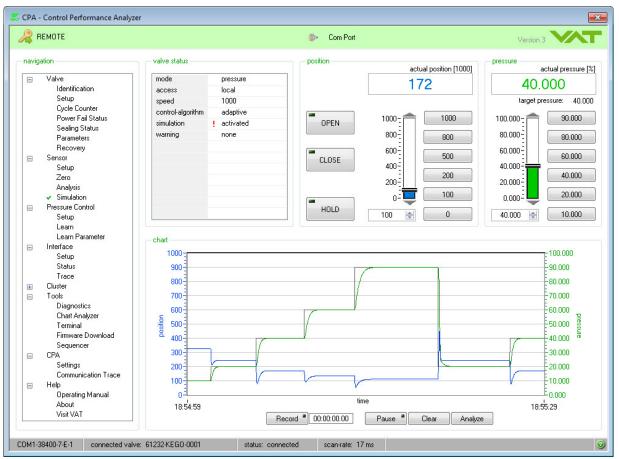
# **Control Performance Analyzer 3**

Release 2.1.5

## **Operating Manual**

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### Imprint

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## 1 Introduction

Keip - About       Software details         edition       CPA - Control Performance Analyzer         version       3         date       yyyy/mm/dd         release       x.x.x         company data         name       VAT Vakuumventile AG         street       Seelistrasse         postcode       CH-9469         town       Haag         country       Switzerland         web       www.vatvalve.com         email       CH@vatvalve.com         tel       ++41 81 771 61 61         fax       ++41 81 771 48 30	Version 3	Release 2.1.5	
software details         edition       CPA - Control Performance Analyzer         version       3         date       yyyy/mm/dd         release       x.x.x         company data         name       VAT Vakuumventile AG         street       Seelistrasse         postcode       CH-9469         town       Haag         country       Switzerland         web       www.vatvalve.com         email       CH@vatvalve.com         tel       ++41 81 771 61 61		n	
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country     Switzerland       web     www.vatvalve.com       email     CH@vatvalve.com       tel     ++41 81 771 61 61			
web www.vatvalve.com email CH@vatvalve.com tel ++41 81 771 61 61		-	
email         CH@vatvalve.com           tel         ++41 81 771 61 61	-		
tel ++41 81 771 61 61			
		_	
fax ++41 81 771 48 30			
	fax	++41 81 771 48 30	
	ready		

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## 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", "updownload 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: <u>«Connect Valve to PC</u>»

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:

🖏 VAT - Control Performance Analyzer 3	- • •
Leader in Vacuum Valves	
Welcome to the installation of the Control PerformanceAnalyzer 3	
System Requirements: Windows® 7 or later	
Please wait while the installer initializes.	
	Cancel
	Cancel

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

9

💹 VAT - Control Performance Analyzer 3	[	- • •
<b>Destination Directory</b> Select the installation directories.		VAT
All software will be installed in the following locations. To install software into a different location, click the Browse button and select another directory.		
Directory for VAT - Control Performance Analyzer 3		
C:\Program Files (x86)\VAT Vacuum Valves\CPA\3.0\	Bro	wse
Directory for National Instruments products		
C:\Program Files (x86)\National Instruments\	Bro	wse
<< Back Next		Cancel

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

😡 VAT - Control Performance Analyzer 3	
License Agreement You must accept the licenses displayed below to proc	reed.
Software License Title to all software provided as separate modules or embedded remain the property of VAT or VAT's licensors. VAT grants to C the Software together with the Goods. Customer shall not decor the Software, and may create derivative works only to the exter sublicense, assign, copy, distribute or disclose any portion of the	ustomer a non-exclusive, limited license to use mpile, disassemble or otherwise reverse engineer nt permitted by VAT. Customer shall not e Software to a third party without the express
written consent of VAT. Customer may transfer or sell its license the Goods to a transferee which has accepted this Article in wr	
	I accept the License Agreement. I do not accept the License Agreement.
	<< Back Next >> Cancel

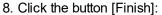
6. Click the button [Next]:

### 10 Operating Manual

WVAT - Control Performance Analyzer 3	
Start Installation Review the following summary before continuing.	VAT
Upgrading • VAT - Control Performance Analyzer 3	
Adding or Changing • NI-VISA 14.0 Run Time Support	
I	
Click the Next button to begin installation. Click the Back button to change the installation settings.	
Save File << Back Next >>	Cancel

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

😡 VAT - Control Performance Analyzer 3	
$\sim$	
Overall Progress: 25% Complete	
Validating install	
	<< Back Next >> Cancel



IVAT - Control Performance Analyzer 3			
Installation Complete			VAT
Serial Interface Port (COM-Port) → Real or Virtual Note: If your computer hardware doesn't support a real on a DB9 male connector please read the following info	serial interface port (	COM - communica	tions port) based
USB-to-RS232 Converters / PCMCIA Cards The communication between the valve controller and th is based on the serial RS232 protocol. If your hardware usually DB9 connector) you can use a USB-to-RS232 c port. Usually USB (universal serial bus) is the commonly a USB-to-RS232 converter can be used to communicate Experience has shown that some USB-to-RS232 conver RS232 converter with FTDI chipset. Alternatively you c	e doesn't support a re- converter to extend yo y used interface port o e with the service por erters do not work pro	al serial interface p pur hardware with on most computer t of the valve cont pperly. VAT recom d to expand your of	port (COM port, a virtual COM equipment. Hence troller. mends USB-to-
	<< Back	Next >>	Finish

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

VAT - C	ontrol Performance Analyzer 3.0	$\times$
Q	You must restart your computer to complete this operation. If you need to install hardware now, shut down the computer. If you choose to restart later, restart your computer before running any of this software.	
	Restart Shut Down Restart Later	

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.

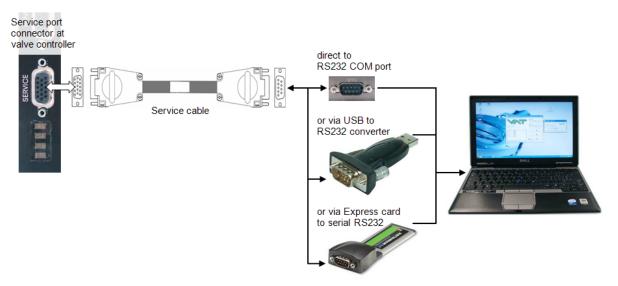
COM4-38400-7-6	-1 connected valve: 61532-KEAP-ANC2/0010	status: connected	scan-rate: 19 ms	

## 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: «<u>Spare parts</u>». 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 than the letters 'C' and '0', 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 >

👯 Control Performance Analyzer 3.0 🛛 📐

- 2. After start up is finished, the 'Control Performance Analyzer' displays it start up screen. (example see below)
- 3. Proceed with: «Connect CPA to VAT valve»

🧱 CPA - Control Performance Analyzer		ß
🔏 LOCAL	∯≻ Com Port	Version 3.0
navigation     valve status       Valve     mode       Sensor     access       Pressure Control     speed       Interface     control-alg       Cluster     warning       Tools     Help	none OPEN 1000 1000	pressure           actual pressure [mTorr]           -7           10000           8000           6000
		4000     6000       2000     4000       0     2000       0     1000
chart 1000 900 800 700 5	Serial Port Status Connected Device	10000 9000 8000 7000 6000 g
500 500 8 400 300 100 100 1858	25 time Record 100:00:00 Pause 1 Clear Analyz	5000 4000 2000 1000 18:59:05 ze
COM1-38400-7-E-1 connected valve: 61534-TEST-N		0

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

According to the type of valve (S61.2, S65IC, 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)

<b></b>	Com P	ort		Versi
🐰 Serial Port Sel	ection			×
④ Help		Enter CPA 🗼		T
Software Mod	le			
Connect to				-
✓ Connect				
Stand-A	lone Op	eration		
Serial Port	Status	Connected Device	e	*
👯 COM1	ready	61534-TEST-MM4	1/0001	
COM3	ready	none		
COM7	ready	none		
				*
Bootload	controll	er-firmware initially	1	
port scan enable	ed		VAT Device	s: 1

### 3.3.1 Connect CPA to VAT valve

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

👯 Serial Port Sel	ection			×
Ø Help		Enter CPA 🔿		T
Software Mod	VAT Val	ve		
Serial Port	Status	Connected Device	1	*
👯 COM1	ready	61534-TEST-MMA	1/0001	
COM3	ready	none		
COM7	ready	none		
				-
Bootload controller-firmware initially				
port scan enable	ed		VAT Device	s: 1

#### 2. Click [Enter CPA]

👯 Serial Port Sel	ection			×		
Ø Help	❷ Help Enter CPA 🐳 💙					
Software Mod	Software Mode					
Connect to	VAT Val	ve				
Serial Port Sel	ection					
Serial Port		Connected Dev				
👯 COM1	ready	61534-TEST-MN	MA1/0001			
COM3	ready	none				
COM7	ready	none				
				-		
Bootload	controll	er-firmware initia	lly			
port scan enable	ed		VAT Device	es: 1		

**Note:** The 'Control Performance Analyzer' is now ready for operation use. Refer to: «<u>Basic functions –</u> <u>use LOCAL MODE</u>».

