

# Electronic Handwheels



More than safety.

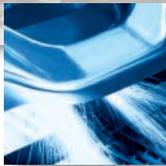


**EUCHNER**

# More than safety.



*Emil Euchner, the promoter of the enterprise and inventor of the multiple limit switch, around 1928*



**Around the world – the Swabian specialists for monitoring various motions in the field of machine and industrial manufacturing.**

EUCHNER's history began in 1940 with the establishment of an engineering office by Emil Euchner. Since that time, EUCHNER has been involved in the design and development of switching devices for controlling a wide variety of motions in the field of machine and industrial manufacturing. 1953 Emil Euchner founded EUCHNER + Co., a milestone in the company's history. In 1952, he developed the first multiple limit switch – to this day a symbol of the enterprising spirit of this family-owned company.

**Automation – Safety – ManMachine**

Today, our products range from electromechanical and electronic components to complex system solutions. With this wide range of products we can provide the necessary technologies for offering the right solution for special requirements - regardless of whether these relate to reliable and precise positioning or to components and systems for safety engineering in the automation sector. EUCHNER products are sold through a world-wide sales network of competent partners. With our closeness to the customer and the guarantee of reliable solutions throughout the globe, we enjoy the confidence of customers all over the world.

**Quality, reliability, precision**

Quality, reliability and precision are the hallmarks of our corporate philosophy. Terms and values to which we feel totally committed. At EUCHNER, quality means that all our employees take personal responsibility for the company as a whole and in particular, for their own area of responsibility. Individual endeavour and carrying out tasks flawlessly result in products which are totally in line with the customers' needs and the requirements of the market. After all: Our customers and their needs are the focus of all our efforts. Through efficient and effective use of resources, the promotion of personal initiative, and courage in finding unusual solutions to the benefit of our customers, we ensure a high level of customer satisfaction. We familiarize ourselves with their needs, requirements and products and we learn from the experiences of our customers' customers.

**EUCHNER – More than safety.**



Quality – made by EUCHNER

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## General

The change from a handwheel directly coupled to the spindle or axes to CNC-controlled axes has meant changes for the handwheel.

The rotation of the handwheel generates square-wave pulses. The CNC axis controller evaluates the pulses signalling the axis to move.

With over 20 years of handwheel experience, EUCHNER provides a wide selection of handwheels built with the finest quality and highest reliability.

Daily use of handwheels places high demands on the mechanical functioning. With twin bearings and a wear-free detent the EUCHNER handwheels are the optimum choice for trouble-free operation. The rotary detent maintains position even in the event of machine vibration.

The rotary detent and 100 pulses per revolution allow a desired value to be set quickly, reliably and accurately. In addition to the manual positioning of axes with CNC-controlled machines, EUCHNER also offers handwheels used for medical and telecommunication applications. These are also listed in this catalogue.



## Magnetic Detent Mechanism

Handwheels with magnetic detent are characterized by their absolutely wear-free and noiseless detent mechanism.

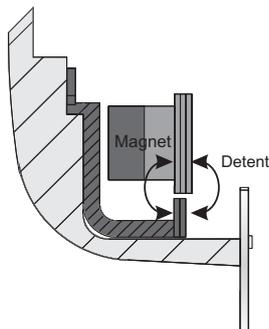
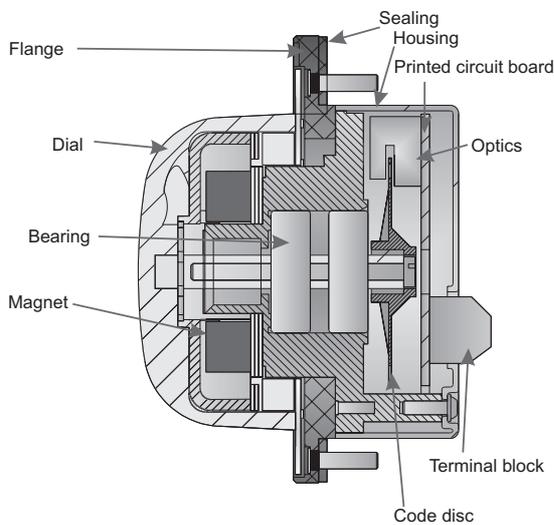
### With 100 detent positions

The detent position is generated by a magnetic field. A combination of 100 magnetic north/south positions are generated by the opposing magnetic fields with one revolution of the handwheel. With an air gap, the detent mechanism with no wear is absolutely maintenance-free. With two ball bearings the bearing assembly of the handwheel can withstand high axial and radial forces.

Different circuit outputs are available for all current controllers.

There are three different designs available:

- ▶ HKD design
  - Suitable for installation in control panels and EUCHNER HBE and HBL series hand-held pendant stations
  - Suitable for integration in universal turning and milling machines for axis movement
- ▶ HKC design
  - Suitable for installation in control panels
  - The design is particularly suitable for flat operating panels
- ▶ HKA design
  - The haptic ergonomically designed dial
  - The same haptic design is built into the EUCHNER HBA hand-held pendant station.
  - Ideally suited for use as the handwheel on the operating panel in conjunction with the EUCHNER HBA hand-held pendant station.



HKD design



HKC design



HKA design

## Mechanical Detent Mechanism

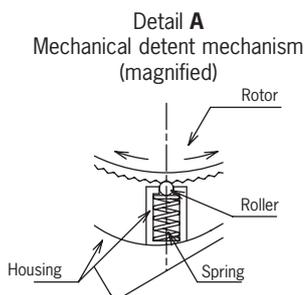
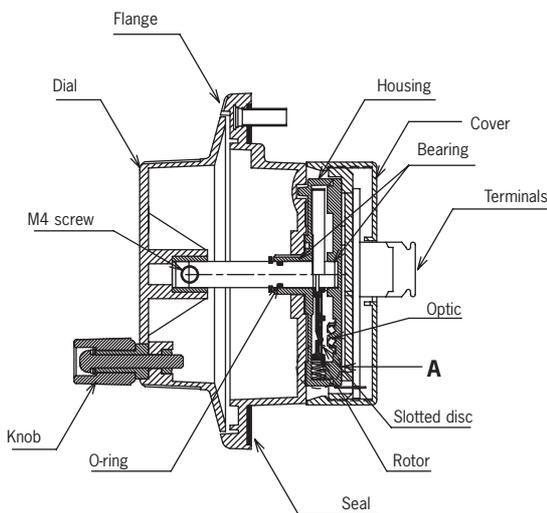
Handwheels with mechanical detent are characterized by lightweight and shallow mounting depth.

### With 100 detent positions

A toothed rotor working in conjunction with a roller creates the detent mechanical positions. The roller is pushed between the teeth of the rotor by a spring and setting wheel. The rotary torque is produced by the movement of the roller over the teeth.

