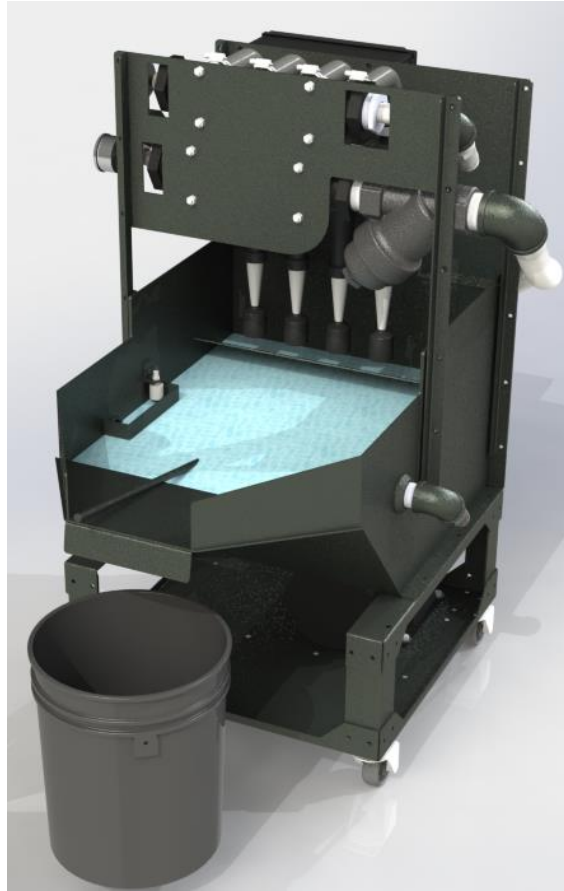


# MP Systems CDR Product Guide

## “Cyclonic Debris Removal” Filtration System



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# CDR Introduction

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The CDR is a proven effective solution for high volume, multiple shift machining applications with a filtering chip conveyor.

- The CDR is designed for applications with the following criteria:
  - High production, high volume machining
  - Running multiple shifts
  - Has a filtering chip conveyor
  - Will have a debris/sludge buildup in coolant problem
- Typical types of machines the CDR can benefit greatly:
  - Horizontal Machining Centers
  - Vertical Machining Centers
  - Automated production lines
  - After filtering conveyors with a rating of 500µm or lower

The CDR provides constant, full flow coolant filtration to catch and prevent fines from accumulating in the machine's coolant tank, where they contaminate the entire coolant system and machining environment.

This buildup eventually takes away from valuable coolant volume and requires frequent cleanouts and shutdowns.

The CDR picks up the dirty coolant as it enters the tank and pumps it through a carefully engineered hydro-cyclone configuration at 80 gallons per minute. It then deposits a concentrated slurry into an easily cleanable settling tank below and allows clean coolant to return to the machine tool tank.

When the CDR settling tank is full, simply scrape out the debris into a bucket or chip hopper without having to interrupt production.

# CDR Benefits

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By keeping your tank clean, you're constantly benefiting from the following:

- Clean coolant lasts significantly longer
- Less wear & tear on machine and components
- Greatly extend tank cleanouts
- Prevent unexpected coolant related shutdowns
- Overall cleaner machining environment
- Improved part quality
- Improved tool life
- Improved pump wear components life

# CDR Features

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Some Key features of the CDR are:

- 80 GPM (gallons per minute) Constant Flow Rate
- Filtration down to 3 $\mu$ m (depending on density)
- Quick and convenient clean out.
- Easy installation with complete parts kit
- Cleanable pre-filter
- No disposable filters
- Low maintenance
- 2 year parts warranty

