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CATALOG VER. 2018/7/EN

tools rental

AVAILABLE IN EUROPE

Original Manufacturer of the Equipment

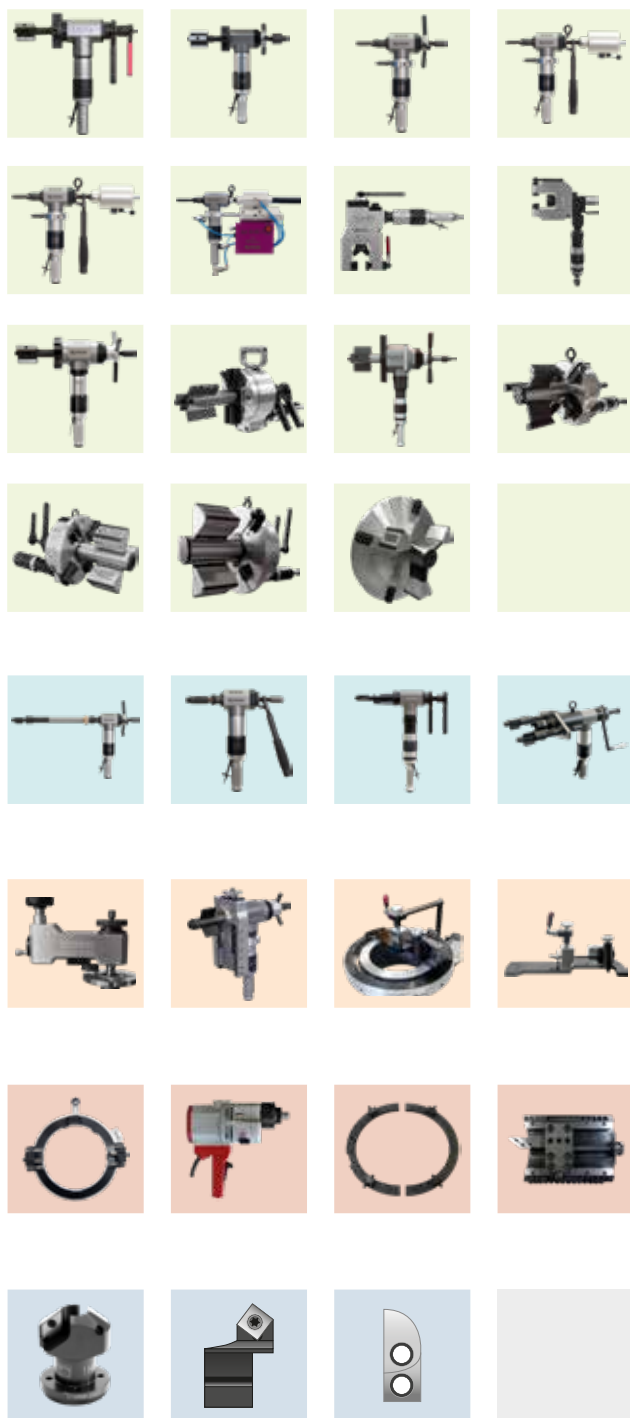


Tube & Pipe Beveling Machines Catalog

KRAIS
Tube Expanders

| MiniMill | HyperMill | PrepMill | SmartMill | MiniLathe | PipeLathe |

KRAIS Beveling Tools



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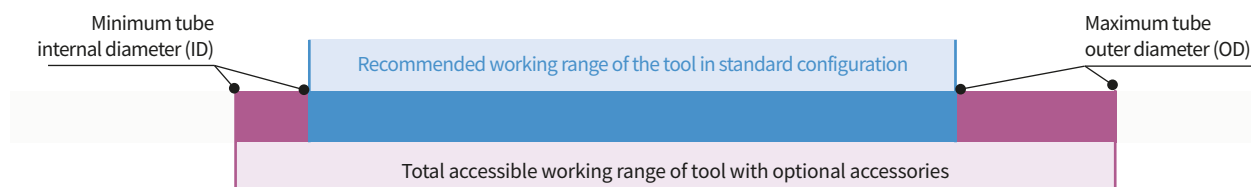
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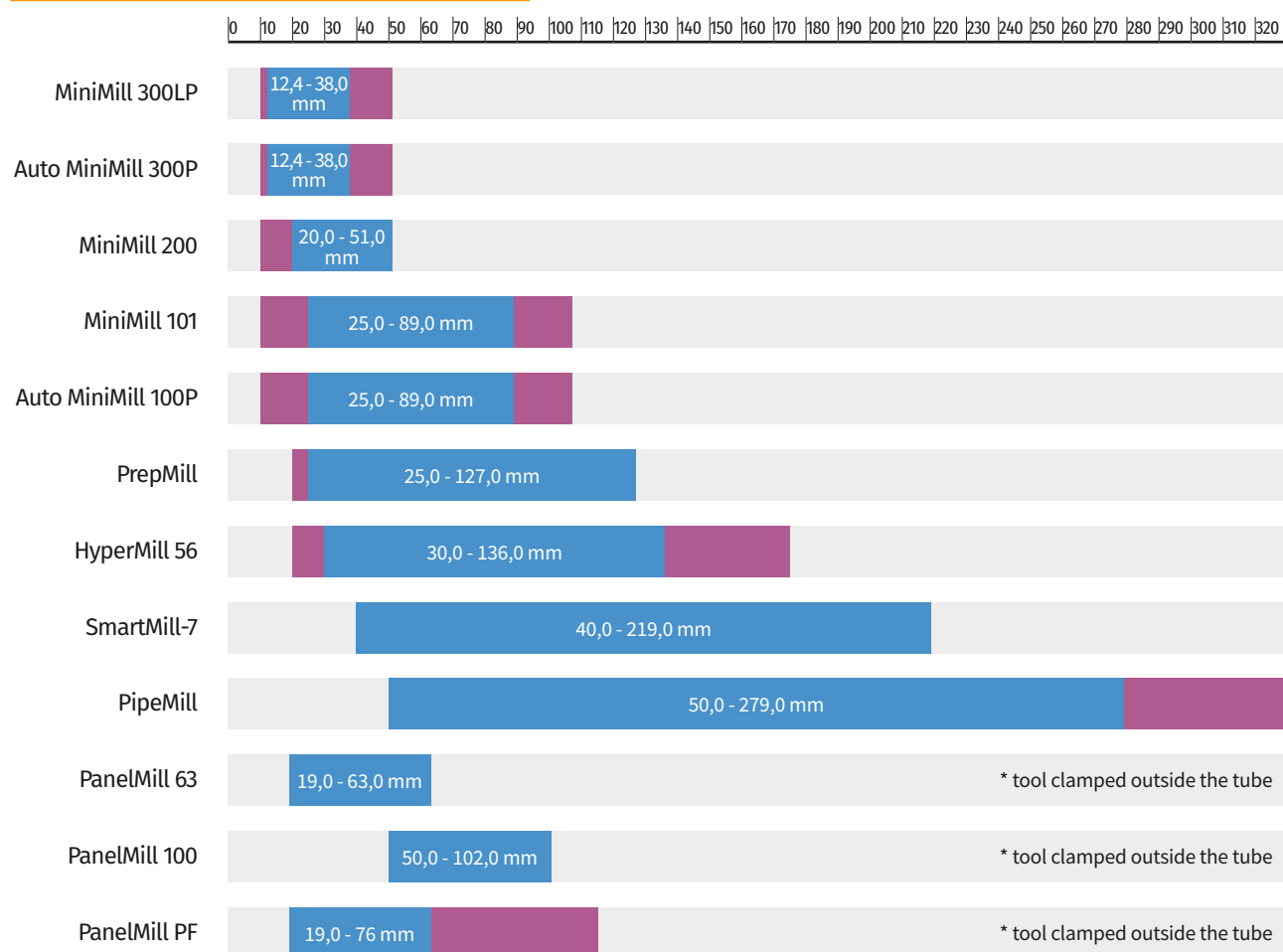
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Working ranges (universal tools)

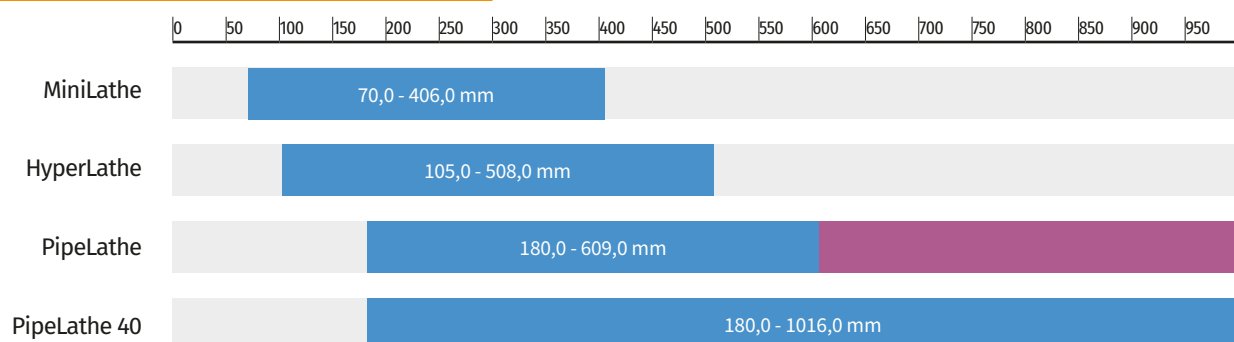
HOW TO READ IT



MILL SERIE WORKING RANGES (UNIVERSAL TOOLS)



LATHE SERIE WORKING RANGES (UNIVERSAL TOOLS)



Wide range of accessories

KRAIS SPECIALIZED TUBE MILLING HEADS



In order to increase the boiler and heat exchanger work efficiency, we have designed and manufactured milling heads for various purposes. Our offer includes heads for strength and seal weld removal, membrane removal, facing, bevelling, fin fan cooler facing or weld removal and many more, all of which can be found in this catalogue. In the case you do not find the head for your application, let us know and we can design it for you.

SHAFTS



MINISHAFT

A system with interchangeable guide shafts. A complete set covers 12,4 to 48,0 mm ID tubes.



MICROSHAFT

A system with interchangeable guide shafts. A complete set covers 10,0 to 15,0 mm ID tubes.



SHAFT20/25/30

Self-align, heavy duty locking systems. Shafts and jaws are longer and wider to ensure maximum clamping force.

FEED SYSTEMS



LEVER FEED

Quick and easy feed system. Used in many basic applications.



STAR WHEEL

The most precise feed system. Used in many basic and demanding applications.



RATCHET FEED

Feed system allowing to work in narrow and tight locations, eg. in water walls.

FAST CLAMPING SYSTEM



The fast pneumatic clamping system (optional) is ideal for manufacturing plants that make large amounts of end preps on tubes and pipes. It offers rapid tube to tube cycle time, increased productivity with little operator fatigue. The system can be used for tube facing on condensers and heat exchangers, boiler tube panel fabrication, seal weld removal.

SPEED ADJUSTMENTS



SPEED VALVE SAV500

Perfect solution for all our pneumatic driven bevelling machines for adjusting cutting speed to suit to the machined tube diameter.



SPEED REDUCER - GEARBOX

The optional speed reducer can be used for seal and strength weld removal applications. Inconel, duplex, super duplex and other hard to machine alloys can be machined with ease. The reduction of speed by a factor of 3 increases the torque, enabling the machine to generate a thick chip whilst reducing the cutting time. This combination increases the lifespan of the components significantly and reduces cutting time. The gear box can be purchased separately. Installation is easy: just remove the angle head from the drive and install the reduction assembly.

HYDRAULIC POWERPACK



Our hydraulic Powerpack ensure reliable power for our SFSF Clamshells. Featuring a powerful electric motor the system provides adjustable volume, constant low pressure and responsive pumps. This adds up to optimum power delivery as required by clamshells that are designed to machine a wide range of pipe sizes and materials.

COMPLETE SET



The machines are shipped complete with a standard cutting head, a mandrel kit with full set of jaws, a hose with couplings, an instructions manual, operating tools and a rugged metal carrying case.

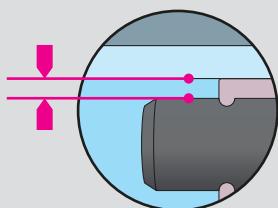
How to proper lock

FOR: MINIMILL 101, MINIMILL 201, MINIMILL 301LP AND AUTO MINIMILL WITH MICRO- OR MINISHAFT.

In order to obtain the best possible centering of the MiniMill into the faced, bevel or weld removal tube, we recommend to select the shaft with diameter closest possible to the inner diameter of tube.

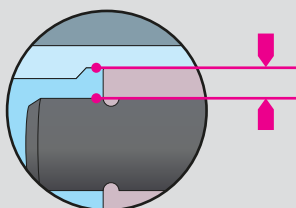
Correct (REGULAR TUBE)

Gap between shaft and tube ID
should be max 0,3 mm



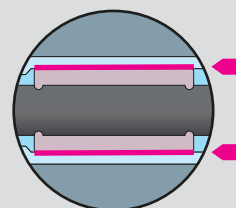
Correct (EXPANDED TUBE)

Gap between shaft and tube ID
should be max 0,3 mm



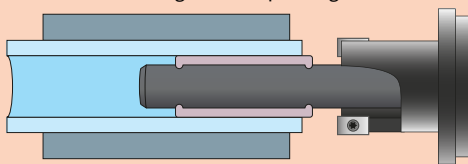
Correct mounting

Contact between jaws and tube
is over the entire surface

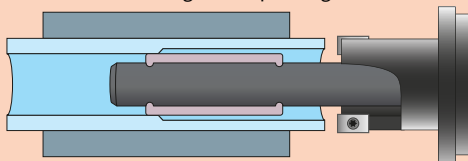


✗ WRONG JAWS SETUP

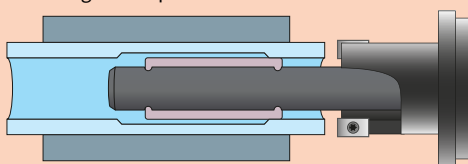
Facing before expanding



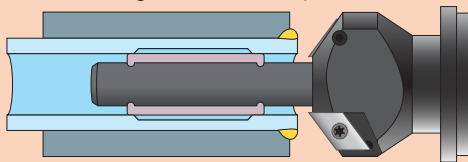
Facing after expanding



Facing after expansion with double radius rolls

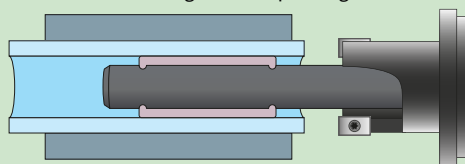


Strength weld removal application

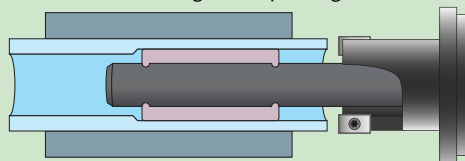


✓ CORRECT JAWS SETUP

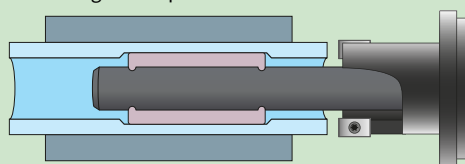
Facing before expanding



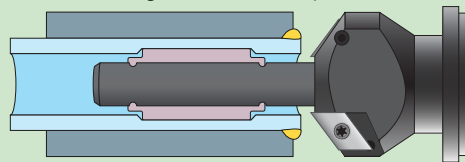
Facing after expanding



Facing after expansion with double radius rolls



Strength weld removal application



Correct shaft choice

FOR: MINIMILL 101, MINIMILL 201, MINIMILL 301LP AND AUTO MINIMILL WITH MICRO- OR MINISHAFT.

In order to obtain the best possible centering of the MiniMill into the faced, bevel or weld removal tube, we recommend to select the shaft with diameter closest possible to the inner diameter of tube.

If the shaft is too thin it is exposed to large probability that the MiniMill will be installed non parallel to the axis of the tube. As well as the jaws may not fully grip the tube with its full face but with the corners only, and will result a non-square face of the tube to the tube sheet as well as there is a big probability that it may result the breaking of guide shaft as the machine might be forced into strong vibration what may created a sudden collision with tube or tube sheet. We strongly recommend to look on this, specially for tubes ¾" O.D.

IMPORTANT NOTE!

The guide shafts in the chart are selected for non-expanded tubes. If the tubes are expanded, a different, bigger diameter shaft has to be considered. As well as the contact length of the locking jaws has to be shorter than the length of the effective expansion length. It is unacceptable if the jaws are longer than the expansion and lock only partially on non-expanded part of tube. In that circumstances the locking jaws must be shaped to be able to lock only on the expanded part of the tube.

MICROSHAFT NUMBERS

SHAFT	[MM]	[INCH]	SPRING
800 MM#151	9,00	0,354	O-7
801 MM#151	10,00	0,394	DW-8,5
805 MM#151	11,00	0,453	DW-10

MICROSHAFT LOCKING RANGES

RANGE [MM]		RANGE [INCH]		JAWS
MIN	MAX	MIN	MAX	
10,00	11,00	0,394	0,433	301 MM#36
11,00	12,00	0,433	0,472	303 MM#36
12,00	13,00	0,472	0,512	305 MM#36
13,00	14,00	0,512	0,551	307 MM#36
14,00	15,00	0,551	0,591	309 MM#36

MINISHAFT NUMBERS

TUBE OD	BWG	SHAFT	[MM]	[INCH]	SPRING
¾"	11	901 MM#151	12,40	0,492	DW-11
	11	911 MM#151	12,60	0,496	DW-11
	12	912 MM#151	13,20	0,519	DW-11
	13	905 MM#151	13,90	0,547	DW-12,5
	14	914 MM#151	14,50	0,570	DW-12,5
	15	9151 MM#151	15,10	0,594	DW-12,5
	16	916 MM#151	15,50	0,610	DW-12,5
	17	917 MM#151	15,70	0,622	DW-12,5
	18	918 MM#151	16,30	0,641	DW-15,5
7/8"	20	909 MM#151	16,80	0,661	DW-15,5
	10	9151 MM#151	15,10	0,594	DW-12,5
	11	917 MM#151	15,70	0,622	DW-12,5
	12	922 MM#151	16,40	0,645	DW-15,5
	13	923 MM#151	17,10	0,673	DW-15,5
	14	924 MM#151	17,70	0,696	DW-15,5
	15	925 MM#151	18,30	0,700	DW-15,5
	16	926 MM#151	18,60	0,732	DW-15,5
	18	928 MM#151	19,50	0,767	DW-15,5
1"	8	909 MM#151	16,80	0,661	DW-15,5
	9	938 MM#151	17,50	0,688	DW-15,5
	10	925 MM#151	18,30	0,700	DW-15,5
	11	931 MM#151	19,00	0,748	O-16
	12	932 MM#151	19,60	0,771	O-16
	13	915 MM#151	20,00	0,787	O-17
	14	934 MM#151	20,90	0,822	O-17
	16	936 MM#151	21,80	0,858	O-17
	18	938 MM#151	22,60	0,889	O-7

MINISHAFT LOCKING RANGES WITH

RANGE [MM]		RANGE [INCH]		JAWS
MIN	MAX	MIN	MAX	
12,40	14,50	0,488	0,571	201 MM#36
13,90	16,00	0,547	0,630	203 MM#36
15,90	18,00	0,626	0,709	205 MM#36
16,90	19,00	0,665	0,748	207 MM#36
18,90	21,00	0,744	0,827	209 MM#36
19,90	22,00	0,783	0,866	211 MM#36
20,90	23,00	0,823	0,906	213 MM#36
21,90	24,00	0,862	0,944	214 MM#36
23,60	25,60	0,929	1,008	215 MM#36
25,20	27,20	0,992	1,071	217 MM#36
26,80	28,80	1,055	1,134	219 MM#36
28,40	30,40	1,118	1,197	221 MM#36
30,00	32,00	1,181	1,260	223 MM#36
31,60	33,60	1,244	1,323	225 MM#36
33,20	35,20	1,307	1,386	227 MM#36
34,80	36,80	1,370	1,449	229 MM#36
36,40	38,40	1,433	1,512	231 MM#36
38,00	40,00	1,496	1,575	233 MM#36
39,60	41,60	1,559	1,638	235 MM#36
41,20	43,20	1,622	1,701	237 MM#36
42,80	44,80	1,685	1,764	239 MM#36
44,40	46,40	1,748	1,827	241 MM#36
46,00	48,00	1,811	1,890	243 MM#36

We do offer non-standard size and non-standard shaped jaws upon receiving a drawing of the tube expansion details.

OPTIONAL HEADS**66 MM (2,59")**

The smallest cutter head, designed to fasten the wide range of cutting inserts.

**88 MM (3,46")**

The popular, medium cutter head, designed to fasten the wide range of cutting inserts.

**OBPM**

Head for outside bevelling of tubes and pipes. Available in wide range of diameters and beveling angles.

→ TABLE PAGE 63

**PRRMBH**

Head for membrane and overlay removal. Efficiently remove material between boiler tubes.

→ TABLE PAGE 63

**STWRPM**

Head dedicated for strength weld removal. Heads are easy to align and sized per tube diameter.

→ TABLE PAGE 64

**TFPM**

Tube facing milling head for tubes made of any type of material. Utilizes 6% cobalt inserts.

→ TABLE PAGE 64

OPT. SHAFT**SHAFT20**

Self-align, heavy duty locking system. Shafts and jaws are longer and wider to ensure maximum clamping force.

OTHER OPTIONAL ACCESSORIES**HEAD FLANGE**

Adapter to use all MiniMill's special cutter heads (from size 1-1/2" and up).

**SPEED ADJUSTMENT VALVE SAV-500**

The solution for all pneumatic drive beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

**SPEED REDUCER**

Easy to use gearbox for 3x speed reduction. Increases the torque, enabling the machine to generate a thick chip whilst reducing the cutting time.

**FAST CLAMPING SYSTEM**

System offers rapid tube to tube cycle time, increased productivity (up to 4x) with little operator fatigue. Ideal for large amount of end preps.

**STAR WHEEL**

The most precise feed system. Used in many basic and demanding applications.

LOCKING RANGES WITH DEFAULT SHAFT25**STANDARD JAWS SET FOR DEFAULT SHAFT**

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
25	30	0,984	1,181	NS-1	-	SP-24	1
30	35	1,181	1,378	NS-2	-	SP-24	1
35	40	1,378	1,575	NS-3	-	SP-25	2
40	45	1,575	1,772	NS-4	-	SP-25	2
45	50	1,772	1,969	NS-5	-	SP-25	2
50	55	1,969	2,165	NS-6	-	SP-25	2
55	60	2,165	2,362	NS-7	-	SP-25	2
60	65	2,362	2,559	NS-8	-	SP-25	2
62	67	2,441	2,638	NS-5	NS-10	SP-25	2
67	72	2,638	2,835	NS-6	NS-10	SP-25	2
72	77	2,835	3,031	NS-7	NS-10	SP-25	2
77	82	3,031	3,228	NS-8	NS-10	SP-25	2
82	87	3,228	3,425	NS-5	NS-20	SP-25	2
87	92	3,425	3,622	NS-6	NS-20	SP-25	2
92	97	3,622	3,819	NS-7	NS-20	SP-25	2
97	102	3,819	4,016	NS-8	NS-20	SP-25	2
102	107	4,016	4,213	NS-5	NS-30	SP-25	2
107	112	4,213	4,409	NS-6	NS-30	SP-25	2
112	117	4,409	4,606	NS-7	NS-30	SP-25	2
117	122	4,606	4,803	NS-8	NS-30	SP-25	2

LOCKING RANGES WITH SHAFT20 (OPTION)

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
20	24	0,787	0,945	NS-0	-	SP-19	1
24	28	0,945	1,102	NS-1	-	SP-19	1

EXAMPLE TOOL APPLICATION

MiniMill 101

The MiniMill 101 is a rugged, fast, portable weld end preparation lathe designed for various tubes and pipes, including stainless steel and other high chromium materials. Our standard machine can be used for pipe sizes of 20 - 74 mm i.d. (0.787" - 2.913") and comes with a 88 mm cutting head.

IMPORTANT!

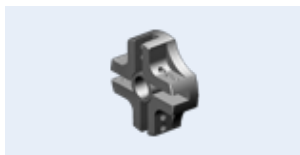
Read how to properly lock on page 7

STANDARD SET UP



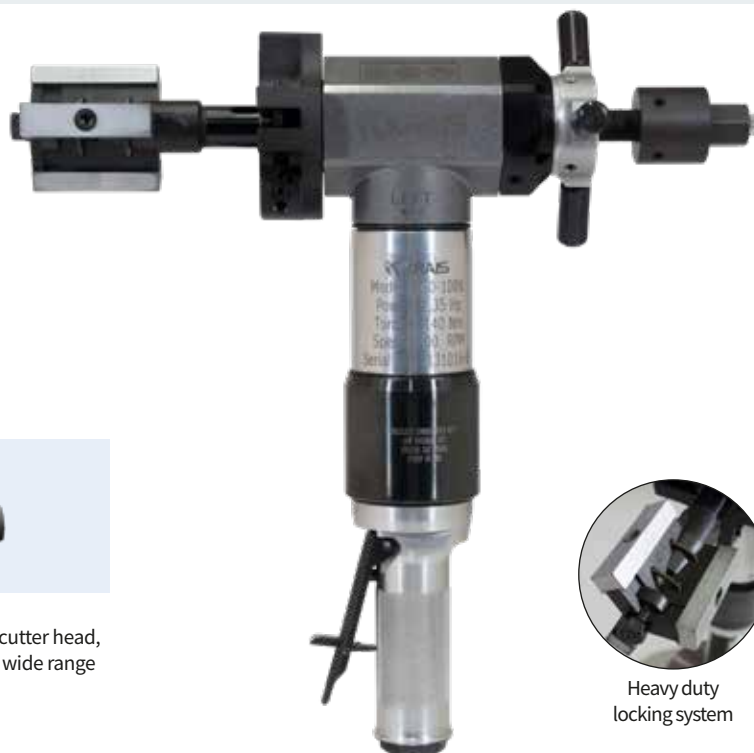
SHAFT25

Self-align, heavy duty locking system. Shafts and jaws are longer and wider to ensure maximum clamping force.



88 MM (3,46")

The popular, medium cutter head, designed to fasten the wide range of cutting inserts.



Heavy duty locking system

STANDARD WORKING RANGE - RECOMMENDED		OPTIONAL WORKING RANGE	
APPLICATION RANGE	STANDARD LOCKING	APPLICATION RANGE	STANDARD LOCKING
25 – 89 mm	25 – 77 mm	10 – 107 mm	10 – 102 mm
0,984 – 3,504"	0,984 – 3,031"	0,394 – 4,213"	0,394 – 4,016"
FEED STROKE		FREE SPEED	
20 mm	0,787"	120 rpm	140 Nm
			105 Ft.lbs
POWER		TORQUE	
	1,3 hp		
AIR USE		BODY WIDTH	
55 cfm	1,3 m³/min	2,32"	59 mm
BODY HEIGHT		BODY WEIGHT	
	13,1"	335 mm	11,4 Lbs
			5,2 kg

OPTIONAL ACCESSORIES



RATCHET FEED

Feed system allowing to work in narrow and tight locations, eg. in water walls.



FAST CLAMPING SYSTEM

System offers rapid tube to tube cycle time, increased productivity (up to 4x) with little operator fatigue. Ideal for large amount of end preps.



SPEED REDUCER

Easy to use gearbox for 3x speed reduction. Increases the torque, enabling the machine to generate a thick chip whilst reducing the cutting time.



SPEED ADJUSTMENT VALVE SAV-500

The solution for all pneumatic drive beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

OPTIONAL SHAFTS**MICROSHAFT**

A system with interchangeable guide shafts. A complete set covers 10,0 to 15,0 mm ID tubes.

**MINISHAFT**

A system with interchangeable guide shafts. A complete set covers 12,4 to 48,0 mm ID tubes.

