

**SAFETY INSTRUCTIONS
AND OPERATOR'S MANUAL
FOR
DRILLING MACHINE
D3XS**



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**BEFORE YOU START WORK WITH THE MACHINE,
PLEASE READ THESE INSTRUCTIONS CAREFULLY
AND USE ALL RECOMMENDATIONS.**

I. SAFETY INSTRUCTION

The magnetic drilling machine should be used only for the purpose described in this manual. Using the machine incorrectly or not for its intended use may result in serious injury and/or death.

1. General information

Portable magnetic drilling machines are fast becoming universal power tools not only at steel fabricating workshops or steel building sites but also at every factory maintenance workshop, truck manufacture & repair company, military equipment service, onboard ship maintenance shop etc. where the size of machined components cannot benefit from large stationary drills and the diameters of holes made prevent using classic hand drills.

The electromagnetic drilling base provides safe machine adherence to steel, and the magnetic strength ensures correct and safe operation of the drilling machine. This way of fixing the machine makes it possible to drill holes in various work positions, for example, vertical steel columns or steel floors.

In these working positions all Portable Magnetic Drilling Machines made by Steelmax Tools must be secured with the safety chain in case of the potential danger of power supply loss.

2. Important safety instruction

Drilling machine must not be used when:

1. The operator has not read the Operator's Manual.
2. The work to be done is not in agreement with the recommendations in this Manual.
3. Drilling machine is not complete or has been repaired with non-original parts.
4. Power supply parameters do not confirm to those stated on the motor's plate.
5. Machines operator has not checked condition of the drilling machine, condition of power cable, control panel or cutter.
6. Power supply socket is not equipped with a protection circuit.
7. Machine is not secured with safety chain as a protection from falling down especially when used at heights or in vertical or upside-down positions.
8. Bystanders are present in the immediate vicinity of machine.



Warning!

Read and save all instruction for future reference!

Important rules of safe use drilling machine on electromagnetic base

1. Before attempting to work with the machine check the condition of electrics including power cord and plug.
2. The drilling machine should be connected to an installation equipped with protection circuit (neutral or ground) and protected with a 16 A fuse for 220V and 32 A fuse for 120V. **When used on building sites, it must be supplied through a separation transformer made in the second class of protection**
3. Machine can be used outdoors, but is not weatherproof. Do not expose to rain, snow or frost.
4. Machine should not be used on: rusty surfaces, steel plates covered with thick paint, uneven surfaces or next to a welding machine. Remove the machine from the metal before welding to avoid possible control panel damage.
5. Always use a safety chain/strap (see drawing 1). A sudden loss of power will cause the drill to fall from vertical or upside down applications. The safety chain mustn't be loose! To avoid this situation the safety chain should be wrapped around the element it is hooked to.

Drawing No 1 The safety chain application



It's recommended to use the safety chain (see pictures).

6. Do not use the machine in explosion hazard zones.
7. Do not start work if the machine has excessive play on guide slides.
8. Always wear safety goggles and ear protection.

9. Do not remove metal chips with bare hands.
10. Do not touch the spindle and the cutter during work.



Do not touch or replace the tool with power source on!

11. Tools must be fastened firmly. When a milling cutter is used, check before start of work if tool holding screws are tight.
12. It is not permitted to use blunt or damaged tools.
13. Do not use milling cutter without pilots, and arbors without ejection spring.
14. Use tools recommended in Operator's Manual only.
15. After use always clean drilling machine from metal chips and coolant.
16. Always unplug machine from power supply when doing any work on the machine
17. Before each use the machine should be checked for damage. Check whether any of the parts are broken, and that all of the parts are fastened properly.
18. In the case that the machine falls on a hard surface, from a height, is wet or is subjected to other unfortunate events that could affect its technical state - work should be terminated immediately and the machine should be sent to service for inspection as soon as possible.



Do not use drill on steel thinner than 3/8" (10 mm). On thin steel (less than 3/8" (10 mm)) magnet's adhesive power will be significantly reduced which can cause machine failure or individuals injury. The machine should be located on the work piece with the entire surface of the electromagnetic base in contact with the surface! If electromagnetic base becomes dirty it should be sanded down with abrasive paper!



Thickness less than 5mm: Magnetic Drilling Machine D3XS won't start because of CLAMPING FORCE CONTROL SYSTEM (SEE II POINT 2.7)



Warning!

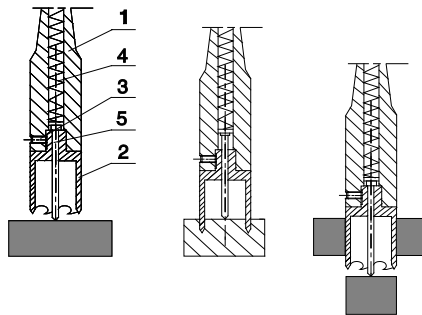
Read and save all instruction for future reference!

II. OPERATING INSTRUCTIONS

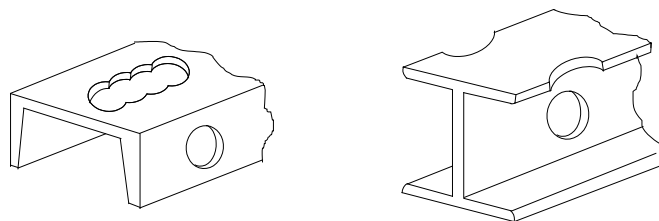
1. Cutters and optional equipment features

The drilling machine has a spindle with Morse Taper MT3 to use twist drill (by using the reduction adapter if necessary) and annular cutters. Arbor mark AMT is mounted in spindle conical taper to fix annular cutters.

Milling cutter (2) is located inside arbor body (1) and is fastened with screws (3). While fastening the cutter in the socket, be aware that screws should be screwed tight so that they will not come loose. It is important to position the cutter in relation to the socket in such a way that the flats on the cutter shank are positioned opposite to the fixing screws (3). Both fastening screws (3) should be used to fasten the cutter. Pilot (5) is located inside the cutter. It makes it easier to position the milling cutter over centre of a planned hole. During drilling as the cutter goes deep into steel, the pilot moves back into the arbor body and tightens discharge spring (4). That spring ejects slug which is a by-product of milling a hole with a centre free cutter [Drawing No.3].