There are two different designs available:

- ▶ HWA design
  - Suitable for installation in control panels
  - Suitable for installation in EUCHNER hand-held pendant stations
  - With centre hole fixing
- ▶ HWB design
  - Suitable for installation in control panels
  - With 3-point fixing



HWA design



HWB design

## Mechanical Detent Mechanism with 20, 25 or 50 pulses

The lower number of pulses per revolution meets other application requirements.

Handwheels with 20, 25 or 50 detented positions can easily be used to generate an input value to display of a position. The smaller number of detented positions allow for a simple relationship with the turning of the handwheel.

Some handwheels are used to select menu applications. The handwheel is rotated forwards/backwards to check or confirm pre-defined values, for example.

The low number of pulses allows the handwheels to be very small. They are ideal for portable applications or for integration in electronic device input fields, e.g. in measuring devices or in medical and communications technology.

There are three different designs available:

- ▶ HWD design
  - Suitable for integration in control panels or stand-alone devices
  - For printed circuit boards
  - With 50 pulses per revolution
  - Small installation dimensions
  - With metal shaft
  
- ▶ HWE design
  - Suitable for integration in control panels or stand-alone devices
  - For printed circuit boards
  - With 20 pulses per revolution
  - Small installation dimensions
  - With plastic shaft
  
- ▶ HWF design
  - Suitable for integration in control panels or stand-alone devices
  - For printed circuit boards
  - With 25 pulses per revolution
  - Small installation dimensions
  - With pushbutton function as acknowledgement signal

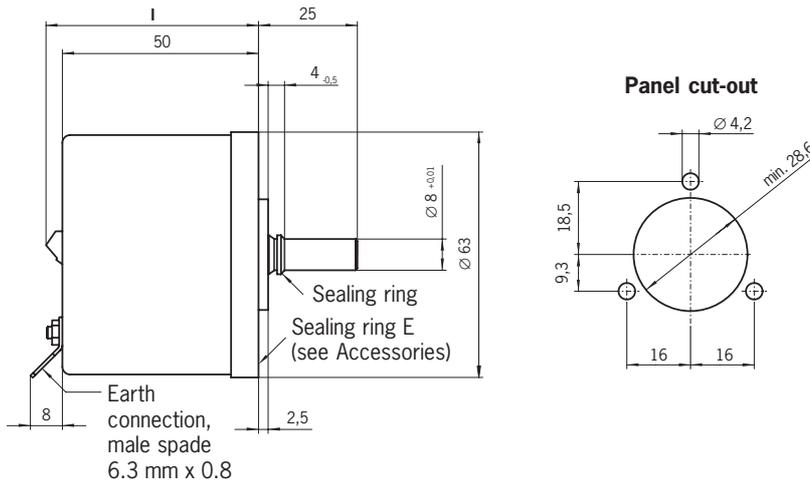


## HKD Design

- ▶ 100 detent positions per revolution
- ▶ Wear-free magnetic detent mechanism
- ▶ 100 or 25 pulses per revolution
- ▶ Installs into control panels and EUCHNER HBE and HBL hand-held pendant stations



## Dimension drawing



## Notes

- ▶ A05 output suitable for Siemens controllers with RS422 input
- ▶ G05 outputs suitable for Fanuc and Allen-Bradley controllers with push-pull input
- ▶ G12 output suitable for Mitsubishi controllers with push-pull inputs (25 pulses/revolution)
- ▶ Front plate, see Accessories, page 24
- ▶ Dial, see Accessories, page 25

## Mounting depth I

Connection type	I [mm]
Screw terminal S	55
Ribbon cable, 6-pin V	53
D-Sub-min, 9-pin X	60

## Ordering / Type table

Type designation	Order No.
HKD025S100G12	091 525
HKD100S100A05	054 866
HKD100S100G05	083 354
HKD100S100G24	054 868
HKD025V100G12	091 526
HKD100V100A05	057 036
HKD100V100G05	091 527
HKD100V100G24	057 037

## Type ordering code

HKD	---	-	100	---
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### Outputs

- A05** RS422A,  $U_B = DC 5 V$
- A12** RS422A,  $U_B = DC 10...30 V$
- G05** Push-pull 5 V,  $U_B = DC 5 V$
- G12** Push-pull 5 V,  $U_B = DC 10...30 V$
- G24** Push-pull 10...30 V,  $U_B = DC 10...30 V$

### Detent positions

### Connection type

- S** Screw terminal
- V** Ribbon cable, 6-pin with plug connector
- X** D-Sub-min plug connector, 9-pin

### Number of pulses per revolution

- 025** 25 pulses/revolution
- 100** 100 pulses/revolution

## Technical data

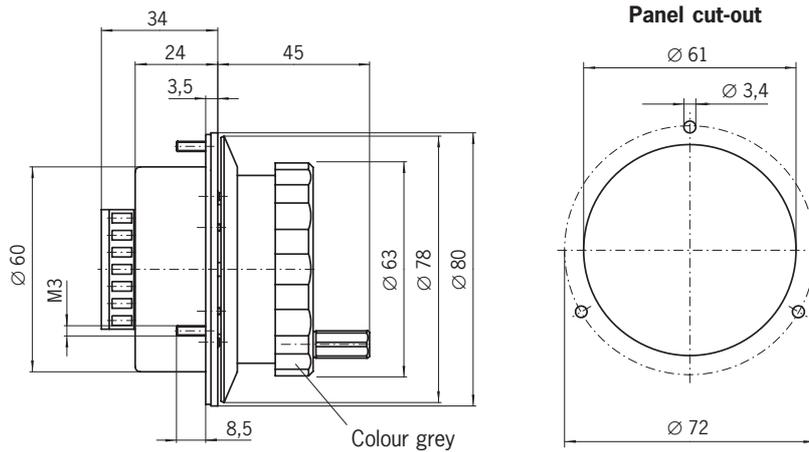
Parameters	Value			Unit
Pulses per revolution	2 x 25 or 2 x 100			
Detent positions	100			
Housing material	Aluminium			
Weight	0.5			kg
Magnetic detent mechanism	0.04 ... 0.06			Nm
Shaft loading, axial, max.	25			N
Shaft loading, radial, max.	40			N
Mechanical life, min.	20 x 10 <sup>6</sup>			Rev.
Operating temperature	0 ... +70			°C
Storage temperature	-25 ... +85			°C
Humidity, max.	80% (condensation not permissible)			
Degree of protection to the front EN 60529/ IEC 529 NEMA 250	IP 65 12			
Resistance to vibration Vibrations (3 axes) Shock (3 axes)	DIN/IEC 68-2-6 DIN/IEC 68-2-7			
EMC protection requirements in accordance with CE	EN 50081-2, EN 61000-6-2			
<b>Output circuit RS422A</b>				
Output circuit	<b>A05</b>		<b>A12</b>	
Output signals	A, /A, B, /B			
Operating voltage U <sub>B</sub>	5 ± 5%		10 ... 30	
Operating current, no load, max.	80			
Output specifications	RS422A			
Output signals				
Pin assignment	Ribbon cable V 	Screw terminal S 	D-Sub-min X 	
<b>Output circuit, push-pull</b>				
Output circuit	<b>G05</b>		<b>G12</b>	
Output signals	A, B			
Operating voltage U <sub>B</sub>	5 ± 5%		10 ... 30	
Operating current, no load, max.	80			
Output voltage HIGH (1), min.	4.0 V / 0 mA	-	-	
	3.3 V / 6 mA	3.9 V / 5 mA	-	
	3.0 V / 20 mA	3.6 V / 20 mA	U <sub>B</sub> - 3 V / 20 mA	
LOW (0), max.	0.5 V / 20 mA	0.5 V / 20 mA	3 V / 20 mA	
Output current per output, max.	20			
Output signals				
Pin assignment	Ribbon cable V 	Screw terminal S 	D-Sub-min X 	

