ERHARD

double-eccentric butterfly valve
The function of butterfly valves is to start and stop the flow of media in pipelines and plants in a safe way at any time. In particular the construction type of the double-eccentric butterfly valve, where the shaft axis is offset in both dimensions compared with the pipeline axis, features a lot of advantages over other types of valves:

- Double-eccentric butterfly valves require only little space within pipeline systems.
- Due to the double-eccentric valve bearing, the strain of elastomers is reduced at the sealing area thereby cutting maintenance efforts.
- Compared with closure devices positioned vertically to the pipeline, they feature a more favourable inflow to the clap disc over the entire pivoting range.
- And last but not least, they have lower actuating moments, especially with larger nominal diameters.

**ERHARD is setting the standard**

ERHARD Butterfly Valves have been a classic under valves for decades. In the 1950s and 1960s already, they were recognised as a standard and used worldwide. This also applies to the constant product developments up to the ERHARD EAK Butterfly Valve and the ERHARD ROCO Premium, the latter of which was launched to the market in 2007. They ensured that ERHARD has been the trendsetter for more than half a century in the area of butterfly valves.

For all generations of butterfly valves, however, the same high requirements have been applicable: a solid and reliable construction complying with a multitude of tasks with outstanding safety and economic efficiency. So with ERHARD, innovative and customer-oriented products come into being where state-of-the-art technologies used in engineering, during production and installation as well as continuous quality assurance ensure highest quality “made in Germany”.

**Perfect solutions for a wide spectrum of applications**

Among other things, ERHARD Butterfly Valves are suitable for drinking water,
industrial water and air as well as for waste water and suspensions. This results in fields of applications in drinking water production and distribution, in water transport and sewage technology as well as in the industrial sector.

For various applications, ERHARD has a comprehensive assortment of double-eccentric butterfly valves:

- With the new ERHARD ROCO wave [1], the further development of the ERHARD ROCO Premium, ERHARD is completely redefining the standard for nominal diameters from DN 150 to DN 1600 and nominal pressures from PN 10 to PN 40 [Page 4].
- Based on the ERHARD ROCO Premium, a wide spectrum of special solutions is available for particular application areas, such as a dismantling type valve [2] or for the BLS system [3] [Page 21].
- And for nominal widths beyond DN 1600, the proven ERHARD EAK Butterfly Valve [4] is the suitable product [Page 24].
ERHARD ROCO wave – redefined the standard

With our new **ERHARD ROCO wave Butterfly Valve**, we are establishing a new standard. As a further development of the ERHARD ROCO Premium butterfly valve, it ensures top values in terms of safety, economic efficiency and durability, using innovative detailed solutions.

**Top in all dimensions**

Six large topics define the quality of butterfly valves. By means of the new **ERHARD ROCO wave Butterfly Valve**, all tasks are performed to the highest degree.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Advantages of the ERHARD ROCO wave</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dynamics Flow-optimised claud discs and internal housing contours ensure stability in any size and highest economic efficiency at the same time.</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>Precision The gearbox with slider-crank mechanism ideally matches the torque curve of the disc and reliably reduces pressure surges due to slowed closing.</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Power The polygon plug connection reliably transmits the drive forces without any play or fluttering.</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Protection High-quality coatings in EKB and Enamel as well as a wide range of special coatings ensure long-term protection for any application.</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>Safety Reliable and maintenance-friendly sealing elements take care of high operational safety and low maintenance effort.</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>Size Nominal diameters from DN 150 to DN 1600 and pressure ratings from PN 10 to PN 40 offer solutions for every task.</td>
<td>16</td>
</tr>
</tbody>
</table>

Solutions which are elaborated in every detail, such as the optimised shape of the disc, the sealing section applied using the PTA process, and easy to replace seal rings ensure economical operation of the ERHARD ROCO for many years.
ERHARD double-eccentric butterfly valve
Dynamics
innovative design for optimised flow
and highest economic efficiency

High dynamic forces are acting in pipelines and plants. These forces have to be coped with by a butterfly valve in a safe way. There are two perspectives at the heart of this: For one, a stable disc is required that especially resists the arising forces during opening and closing in a safe way. For another, the disc’s shape and housing’s internal contour must be designed in such a way, however, that the pressure loss of the opened valve being in media flow is minimal in order to enable economic operation.

During development of the ERHARD ROCO wave Butterfly Valve, we therefore used state-of-the-art computer-aided design techniques. Thus the characteristic waveform came into being giving the butterfly valve its name. The waveform design ensures highest stability on the one hand, with its flow characteristics being optimised in such a way on the other hand that the least possible pressure loss compared with other butterfly valves available on the market could be realized. At the same time, this design ensures optimal protection against cavitation.

In this context, flow optimisation means that the flow is only minimally affected when the valve is open. This ensures that the whole plant can be operated using the least possible pump capacity, for instance. This takes care of permanently low operating costs. Using the formula and the diagram, the pressure loss to be compensated for can be calculated easily. The basis of the table values is the averaged inflow for the enamelled version. On request, we will be happy to provide you with resistance coefficients for other nominal diameters and nominal pressures.

