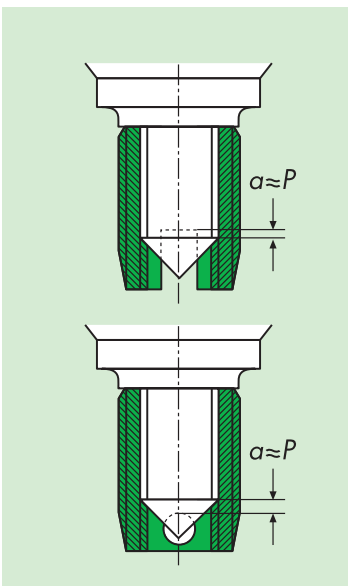


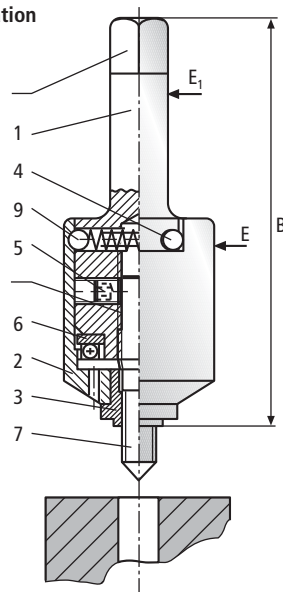
The correct length of the stud for the Ensats with cutting slot / cutting bore results from the pitch of the internal thread (see also illustration below; P=pitch of the internal thread).

Ensats® – driving tools ...

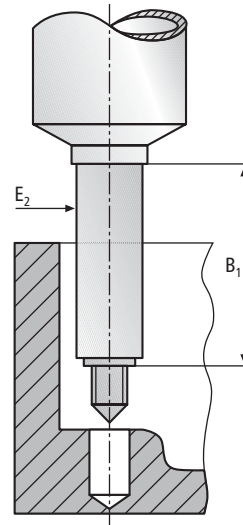


Tool 620
for flush installation

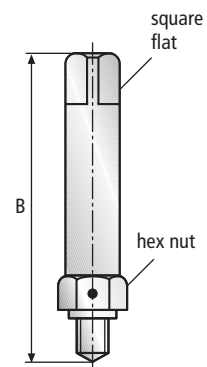
- Square flat
- 1 Shaft
- 4 Pin
- 9 Ball
- 5 Locking screw, colour marking
- 6 Ball bearing
- 2 Shell
- 3 Guide bush
- 7 Stud



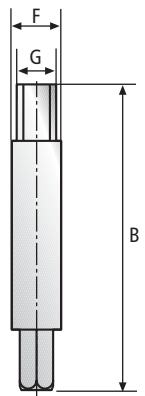
Tool 621
For deep retaining holes



Tool 610
for manual instal-
lation



Tool 6102
for Ensats-SBI



Set or exchange the stud

- Pull off the shell (2) downwards off the shaft (1).
- Release the locking screw (5).
- Screw the stud (7) in or out. The yellow colour marking indicates the flattened surfaces for the locking screws.
- When assembling, tighten both screws (5) evenly.
- Insert the ball bearing (6).
- Push on the shell (2) until the ball stop locks into place. To ensure that the tool functions perfectly, it must be possible to easily rotate the shell. For short Ensats, grind down the thread of tool 610 accordingly.
- If you wish the Ensats to be driven deeper than 0,2 mm below the workpiece surface, screw off the guide bush (3) at the front. Diameter. 0,1 to 0,2 mm smaller than the Ensats retaining hole.

For mounting the thin-walled Ensats (Page 14), modified guide bushes (available on request) should be used.

Dimensions [mm]