# CDR Specifications

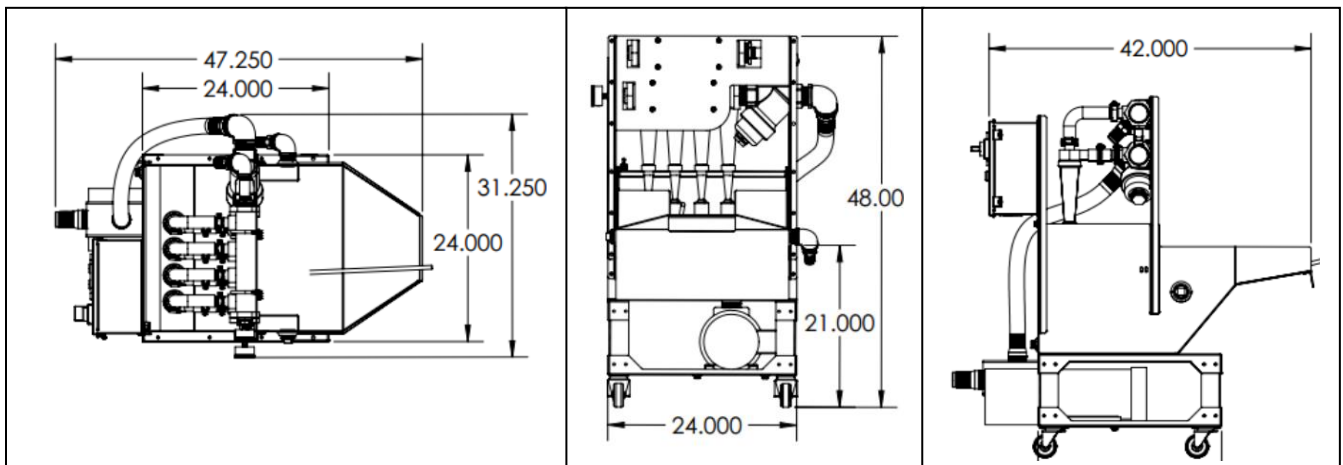
## Electrical Specs

| MODEL | HP | FLA @<br>208/230VAC<br>(Standard VAC) | FLA @<br>480VAC | kVA | CONTROL<br>SIGNALS | ALARM<br>CIRCUIT |
|-------|----|---------------------------------------|-----------------|-----|--------------------|------------------|
| CDR80 | 3  | 9                                     | 6               | 3.2 | Fused 24VDC        | NC/NO            |

## Mechanical Specs

| MODEL | LENGTH<br>(in) | WIDTH<br>(in) | HEIGHT<br>(in) | CAPACITY<br>(gal) | FLOW<br>RATE |
|-------|----------------|---------------|----------------|-------------------|--------------|
| CDR80 | 48             | 24            | 48             | 15                | 80 GPM       |

## Floor Plan



# CDR Considerations

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- The CDR is not intended to be a replacement for filtering conveyors and is not to be used after a standard hinge belt conveyor.
- The CDR is intended to be used after the following filtering conveyor styles: Drum, disc, filter box, and in certain applications, magnetic conveyors.
- A filtering conveyor is a conveyor with a filtration rating of 500µm (micron) or lower. Common examples are the Mayfran Consep 2000, LNS MH250, LNS MH500, or similar.
- The CDR is intended for machines running water-based coolants only. It does not work with oil applications. A purge is recommended for oil applications.
- High volume machining centers running multiple shifts should get a filtering chip conveyor.
  - A shift is considered 2000 hours/year, 2 shifts would be 4000 hours/year, etc
- The CDR is intended to filter out fines/debris smaller than 1/32” (thickness of a credit card)
  - An easy way to determine this is to take a reasonably sized sample of chips from the coolant tank right after the conveyor, dry them out, and lay on a piece of paper next to a steel rule with graduations of 1/32”. Individual chips/grains should not exceed 1/32”
- The CDR is not intended to pick up or filter large chips. Large chips tend to settle to the bottom of the tank rapidly and once the debris begins to pile up, it will stay there until manually removed. Particles must stay in suspension long enough to get sucked up by the pump.
- The CDR does a great job at capturing and filtering “snow” like debris that spreads evenly throughout the machine tank.
- The CDR is for use with materials that have a specific gravity of 2x water or higher, or a density 2g/cm<sup>3</sup> or higher. (Cast Iron, Aluminum, Steel, Alloys)
- The CDR does not work well with plastics or composites. A purge is recommended for plastics or composites applications.