Safety with extreme requirements
The challenge is even greater with large nominal widths or pressure ratings.
Resistance coefficients

<table>
<thead>
<tr>
<th>DN</th>
<th>PN 10</th>
<th>PN 16</th>
<th>DN</th>
<th>PN 10</th>
<th>PN 16</th>
<th>DN</th>
<th>PN 10</th>
<th>PN 16</th>
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</thead>
<tbody>
<tr>
<td>80</td>
<td>–</td>
<td>1.39</td>
<td>500</td>
<td>0.23</td>
<td>0.29</td>
<td>1500</td>
<td>0.12</td>
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<tr>
<td>100</td>
<td>–</td>
<td>0.89</td>
<td>600</td>
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<td>1600</td>
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<tr>
<td>125</td>
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<td>700</td>
<td>0.18</td>
<td>0.23</td>
<td>1800</td>
<td>0.12</td>
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<tr>
<td>150</td>
<td>–</td>
<td>0.78</td>
<td>800</td>
<td>0.16</td>
<td>0.21</td>
<td>2000</td>
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<tr>
<td>200</td>
<td>–</td>
<td>0.71</td>
<td>900</td>
<td>0.15</td>
<td>0.19</td>
<td>2200</td>
<td>0.11</td>
<td>0.15</td>
</tr>
<tr>
<td>250</td>
<td>–</td>
<td>0.42</td>
<td>1000</td>
<td>0.13</td>
<td>0.18</td>
<td>2400</td>
<td>0.11</td>
<td>0.15</td>
</tr>
<tr>
<td>300</td>
<td>0.34</td>
<td>0.40</td>
<td>1100</td>
<td>0.13</td>
<td>0.17</td>
<td>2500</td>
<td>0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>350</td>
<td>0.30</td>
<td>0.37</td>
<td>1200</td>
<td>0.12</td>
<td>0.16</td>
<td>2600</td>
<td>0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>400</td>
<td>0.27</td>
<td>0.34</td>
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<td>0.16</td>
<td>2900</td>
<td>0.11</td>
<td>0.14</td>
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<tr>
<td>450</td>
<td>0.25</td>
<td>0.31</td>
<td>1400</td>
<td>0.12</td>
<td>0.16</td>
<td>3000</td>
<td>0.10</td>
<td>0.13</td>
</tr>
</tbody>
</table>

With the ERHARD ROCO wave, a disc in the “Skeleton” design is used here which is based on the findings of a strength-oriented topology study and represents an optimised further development of the previously existing double-deck disc.

Due to the innovative arrangement of the material, it ensures optimal rigidity at high pressure ratings and large nominal widths (at PN 25 from DN 1000 and at PN 40 from DN 600) on the one hand, with the free pipeline cross section simultaneously being maximised on the other hand, whereby lowest zeta values can also be realised with this type of construction.

The “Skeleton” design was developed using complex topology studies.
Precision: Gearbox with slider-crank mechanism for opening and closing without problems

The actuation gear has the task of opening and closing the butterfly valve without any problems at any time. The gearbox with slider-crank mechanism developed and manufactured at ERHARD is the ideal solution, because its movement kinematics is perfectly adjusted to the torque curve of the ERHARD ROCO wave Butterfly Valve.

The torque curve for operating the disc is not equal, but it increases disproportionately near closing point [see graphic] in order to push the main sealing of the tilting disc reliably into its seat. A defined preload of the sealing element guarantees sufficient sealing pressure and thus the valve’s reliability of service.

Slowed closing speeds of the discs near the “CLOSED” position ensure extremely soft closing. This minimises the danger of pressure surges [see info box on the right] and thus increases the safety and service life of the plant components. Furthermore, the actuating moments of the ERHARD gearbox with slider-crank mechanism are constantly low so that electrical actuators - if used - can be given small dimensions which is a clear cost advantage. Furthermore, the gearboxes are characterized by a self-locking effect in any position as well as adjustability in stop positions.

Further advantages of the ERHARD gearbox with slider-crank mechanism
- The robust, adjustable end stop on the spindle [1]
ensures that no forces are being exerted on the housing parts during operation.

- Thanks to the robust, closed housing \[2\] according to protection class IP68 and the maintenance-free construction, the ERHARD SKG gearbox with slider-crank mechanism is extremely durable and particularly suitable for underground installation, but also for flooded areas.

- The mechanical position indicator \[3\], which is directly connected to the shaft, and the sight glass made of impact resistant polycarbonate make it possible to check the degree of openness at any time so that the SKG can also be used without any problems when installed underground.

- With a slip-on gear according to DIN ISO 5211, a flange bearing for plant engineering or underground installation or a hand wheel or flange according to DIN 5210 for a rotary drive, flexible drive options \[4\] arise thanks to a variable modular kit and the fact that the gearbox arrangement can be changed at any time without problems. A subsequent switch from manual operation to electric operation can also be carried out easily.

- The use of bronze \[5\] and stainless steel ensures very long durability and high security of investment.

**Minimisation of pressure surge danger**

The gearbox with slider-crank mechanism initially closes from full opening towards half-open position. In the further course, in the hydraulically effective throttle range between 30 and 0 % \[from A\], it is closed in a heavily slowed down way due to the toggle lever effect. The danger of pressure surges is thereby clearly minimised. By contrast, the worm gear closes in a linear way and thus relatively slow. In the further course \[from B\], the hydraulically effective throttle range is run through with the same actuation speed until closed position. During the process, the danger of pressure surges is increased several times.
A strong connection is required in order to transmit drive forces to the butterfly disc in a safe way at any time. The polygon plug connection, which was already introduced and patented with the ERHARD ROCO Premium and which is also used with the ERHARD ROCO wave, ensures torque and zero backlash.

Thanks to highest precision during manufacturing, it enables an absolutely clearance-free connection due to the notch-free polygon profile with the same shaft diameter and thus 20% higher torque reserves in comparison with the key joint connection.

