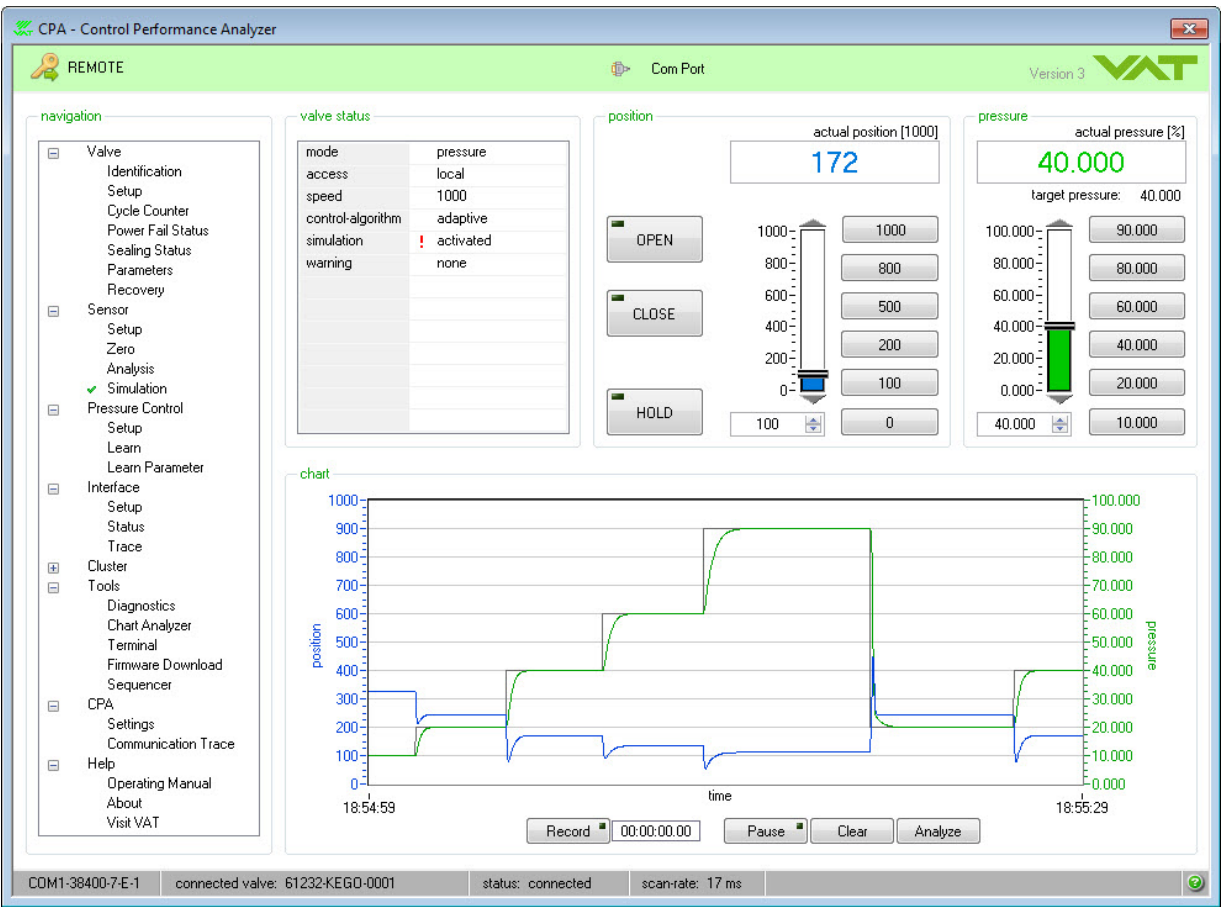


Control Performance Analyzer 3

Release 2.1.5

Operating Manual

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Imprint

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Table of Contents

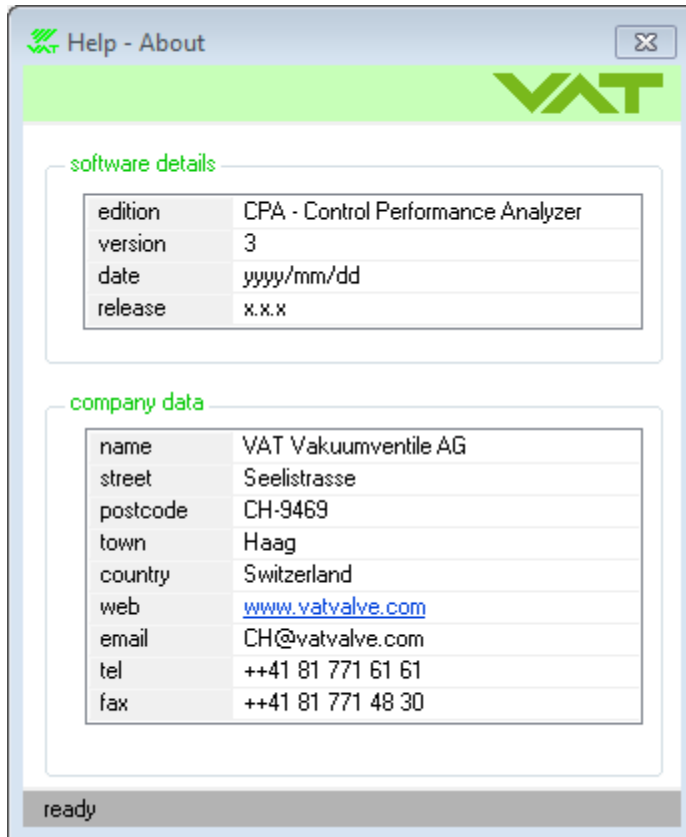
	0
Part I Introduction	6
1 Use of product.....	7
2 Technical data.....	7
Part II Installation	7
1 Installation onto your PC.....	7
2 Start Installation procedure.....	8
Part III General	11
1 Connect Valve to PC.....	12
2 Start up.....	13
3 Port Selection.....	14
Connect CPA to VAT valve	15
Stand alone operation	16
4 Main screen of Control Performance Analyser.....	18
5 Setpoint Position and Pressure.....	19
6 Chart Recorder Analyser.....	20
7 Explanation of Button (window top bar).....	21
CPA status bar	22
8 Basic functions – use LOCAL MODE.....	22
9 Error Condition Diagnostics.....	23
Part IV Valve	23
1 Identification.....	23
2 Setup.....	24
3 Cycle Counter.....	25
4 Power fail status.....	26
5 Compressed air status.....	27
6 Sealing Status.....	28
7 Parameters.....	29
8 Recovery	30
Part V Sensor	31
1 Setup.....	31
2 Setup (advanced).....	33
3 Zero	36
4 Analysis.....	37

5	Simulation.....	39
Part VI	Pressure Control	40
1	Setup single Control Mode.....	40
2	Setup all Control Modes (index).....	41
3	Setup all Control Modes (floating point).....	42
4	Setup unique controllers.....	43
5	Learn.....	44
6	Learn Status.....	47
7	Learn Parameter.....	49
Part VII	Interface	50
1	Setup.....	50
	Interface Setup Logic	50
	Interface Setup RS232	50
	Interface Setup RS485	51
	Interface Setup DeviceNet	52
	Interface Setup Ethernet	53
	Interface Setup EtherCAT	54
	Interface Setup Profibus	55
	Interface Setup CCLink	56
2	Status.....	58
	Interface Status Logic	58
	Interface Status RS232	59
	Interface Status RS485	60
	Interface Status DeviceNet	60
	Interface Status EtherNet	61
	Interface Status EtherCAT	62
	Interface Status Profibus	62
	Interface Status CCLink	63
3	Trace.....	63
Part VIII	Cluster	68
1	Cluster Setup.....	68
2	Cluster Status.....	69
Part IX	Tools	70
1	Diagnostics.....	71
2	Chart Analyzer.....	72
3	Terminal.....	73
4	Firmware Download.....	75
5	Sequencer	78
Part X	CPA	80
1	Settings.....	80

2	Communication Trace.....	82
Part XI Help		83
1	About.....	83
2	Visit VAT.....	83
3	Trouble shooting.....	83
4	Spare parts.....	85

1 Introduction

Version	Release
3	2.1.5



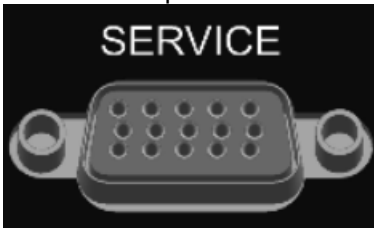
© VAT Vakuumventile AG 2023

1.1 Use of product

Use this product for computers operated by:

- Microsoft Windows® 7
- Microsoft Windows® 8
- Microsoft Windows® 10

This software provides control functions for VAT-control valves with D-Sub service connector:



Using this software, basic functions like “setup of controller”, “open valve”, “close valve”, “learn”, “up-download of learned data” can be executed, and many convenient functions like “monitoring pressure/position”, “analysis of pressure control performance”, “communication monitor”, etc) are available.

1.2 Technical data

This CPA software requires:

- 500 MB disk space
- 512 MB RAM
- RS232 serial com port or USB-to-RS232 converter (recommended with FTDI chip) / PCMCIA Card
- 1024x768 minimum resolution for the display
- Administrator rights for your PC
- Service cable refer to: «[Connect Valve to PC](#)»

This software has a self-detecting function which recognizes the type of the connected valve. According to this information, corresponding functions, screens and menus are provided.

2 Installation

'Control Performance Analyzer 3' and 'Installation Instruction' are available as download form VAT homepage:

<https://www.vatvalve.com/downloads>

Note: Save the Zip file CPA and the CPA Installation Instruction on your PC.

2.1 Installation onto your PC

Note: This software can only be installed, if the “logged-on” user owns Administrator privileges.

If you are not able to install this program, please contact your System Administrator or Help Desk.

2.2 Start Installation procedure

1. "Unzip" the CPA



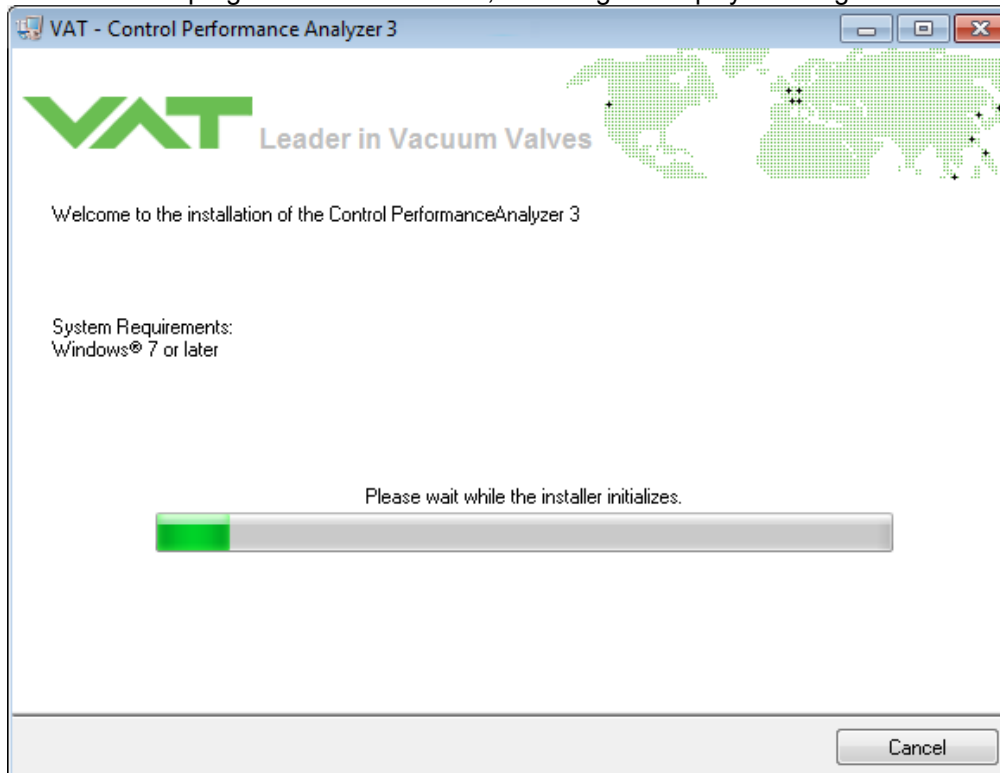
2. "Double-Click" the folder



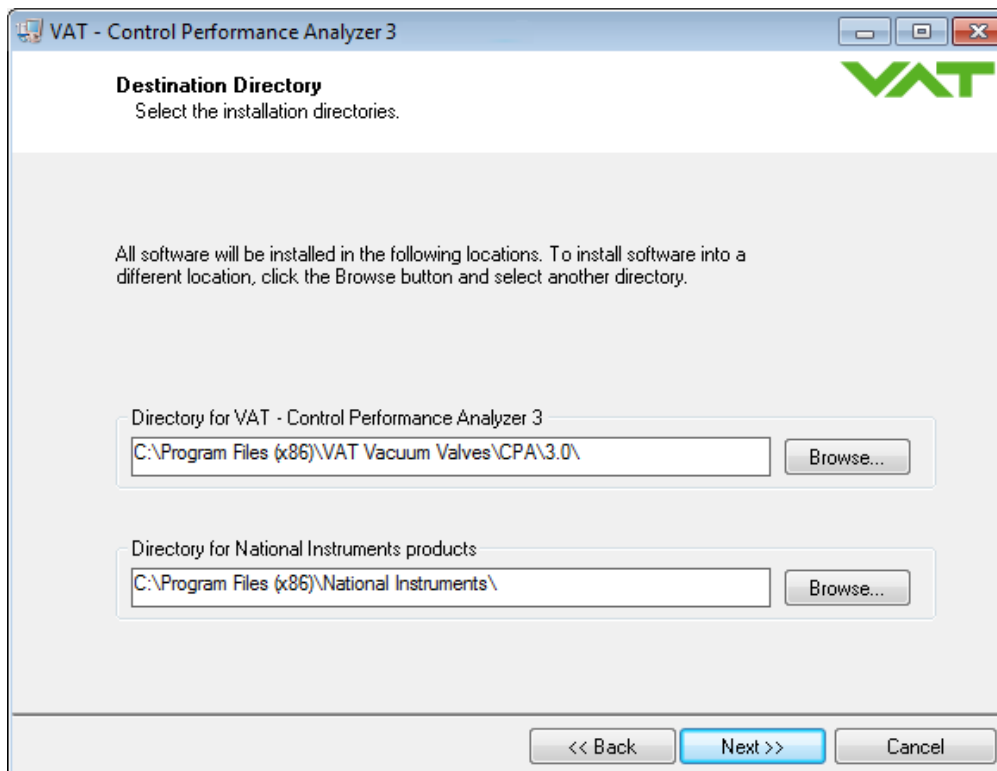
3. "Double-Click" the icon "setup"



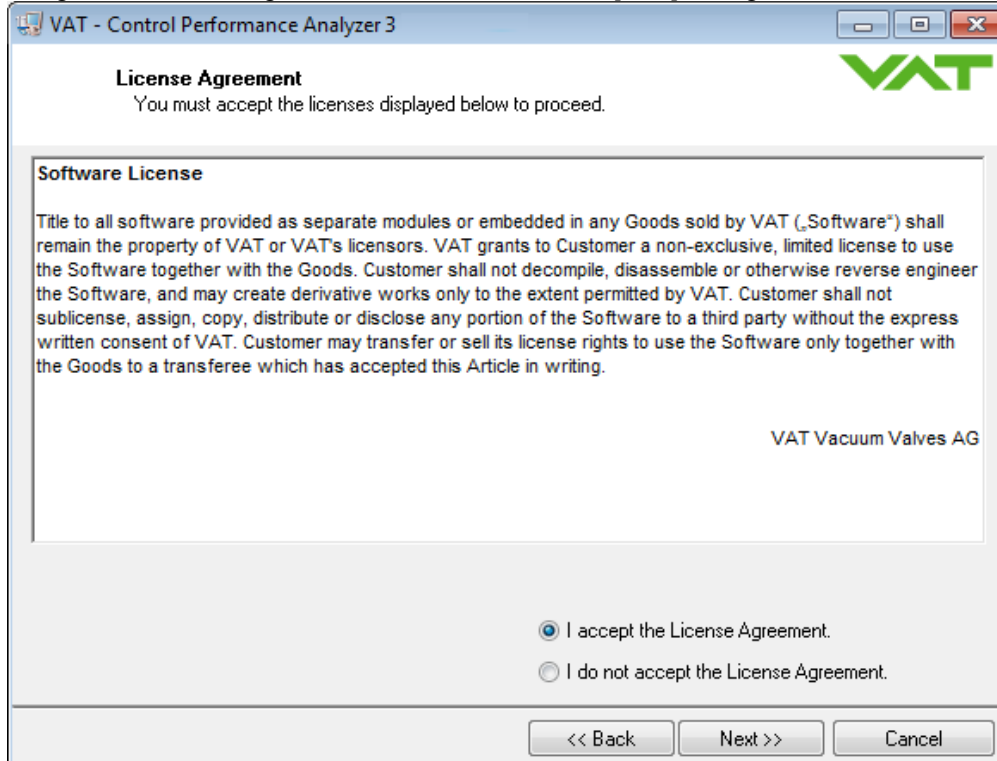
After the install-program has been started, following the displayed dialog:



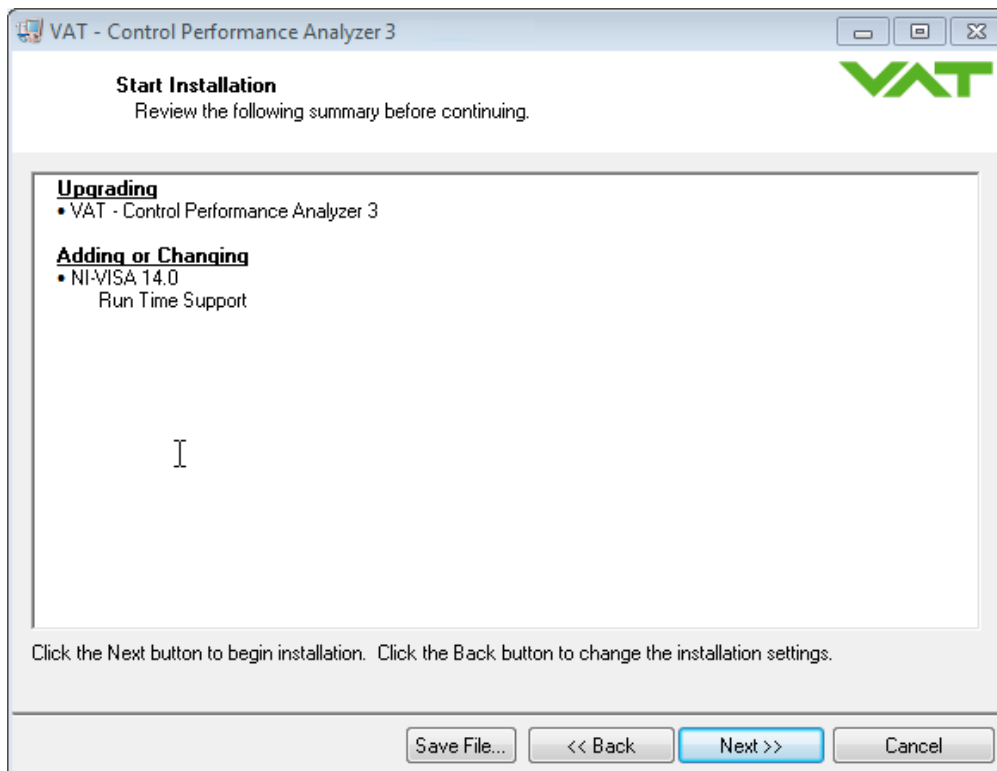
4. Select the primary installation directory and click the button [Next]:



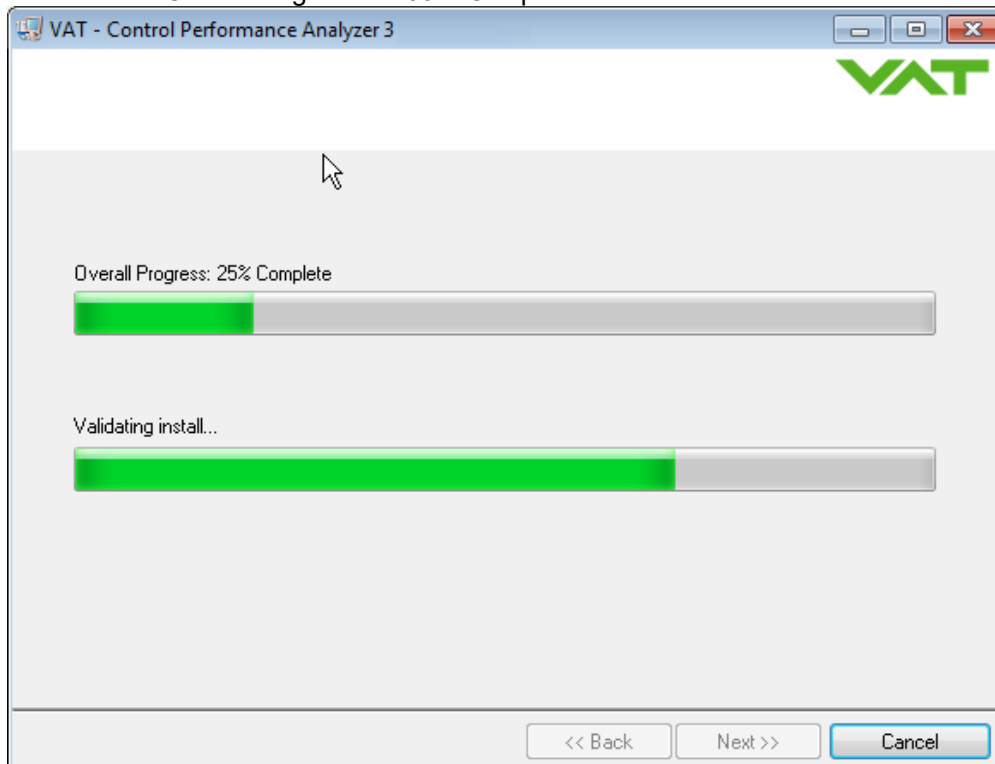
5. Agree the license agreement and click the button [Next] to begin installation:



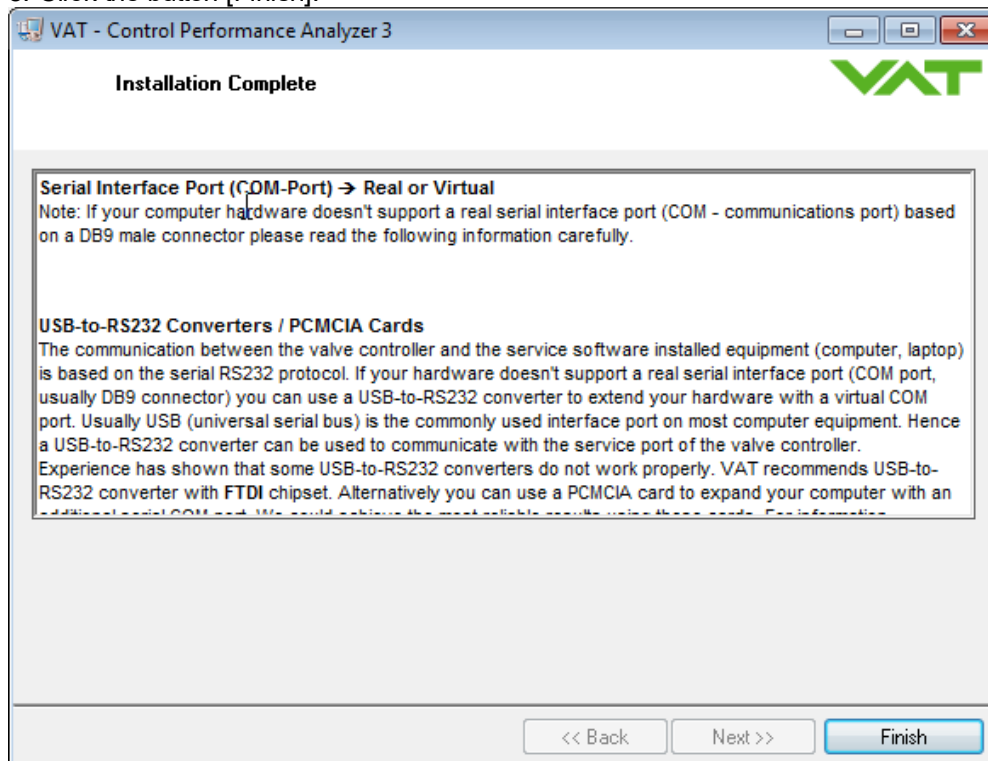
6. Click the button [Next]:



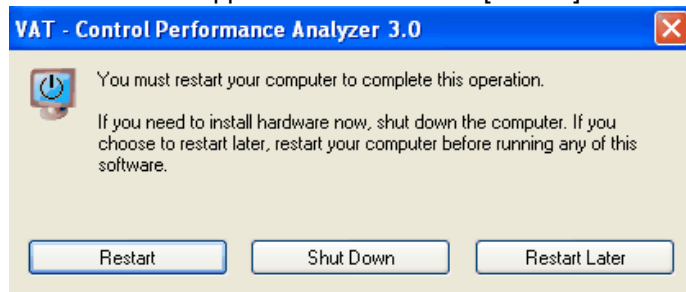
7. Wait until "Overall Progress is 100% Complete":



8. Click the button [Finish]:



9. If this screen appears click the button [Restart] otherwise proceed with step 10:



After restart of your computer the "Control Performance Analyzer" is ready for use.

10. Connect your valve to the PC as described in «[Connect Valve to PC](#)»

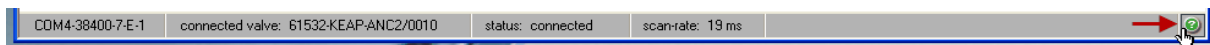
3 General

Note:

- The CPA 3 displays always the connected valve automatically.
- All window screen-shoots in this "Operating Manual" are examples!
- The windows of your installed CPA 3 depend to the connected valve and the installed valve firmware.
- The manual of CPA 3 you will find in CPA 3 folder: Help > Operating Manual



or in CPA 3 Status bar. Click [?] to open the Operating Manual.

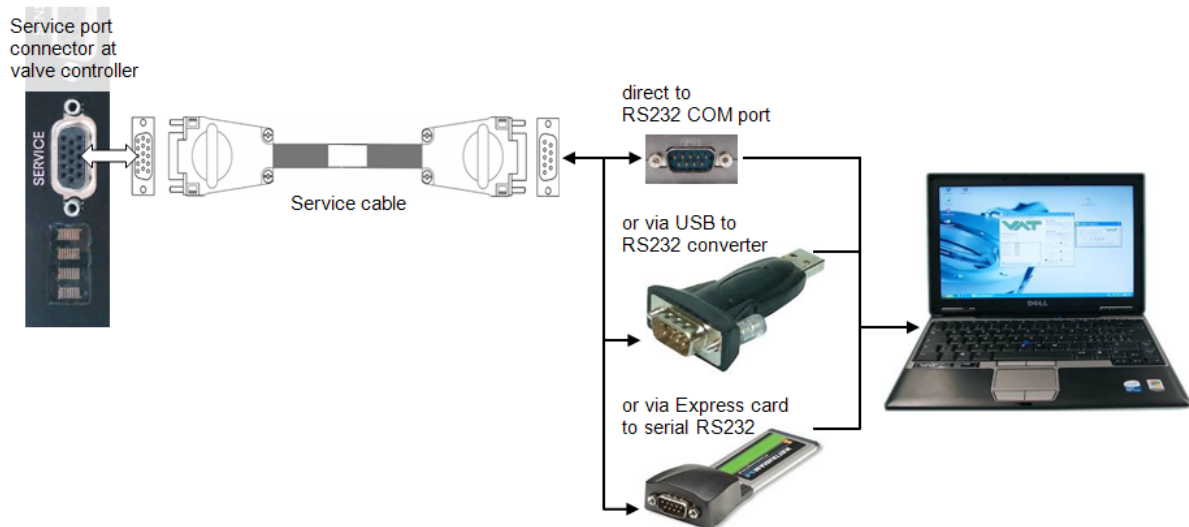


3.1 Connect Valve to PC

Introduction

Connect the valve to your PC via a 'COM port', 'USB to RS232 converter' or 'Express card to RS232'. Use the supplied service cable, see in chapter: «[Spare parts](#)». The maximum cable length is 10m.

Connection overview



Note: If there is no RS232 port available on your computer, please use a 'USB to RS232 converter' (recommended with FTDI chip) or 'Express card to RS232' converter. Please use a converter that is supported by your PC and install the corresponding driver for the converter.

3.2 Start up

Introduction

Check whether the PC is connected via the service port to your valve. Make sure, that the valve is supplied by 24VDC (see cable to connector marked "Power"). The display on the valve shows the version number for a short time and then the letters 'C' and 'O', after self test is finished.

