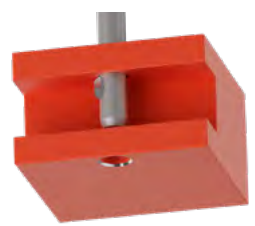


DL2

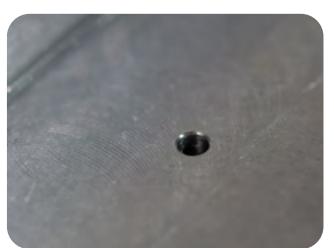
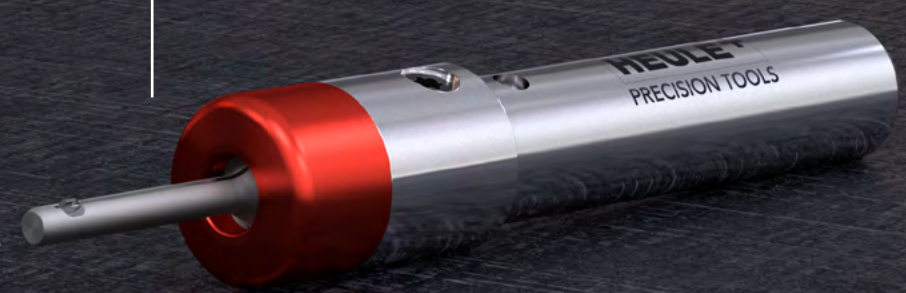
Impressive process reliability and deburring quality in mini bores from a diameter of 1.0 mm.

The advantages – Your benefit

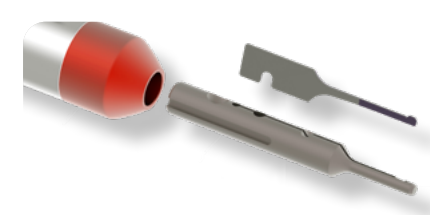


Highly economical when processing flat and slightly uneven bore edges forwards and backwards in a single operation.

Safe handling. DL2 boasts a simple design, quick blade change and robustness.



The defined cutting process with a coated carbide blade ensures a fully broken edge – meaning the edge is burr-free.



Safe processing. The blade housing gives the blade maximum stability and guidance. The coolant supply through the tool flows directly to the cutting edge of the carbide blade.

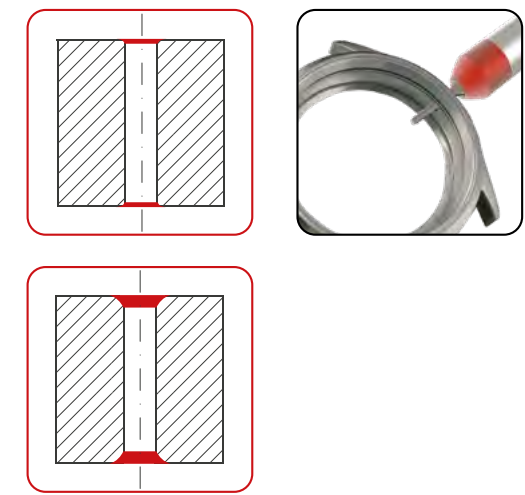


THE RANGE

Bore Ø range mm	Max. deburring size mm	Max. working length mm
Ø1.00–1.05	0.10	3.00
Ø1.10–1.30	0.1–0.15	4.00
Ø1.35–1.45	0.1–0.15	5.00
Ø1.50–1.60	0.1–0.15	6.00
Ø1.65–1.70	0.1–0.15	7.00
Ø1.75–1.80	0.1–0.15	8.00
Ø1.85–1.90	0.1–0.15	9.00
Ø1.95–2.10	0.1–0.15	10.00

If the required tool is not included in the standard range above, the **INDIVIDUAL** range can offer you a possible solution. If required, we can also develop custom solutions that are fully tailored to your application.

