

ATTACHMENT TECHNOLOGY

Undercut technology

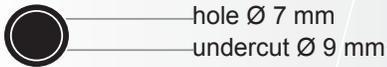
The KEIL undercut hole

A cylindrical hole is drilled and then conically undercut in one step with only one tool.

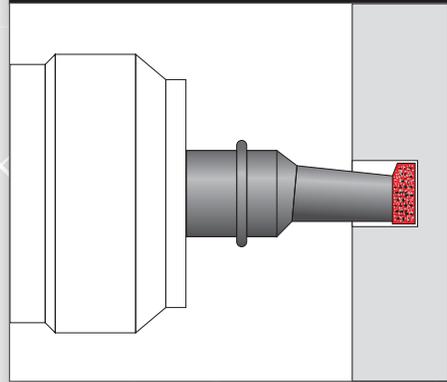
Different levels of automation are possible depending on machine type and material.

The drilling time in ceramics is less than 10 seconds.

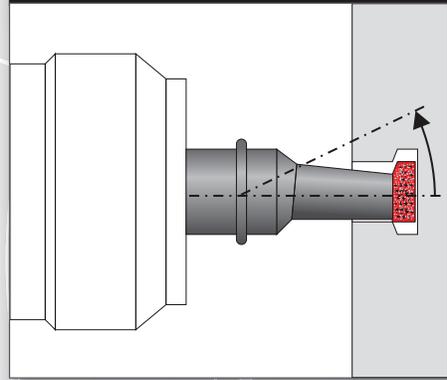
Panels of any size or weight are given an undercut of precise and uniformly symmetrical shape.



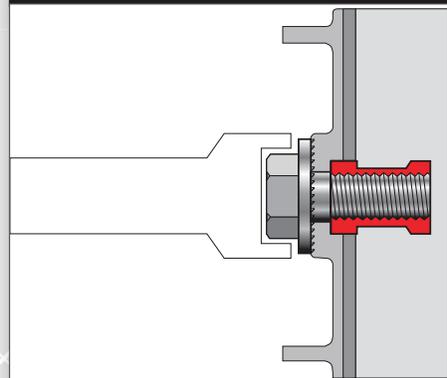
Drilling



Undercutting



Mounting



To prepare for installation, an undercut anchor is inserted into the hole and tightened to a positive fit using a screw.

Quick, simple and safe with normal tools, e.g. a cordless screwdriver.

Safety Information

Safety and product liability require that the KEIL undercut attachment system is always used as a unit. Correct functioning is ensured only if matching KEIL products (anchor with screw or threaded pin, drill head and facade drill bits) are used together. Their use as a system has also been stipulated in the approvals granted and applied for. The components of the KEIL undercut attachment system are protected by patent.

The KEIL undercut anchor

The KEIL undercut anchor, for invisible attachment of thin panels, is manufactured from stainless steel.

Its geometry, matched to the KEIL undercut hole, applies maximum loads to the panels in an optimum manner.

This geometry ensures stress-free attachment in all commonly used panel materials from 6 mm thickness.

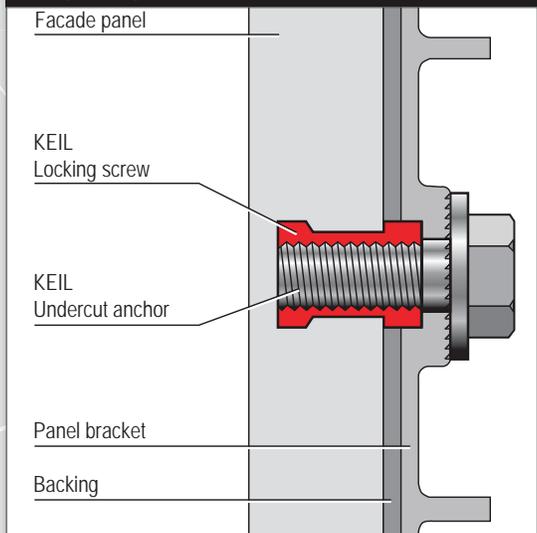
Depending on panel thickness or carrying capacity required, different insertion depths (h_s) are available. The KEIL undercut anchor is designed in such a way that it withstands a greater load than just the weight of the panel.

