

01/2012

Rep news

DUNGS®
 Combustion Controls

Februar/February 2012

Übersicht / Inhaltsverzeichnis

Overview / Content

- **Markteinführung Ventilprüfmodul VPM-VC/LC**
Elimination DSLC/LK2F
Marketintroduction Valve Proving Module VPM-VC/LC
Elimination DSLC/LK2F

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VPM

Valve Proving Module VPM-VC & VPM-LC

1973 wurde das Ventilprüfsystem DK2F eingeführt und 2006 modifiziert und als DSLC weiter vertrieben.

Das Leitungskontrollgerät LK2F wurde 1989 eingeführt und wurde bis jetzt zur Überprüfung von Laboreinrichtungen und Großküchen eingesetzt. Beide Geräte werden jetzt durch die neue VPM-VC/LC abgelöst (Ausnahme DSLC 24 VDC-Ausführung bleibt aktiv).

VPM

Valve Proving Module VPM-VC & VPM-LC

In 1973 the valve proving system DK2F was launched, it was modified and relaunched in 2006 as DSLC.

The controller for leakage testing of gas lines was launched in 1989 and is used in laboratories and kitchens until today. Both controls will be replaced now by the new Valve Proving Module VPM-VC/LC (except DSLC-version 24 VDC).

Vom DSLC/LK2F zum VPM • From DSLC/LK2F to VPM			
Bezeichnung • Designation			
alt old	neu new	Valve Proving Module VPM-...	Anwendung Application
DSLC	VPM-VC	Valve Check (VC) 	Das VPM-VC ist geeignet für die automatische Dichtheitsprüfung zwischen zwei Magnetventilen in Gasverbrauchseinrichtungen, wahlweise vor Inbetriebnahme oder nach Abschaltung der Anlage. Das Prüfsystem kann als Dichtheitskontrolle allein oder in Verbindung mit Feuerungsautomaten verwendet werden. Es findet Einsatz in Gasfeuerungsanlagen für Heizwärme, Prozesswärme und Gasmotoren. The VPM-VC has been designed for automatic leak testing between two solenoid valves in gas-consuming devices, either prior to start-up or after switching off the system. The test system can be used as a single leakage tester or in combination with automatic burners. It is used in gas burner systems for heating, process heating, process industry and gas engines.
LK2F	VPM-LC	Line Check (LC) 	In Laboreinrichtungen, Großküchen und verfahrenstechnischen Anlagen. Die Dichtheitsprüfung erfolgt vor dem Öffnen einer zentralen Gas-Absperrarmatur, die mehrere Gasverbrauchseinrichtungen frei gibt. Das unkontrollierte Ausströmen von Gas an den unterschiedlichen Entnahmestellen wird verhindert. In laboratories, large-scale catering establishments and process engineering plants. The leakage test is performed before opening a central gas shut-off valve that releases gas supply to several gas-consuming devices. Uncontrolled escape of gas at the various extraction points is thus avoided.

Fragen • Questions

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VPM
Valve Proving Module
VPM-VC & VPM-LCVPM
Valve Proving Module
VPM-VC & VPM-LC

Neue Produktmerkmale • New Features	
Valve Proving Module VPM-VC „Valve Check“	Valve Proving Module VPM-LC „Line Check“
• Prüfzeiten max. 1h • Anwendungsspezifisch 3 verschiedene Programmabläufe wählbar: 1. Ventilprüfung vor Brennerstart 2. Ventilprüfung nach Brenner-abschaltung 3. Ventilprüfung nach Brenner-abschaltung mit optimierten Ventilschaltspielen (Patent angemeldet) • LED-Anzeige signalisiert undichten Ventile • Multifunktionsausgang (MFA) zur direkten Ausgabe unterschiedlicher Geräteinformationen • Entlüftung in den Brennerraum oder über Dach • Geeignet für Anwendungen bis SIL 2. Erfüllt die Anforderung nach DIN EN 61508:2011, Teil 1-3. Zertifiziert durch TÜV Süd. • Test time max. 1h • Depending on the application, 3 different program sequences can be selected: 1. Valve test before burner start 2. Valve test after burner switch-off 3. Valve test after burner switch-off with optimised valve operating cycles (patent pending) • LED indicators signal leaky valves • Multifunction output (MFA) for direct output of various device information • Venting into the burner room or through the roof • Suitable for applications up to SIL 2. Meets the requirements according to DIN EN 61508:2011, Part 1-3. Certified by TÜV Süd.	• Prüfzeiten max. 1h • Unterschiedliche Kombinationen der Füll- und Entlüftungsversuche einstellbar • LED-Anzeige signalisiert undichte Ventile • Multifunktionsausgang zur direkten Ausgabe unterschiedlicher Geräteinformationen • Entlüftung in den Aufstellungsraum oder über Dach • Geeignet für Anwendungen bis SIL 2. Erfüllt die Anforderung nach DIN EN 61508:2011, Teil 1-3. Zertifiziert durch TÜV Süd. • Test time max. 1h • Different combinations of filling and venting attempts can be set • LED indicators signal leaky valves • Multifunction output for direct output of various device information • Venting into the installation room or via the roof • Suitable for applications up to SIL 2. Meets the requirements according to DIN EN 61508:2011, Part 1-3. Certified by TÜV Süd.

