DM20
Integrated High-Frequency Diamond Core Drilling Motor

For Wet Drilling of Reinforced Concrete

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Internal & Confidential

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Introduction
Target group & Applications

DM20 Introduction

• Highest Power Output from 230V Single-Phase Input

The DM20 is a core drilling motor for wet drilling up to 500 mm in reinforced concrete. It runs on single phase 230V at 16A input. The motor is rated at 3700 W input, with an impressive 90% output efficiency: making it the most efficient and highest output single phase coring motor on the market. Since 3 phase supply is often not available, running on single phase supply is much more convenient.

• High-Frequency Motor with Integrated Converter

Its outstanding efficiency is achieved by using high-frequency PMSM (permanent magnet synchronous motor) technology. The motor is a water-cooled with the converter conveniently integrated into the motor head. No external power box is required. The AGP is the only PMSM coring motor on the market and its performance is unmatched by any single-phase competitor.

• Electronic Speed Selection

The PMSM motor design allows the rotation speed to be electronically reduced without any loss of torque, allowing the machine to be designed with a single gear ratio to cover its range of operation. There are 17 speed steps, and the speed can be adjusted on the fly as needed. It features constant speed electronics, allowing smooth and fast drilling, with the added benefit of longer core bit life.

• Special Features

The LED screen provides the operator with a clear information interface about bit diameter setting, load conditions, service indicator, hours counter, and error codes. There is a special bit threading function to assist in threading on large diameter bits. The Iron Assist button helps when encountering embedded steel while drilling.

• Protection

Safety for the user and protection of the tool are provided by a robust but accurate clutch in combination with a complete electronic motor protection package including soft-start, thermal protection, and overload protection.

Altogether, this makes the DM20 a great combination of impressive performance and excellent versatility.

Target Groups and Applications

The DM20 will be the primary choice for operators who need to wet drill large diameters up to 500 mm in reinforced concrete. It will be a great choice for drilling companies, contractors, and anyone who needs the highest performance possible with single phase supply.

Sales Arguments

High Efficiency PMSM Motor

Water-cooled, high frequency PMSM motor has the highest output efficiency of any single phase coring motor on the market at 90%. Outstanding performance with large diameters up to 500 mm.

Runs Directly on 230 V single phase

High Frequency Converter is integrated into the unit, so you can just plug it into the 230 V single phase supply and start drilling!

Ferro-Fix Rebar Assist Button

The Ferro-Fix rebar assist mode makes it much easier to handle embedded steel while drilling.
When rebar is encountered, press the Ferro-Fix button, once the steel is passed, press the button again to resume normal drilling mode.

Bit Threading Button

The Bit Threading function makes threading on large bits much easier. Simply align the spindle with the bit, press the button once, and it will automatically rotate at low speed to thread the bit on. Press the button once again to stop.

Electronic Speed Selection

17 Speed settings are easy to select, and can be adjusted on the fly.
Device keeps memory of the most recent speed setting whenever it's plugged in.

Easy to Use Operator Interface

LED display gives bit diameter, as well as mode display, service indicator, hours counter, and error codes.
The separate LED Load Indicator, gives reliable information on load and thermal conditions.

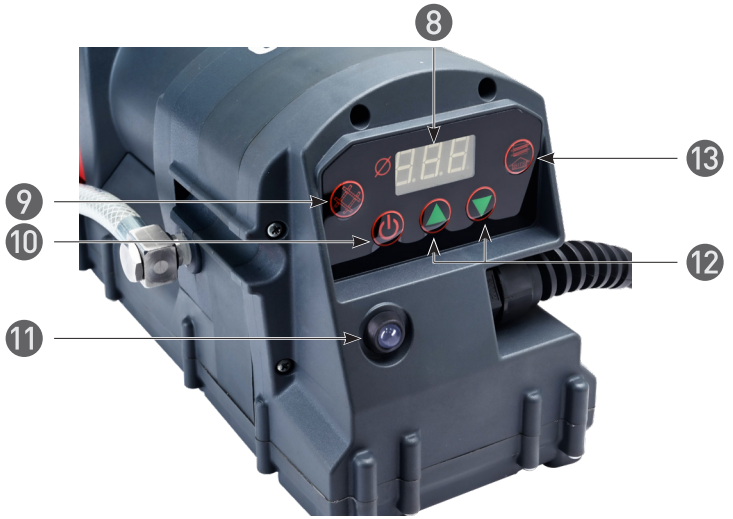
Diameter Display in both mm and Inches

The diameter display can be easily switched between inches and millimeters by simply pushing and holding the rebar assist button.

