

Operational Manual EDU2AE/HPro

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/HPro
CODE:	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).

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

Thiene, January 1st 2024

Giovanni Colasante

The EDU 2AE/HP_{RO} power supply and control unit is an innovative system for controlling the torque of any current control MITO and PLUTO electric screwdrivers: MITO15, PLUTO 3, PLUTO 6, PLUTO 8, PLUTO 10, PLUTO 15, PLUTO 20, PLUTO 35, PLUTO 45, PLUTO 50 and PLUTO70, either inline, pistol, for automation and with angle head.

The EDU 2AE/HP_{RO} delivers all the advantages of precision torque control electric tools at a fraction of the price of transdurized tools.

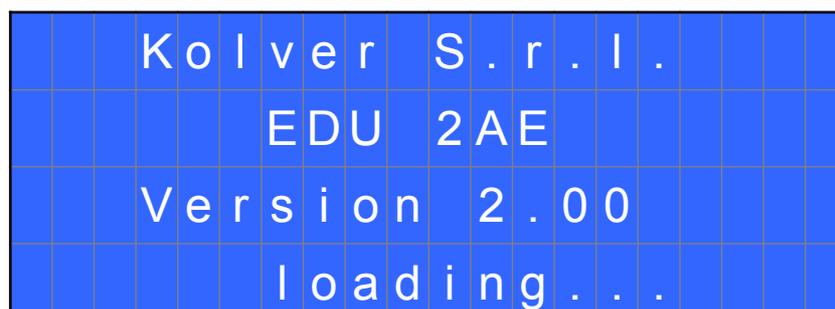
The state-of-the-art electronic control circuit cuts the power supply to the motor calculating the correct torque in response to 3 parameters; voltage, frequency and current, according to the selected options.

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

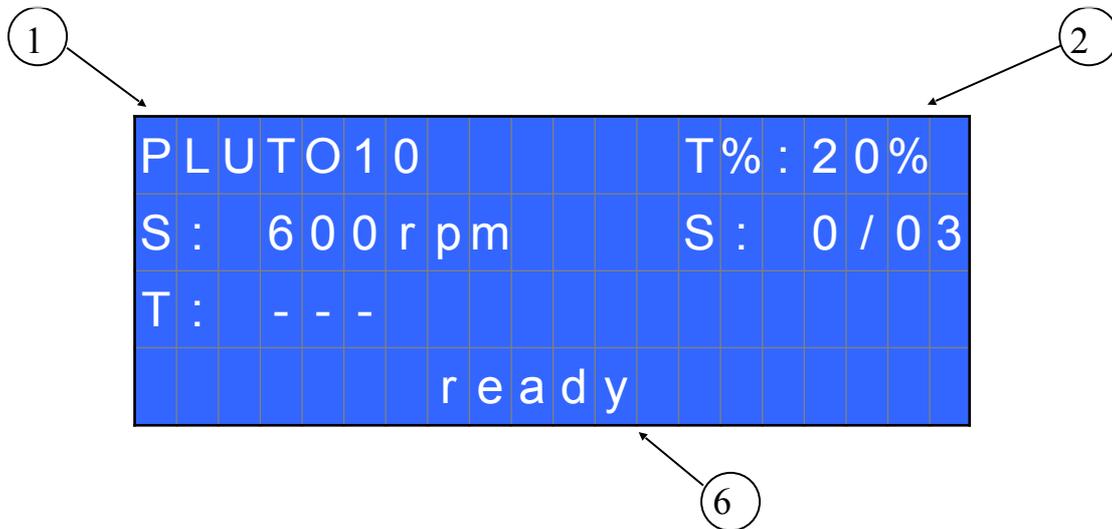
Model	Torque (Nm)	Speed (rpm)	
		Min	Max
MITO15	0,35-1,5	450	850
PLUTO 3	0,5-3	370	1300
PLUTO 6	0,85-6	200	850
PLUTO 10	1,5-10	110	600
PLUTO 15	2-15	60	320
PLUTO 20	3-20	50	200
PLUTO 35	3-35	40	140
PLUTO 50	5-50	20	90
PLUTO 6 ANG	0,7-6	200	850
PLUTO 8 ANG	1,5 - 7	110	600
PLUTO 15 ANG	2-15	100	320
PLUTO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

IMPORTANT: The EDU 2AE/HP_{RO} is a 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:



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
5. Reached torque level 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 \rightarrow will turn into \rightarrow). 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



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



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).