## HKC Design



- ▶ 100 detent positions per revolution
- ▶ Wear-free magnetic detent mechanism
- ▶ 100 or 25 pulses per revolution
- ▶ Flat design

## Dimension drawing



## Notes

- ▶ A05 output suitable for Siemens controllers with RS422 input
- ▶ G05 outputs suitable for Fanuc and Allen-Bradley controllers with push-pull input
- ▶ G12 output suitable for Mitsubishi controllers with push-pull inputs (25 pulses/revolution)

## Ordering / Type table

Type designation	Order No.
HKC025S100G12	072 940
HKC100S100A05	087 733
HKC100S100G05	082 573
HKC100S100G24	087 739

## Type ordering code

<b>HKC</b>	<b>---</b>	<b>S</b>	<b>100</b>	<b>---</b>
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### Outputs

- A05** RS422A,  $U_B = DC 5 V$
- A12** RS422A,  $U_B = DC 10...30 V$
- G05** Push-pull 5 V,  $U_B = DC 5 V$
- G12** Push-pull 5 V,  $U_B = DC 10...30 V$
- G24** Push-pull 10...30 V,  $U_B = DC 10...30 V$

### Detent positions

### Connection type

- S** Screw terminal

### Number of pulses per revolution

- 025** 25 pulses/revolution
- 100** 100 pulses/revolution

## Technical data

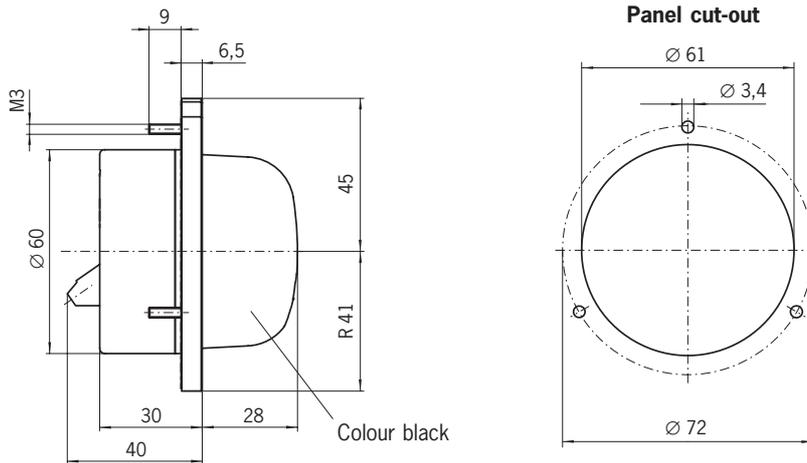
Parameters	Value		Unit
Pulses per revolution	2 x 25 or 2 x 100		
Detent positions	100		
Housing material	Thermoplastic		
Weight	0.25		kg
Detent mechanism	Magnetic		
Shaft loading, axial, max.	25		N
Shaft loading, radial, max.	40		N
Mechanical life, min.	20 x 10 <sup>6</sup>		Rev.
Operating temperature	0 ... +50		°C
Storage temperature	-20 ... +50		°C
Humidity, max.	80% (condensation not permissible)		
Degree of protection to the front EN 60529/ IEC 529 NEMA 250	IP 65 12		
Resistance to vibration Vibrations (3 axes) Shock (3 axes)	DIN/IEC 68-2-6 DIN/IEC 68-2-7		
EMC protection requirements in accordance with CE	EN 50081-2, EN 61000-6-2		
<b>Output circuit RS422A</b>			
Output circuit	<b>A05</b>		<b>A12</b>
Output signals	A, /A, B, /B		
Operating voltage U <sub>B</sub>	5 ± 5%		10 ... 30
Operating current, no load, max.	80		DC V mA
Output specifications	RS422A		
Output signals	<p>25 pulses</p>		<p>100 pulses</p>
Pin assignment	Screw terminal S		
<b>Output circuit, push-pull</b>			
Output circuit	<b>G05</b>		<b>G12</b> <b>G24</b>
Output signals	A, B		
Operating voltage U <sub>B</sub>	5 ± 5%		10 ... 30
Operating current, no load, max.	80		DC V mA
Output voltage HIGH (1), min.	4.0 V / 0 mA	-	-
	3.3 V / 6 mA	3.9 V / 5 mA	-
	3.0 V / 20 mA	3.6 V / 20 mA	U <sub>B</sub> - 3 V / 20 mA
LOW (0), max.	0.5 V / 20 mA	0.5 V / 20 mA	3 V / 20 mA
Output current per output, max.	20		mA
Output signals	<p>25 pulses</p>		<p>100 pulses</p>
Pin assignment	Screw terminal S		

## HKA Design



- ▶ 100 detent positions per revolution
- ▶ Wear-free magnetic detent mechanism
- ▶ 100 or 25 pulses per revolution
- ▶ Haptic handwheel

## Dimension drawing



## Notes

- ▶ A05 output suitable for Siemens controllers with RS422 input
- ▶ G05 outputs suitable for Fanuc and Allen-Bradley controllers with push-pull input
- ▶ G12 output suitable for Mitsubishi controllers with push-pull inputs (25 pulses/revolution)

## Ordering / Type table

Type designation	Order No.
HKA025S100G12	072 956
HKA100S100A05	072 885
HKA100S100G05	072 955
HKA100S100G24	072 967

## Type ordering code

<b>HKA</b>	<b>---</b>	<b>S</b>	<b>100</b>	<b>---</b>
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### Outputs

- A05** RS422A,  $U_B = DC 5 V$
- A12** RS422A,  $U_B = DC 10...30 V$
- G05** Push-pull 5 V,  $U_B = DC 5 V$
- G12** Push-pull 5 V,  $U_B = DC 10...30 V$
- G24** Push-pull 10...30 V,  $U_B = DC 10...30 V$