FIELD OF APPLICATION



Tool Selector

> Step-by-step guide to find the right solution
heule.com/en/tool-selector/dl2



Tool Selector

OPERATING PRINCIPLE

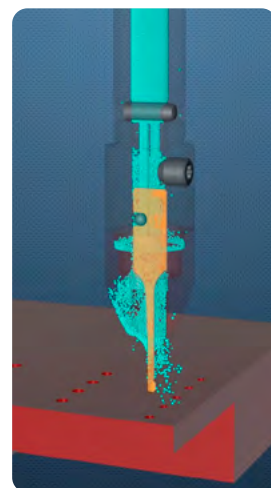
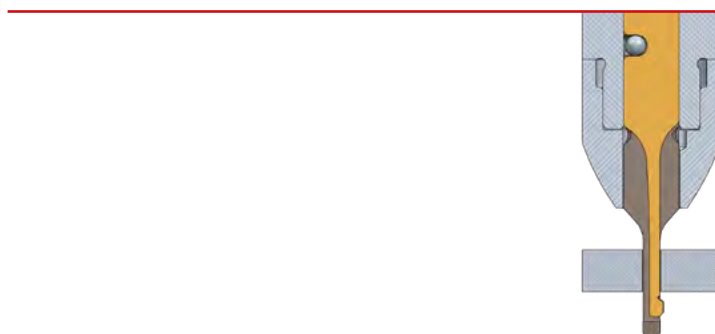
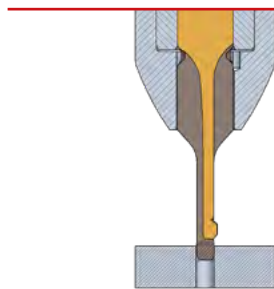
Due to its size, the DL2 blade performs the function of the spring and the blade simultaneously. Due to the rigid alignment of the blade, the operating principle is different from that of other HEULE tool systems. The blade has been designed in such a way that it can be used in confined spaces without compromising on functionality.

The blade produces the desired deburr in working feed. Upon completion of deburring, the blade automatically retracts into the blade housing without external activation. The specially designed sliding section of the blade prevents the bores from being damaged.

The spring-loaded blade automatically returns to its neutral position when it exits the bore.

Integrated cooling

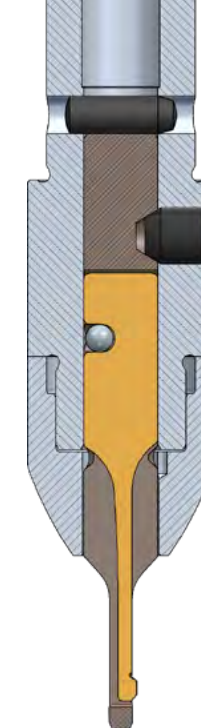
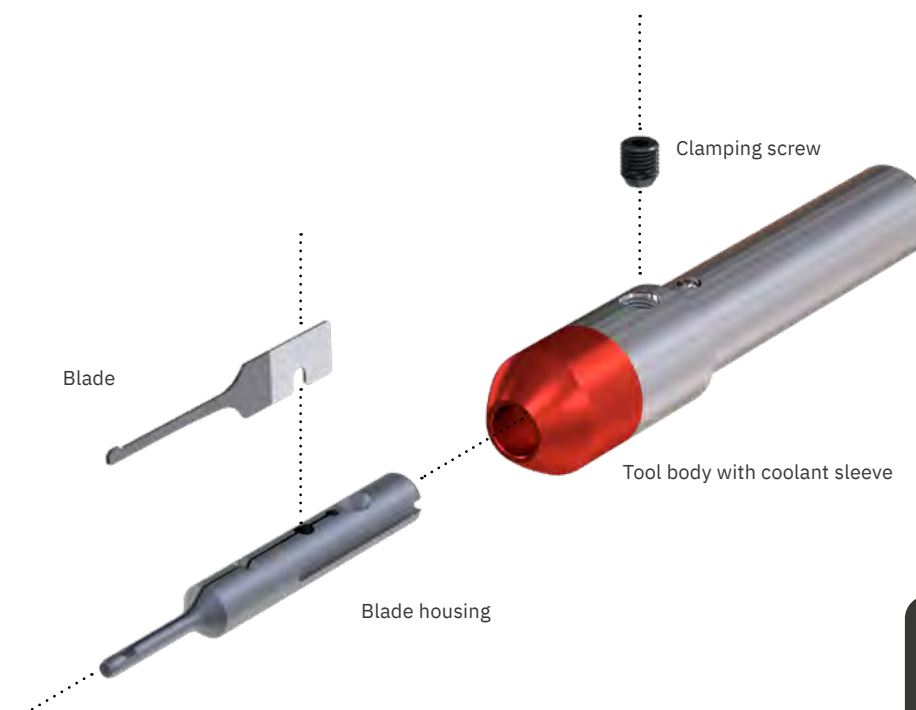
The technical challenge with deburring tools of this size is cooling the cutting edge. With the DL2, the coolant is supplied through the tool and cools and rinses the carbide blade directly – an important factor for process reliability in series production and for blade life.