At the same time, the construction with completely closed butterfly eye and the use of O-ring cages allows complete encapsulation of the bearing from the medium.

The polygon plug connection is absolutely free of play which is also the result of decades of development and production know-how at ERHARD in Heidenheim.

The polygon plug connection is ideally adjusted to the reserves of the ERHARD SKG gearbox with slider-crank mechanism enabling precise and safe power transmission.
However, the polygon plug connection also provides even more advantages:

- Additional connection elements are not required; therefore there are also no separation joints.
- State-of-the-art precision manufacturing technologies make it possible that the connection is absolutely free of play and together with the flow-optimised shape of the butterfly disc prevents any fluttering.
- Sealing takes place consistently on the coated component areas.

In addition, the construction is perfectly adjusted to the reserves of the ERHARD gearbox with slider-crank mechanism used as standard with the ERHARD ROCO wave.

**Double eccentric design for simple opening and long service life**

Three basic types of butterfly valves are possible during construction. With centric butterfly valves, the shaft axis is centred with the axis of the butterfly valve and the pipeline axis. It thus simultaneously runs through main seal or the housing seat, with the main seal being interrupted by the shaft. With eccentric valves, the main seal or the housing seat is offset to the shaft axis by contrast so that an endless seal ring can be used.

If the shaft axis is additionally offset above or under the pipeline axis, the valves are referred to as double-eccentric valves. The tilting disc of the ERHARD ROCO wave Butterfly Valve is also mounted in the housing in a double-eccentric way. That way, when the swivel motion is started for opening, a rotary motion occurs which is superimposed by a translatory motion in addition. The butterfly valve rotates, but it moves away from the seat ring at the same time. Thereby it lifts off from the seat after a few degrees of opening, whereby the sealing ring is relieved. All these effects minimise wear and tear.

Together with the complete releasing of sealing ring tension at maximum opening, this results in a clearly longer service life. At the same time, the translatory motion ensures that the sealing ring can be easily loosened from the seat, even with valves which have been closed for years.
Protection:
perfect surfaces for every field of application

Optimal protection of the medium and construction is the precondition for a permanent function of all valves. By means of the modern surface technologies from ERHARD, your valves will always be provided with the solution adjusted to the relevant application.

ERHARD EKB

The epoxy resin coating provided in the powder coating process is one of the most often used corrosion protection processes. During this process, the coating is applied in a precisely defined thickness and melted on at exactly 210 °C. The standard thickness is at least 250 µm, layer thicknesses up to 500 µm are possible. The plant works using the latest technologies and complies with the test conditions of the Quality Association for “Heavy Duty Corrosion Protection of Powder Coated Valves and Fittings” (GSK) with quality assurance according to RAL-GZ 662. With large valves, EKB is applied in a wet process in a two-layer structure: A cathodic basic protection is followed by an electrostatic wet coating using a low-solvent 2-component epoxy resin. In the heat channel, the final bonding takes place to the heavy corrosion protection according to DIN 30677-2.

EKB is physiologically harmless for drinking water and has confirmed test certificates, among others, from the DVGW Research Centre TZW Karlsruhe, from the Hygiene Institute of Gelsenkrichen and the WRAS (WRc) in Great Britain.

Special coatings

Special coating technologies protect ERHARD ROCO wave Butterfly Valves in a reliable way, also with critical fields of application, such as acids or lye solutions, with sediment-containing water, in cooling systems, in hydraulic steel structures, with sea water or brackish water as well as with industrial wastewater.

EPC (Epoxy Polymer Ceramic) is a polymer ceramic composite material with an excellent mechanical stability. It is pore-free, resistant to chemicals and abrasion-resistant and thus especially suitable for abrasive media or sea water.

An ERHARD hard or soft rubber coating on the inside is resistant against chemical, thermal and mechanical exposure. It is also suitable for abrasive media and sea water.

Individual colour coatings using PU lacquers, for example according to the RAL colour scale, ensure increased operational security, e.g. extinguishing water area. At the same time, they offer optimal UV protection in outdoor areas.

To avoid giving rise to an effective ignition source, the external areas are provided with a conductive special coating. With an earth resistance from 104 to 105 Ohm according to DIN EN 1081, the ATEX requirements are complied with.

The castings are first sandblasted using a special granulate so that the metal is blank. Depending on the size, the epoxy plastic is applied in the powder coating or wet process.
Permanently protected by means of ERHARD Pro-Enamel

ERHARD ROCO wave Butterfly Valves are also available in a fully enamelled version for perfect corrosion protection. After firing at about 720° C, enamel becomes a vitreous, high-tensile material forming an inseparable bond with the metallic substrate. As a special feature, ERHARD valves provided with ERHARD Pro-Enamel have a special fibre enamel. With ERHARD Pro-Enamel, short fibres in the material stop the enamel from cracking in case of any damage.

In accordance with DIN 51178, ERHARD Pro-Enamel offers numerous advantages:
- Safely protected against infiltration
- Absolutely tight for water vapour and oxygen
- Stable connection, also in case of bend of the material and other strains
- Resistant against acids, lye solutions and neutral organic media
- Extremely temperature-resistant. Can also be used when it comes to rapid changes in temperature
- Good resistance also with abrasive media due to high hardness of 600 HV
- There are no further protective measures required, even with soil class III
- Extremely smooth surface (Ra 0.05) for excellent hygienic conditions
- No mineral and organic components get stuck, therefore no build-up of a mineral crust with cross-section reduction
- Ideal mating face for elastomer seals
- Extremely durable and long lasting, no embrittlement and chalk formation
- High environmental compatibility

ERHARD has a wide range of experience with many years of know-how in the complex technology of enamelling. A state-of-the-art enamelling facility enables us to carry out a high-quality production in which we can seamlessly monitor all steps.

