

DICE™ Dosing Module

Model: DS & DM

Installation, Operation and Maintenance Manual

DICE™

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Safety

General

Carefully read this manual before installing, starting up and servicing the DICE™ dosing module.



Warning notes must be strictly followed in order to avoid injuries and damages.

- The module is internally pressurized and can cause injuries if not handled correctly.
- The fluids* used in the dosing module or in the cleaning process may be hazardous.
- The following minimum personal protective equipment should be used near the dosing module: protective gloves, glasses and clothing.
- Always refer to the MSDS for all safety instructions related to the fluids* used.
- Turn off electrical power, depressurize system, release both regulating valves (back pressure valve and pressure relief valve), and vent fluids* to a safe area before servicing the DICE™ dosing module.
- Always flush all fluids* prior to module maintenance.

Refer to technical specifications for the maximum operating flow, pressure and operating temperature.

Modifying the DICE™ module, installing non-factory parts or not following the maintenance procedure listed in the present manual may cause injuries, affect product performance, be hazardous and void existing limited warranties.

*Note: Fluids include: chemicals, polymer solutions, cleaning solutions, water, etc.

Unpacking and Storage

Unpacking

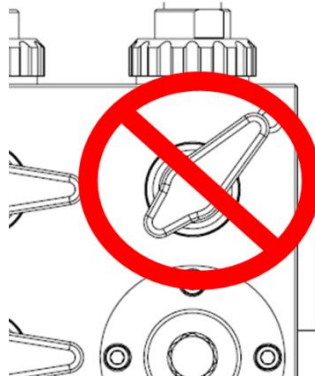
When unpacking the product, ensure that it is defect-free and according to the purchase order. Please notify Meunier Technologies Inc. or your supplier if there are any irregularities.

Avoid any changes to the back pressure valve and pressure relief valve as they may be factory set. Factory set valves are labelled with the desired pressure at each valve.

The box should contain one (1) DICE™ dosing module, one (1) IOM (Installation, Operation and Maintenance) manual and the purchased spare parts.

Storage and Handling

- **The DICE™ dosing module ball valves should be stored in a fully closed position. Storing the DICE™ dosing module with partially open ball valves could cause permanent damage to the ball valve seats, which could lead to ball valve leakage.**



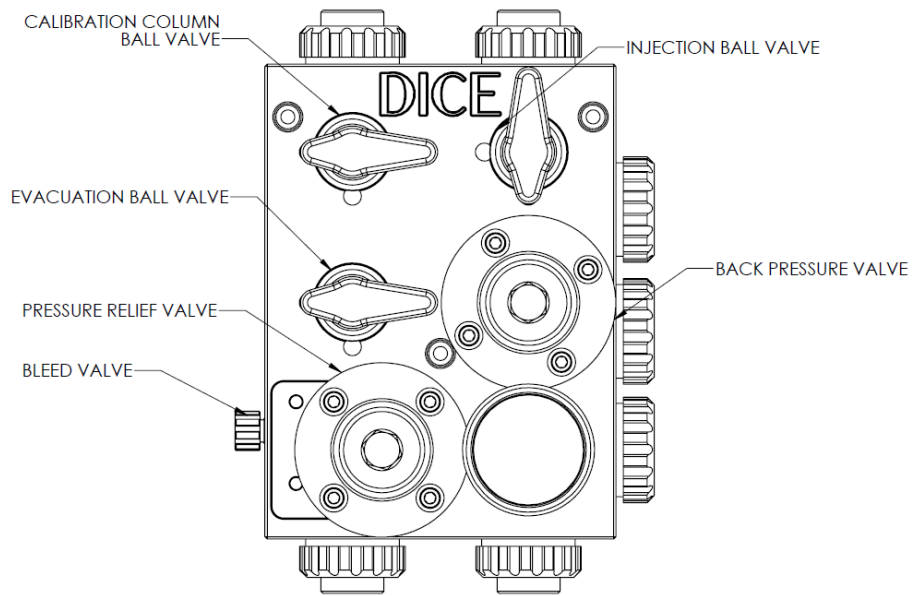
- The DICE™ dosing module must be stored indoors, inside its cardboard box, at a temperature of between 5 °C to 40 °C and with a relative humidity level under 80%.
- The DICE™ dosing module must be stored without any pre-set pressure on the back pressure valve and pressure relief valve.
- Excessive stacking of packages may cause damage to the product. Never stack more than five (5) DICE™ dosing modules.

- Do not store the DICE™ dosing module in a corrosive environment or directly exposed to sunlight.
- Handle the DICE™ dosing module with care. Never throw the dosing module, even when it is in its cardboard box. The product is not designed to sustain impact.
- When transporting the DICE™ dosing module, do not carry it by the ball valve handle or the connectors.

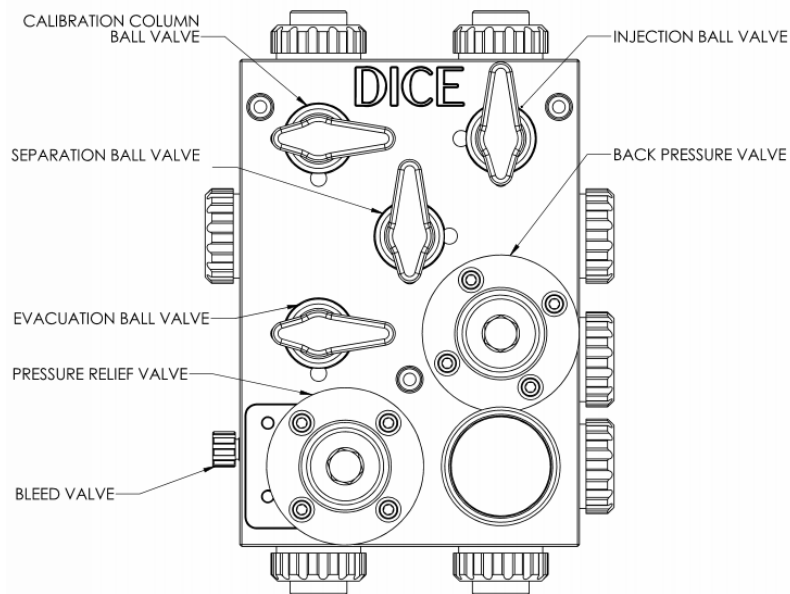
Technical Specifications

Components

DICE™ DS



DICE™ DM

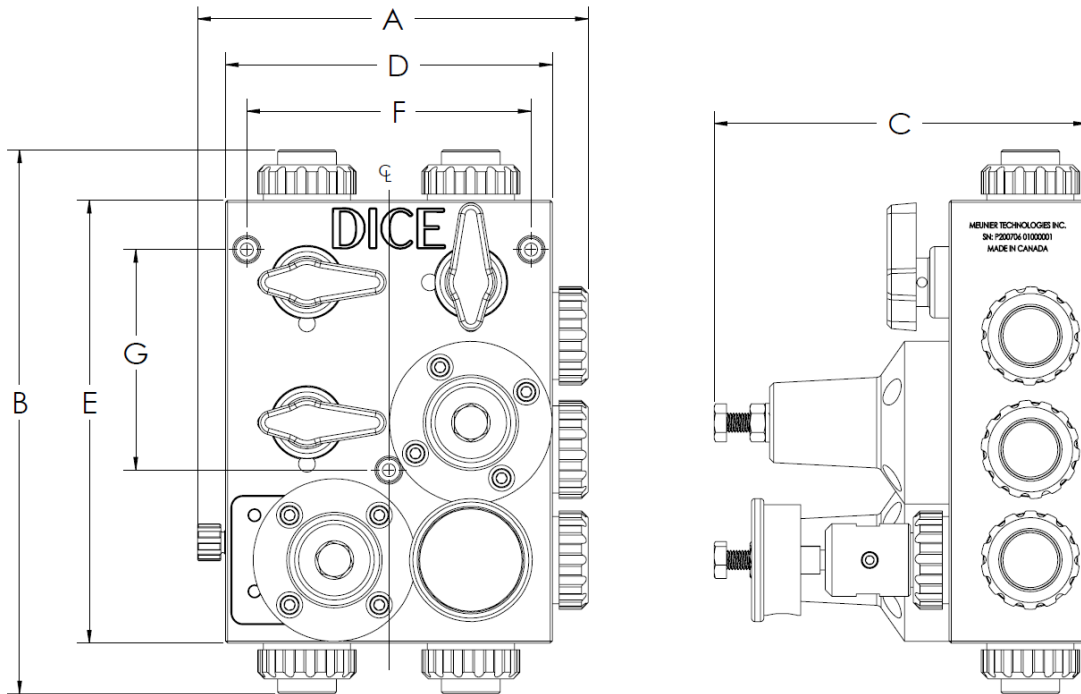


Technical Specifications

Maximum pressure (psi)	DIXX1	DIXX2
	150	250
Ambient operating temperature (°C)	5 @ 40	
Liquid operating temperature (°C)	5 @ 40	
Storage Temperature (°C)	5 @ 40	

The dosing module should not be used with fluid containing slurry or fluid which could crystallize or which may have already crystallized.

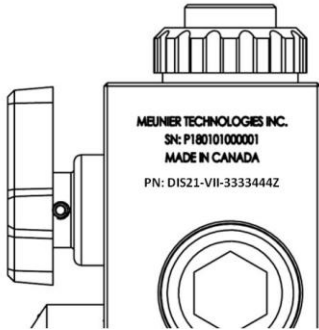
Dimensions



DIMENSIONS mm (in)									
Size			A	B	C	D	E	F	G
1/2"	DS	DIS2X	201,8 (7,94)	280,8 (11.05)	193,4 (7.61)	168,9 (6.65)	228,6 (9.00)	146,9 (5.78)	113,9 (4.48)
	DM	DIM2X	218,6 (8,61)	312,5 (12.30)	193,4 (7.61)	181,6 (7.15)	260,3 (10.25)	159,6 (6.28)	145,7 (5.73)
1"	DM	DIM4X	269,0 (10.59)	376,0 (14.80)	232,7 (9.16)	223,0 (8.78)	296,0 (11.65)	194,0 (7.64)	150,0 (5.90)

Model Number

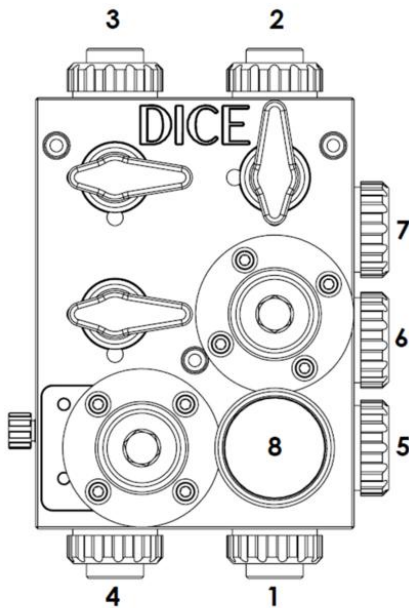
The model number (as purchased) and serial number are engraved on the top of the right side surface of the module.



