

# Operational Manual

## EDU2AE - EDU2AE/HP<sub>RO</sub>

Torque range: 0.35-70 Nm



### IDENTIFICATION DATA OF THE MANUFACTURER

KOLVER S.r.l.  
VIA M. CORNER, 19/21  
36016 THIENE (VI) ITALIA

### IDENTIFICATION DATA OF THE PRODUCT

<b>MODEL:</b>	EDU 2AE	EDU2AE/HP <sub>RO</sub>
<b>CODE:</b>	032000	032000/HPro

### TECHNICAL DATA OF THE PRODUCT

FUSE: 3.15 A  
DIMENSIONS: 195 x 170 x h110 mm WEIGHT: 2,4 Kg

### DECLARATION OF CONFORMITY



**KOLVER S.r.l.** declares that the new tool here described: control unit model EDU 2AE is in conformity with the following standards and other normative documents:

2006/42/CE, LVD 2014/35/UE, EMCD 2014/30/UE, EN 62841-2-2:2014, EN 62841-1: 2015, EN 60204-1, EN 61000-6-2, EN 61000-6-4.

It is also in conformity with RoHS III normative (2011/65/UE and following 2015/863).

Name: Giovanni Colasante  
Position: General Manager  
Person authorized to compile the technical file in Kolver.

Thiene, January 1<sup>st</sup> 2021

*Giovanni Colasante*

EDU 2AE and EDU 2AE/HP<sub>RO</sub> power supply and control units are an innovative system for controlling the torque of any current control MITO and PLUTO electric screwdrivers: MITO15, PLUTO 3, PLUTO 6, PLUTO 10, PLUTO 15, PLUTO 20, PLUTO 35 and PLUTO50, either inline, pistol, for automation and with angle head (only PLUTO).

EDU 2AE and EDU 2AE/HP<sub>RO</sub> deliver all the advantages of precision torque control electric tools at a fraction of the price of transducerized tools.

The state-of-the-art electronic control circuit cuts the power supply to the motor calculating the correct torque in response to 3 parameters; voltage, frequency and current, according to the selected options.

The AC 90÷260V - 50÷60Hz power supply is converted into 40VDC required by the PLUTO series screwdrivers through a switching board.

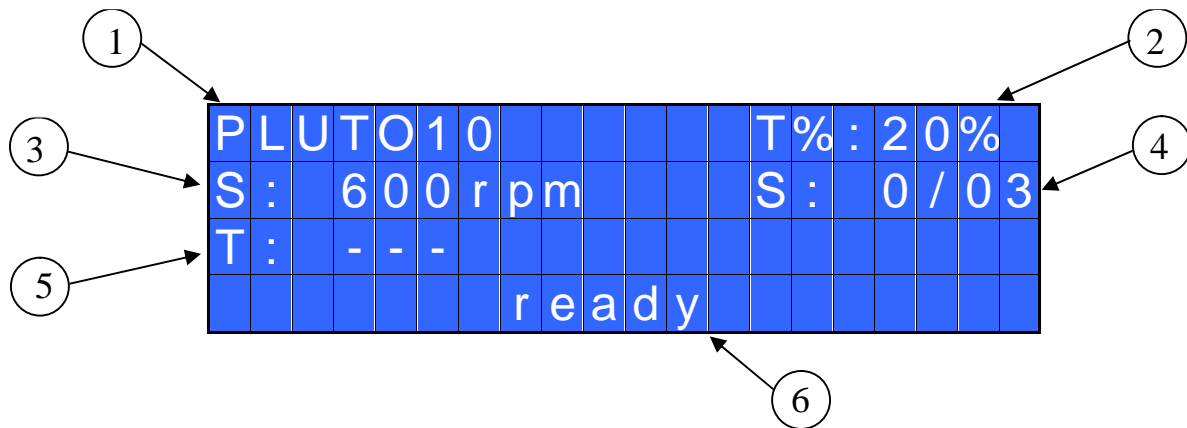
Model	Torque (Nm)	Speed (rpm)	
		Min	Max
MITO15	0,35-1,5	450	850
PLUTO 3	0,5-3	370	1300
PLUTO 6	0,85-6	200	850
PLUTO 10	1,5-10	110	600
PLUTO 15	2-15	60	320
PLUTO 20	3-20	50	200
PLUTO 35	3-35	40	140
PLUTO 50	5-50	20	90
PLUTO 6 ANG	0,7-6	200	850
PLUTO 8 ANG	1,5 - 7	110	600
PLUTO 15 ANG	2-15	100	320
PLUTO 20 ANG	3-18	60	200
PLUTO 30 ANG	6-30	30	130
PLUTO 45 ANG	10-45	25	90
PLUTO 70 ANG	15-70	25	50

**IMPORTANT: EDU 2AE and EDU 2AE/HP<sub>RO</sub> are highly accurate units but it is critically important to select the correct options to ensure that proper torque is being applied. Read the menu description carefully and in case of doubt please contact Kolver for support information.**

Turn the unit on through the on/off switch on the back panel. The unit will carry a general system check and “waiting connection” will appear on the last line of the display. If the connection with the motor control board is successful the following screen will be displayed:

K	o	l	v	e	r	S	.	r	.	l	.						
				E	D	U		2	A	E							
				V	e	r	s	i	o	n		2	.	0	0		
								l	o	a	d	i	n	g	.	.	.

Press any key on the front panel to enter the main screen (see following picture)



- 1- Screwdriver model
- 2- Pre-set torque level (percentage)
- 3- Selected speed
- 4- Screw count: fastened screws/total screws (model EDU 2AE/HP<sub>RO</sub> only)
- 5- Reached torque level (model EDU 2AE/HP<sub>RO</sub> only) in Nm, in.lbs or kgf.cm.
- 6- Status bar ( waiting, screwing, errors, etc...)



To enter the menu press **ESC** for 2 seconds.

Select the line by pressing  $\uparrow$  or  $\downarrow$  then press **OK** (the symbol  $\blacktriangleright$  will turn into  $\blacksquare$ ). Press  $\uparrow$  or  $\downarrow$  to select the required value and then confirm through **OK** (or **ESC** if you don't want to save the value).

The selected value will be immediately operational, even if you are still in the menu screen. Repeat these operations for all the parameters you wish to set and then push **ESC** to return to the main screen.

**FRONT PANEL LED:**



GREEN LED: *Screw OK.*

YELLOW LED: *Program End (only on EDU 2AE/HPro).*

RED LED: error.

## MENU

-	-	-	-	-	M	A	I	N	-	M	E	N	U	-	-	-	-	-	-
O	K		c	h	a	n	g	e		E	S	C		q	u	i	t		
▶	P	r	o	g	r	a	m		s	e	t	t	i	n	g				
	U	n	i	t		o	p	t	i	o	n	s							

**Program setting:** It indicates the menu section where you can set or modify the fastening parameters.

**Unit Options:** It indicates the menu section where you can set the language, the password and the unit.

### **Program setting**

The first 12 menu lines are available in the EDU 2AE and EDU 2AE/HP<sub>RO</sub>.

Lines from 13 to 20 are only available in the HP<sub>RO</sub> model.

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-	-	-
O	K		c	h	a	n	g	e		E	S	C		q	u	i	t		
▶	1	)	M	o	d	e	l	:					P	L	U	T	O	1	0
	2	)	R	a	m	p	:									0	.	3	s

**1) Model:** you can select the screwdriver to be used. Your choice will automatically change the default settings. It's important to select the correct model you're going to use since many parameters regarding the motor software are specific for every single model.

**2) Ramp:** You can select the slow start time (acceleration) from 0.2 to 3.0 sec. This option is only available for the screwing phase, while during the unscrewing phase the ramp time is always 0.2 sec. We suggest using this option with self tapping screws.

**ATTENTION:** Reaching the torque while the ramp is still on could give as result a different torque level from the one that results when the ramp is over. This is due to the motor acceleration.

Reaching the torque while the ramp is still on will activate the "screw OK" signal anyway (this option is useful if you need to tighten screws that are already tightened, the so called "double hit").

On the other hand, if you wish to see an error signal during the preset torque in the ramp phase, you can change the minimum time by setting value which is equal or superior to the ramp value (see point 8).

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-	-	-
	3	)	T	o	r	q	u	e	:							M	I	N	
▶	4	)	T	m		F	a	s	t		s	p	d	:	0	.	3	s	
	5	)	F	a	s	t		s	p	d	:					o	f	f	

**3) Torque:** you can select the desired torque as a percentage of the torque range of the selected screwdriver. For example, for a Pluto10, a 50% setting will result in a torque in the area of 4.5 Nm. The torque range is always referred to the MAX speed. In case you're not working at maximum speed, the torque range will

progressively lower in order to avoid motor stalling. If the torque level is reached correctly, it will be showed on the display and you will hear a beep sound, too.

Such torque level is indicated as “ T: ..% ” on the main screen.

**4) TM Fast Spd (Time Fast Speed):** It indicates how long the screwdriver should turn at the FAST SPEED speed (see point 6) before switching to “pre-set speed” (lower speed). The “pre-set speed” is the speed set at point 4. This FAST SPEED time can be set from 0.3 to 10.0 sec.

To disable the function press  $\downarrow$  until you get to OFF. In this case the screwdriver will automatically start at pre-set speed (see point 6).

**CAUTION:** The aim of the FAST SPEED is only to speed up the approach time in case of long screws. Reaching the torque at higher speed will result in inaccurate torque output. To avoid inaccurate torque values we suggest first to set a shorter time, and then increase it.

Torque reached during the FAST SPEED won't activate the torque signal and the message “*Error FAST SPEED*” will be displayed on the main screen and 2 beep sounds. The red led will turn on, too.

**5) Fast Spd (Fast Speed):** You can select the speed of the screwdriver during the FAST SPEED. It can be set between max speed and the pre-set one (see point 4).

This function is available only if the Time Fast Speed is active.

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-
6	)	F	i	n	a	l	S	p	d	:	6	0	0	r	p	m	
→	7	)	R	u	n	t	i	m	e	:					o	f	f
	8	)	M	i	n	t	i	m	e	:					o	f	f

**6) Final Spd (Final Speed):** You can select any speed value of the screwdriver between the maximum and the minimum specific speed of every single screwdriver (see table with technical data).

**7) Run time:** You can set the time of a tightening, from OFF to 20.0 sec. When the pre-set time has been reached, it results in a torque signal.

The couple reached during this time results in a signal of *Correct screw*. If the correct screw signal is not required, set the Minimum time up to a value of 'Minimum Time -0.1sec'.

**ATTENTION:** Max Time must be set at 20.0 sec.

**8) Min Time - Minimum Time:** You can set this time from 0.1 sec to 'Max time - 0.1s'. To disable the function select OFF by pressing  $\downarrow$  as many times as needed. (Min time = 0).

Torque reached below the minimum time won't activate the torque signal and will result in an error signal. “*Below minimum time*” will be displayed on the status bar and the red led will light up. You will hear two beep sounds, too.

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-
9	)	M	a	x	t	i	m	e	:	2	0	.	0	s			
→	10	)	A	u	t	o	r	e	v	:				o	f	f	
	11	)	R	e	v	t	o	r	q	:				M	A	X	

**9) Max time - Maximum time:** You can select the maximum time of tightening. You can set from 'Min time + 0.1s' to 20.0 sec.

You also can set the Maximum time to OFF by pressing the  $\uparrow$  button when you have reached the value of 20.0s. In this case the screwdriver turns without any time limit.

**ATTENTION:** If torque isn't reached by the maximum time, the screwdriver will stop. "Over maximum time" will be displayed on the status bar and the red led will light up. You will hear two beep sounds, too.

**10) Auto Rev:** This option will automatically start a reverse after a torque reached/ correct screw signal. You can set time from 0.1 to 20.0 sec.

To disable the function select OFF by pressing ↵ as many times as needed.

**ATTENTION:** During the reverse, it is necessary to keep the lever or the start signal pressed as long as it won't stop. "Correct screw" will be displayed on the status bar and a green led will light up. You will hear one beep sound, too. In case the lever is released before the end of the reverse, "unfinished screw" will be displayed and a red led will light up. You will hear two beep sounds, too.

**11) Rev torque – Unscrewing torque:** You can select the desired torque as a percentage of the torque range of the selected screwdriver (see point 2). If the torque is set on MAX, the unscrewing torque is about 20% higher than the possible maximum torque, so that it is always possible to unscrew the tightened screw (we suggest leaving this function on in normal use). If the setting is from MIN to 99% the unscrewing torque with the same percentage will be equal to the settings of the screwing phase.

**ATTENTION:** If you're using open-end wrenches, the unscrewing torque has to be set to MIN value in order to bring the wrench back to the correct position.

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-	
1	2	)	R	e	v		s	p	d	:		6	0	0	r	p	m	
▶	1	3	)	P	r	e	-	r	e	v	.	:				o	f	f
1	4	)	P	V		t	o	r	q	u	e	:				o	f	f

**12) Rev speed – Reverse speed:** You can select any reverse speed value of the screwdriver between the maximum and the minimum specific speed of every single screwdriver (see table with technical data).

**The following menu is available in the HP<sub>RO</sub> model only**

**13) Pre-Rev. (Pre-reverse):** You can set a reverse before a screwing.

Time can set from OFF to 20.0 sec.

**ATTENTION:** Pre-reverse speed and torque are the same as Auto Rev.

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-		
1	3	)	P	r	e	-	r	e	v	.	:					o	f	f	
▶	1	4	)	P	V		t	o	r	q	u	e	:			o	f	f	
1	5	)	R	o	t	a	t	i	o	n	:				r	i	g	h	t

**14) PV torque:** Period of time in which the screwdriver works at maximum torque before switching to the torque that has been set by the user. You can set time from 0.1 to 10.0 sec. To disable the function select OFF by pressing ↵ as many times as needed.

This function overlaps other time settings (fast speed, ramp time, minimum time, maximum time) from the motor start on.

**ATTENTION:** This function is useful for applications where the prevailing torque is higher than the final torque (for example trilobal screws or locknuts).

**Please use this function with utmost attention because an incorrect use can damage both the assembly and the screwdriver.**

Torques reached during the max torque time won't activate the torque signal. "Error tm max torque" will be displayed and the red led will light up. You will hear two beep sounds, too.

**15) Rotation:** You can choose between right tightening (standard screws) or left tightening (left threaded screws). All the other functions will adapt to the selected direction of rotation.

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-	-
1	6	)	C	a	l	i	b	r	a	t	i	o	n	:	o	f	f	
▶	1	7	)	C	o	m	p	e	n	s	:	0	.	0	0	N	m	
1	8	)	T	o	r	q		m	i	n	:	0	.	0	0	N	m	

**16) Calibration:** ON allows to see the torque value on the main screen. OFF doesn't show the torque value.

(To modify the calibration parameters see paragraph *Torque calibration*).

**17) Compens – Compensation:** This function allows an increase or decrease of the displayed torque after calibration. The available range is from 0 to ±55 Nm. For example: after calibration (see Torque calibration) you make a screwing on your assembly and compare the value you see on the main screen display with the value you see on a torque tester (for example a mini-K or a K model). Let's say you notice that the torque displayed in the unit EDU 2AE is +0.2 Nm higher than the value indicated on the tester (which is the right one). In this case you change this value by setting -0.2 Nm so that the value on the screen will be the same as the value on the tester. If it's lower than 0.3 Nm, you need to set +0.3 Nm and so on.

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-	-	
1	8	)	T	o	r	q		m	i	n	:	0	.	0	0	N	m		
▶	1	9	)	T	o	r	q		m	a	x	:	2	0	.	0	0	N	m
2	0	)	S	c	r	e	w	s		n	u	m	.	:				3	

**18) Torq min – Minimum torque:** The minimum torque and maximum torque options allow the user to set the acceptable torque range for each single application. When the reached torque is inside this range, "tightening OK" will be displayed on the status bar and the green led will light up. If the reached torque is outside this range the messages "error minimum torque" or "error maximum torque" will be displayed. You can set the torque range from 0 to 40 Nm at intervals of 0.01 Nm.

The minimum torque option allows to set the lowest value of the torque range and it's on if calibration is 'ON'. If calibration is 'OFF' the minimum torque value automatically sets on 0 Nm.

**19) Torq Max – Maximum Torque:** The minimum torque and maximum torque options allow the user to set the acceptable torque range for the single application. When the reached torque is inside this range, "right screwing" will be displayed on the status bar and the green led will light up. The messages "below minimum torque" or "over maximum torque" will be displayed if the reached torque is outside this range. You can set the torque range from 0 to 55 Nm at intervals of 0.01 Nm.

The maximum torque option allows to set the highest value of the torque range and it's on if the calibration is 'ON'.

**20) Screws number:** The EDU2AE/HP and the EDU 2AE/HP<sub>RO</sub> can act as screw counter. You can set the number of screws from 1 to 99. To disable the function select OFF by pressing ↵ as many times as needed. If the number of correct screws is equal to the number of set screws "Program end" will appear on the status bar and the yellow led will light up. If the OK/ESC function is disabled (see point 23), "Program end" will

automatically disappear at next screwing or when you enter the menu. Otherwise, press OK at the end of each program.

**ATTENTION:** Every time you enter the menu, the number of screws resets to zero.

### Unit Options

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
OK				c	h	a	n	g	e			ESC			q	u	i	t	
▶	1	)	L	a	n	g	u	a	g	e	:								EN
	2	)	V	e	r	s	i	o	n	s									

**1) Language:** This option allows to select among 4 languages: English, French, German, Italian, Spanish and Portuguese.

**2) Versions:** in this screen you can see the versions of boards mounted inside the unit.

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
	3	)	C	y	c	l	e	s	:		0	0	0	0	0	0	0	0	0
▶	4	)	C	h	a	n	g	e		p	a	s	s	w	o	r	d		
	5	)	P	a	s	s	w	o	r	d									

**3) Cycles** - Number of total screwing/errors done which have been carried out: It shows the number of fastened screws and occurred errors. This number can't be modified.

### The following menu is available in the HP<sub>RO</sub> model only

**4) Change password:** You can change password (see point 5).

**5) Password:** If YES, you will be asked for the password to enter the menu. Otherwise select NO.

**ATTENTION:** Password is only asked to enter the menu for the first time after switching the unit on. The default password is: 0000.

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
	6	)	U	n	i	t	:												Nm
▶	7	)	P	r	e	s		O	K	:									o f f
	8	)	P	r	e	s		E	S	C	:								o f f

**6) Unit:** You can choose between the following units of measurements: Nm, in.lbs and kgf.cm.

**7) Press OK:** when ON, press OK at the end of each screwing. When OFF, the control unit resets automatically after a screwing.

**8) Press ESC:** when ON, press ESC to reset the control unit. When OFF, the control unit resets automatically after an error signal.



## TORQUE CALIBRATION

The torque calibration function allows to view the torque value in Nm or in.lbs or kgf.cm directly on the display of the control unit.

**IMPORTANT: You need a torque tester to proceed, either with static transducer (model minik or K) or with rotary transducer (model minik-e).**

CALIBRATION PROCESS:

1. Select Calibration at point 19 of the menu and press OK.
2. The following screen will appear on the display:

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-
1	9	)	C	a	l	i	b	r	a	t	i	o	n	:			o

3. Press OK to confirm. If you choose OFF, calibration will be interrupted and no torque value will be displayed. You choose ON, calibration will continue and the following screen will be displayed:

-	-	-	-	-	-	-	-	S	T	E	P	-	-	1	-	-	-	-		
				E	n	t	e	r												
		p	e	r	c	e	n	t	a	g	e							M	I	N

4. Set the first torque level at 20% percentage by pressing  $\uparrow$ .

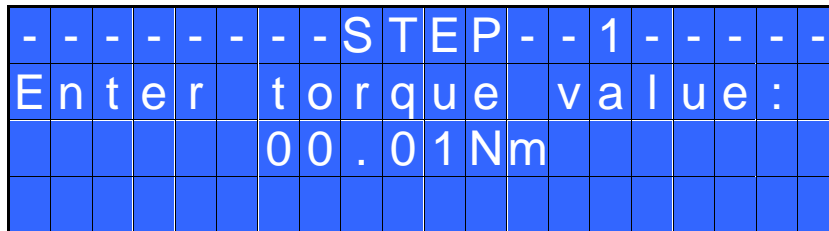
-	-	-	-	-	-	-	-	S	T	E	P	-	-	1	-	-	-	-			
				E	n	t	e	r													
		p	e	r	c	e	n	t	a	g	e								2	0	%

5. Press OK. You will see:

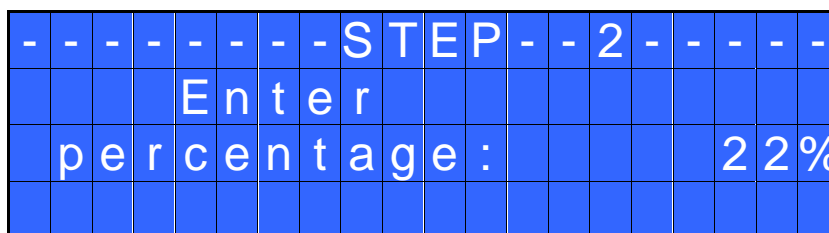
-	-	-	-	-	-	-	-	S	T	E	P	-	-	1	-	-	-	-			
				S	t	a	r	t													
				t	e	s	t														
O	K			c	o	n	f	i	r	m		E	S	C		q	u	i	t		

Complete a screwing cycle on the mini k5 and take note of torque value.

6. Press OK, then the display will show:



Set the torque value by pressing  $\hat{\uparrow}$  and press OK again to save. You will see:



7. Set the percentage of the second torque to 30% by pressing  $\hat{\uparrow}$  and press OK.

8. Repeat the procedures described on points 4 and 5.

9. When calibration ends, "Setting end" will be displayed. You will hear two beep sounds, too.

Now you are ready to work and see the correct torque on the display.

**WARNING:**

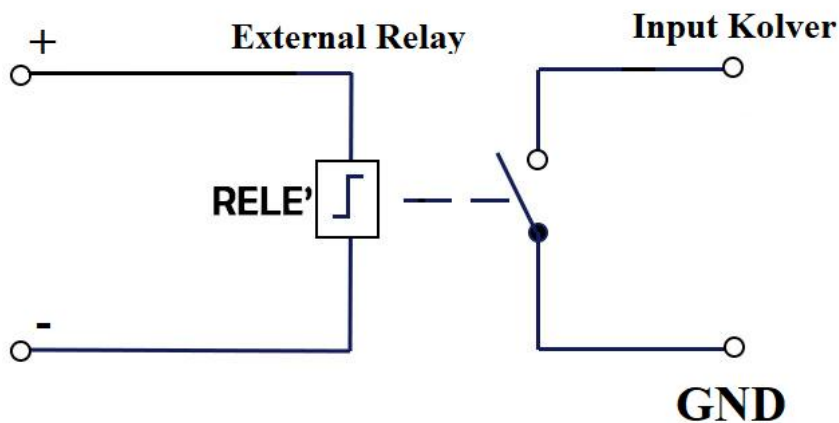
- Calibration values will be referred to the parameters of the control unit which are set during calibration, i.e. if you modify speed or torque, the unit will need to be recalibrated. During calibration when a screwing is not carried out correctly or if for any reasons you're not sure of the torque value it is possible to repeat it. A wrong screwing can affect the precision of the calibration.
- Calibration is carried out for two torque levels optionally chosen. The minimum calibration interval is 5% (example: if I have to work at 50%, I can calibrate at 45% and 55%). In this case, if for any reasons I need to work at torque percentages which are lower or higher than the min-max ones set during the calibration, they will be analyzed and displayed anyway but since they won't be based on effective data the torque value displayed may be not accurate.
- During calibration it is not possible to go back to the previous screen. Press ESC to stop calibration and then repeat the screwing cycles.

**INTERPRETATION OF ACOUSTIC SIGNALS**

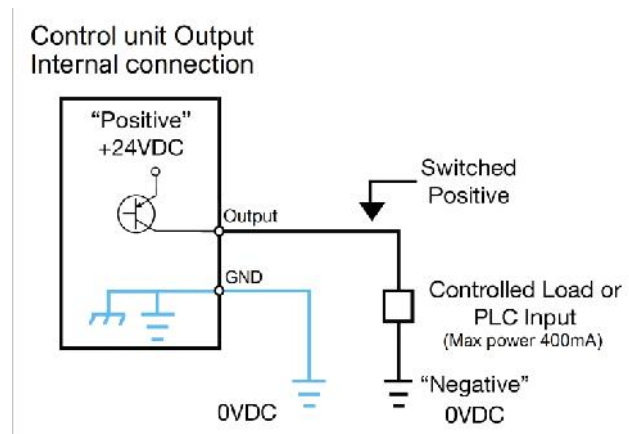
The control unit emits sounds which help you understand if the screwing has been carried out correctly or not. When the torque is reached meeting all the parameters set, the control unit utters a 0.5 sec beep as confirmation. In case of Program End, the unit will utter other two beeps. Instead, torque reached under min time, during the Ramp time or under the Fast speed (see error signals on the display) will cause the control unit to utter three beep sounds.

## I/O CONNECTIONS

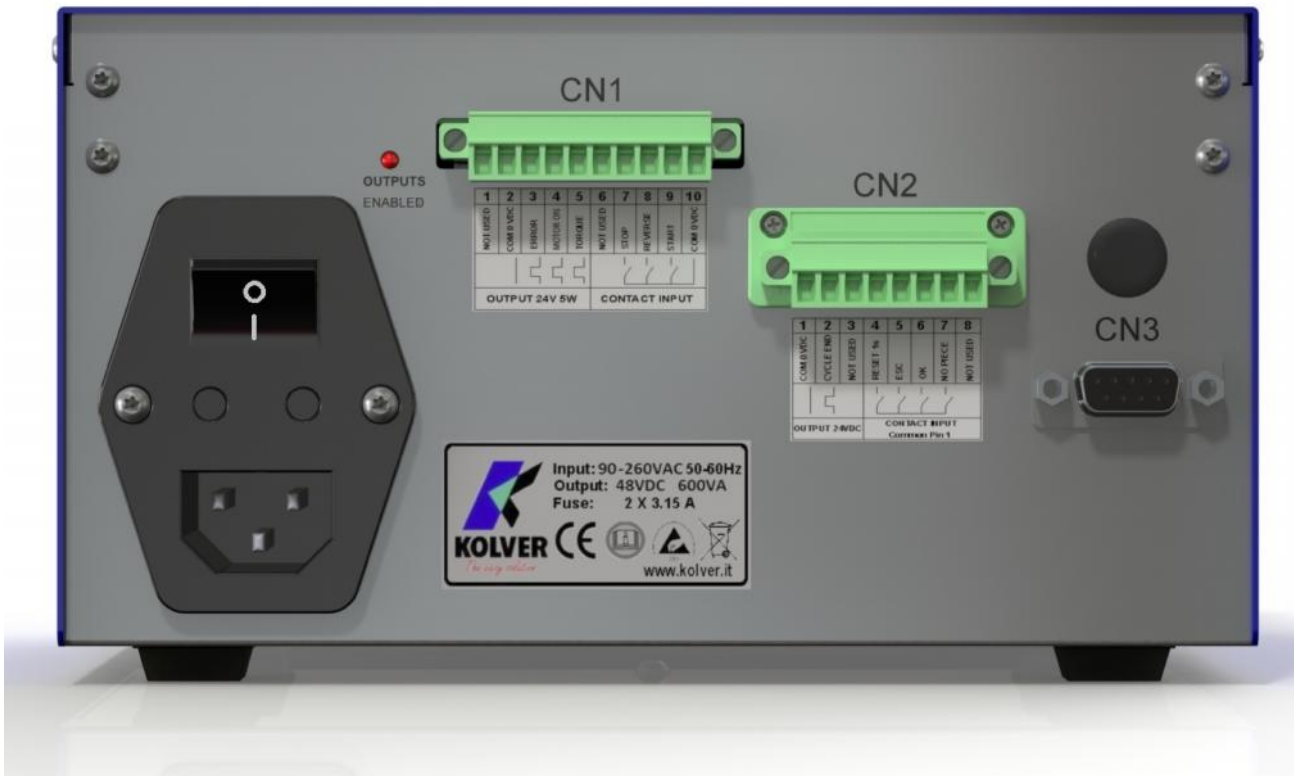
EDU 2AE control unit series have connectors placed on the back panel. These connectors allow to enable functions through inputs and to take signals through outputs. The inputs are activated by connecting them to ground. A positive voltage must NEVER be brought to these inputs. Bringing 24V to the unit inputs could damage the inputs themselves. As seen from the picture below, to enable the inputs it is recommended to bring a clean contact by using a relay or a simple switch or button.



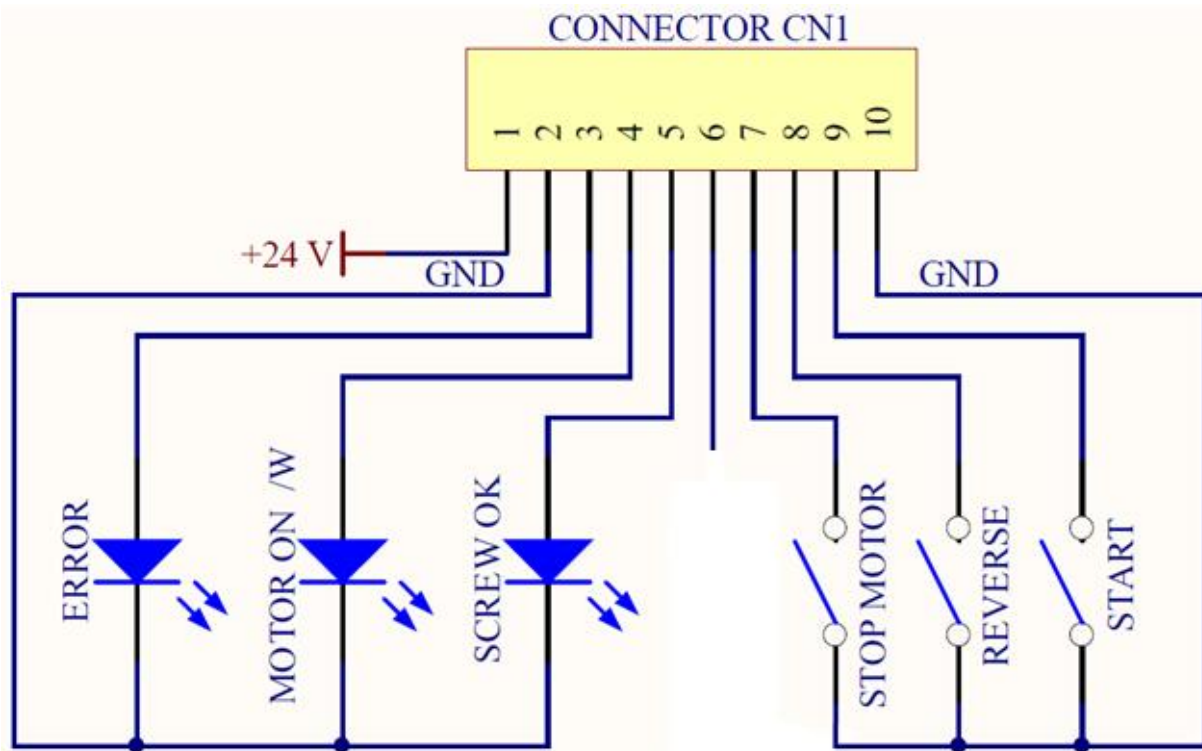
As for the outputs, they are all PNP type with active function. On each pin you will have 24V DC.



These pins can be used directly connected to PNP inputs (PLC) or used to turn on LEDs, buzzers or other devices with 24V power supply. The maximum total power of the outputs is about 400mA. Using inductive loads such as relays or other loads with an initial consumption peak greater than 400mA will send all outputs to protection, displaying the message "output disable". To restore the outputs after a protection, turn off and turn on the unit again.

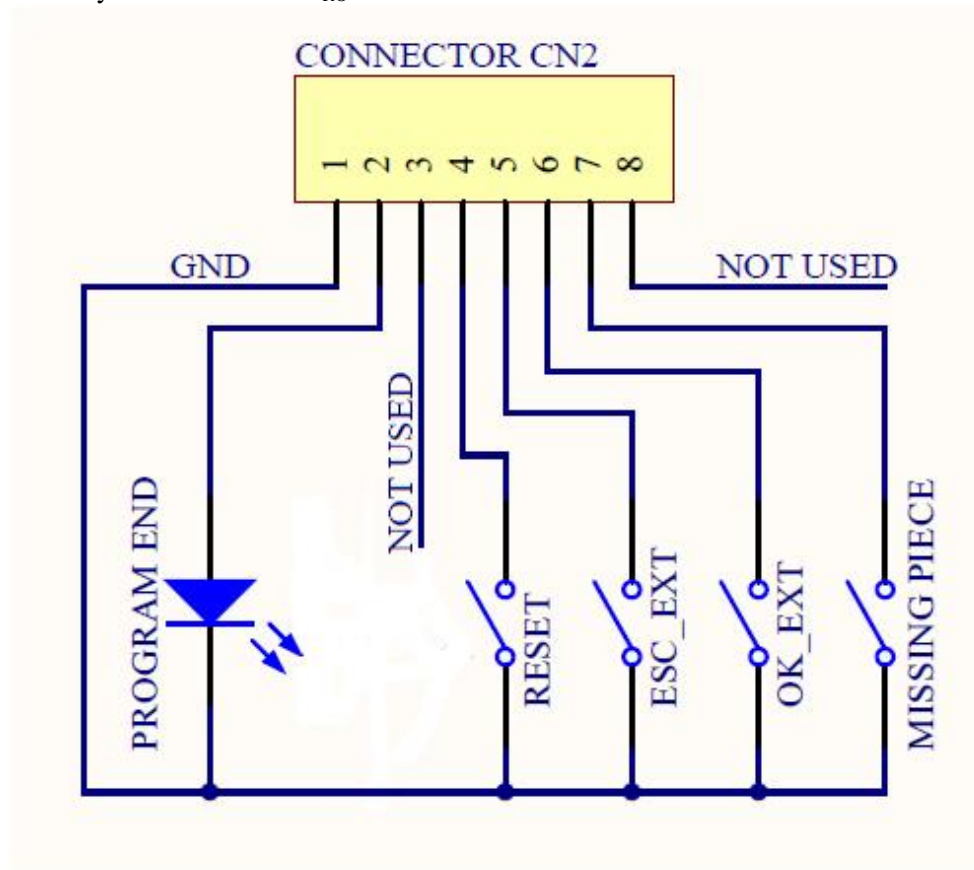


- CN1 CONNECTOR – 10 pin:  
On the back panel, in all the EDU 2AE units, there is a 10 pin I/O connector.



PIN	NAME	FUNCTION
<b>OUTPUT</b>		
1	+24V	+24V voltage protected. The maximum current consumption is 400mA. CAN NOT BE USED TO POWER EXTERNAL DEVICES.
2	GND	Common pin. Signals must be taken between this pin (0VDC) and the respective signal pins.
3	ERROR	Error signal: it activates every time an error occurs. The red led on the front panel will switch on. Signal is 24V.
4	MOTOR ON (W)	It activates when the motor turns during screwing. Signal is 24V.
5	SCREW OK	Correct screw signal. The green led on the front panel will switch on. Signal is 24V.
<b>INPUT</b>		
6	NOT USED	Not used
7	STOP MOTOR	Remote motor stop. If it's activated the message "STOP MOTOR ON" appears on the display. The motor will stop and won't start working again as long as the contact is closed.
8	REVERSE	Remote motor start with torque control while unscrewing.
9	START	Remote start with torque control while screwing.
10	GND	Common pin. Signals must be taken between this pin and the respective signal pins.

- CN2 CONNECTOR – 8 pin:  
Only on EDU 2AE/HP<sub>RO</sub>



PIN	NAME	FUNCTION
<b>OUTPUT</b>		
1	GND	Common pin for any input and output. By closing the contact between pin 1 and any of the other pins to start the function you need. This pin is connected to 0VDC and to the ground.
2	PROGRAM END	It activates at the end of each program.
3		Not used.
<b>INPUT</b>		
4	RESET	If pressed for at least 1 sec, it resets the program you are working in.
5	ESC_EXT	If enabled, (see point 9: OK/ESC), remote ESC key function to reset errors.
6	OK_EXT	If enabled, (see point 9: OK/ESC), remote OK key function to confirm program end.
7	MISSING PIECE	If enabled, it stops the motor, it enables the error signal and "Error missing piece" is displayed on the status bar.
8		Not used.

**ATTENTION:** Output signals are protected from an appropriate circuit. Overload of the available signals (> 450 mA) or short circuit will result in the stop of the unit. To re-activate signals, it is necessary to switch off the unit for 5-6 seconds, check connections and output loads then switch the unit on.

- CN3 CONNECTOR (9 pin serial connector – female)  
Only on EDU 2AE/HP<sub>RO</sub>

PIN	NAME	FUNCTION
1	+15 Vcc	Not used.
2	TX	Serial transmission.
5	GND	Common pin for any input. Signals must be taken between this pin (GND) and the other pins of this connector depending on the signal you want to be printed.

## CORRECT SCREWS ON STATUS BAR

“Screw OK” is displayed on the status bar.	The tool has performed a correct screwing, that is when all the settings have been fulfilled.
“Run Time OK” is displayed on the status bar.	The tool has performed a correct screwing, that is when all the settings have been fulfilled.
“Rev. Torque OK” is displayed on the status bar.	The tool has performed a correct screwing, that is when all the settings have been fulfilled.

## TROUBLE SHOOTING

ERROR	PROBLEM	SOLUTION
0	“waiting connection” doesn’t turn into “system ready” after it’s been switched on.	Contact your nearest Kolver dealer.
1	“Error Torque Control” is displayed on the status bar	Make a new screw. If the error persists, change the torque and speed settings.
2	“Error fast speed” is displayed on the status bar (the torque signal is displayed during the fast speed).	<p style="text-align: center;"><u>For HP<sub>RO</sub> model:</u> If <i>Press ESC</i> function is ON, press ESC for a new screw; if it’s OFF it automatically resets next time you screw. <u>For 2AE model:</u> The error automatically resets next time you screw.</p>
3	“Rev. incomplete” is displayed on the status bar (the displayed torque signal is correct but the set unscrewing is not complete).	
4	“Pre-reverse incompl.” is displayed on the status bar (the lever has been released before the Pre-Rev. has been completed).	

5	“Under min time” is displayed on the status bar (the torque signal is displayed below the set minimum time).	
6	“Over maximum time” is displayed on the status bar (the torque signal is displayed over the set maximum time).	
7	“ <i>Error PV torque</i> ” is displayed on the status bar (the torque signal is displayed inside the set maximum time).	
8	“ <i>Below min torque</i> ” is displayed on the status bar (the torque signal is displayed below the set minimum time).	
9	“ <i>Over max torque</i> ” is displayed on the status bar (the torque signal is displayed over the set maximum time).	
10	“ <i>Compensation error</i> ” is displayed on the status bar (the torque value is negative – this is due to an excessively high negative compensation value)	- Set a higher/lower compensation value.
11	“Error unscrew torque” is displayed on the status bar (The torque signal is displayed while unscrewing, but only if it’s set on “max”).	<ul style="list-style-type: none"> <li>- The screwdriver couldn’t unscrew.</li> <li>- Avoid motor stalling.</li> <li>- Unscrewing too heavy.</li> </ul>
12	“Protection 12A” is displayed on the status bar (it happens when current on mosfets of bridge H is > 12 A for at least 1 sec).	<ul style="list-style-type: none"> <li>- Reduce cycle rate and check settings.</li> <li>- Avoid motor stalling.</li> <li>- Unscrewing too heavy.</li> <li>- Joint too soft.</li> </ul>
13	“ <i>Protection 14p5A</i> ” is displayed on the status bar (it happens when current on mosfets of bridge H is > 14.5 A for at least 800 ms).	<ul style="list-style-type: none"> <li>- Reduce cycle rate and check settings.</li> <li>- Avoid motor stalling.</li> <li>- Unscrewing too heavy.</li> <li>- Joint too soft.</li> </ul>
14	“ <i>Protection 15A</i> ” is displayed on the status bar (it happens when current on mosfets of bridge H is > 15 A for at least 500 ms).	<ul style="list-style-type: none"> <li>- Reduce cycle rate and check settings.</li> <li>- Avoid motor stalling.</li> <li>- Unscrewing too heavy.</li> </ul>
15	“OUTPUT DISABLED” is displayed on the status bar. It is on the protection of the output signals exceeding the maximum load (400mA).	<ul style="list-style-type: none"> <li>- Check that the load does not exceed the max (400mA)</li> <li>- To reset, restart the unit.</li> </ul>

**ATTENTION:** IF THE OK/ESC OPTION IS DISABLED, ERRORS RESET AT THE FOLLOWING SCREWING/PROGRAM. OTHERWISE PRESS ESC. IF THE PROBLEM PERSISTS, PLEASE CONTACT YOUR NEAREST KOLVER DEALER.



## SERIAL PORT only on EDU 2AE/HP<sub>PRO</sub>:

EDU 2AE/HP<sub>PRO</sub> control unit is supplied with a serial 9 pin male connector. In this way you can print the results of each screwing. The transmission characteristics are the following:

9600 (bits per second), 8 (data bits), n (no parity), 1 (bits stop 1).

Connection pin: PIN 2 = TX, PIN 5 = GND

The print string is the following:

RESULT	SCREWDRIVER MODEL	% TORQUE	SPEED	TORQUE	SCREW COUNT	NOTICE
--------	----------------------	-------------	-------	--------	----------------	--------

**Result** = screw evaluation: correct or incorrect.

OK = the torque has been correctly reached, all the selected parameters are satisfied and the control unit will give out a beep sound of 0.5 sec.

NOK = the torque has been reached during the ramp time or the fast speed (see error table). In this case, the unit will give out 2 beep sounds and the red led will light up.

**Screwdriver model** = model of selected screwdriver.

**% Torque** = percentage of the set torque level.

**S: Speed** = speed value.

**T: Torque** = torque value.

**Screws: Count** = number of screws screwed/number of total screws of the sequence/ program.

**Notice** = in case of program end, it prints "Program End" or it indicates the type of error (see paragraph: trouble shooting).

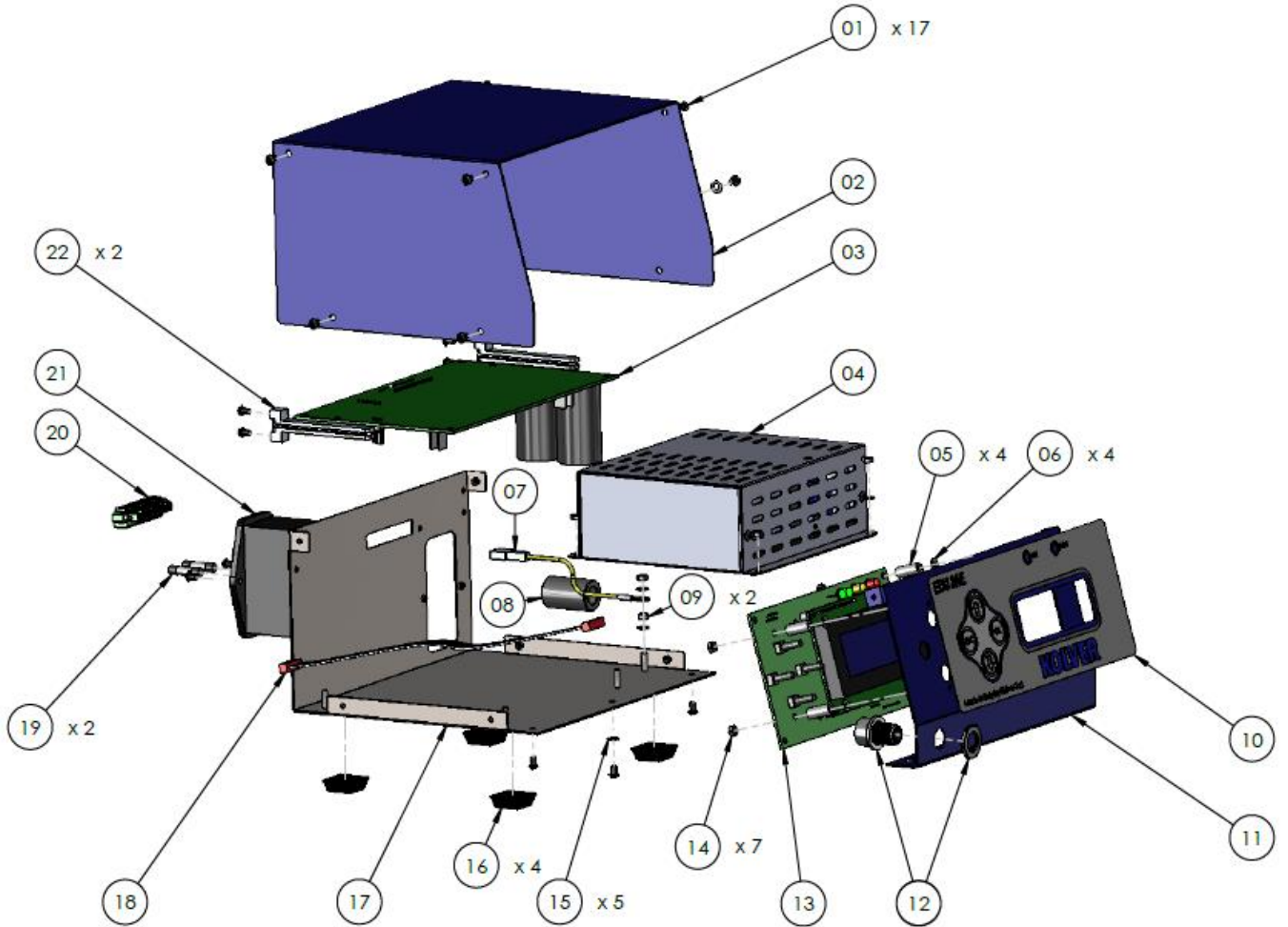
Example of serial print:

```

OK  PLUTO10  T%:20%  S: 600rpm  ST: 0.8s  Screw:01/03  T: 3.00 Nm
OK  PLUTO10  T%:20%  S: 600rpm  ST: 0.8s  Screw:02/03  T: 3.01 Nm
OK  PLUTO10  T%:20%  S: 600rpm  ST: 0.1s  Screw:03/03  T: 3.04 Nm  Program end
NOK PLUTO10  T%:20%  S: 600rpm  ST: 6.0s  Screw:00/03  T:--.--  Error max time
OK  PLUTO10  T%:20%  S: 600rpm  ST: 1.1s  Screw:01/03  T: 3.04 Nm
NOK PLUTO10  T%:20%  S: 600rpm  ST: 6.0s  Screw:01/03  T:--.--  Error max time
OK  PLUTO10  T%:20%  S: 600rpm  ST: 1.4s  Screw:02/03  T: 3.00 Nm
OK  PLUTO10  T%:20%  S: 600rpm  ST: 1.5s  Screw:03/03  T: 3.00 Nm  Program end

```

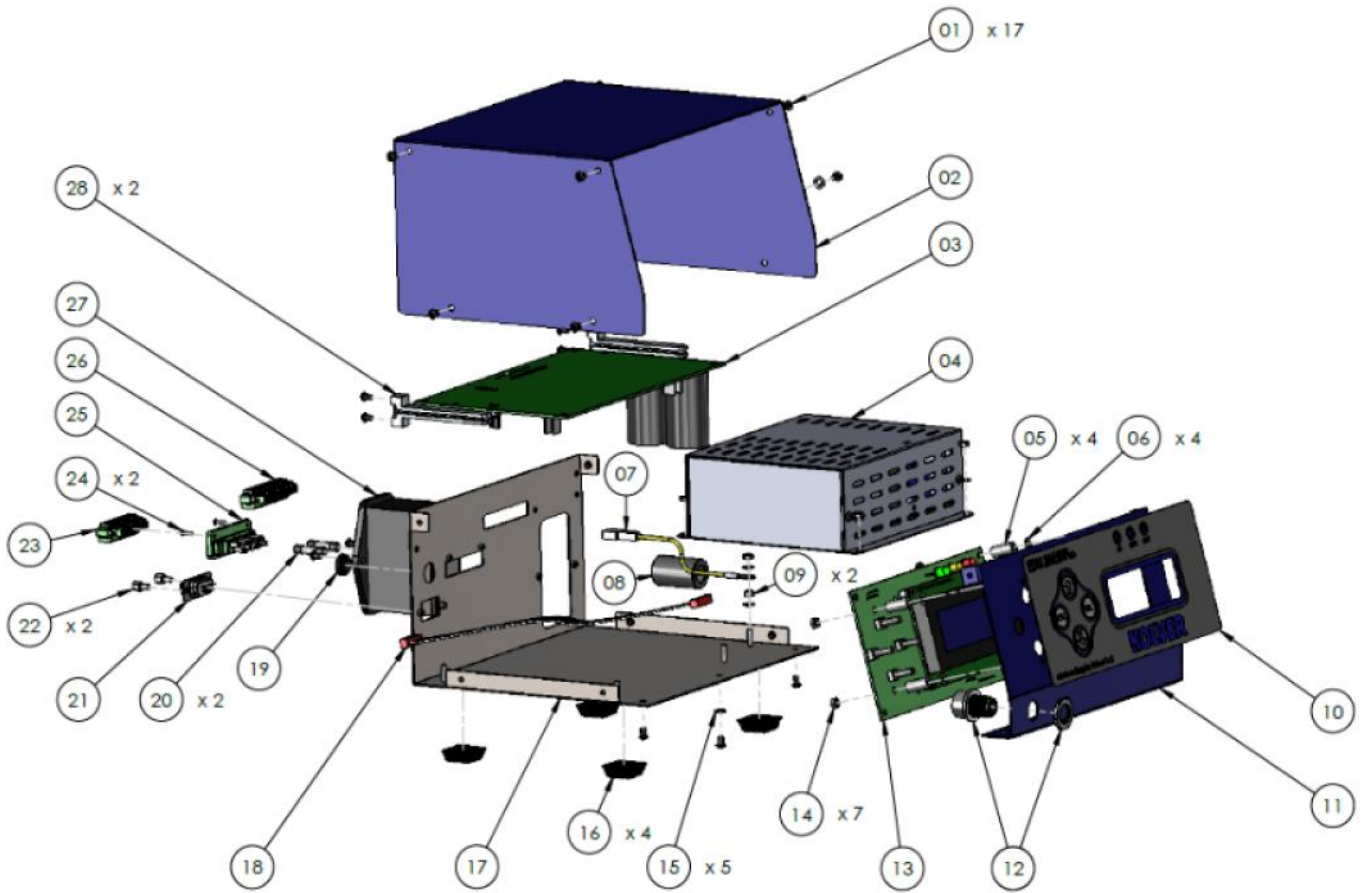
# EXPLODED VIEW EDU2AE



## SPARE PARTS

<b>Position</b>	<b>Description</b>	<b>Quantity</b>	<b>Code</b>
1	Screw M3x5 TX10	17	872444
2	Upper panel 2AE	1	819003
3	Main PCB	1	852521/SW
4	Switching 48V 600W	1	872490
5	Spacer 15mm - 4,8 mm	4	890004/T
6	Washer M3 h0,5 mm	4	800042
7	Ground cable	1	800090/E
8	Ferrite	1	872468
9	M3 Brass nut	2	800056/O
10	Front membrane EDU 2AE	1	858004
11	Front panel EDU2AE	1	818002
12	Connector M12 5 pin + nut + ferrite	1	201666/R1
13	Display EDU2AE	1	852522
14	Zn-white nut M3	7	800056
15	Washer M3	5	800041
16	Plastic support	4	800016/B
17	Bottom panel EDU2AE/SW	1	818001/SW
18	Flat 10 vie	1	872438
19	Fuse 3.15A	2	800619
20	Connector I/O 10 pin spacing 3,81	1	800102
21	Filtered plug	1	800718
22	Board support	2	872442
	Label	1	818006/SW

## EXPLODED VIEW EDU2AE/HPro



## SPARE PARTS

<b>Posizione</b>	<b>Descrizione</b>	<b>Quantità</b>	<b>Codice</b>
1	Screw M3x5 TX10	17	872444
2	Upper panel 2AE	1	819003
3	Main PCB	1	852521/SW
4	Switching 48V 600W	1	872490
5	Spacer 15mm - 4,8 mm	4	890004/T
6	Washer M3 h0,5 mm	4	800042
7	Ground cable	1	800090/E
8	Ferrite	1	872468
9	M3 Brass nut	2	800056/O
10	Front membrane EDU2AE/HPro	1	858009
11	Front panel EDU2AE	1	818002
12	Connector M12 5 pin + nut + ferrite	1	201666/R1
13	Display EDU2AE/HP	1	852522/HP
14	Zn-white nut M3	7	800056
15	Washer M3	5	800041
16	Plastic support	4	800016/B
17	Bottom panel EDU2AE/HPro/SW	1	818007/PSW
18	Flat 10 vie	1	872438
19	Cap	1	800168
20	Fuse 3.15A	2	800619
21	F serial connector	1	890005/F
22	Spacer M3 M-F	2	872453
23	Connector 8 pin F	1	872464
24	Screw M2x6	2	801004
25	Connector 8 pin M	1	872457
26	Connector I/O 10 pin spacing 3,81	1	800102
27	Filtered plug	1	800718
28	Board support	2	872442
	Label	1	818006/SW

## **GUARANTEE**

1. This KOLVER product is guaranteed against defective workmanship or materials, for a maximum period of 12 months following the date of purchase from KOLVER, provided that its usage is limited to single shift operation throughout that period. If the usage rate exceeds of single shift operation, the guarantee period shall be reduced on a prorata basis.
2. If, during the guarantee period, the product appears to be defective in workmanship or materials, it should be returned to KOLVER or its distributors, transport prepaied, together with a short description of the alleged defect. KOLVER shall, at its sole discretion, arrange to repair or replace free of charge such items.
3. This guarantee does not cover repair or replacement required as a consequence of products which have been abused, misused or modified, or which have been repaired using not original KOLVER spare parts or by not authorized service personnel.
4. KOLVER accepts no claim for labour or other expenditure made upon defective products.
5. Any direct, incidental or consequential damages whatsoever arising from any defect are expressly excluded.
6. This guarantee replaces all other guarantees, or conditions, expressed or implied, regarding the quality, the marketability or the fitness for any particular purpose.
7. No one, whether an agent, servant or employee of KOLVER, is authorized to add to or modify the terms of this limited guarantee in any way. However it's possible to extend the warranty with an extra cost. Further information at [kolver@kolver.it](mailto:kolver@kolver.it).

# Operational Manual

## EDU2AE/FR

### Torque range: 0.05-7 Nm



#### IDENTIFICATION DATA OF THE MANUFACTURER

KOLVER S.r.l.  
VIA M. CORNER, 19/21  
36016 THIENE (VI) ITALIA

#### IDENTIFICATION DATA OF THE PRODUCT

<b>MODEL:</b>	EDU 2AE/FR
<b>CODE:</b>	032000/FR

#### TECHNICAL DATA OF THE PRODUCT

FUSE: 3.15 A  
DIMENSIONS: 195 x 170 x h110 mm WEIGHT: 2,4 Kg

#### DECLARATION OF CONFORMITY



**KOLVER S.r.l.** declares that the new tool here described: control unit model EDU 2AE/FR is in conformity with the following standards and other normative documents:

2006/42/CE, LVD 2014/35/UE, EMC 2014/30/UE, EN 62841-2-2:2014, EN 62841-1: 2015, EN 60204-1, EN 61000-6-2, EN 61000-6-4.

It is also in conformity with RoHS III normative (2011/65/UE and following 2015/863).

Name: Giovanni Colasante  
Position: General Manager  
Person authorized to compile the technical file in Kolver.

Thiene, January 1<sup>st</sup> 2021

*Giovanni Colasante*

EDU 2AE/FR power supply and control unit is an innovative system for controlling the torque of any clutch model of PLUTO clutch series: PLUTO 3FR/HS, PLUTO 5FR and PLUTO 7FR. Of FAB series: FAB03, FAB10, FAB12 and FAB18. And of RAF series: RAF32, RAF38 and RAF50.

They are available either inline, pistol, for automation and with angle head (only PLUTO).

EDU 2AE/FR delivers all the advantages of precision torque control electric tools at a fraction of the price of transdurized tools.

The state-of-the-art electronic control circuit cuts the power supply to the motor calculating the correct torque in response to 3 parameters; voltage, frequency and current, according to the selected options.

The AC 90÷260V - 50÷60Hz power supply is converted into 40VDC required by the PLUTO series screwdrivers through a switching board.

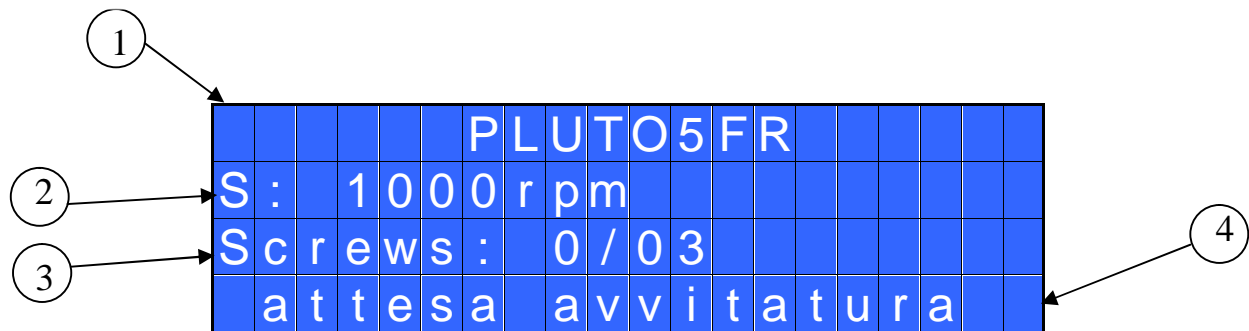
Model	Torque (Nm)	Speed (rpm)	
		Min	Max
PLUTO 3FR/HS	0,5-2,5	1550	2400
PLUTO 5FR	0,7 - 5	600	1000
PLUTO 7FR	1,5 - 7	350	600
FAB03	0,05 - 0,3	450	650
FAB10	0,05 - 0,8	600	1000
FAB12	0,2 - 1,2	600	1000
FAB18	0,3 - 1,8	450	650
RAF32	0,7 - 3,2	600	1000
RAF38	0,9 - 3,8	450	650
RAF50	0,9 - 5	400	700

Turn the unit on through the on/off switch on the back panel. The unit will carry a general system check and “*waiting connection*” will appear on the last line of the display. If the connection with the motor control board is successful the following screen will be displayed:

				K	o	l	v	e	r	S	.	r	.	l	.				
								E	D	U									



Press any key on the front panel to enter the main screen (see following picture).



- 1- Screwdriver model
- 2- Selected speed
- 3- Screw count: fastened screws/total screws
- 4- Status bar ( waiting, screwing, errors, etc...)



To enter the menu press **ESC** for 2 seconds.

Select the line by pressing  $\uparrow$  or  $\downarrow$  then press **OK** (the symbol  $\rightarrow$  will turn into  $\blacksquare$ ). Press  $\uparrow$  or  $\downarrow$  to select the required value and then confirm through **OK** (or **ESC** if you don't want to save the value).

The selected value will be immediately operational, even if you are still in the menu screen. Repeat these operations for all the parameters you wish to set and then push **ESC** to return to the main screen.

#### FRONT PANEL LED:



GREEN LED: *Screw OK.*

YELLOW LED: *Program End.*

RED LED: *Error.*

## MENU

-	-	-	-	-	M	A	I	N	-	M	E	N	U	-	-	-	-	-	-
O	K		c	h	a	n	g	e		E	S	C		q	u	i	t		
▶	P	r	o	g	r	a	m		s	e	t	t	i	n	g				
	U	n	i	t		o	p	t	i	o	n	s							

**Program setting:** It indicates the menu section where you can set or modify the fastening parameters.

**Unit Options:** It indicates the menu section where you can set the language, the password and the unit.

### Program setting

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-	-	-
O	K		c	h	a	n	g	e		E	S	C		q	u	i	t		
▶	1	)	M	o	d	e	l	:		P	L	U	T	O	5	F	R		
	2	)	R	a	m	p	:							0	.	3	s		

**1) Model:** you can select the screwdriver to be used. Your choice will automatically change the default settings. It's important to select the correct model you're going to use since many parameters regarding the motor software are specific for every single model.

**2) Ramp:** You can select the slow start time (acceleration) from 0.2 to 3.0 sec. This option is only available for the screwing phase, while during the unscrewing phase the ramp time is always 0.2 sec. We suggest using this option with self tapping screws.

**ATTENTION:** Reaching the torque while the ramp is still on will activate the "screw OK" signal anyway (this option is useful if you need to tighten screws that are already tightened, the so called "double hit"). On the other hand, if you wish to see an error signal during the preset torque in the ramp phase, you can change the minimum time by setting value which is equal or superior to the ramp value (see point 8).

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-	-	-
	3	)	F	i	n	a	l		S	p	d	:	1	0	0	0	r	p	m
▶	4	)	R	u	n		t	i	m	e	:					o	f	f	
	5	)	M	i	n		t	i	m	e	:					o	f	f	

**3) Final Spd (Final Speed):** You can select any speed value of the screwdriver between the maximum and the minimum specific speed of every single screwdriver (see table with technical data).

**4) Run time:** You can set the time of a tightening, from OFF to 20.0 sec. When the pre-set time has been reached, it results in a torque signal.

The couple reached during this time results in a signal of *Correct screw*. If the correct screw signal is not required, set the Minimum time up to a value of 'Minimum Time -0.1sec'.

**ATTENTION:** Max Time must be set at 20.0 sec.

**5) Min Time - Minimum Time:** You can set this time from 0.1 sec to 'Max time - 0.1s'. To disable the function select OFF by pressing  $\downarrow$  as many times as needed. (Min time = 0).

Torque reached below the minimum time won't activate the torque signal and will result in an error signal. "Below minimum time" will be displayed on the status bar and the red led will light up. You will hear two beep sounds, too.

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-	
6	)	M	a	x		t	i	m	e	:			2	0	.	0	S	
▶	7	)	A	u	t	o		r	e	v	:					o	f	f
	8	)	M	i	n		t	i	m	e	:					o	f	f

**6) Max time - Maximum time:** You can select the maximum time of tightening. You can set from 'Min time + 0.1s' to 20.0 sec.

You also can set the Maximum time to OFF by pressing the  $\uparrow$  button when you have reached the value of 20.0s. In this case the screwdriver turns without any time limit.

**ATTENTION:** If torque isn't reached by the maximum time, the screwdriver will stop. "Over maximum time" will be displayed on the status bar and the red led will light up. You will hear two beep sounds, too.

**7) Auto Rev:** This option will automatically start a reverse after a torque reached/ correct screw signal. You can set time from 0.1 to 20.0 sec.

To disable the function select OFF by pressing  $\downarrow$  as many times as needed.

**ATTENTION:** During the reverse, it is necessary to keep the lever or the start signal pressed as long as it won't stop. "Correct screw" will be displayed on the status bar and a green led will light up. You will hear one beep sound, too. In case the lever is released before the end of the reverse, "unfinished screw" will be displayed and a red led will light up. You will hear two beep sounds, too.

**8) Screws number:** The EDU2AE/FR can act as screw counter. You can set the number of screws from 1 to 99. To disable the function select OFF by pressing  $\downarrow$  as many times as needed.

If the number of correct screws is equal to the number of set screws "Program end" will appear on the status bar and the yellow led will light up. If the *Press OK* function is disabled, "Program end" will automatically disappear at next screwing or when you enter the menu. Otherwise, press OK at the end of each program.

**ATTENTION:** Every time you enter the menu, the number of screws resets to zero.

## Unit Options

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
OK		c	h	a	n	g	e				E	S	C		q	u	i	t	
▶	1	)	L	a	n	g	u	a	g	e	:							E	N
	2	)	V	e	r	s	i	o	n	s									

**1) Language:** This option allows to select among 4 languages: English, French, German, Italian, Spanish and Portuguese.

**2) Versions:** in this screen you can see the versions of boards inside the unit.

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
3	)	C	y	c	l	e	s	:	0	0	0	0	0	0	0	0	0	0	0
▶	4	)	C	h	a	n	g	e	p	a	s	s	w	o	r	d			
5	)	P	a	s	s	w	o	r	d										

**3) Cycles** - Number of total screwing/errors done which have been carried out: It shows the number of fastened screws and occurred errors. This number can't be modified.

**4) Change password:** You can change password (see point 5).

**5) Password:** If YES, you will be asked for the password to enter the menu. Otherwise select NO.

**ATTENTION:** Password is only asked to enter the menu for the first time after switching the unit on. The default password is: 0000.

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
6	)	P	r	e	s	s		O	K	:					o	f	f		
▶	7	)	P	r	e	s	s		E	S	C	:			o	f	f		

**6) Press OK:** when ON, press OK at the end of each screwing.  
When OFF, the control unit resets automatically after a screwing.

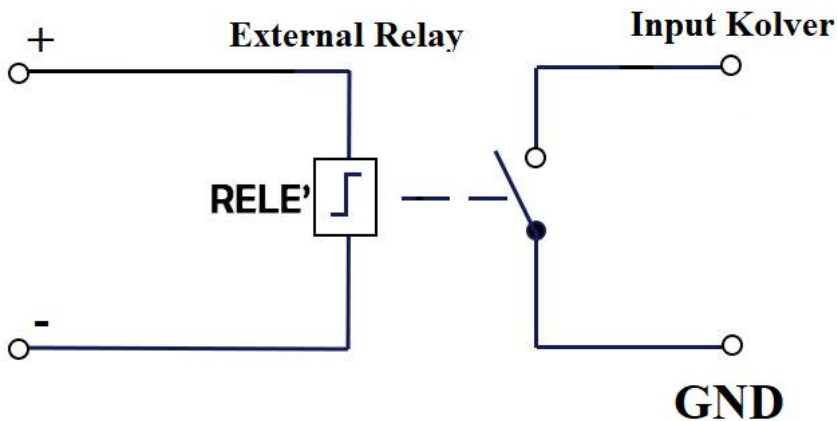
**7) Press ESC:** when ON, press ESC to reset the control unit.  
When OFF, the control unit resets automatically after an error signal.