### 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]

👯 Serial Port Sel	ection		<b>X</b>
Help		Enter CPA 🛸 💦	
Software Mod	le		
Stand-Alon	e Operat	ion	•
Serial Port Sel	ection –		
Serial Port	Status	Connected Device	*
🗶 COM1	ready	61534-TEST-MMA1/00	001
COM3			
COM7			
			-
Bootload	controll	er-firmware initially	
port scan disabl	ed	VAT	Devices: 1

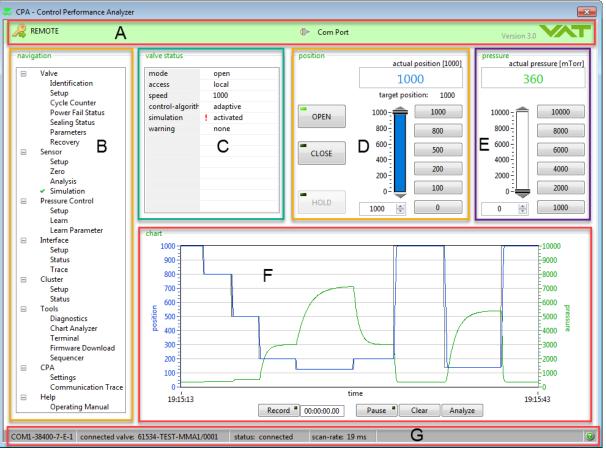
#### 2. Click [Enter CPA]

👯 Serial Port Sel	ection		×
④ Help		Enter CPA 🛸 🛛 💙	<b>T</b>
Software Mod	le		
Stand-Alon	e Operat	tion	-
Serial Port Sel	ection –		
Serial Port	Status	Connected Device	*
👯 COM1		61534-TEST-MMA1/0001	
COM3			
COM7			
			-
Bootload	controll	er-firmware initially	
	controll	cr mining milliony	
port scan disabl	ed	VAT Devi	ices: 1

Example: 👯 CPA - Control Performance Analyzer 83 Ocm Port navigation valve status position pressure actual pressure [mTorr] actual position [1000] Pressure Control mode stand-alone Learn Learn Parameter Interface \*
\*
\* Tools CPA Help Pressure Control - Learn Parameter × ④ Help 😂 Load from File parameter list graph + 😕 🤭 ۶ Di 280 -\* III 00002753998 260 -00102588149 240 00202422300 00302256451 220 -00402090602 200 -00501924753 8 180 00601758904 - 160 -160 -140 -120 -100 -00701593055 00801427206 last learn 00901261357 sition 01001095508 01100929659 80 -01200763810 01300643886 60 -40 01400541946 20 -\_0 0-Ļ 0 format: Standard 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 5 time-constant: 1.38 s 10 checksum: 🗹 (passed) open position [%] parameter-check done connected valve: 61534-TEST-MMA1/0001 status: offline serial port scan-rate: 0 ms

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

## 3.4 Main screen of Control Performance Analyser



Area	Description	Function			
A	top bar	REMOTE / LOCAL Port Selection Version - Release			
В	navigation	explorer menus, adjustment and control			
С	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

		8
Ocm Port		Version 3.0
position	actual position [1000] 1000 target position: 1000	pressure actual pressure [mTorr] 360
OPEN	1000 - 1000 800 - 800	10000 - 10000 8000 - 8000
CLOSE	600         500           400         200	6000 - 6000 4000 - 4000 2000 - 4000
HOLD	0 <sup>-</sup> 100 1000 ♀ 0	0 ÷ 2000 1000

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

🗶 Set-Point Adjustment 💽	🥋 Set-Point Adjustment
🐵 Help 🚽 Save 🔨 🕇	🐵 Help 🚽 Save
set-point adjustment	set-point adjustment
position set-	pressure set-
1000 🚔 set-point 1	10000 💌 set-point 1
800 🚔 set-point 2	8000 🚔 set-point 2
500 🥏 set-point 3	6000 🚖 set-point 3
200 🚔 set-point 4	4000 🚖 set-point 4
100 🥏 set-point 5	2000 🚖 set-point 5
0 🚔 set-point 6	1000 🚔 set-point 6
max. position: 1000	max. pressure: 10000 mTorr
ready	ready

## 3.6 Chart Recorder Analyser

#### Introduction

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



## 3.7 Explanation of Button (window top bar)

🐺 Valve - Setup
❷ Help
valve speed
1000 valve speed
synchronization
close 💽 target-position after synchronization
default (not sealed) 💌 event to start synchronization
short 💽 synchronization mode
control stroke limitation
disabled 💽 control stroke limitation
risolation option
not selected 💽 isolation valve option
behaviour under specific conditions
close 💽 target-position at power-failure
close 🕞 target-position at network-failure
close 💽 target-position at slave offline
ready

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)

COM1-38400-7-E-1	connected valve: 61238-PACH-AKB1/0002	status: connected	scan-rate: 24 ms	0
COM1-30400-7-2-1	Connected valve. 012304 ACHARD170002	status, connecteu	scarnate. 24 ms	9

#### Stand-Alone Operation (only CPA without valve):

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

COM1-38400-7-E-1 connected valve: 61238-PACH-AKB1/0002 status: disconnected scan-rate: 395 ms

### 3.8 Basic functions – use LOCAL MODE

#### Introduction

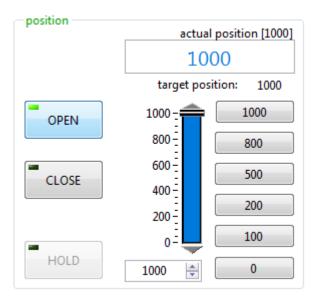
Using the 'Control Performance Analyzer' is only possible, when the valve is the 'LOCAL Mode'.

• Click button [LOCAL]

🎇 CPA - Control Pe	rformance Analyzer
🔏 LOCAL	

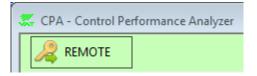
Now the valve can be operated easily via 'Control Performance Analyzer'.

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

🐺 Error Condition - Diagnostics	;	<b>—</b>	
Help	🔁 Re	ecover	
fatal error information			
fatal error code	E_22		
basic description	restricted full stroke		
mode of occurence	normal operation		
potential failure cause	valve mechanics, heavy contaminated		
possible error recovery	check valve mechanics and orifice		
	> Check manual for further details.		
correction information			
	total number of corrections	total number of motor-steps	
single axis valve	5	8834	
multiple axis valve (axis 1)	0	0	
multiple axis valve (axis 2)	0	0	
ready		scan-rate: 201 ms	

## 4 Valve

## 4.1 Identification

#### Introduction

This window shows the configuration of the connected valve.

) Help 🛛 🍪 Refresh	
valve identification table	
👯 serial number	61534-TEST-MMA1/0001
🗶 valve series	615
🏴 sensor capability	2
🏴 interface type	RS232
🏴 power-fail option	YES
)🎟 sensor supply option	NO
)🏴 cluster compliant	YES (slave address 0 - master)
🏴 isolation option	YES
)🏴 controller type	standard
🛃 firmware version	600P1H0001
🛼 firmware generation	Н
🛼 firmware ID	935218
Firmware releasedate (Y/M/D)	2018/04/18
laction ID	706064A
🗋 valve-parameter ID	715588A

## 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.

🗶 Valve - Setup	×
🥝 Help 🛛 🍣 Refresh 🎲 Default 🚽	Save
valve speed	
synchronization	
close 💽 target-position after synchro	nization
default (not sealed) 💌 event to start synchronization	n
short synchronization mode	
control stroke limitation disabled 💽 control stroke limitation	
- isolation option	
selected 💽 isolation valve option	
behaviour under specific conditions	
close 💽 target-position at power-faile	ure
close 💽 target-position at network-fa	ailure
close 🔹 target-position at slave offlin	ie
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.