The KEIL undercut anchor offers major benefits due to the high installation integrity. The anchor is placed quickly, easily and safely at a controlled depth for all panel thicknesses in an optimum installation by using matching KEIL system components: anchor, panel bracket and KEIL locking screw with integral locking mechanism.

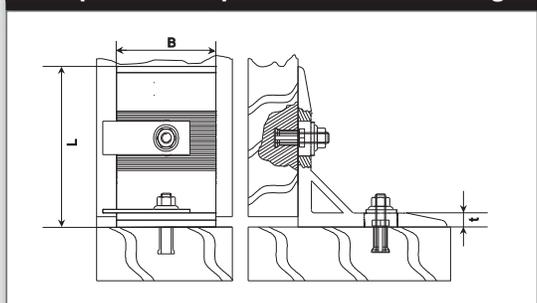
Only two parts (anchor sleeve and screw) are required for safe attachment. Additional screw-in parts for the KEIL undercut anchor provide individually tailored connection options, such as

- ▶ Connection to a support structure
- ▶ Connection to a cassette structure
- ▶ Attachment of soffit panels with internal angles
- ▶ Direct attachment to a wall using fork anchors or plug-in anchors
- ▶ Attachment of wash hand basins, countertops, furniture, grave surrounds or natural stone radiators

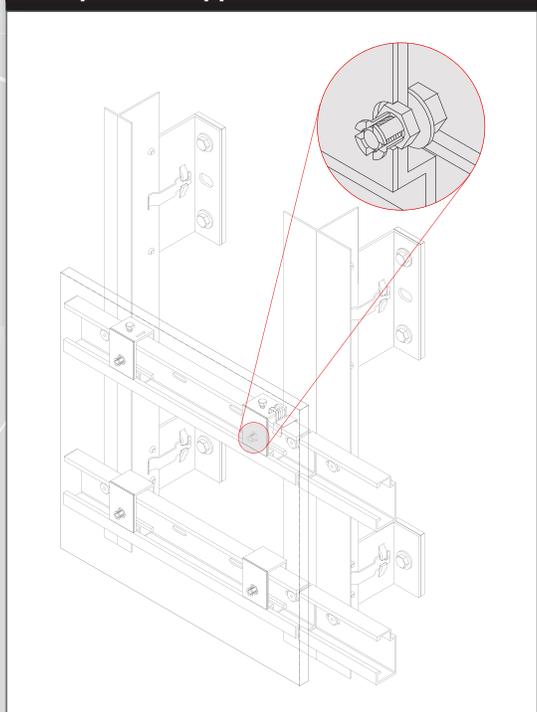
The principle



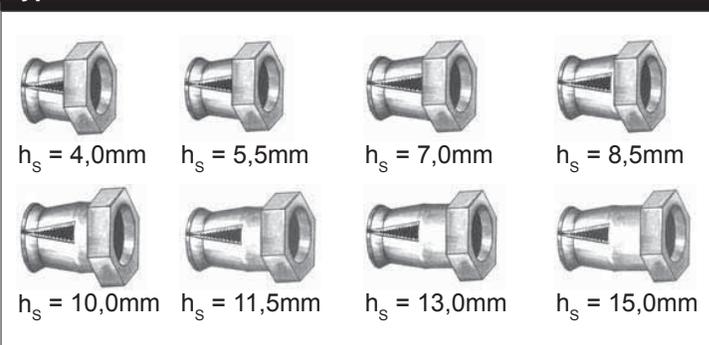
Example of soffit panels with internal angle



Example of a support structure



Types



KEIL undercut technology

The KEIL undercut drilling systems

KEIL system toolset consisting of:

- 1 Facade drill bit
- 2 Drill head



Undercutting drilling machines can be supplied as:

- 3 Portable drilling machines
- 4 Drilling tables with roller conveyor
- 5 Automatic drilling machines



The KEIL service

Advice for your particular attachment problems from our service team.