*Drawing No 2.
Principle of milling cutter's work*



*Drawing No.3
Types of holes that can be done with a milling cutter*

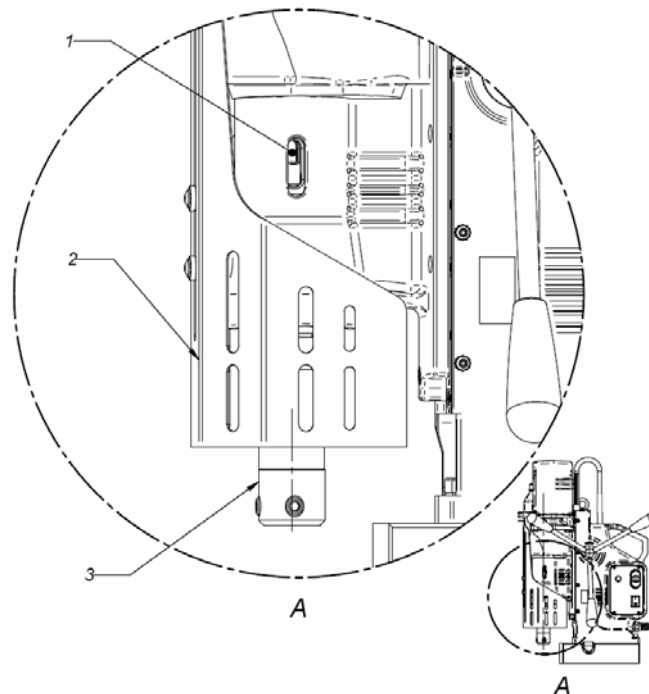
1.1 Installing and uninstalling the arbor



The arbor installation and uninstallation should be carried out when the machine is turned off and disconnected from the power grid!

Installing the arbor:

- a) Raise the guard (2) to the maximum height.
- b) Clean the inside of the spindle using a cotton cloth,
- c) Before mounting, clean off the lubricant from the new arbor (3),
- d) Place the arbor with the fin on top, and place it in the spindle,
- e) By turning the arbor, align the fin to the appropriate slot in the spindle,
- f) Using a light impact from the bottom side, drive the arbor into the spindle.



Uninstalling the arbor:

- a) Raise the guard, turn the spindle so that the wedge MT opening in the spindle (1) is lined up with the wedge MT opening in the reducer body,
- b) Place the wedge MT (included as standard equipment) into the uncovered spindle opening (1),
- c) Hold down the arbor (3) with one hand,
- d) Strike the wedge MT with a hammer, taking care to not to damage the arbor,
- e) Carefully remove the arbor from the socket in the spindle,
- f) Remove the wedge MT.

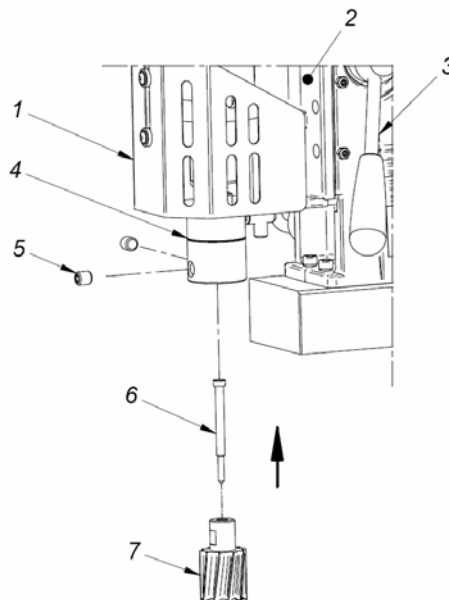
1.2 Installing and uninstalling the milling cutter



Milling cutter installation and uninstallation should be carried out when the machine is turned off and disconnected from the power grid!

Installing the milling cutter:

1. Raise the drive and the slide (2) up using the lever (3);
2. Raise the guard (1) to the maximum in order to attain access to the arbor (4) screws (5);
3. Insert the appropriate type of pilot (6) into the milling cutter (7);
4. Position the milling cutter (7) with the cutter facing up, so that the flat sides of the milling cutter are found facing the screws (5)
5. Put the milling cutter (7) into the arbor socket (4);
6. Tighten the screws securely (5).



Uninstalling the milling cutter:

1. Raise the drive and the slide (2) up using the lever (3);
2. Raise the guard (1) to the maximum in order to attain access to the arbor (4) screws (5).
3. Loosen the screws (5);
4. Remove the milling cutter (7) and the pilot (6) from the arbor socket (4).

2. Magnetic drilling machine start up

The machine is supplied in a metal box with complete standard equipment.

Machine comes in a standard equipment set which consists of:

Standard equipment set	D3X	D3XS
• metal box	1pc	1pc
• drilling machine	1pc	1pc
• arbor AMT3-U-19/3-3	1pc	1pc
• cooling system	1pc	1pc
• chip guard	1pc	1pc
• spoke handles	3pcs	3pcs
• hex wrench s=2,5	1pc	1pc
• hex wrench s=4	1pc	1pc
• hex wrench s=5	1pc	1pc
• hex wrench s=6	1pc	1pc
• hex wrench s=10	-	1pc
• 8 mm flat wrench	1pc	1pc
• wedge, MT3	1pc	1pc
• safety chain with snap hook	1pc	1pc
• operator's manual	1pc	1pc

2.1 Before first drill:

- steel elements of the drilling machine are protected for transit and storing with grease film. Before first start up of the machine all grease should be removed. This especially applies to Morse Taper
- before each use all handles should be screwed into pinion.

2.2 Before you cut:

Before positioning the machine on work piece always make sure that:

- work piece is made of steel
- thickness of work piece is at least 3/8" (10 mm)
- surface of steel under the magnet is flat
- wipe, brush or sand down clean surface where you intend to place the drilling machine, so that you remove rust, paint, dirt etc which would reduce adhesive power of the electromagnetic base.

2.3 Preparing the machine for drilling

1. Set the drilling machine on the surface of the steel into which a hole is to be drilled.
2. Accurately and securely attach the drill spindle in the nest (see II, point 1)
3. Plug in the drilling machine accordance to the requirements (see I point 2)

4. Set the axis of the spindle exactly over the place of drilling (the tool is over the centre of the hole)
5. Turn the magnetic base ON

Prior to use!

Always make sure that the electromagnetic machine is secured from falling down during vertical, ceiling work with original chain (as described in paragraph I point 2 “Important rules of safe use of drilling machine”)

2.4 Cutting

1. Fill cooling reservoir with cooling/lubricating fluid
Select the right speed for the tool you intend to use (see the speeds chart in this manual – paragraph IV no.1).
Cooling and lubricant fluid commercially available in concentrate are recommended to use for cooling twist drill and annular cutter.
It's allowed to use of emulsions formed from a mixture of water and drilling oil.



Do not use clean water as the liquid cooling and lubricant.

The cooling system is an integral part of the machine and should always be used. (see point 2.10)

2. Check working of cooling system. Open coolant reservoir's tap and apply pressure on the pilot by turning spokes counter clockwise. As the pilot starts to sink into the cutter cooling liquid should start to run down cutters inner wall. If there is no liquid flowing down check if the valve is fully opened. It may take a few seconds for cooling liquid to fill the whole system.
3. Turn the motor on.

WARNING: The cooling system can only be used when drilling machine is in vertical position. In other positions additional external source of cooling should be used, for example: a coolant bottle with a long nozzle, or cutting paste.

4. Start the engine by green button on the control panel (see II point 3). Drilling in the material must be conducted with sensitivity.
5. Making a hole with a milling cutter should ideally be done in one pass. It makes the cutter work better and easier to eject the slug after the hole is completed.

WARNING: when the milling cutter goes through the material the slug can be pushed out often with considerable strength. Pay attention to avoid injury.