Except for fully enamelled versions [up to DN 600], ERHARD ROCO wave Butterfly Valves are also available in combinations of EKB and Enamel, for example with interior surface enamelling and/or an enamelled tilting disc.
Safety: permanently tight and easy to maintain

Decisive for operational safety over years are reliable bearing and sealing constructions which are easy to maintain in addition. ERHARD ROCO wave Butterfly Valves set a new standard in this area, too.

Seat ring for lasting safety
A welded-on seat ring is used with the **ERHARD ROCO wave Butterfly Valve** for all models with inside EKB coating. During the process, a special alloy is metallurgically bonded to the base material by means of the MAG welding process. The resultant layer offers high wear protection and an exceptionally high resistance against pitting and crevice corrosion. This particularly applies also to mineral acids, alkaline media, sea and brackish water as well as with high-temperature media. That way, the new construction ensures a permanently tight contact between the rubberized sealing ring and the seat applied to the housing.

With all versions coated inside with enamel, sealing takes place directly on the enamel. That way, no additional seat ring is required. This further increases durability. This direct seat is possible by the fact that enamel represents a glassy and high-strength material which has an inseparable bond with the substrate. Enamel features a high hardness of 600 HV. It has an extremely smooth surface (Ra 0.05) and is thus an ideal mating face for elastomer seals.

Shaft bearing - reliable and ease of maintenance
The shaft bearing, too, complies with highest standards in terms of safety and ease of maintenance: On the drive side [5], the construction features the following details which together ensure a sealing concept without any dead spaces:

- PTFE-coated P1 bushes [C] according to DIN ISO 3547 ensure safe guidance

**Variants with EKB coating [1/2] use a seat ring [A] which is welded-on by means of the PTA process and serves as a counter seal for the rubberized profile seat ring [B]. With enamelled valves [3/4], the seat ring closes directly on the enamelled seat [C] which represents an ideal mating face due to the hardness and smooth surface area of the enamel.**
of the shaft at simultaneously reduced friction.

- As the bearing main seal, an O-ring cage [D] made of POM is used in the interior which is combined with an EPDM or NBR seal depending on the relevant field of application. Thanks to this construction, it is impossible for it to “slip out”.


On the blind side [6], the journals are supported using P1 bushes. As on the drive side, sealing here also takes place directly on the coating surface area using O-ring cages [D] made of POM. A levelling washer [G] ensures that no axial motion is possible for the shaft. The bearing cover [H] consists of stainless steel.

**Easy-to-maintain main seal**

ERHARD ROCO wave Butterfly valves are equipped with a soft sealing main seal. For nominal widths to DN 600, a rubberized steel ring is used which can be easily fixed using screws [7]. For larger nominal widths, a rubber ring is fixed by means of a stable steel ring on the valve disc [8]. Both variants can be readjusted without problems and can be replaced easily at any time. The setting is secured using counter pins. On request, the main seal is also available in Viton, PU or other special materials.

Depending on the nominal width, various main seals are used: a rubberized steel ring for versions up to DN 600, a rubber ring fastened by means of a metal ring for versions beyond DN 600.
As one of the most often used valves, butterfly valves have to cover a wide spectrum of applications. The ERHARD ROCO wave is the right solution: from small to large ones, for use in plants and pipe networks and for water applications. Because by means of this, all nominal diameters from DN 150 to DN 1600 and all nominal pressures from PN 10 to PN 40 are covered by only one product line.

As the only butterfly valve in the market, the ERHARD ROCO wave Butterfly Valve has a DIN-DVGW Type Examination Certificate for versions up to a nominal width of DN 1600 (PN 10 and PN 16) which externally and independently certifies that these valves fulfil the high requirements in the drinking water sector.

With all versions, handling is facilitated by means of two new useful details:

- Additional flange holes make it possible to hang up the valve and thus facilitate transport [1].
- Integrated stands support the valve and guarantee a safe stand on the contact surface [2].

As supplement to the assortment with larger and smaller nominal widths, there are two proven types of butterfly valves available: the ERHARD ROCO Butterfly Valve for DN 80 to DN 125 (PN 16 and PN 25) as well as the ERHARD EAK Butterfly Valve for all nominal diameters beyond DN 1600 [Page 20].

<table>
<thead>
<tr>
<th>PN 10</th>
<th>80</th>
<th>100</th>
<th>125</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
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</tr>
</tbody>
</table>

**The standard product range of the ERHARD ROCO wave by nominal widths and pressure ratings**
ERHARD ROCO wave – overview

Profile of materials and equipment

• **Housing**: Cast iron with spherical graphite EN-JS 1030
• **Housing seat**: EKB version: high-alloyed, welded seat; Enamel version: enamelled seat
• **Disc**: soft-sealed and double-eccentric mounted, made of cast iron with spherical graphite EN-JS 1030
• **Shaft drive**: ferritic Cr steel
• **Shaft bearing**: P1 bushes, maintenance-free
• **Shaft sealing**: elastomer
• **Profile seal ring**: rubberized (EPDM- or NBR-rubberized), steel-reinforced up to DN 600
• **Bolts**: wetted A4 (beyond DN 600 A2), external A2
• **Gearbox with slider-crank mechanism (SKG)**: protection class IP68
• **Gear housing**: cast iron with spheroidal graphite EN-JL 1040 / Epoxy
• **Geared crank**: steel / bronzed
• **Spindle nut**: bronze
• **Spindle**: ferritic Cr steel
• **Hand wheel**: steel / Epoxy
• **Gearbox arrangement**: For standard see Page 28 ff.
• **Corrosion protection of housing parts**: heavy-duty corrosion protection according to quality assurance RAL-GZ 662 (GSK), at least 250µm, epoxy-plastic-coating; optionally inside (housing or housing and tilting disc) with ERHARD enamelling (colour shade: “blue”) or pre-enamelled using ERHARD Pro-Enamel. Further coating variants are possible. We would be pleased to advise you on that.
• **Media**: for drinking water, water and sewage
• **Suitable for vacuum**: due to enclosed seals