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.



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  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.



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).

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
▶	1	4	)	P	V		t	o	r	q	u	e	:		o	f
1	5	)	R	o	t	a	t	i	o	n	:			r	i	g

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
▶	1	7	)	C	o	m	p	e	n	s	:		0	.	0	0
																N
1	8	)	T	o	r	q		m	i	n	:		0	.	0	0
																N

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	)	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.

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	:												N	m	
▶	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:



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:



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





5. Press OK. You will see:



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 \uparrow and press OK again to save. You will see:



7. Set the percentage of the second torque to 30% by pressing \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.

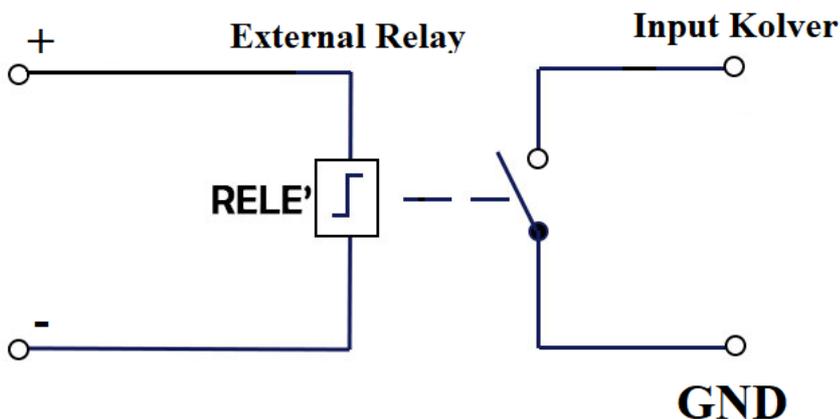
- Calibration is carried out for two torque levels optionally chosen. The minimum calibration interval is 5% (example: if I have to work at 50%, I can calibrate at 45% and 55%). In this case, if for any reasons I need to work at torque percentages which are lower or higher than the min-max ones set during 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.

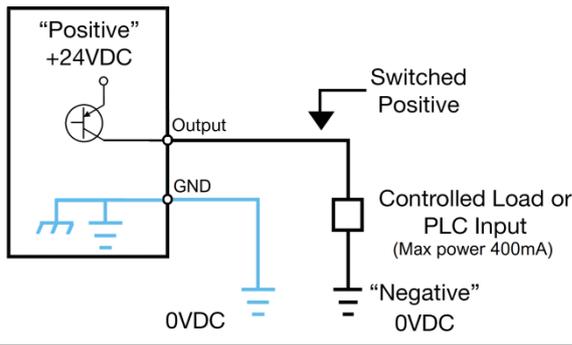
I/O CONNECTIONS

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.

