

HILTI

DS WS15

Operating instructions

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ORIGINAL OPERATING INSTRUCTIONS

DS WS15 3×480V electric wire saw

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It is essential that the operating instructions are read before the machine is operated for the first time.

Always keep these operating instructions together with the machine.

Ensure that the operating instructions are with the machine when it is given to other persons.

DANGER

Draws attention to imminent danger that will lead to serious bodily injury or fatality.

WARNING

Draws attention to a potentially dangerous situation that could lead to serious personal injury or fatality.

CAUTION

Draws attention to a potentially dangerous situation that could lead to slight personal injury or damage to the equipment or other property.

NOTE

Draws attention to an instruction or other useful information.



- ① Drive and storage unit
- ② Control unit
- ③ Air compressor
- ④ Pressure hoses 2×23 ft, 1×3.3 ft (2×7 m, 1×1 m)
- ⑤ Single pair pulley (2 pcs)
- ⑥ Water supply – long
- ⑦ Water supply – flexible
- ⑧ Water hose 2×33 ft (2×10 m)
- ⑨ Tool set DS-WS UL
- ⑩ Extension cord 33 ft (10 m)
- ⑪ Wire guard set DSW-WG

General safety rules

1. General safety rules

1.1 **WARNING!** Read and understand all instructions. Failure to follow all instructions listed below may result in electric shock, fire and/or serious personal injury.

SAVE THESE INSTRUCTIONS

1.2 Work Area

Keep your work area clean and well lit. Cluttered benches and dark areas invite accidents.

Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. Power tools create sparks which may ignite the dust or fumes.

Keep bystanders, children and visitors away while operating a power tool. Distractions can cause you to lose control.

1.3 Electrical Safety

Grounded tools must be plugged into an outlet properly installed and grounded in accordance with all codes and ordinances. Never remove the grounding prong or modify the plug in any way. Do not use any adaptor plugs. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded. If the tools should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user.

Applicable only to Class I (grounded) tools.

Avoid body contact with grounded surfaces such as pipes, radiators, ranges and refrigerators. There is an increased risk of electric shock if your body is grounded.

Don't expose power tools to rain or wet conditions. Water entering a power tool will increase the risk of electric shock.

Do not abuse the cord. Never use the cord to carry the tools or pull the plug from an outlet. Keep cord away from heat, oil, sharp edges or moving parts. Replace damaged cords immediately. Damaged cords increase the risk of electric shock.

When operating a power tool outside, use an outdoor extension cord marked «W-A» or «W». These cords are rated for outdoor use and reduce the risk of electric shock.

1.4 Personal Safety

Stay alert, watch what you are doing and use common sense when operating a power tool. Do not use a tool while tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating power tools may result in serious personal injury.

Dress properly. Do not wear loose clothing or jewelry. Contain long hair. Keep your hair, clothing, and gloves away from moving parts. Loose clothes, jewelry, or long hair can be caught in moving parts.

Avoid accidental starting. Be sure switch is off before plugging in. Carrying tools with your finger on the switch or plugging in tools that have the switch on invites accidents.

Remove adjusting keys or wrenches before turning the tool on. A wrench or a key that is left attached to a rotating part of the tool may result in personal injury.

Do not overreach. Keep proper footing and balance at all times. Proper footing and balance enables better control of the tool in unexpected situations.



Use safety equipment. Always wear eye protection. Dust mask, non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.

1.5 Tool Use and Care

Use clamps or other practical way to secure and support the workpiece to a stable platform. Holding the work by hand or against your body is unstable and may lead to loss of control.

Do not force tool. Use the correct tool for your application. The correct tool will do the job better and safer at the rate for which it is designed.

Do not use tool if the switch does not turn it on or off. Any tool that cannot be controlled with the switch is dangerous and must be repaired.

Disconnect the plug from the power source before making any adjustments, changing accessories, or storing the tool. Such preventive safety measures reduce the risk of starting the tool accidentally.

Store idle tools out of reach of children and other untrained persons. Tools are dangerous in the hands of untrained users.

Maintain tools with care. Keep cutting tools sharp and clean. Properly maintained tools with sharp cutting edges are less likely to bind and are easier to control.

Check for misalignment or binding of moving parts, breakage of parts and any other condition that may affect the tools operation. If damaged, have the tool serviced before using. Many accidents are caused by poorly maintained tools.

Use only accessories that are recommended by the manufacturer for your model. Accessories that may be suitable for one tool may become hazardous when used on another tool.

1.6 Service

Tool service must be performed only by qualified repair personnel. Service or maintenance performed by unqualified personnel could result in a risk of injury.

When servicing a tool, use only identical replacement parts. Follow instructions in the Maintenance section of this manual. Use of unauthorized parts or failure to follow Maintenance Instructions may create a risk of electric shock or injury.

Specific safety rules and symbols

2. Specific safety rules and symbols



WARNING

Failure to observe the instructions listed below may lead to potentially fatal injury and serious damage to property or equipment.

2.1 Proper organization of the work area

- a) Approval must be obtained from the site engineer or architect prior to beginning drilling or sawing work. Drilling or sawing work on buildings and other structures may influence the statics of the structure, especially when steel reinforcing bars or load-bearing components are cut through.
- b) Ensure that the workplace is well ventilated. Exposure to dust at a poorly ventilated workplace may result in damage to the health.
- c) In order to avoid injury and to prevent the diamond wire becoming trapped or jammed, steel wedges and/or supports must be used to prevent uncontrolled movement of parts of the structure being cut.
- d) Ensure that adequately-sized supports are correctly installed so that the remaining structure maintains its stability after completion of the cutting work and removal of the part cut away.
- e) Never loiter in the vicinity of loads suspended by cranes.
- f) The area of the cut or the opening created by the cutting process must be safely and visibly cordoned off in order to avoid the possibility of persons falling.
- g) Keep children away. Keep other persons away from the working area.
- h) Do not allow other persons to touch the machine or the extension cord.
- i) To avoid presenting a tripping hazard, always ensure that cables and hoses leading to the machine are laid flat on the floor.
- j) Keep cables and hoses away from rotating parts.

- k) In cooperation with the site engineer or architect, ensure that no gas, water, electricity or other supply lines are located in the cutting area. Any supply pipes or cables located close to the cutting area which could, for example, be damaged by falling objects, must be specially protected and, if necessary, switched off or temporarily taken out of service.
- l) Ensure that the cooling water used is drained or extracted in a suitably controlled manner. Water that is allowed to drain away or spray around in an uncontrolled manner can lead to damage or accidents. The fact that water could drain away into internal, hidden cavities, e.g. in brickwork or masonry, must also be taken into account.
- m) Do not work from a ladder.

2.2 Safety measures at the danger area

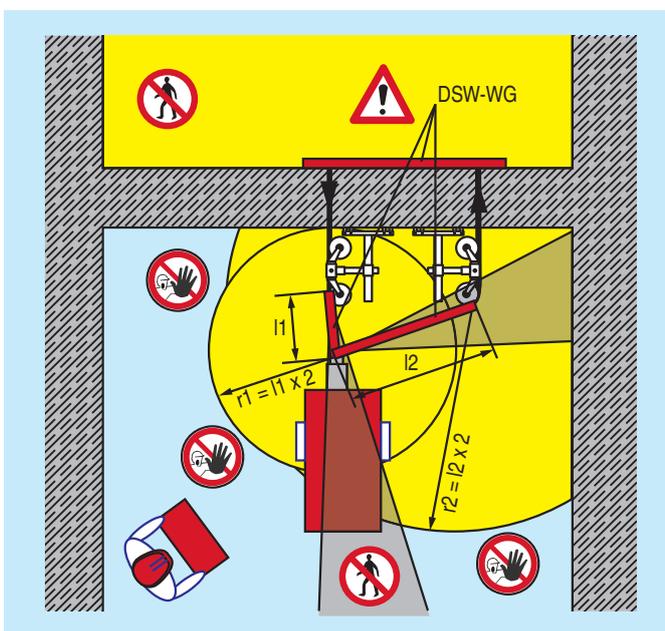
- a) Safety measures must be implemented in the area where sawing is taking place so that operators and bystanders cannot be injured or property damaged by a broken sawing wire or debris that may fly off during the sawing operation. Safety measures must also be implemented in the area not directly visible to the operator, i.e. behind where sawing is taking place.
- b) Persons must NEVER enter the danger area while sawing is in progress.
- c) Always keep the free wire lengths between the drive unit and object being cut as short as possible (max. 11.5 ft / 3.5 m) and mount guide pulleys at the wire entry and exit points in order to reduce the risk of whiplash in the event of wire breakage. The whiplash effect causes great acceleration of the sawing wire, resulting in parts of the wire lashing out or flying off with great force.
- d) Make sure there are no objects such as scaffolding etc. within the wire whiplash area. In the event of wire breakage, the whiplashing end of the wire may be deflected in an unexpected direction by such objects.
- e) The danger area has a radius of at least twice the free length of wire that would be unleashed in the event of wire breakage (shown in yellow) and also includes the areas in the extended axes of the direction in which

the wire is running (shown in gray). The danger area cannot be limited unless suitable means of protection are employed (protective walls, curtains or wire guards etc.). The protective devices must be arranged and mounted in a way that stops the wire lashing out in the event of wire breakage and reliably prevents objects or fragments flying off.

- f) The operator is responsible for cordoning off the area. If necessary, safety personnel must be posted to prevent access to a wide area around the workplace.
- g) When setting up and operating the saw system and when removing parts that have been cut away, always ensure that no persons are below the area in which you are working. Falling objects could cause serious injury.
- h) It is important to utilize the protective equipment supplied, and ask questions if unsure as to how it is properly used.

2.3 General safety instructions

- a) Use the right machine for the job. Do not use the machine for purposes for which it was not intended. Use it only as directed and when in faultless condition.
- b) Persons must NEVER enter the hazardous area while sawing is in progress. The hazardous area extends to at least twice the radius of the length of wire that would be unleashed in the event of the wire breaking and also includes the area in the extended axis of the wire



tension side. The operator is responsible for cordoning off the area and restricting access. The hazardous area may be entered only when the EMERGENCY STOP button is in the pressed-in position.

Children must be instructed not to play with the machine.

The machine is not intended for use by children, by debilitated persons or those who have received no instruction or training.

- c) Use the machine, accessories and sawing wires etc., in accordance with these instructions and in the manner intended for the particular type of machine, taking into account the working conditions and the work to be performed. Use of this machine for operations other than those intended could result in hazardous situations.
- d) Never leave the machine unattended.
- e) Always disconnect the machine from the electric supply when it is not in use (e.g. during breaks between working), before making adjustments, before carrying out care and maintenance and before changing sawing wires. This safety precaution prevents the machine starting unintentionally.
- f) **WARNING: Some dust created by grinding, sanding, cutting and drilling contains chemicals known to cause cancer, birth defects, infertility or other reproductive harm; or serious and permanent respiratory or other injury.** Some examples of these chemicals are: lead from lead-based paints, crystalline silica from bricks, concrete and other masonry products and natural stone, arsenic and chromium from chemically-treated lumber. Your risk from these exposures varies, depending on how often you do this type of work. **To reduce exposure to these chemicals, the operator and bystanders should work in a well-ventilated area, work with approved safety equipment, such as respiratory protection appropriate for the type of dust generated, and designed to filter out microscopic particles and direct dust away from the face and body. Avoid prolonged contact with dust. Wear protective clothing and wash exposed areas with soap and water.** Allowing dust to get into your mouth, nose, eyes, or to remain on your skin may promote absorption of harmful chemicals.
- g) Before use, the machine, the sawing wire and accessories must be checked carefully to ensure that all items function faultlessly and as intended. Check that moving parts function correctly without stick-

Specific safety rules and symbols

ing and that no parts are damaged. All parts must be fitted correctly and fulfill all conditions necessary for correct operation of the machine. Damaged parts must be repaired or replaced properly by an authorized service center.

- h)** Avoid skin contact with slurry.
- i)** Wear a protective mask during work that generates dust, e.g. dry cutting. Connect a dust removal system. Cutting materials hazardous to the health (e.g. asbestos) is not permissible.

2.4 Electrical safety

- a)** Make sure that no gas, water, electricity or other supply lines are located in the cutting area. Supply lines located close to the cutting area which could be damaged by falling parts, for instance, must be specially protected and, if necessary, temporarily switched off etc.
- b)** Check the machine's supply cord at regular intervals and have it replaced by a qualified specialist if found to be damaged. Check extension cords at regular intervals and replace them if found to be damaged.
- c)** Check the condition of the machine and its accessories. Do not operate the machine and its accessories if damage is found, if the machine is incomplete or if its controls cannot be operated faultlessly.
- d)** Do not touch an electric cable that has been damaged while working. Switch off at the main switch and unplug the cable at the power outlet.
- e)** Damaged or faulty switches must be replaced at a Hilti service center. Do not use the machine if it cannot be switched on and off correctly.
- f)** Connect the machine and its ancillary equipment only to a power source equipped with an earth conductor and ground fault circuit breaker (PRCD). Check that these items are in perfect working order before operating the equipment. Install an earth/ground rod if a generator is used.
- g)** Make sure that the mains voltage corresponds to the specification given on the type plate.
- h)** Electric cables and their plug connectors must be

kept dry. When not in use, close power outlets with the cover provided.

- i)** Use only extension cables which have an adequate conductor cross-section and are approved for the intended field of use. Do not work with extension cables when they are rolled up. This can result in a drop in output at the equipment and may cause the cable to overheat.
- j)** Disconnect the power cable before beginning cleaning and maintenance work or in the event of a lengthy interruption between periods of operation.
- k)** Please note that certain components of the power converter retain an extremely dangerous (potentially fatal) high voltage for up to 10 minutes after disconnection from the electric supply.

2.5 Requirements to be met by users

- a)** The wire saw system may be operated only by specialists trained in concrete cutting techniques, referred to in the following as "operators". These persons must be familiar with the content of these operating instructions and must have been trained in their safe application by a Hilti specialist.
- b)** Stay alert, watch what you are doing and use common sense when working. Do not use the equipment when you are tired or under the influence of drugs, alcohol or medication. A moment of inattention while operating the equipment could result in serious injury.
- c)** The user and any other persons in the vicinity must wear suitable eye protection, a hard hat, protective gloves and safety footwear while the equipment is in use.

2.6 Safety during operation

Check that the wire saw and its components, the sawing wire and wire connectors and all accessories are in good condition and perfect working order before use. Any damage or malfunctions must be rectified in a PROFESSIONAL manner before operation commences.

Position the control unit as far as possible outside the danger zone and remain in the vicinity of the control panel during cutting operations.

Sawing may begin only once the wire saw and pulley stands have been securely fastened to a solid base material. A falling component of the system may result in serious damage or personal injury.

Connect the equipment to the electric power supply only after the wire saw has been fully set up.

Begin saw operation only when the wire guards have been fitted correctly and when the sawing wire has been rigged through the hollow axles of pulleys positioned directly at the wire entry and exit points.

