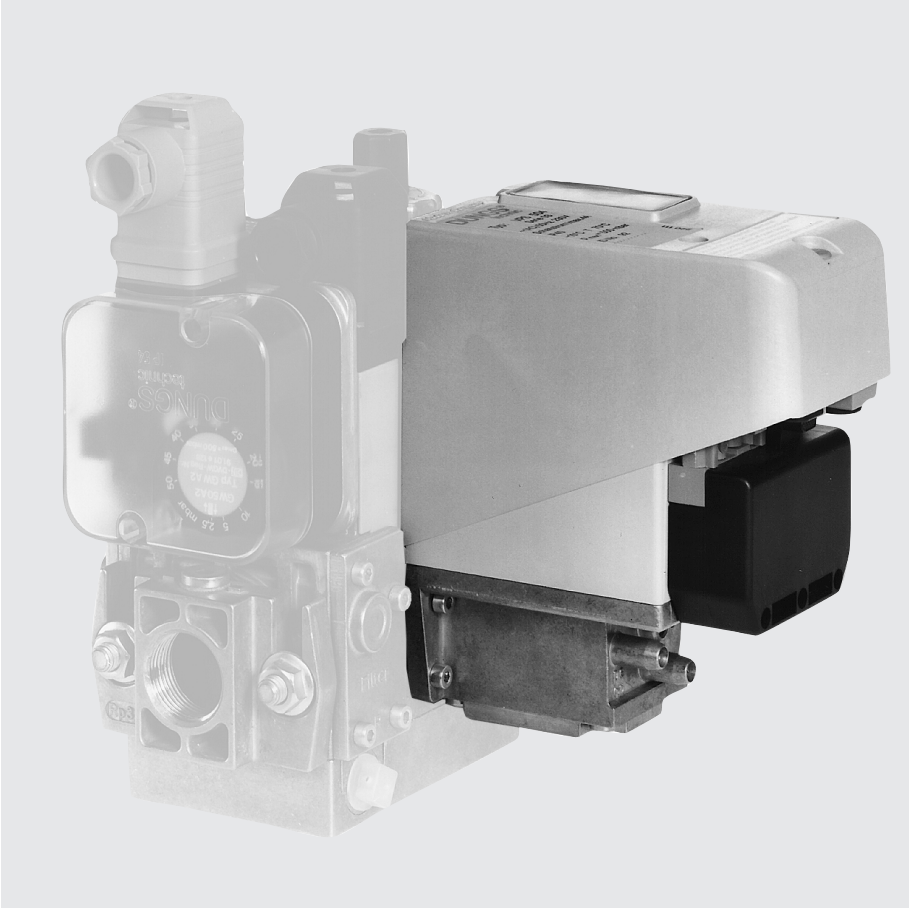
Valve proving system for single valves, and Dungs double - and combination valves
VPS 504

DUNGS®

8.05



Technical description
The VPS 504 is the valve proving system for DUNGS double actuators. The valve proving system complies with EN 1643:
- Equipment operates independent of residual pressure in the range of the permissible operating range.
- Test volume ≤ 4 l
- Setting work not necessary on site
- Short test period: min. 10 s, max. 26 s
- Tightness or leaks are displayed by an LED
- External fault display possible for series 02, series 04 and series 05
- Group fault alarm optional for series 01 (SSM)
- Suitable for TRD systems
- Electrical connection possible by plug connection series 01, 02, 03. No rewiring is required for contact allocation as per DIN 4791.
- Series 04 and series 05: electrical connection at screw terminals via PG 13.5 cable entry

Application
Valve proving system for DUNGS single valves, DMV double solenoid valve and GasMultiBloc.
The VPS 504 can also be used for monitoring the DUNGS solenoid valves up to DN 80, with and without bypass connection.
24 VDC design for gas motors.
Suitable for gases of gas families 1, 2, 3 and other neutral gaseous media.

Approvals
EU type test approval as per EU Gas Appliance Directive.

VPS 504	CE-0085 AP 0168

Approvals in other important gas-consuming countries.
Special design for the North American market with U_L, FM and CSA registration.

