DRAMM

CHEMDOSE™

Owners Manual

CD-2

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DRAMM

CHEMDOSE™

Model: CD2
12 Volt

Serial Number

Test Run & Final Inspection

Date passed final systems test

By:

Shipped to:

Limited Warranty

Dramm Corporation warrants to the extent of the purchase price, that the Chemdose will be free from defects in materials and workmanship to the original purchaser for a period of six months. Parts to wear are not covered under this limited warranty. Defects or damages due to the misuse, non-observance of safety standards, or non-observance of EPA chemical guidelines are not covered under this limited warranty. Please read and follow the instructions and heed warnings stated in the operation manual and on the Chemdose.

Dramm Corporation makes no other further warranty, expressed or implied, and all other or further warranties, including any warranties of merchantability or fitness for a particular purpose are expressly excluded.

In no event shall Dramm Corporation be liable for loss of product, profit or any other special, incidental or consequential damages including, but not limited to, plant damage, property or persons.

This warranty begins on the date of original purchase. If warranty service is required, the equipment must be sent prepaid to:

Chemdose Service
Dramm Corporation
2000 North 18th Street
Manitowoc, WI 54220

Dramm Corporation makes no warranty, expressed or implied, in regard to the efficacy of any pesticide or other chemical which may be applied using the Chemdose.

WARNING

The Dramm CD2 Chemdoese applies toxic chemicals. Extreme caution must be used! Read all warnings. Serious injury or death can occur from misuse.

• Do not operate machine without reading all warnings and instructions.

• Owners or Managers: It is your responsibility to inform and instruct any employee who uses this machine in regards to safety and operational procedures.

When Dispensing:

• ***Never operate the CD2 without a 200 mesh filter!***

• Caution: Use this machine only for chemical application.

• When applying hazardous chemicals care and logic must be adhered to.

• NEVER use this machine to pump flammable liquids.

• NEVER operate this machine in an explosive environment. Switch or motor brush arcing may cause an explosion.

• Do not use this machine without proper ventilation.

• Mix only the amount of chemical solution which will be used. Never-keep, store or hold over unused chemical solution.

• Follow all E.P.A. guidelines and chemical label information when applying chemicals.

• Use the required personal protection gear when applying chemicals. Consult chemical label or chemical manufacturer when in doubt.

• Be sure to connect correct voltage to receptacle.

• Do not charge the unit if it is warm to the touch after use. Allow unit to cool before charging.

• Never use any charger but the one provided to charge the battery, damage to the unit or personal injury may result.

• Exercise accepted safety procedures when using electricity.

• After use-double rinse pesticide/chemical tank. Clean nozzle and suction line thoroughly. Store unit in a safe location away from children and unauthorized personnel.

• Follow all E.P.A guidelines for re-entry.

How Does My Chemdose Work?

The Dramm Chemdose is a machine designed for precision application of chemical solutions directly to a pot or root zone. This results in less wasteful application of expensive chemicals with little or no overdosing. The CD2 uses a precise flow meter to accurately measure flows of solution and dose these accurately. Operation of the unit is easy to program using the controls on the unit. Each dose may be applied individually or on a interval basis, useful for building a rhythm. Additional functions of the unit such as a dose count, max dose limit and a lock feature are all programmable through the digital interface.

The CD2 Chemdose is a rechargeable battery operated unit. The unit operates at 12 volts. This unit can be recharged with the included battery maintainer in approximately 6 hours. On a full charge, the CD2 should be able to operate for a full day of dosing. Charging overnight is recommended and charging a full or half full battery will not create a battery memory or lessen the battery life. The CD2 includes a low battery alarm that will begin to warn the user when the battery is nearing a point where it can no longer dose accurately. When this alarm is heard, a beep every few seconds will tell you that you still have a few hundred doses before the accuracy is compromised. Finish the area you are dosing and recharge the unit overnight.