- The CDR is typically located alongside the machine's coolant tank where space will allow. 15' length hoses are provided to allow for positioning the CDR system where it makes the most sense.
- Machines producing less than 10 gallons of debris a month can typically use the 5-gallon bucket to dispose of the debris in the CDR settling tank.
- Machines with higher debris loads can purchase taller legs and mounting pads to position the settling tank higher up to allow them to scrape the debris from the settling tank right into their chip hopper.
- The tank must be configured to allow proper circulation to ensure that a high percentage of debris is removed over time and the tank eventually reaches an equilibrium of debris being deposited, to debris being removed, maintaining a low acceptable PPM in the machine's coolant tank.

# CDR Explanations

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- Hydro cyclones work based on centrifugal forces separating the denser debris from the lighter fluid and concentrating that debris into the discharge area while the lighter fluid is carried back through the return to tank.
  - The high fluid velocities create high centrifugal forces that “pull” the denser particles towards the walls of the cyclone cone. The velocity and forces increase as the cone narrows towards the bottom. The heavier concentrated debris is discharged through the bottom apex. The lighter fluid exits the top of the cyclone via the vortex finder and returns to the machine coolant tank.
- The CDR uses polypropylene hydrocyclones with ceramic apex cones for abrasion resistance.
- Performance on this type of technology is rated by the D50 cutoff point.
  - D50 cutoff means depending on several variables, 50% of the debris of a certain size will be removed from the coolant and report to the settling tank, while the other 50% of the debris will return back to the tank to be circulated and filtered again.
- Cyclonic filtration works on the idea that the coolant will be constantly circulated and re-filtered every time it passes through the CDR.
  - For example, each time coolant passes through the cyclones, 50% of 5µm particles are removed. The remaining 50% is then recirculated through the tank and filtered again, removing 50% of it, and thus returning 25% of the initial debris back to tank. On the 3<sup>rd</sup> pass, it will return 12.5% and so on.
- The CDR has a flow rate of 80 GPM, meaning it can circulate and filter tanks at a quick rate. Examples are as follows.
  - Tank = 80 gallons, CDR is 80GPM, tank is circulated once every 1 minute.
  - Tank = 100 gallons, CDR is 80GPM, tank is circulated once every 1 min 15 sec.
  - Tank = 200 Gallons, CDR is 80GPM, tank is circulated once every 2 min 30 sec.



# CDR Included Kit Contents

| PART DESCRIPTION                       | MP PART NUMBER            | KIT                  | QTY   |
|--|---------------------------|----------------------|-------|
| CDR INSTALL, OPERATOR, MAINT MANUAL    | B CDR OPERATOR            | AK CDR80 GEN INSTALL | 1     |
| 2" INLET DIP TUBE                      | AM DIP TUBE LL 2" X 16"   |                      | 1     |
| 1 ½" RETURN DIP TUBE                   | AM DIP TUBE RT 1.5" X 14" |                      | 1     |
| 1 ¼" OVERFLOW DIP TUBE                 | AM DIP TUBE 1.25"         |                      | 1     |
| 2" DIP TUBE CLAMP                      | HPC 32 WELD CLAMP         |                      | 1     |
| 1 ½" DIP TUBE CLAMP                    | HPC 24 WELD CLAMP         |                      | 1     |
| 1 ¼" DIP TUBE CLAMP W/ BRACKET         | HPC 20 WELD CLAMP         |                      | 1     |
| 2" DIP TUBE MOUNTING BRACKET           | SM-1049B                  |                      | 1     |
| 1 ½" DIP TUBE MOUNTING BRACKET         | SM-2049B                  |                      | 1     |
| 2" HEAVY DUTY TIGHT SEAL HOSE CLAMP    | HC 2" TS HOSE CLAMP       |                      | 2     |
| 1 ½" HEAVY DUTY HOSE CLAMP             | HC 2" X 5/8" HOSE CLAMP   |                      | 2     |
| 1 ¼" HOSE CLAMP                        | HC 2" HOSE CLAMP          |                      | 2     |
| SELF TAPPING SCREWS FOR BRACKETS       | FT ¼-14X1 HSD             |                      | 6     |
| 14" HEAVY DUTY ZIP TIES                | FTR BLACK TY 14"          |                      | 10    |
| 7" ZIP TIPES                           | FTR BLACK TY              |                      | 10    |
| 2" NITRILE BLACK HOSE                  | HH 2" NITRILE HOSE        |                      | 14FT  |
| 1 ½" NITRILE BLACK HOSE                | HH 1 ½" NITRILE HOSE      |                      | 14FT  |
| 1 ¼" NITRILE BLACK HOSE                | HH 1 ¼" NITRILE HOSE      |                      | 14FT  |
| 5 GALLON BLACK BUCKET FOR DEBRIS       | SH BUCKET – 5 GALLON      |                      | 1     |
| 5 QUART GRADUATED BUCKET FOR TESTING   | SH BUCKET – 5QT           |                      | 1     |
| SETTLING TANK DEBRIS SCRAPER           | SM-2055                   |                      | 1     |
|  |                           |                      |       |
| 20 AMP CIRCUIT BREAKER & WIRING        | AK CB20 KIT               |                      | 1 KIT |
| 10GA CABLE AND TWIST LOCK PLUG         | AE GEN PWR 20AMP 25FT     |                      | 25FT  |
| <b>OPTIONAL MACHINE INTERFACE KIT*</b> |                           |                      |       |
|  |                           | AK CDR EXTERNAL SIG  |       |
|  | AE CDR EX HARNESS         |                      | 1     |
|  | AE CDR EX CABLE           |                      | 1     |

