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CATA-DYNE™ HEATER

STANDARD HEATER APPLICATIONS

INSTALLATION & OPERATION INSTRUCTIONS THERMAL SYSTEMS DIVISION CANADA



ISO 9002 REGISTERED QUALITY SYSTEM

The Cata-Dyne™ heater can be used in all industrial indoor locations where a source of infrared radiant heat is required, providing adequate ventilation is available.

CERTIFICATION

The model "WX" Series Cata-Dyne™ Explosion-proof, flameless infrared catalytic gas heater is certified by the Canadian Standards Association (CSA)/Canadian Gas Association (CGA) for use in Class I, Divisions 1 and 2, Group D hazardous locations and by Factory Mutual Global (FM), for use in Class I, Division 1, Group D hazardous locations, temperature code T2C at an ambient temperature of 40°C (104°F).

The model "BX" Series "G" heater is certified by VCGA and FM for use in ordinary locations. Models listed are certified for industrial use only, for either natural gas or propane gas. CCI Thermal maintains an ISO-9002 registered quality management system at its Edmonton location.

INSTALLATION

To ensure maximum efficiency of your Cata-Dyne™ heater, it should be installed with the heating surface positioned plus or minus 45° from the vertical plane at a height of no more than 8 ft (2.44m). All heaters must be installed in accordance with the latest revisions of the Canadian Electrical Code, CAN/CGA-B149.1, the Natural Gas Installation Code and/or CAN/CGA-B149.2, the Propane Installation Code and/or any local codes and regulations. Before installing the heater, all information on the heater nameplate must be carefully reviewed. The nameplate lists all the fuel and electrical requirements for the heater.

Cata-Dyne™ Heater - Models Available

Model	BTU/h	kW	Model	BTU/h	kW
WX 6x6	1,000 BTU/h	0.293 kW	BX 6x6	1,500 BTU/h	0.4 kW
WX 6x12	2,000 BTU/h	0.586 kW	BX 6x12	3,000 BTU/h	0.9 kW
WX 8x8	1,778 BTU/h	0.521 kW	BX 8x8	3,500 BTU/h	1.0 kW
WX 6x24	4,000 BTU/h	1.171 kW	BX 6x24	6,000 BTU/h	1.8 kW
WX 10x12	3,333 BTU/h	0.976 kW	BX 10x12	5,000 BTU/h	1.5 kW
WX 12x12	4,000 BTU/h	1.171 kW	BX 12x12	6,000 BTU/h	1.8 kW
WX 12x24	8,000 BTU/h	2.343 kW	BX 12x24	12,000 BTU/h	3.5 kW
WX 12x36	12,000 BTU/h	3.514 kW	BX 12x36	18,000 BTU/h	5.3 kW
WX 12x48	16,000 BTU/h	4.686 kW	BX 12x48	24,000 BTU/h	7.0 kW
WX 12x60	20,000 BTU/h	5.857 kW	BX 12x60	30,000 BTU/h	8.8 kW
WX 12x72	24,000 BTU/h	7.029 kW	BX 12x72	36,000 BTU/h	10.5 kW
WX 18x24	12,000 BTU/h	3.514 kW	BX 18x24	18,000 BTU/h	5.3 kW
WX 18x30	15,000 BTU/h	4.393 kW	BX 18x30	22,500 BTU/h	6.6 kW
WX 18x36	18,000 BTU/h	5.272 kW	BX 18x36	27,000 BTU/h	7.9 kW
WX 18x48	24,000 BTU/h	7.029 kW	BX 18x48	36,000 BTU/h	10.5 kW
WX 18x60	30,000 BTU/h	8.786 kW	BX 18x60	45,000 BTU/h	13.2 kW
WX 18x72	36,000 BTU/h	10.543 kW	BX 18x72	54,000 BTU/h	15.8 kW
WX 24x24	16,000 BTU/h	4.686 kW	BX 24x24	24,000 BTU/h	7.0 kW
WX 24x30	20,000 BTU/h	5.857 kW	BX 24x30	30,000 BTU/h	8.8 kW
WX 24x36	24,000 BTU/h	7.029 kW	BX 24x36	36,000 BTU/h	10.5 kW
WX 24x48	32,000 BTU/h	9.372 kW	BX 24x48	48,000 BTU/h	14.1 kW
WX 24x60	40,000 BTU/h	11.715 kW	BX 24x60	60,000 BTU/h	17.5 kW
WX 24x72	48,000 BTU/h	14.058 kW	BX 24x72	72,000 BTU/h	21.0 kW

Model "WX" Series Heaters are certified for use in Class I, Division 1 and 2, Group D hazardous locations by both FM and CSA/CGA

Model "BX" Series Heaters are certified for use in Class I, Division 2, Group D hazardous locations by FM and for Class I, Division 1 and 2, Group D hazardous locations by CSA/CGA

The "WX" Series Cata-Dyne™ features an improved efficiency catalyst pad that requires 1/3 less fuel to generate the same heat value as our "BX" Series Cata-Dyne™ heater.



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SPECIFICATIONS

Clearances

Appropriate clearances from the heating surface must be observed during the installation of the Cata-Dyne™ heaters (See Figure 1).

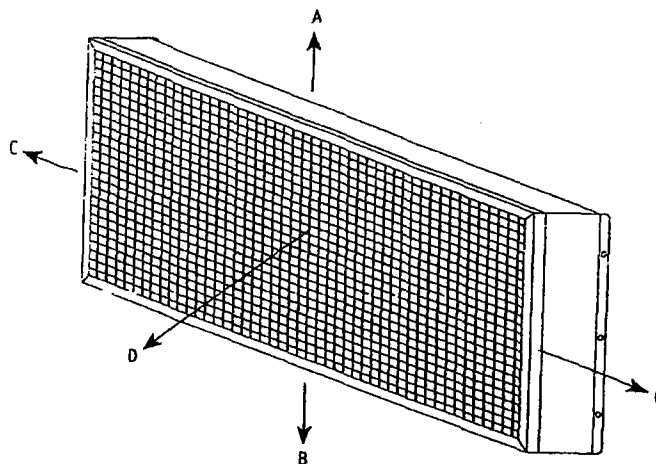
Fuels

The Cata-Dyne™ flameless gas heater is designed to operate on clean, dry natural or propane gas as specified on the heater nameplate.

Natural Gas—these heaters are designed to use natural gas (1000 BTU/ft³, 37 mJ/m³) at 7 in w.c. (1.73 kPa), 4.5 in w.c. (1.12 kPa), or 3.5 in w.c. (0.86 kPa).

Propane—these heaters are designed to use propane gas (2500 BTU/ft³, 88 mJ/m³) at 11 in w.c. (2.72 kPa).

FIGURE 1



	Radiant Surface			Sides	Top			Bottom		
Radiant Surface Position	Heaters Up To 12,000 BTU/h	Over 12,000 Up To 48,000 BTU/h	Over 48,000 Up To 72,000 BTU/h	All Heaters Up To 72,000 BTU/h	Heaters Up To 12,000 BTU/h	Over 12,000 Up To 48,000 BTU/h	Over 48,000 Up To 72,000 BTU/h	Heaters Up To 12,000 BTU/h	Over 12,000 Up To 48,000 BTU/h	Over 48,000 Up To 72,000 BTU/h
Vertical (0°)	28 in	42 in	60 in	12 in	18 in	18 in	42 in	7 in	12 in	18 in
0-45° up	28 in	42 in	60 in	12 in	18 in	32 in	54 in	0 in	12 in	18 in
0-45° down	28 in	42 in	60 in	12 in	18 in	18 in	18 in	22 in	24 in	42 in

Piping

1. A main shut-off valve must be installed upstream of all auxiliary heater controls.
2. The 100% safety shut-off valve and appliance regulator (natural gas heaters only) must be installed in the upright position.
3. The thermostatic temperature controller should be installed with the dial shaft in the horizontal position.
4. The maximum inlet pressure to the 100% safety shut-off valve, thermostatic temperature controller and appliance regulator is 1/2 psi (3.4 kPa). If the inlet pressure is higher than this, a low pressure regulator must be installed upstream of these components.
5. The maximum inlet pressure to the low pressure regulator is 250 psi (1.7 MPa). If the inlet pressure is higher than this, a high pressure regulator must be installed upstream.
6. All components should be installed as indicated in Figure 2.