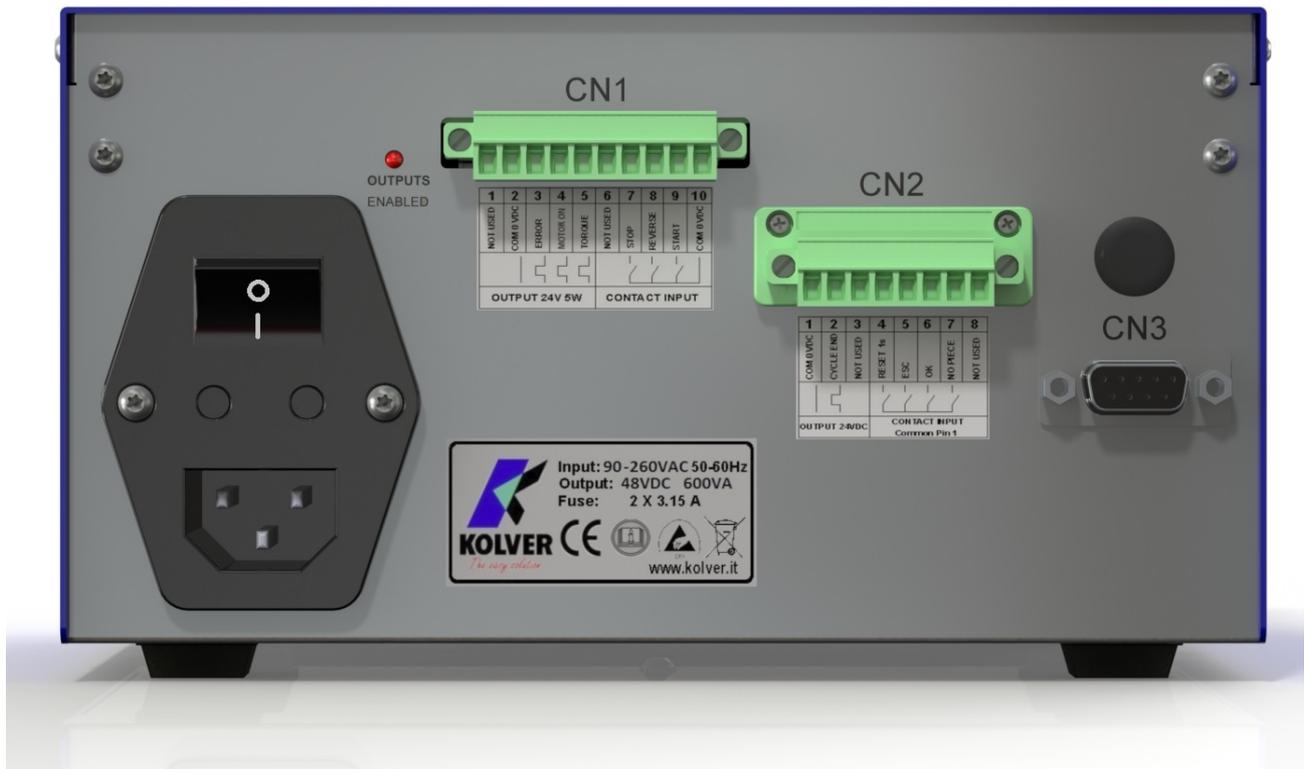


As for the outputs, they are all PNP type with active function. On each pin you will have 24V DC.