**SHAFT20**

Self-align, heavy duty locking system. Shafts and jaws are longer and wider to ensure maximum clamping force.

OPTIONAL HEADS**60 MM (2,36")**

The smallest cutter head, designed to fasten the wide range of cutting inserts.

**106 MM (4,16")**

The popular, large cutter head, designed to fasten the wide range of cutting inserts.

**OBMH**

Head for bevelling tubes without membranes in the boiler water walls.

→ TABLE PAGE 61

**SWOTC**

Seal weld removal head over tube circumference prior to re-welding the damaged joint without removing the tube.

→ TABLE PAGE 62

**STWRMH**

Head dedicated for strength weld removal. Heads are easy to align and sized per tube diameter.

→ TABLE PAGE 60

**TFMH**

Tube facing milling head for tubes made of any type of material. Utilizes 6% cobalt inserts.

→ TABLE PAGE 60

MINIMILL 101E

MiniMill 101E is electric version of MiniMill 101. A standard machine cover the same pipe sizes and comes with the same cutting head. The electric motor made by Makita with 3 stage planetary gear box made by KRAIS has variable speed control and produce enormous torque. Is interchangeable with pneumatic drive and can be purchased separately at any time.

Free Speed 115 RPM
Power 750 W
Torque 366 NM (280 Ft.Lbs)
Feed Stroke 20 mm (0,787")

**LOCKING RANGES WITH DEFAULT SHAFT25****STANDARD JAWS SET FOR DEFAULT SHAFT**

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
25	30	0,984	1,181	NS-1	-	SP-24	1
30	35	1,181	1,378	NS-2	-	SP-24	1
35	40	1,378	1,575	NS-3	-	SP-25	2
40	45	1,575	1,772	NS-4	-	SP-25	2
45	50	1,772	1,969	NS-5	-	SP-25	2
50	55	1,969	2,165	NS-6	-	SP-25	2
55	60	2,165	2,362	NS-7	-	SP-25	2
60	65	2,362	2,559	NS-8	-	SP-25	2
62	67	2,441	2,638	NS-5	NS-10	SP-25	2
67	72	2,638	2,835	NS-6	NS-10	SP-25	2
72	77	2,835	3,031	NS-7	NS-10	SP-25	2

OPTIONAL JAWS FOR DEFAULT SHAFT

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
77	82	3,031	3,228	NS-8	NS-10	SP-25	2
82	87	3,228	3,425	NS-5	NS-20	SP-25	2
87	92	3,425	3,622	NS-6	NS-20	SP-25	2
92	97	3,622	3,819	NS-7	NS-20	SP-25	2
97	102	3,819	4,016	NS-8	NS-20	SP-25	2
102	107	4,016	4,213	NS-5	NS-30	SP-25	2

LOCKING RANGES WITH SHAFT20 (OPTION)

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
20	24	0,787	0,945	NS-0	-	SP-19	1
24	28	0,945	1,102	NS-1	-	SP-19	1

LOCKING RANGES FOR DEFAULT MINISHAFT SET (OPTION)

SHAFT NUMBER	SIZE		JAWS	RANGE [MM]		RANGE [INCH]		SPRING
	[INCH]	[MM]		MIN	MAX	MIN	MAX	
901MM#151	12,40	0,492	201MM#36	12,40	14,50	0,488	0,571	DW-11
905MM#151	13,90	0,547	203 MM#36	13,90	16,00	0,547	0,630	DW-12,5
909MM#151	16,80	0,661	205 MM#36	15,90	18,00	0,626	0,709	DW-15,5
			207 MM#36	16,90	19,00	0,665	0,748	
			209 MM#36	18,90	21,00	0,744	0,827	
			211 MM#36	19,90	22,00	0,783	0,866	
			213 MM#36	20,90	23,00	0,823	0,906	
			214 MM#36	21,90	24,00	0,862	0,944	

For other Minishaft numbers see table on page 7.

LOCKING RANGES FOR DEFAULT MICROSHAFT SET (OPTION)

SHAFT NUMBER	SIZE		JAWS	RANGE [MM]		RANGE [INCH]		SPRING
	[INCH]	[MM]		MIN	MAX	MIN	MAX	
800MM#151	0,354	9,00	301MM#36	10,00	11,00	0,394	0,433	O-7
801MM#151	0,394	10,00	303MM#36	11,00	12,00	0,433	0,472	DW-8,5
805MM#151	0,453	11,00	305MM#36	12,00	13,00	0,472	0,512	DW-10
			307MM#36	13,00	14,00	0,512	0,551	
			309MM#36	14,00	15,00	0,551	0,591	

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MiniMill 201

The MiniMill 201 is a rugged, fast, portable weld end preparation lathe for various tubes including stainless steel and other high chromium alloys. A standard machine comes complete with a 60 mm head, a locking system and includes all jaw sets to cover sizes of 20 to 44 mm (0.787" to 1.732")

IMPORTANT!
Read how to properly lock on page 7

STANDARD SET UP



SHAFT20
Redesigned heavy duty locking system. Shafts and jaws are longer and wider to ensure maximum clamping force. The jaws are self-align.



60 MM (2,36")
The smallest cutter head, designed to fasten the wide range of cutting inserts.



STANDARD WORKING RANGE – RECOMMENDED				OPTIONAL WORKING RANGE			
APPLICATION RANGE		STANDARD LOCKING		APPLICATION RANGE		STANDARD LOCKING	
20 – 51 mm		20 – 48 mm		10 – 51 mm		10 – 48 mm	
0,787 – 2,008"		0,787 – 1,890"		0,394 – 2,008"		0,394 – 1,890"	
FEED STROKE		POWER		FREE SPEED		TORQUE	
20 mm	0,787"	1,3 hp		200 rpm	72 Nm	53 Ft.lbs	
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
55 cfm	1,3 m³/min	2,32"	59 mm	13,1"	335 mm	11,4 Lbs	5,2 kg

EXAMPLE TOOL APPLICATION



Standard locking system with handle feed makes quick work of trimming back tubes.



Completed strength weld removal.



Facing, bevelling tubes quickly and safely.

OPTIONAL HEADS**88 MM (3,46")**

The popular, medium cutter head, designed to fasten the wide range of cutting inserts.

**OBMH**

Outside bevelling of both tubes and pipes. Sized per tube or pipe diameter and angle of required weld bevel.

→ **TABLE PAGE 61**

**SWROTC**

Seal weld removal head over tube circumference prior to re-welding the damaged joint without removing the tube.

TABLE PAGE 62

**STWRMH**

Custom designed head dedicated for strength weld removal. Heads are sized per tube diameter.

→ **TABLE PAGE 60**

OPTIONAL SHAFTS**MICROSHAFT**

A system with interchangeable guide shafts. A complete set covers 9,0 to 15,0 mm inside diameter.

**MINISHAFT**

A system with interchangeable guide shafts. A complete set covers 12,7 to 25 mm inside diameter.

OTHER OPTIONAL ACCESSORIES**FAST CLAMPING SYSTEM**

System offers rapid tube to tube cycle time, increased productivity (up to 4x) with little operator fatigue. Ideal for large amount of end preps.

**SPEED REDUCER**

Easy to use gearbox for 3x speed reduction. Increases the torque, enabling the machine to generate a thick chip whilst reducing the cutting time.

**SPEED ADJUSTMENT VALVE SAV-500**

The solution for all pneumatic drive beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

**LEVER FEED**

Quick and easy feed system. Used in many basic applications.

**RATCHET FEED**

Feed system allowing to work in narrow and tight locations, eg. in water walls.

LOCKING RANGES WITH DEFAULT SHAFT20**STANDARD JAWS SET**

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
20	24	0,787	0,945	NS-0	-	SP-19	1
24	28	0,945	1,102	NS-1	-	SP-19	1
28	33	1,102	1,299	NS-2	-	SP-19	1
33	38	1,299	1,496	NS-3	-	SP-20	2
38	43	1,496	1,693	NS-4	-	SP-20	2
43	48	1,693	1,890	NS-5	-	SP-20	2

LOCKING RANGES FOR DEFAULT MINISHAFT SET (OPTION)

SHAFT NUMBER	SIZE		JAWS	RANGE [MM]		RANGE [INCH]		SPRING
	[INCH]	[MM]		MIN	MAX	MIN	MAX	
901MM#151	12,40	0,492	201MM#36	12,40	14,50	0,488	0,571	DW-11
905MM#151	13,90	0,547	203 MM#36	13,90	16,00	0,547	0,630	DW-12,5
909MM#151	16,80	0,661	205 MM#36	15,90	18,00	0,626	0,709	DW-15,5
			207 MM#36	16,90	19,00	0,665	0,748	
			209 MM#36	18,90	21,00	0,744	0,827	
			211 MM#36	19,90	22,00	0,783	0,866	
			213 MM#36	20,90	23,00	0,823	0,906	
			214 MM#36	21,90	24,00	0,862	0,944	

For other Minishaft numbers see table on page 7.

LOCKING RANGES FOR DEFAULT MICROSHAFT SET (OPTION)

SHAFT NUMBER	SIZE		JAWS	RANGE [MM]		RANGE [INCH]		SPRING
	[INCH]	[MM]		MIN	MAX	MIN	MAX	
800MM#151	0,354	9,00	301MM#36	10,00	11,00	0,394	0,433	O-7
801MM#151	0,394	10,00	303MM#36	11,00	12,00	0,433	0,472	DW-8,5
805MM#151	0,453	11,00	305MM#36	12,00	13,00	0,472	0,512	DW-10
			307MM#36	13,00	14,00	0,512	0,551	
			309MM#36	14,00	15,00	0,551	0,591	

MiniMill 301LP

The fastest and strongest facing machine on the market. Engineered for safety and ease of use, featuring a pneumatic locking system with a double piston cylinder. Compact milling head with double cutting edge inserts with 6% cobalt. For all types of material including: ferrous, non-ferrous, stainless and exotic alloys steel, duplex, inconel and titanium.

IMPORTANT!
Read how to properly lock on page 7

STANDARD SET UP



MINISHAFT
A system with interchangeable guide shafts. A complete set covers 12,4 to 48,0 mm ID tubes.



60 MM (2,36")
The smallest cutter head, designed to fasten the wide range of cutting inserts.



STANDARD WORKING RANGE – RECOMMENDED				OPTIONAL WORKING RANGE			
APPLICATION RANGE		STANDARD LOCKING		APPLICATION RANGE		STANDARD LOCKING	
12,4 – 38,0 mm		12,4 – 24,0 mm		10 – 51 mm		10 – 48 mm	
0,488 – 1,496”		0,488 – 0,945”		0,394 – 2,008”		0,394 – 1,890”	
FEED STROKE		POWER		FREE SPEED		TORQUE	
20 mm	0,787”	1,3 hp		300 rpm		43 Nm	32 Ft.lbs
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
55 cfm	1,3 m³/min	2,32”	59 mm	13,1”	335 mm	15,4 Lbs	7 kg

EXAMPLE TOOL APPLICATION



The fast locking and the handle feed make this system very efficient for heat exchanger manufacturers.

EXAMPLE TOOL APPLICATION



A real application: shortening a bundle. MiniMill can deal with this task quickly and efficiently.



Double sided inserts and fixed diameter heads ensure unsurpassed efficiency and quality. Mechanical stops ensure identical tube projection.

OPTIONAL HEADS**TFMH**

Tube facing milling head for tubes made of any type of material. Utilizes 6% cobalt inserts.

→ TABLE PAGE 60

**MMFH**

Tube facing milling head for tubes made of hardest type of materials. Utilizes carbide inserts with 4 blades.

→ TABLE PAGE 62

**STWRMH**

Head dedicated for strength weld removal. Heads are easy to align and sized per tube diameter.

→ TABLE PAGE 60

OPTIONAL SHAFTS**MICROSHAFT**

A system with interchangeable guide shafts. A complete set covers 9,0 to 15,0 mm inside diameter.

**SHAFT20**

Self-align, heavy duty locking system. Shafts and jaws are longer and wider to ensure maximum clamping force.

OTHER OPTIONAL ACCESSORIES**SPEED ADJUSTMENT VALVE SAV-500**

The solution for all pneumatic drive beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

**SPEED REDUCER**

Easy to use gearbox for 3x speed reduction. Increases the torque, enabling the machine to generate a thick chip whilst reducing the cutting time.

**STAR WHEEL**

The most precise feed system. Used in many basic and demanding applications.

LOCKING RANGES WITH STANDARD SET UP**SHAFT: MINISHAFT**

SHAFT NUMBER	SIZE		JAWS	RANGE [MM]		RANGE [INCH]		SPRING
	[INCH]	[MM]		MIN	MAX	MIN	MAX	
901MM#151	12,40	0,492	201MM#36	12,40	14,50	0,488	0,571	DW-11
905MM#151	13,90	0,547	203 MM#36	13,90	16,00	0,547	0,630	DW-12,5
909MM#151	16,80	0,661	205 MM#36	15,90	18,00	0,626	0,709	DW-15,5
			207 MM#36	16,90	19,00	0,665	0,748	
			209 MM#36	18,90	21,00	0,744	0,827	
			211 MM#36	19,90	22,00	0,783	0,866	
			213 MM#36	20,90	23,00	0,823	0,906	
			214 MM#36	21,90	24,00	0,862	0,944	

For other Minishaft numbers see table on page 7.

LOCKING RANGES FOR DEFAULT MICROSHAFT SET (OPTION)

SHAFT NUMBER	SIZE		JAWS	RANGE [MM]		RANGE [INCH]		SPRING
	[INCH]	[MM]		MIN	MAX	MIN	MAX	
800MM#151	0,354	9,00	301MM#36	10,00	11,00	0,394	0,433	O-7
801MM#151	0,394	10,00	303MM#36	11,00	12,00	0,433	0,472	DW-8,5
805MM#151	0,453	11,00	305MM#36	12,00	13,00	0,472	0,512	DW-10
			307MM#36	13,00	14,00	0,512	0,551	
			309MM#36	14,00	15,00	0,551	0,591	

LOCKING RANGES WITH SHAFT20 (OPTION)

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
20	24	0,787	0,945	NS-0	-	SP-19	1
24	28	0,945	1,102	NS-1	-	SP-19	1
28	33	1,102	1,299	NS-2	-	SP-19	1
33	38	1,299	1,496	NS-3	-	SP-20	2
38	43	1,496	1,693	NS-4	-	SP-20	2
43	48	1,693	1,890	NS-5	-	SP-20	2

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HyperMill 56

Powerful pneumatic tube facing, bevelling and weld removal machine. The HyperMill 56 is a rugged, fast, portable weld end preparation lathe for various tubes and pipes, including stainless steel and other high chromium materials. A standard machine is equipped with a solid locking system to cover most common tube sizes.

STANDARD SET UP



SHAFT30
Self-align, heavy duty locking system. Shafts and jaws are longer and wider to ensure maximum clamping force.



135 MM (5,3")
The large cutter head, very sturdy and rigid, designed to fasten the wide range of cutting inserts.



Heavy duty locking system

STANDARD WORKING RANGE – RECOMMENDED				OPTIONAL WORKING RANGE			
APPLICATION RANGE		STANDARD LOCKING		APPLICATION RANGE		STANDARD LOCKING	
30 – 136 mm		30 – 136 mm		20 – 175 mm		20 – 166 mm	
1,181 – 5,354"		0,181 – 4,354"		0,787 – 6,890"		0,787 – 6,535"	
FEED STROKE		POWER		FREE SPEED		TORQUE	
40 mm	1,6"	1,3 hp		55 rpm		280 Nm	210 Ft.lbs
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
55 cfm	1,3 m³/min	3,22"	82 mm	15"	385 mm	19 Lbs	9 kg

HYPERMILL 56E

HyperMill 56E is electric version of HyperMill 56. The machine can cover the same pipe sizes and comes with the same cutting head. The electric motor made by Makita with 3 stage planetary gear box made by KRAIS has variable speed control and produce enormous torque. Is interchangeable with pneumatic drive and can be purchased separately at any time.

Free Speed58 RPM
Power1500 W
Torque720 Nm (530 Ft.Lbs)
Feed Stroke40 mm (1,6")



EXAMPLE TOOL APPLICATION



OPTIONAL HEADS**116 MM (4,56'')**

The large cutter head, designed to fasten the wide range of cutting inserts.

**175 MM (6,89'')**

Cutter head special for the largest machines, designed to fasten the wide range of cutting inserts.

**HMRBMH**

Head for membrane and overlay removal. Efficiently remove material between boiler tubes.

→ TABLE PAGE 65

OPTIONAL SHAFTS**SHAFT20**

Self-align, heavy duty locking system. Shafts and jaws are longer and wider to ensure maximum clamping force.

**SHAFT25**

Self-align, heavy duty locking system. Shafts and jaws are longer and wider to ensure maximum clamping force.

OTHER OPTIONAL ACCESSORIES**SPEED ADJUSTMENT VALVE SAV-500**

The solution for all pneumatic drive beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

**SPEED REDUCER**

Easy to use gearbox for 3x speed reduction. Increases the torque, enabling the machine to generate a thick chip whilst reducing the cutting time.

**RATCHET FEED**

Feed system allowing to work in narrow and tight locations, eg. in water walls.

**HEAD FLANGE**

Adapter to use all MiniMill's special cutter heads (from size 1-1/2" and up).

LOCKING RANGES WITH DEFAULT SHAFT30**STANDARD JAWS SET FOR DEFAULT SHAFT**

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
30,0	34,0	1,181	1,339	NS-1		SP-29	1
34,0	39,0	1,339	1,535	NS-2		SP-29	1
39,0	44,0	1,535	1,732	NS-3		SP-30	2
44,0	49,0	1,732	1,929	NS-4		SP-30	2
49,0	54,0	1,929	2,126	NS-5		SP-30	2
54,0	59,0	2,126	2,323	NS-6		SP-30	2
59,0	64,0	2,323	2,520	NS-7		SP-30	2
64,0	69,0	2,520	2,717	NS-8		SP-30	2
66,0	71,0	2,598	2,795	NS-5	NS-10	SP-30	2
71,0	76,0	2,795	2,992	NS-6	NS-10	SP-30	2
76,0	81,0	2,992	3,189	NS-7	NS-10	SP-30	2
81,0	86,0	3,189	3,386	NS-8	NS-10	SP-30	2
86,0	91,0	3,386	3,583	NS-5	NS-20	SP-30	2
91,0	96,0	3,583	3,780	NS-6	NS-20	SP-30	2
96,0	101,0	3,780	3,976	NS-7	NS-20	SP-30	2
101,0	106,0	3,976	4,173	NS-8	NS-20	SP-30	2
106,0	111,0	4,173	4,370	NS-5	NS-30	SP-30	2
111,0	116,0	4,370	4,567	NS-6	NS-30	SP-30	2
116,0	121,0	4,567	4,764	NS-7	NS-30	SP-30	2
121,0	126,0	4,764	4,961	NS-8	NS-30	SP-30	2
126,0	131,0	4,961	5,157	NS-5	NS-40	SP-30	2
131,0	136,0	5,157	5,354	NS-6	NS-40	SP-30	2

OPTIONAL JAWS FOR DEFAULT SHAFT

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
136,0	141,0	5,354	5,551	NS-7	NS-40	SP-30	2
141,0	146,0	5,551	5,748	NS-8	NS-40	SP-30	2
146,0	151,0	5,748	5,945	NS-5	NS-50	SP-30	2
151,0	156,0	5,945	6,142	NS-6	NS-50	SP-30	2
156,0	161,0	6,142	6,339	NS-7	NS-50	SP-30	2
161,0	166,0	6,339	6,535	NS-8	NS-50	SP-30	2

LOCKING RANGES WITH SHAFT25 (OPTION)

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
25,0	30,0	0,984	1,181	NS-1		SP-24	1
30,0	35,0	1,181	1,378	NS-2		SP-24	1
35,0	40,0	1,378	1,575	NS-3		SP-25	2
40,0	45,0	1,575	1,772	NS-4		SP-25	2
45,0	50,0	1,772	1,969	NS-5		SP-25	2
50,0	55,0	1,969	2,165	NS-6		SP-25	2
55,0	60,0	2,165	2,362	NS-7		SP-25	2
60,0	65,0	2,362	2,559	NS-8		SP-25	2
62,0	67,0	2,441	2,638	NS-5	NS-10	SP-25	2
67,0	72,0	2,638	2,835	NS-6	NS-10	SP-25	2
72,0	77,0	2,835	3,031	NS-7	NS-10	SP-25	2
77,0	82,0	3,031	3,228	NS-8	NS-10	SP-25	2
82,0	87,0	3,228	3,425	NS-5	NS-20	SP-25	2
87,0	92,0	3,425	3,622	NS-6	NS-20	SP-25	2
92,0	97,0	3,622	3,819	NS-7	NS-20	SP-25	2
97,0	102,0	3,819	4,016	NS-8	NS-20	SP-25	2

LOCKING RANGES WITH SHAFT20 (OPTION)

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
20,0	24,0	0,787	0,945	NS-0		SP-19	1
24,0	28,0	0,945	1,102	NS-1		SP-19	1
28,0	33,0	1,102	1,299	NS-2		SP-19	1
33,0	38,0	1,299	1,496	NS-3		SP-20	2

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Auto MiniMill 101P

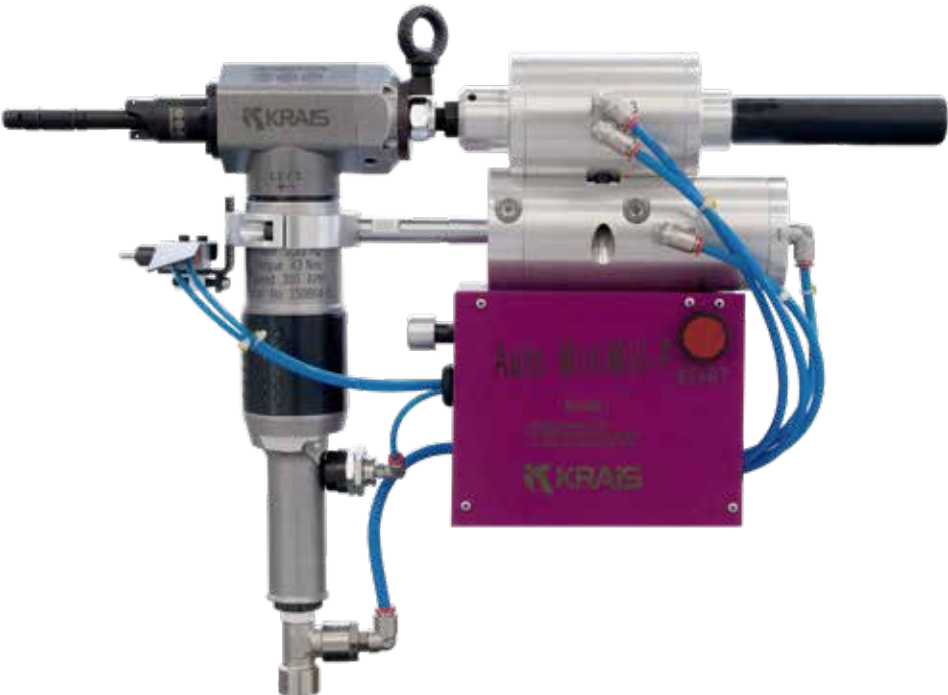
Auto MiniMill 101P is a fully automatic machine, controlled by a built-in, fully pneumatic control box, with adjustable feed rate and actuated by a hand button (foot switch optional). Ideal for repetitive work cycles on condensers and heat exchangers, as well as for bevelling and facing boiler tubes (100 Rpm configuration). AutoMiniMill 101P is specially designed for trimming and weld removal. This tool is based on the MiniMill 101; it is a fast facing and end preparation lathe designed for various tubes including stainless and other high chromium alloys. It works with all MiniMill 101 compatible cutter heads.

IMPORTANT!
Read how to properly lock on page 7

STANDARD SET UP



TFMH
Tube facing milling head for tubes made of any type of material. Utilizes 6% cobalt inserts.
→ **TABLE PAGE 58**



STANDARD WORKING RANGE – RECOMMENDED		FEED STROKE	FREE SPEED	POWER	TORQUE		
APPLICATION RANGE	STANDARD LOCKING						
25 - 89 mm	25 - 77 mm	20 mm	100 Rpm	1,3 Hp	140 Nm		
0,984 - 3,504"	0,984 - 3,031"	0,787"			105 Ft.Lbs		
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
55 cfm	1,3 m³/min	2,32"	59 mm	13,1"	335 mm	25 Lbs	11,5 kg

OTHER



SPEED ADJUSTMENT VALVE SAV-500
The solution for all pneumatic drove beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

EXAMPLE TOOL APPLICATION



Auto MiniMill 301P

Auto MiniMill 301P is a fully automatic machine, controlled by a built-in, fully pneumatic control box, with adjustable feed rate and actuated by a hand button (foot switch optional).

Ideal for repetitive work cycles on condensers and heat exchangers, as well as for bevelling and facing boiler tubes (100 Rpm configuration). AutoMiniMill 301P is specially designed for trimming and weld removal. This tool is based on the MiniMill 301; it is a fast facing and end preparation lathe designed for various tubes including stainless and other high chromium alloys. It works with all MiniMill 301 compatible cutter heads.

IMPORTANT!

Read how to properly lock on page 7

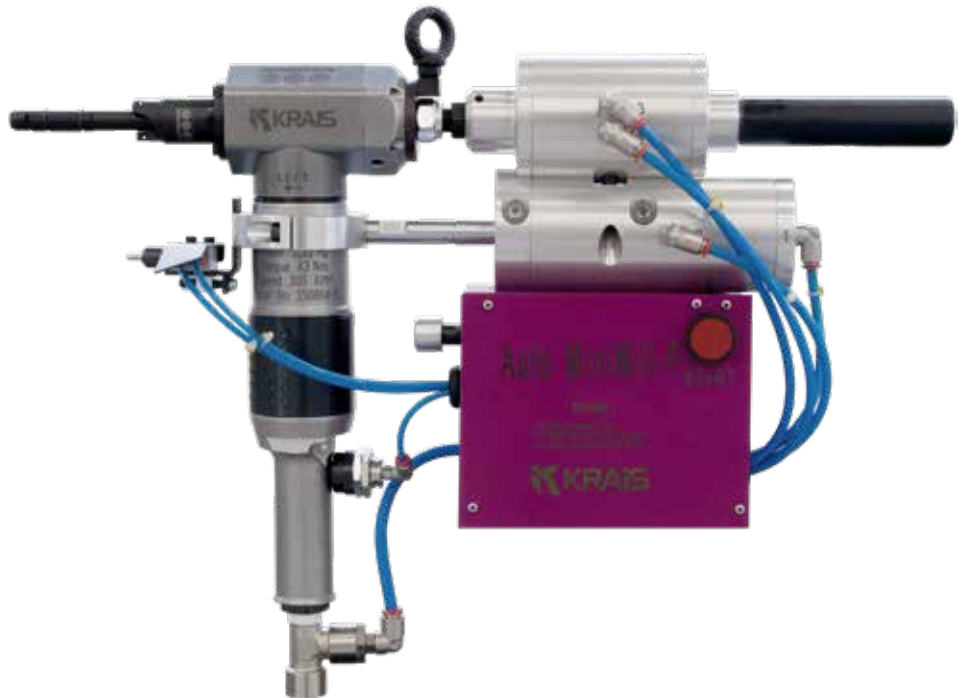
STANDARD SET UP



TFMH

Tube facing milling head for tubes made of any type of material. Utilizes 6% cobalt inserts.

