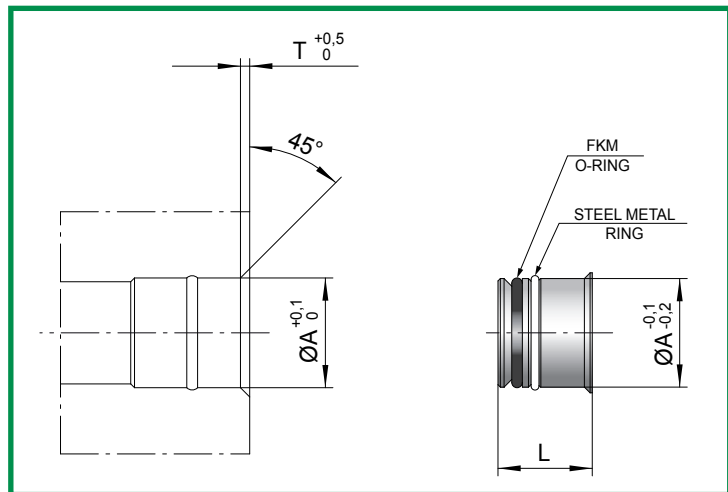
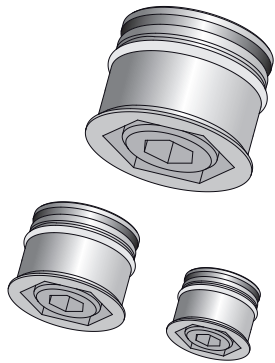


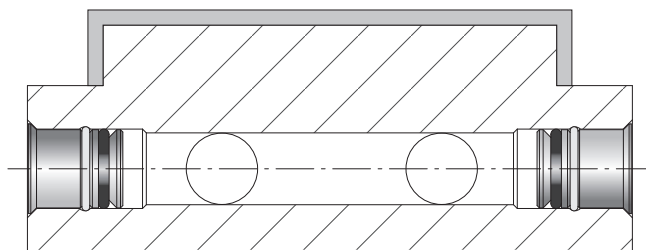
EXTERNAL PLUG

RAPID PLUG AND UNPLUG SYSTEM (PATENTED SYSTEM)



CODE: **TR..**

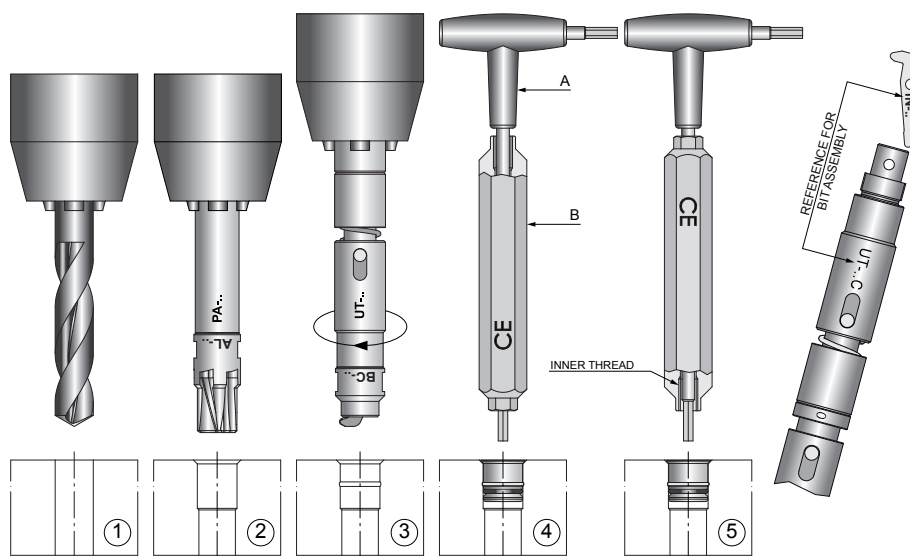
CODE	A	T	L
TR-6	6,5	0,7	7,5
TR-8	8,5	1	9
TR-10	10,5	1	12,5
TR-12	12,5	1	12,5
TR-14	14,5	1	12,5



CHARACTERISTICS

- 1) RAPID MACHINING OF THE HOUSING ;
- 2) RAPID PLUG FITTING AND REMOVING;
- 3) SECURE SEAL IS MAINTAINED EVEN UNDER HIGH PRESSURE CONDITIONS (~100 BAR).

