

K-DUCER MANUAL

KDU-1 / KD-1A

Torque range: 0.1-15 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:	KDU-1	KDU-1A
CODE:	035001	035001/A

TECHNICAL DATA OF THE PRODUCT

FUSE: 3,15 A
DIMENSIONS: 190 x 205 x h120 mm WEIGHT: 2,5 Kg
POWER SUPPLY: 90÷260 V AC 50÷60 Hz
TENSION: 40V DC
POWER: 600W

DECLARATION OF CONFORMITY



KOLVER S.r.l. declares that the new tool here described: control units model KDU-1, KDU-1A are 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 III normative (2011/65/UE and following 2015/863).

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

Thiene, January 1st 2020

Giovanni Colasante

MODELS:

K-DUCER power supply and control units are available in two versions:

Code	Model	Features
035001	KDU-1	
035001/A	KDU-1A	as KDU-1 + RJ4 connector Modbus TCP (slave) communication protocol

They also control the torque of any KDS electric screwdrivers with transducer, available straight, pistol and fixture configuration.

Code	Model	Torque (Nm)	Speed (rpm)	
			Min	Max
135006	KDS-PL6	0,5-6	50	850
135006/ESD	KDS-PL6	0,5-6	50	850
135007/ESD	KDS-PL6P	0,5-6	50	850
135007/U/ESD	KDS-PL6P/U	0,5-6	50	850
135106	KDS-PL6CA	0,5-6	50	850
135106/FN	KDS-PL6CA/FN	0,5-6	50	850
135006/A/ESD	KDS-PL6ANG	0,5-5,5	50	850
135010	KDS-PL10	0,8-10	50	600
135010/ESD	KDS-PL10	0,8-10	50	600
135011/ESD	KDS-PL10P	0,8-10	50	600
135011/U/ESD	KDS-PL10P/U	0,8-10	50	600
135110	KDS-PL10CA	0,8-10	50	600
135110/FN	KDS-PL10CA/FN	0,8-10	50	600
135010/A/ESD	KDS-PL10ANG	0,8-9	50	600
135015	KDS-PL15	0,5-15	50	320
135015/ESD	KDS-PL15	0,5-15	50	320
135016/ESD	KDS-PL15P	0,5-15	50	320
135016/U/ESD	KDS-PL15P/U	0,5-15	50	320
135115	KDS-PL15CA	0,5-15	50	320
135115/FN	KDS-PL15CA/FN	0,5-15	50	320
135015/A/ESD	KDS-PL15ANG	0,5-14	50	320
175015	KDS-MT1.5	0,1-1,5	50	850
175015/ESD	KDS-MT1.5/ESD	0,1-1,5	50	850
175016/ESD	KDS-MT1.5P	0,1-1,5	50	850
175016/U/ESD	KDS-MT1.5P/U	0,1-1,5	50	850
175115	KDS-MT1.5CA	0,1-1,5	50	850
175115/FN	KDS-MT1.5CA/FN	0,1-1,5	50	850

K-DUCER is the new class A intelligent transducerized assembly system from Kolver. Thanks to a sophisticated control system, the electronic circuit communicates with KDS series screwdriver equipped with integrated torque/angle transducer and allows to stop the screwdriver instantly when reaching the preset torque or angle.

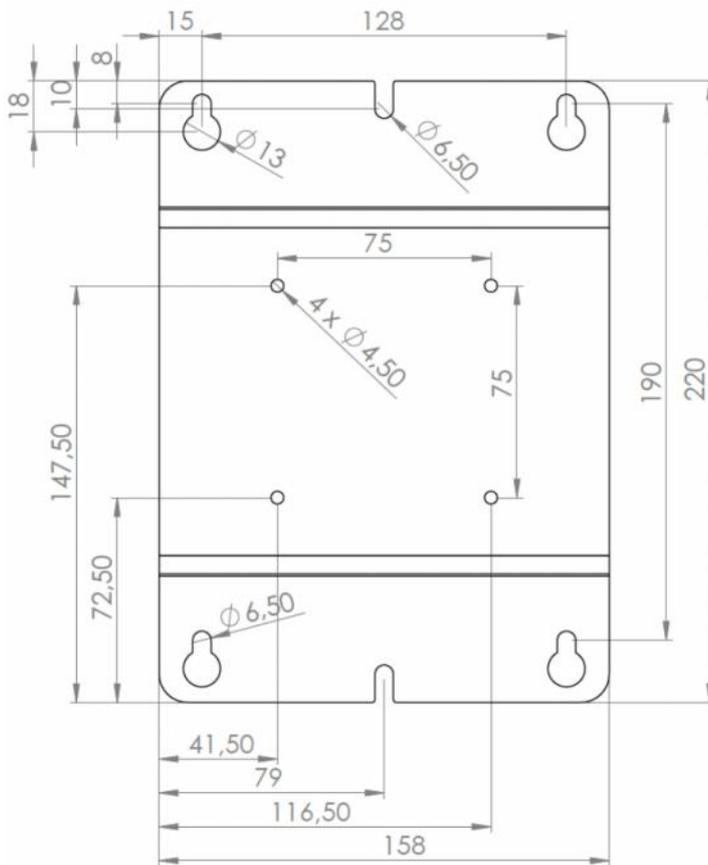
The AC 90÷260V - 50÷60Hz power supply is converted into 40VDC required by the KDS series screwdrivers through a switching board.

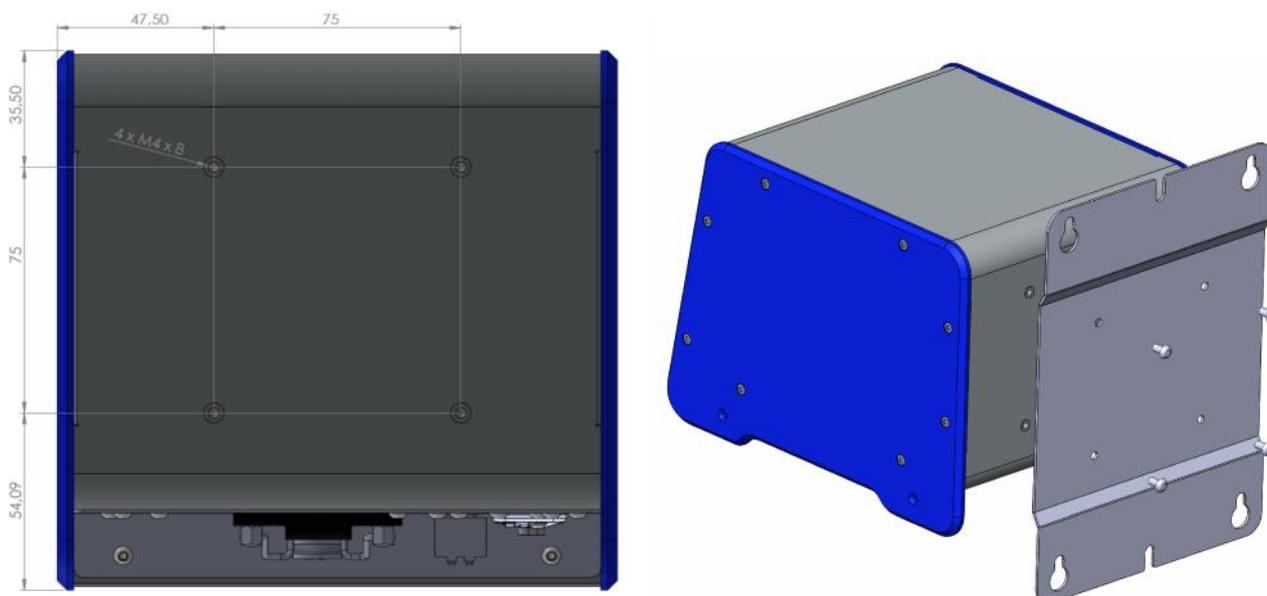
IMPORTANT: K-DUCER is a highly accurate unit but it is critically important to select the correct options to ensure that proper torque is being applied. Read the menu description carefully and in case you are unsure please contact Kolver for support information.

INSTALLATION:

Installation of KDU unit:

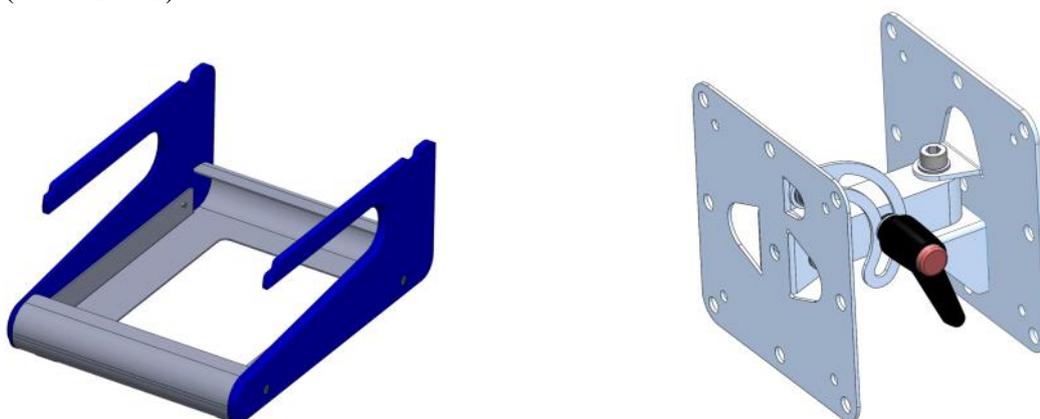
KDU control unit is supplied with a bracket.





On the back panel, there are four female threaded pivots 8 mm depth to be used to fix the bracket. KDU unit is supplied with four M4x8 screws to help the plate to be fixed to the unit or to any other Kolver supports.

It is also available both a table stand (code 010400) and a vertically and horizontally adjustable bracket (code 010401).



Installation of KDS screwdriver:

The KDS screwdrivers series require a 2.5m male/female cable (code 250064) or 5m (code 250564). Or cables with strain relief (2.5m 250064/H and 5 m 250564/H).



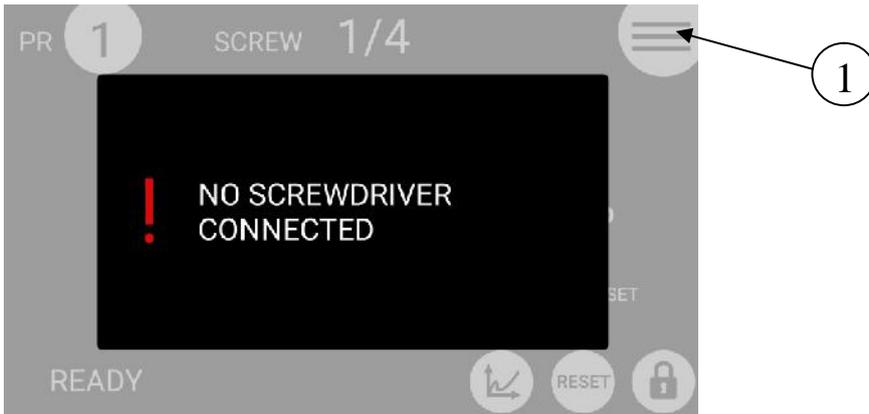
To connect the cable to the unit, insert the male connector into the appropriate TOOL connector on the bottom of the unit, taking care to respect the alignment tabs. Push the connector into its position and turn clockwise the OPEN/CLOSE nut. Referring to the screwdriver, use the female side of the

cable and perform the same operations. To disconnect the connectors, apply a light pressure of the cable connector towards the fixed connector and turn counterclockwise the nut.



Turn the unit on through the on/off switch on the lower panel. The unit will carry a general system check and the words “NO SCREWDRIVER CONNECTED” will appear if no screwdriver is connected.

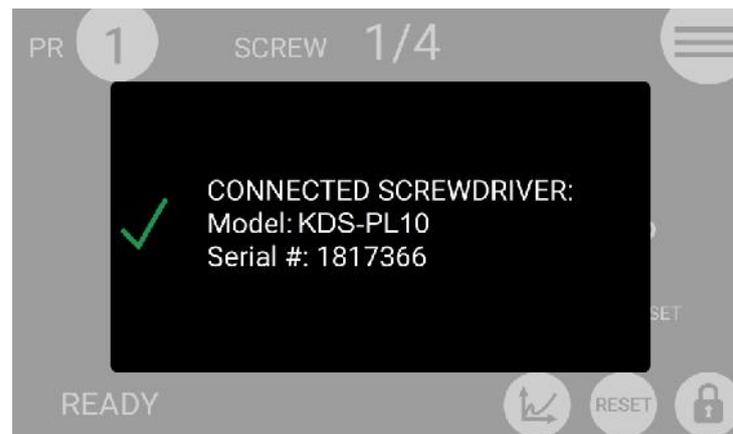
NB: It's possible to enter the menu even without any screwdriver connected.



1- To enter the menu

Instead if the screwdriver is connected, it will be recognized by the unit and the "CONNECTED SCREWDRIVER" screen will appear for a few seconds, also showing the model and serial number.

NB. All parameters read during the recognition of the screwdriver can also be displayed in the SETTING menu.



If the parameters set in the K-DUCER unit are outside of the range of the screwdriver, the following screen will appear:

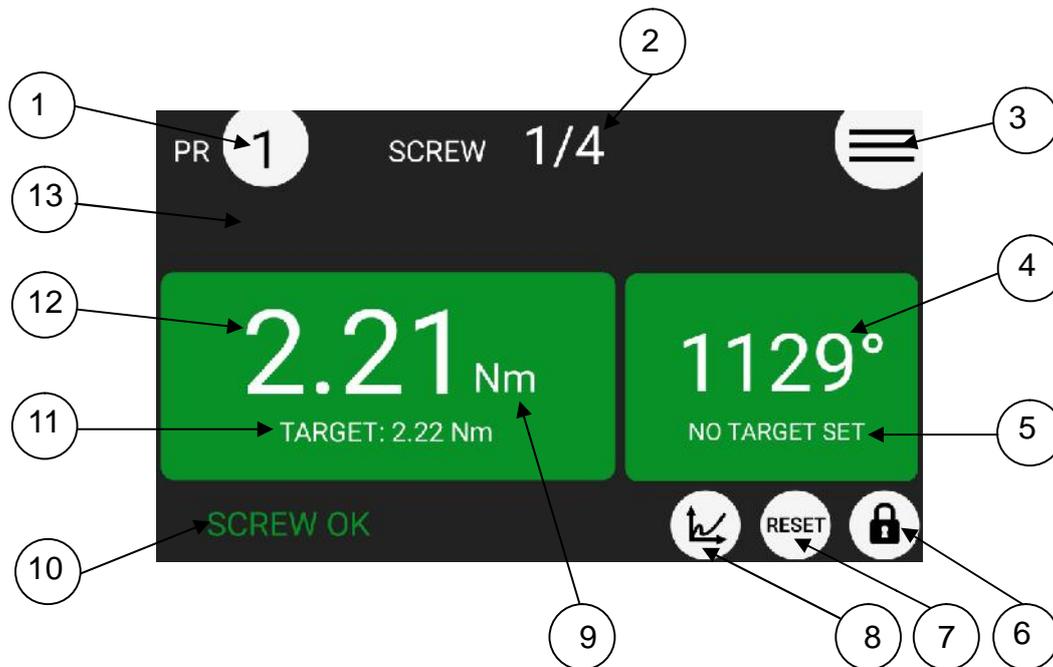


At this point select a different program by clicking on the "Access to the menu" button or modify the parameter out of range.

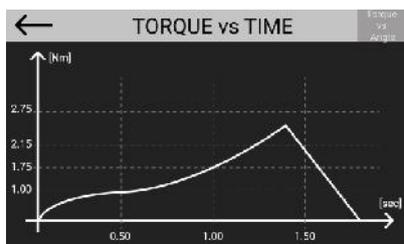
The error messages can be the following:

TorqueTargOverMax	Target torque higher than the allowed limit for the screwdriver.
SpeedTargOverMax	Target speed higher than the limit allowed for the screwdriver.
SpeedTargUnderMin	Target speed less than the limit allowed for the screwdriver (50 RPM).
DownshiftTorqueOverTarg	The fast phase torque setting is higher than the final target torque.
DownshiftSpeedOverMax	The speed of the slow phase of this program is higher than the maximum allowed by the screwdriver.
DownshiftSpeedUnderMin	The speed of the slow phase of this program is less than the minimum allowed by the screwdriver (50 RPM).
TorqueMaxOverMaxLim	<u>In angle control</u> : the maximum torque set in the program is above the limit of the screwdriver. <u>In torque control</u> : the maximum torque set in the program is higher than 20Nm.
TorqueMaxUnderMinLim	<u>In angle control</u> : the maximum torque set in the program is equal or lower than the minimum limit of the screwdriver. <u>In torque control</u> : The maximum torque set in the program is equal or lower than the target torque already set.
TorqueMinOverMaxLim	<u>In angle control</u> : the minimum torque set in the program is equal or higher than the maximum torque already set. <u>In torque control</u> : the minimum torque set in the program is equal or higher than the target torque already set.
RevTorqueOverMax	The reverse torque of this program is higher than the maximum torque of the screwdriver.
RevSpeedOverMax	The reverse speed is higher than the maximum allowed by the screwdriver.
RevSpeedUnderMin	The reverse speed is lower than the minimum allowed by the screwdriver (50 RPM).