## INTERPRETATION OF ACOUSTIC SIGNALS

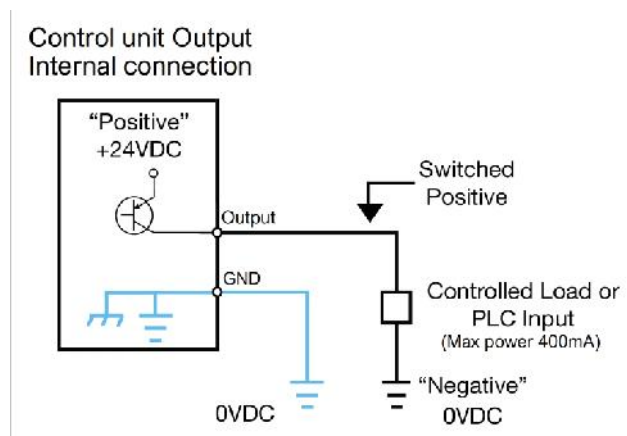
The control unit emits sounds which help you understand if the screwing has been carried out correctly or not. When the torque is reached meeting all the parameters set, the control unit utters a 0.5 sec beep as confirmation. In case of Program End, the unit will utter other two beeps. Instead, torque reached under min time, during the Ramp time or under the Fast speed (see error signals on the display) will cause the control unit to utter three beep sounds.

## I/O CONNECTIONS

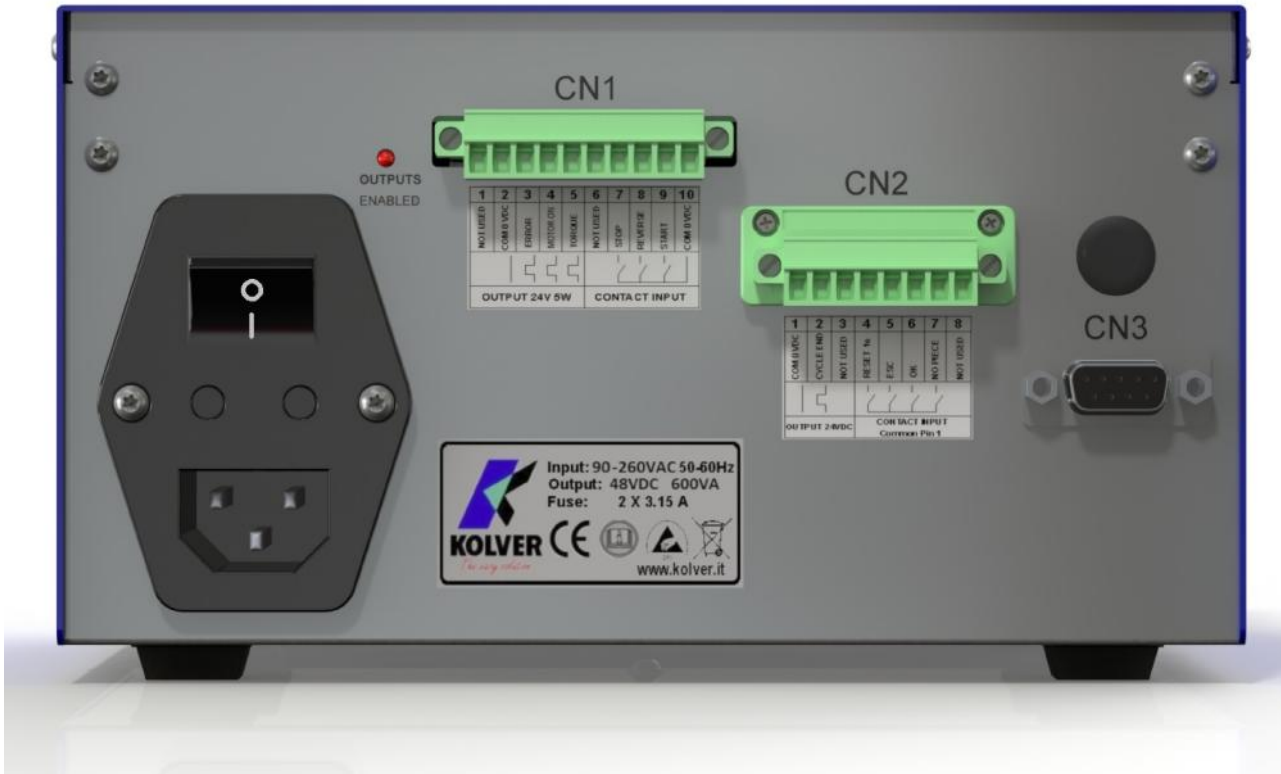
EDU 2AE control unit series have connectors placed on the back panel. These connectors allow to enable functions through inputs and to take signals through outputs. The inputs are activated by connecting them to ground. A positive voltage must NEVER be brought to these inputs. Bringing 24V to the unit inputs could damage the inputs themselves. As seen from the picture below, to enable the inputs it is recommended to bring a clean contact by using a relay or a simple switch or button.



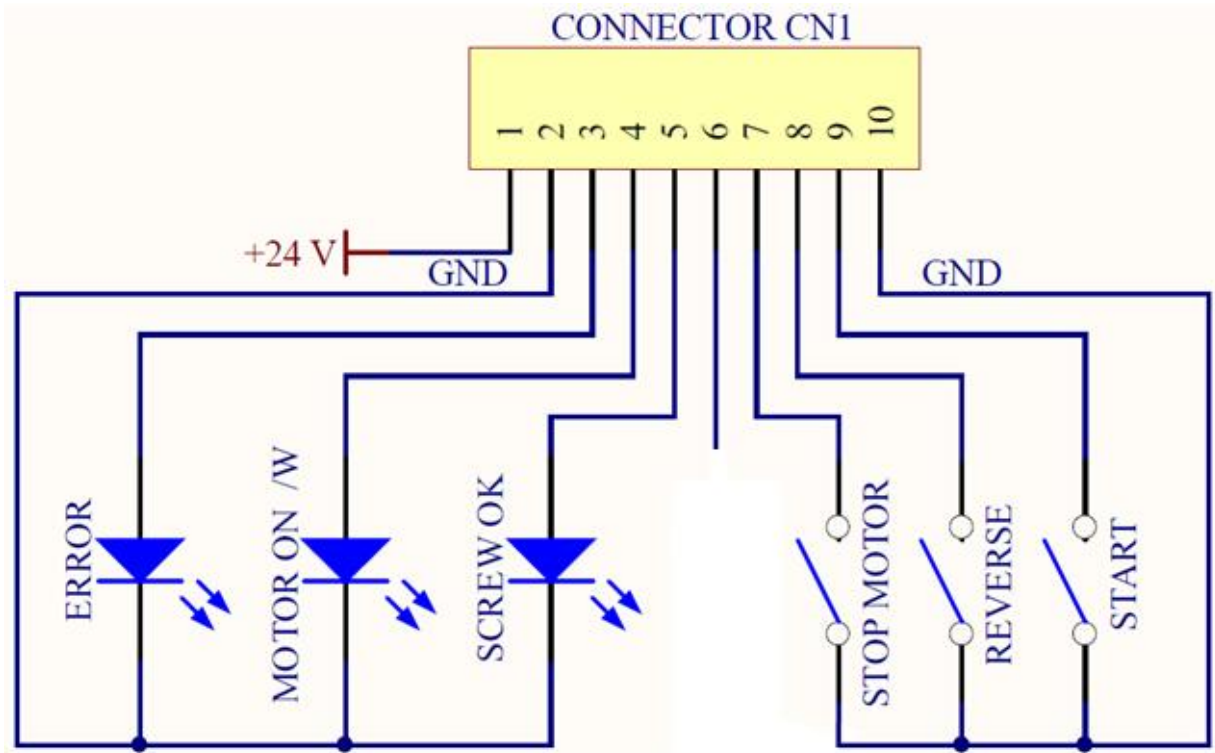
As for the outputs, they are all PNP type with active function. On each pin you will have 24V DC.



These pins can be used directly connected to PNP inputs (PLC) or used to turn on LEDs, buzzers or other devices with 24V power supply. The maximum total power of the outputs is about 400mA. Using inductive loads such as relays or other loads with an initial consumption peak greater than 400mA will send all outputs to protection, displaying the message "output disable". To restore the outputs after a protection, turn off and turn on the unit again.

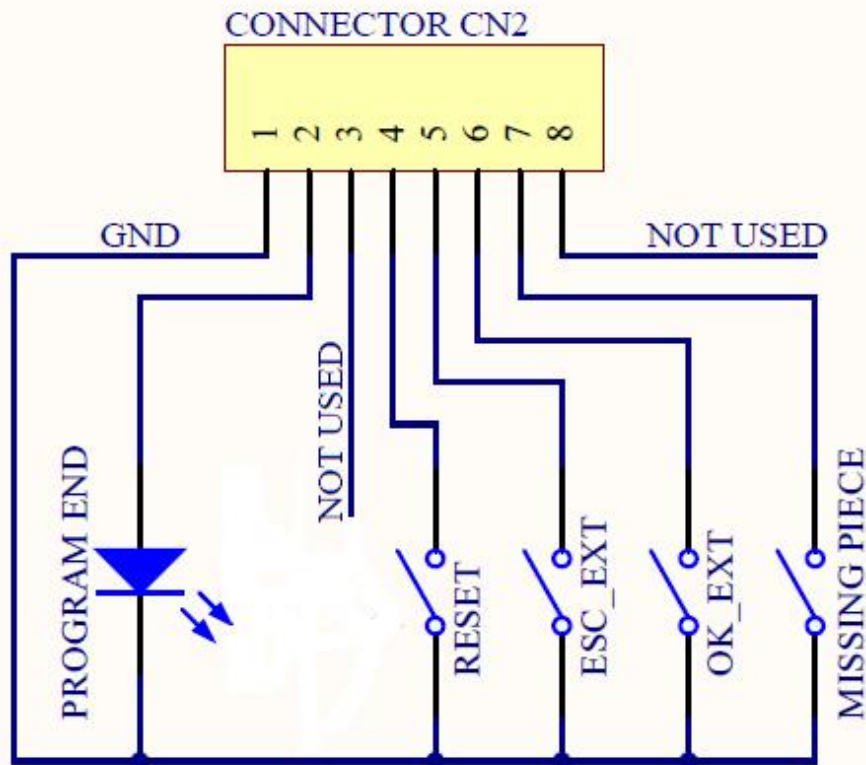


- CN1 CONNECTOR – 10 pin:  
On the back panel, in all the EDU 2AE units, there is a 10 pin I/O connector.



PIN	NAME	FUNCTION
<b>OUTPUT</b>		
1	+24V	+24V voltage protected. The maximum current consumption is 400mA. CAN NOT BE USED TO POWER EXTERNAL DEVICES.
2	GND	Common pin. Signals must be taken between this pin (GND) and the respective signal pins.
3	ERROR	Error signal: it activates every time an error occurs. The red led on the front panel will switch on. Signal is 24V.
4	MOTOR ON (W)	It activates when the motor turns during screwing. Signal is 24V.
5	SCREW OK	Correct screw signal. The green led on the front panel will switch on. Signal is 24V.
<b>INPUT</b>		
6	NOT USED	Not used
7	STOP MOTOR	Remote motor stop. If it's activated the message "STOP MOTOR ON" appears on the display. The motor will stop and won't start working again as long as the contact is closed.
8	REVERSE	Remote motor start with torque control while unscrewing.
9	START	Remote start with torque control while screwing.
10	GND	Common pin. Signals must be taken between this pin and the respective signal pins.

- CN2 CONNECTOR – 8 pin:



PIN	NAME	FUNCTION
<b>OUTPUT</b>		
1	GND	Common pin for any input and output. By closing the contact between pin 1 and any of the other pins to start the function you need.
2	PROGRAM END	It activates at the end of each program.
3		Not used.
<b>INPUT</b>		
4	RESET	If pressed for at least 1 sec, it resets the program you are working in.
5	ESC_EXT	If enabled, (see point 8: Press ESC), remote ESC key function to reset errors.
6	OK_EXT	If enabled, (see point 7: Press OK), remote OK key function to confirm program end.
7	MISSING PIECE	If enabled, it stops the motor, it enables the error signal and "Error missing piece" is displayed on the status bar.
8		Not used.

**ATTENTION:** Output signals are protected from an appropriate circuit. Overload of the available signals (> 450 mA) or short circuit will result in the stop of the unit. To re-activate signals, it is necessary to switch off the unit for 5-6 seconds, check connections and output loads then switch the unit on.

- CN3 CONNECTOR (9 pin serial connector – female)

PIN	NAME	FUNCTION
1	+15 Vcc	Not used.
2	TX	Serial transmission.
5	GND	Common pin for any input. Signals must be taken between this pin (GND) and the other pins of this connector depending on the signal you want to be printed.

## CORRECT SCREWS ON STATUS BAR

"Screw OK" is displayed on the status bar.	The tool has performed a correct screwing, that is when all the settings have been fulfilled.
"Run Time OK" is displayed on the status bar.	The tool has performed a correct screwing, that is when all the settings have been fulfilled.



## TROUBLE SHOOTING

ERROR	PROBLEM	SOLUTION
0	“waiting connection” doesn’t turn into “system ready” after it’s been switched on.	Contact your nearest Kolver dealer.
2	“ <i>Rev. incomplete</i> ” is displayed on the status bar (the displayed torque signal is correct but the set unscrewing is not complete).	If <i>Press ESC</i> function is ON, press ESC for a new screw; if it’s OFF it automatically resets next time you screw.
3	“ <i>Under min time</i> ” is displayed on the status bar (the torque signal is displayed below the set minimum time).	
4	“ <i>Over maximum time</i> ” is displayed on the status bar (the torque signal is displayed over the set maximum time).	
11	“Error unscrew torque” is displayed on the status bar (The torque signal is displayed while unscrewing, but only if it’s set on “max”).	<ul style="list-style-type: none"> <li>- The screwdriver couldn’t unscrew.</li> <li>- Avoid motor stalling.</li> <li>- Unscrewing too heavy.</li> </ul>
12	“Protection 12A” is displayed on the status bar (it happens when current on mosfets of bridge H is > 12 A for at least 1 sec).	<ul style="list-style-type: none"> <li>- Reduce cycle rate and check settings.</li> <li>- Avoid motor stalling.</li> <li>- Unscrewing too heavy.</li> <li>- Joint too soft.</li> </ul>
13	“ <i>Protection 14p5A</i> ” is displayed on the status bar (it happens when current on mosfets of bridge H is > 14.5 A for at least 800 ms).	<ul style="list-style-type: none"> <li>- Reduce cycle rate and check settings.</li> <li>- Avoid motor stalling.</li> <li>- Unscrewing too heavy.</li> <li>- Joint too soft.</li> </ul>
14	“ <i>Protection 15A</i> ” is displayed on the status bar (it happens when current on mosfets of bridge H is > 15 A for at least 500 ms).	<ul style="list-style-type: none"> <li>- Reduce cycle rate and check settings.</li> <li>- Avoid motor stalling.</li> <li>- Unscrewing too heavy.</li> </ul>
15	“OUTPUT DISABLED” is displayed on the status bar. It is on the protection of the output signals exceeding the maximum load (400mA).	<ul style="list-style-type: none"> <li>- Check that the load does not exceed the max (400mA)</li> <li>- To reset, restart the unit.</li> </ul>

**ATTENTION:** IF THE OK/ESC OPTION IS DISABLED, ERRORS RESET AT THE FOLLOWING SCREWING/PROGRAM. OTHERWISE PRESS ESC. IF THE PROBLEM PERSISTS, PLEASE CONTACT YOUR NEAREST KOLVER DEALER.

## SERIAL PORT only on EDU 2AE/FR:

EDU 2AE/FR control unit is supplied with a serial 9 pin male connector. In this way you can print the results of each screwing. The transmission characteristics are the following:

9600 (bits per second), 8 (data bits), n (no parity), 1 (bits stop 1).

Connection pin: PIN 2 = TX, PIN 5 = GND

The print string is the following:

RESULT	SCREWDRIVER MODEL	SPEED	SCREW COUNT	NOTICE
--------	----------------------	-------	----------------	--------

**Result** = screw evaluation: correct or incorrect.

OK = the torque has been correctly reached, all the selected parameters are satisfied and the control unit will give out a beep sound of 0.5 sec.

NOK = the torque has been reached during the ramp time or the fast speed (see error table). In this case, the unit will give out 2 beep sounds and the red led will light up.

**Screwdriver model** = model of selected screwdriver.

**S: Speed** = speed value.

**Screws: Count** = number of screws screwed/number of total screws of the sequence/ program.

**Notice** = in case of program end, it prints "Program End" or it indicates the type of error (see paragraph: trouble shooting).

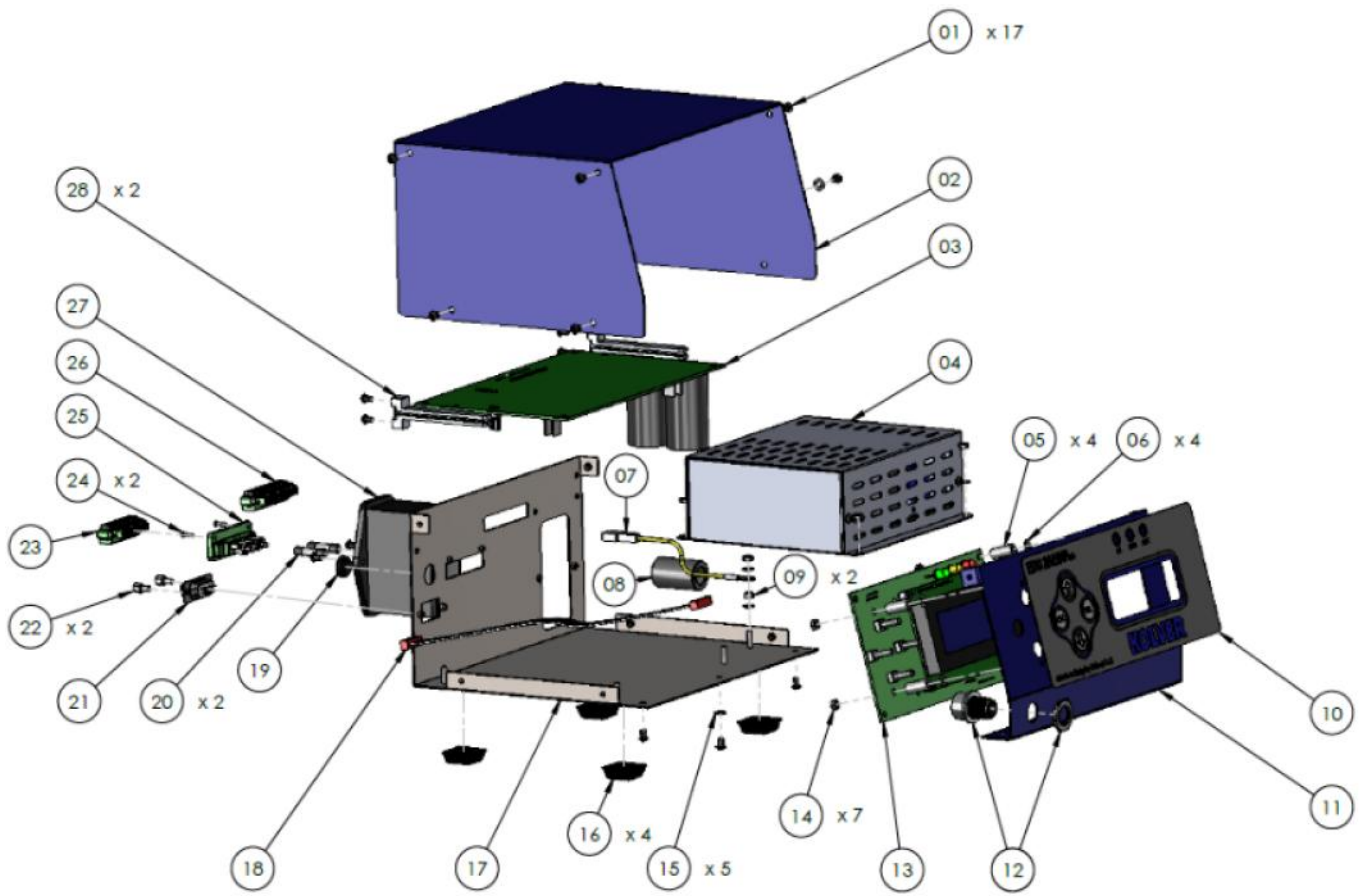
Example of serial print:

```

OK  PLUTO10  T%:20% S: 600rpm ST: 0.8s Screw:01/03 T: 3.00 Nm
OK  PLUTO10  T%:20% S: 600rpm ST: 0.8s Screw:02/03 T: 3.01 Nm
OK  PLUTO10  T%:20% S: 600rpm ST: 0.1s Screw:03/03 T: 3.04 Nm Program end
NOK PLUTO10  T%:20% S: 600rpm ST: 6.0s Screw:00/03 T:--,-- Error max time
OK  PLUTO10  T%:20% S: 600rpm ST: 1.1s Screw:01/03 T: 3.04 Nm
NOK PLUTO10  T%:20% S: 600rpm ST: 6.0s Screw:01/03 T:--,-- Error max time
OK  PLUTO10  T%:20% S: 600rpm ST: 1.4s Screw:02/03 T: 3.00 Nm
OK  PLUTO10  T%:20% S: 600rpm ST: 1.5s Screw:03/03 T: 3.00 Nm Program end

```

## EXPLODED VIEW EDU2AE/FR



## SPARE PARTS

<b>Position</b>	<b>Description</b>	<b>Quantity</b>	<b>Code</b>
1	Screw M3x5 TX10	17	872444
2	Upper panel 2AE	1	819003
3	Main PCB	1	852521/SW
4	Switching 48V 600W	1	872490
5	Spacer 15mm - 4,8 mm	4	890004/T
6	Washer M3 h0,5 mm	4	800042
7	Ground cable	1	800090/E
8	Ferrite	1	872468
9	M3 Brass nut	2	800056/O
10	Front membrane EDU 2AE/FR	1	858004
11	Front panel EDU2AE	1	818002
12	Connector M12 5 pin + nut + ferrite	1	201666/R1
13	Display EDU2AE	1	852522
14	Zn-white nut M3	7	800056
15	Washer M3	5	800041
16	Plastic support	4	800016/B
17	Bottom panel EDU2AE/HPro/SW	1	818001/SW
18	Flat 10 vie	1	872438
19	Cap	1	800168
20	Fuse 3.15A	2	800619
21	F serial connector	1	890005/F
22	Spacer M3 M-F	1	872453
23	F 8 pin connector	1	872464
24	Screw M2x6	2	801004
25	M 8 pin connector	1	872457
26	Connector I/O 10 pin spacing 3,81	1	800102
27	Filtered plug	1	800718
28	Board support	2	872442
	Label	1	818006/SW

## **GUARANTEE**

1. This KOLVER product is guaranteed against defective workmanship or materials, for a maximum period of 12 months following the date of purchase from KOLVER, provided that its usage is limited to single shift operation throughout that period. If the usage rate exceeds of single shift operation, the guarantee period shall be reduced on a prorata basis.
2. If, during the guarantee period, the product appears to be defective in workmanship or materials, it should be returned to KOLVER or its distributors, transport prepaied, together with a short description of the alleged defect. KOLVER shall, at its sole discretion, arrange to repair or replace free of charge such items.
3. This guarantee does not cover repair or replacement required as a consequence of products which have been abused, misused or modified, or which have been repaired using not original KOLVER spare parts or by not authorized service personnel.
4. KOLVER accepts no claim for labour or other expenditure made upon defective products.
5. Any direct, incidental or consequential damages whatsoever arising from any defect are expressly excluded.
6. This guarantee replaces all other guarantees, or conditions, expressed or implied, regarding the quality, the marketability or the fitness for any particular purpose.
7. No one, whether an agent, servant or employee of KOLVER, is authorized to add to or modify the terms of this limited guarantee in any way. However it's possible to extend the warranty with an extra cost. Further information at [kolver@kolver.it](mailto:kolver@kolver.it).

**MANUAL**  
**EDU 2AE/TOP - EDU 2AE/TOP/E -**  
**EDU 2AE/TOP/TA**  
**Torque range: 0.35-70 Nm**



**IDENTIFICATION DATA OF THE MANUFACTURER**

KOLVER S.r.l.  
 VIA M. CORNER, 19/21  
 36016 THIENE (VI) ITALIA

**IDENTIFICATION DATA OF THE PRODUCT**

<b>MODEL:</b>	EDU 2AE/TOP	EDU2AE/TOP/E	EDU2AE/TOP/TA
<b>CODE:</b>	032000/TOP	032000/TOP/E	032000/TOP/TA

**TECHNICAL DATA OF THE PRODUCT**

FUSE: 3,15 A  
 DIMENSIONS: 190 x 205 x h120 mm WEIGHT: 2,5 Kg

**DECLARATION OF CONFORMITY**



**KOLVER S.r.l.** declares that the new tool here described: control unit model EDU2AE/TOP and EDU2AE/TOP/TA is in conformity with the following standards and other normative documents: 2006/42/CE, LVD 2014/35/UE, EMCD 2014/30/UE, EN 62841-2-2:2014, EN 62841-1: 2015, EN 60204-1, EN 61000-6-2, EN 61000-6-4.

It is also in conformity with RoHS III normative (2011/65/UE and following 2015/863).

Name: Giovanni Colasante  
 Position: General Manager  
 Person authorized to compile the technical file in Kolver

Thiene, January 1<sup>st</sup> 2021

*Giovanni Colasante*

EDU 2AE/TOP power supply and control units are an innovative system for controlling the torque of any current control MITO and PLUTO electric screwdrivers: MITO15, PLUTO 3, PLUTO 6, PLUTO 10, PLUTO 15, PLUTO 20, PLUTO 30, PLUTO45, PLUTO50 and PLUTO70, either inline, pistol, push to start, for automation and with angle head (only PLUTO). It's also possible to use the following clutch models: PLUTO 3FR/HS, PLUTO 5FR and PLUTO 7FR.

EDU 2AE/TOP delivers all the advantages of precision torque control electric tools at a fraction of the price of transdurized tools.

The state-of-the-art electronic control circuit cuts the power supply to the motor calculating the correct torque in response to 3 parameters; voltage, frequency and current, according to the selected options.

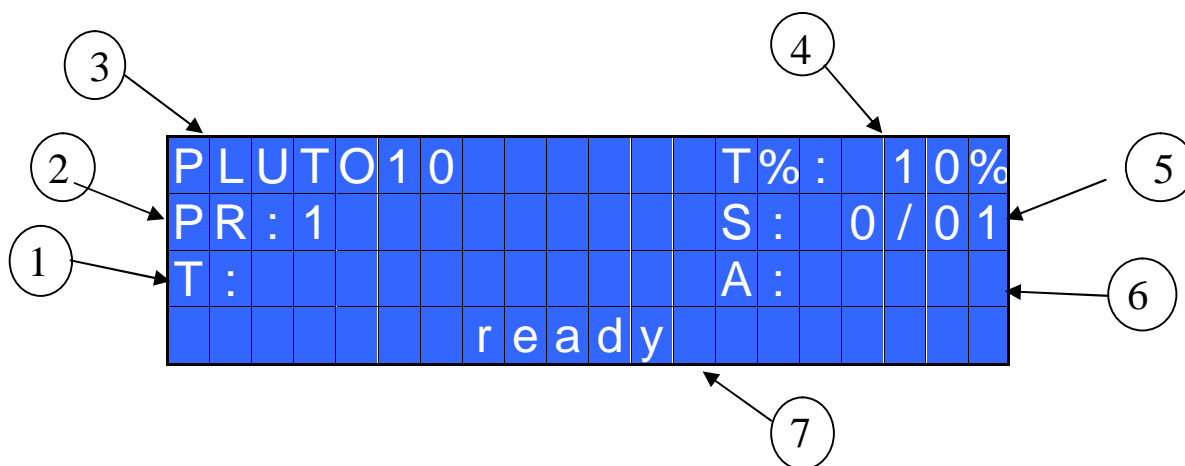
The AC 90÷260V - 50÷60Hz power supply is converted into 40VDC required by the PLUTO series screwdrivers through a switching board.

Model	Torque (Nm)	Speed (rpm)	
		Min	Max
MITO15	0,35-1,5	450	850
PLUTO 3	0,5-3	370	1300
PLUTO 6	0,85-6	200	850
PLUTO 10	1,5-10	110	600
PLUTO 15	2-15	60	320
PLUTO 20	3-20	50	200
PLUTO 35	3-35	40	140
PLUTO 50	5-50	20	90
PLUTO 6 ANG	0,7-6	200	850
PLUTO 8 ANG	1,5 - 7	110	600
PLUTO 15 ANG	2-15	100	320
PLUTO 20 ANG	3-18	60	200
PLUTO 30 ANG	6-30	30	130
PLUTO 45 ANG	10-45	25	90
PLUTO 70 ANG	15-70	25	50
PLUTO 3FR/HS	0,5-2,5	1550	2400
PLUTO 5FR	0,7-5	600	1000
PLUTO 7FR	1,5-7	350	600

**IMPORTANT: EDU 2AE/TOP is a highly accurate unit but it is critically important to select the correct options to ensure that proper torque is being applied. Read the menu description carefully and in case you are unsure please contact Kolver for support information.**

Turn the unit on through the on/off switch on the back panel. The unit will carry a general system check and the words “*waiting connection*” will appear on the last line of the display. If the connection with the motor control board is successful the following screen will be displayed:

				K	o	l	v	e	r	S	.	r	.	l	.				
				E	D	U		2	A	E	/	T	O	P	/	T	A		
				V	e	r	s	i	o	n		5	.	0	0				
				l	o	a	d	i	n	g	.	.	.						



- 1- Reached torque level in Nm, lbf.in or kgf.cm
- 2- Program number or sequence
- 3- Screwdriver model
- 4- Torque level in percentage
- 5- Screw count: done screws/total screws
- 6- Angle value in degrees (only EDU 2AE-TOP TA model)
- 7- Status bar (ready, errors, etc...)



### FRONT PANEL KEYBOARD

To enter the menu press the **ESC** key for 2 seconds.

Select the line by pressing  $\uparrow$  or  $\downarrow$  then press **OK** (the symbol  $\blacktriangleright$  will turn into  $\blacksquare$ ). Press the  $\uparrow$  or  $\downarrow$  to select the required value and then confirm through **OK** (or **ESC** if you don't want to save the value).

The selected values will be immediately operational, even if you are still in the menu screen. Repeat the sequence for all the parameters you wish to change and then push **ESC** to return to the main screen.

Press **RESET** for 3 sec should you need to reset the screw, the program or the sequence. If you want to see all the set parameters press  $\uparrow$  for 2 seconds, however you cannot modify the displayed parameters on this screen.

### LEDS ON FRON PANEL



GREEN LED VERDE: indication of *Screw OK*.

YELLOW LED: indication of *Programm End* or *Sequence End*.

RED LED: any indication of error.



## MAIN MENU:

-	-	-	-	-	M	A	I	N	-	M	E	N	U	-	-	-	-	-
O	K		c	h	a	n	g	e		E	S	C		q	u	i	t	
▶	P	r	o	g	r	a	m		s	e	t	t	i	n	g			
	S	e	q	u	e	n	c	e		s	e	t	t	i	n	g		

**Program setting:** It indicates the menu section where you can set or modify the fastening parameters.

**IMPORTANT:** To work with switch box, socket tray and remote it is mandatory to go to Sequence Menu (Ext Box: ON).

**Sequence:** It indicates the menu section where you can activate the sequence, the switchbox/socket tray and the bar code.

-	-	-	-	-	M	A	I	N	-	M	E	N	U	-	-	-	-	-
	S	e	q	u	e	n	c	e		s	e	t	t	i	n	g		
▶	U	n	i	t		o	p	t	i	o	n	s						
	U	S	B		o	p	t	i	o	n	s							

**Unit Options:** It indicates the menu section where you can set date and time, the password and the language.

**AVAILABLE ONLY ON EDU2AE/TOP/E and EDU 2AE/TOP/TA (from 3.0 version on)**

**USB Options:** It indicates the menu section where you can view, upload and create programs setting of the control unit.

## PROGRAM MENU:

The first 28 menu lines are available in both the EDU 2AE/TOP, EDU 2AE/TOP/E and EDU 2AE/TOP/TA models.

Lines from 29 to 32 are only available in the TOP/TA model.

-	-	-	-	-	M	E	N	U	-	P	R	:	1	-	-	-	-	-
O	K		c	h	a	n	g	e		E	S	C		q	u	i	t	
▶	1	)	P	r	o	g	r	a	m		n	u	m	b	e	r	:	1
	2	)	S	c	r	e	w	s		n	u	m	b	e	r	:		1

**1) Program number:** you can select/ modify the desired program from 1 to 8.

**2) Screws number:** The EDU2AE/TOP can act as screw counter. You can set the number of screws from 1 to 99. To disable the function press ↵ until you get to OFF.

If the number of correct screws matches to the number of set screws, “PROGRAM END” will appear on the status bar and the yellow led will light up. If the “Press OK” is ON (see point 18), “PROGRAM END” will automatically disappear at next screwing or any time you enter the menu. Otherwise, press OK at the end of each program.

**ATTENTION:** Every time you enter the menu, the number of screws will reset.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-	
3	)	M	o	d	e	l	:							P	L	U	T	O	1	0
▶	4	)	R	a	m	p	:									0	.	3	s	
5	)	T	o	r	q	u	e	:										1	0	%

**3) Model:** you can select the screwdriver to be used. Your choice will automatically change the default settings. It's important to select the correct model you're going to use since most parameters regarding the motor software are specific to every single model.

ATTENTION: The pre-set torque level in % and in Nm for PLUTO3FR, PLUTO5FR o PLUTO7FR models does not appear on the display. Moreover, some settings will be unchangeable, so if you try to modify such settings it will be displayed: *"not available for clutch"*.

**IMPORTANT:** To work with CA drivers, switch box, socket tray and remote it is mandatory to select ON on Ext. Box in Sequence Menu.

**4) Ramp:** You can select the slow start time (acceleration) from 0.2 to 3.0 sec. This option is only available for the screwing phase, while during the unscrewing phase the ramp time is always 0.2 sec. We suggest using this option with self tapping screws.

ATTENTION: Reaching the torque while the ramp is still on could give as result a different torque level from the one that results when the ramp is over. This is due to the motor acceleration.

Reaching the torque while the ramp is still on will activate the "screw OK" signal anyway (this option is useful if you need to tighten screws that are already tightened, the so called "double hit").


On the other hand, if you wish to see an error signal during the preset torque in the ramp phase, you can change the minimum time by setting value which is equal or superior to the ramp value (see point 7).

**5) Torque:** you can select the desired torque as a percentage of the torque range of the selected screwdriver. For example, for a Pluto10, a 50% setting will result in a torque in the area of 4 -5 Nm. The torque range is always referred to the MAX speed. In case you're not working at maximum speed, the torque range will progressively lower in order to avoid motor stalling. If the torque level is reached correctly, it will be displayed and you will hear a beep sound, too.

Such torque level is indicated as "T: ..%" on the main screen.

**6) Tm Fast Spd (Time Fast Speed):** It indicates how long the screwdriver should turn at the FAST SPEED (see point 7) before switching to the Final Speed.

This Fast Speed Time can be set from 0.3 to 10.0 sec.

To disable the function press  until you get to OFF. In this case the screwdriver will automatically start at pre-set speed (see point 8).

CAUTION: The aim of the FAST SPEED is only to speed up the approach time in case of long screws. Reaching the torque at higher speed will result in inaccurate torque output. To avoid inaccurate torque values we suggest first to set a shorter time, and then increase it.

Torque reached during the FAST SPEED won't activate the torque signal and the message "Error FAST SPEED" will be displayed on the main screen and 2 beep sounds. The red led will turn on, too.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-
6	)	T	m	F	a	s	t	s	p	d	:			0	.	3	s		
▶	7	)	F	a	s	t	s	p	d	:						o	f	f	
8	)	F	i	n	a	l	s	p	d	:				6	0	0	r	p	m

**7) Fast spd (Fast Speed):** You can select the speed of the screwdriver during the FAST SPEED. It can be set between max speed and the Final Speed (see point 8).  
This function is available only if the Fast Speed Time is ON.

**8) Final Spd (Final Speed):** You can select any speed value of the screwdriver between nominal (maximum speed given in the catalogue) and the minimum speed of every single screwdriver (see table with technical data).

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-
9	)	R	u	n	t	i	m	e	:					2	0	.	0	s	
▶	1	0	)	M	i	n		t	i	m	e	:					o	f	f
1	1	)	M	a	x			t	i	m	e	:		2	0	.	0	s	

**9) Runtime:** You can set the time of a tightening, from OFF to 20.0 sec. When the pre-set time has been reached, it results in a torque signal.  
The couple reached during this time results in a signal of *Correct screw*. If the correct screw signal is not required, set the Minimum time up to a value of 'Minimum Time -0.1sec'.

ATTENTION: Max Time must be set at 20.0 sec.

**10) Min time - Minimum Time:** You can select the minimum time of screwing from 0.1 sec to 'Max time - 0.1s'. To disable the function press  $\downarrow$  until you get to OFF (Min time = 0).  
Torque reached below the minimum time won't activate the torque signal and will result in an error signal. "*Below minimum time*" will be displayed on the status bar and the red led will light up. You will hear two beep sounds, too.

**11) Max time - Maximum time:** You can select the maximum time of screwing. You can set from 'Min time + 0,1s' to 20.0 sec.  
You also can set the Maximum time to OFF by pressing the  $\uparrow$  button when you have reached the value of 20.0s. In this case the screwdriver turns without any time limit.

ATTENTION: If torque isn't reached by the maximum time, the screwdriver will stop. "*Over maximum time*" will be displayed on the status bar and the red led will light up. You will hear two beep sounds, too.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-
1	2	)	P	r	e		R	e	v	:							o	f	f
▶	1	3	)	A	u	t	o		R	e	v	:		2	0	.	0	s	
1	4	)	R	e	v		s	p	d	:				6	0	0	r	p	m

**12) Pre-Rev.:** pre-reverse. You can unscrew before tightening. This time can be set from OFF to 20.0 sec.

N.B. The speed and torque will be the same as those for the Auto Reverse.

**13) Auto rev. – Auto reverse:** This option will automatically start a reverse after a torque reached signal. You can set time from 0.1 to 20.0 sec.  
To disable the function press  $\downarrow$  until you get to OFF.

ATTENTION: During the reverse, it is necessary to keep the lever or the start signal pressed as long as it doesn't stop. "*Correct screw*" will be displayed on the status bar and a green led will light up. You will hear one beep sound, too. In case the lever is released before the end of the reverse, "*unfinished screw*" will be displayed and a red led will light up. You will hear two beep sounds, too.

**14) Rev spd - Reverse speed:** You can select any reverse speed value of the screwdriver between the maximum and the minimum specific speed of every single screwdriver (see table with technical data).

-	-	-	-	MENU	-	-	PR: 1	-	-	-	-
	15	)	Rev	torque:							MAX
▶	16	)	PV	torque:							off
	17	)	Rotation:								right

**15) Rev torque – Reverse torque:** You can select the desired reverse torque as a percentage of the torque range of the selected screwdriver (see point 2). If the torque is set on MAX, the reverse torque is about 20% higher than the possible maximum torque, so that it is always possible to unscrew a tightened screw (we suggest leaving this function on in normal use). If the setting is from MIN to 99% the reverse torque with the same percentage will be equal to the settings of the screwing phase.

**ATTENTION:** If you're using open-end wrenches, the reverse torque has to be set to MIN value in order to bring the wrench back to the correct position.

**16) PV torque:** Period of time in which the screwdriver works at **maximum torque** before switching to the torque that has been set by the user. You can set time from 0.1 to 10.0 sec.

To disable the function press ⏴ until you get to OFF.

This function overlaps other time settings (Fast Speed, ramp time, minimum time, maximum time) from the motor start on.

**ATTENTION:** This function is useful for applications where the prevailing torque is higher than the final torque (for example trilobal screws or locknuts).

**Please use this function with utmost attention because an incorrect use can damage both the assembly and the screwdriver.**

Torques reached during the max torque time won't activate the torque signal. "Error pvt time" will be displayed and the red led will light up. You will hear two beep sounds, too.

**17) Rotation:** You can choose between right tightening (standard screws) or left tightening (left threaded screws). All the other functions will adapt to the selected direction of rotation.

-	-	-	-	MENU	-	-	PR: 1	-	-	-	-
	18	)	Press	OK:							off
▶	19	)	Press	ESC:							off
	20	)	Reset:								on

**18) Press OK:** when ON, press OK at the end of each screwing.  
When OFF, the control unit resets automatically after a screwing.

**19) Press ESC:** when ON, press ESC to reset the control unit.  
When OFF, the control unit resets automatically after an error signal

**20) Reset:** you can reset the program or the single screw.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-			
2	1	)	E	r	r	o	r	l	e	v	e	r	:						o	n		
▶	2	2	)	D	e	f	i	x	a	l	l	o	w	:					o	f	f	
2	3	)	C	a	l	i	b	r	a	t	i	o	n	:						o	f	f

**21) Error lever:** when ON, an error signal will occur when the lever has released before reaching the torque.  
When OFF, this function doesn't work.

**22) Defix allow:** when OFF, the reverse is NOT enabled.

**23) Calibration:** When ON, you will see the torque value (Nm or in.lbs) on the main screen.  
When OFF, the torque value won't be displayed.  
(To modify the calibration parameters see paragraph *Torque calibration*).

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-					
2	4	)	C	o	m	p	e	n	s	:				0	.	0	0	N	m					
▶	2	5	)	T	o	r	q		m	i	n	:							0	.	0	0	N	m
2	6	)	T	o	r	q		m	a	x	:			2	0	.	0	0	N	m				

**24) Compens – Compensation:** This function allows an increase or decrease of the displayed torque value after a calibration. The available range is from 0 to ±55 Nm. For example: after calibration (see Torque calibration) you make a screwing on your assembly and compare the displayed value to the value you see on a torque tester (for example a mini-K or a K model). Let's say you notice that the torque displayed in the unit EDU 2AE/TOP is +0.2 Nm higher than the value indicated on the tester (which is the right one). In this case you can modify this value by setting -0.2 Nm so that the value on the display will be the same as the value on the tester. If it's lower than 0.3 Nm, you need to set +0.3 Nm and so on.

**25) Torq min – Minimum torque:** The minimum torque and maximum torque options allow the user to set the acceptable torque range for each single application. When the reached torque is within this range, "Screw OK" will be displayed on the status bar and the green led will light up. If the reached torque is outside this range, "error minimum torque" or "error maximum torque" will be displayed and the red led will light up. You can set the torque range from 0 to 'Torq Max-0.01 Nm' in steps of 0.01 Nm. The minimum torque option allows to set the lowest value of the torque range. When Calibration is OFF, the minimum torque value automatically sets on 0 Nm. The selection of the torque value is carried out by entering the digit cell by cell.

**26) Torq max – Maximum Torque:** The minimum torque and maximum torque options allow the user to set the acceptable torque range for the single application. When the reached torque is within this range, "Screw OK" will be displayed on the status bar and the green led will light up. If the reached torque is outside this range, "error minimum torque" or "error maximum torque" will be displayed. You can set the torque range from 'Torq Min+0.01 Nm' to 55 Nm at intervals of 0.01 Nm. The maximum torque option allows to set the highest value of the torque range. When Calibration is OFF the maximum torque value automatically sets on 55 Nm. The selection of the torque value is carried out by entering the digit cell by cell.

-	-	-	-	-	MENU	-	-	PR:1	-	-	-	-	-		
27	)	I	n	s	.	b	a	r	c	o	d	e			
▶	28	)	S	e	r	i	a	l	P	R	T	:	o	f	f
29	)	F	u	n	c	T	&	A	:				o	f	f

**27) Ins. barcode:** to scan a barcode and recall the desired program. To be used in combination with option 4. of the Sequence Menu.  
**IMPORTANT:** Barcode can be ONLY numeric.

**28) Serial PRT:** Serial print: from OFF to 5.  
 When OFF, no print.  
 If it is set up to 5, this value identifies the number of line feeds between a string and another.

**THE FOLLOWING MENU IS AVAILABLE ON T&A VERSION ONLY**

-	-	-	-	-	MENU	-	-	PR:1	-	-	-	-	-				
29	)	F	u	n	c	T	&	A	:				o	f	f		
▶	30	)	S	t	a	r	t	i	n	g	T	o	r	:	-	-	-
31	)	A	n	g	.	m	i	n	:				-	-	-	-	

**29) Func T&A–T&A function mode:** You can activate the Torque & Angle function. Set OFF when you don't need this function. When you set ON you can choose among six working conditions (see T&A specific instructions).

**30) Starting Tor – Starting torque:** If T&A option is set on Tor mode (See T&A paragraph), you can set the torque threshold the angle starts to be read from. When T&A is set on angle mode (see T&A paragraph), you can set the torque threshold the angle starts to be carried out from.

**31) Ang. min – Minimum angle:** Minimum angle threshold. You can set it when T&A is set on Tor, T/in or T/lv (see T&A specific instructions). The minimum angle the operator can set is 5°.

-	-	-	-	-	MENU	-	-	PR:1	-	-	-	-	-			
31	)	A	n	g	.	m	i	n	:				-	-	-	-
▶	32	)	A	n	g	.	m	a	x	:				-	-	-

**32) Ang. max - Maximum angle:** Maximum angle threshold. You can set it when T&A is set on Tor, T/in or T/lv (see T&A specific instructions). The maximum angle the operator can set is 29999°.  
 When T&A is set on Ang., A/in or A/lv mode, maximum angle corresponds to the angle that has to be carried out.

## SEQUENCE MENU:

-	-	-	S	E	Q	U	E	-	M	E	N	U	-	-	-					
O	K		c	h	a	n	g	e		E	S	C		q	u	i	t			
▶	1	)	S	e	q		s	e	t	:		1	4	7	3	9	8	1	2	
	2	)	S	e	q	u	e	n	c	e	:							o	f	f

**1) Seq set:** you can set a sequence up to max. 8 programs.  
To set the next program in the sequence, press OK.  
Press ← to save the sequence and quit.

**2) Sequence:** to enable or disable the sequence. ON = enabled; OFF = disabled.

-	-	-	S	E	Q	U	E	-	M	E	N	U	-	-	-					
	3	)	E	x	t		b	o	x	:							o	f	f	
▶	4	)	M	o	d	.	b	a	r	c	:							o	f	f
	5	)	I	n	s	.	b	a	r	c	o	d	e	S	e	q				

**3) Ext box:** It allows to enable or disable the external control.

**IMPORTANT:** It is **mandatory** to select ON to work with switch box, socket tray and remote.

**4) Barc. mode – Barcode mode:** It allows to choose the barcode mode.

- **OFF:** barcode disabled.
- **ON prog:** you can select the program to be executed by scanning the bar code of the product. The unit compares the scanned code to the one previously entered in each program (see point 27: Barc. Set.). If the two codes match, the program is loaded; otherwise it will display *Error Barcode*. The scanned product code is also printed on the serial port of the control unit (see paragraph “*serial print*”).
- **ON S.N.:** the product code is required before running a program or a sequence. The product code is printed on the serial port of the control unit.
- **ON Seq.:** you can set the Sequence by scanning its barcode. The code scanned is compared with the sequence entered in the menu (see point 5: Ins. Barcode Seq on Menu Sequence). If the two codes match, the sequence set is loaded, otherwise display “*Repeat scan*”. The read code is also printed on the serial port of the control unit (see section Serial Print).

**5) Ins. Barcode Seq:** When ON on “Barc. Mode ON Seq.”, you have to scan the barcode to enable the Sequence.

**IMPORTANT:** Barcode can be ONLY numeric.

-	-	-	S	E	Q	U	E	-	M	E	N	U	-	-	-				
	6	)	R	e	s	e	t		S	e	q	.	:				o	f	f
▶	7	)	R	e	s	.	s	e	q		a	u	t	:				o	n

**6) Reset seq.:** When ON, you can reset the Sequence (pushing the Reset button).

**7) Aut. res seq- Automatic Reset Sequence:** When ON, the control unit automatically resets after the end of the sequence. When OFF it is necessary to press OK at the end of each sequence.

## OPTION MENU:

-	-	-	-	-	M	A	I	N	-	M	E	N	U	-	-	-	-	-
S	e	q	u	e	n	c	e	s	e	t	t	i	n	g				
▶	U	n	i	t	o	p	t	i	o	n	s							
U	S	B	o	p	t	i	o	n	s									

### Unit Options:

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
O	K	c	h	a	n	g	e	ESC	q	u	i	t							
▶	1	)	L	a	n	g	u	a	g	e	:							E	N
2	)	C	h	a	n	g	e	p	a	s	s	w	o	r	d				

**1) Language:** This option allows to choose among the languages available: English, French, German, Italian, Spanish and Portuguese.

**2) Change password:** You can change password (see point 3).

-	-	-	-	O	P	T	I	O	N	-	-	M	E	N	U	-	-	-	-			
3	)	P	a	s	s	w	o	r	d	:									o	n		
▶	4	)	E	S	C	-	O	K	-	R	S	T	:						e	x	t	
5	)	U	n	i	t	:															N	m

**3) Password ON:** When YES, you will be asked for the password to enter the menu. Otherwise select NO.

ATTENTION: Password is only asked to enter the menu the first time after switching the unit on. The default password is: 0000.

**4) ESC-OK-RST:** Press ESC in case of error. Press OK at the end of a program or to reset a sequence or a program (see point 7: Reset).

When INT, the operator must press the required key on the front panel.

When EXT, functions can only be enabled through proper connections on the back panel (see paragraph I/O connections).

When INT+EXT you can press either the button on the front or on the back panel.

**5) Unit:** You can choose between the following units of measurements: Nm, lbf.in and kgf.cm.



-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
6	)	V	e	r	s	i	o	n	s										
▶	7	)	S	e	r	i	a	l		n	.	0	0	0	0	0	0	0	0
8	)	S	e	t		t	i	m	e		&		d	a	t	e			

**6) Versions:** in this screen you can see the versions of boards mounted inside the unit.

**7) Serial number:** it is the indication number of the control unit. Default number: 0000000.

It could be the real serial number of the unit or another one you could choose (7 digits max).

This number will also be the name of the folder in the USB drive where you will save the report of your data (see EDU EXPAND part).

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
7	)	S	e	r	i	a	l		n	.	0	0	0	0	0	0	0	0	0
▶	8	)	S	e	t		t	i	m	e		&		d	a	t	e		
9	)	C	y	c	l	e	s	:			0	0	0	0	0	0	0	0	0

**8) Set time & date:** to set time and date on the control unit.

**9) Cycles** - Total number of cycles: It shows the number of tightened and loosened screws. This number can't be modified.

## USB Options:

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
▶	1	)	R	e	a	d		U	S	B									
2	)	W	r	i	t	e		U	S	B									
3	)	I	n	f	o		U	S	B										

1) **Read USB:** press OK and read the USB drive and select the file SETxx.KOL you desire. The EDU control unit recognizes only files as SETxx.KOL (see EDU EXPAND part).

	S	e	l	e	c	t		P	r	o	g	r	a	m					
				S	E	T	0	0	.	K	O	L							
O	K		c	o	n	f	i	r	m		E	S	C		q	u	i	t	

- 2) **Write USB:** press OK and create your new SETxx.KOL application where you save all the parameters you have set in the control unit.

					S	a	v	e	a	s				
					S	E	T	0	0	.	K	O	L	
O	K		c	o	n	f	i	r	m		E	S	C	q

- 3) **Info USB:** press OK and see the loaded program.  
You can see the loaded program only if you have saved the program in your USB drive as named as SETxx.KOL.

					L	o	a	d	e	d		p	r	o
					S	E	T	2	3	.	K	O	L	

## TORQUE CALIBRATION

The torque calibration function allows to view the torque value in Nm or in.lbs or kgf.cm directly on the display of the control unit.

**IMPORTANT: You need a torque tester to proceed, either with static transducer (model minik or K) or with rotary transducer (model minik-e).**

CALIBRATION PROCESS:

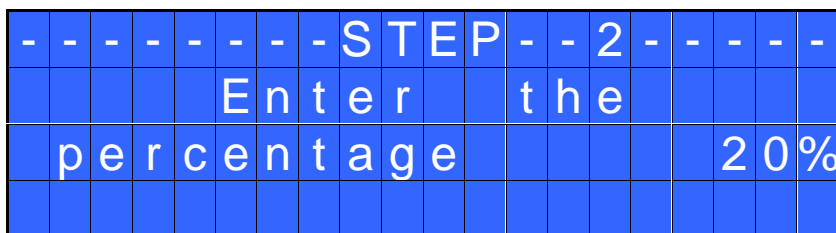
1. Select Calibration at point 23 of the menu and press OK.
2. The following screen will appear on the display:

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-
					2	3	)	C	a	l	i	b	r	a	t	i	o

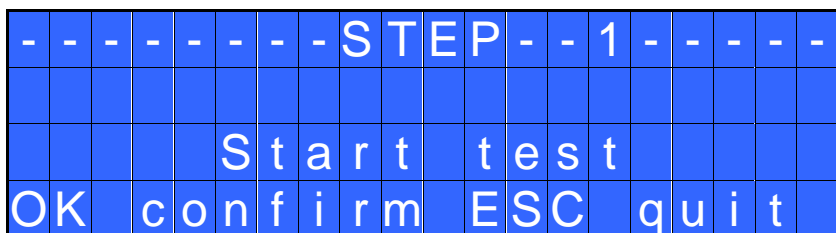
3. Press OK to confirm. If you choose OFF, calibration will be interrupted and no torque value will be displayed. You choose ON, calibration will continue and the following screen will be displayed:

-	-	-	-	-	-	-	-	S	T	E	P	-	-	1	-	-	-	-
								E	n	t	e	r		t	h	e		
					p	e	r	c	e	n	t	a	g	e				M
																		I

4. Set the first torque level at 20% percentage by pressing  $\uparrow$ .  
(20% is just an example).

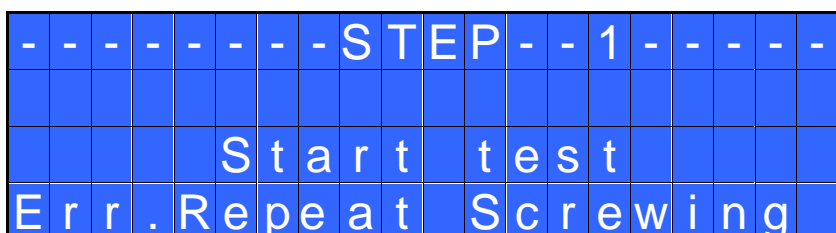


5. Press OK. You will see:



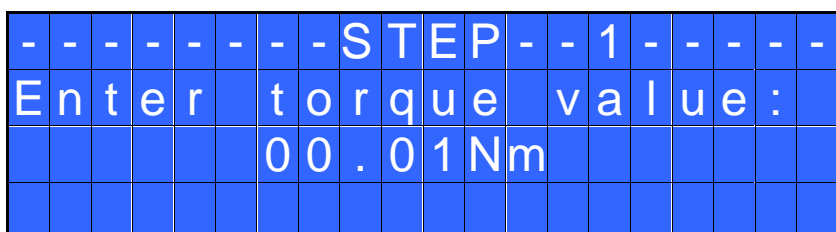
Complete a screwing cycle on the mini k5 and take note of torque value.

In case of error, you will see:

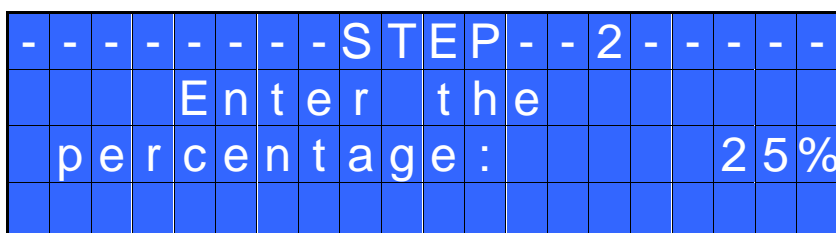


Just repeat the test.

6. Press ESC to abort the calibration process.  
Press OK, then the display will show:



Set the torque value by selecting each digit individually pressing  $\uparrow$  and  $\downarrow$  and press OK to confirm it, then press OK again to save. You will see:



7. Set the percentage of the second torque to 25% by pressing  $\uparrow$  and press OK.  
(25% is just an example).

8. Repeat the procedures described on points 4 and 5.
9. When calibration ends, “Setting end” will be displayed. You will hear two beep sounds, too. Now you are ready to work and see the correct torque on the display.

**WARNING:**

- Calibration values will be referred to the parameters of the control unit which are set during calibration, i.e. if you modify speed or torque, the unit will need to be recalibrated. During calibration when a screwing is not carried out correctly or if for any reasons you’re not sure of the torque value it is possible to repeat it. A wrong screwing can affect the precision of the calibration.
- Calibration is carried out for two torque levels optionally chosen. The minimum calibration interval is 5% (example: if I have to work at 50%, I can calibrate at 45% and 55%). In this case, if for any reasons I need to work at torque percentages which are lower or higher than the min-max ones set during the calibration, they will be analyzed and displayed anyway but since they won’t be based on effective data the torque value displayed may be not accurate.
- During calibration it is not possible to go back to the previous screen. Press ESC to stop calibration and then repeat the screwing cycles.

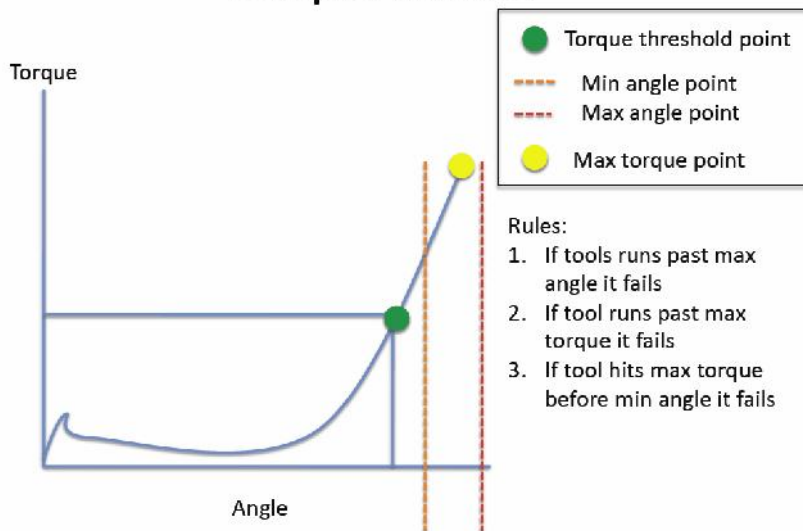
## USE OF T&A (Torque & Angle)

Choose the T & A mode (see point 29: Modify function on the program menu)

It is possible to set 6 different modes:

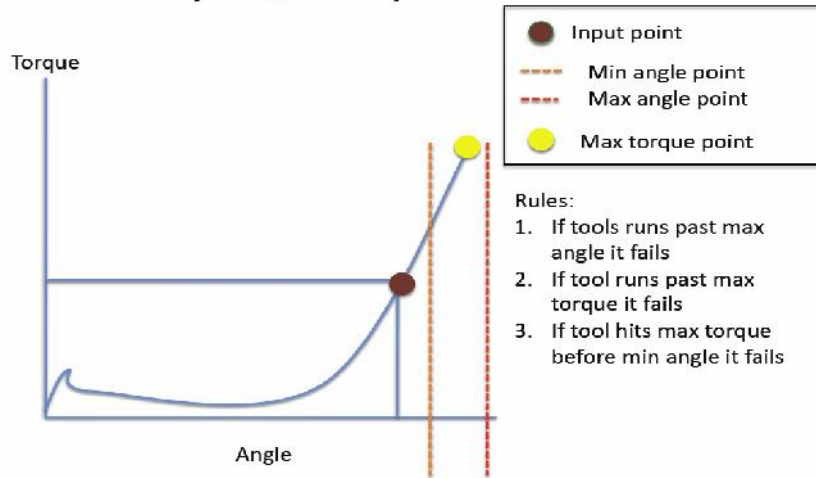
- ▲ **TORQUE (Torque):** It’s the most common use mode. The control unit shows the tightening torque and the torque starting from a certain torque percentage (threshold torque, see point 30). If the final torque and angle values are within the preset minimum and maximum values, the screw is correctly tightened. If the torque and/or angle are outside the preset values, the screw will be considered as incorrectly tightened. In this case the red led will light up and the message “*Error Max (Min) Angle*” or “*Error Max (Min) Torque*” will be displayed.

### Torque mode



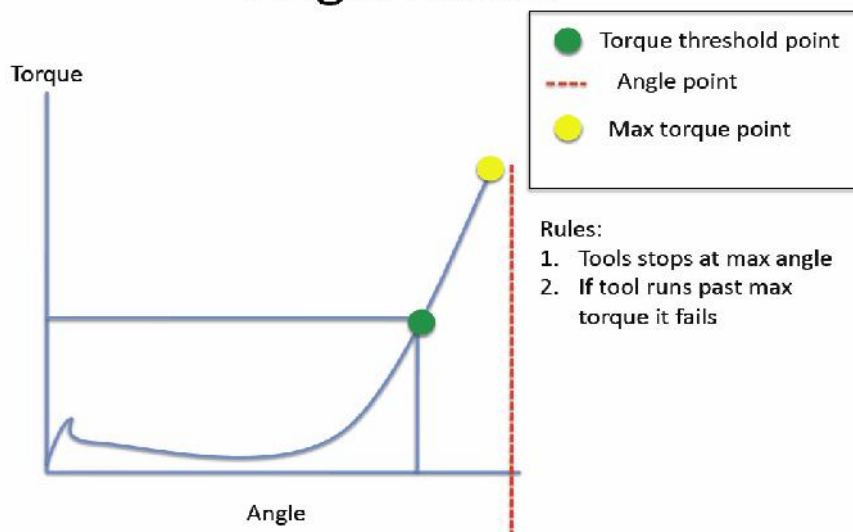
- ▲ TORQUE/INPUT (T/IN): It corresponds to *Torque* mode, except for the threshold torque which can't be set by the operator: in fact the value is the result of an external impulse through a proper contact (see paragraph "connections"). It can be very useful if the operator wants the control unit to start counting the angle from a position which is indicated by a precision instrument.

## Input/Torque mode



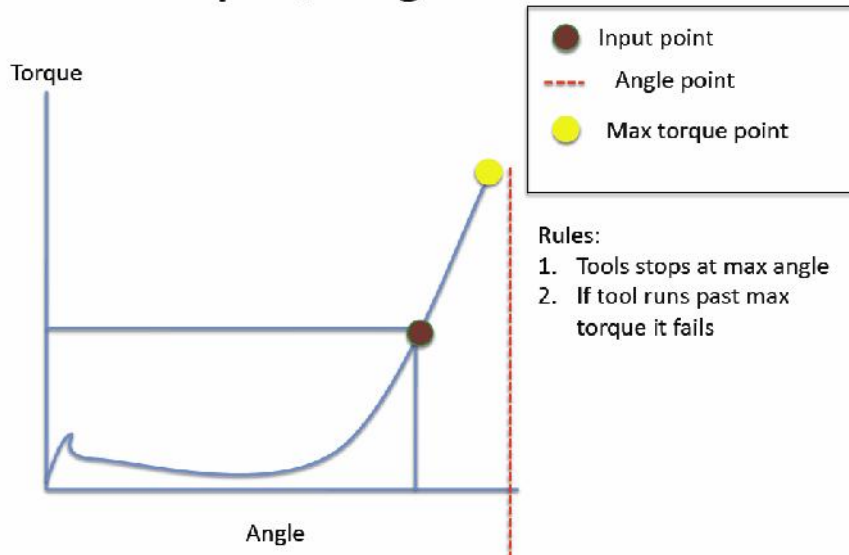
- ▲ TORQUE/LEVER (T/LV): No threshold is preset by the operator: the angle value that appears on the display corresponds to the angle that is carried out starting from the moment in which the lever is pressed until the torque is reached.
- ▲ ANGLE (Ang.): This mode gives priority to the angle to be reached. The value is measured starting from a tightening torque percentage. Starting from the preset threshold torque (see point 30) the system will start counting the degrees and when the preset angle is reached the screwdriver will stop. If the preset angle is reached the screw will be considered as correctly tightened, the green led will light up and the message "tightening OK" will be displayed on the status bar. If the screwdriver stops before reaching the preset angle the tightening will be considered not ok, the red led will light up and the message "error angle not reached" will be displayed on the status bar. Therefore it's very important to set a torque value (line 5) which is sufficiently higher than the threshold value (line 30), so that the set value is reached before the screwdriver stops because of the reached torque.

## Angle mode



- ▲ ANGLE/INPUT (A/IN): The threshold can't be set by the operator: in fact the value is the result of an external impulse through a proper contact (see paragraph "connections"). This function can be very useful if the operator wants the screw to rotate a certain number of degrees after reaching a position indicated by a precision instrument.

## Input/Angle mode



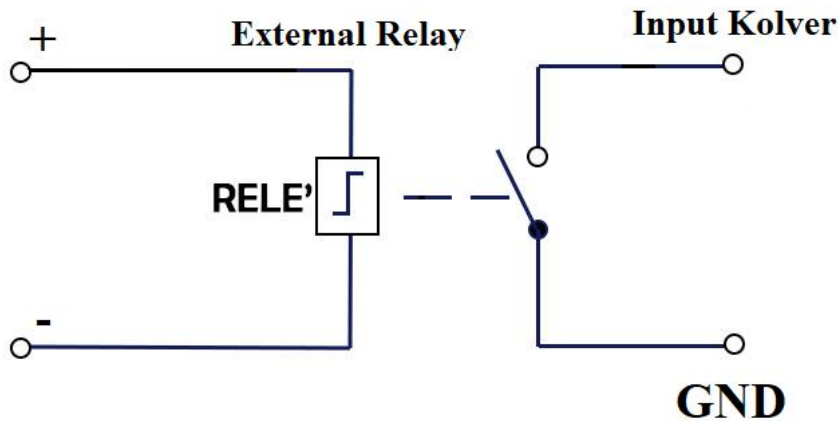
- ▲ ANGLE/LEVER (A/LV): the threshold torque value can't be set by the operator and the angle value that appears on the display corresponds to the angle that is carried out starting from the moment in which the lever is pressed.