<table>
<thead>
<tr>
<th>Application areas</th>
<th>10</th>
<th>16</th>
<th>25</th>
</tr>
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<tbody>
<tr>
<td>PN 150-1600</td>
<td>150-1600</td>
<td>150-1600</td>
<td>150-1600</td>
</tr>
<tr>
<td>Water up to max. 60° C</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Test pressure in bar acc. to DIN EN 12266-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing test</td>
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<tr>
<td>Ending test</td>
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<tr>
<td>Maximum allowable working pressure in bar</td>
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<td>16.0</td>
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**ERHARD ROCO wave – dimension table**

<table>
<thead>
<tr>
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<th>PN</th>
<th>L</th>
<th>D</th>
<th>h1</th>
<th>h1</th>
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*Used dimensions*
- *L* [mm] overall length
- *D* [mm] flange
- *G* [kg] weight
- *u* hand wheel rotations (open/close)
- *RZ* with round pivot
- *HR* with hand wheel
- *EA* with electric rotary drive

*Further drive variants on request*

*Dimensions can vary depending on the relevant drive manufacturer*
ERHARD ROCO Premium Butterfly valve - dismantling type

An ideal butterfly valve for replacement in plants and pipe networks is the ERHARD ROCO Premium Butterfly Valve - dismantling type. It combines all advantages of the ERHARD ROCO Premium Butterfly Valve with a tightly connected dismantling type and is thus perfectly suited for all plant and pipeline network operators.

Butterfly valves of dismantling type have two large fields of application. For one, they are used in the course of new construction measures, whereby it can be done without a time-consuming and expensive installation of fittings and extension pieces. On the one hand, depending on the relevant material selection which is otherwise required for fittings and extension pieces, this results in savings of approximately 20% with regard to new investments, and installation times and thus personnel expenses decrease to about one third on the other hand.

For another, dismantling type butterfly valves are ideally suited as replacement valves for refurbishing plants and supply networks. Because due to compressing the flange seal, the previous valve must often be handled using brute force or special tools. Installation of a valve identical in construction and overall length will therefore be almost impossible. This is not the case with the ERHARD ROCO Premium Butterfly Valve in dismantling type. It in fact falls below the overall length by 3 mm, with the flange seal already being integrated into the dismantling type concept. This results in a variable overall length which makes it possible to install the valve in the existing gap also without fitting or extension piece.

The ERHARD ROCO Premium Butterfly valve of dismantling type can also be used as a shut-off valve in plants or as an underground pipe network valve. By mounting and fixing the valve on the fixed-flange side, it is installed safe against
Within the bounds of refurbishment works, the “Landeswasserversorgung” (Water Supply Agency) of the federal state of Baden-Wuerttemberg replaced a gate valve with an ERHARD ROCO Premium Butterfly valve of dismantling type [3/4]. The replacement of the valves is facilitated by using the loose flange – it can be done without widening the valve flange and pipeline flange for installing a seal.

Installation without problems is also possible with vertical pipelines [5]. Elaborate support of the valve is not required, because it is fastened to the fixed flange during installation. The perfect seat of the valve guarantees ease of handling in all mounting situations [6]. With it, it is also possible to subsequently turn the valve after it has been installed.

turning.

The loose flanges are movable within a certain application range [-1 mm to +5 mm]. Furthermore, they are tightly connected to the valve housing. The overall length of the loose-flange valve is manufactured with a minus tolerance, and by leaving out the flange seal on the loose flange side, additional play is created. The seal in integrated into the loose flange.

Prior to installation [1], the loose flange with integrated flange seal is put into end position. The housing is manufactured with a minus tolerance so that a gap results between butterfly valve and pipeline, enabling easy installation into the existing construction gap. After installation [2], the loose flange with integrated flange seal is pulled up to the pipeline flange and the flange connection is screwed together. While doing so, the gap between valve and pipeline is bridged by the loose flange. The integrated flange seal caulks towards the pipeline and the valve’s housing in a safe way. Due to the holding elements, the bond between loos flange and valve is tightly connected.

ERHARD ROCO Premium Butterfly valve BLS

The longitudinal positive-locking BLS® socket connection (BLS = Buderus Lock System) is a further development of proven restraint systems. It is form-fitting and extremely durable, i.e. it can also be used for extreme applications, and it can be easily mounted or dismounted. So in a rocky terrain, for example, it has proved itself since many years.

On the basis of numerous technical and economic advantages of this flangeless connection, ERHARD - apart from other valves and a lot of fittings - has also developed for this future-oriented system ERHARD ROCO Premium Butterfly Valves in nominal widths DN 200, 250 and 300 (PN 16).
Special variants for a wide spectrum of applications

Apart from the different versions with flange, loose-flange, or BLS connection, ERHARD also offers a lot of special versions for a wide spectrum of applications. Here are some examples:

**ERHARD ROCO Premium Butterfly Valves with butt-welding ends**
ERHARD ROCO Premium butterfly valves with butt-welding ends are manufactured for pressure ratings up to PN 16. In this special case, the outer corrosion protection consists of a high-quality two-component polyurethane coating for underground valves. This coating is excellently suitable for the safe corrosion protection connection after welding took place in the pipe trench. The valve’s housing consists of ST 52-3.