If the connection with the motor control board is successful the following screen will be displayed:

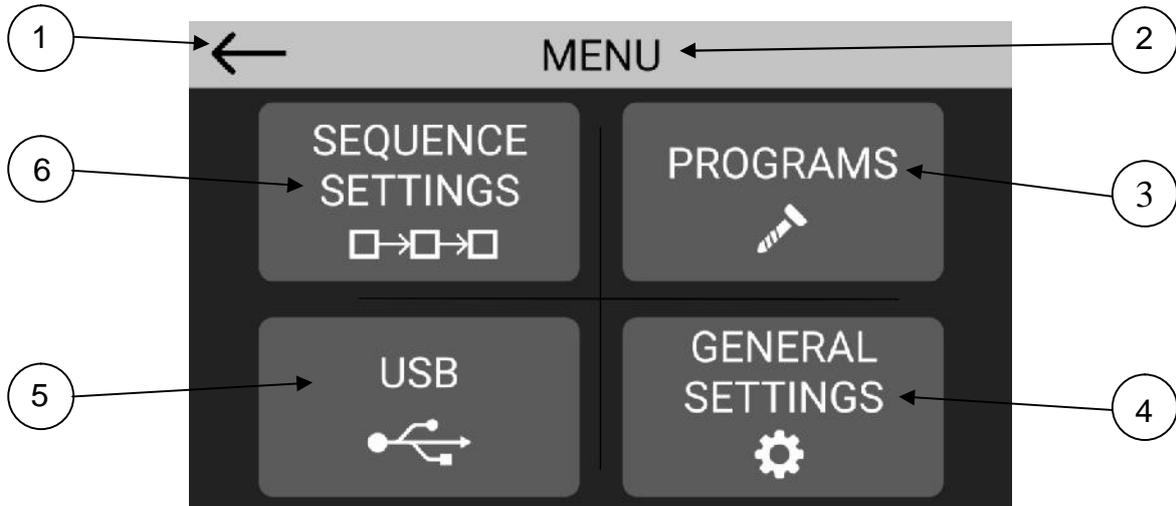


- 1- Program “PR” number. By touching it, you can enter the desired program.
 - 2- Screw count: done screws/total screws.
 - 3- Menu access key.
 - 4- Angle value in degrees.
 - 5- Pre-set angle target.
 - 6- Padlock key. White background= no password required. Red background= password required.
 - 7- Reset RST key. See SETTING Menu.
 - 8- Key to display the chart. Active only after screw reached.
- It is possible to see TORQUE VS TIME and TORQUE VS ANGLE



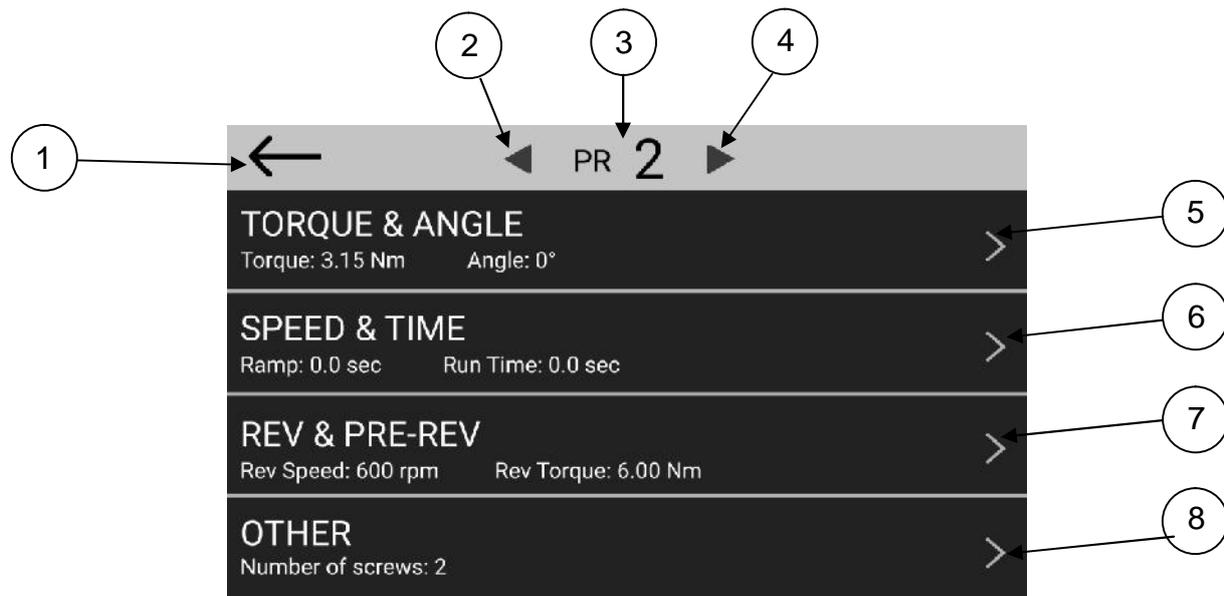
- 9- Unit (Nm, lbf.in or kgf.cm)
- 10- Status bar (ready, OK-NOK, errors...).
- 11- Pre-set torque target. See PROGRAMS Menu.
- 12- Real value of the applied torque. It is displayed when the target value is reached.
The background can be green or red depending on whether the settings are respected or not.
- 13- Program Description. Is displayed only if pre-set. See OTHER menu.

MAIN MENU:



- 1- To return to run screen.
- 2- Displayed page bar.
- 3- PROGRAMS: to enter the programming menu relative to the parameters of each single program.
- 4- GENERAL SETTING: to enter the programming menu relative to all the parameters of all the programs.
- 5- USB: to enter the Menu to manage reading/writing on USB key.
- 6- SEQUENCE SETTING: to enter Sequence Menu and settings.

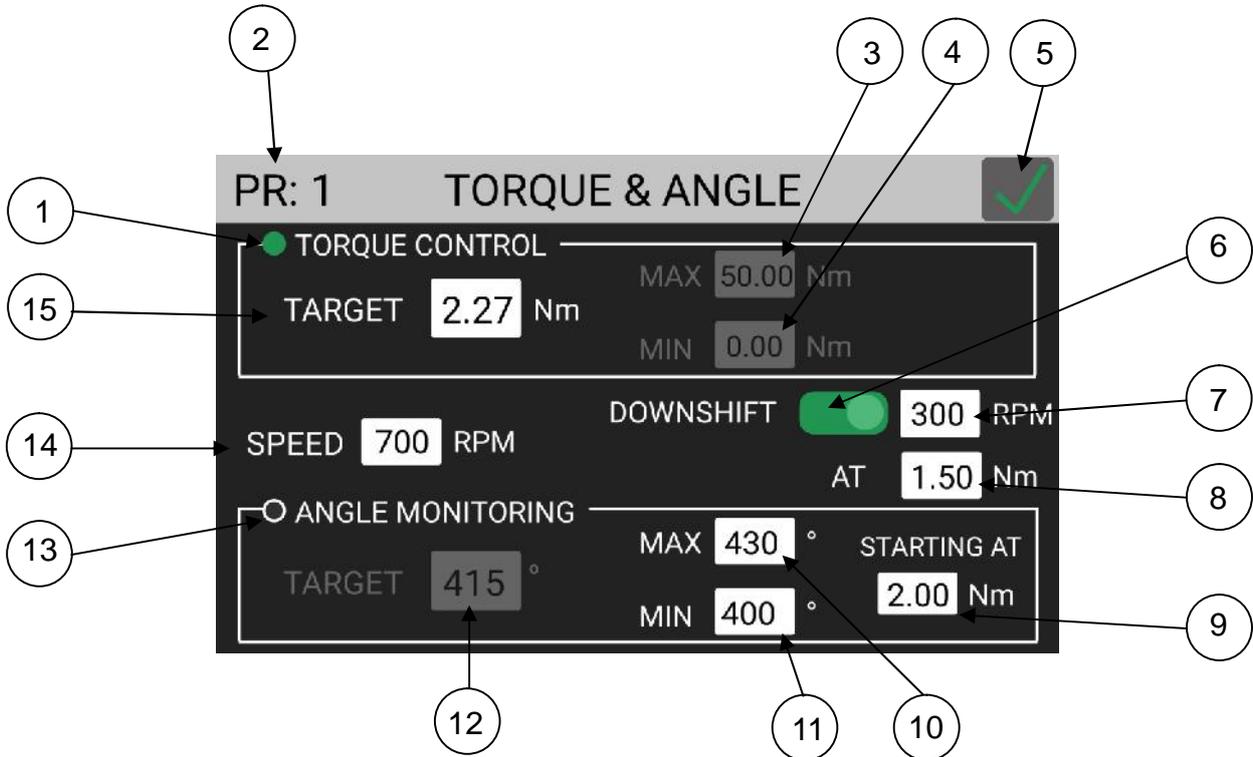
MENU PROGRAMS:



- 1- To return to the previous menu.
- 2- To return to the previous program.
- 3- Program in progress. If pressed to enter the desired program number through the numeric keypad.
- 4- To move to the following program.
- 5- TORQUE & ANGLE: Access to the menu where the torque and angle functions can be set. In the same line, the set values of the main parameters can be seen in small format.
- 6- RAMP & TIME: Access to the menu where Ramp, Run time, Min time, Max time and Prevailing torque functions can be set. In the same line, the set values of the main parameters can be seen in small format.
- 7- REV & PRE-REV: Access to the menu where Reverse Speed, Reverse Torque, Pre-Reverse, Pre-Tightening Reverse, Autoreverse and Pre-Reverse Delay functions can be set. In the same line, the set values of the main parameters can be seen in small format.
- 8- OTHER: Access to the menu where other functions can be set (Program description, Screw number, Rotation, Serial Print, SWX88/CBS880, Barcode, Press OK, Press ESC, Error Lever, ...). In the same line, the set values of the main parameters can be seen in small format.

MENU TORQUE & ANGLE:

TORQUE CONTROL

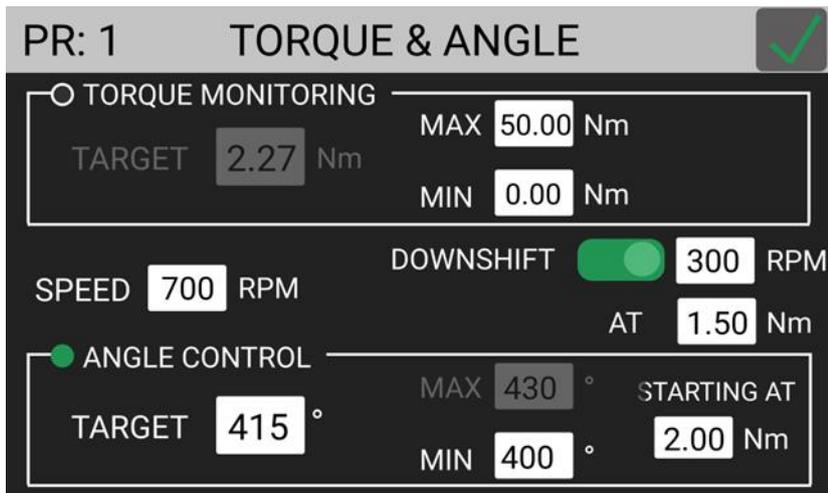


- 1- TORQUE CONTROL flag: it allows to select the mode of Torque Control and Angle monitoring. In this mode, priority is given to the torque. The angle can be monitored by the lever pressed (or by remote), by a certain set torque threshold, or by an external input (see point 9). In this mode the TARGET Angle and MAX Torque functions are deactivated. When this function is active, flag #13 is blank and Angle Monitoring function is on.
- 2- Program number.
- 3- MAX Torque: (not set in Torque Control mode).
- 4- MIN Torque: to set the min torque value. Min Torque and Target functions define 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 below this value, the error signal "under minimum torque" will be displayed and the red led will light up. You can set the torque range from 0 to Target.
- 5- Saving key: to save parameters and/or return to the previous menu. If you have changed any parameters, after touching this key, the SAVE CHANGES screen appears and you have to choose to save or not. After the, you will return to the PROGRAMS menu.



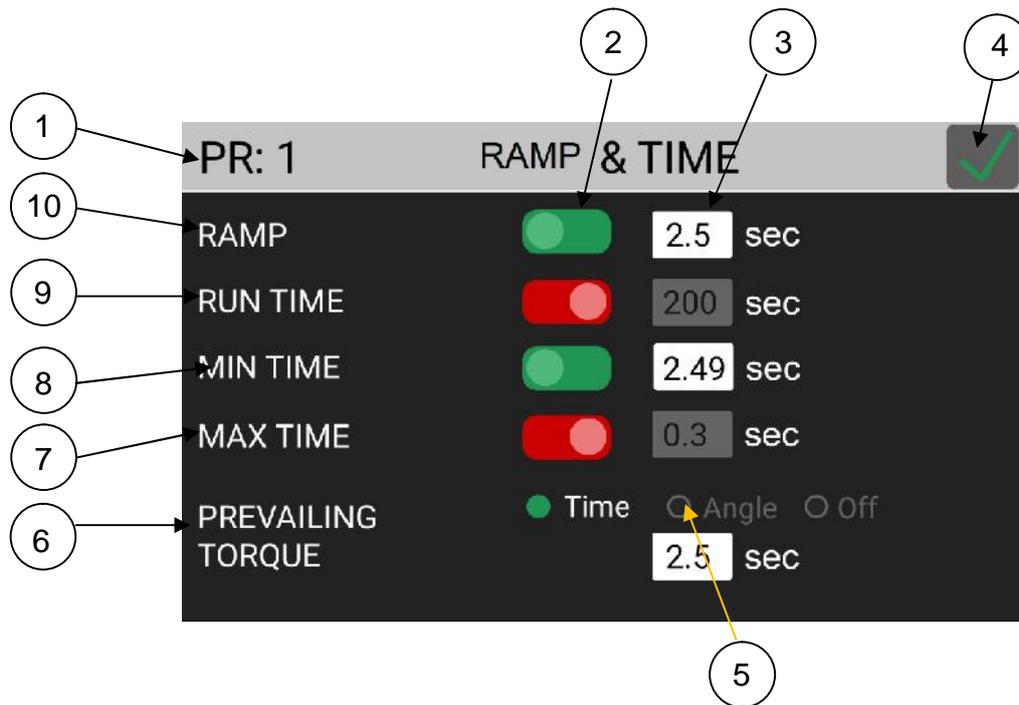
- 6- Downshift screwdriver function. If OFF, the screwdriver will turn at the pre-set final speed (see point 14). If ON, the operator can select a speed different from the final one and manage through a torque threshold. Selecting the downshift function, the RPM (see point 7) and AT (see point 8) functions will be activated.
- 7- RPM: to select a speed different from the final one. The speed can be set within the speed range of the model of screwdriver.
- 8- AT setting: to set the torque threshold the RPM change. The value can not exceed the final TARGET torque. **IMPORTANT:** In case of DOWNSHIFT ON, set the AT treshold close to the final torque so that the screwdriver works at high speed in the first step (80-90% of the final torque) and then slows down for the few final rotations (remaining 10-20% of final torque). In this way the motor will force much less and its temperature will remain lower.

ANGLE CONTROL



- 9- STARTING AT: to set the torque threshold the angle starts to be read from. It's possible to set a torque threshold or activate the Lever flag (starting to read the angle when the lever pressed) or Ext In (starting to read the angle when a remote input arrives on CN3).
- 10- MAX: Maximum angle threshold. In Torque mode, when the angle is reached, the screwdriver will be stopped, the screw will be result as NOK and Err Angle Max error displayed. The maximum angle the operator can set is 30000°. In case of Angle Monitoring function, max pre-set angle is 30100°.
- 11- MIN: Minimum angle threshold. If minimum angle is not reached, the screw will result as NOK and Err Angle Min error will be displayed. The minimum angle the operator can set is 1°. The max pre-set angle is Max - 1°.
- 12- ANGLE TARGET: to set the angle target. This function is active only in Angle control mode.
- 13- ANGLE MONITORING: to select the Angle Control/ Torque monitoring mode. In this mode, priority is given to the angle. In this mode the TARGET Torque and MAX Angle functions are deactivated. When this function is active, flag #1 is blank and Torque Monitoring function is on.
- 14- SPEED: to set the final speed of the screwdriver.
IMPORTANT: In case of Downshift and AT functions, please check also #6 and #8.
NB. It is advisable to set SPEED so that the screwdriver works at high speed in the first step (80/90% of the final torque) and then slows down for the few final laps (remaining 10/20% of final torque). In this way the motor will strain much less and its temperature will remain lower as well as being more precise (see also function DOWNSHIFT and AT points 6 and 8 of this menu).
- 15- TARGET: It is the final torque value that the screwdriver must reach.
IMPORTANT: Continuous use over 80% of torque range is not recommend!

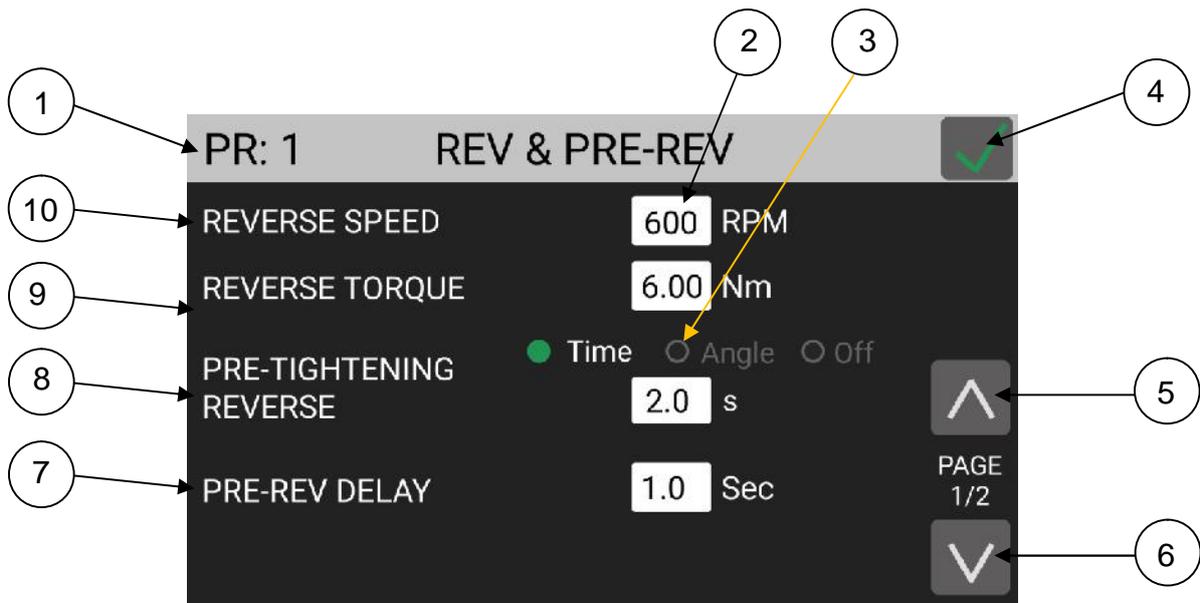
MENU RAMP & TIME:



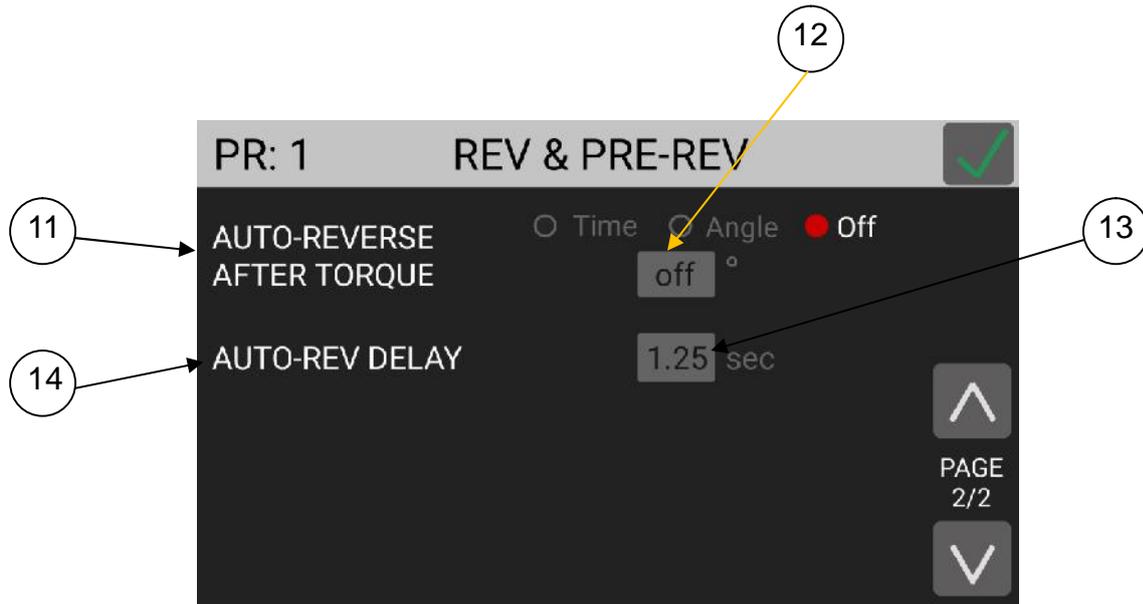
- 1- Program number.
- 2- ON/OFF flags to enable Ramp, Run Time, Min and Max Time functions. If OFF values in grey backgrounds are the default values. If ON, values can be set digiting the desired numbers.
- 3- Values of Ramp, Run Time, Min and Max Time functions.
- 4- Saving key: to save parameters and/or return to the previous menu. If you have changed any parameters, after touching this key, the SAVE CHANGES screen appears and you have to choose to save or not. After the, you will return to the PROGRAMS menu.
- 5- Time – Angle – Off: flags referring to PREVALING TORQUE function. This function can be activated in Time or Angle mode. Depending on the mode selected, in the small box below, the value of the active function will be displayed on a white background. If OFF, the box below will show off in a non-editable gray background.
- 6- PREVALING TORQUE: time period or angle the screwdriver works at maximum torque before switching to the user-set torque. The time is selectable from 0.1 to 19.9 sec and angle from 1 to 360°. To disable the function, select the OFF flag. This function overlaps with the other settings starting from the motor start on.
ATTENTION: This function is useful for applications where the prevailing torque is higher than the final torque (for example self-tapping screws or locknuts). Please use this function with utmost attention because an incorrect use can damage both the assembly and the screwdriver. Torque values reached during the max torque time won't activate the torque signal and "Error pvt time" will be displayed.
- 7- MAX TIME: to select the maximum time of screwing.
IMPORTANT: 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.
- 8- MIN TIME: to select the minimum time of screwing from 0.1 sec to 'Max time - 0.2s' or 'Run Time -0.2s'.
IMPORTANT: 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- **RUN TIME:** set the time of a tightening, from 0,1 to 19,90 sec.
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 Run Time -0.1sec'.
- 10- **RAMP:** select the slow start time (acceleration) from 0,3 to 3,0 sec. 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 #8).