Persons may enter the danger zone (e.g. to adjust pulleys or water supply nozzles) only after the drive has been switched off and when the drive pulley has come to a standstill. Switch off or disconnect the electric supply before entering the danger area.

Observe the permissible drive parameters and the recommended guide values for cutting speed and advance pressure when sawing.

Use only sawing wires that comply with the requirements of ISO/IEC 13236.

The risk of wire breakage can be reduced considerably by using high-quality diamond wires and wire connectors and the appropriate tool for crimping the connectors.

The wire may get hot – don't touch it without gloves!

Use adequately dimensioned fastening materials (anchors, screws etc.) to secure the pulley stands, the wire saw and the parts of the structure that are to be cut free.

When using scaffolds, ladders or platforms etc., check that these are undamaged, of a type that complies with regulations, and that they are set up in accordance with regulations.

The operator must ensure that no person is present in the danger zone at any time during operation of the saw. This also applies to areas not directly visible, e.g. to the rear of the section of the structure being sawn. If necessary, a sufficiently large area must be cordoned off or security personnel posted accordingly.

Stay alert and carefully monitor the sawing operation, the cooling water system and the area surrounding the

workplace. Do not operate the wire saw if your full concentration is not on the job!

No modifications may be made to the saw system equipment. Alteration of the factory-set frequency converter parameters is not permissible.

Specific safety rules and symbols

2.7 Safety instructions for transporting the wire saw

Avoid lifting and carrying heavy objects. Use suitable lifting equipment and means of transport and share heavy loads between several people.

Use the handles provided for transportation. Ensure that the handles are always kept clean and free of grease.

Bear in mind that the machine could fall over. Stand it only on a solid, level surface.

Make sure that the wire saw and its components cannot move about or fall over during transportation.

Use only approved lifting equipment attached to the lifting point provided when transporting the saw by crane. Before transporting the saw, check that all removable parts are securely fastened. Never loiter under loads suspended by crane.



Specific safety rules and symbols



Warning



Caution: High voltage



Warning: avoid hand injuries



Warning: Cutting hazard, sharp edges



Wear protective gloves



Wear protective goggles



Wear a safety helmet



Wear protective footwear



Wear respiratory protection



Read the operating instructions before use



Wear ear protection.



To avoid damage, do not exceed a water pressure of 87 psi / 6 bar.



To avoid damage when there is a risk of freezing, the cooling circuit of the system must be blown out with compressed air after use.



Return waste material for recycling.

A

Amps

V

Volts

~

Alternating current

W

Watts

Hz

Hertz

n_0

Nominal speed under no load

∅

Diameter

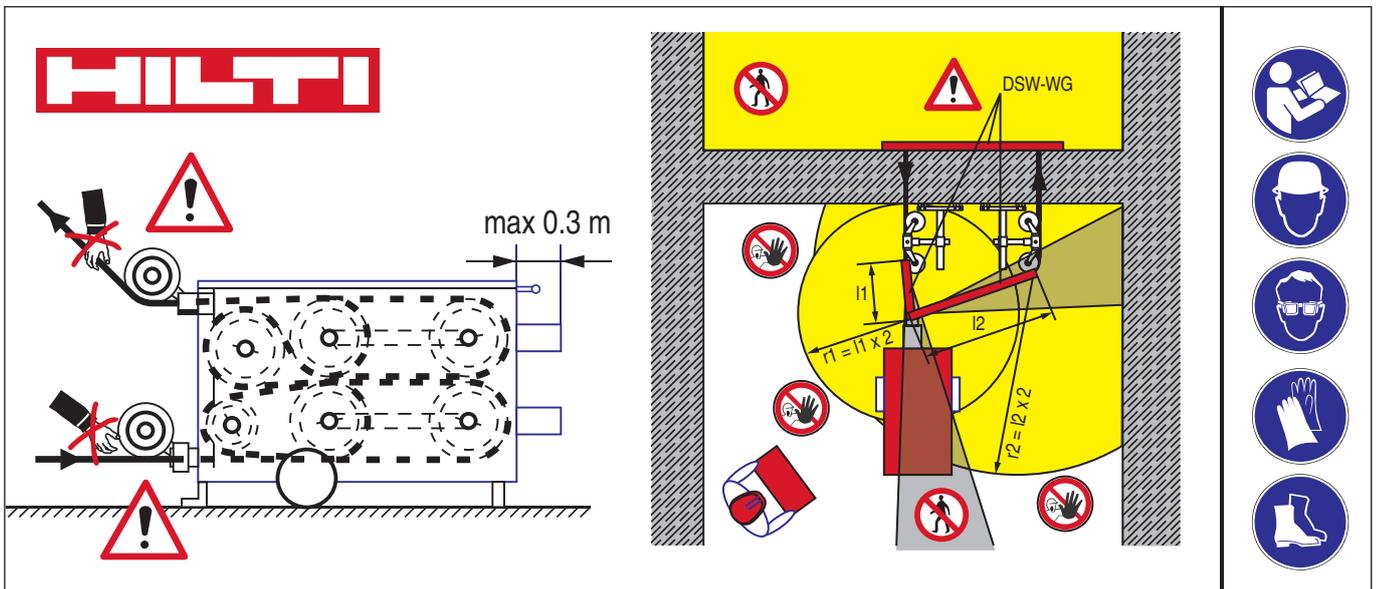
mm

Millimeters

rpm

Revolutions per minute

Control Unit



Specific safety rules and symbols

2.9 Other information

In these operating instructions, the DS WS15 electric wire saw is referred to as **“the machine”**.

Location of identifying data on the machine

The type designation, item number, serial number, year of manufacture and technical status can be found on the rating plate on the machine.

Make a note of this data in your operating instructions and always refer to it when making an enquiry to your Hilti representative or service department.

Control unit:

Type: DS EB-WS15 serial no. _____

Drive unit:

Type: DS WS15 serial no. _____

or other neutralization agents) before it is allowed to flow into the sewerage system.

2.10 Disposal of drilling and sawing slurry

- With regard to environmental aspects, allowing drilling or sawing slurry to flow directly into rivers, lakes or the sewerage system without suitable pre-treatment is problematical.
- In addition to the following recommended pre-treatment procedures, the applicable national regulations must be observed when disposing of drilling or sawing slurry. Ask the local authorities concerned for further information.

We recommend the following pre-treatment

- Collect the drilling and sawing slurry (e.g. using a suitable industrial vacuum cleaner).
- The fine content of the drilling and sawing slurry should be separated from the water by allowing it to settle (e.g. leave standing for some time or add a coagulation agent).
- Solid material from the drilling and sawing slurry should be deposited at a construction waste
- Water from the drilling and sawing slurry should be neutralized (e.g. by adding a large quantity of water

Functional description

3. Functional description

3.1 Areas of application

The DS WS15 is an electrically-powered wire saw which, by means of its diamond wires, is capable of sawing through construction materials ranging from heavily reinforced concrete to metre-thick masonry. Equipped with the appropriate accessories, it can be used to cut openings of all kinds and for the technical demolition of construction components of any shape, thus presenting almost limitless application possibilities. Sawing operations are normally carried out wet, using water cooling, but masonry can also be sawn dry.

3.2 DS WS 15 basic system units

The basic equipment consists of the following components:

- 1 Drive unit with 2 motors, wire storage unit, guide pulleys, and electric cable for connection to the control unit
- 2 Control unit with socket for 480 V electric supply
- 3 Compressor for the compressed air supply to the pneumatic advance system
- 4 Compressed air hoses
1×3.3 ft for connecting the compressor to the control unit
2×23 ft for connecting the control unit to the drive unit
- 5 DS-WS-SPP single-pair pulley stand
The basic equipment includes 2 single-pair pulley stands. These are adequate for most applications but it is also possible to use more than 2 single-pair pulley stands for applications where access is difficult (in cellars, corners, shafts).
- 6 Long water supply nozzle
For use at the rear of the object being cut, deep in the saw kerf.
- 7 Flexible water supply nozzle
For use at the wire entry point (slack side) located at the front of the object being cut.
- 8 Water hoses
2×33 ft for connecting the water supply nozzles to the drive unit
- 9 Toolbox containing accessories and tools

- 10 480 V extension cord
1×33 ft for connecting the control unit to the electric supply
- 11 Wire guard set DSW-WG
The wire guard stops the wire lashing out in the event of wire breakage and prevents objects or fragments flying off

3.3 Operating controls

1 DS WS15 drive unit



Functional description

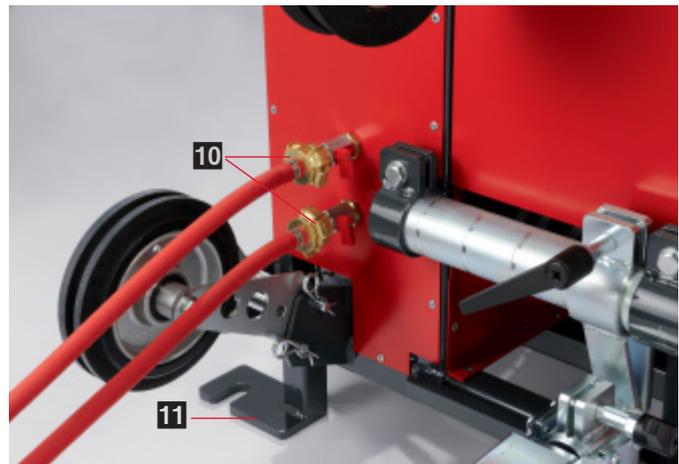
- 1** T-shaped transportation handle, pull-out type
- 2** Folding transportation handle
- 3** Transportation or lifting lever for raising the wheels
- 4** Lifting points for transportation by crane



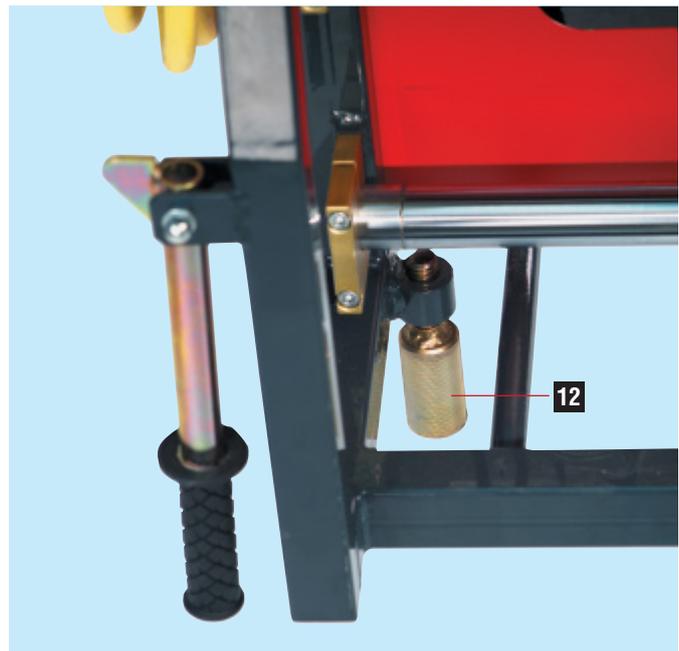
- 5** Cable and hose storage compartment
- 6** Electric cables for drive motors
- 7** Electric cable for control system



- 8** 2 compressed air connections for advance pressure cylinder
- 9** 1 water connection, water supply from construction site



- 10** 2 water connections for cooling water supply to the diamond wire
- 11** 2 baseplates for securing the drive unit to the floor or ground



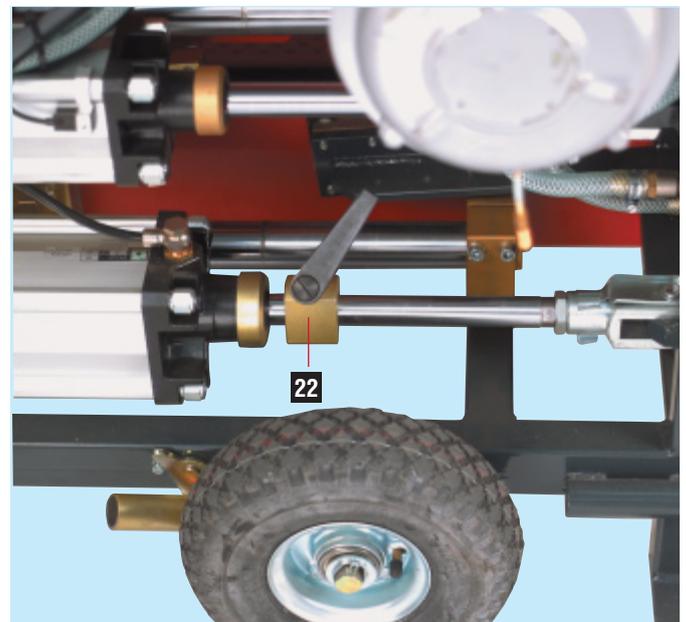
- 12** Three-point supports, adjustable in height



- 13** Drive wheel 1, 280 mm dia., fixed
- 14** Drive wheel 2, 280 mm dia., moving
- 15** Storage pulleys, 280 mm dia., moving
- 16** Storage pulleys, 200 mm dia., fixed



21 Wire clamping vice



22 Compressed air cylinder stop piece

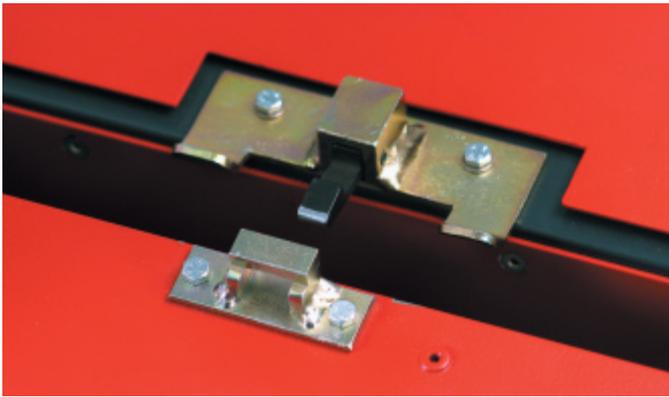


- 17** Tension-side guide pulley, adjustable in direction and position
- 18** Diamond wire lead-in guide
- 19** Slack-side guide pulley – adjustable in direction
- 20** Cylindrical socket for vertical sawing device or for grip bar