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👯 Valve - Cycle C	ounter	×				
Help	ಿ Refresh	VAT				
- control cycles -						
1	42 control cycles	Reset				
142 total control cycles (not resettable)						
-isolation cycles	isolation cycles					
	7 isolation cycles	Reset				
	7 total isolation cycles (not rese	ettable)				
ready		scan-rate: 200 ms				

## 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].

👯 Valve - Power Fa	ail Status	
🥝 Help	👔 Disable PFO	VAT
power failure statu status: enabled	is performed cycles: 3	
battery voltage ch	art	actual battery voltage: 17,95V
19.5-		
19.0-		
2 18.5- 55 18.0- 18.0-		
꽃 18.0- >		
탈 17.5-		
17.0-		
16.5-		
16.0- 14:43:21		14:43:51
		Time
ready		PF0Power Fail Option

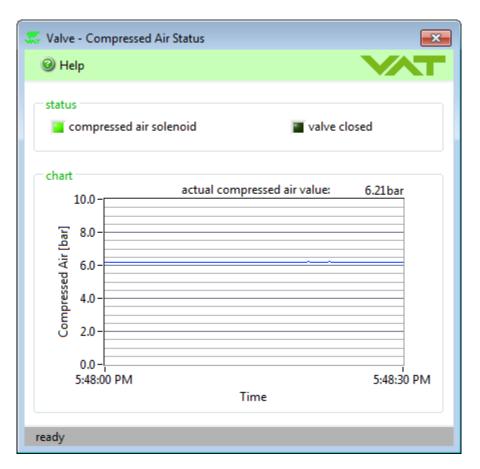
### Note:

- 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)



#### 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)

🐺 Valve - Sealing Status	
④ Help	
status solenoid valve closed position indicator open position indicator close	
_ chart	actual position: 100%
SOLENOID	
valve CLOSED	
CLOSE indicator	
OPEN indicator	
5:56:18 PM	5:56:48 PM Time
ready	

## 4.7 Parameters

#### Introducing



# NOTICE

#### Valve Parameters Inappropriate handling with the valve parameters may cause in malfunction of valve.

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.

) Help	2	Refresh		🕹 Up	odate	
valve-parameter co	nfiguration —		valve-parameter sequence			
			load valve-parameters from database			
ID			ID			
715588A			715588A			
	1.15	6				
S615 DN40/50 Sta	andard Firmwa	ire G	S615 DN40/50 Standard Firmware G			
			<b>•</b>			_
						- ₹
Parameter ID	Value	*	command	duration [s]	description	
00	004800		(S615 DN40/50 Standard Firmware G)			
01	000480	=	a:9901			
04	000150	-	a:00FD615			
05	000000		Wartezeit=5000			
06	020000		a:9901			
10	000660		a:4002 715588A			
11	001000		a:9900			
12	000113					
14	000151					
15	000189					
16	000050					
17	000000	-				

## 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'

🗶 Valve - Recovery		
Ø Help	📃 Reboot	VAT
fatal error Fatal Error 22		Reset
service request	No Service Request.	
ready		

#### 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:

👯 Valve - Recovery		<b>—</b>			
Help	🔲 Reboot	VAT			
fatal error System OK - No Fatal Error condition.					
<ul> <li>service request</li> <li>System OK - No Service Request.</li> </ul>					
ready					

## 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 to10V 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			<b>—</b>
Help	🍣 Refresh	🔒 Save	<b>V</b> AT
sensor port 1			
selected	<ul> <li>selection</li> </ul>		
Torr	💌 unit		
1	🖶 full scale		
sensor port 2			
selected	<ul> <li>selection</li> </ul>		
mTorr	💌 unit		
100	🖶 full scale		
zero adjust			
enabled	💌 zero adjust		
ready		adjusted se	ensor ratio: 10.00

### Settings

ltem	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 stil 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 « <u>Sensor Zero</u> » 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
selection	selected	selected
unit	Torr	mTorr
full-range	10	250
zero-adjust	ena	bled

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 to10V are supported.

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

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Help		🍣 Refresh 🗟 Save 🛛 🔨
sensor port 1	advanced settings 🗐	sensor port 2 advanced settings
analog 💌	source analog 🗸	digital 💌 source analog
selected 👻	selection	selected 👻 selection
range	-	range
Torr	1	Torr 🗨 unit
1	fullscale	0.1 fullscale
		digital value
		0 digital value
zero adjust	]	zero adjust
enabled -	zero adjust offset value [% SFS]	enabled vero adjust 0.0564 offset value [% SFS]
0.0530	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	

### 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 bu (EtherCAT, Profibus or CCLink)		
selection	<ul> <li>'Selected' enable pressure control using the sensor connected to the appropriate sens port 1 or 2.</li> <li>'Not selected' to exclude this sensor from pressure control.</li> <li>The actual sensor value is still measured by the valve controller but is not used for pressure control.</li> </ul>		
unit	Select the pressure unit of the connected sensor according to the sensor specification		
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 « <u>Sensor Zero</u> » 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.		
offset limit max	e.g. range of Sensor -0.210.5V> offset limit min = -0.2, offset limit max = 0.5V		
scale offset	Linear sensors with other voltage range as 010V has to be scaled: Sensor 05V> scale factor = 2, scale offset = 0; Sensor 19V> scale factor = 1.25, scale offset = 1.0 V		
scale factor	Sensor -1010V> scale factor = $0.5$ , scale offset = $-10.0 - 10V$		
zero point	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 19V it is after scale, for all others it is before scale.		
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		
voltage per decade	<ul> <li>2. Pressure control with a linearized signal</li> <li>- linearization on the valve (Linearization 'on' in 'Sensor - Setup')</li> <li>- no linearization in the CPA (Linearization 'off' in 'CPA - Settings')</li> <li>- can use adaptive or PI pressure control algorithm</li> </ul>		
	- disadvantage: only about 4 decades of the sensor range can be used for pressure		
voltage at full scale			
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 contro		

#### 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
selection	selected	selected
unit	Torr	mTorr
full-range	10	250
zero-adjust	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 in 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:

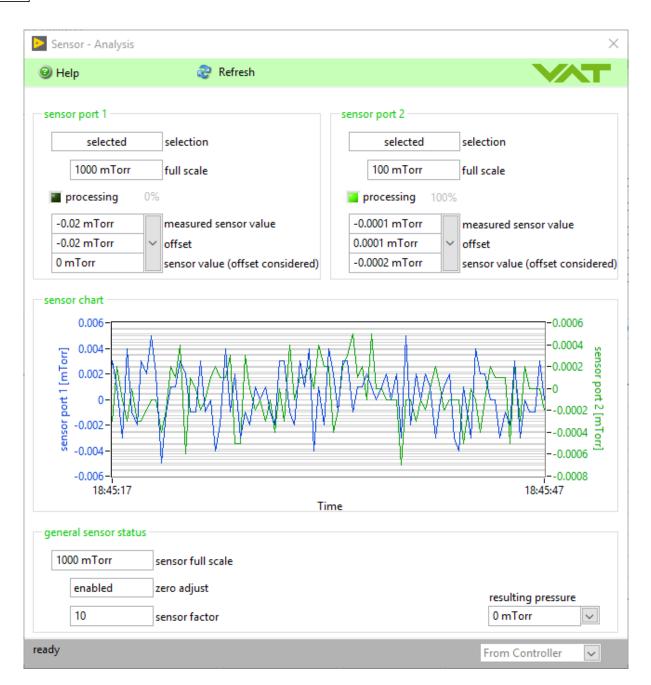
- Base pressure is reached (min. 10000 times below SFS)
- Zero is enabled
- Valve is open
- No gas flow in system
- Sensor is on operating temperature
- Sensor stable, no shifting

🗶 Sensor - Zero 🔍
Help
zero-adjustment wizard         ZERO enabled       Enable         valve opened       Open       100 %         all gas inlets closed       Assure no gas-flow in system.         sensor stable       Note:         Valve       Valve         Valve       Valve
offset values 0.000 Volt sensor 1 0.000 Volt sensor 2 scanning.

