

**CAUTION MESSAGE:**

This unit is designed for high prevailing torque applications. The unit is capable of running at the full torque capability of the selected screwdriver when the thread cutting phase is activated. This can cause damage to your part or injury to the operator if setup incorrectly.



## TABLE OF CONTENTS

1. Identification and conformity data
2. Security Information
3. General overview of the product
4. Operation
  - i. Starting the unit
  - ii. Setting Parameters
  - iii. Parameters review
5. I/O Connections
  - i. Inputs
  - ii. Outputs
6. Audible Signals
7. Data Output
8. Spare Part break down
9. Trouble Shooting
10. Screwdriver torque range table
11. Torque Level/Joint charts and data
12. EDU1AE V2.2 High Prevailing Torque Example

## OPERATIONS MANUAL



### **IDENTIFICATION DATA OF THE MANUFACTURER**

KOLVER S.r.l.  
VIA MARCO CORNER, 19/21  
36016 THIENE (VI) ITALIA  
Phone:  
FAX:  
Email:  
URL:www.kolver.it

### **IDENTIFICATION DATA OF THE PRODUCT**

CONTROL UNIT MODEL: **EDU 1AE V2.2**

CODE: **030000**

### **TECHNICAL DATA OF THE PRODUCT**

TRANSFORMER: 230V AC 50 Hz – 40 V DC 200 VA FUSE: 3,15 A

DIMENSIONS: 185x124x95 mm WEIGHT: 2.550 Kg

### **DECLARATION OF CONFORMITY**



KOLVER S.r.l. declares that the new tool here described: Control unit model EDU 1AE V2.2 is in conformity with the following standards and other normative documents:

98/37/CE, 89/336/CE and 2006/95/CE, EN50144-1 and EN60204-1.

It is also in conformity with RoHS and WEEE





## Security information

### CAUTION:

1. Before use please read all the information given in this manual carefully. The unit may only be used for its foreseen purpose as set out in these operating instructions. Improper use can cause damage of the instrument, your parts, and falsification of the system operation.
2. High voltage on the power supply unit can cause death or serious injury.
3. Disconnect the power plug from the socket before dismantling driver, controller or power supply.
4. Before connecting the equipment to your local power source for the first time check to ensure that the input voltage of the equipment corresponds to the local supply voltage.
5. Do not tamper with the equipment. Use only the original power adapter.
6. Defective components should be repaired or replaced immediately by Kolver or KolverUSA.
7. Only use permitted accessory equipment of Kolver or KolverUSA.
8. Use the tools only in temperature range of 5°C (41°F) to 40°C (104°F).
9. Do not use the tools in explosive environment.
10. Cleaning of the components and the connecting cables should not be done with solvent containing cleanser.



## General product overview:

EDU1AE V2.2 power supply and control unit is an innovative system for controlling the torque of the Kolver Current Control screwdrivers models: PLUTO-10, PLUTO-15 and CA-10, and CA-15. If you are running a PLUTO 3 you need the EDU1AE-LTP Controller.

The unique algorithms in the EDU1AE cuts the power supply to the motor in the screwdriver after the preset value is achieved according to user defined parameters settings in the unit. To identify the resulting torque the tool must be calibrated to an external transducer. It is important to understand that the EDU1AE controller will only work properly when the parameters are set in accordance with the requirements of your specific joint. Read the menu descriptions and refer to the testing results in the back of the manual for help setting up your process.

In addition to the parameters found standard in the EDU1AE V2.1 the 2.2 Version offers high prevailing torque capability during the Delay Time setting. When the Delay Time parameter is set to any value other than zero the unit is running at the full torque capacity and factory set RPM level of the tool connected to the controller for that time period. During the Delay Time the torque output of the screwdriver is not limited in any way. Please take special care when setting the Delay Time Parameter.