23 Side cover

Functional description



24 Side cover securing latch

3.3.1 Operating controls

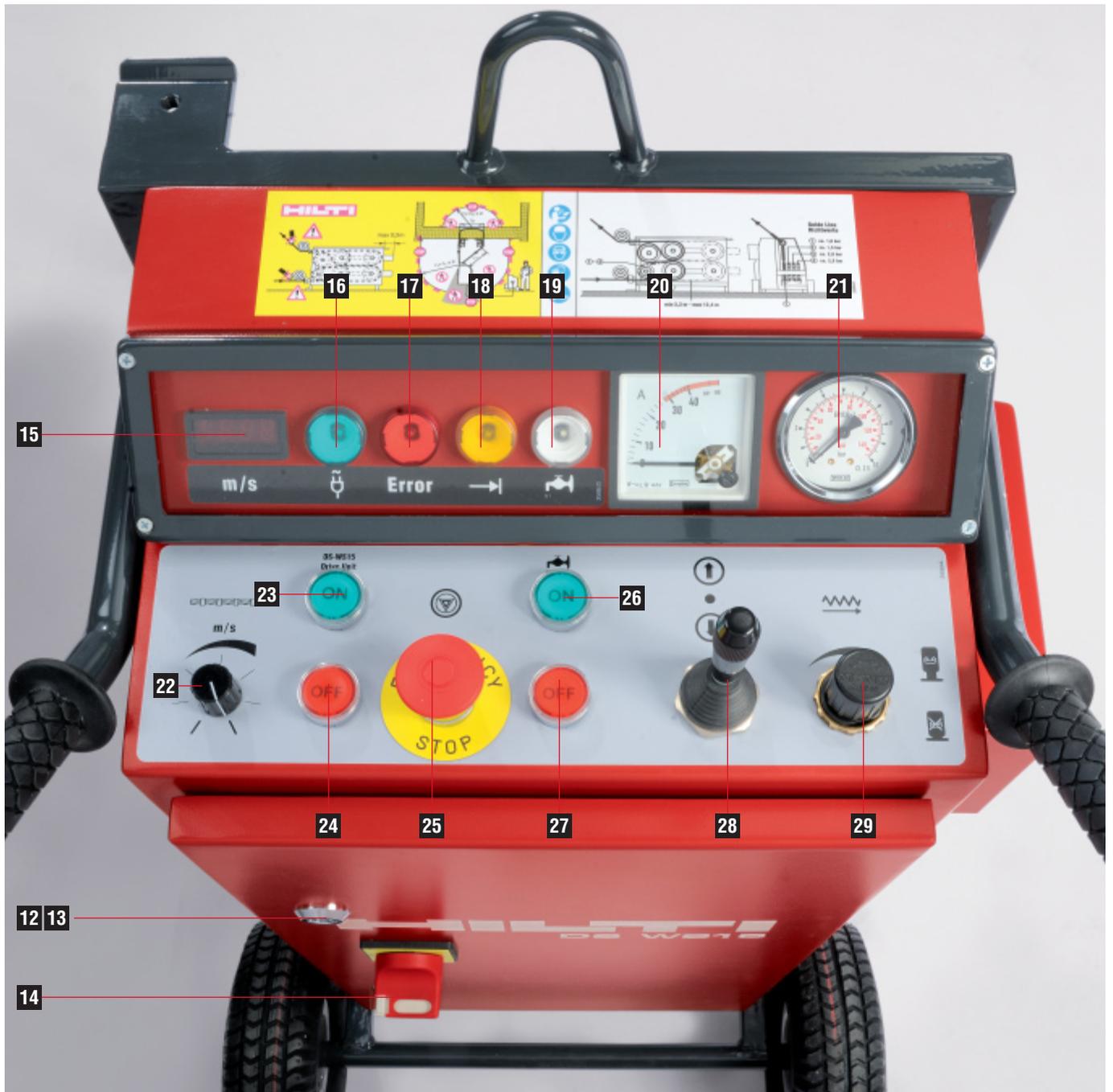
2 Control unit DS EB-WS15



- 1** Transportation and lifting bars
- 2** Transportation handles
- 3** Lifting point for transportation by crane
- 4** Folding shelf for the compressor
- 5** 480 V, 30 amp socket, supply from electric mains
- 6** Ground connection



- 7** Ventilation grille
- 8** Socket, supply to the drive motors
- 9** 24 V control circuit socket for the drive unit
- 10** Compressed air supply, supply from the compressor
- 11** 2 compressed air connections, supply to the drive unit



- 12** Control unit cover lock
- 13** Key for control unit cover lock
- 14** DS WS 15 main power switch
- 15** Digital display for wire cutting speed in m/s
- 16** Green “Ready for operation” indicator light (main power switch ON)
- 17** Red “Error” indicator light - see troubleshooting section
- 18** Yellow light - “Pneumatic advance at rear stop”
- 19** White light - “Water coolant valve open”
- 20** Amperemeter
- 21** Advance pressure in psi/bar
- 22** Regulator for wire drive speed (controls cutting speed, see **15**)
- 23** Drive ON, green light
- 24** Drive OFF, red button
- 25** Emergency OFF switch (EMERGENCY STOP)
- 26** Water supply, I = ON, green light
- 27** Water supply, O = OFF, red button
- 28** Advance control system ↑ ↓ forward or back
- 29** Advance pressure regulator , rotary knob (note pressure, see **21**)
Pushed in = locked, pulled out = unlocked

Functional description

3.4 Drive principle

The wire is driven by 2 electric motors fitted with drive wheels. The diamond wire is fed around the drive wheels in the form of a figure eight to ensure optimum grip. The motors' performance characteristics and control sys-

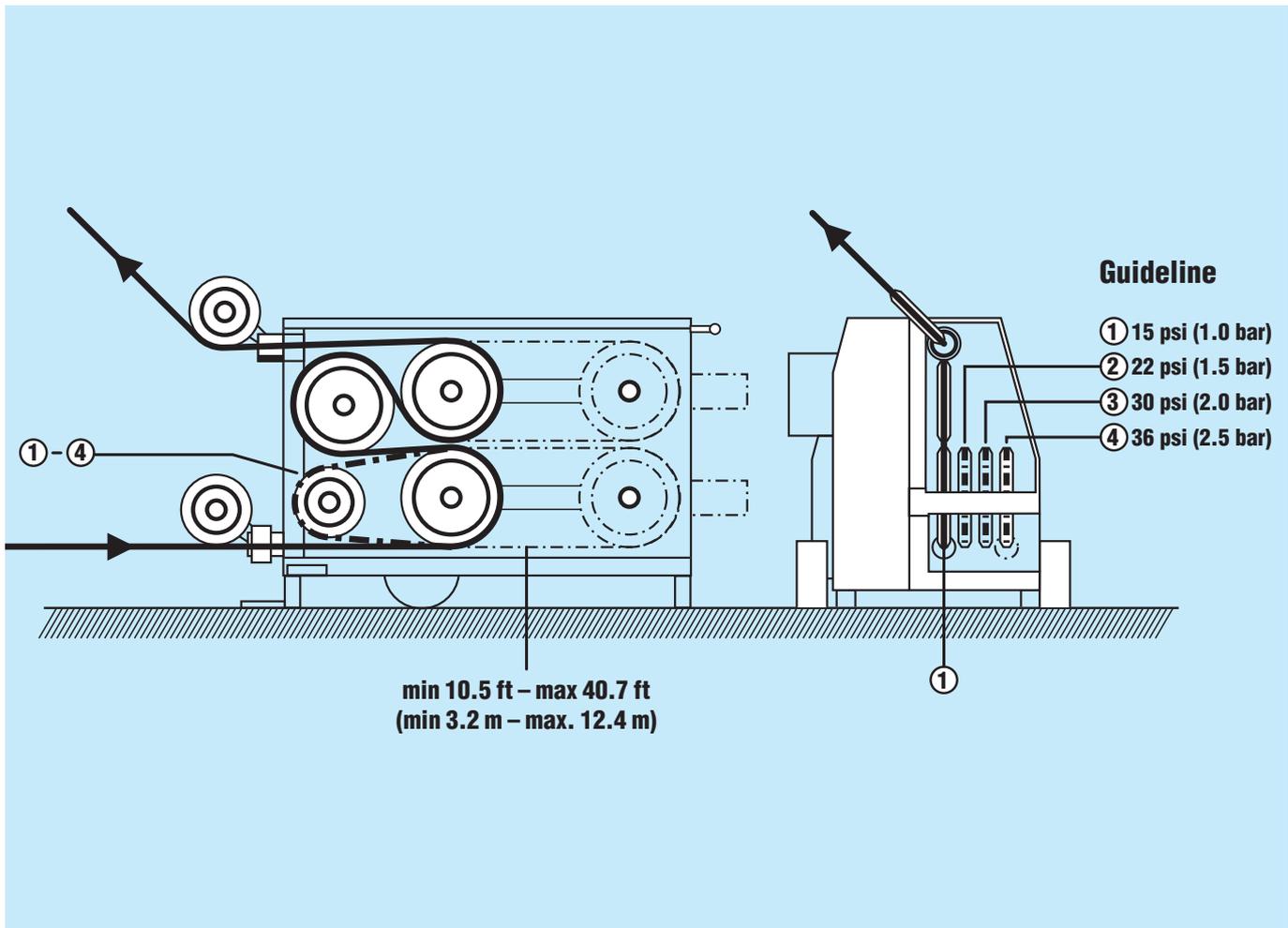
tem are designed to achieve high initial torque and working torque.

The wire speed can be infinitely adjusted within the 0–89 ft/s (0–27 m/s) range.

3.5 Saw advance and wire storage

The wire advance operates according to the principle of a block and tackle working in reverse. The advance movement, causing the wire to be drawn in, is effected by two compressed air cylinders working in opposing directions. Accordingly, the rear pulleys (storage pulleys,

280 mm dia.) are mounted on a moving carriage. The maximum wire storage capacity is 30.2 ft (9.2 m). The minimum length of wire required by the drive system is 10.5 ft (3.2 m).



Wire capacity	Wire in drive	Wire storage	Material thickness
Basic capacity	length 10.5 ft / 3.2 m	6.6 ft / 2 m per stroke	3.3 ft / 1 m
1 storage pulley	length 15.1 ft / 4.6 m	7.9 ft / 2.4 m per stroke	6.2 ft / 1.9 m
Full capacity	length 24.3 ft / 7.4 m	15.7 ft / 4.8 m per stroke	14.8 ft / 4.5 m

3.6 Wire guidance

Guide pulleys are fitted on the wire tension side and on the return side (slack side). The wire is guided to the object being sawn by way of these guide pulleys which can be adjusted in any direction. Wire guides in the form of single-stands, plunge pulleys etc., are mounted at the start and end of the cut. The wire is thus guided and cuts a controlled arc. The wire guides, pulleys and supporting steel tube prevent the wire jumping off uncontrollably at the end of the cut and act as a safety device or as a wire trap in the event of the wire breaking.

Optimum wire guidance is one of the most important and demanding tasks in wire sawing. The distribution of the cut and the arrangement of the pulley stands control the length and curvature of the arc cut by the wire, thus influencing both the service life of the wire as well as the rate of cutting progress.

Functional description

3.7 Technical data for the DS EB-WS15 power supply*

	DS EB-WS15 3 × 480 V	
Rated voltage	480 V ~	
Mains frequency	60 Hz	
Pin assignment	3P+PE	
Rated current	22 A	
Mains fuse rating max.	30 A	
Power input, max.	18.3 kVA	
Generator power rating, min.	40 kVA @ 30 A	
Ground fault circuit breaker in supply	30 mA	
Protection class *****	IP 54	
Weight	124 lbs	56 kg
Dimensions l × w × h	23.2×25.2×42.9 in	59×64×109 cm
Operating / storage temperature	5 to 122° F ***	-15°C to +50°C ***
Operating / ambient temperature	5 to 113° F ***	-15°C to +45°C ***
Leakage current	13.8 mA	
Insulation resistance	250 MΩ	
Compressed air supply pressure	87–116 psi	6–8 bar
Compressed air flow rating	26 gallon/min	min. 100 l/min

3.8 Technical data for the DS WS15 drive unit

	DS WS15	
Motor power S1**	2 × 10 hp	2 × 7.5 kW
Cooling water temperature at 5l/min.	39 to 86° F	4 to 30°C
Cooling water pressure min. / max.	29 to 87 psi	2 to 6 bar
Drive spindle speed	140 to 1900 r.p.m.	
Protection class ****	IP 65	
Sawing wire diameter	1/3"–1/2"	8 mm to 12 mm
Weight	597 lbs	271 kg
Dimensions l × w × h	5.1 ft × 2.6 ft × 3 ft	156 × 79 × 92 cm
Operating / storage temperature	5 to 122° F ***	-15°C to +50°C ***
Operating / ambient temperature	5 to 113° F ***	-15°C to +45°C ***
Cable length (power supply-drive unit)	23 ft	7 m
Wire storage capacity (net)	30 ft	9.2 m
Drive wheel diameter	2 × Ø 11"	2 × Ø 28 cm
Wire speed	0–89 ft/s	0–27 m/s

3.9 Technical data for the DS-WS-SPP single pair pulley

	DS-WS-SPP single pair pulley	
Weight	20 lbs	9 kg
Dimensions l × w × h	18" × 9" × 22"	46 × 24 × 56 cm

* Rated values guaranteed at max. 64° F (18°C) and heights of up to 2,000 m above sea level.

** Continuous operation 100%

*** At temperatures below zero, allow the machine to warm up slowly before subjecting to load and drain (blow out) the water from the cooling circuit after use.

**** Protection class IP65 in accordance with EN 60529, 6 = Dust tight, 5 = Protection against jetting water

***** Protection class IP54 in accordance with EN 60529, 5 = Dust protected, 4 = Protection against splashing water

3.10 Type plates

HILTI DS WS15 01
HILTI = trademark of HILTI Corporation, Schaan, LI Made in Austria

WIRE SAW SYSTEM

Serial number **3** — 0000000

Input	480 V	60 Hz	22 A	3~ + PE
n_o	140 - 1900rpm			

WARNING:
 TO REDUCE THE RISK OF INJURY, USER MUST READ AND UNDERSTAND INSTRUCTION MANUAL



HILTI INC. TULSA, OK 74145

FFE	ETL	DATE
424830	01	10

1 2 4

HILTI DS EB WS15 01
HILTI = trademark of HILTI Corporation, Schaan, LI Made in Austria

CONTROL UNIT

Serial number **3** — 0000000

Input	480 V	60 Hz	22.0A	3~ + PE
Sec.out 1	400 V	5 - 67 Hz	26.5A	3~ + PE
Sec.out 2	24VDC		10.0A	

WARNING:
 TO REDUCE THE RISK OF INJURY, USER MUST READ AND UNDERSTAND INSTRUCTION MANUAL



HILTI INC. TULSA, OK 74145

FFE	ETL	DATE
424831	01	10

1 2 4

HILTI DS WS15 01
HILTI = registered trademark of HILTI Corp. Schaan/LI Made in Austria

DRIVE UNIT

Serial number 0000000 **3**

Input	400V	5 - 67 Hz	26.5A	3~ + PE
Input	24VDC			

Wire \varnothing 1/3" - 1/2" (\varnothing 8mm - 12mm) n_o = 140-1900 rpm

WARNING:
 TO REDUCE THE RISK OF INJURY, USER MUST READ AND UNDERSTAND INSTRUCTION MANUAL



HILTI INC. TULSA, OK 74145

FFE	ETL	DATE
424832	01	10

1 2 4

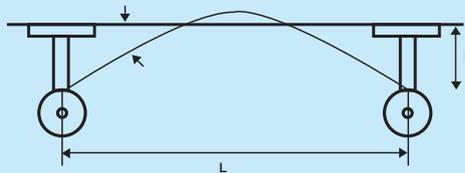
- 1 = Engineering number
- 2 = Spare parts list index
- 3 = Serial number
- 4 = Year of manufacture

4. Assembly

4.1 Planning the wire guidance system

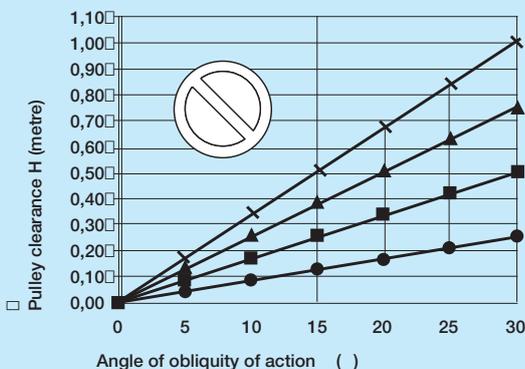
- Before installing the wire saw, you must carefully study the situation and plan the wire guides, the drilling of through-holes, the sequence of the work and the procedure involved. You must also plan the cooling water supply and, if necessary, waste water –disposal.
- Consideration must be given to safety aspects and cordoning off to prevent access by third parties etc.
- Secure the area, plan the removal and transportation of the sawn-out sections of the structure and all other necessary measures.

