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SAFETY

These instructions contain essential health and safety requirements concerning the safe use of the equipment.

1. For the intended purpose that was specified to Hopkinsons, e.g. location, pressure, temperature, fluid, etc.

2. When installed, operated, maintained, etc. in accordance with these instructions.

Failure to comply with these points in their entirety involves serious risk.

The manufacturer of this valve is:

WEIR VALVES & CONTROLS Ltd,
Britannia House,
Huddersfield Rd, Elland,
West Yorkshire,
HX5 9JR. England.

A nameplate (drawing reference 295) is attached to the valve adaptor plate (238) giving details in accordance with the valve standard to which this valve has been manufactured. It includes details of the manufacturing contract and item number and the valve figure number. The nameplate details should be quoted in their entirety in any correspondence with Weir valves & Controls, for the enquiry of spare parts or other technical information.

Where actuators are employed, A nameplate is also attached to the electric actuator, and similarly all nameplate details should be quoted in any correspondence concerning the actuator. In addition to these instructions, the Operating and Maintenance Instructions for the actuator must be read and fully understood, and must be consulted in any matter relating to the actuator.

Where gearboxes are employed, please refer to the information provided by the gearbox manufacturer.

The following warning/instructions are attached to the valve assembly and must be observed and followed at all times.

SAFETY WARNINGS:
Hot surfaces.
Electrically isolate actuator before adjustment or maintenance to valve.
Valve must be depressurised before adjustment or maintenance.

Please refer to Weir Valves & Controls UK Ltd Publications 'SAFETY WITH VALVES' and 'SAFETY WITH ELECTRIC ACTUATORS' for general principles on installation, operation and maintenance. However, in all cases these Operating and Maintenance Instructions supersede any alternative information that may be given in, for example non-specific catalogues or the above mentioned general safety publications.

At all times the valve must be maintained to a safe condition and any damaged or worn parts must be replaced with the correct parts supplied by Weir Valves & Controls UK Ltd. Users are strongly recommended to avail themselves of the training

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courses that can be provided by Weir Valves & Controls UK Ltd.

We recommend that a record is kept of all work done to this equipment, including its operating history.

DESCRIPTION & USE

The valve is a "parallel slide" valve designed to ANSI B16.34 and may be manually operated through a standard handwheel and/or through a bevel gear operator, or fitted with an electric actuator that provides for either:

1. Electric operation, either by remote control or by locally mounted switches.

2. Hand operation by rotating the hand/auto lever on the actuator whilst turning the handwheel. This will engage the drive and allow the valve to be manually positioned, including "backseating" the valve.

IMPORTANT NOTE - **"Backseating"** on this valve refers to bringing the shoulder on the valve stem against the gland ring in order to reduce or prevent any gland leakage that may in time have developed. This does not allow the replacement of gland packing whilst the valve is under pressure, and in this pressurised condition the gland nuts must not be slackened off. Extreme caution must be observed in approaching a valve to either backseat it or un-backseat it. Backseating and un-backseating must only be performed manually using the handwheel, and extreme force must not be used in backseating the valve. Backseating the valve is achieved by rotating the handwheel anti-clockwise, i.e. in the opening direction, after operating the clutch. Refer to "Manual Operation".

The electric actuator has been sized for the specific operating conditions that the valve has been designed for. The valve will be opened and closed to positions set by limit switches, torque switches are not used to control the normal operation of the valve. The backseated position must not be used as the open stop position for normal operation, as the backseat will not be kept in pristine condition until required. Unauthorised re-setting of the torque switch and limit switch settings must be prevented.

The actuator is designed to close the valve against the specified conditions but its torque switch will stop the actuator if anything should foul the internal parts of the valve and cause the torque switch setting to be exceeded. Extra handwheel effort must not be exerted on the valve or further damage will occur. However, reversing the direction of operation may allow the obstruction to pass through the valve and travel downstream if this is desired.

When any defect in the valve and/or actuator is apparent it should be investigated as soon as practicable

Equally, if a valve is found to leak in its closed position, extra effort must not be applied by the use of the handwheel, and the valve should be attended to at the earliest possible time.