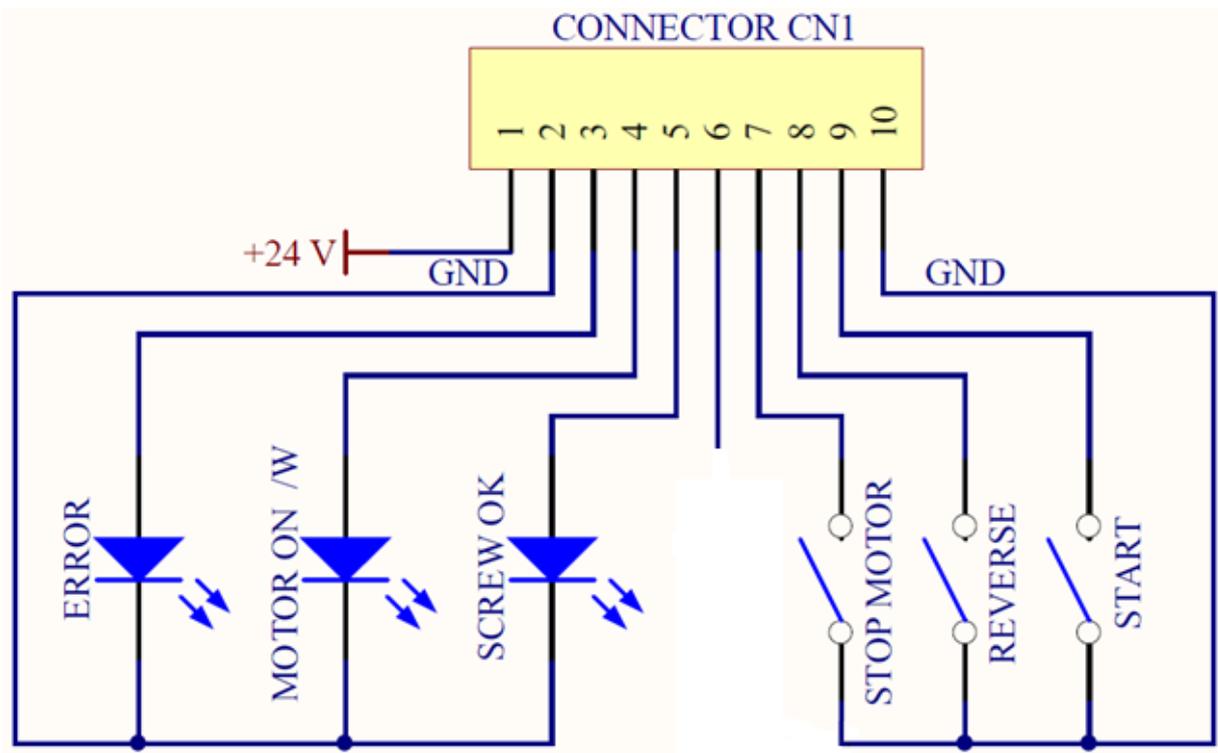
**Control unit Output
Internal connection**



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.



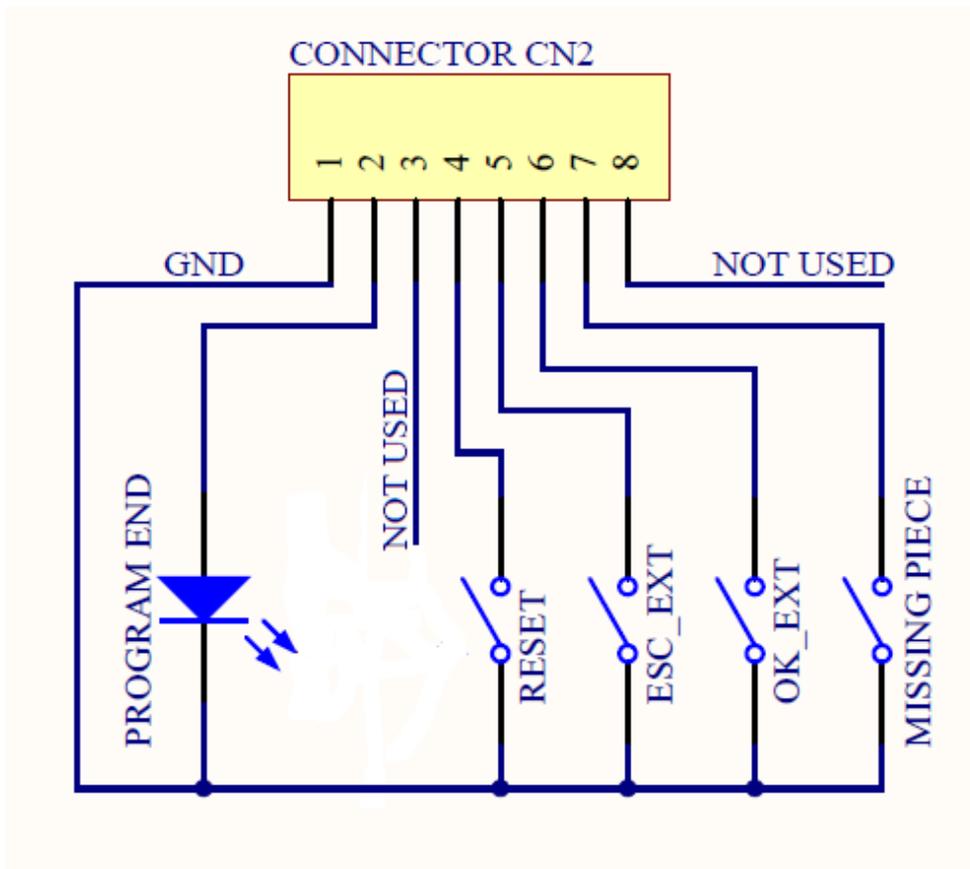
- CN1 CONNECTOR – 10 pin:
On the back panel, there is a 10 pin I/O connector.