4.1.1 Positioning the wire guide pulleys

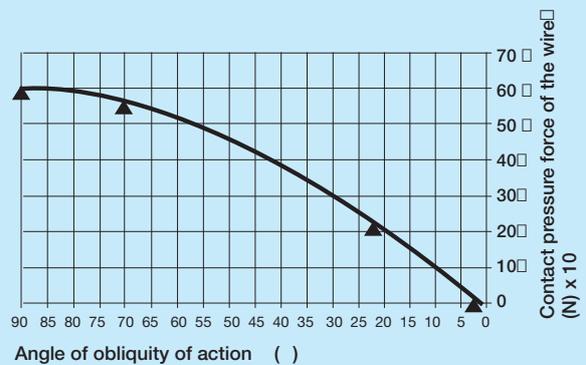
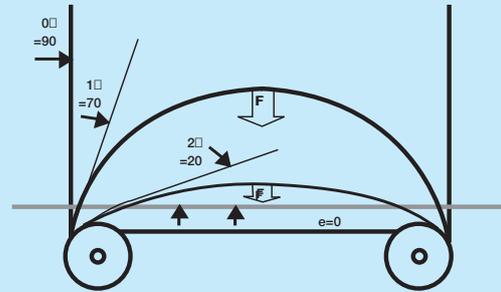


Rule of thumb : Pulley clearance $H = 0.2 \text{ m}$ per metre sawing length L .

□ Sawing length L: ● 1 metre ■ 2 metre ▲ 3 metre ✕ 4 metre



4.1.2 Wire pressure



4.2 Drilling through-holes for the wire

- According to the situation, the material to be cut and the amount of reinforcement in the concrete, a hammer drill and long drill bits or a diamond coring machine mounted on a stand can be used to drill through-holes. Depending on the thickness of the section to be cut and the material involved, we recommend drill bits of $\frac{5}{8}$ " (16 mm), $1\frac{1}{2}$ " (37 mm), $2\frac{5}{8}$ " (67 mm) or 4" (102 mm) diameter.
- Depending on the application, you will also require accessories and special solutions for drilling to greater depths.

4.3 Electric power supply / fuse rating

-CAUTION-

Irrespective of whether using mains power or generator power, always check that an earth/ground conductor and ground fault circuit breaker are present in the

power supply and that these are connected. If in doubt about a correct earth/ground connection in the power supply, the Control Unit must be grounded with the ground connection provided on the Control Unit. The fuse rating of the electric power supply at the construction site must be as follows:

Voltage version	3 × 480 V
Maximum fuse rating	30 A
Ground fault circuit breaker (FI)	Type A 30 mA

4.4 Electric power connection / power cable plugs

Voltage version	3 × 480 V
Pin assignment	3 Pole, 4 Wire Grounding (3P+PE)

Pin assignment



X = phase 1, Y = phase 2, Z = phase 3, G = earth / ground (PE)

The power supply cable supplied with the tool has to be used to connect the tool to the local power supply.

4.5 Extension cables / conductor cross section

- Use only extension cables which are approved for the intended field of use and with conductors of adequate cross section.
- For extension cables use following cable specification and minimum conductor cross sections: cable extra hard type for wet and outdoor locations, 4 wires AWG10, 3P+PE, 480 V / 30 A (conductor cross section = cross-sectional area of individual conductors).
- Inadequate conductor cross sections and long cables result in a drop in voltage and may cause the cable to overheat.

4.6 Transporting the wire saw

- The wheels on the DS WS15 drive unit must be folded up before it is transported in your vehicle or on a trailer. The drive unit, control unit and other components must be secured with suitable belts to prevent them moving around or falling over.

- Use suitable lifting gear or non-slip, stable ramps to load / unload the equipment into the vehicle or onto the trailer.
- The DS WS15 control unit can be moved without any problem by means of the 2 hand grips. A lifting point is provided for the purpose of transportation by crane.
- The DS WS15 drive unit can be easily moved on solid ground on its transportation wheels (located in line with the centre of gravity) by means of the pull-out T-bar located at the rear. The wheels can be brought from the standing position to the transport position (and vice versa) by one person without any trouble by means of a lever, whereupon they can then be locked in position (see fig. 1, 2). Two lifting points are fitted for transportation by crane.



4.7 Securing the wire guides and saw drive unit

- To ensure efficient and safe operation it is essential that the saw and the pulley stands are fastened correctly and securely using fasteners of adequate size.

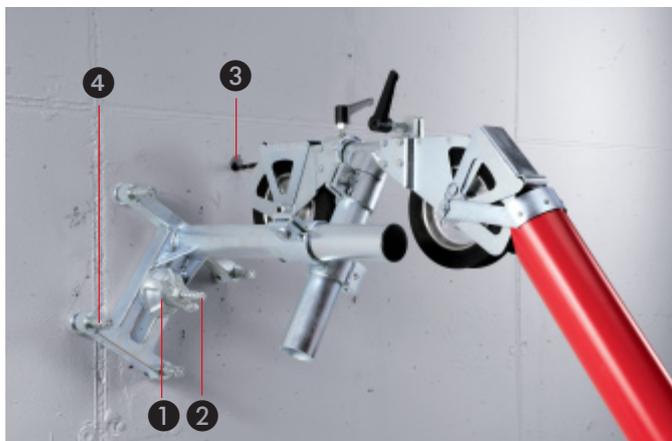
WARNING

Use an anchor suitable for the material on which you are working and observe the anchor manufacturer's instructions.

NOTE

Hilti HDI 1/2" metal expansion anchors are usually suitable for fastening diamond core drilling equipment to uncracked concrete. Under certain conditions it may be necessary to use an alternative fastening method. Please contact Hilti Technical Service if you have any questions about secure fastening.

- Your Hilti representative will be pleased to provide advice in case of questions concerning fastening security on base materials such as brittle or cracked concrete, masonry and synthetic or natural stone.
- The clamping spindles and clamping nuts with swivel baseplate recommended for use with these anchors ensure that the equipment can be fastened in position quickly and securely. Important: The clamping spindles are wearing parts and should be replaced when necessary. Check that they are in good condition before use and do not straighten them by hammering.
- Alternatively, ceiling support jacks, quick-release columns or tension belts may be used instead of anchors for securing the DS WS15 drive unit.
- The anchors for fastening the single-pair pulley stands



- 1 Clamping nut with swivelling baseplate
- 2 Clamping spindle with double-start thread
- 3 Through-hole for the diamond wire
- 4 Levelling screw

do not require to be very precisely positioned. Thanks to their adaptable clamping system, the pulley stands and guide pulleys can always be lined up precisely with the cut. Approximate positioning is adequate (see fig).

- In addition to the central clamping spindle, the levelling screws on the pulley stands can also be tightened. The wire guide pulleys are then fastened securely and will not work loose, even when subjected to vibration.

4.8 Connecting the electric power, water and compressed air

Please also refer to Section 2, "Description of the saw system"

- **Situation: The wire saw is installed, all switches at the control unit are in the OFF or NEUTRAL positions, the EMERGENCY STOP button is pressed in.**

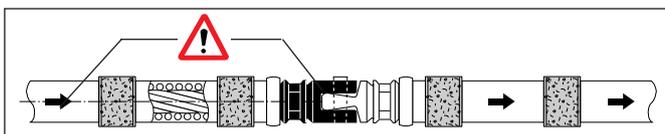
- Connect the system's own power cable and control cable between the drive and the control unit. **Important:** The control unit must be positioned outside the hazardous area of wire saw operation!
- Connect the socket of the mains supply cable / extension cable to the control unit.
- Install the water supply with a feed of at least 1.3 gal/min at a max. water pressure of 87 psi for the DS WS15 drive, and connect it to the rear of the drive unit by way of the quick-release couplings.
- Lead 2 cooling water hoses from the front of the drive unit (close to the guide pulleys), by way of the quick-release water couplings, to the cutting face where sawing is taking place and connect them to the flexible water supply nozzle and to the long water supply nozzle.
- Turn the main switch at the control unit to ON. The indicator lamp lights up green and the outflow water valve at the drive unit closes automatically. **Note:** The red ERROR warning lamp may possibly light up for approximately 6 seconds, until the correct tension is reached.
- Connect the compressor to the mains supply and switch it on immediately. As soon as the compressor switches off automatically, i.e. when the pressure tank is full, connect the compressed air hose of the compressor and the control unit (one hose), and then connect the control unit to the drive by means of the 2 long compressed air hoses. The compressor restarts automatically, when necessary.
- Open the tap at the jobsite water supply. The water

does not yet flow through the machine to the water nozzles (water flows only when the cooling water is switched on at the control unit).

- The DS WS15 drive unit has to be cooled even when used for dry cutting applications (the diamond wire may not have to be cooled when cutting brickwork). As an alternative to connection to a fresh water supply, cooling can be achieved by means of a submersible pump in a water reservoir. The cooling water can be returned to this reservoir from one of the two water taps located at the front of the drive unit, thus forming a closed circuit system.
- Insufficient cooling water or a water temperature significantly in excess of 68°F can lead to premature activation of the temperature protection control switch. The motors then switch off automatically and the "Error" warning lamp lights (see also "Error messages" section).

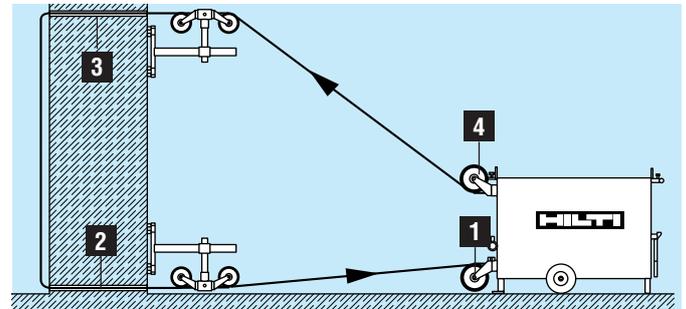
4.9 Rigging and tensioning the wire

- **Situation:** The length of the wire and the optimum position of the drive has been fixed. The drive unit has been set up at approximately the correct distance to the structure to be cut. The wire has been fitted with wire connectors.
- **Important: When the wire is threaded through, attention must be paid to correct direction of travel.**
The forked piece of the wire connector must correspond to the directional arrow on the wire. Should the arrow on the wire no longer be visible, the direction of travel can be determined from the diamond beads. The beads are slightly conical in the direction of travel (narrow end ahead) and the diamonds can be seen to have a "tail" that trails behind.



- The wire running in the direction of tension from the object being cut is always fed to the drive unit via the lower guide pulley or, respectively, through the lower hollow axle. **Important:** Always use the shorter free wire length as the tension side! The system will then work more efficiently, more safely and with reduced wire wear.
- Feed the wire from the hollow axle of the lower guide pulley of the drive **1** at the tension side through the pulley guide mounted at the closer through-hole **2**

and then through the hole to the rear of the object being cut. From there, the wire should return via the next previously-drilled through-hole **3** to the next pulley guide from where it is then fed back to the slack side (wire return side) of the drive unit **4**.



- **Important:** We recommend that the following procedure is followed now, at the latest, before the two ends of the wire are connected: The operators should pull the wire through by hand, in both directions alternately in a "sawing" motion, so that the wire already begins to cut slightly into the object to be sawn. This procedure ensures that the wire guides are secured correctly in position at the object to be cut and that the wire is free to move when sawing begins.
- To ensure that the wire wears evenly and stays round, we recommend that the wire is twisted in a counter-clockwise direction (approx. 0,2 turns per ft length) before the ends are connected together.

Assembly



- Move the drive motor on the carriage manually into the desired position. Before this can be done, the two compressed air connections located at the rear of the drive must be connected, or coupled together (so that the air in the pressure cylinders can circulate).



- Ideally, the drive should be rigged with only the basic minimum length of wire 10.5 ft (3.2 m) at the commencement of sawing. This allows the maximum thickness to be sawn through without having to adjust or change the wire. Nevertheless, it is possible to begin sawing with the wire storage pulleys occupied to full capacity.
- The operator at the control unit should set the advance pressure to approximately 14.2 psi (1 bar) by adjusting the pressure control and then tension the wire by moving the advance lever (fig. 1). At the same time, the operator at the drive unit should ensure that the wire is lying correctly on the storage pulleys (fig. 2).



- Starting from the upper guide pulley (hollow axle) located at the slack side, pass the connected wire around the 280 mm diameter drive wheels (refer to the sticker on drive unit) and fix the lower guide pulley on the tension side in the corresponding storage position. Pass the wire around the storage pulleys in one or more turns, as necessary. When doing so, it may be necessary to re-position the entire drive unit by moving it forward or back before fastening it in position.





Warning: avoid hand injuries



Wear protective gloves

Warning: Take care to avoid injuries to the fingers and hands!

To avoid the risk of hand injury, hold the wire at a point well away from the pulleys.

- Align the lower hollow axle and guide pulley with the corresponding storage pulley (observe the marking grooves) and tighten it in this position (fig. 3).



- Check the entire course followed by the wire and readjust any lengths of wire which may have jumped off the guide pulleys. Make sure that the guide pulleys on the pulley stands are aligned with the drive unit. Exact alignment has been achieved when the wire runs in the centre of the guide pulleys.

- If necessary, e.g. when an extremely soft material is being cut, tighten the compressed air cylinder lock at the cylinder. This prevents the wire from sticking in soft material when the saw is started (fig. 4).



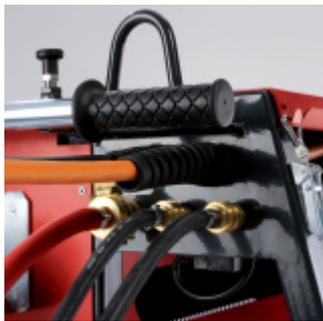
- Fit the wire guard (side cover) once the wire is tensioned. Make sure it is secured and engaged correctly. The drive unit can be started only when the wire guard is locked in position (fig. 5).