### Detent positions

### Connection type

- S** Screw terminal

### Number of pulses per revolution

- 025** 25 pulses/revolution
- 100** 100 pulses/revolution

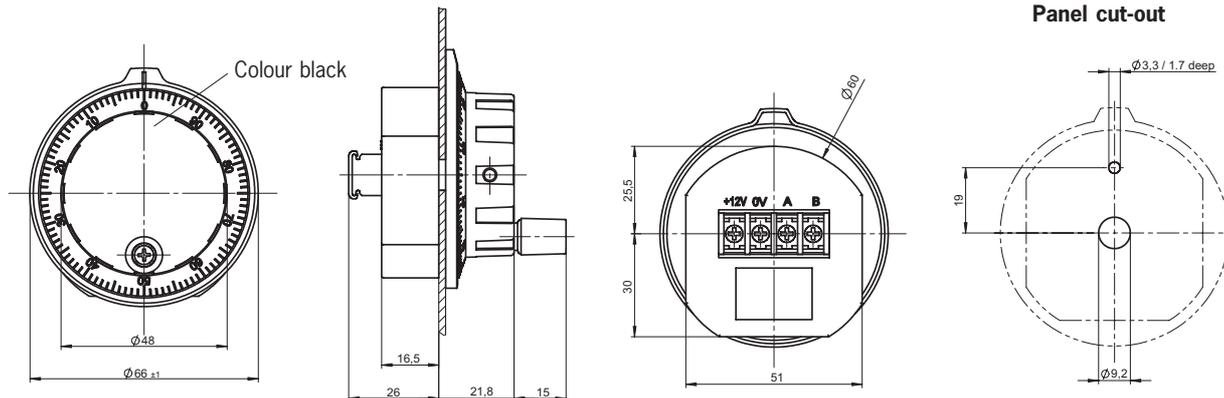
## Technical data

Parameters	Value		Unit
Pulses per revolution	2 x 25 or 2 x 100		
Detent positions	100		
Housing material	Thermoplastic		
Weight	0.25		kg
Detent mechanism	Magnetic		
Shaft loading, axial, max.	25		N
Shaft loading, radial, max.	40		N
Mechanical life, min.	20 x 10 <sup>6</sup>		Rev.
Operating temperature	0 ... +50		°C
Storage temperature	-20 ... +50		°C
Humidity, max.	80% (condensation not permissible)		
Degree of protection to the front EN 60529/ IEC 529 NEMA 250	IP 65 12		
Resistance to vibration Vibrations (3 axes) Shock (3 axes)	DIN/IEC 68-2-6 DIN/IEC 68-2-7		
EMC protection requirements in accordance with CE	EN 50081-2, EN 61000-6-2		
<b>Output circuit RS422A</b>			
Output circuit	<b>A05</b>		<b>A12</b>
Output signals	A, /A, B, /B		
Operating voltage U <sub>B</sub>	5 ± 5%		10 ... 30
Operating current, no load, max.	80		DC V mA
Output specifications	RS422A		
Output signals			
Pin assignment	Screw terminal S		
<b>Output circuit, push-pull</b>			
Output circuit	<b>G05</b>		<b>G12</b> <b>G24</b>
Output signals	A, B		
Operating voltage U <sub>B</sub>	5 ± 5%		10 ... 30
Operating current, no load, max.	80		DC V mA
Output voltage HIGH (1), min.	4.0 V / 0 mA	-	-
	3.3 V / 6 mA	3.9 V / 5 mA	-
	3.0 V / 20 mA	3.6 V / 20 mA	U <sub>B</sub> - 3 V / 20 mA
LOW (0), max.	0.5 V / 20 mA	0.5 V / 20 mA	3 V / 20 mA
Output current per output, max.	20		mA
Output signals			
Pin assignment	Screw terminal S		

## HWA Design

- ▶ 100 detent positions per revolution
- ▶ Mechanical detent mechanism
- ▶ 100 or 25 pulses per revolution
- ▶ Centre hole fixing

## Dimension drawing



## Ordering / Type table

Type designation	Packaging unit	Order No.
HWA025T100G12/V10	Pack of 10	072 972
HWA100T100A05/V10	Pack of 10	072 970
HWA100T100G05/V10	Pack of 10	072 971

## Notes

- ▶ A05 output suitable for Siemens controllers with RS422 input
- ▶ G05 outputs suitable for Fanuc and Allen-Bradley controllers with push-pull input
- ▶ G12 output suitable for Mitsubishi controllers with push-pull inputs (25 pulses/revolution)

## Type ordering code

HWA	---	T	100	---
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### Outputs

- A05** RS422A,  $U_B = DC 5 V$
- G05** Push-pull 5 V,  $U_B = DC 5 V$
- G12** Push-pull 5 V,  $U_B = DC 12 V$

