CORE DRILLING:

THE ULTIMATE GUIDE

A Guide to Core Drilling PLUS some helpful hints for troubleshooting

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Contents

So you are drilling and you don't want to screw it up. It's okay, we've got you

Welcome to your new core drilling resource. Listed in this e-book are a range of factors you need to consider when purchasing and using equipment for core drilling. We hope you find this a useful reference as well as a guide to the products we have available here at UDT. As always, feel free to contact us for further information and pricing.

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Chapter One: How to Use Core Drills

It would be almost impossible to outline all operating and safety procedures to suit all drills on all work sites in all conditions. However, here are a range of factors you need to be aware of when using core drills. These guidelines are not exhaustive. If in doubt on any issues, contact your site supervisor, the drill manufacturer, the barrel manufacturer or your local Occupational Health and Safety Commission.

Selecting Your Core Drill

When selecting a core drill, you will need to know what the largest diameter hole you require to drill, and will you be drilling by hand or using a stand (or rig). Hand held is acceptable for drilling smaller holes or in brick or soft material, but if drilling larger diameters in concrete or reconstituted limestone, you will requires a core drill stand.

The Dymaxion PCD1700HH Core Drill is always in stock at UDT. See **www.udt.com.au**

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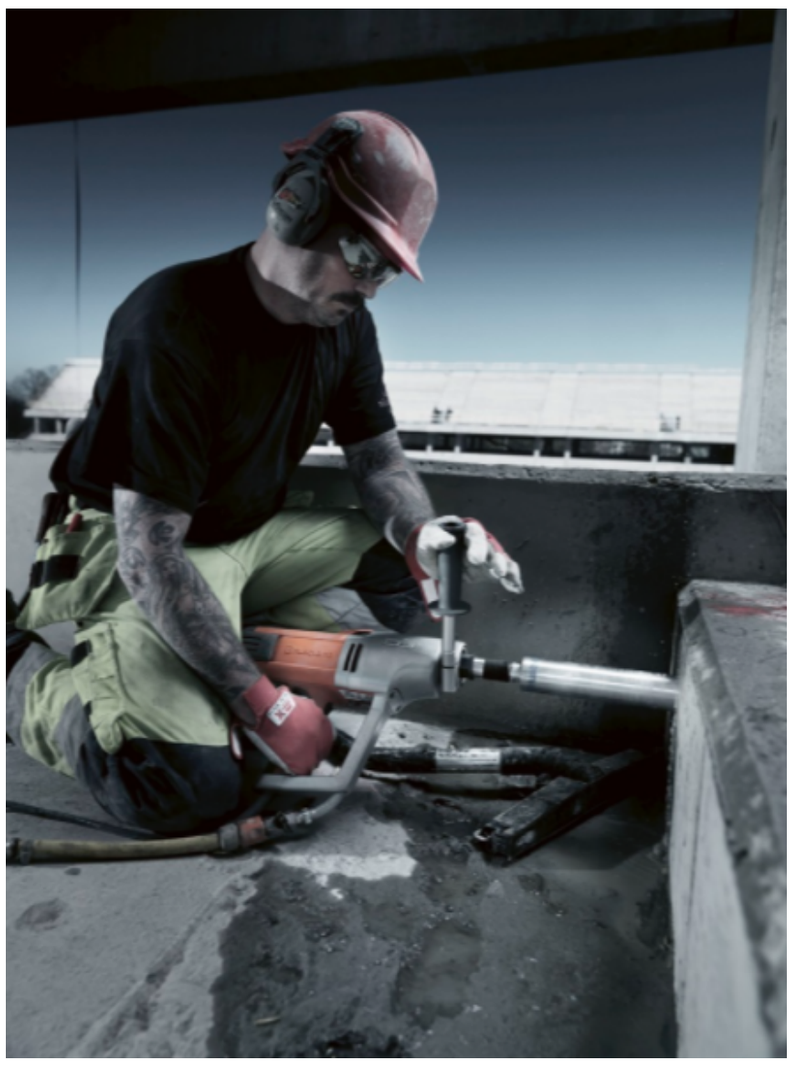
Preparation