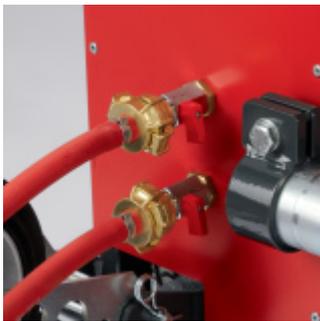
Assembly

4.10 Setting up the wire cooling system

- Ideally, hoses should be led from the 2 water connections with valves at the front of the control unit to the flexible water supply nozzle at the point where the wire enters the front side of the object being cut and to the second (long) water supply nozzle positioned at the diamond wire on the rear side of the object. The water supply nozzles can be mounted by pushing the wedge into the kerf or temporarily by some other suitable means.
- When dry cutting, the water outlet from the drive unit is fed into the drainage system or a reservoir and not to the saw kerf.
- The cooling water supply is controlled by the ON and OFF buttons on the control unit.
- If less water than required for cooling the drive unit is used for cooling the wire, a proportion of the water can be fed directly into the drainage system by way of the second valve located at the front of the drive unit.



Water connection to drive unit



Water supply to the cut

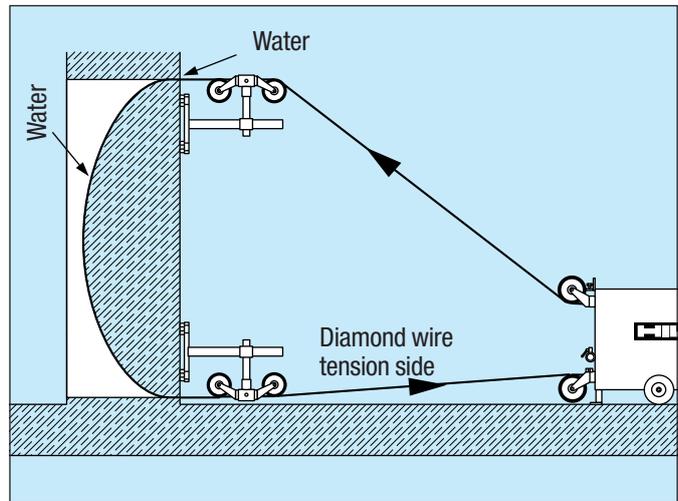


Control unit – water on / off

4.11 Basic applications

4.11.1 Standard vertical cut

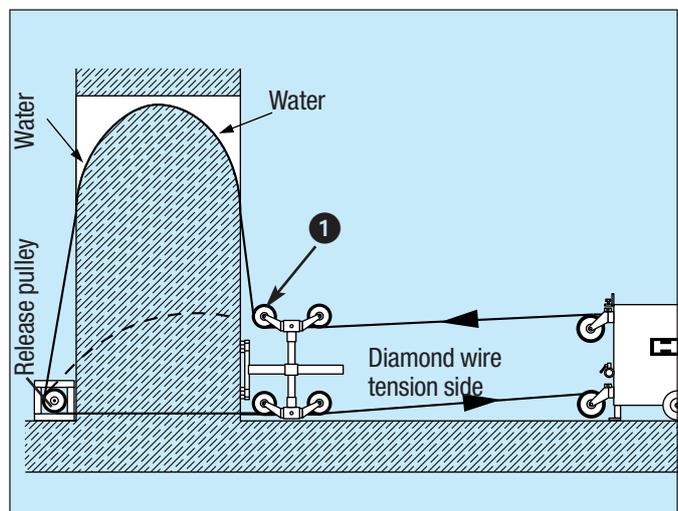
- Illustration: Using a single-pair pulley stand (DS-WS-SPP)
- Optimum length of cut
- Avoid a tight radius in the concrete
- Good cutting performance (cutting speed)
- Normal rate of wire wear



4.11.2 Vertical cut with DS-WSRW release pulley

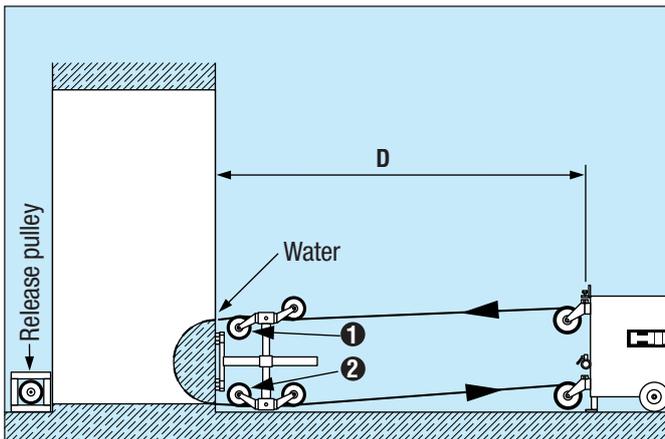
1st step

- Illustration: Using a double-pair pulley stand (made up from two DS-WS-SPP)
- Relatively short length of cut
- High cutting performance (cutting speed)
- Slightly higher rate of wire wear
- **Note:** Once the kerf reaches the height of the pulley ①, rotate the pulley so that it points downwards.



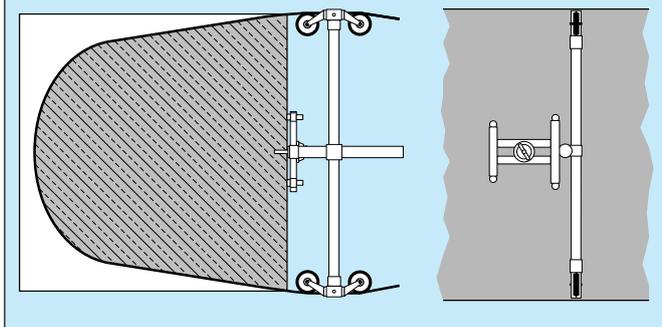
2nd step

- Disengage the wire from the release pulley when the cut is approx. 50% complete, i.e. the wire then also begins to cut from below.
- Provided the operator remains outside the danger zone, this can be done while sawing continues by means of a long string: simply pull out the bolt from the release pulley!



- The wire is caught by pulleys ① and ② when it escapes from the kerf at the end of the cut.

Example: Using a double-pair pulley stand for a vertical cut through a concrete component



4.11.3 Distance “D” between the drive and object being cut

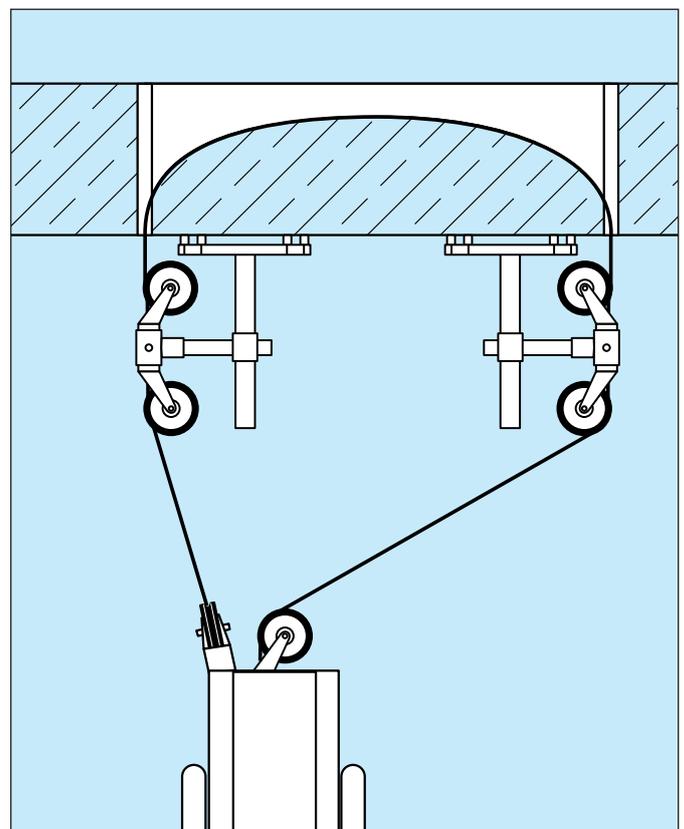
- The distance “D” between the drive unit and the object being cut is determined by the application. The ideal distance, i.e. the “free wire length”, is approximately 6–10 ft. For even greater distances, the wire must run over an additional pulley stand. The distance “D” (or “free wire length”) should always be kept as short as possible for safety reasons.

4.11.4 Optimum length of cut “L”

- The optimum length of cut “L”, i.e. the wire length effectively involved in cutting process, ranges from approximately 6–26 ft for the DS WS15 wire saw. This enables the operator to achieve the greatest efficiency, and also ensures good service life of the wire.

4.11.5 Standard horizontal cut

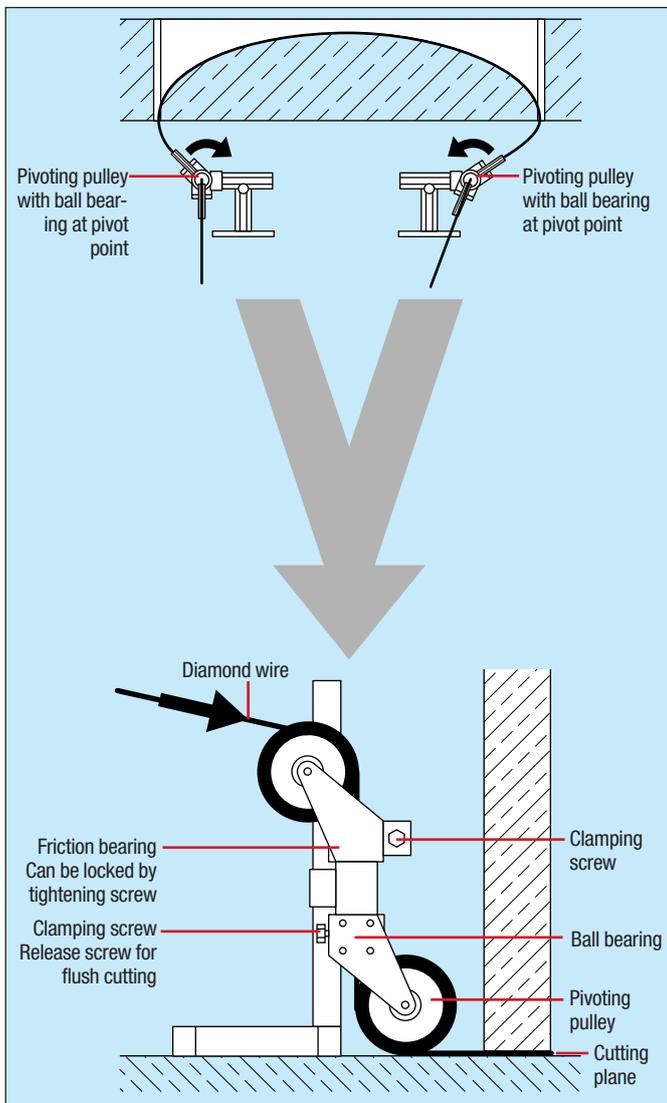
- Position the drive unit at a short distance from the object to be cut, with the tension side facing the object.
- Position the control unit outside the danger zone.



Assembly

4.11.6 Flush horizontal cut

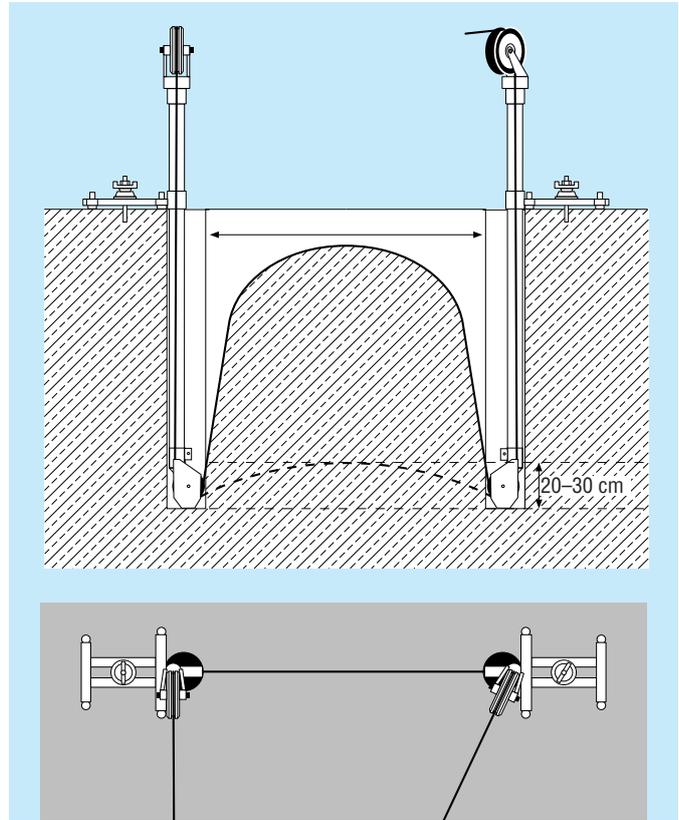
- The pulley stand should be mounted so that the pivoting guide pulley (on bearings), with the clamping screw at the rear, is almost in contact with the surface along which the flush cut is to be made. There should be a maximum of about 1/4" play between the flush surface and the guide pulley.
- The pivoting guide pulleys should be positioned facing outwards at the beginning of the cut and should be free to pivot.
- At the end of the cut, the pulleys will have pivoted to face inwards as they follow the course of the wire.



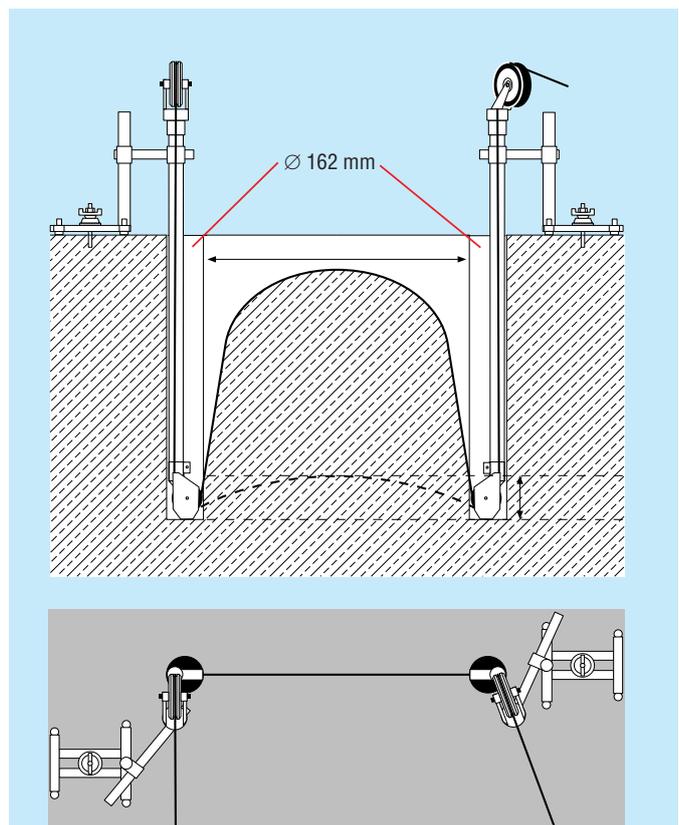
4.11.7 Using plunge pulleys

- A plunge cutting application in a solid material is described.
- For a cut of 6–10 ft in length, the plunge pulleys must be set approximately 8"–12" deeper because the end of the cut always takes the form of an arc.

