**Solenoids**

**Solenoid coil MKY45/18x60**
**For explosion-hazard zones**
**Protection class IP65/66/67**
**Optional with integrated amplifier electronics**

### DESCRIPTION

For explosion-hazard zones
Solenoid coil in acc. with directive 2014/34/EU (ATEX) for explosion-hazard zones.
The flameproof enclosures (acc. to EN/IEC 60079-1/31) prevents an explosion in the interior from getting outside.
The design prevents a surface temperature capable of igniting.
The steel housing is zinc-/nickel-coated
Optional with integrated amplifier electronics.

### FUNCTION

In combination with an armature tube, the function of a switching solenoid or of a proportional solenoid results.
Solenoid coils in AC – construction have an integrated rectifier.
All cable threaded joints certified for this explosion protection class with a protection class of at least IP65 can be used.
The optional amplifier electronics have an analogue interface and can be adjusted by means of push-buttons and 7 segment display or by means of the parameterisation software PASO.

### APPLICATION

The solenoid coil is suitable for use in all explosion-hazard zones, open cast and also in mines.
This signifies, that the coils are certified for applications in zones with explosion-hazard gas, steam, vapour, air and dust mixtures of the zones 1/21 and 2/22.
Valves for explosion-hazard zones are utilised in:
- the shipping- and offshore industries
- the oil- and gas industries
- the chemical industry
- wood processing
- grain mills
- the mining application

### CERTIFICATES

<table>
<thead>
<tr>
<th>Surface</th>
<th>Mining</th>
<th>Standard</th>
<th>M224</th>
<th>M238</th>
<th>M248</th>
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</table>

The certificates can be found on [www.wandfluh.com](http://www.wandfluh.com)

### TYPE CODE

| M K Y 45 / 18 x 60 - |  |  |  |  |

- **Mobile execution, metal housing**
- **Terminal box without cable**
- **Explosion proof version Ex d**
- **Housing width 45mm**
- **Internal coil diameter 18mm**
- **Coil length 60mm**
- **Nominal voltage U_n**
  - 12 VDC
  - 24 VDC
  - 115 VAC
  - 230 VAC
- **Nominal power P_n**
  - 6 W
  - 9 W
  - 15 W
  - 21 W
- **Certification**
  - ATEX, IECEx, CCC, EAC
  - Australia
  - MA
  - (only for G24/L15 and G24/L15-M248)
- **Cable gland**
  - M187
  - Thread NPT ½"
- **Temperature range**
  - -25°C to...
  - -40°C to...
  - -60°C to...
- **Function**
  - Amplifier
  - Freewheel diode
  - Bipolar protecting diode
  - Power reduction
  - only G12 or G24 / up to max. L15 / not for M238
  - only G12 or G24 / do not use for proportional functions
  - only G24
  - only L6

**Design-Index (Subject to change)**
CHARACTERISTICS

Coil winding isolation class H
Protection class acc. to EN 60529 IP65/66/67, with corresponding cable gland with front side O-ring sealing to the housing and correct installation
Relative duty factor 100 % DF, combined with armature tube and valve
Reference temperature

<table>
<thead>
<tr>
<th>Execution</th>
<th>Temperature range</th>
</tr>
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<tbody>
<tr>
<td>L6 / L9</td>
<td>-25° to +40 °C (operation as T1…T6/T80 °C) Temperature range &quot;-25° to...&quot;</td>
</tr>
<tr>
<td>L15 / L12</td>
<td>-25° to +70 °C (operation as T1…T4/T130 °C) Temperature range &quot;-25° to...&quot;</td>
</tr>
<tr>
<td>L21</td>
<td>-25° to +60 °C (operation as T1…T4/T130°C)</td>
</tr>
</tbody>
</table>

Housing Steel housing, zinc-nickel-coated
Relative humidity factor max. 95 % (not dew-forming)
Corrosion protection Salt spray test in accordance with EN ISO 9227 > = 1000 hours
Maximum operating voltage Nominal voltage +10 % in acc. with name plate ±2 %
Nominal frequency Standard
nominal voltages 12 VDC 24 VDC 115 VAC 230 VAC