**ERHARD ROCO Butterfly Valves of the long series**
Apart from the standard version in overall lengths according to DIN EN 558-1, basic series 14, ERHARD ROCO Butterfly Valves are also available in a long version according to basic series 15. The product range comprises nominal widths from DN 400 to DN 1200 in the pressure ratings PN 10 and PN 16. Further versions are possible on request. As a basic variant, there is one version each available - one with and one without bypass. The main application field of this valve is filling and discharging of pipelines free of pressure surges via the integrated bypass using an ERHARD Gate Valve. Therefore it can be done without the complex installation of a bypass line in the pipe trench. The whole system “looks as if from one and the same cast”, providing optimal corrosion protection.

**Further accessories**
The wide product range of ERHARD Butterfly Valves also includes further accessory items, such as:
- Limit switch on the gearbox
- Lockable hand wheels
- Hang-up devices

Further information can be obtained from your ERHARD consultant.
**ERHARD ROCO Premium Butterfly Valves – dimension table**

**ERHARD ROCO Premium Butterfly Valve – dismantling type**

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**ERHARD ROCO Premium Butterfly Valve with loose flange**

*L* [mm] overall length

variable in the range from -1 to +5 mm
ERHARD EAK Butterfly Valve – proven technology

Since more than 70 years, ERHARD EAK Butterfly Valves provide proven technology of the highest quality. Tried and tested details ensure reliable quality and high economic efficiency. With nominal widths between DN 1600 and DN 3600 and pressure ratings from PN 10 to PN 40, they cover a wide field of application. As a matter of course, further customer-specific variants are also possible with the ERHARD EAK Butterfly Valve.

Proven bearing and sealing section

Drive shaft and journal are mounted in maintenance-free, self-lubricating plain bearings. They are highly resistant, robustly designed and designed for toughest operating conditions. The lining of the DU sleeve bearings with PFE ensures very low friction values and a correspondingly high service life. The double shaft sealing is equipped with robust O-rings and support rings and blow-out proofed enclosed.

ERHARD EAK Butterfly Valves are suitable for a wide range of tasks: whether in the turbine feed of the coal-fired power plant of EnBW in Karlsruhe [1], where a butterfly valve DN 3600 [2] is used, or with the comprehensive refurbishment of the water supply in Leipzig which is partly almost 100 years old [3] and where 15 ERHARD Butterfly Valves were installed in sizes of DNV 500 to DN 1000 – partly with integrated bypass for optimal pressure balance during start-up.
**Robust wedge connection**

For the important connection between drive shaft [7] and tilting disc [8], ERHARD with nominal widths beyond DN 600 relies on the proven and robust wedge connection [6], which also at highest dynamic loads ensures clearance-free power transmission and thus a sufficiently high torque at highest safety.

The wedge connection, as a force-locking connection element, is exactly tight-fitted in every valve, connecting shaft and tilting disc as if cast from one mould [9]. Furthermore, a special feather key securing device [5] is standard.

**Safe sealing**

ERHARD Butterfly Valves are sealing softly. The main seal in the form of a profile ring [11] is clamped to the tilting disc and fixed by means of a clamping ring [10]. By means of fastening screws, it is easily adjustable and replaceable without problems. Securing and fixing takes place by means of counter pins. An equal and controlled preload is achieved by means of the profile ring with a one-piece clamping ring. The profile ring is easily interchangeable in the open position. On request, the main seal is also available in Viton, PU or other special materials.

ERHARD Butterfly Valves, too, are optionally available as standard with an internal EKB coating or in enamel, with the design of the seat ring varying:

- With the epoxy coating (EKB, blue) according to the requirements of DIN 30677, Part 2, a rolled-in, solid seat ring made of stainless steel is used.
- With enamelling in the interior (ERHARD Enamel, blue), the seat takes place directly on the enamel.
- Alternatively, there are further high-quality coatings available such as epoxy ceramic.
ERHARD EAK Butterfly Valve – overview

Profile of materials and equipment
- **Housing:** cast iron with spherical graphite EN-JS 1030
- **Housing seat:** austenitic Cr-Ni steel
- **Disc:** mounted in a soft-sealing and double-eccentric way, made of cast iron with spherical graphite EN-JS 1030
- **Valve shaft:** ferritic Cr-steel
- **Shaft bearing:** P1 (PTFE) acc. to DIN 1494-4, maintenance-free
- **Shaft sealing:** elastomer
- **Profile seal ring:** elastomer, chambered with clamping ring, EPDM or NBR, Viton optionally
- **Bolts:** inside and outside A2
- **Gearbox with slider-crank mechanism (SKG/SK):** protection class IP68 / IP67
- **Gear housing:** cast iron with spheroidal graphite EN-JL 1040 / EKB
- **Geared crank:** steel/bronzed
- **Spindle nut:** special brass
- **Spindle:** ferritic Cr-steel
- **Hand wheel:** steel / epoxy
- **Gearbox arrangement:** standard acc. to image 1 (page 23)
- **Corrosion protection of housing parts:** heavy-duty corrosion protection according to quality assurance DIN 30 677-2 (at least 250 µm), epoxy-plastic-coating EKB, optionally inside with ERHARD enamel coating, each in the colour shade of "blue"). Further coating variants are possible. We would be pleased to advise you on that (please also refer to Page 20).