# CDR Installation

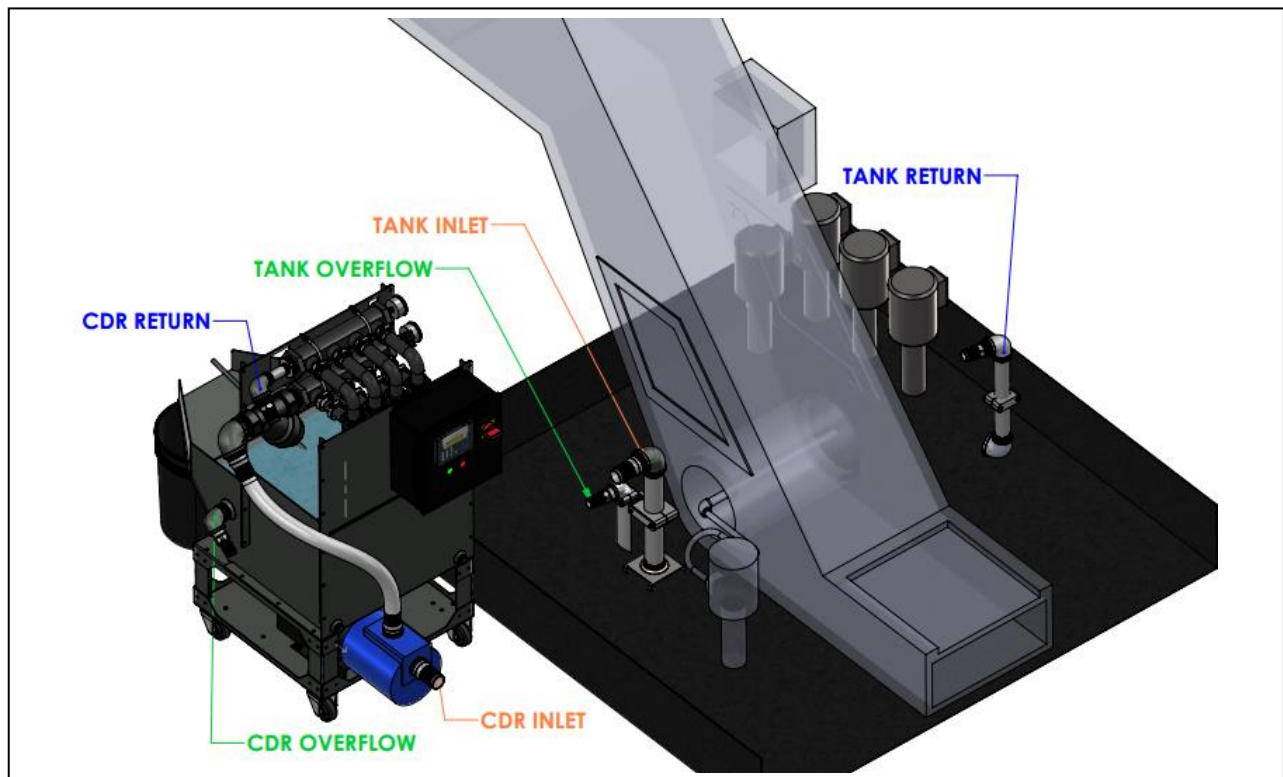
## CDR QUICK START GUIDE

**\*WARNING – PUMP MUST BE PRIMED BEFORE USE\***

### 1. Install Inlet, Return, and Overflow Dip Tubes. Locations:

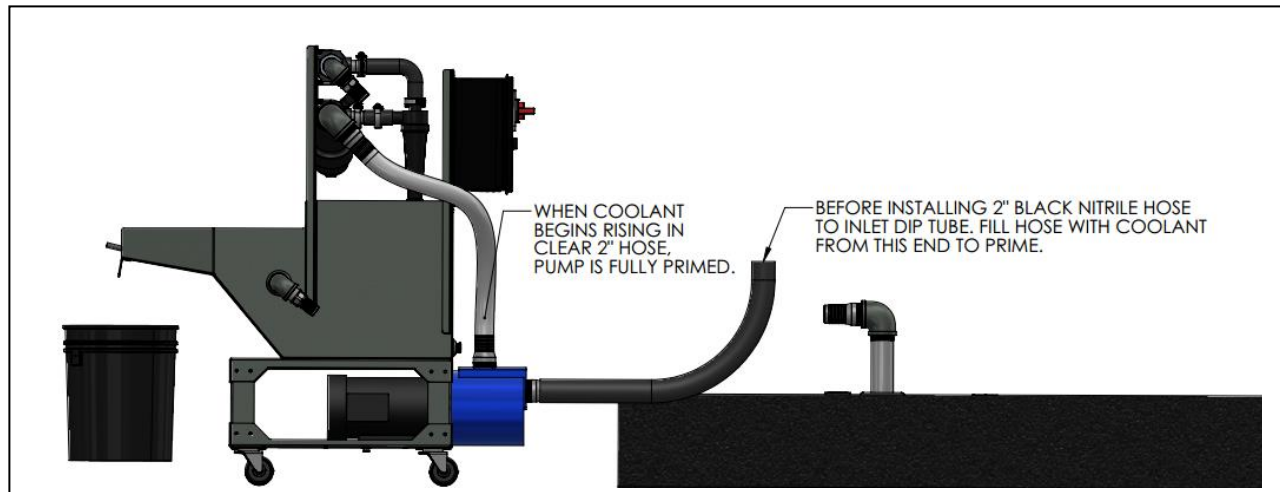
- 2" Inlet – Close to filtering chip conveyor outlet, where coolant and debris first enter the tank.
- 1 ½" Return – Opposite side from inlet, near coolant pumps to create counterflow back to inlet.
  - Use 45 cut pipe for general installations -OR- 90 elbow fitting for direction flow.
- 1 ¼" Overflow – Near inlet dip tube if possible, if not, chose most convenient location.

\*See Hole Saw Guide Document after installation instructions.



## 2. Prime Pump

- Attach 2" inlet hose to the inlet of pump and tighten clamp securely.
- Fill the 2" hose from opposite end, so coolant fills both the hose and pump casting completely from inlet side. You should be able to see coolant rising out of pump outlet hose when full.
- Note: Use a funnel to fill hose. You can also use a large zip tie to secure the open hose end over CDR settling tank to catch any spilled coolant while filling hose.



## 3. Attach hoses and tighten clamps

- 2" Inlet hose should be as short as location allows and run along floor, not on top of tank.
- 1 ½" Return hose should also be kept short.
- 1 ¼" Overflow hose should either be kept on floor or sloped downwards towards tank.
  - Overflow hose MUST NOT be positioned higher than overflow port on settling tank.
  - Overflow port on settling tank MUST BE higher than overflow dip tube in machine tank.