Approvals for various materials and sizes with and without support structure are available. The KEIL undercut attachment system is **protected by patents**.

Demonstration and training at the customer or in our works.

We can demonstrate the undercut system including drilling technology to you. Portable drills or machines with roller tables can be demonstrated in your company. We should be pleased to demonstrate the automatic drilling machines during your visit to our company or at selected distributors.

Machine **rental service** without capital investment:

KEIL and various national and international distributors also rent the drilling machines for undercut holes with KEIL facade drill bits. Use the possibilities of extending your existing machine range temporarily or to have the optimum machine available for special jobs without having to tie down capital.

Drilling and undercutting **service**:

The drilling capacities are adapted to requirements and sufficient capacities are also available for large projects. We have extensive experience in this area.

KEIL undercut technology

The KEIL safety

Approvals of the KEIL KH undercut anchor (as at 1/2013)

Approval	Insertion depth									
	$h_s=4$	$h_s=5,5$	$h_s=7$	$h_s=8$	$h_s=8,5$	$h_s=10$	$h_s=11,5$	$h_s=13$	$h_s=15$	Spacer
ETA-03/0055 Porcelain stoneware to EN		●	●		●					
ETA 09-0348 Porcelain stoneware Royal Mosa		●	●		●					
ETA 12-0175 Porcelain stoneware Petraluxe		●	●		●					
ETA-06/0220 Rieder glass fibre concrete					●					
ETA-06/0253 Natural stone			●			●			●	●
ETA-06/0247 Mineralit polymer concrete					●					
ETA-11-0409 Eternit fibre cement				●						
Z-21.9-1534 Eternit fibre cement				●						
Z-21.9-1822 Dansk Eternit fibre cement					●					
Z-21.9-1544 HPL Trespa			●			●				

Approvals can be provided on request.

KEIL undercut anchors are monitored by third parties.
If required, a certificate of conformity may be requested.



The KEIL arguments

Technology

- ▶ Highest safety due to many patents and approvals, for example the European Technical Approval (ETA) for the attachment of facade panels (see above).
- ▶ A complete system – technically mature and proven innumerable times.
- ▶ Facade panels as thin as 6 mm – economic and saving resources.
- ▶ Installation independent of temperature and climate with a high degree of pre-assembly in the factory or on site.
- ▶ Position of undercut anchor on the back of the panel can be selected without constraints.
- ▶ Tolerances in panel thickness are simply compensated for by means of spacers.
- ▶ Earthquake tested up to magnitude 9.4 on the open-ended Richter scale.
- ▶ Very high load capacity due to optimum load application, but without stressing the facade panel by lateral bracing = positive fit.
- ▶ Breakage loads are up to seven times higher than for edge attachment (e.g. bolt anchors).
- ▶ Subsequent replacement of individual or all facade panels.
- ▶ Non-flammable, mechanical and permanently safe attachment



Photo: KEIL



KEIL undercut technology

Design & aesthetics

- ▶ There are no limits to creativity. Whether elegant, traditional, modern, delicate or unconventional – even the boldest facade designs can be implemented.
- ▶ A clean facade undisturbed by visible attachment points.
- ▶ More than 50 different panel materials are available: e.g. ceramics/fine stoneware, natural stone, plastics/HPL, fibre cement, glass fibre reinforced concrete, ceramic glass, artificial stone, glass.
- ▶ The combination and interaction of different materials, shapes and colours is possible and helps to achieve the effects planned.
- ▶ Closed or open joints without visible anchors are characteristic for high-quality facades.
- ▶ No dirt or rust streaks as the attachment components are situated at the rear.
- ▶ Long life and low maintenance costs.
- ▶ Larger panels than for attachment at the edge for the same safety level.
- ▶ Increase in the value of the building with regard to acceptance and marketing.