- Identify onsite hazards and plan to control the risks they present.
- Have a plan of what you are going to drill. Is there any rebar, sewer lines, electrical lines or gas lines where you will be drilling? Check again you are drilling in the right spot.
- If stressed components or components affecting the integrity of a building are damaged during drilling, operators can be at serious risk
- When coring through floors above ground level, the core will release and fall to the lower level and can cause extremely serious injuries. Ensure the area below the drill hole is restricted with a barrier and is guarded by a worker.
- Ensure you have selected the right sized core barrel that suits the material you are drilling, the type of machine you are using and it's horsepower, and selected the right speed. For operator safety, most manufacturers recommend drilling over 67mm be done with the drill mounted in a stand. If in doubt, contact the saw or barrel manufacturer.
- Check the core barrel for any damage from transport, or from the last time it was used.
- Make sure the drill is in correct working order (with all safety guards, RCD etc in place), and will be safely operated by trained users.
- Use the shortest extension lead possible, and never longer than 30 meters due to the ever increasing resistance in current flow.
- Check with the site electrician there is adequate power as the drill may draw up to 25 amps.
- Check all electrical cords and plugs and elevate them to protect them from water. Test the RCD is operating correctly.
- Waterproof grease on the drill spindle thread will make bit changing easier
- Make sure the drill has adequate clean water running before turning on the motor. Otherwise the water jacket seals on the drill can overheat, which can cause them to leak.
- Ensure adequate ventilation is allowed for petrol powered drills like the Golz KB350
- Ensure adequate collection of slurry as per local legislation.
- Ensure the user is wearing appropriate personal protective equipment eg hearing protection, safety eye wear, dust mask etc. Consider using a PAPR (powered air purifying respirator).
- Ensure adequate lighting.
- Have a fire extinguisher and first aid kit nearby.
- Plan for the removal of debris and rubble.
- Beware of sun damage to the operator.

Positioning

- Properly support and clamp the material being cut if necessary e.g. concrete pipe, to prevent movement while working.
- Proper rig anchoring is essential to ensure a straight core. The best method of anchoring the drill rig is using physical anchors rated for core drilling. Providing the surface is smooth and the vacuum gasket is in good working order, a vacuum drill base can also be good option.
- Many drill rigs also have a ceiling jack that allows the operator to shore the top of the drill stand up to an overhead area with a sturdy piece of wood.
- Ensure the drill collar is fully and squarely seated into the female rig collar, generally tightening both left and right hex head bolts consecutively a little at a time until tight.
- When hand drilling, use a guide or template to keep the core barrel in the correct position. A simple template made from wood can be pinned to the concrete wall or stood on when floor drilling.
- Make sure there is an exclusion area around the cutting area adequate to keep other workers, general public and animals safe.
- Never work off ladders, crates, drums or chairs. Always use proper access equipment if the work cannot be reached from the ground.
- Be aware concrete and masonry cutting and drilling equipment can be heavy, and the operator may be required to carry it around on site, then hold it in an awkward position for a long time.
- Use correct manual handling techniques.
- Adopt the correct grip and stance to control the drill. You need to be well balanced as the barrel will turn clockwise to your right and you need to counter the rotational forces.
- Be aware of vibration fatigue and how to manage it.
- Be aware of slippery floors, and unstable or uneven surfaces.
- The risk of harm increases when working alone, even if that is just out of sight of other workers.