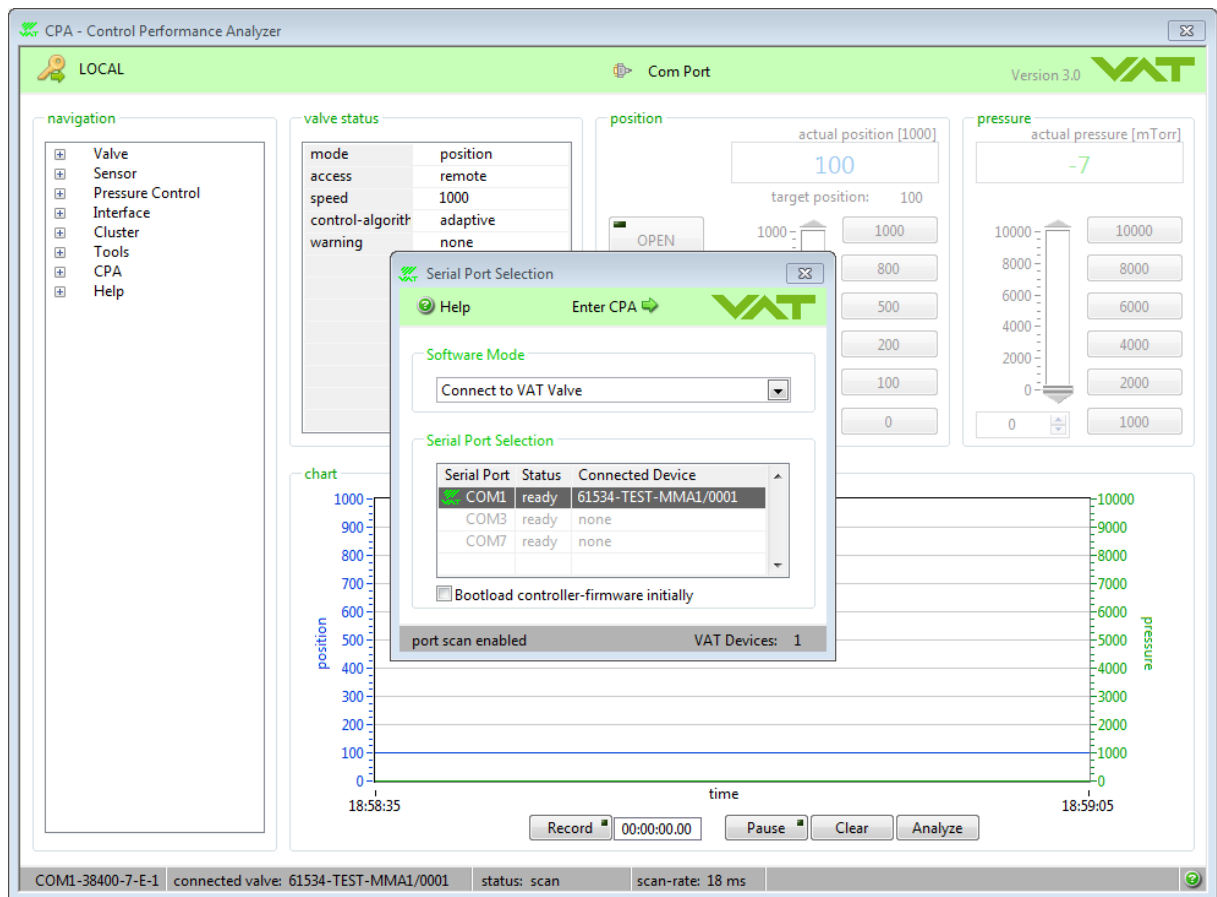
You need not do any adjustments for the RS232 port in advance. Setup of the RS232-port for the PC is done automatically by Control Performance Analyzer Software.

1. Start the program on your Start-menu > All Programs > VAT Vacuum Valves >



2. After start up is finished, the 'Control Performance Analyzer' displays its start up screen. (example see below)

3. Proceed with: «[Connect CPA to VAT valve](#)»



Note: 'Control Performance Analyzer' check which valve is connected to the PC.

According to the type of valve (S61.2, S651C, S65.1 etc.), slightly different screens and menus are displayed.

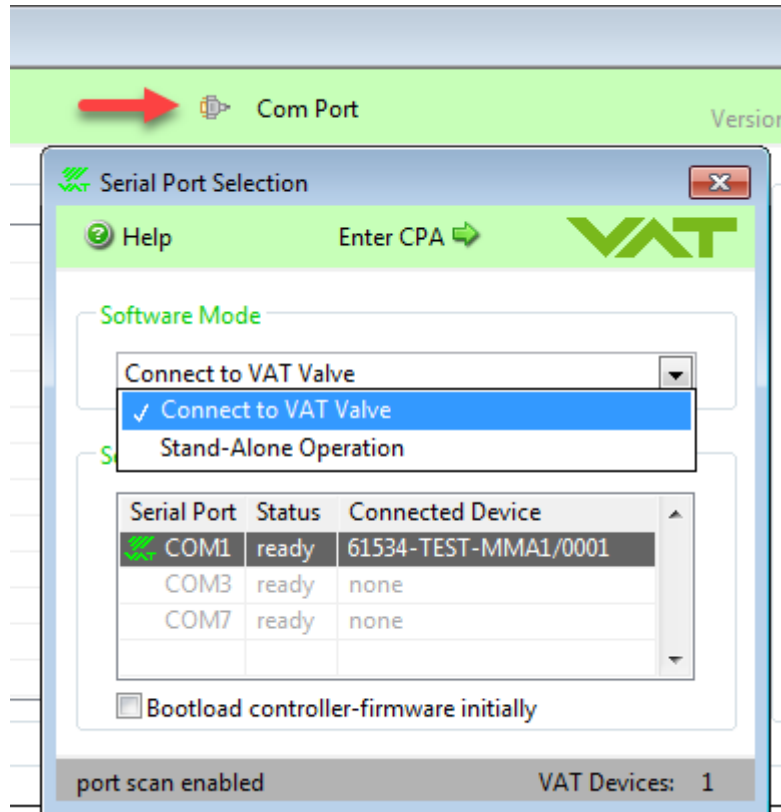
All necessary functions are provided to setup the valve and controller. Parameters are stored to the valve permanently.

3.3 Port Selection

Introduction

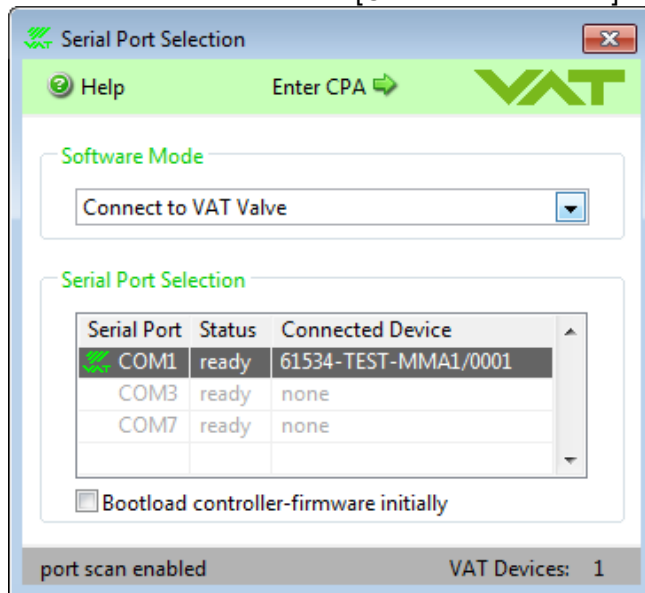
With this function it is possible to change the 'Software Mode'. (Connected to VAT valve or Stand-Alone Operation)

Window

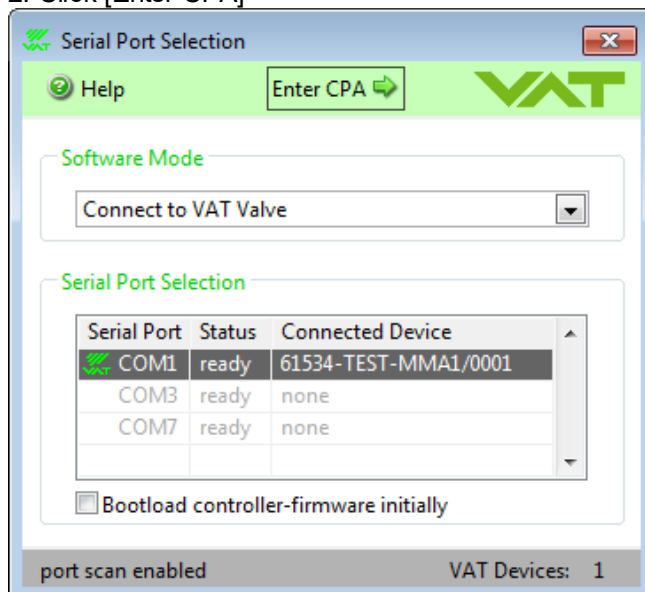


3.3.1 Connect CPA to VAT valve

1. In «Software Mode» select [Connect to VAT valve]



2. Click [Enter CPA]



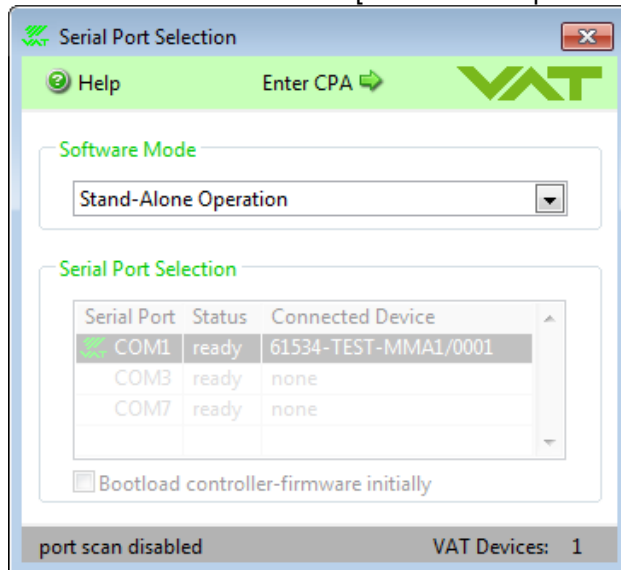
Note: The 'Control Performance Analyzer' is now ready for operation use. Refer to: [«Basic functions – use LOCAL MODE»](#).

3.3.2 Stand alone operation

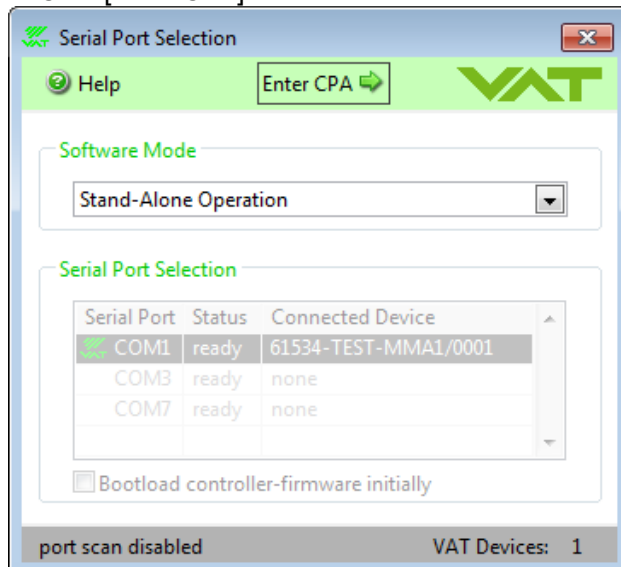
Introducing

In this operation mode it is possible to 'Load' existing data from PC to CPA for checking only. No valve is connected to CPA in this operation mode.

1. In «Software Mode» select [Stand-Alone Operation]

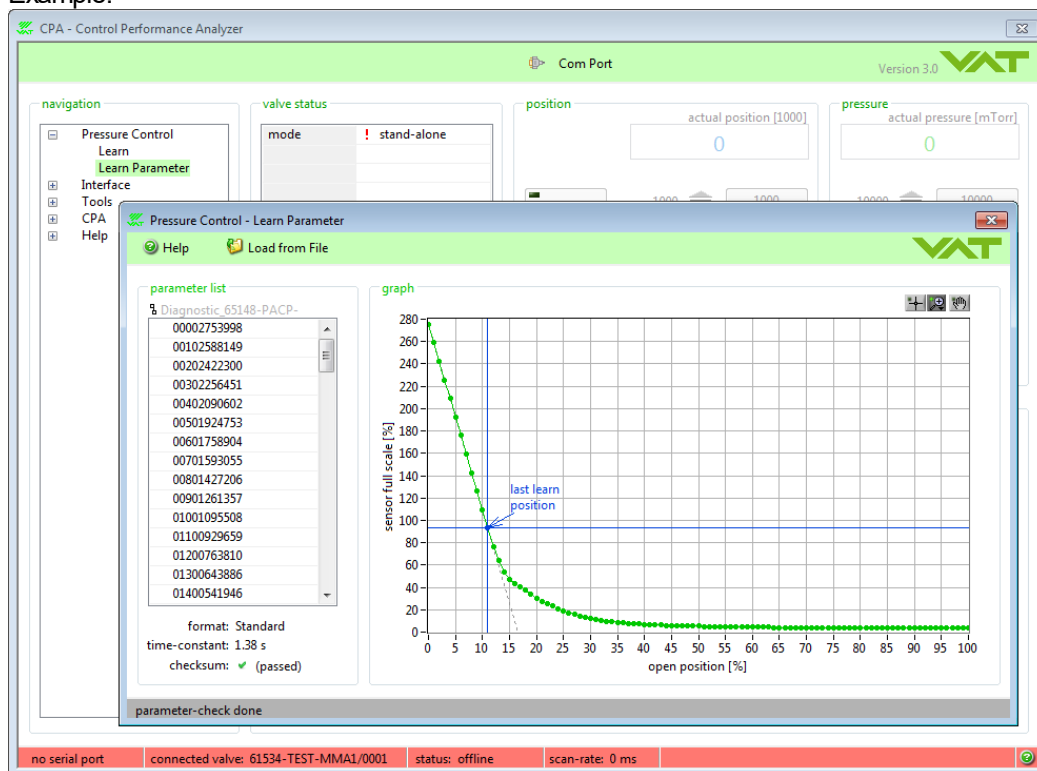


2. Click [Enter CPA]



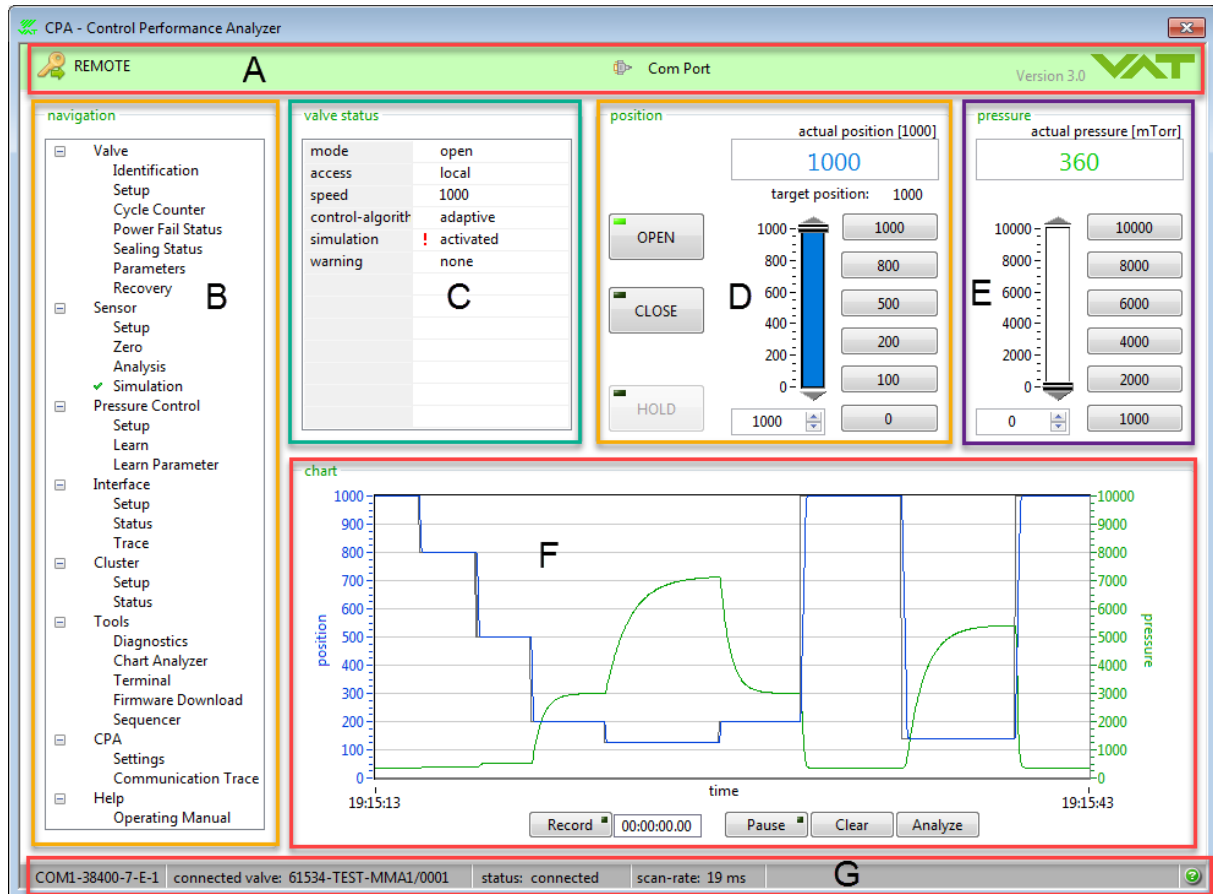
Note: The "Control Performance Analyzer" is now ready for "Stand-Alone Operation" use.

Example:



3.4 Main screen of Control Performance Analyzer

Window



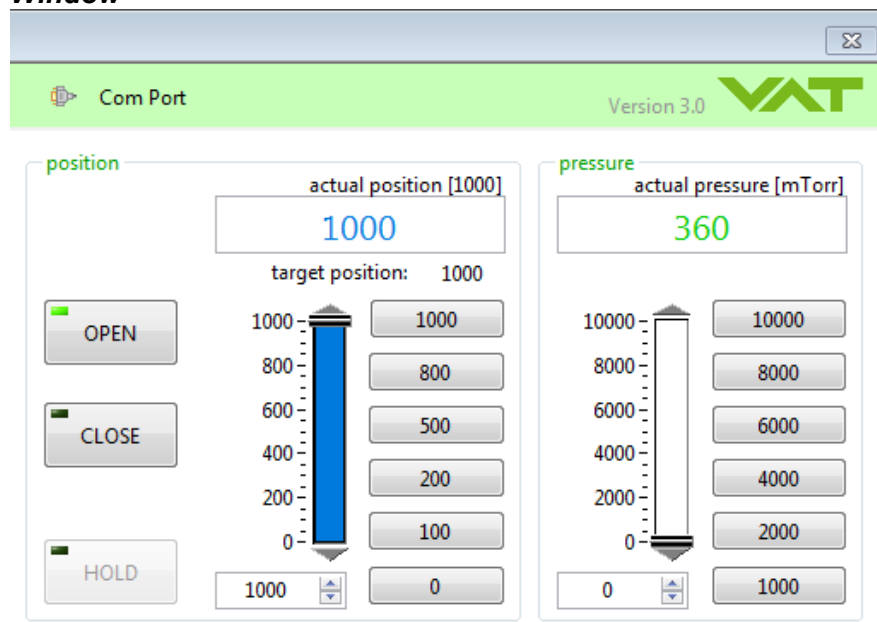
Area	Description	Function
A	top bar	REMOTE / LOCAL Port Selection Version - Release
B	navigation	explorer menus, adjustment and control
C	valve status	display the valve status
D	position	monitor, open, close, hold, adjust and save position setpoint
E	pressure	monitor, adjust and save pressure setpoint
F	chart	record / analyze position, pressure in time
G	status bar	display com port, connected valve, connection status and scan-rate

3.5 Setpoint Position and Pressure

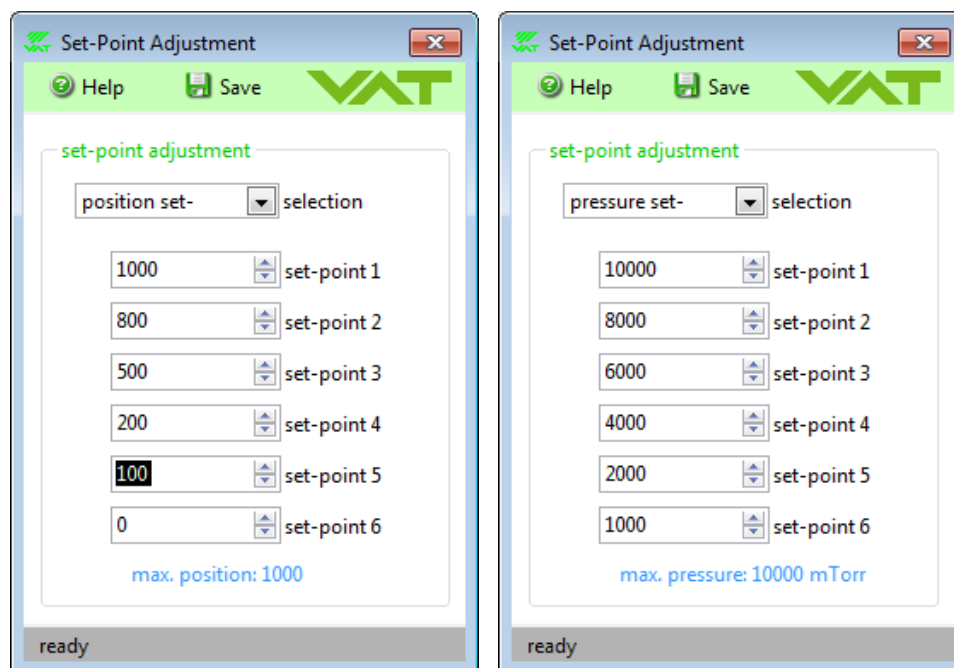
Introduction

These functions are used to set the position or pressure set-points.

Window



Edit position set-points..... edit pressure set-points

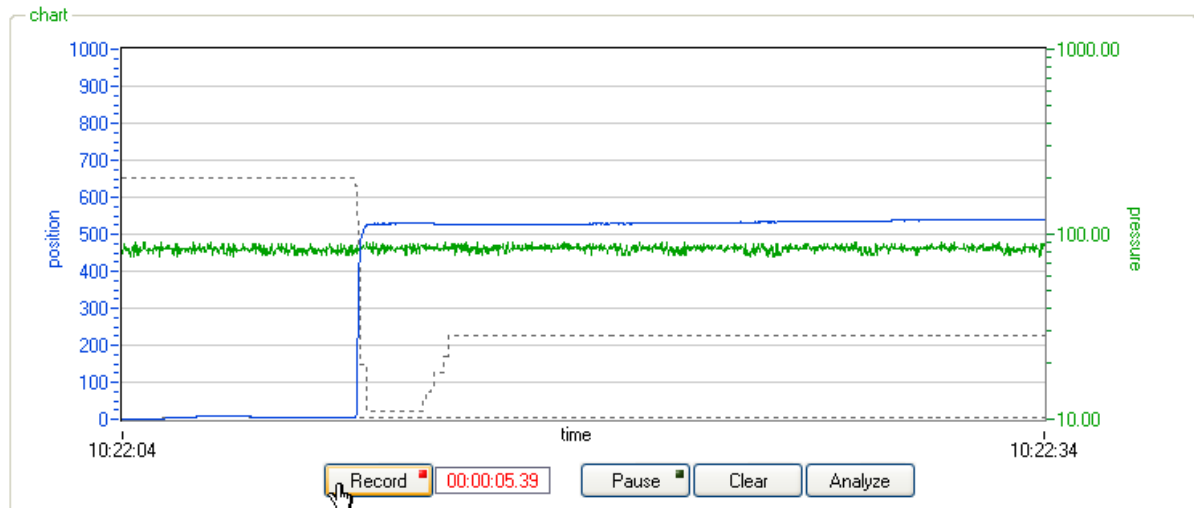


3.6 Chart Recorder Analyser

Introduction

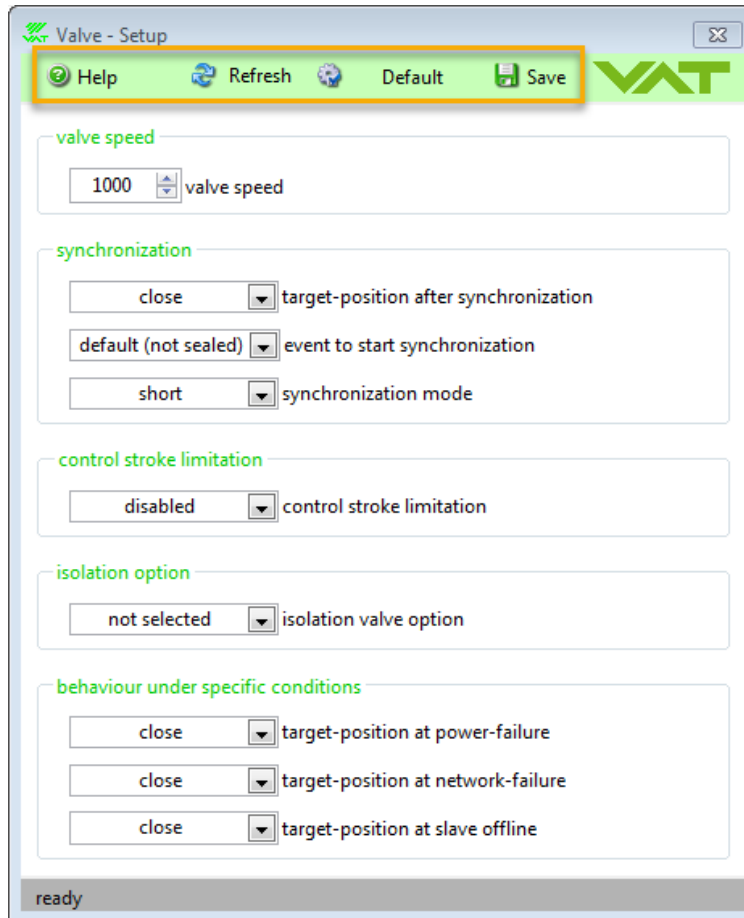
This function is used for record or analyze of position and pressure in time.






Window



3.7 Explanation of Button (window top bar)

Window



Button	Function
 Save	Save changed settings to valve controller
 Default Settings	Set to default settings
 Refresh	Reload changed settings from valve controller
 Help	Open Online Help for this window
Esc or 	Close the actual window

3.7.1 CPA status bar

Introduction

There are two possible status of CPA. These are described in status bar on bottom of main screen.

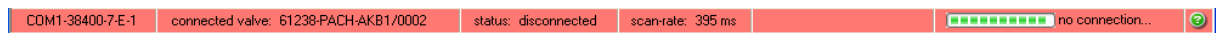
Connected to VAT valve:

- Connected (CPA is connected to valve, communication is OK and operation possible)



Stand-Alone Operation (only CPA without valve):

- Disconnected (CPA is not connected to valve, no communication and no operation possible)

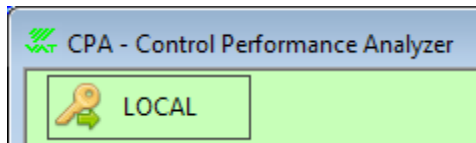


3.8 Basic functions – use LOCAL MODE

Introduction

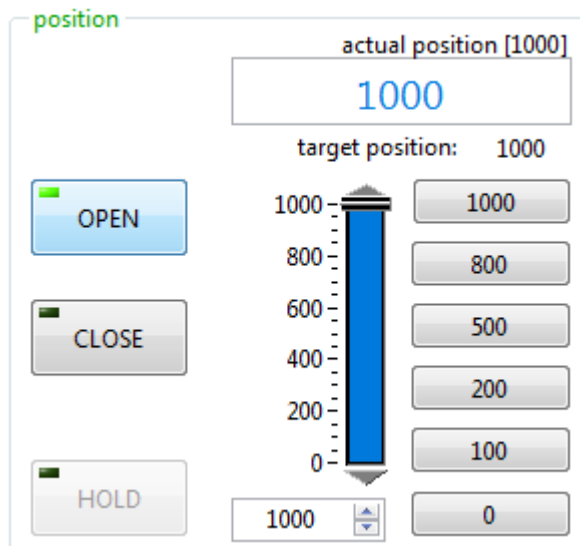
Using the 'Control Performance Analyzer' is only possible, when the valve is the 'LOCAL Mode'.

- Click button [LOCAL]



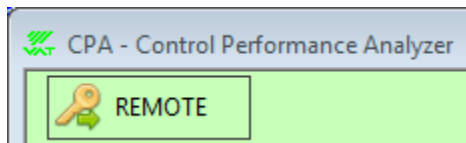
Now the valve can be operated easily via 'Control Performance Analyzer'.

First steps should be [OPEN], [CLOSE] etc.