## INTERPRETATION OF ACOUSTIC SIGNALS

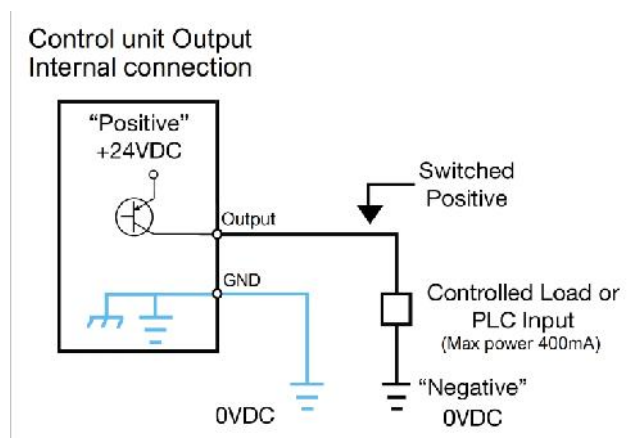
The control unit emits sounds which help you understand if the screwing has been carried out correctly or not. When the torque is reached meeting all the parameters set, the control unit utters a 0.5 sec beep as confirmation. In case of Program End, the unit will utter other two beeps. On the other hand, torque reached under min time, during the Ramp time or under the Fast Speed (see error signals on the display) will cause the control unit to utter three beep sounds.

## I/O CONNECTIONS:

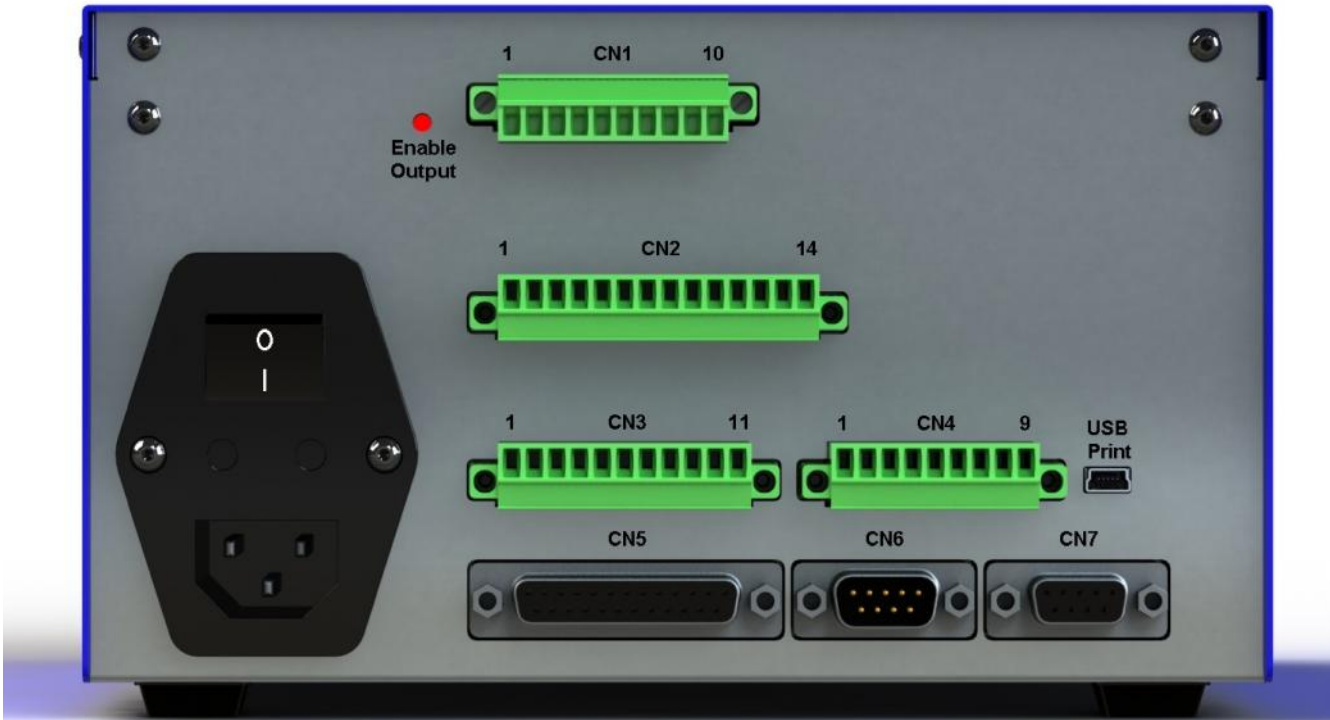
EDU 2AE/TOP control unit series have connectors placed on the back panel. These connectors allow to enable functions through inputs and to take signals through outputs. The inputs are activated by connecting them to ground. A positive voltage must NEVER be brought to these inputs. Bringing 24V to the unit inputs could damage the inputs themselves. As seen from the picture below, to enable the inputs it is recommended to bring a clean contact by using a relay or a simple switch or button.



As for the outputs, they are all PNP type with active function. On each pin you will have 24V DC.

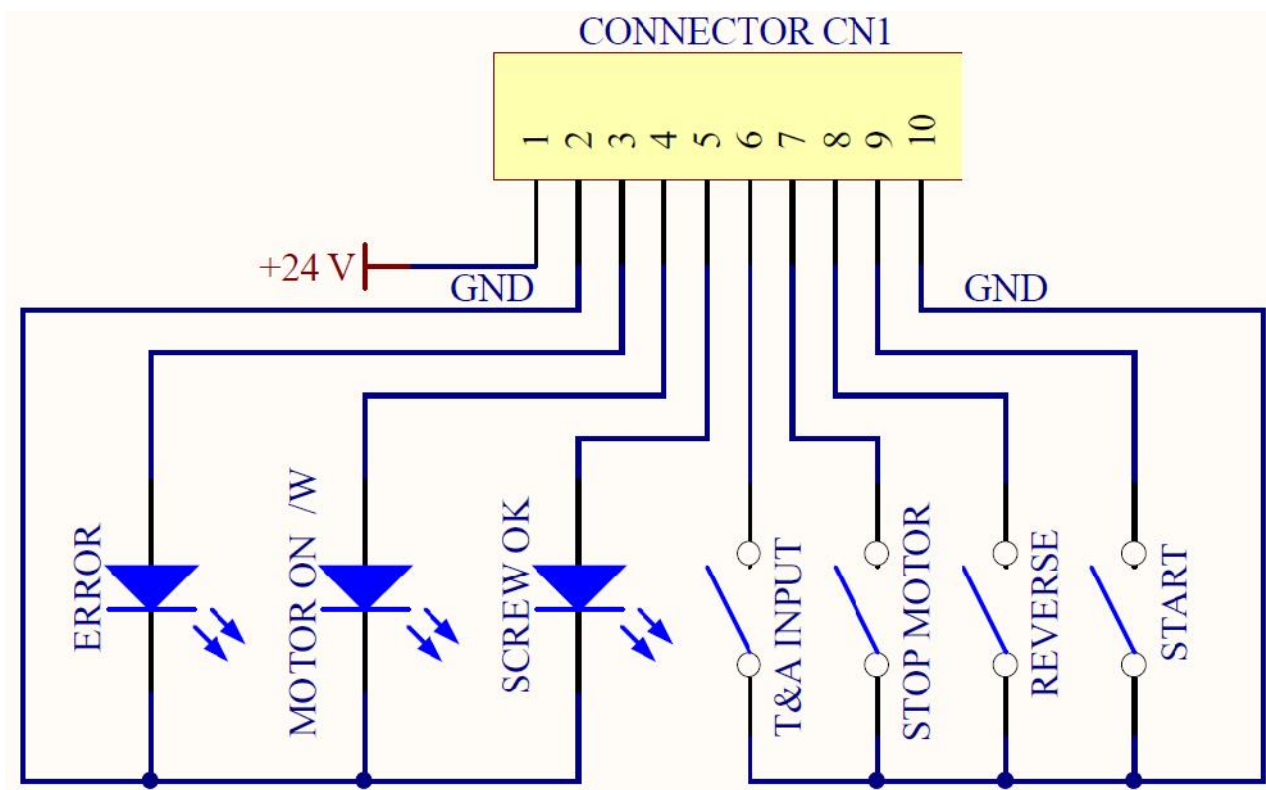


These pins can be used directly connected to PNP inputs (PLC) or used to turn on LEDs, buzzers or other devices with 24V power supply. The maximum total power of the outputs is about 400mA. Using inductive loads such as relays or other loads with an initial consumption peak greater than 400mA will send all outputs to protection, displaying the message "output disable". To restore the outputs after a protection, turn off and turn on the unit again.





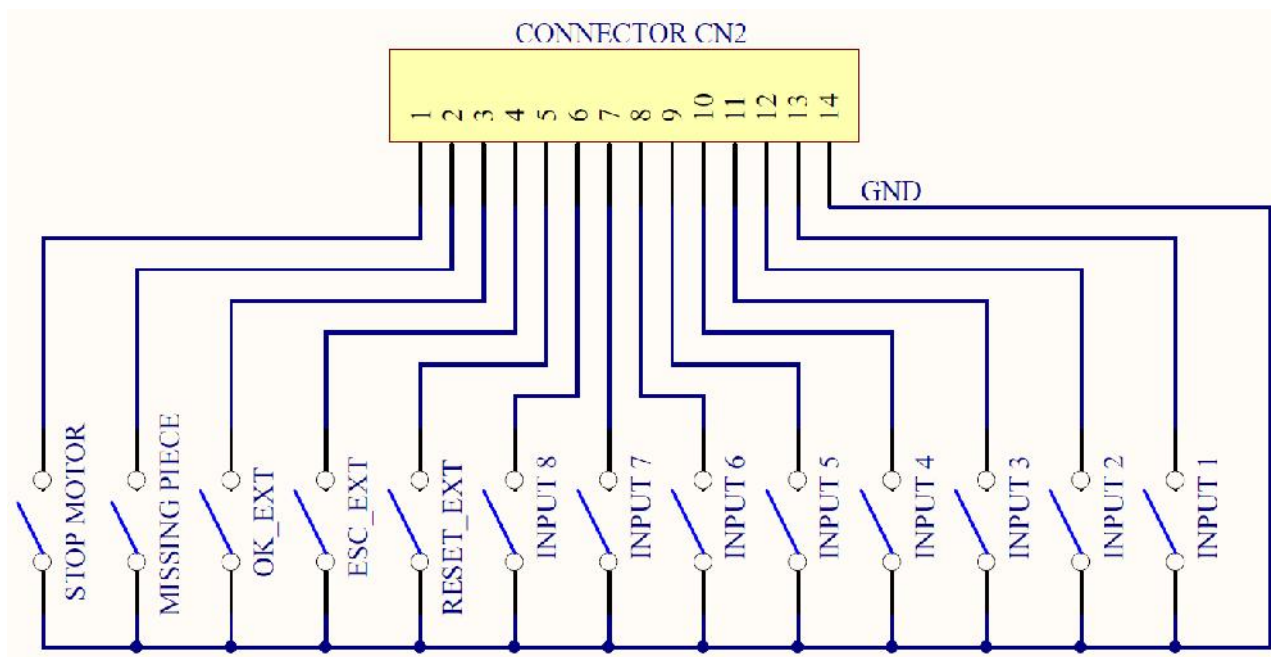
- CN1 CONNECTOR – 10 pins  
It is situated on the upper part of the back panel.



PIN	NAME	FUNCTION
<b>OUTPUT</b>		
1	+24V	+24V voltage protected. The maximum current consumption is 400mA. CAN NOT BE USED TO POWER EXTERNAL DEVICES.
2	GND	Common pin. Signals must be taken between this pin (GND and the respective signal pins (pin 3, 4 and 5).
3	ERROR	Error signal: it activates every time an error occurs. The red led on the front panel will switch on. Signal is 24V.
4	MOTOR ON (W)	It activates when the motor turns during screwing. Signal is 24V.
5	SCREW OK	Correct screw signal. The green led on the front panel will switch on. Signal is 24V.
<b>INPUT</b>		
6	T&A INPUT	External input for making the control unit start to count the angle. It can be only used in A/IN and T/IN mode (see T&A paragraph)
7	STOP MOTOR	Remote motor stop. If it's activated the message "STOP MOTOR ON" appears on the display. The motor will stop and won't start working again as long as the contact is closed (as Input pin 1 of CN2).
8	REVERSE	Remote motor start with torque control while unscrewing.
9	START	Remote start with torque control while screwing.
10	GND	Common pin. The desired function is activated through a contact between this pin and one of the other pins.

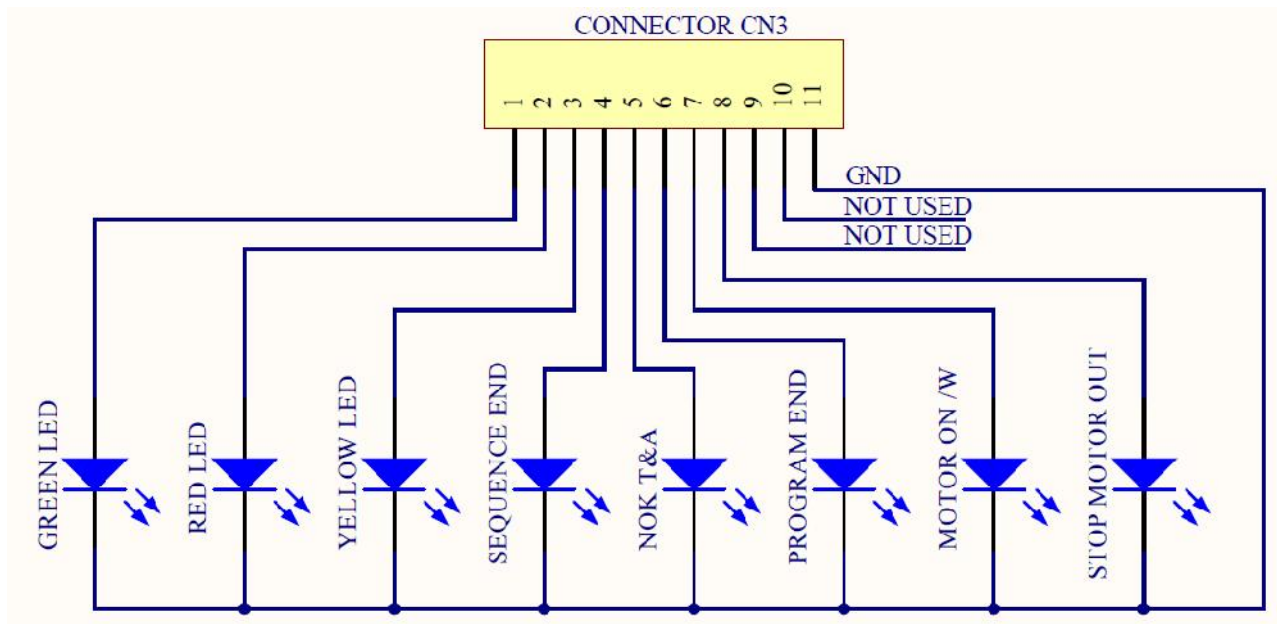
- CN2 CONNECTOR – 14 pins

All of the following pins are input: make a contact with pin 14 to activate them.



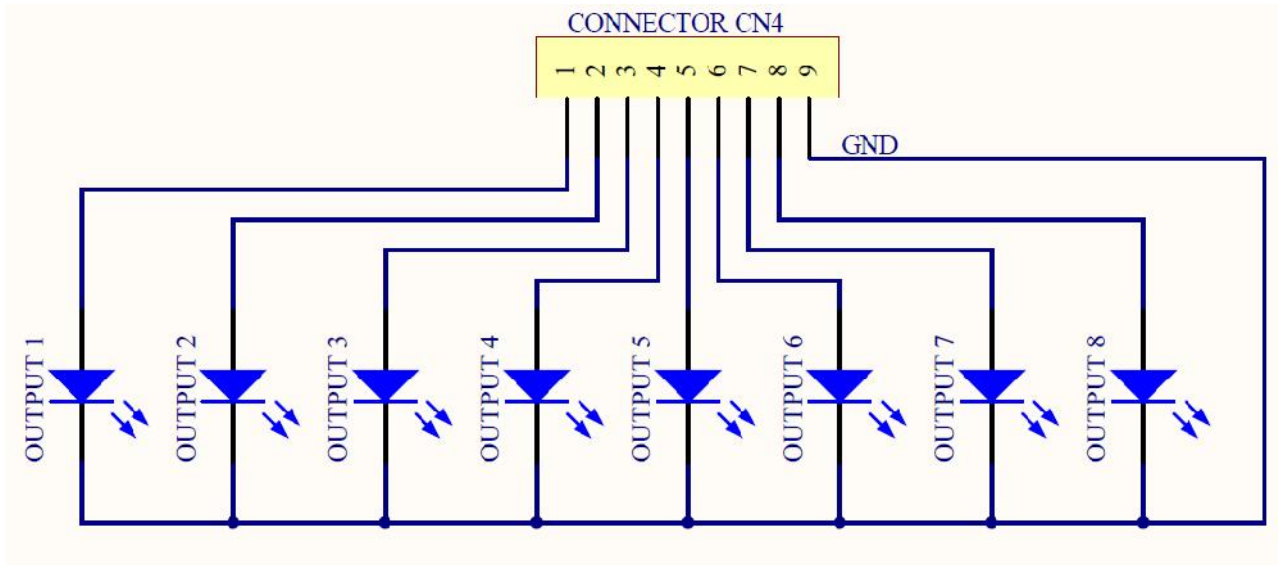
PIN	NAME	FUNCTION
1	STOP MOTOR	Remote motor stop. If it's activated the message "STOP MOTOR ON" appears on the display. The motor will stop and won't start working again as long as the contact is closed (as Input pin 1 of CN2).
2	MISSING PIECE	If enabled it stops the motor, enables the error signal and "Error missing piece" is displayed on the status bar.
3	OK EXT	If enabled (see point 4: OK-ESC commands, in the option menu), remote OK key function.
4	ESC EXT	If enabled (see point 4: OK-ESC, in the option menu), ESC key function to reser remote errors.
5	RESET EXT	If enabled (see point 4: OK-ESC commands, in the option menu), it resets program or sequence according to the preset function (see point 5: Reset, in the option menu)
6	INPUT 8	Switch – selection of program 8
7	INPUT 7	Switch – selection of program 7
8	INPUT 6	Switch – selection of program 6
9	INPUT 5	Switch – selection of program 5
10	INPUT 4	Switch – selection of program 4
11	INPUT 3	Switch – selection of program 3
12	INPUT 2	Switch – selection of program 2
13	INPUT 1	Switch – selection of program 1
14	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (GND) .

- CN3 CONNECTOR – 11 pins  
All of the following pins are output.



PIN	NAME	FUNCTION
1	GREEN LED	This signal works in parallel with the green led on the front panel.
2	RED LED	This signal works in parallel with the red led on the front panel.
3	YELLOW LED	This signal works in parallel with the yellow led on the front panel.
4	SEQUENCE END	It indicates the end of a sequence, if enabled.
5	NOK T&A	It activates if any angle error occurs.
6	PR OK	It activates at the end of each program.
7	MOTOR ON (\W)	It activates when the motor runs while tightening.
8	STOP MOTOR	It activates when stop motor is enabled.
9	NOT USED	
10	NOT USED	
11	GND	Common to every output. Signals have to be enabled making contact between the desired signal and this pin (GND).

- CN4 CONNECTOR – 9 pins  
All of the following pins are output.



PIN	NAME	FUNCTION
1	OUTPUT 1	It indicates you're using program 1
2	OUTPUT 2	It indicates you're using program 2
3	OUTPUT 3	It indicates you're using program 3
4	OUTPUT 4	It indicates you're using program 4
5	OUTPUT 5	It indicates you're using program 5
6	OUTPUT 6	It indicates you're using program 6
7	OUTPUT 7	It indicates you're using program 7
8	OUTPUT 8	It indicates you're using program 8
9	GND	Common to every output. Signals have to be enabled making contact between the desired signal and this pin (GND).

- CN5 CONNECTOR (25 pin connector - female):

PIN	NAME	FUNCTION
1	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (common 0VDC).
2		Not used
3	STOP MOTOR OUT	It indicates stop motor is enabled
4	OUTPUT 8	It indicates you're using program 8
5	OUTPUT 7	It indicates you're using program 7
6	OUTPUT 6	It indicates you're using program 6
7	OUTPUT 5	It indicates you're using program 5
8	OUTPUT 4	It indicates you're using program 4
9	OUTPUT 3	It indicates you're using program 3
10	OUTPUT 2	It indicates you're using program 2
11	OUTPUT 1	It indicates you're using program 1
12	+24V	+24V available on this pin, they can't be used to charge external devices.
13	+5V	+5V available on this pin, it can't be used to charge external devices
14	OK EXT	If enabled (see point 4: OK-ESC, in the option menu), remote OK key function.
15	ESC EXT	If enabled (see point 4: OK-ESC, in the option menu), ESC key function to reset remote errors.
16	RESET EXT	If enabled (see point 4: OK-ESC, in the option menu), it resets program or sequence according to the preset function (see point 5: Reset, in the option menu).
17	INPUT 8	Switch – selection of program 8
18	INPUT 7	Switch – selection of program 7
19	INPUT 6	Switch – selection of program 6
20	INPUT 5	Switch – selection of program 5
21	INPUT 4	Switch – selection of program 4
22	INPUT 3	Switch – selection of program 3
23	INPUT 2	Switch – selection of program 2
24	INPUT 1	Switch – selection of program 1
25	+15V	+15V available on this pin, not used to charge external devices

- CN6 CONNECTOR (serial connector 9 pin - male) - FOR BARCODE CONNECTION

PIN	NAME	FUNCTION
1	+15V	+15V available on this pin, it can't be used to charge external devices.
2	RX	Serial reception.
5	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (GND)
9	+5V	Not used.

**IMPORTANT:** the barcode scanner to be used must have the following features: RS232 transmission with 9600baud, 8 data bits, 1stop bit, no parity, terminators CR-LF.

- CN7 CONNECTOR (9 pin serial connector - female) – PRINT FUNCTION

PIN	NAME	FUNCTION
1	+15V	Not used.
2	TX	Serial transmission.
3	RX	Serial reception.
5	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (GND).
9	+5V	Not used.

- **USB-PRINT CONNECTOR**

Only used to print data on PC (see dedicated paragraph).

**ATTENTION: Output signals are protected from an appropriate circuit. Overload of the available signals (> 400 mA) or short circuit will result in the stop of the unit. To re-activate signals, it is necessary to switch off the unit for 5-6 seconds, check connections and output loads then switch the unit on.**

## **CORRECT SCREWS MESSAGES ON DISPLAY**

On the status bar it will display “ <i>Screw OK</i> ”.	A correct screwing has been performed, reaching the pre-set torque value.
On the status bar it will display “ <i>Angle OK</i> ”.	A correct screwing has been performed, reaching the pre-set angle.
On the status bar it will display “ <i>Runtime OK</i> ”.	A correct screwing has been performed, reaching the pre-set runtime.
On the status bar it will display “ <i>Reverse torque OK</i> ”	A correct screwing has been performed, reaching the pre-set reverse torque value.

## TROUBLE SHOOTING

<b>ERROR</b>	<b>PROBLEM</b>	<b>SOLUTION</b>
0	“ <i>waiting connection</i> ” doesn’t turn into “ <i>loading</i> ” after it’s been switched on.	Contact the nearest Kolver dealer.
1	“ <i>Error Torque Control</i> ” is displayed on the status bar	Make a new screw. If the error persists, change the torque and speed settings.
2	“ <i>Error Fast Speed</i> ” is displayed on the status bar (the torque signal is displayed during the brake time).	
3	“ <i>Reverse incomplete</i> ” is displayed on the status bar (the displayed torque signal is correct but the set unscrewing is not complete).	
4	“ <i>Pre-Reverse incompl.</i> ” is displayed on the status bar (the lever has been released before the runtime has been achieved)	
5	“ <i>Under min time</i> ” is displayed on the status bar (the torque signal is displayed below the pre-set minimum time).	
6	“ <i>Over maximum time</i> ” is displayed on the status bar (torque is not reached and the screwing time is over the preset maximum time).	
7	“ <i>Error PV torque</i> ” is displayed on the status bar (the torque signal is displayed inside the set maximum time).	
8	“ <i>Error min torque</i> ” is displayed on the status bar (the torque signal is displayed below the preset minimum torque).	
9	“ <i>Error max torque</i> ” is displayed on the status bar (the torque signal is displayed over the set maximum torque).	
10	“ <i>Error min angle</i> ” is displayed on the status bar (the torque signal is displayed below the set minimum angle).	

11	“ <i>Error max angle</i> ” is displayed on the status bar (The max preset angle has been reached. Only available in Tor, T/lv and T/in mode).	
12	“ <i>Error angle not OK</i> ” is displayed on the status bar (The preset angle hasn’t been reached. Only available in Ang., A/lv and A/in mode).	
13	“ <i>Warning! No piece</i> ” is displayed on the status bar (The “missing piece” contact is enabled).	-check contact 2 on the CN2 connector
14	“ <i>Compensation error</i> ” is displayed on the status bar. A negative torque value is displayed due to a high negative compensation value.	- increase or decrease the compensation value
15	“ <i>Released lever error</i> ” is displayed on the status bar (The lever has been released while tightening).	Such error can be enabled or disabled through “PROGRAM-MENU” (see point 18 on the program menu).
16	“ <i>Reverse torque error</i> ” is displayed on the status bar (The torque signal is displayed while loosening, but only if it’s set on “max”).	- The screwdriver couldn’t loosen - Avoid motor stalling - Loosening too heavy
17	“ <i>Output Disabled</i> ”. Protection of output signals was activated after exceeding maximum load (400mA).	- Check the set load is not over the allowed maximum value - Restart the control unit to reset error
18	“ <i>Protection 12A</i> ” is displayed on the status bar (it happens when current on mosfets of bridge H is > 12 A for at least 1 s)	- Decrease screwing time and check settings - Avoid motor stalling - Unscrewing too heavy - Joint too soft
19	“ <i>Protection 14p5A</i> ” is displayed on the status bar (it happens when current on mosfets of bridge H is > 14.5 A for at least 800 ms)	- Decrease screwing time and check settings - Avoid motor stalling - Unscrewing too heavy - Joint too soft
20	“ <i>Protection 15A</i> ” is displayed on the status bar (it happens when current on mosfets of bridge H is > 15 A for at least 500 ms)	- Decrease screwing time and check settings - Avoid motor stalling - Unscrewing too heavy

ATTENTION: IF THE OK/ESC OPTION IS DISABLED, ERRORS RESET AT THE FOLLOWING SCREW/PROGRAM. OTHERWISE PRESS ESC. IF THE PROBLEM PERSISTS, PLEASE CONTACT YOUR NEAREST KOLVER DEALER.



## SERIAL PRINT:

Every control unit is supplied with a 9 pin serial female connector (connection pin: PIN 2 = TX, PIN 3 = RX, PIN 5 = GND) and a mini USB connector. You can print the results of each screwing on a printer (for example Kolver model PRNTR1) and/or on PC (for example through Hyper Terminal or Realterm or any data transmission program or EDU EXPAND only on EDU2AE/TOP ver. 3.00 – only print not setting). You can also save those results on a USB device (only on EDU2AE/TOP/E and EDU2AE/TOP/TA from ver. 3.00). The transmission characteristics (only serial and USB) are the following: 9600 (bits per second), 8 (data bits), n (no parity), 1 (bits stop 1).

The print string is the following:

BARCODE	RESULT	PROGRAM NUMBER	MODEL	TORQUE%	SCREWING TIME	SPEED
---------	--------	----------------	-------	---------	---------------	-------

SCREW	SEQUENCE STAGE	TORQUE	ANGLE	DATE HOUR	NOTICE
-------	----------------	--------	-------	-----------	--------

**BC: Barcode** = it begins with “BC:” and it’s followed by the code of the scanned product.

**Result** = screwing result: correct or incorrect.

OK = the torque has been correctly reached, all the selected parameters are satisfied and the control unit will give out a beep sound of 0.5 sec.

NOK = the torque has been reached during ramp time or Fast Speed (see error table). In this case, the unit will give out 2 beep sounds and the red led will light up.

**PR: Program number** = it indicates the running program.

**Model** = Model of screwdriver you’re using.

**T%: Torque%** = percentage of the set torque level.

**S: Speed** = preset speed value.

**ST: Screwing time** = it indicates the time of the screwing.

**Screw: Number of screws** = number of tightened screws/total number of screws.

**Seq: Sequence stage** = it indicates the stage of the sequence.

**T: Torque** = torque value.

**A: Angle** = angle value.

**Notice** = in case of program end, it prints “Program End”, in case of sequence end, it prints “Seq. end” or it indicates the type of error (see paragraph: trouble shooting).

```

BC:28017596057082 OK PR:1 PLUTO10 Tz:10% S: 600rpm ST: 0.7s Screw:01/03 Seq:1/1 T: 1.97 Nm A: 2681deg 04/06/01 03:06:31
BC:28017596057082 OK PR:1 PLUTO10 Tz:10% S: 600rpm ST: 0.7s Screw:02/03 Seq:1/1 T: 2.00 Nm A: 2402deg 04/06/01 03:06:32
BC:28017596057082 OK PR:1 PLUTO10 Tz:10% S: 600rpm ST: 0.7s Screw:03/03 Seq:1/1 T: 2.00 Nm A: 2544deg 04/06/01 03:06:33 Program end
BC:21234567890005 OK PR:1 PLUTO10 Tz:10% S: 600rpm ST: 1.2s Screw:01/03 Seq:1/1 T: 2.00 Nm A: 4504deg 04/06/01 03:06:43
BC:21234567890005 NOK PR:1 PLUTO10 Tz:10% S: 600rpm ST: 2.6s Screw:01/03 Seq:1/1 T: --- A: 9720deg 04/06/01 03:06:47 Error ang. max
BC:21234567890005 NOK PR:1 PLUTO10 Tz:10% S: 600rpm ST: 2.6s Screw:01/03 Seq:1/1 T: --- A: 9720deg 04/06/01 03:06:51 Error ang. max
BC:21234567890005 OK PR:1 PLUTO10 Tz:10% S: 600rpm ST: 1.0s Screw:02/03 Seq:1/1 T: 1.99 Nm A: 3783deg 04/06/01 03:06:53
BC:21234567890005 OK PR:1 PLUTO10 Tz:10% S: 600rpm ST: 0.9s Screw:03/03 Seq:1/1 T: 2.01 Nm A: 3302deg 04/06/01 03:06:54 Program end
BC:24560138455821 OK PR:1 PLUTO10 Tz:10% S: 600rpm ST: 0.8s Screw:01/03 Seq:1/1 T: 1.99 Nm A: 2756deg 04/06/01 03:07:04
BC:24560138455821 OK PR:1 PLUTO10 Tz:10% S: 600rpm ST: 0.6s Screw:02/03 Seq:1/1 T: 1.97 Nm A: 2272deg 04/06/01 03:07:06
BC:24560138455821 OK PR:1 PLUTO10 Tz:10% S: 600rpm ST: 0.7s Screw:03/03 Seq:1/1 T: 1.97 Nm A: 2500deg 04/06/01 03:07:08 Program end

```

## EDU EXPAND

EDU EXPAND is the software for pc created by Kolver to set, change and save all parameters of EDU2AE/TOP/E or EDU2AE/TOP/TA 3.0 unit.

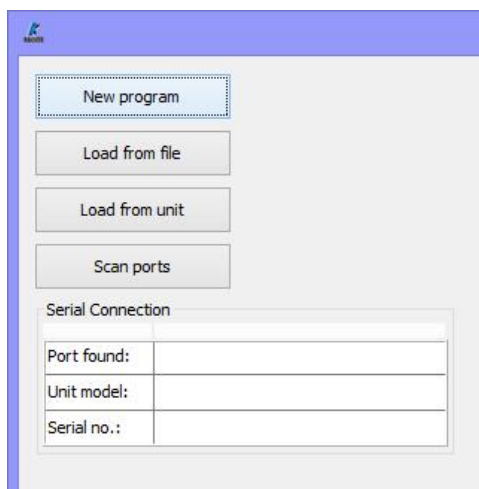
It communicates with the control unit via miniUSB or RS232 and makes you create up to 100 different settings configurations, save them on your USB drive and then recall on your EDU unit.

Just connect your USB drive to the port on the front panel of the EDU unit and recall the desired program on the menu (see Menu Options, USB Options).

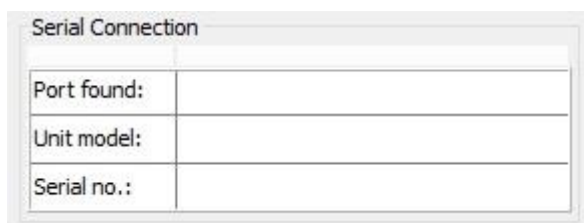
At the same time the programs set on control unit can be downloaded on USB and recalled on another unit and on EDU EXPAND, too.

Here is a quick guide to use EDU EXPAND.

Double click the icon program and this is the main view.



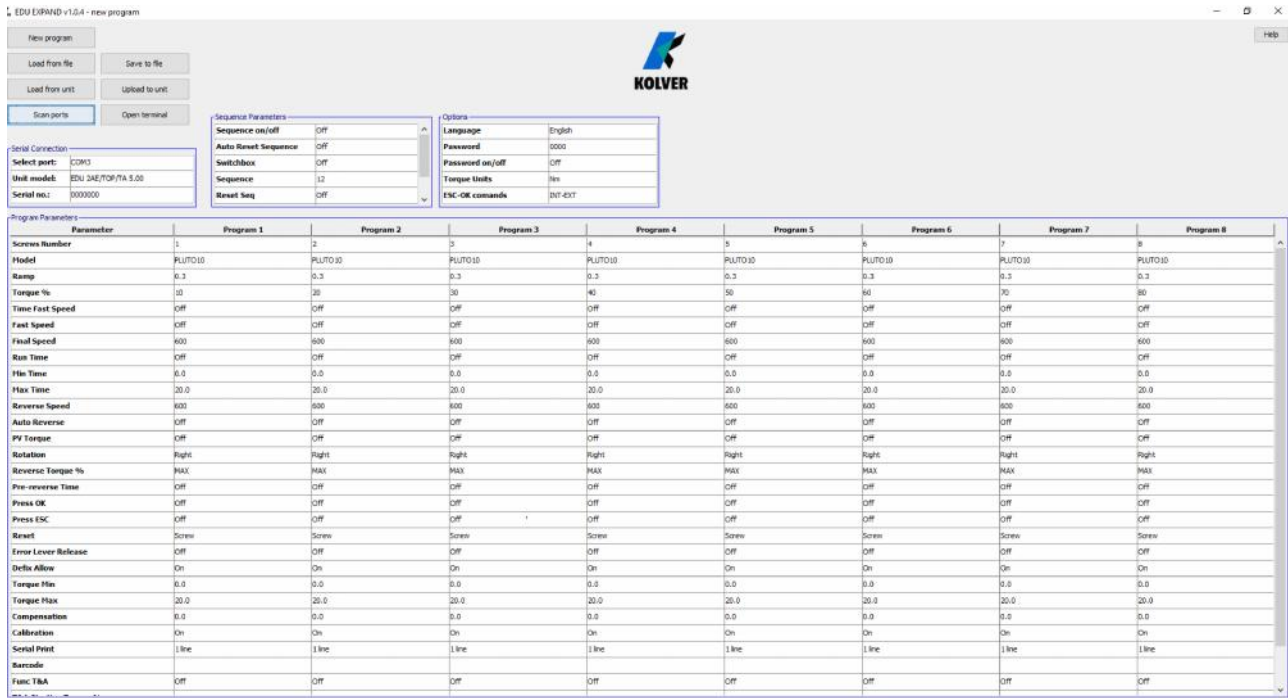
- **New program:** to load a new program.
- **Load from file:** it loads all programs, sequences and option settings from a previously saved file on your computer.
- **Load from unit:** it loads all program, sequence and option settings from the unit. The unit must first be connected to the pc using *Scan ports*.
- **Scan port:** it locates the unit. EDU EXPAND recalls the port, the model of the control unit and its serial number.
- 



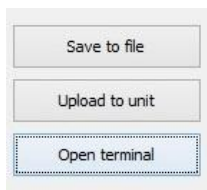
The control unit must be connected to the PC via miniUSB port or RS232 seat in the back panel of the unit.

If you cannot locate the control unit, make sure the unit and PC are connected properly or that the unit is on the initial screen of the Menu.

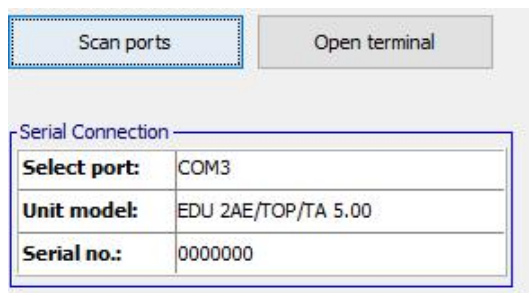
Here is the main screen when a program has been recalled or when you are creating a new one.



- To modify or enter any parameter values, double click a cell, select a number within the proper range, then press Enter. If the value is not within its valid range, pressing Enter will not confirm the change.

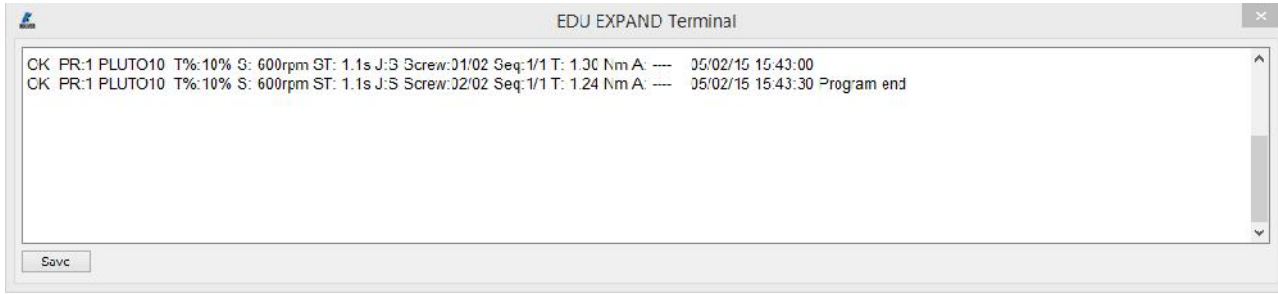


- **Save to file:** it saves all programs to a file. This file can be read directly from a USB drive connected to the unit on its front panel. In this case, the file name must be SETxx.KOL (xx = range from 00 to 99). This file could be copied in the USB drive and upload to the unit or recall with EDU EXPAND.
- **Upload to unit:** it uploads all the setting to the EDU control unit  
Connect the unit to your computer through miniUSB or RS232. Switch the unit on.



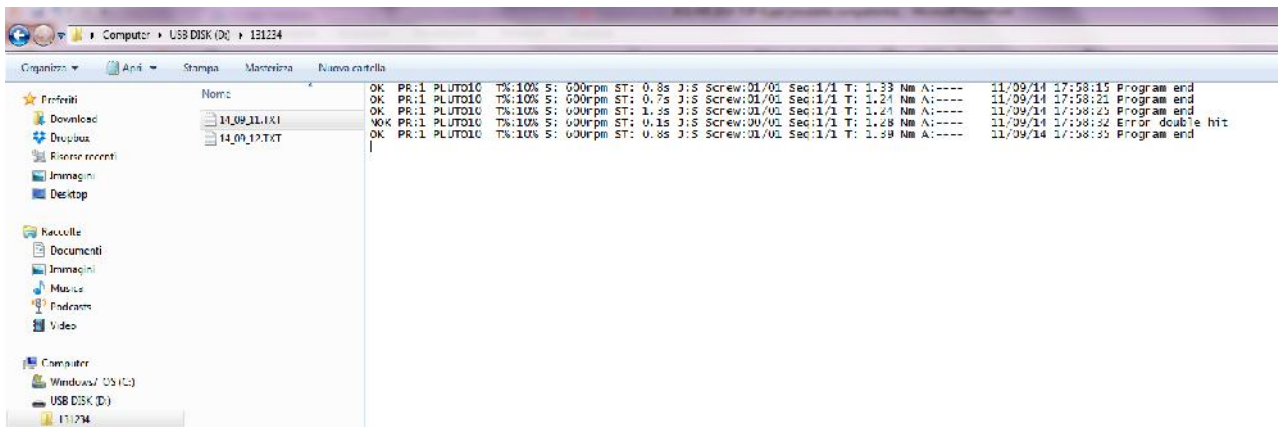
Click *Scan ports* to locate the unit. EDU EXPAND recalls the port, the model of the control unit and its serial number. Then click *Upload to unit*. The text *Programming...* will appear on the EDU display. When the text *Programming...* disappears, you may disconnect the cable. Uploading can only be initiated if the control unit shows *Ready* on the main screen.

- **Open terminal:** to display the print string (see Serial Print). To save in a .txt file the results of each tightening, push Save.

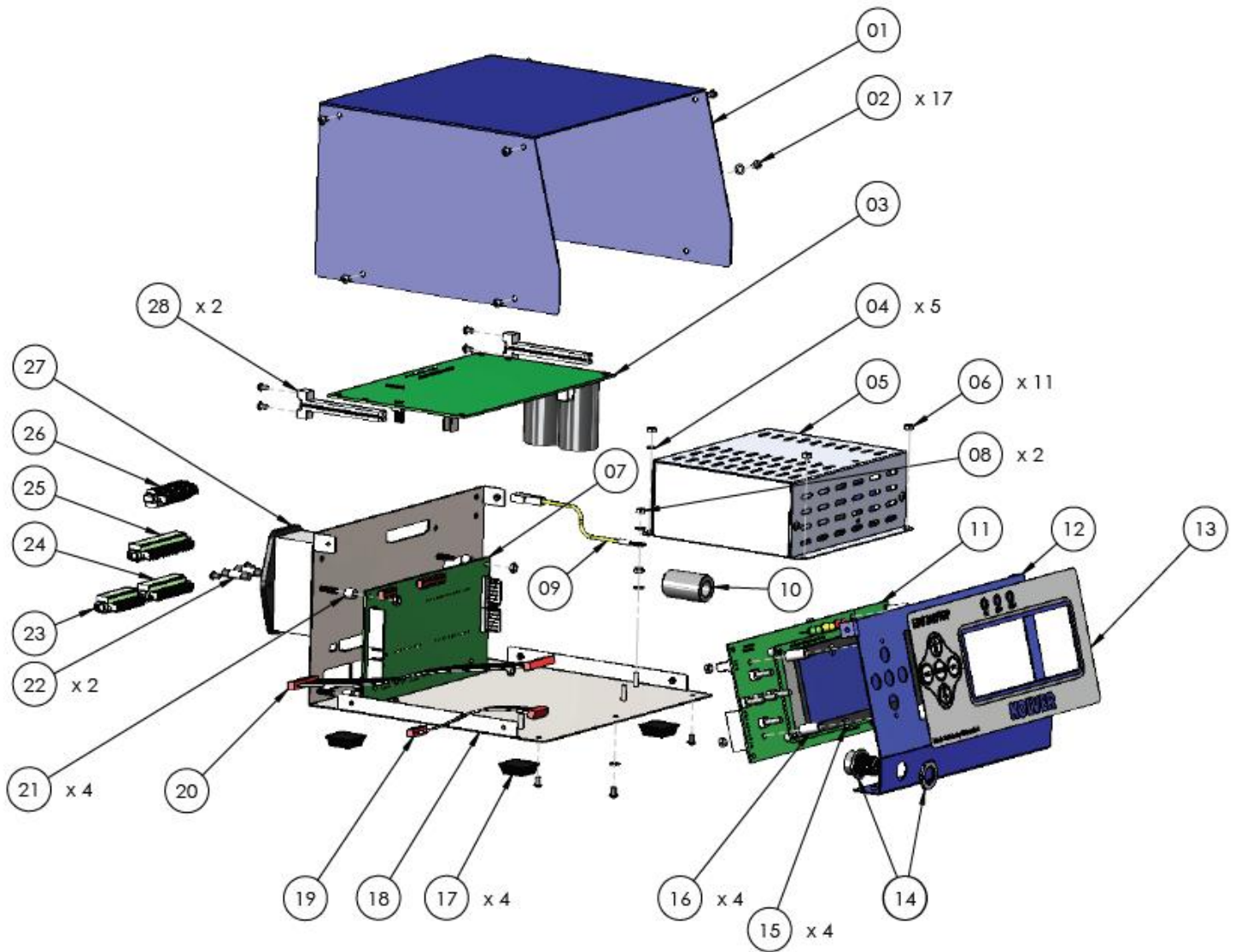


### Report of the screwing done

- If you connect the USB drive to the control unit, the unit creates a folder where the report of the screwing done will be saved.  
The folder is named as the serial number of the unit.  
The text file which contains all the screwing data is named as the current date.



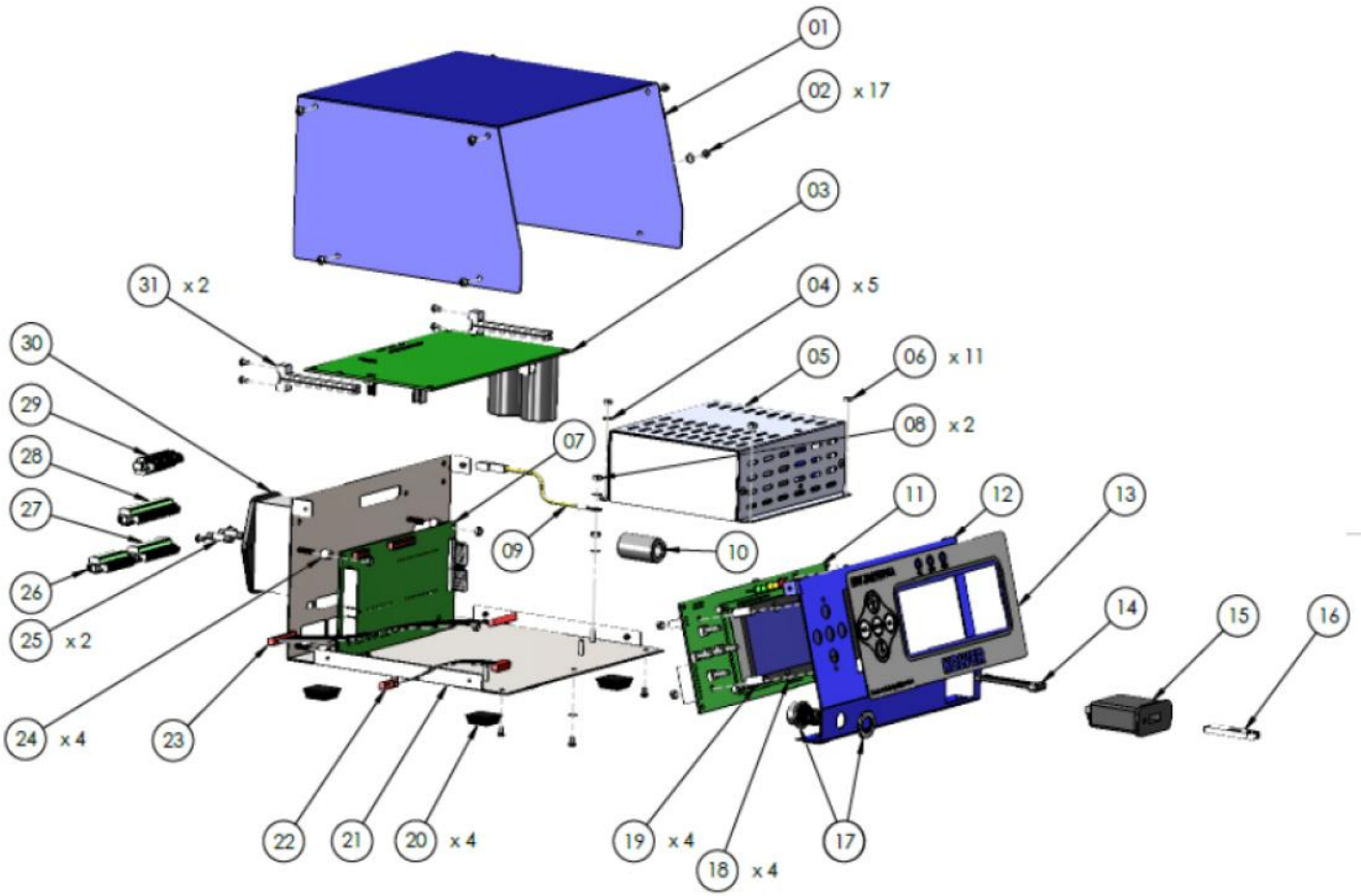
# EXPLODED VIEW: EDU2AE/TOP 5.00



## SPARE PARTS:

Position	Description	Quantity	Code
1	Upper panel EDU2AE/TOP	1	819003
2	3x5 Button head screw burnished TX10	17	872444
3	Motor board	1	852521/SW
4	M3 toothed washer	5	800041
5	Switching 48V 600W	1	872490
6	M3 burnished nut	11	800056
7	I/O EDU 2AE/TOP board	1	852525
8	M3 brass nut	2	800056/O
9	Ground cable	1	800090/E
10	Ferrite	1	872468
11	Display board EDU2AE/TOP	1	852526
12	Front panel EDU2AE/TOP	1	819002
13	Membrane EDU 2AE/TOP	1	819004
14	M12 5pin + nut + ferrite connector	1	201666/R1
15	M3 Washer h0,5 mm	4	800042
16	Spacer 15mm dest 4,8 mm	4	890004/T
17	Plastic support	4	800016/B
18	Bottom panel EDU2AE/TOP/SW	1	819001/SW
19	Flat cable 10 vie	1	819007
20	Flat cable 20 vie	1	872438/T
21	Spacer 6,3 mm dest 6.2mm	4	241003
22	Fuse 3.15A	2	800619
23	I/O Connector 9 pin spacing 3.81	1	800164
24	I/O Connector 11 pin spacing 3.81	1	800165
25	I/O Connector 14 pin spacing 3.81	1	800166
26	I/O Connector 10 pin spacing 3.81	1	800102
27	Filtered plug	1	800718
28	Main board support	2	872442
	Label	1	818006/SW
	Schuko Cable	1	800620

# EXPLODED VIEW: EDU2AE/TOP/E 5.00

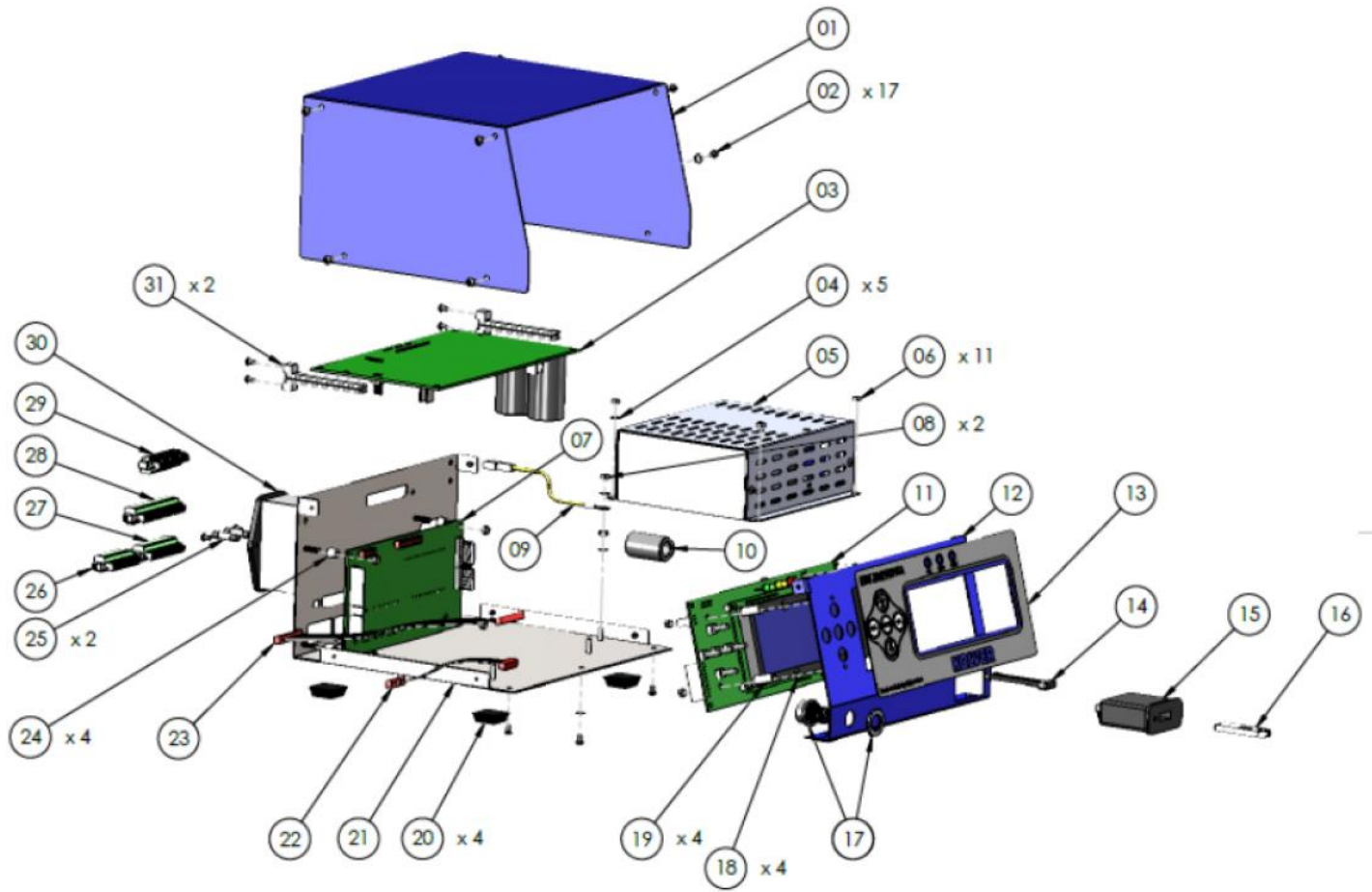


## SPARE PARTS:

Position	Description	Quantity	Code
1	Upper panel EDU2AE/TOP	1	819003
2	3x5 Button head screw burnished TX10	17	872444
3	Motor board	1	852521/SW
4	M3 toothed washer	5	800041
5	Switching 48V 600W	1	872490
6	M3 burnished nut	11	800056
7	I/O EDU 2AE/TOP/E board	1	852525/E
8	M3 brass nut	2	800056/O
9	Ground cable	1	800090/E
10	Ferrite	1	872468
11	Display board EDU2AE/TOP	1	852526
12	Front panel EDU2AE/TOP /E	1	819002/USB
13	Membrane EDU 2AE/TOP/E	1	819004/USB
14	USB Flat cable	1	872474
15	USB Device	1	852424
16	USB Pen drive	1	872475
17	M12 5pin + nut + ferrite connector	1	201666/R1
18	M3 Washer h0,5 mm	4	800042
19	Spacer 15mm dest 4,8 mm	4	890004/T
20	Plastic support	4	800016/B
21	Bottom panel EDU2AE/TOP/SW	1	819001/SW
22	Flat cable 10 vie	1	819007
23	Flat cable 20 vie	1	872438/T
24	Sapcer da 6,3 mm dest 6.2mm	4	241003
25	Fuse 3.15A	2	800619
26	I/O Connector 9 pin spacing 3.81	1	800164
27	I/O Connector 11 pin spacing 3.81	1	800165
28	I/O Connector 14 pin spacing 3.81	1	800166
29	I/O Connector 10 pin spacing 3.81	1	800102
30	Filtered plug	1	800718
31	Main board support	2	872442
	Label	1	818006/SW
	Schuko Cable	1	800620



# EXPLODED VIEW: EDU2AE/TOP/TA 5.00



## SPARE PARTS:

<b>Posizione</b>	<b>Descrizione</b>	<b>Quantità</b>	<b>Codice</b>
1	Upper panel EDU2AE/TOP	1	819003
2	3x5 Button head screw burnished TX10	17	872444
3	Motor board	1	852521/SW
4	M3 toothed washer	5	800041
5	Switching 48V 600W	1	872490
6	M3 burnished nut	11	800056
7	I/O EDU 2AE/TOP/TA board	1	852525/TA
8	M3 brass nut	2	800056/O
9	Ground cable	1	800090/E
10	Ferrite	1	872468
11	Display board EDU2AE/TOP	1	852526
12	Front panel EDU2AE/TOP /TA	1	819002/USB
13	Membrane EDU 2AE/TOP/TA	1	819006
14	USB Flat cable	1	872474
15	USB Device	1	852424
16	USB Pen drive	1	872475
17	M12 8pin + nut + ferrite connector	1	201766/LTA
18	M3 Washer h0,5 mm	4	800042
19	Spacer 15mm dest 4,8 mm	4	890004/T
20	Plastic support	4	800016/B
21	Bottom panel EDU2AE/TOP/SW	1	819001/SW
22	Flat cable 10 vie	1	819007
23	Flat cable 20 vie	1	872438/T
24	Spacer da 6,3 mm dest 6.2mm	4	241003
25	Fuse 3.15A	2	800619
26	I/O Connector 9 pin spacing 3.81	1	800164
27	I/O Connector 11 pin spacing 3.81	1	800165
28	I/O Connector 14 pin spacing 3.81	1	800166
29	I/O Connector 10 pin spacing 3.81	1	800102
30	Filtered plug	1	800718
31	Main board support	2	872442
	Label	1	818006/SW
	Schuko Cable	1	800620

## **GUARANTEE**

1. This KOLVER product is guaranteed against defective workmanship or materials, for a maximum period of 12 months following the date of purchase from KOLVER, provided that its usage is limited to single shift operation throughout that period. If the usage rate exceeds of single shift operation, the guarantee period shall be reduced on a prorata basis.
2. If, during the guarantee period, the product appears to be defective in workmanship or materials, it should be returned to KOLVER or its distributors, transport prepaid, together with a short description of the alleged defect. KOLVER shall, at its sole discretion, arrange to repair or replace free of charge such items.
3. This guarantee does not cover repair or replacement required as a consequence of products which have been abused, misused or modified, or which have been repaired using not original KOLVER spare parts or by not authorized service personnel.
4. KOLVER accepts no claim for labour or other expenditure made upon defective products.
5. Any direct, incidental or consequential damages whatsoever arising from any defect are expressly excluded.
6. This guarantee replaces all other guarantees, or conditions, expressed or implied, regarding the quality, the marketability or the fitness for any particular purpose.
7. No one, whether an agent, servant or employee of KOLVER, is authorized to add to or modify the terms of this limited guarantee in any way. However it's possible to extend the warranty with an extra cost. Further information at [kolver@kolver.it](mailto:kolver@kolver.it).

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# MANUAL

## EDU 2AE/TOP/TA

### Torque range: 0.35-70 Nm



#### IDENTIFICATION DATA OF THE MANUFACTURER

KOLVER S.r.l.  
VIA M. CORNER, 19/21  
36016 THIENE (VI) ITALIA

#### IDENTIFICATION DATA OF THE PRODUCT

<b>MODEL:</b>	EDU2AE/TOP/TA
<b>CODE:</b>	034000/TOP/TA

#### TECHNICAL DATA OF THE PRODUCT

FUSE: 3,15 A  
DIMENSIONS: 190 x 205 x h120 mm WEIGHT: 2,5 Kg

#### DECLARATION OF CONFORMITY



**KOLVER S.r.l.** declares that the new tool here described: control unit model EDU2AE/TOP/TA is in conformity with the following standards and other normative documents:  
2006/42/CE, LVD 2014/35/UE, EMCD 2014/30/UE, EN 62841-2-2:2014, EN 62841-1: 2015, EN 60204-1, EN 61000-6-2, EN 61000-6-4.

It is also in conformity with RoHS III normative (2011/65/UE and following 2015/863).

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Position: General Manager  
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EDU 2AE/TOP/TA power supply and control units are an innovative system for controlling the torque of any current control MITO and PLUTO electric screwdrivers: MITO15, PLUTO 3, PLUTO 6, PLUTO 10, PLUTO 15, PLUTO 20, PLUTO 30, PLUTO45, PLUTO50 and PLUTO70, either inline, pistol, for automation and with angle head (only PLUTO).

EDU 2AE/TOP/TA delivers all the advantages of precision torque control electric tools at a fraction of the price of transdurized tools.

The state-of-the-art electronic control circuit cuts the power supply to the motor calculating the correct torque in response to 3 parameters; voltage, frequency and current, according to the selected options.

The AC 90÷260V - 50÷60Hz power supply is converted into 40VDC required by the PLUTO series screwdrivers through a switching board.

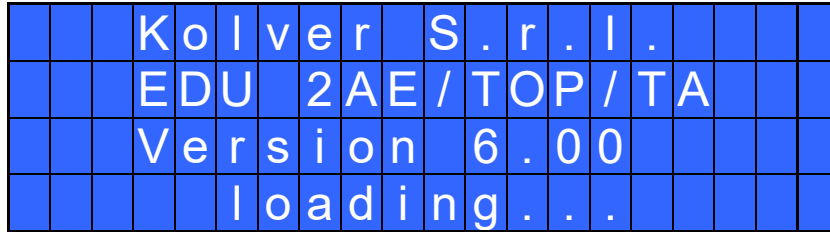
The EDU 2AE/TOP/TA control units can be set in two operating modes:

- %: the tightening and unscrewing torque values are set through a percentage;
- #: the tightening and unscrewing torque values are set directly as the desired value and in the selected unit of measurement.

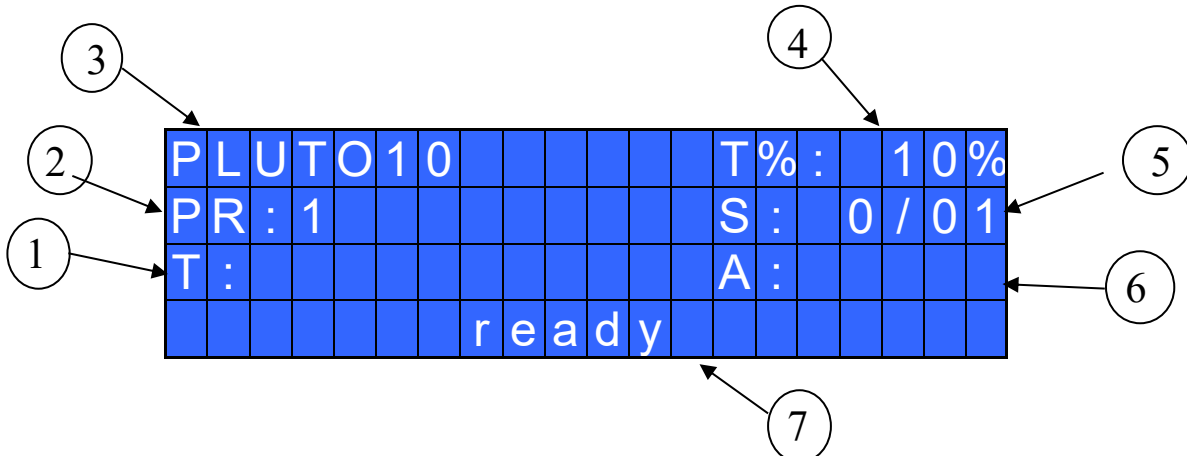
Torque setting		Model	Torque (Nm)	Speed (rpm)	
Unit	%			Min	Max
✓	✓	MITO15	0,35-1,5	450	850
✓	✓	PLUTO 3	0,5-2,5	370	1300
✓	✓	PLUTO 6	0,85-6	200	850
✓	✓	PLUTO 10	1,5-10	110	600
✓	✓	PLUTO 15	2-15	60	320
✓	✓	PLUTO 20	3-20	50	200
✓	✓	PLUTO 35	3-35	40	140
✓	✓	PLUTO 50	5-50	20	90
✓	✓	PLUTO 3 ANG	0,5-2,5	370	1300
✓	✓	PLUTO 6 ANG	1-6	200	850
✓	✓	PLUTO 8 ANG	1,5 - 8	110	600
	✓	PLUTO 15 ANG	2-13	100	320
	✓	PLUTO 20 ANG	3-18	60	200
	✓	PLUTO 30 ANG	6-30	30	130
	✓	PLUTO 45 ANG	10-45	20	90
	✓	PLUTO 70 ANG	15-70	20	50

**IMPORTANT: EDU 2AE/TOP/TA/TA is a highly accurate unit but it is critically important to select the correct options to ensure that proper torque is being applied. Read the menu description carefully and in case you are unsure please contact Kolver for support information.**

Turn the unit on through the on/off switch on the back panel. The unit will carry a general system check and the words “*waiting connection*” will appear on the last line of the display. If the connection with the motor control board is successful the following screen will be displayed:



When turned on and the screwdriver is connected, the unit is set to % mode and the display will contain the following information:



- 1- Reached torque level in Nm, lbf.in or kgf.cm (in % mode, only if *Show Torque* function is active)
- 2- Program number or sequence
- 3- Screwdriver model
- 4- Torque level in percentage
- 5- Screw count: done screws/total screws
- 6- Angle value in degrees
- 7- Status bar (ready, errors, etc...)



### FRONT PANEL KEYBOARD

To enter the menu press the **ESC** key for 2 seconds.

Select the line by pressing  $\uparrow$  or  $\downarrow$  then press **OK** (the symbol  $\blacktriangleright$  will turn into  $\blacksquare$ ). Press the  $\uparrow$  or  $\downarrow$  to select the required value and then confirm through **OK** (or **ESC** if you don't want to save the value).

The selected values will be immediately operational, even if you are still in the menu screen. Repeat the sequence for all the parameters you wish to change and then push **ESC** to return to the main screen.

Press **RESET** for 3 sec should you need to reset the screw, the program or the sequence. If you want to see all the set parameters press  $\uparrow$  for 2 seconds, however you cannot modify the displayed parameters on this screen.



### LEDS ON FRON PANEL

GREEN LED VERDE: indication of *Screw OK*.

YELLOW LED: indication of *Programm End* or *Sequence End*.

RED LED: any indication of error.



## MAIN MENU:

-	-	-	-	-	M	A	I	N	-	M	E	N	U	-	-	-	-	-
O	K		c	h	a	n	g	e		E	S	C		q	u	i	t	
▶	P	r	o	g	r	a	m		s	e	t	t	i	n	g			
	S	e	q	u	e	n	c	e		s	e	t	t	i	n	g		

**Program setting:** It indicates the menu section where you can set or modify the fastening parameters.

**IMPORTANT:** To work with switch box, socket tray and remote it is mandatory to go to Sequence Menu (Ext Box: ON).

**Sequence:** It indicates the menu section where you can activate the sequence, the switchbox/socket tray and the bar code.