Drilling

- Only start drilling after water starts to flow from the drill bit.
- Select the drill speed (R.P.M.) based on the diameter of the core bit. The smaller the diameter, then the greater the speed allowable. Refer to the speed chart on "Core Drilling Tips and Troubleshooting" page
- Open up the diamonds on a new drill bit with shallow cuts in soft, abrasive material (eg. limestone)
- If drilling by hand, start drilling at a slight angle, then when a crescent shaped notch has formed, raise the drill to the vertical position.
- Do not force the bit - allow the drill to do the work. Forcing or twisting the barrel can cause binding, overheating, distortion and segment damage.
- If hand drilling, keep the same drilling angle at all times to avoid uneven wear to the core bit or jamming.
- When removing the bit, turn the water down and back the bit out while the drill motor is still running.
- Check the bit periodically for heat marks, cracks in the steel core or segments, or excessive wear underneath the segment.
- If excessive vibration or 'snatching' at the core barrel is detected – stop, remove the core drill, remove the core and investigate. Remove any loose material, pieces of steel rod etc. When drilling brick walls, wall ties maybe encountered - remove them with pliers. Failure to fix these problems may result in segment damage or loss.
- When the slurry changes colour (usually to gray) or the drill motor speed drops, you are most probably cutting steel. Drop the motor speed down and relax pressure by about 1/3. Some operators reduce water after exiting the steel to redress the bit again, but don't forget to turn the water up again afterwards.
- Maintain a straight drilling direction. If you allow the barrel to skew , usually the wall of the barrel will bind in the hole
- If the drilling is slow, the barrel segments may have glazed up. Redress the bit by reducing the water by half for a few minutes, or by drilling into an abrasive material like limestone, a cinder block or similar. A bit of Ajax or builders sand down the hole, with the drill run at a slower speed for a couple of minutes, can also have the same effect.
- Never leave a running machine unattended.
- Compared to SDS percussive drilling, drilling with diamonds (an abrasive technology) is the slowest of all cutting methods. Concrete drilling with embedded steel can take many times longer. Have realistic expectations as to the time it requires.

These guidelines are not exhaustive. If in doubt, contact the saw manufacturer, the blade manufacturer, site supervisor or local Occupational Health and Safety Commission.

Chapter Two: Core Drilling Tips

- For operator safety, most manufacturers recommend drilling over 67mm be done with the drill mounted in a stand.
- Ensure there are no gas, power or water lines or any other issues where you are going to drill.
- Never stand on a rig to hold it down, as this causes a 'ribbing' effect on the core, and the bit will eventually bind up in the hole.
- Always turn on the water (always use clean water) before turning on the motor. Otherwise the water jacket seals on the drill can overheat, then leak.
- For best results, apply water until the slurry looks like coffee made with a lot of milk. Too much water flow washes away the abrasive slurry which is needed to keep wearing away the segment and keep fresh diamonds exposed. Too little water can cause the diamond segments to overheat.
- When cutting steel, the slurry usually changes colour (usually to gray), or the drill motor speed drops. Drop the motor speed down and relax pressure by about 1/3. If you don't, the segments may overheat and bend inwards (occasionally outwards), and stop cutting. The barrel may also crack. Some operators reduce water after exiting the steel to redress the blade again, but don't forget to turn the water up again afterwards.

- Similarly, if you are drilling concrete with a high strength (or MPA), or with very hard aggregate in it, the bit may glaze up and need redressing. Do this by reducing the water by half for a few minutes, or by drilling into an abrasive material like limestone, a cinder block or similar. A bit of Ajax down the hole can also have the same effect.
- With conventional brush type motors, as the motor current rises from feed pressure, the RPM will drop. This causes a decrease in surface feet per minute (SFM), which slows the production rate of drilling. An amp meter can assist the operator in getting the most out of a drill motor by maintaining a more constant RPM or SFM. Drilling should not be carried out above the rated amp draw of the motor.
- An amp meter can also assist brush-less induction type motors not to draw too much current that the overload protection device trips.
- Be aware, no two coring jobs are ever the exactly the same. Variables include (but are not limited to): what age is the concrete, what hardness and size of stone was used, the quantity and type of chemicals added to produce harder MPA's, how much steel reinforcing rod will be drilled etc.
- If your 127mm bit binds in limestone, United Diamond Tools have a limestone barrel specifically designed to reduce binding. We also sell 127mm bits for concrete, granite and laterite.
- When removing the bit, turn the water down and back the bit out while the drill motor is still running.