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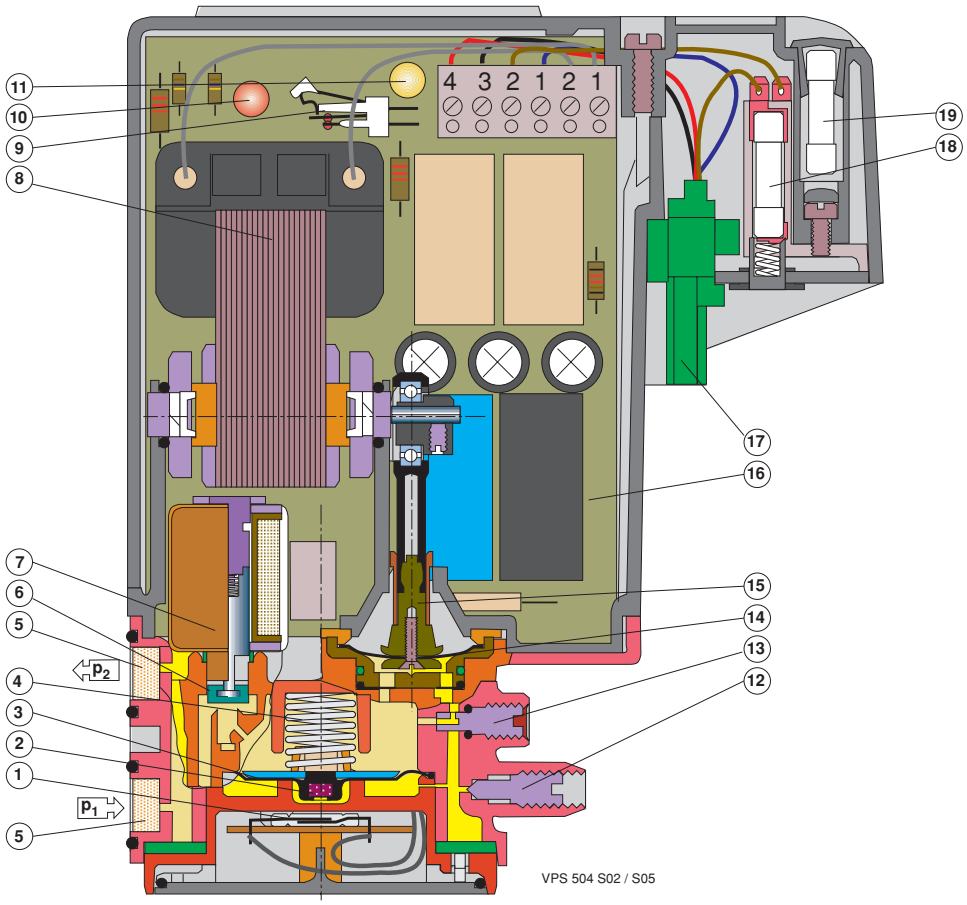
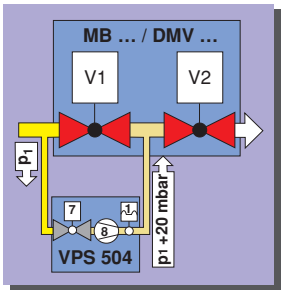
VPS 504 Valve proving system for automatic shutoff valves as per EN 161, Class A and Class B

Specifications

Operating pressure	max. 500 mbar (50 kPa)		
Test volume	≤ 4.0 l		
Pressure increase by motor pump	≈ 20 mbar		
Nominal voltage	230 V AC -15% to -240 V +10%, VPS 504 series 05: 24 VDC For further voltages, refer to type overview		
Frequency	VPS series 01-04: 50 Hz or 60 Hz Series 05: DC		
Rating requirement	During pumping time approx. 6 VA, in operation 17 VA		
Prefuse (provided by customer)	10 A quick-acting fuse or 6.3 A slow-blow fuse		
Fuse installed in housing cover, replaceable	Microfuse 6.3 slow-blow L 250 V; IEC-127-2/III (DIN 41 662)		
Switching current	Operating output Interference output	VPS 504 Series 01, 02, 03, 04, 05: VPS 504 Series 02, 04, 05:	max. 4 A max. 1A
Degree of protection	VPS 504 Series 01, 02, 03: IP 40 VPS 504 Series 04, 05: IP 54		
Ambient temperature	50 Hz 230 VAC -15°C to +70°C others: -15°C to +60°C		
Release time	Approx. 10 - 26 s, depending on test volume **and** input pressure		
Sensitivity limit	max. 50 l/h		
Switch-on duration of control	100 %		
Max. number of test cycles	20/h		
Installation position	upright, horizontal, not inverted		

VPS 504 sectional diagram





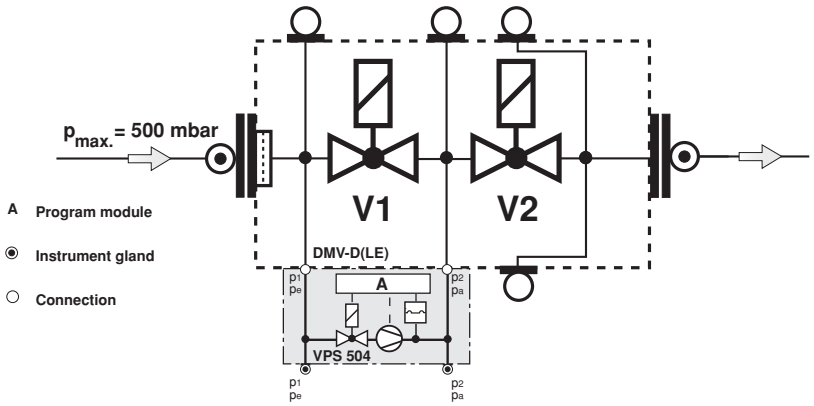
1	Reed switch	7	Solenoid valve coil	13	Volume restrictor
2	Solenoid	8	Pressure pump	14	Pump diaphragm
3	Pressure switch diaphragms	9	Unlock switch	15	Pump linkage
4	Compression spring	10	Fault lamp	16	pcb
5	Filter	11	Operating lamp	17	Plug connection
6	Solenoid valve anchor	12	Test nipple	18	Equipment fuse
				19	Spare fuse

Functional description

The VPS 504 operates depending on pressure build-up.
The program module starts to function when heat is requested.
Test is performed depending on the burner functional procedure:

Check **prior to** burner start or
Check **during** pre-purge period or
Check **after** burner shut-down

