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

MODEL:	EDU2AE/TOP/TA
CODE:	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

$C \epsilon$

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
                   Person authorized to compile the technical file in Kolver

Thiene, January 1st 2023

Giovanni Colasante

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.

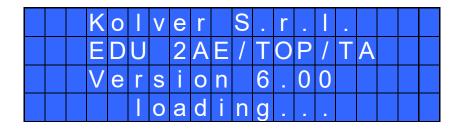The EDU 2AE/TOP/TA control units can be set in two operating modes:

•%: 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.

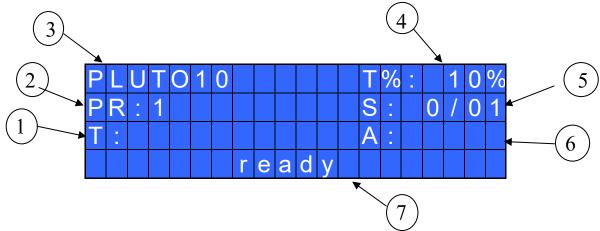| Torque setting		Model	Torque (Nm)	Speed (rpm)	
Unit	%			Min	Max
✔	✔	MITO15	0,35-1,5	450	850
✔	✔	PLUTO 3	0,5-2,5	370	1300
✔	✔	PLUTO 6	0,85-6	200	850
✔	✔	PLUTO 10	1,5-10	110	600
✔	✔	PLUTO 15	2-15	60	320
✔	✔	PLUTO 20	3-20	50	200
✔	✔	PLUTO 35	3-35	40	140
✔	✔	PLUTO 50	5-50	20	90
✔	✔	PLUTO 3 ANG	0,5-2,5	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:

```
Kolver  S.r.l.
EDU  2AE/TOP/TA
Version  6.00
   loading...
```

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

```
PLUTO10          T%:   10%
PR:1             S:   0/01
T:               A:
        ready
```

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 ⇧ or ⇩ then press **OK** (the symbol ➔ will turn into ⤳). Press the ⇧ or ⇩ 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 ⇧ for 2 seconds, however you cannot modify the displayed parameters on this screen.
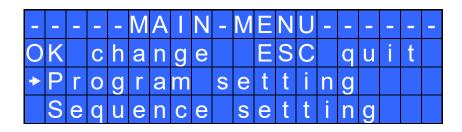
LEDS ON FRON PANEL

GREEN LED VERDE: indication of *Screw OK*.

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

RED LED: any indication of error.

MAIN MENU:

```
-----MAIN-MENU------
OK  change   ESC  quit
➔Program  setting
 Sequence  setting
```
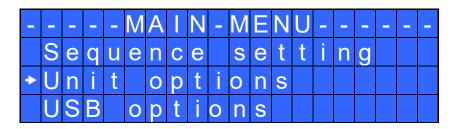
Program setting: It indicates the menu section where you can set or modify the fastening parameters.

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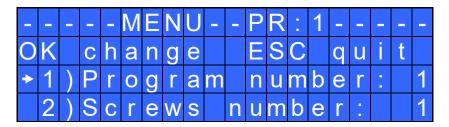NB: It is not possible to set a sequence containing programs both in % and in # mode. See the dedicated Section.

```
-----MAIN-MENU------
 Sequence  setting
➔Unit  options
 USB  options
```

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:

```
-----MENU--PR:1-----
OK  change   ESC  quit
➔1)Program  number:    1
 2)Screws  number:    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 21), "*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.

```
-----MENU--PR:1-----
  3)Model:      PLUTO10
→ 4)Ramp:          0.3s
  5)Torque:         10%
```

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.
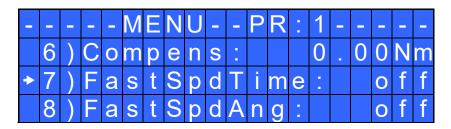Reaching the torque while the ramp is still on will activate the "screw OK" signal anyway (this option is useful if you need to tighten screws that are already tightened, the so called "double hit").
On the other hand, if you wish to see an error signal during the preset torque in the ramp phase, you 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.