NB: It is not possible to set a sequence containing programs both in % and in # mode. See the dedicated Section.

-	-	-	-	-	M	A	I	N	-	M	E	N	U	-	-	-	-	-
	S	e	q	u	e	n	c	e		s	e	t	t	i	n	g		
▶	U	n	i	t		o	p	t	i	o	n	s						
	U	S	B		o	p	t	i	o	n	s							

**Unit Options:** It indicates the menu section where you can set date the language, the password, the unit, the buttons, the unit mode, date and time, the firmware version, the serial number and the cycles done.

**USB Options:** It indicates the menu section where you can view, upload and create programs setting of the control unit.

## PROGRAM MENU:

-	-	-	-	-	M	E	N	U	-	P	R	:	1	-	-	-	-	-
O	K		c	h	a	n	g	e		E	S	C		q	u	i	t	
▶	1	)	P	r	o	g	r	a	m		n	u	m	b	e	r	:	1
	2	)	S	c	r	e	w	s		n	u	m	b	e	r	:		1

**1) Program number:** you can select/ modify the desired program from 1 to 8.

**2) Screws number:** The EDU2AE/TOP/TA can act as screw counter. You can set the number of screws from 1 to 99. To disable the function press ↵ until you get to OFF.

If the number of correct screws matches to the number of set screws, “PROGRAM END” will appear on the status bar and the yellow led will light up. If the “Press OK” is OFF (see point 18), “PROGRAM END” will automatically disappear at next screwing or any time you enter the menu. Otherwise, press OK at the end of each program.

**ATTENTION:** Every time you enter the menu, the number of screws will reset.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-	
3	)	M	o	d	e	l	:							P	L	U	T	O	1	0
▶	4	)	R	a	m	p	:							0	.	3	s			
5	)	T	o	r	q	u	e	:									1	0	%	

**3) Model:** you can select the screwdriver to be used. Your choice will automatically change the default settings. It's important to select the correct model you're going to use since most parameters regarding the motor software are specific to every single model.

In the # mode, the models that can be selected are: MITO 15, PLUTO3, PLUTO6, PLUTO10, PLUTO15, PLUTO20, PLUTO35, PLUTO50, PLUTO 3ANG, PLUTO 6ANG and PLUTO 8ANG. In this mode, once chosen a screwdriver model, a speed and tightening torque will be automatically set in an intermediate value between those available. While in reverse, torque and speed values will be set at maximum.

Also in the # mode, if the *Model Detect* is set on auto and no screwdriver is connected, it won't be possible to set any torque value or speed.

**IMPORTANT:** To work with CA drivers, switch box, socket tray and remote it is mandatory to select **ON on Ext. Box in Sequence Menu.**

**4) Ramp:** You can select the slow start time (acceleration) from 0.2 to 3.0 sec. This option is only available for the screwing phase, while during the unscrewing phase the ramp time is always 0.2 sec. We suggest using this option with self-tapping screws.

**ATTENTION:** Reaching the torque while the ramp is still on could give as result a different torque level from the one that results when the ramp is over. This is due to the motor acceleration.

Reaching the torque while the ramp is still on will activate the "screw OK" signal anyway (this option is useful if you need to tighten screws that are already tightened, the so called "double hit").

On the other hand, if you wish to see an error signal during the preset torque in the ramp phase, you can change the minimum time by setting value which is equal or superior to the ramp value (see point 7).

**5) Torque:** you can select the desired torque as a percentage of the torque range of the selected screwdriver. For example, for a Pluto10, a 50% setting will result in a torque in the area of 4 -5 Nm. The torque range is always referred to the MAX speed. In case you're not working at maximum speed, the torque range will progressively lower in order to avoid motor stalling. If the torque level is reached correctly, it will be displayed and you will hear a beep sound, too.

Such torque level is indicated as "T: ..%" on the main screen.

In # mode, the desired torque value is set automatically. This value depends on some tables which show a range of selectable torque values for each speed (see page 18). Therefore, for each speed it is possible to set a torque value between the minimum and maximum indicated. The torque range available will be displayed also on the main screen. If you want to set a torque value outside the range of that speed, you will have to increase or decrease the speed value in order to get a range of values the desired one is contained in.

**6) Compens – Compensation:** This function allows an increase or decrease of the displayed torque value after a calibration. The available range is from 0 to  $\pm 55$  Nm. For example: after calibration (see Torque calibration) you make a screwing on your assembly and compare the displayed value to the value you see on a torque tester (for example a mini-K or a K model). Let's say you notice that the torque displayed in the unit EDU 2AE/TOP/TA is +0.2 Nm higher than the value indicated on the tester (which is the right one). In this case you can modify this value by setting -0.2 Nm so that the value on the display will be the same as the value on the tester. If it's lower than 0.3 Nm, you need to set +0.3 Nm and so on.

In # mode, this function is used to increase the torque accuracy in tightening. If a tightening value is checked through a torque meter (for example a K or miniK model) and you notice a deviation between this and the target value or the one on the unit display, you can intervene by adding an offset (positive or negative) through compensation.

**ATTENTION:** the torque target value added to the compensation must in any case be contained in the torque range relating to the set speed. Any invalid value will be signaled with "Torque/ speed error".

**7) Tm Fast Spd (Time Fast Speed):** It indicates how long the screwdriver should turn at the FAST SPEED (see point 7) before switching to the Final Speed.

This Fast Speed Time can be set from 0.3 to 10.0 sec.

To disable the function press  $\downarrow$  until you get to OFF. In this case the screwdriver will automatically start at pre-set speed (see point 8).

**CAUTION:** The aim of the FAST SPEED is only to speed up the approach time in case of long screws. Reaching the torque at higher speed will result in inaccurate torque output. To avoid inaccurate torque values we suggest first to set a shorter time, and then increase it.

Torque reached during the FAST SPEED won't activate the torque signal and the message "Error FAST SPEED" will be displayed on the main screen and 2 beep sounds. The red led will turn on, too.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-	
6	)	C	o	m	p	e	n	s	:					0	.	0	0	N	m	
▶	7	)	T	m	F	a	s	t	s	p	d	:						o	f	f
8	)	F	a	s	t	s	p	d	:									o	f	f

**8) Fast spd (Fast Speed):** You can select the speed of the screwdriver during the FAST SPEED. It can be set between max speed and the Final Speed (see point 8).

This function is available only if the Fast Speed Time is ON.

**9) Final Spd (Final Speed):** You can select any speed value of the screwdriver between nominal (maximum speed given in the catalogue) and the minimum speed of every single screwdriver (see table with technical data).

In # mode, the speed is also linked to the relative table of the screwdriver in use. It is therefore not possible to select a speed not included in its torque range. In this case, the error "Torque/speed error" will appear and it will not be possible to exit the speed setting until a correct speed has been selected. To switch from one speed to another, it will be necessary to set a torque value in common for each of the two ranges.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-	
9	)	F	i	n	a	l	s	p	d	:				6	0	0	r	p	m	
▶	10	)	R	u	n	t	i	m	e	:				2	0	.	0	s		
11	)	M	i	n	t	i	m	e	:									o	f	f

**10) Runtime:** You can set the time of a tightening, from OFF to 20.0 sec. When the pre-set time has been reached, it results in a torque signal.

The couple reached during this time results in a signal of *Correct screw*. If the correct screw signal is not required, set the Minimum time up to a value of 'Minimum Time -0.1sec'.

**ATTENTION:** Max Time must be set at 20.0 sec.

**11) Min time - Minimum Time:** You can select the minimum time of screwing from 0.1 sec to 'Max time - 0.1s'. To disable the function press  $\downarrow$  until you get to OFF (Min time = 0).

Torque reached below the minimum time won't activate the torque signal and will result in an error signal. "Below minimum time" will be displayed on the status bar and the red led will light up. You will hear two beep sounds, too.

**12) Max time - Maximum time:** You can select the maximum time of screwing. You can set from 'Min time + 0,1s' to 20.0 sec.

You also can set the Maximum time to OFF by pressing the  $\uparrow$  button when you have reached the value of 20.0s. In this case the screwdriver turns without any time limit.

**ATTENTION:** If torque isn't reached by the maximum time, the screwdriver will stop. "Over maximum time" will be displayed on the status bar and the red led will light up. You will hear two beep sounds, too.

-	-	-	-	-	MENU	-	-	PR: 1	-	-	-	-
1	2	)	Max	time:				20.0s				
▶	1	3	)	Pre	Rev:					off		
1	4	)	Auto	Rev:				20.0s				

**13) Pre-Rev.:** pre-reverse. You can unscrew before tightening. This time can be set from OFF to 20.0 sec.

*N.B.* The speed and torque will be the same as those for the Auto Reverse.

**14) Auto rev. – Auto reverse:** This option will automatically start a reverse after a torque reached signal. You can set time from 0.1 to 20.0 sec.

To disable the function press  $\downarrow$  until you get to OFF.

**ATTENTION:** During the reverse, it is necessary to keep the lever or the start signal pressed as long as it doesn't stop. "Correct screw" will be displayed on the status bar and a green led will light up. You will hear one beep sound, too. In case the lever is released before the end of the reverse, "unfinished screw" will be displayed and a red led will light up. You will hear two beep sounds, too.

**15) Rev spd - Reverse speed:** You can select any reverse speed value of the screwdriver between the maximum and the minimum specific speed of every single screwdriver (see table with technical data).

In Unit mode, even the reverse speed is linked to the relative table of the screwdriver in use. At each model change, this speed will be automatically set at its maximum.

-	-	-	-	-	MENU	-	-	PR: 1	-	-	-	-
1	5	)	Rev	spd:				600rpm				
▶	1	6	)	Rev	torque:			MAX				
1	7	)	PV	torque:				off				

**16) Rev torque – Reverse torque:** You can select the desired reverse torque as a percentage of the torque range of the selected screwdriver (see point 2). If the torque is set on MAX, the reverse torque is about 20% higher than the possible maximum torque, so that it is always possible to unscrew a tightened screw (we suggest leaving this function on in normal use). If the setting is from MIN to 99% the reverse torque with the same percentage will be equal to the settings of the screwing phase.

In Unit mode, the desired reverse torque value is set automatically. At each model change, the torque will be automatically set at its maximum, so that the closed screw can always be unscrewed.

**ATTENTION:** If you're using open-end wrenches, the reverse torque has to be set to MIN value in order to bring the wrench back to the correct position.

**17) PV torque:** Period of time in which the screwdriver works at **maximum torque** before switching to the torque that has been set by the user. You can set time from 0.1 to 10.0 sec.

To disable the function press  $\downarrow$  until you get to OFF.

This function overlaps other time settings (Fast Speed, ramp time, minimum time, maximum time) from the motor start on.

**ATTENTION:** This function is useful for applications where the prevailing torque is higher than the final torque (for example trilobal screws or locknuts).

**Please use this function with utmost attention because an incorrect use can damage both the assembly and the screwdriver.**

Torques reached during the max torque time won't activate the torque signal. "Error pvt time" will be displayed and the red led will light up. You will hear two beep sounds, too.

**18) Rotation:** You can choose between right tightening (standard screws) or left tightening (left threaded screws). All the other functions will adapt to the selected direction of rotation.

-	-	-	-	-	MENU	-	-	PR:1	-	-	-	-					
18)	R	o	t	a	t	i	o	n	:		r	i	g	h	t		
▶19)	P	r	e	s	s		O	K	:					o	f	f	
20)	P	r	e	s	s		E	S	C	:					o	f	f

**19) Press OK:** when ON, press OK at the end of each program.  
When OFF, the control unit resets automatically at the end of each program.

**20) Press ESC:** when ON, press ESC to reset the control unit.  
When OFF, the control unit resets automatically after an error signal.

-	-	-	-	-	MENU	-	-	PR:1	-	-	-	-					
21)	R	e	s	e	t	:									o	n	
▶22)	E	r	r	o	r		l	e	v	e	r	:			o	n	
23)	D	e	f	i	x		a	l	l	o	w	:			o	f	f

**21) Reset:** you can reset the program or the single screw.

**22) Error lever:** when ON, an error signal will occur when the lever has released before reaching the torque.  
When OFF, this function doesn't work.

**23) Defix allow:** when OFF, the reverse is NOT enabled.

**24) Show Torque:** When ON, you will see the torque value (Nm or in.lbs) on the main screen.  
When OFF, the torque value won't be displayed.

**(To modify the calibration parameters see paragraph Torque calibration).**

-	-	-	-	-	MENU	-	-	PR:1	-	-	-	-					
24)	S	h	o	w		t	o	r	q	u	e	:			o	f	f
▶25)	T	o	r	q		m	i	n	:		0	.	00	N	m		
26)	T	o	r	q		m	a	x	:		20	.	00	N	m		

**25) Torq min – Minimum torque:** The minimum torque and maximum torque options allow the user to set the acceptable torque range for each single application. When the reached torque is within this range, “Screw OK” will be displayed on the status bar and the green led will light up. If the reached torque is outside this range, “error minimum torque” or “error maximum torque” will be displayed and the red led will light up. You can set the torque range from 0 to ‘Torq Max-0.01 Nm’ in steps of 0.01 Nm.

The minimum torque option allows to set the lowest value of the torque range. When Calibration is OFF, the minimum torque value automatically sets on 0 Nm.

The selection of the torque value is carried out by entering the digit cell by cell.

**26) Torq max – Maximum Torque:** The minimum torque and maximum torque options allow the user to set the acceptable torque range for the single application. When the reached torque is within this range, “Screw OK” will be displayed on the status bar and the green led will light up. If the reached torque is outside this range, “error minimum torque” or “error maximum torque” will be displayed. You can set the torque range from ‘Torq Min+0.01 Nm’ to 55 Nm at intervals of 0.01 Nm.

The maximum torque option allows to set the highest value of the torque range. When Calibration is OFF the maximum torque value automatically sets on 55 Nm.

The selection of the torque value is carried out by entering the digit cell by cell.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-	
2	7	)	I	n	s	.	b	a	r	c	o	d	e							
▶	2	8	)	S	e	r	i	a	l	P	R	T	:					o	f	f
2	9	)	F	u	n	c	T	&	A	:								o	f	f

**27) Ins. barcode:** to scan a barcode and recall the desired program. To be used in combination with option 4. of the Sequence Menu.

IMPORTANT: Barcode can be ONLY numeric.

**28) Serial PRT:** Serial print: from OFF to 5.

When OFF, no print.

If it is set up to 5, this value identifies the number of line feeds between a string and another.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-	
2	9	)	F	u	n	c	T	&	A	:								o	f	f
▶	3	0	)	S	t	a	r	t	i	n	g	T	o	r	:	-	-	-		
3	1	)	A	n	g	.	m	i	n	:								-	-	-

**29) Func T&A–T&A function mode:** You can activate the Torque & Angle function. Set OFF when you don’t need this function. When you set ON you can choose among six working conditions (see T&A specific instructions).

**30) Starting Tor – Starting torque:** If T&A option is set on Tor mode (See T&A paragraph), you can set the torque threshold the angle starts to be read from. When T&A is set on angle mode (see T&A paragraph), you can set the torque threshold the angle starts to be carried out from.

In # mode, the torque threshold must be included in the range of values relating to the pre-set speed and model.

**31) Ang. min – Minimum angle:** Minimum angle threshold. You can set it when T&A is set on Tor, T/in or T/lv (see T&A specific instructions). The minimum angle the operator can set is 5°.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-
3	1	)	A	n	g	.	m	i	n	:					-	-	-	-
▶	3	2	)	A	n	g	.	m	a	x	:				-	-	-	-

**32) Ang. max - Maximum angle:** Maximum angle threshold. You can set it when T&A is set on Tor, T/in or T/lv (see T&A specific instructions). The maximum angle the operator can set is 29999°. When T&A is set on Ang., A/in or A/lv mode, maximum angle corresponds to the angle that has to be carried out.

## SEQUENCE MENU:

-	-	-	S	E	Q	U	E	-	M	E	N	U	-	-	-	-			
O	K		c	h	a	n	g	e		E	S	C		q	u	i	t		
▶	1	)	S	e	q		s	e	t	:	1	4	7	3	9	8	1	2	
	2	)	S	e	q		u	e	n	c	e	:					o	f	f

**1) Seq set:** you can set a sequence up to max. 8 programs.

To set the next program in the sequence, press OK.

Press ← to save the sequence and quit.

To set the programs of a sequence, it is suggested to set the *Model Detect in Manual* and manually select the desired screwdriver model for each program. Then enable automatic recognition. If you select a program which does not have a screwdriver model set (----), the *Select model* warning will appear and this setting will be exited.

**2) Sequence:** to enable or disable the sequence. ON = enabled; OFF = disabled.

-	-	-	S	E	Q	U	E	-	M	E	N	U	-	-	-	-		
3	)	E	x	t		b	o	x	:							o	f	f
▶	4	)	M	o	d	.	b	a	r	c	:					o	f	f
	5	)	I	n	s	.	b	a	r	c	o	d	e		S	e	q	

**3) Ext box:** It allows to enable or disable the external control.

**IMPORTANT:** It is **mandatory** to select ON to work with switch box, socket tray and remote.

**4) Barc. mode – Barcode mode:** It allows to choose the barcode mode.

- **OFF:** barcode disabled.
- **ON prog:** you can select the program to be executed by scanning the bar code of the product. The unit compares the scanned code to the one previously entered in each program (see point 27: Barc. Set.). If the two codes match, the program is loaded; otherwise it will display *Error Barcode*. The scanned product code is also printed on the serial port of the control unit (see paragraph “*serial print*”).
- **ON S.N.:** the product code is required before running a program or a sequence. The product code is printed on the serial port of the control unit.
- **ON Seq.:** you can set the Sequence by scanning its barcode. The code scanned is compared with the sequence entered in the menu (see point 5: Ins. Barcode Seq on Menu Sequence). If the two codes match, the sequence set is loaded, otherwise display “*Repeat scan*”. The read code is also printed on the serial port of the control unit (see section *Serial Print*).

**5) Ins. Barcode Seq:** When ON on “Barc. Mode → ON Seq.”, you have to scan the barcode to enable the Sequence.

**IMPORTANT:** Barcode can be ONLY numeric.

-	-	-	S	E	Q	U	E	-	M	E	N	U	-	-	-	-			
	6	)	R	e	s	e	t		S	e	q	.	:			o	f	f	
▶	7	)	R	e	s	.		s	e	q		a	u	t	:			o	n

**6) Reset seq.:** When ON, you can reset the Sequence (pushing the Reset button).

**7) Aut. res seq- Automatic Reset Sequence:** When ON, the control unit automatically resets after the end of the sequence. When OFF it is necessary to press OK at the end of each sequence.

## OPTION MENU:

-	-	-	-	-	M	A	I	N	-	M	E	N	U	-	-	-	-	-
	S	e	q	u	e		s	e	t	t	i	n	g					
▶	U	n	i	t		o	p	t	i	o	n	s						
	U	S	B		o	p	t	i	o	n	s							

### Unit Options:

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
OK		c	h	a	n	g	e		E	S	C		q	u	i	t			
▶	1	)	L	a	n	g	u	a	g	e	:					E	N		
	2	)	C	h	a	n	g	e		p	a	s	s	w	o	r	d		

**1) Language:** This option allows to choose among the languages available: English, French, German, Italian, Spanish and Portuguese.

**2) Change password:** You can change password (see point 3).

-	-	-	-	O	P	T	I	O	N	-	-	M	E	N	U	-	-	-	-
	3	)	P	a	s	s	w	o	r	d	:					o	n		
▶	4	)	E	S	C	-	O	K	-	R	S	T	:			e	x	t	
	5	)	U	n	i	t	:									N	m		

**3) Password ON:** When YES, you will be asked for the password to enter the menu. Otherwise select NO.

**ATTENTION:** Password is only asked to enter the menu the first time after switching the unit on. The default password is: 0000.

**4) ESC-OK-RST:** Press ESC in case of error. Press OK at the end of a program or to reset a sequence or a program (see point 7: Reset).

When INT, the operator must press the required key on the front panel.



When EXT, functions can only be enabled through proper connections on the back panel (see paragraph I/O connections).

When INT+EXT you can press either the button on the front or on the back panel.

**5) Unit:** You can choose between the following units of measurements: Nm, lbf.in and kgf.cm.

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
6	)	T	o	r	q	u	e		s	e	t	:			u	n	i	t	
→	7	)	M	o	d	e	l		d	e	t	e	c	t					
8	)	V	e	r	s	i	o	n	s										

**6) Torque mode:** this parameter allows to set the % or # (numerical value) operating mode of the control unit. Each time this parameter is changed, the unit of measurement is set automatically in Nm and any compensation value is reset. If you change from % to #, an intermediate speed and torque value will be set for each program, while in reverse the maximum values are set. If you move from # to %, the torque values set for each program will be converted into a percentage.

**7) Model Detect:** this function allows you to enable or disable automatic screwdriver recognition. If set to Auto, the unit recognizes and sets the screwdriver autonomously. In case of the screwdriver is not connected, the unit shows the warning "*Connect screwdriver*". When you connect a screwdriver different from the previous one or after formatting the unit (or on first use), the warning "*Change model?*" and the user can select "*No*" or "*Yes*". At the same time, the scrolling notice "*All program settings will be reset*" will be displayed to underline the fact that if "*Yes*" is selected, the torque, speed, etc. settings will be displayed. related to the previously connected screwdriver model will be lost. In the latter case, the new connected screwdriver will be set and the relative default values for torque and speed will be loaded. If the user selects "*No*" and leaves the screwdriver connected, the warning "*Connect right model*" which is the one set in the "*Model*" function of the relevant program, tightening is not allowed. In this mode it is not possible to manually set a screwdriver model. If there is no screwdriver connected to the unit, the display shows ---- instead of the model and torque. In case of an unrecognizable screwdriver is connected, the unit will not show any model and tightening will not be allowed.

If this function is set in **manual**, automatic model recognition is disabled and the user will select the desired screwdriver model through the Program menu). After formatting the unit or its first use with the Model Detection setting in Manual, the warning "*Select Model*" will appear on the display.

In both operating modes (**Auto** and **Manual**), if in field 3) of the Program menu you are in the "*Model: ----*" status, it is not possible to change the values relating to the torque and speed in tightening (unscrewing).

**ATTENTION:** with the model detection set to Auto in case of recognition malfunctions caused for example by external interferences, set the model detection in Manual and select the desired screwdriver.

**IMPORTANT:** the "**Model Detection**" function is active only in the inline models **PLUTO3, PLUTO6, PLUTO10, PLUTO15.**

**8) Versions:** in this screen you can see the versions of boards mounted inside the unit.

**9) Serial number:** it is the indication number of the control unit. Default number: 0000000.

It could be the real serial number of the unit or another one you could choose (7 digits max).

This number will also be the name of the folder in the USB drive where you will save the report of your data (see EDU EXPAND part).

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
9	)	S	e	r	i	a	l	n	.	0	0	0	0	0	0	0	0	0	0
▶	1	0	)	S	e	t	t	i	m	e	&	d	a	t	e	S			
1	1	)	C	y	c	l	e	s	:	0	0	0	0	0	0	0	0	0	0

**10) Set time & date:** to set time and date on the control unit.

**11) Cycles** - Total number of cycles: It shows the number of tightened and loosened screws. This number can't be modified.

### USB Options:

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
▶	1	)	R	e	a	d	U	S	B										
2	)	W	r	i	t	e	U	S	B										
3	)	I	n	f	o	U	S	B											

1) **Read USB:** press OK and read the USB drive and select the file SETxx.KOL you desire. The EDU control unit recognizes only files as SETxx.KOL (see EDU EXPAND part).

		S	e	l	e	c	t	P	r	o	g	r	a	m					
		S	E	T	0	0	.	K	O	L									
O	K	c	o	n	f	i	r	m	E	S	C	q	u	i	t				

2) **Write USB:** press OK and create your new SETxx.KOL application where you save all the parameters you have set in the control unit.

				S	a	v	e	a	s										
				S	E	T	0	0	.	K	O	L							
O	K	c	o	n	f	i	r	m	E	S	C	q	u	i	t				

3) **Info USB:** press OK and see the loaded program. You can see the loaded program only if you have saved the program in your USB drive as named as SETxx.KOL.

		L	o	a	d	e	d	p	r	o	g	r	a	m	:				
		S	E	T	2	3	.	K	O	L									

## TORQUE CALIBRATION (only % model)

The torque calibration function allows to view the torque value in Nm or in.lbs or kgf.cm directly on the display of the control unit.

**IMPORTANT: You need a torque tester to proceed, either with static transducer (model minik or K) or with rotary transducer (model minike).**

### CALIBRATION PROCESS:

1. Select *Show Torque* at point 24 of the menu and press OK.
2. The following screen will appear on the display:

-	-	-	-	-	-	-	-	M	E	N	U	-	-	-	-	-	-
		2	3	)	C	a	l	i	b	r	a	t	i	o	n		

3. Press OK to confirm. If you choose OFF, calibration will be interrupted and no torque value will be displayed. You choose ON, calibration will continue and the following screen will be displayed:

-	-	-	-	-	-	-	-	S	T	E	P	-	-	1	-	-	-	-	
								E	n	t	e			t	h	e			
		p	e	r	c	e	n	t	a	g	e						M	I	N

4. Set the first torque level at 20% percentage by pressing  $\uparrow$ . (20% is just an example).

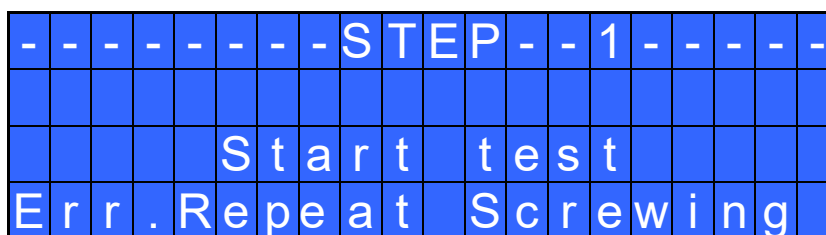
-	-	-	-	-	-	-	-	S	T	E	P	-	-	2	-	-	-	-	
								E	n	t	e			t	h	e			
		p	e	r	c	e	n	t	a	g	e						2	0	%

5. Press OK. You will see:

-	-	-	-	-	-	-	-	S	T	E	P	-	-	1	-	-	-	-		
								S	t	a	r	t		t	e	s	t			
		O	K		c	o	n	f	i	r	m		E	S	C		q	u	i	t

Complete a screwing cycle on the mini k5 and take note of torque value.

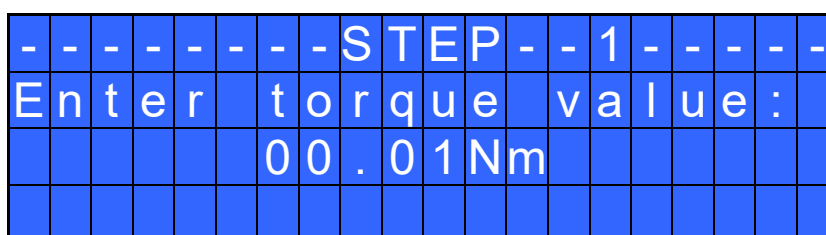
In case of error, you will see:



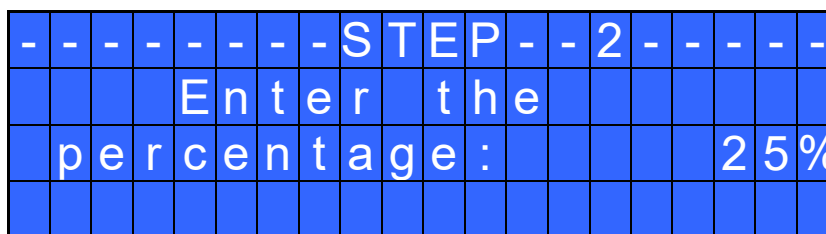
Just repeat the test.

6. Press ESC to abort the calibration process.

Press OK, then the display will show:



Set the torque value by selecting each digit individually pressing  $\uparrow$  and  $\downarrow$  and press OK to confirm it, then press OK again to save. You will see:



7. Set the percentage of the second torque to 25% by pressing  $\uparrow$  and press OK. (25% is just an example).

8. Repeat the procedures described on points 4 and 5.

9. When calibration ends, “Setting end” will be displayed. You will hear two beep sounds, too.

Now you are ready to work and see the correct torque on the display.

**WARNING:**

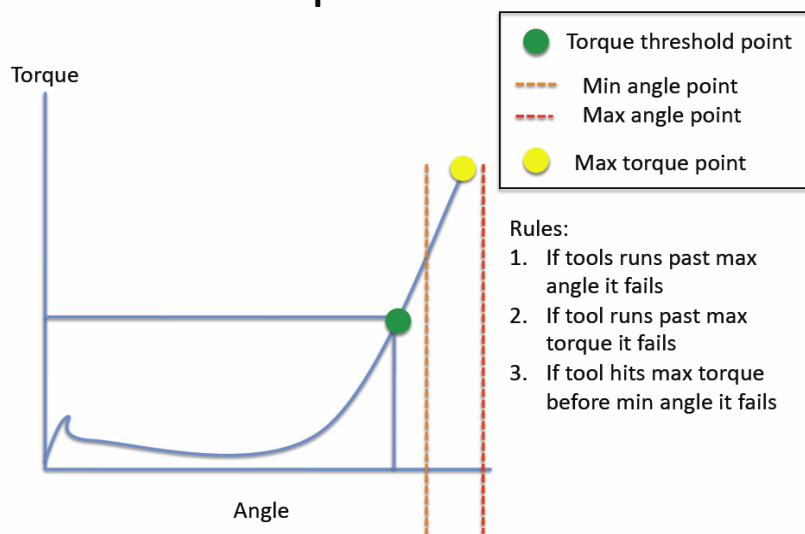
- Calibration values will be referred to the parameters of the control unit which are set during calibration, i.e. if you modify speed or torque, the unit will need to be recalibrated. During calibration when a screwing is not carried out correctly or if for any reason you’re not sure of the torque value it is possible to repeat it. A wrong screwing can affect the precision of the calibration.
- Calibration is carried out for two torque levels optionally chosen. The minimum calibration interval is 5% (example: if I have to work at 50%, I can calibrate at 45% and 55%). In this case, if for any reasons I need to work at torque percentages which are lower or higher than the min-max ones set during the calibration, they will be analyzed and displayed anyway but since they won’t be based on effective data the torque value displayed may be not accurate.
- During calibration it is not possible to go back to the previous screen. Press ESC to stop calibration and then repeat the screwing cycles.

## USE OF T&A (Torque & Angle)

Choose the T & A mode (see point 29: Modify function on the program menu)  
It is possible to set 6 different modes:

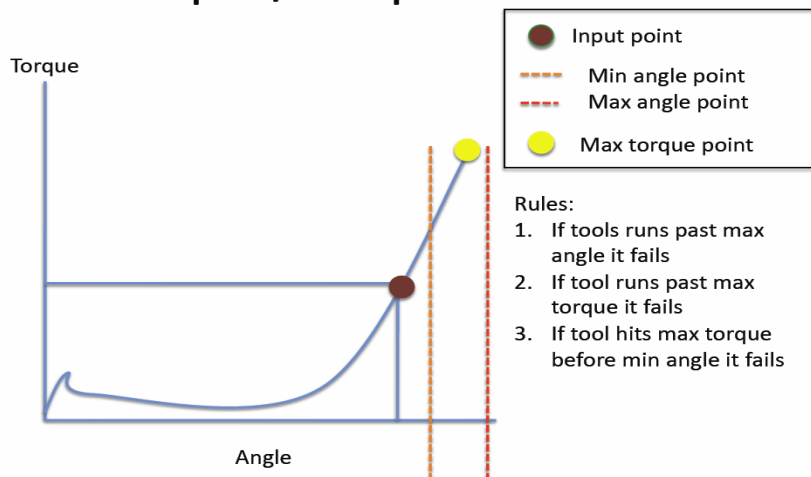
- ⤴ TORQUE (Torque): It's the most common use mode. The control unit shows the tightening torque and the torque starting from a certain torque percentage (threshold torque, see point 30). If the final torque and angle values are within the preset minimum and maximum values, the screw is correctly tightened. If the torque and/or angle are outside the preset values, the screw will be considered as incorrectly tightened. In this case the red led will light up and the message "Error Max (Min) Angle" or "Error Max (Min) Torque" will be displayed.

### Torque mode



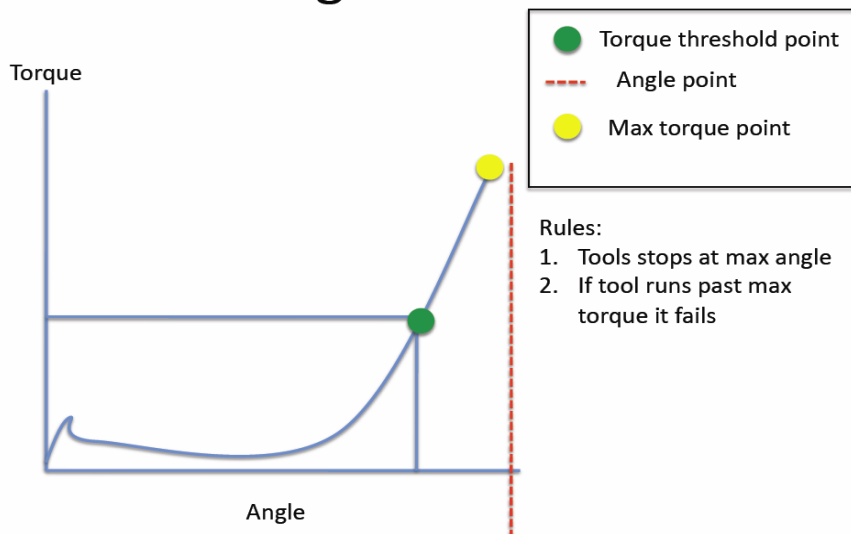
- ⤴ TORQUE/INPUT (T/IN): It corresponds to *Torque* mode, except for the threshold torque which can't be set by the operator: in fact the value is the result of an external impulse through a proper contact (see paragraph "connections"). It can be very useful if the operator wants the control unit to start counting the angle from a position which is indicated by a precision instrument.

### Input/Torque mode



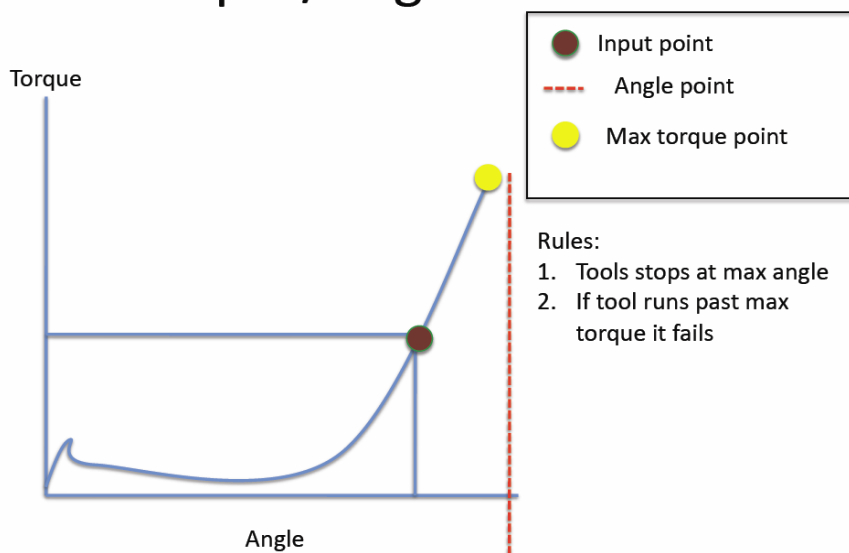
- ⤴ TORQUE/LEVER (T/LV): No threshold is preset by the operator: the angle value that appears on the display corresponds to the angle that is carried out starting from the moment in which the lever is pressed until the torque is reached.
- ⤴ ANGLE (Ang.): This mode gives priority to the angle to be reached. The value is measured starting from a tightening torque percentage.  
Starting from the preset threshold torque (see point 30) the system will start counting the degrees and when the preset angle is reached the screwdriver will stop. If the preset angle is reached the screw will be considered as correctly tightened, the green led will light up and the message “tightening OK” will be displayed on the status bar. If the screwdriver stops before reaching the preset angle the tightening will be considered not ok, the red led will light up and the message “error angle not reached” will be displayed on the status bar. Therefore it’s very important to set a torque value (line 5) which is sufficiently higher than the threshold value (line 30), so that the set value is reached before the screwdriver stops because of the reached torque.

## Angle mode



- ⤴ ANGLE/INPUT (A/IN): The threshold can’t be set by the operator: in fact the value is the result of an external impulse through a proper contact (see paragraph “connections”). This function can be very useful if the operator wants the screw to rotate a certain number of degrees after reaching a position indicated by a precision instrument.

## Input/Angle mode



- ▲ ANGLE/LEVER (A/LV): the threshold torque value can't be set by the operator and the angle value that appears on the display corresponds to the angle that is carried out starting from the moment in which the lever is pressed. The angle has to be set in the "Ang. max ". If the lever is released before reaching the set angle, the error "Error ang not OK" will be displayed.

## TORQUE - SPEED TABLES

The following tables valid for the Unit operating mode show the selectable torques for each speed.

### MITO 15

Nm		Lbf.in		Kgf.cm		rpm
min	MAX	min	MAX	min	MAX	
0,4	0,8	3,6	7,1	4,1	8,2	450
0,5	0,9	4,5	8,0	5,1	9,2	500
0,5	1,0	4,5	8,9	5,1	10,2	550
0,6	1,1	5,4	9,7	6,2	11,2	600
0,7	1,2	6,2	10,6	7,2	12,2	650
0,7	1,3	6,2	11,5	7,2	13,3	700
0,8	1,4	7,1	12,4	8,2	14,3	800
0,9	1,5	8,0	13,3	9,2	15,3	850

### PLUTO 3

Nm		Lbf.in		Kgf.cm		rpm
min	MAX	min	MAX	min	MAX	
0,5	0,8	4,5	7,1	5,1	8,2	370
0,6	1,1	5,4	9,7	6,2	11,2	500
0,7	1,4	6,2	12,4	7,2	14,3	640
0,8	1,6	7,1	14,2	8,2	16,3	770
0,9	1,8	8,0	15,9	9,2	18,4	900
1,0	2,0	8,9	17,7	10,2	20,4	1040
1,0	2,2	8,9	19,5	10,2	22,4	1170
1,1	2,3	9,8	20,4	11,2	23,5	1300

### PLUTO 6

Nm		Lbf.in		Kgf.cm		rpm
min	MAX	min	MAX	min	MAX	
0,9	2,1	8,0	18,6	9,2	21,4	200
1,1	3,1	9,8	27,4	11,3	31,6	300
1,2	3,9	10,7	34,5	12,3	39,8	400
1,2	4,6	10,7	40,7	12,3	46,9	500
1,3	4,9	11,6	43,4	13,3	50,0	600
1,3	5,5	11,6	48,7	13,3	56,1	700
1,4	6,0	12,4	53,1	14,3	61,2	800
1,5	6,3	13,3	55,8	15,3	64,2	850

### PLUTO 10

Nm		Lbf.in		Kgf.cm		rpm
min	MAX	min	MAX	min	MAX	
0,7	1,7	6,2	15,0	7,2	17,3	110
1,0	3,7	8,9	32,7	10,2	37,7	200
1,0	4,6	8,9	40,7	10,2	46,9	250
1,1	5,2	9,8	46,0	11,3	53,0	300
1,2	6,4	10,7	56,6	12,3	65,3	400
1,3	7,3	11,6	64,6	13,3	74,4	450
1,5	7,9	13,3	69,9	15,3	80,6	500
1,5	9,1	13,3	80,5	15,3	92,8	600

### PLUTO 15

Nm		Lbf.in		Kgf.cm		rpm
min	MAX	min	MAX	min	MAX	
1,3	2,5	11,6	22,1	13,3	25,5	60
1,5	4,5	13,3	39,8	15,3	45,9	80
2,0	6,1	17,8	54,0	20,4	62,2	100
2,1	7,7	18,6	68,2	21,5	78,5	130
2,2	9,8	19,5	86,7	22,5	99,9	170
2,3	11,4	20,4	100,9	23,5	116,2	210
2,4	12,7	21,3	112,4	24,5	129,5	250
2,7	14,7	23,9	130,1	27,6	149,9	320

### PLUTO 20

Nm		Lbf.in		Kgf.cm		rpm
min	MAX	min	MAX	min	MAX	
2,9	6,3	25,7	55,8	29,6	64,2	50
3,8	8,6	33,7	76,1	38,8	87,7	60
3,9	9,9	34,6	87,6	39,8	101,0	70
4,0	13,9	35,5	123,0	40,8	141,7	100
4,0	15,7	35,5	139,0	40,8	160,1	120
4,1	18,6	36,3	164,6	41,9	189,7	150
4,4	20,0	39,0	177,0	44,9	203,9	170
4,5	22,9	39,8	202,7	45,9	233,5	200



### PLUTO 35

Nm		Lbf.in		Kgf.cm		rpm
min	MAX	min	MAX	min	MAX	
2,5	9,0	22,2	79,7	25,5	91,8	40
4,4	13,3	39,0	117,7	44,9	135,6	50
4,9	16,6	43,4	146,9	50,0	169,3	60
5,3	19,0	47,0	168,2	54,1	193,7	70
5,7	21,9	50,5	193,8	58,2	223,3	80
6,3	25,0	55,8	221,3	64,3	254,9	100
6,7	28,9	59,3	255,8	68,4	294,7	120
6,9	30,6	61,1	270,8	70,4	312,0	140

### PLUTO 50

Nm		Lbf.in		Kgf.cm		rpm
min	MAX	min	MAX	min	MAX	
4,2	14,0	37,2	123,9	42,9	142,8	20
7,4	25,1	65,5	222,2	75,5	255,9	30
8,4	33,6	74,4	297,4	85,7	342,6	40
8,9	39,3	78,8	347,8	90,8	400,7	50
9,4	43,2	83,2	382,4	95,9	440,5	60
9,5	45,6	84,1	403,6	96,9	465,0	70
9,6	49,1	85,0	434,6	97,9	500,7	80
10,4	52,3	92,1	462,9	106,1	533,3	90

### PLUTO 3 ANG

Nm		Lbf.in		Kgf.cm		rpm
min	MAX	min	MAX	min	MAX	
0,4	0,6	3,6	5,3	4,1	6,1	370
0,5	1,0	4,5	8,9	5,1	10,2	500
0,6	1,3	5,4	11,5	6,2	13,3	640
0,7	1,5	6,2	13,3	7,2	15,3	770
0,7	1,7	6,2	15,0	7,2	17,3	900
0,8	1,9	7,1	16,8	8,2	19,4	1040
0,9	2,0	8,0	17,7	9,2	20,4	1170
1,0	2,1	8,9	18,6	10,2	21,4	1300

### PLUTO 6 ANG

Nm		Lbf.in		Kgf.cm		rpm
min	MAX	min	MAX	min	MAX	
0,9	2,0	8,0	17,7	9,2	20,4	200
1,0	3,1	8,9	27,4	10,2	31,6	300
1,1	4,0	9,8	35,4	11,3	40,8	400
1,2	4,6	10,7	40,7	12,3	46,9	500
1,3	5,1	11,6	45,1	13,3	52,0	600
1,4	5,5	12,4	48,7	14,3	56,1	700
1,5	5,9	13,3	52,2	15,3	60,2	800
1,7	6,1	15,1	54,0	17,4	62,2	850

### PLUTO 8 ANG

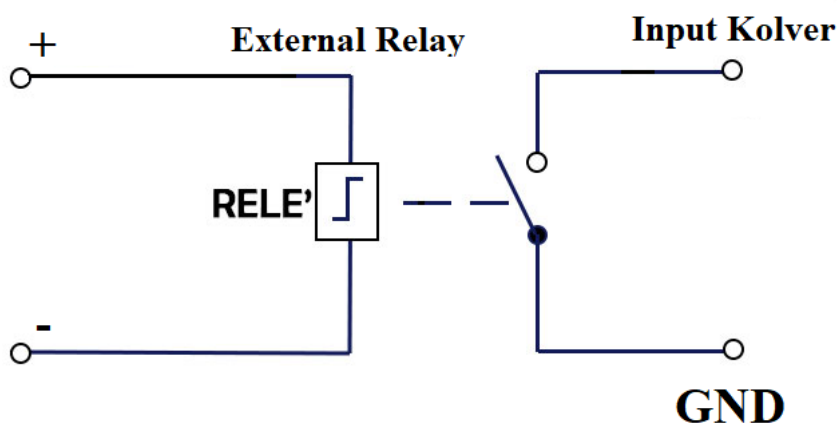
Nm		Lbf.in		Kgf.cm		rpm
min	MAX	min	MAX	min	MAX	
1,0	1,7	8,9	15,0	10,2	17,3	110
1,2	3,5	10,7	31,0	12,3	35,7	200
1,3	4,3	11,6	38,1	13,3	43,8	250
1,4	5,2	12,4	46,0	14,3	53,0	300
1,6	6,0	14,2	53,1	16,4	61,2	400
1,6	6,5	14,2	57,5	16,4	66,3	450
1,7	7,0	15,1	62,0	17,4	71,4	500
1,9	7,6	16,9	67,3	19,4	77,5	600

## INTERPRETATION OF ACOUSTIC SIGNALS

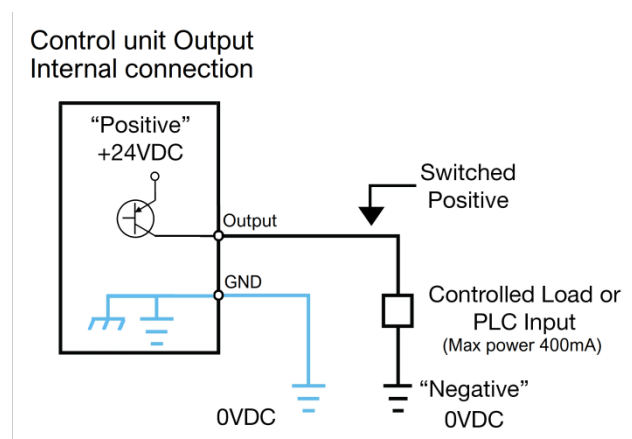
The control unit emits sounds which help you understand if the screwing has been carried out correctly or not. When the torque is reached meeting all the parameters set, the control unit utters a 0.5 sec beep as confirmation. In case of Program End, the unit will utter other two beeps. On the other hand, torque reached under min time, during the Ramp time or under the Fast Speed (see error signals on the display) will cause the control unit to utter three beep sounds.

## I/O CONNECTIONS:

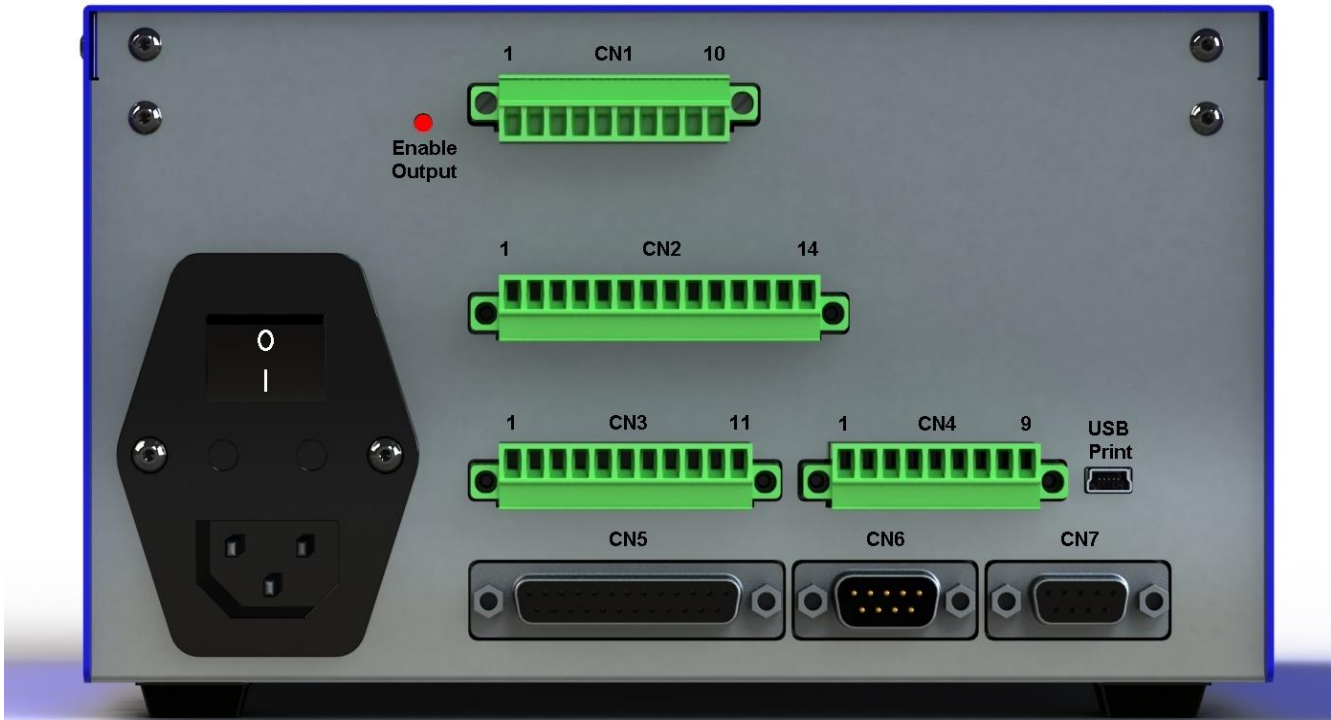
EDU 2AE/TOP/TA control unit series have connectors placed on the back panel. These connectors allow to enable functions through inputs and to take signals through outputs. The inputs are activated by connecting them to ground. A positive voltage must NEVER be brought to these inputs. Bringing 24V to the unit inputs could damage the inputs themselves. As seen from the picture below, to enable the inputs it is recommended to bring a clean contact by using a relay or a simple switch or button.



As for the outputs, they are all PNP type with active function. On each pin you will have 24V DC.

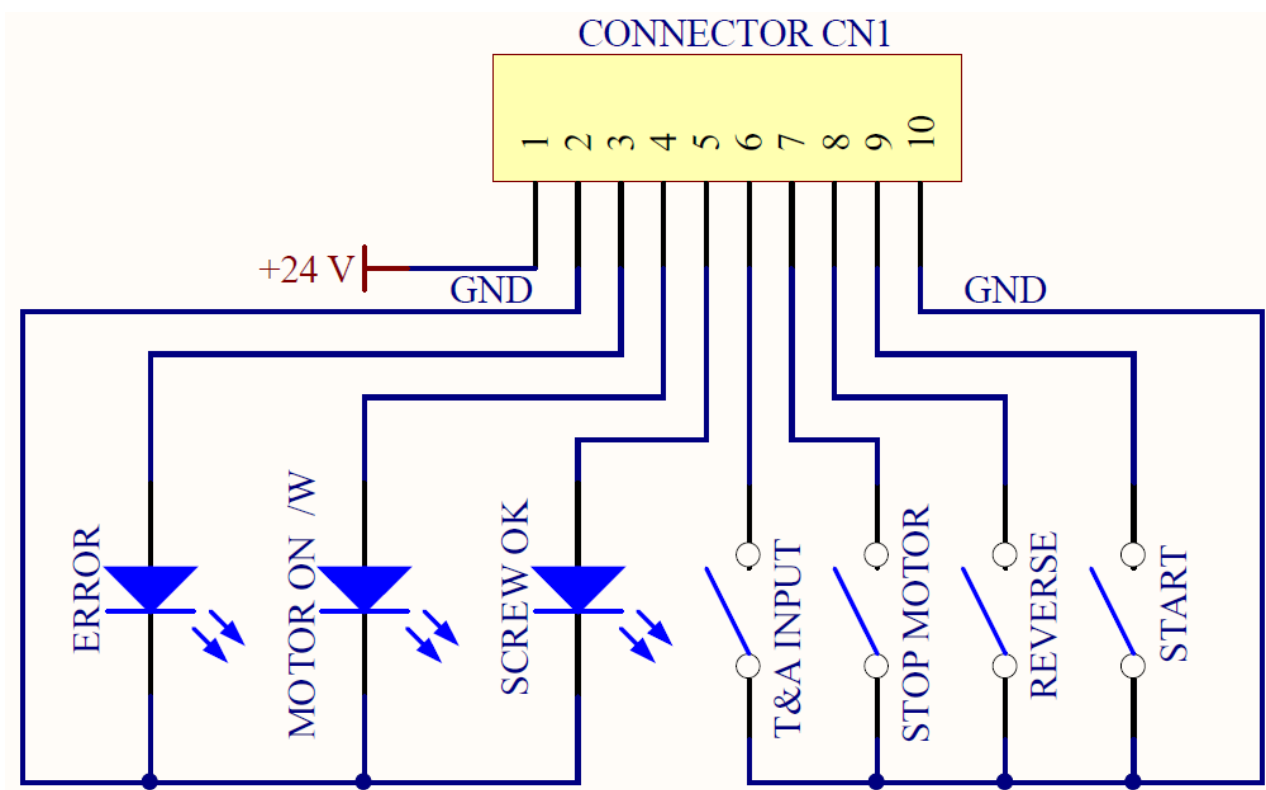


These pins can be used directly connected to PNP inputs (PLC) or used to turn on LEDs, buzzers or other devices with 24V power supply. The maximum total power of the outputs is about 400mA. Using inductive loads such as relays or other loads with an initial consumption peak greater than 400mA will send all outputs to protection, displaying the message "output disable". To restore the outputs after a protection, turn off and turn on the unit again.



- CN1 CONNECTOR – 10 pins

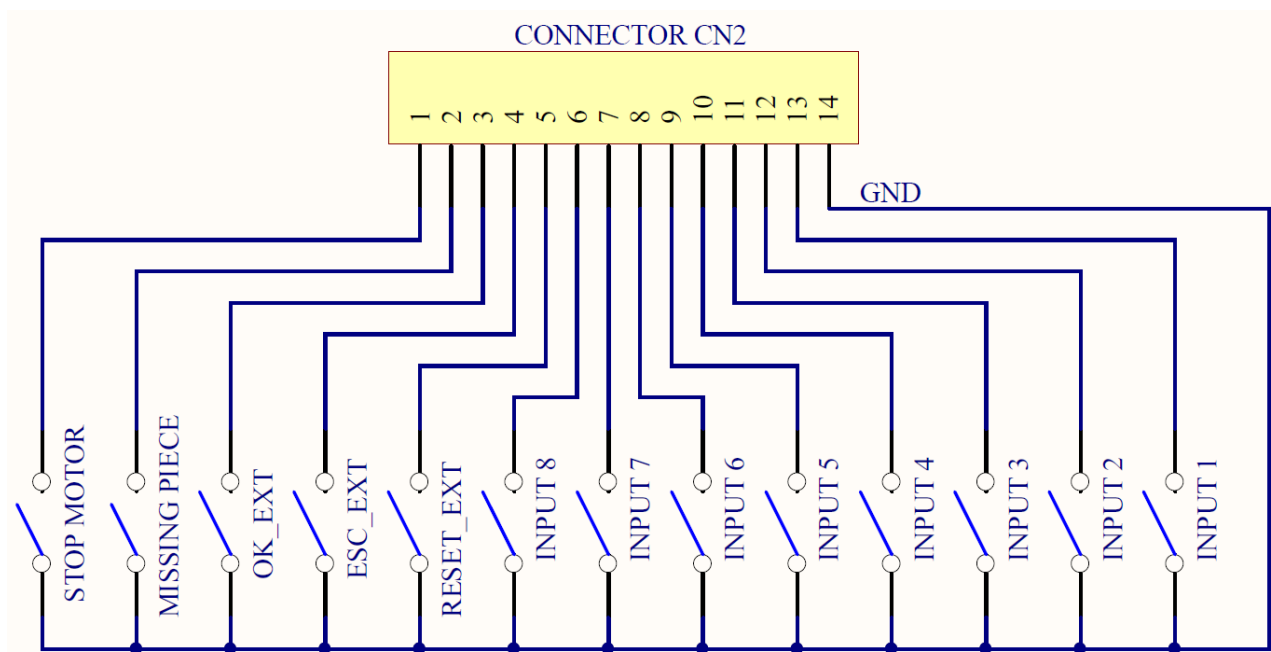
It is situated on the upper part of the back panel.



PIN	NAME	FUNCTION
<b>OUTPUT</b>		
1	+24V	+24V voltage protected. The maximum current consumption is 400mA. IT CANNOT BE USED TO POWER EXTERNAL DEVICES.
2	GND	Common pin. Signals must be taken between this pin (GND and the respective signal pins (pin 3, 4 and 5).
3	ERROR	Error signal: it activates every time an error occurs. The red led on the front panel will switch on. Signal is 24V.
4	MOTOR ON (W)	It activates when the motor turns during screwing. Signal is 24V.
5	SCREW OK	Correct screw signal. The green led on the front panel will switch on. Signal is 24V.
<b>INPUT</b>		
6	T&A INPUT	External input for making the control unit start to count the angle. It can be only used in A/IN and T/IN mode (see T&A paragraph)
7	STOP MOTOR	Remote motor stop. If it's activated the message "STOP MOTOR ON" appears on the display. The motor will stop and won't start working again as long as the contact is closed (as Input pin 1 of CN2).
8	REVERSE	Remote motor start with torque control while unscrewing.
9	START	Remote start with torque control while screwing.
10	GND	Common pin. The desired function is activated through a contact between this pin and one of the other pins.

- CN2 CONNECTOR – 14 pins

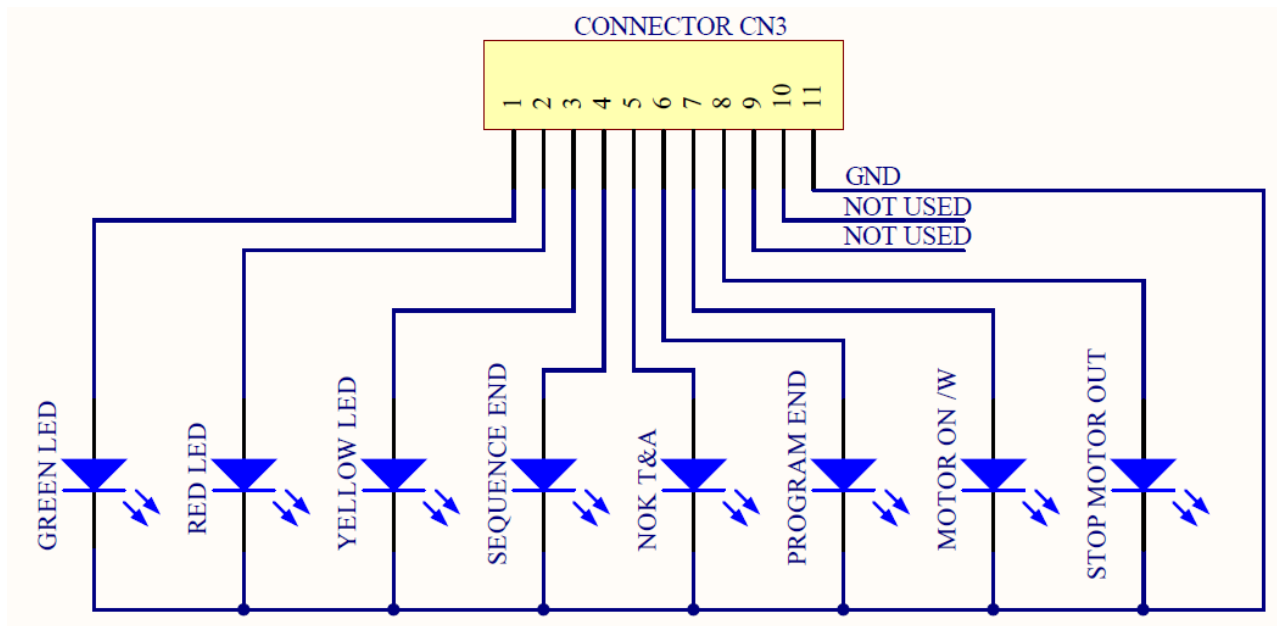
All of the following pins are input: make a contact with pin 14 to activate them.



PIN	NAME	FUNCTION
1	STOP MOTOR	Remote motor stop. If it's activated the message "STOP MOTOR ON" appears on the display. The motor will stop and won't start working again as long as the contact is closed (as Input pin 1 of CN2).
2	MISSING PIECE	If enabled it stops the motor, enables the error signal and "Error missing piece" is displayed on the status bar.
3	OK EXT	If enabled (see point 4: OK-ESC commands, in the option menu), remote OK key function.
4	ESC EXT	If enabled (see point 4: OK-ESC, in the option menu), ESC key function to reset remote errors.
5	RESET EXT	If enabled (see point 4: OK-ESC commands, in the option menu), it resets program or sequence according to the preset function (see point 5: Reset, in the option menu)
6	INPUT 8	Switch – selection of program 8
7	INPUT 7	Switch – selection of program 7
8	INPUT 6	Switch – selection of program 6
9	INPUT 5	Switch – selection of program 5
10	INPUT 4	Switch – selection of program 4
11	INPUT 3	Switch – selection of program 3
12	INPUT 2	Switch – selection of program 2
13	INPUT 1	Switch – selection of program 1
14	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (GND) .

- CN3 CONNECTOR – 11 pins

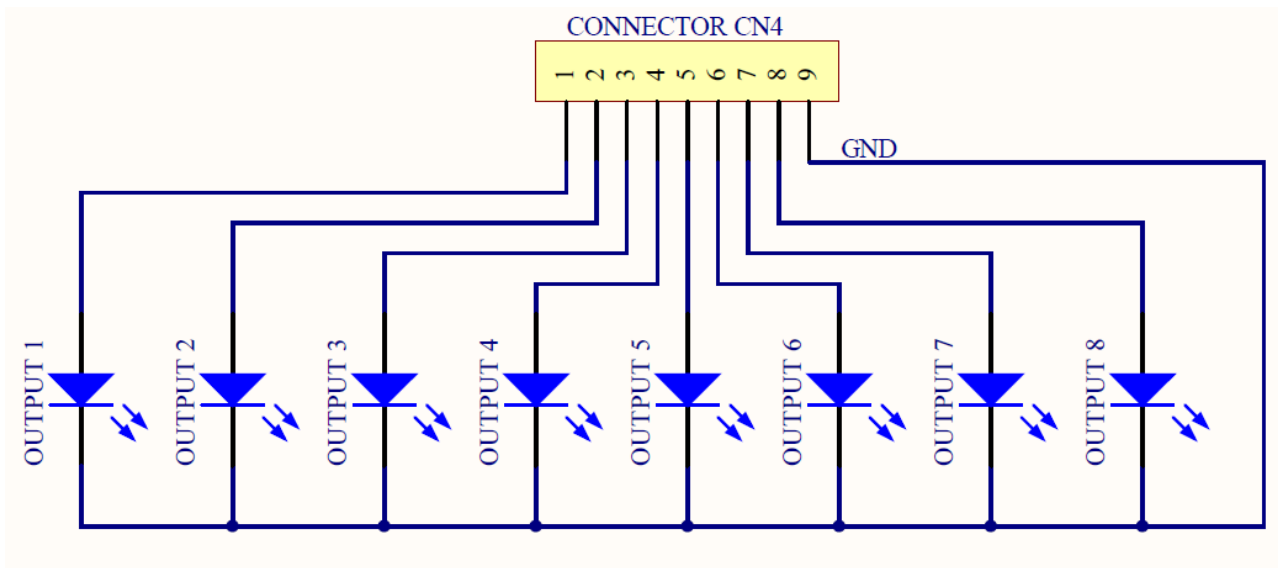
All of the following pins are output.



PIN	NAME	FUNCTION
1	GREEN LED	This signal works in parallel with the green led on the front panel.
2	RED LED	This signal works in parallel with the red led on the front panel.
3	YELLOW LED	This signal works in parallel with the yellow led on the front panel.
4	SEQUENCE END	It indicates the end of a sequence, if enabled.
5	NOK T&A	It activates if any angle error occurs.
6	PR OK	It activates at the end of each program.
7	MOTOR ON (\W)	It activates when the motor runs while tightening.
8	STOP MOTOR	It activates when stop motor is enabled.
9	NOT USED	
10	NOT USED	
11	GND	Common to every output. Signals have to be enabled making contact between the desired signal and this pin (GND).

- CN4 CONNECTOR – 9 pins

All of the following pins are output.



PIN	NAME	FUNCTION
1	OUTPUT 1	It indicates you're using program 1
2	OUTPUT 2	It indicates you're using program 2
3	OUTPUT 3	It indicates you're using program 3
4	OUTPUT 4	It indicates you're using program 4
5	OUTPUT 5	It indicates you're using program 5
6	OUTPUT 6	It indicates you're using program 6
7	OUTPUT 7	It indicates you're using program 7
8	OUTPUT 8	It indicates you're using program 8
9	GND	Common to every output. Signals have to be enabled making contact between the desired signal and this pin (GND).

- CN5 CONNECTOR (25 pin connector - female):



PIN	NAME	FUNCTION
1	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (common 0VDC).
2		Not used
3	STOP MOTOR OUT	It indicates stop motor is enabled
4	OUTPUT 8	It indicates you're using program 8
5	OUTPUT 7	It indicates you're using program 7
6	OUTPUT 6	It indicates you're using program 6
7	OUTPUT 5	It indicates you're using program 5
8	OUTPUT 4	It indicates you're using program 4
9	OUTPUT 3	It indicates you're using program 3
10	OUTPUT 2	It indicates you're using program 2
11	OUTPUT 1	It indicates you're using program 1
12	+24V	+24V available on this pin, they can't be used to charge external devices.
13	+5V	+5V available on this pin, it can't be used to charge external devices
14	OK EXT	If enabled (see point 4: OK-ESC, in the option menu), remote OK key function.
15	ESC EXT	If enabled (see point 4: OK-ESC, in the option menu), ESC key function to reset remote errors.
16	RESET EXT	If enabled (see point 4: OK-ESC, in the option menu), it resets program or sequence according to the preset function (see point 5: Reset, in the option menu).
17	INPUT 8	Switch – selection of program 8
18	INPUT 7	Switch – selection of program 7
19	INPUT 6	Switch – selection of program 6
20	INPUT 5	Switch – selection of program 5
21	INPUT 4	Switch – selection of program 4
22	INPUT 3	Switch – selection of program 3
23	INPUT 2	Switch – selection of program 2
24	INPUT 1	Switch – selection of program 1
25	+15V	+15V available on this pin, not used to charge external devices

- CN6 CONNECTOR (serial connector 9 pin - male) - FOR BARCODE CONNECTION

PIN	NAME	FUNCTION
1	+15V	+15V available on this pin, it can't be used to charge external devices.
2	RX	Serial reception.
5	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (GND)
9	+5V	Not used.