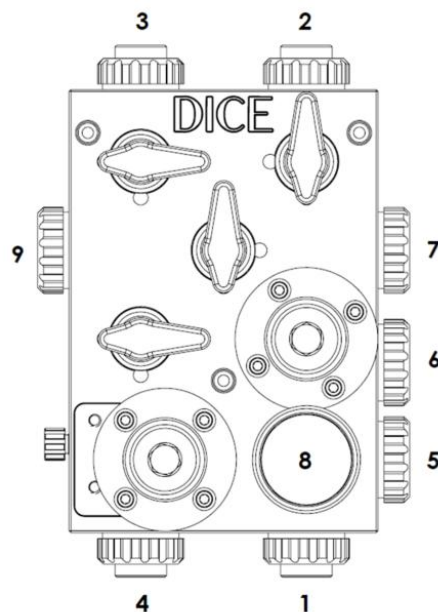
Connection reference numbers

Note: The DICE™ DS is only available in the 1/2" version and the DICE™ DM is available in both the 1/2" and the 1" version.

DICE™ DS SUCTION LIFT



DICE™ DM FLOODED SUCTION



Model Number nomenclature

Example:

DICE™ DS (Only available in 1/2"): DIS21-MVII-3333444Z

DICE™ DM (Available in 1/2" & 1"): DIM21-MVII-3333444Z4

										#1	#2	#3	#4	#5	#6	#7	#8	#9			
DI	S	2	1	-	M	V	I	I	-	3	3	3	3	4	4	4	4	Z	4	XXX	
Family	DICE DI	Configuration	DS S DM M	Size (in)	1/2 2 1 4	Pressure	150 psi 1 250 psi 2	Block Material	PVC V PMMA M PVDF D	Wetted Parts Material	PVC V CPVC C PVDF D	O-ring Material	VITON I EPDM E	Diaph Material	VITON I EPDM E	Connections					
																Size 1/2"					
																Mushroom Nut Only	0				
																1/2" MNPT & Fits LMI Tubing Ferrule Adaptor	1				
																1/2" FNPT	2				
																1/2" Socket; For SCH 80 Rigid Piping	3				
																CAP	4				
																G5/8 & Fits Grundfos Tubing Ferrule Adaptor	5				
																Socket for 20mm OD Rigid Piping	6				
																Flare connector for 1/2" OD PFA Tubing	7				
																Isolator & Pressure	Z				
																Size 1"					
																Mushroom Nut Only	0				
																1" FNPT	2				
																1" Socket; For SCH 80 Rigid Piping	3				
																CAP	4				
																Socket for 32mm OD Rigid Piping	6				
																Isolator & Pressure	Z				
																No Connector & No Mushroom Nut	W				
																				Option	

Other standard materials:





- Ball valve handle: ABS or HDPE plastic
- Ball valve Seat: Virgin PTFE
- Bolts, nuts, washers, set screws: 18-8 stainless steel

Note:

- Vented ball valves offered as an option.
- **Other materials can be supplied upon request.**
- Options will be listed at the end of the Model Number in the option section.

Connectors

As per numbers in *Model Number Nomenclature*

<p>Mushroom Nut Only</p>  <p>Connector code: 0</p>	<p>1/2" MNPT & Fits LMI Tubing Ferrule Adaptor</p>  <p><i>*LMI Ferrule Kit included; Refer to LMI tubing connection system information sheet</i></p> <p>Connector code: 1</p>
<p>FNPT</p>  <p>Connector code: 2</p>	<p>Socket for SCH 80 Rigid Piping</p>  <p>Connector code: 3</p>

<p>CAP</p>  <p>Connector code: 4</p>	<p>G5/8 & Fits Grundfos Tubing Ferrule Adaptor</p>  <p><i>*Grundfos Ferrule Kit <u>not</u> included; sold separately</i></p> <p>Connector code: 5</p>
<p>Socket for Metric Rigid Piping</p>  <p>Connector code: 6</p>	<p>Flare connector for PFA Tubing</p>  <p><i>*Connection nut <u>not</u> included; sold separately</i></p> <p>Connector code: 7</p>
<p>Isolator & Pressure Gauge</p>  <p>Connector code: Z</p>	<p>No Connector & No Mushroom Nut</p>  <p>Connector code: W</p>

Parts List

PART NO.	DESCRIPTION
1	MONO BLOCK
2	CARRIER
3	STEM
4	BALL
5	STEM NUT
6	SEAT
7	O-RING – CARRIER
8	O-RING – SEAT
9	O-RING – STEM
10	O-RING – STEM NUT
11	VALVE HANDLE
12	HANDLE SET SCREW
13	BP/PR TOP BODY
14	SPRING BOTTOM SEAT
15	SPRING TOP SEAT
16	DIAPHRAGM
17	SPRING
18	SOCKET HEAD SCREW
19	ADJUSTMENT SCREW
20	HEX NUT
21	PR/BP WASHER
22	SLEEVE CONE ADAPTER
23	O-RING – SLEEVE CONE ADAPTER
24	ISOLATOR AND PRESSURE GAUGE
25	MUSHROOM NUT
26	CONNECTOR SOCKET
27	CONNECTOR NPT
28	CONNECTOR HOSE
29	CAP
30	O-RING - CONNECTOR
31	MOUNTING WASHER
32	BLEED VALVE
33	O-RING -BLEED VALVE

Refer to the figures in the *Installation and Disassembly and Assembly* sections for PART NO.

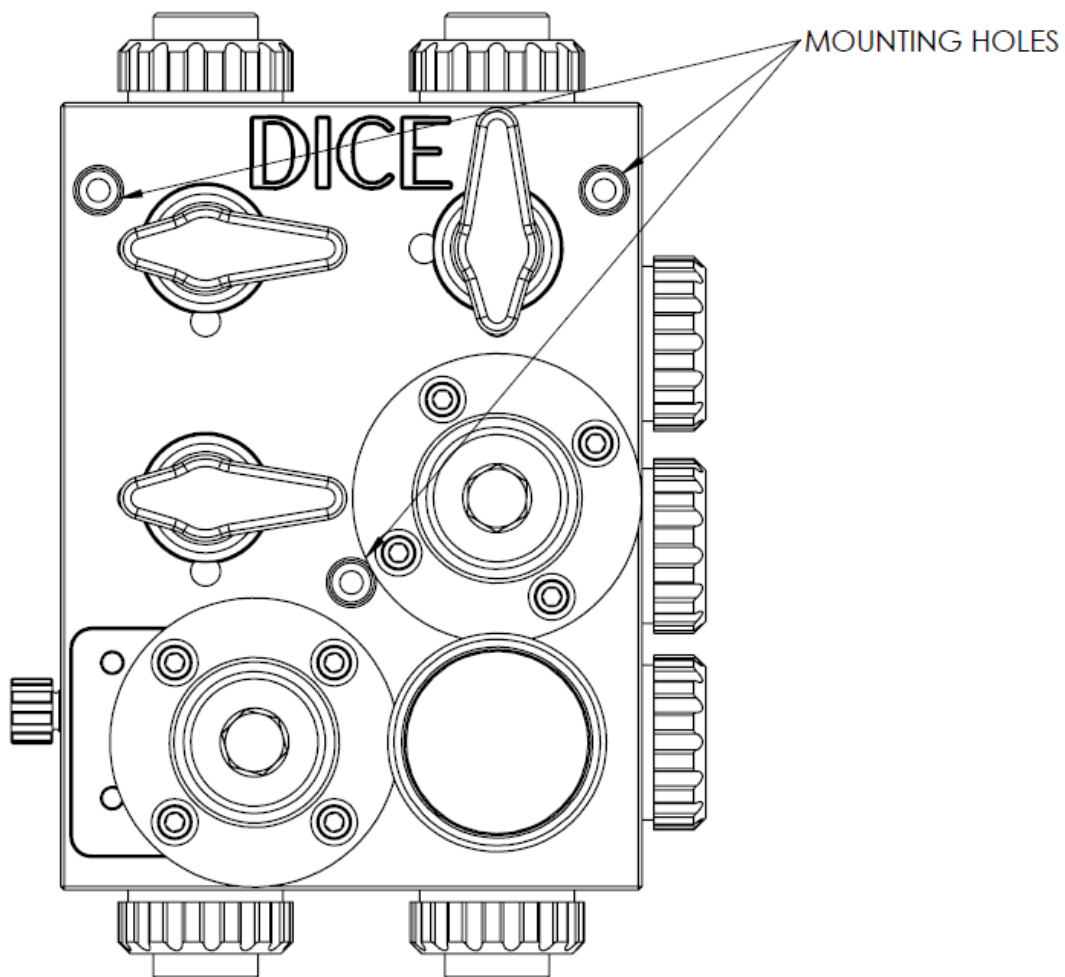
Note: 25, 26 and 27 are exemplary connectors. All the connector configurations can be found in the Model Number nomenclature of the IOM (Installation, Operation and Maintenance Manual).