```
-----MENU--PR:1-----
  6)Compens:    0.00Nm
→ 7)FastSpdTime:    off
  8)FastSpdAng:     off
```

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 ±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) FastSpdTime (Fast Speed Time): it indicates a time during the screwdriver will turn at FV speed (see point 9) before continuing at the preset speed (see point 10).
This time can be set from 0.3 to 10.0 sec.
Once the fast timed phase has been set, it will not be possible to set a PVTangle.
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).

8) FastSpdAng (Fast Speed Angle): it indicates the angle the screwdriver must turn at the Fast Speed (see point 9) and then continue at the Final Speed (see point 10).
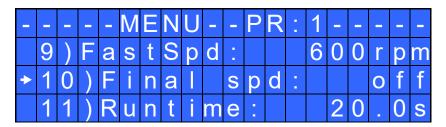The angle can only be set if the "TORQUE/LEVER" mode is active (see point 31), therefore when the lever is pressed the screwdriver will turn at the Fast Speed.
Once the Fast Speed Angle has been set, it will not be possible to set a Fast Speed Time.
To disable the function, enter an angle of 0°. In this case the screwdriver will start directly at the set speed.

CAUTION: The aim of these speeds (see point 7 and 8) 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.

```
- - - - -MENU- -PR:1- - - - -
  9)FastSpd:     600rpm
➜10)Final  spd:      off
  11)Runtime:     20.0s
```

9) 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.
This option is selectable only if Fast Speed Time or Fast Speed Angle are enabled.

10) 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.

11) 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.

```
-----MENU--PR:1-----
 11)Run time:    20.0s
➜12)Min  time:      off
 13)Max  time:      off
```
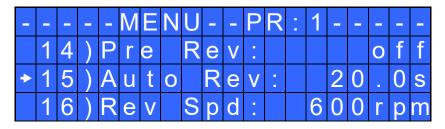
12) Min time - Minimum Time: You can select the minimum time of screwing from 0.1 sec to 'Max time - 0.1s'. To disable the function press ⇩ until you get to OFF (Min time = 0).
Torque reached below the minimum time won't activate the torque signal and will result in an error signal. "*Below minimum time*" will be displayed on the status bar and the red led will light up. You will hear two beep sounds, too.

13) 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 ⇧ 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-----
 14)Pre  Rev:       off
➜15)Auto Rev:    20.0s
 16)Rev  Spd:    600rpm
```

14) Pre-Rev.: pre-reverse. You can unscrew before tightening. This time can be set from OFF to 20.0 sec.
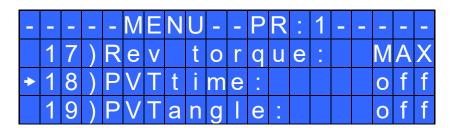
N.B. The speed and torque will be the same as those for the Auto Reverse.

15) 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 ⇩ 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.

16) 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-----
 17)Rev  torque:   MAX
➜18)PVT time:      off
 19)PVT angle:     off
```

17) Rev torque – Reverse torque: You can select the desired reverse torque as a percentage of the torque range of the selected screwdriver (see point 3). 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.**

18) PVTemp (Prevaling Torque Runtime): 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.
Once the angle Prevaling Torque Timr has been set, it will not be possible to set the Prevaling Torque Angle.

ATTENTION: This function is useful for applications where the prevailing torque is higher than the final torque (for example trilobal screws or locknuts).
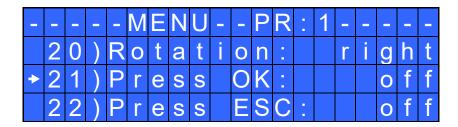**Please use this function with utmost attention because an incorrect use can damage both the assembly and the screwdriver.**
Torques reached during the max torque time won't activate the torque signal. "*Error pv*" will be displayed and the red led will light up. You will hear two beep sounds, too.

19) PVTAngle (Prevaling Torque Angle): angle which the screwdriver must reach at maximum torque before switching to the torque that has been set by the user. The angle can only be set if the "TORQUE/LEVER" mode is active (see point 31) therefore when the lever is pressed the screwdriver will turn at maximum torque.
This function overlaps other time/angle settings (fast phase, ramp, minimum time, maximum time) starting from motor start on.
Once the angle Prevaling Torque Angle has been set, it will not be possible to set the Prevaling Torque Time.
To disable the function, enter an angle of 0°. In this case the screwdriver will apply the torque set by the user.