**IMPORTANT:** the barcode scanner to be used must have the following features: RS232 transmission with 9600baud, 8 data bits, 1stop bit, no parity, terminators CR-LF.

- CN7 CONNECTOR (9 pin serial connector - female) – PRINT FUNCTION

PIN	NAME	FUNCTION
1	+15V	Not used.
2	TX	Serial transmission.
3	RX	Serial reception.
5	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (GND).
9	+5V	Not used.

- **USB-PRINT CONNECTOR**

Only used to print data on PC (see dedicated paragraph).

**ATTENTION:** Output signals are protected from an appropriate circuit. Overload of the available signals (> 400 mA) or short circuit will result in the stop of the unit. To re-activate signals, it is necessary to switch off the unit for 5-6 seconds, check connections and output loads then switch the unit on.

## CORRECT SCREWS MESSAGES ON DISPLAY

On the status bar it will display “ <i>Screw OK</i> ”.	A correct screwing has been performed, reaching the pre-set torque value.
On the status bar it will display “ <i>Angle OK</i> ”.	A correct screwing has been performed, reaching the pre-set angle.
On the status bar it will display “ <i>Runtime OK</i> ”.	A correct screwing has been performed, reaching the pre-set runtime.
On the status bar it will display “ <i>Reverse torque OK</i> ”	A correct screwing has been performed, reaching the pre-set reverse torque value.

## TROUBLE SHOOTING

<b>ERROR</b>	<b>PROBLEM</b>	<b>SOLUTION</b>
0	“ <i>waiting connection</i> ” doesn’t turn into “ <i>loading</i> ” after it’s been switched on.	Contact the nearest Kolver dealer.
1	“ <i>Error Torque Control</i> ” is displayed on the status bar	Make a new screw. If the error persists, change the torque and speed settings.
2	“ <i>Error Fast Speed</i> ” is displayed on the status bar (the torque signal is displayed during the brake time).	
3	“ <i>Reverse incomplete</i> ” is displayed on the status bar (the displayed torque signal is correct but the set unscrewing is not complete).	
4	“ <i>Pre-Reverse incompl.</i> ” is displayed on the status bar (the lever has been released before the runtime has been achieved)	
5	“ <i>Under min time</i> ” is displayed on the status bar (the torque signal is displayed below the pre-set minimum time).	
6	“ <i>Over maximum time</i> ” is displayed on the status bar (torque is not reached and the screwing time is over the preset maximum time).	
7	“ <i>Error PV torque</i> ” is displayed on the status bar (the torque signal is displayed inside the set maximum time).	
8	“ <i>Error min torque</i> ” is displayed on the status bar (the torque signal is displayed below the preset minimum torque).	
9	“ <i>Error max torque</i> ” is displayed on the status bar (the torque signal is displayed over the set maximum torque).	
10	“ <i>Error min angle</i> ” is displayed on the status bar (the torque signal is displayed below the set minimum angle).	

11	“ <i>Error max angle</i> ” is displayed on the status bar (The max preset angle has been reached. Only available in Tor, T/lv and T/in mode).	
12	“ <i>Error angle not OK</i> ” is displayed on the status bar (The preset angle hasn’t been reached. Only available in Ang., A/lv and A/in mode).	
13	“ <i>Warning! No piece</i> ” is displayed on the status bar (The “missing piece” contact is enabled).	-check contact 2 on the CN2 connector
14	“ <i>Compensation error</i> ” is displayed on the status bar. A negative torque value is displayed due to a high negative compensation value.	- increase or decrease the compensation value
15	In % mode, “ <i>Model not available</i> ” is displayed on the status bar (It has been made an to switch from % to Unit mode with a screwdriver model not available)	
16	In Unit mode, “ <i>Torque / Speed Error</i> ” is displayed on the status bar. (A torque or speed has been set which are not included in the table relating to the selected screwdriver)	- set a torque or speed value included in the range indicated in the table
17	“ <i>Released lever error</i> ” is displayed on the status bar (The lever has been released while tightening).	Such error can be enabled or disabled through “PROGRAM-MENU” (see point 18 on the program menu).
18	“ <i>Reverse torque error</i> ” is displayed on the status bar (The torque signal is displayed while loosening, but only if it’s set on “max”).	- The screwdriver couldn’t loosen - Avoid motor stalling - Loosening too heavy
19	“ <i>Output Disabled</i> ”. Protection of output signals was activated after exceeding maximum load (400mA).	- Check the set load is not over the allowed maximum value - Restart the control unit to reset error
20	“ <i>Protection 12A</i> ” is displayed on the status bar (it happens when current on mosfets of bridge H is > 12 A for at least 1 s)	- Decrease screwing time and check settings - Avoid motor stalling - Unscrewing too heavy - Joint too soft
21	“ <i>Protection 14p5A</i> ” is displayed on the status bar (it happens when current on mosfets of bridge H is > 14.5 A for at least 800 ms)	- Decrease screwing time and check settings - Avoid motor stalling - Unscrewing too heavy - Joint too soft
22	“ <i>Protection 15A</i> ” is displayed on the status bar (it happens when current on mosfets of bridge H is > 15 A for at least 500 ms)	- Decrease screwing time and check settings - Avoid motor stalling - Unscrewing too heavy

ATTENTION: IF THE OK/ESC OPTION IS DISABLED, ERRORS RESET AT THE FOLLOWING SCREW/PROGRAM. OTHERWISE PRESS ESC. IF THE PROBLEM PERSISTS, PLEASE CONTACT YOUR NEAREST KOLVER DEALER.

## SERIAL PRINT:

Every control unit is supplied with a 9 pin serial female connector (connection pin: PIN 2 = TX, PIN 3 = RX, PIN 5 = GND) and a mini USB connector. You can print the results of each screwing on a printer (for example Kolver model PRNTR1) and/or on PC (for example through Hyper Terminal or Realterm or any data transmission program or EDU EXPAND). You can also save those results on a USB device. The transmission characteristics (only serial and USB) are the following: 9600 (bits per second), 8 (data bits), n (no parity), 1 (bits stop 1).

The print string is the following:

BARCODE	RESULT	PROGRAM NUMBER	MODEL	TORQUE%	SCREWING TIME	SPEED
---------	--------	----------------	-------	---------	---------------	-------

SCREW	SEQUENCE STAGE	TORQUE	ANGLE	DATE HOUR	NOTICE
-------	----------------	--------	-------	-----------	--------

**BC: Barcode** = it begins with “BC:” and it’s followed by the code of the scanned product.

**Result** = screwing result: correct or incorrect.

OK = the torque has been correctly reached, all the selected parameters are satisfied and the control unit will give out a beep sound of 0.5 sec.

NOK = the torque has been reached during ramp time or Fast Speed (see error table). In this case, the unit will give out 2 beep sounds and the red led will light up.

**PR: Program number** = it indicates the running program.

**Model** = Model of screwdriver you’re using.

**T%: Torque%** = percentage of the set torque level.

**S: Speed** = preset speed value.

**ST: Screwing time** = it indicates the time of the screwing.

**Screw: Number of screws** = number of tightened screws/total number of screws.

**Seq: Sequence stage** = it indicates the stage of the sequence.

**T: Torque** = torque value.

**A: Angle** = angle value.

**Notice** = in case of program end, it prints “Program End”, in case of sequence end, it prints “Seq. end” or it indicates the type of error (see paragraph: trouble shooting).

```

BC:28017596057082 OK PR:1 PLUT010 Tz:10% S: 600rpm ST: 0.7s Screw:01/03 Seq:1/1 T: 1.97 Nm a: 2681deg 04/06/01 03:06:31
BC:28017596057082 OK PR:1 PLUT010 Tz:10% S: 600rpm ST: 0.7s Screw:02/03 Seq:1/1 T: 2.00 Nm a: 2402deg 04/06/01 03:06:32
BC:28017596057082 OK PR:1 PLUT010 Tz:10% S: 600rpm ST: 0.7s Screw:03/03 Seq:1/1 T: 2.00 Nm a: 2544deg 04/06/01 03:06:33 Program end
BC:21234567890005 OK PR:1 PLUT010 Tz:10% S: 600rpm ST: 1.2s Screw:01/03 Seq:1/1 T: 2.00 Nm a: 4504deg 04/06/01 03:06:43
BC:21234567890005 NOK PR:1 PLUT010 Tz:10% S: 600rpm ST: 2.6s Screw:01/03 Seq:1/1 T: --- a: 9720deg 04/06/01 03:06:47 Error ang. max
BC:21234567890005 NOK PR:1 PLUT010 Tz:10% S: 600rpm ST: 2.6s Screw:01/03 Seq:1/1 T: --- a: 9720deg 04/06/01 03:06:51 Error ang. max
BC:21234567890005 OK PR:1 PLUT010 Tz:10% S: 600rpm ST: 1.0s Screw:02/03 Seq:1/1 T: 1.99 Nm a: 3783deg 04/06/01 03:06:53
BC:21234567890005 OK PR:1 PLUT010 Tz:10% S: 600rpm ST: 0.9s Screw:03/03 Seq:1/1 T: 2.01 Nm a: 3302deg 04/06/01 03:06:54 Program end
BC:24560138455821 OK PR:1 PLUT010 Tz:10% S: 600rpm ST: 0.8s Screw:01/03 Seq:1/1 T: 1.99 Nm a: 2756deg 04/06/01 03:07:04
BC:24560138455821 OK PR:1 PLUT010 Tz:10% S: 600rpm ST: 0.6s Screw:02/03 Seq:1/1 T: 1.97 Nm a: 2272deg 04/06/01 03:07:06
BC:24560138455821 OK PR:1 PLUT010 Tz:10% S: 600rpm ST: 0.7s Screw:03/03 Seq:1/1 T: 1.97 Nm a: 2500deg 04/06/01 03:07:08 Program end

```

## EDU EXPAND

EDU EXPAND is the software for pc created by Kolver to set, change and save all parameters of EDU2AE/TOP/TA unit.

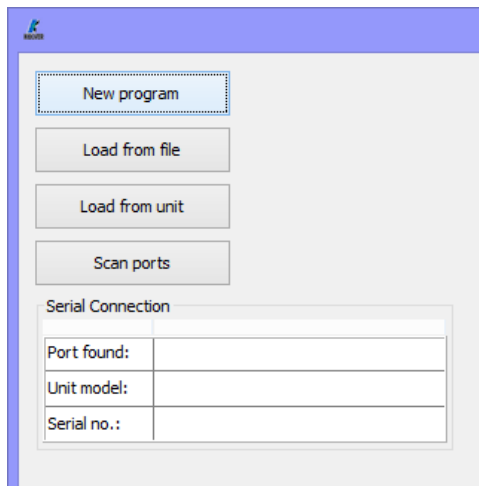
It communicates with the control unit via miniUSB or RS232 and makes you create up to 100 different settings configurations, save them on your USB drive and then recall on your EDU unit.

Just connect your USB drive to the port on the front panel of the EDU unit and recall the desired program on the menu (see Menu Options, USB Options).

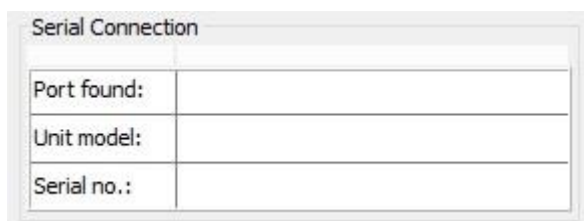
At the same time the programs set on control unit can be downloaded on USB and recalled on another unit and on EDU EXPAND, too.

Here is a quick guide to use EDU EXPAND.

Double click the icon program and this is the main view.



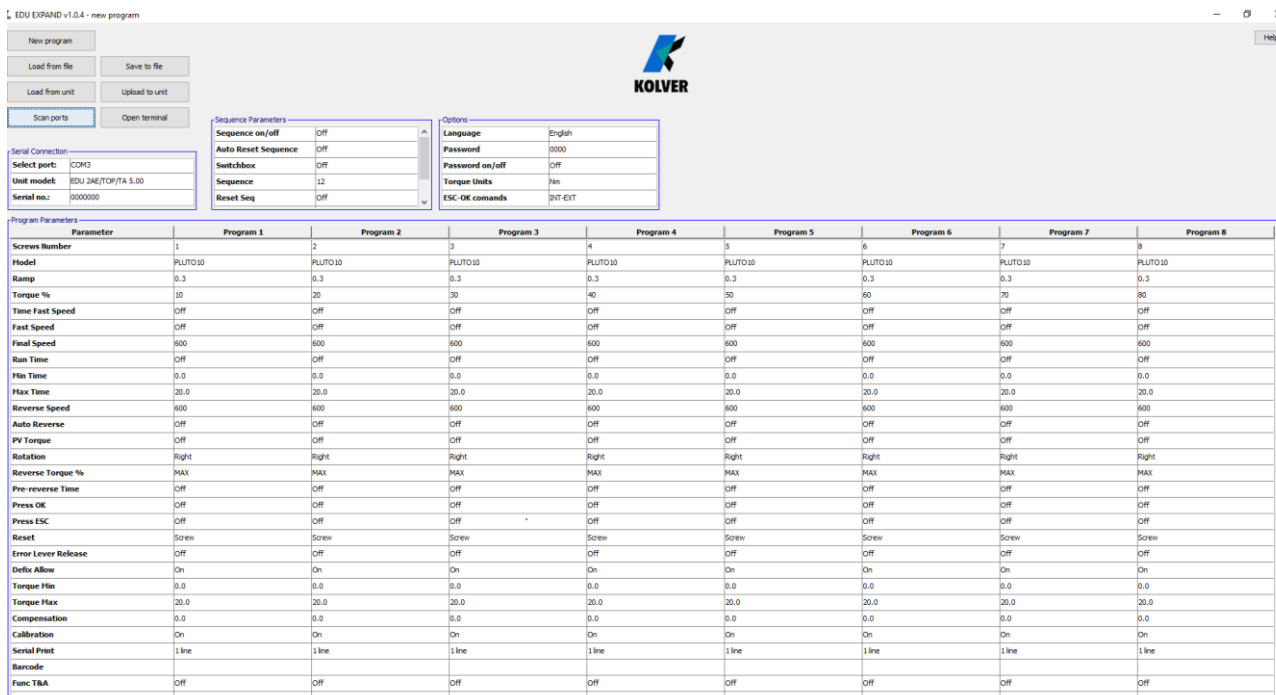
- **New program:** to load a new program.
- **Load from file:** it loads all programs, sequences and option settings from a previously saved file on your computer.
- **Load from unit:** it loads all program, sequence and option settings from the unit. The unit must first be connected to the pc using *Scan ports*.
- **Scan port:** it locates the unit. EDU EXPAND recalls the port, the model of the control unit and its serial number.
- 



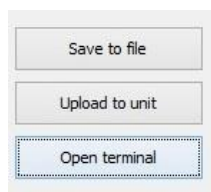
The control unit must be connected to the PC via miniUSB port or RS232 seat in the back panel of the unit.

If you cannot locate the control unit, make sure the unit and PC are connected properly or that the unit is on the initial screen of the Menu.

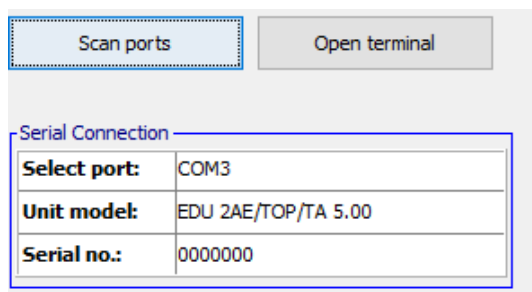
Here is the main screen when a program has been recalled or when you are creating a new one.



- To modify or enter any parameter values, double click a cell, select a number within the proper range, then press Enter. If the value is not within its valid range, pressing Enter will not confirm the change.

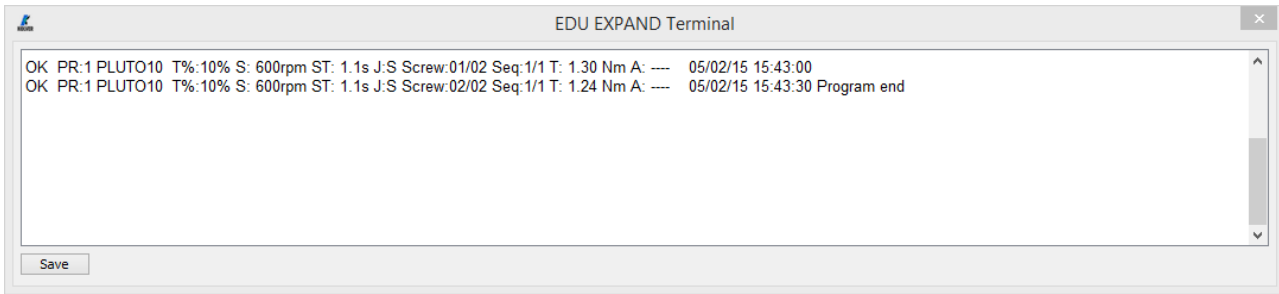


- **Save to file:** it saves all programs to a file. This file can be read directly from a USB drive connected to the unit on its front panel. In this case, the file name must be SETxx.KOL (xx = range from 00 to 99). This file could be copied in the USB drive and upload to the unit or recall with EDU EXPAND.
- **Upload to unit:** it uploads all the setting to the EDU control unit. Connect the unit to your computer through miniUSB or RS232. Switch the unit on.



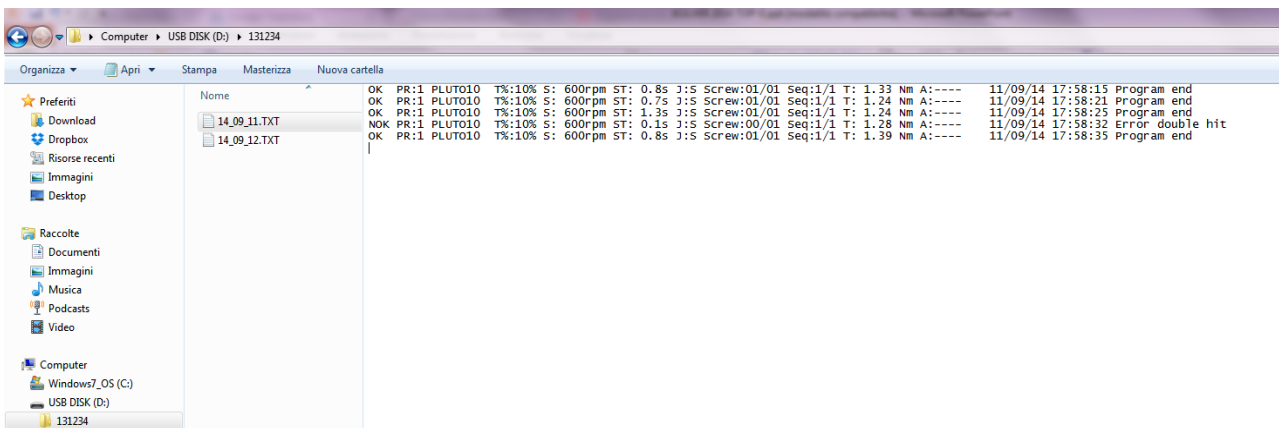
Click *Scan ports* to locate the unit. EDU EXPAND recalls the port, the model of the control unit and its serial number. Then click *Upload to unit*. The text *Programming...* will appear on the EDU display. When the text *Programming...* disappears, you may disconnect the cable. Uploading can only be initiated if the control unit shows *Ready* on the main screen.

- **Open terminal:** to display the print string (see Serial Print). To save in a .txt file the results of each tightening, push Save.



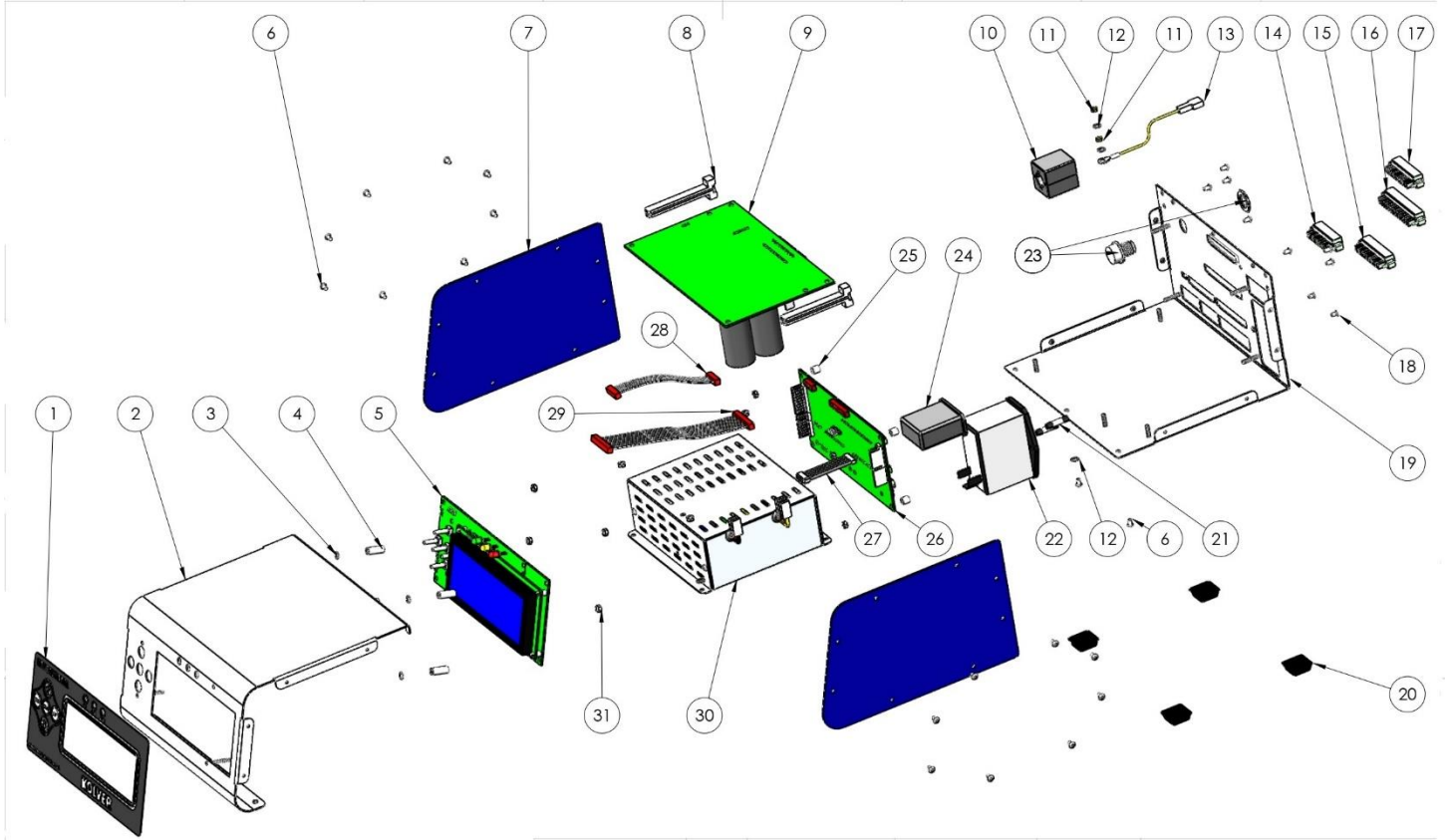
## Report of the screwing done

- If you connect the USB drive to the control unit, the unit creates a folder where the report of the screwing done will be saved.  
The folder is named as the serial number of the unit.  
The text file which contains all the screwing data is named as the current date.





# EXPLODED VIEW: EDU2AE/TOP/TA



## SPARE PARTS:

Position	Description	Qty	Code
1	Membrane EDU 2AE/TOP/TA	1	819006
2	Front cover	1	819012
3	Washer M3	4	800042
4	Spacer 15mm	4	890004/T
5	Display	1	852526
6	Screw M3X6 (6N)	26	8001002
7	Right panel	2	819013/F
8	Support board	2	872442
9	Main board	1	852521/SW
10	Ferrite	1	872468
11	Nut M3	2	800056/O
12	Washer	5	800041
13	Ground cable	1	800090/E
14	Connector 9PIN	1	800164
15	Connector 11PIN	1	800165
16	Connector 14PIN	1	800166
17	Connector 10PIN	1	800102
18	Screw M3X5 TX10	2	801003
19	Bottom panel	1	819011
20	Plastic support	4	800016-B
21	Fuse	2	800619
22	Filtered connector 220V	1	800718
23	Connector M12 8 pin + ferrite	1	201766/LTA
24	USB device	1	852424
25	Spacer 6mm	4	241003
26	I/O Board TOP/TA	1	852525/TA
27	USB Cable	1	872474
28	Plate 10 cm	1	872438
29	Plate 20 PIN	1	872438/T
30	Switching device	1	872490
31	Nut M3	11	800056

## **GUARANTEE**

1. This KOLVER product is guaranteed against defective workmanship or materials, for a maximum period of 12 months following the date of purchase from KOLVER, provided that its usage is limited to single shift operation throughout that period. If the usage rate exceeds of single shift operation, the guarantee period shall be reduced on a prorata basis.
2. If, during the guarantee period, the product appears to be defective in workmanship or materials, it should be returned to KOLVER or its distributors, transport prepaid, together with a short description of the alleged defect. KOLVER shall, at its sole discretion, arrange to repair or replace free of charge such items.
3. This guarantee does not cover repair or replacement required as a consequence of products which have been abused, misused or modified, or which have been repaired using not original KOLVER spare parts or by not authorized service personnel.
4. KOLVER accepts no claim for labour or other expenditure made upon defective products.
5. Any direct, incidental or consequential damages whatsoever arising from any defect are expressly excluded.
6. This guarantee replaces all other guarantees, or conditions, expressed or implied, regarding the quality, the marketability or the fitness for any particular purpose.
7. No one, whether an agent, servant or employee of KOLVER, is authorized to add to or modify the terms of this limited guarantee in any way. However it's possible to extend the warranty with an extra cost. Further information at [kolver@kolver.it](mailto:kolver@kolver.it).

# MANUAL

## EDU 2AE/TOP/NT/TA

### Torque range: 1.5-50 cNm



#### IDENTIFICATION DATA OF THE MANUFACTURER

KOLVER S.r.l.  
VIA M. CORNER, 19/21  
36016 THIENE (VI) ITALIA

#### IDENTIFICATION DATA OF THE PRODUCT

<b>MODEL:</b>	EDU2AE/TOP/NT/TA
<b>CODE:</b>	031000/TOP/NT/TA

#### TECHNICAL DATA OF THE PRODUCT

FUSE: 3,15 A  
DIMENSIONS: 190 x 205 x h120 mm WEIGHT: 2,0 Kg

#### DECLARATION OF CONFORMITY



**KOLVER S.r.l.** declares that the new tool here described: control unit model EDU2AE/TOP/NT/TA is in conformity with the following standards and other normative documents: 2006/42/CE, LVD 2014/35/UE, EMCD 2014/30/UE, EN 62841-2-2:2014, EN 62841-1: 2015, EN 60204-1, EN 61000-6-2, EN 61000-6-4.  
It is also in conformity with RoHS III normative (2011/65/UE and following 2015/863).

Name: Giovanni Colasante  
Position: General Manager  
Person authorized to compile the technical file in Kolver

Thiene, January 1<sup>st</sup> 2021

*Giovanni Colasante*

EDU 2AE/TOP/NT/TA power supply and control units are an innovative system for controlling the torque of any current control NATO../TA electric screwdrivers.

EDU 2AE/TOP/NT/TA delivers all the advantages of precision torque control electric tools at a fraction of the price of transdurized tools.

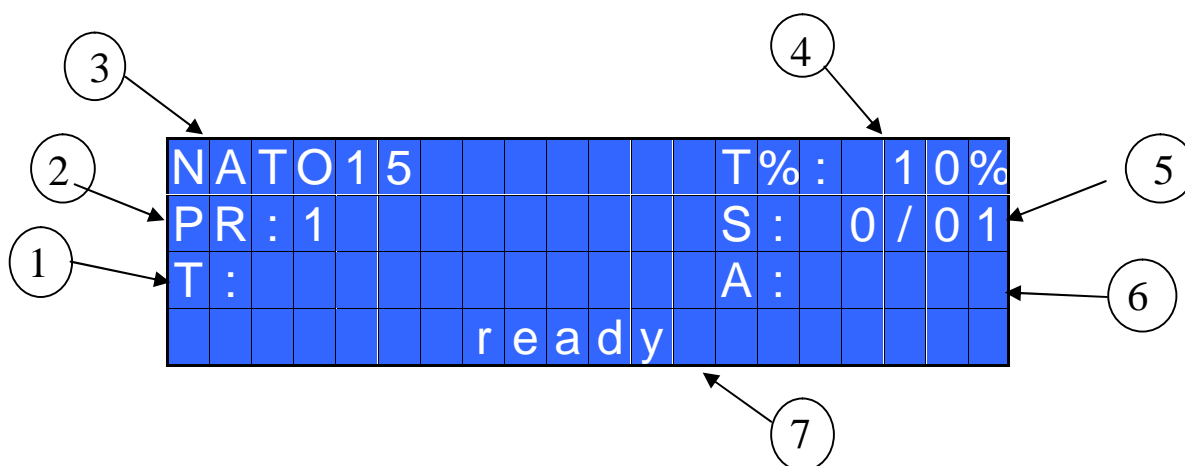
The state-of-the-art electronic control circuit cuts the power supply to the motor calculating the correct torque in response to 3 parameters; voltage, frequency and current, according to the selected options.

The AC 90÷260V - 50÷60Hz power supply is converted into 40VDC required by the NATO series screwdrivers through a switching board.

Model	Torque (cNm)	Speed (rpm)	
		Min	Max
NATO15	1.5-25	100	700
NATO50	5-50	50	700

**IMPORTANT: EDU2AE/TOP/NT/TA is a highly accurate unit but it is critically important to select the correct options to ensure that proper torque is being applied. Read the menu description carefully and in case you are unsure please contact Kolver for support information.**

Turn the unit on through the on/off switch on the back panel. The unit will carry a general system check and the words “*waiting connection*” will appear on the last line of the display. If the connection with the motor control board is successful the following screen will be displayed:



- 1- Reached torque level in Ncm, lbf.in or kgf.cm
- 2- Program number or sequence
- 3- Screwdriver model
- 4- Torque level in percentage
- 5- Screw count: done screws/total screws
- 6- Angle value in degrees
- 7- Status bar (ready, errors, etc...)



## FRONT PANEL KEYBOARD

To enter the menu press the **ESC** key for 2 seconds.

Select the line by pressing  $\uparrow$  or  $\downarrow$  then press **OK** (the symbol  $\blacktriangleright$  will turn into  $\blacksquare$ ). Press the  $\uparrow$  or  $\downarrow$  to select the required value and then confirm through **OK** (or **ESC** if you don't want to save the value).

The selected values will be immediately operational, even if you are still in the menu screen. Repeat the sequence for all the parameters you wish to change and then push **ESC** to return to the main screen.

Press **RESET** for 3 sec should you need to reset the screw, the program or the sequence. If you want to see all the set parameters press  $\uparrow$  for 2 seconds, however you cannot modify the displayed parameters on this screen.

## LEDS ON FRON PANEL



GREEN LED VERDE: indication of *Screw OK*.

YELLOW LED: indication of *Programm End* or *Sequence End*.

RED LED: any indication of error.

## MAIN MENU:

-	-	-	-	-	M	A	I	N	-	M	E	N	U	-	-	-	-	-
O	K	c	h	a	n	g	e			E	S	C	q	u	i	t		
▶	P	r	o	g	r	a	m	s	e	t	t	i	n	g				
	S	e	q	u	e	n	c	e	s	e	t	t	i	n	g			

**Program setting:** It indicates the menu section where you can set or modify the fastening parameters.

**IMPORTANT:** To work with switch box, socket tray and remote it is mandatory to go to Sequence Menu (Ext Box: ON).

**Sequence:** It indicates the menu section where you can activate the sequence, the switchbox/socket tray and the bar code.

-	-	-	-	-	M	A	I	N	-	M	E	N	U	-	-	-	-	-	
					S	e	q	u	e	n	c	e	s	e	t	t	i	n	g
					▶	U	n	i	t	o	p	t	i	o	n	s			
					U	S	B	o	p	t	i	o	n	s					

**Unit Options:** It indicates the menu section where you can set date and time, the password and the language.

**USB Options:** It indicates the menu section where you can view, upload and create programs setting of the control unit.

## PROGRAM MENU:

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-			
O	K				c	h	a	n	g	e				E	S	C		q	u	i	t	
					▶	1	)	P	r	o	g	r	a	m	n	u	m	b	e	r	:	1
						2	)	S	c	r	e	w	s	n	u	m	b	e	r	:		1

**1) Program number:** you can select/ modify the desired program from 1 to 8.

**2) Screws number:** The EDU2AE/TOP/NT/TA can act as screw counter. You can set the number of screws from 1 to 99. To disable the function press ↓ until you get to OFF.

If the number of correct screws matches to the number of set screws, “PROGRAM END” will appear on the status bar and the yellow led will light up. If the “Press OK” is ON (see point 18), “PROGRAM END” will automatically disappear at next screwing or any time you enter the menu. Otherwise, press OK at the end of each program.

**ATTENTION:** Every time you enter the menu, the number of screws will reset.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-	-										
					3	)	M	o	d	e	l	:							P	L	U	T	O	1	0				
					▶	4	)	R	a	m	p	:													0	.	3	s	
						5	)	T	o	r	q	u	e	:													1	0	%

**3) Model:** you can select the screwdriver to be used. Your choice will automatically change the default settings. It’s important to select the correct model you’re going to use since most parameters regarding the motor software are specific to every single model.

**IMPORTANT:** For NATO..CA drivers, switch box, socket tray and remote it is mandatory to select ON on Ext. Box in Sequence Menu.

**4) Ramp:** You can select the slow start time (acceleration) from 0.2 to 3.0 sec. This option is only available for the screwing phase, while during the unscrewing phase the ramp time is always 0.2 sec. We suggest using this option with self tapping screws.

**ATTENTION:** Reaching the torque while the ramp is still on could give as result a different torque level from the one that results when the ramp is over. This is due to the motor acceleration. Reaching the torque while the ramp is still on will activate the “screw OK” signal anyway (this option is useful if you need to tighten screws that are already tightened, the so called “double hit” ). On the other hand, if you wish to see an error signal during the preset torque in the ramp phase, you can change the minimum time by setting value which is equal or superior to the ramp value (see point 7).

**5) Torque:** you can select the desired torque as a percentage of the torque range of the selected screwdriver. The torque range is always referred to the MAX speed. In case you’re not working at maximum speed, the torque range will progressively lower in order to avoid motor stalling. If the torque level is reached correctly, it will be displayed and you will hear a beep sound, too. Such torque level is indicated as “ T: ..% ” on the main screen.

**6) Tm Fast Spd (Time Fast Speed):** You can select any speed value of the screwdriver between nominal (maximum speed given in the catalogue) and the minimum speed of every single screwdriver (see table with technical data). This function is available only if the Fast Speed is active.

-	-	-	-	-	MENU	-	-	PR:1	-	-	-	-		
6)	Tm	F	a	s	t	s	p	d:	0	.	3	s		
▶7)	F	a	s	t	s	p	d:				o	f	f	
8)	F	i	n	a	l	s	p	d:	7	0	0	r	p	m

**7) Fast spd (Fast Speed):** It indicates how long the screwdriver should turn at the FAST SPEED speed (see point 8) before switching to “pre-set speed” (lower speed). The “pre-set speed” is the speed set at point 6. This FAST SPEED time can be set from 0.3 to 10.0 sec. To disable the function press ↵ until you get to OFF. In this case the screwdriver will automatically start at pre-set speed (see point 8).

**CAUTION:** The aim of the FAST SPEED is only to speed up the approach time in case of long screws. Reaching the torque at higher speed will result in inaccurate torque output. To avoid inaccurate torque values we suggest first to set a shorter time, and then increase it. Torque reached during the FAST SPEED won’t activate the torque signal and the message “Error FAST SPEED” will be displayed on the main screen and 2 beep sounds. The red led will turn on, too.

**8) Final Spd (Final Speed):** You can select the speed of the screwdriver during the FAST SPEED. It can be set between max speed and the pre-set one (see point 7).

-	-	-	-	-	MENU	-	-	PR:1	-	-	-	-	
9)	R	u	n	t	i	m	e:		2	0	.	0	s
▶10)	M	i	n	t	i	m	e:				o	f	f
11)	M	a	x	t	i	m	e:		2	0	.	0	s

**9) Runtime:** You can set the time of a tightening, from OFF to 20.0 sec. When the pre-set time has been reached, it results in a torque signal. The couple reached during this time results in a signal of *Correct screw*. If the correct screw signal is not required, set the Minimum time up to a value of 'Minimum Time -0.1sec'.

**ATTENTION:** Max Time must be set at 20.0 sec.



**10) Min time - Minimum Time:** You can select the minimum time of screwing from 0.1 sec to 'Max time - 0.1s'. To disable the function press  $\downarrow$  until you get to OFF (Min time = 0). Torque reached below the minimum time won't activate the torque signal and will result in an error signal. “*Below minimum time*” will be displayed on the status bar and the red led will light up. You will hear two beep sounds, too.

**11) Max time - Maximum time:** You can select the maximum time of screwing. You can set from 'Min time + 0,1s' to 20.0 sec. You also can set the Maximum time to OFF by pressing the  $\uparrow$  button when you have reached the value of 20.0s. In this case the screwdriver turns without any time limit.

**ATTENTION:** If torque isn't reached by the maximum time, the screwdriver will stop. “*Over maximum time*” will be displayed on the status bar and the red led will light up. You will hear two beep sounds, too.

-	-	-	-	-	MENU	-	-	PR: 1	-	-	-	-						
1	2	)	P	r	e		R	e	v	:		o	f	f				
▶	1	3	)	A	u	t	o		R	e	v	:		2	0	.	0	s
1	4	)	R	e	v		s	p	d	:		6	0	0	r	p	m	

**12) Pre-Rev.:** pre-reverse. You can unscrew before tightening. This time can be set from OFF to 20.0 sec.

*N.B.* The speed and torque will be the same as those for the Auto Reverse.

**13) Auto rev. – Auto reverse:** This option will automatically start a reverse after a torque reached signal. You can set time from 0.1 to 20.0 sec. To disable the function press  $\downarrow$  until you get to OFF.

**ATTENTION:** During the reverse, it is necessary to keep the lever or the start signal pressed as long as it doesn't stop. “*Correct screw*” will be displayed on the status bar and a green led will light up. You will hear one beep sound, too. In case the lever is released before the end of the reverse, “*unfinished screw*” will be displayed and a red led will light up. You will hear two beep sounds, too.

**14) Rev spd - Reverse speed:** You can select any reverse speed value of the screwdriver between the maximum and the minimum specific speed of every single screwdriver (see table with technical data).

-	-	-	-	-	MENU	-	-	PR: 1	-	-	-	-					
1	5	)	R	e	v		t	o	r	q	u	e	:		M	A	X
▶	1	6	)	P	V		t	o	r	q	u	e	:		o	f	f
1	7	)	R	o	t	a	t	i	o	n	:		r	i	g	h	t

**15) Rev torque – Reverse torque:** You can select the desired reverse torque as a percentage of the torque range of the selected screwdriver (see point 2). If the torque is set on MAX, the reverse torque is about 20% higher than the possible maximum torque, so that it is always possible to unscrew a tightened screw (we suggest leaving this function on in normal use). If the setting is from MIN to 99% the reverse torque with the same percentage will be equal to the settings of the screwing phase.

**ATTENTION:** If you're using open-end wrenches, the reverse torque has to be set to MIN value in order to bring the wrench back to the correct position.

**16) PV torque:** Period of time in which the screwdriver works at **maximum torque** before switching to the torque that has been set by the user. You can set time from 0.1 to 10.0 sec.

To disable the function press ↵ until you get to OFF.

This function overlaps other time settings (Fast Speed, ramp time, minimum time, maximum time) from the motor start on.

**ATTENTION:** This function is useful for applications where the prevailing torque is higher than the final torque (for example trilobal screws or locknuts).

**Please use this function with utmost attention because an incorrect use can damage both the assembly and the screwdriver.**

Torques reached during the max torque time won't activate the torque signal. "Error pvt time" will be displayed and the red led will light up. You will hear two beep sounds, too.

**17) Rotation:** You can choose between right tightening (standard screws) or left tightening (left threaded screws). All the other functions will adapt to the selected direction of rotation.

-	-	-	-	-	MENU	-	-	PR :	1	-	-	-	-	-
1	8	)	P	r	e	s	s	OK :					o	f
▶	1	9	)	P	r	e	s	ESC :					o	f
2	0	)	R	e	s	e	t :							o

**18) Press OK:** when ON, press OK at the end of each screwing.  
When OFF, the control unit resets automatically after a screwing.

**19) Press ESC:** when ON, press ESC to reset the control unit.  
When OFF, the control unit resets automatically after an error signal.

**20) Reset:** you can reset the program or the single screw.

-	-	-	-	-	MENU	-	-	PR :	1	-	-	-	-	-
2	1	)	E	r	r	o	r	l	e	v	e	r :		o
▶	2	2	)	D	e	f	i	x	a	l	l	o	w :	o
2	3	)	C	o	m	p	e	n	s :			0	.	0

**21) Error lever:** when ON, an error signal will occur when the lever has released before reaching the torque.

When OFF, this function doesn't work.

**22) Defix allow:** when OFF, the reverse is NOT enabled.

-	-	-	-	-	MENU	-	-	PR :	1	-	-	-	-	-
2	3	)	C	o	m	p	e	n	s :			0	.	0
▶	2	4	)	T	o	r	q	m	i	n :			0	.
2	5	)	T	o	r	q	m	a	x :	2	0	0	.	0

**23) Compens – Compensation:** This function allows an increase or decrease of the displayed torque value. The available range is from 0 to  $\pm 599.9$  Ncm. For example: you make a screwing on your assembly and compare the displayed value to the value you see on a torque tester (for example a miniK/S model). Let's say you notice that the torque displayed in the unit EDU2AE/TOP/NT/TA is +2 Ncm higher than the value indicated on the tester (which is the right one). In this case you can modify this value by setting -2 Ncm so that the value on the display will be the same as the value on the tester. If it's lower than 3 Ncm, you need to set +3 Ncm and so on.

**24) Torq min – Minimum torque:** The minimum torque and maximum torque options allow the user to set the acceptable torque range for each single application. When the reached torque is within this range, "Screw OK" will be displayed on the status bar and the green led will light up. If the reached torque is outside this range, "error minimum torque" or "error maximum torque" will be displayed and the red led will light up. You can set the torque range from 0 to 'Torq Max-0.1 Ncm' in steps of 0.1 Ncm.

The minimum torque option allows to set the lowest value of the torque range.

The selection of the torque value is carried out by entering the digit cell by cell.

**25) Torq max – Maximum Torque:** The minimum torque and maximum torque options allow the user to set the acceptable torque range for the single application. When the reached torque is within this range, "Screw OK" will be displayed on the status bar and the green led will light up. If the reached torque is outside this range, "error minimum torque" or "error maximum torque" will be displayed. You can set the torque range from 'Torq Min+0.1 Ncm' to 599.9 Ncm at intervals of 0.1 Ncm.

The maximum torque option allows to set the highest value of the torque range.

The selection of the torque value is carried out by entering the digit cell by cell.

-	-	-	-	-	MENU	-	-	PR:1	-	-	-	-
2	6	)	I	n	s	.	b	a	r	c	o	d
▶	2	7	)	S	e	r	i	a	l	P	R	T
												o
												f
2	8	)	F	u	n	c	T	&	A	:		
												o
												f

**26) Ins. barcode:** to scan a barcode and recall the desired program. To be used in combination with option 4. of the Sequence Menu.

**27) Serial PRT:** Serial print: from OFF to 5.

When OFF, no print.

If it is set up to 5, this value identifies the number of line feeds between a string and another.

-	-	-	-	-	MENU	-	-	PR:1	-	-	-	-
2	8	)	F	u	n	c	T	&	A	:		
												o
												f
▶	2	9	)	S	t	a	r	t	i	n	g	T
												-
												-
3	0	)	A	n	g	.	m	i	n	:		
												-
												-

**28) Func T&A–T&A function mode:** You can activate the Torque & Angle function. Set OFF when you don't need this function. When you set ON you can choose among six working conditions (see T&A specific instructions).

**29) Starting Tor – Starting torque:** If T&A option is set on Tor mode (See T&A paragraph), you can set the torque threshold the angle starts to be read from. When T&A is set on angle mode (see T&A paragraph), you can set the torque threshold the angle starts to be carried out from.

**30) Ang. min – Minimum angle:** Minimum angle threshold. You can set it when T&A is set on Tor, T/in or T/lv (see T&A specific instructions). The minimum angle the operator can set is 5°.

-	-	-	-	-	M	E	N	U	-	-	P	R	:	1	-	-	-	-
	3	0	)	A	n	g	.	m	i	n	:					-	-	-
▶	3	1	)	A	n	g	.	m	a	x	:					-	-	-

**31) Ang. max - Maximum angle:** Maximum angle threshold. You can set it when T&A is set on Tor, T/in or T/lv (see T&A specific instructions). The maximum angle the operator can set is 9720°.

When T&A is set on Ang., A/in or A/lv mode, maximum angle corresponds to the angle that has to be carried out.

## SEQUENCE MENU:

-	-	-	S	E	Q	U	E	N	C	E	-	M	E	N	U	-	-	-		
OK			c	h	a	n	g				E	S	C		q	u	i	t		
▶	1	)	S	e	q		s	e	t	:		1	4	7	3	9	8	1	2	
	2	)	S	e	q		u	e	n	c	e	:						o	f	f

**1) Seq set:** you can set a sequence up to max. 8 programs.

To set the next program in the sequence, press OK.

Press ← to save the sequence and quit.

**2) Sequence:** to enable or disable the sequence. ON = enabled; OFF = disabled.

-	-	-	S	E	Q	U	E	N	C	E	-	M	E	N	U	-	-	-			
	3	)	E	x	t		b	o	x	:								o	f	f	
▶	4	)	M	o	d	.		b	a	r	c	:							o	f	f
	5	)	I	n	s	.		b	a	r	c	o	d	e		S	e	q			

**3) Ext box:** It allows to enable or disable the external control.

**IMPORTANT: It is mandatory to select ON to work with switch box, socket tray and remote.**

**4) Barc. mode: – Barcode mode:** It allows to choose the barcode mode.

- **OFF:** barcode disabled.
- **ON prog:** you can select the program to be executed by scanning the bar code of the product. The unit compares the scanned code to the one previously entered in each program (see point 27: Barc. Set.). If the two codes match, the program is loaded; otherwise it will display *Error Barcode*. The scanned product code is also printed on the serial port of the control unit (see paragraph “*serial print*”).
- **ON S.N.:** the product code is required before running a program or a sequence. The product code is printed on the serial port of the control unit.

- **ON Seq.:** you can set the Sequence by scanning its barcode. The code scanned is compared with the sequence entered in the menu (see point 5: Ins. Barcode Seq on Menu Sequence). If the two codes match, the sequence set is loaded, otherwise display “Repeat scan”. The read code is also printed on the serial port of the control unit (see section Serial Print).

**5) Ins. Barcode Seq:** When ON on “Barc. Mode ON Seq.”, you have to scan the barcode to enable the Sequence. IMPORTANT: Barcode can be ONLY numeric.

-	-	-	S	E	Q	U	E	-	M	E	N	U	-	-	-	-
6	)	R	e	s	e	t	S	e	q	.	:			o	f	f
▶	7	)	R	e	s	.	s	e	q	a	u	t	:		o	n

**6) Reset seq.:** When ON, you can reset the Sequence (pushing the Reset button).

**7) Aut. res seq- Automatic Reset Sequence:** When ON, the control unit automatically resets after the end of the sequence. When OFF it is necessary to press OK at the end of each sequence.

## OPTION MENU:

-	-	-	-	-	M	A	I	N	-	M	E	N	U	-	-	-	-	-
S	e	q	u	e	s	e	t	t	i	n	g							
▶	U	n	i	t	o	p	t	i	o	n	s							
U	S	B	o	p	t	i	o	n	s									

## Unit Options:

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
O	K	c	h	a	n	g	e		E	S	C	q	u	i	t				
▶	1	)	L	a	n	g	u	a	g	e	:						E	N	
2	)	C	h	a	n	g	e	p	a	s	s	w	o	r	d				

- 1) Language:** This option allows to choose among the languages available: English, French, German, Italian, Spanish and Portuguese.

**2) Change password:** You can change password (see point 3).

-	-	-	-	O	P	T	I	O	N	-	-	M	E	N	U	-	-	-	-		
	3	)	P	a	s	s	w	o	r	d	:								o	n	
→	4	)	E	S	C	-	O	K	-	R	S	T	:						e	x	t
	5	)	U	n	i	t	:												N	c	m

**3) Password ON:** When YES, you will be asked for the password to enter the menu. Otherwise select NO.

ATTENTION: Password is only asked to enter the menu the first time after switching the unit on. The default password is: 0000.

**4) ESC-OK-RST:** Press ESC in case of error. Press OK at the end of a program or to reset a sequence or a program (see point 7: Reset).

When INT, the operator must press the required key on the front panel.

When EXT, functions can only be enabled through proper connections on the back panel (see paragraph I/O connections).

When INT+EXT you can press either the button on the front or on the back panel.

**5) Unit:** You can choose between the following units of measurements: Ncm, lbf.in and kgf.cm.

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-	
	6	)	V	e	r	s	i	o	n	s										
→	7	)	S	e	r	i	a	l		n	.	0	0	0	0	0	0	0	0	0
	8	)	S	e	t		t	i	m	e		&		d	a	t	e			

**6) Versions:** in this screen you can see the versions of boards mounted inside the unit.

**7) Serial number:** it is the indication number of the control unit. Default number: 0000000.

It could be the real serial number of the unit or another one you could choose (7 digits max).

This number will also be the name of the folder in the USB drive where you will save the report of your data (see EDU EXPAND part).

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-	
	7	)	S	e	r	i	a	l		n	.	0	0	0	0	0	0	0	0	0
→	8	)	S	e	t		t	i	m	e		&		d	a	t	e			
	9	)	C	y	c	l	e	s	:			0	0	0	0	0	0	0	0	

**8) Set time & date:** to set time and date on the control unit.

**9) Cycles** - Total number of cycles: It shows the number of tightened and loosened screws. This number can't be modified.

## USB Options:

-	-	-	-	O	P	T	I	O	N	S	-	M	E	N	U	-	-	-	-
→	1	)	R	e	a	d		U	S	B									
	2	)	W	r	i	t	e		U	S	B								
	3	)	I	n	f	o		U	S	B									

- 1) **Read USB:** press OK and read the USB drive and select the file SETxx.KOL you desire. The EDU control unit recognizes only files as SETxx.KOL (see EDU EXPAND part).

		S	e	l	e	c	t		P	r	o	g	r	a	m				
		S	E	T	0	0	.	K	O	L									
O	K		c	o	n	f	i	r	m		E	S	C		q	u	i	t	

- 2) **Write USB:** press OK and create your new SETxx.KOL application where you save all the parameters you have set in the control unit.

				S	a	v	e		a	s									
				S	E	T	0	0	.	K	O	L							
O	K		c	o	n	f	i	r	m		E	S	C		q	u	i	t	

- 3) **Info USB:** press OK and see the loaded program. You can see the loaded program only if you have saved the program in your USB drive as named as SETxx.KOL.

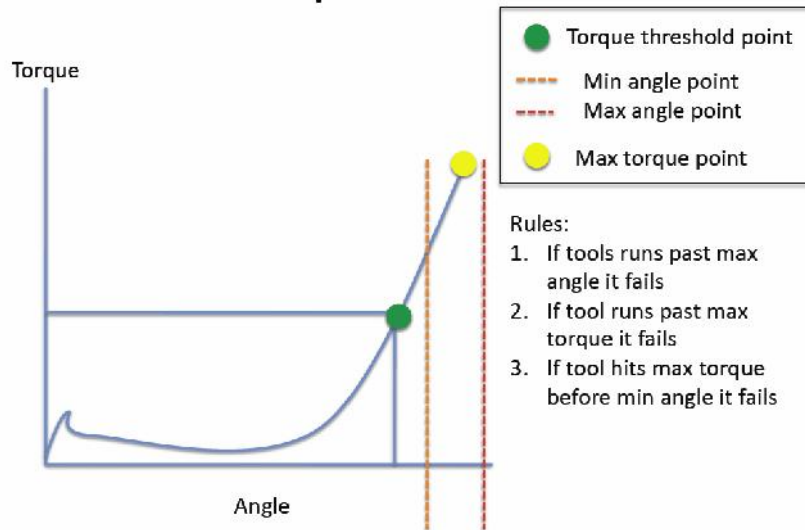
		L	o	a	d	e	d		p	r	o	g	r	a	m	:				
		S	E	T	2	3	.	K	O	L										

## USE OF T&A (Torque & Angle)

Choose the T & A mode (see point 26: Modify function on the program menu)  
It is possible to set 6 different modes:

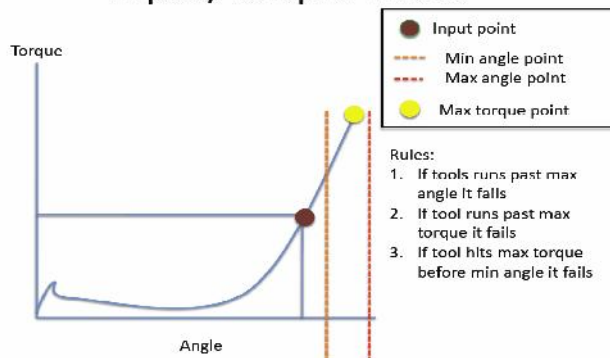
- ⤴ TORQUE (Torque): It's the most common use mode. The control unit shows the tightening torque and the torque starting from a certain torque percentage (threshold torque, see point 27). If the final torque and angle values are within the preset minimum and maximum values, the screw is correctly tightened. If the torque and/or angle are outside the preset values, the screw will be considered as incorrectly tightened. In this case the red led will light up and the message "Error Max (Min) Angle" or "Error Max (Min) Torque" will be displayed.

### Torque mode



- ⤴ TORQUE/INPUT (T/IN): It corresponds to *Torque* mode, except for the threshold torque which can't be set by the operator: in fact the value is the result of an external impulse through a proper contact (see paragraph "connections"). It can be very useful if the operator wants the control unit to start counting the angle from a position which is indicated by a precision instrument.

### Input/Torque mode

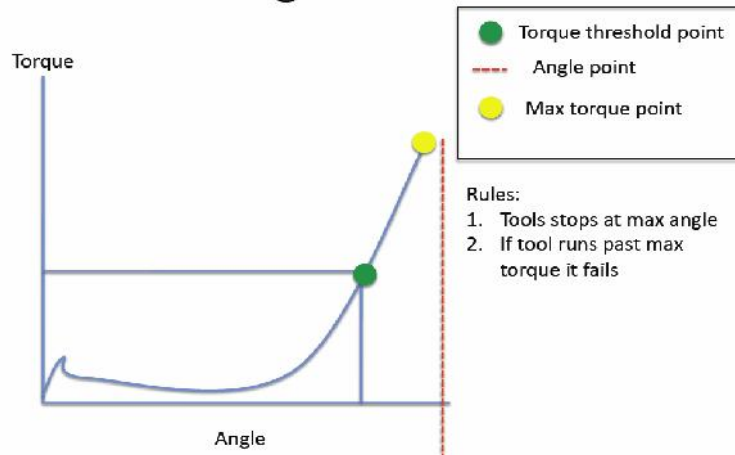


- ⤴ TORQUE/LEVER (T/LV): No threshold is preset by the operator: the angle value that appears on the display corresponds to the angle that is carried out starting from the moment in which the lever is pressed until the torque is reached.
- ⤴ ANGLE (Ang.): This mode gives priority to the angle to be reached. The value is measured starting from a tightening torque percentage.



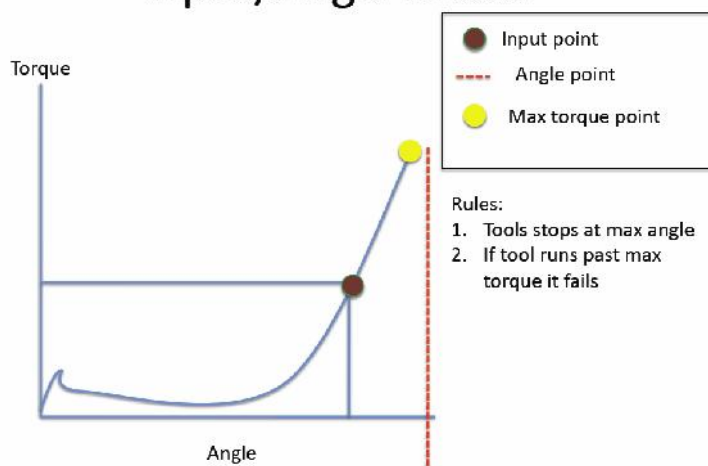
Starting from the preset threshold torque (see point 27) the system will start counting the degrees and when the preset angle is reached the screwdriver will stop. If the preset angle is reached the screw will be considered as correctly tightened, the green led will light up and the message “*tightening OK*” will be displayed on the status bar. If the screwdriver stops before reaching the preset angle the tightening will be considered not ok, the red led will light up and the message “error angle not reached” will be displayed on the status bar. Therefore it’s very important to set a torque value (line 4) which is sufficiently higher than the threshold value (line 27), so that the set value is reached before the screwdriver stops because of the reached torque.

## Angle mode



- ⤴ ANGLE/INPUT (A/IN): The threshold can’t be set by the operator: in fact the value is the result of an external impulse through a proper contact (see paragraph “connections”). This function can be very useful if the operator wants the screw to rotate a certain number of degrees after reaching a position indicated by a precision instrument.

## Input/Angle mode



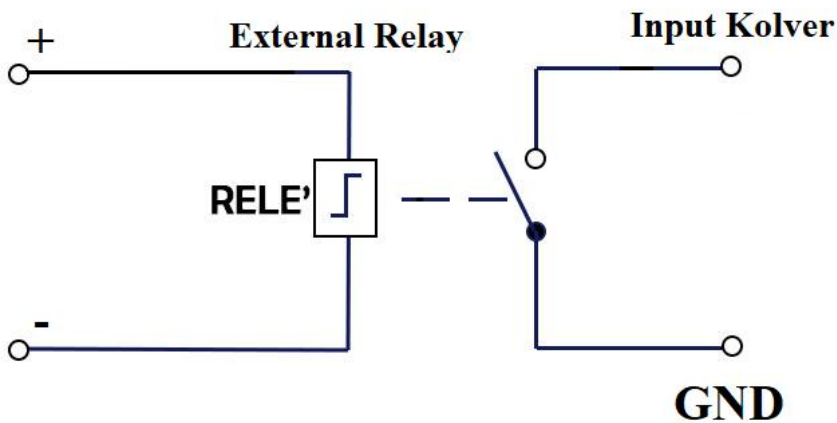
- ⤴ ANGLE/LEVER (A/LV): the threshold torque value can’t be set by the operator and the angle value that appears on the display corresponds to the angle that is carried out starting from the moment in which the lever is pressed.

## INTERPRETATION OF ACOUSTIC SIGNALS

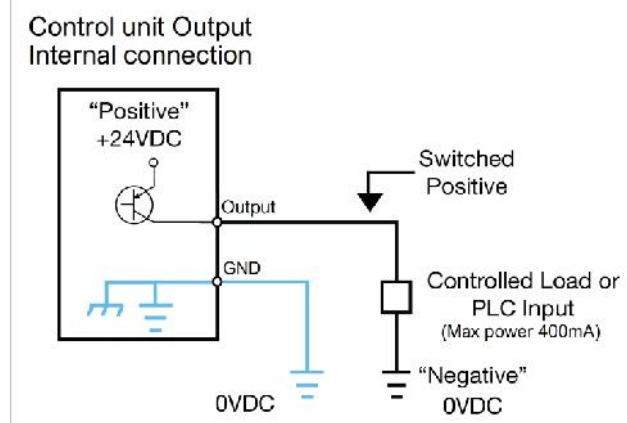
The control unit emits sounds which help you understand if the screwing has been carried out correctly or not. When the torque is reached meeting all the parameters set, the control unit utters a 0.5 sec beep as confirmation. In case of Program End, the unit will utter other two beeps. On the other hand, torque reached under min time, during the Ramp time or under the Fast Speed (see error signals on the display) will cause the control unit to utter three beep sounds.

## I/O CONNECTIONS

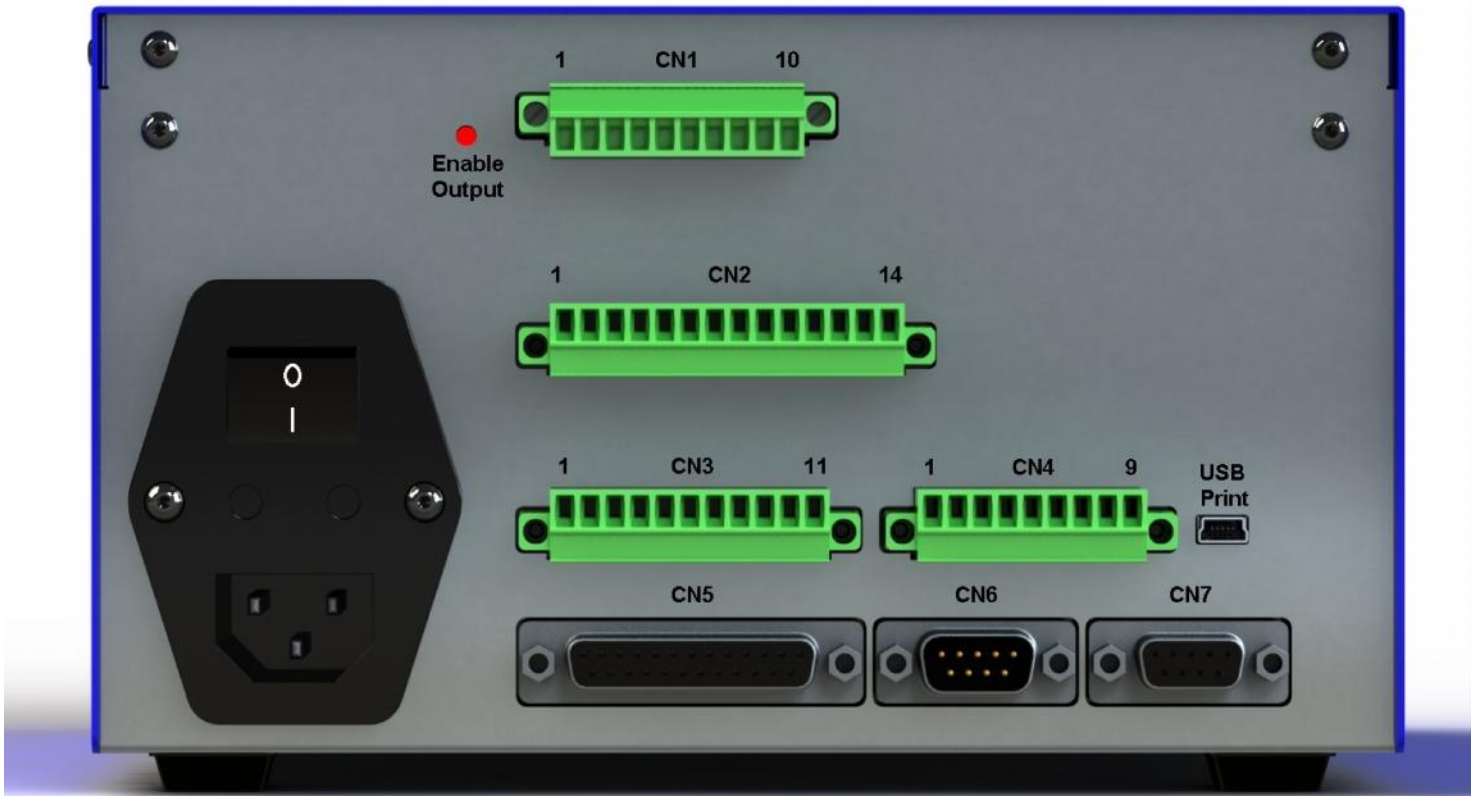
EDU 2AE/TOP control unit series have connectors placed on the back panel. These connectors allow to enable functions through inputs and to take signals through outputs. The inputs are activated by connecting them to ground. A positive voltage must NEVER be brought to these inputs. Bringing 24V to the unit inputs could damage the inputs themselves. As seen from the picture below, to enable the inputs it is recommended to bring a clean contact by using a relay or a simple switch or button.