# 5.4 Analysis

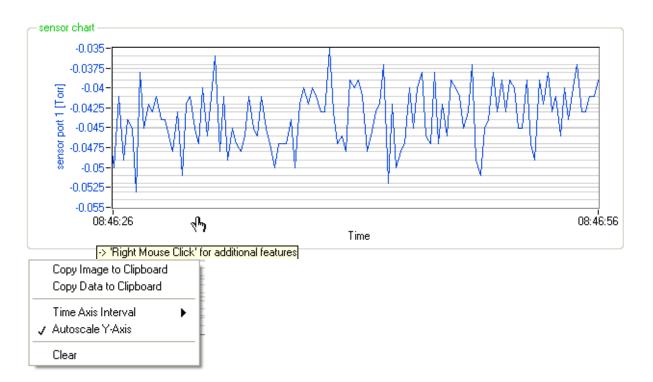
### Introduction

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

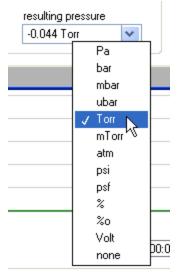


#### Settings

- 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.

aremote	
navigation	valve status
<ul> <li>∀alve</li> <li>Sensor</li> <li>Setup</li> <li>Zero</li> <li>Analysis</li> <li>✓ Simulation</li> <li>Pressure Control</li> <li>Interface</li> <li>Cluster</li> <li>Tools</li> <li>CPA</li> <li>Help</li> </ul>	modeopenaccesslocalspeed1000control-algorithadaptivesimulation! activatedwarningnone

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

👯 Pressure Control	- Setup		<b>×</b>
🕑 Help	🍣 Refresh 🚱 Default	🛃 Save	VAT
	mode configuration stream 💌 control-mode selection		
1.0000 0.00 0.0	<ul> <li>▼ gain factor</li> <li>▼ sensor delay</li> <li>▼ ramp time</li> </ul>		
ready			

## 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.

Pressure Control - Setup		×
④ Help	🍣 Refresh 🎡 Defau	ılt 🚽 Save
control algorithm adaptive downstream activate 1.0000 gain factor 0.00 sensor delay 0.0 ramp time	fixed downstream activate 0.10 • P-gain 0.10 • I-gain 0.0 • ramp time	soft-pump activate 0.10  P-gain 0.0  ramp time
	fixed upstream activate 0.10 P-gain 0.10 I-gain 0.0 ramp time	
eady		

## 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.

<b></b>		
👯 Pressure Control - Setup		
lelp	🤯 Refresh 🞲 De	efault 🛃 Save
Control algorithm adaptive downstream activate 1.0000 g gain factor 0.00s sensor delay 0.00s ramp time constant time ramp mode	Refresh Image: Constant time   fixed 1   □ activate   0.1000 I-gain   0.00s ramp time   constant time ramp mode   downstream control direction   fixed 2   □ activate   0.1000 P-gain   0.1000 P-gain   0.1000 P-gain   0.1000 I-gain   0.00s ramp time   constant time ramp mode   downstream control direction	efault Save
ready		

## 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.

🗶 Pressure Control - Setup			<b>×</b>
elp		🍣 Refresh 🛛 🎡 D	efault 🔒 Save 🔨 🥂
_ controller 1	controller 2	controller 3	controller 4
✓ activate	activate	activate	activate
adaptive 💌 algorithm	PI algorithm	PI 💌 algorithm	soft pump 💌 algorithm
1.0000 gain factor			
0.00s sensor delay			
bank 1 💌 learn bank			
	0.100 P-gain	0.100 🚔 P-gain	0.100 🚔 P-gain
	0.100 🔄 I-gain	0.100 🚔 I-gain	0.100 🚔 I-gain
0.00s 🚔 ramp time	0.00s 🚔 ramp time	0.00s 🔄 ramp time	0.00s 🚔 ramp time
constant time 💌 ramp mode	constant time 💌 ramp mode	constant time 💌 ramp mode	constant time 💌 ramp mode
linear 💌 ramp type	linear 💌 ramp type	linear 💌 ramp type	linear 💌 ramp type
	downstream 💽 control direction	downstream 💌 control direction	
ready			

### 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:

$$q_{L}[mbar \cdot \frac{l}{s}] = 0.9 \cdot p_{max}[mbar] \cdot C_{R}[\frac{l}{s}]$$

q\_recommended gas flow [mbar l/s]

pmax pressure limit [mbar]

C<sub>R</sub> 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 <sup>-2</sup> )	psf (lbf ft <sup>-2</sup> )
1 Pa (N m <sup>-2</sup> )	=	1	1 · 10 <sup>-5</sup>	1 · 10 <sup>-2</sup>	10	7.5 · 10 <sup>-3</sup>	7.5	9.87 · 10 <sup>-6</sup>	1.45 · 10-4	2.09 · 10 <sup>-2</sup>
1 bar	=	1 · 10⁵	1	1000	1 · 10 <sup>6</sup>	750	7.5 · 10⁵	0.987	14.5	$2.09\cdot10^3$
1 mbar	=	100	1 · 10 <sup>-3</sup>	1	1000	0.75	750	9.87 · 10-4	1.45 · 10-2	2.09
1 μbar (dyn cm-²)	=	0.1	1 · 10 <sup>-6</sup>	1 · 10 <sup>-3</sup>	1	7.5 · 10-4	0.75	9.87 · 10 <sup>-7</sup>	1.45 · 10-5	2.09 · 10 <sup>-3</sup>
1 Torr (mm Hg)	=	133.3	1.333 · 10 <sup>-3</sup>	1.333	1333	1	1000	1.32 · 10 <sup>-3</sup>	1.93 · 10-2	2.78
1 micron (µ, mTorr)	=	0.1333	1.333 · 10 <sup>-6</sup>	1.333 · 10 <sup>-3</sup>	1.333	1 · 10 <sup>-3</sup>	1	1.32 · 10-6	1.93 · 10-5	2.78 · 10 <sup>-3</sup>
1 atm	=	1.01 · 10⁵	1.013	1013	1.01 · 10 <sup>6</sup>	760	7.6 · 10 <sup>5</sup>	1	14.7	$2.12\cdot10^3$
1 psi (lbf inch⁻²)	=	6.89 · 103	6.89 · 10 <sup>-2</sup>	68.9	$6.89\cdot10^4$	51.71	5.17 · 10 <sup>4</sup>	6.8 · 10 <sup>-2</sup>	1	144
1 psf (lbf ft-2)	=	47.8	4.78 · 10-4	0.478	478	0.359	359	$4.72\cdot10^{4}$	$6.94\cdot10^{\scriptscriptstyle -3}$	1

#### Gas flow and leak rate

		Pa m <sup>3</sup> s <sup>-1</sup>	mbar Is <sup>.1</sup>	Torr Is-1	atm cm <sup>3</sup> s <sup>-1</sup>	lusec	sccm	slm	Mol s <sup>-1</sup>
1 Pa m <sup>3</sup> s <sup>-1</sup>	=	1	10	7.5	9.87	7.5 · 103	592	0.592	4.41 · 10-4
1 mbar ls <sup>.1</sup>	=	0.1	1	0.75	0.987	750	59.2	5.92 · 10 <sup>-2</sup>	4.41 · 10 <sup>-5</sup>
1 Torr Is <sup>-1</sup>	=	0.1333	1.333	1	1.32	1000	78.9	7.89 · 10 <sup>-2</sup>	5.85 · 10-5
1 atm cm <sup>3</sup> s <sup>-1</sup>	=	0.101	1.01	0.76	1	760	60	6 · 10 <sup>-2</sup>	4.45 · 10-5
1 lusec	=	1.333 · 10-4	1.333 · 10 <sup>-3</sup>	10 <sup>-3</sup>	1.32 · 10 <sup>-3</sup>	1	7.89 · 10 <sup>-2</sup>	7.89 · 10-5	5.86 · 10 <sup>-8</sup>
1 sccm	=	1.69 · 10 <sup>-3</sup>	1.69 · 10 <sup>-2</sup>	1.27 · 10-2	1.67 · 10 <sup>-2</sup>	12.7	1	10 <sup>-3</sup>	7.45 · 10 <sup>-7</sup>
1 slm	=	1.69	16.9	12.7	16.7	1.27 · 104	1000	1	7.45 · 10-4
1 Mol s <sup>-1</sup>	=	$2.27\cdot 10^3$	2.27 · 10 <sup>4</sup>	1.7 · 104	2.24 · 10 <sup>4</sup>	1.7 · 10 <sup>7</sup>	1.34 · 10 <sup>6</sup>	$1.34 \cdot 10^{3}$	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
Help
valve type       612       DN80       size       0.65 l/s       min. conductance       edit pre-settings
1 Torr     max. learn pressure     1000     opening speed
time optimized (working point table)
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'.
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.