Note: If LOCAL operation is finished, please switch back to 'REMOTE mode'

- Click button [REMOTE]



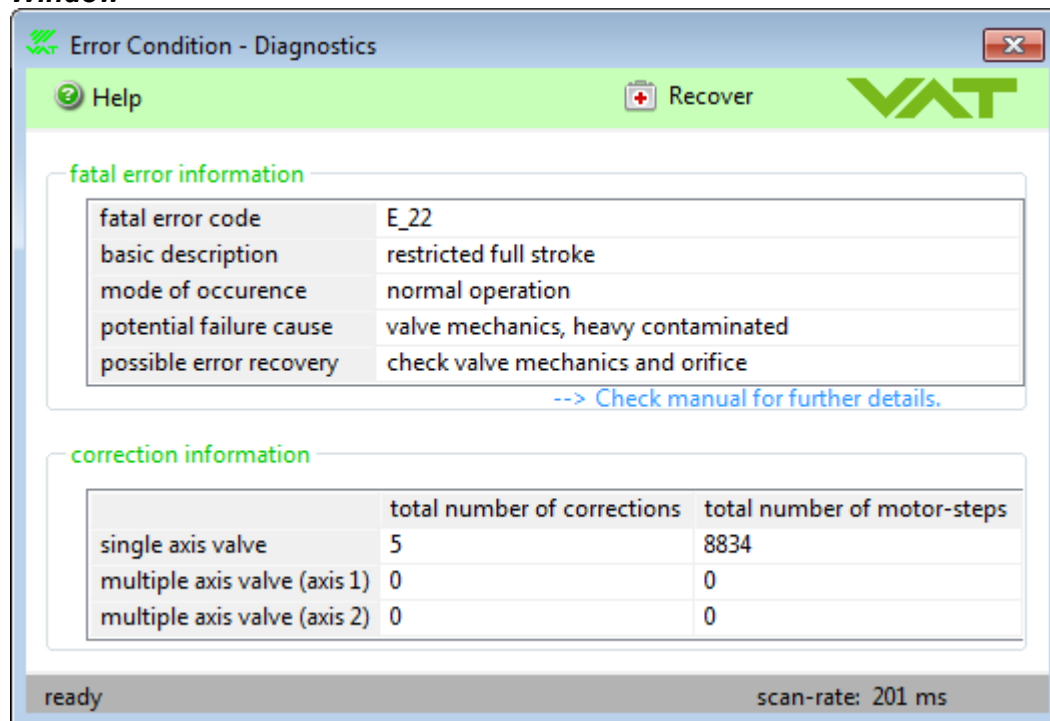
3.9 Error Condition Diagnostics

Introduction

This window comes up if the valve ran into in an error condition. The basic error information is shown in the upper part of the window.

Depending on the valve controller firmware additional data concerning the previous position corrections are also shown in the lower part of the window.

Window



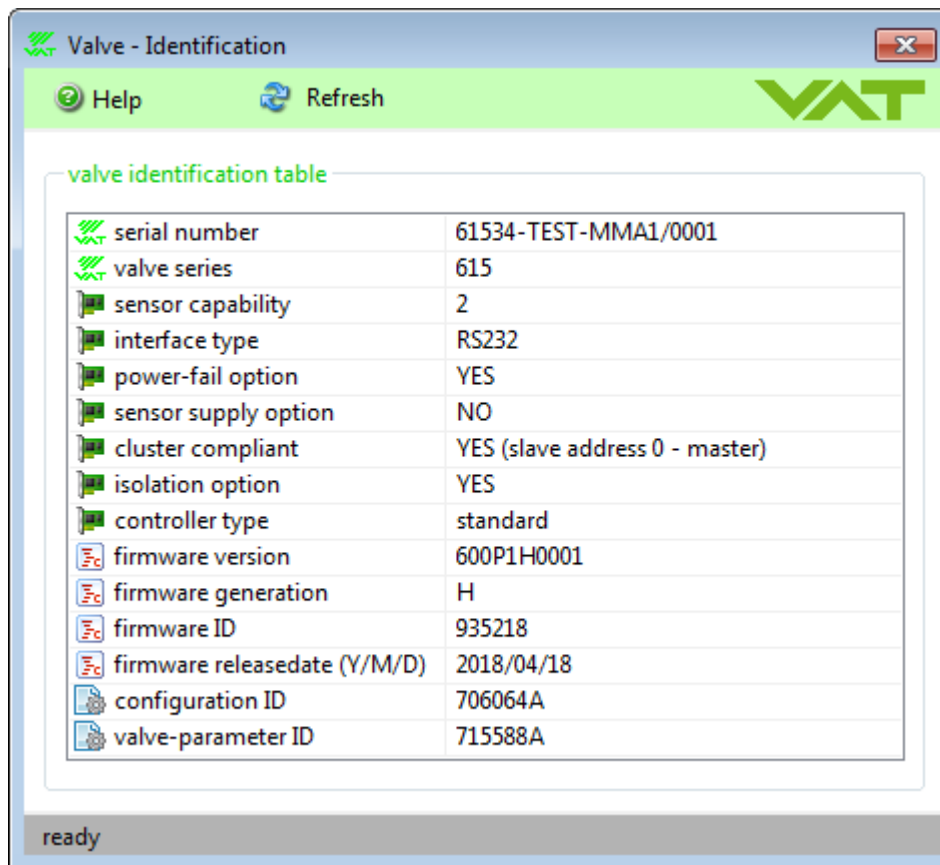
4 Valve

4.1 Identification

Introduction

This window shows the configuration of the connected valve.

Window



4.2 Setup

Introduction

Basic configurations of valve must be adapted according to application needs. It is possible to change the settings. If necessary, change the settings according valve specification.

Window

The screenshot shows the 'Valve - Setup' window with the following settings:

- valve speed:** 1000
- synchronization:**
 - target-position after synchronization: close
 - event to start synchronization: default (not sealed)
 - synchronization mode: short
- control stroke limitation:** disabled
- isolation option:** selected
- behaviour under specific conditions:**
 - target-position at power-failure: close
 - target-position at network-failure: close
 - target-position at slave offline: close

The status bar at the bottom indicates 'ready'.

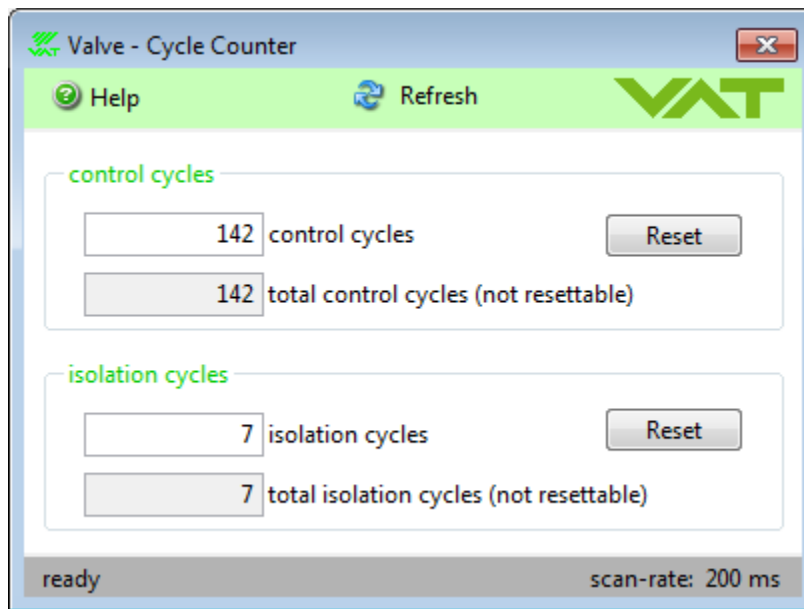
Note: Please refer also to chapter: «Valve configuration» in the valve manual for more details.

4.3 Cycle Counter

Introduction

This window shows the control cycles and the isolation cycles of connected valve. Reset of 'control cycles' and 'isolation cycles' are possible.

Window



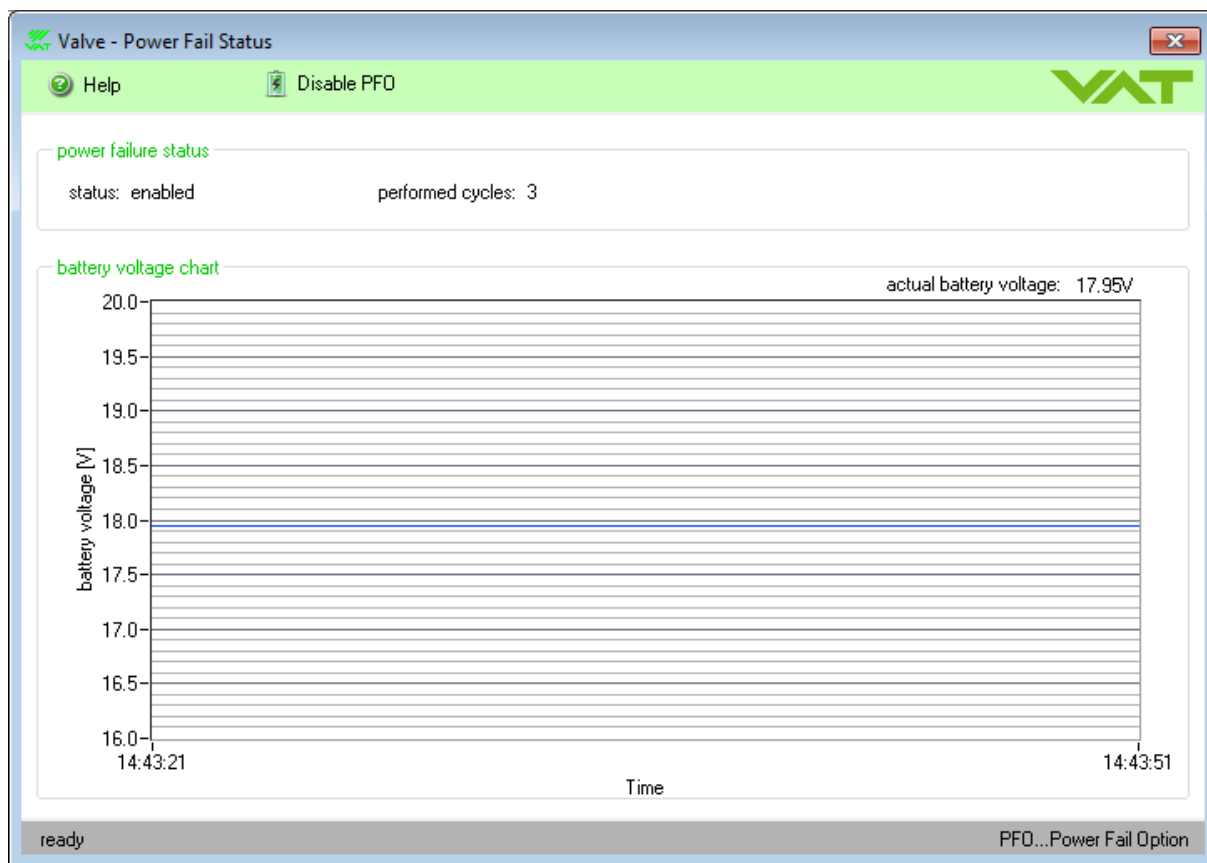
4.4 Power fail status

Introduction

PFO = Power Failure Option

This window shows the status of PFO. This function is only available if PFO is installed. It is possible to disable PFO temporary. Click [Disable PFO].

Window

**Note:**

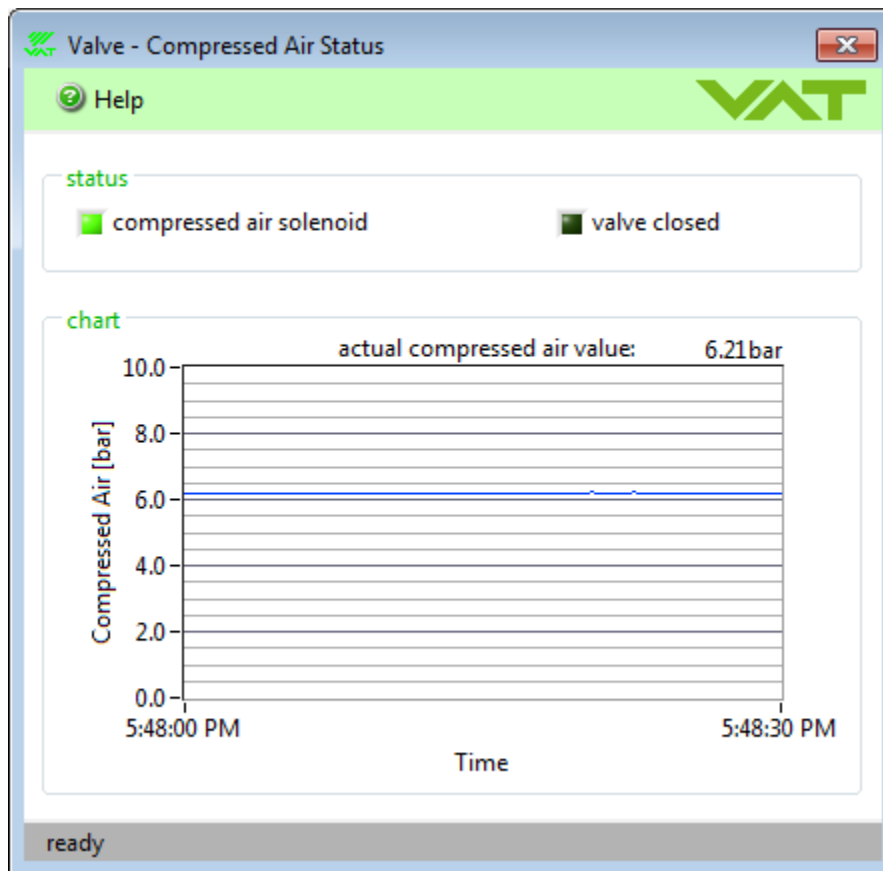
- PFO is always enabled after power up!
- For "Safety", disable PFO always before maintenance! Refer also to chapter: «Maintenance» in valve manual for details.
- Refer also to chapter: «Behavior in case of power failure» in valve manual for details.

4.5 Compressed air status

Introduction

This window shows the status of compressed air. (Only for valves with compressed air connection, e.g. Series 65.0)

Window

**Note:**

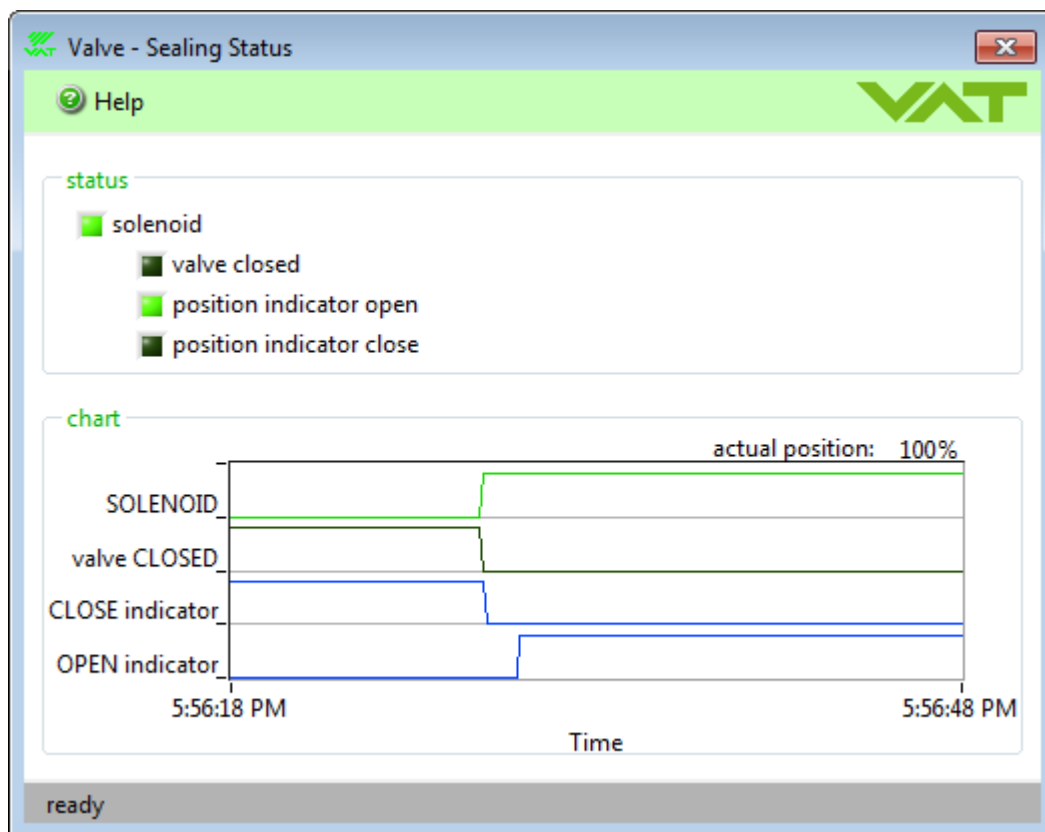
- Compressed air value must be between 4 bar (55 psi) and 7 bar (100 psi) if valve is not closed!
- Refer also to chapter: «Behavior in case of compressed air pressure drop» in valve manual for details.

4.6 Sealing Status

Introduction


This window shows the status of of isolation valve. (Only for valves with isolation valve connection, e.g. Series 95.1 or 95.2)

Window

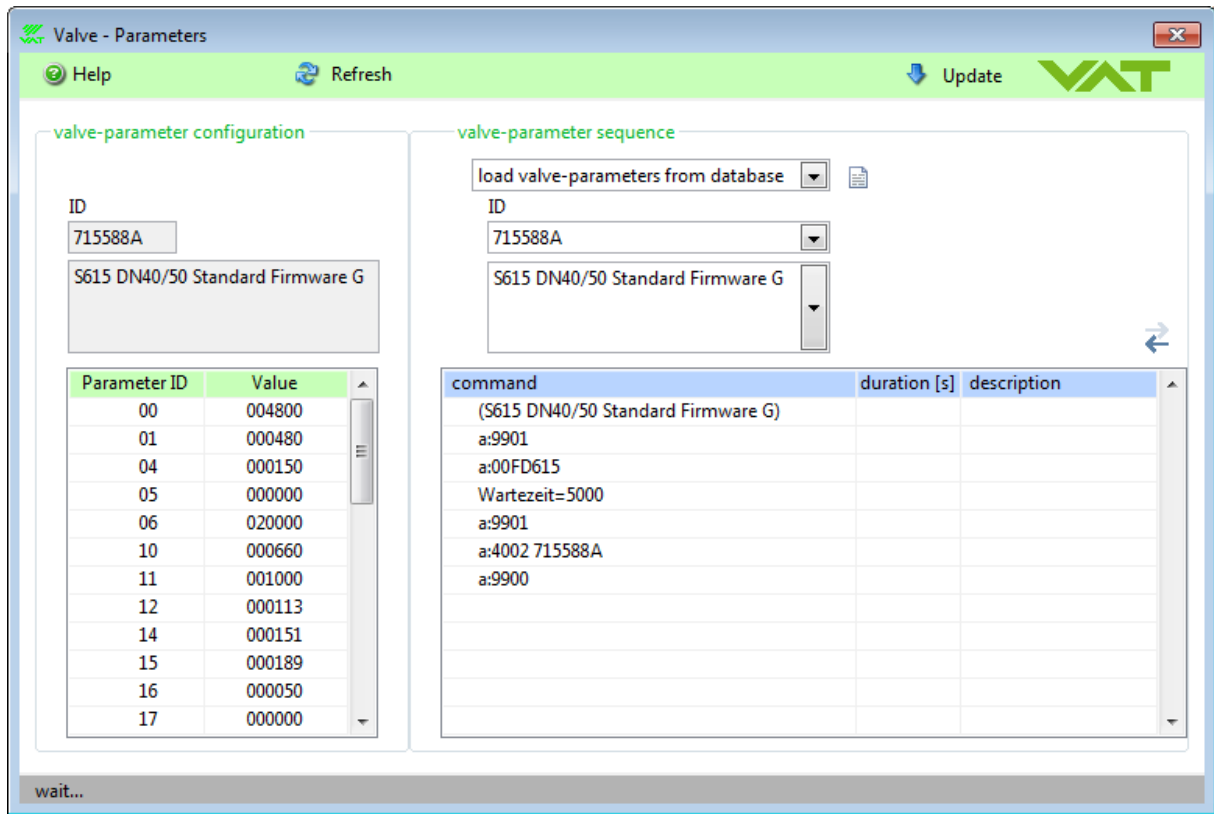


4.7 Parameters

Introducing

NOTICE	
	<p>Valve Parameters</p> <p>Inappropriate handling with the valve parameters may cause in malfunction of valve.</p> <p>Update valve parameters may only be carried out by the VAT service staff. In exceptional cases, the customer is allowed to carry out update valve parameters, but only with the prior consent of VAT.</p>

Window



4.8 Recovery

Introducing

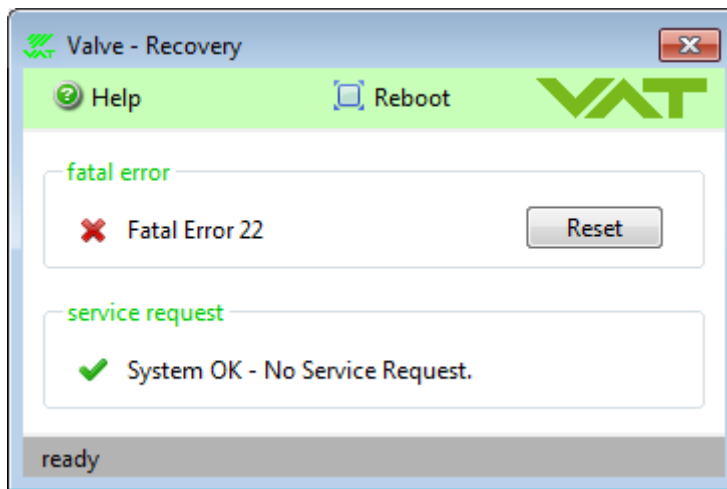
With this function it is possible to [Reset] Fatal Error or to [Reset] 'Service Request'. It is also possible to [Reboot] the valve controller (Soft Start).

If Fatal Error appear:

The valve is heavily contaminated or gate seal is heavily sticking and valve cleaning is necessary. Condition of fatal error = loss of more than 5 motor steps within 1 second. Please refer to chapter: «Maintenance» in the valve manual for maintenance.

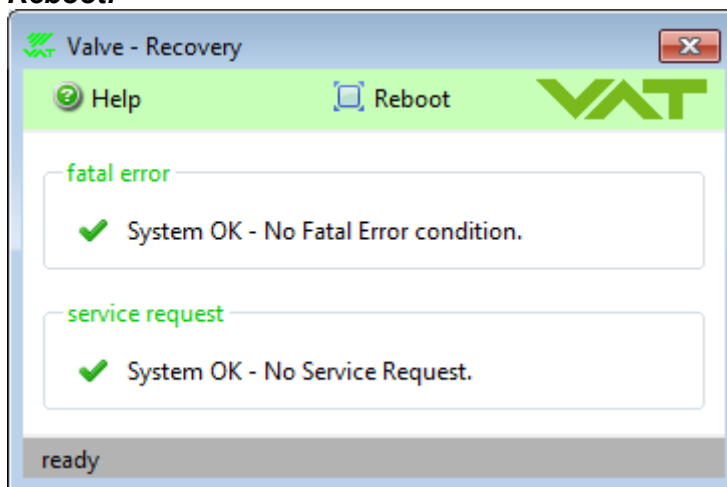
1. Do the Maintenance procedure
2. Reset the 'Fatal Error'

Window

**If Service request appear:**

The contamination of valve is getting higher and valve cleaning is necessary in near future. Condition of service request = loss of more than 5 motor steps within 1 minute. Please refer to chapter: «Maintenance» in the valve manual for maintenance.

1. Do the Maintenance procedure
2. Reset the 'Service Request'

Reboot:

5 Sensor

5.1 Setup

Introduction

A sensor (vacuum gauge) is used for pressure control only. Depending on the hardware-specification VAT valve controllers can support 1 or 2 sensors. In general sensors with a linear output-voltage range of 0 to 10V are supported.

Use the Sensor-Setup window to enter the sensor specifications of the connected sensor(s). For other sensor types please contact VAT.

Window

Sensor - Setup

Help Refresh Save VAT

sensor port 1

selected selection

Torr unit

1 full scale

sensor port 2

selected selection

mTorr unit

100 full scale

zero adjust

enabled zero adjust

ready adjusted sensor ratio: 10.00

Settings

Item	Function
selection	'Selected' enable pressure control using the sensor connected to the appropriate sensor port 1 or 2. 'Not selected' to exclude this sensor from pressure control. The actual sensor value is still measured by the valve controller but is not used for pressure control.
unit	Select the pressure unit of the connected sensor according to the sensor specifications.
full-range	Enter the full-range value of the connected sensor according to the sensor specifications. Data of sensor full scale (SFS)
zero adjust	This feature is used to set the actual pressure value of a vacuum system to zero. Select enable or disable to activate or deactivate this feature. Please refer to « Sensor Zero » for further details.

Note: Please refer also to chapter: «Sensor configuration» in the valve manual for further details.

Appendix

Example: Two sensors (vacuum gauges) should be used for pressure control within a vacuum system. Zero adjustment at base pressure must be 'enabled'.

The sensor specifications are as follows (see label on the appropriate sensor):

output range: 0 – 10V
full-range sensor 1: 10Torr
full-range sensor 2: 250mTorr

	sensor port 1	sensor port 2
<i>selection</i>	selected	selected
<i>unit</i>	Torr	mTorr
<i>full-range</i>	10	250
<i>zero-adjust</i>	enabled	

Note: The resulting sensor ratio is 40 (10Torr / 250mTorr).

5.2 Setup (advanced)

Introduction

A sensor (vacuum gauge) is used for pressure control only. Depending on the hardware-specification VAT valve controllers can support 1 or 2 sensors. In general sensors with a linear output-voltage range of 0 to 10V are supported.

Use the Sensor-Setup window to enter the sensor specifications of the connected sensor(s). For other sensor types please contact VAT.

Window

Sensor - Setup [X]

Help Refresh Save VAT

sensor port 1 advanced settings ☐

analog source analog ☒

selected selection

range

Torr unit

1 fullscale

zero adjust

enabled zero adjust

0.0536 offset value [% SFS]

sensor port 2 advanced settings ☒

digital source analog ☒

selected selection

range

Torr unit

0.1 fullscale

digital value

0 digital value

zero adjust

enabled zero adjust

0.0564 offset value [% SFS]

-14 offset limit min [% SFS]

14 offset limit max [% SFS]

scale

0 scale offset [V]

1 scale factor

before scale zero point

filter

0.00 filter time [sec]

logarithmic sensor

yes linearize log signal

0.750 voltage per decade

5.324 voltage at full scale

crossover

soft switch mode

90 low [% SFS Low Sensor]

100 high [% SFS Low Sensor]

0.00s delay

ready

Settings

Item	Function
source	none --> if no analog or digital reading happens analog --> sensor is connected to the valve, read the analog voltage of the sensor digital --> sensor is not connected to the valve, valve receive the value from the field bus (EtherCAT, Profibus or CCLink)
selection	'Selected' enable pressure control using the sensor connected to the appropriate sensor port 1 or 2. 'Not selected' to exclude this sensor from pressure control. The actual sensor value is still measured by the valve controller but is not used for pressure control.
unit	Select the pressure unit of the connected sensor according to the sensor specifications.
full-range	Enter the full-range value of the connected sensor according to the sensor specifications. Data of sensor full scale (SFS)
digital value	Actual value of the digital input. (Or it is possible to set the value for test purpose)
zero adjust	This feature is used to set the actual pressure value of a vacuum system to zero. Select enable or disable to activate or deactivate this feature. Please refer to « Sensor Zero » for further details.
offset value	Shows resulting value after a zero adjust or can be used to set the value.
offset limit min	Depending on the voltage range of the sensor the offset limit can be adjusted. e.g. range of Sensor -0.2..10.5V --> offset limit min = -0.2, offset limit max = 0.5V
offset limit max	
scale offset	Linear sensors with other voltage range as 0..10V has to be scaled: Sensor 0..5V --> scale factor = 2, scale offset = 0; Sensor 1..9V --> scale factor = 1.25, scale offset = 1.0 V Sensor -10..10V --> scale factor = 0.5, scale offset = -10.0 -10V Zero adjust must take place at the calculation point where the value should be 0, therefore zeroing must happens before or after scaling. In above example for sensor 1..9V it is after scale, for all others it is before scale.
scale factor	
zero point	
filter time	Reduces noise of the sensor signal Note: For pressure control it is not good to have delayed sensor signal, so be carefully with filtering of the sensor signal.
linearize log signal	If a logarithmic sensor is used, then there are 2 possibilities: 1. Pressure control with the logarithmic signal - no linearization on the valve (Linearization 'off' in 'Sensor - Setup') - linearization in the CPA (Linearization 'on' in 'CPA - Settings') - use of PI pressure control algorithm (adaptive algorithm cannot be used because it needs a linear signal) - advantage: whole range of sensor can be used 2. Pressure control with a linearized signal - linearization on the valve (Linearization 'on' in 'Sensor - Setup') - no linearization in the CPA (Linearization 'off' in 'CPA - Settings') - can use adaptive or PI pressure control algorithm - disadvantage: only about 4 decades of the sensor range can be used for pressure control
voltage per decade	
voltage at full scale	
	voltage per decade: normally can be found in the manual of the sensor. voltage at full scale: highest voltage point of the logarithmic sensor for pressure control
crossover	When two sensors are used for pressure control the crossover handles the two pressure signals to building one system pressure (Actual Pressure).
	<div>Soft Switch</div> <div>Hard Switch</div> <div>Target Pressure</div>

Appendix

Example: Two sensors (vacuum gauges) should be used for pressure control within a vacuum system. Zero adjustment at base pressure must be 'enabled'.