Installation

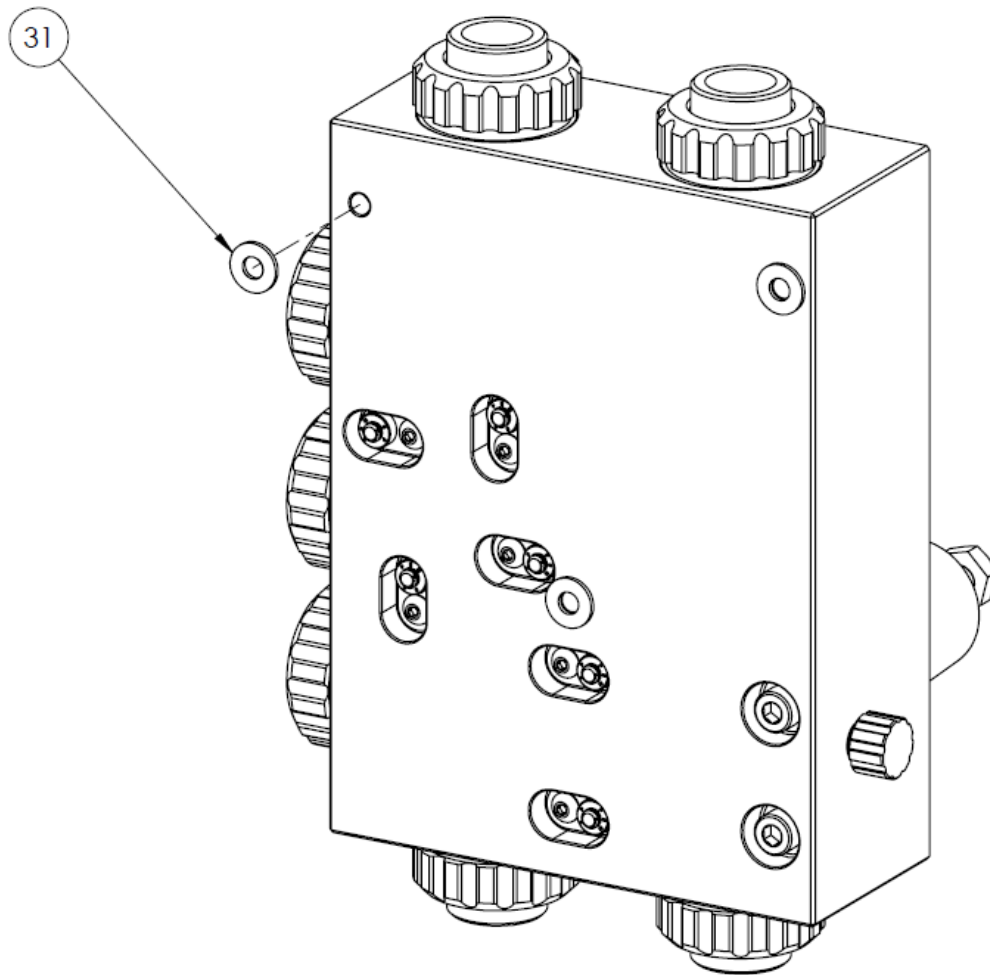
Warning! Always use the proper tool for each step of the installation.

Mounting

The DICE™ dosing module is designed to be mounted on a planar surface using the three (3) mounting holes. The DICE™ should always be mounted so that the injection port is facing upwards as shown in the following figure. To avoid accumulation and trapped air, the DICE™ should always be levelled.



To avoid mechanical stress on the DICE™ body, put the three (3) washers (31) provided between each of the mounting holes (rear face) and the mounting surface. It is important to make sure that no corner is touching the mounting surface. Only the washers should touch the mounting surface. See the following figure for this type of mounting. Mounting holes can accommodate both M6 and ¼ size socket head screws. Each screw should be torqued to 35 in-lb.



When installing the DICE™ dosing module, remember to factor in sufficient space for module maintenance.

Connections



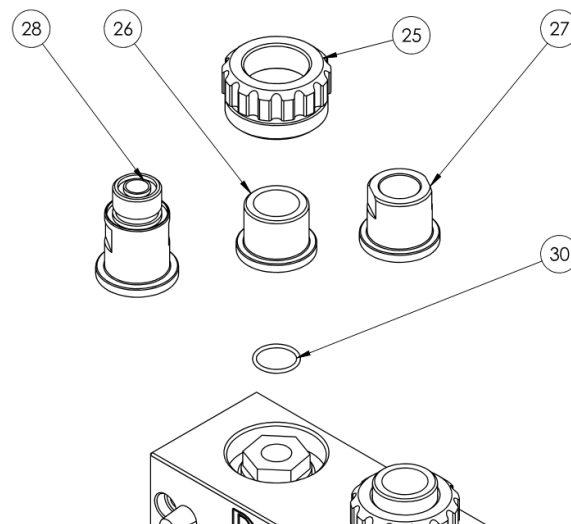
In order to suit all application needs, a variety of connections are available. All connections (NPT, Socket, Hose, etc.) are assembled on the block using the mushroom nut (25). This type of assembly allows for simple disassembly of connections, thereby avoiding the need to cut any pipe when doing maintenance.

In order to assemble the pipe with the chosen connection type, slide the mushroom nut (25) onto the connector (26/27/28). Insert the pipe or flexible hose into the connector according to state-of-the-art rules so that the two parts are securely fastened to each other.

The pipes and tubing should be perfectly aligned with the dosing module connections to prevent mechanical stress. Excessive stress can cause part failure.

Once the assembly is completed, fasten it to the desired port on the block. When tightening the mushroom nut (25), verify that the o-ring (30) is well positioned in the connector groove (26/27/28). The mushroom nut (25) should be hand tightened only; no tools should be used for this. Ensure that the o-ring is properly squeezed.

Connectors: Socket (26), NPT (27), Hose (28), Cap (29)



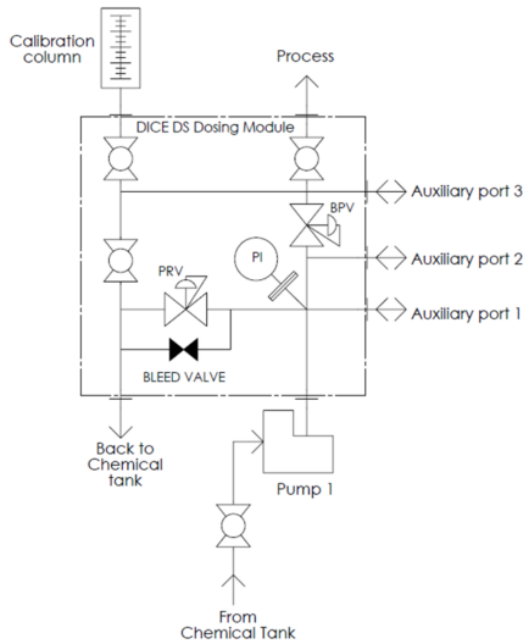
If an accessory is connected to the accessory port (ex: pulsation damper), it must be equipped with its own support. The dosing module is not designed to support the accessory weight.

Note: 25, 26 and 27 are exemplary connectors. All the connector configurations can be found in the *Model Number nomenclature* of the IOM (Installation, Operation and Maintenance Manual).

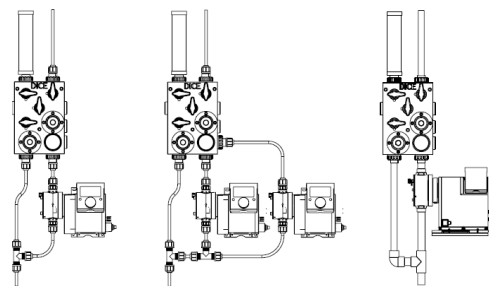
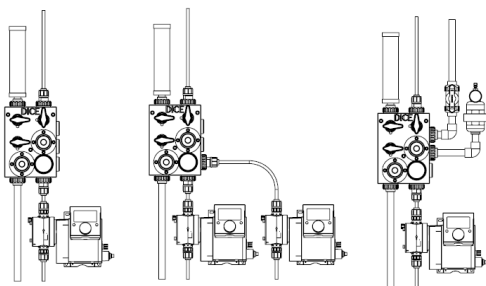
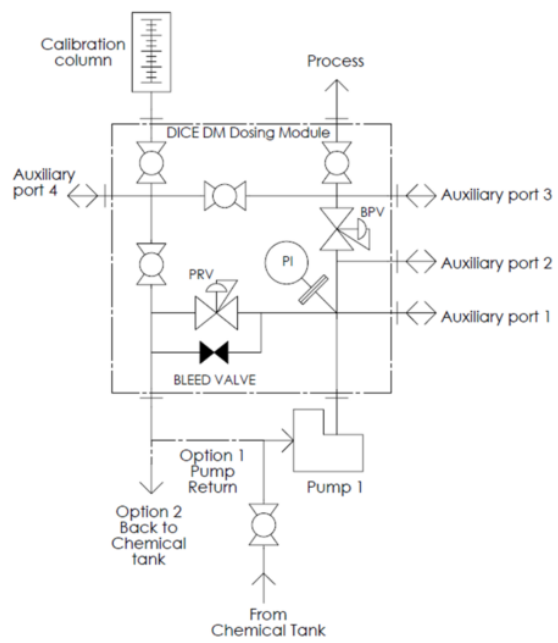
Typical Installation

The following figures can be used as a typical installation of the DICE™ dosing module in a dosing system.

DICE™ DS SUCTION LIFT



DICE™ DM FLOODED SUCTION



Note: Never use a pipe wrench for dosing module installation.

Operation

Start-up

Prior to system start-up, the responsible individuals should be informed of the safety instructions to be followed. This manual should be available at all times.

Setup and adjustment

The pressure relief and back pressure valve needs to be adjusted prior to system operation.

Note: If requested upon purchase, the back pressure and pressure relief valve can be factory preset. If so, no adjustment is required prior to system operation.

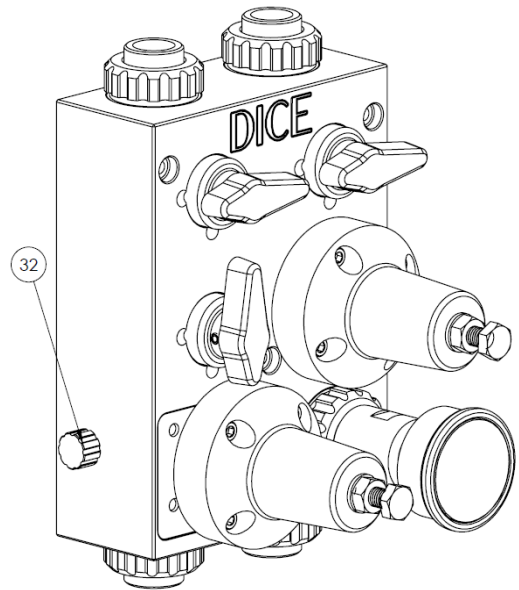
Pump priming assistance

In order to assist and optimise initial pump priming, a bleed valve (32) has been integrated on the left side of the DICE Module. The valve allows evacuating potential trapped gas between the pump outlet and the back pressure valve that could be preventing the pump from priming.