Fragen • Questions

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3 ...4

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Combustion Controls

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VPM
Valve Proving Module
VPM-VC & VPM-LCVPM
Valve Proving Module
VPM-VC & VPM-LC

Bestell-Nr. / Order no. & Last Order					
Alt/Old		Last Order	Neu/New		
Bezeichnung Designation	Bestell-Nr. Order no.		Bezeichnung Designation	Bestell-Nr. Order no.	
Komplettgeräte (Steuergerät & Stecksocket) • Complete controls (control box & plug-in base)					
DSLCL PX VX 24 VDC	247963	bleibt unverändert im Programm stays without any change in the program	DSLCL PX VX 24 VDC	247963	
DSLCL PX VX 230 VAC	247962		2012-06-01	VPM-VC V1.0 230 VAC	259696
DSLCL PX VX 110 VAC	248762			VPM-VC V1.0 115 VAC	Zulassung beantragt/Approval in process
LK2F/2-10FV 230 VAC/50Hz	213569	2012-03-01	VPM-LC V1.0 230 VAC	259146	
LK2F/2-3FV 230 VAC/50Hz	255980				
LK2F/2-3FV 230VAC/50Hz	257143				
Steuergerät ohne Sockel • Control without plug-in base					
LK2F/2-10FV 230 VAC/50Hz	213568	2012-03-01	VPM-LC V1.0 230 VAC	259730	
LK2F/2-3FV 230 VAC/50Hz	256540		VPM-LC V1.0 230 VAC	259730	
			VPM-LC V1.0 115 VAC	Zulassung beantragt/Approval in process	
			VPM-VC V1.0 230 VAC	258890	
			VPM-VC V1.0 115 VAC	Zulassung beantragt/Approval in process	
Stecksocket • Plug-in base					
			VPM-LC/VC (1 St./pcs)	259694	
			VPM-LC/VC (48 St./pcs)	259695	
Achtung! Es ist unmöglich das neue VPM-VC/LC auf den alten Stecksocket DSLCL bzw. LK2F zu montieren. Beim Austausch muß immer das gesamte Gerät mit dem Stecksocket ausgetauscht und neu verdrahtet werden. Dazu den Anweisungen in der Betriebs- und Montageanleitung der VPM-VC/LC folgen. Please note! It is impossible to mount the new VPM-VC/LC on the old plug-in base of DSLCL/LK2F. In case of replacement you had to replace the whole control including the old plug-in base. The wiring must be done in according with the installation instruction of VPM-VC/LC.					
VPM-VC/LC kann bestellt werden ab You can order the VPM-VC/LC from			2012-02-15		

Fragen • Questions

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Bitte informieren Sie Ihre Kunden!
 Please inform your customers!

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4 ...4

Control unit for system leakage tests

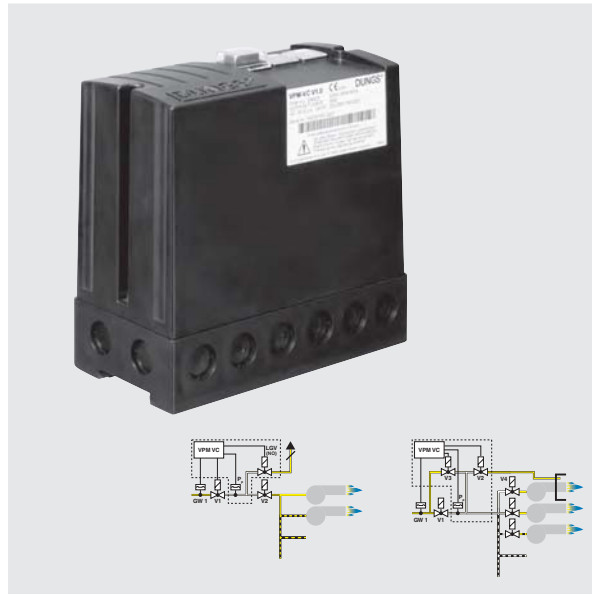
Type VPM-VC (Valve Check)

8.22

DUNGS®
Combustion Controls

neue
nouveau

- Test time max. 1h
- Depending on the application, 3 different program sequences can be selected:
 1. Valve test before burner start
 2. Valve test after burner switch-off
 3. Valve test after burner switch-off with optimised valve operating cycles (patent pending)
- LED indicators signal leaky valves
- Multifunction output (MFA) for direct output of various device information
- Venting into the burner room or through the roof
- Suitable for applications up to SIL 2. Meets the requirements according to DIN EN 61508:2011, Part 1-3. Certified by TÜV Süd



Description

The VPM-VC valve test module checks the tightness of burner gas shut-off valves in combination with one or two pressure switches. The test is performed in accordance with EN 1643.

The program sequence, filling and venting parameters as well as program times can be adjusted by the user according to the system requirements.

Application

The VPM-VC has been designed for automatic leak testing between two solenoid valves in gas-consuming devices, either prior to start-up or after switching off the system. The test system can be used as a single leakage tester or in combination with automatic burners. It is used in gas burner systems for heating, process heating, process industry and gas engines.

Approvals

EC type-examination certificate according to the EC Gas Appliances Directive (2009/142/EC):

VPM-VC CE-0085 CM 0240

EC type-examination certificate according to the EC Pressure Equipment Directive:

VPM-VC CE0036

The VPM meets the requirements of:

- Machinery Directive 2006/42/EC
- Low Voltage Directive 2006/95/EC
- EMV 2004/108/EC

Approvals in other important gas-consuming countries.

FM and CSA approval on request.

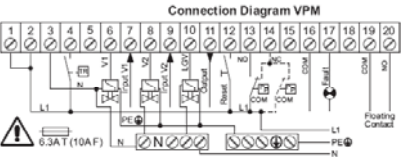
VPM-VC Control unit for system leakage tests according to En 1643. Checks tightness of the gas burner shut-off valves either before burner start or after shutdown. Equipment: one or two gas pressure switches. Additional pilot valves are required depending on the system

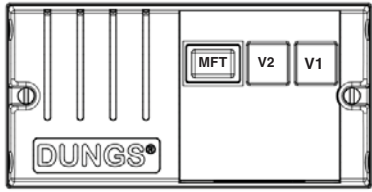
⚠ Pressure switches/valves/pilot valves are not part of the scope of delivery!