**This is a powerful unit and can damage your parts and cause injury to the operator if setup incorrectly.**

### EDU1AE Features:

- One controller only for a torque range from 2 to 15 Nm (screwdriver dependent)
- User interface screens: walk through a few simple steps to input the parameters requested for your application and your fastening process can begin.
- Slow start and adjustable speed.
- Soft, hard or high prevailing joint application.
- High speed rundown and slow speed tightening for improved accuracy.
- Automatic reverse at cycle end possible.
- Auto-stop on elapsed time.
- Torque reached signal, lever signal.
- Start and reverse contacts.
- Remote torque selection possible (please contact Kolver for additional information).
- Low noise level, only 55 dBA, low weight, less than 0.5 kg .

## Operation:

### Starting the unit:

Turn the unit on through the on/off switch on the back panel, under the power cord connection.

- 1) The unit will display the model and software version. It is a good idea to confirm the unit you have matches the operations manual being referenced at this point.



- 2) The unit will then perform a general system check and confirm whether it is OK.



- 3) Then the unit will display the main screen indicating the screwdriver model, the corresponding torque range, the joint type (J: Hard or J: Soft), the brake time (Z) and the torque level (Level).



## Setting Parameters:

To begin setting Parameters you must first enter the menu by pushing the **ESC** key for 3 seconds.



The menu consists of 11 lines. To move through the menu push the **▽** or **Δ** keys. Push the **OK** key to select a line ( the arrow → will start blinking). Push the **▽** or **Δ** keys to select the required value and then confirm thru the **OK** key (or **ESC** if you don't want to save the value). The selected value will be immediately operational also if you are still in the menu screen. Repeat the sequence for all the parameters you wish to change and then push the **ESC** key to return to the main screen.

## Parameters review:

1) **MODEL**: you can select the screwdriver to be used (Pluto 3, Pluto10 or Pluto15). Your choice will automatically change the default settings.

**CAUTION**: having this Parameter set incorrectly will result in your screwdriver not working to the published specifications.

Note: The PLUTO 3 runs from 600 – 1800 RPM with the V2.2 system, superseding the published specification.





2) **TORQUE LEVEL:** you can select the desired torque as a percentage of the torque range of the selected screwdriver. See the torque level testing in the back of the manual for setting guidelines. Please confirm desired torque value with a Kolver digital torque tester. The torque level is indicated on the main screen by "LEVEL".



### 3) JOINT:

You must select the type of joint (soft or hard) that you are working on. A soft joint is typically a self-tapping screw on plastic or sheet metal, or a metric (machine) screw on a material subject to compression (for example: gasket, o-ring, etc). A hard joint is typically a fastener joining metal with metal.

If you select the option SOFT the screwdriver will run the complete cycle at the selected speed (see Parameter 6.).

When selecting the option HARD the screwdriver will run the speed setting programmed until the Final Phase Time has been met (see Parameter 4.) and then the speed will down shift to apply a pre-torque before reaching the Torque Level (see Parameter 2.)

Note: Enabling the Parameter Delay Time adds additional time before the tool down shifts.



**IMPORTANT:** An incorrect selection of the joint type can result in inaccurate torque output.



DATE: 08.11.09

4) **FINAL PHASE TIME:** This option can be selected "ONLY" in combination with the option **JOINT: HARD**. You can select a time between MIN and 10.0 seconds indicating how long the selected speed (higher speed) will be on before switching to "pre-torque speed" (lower speed). The Final Phase Time is indicated on the main screen by letter "Z".

**NOTES:**

- 1.0 The MIN setting excludes (turns-off) this Parameter, resulting in the tool running continuously at the lower selected speed.
- 2.0 The "pre-torque speed" is not the speed you have set in Parameter six (6). This speed will be automatically chosen by the unit depending on the preset torque level. The user cannot adjust the "pre-torque speed".
- 3.0 Reaching the torque at higher speed (before the Final Phase Time is met) will result in inaccurate final torque, when running a Hard Joint. To avoid inaccurate torque we suggest either selecting a shorter time, and then increase it step by step until finding the optimum time – or – plotting your joint via a torque/time graph to determine the proper setting.
- 4.0 Torque reached before the Final Phase Time is complete will result in a torque level and error signals indicated by 3 beeps sounding.