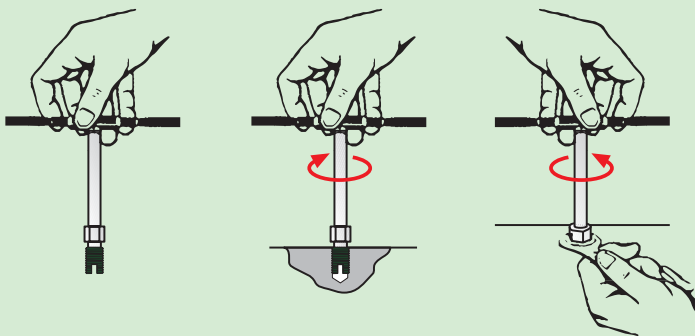
For Ensaf®	Tool 620								Tool 621			Manual assembly tool 610				For Ensaf®-SBI	Tool 6102				Machine/Hand		
	Article-no.		Whitworth	UNC	UNF	E	E1	Square SW D	Length B	Article-no.		B1	E2	Article-no.			Length B	Square SW D	Collar SW D	Article-no.		Length B	Square SW G
M 2,5	-	620 000 025	-	-	-	18	8	6,3	78	621 000 025	40	7	610 000 025	55	5	7	M 2,5	-	-	-	-	-	
M 3	Nr. 4	620 000 030	-	620 000 604	620 000 704	18	8	6,3	78	621 000 030	40	7	610 000 030	55	5	7	M 3	-	-	-	-	-	
M 3,5	Nr. 6	620 000 035	-	620 000 606	620 000 706	18	8	6,3	78	621 000 035	40	7	610 000 035	60	5	7	M 3,5	-	-	-	-	-	
M 4	Nr. 8	620 000 040	-	620 000 608	620 000 708	18	8	6,3	78	621 000 040	40	7	610 000 040	60	5	7	M 4	610 200 040	80	4,9	6	-	
M 5	Nr. 10 1/4" 5/16"	620 000 050	-	620 000 610	620 000 710	24	12,5	10	95	621 000 050	50	9	610 000 050	75	8	13	M 5	610 200 050	90	6,2	8	-	
M 6		620 000 060	620 000 525	620 000 625	620 000 725	24	12,5	10	95	621 000 060	50	10	610 000 060	75	8	13	M 6	610 200 060	100	8	10	-	
M 8		620 000 080	620 000 531	620 000 631	620 000 731	24	12,5	10	95	621 000 080	50	12	610 000 080	75	8	13	M 8	610 200 080	100	8	10	-	
M 10	3/8" 7/16"	620 000 100	620 000 537	620 000 637	620 000 737	32	16	12,5	118	621 000 100	60	15	610 000 100	95	12,5	19	M 10	610 200 100	110	9	12	-	
M 12		620 000 120	620 000 544	620 000 644	620 000 744	32	16	12,5	118	621 000 120	60	18	610 000 120	95	12,5	19	M 12	-	-	-	-	-	
M 14	1/2" 5/8" -	620 000 140	620 000 550	620 000 650	620 000 750	50	25	20	145	621 000 140	60	20	610 000 140	95	12,5	19	M 14	-	-	-	-	-	
M 16		620 000 160	620 000 562	620 000 662	620 000 762	50	25	20	145	621 000 160	60	22	-	-	-	-	M 16	-	-	-	-	-	
M 18		620 000 180	-	-	-	-	50	25	20	145	621 000 180	60	24	-	-	-	-	M 18	-	-	-	-	-
M 20	-	620 000 200	-	-	-	58	25	20	169	621 000 200	60	26	-	-	-	-	M 20	-	-	-	-	-	
M 22	-	620 000 220	-	-	-	58	25	20	169	621 000 220	60	28	-	-	-	-	M 22	-	-	-	-	-	
M 24	-	620 000 240	-	-	-	70	30	25	198	621 000 240	60	32	-	-	-	-	M 24	-	-	-	-	-	
M 27	-	620 000 270	-	-	-	70	30	25	198	621 000 270	60	35	-	-	-	-	M 27	-	-	-	-	-	
M 30	-	620 000 300	-	-	-	70	30	25	198	621 000 300	60	38	-	-	-	-	M 30	-	-	-	-	-	

Tools 620 and 621 also fit within the coloured lines for other thread dimensions, if the guide bush and stud are exchanged.

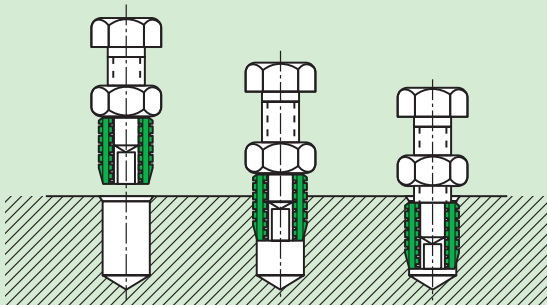
Manual Ensat® Installation ...



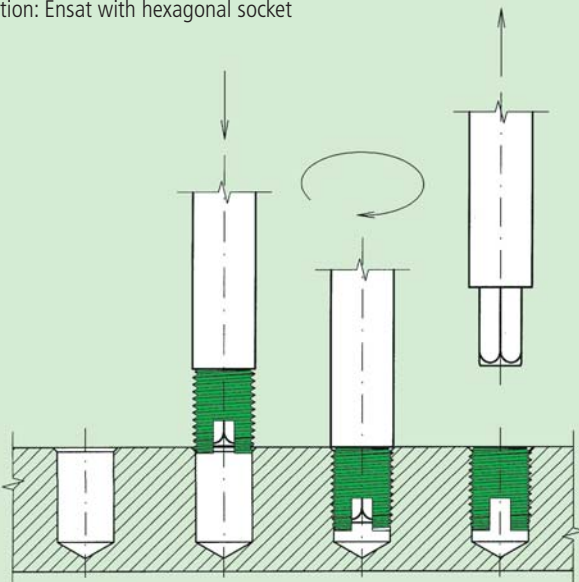
Manual installation with driving tool and tap wrench:



Emergency installation using screw and nut:



Installation: Ensat with hexagonal socket



Manual installation

Manual driving takes place using the driving tools 620, 621 or 610 and a tap wrench:

1. Drill the hole: see page 6 for the correct diameter, countersink if necessary.
2. Screw the Ensat onto the driving tool with the cutting slot or cutting bore pointing downwards.
3. Drive in the Ensat until appr. 0,1 - 0,2 mm below the surface of the workpiece. Ensure that it does not tilt! When using tool 620 and 621, the rotatable shell must rest against the externally visible stop pins in such a way that it is driven round clockwise by the pins.
4. Back out the driver tool. During this process, tool 620 or 621 is automatically released from the Ensat. Tool 610: Hold the hex nut using a spanner until the lock breaks.