STANDARD SET



EXECUTION PLUGS' HOUSING

- PERFORM HOLE WITH DRILL (the diameter of the drill has to correspond to the mark of the plug; exemple: for the plug TR-8 use drill $\varnothing 8$). See picture 1.
The diameter obtained by the drill can also be increased of $0,2 \pm 0,3$ millimeters.
- PERFORM BLADE WITH A SUITABLE REAMER. See picture 2. In the operation n° 2 the hole has to be calibrated with a suitable reamer to \varnothing drill + 0,5 (exemple: the hole $\varnothing 8$ will be brought up to $\varnothing 8,5$). **N.B.:** the cutting speed of this operation will change according to the type of machined steel and will be equal to the one used for any other reamer in HSS (high-speed tool steel).
- PERFORM RETAINING GROOVE WITH SUITABLE TOOL. See picture 3

SOME ADVICE FOR THE CORRECT USE OF ABOVE MENTIONED TOOL

- Before beginning the operation put a drop of oil on the chamfer created on the piece by the reamer (picture 2) to encourage the sliding of the centering bush of the tool.
- The descent in vertical of the tool has to be slow (as adopted when a center drill is used). Consider however that such a tool works only in the last millimeter of the descent.
- When the two elements of the tool separated by the spring (visible) touch each other, the operation is completed. Now neither making further pressure on the tool nor stopping in such a position more than a few seconds is not advisable (so to avoid the heating of the centering bush that rubs on the piece).
- The above mentioned advice, related to the pressure that has to be applied on the tool, are obviously usable by the worker only in case of operation on a drill or also on a miller, only if provided by a mobile chuck (type drill) so to have the sensitivity of the practiced pressure. In case of performing the above mentioned operation on a machine with fixed head or on a machining center, it's necessary to use the tool with the pressure compensator (provided on request).

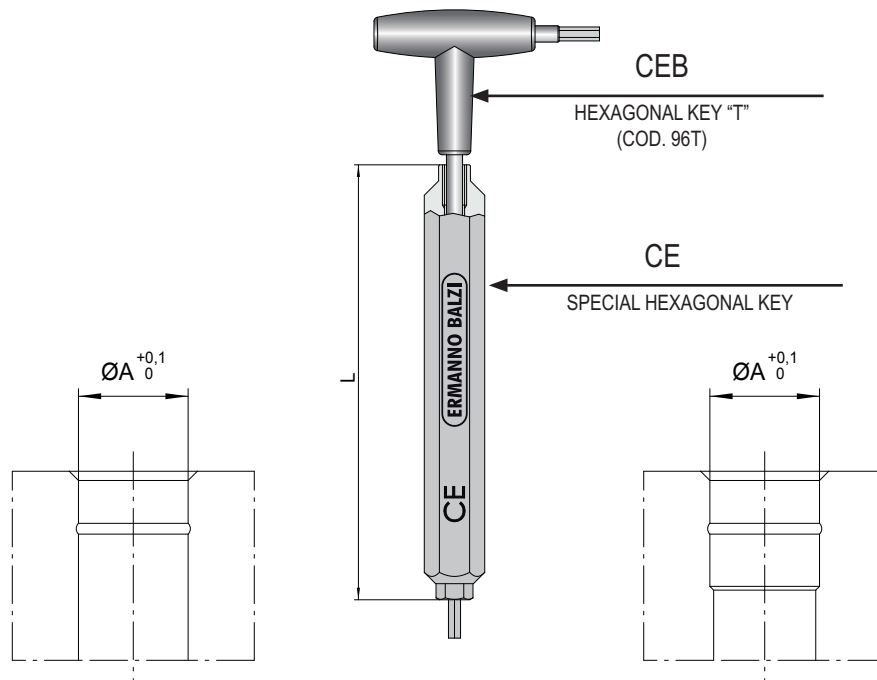
PLUGS ASSEMBLY

- Insert the piece to be assembled in its seat.
- Insert the keys as in picture 4.
- Holding the key "A" tight, rotate the key "B" clockwise blocking the plug with strong pressure, but using only the hands (without the help of any other keys to subsequently increase the pressure of locking).

PLUGS DISASSEMBLY

- Insert the keys as in picture 4.
- Unblock the plug holding the key "A" tight and rotating the key "B" counter clockwise (1-2 turns maximum).
- Remove the keys.
- Using the key "B" from the side with the inner thread hook the plug and extract.