5) **SLOW START:** You can select the slow start time (acceleration) from 0.2 to 2 seconds. This option is mainly used with self-tapping screws. Reaching the torque before the SLOW START time has completed will result in inaccurate torque output.

NOTE: Torque reached during the SLOW START time will result in level and error signal of 3 beeps.



6) **SPEED:** You can select any speed value of the screwdriver between nominal (max) speed and 30% of max speed (see also point 3.)

**NOTE:** The torque range specified is only possible at the nominal speed of the screwdriver (600 RPM for Pluto10 and 320 RPM for Pluto15). If you should set lower speeds, please check if the screwdriver stops correctly at the pre-set torque. See also Parameter 4 (Final Phase time) for speed in JOINT: HARD.



7) **MINIMUM TIME:** This is the minimum time allowed for the joint run down. If the torque signal is met before this time the tool will error out resulting in an error signal of 3 beeps.



8) **ELAPSED TIME:** This is the maximum time that the tool will run. The tool stops running when this time is met.



**9) DELAY TIME:** This is the amount of time the tool will run at full power and RPM. This parameter is designed to enable thread cutting strategies (see the Thread Cutting example in the back of this manual). The name Delay Time described exactly what this setting does; it delays the rest of the Parameter settings defined. As a result the Parameters you have set run in Sequence not in Parallel. For example: If the Parameter “Hard Joint” is activated the Final Phase Time will be added to the Delay Time before the tool down shifts to the Final Phase Speed. Be sure to add all the times together when setting up your strategy.

**CAUTION:** The Delay Time setting allows the tool to run at is full power. If you have this setting set too long it will damage your parts and can cause injury to your operator. A torque reaction arm is recommended when this parameter is enabled.



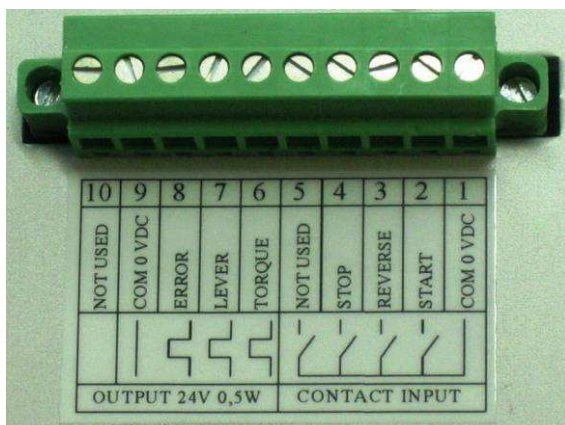
**10) REVERSE TIME:** This option will automatically start a reverse cycle after a torque reached signal or a time out signal (see also point 4 and 5). You can select a time between OFF (function excluded) and up to 10 seconds. During the reverse cycle, it is necessary to keep the lever pressed or the start signal otherwise the screwdriver will stop before the pre-set time.



**11) LANGUAGE:** This option allows to select between 4 languages: English, French, German and Italian.



## I/O CONNECTION



On the back panel you'll find only one connector I/O 10 pins which must be connected to the 90° connector coming from the unit.

### INPUT:

PIN		FUNCTION
1	COM 0VDC	Common pin. Close the contact between pin 1 and any of the other pins ( 2, 3, 4, 5) to start the function you need.
2	START	Remote start. Clockwise. Torque control.
3	REVERSE	Reverse remote start. Counter-clockwise. No torque control
4	STOP	Stop motor. "STOP ACTIVE"screen. Motor stops and starts again after the contact has opened.
5	NOT USED	Only used in special versions.

