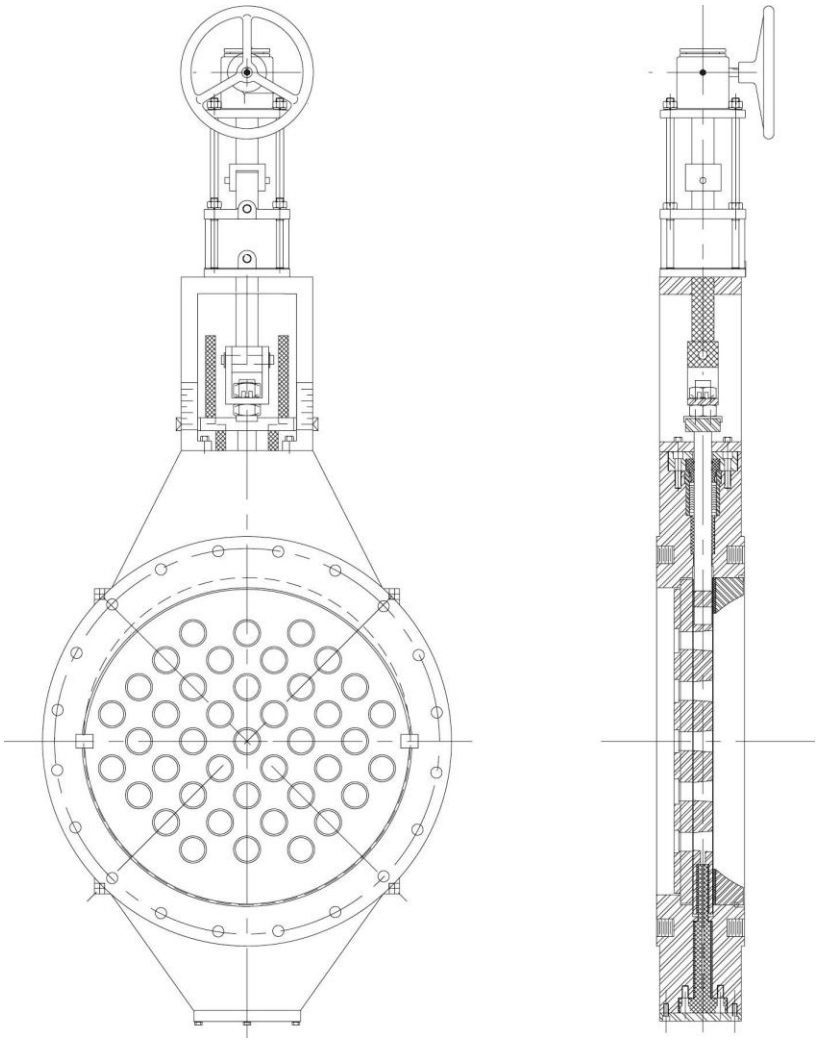
Henry Pratt Company, LLC.

401 S. Highland Avenue
Aurora, Illinois 60506-5563
Phone: (630) 844-4000
Fax: (630) 844 –4124
Toll Free: (877) 436-7977

General Installation, Operation and Maintenance Manual

www.henrypratt.com



Pratt Sonic Flow Valve
Model CCED
All Sizes – Manual & Automated

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If in doubt consult the factory

PRATT CCED SONIC FLOW CONTROL VALVE

PLEASE READ THIS ENTIRE MANUAL BEFORE INSTALLATION

PLEASE REVIEW THE PRE INSTALLATION INSPECTION DOCUMENTS PRIOR TO INSTALLATION

1.0 SAFETY PRECAUTIONS

Caution

For all maintenance, disconnect the air or the hydraulic supply at the actuator, solenoid or controls. Ensure the actuator is purged of air or hydraulic fluid. Disconnect the actuator power supply (electricity, pneumatic or hydraulic couplings, etc.) Remove all power to the actuator/solenoids. If you have not been trained on the operation of this equipment consult factory prior to conduction any type of maintenance.

1.1 GENERAL OPERATING PRINCIPLE CCED VALVE

The limited relative movement of two perforated plates causes a change in the cross-sectional area of the flow, and hence of the loss of head. This valve is not intended for use as an isolation valve and is not a zero leakage valve. The media must be free of debris or solids. High solid content may damage the valve. Ensure you have selected all applicable options for the application.

1.1.1 DESIGN OF THE CCED VALVE *(Refer to Figure 1 on page 4)*

An annular body (1), inserted between the pipe flanges, holds two round plates right angle to the flow, each of which is perforated, with conical nozzles. Plate (2), on the downstream side, is fixed, plate (3), on the upstream side, is free to slide up and down over the fixed plate. Upstream-to-downstream sealing is not bubble tight. The valve is not designed for tight shut-off, however, to dissipate the energy in the best conditions from the division of the flow in several tens of small jets evenly distributed over the cross section. Internal-external sealing is obtained by static O-rings on the valve upper and lower stems with a patented stem sealing design.