Driving into steel

With Ensat®-S 302:

Pre-cut the thread using the drill (max. centre cutter), set the threaded stud of the tool to the full Ensat length (tool 610 cannot be adjusted).

With Ensat®-SB 307 / 308:

In steel up to medium strength, pre-cutting is not required.

Up to M12, we recommend for high-strength steel the use of **Mubux®-M**.

Mubux®-M installation

Pre-cut the retaining thread with customary thread tapping tool, then drive in as for the Ensat.





Machine installation ...

Machine driving process

1. Precisely position the workpiece to ensure that the hole and machine spindle are in exact alignment (do not tilt). Set the machine to the precise driving depth (appr. 0,1 – 0,2 mm below the surface of the workpiece).
2. Turn the machine to clockwise rotation. At the start of the driving process, the rotatable external shell of the tool must be resting against the external visible stop pins in such a way that it is driven by the pins in the clockwise direction.
3. Feed the Ensats towards the tool (slot or cutting hole facing downwards) and grip for the duration of 2 to 4 revolutions.
4. Actuate the operating lever of the machine until the Ensats cuts into the borehole. The remainder of the driving process takes place without actuating the feed.
5. Switch on the reversing function. Always avoid setting the tool down hard on the workpiece, as this can lead to breaking both the tool and the Ensats.

Excessively hard contact of the tool can damage the play-free fit of the Ensats and so reduce the pull-out strength. If necessary, the driving speed may have to be adapted in line with the necessary reversal time.

Machine installation takes place with production tool 620 or 621, integrated in a:

1. Thread tapping machine

2. Use a drill press fitted with a reversing tapping attachment or a tapping machine which is not pitch controlled. Important: Never exceed the maximum admissible driving torque.

3. Special manual machine with bit stop and reversing system.

4. For large-scale series:

Single or multiple installation machines with pneumatic or electric drive, semi or fully automatic, CNC.

Recommended speed values for light alloys:

Ensats® Internal thread	Speed [min ⁻¹]
M 2,5 / M 3	650 - 900
M 4 / M 5	400 - 600
M 6 / M 8	280 - 400
M 10 / M 12	200 - 300
M 14 / M 16	150 - 200
M 18 / M 20	120 - 200
M 22 / M 24	100 - 160
M 27 / M 30	80 - 140

Torque M

The maximum admissible torque depends on:

1. The axial load capacity of the tool stud
2. The pressure resistance capacity of the Ensats® in the axial direction.

Guideline value for installation torque

Ensats® M 2,5	1,5 Nm
Ensats® M 3	2,5 Nm
Ensats® M 4	5,5 Nm
Ensats® M 5	10 Nm
Ensats® M 6	15 Nm
Ensats® M 8	28 Nm
Ensats® M 10	40 Nm
Ensats® M 12	60 Nm

Lubrication

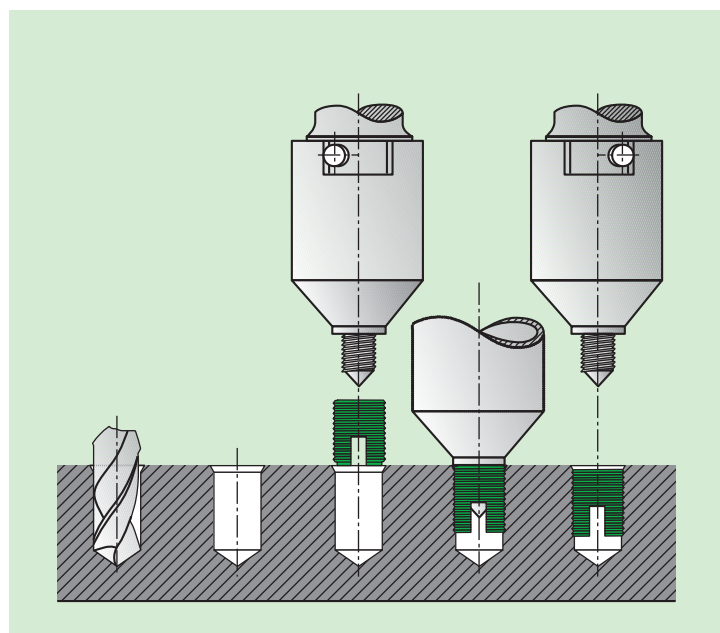
Only in the case of materials with difficult cutting properties.

For medium-hard light alloys:

Cutting oil, spirit or petroleum.

For tough light alloys and cast iron:

Cutting oil with appr. 5 – 8% molybdenum sulphide.





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