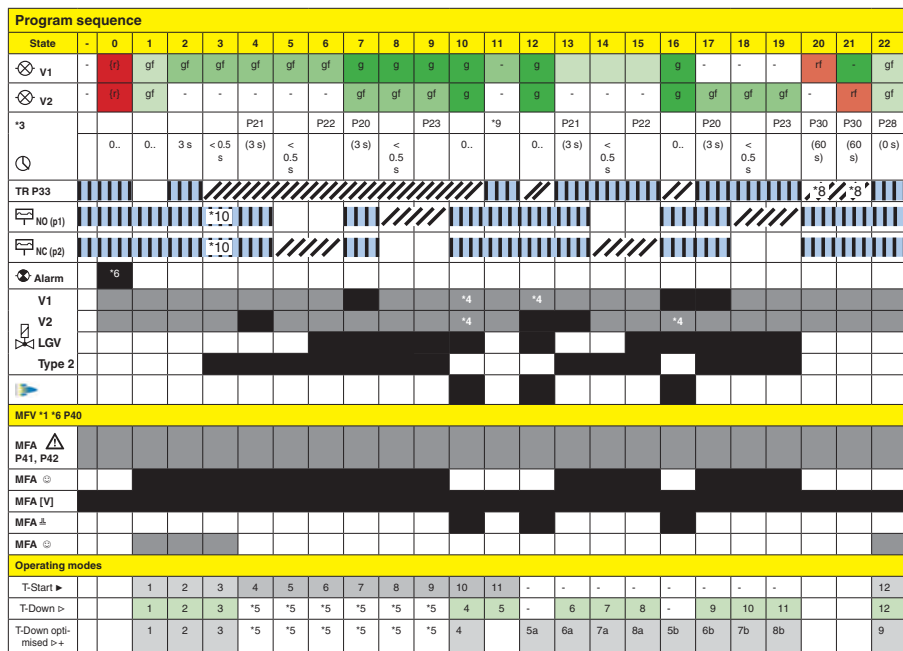
Technical data

Rated voltage (depending on the model)	~ (AC) 230 V +10 % / -15 % 50-60 Hz ±5 % ~ (AC) 115 V +10 % / -15 % 50-60 Hz ±5 %
Power consumption	max. 10 W
Power consumption Typical	115 V: standby 2.6 W operation 4.6 W 230 V: standby 3.1 W operation 5.4 W
Backup fuse L1	6.3 A T (10 A F), integrated, replaceable
Humidity	DIN 60730-1, no dewing admissible
Type of protection	IP 42
Ambient temperature	-20 °C to +60 °C
Storage temperature	-40 °C to +80 °C
Switch-on duration	100 %
Test volume	Unlimited
Medium	Any; gas type depending on pressure switch and valve
Inlet pressure	Any; depending on pressure switch and valve
Multifunction output (MFA)	Number of operating cycles V1 > 100000 (terminal 19 + 20, potential-free). Further settings possible via VisionBox + parameter change: 1. Freely selectable number of operating cycles up to 6.5 million (standard 100,000) 2. Signal output with freely selectable number of operating cycles of V2, LGV or release in place of V1 3. Signal output while the test is running or while voltage is applied 4. Signal after successful switch-off
Program sequence can be selected	Three different program sequences can be selected via DIP switches: 1. Valve test before burner start 2. Valve test after burner switch-off 3. Test sequence with optimised valve operating cycles after burner switch-off without additional switching cycles. In this case, only one valve will be tested at a time after successful switch-off, --> lower power consumption and increased valve life.
Test times can be set	DIP switches can be used to select predefined test times of V1 and V2, enabling optimal setting in case of different test volumes, inlet pressures and leakage rates. Alternatively, individual test times, even different times for V1 and V2, can be set via VisionBox.
Filling and venting attempts	Depending on the test volume, different combinations can be selected using DIP switches.
Signalling for V1 and V2	Red/green LEDs signal various information on the program and release states or error codes.
TWI interface	Plug-in connection for DUNGS VisionBox. The VisionBox can be used to access the VPM via a PC. The VisionBox is hardware and software for VPM parameter setting. Status information and error error memory data can be read out.
Mounting position	As desired

Application information		
EN 676: 2008-11	...	requests tightness checks at burner capacities above 1,200 kW or already at capacities from 70 kW for burners without pre-purging.
EN 746-2: 2011-02	...	requests the use of a VPM for some applications. Pre-venting of the burner chamber can be omitted when using a VPM. Venting of the furnace is done to the atmosphere.
EN 1643: 2001-02	...	in combination with a VPM, venting may be done into the furnace for max. 3 s.