Tilting discs made of stainless steel casting are the special feature of the butterfly valves used for the Cannington Link Project in Perth [1]. In Belgrade, ERHARD EAK Butterfly Valves DN 3000 with electric actuators ensure the water supply [2].

Application areas

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Further nominal widths, pressure ratings and drive variants on request.

**Used dimensions**
- L [mm] overall length
- D [mm] flange
- G [kg] weight
- u hand wheel rotations (open/close)
- RZ with round pivot
- HR with hand wheel
- EA with electric rotary drive (dimensions may vary depending on the manufacturer of the drive)
Notes on design and installation

**Gearbox arrangement**

ERHARD Butterfly Valves are basically factory-adjusted for both pressure directions. For actuation, gearboxes are by default designed for $\Delta p=PN$. In the event of an order, the gearbox arrangement has to be defined by means of the overview graphics. Delivery of the valve takes place as standard according to figure 1. In case of pressurisation in one direction, the pressure shall be present from side A (preferred pressure direction).

ERHARD Butterfly Valves can be installed in all positions so that the stated arrangements can also be used for vertical pipelines. The tilting disc closes by clockwise rotation of the hand wheel.
Optimal drives for every application

Depending on the mounting location and area of application, there are a lot of drive options available which thanks to standardised connections can be replaced easily at any time.

To both the classic spindle gear and the innovative gearbox with slider-crank mechanism, the following drives can be directly connected:
1. Interface with coupling sleeve for installation equipment according to DVGW Worksheet GW 336
2. Square caps
3. Hand wheel
4. Chain wheel
5. Column stand with hand wheel and spindle extension
6. Column stand with electric rotary drive and spindle extension
7. Spindle extension with hand wheel
8. adjustable underground installation equipment with street cap or
9. adjustable underground installation equipment with street cap and gear wheeled position indicator

For use of electric rotary drives [10], in combination with spur-type transmission gears [11], if necessary, the spindle gear is supplemented by a drive flange [12]. Further options are hydraulic or pneumatic rotary actuators [13] as well as break-and-lift units [14].
Safety first

Break-and-lift drive
Both ERHARD ROCO wave and ERHARD EAK Butterfly Valves are optionally available with a hydraulically controlled break-and-lift drive in compact design. Among others, applications include:
- Pipe burst control
- automatically operated pump return safety device
- Turbine inflow safety device
- Quick-opening valve

All devices which are required for hydraulic control of the closed hydraulic system, such as pumps and valves, are fastened directly to the cylinder so that few piping is necessary. In order to reduce the flow rate within a pipeline, the first braking range (approx. 70 % of the closing angle) is passed quickly, with the remaining 30 % flow rate being strongly throttled in order to keep dynamic pressure peaks low (closing time characteristic in 2 steps).

The opening process of the butterfly valve takes place by raising the weight lever by means of hydraulic cylinders using an electric hydraulic pump or a manual oil pump. The tilting disc is hydraulically kept in opening position.

Piston actuator and emergency hand wheel
With the version with piston actuator and emergency wheel it is ensured that the valve can be closed in a safe way also when the hydraulic system or the pressure-air supply fails.

Non-return protection
For special applications like manifolds with parallel pumps or ascending lines, butterfly valves from DN 150 can also be combined with a suitable non-return protection.

ERHARD Check Valves are manufactured in accordance with the same high standards. With stable housings, a streamlined tilting disc, shafts brought out to both sides and mounted maintenance-free, as well as a robust wedge connection between shaft and disc, the butterfly valves represent the perfect supplement to the ERHARD ROCO wave and ERHARD EAK Butterfly Valves.

Also with international large-scale projects, professionals rely on ERHARD when it comes to the topic of butterfly valves. So in the power plant in Taishan, China, for instance, 26 ERHARD EAK Butterfly Valves DN 2400 with hydraulic brake-and-lift units are used [1]. The 18-ton heavy brake-and-lift valves in the Australian Warragamba dyke are designed for emergency shunts with a maximum flow velocity of 30 m/s [2].
ERHARD three-point locking

Accidental opening of the butterfly valve in case of revisions of the pipeline system is safely and reliably prevented due to the ERHARD three-point locking system. This guarantees that the butterfly functions as a locked and drip-tight closed safety valve. Inspection of the pipeline can take place without danger even in case of an operating error on the drive.

The locking device consists of two fixed and one movable end stop. At the movable end stop, a pin operated by a hand wheel drives into the housing, blocking reliable the closed tilting disc. In this position, the valve is closed drip-tight in both pressure directions. An additional mechanical locking of the pin in the end positions serves as another safety feature. Unintentional opening and closing of the locking is thus effectively prevented.

Furthermore, the locking is dimensioned in such a way that it withstands the maximum occurring actuating moment from drive and valve at any time. Even if the drive shafts fail, the valve keeps being safely closed and thus provides the highest degree of safety.

Further blocking versions are available on request.
ERHARD Butterfly Valves are used worldwide and have proved in thousands of applications. Especially in the use of drinking water, the requirements are particularly high. Accordingly, the components and coating systems have been carefully developed for these applications.

For use in the drinking water area, the requirements of the KTW recommendations, a guideline for hygienic assessment of organic materials which are in contact with drinking water (KTW = Plastic and Drinking water), have been considered throughout during construction. The same is applicable to the requirements of the DVGW Worksheet W270 “The growth of micro-organisms on materials intended for use in drinking water systems - examination and assessment”, in which the DVGW pointed to the necessity of protection of drinking water against micro-organisms on non-metallic materials.