SET KEYS FOR THE ASSEMBLY OF STANDARD SET AND SET F



CODE	A	L
CE-4 CEB-1,5	$\varnothing 5$	60

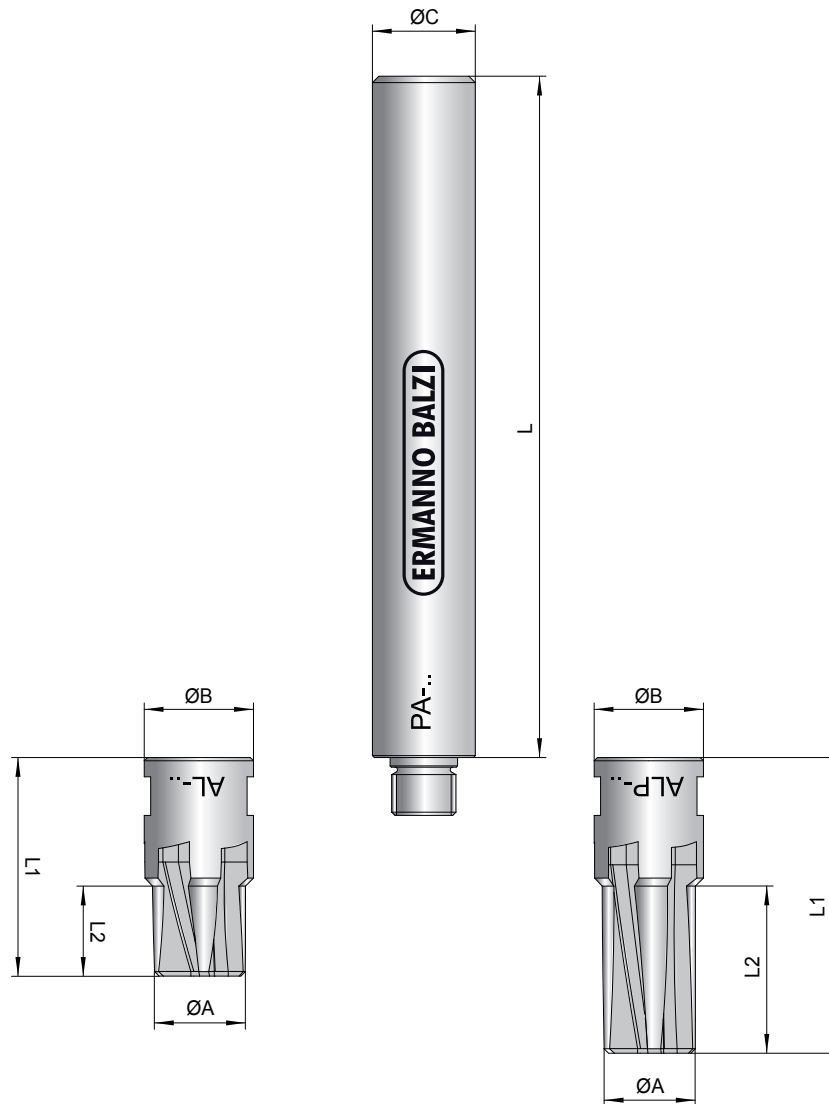
CODE	A	L
CE-5 CEB-2	$\varnothing 6 / \varnothing 6,5$	97

CODE	A	L
CE-6,5 CEB-2,5	$\varnothing 8 / \varnothing 8,5$	108

CODE	A	L
CE-8 CEB-3	$\varnothing 10 / \varnothing 10,5$	108
	$\varnothing 12 / \varnothing 12,5$	
	$\varnothing 14 / \varnothing 14,5$	

CODE	A	L
CE-12 CEB-5	$\varnothing 15$	126
	$\varnothing 16$	
	$\varnothing 18$	
	$\varnothing 20$	
	$\varnothing 25$	
	$\varnothing 30$	