Tressure Control - Learn
Help
valve type         612       series         DN80       size         0.65 l/s       min. conductance         edit pre-settings
I Torr     max. learn pressure     1000     opening speed
time optimized (working point table)         pressure [Torr]       gasflow [sccm]       conductance [l/s]         0.2       100
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'.

Click [Learn] to start the learn procedure

# 6.6 Learn Status

#### Introduction

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

🗶 Pressure Control - Learn Status	
🥝 Help 🛛 🔟 Terminate Learn	<b>V</b> AT
_ learn	]
! learn-procedure running	
negative pressure at position OPEN	
insufficient pressure stability (>20% deviation at position OPEN)	
learn-procedure running lear	n pressure: 1 Torr

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 procedu running (e.g. OPEN, CLOSE, POSITION / PRES 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.

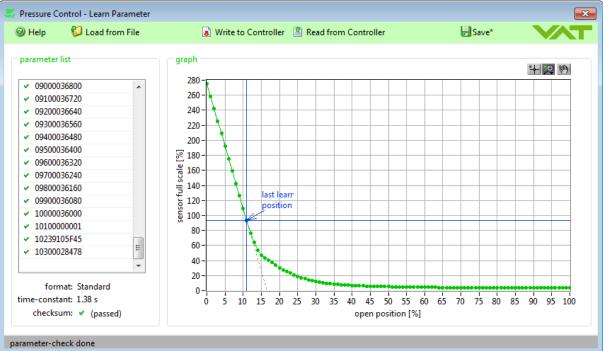
**Note:** At the end of the learn procedure all conditions are listed in the status-box of the learn-status window.

## 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

👯 Interface Setup - Logic			<b>—</b> ×-
) Help	ಿ Refr	esh 🛛 🛃 Sav	
digital inputs		— digital outp	outs
not inverted 💌 open i	nput	ope	n 🕞 open output
not inverted 🗨 close i	nput	clos	e 💌 close output
fullrange learn	range		
pressure range factor	factor		
ready			

### 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.

Finterface Setup - RS232	Refresh 🛃 Save
- interface settings	
_	
9600 v 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 pre	ssure range
digital inputs	digital outputs
enabled 🗨 activation	enabled 🗨 activation
interlock open 💽 function	open 🖵 function
not inverted 💌 polarity	not inverted 💌 polarity
enabled 💽 activation	enabled 💽 activation
interlock close 🗨 function	close function
	not inverted 🖵 polarity
not inverted 💌 polarity	polanty
not inverted 💌 polarity	

### 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.

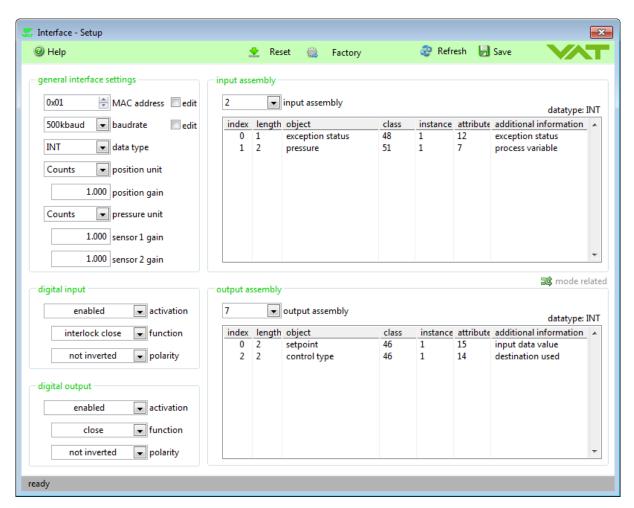
Interface Setup - RS232/485 Ø Help	Refresh 🔒 Save
- interface settings	
9600 💌 baud rate	RS485 💌 operation mode
even 💌 parity	Full Duplex 💌 duplex mode
7 bits 💌 data length	P2P 000 🚔 device address
1 bit stop bits	LF (CR/LF) 💌 termination
communication settings	
0-100000 💌 position range	IC 💌 command set
0-1000000 💌 pressure range	disabled 💌 second answer
1000000 customized press	ure range
digital inputs	digital outputs
enabled 💽 activation	enabled 🗨 activation
interlock open 💽 function	open 🗨 function
not inverted 💌 polarity	not inverted 🗨 polarity
enabled activation	enabled 💌 activation
interlock close 💌 function	close function
not inverted 💌 polarity	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.



### 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.

Interface - Setup				×
Help	2	Refresh	🚽 Save	
interface settings				
192 168 009	104 IP-address		OFF •	DHCP
255 255 255	000 sub-address		503	telnet port 1
000 000 000	000 gateway		504	telnet port 2
firmware: vat_app_	006			
model: type C				
- communication setti	ngs			
0-100000 👻	• position range		IC	<ul> <li>command set</li> </ul>
0-1000000	pressure range		disabled	<ul> <li>second answe</li> </ul>
1000000	customized pressu	ure range	CR	▼ termination
digital inputs		dig	jital outputs —	
enabled	<ul> <li>activation</li> </ul>		enabled	<ul> <li>activation</li> </ul>
interlock open	function	output 1	open	👻 function
not inverted	<ul> <li>polarity</li> </ul>	Î	not inver	ted 🖵 polarity
enabled	▼ activation	1	enabled	▼ activation
2		output 2	close	
interlock close	• runcuon		ciose	▼ Tunction
interlock close	polarity	0     1	not invert	
		0		

## 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.

) Help 🛛 🚽 Save 🏾 🍣 Refresh	🎡 Set to Default		VA
communication parameters			
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	t	digital outp	out
function interlock close 💌	function	close	•
inverted no 💌	inverted	no	•
disabled no 💌	disabled	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.

🐖 Interface Setup			<b>X</b>
🥝 Help 🛛 🖯 Save 🛭 🍣 Refresh	🊱 Set to Default		VAT
communication parameters			
- 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 outp	ut
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.

Tinterface Setup			<b>_</b>
🥝 Help 🛛 🚽 Save 🛛 & Refresh	🎡 Set to Default		
communication parameters station number 12 operational settings CC-Link Ver.2 - transmission rate 2.5 Mbps 💌	Occupies 1 station -	Octuple expand	ed cyclic 💌
– 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		digital	output
function interlock close 💌	functio	on close	
inverted no 💌	invert	ed no	
disabled no 💌	disabl	ed no	•

## 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/0	Out: Voltag	e [010V]
-------------	-------------	----------

	digital input	-	connector-pin	status
	open	not inverted	17	OFF
	close	not inverted	15	ON
	control mode	-	7	OFF
	learn	fullrange	19	OFF
	zero	-	3	OFF
	locked	-	18	OFF
	hold	-	16	OFF
	hold pressure range		16 5 1, contact contro 1, voltage contro	OFF ol = pin 6
digita	pressure range	input commor	5 I, contact contro I, voltage contro	OFF ol = pin 6 ol = pin 4
digita	al outputs	input common	5 a, contact contro a, voltage contro connector-pin	OFF ol = pin 6 ol = pin 4
digita	al outputs digital output valve opened	configuration open	5 a, contact contro a, voltage contro connector-pin 8	OFF ol = pin 6 ol = pin 4
digita	digital outputs valve opened valve closed	input common	5 a, contact contro a, voltage contro connector-pin 8 9	OFF OFF ol = pin 6 ol = pin 4 status OFF ON
digita	al outputs digital output valve opened valve closed alarm	configuration open	5 a, contact contro a, voltage contro connector-pin 8	OFF ol = pin 6 ol = pin 4
digita	digital outputs valve opened valve closed	configuration open close - -	5 a, contact contro b, voltage contro connector-pin 8 9 22 21	OFF OF = pin 6 of = pin 4 Status OFF ON OFF ON
digita	al outputs digital output valve opened valve closed alarm	configuration open close - -	5 a, contact contro a, voltage contro connector-pin 8 9 22	OFF OF = pin 6 of = pin 4 Status OFF ON OFF ON
digita	al outputs digital output valve opened valve closed alarm	configuration open close - -	5 a, contact contro b, voltage contro connector-pin 8 9 22 21	OFF OF = pin 6 of = pin 4 Status OFF ON OFF ON