Furthermore, for ERHARD ROCO wave Butterfly Valves, we have a DIN-DVGW Type Examination Certificate which internally and externally confirms that these valves comply with the high requirements in the drinking water area. As a matter of course, however, all other drinking water valves also comply with the requirements according to the KTW and DVGW Regulations W270.

Apart from these two national certificates, ERHARD Butterfly Valves have numerous further international approvals. We would be pleased to inform you about them.

With a transport network which is more than 500 km long, the Harzwasserwerke provides more than 1.5 million people with drinking water of best quality. Among other things, the natural soft water is taken from the Grane Dam in the western Harz mountains. From this drinking water reservoir holding 46 million m³ of water, up to 180,000 m³ of high-quality drinking water is extracted every day.

Since the Harzwasserwerke started operation in 1928, the long service life of the equipment is paramount to engineering planning. The waterworks at the Grane Dam was built in 1972 and in recent years equipped with ERHARD ROCO Butterfly Valves.
Always by your side – the service from ERHARD

Especially with complex technical installations, product supplies are not enough. So we from ERHARD will offer you assistance and advice in all life-cycle phases. Highly qualified teams in our head office in Heidenheim and in representations throughout Germany as well as on five continents will develop first-class solutions together with you.

Planning and conception
Individual consultation through our experienced engineers and technicians already begins in the project phase. That way, in a dialog with the customers, optimal solutions are developed, no matter whether is with serial products or through particular special designs. Especially these “tailor-made” packages are the reason why ERHARD products are used particularly frequent in difficult applications and mounting situations.

For material tests, project-specific investigations as well as for checking and analysing materials and components, there is our own test centre available in addition.

Installation and commissioning
ERHARD employees install the valves in your plants on request, and they take over commissioning together with your employees. As a matter of course, this includes training and instruction of qualified personnel by means of detailed operating instructions and training material.

Maintenance and repair
Also during the long service life of the valves, ERHARD is available for you to provide services. Regular inspection and maintenance ensure that the valves fulfil their functions in a safe way. In case you encounter any problems, repairs can be carried out timely on site. Spare parts required for this will also be available years after commissioning.

For larger repairs, our technicians in the Heidenheim plant will be available in addition. We offer these services also for third-party products.
It was 1871 as the brass caster Johannes Erhard started his business in the small Swabian town of Heidenheim an der Brenz. Since this time, with our valves, we at ERHARD have been helping to ensure that water is available wherever it is needed: in private households, in public facilities, in agriculture or in industrial plant.

Proverbial Swabian inventiveness, the most recent technical findings and experience acquired over 140 years ensure that, with innovative solutions and our wide range of products, we can provide suitable systems for every task. Modern machinery, state of the art and environmentally friendly production methods and high-quality materials enable ERHARD to supply technically advanced, fully developed products with worldwide reputation:

ERHARD customers also benefit from ERHARD being part of the international TALIS Group. With its brands that have been established for generations – ERHARD, FRISCHHUT, SCHMIEDING and STRATE in Germany, BAYARD in France, BELGICAST in Spain, ATLANTIC PLASTICS in the UK, UNIJOINT and WAFREGA in the Netherlands – as well as its global agencies, the Group probably offers the most comprehensive range in the industry. Whether it’s small ventilation valves or gigantic butterfly valves you’re looking for, whether it’s fittings for pipes or wastewater lifting systems – TALIS has the right solution.

TALIS covers numerous areas of application: from water collection and treatment through cisterns, pipe networks, pumping plants, industrial applications and irrigation systems to wastewater and sewage treatment plant technology. Other important fields include valves for dams, power stations and for energy recuperation as well as for gas transport.

Task-specific solutions with top economic viability, low maintenance costs and a long service life thanks to high product quality and perfect surface protection are a matter of course at TALIS. This is achieved through highly qualified employees, the use of modern development and production methods as well as high-quality materials. In addition, TALIS experts are available to support customers during all life cycle phases, from project planning through assembly and initial use to regular servicing and maintenance.
ERHARD valves – for every application

Isolation Valve

- ERHARD Multamed Premium Gate Valve
- ERHARD ERU K1 Knife Gate Valve
- ERHARD Ball Valve
- ERHARD ECLI Butterfly Valve
- ERHARD Diaphragm Valve

Control valves

- ERHARD RKV Needle Valve
- ERHARD DVP4 Pressure Reducing Valve
- ERHARD TWI-AIR Air Valve
- ERHARD Non Slam Nozzle Check Valve
- ERHARD SWING Check Valve

Hydrants

- ERHARD Industrial Hydrant 150
- ERHARD CITY Hydrant
- ERHARD Post Fire Hydrant
- ERHARD Underground Hydrant
- ERHARD ABS Premium Tapping System

House connection

Couplings and fittings

- ERHARD Dismantling Joint
- ERHARD WAGU

Penstocks

ERHARD double-eccentric butterfly valve 35
Your Choice in Waterflow Control

TALIS is the undisputed Number One for water transport and water flow control. TALIS has the best solutions available in the fields of water and energy management as well as for industrial and communal applications. We have numerous products for comprehensive solutions for the whole water cycle – from hydrants, butterfly valves and knife gate valves through to needle valves. Our experience, innovative technology, global expertise and individual consultation processes form the basis for developing long-term solutions for the efficient treatment of the vitally important resource “water”.

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