→ TABLE PAGE 58



STANDARD WORKING RANGE – RECOMMENDED		FEED STROKE	FREE SPEED	POWER	TORQUE		
APPLICATION RANGE	STANDARD LOCKING						
12,4 - 38,0 mm	12,4 - 24,0 mm	20 mm	300 Rpm	1,3 Hp	43 Nm		
0,488 - 1,496"	0,488 - 0,945"	0,787"			32 Ft.Lbs		
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
55 cfm	1,3 m³/min	2,32"	59 mm	131"	335 mm	25 Lbs	11,5 kg

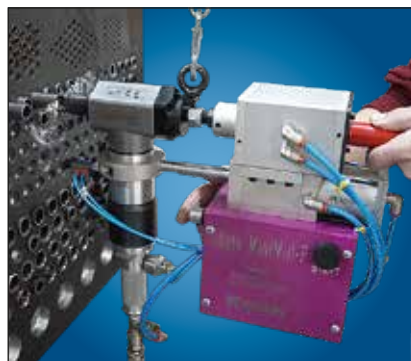
OTHER



SPEED ADJUSTMENT VALVE SAV-500

The solution for all pneumatic drove beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

EXAMPLE TOOL APPLICATION



PanelMill

The PanelMill attaches to the tube outside diameter by means of custom or specific clamp type jaws that provide strong clamping action that minimizes chatter and vibration.

Rugged construction allows the tool's cutting blade to end prep quickly. Several cutter heads are available for tubes with up to 2-1/2" O.D. Both the clamp and cutter heads are extremely durable and easy to change.

The ratchet feed arm enables the operator to comfortably feed the tool during bevelling or facing. The PanelMill is suitable for small bore heavy wall tubes with a high percentage of chrome, stainless steel, and other exotic alloys. Standard and custom made blades are offered in a wide variety of angles and sizes.



STANDARD WORKING RANGE		FEED STROKE	FREE SPEED	TORQUE			
MODEL	APPLICATION RANGE						
PANEMILL 63	19 - 63 mm	25 mm	100 Rpm (Opt. 35, 200, 300)	140 Nm			
	0,75 - 2,50"	1,0"		105 Ft.Lbs			
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
55 cfm	1,3 m³/min	1,96"	50 mm	13,1"	300 mm	22 Lbs	10 kg

STANDARD WORKING RANGE		FEED STROKE	FREE SPEED	TORQUE			
MODEL	APPLICATION RANGE						
PANEMILL 100	50 - 102 mm	25 mm	100 Rpm (Opt. 40)	140 Nm			
	2 - 4"	1,0"		105 Ft.Lbs			
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
42,4 cfm	1,2 m³/min	3,11"	79 mm	13,77"	350 mm	40 Lbs	18 kg

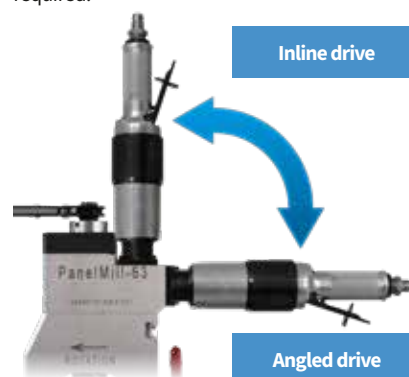
MACHINING IN EVERY POSITION

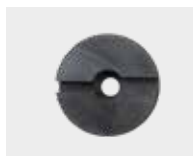


PanelMill can be rotated through 180 degrees to work in every position. Machine can be used for standard beveling application and for opposite tubes.

UNIVERSAL DRIVE PLACEMENT

Adjustable drive position is a standard feature of this machine. No additional components are required.

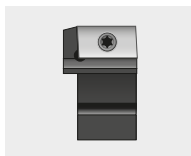


UNIVERSAL CUTTER HEADS**50 MM (1,97")**

Head supplied with PanelMill 63. Designed to fasten wide range of cutting inserts.

**63 MM (2,48")**

Head supplied with PanelMill 100. Designed to fasten wide range of cutting inserts.

**BIT & HOLDERS**

Universal cutter heads can hold a wide range of holders, with a bunch types of bits.

→ TABLE PAGE 71

OPTIONAL HEADS**OBPMH**

Head for bevelling tubes without membranes in the boiler water walls.

→ TABLE PAGE 65

**PMRBMH**

Head for membrane and overlay removal. Efficiently remove material between boiler tubes.

→ TABLE PAGE 65

OTHER OPTIONS**SPEED ADJUSTMENT VALVE SAV-500**

The solution for all pneumatic drive beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

JAWS FOR PANELMILL

JAWS NO.	TUBE OD	
	[MM]	[INCH]
300 PM#2	19,05	0,750
301 PM#2	20,00	0,787
304 PM#2	22,20	0,874
308 PM#2	25,40	1,000
309 PM#2	25,00	0,984
312 PM#2	28,80	1,134
313 PM#2	30,00	1,181
314 PM#2	31,70	1,248
318 PM#2	34,90	1,374
322 PM#2	38,10	1,500
326 PM#2	44,40	1,748
330 PM#2	50,80	2,000
331 PM#2	51,00	2,008
334 PM#2	57,10	2,248
338 PM#2	60,30	2,374
342 PM#2	63,50	2,500
346 PM#2	76,20	3,000

PANELMILL-E

PanelMill E is electric version of PanelMill. A standard machine cover the same pipe sizes and comes with the same cutting head. The electric motor made by Makita with 3 stage planetary gear box made by KRAIS has variable speed control and produce enormous torque. Is interchangeable with pneumatic drive and can be purchased separately at any time.

Free Speed 115 RPM
 Power 1,1 Hp
 Torque 366 NM (280 Ft.Lbs)
 Feed Stroke 20 mm (0,787")



PanelMill PF

The first one in the world! OD clamp pipe bevelling machine with Positive Feed.

KRAIS PanelMill PF is the first machine where the bevelling cycle time is not dependent on an operator efficiency but on the machine mechanism. Both, the feed mechanism and the spindle rotation mechanism are driven from one source. A fixed rate of spindle advancement is achieved for each rotation of the spindle so every stroke cycle is predictable. The standard machine has 35 mm feed stroke (longer ones are available as option).

PanelMill PF – positive feed bevelling machine, is highly recommended for tube end facing, bevelling, and membrane milling in water wall panels. As well as for the tube end preparation in the boiler and heat exchanger industry and FAB shops.

STANDARD SET UP



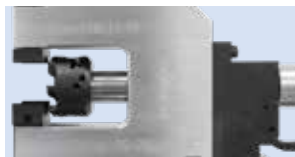
CUTTER HEAD 66 MM

Cutter head thanks to special way of fixing with spindle can cover full range from 0 to 76 mm



3" CLAMPS

Standard machine clamps allows for machining tubes up to 3" with 35 mm positive feed range.



35 MM SPINDLE

Heavy duty 35 mm (1-3/8") diameter spindle. The best stability and rigidity available on the market within this machine sizes!



STANDARD WORKING RANGE			OPTIONAL WORKING RANGE		
APPLICATION	FEED STROKE	FEED PER REV.	APPLICATION	FEED STROKE	FEED PER REV.
19,05 - 76,20 mm	35 mm	0,1 mm	51 - 114 mm	35 mm	0,1 mm
0,75 - 3,00"	1,377"	0,003"	2,00 - 4,50"	1,377"	0,003"
POWER	FREE SPEED	TORQUE	POWER	FREE SPEED	TORQUE
2,2 hp	125 Rpm	300 Nm	2,2 Hp	100 Rpm	360 Nm

STANDARD CLAMPING JAWS

JAWS NO.	TUBE OD	
	[MM]	[INCH]
308 PM#2	25,40	1,000
314 PM#2	31,70	1,248
322 PM#2	38,10	1,500
330 PM#2	50,80	2,000
342 PM#2	63,50	2,500
346 PM#2	76,20	3,000

OPTIONAL CLAMPING JAWS

JAWS NO.	TUBE OD	
	[MM]	[INCH]
300 PM#2	19,05	0,750
301 PM#2	20,00	0,787
304 PM#2	22,20	0,874
309 PM#2	25,00	0,984
312 PM#2	28,80	1,134
313 PM#2	30,00	1,181
318 PM#2	34,90	1,374
326 PM#2	44,40	1,748
331 PM#2	51,00	2,008
334 PM#2	57,10	2,248
338 PM#2	60,30	2,374

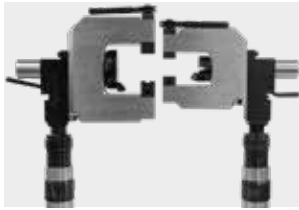
PANELMILL PF-E

PanelMill PF can be driven by electric motor. Thus equipped machine covers the same working range but gets much more mobility. We offer two drives with different free speed. Both of them are run by Makita motor and use planetary gear Box's made by KRAIS. It has variable speed control and produce enormous torque. Electric drives are interchangeable with pneumatic one and can be purchased separately at any time.

PanelMill Size	3"	4,5"
Type:	ED600	ED240
Free speed:	220 Rpm	110 Rpm
Power:	1500 W	1500 W
Torque:	360 Nm	420 Nm
Gearbox:	2-stage	3-stage



OPTIONAL PARTS AND ACCESSORIES



4,5" CLAMP

The bigger 4,5" clamp to increase PanelMill PF capacity up to 114 mm (4,5"). With this clamp the machine covers tube range from 51 to 114 mm (2-4,5").



LONG FEED STROKE

Special version of clamps and sindle with longer feed stroke. Depending on the application, there is a possibility to build machine with stroke even up to 4". Please consult with factory if you have an application that needs even longer feed.



BENCH MOUNT PLATE (BMP)

PanelMill PF is not the only portable tool for on site applications! Thanks to Bench Mount Plate, it is possible to attach it to the table/worktop. A table base allows you to convert PanelMill-PF to a table machine for bevelling pipes, stubs or elbows. This is only available for 4,5" clamp only.

TWO VARIANTS



RIGHT-ANGLE AND IN-LINE

PanelMill-PF is available in two versions: right angle and in-line. Depending on application and preferences you can choose the version, which suits better for your needs. Both models have exactly the same parameters.

UNIVERSAL CUTTER HEADS



PMH-PF-66

66 MM (2,598")
Head supplied with PanelMill 3". Designed to fasten wide range of cutting inserts.



PMH-PF-99

99 MM (3,897")
Head supplied with PanelMill 4,5". Designed to fasten wide range of cutting inserts.



BIT & HOLDERS

Universal cutter heads can hold a wide range of holders, with a bunch types of bits.
→ **TABLE PAGE 71**



PRRMBH-PF

Membrane removal and overlay head with carbide bits.
→ **TABLE PAGE 66**



CRH-PF

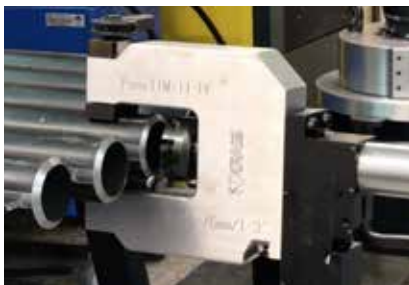
Cladding removal head with carbide bits.
→ **TABLE PAGE 66**



OBPMH-PF

Outside bevelling head (37,5°) for tubes without membranes, with HSS 6% cobalt bits.
→ **TABLE PAGE 66**

PANELMILL PF PERFORMANCE



Facing/beveling application



Membrane removal application on 1" length



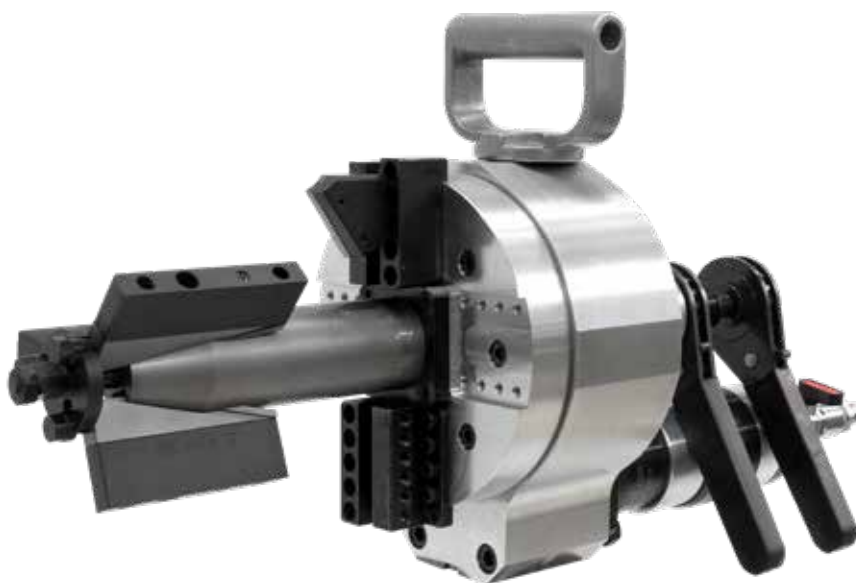
Inconel cladding removal application on 1" length

SmartMill-7

Most powerful machine within this size range on the market today. Utilizes a powerful 2.2 kW (3 HP) pneumatic motor that is entirely engineered and manufactured by KRAIS. SmartMill-7 has a unique construction that has been specifically designed for the largest end prep systems.

- Self-centering 40 mm (1,57") one piece locking shaft.
- Only one mandrel and 6 Jaw sets needed to cover machines entire range.
- Wide clamps produce superior clamping force for chatter free end preps.
- Fully portable for on-site and Fab-shop work.

SmartMill-7 is available for sale or rent.



STANDARD WORKING RANGE				FEED STROKE	FREE SPEED	POWER	TORQUE
APPLICATION RANGE		LOCKING RANGE					
40 - 219 mm		40 - 203,5 mm		50 mm	39 Rpm	3,0 hp	930 Nm
1,574 - 8,622"		1,574 - 8,012"		2"			697 Ft.Lbs
AIR USE		AIR PRESSURE		BODY DIMENSIONS		BODY WEIGHT	
75 cfm	2,2 m³/min	90 PSI	6,2 Bar	22 x 9,25 x 7,48"	560 x 235 x 190 mm	46 Lbs	21 kg

LOCKING RANGES WITH STANDARD JAWS

JAWS: SM-7

RANGE [MM]		RANGE [INCH]		SEGMENTS		
MIN	MAX	MIN	MAX	SM-42-0	SM-42-1	ML-42-A
40,0	55,0	1,575	2,165	SM-42-0		
55,0	69,5	2,165	2,736		SM-42-1	
69,5	84,0	2,736	3,307		SM-42-1	ML-42-A-75
84,0	98,5	3,307	3,878		SM-42-1	ML-42-A-150
98,5	113,5	3,878	4,469		SM-42-1	ML-42-A-225
113,5	128,5	4,469	5,059		SM-42-1	ML-42-A-300
128,5	143,5	5,059	5,650		SM-42-1	ML-42-A-300 ML-42-A-75
143,5	158,5	5,650	6,240		SM-42-1	ML-42-A-300 ML-42-A-150
158,5	173,5	6,240	6,831		SM-42-1	ML-42-A-300 ML-42-A-225
173,5	188,5	6,831	7,421		SM-42-1	ML-42-A-300 ML-42-A-225 ML-42-A-75
188,5	203,5	7,421	8,012		SM-42-1	ML-42-A-300 ML-42-A-225 ML-42-A-150

OPTIONAL ELECTRIC MOTOR UNIT

SmartMill-7E is electric version of SmartMill-7. The machine can cover the same pipe sizes and comes with the same cutting head. The electric motor with 4 speed mechanical gear box has also variable speed control and produce enormous torque on the cutter blade. Is interchangeable with pneumatic drive and can be purchased separately at any time. Take 5 min to replace from pneumatic to electric.



DUDE-2000-4-SPEED

Motor free speed: 120-210-380-650 RPM

Motor power: 2000 Watt

Motor torque (on the 1st gear): 240 Nm (180 Ft.Lbs)

Machine feed stroke: 50 mm (2")

Cutter head speed: 8-14-25-43 rpm

Max torque on cutter blade (on the 1st gear): 3600 Nm (2664 Ft.Lbs)

ADVANTAGES OF MINIMILL-7**UNIQUE SHAFT DESIGN**

40 mm (1,57") shaft, assures rigidity when machining heavy wall pipe. Only 6 set of jaws needed to cover the full locking range.

**POWERFUL MOTOR UNIT**

SmartMill-7 is powered by powerful and efficient drives dedicated for our Lathe series beveling machines. 39 rpm and 930 Nm (697 Ft.Lbs) torque on the cutter blade is a standard feature.

**HEAVY DUTY HANDLE**

Machine is equipped with a solid and convenient aluminium handle.

**LIGHTWEIGHT AND PORTABLE**

The innovative design made it possible to produce lightweight and portable machine. Small weight of SmartMill-7 allows for fatigue-free operation in all conditions.

OTHER ACCESSORIES**RIGHT ANGLE HEAD**

This right angle head allows for fastening drive in alternate positions. The useful option in tight spaces.

SMARTMILL-7 PERFORMANCE

The performance of the machine may vary depending on the skill of the operator, the materials, the conditions of the tools and the air supply system in case of pneumatic unit.



SmartMill-7 is lightweight for its power and capacity and easy to handle by operator.



PipeMill

PipeMill is a pneumatic powered tube facing, bevelling and weld removal machine. The PipeMill is a rugged, fast and powerful weld end preparation lathe for various pipes including stainless steel and other exotic alloys. A standard machine is equipped with a locking system to cover sizes of 50,8 to 172 mm ID (2.000" to 6.800") with a 250 mm cutting head.

STANDARD SET UP



250 MM (9,8")

Cutter head special for the largest machines. Very rigid. Designed to fasten the wide range of cutting inserts.



STANDARD WORKING RANGE – RECOMMENDED				OPTIONAL WORKING RANGE			
APPLICATION RANGE		STANDARD LOCKING		APPLICATION RANGE		STANDARD LOCKING	
50 – 279 mm		50 – 319 mm		50 – 319 mm		50 – 319 mm	
1,968 – 10,984”		1,968 – 12,559”		1,968 – 12,559”		1,968 – 12,559”	
FEED STROKE		POWER		FREE SPEED		TORQUE	
50 mm	1,968”	1,3 hp		Depends on gear			
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
70 cfm	2,2 m³/min	5,7”	145 mm	21,5”	550 mm	52,9 Lbs	24 kg

LOCKING RANGES WITH STANDARD JAWS

JAWS: SM-42

RANGE [MM]		RANGE [INCH]		EXTENSIONS		
MIN	MAX	MIN	MAX	A	B	C
50,0	65,0	1,969	2,559			
65,0	80,0	2,559	3,150	ML-42-A-75		
80,0	95,0	3,150	3,740	ML-42-A-150		
95,0	110,0	3,740	4,331	ML-42-A-225		
110,0	125,0	4,331	4,921	ML-42-A-300		
125,0	140,0	4,921	5,512	ML-42-A-375		
140,0	155,0	5,512	6,102			SML-42-C
155,0	170,0	6,102	6,693	ML-42-A-75		SML-42-C
170,0	184,5	6,693	7,264	ML-42-A-150		SML-42-C
184,5	199,0	7,264	7,835	ML-42-A-225		SML-42-C
199,0	214,0	7,835	8,425	ML-42-A-300		SML-42-C
214,0	229,0	8,425	9,016	ML-42-A-375		SML-42-C
229,0	244,5	9,016	9,626		ML-42-B	SML-42-C
244,5	259,5	9,626	10,217	ML-42-A-75	ML-42-B	SML-42-C
259,5	274,0	10,217	10,787	ML-42-A-150	ML-42-B	SML-42-C
274,0	289,0	10,787	11,378	ML-42-A-225	ML-42-B	SML-42-C
289,0	304,0	11,378	11,969	ML-42-A-300	ML-42-B	SML-42-C
304,0	319,0	11,969	12,559	ML-42-A-375	ML-42-B	SML-42-C

AVAILABLE GEARBOX CONFIGURATIONS

This tool comes with one chosen gearbox as a standard. Torque/speed depends on gear configuration:

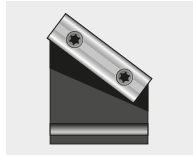
GEARBOX 15	15 RPM	2544 Nm	1908 Ft.Lbs
GEARBOX 20	20 RPM	1883 Nm	1415 Ft.Lbs
GEARBOX 28	28 RPM	1290 Nm	969 Ft.Lbs
GEARBOX 37	37 RPM	971 Nm	730 Ft.Lbs

OPTIONAL HEADS AND CUTTERS



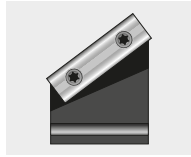
290 MM (11,4'')

Biggest head for KRAIS Mini&HyperMill tools. Very rigid. Designed to fasten the wide range of cutting inserts.



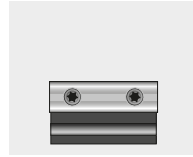
OB-45-37

Holder for outside tube beveling.



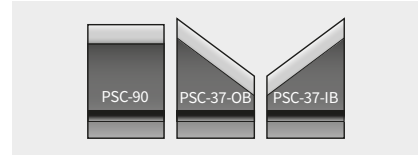
IB-45-37

Holder for inside tube beveling.



F-45-90

Holder for tube end facing..



CUTTERS SET

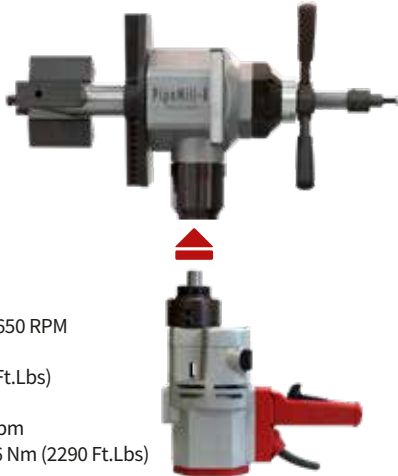
Cutters made of HSS with 6% cobalt, for use without additional holders.

PIPEMILL-E – ELECTRIC VERSION

PipeMill-E is electric version of PipeMill. The machine can cover the same pipe sizes and comes with the same cutting head. The electric motor with 4 speed mechanical gear box has also variable speed control and produce enormous torque on the cutter blade. Is interchangeable with pneumatic drive and can be purchased separately at any time. Take 5 min to replace from pneumatic to electric.

DUDE-2000-4-SPEED

Motor free speed	120-210-380-650 RPM
Motor power	2000 Watt
Motor torque (on the 1st gear)	240 Nm (180 Ft.Lbs)
Machine feed stroke.....	40 mm (1,6'')
Cutter head speed	10-17-30-50 rpm
Max torque on cutter blade (on the 1st gear)	3096 Nm (2290 Ft.Lbs)



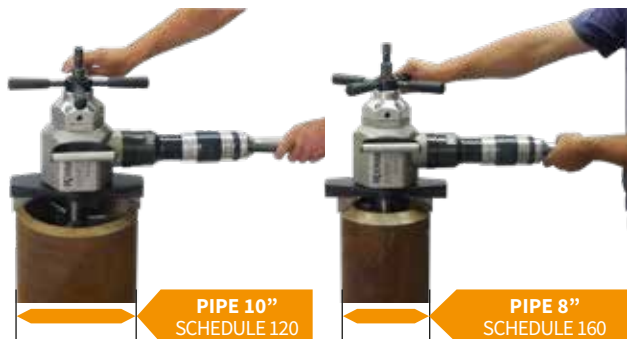
OTHER



SPEED ADJUSTMENT VALVE SAV-500

The solution for all pneumatic drive beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

EXAMPLE TOOL APPLICATION



MiniLathe

- Most powerful machine within this size range on the market today. Utilises a powerful 2.2kW (3 HP) pneumatic motor that is entirely engineered and manufactured by KRAIS for the largest end prep systems.
- MiniLathe comes with one of 3 gearboxes as a standard. It gives a wide choice for operator. No need for extra gearbox that reduces the RPM and multiplies the torque - it comes as standard!
- Innovative 6 point locking system assures maximum stability during all machining operations.
- Self-centering 2,75" one piece locking shaft with build in jaws, eliminates the issue of broken or loosening retaining springs and o-rings.
- Only one mandrel and 10 Jaw sets needed to cover machines entire range.
- Wide clamps produce superior clamping force for chatter free end preps.
- Fully portable for on-site and Fab-shop work.
- Available for sale or rent.



STANDARD WORKING RANGE*		FEED STROKE	POWER	FREE SPEED	TORQUE		
APPLICATION RANGE	LOCKING RANGE (ID)						
72 - 406 mm	70 - 400 mm	50 mm	3,0 Hp	DEPENDS ON GEARBOX			
2,800 - 16,000"	2,755 - 15,700"	2"					
AIR USE		AIR PRESSURE		BODY DIMENSIONS		BODY WEIGHT	
70 cfm	2,2 m³/min	90 PSI	6,2 Bar	25 x 13 x 12"	640 x 330 x 300 mm	75 Lbs	35 kg

* other capacity and locking range are available – please consult factory!

LOCKING RANGES WITH STANDARD JAWS

JAWS: ML-42

RANGE [MM]		RANGE [INCH]		SEGMENT		
MIN	MAX	MIN	MAX	A	B	C
70	85	2,756	3,346			
85	100	3,346	3,937	ML-42-A-75		
100	115	3,937	4,528	ML-42-A-150		
115	130	4,528	5,118	ML-42-A-225		
130	145	5,118	5,709	ML-42-A-300		
145	160	5,709	6,299	ML-42-A-375		
160	175	6,299	6,890			ML-42-C
175	190	6,890	7,480	ML-42-A-75		ML-42-C
190	205	7,480	8,071	ML-42-A-150		ML-42-C
205	220	8,071	8,661	ML-42-A-225		ML-42-C
220	235	8,661	9,252	ML-42-A-300		ML-42-C
235	250	9,252	9,843	ML-42-A-375		ML-42-C
250	265	9,843	10,433		ML-42-B	ML-42-C
265	280	10,433	11,024	ML-42-A-75	ML-42-B	ML-42-C
280	295	11,024	11,614	ML-42-A-150	ML-42-B	ML-42-C
295	310	11,614	12,205	ML-42-A-225	ML-42-B	ML-42-C
310	325	12,205	12,795	ML-42-A-300	ML-42-B	ML-42-C
325	340	12,795	13,386	ML-42-A-375	ML-42-B	ML-42-C
340	355	13,386	13,976	ML-42-A-300 ML-42-A-150	ML-42-B	ML-42-C
355	370	13,976	14,567	ML-42-A-300 ML-42-A-225	ML-42-B	ML-42-C
370	385	14,567	15,157	ML-42-A-375 ML-42-A-225	ML-42-B	ML-42-C
385	400	15,157	15,748	ML-42-A-375 ML-42-A-300	ML-42-B	ML-42-C

AVAILABLE GEARBOX

This tool comes with one of 3 gearboxes as a standard. Torque/speed depends on gear configuration.

GEARBOX 11	11 RPM	3850 Nm	2840 Ft.Lbs
GEARBOX 15	15 RPM	2615 Nm	1960 Ft.Lbs
GEARBOX 21	21 RPM	1770 Nm	1327 Ft.Lbs

AVAILABLE HOLDERS

Facing (2CDI insert) F-45-90	Inside beveling and boring (2CDI insert) IB-45-37 IB-45-10	Outside beveling (2CDI insert) OB-45-45 OB-45-37 OB-45-30 OB-45-10	J beveling (2CDJ-Rxx insert) JP-45-45 JP-45-37 JP-45-30	Compound Beveling (CB-45 insert) CB-10/37 (others on request)

ADVANTAGES OF MINILATHE



UNIQUE SHAFT DESIGN

70 mm (2,75") shaft, assures rigidity when machining heavy wall pipe. The jaws are fully contained within the shaft with no need for retaining springs or O-rings that easily brake or get lost.



POWERFUL MOTOR UNIT

Powerful and efficient drives dedicated for our Lathe series beveling machines. 11 rpm and 3850 Nm (2840 Ft.Lbs) torque on the cutter blade is a standard feature.



6 POINTS LOCKING JAWS

The innovative, 6 points jaws, effectively lock the machine within the pipe, allowing safe, efficient and smooth processing of the tube end.



HEAVY DUTY PENDANT

Machine is equipped with a heavy duty pendant. This can be attached to both sides of the motor for operator convenience.