Core Drilling Tips

- You can avoid stuck core barrels by:
- 1. cleaning the core hole often
- 2. don't try removing too large of a slug
- 3. good water pressure will help flood the sediments up from deeper holes. Relieve the pressure on the core bit for a few minutes now and then.
- The driller's experience in deep coring is essential. The slurry from the cutting of asphalt or concrete is distinct and consistent. As soon as the core barrel cuts through the bottom of the asphalt or concrete into the road base, the slurry coming up to the surface will look different. Watch for the change, and then you will know you are through.
- Need to drill dry for environmental reasons but only have a standard water-cooled core drill and bit? There have been cases of operators connecting up air to the drill instead of water, but this may not suit all applications, and air is not as efficient at cooling as water. It also may lead to damaged seals in the drill in prolonged use. But it may be ok for a small job.
- Waterproof grease on the drill spindle thread will make bit changing easier
- Always read your drill's operation manual before use
- Wear correct PPE (personal protective equipment)
- Use the drill and bits only in a safe manner as described in the operation manual
- Be aware if using a vacuum assembly to anchor a core drill stand to a surface, the operator may risk injury if the vacuum pump fills with slurry, or the power goes off. This can cause loss of vacuum, which can result in the drill stand breaking free and falling, or rotating round the drill.
- If excessive vibration or 'snatching' at the core barrel is detected – stop, remove the core drill, remove the core and investigate. Remove any lose material, pieces of cut steel rod etc. When drilling brick walls, wall ties maybe encountered - remove them with pliers. Failure to fix these problems may result in segment damage or loss.
- If the drill speed is too high, the diamond segment will skip over the grinding surface. This means the core barrel bond will not wear away to expose new diamonds and the cutting edge becomes blunt or glazed over
- On smaller diameter holes, there is a tendency for the core barrel to wander away from the true center. This is because there is no pilot drill system to lock the barrel in the drilling position. A piece of heavy timber is sometimes used (on the outbound rotational side) to steady the bit
- Drilling with diamonds (an abrasive technology), when compared to SDS percussive drilling, is the slowest of all cutting methods. Concrete drilling with embedded steel can take many times longer. Have realistic expectations as to the time it requires.
- If the drilling is slow, the blade may have glazed up. Redress the bit by reducing the water by half for a few minutes, or by drilling into an abrasive material like limestone, a cinder block or similar. A bit of Ajax down the hole can also have the same effect.
- If your internal 1/2" thread is rusted, and won't clean up, you can still use 1/2" bits by buying a 1 1/4"UNC to 1/2" adaptor from UDT.

For up to date information, visit:

www.udt.com.au

Chapter Three: Trouble Shooting

Problem	Cause	Remedy
Segment bent over	Too much pressure by operator when cutting reo	Replace barrel, decrease pressure when cutting reo
Loss of Segment	Bit is too hard, causing barrel to bounce	Decrease drill speed, or use softer bond
	Overheating	Increase water flow
	Drill not held rigidly allowing vibration	Hold drill firmly, or mount drill on a stand
Segments crack	Bit is too hard	Decrease drill speed, or use softer bond
	Drill not held rigidly	Hold drill firmly, or mount drill on a stand
Barrel Cracking	Too much pressure by operator	Reduce pressure
	Bit is too hard	Use softer bond
Belled Barrel	Too much pressure by operator	Reduce pressure
Bit not cutting	Too little pressure by operator causes the bit to glaze up	De-glaze bit (see above) then re drill with more pressure

Core Drill Bit Speeds

Diameter mm	**Drill speed**
8-29mm	3,000RPM
30-45mm	1,500RPM
46-65mm	1,200RPM
66-89mm	900RPM
90-125mm	600RPM
126-200mm	450RPM
201-400mm	300RPM

Chapter Four: Basic Safety

Essential to reduce the risk of any injuries.
Always wear eye and hearing protection! Wear respiratory mask for dry cutting!

Careless or improper use of a equipment could cause personal injury!