6. For safety reasons the swarf should not be allowed to accumulate in large quantities or allowed to come outside the guard and close to the handles.
7. After a hole is made the cutter should be raised back up and both the motor and the electromagnet should be switched OFF.
8. When work with the machine is finished the power cord should be disconnected from the power source, the machine should be cleaned up from chips, and coolant etc. The cutter should be removed and cleaned.
9. The tool should be removed from drill chuck before placing the drill in the toolbox.

2.5 Tapping

The machine allows hole threading to the extent specified in the technical data. To perform tapping it is recommended that hand-threading No.1 and No. 3 be used.

Thread must be made in two operations. During drilling holes: is recommended to pay special attention to the selection of hole diameter. If the hole is too small the threading process may be impossible due to excessive cutting resistance and the associated lack of power.

2.6 Types of a ground material

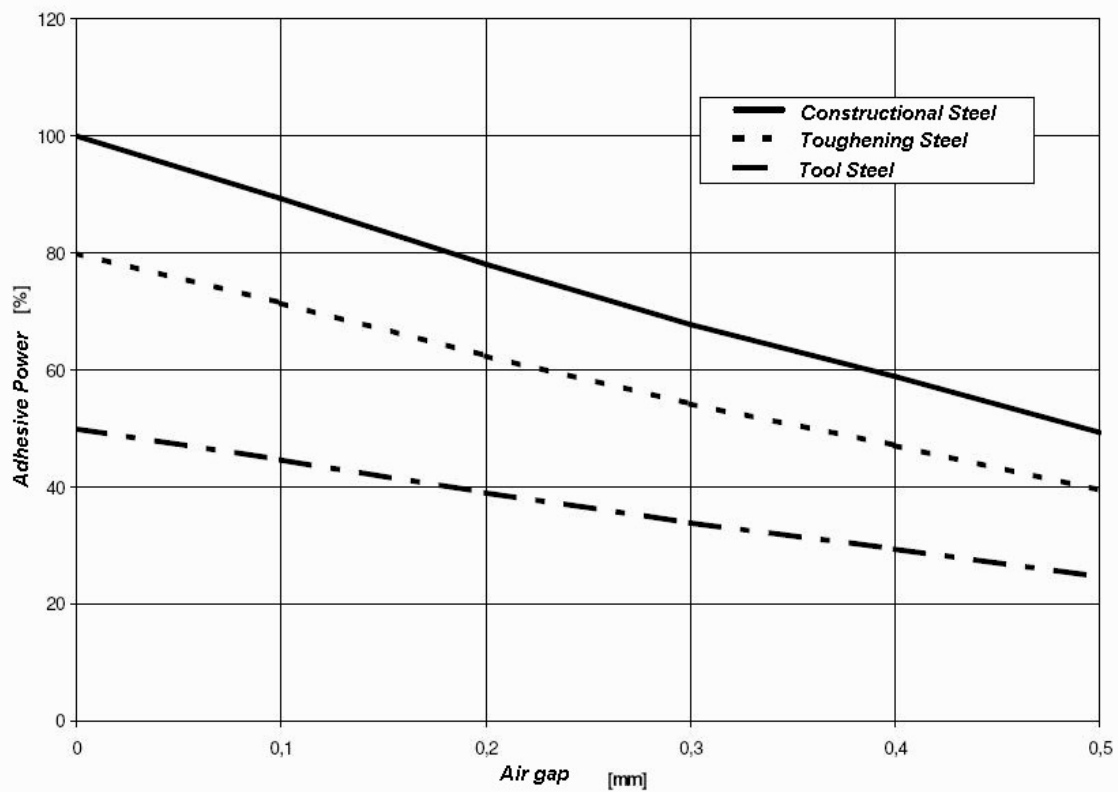
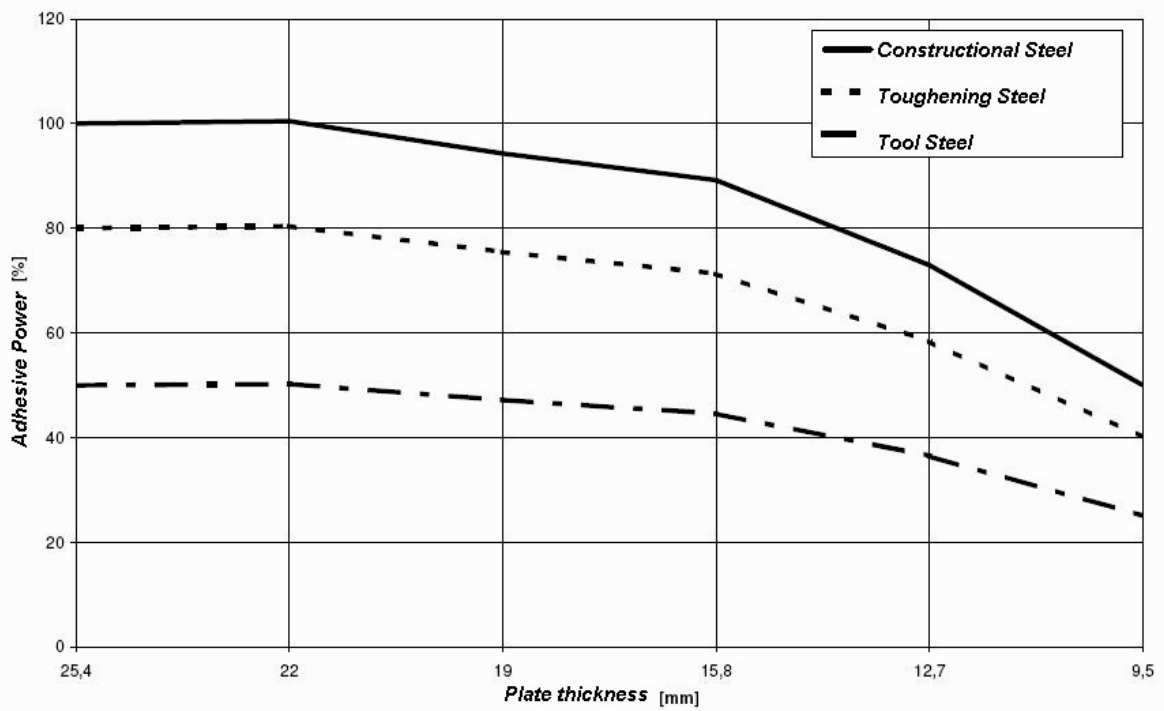
As shown on the graphs [Drawing 4], magnetic clamping force of the electromagnetic base to the steel you are working on depends on its magnetic properties. Steel with increased carbon content and some other alloying ingredients has lower magnetic permeability, which causes a decrease in the clamping force. Also the thickness of the work piece, on which the drill is placed, is significant.

Maximum clamping force of the electromagnetic base to a 3/8" thick work piece surface is only about 25% of a clamping force obtained from a smooth, plane, 1" thick standard plate.