In order to assist pump priming, slightly open the bleed valve (32) by unscrewing it while the pump is cycling until fluid starts passing through. Only partial unscrewing is required. The Bleed valve does not need to be (and should not be) fully unscrewed to assist pump priming.

Then simply close the bleed valve and carry on with either the DICE™ set-up and adjustment or the system normal operation.

Note: The bleed valve can also assist with pump priming if the pump loses prime during normal operation.



Pressure relief valve adjustment

In order to adjust the set point of the Pressure Relief valve, the module's three ball valves must be in the closed position.

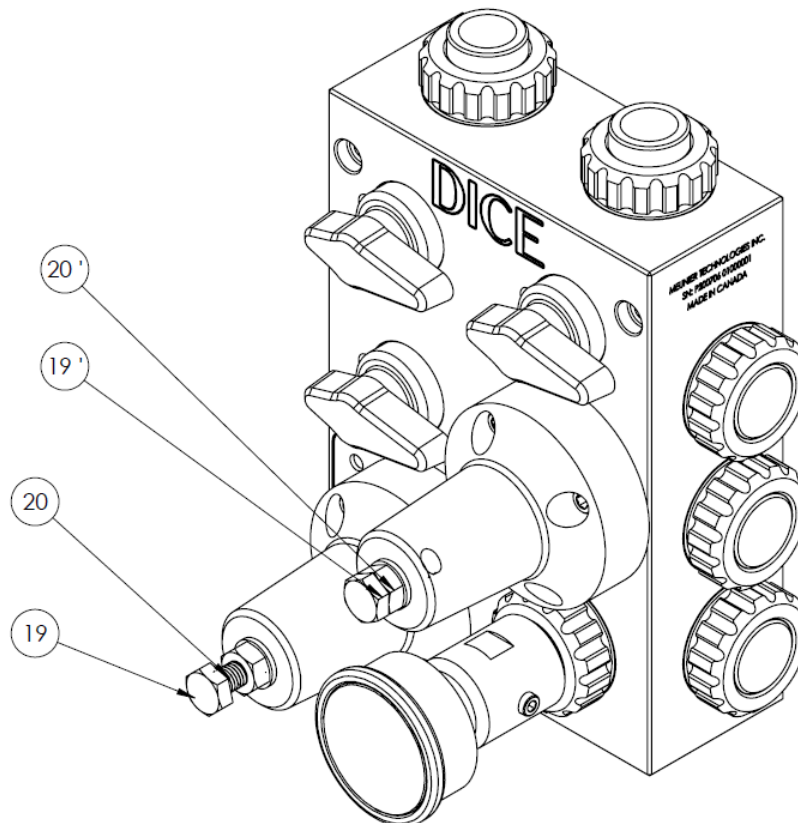
Start by screwing completely the back pressure adjustment screw (19').

Start the pump and wait until fluid passes through the pressure relief valve into the evacuation port. Use the adjustment screw (19) to obtain the desired pressure set point.

Once the desired set-pressure is obtained, tighten the counter nut (20), stop the pump and slowly open the evacuation valve to release the system pressure. Proceed with the back pressure valve adjustment.

Notes:

- The maximum torque to be applied on the adjustment screw (19 & 19') and counter nut (20 & 20') is **35 in-lb**.
- Turning the screw clockwise increases the set pressure.



Back pressure valve adjustment

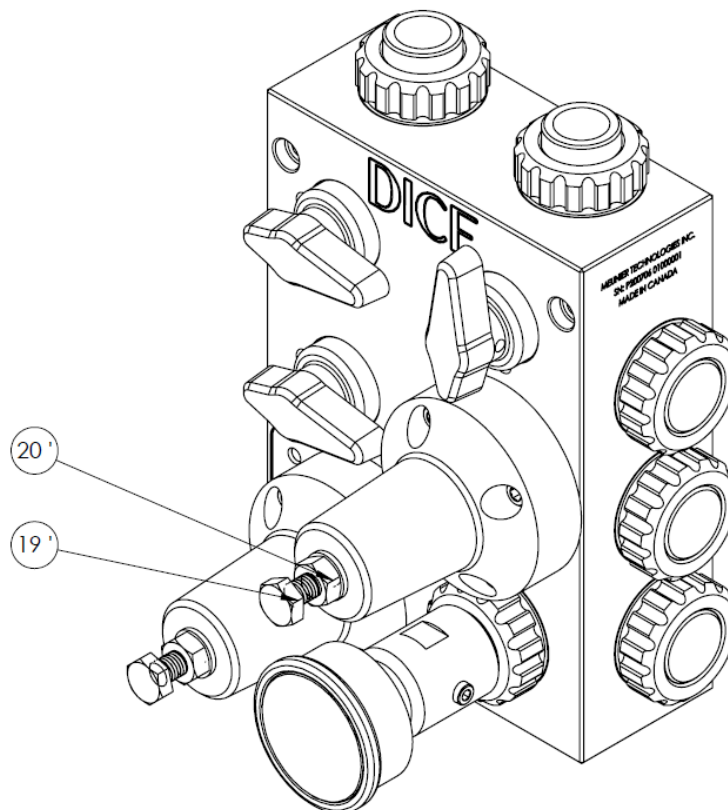
In order to adjust the set point of the back pressure valve, the evacuation and calibration column valve must be in the closed position. The injection valve must be in the open position. Start the pump and wait until fluid passes through the back pressure valve. Use the adjustment screw (19') to obtain the desired pressure set point, by initially unscrewing the back pressure adjustment screw (19').

Once the desired set-pressure is obtained, tighten the counter nut (20'). Then proceed with system calibration.

Important: It is recommended to set the back pressure at 20psi over the process pressure.

Notes:

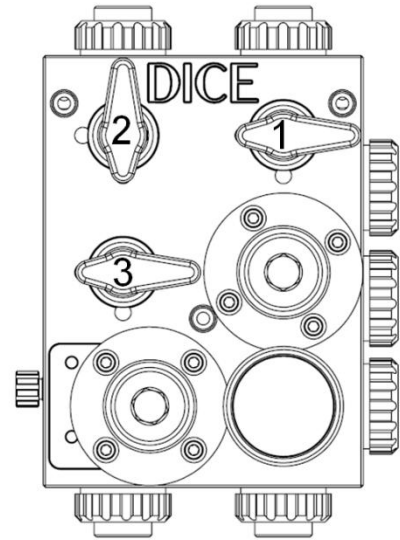
- The maximum torque to be applied on the adjustment screw (19') and counter nut (20') is **35 in-lb**.
- Turning the screw clockwise increases the set pressure.



Dosing Pump Calibration

DICE™ DS

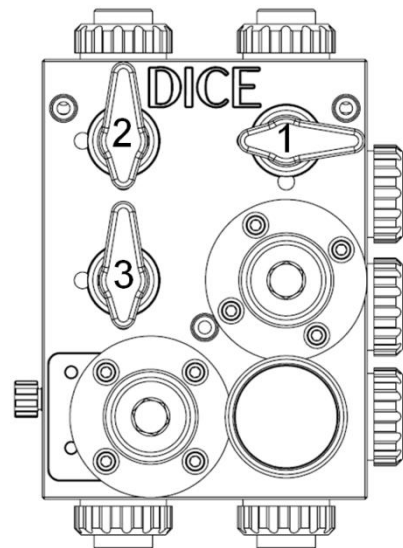
1. The back pressure and pressure relief valve need to be adjusted prior to pump calibration.
2. The evacuation (3) and injection valve (1) must be in the closed position. The calibration column valve (2) must be in the open position.
3. Once the pump calibration is done, open the evacuation valve (3) to empty the calibration column.
4. Close the evacuation (3) and calibration column valve (2) and open the injection valve (1).



Refer to dosing system manual for the calibration procedure.

Note:

- The top of the calibration column must be vented in order to empty its contents using the evacuation valve (3).
- Refer to dosing pump manual for the calibration procedure.

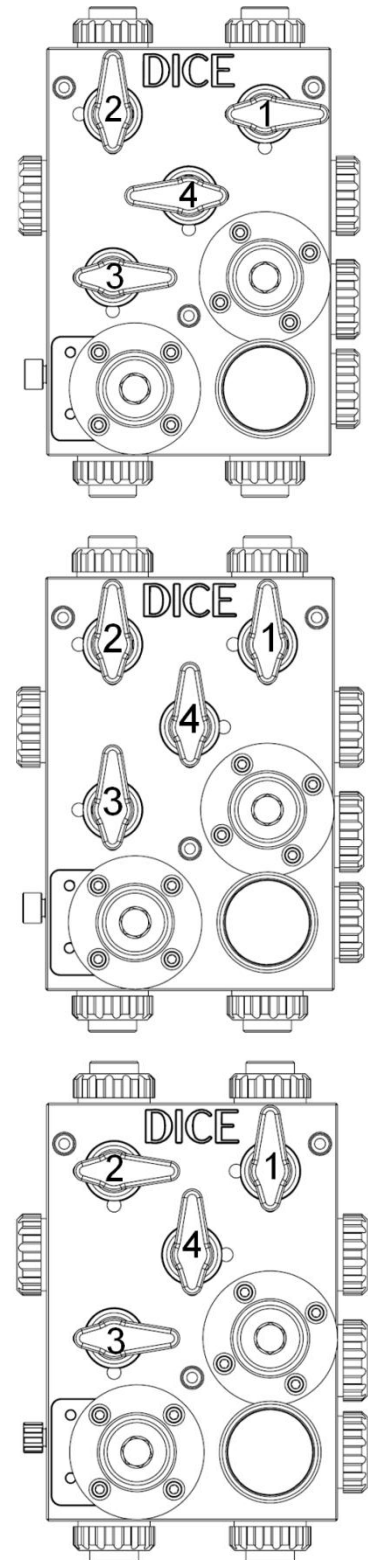


DICE™ DM

1. The back pressure and pressure relief valve need to be adjusted prior to pump calibration.
2. The evacuation (3) and injection valve (1) must be in the closed position. The calibration column valve (2) and the separation valve (4) must be in the open position.
3. Proceed to the pump calibration.
4. Once the pump calibration is done, close the chemical tank isolation valve (either located at the chemical tank or on the pump suction line).
5. Close the separation valve (4) and open the injection valve (1).
6. Open the evacuation valve (3) to drain the calibration cylinder content.
 - a. For suction lift applications, the content will drain by gravity to the tank located under the system.
 - b. For flooded suction applications, start the pump to empty the calibration column content into the process.
7. Close the evacuation valve (3) and calibration column valve (2).
8. Open the chemical tank isolation valve.
9. The system is now ready for operation.