### Detent positions

### Connection type

- T** Screw terminal

### Number of pulses per revolution

- 025** 25 pulses/revolution
- 100** 100 pulses/revolution

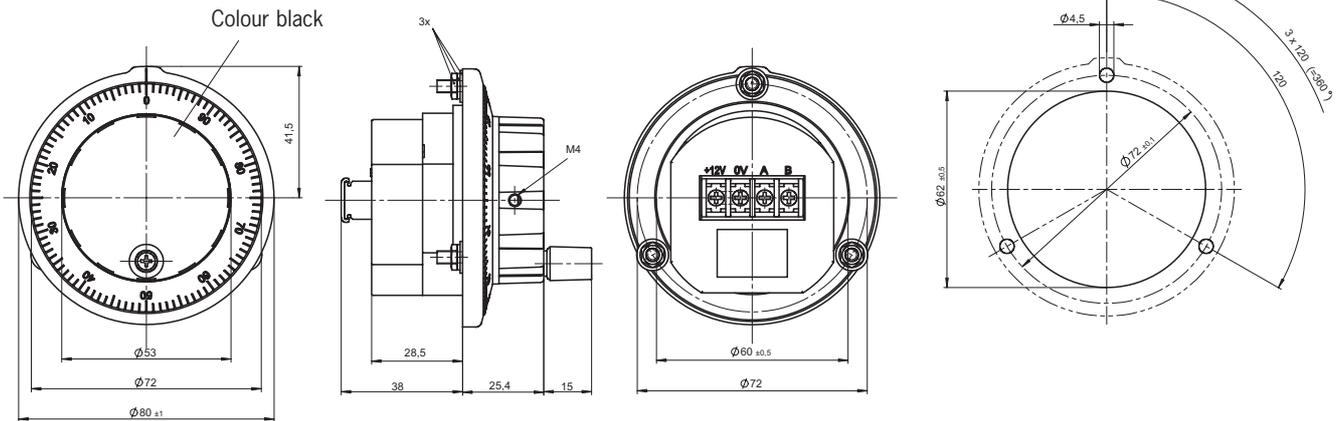
## Technical data

Parameters	Value	Unit
Pulses per revolution	2 x 25 (G12) or 2 x 100 (A05, G05)	
Detent positions	100	
Housing material	Plastic/metal	
Weight	0.125	kg
Detent mechanism	Mechanical	
Shaft loading, axial, max.	25	N
Shaft loading, radial, max.	40	N
Mechanical life, min.	1 x 10 <sup>6</sup>	Rev.
Operating temperature	0 ... +50	°C
Storage temperature	-20 ... +50	°C
Humidity, max.	80% (condensation not permissible)	
Degree of protection to the front EN 60529/ IEC 529 NEMA 250	IP65 12	
<b>Output circuit RS422A</b>		
Output circuit	<b>A05</b>	
Output signals	A, /A, B, /B	
Operating voltage U <sub>B</sub>	5 ± 10%	DC V
Operating current, no load, max.	80	mA
Output specifications	RS422A	
Output signals	100 pulses 	
Pin assignment	Screw terminal T +5V 0V A $\bar{A}$ B $\bar{B}$ 	
<b>Output circuit, push-pull</b>		
Output circuit	<b>G05</b>	<b>G12</b>
Output signals	A, B	
Operating voltage U <sub>B</sub>	5 ± 10%	12 ± 10%
Operating current, no load, max.	80	
Output voltage HIGH (1), min.	4.0 V / 20 mA	
Output voltage LOW (0), max.	0.5 V / 20 mA	
Output current per output, max.	20	mA
Output signals	100 pulses 	25 pulses 
Pin assignment	Screw terminal T +U <sub>B</sub> 0V A B 	

## HWB Design

- ▶ 100 detent positions per revolution
- ▶ Mechanical detent mechanism
- ▶ 100 or 25 pulses per revolution
- ▶ 3-point fixing

## Dimension drawing



## Ordering / Type table

Type designation	Packaging unit	Order No.
HWB025T100G12/V05	Pack of 5	072 975
HWB100T100A05/V05	Pack of 5	072 973
HWB100T100G05/V05	Pack of 5	072 974

## Notes

- ▶ A05 output suitable for Siemens controllers with RS422 input
- ▶ G05 outputs suitable for Fanuc and Allen-Bradley controllers with push-pull input
- ▶ G12 output suitable for Mitsubishi controllers with push-pull inputs (25 pulses/revolution)

## Type ordering code

<b>H W B</b>	---	<b>T</b>	<b>1 0 0</b>	---
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### Outputs

- A05** RS422A,  $U_B = DC 5 V$
- G05** Push-pull 5 V,  $U_B = DC 5 V$
- G12** Push-pull 5 V,  $U_B = DC 12 V$

### Detent positions

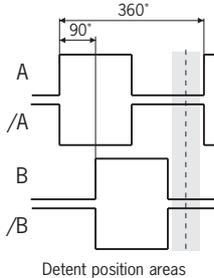
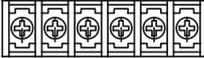
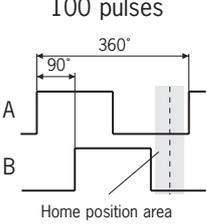
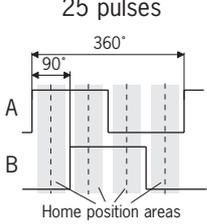
### Connection type

- T** Screw terminal

### Number of pulses per revolution

- 025** 25 pulses/revolution
- 100** 100 pulses/revolution

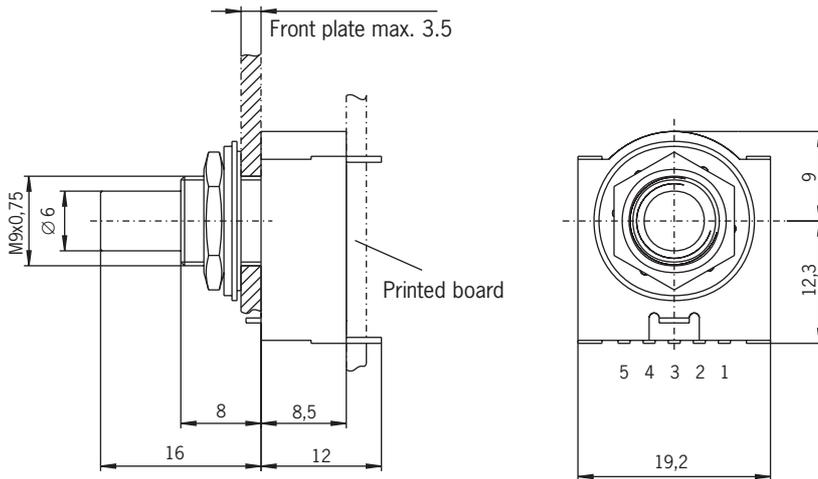
## Technical data

Parameters	Value	Unit
Pulses per revolution	2 x 25 (G12) or 2 x 100 (A05, G05)	
Detent positions	100	
Housing material	Plastic/metal	
Weight	0.125	kg
Detent mechanism	Mechanical	
Shaft loading, axial, max.	25	N
Shaft loading, radial, max.	40	N
Mechanical life, min.	1 x 10 <sup>6</sup>	Rev.
Operating temperature	0 ... +50	°C
Storage temperature	-20 ... +50	°C
Humidity, max.	80% (condensation not permissible)	
Degree of protection to the front EN 60529/ IEC 529 NEMA 250	IP65 12	
<b>Output circuit RS422A</b>		
Output circuit	<b>A05</b>	
Output signals	A, /A, B, /B	
Operating voltage U <sub>B</sub>	5 ± 10%	DC V
Operating current, no load, max.	80	mA
Output specifications	RS422A	
Output signals	100 pulses  <p>Detent position areas</p>	
Pin assignment	Screw terminal T +5V 0V A $\bar{A}$ B $\bar{B}$ 	
<b>Output circuit, push-pull</b>		
Output circuit	<b>G05</b>	<b>G12</b>
Output signals	A, B	
Operating voltage U <sub>B</sub>	5 ± 10%	12 ± 10%
Operating current, no load, max.	80	
Output voltage HIGH (1), min.	4.0 V / 20 mA	
Output voltage LOW (0), max.	0.5 V / 20 mA	
Output current per output, max.	20	mA
Output signals	100 pulses  <p>Home position area</p>	25 pulses  <p>Home position areas</p>
Pin assignment	Screw terminal T +U <sub>B</sub> 0V A B 	

## HWD Design

- ▶ 50 detent positions per revolution
- ▶ Mechanical detent mechanism
- ▶ 50 pulses per revolution
- ▶ For printed circuit boards
- ▶ Metal shaft