This is a parallel slide valve which does not utilise any 'nip' or extra load at the end of travel to make the valve seal. Any such loading serves only to strain and damage valve components.

Note that the actuator is intended for intermittent operation and continuous repeated opening and closings will eventually cause overheating and electrical components to burn out.
Do not operate unless the actuator covers are in place.

IMPORTANT: *Before operating the valve it must be ascertained that it is safe to do so, i.e. that fluid can be safely passed into the downstream pipework and that fluid can be safely removed from upstream.*

2 ELECTRIC OPERATION

The actuator carries a 3-position selector, which is lockable in any position. The selector should be positioned as follows:

a) Local – For local electric operation using the pushbuttons on the actuator.

b) Off – For preventing the actuator from running and for hand operation.

c) Remote – For remote operation of the actuator.

a) For local operation the actuator is controlled by the open and close switch. The position of the valve will be indicated by a red light for open and a green light for closed. In mid-travel a yellow light will illuminate. Also a LCD position indicator shows either "open" or "closed" symbols or percentage open throughout the valve travel regardless of selector position. EMERGENCY STOP is by rotating the red stop switch. If the selector has

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been turned to "off", it must be returned to “local” before the actuator will respond to any further push-button operation.

b) The “off” position for the selector should be chosen for hand operation, as this will prevent inadvertent remote operation of the actuator (if the selector was set for "remote") or accidental local operation of the actuator should a switch be rotated (whilst the selector is set for "local"). See Manual operation below for details of hand operation. Whilst the "off" position prevents the actuator from running, it should be isolated elsewhere when necessary. The indicator lamps continue to indicate valve position whilst selector is in the "off" position unless the electric supply has been isolated elsewhere.

c) When the selector is in the “remote” position, operation of the actuator is carried out from the remote station. However, the actuator may still be stopped by rotating the stop switch, although return of the stop switch will permit further remote commands to be executed. Leaving the selector “off” will prevent further remote commands being executed. The indicator lamps will indicate valve position provided the electric supply has not been isolated elsewhere.

MANUAL OPERATION – ELECTRIC ACTUATOR

Manual operation of the valve is permissible after firstly turning the actuator switch to "off" and then engaging the handwheel clutch mechanism. The handwheel may then be turned clockwise to shut the valve, or anti-clockwise to open the valve. To backseat the valve, hand operation must be adopted by further turning the handwheel anti-clockwise from the shut position. Do not use extreme force or handwheel "keys" for any position.

The handwheel clutch mechanism is operated by a lever on the side of the actuator. The lever should be rotated through approximately 90°, and the handwheel turned. The clutch might not engage straight away and the clutch lever should be held towards the "hand" position until the handwheel is felt to take up the drive and the valve stem begins to move. The engaged clutch lever can then be released, as the drive will remain engaged.

The position of the valve will be indicated by the mechanical position indicator.

The handwheel drive automatically disengages itself on starting the electric motor and will not be rotated by the actuator motor.

MANUAL OPERATION – STANDARD HANDWHEEL

Rotating the handwheel clockwise will shut the valve and anti-clockwise will open the valve. No form of engagement is necessary, unless some form of locking facility is provided. Do not use extreme force or keys for any position. To backseat the valve, turn the handwheel anti-clockwise for the shut position.

MANUAL OPERATION – BEVEL GEAR OPERATOR

Operating principle is the same as above. The bevel gear operators are sized to suit the valve operating parameters, so to reduce the necessary operating effort being applied at the handwheel.

BYPASS VALVES

Large high pressure isolation valves are usually equipped with a bypass valve. The bypass is operated in the conventional manner, i.e. the handwheel may then be turned clockwise to shut the valve, or anti-clockwise to open the valve. To backseat the valve, further turn the handwheel anti-clockwise from the open position. Do not use extreme force or handwheel "keys" for any position.

The position of the valve will be indicated by the stem guide and the index on the valve pillars.

Bypass valves can also be actuator operated if required.