```
- - - - - MENU - - PR : 1 - - - - -
    20 ) Rotation :       right
  ➜ 21 ) Press  OK :        off
    22 ) Press  ESC :       off
```

20) 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.

21) 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.

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

```
- - - - - M E N U - - P R : 1 - - - - -
    2 3 ) R e s e t :              o n
 ➜  2 4 ) E r r o r   l e v e r :    o n
    2 5 ) D e f i x   a l l o w :  o f f
```

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

24) 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.

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

26) 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*).

```
- - - - - M E N U - - P R : 1 - - - - -
    2 6 ) S h o w   t o r q u e :   o f f
 ➜  2 7 ) T o r q   m i n :   0 . 0 0 N m
    2 8 ) T o r q   m a x : 2 0 . 0 0 N m
```

27) 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.
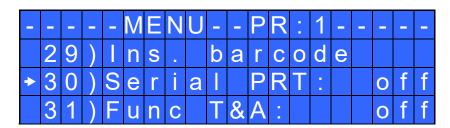The minimum torque option allows to set the lowest value of the torque range. When Calibration is OFF, the minimum torque value automatically sets on 0 Nm.
The selection of the torque value is carried out by entering the digit cell by cell.

28) 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 9 ) I n s .   b a r c o d e
 ➜  3 0 ) S e r i a l   P R T :    o f f
    3 1 ) F u n c   T & A :        o f f
```

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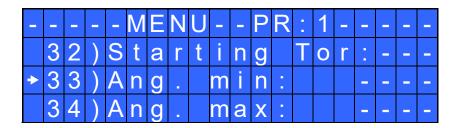IMPORTANT: Barcode can be ONLY numeric.

30) 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.

31) 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).
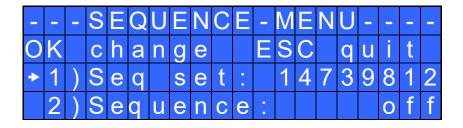
```
-----MENU--PR:1-----
   32)Starting Tor:---
➔  33)Ang. min:    ----
   34)Ang. max:    ----
```

32) 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.

33) 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°.

34) 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:

```
---SEQUENCE-MENU----
OK change   ESC quit
➔ 1)Seq set:  14739812
  2)Sequence:       off
```

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.

```
---SEQUENCE-MENU----
   3)Ext box:       off
➔  4)Mod. barc:     off
   5)Ins. barcode Seq
```
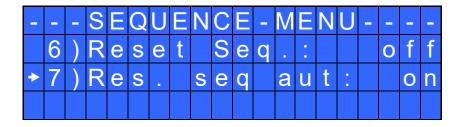
3) Ext box: It allows to enable or disable the external control.
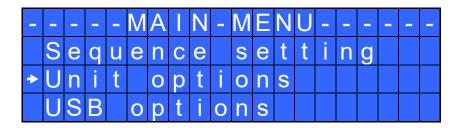**IMPORTANT**: It is **mandatory** to select ON to work with switch box, socket tray and remote.