The sensor specifications are as follows (see label on the appropriate sensor):

output range: 0 – 10V
 full-range sensor 1: 10Torr
 full-range sensor 2: 250mTorr

	sensor port 1	sensor port 2
<i>selection</i>	selected	selected
<i>unit</i>	Torr	mTorr
<i>full-range</i>	10	250
<i>zero-adjust</i>	enabled	

Note: The resulting sensor ratio is 40 (10Torr / 250mTorr).

5.3 Zero

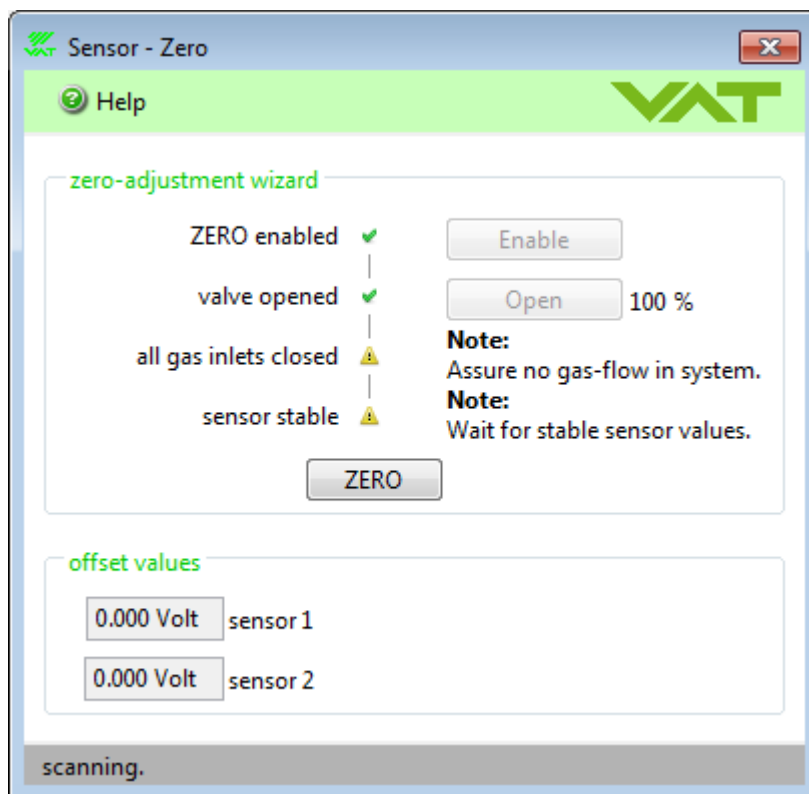
Introduction

Sensor Zero is a convenience function to calibrate the sensor at base pressure (no adjustment at sensor necessary). When ZERO is performed the actual pressure value is set to zero. In case of 2 sensors both are calibrate (zero) at the same time. A maximum offset voltage of +/- 1.4 VDC could be compensated. The actual 'offset values' can be watched.

Condition for successful ZERO:

- Base pressure is reached (min. 10000 times below SFS)
- Zero is enabled
- Valve is open
- No gas flow in system
- Sensor is on operating temperature
- Sensor stable, no shifting

Window

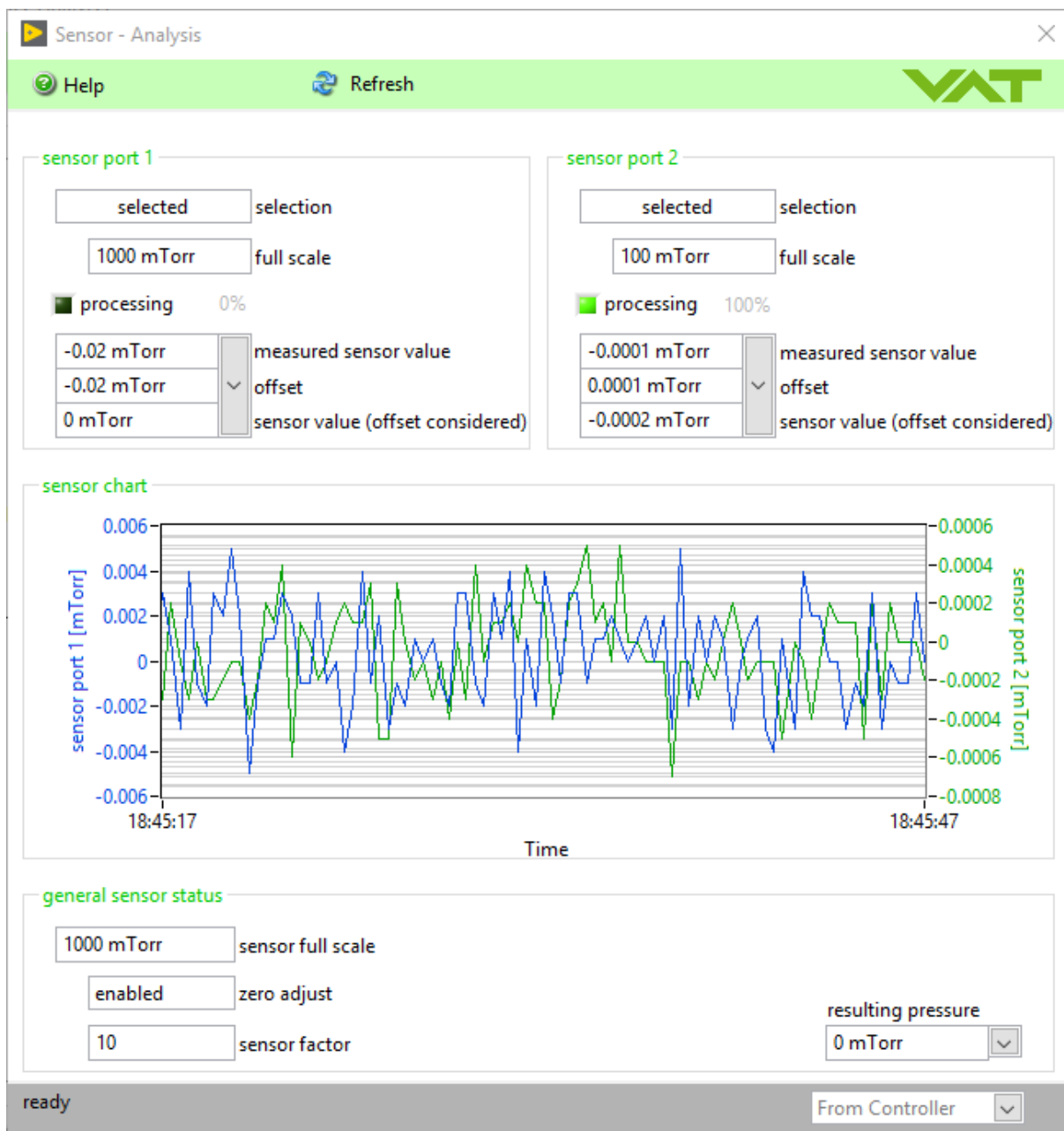


5.4 Analysis

Introduction

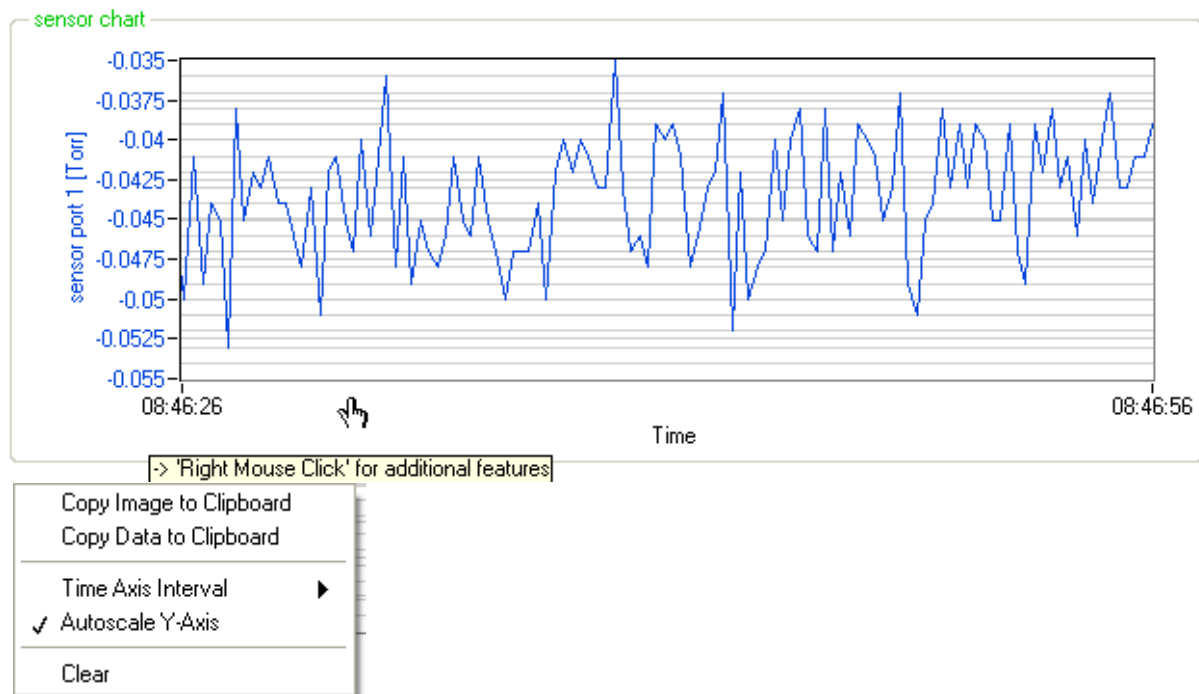
The Sensor Analysis screen shows the actual data of connected sensor(s).

Window

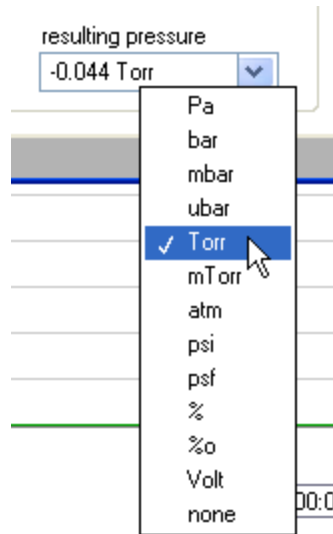


Settings

- You can choose the unit for sensor port 1 (2), see screen above.
- Click [Right Mouse] button in sensor chart for additional features.



- You can choose the unit for the resulting pressure.

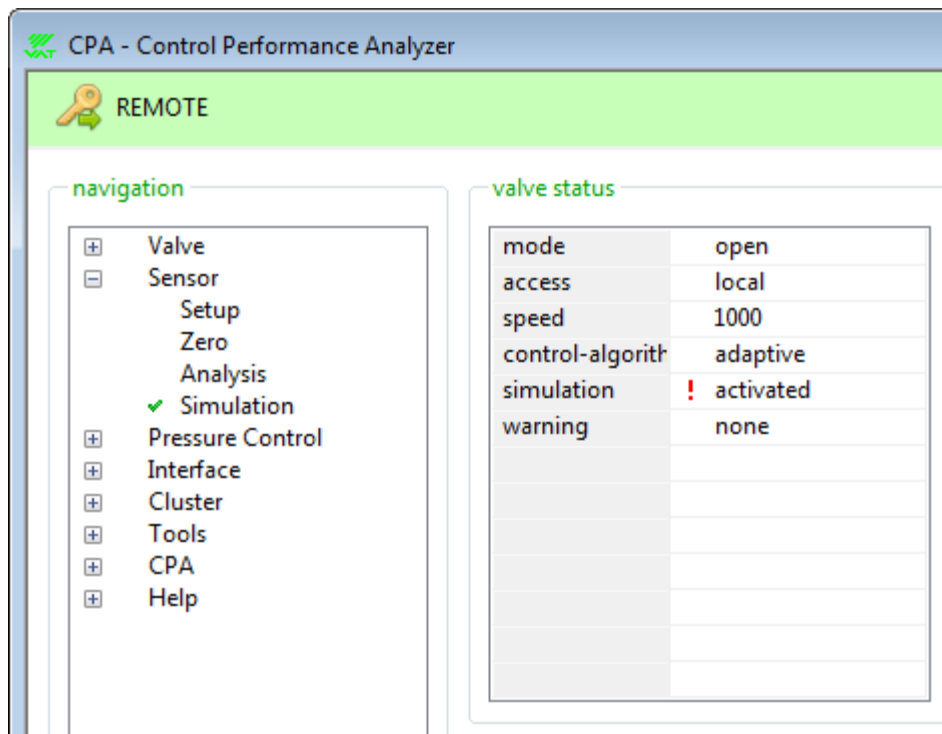


5.5 Simulation

Introduction

The sensor simulation allows to use the valve for testing without any pressure system. Inside the CPA a pressure system (sensor, gas flow, chamber size, pump performance) is implemented to simulate learn and pressure control.

Window



Note: The learn data cannot be used for a real pressure system

6 Pressure Control

Introduction

The 'Pressure Control Setup' is dependent of installed firmware versions. There are three possible pressure control setup.

- Setup single Control Mode
- Setup all Control Modes (floating point)
- Setup all Control Modes (index)
- Setup unique controllers

Note: For 'Pressure Control Setup' refer to your firmware supported 'Pressure Control Setup'.

6.1 Setup single Control Mode

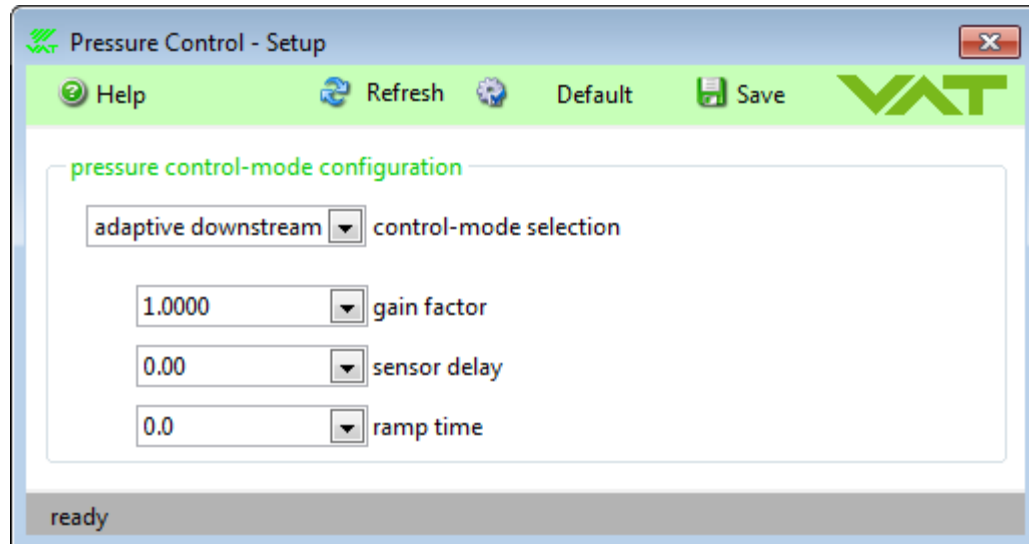
Introduction

This pressure control setup is used for firmware versions that can only handle a single control-mode because only one control parameter-set is available. If different control modes are used during a pressure control application this setup needs to be ran through prior to continue with pressure control. In general:

- Adaptive downstream
 - Fixed downstream
 - Fixed upstream
 - Soft pump
- control-modes are supported.

Select the Pressure Control - Setup configuration according to requirement of application. Refer for details to chapter: «Pressure control configuration» in the valve manual for function and adjustment procedure.

Windows



6.2 Setup all Control Modes (index)

Introduction

"index" means: All parameters can be selected from the pull-down list.

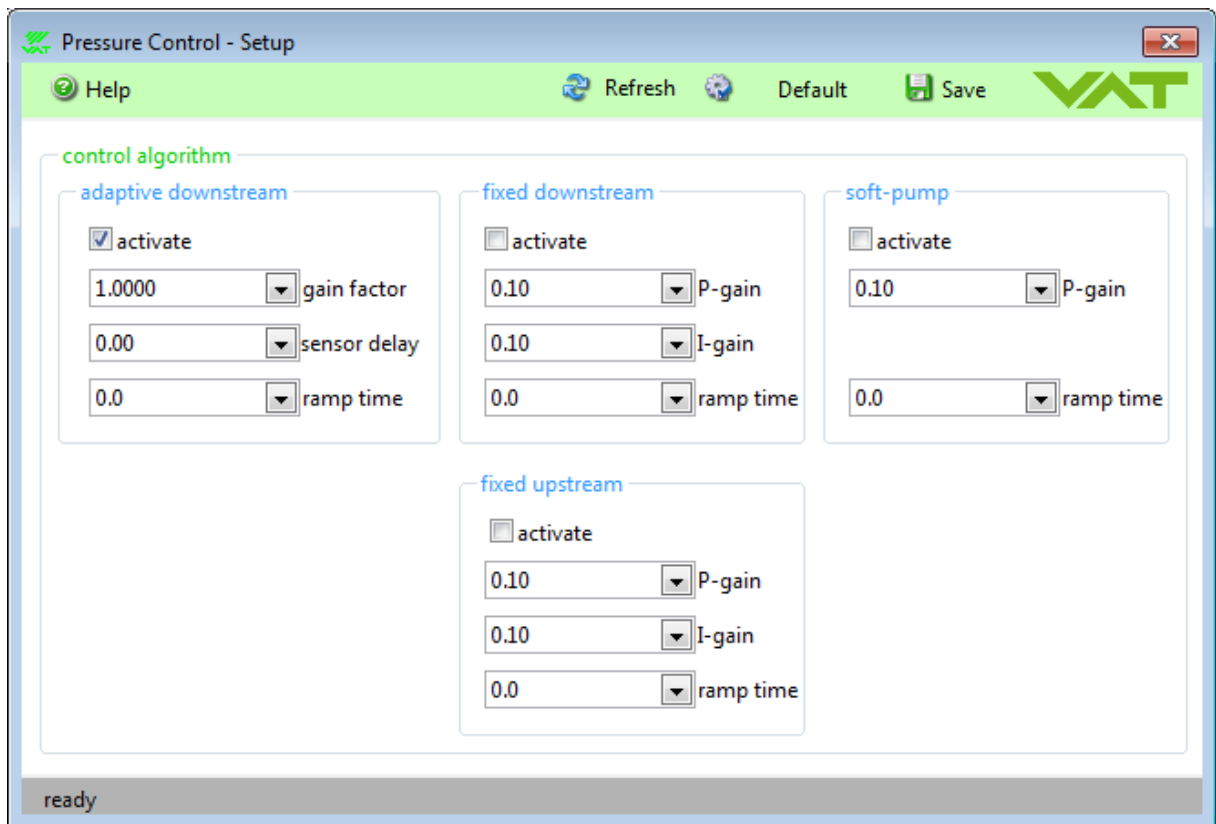
This pressure control setup is used for firmware versions that can handle multiple control-modes. The parameters of each control-mode are stored individually within the valve-controller memory. You can simply activate the desired control-mode during run time.

The following control-modes can be configured.

- Adaptive downstream
- Fixed downstream
- Fixed upstream
- Soft pump

Select the Pressure Control - Setup configuration according to requirement of application. Refer for details to chapter: «Pressure control configuration» in the valve manual for function and adjustment procedure.

Window



6.3 Setup all Control Modes (floating point)

Introduction

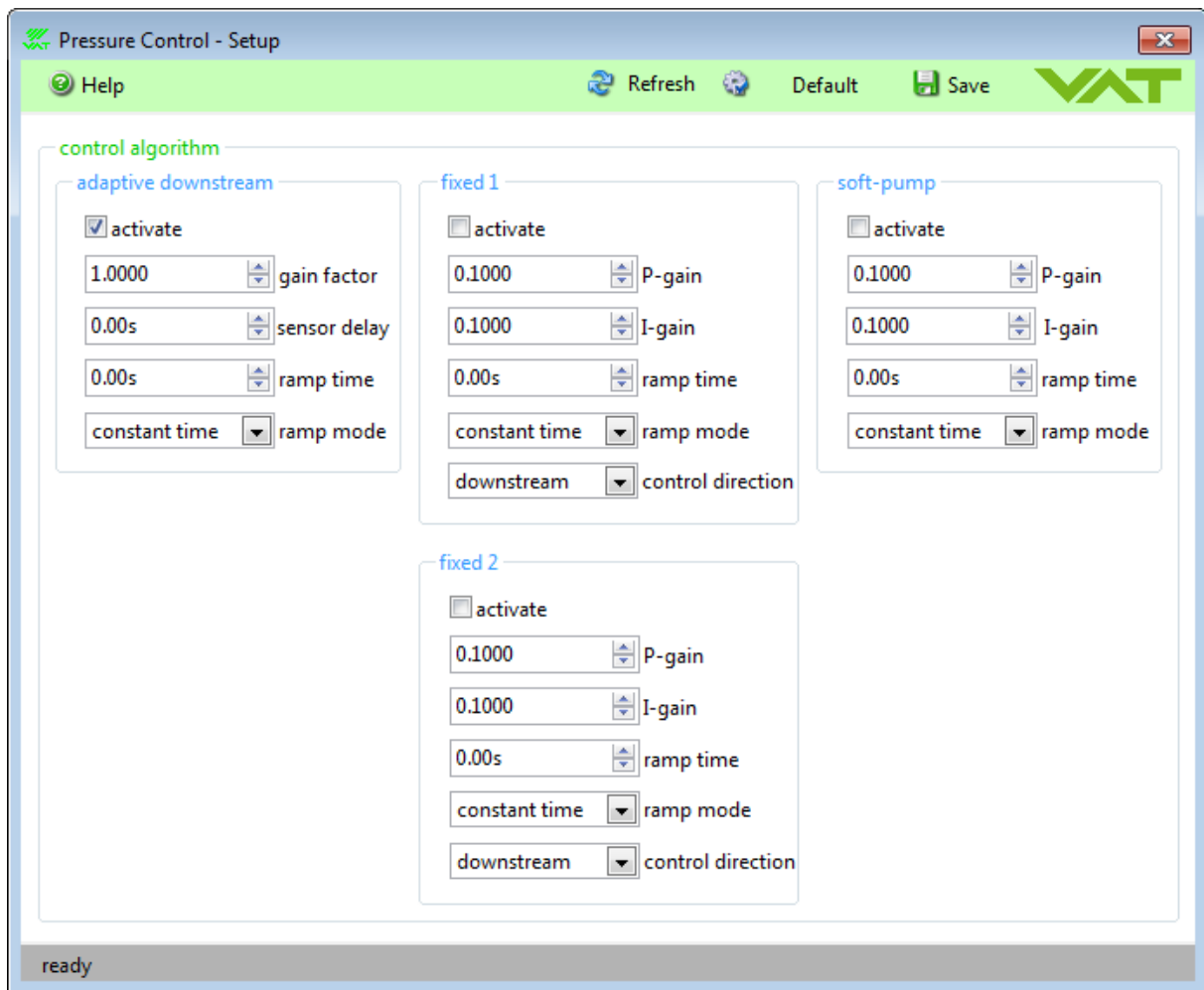
"floating point" means: All parameters can be entered as a floating-point number. This pressure control setup is used for firmware versions that can handle multiple control-modes. The parameters of each control-mode are stored individually within the valve-controller memory. You can simply activate the desired control-mode during runtime.

The following control-modes can be configured.

- Adaptive downstream
- Fixed downstream
- Fixed upstream
- Soft pump

Select the Pressure Control - Setup configuration according to requirement of application. Refer for details to chapter: «Pressure control configuration» in the valve manual for function and adjustment procedure.

Window



6.4 Setup unique controllers

Introduction

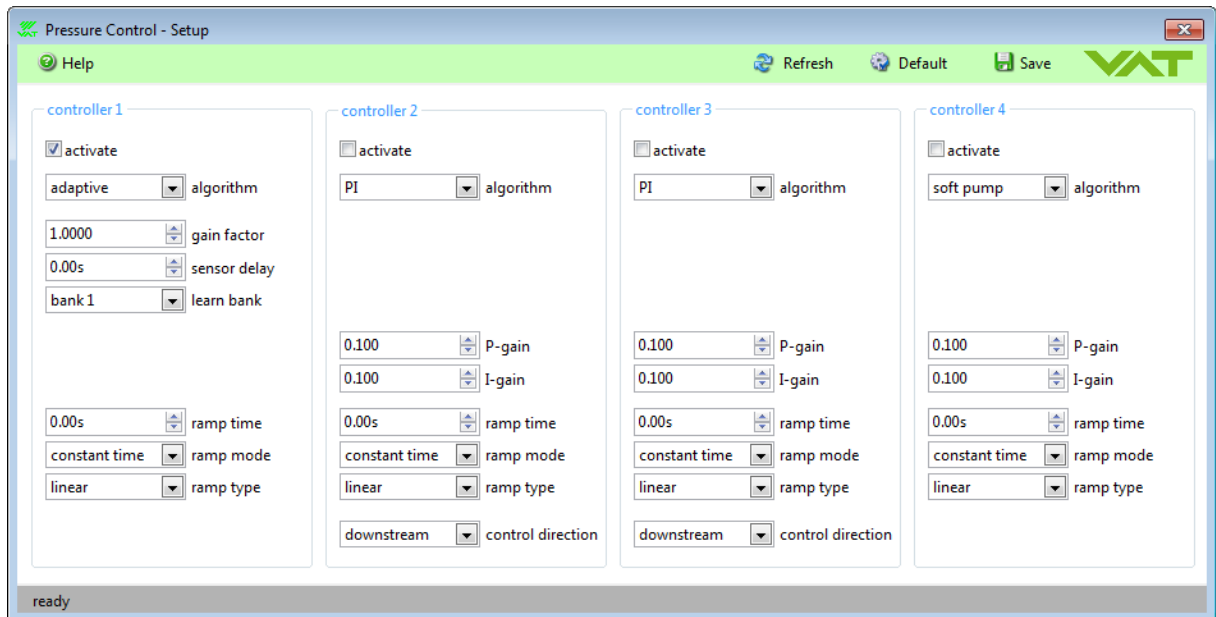
This pressure control setup is used for firmware versions that can handle unique pressure controllers. The parameters of each control-mode are stored individually within the valve-controller memory. You can simply activate the desired control-mode during run time.

The following control-modes can be configured.

- Adaptive downstream
- Fixed downstream
- Fixed upstream
- Soft pump

Select the Pressure Control - Setup configuration according to requirement of application. Refer for details to chapter: «Pressure control configuration» in the valve manual for function and adjustment procedure.

Window



6.5 Learn

Introduction

LEARN adapts the PID controller of the valve to the vacuum system and its operating conditions.

LEARN must be executed only once during system setup. The LEARN routine determines the characteristic of the vacuum system. Based on this, the PID controller is able to run fast and accurate pressure control cycles. This characteristic depends on various parameters such as chamber volume, conductance and flow regime. Therefore it must be performed with a specific gas flow which will be calculated in this part of this software.

Note: Learn is only possible for adaptive pressure control (refer to: [Pressure Control](#)).

Note: The result of LEARN is a pressure versus valve position data table. This table is used to adapt the PID parameters. The data table is stored in the device memory that is power fail save. Due to encoding the data may not be interpreted directly. By an OPEN VALVE, CLOSE VALVE, POSITION CONTROL or PRESSURE CONTROL command the routine may be interrupted.