## Dimension drawing

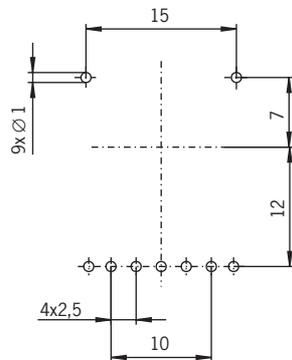


## Notes

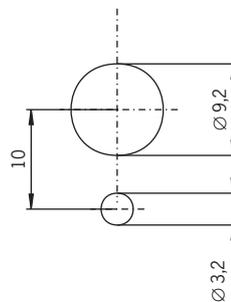
- ▶ Dial, see Accessories, page 25

## Printed circuit board drill pattern

View from assembly side



## Panel cut-out



## Ordering / Type table

Type designation	Packaging unit	Order No.
HWD-072988/V10	Pack of 10	072 988

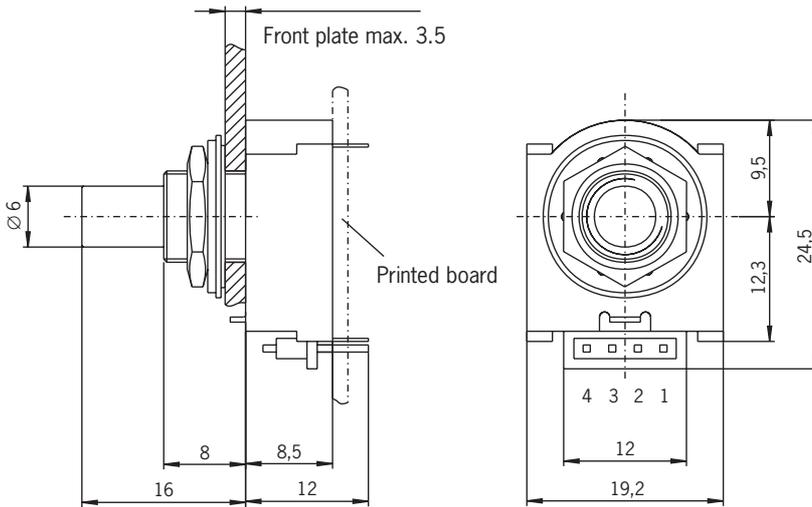
## Technical data

Parameters	Value	Unit
Pulses per revolution	50	
Detent positions	50	
Housing material	Plastic/metal	
Weight	20	g
Mechanical detent mechanism	$7 \dots 14 \times 10^{-3}$	Nm
Mechanical life, min.	$1 \times 10^6$	Rev.
Operating temperature	0 ... +70	°C
Degree of protection to the front panel	EN 60529/IEC 529 NEMA 250	IP 65 12
<b>Output circuit</b>		
Output circuit	NPN, 4.7 kΩ pull-up	
Output signals	A, B	
Operating voltage $U_B$	$5 \pm 10\%$	DC V
Operating current, no load, max.	20	mA
Output voltage	HIGH (1), min. LOW (0), max.	$U_B - 0.5 \text{ V (No load)}$ $0.4 \text{ V (No load)}$
Output current per output, max.	8	mA
Open collector $U_{max}$	7	V
Open collector $I_{max}$	8	mA
Cable length > 300 mm	Amplifier required	
Output signals	<p>Detent position areas</p>	
Pin assignment/output circuit	<p><math>R = 4,7k\Omega</math></p>	
<b>Soldering</b>		
Manual soldering	max. 350 °C / max. 3 s	
Wave soldering	max. 260 °C / max. 5 s	
Reflow soldering	Not possible	

## HWE Design

- ▶ 20 detent positions per revolution
- ▶ Mechanical detent mechanism
- ▶ 20 pulses per revolution
- ▶ For printed circuit boards
- ▶ Plastic shaft

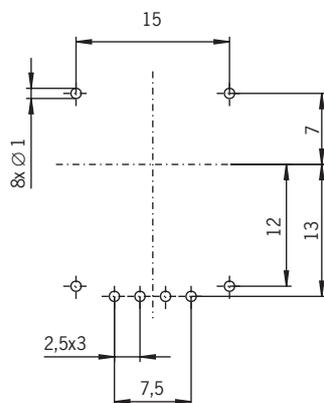
### Dimension drawing



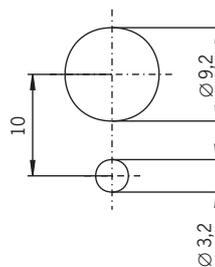
### Notes

- ▶ Dial, see Accessories, page 25

**Printed circuit board drill pattern**  
View from assembly side



**Panel cut-out**



### Ordering / Type table

Type designation	Packaging unit	Order No.
HWE-072989/V10	Pack of 10	072 989

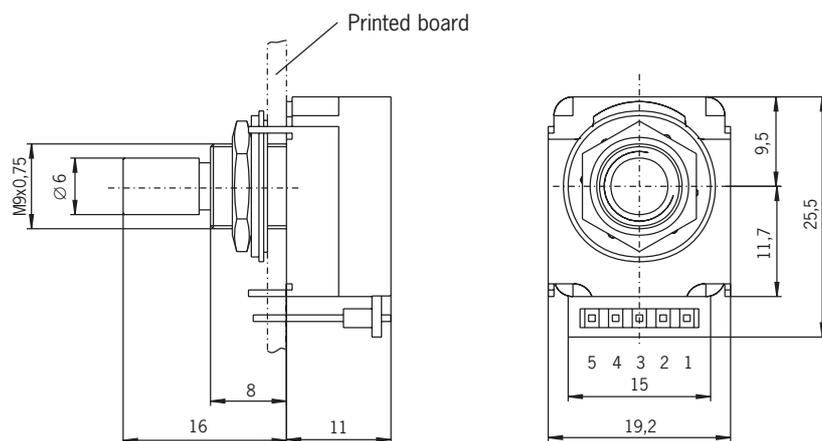
## Technical data

Parameters		Value	Unit
Pulses per revolution		20	
Detent positions		20	
Housing material		Plastic/metal	
Weight		15	g
Mechanical detent mechanism		$3 \dots 10 \times 10^{-3}$	Nm
Mechanical life, min.		$1 \times 10^6$	Rev.
Operating temperature		0 ... +60	°C
Degree of protection to the front panel	EN 60529/IEC 529 NEMA 250	IP 65 12	
Resistance to vibration			
Vibrations (3 axes)		DIN/IEC 68-2-6	
Shock (3 axes)		DIN/IEC 68-2-27	
<b>Output circuit</b>			
Output circuit		CMOS level	
Output signals		A, B	
Operating voltage $U_B$		$5 \pm 10\%$	DC V
Operating current, no load, max.		40	mA
Output voltage	HIGH (1), min. LOW (0), max.	$U_B - 0.5 \text{ V (No load)}$ $0.5 \text{ V (No load)}$	
Cable length > 300 mm		Amplifier required	
Output signals		<p>Detent position areas</p>	
Pin assignment/output circuit			
<b>Soldering</b>			
Manual soldering		max. 350 °C / max. 3 s	
Reflow soldering		Not possible	