- Do not use any tools if damage is suspected.
- Beware of sun damage to the operator
- Have a fire extinguisher and first aid kit nearby.
- Use a barrel that is suitable for the machine and the material to be cut.
- Check for suitability before cutting dry, and take extra precautions because of the dust.
- Check barrel for damage before installing.
- Check machine condition before performing any cutting operations.
- Check for a tight fit to the shaft of the drill.
- Check condition of barrel regularly.
- Check all electrical cords and plugs (if applicable) and protect them from water.
- Never drill without the safety guards provided in place.
- Do not apply side pressure.

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Chapter Five: Core Barrels

United Diamond Tools carry a large range of diamond core barrels for the construction industry. Our range includes diamond core barrels for the fencing contractor (suit limestone and laterite) and the professional concrete cutter, as well as plumbers, electricians, pest controllers, air conditioning installers and builders. We stock barrels in 450mm, 600mm and 800mm lengths, and barrels specifically designed for coring into laterite. We also supply selected barrels to cut granite.

Our core barrels for the fencing contractor have set an industry standard with a design that reduces the incidence of the barrel locking in the hole.
United Diamond Tools can also arrange manufacture of special core barrels which are used in the mining industry. Should you require a special build core barrel for coring into mineral samples, then we can build a core barrel to suit.

See also our **dry core cutter** page for our all our dry cut core cutters.

We also stock and sell:
- Extensions - 1/2" and 1 1/4" UNC types (150mm and 300mm)
- Adaptors - from 1/2" to 1 1/4" UNC, or Hilti to 1 1/4" UNC
- Husqvarna Vari-Drill core bits

See our "Core Drill Accessories and Spare Parts" section on page 17 for further info.

Code	Description	Quality	Arbour	Met
DBS14CON	Concrete	Premium	1/2"	14mm
DBS16CON	Concrete	Premium	1 1/4" UNC	16mm
DBS18CON	Concrete	Premium	1/2" or 1 1/4" UNC	18mm
DBS20CON	Concrete	Premium	1/2" or 1 1/4" UNC	20mm
DBS22CON	Concrete	Premium	1/2"	22mm
DBS24CON	Concrete	Premium	1/2"	24mm
DBS25CON	Concrete	Premium	1/2" or 1 1/4" UNC	25mm
DBS28CON	Core Barrel Wet Cutting	Trade or Premium	1/2"	28mm
DBS30	Concrete	Trade	1/2"	30mm
DBS32	Concrete	Trade or Premium	1/2" or 1 1/4" UNC	32mm
DBS35CON	Concrete	Trade or Premium	1/2"	35mm
DBS40	Concrete	Premium	1/2"	40mm
DBS52CON	Concrete	Premium	1.1/4" UNC	52mm
DBS52G	Granite	Premium	1.1/4" UNC	52mm
DBS52	Concrete	Trade	1.1/4" UNC	52mm
DB52L	Limestone	Trade	1.1/4" UNC	52mm
DBS53H	Concrete	Husqvarna	1.1/4" UNC	53mm
DBS65L	Limestone	Trade	1.1/4" UNC	64+65mm
DBS65CON	Concrete	Premium	1.1/4" UNC	65mm
DBS65	Concrete	Trade	1.1/4" UNC	65mm
DBS70H	Concrete	Husqvarna	1.1/4" UNC	70mm
DBS72H	Concrete	Husqvarna	1.1/4" UNC	72mm
DBS76	Concrete	Trade	1.1/4" UNC	76mm
DBS76L	Limestone	Trade	1.1/4" UNC	76mm
DBS77CON	Concrete	Premium	1.1/4" UNC	77mm
DBS82CON	Concrete	Premium	1.1/4" UNC	82mm
DBS83H	Concrete	Husqvarna	1.1/4" UNC	83mm
DBS102CON	Concrete	Premium	1.1/4" UNC	102mm
DBS102G	Granite	Premium	1.1/4" UNC	102mm
DBS102	Concrete	Trade	1.1/4" UNC	102mm
DBS102H	Concrete	Husqvarna	1.1/4" UNC	102mm
DBS102L	Limestone	Trade	1.1/4" UNC	102mm
DBS115CON	Concrete	Premium	1.1/4" UNC	115mm
DBS126L	Limestone - wide segment	Trade	1.1/4" UNC	126mm
DBS127L	Limestone - 450mm, 600mm or 800mm long	Premium	1.1/4" UNC	127mm
DBS127CON	Concrete	Premium	1.1/4" UNC	127mm
DBS127H	Concrete	Husqvarna	1.1/4" UNC	127mm
DBS127/800	Laterite	Premium	1.1/4" UNC	127mm
DBS132CON	Concrete	Premium	1.1/4" UNC	132mm
DBS152CON	Concrete	Premium	1.1/4" UNC	152mm
DBS152H	Concrete	Husqvarna	1.1/4" UNC	152mm
DBS162CON	Concrete	Premium	1.1/4" UNC	162mm
DBS250CON	Concrete	Premium	1.1/4" UNC	250mm