<table>
<thead>
<tr>
<th>Nominal power (W)</th>
<th>12 VDC</th>
<th>24 VDC</th>
<th>115 VAC</th>
<th>230 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal power (W)</td>
<td>6 9 12 15 21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal resistance (Ω)</td>
<td>24.75 16.5 13.5 9.9 7.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended rated</td>
<td>1000 1600 2000 2500 4000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current for fuse inserts (mA)</td>
<td>400 610 720 960 1230</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal power (W)</th>
<th>115 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal power (W)</td>
<td>6 9 12 15 21</td>
</tr>
<tr>
<td>Nominal resistance (Ω)</td>
<td>98.5 64 49.2 38.5 27.5</td>
</tr>
<tr>
<td>Recommended rated</td>
<td>400 800 800 1250 2000</td>
</tr>
<tr>
<td>Current for fuse inserts (mA)</td>
<td>200 300 370 450 600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal power (W)</th>
<th>230 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal power (W)</td>
<td>6 9 12 15 21</td>
</tr>
<tr>
<td>Nominal resistance (Ω)</td>
<td>1840 1180 869 700 500</td>
</tr>
<tr>
<td>Recommended rated</td>
<td>100 200 200 315 400</td>
</tr>
<tr>
<td>Current for fuse inserts (mA)</td>
<td>100 100 100 160 200</td>
</tr>
</tbody>
</table>

| Other nominal voltages in the ranges of 12–230 VDC and 24–230 VAC on request |

M272 reduces the nominal power (Pn) after 500ms to a reduced power (Pn)

OPERATION SECURITY

The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.

In case of non-observance, no liability can be assumed.

A corresponding fuse in accordance with its design current has to be connected in series as short-circuit protection for every solenoid coil.

INSTALLATION

For stack assembly please observe the remarks in the operating instructions.

ACCESSORIES

- The operating instructions incl. the EC declaration of conformity for solenoid coils of the type MKY45/18 x 60 is supplied in German, English and French (download under www.wandfluh.com)
- Type test certifications (download under www.wandfluh.com)
- EC-declaration of conformity (download under www.wandfluh.com)
With amplifier electronics and with analogue interface

Digital amplifier electronics to MKY...M248
• Electronics integrated in solenoid housing
• For proportional or switching valves
• Screw terminals for simple assembly
• 1 analogue input
• 1 digital input
• Adjustable with push-buttons and display directly on the device or via PC

ELECTRICAL SPECIFICATIONS

Supply voltage  G12: 12 V +10 %, G24: 24 V +10 %
Residual ripple  < +/-5 %
Fuse  low
No-load current  approx. 20 mA
Max. current consumption  No-load current + limiting current of the solenoid
Analogue input  1 input non-differential
Voltage / current (switchable by means of parameter)
0...+/−10 V or 0/4...20mA
Resolution  10-Bit
Input resistance  Voltage input >100 kΩ
(�nput current < 5 mA)
Stabilised output voltage  5 VDC
Load for current input = 124 Ω
Stabilised output voltage max. load 20 mA
Solenoid current:
• Minimal current $I_{\text{min}}$ Adjustable 0…$I_{\text{max}}$ mA
  Factory setting 30 mA
• Maximal current $I_{\text{max}}$
  G24/L15 Adjustable $I_{\text{min}}$…510 mA
  Factory setting 450 mA
  G12/L15 Adjustable $I_{\text{min}}$…1020 mA
  Factory setting 960 mA
Dither  Frequency adjustable 4…500 Hz
Temperature drift  <1 % at $\Delta T = 40^\circ$C
Digital inputs  1 input high-active, no pull-up/down
Level adjustable 0…400 mA
Factory setting 150mA
Switching threshold high 6...32 VDC
Switching threshold low 0...1 VDC
Usable as frequency input
(freqency 5...5000 Hz) and as PWM input
(automatic frequency recognition)
Factory setting 80 Hz
USB interface Via digital input
Requires the Wandfluh USB adapter PD2
EMC
Immunity  EN 61 000-6-2
Emission  EN 61 000-6-4

DIMENSIONS

with amplifier electronics

CONNECTOR ASSIGNMENT (X1)

1 = +VCC
2 = Command value
3 = Dig Inp
4 = Stab out
5 = GND

GENERAL SPECIFICATIONS

Execution  Electronics board built-in directly in solenoid housing
Connections  Screw terminal
USB interface  Requires an additional Wandfluh adapter PD2

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### Block Diagram

- **+VCC**
- **GND**
- **Stabilised output**
- **Analog input**: Voltage or current
- **Digital input**

**Component Connections**
- **Adapter USB-PD2**
- **Internal supply**
- **Microcontroller**
- **PWM**
- **A/D**
- **RAM**
- **FLASH**
- **7 segment display**

### Start-up

Information regarding installation and commissioning are contained in the information leaflet supplied with the amplifier electronics and in the operating instructions.