REAMERS FOR THE EXECUTION OF STANDARD SEAT

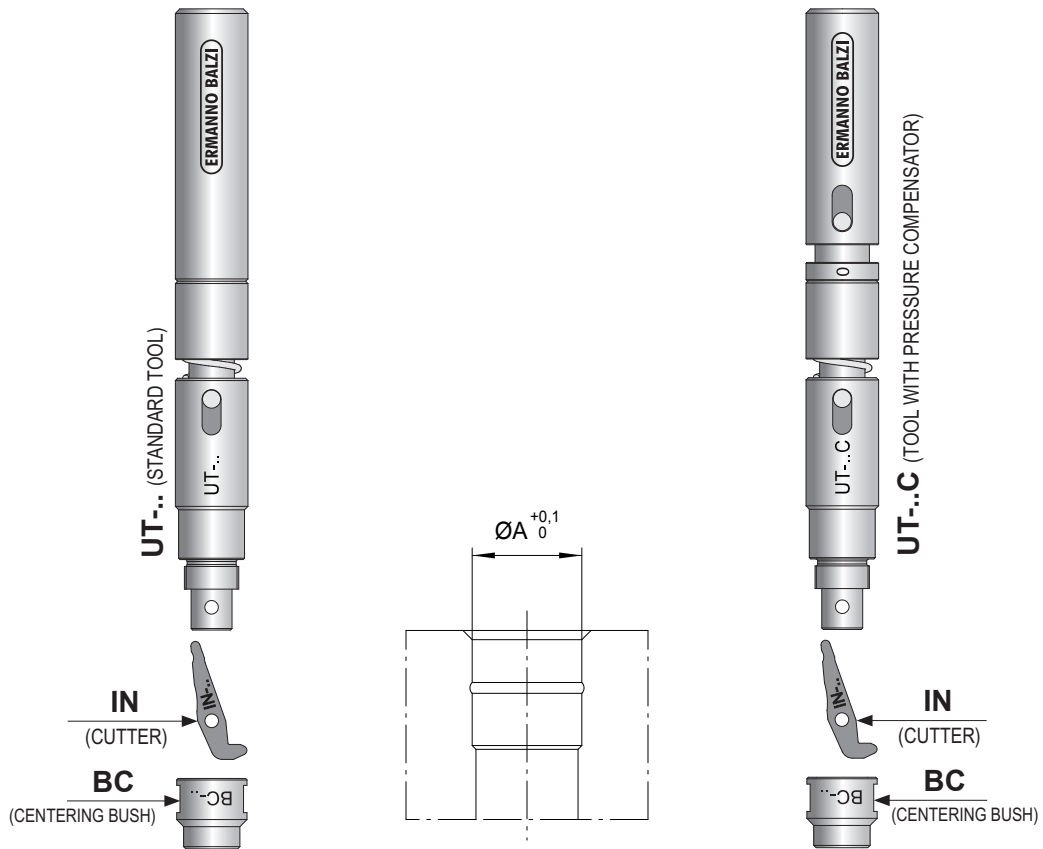


CODE	A	B	C	L	L1	L2	EXTENSION
AL-6	$\varnothing 6,5$	10	10	98	28	8	PA-1

CODE	A	B	C	L	L1	L2	EXTENSION
AL-8	$\varnothing 8,5$	12,5	12	95	31	9,5	PA-2
ALP-8					41	19,5	

CODE	A	B	C	L	L1	L2	EXTENSION
AL-10	$\varnothing 10,5$	15	16	106	34	14	PA-3
ALP-10					44	24	
AL-12	$\varnothing 12,5$	15	16	106	34	14	PA-3
ALP-12					45	25	
AL-14	$\varnothing 14,5$	15	16	106	34	14	PA-3
ALP-14					46	26	

STANDARD SET



CODE	A	BC	IN
UT-1 / UT-1C	Ø6,5	BC-6	IN-6

CODE	A	BC	IN
UT-2 / UT-2C	Ø8,5	BC-8	IN-8

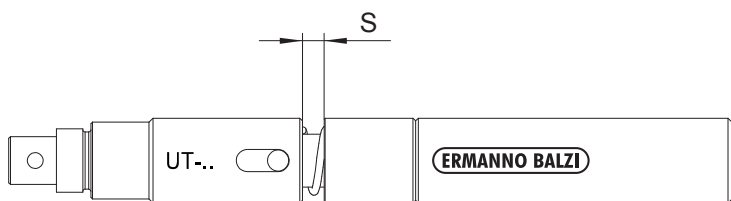
CODE	A	BC	IN
UT-3 / UT-3C	Ø10,5	BC-10	IN-10
	Ø12,5	BC-12	IN-12
	Ø14,5	BC-14	IN-14

STANDARD CUTTER		
CODE	CUTTING SPEED m/min.	RPM
IN-5F	9,4÷11	600÷700
IN-6F	9,4÷11	500÷600
IN-6	9,4÷11	460÷550
IN-8F	9,4÷11	370÷450
IN-8	9,4÷11	350÷420
IN-10F	9,4÷11	300÷360
IN-10	9,4÷11	290÷340
IN-12F	9,4÷11	250÷300
IN-12	9,4÷11	240÷290
IN-14F	9,4÷11	215÷260
IN-14	9,4÷11	210÷250
IN-15F	9,4÷11	200÷240
IN-16F	9,4÷11	190÷225
IN-18F	9,4÷11	200÷170
IN-19F	9,4÷11	190÷160
IN-20F	9,4÷11	150÷180
IN-25F	9,4÷11	120÷140
IN-30F	9,4÷11	100÷120