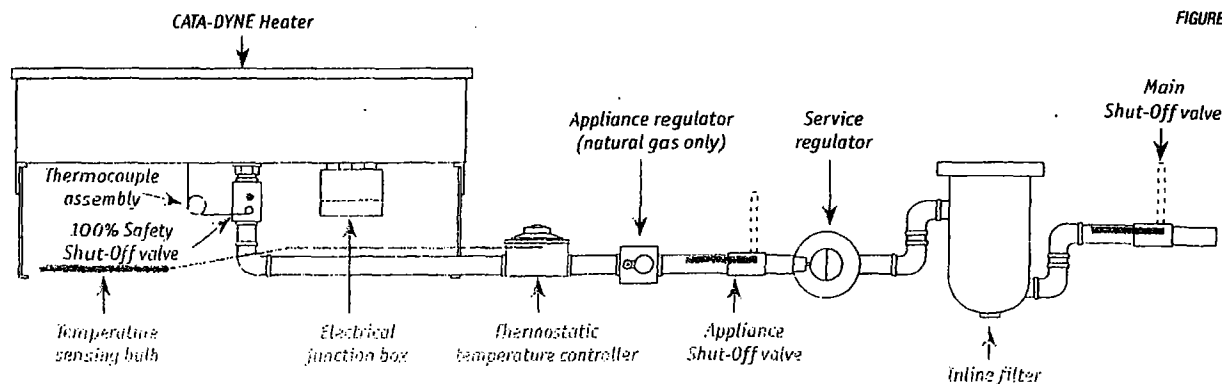


FIGURE 2

OPERATION

All Cata-Dyne™ heaters are supplied with a Safety Shut-Off Valve (SSOV)/Thermocouple assembly to ensure the safe operation of the heater. Under no circumstances should the reset button be held or locked into the depressed position by use of a mechanical restraint. A tamper resistant model SSOV is available if desired.

Start-up

1. Ensure the heater has been installed according to all instructions and relevant codes.
2. Turn on the main gas supply to the system.
3. If the heater is equipped with a thermostatic temperature controller, rotate the dial completely clockwise to the fully open position.
4. Turn on the power to the electrical elements.
5. After 15 minutes, depress the reset button on the top of the 100% safety shut-off valve. The button should return to the original position and internally open the valve and allow gas to flow to the heater. If the valve does not stay open when the reset button is released, it may be necessary to wait an additional few minutes and then depress the reset button again. This will allow the electrical elements additional time to warm up.
6. When the catalytic reaction is well established, turn off the electrical power to the elements.
7. If the heater is equipped with a thermostatic temperature controller, it can be set to the desired setting after the catalytic reaction has been established for at least one hour.

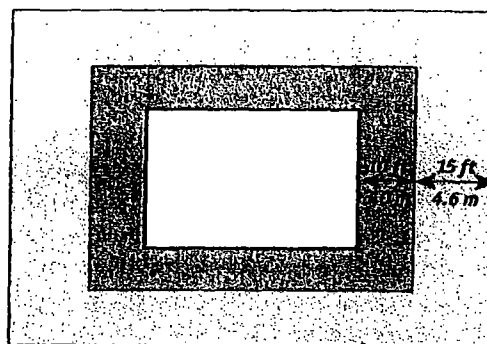
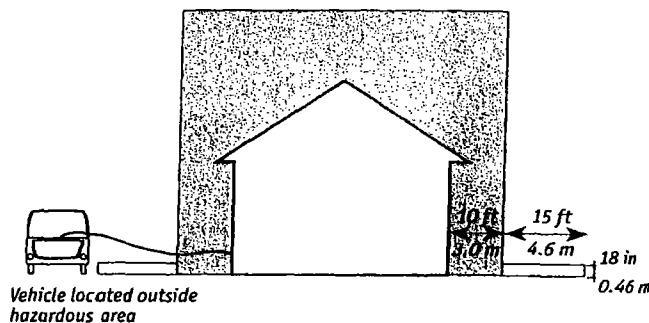
Shut down

Turn off the gas supply to the heater.

Multi-heater start-up

Cata-Dyne™ heaters can also be purchased/installed in multi-heater assemblies. If these assemblies are 12V, each heater must be started individually. This ensures the correct voltage and current will be reaching the heater from the power supply.

12 V HAZARDOUS ELECTRICAL INSTALLATIONS



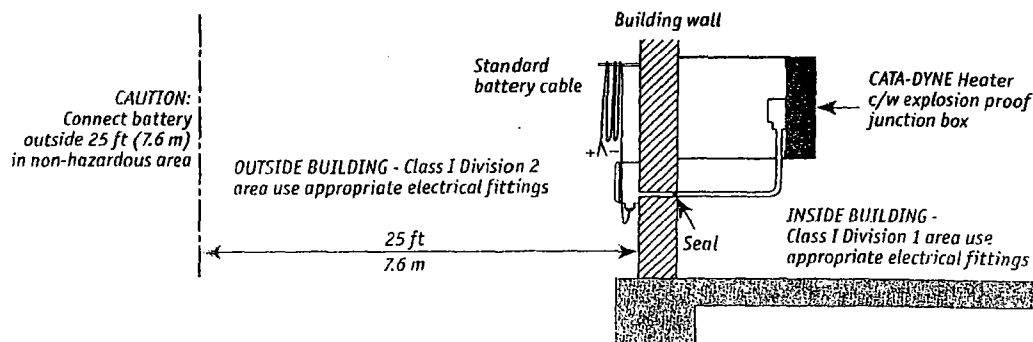
Class I Division 1
Class I Division 2

Class I Division 2
18 in (0.46 m) from ground
Subject to possible transient vapour

Most oil and gas production buildings have an area classification as follows:

1. Class I, Division 1, within the building.
2. Class I, Division 2, outside the building for a distance of 10 ft (3.0 m) from the building at all elevations.
3. Class I, Division 2, outside the building for a distance of 25 ft (4.5 m) from the building at an elevation of 18 in (0.45 m) from the ground.

All electrical apparatus and wiring within this area must conform to the appropriate codes. Connection to the power supply must be outside of the Class I, Division 2 location.



SPOT HEATING

There are several factors to consider when Cata-Dyne™ heaters are utilized for spot heating.

Infrared energy travels in straight lines from the face of the Cata-Dyne™ heater covering approximately 160° of arc and is inversely proportional to the square of the distance. The heater should therefore be mounted as close as practical (min. of 8 in (20 cm)) to the object requiring heat for maximum temperature rise.

Match the shape of the object requiring heat with the appropriate Cata-Dyne™ heater, e.g. WX/BX 6x24 for long narrow objects or WX/BX 12x12 for a square object.

Objects requiring heat should be painted dull, dark colors for maximum infrared absorption and objects not requiring heat should be painted light or reflective colors.

Maintain nameplate clearances from combustible materials such as wood, cloth, paper, etc.

Insulate and protect plastic, rubber and similar materials from direct intense infrared heat.

SPACE HEATING

A separate heat load calculation should be done for each building in which a Cata-Dyne™ will be installed for space heating purposes.