MENU REV & PRE-REV:

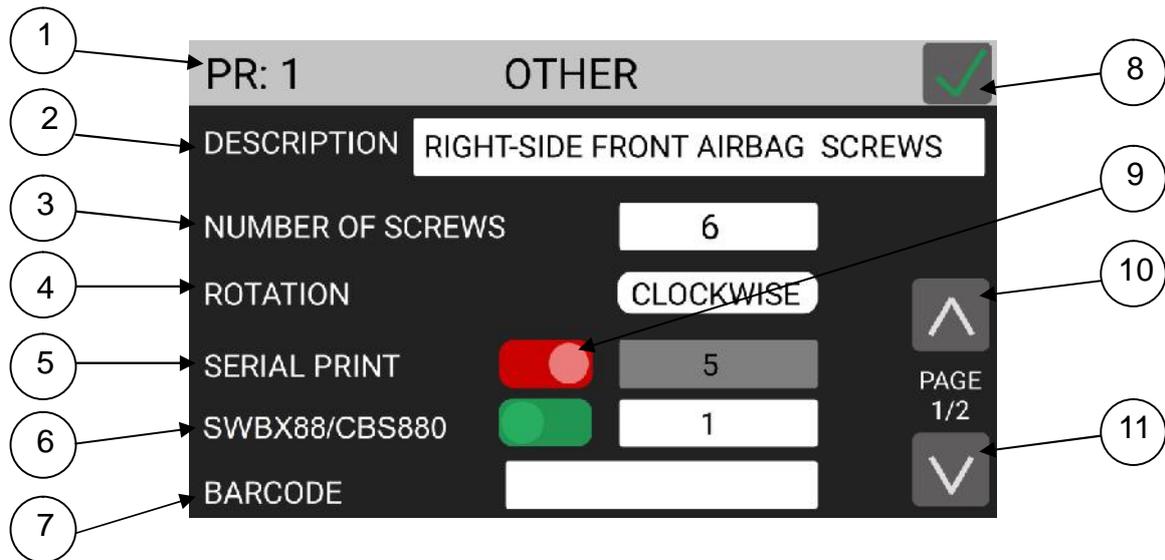


- 1- Program number.
- 2- Values of Reverse speed, Reverse torque, Pre-tightening reverse, Pre-rev delay, Auto-reverse after torque and auto-rev delay functions.
- 3- Flags referring to PRE-TIGHTENING REVERSE function.
It is possible to activate the function in time or angle mode. Depending on the mode selected, a green flag will switch on. If OFF the box will show off with a non-editable grey background.
- 4- Saving key: to save parameters and/or return to the previous menu. If you have changed any parameters, after touching this key, the SAVE CHANGES screen appears and you have to choose to save or not. After the, you will return to the PROGRAMS menu.
- 5- Switch button from screen page 2 to screen page 1 of REV & PRE-REV menu.
- 6- Switch button from screen page 1 to screen page 2 of REV & PRE-REV menu.
- 7- **PRE-REV DELAY:** to set a delay before the Pre-Tightening Reverse starts, if PRE-TIGHTENING REVERSE is on (see #8). Time can be set from 0.3 to 10 secs.
- 8- **PRE-TIGHTENING REVERSE:** to allow untightening before screwing. Time can set from OFF to OFF a 20.0 sec.
ATTENTION: Pre-Tightening Speed and Torque will be the same as Reverse.
- 9- **REVERSE TORQUE:** to set a reverse torque within the range of the screwdriver selected. If you're using an openend wrench attachment, the reverse torque has to be set to MIN value in order to bring the wrench back to the correct position.
- 10- **REVERSE SPEED:** to set any reverse speed value of the screwdriver between the maximum and the minimum specific speed of every single screwdriver (see table with technical data).



- 11- AUTO-REVERSE AFTER TORQUE: This option will automatically start a reverse after a torque reached signal. You can set time from 0.1 to 10.0 sec and angle from 0 to 30000°.
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.
- 12- Flags of PRE-TIGHTENING REVERSE function. This function can be activated in Time or Angle mode. Depending on the mode selected, in the small box below, the value of the active function will be displayed on a white background.
 If OFF, the box below will show off in a non-editable gray background.
- 13- To set AUTO-REVERSE AFTER TORQUE and AUTO-REV DELAY values.
- 14- AUTO-REV DELAY: to set a delay before the Auto-Reverse starts, if AUTO-REV is on (see # 11). Time can be set from 0.3 to 10 secs.

MENU OTHER:

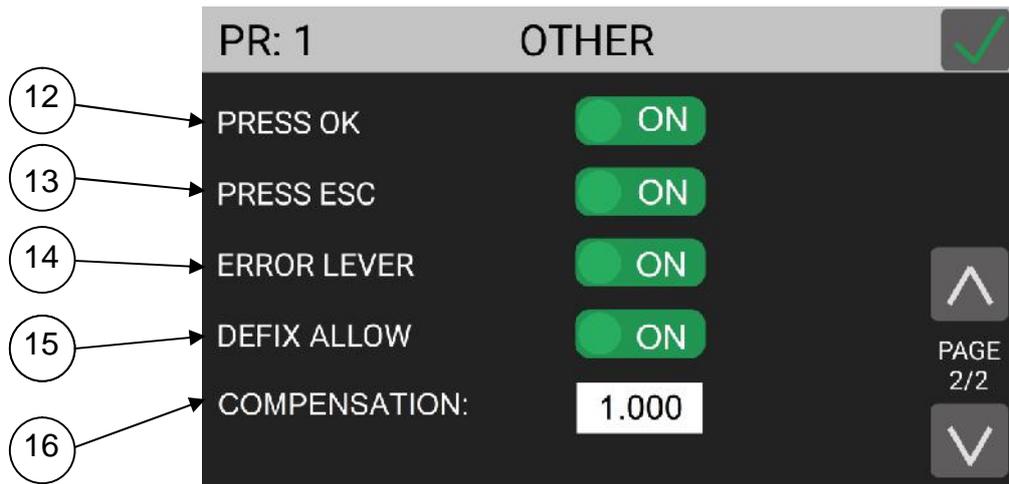


- 1- Program number.
- 2- DESCRIPTION: free field of 28 alphanumeric characters to digit a program description.
If you are working on the Program screen, the description will be displayed in the main screen.



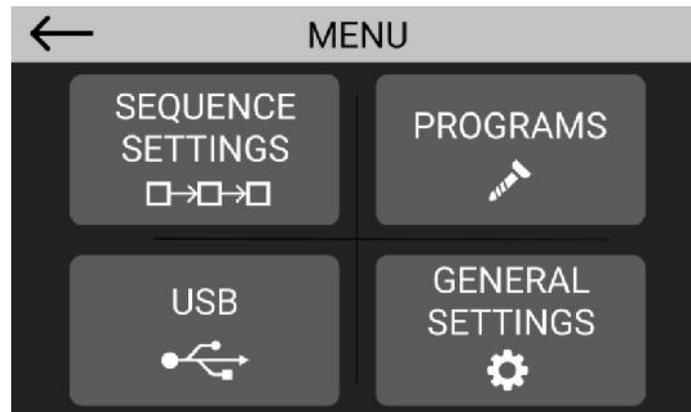
- 3- NUMBER OF SCREWS: to set the number of screws from 0 to 99.
- 4- ROTATION: to set the rotation of the screwdriver between right or left tightening . All the other functions will adapt to the selected direction of rotation.
- 5- SERIAL PRINT: to set from OFF to 5. The value identifies the number of line feeds between a string and another. Useful
- 6- SWBX88/CBS880: if ON, it allows to enter a digit from 1 to 8 and to match it to a tray or a button from CBS880 and SWBX88 of Kolver devices.
- 7- BARCODE: to set the barcode of the product. To be used only if it is required to recall the program from remote by scanning the barcode of the part.
It can be set up to 16 alphanumeric characters. QR code bars are not supported.
SCAN BARCODE screen will be activated by pressing the white background box and the barcode can be directly scan by the reader and imported. It's also possible to confirm, repeat or delete the bar code again directly by the reader.

- 8- Saving key: to save parameters and/or return to the previous menu. If you have changed any parameters, after touching this key, the SAVE CHANGES screen appears and you have to choose to save or not. After the, you will return to the PROGRAMS menu.
- 9- ON/OFF flags to enable functions #5 and #6. If OFF values in grey backgrounds are the default values. If ON, values can be set digiting the desired numbers.
- 10- Switch button from screen page 2 to screen page 1 of OTHER menu.
- 11- Switch button from screen page 1 to screen page 2 of OTHER menu.
- 12- PRESS OK: when ON, press OK at the end of each screwing.
When OFF, the control unit resets automatically after a screwing.

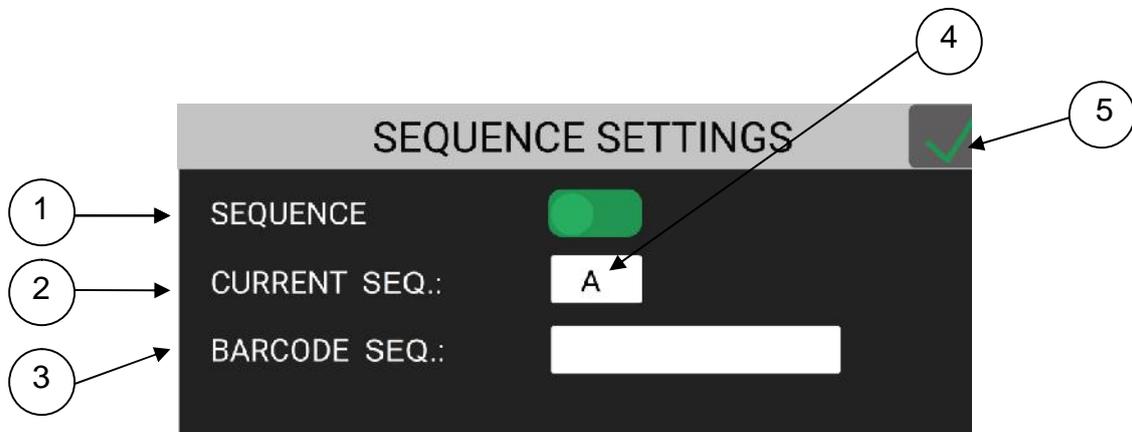


- 13- PRESS ESC: when ON, press ESC to reset the control unit.
When OFF, the control unit resets automatically after an error signal.
- 14- LEVER ERROR: when ON, an error signal will occur when the lever has released before reaching the torque. When OFF, this function doesn't work.
- 15- DEFIX ALLOW: when OFF, reverse is NOT active.
- 16- COMPENSATION: It allows to change the calibration factor for each individual program. This function is useful when working on rigid joints, angle heads, transducer linearity errors occur and whenever the torque result shown by an external instrument is not in line with what is shown at display.
If left at 1.000 the compensation is not active as the final torque value will be multiplied by 1,000. If, for example, for a program set at 3Nm in the KDU unit we are going to verify with an external instrument a value of 3.09 Nm, it's possible to compensate this error by reducing the compensation factor by 3% to 0.970.
NB. This function modifies the FATC calibration value of the screwdriver and therefore must be used only in case of real need and with full knowledge. In all other cases it should be left at 1,000. Kolver supplies all KDS series screwdrivers with transducer calibrated on a semi-elastic joint at a final speed of 100RPM.

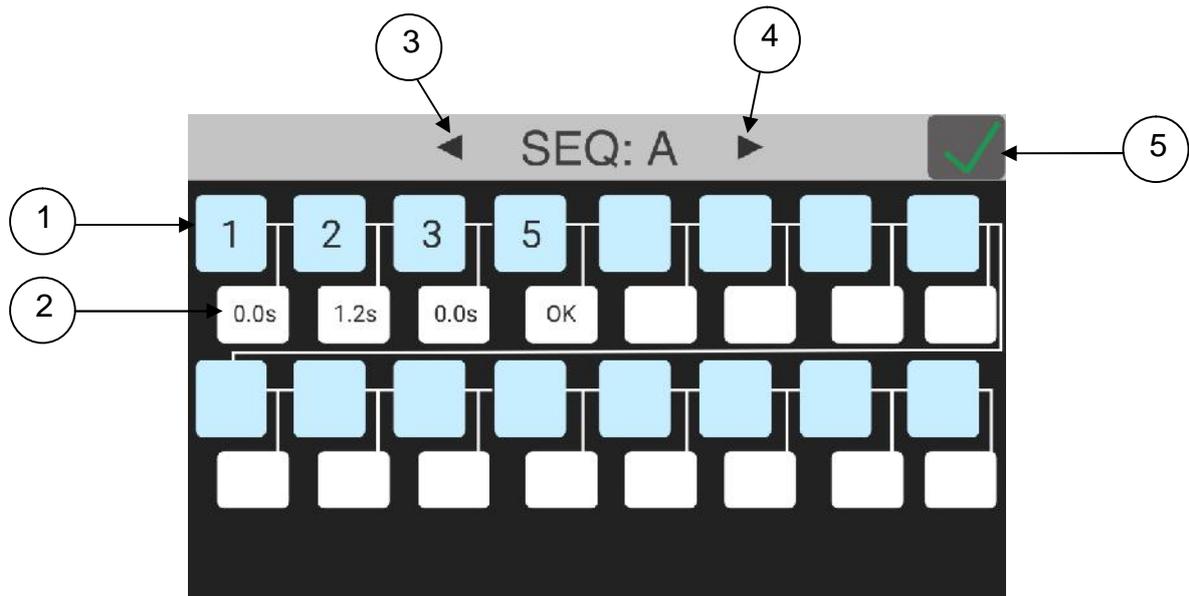
SEQUENCE SETTINGS:



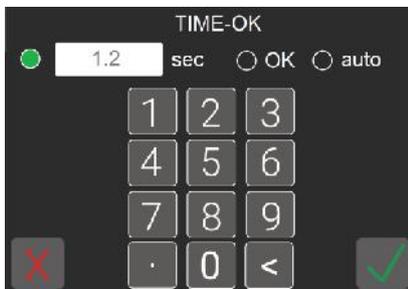
From main manu, select SEQUENCE SETTINGS and it's possible to enter in the SEQUENCE SETTINGS screen related to the setting of the program sequences.



- 1- **SEQUENCE:** If enabled, the sequence function is activated in place of the program function. Enabling this function also changes the main screen (see main sequence screen). The current sequence is the one displayed in the box **CURRENT SEQ.**
- 2- **CURRENT SEQ.:** It allows to view sequence in progress and to access the SEQ screen (see 4). The sequences that can be set are 8 and are distinguished by letters from A (first sequence) to H (eighth sequence).
- 3- To enter the barcode of the part. To be used only if you want to select the sequence remotely by scanning the barcode of the part itself. It can be set up to 16 alphanumeric characters. QR code bars are not supported. Pressing the value box the **SCAN BARCODE** screen gets active. From this screen it is also possible to confirm or repeat the scan or cancel the bar code set.
- 4- **MENU SEQ. :** Pressing this box, the SEQ screen gets active.



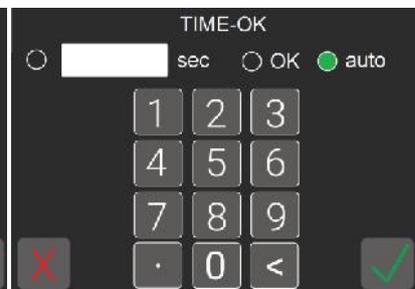
- 1- TO ENTER PROGRAM INTO SEQUENCE: in the blue cells, it can set the desired program into the sequence. Up to 16 programs per sequence.
- 2- Time between programs: to set a time between one program and another. Besides the time you can also set the OK flag in the TIME-OK screen; this function will require an OK from the display or remote to continue to the next program. It's also possible to set the Auto function to move from a program to another one without releasing the lever.
IMPORTANT: the AUTO function will result in the loss of the screw counting previously set (see Menu Other, point 3).



Time function



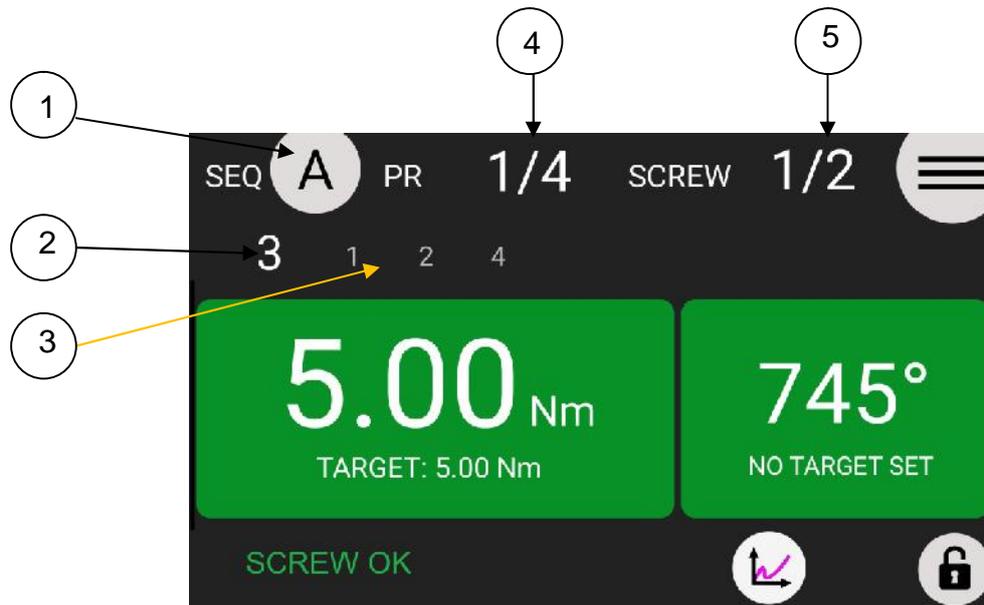
OK function



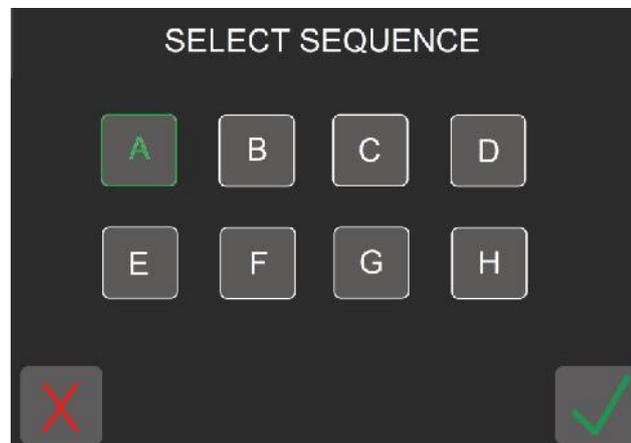
Auto function

- 3- To go to the previous sequence.
- 4- To go to the following sequence.
- 5- Saving key: to save parameters and/or return to the previous menu. If you have changed any parameters, after touching this key, the SAVE CHANGES screen appears and you have to choose to save or not. After the, you will return to the main menu screen.