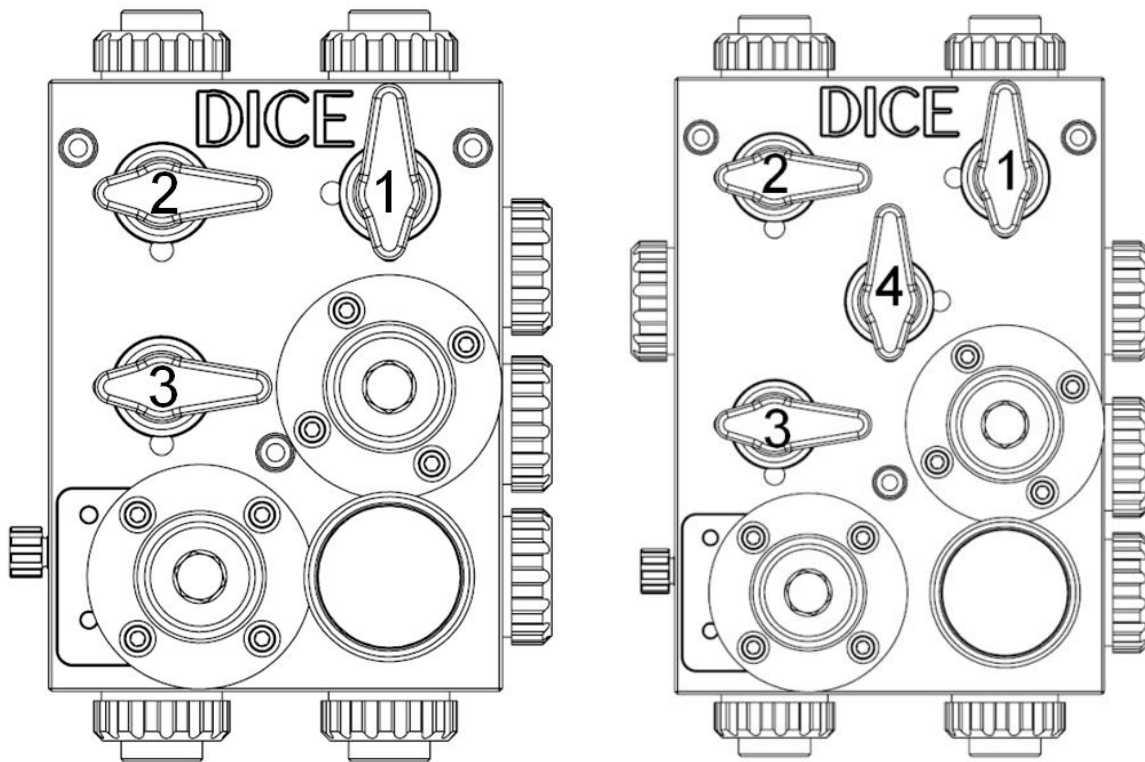
Note:

- The top of the calibration column must be vented in order to empty its contents using the evacuation valve (3).
- Refer to dosing pump manual for the calibration procedure.



Normal Operation

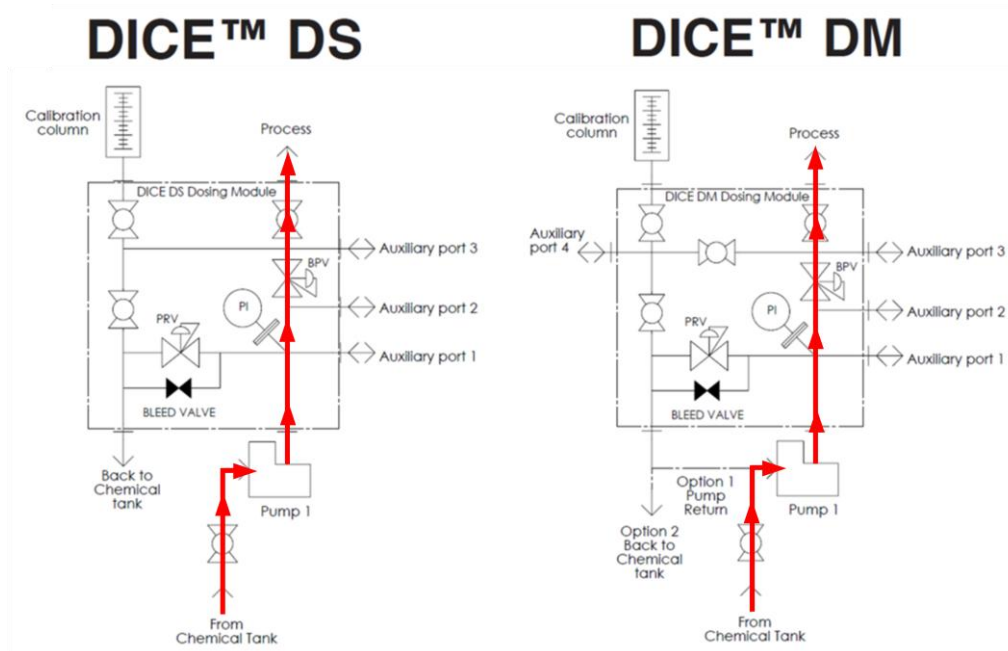
In normal operation, the evacuation (3), separation valve (4) and calibration column (2) valve should be in the closed position. The injection valve (1) should be in the open position.



In normal operation, the pressure indicator reading should be the value of the pressure set-point of the back pressure valve. If this is not the case, refer to the troubleshooting section of the present manual.

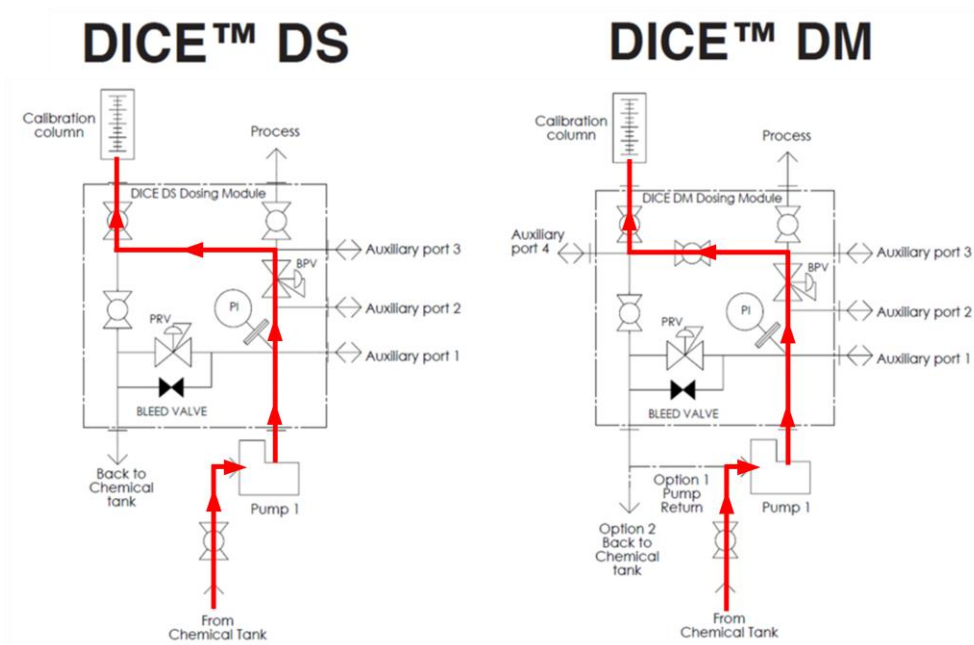
Typical operating modes

Injecting (normal operation)