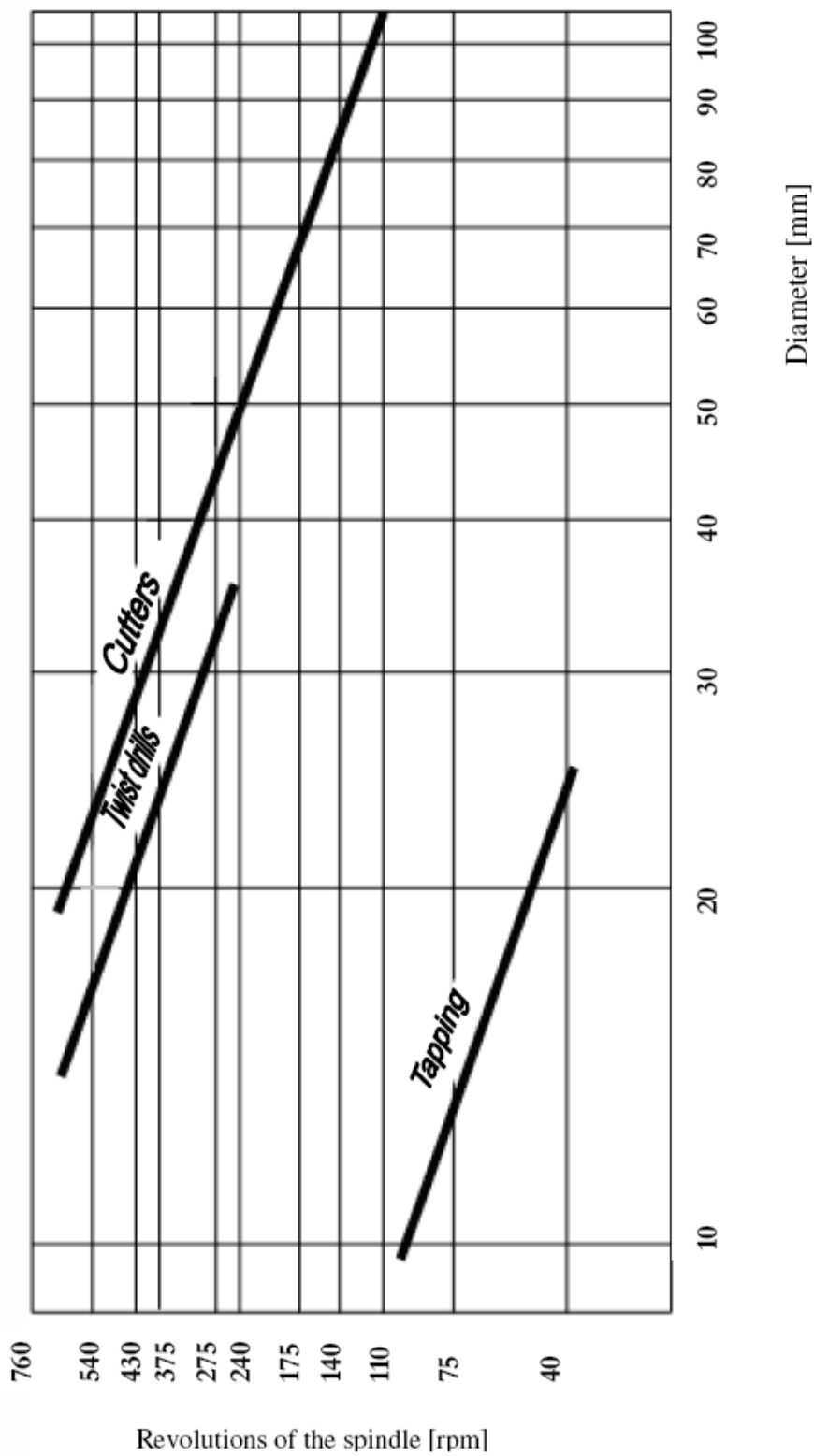
The minimum thickness of work pieced allowed is 3/8". If necessary clamp a thicker piece of metal to the workpiece to increase electromagnetic force.

Appropriate rpm should be adjusted depending on if drilling will be performed with a drill bit, or with an annular cutter. The drill is equipped in mechanical 2-step reducing gearbox. A general dependence between drilling diameter and drilling speed is shown in graphs [drawing 5], a detailed guide may be supplied by the cutter manufacturer. The graph is just a general guide and the shown dependence applies to average structural steel.

Cooling agent is fed gravitationally from a coolant bottle through an arbor to the inside of the metal cutter. For on-a-wall and on-a-ceiling positions special cooling pastes have to be used.



Drawing 4. Clamping force depending on the thickness of the substrate and the value gap.



Drawing 5. Dependence of rotational speed on drilling diameter.

2.7 Electromagnetic base clamping force control system

For security reasons the electromagnet safety system is an integral part of each drill. It works by constant monitoring of the electromagnetic force base adhesion value to the substrate. In case the force value falls below a safe value, the system automatically switches off the drive drill. Drilling will not be allowed without the proper amount of electromagnetic clamping force.

Clamping force depends on: type and thickness of substrate, thick coatings on the substrate, rust or other contaminants, lack of flatness of the substrate, excessive roughness of the surface and excessive wear of the lower part of the electromagnetic base.

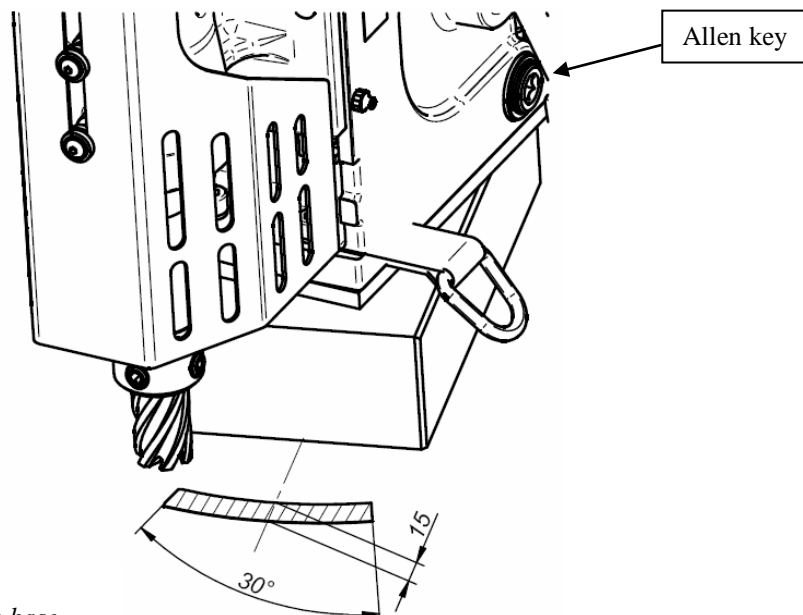
If the drill will not stay on after releasing the green drive button it indicates that the safety system is functioning properly and remedial measures such as clamping a thicker piece of metal to the workpiece must occur before proceeding with the drilling operation.

2.8 Working in difficult areas

While working in difficult access areas as well as left-handed operator the spoke handles may be relocated to the other side of drilling machine.

