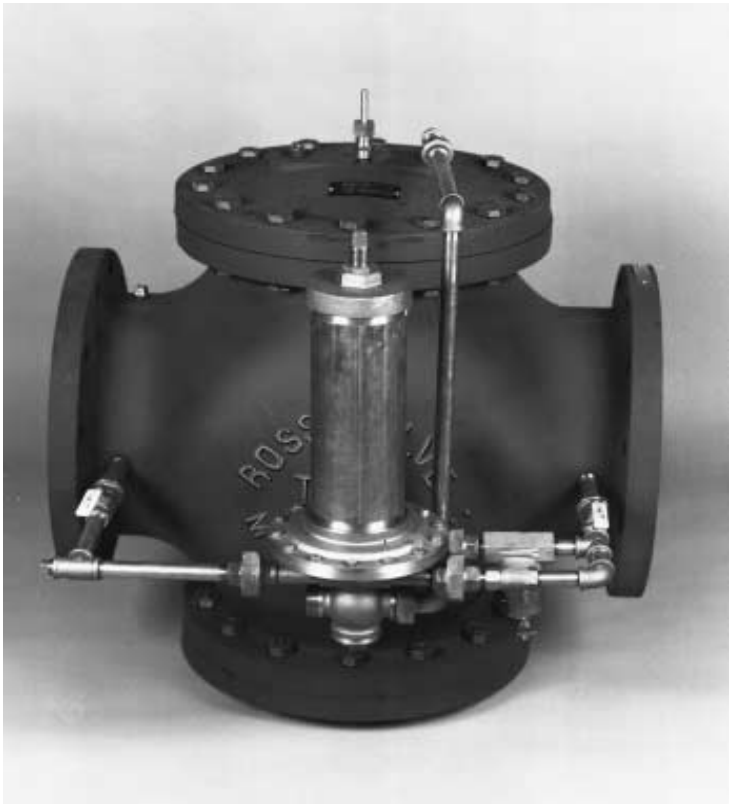
DOUBLE ACTING ALTITUDE VALVE

Purpose: Prevent storage overflow / Enable two way flow Model Number: 40DAWR

Sizes: 4" - 48"
Type: Nonthrottling
Primarily Controlled By:
Hydraulic pressure
Located: In line between distribution (supply / user) and storage
Purpose: To prevent exceeding a maximum preset storage pressure / Let water flow through the same line from storage to user
Band: Fixed within 9" - 4'
Inlet Pressure: Maximum: 300 psi
Inlet Pressure: Minimum: 5 psi
Construction: Body: 4" - 36" - Cast iron (semi-steel) with bronze trim
40" - 48" - Ductile iron, with bronze / stainless steel trim
Control Devices:
Strainer: Model 5F-2
Pilot: Altitude: Model 40DAWR
See overall parts lists and specific parts information for complete details.

Options

1. Cast steel or ductile iron body and stainless steel trim
2. External spring assists (to open or close) - For low head applications
3. Auxiliary pilot added to the control circuit - For faster operation (standard on valve sizes 20 inch and larger)
4. Vacuum breaker line - To prevent a vacuum from holding the valve closed
5. Teflon coated cylinders



Ross engineers customize the basic **40DAWR** to accommodate individual needs.

Customized Features

Any one or a selection of features can be added to the double acting altitude valve.

Code

D - Delayed Opening Feature: Second Double Acting Altitude Valve

N - Speed Control Valve

SG or **SF** - Solenoid Pilot Valve: 3 Way
(Can be modified to stay closed once actuated and require manual opening-latching action)