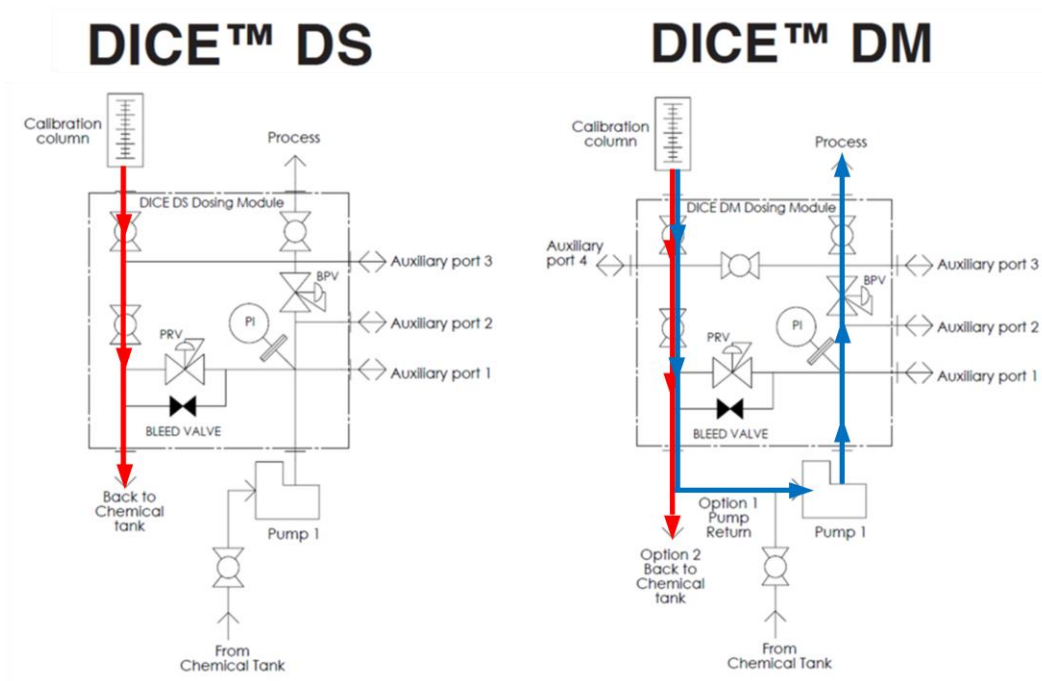


Pump calibration

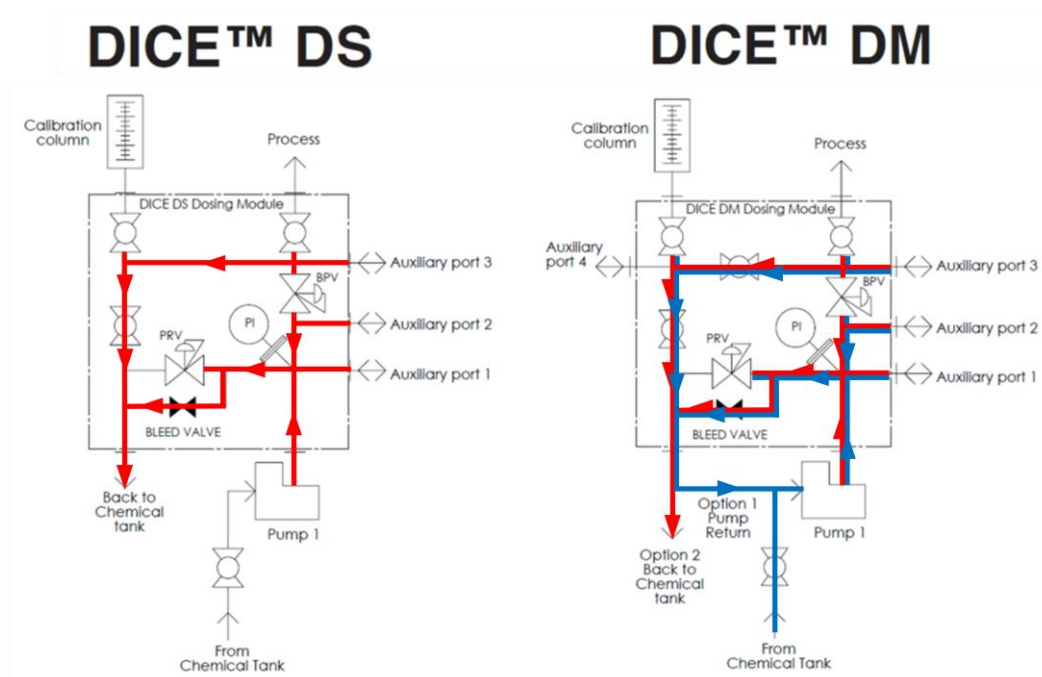
Filling the calibration cylinder



Emptying the calibration cylinder

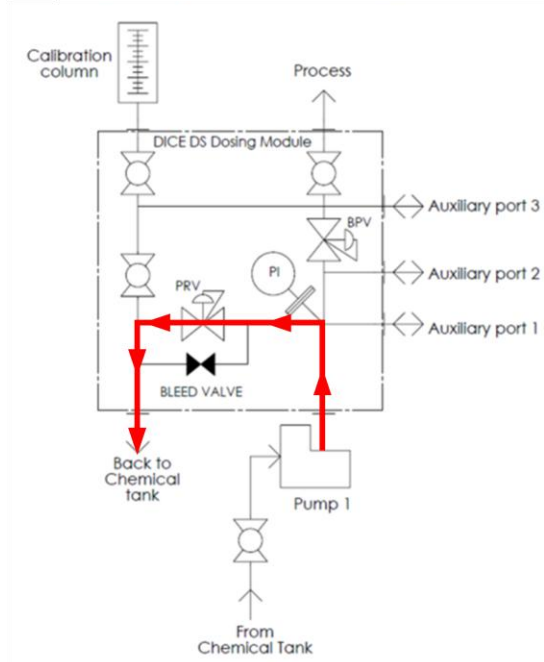


Depressurizing the DICE™ module

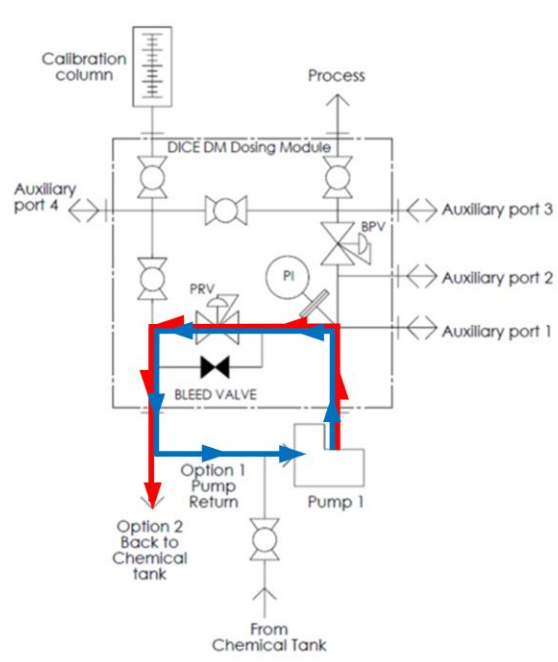


Pressure relief (Preventing overpressure condition)

DICE™ DS



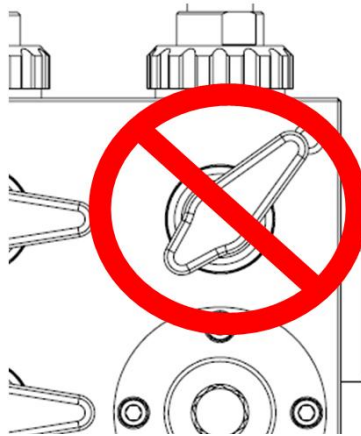
DICE™ DM



Ball Valves

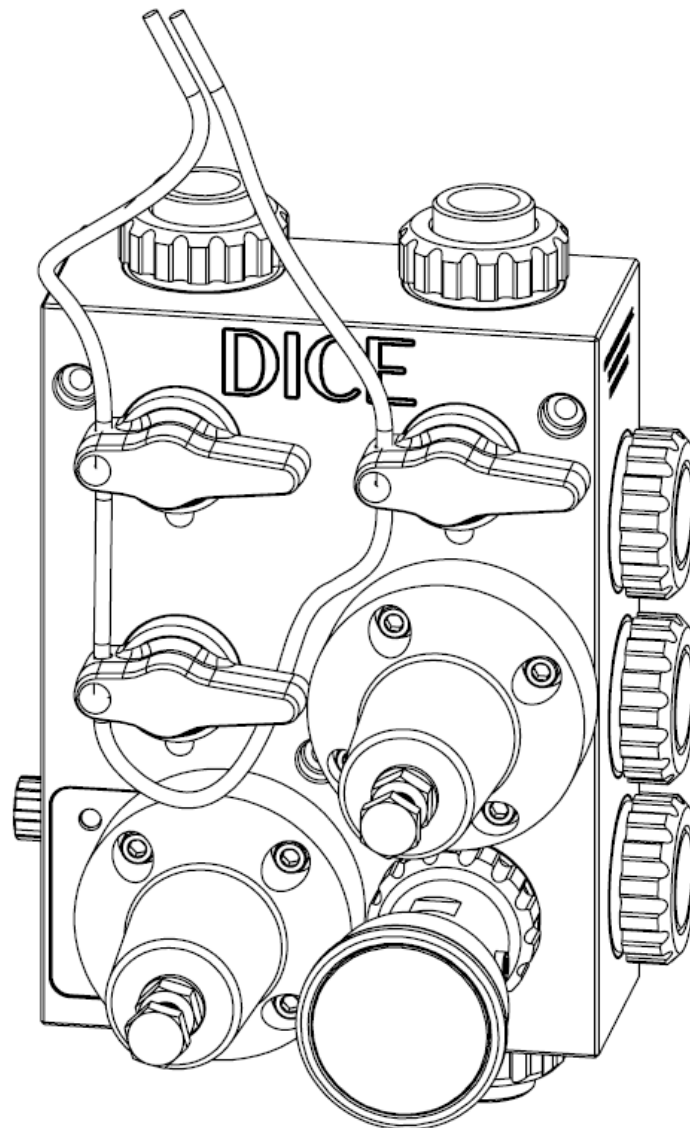
The DICE™ dosing module ball valves should never be partially open or partially closed for a long period of time. This position could cause permanent damage to the ball valve seats, which could lead to ball valve leakage.

The ball valves are designed for on-off service only. Throttling (partial opening) may cause excessive and non-uniform wear on the seats. The ball valve should always be left in an either fully open or fully closed position after operation.



Lockout

The DICE™ dosing module can be ordered with the optional lockout handle kit. The lockout handle kit can also be bought separately. The purpose of the lockout handles is to lock the ball valves at the desired position. To lock the handle in the desired position, the locking ball device should be located in the spherical groove of the block. Insert the provided lockout wire through each handle. Ensure that each ball valve is locked.

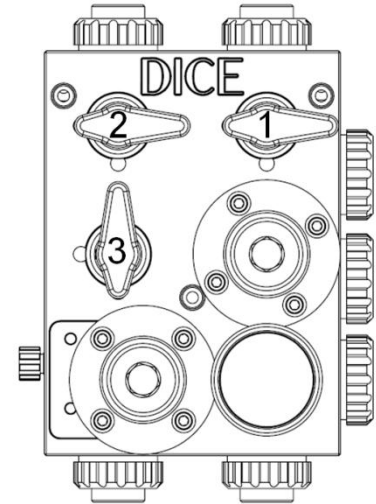


DICE™ module depressurizing

In order to fully depressurize in DICE™ module two actions are required:

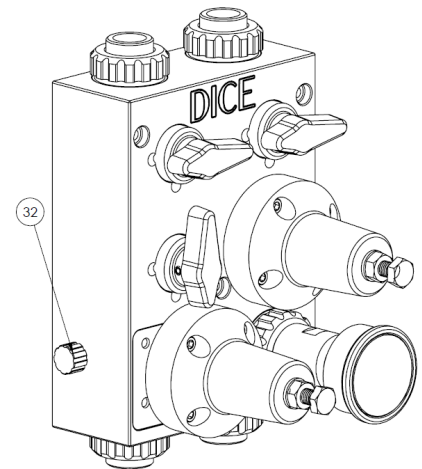
Downstream of the back pressure valve

Depressurizing the DICE internal pressure downstream of the back pressure valve can be performed by closing the injection ball valve (1) and the calibration column ball valve (2) and opening the evacuation ball valve (3). See note for flooded suction applications.