Wiring scheme	Outputs	Electrical data
 The sum of the currents of all safety-related consumers must not exceed 5 A! The sum of the currents of all consumers must not exceed 6.3 A (10 A).	11	Release 115/230 VAC / 5 A cos $\varphi = 1$ Minimum load 0.5 W
	6	V1 115/230 VAC / 2 A cos $\varphi = 1$ Minimum load 0.5 W
	8	V2 115/230 VAC / 2 A cos $\varphi = 1$ Minimum load 0.5 W
	10	LGV 115/230 VAC / 2 A cos $\varphi = 1$ Minimum load 0.5 W
	16	External fault 115/230 VAC / 1 A cos $\varphi = 1$
	17	
	19	MFA 115/230 VAC / 1 A cos $\varphi = 1$
	20	
	Inputs	Electrical data
	4	TR Test request 115/230 VAC
	13	Pp1 115/230 VAC normally open
	14	Pp2 115/230 VAC normally closed
	12	Remote unlocking 115/230 VAC
	7	V1_In 115/230 VAC
	9	V2_In 115/230 VAC

Signalling unit			Error information		
			V2	V1	Detailed error information via flash codes All LEDs are flashing: - when a key press is requested during a level change - when the VPM is ready for extended unlocking
MFT = multifunction switch: Unlocking switch for error status ...max. 5x/15 min. Changeover switch to switch to the password-protected function level for service and OEM parameter setting via TWI interface by means of the VisionBox.	V2 two LEDs green / red Switch-on (mains): all LEDs light up as a functional test for approx. 1.5 s. Depending on the states, the LED-V1 and LED-V2 indicators are flashing or lit constantly	V1 two LEDs green / red	Off	Constantly red	V1 leaking
			Constantly red	Off	V2 leaking
			Red flashing 1x	Red flashing 1x	Venting error
			Red flashing 2x	Red flashing 2x	Filling error
			Red flashing 3x	Red flashing 3x	Wrong position of DIP switch
			Red flashing 4x	Red flashing 4x	Unlock failed
			Red flashing 5x	Red flashing 5x	V1_in or V2 -in
			Constantly red	Constantly red	...all other errors
			Constantly green	Constantly green	Release signal



Output: ON
 Output: OFF
 Output: dependency

Input: ON
 Input: OFF
 Input: any

V1/V2 LED indicators	
{r}	Red ON or with flash code
g	Green ON
gf	Green flashing (1 Hz)
gf	Green slowly flashing (approx. 4 s off, then 0.125 s on)
rf	Red flashing (1 Hz)

Notes on the test sequence	
*1	The multifunction output can be configured via parameters.
*2	Signals ≤ 0.9 s are tolerated. Per parameter P14, the control can be deactivated to OFF.
*3	DIP switch positions have priority over parameters
*4	In these states, an automatic burner control system or a PLC opens the valve outputs V1 and V via V1in or V2in.
*5	Under certain conditions, the test is also carried out during the start phase, for example after a power failure, if an error has been detected in the previous sequence, or if too much time (P24) has elapsed since the last test (parameter-dependent, only for "T-Down optimised" - shutdown optimised).
*6	Black = ON here means: the signal on IN (e.g. L1) is connected to OUT with a jumper
*8	The response to the removal of the test request can be deactivated via parameter P33.
*9	This state takes 1/16 s in the operating modes LC-mode, TStart (start) and T- Down optimised (shutdown optimised) . In the T-Down mode (regular shutdown), the duration of this state is defined by P25 (as-delivered configuration P25: 3 s).
*10	Per parameter P15, an idle state control of Pp can be activated during the start phase (state 3), i.e., Pp NO must be Low and Pp NC must be High.

Modification of the program sequence by an application-specific setting of the B/C DIP switches



A Test sequence		B t _{test} V1, V2 test time		C Number of venting or filling attempts	
1100	Test during the start phase before burner ignition	1100	10 s	1100	Venting 10 (●) Filling 1
		0110	22 s VPM-VC	0110	Venting 1 Filling 1
		1001	30 s	1001	Venting 1 Filling 10
1001	Test after regular shutdown	0011	55 s The following can be changed via the software: P22 for test time V1 P23 for test time V2 If this switch position is used, parameter setting should be checked via the VisionBox.	0011	Venting 3 (●) Filling 3 (●) The following can be changed via the software: P32: Number of venting operations P31: Number of filling operations If this switch position is used, parameter setting should be checked via the VisionBox.
0011	Test after regular shutdown in reduced mode without additional operating cycles Operating mode "T- Down optimised": after regular switch-off, one valve is tested at a time alternatively, the other valve is kept open. The alternation takes place during release, when removing the test request next time. - burner with frequent starts - longer valve life - reduced power consumption	t _{test}	For the calculation of the test times, see p. 7 Setting must be higher than the calculated time. $t_{DIP} > t_{test V1} + t_{test V2}$ When the test times are long, a safety shutdown is already triggered at smaller leakage rates [Qp].	⚠	For more detailed explanations, see installation examples in the VPM-VC operating and mounting instructions. According to EN1643, 1 filling or 1 emptying attempt for max. 3 s into the burner chamber is admissible (DUNGS as-delivered configuration). At filling and emptying times of 1 s of the gas main valves, max. 3 attempts are admissible. If the number of venting attempts is higher, venting must be into a safe area (LGV vent valve).
As-delivered configuration					
0000		0000		0000	

Calculation, individual setting of the test time or DIP switch group BBBB					
$t_{\text{test V1}} = \frac{p_e \cdot V_p \cdot \ln(p_e / (p_e - p_{s1}))}{p_{\text{atm}} \cdot Q_p} \cdot 3600 \text{ s/h} \cdot \text{S}$		$t_{\text{test V2}} = \frac{p_e \cdot V_p \cdot \ln(p_e / p_{s2})}{p_{\text{atm}} \cdot Q_p} \cdot 3600 \text{ s/h} \cdot \text{S}$			
xxxx 1100 xxxx xxxx 0110 xxxx xxxx 1001 xxxx	DIP mode for pre-defined test times of V1 and V2: Setting must be higher than the calculated time. $t_{\text{DIP}} > t_{\text{test V1}} + t_{\text{test V2}}$	V_p	[dm ³]	Test volume between the valves to be monitored	
xxxx 0011 xxxx	Individual setting of the test time via the software: Select DIP mode xxxx 0011 xxxx. Enter calculated value for t_{p22} in P22 and t_{p23} in P23.	Q_p	[dm ³ /h]	Admissible leakage rate according to EN1643. The leakage rate corresponds to 0.1 % of the burner's gas consumption at maximum burner load, but at least 50 dm ³ /h. A limit value of 200 dm ³ /h is recommended by DUNGS!	
$t_{\text{test V1}}$	[s]	Test time for V1	p_e	[mbar]	Gas inlet pressure
$t_{\text{test V2}}$	[s]	Test time for V2	p_{s1}	[mbar]	Increasing switching pressure +15 %
t_{p22}	[]	to be entered in P22 Select higher value!	p_{atm}	[mbar]	Dropping switching pressure -15 %
t_{p23}	[]	To be entered in P23 Select higher value!		[mbar]	Atmospheric pressure = 1013 mbar