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

	digital input	configuration	connector-pin	status
	open	not inverted	3	OFF
-	close	not inverted	16	OFF
	control mode	•	8	OFF
	learn	fullrange	19	OFF
	zero		6	OFF
	locked	-	24	OFF
	hold	-	21	OFF
	pressure range	- input comm input comm	11 non, contact contri non, voltage contri	OFF ol = pin ol = pin
	outputs	input comm input comm	non, contact contri non, voltage contri	ol = pin ol = pin
ital	outputs digital output	input comm input comm configuration	non, contact contri non, voltage contri connector-pin	ol = pin ol = pin status
iital	outputs digital output valve opened	input comm input comm configuration open	non, contact contri non, voltage contri connector-pin 5/18	ol = pin ol = pin status OFF
iital	outputs digital output valve opened valve closed	input comm input comm configuration	connector-pin 5/18 4/17	ol = pin ol = pin status OFF OFF
jital	outputs digital output valve opened	input comm input comm configuration open	non, contact contri non, voltage contri connector-pin 5/18	ol = pin ol = pin status OFF

## 7.2.2 Interface Status RS232

#### Introduction

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

He	lp			
gita	al inputs			
_	digital input	configuration	connector-pin	status
	interlock open	not inverted (enabled)	17	OFF
	interioek open			
_	interlock close	not inverted (enabled) input common	15 , contact contro , voltage contro	
		not inverted (enabled) input common	, contact contro	l = pin l
	interlock close	not inverted (enabled) input common	, contact contro	l = pin 2 l = pin 2
	interlock close	not inverted (enabled) input common input common	, contact contro , voltage contro connector-pin	l = pin 2 l = pin 2
gita	al outputs digital output	not inverted (enabled) input common input common	, contact contro , voltage contro connector-pin	I = pin 2 I = pin 2 status

### 7.2.3 Interface Status RS485

#### Introduction

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

F Interface - Status			
elp			
digital inputs			
digital input	configuration	connector-pin	status
interlock open	not inverted (enabled)	17	OFF
interlock close	not inverted (enabled)	15	OFF
	-	, contact contro	
- digital outputs	-	, contact contro , voltage contro	
	-		I = pin 25
- digital outputs	input common	, voltage contro	I = pin 25
digital outputs	configuration	, voltage contro connector-pin	I = pin 25 status
digital outputs digital output open	configuration not inverted (enabled) not inverted (enabled)	, voltage contro connector-pin 8	status OFF ON

### 7.2.4 Interface Status DeviceNet

#### Introduction

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

) Help		🍣 Refresh	
levice status		general interface se	ttings
idle		MAC address	1 (0x01)
		baudrate	500kbaud
exception status		firmware ID	520437
exception status		serial number	12345
□ ALARM/device-c	ommon	datatype	INT
□ ALARM/device-s	pecific	output assembly	7
□ ALARM/manufac	turer-specific	input assembly	2
undefined		pressure unit	Counts
WARNING/device	e-common	position unit	Counts
WARNING/devic	e-specific	sensor 1 gain	1
WARNING/manu	facturer-speci	sensor 2 gain	1
expanded mode		position gain	1
digital I/O digital input	configuration	connector-pin	
interlock close	not inverted (enabled	d) OFF	
digital output	configuration	connector-pin	
	-		
	not inverted (enabled		

## 7.2.5 Interface Status EtherNet

### Introduction

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

nterface - Status				
пер				
igital inputs				
igital inputs				
digital input	configuration	connector-pin	status	
interlock open	not inverted (enabled)	17	OFF	
interlock close		contact control		
igital outputs	input common		= pin 1	
	input common	contact contro	= pin 1 = pin 1(	
igital outputs	input common input common	, contact control , voltage control	= pin 1 = pin 1(	
igital outputs digital output	input common input common configuration	contact control voltage control	= pin 1 = pin 1 status	
igital outputs digital output □ open	input common input common configuration not inverted (enabled) not inverted (enabled)	contact control voltage control connector-pin 8	= pin 1 = pin 10 status OFF ON	

## 7.2.6 Interface Status EtherCAT

#### Introduction

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

F Interface - Status			<b>_</b> ×
④ Help			
digital input			
digital input	configuration	connector-pin	status
interlock close	not inverted (enabled)	3/1	OFF
digital output			
digital output	configuration	connector-pin	status
digital output close	configuration not inverted (enabled)	connector-pin 2/4	status ON

### 7.2.7 Interface Status Profibus

#### Introduction

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

In	terface - Status			
8	Help			
d	igital input			
	digital input	configuration	connector-pin	status
			3.74	0.55
	interlock close	not inverted (enabled)	3/1	OFF
d	igital output	not inverted (enabled)	3/1 connector-pin	
d	igital output		connector-pin	
d	igital output digital output	configuration	connector-pin	status

## 7.2.8 Interface Status CCLink

#### Introduction

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

In	terface - Status			
0	Help			
di	igital input			
	digital input	configuration	connector-pin	status
	interlock close	not inverted (enabled)	3/1	OFF
- di	igital output digital output	configuration	connector-pin	status
	close	not inverted (enabled)	2/4	ON
:an-	-rate: 97 ms			

## 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)

Help			🚱 Open 🚽 Save	
Append to To	00:00:24.83 ( p 💌 data	Hold Clear	search tools	Previous
race table local time	intervall [ms]	received command	transmitted answer	
13:10:56.829	20	P:	P:00042900	E
13:10:56.809	20	A:	A:054815	
13:10:56.788	20	P:	P:00038740	
13:10:56.769	20	A:	A:069445	
13:10:56.758	10	P:	P:00036980	
13:10:56.739	20	A:	A:080465	
13:10:56.720	20	P:	P:00036460	
13:10:56.699	20	A:	A:095060	
13:10:56.680	20	P:	P:00036580	
13:10:56.660	20	R:012345	R:	
13:10:56.649	10	A:	A:099995	
13:10:56.628	20	P:	P:00037760	
13:10:56.609	20	A:	A:099980	
13:10:56.588	20	P:	P:00040280	
13:10:56.569	20	A:	A:099895	-

- 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  ${\bf i}$

(with [Next] and [Previous] you can jump to matched entries with i)

Help			🕼 Open 🚽 Save*	
ecord tools Record () Append to Top	00:01:03.23	Hold Clear	Rearch tools       R.     Next     F       24 matches found     total trace items: 3563	reviou
local time	intervall [ms]	received command	transmitted answer	
13:11:07.182	20	R:012345	R:	
13:11:07.154	30	A:	A:099999	
13:11:07.142	10	P:	P:00037720	
13:11:07.114	30	A:	A:099990	
13:11:07.101	10	P:	P:00040180	
13:11:07.074	30	A:	A:099935	
13:11:07.053	20	P:	P:00046180	E
13:11:07.033	20	A:	A:099410	
13:11:07.021	10	P:	P:00060700	
13:11:06.993	30	A:	A:096075	
13:11:06.982	10	P:	P:00094120	
13:11:06.952	30	A:	A:081925	
13:11:06.941	10	P:	P:00165060	
13:11:06.913	30	A:	A:067265	
13:11:06.893	20	P:	P:00294380	

#### Raw Mode

Shows raw string which is received from the valve

Interface - Trace ④ Help		💕 Open	Save	
record tools		search t	tools	
Record  00:01:17.23	lold Clear	R:	4	Next Previous
	raw mode 🔽			
trace table				
000020 P: P:00588740				
000020 A: A:004955				
000020 P: P:00613640				
000020 A: A:019575				
000010 P: P:00605300				
000020 A: A:030600				
000020 P: P:00508820				
000020 A: A:045280				
000010 P: P:00377080				
000020 A: A:056295				
000020 P: P:00220320				
000010 A: A:067350				
000020 P: P:00141620				
000020 A: A:081945				
000020 P: P:00082820				
000010 A: A:092945 000020 P: P:00060520				
000020 P: P:00060520 000020 A: A:099425				
000020 A: A:099423				-
				-

Logic Interface (not supported for all firmware)

) Help			🕼 Open 🛛 😓 Save	
Append to Top	00:00:24.75	Hold Clear a acquisition raw mode	Search tools	Previous
race table local time	intervall [ms]	received command	transmitted answer	
13:29:59.037	10	0000004810000100	1001	E
13:29:59.029	10	0000006210000100	1001	
13:29:59.018	10	0000005610000100	1001	
13:29:59.008	10	0000006310000100	1001	
13:29:59.000	10	0000004610000100	1001	
13:29:58.988	10	0000006410000100	1001	
13:29:58.977	10	0000004210000100	1001	
13:29:58.968	10	0000006610000100	1001	
13:29:58.958	10	0000005010000100	1001	
13:29:58.947	10	0000005910000100	1001	
13:29:58.937	10	0000005010000100	1001	
13:29:58.927	10	0000006310000100	1001	
13:29:58.919	10	0000004710000100	1001	
13:29:58.907	10	0000006810000100	1001	
13:29:58.897	10	0000005510000100	1001	