The CD2 is meant to be worn or attached to a small cart (part number CD2-C). When wearing the unit, you may choose to wear the CD2 in a chest mounted or "side-bag" position.

The CD2 can be programmed to output precise doses on a single or interval basis. Unlike previous versions of the Chemdose, the CD2 is a hose-end attachment. There is no tank or pump included with the CD2. The CD2 can be connected to a hydraulic sprayer on low pressure (below 100psi), to a proportioning injector or to your own pump and tank system. The CD2 will accept any source below 100 PSI and dose this source into accurate doses.

The CD2 uses a precision flow meter to accurately measure each dose. ***It is important to keep this flow meter clean by using the included filters during every use.*** Occasional cleaning of the flow meter will be necessary.

Six different wands accompany the CD2 for a variety of applications options. These offer flexibility in the length and bend of the wand as well as in the diameter

Pre Operation Checklist

Treatment Area:

A. Make sure the treatment area is vacant. No humans or pets should be present.

B. Post all hazard signs before application.

C. Follow all E.P.A and W.P.S guidelines. Follow all chemical label directions.

Chemdose:

A. ***Never operate the CD2 without a 200 mesh filter!***

B. Fit the Chemdose with the proper wand for your application situation. Make sure that the wand does not leak from any of the fittings.

C. Program the dose and interval following the instructions in this manual.

D. Reset the cycle counter. Make sure to keep track of the number of shots used on a full charge to ensure proper dosing.

E. Test the Chemdose with clear water. Use each button separately to ensure proper operation of both. Make sure that nothing is blocking the output. Proper flow would be even, aerated flow.

F. Uncoil the hose and make sure that there are no kinks in the hose.

G. Mix chemical solution according to label guidelines.

Application

1. WARNING: Follow all EPA guidelines on the handing, application, and re-entry periods for chemicals. Only crops listed on the label should be treated.

2. Pre water plants to be treated. Most applications of drench products work best when the plant has been pre-watered. Ensure that the media is thoroughly saturated. Some chemicals can be applied to dry soil. Always defer to the chemical manufacturer recommendations for applications.

3. Determine how you will treat the area and whether or not you will be spot treating individual plants or treating all the plants in the area. Choose the correct button for the method you prefer.

Operation : Connecting Your CD2

Connecting your Chemdose 2:

Connect the output hose and wand to the unit. Both the fluid hose and the electrical connection need to be connected for proper operation.

The CD2 Chemdose comes with 6 different wand extensions for flexibility. Included with your CD2 you will find two wands of 16", 30" straight, and 36" bent for baskets. These wands are in two different gauges, or diameters. The two different gauge wands are included for different flow rates.

- Use the narrow gauge wands with lower flow sources such as hydraulic sprayers.
- Use the larger gauge wands with higher flow sources such as an injector.

Matching the gauge of the wand to the flow rate will prevent dribbling between doses.

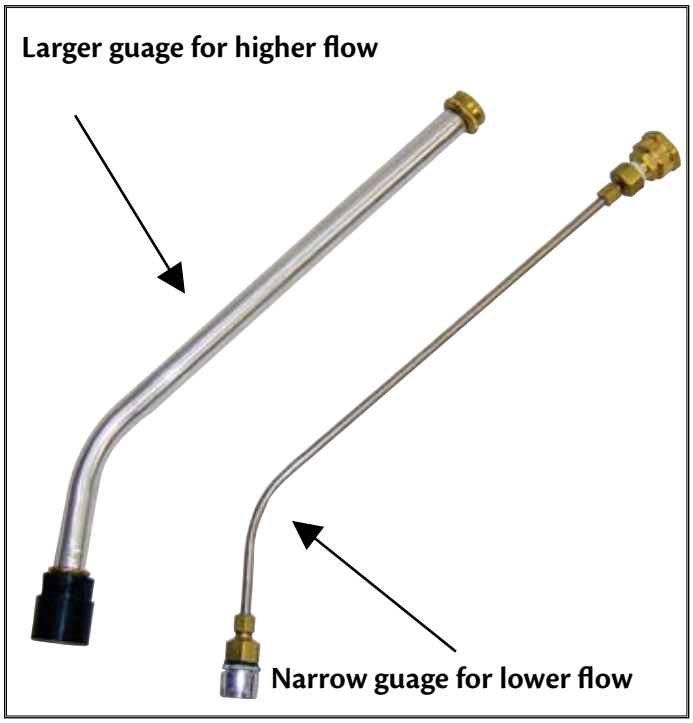
The different wand lengths are offered for different reach options: benches, ground applications or hanging baskets.