1.1.2 FLOW DIRECTION

CCED valves are designed to control flows in a single direction. Valves are capable of intermittent bi-directional flow. This means that they can withstand back-pressures exerted from downstream to upstream not greater than 10 percent of the rated pressure. Also, only static pressures are acceptable. Operators should take all necessary measures to ensure compliance with this constraint. A lower shaft (4) has been installed to facilitate the guiding of the linear plate. A taper ring (5) has been inserted to accommodate intermittent bi-directional flow.

1.2 FEATURES OF YOKE ASSEMBLY

The standard assembly of the CCED is as shown on the cross-sectional drawing of the valve with yoke. The yoke (6), consisting of two shafts connected to the linear plate, facilitates valve operation by the following advantages:

- Any leaks from inside the valve show up immediately on the upper bearing plate
- The operating stem O-ring seal can be replaced without having to dismantle the valve from the piping.
- The control system can be dismantled for servicing and reassembled without requiring re-adjustment of the open or closed position. This is a result of shaft markings indicating the position of the linear plate.
- Front & side indication for open & closed position.
- Excessive force must not be used on the manual override for the open position (Downward shaft movement).
- Do not exceed the rim pull of the actuator if the valve will not operate electrically or manually. Refer to the troubleshooting guide.

Description:

1. Body
2. Fixed Plate
3. Linear Plate
4. Lower Fixed Stem
5. Taper Ring
6. Actuator Drive Stem
7. Lower Sealing Plate
8. Packing and Seal Cartridge
9. Yoke Assembly
10. Stem connection environmental shields

Typical drawing
Not always this configuration
Please refer to the project submittal drawing

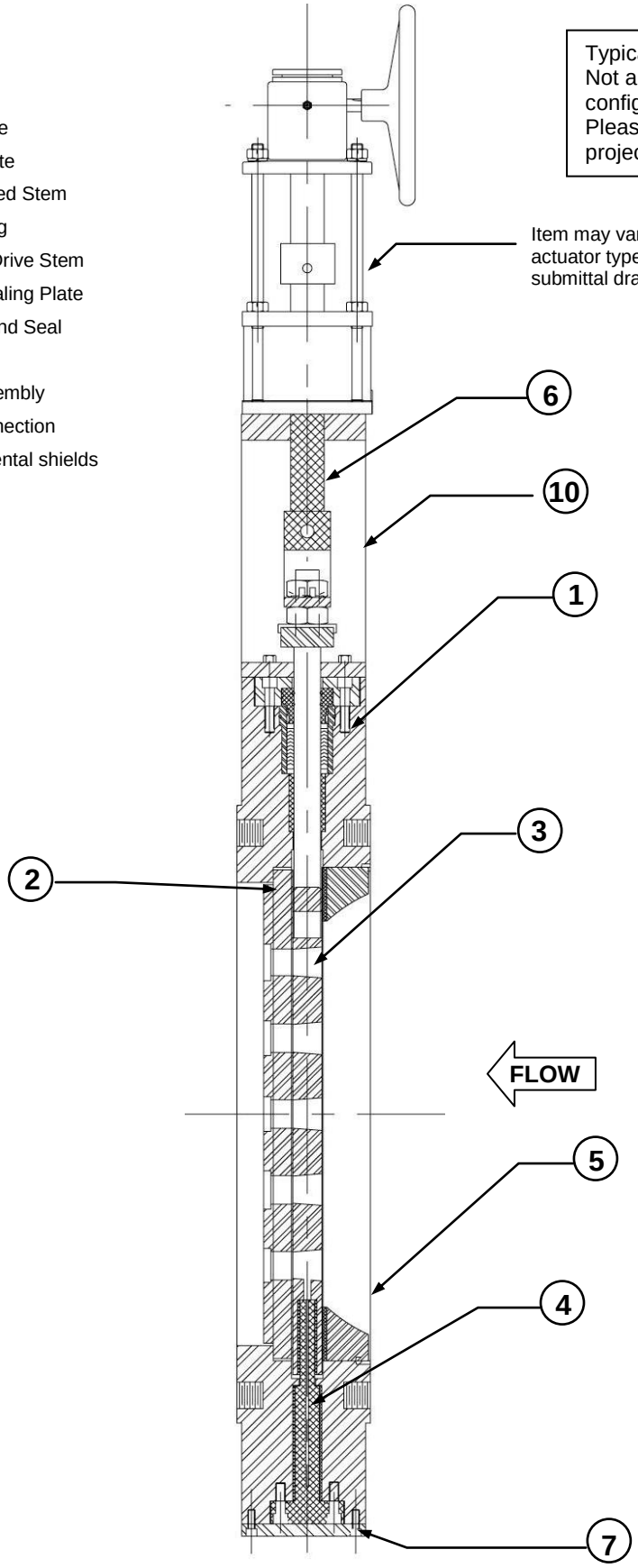


Figure 1

If in doubt consult the factory

2.0 STORAGE RECOMMENDATIONS

2.1 GENERAL STORAGE CONDITIONS

The CCED and its actuating system must be stored protected from corrosive weather, saline atmosphere, dust or moisture. No further special precautions need be taken if storage is not for more than six months. Storage exceeding 6 months – consult factory and provide environmental conditions. The temperature of the place of storage must not be less than –10ºF or exceed 200ºF. Under no circumstances will valve-operating components be used to attach hooks for handling purposes. Special eyebolt lifting holes are provided on the perimeter of body for vertical or horizontal lifting upwards equal to or over 500 mm. Never lift the valve assembly by the actuator or valve yoke bracket. Lifting by the yoke may void warranty.