Yellow:

Analog Input (10V = 1000000) Digital Input OPEN | CLOSE | PRESSURE MODE | LEARN | ZERO | LOCKED | HOLD | RANGE Digital Output OPEN | CLOSE | ALARM | READY Green:

Blue:

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

ols Q Next Previous re items: 165
e items: 165
enems, 105
Output
Input -
3CF5C28F3D75C28F00000000
00000000
3C23D70A000000000000000
00000000
3CF5C28F3CA3D70A0000000
00000000
3DA3D70A3D23D70A0000000
00000000
3C23D70A3CF5C28F00000000
00000000
3CF5C28F3CA3D70A0000000
00000000
3C23D70A3D4CCCCD00000000
00000000
3CA3D70A3CF5C28F00000000
13CA3D70A3CF5C28F00000000

# 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.

👯 Cluster - Setup			<b>×</b>
Ø Help	Refresh	🛃 Save	VAT
cluster valve se master valve	ttings (slave 0) 💌 valv	e type selectio	on
	total number of		ster
ready			

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.

air value 6.25 bar 6.25 bar	status	mode		anaad	freeze mode	position offset	valve position	device address
		PRES	mode -	speed 1000		Oliset	24464	00
6.20 Dar		POS		1000		0	24464	01
	1					ve 01	ar valve: Islar	cted cluste
						ve 01	alve: sla	er v

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: <u>Chart Analyzer</u>

Terminal RS232 command can be sent. Refer to: <u>Terminal</u>

Firmware Download
Firmware can be downloaded to controller. Refer to: <a href="#">Firmware Download</a>

Run Sequence

Start edited sequence. Run Sequence is displayed on the main screen while the sequence is running. Refer to: <u>Sequencer</u>

➢ 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:
•••	Onon	loioaio	Dorading	101	Diagnoodo	1110		00111100100	vaivo.

		additional information
filename	unknown	additional information
date (DD.MM.YY)	9/25/2018	<b>^</b>
time (HH:MM:SS)		
diagnostic status	▲ busy	
command count	1688 / 2253	
file size (kB)	unknown	
Command i:82	Answer i:82600P1H0002	Description A Ident.Firmware Version
i:82	i:82600P1H0002	Description A Ident.Firmware Version
i:82 i:83	i:82600P1H0002 i:8361534-TEST-	Description Ident.Firmware Version
i:82 i:83 i:84	i:82600P1H0002 i:8361534-TEST- i:84000000	Description Ident.Firmware Version
i:82 i:83 i:84 i:89	i:82600P1H0002 i:8361534-TEST- i:8400000 i:8900200000000	Description Ident.Firmware Version Ident.Serial Number Ident.Firmware Number 000000 Ident.User String 3, valve conductance
i:82 i:83 i:84 i:89 b:3271	i:82600P1H0002 i:8361534-TEST- i:84000000 i:8900200000000 b:3271170918	Description       Ident.Firmware Version         Ident.Firmware Version       Ident.Firmware Version         IMMA1/0001       Ident.Serial Number         Ident.Firmware Number       Ident.User String 3, valve conductance         Ident.Firmware Release Date       Ident.Firmware Release Date
i:82 i:83 i:84 i:89 b:3271 b:4000	i:82600P1H0002 i:8361534-TEST- i:84000000 i:8900200000000 b:3271170918 b:400061534-TE	Description       Ident.Firmware Version         Ident.Firmware Version       Ident.Firmware Version         MMA1/0001       Ident.Serial Number         Ident.Firmware Number       Ident.Vser String 3, valve conductance         Ident.Firmware Release Date       Ident.Serial Number         ST-MMA1/0001       Ident.Serial Number
i:82 i:83 i:84 i:89 b:3271	i:82600P1H0002 i:8361534-TEST- i:84000000 i:8900200000000 b:3271170918	Description       Ident.Firmware Version         Ident.Firmware Version       Ident.Firmware Version         MMA1/0001       Ident.Serial Number         Ident.Firmware Number       Ident.User String 3, valve conductance         Ident.Firmware Release Date       Ident.Serial Number         ST-MMA1/0001       Ident.Serial Number         Ident.Config File Number       Ident.Config File Number
i:82 i:83 i:84 i:89 b:3271 b:4000 b:4001	i:82600P1H0002 i:8361534-TEST- i:84000000 i:89002000000000 b:3271170918 b:400061534-TE b:4001 706064	Description       Ident.Firmware Version         Ident.Firmware Version       Ident.Firmware Version         MMA1/0001       Ident.Serial Number         Ident.Firmware Number       Ident.User String 3, valve conductance         Ident.Firmware Release Date       Ident.Serial Number         ST-MMA1/0001       Ident.Serial Number         Ident.Config File Number       Ident.
i:82 i:83 i:84 i:89 b:3271 b:4000 b:4001 b:4002	i:82600P1H0002 i:8361534-TEST- i:84000000 i:89002000000000 b:3271170918 b:400061534-TE b:4001 706064 b:4002 715588A	Description       Ident.Firmware Version         Ident.Firmware Version       Ident.Firmware Version         MMA1/0001       Ident.Serial Number         Ident.Firmware Number       Ident.Firmware Number         000000       Ident.User String 3, valve conductance         Ident.Firmware Release Date       Ident.Firmware Release Date         ST-MMA1/0001       Ident.Serial Number         Ident.Config File Number       Ident.Drive Parameter Number         Ident.User String 2       Ident.User String 2
i:82 i:83 i:84 i:89 b:3271 b:4000 b:4001 b:4002 b:4003	i:82600P1H0002 i:8361534-TEST- i:84000000 i:89002000000000 b:3271170918 b:400061534-TE b:4001 706064 b:4002 715588A b:4003	Description         Ident.Firmware Version         Ident.Firmware Version         IMMA1/0001         Ident.Serial Number         Ident.Firmware Number         100000         Ident.Vser String 3, valve conductance         Ident.Firmware Release Date         ST-MMA1/0001         Ident.Serial Number         Ident.Config File Number         Ident.Drive Parameter Number         Ident.User String 2         00000000         Ident.User String 3, valve conductance

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

) Help 🛛 🖗 Load Exi	sting   🛃 Create Default	🛃 Create Customized	🚡 Open Database	Save*
ile information				additional information
filename	unknown			
date (DD.MM.YY)	9/25/2018			
time (HH:MM:SS)	4:25:17 PM			
diagnostic status	completed			
command count	2253 / 2253			
file size (kB)	unknown			-

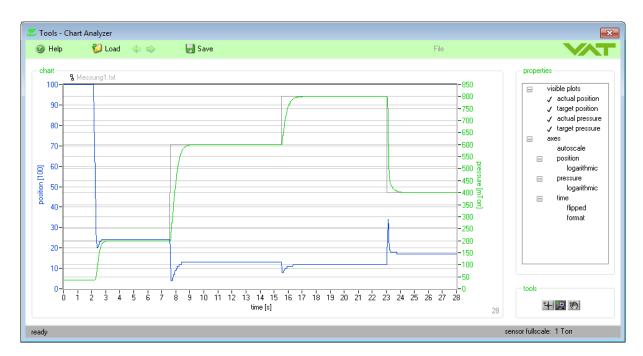
Diagnostic file is based on a text file with commands.

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.



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

) Help		
command		
<b>FN</b>	Press 'EN	ITER' to send
P:		•
response		
D 00000000		
<u>P:00036000</u>		
<u>P:00036000</u>		
<u>P:00036000</u> transmission history -		
	answer	
transmission history -	answer P:00036000	•
transmission history -		
transmission history - command P: A: O:	P:00036000	
transmission history - command P: A:	P:00036000 A:100000	•
transmission history - command P: A: O:	P:00036000 A:100000 x:1000000010500000000000100080303000000	•
transmission history command P: A: 0: P:	P:00036000 A:100000 x:100000001050000000000100080303000000 P:01050000	<b>^</b>
transmission history command P: A: O: P: A: P: A:	P:00036000 A:100000 x:10000000010500000000000000000000000 P:01050000 A:000000	
transmission history - <u>command</u> P: A: O: P: A: C:	P:00036000 A:100000 x:100000001050000000000100080303000000 P:01050000 A:000000 x:10100000003600000100000100080403000000	
transmission history - <u>command</u> P: A: O: P: A: C:	P:00036000 A:100000 x:100000001050000000000100080303000000 P:01050000 A:000000 x:10100000003600000100000100080403000000	A

**Settings** Example: O: + [Enter], opens the valve. **Note:** For detail information about RS232 commands please refer to your valve manual or contact VAT.