Photo: Shackerley



Photo: Trespa

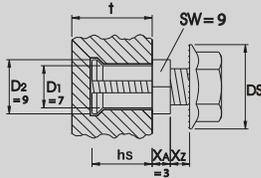


Photo: KEIL

Photo: fibreC by Rieder

Undercut anchor KH AA

555



Execution



▶ Anchor sleeve inc. hexagon bolt with locking ratchet in stainless steel A4

For use in

▶ For rear fixed facade panels

- ▶ Natural stone
- ▶ Artificial stone
- ▶ Manufactured stone
- ▶ Ceramics
- ▶ HPL
- ▶ Plastics
- ▶ Fibre cement
- ▶ Glass-fibre reinforced concrete
- ▶ Ceramic glass

Accessories

- ▶ Depth control guide for anchor hole 56
- ▶ Torque wrench 2-6 Nm 58
- ▶ Wrench socket DIN 3126 E6.3 59
- ▶ Special open jaw spanner AF9 58

Packaging



500 pieces

Surcharges

- ▶ If quantities lower than the packing unit are ordered, the following surcharges apply:
- ▶ 499 - 100 pieces + 10%
- ▶ 99 - 50 pieces + 25%
- ▶ 49 - 1 pieces + 40%

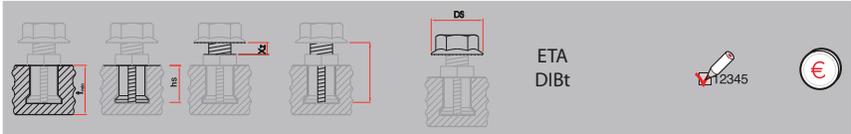
Comments

- ▶ * See appropriate approval table 13
- ▶ KEIL undercut anchors are monitored by approved bodies
- ▶ Other dimensions on request

Usage

- ▶ Application only as per approval and KEIL installation instructions 22

Undercut anchor KH AA



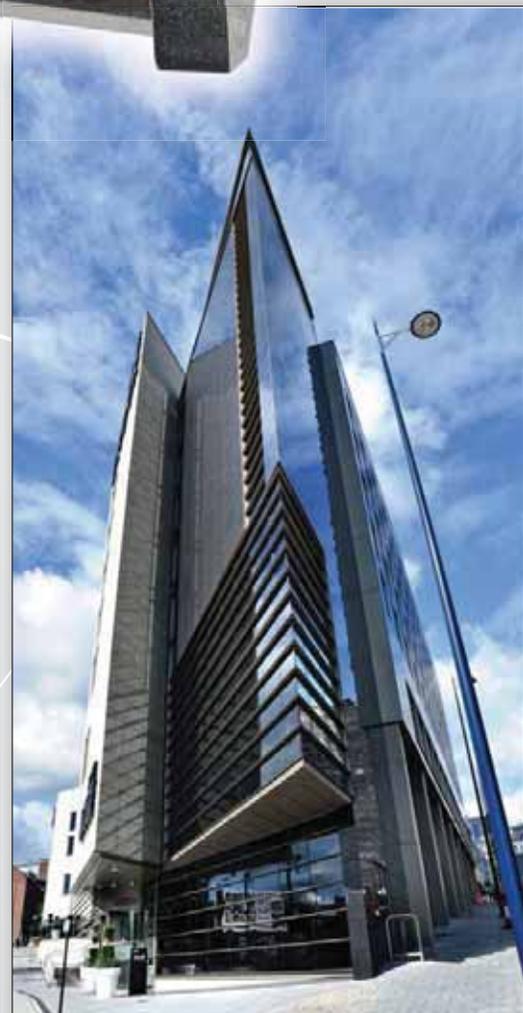
6,0	4,0	1,5	M6x8.5	14		555 020 820
6,0	4,0	3,0	M6x10	14		555 020 742
8,0	5,5	0,0	M6x8.5	14	*	555 020 856
8,0	5,5	1,5	M6x10	14	*	555 020 724
8,0	5,5	3,0	M6x11.5	14	*	555 020 712
8,0	5,5	9,0	M6x17.5	14	*	555 020 846
9,5	7,0	0,0	M6x10	14	*	555 020 804
9,5	7,0	1,5	M6x11.5	14	*	555 020 780
9,5	7,0	3,0	M6x13	14	*	555 020 830
11,0	8,5	0,0	M6x11.5	14	*	555 020 823
11,0	8,5	1,5	M6x13	14	*	555 020 752
11,0	8,5	3,0	M6x14.5	14	*	555 020 777
13,0	10,0	0,0	M6x13	14	*	555 020 809
13,0	10,0	1,5	M6x14.5	14	*	555 020 734
13,0	10,0	3,0	M6x16	14	*	555 020 715
13,0	10,0	0,0	M6x19	14	*	555 020 848
14,5	11,5	0,0	M6x14.5	14		555 020 700
16,0	13,0	1,5	M6x17.5	14		555 020 802
18,0	15,0	0,0	M6x17.5	14	*	555 020 815
18,0	15,0	1,5	M6x19	14	*	555 020 756
18,0	15,0	3,0	M6x20.5	11	*	555 020 759
18,0	15,0	6,0	M6x23.5	14	*	555 020 826