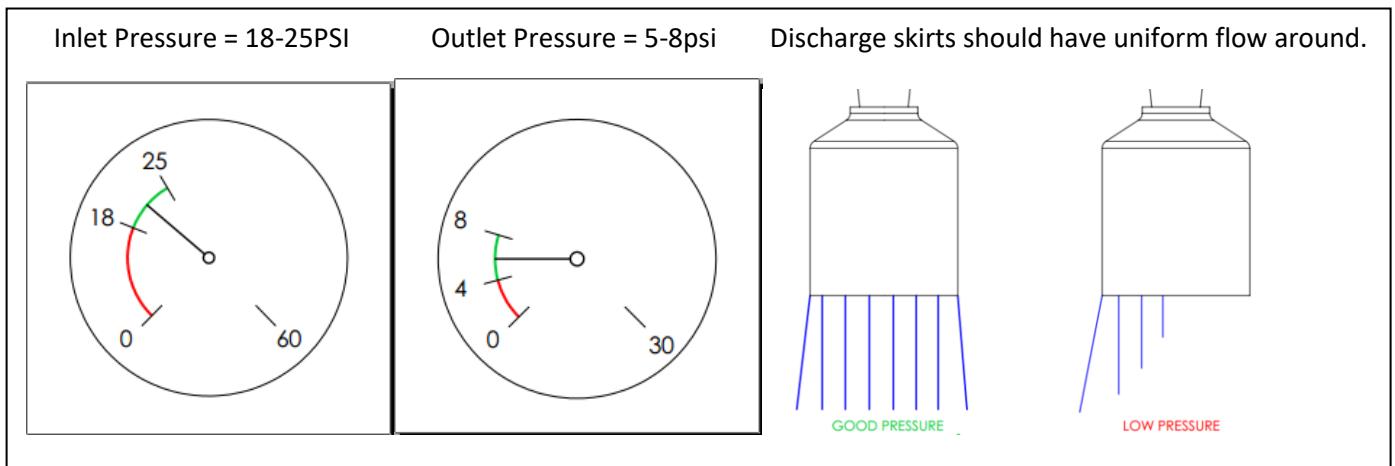


#### 4. Install Power

- CDR kit contains power cable, circuit breaker, twist lock plug, and all necessary connectors.
- Following local electrical codes, install 3 phase power to 208-230VAC line.
- The CDR is phased red, white, black.
- Power can easily be pulled from bottom of machine tool breaker in most cases.
- Connect twist lock plug into receptacle on bottom of CDR electrical panel.

#### 5. Start system and do preliminary check.

- Motor rotation. Pump motor should rotate clockwise when looking at fan.
- Pressure gauges. Inlet should be around 22psi, outlet should be around 7psi.
- Discharge skirt flow. All 4 filters should have minimal but equal flow around perimeter of skirts.
- Overflow. Ensure overflow hose allows for settling tank to freely flow back to machine tank.



## \*Dip Tube Installation Hole Saw Guide

When installing MP Systems products, the correct location of the dip tubes is important to a successful install. The best way to do this is to use a preexisting hole in the tank to pass the various pipes through the tank top. This is not only quick and easy, but also gives you a perfect window to be able to see what is going on in your tank for troubleshooting. Sometimes, this is simply not an option and a hole must be drilled in the tank.

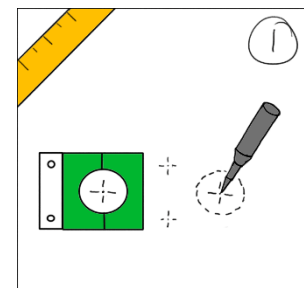
If you find yourself in a pinch, most hardware stores like Home Depot or Lowes will have the required hole saws available. You will want to find a **bi-metallic hole saw** like a Milwaukee or Lenox depending on which store you go to. These tend to be the best option in a hurry, however they will wear out, so if you have a lot of holes to drill, it may be wise to purchase more than one.

If you know ahead of time that you will need them, then they can be ordered from McMaster, or MP Systems stocks and can ship a kit with all the necessary components.