The heat load calculation determines the building heat losses through the structure and allows for air infiltration (refer to the sample Heat Load Calculation in the Cata-Dyne™ catalogue).

Cata-Dyne™ heaters produce low intensity infrared heat that is absorbed by objects within the range of the heat source. The closer the object is to the source of heat, the more heat the object will absorb. Cata-Dyne™ heaters should be placed close to the floor level within the building to heat objects close to the floor.

Ideally, Cata-Dyne™ heaters should be mounted 1-3 ft (0.3-1 m) from the floor and equally spaced around the building perimeter for space heating applications.

If low mounting is not practical, then overhead mounting may be utilized. Overhead mounted heaters should be sloped face down to a maximum 45° angle to direct the infrared energy towards the floor. Overhead mounting should be restricted to heaters of 30,000 BTU/hr (8.8 kW) capacity and larger.

If the building requires only one heater, place the Cata-Dyne™ heater as close as possible to the centre of the longest wall.

For multiple heater installations, space the Cata-Dyne™ heaters as evenly as possible around the perimeter of the building.

Make sure the piping is large enough to handle the gas load (refer to the sample Piping Calculation in the Cata-Dyne™ catalogue for sizing information).

Make sure the electrical starting system has sufficient current carrying capacity and conforms to all applicable electrical codes.

It is advisable to install an indicator light in the electrical circuit to reduce the possibility of the power being left on once the heater is started.

PERSONAL SAFETY

The Cata-Dyne™ flameless infrared catalytic gas heater does not produce harmful carbon monoxide gas when used with natural gas or propane. Adequate ventilation must be incorporated in any building design to ensure oxygen replenishment and removal of any carbon dioxide. Protective grills should be used on any installation where personnel may come in contact with the face of the heater.

ORDERING INFORMATION

You can order any of CCI Thermal's products by telephone, fax, mail or e-mail. To assist us in processing your order as quickly and efficiently as possible, please provide us with the following information:

- ♦ Cata-Dyne™ product name
- ♦ Cata-Dyne™ model number
- ♦ Fuel gas - natural gas or propane
- ♦ Starting voltage - 12, 24, 120, 208, 240, 480, or 600 volt
- ♦ Accessories required:
 - Protection Grill
 - Wall Mount Brackets
 - Thermostat
 - Regulator
 - Start Up Leads (12 volt system only)
 - Vent Hood
 - Other
- ♦ Company name and contact
- ♦ Billing address, phone number, fax or e-mail
- ♦ Shipping address and phone number
- ♦ Shipping instructions
- ♦ Special tagging instructions
- ♦ Date required
- ♦ Method of payment:
 - on account - P.O. number required
 - credit card - Visa or Mastercard number
 - cash or cheque

GUARANTEE

CCI Thermal warrants all Cata-Dyne™ flameless infra-red heaters sold to be free from defects in material or workmanship under normal use and service. The company agrees to repair or replace any Cata-Dyne™ heater which, upon its examination, reveals it to have been defective due to faulty workmanship or material, if returned to our factory, transportation PREPAID, within one (1) year from date of purchase. The company does not assume responsibility for misuse or misapplication of its heaters.

Warranty is void if heaters are used with sour, dirty or wet gas, or where sulphur content is greater than allowable for utility gas specifications. Warranty is void if, upon our inspection, the heater has been tampered with. Neither CCI Thermal nor the selling dealer shall be held responsible for loss of time, inconvenience, commercial loss or consequential damages relating to the use of Cata-Dyne™ heaters.

RETURN GOODS POLICY

Prior written approval must be obtained from CCI Thermal for the return of any Cata-Dyne™ product(s). A restocking charge of 15% will apply. All returns must be shipped to our factory in Edmonton, freight prepaid. Final acceptance will be contingent on inspection at our factory.

REPAIRS

Cata-Dyne™ heaters may require periodic maintenance or repair. Our factory is staffed with technicians who are qualified to perform any required repairs. The procedure to follow to have a heater repaired is as follows.

Send the heater to our factory in Edmonton. Include the following information with the heater:

- ♦ Company name and address
- ♦ Contact name
- ♦ Telephone number/fax number/e-mail
- ♦ P.O. number
- ♦ Advise if an estimate is required prior to starting the repair
- ♦ Details on the repair or conversion required
- ♦ Return shipping instructions

NOTE: Under the terms of our certification, all repairs must be performed at our factory in Edmonton.

TROUBLE SHOOTING

1. Ensure that the fuel matches that listed on the nameplate.
2. Ensure that the voltage matches that listed on the nameplate.
3. Check for any physical damage. All signs of physical damage to the catalyst pad such as holes, tears or a general deterioration of the catalyst bed signal that it is time to have the heater repaired.
4. Check the gas supply pressure at the heater-7 in w.c. (1.73 kPa), 4.5 in w.c. (1.12 kPa), or 3.5 in w.c. (0.86 kPa) for natural gas and 11 in w.c. (2.72 kPa) for propane.
5. Check the gas orifice for obstructions or dirt and ensure the size matches that listed on the nameplate. It may be necessary to install a filter upstream of the heater or regulator if the gas supply is dirty. If the fuel supply is constantly dirty and/or wet it would be advisable to use bottled propane fuel.
6. Check the mounting position of the heater. The face of the heater should be preferably in the vertical position and should not vary more than 45° from the vertical position for maximum efficiency.
7. Check for saturation of the catalyst face caused by condensation or rain running down the face of the heater. If the heater has been exposed to water, it is advisable to place the unit in a warm area for a period of a few hours or longer if required. Once the moisture is removed, the heater can be re-installed and re-started.
8. Check the jumper cable size to ensure that the resistance of the cable is not reducing the current to the heater. This would not allow sufficient power to the electrical element to preheat the catalyst to the activity temperature. It is recommended to run the service vehicle at fast idle while starting the heater.
9. Cata-Dyne™ heaters are designed to use clean fuel and to be used in non-contaminated atmospheres. Sulphur compounds in the fuel or atmosphere will poison the catalyst bed over a period of time and render the heater inoperative. If the heater has been exposed to sulphur compounds, it should be sent to the factory for service.
10. Avoid spraying the face of the heater with high pressure air, steam or water because this can damage the catalyst bed. If physical damage is visible, return the heater to the factory for servicing.
11. The temperature controller corresponds to the heater(s) it is controlling and must match the fuel and model size listed on the nameplate. If temperature controller is too low, the heater will not have sufficient fuel rating to operate and will stop.

Separate installation and operation instructions are available for oven and industrial heating applications.

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J-13

Manual 004

OPERATION MANUAL

FOR

FLOATING BALL TYPE
KITZ STEEL BALL VALVES
ONE-PIECE BODY, END-ENTRY DESIGN

$\frac{1}{2}$ " to 10"	Fig. 150SCTA
$\frac{1}{2}$ " to 10"	Fig. 300SCTA
$\frac{1}{2}$ " to 10"	Fig. 150UTA
$\frac{1}{2}$ " to 10"	Fig. 300UTA