Photo: KEIL

Undercut anchor KH AA

- ▶ The undercut anchor consists of an anchor sleeve and its hex screw.
- ▶ Hole, anchor sleeve and screw length have to be matched to the hole depth required and to the panel bracket chosen. Only the use of matching components results in quick, simple and safe installation.
- ▶ The anchor sleeve, which is compressed in the lower end, is placed in the hole with the specified panel bracket.
- ▶ The screw is screwed in while exerting slight pressure on the panel bracket (to fix the anchor). The locking mechanism of the screw cuts into the panel bracket to secure it.
- ▶ The panel bracket forms a rigid unit with the KEIL facade anchor for this type of installation.
- ▶ The anchor sleeve is expanded to its original dimension by inserting the screw to a controlled depth, so that the sleeve sits snugly against the undercut section of the hole in the facade panel. After installation, the anchor sits stress-free in the undercut hole (i.e. the bracket can still be rotated with a certain amount of effort).



Photos: Shackerley

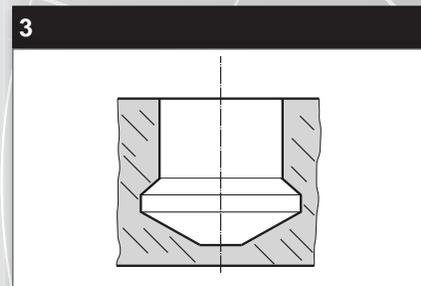
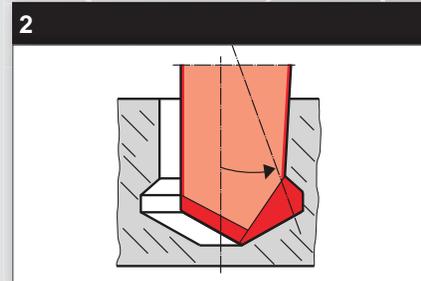
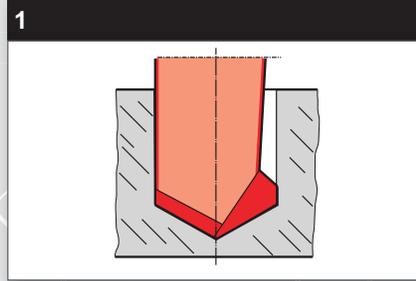
Drilling and Undercutting

The undercut holes on the back of the facade panels must be made using KEIL System tools under workshop conditions.