SEQUENCE OF OPERATION

From the closed positions, open the bypass valve to pass any condensate and allow the downstream pipework to warm up. This also helps to equalise the pressure and make the main valve easier to operate. This is important for hand operation of the main valve. When the downstream pipework has been warmed up and drained, the main valve can be operated. To close, close the main valve, then close the bypass if required. The bypass valve should be closed during long periods of running and opened up just before the closing down procedure.

Refer to Page 5 of this manual for important note on Intergate Overpressurisation.

INSTALLATION AND COMMISSIONING

INSTALLATION

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The valve must be positioned so that the handwheel etc. is easy to operate from a safe position. It is the users responsibility to provide a safe working area with adequate lighting and an unobstructed access, and that the position indicator is easily visible. The valve and actuator or gearbox must be suitably protected against falling objects, including rain etc., and must not be used for any purpose for which it was not designed e.g. it must not be used for standing on, securing scaffolding, welding earth return, etc.

Before installing, make sure all the protection has been removed from the valve and inspect it for any damage which might have occurred during either transit or handing. Ensure the pipework into which the valve is to be fixed is square and adequately supported and that it is clean and rust free with no debris which could affect subsequent valve operation. Use suitable lifting gear to support the valve for installing.

Install the valve into the pipeline using approved procedures.

Wire up the electrical supply to the actuator with adequately sized cable (not in Weir Valves & Controls UK Ltd supply) taking care to allow for sufficient free movement of the valve through pipe deflections, thermal expansions etc. Using only approved electrical practices ensure phases are correct and the valve runs in the correct direction. Before first running the valve electrically, position the valve at mid-travel by hand, then operate electrically, but be prepared to stop the actuator immediately by pressing the stop button if it runs in the wrong direction. Take appropriate action if the motor runs in the wrong direction.

Check that the actuator stops at the appropriate places i.e. that the run-down of the actuator stops before the valve backseats in the opening direction, and before the belt guide reaches the shoulders of the pillars in the closing direction. If it is required to alter any of the actuator settings, refer to the actuator information included with these instructions.

Once installed, the system must only be operated so that the valve assembly is not exposed to excess operating conditions, water hammer, water freezing, corrosion or abuse in any way whatsoever.

NOTE: *If the equipment is not to be installed immediately, it must be stored under suitable conditions to ensure that no deterioration takes place.*

COMMISSIONING

The valve should be thermally insulated - "lagged" - to protect operators when the valve is hot, and also as an aid to reducing noise and conserving energy. Such insulation may be fitted during or after commissioning providing adequate safety measures are taken to prevent hazards from a hot valve.

Commissioning involves testing the valve and the system that it is in (e.g. hydraulic testing of the pipe to valve connections, the correct remote operation of the valve, etc.), and then equipping the valve for the start of its operational life (e.g. charging up the system to the valve). During commissioning, it is sometimes necessary to bypass interlocks or safeguards on equipment in order to simulate meaningful commissioning trials. Under these circumstances, the utmost care must be exercised. As Weir Valves & Controls UK Ltd. has not been informed of any procedure which will either interfere with this valve in order to test other plant, or to interfere with other equipment to test this valve, it is the responsibility of the user to ensure the total safety of persons and equipment.

The following items may require to be attended to during commissioning, and it must be recognised that their mention here is on the strict understanding that measures will be taken to prevent any risk.

CHEMICAL CLEANING OF PIPELINES

If chemical cleaning has to be undertaken, ensure the chemicals are compatible with the materials in the valve. It is important to ensure that any chemicals used in this operation do not soak into the gland packing where they could promote corrosion of the valve stem and/or deterioration of the packing. For this reason, it is recommended that the valve is first pressurised with water to "saturate" the gland packing, operating the valve at the same time to promote this, and leaving the valve in the half-open position. Proceed with the chemical cleaning and passivation. Then with water in the valve, operate it several times to flush away any chemicals that may have penetrated the gland packing.

HYDRAULIC TESTING

Test only up to the maximum hydraulic test pressure for the valve rating. At shell test pressure the actuator is not designed to close the valve and also the gland packing is permitted to leak at this

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pressure. Check for other leaks, e.g. at valve to pipe flanges.