June 1, 1985

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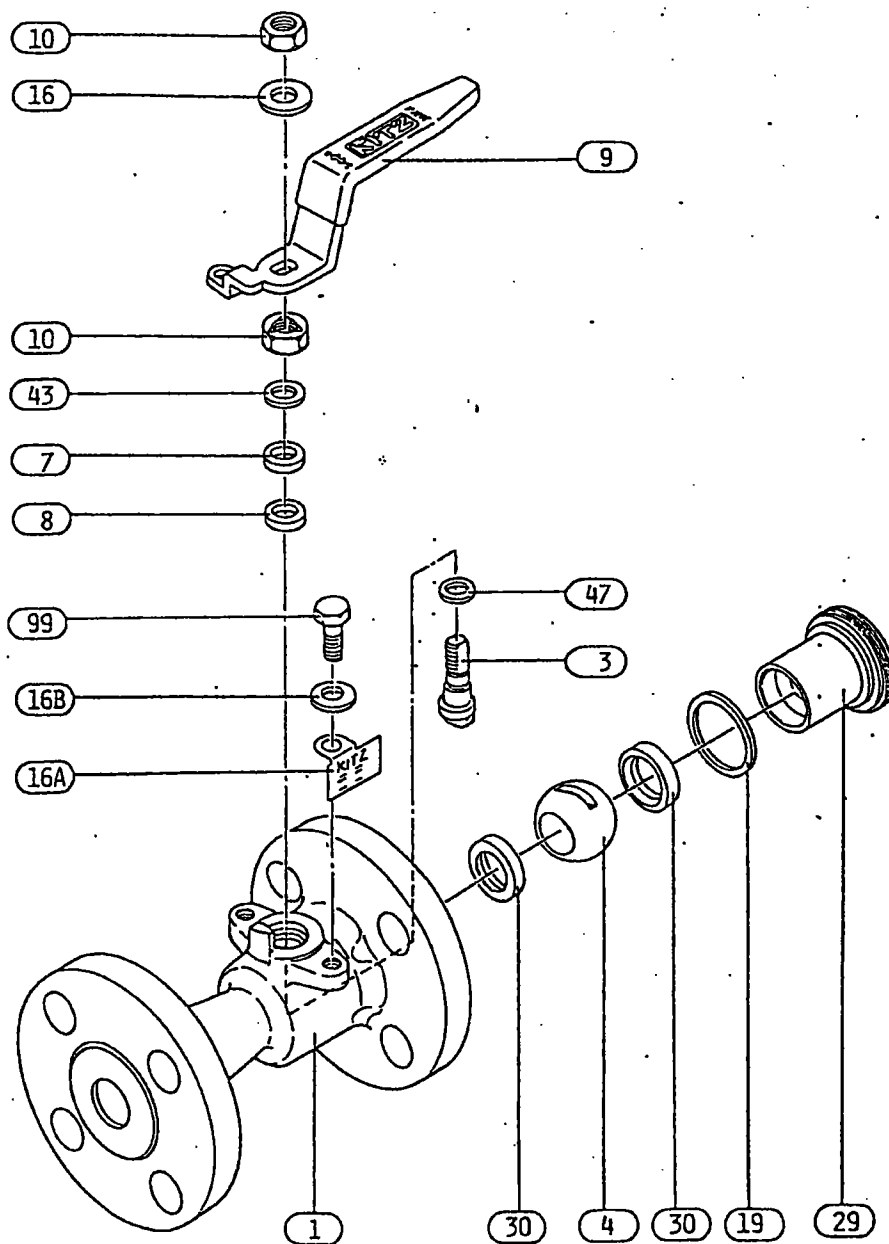


Fig. 1. Disassembly illustration of $\frac{1}{2}$ " to 1" valves

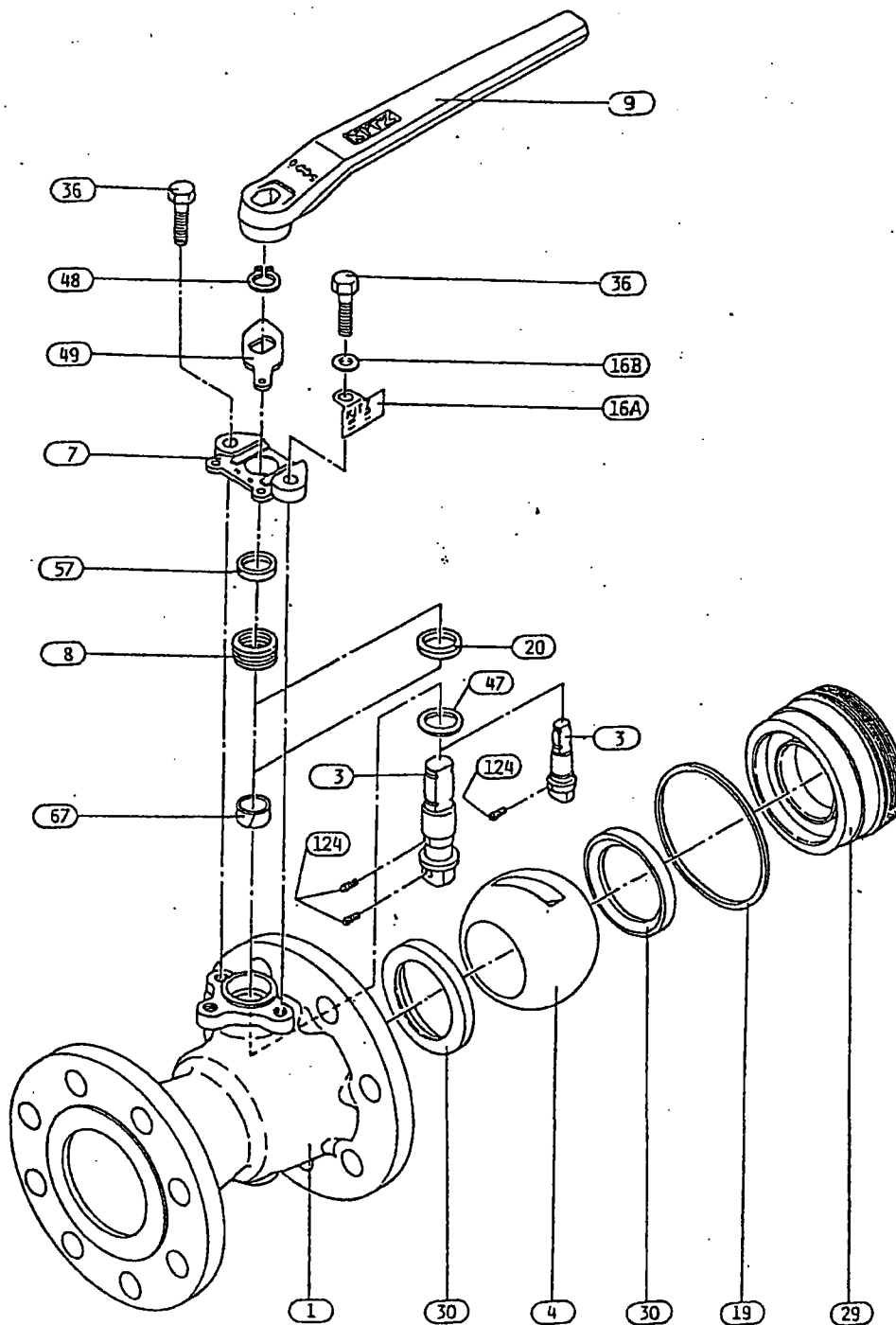
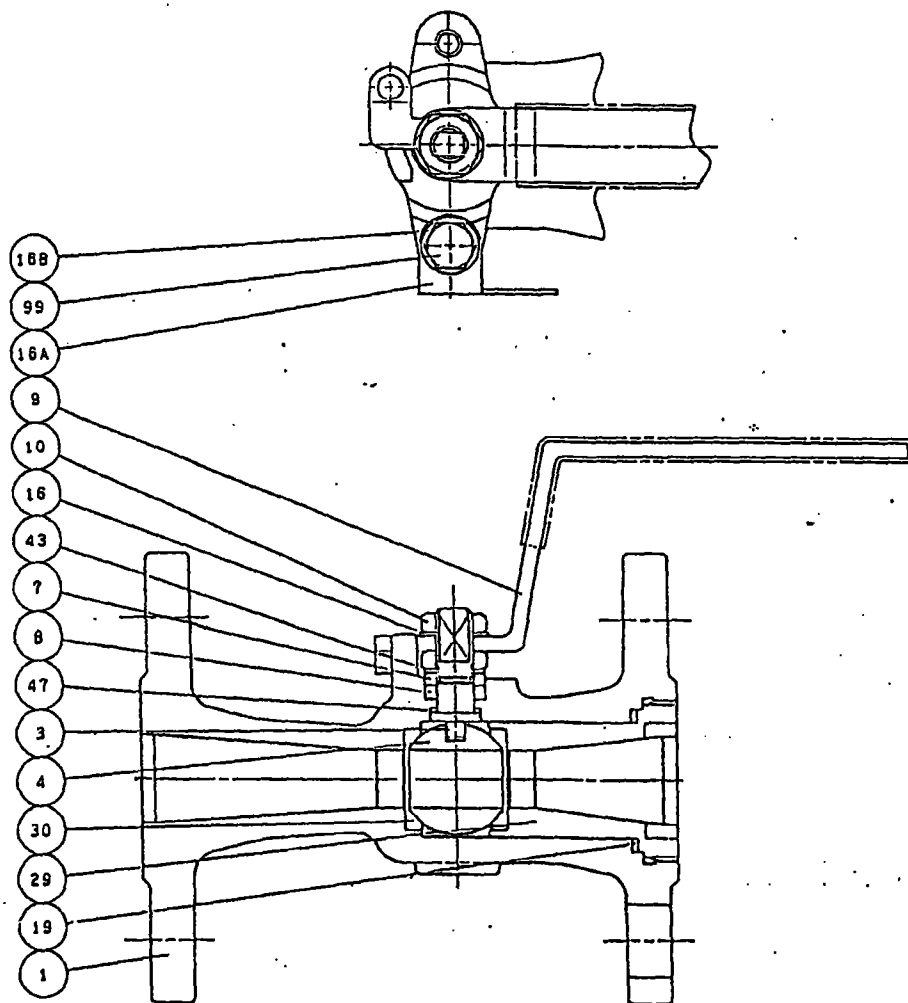