**OUTPUT:**

PIN		FUNCTION
6	TORQUE	Torque reached signal. Signal is 24V 20 mA , max 0,5W.
7	LEVER	Lever signal: when lever is pressed or when the start is remote. No signal during unscrewing cycle. It resets after their release. Signal is 24V 20 mA , max 0,5W.
9	COM0VDC	Common pin for any output. Signals must take between pin 1 ( 0VDC common) and the other pins (6,7 and 8).
10	NOT USED	Only used for special versions.

Output signals are protected. Overload of these 3 available signals (> 60 mA) or short circuit will result in the stop of the unit. To re-activate signals, it is necessary switch off the unit for 5-6 seconds, check connections outputs then switch on the unit.

**Audible signals**

Beep sounds at the end of the screwing allow to check if the screwing itself is correct or not. A screwing results correct when the torque has been reached satisfying all the settings (0.5 sec beep sound). Torque reached during Ramp or Brake Time (only on hard joint) will result 3 beep sounds. **NB.** Torque reached during Ramp or Brake Time will result in torque reached signal. For Brake Time only in error signal also.

**DATA OUTPUT:**

Serial port for data downloading available on request for all models.

The configuration of the RS 232 port is: 9600 (bits per second), 8 (data bits), n (no parity), 1 (stop bits 1).

Connection pin: PIN 2 = TX, PIN 3= RX, PIN 5 = GND

Printed DATA will be as follows:

Model:	Pluto 10	Joint:	Soft	Torque:	Min	Rpm:	600	Result:	OK	Stop time:	N
--------	-------------	--------	------	---------	-----	------	-----	---------	----	---------------	---

Model: model of selected screwdriver (PLUTO10 or PLUTO15)

Joint: type of joint (soft or hard)

Torque: pre-set torque level

Rpm: speed value

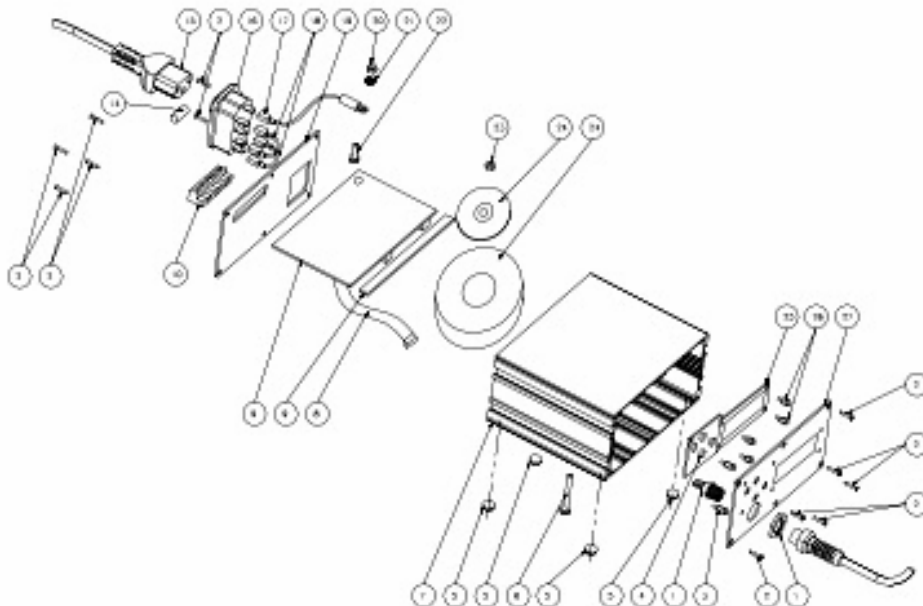
Result: OK= the torque has been correctly reached, all the selected parameters are satisfied and the control unit will give out a beep sound of 0.5 sec.

Result: NOK= the torque has been reached during the ramp time or the brake time (only on hard joint). In this case, the unit will give out 3 beep sounds.

Stop time: the torque has been reached before the stop time (N on the main screen) or at the stop time (Y on the main screen), in this case the torque result will always be NOK.



