Intelligent Valves with ERHARD Compact Type
Weight-loaded Hydraulic Actuators KFa

– ERHARD System Engineering –

ERHARD Valves with Compact Weight-loaded Hydraulic Actuators KFa reliably ensure safety functions for different fields and applications, e.g. as

- main burst control valve
- controlled pump discharge and non-return valve
- overflow safety device (inlet and outlet of reservoirs)
- turbine inlet safety valve (emergency isolating valve)
- quick-opening (dump) valve and/or water hammer relief valve.

Apart from designing and manufacturing the specific safety valve with compact weight-loaded hydraulic actuator, upon request ERHARD supplies a whole package including system engineering. For the “intelligent valve”, the interaction between measuring, regulating and control engineering as well as the actuator, is of utmost importance.

As a package solution for the compact weight-loaded hydraulic actuator, ERHARD optionally offers:

- Measuring detectors/transducers, flow rate measuring systems – inductive, ultrasonic or on a mechanical/hydraulic basis.
- Electrical control cubicle with all the components necessary for control/regulation of the Compact Weight-loaded Hydraulic Actuator KFa adapted to the specifications and requirements of the user.
- Assembly, installation, and commissioning of all components with corresponding after-sales service and customer support.

Upon request, we will also supply pipe components (dismantling pieces/by-passes including valves, etc.).

Please, contact us. Our experts are always at your disposal.
**ERHARD** Weight-loaded Hydraulic Actuators, Compact Type KFa – SAFETY first!

Weight-loaded Hydraulic Actuators are used wherever valves installed at crucial points of pipe networks have to close or to open in a secure and reliable manner even on failure of external operating energy. Thus, they have to meet the most stringent requirements in terms of functional safety.

Thanks to their solid and state-of-the-art design, **ERHARD** Compact Type Weight-loaded Hydraulic Actuators KFa are the optimized, economical solution.

Various Valves – A Single Actuator System

**ERHARD** Compact Type Weight-loaded Hydraulic Actuators KFa are used for operating valves with a drive shaft rotating by max. 90°. The Weight-loaded Hydraulic Actuator is equipped with an energy accumulator. The weight-loaded lever provides the energy required for a single closing or opening operation of the valve.

Depending on the particular application and service required, the **ERHARD** Compact Type Hydraulic Actuator KFa may be incorporated in Ball Valves, Butterfly Valves or Needle Valves. A range of sizes and standardized interfaces combined with a perfected modular concept enable us to supply the best solution for valves of all sizes and pressure ratings.

Design of the Compact Type Hydraulic Actuator KFa

The **ERHARD** Compact Type Hydraulic Actuators KFa excel by their compact design. The weight-loaded hydraulic actuator incorporated in the valve includes not only the mechanical components as weight-loaded lever, bracket, and support plate (for cylinder attachment) but also the hydraulic damping and opening cylinder incorporating the hydraulic unit. All hydraulic components as motor pump, manual pump, compensating tank, and control block with various valve combinations are rigidly fixed on the cylinder using little tubing. Thus, undamped closing of the valve is excluded even in case of burst of the control line.

**Sizing and Dimensioning**

**ERHARD** Weight-loaded hydraulic actuators KFa are designed according to the case of application and the hydraulic conditions. The required parameters are given in below check list. The weight-loaded hydraulic actuators KFa are sized and designed to the modular concept.

- Max. operating torque for seating and off-seating the closed valve.
- Case of application and existing specifications.

- Pressure conditions (upstream and downstream), static and dynamic incl. water hammer
- Tripping flow rate (for a main burst control valve)
- Operating times for opening and closing
- Lowering process of the weight-loaded lever initiated by means of:
  - mechanical impulse (without external energy)
  - electrical impulse (electrical data to be specified)

Upon request, we will send our questionnaire for more detailed data! For further information about **ERHARD** valves with weight-loaded hydraulic actuator KFa, special technical descriptions will be submitted upon request.

**Necessary Parameters**

For submitting a quotation for each specific requirement, the following data are necessary:

- Valve type
- Size DN
- Pressure rating PN
- Application
  - Main burst control valve
  - Combined pump discharge and non-return valve
  - Turbine inlet safety valve
  - Quick-opening valve
  - Others, please describe!
- Flow velocity or flow rate (min., normal, max.)
- Pressure conditions (upstream and downstream), static and dynamic incl. water hammer
- Tripping flow rate (for a main burst control valve)
- Operating times for opening and closing
- Lowering process of the weight-loaded lever initiated by means of:
  - mechanical impulse (without external energy)
  - electrical impulse (electrical data to be specified)

**Technical Data/Scope of Supply**

Range of torques:

| (dynamic / static) | 250 – 300,000 Nm (divided into 9 different actuator sizes) |

Main components:

- Actuator bracket/lever hub: ductile cast iron SG GGG/EKB epoxy coating or welded steel/EKB steel/EKB
- Drive lever and cylinder: cast iron GG/EKB stainless steel
- Weight: zinc-coated steel
- Piston rod/control lines: anodized aluminium, with screwed-on flow control valves, manual valves, and solenoid valves
- Screwed pipe unions: cast iron GG/EKB – plexiglass (aluminium)
- Control block: with visual oil level indicator
- Compensating reservoir:

**Actuators for:**

- **ERHARD** Butterfly Valve DN 150 – DN 2600, PN 10-40
- **ERHARD** Ball Valve DN 100 – DN 1200, PN 10-100
- **ERHARD** Needle Valve DN 100 – DN 1800, PN 10-100
ERHARD Valves with Compact Weight-loaded Hydraulic Actuators KFa

Typical Applications

- Opening: The pumps (motor or manual pump) suck up the oil from the cylinder chamber on the rod side or from the compensating tank (5) and produce a pressure on the piston side of the cylinder which raises the weight-loaded lever. In OPEN position, oil must not escape from the cylinder (1). This will be ensured by means of the control block (4) and its valve combinations. Mechanically, electrically or hydraulically operated pilot valves (4.2) control a main valve (4.1) which isolates or releases the oil flow from the cylinder.

- The actuator is hydraulically maintained in “working position” (weight-loaded lever raised). This brings about the advantage that the lowering of the weight-loaded lever immediately shows the oil losses due to internal leakage. Inadmissible lowering of the weight-loaded lever out of the OPEN position, will be detected by an additional limit switch (90% open) which initiates automatic starting of the motor pump (3) and return to 100% OPEN position.

- Tripping movement: The lowering velocity for the first damping phase (about 70% of the cylinder stroke) can be adjusted at flow control valve (51), the velocity for the second damping zone at the flow control valve (52). Flow control valves keep the flow rate constant irrespective of the differential pressure.

- This principle permits phased operating laws for the lowering of the weight-loaded lever. These phases are necessary in order to keep the pressure increase (water hammer) in the pipeline within an admissible range, with the lowering times being as short as possible. For compensating the difference in flow rate between the cylinder chamber on the rod side and that on the piston side and for keeping a small oil reserve for losses due to leakage, the actuator is equipped with a small compensating tank (5), with visual control of the oil level.

- For detecting and signalling the different positions of the valve obturator, several limit switches are mounted on the cover plate. Apart from signalling, these limit switches also serve for controlling the electric components at the actuator. If a weight-loaded hydraulic actuator is equipped with an electrical pilot valve (solenoid valve 4.2) and with a motor pump (3), the valve user needs a control cubicle.

- With the electrical pilot valves, the closing movement is tripped by energizing (open-circuit concept) or de-energizing (closed-circuit concept) the solenoid valve (4.2). Thus, lowering of the weight-loaded lever is started. The components (motor pump 3, thermal switch 2.5, pilot valve 4.2 and limit switches) must be controlled electrically. Upon request, ERHARD can also supply the electrical control system.
Standard type of the KFa actuator:
- two-phase adjustable closing law (see diagram),
- compact design with incorporated hydraulic unit (motor pump and manual pump) as well as thermal switch and pressure limiting valve,
- control by means of solenoid valve (open-circuit/closed-circuit concept),
- manual valve (3/3-way ball) valve for emergency tripping (manual) or for hydraulic blocking (manual).

Modular concept:
Among others, the following types are available within the modular concept:
- Weight-loaded hydraulic actuators KFaR without hydraulic unit, i.e., equipped only with weight-loaded lever and cylinder assembly for connecting to hydraulic unit supplied by customer,
- one or three-phase operating laws, depending on the requirement and application of the plant,
- mechanical control of the main valve (if there is no external energy available on site) – see "Main burst control valves" under Section "Typical Applications".
- hydraulic unit equipped with accumulator.

There are a lot of other options and features available. Please, contact us. We will be glad to help you.

Performance
Compact-design actuator firmly incorporated in the valve. Hydraulic unit incorporated in the actuator.

Users’ Advantages
The user does not have to provide hydraulic units or cylinders. It is not necessary to lay expensive hydraulic lines on site. The hydraulic moments are absorbed and supported within the valve, no transmission onto the structure.

Control block and control valves directly mounted on the cylinder in "block design" with little tubing.

Precise adaptation to the plant and operating conditions possible. Thus, minimizing of water hammer. Exactly reproducible closing or opening laws can be set.

Pilot valves with small electrical output, irrespective of actuator and valve size.

Economical and safe operation ensured.

High-grade corrosion protection of complete actuator unit with ERHARD EKB epoxy coating. Valves and accessories of stainless materials.

Long-time protection, long life.

The actuator can optionally be operated with biologically decomposable hydraulic liquid.

Ecological operation possible.

Safety devices as e.g. pressure limiting and temperature monitoring devices are incorporated in the standard actuator.

High functionality and safety.

Package solution: Weight-loaded hydraulic actuator with measuring and control system incl. control cubicle as well as assembly and commissioning services (ERHARD system engineering).

One single supplier – one partner! Adaptation of the individual components. Functionality and safety ensured!