## HWF Design

- ▶ 25 detent positions per revolution
- ▶ Mechanical detent mechanism
- ▶ 25 pulses per revolution
- ▶ For printed circuit boards
- ▶ Pushbutton function

## Dimension drawing

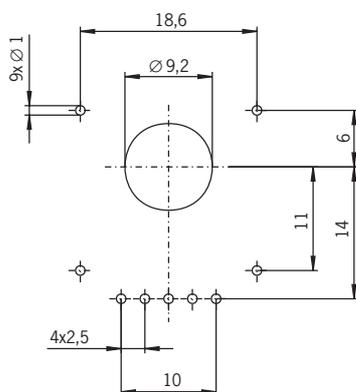


## Notes

- ▶ Dial, see Accessories, page 25

## Printed circuit board drill pattern

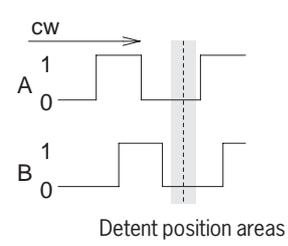
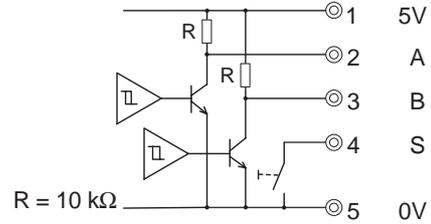
View from assembly side



## Ordering / Type table

Type designation	Packaging unit	Order No.
HWF-072990/V10	Pack of 10	072 990

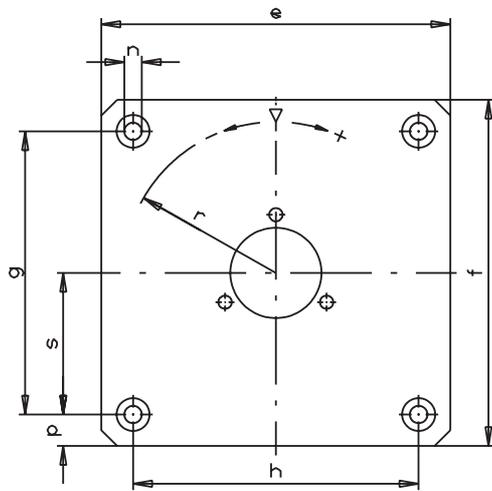
## Technical data

Parameters	Value	Unit
Pulses per revolution	25	
Detent positions	25	
Housing material	Plastic/metal	
Weight	20	g
Mechanical detent mechanism	$3 \dots 7 \times 10^{-3}$	Nm
Mechanical life, min.	$1 \times 10^6$	Rev.
Pushbutton life, min.	$500 \times 10^3$	
Lift of key	1.2	mm
Operating temperature	0 ... +60	°C
Degree of protection to the front printed board	EN 60529/IEC 529 NEMA 250	IP 65 12
Resistance to vibration		
Vibrations (3 axes)	DIN/IEC 68-2-6	
Shock (3 axes)	DIN/IEC 68-2-27	
<b>Output circuit</b>		
Output circuit	NPN, 10 kΩ pull-up	
Output signals	A, B	
Operating voltage $U_B$	$5 \pm 10\%$	DC V
Operating current, no load, max.	10	mA
Output voltage HIGH (1), min.	$U_B - 0.5 \text{ V (No load)}$	
Output voltage LOW (0), max.	0.4 V (No load)	
Cable length > 300 mm	Amplifier required	
Pushbutton $U_{max}$	12	DC V
Pushbutton $I_{max}$ (resistive load)	20	mA
Output signals	 <p style="text-align: center;">Detent position areas</p>	
Pin assignment/output circuit	 <p style="text-align: center;"><math>R = 10 \text{ k}\Omega</math></p>	
<b>Soldering</b>		
Manual soldering	max. 350 °C / max. 3 s	
Reflow soldering	Not possible	

## Accessories

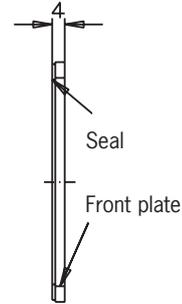
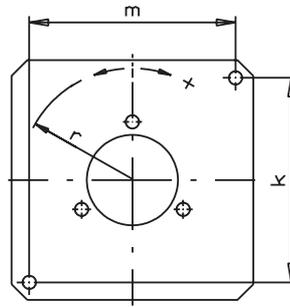
### Front plate for Handwheel HKD

Dimensions in mm



Front plate with bonded seal.

Devices without front plate sealed with sealing ring E.



### Dimensions

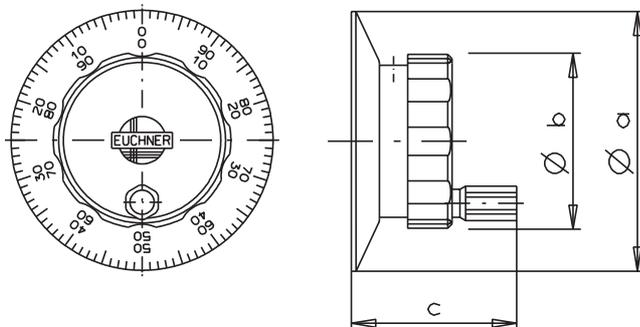
Type	e	f	g	h	k	m	n	p	s	r
F	110	110	90	90	-	-	DIN74-Am5	-	-	R48
G	108	108	89	89	-	-	5.2	-	-	R48
H	114.3	127	101.6	89	-	-	5.2	12.7	49.5	R48
K	108	108	89	89	-	-	5.2	9.5	37	R48
L	114.3	127	101.6	89	-	-	5.2	12.7	42	R48
M	76.2	76.2	-	-	65	65	4.2	-	-	R35.5
S	120	120	100	100	-	-	5.2	-	-	R48

### Ordering / Type table

Type designation	Order No.
Sealing ring E	054 861
Front plate F with seal	028 760
Front plate G with seal	028 761
Front plate H with seal	028 762
Front plate K with seal	028 763
Front plate L with seal	028 764
Front plate M with seal	041 758
Front plate S with seal	055 872

## Dials for Handwheel HKD

Customer-specific company imprint on request, dimensions in mm



### Dimensions

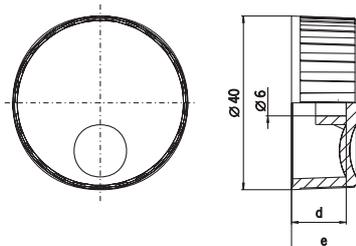
Type	Ø a	Ø b	c
Dial 90 mm	90	63	41
Dial 78 mm	78	63	39
Dial 65 mm	65	44	42
Dial 58 mm	58	44	40

### Ordering / Type table

Type designation	Order No.
Dial 90 mm black	057 266
Dial 90 mm silver	057 268
Dial 78 mm black	057 280
Dial 78 mm silver	057 272
Dial 65 mm black	057 318
Dial 65 mm silver	057 314
Dial 58 mm black	059 276

## Dials for Handwheels HWD, HWE and HWF

Material plastic, colour grey (similar to RAL 7032), dimensions in mm



### Dimensions

Type	d	e
Dial GD 60	7.5	10
Dial GE 60	12.5	15

### Ordering / Type table

Type designation	Packaging unit	Order No.
Dial GD60/V10	Pack of 10	072 991
Dial GE60/V10	Pack of 10	072 992

## Appendix

### Suggestions for counting the handwheel pulses: Handwheel HKD

The following options are recommended for counting the handwheel pulses:

- ▶ Suitable counter module
- ▶ Phase discriminator

### Suggestions for counting the handwheel pulses: Handwheel HKA100 and HKC100

In the initial detent position, outputs A and B are both in the LOW state.