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.

```
- - - SEQUENCE - MENU - - - -
  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:

```
- - - - - MAIN - MENU - - - - - -
    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:

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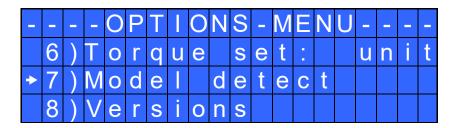
```
- - - - O P T I O N S - M E N U - - - -
    6 ) T o r q u e   s e t :     u n i t
  ➜ 7 ) M o d e l   d e t e c t
    8 ) V e r s i o n s
```

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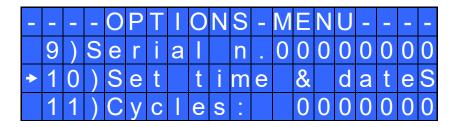
In both operating modes (**Auto** and **Manual**), if in field 3) of the Program menu you are in the "*Model*: ----" status, it is not possible to change the values relating to the torque and speed in tightening (unscrewing).

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).

```
----OPTIONS-MENU----
  9)Serial n.00000000
→ 10)Set  time  & dateS
  11)Cycles:   0000000
```

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:

```
----OPTIONS-MENU----
→ 1)Read  USB
  2)Write  USB
  3)Info  USB
```

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).

```
    Select  Program
       SET00.KOL

OK  confirm  ESC  quit
```

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.

```
       Save  as
       SET00.KOL
```

```
OK  confirm  ESC  quit
```

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.

```
    Loaded  program:
         SET23.KOL
```

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:

```
- - - - - - - MENU - - - - - - -

    23)Calibration      on
```

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:

```
- - - - - - - - STEP - - 1 - - - - -
         Enter     the
    percentage          MIN
```

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

```
- - - - - - - - STEP - - 2 - - - - -
         Enter     the
    percentage          20%
```

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:

```
- - - - - - - - S T E P - - 1 - - - - -
                                        
          S t a r t   t e s t         
E r r . R e p e a t   S c r e w i n g
```

Just repeat the test.

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

```
- - - - - - - - S T E P - - 1 - - - - -
E n t e r   t o r q u e   v a l u e :
              0 0 . 0 1 N m           
                                        
```

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

```
- - - - - - - - S T E P - - 2 - - - - -
          E n t e r   t h e           
p e r c e n t a g e :         2 5 %
                                        
```

7. Set the percentage of the second torque to 25% by pressing ⇧ 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

Legend:
- 🟢 Torque threshold point
- ---- Min angle point
- ---- Max angle point
- 🟡 Max torque point

Rules:
1. If tools runs past max angle it fails
2. If tool runs past max torque it fails
3. If tool hits max torque before min angle it fails

⚔ 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

Angle

Legend:
- 🔴 Input point
- ⋮ Min angle point
- ╌╌ Max angle point
- 🟡 Max torque point

Rules:
1. If tools runs past max angle it fails
2. If tool runs past max torque it fails
3. If tool hits max torque before min angle it fails

⚔ 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

Torque

Angle

Legend:
- 🟢 Torque threshold point
- ╌╌ Angle point
- 🟡 Max torque point

Rules:
1. Tools stops at max angle
2. If tool runs past max torque it fails

⚔ 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

Torque

Input point

---- **Angle point**

⬤ **Max torque point**

Rules:
1. Tools stops at max angle
2. If tool runs past max torque it fails

Angle

⚔ 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		
min	MAX	min	MAX	min	MAX	rpm
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		
min	MAX	min	MAX	min	MAX	rpm
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		
min	MAX	min	MAX	min	MAX	rpm
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		
min	MAX	min	MAX	min	MAX	rpm
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		
min	MAX	min	MAX	min	MAX	rpm
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		
min	MAX	min	MAX	min	MAX	rpm
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		
min	MAX	min	MAX	min	MAX	rpm
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		
min	MAX	min	MAX	min	MAX	rpm
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		
min	MAX	min	MAX	min	MAX	rpm
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		
min	MAX	min	MAX	min	MAX	rpm
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