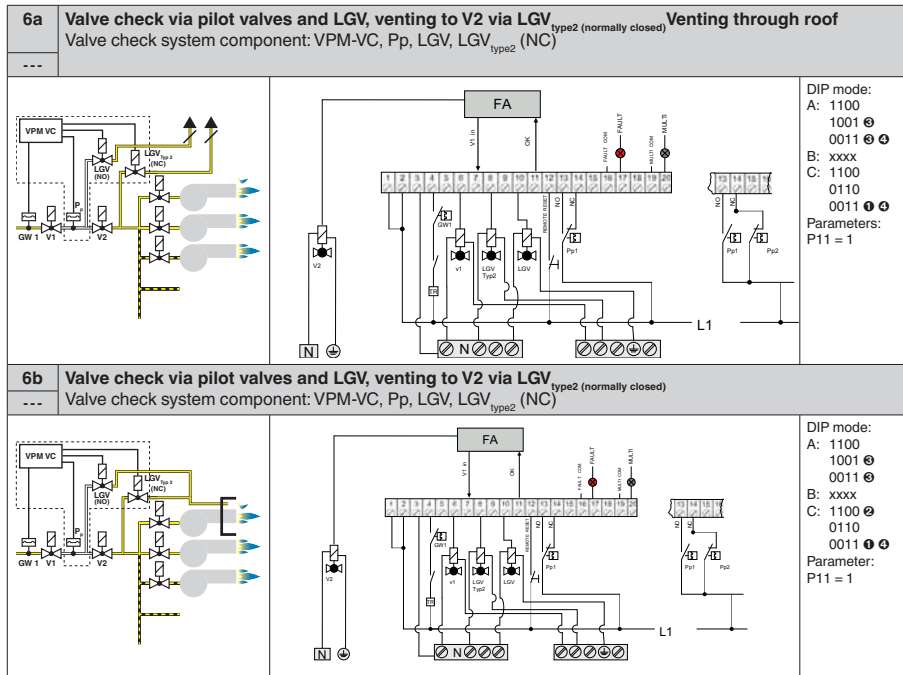
Vp determination of the test volume

Depending on the selected installation (for examples, see pages 8-11) Include all valve and pipeline volumes of the test section.	
Vp	1. Determine the V1 volume on the outlet side. For Rp 1/2 - DN 80, see operating and mounting instructions. 2. Determine the V2 volume on the inlet side. For Rp 1/2 - DN 80, see operating and mounting instructions. 3. Determine the volume of all connecting pipe sections (3) For Rp 1/2 - DN 80, see operating and mounting instructions. 4. If present, determine the volume of the pilot valves. 5. $VP = V(V1) + V(\text{connecting pipe section(s)}) + V(V2) + V(\text{LGV})$
Example	

Installation examples	
	The functional principle must be selected in accordance with the local regulations!
	Prevent soiling by using appropriate gas filters
	Use of pilot valves recommended

Please note: Switch positions ❶ ❷ ❸ ❹					
❶	According to EN1643, 1 filling or 1 emptying attempt for max. 3 s into the burner chamber is admissible (DUNGS as-delivered configuration). At filling and emptying times of 1 s of the gas main valves, max. 3 attempts are admissible.	❷	When filling or emptying attempts are carried out via pilot valves, the situation described in ❶, shows that the specifications of EN1643 are also met with 10 filling or emptying attempts if pilot valves are used that can reach at most only 1/10 of the maximum gas flow of the main valves.	❸	If the valve check is carried after a regular shutdown, the system setup must ensure that locking the system prevents a valve check during a fault situation. This can only be achieved by safe interruption of the power supply to the VPM when a fault occurs.
				❹	If this switch position is used, parameter setting should be checked via the VisionBox.

1a Direct valve check via LGV, venting through roof	
---	Valve check system component: VPM-VC, Pp, LGV
	DIP-mode: A: 1100 1001 ③ 0011 ③ ④ B: xxxx C: 1100 0110 0011 ① ③ Parameters: ----
1b Direct valve check via LGV, venting into the burner chamber	
---	Valve check system component: VPM-VC, Pp, LGV
	DIP-mode: A: 1100 1001 ③ 0011 ③ ④ B: xxxx C: 0110 0011 ① ③ Parameters: ----