TOOL DESIGN

The DL2 tool has a very simple and robust design, comprising only four components in its entire construction. The advantages of this design become obvious when changing the blade. Despite the extremely delicate dimensions of the cutting edge, the blade is easy to replace without tweezers or a magnifying glass.

The tool body and blade housing form the heart of this mini tool. The coolant sleeve guides the coolant into the blade window and ensures that the cutting edge is flushed at all times. The smaller the tool, the more important cooling is for reliable operation and a long blade life.



Operating instructions

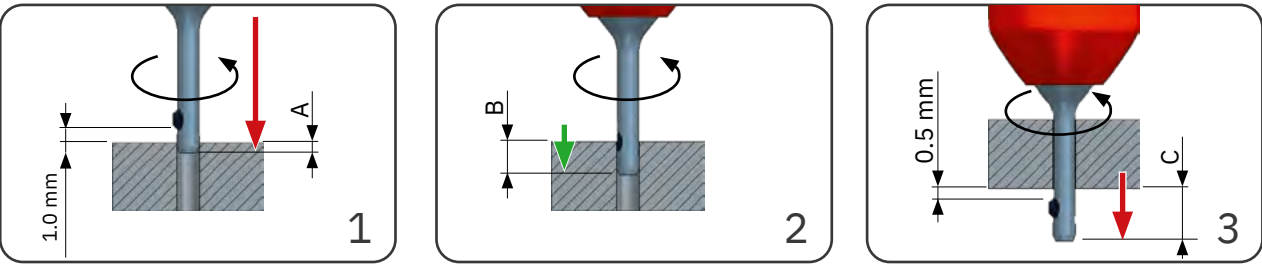
> Blade change

heule.com > Service >
Media & download centre



DL2 PROCESS STEPS

Important! The DL2 works in the anti-clockwise direction (left-hand cut).



- Rapid feed to position **A** or 1.0 mm distance
 - Spindle turning **anti-clockwise**
 - Internal coolant on
- Working feed to position **B**
- Rapid feed to position **C** or 0.5 mm distance

Example

G0 Z-0.5¹⁾
S7500 M4
M88

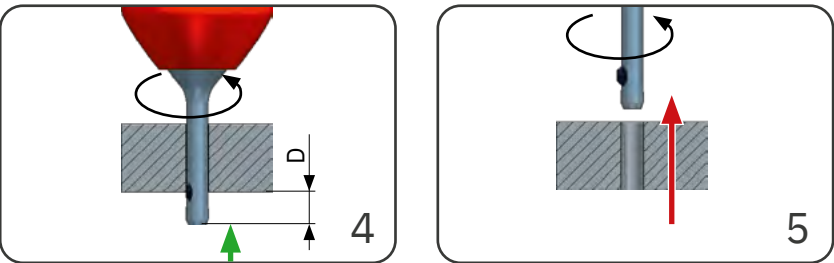
¹⁾0.5=1.5-1.0

G1 Z-2.15²⁾ F75

²⁾2.15=2.8-((2.8-1.5)/2)

G0 Z-8.3³⁾

³⁾8.3=5.0+2.8+0.5



- Working feed to position **D**

G1 Z-7.15⁴⁾

⁴⁾7.15=5.0+2.8-((2.8-1.5)/2)