## Part break down:



RIF	DESCRIPTION	CODE	RIF	DESCRIPTION	CODE
1	Connector 5 PIN M12 M	201666	16	Plug w/fuseholder 230V	800618
2	Screw 2,6 x 9,5 (12pcs)	800605	17	Earth cable	800090
3	Nut M2,5 h 11	872436	18	Plug internal cable	800080/N
4	Button for user interface	872437	19	Back panel	832414
5	Rubber support (4pcs)	800016	20	Nut M3	800056
6	Screw M6 x 60	872430	21	Washer M3	800041
7	Alu box	812010/VB	22	Screw M3 x 8	806235
8	Internal connector	872438	23	Nut M6	872433
9	Main PCB	852421	24	Transformer 230/36-18V 200VA w/fixing plate	848009
10	Connector I/O 10 pin F	800109	25	PCB display	852422/N
11	Thickness	800110	26	Nut M2,5 h 7	872435
14	Fuse 3,15 A	800619	27	Front panel	822426
15	Power supply cable	800620			



**TROUBLE SHOOTING**

ERROR #	PROBLEM	ACTION / SOLUTION
0	No connection between main PCB and display PCB	Check flat connector inside the unit
1	Choosing SOFT joint and working on a HARD joint: the screwdriver will stop	- Switch the unit off and on again after 5 seconds and check the joints
2	Choosing HARD joint and working on a SOFT joint: the screwdriver will stop	- Switch the unit off and on again after 5 seconds and check the joints
5	Bus under voltage (it happens when the supply +V bus to the motor remains below 25V for more than 3 seconds)	- Make sure that 110/230 (depending on Country) VAC input is supplied
6	Overload on bridge H (it happens when current on mosfets of bridge H > 10 A for more than 600 ms)	- Reduce cycle rate - Avoid motor stalling
7	Motor not detected (it happens when the motor connection is missing)	- Check cable and connection between screwdriver and controller
8	Overload on bridge H (it happens when current on mosfets of bridge H > 14,5 A for more than 10 ms)	- Reduce cycle rate - Avoid motor stalling - Unscrewing too heavy (> tool torque range)

NB. TO RESET ERRORS, TURN OFF THEN SWITCH ON THE UNIT. RESET OF ERRORS #6 AND #8 COMES AUTOMATICALLY AFTER THE PROBLEM END.

IF THE PROBLEM PERSISTS, PLEASE CONTACT YOUR NEAREST KOLVER DEALER.

EDU1AE power supply and control unit is a maintenance free unit. Should you need any assistance please call the nearest Kolver dealer in your Country or contact directly Kolver at [kolver@kolver.it](mailto:kolver@kolver.it) or KolverUSA [www.kolverusa.com](http://www.kolverusa.com) or call: International +39 0445 371068, North America call 978-692-5166.