CARBIDE CUTTER		
CODE	CUTTING SPEED m/min.	RPM
IN-5FD	19÷23	1200÷1400
IN-6FD	19÷23	1000÷1200
IN-6D	19÷23	920÷1100
IN-8FD	19÷23	750÷900
IN-8D	19÷23	700÷850
IN-10FD	19÷23	600÷720
IN-10D	19÷23	570÷680
IN-12FD	19÷23	500÷600
IN-12D	19÷23	480÷580
IN-14FD	19÷23	430÷520
IN-14D	19÷23	420÷500
IN-16FD	19÷23	380÷450
IN-18FD	19÷23	340÷400
IN-20FD	19÷23	300÷360
IN-25FD	19÷23	240÷290

MATERIALS HARDNESS

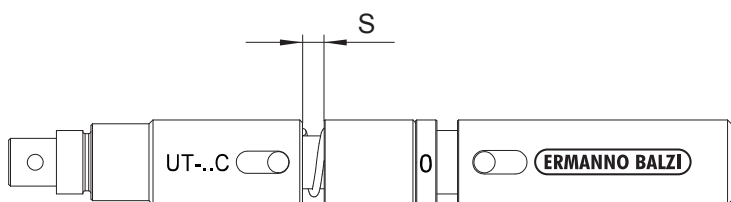
The standard cutters code IN-.. are made in HSS and titanium carbonitride coated. Such cutters can machine steel with maximum hardness of 40÷42 HRC; it is necessary to consider that as the hardness of the steel increases the working life of the cutter becomes significantly shorter. In order to meet the growing need to assembly cooling components on pre hardened inserts, a new set of cutters made in carbide steel code IN-..D able to machine steel with hardness up to 50÷52 HRC, is now available.



TOOL	S
UT-0	4,3
UT-1	4,3
UT-2	4,3
UT-3	4,7
UT-4	5,1

ADVICES FOR THE CORRECT USE OF THE TOOL "UT"

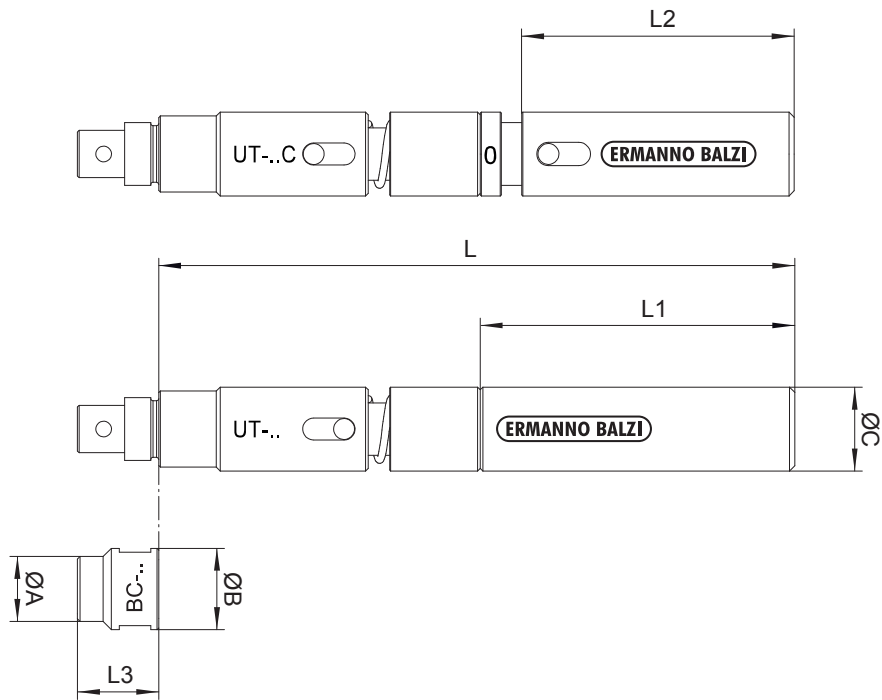
1. The tool "UT" is designed to be used on machines where the forward movement is manually controlled.
2. The cutter starts the machining of the groove a few millimeters after the centering bush "BC" get in contact with the chamfer on the hole. Starting from this point the forward movement has to be slow.
3. The machining of the groove is completed when the gap "S" is completely closed by the forward movement of the tool.
4. Once the forward movement is completed neither making further pressure on the tool, nor stopping in such a position more than a few seconds is advisable.