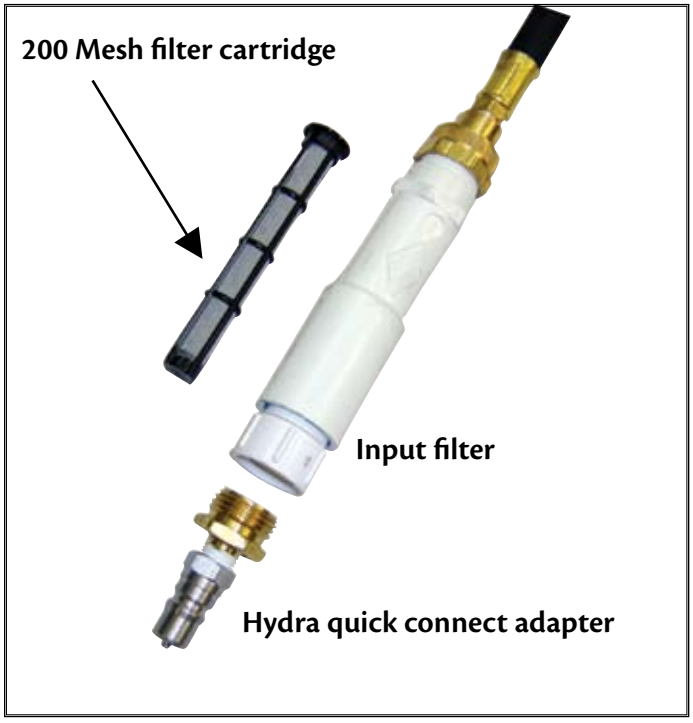
The CD2 can be used to accurately dose the output from any source **BELOW 100 psi**. Never over-pressure the Chemdose. Over-pressuring the CD2 may damage the unit and void the warranty.

Filter:

The Chemdose 2 input consists of a strain relief hose connected to a 200 mesh filter with a 3/4" female hose thread. After determining your source, you may need to adapt to the 3/4" hose thread. The filter end includes a swivel fitting to ease attachment of hoses.

NEVER OPERATE THE CD2 WITHOUT A 200 MESH FILTER. Failure to use a filter will clog the unit and may void the warranty





Operation : Connecting Your CD2

Using a hydraulic sprayer as a source:

Using a hydraulic sprayer as a source: ***Ensure that the pressure on the hydraulic sprayer is 100 psi or less.*** NOTE: This may reduce the flow of your hydraulic sprayer from its maximum normal output.

Connect the hose from the sprayer to the input filter on the CD2 using the Dramm included quick connect or your own adaption to 3/4" female hose thread. ENSURE THAT THESE CONNECTIONS ARE TIGHT AND LEAK-FREE BEFORE WEARING THE UNIT.

Included with each CD2 is an adaptor to a Dramm stainless steel, water-stop quick connect. This is the same quick connect utilized on all Dramm HYDRA sprayers and will facilitate connection to these units. Female quick connects for attachment to your non-Dramm sprayers can be purchased from the Dramm parts department under part number FD45-1005-0404.

If the output from your hydraulic sprayer is low (less than 3 gpm) use the narrow gauge wands to control drip between doses. Connect your selected length wand to the Chemdose 2 handle. Make sure this connection is tight.