Function principle



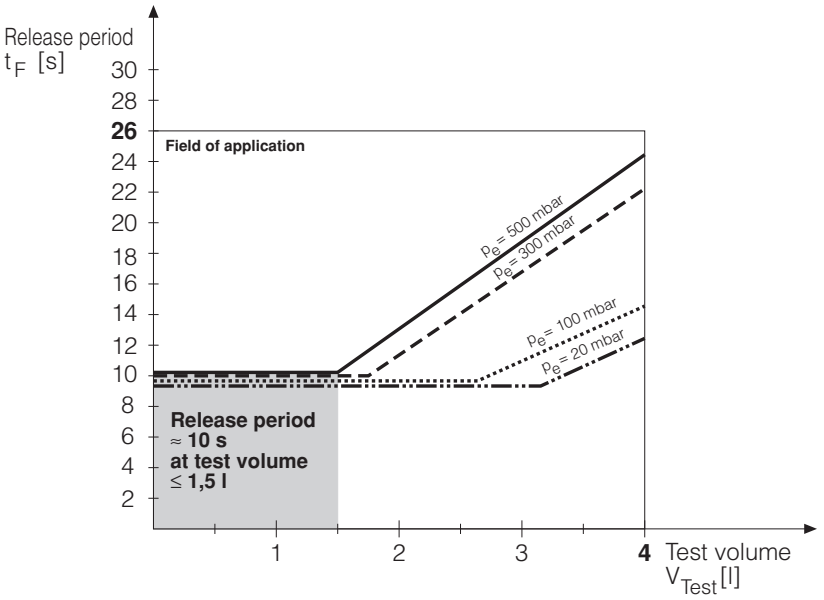
Release period t_F

Period which a VPS requires to perform a complete operation procedure. The release period of the VPS 504 depends on **test volume and input pressure**:

V_{Test} < 1.5 l
p_e > 20 – 500 mbar } $t_F \approx 10$ s

V_{Test} > 1.5 l
p_e > 20 mbar } $t_F > 10$ s

t_F max. ≈ 26 s



Test period P_t

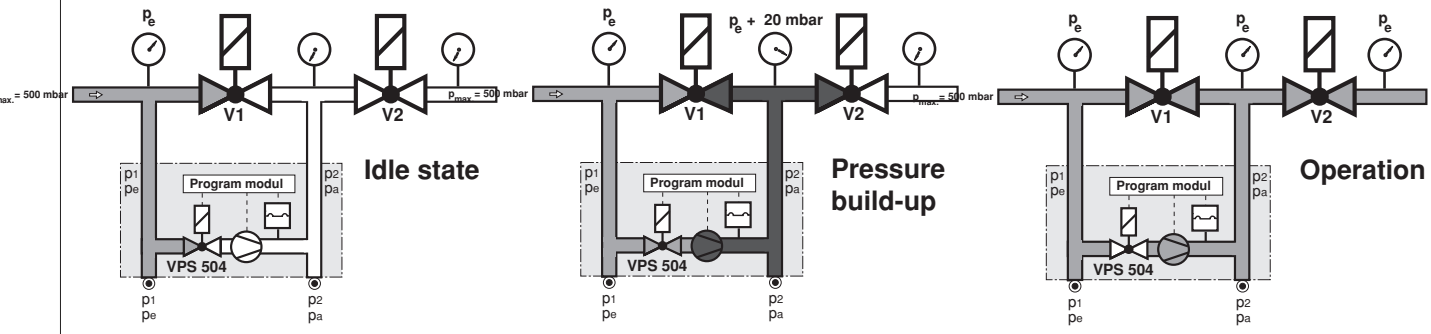
Pumping time of motor pump.

Test volume V_{Test}

Volume between V1 output-side and V2 input-side and the intermediate tube pieces.