2.1.1 ELECTRICAL AND ELECTRONIC ACTUATORS

Electrical devices very likely to be attacked by corrosion, and should be placed under leak proof covers. Heated storage is recommended. Refer to the actuator manufacturer's OM&I Manual for proper handling and storage instructions.

2.1.2. PRECAUTIONS TO BE TAKEN BEFORE FITTING THE COVERS

Blank off any orifices in the equipment with cloth or paper to prevent dust from entering any conduits. Replace any temporary plastic conduit inserts to permanent plugs per all codes and local industry standards. Isolate the equipment from vibration due to neighboring machines.

2.1.3 RUBBER-BASED MATERIALS AND SEALS

These are essentially seals to maintaining the sealing integrity of the media from exiting to atmosphere. The presence of ozone in the air will attack seals. The oxidizing action of light, stimulated by sunlight and more particularly by ultra-violet radiation.

The precautions to be taken are as follows:
Store any parts in a cool, closed room.
Blank off any opening in the room in order to keep out any direct sunlight.
If these parts are stored in an open shed, they must be either packed in packing cases, or in opaque plastic covers.
Rubber-based materials must never come into contact with oil, grease or solvents.

2.1.4 SPECIAL STORAGE CONDITIONS

These conditions apply where the equipment is unpacked, assembled and adjusted in accordance with the instructions in this handbook, but have to be kept in that condition for a month or more before being put into use.

a) The equipment must be protected from weather, saline atmospheres, dust and damp. It is therefore advisable to place it under opaque plastic covers.
b) Under no circumstance must the equipment carry any external load, nor act as support for other equipment (piping, valves, various fittings, etc.)
c) The equipment must be protected from any objects that might drop on it and must be isolated from vibration produced by neighbouring machines.

2.1.5 LONG TERM STORAGE

For storage exceeding 6 months, special requirements may be necessary based on environmental factors. Please consult the factory for specific requirements and instructions.

2.2 GENERAL INSTALLATION CONDITIONS

In accordance with the specifications in the order, the CCED valve is intended to be fitted between standard pipe flanges. Flanges must be aligned and plumb on all axis.

a) Check that the valve is installed correctly with respect to the direction of fluid flow arrow. An arrow on both sides of the body shows the correct flow direction; this direction **MUST BE OBSERVED**.
b) Before installing the CCED valve, clean the plates with compressed air. See that the pipes are perfectly clean and especially that there is no material inside them likely to cause serious damage (rust, metal dropped from welds, slag, sand, etc.)
c) Allow for the CCED to be removed at a future date (observe clearances, use sliding joints and unions, etc.) Ensure allowable height to remove actuation.
d) Install the pipes and install their fittings so that the CCED valve does not have to withstand any abnormal forces, due to pipe expansion (circuits carrying hot fluids) or to axial thrust exerted by the fluid (combination of a very high pressure and a large nominal diameter). Both valve flanges (mating) must be equal and parallel.
e) Check that the pipe sections are in line, that the flanges are parallel, that any sliding flanges are working correctly and that the holes in mating flanges coincide.
f) Depending on the kind of water carried, provide a screen, filter or sludge trap upstream of the valve so as to prevent it from jamming or suffering damage to the orifices of the plates.

2.2.1 GASKETS

All valves require full-face gaskets to meet the requirements of the valve and corresponding flange face. Please contact the gasket supplier for verification of the following:

- Compatibility with the media.
- Sizing requirements based on the face dimension of the valve on the upstream and downstream face. Note on some sizes this area or dimension is different.

If ridgid or linebacker type gaskets are used, consult the valve manufacturer prior to ordering, as O-ring placement of this style is non-standard. For all valve sizes ensure the gasket, only, comes in contact with the gasket RMS surfaces of the valve. Gaskets must not protrude into the valve on either the upstream or downstream surfaces.

- Do not preload or apply any pressure on the taper ring

2.2.2 FLANGE BOLT TORQUE

This is a value from the gasket manufacturer and determined based on the gasket material, pipe flange material, thickness, and hardware. Flange bolt torques are not supplied by the valve manufacturer.

2.2.3 POSITION OF CCED VALVE

The CCED valve may be installed either in a horizontal pipe (normal) or vertical pipe carrying a downward flow of liquid. Horizontal valve shaft orientation in horizontal pipe must be requested prior to ordering the valve or releasing to manufacturing. Valves mounted with shafts in the horizontal position may require the actuator to be supported independently.