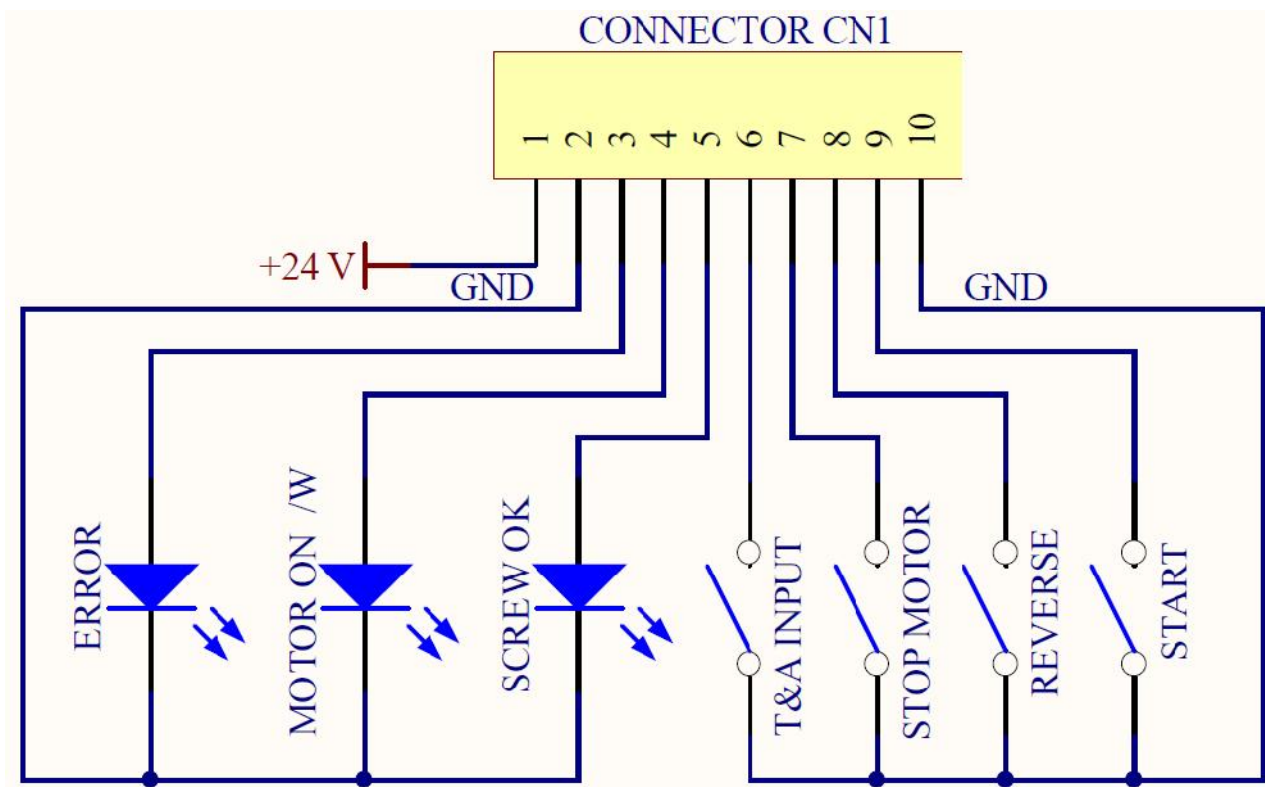
As for the outputs, they are all PNP type with active function. On each pin you will have 24V DC.



These pins can be used directly connected to PNP inputs (PLC) or used to turn on LEDs, buzzers or other devices with 24V power supply. The maximum total power of the outputs is about 400mA. Using inductive loads such as relays or other loads with an initial consumption peak greater than 400mA will send all outputs to protection, displaying the message "output disable". To restore the outputs after a protection, turn off and turn on the unit again.



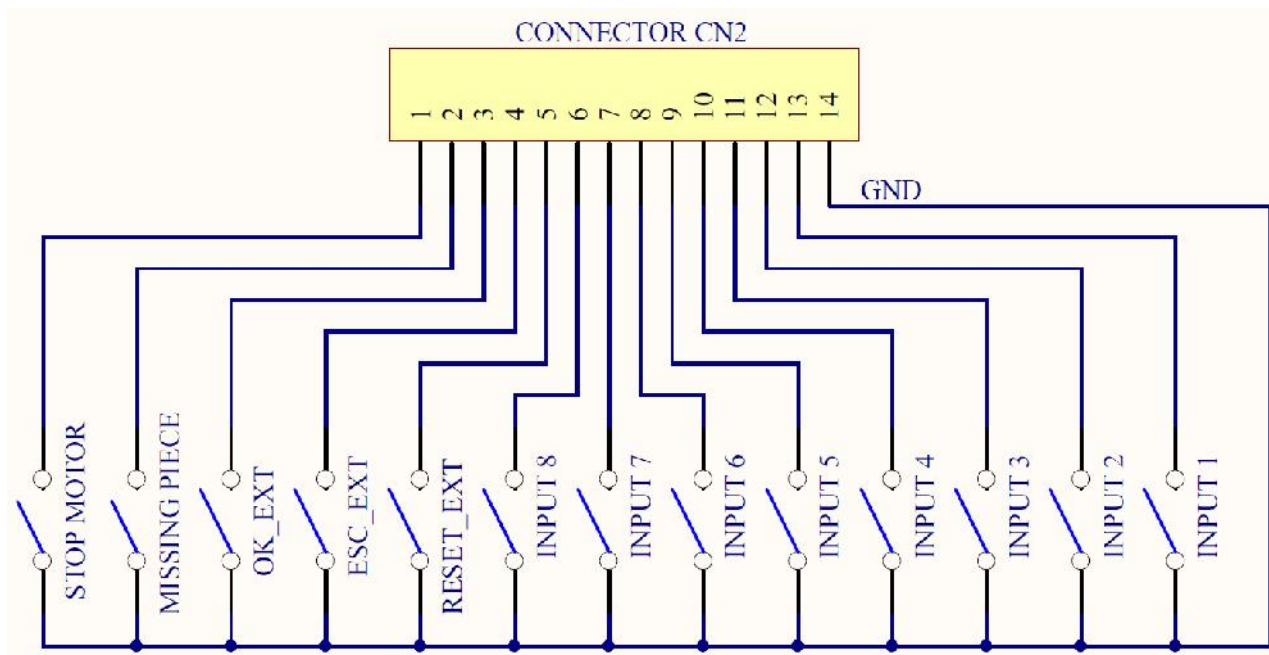
- CN1 CONNECTOR – 10 pins  
It is situated on the upper part of the back panel.



PIN	NAME	FUNCTION
<b>OUTPUT</b>		
1	+24V	+24V voltage protected. The maximum current consumption is 400mA. CAN NOT BE USED TO POWER EXTERNAL DEVICES.
2	GND	Common pin. Signals must be taken between this pin (GND and the respective signal pins (pin 3, 4 and 5).
3	ERROR	Error signal: it activates every time an error occurs. The red led on the front panel will switch on. Signal is 24V.
4	MOTOR ON (W)	It activates when the motor turns during screwing. Signal is 24V.
5	SCREW OK	Correct screw signal. The green led on the front panel will switch on. Signal is 24V.
<b>INPUT</b>		
6	T&A INPUT	External input for making the control unit start to count the angle. It can be only used in A/IN and T/IN mode (see T&A paragraph)
7	STOP MOTOR	Remote motor stop. If it's activated the message "STOP MOTOR ON" appears on the display. The motor will stop and won't start working again as long as the contact is closed (as Input pin 1 of CN2).
8	REVERSE	Remote motor start with torque control while unscrewing.
9	START	Remote start with torque control while screwing.
10	GND	Common pin. The desired function is activated through a contact between this pin and one of the other pins.

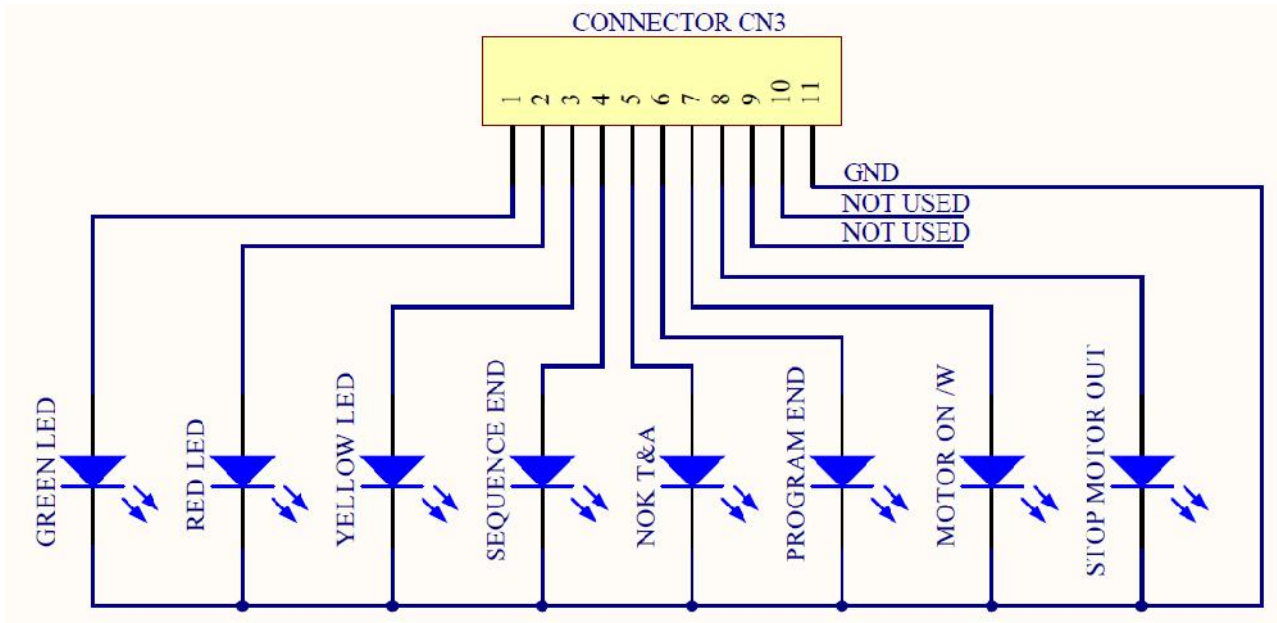
- CN2 CONNECTOR – 14 pins

All of the following pins are input: make a contact with pin 14 to activate them.



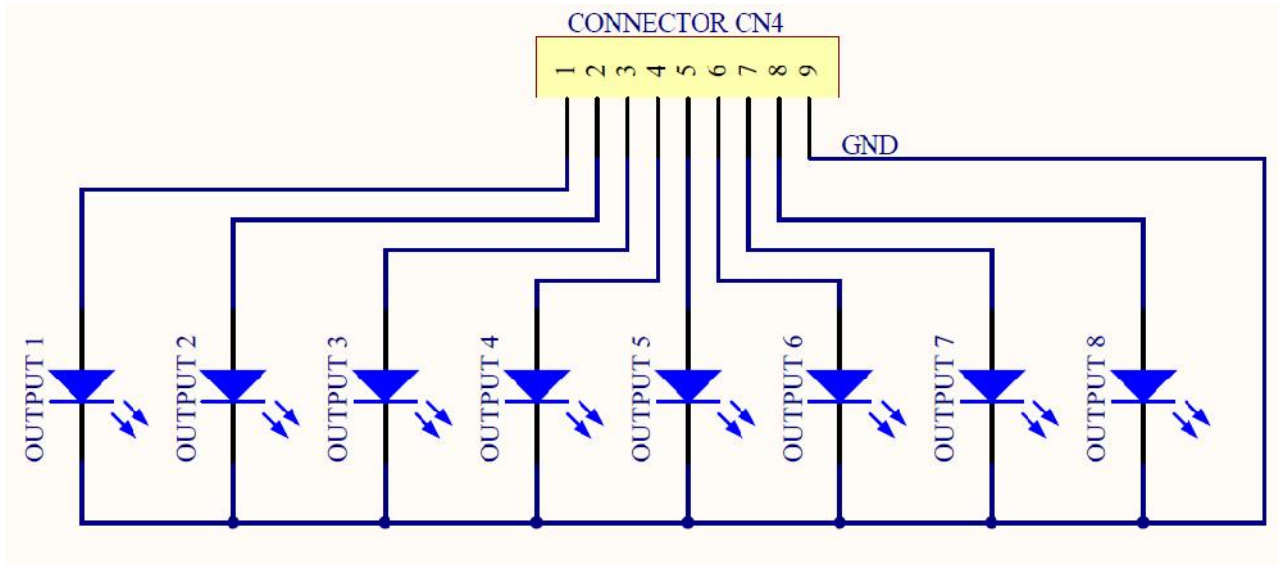
PIN	NAME	FUNCTION
1	STOP MOTOR	Remote motor stop. If it's activated the message "STOP MOTOR ON" appears on the display. The motor will stop and won't start working again as long as the contact is closed (as Input pin 1 of CN2).
2	MISSING PIECE	If enabled it stops the motor, enables the error signal and "Error missing piece" is displayed on the status bar.
3	OK EXT	If enabled (see point 4: OK-ESC commands, in the option menu), remote OK key function.
4	ESC EXT	If enabled (see point 4: OK-ESC, in the option menu), ESC key function to reset remote errors.
5	RESET EXT	If enabled (see point 4: OK-ESC commands, in the option menu), it resets program or sequence according to the preset function (see point 5: Reset, in the option menu)
6	INPUT 8	Switch – selection of program 8
7	INPUT 7	Switch – selection of program 7
8	INPUT 6	Switch – selection of program 6
9	INPUT 5	Switch – selection of program 5
10	INPUT 4	Switch – selection of program 4
11	INPUT 3	Switch – selection of program 3
12	INPUT 2	Switch – selection of program 2
13	INPUT 1	Switch – selection of program 1
14	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (GND) .

- CN3 CONNECTOR – 11 pins  
All of the following pins are output.



PIN	NAME	FUNCTION
1	GREEN LED	This signal works in parallel with the green led on the front panel.
2	RED LED	This signal works in parallel with the red led on the front panel.
3	YELLOW LED	This signal works in parallel with the yellow led on the front panel.
4	SEQUENCE END	It indicates the end of a sequence, if enabled.
5	NOK T&A	It activates if any angle error occurs.
6	PR OK	It activates at the end of each program.
7	MOTOR ON (\W)	It activates when the motor runs while tightening.
8	STOP MOTOR	It activates when stop motor is enabled.
9	NOT USED	
10	NOT USED	
11	GND	Common to every output. Signals have to be enabled making contact between the desired signal and this pin (GND).

- CN4 CONNECTOR – 9 pins  
All of the following pins are output.



PIN	NAME	FUNCTION
1	OUTPUT 1	It indicates you're using program 1
2	OUTPUT 2	It indicates you're using program 2
3	OUTPUT 3	It indicates you're using program 3
4	OUTPUT 4	It indicates you're using program 4
5	OUTPUT 5	It indicates you're using program 5
6	OUTPUT 6	It indicates you're using program 6
7	OUTPUT 7	It indicates you're using program 7
8	OUTPUT 8	It indicates you're using program 8
9	GND	Common to every output. Signals have to be enabled making contact between the desired signal and this pin (GND).

- CN5 CONNECTOR (25 pin connector - female):

PIN	NAME	FUNCTION
1	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (common 0VDC).
2		Not used
3	STOP MOTOR OUT	It indicates stop motor is enabled
4	OUTPUT 8	It indicates you're using program 8
5	OUTPUT 7	It indicates you're using program 7
6	OUTPUT 6	It indicates you're using program 6
7	OUTPUT 5	It indicates you're using program 5
8	OUTPUT 4	It indicates you're using program 4
9	OUTPUT 3	It indicates you're using program 3
10	OUTPUT 2	It indicates you're using program 2
11	OUTPUT 1	It indicates you're using program 1
12	+24V	+24V available on this pin, they can't be used to charge external devices.
13	+5V	+5V available on this pin, it can't be used to charge external devices
14	OK EXT	If enabled (see point 4: OK-ESC, in the option menu), remote OK key function.
15	ESC EXT	If enabled (see point 4: OK-ESC, in the option menu), ESC key function to reset remote errors.
16	RESET EXT	If enabled (see point 4: OK-ESC, in the option menu), it resets program or sequence according to the preset function (see point 5: Reset, in the option menu).
17	INPUT 8	Switch – selection of program 8
18	INPUT 7	Switch – selection of program 7
19	INPUT 6	Switch – selection of program 6
20	INPUT 5	Switch – selection of program 5
21	INPUT 4	Switch – selection of program 4
22	INPUT 3	Switch – selection of program 3
23	INPUT 2	Switch – selection of program 2
24	INPUT 1	Switch – selection of program 1
25	+15V	+15V available on this pin, not used to charge external devices

- CN6 CONNECTOR (serial connector 9 pin - male) - FOR BARCODE CONNECTION

PIN	NAME	FUNCTION
1	+15V	+15V available on this pin, it can't be used to charge external devices.
2	RX	Serial reception.
5	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (GND)
9	+5V	Not used.

**IMPORTANT:** the barcode scanner to be used must have the following features: RS232 transmission with 9600baud, 8 data bits, 1stop bit, no parity, terminators CR-LF.



- CN7 CONNECTOR (9 pin serial connector - female) – PRINT FUNCTION

PIN	NAME	FUNCTION
1	+15V	Not used.
2	TX	Serial transmission.
3	RX	Serial reception.
5	GND	Common to every input. Signals have to be enabled making contact between the desired signal and this pin (GND).
9	+5V	Not used.

- **USB-PRINT CONNECTOR**

Only used to print data on PC (see dedicated paragraph).

**ATTENTION: Output signals are protected from an appropriate circuit. Overload of the available signals (> 400 mA) or short circuit will result in the stop of the unit. To re-activate signals, it is necessary to switch off the unit for 5-6 seconds, check connections and output loads then switch the unit on.**

## **CORRECT SCREWS MESSAGES ON DISPLAY**

On the status bar it will display “ <i>Screw OK</i> ”.	A correct screwing has been performed, reaching the pre-set torque value.
On the status bar it will display “ <i>Angle OK</i> ”.	A correct screwing has been performed, reaching the pre-set angle.
On the status bar it will display “ <i>Runtime OK</i> ”.	A correct screwing has been performed, reaching the pre-set runtime.
On the status bar it will display “ <i>Reverse torque OK</i> ”	A correct screwing has been performed, reaching the pre-set reverse torque value.

## TROUBLE SHOOTING

<b>ERROR</b>	<b>PROBLEM</b>	<b>SOLUTION</b>
0	“ <i>waiting connection</i> ” doesn’t turn into “ <i>loading</i> ” after it’s been switched on.	Contact the nearest Kolver dealer.
1	“ <i>Error Torque Control</i> ” is displayed on the status bar	Make a new screw. If the error persists, change the torque and speed settings.
2	“ <i>Error Fast Speed</i> ” is displayed on the status bar (the torque signal is displayed during the brake time).	
3	“ <i>Reverse incomplete</i> ” is displayed on the status bar (the displayed torque signal is correct but the set unscrewing is not complete).	
4	“ <i>Pre-Reverse incompl.</i> ” is displayed on the status bar (the lever has been released before the runtime has been achieved)	
5	“ <i>Under min time</i> ” is displayed on the status bar (the torque signal is displayed below the pre-set minimum time).	
6	“ <i>Over maximum time</i> ” is displayed on the status bar (torque is not reached and the screwing time is over the preset maximum time).	
7	“ <i>Error PV torque</i> ” is displayed on the status bar (the torque signal is displayed inside the set maximum time).	
8	“ <i>Error min torque</i> ” is displayed on the status bar (the torque signal is displayed below the preset minimum torque).	
9	“ <i>Error max torque</i> ” is displayed on the status bar (the torque signal is displayed over the set maximum torque).	
10	“ <i>Error min angle</i> ” is displayed on the status bar (the torque signal is displayed below the set minimum angle).	

11	“ <i>Error max angle</i> ” is displayed on the status bar (The max preset angle has been reached. Only available in Tor, T/lv and T/in mode).	
12	“ <i>Error angle not OK</i> ” is displayed on the status bar (The preset angle hasn’t been reached. Only available in Ang., A/lv and A/in mode).	
13	“ <i>Warning! No piece</i> ” is displayed on the status bar (The “missing piece” contact is enabled).	-check contact 2 on the CN2 connector
14	“ <i>Compensation error</i> ” is displayed on the status bar. A negative torque value is displayed due to a high negative compensation value.	- increase or decrease the compensation value
15	“ <i>Released lever error</i> ” is displayed on the status bar (The lever has been released while tightening).	Such error can be enabled or disabled through “PROGRAM-MENU” (see point 18 on the program menu).
16	“ <i>Reverse torque error</i> ” is displayed on the status bar (The torque signal is displayed while loosening, but only if it’s set on “max”).	- The screwdriver couldn’t loosen - Avoid motor stalling - Loosening too heavy
17	“ <i>Output Disabled</i> ”. Protection of output signals was activated after exceeding maximum load (400mA).	- Check the set load is not over the allowed maximum value - Restart the control unit to reset error
18	“ <i>Over current Protect</i> ” is displayed on the status bar (it happens in case of over current on mosfets)	- Decrease screwing time and check settings - Avoid motor stalling - Unscrewing too heavy - Joint too soft

ATTENTION: IF THE OK/ESC OPTION IS DISABLED, ERRORS RESET AT THE FOLLOWING SCREW/PROGRAM. OTHERWISE PRESS ESC. IF THE PROBLEM PERSISTS, PLEASE CONTACT YOUR NEAREST KOLVER DEALER.

## SERIAL PRINT:

Every control unit is supplied with a 9 pin serial female connector (connection pin: PIN 2 = TX, PIN 3 = RX, PIN 5 = GND) and a mini USB connector. You can print the results of each screwing on a printer (for example Kolver model PRNTR1) and/or on PC (for example through Hyper Terminal or Realterm or any data transmission program or EDU EXPAND only on EDU2AE/TOP/NT/TA). You can also save those results on a USB device (only ver. 1.00.03). The transmission characteristics (only serial and USB) are the following: 9600 (bits per second), 8 (data bits), n (no parity), 1 (bits stop 1).

The print string is the following:

BARCODE	RESULT	PROGRAM NUMBER	MODEL	TORQUE%	SCREWING TIME	SPEED
---------	--------	----------------	-------	---------	---------------	-------

SCREW	SEQUENCE STAGE	TORQUE	ANGLE	DATE HOUR	NOTICE
-------	----------------	--------	-------	-----------	--------

**BC: Barcode** = it begins with “BC:” and it’s followed by the code of the scanned product.

**Result** = screwing result: correct or incorrect.

OK = the torque has been correctly reached, all the selected parameters are satisfied and the control unit will give out a beep sound of 0.5 sec.

NOK = the torque has been reached during ramp time or Fast Speed (see error table). In this case, the unit will give out 2 beep sounds and the red led will light up.

**PR: Program number** = it indicates the running program.

**Model** = Model of screwdriver you’re using.

**T%: Torque%** = percentage of the set torque level.

**S: Speed** = preset speed value.

**ST: Screwing time** = it indicates the time of the screwing.

**Screw: Number of screws** = number of tightened screws/total number of screws.

**Seq: Sequence stage** = it indicates the stage of the sequence.

**T: Torque** = torque value.

**A: Angle** = angle value.

**Notice** = in case of program end, it prints “Program End”, in case of sequence end, it prints “Seq. end” or it indicates the type of error (see paragraph: trouble shooting).

```
NOK PR:1 NAT050 T%:10% S: 700rpm ST: 0.1s Screw:01/02 Seq:1/1 T: 32.0 Ncm A: ---- 31/08/17 13:30:27 Error min time \r\n
OK PR:1 NAT050 T%:10% S: 700rpm ST: 0.8s Screw:02/02 Seq:1/1 T: 11.8 Ncm A: ---- 31/08/17 13:30:30 Program end \r\n
OK PR:1 NAT050 T%:10% S: 700rpm ST: 0.7s Screw:01/02 Seq:1/1 T: 11.9 Ncm A: ---- 31/08/17 13:30:31 \r\n
OK PR:1 NAT050 T%:10% S: 700rpm ST: 0.7s Screw:02/02 Seq:1/1 T: 11.8 Ncm A: ---- 31/08/17 13:30:33 Program end \r\n
NOK PR:1 NAT050 T%:10% S: 700rpm ST: 0.1s Screw:00/02 Seq:1/1 T: 31.0 Ncm A: ---- 31/08/17 13:30:34 Error min time \r\n
OK PR:1 NAT050 T%:10% S: 700rpm ST: 0.7s Screw:01/02 Seq:1/1 T: 11.6 Ncm A: ---- 31/08/17 13:30:36 \r\n
OK PR:1 NAT050 T%:10% S: 700rpm ST: 0.8s Screw:02/02 Seq:1/1 T: 11.6 Ncm A: ---- 31/08/17 13:30:37 Program end \r\n
```

## EDU EXPAND

EDU EXPAND is the software for pc created by Kolver to set, change and save all parameters of EDU2AE/TOP/NT/TA unit.

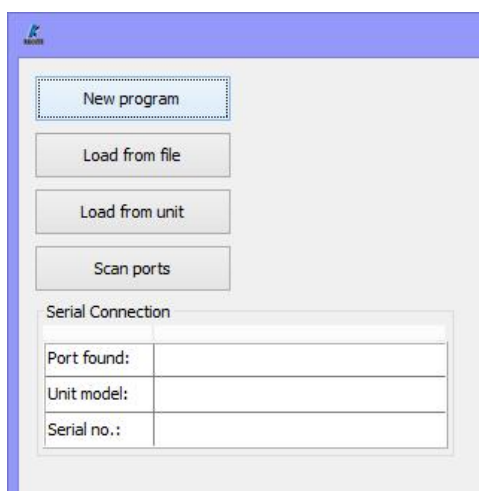
It communicates with the control unit via miniUSB or RS232 and makes you create up to 100 different settings configurations, save them on your USB drive and then recall on your EDU unit.

Just connect your USB drive to the port on the front panel of the EDU unit and recall the desired program on the menu (see Menu Options, USB Options).

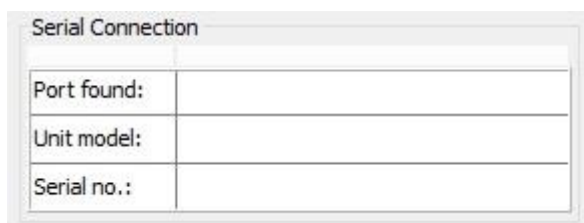
At the same time the programs set on control unit can be downloaded on USB and recalled on another unit and on EDU EXPAND, too.

Here is a quick guide to use EDU EXPAND.

Double click the icon program and this is the main view.



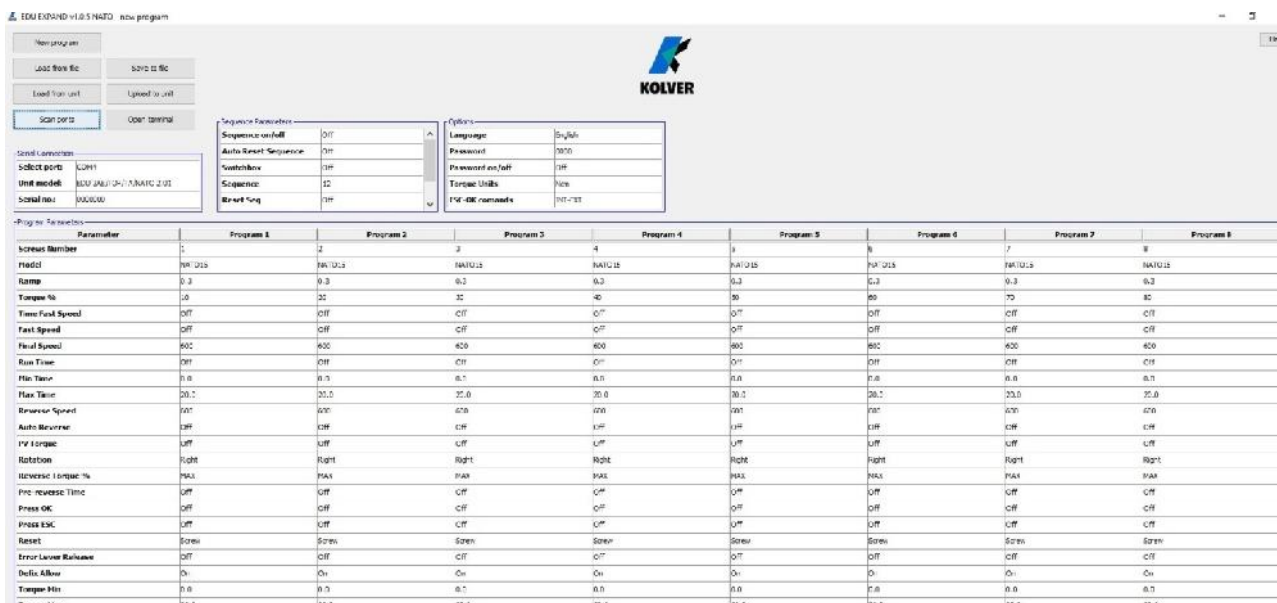
- **New program:** to load a new program.
- **Load from file:** it loads all programs, sequences and option settings from a previously saved file on your computer.
- **Load from unit:** it loads all program, sequence and option settings from the unit. The unit must first be connected to the pc using *Scan ports*.
- **Scan port:** it locates the unit. EDU EXPAND recalls the port, the model of the control unit and its serial number.



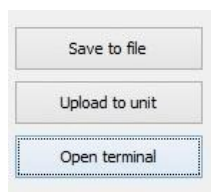
The control unit must be connected to the PC via miniUSB port or RS232 seat in the back panel of the unit.

If you cannot locate the control unit, make sure the unit and PC are connected properly or that the unit is on the initial screen of the Menu.

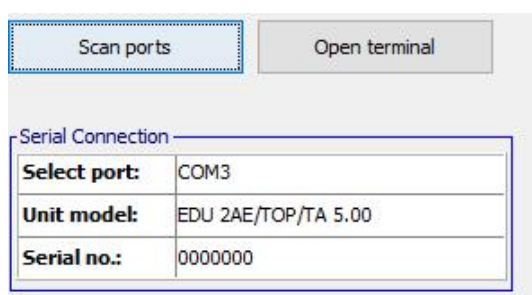
Here is the main screen when a program has been recalled or when you are creating a new one.



- To modify or enter any parameter values, double click a cell, select a number within the proper range, then press Enter. If the value is not within its valid range, pressing Enter will not confirm the change.



- **Save to file:** it saves all programs to a file. This file can be read directly from a USB drive connected to the unit on its front panel. In this case, the file name must be SETxx.KOL (xx = range from 00 to 99). This file could be copied in the USB drive and upload to the unit or recall with EDU EXPAND.
- **Upload to unit:** it uploads all the setting to the EDU control unit. Connect the unit to your computer through miniUSB or RS232. Switch the unit on.



Click *Scan ports* to locate the unit. EDU EXPAND recalls the port, the model of the control unit and its serial number. Then click *Upload to unit*. The text *Programming...* will appear on the EDU display. When the text *Programming...* disappears, you may disconnect the cable. Uploading can only be initiated if the control unit shows *Ready* on the main screen.

- **Open terminal:** to display the print string (see Serial Print). To save in a .txt file the results of each tightening, push Save.

```

FDU/ EXPAND Terminal
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.1s Screw:01/02 Seq:1/1 T: 11.8 Nm A: ---- 31/08/17 12:08:49
NOK PR:1 NAT050 TX:10% S: 700rpm ST: 0.1s Screw:01/02 Seq:1/1 T: 29.0 Nm A: ---- 31/08/17 12:08:49 Error min time
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.9s Screw:02/02 Seq:1/1 T: 11.7 Nm A: ---- 31/08/17 12:08:51 Program end
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.9s Screw:01/02 Seq:1/1 T: 11.7 Nm A: ---- 31/08/17 12:08:53
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.1s Screw:02/02 Seq:1/1 T: 11.7 Nm A: ---- 31/08/17 12:08:55 Program end
  
```

### Report of the screwing done

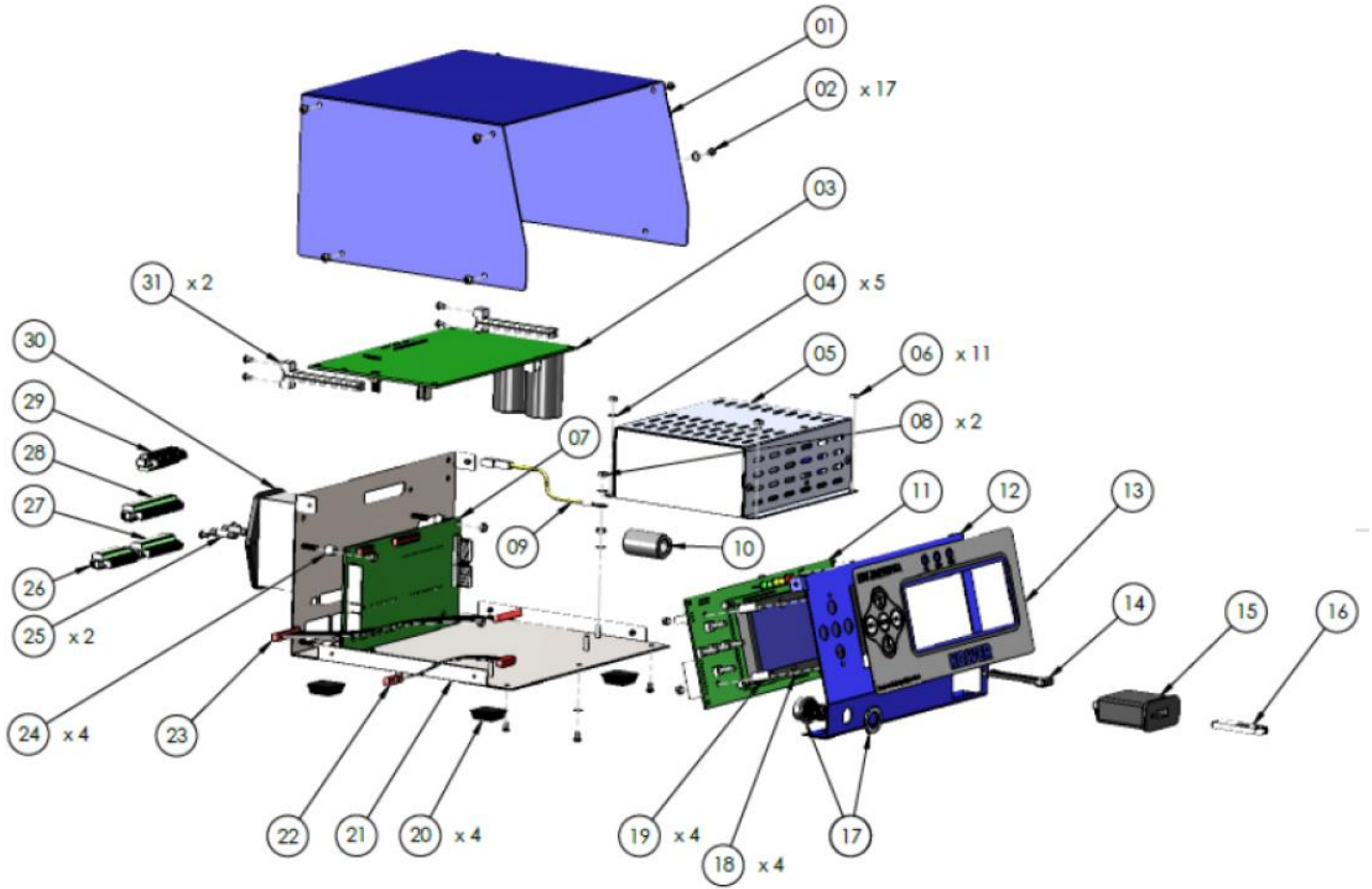
- If you connect the USB drive to the control unit, the unit creates a folder where the report of the screwing done will be saved.  
The folder is named as the serial number of the unit.  
The text file which contains all the screwing data is named as the current date.

Nome	Ultima modifica	Tipi	Dimensione
17_06_26.TXT	26/06/2017 08:35	Documento di testo	1 KB
17_08_31.TXT	31/08/2017 12:12	Documento di testo	2 KB

```

OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.5s Screw:01/02 Seq:1/1 T: 11.7 Nm A: ---- 31/08/17 12:11:59
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.5s Screw:02/02 Seq:1/1 T: 11.7 Nm A: ---- 31/08/17 12:12:05 Program end
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.5s Screw:01/02 Seq:1/1 T: 11.9 Nm A: ---- 31/08/17 12:12:07
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.5s Screw:02/02 Seq:1/1 T: 11.9 Nm A: ---- 31/08/17 12:12:08 Program end
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.5s Screw:01/02 Seq:1/1 T: 11.7 Nm A: ---- 31/08/17 12:12:10
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.5s Screw:02/02 Seq:1/1 T: 11.8 Nm A: ---- 31/08/17 12:12:11 Program end
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.4s Screw:01/02 Seq:1/1 T: 11.9 Nm A: ---- 31/08/17 12:12:12
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.5s Screw:02/02 Seq:1/1 T: 11.8 Nm A: ---- 31/08/17 12:12:14 Program end
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.5s Screw:01/02 Seq:1/1 T: 11.6 Nm A: ---- 31/08/17 12:12:15
NOK PR:1 NAT050 TX:10% S: 700rpm ST: 0.8s Screw:01/02 Seq:1/1 T: 28.5 Nm A: ---- 31/08/17 12:12:19 Error min time
OK PR:1 NAT050 TX:10% S: 700rpm ST: 0.5s Screw:02/02 Seq:1/1 T: 11.8 Nm A: ---- 31/08/17 12:12:18 Program end
  
```

# EXPLODED VIEW: EDU2AE/TOP/NT/TA





## SPARE PARTS:

Posizione	Descrizione	Quantità	Codice
1	Upper panel EDU2AE/TOP	1	819003
2	3x5 Button head screw burnished TX10	17	872444
3	Motor board	1	852521/NT
4	M3 toothed washer	5	800041
5	Switching 31,3V	1	872490/NT
6	M3 burnished nut	11	800056
7	I/O EDU 2AE/TOP/TA board	1	852525/NT/TA
8	M3 brass nut	2	800056/O
9	Ground cable	1	800090/E
10	Ferrite	1	872468
11	Display board EDU2AE/TOP	1	852526
12	Front panel EDU2AE/TOP /TA	1	819002/USB
13	Membrane EDU 2AE/TOP/TA	1	819006/NT
14	USB Flat cable	1	872474
15	USB Device	1	852424
16	USB Pen drive	1	872475
17	M12 5pin + nut + ferrite connector	1	201766/LTA
18	M3 Washer h0,5 mm	4	800042
19	Spacer 15mm dest 4,8 mm	4	890004/T
20	Plastic support	4	800016/B
21	Bottom panel EDU2AE/TOP/SW	1	819001/SW
22	Flat cable 10 vie	1	819007
23	Flat cable 20 vie	1	872438/T
24	Sapcer da 6,3 mm dest 6.2mm	4	241003
25	Fuse 3.15A	2	800619
26	I/O Connector 9 pin spacing 3.81	1	800164
27	I/O Connector 11 pin spacing 3.81	1	800165
28	I/O Connector 14 pin spacing 3.81	1	800166
29	I/O Connector 10 pin spacing 3.81	1	800102
30	Filtered plug	1	800718
31	Main board support	2	872442
	Label	1	818006/SW
	Schuko Cable	1	800620

## **GUARANTEE**

1. This KOLVER product is guaranteed against defective workmanship or materials, for a maximum period of 12 months following the date of purchase from KOLVER, provided that its usage is limited to single shift operation throughout that period. If the usage rate exceeds of single shift operation, the guarantee period shall be reduced on a prorata basis.
2. If, during the guarantee period, the product appears to be defective in workmanship or materials, it should be returned to KOLVER or its distributors, transport prepaied, together with a short description of the alleged defect. KOLVER shall, at its sole discretion, arrange to repair or replace free of charge such items.
3. This guarantee does not cover repair or replacement required as a consequence of products which have been abused, misused or modified, or which have been repaired using not original KOLVER spare parts or by not authorized service personnel.
4. KOLVER accepts no claim for labour or other expenditure made upon defective products.
5. Any direct, incidental or consequential damages whatsoever arising from any defect are expressly excluded.
6. This guarantee replaces all other guarantees, or conditions, expressed or implied, regarding the quality, the marketability or the fitness for any particular purpose.
7. No one, whether an agent, servant or employee of KOLVER, is authorized to add to or modify the terms of this limited guarantee in any way. However it's possible to extend the warranty with an extra cost. Further information at [kolver@kolver.it](mailto:kolver@kolver.it).

**DICHIARAZIONE DI CONFORMITA'/  
DECLARATION OF CONFORMITY**



**KOLVER S.r.l.**  
**VIA MARCO CORNER, 19/21**  
**36016 THIENE (VI) ITALIA**

Dichiara che la macchina nuova qui descritta/ *Declare that the new tool here described:*  
Avvitatore elettrico e unità di controllo/ *Electric screwdriver and control unit:*

**KBL SERIE/ SERIES & EDU1BL SERIE/ SERIES**

È conforme alle disposizioni legislative che traspongono le direttive/ *Is in conformity with the following standards and other normative documents:* 2006/42/CE, LVD 2014/35/UE, EMCD 2014/30/UE, EN 62841-2-2:2014, EN 62841-1:2015, EN 60204-1, EN 61000-6-2:2005+AC:2005 and EN 61000-6-4:2007+A1:2011.

È conforme alla direttiva RoHS III (2011/65/UE e successiva 2015/863)/  
*It is also in conformity with RoHS III normative (2011/65/UE and following 2015/863).*

Nome/Name: Giovanni Colasante  
Posizione/Position: Amministratore Delegato/General Manager  
Persona incaricata a costituire il fascicolo tecnico presso la Sede/  
*Person authorized to compile the technical file in Kolver*

Thiene, 1° gennaio 2021

*Giovanni Colasante*



# **Manuale Istruzioni/ *Operator's Handbook***

**KBL**

*Avvitatori/ Screwdrivers*

**EDU1BL - EDU1BL/SG**

*Unità di controllo/ Control units*

**KOLVER S.r.l.  
VIA MARCO CORNER, 19/21  
36016 THIENE (VI) ITALIA  
TEL +39 0445 371068  
[www.kolver.it](http://www.kolver.it)**

Modello/ Model	Codice/ Code	Coppia/ Torque Nm	RPM min-max	Output	Unità di controllo/ Control unit
<b>Diritti/ Inline</b>					
<b>KBL04FR</b>	190004	0,04-0,4	700-1150	¼ Hex	EDU1BL o/or EDU1FR
<b>KBL15FR</b>	190015	0,4-1,5	700-1150		
<b>KBL30FR</b>	190030	0,7-3,0	700-1150		
<b>KBL40FR</b>	190040	0,9-4,0	400-700		
<b>Diritti - segnali/ Inline - signals</b>					
<b>KBL04FR/S</b>	190004/S	0,04-0,4	700-1150	¼ Hex	EDU1BL/SG
<b>KBL15FR/S</b>	190015/S	0,4-1,5	700-1150		
<b>KBL30FR/S</b>	190030/S	0,7-3,0	700-1150		
<b>KBL40FR/S</b>	190040/S	0,9-4,0	400-700		
<b>Per automazione/ For automation</b>					
<b>KBL04FR/CA</b>	190004/CA	0,04-0,4	700-1150	¼ Hex	EDU1BL/SG
<b>KBL15FR/CA</b>	190015/CA	0,4-1,5	700-1150		
<b>KBL30FR/CA</b>	190030/CA	0,7-3,0	700-1150		
<b>KBL40FR/CA</b>	190040/CA	0,9-4,0	400-700		
<b>KBL04FR/CA/FN</b>	190004/CA/FN	0,04-0,4	700-1150		
<b>KBL15FR/CA/FN</b>	190015/CA/FN	0,4-1,5	700-1150		
<b>KBL30FR/CA/FN</b>	190030/CA/FN	0,7-3,0	700-1150		
<b>KBL40FR/CA/FN</b>	190040/CA/FN	0,9-4,0	400-700		
<b>Con testina ad angolo/ With angle head</b>					
<b>KBL04FR/ANG</b>	190004/A	0,04-0,4	700-1150	¼ Hex	EDU1BL
<b>KBL15FR/ANG</b>	190015/A	0,4-1,5	700-1150		
<b>KBL30FR/ANG</b>	190030/A	0,7-3,0	700-1150		
<b>KBL40FR/ANG</b>	190040/A	0,9-4,0	400-700		
<b>Con testina ad angolo + segnali/ With angle head + signals</b>					
<b>KBL04FR/S/ANG</b>	190004/S/A	0,04-0,4	700-1150	¼ Hex	EDU1BL/SG
<b>KBL15FR/S/ANG</b>	190015/S/A	0,4-1,5	700-1150		
<b>KBL30FR/S/ANG</b>	190030/S/A	0,7-3,0	700-1150		
<b>KBL40FR/S/ANG</b>	190040/S/A	0,9-4,0	400-700		

**KBL../AR**

Modello/ Model	Codice/ Code	Coppia/ Torque Nm	RPM min-max	Output	Unità di controllo/ Control unit
<b>Diritti Auto-reverse/ Inline Auto-reverse</b>					
<b>KBL04FR/AR</b>	190004/AR	0,04-0,4	700-1150	¼ Hex	EDU1BL
<b>KBL15FR/AR</b>	190015/AR	0,4-1,5	700-1150		
<b>KBL30FR/AR</b>	190030/AR	0,7-3,0	700-1150		
<b>KBL40FR/AR</b>	190040/AR	0,9-4,0	400-700		
<b>Diritti - segnali Auto-reverse / Inline – signals Auto-reverse</b>					
<b>KBL04FR/S/AR</b>	190004/S/AR	0,04-0,4	700-1150	¼ Hex	EDU1BL/SG
<b>KBL15FR/S/AR</b>	190015/S/AR	0,4-1,5	700-1150		
<b>KBL30FR/S/AR</b>	190030/S/AR	0,7-3,0	700-1150		
<b>KBL40FR/S/AR</b>	190040/S/AR	0,9-4,0	400-700		

**IMPORTANTE: E' sconsigliato l'uso continuo oltre l'80% del campo di coppia!**  
**IMPORTANT: Continuous use over 80% of torque range is not recommend!**

# IT

**ATTENZIONE:** Prima di qualsiasi utilizzazione o intervento sull'attrezzo, verificate che le informazioni che seguono e le istruzioni contenute nella Guida di sicurezza (Codice articolo: OMS000) siano state lette, comprese e rispettate. Le caratteristiche e le descrizioni dei nostri prodotti sono soggette a cambiamenti senza preavviso da parte nostra.

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## 1. Applicazioni

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Gli avvitatori elettrici KOLVER vengono utilizzati per avvitare alla coppia richiesta viti, dadi, bulloni, grani e qualunque altro organo di collegamento filettato su qualunque materiale. Tutti i modelli sono reversibili e quindi utilizzabili anche per svitare. Gli impieghi più frequenti sono nel montaggio di apparecchi elettronici in genere, elettrodomestici, cablaggi, giocattoli, lampadari, occhiali etc.

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## 2. Uso

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Il complesso di avvitatura è formato dall'avvitatore, dal cavo con connettore e dall'unità di controllo ed alimentazione.

Per procedere all'utilizzo operare come segue:

- a) Collegare il connettore del cavo dell'avvitatore alla presa dell'unità di alimentazione e serrare la ghiera relativa.
- b) Inserire la spina dell'alimentatore in una presa di corrente (vedi punto 4).
- c) Accendere l'alimentatore premendo l'apposito pulsante nel pannello posteriore.
- d) Procedere all'avvitatura assicurandosi che la velocità impostata garantisca sempre e comunque il corretto scatto della frizione. Se non si verifica questo, la frizione si può bloccare. L'unità di controllo segnala l'anomalia arrestando l'avvitatore.
- e) Per lavorare correttamente l'avvitatore deve raggiungere la coppia alla velocità di regime e non da fermo su vite già chiusa.
- f) Per evitare di danneggiare l'avvitatore, restare sempre all'interno del campo di coppia specificato in questo manuale.
- g) Se si inverte il senso di rotazione mentre l'avvitatore sta girando, il comando verrà ignorato fino al ciclo successivo.
- h) Se l'avvitatore gira per più di 5 sec si arresta automaticamente per evitare il surriscaldamento del motore.
- i) Dopo l'arrivo in coppia l'avvitatore sarà pronto a essere riavviato dopo 0,3 secondi.
- l) Se si verificano sovraccarichi durante l'utilizzo o sovratemperatura dell'avvitatore, si attiverà la funzione di sovraccarico e l'avvitatore resterà bloccato. Si consiglia di spegnere l'unità di controllo per 1 min e riaccenderla.

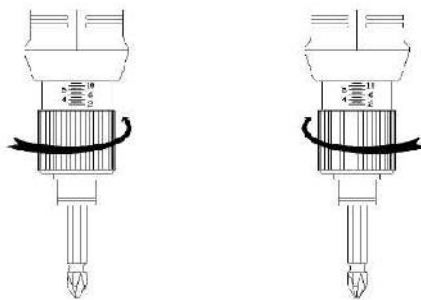
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## 3. Regolazione della coppia di serraggio

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La coppia di serraggio degli avvitatori si regola variando la tensione della molla della frizione, avvitando o svitando la ghiera filettata.

Per aumentare la coppia ruotare la ghiera in senso orario, per diminuire la coppia ruotare la ghiera in senso antiorario. Le tacche di riferimento sono puramente indicative.



E' possibile bloccare la ghiera tramite un coprifrizione (venduto separatamente). Per posizionarlo correttamente, è necessario togliere l'anello di fermo #2, svitare la ghiera di regolazione #3, svitare e togliere l'anello frontale #1 e sostituirlo con il copri frizione #35.

A raggiungimento della coppia impostata, i modelli **KBL.../AR** invertono automaticamente il senso di rotazione fino al rilascio della leva da parte dell'operatore. La svitatura inizierà dopo circa 0,5 sec dal raggiungimento della coppia. L'operatore rilascerà la leva solo quando riterrà la svitatura completa.

Per il controllo dei valori di coppia consigliamo l'utilizzo di un misuratore di coppia elettronico K5 o MINI K5.

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#### **4. Unità di controllo ed alimentazione**

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L'unità di controllo assolve alle funzioni alimentatore stabilizzato in bassa tensione per permettere all'avvitatore di lavorare.

L'alimentazione da rete in corrente alternata (90/260VAC-50/60Hz) viene convertita in corrente continua da 18 a 30V, idonea per il funzionamento dell'avvitatore, tramite un sofisticato regolatore switching da 120W.

#### **Modelli KBL..FR, cavo 5 pin, utilizzo con EDU 1BL**

L'unità di controllo EDU1BL è studiata per essere utilizzata con gli avvitatori della serie KBL per utilizzo manuale sia a leva che a spinta, diritto o a pistola.

Tutta la gestione del motore avviene in un'apposita scheda posizionata all'interno dell'avvitatore. Il cavo utilizzato è a 5 pin.

Il circuito elettronico di controllo presente nell'avvitatore arresta istantaneamente l'alimentazione di corrente al motore al raggiungimento della coppia prefissata.

Sul pannello frontale dell'unità di controllo è presente la manopola "A", tramite la quale è possibile regolare la velocità: la posizione 1 corrisponde al 60% e la posizione 10 corrisponde al 100%.

Su questo pannello è anche presente un led verde che indica se il dispositivo è acceso o spento.

La temperatura di lavoro dell'unità di controllo può raggiungere i 45°C ma questo non pregiudica il corretto funzionamento dell'unità stessa.

Nel pannello posteriore tutte le unità sono dotate di presa con portafusibile autobloccante a norma IEC/CEE22. Per sostituire il fusibile estrarre con la punta di un cacciavite il cassetto portafusibile.



## **Modelli KBL..FR cavo 5 poli utilizzo con EDU 1FR**

Per tutti i modelli KBL è possibile utilizzare la centralina EDU 1FR di cui sfrutterà solo i pin necessari per alimentare l'avvitatore. Tutta la gestione del motore avviene in un'apposita scheda posizionata all'interno dell'avvitatore. Il cavo utilizzato è lo stesso della serie FAB e RAF a 5 pin.

Il circuito elettronico di controllo presente nell'avvitatore arresta istantaneamente l'alimentazione di corrente al motore al raggiungimento della coppia prefissata.

Sul pannello frontale dell'unità di controllo sono presenti due manopole: "R" e "A".

La manopola "R" per tutti i modelli KBL non è abilitata e non regola la rampa di accelerazione come avviene per i modelli FAB/RAF.

La manopola "A" indica la velocità dell'avvitatore, regolabile dal 60% posizione 1 al 100% posizione 10.

Sul pannello anteriore sono presenti 2 led: uno verde che segnala l'accensione del dispositivo e uno rosso che rimane disabilitato.

La temperatura di lavoro dell'unità di controllo può raggiungere i 45°C ma questo non pregiudica il corretto funzionamento dell'unità stessa.

Nel pannello posteriore tutte le unità sono dotate di presa con portafusibile autobloccante a norma IEC/CEE22. Per sostituire il fusibile estrarre con la punta di un cacciavite il cassetto portafusibile.

<b>Unità di controllo</b>	<b>Caratteristiche</b>	<b>Dimensioni mm</b>	<b>Peso kg</b>
EDU1BL	120W, 1 connettore 5 pin, velocità regolabile.	130 x 118 x 67	0,6
EDU1FR	120W, 1 connettore, velocità regolabile	130 x 118 x 67	0,6

## **Modelli KBL../S, KBL../CA, cavo 8 pin, utilizzo con EDU 1BL/SG**

L'unità di controllo EDU1BL/SG è studiata per essere utilizzata con gli avvitatori della serie KBL../S (per utilizzo manuale sia a leva che a spinta, dritto o a pistola) e KBL../CA.

Tutta la gestione del motore avviene in un'apposita scheda posizionata all'interno dell'avvitatore. Il cavo utilizzato è a 8 pin.

Il circuito elettronico di controllo presente nell'avvitatore arresta istantaneamente l'alimentazione di corrente al motore al raggiungimento della coppia prefissata.

Sul pannello frontale sono presenti due manopole: "R" e "A".

"R" indica la rampa di accelerazione, regolabile da 0 a 2 sec e la velocità "A" indica la velocità dell'avvitatore, regolabile dal 60% al 100%.

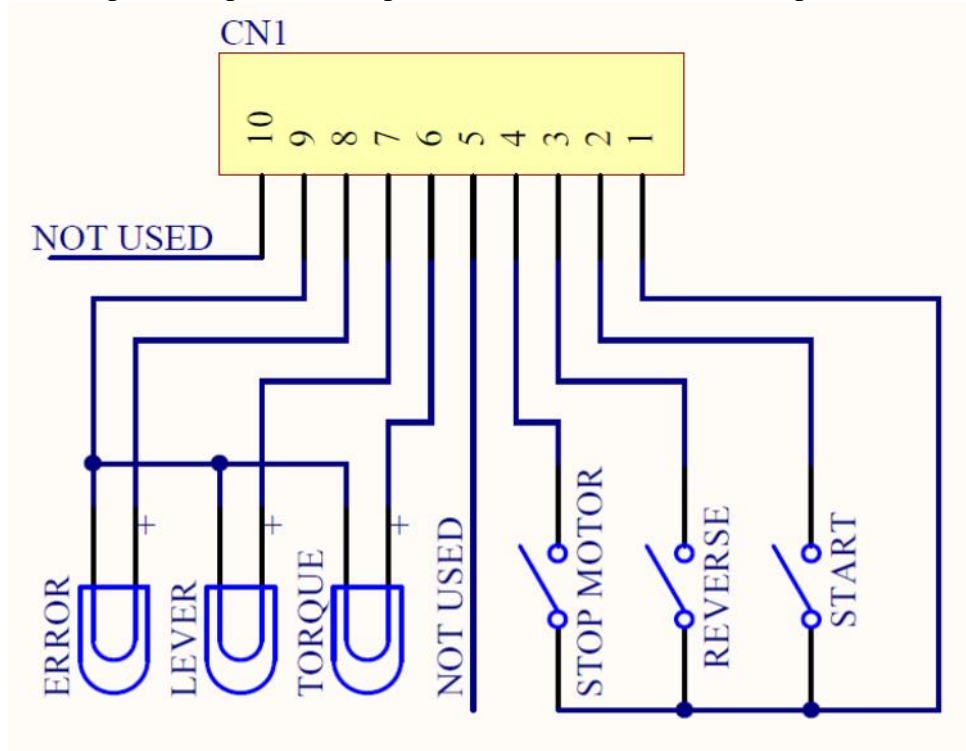
Sul pannello anteriore sono presenti 2 led: uno verde che segnala l'accensione del dispositivo e uno rosso che segnala la coppia avvenuta.

La temperatura di lavoro dell'unità di controllo può raggiungere i 45°C ma questo non pregiudica il corretto funzionamento dell'unità stessa.

Nel pannello posteriore tutte le unità sono dotate di presa con portafusibile autobloccante a norma IEC/CEE22. Per sostituire il fusibile estrarre con la punta di un cacciavite il cassetto portafusibile.

Unità di controllo	Caratteristiche	Dimensioni mm	Peso kg
EDU1BL/SG	120W, 1 connettore 8 pin, velocità regolabile. Input: segnali di partenza e inversione. Output: segnali di coppia e leva.	130 x 118 x 67	0,6

Su questo modello nel pannello posteriore è presente un connettore I/O a 10 pin.



PIN	NOME	FUNZIONE
<b>INPUT</b>		
1	COM 0VDC	E' il pin comune a tutti gli input. La funzione desiderata si attiva con un contatto tra questo pin e uno degli altri ingressi (pin 2, 3, 4, 5). Questo pin è connesso sia a 0VDC che alla terra.
2	START	Start remoto motore con controllo di coppia funzione "avvitatura".
3	REVERSE	Start remoto motore con controllo di coppia funzione "svitatura".
4	STOP	Disabilitazione remota motore, se attivato appare sul display la scritta "STOP MOTOR ON", il motore si fermerà e non potrà funzionare fino all'apertura del contatto.
5	NOT USED	Utilizzato solo nelle versioni speciali.
<b>OUTPUT</b>		
6	TORQUE	Segnale di coppia. Si attiva ogni volta che l'avvitatore va in coppia e si resetta al rilascio della leva o dello start remoto. Il segnale è 24VDC.
7	LEVER	Segnale leva premuta. Si attiva quando si preme la leva di start dell'avvitatore o attraverso lo start remoto e si resetta al loro rilascio. Non si attiva in svitatura. Il segnale è 24 VDC.
8	ERROR	Segnale di errore, si attiva ogni volta che si manifesta un errore. Il segnale di errore si resetta quando l'avvitatore va in coppia e si resetta al rilascio della leva o dello start remoto. Il segnale è 24VDC.
9	COM 0VDC	E' il pin comune a tutti gli output. I segnali vanno prelevati tra questo pin (0 VDC comune) e i rispettivi pin dei segnali (pin 6, 7 e 8).
10		Non usato

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## 5. Manutenzione

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Il motore brushless dell'avvitatore e l'unità di controllo sono state progettate per non avere nessuna usura elettrica. Si suggerisce un ingrassaggio del riduttore dopo ½ milione di cicli.

Se si dovessero tuttavia presentare dei problemi, si consiglia di rivolgersi ad un tecnico KOLVER specializzato.

**Si raccomanda di spegnere l'unità alla fine di ogni sessione di lavoro.**

### NOTE

Il livello di pressione acustica continuo equivalente ponderato è sempre inferiore a 70dB(A).

Il braccio dell'utilizzatore è esposto ad una accelerazione media ponderata in frequenza complessiva (somma quadratica sui tre assi) sempre inferiore a 2.5m/s<sup>2</sup>. In particolare l'esposizione alle vibrazioni risulta inferiore a 1m/s<sup>2</sup> per operatori che avvitano fino a 4200 viti al giorno.

La durata nominale di funzionamento e la durata nominale di riposo sono legate da un rapporto di 1:3, come indicato nell'etichetta sul corpo dell'avvitatore (1s/3s). Ciò vuol dire che per ogni secondo o multiplo di funzionamento si deve prevedere un periodo di riposo del motore pari a tre volte il tempo di funzionamento stesso. Il mancato rispetto di tale norma fa decadere la validità della garanzia.

### GARANZIA

1. Questo prodotto è garantito da difetti di lavorazione o di materiali per un periodo massimo di 12 mesi a partire dalla data di acquisto presso KOLVER, sempre che il suo impiego sia stato limitato ad un unico turno per tutto quel periodo. Se il ritmo d'impiego supera il funzionamento di un unico turno, la durata della garanzia sarà ridotta in modo proporzionale.
2. Se il prodotto presenta difetti di fabbricazione o di materiali, durante il periodo della garanzia, deve essere restituito a KOLVER, trasporto prepagato, unitamente ad una breve descrizione del presunto difetto. KOLVER deciderà, a sua discrezione, se dar disposizioni per la riparazione o la sostituzione gratuita dei componenti che ritiene essere difettosi, a causa della fabbricazione o dei materiali.
3. Questa garanzia non è valida per quei prodotti che sono stati usati in modo non-conforme, o modificati, o che non sono stati riparati da KOLVER, o perché sono stati utilizzati ricambi non originali KOLVER, o perché riparati da persone non autorizzate da KOLVER.
4. KOLVER non accetta nessuna richiesta di risarcimento per spese di manodopera o di altro tipo causate da prodotti difettosi.
5. Si escludono espressamente danni diretti, incidentali o indiretti di qualsiasi tipo, dovuti a qualsiasi difetto.
6. Questa garanzia sostituisce ogni altra garanzia o condizione, espressa o implicita, riguardante la qualità, la commerciabilità o l'idoneità a qualsiasi scopo particolare.
7. Nessuno, neppure i rappresentanti, dipendenti o impiegati KOLVER, è autorizzato ad ampliare o modificare, in qualsiasi modo, i termini di questa garanzia limitata. E' comunque possibile estendere la garanzia dietro pagamento di un corrispettivo. Ulteriori informazioni contattando [kolver@kolver.it](mailto:kolver@kolver.it).

**WARNING:** To reduce the risk of injury, before using or servicing the tool, read and understand the following information as well as separately provided safety instructions (Item number: OMS000). The features and descriptions of our products are subject to change without prior notice.

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## 1. Applications

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KOLVER electric screwdrivers are used to tighten to the required torque screws, nuts, studs and any other kind of threaded connection on any material. Obviously, it is possible to use the screwdrivers with screw having a larger diameter if the torque fall within the indicated range. All models are reversible and can consequently be used to unscrew. Electric screwdrivers are mainly used in the electronic industry as well as for electric appliances, wiring, toys, lamps, glasses, in the mechanical light industry etc.

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## 2. Use

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KOLVER screwdriving system is composed by a screwdriver, a cable with 2 x M12 female 5 pin connectors and a power supply and control unit. To install it please follow the instructions.

- a) Connect the connectors of the cable to the controller and to the screwdriver and tighten the relevant nuts.
- b) Connect the controller plug to a main supply socket 90/230V- 50/60Hz.
- c) Switch the controller on through the black button on the back panel.
- d) Select the desired setting of speed (A) through the relevant knob. Please make sure that such setting is compatible with the torque setting. Since the speed reduction is obtained through a voltage reduction (= power reduction), if the torque setting is too high for a low speed setting, the clutch may not operate correctly and get stuck. In such a case, the driver will not run and when you press the start lever the red light will signal. To reset the driver just turn the bit chuck until you hear the clutch “click” (usually 180°). Increase the speed setting before running the driver again.
- e) Do not slide the forward/reverse while the motor is running, it's dangerous for the motor.

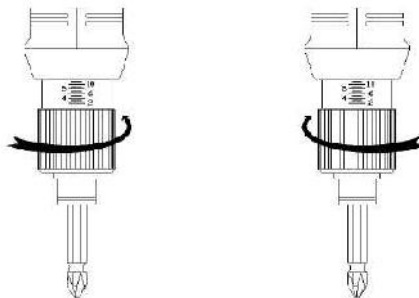
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## 3. Adjusting the torque

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The torque value of the screwdriver is adjusted by changing the tension of the clutch spring, i.e. screwing or unscrewing the threaded nut. To increase the torque, turn the nut clockwise; to decrease it, turn the nut anticlockwise.

To change the spring remove the nut, replace the spring and then adjust the torque value as mentioned above..



After each adjustment, it is possible to lock the nut with the clutch cover (sold separately). To place properly this cover, you must remove the stopper ring #2, unscrew the adjusting nut #3, unscrew and remove the front ring #1 and replace it with the clutch cover #35.

When the pre-set torque is reached, the **KBL.../AR** models automatically reverse the direction of rotation until the operator releases the lever. The unscrewing will start approximately 0.5 seconds after reaching the torque. The operator will release the lever only when the unscrewing has been completed. .

To check the torque value we suggest the use of K5 or MINI K5 electronic torque tester.

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#### **4. Control unit and power supply**

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EDU1BL, EDU1BL/SG and EDU 1FR power supply and control units act as voltage transformer and electronic torque controller.

The power supply, 90/260VAC-50/60Hz, is converted into 18-30V DC required by KBL series screwdrivers through an electronic transformer with constant power of 120W.

##### **KBL..FR models – 5 pin cable – use with EDU 1BL controller**

EDU1BL is made especially to work in combination with KBL screwdrivers either lever or push start, inline or pistol type. The motor is controlled by the board inside the screwdriver. The screwdriver is connected to the controller through a 5 pin cable.

The electronic control circuit cuts the power supply to the motor in response to the clutch action as soon as the pre-set torque is reached.

On the front panel of the control unit you can find the “A” knob, through which you can set the speed: 1 corresponds to 60% and 10 corresponds to 100%.

You can also find a green led on the front panel of the control unit, showing if the controller is on or off.

The temperature of the unit can normally reach 45°C.

On the back panel you can find a socket equipped with a fuse holder and on/off switch. To replace the fuse just pull out the fuse holder and change the fuse.

##### **KBL..FR models – 5 pin cable – use with EDU 1FR controller**

EDU1FR is meant to work with FAB&RAF screwdrivers, but it can be used with KBL screwdrivers, too.

On the front panel of the controller there are two knobs indicated with the letters “R” and “A”.

Knob “R” is used to adjust the slow start option (ramp), but it’s only enabled for FAB and RAF screwdrivers, not for KBL.

Knob “A” is used to adjust the motor speed for nominal speed, i.e. speed as per ctg. data sheet, to 60% of nominal speed. “1” stands for minimum speed and “10” for nominal speed.

On the front panel you can also see two lights: the green one will light permanently when the power is on, the red one will light only when the clutch “fires” indicating the preset torque has been reached.

The temperature of the unit can normally reach 45°C.

On the back panel you can find a socket equipped with a fuse holder and on/off switch. To replace the fuse just pull out the fuse holder and change the fuse.

Control unit	Features	Dimensions mm	Weight kg
EDU1BL	120W, 5 pin connector, adjustable speed	130 x 118 x 67	0,6
EDU1FR	120W, 5 pin connector, adjustable speed	130 x 118 x 67	0,6

**KBL..FR/S, KBL..FR/CA models – 8 pin cable – use with EDU 1BL/SG controller**

EDU1BL/SG is made especially to work in combination with KBL../S (either lever or push start, inline or pistol type) and KBL..CA screwdrivers.