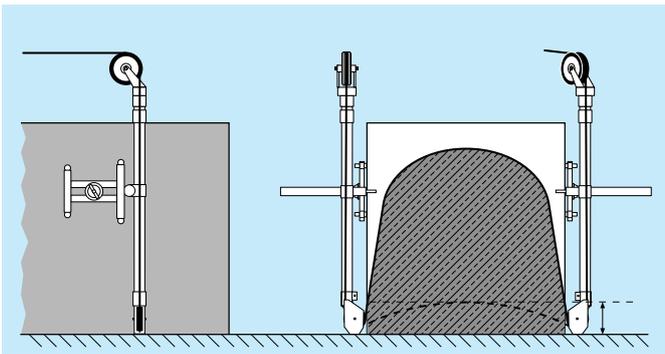
■ Guide pulley tube attached directly to the baseplate



■ Guide pulley tube attached to the distance piece

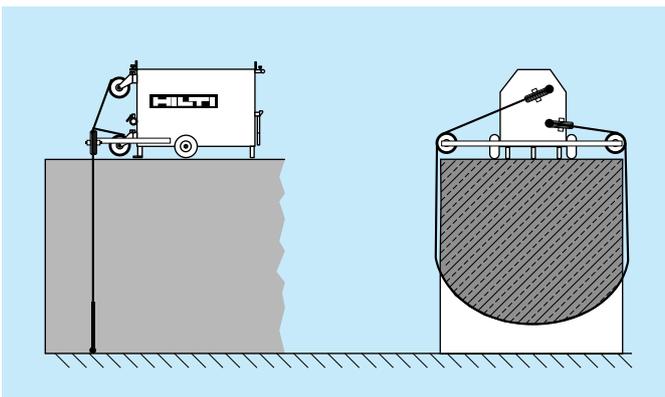


- In so-called "external plunge" applications, the plunge pulleys are mounted on the outside of the object being cut. Cross-type tube clamps are used to mount the plunge pulleys on single-pair pulley stands. The time-consuming job of drilling through the object to be cut is thus no longer necessary.



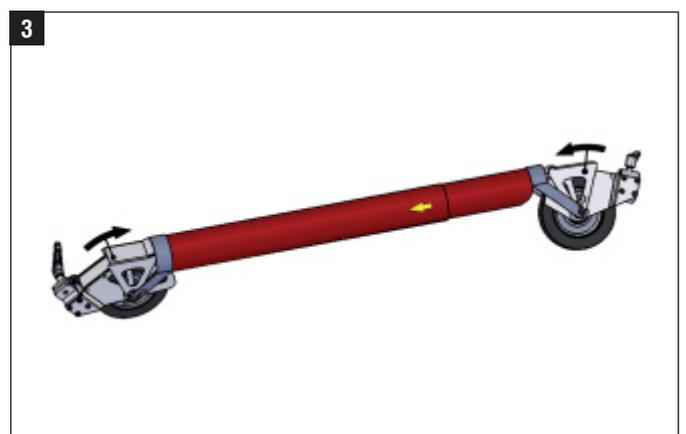
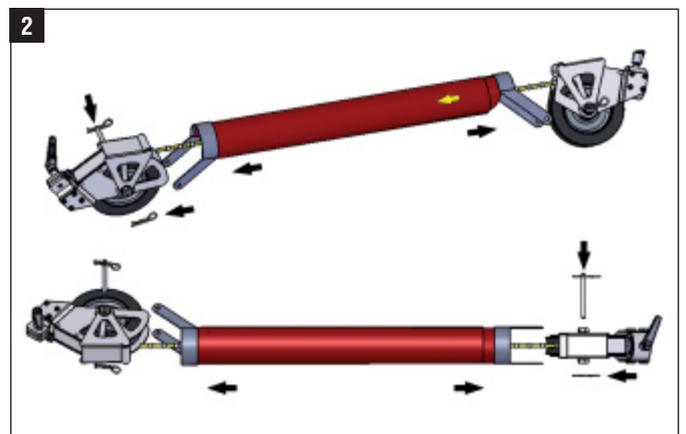
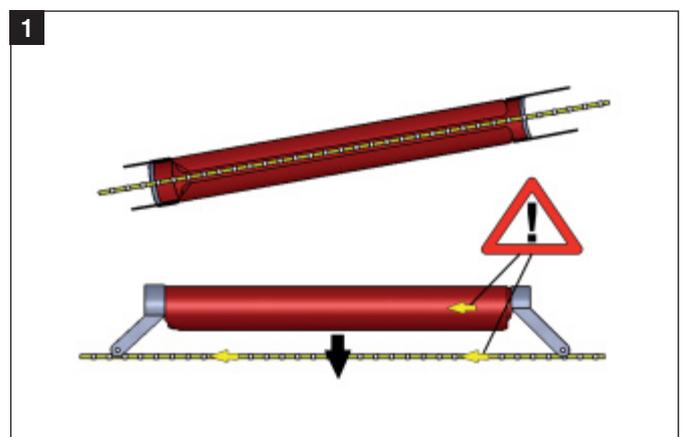
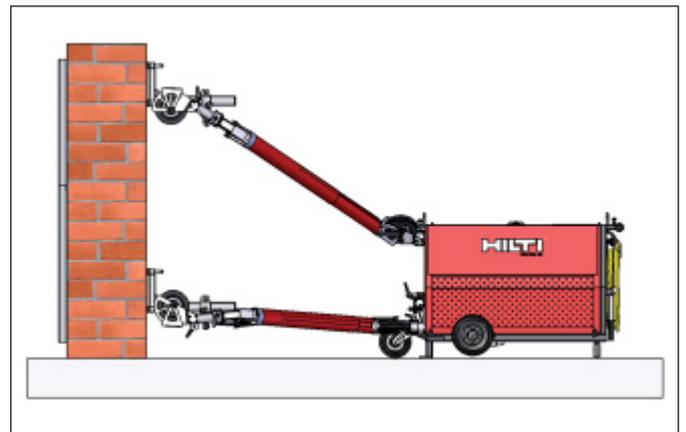
4.11.8 Using the DS-WSVC vertical cutting device

- No pulley stands are required for this type of cut.
- The drive unit is positioned directly on the object to be cut.
- Care must be taken to ensure that the drive unit and the guides for the wire to the object being cut are at right angles to each other. This can be adjusted by means of the height adjustment mechanism at the rear.



4.11.9 Assembly instructions DSW-WG Protective cover

- Use the protective cover to augment the safety on your jobsite. NEVER enter the danger area while sawing is in progress.
- Mount the cover according to the assembly instructions below. It can be mounted after complete set up of the wire saw.



5. Operation

5.1 Checks prior to beginning sawing

- On-site preparatory work should be completed (supports, cordoning off the danger zone, arrangements for water collection etc.)
- The pulley stands and the drive unit should be correctly secured and the wire rigged on the saw in the correct direction of travel, the wire guards fitted, wire guidance on the pulleys checked and the guide pulleys tightened. The cooling water supply to the wire should have been installed.
- Electric power, compressed air and water should be connected. The power supply should be equipped with an earth/ground conductor and ground fault circuit breaker (PRCD) and should have been checked / tested. Water and compressed air supplies should be within the permitted pressure range.
- The control unit should be located outside the danger zone, hazardous areas in front of and behind the object to be sawn should have been checked and cordoned off and no persons should be present in the hazardous area.

5.2 The starting procedure

- Situation: The main switch is in the ON position. The “power” indicator light is green. The compressor and the system are pressurised. The advance lever is in the “sawing” (advance) position. The remaining switches are OFF or set at “0”.
- If necessary, when cutting masonry, the lower advance compressed air cylinder may be locked in position using the locking ring provided.
- Open the 2 water valves on the drive unit for the water supply to the cutting face.
- Adjust the advance pressure to approximately 1 bar at the control unit by means of the control knob (pulled out), or to the pressure recommended depending on the wire used for sawing.
- Switch on the water supply. The white indicator lamp lights.
- Switch on the drive (green “DS WS15 Drive Unit” push-button).

- Use the speed regulator to increase speed gradually and, once the wire is running at a low speed (approximately 3–10 m/s cutting speed), allow the wire to cut for a few seconds. Check that the wire is running correctly on all guide pulleys (max. 1 minute).
- By adjusting the speed regulator, accelerate the motors until the wire is running at the desired or, respectively, the optimum cutting speed.

Recommended cutting speeds (approximate)

Cutting method	Recommended cutting speed	Recommended wire length
Wet	Approx. 20–25 m/s	Keep wire as short as possible
Dry	Approx. 10–20 m/s	Long wire (assists cooling)

- Set the advance pressure (bar) so that current consumption is 25 – 30 amps.
- The DS WS15 now continues sawing automatically. Monitor the cutting process. Normally, the saw has to be stopped for a short time soon after beginning cutting. Stop the saw by switching the drive OFF and then press in the EMERGENCY STOP button. Check the wire guidance and readjust the water supply.
- If necessary, release the locking ring on the compressed air cylinder.

5.3 The sawing operation

- Release the EMERGENCY STOP button and start the drive (the speed and pressure are already set and remain unchanged). The motors accelerate up to speed. The wire saw then cuts automatically.
- Monitor the sawing operation, paying particular attention to the cooling water supply to the wire. When wet sawing, the cooling water system must be readjusted as soon as dust is produced. In most cases, alignment of the guide pulleys also has to be changed approximately half-way through the cut.

Wire cooling

Cutting method	Cooling	Comments
Wet	Approx. 5 litres of water per min.	NO dust should be produced. Readjust water supply.
Dry	“Air cooling” - long wire	If necessary, use vacuum cleaner to remove dust at the wire exit point.

- The yellow warning lamp →I lights and the machine switches off. The drive carriage has reached the end of its travel, i. e. is at the advance end stop. Press the dri-

ve OFF and the EMERGENCY STOP buttons. Stop the flow of cooling water.

- Remove the cover from the drive unit and bring the travelling drive motor into the forward drive position either manually or using the compressed air control system.
- Wind the slack wire onto the storage pulleys. The second operator ensures that the wire is correctly positioned on the pulleys. Re-adjust the hollow axle of the guide pulleys at the tension side to bring it into alignment with the wire entering the store and tighten the clamping screw. Replace the wire compartment cover.
- Should the wire store offer insufficient capacity during extreme applications, simply move the drive unit back a distance of 3–6 ft and then re-secure it in its new position.
- Check the alignment of the guide pulleys and readjust if necessary.
- Reset the advance pressure to the recommended value in accordance with the table. Lock the compressed air control knob again and switch on the cooling water system.
- Disengage the EMERGENCY STOP button and press the drive ON button. Use the speed control knob to accelerate gently to the desired or optimum cutting speed. The DS WS15 then saws automatically.
- Monitor the sawing operation. If the saw wire vibrates excessively, check the alignment of the pivoting or guiding pulleys. If necessary, adjust the wire speed and advance pressure slightly.
- **Important:** Press the EMERGENCY STOP button in the event of a critical or dangerous, unforeseen situation developing while sawing, e.g. a wire jumping off a guide pulley or a person entering the danger area unexpectedly. The drive unit then switches off.
- Closely observe sawing progress and pay attention to the guide pulleys. Switch off the machine and pivot the guide pulleys through 180° in good time - before the wire begins to cut into the hollow axle between the pulleys!
- Adequate cooling water and round, gentle cutting arcs are the decisive factors in achieving good cutting results in terms of cutting speed, safety and wire life.



- **The drive unit must be switched off and the EMERGENCY STOP button pressed before readjusting the water supply, swivelling the guide pulleys, winding wire onto the storage pulleys and before cleaning parts.**
- When switching the drive unit off temporarily (e.g. when adjusting the water supply etc.) do not alter the previously set parameters such as drive speed and advance pressure (compressed air set at 1.5 bar, for example). These operating controls can remain at the previous settings.

5.4 Ending the sawing operation

- Towards the end of the cut, the arc followed by the wire becomes increasingly flat, sawing efficiency drops and the tension on the wire increases. If necessary, the guide pulleys can then be mounted at the end of the pulley stand, further away from the object being cut.
- Prior to completing the cut and sawing right through, ensure that the part of the object being cut (or being cut free) is secured so that it cannot move or will move in the desired direction. If necessary, use steel wedges to secure the object temporarily.
- Reduce the speed of the wire considerably during the final cutting phase. In normal circumstances, the wire will be caught by the guide pulleys, without jumping off. Switch off the drive unit after the object has been sawn through.
- Set all operating controls on the control unit to the OFF or neutral positions and press the EMERGENCY STOP button. The main power switch may be left in the ON position and the electric supply cable should remain connected.
- Immediately after completing the cut, wash down the pulley stands and the guide pulleys mounted at the object cut and on the drive unit by spraying the parts with water, paying special attention to the guide pulleys and wire storage section.

6. Maintenance

6.1 Cleaning the wire saw

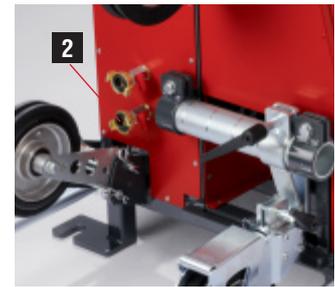
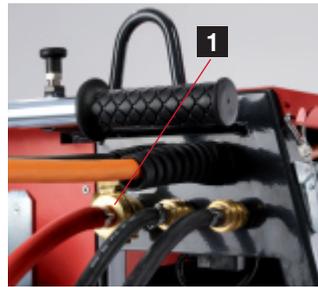
CAUTION

Disconnect the supply cord plug from the power outlet.

CAUTION

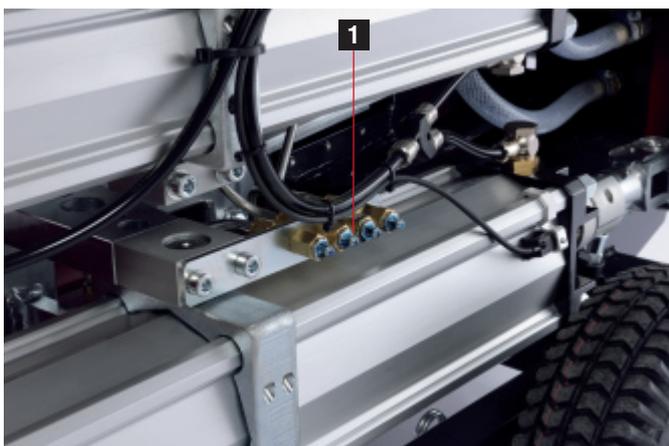
Keep the machine, especially its grip surfaces, clean and free from oil and grease. Do not use cleaning agents which contain silicone.