Technical Specification

Model	DM20
Power Input	3700 W /16 A
Power Output	3.3 kW (4.4 hp)
Voltage, Frequency	1~ 220-240 V, 50-60 Hz
Rated Load Speeds*	220-540 min^{-1}
Drilling Capacity	Ø500 mm (20")
Gear Oil Type	80W-90
Gear Oil Capacity	400 ml
Spindle Thread	1-1/4"UNC male
Insulation Class	Class 1 With PRCD
Ingress Protection Class	IP55
Weight	16.7 kg (36.7 lb)

*Due to the constant speed design, the no load speeds and rated load speeds are the same.



1. Spindle
2. Anti-Seize Ring
3. Motor Unit
4. Control Panel
5. Tail Handle
6. Power Supply Cord
7. Water Feed Valve
8. Information Screen
9. Ferro-Fix Rebar Assist Button
10. Motor Start / Stop Switch
11. LED Load Indicator
12. Diameter Selector Buttons
13. Threading Button

Offer Content

Standard Accessories

1 DM20 High-Frequency Brushless Diamond Core Drilling Motor

Optional Accessories

2 40mm Extension Spacer Kit

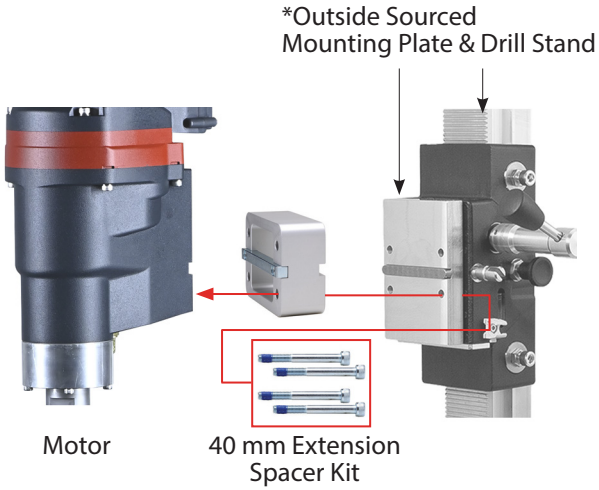
This spacer kit is not necessary with AGP drill stands, but may be necessary when mounting the motor to some models of other manufacturers' drill stands. The spacer fits between the motor and the stand's mounting plate to provide clearance and prevent the motor from interfering with the stand. Screws are included. (The spacer also adds an extra 80 mm to the maximum core bit diameter with a given stand.)

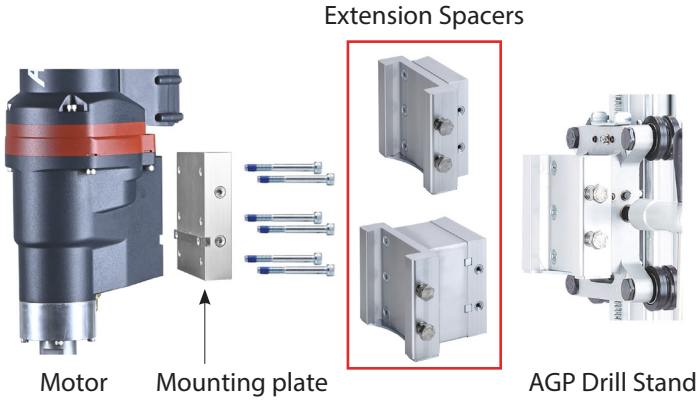
3 Mounting Plate (AGP drill stands only)

6-bolt type, for use with AGP drill stands. The plate is standard equipment with large AGP drill stands, so you only need to buy the mounting plate if you need to use multiple motors sharing the same drill stand.

4 5 Modular Extension Spacers (AGP drill stands only)

When using AGP S500 & S800 drill stands, these modular extension spacers add clearance to allow the mounting of large diameter bits above 350 mm. The 45 mm spacer allows up to 440 mm bits to be mounted. The 100 mm spacer allows up to 550 mm bits to be mounted.