DRAMM Hydra

Hydra quick connect adapter

Operation: Connecting your CD2

Using an injector as a source:

Ensure that the pressure from your injector is 100 psi or less. Pressures higher than 100 psi require the use of a pressure regulator.

Never operate the CD2 without a 200 mesh filter

Connect your hose from the injector to the 3/4" female hose thread connection on the input filter hanging below the CD2. ENSURE THAT THESE CONNECTIONS ARE TIGHT AND LEAK-FREE BEFORE WEARING THE UNIT.

In addition to the input filter on the CD2 a mixing is included for use with injectors. This kit consists of a filter body with hose end fittings at each end. This filter body is empty and is used as a mixing bowl. Because we are cycling the doses on an interval, this will help mix the output from the injector and homogenize the solution. Connect this kit to the output of the injector before the hose.

ALWAYS USE THIS KIT WITH AN INJECTOR APPLICATION TO ENSURE PROPER SOLUTION MIXING.

When using an injector, use the larger gauge wands to allow maximum flow through the unit. Connect your selected length wand to the Chemdose 2 handle. Make sure this connection is tight.

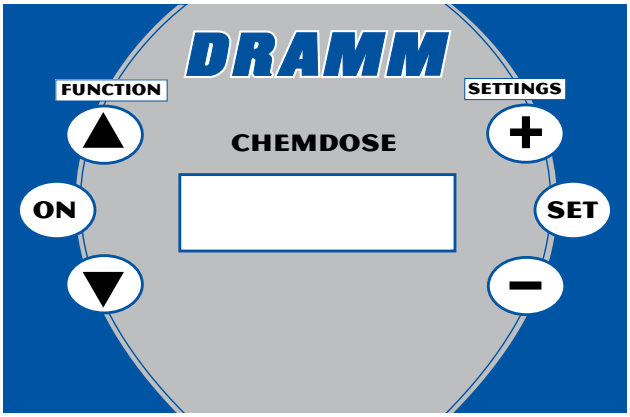
NOTE: If dripping between doses occurs using the large gauge wands, try switching to the narrow gauge wands for drip control.

DRAMM Ferticart

Mixing kit

Operation: Programming

Programming your Chemdose 2:



The CD2 is easy to program. The two line display on the unit will describe each step of programming. This checklist will walk you through this programming.

First switch on the unit in the side of the black box. This switch is a mainpowerswitch and can be used to turn off the unit in the event of a controller failure.

Press the ON button on the face of the unit to program or use the unit. The unit will time out after 4 minutes of non-use. The CD2 will beep once and shut off. Simply press the ON button again if this happens. Your settings will remained saved.

The program for the CD2 consists of a series of input options. You can scroll between these options by pressing the Function Up or Function Down buttons. To program any setting press the Settings Up or Settings Down buttons until the desired setting is shown and press Set to accept the change.

The following functions are available:

Graduation Select mL/OZ	OZ	Choose the graduation in either ounces or mL.
Dose In OZ	xxx.x	Select the dose in the chosen graduation. You may select the dose in 10ths of. of a unit.
Interval in seconds	xxx.x	Select the interval between doses. You may select the interval in 10ths of a second.
Count	xxxxxxx	Displays the number of doses since the last reset. Press Set to reset this reading.
Max Number of doses	xxxxxxx	Maximum # of doses limit. Select how many doses can be output for the unit before the unit beeps and stops running. To reset this, go back to the previous setting: Count, and reset the count.

Operation: Programming

This function is useful to ensure properly mixed solution is always flowing through the Chemdose. Calculate the number of doses in the chemical tank using one of the following formulas and input a number slightly less. This will prevent an empty tank from affecting the dose. This is especially important when using an injector as plain water will still continue to flow when the stock tank is empty.