## Screwdriver torque range table:

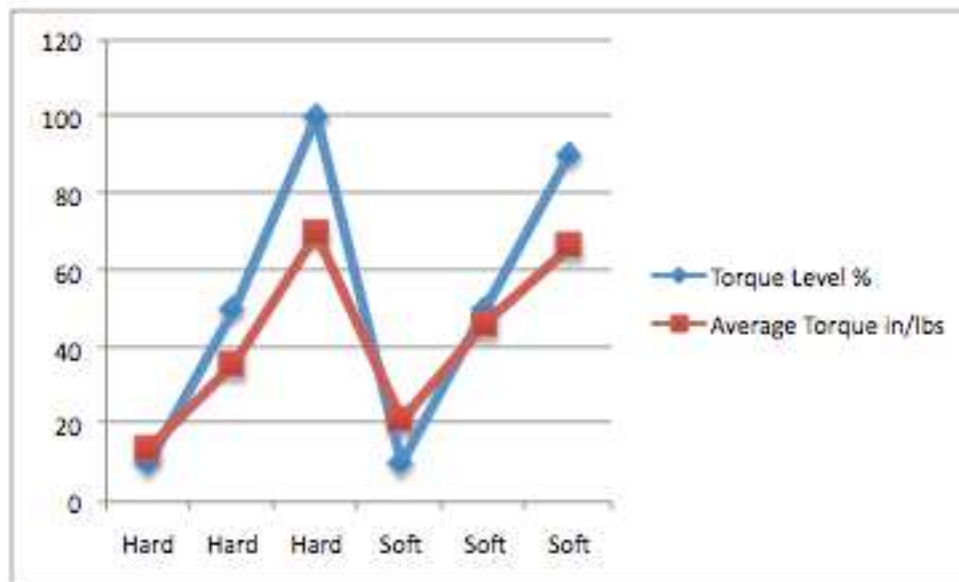
Model	Control unit	Torque (in/lbs)		Speed		Output	Dimensions L x ø mm
		SOFT	HARD	Min	Max		
PLUTO 3 P PLUTO 3 P/U PLUTO 3D PLUTO 3 CA	EDU1AE/LTP	2.6 to 17.7	5.3 to 26.5	390	1200	Hex 1/4"	150x150x45
PLUTO 10 P/N PLUTO 10 P/U/N PLUTO 10 D/N PLUTO 10CA/N	EDU1AE/LTP	5.3 to 31.8	5.3 to 35.4	130	400	Hex 1/4"	150x150x45
	EDU1AE	17.7 to 70	17.7 to 86	200	600		
PLUTO 15 P/N PLUTO 15P/U/N PLUTO 15 D/N PLUTO 15CA/N	EDU1AE/LTP	5.3 to 55.7	12.3 to 60	70	220	Hex 1/4"	150x150x45
	EDU1AE	17.7-119	17.7-132	100	320		
PLUTO 20CA	EDU1AE/20	22	177	43	130	Sq 3/8 "	200x45,5

NOTE: The settings outlined above are affected by joint stiffness (hard or soft) and the RPM at the final torque. You may not be able to achieve the exact torque range outlined above if you have the incorrect settings.

NOTE: For optimal performance use 20% & 80% of the torque ranges outlined above when specifying a tool for your application.

**PLUTO 10****Torque Level/Speed Chart****HARD & SOFT JOINT**

Joint	Torque Level %	Average Torque in/lbs	Speed RPM	Repeatability
Hard	10	13.605	200	11.39%
Hard	50	35.425	500	1.69%
Hard	100	69.665	600	2.66%
Soft	10	21.185	200	6.14%
Soft	50	45.905	500	6.54%
Soft	90	66.47	500	5.19%



The above chart shows how a typical PLUTO 10 Screwdriver will respond to a Hard & Soft Joint at specific torque level and speed settings. Note both joints tested are on the extreme ends of the curve. The hard joint has almost no movement in the clamping zone while the soft joint has two full rotations in clamping zone. If your joint has more or less rotation in the clamping zone you will see different results.



## PLUTO 10

### HARD & SOFT JOINT TESTING

#### HARD JOINT DATA SUMMARY:

- The PLUTO 10 published **lower torque** limit for a hard joint is 18 in/lbs:
  - Testing required a torque level setting of 10% and a speed setting of 200 RPM to achieve an average torque of 13.6 in/lbs with repeatability of 11% \*
- The PLUTO 10 published **upper torque** limit for a hard joint is 86 in/lbs:
  - Testing required a torque level setting of 100% and a speed setting of 600 RPM (MAX) to achieve an average torque of 69.6 in/lbs with repeatability of 3%

#### SOFT JOINT DATA SUMMARY:

- The PLUTO 10 published **lower torque** limit for a soft joint is 18 in/lbs:
  - Testing required a torque level setting of 10% and a speed setting of 200 RPM to achieve an average torque of 21.1 in/lbs with repeatability of 6%. NOTE: the same test at 600 RPM resulted in lower torque values of approximately 14 in/lbs.
- The PLUTO 10 published **upper torque** limit for a soft joint is 70 in/lbs:
  - Testing required a torque level setting of 90% and a speed setting of 500 RPM to achieve an average torque of 66.4 in/lbs with repeatability of 5%. NOTE: the same test at 200 RPM resulted in a motor stall condition.