MAIN SCREEN WITH ACTIVE SEQUENCE



- 1- **SEQUENCE:** it indicates the sequence you are on. Pressing the letter button, it will bring up the **SELECT SEQUENCE** screen and you will be able to select the sequence directly from the main screen. The letter with the desired setting will be displayed in green.

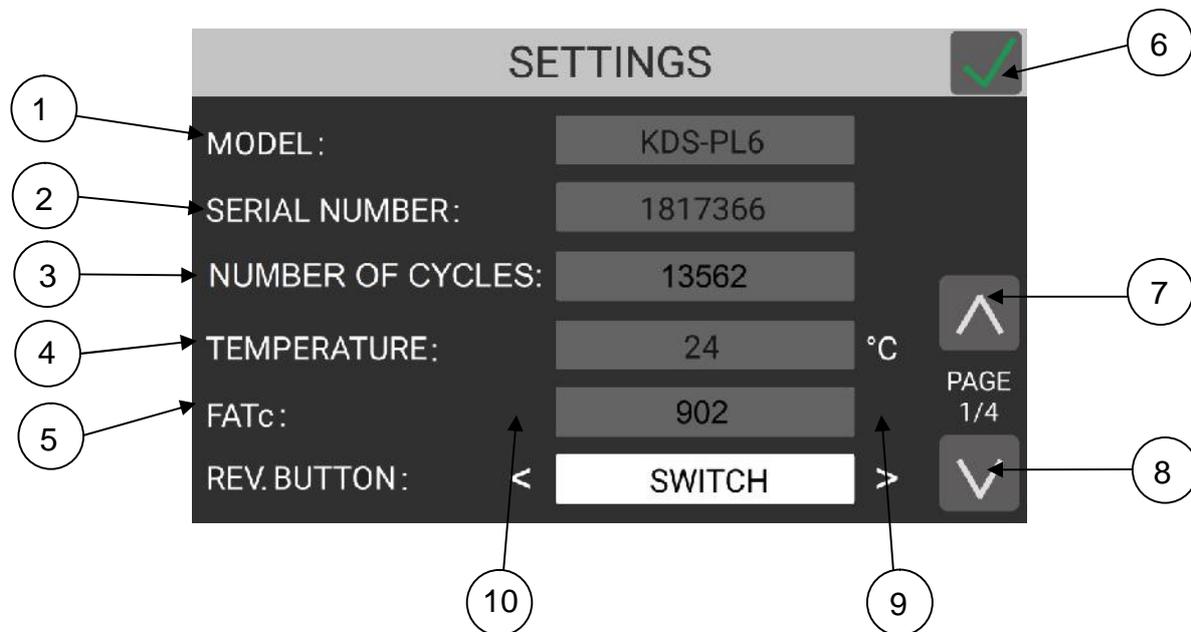


- 2- **PROGRAM:** it shows in a bigger font which program is on.
- 3- **SEQUENCE PROGRAMS:** it shows with smaller characters which programs are active in the sequence. If more than 8 the screen will adapt.
- 4- **STEP OF SEQUENCE:** it shows which step of the sequence you are working on. The first number indicates the programs made / in progress, the second number the total programs of the sequence.
- 5- **SCREWS:** the first number shows the screw in progress, the second one the total screws of that program.

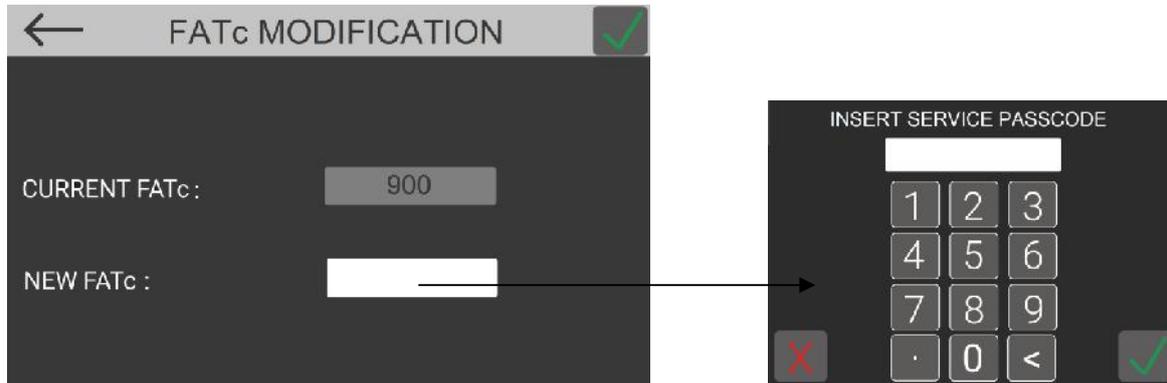
MENU GENERAL SETTINGS

These are general settings that apply to all programs.

SCREEN 1/4

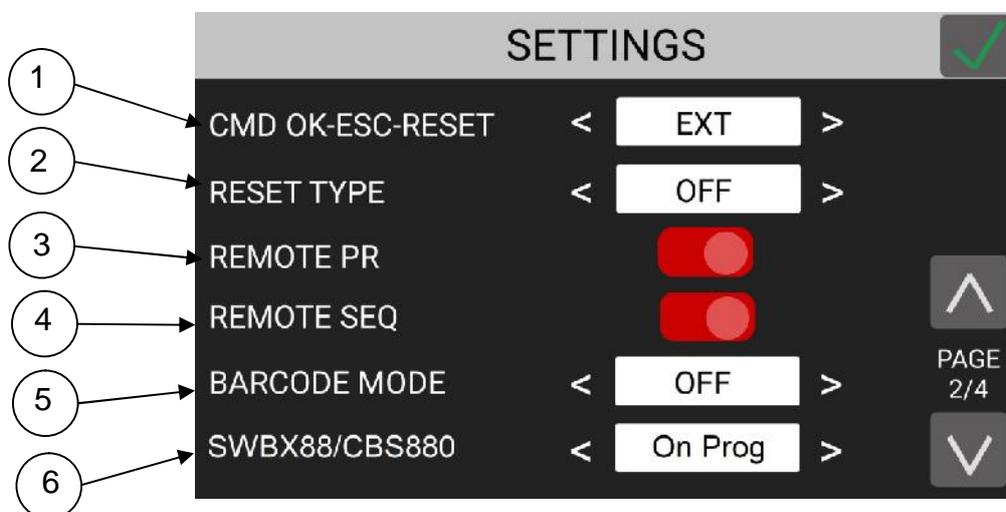


- 1- **MODEL:** it shows the screwdriver model the unit has detected on the connection. (The grey box is not editable).
- 2- **SERIAL NUMBER:** it shows the serial number of the screwdriver the unit has detected on the connection. (The grey box is not editable).
- 3- **NUMBER OF CYCLES:** number of cycle of the connected screwdriver.
- 4- **TEMPERATURE:** it shows the temperature on the external casing that the unit reveals in real time. Exceeding the temperature of 40° C activates the temperature protection, preventing the screwdriver from working, as soon as the temperature returns below 37° C the error is reset and the screwdriver can continue working.
- 5- **FATc:** it is the calibration value of the transducer (available also in the calibration certificate of the tool). This value cannot be changed as it is protected by a Service Passcode. Pressing the grey box, it's possible to enter the FATC MODIFICATION menu where you can change the value using the Service password. By increasing the value the resulting torque will decrease; if the value decreases, the resulting torque will increase. Should you need to change this parameter, please contact first Kolver.



- 6- REV. BUTTON: This function allows to choose 2 modes of operation of the reverse function (either by reverse switch on the screwdriver or by remote from CN3). The modes that can be set are button and switch modes.
 BUTTON mode: start and reverse functions work as two simple buttons, pressing one or the other button activates the respective function. On the screwdriver if you press start the white LED will light up and if you press reverse LED light.
 SWITCH mode: by pressing the reverse button the reverse function is stored in the screwdriver (blinking led flashing), pressing the screwdriver start will always reverse (led fuchsia on) if you press the reverse button the LEDs turn off and pressing the screwdriver start lever will turn to start (white LED on).
- 6- Saving key: to save parameters and/or return to the previous menu. If you have changed any parameters, after touching this key, the SAVE CHANGES screen appears and you have to choose to save or not. After that, you will return to the main menu screen.
- 7- To go to the previous screen of Settings Menu.
- 8- To go to the following screen of Settings Menu.
- 9- To go from BUTTON to SWITCH functions and viceversa.
- 10- To go from BUTTON to SWITCH functions and viceversa.

SCREEN 2/4



- 1) CMD OK-ESC-RESET: This function allows to choose from where the OK-ESC and RESET functions can be enabled. By setting "Int" the functions can only be enabled from

the front display; by setting "Ext" the functions can be enabled only with external inputs on CN3 connector (See input on CN3). By setting "Int + Ext" the functions can be enabled both from display and from remote.

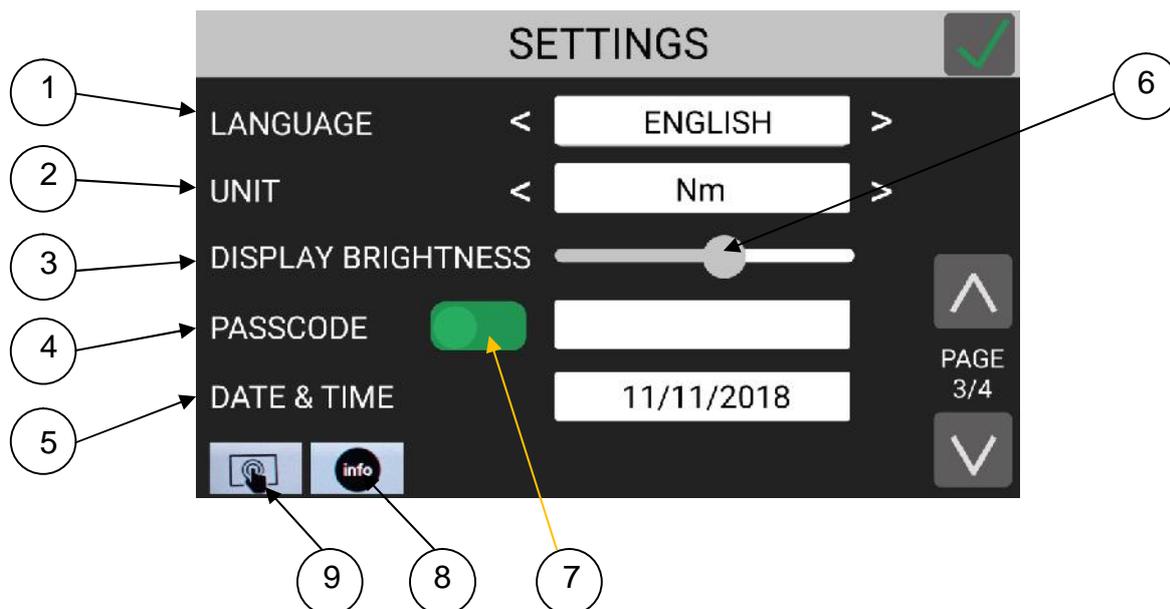
- 2) **RESET TYPE:** this function allows to manage the reset according to the set function. If set to OFF, the function is disabled and no RST button will appear on the main screen. If set to PRG, it allows the program in progress to be reset at any time during the cycle. If set to SCREW, it allows to reset the screw made even if correct. If the sequences are enabled, you can also set RESET SEQ, in this case if you activate the RST function the unit will reset the whole sequence.
- 3) **REMOTE PR:** if enabled it allows to set the programs through the Input CN3 connector (see input menu related to the selection of programs) the setting must be done in binary. 63 programs can be set remotely.
- 4) **REMOTE SEQ:** if enabled it allows to set the programs through the Input CN3 connector (see input menu related to the selection of sequences) the setting must be done in binary. The sequences that can be set remotely are 7.
- 5) **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. 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. 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).

SCREEN 3/4

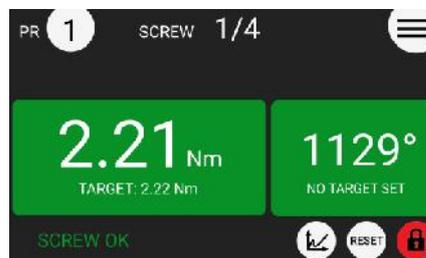


- 1- **LANGUAGE:** This option allows to choose among the languages available: English, French, German, Italian, Spanish and Portuguese.

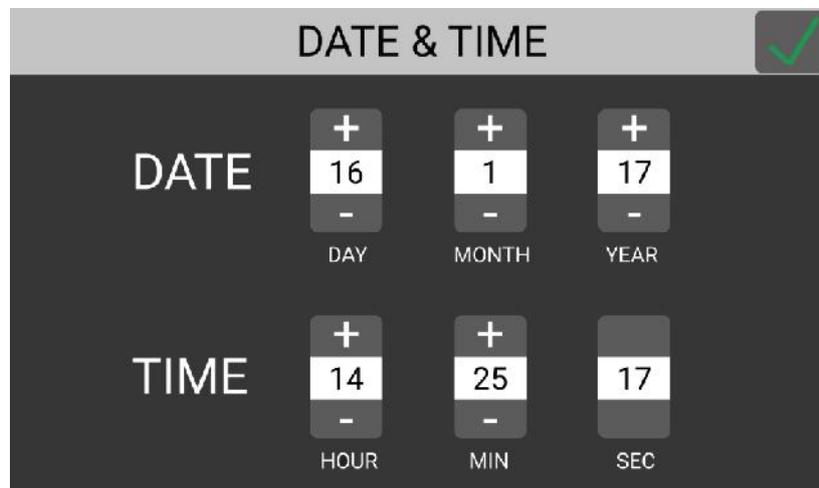
- 2- UNIT: it allows to choose between the following units of measurements: Nm, lbf.in and kgf.cm
- 3- DISPLAY BRIGHTNESS: to set the display brightness.
- 4- PASSCODE: to enable it, first it is necessary to set it in the numeric keyboard.



If the Passcode is set correctly, the flag 7 turns to green ON while the main screen will appear red. With the red padlock to enter the menu the Passcode will be required.

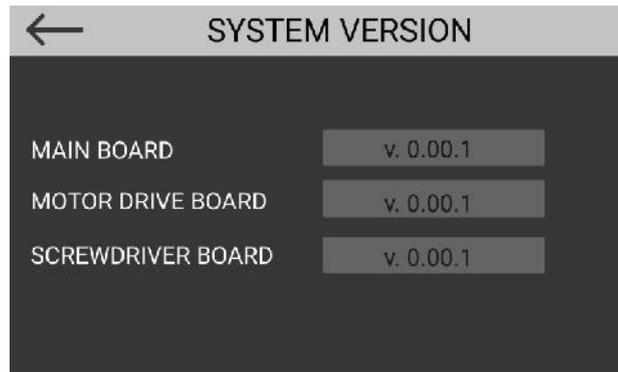


- 5- DATE & TIME: to enter in DATE & TIME menu.



By pressing the + and - keys it is possible to set the date and time that will be used by the unit in the print string and in the savings. The displayed date format will be day, month, year while the time has 0 - 24 format.

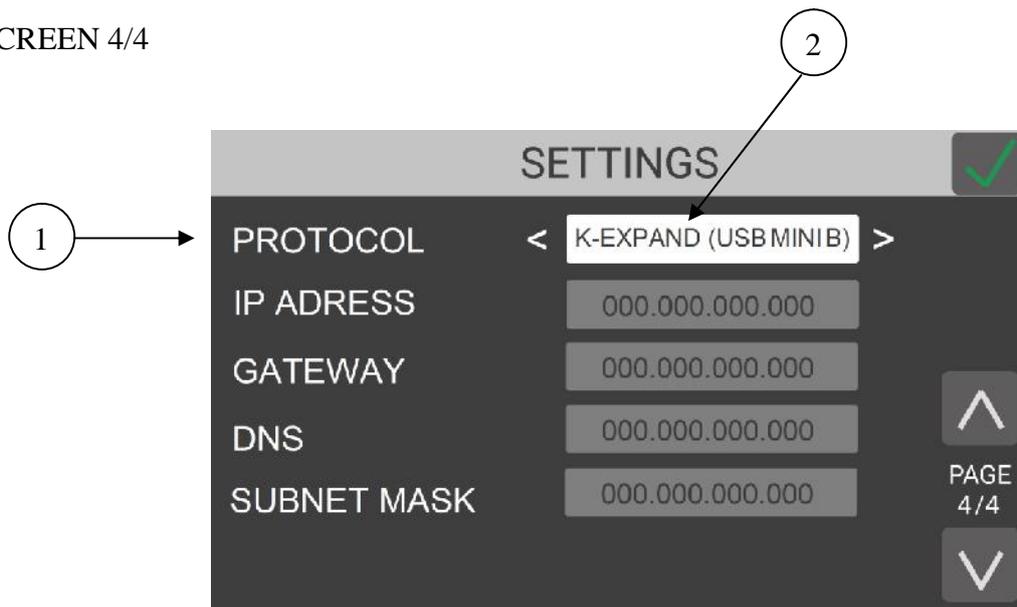
- 6- BRIGHTNESS BAR: to adjust the brightness of the display by moving the circle back and forth.
- 7- ENABLING PASSCODE: to enable the PASSCODE function (see #4).
- 8- INFO: to go to INFO screen to see the versions of boards mounted inside the unit and the connected screwdriver.
 - MAIN BOARD: it indicates the board which manages the interface display and I/O.
 - MOTOR DRIVE BOARD: it indicates the board which manages motor and communication with screwdriver.
 - SCREWDRIVER BOARD: it indicates the board in the screwdriver.