$V_{Test\ max./VPS\ 504}$ = 4 l

Program sequence

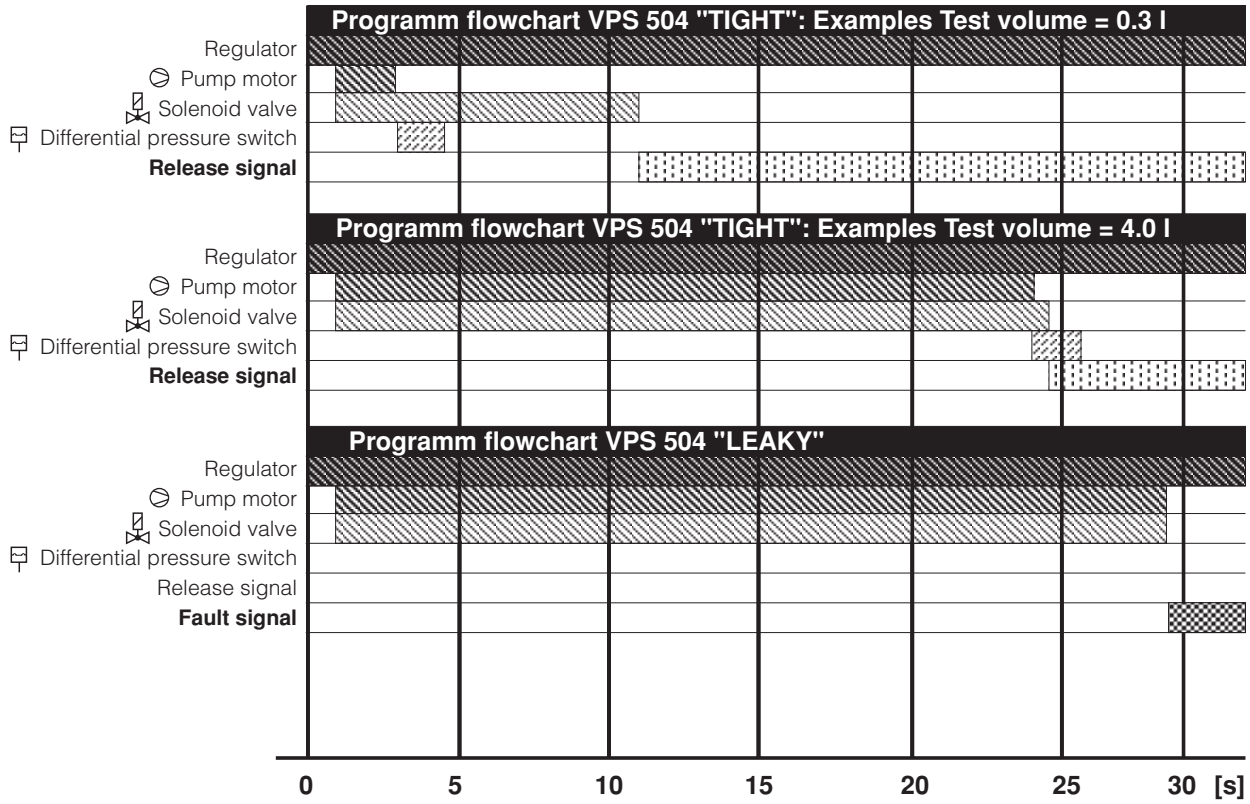


Idle state: Valves 1 and 2 are closed.
Pressure build-up: The internal motor pump increases the gas pressure p_e in the test section by approx. 20 mbar compared to the input-side pressure applied to valve V1.
During the test period, the installed differential pressure switch monitors the test section for leakage. If the test pressure is attained, the motor pump is switched off (end of test period). The release time (10-26 s) depends on the test volume (max. 4.0 l) and input pressure (max. 500 mbar).
If the test section is tight, the contact is released to the automatic burner control after max. 26 s - the yellow signal lamp lights up.

If the test section is leaky or if the pressure increase by + 20 mbar is not attained during the test period (max. 26 s), the VPS 504 switches to fault. The red signal lamp lights as long as the contact release by the regulator or thermostat is present (heat requirement).

In the case of short-term voltage failure during test or burner operation, an automatic restart is carried out.

Program flowchart



Electrical connection
VPS 504 Series 01

The VPS 504 Series 01 is connected in series between temperature regulator and automatic burner control via a 7-pole connector. Connector pin assignment between burner and boiler is performed as per DIN 4791. For pin assignment, refer to connection diagram.

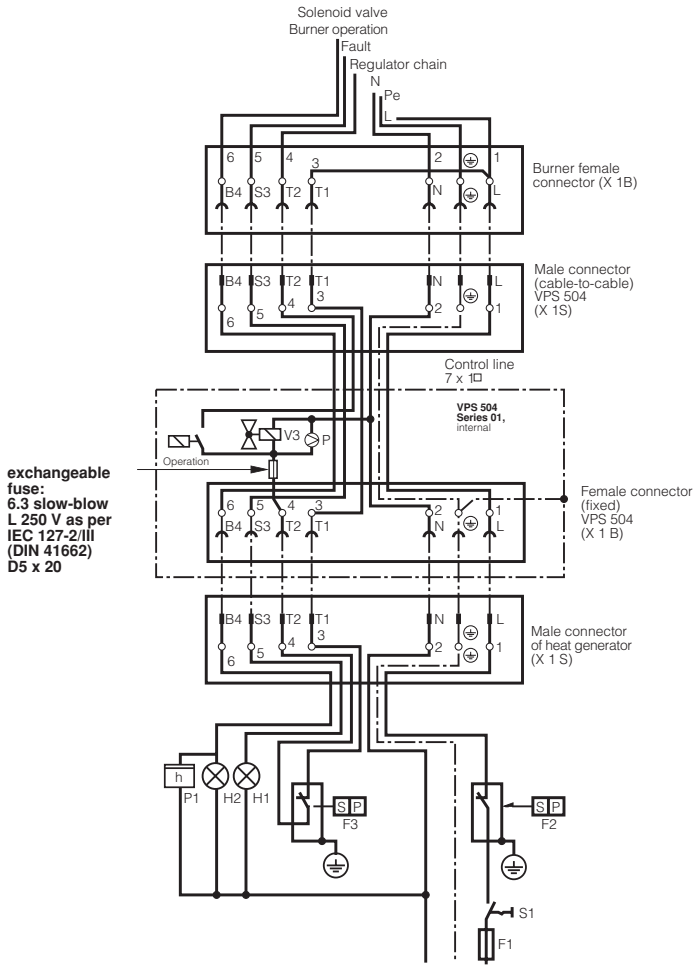
If the heat generator is wired as per DIN 4791, no boiler- or burner-side rewiring is necessary for electrical connection.

The burner female connector is connected with the cable-to-cable male connector of VPS 504 Series 01.

The female connector VPS 504 Series 01 is connected with the cable-to-cable male connector of the heat generator.

F1 Fuse
F2 Switch or limiter
F3 Regulator
H1 Fault signal
H2 Operation signal

P1 Operating hours counter Stage 1
S1 Switch
X1B Female connection
X1s Male connection

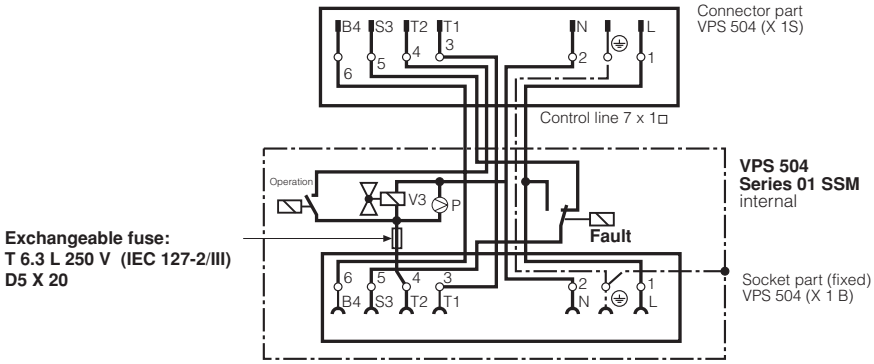


Electrical connection VPS 504 Series 01 SSM Group fault alarm

The electrical connection of VPS 504 Series 01 SSM is performed the same way as with the VPS 504 Series 01.