2.9 Additional option of machine D3XS

Drilling machine D3XS is equipped with an additional special function which allows the upper part of the machine to move about ± 15 degrees and 15 mm front/back by loosening allen key s=10, without moving the electromagnetic base. This allows faster and more accurate setup. Be sure to tighten the allen key before activating the drill.

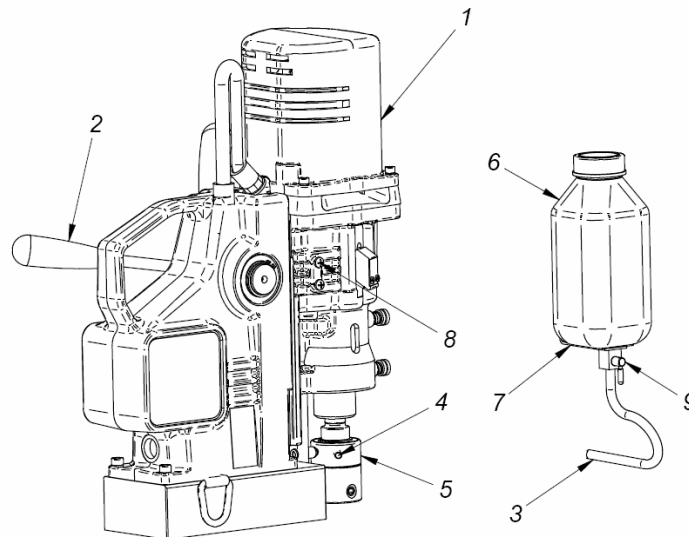


*Drawing No. 6.
Parameter of set-up magnetic base*

2.10 Installing and uninstalling the cooling system

Installing the cooling system:

- a) Place the machine in the vertical position,
- b) Slide the drive and the slider (1) up using lever (2),
- c) Coolant bracket (7) with cooling unit (6) on screws (8) located to the side of the slider,
- d) Connect the cooling conduit ending (3) with the coolant coupling (4) found in the cooling ring (5).



Before starting the machine:

- Remove the bottle's cap,
- Fill it with cooling lubricant,
- Replace bottle cap.

After fulfilling the above actions and making sure, that the system has been appropriately fixed, and the cooling conduit (2) is placed correctly on the coolant coupling (4), the bottle cap should be loosened by 1/3 of a turn so coolant will flow freely, turn on the valve (3), so that liquid travels to the hose, after which the machine can be started (see II no. 3)

After ending work, one must remember to tighten the bottle cap and turn off the valve (9) (to prevent liquid from leaking during the time that the machine is not being used) and uninstall the cooling system (6) before placing the machine in the box.

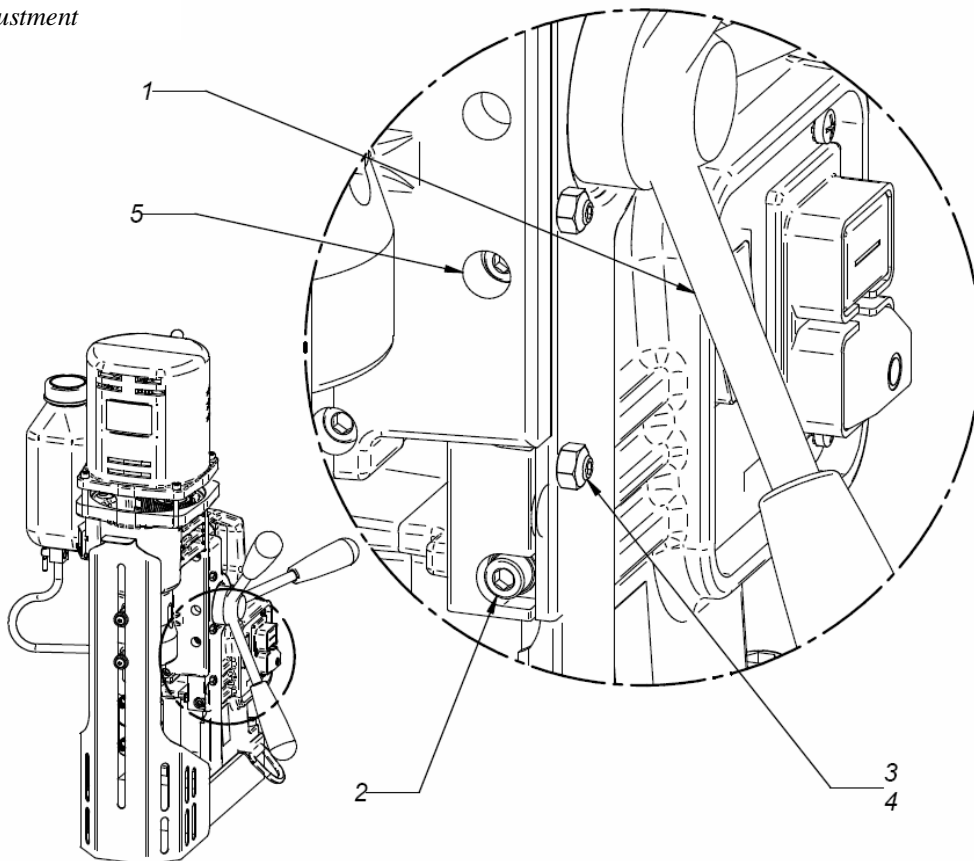
Uninstalling the cooling system:

- a) Place the machine in the vertical position,
- b) Slide the drive and the slider (1) up using lever (2),
- c) Disconnect the cooling conduit ending (3) and the coolant coupling (4) found in the cooling ring (5).
- d) Take off the cooling system.

2.11 Semiautomatic gib adjustment

The drive and the slider can be moved up and down smoothly using the lever (1), making the screws (2) fixing the strip to the drill body visible through the openings in the slider (5). To loosen screws (2), the slider should be placed in such a position (using levers) so that the openings make the screws visible. After loosening all the screws slide the slider up and down several times so that the pressure strip aligns itself and automatically adjusts the gib to the proper clearance. This is only necessary in case the drill drops to the bottom by itself (too loose) or binds during operation (too tight or out of straight alignment).

Gib Adjustment



After resetting the gib clearance, tighten screws (2) starting from the middle screw. The slider should be located symmetrically relative to the middle screw. Next, tighten the neighboring screws (2) moving the slider in the degree necessary for making them visible.

Then, tighten screws (3) until any noticeable resistance is felt. When the screw is in this position and held with an allen key, tighten counter nut (4). The screws (3) counteract the machining force and protect the pressure strip from shifting during operation.

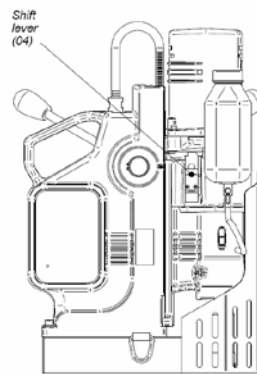
3. Machine start-up

In order to start the machine press the main switch MAGNET on “I” button then start the motor by pressing green button switch MOTOR (START-STOP) .