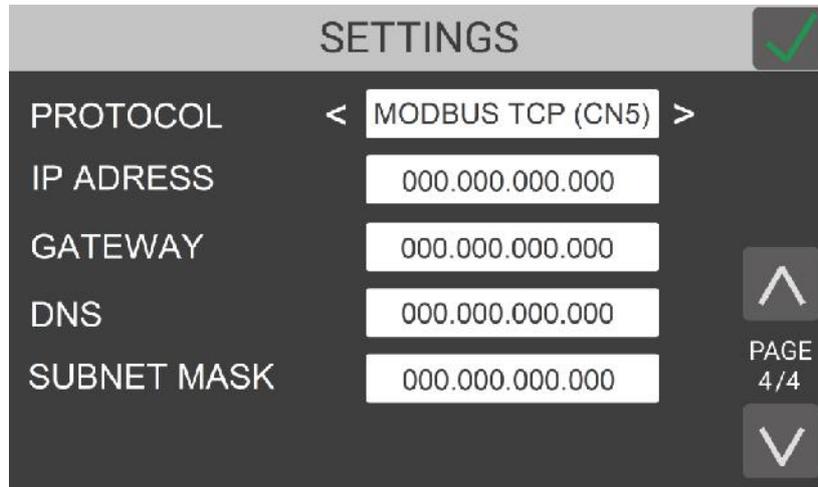


- 9- **DISPLAY CALIBRATION:** it allows to calibrate the display so that the point it is pressed is aligned with the information in that position. To do this, simply press the blue dots in sequence in the display screen.



SCREEN 4/4

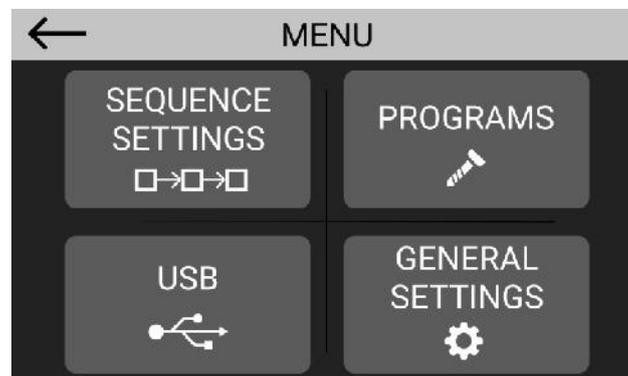




- 1- PROTOCOL: to select which tool to be used to modify / monitor the parameters of the unit. There are 2 possible modes (see point 2): K-EXPAND (only to interface via PC via the MINI B USB port) and MODBUS TCP (to interface only through the network on the CN5 Ethernet connector). The K-EXPAND software can work with both protocol modes but must be appropriately set so that the settings match with those of the unit otherwise a connection error will be displayed. Only on MODBUS TCP mode and related to the network settings, IP ADDRESS, GATEWAY, DNS and SUBNET MASK will be active (white background editable box).

NB The network settings are specific to each company and must be set in agreement with the person in charge of the network.

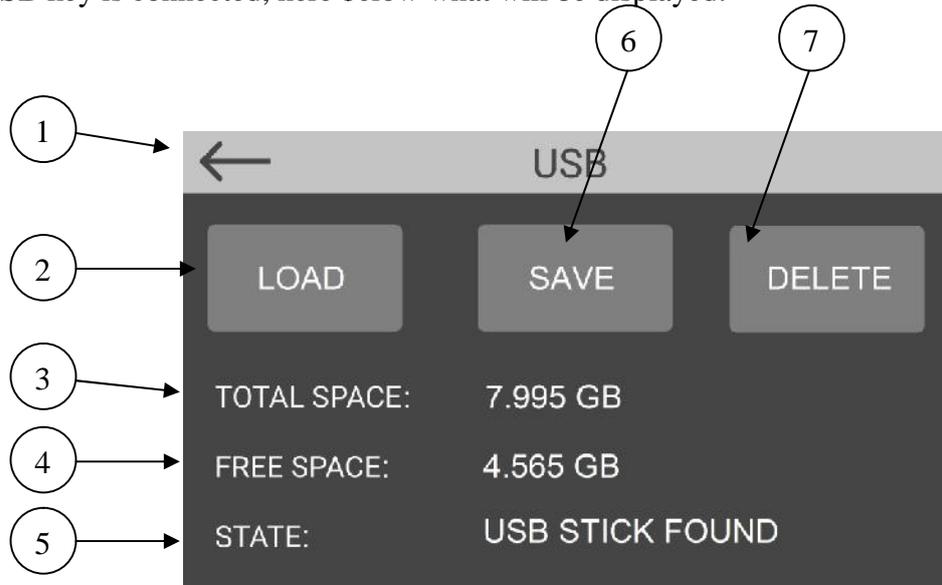
USB MENU



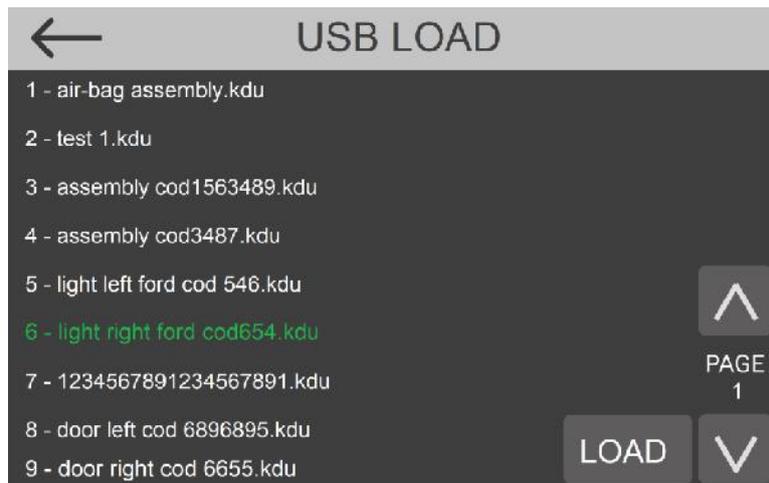
To enter in USB menu, on main menu push on USB box.
If no USB key is connect, here below what will be displayed:



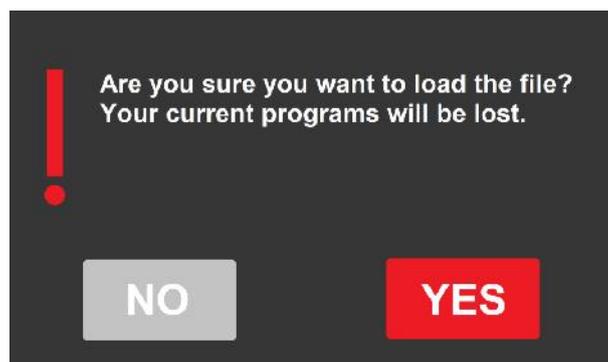
If a USB key is connected, here below what will be displayed:



- 1- To return to the previous program.
- 2- LOAD: to load the selected file in green.

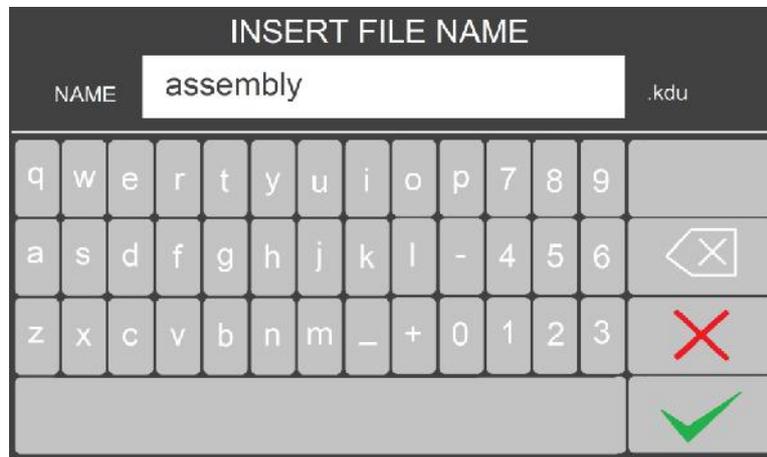


Once selected the file, push on LOAD and the unit will display a warning screen. Here you have to If YES, the selected program will be saved and overwrite the previous one. All the modifications will be lost if not saved. (See SAVE function).

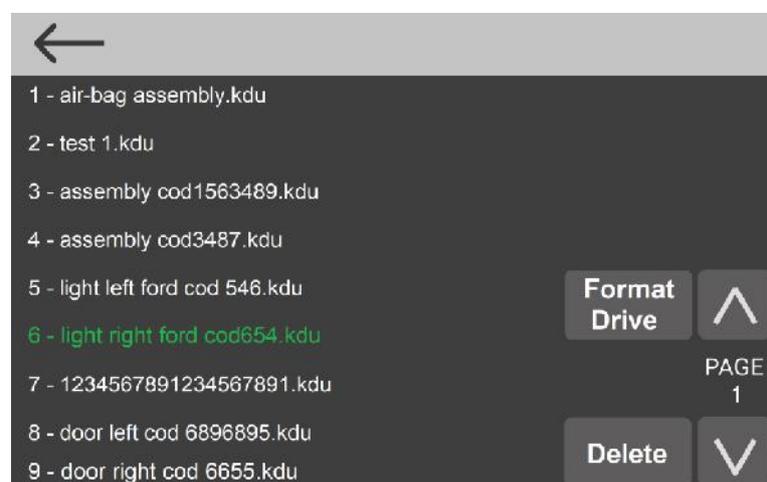


- 3- TOTAL SPACE: the dimensions of the USB key.

- 4- **FREE SPACE:** free space available on the USB key. 10 programs correspond to 0,001 GB.
- 5- **STATUS:** it shows if the USB key is connected or not.
- 6- **SAVE:** it allows to enter the **INSERT FILE NAME** screen where you can set the name of the file you want to save for the entire unit programming. Once saved the file can be recalled from the **LOAD** menu (see point 2). The saved file will have a **.kdu** extension and can be copied to other keys or read directly by **K-EXPAND**.



- 7- **DELETE:** to delete any **.kdu** file. The file deleted is the select file in green.
IMPORTANT: pushing on Format Drive, the USB key will be formatted and all the files will be deleted.



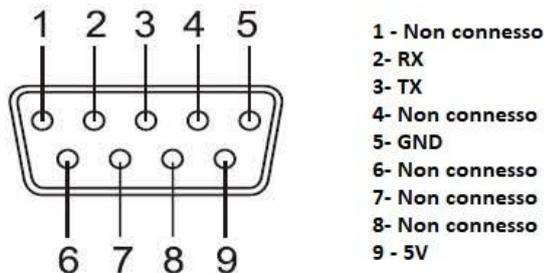
INPUT/OUTPUT CONNECTIONS:



TOOL Connector: connection to the screwdriver.

CN1 Connector: to upgrade the unit firmware.

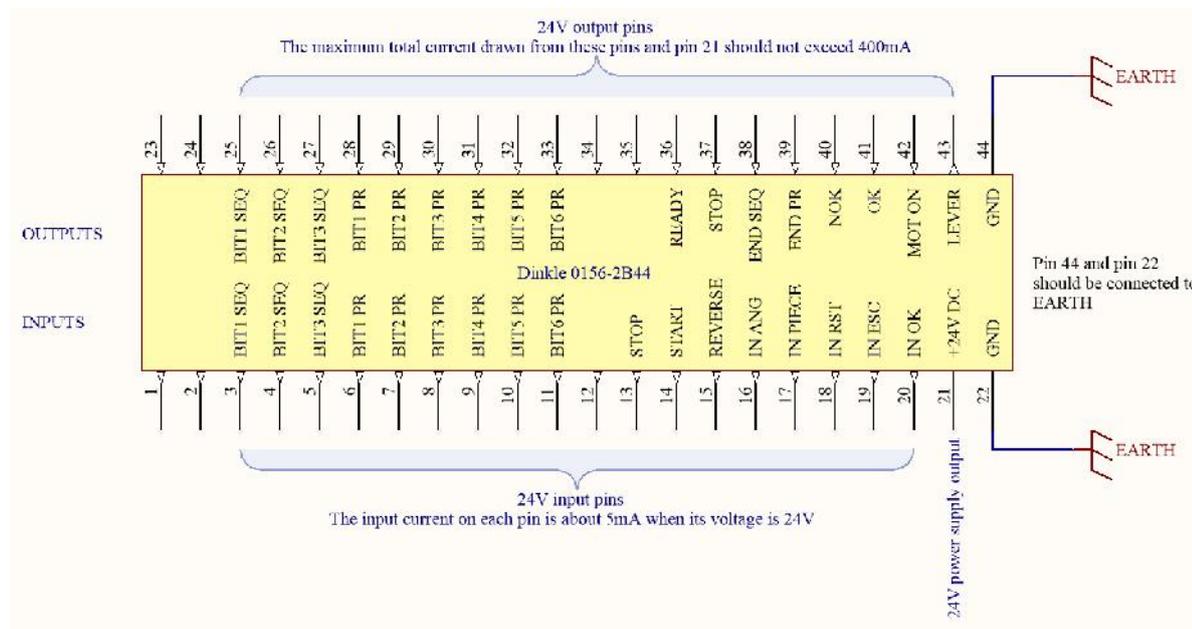
CN2 male serial connector: to be used with Kolver Barcode code 020050
If not used with the Barcode, a serial string will be printed (see #Serial Print).



PIN	NAME	FUNCTION
2	RX	RS232 reception.
3	TX	RS232 transmission.
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 must have these features: RS232 con 9600baud, 8 data bits, 1stop bit, no parity, terminators CR-LF.

Input/Output CN3 Connector:



PIN	NAME	FUNCTION
INPUT 24V		
1	NOT USED	
2	NOT USED	
3	BIT1 SEQ	Less significant weight bit to enable the Sequence (see the chart below)
4	BIT2 SEQ	
5	BIT3 SEQ	More significant weight bit to enable the Sequence (see the chart below)
6	BIT1 PR	Less significant weight bit to enable Program (see the chart below)
7	BIT2 PR	
8	BIT3 PR	
9	BIT4 PR	
10	BIT5 PR	
11	BIT6 PR	More significant weight bit to enable Program (see the chart below)
12	NOT USED	
13	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 re-start working as long as the signal stays active.
14	START	Remote start with torque control screwing function.
15	REVERSE	Remote motor reverse with torque control "unscrewing" function. The operating mode changes depending on how the REV BUTTON mode on SETTING menu. The remote reverse input behaves exactly like the manual reverse button on the screwdriver (see REV. BUTTON function).
16	IN ANG	External input for making the control unit start to count the angle. To be used only if the function is active (see TORQUE & ANGLE function, STARTING AT).
17	MISSING PIECE	If enabled it stops the motor, enables the error signal and "Error missing piece" is displayed on the status bar.
18	IN RST	REMOTE RESET (see RESET TYPE on SETTINGS menu). If enabled it resets screw, program or sequence depending on the pre-set mode.

19	ESC EXT	If enabled (see PRESS ESC on OTHER menu), ESC key function to reset remote errors.
20	OK EXT	If enabled (see PRESS OK on OTHER menu), remote OK key function.
21	24 VDC	+24V voltage protected. The maximum current consumption is 400mA. To be used to activate the inputs. IT CANNOT BE USED TO POWER EXTERNAL DEVICES.
22	GND	It is connected in parallel to pin 44 and to the ground connector. It is the common pin to all inputs and outputs. The output signals must be taken between this pin (GND) and the respective pins of the output signals. It can also be used to connect the mass references of other devices in order to be able to pilot the various inputs in (see schemes related to the connections for input and output).
OUTPUT 24V		
23	NOT USED	
24	NOT USED	
25	BIT1 SEQ	Less significant weight bit to enable the Sequence (see the chart below)
26	BIT2 SEQ	
27	BIT3 SEQ	More significant weight bit to enable the Sequence (see the chart below)
28	BIT1 PR	Less significant weight bit to enable Program (see the chart below)
29	BIT2 PR	
30	BIT3 PR	
31	BIT4 PR	
32	BIT5 PR	
33	BIT6 PR	More significant weight bit to enable Program (see the chart below)
34	NOT USED	
35	NOT USED	
36	READY	This signal is active when the screwdriver is in stand-by
37	STOP	This signal is active when the screwdriver is in STOP MOTOR
38	END SEQ	This signal is active when the pre-set sequence is correctly done.
39	END PR	This signal is active when the pre-set program is correctly done.
40	NOK	This signal works in parallel with the red light on the front panel. It advises that at least one of the pre-set parameters have not been successful.
41	OK	This signal works in parallel with the green light on the front panel. It advises that all the pre-set parameters have been successful.
42	MOTOR ON (/W)	It activates when the motor runs while tightening.
43	LEVER	It activates when the lever is pressed in screwing.
44	GND	It is connected in parallel to pin 22 and to the ground connector. It is the common pin to all inputs and outputs. The output signals must be taken between this pin (GND) and the respective pins of the output signals. It can also be used to connect the mass references of other devices in order to be able to pilot the various inputs in (see schemes related to the connections for input and output).

CN3 CONNECTOR AND USABLE CABLES:



To connect, simply push the cable or the ferrule directly onto the corresponding hole.
To disconnect the cables, press lightly on the respective orange plate.

Solid cable section min (mm²) 0.2

Solid cable section max (mm²) 0.5

Section of braided cable min (mm²) 0.2

Section of braided cable max (mm²) 0.5

Flexible cable section with min ferrule without sheath (mm²) 0.25

Flexible cable section with max ferrule without sheath (mm²) 0.75

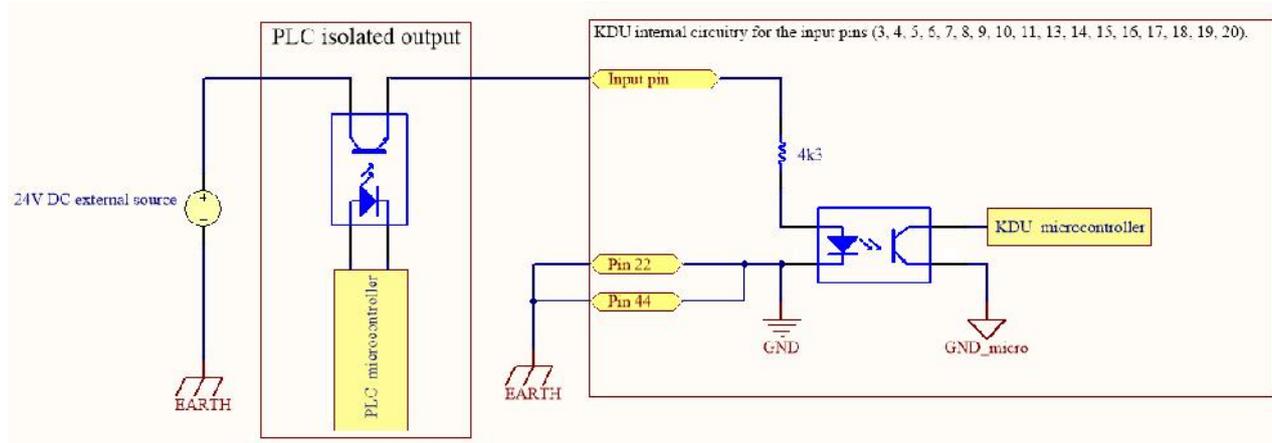
Flexible cable section with min ferrule with sheath (mm²) 0.25

Flexible cable section with max ferrule with sheath (mm²) 0.5

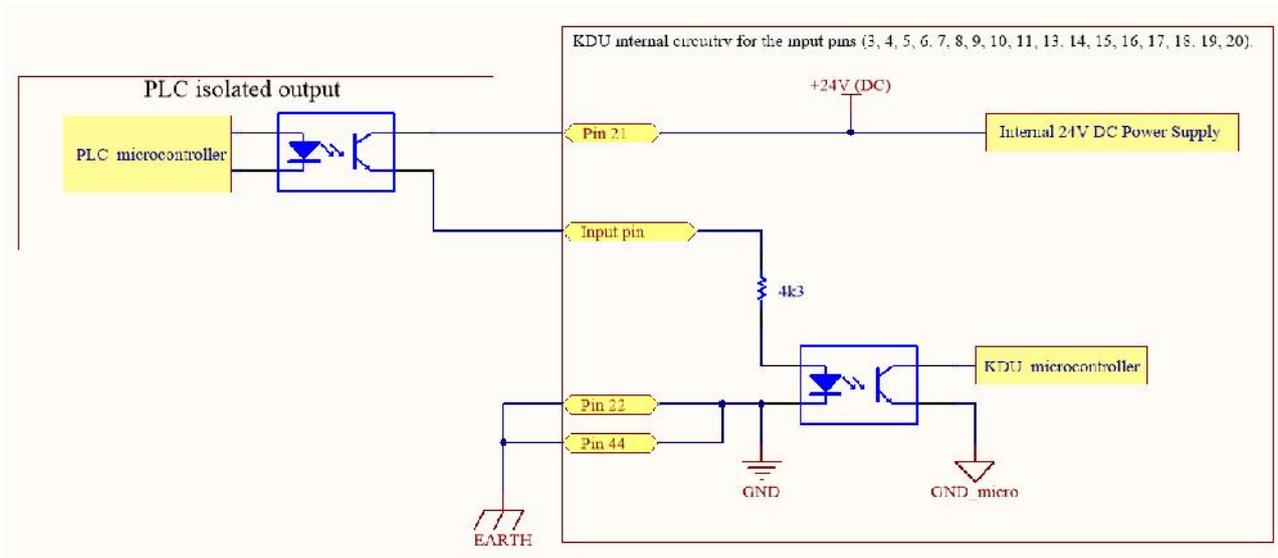
INPUT:

All inputs (Pin from 1 to 20) of the CN3 connector are and they required a 24V DC positive signal. The signals can be provided either by using an external source (in this case the negative of the source with the negative common of the KDU unit must be shared) or by using the pin 21 (24VDC) in the CN3 connector (in this case just make a contact with opto-isolator, relay or button to activate the desired input).