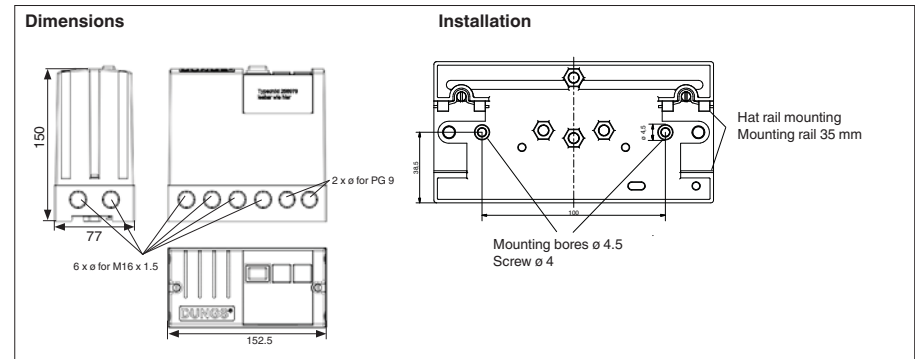


Control unit for system leakage tests

Type VPM-VC
(Valve Check)

DUNGS®
Combustion Controls

Version	Description	Order No.
Complete device	VPM-VC cpl. 230 VAC	259 696
	VPM-VC cpl. 115 VAC	259 697
Top part	VPM-VC 230 VAC	258 625
	VPM-VC 115 VAC	258 890
Base	1 piece	259 694
	48 piece	259 695



Accessories	
	Gas pressure switch Depending on the operating pressure, see data sheets LGW...A4 (5.08) GW...A6 (5.01) GW...A4 HP (5.04)
	Pilot solenoid valves see data sheets DMV... (7.30, 7.37, 7.38), MV 502 (6.21) MVD ... (6.20)
	MPA VisionBox As addition to MPA parameterisation and service box for setting VPM parameters via a PC/laptop.

Subject to technical modification in the interest of technical progress.



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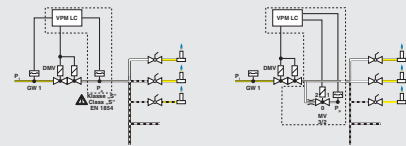
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e-mail: info@dungs.com
Internet: www.dungs.com

Control unit for system leakage tests

Type VPM-LC (Line Check)

8.30

DUNGS®
Combustion Controls



Description

The VPM-LC valve test module checks the tightness of the gas line between the central shut-off fitting (safety solenoid valve) and the gas extraction points. Filling and venting parameters as well as program times can be adjusted by the user according to the system requirements.

Application

In laboratories, large-scale catering establishments and process engineering plants. The leakage test is performed before opening a central gas shut-off valve that releases gas supply to several gas-consuming devices. Uncontrolled escape of gas at the various extraction points is thus avoided.

Approvals

DVGW type examination certificate according to DIN EN 13611 and DIN EN 298: DG-4115CM0413

VPM-LC meets the requirements of:

- DVGW worksheet G621:2009-11: Components of gas installations in laboratories and scientific classrooms.
- DVGW worksheet G634:1998-09: Installation of catering gas appliances in premises
- Machinery Directive 2006/42/EC
- Low Voltage Directive 2006/95/EC
- EMV 2004/108/EC

FM and CSA approval on request.

VPM-LC

Control unit for system leakage tests
Equipment: Depending on the chosen equipment option, two pressure switches, double solenoid valve and pilot valve.

VPM-LC checks the following parameters before starting:

- Tightness of the gas line system
- Closed position of shut-off devices (valves, manual valves/lab equipment)
- Inlet pressure

Monitoring during operation:

- Power failure
- Min. gas pressure

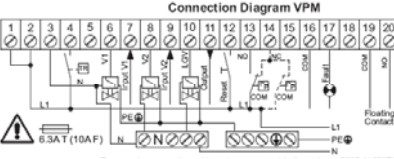


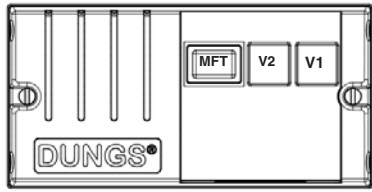
Pressure switches/valves/pilot valves are not part of the scope of delivery!

Technical data

Rated voltage (depending on the model)	~ (AC) 230 V +10 % / -15 % 50-60 Hz ±5 % ~ (AC) 115 V +10 % / -15 % 50-60 Hz ±5 %
Power consumption	max. 10 W
Power consumption Typical	115 V: standby 2.6 W operation 4.6 W 230 V: standby 3.1 W operation 5.4 W
Backup fuse L1	6.3A T (10A F), integrated, replaceable
Humidity	DIN 60730-1, no dewing admissible
Type of protection	IP 42
Ambient temperature	-20 °C bis +60 °C
Storage temperature	-40 °C bis +80 °C
Switch-on duration	100 %
Test volume	Unlimited
Medium	Any; gas type depending on pressure switch and valve
Inlet pressure	Any; depending on pressure switch and valve
Multifunction output (MFA)	Number of operating cycles V1 > 100000 (terminal 19 + 20, potential-free). Further settings possible via VisionBox + parameter change: 1. Freely selectable number of operating cycles up to 6.5 million (standard 100,000) 2. Signal output with freely selectable number of operating cycles of V2, LGV or release in place of V1 3. Signal output while the test is running or while voltage is applied or release of water and electrics. 4. Signal after successful switch-off
Program sequence	Line check before start
Test times can be set	DIP switches can be used to select predefined test times of V1 and V2 (manual valves), enabling optimal setting in case of different test volumes, inlet pressures and leakage rates. Alternatively, individual test times, even different times for V1 and V2, can be set via VisionBox.
Filling and venting attempts	Depending on the test volume, different combinations can be selected using DIP switches.
Signalling for V1 and V2	Red/green LEDs signal various information on the program and release states or error codes.
TWI interface	Plug-in connection for DUNGS VisionBox. The VisionBox can be used to access the VPM via a PC. The VisionBox is hardware and software for VPM parameter setting. Status information and error error memory data can be read out.
Mounting position	As desired