Additional information can be found on our website: «www.wandfluh.com»

Free-of-charge download:
- «PASO-PD2» Parameterisation software
- Operating instruction (*.pdf)

### Additional Information

**Wandfluh documentation**
- Proportional spool valve register 1.10
- Proportional pressure valves register 2.3
- Proportional flow control valves register 2.6

**Accessories**
- USB adapter PD2 Article no. 726.9900
  - incl. USB cable type A-B, 1.8 m
  - (for parameterisation via PASO)

### Parameter Settings

The MKY electronics have push-buttons and a display which enable setting the most important parameters. In addition, the digital input can be used as a communication interface, through which, by means of the parameterisation software "PASO-PD2", the complete parameterisation and diagnostics can be carried out. For this, the Wandfluh USB-PD2 adapter is required. (not included in the delivery)

Attention: During the communication, the digital input cannot be used.

### Function Description

**S e L.**
- Command value
  - Command scaling
- Fixed command values
- Ramp generator
- Valve type
- Solenoid driver
- Solenoid output
- Current measurement
- Error

**S o L.**
- Command
  - Command value
- Number
- Enable
- Solenoid
- Error

**R e E.**
- Fixed command values
- Enable
- Solenoid
- Error

**S o L.**
- Command
  - Command value
  - Number
  - Enable
  - Solenoid
  - Error

**S e L.**
- Command
  - Command value
  - Number
  - Enable
  - Solenoid
  - Error

**S o L.**
- Command
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**Solenoids**

**AMPLIFIER WITH ANALOGUE INTERFACE**

**Command value scaling**
The command value can be applied as a voltage, current, digital, frequency or PWM signal. The scaling takes place via the parameter “Interface”. Furthermore, the command value can be monitored for a cable break. A dead band can also be set.

**Fixed command value**
There is 1 fixed command value available, which can be selected via the digital input. This function has to be configurated before in PASO.

**Ramp generator**
Two linear ramps for up and down are available which can be adjusted separately.

**Valve type**
Adjustment possibilities: switching solenoid or proportional solenoid.

**Mode of operation „Command value unipolar/bipolar (1-Sol)**
Dependent on a command value signal (voltage, current, digital, frequency or PWM), the solenoid is driven (e.g. 0….10V correspond to 0….100 % command value, 0….+100 % command value correspond to 0….5000 Hz). The scaling takes place via the parameter “In

**Signal recording**
Furthermore, the „PD2“ amplifier electronics have a signal recording function. This, by means of PASO, enables the recording of various system signals, such as command value, solenoid current, etc., which can be represented on a common time axis.

**Solenoid driver**
A Pulse-Width-Modulated current output is available. A dither signal is superimposed, whereby the dither frequency and the dither level are separately adjustable. The minimum (Imin) and maximum (Imax) current can be adjusted. The solenoid output can also be configurated as switching solenoid output. In this case, a power reduction can be adjusted.

**Optimisation of characteristic curve**
An adjustable characteristic curve „Command value input – solenoid current output“ enables an optimised (e.g. linearised) characteristic of the hydraulic system.

**Channel enabling**
The device is enabled as per factory setting. Via PASO or menu item, the digital input can the enabling can be set “on”, “out” or “external” (digital input).

**Hints:**
Digital input: if not wired, the state of the digital input is not defined
Analogue input: if not wired, the voltage input will read 1.11 V constantly.

### CONNECTION EXAMPLES

**Supply voltage**
Supply voltage

**Analoge input with potentiometer**

**Analogue input voltage with external voltage source**

**Analogue input current with external current source**

**Digital input as USB interface**

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