Example on how to enable Input signals by using an external source



Example on how to enable Input signals by tension on Pin 21.



HOW TO SELECT SEQUENCES AND PROGRAMS BY REMOTE:

Input Sequence Settings (if REMOTE SEQ and SEQUENCE function enabled).

The selection of the sequences takes place in binary on SEQ input as shown in the table:

Sequence	BIT3 SEQ PIN 5	BIT2 SEQ PIN 4	BIT1 SEQ PIN 3
-	0	0	0
A	0	0	1
B	0	1	0
C	0	1	1
D	1	0	0
E	1	0	1
F	1	1	0
G	1	1	1
H	Not Selectable		

NB: For security reasons, Kolver has chosen not to associate any sequence if no input is activated. In this way the possibility of setting the sequence H from remote input is lost. It will however be possible to set up Sequence H manually, with Kolver accessories or communication ports.

Input Program Settings (if REMOTE PR function enabled).

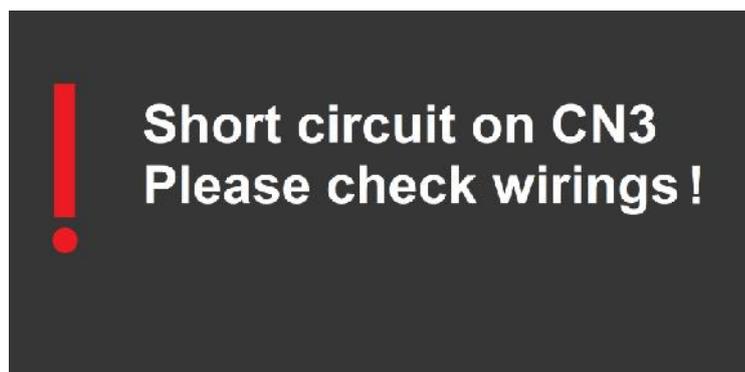
The selection of the programs takes place in binary on PR input as shown in the table:

PR	BIT6PR PIN11	BIT5PR PIN10	BIT4PR PIN9	BIT3PR PIN8	BIT2PR PIN7	BIT1PR PIN 6	PR	BIT6PR PIN11	BIT5PR PIN10	BIT4PR PIN9	BIT3PR PIN8	BIT2PR PIN7	BIT1PR PIN 6
-	0	0	0	0	0	0	32	1	0	0	0	0	0
1	0	0	0	0	0	1	33	1	0	0	0	0	1
2	0	0	0	0	1	0	34	1	0	0	0	1	0
3	0	0	0	0	1	1	35	1	0	0	0	1	1
4	0	0	0	1	0	0	36	1	0	0	1	0	0
5	0	0	0	1	0	1	37	1	0	0	1	0	1
6	0	0	0	1	1	0	38	1	0	0	1	1	0
7	0	0	0	1	1	1	39	1	0	0	1	1	1
8	0	0	1	0	0	0	40	1	0	1	0	0	0
9	0	0	1	0	0	1	41	1	0	1	0	0	1
10	0	0	1	0	1	0	42	1	0	1	0	1	0
11	0	0	1	0	1	1	43	1	0	1	0	1	1
12	0	0	1	1	0	0	44	1	0	1	1	0	0
13	0	0	1	1	0	1	45	1	0	1	1	0	1
14	0	0	1	1	1	0	46	1	0	1	1	1	0
15	0	0	1	1	1	1	47	1	0	1	1	1	1
16	0	1	0	0	0	0	48	1	1	0	0	0	0
17	0	1	0	0	0	1	49	1	1	0	0	0	1
18	0	1	0	0	1	0	50	1	1	0	0	1	0
19	0	1	0	0	1	1	51	1	1	0	0	1	1
20	0	1	0	1	0	0	52	1	1	0	1	0	0
21	0	1	0	1	0	1	53	1	1	0	1	0	1
22	0	1	0	1	1	0	54	1	1	0	1	1	0
23	0	1	0	1	1	1	55	1	1	0	1	1	1
24	0	1	1	0	0	0	56	1	1	1	0	0	0
25	0	1	1	0	0	1	57	1	1	1	0	0	1
26	0	1	1	0	1	0	58	1	1	1	0	1	0
27	0	1	1	0	1	1	59	1	1	1	0	1	1
28	0	1	1	1	0	0	60	1	1	1	1	0	0
29	0	1	1	1	0	1	61	1	1	1	1	0	1
30	0	1	1	1	1	0	62	1	1	1	1	1	0
31	0	1	1	1	1	1	63	1	1	1	1	1	1
							64						Not selectable

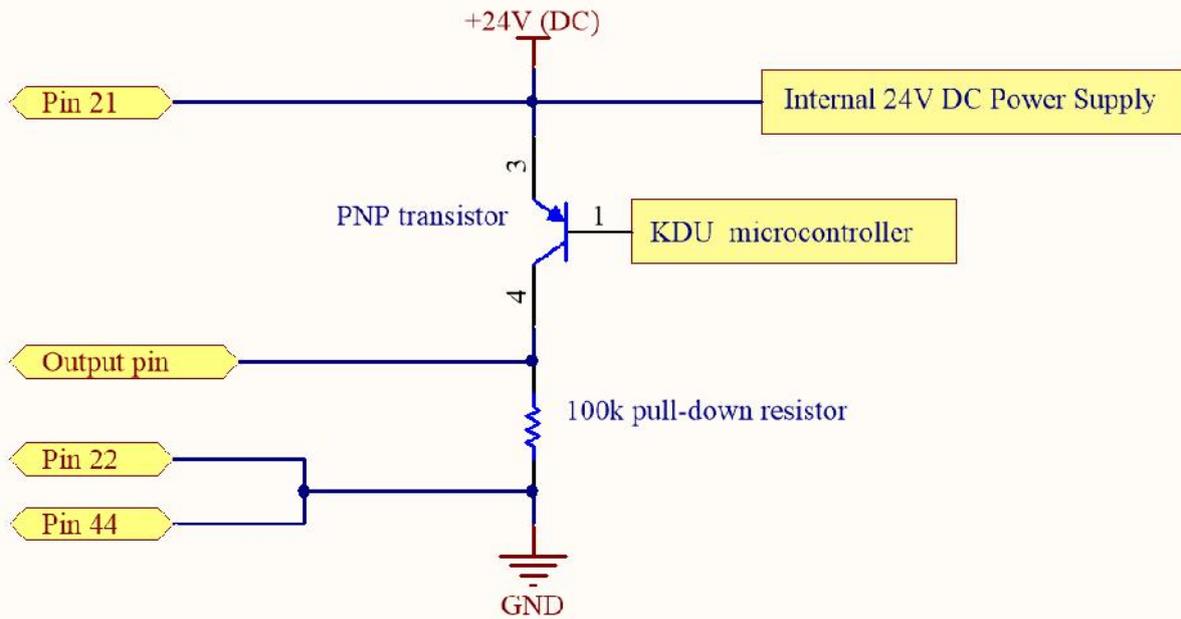
NB: For security reasons, Kolver has chosen not to associate any sequence if no input is activated. In this way the possibility of setting the program 64 from remote input is lost. It will however be possible to set up program 64 manually, with Kolver accessories or communication ports.

OUTPUT:

When activated all CN3 connector outputs (Pins from 23 to 43) provide a 24V DC signal on the respective pins. The signals can be used to activate LEDs / sensors or read directly from an external PLC. In this case the negative of the KDU unit (pins 22 and 44) must be shared with the PLC negative. The total power of the output signals is Max 400mA; if exceeded, a protection circuit deactivates the output signals and activates an alarm on the display (see figure below). The alarm signal remains active until the problem remains. Every 2 sec the entire port will be checked to see if the problem on the outputs has been fixed.



KDU internal circuitry for the output pins (25, 26, 27, 28, 29, 30, 31, 32, 33, 37, 38, 39, 40, 41, 42, 43).



SEQUENCES AND PROGRAMS OUTPUTS

When a sequence or program is activated, the corresponding sequence and program outputs are also activated as 24 VDC output signals. The output signals must be interpreted in binary as shown in the tables below:

Sequence	BIT3 SEQ PIN 27	BIT2 SEQ PIN 26	BIT1 SEQ PIN 25
-	0	0	0
A	0	0	1
B	0	1	0
C	0	1	1
D	1	0	0
E	1	0	1
F	1	1	0
G	1	1	1
H	NOT DISPLAYED		

NB: To be aligned even with remote inputs Kolver chose not to display the sequence H on the outputs.

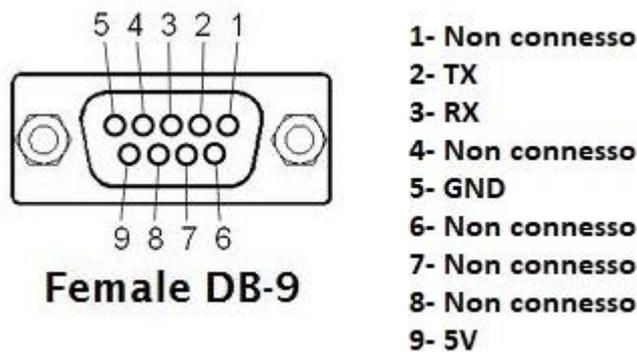
PR	BIT6PR PIN33	BIT5PR PIN32	BIT4PR PIN31	BIT3PR PIN30	BIT2PR PIN29	BIT1PR PIN 28	PR	BIT6PR PIN33	BIT5PR PIN32	BIT4PR PIN31	BIT3PR PIN30	BIT2PR PIN29	BIT1PR PIN 28
-	0	0	0	0	0	0	32	1	0	0	0	0	0
1	0	0	0	0	0	1	33	1	0	0	0	0	1
2	0	0	0	0	1	0	34	1	0	0	0	1	0
3	0	0	0	0	1	1	35	1	0	0	0	1	1
4	0	0	0	1	0	0	36	1	0	0	1	0	0
5	0	0	0	1	0	1	37	1	0	0	1	0	1
6	0	0	0	1	1	0	38	1	0	0	1	1	0
7	0	0	0	1	1	1	39	1	0	0	1	1	1
8	0	0	1	0	0	0	40	1	0	1	0	0	0
9	0	0	1	0	0	1	41	1	0	1	0	0	1
10	0	0	1	0	1	0	42	1	0	1	0	1	0
11	0	0	1	0	1	1	43	1	0	1	0	1	1
12	0	0	1	1	0	0	44	1	0	1	1	0	0
13	0	0	1	1	0	1	45	1	0	1	1	0	1
14	0	0	1	1	1	0	46	1	0	1	1	1	0
15	0	0	1	1	1	1	47	1	0	1	1	1	1
16	0	1	0	0	0	0	48	1	1	0	0	0	0
17	0	1	0	0	0	1	49	1	1	0	0	0	1
18	0	1	0	0	1	0	50	1	1	0	0	1	0
19	0	1	0	0	1	1	51	1	1	0	0	1	1
20	0	1	0	1	0	0	52	1	1	0	1	0	0

21	0	1	0	1	0	1	53	1	1	0	1	0	1
22	0	1	0	1	1	0	54	1	1	0	1	1	0
23	0	1	0	1	1	1	55	1	1	0	1	1	1
24	0	1	1	0	0	0	56	1	1	1	0	0	0
25	0	1	1	0	0	1	57	1	1	1	0	0	1
26	0	1	1	0	1	0	58	1	1	1	0	1	0
27	0	1	1	0	1	1	59	1	1	1	0	1	1
28	0	1	1	1	0	0	60	1	1	1	1	0	0
29	0	1	1	1	0	1	61	1	1	1	1	0	1
30	0	1	1	1	1	0	62	1	1	1	1	1	0
31	0	1	1	1	1	1	63	1	1	1	1	1	1
							64			Not Displayed			

NB: To be aligned even with remote inputs Kolver chose not to display the program 64 on the outputs.

CN4 male serial connector:

Used to connect printers or to Kolver accessories. When used with Kolver accessories, the print string is also on CN2 (see dedicated paragraph on the print string).



PIN	NAME	FUNCTION
2	TX	RS232 reception.
3	RX	RS232 transmission.
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: RS232 with 9600baud, 8 data bits, 1stop bit, no parity, terminators CR-LF.

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 K-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	SERIAL #	TARGET	SCREWING TIME	SPEED
BC: 7612320103052	OK	PR:8	KDS-PL10	s/n 1819357	TARGET: 2.00Nm	ST:1.23s	S:600

SCREW NUMBERS	SEQUENCE STAGE	TORQUE	ANGLE	DATE	HOUR	NOTE
Screw: 1/8	Seq: A 1/1	T: 1,99Nm	A: 114deg	18/01/18	17.44.50	

Example:

BC: 7612320103052 OK PR: 8 KDS-PL10 s/n: 1814914 TARGET: 2.0Nm ST: 1.23 S:600rpm Screw:1/8
Seq: A 1/1 T: 1.99Nm A: 114deg 18/01/18 17.44.50

BC: Codice 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.

NOK = the torque has been reached during ramp time, under min time...

PR: Program Number = it indicates the running program.

Model = Model of screwdriver you're using.

Serial # = serial number of the screwdriver that the unit has recognized.

Target = pre-set torque value

S: Speed = pre-set final speed.

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

Screw: Screw numbers = number of tightened screws/total number of screws.

Seq: Sequence and Sequence Stage = it indicates the sequence and stage of the sequence

T: Torque = torque value.

A: Angle = angle value.

Date = date

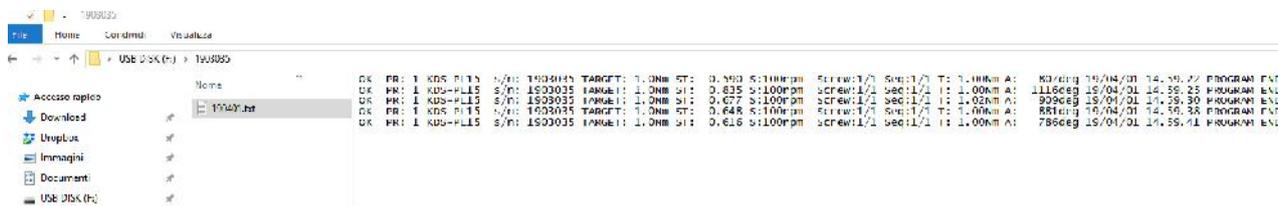
Hour = hour

Note = in case of end of program, it will be printed "Program end"; in the case of a sequence ended "Sequence end". Or it indicates the type of error found or the correct screw mode.

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 automatically named as the serial number of the screwdriver.

The text file which contains all the screwing data is named as the current date (year, month, day).

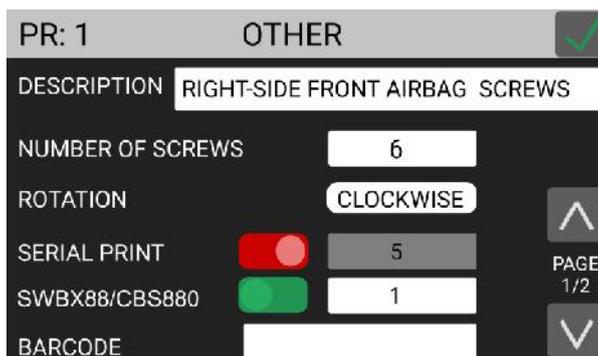


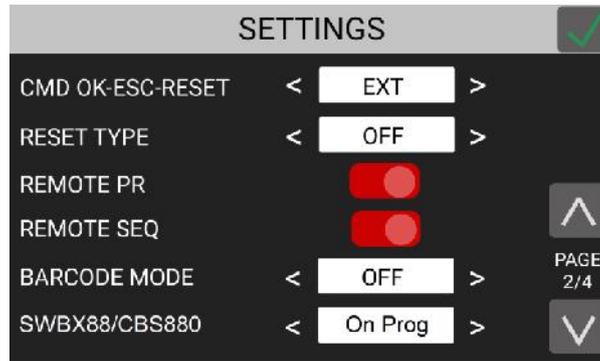
KOLVER SW88 & CBS880 ACCESSORIES

On the CN4 connector it is possible to connect the accessory via the M-F serial cable (code 881007) KIT KDU ADAPTER WITH SW AND CBS (code 010410). With this accessory it is possible to connect both the SWBX88 Switchbox and the CBS880 sockt tray to the K-Ducer and be able to choose up to a maximum of 8 programs or desired sequences.



To set the correct bit or button, it is necessary to activate the function on the menu OTHER-SWBX88 / CBS880 and enter a number from 1 to 8 in the menu line SWBX88 / CBS880. At this point the unit will match the program to the corresponding bit or button (positions 1 to 8). To activate the program selection function from Kolver accessories, it is necessary to activate the function on the GENERAL SETTING - PAGE 2/4 - SWBX88 / CBS880 menu by selecting On prog. The PR1-8 functions / writings in the Kolver accessories will no longer be interpreted as programs but as positions from 1 to 8 and can be associated with any program. The same can be done to set sequences (in this case, first activate the sequence and then on activation of the function choose On Seq instead of On Prog).





USB MINI B Connector: to connect K-Expand and set/ read the programs by the PC.