When moving clockwise (to the right), the detent position area is located closer to the rising edge of A (distance b). When moving counter-clockwise rising edge of B (distance a) will lead A.

If you use one output (A) as counting edge with the second output (B) for direction of rotation the output resulting output is inconsistent (each pulse has two edges).

#### Suitable counting methods

The following options are recommended for counting the handwheel pulses:

- ▶ Suitable counter module
- ▶ Phase discriminator
- ▶ Count with the edge of A
  - Ascending ▶ negative edge from A and HIGH level at B
  - Descending ▶ positive edge from A and HIGH level at B

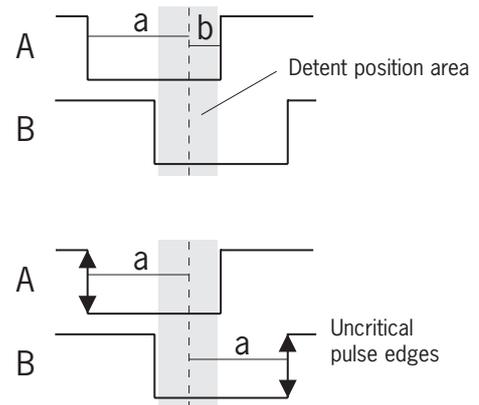
or

- ▶ Count with the edges of B
  - Ascending ▶ negative edge from B and HIGH level at A
  - Descending ▶ positive edge from B and HIGH level at A

#### Note for A05 and A12:

If the counter module is not responding properly to the input pulses, a possible solution is recommended:

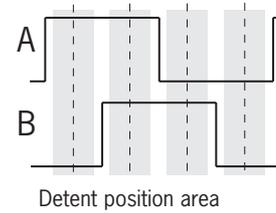
- Handwheel signal A ▶ Counter module input /A
- Handwheel signal/A ▶ Counter module input A
- Handwheel signal B ▶ Counter module input /B
- Handwheel signal/B ▶ Counter module input B



## Suggestions for counting the handwheel pulses: Handwheel HKA025 and HKC025

Handwheels with 25 pulses and 100 detent positions are used with Mitsubishi controllers, for example. The controller converts the 25 pulses/revolution to 100 counting pulses.

In the detent position area, the two output signals assume the states shown to the right.



### Suitable counting methods

The following options are recommended for counting the handwheel pulses:

- ▶ Suitable counter module
- ▶ Phase discriminator

## Index sorted by type designation

Type designation	Order No.	Page
Dial 58 mm black	059 276	25
Dial 65 mm black	057 318	25
Dial 65 mm silver	057 314	25
Dial 78 mm black	057 280	25
Dial 78 mm silver	057 272	25
Dial 90 mm black	057 266	25
Dial 90 mm silver	057 268	25
Dial GD60/V10	072 991	25
Dial GE60/V10	072 992	25
Front plate F with seal	028 760	24
Front plate G with seal	028 761	24
Front plate H with seal	028 762	24
Front plate K with seal	028 763	24
Front plate L with seal	028 764	24
Front plate M with seal	041 758	24
Front plate S with seal	055 872	24
HKA025S100G12	072 956	12
HKA100S100A05	072 885	12
HKA100S100G05	072 955	12
HKA100S100G24	072 967	12
HKC025S100G12	072 940	10
HKC100S100A05	087 733	10
HKC100S100G05	082 573	10
HKC100S100G24	087 739	10
HKD025S100G12	091 525	8
HKD025V100G12	091 526	8
HKD100S100A05	054 866	8
HKD100S100G05	083 354	8
HKD100S100G24	054 868	8
HKD100V100A05	057 036	8
HKD100V100G05	091 527	8
HKD100V100G24	057 037	8
HWA025T100G12/V10	072 972	14
HWA100T100A05/V10	072 970	14
HWA100T100G05/V10	072 971	14
HWB025T100G12/V05	072 975	16
HWB100T100A05/V05	072 973	16
HWB100T100G05/V05	072 974	16
HWD-072988/V10	072 988	18
HWE-072989/V10	072 989	20
HWF-072990/V10	072 990	22
Sealing ring E	054 861	24

## Index sorted by catalogue number

Order No.	Type designation	Page
028 760	Front plate F with seal	24
028 761	Front plate G with seal	24
028 762	Front plate H with seal	24
028 763	Front plate K with seal	24
028 764	Front plate L with seal	24
041 758	Front plate M with seal	24
054 861	Sealing ring E	24
054 866	HKD100S100A05	8
054 868	HKD100S100G24	8
055 872	Front plate S with seal	24
057 036	HKD100V100A05	8
057 037	HKD100V100G24	8
057 266	Dial 90 mm black	25
057 268	Dial 90 mm silver	25
057 272	Dial 78 mm silver	25
057 280	Dial 78 mm black	25
057 314	Dial 65 mm silver	25
057 318	Dial 65 mm black	25
059 276	Dial 58 mm black	25
072 885	HKA100S100A05	12
072 940	HKC025S100G12	10
072 955	HKA100S100G05	12
072 956	HKA025S100G12	12
072 967	HKA100S100G24	12
072 970	HWA100T100A05/V10	14
072 971	HWA100T100G05/V10	14
072 972	HWA025T100G12/V10	14
072 973	HWB100T100A05/V05	16
072 974	HWB100T100G05/V05	16
072 975	HWB025T100G12/V05	16
072 988	HWD-072988/V10	18
072 989	HWE-072989/V10	20
072 990	HWF-072990/V10	22
072 991	Dial GD60/V10	25
072 992	Dial GE60/V10	25
082 573	HKC100S100G05	10
083 354	HKD100S100G05	8
087 733	HKC100S100A05	10
087 739	HKC100S100G24	10
091 525	HKD025S100G12	8
091 526	HKD025V100G12	8
091 527	HKD100V100G05	8





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