#### CONCLUSION:

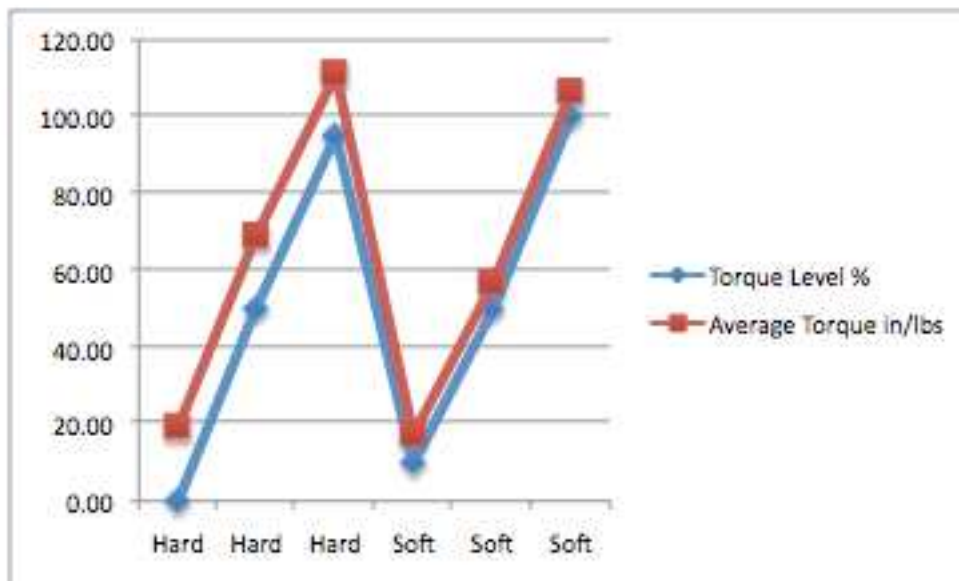
- \* The lower limit hard joint testing showed repeatability of 11% and 3% for the upper limit. It should be noted that the tool is much more repeatable on the upper end of the torque range.

#### GENERAL

- No two joints are exactly the same. This data is meant to help you get a feeling for how a typical PLUTO 15 will react. You will most likely get slightly different results with your specific joint.

**PLUTO 15****Torque Level/Speed Chart****HARD & SOFT JOINT**

Joint	Torque Level %	Average Torque in/lbs	Speed RPM	Repeatability
Hard	0.00	19.215	200	11.39%
Hard	50.00	68.945	500	0.22%
Hard	95.00	111.205	600	3.06%
Soft	10.00	17.26	200	4.06%
Soft	50.00	56.793	500	3.70%
Soft	100.00	106.435	500	4.13%



The above chart shows how a typical PLUTO 15 Screwdriver will respond to a Hard & Soft Joint at specific torque level and speed settings. Note, both joints tested are on the extreme ends of the curve. The hard joint has almost no movement in the clamping zone while the soft joint has two full rotations in clamping zone. If your joint has more or less rotation in the clamping zone you will see different results.



## PLUTO 15

### HARD & SOFT JOINT TESTING

#### HARD JOINT DATA SUMMARY:

- The PLUTO 15 published **lower torque** limit for a hard joint is 18 in/lbs:
  - Testing required a torque level setting of MIN and a speed setting of 200 RPM to achieve 19 in/lbs with repeatability of 11%\*
- The PLUTO 15 published **upper torque** limit for a hard joint is 110 in/lbs:
  - Testing required a torque level setting of 100% and a speed setting of 320 RPM (MAX) to achieve 111 in/lbs with repeatability of 3%