Fig. 2. Disassembly illustration of 1½" to 10" valves

Fig. 3. Cross-sectional assembly drawing of $\frac{1}{2}$ " to 1" valves



NO.	NAME OF PARTS
1	BODY
3	STEM
4	BALL
7	GLAND
8	GLAND PACKING
9	HANDLE
10	HANDLE NUT
16	WASHER
16A	NAME PLATE
168	WASHER
19	GASKET
29	INSERT
30	BALL SEAT
43	WASHER
47	THRUST WASHER
99	BOLT

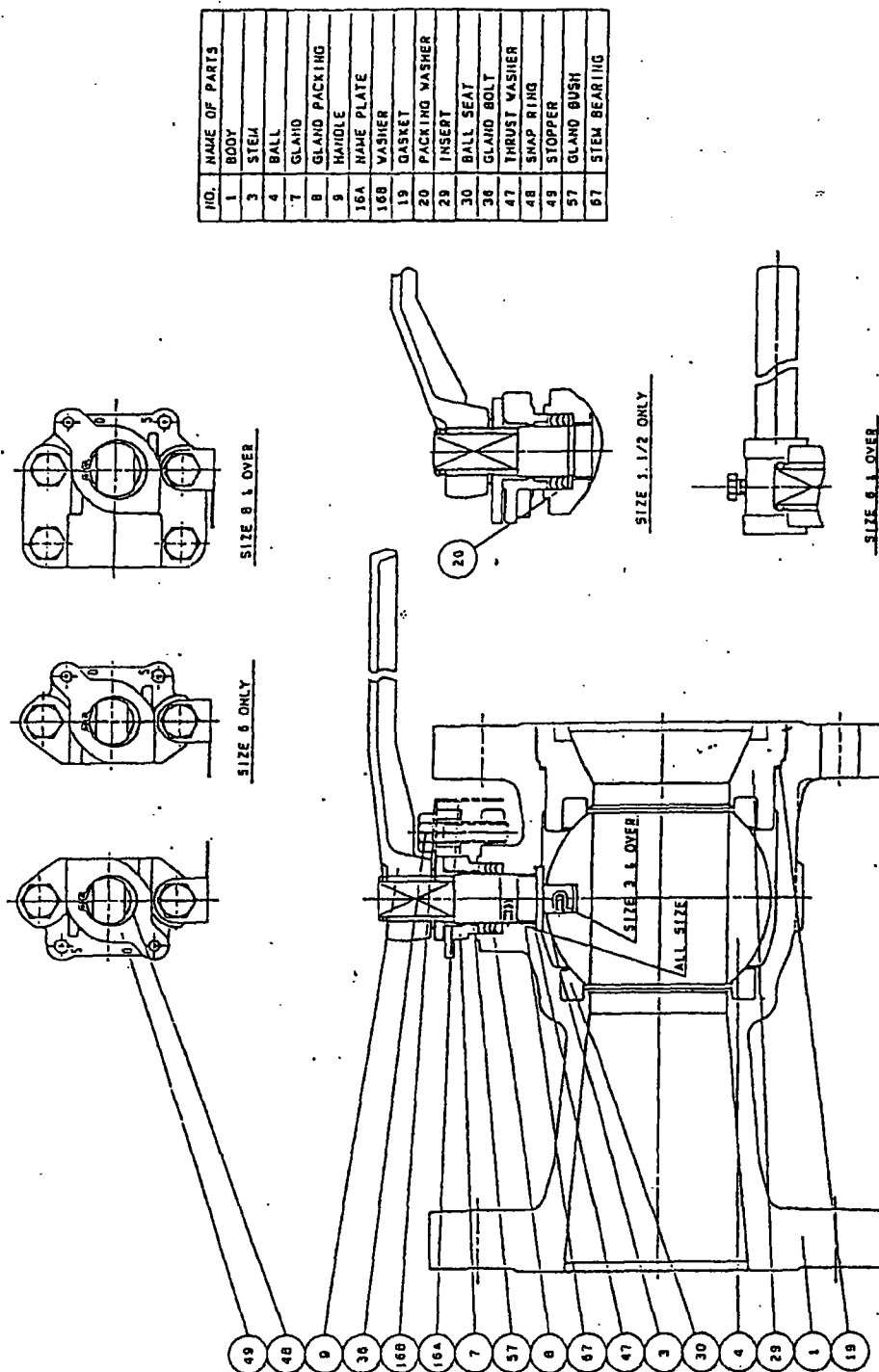


Fig. 4. Cross-sectional assembly drawing of 1½" to 10" valves

1. Outline

Safe and efficient operation of industrial installations requires not only complete knowledge of the engineering and functioning of all machinery and equipment but their continuous and proper maintenance as well. Improper operation or maintenance of a piece of valve may affect the whole installation. General information is given here for proper operation and maintenance of KITZ steel ball valves, floating ball type with one-piece body and end-entry design.

1.1 Scope

This operation manual applies to ANSI Class 150 and 300 KITZ steel ball valves, floating ball type, reduced bored, with one-piece body and end-entry design, made of cast steel, figure-numbered and sized as below:

½" to 10"	150SCTA	(Carbon steel)
½" to 10"	300SCTA	(Carbon steel)
½" to 10"	150UTA	(Stainless steel)
½" to 10"	300UTA	(Stainless steel)

1.2 Actuator operation manuals

This operation manual covers manually operated ball valves only. For electric, pneumatic or hydraulic actuation of ball valves, refer to the actuator operation manuals prepared by relevant actuator manufacturers.

For KITZ B-Series Pneumatic Actuators, Operational Manual #901-E is available.