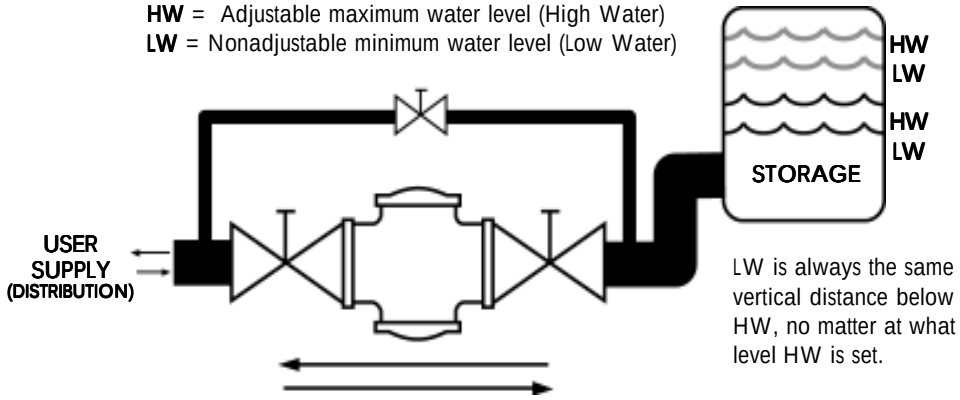
ES - Higher Efficiency Strainer

LS - Limit Switch

(Basic Application on next page)

DOUBLE ACTING ALTITUDE VALVE

Basic Application — Customized Features



Basic Application

1. Prevent overflow of an elevated tank, stand pipe or basin.
2. Let water flow into storage and back to distribution through the same line.

The minimum water level is preset at the factory to be a constant distance below the maximum level no matter what maximum is set. The maximum is adjustable. *The norm for the difference between high and low is between 9" and 4'.*

If: Level in the tank reaches the maximum setting
Ross Main Valve will: Full close to prevent flow from supply into storage.
If: Enough water is discharged from storage to reduce the level (pressure) in the tank to the minimum setting
Ross Main Valve will: Full open to let water flow from supply to storage.
If: Pressure from storage to the user drops below storage pressure
Ross Main Valve will: Full open to let water flow back from storage to the user.

D - Delayed Opening Feature: Second Altitude Pilot Valve

Primarily Controlled By: Hydraulic pressure (supply)
Located: On external piping in series with the first altitude pilot valve
Purpose: To let the main valve opening respond to supply side pressure independently from storage side pressure
BASIC APPLICATIONS:

1. Let water which flows back to distribution respond to a pressure level independent of storage pressure.
2. Force a lower tank that might be hooked to the same system to spill before the higher tank opens.

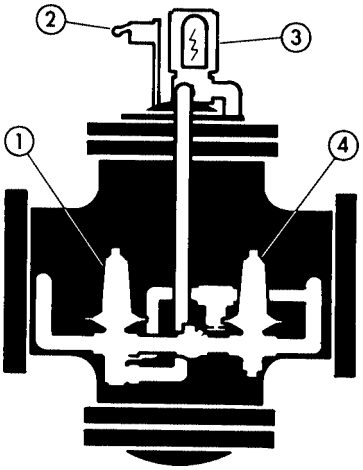
In addition to the basic applications described earlier the delayed opening feature responds to an independent *minimum* acceptable pressure point which is preset for the User/Supply side.

If: User/Supply side pressure falls below the preset level
Ross Main Valve will: Open to let water flow from storage to the user.

Factory: Telephone (518) 274-0961; Fax (518) 274-0210

DOUBLE ACTING ALTITUDE VALVE

Model Number: 40DAWR



FEATURES
1 Pilot Valve (Standard)
2 **LS -** Limit Switch
3 3 Way Solenoid Pilot
4 Pilot Valve (Delayed Opening)

N - Speed Control Valve

Primarily Controlled By: Hydraulic pressure
Located: On external piping
Purpose: In very specific circumstances, to control the valve closure rate on pressure reversal
BASIC APPLICATION: Minimize surge on closure by controlling the valve closure rate.
NOTE: Internal porting on the Ross pilot valves regulates speed control. In almost all instances an external speed control valve is not necessary.
CONSULT A ROSS ENGINEER: To determine if this feature is appropriate for a specific set of conditions.

SG - Opens Valve When Energized:
SF - Opens Valve When De-energized:
Solenoid Pilot Valve - 3 Way

Primarily Controlled By: Electricity
Located: On external control circuit at the juncture leading to mainline storage, the hydraulic pilot and operating chamber
Three openings and two ports control pressure in the operating chamber:
1 Opening - to the operating chamber
1 Opening - to the line (controlled by 1 port)
1 Opening - to pilot (controlled by 1 port)
A 3 way solenoid pilot is always open to the operating chamber.
Purpose: To override hydraulic pilot and lock the main valve in a CLOSED position
BASIC APPLICATIONS:
1. Remove valve's control over line flow/pressure so the system operates as if no valve is involved.
2. Allow the main valve to function in a predetermined manner in case of a power outage.