Upstream of the back pressure valve

The pressure upstream of the back pressure valve can be released by slightly unscrewing the bleed valve (32). Only partial unscrewing is required. Depressurizing can be visually notice by looking at the pressure indicator while unscrewing the bleed valve. The Bleed valve (32) does not need to be (and should not be) fully unscrewed to depressor the internal pressure uptrend.



Note:

- The above procedure only allows depressurizing the DICE™ internal cavities. Chemical pressure may still be present downstream of the ball isolation valve (for example process pressure could be seen downstream of the closed injection ball valve). This pressure must be released prior to disconnecting the DICE™ from the tubing or rigid piping.
- If the DICE is installed in a flooded suction application, the pump suction line should be drained prior to depressurizing the DICE™ module.
- No tool should be used to screw, unscrew or tighten the bleed valve. Hand tight only.



Warning:

The above depressurizing procedure is informative and should in no way limit the operator's responsibility to validate the absence of pressure before performing maintenance on the DICE™ module.

Even in the absence of pressurized chemical the following minimum personal protective equipment should be used near the dosing module: protective gloves, glasses and clothing. Always refer to the MSDS for all safety instructions related to the fluids used.*

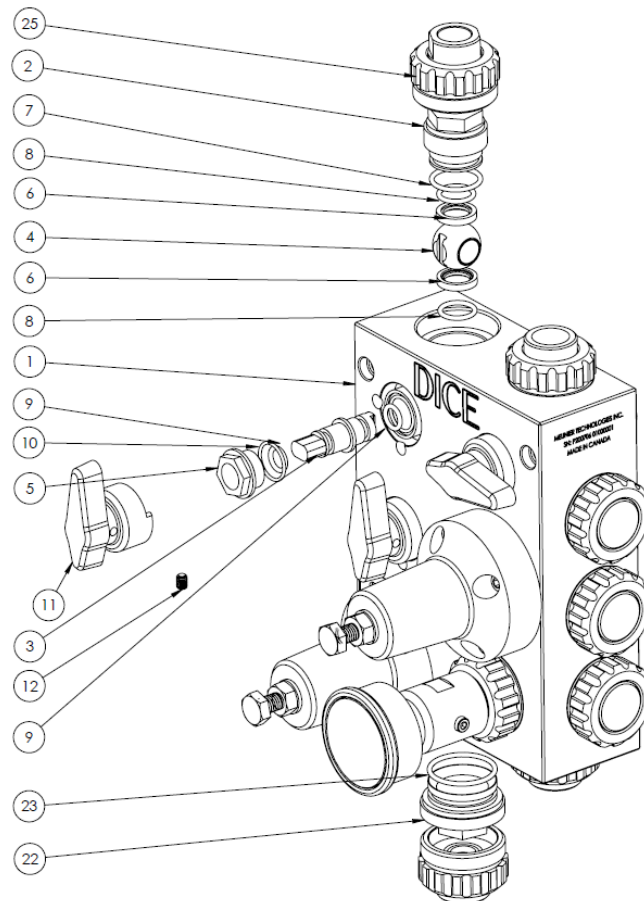
Maintenance

Disassembly and Assembly

WARNING: During operation, the module is internally pressurized with fluid such as chemicals, which may cause injuries. Before any disassembly manipulation, make sure that there is no more internal pressure. Follow the steps listed in the first section of the manual for a safe work environment.



Ball valve



Ensure the ball valve inner (housing) pressure is released by partially opening the ball valve. All ball valves need to be in the closed position prior to disassembly. **When using sockets, apply axial force to prevent the socket from skipping.**

1. Loosen the mushroom nut (25) and remove the connector (26/27/28).
2. *Loosen and remove the sleeve cone (22) with a 27-mm socket.
3. Loosen and remove the ball valve carrier (2) with a 27-mm socket.
4. Remove the ball (4) from the ball valve housing.

5. Remove the ball valve seats** (6) from the carrier (2) and the block (1).
6. Loosen the handle set-screw (12) with a 3-mm Allen key and remove the handle (11).
7. Loosen the stem nut (5) with a 22-mm socket and remove the stem nut (5) and stem (3) from the block (1).

*Only for evacuation ball valve or the center ball valve (For the DICE™ DM).

** When removing the ball valve seats (6), gently mark (with a black marker) the opposite side of the seats (6) (not facing the ball (4)) to ensure proper reassembly.

Inspect all parts and replace them if necessary.

To re-install the ball valve, follow steps 1 through 7 in reverse order.

When reinstalling the ball valve seats (6), ensure that the black mark is on the opposite side of the ball (4) (facing the block (1) and facing the carrier (2)).

If new ball valve seats (6) are used during the reinstallation, gently operate the ball valve 5 times after tightening the carrier (2).

When reinstalling the connector (29), ensure the o-ring (31) is well positioned in the groove.

Important:

Torque the carrier (2) to 20 in-lb (dynamically).

Verify that the carrier (2) position from the block (1) surface is within the following tolerances:

- ***Calibration column and injection ball valve: 0 mm (0 in; flush to the block surface) ±0.25 mm (0.010 in)***
- ***Evacuation ball valve: 71.6 mm (2.820 in) ±0.25 mm (0.010 in)***

Torque the stem nut (5) to 30 in-lb.

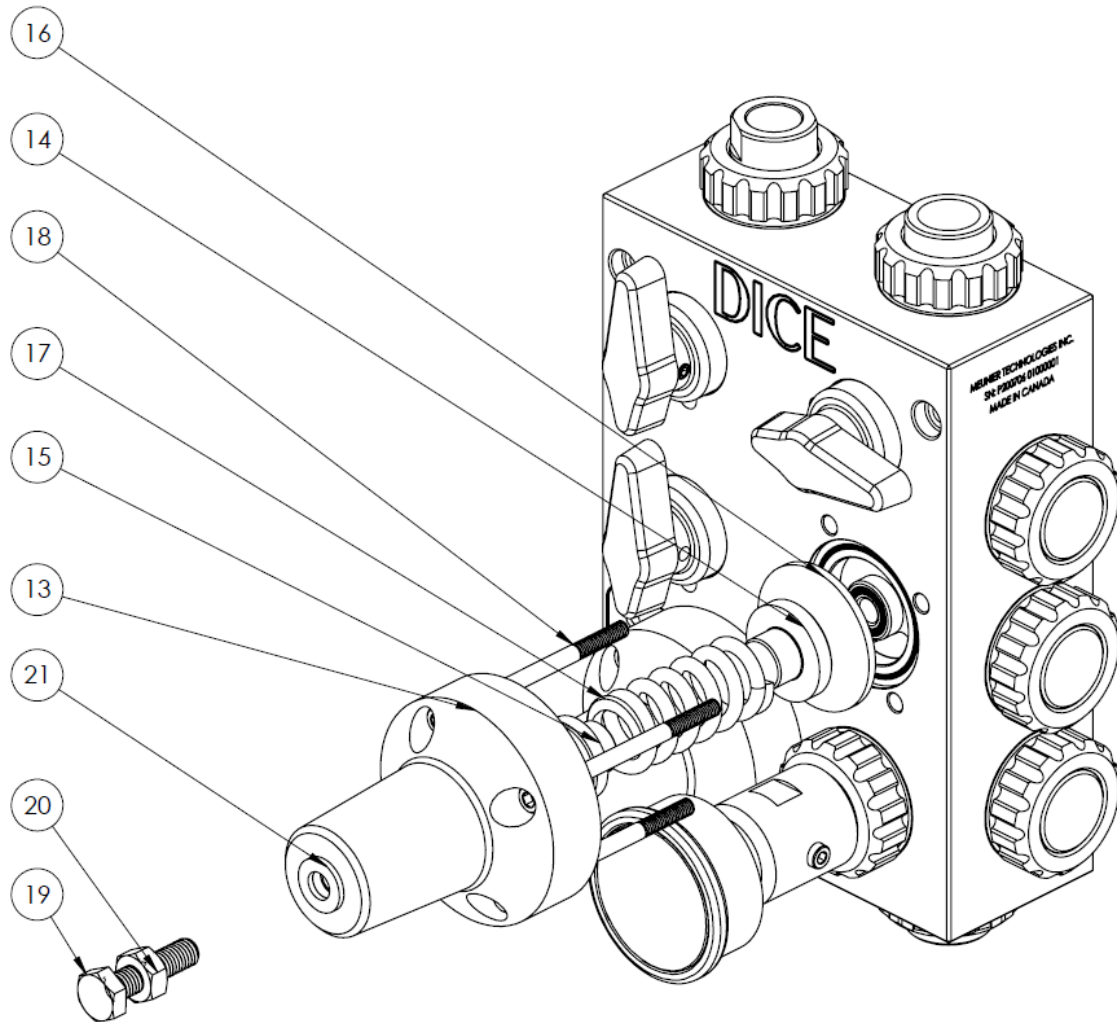
Torque the handle set screw (12) to 60 oz-in.

Always grease all o-rings with clear food grade silicone NLGI #1 grease prior to assembly.

The following tools are required:

- Carrier (2): 27-mm socket
- Handle set screw (12): 3-mm Allen
- Stem nut (5): 22-mm socket
- Torque wrench

Pressure relief and back pressure valve

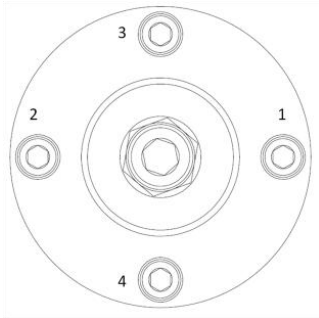


1. Using a 17-mm socket wrench, loosen and remove the adjustment screw (19) along with the counter nut (20) and washer (21).
2. Loosen and remove the four regulating valve mounting bolts (18) with a 5-mm Allen key.
3. Remove the regulating valve body (13).
4. Remove the spring assembly (spring (17), top seat (15) and bottom seat (14)).
5. Remove the diaphragm (16) from the block (1).