2.2.4 INSTALLATION OF CCED

When CCED valve is being installed in the pipe, **IT IS ESSENTIAL TO FOLLOW THE SEQUENCE BELOW**:

a) Apply the flange gaskets to the face of the valve.
b) Place the CCED valve between the pipe flanges, ensuring that the gaskets remain in position, as they might be damaged if nipped between the body and the flanges.
c) Allow the valve body to rest on the bottom two through-bolts.
d) See that the actuator is resting on its supporting bracket if the valve body is fitted horizontally.
e) Fit all through-bolts and tighten them without excess. Fit all cap screws at the top and bottom of the valve, both sides, if applicable.
f) Tighten all bolts in cross bolt sequence to prevent body deflection or damage.

This procedure makes it possible to avoid abnormal stresses between valve and actuator. For the same reason, it is essential for the pipeline and supporting bracket to be bolted down to the same foundation block, or for the bracket to be mounted on a sliding support.

2.2.5 COMPONENT FUNCTIONS/ACTUATION

The mounting housing contains a drive coupling and locking nut engaging the actuator shaft in the drive tube. This coupling is used to adjust the position of the plate for the full travel of the linear plate. This design also allows for re-setting to the fully open or closed position with fixed travel stops.

Torque position switches and input signals in the actuator must be set to prevent permanent valve damage.

Electric actuators are provided with travel-limit switches and a torque limit switches, and some designs also have a mechanical position-indicator and/or a valve position feedback potentiometer. DO NOT USE THE MECHANICAL TRAVEL STOP in electric actuators to position the valve actuator assembly.

Valves may incorporate mechanical stops of the valve shafts. Do not exceed the mechanical output of the manual override.

3.0 COMMISSIONING THE VALVE – INITIAL TESTS

3.1 ACTUATOR – *Electric / Hydraulic / Pneumatic / Manual*

Please refer to the actuator's OM&I Manual specific to the model supplied with the valve.

3.2 COMMISSIONING

1) Make sure that the electrical circuit selected meets the following conditions:
   i. Normal stop obtained by travel limit switch. (Electrical)
   ii. Stop by default on tripping of torque limit switch (Warning: short-duration contact).
   iii. Valve must 'NOT' operate electrically if the torque limit switches or travel limit switches are not connected.
   iv. Valve can be operated only in the opposite direction if it stops because of the limit switch travel or torque limit switch.

2) Connect up the electrical circuits to the actuator in accordance with the manufacturer's OMI and the approved drawings.

3) When fitted in our workshops, the actuator has been tested electrically, and the following components have been adjusted: travel limit switches, end-stops, and if the actuator has been fitted with the mechanical position indicator, position potentiometer or transmitter. The manufacturer has adjusted the torque limit switches. Not all actuators may be set at the factory, as electric actuator personnel are required on-site prior to confirm necessary adjustments or calibration.

Specific site commissioning data sheets are available from Pratt. The commissioning sheets are used when installation is complete (supervision recommended). Once installed, dry & wet commissioning sheets are used to verify the installation and operation of the valve based on specific conditions. Please refer to commissioning forms #160310-Rev.3 for Dry and #160311-Rev.3 for Wet.

3.3. FIELD TEST REQUIREMENTS

The following checks and tests are required in the field:

a) Prior to watering up the system, verify the line is free of debris. Verify nothing is obstructing the operation of the valve.
b) Using the manual override, bring the valve manually to the mid-open position. Switch on the actuator and check its direction of rotation with respect to this position. Reverse this direction of rotation at once if it is incorrect (the normal direction is generally shown on the actuator's hand-wheel).
c) Return the valve to the mid position, operate the valve electrically in the "open" direction and check that it stops when the limit switches are deliberately tripped by hand, i.e. the "open" travel limit micro switch, then the "open" torque limit micro switch. In both cases, if the valve does not stop, check the connections to the micro switches.
d) Return to the mid position, and repeat the same tests as above for the "closed" direction and the corresponding micro switches.
e) Operate the valve electrically in the "closed" direction and check by observing the micro switches that the valve stops in the "closed" direction because of the travel limit switch and not the torque limit switch. If not, it is VITAL to adjust the position of the "closed" cam.
f) Repeat this check for the "open" direction and the corresponding micro switches. If they are incorrectly adjusted, it is VITAL to adjust the position of the "open" cam.
g) Note: upward motion is to close the valve. DO NOT over travel the valve or "bottom out" the valve in the open or closed position. The valve is fully open or fully closed without the linear plate coming in contact with any part of the valve body. Ensure the switches trip prior to the external mechanical travel stops contacting the final stop or end stops of the mounting yoke (6) on page 3.
h) Pipe water up should be a slow fill procedure. Do not subject the valve to any transient hydraulic conditions.

If in doubt consult the factory

4.0 GENERAL OPERATING INSTRUCTIONS - MAINTENANCE

4.1 CCED VALVE

The CCED valve has been supplied to you and designed for the service conditions specified when the equipment was ordered and released to production. If some of those flow conditions, installation, media or operation have changed, consult the factory prior to startup. Failure to use the valve in an environment or application that is not designed or intended for will void all warranties and liability.