Use corrosion inhibited water for testing.

NOTE: *Shell test pressure is 1.5 times the "cold rating pressure" stated on the valve nameplate.*

ELECTRICAL TESTING/FUNCTIONAL TESTING

Carry out full electrical testing and functional testing including earth continuity checks and ensure everything is working correctly. Isolate electrically before removing actuator covers.

PREPARATION FOR OPERATION

Ensure that the actuator covers are secure with no possible ingress of water, moisture etc.

Set the valve in the position required for starting up the plant after bleeding through or draining as required any fluid appropriate to the commencement of operation.

Note that when the valve enters full and proper operation this may be the first time that the valve and actuator are subjected to the most arduous combination of conditions e.g. flow, temperature (including ambient temperature), pressure, operating loads, full load current on the actuator etc. It is therefore important that the valve is seen to operate correctly not only during "commissioning", but also when the valve has entered "operation". The same is true if the valve should be subjected to any changed conditions of operation.

COMMISSIONING AND OPERATIONAL PRECAUTIONS

In certain circumstances, it is possible that the valve is operated more frequently during commissioning than that which occurs during normal operation. Routine maintenance, overhaul, lubrication etc. may therefore still be necessary and it should not be assumed that these can be neglected during commissioning and early operation.

Internal damage to the valve can also occur during this period as weld spatter, pipe scale, debris etc. is still finding its way through the system pipework. Care should be taken to ensure that no damage is done to the valve during such times.

IMPORTANT NOTE: INTERGATE OVERPRESSURISATION

All double seated valves like parallel slide valves and wedge gate valves can be subjected to a series of events, which causes over pressurisation of the intergate space. Such over pressurisation can be extremely damaging to valve components and must be avoided by strict operational procedures or else by the valve having a dedicated design feature like a balance pipe.

Over pressurisation is caused when the intergate space contains some, or all liquid and is then subjected to heat. The expansion of the liquid causes extremely high pressures to be generated when this cavity is perfectly sealed.

The problem is prevented by bleeding away the pressure before it builds up, either by opening the valve or by having a balance pipe as a design feature. Balance pipes are entirely automatic in their operation.

An example of this problem is when after a hydraulic test steam is put on one side of the valve. The conducted heat causes the water to expand and this can produce conditions many times in excess of the valve rating. This is simply one example of many - various codes warn about exposure to solar heating for instance.

ROUTINE MAINTENANCE

The valve requires little routine maintenance. However, the valve should be inspected regularly, preferably whilst it is operating, to check for gland leakage, loose fasteners, signs of seat wear or leakage etc., so that timely rectification work can be arranged. This inspection can also determine if additional lubrication is required where the valve stem screws into the actuator drive sleeve/handwheel drive sleeve.

The frequency of this inspection depends on the amount of use received by the valve, and thus it is recommended that a suitable inspection interval be taken as say six months, and that this interval is adjusted as necessary in the light of site experience.

Take care when approaching a valve, particularly if it is seen to be leaking at the gland, or if the valve has been backseated. Refer Section 2 for details on backseating.

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If the gland has been leaking then depressurise the system, isolate the actuator, and tighten the gland nuts. Glands benefit from early attention to stop

leakage, or else a path through the gland packing will be cut which cannot be remedied by simply re-tightening the gland nuts.
The gland nuts must not be over-tightened! Reconnect the electric supply, and re pressurise the system to test for gland leakage. If re-tightening the gland has not made it leak-tight then overhaul the valve in accordance with pages 6 and 7 dismantling and assembly is required. Temporarily it may be possible to operate the valve in its backseated position in order to minimise gland leakage.

To re-lubricate the stem thread make sure the valve is safe to work on, that the system is depressurised and that the electric supply to any actuator has been isolated. Apply one of the recommended lubricants (refer to Publication IOM- G3-R0) to the exposed part of the spindle thread. Engage the actuator handwheel (refer to Section 2.2 if further details are needed) and operate the valve in order to work the lubricant into the actuator drive sleeve. Return the valve to the required position and return it to service. (Note: small manual valves have a grease nipple that lubricates bridge bearings and the valve stem. Do no over-pack with lubricant.