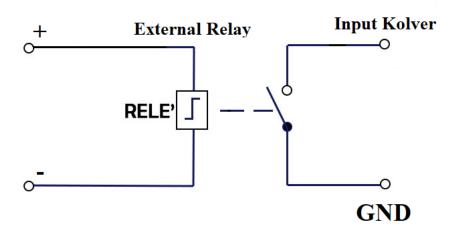| Nm		Lbf.in		Kgf.cm		
min	MAX	min	MAX	min	MAX	rpm
1,0	1,7	8,9	15,0	10,2	17,3	110
1,2	3,5	10,7	31,0	12,3	35,7	200
1,3	4,3	11,6	38,1	13,3	43,8	250
1,4	5,2	12,4	46,0	14,3	53,0	300
1,6	6,0	14,2	53,1	16,4	61,2	400
1,6	6,5	14,2	57,5	16,4	66,3	450
1,7	7,0	15,1	62,0	17,4	71,4	500
1,9	7,6	16,9	67,3	19,4	77,5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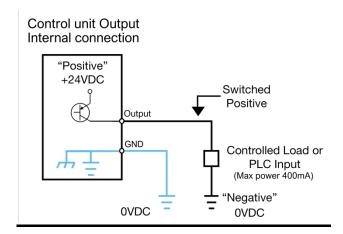
I/O CONNECTIONS:

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.
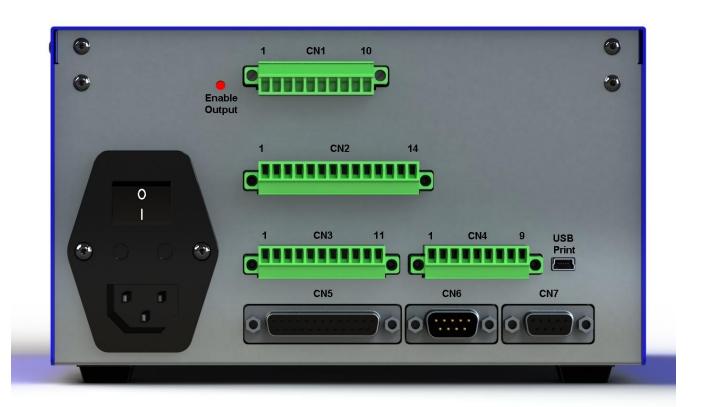

As for the outputs, they are all PNP type with active function. On each pin you will have 24V DC.

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.
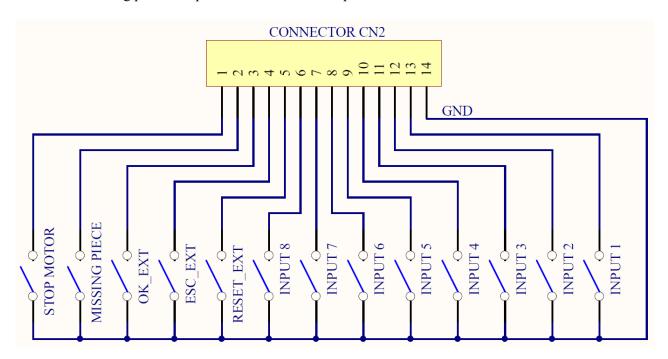
- CN1 CONNECTOR – 10 pins

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

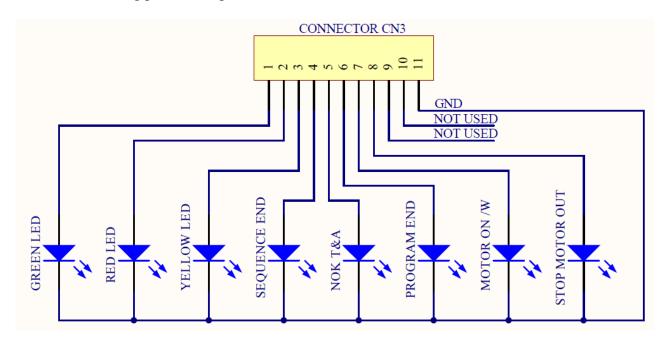| PIN	NAME	FUNCTION
		OUTPUT
1	+24V	+24V voltage protected. The maximum current consumption is 400mA. IT CANNOT BE USED TO POWER EXTERNAL DEVICES.
2	GND	Common pin. Signals must be taken between this pin (GND and the respective signal pins (pin 3, 4 and 5).
3	ERROR	Error signal: it activates every time 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.
		INPUT
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.