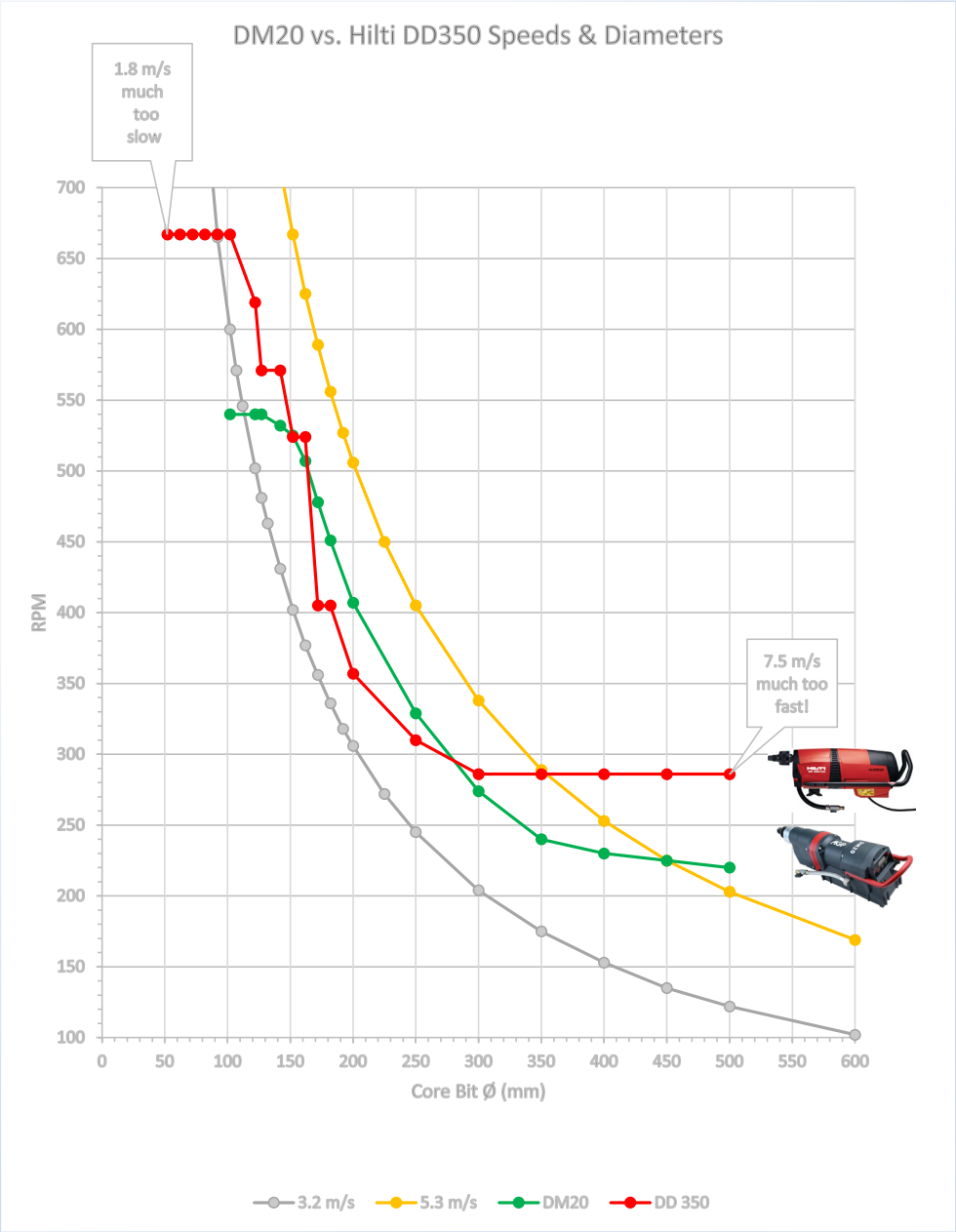
Comparison Table (1/2)