IMPORTANT: After any maintenance ensure the actuator covers are properly in place before the valve is returned to service.

Refer to the actuator manufacturers recommendation for routine maintenance of the actuator.

DISMANTLING

These valves have been designed for quick and easy maintenance, and no special tools are required to dismantle them.

Before any dismantling work, ensure that the equipment is safe to work on, that the system has been depressurised and drained and that the actuator has been electrically isolated. Ensure all site safety regulations, permit systems etc., are complied with, and take care if handrails or flooring has to be removed to gain access to the valve. Ensure adequate lighting and lifting facilities are available. Refer to the arrangement drawing for the valve. (figure 2)

DISMANTLE VALVE

1.Use the handwheel to open the valve. Support the actuator where fitted.

2. Remove capscrews (654) which secure the actuator or the gearbox to the adaptor plate (238). On other valves, remove the fasteners holding the pillars to the bridge. Turn the handwheel in a "Closing", clockwise direction, simultaneously drawing away from the valve.

Actuators: When the actuator disengages from the end of the stem thread do not turn the handwheel any further as this will simplify replacement (i.e. in the re-setting of limit switches). Place actuator in a safe position, taking care not to strain the actuator cables. If necessary, disconnect the electric cables.

Handwheel: On handwheel assemblies, there is normally no need to dismantle this unless it is damaged.

3. Valves with split stem guides. Remove the nuts and bolts (527) and (565) from the stem guide (11), remove stem guide and stem guide key (57).

4. Remove adaptor plate (238) and pillars (8). (Actuator and gearbox operators).

5. Remove pillars (8). (Handwheel valves without gearboxes).

6. Valves without split stem guides. Remove grubscrew (57) and unscrew stem guide nut (18). Note the position of the stem guide (11) for subsequent replacement. Remove stem guide cotter (97) and stem guide key (59) then unscrew the stem guide (11).

7. Remove gland stud nuts (522) in order to remove gland assembly, the gland (12), the gland cover (994), the gland cleaning ring (2058).

8. Match mark cover (Ref 200) and body (Ref 1) so that on reassembly, the correct location is assured.

9. Remove jacking stud nuts and distance pieces.

10. Remove cover (200).

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NOTE: It is not necessary to remove jacking screws unless part is damaged or needs replacing.

11. With a soft faced hammer, tap the bonnet (Ref 2) so that it drops sufficiently inside the body (Ref 1) to release the segments of the locking ring (Ref 926).

Take care not to bruise any surfaces.

12. Remove the segmental locking ring (Ref 926)

NOTE: If the segmental locking ring (Ref 926) is not loose, light tapping with hammer and soft metal drift will soon achieve this.

The master segment with parallel sides should be removed first.

13. Lift stem (Ref 9) until discs (Ref 26) are in the 'Lap' position, then fit disc clamp across discs (Ref 26) and compress them.
See Figure 1.

14. Carefully lift stem (Ref 9), belt eye (Ref 22), bonnet (Ref 2) and discs (Ref 26) clear of body (Ref 1) and onto transporting trolley. Remove sling.

15. Transport all removed parts to workshop.

CAUTION: *Discs will be free to drop once they are withdrawn from the seat space. Be prepared to take hold of the two discs and the disc spring to avoid them being damaged.*

On valve sizes 150 mm and above,

Clamp the discs together as shown in Fig. 1. Bend back the tab washers and unscrew the disc holder setscrews (68). Then release the disc clamp.

Alternatively if the disc holder (29) has pins fitted knock the two pins out using a drift.

IMPORTANT: Note the relative position of the stem, and ensure the stem is replaced with the same orientation.

N.B. If repacking is required remove stem/belt from lid to enable the old gland packing to be removed easier.

TO REMOVE ACTUATOR WITHOUT DISMANTLING VALVE

Follow Items 1 and 2 detailed in Clause 5.1 above.

EXAMINATION AND COURSE OF ACTION

Carefully clean and examine all parts for damage, wear, corrosion etc. and replace or renovate all parts as necessary.