2. Handling ball valves before mounting

- 2.1 Prior to shipment, blind covers are attached to the inlet and outlet of each valve for protection from mechanical damage as well as for prevention of the intrusion of dust and other foreign objects into the valve bore during transit.
Do not remove these end protectors before valves are mounted.
- 2.2 Valves should be stored at a dust-free, least humid and well ventilated place. Always be careful not to damage the valve stems during handling. Placing valves directly on the ground or on the concrete floor is not recommended. Under no circumstances should valves be stored outdoors.
- 2.3 All KITZ ball valves are shipped with the ball in its fully opened position for protection of ball surface and resilient seats. Valves should be left fully open during storage.
- 2.4 For moving with a crane, valves should be positively rigged with a wire around the valve body and end flanges or through the lifting lugs.
The crane wire should not be in direct contact with valve operational gears or actuators.

3. Mounting ball valves

- 3.1 First of all, check the nameplate, the tag number or any other identification mark of the valve, and make sure that a correct KITZ valve shown in your piping arrangement plan has been prepared.
- 3.2 As piping sites are usually very dusty, be sure not to remove the valve end protectors before valves are ready for mounting.
- 3.3 After removal of the end protectors, thoroughly clean the inlets and outlets of both pipes and valves so that the gasket faces of the flanges are free from dust which will affect the sealing performance.
- 3.4 Any scratch or defect on the gasket contact face of the valve flanges and pipe flanges should be carefully detected. Correct such a scratch or defect with sand papers or grinding stones to have smooth surface.
- 3.5 Before flange coupling, first align the bolt holes of the valve flanges with those of the pipe flanges, then insert the gaskets and tighten the bolts. If the valve and pipeline are not aligned accurately, unbalanced tightening will cause excessive stress on the bolts. Make sure that valve flanges and pipe flanges are coupled with correct alignment.
- 3.6 Tighten the bolts evenly and alternately on the tangential line. The ends of all tightened bolts should protrude equally beyond the nuts.
- 3.7 After mounting the valve, be sure to recheck all bolts and nuts of the coupled flanges and tighten them, if found loose.
- 3.8 Finally, the valve and pipe interior should be flushed to remove foreign objects, which may later cause fluid leakage. In fact, on plant commissioning, leakages are rather frequently detected due to the foreign objects getting stick around valve seats because of incomplete flushing of the pipes and valve bores.
- 3.9 Then, straightness of pipelines and flange faces should be assured to avoid the piping stress unevenly loaded on the valve.
- 3.10 Make sure that the stress of the pipeline is not concentrated on the valves.
- 3.11 For valves mounted at the end of a pipeline, installation of a drain discharge device is recommended.

4. Operating ball valves

4.1 Rotation of the valve stem by 90° fully opens or closes ball valves. To close a valve, turn the operating handle clockwise according to the letter, symbol or mark indicating operational direction. Counter-clockwise turn of the handle will open the valve. Valve operation usually needs lower torque when it is half opened, and higher torque when fully opened or closed.

4.2 By observing the position indicator of the valve or the actuator, make sure that the valve is always fully opened or closed. Ball valves are not recommended for controlling volume of fluid. Their main purpose is to completely free or shut the fluid in the pipeline. Leaving ball valves to half open or close position may damage ball seats and cause serious fluid leakage.

4.3 On valve commissioning, be sure to detect fluid leakage from the gland area, pipe flange gaskets or threaded area of the valve.

4.3.1 Leakage through gland packings may be stopped by tightening the gland bolts (No.36) or handle nut (No.10).

The gland bolts should be tightened not too much, because excessive tightening may affect resiliency and, after all, sealing performance of packings.

If tightening the gland as above cannot stop fluid leakage, replace gland packings.

4.3.2 To solve leakage problem through the flange gasket, retighten all related flange boltings evenly and alternately on the tangential line. If retightening bolts cannot solve the problem, replace flange gasket.

4.3.3 In case of leakage through the drain plug or other threaded areas, retighten the relevant threads securely, or replace the relevant parts when retightening cannot solve the problem.

4.4 Servicing liquid with high velocity

When ball valves are operated very frequently to service liquid with very high velocity, it is recommended to ask the manufacturer for appropriate advice to minimize the possible problem of seat deformation, particularly when they are highly pressurized under high temperature.

5. Daily valve inspection during operation

5.1 For safe operation of valves, daily inspection is very important. The following are the main items required for daily inspection:

- (a) Correct indication of valve opening or closing position by the position indicator
- (b) Contamination of valve drive mechanism such as dust, sand and other foreign objects.
- (c) Tightness of threading of handle nuts (No.10) and gland bolts (No.36)
- (d) Leakage from the gland area
- (e) Leakage from the flange connection
- (f) Leakage from the drain plug and other threaded area
- (g) Leakage through the valve body surface
- (h) Generation of abnormal noises from the valve interior
- (i) Vibration of pipelines transferred to valves

5.2 In case of detecting any of the above problems, remedial measures must be taken immediately as follows:

- (a) Adjust the incorrect indication of valve position indicator for its accurate indication.
- (b) Clean the contaminated valve drive mechanism such as dust, sand and other foreign objects with an adequate cleaning agent.
- (c) Retighten loosened boltings of handle nuts (No.10) and gland bolts (No.36) evenly and securely.
- (d) Refer to Section 4.3 to remedy the leakage from the gland area, flange connection or threaded area.
- (e) Ask a valve repair specialist to remedy the leakage through the valve body surface.
- (f) Ask a piping engineer to remedy noises from the valve interior or vibration of the pipeline.

6. Periodic valve inspection and maintenance

- 6.1 Inspection should be made periodically to detect wear or corrosion of the ball and stem, corrosion of the body and body insert (No.29), and wear of the threads. Usually, gland packings, gaskets, ball seats, thrust washers and stem bearings shall be replaced after periodic inspections.
Don't forget to maintain a sufficient quantity of such spare parts at all times.
- 6.2 Before disassembly of valves, be sure to follow the preliminary procedures below:
 - 6.2.1 Before dismantling valves from the pipeline, mark the valve end flanges and coupled pipe flanges adequately with their original positions of coupling each other, to avoid confusion or mistake on subsequent remounting of valves.
 - 6.2.2 Give identification marks on the valve body insert (No.29) and its coupled end flange of the valve adequately for easy coupling on subsequent valve reassembly.
 - 6.2.3 If boltings of flanges or threads of the body insert are found seized or stuck each other, apply some lubricant and leave it for a while for easier unthreading.
 - 6.2.4 Prepare a tool sized properly to match the tightening groove (Fig.5) of the body insert for unthreading it from the valve body.

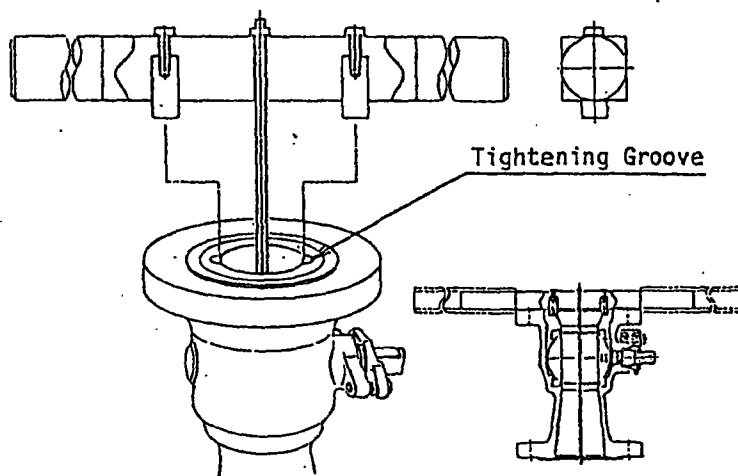


Fig. 5

- 6.2.5 Even after the live fluid has been discharged through the pipeline, some fluid is always trapped inside the body and body cavity (the room surrounded by the body, ball and two seats). Be sure to completely discharge the pressure trapped in the body cavity.