### Appendix

Tools - Terminal		
) Help		
command		
_		Press 'ENTER' to sen
P:		Copy to Clipboard
		Paste from Clipboard
response		Clear
D.00000000		Edit
<u>P:00036000</u>	Copy to Clipboard	Clear Command History
command	answer	A
P:	P:00036000	^
A:	A:100000	
0:	x:10000000105000000000000000000000000000	00080303000000
P:	P:01050000	00080303000000
P: A:	P:01050000 A:000000	Copy to Clipboard
P: A: C:	P:01050000 A:000000 x:1010000000360000010000	Copy to Clipboard
P: A:	P:01050000 A:000000	
P: A: C:	P:01050000 A:000000 x:1010000000360000010000	Copy to Clipboard
P: A: C:	P:01050000 A:000000 x:1010000000360000010000	Copy to Clipboard
P: A: C:	P:01050000 A:000000 x:1010000000360000010000	Copy to Clipboard Clear Transmission History

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'

👯 VAT Firmware Loader v4	.4.8	23			
Firmware Loader					
an VAT device. Please se	This software is used to download a new firmware into the flash memory of an VAT device. Please select the serial interface port of your computer and the designated firmware type to which you want to perform a firmware download to.				
select serial port:	COM 1				
select firmware type: Valve firmware					
	🗸 Valve firmware				
	DeviceNet firmware				
	ServiceBox firmware				
Cancel		ext			

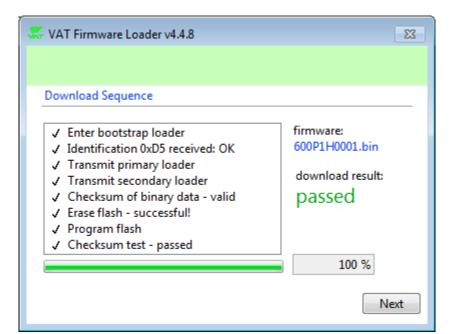
#### 2. Select firmware

💥 VAT Firmware Loader v4.4.8	8
File Selection	
Confirm the displayed firmware path using or press 'Browse' to search for a new firmy	
C:\Download\600P1H0001.bin	
Note: Use VAT provided files only!	Browse
Cancel	Back Next

3. Now connect the VAT download dongle



4. Wait until firmware download is finished...



#### 5. Disconnect the download dongle

💥 VAT Firmware Loader v4.4.8
Controller firmware - final instructions:
Follow the steps and press 'Next' afterwards.
<ol> <li>disconnect the service interface cable</li> <li>disconnect the special download dongle</li> </ol>
<ol> <li>connect the service interface cable to the valve</li> <li>download is finished</li> </ol>
Again Finish

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

🗶 Tools - Sequencer				×
🕑 Help 🛛 🚱 Load	📰 New 🚽	Save File		VAT
sequence			1 seq	uence entries
command	duration [s]	description	answer	*
Ir	nsert Row Above nsert Row Below Delete Row			
P	C <b>opy Row</b> Paste Row Above Paste Row Below			
Ir	nsert Command 💦 🕨 🕨	Open Valve		
R	Reset All Durations	Close Valve Position Setpoint		
C	Copy To Clipboard	Pressure Setpoint		-
C:\Users\PG500\AppData\	Local\VAT Vacuum Va	Hold Local Mode Remote Mode	]	
1 target cycle 0 actual cycle 0 actual inde	es	Run Pause		
ready				

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

equence					3 sequence entries
command		duration [s]	description	answer	
C:		4.00	-		
0:	_	4.00	open valve		
R:050000		4.00	position setpoint		
	25001A D . 11				
C:\Users\P(	3000\AppData\Local	VAT Vacuum Va	lves\CPA\3.0\Support\		
tatus / operati	on				
1	🚔 target cycles				
	actual cycles				
0			Run Pause		

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3. Select target cycles

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

🐺 Tools - Sequenc	er				×
Help	🚱 Load 🚺	New 🔒	Save File		T
- sequence					
·				3 sequence entries	
command		duration [s]	description	answer	•
C:		4.00	-	x:10999999-000008300050000100080202004000	
➡ 0:		4.00	-	x:10999999-00000840000000100080302004000	
R:050000		4.00	-		
					-
					-
					-
					-
					-
	500) A D - 11				
L C:\Users\PG	500\AppData\Loca	I\VAT Vacuum Va	lves\CPA\3.0\Support\		
- status / operatio	n				
10	🗧 target cycles				
2	actual cycles				
1	actual index		Run Pause		
	accounter and a			1	
·					
sequence running					

[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

CPA 81

🖑 CPA - Settings	
🥝 Help 🎲 Set to Default   & Refresh	🖥 Save 🕃 Data Folder
position indicator	pressure indicator
100 resolution	mTorr 💌 unit 📝 linearize
1 💌 decimal	10 voltage at full scale
	0.75 voltage per decade
- chart - position axis	chart - pressure axis
show 💌 actual position	show 💌 actual pressure
show 💌 target position	show 💌 target pressure
fixed 💌 axis scaling	fixed 💌 axis scaling
	linear 💌 axis mapping
	2 decades
chart - time axis	
30 seconds 💌 time interval	
ready (pressure controller)	

#### 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]...

CPA Settings 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.

nterface - Trac Help	.e		🚱 Open 🚽 Save	
Record tools		Hold Clear	search tools	t Previous
race table		• •		
local time		received command	transmitted answer	
13:10:56.829	20	P:	P:00042900	
13:10:56.809	20	A:	A:054815	
13:10:56.788	20	P:	P:00038740	
13:10:56.769	20	A:	A:069445	
13:10:56.758	10	P:	P:00036980	
13:10:56.739	20	A:	A:080465	
13:10:56.720	20	P:	P:00036460	
13:10:56.699	20	A:	A:095060	
13:10:56.680	20	P:	P:00036580	
13:10:56.660	20	R:012345	R:	
13:10:56.649	10	A:	A:099995	
13:10:56.628	20	P:	P:00037760	
13:10:56.609	20	A:	A:099980	
13:10:56.588	20	P:	P:00040280	
13:10:56.569	20	A:	A:099895	-

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

software details	
edition	CPA - Control Performance Analyzer
version	3
date	yyyy/mm/dd
release	8.8.8
company data	VAT Vakuumventile AG
	VAT Vakuumventile AG
name street	Seelistrasse
name street postcode	Seelistrasse CH-9469
name street postcode town	Seelistrasse CH-9469 Haag
name street postcode town country	Seelistrasse CH-9469 Haag Switzerland
name street postcode town country web	Seelistrasse CH-9469 Haag Switzerland <u>www.vatvalve.com</u>
name street postcode town country web email	Seelistrasse CH-9469 Haag Switzerland <u>www.vatvalve.com</u> CH@vatvalve.com
name street postcode town country web email tel	Seelistrasse CH-9469 Haag Switzerland <u>www.vatvalve.com</u> CH@vatvalve.com ++41 81 771 61 61
name street postcode town country web email	Seelistrasse CH-9469 Haag Switzerland <u>www.vatvalve.com</u> CH@vatvalve.com
name street postcode town country web email tel	Seelistrasse CH-9469 Haag Switzerland <u>www.vatvalve.com</u> CH@vatvalve.com ++41 81 771 61 61

## 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:

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

Help 85

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: <u>http://www.vatvalve.com</u>

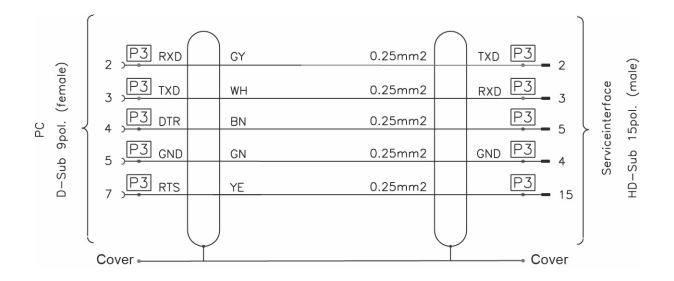
### 11.4 Spare parts

#### 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):