Inspect all parts and replace them if necessary.

To re-install the regulating valve, follow steps 1 through 5 in reverse order.

Gently screw all four bolts following the pattern below.



Important:

Torque the 4 mounting screws to 35 in-lb.

Make sure the regulating valve body (13) is properly seated on the block (1) by ensuring no gap is present between the two parts, using a filler gauge on four different points.

The following tools are required:

- Adjustment screw (19): 17-mm socket wrench
- Mounting screws (18): 5-mm-Allen
- Torque wrench

Once the regulating valve is installed, proceed with the regulating valve adjustment. Follow the above procedure for back pressure valve and pressure relief valve adjustment.

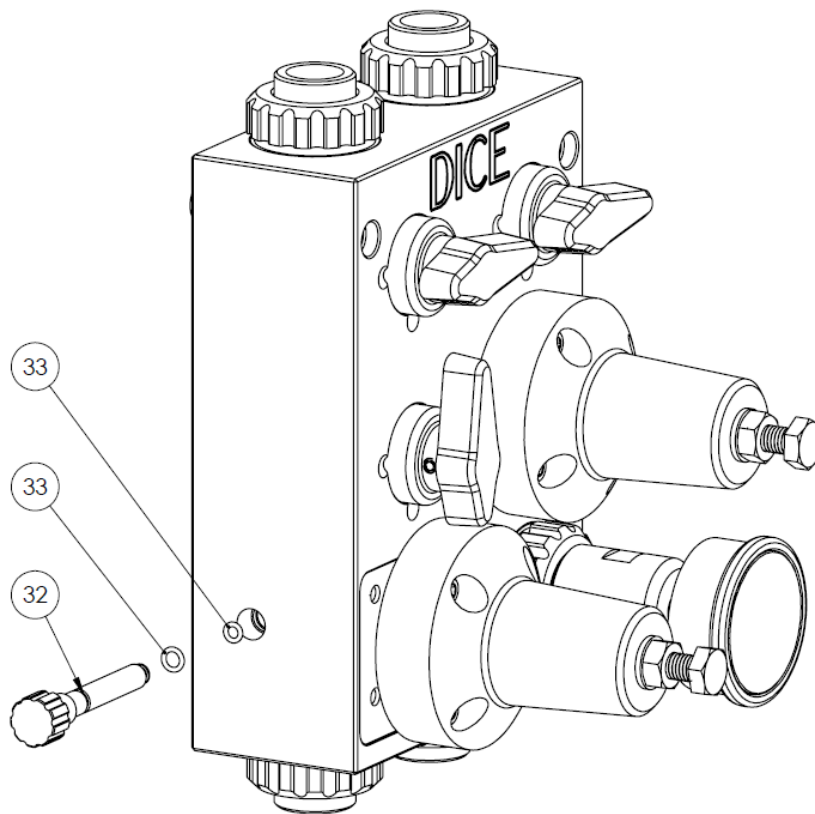
Bleed Valve

Disassembly

Completely unscrew and pull the Bleed valve (32) using its knob to extract it from the DICE™ module. The Bleed valve has two replaceable O-rings (33).

Assembly

To assemble the bleed valve (32) simply push and screw completely the bleed valve into the DICE™ module.



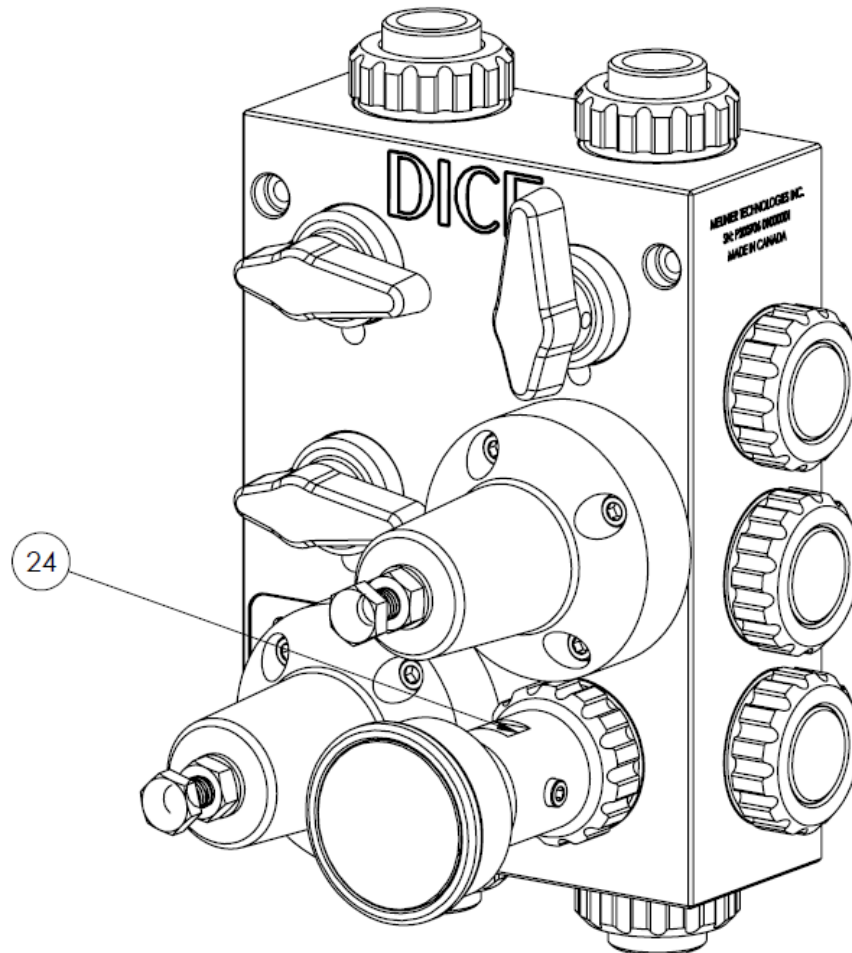
Note:

- No tool should be used to screw, unscrew or tighten the Bleed valve. Hand tight only.



Pressure indicator and isolator

No periodic maintenance is required on the pressure indicator and its isolator.



If a failure arises related to the pressure indicator or the isolator, the isolator and pressure indicator assembly (**24**) should be disassembled from the block (**1**) and shipped to the supplier with the RMA form.



The re-installation of the isolator should be done manually (hand tightened); no tools should be used for tightening.

Note: The pressure indicator and isolator assembly shall not be disassembled on site. The isolator filling is made by our technician, using specialized tools, prior to shipment.

Note: Never use a pipe wrench for servicing the dosing modules.

Periodic Maintenance

Inspection

A regular inspection should be made at least once per week. At minimum, this inspection should comprise a visual inspection for leaks and verification of system operating pressure.

Cleaning

The DICE™ needs to be cleaned periodically. The frequency of this cleaning depends on the fluid used as well as operating conditions and environment. Internal cleaning should minimally be done when there is a presence of deposit, scaling or crystals that may obstruct the flow.

CAUTION: The fluids used during the cleaning process must be compatible with the dosed chemical and system materials. Refer to your chemical supplier.

Ball valve

The DICE™ ball valves need to be operated periodically. While the frequency of these operations depends on fluid used, operating conditions and environment, we recommend operating them every 3 months.

Keep a record of the ball valve operation.

*A valve operation is the action of fully opening and fully closing the valve.

CAUTION: Prior to ball valve operation, ensure that the module pressure is released by closing the outlet port valve and opening the evacuation valve. Operating the calibration column while there is residual pressure remaining in the system can cause chemicals to spill out of the calibration column.

Pressure relief and back pressure valve

The DICE™ back pressure and pressure relief valve diaphragms should be fully inspected at least every three (3) years. If the diaphragm shows signs of wear, it should be replaced. Follow the disassembly and assembly procedure indicated in the above section.

CAUTION: Strictly follow the warning note in the Disassembly and Assembly section prior to pressure relief and back pressure valve servicing.

Pressure indicator and isolator

Note: No periodic maintenance is required on the pressure indicator and its isolator, other than periodic visual inspection.

Spare Parts

To request spare parts, please supply the module serial number and PART NO. according to the parts list in the *component list*.

Troubleshooting

	Trouble	Possible reason	Action
Module			
	Leaking from connector	Insufficient pressure on the connector from the mushroom nut	Hand tight the connector by screwing the mushroom nut
		O-ring failure	Replace the o-ring
Ball Valve			
	Leaking fluid from the connector	Carrier o-ring failure	Replace carrier o-ring
	Leaking ball valve (fluid passing through the valve in closed position)	Worn ball	Replace ball
		Worn ball valve seat	Replace both ball valve seat and seat o-ring
		Loosen ball valve carrier	Adjust the carrier position according to the ball valve assembly section
	Ball valve not fully opening and closing; or excessive torque required to operate	Excessive pressure between ball and seats	Adjust the carrier position according to the ball valve assembly section
		Excessive torque on stem nut	Unscrew the stem nut and tighten to 30 lb-in
	Handle not operating the ball valve	Broken stem	Replace the stem
		Broken stem/handle coupling	Replace the stem and handle
		Broken stem/ball coupling	Replace the stem and ball
	Presence of leakage next to the ball valve handle	Stem or Stem nut O-ring failure	Replace the stem o-ring and stem nut o-ring
Back Pressure and Pressure Relief Valve			
	Leaking from the adjustment screw	Ruptured diaphragm	Replace the diaphragm
	Leaking from the valve block interface	Ruptured diaphragm	Replace the diaphragm
		Insufficient pressure between the diaphragm and the block	Tighten the 4 mounting screws to 35lb-in
	Adjustment screw not working	Regulating valve spring failure	Spring replacement
Pressure Indicator			
	Leaking fluid from the pressure indicator NPT connection	Insufficient tightening of the pressure gauge NPT connection on the isolator	Tighten the pressure gauge NPT connection on the isolator
		Ruptured diaphragm; chemical attacked pressure indicator connection	Ship the isolator and pressure gauge assembly to our facility
	Leaking from the bleeding screw	Bleeding screw o-ring failure	Ship the isolator and pressure gauge assembly to our facility
		Ruptured diaphragm	