#### SOFT JOINT DATA SUMMARY:

- The PLUTO 15 published **lower torque** limit for a soft joint is 18 in/lbs:
  - Testing required a torque level setting of 10% and a speed setting of 200 RPM to achieve 17 in/lbs with repeatability of 4%
- The PLUTO 15 published **upper torque** limit for a soft joint is 119 in/lbs:
  - Testing required a torque level setting of 100% and a speed setting of 320 RPM (MAX) to achieve 109 in/lbs with repeatability of 5.6%

#### CONCLUSION:

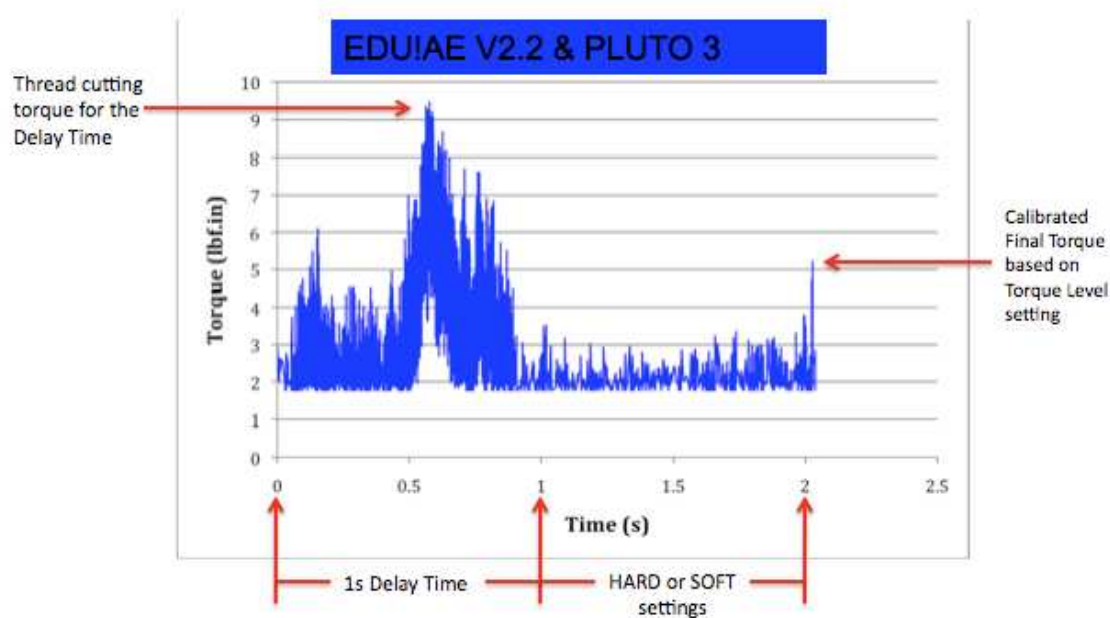
- \* The lower limit hard joint testing showed repeatability of 11% and 3% for the upper limit. It should be noted that the tool is much more repeatable on the upper end of the torque range.

#### GENERAL

- No two joints are exactly the same. This data is meant to help you get a feeling for how a typical PLUTO 15 will react. You will most likely get slightly different results with your specific joint.

## EDU1AE V2.2

### HIGH PREVAILING TORQUE EXAMPLE



Parameters	Settings	Comments
MODEL:	PLUTO 3	This test was done with a threaded fastener with Loctite thread locker adhesive that had been allowed to cure over night on the threads. The tool ran for 1 second at full power requiring 9+ in/lbs to cut through the adhesive, then shifted to the Hard joint settings and a final torque of just over 5 in/lbs.
TORQUE LEVEL:	10%	
JOINT:	HARD	
FINAL PHASE:	0.3s	
SLOW START:	0.2s	
SPEED:	1200	
MINIMUM TIME:	.1s	
ELAPSED TIME:	10s	
DELAY TIME:	1s	
REVERSE TIME:	OFF	