OTHER ACCESSORIES



SLIDE BEARING

As an option we can supply a bronze slide bearing that delivers more stability and rigidity while machining a very hard materials and heavy wall pipes.

OPTIONAL MOTOR UNITS



DUDE-2000-4-SPEED

For thin wall application (up to 1" / 25,4 mm) is an electric motor DUDE-2000-4-SPEED, which offers 4 speed: 120-210-380-650 RPM



PDE MOTOR

The PipeLathe can also be supplied as an electric version, with a 3200 Watt heavy duty motor.



PDH MOTOR

Optional super strong hydraulic motor. Constructed on the basis of a small hydraulic motor and multistage planetary gear box. HyperLathe version generates 11 rpm and up to 8200 Nm (6050 Ft.Lbs) torque on cutter blade at constant cutting speed.

EXAMPLE TOOL APPLICATION



In order to facilitate the assembly of the machine in the pipe, the machine optionally can be equipped with a double-sided yoke with removable extensions so that two people can freely install into the processed pipe.

HyperLathe

- Powerful 3.5 HP pneumatic drive generating 7500 Nm (5,530 ft.lbs) torque on the cutter blade. Variable speed control 0-10 rpm.
- No need for extra gear box that reduces the rpm and multiplies the torque. It comes as standard!
- 4" One piece locking shaft with build in jaws, eliminates the issue of broken or loosening retaining springs and o-rings
- One mandrel covers complete working range.
- Innovative 6 point locking system assures maximum stability during all machining operations.
- Only one mandrel and 10 Jaw sets needed to cover machines entire range.
- Self-centering shaft with build in jaws.
- Wide Clamps produce superior clamping force for chatter free end preps.
- Fully portable for on-site and Fab-shop work.
- Available for sale or rent.



STANDARD WORKING RANGE				FEED STROKE	FREE SPEED	POWER	TORQUE
APPLICATION RANGE		LOCKING RANGE (ID)					
105 - 508 mm		100 - 460 mm		60 mm	10 Rpm	3,5 Hp	7500 Nm
4,0 - 20,0"		3,937 - 18,110"		2,4"			5530 Ft.Lbs
AIR USE		AIR PRESSURE		BODY DIMENSIONS		BODY WEIGHT	
85 cfm	2,8 m³/min	90 PSI	6,2 Bar	31 x 17 x 16"	800 x 425 x 400 mm	185 Lbs	84 kg

LOCKING RANGES WITH STANDARD JAWS

JAWS: HL-42

RANGE [MM]		RANGE [INCH]		SEGMENT		
MIN	MAX	MIN	MAX	A	B	C
100	120	3,937	4,724			
120	140	4,724	5,512	HL-42-A-100		
140	160	5,512	6,299	HL-42-A-200		
160	180	6,299	7,087	HL-42-A-300		
180	200	7,087	7,874	HL-42-A-400		
200	220	7,874	8,661	HL-42-A-500		
220	240	8,661	9,449		HL-42-B	
240	260	9,449	10,236	HL-42-A-100	HL-42-B	
260	280	10,236	11,024	HL-42-A-200	HL-42-B	
280	300	11,024	11,811	HL-42-A-300	HL-42-B	
300	320	11,811	12,598	HL-42-A-400	HL-42-B	
320	340	12,598	13,386	HL-42-A-500	HL-42-B	
340	360	13,386	14,173			HL-42-C
360	380	14,173	14,961	HL-42-A-100		HL-42-C
380	400	14,961	15,748	HL-42-A-200		HL-42-C
400	420	15,748	16,535	HL-42-A-300		HL-42-C
420	440	16,535	17,323	HL-42-A-400		HL-42-C
440	460	17,323	18,110	HL-42-A-500		HL-42-C

AVAILABLE HOLDERS

Facing (2CDI insert) F-45-90	Inside beveling and boring (2CDI insert)	Outside beveling (2CDI insert)	J beveling (2CDJ-Rxx insert)	Compound Beveling (CB-45 insert)
	IB-45-37 IB-45-10	OB-45-45 OB-45-37 OB-45-30 OB-45-10	JP-45-45 JP-45-37 JP-45-30	CB-10/37 (others on request)

ADVANTAGES OF HYPERLATHE



6 POINT LOCKING JAWS

The Innovative, 6 points jaws, effectively lock the machine within the pipe, allowing safe, efficient and smooth processing of the tube end.



POWERFUL MOTOR UNIT

Powerful and efficient drives dedicated for our Lathe series beveling machines. 10 rpm and 7500 Nm (5530 Ft.Lbs) torque on the cutter blade is a standard feature.



UNIQUE SHAFT DESIGN

100 mm (4") shaft, assures rigidity when machining heavy wall pipe. The jaws are fully contained within the shaft with no need for retaining springs or O-rings that easily brake or get lost.



HEAVY DUTY PENDANT

Machine is equipped with a heavy duty pendant. This can be attached to both sides of the motor for operator convenience.

OPTIONAL MOTOR UNITS



PDE MOTOR

The PipeLathe can also be supplied as an electric version, with a 3200 Watt heavy duty motor.



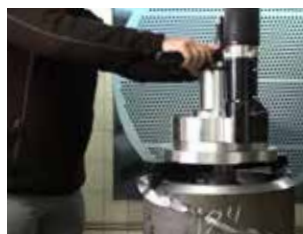
PDH MOTOR

Optional super strong hydraulic motor. Constructed on the basis of a small hydraulic motor and multistage planetary gear box. HyperLathe version generates 11 rpm and up to 8200 Nm (6050 Ft.Lbs) torque on cutter blade at constant cutting speed.

EXAMPLE TOOL APPLICATION



ID Clamping End Prep Tool 4" I.D. to 19" O.D. 101,4 mm I.D. to 500,0 mm O.D.



Machining pipe 18" schedule 160.



PipeLathe

- Powerful 3.5 HP pneumatic drive generating 12500 Nm (9259 ft.lbs) torque on the cutter blade. Variable speed control 0-5 rpm.
- No need for extra gear box that reduces the rpm and multiplies the torque. It comes as standard!
- 150 mm (5,9") One piece locking shaft with build in jaws, eliminates the issue of broken or loosening retaining springs and o-rings.
- One mandrel covers complete working range.
- Innovative 6 point locking system assures maximum stability during all machining operations.
- Only one mandrel and 6 Jaw sets needed to cover machines entire range.
- Self-centering shaft with build in jaws.
- Wide Clamps produce superior clamping force for chatter free end preps.
- Fully portable for on-site and Fab-shop work.
- Available for sale or rent.



STANDARD WORKING RANGE – RECOMMENDED				OPTIONAL WORKING RANGE			
APPLICATION RANGE		LOCKING RANGE (ID)		APPLICATION RANGE		LOCKING RANGE (ID)	
180 - 609 mm		175 - 600 mm		180 - 1016		175 - 972 mm	
7,0 - 24,0"		6,889 - 23,6"		7,0 - 40"		6,9 - 38,3"	
FEED STROKE		POWER		FREE SPEED		TORQUE	
60 mm	2,4"	3,5 hp		5 Rpm		12500 Nm	9219 Ft.lbs
AIR USE		AIR PRESSURE		BODY DIMENSIONS		BODY WEIGHT	
85 cfm	2,8 m³/min	90 PSI	6,2 Bar	38 x 22 x 22"	950 x 550 x 500 mm	495 Lbs	225 kg

LOCKING RANGES WITH STANDARD JAWS

JAWS: PL-42

RANGE [MM]		RANGE [INCH]		SEGMENT		
MIN	MAX	MIN	MAX	A	B	C
175,0	200,0	6,890	7,874			
200,0	225,0	7,874	8,858	PL-42-A-125		
225,0	250,0	8,858	9,843	PL-42-A-250		
250,0	275,0	9,843	10,827	PL-42-A-375		
275,0	300,0	10,827	11,811	PL-42-A-500		
300,0	325,0	11,811	12,795	PL-42-A-500 PL-42-A-125		
325,0	350,0	12,795	13,780	PL-42-A-500 PL-42-A-250		
350,0	375,0	13,780	14,764		PL-42-B	
375,0	400,0	14,764	15,748	PL-42-A-125	PL-42-B	
400,0	425,0	15,748	16,732	PL-42-A-250	PL-42-B	
425,0	450,0	16,732	17,717	PL-42-A-375	PL-42-B	
450,0	475,0	17,717	18,701	PL-42-A-500	PL-42-B	
475,0	500,0	18,701	19,685			PL-42-C
500,0	525,0	19,685	20,669	PL-42-A-125		PL-42-C
525,0	550,0	20,669	21,654	PL-42-A-250		PL-42-C
550,0	575,0	21,654	22,638	PL-42-A-375		PL-42-C
575,0	600,0	22,638	23,622	PL-42-A-500		PL-42-C

AVAILABLE HOLDERS

Facing (2CDI insert) F-45-90	Inside beveling and boring (2CDI insert)	Outside beveling (2CDI insert)	J beveling (2CDJ-Rxx insert)	Compound Beveling (CB-45 insert)
	IB-45-37 IB-45-10	OB-45-45 OB-45-37 OB-45-30 OB-45-10	JP-45-45 JP-45-37 JP-45-30	CB-10/37 (others on request)

ADVANTAGES OF HYPERLATHE



HEAVY DUTY DESIGN

All the Lathe series machine design is based on long steel spindle which assure maximum rigidity because the locking shaft is fully mounted into that spindle instead partially into the main aluminium body what is causing adverse vibration due to a lot of tension on it.



POWERFUL MOTOR UNIT

Powerful and efficient drive dedicated for our Lathe series beveling machines. 0-5 rpm and 12500 Nm (9219 ft.lbs) torque on the cutter blade is a standard feature.



6 POINT LOCKING JAWS

150 mm (5,9") shaft, assures rigidity when machining heavy wall pipe. The jaws are fully contained within the shaft with no need for retaining springs or O-rings that easily brake or get lost.



HEAVY DUTY PENDANT

Machine is equipped with a heavy duty pendant. This can be attached to both sides of the motor for operator convenience.

OPTIONAL MOTOR UNITS



MOTOR PDE

The PipeLathe can also be supplied as an electric version, with a 3200 Watt heavy duty motor.



MOTOR PDH

Optional super strong hydraulic motor. Constructed on the basis of a small hydraulic motor and multistage planetary gear box. PipeLathe version generates 6 rpm and up to 14200 Nm (10475 Ft.Lbs) torque on cutter blade at constant cutting speed.

EASY CONVERSION TO PIPELATHE 40

Due to high torque of our PipeLathe hydraulic drive we offer special extension kit for regular PipeLathe machine to increase working range up to 40" OD pipe. See next page for more info.



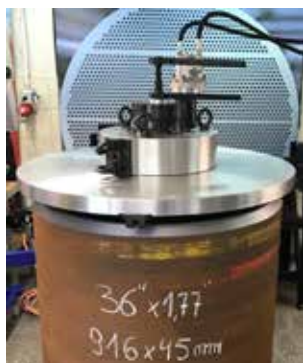
EXAMPLE TOOL APPLICATION



PipeLathe is the strongest machine from all KRAIS Lathe tools. It allows for machining tubes up to 24" (600 mm) OD.

PipeLathe 40

- Powerful hydraulic drive generating 14500 Nm (10800 ft.lbs) torque on the cutter blade. Variable speed control 0-5 rpm.
- No need for extra gear box that reduces the rpm and multiplies the torque. It comes as standard!
- 150 mm (5,9") locking shaft with built in jaws, eliminates the issue of broken or loosening retaining springs and o-rings.
- Innovative 6 point locking system with wide clamps assures maximum stability during machining.
- Only one mandrel and 6 Jaws set covers entire working range.
- Fully portable for on-site and Fab-shop work.
- Available for sale or rent.



STANDARD WORKING RANGE	
APPLICATION RANGE	LOCKING RANGE (ID)
180 - 1016 mm	175 - 972 mm
7,0 - 40,0"	6,9 - 38,3"

FEED STROKE		POWER	FREE SPEED		TORQUE	
60 mm	2,4"	3,5 hp	5 Rpm		12500 Nm	9219 Ft.lbs
AIR USE		AIR PRESSURE		BODY DIMENSIONS		BODY WEIGHT
85 cfm	2,8 m ³ /min	90 PSI	6,2 Bar	38 x 22 x 22"	950 x 550 x 500 mm	495 Lbs 225 kg

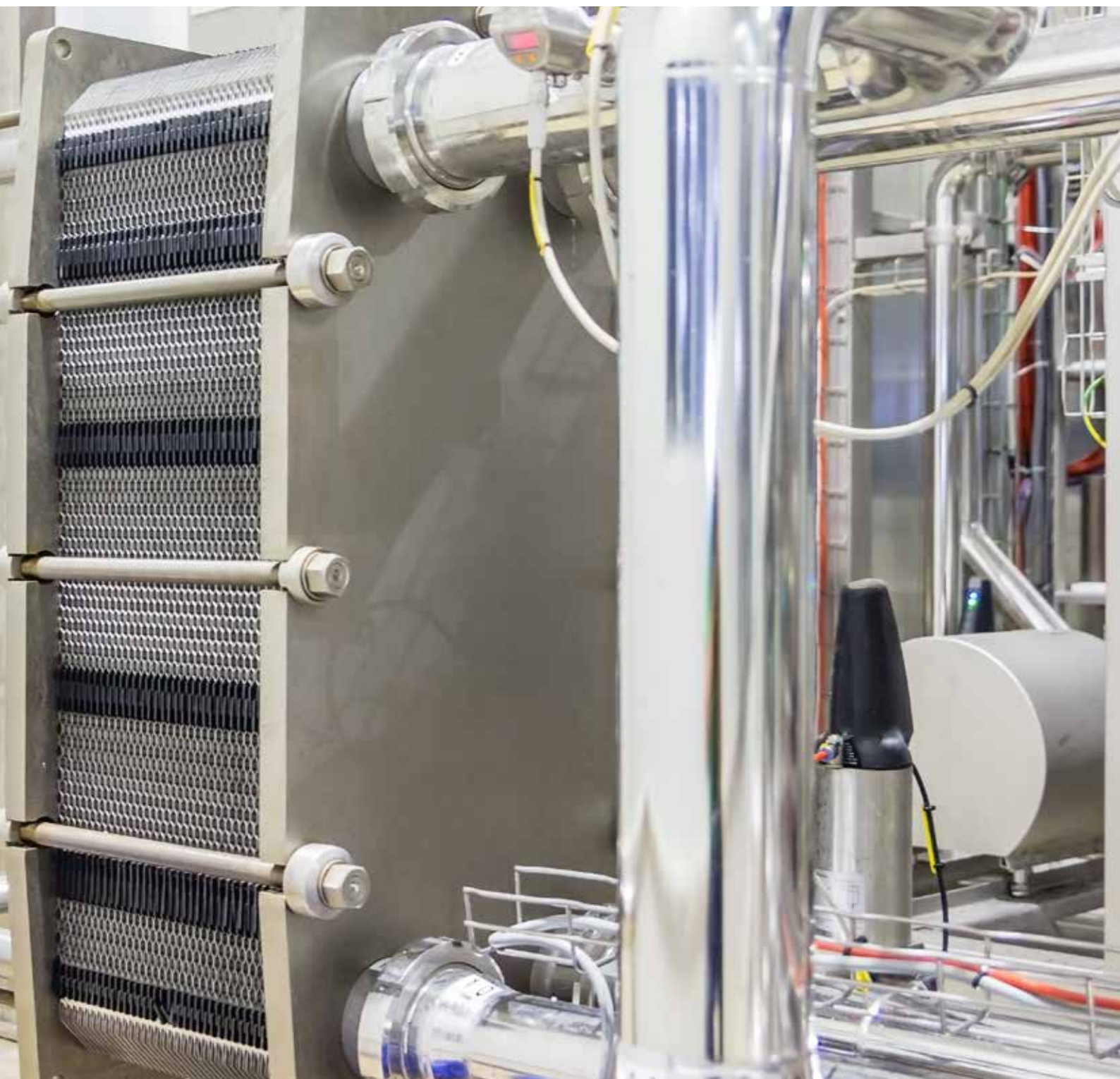
LOCKING RANGES WITH STANDARD JAWS

JAWS: PL-42

RANGE [MM]		RANGE [INCH]		SEGMENT				
MIN	MAX	MIN	MAX	A	B	C	D	E
175	200	6,9	7,9					
200	225	7,9	8,9	PL-42-A-125				
225	250	8,9	9,8	PL-42-A-250				
250	275	9,8	10,8	PL-42-A-375				
275	300	10,8	11,8	PL-42-A-500				
300	325	11,8	12,8	PL-42-A-500 PL-42-A-125				
325	350	12,8	13,8	PL-42-A-500 PL-42-A-250				
350	375	13,8	14,8		PL-42-B			
375	400	14,8	15,7	PL-42-A-125	PL-42-B			
400	425	15,7	16,7	PL-42-A-250	PL-42-B			
425	450	16,7	17,7	PL-42-A-375	PL-42-B			
450	475	17,7	18,7	PL-42-A-500	PL-42-B			
475	500	18,7	19,7			PL-42-C		
500	525	19,7	20,7	PL-42-A-125		PL-42-C		
525	550	20,7	21,7	PL-42-A-250		PL-42-C		
550	575	21,7	22,6	PL-42-A-375		PL-42-C		
575	600	22,6	23,6	PL-42-A-500		PL-42-C		
593	622	23,3	24,5	PL-42-A-500 PL-42-A-125		PL-42-C		

RANGE [MM]		RANGE [INCH]		SEGMENT				
MIN	MAX	MIN	MAX	A	B	C	D	E
621	647	24,4	25,5	PL-42-A-500 PL-42-A-250		PL-42-C		
646	671	25,4	26,4	PL-42-A-500 PL-42-A-375		PL-42-C		
667	693	26,3	27,3			PL-42-C	PL-42-D	
692	716	27,2	28,2	PL-42-A-125		PL-42-C	PL-42-D	
715	739	28,1	29,1	PL-42-A-250		PL-42-C	PL-42-D	
738	762	29,1	30,0	PL-42-A-375		PL-42-C	PL-42-D	
761	786	30,0	30,9	PL-42-A-500		PL-42-C	PL-42-D	
787	811	31,0	31,9			PL-42-C		PL-42-E
810	834	31,9	32,8	PL-42-A-125		PL-42-C		PL-42-E
833	856	32,8	33,7	PL-42-A-250		PL-42-C		PL-42-E
856	879	33,7	34,6	PL-42-A-375		PL-42-C		PL-42-E
878	903	34,6	35,6	PL-42-A-500		PL-42-C		PL-42-E
902	925	35,5	36,4	PL-42-A-500 PL-42-A-125		PL-42-C		PL-42-E
924	949	36,4	37,4	PL-42-A-500 PL-42-A-250		PL-42-C		PL-42-E
948	972	37,3	38,3	PL-42-A-500 PL-42-A-375				PL-42-E

SPECIAL BEVELING



MiniMill 300FF



A standard machine for Fin Fan cooler tube trimming is equipped with custom head and locking system to suit your application (customer to provide drawing of unit). The MiniMill 300FF cutter heads have 3 carbide inserts with 4 Cutting edges each.

STANDARD SET UP



FINFAN ATTACHMENT

Special attachment for facing tubes in fin fan gas coolers. A locking shaft with adjustable length and a support bushing are screwed into the plug thread, making this tool the best one available on the market today. The cycle is approx. 1 min from tube to tube. For this application we recommend our 300 Rpm machine

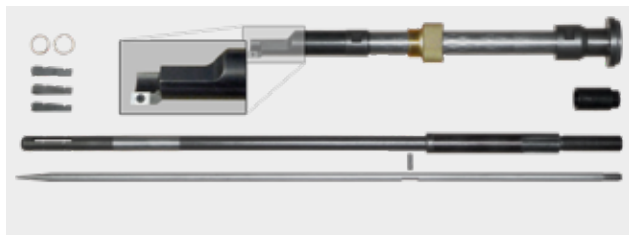
STANDARD WORKING RANGE		FEED STROKE	FREE SPEED	POWER	TORQUE		
APPLICATION RANGE (ID-OD)	LOCKING RANGE (ID)						
12,5– 51,0 mm	According to the drawing	20 mm	300 Rpm	1,3 Hp	43 Nm		
0,492 – 2,000"		0,787"			32 Ft.Lbs		
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
55 cfm	1.3 m³/min	2.32"	59 mm	131"	335 mm	13.2Lbs	6 kg

FINFAN ATTACHMENT PART NUMBERS

FINFAN	TUBE CAPACITY (OD)			INSERT	NO. INSERTS	SCREW	JAWS COVER	
	[INCH]	[MM]	BWG				MIN	MAX
601-FinFan-1-12"	1,000	25,40	12-23	CI	3	1-1/8	207MM#36	213MM#36
603-FinFan-1-1/8-12"	1,125	28,58	12-23	CI	3	1-1/4	211MM#36	217MM#36
605-FinFan-1-1/4-12"	1,250	31,75	11-23	CI	3	1-3/8	103MM#36	107MM#36
607-FinFan-1-1/2-12"	1,500	38,10	11-23	CI	3	1-5/8	107MM#36	111MM#36
609-FinFan-1-3/4-12"	1,750	44,45	9-23	CI	3	1-7/8	111MM#36	115MM#36
611-FinFan-2-12"	2,000	50,80	9-23	CI	3	2-1/8	115MM#36	119MM#36

AVAILABLE LENGTHS

MODEL	DŁUGOŚĆ	
	[MM]	[INCH]
601-FinFan-xx-6	152,4	6"
601-FinFan-xx-8	203,2	8"
601-FinFan-xx-10	254,0	10"
601-FinFan-xx-12	305,0	12"
601-FinFan-xx-14	355,6	14"
601-FinFan-xx-16	406,4	16"

OPTIONAL ATTACHMENT**FINFAN SEAL WELD REMOVAL ATTACHMENT**

Simply the best solution for seal weld removal from air coolers. Adjustable length locking shaft and support bushing that fits into the plug thread, making this tool the best one available on the market today. A cycle time of approximately 1 min from tube to tube can be expected.

EXAMPLE TOOL APPLICATION

Trimming tubes safely and efficiently. Machine locks securely both to the tube and the plug thread of the water box.

OTHER OPTIONAL ACCESSORIES**SPEED REDUCER**

Easy to use gearbox for 3x speed reduction. Increases the torque, enabling the machine to generate a thick chip whilst reducing the cutting time.

**SPEED ADJUSTMENT VALVE SAV-500**

The solution for all pneumatic drive beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

**RATCHET FEED**

Feed system allowing to work in narrow and tight locations, eg. in water walls.

**LEVER FEED**

Quick and easy feed system. Used in many basic applications.

EXAMPLE TOOL APPLICATION

Water box demonstration of the simplicity of machine operation.



An operator trimming back tubes prior to seal welding.



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MiniMill 300GFF

Ideal for gasket seat machining of any size of fin fan cooler. A standard machine is equipped with a cutter head and a special locking system to fit your application. The machine locks directly into the plug thread.

STANDARD SET UP



GASKET FINFAN SET
Supplied with 20 mm shaft, one set of jaws to suit plug thread diameter, pilot and gasket seat milling head. Plug size details must be provide by customer with order.



Custom machined jaws. Showing locked and up-locked position.



STANDARD WORKING RANGE		FEED STROKE	FREE SPEED	POWER	TORQUE		
APPLICATION RANGE (ID-OD)	LOCKING RANGE (ID)						
12 TPI	According to the thread	20 mm	300 Rpm	1,3 Hp	43 Nm		
1,125 - 2,125"		0,787"			32 Ft.Lbs		
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
55 cfm	1,3 m³/min	2,32"	59 mm	13,1"	335 mm	13,2Lbs	6 kg

EXAMPLE TOOL APPLICATION



FinFan cooler before a maintenance



Plug hole before re machining the gasket seat



Safely re-machine gasket surfaces in seconds.



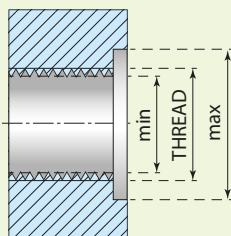
All types of water box materials can be machined with the carbide inserts of the MiniMill 300 GFF.

GASKET SEAT FACING HEADS AND JAWS NUMBERS

HEAD TYPE	PLUG SIZE			SEAL NEST DIAMETER				INSERT	NO. OF INSERTS	JAWS SET NUMBER	PLUG SIZE		TPI	PILOT
	[INCH]	[MM]	TPI	MIN [INCH]	MAX [INCH]	MIN [MM]	MAX [MM]				[INCH]	[MM]		
FFGSMH-1125	1,125	28,58	12	0,940	1,496	24,00	38,00	CI 5x5	4	701MM #36-1-1/8-GFF	1,125	28,575	12	PGFF-1125
FFGSMH-1250	1,250	31,75	12	1,063	1,614	27,00	41,00	CI 5x5	4	703MM #36-1-1/4-GFF	1,250	31,750	12	PGFF-1250
FFGSMH-1350	1,375	34,93	12	1,220	1,772	31,00	45,00	CI 5x5	4	705MM #36-1-3/8-GFF	1,375	34,925	12	PGFF-1350
FFGSMH-1500	1,500	38,10	12	1,339	1,890	34,00	48,00	CI 5x5	4	707MM #36-1-1/2-GFF	1,500	38,100	12	PGFF-1500
FFGSMH-1625	1,625	41,27	12	1,457	2,008	37,00	51,00	CI 5x5	4	709MM #36-1-5/8-GFF	1,625	41,275	12	PGFF-1625
FFGSMH-1750	1,750	44,45	12	1,590	2,140	40,40	54,40	CI 5x5	4	711MM #36-1-3/4-GFF	1,750	44,450	12	PGFF-1750
FFGSMH-1875	1,875	47,62	12	1,720	2,270	43,60	57,60	CI 5x5	4	713MM #36-1-7/8-GFF	1,875	47,625	12	PGFF-1875

Other sizes on request. If plug holes are damaged beyond repair, our MiniDrill 55 can be used to upsize them to the next size. Example - 1-1/8" to 1-3/8".

Seal nest diameter diagram

**OTHER OPTIONAL ACCESSORIES****FAST CLAMPING SYSTEM**

System offers rapid tube to tube cycle time, increased productivity (up to 4x) with little operator fatigue. Ideal for large amount of end preps.

**SPEED ADJUSTMENT VALVE SAV-500**

The solution for all pneumatic drive beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

FinMill

KRAIS FinMill is a air powered tool designed for removing fin from the outside diameter of a tube. The tool is based on the same quality drive and housing as our other PrepMill series tools. Thanks to heavy duty locking system The FinMill fin tube removal tool clamps reliably in the tube and offers chatter-free work at any position.

STANDARD SET UP



DOUBLE SIDE HEAD

Special shaped head, allows to remove left- and right-handed fins.



SHAFT25

Self-align, heavy duty locking system. Shafts and jaws are longer and wider to ensure maximum clamping force.



Reversible motor allow to work and remove left and right hand fins.