If an external leak is seen at a pipe flange joint between the body and mating pipe flanges, verify the installation bolt torque is correct and uniform on the Bolt Circle Diameter. Do not exceed the recommended bolt torque. Remove the CCED valve and check the condition of the flange gaskets or RMS finish on the face of the valve. Replace the gaskets if damaged or incorrect.

If leakage observed from the operating stem gland, remove the upper retaining cap seal, check its condition and fit a new seal in the gland if required. Do not attempt to cure the leak by over tightening the gland screw. This is not a live loaded packing system. Depressurize the system when attempting this procedure.

If a leak develops in the lower cap (7) – see Figure 1 on page 3, remove the outer lower cap only and replace the o-ring in (7). **Do not remove the lower shaft (4) or bolts, unless the valve is removed from the pipe.**

4.2 ELECTRIC ACTUATOR

The actuator manufacturer supplies the operating instructions for the actuator with the valve. Follow all manufacturers' instructions as indicated in their OMI.

If the power is disconnected from the actuator through the action of the torque limit switch, it is not advisable to use the manual control, which has a very high step-down ratio, as this might damage the valve if some object has got into one of the holes in the perforated plates and stopped the valve from working.

It is therefore necessary to proceed as follows:

Operate the valve electrically in the opposite direction to that during which the fault appeared, then reverse direction (to confirm the fault).

If the fault is still there, remove the valve from the pipe to verify an object has jammed one of the holes in the perforated plates. If not, contact the factory to have the torque limit switches reset as required and fully inspect the valve.

THE MANUAL CONTROL IS AN EMERGENCY DEVICE, IT MUST THEREFORE ONLY BE USED EXCEPTIONALLY AND WITH GREAT CARE (because of its very high step-down ratio). It is advisable to watch the position indicator on the actuator. To know which way to turn the control, refer to the arrows on its hand-wheel.

4.3 MAINTENANCE

Refer to: Cross-sectional and Isometric drawing attached.

The valve does not require any maintenance. However, it is necessary to check the operation periodically. Hardware should be verified for tightness annually. Perform a complete “close-open” sequence once a month to prevent deposits from forming on the fixed and mobile plates. Also, check the operating stem seal once a month for any external leakage. Condensation may be present and is normal.

Some transmission components require regular-interval lubrication (e.g. rod link and actuator bushing) DO NOT LUBRICATE THE LOWER STEM OR ALLOW LUBRICANTS TO FLOW TO THE PACKING RETAINER (Item #7 on page 15)

For remedial action, in the event of operating trouble you should preferably start by referring to the manufacturer’s trouble-shooting instructions or consult factory.

If the valve is supplied with purge ports or blow down valves, these should be checked monthly if not automated and monitored on a regular basis.

4.4 SPARE PARTS

Flange and yoke O-rings.

Any spares required are those recommended by the manufacturer. Parts not supplied directly by the manufacturer will void the warranty. Substandard quality will have detrimental effects on valve performance.

4.4.1 Caution

For all maintenance, disconnect the air or the hydraulic supply at the actuator, solenoid or controls. Ensure the actuator is purged of air or hydraulic fluid. Disconnect the actuator power supply (electricity, pneumatic or hydraulic couplings, etc.) Remove all power to the actuator/solenoids. If you have not been trained on the operation of this equipment consult factory prior to conduction any type of maintenance.

4.5 DISASSEMBLY – ALL SIZES

In order to dismantle the valve easily, proceed in the following order:

1. The pipe must be drained.
2. Read and follow Section 4.4.1 **(CAUTION)** above.

ACTUATOR

1. Separate the control system from the valve by disconnecting rod link
    i. Hydraulic system: dismantle the coupling nut
    ii. Electrical system; separate the actuator from the nut housing and the latter from the torque housing and withdraw these items from rod link.

VALVE

1. Remove any screws securing the control system to the yoke, if supplied.
2. Remove the valve from the pipeline.
3. Remove screws on the taper ring and remove the ring.
4. Taper ring removal procedure:
    i. There are locking screws located approximately 120º apart around the outside of the taper ring.
    ii. These set screws must be removed prior to lifting out the taper ring.
    iii. Taper ring is removed using the 3-4 tapped hoist ring holes from the flat surface of the taper ring.
    iv. Install the hoist rings. Ensure they are rated for the weight of the taper ring.
    v. Remove the set screws.
    vi. Lift the taper ring with equal vertical and horizontal force.
    vii. The taper ring is located within the valve body by a strip of UHMW plastic around the circumference of the taper ring; this will begin to appear as you lift the taper ring and is retained in a shoulder. Retain this component for re assembly.
    viii. The UHMW surface is bolted to the back of the taper ring and remains in place.
    ix. An NSF lubricant safe for the environment and EPDM must be used to lubricate the components on re assembly.
5. Remove linear plate. Use a magnetic crane.
6. Remove the upper and lower shafts.
7. Remove fixed plate locking screws from fixed plate.
8. Withdraw fixed plate from body by pushing it in the upstream direction.
9. Remove the actuator mounting bracket.
10. Remove screws securing gland body to the yoke, and free the herringbone seal.
11. Unscrew operating stem from rod link and nut.
12. Replaceable Parts : Gaskets
    i. Flange gaskets are the responsibility of the contractor.
    ii. Gaskets material will vary with pressure ratings and material requirements based on the specifications for the application. Consult the specification or refer to the SO number on the valve for reference information.
    iii. An NSF lubricant safe for the environment and EPDM must be used to lubricate the components on re assembly.