The motor is controlled by the board inside the screwdriver. The screwdriver is connected to the controller through a 8 pin cable.

The electronic control circuit cuts the power supply to the motor in response to the clutch action as soon as the pre-set torque is reached.

On the front panel of the controller, there are two knobs indicated with the letters “R” and “A”.

Knob “R” is used to adjust the slow start option (ramp) from 0 to 2 seconds, i.e. the motor will reach the nominal speed gradually. Dial “1” for no ramp and “10” for maximum ramp.

Knob “A” is used to adjust the motor speed for nominal speed, i.e. speed as per ctg. data sheet, to 60% of nominal speed. Dial “1” for minimum speed and “10” for nominal speed.

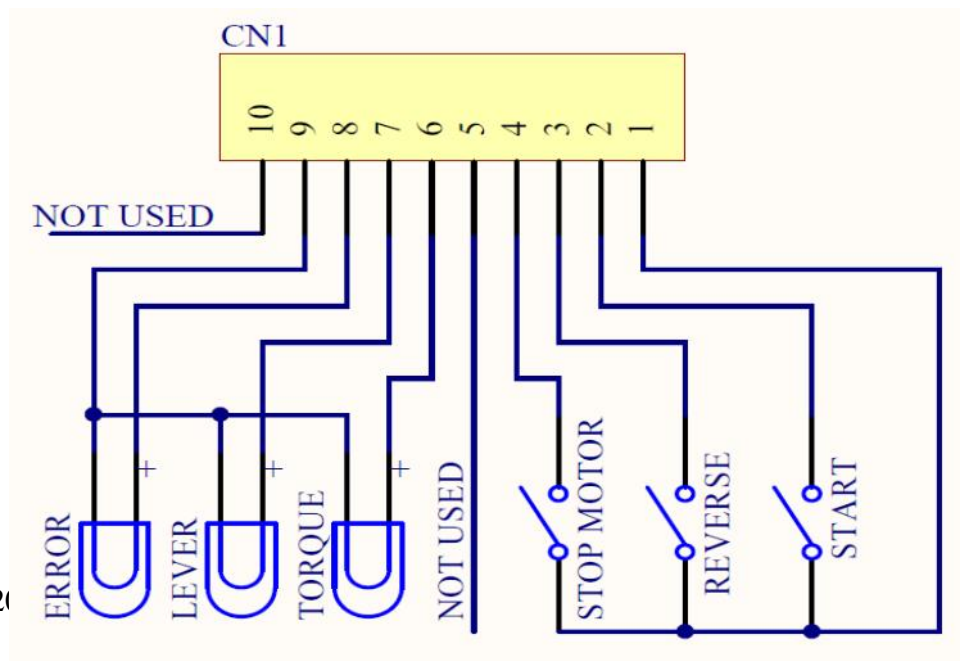
On the front panel you can also see 2 lights: the green one will light permanently when the power is on, the red one will light only when the clutch “fires” indicating the preset torque has been reached.

The temperature of the unit can normally reach 45°C.

On the back panel you can find a socket equipped with a fuse holder and on/off switch. To replace the fuse just pull out the fuse holder and change the fuse.

Control unit	Features	Dimensions mm	Weight kg
EDU1BL/SG	120W, 8 pin connector, adjustable speed Input: start and reverse contacts Output: reached torque and lever pressed	130 x 118 x 67	0,6

On the back panel, you can also find a 10 pin connector for input and output signals.



PIN	NAME	FUNCTION
<b>INPUT</b>		
1	COM 0VDC	Common pin. By closing the contact between pin 1 and any of the other pins ( 2, 3, 4, 5) to start the function you need. This pin is connected to 0VDC and to the ground.
2	START	Remote start. Clockwise. Torque control.
3	REVERSE	Reverse remote start. Counterclockwise. Torque control.
4	STOP	Stop motor. "STOP MOTOR ON" screen. Motor stops and starts again after the contact has opened.
5		Not used
<b>OUTPUT</b>		
6	TORQUE	Torque reached signal. Signal is 24VDC.
7	LEVER	Lever signal: when lever is pressed or when the start is remote. No signal during unscrewing cycle. It resets after their release. Signal is 24VDC.
8	ERROR	Error signal: it activates every time an error occurs. Error signal resets when the torque is reached or after releasing the lever or of the remote start. Signal is 24VDC.
9	COM 0VDC	Common pin for any output. Signals must be taken between this pin ( 0VDC common) and the other pins (6,7 and 8).
10		Not used

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## 5. Maintenance

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The brushless motor and control unit are maintenance free, which means they are not subjected to wear and tear. Kolver suggests greasing the gears after half a million cycles.  
Should you have any problems or doubts, please contact the nearest Kolver technical centre.

**We kindly remind you to switch the control unit off when not in use.**

### NOTE

The sound level generated by Kolver electric screwdrivers is always lower than 70dB(A).  
The vibrations transmitted to operator's hand are lower than 2.5m/s<sup>2</sup>. In particular the exposition to vibrations is lower than 1m/s<sup>2</sup> for operators who make up to 4200 screwing cycles per day.

**IMPORTANT:** For each second of operation the motor needs 3 seconds of rest, as indicated on the tool label (1s/3s). Failure to do so may result in motor overheating and eventually damage and will be considered as a misuse. Our warranty will not apply.

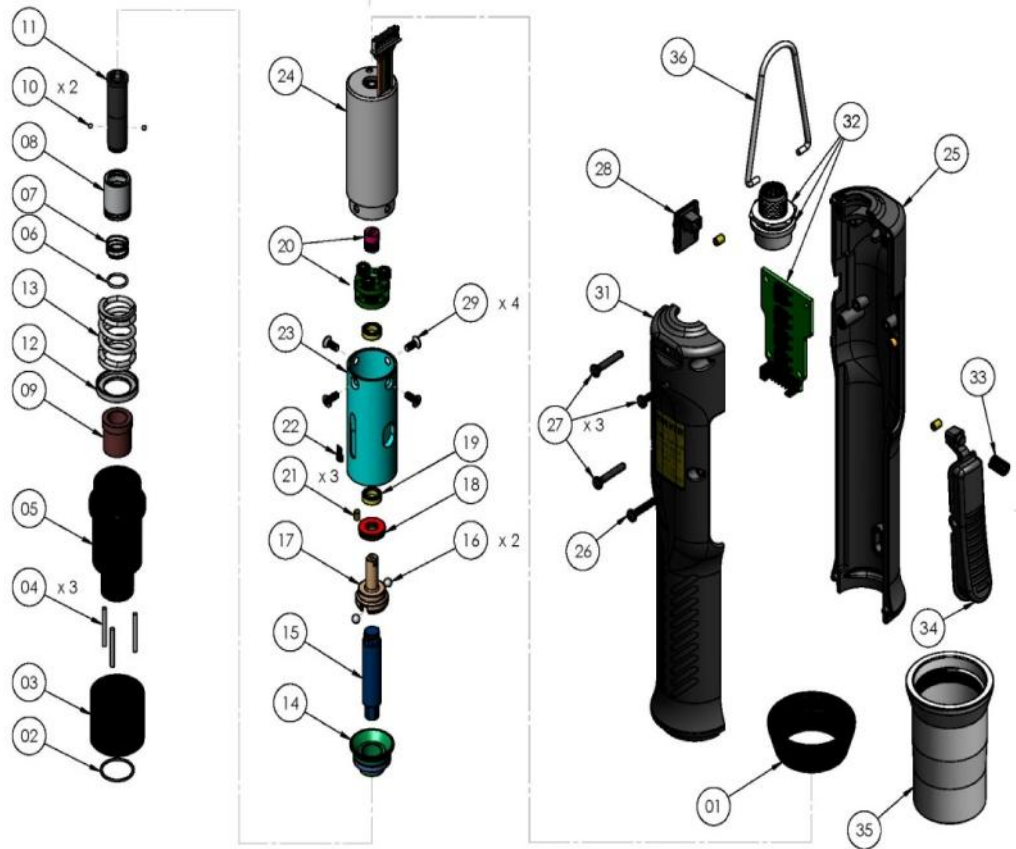
## **GUARANTEE**

1. This KOLVER product is guaranteed against defective workmanship or materials, for a maximum period of 12 months following the date of purchase from KOLVER, provided that its usage is limited to single shift operation throughout that period. If the usage rate exceeds of single shift operation, the guarantee period shall be reduced on a prorata basis.
2. If, during the guarantee period, the product appears to be defective in workmanship or materials, it should be returned to KOLVER or its distributors, transport prepaid, together with a short description of the alleged defect. KOLVER shall, at its sole discretion, arrange to repair or replace free of charge such items.
3. This guarantee does not cover repair or replacement required as a consequence of products which have been abused, misused or modified, or which have been repaired using not original KOLVER spare parts or by not authorized service personnel.
4. KOLVER accepts no claim for labour or other expenditure made upon defective products.
5. Any direct, incidental or consequential damages whatsoever arising from any defect are expressly excluded.
6. This guarantee replaces all other guarantees, or conditions, expressed or implied, regarding the quality, the marketability or the fitness for any particular purpose.
7. No one, whether an agent, servant or employee of KOLVER, is authorized to add to or modify the terms of this limited guarantee in any way. However it's possible to extend the warranty with an extra cost. Further information at [kolver@kolver.it](mailto:kolver@kolver.it).



# KBL04 – 15 – 30 – 40/FR:

## ESPLOSO/ EXPLODED VIEW

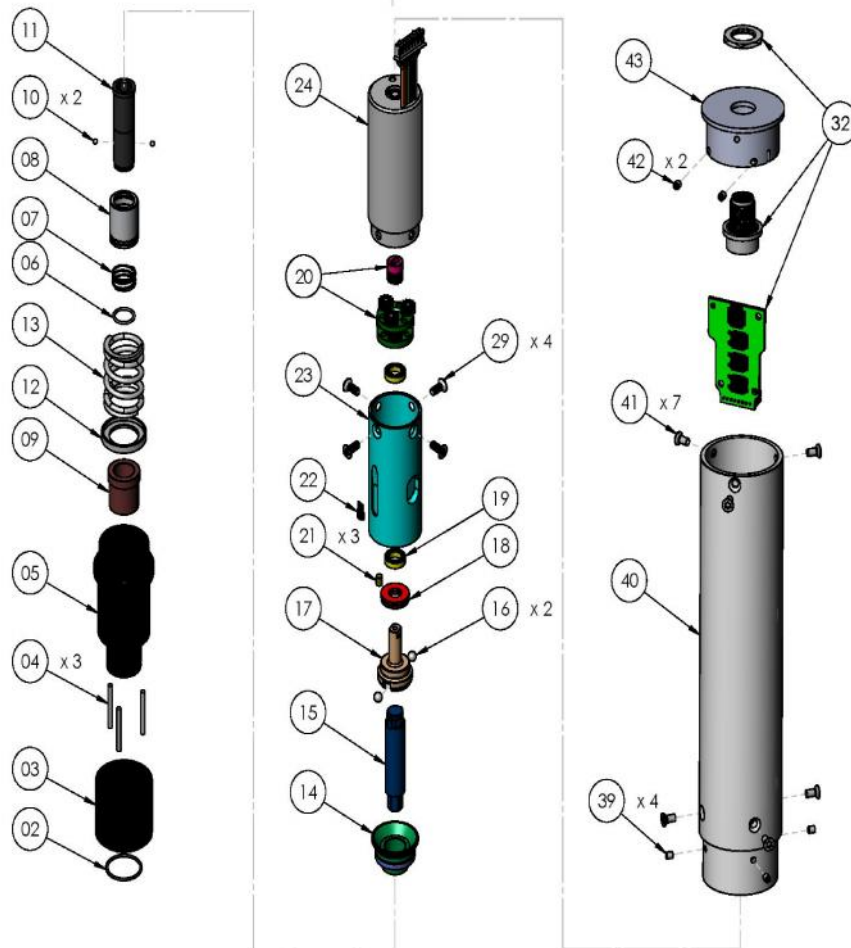


## PARTI DI RICAMBIO/ SPARE PARTS

RIF	DESCRIZIONE/ DESCRIPTION	COD. KBL04	COD. KBL15	COD. KBL30	COD. KBL40
1	Anello frontale/ <i>Front ring</i>	251101	251101	251201	251401
2	Anello di fermo/ <i>Nut stopper ring</i>	251102	251102	251202	251402
3	Ghiera regolazione coppia/ <i>Torque adjusting nut</i>	251103	251103	251203	251403
4	Pin/ <i>Knotting pin (3)</i>	251004	251004	251004	251004
5	Corpo sede frizione/ <i>Torque adjusting bolt</i>	251105	251105	251205	251205
6	Anello di fermo/ <i>Collar stopper</i>	251006	251006	251006	251006
7	Molla/ <i>Collar spring</i>	251007	251007	251007	251007
8	Boccola/ <i>Joint shaft collar</i>	251008	251008	251008	251008
9	Cuscinetto/ <i>Bearing</i>	251009	251009	251009	251009
10	Sfera/ <i>Steel ball (2)</i>	251010	251010	251010	251010
11	Alberino/ <i>Joint shaft</i>	251011	251011	251011	251011
12	Ferma molla/ <i>Spring holder</i>	251112	251112	251212	251412
13	Molla coppia/ <i>Torque adjusting spring</i>	251313	251113	251213	251413
14	Sede frizione/ <i>Clutch seat</i>	251114	251114	251214	251214
15	Camma/ <i>Cam</i>	251015	251015	251015	251015
16	Sfera/ <i>Steel ball (2)</i>	251116	251116	251216	251416
17	Salterello/ <i>Fixed clutch</i>	251117	251117	251217	251417
18	Cuscinetto/ <i>Thrust bearing</i>	251118	251118	251218	251418
19	Cuscinetto/ <i>Bearing</i>	251119	251119	251219	251419
20	Riduzioni/ <i>Gears</i>	251120	251120	251220	251420
21	Magnete/ <i>Magnet (3)</i>	251021	251021	251021	251021
22	Sensore/ <i>Brake sensor</i>	251022	251022	251022	251022
23	Sede ingranaggi/ <i>Gear case</i>	251123	251123	251223	251223
24	Motore/ <i>Motor</i>	251124	251124	251224	251224
25	Impugnatura dx/ <i>Right housing</i>	251125	251125	251225	251225
26	Vite impugnatura/ <i>Screw (1)</i>	251126	251126	251226	251226
27	Vite impugnatura/ <i>Screw (3)</i>	251127	251127	251227	251227
28	Interruttore reversibilità/ <i>Reverse switch</i>	251028	251028	251028	251028
29	Vite sede ingranaggi/ <i>Gear case screw (4)</i>	251029	251029	251029	251029
31	Impugnatura sx/ <i>Left housing</i>	251131	251131	251231	251231
32	Scheda incluso connettore 5 pin/ <i>PCB included 5 pin connector KBL..FR</i>	251032+ 251030	251032+ 251030	251232+ 251030	251232+ 251030
	Scheda incluso connettore 8 pin/ <i>PCB included 8 pin connector KBL..FR/S</i>	251032/S+ 251730	251032/S+ 251730	251232/S+ 251730	251232/S+ 251730
33	Molla leva/ <i>Lever spring</i>	251133	251133	251233	251233
34	Leva/ <i>Lever</i>	251134	251134	251234	251234
35	Cover –COV KB1 (option)	020028	020028	020029	020029
36	Gancio/ <i>Hook</i>	200060	200060	200060	200060
	Cavo/ <i>Cable 5 pin</i>	200063	200063	200063	200063
	Cavo/ <i>Cable 8 pin for KBL..FR/S</i>	250063/N	250063/N	250063/N	250063/N

# KBL04 – 15 – 30 – 40FR/CA:

## ESPLOSO/ EXPLODED VIEW

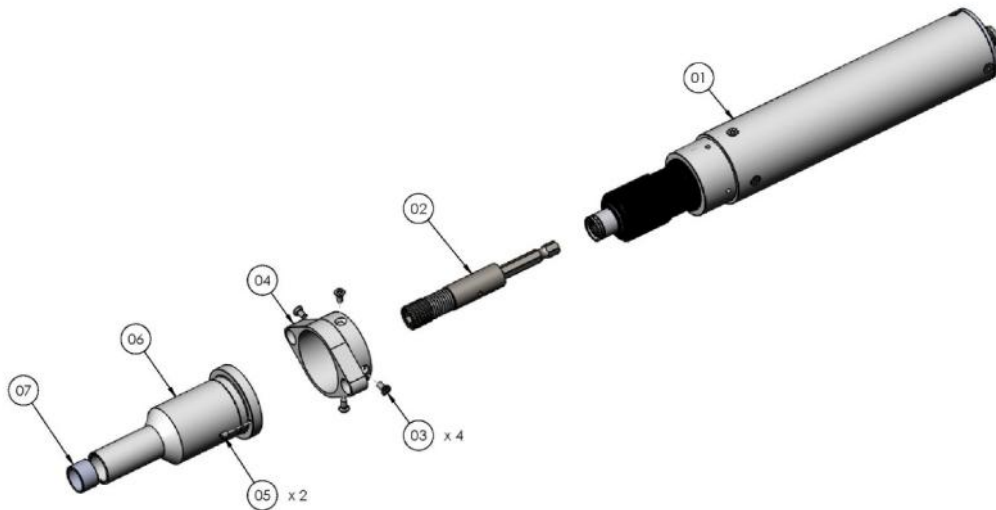


## PARTI DI RICAMBIO/ SPARE PARTS

RIF	DESCRIZIONE/ DESCRIPTION	COD. KBL04	COD. KBL15	COD. KBL30	COD. KBL40
2	Anello di fermo/ <i>Nut stopper ring</i>	251102	251102	251202	251402
3	Ghiera regolazione coppia/ <i>Torque adjusting nut</i>	251103	251103	251203	251403
4	Pin/ <i>Knotting pin</i> (3)	251004	251004	251004	251004
5	Corpo sede frizione/ <i>Torque adjusting bolt</i>	251105	251105	251205	251205
6	Anello di fermo/ <i>Collar stopper</i>	251006	251006	251006	251006
7	Molla/ <i>Collar spring</i>	251007	251007	251007	251007
8	Boccola/ <i>Joint shaft collar</i>	251008	251008	251008	251008
9	Cuscinetto/ <i>Bearing</i>	251009	251009	251009	251009
10	Sfera/ <i>Steel ball</i> (2)	251010	251010	251010	251010
11	Alberino/ <i>Joint shaft</i>	251011	251011	251011	251011
12	Ferma molla/ <i>Spring holder</i>	251112	251112	251212	251242
13	Molla coppia/ <i>Torque adjusting spring</i>	251313	251113	251213	251413
14	Sede frizione/ <i>Clutch seat</i>	251114	251114	251216	251216
15	Camma/ <i>Cam</i>	251015	251015	251015	251015
16	Sfera/ <i>Steel ball</i> (2)	251116	251116	251216	251416
17	Salterello/ <i>Fixed clutch</i>	251117	251117	251217	251417
18	Cuscinetto/ <i>Thrust bearing</i>	251118	251118	251218	251418
19	Cuscinetto/ <i>Bearing</i>	251119	251119	251219	251419
20	Corona riduzioni/ <i>Gear assembly</i>	251120	251120	251220	251220
21	Magnete/ <i>Magnet</i>	251021	251021	251021	251021
22	Sensore/ <i>Brake sensor</i>	251022	251022	251022	251022
23	Sede ingranaggi/ <i>Gear case</i>	251123	251123	251223	251223
24	Motore/ <i>Motor</i>	251124	251124	251224	251224
29	Vite sede ingranaggi/ <i>Gear case screw</i> (4)	251029	251029	251029	251029
30	Connettore M 8 pin/8 <i>pin connector</i> KBL..FR/CA	251730	251730	251730	251730
32	Scheda incluso connettore 8 pin/ <i>PCB included 8 pin connector</i> KBL..FR/CA	251032/S	251032/S	251032/S	251032/S
39	Grano/ <i>Screw</i> M3x3 (4)	200039	200039	200039	200039
40	Cannotto/ <i>Aluminium body</i>	251138	251138	251238	251238
41	Vite/ <i>Screw</i> M3x6 (7)	801002	801002	801002	801002
42	Grano/ <i>Screw</i> M4x4 (2)	895014	895014	895014	895014
43	Coperchio/ <i>Cap</i>	251034	251034	251034	251034
	Cover – COV KB01/CA (option)	020028/CA	020028/CA	020029/CA	020029/CA
	Cavo/ <i>Cable</i> 8 pin	250063/N	250063/N	250063/N	250063/N

## KBL04 – 15FR/CA/FN:

### ESPLOSO/ EXPLODED VIEW



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### PARTI DI RICAMBIO/ SPARE PARTS

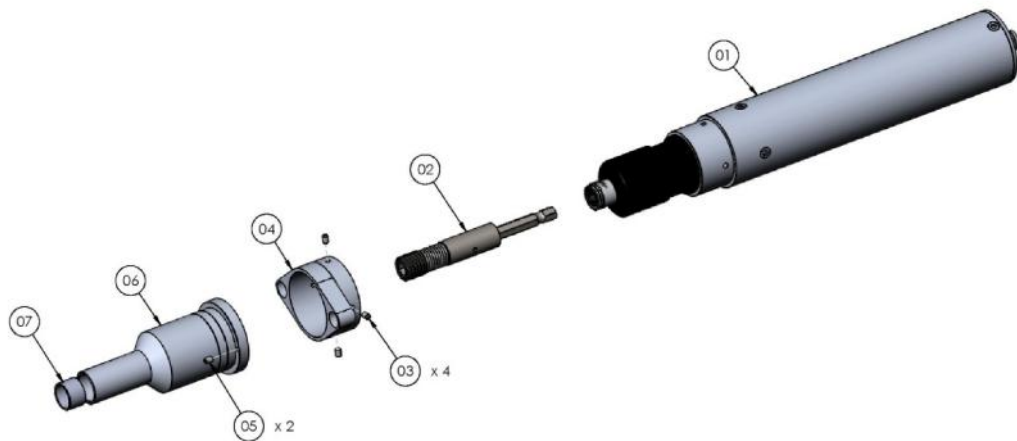
RIF	DESCRIZIONE/ DESCRIPTION	COD.
1	KBL04FR/CA	190004/CA
	KBL15FR/CA	190015/CA
2	Compensatore/ Axial compensator	800322
3	Vite/ Screw M3x5 T10 (4)	801003
4	Flangia supporto/ Support plate	251140
5	Vite/ Screw M3x5	200039
6	Bussola guida telescopica/ Telescopic drive bush	251141
7	Permaglide	800334
	Cavo/ Cable 5 pin	200063

## PARTI DI RICAMBIO/ SPARE PARTS

<b>RIF</b>	<b>DESCRIZIONE/ DESCRIPTION</b>	<b>COD.</b>
2	Anello di fermo/ <i>Nut stopper ring</i>	251202
3	Ghiera regolazione coppia/ <i>Torque adjusting nut</i>	251203
4	Pin/ <i>Knotting pin</i> (3)	251004
5	Corpo sede frizione/ <i>Torque adjusting bolt</i>	251205
6	Anello di fermo / <i>Collar stopper</i>	251006
7	Molla/ <i>Collar spring</i>	251007
8	Boccola/ <i>Joint shaft collar</i>	251008
9	Cuscinetto/ <i>Bearing</i>	251009
10	Sfera/ <i>Steel ball</i> (2)	251010
11	Alberino/ <i>Joint shaft</i>	251011
12	Alberino/ <i>Joint shaft</i>	251212
13	Raccordo/ <i>Joint</i>	251213
14	Ferma molla/ <i>Spring holder</i>	251214
15	Molla coppia/ <i>Torque adjusting spring</i>	251215
16	Sede frizione/ <i>Clutch seat</i>	251216
17	Camma/ <i>Cam</i>	251217
18	Sfera/ <i>Steel ball</i> (2)	251218
19	Salterello/ <i>Fixed clutch</i>	251219
20	Corona riduzioni/ <i>Gear assembly</i>	251220
21	Magnete/ <i>Magnet</i> (3)	251021
22	Cuscinetto/ <i>Thrust bearing</i>	251222
23	Sede ingranaggi/ <i>Gear case</i>	251223
24	Motore/ <i>Motor</i>	251224
26	Sensore/ <i>Sensor</i>	251226
27	Cuscinetto/ <i>Bearing</i>	251227
30	Connettore M 8 pin/ <i>8 pin connector KBL..FR/CA</i>	251730
32	Scheda incluso connettore 8 pin/ <i>PCB included 8 pin connector KBL..FR/CA</i>	251032/S
36	Vite sede ingranaggi/ <i>Gear case screw</i> (4)	251236
40	Cannotto/ <i>Aluminium body</i>	251238
41	Vite/ <i>Screw M3x6</i> (7)	801002
42	Grano/ <i>Screw M4x4</i> (2)	895014
43	Coperchio/ <i>Cap</i>	251034
	Cover – COV KB02/CA (option)	020029/CA
	Cavo/ <i>Cable</i> 8 pin	250063/N

## **KBL30-40FR/CA/FN:**

### **ESPLOSO/ EXPLODED VIEW**

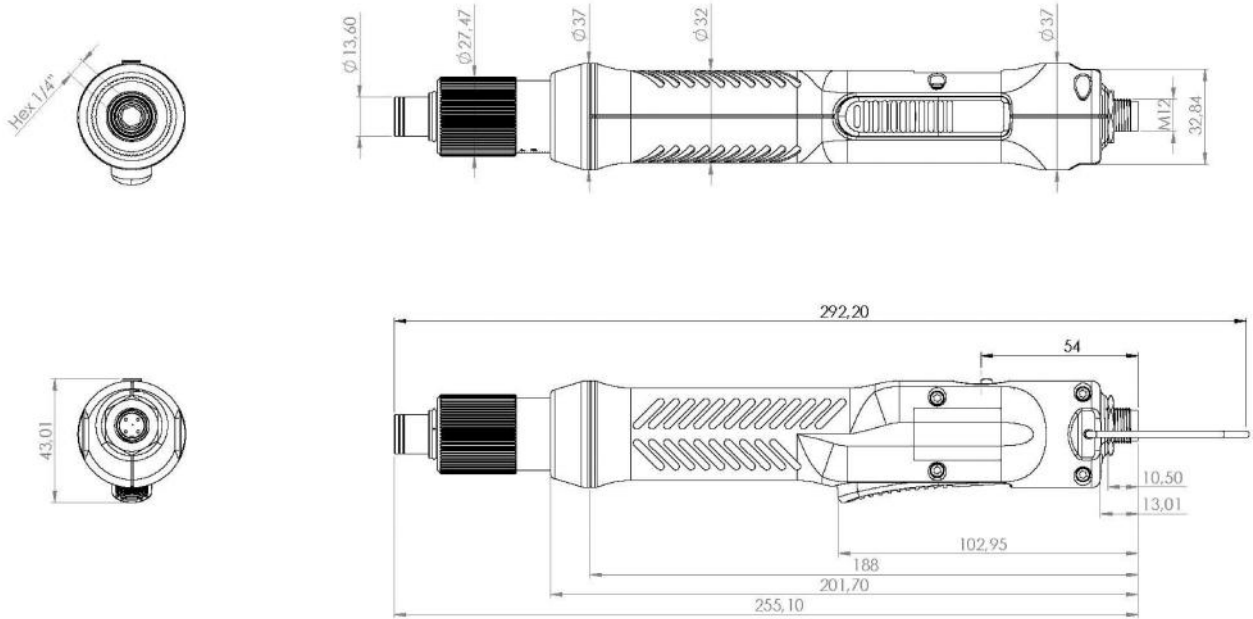


### **PARTI DI RICAMBIO/ SPARE PARTS**

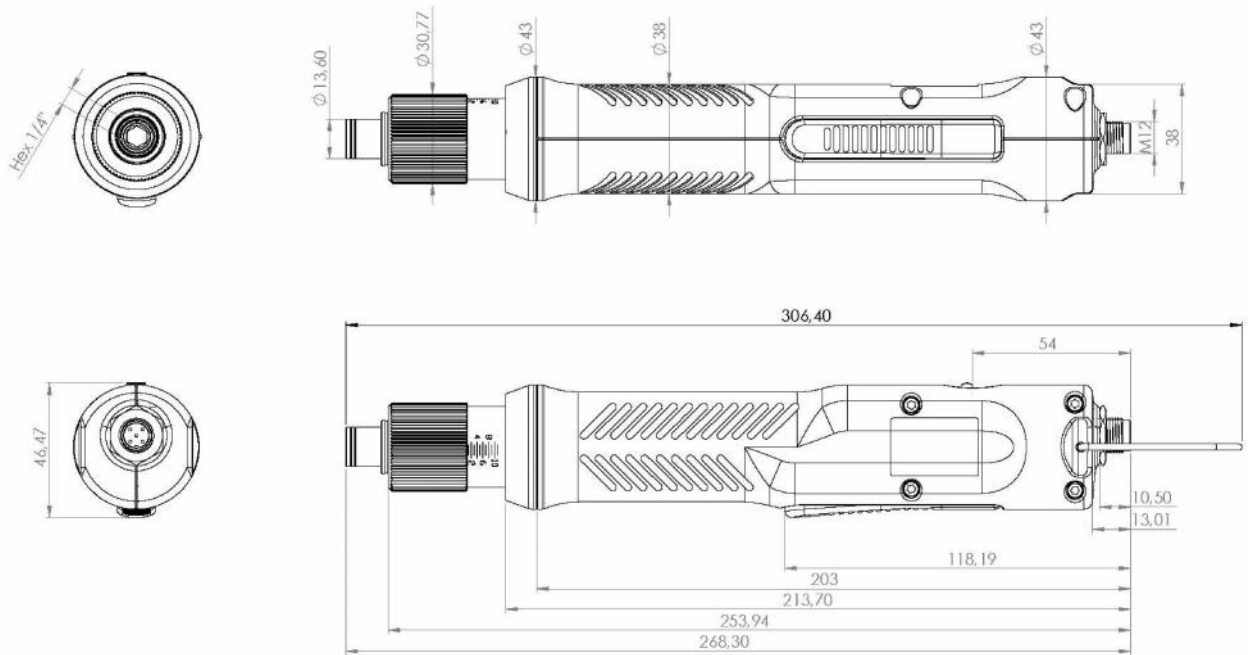
<b>RIF</b>	<b>DESCRIZIONE/ DESCRIPTION</b>	<b>COD.</b>
<b>1</b>	KBL30FR/CA	190030/CA
	KBL40FR/CA	190040/CA
<b>2</b>	Compensatore/ Axial compensator	800322
<b>3</b>	Vite/ Screw M3x5	200039
<b>4</b>	Flangia supporto/ Support plate	251240
<b>5</b>	Vite/ Screw M3x5	200039
<b>6</b>	Bussola guida telescopica/ Telescopic drive bush	251241
<b>7</b>	Permaglide	800334
	Cavo/ Cable 5 pin	200063

**INGOMBRI/ DRAWINGS:**

**KBL04-15FR – KBL04-15FR/S:**

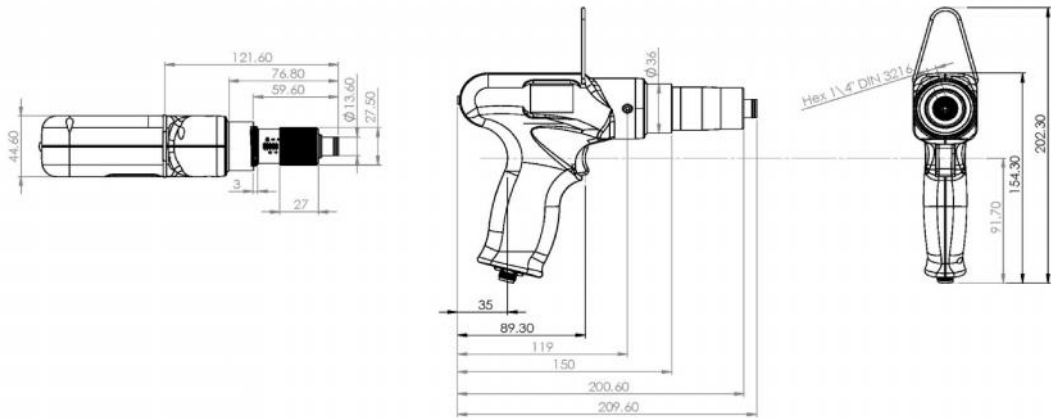


**KBL30-40FR – KBL30-40FR/S:**

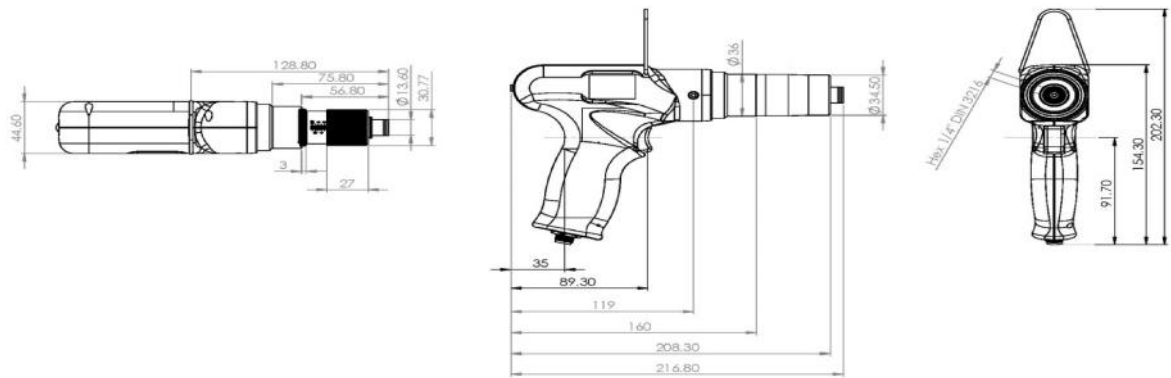




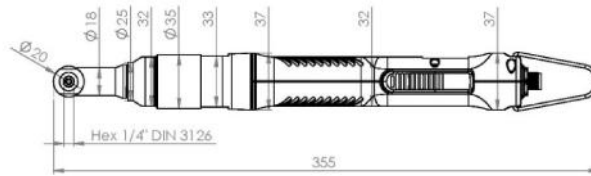
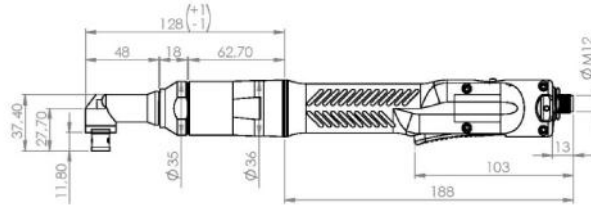
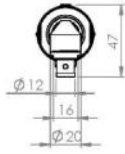
# KBL04-15P



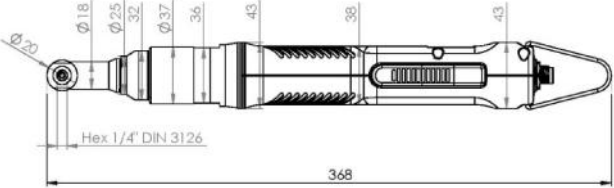
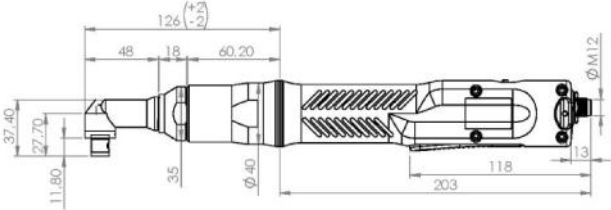
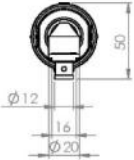
# KBL30-40P



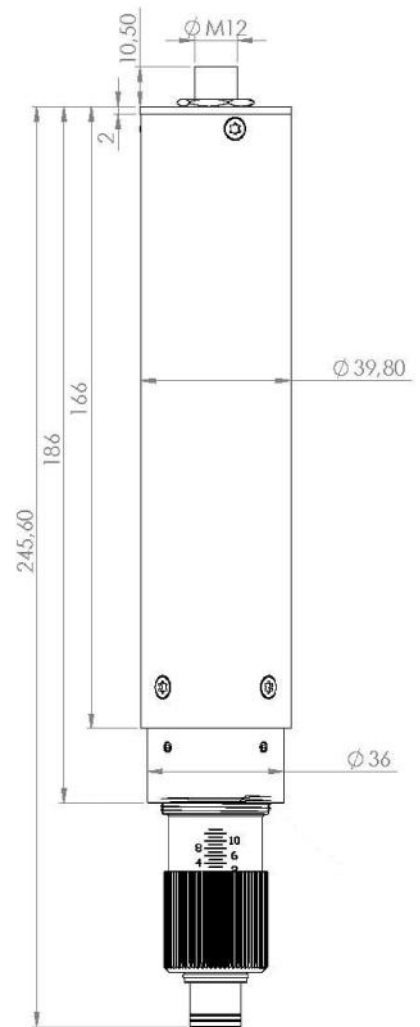
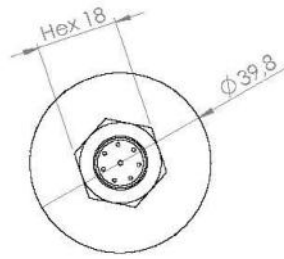
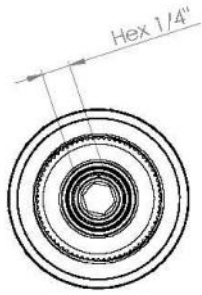
# KBL04-15FR /ANG:



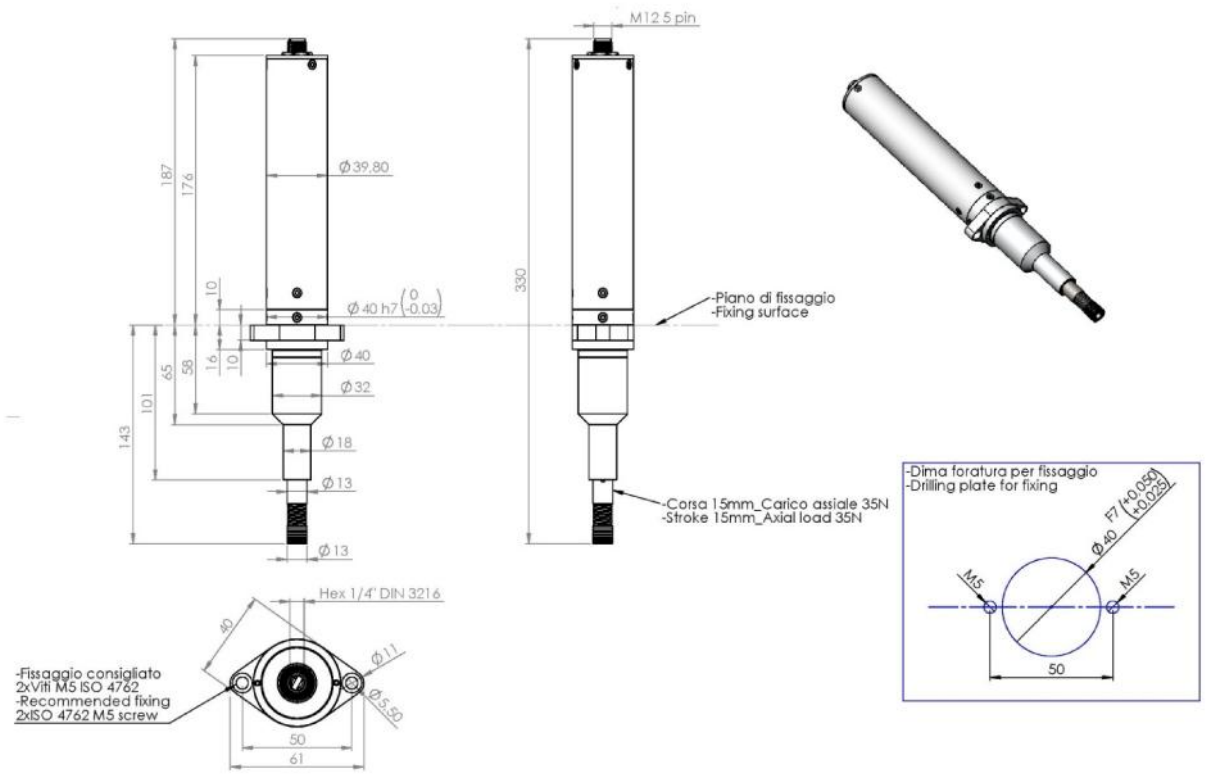
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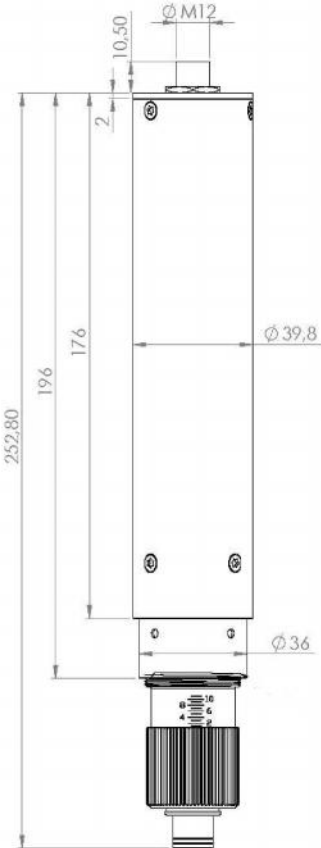
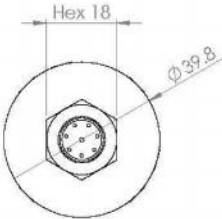
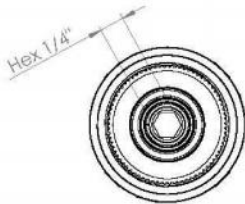
**KBL04-15FR/CA :**



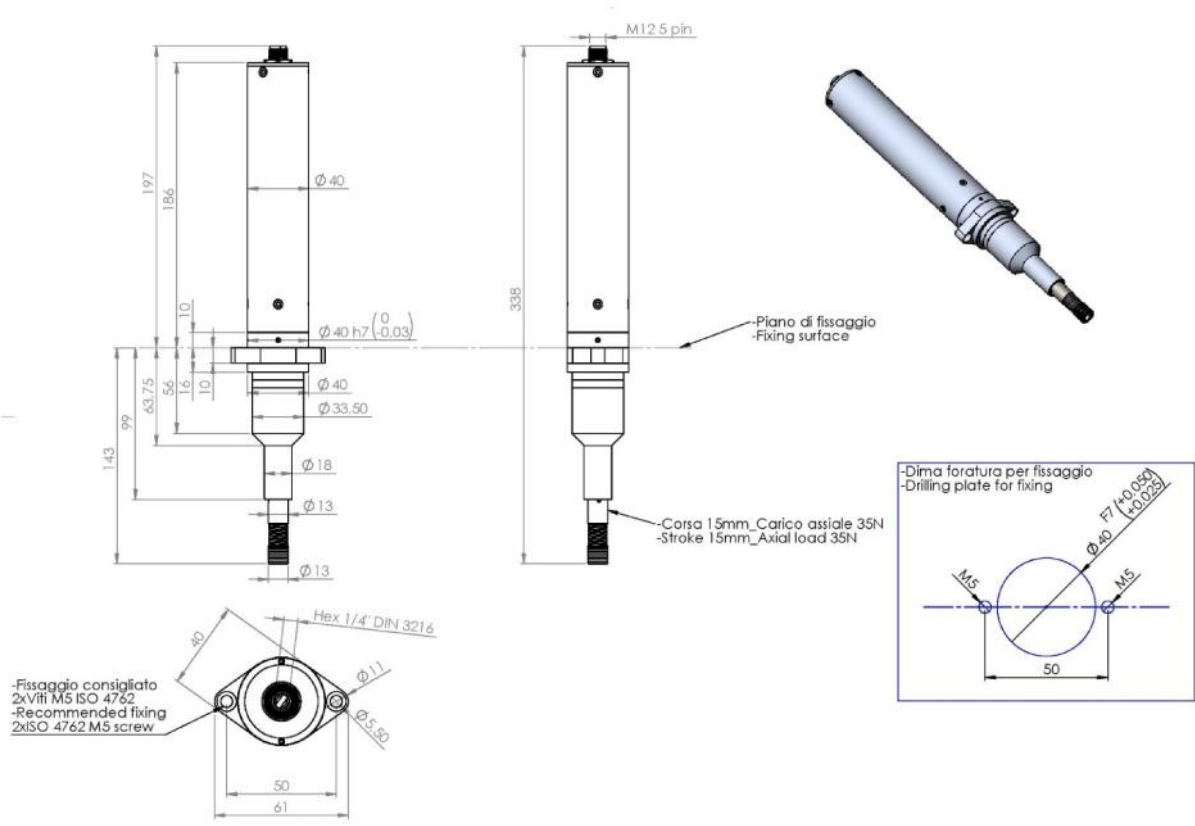
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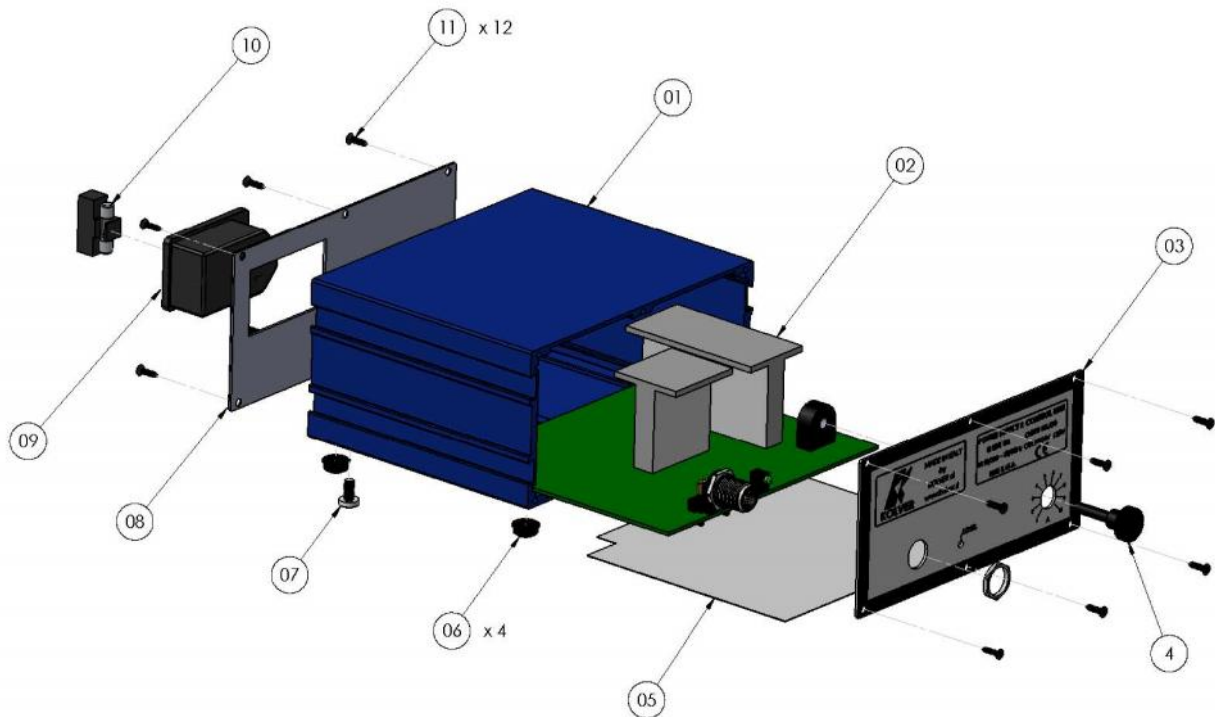
**KBL30-40FR/CA:**



# KBL30-40FR/CA/FN :



## **EDU 1BL: ESPLOSO / EXPLODED VIEW**

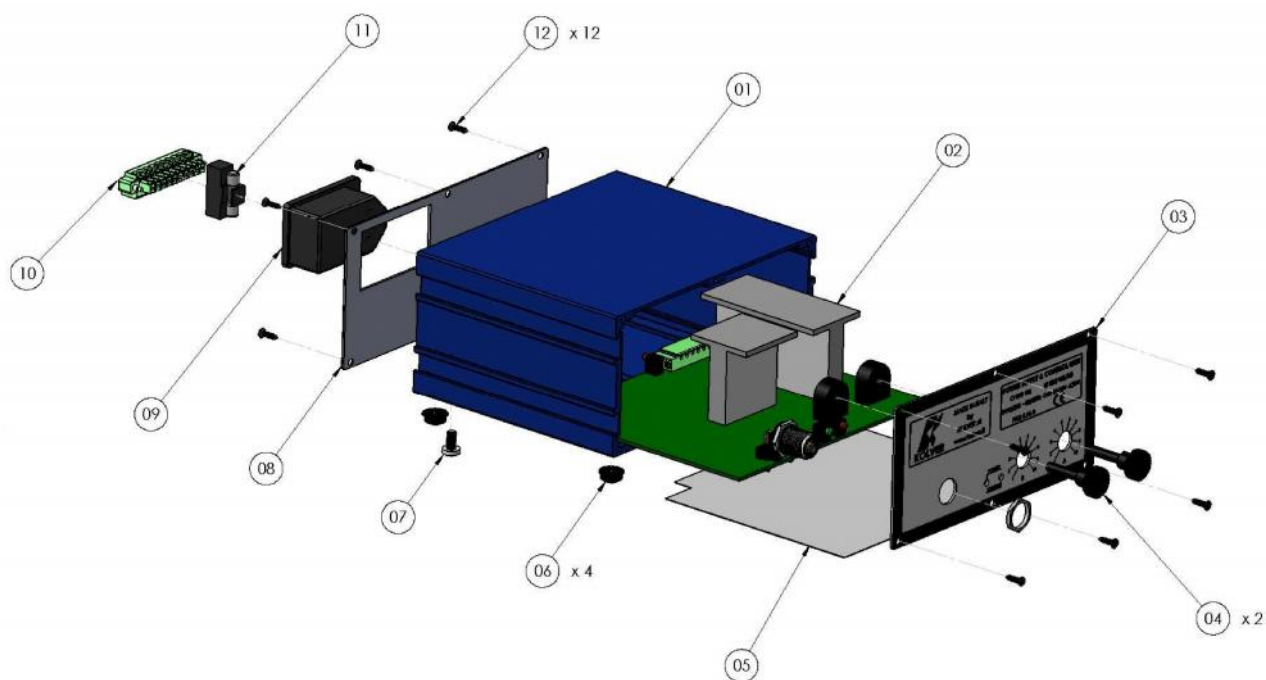


## **EDU 1BL: PARTI DI RICAMBIO/ SPART PARTS**

<b>RIF</b>	<b>DESCRIZIONE/ DESCRIPTION</b>	<b>COD.</b>	<b>RIF</b>	<b>DESCRIZIONE/ DESCRIPTION</b>	<b>COD.</b>
<b>1</b>	Contenitore/ <i>Box</i>	811010/VB	<b>7</b>	Vite/ <i>Screw M4 x 4 mm</i>	806635
<b>2</b>	Scheda PCB/ <i>Main board</i>	856807/B	<b>8</b>	Pannello posteriore/ <i>Back panel</i>	831617
<b>3</b>	Pannello anteriore/ <i>Front panel</i>	821605	<b>9</b>	Presca con portafusibile/ <i>Socket with fuseholder 230V</i>	800618
<b>4</b>	Manopola plastica/ <i>Plastic knob</i>	800640	<b>10</b>	Fusibile rapido/ <i>Fuse 3,15 A</i>	800619
<b>5</b>	Foglio isolante/ <i>Isolating sheet</i>	800653	<b>11</b>	Vite autofil./ <i>Self tapping screw (12)</i>	800605
<b>6</b>	Piedino plastica/ <i>Plastic support (4)</i>	800016			



## **EDU 1BL/SG: ESPLOSO / EXPLODED VIEW**



## **EDU 1BL/SG: PARTI DI RICAMBIO/ SPART PARTS**

RIF	DESCRIZIONE/ DESCRIPTION	COD.	RIF	DESCRIZIONE/ DESCRIPTION	COD.
<b>1</b>	Contenitore/ <i>Box</i>	811010/VB	<b>7</b>	Vite/ <i>Screw</i> M4 x 4 mm	806635
<b>2</b>	Scheda PCB/ <i>Main board</i>	856807/T	<b>8</b>	Pannello posteriore/ <i>Back panel</i>	831717/SG
<b>3</b>	Pannello anteriore/ <i>Front panel</i>	821605/SG	<b>9</b>	Presca con portafusibile/ <i>Socket with fuseholder 230V</i>	800618
<b>4</b>	Manopola plastica/ <i>Plastic knob (2)</i>	800640	<b>10</b>	Connettore / <i>Connector I/O F 10 pin</i>	800102
<b>5</b>	Foglio isolante/ <i>Isolating sheet</i>	800653	<b>11</b>	Fusibile rapido/ <i>Fuse 3,15 A</i>	800619
<b>6</b>	Piedino plastica/ <i>Plastic support (4)</i>	800016	<b>12</b>	Vite autofil./ <i>Self tapping screw (12)</i>	800605

**DICHIARAZIONE DI CONFORMITA' /  
DECLARATION OF CONFORMITY**



**KOLVER S.r.l.  
VIA MARCO CORNER, 19/21  
36016 THIENE (VI) ITALIA**

Dichiara che la macchina nuova qui descritta/ *Declare that the new tool here described:*  
Avvitatore elettrico e unità di controllo/ *Electric screwdriver and control unit:*

<b>FAB03SS/FR</b>	110003/FR	<b>RAF32NS/FR</b>	120032/FR
<b>FAB10RE/FR</b>	110010/FR	<b>RAF32PS/FR</b>	122032/FR
<b>FAB12RE/FR</b>	110012/FR	<b>RAF32PP/FR</b>	120033/FR
<b>FAB12PS/FR</b>	112012/FR	<b>RAF32PP/FR/U</b>	120033/FR/U
<b>FAB12PP/FR</b>	110013/FR	<b>RAF38NS/FR</b>	120638/FR
<b>FAB12PP/FR/U</b>	110013/FR/U	<b>RAF38PS/FR</b>	122638/FR
<b>FAB18RE/FR</b>	110618/FR	<b>RAF38PP/FR</b>	120639/FR
<b>FAB18PS/FR</b>	112618/FR	<b>RAF38PP/FR/U</b>	120639/FR/U
<b>FAB18PP/FR</b>	110619/FR	<b>RAF50NS/FR</b>	120650/FR
<b>FAB18PP/FR/U</b>	110619/FR/U	<b>RAF50PS/FR</b>	122650/FR
		<b>RAF50PP/FR</b>	120651/FR
		<b>RAF50PP/FR/U</b>	120651/FR/U
<b>EDU1FR</b>	010010/FR	<b>EDU1FR/SG</b>	010010/FR/SG

È conforme alle disposizioni legislative che traspongono le direttive e le normative/ *Is in conformity with the following standards and other normative documents:*

2006/42/CE, LVD 2014/35/UE, EMC 2014/30/UE, EN 62841-2-2:2014, EN 62841-1: 2015, EN 60204-1, EN 61000-6-2, EN 61000-6-4.

È conforme alla direttiva RoHS III (2011/65/UE e successiva 2015/863)/ *It is also in conformity with RoHS III normative (2011/65/UE and following 2015/863).*

Nome/Name:

Giovanni Colasante

Posizione/Position:

Amministratore Delegato/General Manager

Persona incaricata a costituire il fascicolo tecnico presso la Sede/ *Person authorized to compile the technical file in Kolver*

Thiene, 1° gennaio 2021

*Giovanni Colasante*



# **Manuale Istruzioni/ *Operator's Handbook***

## **FAB/ RAF**

*Avvitatori/ Screwdrivers*

## **EDU1FR/ EDU1FR/SG**

*Unità di controllo/ Control unit*

**KOLVER S.r.l.**  
**VIA MARCO CORNER, 19/21**  
**36016 THIENE (VI) ITALIA**  
**TEL +39 0445 371068**  
[www.kolver.it](http://www.kolver.it)

<b>Modello/ Model</b>	<b>Codice/ Code</b>	<b>Coppia/ Torque Nm</b>	<b>RPM max</b>	<b>Avvio/ Start Option</b>	<b>L x à1 mm</b>
<b>FAB03SS/FR</b>	110003/FR	0,05 - 0,3	650	<i>Leva/ Lever</i>	226 x 36
<b>FAB10RE/FR</b>	110010/FR	0,05 - 0,8	1000	<i>Leva/ Lever</i>	226 x 36
<b>FAB12RE/FR</b>	110012/FR	0,2 - 1,2	1000	<i>Leva/ Lever</i>	226 x 36
<b>FAB12PS/FR</b>	112012/FR	0,2 - 1,2	1000	<i>Pressione/ Push</i>	226 x 36
<b>FAB12PP/FR</b>	110013/FR	0,2 - 1,2	1000	<i>Leva/ Lever</i>	200x150x34
<b>FAB12PP/FR/U</b>	110013/FR/U	0,2 - 1,2	1000	<i>Leva/ Lever</i>	200x150x34
<b>FAB18RE/FR</b>	110618/FR	0,3 - 1,8	650	<i>Leva/ Lever</i>	226 x 36
<b>FAB18PS/FR</b>	112618/FR	0,3 - 1,8	650	<i>Pressione/ Push</i>	220 x 33
<b>FAB18PP/FR</b>	110619/FR	0,3 - 1,8	650	<i>Leva/ Lever</i>	200x150x34
<b>FAB18PP/FR/U</b>	110619/FR/U	0,3 - 1,8	650	<i>Leva/ Lever</i>	200x150x34
<b>RAF32NS/FR</b>	120032/FR	0,7 - 3,2	1000	<i>Leva/ Lever</i>	247 x 40
<b>RAF32PS/FR</b>	122032/FR	0,7 - 3,2	1000	<i>Pressione/ Push</i>	247 x 40
<b>RAF32PP/FR</b>	120033/FR	0,7 - 3,2	1000	<i>Leva/ Lever</i>	200x150x40
<b>RAF32PP/FR/U</b>	120033/FR/U	0,7 - 3,2	1000	<i>Leva/ Lever</i>	200x150x40
<b>RAF38NS/FR</b>	120638/FR	0,9 - 3,8	650	<i>Leva/ Lever</i>	247 x 40
<b>RAF38PS/FR</b>	122638/FR	0,9 - 3,8	650	<i>Pressione/ Push</i>	247 x 40
<b>RAF38PP/FR</b>	120639/FR	0,9 - 3,8	650	<i>Leva/ Lever</i>	200x150x40
<b>RAF38PP/FR/U</b>	120639/FR/U	0,9 - 3,8	650	<i>Leva/ Lever</i>	200x150x40
<b>RAF50NS/FR</b>	120650/FR	0,9 - 5,0	700	<i>Leva/ Lever</i>	247 x 40
<b>RAF50PP/FR</b>	120651/FR	0,9 - 5,0	700	<i>Leva/ Lever</i>	200x150x40
<b>RAF50PP/FR/U</b>	120651/FR/U	0,9 - 5,0	700	<i>Leva/ Lever</i>	200x150x40

**IMPORTANTE: E' sconsigliato l'uso continuo oltre l'80% del campo di coppia!**  
**IMPORTANT: Continuous use over 80% of torque range is not recommend**

# IT

**ATTENZIONE:** Prima di qualsiasi utilizzazione o intervento sull'attrezzo, verificate che le informazioni che seguono e le istruzioni contenute nella guida di sicurezza (Codice articolo: OMS000) siano state lette, comprese e rispettate. Le caratteristiche e le descrizioni dei nostri prodotti sono soggette a cambiamenti senza preavviso da parte nostra.

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## 1. Applicazioni

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Gli avvitatori elettrici KOLVER vengono utilizzati per avvitare alla coppia richiesta viti, dadi, bulloni, grani e qualunque altro organo di collegamento filettato su qualunque materiale. Tutti i modelli sono reversibili e quindi utilizzabili anche per svitare. Gli impieghi più frequenti sono nel montaggio di apparecchi elettronici in genere, elettrodomestici, cablaggi, giocattoli, lampadari, occhiali etc.

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## 2. Uso

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Il complesso di avvitatura è formato dall'avvitatore, dal cavo con connettore e dall'unità di controllo ed alimentazione. Per procedere all'utilizzo operare come segue:

- a) Collegare il connettore a 5 contatti del cavo dell'avvitatore alla presa dell'unità di alimentazione e serrare la ghiera relativa.
- b) Inserire la spina dell'alimentatore in una presa di corrente (vedi dati tecnici)
- c) Accendere l'alimentatore premendo l'apposito pulsante sul pannello posteriore
- d) Procedere all'avvitatura assicurandosi che la velocità e la rampa impostate garantiscano sempre e comunque il corretto scatto della frizione. Se non si verifica questo la frizione si può bloccare. L'unità di controllo segnala l'anomalia arrestando l'avvitatore e accendendo il segnale di coppia quando si preme la leva. Per sbloccare la frizione ruotare l'inserito mandrino di un giro.
- e) Per lavorare correttamente l'avvitatore deve raggiungere la coppia alla velocità di regime e non nel transitorio di rampa di accelerazione.
- f) Per evitare di danneggiare l'avvitatore, restare sempre all'interno del campo di coppia specificato in questo manuale.
- g) Per evitare di danneggiare l'avvitatore e l'unità di controllo invertire il senso di rotazione solamente a motore fermo.

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### **3. Regolazione della coppia di serraggio**

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La coppia di serraggio degli avvitatori si regola variando la tensione della molla della frizione, avvitando o svitando la ghiera filettata #2 dopo avere allentato la ghiera di bloccaggio #30.

Per aumentare la coppia ruotare la ghiera in senso orario, per diminuire la coppia ruotare la ghiera in senso antiorario.

Per il controllo dei valori di coppia consigliamo l'utilizzo di un misuratore di coppia elettronico K5 o MINI K5.

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### **4. Unità di controllo ed alimentazione**

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L'unità di controllo ed alimentazione assolve alle funzioni di trasformatore di corrente e di regolatore elettronico della coppia di serraggio.

L'alimentazione da rete in corrente alternata (90/260VAC-50/60Hz) viene convertita in corrente continua da 18 a 30V idonea per il funzionamento dell'avvitatore, tramite un sofisticato regolatore switching da 120W.

Il circuito elettronico di controllo arresta istantaneamente l'alimentazione di corrente al motore dell'avvitatore al raggiungimento della coppia prefissata.

Sul pannello frontale sono presenti due manopole: "R" e "A".

"R" indica la rampa di accelerazione, regolabile da 0 a 2 sec e la velocità "A" indica la velocità dell'avvitatore, regolabile dal 60% al 100%.

Sul pannello anteriore sono presenti 2 led: uno verde che segnala l'accensione del dispositivo e uno rosso che segnala la coppia avvenuta.

La temperatura di lavoro dell'unità di controllo può raggiungere i 45°C ma questo non costituisce un problema.







Nel pannello posteriore tutte le unità sono dotate di presa con portafusibile autobloccante a norma IEC/CEE22. Per sostituire il fusibile estrarre con la punta di un cacciavite il cassetto portafusibile.

<b>Unità di controllo</b>	<b>Caratteristiche</b>	<b>Dimensioni</b>	<b>Peso</b>
EDU1FR	120W, 1 connettore, velocità e rampa regolabile	130 x 118 x 67	0,6 Kg

Il modello EDU 1FR/SG può essere utilizzato con qualsiasi avvitatore Kolver per utilizzo manuale o automatico, con frizione meccanica, sia a leva che a spinta, diritto o a pistola.

Unità di controllo	Caratteristiche	Dimensioni	Peso
EDU1FR/SG	120W, 1 connettore, velocità e rampa regolabile IN: partenza e inversione remota; OUT: segnali di coppia e leva in uscita.	130 x 118 x 67	0,6 Kg

Su questo modello nel pannello posteriore è presente un connettore I/O segnali. INPUT: per start, inversione avvitatore, stop motore. OUTPUT: segnali di coppia e leva premuta (24V 20mA).

INPUT				OUTPUT 24V 20mA		
						
COMMON 0 VDC	START MOTOR CONTACT PIN 1-2	N.O. REVERSE CONTACT PIN 1-3	STOP MOTOR CONTACT PIN 1-4	TORQUE SIGNAL SIGNAL PIN 5 - 0VDC PIN 1	LEVER SIGNAL SIGNAL PIN 6 - 0VDC PIN 1	NOT USED
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>

PIN 1: massa comune (COM 0Vdc)

PIN 2: tramite contatto tra pin 1 e 2, l'avvitatore avvita con controllo di coppia in senso orario.

PIN 3: tramite contatto tra pin 1 e 3, l'avvitatore svita.

PIN 4: tramite contatto tra pin 1 e 4, il motore si ferma in qualsiasi situazione.

PIN 5: il segnale si attiva ad avvitaratura avvenuta e si resetta quando si preme la leva per una nuova avvitaratura.

PIN 6: il segnale si attiva quando premo la leva o input start e si spegne al suo rilascio.

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## 5. Manutenzione

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Il motore dell'avvitatore è dotato di spazzole di carbone della lunghezza di 9mm. Tali spazzole devono essere sostituite quando la loro lunghezza si riduce a circa 5mm. Per la sostituzione procedere come segue:

- a. Svitare le viti #59 e #68, togliere le impugnature #54 e #58.
- b. Togliere le spazzole #53 dalla loro sede sollevando delicatamente la molla premispazzole #52 e dissaldare il loro filo.
- c. Saldare il filo delle nuove spazzole, inserirle nella sede e bloccarle con le relative molle.
- d. Rimontare le impugnature.

L'unità di controllo è stata progettata per non avere alcuna usura elettrica di alcun tipo. Se si dovessero tuttavia presentare dei problemi si consiglia di rivolgersi ad un tecnico KOLVER specializzato.

**Si raccomanda di spegnere l'unità alla fine di ogni sessione di lavoro.**

L'utilizzo continuo alla massima coppia nominale si tradurrà in una prematura usura delle spazzole in carbone, della molla della frizione e della frizione superiore. L'uso continuo oltre l'80% del campo di coppia non è raccomandato!

### NOTE

Il livello di pressione acustica continuo equivalente ponderato è sempre inferiore a 70dB (A).

Il braccio dell'utilizzatore è esposto ad una accelerazione media ponderata in frequenza complessiva (somma quadratica sui tre assi) sempre inferiore a  $2.5\text{m/s}^2$ . In particolare l'esposizione alle vibrazioni risulta inferiore a  $1\text{m/s}^2$  per operatori che avvitano fino a 4200 viti al giorno.