Chapter Six: Dry Core Cutters

As Used By Most Electricians and Plumbers...

At United Diamond Tools, we carry a large range of dry core cutters. These are used for dry cutting concrete blocks, bricks, paving slabs, limestone, clay bricks and cured concrete with an ordinary drill. These are used by most plumbers, electricians, air conditioning installers and builders. They can be used dry, which suits many tradespeople. We carry our range here in Perth, Western Australia, so there is no need to buy an expensive kit - just get the barrels you need.

These are to be used in **rotary mode only** ie not hammer drill.

Note - When cutting dry, always be aware of the danger of breathing in the dust. Use a half face respirator or PAPR.

Dry core cutters are designed for concrete (but not reinforced), so you may run into problems (like binding, premature wear or loosing segments) when cutting the reo.

Code	Description	Quality	Met
DBS32CC	32mm x 150mm	Trade	32mm
DBS38CCB	38mm x 150mm	Trade	38mm
DBS52CC	52mm x 150mm	Trade	52mm
DBS65CC	65mm x 150mm	Trade	65mm
DBS68CC	68mm x 150mm	Trade	68mm
DBS78CC	78mm x 150mm	Trade	78mm
DBS82CC	82mm x 150mm	Trade	82mm
DBS102CC	102mm x 150mm	Trade	102mm
DBS107CC	107mm x 150mm	Trade	107mm
DBS117CCB	117mm x 150mm	Trade	117mm
DBS127CC	127mm x 150mm	Trade	127mm
DBS152CC	152mm x 150mm	Trade	152mm
DBS158CC	158mm x 150mm	Trade	158mm
DBSCCAdaptor	Drill adaptor - SDS or Hex	Special	
DBSPilotDrill	Pilot Drill	Special	

For up to date information, visit:
www.udt.com.au

Chapter Seven: Core Drills & Stands

We always stock a range of quality core drills and stands. They include:

DYMAXION PCD1700HH CORE DRILL This basic machine design has been available for many years and is popular in the market due to it's great value.

Husqvarna DM230 DRILL The well known Husqvarna DM230 CORE DRILL is strong, reliable and durable.

Golz FB33P Core Drill with pistol grip is a powerful core drill with full metal housing.

For current pricing visit our website: **www.udt.com.au**
or give us a call on **0419 901 533**

Core Drill & Rig Comparison Sheet

CORE DRILL COMPARISON

Model Number	Dymaxion PCD1700HH	Dymaxion AGCDM160	Golz FB33P	Golz FB33S	Husqvarna DM230
Power Watts	1700W	2000W	2200W	2200W	1850W
No Load Speeds RPM	950/2100/2400	400-850 750-1640 1550-3450	520/1400/2900	520/1400/2900	700/1700/3600
Max Drilling Diameter Concrete on Rig	90mm **1 1/4" UNC ONLY**	160mm	160mm	160mm	150mm
Max Drilling Diameter Brick by hand	133mm	200mm	200mm	200mm	80mm
Net Weight	10kg	6kg	6.5kg	6.5kg	7kg
Variable Speeds	No	Yes	No	No	No
Soft Start	No	Yes	Yes	Yes	Smart Start
Overload Protection	No	Yes	Yes	Yes	Yes
Feedback Electronic Speed Control	No	No	No	No	Elgard
Warranty	1 Year	1 Year	1 Year	1 Year	1 Year (except K4000 6 months)
Drill Rig To Suit	AGDMRIG/ PCD1500SS	AGDMRIG/ PCD150SS	KBS125	KBS125	DS150/DS250

