 'Trend' table displays data for 'Sollwert[kg/min]', 'Istwert[kg/min] hinter Poly', 'Stellwert [V]', and 'Gewicht', with their respective tag connections and values.

Trend	Tag connection	Value	Date/time
Sollwert[kg/min]	DB_AreaPointerOS_PID...	0.000000	7/1/2017 11:26:15:653...
Istwert[kg/min] hinter Poly	DB_AreaPointerOS_PID...	-0.012833	7/1/2017 11:26:15:653...
Stellwert [V]	DB_AreaPointerOS_Adj...	0.000000	7/1/2017 11:26:15:653...
Gewicht	DB_AreaPointerOS_Adj...	0.000000	7/1/2017 11:26:15:653...

Operating Instructions

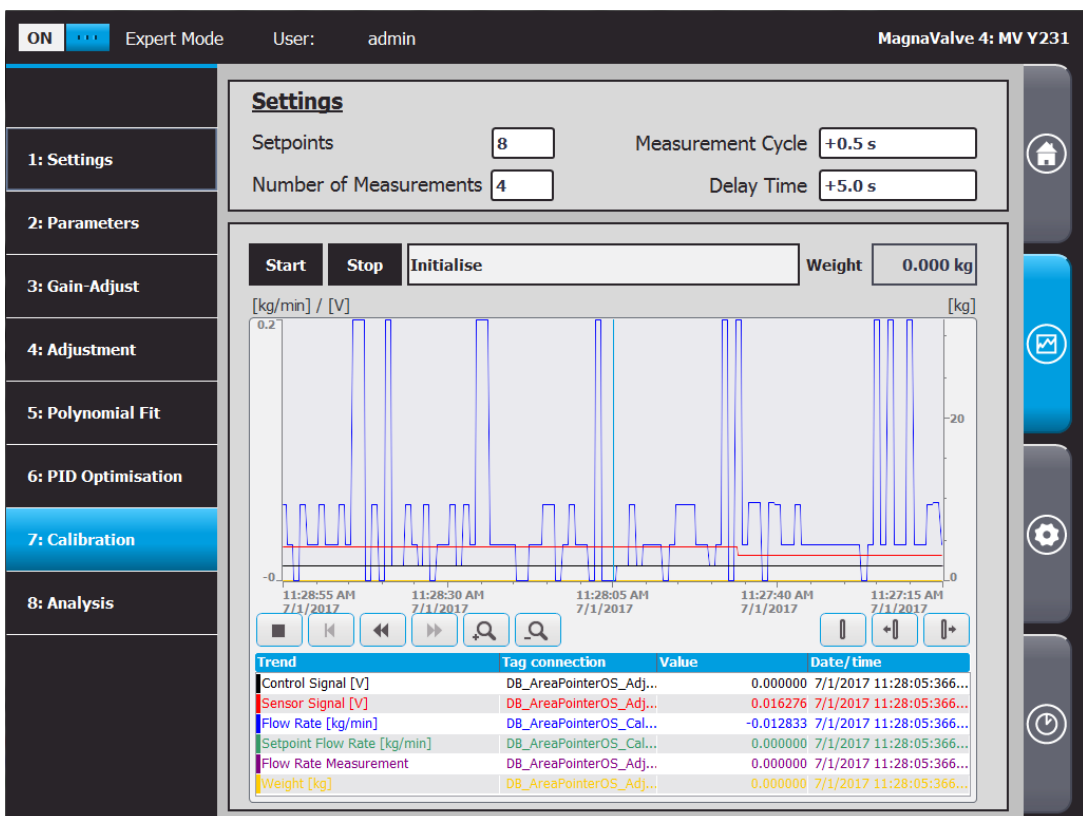
Operator/Expert Mode

Step 7: Calibration

Assistance Screen to Control MagnaValve Calibration Procedure

Functions

- Number of Setpoints for MagnaValve.
- Number of Measurements per Setpoint.
- Measurement Cycle Time.
- Delay Time before measurement starts (use to wait for flow equalization).
- Press 'Start/Stop' to start and stop the calibration procedure.
- The parameter graphs over elapsing time are plotted in the diagram window.
- NOTE:
The fields are filled with standard values.