Finished Solution Tank # of Doses Calculation:

Tank Size in Gallons X 128 oz/gallon = number of ounces in tank
Number of ounces/ounces per dose = number of doses

Example:

Calculate the number of doses in a 50 gallon tank when applying 10 oz doses:

50 gallons X 128 oz/gallon = 6,400 oz in tank
6,400 oz / 10 oz/dose = 640 doses

Stock Solution Tank # of Doses Calculation:

Tank Size in Gallons X 128 oz/gallon = number of ounces in stock tank
number of ounces in tank X ratio of injector = number of ounces finished solution
number of ounces finished solution / ounces per dose = number of doses

Example:

Calculate the number of doses in a 20 gallon stock tank when applying 10 oz doses with an injector ratio of 1:100:

20 gallons X 128 oz/gallon = 2,560 oz in stock tank
2,560 oz in stock tank X 1:100 ratio = 256,000 oz finished solution
256,000 oz finished solution / 10 oz/dose = 25,600 doses

Input an amount slightly less than the result of the calculation to ensure that you will have enough solution to dose accurately.

Lock code	xxx
Push SET to lock	

The programmer can select a 3 digit code to lock access to the settings. Enter up to a 3 digit code and press set. Once pressing SET the unit is locked and the chosen code will be required to change any settings. NOTE: if no code is entered there is no lock. REMEMBER YOUR CODE! If you forget your code, contact Dramm for help in removing the lock.

Operation: Programming

Installer's Program

The Installer's Program is a set of functions that should rarely need to be accessed by the user. They are settings used to calibrate and control the operation of the unit and may be used in diagnosing problems during a service call.

You may access the installer's program by pressing the up-setting, down-setting and up-function keys at the same time. To leave the installer's program press the up-setting, down-setting and down-function keys at the same time.

Functions:

Calibration Pulses per mL	xxx.x	This calibrates the flow meter to the controller. The correct setting for this is 0.4 mL. This is always set in mL. Do not change this setting without contacting Dramm first.
Total Count Push SET=reset	xxxxxxxxxx	This is the total number of doses run through the unit.
Total flow	xxxxxxxxx.x	This is the total flow through the unit in the selected graduation.
Battery In volt	xx.x	This displays the actual voltage of the battery.
Min. bat.	xx.x	The minimum battery voltage is set here. Once the battery reaches this limit, the unit will beep, warning the user that battery is low. Do not change this setting without contacting Dramm first
Power down After minutes	xx	The unit will turn off after this number of minutes with no input on the controller or depressing of handle buttons. This is done to save battery life.

To exit the installer's program press the up-setting, down-setting and down-function keys at the same time.

Operation: Application

Application:

Once you have programmed the dose and interval, you have reset the count and input the maximum number of doses, you are ready to use your CD2 Chemdose.

IMPORTANT: MAKE SURE THAT THE UNIT IS IN THE UPRIGHT POSITION WHEN IN OPERATION. Operation in any position other than this upright position may damage the unit and void the warranty.

The unit is designed to be worn or used on a small, portable cart

BEFORE USING YOUR CHEMDOSE, CHECK THE CALIBRATION OF THE UNIT WITH THE INCLUDED GRADUATED CYLINDER TO ENSURE ACCURATE DOSING.

Wearing the CD2:

BEFORE WEARING THE CD2 TEST ALL CONNECTIONS AND RUN SEVERAL DOSES THROUGH THE UNIT TO ENSURE THAT THERE ARE NO LEAKS.

The CD2 is designed to be worn on the chest or work like a mail-pouch over one shoulder. Do not wear the CD2 on your back. Wearing the CD2 in the front allows access to the controls of the unit.

If wearing the CD2 on the chest, place the main, padded strap over your head and your arm through the loops on either side. A clip on the left side will help secure the unit and distribute the weight to the hips as well as the shoulders.

The CD2 can also be worn as a shoulder-bag. Use the main, padded strap over your shoulder. NOTE: It is recommended to use this method for short periods of time. Less fatigue will result with the chest mounted position.

Operation: Application

Cart for the CD2:

A small, narrow cart is available to carry the CD2 down aisles. This is a four wheel cart with an upright handle. The CD2 can be mounted to the handle allowing access to the controls. Included with the cart is an extra wand with a longer hose for ease of movement.