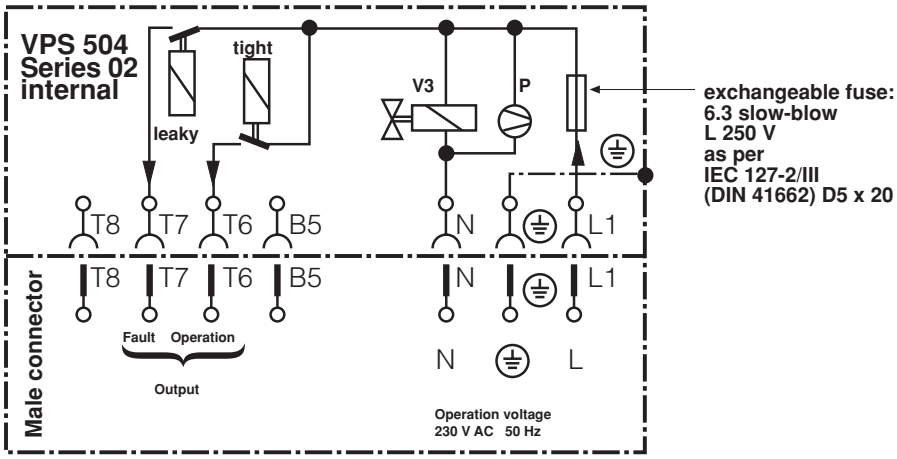
Additional switching characteristic of VPS 504 Series 01 SSM

If the test path is "untight", the VPS switches to fault.
An additional relay in the VPS interrupts the burner fault line S3 between burner and heat generator. At the same time, voltage is applied from the heat generator to S3 line and the LED H1 lights up.



Electrical connection VPS 504 Series 02

The VPS 504 Series 01 is connected in series between temperature regulator and automatic burner control via a 7-pole connector.
The boiler male connector is inserted into the female connector of VPS 504.
For pin assignment of female connector VPS 504 and heat generator male connector, refer to connection diagram.
Switching feature: No disconnection between operating voltage circuit and control circuit.



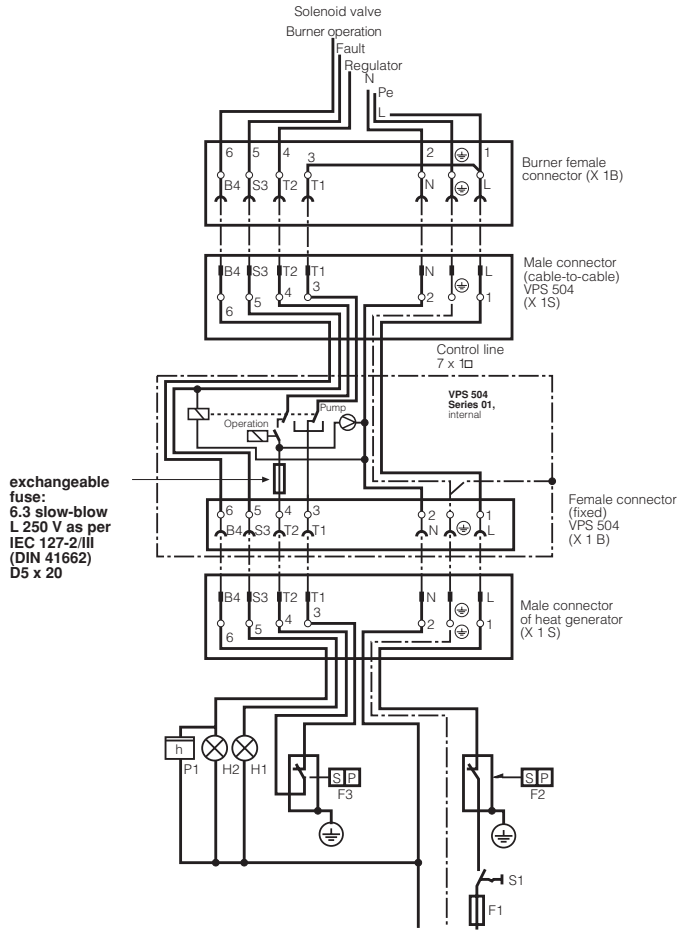
Electrical connection VPS 504 Series 03

The electrical connection of VPS 504 Series 03 is performed as in VPS 504 Series 01 (see left).

Additional switching feature of VPS 504 Series 03

If a fault signal is existent on S3 (burner fault), the regulator chain is bridged to the burner via an additional relay in VPS 504 Series 03 and at the same time the operating voltage of VPS 504 Series 03 is interrupted.
After eliminating the burner fault, the valve proving system is restarted (refer to following connection diagram).

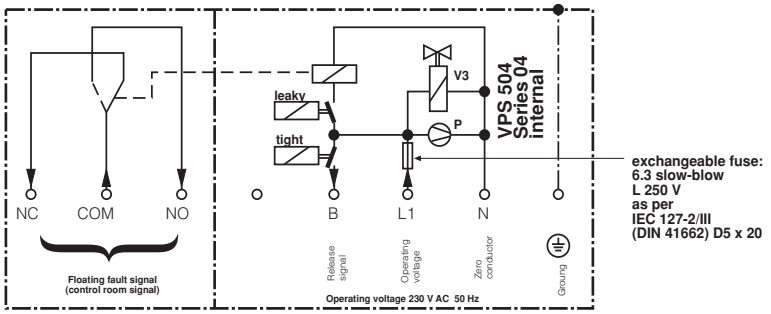
⚠ Only the fault signal coming from the automatic burner control of the burner may be connected to connection S3. If you do not observe this instruction, persons may be injured or objects may be damaged. Therefore, strictly keep to this instruction.