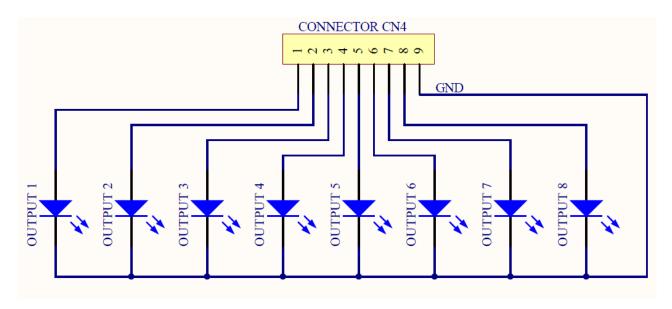| PIN	NAME	FUNCTION
1	STOP MOTOR	Remote motor stop. If it's activated the message "STOP MOTOR ON" appears on the display. The motor will stop and won't start working again as long as the contact is closed (as Input pin 1 of CN2).
2	MISSING PIECE	If enabled it stops the motor, enables the error signal 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.

CONNECTOR CN4

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 *"Screw OK"*.	A correct screwing has been performed, reaching the pre-set torque value.
On the status bar it will display "*Angle OK*".	A correct screwing has been performed, reaching the pre-set angle.
On the status bar it will display "*Runtime OK*".	A correct screwing has been performed, reaching the pre-set runtime.
On the status bar it will display "*Reverse torque OK*"	A correct screwing has been performed, reaching the pre-set reverse torque value.

TROUBLE SHOOTING

ERROR	PROBLEM	SOLUTION
0	"*waiting connection*" doesn't turn into "*loading*" after it's been switched on.	Contact the 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 brake time).	
3	"*Reverse 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 runtime has been achieved)	
5	"*Under min time*" is displayed on the status bar (the torque signal is displayed below the pre-set minimum time).	
6	"*Over maximum time*" is displayed on the status bar (torque is not reached and the screwing time is over the preset maximum time).	
7	"*Error PV torque*" is displayed on the status bar (the torque signal is displayed inside the set maximum time).	
8	"*Error min torque*" is displayed on the status bar (the torque signal is displayed below the preset minimum torque).	
9	"*Error max torque*" is displayed on the status bar (the torque signal is displayed over the set maximum torque).	
10	"*Error min angle*" is displayed on the status bar (the torque signal is displayed below the set minimum angle).	

11	"*Error max angle*" is displayed on the status bar (The max preset angle has been reached. Only available in Tor, T/lv and T/in mode).	
12	"*Error angle not OK*" is displayed on the status bar (The preset angle hasn't been reached. Only available in Ang., A/lv and A/in mode).	
13	"*Warning! No piece*" is displayed on the status bar (The "missing piece" contact is enabled).	-check contact 2 on the CN2 connector
14	"*Compensation error*" 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, *"Model not available"* 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, *"Torque / Speed Error"* 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	"*Released lever error*" 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	"*Reverse torque error*" 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	"*Output Disabled*". 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	"*Protection 12A*" 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	"*Protection 14p5A*" 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	"*Protection 15A*" 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.

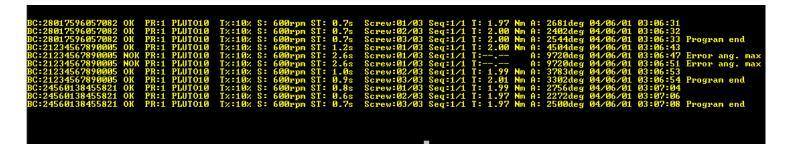**ST: Screwing time =** it indicates the time of the screwing.