Operating Instructions

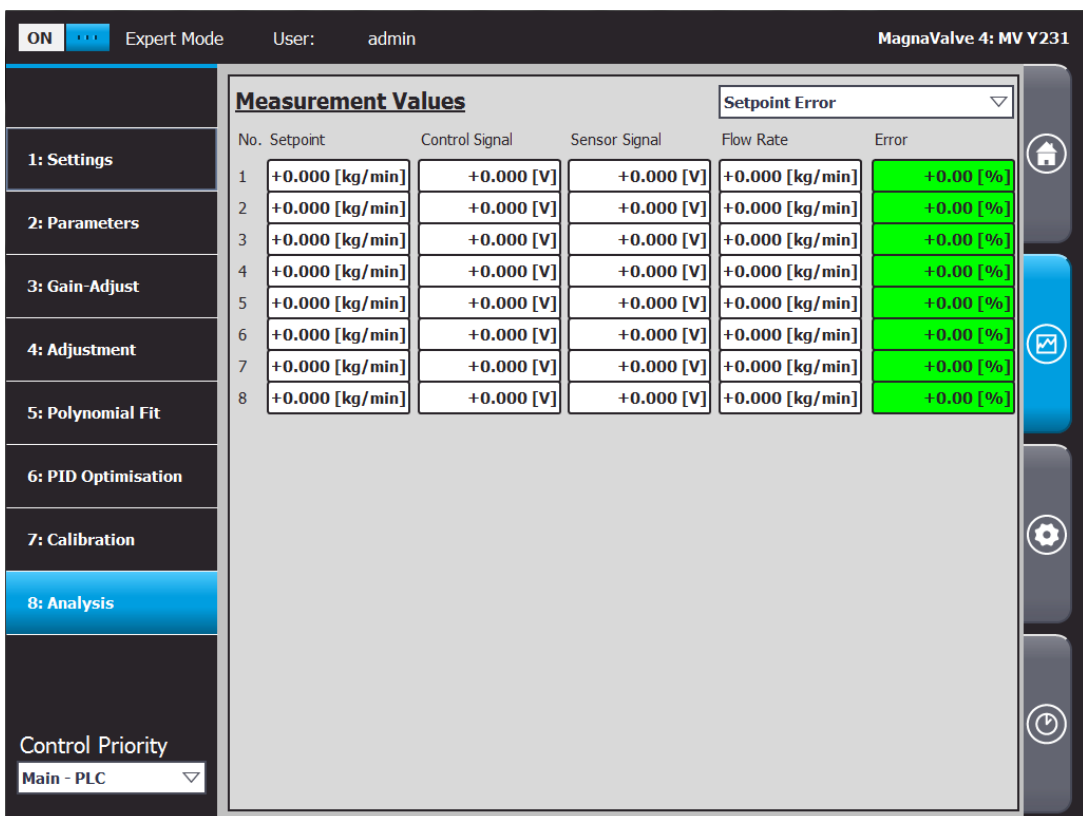
Operator/Expert Mode

Step 8: Analysis

Information Screen to Display Calibration Results

Functions

- Selection of Error Mode:
 - ‘Setpoint Error’ is the error in relation to the actual setpoint flow value
 - ‘Full Scale Error’ is the error in relation to the selected full MagnaValve flow value
- The error results for each setpoint are tagged in green if below and in red if above the acceptable tolerance.



The screenshot shows the 'Expert Mode' interface for 'MagnaValve 4: MV Y231'. The user is 'admin'. The '8: Analysis' menu item is selected. The 'Measurement Values' table is displayed with the following data:

No.	Setpoint	Control Signal	Sensor Signal	Flow Rate	Error
1	+0.000 [kg/min]	+0.000 [V]	+0.000 [V]	+0.000 [kg/min]	+0.00 [%]
2	+0.000 [kg/min]	+0.000 [V]	+0.000 [V]	+0.000 [kg/min]	+0.00 [%]
3	+0.000 [kg/min]	+0.000 [V]	+0.000 [V]	+0.000 [kg/min]	+0.00 [%]
4	+0.000 [kg/min]	+0.000 [V]	+0.000 [V]	+0.000 [kg/min]	+0.00 [%]
5	+0.000 [kg/min]	+0.000 [V]	+0.000 [V]	+0.000 [kg/min]	+0.00 [%]
6	+0.000 [kg/min]	+0.000 [V]	+0.000 [V]	+0.000 [kg/min]	+0.00 [%]
7	+0.000 [kg/min]	+0.000 [V]	+0.000 [V]	+0.000 [kg/min]	+0.00 [%]
8	+0.000 [kg/min]	+0.000 [V]	+0.000 [V]	+0.000 [kg/min]	+0.00 [%]

The 'Error' column values are all '+0.00 [%]' and are highlighted in green. The interface also shows a 'Setpoint Error' dropdown menu set to 'Setpoint Error' and a 'Control Priority' dropdown set to 'Main - PLC'.

Operating Instructions

8. Maintenance

8.1 General Aspects

The flux:on Media Flow Management system is engineered and designed to provide

- a low-maintenance and
- a maintenance-friendly

device. Nevertheless some general maintenance aspects as well as potential wear effects should be considered. Please note that a lack of maintenance may result in loss of liability and guarantee.

8.2 Points of Maintenance and Maintenance Intervals

The following points should be checked regularly. The recommended maintenance intervals depend on your working conditions, environmental conditions and above all on your operation time and the shotblast process parameters such as media type and condition, nozzle diameter, blast pressure and more.

Make sure you start at short maintenance intervals and adapt the length of these intervals to your specific requirements.