- Rapid feed out of the workpiece

G0 Z+2.0

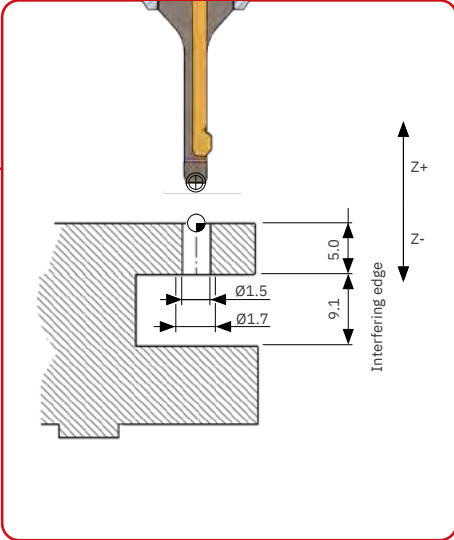
DIMENSION TABLE PROGRAMMING

Tool	A	B	C	D
DL2	0.5 mm	2.15 mm	3.3 mm	2.15 mm

IMPORTANT!
Observe max. working length

Bore Ø range	max. working length
1.00–1.05 mm	3.00 mm
1.10–1.35 mm	4.00 mm
1.40–1.45 mm	5.00 mm
1.50–1.60 mm	6.00 mm
1.65–1.70 mm	7.00 mm
1.75–1.80 mm	8.00 mm
1.85–1.90 mm	9.00 mm
1.95–2.10 mm	10.00 mm

APPLICATION AND PROGRAMMING EXAMPLE



Application data

Material: Steel C45

Bore diameter: Ø1.5 mm

Deburr diameter: Ø1.7 mm

Burr height max. 0.1 mm

Workpiece depth: 5.0 mm

Machining: both bore edges

Tool and blade selection

Tool: DL2/1.5/06

Blade: DL2-M-0164-A (HM, Latuma coated)

Tool diameter: 1.45 mm

Cutting data

Cutting speed Vc: 30–50 m/min.