TOOL	S ^{+2 / +3}
UT-0C	4,3
UT-1C	4,3
UT-2C	4,3
UT-3C	4,7
UT-4C	5,1

ADVICES FOR THE CORRECT USE OF THE TOOL "UT-C"

1. The tool "UT-C" is designed to be used on CNC machines where forward movement is electronically controlled.
2. It is possible to move in fast forward till 2 mm from the working position (contact point between centering bush "BC" and chamfer of the hole).
3. Starting from this point a feed rate of 0,05 mm/rotation is suggested.
4. The machining of the groove is completed when the gap "S" is completely closed by the forward movement of the tool. To guarantee the proper machining we suggest to set an extra stroke of 2+3 mm, the extra stroke will be compensated by a spring inside the tool.
5. Once the forward movement is completed neither making further pressure on the tool, nor stopping in such a position more than a few seconds is advisable.



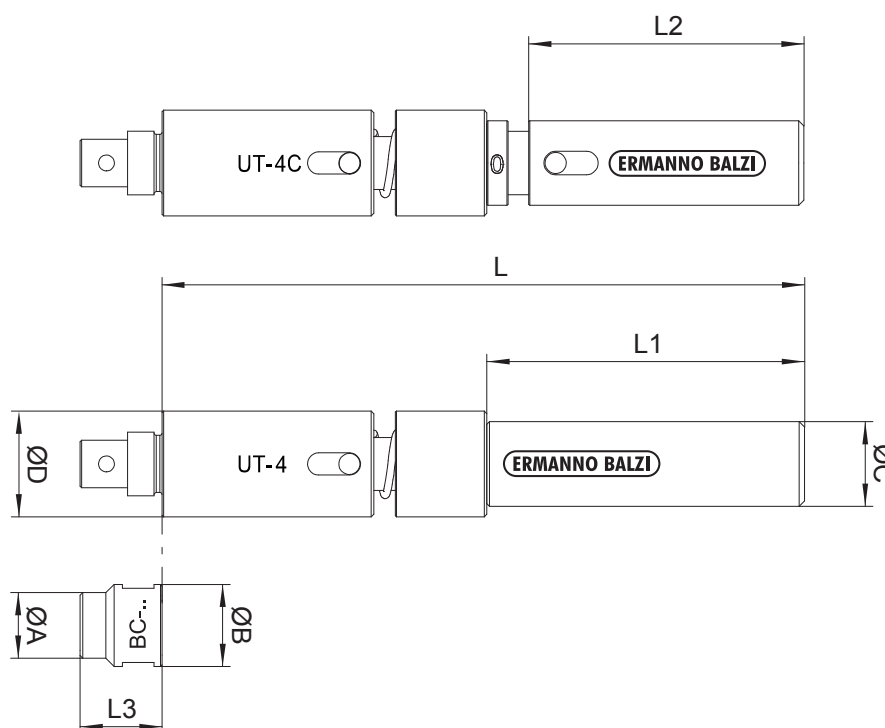
CODE	C	L	L1	L2
UT-0 / UT-0C	10	110	70	62
UT-1 / UT-1C	10	110	70	62
UT-2 / UT-2C	12	108	60	52
UT-3 / UT-3C	16	122	60	54