The valve discs, seat and backseat should all be lapped independently. The valve disc may, if required, be machined in a lathe prior to lapping if there are severe wear marks. If the discs are machined, it is most important that the smooth radii on the inside and outside diameters of the seating face are replaced. The minimum amount of metal (not exceeding 1 mm in the life of the valve) should be removed from the face of the disc. Information on lapping the seating faces is given in Publication Maintenance of Valves and Seats. The maximum amount recommended to be removed from any sealing face is 1 mm.

If a large amount of material is lapped off any of the sealing faces, or if the valve discs are machined, then the locating face for the disc clip must also be machined. This is to ensure that the disc clip does not hold in the discs and stop them from touching the seats. Therefore, an equal amount should be taken off the back face of the clip retaining flange of the disc, as is taken off the (combined) seat and disc. If it is required to check this dimension, or when new discs are fitted, the distance across the disc faces when held in the clip, should be 2 mm greater than the distance between the seats, i.e. 1 mm per side.

For details concerning the actuator, refer to the actuator information.

Where a gearbox is fitted refer to Publication IOM-G4-R0..

ASSEMBLY

1. Remove protective cover from valve body (Ref 1) and ensure body jointing surfaces and internals are still clean and free from debris.

2. Re-assemble belt rings, disc spring and discs (Ref 26) to belt eye (Ref 22). Fit disc clamp over the centre of the discs (Ref 26) as shown in Figure 1 and re-assemble disc holder (29).

3. Fit stem guide temporary to stem (Ref 9). Attach sling and carefully lift stem (Ref 9) and disc assembly and lower into position until discs (Ref 26)

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are between seats (Ref 25) then remove disc clamp.

4. Lower stem (Ref 9) until discs (Ref 26) are in 'Valve closed' position then remove sling and stem guide.

5. Slide bonnet (Ref 2) over valve stem (Ref 9) and engage into body (Ref 1). Continue lowering bonnet (Ref 2) until it locates on shoulder in the valve body (Ref 1).

6. Carefully position the new gasket (Ref 430) and holding ring (Ref 424) ensuring they are square in the bore.

7. Replace segmental locking ring (Ref 926). The master segment with parallel sides should be installed last.

8. Replace cover plate (Ref 200), jacking studs (Ref 443) if they have been removed from bonnet (Ref 2) during dismantling.

Replace distance pieces and jacking stud nuts

Tighten jacking screw nuts systematically to ensure that the gasket (Ref 430), locking ring (Ref 926) and bonnet (Ref 2) are evenly and squarely pulled up to the load bearing shoulder in the body.

Note: *This part of the re-assembly procedure is by far the most important as damage to the gasket or surfaces at this point can undo all previous work.*

9. Slide bottom packing block (Ref 61) over stem (Ref 9) and into stuffing box and tamp it in with a tubular ram. This ram should preferably be of brass or any other soft alloy so as to prevent damage to stuffing box or stem (Ref 9).

10. Slide new packing rings (Ref 921) into stuffing box, firmly tamping down each one in turn.

11. Enter top packing block (Ref 61) into stuffing box and firmly tamp down.

12. Fit gland follower (Ref 12) over stem (Ref 9) and enter into top of stuffing box, ensuring it is square to

13. bonnet (Ref 2) top and that valve stem (Ref 9) is central in stuffing box.

14. Fit gland plate (Ref 718), correct way up, over gland studs (Ref 15) and onto gland follower (Ref 12), ensuring it is central on follower and parallel to bonnet (Ref 2) top.

15. Tighten the gland nuts (Ref 522) progressively and evenly until they are all tightened. Ensure gland plate is still parallel and square.

16. Attach lifting bolts to cover (Ref 200) and lift into position on body (Ref 1), taking care not to damage valve stem (Ref 9). Confirm match marks are correctly aligned.

17. Secure cover (Ref 200) to body (Ref 1) with stud nuts progressively tightened to a final torque determined by reference to section 1.3.7.