DRILL RIG COMPARISON

Make	Dymaxion	Dymaxion	Golz	Husqvarna	Husqvarna
Model	PCD1500SS	AGDMRIG + ABRAC 160 mtg Bracket	KB125	KB125	DS250
Rig Height: Floor to Bracket Collar	560mm	820mm	650mm	495mm	685mm
Angles	90° only	45-90°	45-90°	45-90°	45-90°
Weight	9kg	15kg	12kg	16kg	16kg
Max Diameter Core Drills	90mm	130mm	250mm	150mm	250mm
Notes					Vertical Drilling

For current pricing visit our website:
www.udt.com.au
or give us a call on **0419 901 533**

Chapter Eight: Core Drill Accessories and Spare Parts

United Diamond Tools carry a large range of accessories to suit diamond core barrels, as well as parts for core drills and stands.We stock and sell:

Accessories

Drill Extensions:
- 1/2" (150mm and 300mm long)
- 1 1/4" UNC (150mm and 300mm long)

Adaptors:
- From 1/2" to 1 1/4" UNC
- Hilti BL/BS/BR to 1 1/4" UNC
- Other Hilti to 1 1/4" UNC
- As well as various other adaptors

Core Drills and Drill Rigs (stands)

-We always have a couple of new drill rigs in stock
- Second hand usually available as well

Dymaxion Vacuums and Base Plates:

- The VACPLATE is a universal device that is available on all Dymaxion core drill rig bases, that uses a vacuum to hold the drill stand in place. An example of its use would be a perfect floor (tile/granite) that has to be drilled for a new lavatory bowl.
- The VACPLATE will not leave a mark on the floor but will hold the rig firmly for drilling.
- AGVAC140 vac pump is a premium quality vacuum suction pump system and is supplied with the ultimate in product benefits.
- AGVACBUN is a vac pump combined with a 8 litre air tank, ensuring suction is maintained for a couple of minutes should the vacuum pump stop working for whatever reason (e.g. power outage).

Dymaxion Vacuum Suction Sets:

The wet and dry vacuum suction pipe is inserted into the ring take off which then sucks up slurry or dust into the collection unit. The inner reducing rings increase the suction efficiency depending on the core drill bit diameter. These ring sets can be used in conjunction with normal power drill operations including masonry or concrete where dust and typical drilling debris cause concern. The master suction ring will grip onto most wall or floor surfaces. More powerful wet and dry vacuums increase the overall performance.

Small Set: $70
Open Ring Diameter: 80mm
Inner Rings: 60, 45 & 40mm

Large Set: $90
Open Ring Diameter: 150mm
Inner Rings: 115 & 125mm

Golz 10 Litre Portable Pressure Tank: $290

No water where you are cutting or coring? This will solve your problems. The 10 litre Golz tank is built tough for drilling and coring situations, and will fit most quick cuts and core drills. It has a pressure gauge built in as well.

Maximum pressure 6 bar (87 PSI)
Maximum flow - 4.5 l/min at 6 bar
10 litre capacity

Core Drill Parts

We carry oil, gaskets, o-rings and brushes in stock for the Husqvarna DM230 core drill.

Golz core drill (FB33P and FB33S) **parts** are usually available ex Perth 1-2 days.

We also carry Dymaxion PC D1700HH brushes in stock

We stock a front handle assembly (suits all core drills with 60mm mount such as Weka, Husqvarna, Golz etc with 60mm collar).

Inline RCD (aftermarket) to suit core drills (must be installed by an electrician). Water line on/off taps and fittings.

THAT'S IT!

Thank you for reading, we hope you found this guide useful. If you have any more queries feel free to drop in to:

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