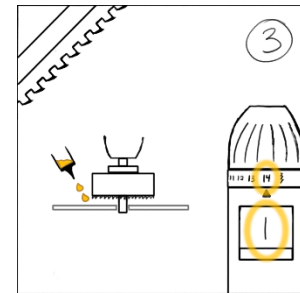
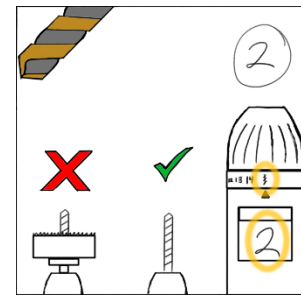
| PURGE | CDR | PIPE SIZE | HOLE SAW     | McMaster  | MP Systems      |
|-------|-----|-----------|--------------|-----------|-----------------|
| X     | X   | 1 1/4"    | 1 3/4"       | 3789A29   | AK HOLE SAW KIT |
|       | X   | 1 1/2"    | 2"           | 3789A33   | AK HOLE SAW KIT |
|       | X   | 2"        | 2 1/2"       | 3789A39   | AK HOLE SAW KIT |
| X     |     | 2 1/2"    | 3"           | 3789A45   | AK HOLE SAW KIT |
| X     | X   | ALL       | ARBOR        | 3789A61   | AK HOLE SAW KIT |
| X     | X   | ALL       | PIN 3/16 X 2 | 97395A618 | AK HOLE SAW KIT |

Cutting a hole in sheet metal seems like a common task, however doing it right will not only be safer, but can also improve tool life, cut speed, and cut quality (clean vs. jagged edges).

1. Start by measuring twice. Use the green pipe clamp for the dip tube you are installing to help layout where the hole needs to be drilled, as well as where the fasteners will need to go for the clamp. Use a center punch to locate the holes and prevent drill drift.



2. Use the appropriate size drill to make a pilot hole in the center of the cut. \*NOTE\* Only the drill bit should be used at this point, do not use the drill bit while attached to the hole saw. When the drill breaks through, you can damage the hole saw by “punching” the sheet metal and breaking or bending the teeth.
3. Install the blank pin in the arbor, then thread on the hole saw. (In a pinch, an old drill bit installed backwards can work as a guide too) Be sure to set your drill to low speed and change from drilling to torque mode.
4. Apply cutting fluid and begin cutting, feathering the trigger to maintain a moderate speed.
5. Be sure to continuously add cutting fluid to keep the hole saw cool and lubricate the cut.



# CDR Debris Test & Maintenance Schedule

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How do I know how well the CDR is working?

- The quickest way to know how well the CDR is working is to do a debris accumulation test. This can be done by simply measuring how much debris was taken out and deposited into the CDR settling tank over a certain period of time or number of parts made.

1. Start with a clean CDR settling tank and **DO NOT clean or remove debris during the test run time.**

2. Run the machine with CDR running for a known amount of days (ex 5 days' work) or parts made and allow it to filter out and accumulate debris in the settling tank.