Condition for successful LEARN:

1. Make sure all connected sensors are set-up properly (refer to: [Sensor Setup](#))
2. Make sure zero-adjust was performed (refer to: [Sensor Zero](#))
3. Wait until all sensor signal are stable
4. Make sure all sensors are at operating temperature and ready for operation

The recommended gas flow to adjust on the system prior to start the learn process is based on the following formula:

$$q_L \left[\text{mbar} \cdot \frac{\text{l}}{\text{s}} \right] = 0.9 \cdot p_{\max} [\text{mbar}] \cdot C_R \left[\frac{\text{l}}{\text{s}} \right]$$

q_L recommended gas flow [mbar l/s]

p_{\max} pressure limit [mbar]

C_R required lower conductance (min. valve conductance or working point conductance)

Conversion Tables:

Pressure

		Pa (N m ⁻²)	bar	mbar	μbar (dyn cm ⁻²)	Torr (mm Hg)	micron (μ, mTorr)	atm	psi (lbf inch ⁻²)	psf (lbf ft ⁻²)
1 Pa (N m ⁻²)	=	1	1 · 10 ⁻⁵	1 · 10 ⁻²	10	7.5 · 10 ⁻³	7.5	9.87 · 10 ⁻⁶	1.45 · 10 ⁻⁴	2.09 · 10 ⁻²
1 bar	=	1 · 10 ⁵	1	1000	1 · 10 ⁶	750	7.5 · 10 ⁵	0.987	14.5	2.09 · 10 ³
1 mbar	=	100	1 · 10 ⁻³	1	1000	0.75	750	9.87 · 10 ⁻⁴	1.45 · 10 ⁻²	2.09
1 μbar (dyn cm ⁻²)	=	0.1	1 · 10 ⁻⁶	1 · 10 ⁻³	1	7.5 · 10 ⁻⁴	0.75	9.87 · 10 ⁻⁷	1.45 · 10 ⁻⁵	2.09 · 10 ⁻³
1 Torr (mm Hg)	=	133.3	1.333 · 10 ⁻³	1.333	1333	1	1000	1.32 · 10 ⁻³	1.93 · 10 ⁻²	2.78
1 micron (μ, mTorr)	=	0.1333	1.333 · 10 ⁻⁶	1.333 · 10 ⁻³	1.333	1 · 10 ⁻³	1	1.32 · 10 ⁻⁶	1.93 · 10 ⁻⁵	2.78 · 10 ⁻³
1 atm	=	1.01 · 10 ⁵	1.013	1013	1.01 · 10 ⁶	760	7.6 · 10 ⁵	1	14.7	2.12 · 10 ³
1 psi (lbf inch ⁻²)	=	6.89 · 10 ³	6.89 · 10 ⁻²	68.9	6.89 · 10 ⁴	51.71	5.17 · 10 ⁴	6.8 · 10 ⁻²	1	144
1 psf (lbf ft ⁻²)	=	47.8	4.78 · 10 ⁻⁴	0.478	478	0.359	359	4.72 · 10 ⁻⁴	6.94 · 10 ⁻³	1

Gas flow and leak rate

		Pa m ³ s ⁻¹	mbar ls ⁻¹	Torr ls ⁻¹	atm cm ³ s ⁻¹	lusec	sccm	slm	Mol s ⁻¹
1 Pa m ³ s ⁻¹	=	1	10	7.5	9.87	7.5 · 10 ³	592	0.592	4.41 · 10 ⁻⁴
1 mbar ls ⁻¹	=	0.1	1	0.75	0.987	750	59.2	5.92 · 10 ⁻²	4.41 · 10 ⁻⁵
1 Torr ls ⁻¹	=	0.1333	1.333	1	1.32	1000	78.9	7.89 · 10 ⁻²	5.85 · 10 ⁻⁵
1 atm cm ³ s ⁻¹	=	0.101	1.01	0.76	1	760	60	6 · 10 ⁻²	4.45 · 10 ⁻⁵
1 lusec	=	1.333 · 10 ⁻⁴	1.333 · 10 ⁻³	10 ⁻³	1.32 · 10 ⁻³	1	7.89 · 10 ⁻²	7.89 · 10 ⁻⁵	5.86 · 10 ⁻⁸
1 sccm	=	1.69 · 10 ⁻³	1.69 · 10 ⁻²	1.27 · 10 ⁻²	1.67 · 10 ⁻²	12.7	1	10 ⁻³	7.45 · 10 ⁻⁷
1 slm	=	1.69	16.9	12.7	16.7	1.27 · 10 ⁴	1000	1	7.45 · 10 ⁻⁴
1 Mol s ⁻¹	=	2.27 · 10 ³	2.27 · 10 ⁴	1.7 · 10 ⁴	2.24 · 10 ⁴	1.7 · 10 ⁷	1.34 · 10 ⁶	1.34 · 10 ³	1

• Learn procedure

Complete the learn preparation by using the following parameters and settings.

Learn limits

Make sure the basic learn limits are set properly prior to start the learn procedure.

- **Maximum learn pressure:** The system-pressure during the learn process will not exceed this limit. Hence the pressure range can be adapted to the real process regime. Some vacuum pumps may also be limited in its maximum pressure compatibility. The default value is set to sensor full scale.
- **Opening speed:** This parameter limits the valve speed when opening the valve during the learn procedure.
This will prevent to the vacuum pump from excessive gas load.
Note: Opening speed is not supported by all firmware versions.

Click [Learn] to start the learn procedure

Pressure Control - Learn

valve type

612 series

DN80 size

0.65 l/s min. conductance

☐ edit pre-settings

cluster

No cluster

learn limits

1 Torr max. learn pressure

1000 opening speed

time optimized (working point table)

pressure [Torr]	gasflow [mbar l/]	conductance [l/s]

recommended gas-flow

0.77805 mbar l/s gas-flow

execution

☒ View learns status after learn procedure has been started.

--> Adjust recommended system gas-flow, afterwards press 'Learn'.

Learn

connected valve: 61238-PACH-AKB1/0000 firmware: 600P1H000 sensor full scale: 1 Torr

...or additionally edit the optional working point table to reduce the duration for the learn process, refer to: Time optimized (working point table) optional

Note: If learn is started now by pressing the 'Learn' button, the recommended gas flow is calculated using the maximum learn pressure and the minimum valve conductance (see formula above).

• Time optimized (working point table) optional

If the complete pressure and gas flow regime are known this additional feature can be used optionally. The most suitable flow to learn a specific range can be determined with this method. This may reduce the required time to LEARN the vacuum system and ensures best pressure control responses.

Out of this working point table the lowest conductance value will be considered for the calculation of the recommended gas flow. All conductance values which fall below the minimum valve conductance limit are ignored for this calculation. In addition the maximum learn pressure will be used for the recommended gas flow calculation.

Note: Select the pressure and gas flow unit as desired using the pull-down control.

Click [Learn] to start the learn procedure

Pressure Control - Learn

Help

valve type

612 series

DN80 size

0.65 l/s min. conductance

☐ edit pre-settings

cluster

No cluster

learn limits

1 Torr max. learn pressure

1000 opening speed

time optimized (working point table)

pressure [Torr]	gasflow [sccm]	conductance [l/s]
0.2	100	✓ 6.35
0.5	150	✓ 3.81
0.08	200	✓ 31.75
0.9	80	✓ 1.13

recommended gas-flow

80.0745 sccm gas-flow

execution

View learns status after learn procedure has been started. ☒

--> Adjust recommended system gas-flow, afterwards press 'Learn'.

Learn

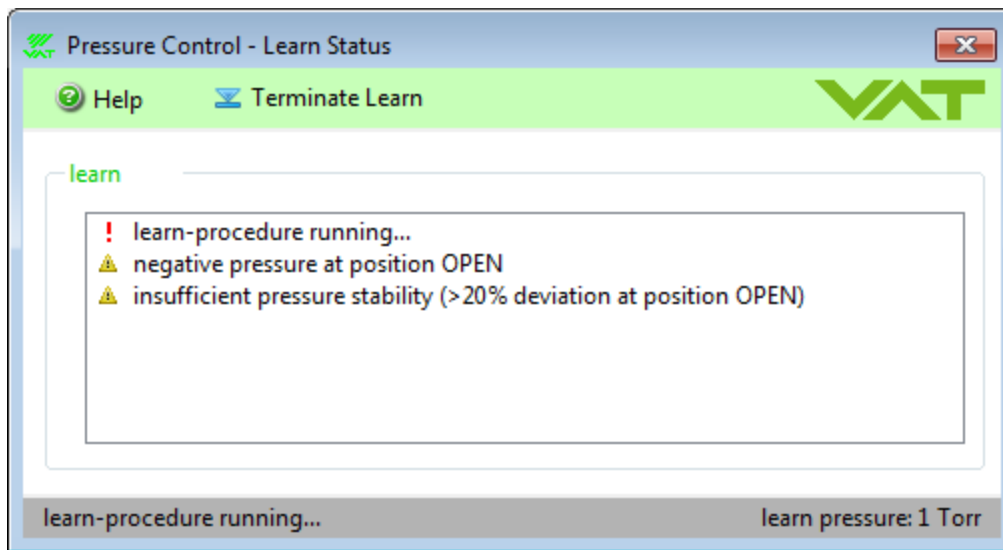
connected valve: 61238-PACH-AKB1/0000 firmware: 600P1H000 sensor full scale: 1 Torr

6.6 Learn Status

Introduction

While learn is running, the actual learn status is indicated in an additional window.

Window



Click [Terminate Learn] button to cancel learn.
Click [X] to close the learn-status window.

The following error conditions may appear during the learn procedure:

Error condition	Possible reason
Incomplete learn-parameters	Learn not performed yet Learn procedure discontinued Learn parameter check sum failed
Learn-procedure discontinued by user (learn-parameters remain unchanged)	Control command was sent during learn procedure running (e.g. OPEN, CLOSE, POSITION / PRESSURE command)
Learn-procedure discontinued by valve-controller (learn-parameters remain unchanged)	Internal fault interrupting the learn procedure
Pressure at position OPEN >50% of maximum learn pressure	Improper sensor for this application. Too much gas-flow.
Negative pressure at position OPEN	ZERO adjust missing.
Pressure at minimum conductance position < 10% of maximum learn pressure	Improper sensor for this application
Decreasing pressure at increasing conductance (valve position)	Operating temperature not reached. Sensor not ready for operation.
Insufficient pressure stability (>20% deviation at position OPEN); multiple measurements during LEARN)	Operating temperature not reached. Sensor not ready for operation.

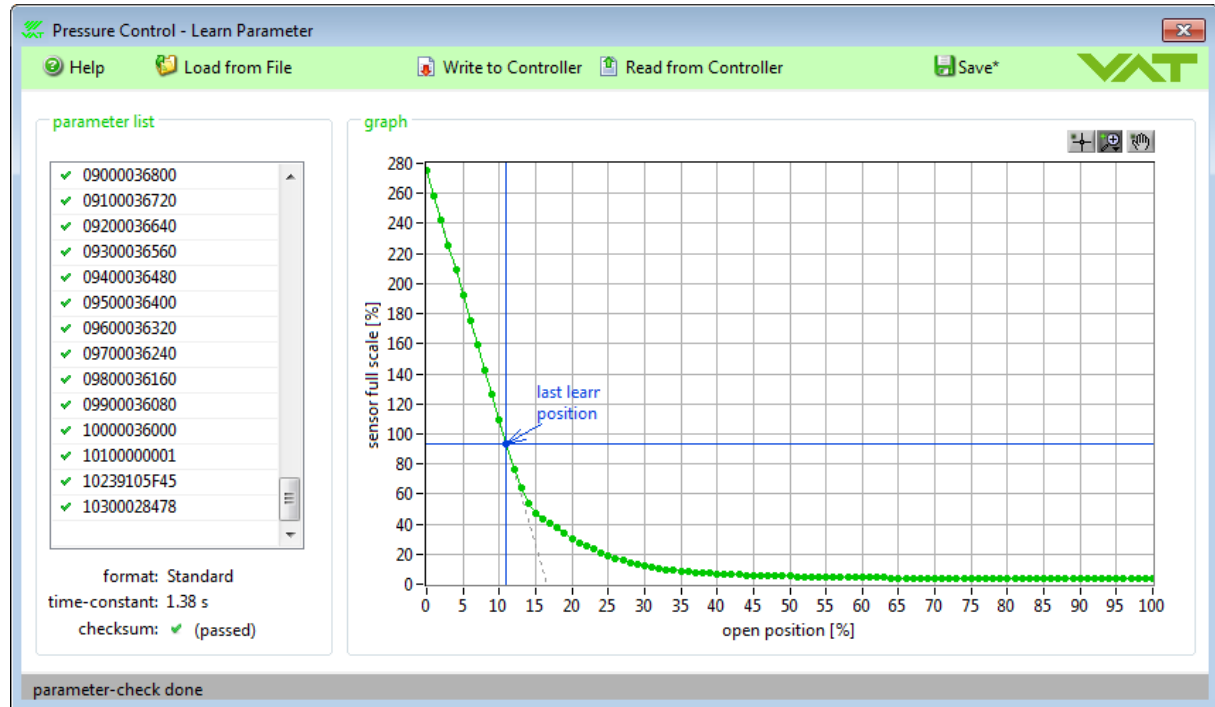
Note: At the end of the learn procedure all conditions are listed in the status-box of the learn-status window.

6.7 Learn Parameter

Introduction

With this function it is possible to «Load», «Write», «Read» or «Save» the 'Learn Parameters'.

Window



Settings

Button	Function
Load from File	'Learn Parameters' are loaded from file into parameter list
Write to Controller	'Learn Parameters' will be saved to valve controller
Read from Controller	'Learn Parameters' will be read from valve controller.
Save	'Learn Parameters' of parameter list will be saved to file.

7 Interface

7.1 Setup

7.1.1 Interface Setup Logic

Introduction

For setting the Logic interface configuration, select each parameter according to your host computer. Refer to chapter: «Interface configuration» in the valve manual for details.

Window

The screenshot shows the 'Interface Setup - Logic' window. The title bar includes the VAT logo and a close button. The menu bar contains 'Help', 'Refresh', 'Save', and the VAT logo. The main content area is divided into four sections:

- digital inputs:** Two rows of settings. The first row has a 'not inverted' dropdown and an 'open input' label. The second row has a 'not inverted' dropdown and a 'close input' label.
- digital outputs:** Two rows of settings. The first row has an 'open' dropdown and an 'open output' label. The second row has a 'close' dropdown and a 'close output' label.
- learn range:** A single row with a 'fullrange' dropdown and a 'learn range' label.
- pressure range factor:** A single row with a text input field containing '10' and a 'range factor' label.

A 'ready' status bar is located at the bottom of the window.

7.1.2 Interface Setup RS232

Introduction

For setting the RS232 interface configuration, select each parameter according to your host computer. Refer to chapter: «Interface configuration» in the valve manual for details.

Window

Interface Setup - RS232

Help Refresh Save VAT

interface settings

9600 baud rate RS232 operation mode

even parity Full Duplex duplex mode

7 bits data length ☐ P2P 000 device address

1 bit stop bits LF (CR/LF) termination

communication settings

0-100000 position range IC command set

0-1000000 pressure range disabled second answer

1000000 customized pressure range

digital inputs

input 1 — enabled activation

interlock open function

not inverted polarity

input 2 — enabled activation

interlock close function

not inverted polarity

digital outputs

output 1 — enabled activation

open function

not inverted polarity

output 2 — enabled activation

close function

not inverted polarity

ready

7.1.3 Interface Setup RS485

Introduction

For setting the RS485 interface configuration, select each parameter according to your host computer. Refer to chapter: «Interface configuration» in the valve manual for details.

Window

Interface Setup - RS232/485

Help Refresh Save VAT

interface settings

9600 baud rate RS485 operation mode

even parity Full Duplex duplex mode

7 bits data length ☐ P2P 000 device address

1 bit stop bits LF (CR/LF) termination

communication settings

0-100000 position range IC command set

0-1000000 pressure range disabled second answer

1000000 customized pressure range

digital inputs

input 1 — enabled activation

interlock open function

not inverted polarity

input 2 — enabled activation

interlock close function

not inverted polarity

digital outputs

output 1 — enabled activation

open function

not inverted polarity

output 2 — enabled activation

close function

not inverted polarity

ready

7.1.4 Interface Setup DeviceNet

Introduction

For setting the DeviceNet interface configuration, select each parameter according to your host computer.

Refer to chapter: «Interface configuration» in the valve manual for details.

Window

The screenshot shows the 'Interface - Setup' window with the following sections:

- general interface settings:**
 - MAC address: 0x01 (edit)
 - baudrate: 500kbaud (edit)
 - data type: INT
 - position unit: Counts
 - position gain: 1.000
 - pressure unit: Counts
 - sensor 1 gain: 1.000
 - sensor 2 gain: 1.000
- input assembly:**
 - input assembly: 2
 - datatype: INT

index	length	object	class	instance	attribute	additional information
0	1	exception status	48	1	12	exception status
1	2	pressure	51	1	7	process variable
- digital input:**
 - activation: enabled
 - function: interlock close
 - polarity: not inverted
- digital output:**
 - activation: enabled
 - function: close
 - polarity: not inverted
- output assembly:**
 - output assembly: 7
 - datatype: INT

index	length	object	class	instance	attribute	additional information
0	2	setpoint	46	1	15	input data value
2	2	control type	46	1	14	destination used

mode related

ready

7.1.5 Interface Setup Ethernet

Introduction

For setting the Ethernet interface configuration, select each parameter according to your host computer.

Refer to chapter: «Interface configuration» in the valve manual for details.

Window

The screenshot shows the 'Interface - Setup' window with the following sections:

- interface settings**
 - IP-address: 192 168 009 104
 - sub-address: 255 255 255 000
 - gateway: 000 000 000 000
 - DHCP: OFF
 - telnet port 1: 503
 - telnet port 2: 504
 - firmware: vat_app_006
 - model: type C
- communication settings**
 - position range: 0-100000
 - pressure range: 0-1000000
 - customized pressure range: 1000000
 - command set: IC
 - second answer: disabled
 - termination: CR
- digital inputs**
 - input 1**
 - activation: enabled
 - function: interlock open
 - polarity: not inverted
 - input 2**
 - activation: enabled
 - function: interlock close
 - polarity: not inverted
- digital outputs**
 - output 1**
 - activation: enabled
 - function: open
 - polarity: not inverted
 - output 2**
 - activation: enabled
 - function: close
 - polarity: not inverted

At the bottom, a status bar indicates 'configuration-mode enabled'.

7.1.6 Interface Setup EtherCAT

Introduction

For setting the EtherCAT interface configuration, select each parameter according to your host computer.

Refer to chapter: «Interface configuration» in the valve manual for details.

Window

The screenshot shows the 'Interface Setup' window for VAT. It has a title bar with the VAT logo and a close button. Below the title bar is a menu bar with 'Help', 'Save', 'Refresh', and 'Set to Default'. The main content area is divided into three sections: 'communication parameters', 'pdo data', and 'digital input/output'.

communication parameters

Device ID: 87

pdo data

pdo data	data type	range
pressure	floating point	0 10000
pressure sensor 1	floating point	0 10000
pressure sensor 2	floating point	0 10000
position	floating point	0 100000
target position	floating point	0 100000
cluster valve position	signed integer	0 100000
pressure setpoint	floating point	0 10000
position setpoint	floating point	0 100000
pressure alignment setpoint	signed integer	0 1000000
external digital pressure sensor 1	floating point	0 0.1
external digital pressure sensor 2	floating point	0 10
cluster valve freeze position	signed integer	0 100000

digital input

function	inverted	disabled
interlock close	no	no

digital output

function	inverted	disabled
close	no	no

7.1.7 Interface Setup Profibus

Introduction

For setting the Profibus interface configuration, select each parameter according to your host computer.

Refer to chapter: «Interface configuration» in the valve manual for details.

Window

The screenshot shows the 'Interface Setup' window for VAT. It has a menu bar with 'Help', 'Save', 'Refresh', and 'Set to Default'. The main content is divided into three sections:

- communication parameters:** A single input field for 'node number' with the value '1'.
- pdo data:** A table with three columns: 'pdo data', 'data type', and 'range'. It lists 12 parameters, all with 'signed integer' as the data type and a range from 0 to a specific maximum value.
- digital input/output:** Two separate configuration blocks. The 'digital input' block has fields for 'function' (interlock close), 'inverted' (no), and 'disabled' (no). The 'digital output' block has fields for 'function' (close), 'inverted' (no), and 'disabled' (no).

pdo data	data type	range
pressure	signed integer	0 1000000
pressure sensor 1	signed integer	0 1000000
pressure sensor 2	signed integer	0 1000000
position	signed integer	0 10000
target position	signed integer	0 10000
cluster valve position	signed integer	0 10000
pressure setpoint	signed integer	0 1000000
position setpoint	signed integer	0 10000
pressure alignment setpoint	signed integer	0 1000000
external digital pressure sensor 1	signed integer	0 1000000
external digital pressure sensor 2	signed integer	0 1000000
cluster valve freeze position	signed integer	0 10000

digital input		digital output	
function	interlock close	function	close
inverted	no	inverted	no
disabled	no	disabled	no

7.1.8 Interface Setup CCLink

Introduction

For setting the CCLink interface configuration, select each parameter according to your host computer. Refer to chapter: «Interface configuration» in the valve manual for details.

Window

Interface Setup

Help Save Refresh Set to Default VAT

communication parameters

station number

operational settings

transmission rate

pdo data

	data type	range
pressure	signed integer	0 1000000
pressure sensor 1	signed integer	0 1000000
pressure sensor 2	signed integer	0 1000000
position	signed integer	0 100000
target position	signed integer	0 100000
cluster valve position	signed integer	0 100000
pressure setpoint	signed integer	0 1000000
position setpoint	signed integer	0 100000
pressure alignment setpoint	signed integer	0 1000000
external digital pressure sensor 1	signed integer	0 1000000
external digital pressure sensor 2	signed integer	0 1000000
cluster valve freeze position	signed integer	0 100000

digital input

function

inverted

disabled

digital output

function

inverted

disabled

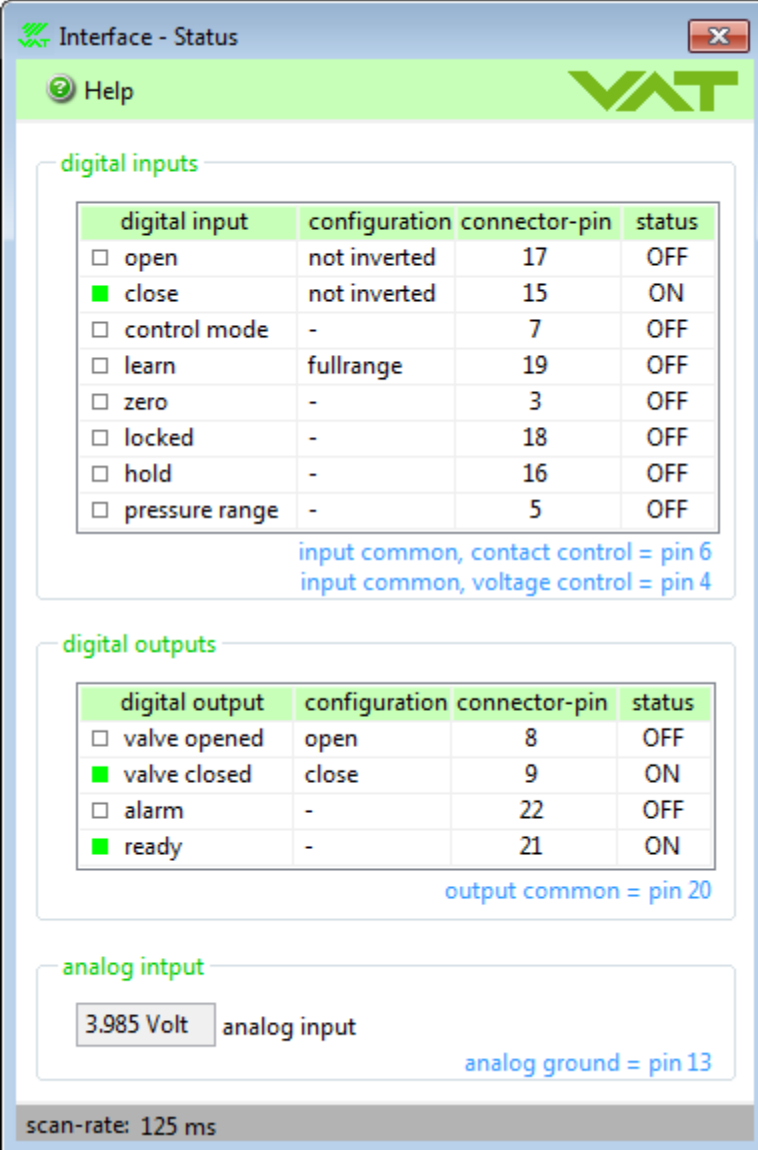
7.2 Status

7.2.1 Interface Status Logic

Introduction

This window shows the Status (digital input / digital output / analog output) of connected valve with Logic interface.

Analog In/Out: Voltage [0...10V]



The screenshot shows the 'Interface - Status' window with a green header bar containing a 'Help' icon and the VAT logo. The window is divided into three main sections: digital inputs, digital outputs, and analog input.

digital inputs

digital input	configuration	connector-pin	status
<input type="checkbox"/> open	not inverted	17	OFF
<input checked="" type="checkbox"/> close	not inverted	15	ON
<input type="checkbox"/> control mode	-	7	OFF
<input type="checkbox"/> learn	fullrange	19	OFF
<input type="checkbox"/> zero	-	3	OFF
<input type="checkbox"/> locked	-	18	OFF
<input type="checkbox"/> hold	-	16	OFF
<input type="checkbox"/> pressure range	-	5	OFF

input common, contact control = pin 6
input common, voltage control = pin 4

digital outputs

digital output	configuration	connector-pin	status
<input type="checkbox"/> valve opened	open	8	OFF
<input checked="" type="checkbox"/> valve closed	close	9	ON
<input type="checkbox"/> alarm	-	22	OFF
<input checked="" type="checkbox"/> ready	-	21	ON

output common = pin 20

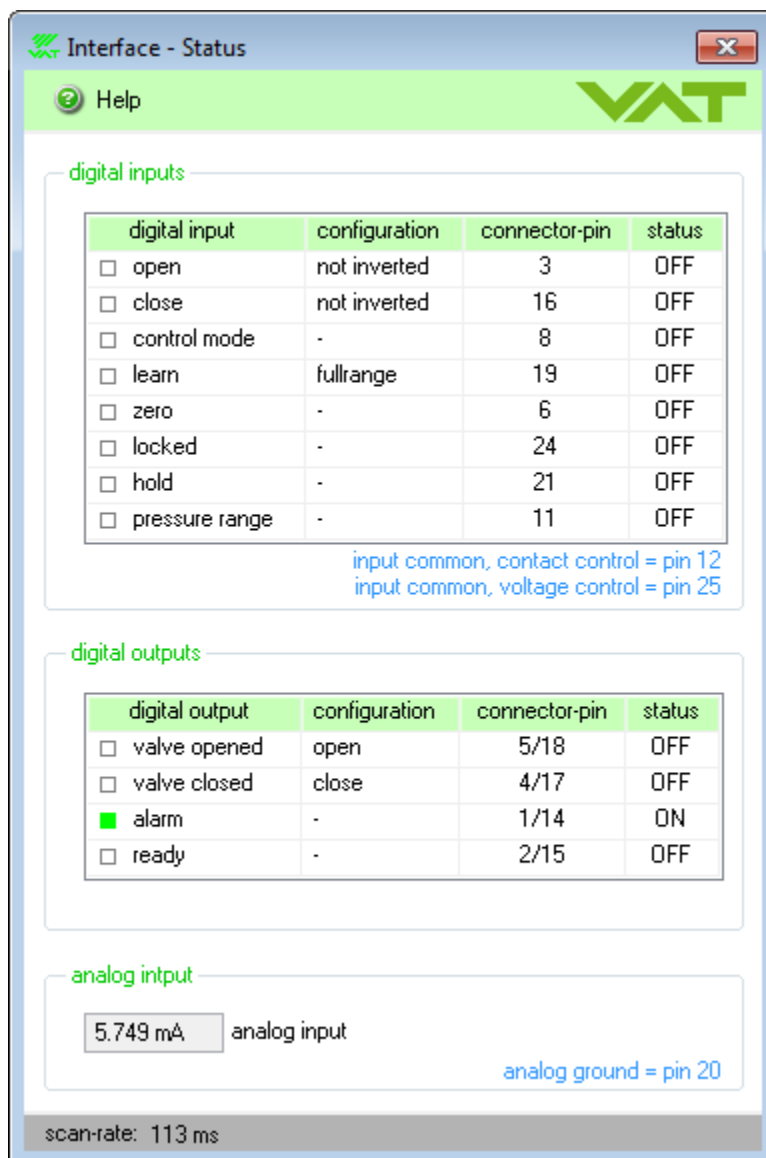
analog input

3.985 Volt analog input

analog ground = pin 13

scan-rate: 125 ms

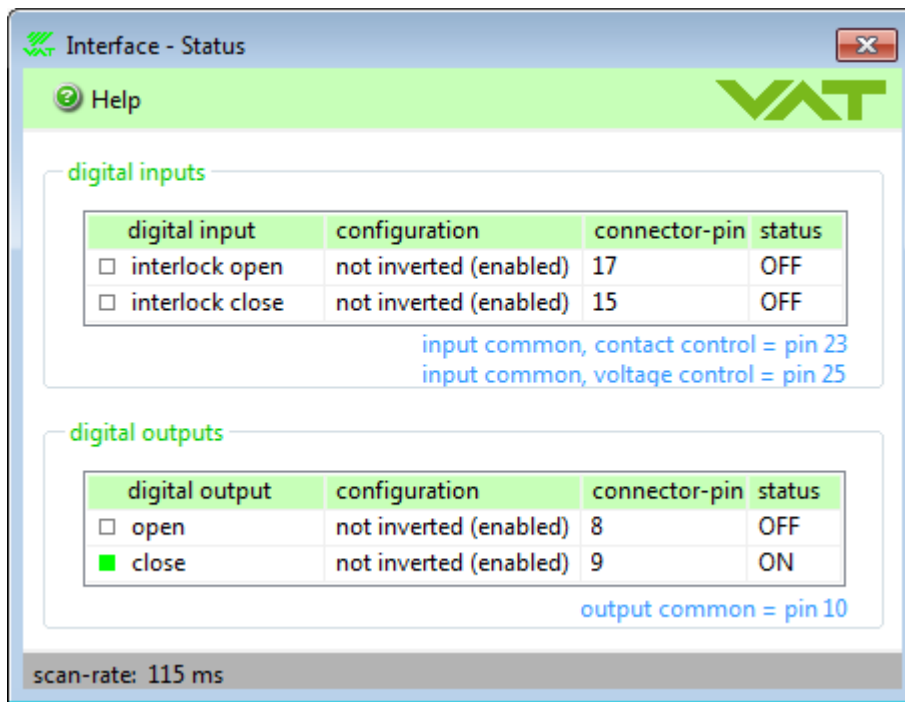
Analog In/Out: Current [4...20mA]



7.2.2 Interface Status RS232

Introduction

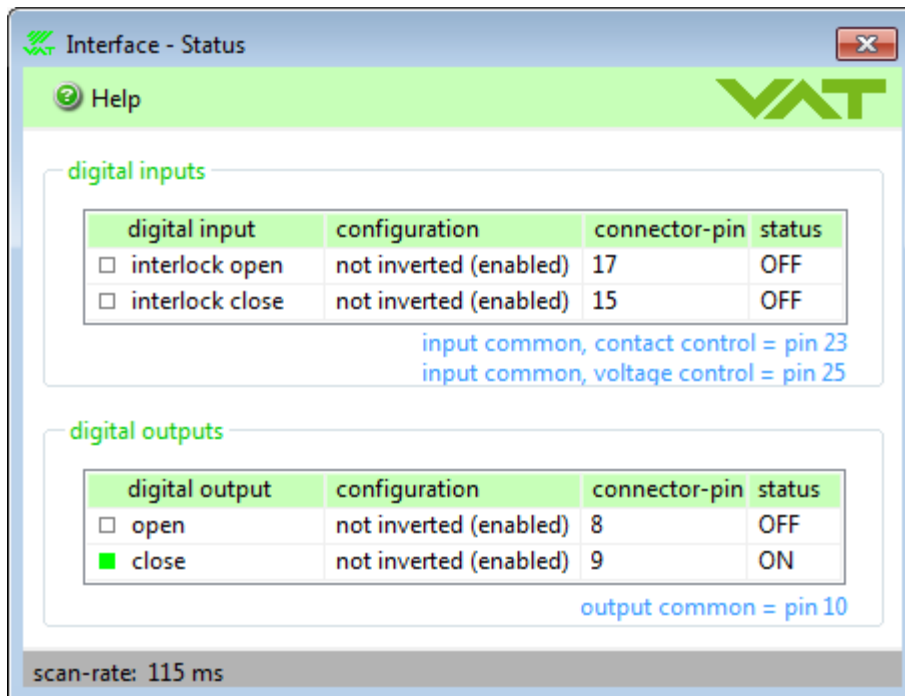
This window shows the Status (digital input / digital output) of connected valve with RS232 interface.