OPERATION: Energizing and de-energizing the solenoid pilot controls the main valve.
OPTION 1 - *When the pilot is:*
De-Energized - Port to the line opens/waste port closes which allows the main valve to operate as a double acting altitude valve.
Energized - Port to the line closes/waste port opens which locks the valve in a CLOSED position.
OPTION 2 - *When the pilot is:*
De-Energized - Port to the line closes/waste port opens which locks the valve in a CLOSED position.
Energized - Port to line opens/waste port closes which allows the main valve to operate as a double acting altitude valve.

ES - Higher Efficiency Strainer

Located: On external piping
Purpose: To provide extra protection against fouling or damaging the control system from foreign particles
BASIC APPLICATION: Protect external piping and controls when extremely fine particles and/or more than usual debris is expected.
NOTE: This strainer offers an increased capacity to hold debris and comes with a finer screen than the standard model.

LS - Limit Switch

Primarily Controlled By: Valve position indicator
Located: Attached to a valve position indicator
Purpose:
1. To signal if the valve is opened or closed
2. To start or stop allied equipment

BASIC APPLICATION:
1. Signal if the valve is open or closed.
2. Function as an electrical interlock with other equipment (ie. Chlorinator pump, etc.).

COMMON CONFIGURATIONS
1 40DAWR-D
2 40DAWR-SG or 40DAWR-SF

Factory: Telephone (518) 274-0961; Fax (518) 274-0210

DOUBLE ACTING ALTITUDE VALVE

Operation

Control Unit

By regulating flow in and out of the operating chamber, an external piping circuit accurately controls the piston open/closed position. It includes:

1. Hydraulic pilot valve - Controls flow into and out of the operating chamber by means of a
   a. Diaphragm attached to a stem and balanced between a spring load on its top side and storage side water underneath.
   b. Second seat/spring attached to the lower end of the stem. (The spring resistance controlling the maximum pressure is preset and can be adjusted when pressure requirements change.)
2. Check Valve - Monitors flow from the supply side into one port of the hydraulic pilot valve.
3. External piping has five basic piping segments - All are connected to the hydraulic pilot valve and:
   a. Two to the inlet side of the main line valve. (One running through a check valve.)
   b. One to the storage side of the main line valve.
   c. One to the operating chamber.
   d. One to waste.

Operation

The valve is either fully open or fully closed. There is no "real" in between. This straight forward operation provides the necessary control to maintain preset pressure levels.

1. When storage pressure reaches its high water level, the
   a. Storage pressure backs up through the external pipe, into the pilot valve, pushes the diaphragm up.
   b. Pilot valve seat between the upper and lower stems opens.
   c. Water flows from the supply side of the main valve, through the external pipe, through the pilot valve, through the pipe leading into the operating chamber, where it has no way out.
   d. Water pressure builds up in the operating chamber, pushing the piston down.
   e. Main valve fully closes.
2. When storage pressure reaches its low water level (fixed within 9" to 4'), or when supply pressure falls below the tank head, the
   a. Spring loading overcomes the water pressure under the diaphragm.
   b. Expanded top spring:
      1. Closes the pilot seat that allows water to flow from the supply side of the main line valve through the external piping and into the operating chamber.
      2. Opens the lower seat on the lower stem of the pilot valve to empty the operating chamber to waste.
   c. Main line water pushes the piston up when pressure above the piston drops.
   d. Main valve fully opens.

Note

The main valve may assume an intermediate position when feeding from storage to the system. This means valve is satisfying system demand.

Consult a Ross Representative

1. For recommendations if conditions for a vacuum break are encountered.
2. To build a customized valve for any specific requirements.

ROSS ADVANTAGE

1. Ross engineers provide in depth service based on
   a. state of the art technology and
   b. the company's experience which dates back to 1879.
2. Globe body design provides most desirable characteristics for flow into and out of storage.
3. Valve operates totally on hydraulic pressure. No external controls are needed.
4. Valve is completely pre-piped, tested and adjusted in the factory.
5. Rugged construction materials provide a longer valve life and insure that the valve WILL NOT experience sudden breakdowns due to component failures.
6. All parts are built and manufactured in the USA.