Working feed fz: 0.005–0.015 mm/rev

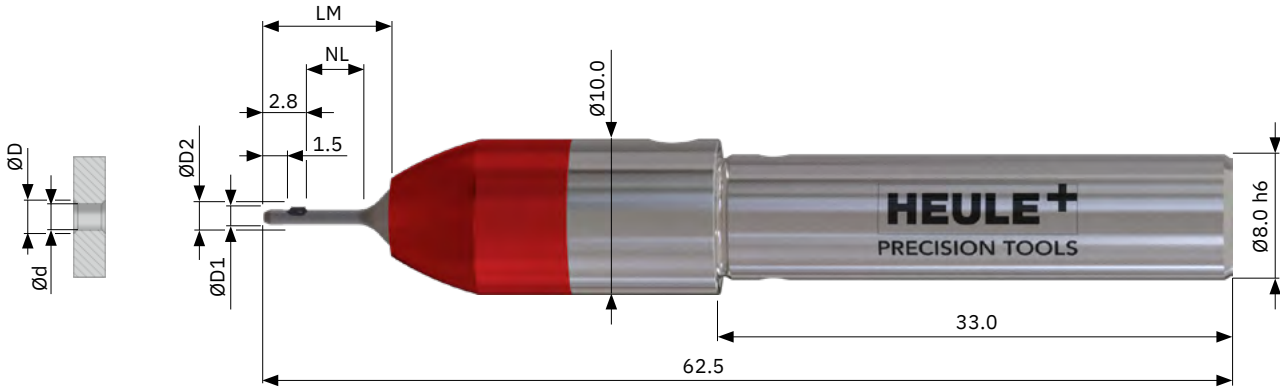
CUTTING DATA

	Description	Tensile str. RM (MPa)	Hardness (HB)	Hardn. (HRC)	DL2		
					Vc	fz	B*
P0	Low-carbon steel, long-chipping, C <0.25%	<530	<125	–	30–50	0.005–0.015	A
P1	Low-carbon steel, short-chipping, C <0.25%	<530	<125	–	30–50	0.005–0.015	A
P2	Steel with carbon content C >0.25%	>530	<220	<25	30–50	0.005–0.015	A
P3	Alloy steel and tool steel, C >0.25%	600–850	<330	<35	30–50	0.005–0.015	A
P4	Alloy steel and tool steel, C >0.25%	850–1400	340–450	35–48	25–45	0.005–0.015	A
P5	Ferritic, martensitic and stainless PH steel	600–900	<330	<35	20–40	0.005–0.015	A
P6	High-strength ferritic, martensitic and PH stainless steel	900–1350	350–450	35–48	20–40	0.005–0.015	A
M1	Austenitic stainless steel	<600	130–200	–	15–30	0.005–0.015	A
M2	High-strength austenitic stainless steel	600–800	150–230	<25	15–30	0.005–0.015	A
M3	Duplex stainless steel	<800	135–275	<30	15–30	0.005–0.015	A
K1	Cast iron	125–500	120–290	<32	40–60	0.005–0.015	A
K2	Ductile cast iron with up to medium strength	<600	130–260	<28	40–60	0.005–0.015	A
K3	High-strength cast iron and bainitic cast iron	>600	180–350	<43	40–60	0.005–0.015	D
N1	Wrought aluminium alloys	–	–	–	60–80	0.005–0.015	D
N2	Aluminium alloys with low Si content	–	–	–	60–80	0.005–0.015	D
N3	Aluminium alloys with high Si content	–	–	–	60–80	0.005–0.015	D
N4	Copper, brass and zinc base	–	–	–	50–60	0.005–0.015	D
S1	Iron-based heat-resistant alloys	500–1200	160–260	25–48	20–40	0.005–0.015	A
S2	Cobalt-based heat-resistant alloys	1000–1450	250–450	25–48	10–15	0.005–0.015	A
S3	Nickel-based heat-resistant alloys	600–1700	160–450	<48	10–15	0.005–0.015	A
S4	Titanium and titanium alloys	900–1600	300–400	33–48	10–15	0.005–0.015	A

* coating for blades

The cutting data listed are guide values!
For materials that are difficult to machine or slightly uneven bore edges, we recommend applying cutting speeds that are at the lower end of the range.

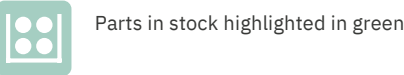
DL2 Ø1.0 mm to 2.1 mm



Tool

- Standard tool **without** blades
- The blades must always be ordered separately.
 - Different blades can be used for each bore diameter, thus achieving different deburr diameters.
However, a blade is only designed for a defined deburr diameter. The achievable deburr diameter may vary slightly depending on the material, blade force, cutting parameters and application.
 - With cylindrical shank

Bore Ø d	Deburring Ø D	Working length max.	Length of LM blade housing	Tool Ø D1	Max. Ø D2	Tool Part no.
1.00	1.20	3.00	8.30	0.95	1.35	DL2/1.00/03
1.05	1.25	3.00	8.30	1.00	1.40	DL2/1.05/03
1.10	1.30	4.00	9.30	1.05	1.55	DL2/1.10/04
1.15	1.35	4.00	9.30	1.10	1.60	DL2/1.15/04
1.20	1.40 / 1.45	4.00	9.30	1.15	1.65	DL2/1.20/04
1.25	1.45 / 1.50 / 1.55	4.00	9.30	1.20	1.70	DL2/1.25/04
1.30	1.50 / 1.55 / 1.60	4.00	9.30	1.25	1.75	DL2/1.30/04
1.35	1.55 / 1.60 / 1.65	5.00	10.30	1.30	1.80	DL2/1.35/05
1.40	1.60 / 1.65 / 1.70	5.00	10.30	1.35	1.85	DL2/1.40/05
1.45	1.65 / 1.70 / 1.75	5.00	10.30	1.40	1.90	DL2/1.45/05
1.50	1.70 / 1.75 / 1.80	6.00	11.30	1.45	1.95	DL2/1.50/06
1.55	1.75 / 1.80 / 1.85	6.00	11.30	1.50	2.00	DL2/1.55/06
1.60	1.80 / 1.85 / 1.90	6.00	11.30	1.55	2.05	DL2/1.60/06
1.65	1.85 / 1.90 / 1.95	7.00	12.30	1.60	2.10	DL2/1.65/07
1.70	1.90 / 1.95 / 2.00	7.00	12.30	1.65	2.15	DL2/1.70/07
1.75	1.95 / 2.00 / 2.05	8.00	13.30	1.70	2.20	DL2/1.75/08
1.80	2.00 / 2.05 / 2.10	8.00	13.30	1.75	2.25	DL2/1.80/08
1.85	2.05 / 2.10 / 2.15	9.00	13.30	1.80	2.30	DL2/1.85/09
1.90	2.10 / 2.15 / 2.20	9.00	13.30	1.85	2.35	DL2/1.90/09
1.95	2.15 / 2.20 / 2.25	10.00	13.30	1.90	2.40	DL2/1.95/10
2.00	2.20 / 2.25 / 2.30	10.00	13.30	1.95	2.45	DL2/2.00/10
2.05	2.25 / 2.30	10.00	13.30	2.00	2.50	DL2/2.05/10
2.10	2.30	10.00	13.30	2.05	2.55	DL2/2.10/10