La durata nominale di funzionamento e la durata nominale di riposo sono legate da un rapporto di 1:3, come indicato nell'etichetta sul corpo dell'avvitatore (1s/3s). Ciò vuol dire che per ogni secondo o multiplo di funzionamento si deve prevedere un periodo di riposo del motore pari a tre volte il tempo di funzionamento stesso. Il mancato rispetto di tale norma fa decadere la validità della garanzia.



## GARANZIA

1. Questo prodotto è garantito da difetti di lavorazione o di materiali per un periodo massimo di 12 mesi a partire dalla data di acquisto presso KOLVER, sempre che il suo impiego sia stato limitato ad un unico turno per tutto quel periodo. Se il ritmo d'impiego supera il funzionamento di un unico turno, la durata della garanzia sarà ridotta in modo proporzionale.
2. Se il prodotto presenta difetti di fabbricazione o di materiali, durante il periodo della garanzia, deve essere restituito a KOLVER, trasporto prepagato, unitamente ad una breve descrizione del presunto difetto. KOLVER deciderà, a sua discrezione, se dar disposizioni per la riparazione o la sostituzione gratuita dei componenti che ritiene essere difettosi, a causa della fabbricazione o dei materiali.
3. Questa garanzia non è valida per quei prodotti che sono stati usati in modo non-conforme, o modificati, o che non sono stati riparati da KOLVER, o perché sono stati utilizzati ricambi non originali KOLVER, o perché riparati da persone non autorizzate da KOLVER.
4. KOLVER non accetta nessuna richiesta di risarcimento per spese di manodopera o di altro tipo causate da prodotti difettosi.
5. Si escludono espressamente danni diretti, incidentali o indiretti di qualsiasi tipo, dovuti a qualsiasi difetto.
6. Questa garanzia sostituisce ogni altra garanzia o condizione, espressa o implicita, riguardante la qualità, la commerciabilità o l'idoneità a qualsiasi scopo particolare.
7. Nessuno, neppure i rappresentanti, dipendenti o impiegati KOLVER, è autorizzato ad ampliare o modificare, in qualsiasi modo, i termini di questa garanzia limitata. E' comunque possibile estendere la garanzia dietro pagamento di un corrispettivo. Ulteriori informazioni contattando [kolver@kolver.it](mailto:kolver@kolver.it).

**WARNING:** To reduce the risk of injury, before using or servicing tool, read and understand the following information as well as separately provided safety instructions (Item number: OMS000). The features and descriptions of our products are subject to change without prior notice.

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## 1. Applications

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KOLVER electric screwdrivers are used to tighten to the required torque screws, nuts, studs and any other kind of threaded connection on any material. Obviously, it is possible to use the screwdrivers with screw having a larger diameter if the torque fall within the indicated range. All models are reversible and can consequently be used to unscrew. Electric screwdrivers are mainly used in the electronic industry as well as for electric appliances, wiring, toys, lamps, glasses, in the mechanical light industry etc.

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## 2. Use

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KOLVER screwdriving system is composed by a screwdriver, a cable with 2 x M12 female 5 pin connectors and a power supply and control unit. To install it please follow the instructions.

- a) Connect the 5-pin connectors of the cable to the controller and to the screwdriver and tighten the relevant nuts.
- b) Connect the controller plug to a mains supply socket 90 / 230V- 50/60Hz.
- c) Switch the controller on through the black button on the back panel.
- d) Select the desired setting of speed (A) and slow start (R) options through the relevant knobs. Please make sure that such settings are compatible with the torque setting. Since the speed reduction is obtained through a voltage reduction (= power reduction), if the torque setting is too high for a low speed setting, the clutch may not operate correctly and get stuck. In such a case, the driver will not run and when you press the start lever the red light will signal. To reset the driver just turn the bit chuck until you hear the clutch “click” (usually 180°). Increase the speed setting before running the driver again.
- e) Similarly, the slow start setting should be chosen according to the torque that must be reached at full speed and not when the slow start is still in action.
- g) Do not slide the forward/reverse while the motor is running, it's dangerous for the motor.

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### 3. Adjusting the torque

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The torque value of the screwdriver is adjusted by changing the tension of the clutch spring, screwing or unscrewing the threaded #2 nut. After each adjustment lock the nut by means of #30 ring.

To increase the torque turn the nut clockwise, to decrease it turn the nut anticlockwise.

To change the spring remove #2 nut, replace the spring and then adjust the torque value as mentioned above.

To check the torque value we suggest the use of K5 or MINI K5 electronic torque tester.

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### 4. Control unit and power supply

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EDU 1FR power supply and control units act as voltage transformer and electronic torque controller.

The power supply, 90/260VAC-50/60Hz, is converted into 18-30V DC required by FAB and RAF series screwdrivers through an electronic transformer with constant power of 120W. The electronic control circuit cuts the power supply to the motor in response to the clutch action as soon as the pre-set torque has been reached.

On the front panel of the controller, there are two knobs indicated with the letters “R” and “A”.

Knob “R” is used to adjust the slow start option (ramp) from 0 to 2 seconds, i.e. the motor will reach the nominal speed gradually. Dial “1” for no ramp and “10” for maximum ramp.

Knob “A” is used to adjust the motor speed for nominal speed, i.e. speed as per ctg. data sheet, to 60% of nominal speed. Dial “1” for minimum speed and “10” for nominal speed.

On the front panel you can also see 2 lights: the green one will light permanently when the power is on, the red one will light only when the clutch “fires” indicating the preset torque has been reached.

The temperature of the unit can normally reach 45°C.

On the back panel you can find a socket equipped with a fuse holder and on/off switch. To replace the fuse just pull out the fuse holder and change the fuse.

Controller	Features	Dimensions	Weight
EDU1FR	120W, 1 connector, adjustable speed and ramp	130 x 118 x 67	0,6 Kg

EDU1FR/SG can be used with any Kolver screwdriver with clutch, either lever or push start, inline or pistol type.

This model rear panel presents one connector for input and output signals. Input: start, reverse, stop motor and torque HL. Output: torque and pressed lever signals (24V 20mA).

Controller	Features	Dimensions	Weight
EDU1FR/SG	120W, 1 connector, adjustable speed and ramp IN: remote start and reverse; OUT: torque and lever signals	130 x 118 x 67	0,6 Kg

INPUT				OUTPUT 24V 20mA		
<b>COMMON 0 VDC</b>	<b>START MOTOR</b> CONTACT PIN 1-2	<b>N.O. REVERSE</b> CONTACT PIN 1-3	<b>STOP MOTOR</b> CONTACT PIN 1-4	<b>TORQUE SIGNAL</b> SIGNAL PIN 5 - 0 VDC PIN 1	<b>LEVER SIGNAL</b> SIGNAL PIN 6 - 0 VDC PIN 1	<b>NOT USED</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>

PIN 1: earth common (COM 0Vdc)

PIN 2: contact between pin 1 and 2. Clockwise.

PIN 3: contact between pin 1 and 3. Counterclockwise.

PIN 4: contact between pin 1 and 4, it stops the motor in any situation.

PIN 5: Correct screwing done between min and max time.

Signal starts when the screwing is done and it resets when the lever is pressed to start a new one.

PIN 6: Signal starts when the lever is pressed or at input start and it stops when it is released.

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## 5. Maintenance

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The screwdriver's motor is equipped with carbon brushes 9 mm long. When their length is about 5mm it is time to replace them as per the following instructions:

- a. Remove the #3, #10 and #14 screws and the #9 and #15 housings (housing spare parts).
- b. Remove #53 brushes from their seat by delicately lifting up the #52 spring and unsolder their wire (motor assembly spare parts).
- c. Solder the wire of the new brushes, insert them into their seat and stop them with the relevant #52 springs.
- d. Re-mount the housing.

Power supply and control unit is a maintenance free unit. Should you need any assistance please call your nearest Kolver dealer or repair centre.

Always remember to switch off the control unit at the end of each working shift.

Using a screwdriver at the max torque rated will result in a premature wear out of carbon brushes, clutch spring and upper clutch. Continuous use over 80% of torque range is not recommended.

### NOTE

The sound level generated by Kolver electric screwdrivers is always lower than 70dB(A).

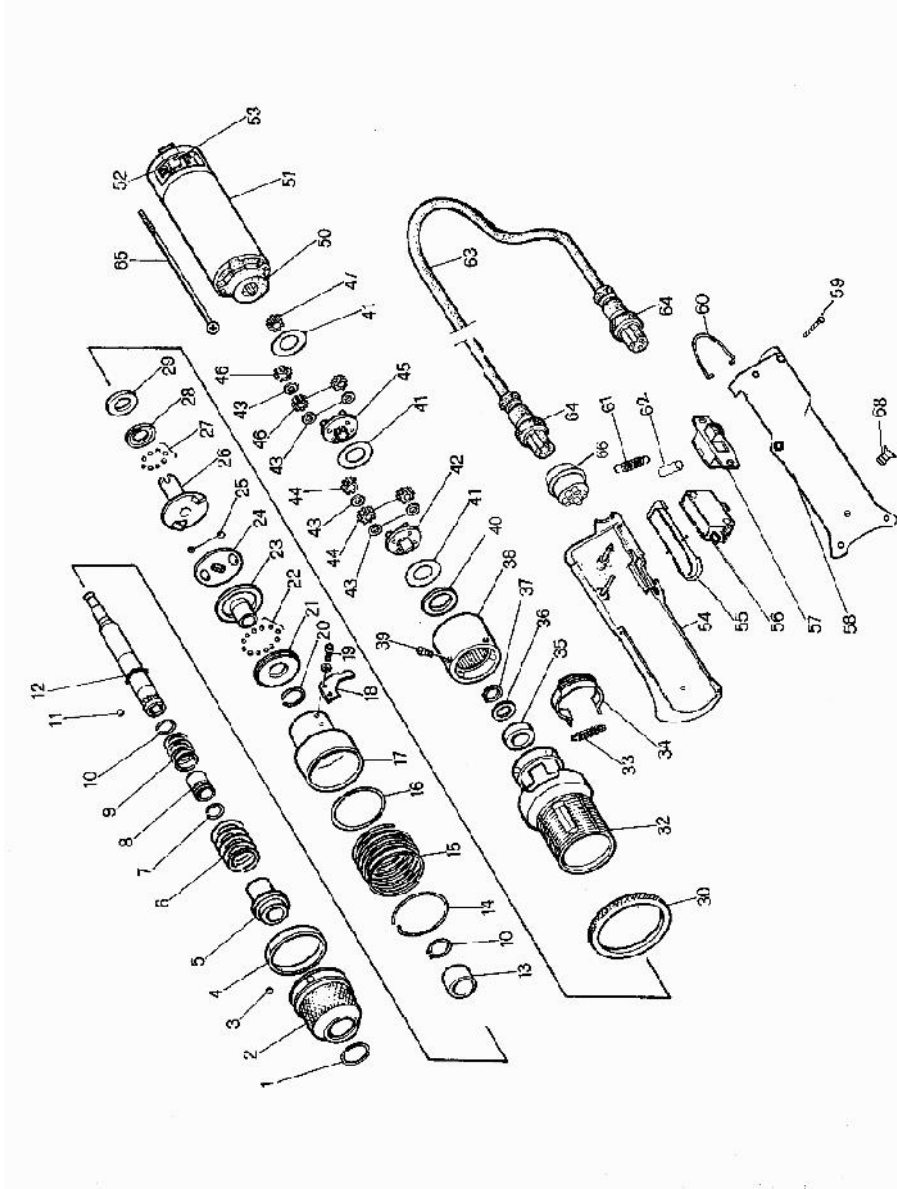
The vibrations transmitted to operator's hand are lower than  $2.5\text{m/s}^2$ . In particular the exposition to vibrations is lower than  $1\text{m/s}^2$  for operators who make up to 4200 screwing cycles per day.

**IMPORTANT:** For each second of operation the motor needs 3 seconds of rest, as indicated on the tool label (1s/3s). Failure to do so may result in motor overheating and eventually damage and will be considered as a misuse. Our warranty will not apply.

## **GUARANTEE**

1. This KOLVER product is guaranteed against defective workmanship or materials, for a maximum period of 12 months following the date of purchase from KOLVER, provided that its usage is limited to single shift operation throughout that period. If the usage rate exceeds of single shift operation, the guarantee period shall be reduced on a prorata basis.
2. If, during the guarantee period, the product appears to be defective in workmanship or materials, it should be returned to KOLVER or its distributors, transport prepaid, together with a short description of the alleged defect. KOLVER shall, at its sole discretion, arrange to repair or replace free of charge such items.
3. This guarantee does not cover repair or replacement required as a consequence of products which have been abused, misused or modified, or which have been repaired using not original KOLVER spare parts or by not authorized service personnel.
4. KOLVER accepts no claim for labour or other expenditure made upon defective products.
5. Any direct, incidental or consequential damages whatsoever arising from any defect are expressly excluded.
6. This guarantee replaces all other guarantees, or conditions, expressed or implied, regarding the quality, the marketability or the fitness for any particular purpose.
7. No one, whether an agent, servant or employee of KOLVER, is authorized to add to or modify the terms of this limited guarantee in any way. However it's possible to extend the warranty with an extra cost. Further information at [kolver@kolver.it](mailto:kolver@kolver.it).

# FAB..RE/FR: ESPLOSO/ EXPLODED VIEW

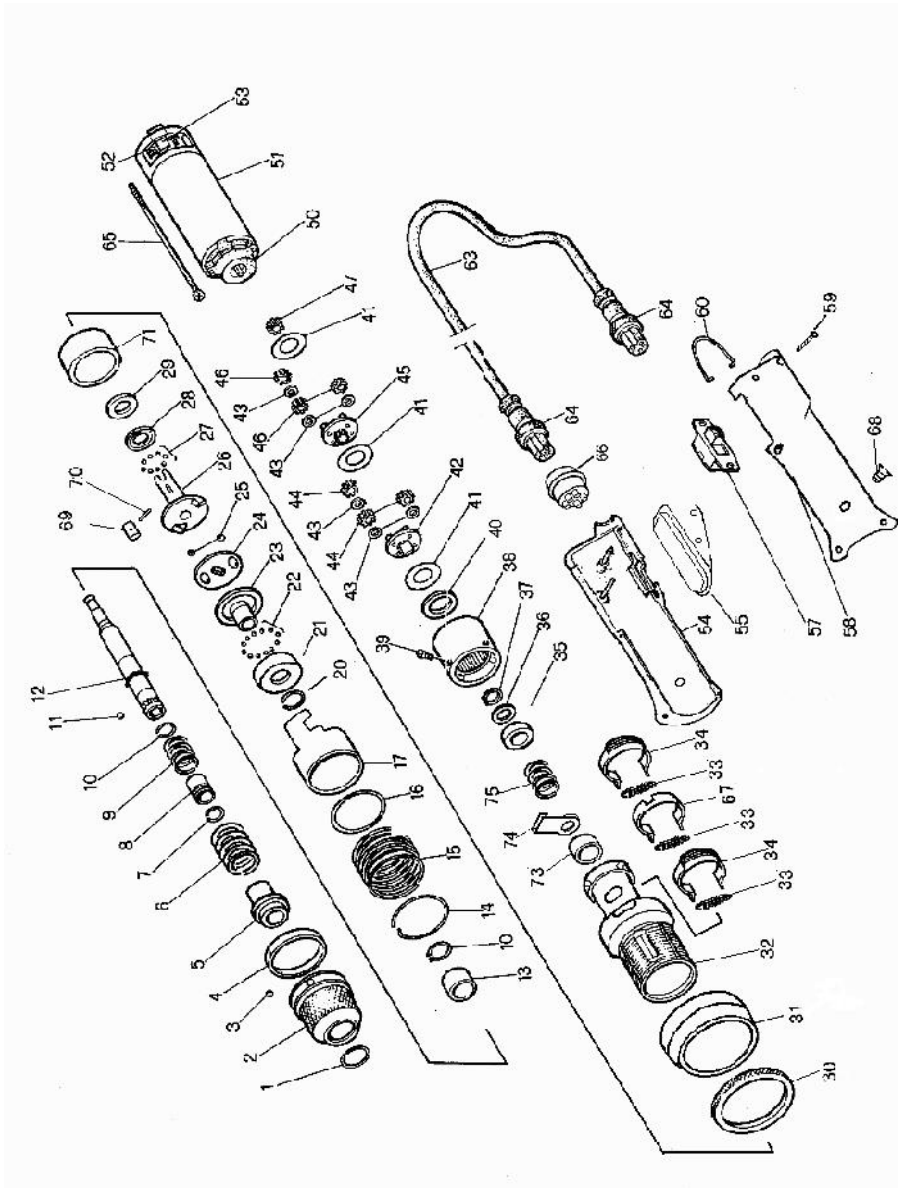


## FAB..RE/FR: PARTI DI RICAMBIO/ SPARE PARTS

RIF	DESCRIZIONE/ DESCRIPTION	COD.	RIF	DESCRIZIONE/ DESCRIPTION	COD.
1	Anello di fermo/ <i>Stop ring</i>	200001	35	Cuscinetto/ <i>Bearing</i>	200035
2	Ghiera regolazione coppia/ <i>Torque nut</i>	211002	36	Distanziale/ <i>Spacer</i>	200036
3	Sfera/ <i>Steel ball</i>	200003	37	Anello/ <i>Circlip</i>	200037
4	Anello/ <i>Circlip</i>	200004	38	Corona riduzione/ <i>Inner gear</i>	210038
5	Boccola/ <i>Bushing</i>	200005	39	Grano fissaggio corona/ <i>Screw</i>	210039
6	Molla frizione/ <i>Torque spring FAB03</i>	210306	40	Anello/ <i>Circlip</i>	210040
	Molla frizione/ <i>Torque spring FAB10</i>	210406	41	Rondella/ <i>Washer</i>	200041
	Molla frizione/ <i>Torque spring FAB12</i>	210106	42	Gabbia riduzione/ <i>Reduction plate FAB10 - FAB12</i>	210142
	Molla frizione/ <i>Torque spring FAB18</i>	210206		Gabbia riduzione/ <i>Reduction plate FAB03 -FAB18</i>	210242
7	Anello/ <i>Circlip</i>	200007	43	Rondella/ <i>Washer (6)</i>	210043
8	Mandrino porta inserto/ <i>Bit ring</i>	200008	44	Ingranaggio satellite/ <i>Planet gear FAB10 - FAB12 (3)</i>	210144
9	Molla mandrino/ <i>Bit spring</i>	200009		Ingranaggio satellite/ <i>Planet gear FAB03 -FAB18 (4)</i>	210244
10	Anello/ <i>Circlip</i>	200010	45	Gabbia riduzione/ <i>Reduction plate FAB10 - FAB12</i>	210145
11	Sfera/ <i>Ball</i>	200011		Gabbia riduzione/ <i>Reduction plate FAB03 -FAB18</i>	210245
12	Alberino/ <i>Spindle</i>	211012	46	Ingranaggio satellite/ <i>Planet gear FAB10 - FAB12 (3)</i>	210146
13	Cuscinetto/ <i>Bearing</i>	200013		Ingranaggio satellite/ <i>Planet gear FAB03 - FAB18 (4)</i>	210246
14	Anello elastico/ <i>Circlip</i>	211014	47	Ingranaggio motore/ <i>Main gear FAB10 - FAB12</i>	210147
15	Molla/ <i>Spring</i>	211015		Ingranaggio motore/ <i>Main gear FAB03 -FAB18</i>	210247
16	Guarnizione/ <i>Ring</i>	211016	50	Testa motore/ <i>Motor head</i>	210050
17	Bussola porta micro/ <i>Buffer cone</i>	211017	51	Motore/ <i>Motor</i>	210051
18	Gancio microinterruttore/ <i>Hook</i>	201018		Motore/ <i>Motor FAB03 - FAB10</i>	210351
19	Vite/ <i>Screw</i>	201019	52	Molla spazzola/ <i>Brush spring</i>	210052
20	Guarnizione/ <i>Ring</i>	202020	53	Spazzola/ <i>Brush</i>	210053
21	Cuscinetto reggispinta/ <i>Bearing</i>	210021	54	Impugnatura dx nera/ <i>Right housing</i>	210154/ESD
22	Sfere/ <i>Balls</i>	210022	55	Leva azionamento micro/ <i>Lever</i>	211255/ESD
23	Sede cuscinetto/ <i>Bearing seat</i>	210023	56	Microinterruttore/ <i>Micro switch</i>	201056
24	Sede sfere/ <i>Ball seat</i>	210024	57	Interruttore reversibilità/ <i>Reverse switch</i>	200057/S
25	Sfera/ <i>Ball</i>	210025	58	Impugnatura sx nera/ <i>Left housing</i>	210158/ESD
26	Salterello/ <i>Fixed clutch</i>	210026	59	Vite impugnatura/ <i>Screw</i>	210059
27	Sfere/ <i>Balls</i>	210027	60	Gancio/ <i>Hook</i>	200060
28	Cuscinetto/ <i>Bearing</i>	210028	61	Molla/ <i>Spring</i>	211061
29	Anello protezione olio/ <i>Oil protector</i>	210029	62	Isolatore/ <i>Isolator</i>	-
30	Ghiera bloccaggio/ <i>Locking nut</i>	211030	63	Cavo/ <i>Cable 2,5mt</i>	200063
32	Corpo sede frizione/ <i>Clutch housing</i>	211032	64	Fornito con/ <i>supplied with 200063</i>	
33	Molla/ <i>Spring</i>	200033	66	Connettore M 5 poli/ <i>5 pin connector</i>	201666
34	Microinterruttore/ <i>Micro Switch</i>	200034	68	Vite fissaggio motore/ <i>M3 Screw (2)</i>	801002



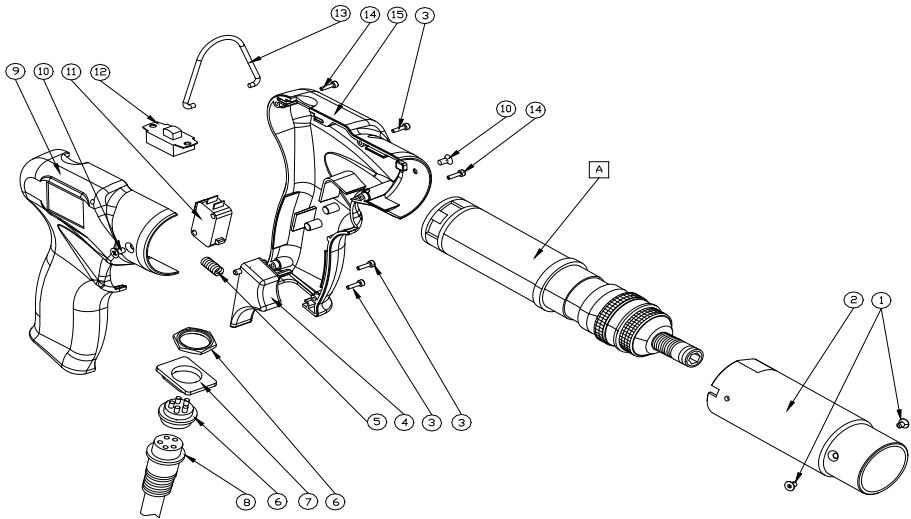
FAB..PS/FR: ESPLOSO/ EXPLODED VIEW



## FAB..PS/FR: PARTI DI RICAMBIO/ SPARE PARTS

RIF	DESCRIZIONE/ DESCRIPTION	COD.	RIF	DESCRIZIONE/ DESCRIPTION	COD.
1	Anello di fermo/Stop ring	200001	38	Corona riduzione/ Inner gear	210038
2	Ghiera regolazione coppia/ Torque nut	202002	39	Grano fissaggio corona/ Screw	210039
3	Sfera/ Steel ball	200003	40	Anello/ Circlip	210040
4	Anello/ Circlip	200004	41	Rondella/ Washer	200041
5	Boccola/ Bushing	200005	42	Gabbia riduzione/ Reduction plate FAB10 – FAB12	210142
6	Molla frizione/ Torque spring FAB12PS	212106		Gabbia riduzione/ Reduction plate FAB03 -FAB18	210242
	Molla frizione/ Torque spring FAB18PS	212206	43	Rondella/ Washer (6)	210043
7	Anello/ Circlip	200007	44	Ingranaggio satellite/ Planet gear FAB10 – FAB12 (3)	210144
8	Mandrino porta inserto/Bit ring	200008		Ingranaggio satellite/ Planet gear FAB03 - FAB18 (4)	210244
9	Molla mandrino/ Bit spring	200009	45	Gabbia riduzione/ Reduction plate FAB12	210145
10	Anello/ Circlip	200010		Gabbia riduzione/ Reduction plate FAB18	210245
11	Sfera/ Ball	200011	46	Ingranaggio satellite/ Planet gear FAB10 – FAB12 (3)	210146
12	Alberino/ Spindle	202012		Ingranaggio satellite/ Planet gear FAB03 - FAB18 (4)	210246
13	Cuscinetto/ Bearing	200013	47	Ingranaggio motore/ Main gear FAB10 – FAB12	210147
14	Anello elastico/ Circlip	202014		Ingranaggio motore/ Main gear FAB03 -FAB18	210247
15	Molla/ Spring	202015	50	Testa motore/ Motor head	210050
16	Guarnizione/ Ring	202016	51	Motore/ Motor	210051
17	Bussola porta micro/ Buffer cone	202017	52	Molla spazzola/ Brush spring	210052
20	Guarnizione/ Ring	202020	53	Spazzola/ Brush	210053
21	Cuscinetto reggispinta/ Bearing	202021	54	Impugnatura dx nera/ Right housing	210154/ESD
22	Sfere/ Balls	202022	55	Coperchio/ Cover	212055
23	Sede cuscinetto/ Bearing seat	202023	57	Interruttore reversibilità/ Reverse switch	200057/S
24	Sede sfere/ Ball seat	202024	58	Impugnatura sx nera/ Left housing	210158/ESD
25	Sfera/ Ball	202025	59	Vite impugnatura/ Screw	210059
26	Salterello/ Fixed clutch	202026	60	Gancio/ Hook	200060
27	Sfere/ Balls	202027	63	Cavo/ Cable 2,5mt	200063
28	Cuscinetto/ Bearing	202028	64	Fornito con/ supplied with 200063	
29	Anello protezione olio/ Oil protector	202029	66	Connettore M 5 poli/ 5 pin connector	201666
30	Ghiera bloccaggio/ Locking nut	202030	67	Anello distanziatore/ Spacer ring	202067
31	Copertina/ Clutch case	202031	68	Vite fissaggio motore/ Screw (2)	801002
32	Corpo sede frizione/ Clutch housing	202032	69	Chiavetta/ Control rode	202069
33	Molla/ Spring	200033	70	Perno/ Pin	202070
34	Microinterruttore/ Micro Switch (2)	200034	71	Cuscinetto/ Bearing	202071
35	Cuscinetto/ Bearing	200035	73	Cuscinetto/ Bearing	202073
36	Distanziale/ Spacer	200036	74	Prolunga/ Control plate	202074
37	Anello/Ghiera Vers. 080920	200037	75	Molla/ Spring	202075

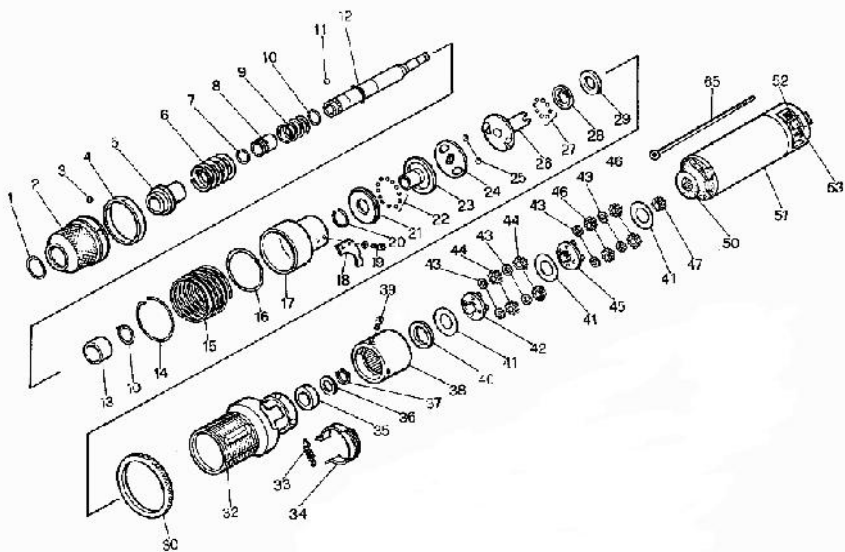
## FAB..PP/FR: IMPUGNATURA/ HOUSING



### PARTI DI RICAMBIO/ SPARE PARTS

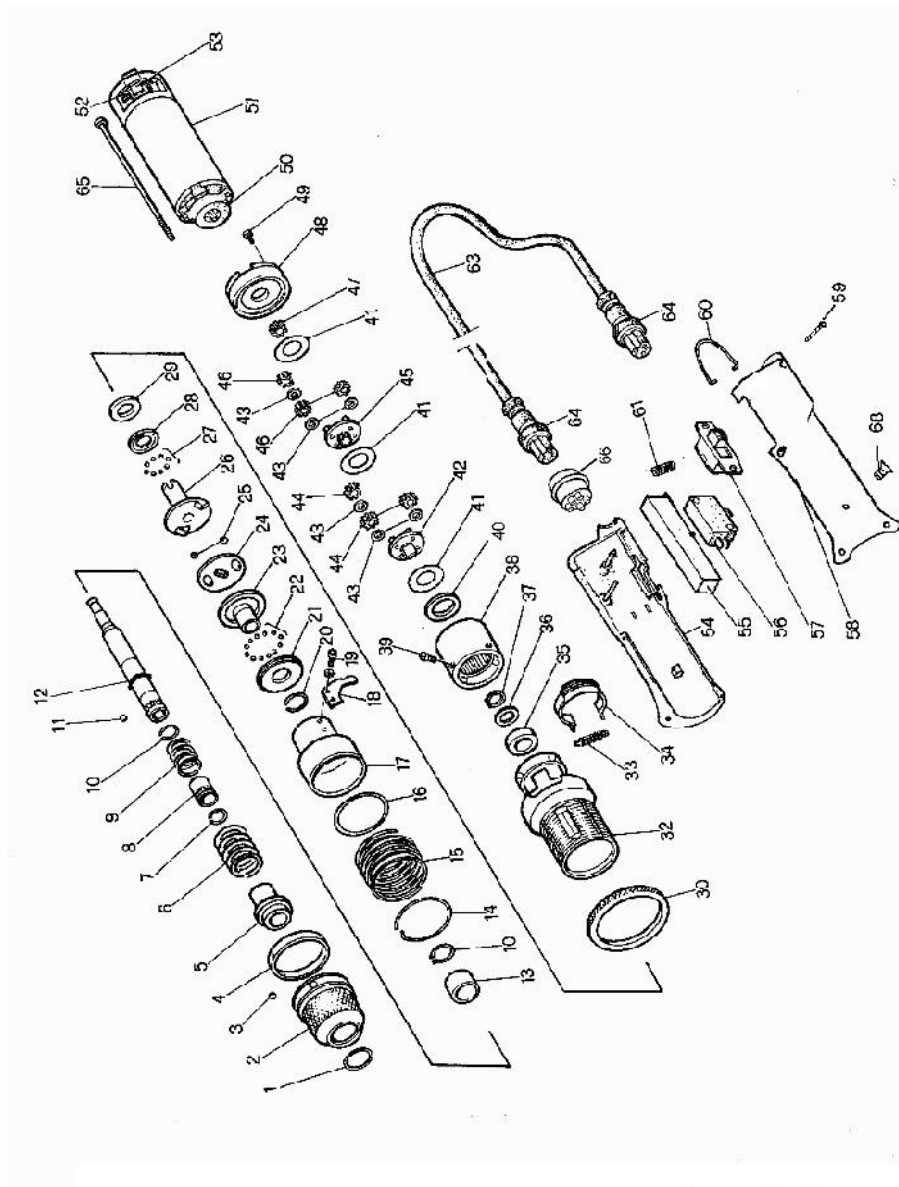
RIF	DESCRIZIONE/ DESCRIPTION	COD.
1	Vite/ Screw M3 x 6 TS (2)	801002
2	Portamotore/ Motor cover	234507
3	Vite impugnatura/ Screw (2)	234504
4	Tasto/ Trigger	234503/ESD
5	Molla tasto/ Spring trigger	221061
6	Connettore/ Connector 5 pin M	231666
7	Portaconnettore/ Connector seat	234506
8	Cavo/ Cable 5 pin 2,5mt	200063
9	Impugnatura sx/ Left housing	234502/ESD
10	Vite/Screw M3 x 6 TS (2)	801002
11	Micro interruttore/ Micro switch	201056
12	Interruttore reversibilità/ Reverse switch	200057/S
13	Gancio/ Hook	200060
14	Vite impugnatura/ Screw	210059
15	Impugnatura dx/ Right housing	234501/ESD
	Motoriduttore/ Motor assembly FAB 12 – FAB18	

# A : FAB..PP/FR: MOTORIDUTTORE/ *MOTOR ASSEMBLY*



<b>RIF</b>	<b>DESCRIZIONE/ DESCRIPTION</b>	<b>COD.</b>	<b>RIF</b>	<b>DESCRIZIONE/ DESCRIPTION</b>	<b>COD.</b>
<b>1</b>	Anello di fermo/ <i>Stop ring</i>	200001	<b>28</b>	Cuscinetto/ <i>Bearing</i>	210028
<b>2</b>	Ghiera regolazione coppia/ <i>Torque nut</i>	211002	<b>29</b>	Anello protezione olio/ <i>Oil protector</i>	210029
<b>3</b>	Sfera/ <i>Steel ball</i>	200003	<b>30</b>	Ghiera bloccaggio/ <i>Locking nut</i>	211030
<b>4</b>	Anello/ <i>Circlip</i>	200004	<b>32</b>	Corpo sede frizione/ <i>Clutch housing</i>	211032
<b>5</b>	Boccola/ <i>Bushing</i>	200005	<b>33</b>	Molla/ <i>Spring</i>	200033
<b>6</b>	Molla frizione/ <i>Torque spring FAB12</i>	210106	<b>34</b>	Microinterruttore/ <i>Micro Switch</i>	200034
	Molla frizione/ <i>Torque spring FAB18</i>	210206	<b>35</b>	Cuscinetto/ <i>Bearing</i>	200035
<b>7</b>	Anello/ <i>Circlip</i>	200007	<b>36</b>	Distanziale/ <i>Spacer</i>	200036
<b>8</b>	Mandrino porta inserto/ <i>Bit ring</i>	200008	<b>37</b>	Anello/ <i>Circlip</i>	200037
<b>9</b>	Molla mandrino/ <i>Bit spring</i>	200009	<b>38</b>	Corona riduzione/ <i>Inner gear</i>	210038
<b>10</b>	Anello/ <i>Circlip</i>	200010	<b>39</b>	Grano fissaggio corona/ <i>Screw</i>	210039
<b>11</b>	Sfera/ <i>Ball</i>	200011	<b>40</b>	Anello/ <i>Circlip</i>	210040
<b>12</b>	Alberino/ <i>Spindle</i>	211012	<b>41</b>	Rondella/ <i>Washer</i>	200041
<b>13</b>	Cuscinetto/ <i>Bearing</i>	200013	<b>42</b>	Gabbia riduzione/ <i>Reduction plate FAB12</i>	210142
<b>14</b>	Anello elastico/ <i>Circlip</i>	211014		Gabbia riduzione/ <i>Reduction plate FAB18</i>	210242
<b>15</b>	Molla/ <i>Spring</i>	211015	<b>43</b>	Rondella/ <i>Washer (8)</i>	210043
<b>16</b>	Guarnizione/ <i>Ring</i>	211016	<b>44</b>	Ingranaggio satellite/ <i>Planet gear FAB12 (3)</i>	210144
<b>17</b>	Bussola porta micro/ <i>Buffer cone</i>	211017		Gabbia riduzione/ <i>Reduction plate FAB18</i>	210244
<b>18</b>	Gancio microinterruttore/ <i>Hook</i>	201018	<b>45</b>	Gabbia riduzione/ <i>Reduction plate FAB12</i>	210145
<b>19</b>	Cuscinetto reggispinta/ <i>Bearing</i>	201019		Gabbia riduzione/ <i>Reduction plate FAB18</i>	210245
<b>20</b>	Sfere/ <i>Balls</i>	202020	<b>46</b>	Ingranaggio satellite/ <i>Planet gear FAB12 (3)</i>	210144
<b>21</b>	Anello/ <i>Circlip</i>	210021		Ingranaggio satellite/ <i>Planet gear FAB18 (3)</i>	210244
<b>22</b>	Mandrino porta inserto/ <i>Bit ring</i>	210022	<b>47</b>	Ingranaggio motore/ <i>Main gear FAB12</i>	210147
<b>23</b>	Sede cuscinetto/ <i>Bearing seat</i>	210023		Ingranaggio motore/ <i>Main gear FAB18</i>	210247
<b>24</b>	Sede sfere/ <i>Ball seat</i>	210024	<b>50</b>	Testa motore/ <i>Motor head</i>	210050
<b>25</b>	Sfera/ <i>Ball</i>	210025	<b>51</b>	Motore/ <i>Motor</i>	210051
<b>26</b>	Salterello/ <i>Fixed clutch</i>	210026	<b>52</b>	Molla spazzole/ <i>Brush spring</i>	210052
<b>27</b>	Sfere/ <i>Balls</i>	210027	<b>53</b>	Spazzola/ <i>Brush</i>	210053

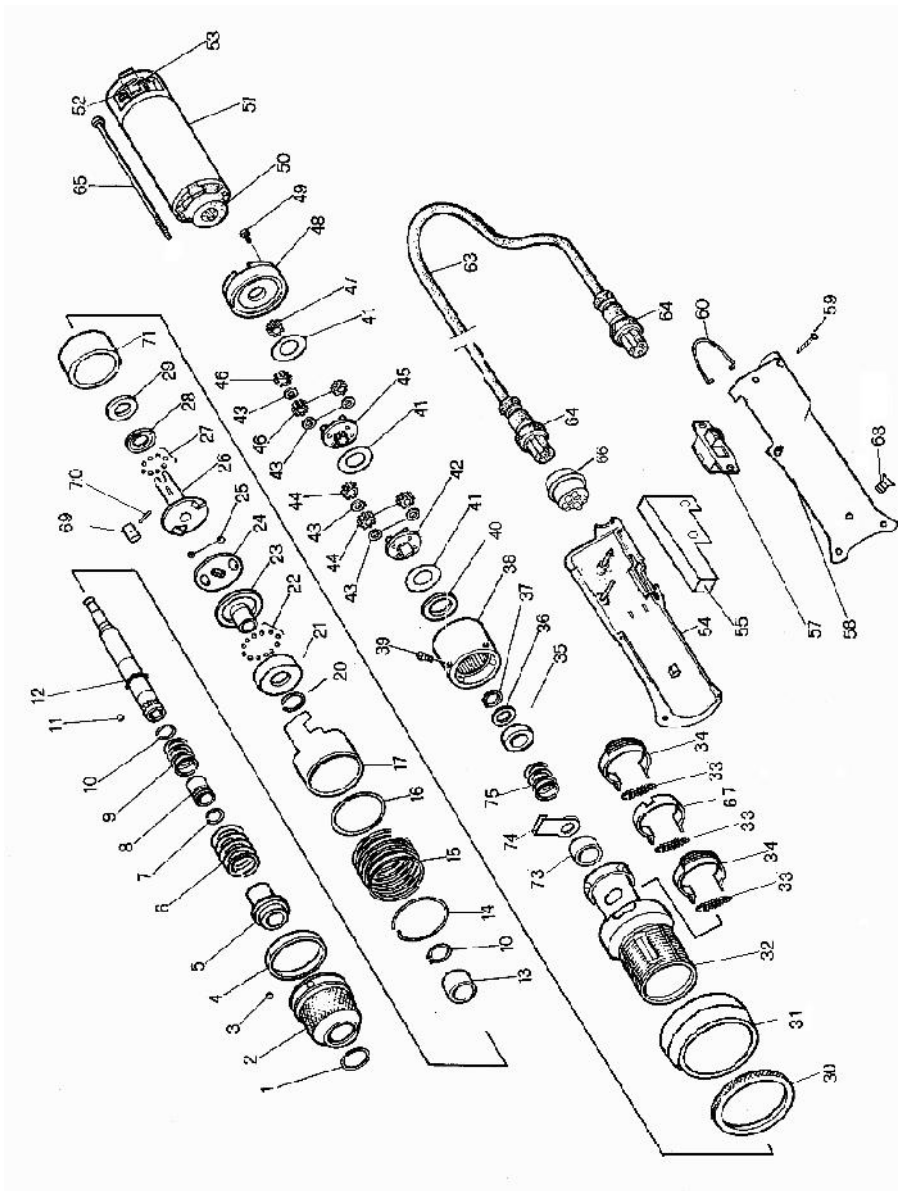
# RAF..NS/FR: ESPLOSO/ EXPLODED VIEW



# RAF..NS/FR: PARTI DI RICAMBIO/ SPARE PARTS

RIF	DESCRIZIONE/ DESCRIPTION	COD.	RIF	DESCRIZIONE/ DESCRIPTION	COD.
1	Anello di fermo/ <i>Stop ring</i>	200001	35	Cuscinetto/ <i>Bearing</i>	200035
2	Ghiera regolazione coppia/ <i>Torque nut RAF32</i>	221302	36	Distanziale/ <i>Spacer</i>	200036
	Ghiera regolazione coppia/ <i>Torque nut RAF38-50</i>	221402	37	Anello/ <i>Circlip</i>	200037
3	Sfera/ <i>Steel ball</i>	200003	38	Corona riduzione/ <i>Inner gear</i>	220038
4	Anello/ <i>Circlip</i>	200004	39	Grano fissaggio corona/ <i>Screw</i>	220039
5	Boccola/ <i>Bushing</i>	200005	40	Anello/ <i>Circlip</i>	220040
6	Molla frizione/ <i>Torque spring RAF32</i>	220306	41	Rondella/ <i>Washer</i>	200041
	Molla frizione/ <i>Torque spring RAF38</i>	220406	42	Gabbia riduzione/ <i>Reduction plate RAF32</i>	220342
	Molla frizione/ <i>Torque spring RAF50</i>	220506		Gabbia riduzione/ <i>Reduction plate RAF38-50</i>	220442
7	Anello/ <i>Circlip</i>	200007	43	Rondella/ <i>Washer (6)</i>	220043
8	Mandrino porta inserto/ <i>Bit ring</i>	200008	44	Ingranaggio satellite/ <i>Planet gear RAF32 (3)</i>	220344
9	Molla mandrino/ <i>Bit spring</i>	200009		Ingranaggio satellite/ <i>Planet gear RAF38-50 (4)</i>	220444
10	Anello/ <i>Circlip</i>	200010	45	Gabbia riduzione/ <i>Reduction plate RAF32</i>	220345
11	Sfera/ <i>Ball</i>	200011		Gabbia riduzione/ <i>Reduction plate RAF38-50</i>	220445
12	Alberino/ <i>Spindle</i>	221012	46	Ingranaggio satellite/ <i>Planet gear RAF32 (3)</i>	220346
13	Cuscinetto/ <i>Bearing</i>	200013		Ingranaggio satellite/ <i>Planet gear RAF38-50 (4)</i>	220446
14	Anello elastico/ <i>Circlip</i>	221014	47	Ingranaggio motore/ <i>Main gear RAF32</i>	220347
15	Molla/ <i>Spring</i>	221015		Ingranaggio motore/ <i>Main gear RAF38-50</i>	220447
16	Guarnizione/ <i>Ring</i>	221016	48	Giunto/ <i>Motor joint</i>	220048
17	Bussola porta micro/ <i>Buffer cone</i>	221017	49	Vite/ <i>Screw</i>	220049
18	Gancio microinterruttore/ <i>Hook</i>	201018	50	Testa motore/ <i>Motor head</i>	220050
19	Vite/ <i>Screw</i>	201019	51	Motore/ <i>Motor</i>	220051
20	Guarnizione/ <i>Ring</i>	202020	52	Molla spazzola/ <i>Carbon brush spring</i>	220052
21	Cuscinetto reggispinta/ <i>Bearing</i>	220021	53	Spazzola/ <i>Carbon brush</i>	220053
22	Sfere/ <i>Balls</i>	220022	54	Impugnatura dx nera/ <i>Right housing</i>	220354/ESD
23	Sede cuscinetto/ <i>Bearing seat</i>	220023	55	Leva azionamento micro/ <i>Lever</i>	221455ESD
24	Sede sfere/ <i>Bearing ball seat</i>	220024	56	Microinterruttore/ <i>Micro switch</i>	201056
25	Sfera/ <i>Ball</i>	220025	57	Interruttore reversibilità/ <i>Reverse switch</i>	200057/S
26	Salterello/ <i>Fixed clutch</i>	220026	58	Impugnatura sx nera/ <i>Left housing</i>	220358/ESD
27	Sfere/ <i>Balls</i>	220027	59	Vite impugnatura/ <i>Screw</i>	220059
28	Cuscinetto/ <i>Bearing</i>	220028	60	Gancio/ <i>Hook</i>	200060
29	Anello protezione olio/ <i>Oil protector</i>	220029	61	Molla/ <i>Spring</i>	221061
30	Ghiera bloccaggio/ <i>Locking nut</i>	221030	63	Cavo/ <i>Cable 2,5mt</i>	200063
32	Corpo sede frizione/ <i>Clutch housing</i>	221032	64	Fornito con/ <i>supplied with 200063</i>	
33	Molla/ <i>Spring</i>	200033	66	Connettore/ <i>Connector M 5 pin</i>	201666
34	Micro frizione/ <i>Micro switch</i>	200034	68	Vite fissaggio motore/ <i>M3 Screw (2)</i>	231508

RAF..PS/FR: ESPLOSO/ EXPLODED VIEW

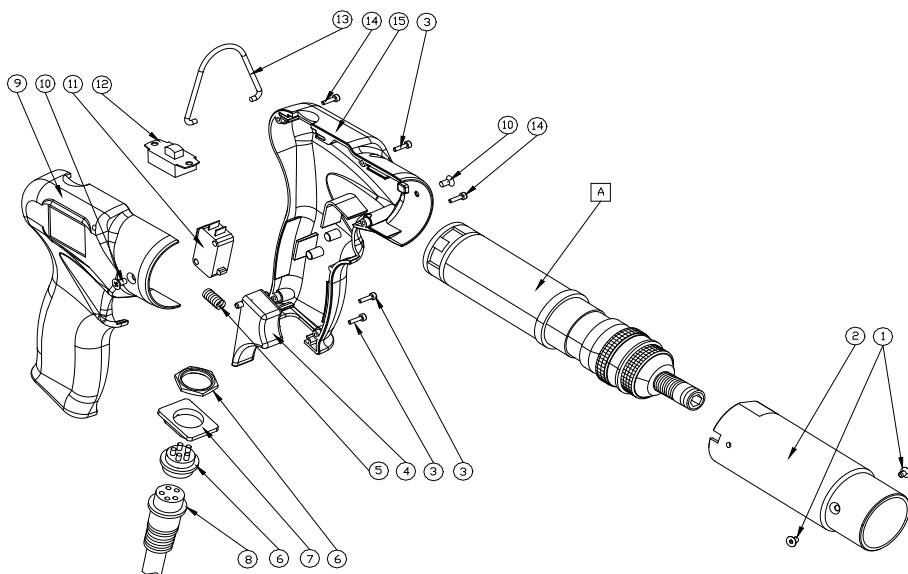




## RAF..PS/FR: PARTI DI RICAMBIO/ SPARE PARTS

RIF	DESCRIZIONE/ DESCRIPTION	COD.	RIF	DESCRIZIONE/ DESCRIPTION	COD.
1	Anello di fermo/ <i>Stop ring</i>	200001	39	Grano fissaggio corona/ <i>Screw</i>	220039
2	Ghiera regolazione coppia/ <i>Torque nut</i>	202002	40	Anello/ <i>Circlip</i>	220040
3	Sfera/ <i>Steel ball</i>	200003	41	Rondella/ <i>Washer</i>	200041
4	Anello/ <i>Circlip</i>	200004	42	Gabbia riduzione RAF32	220342
5	Boccola/ <i>Bushing</i>	200005		Gabbia riduzione RAF38-50	220442
6	Molla frizione/ <i>Torque spring</i> RAF32PS	222306	43	Rondella/ <i>Washer</i>	220043
	Molla frizione/ <i>Torque spring</i> RAF38PS	222406	44	Ingranaggio satellite/ <i>Planet gear</i> RAF32 (3)	220344
	Molla frizione/ <i>Torque spring</i> RAF50PS	222506		Ingranaggio satellite/ <i>Planet gear</i> RAF38-50 (4)	220444
7	Anello/ <i>Circlip</i>	200007	45	Gabbia riduzione/ <i>Reduction plate</i> RAF32	220345
8	Mandrino porta inserto/ <i>Bit ring</i>	200008		Gabbia riduzione/ <i>Reduction plate</i> RAF38-50	220445
9	Molla mandrino/ <i>Bit spring</i>	200009	46	Ingranaggio satellite/ <i>Planet gear</i> RAF32 (3)	220346
10	Anello/ <i>Circlip</i>	200010		Ingranaggio satellite/ <i>Planet gear</i> RAF38-50 (4)	220446
11	Sfera/ <i>Ball</i>	200011	47	Ingranaggio motore/ <i>Main gear</i> RAF32	220347
12	Alberino/ <i>Spindle</i>	202012		Ingranaggio motore/ <i>Main gear</i> RAF38-50	220447
13	Cuscinetto/ <i>Bearing</i>	200013	48	Giunto motore/ <i>Motor joint</i>	220048
14	Anello elastico/ <i>Circlip</i>	202014	49	Vite/ <i>Screw</i>	220049
15	Molla/ <i>Spring</i>	202015	50	Testa motore/ <i>Motor head</i>	220050
16	Guarnizione/ <i>Ring</i>	202016	51	Motore/ <i>Motor</i>	220051
17	Bussola porta micro/ <i>Buffer cone</i>	202017	52	Molla spazzola/ <i>Brush spring</i>	220052
20	Guarnizione/ <i>Ring</i>	202020	53	Spazzola/ <i>Brush</i>	220053
21	Cuscinetto reggispinta/ <i>Bearing</i>	202021	54	Impugnatura dx nera/ <i>Right housing</i>	220354/ESD
22	Sfere/ <i>Balls</i>	202022	55	Coperchio/ <i>Cover</i>	222055
23	Sede cuscinetto/ <i>Bearing seat</i>	202023	57	Interruttore reversibilità/ <i>Reverse switch</i>	200057/S
24	Sede sfere/ <i>Ball seat</i>	202024	58	Impugnatura sx nera/ <i>Left housing</i>	220358/ESD
25	Sfera/ <i>Ball</i>	202025	59	Vite impugnatura/ <i>Screw</i>	220059
26	Salterello/ <i>Fixed clutch</i>	202026	60	Gancio/ <i>Hook</i>	200060
27	Sfere/ <i>Balls</i>	202027	63	Cavo/ <i>Cable</i> 2,5mt	200063
28	Cuscinetto/ <i>Bearing</i>	202028	64	Fornito con/ <i>supplied with</i> 200063	
29	Anello protezione olio/ <i>Oil protector</i>	202029	66	Connettore M 5 poli/ <i>5 pin connector</i>	201666
30	Ghiera bloccaggio/ <i>Locking nut</i>	202030	67	Anello distanziatore/ <i>Spacer ring</i>	202067
31	Copertina/ <i>Clutch case</i>	202031	68	Vite fissaggio motore/ <i>Screw</i> (2)	231508
32	Corpo sede frizione/ <i>Clutch housing</i>	202032	69	Chiavetta/ <i>Control rode</i>	202069
33	Molla/ <i>Spring</i>	200033	70	Perno/ <i>Pin</i>	202070
34	Microinterruttore/ <i>Micro Switch</i> (2)	200034	71	Cuscinetto/ <i>Bearing</i>	202071
35	Cuscinetto/ <i>Bearing</i>	200035	73	Cuscinetto/ <i>Bearing</i>	202073
36	Distanziale/ <i>Spacer</i>	200036	74	Prolunga/ <i>Control plate</i>	202074
37	Anello/ <i>Circlip</i>	200037	75	Molla/ <i>Spring</i>	202075
38	Corona riduzione/ <i>Inner gear</i>	220038			

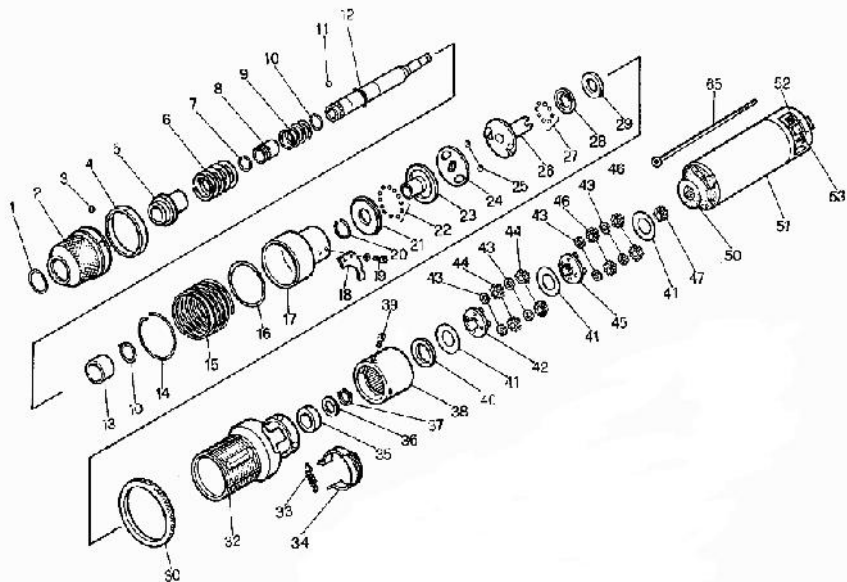
# RAF..PP/FR: IMPUGNATURA/ *HOUSING*



## PARTI DI RICAMBIO/ *SPARE PARTS*

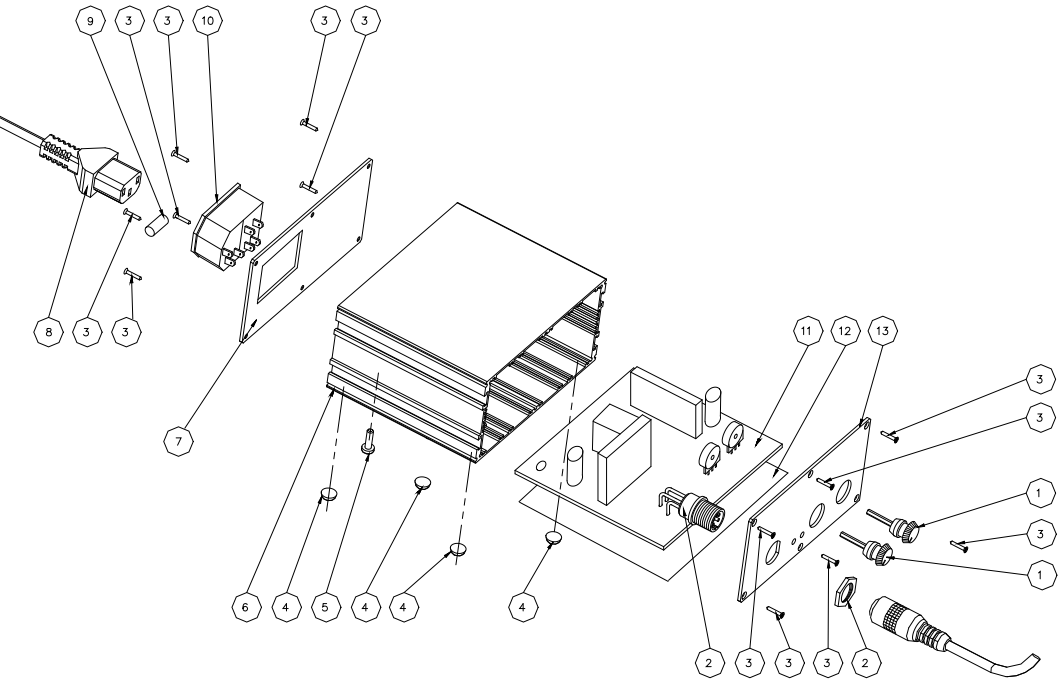
RIF	DESCRIZIONE/ <i>DESCRIPTION</i>	COD.
1	Vite/ <i>Screw</i> M3 x 6 TS (2)	801002
2	Portamotore/ <i>Motor cover</i>	234508
3	Vite impugnatura/ <i>Screw</i> (2)	234504
4	Tasto/ <i>Trigger</i>	234503/ESD
5	Molla tasto/ <i>Spring trigger</i>	221061
6	Connettore/ <i>Connector</i> 5 pin M	231666
7	Portaconnettore/ <i>Connector seat</i>	234506
8	Cavo/ <i>Cable</i> 5 pin 2,5mt	200063
9	Impugnatura sx/ <i>Left housing</i>	234502/ESD
10	Vite/Screw M3 x 6 TS (2)	801002
11	Micro interruttore/ <i>Micro switch</i>	201056
12	Interruttore reversibilità/ <i>Reverse switch</i>	200057/S
13	Gancio/ <i>Hook</i>	200060
14	Vite impugnatura/ <i>Screw</i>	210059
15	Impugnatura dx/ <i>Right housing</i>	234501/ESD
	Motoriduttore/ <i>Motor assembly</i> RAF32 – RAF38	

**A : RAF..PP/FR: MOTORIDUTTORE/ MOTOR ASSEMBLY**



<b>RIF</b>	<b>DESCRIZIONE/ DESCRIPTION</b>	<b>COD.</b>	<b>RIF</b>	<b>DESCRIZIONE/ DESCRIPTION</b>	<b>COD.</b>
1	Anello di fermo/ <i>Stop ring</i>	200001	28	Cuscinetto/ <i>Bearing</i>	220028
2	Ghiera regolazione coppia RAF32/ <i>Torque nut RAF32</i>	221302	29	Anello protezione olio/ <i>Oil protector</i>	220029
	Ghiera regolazione coppia RAF38/ <i>Torque nut RAF38-50</i>	221402	30	Ghiera bloccaggio/ <i>Locking nut</i>	221030
3	Sfera/ <i>Steel ball</i>	200003	32	Corpo sede frizione/ <i>Clutch housing</i>	221032
4	Anello/ <i>Circlip</i>	200004	33	Molla/ <i>Spring</i>	200033
5	Boccola/ <i>Bushing</i>	200005	34	Microinterruttore/ <i>Micro Switch (2)</i>	200034
6	Molla frizione/ <i>Torque spring RAF32</i>	220306	35	Cuscinetto/ <i>Bearing</i>	200035
	Molla frizione/ <i>Torque spring RAF38</i>	220406	36	Distanziale/ <i>Spacer</i>	200036
	Molla frizione/ <i>Torque spring RAF50</i>	220506	37	Anello/ <i>Circlip</i>	200037
7	Anello/ <i>Circlip</i>	200007	38	Corona riduzione/ <i>Inner gear</i>	220038
8	Mandrino porta inserto/ <i>Bit ring</i>	200008	39	Grano fissaggio corona/ <i>Screw</i>	220039
9	Molla mandrino/ <i>Bit spring</i>	200009	40	Anello/ <i>Circlip</i>	220040
10	Anello/ <i>Circlip</i>	200010	41	Rondella/ <i>Washer</i>	200041
11	Sfera/ <i>Ball</i>	200011	42	Gabbia riduzione/ <i>Reduction plate RAF32</i>	220342
12	Alberino/ <i>Spindle</i>	221012		Gabbia riduzione/ <i>Reduction plate RAF38-50</i>	220442
13	Cuscinetto/ <i>Bearing</i>	200013	43	Rondella/ <i>Washer (6)</i>	220043
14	Anello elastico/ <i>Circlip</i>	221014	44	Ingranaggio satellite/ <i>Planet gear RAF32 (3)</i>	220344
15	Molla/ <i>Spring</i>	221015		Ingranaggio satellite/ <i>Planet gear RAF38-50 (4)</i>	220444
16	Guarnizione/ <i>Ring</i>	221016	45	Gabbia riduzione/ <i>Reduction plate RAF32</i>	220345
17	Bussola porta micro/ <i>Buffer cone</i>	221017		Gabbia riduzione/ <i>Reduction plate RAF38-50</i>	220445
18	Gancio micro interruttore/ <i>Hook piece</i>	201018	46	Ingranaggio satellite/ <i>Planet gear RAF32 (3)</i>	220346
19	Vite/ <i>Screw</i>	201019		Ingranaggio satellite/ <i>Planet gear RAF38-50 (4)</i>	220446
20	Guarnizione/ <i>Ring</i>	202020	47	Ingranaggio motore/ <i>Main gear RAF32</i>	220347
21	Cuscinetto reggispira/ <i>Bearing</i>	220021		Ingranaggio motore/ <i>Main gear RAF38-50</i>	220447
22	Sfera/ <i>Ball</i>	220022	48	Giunto/ <i>Motor joint</i>	220048
23	Sede cuscinetto/ <i>Bearing seat</i>	220023	49	Vite/ <i>Screw</i>	220049
24	Sede sfere/ <i>Ball seat</i>	220024	50	Testa motore/ <i>Motor head</i>	220050
25	Sfere/ <i>Balls</i>	220025	51	Motore/ <i>Motor</i>	220051
26	Salterello/ <i>Fixed clutch</i>	220026	52	Molla spazzola/ <i>Carbon brush spring</i>	220052
27	Sfere/ <i>Balls</i>	220027	53	Spazzola/ <i>Carbon brush</i>	220053

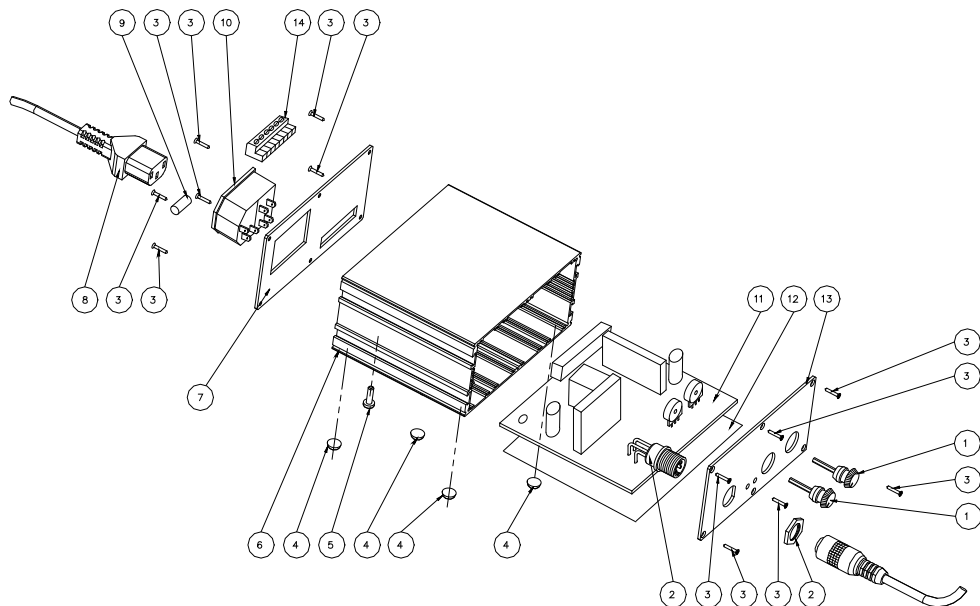
## EDU 1FR: ESPLOSO / EXPLODED VIEW



## EDU 1FR : PARTI DI RICAMBIO/ SPART PARTS

RIF	DESCRIZIONE/ DESCRIPTION	COD.	RIF	DESCRIZIONE/ DESCRIPTION	COD.
<b>1</b>	Manopola plastica/ Plastic knob (2)	800640	<b>8</b>	Cavo alimentazione/ Cable	800620
<b>2</b>	Connettore/ Connector 5 PIN M12 M	201666/CS	<b>9</b>	Fusibile rapido/ Fuse 3,15 A	800619
<b>3</b>	Vite autofil./ Self tapping screw 2,6 x 9,5 (12)	800605	<b>10</b>	Presca con portafusibile/ Socket with fuseholder 230V	800618
<b>4</b>	Piedino plastica/ Plastic support (4)	800016	<b>11</b>	Scheda PCB/ Main board	856806/B
<b>5</b>	Vite/ Screw M4 x 4 mm	806635	<b>12</b>	Foglio isolante/ Isolating sheet	800653
<b>6</b>	Contenitore/ Box	811010/VB	<b>13</b>	Pannello anteriore/ Front panel	821604
<b>7</b>	Pannello posteriore/ Back panel	831617			

## EDU 1FR/SG: ESPLOSO / EXPLODED VIEW



## EDU 1FR/SG : PARTI DI RICAMBIO/ SPART PARTS

RIF	DESCRIZIONE/ DESCRIPTION	COD.	RIF	DESCRIZIONE/ DESCRIPTION	COD.
<b>1</b>	Manopola plastica/ <i>Plastic knob</i> (2)	800640	<b>8</b>	Cavo alimentazione/ <i>Cable</i>	800620
<b>2</b>	Connettore/ <i>Connector</i> 5 PIN M12 M	201666/CS	<b>9</b>	Fusibile rapido/ <i>Fuse</i> 3,15 A	800619
<b>3</b>	Vite autofil./ <i>Self tapping screw</i> 2,6 x 9,5 (12)	800605	<b>10</b>	Presca con portafusibile/ <i>Socket</i> with fuseholder 230V	800618
<b>4</b>	Piedino plastica/ <i>Plastic support</i> (4)	800016	<b>11</b>	Scheda PCB/ <i>Main board</i>	856806/T
<b>5</b>	Vite/ <i>Screw</i> M4 x 4 mm	806635	<b>12</b>	Foglio isolante/ <i>Isolating sheet</i>	800653
<b>6</b>	Contenitore/ <i>Box</i>	811010/VB	<b>13</b>	Pannello anteriore/ <i>Front panel</i>	821604
<b>7</b>	Pannello posteriore/ <i>Back panel</i>	831617/SG	<b>14</b>	Connettore/ <i>Connector</i> 7 pin	800108