The KEIL System tools comprise the KEIL facade drill bit, the KEIL drill head and the undercutting and drilling machine (e.g. KEIL portable drill, KEIL bench drill or automatic drilling machine with KEIL drill head).

The undercut hole is produced in one step (cylindrical drilling [1] and undercutting [2]).

Correct installation of the undercut anchor is possible only if a precisely undercut hole exists [3]. The hole geometry is regularly monitored with the KEIL gauge matching the insertion depth of the anchor. The hole depth is set by means of this gauge, and all major hole dimensions can be checked efficiently with it.



Assembly

The undercut anchor consists of an anchor sleeve and its hex screw.

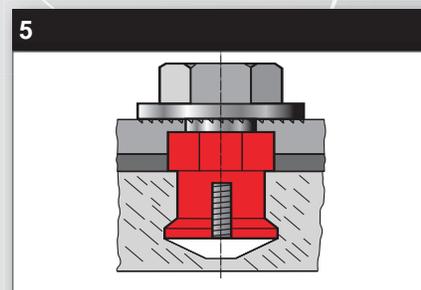
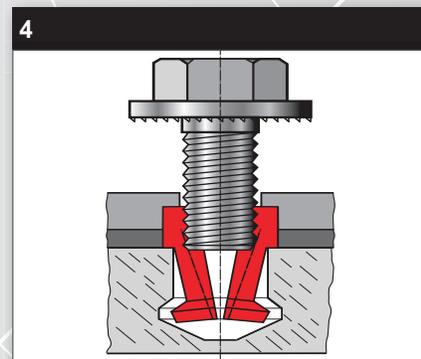
Hole, anchor sleeve and screw length have to be matched to the hole depth required and to the panel bracket chosen. Only the use of matching components results in quick, simple and safe installation.

The anchor sleeve, which is compressed in the lower end, is placed in the hole with the specified panel bracket [4].

The screw is screwed in while exerting slight pressure on the panel bracket (to fix the anchor) [5]. The locking ratchets of the screw cuts into the panel bracket to secure it.

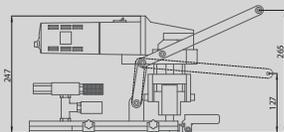
The panel bracket forms a rigid unit with the KEIL facade anchor for this type of installation.

The anchor sleeve is expanded to its original dimension by inserting the screw to a controlled depth, so that the sleeve sits snugly against the undercut section of the hole in the facade panel. After installation, the anchor sits stress-free in the undercut hole (i.e. the bracket can still be rotated with a certain amount of effort).



Portable drilling machine KSDV

532



Execution



- ▶ Portable undercutting drilling machine with vacuum foot
- ▶ Industry Standard
- ▶ Flushing chuck
- ▶ Drilling chuck
- ▶ Vacuum foot
- ▶ Venturi nozzle
- ▶ PRCD (partial)
- ▶ Self activated water control
- ▶ Stop rail

For use in

- ▶ For drilling and undercutting

Application

- ▶ With KEIL diamond facade drill bit

Accessories

- ▶ Diamond tipped facade drill bit ■32
- ▶ Diamond tipped facade drill bit with countersink ■33
- ▶ Diamond tipped facade drill bit for through holes ■34
- ▶ Roller conveyor drilling table KRT ■47
- ▶ Cooling water supply ■62
- ▶ Filter cartridge ■62
- ▶ Water pressure tank ■63
- ▶ Cooling lubricant ■63
- ▶ Chuck for portable drilling machines ■64
- ▶ Flushing chuck for KSD/HV ■64
- ▶ Fastener set 1 ■65
- ▶ Whetstone ■66
- ▶ Wooden case for transportation of KSDV, KSHV and KRDV ■65
- ▶ Seal for vacuum foot ■66
- ▶ Ball bearing ■66
- ▶ Carbon brush set ■66
- ▶ Cable integrated circuit breaker ■67
- ▶ Water locking ■67
- ▶ Silencer ■67
- ▶ Corrosion inhibitor ■68