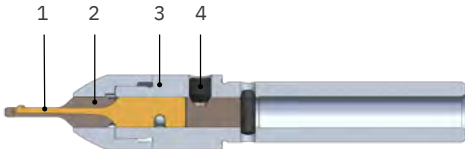
Parts in stock highlighted in green

DL2 Ø1.0 mm to 2.1 mm

Blades

Deburr. Ø max.	Part no. forward and backward cutting		Part no. backward cutting only		Part Designation
	Coating A Steel, titanium, Inconel	Coating D for aluminium	Coating A Steel, titanium, Inconel	Coating D for aluminium	
1.20	DL2-M-0104-A	DL2-M-0104-D	DL2-M-0101-A	DL2-M-0101-D	DL2 Blade 1.00
1.25	DL2-M-0110-A	DL2-M-0110-D	DL2-M-0107-A	DL2-M-0107-D	DL2 Blade 1.05
1.30	DL2-M-0116-A	DL2-M-0116-D	DL2-M-0113-A	DL2-M-0113-D	DL2 Blade 1.10
1.35	DL2-M-0122-A	DL2-M-0122-D	DL2-M-0119-A	DL2-M-0119-D	DL2 Blade 1.15
1.40	DL2-M-0128-A	DL2-M-0128-D	DL2-M-0125-A	DL2-M-0125-D	DL2 Blade 1.20
1.45	DL2-M-0134-A	DL2-M-0134-D	DL2-M-0131-A	DL2-M-0131-D	DL2 Blade 1.25
1.50	DL2-M-0140-A	DL2-M-0140-D	DL2-M-0137-A	DL2-M-0137-D	DL2 Blade 1.30
1.55	DL2-M-0146-A	DL2-M-0146-D	DL2-M-0143-A	DL2-M-0143-D	DL2 Blade 1.35
1.60	DL2-M-0152-A	DL2-M-0152-D	DL2-M-0149-A	DL2-M-0149-D	DL2 Blade 1.40
1.65	DL2-M-0158-A	DL2-M-0158-D	DL2-M-0155-A	DL2-M-0155-D	DL2 Blade 1.45
1.70	DL2-M-0164-A	DL2-M-0164-D	DL2-M-0161-A	DL2-M-0161-D	DL2 Blade 1.50
1.75	DL2-M-0170-A	DL2-M-0170-D	DL2-M-0167-A	DL2-M-0167-D	DL2 Blade 1.55
1.80	DL2-M-0176-A	DL2-M-0176-D	DL2-M-0173-A	DL2-M-0173-D	DL2 Blade 1.60
1.85	DL2-M-0182-A	DL2-M-0182-D	DL2-M-0179-A	DL2-M-0179-D	DL2 Blade 1.65
1.90	DL2-M-0188-A	DL2-M-0188-D	DL2-M-0185-A	DL2-M-0185-D	DL2 Blade 1.70
1.95	DL2-M-0194-A	DL2-M-0194-D	DL2-M-0191-A	DL2-M-0191-D	DL2 Blade 1.75
2.00	DL2-M-0200-A	DL2-M-0200-D	DL2-M-0197-A	DL2-M-0197-D	DL2 Blade 1.80
2.05	DL2-M-0206-A	DL2-M-0206-D	DL2-M-0203-A	DL2-M-0203-D	DL2 Blade 1.85
2.10	DL2-M-0212-A	DL2-M-0212-D	DL2-M-0209-A	DL2-M-0209-D	DL2 Blade 1.90
2.15	DL2-M-0218-A	DL2-M-0218-D	DL2-M-0215-A	DL2-M-0215-D	DL2 Blade 1.95
2.20	DL2-M-0224-A	DL2-M-0224-D	DL2-M-0221-A	DL2-M-0221-D	DL2 Blade 2.00
2.25	DL2-M-0230-A	DL2-M-0230-D	DL2-M-0227-A	DL2-M-0227-D	DL2 Blade 2.05
2.30	DL2-M-0236-A	DL2-M-0236-D	DL2-M-0233-A	DL2-M-0233-D	DL2 Blade 2.10