- a) In order to start the machine press the main switch MAGNET (01) on “I” button. By pressing green button (02) MOTOR start the motor.
- b) Before starting the engine is necessary to choose appropriate range of speed (depending on the hole diameter) by using the shift lever (04)
- c) After starting the engine set the right rotational speed for machining by using control knob(03)
- d) Stopping the motor is executed with red button (02) MOTOR (START-STOP) switch. The motor is switched OFF but the electromagnetic base is still ON.



Drawing No.7 Control Panel



Drawing No.8 View of the machine D3XS

 To move machine into next drilling spot, stop the motor then push switch MAGNET into the position “O”. To change the spindle speed switch gear lever.

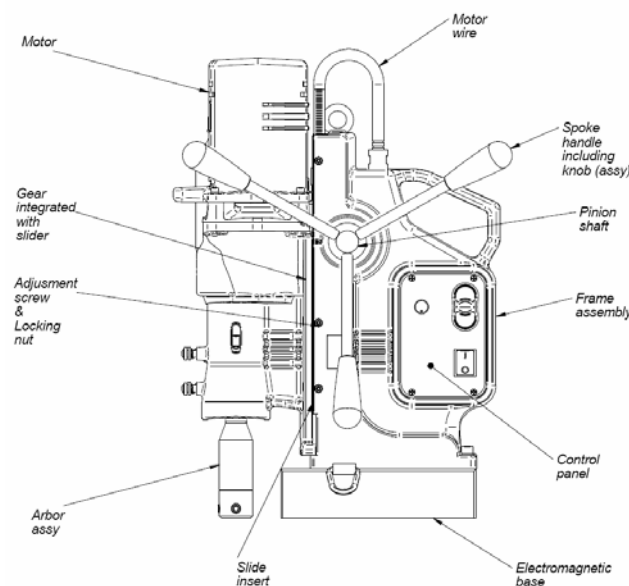
3.1 Overload switch

During drilling operations the machine can be switched off as a result of overloading (large feed in relation to the tool diameter, poor cooling, dull tool etc.) In this case stop the motor by pressing red button (02) MOTOR (START-STOP) switch. Slide the cutter from the material then start the machine again by pressing green button. (02) MOTOR (START-STOP) Do not switch off electromagnetic base (01) MAGNET switch to prevent accidental movement of the drilling machine from the axis of the drilled hole.

III. MAINTENANCE AND SERVICE

To avoid accidents drill stand, power cable, wiring, plug connectors, switches must be regularly inspected for damage.

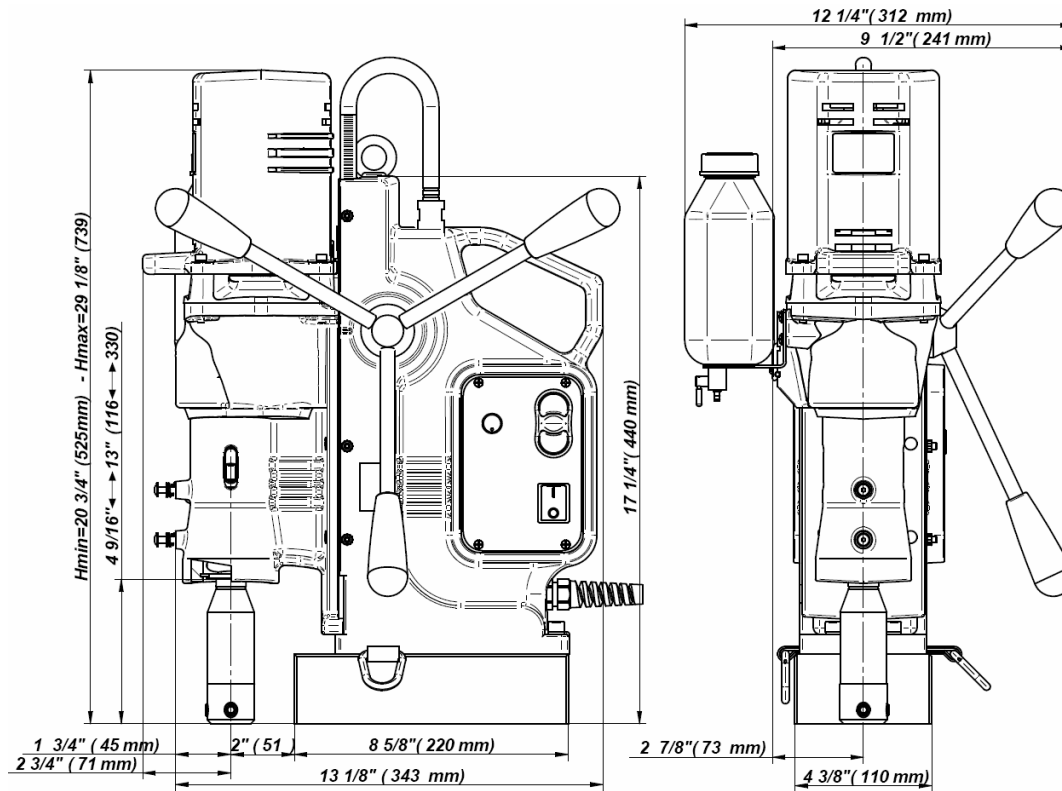
- Perform adjustment of the machine play guides every 50 hours or as necessary. Slide guide adjustment is correct if the drive can be moved smoothly by using the lever. It should not automatically slide down under its own weight. (see II point 2.11)
- In order to properly distribute gearbox lubricant, at the end of each days work change the position of the of the gearbox speed lever. For example if machine worked with 150 rpm speed, it should be switched to 300rpm. (see IV point.1).
- Every 100 hours of work check condition of carbon brushes. If their length is less than 0.2” (5mm) they should be replaced with new ones. After replacement new brushes should be run-in without load for about 20 min. Other repair work should be done only by authorized service points, appointed by Steelmax. Replacement of brushes is possible without removing the motor from the drill. (see IV)
- Lubricate regularly brass slide guide inserts with grease as well as the rack and pinion.
- To prevent the machine from rusting (especially when used outdoors) all steel parts should be covered with thin layer of grease film
- Damaged machine parts should be replaced with new factory parts. For parts contact Steelmax.



Caution:

If the machine falls on a hard surface, from a height, is wet or is subjected to other unfortunate events that could affect its technical state - work should be terminated immediately and the machine should be sent to service for inspection as soon as possible.