7.2.3 Interface Status RS485

Introduction

This window shows the Status (digital input / digital output) of connected valve with RS485 interface.



7.2.4 Interface Status DeviceNet

Introduction

This window shows the Status of connected valve with DeviceNet interface.

The screenshot shows the 'Interface - Status' window with the following sections:

- device status:** A text field displaying 'idle'.
- exception status:** A list of checkboxes for various alarm and warning levels:
 - ☐ ALARM/device-common
 - ☐ ALARM/device-specific
 - ☐ ALARM/manufacture-specific
 - ☐ undefined
 - ☒ WARNING/device-common
 - ☒ WARNING/device-specific
 - ☐ WARNING/manufacture-specific
 - ☒ expanded mode
- general interface settings:** A table of settings:

MAC address	1 (0x01)
baudrate	500kbaud
firmware ID	520437
serial number	12345
datatype	INT
output assembly	7
input assembly	2
pressure unit	Counts
position unit	Counts
sensor 1 gain	1
sensor 2 gain	1
position gain	1
- digital I/O:** Two tables showing configuration:

digital input	configuration	connector-pin
<input type="checkbox"/> interlock close	not inverted (enabled)	OFF

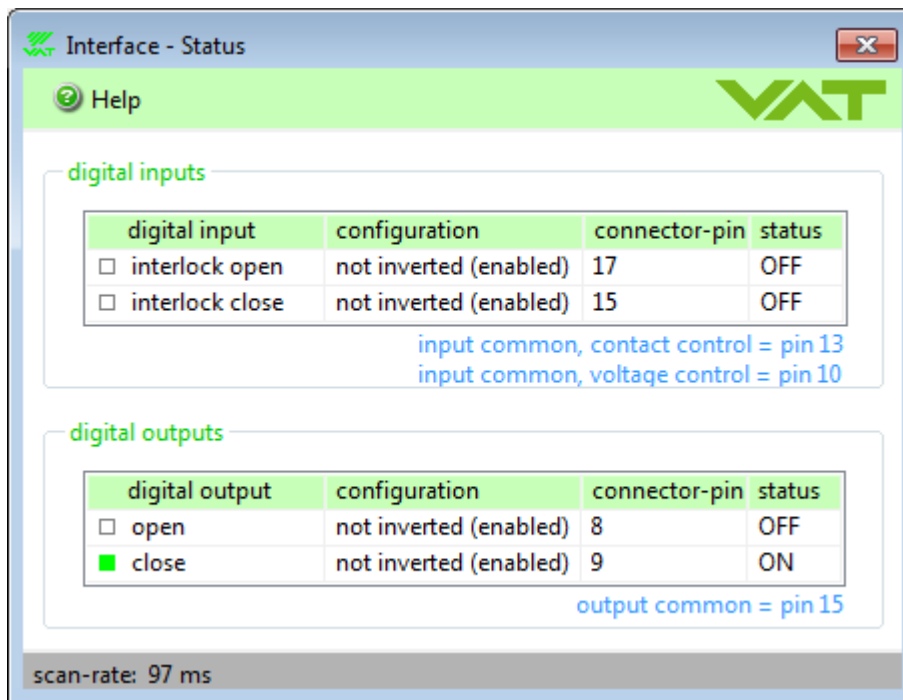
digital output	configuration	connector-pin
<input checked="" type="checkbox"/> close	not inverted (enabled)	ON

At the bottom, a status bar shows 'ready' and 'scan-rate: 95 ms'.

7.2.5 Interface Status EtherNet

Introduction

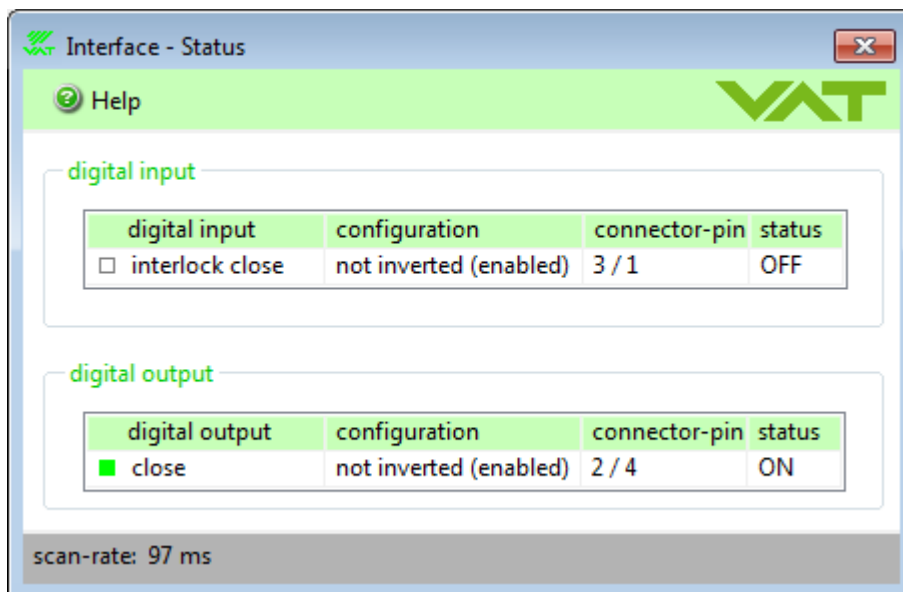
This window shows the Status (digital input / digital output) of connected valve with Ethernet interface.



7.2.6 Interface Status EtherCAT

Introduction

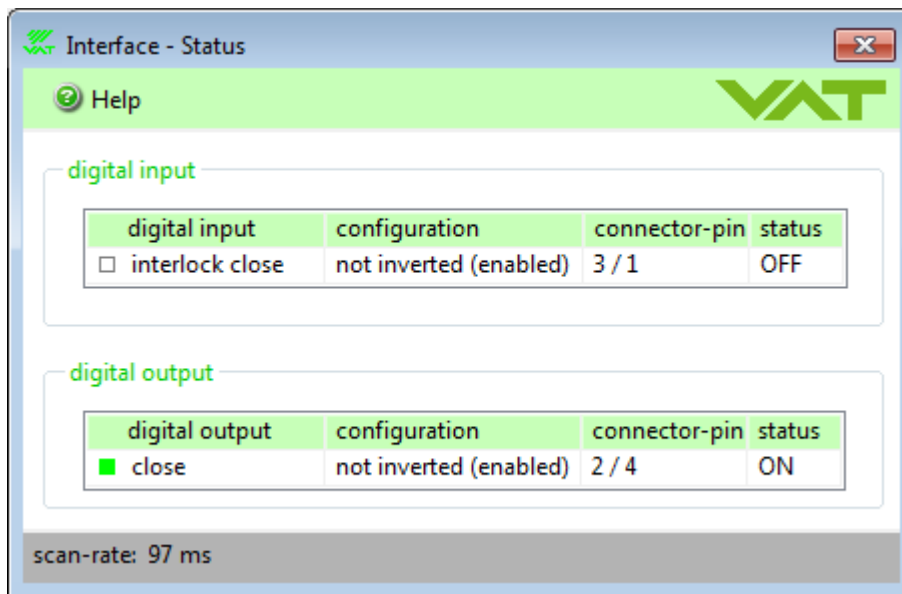
This window shows the Status (digital input / digital output) of connected valve with EtherCAT interface.



7.2.7 Interface Status Profibus

Introduction

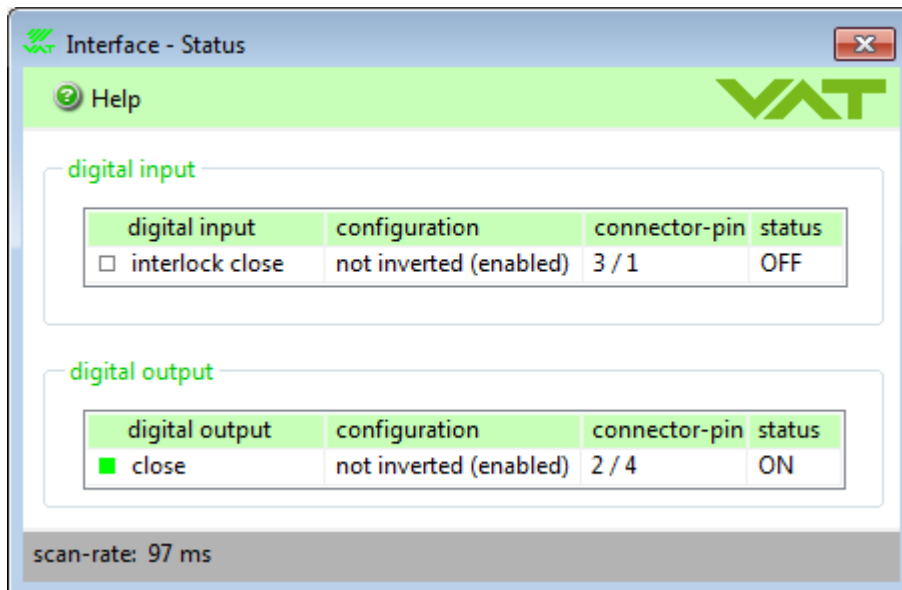
This window shows the Status (digital input / digital output) of connected valve with Profibus interface.



7.2.8 Interface Status CCLink

Introduction

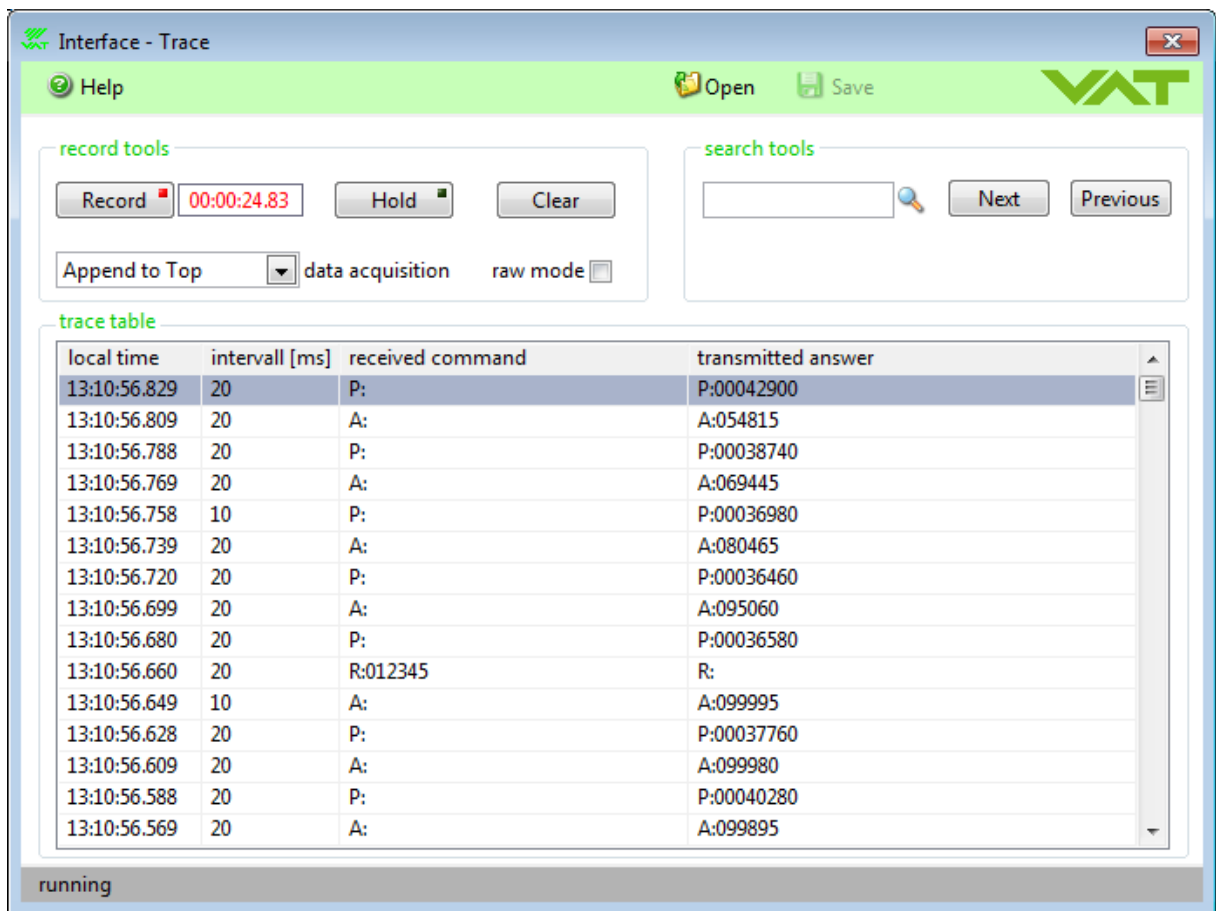
This window shows the Status (digital input / digital output) of connected valve with CCLink interface.



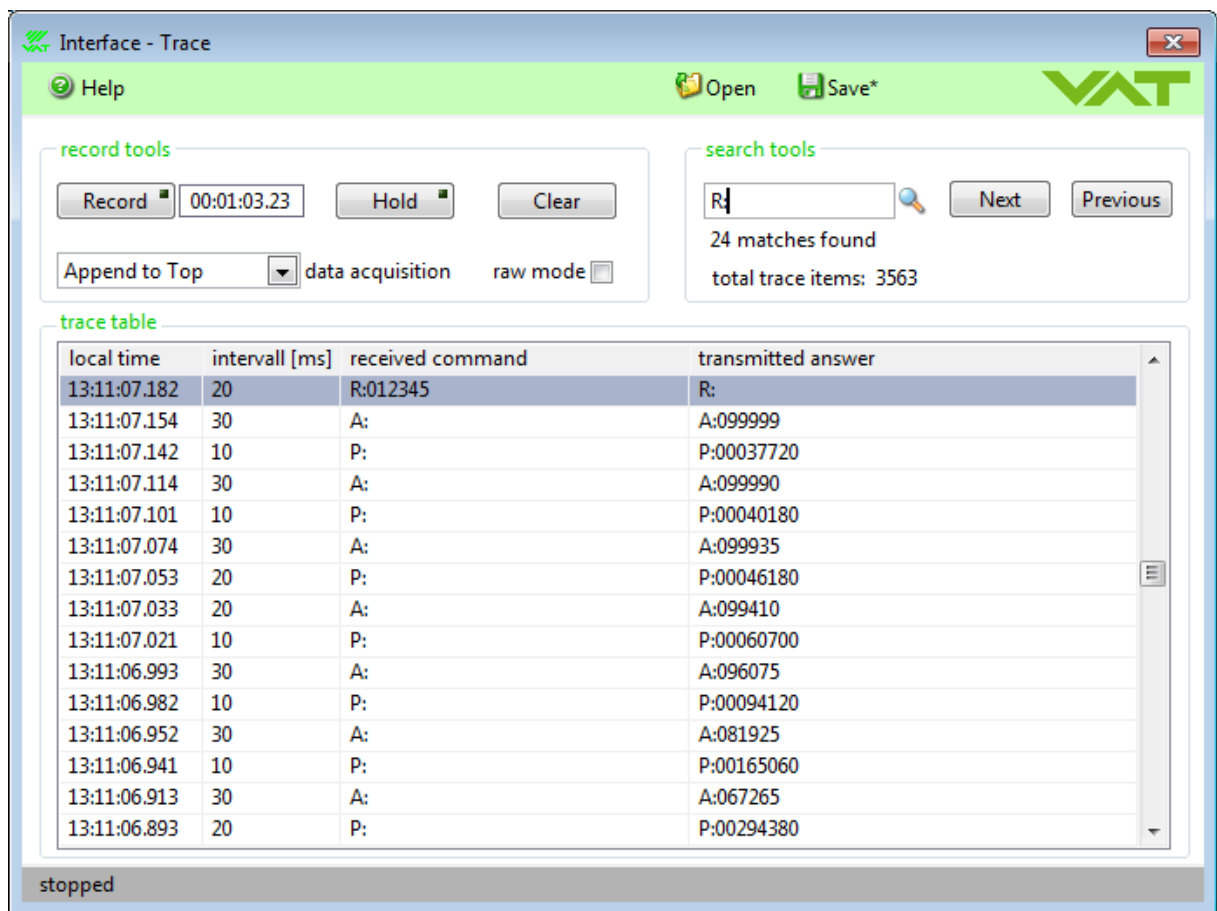
7.3 Trace

Introducing

- Monitoring of communication between interface board in controller and Host computer is possible.
 - History of communication can be saved.
 - Monitoring of communication between interface board (only DeviceNet) in controller and master board in controller is possible.
- Click [Record] to record the communication between interface board and master board in controller ([Hold], hold record / [Clear] delete all recorded data)

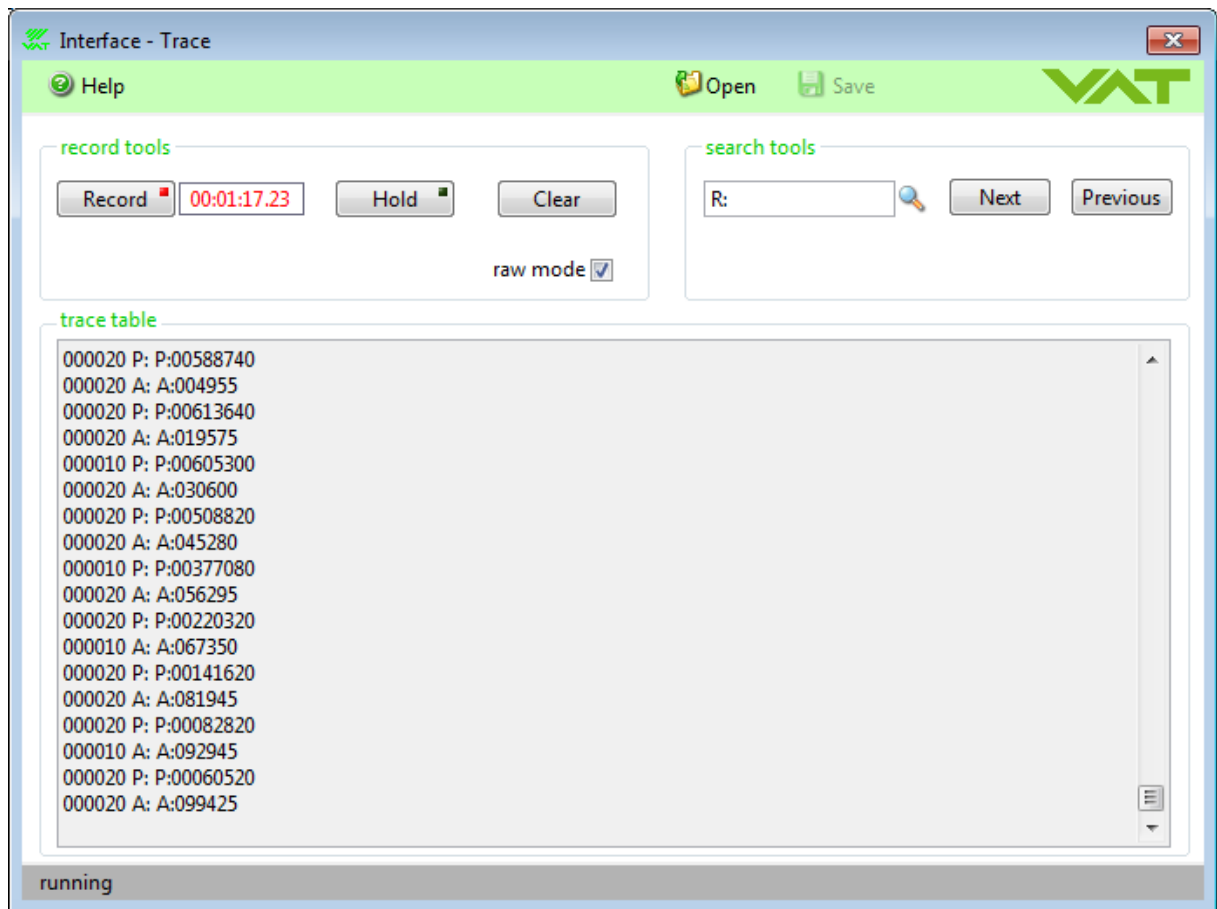


- Click [Record] again to stop the recorded data
 - Click [Save] to save the recorded data (with [Open] opens saved data)
 - For searching entries in trace table, enter **R:** (example) and the search tool chumps automatically to all entries with i
- (with [Next] and [Previous] you can jump to matched entries with i)

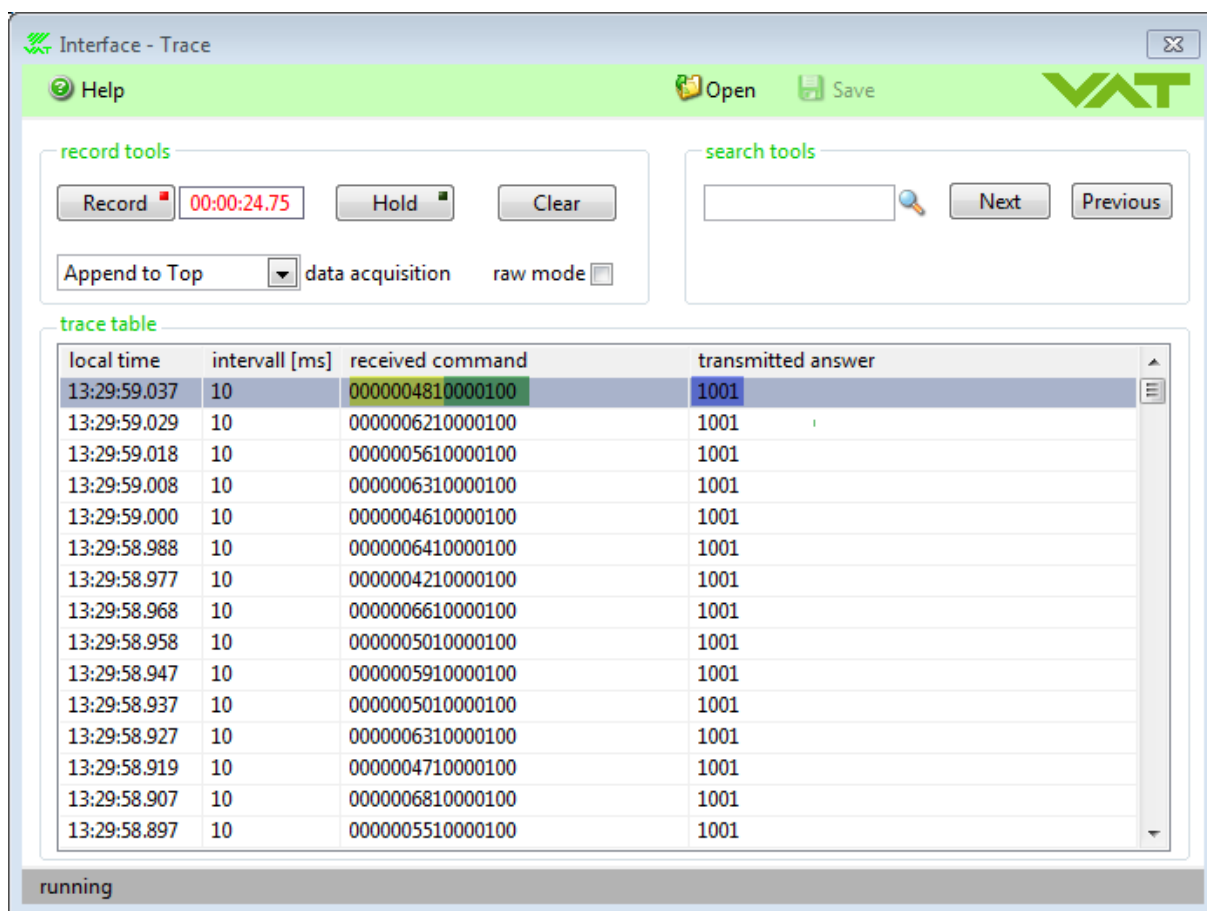


Raw Mode

Shows raw string which is received from the valve



Logic Interface (not supported for all firmware)

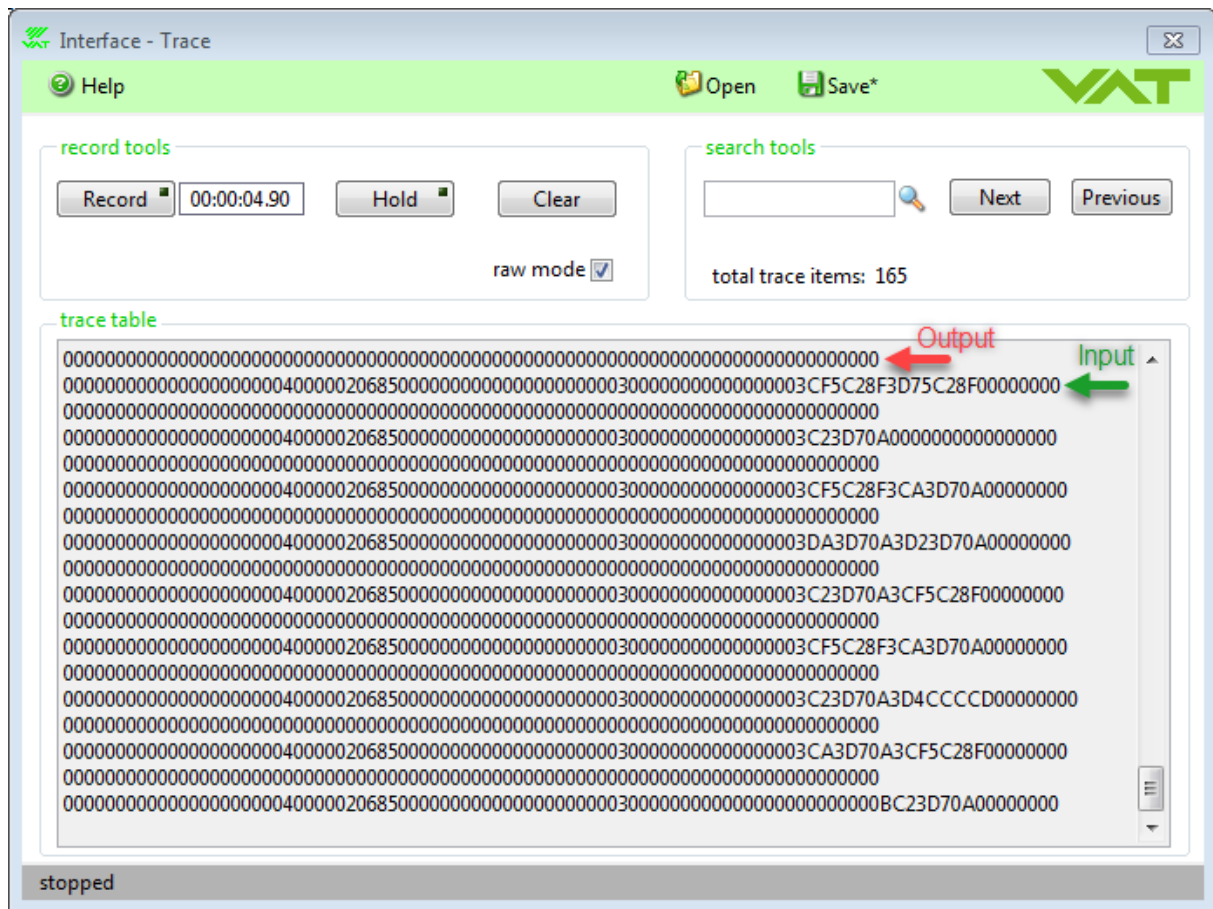


Yellow: Analog Input (10V = 1000000)

Green: Digital Input OPEN | CLOSE | PRESSURE MODE | LEARN | ZERO | LOCKED | HOLD | RANGE

Blue: Digital Output OPEN | CLOSE | ALARM | READY

EtherCAT, Profibus, CCLink (not supported for all firmware)



8 Cluster

8.1 Cluster Setup

Introduction

To setup a valve cluster system each cluster valve needs to be set individually.