13. Replaceable Parts : O-Ring Seals
    i. O-Ring sizes and part numbers are located on the part drawings. O-Rings are sized based on standard Parker “Dash” sized O-Rings.
    ii. O-Ring replacement is recommended when valves are disassembled.
    iii. An NSF lubricant safe for the environment and EPDM must be used to lubricate the components on re assembly.
14. Replaceable Parts : Bushings
    i. These parts are located on the drawings and associated part numbers. Consult the factory for these spare parts.
    ii. Bushing replacement is recommended when valves are disassembled.
    iii. An NSF lubricant safe for the environment and EPDM must be used to lubricate the components on re assembly.

4.6 REASSEMBLING UP TO 500 MM AND OVER

These valves can be assembled normally without major uncertainties if the order of the following steps is observed and the precautions indicated are taken.

1) Use new seals only, treating them very carefully. When fitting them into their housing, smear them lightly with fine NSF approved lubricant.
2) Clean all parts carefully, and replace any which may be defective.
3) Insert the fixed plate in the body. Position it by means of locking screws. Do not tighten the screws fully. Position fixed plate with respect to the holes in moving plate by means of locking plates and screws. Tighten the screws fully.
4) Insert the upper stem into body.
5) Lower the linear plate onto operating stem. Insert the lower stem aligning the lower bushing.
6) Install tape ring and secure it with screws. Check free sliding motion of the moving plate on the fixed plate by moving it with the aid of the operating stem. There is a clearance of about 1 mm between the guard ring and the moving plate.
7) Taper ring installation procedure: Install the hoist rings into the lifting holes in the taper ring located on the face or tapered section of the taper ring. Prior to insertion into the body align the taper ring holes on the perimeter with the linear plate holes. An NSF lubricant safe for the environment and EPDM must be used to lubricate the components on re assembly.
8) Insert O-ring into its seating in lower cap and bolt the lower stem cap in place.
9) Secure the yoke to the valve body stem with the locknut.
10) Adjust the travel limit switches.
11) Adjust the end-stops.
12) Cycle test the valve pressure.

4.7 DIS-ASSEMBLY OF THE UPPER YOKE – *(Refer to page 14 for component detail.)*

1) Disconnect the actuator stem or cylinder shaft (10) from the yoke (8) by removing the c-clips (6) from one end of the yoke pin (7)
2) Remove the yoke pin (7) and shims if installed (14). Unbolt the actuator and remove the actuator from the cylinder mounting stand (11)
3) Remove the yoke lock nut (5) and lockwasher (9) from the stem – remove the yoke (8)
4) Remove the lower nut (5a) and the counter rotating clip (4)

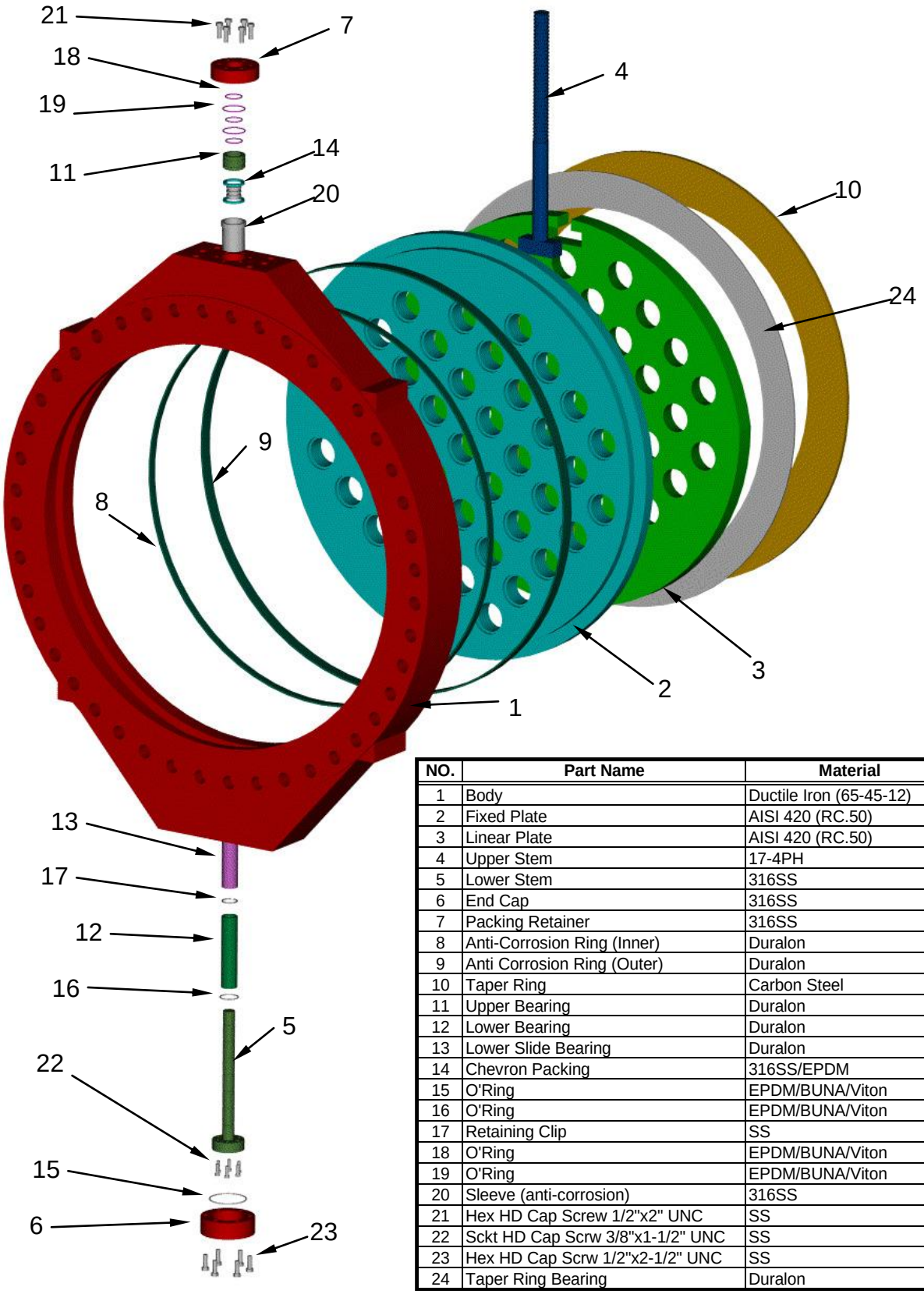
5) Remove counterclockwise the close travel stops (16) and the position indicator pins (17). Remove the position indicator (3) from the valve stem. Note: as you remove the lower nut (5a), the valve stem will drop to a final open position. This is normal.
6) Remove the cylinder mounting stand (11) by removing the mounting bolts (12).