IV. TECHNICAL DATA



Power supply	<input type="checkbox"/> 110÷120V AC / 50-60 Hz <input type="checkbox"/> 220÷240V AC / 50-60 Hz
Power required	<input type="checkbox"/> 110÷120V - 1700 W <input type="checkbox"/> 220÷240V - 1800 W
Motor power	<input type="checkbox"/> 110÷120V - 1550 W <input type="checkbox"/> 220÷240V - 1650 W
Tool holder	MT 3
Max. twist drill diameter	8 - 32 mm (5/16" – 1 1/4")
Max. annular drill diameter	12 - 75 mm (1/2" – 3")
Max. milling depth	76 mm (3")
Insulation Class	I
Standard adhesive force of electromagnet (for steel 7/8" (22 mm) thick and Ra < 1,25)	19 500 N - (4,383 lbs.)
Slide stroke	225 mm - (8.86")
Machine speeds /under load/	I gear – 80÷160 min ⁻¹ II gear – 210÷420 min ⁻¹
Electromagnetic base	110x220x56 mm - (4 3/8"x8 5/8"x2 1/4")
Length of the power cord	3,0 m - (9.8')
Total weight	~27 kg - (60 lbs)
Noise level	85 dB
Surrounding temperature	0 ÷ 40° C

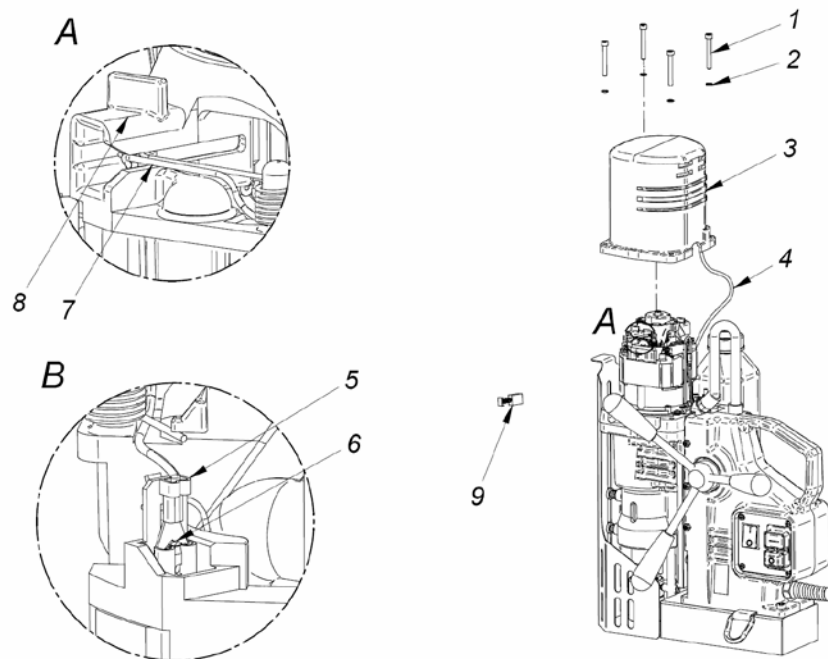
Using the D3XS with special annular cutters you are capable of drilling and reaming holes up to 75mm diameter and 76mm depth with a precision achievable previously only in a workshop.

Replacement of motor brushes:

For the D3XS drill, the state of the carbon brushes should be monitored every 100 working hours.



Replacement of motor brushes should take place when the machine is turned off and the power cable is disconnected from the power grid!



1. Unscrew 4 M5x40 engine cover screws (1), using a 6-kt s=4 wrench.
2. Carefully take off the motor cover (3). Remember that it is connected with the motor by a grounding lead (4).
3. Remove the connector (6) using the flat ending (5) of the lead. The connector has a safeguard to prevent it from sliding down – first, press the protruding element at the middle of the connector, then carefully slide off the connector.
4. Push aside the spring arm (7) pressing down the brush and rest it on the surface of the brush holder (8) and remove the brush (9).
5. Inspect brush length - if the length is less than 0.2 " (5mm), the brush should be replaced with an original brush.
6. Carry out all actions in reverse, in order to install the motor.

After replacement, new brushes should be run in for about 20 minutes without a load. Replacement of motor brushes is possible without removing the drive from the drill.

1. Parameters depending on spindle speed(drilling)

Due to the distribution of lubricant after every days work the position of the gear lever (used for selection of gearbox speed) should be changed. For example if machine worked with 160 rpm speed, it should be switched to 420rpm.

Relationship between machine speed and cutter diameter

The cutter diameter		Rotary speed [rpm]
[inch]	[mm]	
1.38-3.00	35-75	80-160
0.50-1.37	12-34	210-420

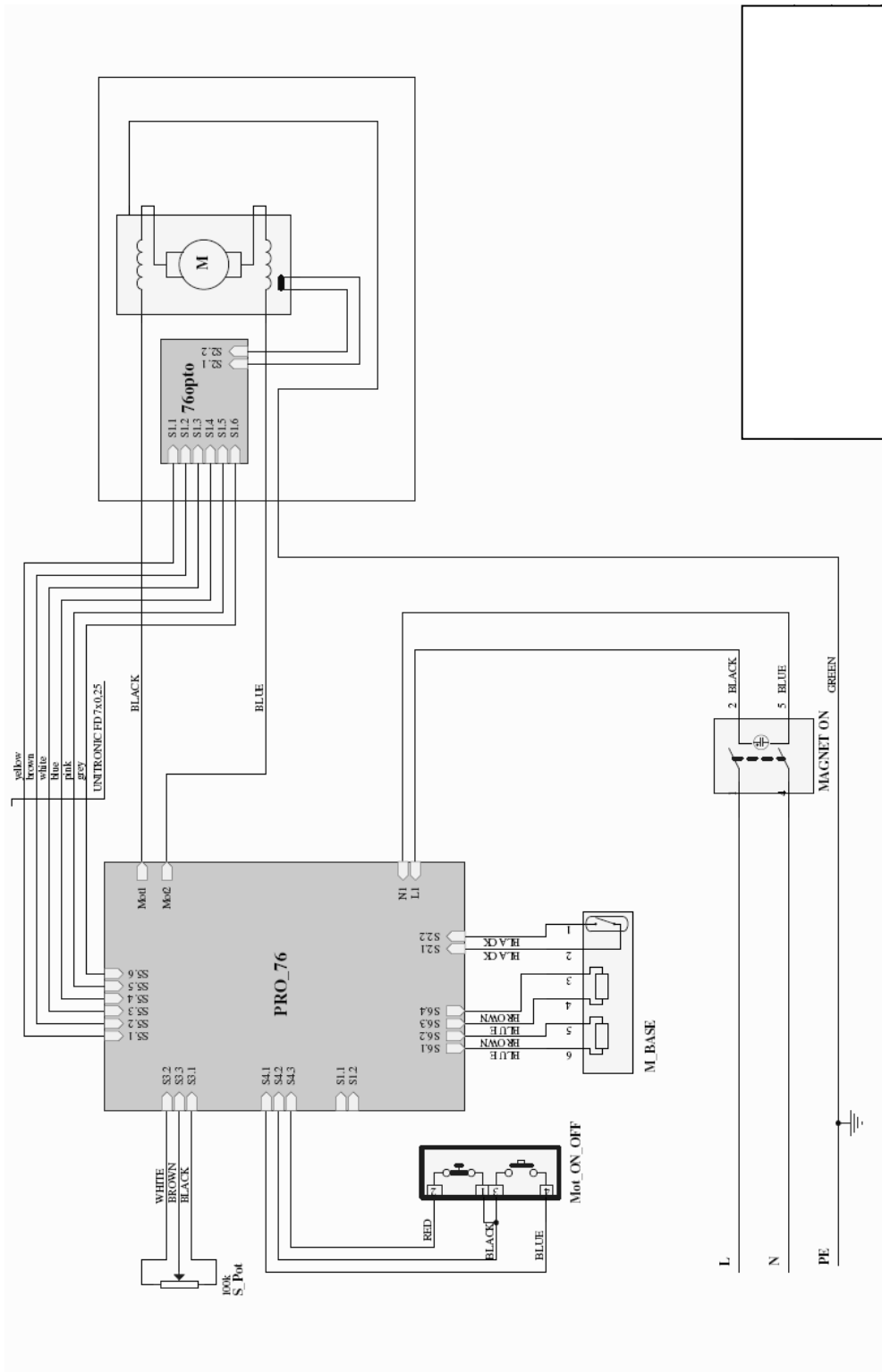
Relationship between machine speed and twist drill diameter