Note: It is not possible to configure the cluster valve via the valve cluster connection (using the master valve controller). Hence you need to connect each cluster valve individually to the CPA software for this setup procedure!

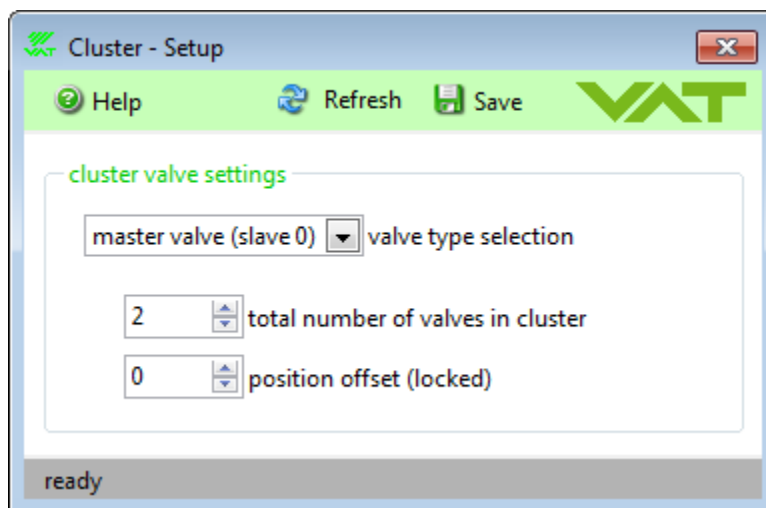
Master valve:

If the desired cluster valve should be configured as a master valve the total number of valves (including the master valve) needs to be entered (e.g. cluster with master and 3 slave valves a total number = 4).

Slave valve:

If the desired cluster valve should be configured as a slave valve the device address needs to be entered. Optional a position offset can be entered for slave valves which can be used for gas-flow optimization within the process chamber.

Window



Note: For more details about Valve Cluster please refer also to valve manual.

8.2 Cluster Status

Introduction

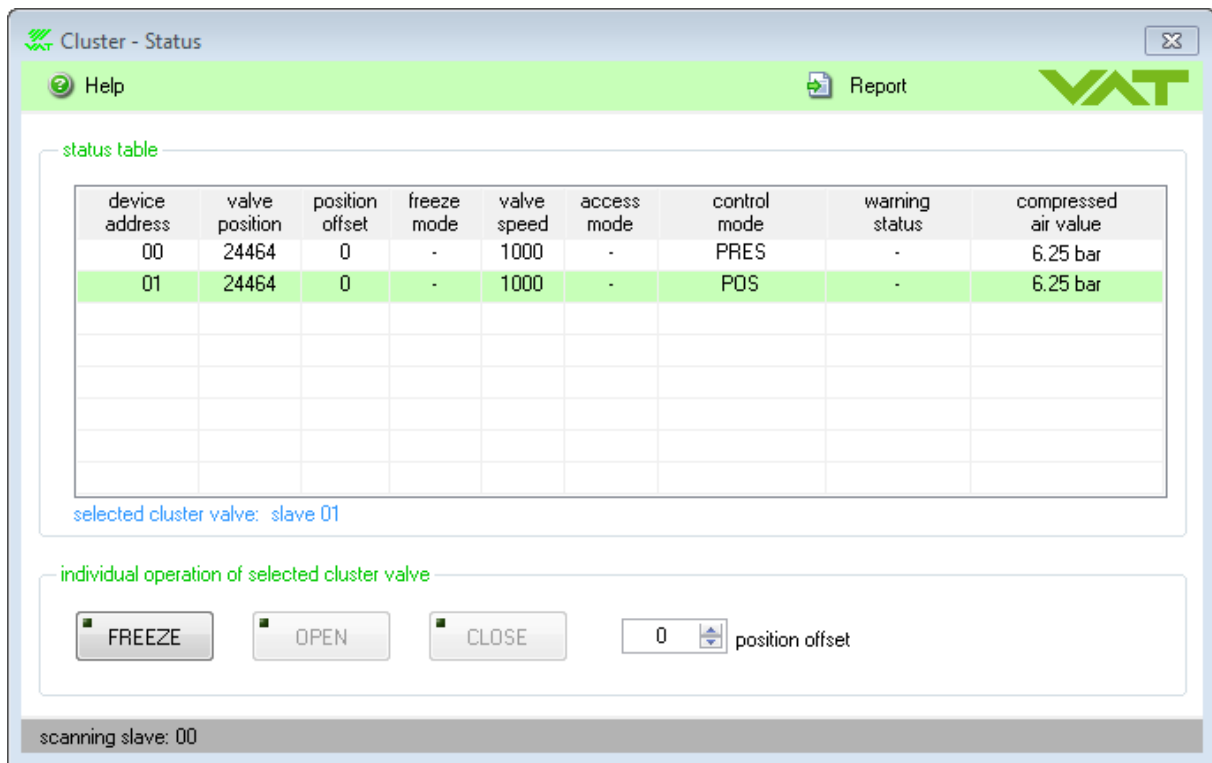
This window shows the status of all cluster valves in a single status table. It is also possible to operate a single cluster valve individually within the valve cluster.

For this you need to select the desired cluster valve in the status-table and press the [FREEZE] button.

Afterward the cluster valve can be controlled individually using the [OPEN] and [CLOSE] button.

The [REPORT] button can be used to save the actual cluster status to a text file or image.

Window



Note: For more details about Valve Cluster please refer also to valve manual.

9 Tools

Introduction

With 'Tools' the following functions can be selected:

➤ Create Diagnostic File

For trouble shooting, Diagnostic File can be made. Refer to: [Diagnostics](#)

➤ Chart Analyzer

A chart data that were recorded by the graph in the main screen can be displayed. You can view multiple charts in one graph provided that all charts are based on the same pressure unit. You can not mix charts with different pressure unit. Edit functions are also available. Refer to: [Chart Analyzer](#)

➤ Terminal

RS232 command can be sent. Refer to: [Terminal](#)

➤ Firmware Download

Firmware can be downloaded to controller. Refer to: [Firmware Download](#)

➤ Run Sequence

Start edited sequence. Run Sequence is displayed on the main screen while the sequence is running. Refer to: [Sequencer](#)

➤ Edit Sequence

Edit of sequence is possible. Save and load sequence is possible. Refer to: [Sequencer](#)

9.1 Diagnostics

Introduction

In case of trouble, please create a 'Diagnostic File' and send it to VAT service for trouble shooting. Integrated Controller records error history until turn off the power. So it will be helpful for us to save the diagnostic file before you turn off the power, in case of trouble.

Create "Diagnostic file"

1. Click [Create Default] for 'Diagnostic file' of the connected valve:

The screenshot shows the 'Tools - Diagnostics' window. The 'file information' section displays the following data:

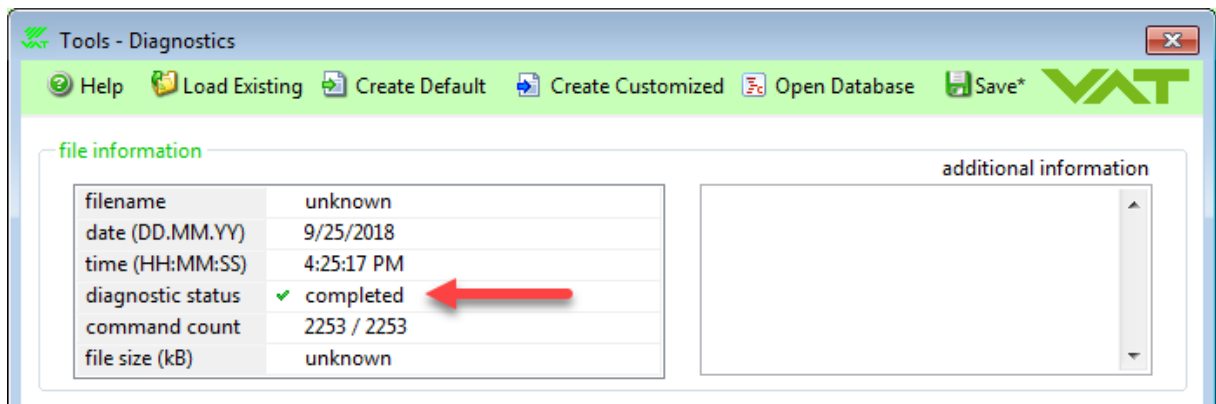
filename	unknown
date (DD.MM.YY)	9/25/2018
time (HH:MM:SS)	4:24:40 PM
diagnostic status	⚠ busy
command count	1688 / 2253
file size (kB)	unknown

The 'data table' section contains a table with the following data:

Command	Answer	Description
i:82	i:82600P1H0002	Ident.Firmware Version
i:83	i:8361534-TEST-MMA1/0001	Ident.Serial Number
i:84	i:84000000	Ident.Firmware Number
i:89	i:890020000000000000	Ident.User String 3, valve conductance
b:3271	b:3271170918	Ident.Firmware Release Date
b:4000	b:400061534-TEST-MMA1/0001	Ident.Serial Number
b:4001	b:4001 706064A	Ident.Config File Number
b:4002	b:4002 715588A	Ident.Drive Parameter Number
b:4003	b:4003 _____	Ident.User String 2
b:4004	b:40040020000000000000	Ident.User String 3, valve conductance
b:4010	b:4010600P1H0002	Ident.Firmware Version
b:4011	b:4011000000	Ident.Firmware Number

The status bar at the bottom shows 'inquire command --> b:2230' and a progress bar labeled 'uploading...'.

2. Wait until 'diagnostic status' is completed and the push [Save] to save the diagnostic file:



Diagnostic file is based on a text file with commands.

With [**Create Customize**] you can load another command text file.

With [**Open Database**] the folder with the default command text file opens.

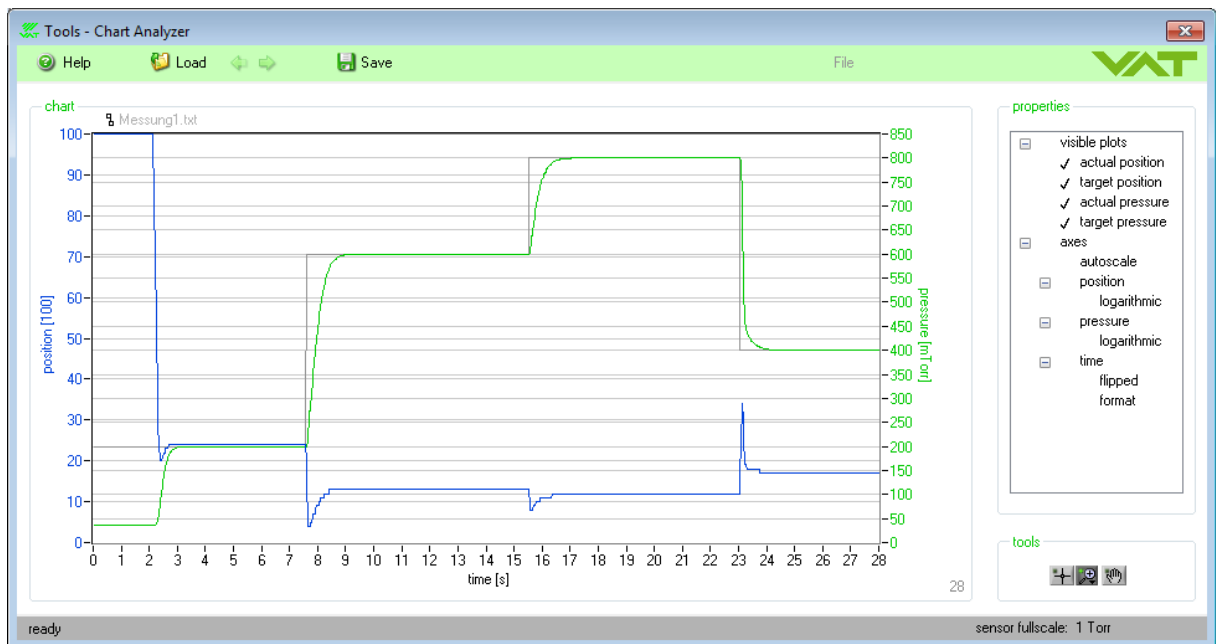
Now it is possible exchange the default command file: DefaultDiagnostic.txt

9.2 Chart Analyzer

Introduction

A chart that was recorded by the graph in the main screen can be displayed. You can view multiple charts in one graph provided that all charts are based on the same pressure unit. Edit functions like zoom-in , zoom-out are also available. The value of each end of each axis can be manually changed. Please enter the preferable value to the each end of axis.

Window



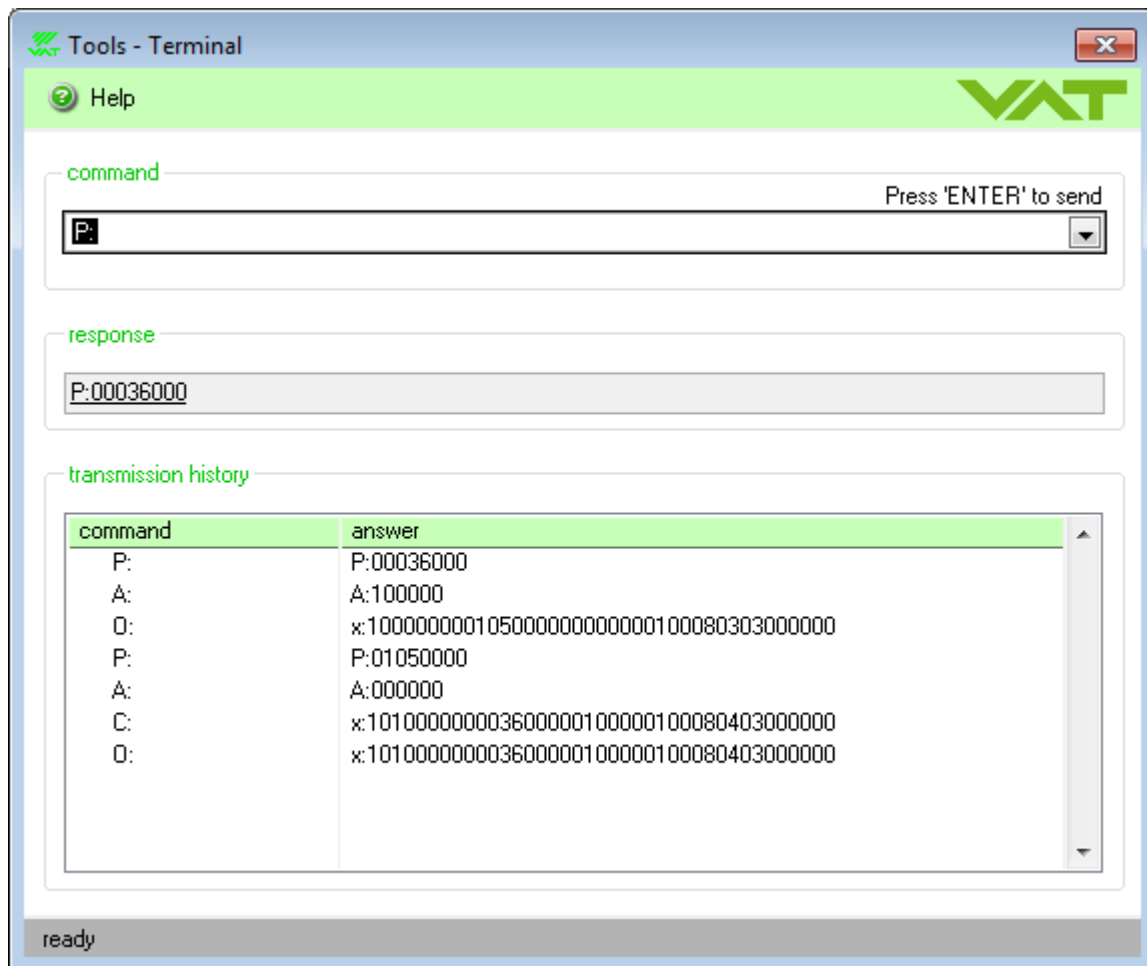
Note: The data in the different pressure unit can not add to the other chart.

9.3 Terminal

Introduction

With 'Terminal' it is possible to send a RS232 command to the controller via the service port.

Window



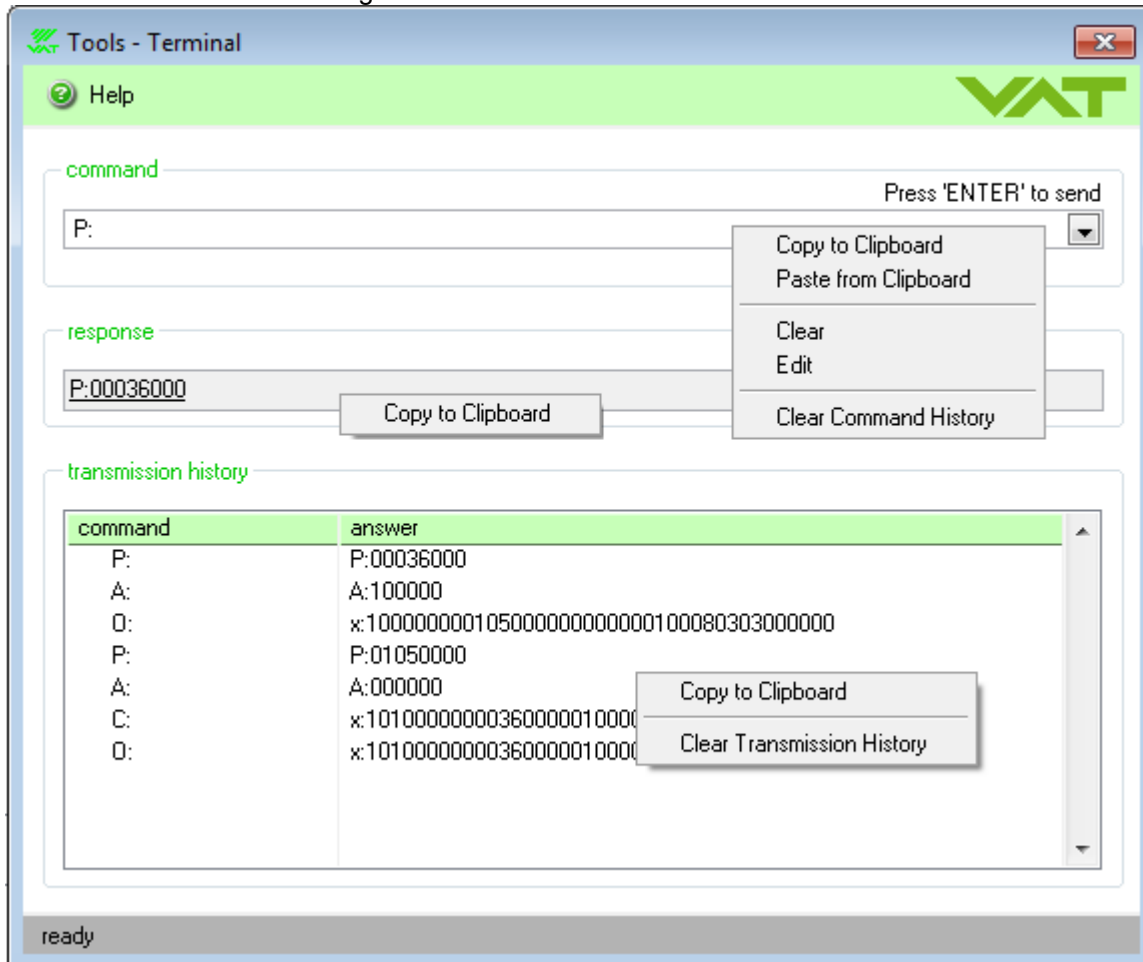
Settings

Example: O: + [Enter], opens the valve.

Note: For detail information about RS232 commands please refer to your valve manual or contact VAT.

Appendix

There are additional tools on right mouse menu:



9.4 Firmware Download

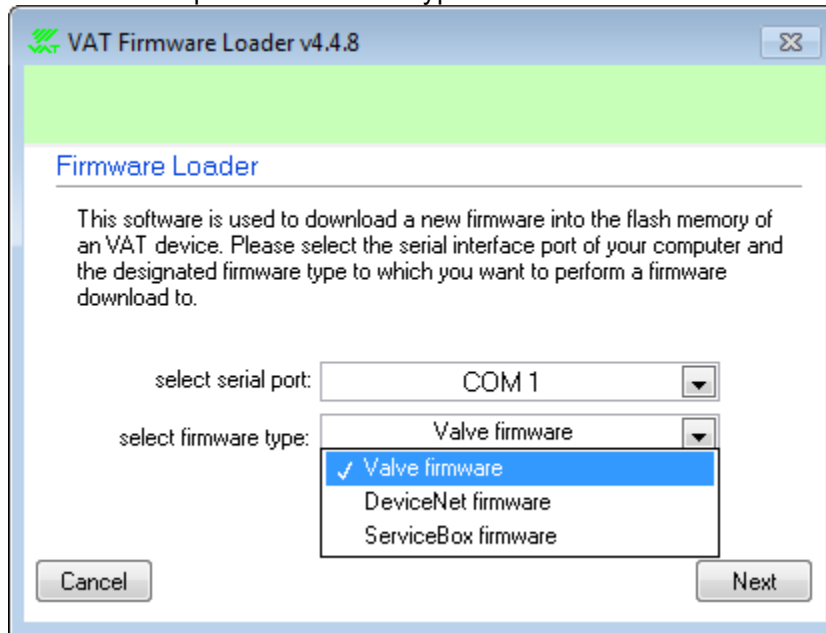
Introduction

'Firmware Download' is used for download VAT firmware to valve controller.

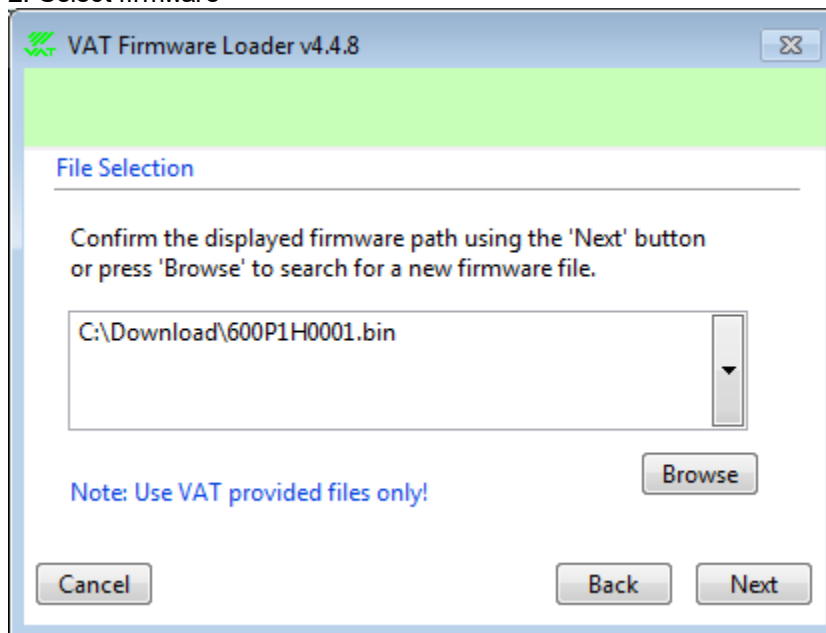
Note: Download only original VAT firmware to valve controller! When a firmware is downloaded make sure that configuration and drive parameters are valid.

Procedure (example)

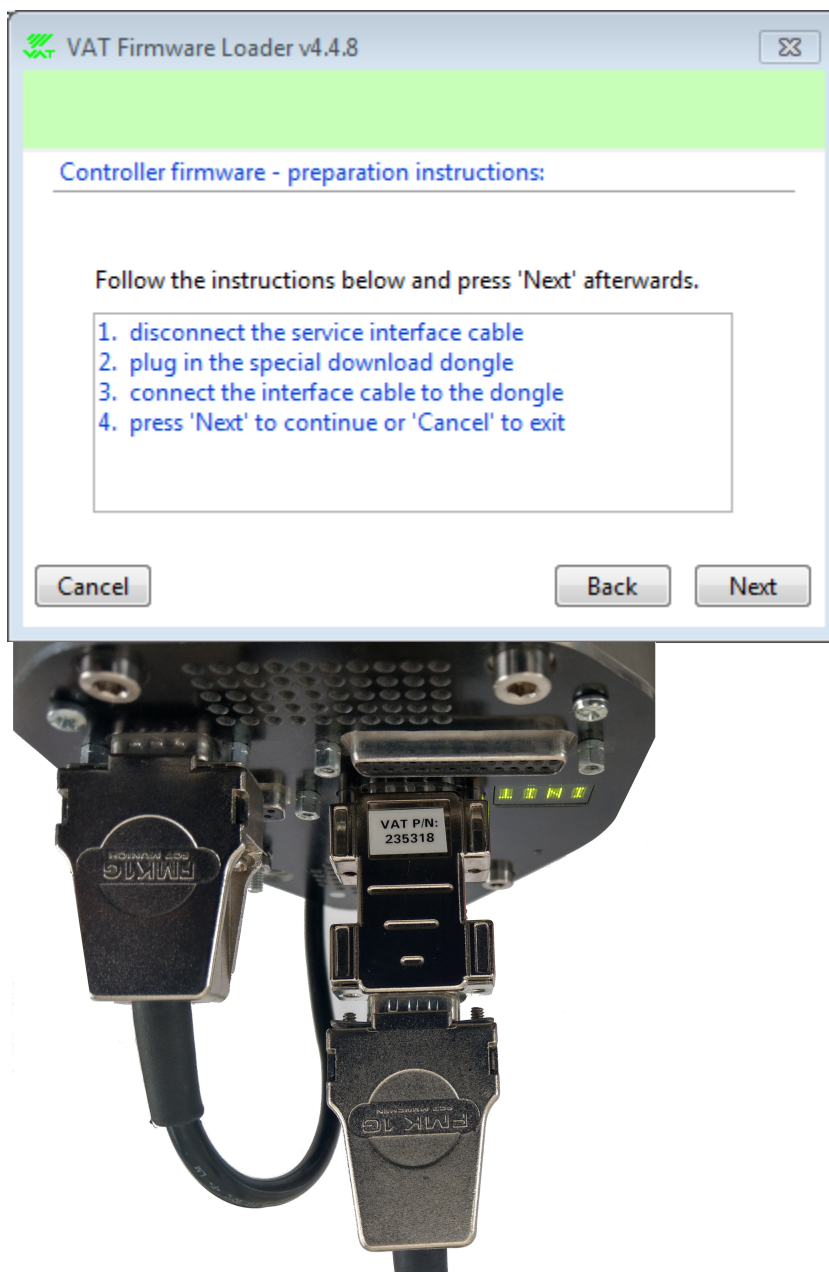
1. Select 'serial port' and 'firmware type'