UT-0 / UT-0C			
CENTERING BUSH	A	B	L3
BC-5F	5	10	12

UT-1 / UT-1C			
CENTERING BUSH	A	B	L3
BC-6F	6	10	12
BC-6	6,5	10	12

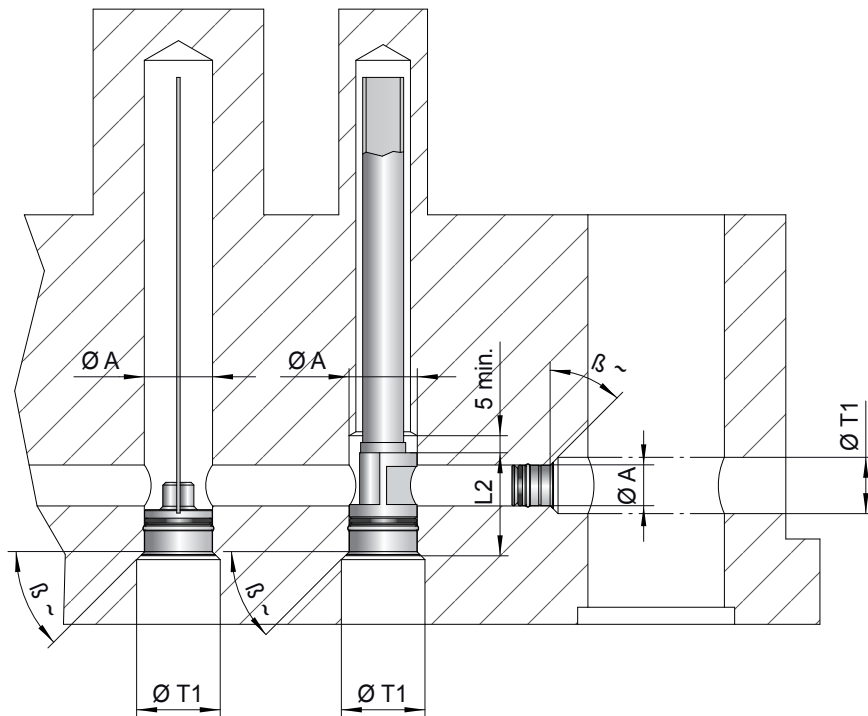
UT-2 / UT-2C			
CENTERING BUSH	A	B	L3
BC-8F	8	12	14,5
BC-8	8,5	12	14,5

UT-3 / UT-3C			
CENTERING BUSH	A	B	L3
BC-10F	10	14,5	15,5
BC-10	10,5	14,5	15,5
BC-11F	11	15,5	15,5
BC-11,5F	11,5	15,5	15,5
BC-12F	12	15,5	15,5
BC-12	12,5	15,5	15,5
BC-14F	14	16,5	15,5
BC-14	14,5	16,5	15,5
BC-15F	15	17,5	15,5



CODE	C	D	L	L1	L2
UT-4 / UT-4C	16	20	122	60	54

UT-4 / UT-4C			
CENTERING BUSH	A	B	L3
BC-16F	16	19,5	15,5
BC-18F	18	21	15,5
BC-19F	19	22	15,5
BC-20F	20	23	15,5
BC-25F	25	28	15,5
BC-30F	30	34	15,5



NOTE:

1. In the case where it is necessary to position some cooling elements in depth (as in the diagram above) and it is desired to execute the retaining groove using the appropriate tool, you will have to machine the undercut ØT1 with the measures indicated in table.
2. The angle β (front inclination of the drill) should vary from a minimum of 0° to a maximum of 45° .
3. During the execution of a seat with double diameter (as in the diagram above), the depth of the ØA must be at least 5mm longer than the dimension «L2» of the bubbles.

DIMENSION ØA OF THE ITEM TO APPLY	ØT1	L2
5	10,5	/
6 / 6,5	10,5	/
8 / 8,5	13	18
10 / 10,5	16,5	22,5
11	16,5	/
11,5	16,5	/
12 / 12,5	16,5	24
14/14,5	17,5	24,5
15	20	/
16	20,5	27,5
18	22,5	/
19	23,5	/
20	24,5	29,5
25	29	33,5
30	35	/

STANDARD SERIES TOOL BOX

TOOL WITHOUT PRESSURE COMPENSATION SYSTEM



CODE	STANDARD SET COMPOSITION
UT	N°1 SINGLE TOOL
CE	N°1 SPECIAL HEXAGONAL KEY
CEB	N°1 "T" BETA HEXAGONAL KEY
PA	N°1 REAMER EXTENSION
AL	N°1 REAMER FOR EACH SIZE
BC	N°1 CENTERING BUSH FOR EACH SIZE
IN	N°1 CUTTER FOR EACH SIZE

Order example: CS-10

CODE	CS-6	CS-8	CS-10	CS-12	CS-14	CS-10-12	CS-10-14	CS-12-14	CS-10-12-14
UT-1	✓								
UT-2		✓							
UT-3			✓	✓	✓	✓	✓	✓	✓
BC-6	✓								
BC-8		✓							
BC-10			✓			✓	✓		✓
BC-12				✓		✓		✓	✓
BC-14					✓		✓	✓	✓
IN-6	✓								
IN-8		✓							
IN-10			✓			✓	✓		✓
IN-12				✓		✓		✓	✓
IN-14					✓		✓	✓	✓
AL-6	✓								
AL-8		✓							
AL-10			✓			✓	✓		✓
AL-12				✓		✓		✓	✓
AL-14					✓		✓	✓	✓
PA-1	✓								
PA-2		✓							
PA-3			✓	✓	✓	✓	✓	✓	✓
CE-5	✓								
CE-6,5		✓							
CE-8			✓	✓	✓	✓	✓	✓	✓
CEB-2	✓								
CEB-2,5		✓							
CEB-3			✓	✓	✓	✓	✓	✓	✓