Factory: Telephone (518) 274-0961; Fax (518) 274-0210

DOUBLE ACTING ALTITUDE VALVE

Model Number: 40DAWR

Vacuum Break

It is important to install a vacuum break on the control circuit when

1. There is a chance that the system side pressure can fall below atmospheric.
2. The double acting valve is used on very low head basins.
3. If a pump takes suction directly from the system side of the altitude valve so the valve can not be held closed if the distribution side pressure falls below atmospheric pressure.

Caution

1. A SEPARATE SENSING LINE from the control circuit to the tank allows the most accurate control.
2. A SEPARATE SENSING LINE IS NECESSARY if the valve is located 25 ft. or more from the tank so that the head loss between the valve and the tank is significant or if the inlet pressure is high in relation to the tank head (more than 20 psi).
3. Provision should be made in the pit (sump pump or drain) to dispose of this small quantity of water discharged ONLY WHEN THE VALVE IS IN THE PROCESS OF OPENING. Discharge will range from 0.15 gal. for a 4 inch valve to 15.7 gal. for a 24 inch valve.
4. A LIFTING HOOK over the valve or the valve should be located under a manhole or hatch for valves larger than 12 inches.
5. Main line ISOLATION VALVES (plus a small bypass line if necessary) should be provided on the valve inlet and outlet for serving the altitude valve.
6. It is important to service the pilot periodically in order to insure dependable service.

Additional Information

Approximate Shipping Weights (lbs.)

Valve Size	4”	6”	8”	10”	12”	14”	16”	18”	20”	24”	30”	36”	42"	48"
125 lb. Flanges	320	520	830	1080	1700	2120	2850	3600	4690	5800	10800	13000	19500	24500
250 lb. Flanges	360	575	890	1160	1800	2275	3000	3800	4900	6100	11800	14000	20600	26000

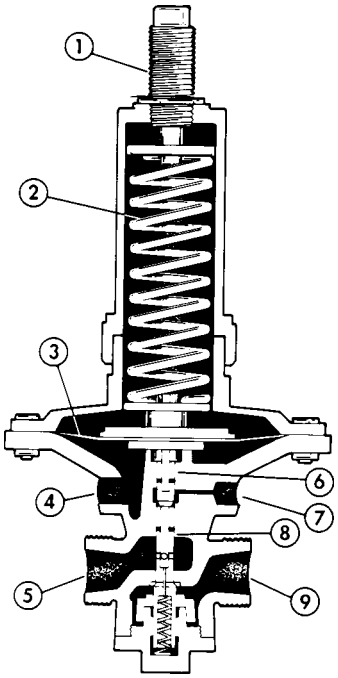
Volume of Liquid Exhausted When the Valve Opens

Valve Size	4”	6”	8”	10”	12”	14”	16”	18”	20”	24”	30”	36”	42"	48"
Cubic Inches	34	82	188	314	565	923	1355	2200	2200	3620	6730	9160	23013	34743
Gallons	0.15	0.35	0.81	1.36	2.44	4.00	5.87	9.50	9.50	15.70	29.00	39.60	99.62	150.4

Caution: Provision should be made in the valve chamber to dispose of the waste water.

DOUBLE ACTING ALTITUDE VALVE

Pilot Valves — Model Number: 40DAWR



PARTS

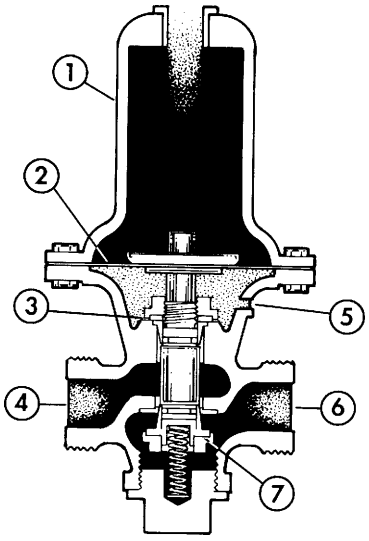
1 Adjusting Screw
2 Adjusting Spring
3 Diaphragm
4 Sensing Port
5 Main Valve Top Cap Connection
6 Upper Stem
7 Supply Port
8 Lower Stem
9 Waste Port