Spare parts



Item	Description	Part no.
1	Blade	see above
2	Blade housing	see page 62
3	Tool body	see page 62
4	Clamping screw Allen key	GH-H-S-1125 GH-H-S-2021

DL2 spare parts

	Blade housing	Tool body
Bore Ø	Part no.	Part no.
1.00	DL2-N-0102	DL2-G-0103
1.05	DL2-N-0112	DL2-G-0103
1.10	DL2-N-0123	DL2-G-0104
1.15	DL2-N-0133	DL2-G-0104
1.20	DL2-N-0143	DL2-G-0104
1.25	DL2-N-0153	DL2-G-0104
1.30	DL2-N-0163	DL2-G-0104
1.35	DL2-N-0174	DL2-G-0104
1.40	DL2-N-0184	DL2-G-0105
1.45	DL2-N-0194	DL2-G-0105
1.50	DL2-N-0205	DL2-G-0106
1.55	DL2-N-0215	DL2-G-0106
1.60	DL2-N-0225	DL2-G-0106
1.65	DL2-N-0236	DL2-G-0107
1.70	DL2-N-0246	DL2-G-0107
1.75	DL2-N-0257	DL2-G-0108
1.80	DL2-N-0267	DL2-G-0108
1.85	DL2-N-0278	DL2-G-0109
1.90	DL2-N-0288	DL2-G-0109
1.95	DL2-N-0299	DL2-G-0110
2.00	DL2-N-0309	DL2-G-0110
2.05	DL2-N-0319	DL2-G-0110
2.10	DL2-N-0329	DL2-G-0110

DL2 FAQ

Question	Causes	Remedy
Burr is not cut away cleanly or deburr too small	• Blade selected too small • Working feed rate too high • Burr too large	• Select blade for larger deburr Ø • Reduce working feed rate • Minimise burr size from drilling
No deburring	• Blade worn, worn out	• Replace blade
	• Excessive burr formation	• Replace or sharpen the drill
	• Wrong direction of rotation	• DL2 runs anti-clockwise (M4)
Forward and backward deburring size not the same	• Working feed rate forwards and backwards different	• Select the same working feed rate forwards and backwards if possible
	• Different burr formations front and back	• On the side with under-deburring: reduce working feed rate. On the side with over-deburring: increase working feed rate
Deburring with chatter marks	• Poorly set workpiece or tool	• Ensure that workpiece and tool are firmly clamped
	• Tool in unstable condition	• Increase tool feed rate
	• Cutting speed too high	• Reduce cutting speed
Inconsistent deburring size	• Different working feed rate	• Select consistent working feed rate
	• Tool in unstable condition	• Increase working feed rate
Poor service life	• Poorly clamped workpiece or tool (vibration)	• Ensure that workpiece and tool are rigidly clamped
	• Insufficient machine stability (spindle play, etc.)	• Improve machine stability or guide with special tool in the bore
	• Incorrect blade coating	• Select correct coating