Electrical connection
VPS 504 Series 04

PG 13.5 cable duct and connection to screw terminals below cover in housing (see Dimensions VPS 504 S04).

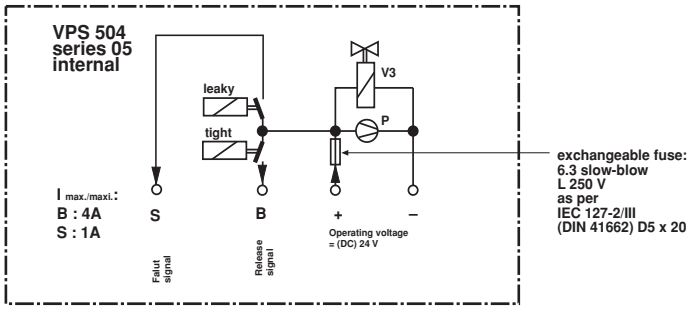
⚠ Floating control room signal may only be used for signalling, never for burner release.



Electrical connection
VPS 504 Series 05

PG 13.5 cable duct and connection to screw terminals below cover in housing (see Dimensions VPS 504 S04).

⚠ Operating voltage range 20 V - 30 V DC. Refer to motor startup current



Test volume of DUNGS multiple actuators MB-D..., MB-ZR..., MB-VEF..., DMV-D.../11

Type	Nominal diameter Rp/DN	Test volume [l]	Type	Nominal diameter Rp/DN	Test volume [l]
DMV-D(LE) 503/11	Rp 3/8	0.03 l	**MB-D(LE) 403**	Rp 3/8	0.02 l
DMV-D(LE) 507/11	Rp 3/4	0.09 l	**MB-D(LE) 405**	Rp 1/2	0.11 l
DMV-D(LE) 512/11	Rp 1 1/4	0.25 l	**MB-D(LE) 407**	Rp 3/4	0.12 l
DMV-D(LE) 520/11	Rp 2	0.25 l	**MB-D(LE) 410**	Rp 1	0.25 l
DMV-D(LE) 525/11	Rp 2	0.60 l	**MB-D(LE) 412**	Rp 1 1/4	0.28 l
DMV-D(LE) 5040/11	DN 40	0.36 l	**MB-D(LE) 415**	Rp 1 1/2	0.25 l
DMV-D(LE) 5050/11	DN 50	0.36 l	**MB-D(LE) 420**	Rp 2	0.25 l
DMV-D(LE) 5065/11	DN 65	0.60 l	**MB-ZRD(LE) 405**	Rp 1/2	0.11 l
DMV-D(LE) 5080/11	DN 80	1.70 l	**MB-ZRD(LE) 407**	Rp 3/4	0.12 l
DMV-D(LE) 5100/11	DN 100	2.30 l	**MB-ZRD(LE) 410**	Rp 1	0.25 l
DMV-D(LE) 5125/11	DN 125	3.75 l	**MB-ZRD(LE) 412**	Rp 1 1/4	0.28 l
			MB-ZRD(LE) 415	Rp 1 1/2	0.25 l
			MB-ZRD(LE) 420	Rp 2	0.25 l
			MB-VEF 407	Rp 3/4	0.12 l
			MB-VEF 412	Rp 1 1/4	0.28 l
			MB-VEF 415	Rp 1 1/2	0.25 l
			MB-VEF 420	Rp 2	0.25 l
			MB-VEF 425	Rp 2	0.60 l

Using the VDK 200 A S02 at DUNGS individual solenoid valves .../5

For mounting the VPS 504 to valves **Rp 1 1/2 to Rp 2**, the adapter kit, **Order No. 205 360** is required.

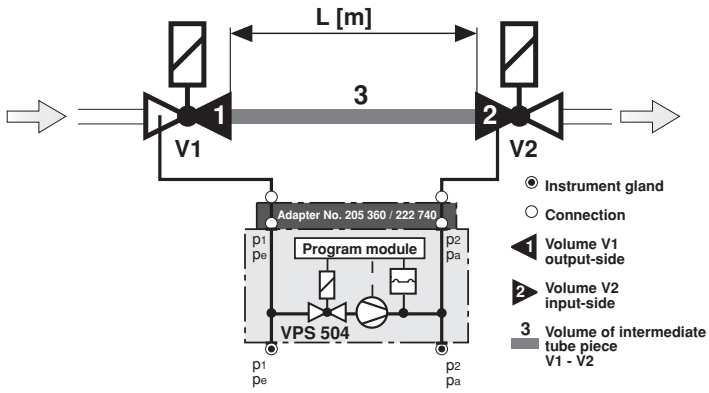
For mounting the VPS 504 to valves **DN 40 to DN 80**, the adapter kit, **Order No. 222 740** is required.