- We recommend that the most important parts of the wire saw are cleaned quickly between each cut made. Simply hose down the guide pulleys, the pulley stands and the front as well as the wire storage section of the drive unit.
- All operating controls should be switched to the OFF or neutral position prior to more thorough daily cleaning of the equipment. Switch off the main switch at the control unit and disconnect the power supply plug.
- Wash down the complete set of equipment at the end of each working day using a hose and brush, paying special attention to the parts mentioned above. The cleaning operation should be part of your daily work schedule and ensures that you will be able to work efficiently each day. If the equipment is left uncleaned even for only one night, the guide pulleys and moving parts will become stuck with hardened concrete slurry which will then have to be removed in a tedious, time-consuming process, with a risk of causing damage to the parts.
- Do not hose down the control unit, simply wipe it clean with a damp cloth. Use of a high-pressure steam cleaning system is not permissible!
- After cleaning the equipment, check the guide pulleys and moving parts for ease of movement. Inspect the parts to ensure they are in good condition and the controls are in good working order. Damaged or malfunctioning parts must be replaced immediately in order to avoid accidents or further costly damage.
- At temperatures below zero ($-^{\circ}\text{C}$), the cooling water must be blown out of the motors after work or cleaning is complete (open one of the two water taps at the front and direct compressed air into the drive **1** unit water supply connector **2**). Blow through until all water is forced out.



6.2 Care and maintenance

- Clean and oil all moving parts after use and, from time to time, use a grease gun to grease the bearings of the guides on the guide rods (grease nipples, **1**). This prevents water and dirt entering the bearings and thus avoids unnecessary wear.



- Check the condition of the air filter occasionally **2**. It is located in the top right-hand section of the control unit and should be cleaned or replaced as necessary.



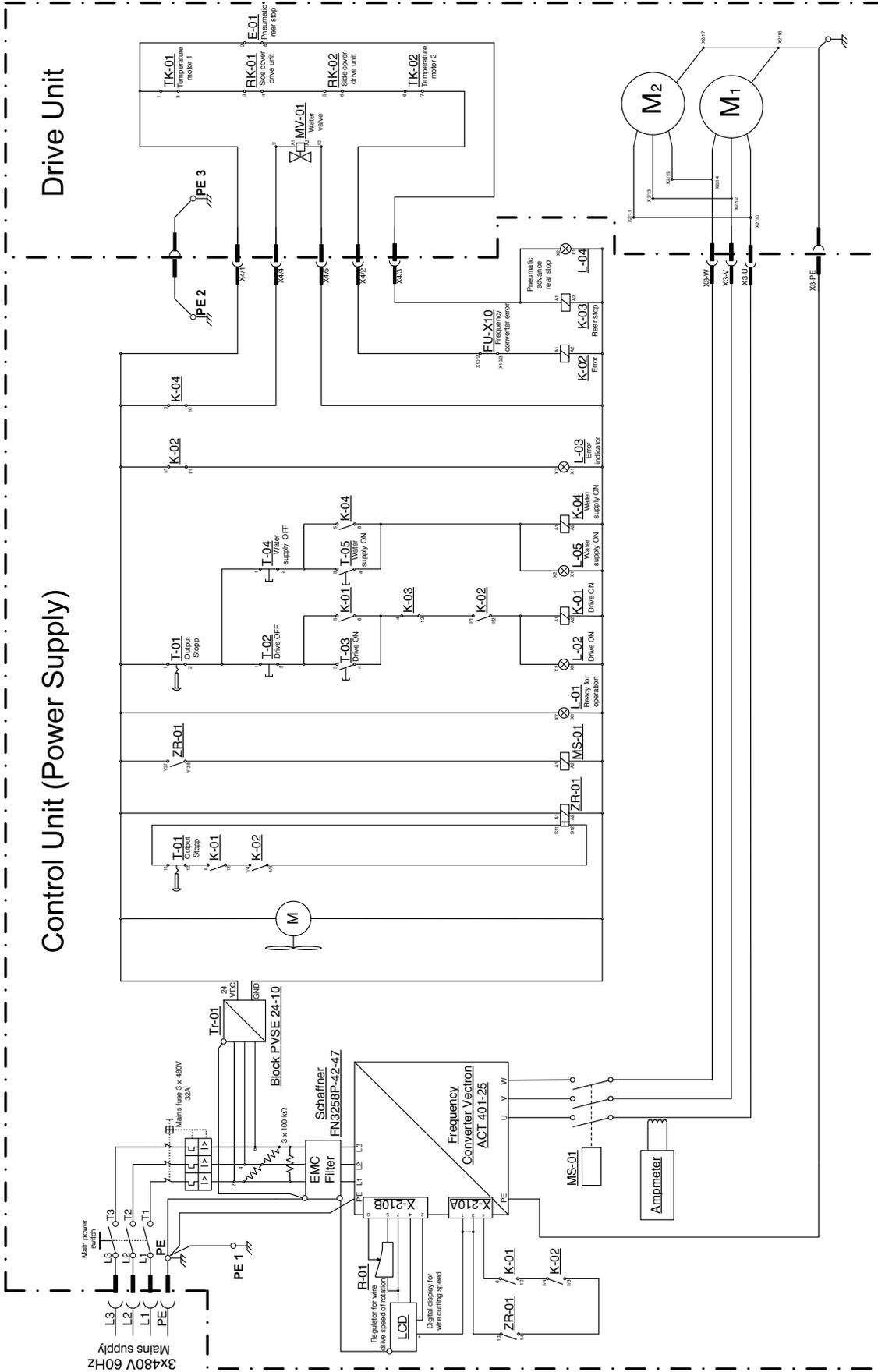
6.3 Wearing parts

- A list of the most important consumables and wearing parts is provided in Section 7 and in the tools / accessories brochure. Please contact your Hilti representative if you require parts.

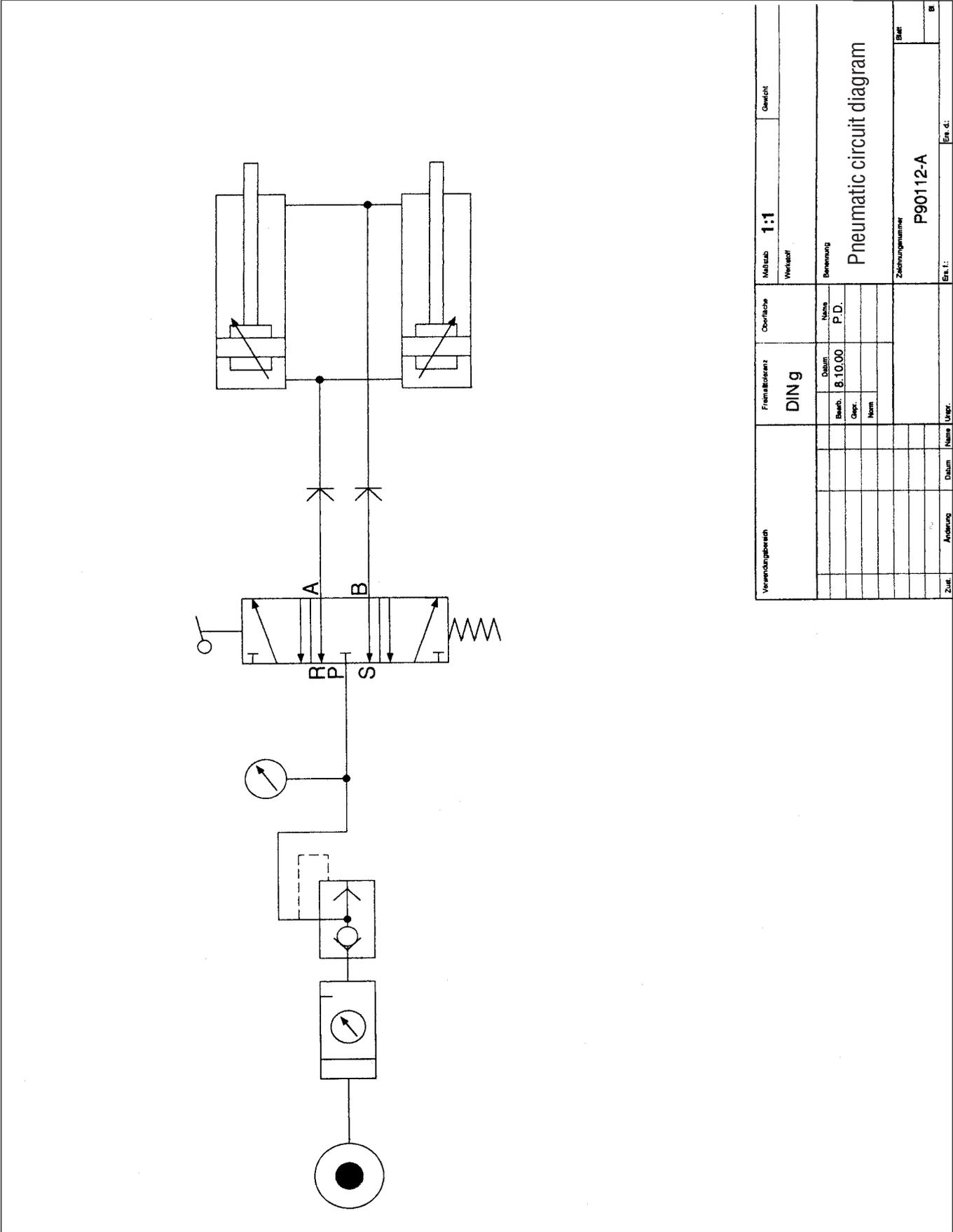
6.4 Service and repair

- Malfunctions are unlikely to occur as long as the equipment is kept clean and well lubricated. Dirty parts and incorrect operation lead to malfunctions.
- The mechanical design of the wire saw system has been kept very simple. With the aid of the consumables items and wearing parts supplied by Hilti, the operator is in a position to maintain and service the mechanical parts of the system himself by replacing items such as guide pulleys or connectors etc.
- Other parts (spare parts) are available as necessary from the service department and can usually be fitted on-site by the operator himself or by a Hilti diamond systems specialist or Hilti mechanic.
- It may happen, for various reasons, that one of the fuses in the control unit blows.
- All fuses are available commercially and a spare set of fuses is provided inside the control unit. The fuses in the control unit can be replaced by the operator. Please refer to the “Accessories” and “Fault Finding” sections.
- Repairs or adjustments to electrical components (e.g. to the current converter) may be carried out only by appropriately trained and qualified specialists. Instructions applicable to the current converter are provided inside the control unit.

6.5 Electrical circuit diagram – Wire saw system DS WS15



6.6 Pneumatic circuit diagram – drive unit



Verwendungsbezeichnung	Früherbezeichnung		DIN g		DIN g	Maßstab Verstärkt	Verhältnis 1:1	Gezeichnet
	Bezeichnung		Pneumatic circuit diagram					
	Zählungsnummer		P90112-A					
	Blatt		8					
Zust.	Änderung	Datum	Name	Unger.	Erst. d.			

7. Accessories

7.1 Hilti sawing wires and accessories

Safety precautions and instructions for use

- Use only sawing wires that comply with the requirements of ISO/IEC 13236.
- Connecting together lengths of wires of different diameters, from different manufacturers or of different types (e.g. electroplated or sintered beads) or use of badly worn or out-of-round wires is not permissible.
- Use of damaged wires (e.g. wires with kinks, loose or shifted beads, broken strands, etc.) is not permissible.
- Observe the wire and wire connector manufacturer's instructions when connecting sawing wires and, as far as possible, use only one wire connector in each complete wire loop.
- Use of flexible connectors greatly reduces alternating bending stresses and thus reduces the probability of wire breakage due to fatigue.
- Use only diamond wires with beads of a diameter within the $\frac{1}{3}$ – $\frac{1}{2}$ " range. Other diameters may cause the wire to jump off the pulleys or result in damage to the running surface of the pulleys.

Specification	Cutting characteristics	Concrete type	Reinforcement content
CM	Good balance between cutting speed and life	M: medium, hard aggregates	Normal
CH	Specially for flint, long life	H: hard, very hard aggregates	Normal
20% steel	Fast-cutting	Universal	Normal to very high
100% steel	–	–	Only steel
Dry	–	Universal	Normal to high

Sawing wire types

	Sintered			Electroplated		
Specification	CS	CM	CH	Concrete, dry cutting	20 % steel	100 % steel
No. of beads / m**	40	44	40	40*)	40	48*)
Bead dia. (mm)	10.5	10.5	10.5	10.2	10.2	10.8

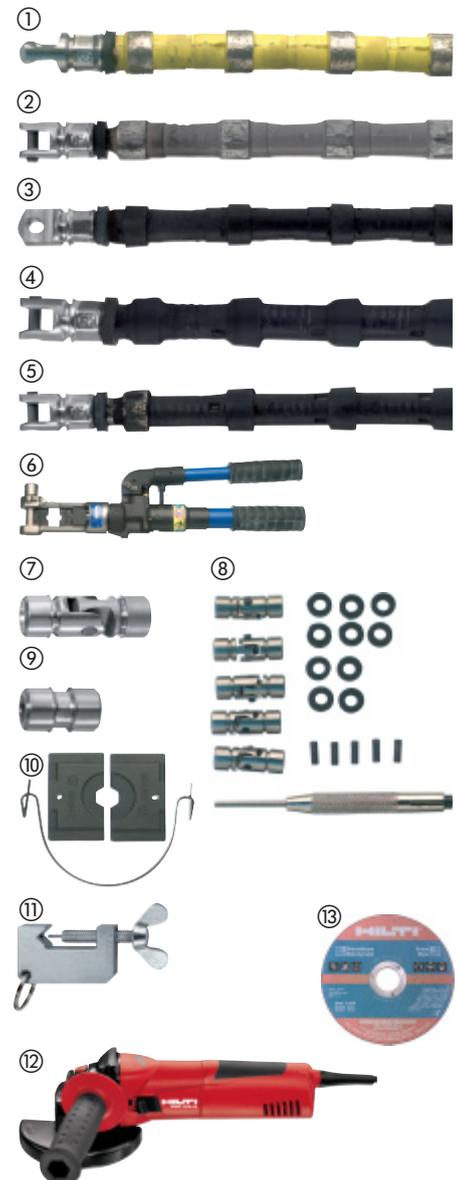
*) each bead is crimped additionally 1m = 3.28 ft.

