

Hydraulically Controlled Check Valve for surge protection



A.R.I.

FLOW CONTROL ACCESSORIES Ltd.

GGG40



DN800
PN16



CLC

A.R.I. Hydraulically Controlled Check Valve (HCCV) Full Hydraulic Transient control.

Extreme pressure surges and slam caused by the sudden closing of check valves are the constant nightmare of hydraulic engineers and maintenance personnel.

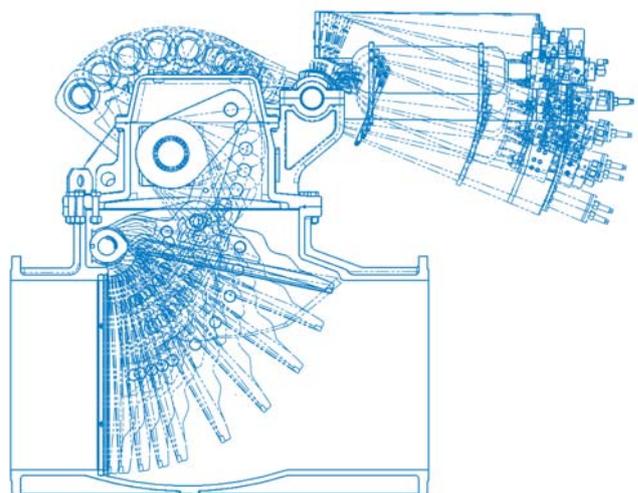
At pump start-up and shut-off, and at power failure, a conventional uncontrolled pump check valve will close rapidly and, depending on the pressure transient and / or reverse flow, can cause a very high pressure surge and slam, leading to damage and destruction.

The A.R.I. Hydraulically Controlled Check Valve is one of the most efficient tools available to prevent damages caused by surge and slam. Due to its fine-tuning capabilities, the A.R.I. HCCV can be applied effectively to a wide range of hydraulic pumping regimes.

Main Features & Benefits

- Innovatively designed, specifically to control surge.
- Can be applied effectively to the two main types of check valves:
 1. Swing Check Valves
 2. Tilting Disc Check Valves
- Face to face dimensions according to ISO and EN standards.
- Efficient pump station protection.
- The Hydraulic accumulator provides all counter-force required. Levers or clumsy counter weights are not necessary.
- Controlled closing cycle remains fully functional, even during power failure
- Opening cycle of the A.R.I. HCCV can be timed to prevent surge and slam at pump start-up.
- Closing cycle of the A.R.I. HCCV is fully controlled and adjustable to two principal phases:
 1. Initial fast closing of the disk to 80% of its fully closed position – controllable from 2 to 10 seconds.
 2. Secondary, damping stage, 80% to fully closed – controllable from 5 to 300 seconds

- Provides additional flexibility of operation, supplemental fine-tuning is enabled by cam adjustment.
- Metallic removable seals for quick servicing
- Sealing seats are resistant to corrosion and wear.
- Designed for energy savings; full flow achieved by external hydraulic source – disc lifts out of flow stream.
- Timing adjustments can be made on-sight in the field
- Dampening characteristics can be synchronized to match the dynamic behaviour of the surge waves in the system and can be aligned with the transient conditions in the pipeline.
- The A.R.I. HCCV acts as an internal surge relief valve.
- Low maintenance.
- Non-slam, smooth closing of disc.
- Long working life.



Specifications

- Nominal Size: 400 mm – 1000 mm
- Pressure Rating : 10 bar , 16 bar.
- Max. working Temp. : 70° C
- Electric Oil Pump : 3 phase 220 V
- Control : 24 DVC

Options

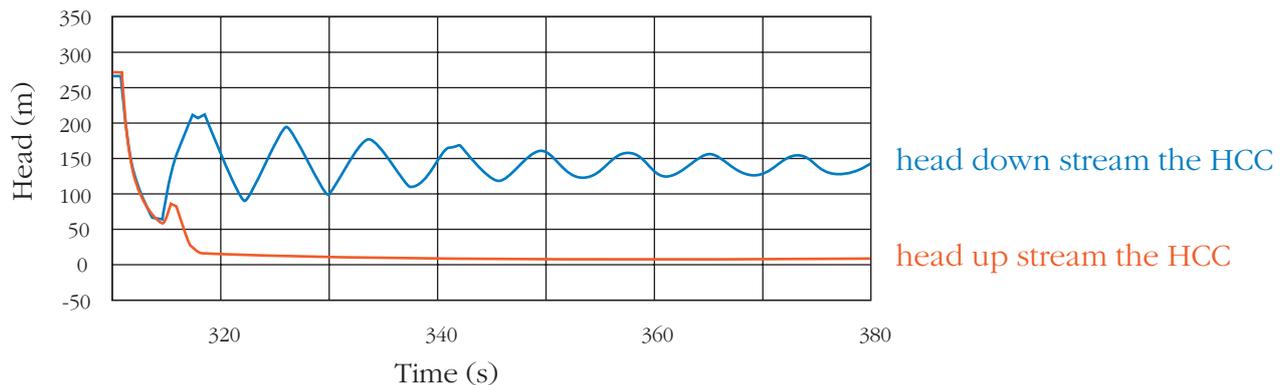
- Swing or Tilting disc check valve.
- Higher back pressure application.
- Custom external dimension for confined space installation.
- Special internal/external coatings for use with corrosive liquids.

Materials

Part	Material
Body, cover and disc	Cast Ductile iron
Metal on metal seating	Phosphoric Bronze – C907 on SS 316
Shaft and pins	SS 431 – 17-4PH-316
Shaft bearing	Phosphoric Bronze – C907
Internal Mechanical parts	St 37, St 52 with epoxy coating
Internal coating	FBE – blue RAL 5010
External coating	FBE – blue RAL 5010

Surge at Hccv After Pump Trip (Granot Pumping Station)

Only a part of the surge wave is reflected by the HCCV allowing attenuated pressure fluctuation in the pipe



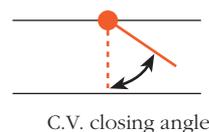
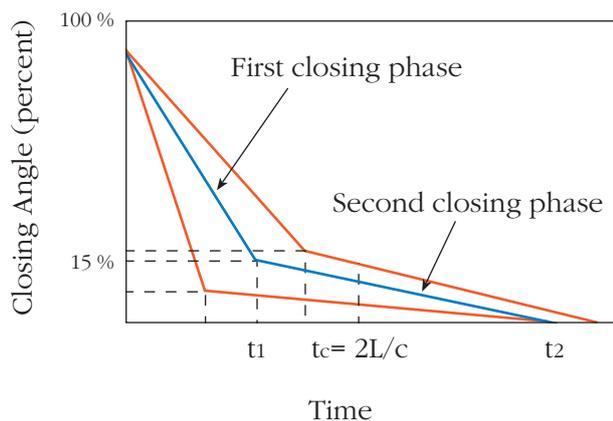
Typical Power Failure Closing Characteristics

The first fast closing angle (%) and time (t_1) are continuously adjustable depending on the hydraulic characteristics of the line.

The second damping closure is adjusted to include the surge wave return time: $2L/c$.

This allows a part of the surge wave to be absorbed by the HCCV and pump resistance.

Example of three closing regims



- t_1 = First closing time
- t_2 = Second closing time
- $t_c = 2L/c$ Critical time
- c = Surge wave celerity

Tilting Disc Type HCCV



Swing Type HCCV Horizontal Actuator



Swing Type HCCV Vertical Actuator



Tilting Disc Type Check Valve With Damper