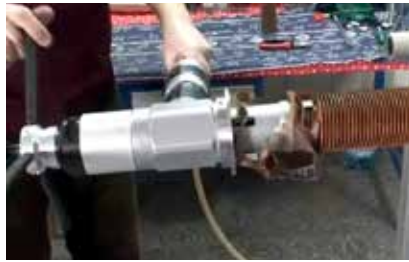
STANDARD WORKING RANGE		FEED STROKE	FREE SPEED	POWER	TORQUE		
APPLICATION RANGE (ID-OD)	LOCKING RANGE (ID)						
25 - 127 mm	25 - 122 mm	40 mm	55 Rpm	1,3 Hp	140 Nm		
0,984 - 5,000"	0,984 - 4,803"	1,6"			105 Ft.Lbs		
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
75 cfm	2,2 m³/min	2.59"	66 mm	14.5"	370 mm	19 Lbs	9 kg

LOCKING RANGES WITH STANDARD SET UP

SHAFT: SHAFT25

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
25	30	0,984	1,181	NS-1	-	SP-24	1
30	35	1,181	1,378	NS-2	-	SP-24	1
35	40	1,378	1,575	NS-3	-	SP-25	2
40	45	1,575	1,772	NS-4	-	SP-25	2
45	50	1,772	1,969	NS-5	-	SP-25	2
50	55	1,969	2,165	NS-6	-	SP-25	2
55	60	2,165	2,362	NS-7	-	SP-25	2
60	65	2,362	2,559	NS-8	-	SP-25	2
62	67	2,441	2,638	NS-5	NS-10	SP-25	2
67	72	2,638	2,835	NS-6	NS-10	SP-25	2
72	77	2,835	3,031	NS-7	NS-10	SP-25	2

RANGE [MM]		RANGE [INCH]		JAWS	EXT.	SPRING	
MIN	MAX	MIN	MAX			NUMBER	QTY.
77	82	3,031	3,228	NS-8	NS-10	SP-25	2
82	87	3,228	3,425	NS-5	NS-20	SP-25	2
87	92	3,425	3,622	NS-6	NS-20	SP-25	2
92	97	3,622	3,819	NS-7	NS-20	SP-25	2
97	102	3,819	4,016	NS-8	NS-20	SP-25	2
102	107	4,016	4,213	NS-5	NS-30	SP-25	2
107	112	4,213	4,409	NS-6	NS-30	SP-25	2
112	117	4,409	4,606	NS-7	NS-30	SP-25	2
117	122	4,606	4,803	NS-8	NS-30	SP-25	2

EXAMPLE TOOL APPLICATION

Removes 4.0" (101 mm) depth of fin from the tube OD in less than 2 minutes

OTHER OPTIONAL ACCESSORIES**STAR WHEEL**

The most precise feed system. Used in many basic and demanding applications.

**SPEED ADJUSTMENT****VALVE SAV-500**

The solution for all pneumatic drive beveling machines. Allows adjusting cutting speed to suit to the machined tube diameter.

MiniDrill

MiniDrill is a unique machining platform designed to safely perform multiple machining operations on heat exchangers, boilers and similar thermal exchange equipment. Designed with operator safety in mind, this system can drill, ream, bore and even re-machine serrations in steam drums quickly and safely. With a 80 mm (3.150") travel, this tool is ideally suited for the majority of plant equipment. The system is fully torque reacted with 2 clamping arms that are independent of one another and can accommodate most pitch configurations. Once locked into the tubes, the MiniDrill is extremely stable.



AVAILABLE TOOLS WORKING WITH MINIDRILL



WALL REDUCING

Tube wall reducing head with carbide inserts.



DRILLING

Drill for machining holes in tube plugs before removing them with our special plug removal tool.



REAMMING

Safely ream tube sheets.



BORING HEAD

Boring head to machine heavy wall boiler tubes, safely and efficiently prior to collapsing through the drum.



OTHER AVAILABLE ACCESSORIES

MINIDRILL WITH FAST CLAMPING

MiniDrill with the fast pneumatic clamping system is ideal for manufacturing plants that make large amounts of work on tubes and pipes. It offers rapid tube to tube cycle time, increased productivity with little operator fatigue.



EXAMPLE TOOL APPLICATION



Reducing tube wall on a 6" thick tube sheet prior to punching.

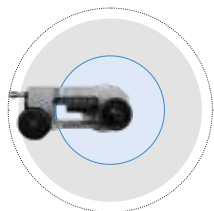
FLANGE FACING



44 MFM – Manual FlangeMill

Basic, simple and cost-effective solution for ID mount flange facing. It is a quick and easy way to reface a damaged flat, grooves in pipe flanges on site. Manual FlangeMill size and body is designed and built to allow quick and convenient processing of small flanges in awkward or dangerous locations.

TOOL SWING DIAMETERS



FACING RANGE

BODY SWING DIAMETER



STANDARD WORKING RANGE		MAX V TOOL TRAVEL	MAX H TOOL TRAVEL	BODY SWING DIAMETER		
FACING RANGE	LOCKING RANGE					
30 – 350 mm	25,4 - 254,0 MM	10 MM	55 MM	457,2 MM		
1,750 – 14,000”	1 - 10”	0,395”	2,165”	18”		
DRIVE	BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
Manual	6,5”	165 mm	12,8”	325 mm	19,4 Lbs	8,8 kg

MFM TOOL BITS AND HOLDER



Manual Flange Mill uses one just type of holders: MFMH-7-L and MFMH-7-R with carbide insert C17 (screw MHS-2,7)

C17	mm	
	A	B
	7	7

MFM ADVANTAGES



PRECISE DEPTH ADJUSTMENT

The tool depth can be adjusted (10 mm stroke) thru spindle to define cut depth and the correct finish.



EASE OF USE

The tool arm is rotated by hand using a worm-gear mechanism to provide a perfect spiral finish.



SMOOTH OPERATION

Quick adjustment handle to move the cutter to groove position



MACHINING IN EVERY POSITION

Manual FlangeMill can be freely rotated to work in every position. Remachining damaged flat, grooves and raised faced flanges on site is possible in every position.

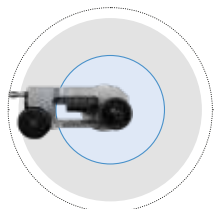
EXAMPLE TOOL APPLICATION



MFML – Manual FlangeMill, long

Long version of simple and cost-effective solution for ID mount flange facing. It is a quick and easy way to reface a damaged flat, grooves in pipe flanges on site. The L(ong) version FlangeMill size and body is designed and built to allow quick and convenient processing of mid sized flanges in awkward or dangerous locations.

TOOL SWING DIAMETERS



FACING RANGE

BODY SWING DIAMETER



STANDARD WORKING RANGE		MAX V TOOL TRAVEL	MAX H TOOL TRAVEL	BODY SWING DIAMETER
FACING RANGE	LOCKING RANGE			
51 – 650 mm	51 - 550 MM	10 MM	55 MM	757 MM
2,01 – 25,60"	2,01 - 21,65"	0,395"	2,165"	30"

DRIVE	BODY WIDTH		BODY HEIGHT		BODY WEIGHT	
Manual	6,5"	165 mm	18,7"	475 mm	19,4 Lbs	8,8 kg

MFM TOOL BITS AND HOLDER



Manual Flange Mill uses one just type of holders: MFMH-7-L and MFMH-7-R with carbide insert C17 (screw MHS-2,7)

C17	A	B
mm	7	7

MFM ADVANTAGES



PRECISE DEPTH ADJUSTMENT

The tool depth can be adjusted (10 mm stroke) thru spindle to define cut depth and the correct finish.



EASE OF USE

The tool arm is rotated by hand using a worm-gear mechanism to provide a perfect spiral finish.



SMOOTH OPERATION

Quick adjustment handle to move the cutter to groove position



MACHINING IN EVERY POSITION

Manual FlangeMill can be freely rotated to work in every position. Remachining damaged flat, grooves and raised faced flanges on site is possible in every position.

FlangeMill

FlangeMill is ID mount flange facing machines. It is a quick and easy way to re-machine damaged flat and raised faced flanges on site.

The machine comes factory configured.

FlangeMill is designed and built on the basis of the HyperMill-55.



STANDARD WORKING RANGE		FEED STROKE	FEED SPEED	FREE SPEED	POWER	TORQUE
APPLICATION RANGE (ID-OD)	SURFACE FINISH					
44 – 356 mm	63 to 250 RMS	38 MM	0,15 MM/PIN	55 Rpm	1,7 HP	280 Nm
1,750 – 14,000"		1,500"	0,005"/PIN			210 Ft.Lbs
AIR USE		BODY WIDTH		BODY HEIGHT		BODY WEIGHT
55 cfm	1.3 m³/min	2.32"	59 mm	131"	335 mm	30.6 Lbs 13.9 kg

MACHINING IN EVERY POSITION



FlangeMill can be rotated under any angle. Machine can be used for machining flanges in every position.

ACCURATE LOCKING SYSTEM



Both version of FlangeMill uses the same internal locking system for safety and better accuracy.

ELECTRIC VERSION: FLANGEMILL-E



FlangeMill-E is electric version of regular FlangeMill. An electric machine cover the same working range and can be delivered with the same configuration. The electric motor made by Makita with 3 stage planetary gear box made by KRAIS has variable speed control and produce enormous torque. Is interchangeable with pneumatic drive and can be purchased separately at any time.

Free Speed 115 RPM
 Power 1,1 Hp
 Torque 366 NM (280 Ft.Lbs)
 Feed Stroke 38 mm (0,787")

IMFM-24 Internal Mounted FlangeMill



Internally mounted, lightweight and durable machine tool. Ideal for machining all types of flange faces, seal grooves, weld preparations and counterbores.

Features:

- Heavy-duty steel/aluminium design
- High rigidity of the machine in relation to the dimension and weight
- Solid but lightweight construction
- Continuous groove facing feeds
- Swivel tool post for grooves, RTJ flanges and bevels
- Easy levelling and centering system with built-in fast centre feature
- Quick clamping with solid, 50 mm self-centering steel shaft
- CE certificate

As standard IMFM is supplied with the complete toolkit, including cutting tool and inserts, air filter with lubricator and hose connection, required jaws to cover the full range, paper manual and storage/shipping box.

Beside standard pneumatic 2,2 Hp drive, for IMFM we offer a wide choice of pneumatic and electric drives.

Bigger sizes (IMFM-32 and IMFM-60) coming soon!

STANDARD WORKING RANGE		FACING FEEDS			FREE SPEED	POWER
FACING DIAMETER	CLAMPING DIAMETER	1,75 MM SCREW	1,25 MM SCREW	1,00 MM SCREW		
63 – 610 mm	57 - 508 mm	0,2 / 0,8 mm	0,14 / 0,57 mm	0,15 / 0,45 mm	20 - 42 Rpm	2,2 Hp
2,50 - 24,00"	2,25 - 20,00"	0,008 / 0,031"	0,006 / 0,022"	0,004 / 0,018"		1,6 kW
AIR USE		BODY WIDTH		BODY HEIGHT	BODY WEIGHT	
75 cfm	2,2 m ³ /min	Depends on motor configuration, see drawing below			99 Lbs	45 kg

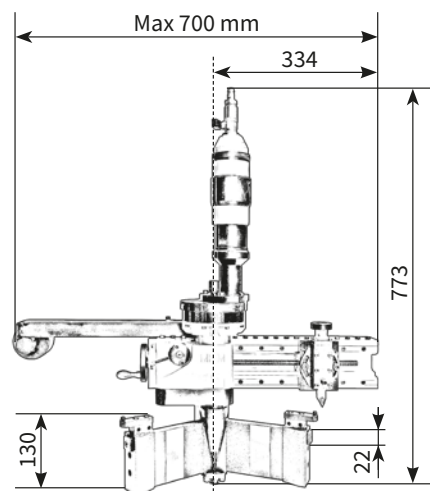
LEVELLING AND CENTERING



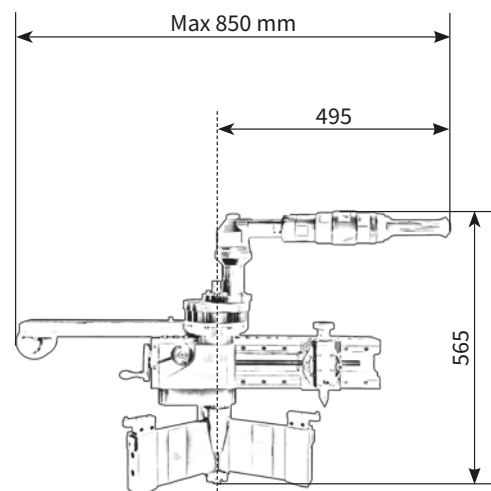
Special jaw set for easy and quick levelling and centering machines on the flange

DIMENSIONS

INLINE VERSION



RIGHTANGLE VERSION



SFFM Flange Facer

SFFM series Flange Facing Machines are mounted on the outer diameter of the flange. The precise, synchronized radial and axial feed mechanism allows for a high quality machining, resulting in one continuous groove producing a true gramophone finish.

SFFM Flange Facing Machines are suitable for various flange types:

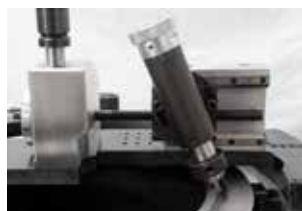
- Flat Face
- Raised Face
- Ring Type Joints (RTJ)
- Tongue & Groove
- Lens Ring
- Grayloc® (hub profile)
- Compact Flanges

SFFM Flange Facers are suitable for the oil and gas industry, power plants, chemical plants, oil rigs and many others. They are prepared to implement applications complying with ASME standards.



MODEL	WORKING RANGE			DIMENSIONS					WEIGHT	JAWS
		MIN OD	MAX OD	UNIT	FRAME OD	FRAME ID	FRAME WIDTH	HEIGHT		
SFFM-0410	NPS	2,00	10,00	[inch]	16,22	11,24	2,50	17,3"	57	4
	Metric	50,00	250,00	[mm]	412,00	285,40	63,50	440		
SFFM-1016	NPS	2,00	15,00	[inch]	21,46	16,48	2,50	17,3"	68	6
	Metric	50,00	370,00	[mm]	545,00	418,70	63,50	440		
SFFM-1624	NPS	4,00	23,00	[inch]	29,49	24,41	2,50	17,3"	103	10
	Metric	100,00	580,00	[mm]	749,00	619,90	63,50	440		
SFFM-2836	NPS	8,00	35,00	[inch]	42,15	37,00	2,76	17,3"	180	10
	Metric	200,00	890,00	[mm]	1070,60	939,80	65,40	440		
SFFM-4048	NPS	10,00	47,00	[inch]	54,40	49,53	2,76	17,3"	260	12
	Metric	250,00	1200,00	[mm]	1381,80	1251,00	65,40	440		

FEATURES OF MACHINE



CUTTING GROOVES

The machine offers a simple way of execution of the RTJ grooves by using the single point swivel head or formed tools



GRAMOPHONE GROOVE

The design of the feed attachment assures the automatic and variable feed rate on radial axe producing proper gramophone groove.



STRONG DRIVES

Machine can be driven with a wide range of motors, pneumatic, hydraulic and electrical, including servo drives - all made by KRAIS.

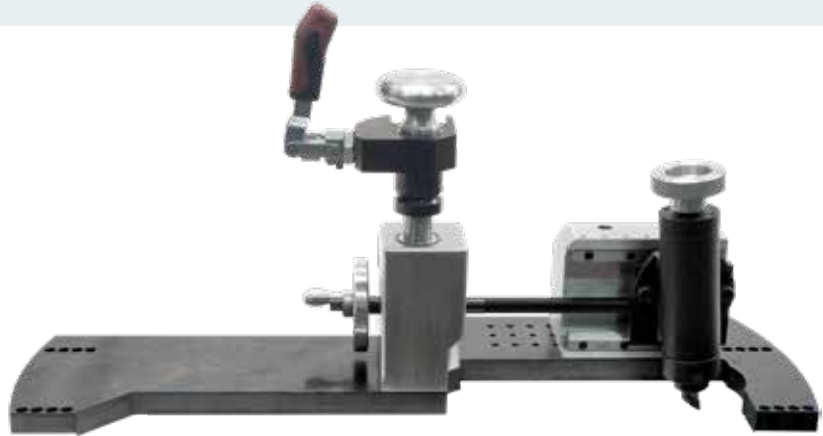


AVAILABLE AS MODULE

For owners of our regular SFSF machines we offer special module, allowing to convert the standard SFSF into regular flange facing module

SFFM Module

SFFM Module can be mounted on all our SFSF clamshells and convert the regular Clamshell into OD mount flange facing machine. SFSF clamshell combined with the module widens the scope of its application and still providing the same functionality as the machine SFFM. Purchasing the SFFM Module allows to save a lot of money by avoiding the purchase of two separate machine tools. Time needed for the machine changeover is only 20 minutes.



MODEL SFSF	WORKING RANGE WITH MODULE			DIMENSIONS					WEIGHT*	JAWS
		MIN OD	MAX OD	UNIT.	FRAME OD	FRAME ID	FRAME WIDTH	BOTH HEIGHT		
SFSF-0410	NPS	0,80	8,80	[inch]	16,22	11,24	2,50	16,25	57,00	4
	Metric	20,00	224,00	[mm]	412,00	285,40	63,50	412,5		
SFSF-0612	NPS	1,60	10,50	[inch]	18,15	13,24	2,50	16,25	59,00	4
	Metric	40,00	270,00	[mm]	461,00	336,20	63,50	412,5		
SFSF-0814	NPS	1,60	12,00	[inch]	19,49	14,48	2,50	16,25	61,00	6
	Metric	40,00	305,00	[mm]	495,00	367,90	63,50	412,5		
SFSF-1016	NPS	1,60	14,00	[inch]	21,46	16,48	2,50	16,29	68,00	6
	Metric	40,00	356,00	[mm]	545,00	418,70	63,50	413,5		
SFSF-1218	NPS	2,00	16,80	[inch]	23,50	18,48	2,50	16,29	83,00	6
	Metric	50,00	427,00	[mm]	597,00	469,50	63,50	413,5		
SFSF-1420	NPS	2,00	20,00	[inch]	25,47	20,85	2,50	16,29	90,00	6
	Metric	50,00	508,00	[mm]	647,00	520,30	63,50	413,5		
SFSF-1624	NPS	2,00	22,70	[inch]	29,49	24,41	2,50	16,29	103,00	10
	Metric	50,00	578,00	[mm]	749,00	619,90	63,50	413,5		
SFSF-2028	NPS	4,00	26,80	[inch]	33,90	28,75	2,76	17,48	145,00	10
	Metric	100,00	681,00	[mm]	861,10	730,30	65,40	443,7		
SFSF-2432	NPS	8,00	30,70	[inch]	38,15	33,00	2,76	17,48	158,00	10
	Metric	200,00	782,00	[mm]	969,00	838,20	65,40	443,7		
SFSF-2836	NPS	8,00	34,80	[inch]	42,15	37,00	2,76	17,48	180,00	10
	Metric	200,00	884,00	[mm]	1070,60	939,80	65,40	443,7		
SFSF-3442	NPS	10,00	40,70	[inch]	48,15	43,00	2,76	17,48	202,00	10
	Metric	250,00	1036,00	[mm]	1223,00	1092,20	65,40	443,7		
SFSF-4048	NPS	10,00	46,80	[inch]	54,40	49,53	2,76	17,48	260,00	12
	Metric	250,00	1189,00	[mm]	1381,80	1251,00	65,40	443,7		

*depends on machine configuration

SURFACE FINISH



The Modul is equipped as standard with feed gearbox in order to generate both, fine or coarse surface finish by simple switch on the gear box.

SPLIT FRAME CLAMSHELLS



SlimFit Split Frame Clamshells



KRAIS SFSF portable SLIM FIT Clamshell series are designed for strength and easy handling. Each of the machine from the SFSF series have a height of 3,248" (82,5 mm) up 24" and 4,47" (113,7 mm) up to 48" and a width of 2.5" (63,5 mm) resulting narrow body low profile design that makes the SFSF series the ideal choice in tight spaces .

- 15 Standard models cover a range from 1" (33,4 mm) to 48" (1219 mm) OD
- Pneumatic, hydraulic and electric drive options are available .
- Motor mount on keyways to prevent the motor to twist and potential damage on gear ring .
- Several different drive options are available to best position the motor for a specific machining application
- All pneumatic and electric motors are design and Manufactured by KRAIS after 20 years experience of manufacturing pneumatic drives for boiler and heat exchangers tube rolling motors.
- SFSF series clamshells can be equipped a wide range of accessories to increase performance and expand capabilities.
- Adjustable locator pads minimize the number of locators.



TOOL HOLDER



Choice of 3 positions with different travel length tool holder with heat treated slights.

TRIPPER MODULE



Lever type tripper module for operator safety.

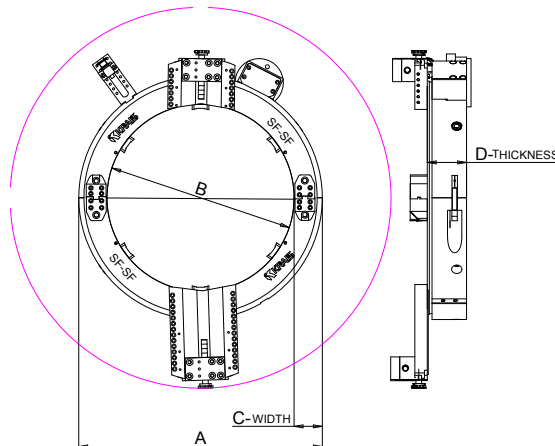
QUALITY MATERIALS



Steel plates on the back part for machine squaring on the pipe .

General technical machine information to enable to make the right choice to suit your application.

For our SFSF clamshells we offer a wide range of pneumatic , electric made 100% in house and hydraulic choose by our engineers or upon customer preference . Such a big range and variety of parameters allow us to select motor to achieve to best and most post suitable cutting speed to machined pipe material and diameter.



MODEL	PIPE CAPACITY			DIMENSIONS								LOCATOR PADS	GEAR RING RATIO
		MIN OD	MAX OD	UNIT	A	B	C	D	1" SLIDE SWING	3" SLIDE SWING	6" SLIDE SWING		
SFSF-0204	NPS	2,000	4,000	[inch]	9,685	4,736	2,500	3,248	12,165	16,165		4	4,6:1
	Metric	60,32	127,00	[mm]	246,00	120,30	63,50	82,50	309,00	410,60			
SFSF-0256	NPS	2,500	6,000	[inch]	11,831	6,858	2,500	3,248	14,339	18,339		4	5,7:1
	Metric	73,02	168,27	[mm]	300,50	174,20	63,50	82,50	364,20	465,80			
SFSF-0358	NPS	3,500	8,000	[inch]	13,819	8,846	2,500	3,248	16,339	20,339	26,339	4	6,7:1
	Metric	101,60	219,07	[mm]	351,00	224,70	63,50	82,50	415,00	516,60	669,00		
SFSF-0410	NPS	4,500	10,000	[inch]	16,220	11,236	2,500	3,248	18,756	22,756	28,756	4	7,8:1
	Metric	127,00	273,05	[mm]	412,00	285,40	63,50	82,50	476,40	578,00	730,40		
SFSF-0612	NPS	6,000	12,000	[inch]	18,150	13,236	2,500	3,248	20,843	24,843	30,843	4	8,9:1
	Metric	168,27	323,85	[mm]	461,00	336,20	63,50	82,50	529,40	631,00	783,40		
SFSF-0814	NPS	8,000	14,000	[inch]	19,488	14,484	2,500	3,248	22,063	26,063	32,063	6	9,5:1
	Metric	219,07	355,60	[mm]	495,00	367,90	63,50	82,50	560,40	662,00	814,40		
SFSF-1016	NPS	10,000	16,000	[inch]	21,457	16,484	2,500	3,287	24,102	28,102	34,102	6	10,6:1
	Metric	273,05	406,40	[mm]	545,00	418,70	63,50	83,50	612,20	713,80	866,20		
SFSF-1218	NPS	12,000	18,000	[inch]	23,504	18,484	2,500	3,287	26,224	30,224	36,224	6	11,6:1
	Metric	323,85	457,20	[mm]	597,00	469,50	63,50	83,50	666,10	767,70	920,10		
SFSF-1420	NPS	14,000	20,000	[inch]	25,472	20,848	2,500	3,287	28,150	32,150	38,150	6	12,6:1
	Metric	355,60	508,00	[mm]	647,00	520,30	63,50	83,50	715,00	816,60	969,00		
SFSF-1624	NPS	16,000	24,000	[inch]	29,488	24,406	2,500	3,287	32,268	36,268	42,268	10	14,6:1
	Metric	406,40	609,60	[mm]	749,00	619,90	63,50	83,50	819,60	921,20	1073,60		
SFSF-2028	NPS	20,000	28,000	[inch]	33,900	28,750	2,757	4,476	36,516	40,516	46,516	10	16,9:1
	Metric	508,00	711,20	[mm]	861,10	730,30	65,40	113,70	927,50	1029,10	1181,50		
SFSF-2432	NPS	24,000	32,000	[inch]	38,150	33,000	2,757	4,476	40,787	44,787	50,787	10	19:1
	Metric	609,60	812,80	[mm]	969,00	838,20	65,40	113,70	1036,00	1137,60	1290,00		
SFSF-2836	NPS	28,000	36,000	[inch]	42,150	37,000	2,757	4,476	44,913	48,913	54,913	10	21:1
	Metric	711,20	914,40	[mm]	1070,60	939,80	65,40	113,70	1140,80	1242,40	1394,80		
SFSF-3442	NPS	34,000	42,000	[inch]	48,150	43,000	2,757	4,476	50,906	54,906	60,906	10	24,2:1
	Metric	863,60	1066,80	[mm]	1223,00	1092,20	65,40	113,70	1293,00	1394,60	1547,00		
SFSF-4048	NPS	40,000	48,000	[inch]	54,402	49,525	2,757	4,476	57,276	61,276	67,276	12	27,3:1
	Metric	1016,00	1219,20	[mm]	1381,80	1251,00	65,40	113,70	1454,80	1556,40	1708,80		

54 SFSF clamshells motors

PNEUMATIC MOTORS

B50-100X



B50-xxx-RA



HM-xxx



K7x-LT-xxx



PDx48U



MOTOR	RIGHT-ANGLE	SPEED	POWER	TORQUE	AIR CONSUMPTION		AIR PRESSURE	
		RPM	HP	NM	LT/MIN	CFM	BAR	PSI
B50-100X	-	200	1,3	70	1300	55	6,2	90
B50-115-RA	YES	115	1,3	186	1300	55	6,2	90
B50-210-RA	YES	210	1,3	102	1300	55	6,2	90
B50-290-RA	YES	290	1,3	74	1300	55	6,2	90
HM-198	-	198	2,2	186	2200	75	6,2	90
HM-252	-	252	2,2	150	2200	75	6,2	90
HM-379	-	379	2,2	105	2200	75	6,2	90
HM-498	-	498	2,2	83	2200	75	6,2	90
K72-LT-90	YES	90	2,2	405	2200	75	6,2	90
K73-LT-190	YES	190	2,2	200	2200	75	6,2	90
PD248U	-	185	3,5	416	2800	95	6,2	90
PD348U	-	60	3,5	1250	2800	95	6,2	90

HYDRAULIC MOTOR



MOTOR	SPEED	POWER	TORQUE	OIL PRESSURE		MIN. OIL FLOW RATE	
	RPM	HP	NM	BAR	PSI	LT/MIN	GPM
HTB-165	343	16,7	273	190	2750	57	15

ELECTRIC MOTORS



PDEC-3200



DUDE 2000



K90Exxx

MOTOR	REVERSIBLE	RIGHTANGLE	MOTOR SPEED	POWER	TORQUE	VOLTAGE
			RPM	WATT	OUT	VOLT
PDEC-3200/100	-	-	100	3200	800 Nm	110/230
PDEC-3200/145	-	-	145	3200	540 Nm	110/230
PDEC-3200/185	-	-	185	3200	420 Nm	110/230
DUDE-2000-4-speed	YES	-	120, 210, 380, 650	2000	240 Nm	110/230
K90E90	-	YES	90	1150	510 Nm	110/230
K90E190	-	YES	190	1150	260 Nm	110/230
K90E280	-	YES	280	1150	190 Nm	110/230

HIGH-END ELECTRIC SERVO DRIVE WITH CONTROL BOX (3 PHASE)



	POWER [WATT]	VOLTAGE [V]
Drive option 1	2300	390 – 440
Drive option 2	4300	390 – 440

RECOMMENDATIONS

Only proposal and subject to change upon customer requirement and application

PNEUMATIC MOTORS

UNIT	MOTOR*	POWER	WEIGHT
		HP	KG
SF-4	B50-100X	1,3	11
SF-6	HM-252	2,2	17
SF-8	HM-252	2,2	20
SF-10	HM-252	2,2	27
SF-12	HM-252	2,2	23
SF-14	HM-198	2,2	28
SF-16	HM-198	2,2	32
SF-18	K72-LT-90	3,5	36
SF-20	K72-LT-90	3,5	39
SF-24	PD248U	3,5	52
SF-28	PD248U	3,5	95
SF-32	PD248U	3,5	107
SF-36	PD248U	3,5	118
SF-42	PD248U	3,5	137
SF-48	PD248U	3,5	153

HYDRAULIC MOTORS

UNIT	MOTOR*	POWER	WEIGHT
		HP	KG
SF-16	HTB-165	16,7	32
SF-18	HTB-165	16,7	36
SF-20	HTB-165	16,7	39
SF-24	HTB-165	16,7	52
SF-28	HTB-165	16,7	95
SF-32	HTB-165	16,7	107
SF-36	HTB-165	16,7	118
SF-42	HTB-165	16,7	137
SF-48	HTB-165	16,7	153

RECOMMENDATION - ELECTRIC MOTORS

First choice electric drive: PDEC-3200 - high-torque motor with built-in controller for precise speed control. Similar to servo motors, this drive does not slow down and does not tighten under load, but generates up to 5 times more torque than a servo motor which translates into high machining stability. Offers additionally a bunch of indicators: for overload, overheating and brush worn.