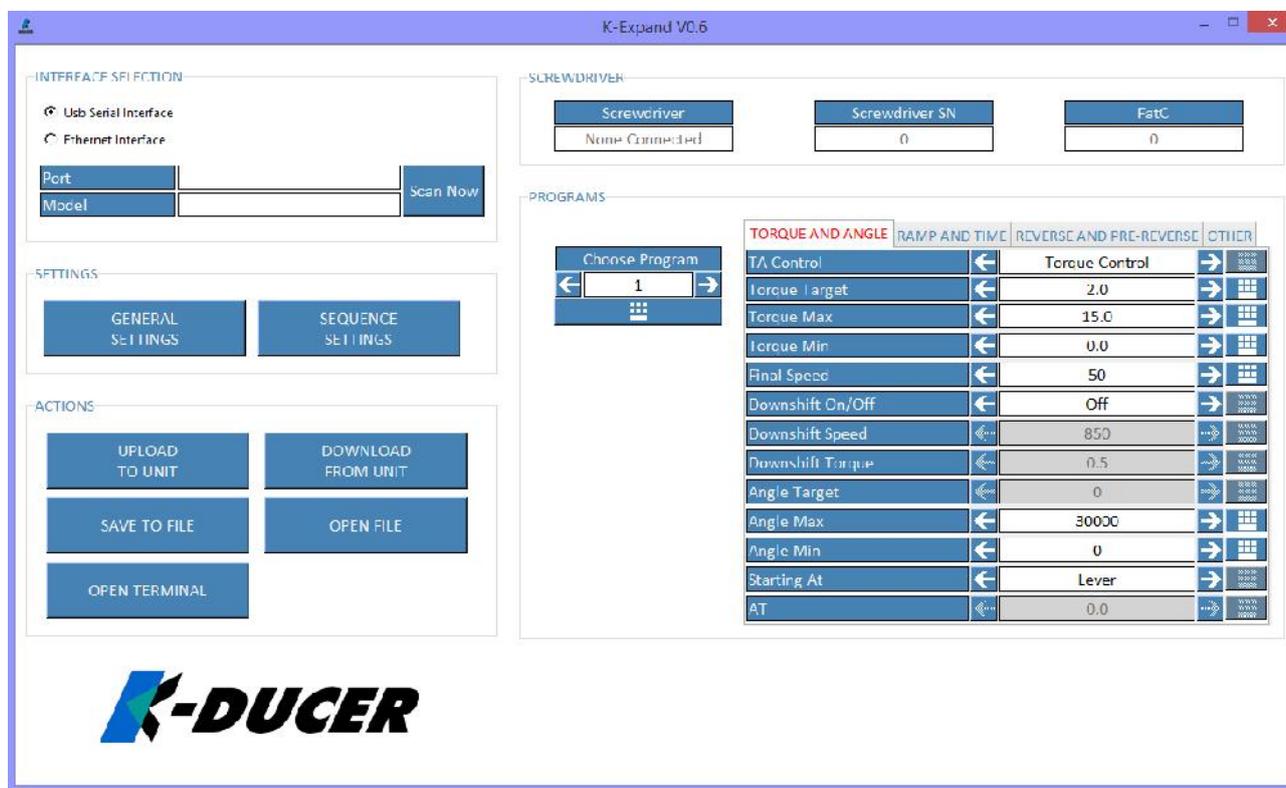
USB Connector: to be used with USB key to save any results of the programming.

CN5 Connector: only on KDU-1A unit. In order to connect a network cable to read or to set the data by remote. The protocol is Ethernet Modbus.

K-EXPAND

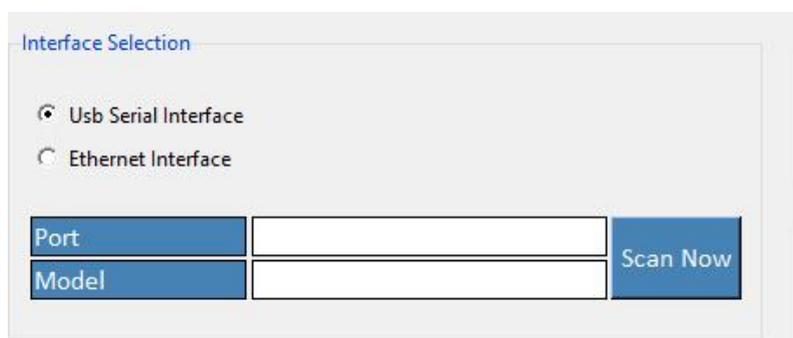
K-EXPAND is the software for pc created by Kolver to set, change and save all parameters of KDU Kducer control unit.

Double click the icon program and this is the main view. This is the screen that appears when you create a new program or when one has been recalled from the connected unit. The parameters that are displayed are the same as those inside the K-Ducer unit and have the same functions.



INTERFACE SELECTION

It is necessary to select in which mode you want to go to modify / monitor the parameters of the unit. There are 2 possible modes: USB and Ethernet. The K-EXPAND software can work with both protocol modes but must be properly set so that the settings correspond with those of the connected unit. If you set USB Serial Interface, you must interface only via PC through port B.



If instead you set up Ethernet Interface (MODBUS TCP) you have to interface only through the network on the CN5 Ethernet connector.

Interface Selection

Usb Serial Interface
 Ethernet Interface

Ip Address	192.168.168.100	
Port	502	

Only in MODBUS TCP mode, the IP ADDRESS, GETAWAY, DNS AND SUBNET MASK are activated.

NB: The network settings are specific to each network and must be set in accordance with the network manager.

While the Port cannot be modified as defined by the protocol (MODBUS TCP), the Ip Address must be set with the address of the unit. Then once pressed Scan Now, the software will attempt to initiate communication with the unit, informing the user with a message in case of impossibility of connection and in case of successful connection.

SCREWDRIVER

SCREWDRIVER

Screwdriver	Screwdriver SN	FatC
None Connected	0	0

Once the screwdriver is connected to the unit, K-Expand recalls its model, serial number and FaTC.

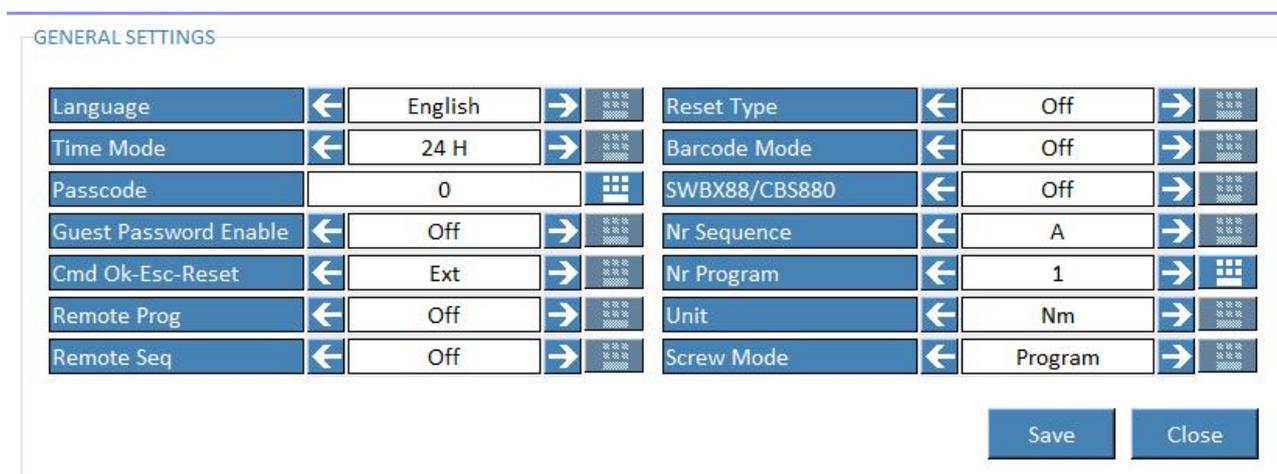
SCREWDRIVER

Screwdriver	Screwdriver SN	FatC
KDS-PL10	1814914	1150

SETTINGS



GENERAL SETTINGS



In addition to the parameters in the control unit, General Settings also include Screw Mode, Nr Program and Nr Sequence. In particular:

1. Screw Mode: Working mode of the unit (according to program or according to sequence of programs)
2. Nr Program: program active in the unit in the case of Screw Mode Program.
3. Nr Sequence: sequence active in the unit in the case of Screw Mode-Sequence.

After setting the desired parameters, press SAVE to save.

SEQUENCE SETTINGS

SEQUENCE SETTINGS

Choose Sequence

← A →

Enter Barcode

[Barcode Input]

[Keypad Icon]

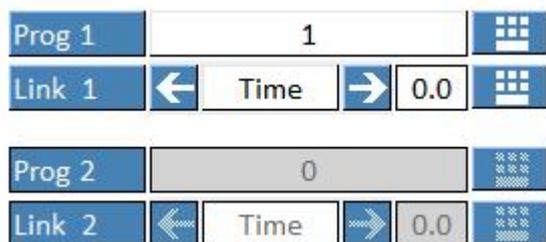
Prog 1	1	[Keypad Icon]
Link 1	← Time → 0.0	[Keypad Icon]
Prog 2	0	[Keypad Icon]
Link 2	← Time → 0.0	[Keypad Icon]
Prog 3	0	[Keypad Icon]
Link 3	← Time → 0.0	[Keypad Icon]
Prog 4	0	[Keypad Icon]
Link 4	← Time → 0.0	[Keypad Icon]
Prog 5	0	[Keypad Icon]
Link 5	← Time → 0.0	[Keypad Icon]
Prog 6	0	[Keypad Icon]
Link 6	← Time → 0.0	[Keypad Icon]
Prog 7	0	[Keypad Icon]
Link 7	← Time → 0.0	[Keypad Icon]
Prog 8	0	[Keypad Icon]
Link 8	← Time → 0.0	[Keypad Icon]
Prog 9	0	[Keypad Icon]
Link 9	← Time → 0.0	[Keypad Icon]
Prog 10	0	[Keypad Icon]
Link 10	← Time → 0.0	[Keypad Icon]
Prog 11	0	[Keypad Icon]
Link 11	← Time → 0.0	[Keypad Icon]
Prog 12	0	[Keypad Icon]
Link 12	← Time → 0.0	[Keypad Icon]
Prog 13	0	[Keypad Icon]
Link 13	← Time → 0.0	[Keypad Icon]
Prog 14	0	[Keypad Icon]
Link 14	← Time → 0.0	[Keypad Icon]
Prog 15	0	[Keypad Icon]
Link 15	← Time → 0.0	[Keypad Icon]
Prog 16	0	[Keypad Icon]
Link 16	← Time → 0.0	[Keypad Icon]

It is possible to select up to 8 sequences and 16 programs each. It is necessary to select the position of each program and hot to move from one program to another: after a pre-set time or after OK on the display or by remote.

Prog 1	1	[Keypad Icon]
Link 1	← Time → 0.5	[Keypad Icon]

Prog 1	1	[Keypad Icon]
Link 1	← Ok → 0.0	[Keypad Icon]

To enable further programs after the first one, it is sufficient to double-click on the cells of the desired program number.



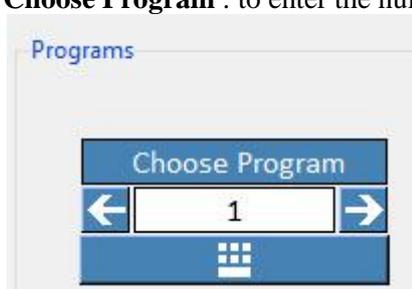
NB: It is not possible to leave empty positions in the definition of a sequence, for example it is not possible to enable a program in position 1 and one in position 3 without activating the program in position 2.

It is also possible to insert the bar code of the piece on which you want to operate. It is used only if you want to select the sequence remotely by scanning the bar code of the piece itself. It is possible to set up to 16 alphanumeric characters.

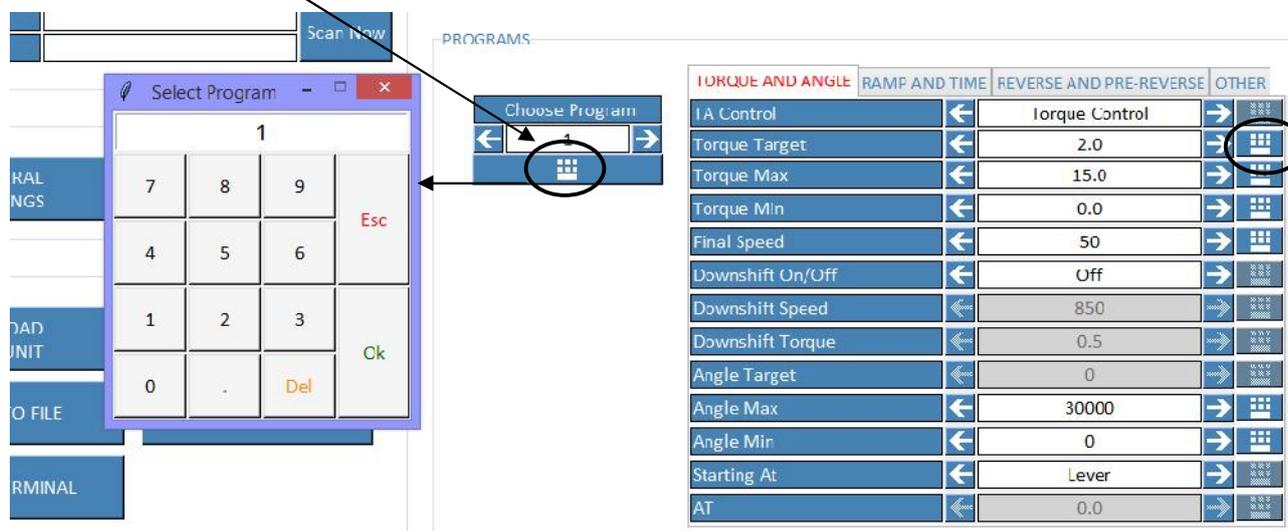


PROGRAMS

Choose Program : to enter the number of the program you want to view/ modify/ insert.



Just press the keyboard key and enter the number of the desired program.



To move from one tab to another (Torque and Angle, Ramps and Time, Reverse and Pre-Reverse and Other), it is sufficient to press on the desired tab. Each parameter is the same as the KDS unit with the same characteristics. To change it, simply enter the cell, select a number in the correct range, then press Enter. Or you can press the keyboard and type the desired value. The selection is saved automatically. If the choice is not in its range, the modification will be canceled by pressing Enter and an error message will be displayed to inform the user.

PROGRAMS

Choose Program

←

1

→



TORQUE AND ANGLE	←	RAMP AND TIME	→	
Ramp On/Off	←	Off	→	
Ramp	←	0.3	→	
Run Time On/Off	←	Off	→	
Run Time	←	0.0	→	
Min Time On/Off	←	Off	→	
Min Time	←	0.0	→	
Max Time On/Off	←	Off	→	
Max Time	←	20.0	→	
Prevaling Torque	←	Off	→	
Prevaling Time	←	0.1	→	
Prevaling Angle	←	1	→	

PROGRAMS

Choose Program

←

1

→



TORQUE AND ANGLE	←	REVERSE AND PRE-REVERSE	→	
Reverse Speed	←	850	→	
Reverse Torque	←	15.0	→	
Pre-Tightening	←	Off	→	
Pre-Tight Time	←	0.1	→	
Pre-Tight Angle	←	1	→	
Pre-Rev Delay	←	0.3	→	
Auto-Reverse	←	Off	→	
Auto-Reverse Time	←	0.1	→	
Auto-Reverse Angle	←	1	→	
Auto-Rev. Delay On/Off	←	Off	→	
Auto-Reverse Delay	←	0.3	→	

PROGRAMS

	TORQUE AND ANGLE	RAMP AND TIME	REVERSE AND PRE-REVERSE	OTHER
Choose Program	Description			Program 1
← 1 →	Number of Screws	← 1 →		
	Rotation	← Clockwise →		
	Serial Print On/Off	← Off →		
	Serial Print	← 0 →		
	SWBX88/CBS880	← 0 →		
	Bar Code	0123456789abcdef		
	Press Ok	← Off →		
	Press Esc	← Off →		
	Error Lever	← Off →		
	Defix Allow	← On →		
	Compensation	← 1.0 →		

ACTIONS

ACTIONS

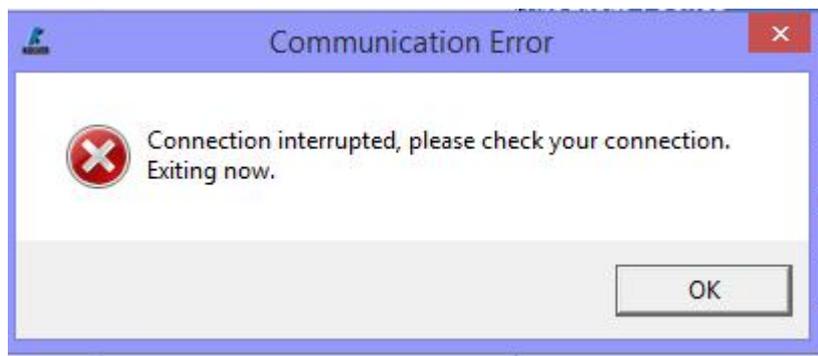
UPLOAD TO UNIT	DOWNLOAD FROM UNIT
SAVE TO FILE	OPEN FILE
OPEN TERMINAL	

Upload to unit

To upload all the setting to the KDU unit. It is necessary that the unit is connected to the pc.



In case of any connection error, an error message will be displayed.



Download from unit

To be used to recall all the settings from the control unit and display them in the software. The KDU unit must be connected to the PC.

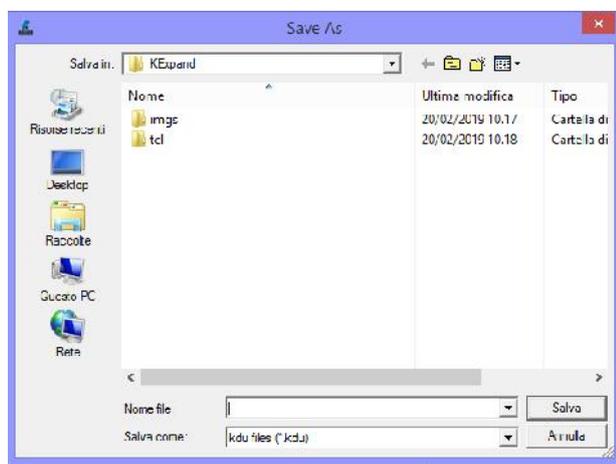


In case of any connection error, an error message will be displayed.

Save to file

Press Save to file to save all settings in a file. This file can be copied to the USB key and then loaded onto the unit or re-opened with the K-EXPAND software. The file format is automatic .kdu and cannot be modified.

There are no constraints on the name.