Determining test volume V_{Test}

1. Determine output-side volume of V1. Refer to table for Rp 1/2 to DN 80.
2. Determine input-side volume of V2. Refer to table for Rp 1/2 to DN 80.
3. Determine volume of intermediate tube piece 3. Refer to table for Rp 1/2 to DN 80.
4. V_{Test} = Volume $_{Valve\ 1}$ + Volume $_{Intermediate\ tube\ piece}$ + Volume $_{Valve\ 2}$

V_{Test} = **Valve volume** V1 output-side+ V2 input-side + **Volume of tube line**

Determining test volume V_{Test}



Determining test volume V_{Test} for DUNGS individual solenoid valves .../5

Nominal diameter Rp / DN	Valve volume [l] V1 $_{output-side}$+ V2 $_{input-side}$	Test volume [l] = Volume V1 $_{output-side}$+ V2 $_{input-side}$+ tube length Tube lengths between individual valves L [m] 0.5 m	1.0 m	1.5 m	2.0 m
Rp 1/2	0.07 l	0.17 l	0.27 l	0.37 l	0.47 l
Rp 3/4 (DN 20)	0.12 l	0.27 l	0.42 l	0.57 l	0.72 l
Rp 1 (DN 25)	0.20 l	0.45 l	0.70 l	0.95 l	1.20 l
Rp 1 1/2 (DN 40)	0.50 l	1.20 l	1.80 l	2.50 l	3.10 l
Rp 2 (DN 50)	0.90 l	1.90 l	2.90 l	3.90 l	
DN 65	2.00 l	3.70 l			
DN 80	3.30 l				

⚠ The max. test volume of 4.0 l must not be exceeded.

Startup

1. Check test section for leaks after assembly.
2. Start test by using temperature regulator and/or restart or by pressing the reset button of VPS 504.

3. If the test section is tight

Depending on the length of the test section and the residual pressure applied, the pumping time is between 3 s and 26 s.

The release for the automatic burner control is then given after approx. 10 s at the earliest (at small test volumes and small input pressures) and after approx. 26 s at the latest (at large test volumes and large input pressures) - the yellow signal lamp lights up.

If the test section is leaky

The test pressure is not attained. The motor pump switches off, the red fault lamp lights up. Switch-through to the automatic burner control does not take place.

Functional check

By opening a screw plug in test nipple p_2 (p_a) during test period (pumping time), leakage can be simulated and a function check can take place.

Setting

The VPS 504 must **not** be adjusted on site.

Assembly

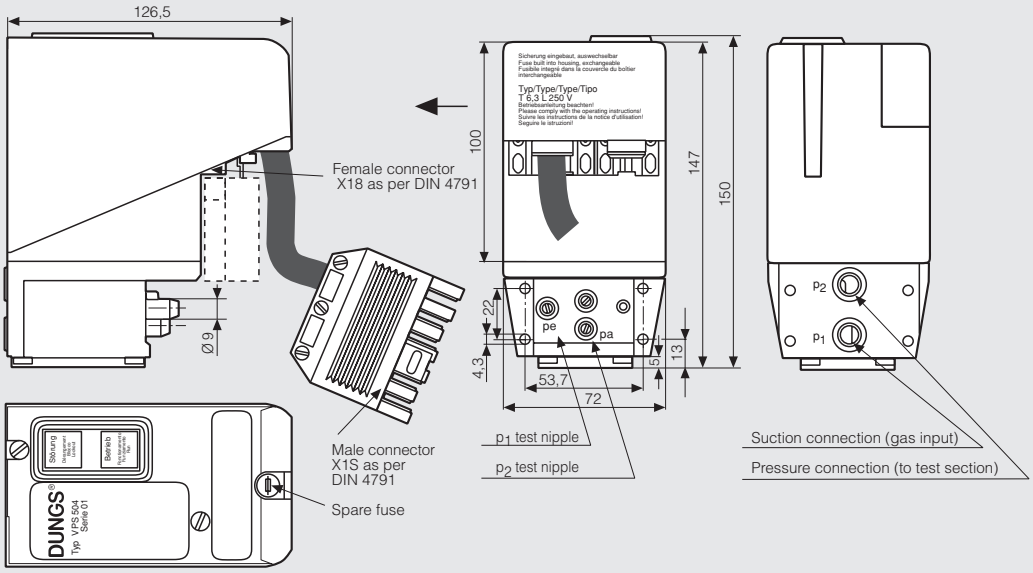
Directly flange the VPS 504 laterally to the DUNGS multiple actuators (mounting is possible on left-hand or right-hand side) using two 10.5 x 2.25 O rings and four M4 x 16 self-tapping screws.

⚠ If an exhaust gas valve is installed in the boiler, it must be open at the beginning of the test.

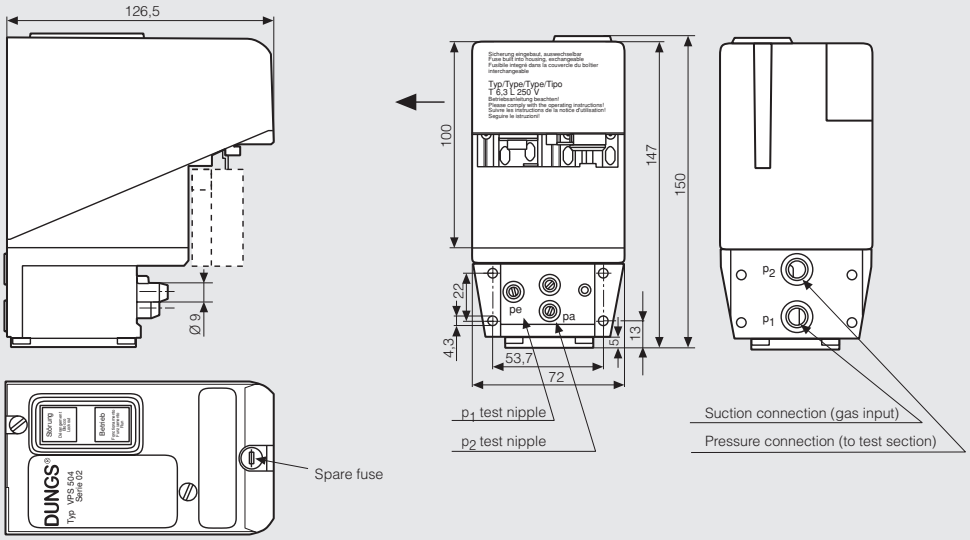
⚠ In order to prevent functional and leakage problems, we recommend the use of solenoid valves as per EN 161 Class A and Class B.