UNIT	MOTOR*	POWER	WEIGHT
		WATT	KG
SF-4	PDEC	3200	11
SF-6	PDEC	3200	17
SF-8	PDEC	3200	20
SF-10	PDEC	3200	27
SF-12	PDEC	3200	23
SF-14	PDEC	3200	28
SF-16	PDEC	3200	32

Reaction ring for SFSF clamshells

KRAIS SFSC REACTION RING IS PATENT PENDING! ALL RIGHTS RESERVED



For super heavy applications with super heavy wall and/or hard alloy pipes, consider our ORR to enhance axial and linear stability.

We manufacture the ORR steel ring, which mounts on the rear of the aluminium ring. The ORR is also equipped with 4 steel location stabilizers to enhance the range and rigidity of the machine for those heavy duty applications. The ORR dramatically increases the axial stability and rigidity when cutting and/or bevelling. This solution can help to save time and expense for clamshells completely made out of steel – ask your representative for more details.



SFSF-1624 with ORR mounted on the 24" pipe schedule 120.



ORR mounted on the rear on the existing threaded holes in the aluminium ring.

56 SFSF clamshells add-ons

TOOL SLIDES



KRAIS Tool Slides are rugged and build for strength and durability tool slides. Standard sizes are 1", 3" and 6". Other on request. Out-of-round and axial-feed tool slides are also available. Built with the same quality: for strength and durability as other KRAIS tool slides. KRAIS Slide construction dramatically eases tool slide mounting and locating.

BCS - BRIDGE CROSS SLIDES



Bridge Cross Slides are available for all KRAIS Split Frame SlimFit series machines. Whether flange facing or single point heavy wall machining, the BCS quickly and easily bolts onto the split frame ring.

BCS NUMBER	RANGE [MM]		RANGE [INCH]	
	MIN	MAX	MIN	MAX
BCS-0814	203,2	355,6	8,000	14,000
BCS-1416	355,6	406,4	14,000	16,000
BCS-1618	406,4	457,2	16,000	18,000
BCS-1820	457,2	508,0	18,000	20,000
BCS-2024	508,0	609,6	20,000	24,000
BCS-2832	609,6	812,8	24,000	32,000
BCS-3236	812,8	914,4	32,000	36,000
BCS-3642	914,4	1066,8	36,000	42,000
BCS-4248	1066,8	1117,6	42,000	44,000

HYDRAULIC MOTOR



SFSF-CBA UNIVERSAL COUNTERBORE ATTACHMENT



Designed for the precision counterboring of tube and pipe inside diameters. The Universal counterbore is manufactured with both 6" (SFSF-CBA-150) and 10" (SFSF-CBA-254) long sleeves, and attaches directly to all KRAIS Split Frame SlimFit clamshells. The Universal Counterbore Attachment utilizes a simple and effective hand wheel to precisely control the counterboring process. Both versions (6" and 10") can be mounted directly to the tool slide or Bridge Cross Slide.

SFSF-SCBA SWIVEL HEAD COUNTERBORING ATTACHMENT



Designed for the precision counterboring of tube and pipe inside diameters. The swivel head attachment can also be used for flange facing, OD beveling and flange facing grooving. The Swivel counterbore is manufactured with both 6" (SFSF-SCBA-150) and 10" (SFSF-SCBA-254) long sleeves, and attaches directly to all KRAIS Split Frame SlimFit clamshells. The Universal Counterbore Attachment utilizes a simple and effective hand wheel to precisely control the counterboring process. Both versions (6" and 10") can be mounted directly to the tool slide or Bridge Cross Slide.

OUT OF ROUND TOOL SLIDES



Out of round tool slides - can be solution for all misshapen tubes and pipes. Out of round slides feature durable springs and tracking module that follows the contours of a deformed or less than perfectly round pipe. Built with the same quality: for strength and durability as other KRAIS tool slides.

SFSF clamshells bits and holders

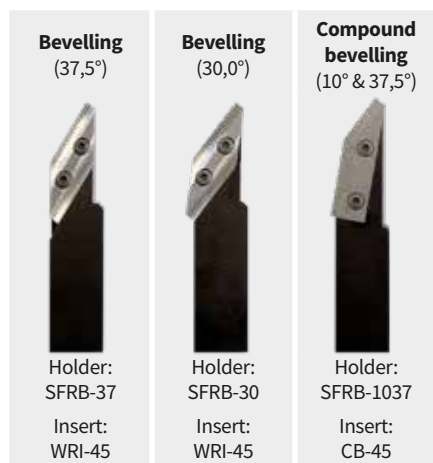
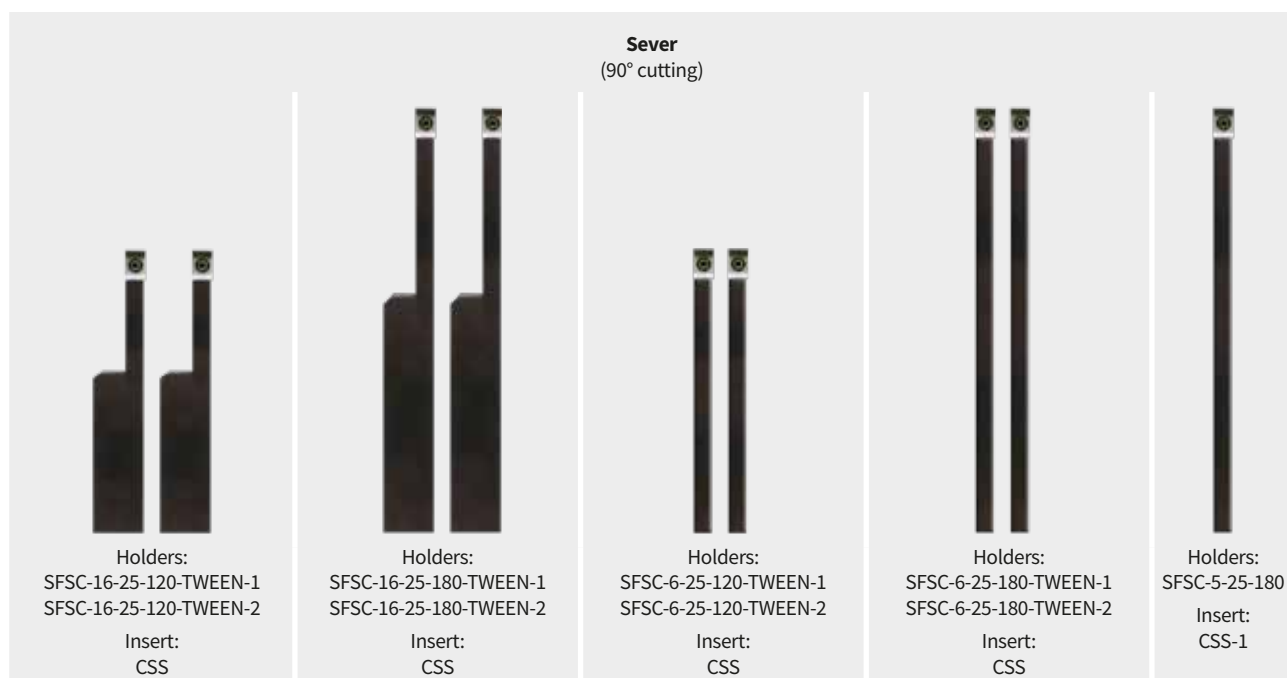
INSERTS FOR CLAMSHELLS



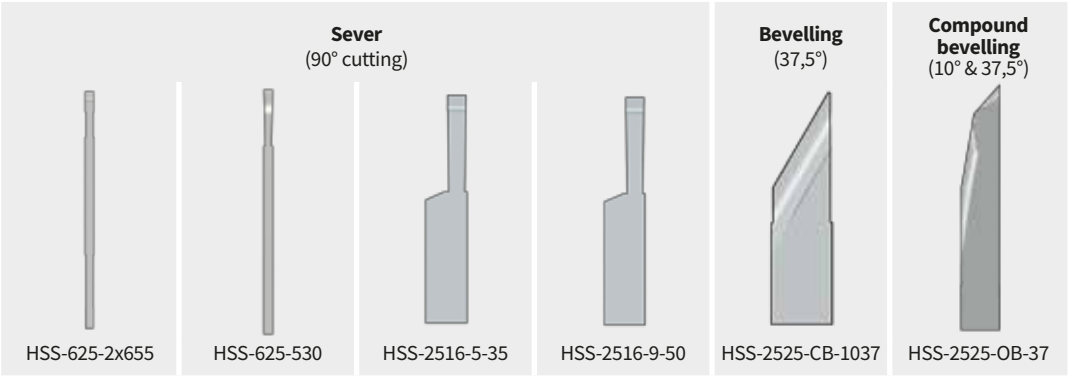
Inserts are made out of High Speed Steel with 6% Cobalt and are available with ALNOVE hard coating also.

For other tool bits please send your request.

HOLDERS FOR CLAMSHELLS



CUTTERS FOR CLAMSHELLS



HSS tooling is also available in both **TiNi** and **ALNOVE coatings** (please consult factory for details).

ACCESSORIES



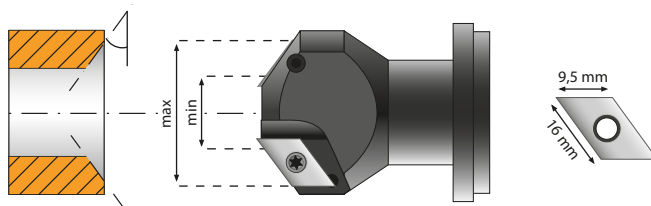
60 Special Heads for MiniMill

STWRMH

STRENGTH WELD REMOVAL
BIT: HSS 6% Cobalt
DEGREE: 37.5°



Custom designed head dedicated for strength weld removal. The heads are sized per tube diameter and are precisely engineered so that the inserts cannot damage the shaft or locking jaws. Simple, trouble-free set up makes these heads very advantageous.



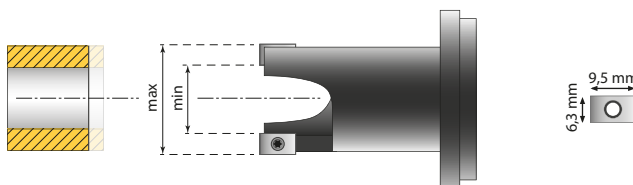
HEAD NR	TUBE CAPACITY			RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS	SHAFT
	[INCH]	[MM]	BWG	MIN	MAX	MIN	MAX			
STWRMH-190	0,750	19,05	12-23	0,530	1,46	13,50	37,00	WRI	2	901 MM#151 12,4 mm
STWRMH-222	0,875	22,23	12-23	0,650	1,496	16,50	38,00	WRI	2	905 MM#151 13,9 mm
STWRMH-254	1,000	25,40	10-23	0,732	1,654	18,60	42,00	WRI	2	909 MM#151 16,9 mm
STWRMH-285	1,125	28,58	10-23	0,858	1,772	21,80	45,00	WRI	2	915 MM#151 20 mm
STWRMH-317	1,250	31,75	9-23	0,945	1,850	24,00	47,00	WRI	2	915 MM#151 20 mm
STWRMH-381	1,500	38,10	8-23	1,142	2,047	29,00	52,00	WRI	2	915 MM#151 20 mm
STWRMH-444	1,750	44,45	8-23	1,417	2,244	36,00	57,00	CDI	2	STD Shaft: 20 or 25 mm
STWRMH-508	2,000	50,80	6-23	1,575	2,480	40,00	63,00	CDI	2	STD Shaft: 20 or 25 mm
STWRMH-571	2,250	57,15	6-23	1,811	2,717	46,00	69,00	CDI	2	STD Shaft: 20 or 25 mm
STWRMH-603	2,375	60,33	6-23	1,949	2,854	49,50	72,50	CDI	2	STD Shaft: 20 or 25 mm
STWRMH-635	2,500	63,50	6-23	2,067	2,972	52,50	75,50	CDI	2	STD Shaft: 20 or 25 mm
STWRMH-762	3,000	76,20	6-23	2,579	3,484	65,50	88,50	CDI	2	STD Shaft: 20 or 25 mm
STWRMH-889	3,500	88,90	6-23	3,071	3,976	78,00	101,00	CDI	2	STD Shaft: 20 or 25 mm
STWRMH-900	4,000	101,60	6-23	3,563	4,469	90,50	113,50	CDI	2	STD Shaft: 20 or 25 mm

TFMH

TUBE FACING MILLING HEAD
BIT: HSS 6% Cobalt
DEGREE: 90.0°



A tube facing milling head created for facing tubes made of any type of material. Utilizes 6% cobalt inserts.



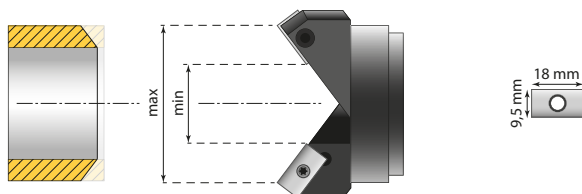
HEAD NR	RURA			RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS	SHAFT
	[INCH]	[MM]	BWG	MIN	MAX	MIN	MAX			
TFMH-145	0,570	14,48	16-23	0,441	0,870	11,2	22,1	CSZ	2	801 MM#151 Micro 10,0MM
TFMH-158	0,625	15,88	16-23	0,500	0,933	12,70	23,70	CSZ	2	805 MM#151 Micro 11,5 MM
TFMH-190	0,750	19,05	12-23	0,531	1,004	13,50	25,50	CSS	2	901 MM#151 12,4 mm
TFMH-222	0,875	22,23	12-23	0,654	1,063	16,60	27,00	CSS	2	905 MM#151 13,9 mm
TFMH-254	1,000	25,40	11-23	0,764	1,201	19,40	30,50	CSS	2	909 MM#151 16,9 mm
TFMH-285	1,125	28,58	11-23	0,854	1,307	21,70	33,20	CSS	2	915 MM#151 20,0 mm
TFMH-317	1,250	31,75	9-23	0,949	1,366	24,10	34,70	CSS	2	915 MM#151 20,0 mm
TFMH-381	1,500	38,10	9-23	1,197	1,614	30,40	41,00	CSS	2	915 MM#151 20,0 mm
TFMH-444	1,750	44,45	9-23	1,449	1,862	36,80	47,30	CS	2	MM#37
TFMH-508	2,000	50,80	9-23	1,701	2,114	43,20	53,70	CS	2	MM#37

OBMH

OUTSIDE BEVEL MILLING HEAD
BIT: HSS 6% Cobalt
DEGREE: 37,5°



Dedicated for the outside beveling of both tubes and pipes. Sized per tube or pipe diameter and angle of required weld bevel. The heads are precisely engineered so that the inserts cannot damage the shaft or locking jaws.



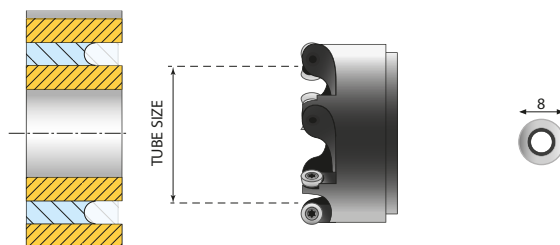
HEAD NR	TUBE CAPACITY			RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS	SHAFT
	[INCH]	[MM]	BWG	MIN	MAX	MIN	MAX			
OBMH-190	0,750	19,05	14-23	0,5826	0,866	14,80	22,00	CS	2	901 MM#151 12,4 mm
OBMH-222	0,875	22,23	12-23	0,654	1,004	16,60	25,50	CS	2	905 MM#151 13,9 mm
OBMH-254	1,000	25,40	11-23	0,764	1,122	19,40	28,50	CS	2	909 MM#151 16,9 mm
OBMH-285	1,125	28,58	11-23	0,890	1,240	22,60	31,50	CS	2	915 MM#151 20 mm
OBMH-317	1,250	31,75	8-23	0,917	1,732	23,30	44,00	CDI	2	STD Shaft: 20 or 25 mm
OBMH-381	1,500	38,10	6-23	0,984	1,850	25,00	47,00	CDI	2	STD Shaft: 20 or 25 mm
OBMH-444	1,750	44,45	6-23	1,024	1,890	26,00	48,00	CDI	2	STD Shaft: 20 or 25 mm
OBMH-508	2,000	50,80	6-23	1,181	2,047	30,00	52,00	CDI	2	STD Shaft: 20 or 25 mm
OBMH-571	2,250	57,15	6-23	1,417	2,283	36,00	58,00	CDI	2	STD Shaft: 20 or 25 mm
OBMH-603	2,375	60,33	6-23	1,535	2,402	39,00	61,00	CDI	2	STD Shaft: 20 or 25 mm
OBMH-635	2,500	63,50	6-23	1,654	2,559	42,00	65,00	CDI	2	STD Shaft: 20 or 25 mm
OBMH-762	3,000	76,20	6-23	2,165	3,031	55,00	77,00	CDI	2	STD Shaft: 20 or 25 mm
OBMH-889	3,500	88,90	6-23	2,677	3,543	68,00	90,00	CDI	2	STD Shaft: 20 or 25 mm
OBMH-900	4,000	101,60	6-23	3,150	4,016	80,00	102,00	CDI	2	STD Shaft: 20 or 25 mm

MMRBMH

MEMBRANE REMOVAL HEAD
BIT: CARBIDE



Specially designed head for membrane removal and overlay head (cladding removal)



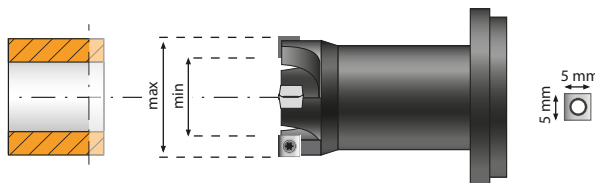
HEAD NR	TUBE CAPACITY		RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS
	[INCH]	[MM]	MIN	MAX	MIN	MAX		
MMRBMH-254	1,000	25,40	1,000	1,630	25,40	41,40	PO8	4
MMRBMH-288	1,125	28,58	1,134	1,764	28,80	44,80	PO8	5
MMRBMH-317	1,250	31,75	1,248	1,878	31,70	47,70	PO8	5
MMRBMH-381	1,500	38,10	1,500	2,130	38,10	54,10	PO8	6
MMRBMH-444	1,750	44,45	1,748	2,378	44,40	60,40	PO8	6
MMRBMH-508	2,000	50,80	2,000	2,630	50,80	66,80	PO8	7
MMRBMH-571	2,250	57,15	2,252	2,882	57,20	73,20	PO8	7
MMRBMH-603	2,375	60,33	2,374	3,004	60,30	76,30	PO8	7
MMRBMH-635	2,500	63,50	2,500	3,130	63,50	79,50	PO8	7
MMRBMH-762	3,000	76,20	3,000	3,630	76,20	92,20	PO8	8
MMRBMH-889	3,500	88,90	3,500	4,130	88,90	104,90	PO8	8
MMRBMH-101	4,000	101,60	4,000	4,630	101,60	117,60	PO8	9

SWRMH

SEAL WELD REMOVAL HEAD
BIT: CARBIDE
DEGREE: 90.0°



Size specific heads designed for seal weld removal on tubes. Suitable for weld removal on carbon, duplex, inconel and other exotic alloys. Utilizes 4 sided carbide inserts.



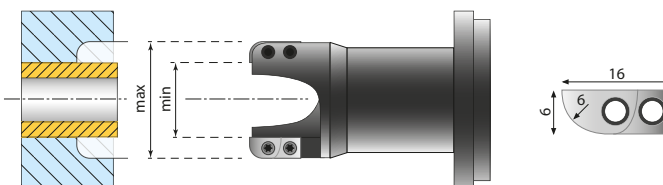
HEAD NR	TUBE CAPACITY			RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS	SCREW
	[INCH]	[MM]	BWG	MIN	MAX	MIN	MAX			
SWRMH-160	0,625	15,88	17-22	0,500	1,100	12,70	28,00	CI 5x5	4	MHS-2
SWRMH-190	0,750	19,05	11-22	0,510	1,140	13,00	29,00	CI 5x5	4	MHS-2
SWRMH-222	0,875	22,23	10-22	0,710	1,300	18,00	33,00	CI 5x5	4	MHS-2
SWRMH-254	1,000	25,40	8-20	0,810	1,380	20,50	35,00	CI 5x5	4	MHS-2

SWROTC

TUBE FACING MILLING HEAD
BIT: HSS 6% Cobalt



A seal weld removal head over tube circumference prior to re-welding the damaged joint without removing the tube.



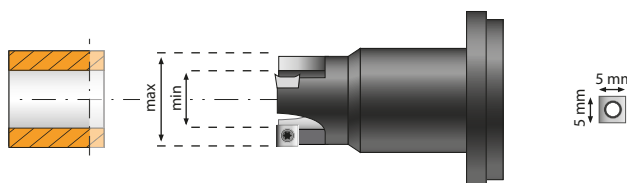
HEAD NR	TUBE CAPACITY		RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS	SHAFT
	[INCH]	[MM]	MIN	MAX	MIN	MAX			
SWROTC-190	0,750	19,05	0,750	1,222	19,05	31,05	CSWR	2	901 MM#151 12,4 mm
SWROTC-222	0,875	22,23	0,874	1,346	22,20	34,20	CSWR	2	905 MM#151 13,9 mm
SWROTC-254	1,000	25,40	1,000	1,472	25,40	37,40	CSWR	2	909 MM#151 16,9 mm
SWROTC-285	1,125	28,58	1,124	1,596	28,55	40,55	CSWR	2	915 MM#151 20,0 mm
SWROTC-318	1,250	31,7	1,250	1,722	31,75	43,75	CSWR	2	915 MM#151 20,0 mm
SWROTC-381	1,500	38,1	1,500	1,969	38,10	50,01	CSWR	2	915 MM#151 20,0 mm

MMFH

TUBE FACING MILLING HEAD
BIT: CARBIDE
DEGREE: 90.0°



A tube facing milling head suitable for machining tubes manufactured from very hard materials such as duplex, inconel and other exotic alloys. Utilizes 4 sided carbide inserts.



HEAD NR	TUBE CAPACITY			RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS	SHAFT
	[INCH]	[MM]	BWG	MIN	MAX	MIN	MAX			
MMFH-145	0,550	14,00	17-23	0,440	0,807	11,20	20,5	CI 5x5	2	801 MM#151 Micro 10,0 MM
MMFH-158	0,625	15,88	16-23	0,500	0,866	12,70	22,00	CI 5x5	2	805 MM#151 Micro 11,5 MM
MMFH-190	0,750	19,05	13-23	0,559	0,906	14,20	23,00	CI 5x5	3	901 MM#151 12,4 mm
MMFH-222	0,875	22,23	12-23	0,654	0,965	16,60	24,50	CI 5x5	3	905 MM#151 13,9 mm
MMFH-254	1,000	25,40	11-23	0,764	1,087	19,40	27,50	CI 5x5	3	909 MM#151 16,9 mm
MMFH-285	1,125	28,58	11-23	0,886	1,213	22,50	30,80	CI 5x5	3	915 MM#151 20,0 mm

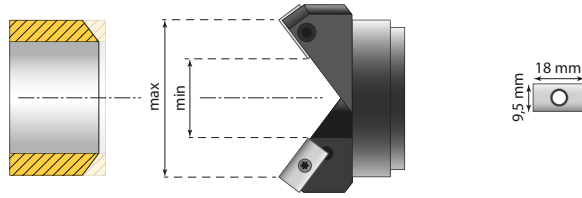
Special Heads for PrepMill/HyperMill

OBPM

OUTSIDE BEVEL MILLING HEAD
BIT: HSS 6% Cobalt
DEGREE: 37,5°



Custom, precisely designed head. Dedicated for the outside beveling of both tubes and pipes. Sized per tube or pipe diameter and angle of required weld bevel. The heads are precisely engineered so that the inserts cannot damage the shaft or locking jaws.



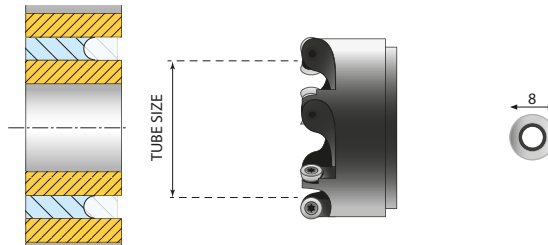
HEAD NR	TUBE CAPACITY			RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS	SHAFT
	[INCH]	[MM]	BWG	MIN	MAX	MIN	MAX			
OBPM-254	1,000	25,40	11-23	0,764	1,122	19,40	28,50	CS	2	STD Shaft: 20 or 25 mm
OBPM-285	1,125	28,58	11-23	0,890	1,240	22,60	31,50	CS	2	STD Shaft: 20 or 25 mm
OBPM-317	1,250	31,75	8-23	0,917	1,732	23,30	44,00	CDI	2	STD Shaft: 20 or 25 mm
OBPM-381	1,500	38,10	6-23	0,984	1,850	25,00	47,00	CDI	2	STD Shaft: 20 or 25 mm
OBPM-444	1,750	44,45	6-23	1,024	1,890	26,00	48,00	CDI	2	STD Shaft: 20 or 25 mm
OBPM-508	2,000	50,80	6-23	1,181	2,047	30,00	52,00	CDI	2	STD Shaft: 20 or 25 mm
OBPM-571	2,250	57,15	6-23	1,417	2,283	36,00	58,00	CDI	2	STD Shaft: 20 or 25 mm
OBPM-603	2,375	60,33	6-23	1,535	2,402	39,00	61,00	CDI	2	STD Shaft: 20 or 25 mm
OBPM-635	2,500	63,50	6-23	1,654	2,559	42,00	65,00	CDI	2	STD Shaft: 20 or 25 mm
OBPM-762	3,000	76,20	6-23	2,165	3,031	55,00	77,00	CDI	2	STD Shaft: 20 or 25 mm
OBPM-889	3,500	88,90	6-23	2,677	3,543	68,00	90,00	CDI	2	STD Shaft: 20 or 25 mm
OBPM-900	4,000	101,60	6-23	3,150	4,016	80,00	102,00	CDI	2	STD Shaft: 20 or 25 mm

PRRBH

MEMBRANE REMOVAL HEAD
BIT: CARBIDE



Specially designed head for membrane removal and overlay head (cladding removal)



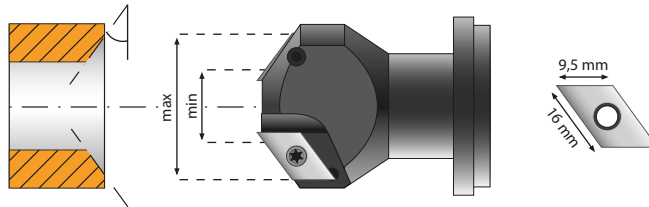
HEAD NR	TUBE CAPACITY		RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS
	[INCH]	[MM]	MIN	MAX	MIN	MAX		
PRRBH-254	1,000	25,40	1,000	1,630	25,40	41,40	PO8	4
PRRBH-288	1,125	28,58	1,134	1,764	28,80	44,80	PO8	5
PRRBH-317	1,250	31,75	1,248	1,878	31,70	47,70	PO8	5
PRRBH-381	1,500	38,10	1,500	2,130	38,10	54,10	PO8	6
PRRBH-444	1,750	44,45	1,748	2,378	44,40	60,40	PO8	6
PRRBH-508	2,000	50,80	2,000	2,630	50,80	66,80	PO8	7
PRRBH-571	2,250	57,15	2,252	2,882	57,20	73,20	PO8	7
PRRBH-603	2,375	60,33	2,374	3,004	60,30	76,30	PO8	7
PRRBH-635	2,500	63,50	2,500	3,130	63,50	79,50	PO8	7
PRRBH-762	3,000	76,20	3,000	3,630	76,20	92,20	PO8	8
PRRBH-889	3,500	88,90	3,500	4,130	88,90	104,90	PO8	8
PRRBH-101	4,000	101,60	4,000	4,630	101,60	117,60	PO8	9

STWRPM

STRENGTH WELD REMOVAL
BIT: HSS 6% Cobalt
DEGREE: 37.5°



Custom designed head dedicated for strength weld removal. The heads are sized per tube diameter and are precisely engineered so that the inserts cannot damage the shaft or locking jaws. Simple, trouble-free set up makes these heads very advantageous.