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 PLUTO10   T%: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   T%: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   T%: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   T%:10% S: 600rpm ST: 1.2s   Screw:01/03 Seq:1/1 T: 2.00 Nm A: 4564deg 04/06/01 03:06:43
BC:21234567890005 NOK PR:1 PLUTO10   T%: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   T%: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   T%: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   T%: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   T%: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   T%: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   T%: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.
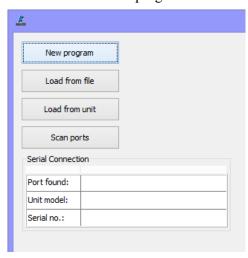
It communicates with the control unit via miniUSB or RS232 and makes you create up to 100 different settings configurations, save them on your USB drive and then recall on your EDU unit.

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.
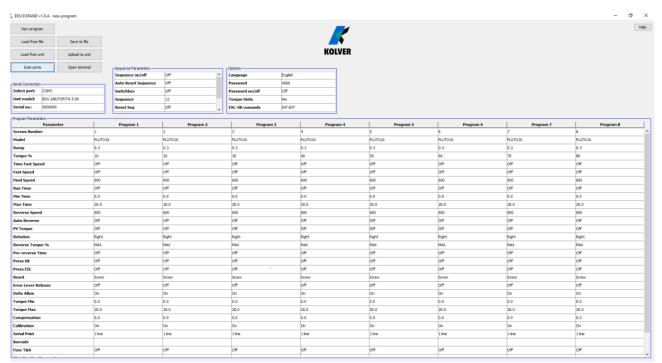-

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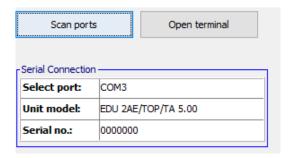
Here is the main screen when a program has been recalled or when you are creating a new one.

- 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.
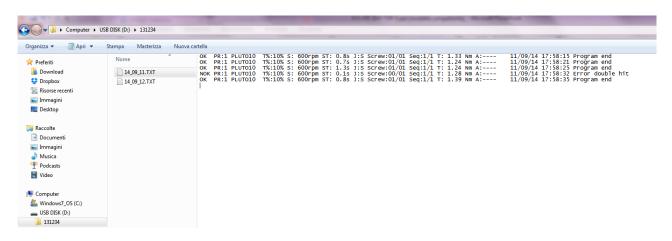
Report of the screwing done

- 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.
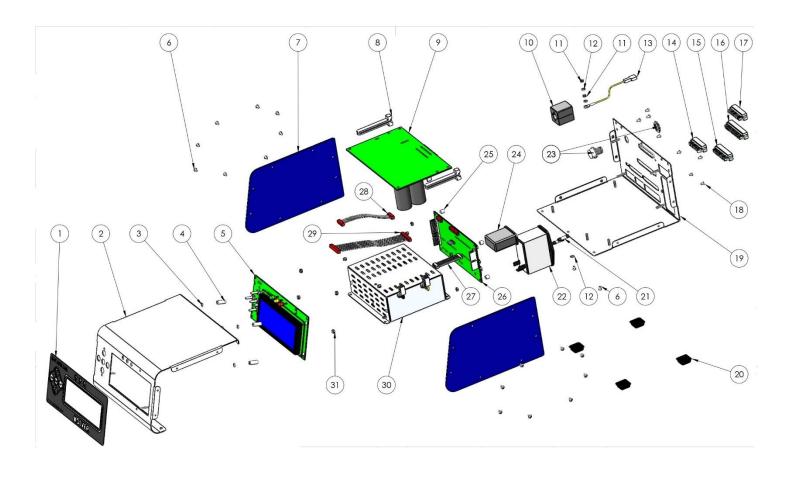 The folder is named as the serial number of the unit.
  The text file which contains all the screwing data is named as the current date.

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 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.