17. Remove sling and lifting bolts from cover (Ref 200).

18. Fit stem guide key into stem keyway then fit stem guide and replace belt guide nut

19. Replace pillars taking care not to cause damage to the guide bushes.

20. When refitting the actuator, offer it up to the bare end of the stem thread. The stem may be lubricated with grease at this point (refer to Weir Valves & Controls UK Ltd publication: IOM P3 R0). Rotate the actuator handwheel anti-clockwise to engage it on the stem. Provided the actuator is engaged in exactly the same relation to the stem, then its limit switches will not require resetting, but must be checked to confirm this.

Complete the refitting of the valve. Instigate safe conditions to hydraulically test the valve and adjust the gland packing to be leak-tight at pressures up to 1.1 times the designed operating pressure. It may be beneficial to check the operation of the actuator by reference to the position of the stem guide (11) before replacing the actuator covers. Replace the covers before operating the actuator electrically. When complete make a complete check of the operation of the valve and actuator (refer to Section 3 on Installation and Commissioning). Take care whilst actuator covers are open.

Reinstate the job-site to safe working conditions e.g. remove lifting tackle, replace flooring, handrails, etc. cancel permits.

For actuator assembly checking and re-setting refer to the actuator information.

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For faults not specifically covered, e.g. "blown" fuses, follow the accepted safe methods of investigation and rectification.

IF IN DOUBT ASK!

Consult Weir Valve & Controls Ltd if anything is not clear. Safe working practices must prevail at all times.

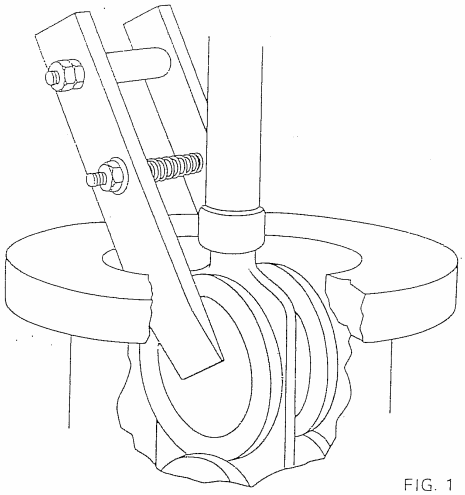

FIG. 1

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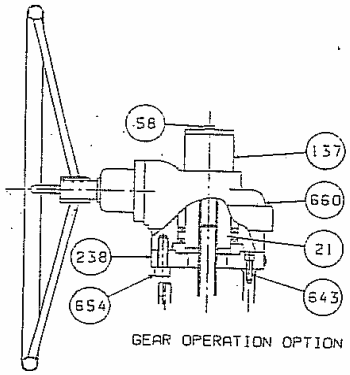
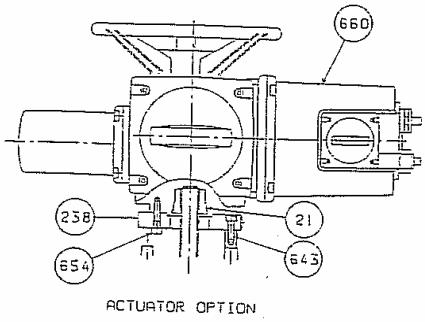
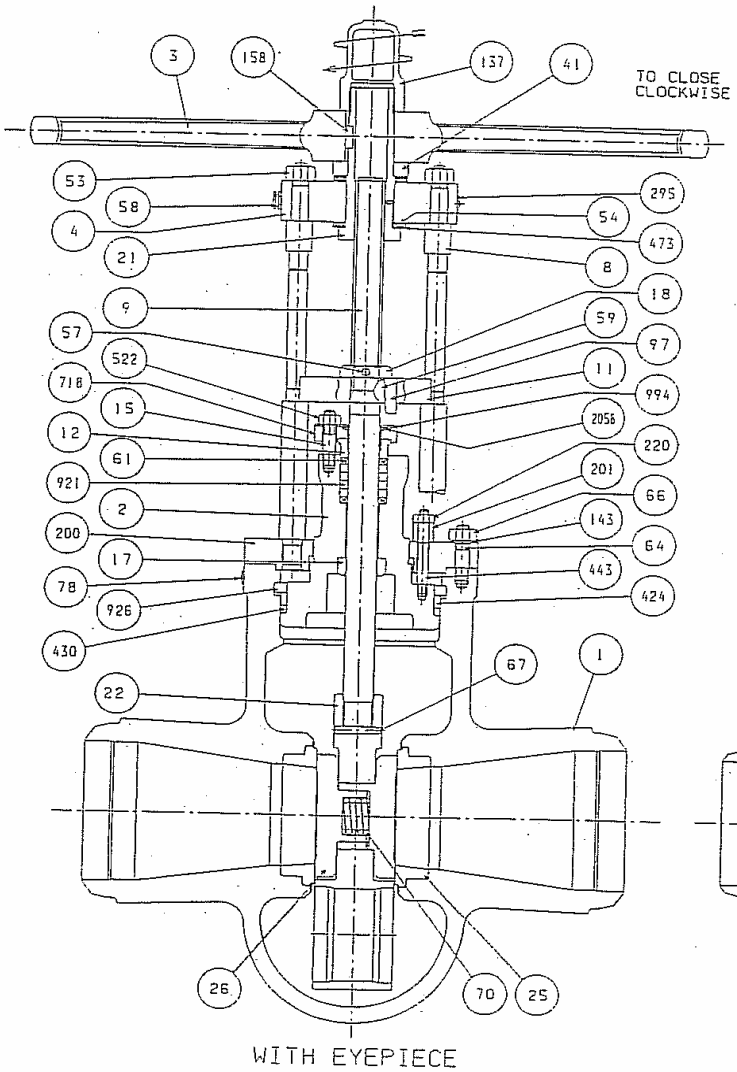