PIN	NAME	FUNCTION
OUTPUT		

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.
INPUT		
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
OUTPUT		
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
2	PROGRAM END	It activates at the end of each program.
3		Not used.
INPUT		
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)

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

<i>“Screw OK”</i> is displayed on the status bar.	The tool has performed a correct screwing, that is when all the settings have been fulfilled.
<i>“Run Time OK”</i> is displayed on the status bar.	The tool has performed a correct screwing, that is when all the settings have been fulfilled.
<i>“Rev. Torque OK”</i> 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	<i>“Error Torque Control”</i> is displayed on the status bar	Tighten 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).	
3	<i>“Rev. incomplete”</i> 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).	If the <i>Press ESC</i> function is ON, press ESC for a new screw; if it’s OFF it automatically resets next time you screw.	
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	“Error PV torque” is displayed on the status bar (the torque signal is displayed inside the set maximum time).		
8	“Below min torque” is displayed on the status bar (the torque signal is displayed below the set minimum time).		
9	“Over max torque” is displayed on the status bar (the torque signal is displayed over the set maximum time).		
10	“Compensation error” 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”).		- The screwdriver couldn’t unscrew. - Avoid motor stalling. - Unscrewing is too hard for the driver.
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).		- Reduce cycle rate and check settings. - Avoid motor stalling. - Unscrewing is too hard for the driver. - Joint too soft.
13	“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).	- Reduce cycle rate and check settings. - Avoid motor stalling. - Unscrewing is too hard for the driver. - Joint too soft.	
14	“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).	- Reduce cycle rate and check settings. - Avoid motor stalling. - Unscrewing is too hard for the driver.	
15	“OUTPUT DISABLED” is displayed on the status bar. It is on the protection of the output signals exceeding the maximum load (400mA).	- Check that the load does not exceed the max (400mA) - To reset, restart the unit.	

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.

EDU 2AE/HP_{PRO} 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
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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).