6.3 Disassembly of valves; size $\frac{1}{2}$ " to 1" (Fig. 1)

- (a) Remove the handle nut (No.10) and then the handle (No.9).
- (b) Unthread the body insert (No.29) counter-clockwise slowly and gradually so that its tightening groove and threads may not be damaged. Then, remove it from the body (No.1) carefully.
- (c) Remove the ball (No.4) set in its fully closed position, from the stem (No.3).
- (d) Remove the gland bolts (No.36), and then the gland (No.7).
- (e) Push the stem (No.3) from the exterior into the valve interior to remove it from the body.
- (f) Remove the gland packings (No.8) and gasket (No.19).
- (g) Remove the thrust washer (No.47) from the stem (No.3).
- (h) Remove the ball seats (No.30) from the body to complete disassembly of valves, size $\frac{1}{2}$ " to 1".

6.4 Disassembly of valves; size $1\frac{1}{2}$ " to 10" (Fig.2)

- (a) Remove the handle nut (No.10) and then the handle (No.9).
- (b) Unthread the body insert (No.29) counter-clockwise slowly and gradually so that its tightening groove and threads may not be damaged. Then, remove it from the body (No.1) carefully.
- (c) Remove the ball (No.4) set in its fully closed position, from the stem (No.3).
- (d) Remove the snap ring (No.48) and the stopper (No.49).
- (e) Remove the gland bolts (No.36) and then, the gland (No.7), the nameplate (No.16A) and the washer (No.16B).
- (f) Push the stem (No.3) from the exterior into the valve interior to remove it from the body.
- (g) Remove the gland packings (No.8) and gasket (No.19). In case of size $1\frac{1}{2}$ ", the packing washer (No.20) should be also removed.
- (h) Remove the stem bearing (No.67) and the thrust washer (No.47) from the stem (No.3).
- (i) Remove the ball seats (No.30) from the body.
- (j) Remove the gland bush (No.57) from the gland (No.7) to complete disassembly of valves, size $1\frac{1}{2}$ " to 10".

6.5 Examination of valve components

- 6.5.1 Soiled valve interior should be cleaned by either adequate mean of water, steam, acid or oil before examination. Examine the invisible internal area with a tube inspector or a small mirror and a flashlight. Liquid penetrant examination or radiographic inspection shall be also carried if found necessary.
- 6.5.2 Worn or corroded area or part shall be carefully examined visually or, if necessary, with a magnifying glass. The wear or corrosion taking place in the limited area of the valve body is extremely dangerous as it may develop fears of leakage rather quickly. Cracks should be also carefully detected.
- 6.5.3 Wall thickness should be periodically measured for recording undesired variation which may happen through the passage of time.

- 6.6 Valve should be assembled in the following sequence after all the component parts have been cleaned and new spare parts of gland packings, gaskets, ball seats, thrust washers, and stem bearings have been prepared. Be sure to remove rusts and other soils out of the seat retaining area of the body to have satisfactory sealing performance.

Also apply METAL GUARD 814 or an equivalent rust preventative to the inner surface of the body, including stem holes.

6.7 Reassembly of valves; Size $\frac{1}{2}$ " to 1" (Fig. 1)

- (a) Mount a ball seat (No.30) on the body.
- (b) Assemble the thrust washer (No.47) with the stem (No.3) and insert it from the valve interior into the stem hole.
- (c) Mount the gland packings (No.8) and the gland (No.7) on the stem and secure it tight with the handle nut (No.10).
- (d) Assemble the ball (No.4) on the stem (No.3) set for the fully closed position of the valve.
Apply a little lubricant on the ball seat.
- (e) Mount the gasket (No.19) on the gasket face of the body.
- (f) Assemble another ball seat (No.30) with the body insert (No.29) and apply a little lubricant. Also apply some galling preventative on the threads of the body insert.
- (g) Thread the body insert (No.29) clockwise into the valve body. Continue to thread it into the body until the end face of the body insert gets flat with the flange face of the valve end flange. Make sure that reassembly was made correctly according to the identification mark provided before disassembly of the valve.

- (h) Thread the handle nut (No.10) to securely load the gland packings (No.8) into the packing chamber.
- (i) Assemble the handle (No.9) firmly with the handle nut (No.10), according to the position indicator.

6.8 Reassembly of valves; Size 1½" to 10" (Fig. 2)

- (a) Mount a ball seat (No.30) on the body.
- (b) Assemble the stem bearing (No.67) and the thrust washer (No.47) with the stem and insert it from the valve interior into the stem hole.
- (c) Mount the gland packing (No.8) (also the packing washer (No.20) in case of size 1½") on the stem. V-type packings should be carefully handled so that their lips may not be damaged.
- (d) Assemble the gland bush (No.57) with the gland and mount it on the stem (No.3). Mount the nameplate (No.16A) and the washer (No.16B) on the gland and tighten it light with the gland bolts (No.36).
- (e) Mount the stopper (No.49) on the stem and secure it with the snap ring (No.48). Take care so that the stopper is mounted properly for correct indication of the valve opening position. Valves should be opened or closed when the stem is rotated counter-clockwise or clockwise respectively.
- (f) Mount the ball (No.4) on the stem set on the fully closed position. Apply a little lubricant on the ball seat.
- (g) Mount the gasket (No.19) on the gasket face of the body.
- (h) Mount another ball seat (No.30) on the body insert (No.29) and apply a little lubricant. Also apply some galling preventative on the threads of the body insert.
- (i) Thread the body insert (No.29) clockwise into the valve body. Continue to thread it into the body until the end face of the body insert gets flat with the flange face of the valve end flange. Make sure that reassembly was made correctly according to the identification mark provided before disassembly of the valve.
- (j) Tighten the gland bolts (No.36) evenly and mount the handle on the stem. Confirm again that position indicator indicates the correct position of the valve operation to finish reassembly of the valve.

7. Acceptance Test

All valves, after reassembly, should be subjected to a shell test at the required test pressure, and then a pneumatic seat test at the pressure of 6 kgf/cm² to insure the valve performance for final acceptance.

5. Manual operation of Actuators

- ① Manual operation is possible for Type D and DA actuator, Size 1, 2, 3. Apply a spanner wrench to the top of the actuator shaft which is designed for this specific function. Clockwise shaft rotation closes the valve, while counterclockwise rotation will open it.
- ② Manual operation is not possible for Type DS and DAS of all sizes.

⚠ WARNING

- Never forget to remove the spanner wrench used for manual actuator operation. Energizing the actuator by air without removal of the spanner is dangerous.

⚠ CAUTION

- Prior to manual operation, shut off the compressor and discharge the air residue in the actuator housing to the atmosphere.
- Securely fit the spanner wrench to the top of the actuator shaft before manual operation.

6. Position Adjustment

- Set the valve fully opened and closed position with the adjusting bolts.
- Then tighten the lock nut to prevent the looseness of the adjusting bolts and the leakage of operating media.
- When you set the adjusting bolt at the openside of Type D and DA, you should set another one to strike the piston at the same time.

7. Disassembly and Reassembly of Actuators

Strictly follow the instructions provided in KITZ Operation Manual MT-24.