The twist grill diameter		Rotary Speed [rpm]
[inch]	[mm]	
0.70-1.25	18-32	80-160
0.30-0.70	8-17	210-420

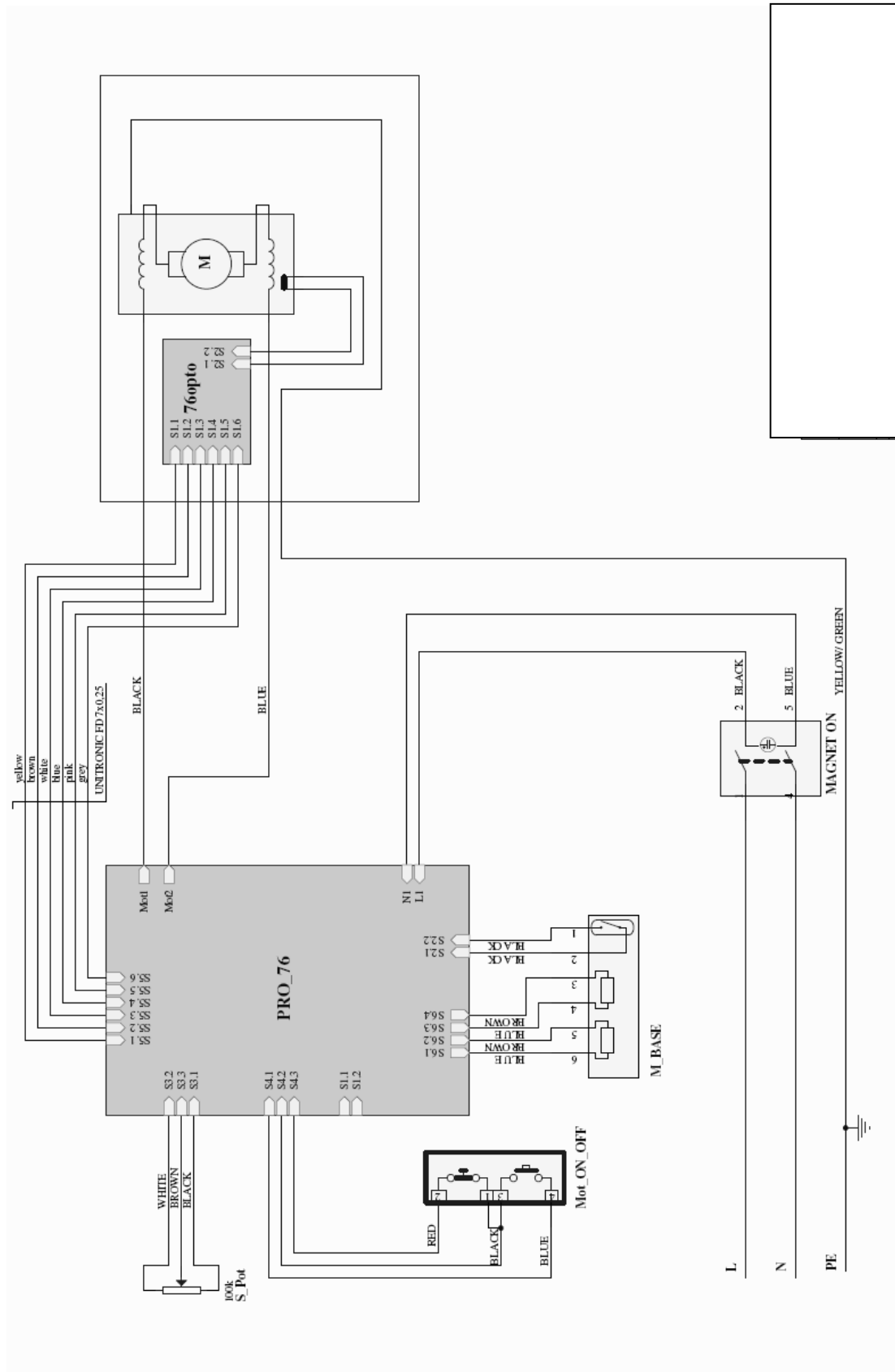
**Detailed PARTS LIST of Drilling Machine D3XS
is available from Steelmax.**

V. ELECTRICAL DIAGRAM

1. Electrical diagram /120V



2. Electrical diagram /230V



VI. EC DECLARATION OF CONFORMITY

1. Drilling machine D3XS

Declaration of compatibility

We

PROMOTECH Ltd.
Elewatorska Street 23/1
15-620 Bialystok, Poland

declare with full responsibility that product:

D3XS DRILLING MACHINE

which the declaration applies to is in accordance with the following standard(s) placed below:

EN 50144-1, EN 55014 and satisfies safety regulations of guidelines: 2004/108/EC, 2006/95/EC,
2006/42/EC

Bialystok, 2009-10-15



Prezes

2. Drilling machine D3XS

Declaration of compatibility

We

***PROMOTECH Ltd.
Elewatorska street 23/1
15-620 Bialystok, Poland***

declare with full responsibility that product:

DRILLING MACHINE D3XS

which the declaration applies to is in accordance with the following standard(s) placed below:

EN 50144-1, EN 55014 and satisfies safety regulations of guidelines: 2004/108/EC, 2006/95/EC,
2006/42/EC

Bialystok, 2009-10-15



Prezes

VII. MACHINE TEST CERTIFICATE

Machine control card

D3XS / 120V

Serial No. _____

Date of test: _____

Electric test results:

Test	Result
Test with sinusoidal voltage of 1000 V and frequency 50 Hz	
Resistance of the protective circuit [Ω]	

The above-mentioned product meets the requirements of safe usage as prescribed in standard IEC-745

Name of tester _____

Quality Control _____

VIII. WARRANTY CARD

WARRANTY CARD No.....

Steelmax Tools LLC in the name of Manufacturer warrants the Drilling Machine to be free of defects in material and workmanship under normal use for a period of twelve months from date of original sale to the end user.

This warranty does not cover cutters, damage or wear arises from misuse, accident, tempering or any other causes not related to defects in workmanship or material.

Date of Production Serial No

Quality Control:

Date of Purchase:

Signature of Seller.....