Currently, this cart is not available. This will be available later in the fall of 2006 under part number CD2-C. Contact Dramm for ordering information and availability.

Once you have your CD2 ready for use, simply depress either the "Single" or "Interval" button on the wand and the CD2 will accurately measure the dose you have selected. You can adjust the dose or the interval on the fly to accommodate larger pots or wider plant spacing.

For a single dose, depress the button on the wand marked "single." For an interval dose, depress the button on the wand marked "interval." You do not need to hold this button like a trigger to get multiple doses. One press of the button will activate the interval dosing. A second press of the button will deactivate interval dosing. This is done to prevent fatigue.

Once you have finished your application clean the unit and any chemical tanks and pump thoroughly. Follow all instructions from the manufacturers of any of these systems.

Operation: Cleaning/Maintenance

Cleaning your CD2 after use:

After completing a successful application, connect your CD2 to a FILTERED garden hose and flush the unit with PLAIN water. Warm water may be used but do not exceed 120˚.

Clean any nozzles used to ensure that chemical deposits do not build up.

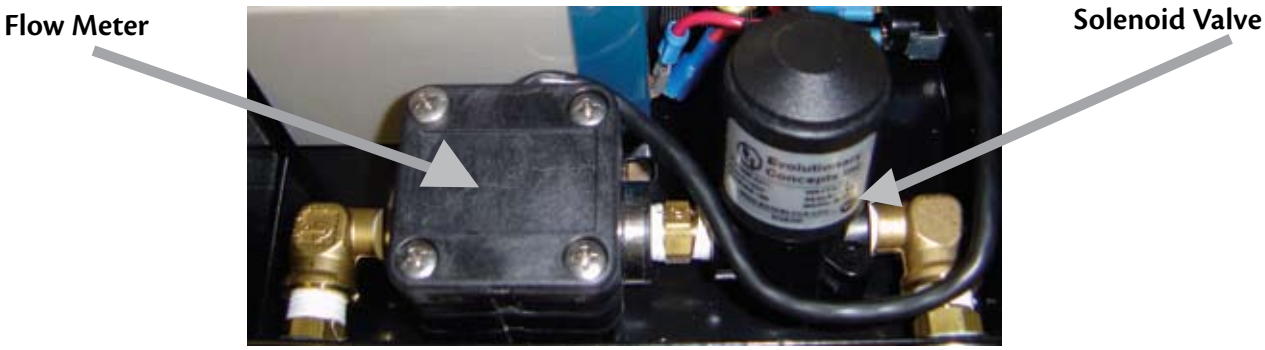
Clean the 200 mesh input filter by unthreading the filter from the strain relief and removing the filter cartridge. A simple flushing will work most of the time but light brushing may be necessary to dislodge any grit or residue. Replace the filter cartridge after it is dry. When reconnecting the filter, make sure the connection is tight and that there are no leaks before the next use.

Maintaining your CD2:

Your CD2 Chemdose incorporates some sensitive components to achieve accurate results. In addition to the operational controls, the CD2 utilizes an accurate flow meter designed to measure small amounts and a high pressure solenoid valve. Each of these components are in contact with the flow through the unit. The 200 mesh filter and pressure requirements of 100 psi or less are to prevent damage and clogging of these sensitive components. Always follow these guidelines. Additionally, for the flow meter to accurately measure flow and to prevent undue wear, always operate the CD2 in the upright position as shown on the label.

The CD2 consists of two chambers, the control box and the mechanical box. These boxes are sealed off from each other and the control box is sealed against moisture. Keep the integrity of this box intact. Do not open this box unless directed to do so by a Dramm employee.

The mechanical box contains the flow meter and solenoid as well as the battery, switches and all connections. It will be necessary for you to access the mechanical box from time to time. With normal use both the flow meter and solenoid valve will need cleaning (see instructions below). Additionally, over time the battery may wear and require replacement.