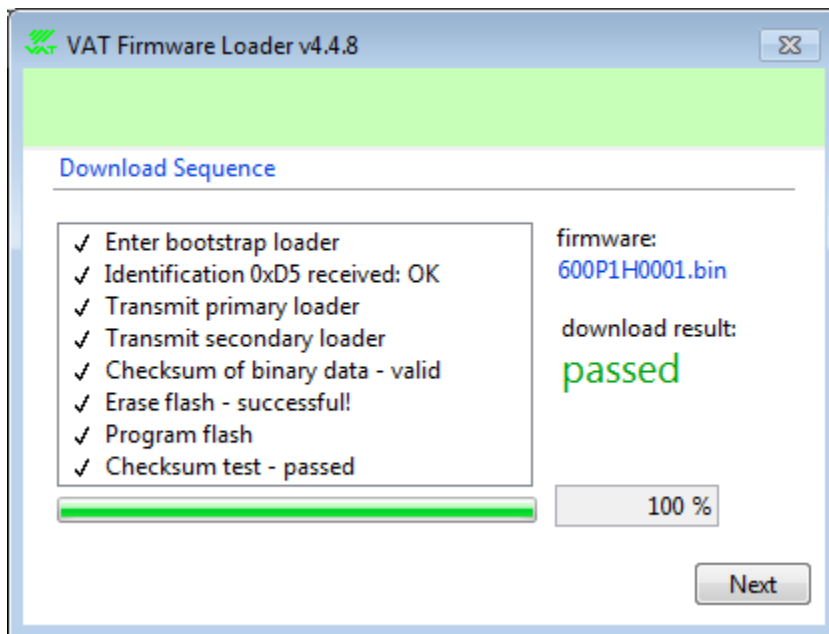
2. Select firmware



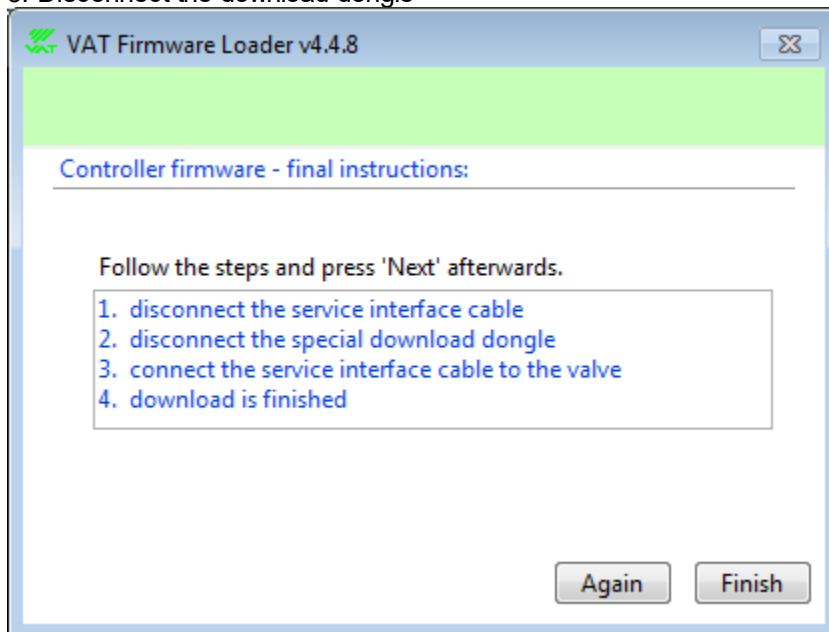
3. Now connect the VAT download dongle



4. Wait until firmware download is finished...



5. Disconnect the download dongle



The Firmware Download is done. You can check the Firmware version on «[Valve Identification](#)»

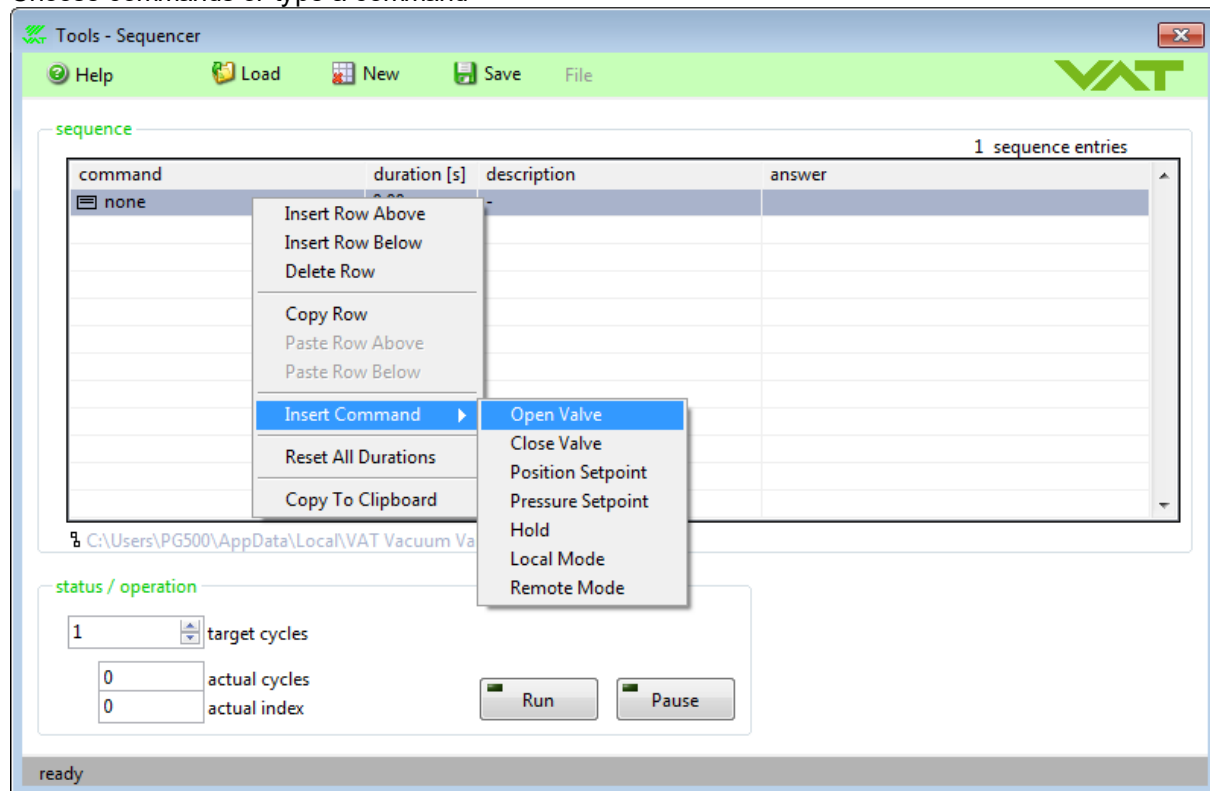
9.5 Sequencer

Introduction

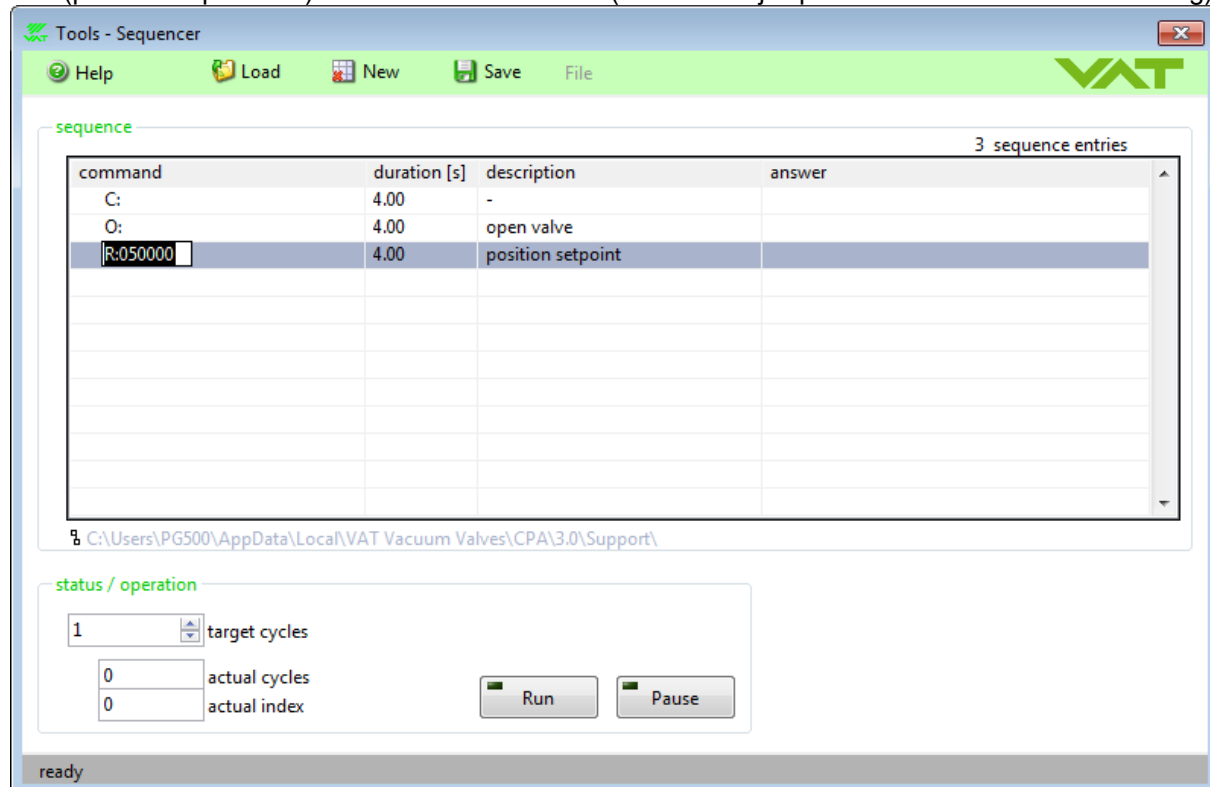
Creating a command sequence.

Window

Choose commands or type a command

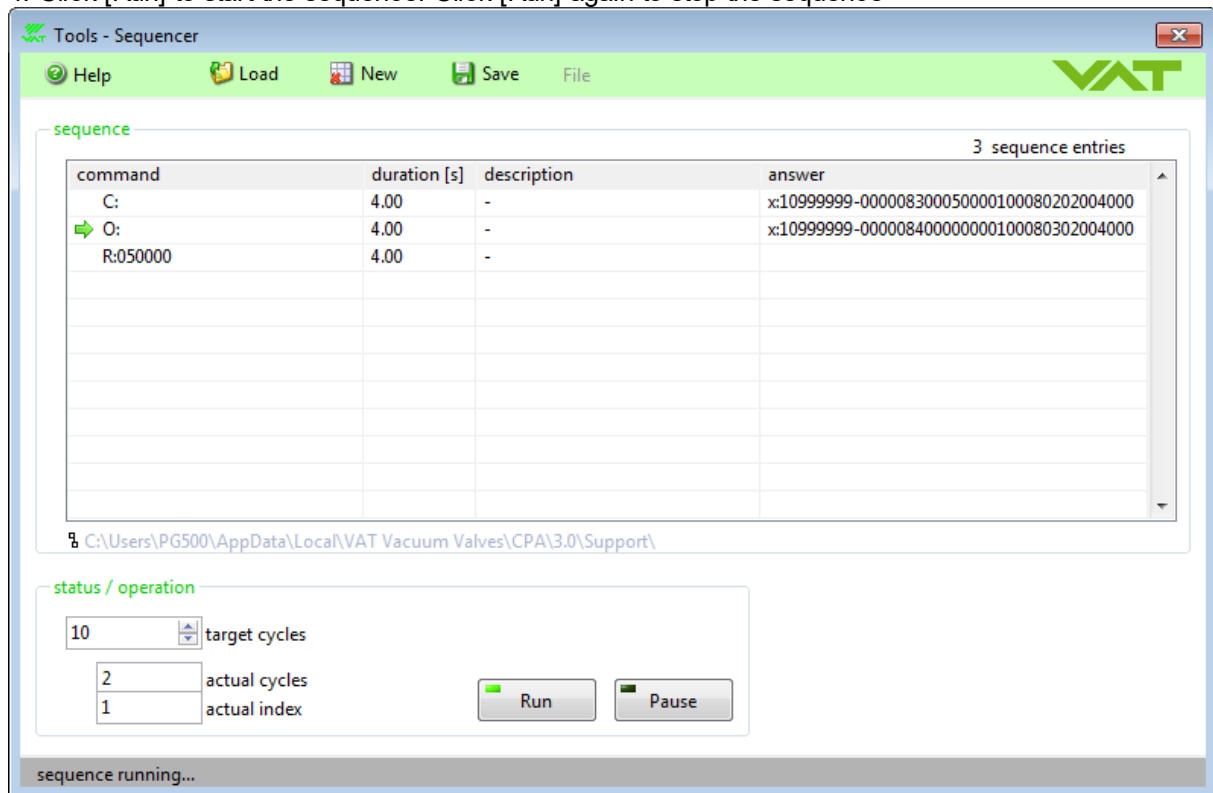


Edit (position or pressure) commands and duration (Use TAB to jump to the end of the command string)



3. Select target cycles

4. Click [Run] to start the sequence. Click [Run] again to stop the sequence



[Load] Load a sequence file

[Save] Saver your sequence

[File],[Clipboard] Load and save to from file or clipboard

[New] Clear sequence

Note: The 'Run Sequence' is displayed on the main screen while the sequence is running.

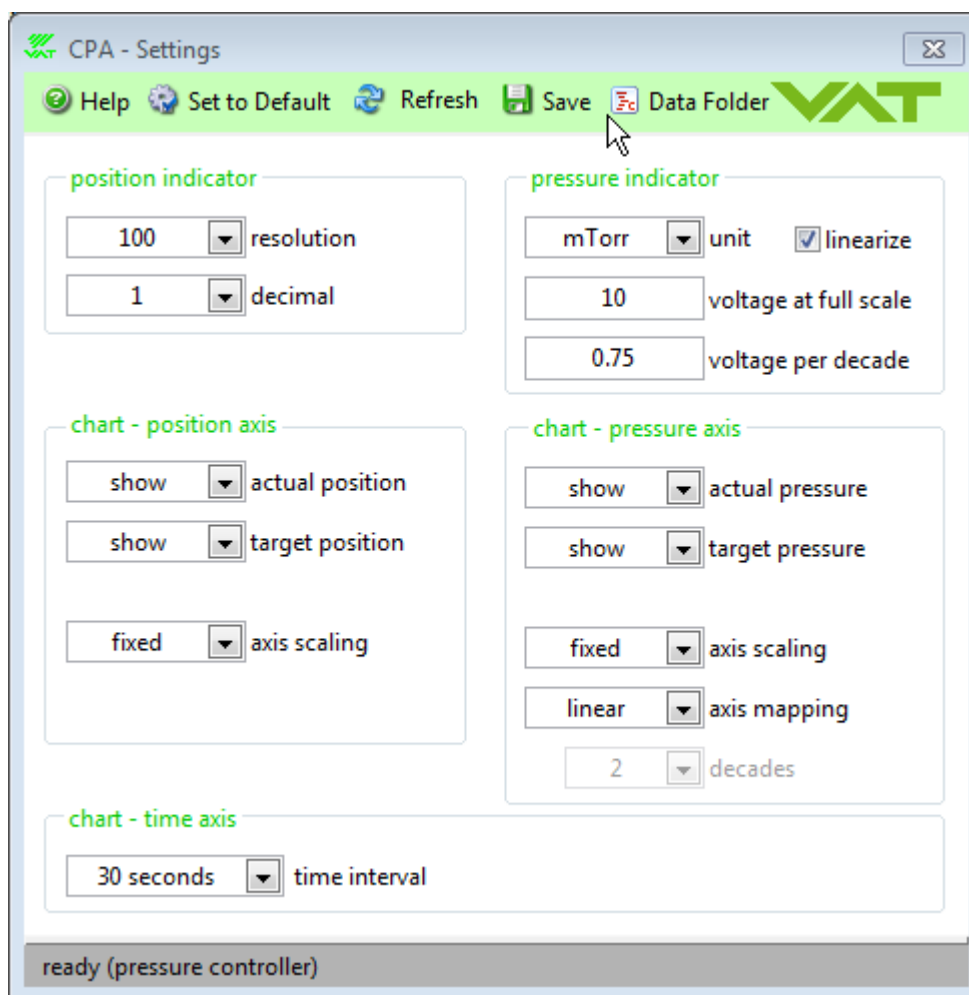
10 CPA

10.1 Settings

Introduction

The CPA Settings are used for adjustment display of position, pressure and time axis.

Window



linearize

If a logarithmic sensor is used, then there are 2 possibilities:

1. Pressure control with the logarithmic signal
 - no linearization on the valve (Linearization 'off' in 'Sensor - Setup')
 - linearization in the CPA (Linearization 'on' in 'CPA - Settings')
 - use of PI pressure control algorithm (adaptive algorithm cannot be used because it needs a linear signal)
 - advantage: whole range of sensor can be used
2. Pressure control with a linearized signal
 - linearization on the valve (Linearization 'on' in 'Sensor - Setup')
 - no linearization in the CPA (Linearization 'off' in 'CPA - Settings')
 - can use adaptive or PI pressure control algorithm
 - disadvantage: only about 4 decades of the sensor range can be used for pressure control

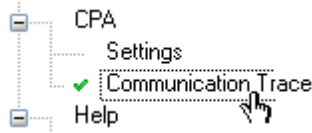
voltage per decade: can be found in the manual of the sensor.

voltage at full scale: can be found in the manual of the sensor, the full scale in pressure unit must be set in 'Sensor - Setup'

10.2 Communication Trace

Introduction

First click on [Communication Trace]...

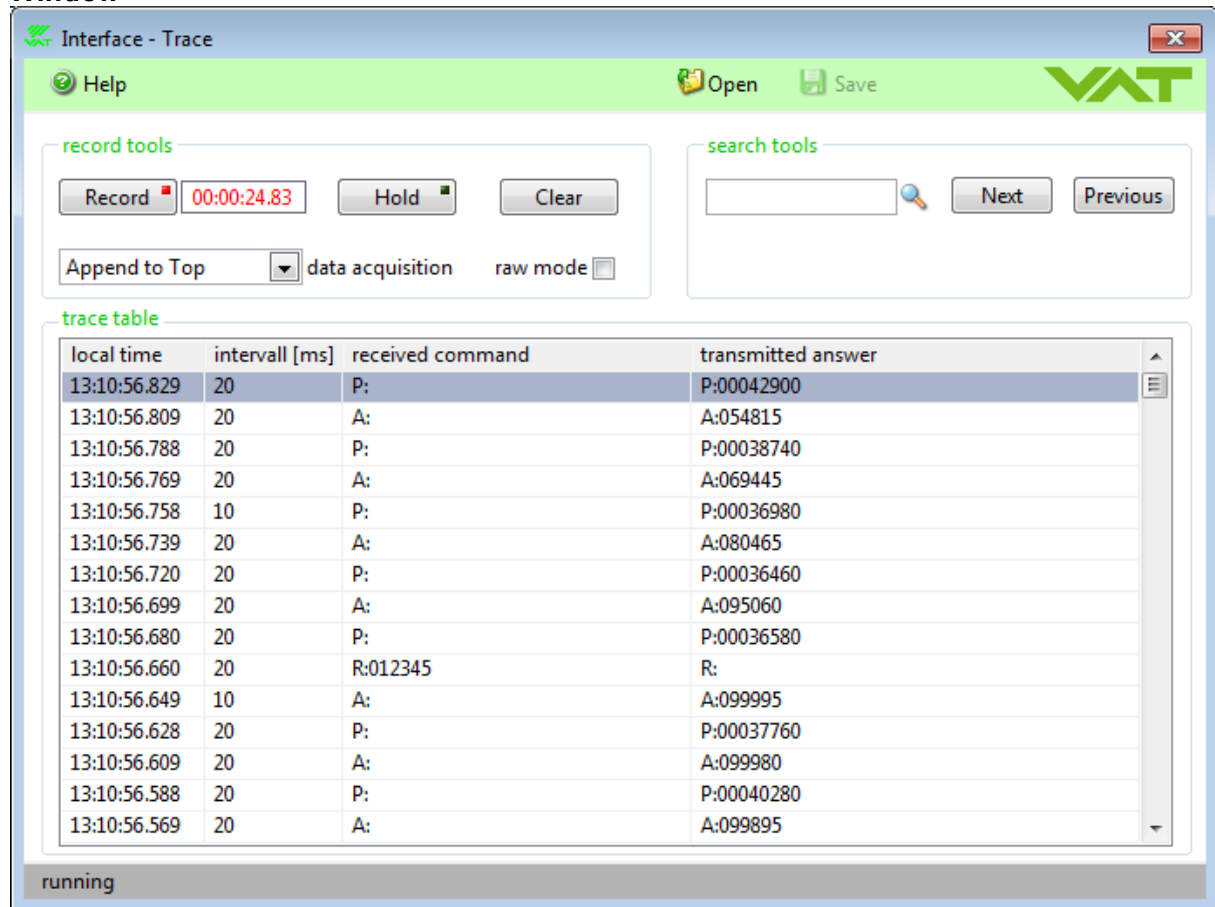


...and 'Communication Trace' is running in the background.

Second click on [Communication Trace] and the window below appears with traced data.

The Communication Trace is used for checking the communication between 'CPA' and valve controller.

Window

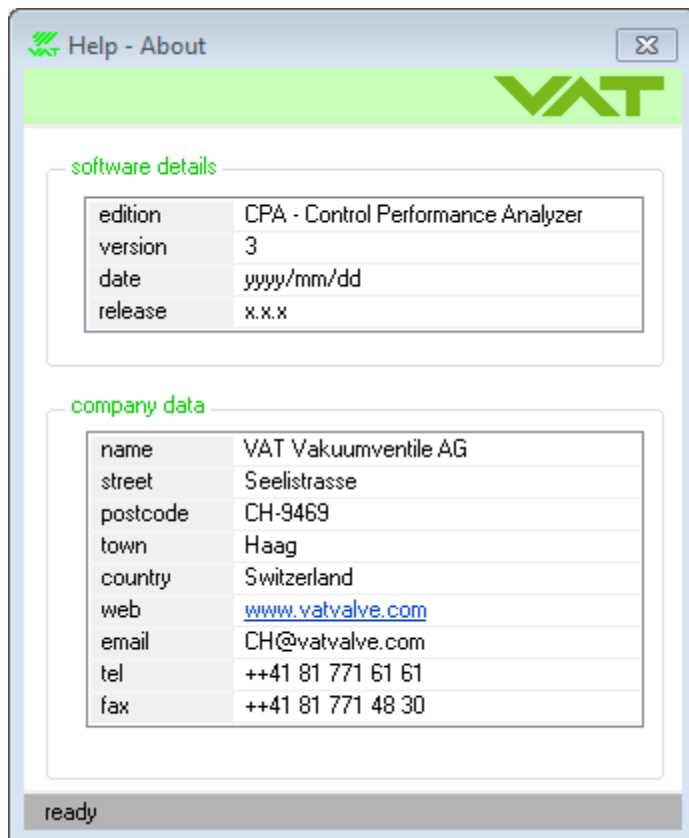


x:10 is the scan command to update the values (pressure, position, control mode, access mode,...) on the surface of the CPA.

It is possible to trace without the x:10 command --> push 'with scan' in the lower right corner to scan without x:10 command.

11 Help

11.1 About



11.2 Visit VAT

<http://www.vatvalve.com>

11.3 Trouble shooting

Failure	Check	Action
No communication to valve	Serial line / service cable Power Supply Motor interlock	Connect cable correctly Look at display on integrated controller (display should show some information)
No action can be executed	Safety bridge on power connector is available	Refer valve manual chapter: Power and Sensor connection for wiring of power-connector
No action can be executed	Check if valve is in 'LOCAL' mode	Change into 'LOCAL' mode

Further more, the below information for fatal error and warning information is included in the CPA

software.

WARNING – INFORMATION:

A warning indicates that the VAT controller is restricted in its functionality. We distinguish between hardware and run-time warnings. There are several warnings that can occur. These warnings are listed below.

Hardware warnings:

- 1) firmware memory failure
reason: flash memory on master board is corrupt
solution: replace master board
- 2) unknown interface board
reason: interface board encoding is missing or faulty
solution: replace interface board
- 3) sensor port 1 signal missing
reason: AD-converter on master board is corrupt
solution: replace master board
- 4) analog signal missing on logic interface
reason: AD-converter on logic interface board is corrupt
solution: replace logic interface board

Run-time warnings:

- 1) service request
reason: motor steps are apparently not effective
solution: the valve needs to be cleaned
- 2) learn parameter failure
reason: learn-parameters are missing or faulty
solution: run learn procedure
- 3) compressed air failure
reason: compressed air is out of range
solution: refer to the 'compressed air status' sub menu for more information
- 4) power fail not ready
reason: ongoing capacitor charging, corrupt capacitor cell(s)
solution: refer to the 'power fail status' sub menu for more information
- 5) sensor factor warning
reason: sensor ratio in sensor transition zone exceeds 10%
solution: sensor malfunction at sensor port 1 or sensor port 2
- 6) isolation valve failure
reason: position indicator failure on isolation valve
solution: refer to the 'isolation valve status' sub menu for more information

FATAL ERROR – INFORMATION

A fatal error indicates a serious problem with the control valve. We distinguish between four fatal errors which are:

1) ERROR CODE 20

Group: position failure
Phase: synchronization
description: mechanical stop not found
possible reasons: a) clutch disengaged
 b) mechanical stop broken
 c) shaft broken

2) ERROR CODE 21

Group: position failure

Phase: synchronization

description; rotation angle of valve plate limited during power up

possible reasons: a) valve unit heavy contaminated
b) valve plate mechanically obstructed
c) valve plate centric adjustment failure
d) ball bearings broken
e) control and actuating unit failure

2) ERROR CODE 22

Group: position failure

Phase: normal operation

description; rotation angle of valve plate limited during normal operation

possible reasons: a) valve unit heavy contaminated
b) valve plate mechanically obstructed
c) ball bearings broken
d) control and actuating unit failure

2) ERROR CODE 40

Group: hardware failure

Phase: synchronization

description; motor driver failure

possible reasons: a) motor driver controller failure
b) motor driver wiring failure

Please also refer to the trouble shooting of valve manual.

If you need any further information, please contact one of our service centers. You can find the addresses on our website: <http://www.vatvalve.com>

11.4 Spare parts

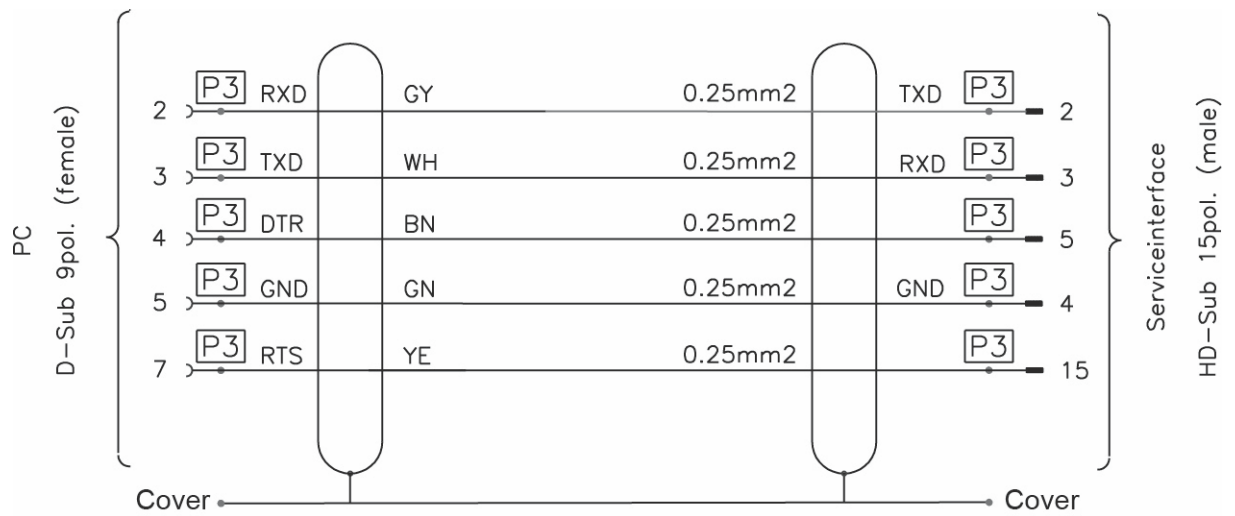
Introducing

For ordering the 'Service cable' please specify the fabrication number of the valve (see label on valve) when ordering spare parts. This is to ensure that the appropriate spare parts are supplied.

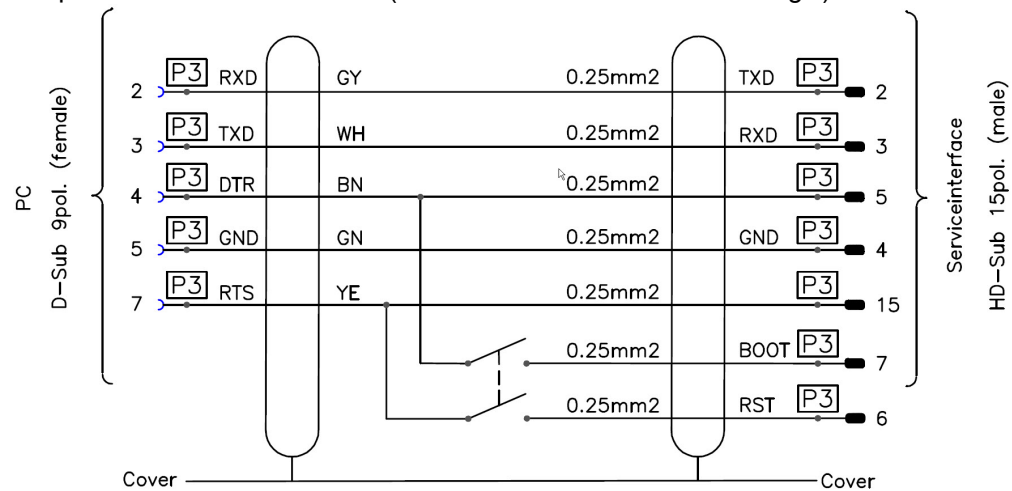
Item	Description	Ordering No.
1	Service cable 2 m (between computer and valve)	230327
2	Service cable 10 m (between computer and valve)	246056

For building the service cable by yourself, please use the following drawing.

You need a 5 line cable, 1 piece D-Sub 9pin female, 1 piece HD-Sub 15pin male (3 rows D-Sub).



Adaption for firmware download (instead of firmware download dongle):



Back Cover