Brand						
						
Model	**DM20**		DD 350-CA	DD 250	SR 25	SR 38
Motor Type	**PMSM, 1~ Integrated Converter, Water-Cooled**	👍	High Frequency Induction, 1~ Integrated Converter, Water-Cooled	Universal (Carbon Brush) Motor, Air-Cooled	Switched Reluctance, 1~ Integrated Converter, Water-Cooled	Switched Reluctance, 1~ Integrated Converter, Water-Cooled
Supply, 220-240 V, Single Phase	**1~ 220-240 V, 16 A**		1~ 220-240 V, 16 A	1~ 220-240 V, 16 A	1~ 230 V, 16 A	1~ 230 V, 16 A
Input Power	**3700 W (16 A) (230 V)**		3600 W	3200 W	3700 W	3700 W
Output Power	**3.3 kW (90%)**		2.7 kW (75%)	2.1 kW (66%)	2.7 kW (73%)	2.7 kW (73%)
Capacity Ø	**100-500 mm**	👍	52-500 mm	12-500 mm	70-370 mm	50-400 mm
Rated Load Speeds	**220-540 min^{-1}**		286-667 /min	156-1443 /min	230-570 /min	180-1370 /min
Electronic Speed Steps	**17 steps**	👍	10 steps, 1 gear	4 gears only	6 steps only	6 steps, 3 gears (18-speeds total)
Weight	**16.7 kg**		Actual 16.7 kg (14.4 kg claimed)	15.4 kg	14.7 kg	16.0 kg
Dimensions (LxWxH)	**669 x 181 x 183 mm**		675 x 200 x 185 mm			
Ingress Protection	**IP55**		IP55	N/A	IP55	IP55
Fixture	**1-1/4" UNC**		Special HILTI BL chuck	Special HILTI BL+ chuck	1-1/4" UNC	1-1/4" UNC
Mounting	**Standard (4 bolt) & AGP-type (6 bolt)**		Special HILTI coupling	Special HILTI coupling	Standard (4 bolt)	Standard (4 bolt)
Slow Rotation (threading)	**Yes THREADING BUTTON" on panel, 30 rpm (press once and goes automatically)**	👍	N/A (quick-release chuck)	No	Yes	Yes
Rebar Mode	**Yes "FERRO-FIX BUTTON" on panel**	👍	YES "IRON BOOST BUTTON"	No	No	No
LED Load Indicator	**Yes**	👍	4 LEDs show the load level	4 LEDs show the load level	No	No
Information Display	**Yes**	👍	No	No	Shows recommended Ø	Shows recommended Ø (flashes 3 gears)
Auto Save of Speed Setting	**Yes, remembers the most recent electronic setting**	👍	N/A	N/A	Yes	Yes
Error Codes	**Yes**	👍	No	No	Yes	Yes
Hours Counter	**Yes**	👍	No	No	Yes (total hours & hours to next ervice)	Yes (total hours & hours to next service)
Service Indicator	**Yes (reminder to replace water seals)**		Yes	Yes	Yes	Yes
Overload Protection	**Yes AVR style**		Yes	Yes	AVR style	AVR style
Overheat Protection	**Yes**		Yes	Yes	Yes	Yes
Under /Over Voltage Protection	**Yes**		Yes	No	Yes	Yes
Autofeed System			Yes (optional DD AF-CA autofeed module)	Yes (optional DD AF-CA H 230V autofeed module)	Yes (optional BA50 unit)	Yes (optional BA50 unit)

Comparison Table (2/2)