Pilot: External Sensing Port

Primarily Controlled By: Hydraulic pressure
Located: On external piping which is connected to the inlet side, outlet side and the operating chamber
Purpose: To prevent high storage from exceeding a preset maximum level

Operation

1. When the pressure in storage reaches its high water level, the
   a. Storage pressure backs up into the pilot valve, pushing the diaphragm up.
   b. Pilot seat between the upper and lower stems opens letting water flow from the supply side into the operating chamber.
   c. Main valve closes.
2. When distribution pressure falls below storage pressure or when storage pressure falls below a predetermined minimum, the
   a. Check valve which monitors another sensing port to the supply side opens, closing the upper seat.
   b. Top spring loading pushes the pilot diaphragm down.
   c. Upper seat (that controls the supply flow) closes.
   d. Lower pilot seat opens letting water flow out of the operating chamber.
   e. Main valve opens, so water first flows toward lower pressure distribution and then as storage decreases, eventually the water flows into storage, replenishing the level.



PARTS

1 Operating Chamber
2 Diaphragm
3 Upper Seat
4 Main Valve Top Cap
5 Waste Port
6 Supply Pressure
7 Lower Seat

Caution: The waste port (5) must be kept completely free for discharge.

Pilot: Auxiliary

Subordinate to the primary pilot/Provides larger ports
Primarily Controlled By: Hydraulic pressure
Located: On external piping which is connected to the inlet side, outlet side, operating chamber and primary pilot valve
Purpose: To handle the larger volumes of water required to open and close the larger valves

Operation

1. When pressure sensed by the primary pilot exceeds its preset level, the
   a. Water enters the auxiliary top port, closing the seat to waste and opening the seat from supply to the operating chamber.
   b. Operating chamber fills more rapidly than it would without the auxiliary.
   c. Main valve closes more rapidly.
2. When pressure sensed by the primary pilot falls below its preset level, the
   a. Top pressure decreases, causing the stem to rise, open the port to waste and close the port to supply.
   b. Operating chamber empties more rapidly than it would without an auxiliary.
   c. Main valve opens more rapidly.

Standard Pilot Adjustment Ranges

These ranges should be used as a guide only. When specific operating conditions are known, the pilot is constructed to give at least a 30% adjustment above and below the aniticipated set point. Standard pilot adjustment ranges: 4 to 12 ft.; 8 to 25 ft.; 18 to 60 ft.; 50 to 90 ft.; 75 to 140 ft.; 120 to 200 ft.

Factory: Telephone (518) 274-0961; Fax (518) 274-0210

DOUBLE ACTING ALTITUDE VALVE

Specifications — Model Number: 40DAWR

Basic Valve: Double Acting Altitude (40DAWR)

The altitude valve shall be a double acting, closing to prevent overflow when the high water level is reached and opening to permit flow from the tank or reservoir to distribution when distribution pressure becomes less than the full tank head.

The altitude valve shall be ruggedly constructed with a size_____ inch, 125 lb./250 lb. flanged, full ported globe body design.

The altitude valve shall be fully bronze mounted, external pilot operated, with free floating piston (operated without springs, diaphragm or levers), single seat with seat bore equal to size of valve.

Non-throttling action is required for operation either fully open or fully closed.

The minimum travel of the piston shall be equal to 25% of the diameter of the seat.

For true alignment (to correct lateral thrust and stem binding) the piston shall be guided above and below the seat a distance equal to no less than 75% of the diameter of the seat.

The piston shall carry a contoured cushion device that will cause a gradual change in flow area as the valve approaches the seat. The cushion device must move with the piston to minimize head loss when the valve is fully opened and so designed as to insure positive closure.

The main valve shall be packed with leather (or other soft material) to insure tight closure and prevent metal to metal friction and seating.

The main valve shall include a position indicator rod to show position of opening of the piston.

The main valve shall include gauge cocks for testing purposes.

The pilot valve, controlling operation of the main valve, shall have a range for adjustment, be easily accessible and so arranged to allow for its removal from the main valve while the main valve is under pressure.