Usage

- ▶ Speed approx. 10,000 rpm

Portable drilling machine KSDV



Volt	Hertz	€	€	PRCD	□	✍️ 12345	€
230 V	50 Hz				D		532 500 000
110 V	50 Hz				EU		532 500 001
120 V	60 Hz				USA		532 500 005

Product information 532

Portable drilling machine KSDV

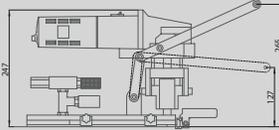
- ▶ The portable drills are used for industrial and mobile drilling and undercutting of small batches, infill and special size panels.
- ▶ This handy machine is placed on the facade panel at any point and is rigidly connected to the panel via the vacuum foot.
- ▶ Precise positioning can be carried out via stop rails.
- ▶ The portable drill has been developed for water-cooled drilling with the KEIL diamond facade drill bit.
- ▶ The simple handling is supported by the low weight of the portable machine and makes its use on site possible.
- ▶ Panels of any size or weight are drilled efficiently and undercut precisely with it.



Photo: KEIL

Portable drilling machine KRDV

532



Execution



- ▶ Portable undercutting drilling machine with vacuum foot
- ▶ Professional design
- ▶ Flushing chuck
- ▶ Drilling chuck
- ▶ Vacuum foot
- ▶ Venturi nozzle
- ▶ PRCD
- ▶ Self activated water control
- ▶ Stop rail

For use in

- ▶ For drilling and undercutting

Application

- ▶ With KEIL diamond facade drill bit

Accessories

- ▶ Diamond tipped facade drill bit ■32
- ▶ Diamond tipped facade drill bit with countersink ■33
- ▶ Diamond tipped facade drill bit for through holes ■34
- ▶ Roller conveyor drilling table KRT ■47
- ▶ Cooling water supply ■62
- ▶ Filter cartridge ■62
- ▶ Water pressure tank ■63
- ▶ Cooling lubricant ■63
- ▶ Fastener set 1 ■65
- ▶ Whetstone ■66
- ▶ Wooden case for transportation of KSDV, KSHV and KRDV ■65
- ▶ Seal for vacuum foot ■66
- ▶ Ball bearing ■66
- ▶ Carbon brush set ■66
- ▶ Solenoid valve for portable machine ■67
- ▶ Cable integrated circuit breaker ■67
- ▶ Silencer ■67
- ▶ Corrosion inhibitor ■68

Usage

- ▶ Speed adjustable up to approx. 6,500 rpm

Portable drilling machine KRDV



Volt	Hertz	€	€	PRCD			€
230 V	50 Hz				D	532 600 000	
120 V	60 Hz				USA	532 600 025	

Product information 532

Portable drilling machine KRDV

- ▶ The portable drilling machines are used for professional mobile drilling and undercutting of small batches, infill and special size panels.
- ▶ This handy machine is placed on the facade panel at any point and is rigidly connected to the panel via the vacuum foot.
- ▶ Precise positioning can also be carried out via stop rails.
- ▶ The KRDV portable drilling machine has been developed for water-cooled drilling of holes with the KEIL diamond facade drill bit.
- ▶ The simple handling is supported by the low weight of the portable machine and makes its use on site possible.
- ▶ Panels of any size or weight are drilled efficiently and undercut precisely with it.



Photo: KEIL

Portable drilling machine KSHV

Blow out nozzle for KSHV

TECHNOLOGY

ANCHOR

FASTENERS

DRILLING TOOLS

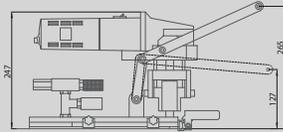
DRILLING TECHNOLOGY

ACCESSORIES

WALL ANCHOR

INFO

532



Execution



- ▶ Portable undercutting drilling machine with vacuum foot
- ▶ Industry Standard
- ▶ Drill chuck for dry drilling
- ▶ Vacuum foot
- ▶ Venturi nozzle
- ▶ Stop rail