DS-WS10.5 diamond wires

Wire length (m)	Designation DS-W 10.5 CM	Designation DS-W 10.5 CH	Designation DS-W 10.2 20% steel	Designation DS-W 10.8 100% steel	Designation DS-W 10.2 dry
per/m	① 376 635	② 376 634	③ 377 830	④ 377 781	⑤ 377 782
1m = 3.28 ft					

Accessories for connecting Hilti diamond wires

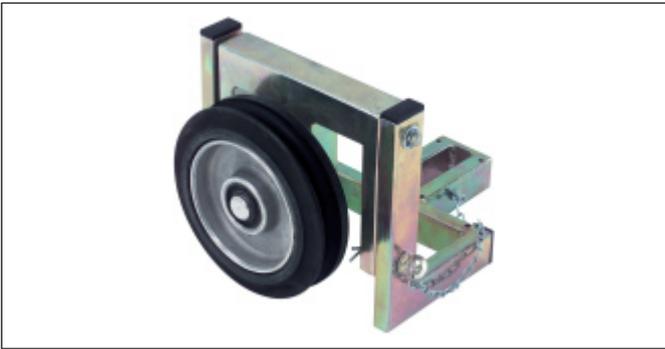
Designation	Package contents	Ordering designation	Item no.
Crimping pliers For crimping connectors / repair sleeves	1	DS-WSTHY	⑥ 235845
Flexible connectors Quick-release type	1	DS-WCMV	⑦ 340427
Set of flexible connectors Quick-release type with pin and O-ring	5	DS-WCSet	⑧ 371383
Pin Replacement pin for quick-release connectors	10	DS-WP	235842
Sleeve Repair sleeve	5	DS-WS	⑨ 235841
O-ring Fitted between connector and bead	10	O-Ring 10/4,7×2,5	235844
Crimping jaws Replacement jaws for crimping pliers	2	DS-WJ	⑩ 340426
Assembly tool connector For pin removal	1	DS-WMT	⑪ 295161
Angle grinder For cutting diamond wire	1	AG 125-S	⑫ 000000
Cutting disc For cutting diamond wire	1	AC-D 125 1mm	⑬ 304623



Accessories

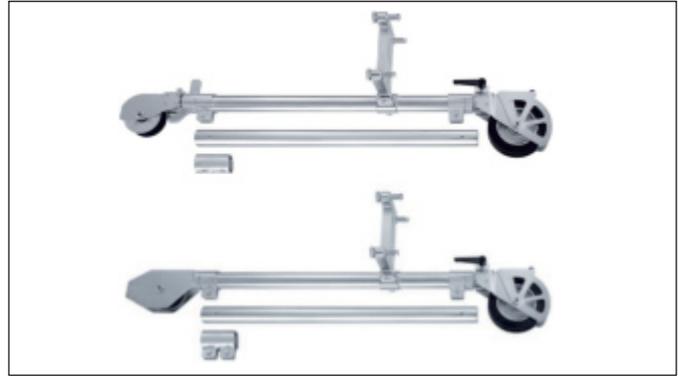
7.2 DS-WRSW Item no. 315834

The release pulley is used to reduce the length of wire in contact or to increase the radius of the arc followed by the wire (avoiding a tight radius) at the rear of the object to be cut.



7.3 DSW-PW Plunge wheel assembly Item no. 365428 / 247620

For plunge applications of all kinds. At least 2 pulleys are required. Can also be mounted on the single-pair pulley stand if necessary.



7.4 DS-WSVC vertical sawing device Item no. 339312

For simple, fast cuts directly below the wire drive unit. No further pulleys or wire guidance system is then used (no single-pair pulley stand). The optimum solution for applications where the drive normally stands in a horizontal position. For sawing ceiling sections, supporting beams etc.



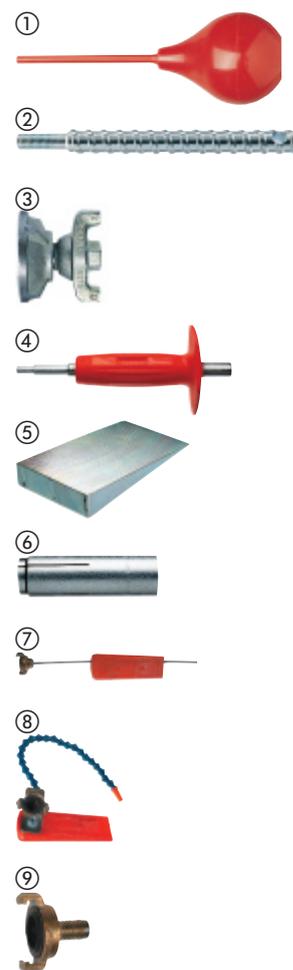
7.5 DSW-WG wire guard Item no. 365426

Wire guards must be fitted in situations where it cannot be ensured that persons do not enter the danger area while the equipment is in operation, i.e. the area in which flying fragments etc. present a risk of injury, or in situations where there is a risk of damage to property or other equipment within this area.



7.6 Accessories for setting up and operating wire saws and wire guides

Ordering designation	Quantity	Item no.	Use
DS-WS UL tool set		424627	Wire saws
comprising:			
Hilti plastic toolbox	1	206726	Storage
Accessories, list of contents and uses	1		Overview of contents
Open-end / ring wrench, 19 mm	1	221189	Fastening
Hammer 1½ kg	1	339303	Fastening
Screwdriver, 6 mm	1	339304	Fastening
BB blow-out pump	① 1	59725	Blowing out anchor holes
Spirit level	1	310306	Marking
Wooden pencil	2	335500	Marking
Cleaning cloth	1	334211	Cleaning
Hilti spray	1	308976	Lubrication
Hilti grease dispenser	1	203086	Lubrication
Flat brush	1	3206	Cleaning
Protective goggles	1	285775	Eye protection
Jack screw DD-CS ½"	② 3	282990	Fastening
DD-CN-SML clamping nut	③ 3	251834	Fastening
HSD-G setting tool	④ 1	243743	Fastening
Water connection nipple	⑨ 1	356700	Water supply
GK seal	5	356701	Water seal for 356700
Steel wedge	⑤ 4	41910	Securing concrete blocks



7.7 Accessories and wearing parts for Hilti wire saw systems

Ordering designation	Quantity	Item no.	Use
Flush anchor HDI ½"	⑥ 50		Fastening
Water supply, long	⑦ 1	339307	Water supply
Water supply, flexible	⑧ 1	339379	Water supply



Troubleshooting

Persons may enter the danger zone only when the drive unit is switched off and the drive pulley has stopped rotating. Press the EMERGENCY STOP button before entering the danger zone.

Disconnect the equipment from the electric supply (unplug the supply cord from the power outlet) before opening the control unit.

8. Troubleshooting

8.1 Problems or faults concerning the diamond wire

■ The DS WS15 cannot start movement of the wire

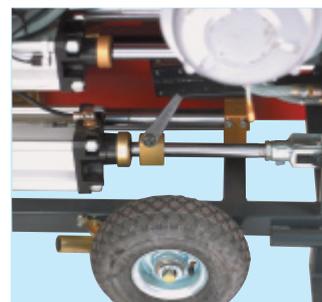
Possible cause	Solution / measures
Edges of the concrete are too sharp.	– Use a Hilti combihammer to round the edges and pull the diamond wire back and forward by hand before starting.
A new diamond wire sticks in the kerf cut by a worn wire.	– Complete the cut with the worn wire. – Mount additional return pulleys or release pulleys.
The length of contact between the diamond wire and the concrete is excessive.	– Drill a hole through which the new wire can be threaded.
Tension on the diamond wire is too high.	– Reduce wire tension by adjusting the air pressure regulation valve.

■ The diamond wire slips on the drive wheels

Possible cause	Solution / measures
Insufficient tension on the diamond wire	– Increase the tension by adjusting the air pressure regulation valve.
The rubber tyre on the drive wheel is worn excessively.	– Replace the drive wheel.

■ The wire jumps off the drive wheels when starting

Possible cause	Solution / measure
The starting lock was not used.	– Use the starting lock (position and lock the clamping piece against the air cylinder).



■ Irregular, one-sided wear of the diamond wire

Possible cause	Solution / measures
The diamond wire was not twisted before connecting the ends together.	– Twist the diamond wire approx. 0,2 turns per ft (counterclockwise)

■ Wire breakage directly after the connector

Possible cause	Solution / measures
Cutting radius of the diamond wire in the concrete is too tight.	– Mount additional return pulleys.
Wire connector is too long.	– Fit shorter wire connector. – Use the quick-release connectors recommended by Hilti instead of rigid connectors.

■ The diamond wire pulls out of the crimped connector

Possible cause	Solution / measures
Incorrectly adjusted crimping pliers	Check how the crimping pliers are set.
Insufficient pressure applied to the crimping pliers	– Minimum crimping pressure is 7 t (Hilti crimping pliers = 8 t)
Incorrect or worn crimping jaws	– Check the crimping jaws and replace if necessary.
The wire was not pushed far enough into the connector.	– The wire must always be pushed into the connector as far as it will go. The end of the wire must be cut cleanly and in accordance with instructions.

■ The diamond wire jumps about and vibrates very strongly

Possible cause	Solution / measures
Insufficient tension on the wire	– Increase the wire tension by adjusting the air pressure regulation.
Guide pulleys are too far apart (free length of wire is too long).	– Mount additional pulley stands. – Fit a shorter diamond wire. – Position the drive unit closer to the object being cut.

■ The diamond wire vibrates very strongly at a high frequency

Possible cause	Solution / measures
Tension on the wire is too high.	– Reduce the tension on the wire by adjusting the air pressure regulation.
The saw is running at the wrong speed.	– Set the correct speed.

Troubleshooting

■ The diamond wire wears too quickly

Possible cause	Solution / measures
Drive speed is too low and wire cutting speed is thus also too low.	– Increase drive speed or, respectively, cutting speed.
Inadequate cooling of the diamond wire	– Set up more water nozzles at the cutting face.
Wire cutting length too short (length of contact between the wire and the concrete)	– Increase the cutting length (length of contact).
Wire tension too high relative to length of cut.	– Reduce the tension on the wire by adjusting the air pressure regulation valve.
Very abrasive material being cut.	– Select a different diamond wire specification.
The direction in which the wire runs is changed continually.	– Always fit the diamond wire so that it runs in the same, specified direction.

■ The diamond wire collapses

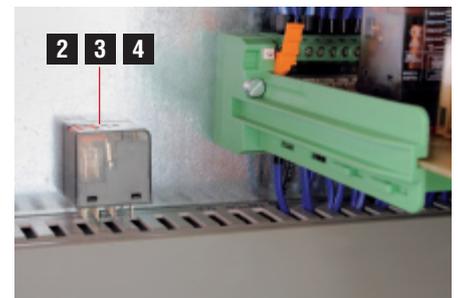
(The diamond beads, connecting pieces and separating springs are bunched together on the wire.)

Possible cause	Solution / measures
Diamond wire not cooled adequately or not cooled at all	– Always ensure that sufficient water reaches the cutting face.
The diamond wire becomes stuck in the kerf and stalls during sawing.	– Steel wedges must be used to prevent movement of the concrete sections. – Loose fragments or aggregates must be removed from the kerf.

8.2 Remediating DS WS15 wire saw system malfunctions

- **The saw doesn't start.**
The main switch is in the ON position but the green "ready for operation" lamp doesn't light.

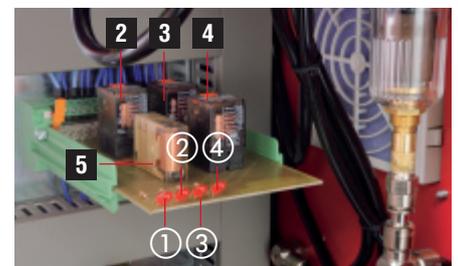
Possible cause	Solution / measures
No power supplied by the cable.	– Check the mains fuse at the switchbox (32 A)
Voltage of one phase is too low or missing completely.	– Check the 3 phases individually. – Check the extension cable and plugs / sockets for faults or loose contacts. – Call in the jobsite electrician.
Fuse blown at the switchbox.	■ Replace blown fuses or reset the circuit breaker. – Mains fuse 1 – 1 relay unit for 2, 3, 4



■ Fault with one of the following symptoms

Possible cause	Solution / measures
① Red lamp on left doesn't light, converter/drive motors not running.	– Swap or replace relay 2 .
② Red lamp at middle left doesn't light, problem with thermal circuit breaker, wire guard.	– Call in an electrical specialist, relay 5
③ Red lamp at middle right doesn't light, pneumatic advance at end stop	– Swap or replace relay 3 .
④ Red lamp on the right lights, water valve	– Swap or replace relay 4 .

The same type of relay **2, 3, 4** is used for ①, ③ and ④, i. e. they can be swapped with each other.



Troubleshooting

- **The DS WS15 doesn't start.**
The green "ready for operation" lamp lights together with the red "error" lamp.

Possible cause	Solution / measures
Power cable or control cable from the drive is not connected to the control unit.	– Connect the cables.
The side cover is not fitted on the machine 5	– Fit the side cover.
The motors are too hot.	– Use more cooling water or colder water.
The current converter is overloaded.	– Do not work at above 30 A. – Check the filter in the base of the control unit (a flow of air must be felt at the top opening on the control unit).

Resetting the converter:
Switch off at the main switch and wait approx. 1 minute before switching on again.



- **The DS WS15 doesn't start.**
The green "ready for operation" lamp lights.

Possible cause	Solution / measures
The EMERGENCY OFF button is pressed in.	– Release the EMERGENCY OFF button.

- **The DS WS15 cuts out while running and cannot be restarted.**
The green "ready for operation" lamp lights together with the yellow "pneumatic advance" lamp.

Possible cause	Solution / measures
The air cylinders and carriage are in the end position.	– Reduce the wire length (wind onto the storage pulleys) or move the machine back.

■ High current input (more than 40 A) or the converter is overloaded.

Possible cause

Solution / measures

Wire tension is too high.

- Reduce the tension by adjusting the air pressure regulating valve **7**.



One phase is missing.

- Check the mains supply.

9. Manufacturer's warranty – tools

Hilti warrants that the tool supplied is free of defects in material and workmanship. This warranty is valid so long as the tool is operated and handled correctly, cleaned and serviced properly and in accordance with the Hilti Operating Instructions, and the technical system is maintained. This means that only original Hilti consumables, components and spare parts may be used in the tool.

This warranty provides the free-of-charge repair or replacement of defective parts only over the entire lifespan of the tool. Parts requiring repair or replacement as a result of normal wear and tear are not covered by this warranty.

Additional claims are excluded, unless stringent national rules prohibit such exclusion. In particular, Hilti is not obligated for direct, indirect, incidental or consequential damages, losses or expenses in connection with, or by reason of, the use of, or inability to use the tool for any purpose. Implied warranties of merchantability or fitness for a particular purpose are specifically excluded.

For repair or replacement, send tool or related parts immediately upon discovery of the defect to the address of the local Hilti marketing organization provided.

This constitutes Hilti's entire obligation with regard to warranty and supersedes all prior or contemporaneous comments and oral or written agreements concerning warranties.

10. Disposal



Return waste material for recycling

Most of the materials from which Hilti appliances are manufactured can be recycled.

The materials must be correctly separated before they can be recycled.

Hilti has already made arrangements in many countries for taking back your old appliance for recycling.

Please ask your Hilti customer service department or a Hilti sales representative for further information.



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