STANDARD SERIES TOOL BOX

TOOL WITH PRESSURE COMPENSATION SYSTEM

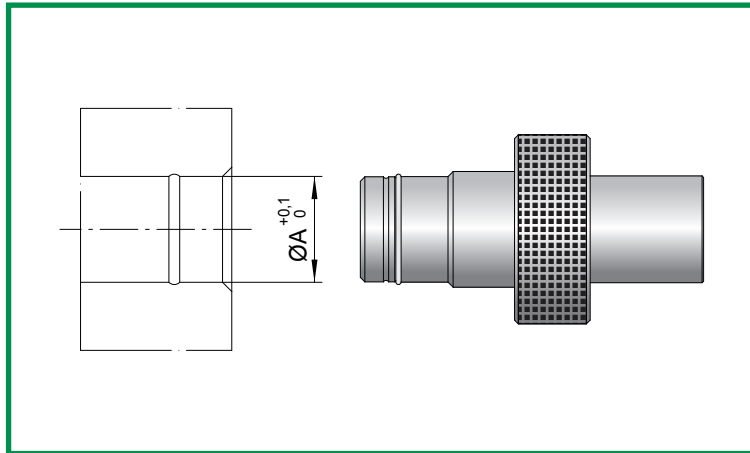
CODE	STANDARD SET COMPOSITION
UT-C	N°1 SINGLE TOOL
CE	N°1 SPECIAL HEXAGONAL KEY
CEB	N°1 "T" BETA HEXAGONAL KEY
PA	N°1 REAMER EXTENSION
AL	N°1 REAMER FOR EACH SIZE
BC	N°1 CENTERING BUSH FOR EACH SIZE
IN	N°1 CUTTER FOR EACH SIZE



Order example: CS-10C

CODE	CS-6C	CS-8C	CS-10C	CS-12C	CS-14C	CS-10-12C	CS-10-14C	CS-12-14C	CS-10-12-14C
UT-1C	✓								
UT-2C		✓							
UT-3C			✓	✓	✓	✓	✓	✓	✓
BC-6	✓								
BC-8		✓							
BC-10			✓			✓	✓		✓
BC-12				✓		✓		✓	✓
BC-14					✓		✓	✓	✓
IN-6	✓								
IN-8		✓							
IN-10			✓			✓	✓		✓
IN-12				✓		✓		✓	✓
IN-14					✓		✓	✓	✓
AL-6	✓								
AL-8		✓							
AL-10			✓			✓	✓		✓
AL-12				✓		✓		✓	✓
AL-14					✓		✓	✓	✓
PA-1	✓								
PA-2		✓							
PA-3			✓	✓	✓	✓	✓	✓	✓
CE-5	✓								
CE-6,5		✓							
CE-8			✓	✓	✓	✓	✓	✓	✓
CEB-2	✓								
CEB-2,5		✓							
CEB-3			✓	✓	✓	✓	✓	✓	✓

CONTROL GAUGE FOR RETAINING GROOVE



CODE	ØA
CST-6F	6
CST-8F	8
CST-10F	10
CST-12F	12
CST-14F	14

CODE	ØA
CST-6	6,5
CST-8	8,5
CST-10	10,5
CST-12	12,5
CST-14	14,5

REALIZATION OF THE SEAT:

Thanks to the proper gauge it is possible to check the hole dimension and the retaining groove.

O-RING COMPOUND

O-ring maximum working temperature changes with the type of fluid.

ERMANN BALZI cooling components are equipped with FKM O-rings suitable to work with pressurized water or oil up to 150 °C.

In case of applications requiring the circulation of fluids such as steam, pressurized water or oil at high temperature we suggest to apply O-ring made in special FKM compounds properly developed to guarantee better performance.

- O-ring for steam or pressurized water suitable for working temperature up to 190 – 200°C and peak temperature of 220°C.
- O-ring for diathermic oil suitable for working temperature up to 200 – 220°C and peak temperature of 250 – 270°C.

DIAM.	O-RING STEAM (ST)	O-RING OIL (HO)
6	✓	✓
6,5	✓	
8	✓	✓
8,5	✓	
10	✓	✓
11	✓	
11,5	✓	✓
12	✓	✓
14	✓	
15	✓	
16	✓	✓
19	✓	✓
20	✓	✓
25	✓	✓

Order example with steam o-ring: TR-8FST

Order example with oil o-ring: TR-8FHO