The pilot valve and all associated piping and fittings necessary for proper operation (except the separate static pressure sensing line if required) shall be factory assembled and furnished with the altitude valve.

Ball valves shall be installed in the control piping to completely isolate the pilot valve when conditions may require pilot isolation for maintenance or repair.

An external strainer with blow-off will be provided in the control circuit to protect the pilot and speed control valves.

The design shall be such that repairs and dismantling internally of the main valve may be made without its removal from the line.

Options

D - The valve will be equipped with a delayed opening feature.

N - The valve will be equipped with a speed control valve to deal with highly specific requirements for controlling the valve closure rate on pressure reversal.

SG - The valve will include a 3 Way solenoid pilot to close the valve fully when the solenoid is energized.

SF - The valve will include a 3 Way solenoid pilot to close the valve fully when the solenoid is de-energized.

ES - The valve will include a higher efficiency strainer to provide extra protection against fouling or damaging the control system.

LS - The valve will include a limit switch to signal if the valve is opened or closed.

Physical and Chemical Properties

The 125 lb. and 250 lb. flanged assemblies shall conform to ANSI standards for flange thickness and drilling and wall thickness of body and caps.

The valve shall be constructed of first class grey iron.

The grey iron shall be free from cold shuts, defective or spongy spots and conforming to ASTM specification A-126 Class B.

The bronze parts shall conform to ASTM specification B-62.

For sizes 4" - 12"

The seat disc shall be bronze.
The main cup plates shall be bronze.
The main bushing shall be bronze.

For sizes 14" - 36"

The seat disc shall be a cast iron center/bronze outer ring.
The main cup plates shall be bronze.
The main bushing shall be bronze.

For sizes 42" - 48"

The seat disc shall be a cast steel.
The main cup plates shall be cast steel.
The main bushing shall be stainless steel.

For all sizes

The external pilot valve shall be bronze
The rugged internal piston shall be bronze.
The seat ring shall be bronze.
The stem nuts shall be bronze.
The seat packing support shall be bronze.
The position indicator shall be bronze.
The bottom cap cylinder shall be bronze.
The piping shall be rigid brass pipe.

(Specifications continued on next page)

DOUBLE ACTING ALTITUDE VALVE

(Physical and Chemical Properties continued)
The strainer shall be bronze body with stainless steel screen.
The ball valves shall be full ported with stainless steel shaft, nut and adjusting handle.
The stainless steel shall be Grade 303 / 304 / 316 / CF8M /_____.

(*Option*) The bottom cap cylinder shall be bronze and teflon coated. The Teflon shall be applied in two parts: Part 1 shall be a primer Teflon coating with a minimum thickness of 5 mils. Part 2 shall be a finish coat of Teflon TFE with a minimum thickness of 5 mils. for a final coat minimum thickness of 10 mils.

Test

The test before shipment may be witnessed by a representative of the Engineers for simulated field conditions and a cold hydrostatic test of at least 100% above the maximum pressure for which the valve is to be operated.

Painting

Ferrous surfaces of the valve shall be coated with NSF Certified Epoxy in accordance with ANSI/NSF Std. 61, and conforms to AWWA D102 Inside System No. 1..

Reference

The valve will be equal in all respects to the basic 40DAWR_____model with customized features checked below; as manufactured by the Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy, NY 12181.

NOTE: To indicate the basic valve with the required customized features, simply add the related codes to the basic valve number.

Example: The valve will be equal in all respects to the 40DAWR-D model as manufactured by the Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy, NY 12181. *(40DAWR-D = 40DAWR with delayed opening feature.)*

Customized Feature Codes

D - Delayed Opening Feature: Second Altitude Pilot Valve
SG - Solenoid Pilot Valve: 3 Way - Closes the Valve When Energized
SF - Solenoid Pilot Valve: 3 Way - Closes the Valve When De-energized
ES - Higher Efficiency Strainer
LS - Limit Switch

NOTE: The Ross Valve Mfg. Co., Inc. reserves the right to modify valve construction which will result in equal or superior performance to existing designs. These modifications may be made at any time and at the sole discretion of the manufacturer.

Factory: Telephone (518) 274-0961; Fax (518) 274-0210