8.2.1 Cleaning

- Keep the devices free of dust, media and other substances. For cleaning use a vacuum cleaner, brushes or a slightly damp cloth.

8.2.2 Electrical Connections

- All cables and electrical connections must be checked for damages regularly.

8.2.3 Cyclone

- Remove the cover lid (3)
- Check the condition of the cyclone inlet tube (1). In case of excessive wear it needs to be replaced.
- Check the cyclone's inside condition. Clean the inside if necessary. In case of excessive wear additional wear plaets may have to be added.
- Check the cyclone bottom outlet for residues of media or other substances, particles and foreign objects that may irritate or block the media flow. Clean if necessary.

NOTE:

Make sure you wear suitable ear, eye and dust protection items and do not emit dust to the environment.

- Check the condition of the wear protection plate inside the cyclone.

NOTE:

The cyclone's inner wall is additionally protected by a wear control system that will be activated in case the wear protection plate gets holes. In this case you will receive a corresponding system message on the operator panel. The wear protection system cannot be repaired and needs to be exchanged once it is activated.

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8.2.4 Weighing Bin

- Check the mechanical overload protection of the load cell (7) for residues of media or other substances, particles and foreign objects that may irritate or block the weight measurement. Clean if necessary.
- Remove the ON/OFF valve (8) at the bottom of the weighing bin.
NOTE:
When turning the valve make sure you counteract the turning force at the bin in order not to apply loads on the load cell.
- Check the On/Off valve for residues of media or other substances, particles and foreign objects that may irritate or block the media flow. Clean if necessary.
- Check the weighing bin outlet for residues of media or other substances, particles and foreign objects that may irritate or block the media flow. Clean if necessary.

8.2.5 Load Cell Calibration

- Follow the instructions of the Weight Cell Calibration in flux:on Menu Functions (Settings sub screen).

8.2.6 Timer Calibration

- Follow the instructions of the Time Calibration in flux:on Menu Functions (Settings sub screen).

Operating Instructions

9. Troubleshooting

You can find help for the most frequent failure cases and the recommended measures in the table 2 below.

No.	Failure	Measures
1	Display of unexpected values for weight and flow rate.	<ul style="list-style-type: none"> • Check air and media flow for stable conditions. • Check the mechanical overload protection of the load cell (7) for residues of media or other substances, particles and foreign objects that may irritate or block the weight measurement.. • Check the cyclone bottom outlet for residues of media or other substances, particles and foreign objects that may irritate or block the media flow. • Check the cyclone top outlet for free air flow, to avoid over- pressure inside the cyclone.
2	Weighing bin does not empty.	<ul style="list-style-type: none"> • Check On/Off valve for proper function. • Check the bin outlet for residues of media or other substances, particles and foreign objects that may irritate or block the media flow.
3	Media drops out of the weighing bin	<ul style="list-style-type: none"> • Check weighing bin for overload. • Check On/Off valve for proper function.
4	Wear detection initiated.	<ul style="list-style-type: none"> • Stop operation. • Open the cyclone, remove the wear protection plate and the wear indication pad. • Contact sentenso for replacement parts and assistance. • Replace the defective parts by new ones.

Table 2: Typical failure cases and recommended measures

For other failures, damages, repairs and technical questions please contact our customer service.

Operating Instructions

10. Warranty

Warranty is granted for one year starting from delivery date under the condition that the operating instructions have been followed, no interventions on the appliances have been made and the components of the system show no mechanical damage or wear.

In case of a defect during the warranty period, defective components are repaired or are replaced free of charge. Replaced parts turn into the property of sentenso.

Shipping costs to sentenso will not be covered, shipping costs back to the customer will be covered by sentenso. If desired by the customer that the parts should be repaired or replaced on its site, the customer has to take over all costs for the sentenso service staff.

sentenso is not responsible for damage, which developed at any item other than the delivered items. Especially sentenso is not responsible for escaped profit, business interruption or any other financial damages to the customer.

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11. Critical Spare Parts

1	Load cell SP4MC6MR/36 kg	Fig 1. Line 7	Item No. 2-001001
2	Cyclone wear plate R172/L275/H210/T5	Fig 2. Line 10	Item No. 4-001006
3	Cyclone wear detection 106311100	Fig 2. Line 11	Item No. 3-001004

Table 3: Critical Spare Parts

12. Technical Specifications

Technical Specifications	
Construction	Extruded aluminum profile
Dimension of processing unit	W 690 mm / H 2160 mm / D 550 mm
Operating pressure	max. 10 bar
Nominal load cell capacity	36 kg
Effective weighing capacity (gain-in-weight)	30 kg
Effective weighing (loss-in-weight)	30 kg less weight of sensor/actuator unit
Nominal load cell overload capacity	54 kg
Minimum load cell verification interval	2 g
Weighing accuracy	typically 1 g at constant temperature

Media Flow Management System flux:on



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