Application information (DVGW worksheet/Germany)	
G 621: 2009-11	Gas systems in laboratories and scientific classrooms, installation and operation
G 634: 1998-09	Installation of catering gas appliances in premises. Special requirements for combustion air supply and exhaust gas evacuation

Electrical connection	Outputs	Electrical data
 The sum of the currents of all safety-related consumers must not exceed 5 A! The sum of the currents of all consumers must not exceed 6.3 A (10 A).	11	Release (bridged to 7) → V1
	6	V1 115/230 VAC / 2 A cos φ = 1 Minimum load 0.5 W
	8	Not required (V2) 115/230 VAC / 2 A cos φ = 1 Minimum load 0.5 W
	10	LGV 115/230 VAC / 2 A cos φ = 1 Minimum load 0.5 W
	16	External fault 115/230 VAC / 1 A cos φ = 1
	17	MFA 115/230 VAC / 1 A cos φ = 1
	19	
	20	
	Inputs	Electrical data
	4	TR Test request 115/230 VAC
	13	Pp1 115/230 VAC normally open
	14	Pp2 115/230 VAC normally closed
	12	Remote unlocking 115/230 VAC
	7	V1_In (bridged to 11) 115/230 VAC
	9	V2_In 115/230 VAC

Signalling unit			Error information		
			V2	V1	Detailed error information via flash codes All LEDs are flashing: - when a key press is requested during a level change - when the VPM is ready for extended unlocking
MFT = multifunction switch: Unlocking switch for error status ...max. 5x/15 min. Changeover switch to switch to the password-protected function level for service and OEM parameter setting via TWI interface by means of the VisionBox.	V2 two LEDs green / red Switch-on (mains): all LEDs light up as a functional test for approx. 1.5 s. Depending on the states, the LED-V1 and LED-V2 indicators are flashing or lit constantly	V1 two LEDs green / red	Off	Constantly red	V1 leaking
			Constantly red	Off	V2 leaking
			Red flashing 1x	Red flashing 1x	Venting error
			Red flashing 2x	Red flashing 2x	Filling error
			Red flashing 3x	Red flashing 3x	Wrong position of DIP switch
			Red flashing 4x	Red flashing 4x	Unlock failed
			Red flashing 5x	Red flashing 5x	V1_in or V2_in
			Constantly red	Constantly red	...all other errors
			Constantly green	Constantly green	Release signal

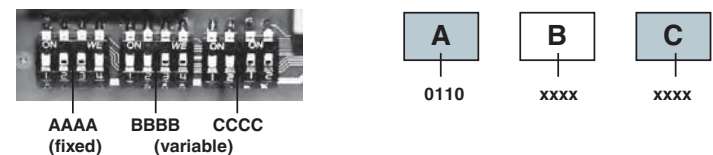
Program sequence											
State	-	0	1	2	3	7	8	9	10	11	22
V1	-	{r}	gf	gf	gf	g	g	g	g	-	gf
V2	-	{r}	gf	-	-	gf	gf	gf	g	-	gf
*3		0..	0..	3 s	< 0.5 s	(3 s)	< 0.5 s	P23	0..	*9	P28
TR P33											
NO (p1)											
NC (p2)											
Alarm		*6									
V1 LGV											
→ V1											
MFV *1 *6 P40											
MFA P41, P42											
MFA ►											
MFA [V]											
MFA ⚡											
MFA ☹											
Operating modes											
LC mode			1	2	3	4	5	6	7	8	9

	Output: ON		Output: OFF		Output: dependency
	Input: ON		Input: OFF		Input: any

V1/V2 LED indicators	
{r}	Red ON or with flash code
g	Green ON
gf	Green flashing (1 Hz)
gf	Green slowly flashing (approx. 4 s off, then 0.125 s on)
rf	Red flashing (1 Hz)

Notes on the test sequence	
*1	The multifunction output can be configured via parameters.
*3	DIP switch positions have priority over parameters
*6	Black = ON here means: the signal on IN (e.g. L1) is connected to OUT with a jumper
*9	In LC mode, this state lasts for 1/16 s
*10	Per parameter P15, an idle state control of Pp can be activated during the start phase (state 3), i.e., Pp NO must be Low and Pp NC must be High.

Modification of the program sequence by an application-specific setting of the B/C DIP switches

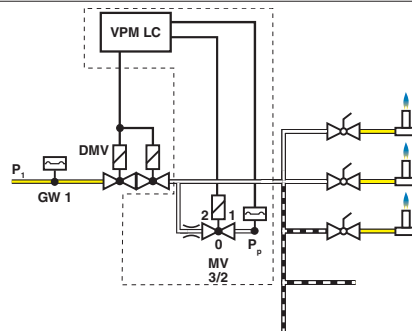


A Test sequence	B t_{test} V1, V2 test time		C Number of venting or filling attempts	
0110 VPM-LC Line check before start	1100	10 s	1100	Filling 1
	0110	55 s VPM-LC	0110	Filling 1
	1001	30 s	1001	Filling 10
	0011	55 s The following can be changed via the software: P23 for test time V2 If this switch position is used, parameter setting should be checked via the VisionBox.	0011	Filling 3 The following can be changed via the software: P31: Number of filling operations If this switch position is used, parameter setting should be checked via the VisionBox.
	t_{test}	For the calculation of the test times, see p. 7 Setting must be higher than the calculated time. $t \text{ DIP} > t_{\text{test V1}} + t_{\text{test V2}}$ When the test times are long, a safety shutdown is already triggered at smaller leakage rates [Qp].		According to EN1643, 1 filling or 1 emptying attempt for max. 3 s into the burner chamber is admissible (DUNGS as-delivered configuration). At filling and emptying times of 1 s of the gas main valves, max. 3 attempts are admissible. If the number of venting attempts is higher, venting must be into a safe area (LGV vent valve).
As-delivered configuration				
0110		0000		0000