For use in

- ▶ For drilling and undercutting

Application

- ▶ With KEIL carbide tipped facade drill bit

Accessories

- ▶ Carbide tipped facade drill bit ■39
- ▶ Roller conveyor drilling table KRT ■47
- ▶ Chuck for portable drilling machines ■64
- ▶ Fastener set 1 ■65
- ▶ Wooden case for transportation of KSDV, KSHV and KRDV ■65
- ▶ Seal for vacuum foot ■66
- ▶ Ball bearing ■66
- ▶ Silencer ■67
- ▶ Corrosion inhibitor ■68

Usage

- ▶ Speed approx. 1,400 - 4,200 rpm

Portable drilling machine KSHV



Volt	Hertz	€	€	⚡	🔧 12345	€
230 V	50 Hz			D	532 550 000	
110 V	50 Hz			EU	532 550 002	

Product information 532

Portable drilling machine KSHV

- ▶ The portable drilling machines are used for industrial and mobile drilling and undercutting of small batches, infill and special size panels.
- ▶ This handy machine is placed on the facade panel at any point and is rigidly connected to the panel via the vacuum foot.
- ▶ Precise positioning can also be carried out via stop rails.
- ▶ The KSHV portable drilling machine has been developed for drilling dry holes with the KEIL carbide facade drill bit.
- ▶ The simple handling is supported by the low weight of the portable machine and makes its use on site possible.
- ▶ Panels of any size or weight are drilled efficiently and undercut precisely with it.

532

Execution

- ▶ Flexible adjustable nozzle head
- ▶ Regulator for blow out pressure

For use in

- ▶ Nozzle for cleaning and cooling while drilling

Blow out nozzle for KSHV



📄	📦	🔧 12345	€
KSHV	1	532 500 106	



532

Roller conveyor drilling table KRT

Execution



- ▶ Multidirectional roller conveyor 1500mm x 600mm inc. portable drilling machine
- ▶ Of stainless steel
- ▶ With pneumatic tile fixing device (manual control)
- ▶ 2 stop rails
- ▶ 4 swinging stops
- ▶ Air service unit
- ▶ Max. Edge distance to hole from axis Y = 150 mm
- ▶ Crate

For use in

- ▶ For drilling and undercutting

Application

- ▶ With KEIL diamond facade drill bit

Accessories

- ▶ Diamond tipped facade drill bit 32
- ▶ Diamond tipped facade drill bit with countersink 33
- ▶ Diamond tipped facade drill bit for through holes 34
- ▶ Set for KRT for front face controlled drilling 48
- ▶ Portable drilling machine KRDV 45
- ▶ Portable drilling machine KSHV 46
- ▶ Cooling water supply 62
- ▶ Filter cartridge 62
- ▶ Water pressure tank 63
- ▶ Cooling lubricant 63
- ▶ Fastener set 1 65
- ▶ Whetstone 66
- ▶ Corrosion inhibitor 68
- ▶ Collecting tray for KRT 48

Usage

- ▶ Speed approx. 10,000 rpm



Volt

Hertz



PRCD



230 V

50 Hz

D

532 500 201

Product information 532

Drilling table with roller conveyor KRT

- ▶ Drilling machine for the efficient manufacture of KEIL undercut holes for use in workshop and on site (total weight approx. 90 kg). The multidirectional roller conveyor (1,500 mm x 600 mm) with pneumatic panel clamping unit and attached KSDV or KSHV portable drill provides excellent handling, simple operation and fast changeover to different hole spacings.
- ▶ After setting the insertion depth h_s , panels of different thickness can be drilled without further adjustment.
- ▶ The depth of the undercut hole may be constant either to the front or rear of the panel. For undercut holes which are constant to the front of the panel, the conversion kit for front face controlled drilling has to be fitted.
- ▶ The undercutting drilling machine can be removed and used with the vacuum foot (without roller conveyor).