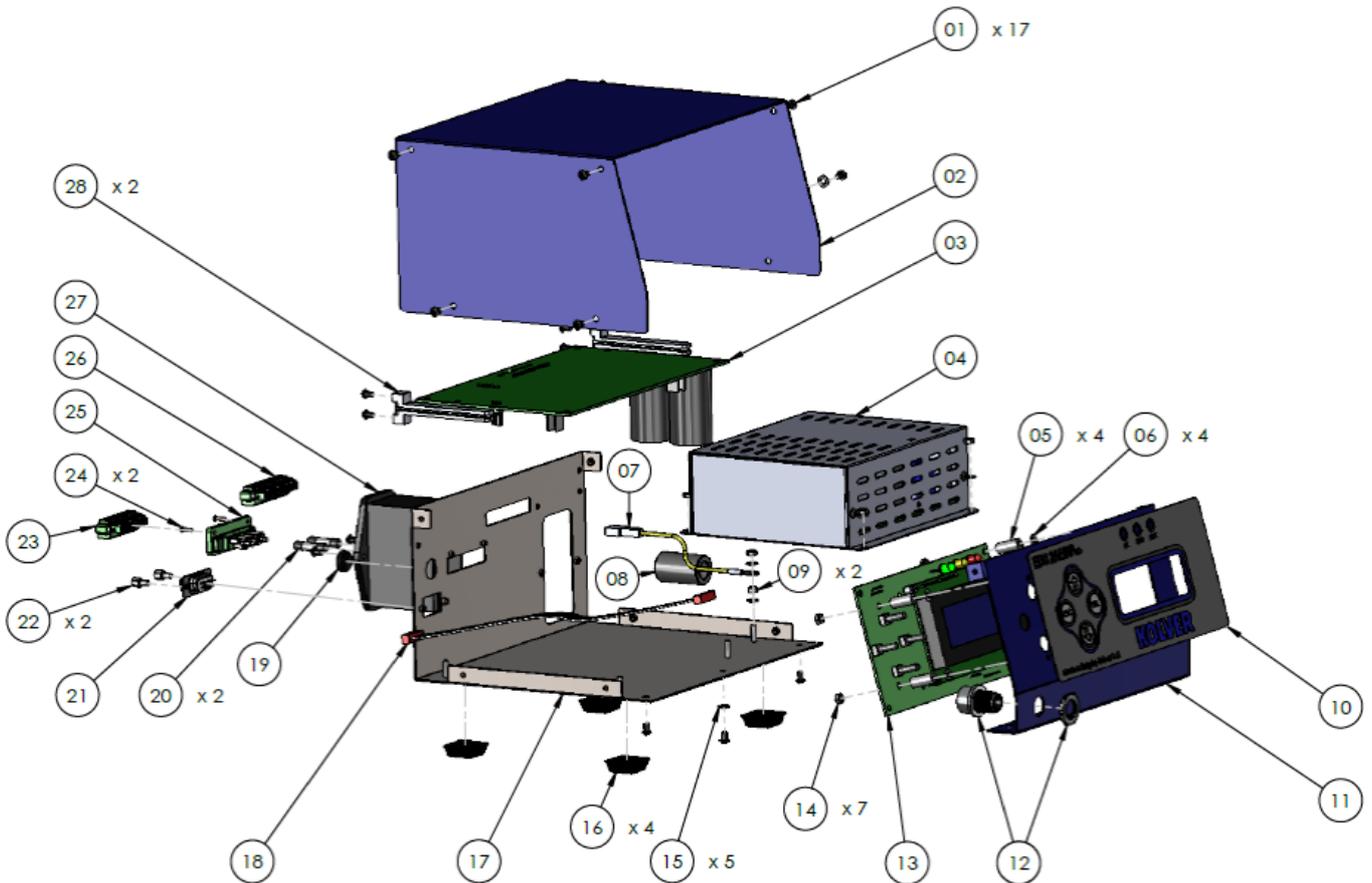
Example of serial print:

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OK PLUT010 I%:20% S: 600rpm ST: 0.8s Screw:01/03 T: 3.00 Nm
OK PLUT010 I%:20% S: 600rpm ST: 0.8s Screw:02/03 T: 3.01 Nm
OK PLUT010 I%:20% S: 600rpm ST: 0.1s Screw:03/03 T: 3.04 Nm Program end
NOK PLUT010 I%:20% S: 600rpm ST: 6.0s Screw:00/03 T:--.-- Error max time
OK PLUT010 I%:20% S: 600rpm ST: 1.1s Screw:01/03 T: 3.04 Nm
NOK PLUT010 I%:20% S: 600rpm ST: 6.0s Screw:01/03 T:--.-- Error max time
OK PLUT010 I%:20% S: 600rpm ST: 1.4s Screw:02/03 T: 3.00 Nm
OK PLUT010 I%:20% S: 600rpm ST: 1.5s Screw:03/03 T: 3.00 Nm Program end

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EXPLODED VIEW EDU2AE/HPro



SPARE PARTS

Posizione	Descrizione	Quantità	Codice
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.