⚠ Inadequately shielded frequency alignment devices can lead to faults in the VPS due to mains cleanness.
Always arrange for sufficient mains shielding.

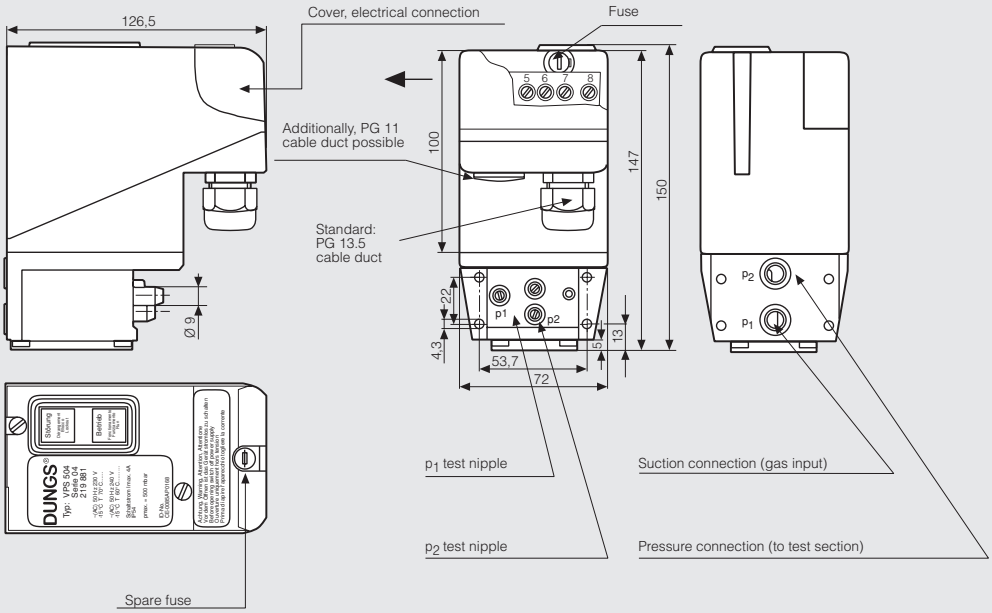
Dimensions [mm]
VPS 504 Series 01, Series 03



Dimensions [mm]
VPS 504 Series 02



Dimensions [mm]
VPS 504 Series 04, 05



VPS 504
Valve proving system for single valves, Dungs double - and combination valves

Type overview
Order details
Accessories

DUNGS®

VPS 504 type overview / accessories / order data

Version VPS 504 Series …		24 VDC	230 V 50 Hz	220 V 60 Hz	120 V 60 Hz	110 V 50 Hz
VPS 504 Series 01						
7-pole plug connection	Cable length: 0.30 m		**219 873**			
Wiring as per DIN 4791	Cable length: 0.85 m		**219 874**			
IP 40 degree of protection	Cable length: 1.50 m		**219 875**	**222 390**		**223 464**
	Cable length: 2.00 m		**219 876**			
Group fault alarm	Cable length: 0.85 m		**227 462**			
Group fault alarm	Cable length: 2.00 m		**227 527**			
VPS 504 Series 02						
7-pole plug connection	with male connector	**225 481**	**219 877**	**222 389**		**223 463**
Free connection	without male connector		**219 878**			
IP 40 degree of protection						
Butane version	with connector		**226 315**			
VPS 504 Series 03						
7-pole plug connection	Cable length: 0.30 m		**219 879**			
Wiring as per DIN 4791	Cable length: 0.85 m		**219 880**	**222 348**	**223 428**	**223 427**
IP 40 degree of protection	Cable length: 1.50 m		**223 590**			
Special function: **After burner fault, automatic restart of valve proving system**						
VPS 504 Series 04						
Connection to screw terminals			**219 881**	**222 388**	**223 426**	**221 327**
PG 13.5 cable duct						
Additionally, PG 11 possible						
Floating fault signal (control room signal)						
IP 54 degree of protection						
Butane version			**226 316**			
VPS 504 Series 05	Gasmotors	**224 983**				
VPS 504 Series 06 U_L, FM, CSA					**221 073**	
Accessories/spare parts						
PG 11 screw union			**231 778**			
Adapter kit VPS 504 for solenoid valves up to Rp 2			**205 360**			
Adapter kit VPS 504 for solenoid valves from DN 40 to DN 80			**222 740**			
7-pole male connector, 2 cable inputs with strain relief (standard)			**231 807**			
7-pole male connector, 4 cable inputs with PG 11			**231 808**			
7-pole male connector, 4 cable inputs with strain relief			**231 809**			
Mounting kit (4 x M4 x 16,2, 2 x O-Ring, 2 x filter insert			**221 503**			

We reserve the right to make any changes in the interest of technical progress.

CERTIFIED DIN ISO 9001 QUALITY SYSTEM REG.NO 14 313

ZERTIFIZIERTE PRODUKTE DVGW

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