GEAR OPERATION OPTION

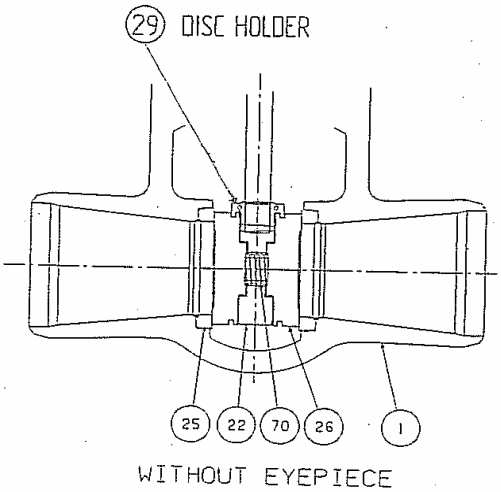


ACTUATOR OPTION

REF	NAME OF PART
1	BODY
2	BONNET
3	HANDWHEEL
4	BRIDGE
8	PILLAR
9	STEM
11	STEM GUIDE
12	GLAND FOLLOWER
15	GLAND STUD
17	BONNET BUSH
18	STEM GUIDE NUT
21	SLEEVE
22	BELT EYE
25	SEAT
26	DISC(MALE & FEMALE)
41	DISTANCE PIECE
53	PILLAR NUT
54	NEEDLE BEARING
57	GRUBSCREW
58	LUBRICATOR
59	STEM GUIDE KEY
61	PACKING BLOCK
64	COVER STUD
66	COVER STUD NUT
67	TAPER PIN
70	DISC SPRING
97	STEM GUIDE COTTER
137	CAP NUT
143	COVER STUD WASHER
158	SLEEVE KEY
200	COVER
201	DISTANCE PIECE
220	JACKING SCREW NUT
238	ADAPTOR PLATE
295	IDENTIFICATION PLATE
424	HOLDING RING
430	GASKET
443	JACKING SCREW
473	THRUST WASHER
522	GLAND STUD NUT
643	CAPSCREW
654	CAPSCREW (ACTUATOR)
660	ACTUATOR/GEAR OPERATOR
718	GLAND PLATE
921	PACKING RING
926	LOCKING RING
994	GLAND COVER
2058	CLEANING RING



WITH EYEPIECE



WITHOUT EYEPIECE

FIGURE 2

TYPICAL PRESSURE SEAL BONNET PARALLEL SLIDE VALVE

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