4.8 RE-ASSEMBLY OF THE UPPER YOKE – *(Refer to page 14 for component detail.)*

1) Bolt the cylinder-mounting stand (11) on the top of the valve trunnion. Use Loctite and tighten all bolts (12) in sequence.
2) Insert the position indicator (3) over the valve stem. Insert the lower counter rotating lock washer over the stem. Ensure the tabs are bent downwards towards the valve trunnion.
3) Install the lower lock nut (5a) and tighten so the shoulder of the stem bottoms out on the lock nut. The linear plate will rise to the center of the fully open position.
4) Install the yoke over the valve stem.
5) Insert the lock washer (9), tabs face upwards towards the actuator. Tighten completely. Bend the tabs to contact the flats on the hex nut.
6) Lower the cylinder/actuator stem (10) through the upper hole of the cylinder mounting stand (11) and insert the yoke pin (7) (shim where required)
7) Replace the c-clips (6) on the yoke pin.
8) Bolt the actuator in back to the stand.
9) Manually set the valve in mid open position.
10) Actuate the valve automatically in both directions to ensure the valve stops in either direction prior to the open or closed travel stops (15 & 16) contacting the valve trunnion or the cylinder mounting stand.

Pratt CCED Flow Valve

Valve Parts Break Down

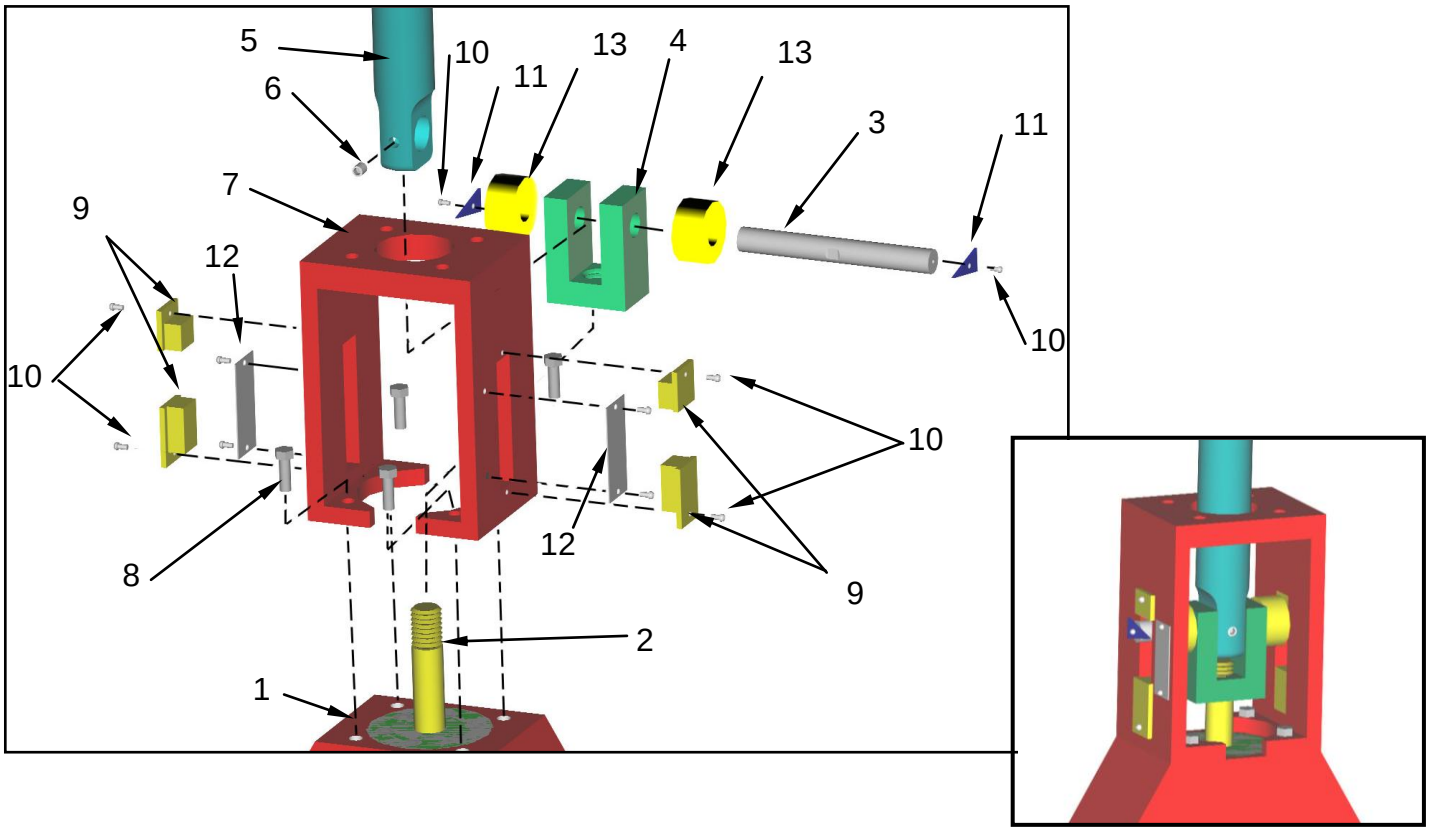


NO.	Part Name	Material	Part Number	QTY
1	Body	Ductile Iron (65-45-12)	IBC-XXXX-010-BO	1
2	Fixed Plate	AISI 420 (RC.50)	IBC-XXXX-020-FP	1