Brand	AGP 	HILTI 	HILTI 	WEKA ELEKTROWERKZEUGE 	WEKA ELEKTROWERKZEUGE 
Model	**DM20**	DD 350-CA	DD 250	SR 25	SR 38
Electronic Speed Steps	**17 steps**	10 steps, 1 gear	4 gears only	6 steps only	6 steps, 3 gears (18-speeds total)
Step 1 (n /min)	**220 / min (Ø 500 mm)**	286 / min (Ø 300 - 500 mm)	(No Load) I: 240, II: 580, III: 1160, IV: 2220	Step 1: 230 (Ø 200-370 mm)	I: 180 (Ø400), II: 360 (Ø190), III: 560 (Ø120)
Step 2 (n /min)	**225 / min (Ø 450 mm)**	310 / min (Ø 225 - 250 mm)	(Rated Load) I: 156, II: 377, III: 754, IV: 1443	Step 2: 280 (Ø 170-310 mm)	I: 220 (Ø310), II: 430 (Ø155), III: 670 (Ø100)
Step 3 (n /min)	**230 / min (Ø 400 mm)**	357 / min (Ø 202 mm)		Step 3: 340 (Ø 140-260 mm)	I: 260 (Ø255), II: 520 (Ø130), III: 810 (Ø80)
Step 4 (n /min)	**240 / min (Ø 350 mm)**	405 / min (Ø 172 - 182 mm)		Step 4: 410 (Ø 110-210 mm)	I: 320 (Ø210), II: 630 (Ø105), III: 980 (Ø70)
Step 5 (n /min)	**253 / min (Ø 325 mm)**	524 / min (Ø 152 - 162 mm)		Step 5: 490 (Ø 100 - 180 mm)	I: 380 (Ø175), II: 755 (Ø90), III: 1180 (Ø55)
Step 6 (n /min)	**274 / min (Ø 300 mm)**	571 / min (Ø 127 - 142 mm)		Step 6: 570 (Ø 70 - 150 mm)	I: 440 (Ø150), II: 880 (Ø75), III: 1370 (Ø40)
Step 7 (n /min)	**300 / min (Ø 275 mm)**	619 / min (Ø 122 mm)			
Step 8 (n /min)	**329 / min (Ø 250 mm)**	667 / min (Ø 102 - 112 mm)			
Step 9 (n /min)	**407 / min (Ø 202 mm)**	667 / min (Ø 72 - 92 mm) (* torque reduced)			
Step 10 (n /min)	**451 / min (Ø 182 mm)**	667 / min (Ø 52 - 62 mm) (* torque reduced)			
Step 11 (n /min)	**478 / min (Ø 172 mm)**				
Step 12 (n /min)	**507 / min (Ø 162 mm)**				
Step 13 (n /min)	**525 / min (Ø 152 mm)**				
Step 14 (n /min)	**532 / min (Ø 142 mm)**				
Step 15 (n /min)	**540 / min (Ø 127 mm)**				
Step 16 (n /min)	**540 / min (Ø 122 mm) (* torque reduced)**				
Step 17 (n /min)	**540 / min (Ø 102 mm) (* torque reduced)**				
Speed Can Change While Drilling	**Yes**	Yes	No	Yes	Yes
Conclusion	This comparison shows a wide range of drilling motor types, all designed for large diameter drilling. The AGP DM20, being a high frequency, single phase input machine, with integrated converter, and with single gear and electronic speed steps, the most directly comparable tools are the Weka SR 25 and Hilti DD350. The Hilti uses the inherently less efficient induction motor design. The Weka uses an SR (switched reluctance) type motor , which is somewhat better than an induction motor. But the AGP's PMSM motor is far superior in both efficiency and torque density. The inherent characteristics of the AGP PMSM motor allow peak torque to be maintained over a wide RPM range, thus allowing it to use only one mechanical gear ratio, while still performing at peak efficiency throughout its range of drilling diameters. The DD250 universal motor machine has the disadvantage of having much lower efficiency, and thus lower power output. With the limited available power, the low gearing does allow larger diameters to be used, but drilling speed will be slow and the diamond segments will glaze (go dull) easily. (The diamonds need enough power driving them to keep them sharp.) The DM20 is the most optimal machine in this list for drilling large diameters running on 230V single phase supply. With by far the highest power output with its superior PMSM motor and wide range of electronic and design features, it is the most usable tool available for drilling large diameters.				

Comparison of DM20 vs. DD350 Speeds and Diameters



diameter Ø mm	low rpm (3.2 m/s)	optimal rpm (4.3 m/s)	high rpm (5.3 m/s)	DM20 rpm	DD 350 rpm
600	102	**137**	169		
500	122	**164**	203	220	286
450	135	**183**	225	225	286
400	153	**205**	253	230	286
350	175	**235**	289	240	286
300	204	**274**	338	274	286
250	245	**329**	405	329	310
200	306	**411**	506	407	357
182	336	**451**	556	451	405
172	356	**478**	589	478	405
162	377	**507**	625	507	524
152	402	**541**	667	525	524
142	431	**579**	713	532	571
127	481	**647**	797	540	571
122	502	**673**	830	540	619
102	600	**806**	993	540	667
92	665	**893**	1101		667
82	764	**1027**	1266		667
72	849	**1141**	1407		667
62	986	**1325**	1633		667
52	1176	**1580**	1948		667

Conclusion:
A careful reading of the chart and graph shows that the Hilti is way beyond reasonable surface speeds in both directions. For large diameters, the maximum recommended diameter should be limited to 350mm at most. Claiming 500mm is way above the recommended surface speed (7.5 m/s!). For small diameters, 82mm should be the limit. Hilti claims 52mm, and that is about half the recommended minimum surface speed. The Hilti should be rated at 82-350mm for its actual capabilities. The AGP is very reasonably rated at 102-500mm and works very well in this entire range. With its superior PMSM motor, the AGP's efficiency, and thus its power output is much higher than the Hilti's, and this allows it to comfortably run at slightly higher than the recommended maximum 5.3 m/s at 500mm. For sizes below 102mm, drilling can easily be performed with any smaller model, such as the DM6, etc.

Tool Dimensions (mm)