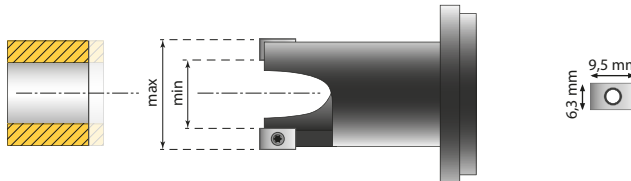
HEAD NR	TUBE CAPACITY			RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS	SHAFT
	[INCH]	[MM]	BWG	MIN	MAX	MIN	MAX			
STWRPM-254	1,000	25,40	10-23	0,732	1,654	18,60	42,00	WRI	2	STD Shaft: 20
STWRPM-285	1,125	28,58	10-23	0,858	1,772	21,80	45,00	WRI	2	STD Shaft: 20
STWRPM-317	1,250	31,75	9-23	0,945	1,850	24,00	47,00	WRI	2	STD Shaft: 20 or 25 mm
STWRPM-381	1,500	38,10	8-23	1,142	2,047	29,00	52,00	WRI	2	STD Shaft: 20 or 25 mm
STWRPM-444	1,750	44,45	8-23	1,417	2,244	36,00	57,00	CDI	2	STD Shaft: 20 or 25 mm
STWRPM-508	2,000	50,80	6-23	1,575	2,480	40,00	63,00	CDI	2	STD Shaft: 20 or 25 mm
STWRPM-571	2,250	57,15	6-23	1,811	2,717	46,00	69,00	CDI	2	STD Shaft: 20 or 25 mm
STWRPM-603	2,375	60,33	6-23	1,949	2,854	49,50	72,50	CDI	2	STD Shaft: 20 or 25 mm
STWRPM-635	2,500	63,50	6-23	2,067	2,972	52,50	75,50	CDI	2	STD Shaft: 20 or 25 mm
STWRPM-762	3,000	76,20	6-23	2,579	3,484	65,50	88,50	CDI	2	STD Shaft: 20 or 25 mm
STWRPM-889	3,500	88,90	6-23	3,071	3,976	78,00	101,00	CDI	2	STD Shaft: 20 or 25 mm
STWRPM-900	4,000	101,60	6-23	3,563	4,469	90,50	113,50	CDI	2	STD Shaft: 20 or 25 mm

TFPM

TUBE FACING MILLING HEAD
BIT: HSS 6% Cobalt
DEGREE: 90.0°



A tube facing milling head created for facing tubes made of any type of material. Utilizes 6% cobalt inserts.



HEAD NR	TUBE CAPACITY			RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS	SHAFT
	[INCH]	[MM]	BWG	MIN	MAX	MIN	MAX			
TFMP-285	1,125	28,58	11-23	0,854	1,307	21,70	33,20	CSS	2	STD Shaft 20 mm
TFMP-317	1,250	31,75	9-23	0,949	1,366	24,10	34,70	CSS	2	STD Shaft 20 mm
TFMP-381	1,500	38,10	9-23	1,197	1,614	30,40	41,00	CSS	2	STD Shaft: 20 or 25 mm
TFMP-444	1,750	44,45	9-23	1,449	1,862	36,80	47,30	CS	2	STD Shaft: 20 or 25 mm
TFMP-508	2,000	50,80	9-23	1,701	2,114	43,20	53,70	CS	2	STD Shaft: 20 or 25 mm

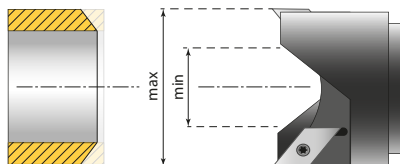
Special Heads for PanelMill

OBPMH

OUTSIDE BEVEL MILLING HEAD
BIT: HSS 6% COBALT
DEGREE: 37,5°



OBPMH beveling head for beveling tubes without membranes in a boiler waterwall.



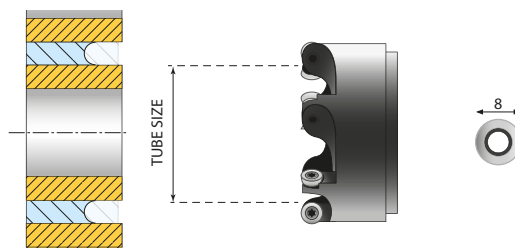
HEAD NR	TUBE CAPACITY			RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS
	[INCH]	[MM]	BWG	MIN	MAX	MIN	MAX		
OBPMH-190	0,750	19,05	14-23	0,5826	0,866	14,80	22,00	WRIL	2
OBPMH-222	0,875	22,23	12-23	0,654	1,004	16,60	25,50	WRIL	2
OBPMH-254	1,000	25,40	11-23	0,764	1,122	19,40	28,50	WRIL	2
OBPMH-285	1,125	28,58	11-23	0,890	1,240	22,60	31,50	WRIL	2
OBPMH-317	1,250	31,75	8-23	0,917	1,732	23,30	44,00	WRIL	2
OBPMH-381	1,500	38,10	6-23	0,984	1,850	25,00	47,00	WRIL	2
OBPMH-444	1,750	44,45	6-23	1,024	1,890	26,00	48,00	WRIL	2
OBPMH-508	2,000	50,80	6-23	1,181	2,047	30,00	52,00	WRIL	2
OBPMH-571	2,250	57,15	6-23	1,417	2,283	36,00	58,00	WRIL	2
OBPMH-603	2,375	60,33	6-23	1,535	2,402	39,00	61,00	WRIL	2
OBPMH-635	2,500	63,50	6-23	1,654	2,559	42,00	65,00	WRIL	2
OBPMH-889	3,500	88,90	6-23	2,677	3,543	68,00	90,00	WRIL	2

PMRBMH

MEMBRANE REMOVAL HEAD
BIT: CARBIDE



Specially designed head for membrane removal and overlay head (cladding removal)



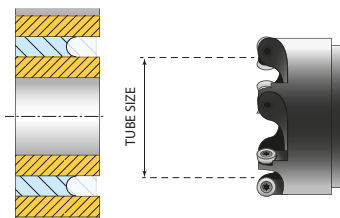
HEAD NR	TUBE CAPACITY		RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS
	[INCH]	[MM]	MIN	MAX	MIN	MAX		
PMRBMH-254	1,000	25,40	1,000	1,630	25,40	41,40	PO8	4
PMRBMH-288	1,125	28,58	1,134	1,764	28,80	44,80	PO8	5
PMRBMH-317	1,250	31,75	1,248	1,878	31,70	47,70	PO8	5
PMRBMH-381	1,500	38,10	1,500	2,130	38,10	54,10	PO8	6
PMRBMH-444	1,750	44,45	1,748	2,378	44,40	60,40	PO8	6
PMRBMH-508	2,000	50,80	2,000	2,630	50,80	66,80	PO8	7
PMRBMH-571	2,250	57,15	2,252	2,882	57,20	73,20	PO8	7
PMRBMH-603	2,375	60,33	2,374	3,004	60,30	76,30	PO8	7
PMRBMH-635	2,500	63,50	2,500	3,130	63,50	79,50	PO8	7
PMRBMH-762	3,000	76,20	3,000	3,630	76,20	92,20	PO8	8
PMRBMH-889	3,500	88,90	3,500	4,130	88,90	104,90	PO8	8
PMRBMH-101	4,000	101,60	4,000	4,630	101,60	117,60	PO8	9

Special Heads for PanelMill PF

SPECIALIZED CUTTER HEADS

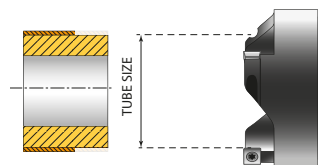
PRRMBH-PF

Membrane removal and overlay head with carbide bits.



CRH-PF

Cladding removal head with carbide bits.

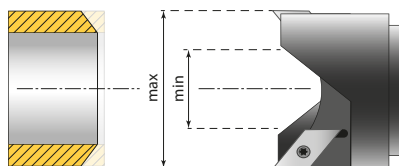


HEAD NR	TUBE CAPACITY		INSERT	NO. OF INSERTS
	[INCH]	[MM]		
PRRBMH-PF-508	2,000	50,80	PO8	7
PRRBMH-PF-571	2,250	57,15	PO8	7
PRRBMH-PF-603	2,375	60,33	PO8	7
PRRBMH-PF-635	2,500	63,50	PO8	7
PRRBMH-PF-762	3,000	76,20	PO8	9

HEAD NR	TUBE CAPACITY		INSERT	NO. OF INSERTS
	[INCH]	[MM]		
CRH-PF-508	2,000	50,80	CI 9x9	3
CRH-PF-571	2,250	57,15	CI 9x9	3
CRH-PF-603	2,375	60,33	CI 9x9	3
CRH-PF-635	2,500	63,50	CI 9x9	3
CRH-PF-762	3,000	76,20	CI 9x9	3

OBPMH-PF

Outside bevelling head (37,5°) for tubes without membranes, with HSS 6% cobalt bits.

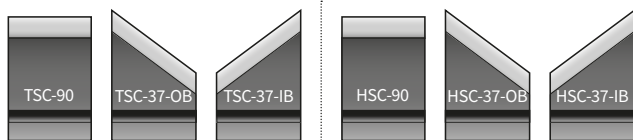


HEAD NR	TUBE CAPACITY			RANGE [INCH]		RANGE [MM]		INSERT	NO. OF INSERTS
	[INCH]	[MM]	BWG	MIN	MAX	MIN	MAX		
OBPMH-PF-285	1,125	28,58	11-23	0,890	1,240	22,60	31,50	WRIL	2
OBPMH-PF-317	1,250	31,75	8-23	0,917	1,732	23,30	44,00	WRIL	2
OBPMH-PF-381	1,500	38,10	6-23	0,984	1,850	25,00	47,00	WRIL	2
OBPMH-PF-444	1,750	44,45	6-23	1,024	1,890	26,00	48,00	WRIL	2
OBPMH-PF-508	2,000	50,80	6-23	1,181	2,047	30,00	52,00	WRIL	2
OBPMH-PF-571	2,250	57,15	6-23	1,417	2,283	36,00	58,00	WRIL	2
OBPMH-PF-603	2,375	60,33	6-23	1,535	2,402	39,00	61,00	WRIL	2
OBPMH-PF-635	2,500	63,50	6-23	1,654	2,559	42,00	65,00	WRIL	2
OBPMH-PF-889	3,500	88,90	6-23	2,677	3,543	68,00	90,00	WRIL	2

Cutters and inserts

STANDARD CUTTERS

FOR USE WITHOUT HOLDERS
BIT: HSS and HSS Cobalt




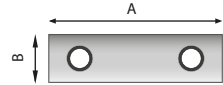






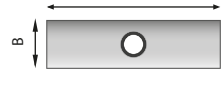





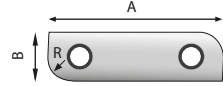


Cutters for use with MiniMill series

Cutters for use with HyperMill series

INSERTS

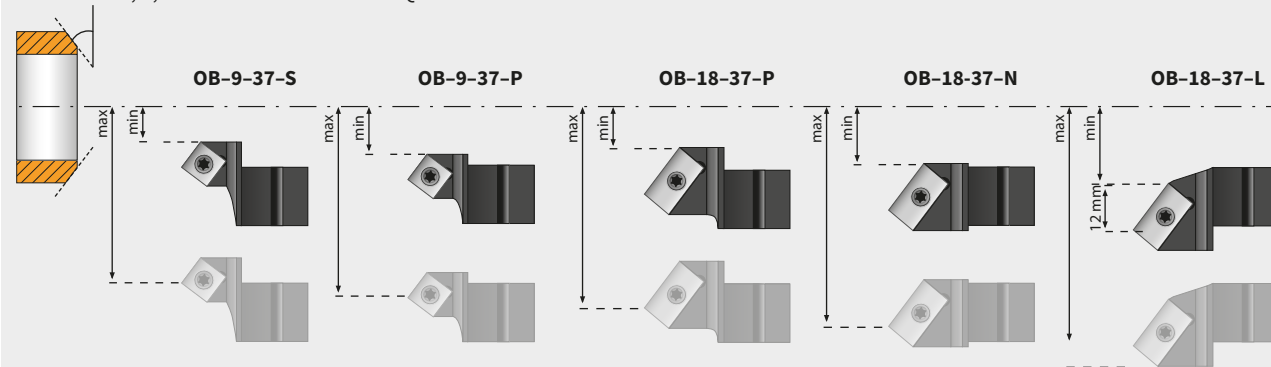
INSERTS FOR USE ONLY WITH HOLDERS OR SPECIAL HEADS

 <table border="1"> <thead> <tr> <th>CS</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>9,5</td> <td>9,5</td> </tr> </tbody> </table> <p>MAT: HSS 6% Cobalt SCREW: MHS-4</p>	CS	A	B	mm	9,5	9,5	 <table border="1"> <thead> <tr> <th>CDI</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>18</td> <td>9,5</td> </tr> </tbody> </table> <p>MAT: HSS 6% Cobalt SCREW: MHS-4</p>	CDI	A	B	mm	18	9,5	 <table border="1"> <thead> <tr> <th>CI7</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>7</td> <td>7</td> </tr> </tbody> </table> <p>MAT: CARBIDE SCREW: MHS-2,7</p>	CI7	A	B	mm	7	7	 <table border="1"> <thead> <tr> <th>2CDI</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>45</td> <td>12,7</td> </tr> </tbody> </table> <p>MAT: HSS 6% Cobalt SCREW: MHS-4</p>	2CDI	A	B	mm	45	12,7				
CS	A	B																													
mm	9,5	9,5																													
CDI	A	B																													
mm	18	9,5																													
CI7	A	B																													
mm	7	7																													
2CDI	A	B																													
mm	45	12,7																													
 <table border="1"> <thead> <tr> <th>CI</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>5</td> <td>5</td> </tr> </tbody> </table> <p>MAT: CARBIDE SCREW: MHS-2</p>	CI	A	B	mm	5	5	 <table border="1"> <thead> <tr> <th>CDI-CB</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>18</td> <td>9,5</td> </tr> </tbody> </table> <p>MAT: HSS 6% Carbide SCREW: MHS-4</p>	CDI-CB	A	B	mm	18	9,5	 <table border="1"> <thead> <tr> <th>PO8</th> <th>R</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>8</td> </tr> </tbody> </table> <p>MAT: CARBIDE SCREW: MHS-2,7</p>	PO8	R	mm	8													
CI	A	B																													
mm	5	5																													
CDI-CB	A	B																													
mm	18	9,5																													
PO8	R																														
mm	8																														
 <table border="1"> <thead> <tr> <th>CSZ</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>5,8</td> <td>9,5</td> </tr> </tbody> </table> <p>MAT: HSS 6% Cobalt SCREW: MHS-2,5</p>	CSZ	A	B	mm	5,8	9,5	 <table border="1"> <thead> <tr> <th>WRIL</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>13,5</td> <td>9,5</td> </tr> </tbody> </table> <p>MAT: HSS 6% Cobalt SCREW: MHS-4</p>	WRIL	A	B	mm	13,5	9,5	 <table border="1"> <thead> <tr> <th>CSWR</th> <th>A</th> <th>B</th> <th>R</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>6,5</td> <td>16,5</td> <td>6</td> </tr> </tbody> </table> <p>MAT: HSS 6% Cobalt SCREW: MHS-2,5</p>	CSWR	A	B	R	mm	6,5	16,5	6	 <table border="1"> <thead> <tr> <th>CDK</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>25</td> <td>9,5</td> </tr> </tbody> </table> <p>MAT: HSS 6% Cobalt SCREW: MHS-4</p>	CDK	A	B	mm	25	9,5		
CSZ	A	B																													
mm	5,8	9,5																													
WRIL	A	B																													
mm	13,5	9,5																													
CSWR	A	B	R																												
mm	6,5	16,5	6																												
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 <table border="1"> <thead> <tr> <th>CSS-CB</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>6,3</td> <td>9,5</td> </tr> </tbody> </table> <p>MAT: HSS 6% Carbide SCREW: MHS-2,5</p>	CSS-CB	A	B	mm	6,3	9,5	 <table border="1"> <thead> <tr> <th>WRK</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>mm</td> <td>10</td> <td>9,5</td> </tr> </tbody> </table> <p>MAT: HSS 6% Cobalt SCREW: MHS-4</p>	WRK	A	B	mm	10	9,5	 <table border="1"> <thead> <tr> <th>[mm]</th> <th>A</th> <th>B</th> <th>R</th> </tr> </thead> <tbody> <tr> <td>CDJ-2.5*</td> <td>18</td> <td>9,5</td> <td>2,5</td> </tr> <tr> <td>CDJ-5</td> <td>18</td> <td>9,5</td> <td>4,7</td> </tr> <tr> <td>CDJ-8*</td> <td>18</td> <td>9,5</td> <td>8,0</td> </tr> </tbody> </table> <p>* on request MAT: HSS 6% Cobalt SCREW: MHS-4</p>	[mm]	A	B	R	CDJ-2.5*	18	9,5	2,5	CDJ-5	18	9,5	4,7	CDJ-8*	18	9,5	8,0	
CSS-CB	A	B																													
mm	6,3	9,5																													
WRK	A	B																													
mm	10	9,5																													
[mm]	A	B	R																												
CDJ-2.5*	18	9,5	2,5																												
CDJ-5	18	9,5	4,7																												
CDJ-8*	18	9,5	8,0																												
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CSS	A	B																													
mm	6,3	9,5																													
WRI	A	B																													
mm	13,5	9,5																													
2CDJ-5	A	B	R																												
mm	45	12,7	4,7																												

Holders

OUTSIDE BEVELING HOLDERS

STANDARD: 37,5°; OTHER ANGLES ONLY ON REQUEST

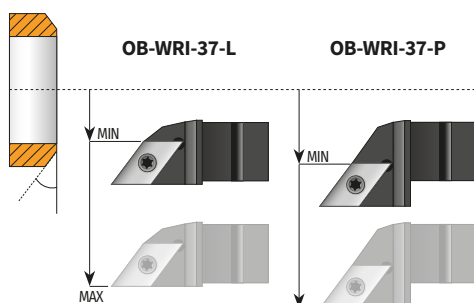


HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
OB-9-37-S	CS	60	16,00	26,00	0,630	1,024	20; 30; 37,5 ; 45
		88	16,00	51,00	0,630	2,008	20; 30; 37,5 ; 45
OB-9-37-P	CS	60	24,00	34,00	0,945	1,339	20; 30; 37,5 ; 45
		88	24,00	58,00	0,945	2,283	20; 30; 37,5 ; 45
		106	28,00	72,00	1,102	2,835	20; 30; 37,5 ; 45
OB-18-37-P	CDI	60	24,00	47,00	0,945	1,850	20; 30; 37,5 ; 45
		88	24,00	71,00	0,945	2,795	20; 30; 37,5 ; 45
		106	28,00	85,00	1,102	3,346	20; 30; 37,5 ; 45
		114	31,00	88,00	1,220	3,465	20; 30; 37,5 ; 45
		135	31,00	109,00	1,220	4,291	20; 30; 37,5 ; 45
		175	31,00	149,00	1,220	5,866	20; 30; 37,5 ; 45

HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
OB-18-37-N	CDI	60	34,00	56,00	1,339	2,205	20; 30; 37,5 ; 45
		88	34,00	80,00	1,339	3,150	20; 30; 37,5 ; 45
		106	38,00	94,00	1,496	3,701	20; 30; 37,5 ; 45
		114	43,00	101,00	1,693	3,976	20; 30; 37,5 ; 45
		135	43,00	122,00	1,693	4,803	20; 30; 37,5 ; 45
OB-18-37-L	CDI	175	43,00	162,00	1,693	6,378	20; 30; 37,5 ; 45
		60	40,00	63,00	1,575	2,480	20; 30; 37,5 ; 45
		88	40,00	87,00	1,575	3,425	20; 30; 37,5 ; 45
		106	44,00	101,00	1,732	3,976	20; 30; 37,5 ; 45
		114	47,00	104,00	1,850	4,094	20; 30; 37,5 ; 45
		135	47,00	125,00	1,850	4,921	20; 30; 37,5 ; 45
		175	47,00	165,00	1,850	6,496	20; 30; 37,5 ; 45

OUTSIDE BEVELING HOLDERS

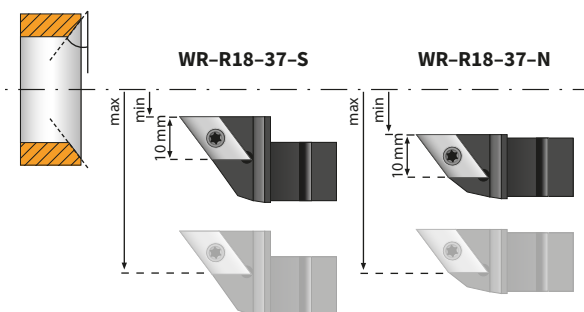
Cutting edge length: 10 mm, standard angle: 37,5° (others on request)



HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
WR-PM-R18-37-S	WRIL	64	22,00	66,00	0,866	2,598	30; 37,5
WR-PM-R18-37-N	WRIL	64	36,00	80,00	1,417	3,150	30; 37,5
WR-PM-R18-37-N	WRIL	99	36,00	116,00	1,417	4,567	30; 37,5

WELD REMOVAL HOLDERS

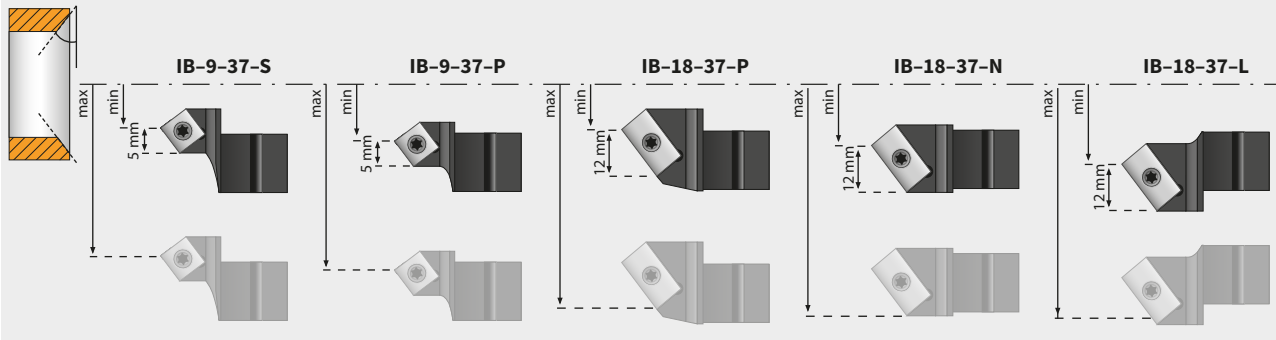
STANDARD: 37,5°; OTHER ANGLES ONLY ON REQUEST



HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
WR-R18-37-S	WRI	60	15,50	36,00	0,610	1,417	20; 30; 37,5 ; 45
		88	15,50	61,00	0,610	2,402	20; 30; 37,5 ; 45
		106	19,50	75,00	0,768	2,953	20; 30; 37,5 ; 45
WR-R18-37-N	WRI	60	30,00	50,00	1,181	1,969	20; 30; 37,5 ; 45
		88	30,00	75,00	1,181	2,953	20; 30; 37,5 ; 45
		106	34,00	89,00	1,339	3,504	20; 30; 37,5 ; 45
		114	37,00	94,00	1,457	3,701	20; 30; 37,5 ; 45
		135	37,00	115,00	1,457	4,528	20; 30; 37,5 ; 45
		175	37,00	155,00	1,457	6,102	20; 30; 37,5 ; 45

INSIDE BEVELING HOLDERS

STANDARD: 37,5°; OTHER ANGLES ONLY ON REQUEST

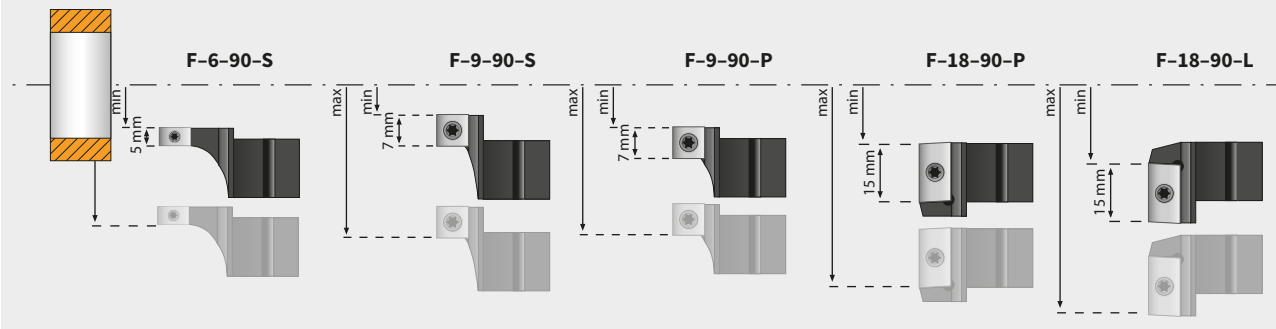


HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
IB-9-37-S	CS	60	29,00	39,00	1,142	1,535	20; 30; 37,5 ; 45
		88	29,00	63,00	1,142	2,480	20; 30; 37,5 ; 45
		106	33,00	77,00	1,299	3,031	20; 30; 37,5 ; 45
IB-9-37-P	CS	60	35,50	45,50	1,398	1,791	20; 30; 37,5 ; 45
		88	35,50	70,00	1,398	2,756	20; 30; 37,5 ; 45
		106	39,50	84,00	1,555	3,307	20; 30; 37,5 ; 45
IB-18-37-P	CDI	60	35,50	58,00	1,398	2,283	20; 30; 37,5 ; 45
		88	35,50	82,50	1,398	3,248	20; 30; 37,5 ; 45
		106	39,50	96,50	1,555	3,799	20; 30; 37,5 ; 45
		114	42,00	102,00	1,654	4,016	20; 30; 37,5 ; 45
		135	42,00	123,00	1,654	4,843	20; 30; 37,5 ; 45
		175	42,00	163,00	1,654	6,417	20; 30; 37,5 ; 45

HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
IB-18-37-N	CDI	60	44,50	67,50	1,752	2,657	20; 30; 37,5 ; 45
		88	44,50	92,00	1,752	3,622	20; 30; 37,5 ; 45
		106	48,50	106,00	1,909	4,173	20; 30; 37,5 ; 45
		114	51,00	111,00	2,008	4,370	20; 30; 37,5 ; 45
		135	51,00	132,00	2,008	5,197	20; 30; 37,5 ; 45
		175	51,00	172,00	2,008	6,772	20; 30; 37,5 ; 45
IB-18-37-L	CDI	60	53,00	76,00	2,087	2,992	20; 30; 37,5 ; 45
		88	53,00	100,00	2,087	3,937	20; 30; 37,5 ; 45
		106	57,00	114,00	2,244	4,488	20; 30; 37,5 ; 45
		114	60,00	120,00	2,362	4,724	20; 30; 37,5 ; 45
		135	60,00	141,00	2,362	5,551	20; 30; 37,5 ; 45
		175	60,00	181,00	2,362	7,126	20; 30; 37,5 ; 45

FACING HOLDERS

STANDARD: 90,0°

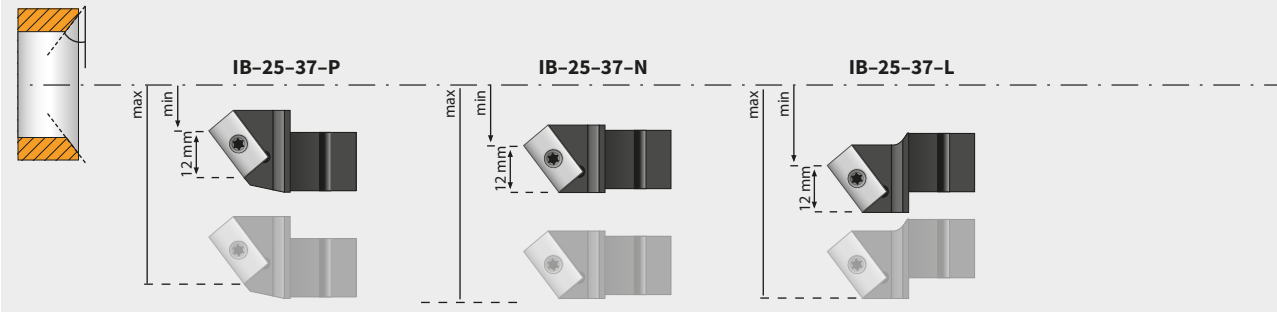


HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
F-6-90-S	CSS	60	14,50	24,50	0,571	0,965	90
F-9-90-S	CS	60	16,00	30,00	0,630	1,181	90
F-9-90-P	CS	60	24,00	38,00	0,945	1,496	90
		88	24,00	62,00	0,945	2,441	90
		106	28,00	75,00	1,102	2,953	90
		114	31,00	80,00	1,220	3,150	90
F-18-90-P	CDI	60	24,00	54,00	0,945	2,126	90
		88	24,00	79,00	0,945	3,110	90
		106	28,00	95,00	1,102	3,740	90

HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
F-18-90-P	CDI	114	31,00	98,00	1,220	3,858	90
		135	31,00	119,00	1,220	4,685	90
		175	31,00	159,00	1,220	6,260	90
F-18-90-L	CDI	60	33,00	62,00	1,299	2,441	90
		88	33,00	87,00	1,299	3,425	90
		106	37,00	101,00	1,457	3,976	90
		114	38,00	104,00	1,496	4,094	90
		135	38,00	125,00	1,496	4,921	90
		175	38,00	165,00	1,496	6,496	90

INSIDE BEVELING HOLDERS

STANDARD: 37,5°; OTHER ANGLES ONLY ON REQUEST

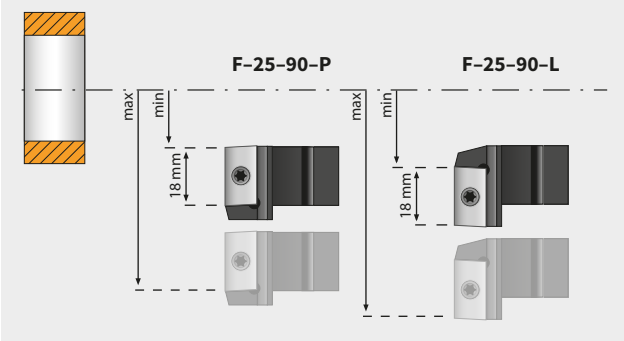


HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
IB-25-37-P	CDI	60	35,50	63,00	1,398	2,480	20; 30; 37,5 ; 45
		88	35,50	87,50	1,398	3,444	20; 30; 37,5 ; 45
		106	39,50	101,50	1,555	3,996	20; 30; 37,5 ; 45
		114	42,00	107,00	1,654	4,212	20; 30; 37,5 ; 45
		135	42,00	128,00	1,654	5,039	20; 30; 37,5 ; 45
		175	42,00	168,00	1,654	6,614	20; 30; 37,5 ; 45
IB-25-37-N	CDK	60	44,50	72,50	1,752	2,854	20; 30; 37,5 ; 45
		88	44,50	97,00	1,752	3,818	20; 30; 37,5 ; 45
		106	48,50	111,00	1,909	4,370	20; 30; 37,5 ; 45
		114	51,00	116,00	2,008	4,566	20; 30; 37,5 ; 45
		135	51,00	137,00	2,008	5,393	20; 30; 37,5 ; 45
		175	51,00	177,00	2,008	6,969	20; 30; 37,5 ; 45

HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
IB-25-37-L	CDK	60	53,00	81,00	2,087	3,188	20; 30; 37,5 ; 45
		88	53,00	105,00	2,087	4,133	20; 30; 37,5 ; 45
		106	57,00	119,00	2,244	4,685	20; 30; 37,5 ; 45
		114	60,00	125,00	2,362	4,921	20; 30; 37,5 ; 45
		135	60,00	146,00	2,362	5,748	20; 30; 37,5 ; 45
		175	60,00	186,00	2,362	7,322	20; 30; 37,5 ; 45

FACING HOLDERS

STANDARD: 90,0°



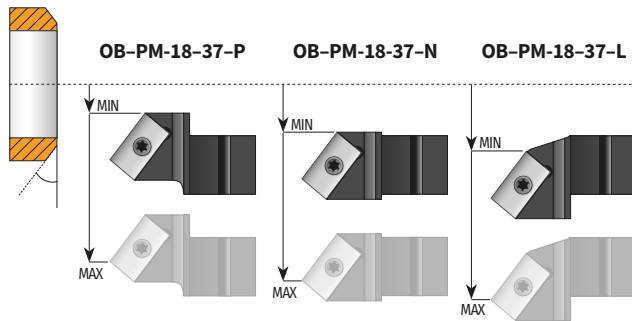
HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
F-25-90-P	CD7	60	24,00	61,00	0,945	2,401	90
		88	24,00	86,00	0,945	3,385	90
		106	28,00	102,00	1,102	4,015	90
	CDK	114	31,00	105,00	1,220	4,133	90
		135	31,00	126,00	1,220	4,960	90
		175	31,00	166,00	1,220	6,535	90
F-25-90-L	CDI	60	33,00	69,00	1,299	2,716	90
		88	33,00	94,00	1,299	3,700	90
		106	37,00	108,00	1,457	4,251	90
		114	38,00	111,00	1,496	4,370	90
		135	38,00	132,00	1,496	5,196	90
		175	38,00	172,00	1,496	6,771	90

PanelMill & PanelMill PF holders

It is highly recommended to use on this machine inserts made by KRAIS with ALNOVA coating by OERLIKON.

OUTSIDE BEVELING HOLDERS

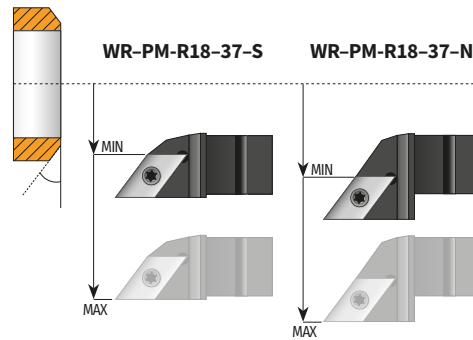
Cutting edge length: 12 mm, standard angle: 37,5° (others on request)



HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
OB-PM-18-37-P	CDI	64	0,00	47,00	0,000	1,850	30; 37,5
OB-PM-8-37-P	CDI	99	0,00	85,00	0,000	3,346	30; 37,5
OB-PM-18-37-N	CDI	64	11,00	56,50	0,433	2,224	30; 37,5
OB-PM-18-37-N	CDI	99	11,00	95,00	0,433	3,740	30; 37,5
OB-PM-18-37-L	CDI	64	20,00	65,50	0,787	2,579	30; 37,5
OB-PM-18-37-L	CDI	99	20,00	104,00	0,787	4,094	30; 37,5

OUTSIDE BEVELING HOLDERS

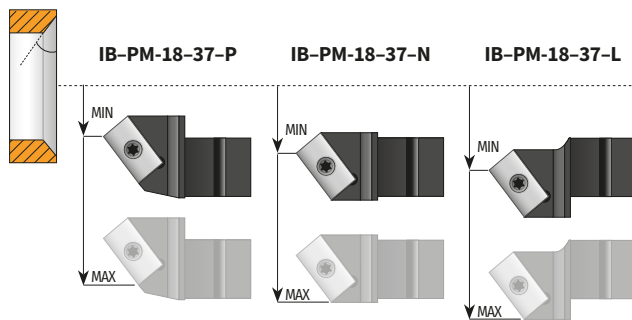
Cutting edge length: 10 mm, standard angle: 37,5° (others on request)



HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
WR-PM-R18-37-S	WRIL	64	22,00	66,00	0,866	2,598	30; 37,5
WR-PM-R18-37-N	WRIL	64	36,00	80,00	1,417	3,150	30; 37,5
WR-PM-R18-37-N	WRIL	99	36,00	116,00	1,417	4,567	30; 37,5

INSIDE BEVELING HOLDERS

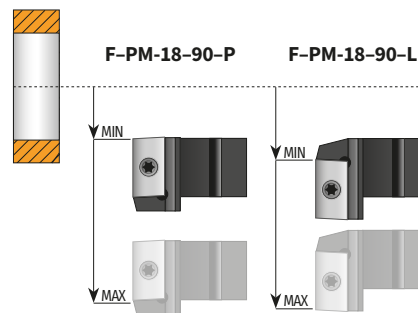
Cutting edge length: 12 mm, standard angle: 37,5° (others on request)



HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
IB-PM-18-37-P	CDI	64	10,00	56,00	0,394	2,205	30; 37,5
IB-PM-18-37-P	CDI	99	10,00	95,00	0,394	3,740	30; 37,5
IB-PM-18-37-N	CDI	64	20,00	65,00	0,787	2,559	30; 37,5
IB-PM-18-37-N	CDI	99	20,00	104,00	0,787	4,094	30; 37,5
IB-PM-18-37-L	CDI	64	35,00	79,00	1,378	3,110	30; 37,5
IB-PM-18-37-L	CDI	99	35,00	115,00	1,378	4,528	30; 37,5

FACING HOLDERS

Cutting edge length: 15 mm, standard angle: 90,0°



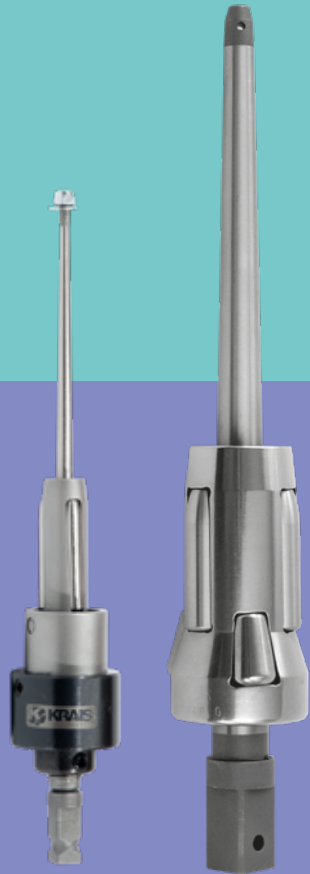
HOLDER NO.	BIT	HEAD	RANGE [MM]		RANGE [INCH]		DEGREE*
			MIN	MAX	MIN	MAX	
F-PM-18-90-P	CDI	64	0,00	53,00	0,000	2,087	90
F-PM-18-90-P	CDI	99	0,00	88,00	0,000	3,465	90
F-PM-18-90-L	CDI	64	20,00	80,00	0,787	3,150	90
F-PM-18-90-L	CDI	99	20,00	116,00	0,787	4,567	90

Pipe Chart [inch]

SIZE	OUTER DIAMETER		SCHEDULE 5	SCHEDULE 10	SCHEDULE 20	SCHEDULE 30	SCHEDULE 40	STANDARD	SCHEDULE 60	SCHEDULE 80	X-HEAVY	SCHEDULE 100	SCHEDULE 120	SCHEDULE 140	SCHEDULE 160	X-HEAVY
1/8	0,405	Wall thickness	0,035	0,049			0,068	0,068		0,095	0,095					
		Inside diameter	0,335				0,269	0,269		0,215	0,215					
1/4	0,540	Wall thickness	0,049	0,065			0,088	0,088		0,119	0,119					
		Inside diameter	0,442	0,410			0,364	0,364		0,302	0,302					
3/8	0,675	Wall thickness	0,049	0,065			0,091	0,091		0,126	0,126					
		Inside diameter	0,577	0,545			0,493	0,493		0,423	0,423					
1/2	0,840	Wall thickness	0,065	0,083			0,109	0,109		0,147	0,147				0,187	0,294
		Inside diameter	0,710	0,674			0,622	0,622		0,546	0,546				0,466	0,442
3/4	1,050	Wall thickness	0,065	0,083			0,113	0,113		0,154	0,154				0,218	0,308
		Inside diameter	0,920	0,884			0,824	0,824		0,742	0,742				0,614	0,434
1	1,315	Wall thickness	0,065	0,190			0,133	0,133		0,179	0,179				0,250	0,358
		Inside diameter	1,185	0,935			1,049	1,049		0,957	0,957				0,815	0,599
1 1/4	1,660	Wall thickness	0,065	0,109			0,140	0,140		0,191	0,191				0,250	0,382
		Inside diameter	1,530	1,442			1,380	1,380		1,278	1,278				1,160	0,896
1 1/2	1,900	Wall thickness	0,065	0,109			0,145	0,145		0,200	0,200				0,281	0,400
		Inside diameter	1,770	1,682			1,610	1,610		1,500	1,500				1,338	1,100
2	2,375	Wall thickness	0,065	0,109			0,154	0,154		0,218	0,218				0,343	0,436
		Inside diameter	2,245	2,157			2,067	2,067		1,939	1,939				1,689	1,503
2 1/2	2,875	Wall thickness	0,083	0,120			0,203	0,203		0,276	0,276				0,375	0,552
		Inside diameter	2,709	2,635			2,469	2,469		2,323	2,323				2,125	1,771
3	3,500	Wall thickness	0,083	0,120			0,216	0,216		0,300	0,300				0,437	0,600
		Inside diameter	3,334	3,260			3,068	3,068		2,900	2,900				2,626	2,300
3 1/2	4,000	Wall thickness	0,083	0,120			0,226	0,226		0,318	0,318					0,636
		Inside diameter	3,834	3,760			3,548	3,548		3,364	3,364					2,728
4	4,500	Wall thickness	0,083	0,120			0,237	0,237	0,281	0,337	0,337		0,437		0,531	0,674
		Inside diameter	4,334	4,260			4,026	4,026	3,938	3,826	3,826		3,626		3,438	3,152
4 1/2	5,000	Wall thickness						0,247			0,355					0,710
		Inside diameter						4,506			4,290					3,580
5	5,563	Wall thickness	0,109	0,134			0,258	0,258		0,375	0,375		0,500		0,625	0,750
		Inside diameter	5,345	5,295			5,047	5,047		4,813	4,813				4,313	4,063
6	6,625	Wall thickness	0,109	0,134			0,280	0,280		0,432	0,432		0,562		0,718	0,864
		Inside diameter	6,407	6,357			6,065	6,065		5,761	5,761				5,189	4,897
7	7,625	Wall thickness						0,301			0,500					0,875
		Inside diameter						7,023			6,625					5,875
8	8,625	Wall thickness	0,109	0,148	0,250	0,277	0,322	0,322	0,406	0,500	0,500	0,593	0,718	0,812	0,906	0,875
		Inside diameter	8,407	8,329	8,125	8,071	7,981	7,981	7,813	7,625	7,625	7,439	7,189	7,001	6,813	6,875
9	9,625	Wall thickness						0,342			0,500					
		Inside diameter						8,941			8,625					
10	10,750	Wall thickness	0,134	0,165	0,250	0,307	0,365	0,365	0,500	0,593	0,500	0,718	0,843	1,000	1,125	
		Inside diameter	10,482	10,420	10,250	10,136	10,020	10,020	9,750	9,564	9,750	9,314	9,064	8,750	8,500	
11	11,750	Wall thickness						0,375			0,500					
		Inside diameter						11,000			10,750					
12	12,750	Wall thickness	0,156	0,180	0,250	0,330	0,406	0,375	0,562	0,687	0,500	0,843	1,000	1,125	1,312	
		Inside diameter	12,438	12,390	12,250	12,090	11,938	12,000	11,626	11,376	11,750	11,064	10,750	10,500	10,126	
14	14,000	Wall thickness	0,156	0,250	0,312	0,375	0,437	0,375	0,593	0,750	0,500	0,937	1,090	1,250	1,406	
		Inside diameter	13,688	13,500	13,376	13,250	13,126	13,250	12,814	12,500	13,000	12,126	-7,860	11,500	11,188	
16	16,000	Wall thickness	0,165	0,250	0,312	0,375	0,500	0,375	0,656	0,843	0,500	1,031	1,218	1,437	1,593	
		Inside diameter	15,670	15,500	15,376	15,250	15,000	15,250	14,688	14,314	15,000	13,938	13,564	13,126	12,814	
18	18,000	Wall thickness	0,165	0,250	0,312	0,437	0,562	0,375	0,750	0,937	0,500	1,156	1,375	1,562	1,781	
		Inside diameter	17,670	17,500	17,376	17,126	16,876	17,250	16,500	16,126	17,000	15,688	15,250	14,876	14,438	
20	20,000	Wall thickness	0,188	0,250	0,375	0,500	0,593	0,375	0,812	1,031	0,500	1,280	1,500	1,750	1,968	
		Inside diameter	19,624	19,500	19,250	19,000	18,814	19,250	18,376	17,938	19,000	17,440	17,000	16,500	16,064	
24	24,000	Wall thickness	0,218	0,250	0,375	0,562	0,687	0,375	0,968	1,218	0,500	1,531	1,812	2,062	2,343	
		Inside diameter	23,564	23,500	23,250	22,876	22,626	23,250	22,064	21,564	23,000	20,938	20,376	19,876	19,314	
26	26,000	Wall thickness		0,312	0,500			0,375			0,500					
		Inside diameter		25,376	25,000			25,250			25,000					
28	28,000	Wall thickness		0,312	0,500	0,625		0,375			0,500					
		Inside diameter		27,376	27,000	26,750		27,250			27,000					
30	30,000	Wall thickness	0,250	0,312	0,500	0,625		0,375			0,500					
		Inside diameter	29,500	29,376	29,000	28,750		29,250			29,000					
32	32,000	Wall thickness		0,312	0,500	0,625	0,688	0,375			0,500					
		Inside diameter		31,376	31,000	30,750	30,624	31,250			31,000					
34	34,000	Wall thickness		0,344	0,500	0,625	0,688	0,375			0,500					
		Inside diameter		33,312	33,000	32,750	32,624	33,250								
36	36,000	Wall thickness		0,312	0,500	0,625	0,750	0,375			0,500					
		Inside diameter		35,376	35,000	34,750	34,500	35,250			35,000					
42	42,000	Wall thickness						0,375			0,500					
		Inside diameter						41,250			41,000					
48	48,000	Wall thickness						0,375			0,500					
		Inside diameter						47,250			47,000					

Pipe Chart [mm]

SIZE	OUTER DIAMETER		SCHEDULE 5	SCHEDULE 10	SCHEDULE 20	SCHEDULE 30	SCHEDULE 40	STANDARD	SCHEDULE 60	SCHEDULE 80	X-HEAVY	SCHEDULE 100	SCHEDULE 120	SCHEDULE 140	SCHEDULE 160	X-HEAVY
1/8	10,28	Wall thickness	0,89	1,24			1,73	1,73		2,41	2,41					
		Inside diameter	8,51				6,83	6,83		5,46	5,46					
1/4	13,71	Wall thickness	1,24	1,65			2,24	2,24		3,02	3,02					
		Inside diameter	11,23	10,41			9,25	9,25		7,67	7,67					
3/8	17,14	Wall thickness	1,24	1,65			2,31	2,31		3,20	3,20					
		Inside diameter	14,66	13,84			12,52	12,52		10,74	10,74					
1/2	21,33	Wall thickness	1,65	2,11			2,77	2,77		3,73	3,73				4,75	7,47
		Inside diameter	18,03	17,12			15,80	15,80		13,87	13,87				11,84	11,23
3/4	26,67	Wall thickness	1,65	2,11			2,87	2,87		3,91	3,91				5,54	7,82
		Inside diameter	23,37	22,45			20,93	20,93		18,85	18,85				15,60	11,02
1	33,40	Wall thickness	1,65	4,83			3,38	3,38		4,55	4,55				6,35	9,09
		Inside diameter	30,10	23,75			26,64	26,64		24,31	24,31				20,70	15,21
1 1/4	42,16	Wall thickness	1,65	2,77			3,56	3,56		4,85	4,85				6,35	9,70
		Inside diameter	38,86	36,63			35,05	35,05		32,46	32,46				29,46	22,76
1 1/2	48,26	Wall thickness	1,65	2,77			3,68	3,68		5,08	5,08				7,14	10,16
		Inside diameter	44,96	42,72			40,89	40,89		38,10	38,10				33,99	27,94
2	60,32	Wall thickness	1,65	2,77			3,91	3,91		5,54	5,54				8,71	11,07
		Inside diameter	57,02	54,79			52,50	52,50		49,25	49,25				42,90	38,18
2 1/2	73,02	Wall thickness	2,11	3,05			5,16	5,16		7,01	7,01				9,53	14,02
		Inside diameter	68,81	66,93			62,71	62,71		59,00	59,00				53,98	44,98
3	88,90	Wall thickness	2,11	3,05			5,49	5,49		7,62	7,62				11,10	15,24
		Inside diameter	84,68	82,80			77,93	77,93		73,66	73,66				66,70	58,42
3 1/2	101,60	Wall thickness	2,11	3,05			5,74	5,74		8,08	8,08					16,15
		Inside diameter	97,38	95,50			90,12	90,12		85,45	85,45					69,29
4	114,30	Wall thickness	2,11	3,05			6,02	6,02	7,14	8,56	8,56		11,10		13,49	17,12
		Inside diameter	110,08	108,20			102,26	102,26	100,03	97,18	97,18		92,10		87,33	80,06
4 1/2	127,00	Wall thickness						6,27			9,02					18,03
		Inside diameter						114,45			108,97					90,93
5	141,30	Wall thickness	2,77	3,40			6,55	6,55		9,53	9,53		12,70		15,88	19,05
		Inside diameter	135,76	134,49			128,19	128,19		122,25	122,25				109,55	103,20
6	168,27	Wall thickness	2,77	3,40			7,11	7,11		10,97	10,97		14,27		18,24	21,95
		Inside diameter	162,74	161,47			154,05	154,05		146,33	146,33				131,80	124,38
7	193,67	Wall thickness						7,65			12,70					22,23
		Inside diameter						178,38			168,28					149,23
8	219,07	Wall thickness	2,77	3,76	6,35	7,04	8,18	8,18	10,31	12,70	12,70	15,06	18,24	20,62	23,01	22,23
		Inside diameter	213,54	211,56	206,38	205,00	202,72	202,72	198,45	193,68	193,68	188,95	182,60	177,83	173,05	174,63
9	244,47	Wall thickness						8,69			12,70					
		Inside diameter						227,10			219,08					
10	273,05	Wall thickness	3,40	4,19	6,35	7,80	9,27	9,27	12,70	15,06	12,70	18,24	21,41	25,40	28,58	
		Inside diameter	266,24	264,67	260,35	257,45	254,51	254,51	247,65	242,93	247,65	236,58	230,23	222,25	215,90	
11	298,45	Wall thickness						9,53			12,70					
		Inside diameter						279,40			273,05					
12	323,85	Wall thickness	3,96	4,57	6,35	8,38	10,31	9,53	14,27	17,45	12,70	21,41	25,40	28,58	33,32	
		Inside diameter	315,93	314,71	311,15	307,09	303,23	304,80	295,30	288,95	298,45	281,03	273,05	266,70	257,20	
14	355,60	Wall thickness	3,96	6,35	7,92	9,53	11,10	9,53	15,06	19,05	12,70	23,80	27,62	31,75	35,71	
		Inside diameter	347,68	342,90	339,75	336,55	333,40	336,55	325,48	317,50	330,20	308,00	-199,64	292,10	284,18	
16	406,40	Wall thickness	4,19	6,35	7,92	9,53	12,70	9,53	16,66	21,41	12,70	26,19	30,94	36,50	40,46	
		Inside diameter	398,02	393,70	390,55	387,35	381,00	387,35	373,08	363,58	381,00	354,03	344,53	333,40	325,48	
18	457,20	Wall thickness	4,19	6,35	7,92	11,10	14,27	9,53	19,05	23,80	12,70	29,36	34,93	39,67	45,24	
		Inside diameter	448,82	444,50	441,35	435,00	428,65	438,15	419,10	409,60	431,80	398,48	387,35	377,85	366,73	
20	508,00	Wall thickness	4,78	6,35	9,53	12,70	15,06	9,53	20,62	26,19	12,70	32,51	38,10	44,45	49,99	
		Inside diameter	498,45	495,30	488,95	482,60	477,88	488,95	466,75	455,63	482,60	442,98	431,80	419,10	408,03	
24	609,60	Wall thickness	5,54	6,35	9,53	14,27	17,45	9,53	24,59	30,94	12,70	38,89	46,02	52,37	59,51	
		Inside diameter	598,53	596,90	590,55	581,05	574,70	590,55	560,43	547,73	584,20	531,83	517,55	504,85	490,58	
26	660,40	Wall thickness		7,92	12,70			9,53			12,70					
		Inside diameter		644,55	635,00			641,35			635,00					
28	711,20	Wall thickness		7,92	12,70	15,88		9,53			12,70					
		Inside diameter		695,35	685,80	679,45		692,15			685,80					
30	762,00	Wall thickness	6,35	7,92	12,70	15,88		9,53			12,70					
		Inside diameter	749,30	746,15	736,60	730,25		742,95			736,60					
32	812,80	Wall thickness		7,92	12,70	15,88	17,48	9,53			12,70					
		Inside diameter		796,95	787,40	781,05	777,85	793,75			787,40					
34	863,60	Wall thickness		8,74	12,70	15,88	17,48	9,53			12,70					
		Inside diameter		846,12	838,20	831,85	828,65	844,55								
36	914,40	Wall thickness		7,92	12,70	15,88	19,05	9,53			12,70					
		Inside diameter		898,55	889,00	882,65	876,30	895,35			889,00					
42	1 066,80	Wall thickness						9,53			12,70					
		Inside diameter						1 047,75			1 041,40					
48	1 219,20	Wall thickness						9,53			12,70					
		Inside diameter						1 200,15			1 193,80					



Product Catalog 2018





KRAIS Tube Expanders

Poland, 55-106 Zawonia
Czachowo 15

Tel. +48 71 312 05 96

Fax +48 71 387 03 32

<http://www.krais.com>
export@krais.com