Calculation, individual setting of the test time or DIP switch group BBBB					
$t_{\text{test V2}} = \frac{p_a \cdot V_p \cdot \ln(p_a / (p_a - p_{a1}))}{p_{\text{atm}} \cdot Q_p} \cdot 3600 \text{ s/h} \cdot S$			$t_{p23} = t_{\text{test V2}} \cdot 16/\text{s}$		
xxxx 1100 xxxx xxxx 0110 xxxx xxxx 1001 xxxx	DIP mode for pre-defined test times of V1 and V2: Setting must be higher than the calculated time: $t_{\text{DIP}} > t_{\text{test V1}}, t_{\text{test V2}}$	V_p	[dm ³]	Test volume between the valves to be monitored	
xxxx 0011 xxxx	Individual setting of the test time via the software: Select DIP mode xxxx 0011 xxxx. Enter the value calculated for t_{p23} in P23.	Q_p	[dm ³ /h]	Admissible leakage rate according to EN1643. The leakage rate corresponds to 0.1 % of the burner's gas consumption at maximum burner load, but at least 50 dm ³ /h. A limit value of 200 dm ³ /h is recommended by DUNGS!	
$t_{\text{test V1}}$	[s]	Test time for V1	p_a	[mbar]	Gas inlet pressure
$t_{\text{test V2}}$	[s]	Test time for V2 (manual valves)	p_{s1}	[mbar]	Increasing switching pressure +15 %
t_{p23}	[]	To be entered in P23 Select higher value!	p_{atm}	[mbar]	Atmospheric pressure = 1013 mbar

Vp determination of the test volume

! Depending on the selected installation (for examples, see page 8) Include all valve and pipeline volumes of the test section.	
Vp	1. Determine the DMV volume on the outlet side. For Rp 1/2 - DN 80, see operating and mounting instructions. 2. Determine the volume of the manual valves on the inlet side. For Rp 1/2 - DN 80, see operating and mounting instructions. 3. Determine the volume of all connecting pipe sections (3) For Rp 1/2 - DN 80, see operating and mounting instructions. 4. If present, determine the volume of the pilot valves. 5. $VP = V(V1) + V(\text{connecting pipe section(s)}) + V(V2) + V(MV 3/2)$



Installation examples

! The functional principle must be selected in accordance with the local regulations!

1 Line check via gas pressure switch without idle state control, DMV

---	System component Line check: VPM-LC, Pp according to DIN 1854, Class "S"
The manual valves are checked as to whether they are closed. If one of the manual valves is open, no pressure can built up. Tightness of the DMV cannot be checked.	
DIP-Mode: A: 0110 B: xxxx C: 0110 0011, ! 1001 Parameters: ---	

2 Direct line check via gas pressure switch with idle state control, MV

---	System component Valve check: VPM-LC, Pp, shutter, MV 3/2 A shutter diameter of 0.3 mm and $p_e = 50 \text{ mbar}$ results in a leakage rate $Q_p = 16 \text{ L}_{\text{air}}/\text{h}$
The manual valves are checked as to whether they are closed. If one of the manual valves is open, no pressure can built up.	
Leakage rate $Q_p = 16 \text{ L}_{\text{air}}/\text{h}$ with shutter diameter 0.3 mm @ $p_e = 50 \text{ mbar}$	
DIP-Mode: A: 0110 B: xxxx C: 0110 0011, ! 1001 Parameters: P15 = 1	

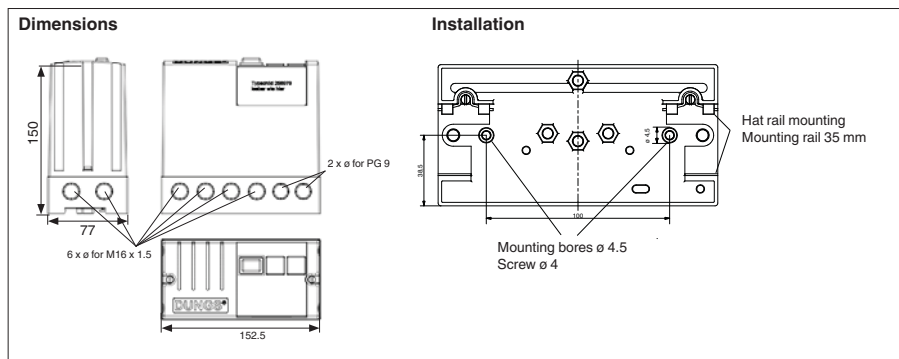
Attention **!** If this switch position is used, parameter setting should be checked via the VisionBox.

Control unit for
system leakage tests

Type VPM-LC
(Line Check)



Version	Description	Order No.
Complete device 	VPM-LC cpl. 230 VAC	259 146
	VPM-LC cpl. 115 VAC	259 147
Top part 	VPM-LC 230 VAC	259 730
	VPM-LC 115 VAC	259 731
Base 	1 piece	259 694
	48 piece	259 695



Accessories	
	Gas pressure switch Depending on the operating pressure, see data sheets LGW...A4 (5.08) GW...A6 (5.01) GW...A4 HP (5.04)
	Pilot solenoid valves see data sheets DMV... (7.30, 7.37, 7.38), MV 502 (6.21) MVD ... (6.20) Pilot valve 3/2 way solenoid valve/MV...
	MPA VisionBox As addition to MPA parameterisation and service box for setting VPM parameters via a PC/laptop.

Subject to technical modification in the interest of technical progress.



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