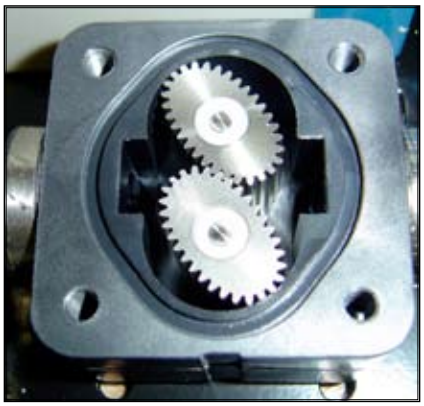


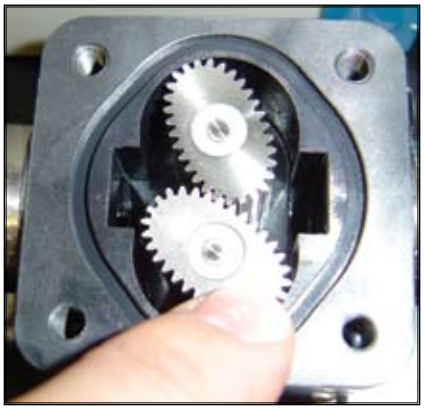
Operation: Cleaning/Maintenance

Cleaning the flow meter:

Your Dramm CD2 Chemdose uses an oval gear positive displacement flow meter to accurately measure flow through the unit. Even with proper filtration, chemical solutions may cause the gears to clog and prevent the unit from operating properly. If this occurs, the gears need to be cleaned.

- Ensure fluid supply to the CD2 has been disconnected and all pressure has been released.
- Open the black metal cover to the CD2.
- Locate the flow meter. photo of inside of unit
- Remove the four screws and the body cover on the flow meter.
- Remove the stainless steel gears. Clean the gears and inspect for wear.
- Replace the gears 90˚ to each other. The gear with the magnet (noted by the small dot on the gear next to the axle hole) should be on the same side of the flow meter body as the groove on the outside of the body.
- Lightly rotate the gears to ensure that they are properly installed. They must rotate freely.
- Ensure that the diamond-shaped o-ring is installed properly.
- Replace the body cap so that the groove on the outside of the body matches up properly.
- Replace the black metal housing.





Operation

Cleaning the solenoid valve:

- Ensure fluid supply to the CD2 has been disconnected and all pressure has been released.
- Open the black metal cover to the CD2.
- Locate the solenoid valve. photo of inside of unit
- Remove the black plastic cap on the top of the solenoid valve coil.
- Unthread the nut securing the coil in place.
- Remove the coil from the solenoid valve. see photo
- Using the included spanner wrench, remove the plunger body from the main body. see photo
- Clean any debris from the slide and slide cavity that may prevent the solenoid valve from operating.
- Reassemble the valve making sure that the body it tightened.
- Reattach the coil and replace the protective cap after tightening the nut on the coil.

Included spanner wrench

Chemdose Troubleshooting

Problem	Cause
Unit is leaking	Check all fittings to ensure they are tight If leak is from inside the box, contact Dramm for service.
Unit does not run	Make sure unit is charged. You may check the battery voltage by enter ing the installer's program. (see programming) Make sure switch on side of unit is in on position. Press the ON button on the face of the control, the unit times out with out input after 5 minutes. Make sure solution flow is present. Make sure filter is not clogged. If unit beeps when wand buttons are pressed, reset the cycle count. Make sure the wand is plugged in. Make sure unit is not overpressured. Clean the gears in the flow meter.
Unit won't stop running	Switch off unit at main switch. Check the integrity of the wand connection.

Notes

DRAMM

2000 North 18th Street
P.O. Box 1960
Manitowoc, WI 54221 - 1960
dramm.com

920.684.0227
Order Fax: 920.684.4499
Parts & Service Fax: 920.684.0193

information@dramm.com

800.258.0848