⚠ WARNING

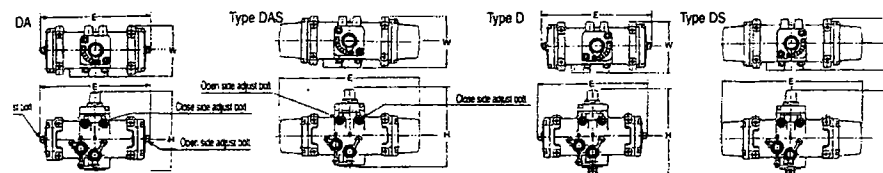
Never disassemble spring units of Type DS and DAS spring return actuators, which enclose compressed heavy-duty springs inside. Energized compressed springs may cause a serious danger.

8. High Specifications of Actuators

or Size	1	2	3
ating angle	90° ± 5°		
or volume (cc)	180	380	680
rd operating pressure	0.39Mpa(4kgf/cm ² or 60 psi)		
ing pressure range	0.29Mpa(3kgf/cm ² or 45 psi) to 0.69Mpa(7kgf/cm ² or 100 psi)		
or test pressure	0.97Mpa(9.9kgf/cm ² or 140 psi)		
n indicator angle	90° with 15° gradations		
ible ambient temperature	-20°C to 60°C (-4°F to 140°F)		
or-proof	IP-54(JIS C 0920)		
ng flange to valve	ISO 5211		

9. Dimension and weight of Actuators

Size	Dimension (mm)					Weight (kg)			
	W	E	H	D/DA	DS/DAS				
1	86	186	238	145.5	131.5	1.6	2.0	1.6	2.0
2	105	235	256	166.5	151.5	2.5	3.4	2.5	3.4
3	116	302	396	225	205	5.5	7.7	5.5	7.7



KITZ CORPORATION

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Operational Instructions

KITZ D Series Pneumatic Actuators with KITZ Valves

Type D Double Action Ball Valve Actuator

Type DS Spring Return Ball Valve Actuator

Type DA Double Action Butterfly Valve Actuator

Type DAS Spring Return Butterfly Valve Actuator

Introduction

Your KITZ valve actuated by KITZ D Series pneumatic actuator has been stringently inspected in accordance with the quality assurance and quality control standards of KITZ Corporation. To ensure safe and trouble-free function and performance, please go through all items of these instructions and KITZ Operation Manual MT-24 before handling, transportation, mounting, air piping and operation of the unit.

⚠ WARNING

⚠ CAUTION

The warnings here indicate potential hazardous conditions which may result in serious injury to personnel, and the cautions here indicate potential hazardous conditions which may result in minor or moderate injury to personnel and property damage, if such warnings or cautions shall be ignored.

If any item of these instructions are not strictly followed by users, KITZ Corporation shall have no responsibility for any resulting accident or equipment malfunction.

1. Storage and Handling

KITZ D series actuators should remain individually packed until released for piping, and be stored in cool, dry and corrosion-free environment. Overloading actuators must be prevented by all means, and thus any other objects must not be placed on the actuators. Careful handling is very important during storage and transportation.

⚠ CAUTION

- The unit is provided in a dust preventative cover. Don't remove the cover until you are ready to mount it on the pipeline.
- Avoid any improper storage environment, which may cause the actuator to get rusty and malfunction.
- Handle the unit with extreme care to prevent damage. This caution is particularly important when the unit is equipped with a solenoid valve and other accessories.
- Use ropes or straps for safe handling of the unit.
- Never modify the valve or actuator at your own discretion. It may damage the unit or affect the function.



2. Mounting and

- ① Clean the valve and pipe bores to remove dusts, scales or any other foreign objects.
- ② Check if the valve specification fully satisfies the service conditions.
- ③ The unit may be mounted on the pipeline either horizontally, vertically or at any angle, depending on your piping or operational convenience. However, the filter-regulator must be always horizontally positioned, unless the unit is horizontally mounted.
- ④ Standard air supply inlet threading is Rc 1/4.
- ⑤ After the valve mounting, air-blow the inside of pipes and fully opened valve prior to the pilot operation of the system.

⚠WARNING

- Be sure to employ explosion-proof type solenoid valves and limit switches, in any explosive, flammable, or corrosive environments.

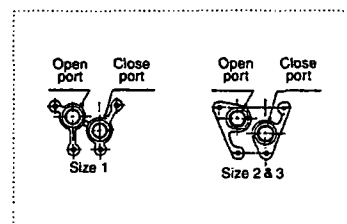
⚠CAUTION

- Before mounting, check if any damage has been caused during transportation or storage, and if any bolting has been loosened.
- Actuators are factory-assembled to the valves according to the predetermined orientation for valve open/close positions. Don't change such an orientation, because it may cause incorrect orientation between the position indication and the actual valve operating position.
- Allow some room around the unit mounted on the pipe, for convenience of subsequent maintenance or servicing work. A space of 300 mm upwards, 500 mm downwards and 300 mm each on the right and left is recommended.
- -20°C (-4°F) to 60°C (140°F) is the recommended range of applicable environment temperature. Make appropriate insulation or cooling measures for installation in lower or higher temperatures.
- Take appropriate corrosion-resistant measures when the unit is to be installed in corrosive or dusty environments.
- Ensure that your valves are free from rust. Particularly in case of iron or steel valves in water service rust may get stuck with the seating surfaces of valve internals and cause malfunction of the actuator.
- Never step on the unit or don't cause any excessive load on the unit during installation.
- Take appropriate measures for prevention of water intrusion into the air inlets and outlets of spring return actuators.

3. Air Piping

- ① Remove dust-prevention covers from the ports of actuators and accessories just before mounting the unit on the pipeline.
- ② Install the air supply piping between the compressor and the solenoid valve, when the actuator is factory-assembled with KITZ standard solenoid valve. The air inlet size is Rc 1/4.
- ③ Use 6 mm tubing for Size 1, 2 and 3 actuators, made of copper, covered or uncovered. Completely seal the pipe connection area to prevent air leakage.
- ④ Assemble an equalization valve between the actuator and the solenoid valve. The equalizer shall be used for releasing residual air from the actuator housing before manual operation of the unit.

- ⑤ Air supply ports are designed as illustrated below:



⚠CAUTION

- Prevent the sealing tape from extending into tube bore and ensure that piping connections are free from leakage. Otherwise, functions of the actuator may be disturbed.

4. Operation of Actuators

- ① Apply the standard pressure of 0.39 MPa (4 kgf/cm² or 60 psi) for trouble-free operation, although the actuators are designed for operating pressure ranging from 0.29 MPa (3 kgf/cm² or 45 psi) to 0.69 MPa (7 kgf/cm² or 100 psi). Operating media must be compressed air or Nitrogen gas.
- ② When you specified the operating pressure in your purchase order, the unit must be set to your specification at the factory. Energizing the actuator with any different pressure may cause a malfunction.
- ③ Be sure to dry and filter the operating media for trouble-free operation. This is particularly important in cold and humid climates.
- ④ Before supply of the operation media, operate the actuator manually with a spanner wrench a few times, as noted below, to ensure that assembly of the unit has been properly done.
- ⑤ During pilot operation, watch the system to check the following :
 - a. No leakage from the air piping.
 - b. Adequate line voltage of a solenoid valve.
 - c. Adequate operating pressure of the actuator.
 - d. Adequate operating speed, which may be adjusted with a speed controller.
 - e. Ensure that change of the specific signal pressure results in the preferred valve operating position, when a positioner is provided.

⚠CAUTION

- Never use any gas other than compressed air or Nitrogen for actuator operation.
- Never apply higher pressure than 0.69 MPa (7 kgf/cm² or 100 psi).
- Completely dry the air particularly in cold climate, to prevent rust and subsequent actuator malfunction.
- If the actuator has not been operated for longer than 3 months, or when a new actuator is initially operated, energizing the actuator might instantaneously cause an extraordinarily high torque and cause malfunction. To prevent this, be sure to manually operate the actuator a few times, as noted below, before actual operation.