3	Linear Plate	AISI 420 (RC.50)	IBC-XXXX-030-LP	1
4	Upper Stem	17-4PH	IBC-XXXX-040-US	1
5	Lower Stem	316SS	IBC-XXXX-050-LS	1
6	End Cap	316SS	IBC-XXXX-060-EC	1
7	Packing Retainer	316SS	IBC-XXXX-070-PR	1
8	Anti-Corrosion Ring (Inner)	Duralon	IBC-XXXX-080-ACI	1
9	Anti Corrosion Ring (Outer)	Duralon	IBC-XXXX-090-ACO	1
10	Taper Ring	Carbon Steel	IBC-XXXX-100-TR	1
11	Upper Bearing	Duralon	IBC-XXXX-110-UB	1
12	Lower Bearing	Duralon	IBC-XXXX-120-LB	1
13	Lower Slide Bearing	Duralon	IBC-XXXX-130-SB	1
14	Chevron Packing	316SS/EPDM		1
15	O'Ring	EPDM/BUNA/Viton		1
16	O'Ring	EPDM/BUNA/Viton		1
17	Retaining Clip	SS		1
18	O'Ring	EPDM/BUNA/Viton		3
19	O'Ring	EPDM/BUNA/Viton		2
20	Sleeve (anti-corrosion)	316SS		1
21	Hex HD Cap Screw 1/2"x2" UNC	SS		6
22	Sckt HD Cap Scrw 3/8"x1-1/2" UNC	SS		6
23	Hex HD Cap Scrw 1/2"x2-1/2" UNC	SS		6
24	Taper Ring Bearing	Duralon		7

If in doubt consult the factory

Pratt CCED Flow Valve

Top Works Connection



ASSEMBLY VIEW

NO.	Part Name	Material	Part Number	QTY
1	VALVE BODY	DUCTILE IRON (65-45-12)		1
2	UPPER VALVE STEM	316SS		1
3	YOKE PIN/POSITION INDICATOR	17-4PH		1
4	YOKE	CARBON STEEL (EPOXY COATED)		1
5	ACTUATOR SHAFT	316SS		1
6	SET SCREW	316SS		1
7	ACTUATOR MOUNTING STAND	17-4PH		1
8	HEX HEAD CAP SCREWS	316SS		4
9	TRAVEL STOP INSERTS	NAVAL BRONZE		4
10	PAN HEAD CAP SCREWS	316SS		10
11	POSITION INDICATOR ARROW	CARBON STEEL (EPOXY COATED)		2
12	POSITION IND. LBL WITH COVER	ALUM & LEXAN (CLEAR)		2
13	GUIDES	NAVAL BRONZE		2
14				
15				
16				

If in doubt consult the factory