3. After run time, using the provided measuring bucket, carefully scrape debris from the settling tank into the bucket.

4. Allow time to settle and slowly pour off coolant on top.

5. Read measurement on bucket or calculate volume.

6. Divide the total gallons by total number of days run or parts run.

7. Result is: Gallons/Day or Gallons/Parts

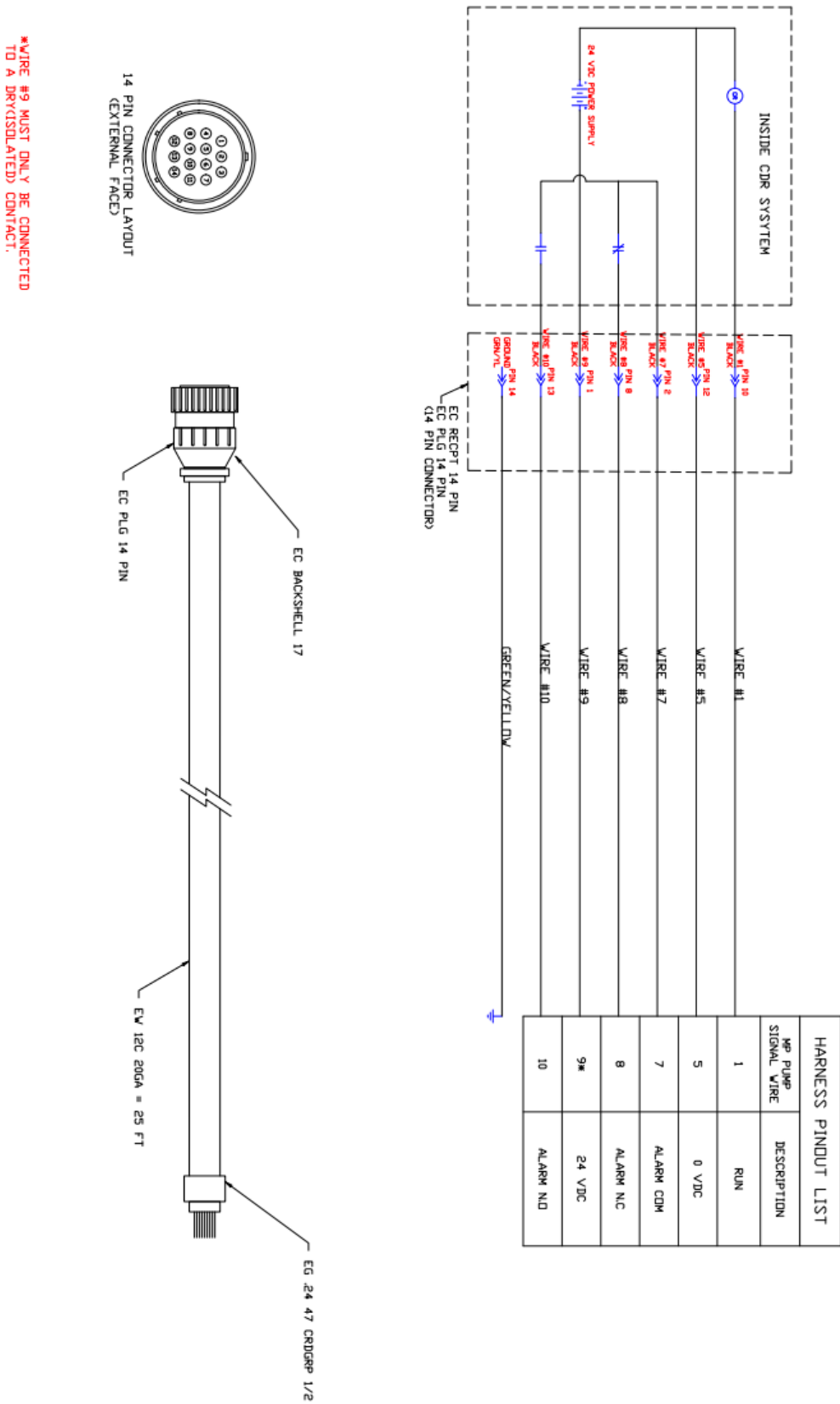
8. Multiply by days run per week, month, quarter, year, etc.

- Example: 5 quarts were removed over 5 days.  $5/5 = 1$  quart/day, 1.25gal/week
  - $1.25\text{gal/week} \times 4 \text{ weeks} = 5$  gallons removed per month
- Example: 5 gallons were removed over 5 days.  $5/5 = 1$  gal/day, 5gal/week
  - $5\text{gal/week} \times 4 \text{ weeks} = 20$  gallons removed per month
- This can be used to not only test the performance, but also to estimate when the settling tank should be cleaned for maintenance schedule.
  - Settling tank should only be cleaned once a reasonable amount of debris has accumulated.

- Settling tank fluid capacity is 15 gallons, however it should not be allowed to fill completely with debris.
- MP Systems recommends cleaning the settling tank once a few inches of debris have accumulated. Appropriate amount and times will vary per application, but 5-8 gallons is a good window to start.

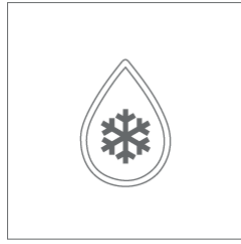


# CDR Machine Interface Wiring (Optional)

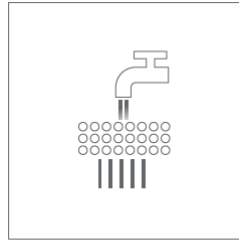




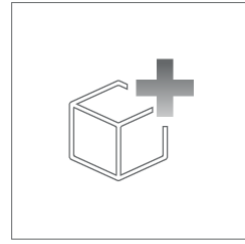
Coolant Systems



Coolant Chillers



Filtration



Accessories

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