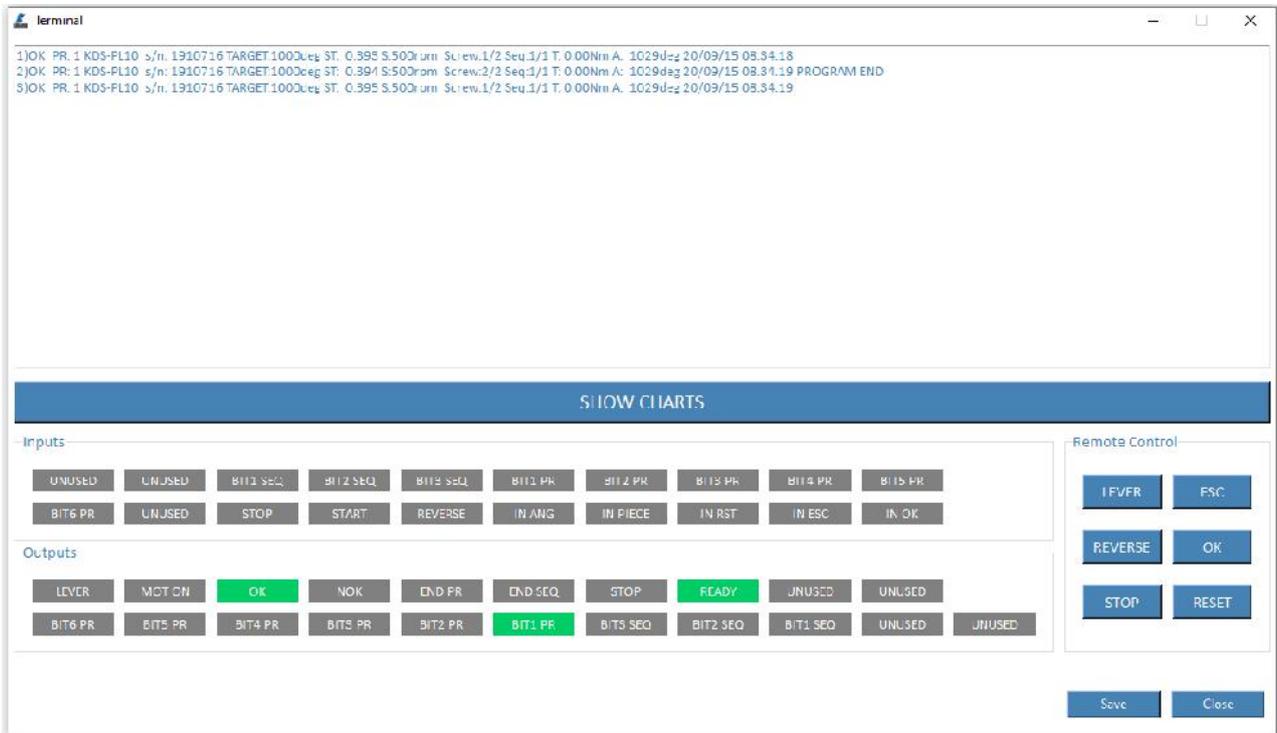


Open file

Press to recall a file previously saved on a PC or USB key. Once the file is selected, the parameters will be loaded automatically on K-Expand.

Open Terminal

Press to display the print string and the status of the inputs/outputs in the KDU unit. By selecting the ethernet-MODBUS TCP interface, it is also possible to test the remote control via ethernet, in particular Start, Reverse, Stop Motor, Reset, ESC.



The terminal window displays the following print strings:

```

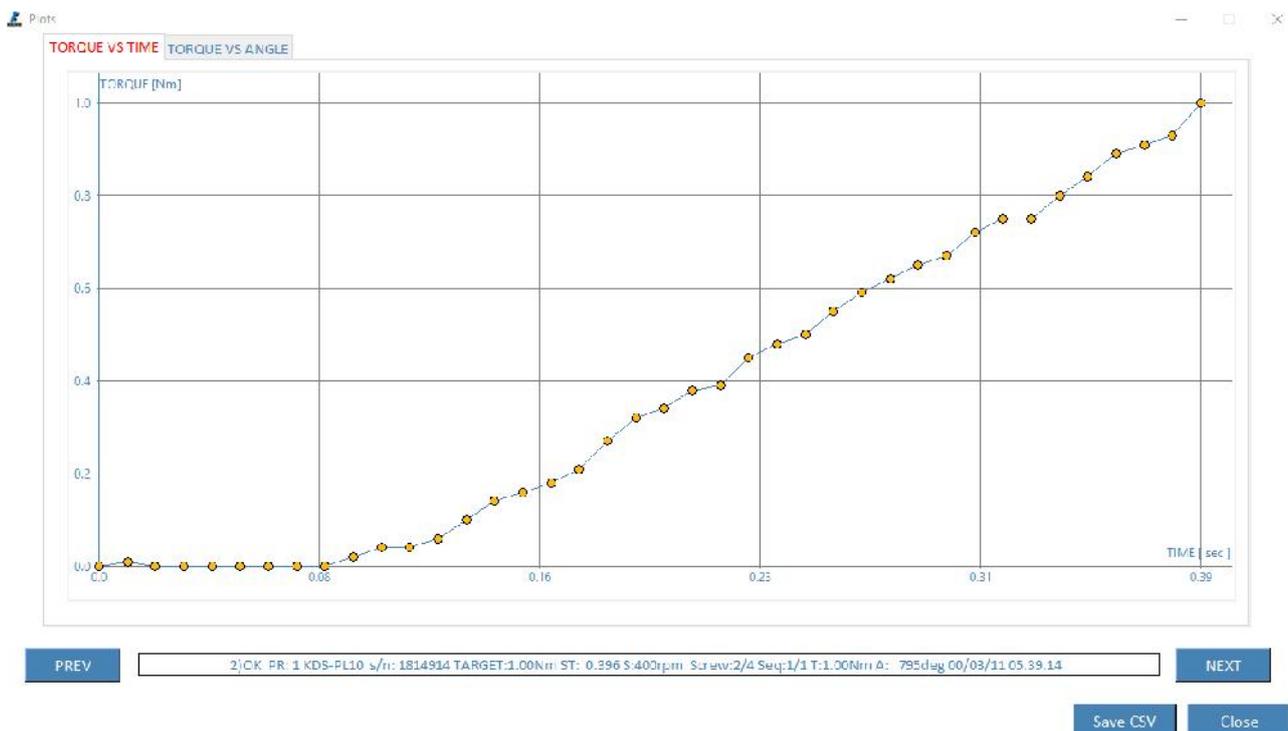
1)OK PR: 1 KDS-FL10 s/n: 1910716 TARGET:1000deg ST: 0.395 S:500rpm Screw:1/2 Seq:1/1 T: 0.00Nm A: 1029deg 20/09/15 08.34.18
2)OK PR: 1 KDS-FL10 s/n: 1910716 TARGET:1000deg ST: 0.394 S:500rpm Screw:2/2 Seq:1/1 T: 0.00Nm A: 1029deg 20/09/15 08.34.19 PROGRAM END
3)OK PR: 1 KDS-FL10 s/n: 1910716 TARGET:1000deg ST: 0.395 S:500rpm Screw:1/2 Seq:1/1 T: 0.00Nm A: 1029deg 20/09/15 08.34.19
  
```

The interface includes a "SHOW CHARTS" bar and a control panel with the following sections:

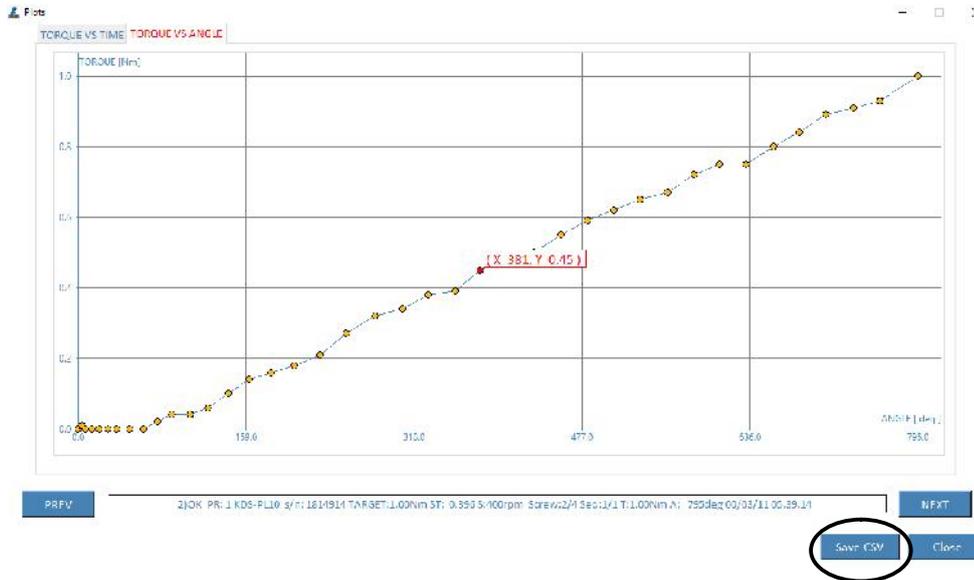
- Inputs:** A grid of buttons for various input signals, including BIT1-5 SEQ, BIT1-5 PR, STOP, START, REVERSE, IN ANG, IN PIECE, IN RST, IN ESC, and IN OK.
- Outputs:** A grid of buttons for various output signals, including LEVER, MCT ON, OK, NOK, END FR, END SEQ, STOP, READY, and several UNUSED buttons.
- Remote Control:** A set of buttons for remote control functions: FVFR, FSC, REVERSE, OK, STOP, and RESET.

Buttons for "Save" and "Close" are located at the bottom right of the control panel.

Also, by pressing the SHOW CHARTS bar, you can view the torque-time and torque-angle graphs.

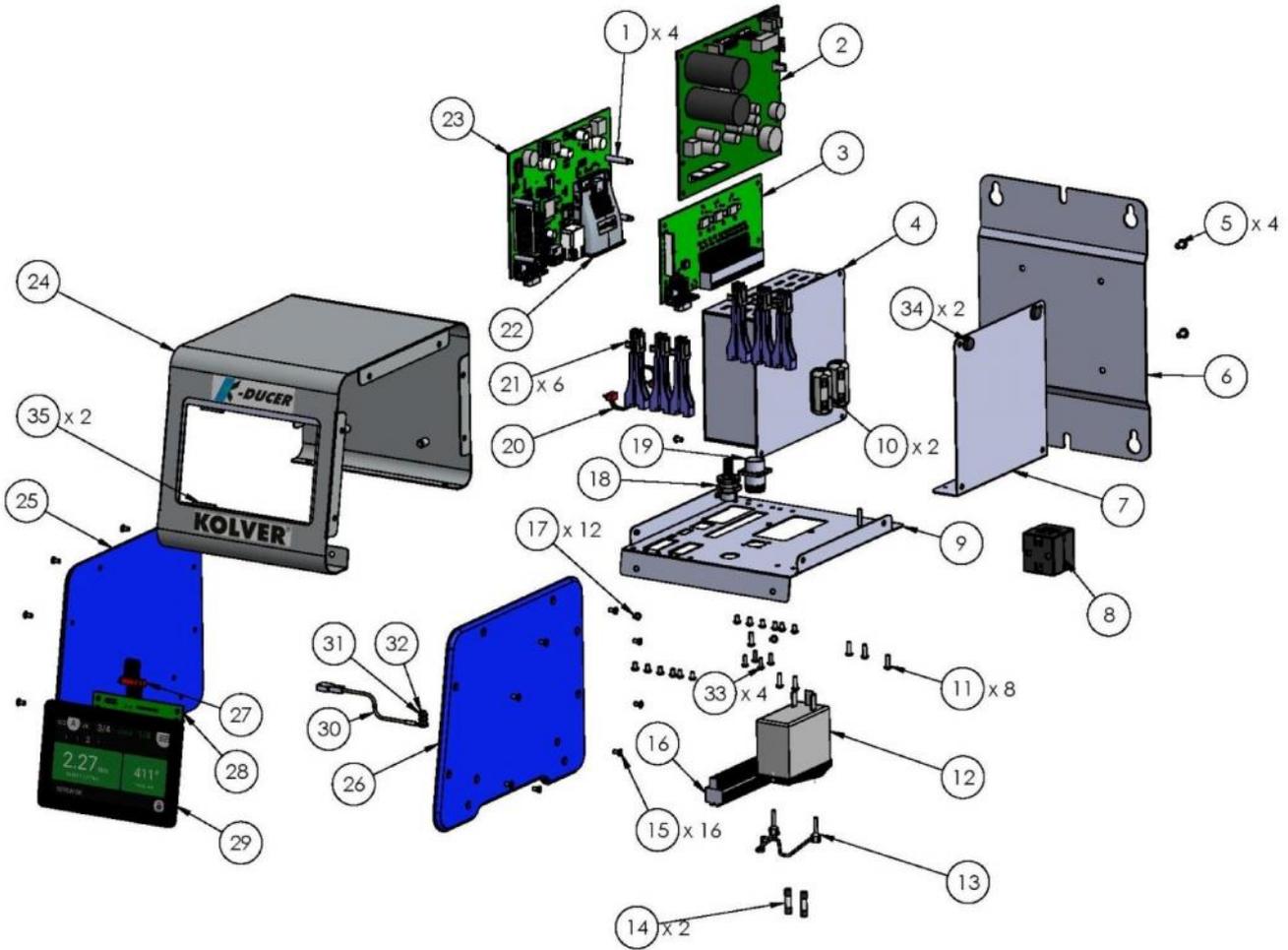


The graphs show the values sampled during the screwing corresponding to the print string shown below them. Pressing on one of them with the mouse it is possible to visualize the abscissa and ordinate values. Also note that it is possible to move between the values shown by pressing the right and left directional arrows.



The system acts as a monitor and it updates graphics and print strings in real time, among which it is possible to move by pressing on the elements PREV (previous) and NEXT (next). Finally it is possible to export the graphs in .csv format by clicking on the Save CSV, in order to provide the user with an additional analysis tool through the various calculation sheet processing programs available.

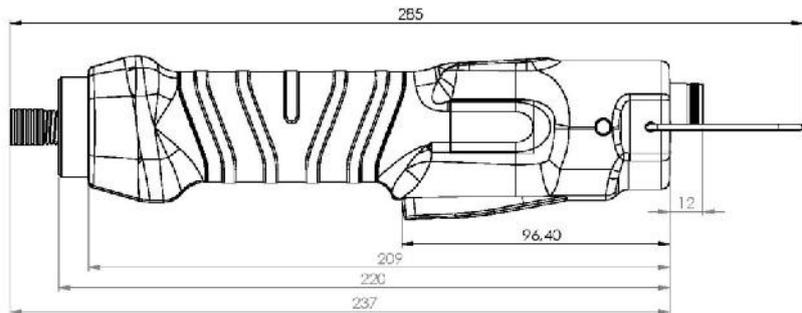
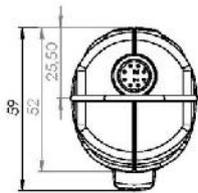
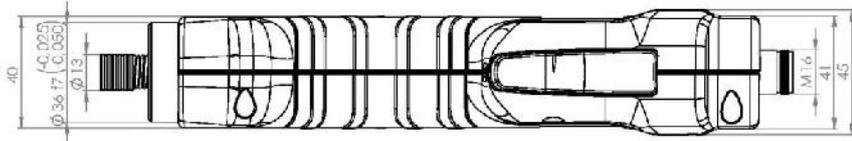
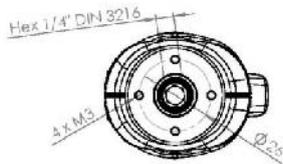
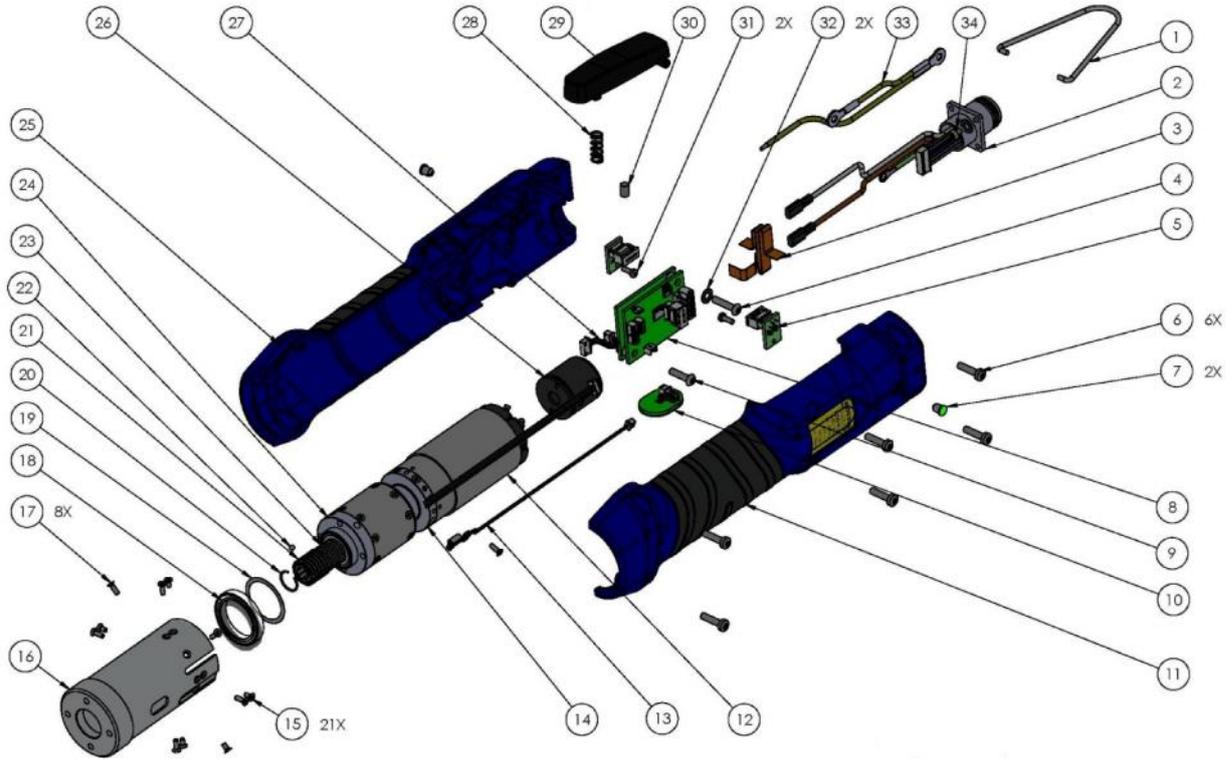
EXPLODED VIEW KDU-1/ KDU-1A:



SPARE PARTS:

Posizione	Descrizione	Quantità	Codice
1	SPACER 22MM KDU	4	872522
2	MOTOR BOARD K-DUCER	1	852530
3	I/O BOARD (44 PIN CONNECTOR) - KDU	1	852533/B
4	SWITCHING	1	872490
5	SCREW M4X8 ZN TX20	4	872534
6	SIDE PLATE	1	872504
7	SUPPORT SWITCHING PLATE KDU-1	1	872505
8	FERRITE RKCF-08-A5	1	872468
9	BOARDS SEAT	1	872503/A
10	FERRITE SCREWDRIVER CONNECTOR	2	872523
11	SCREW M3X10 ZN TX10	6	231530
12	FILTER AR13.6 A	1	800718
13	ANTI-UNTHREAD PLUGS	1	800719
14	FUSE 3,15A F-520LT3.15	2	800619
15	SCREW TSP M3X8 TX10 ZN	16	801009
16	CONNECTOR I/O 44PIN	1	872526
17	SCREW M3 X 5 ZN TX10	18	872444
18	CONNECTOR M12 8 POLI FEMALE	1	872537
19	CONNECTOR M16 10 PIN FEMALE	1	201668/HU
20	FLAT CABLE 4 PIN	1	872539
21	SUPPORT MOTOR BOARD	6	872442
22	ANYBUS	1	872521
23	I/O (MICRO) BOARD	1	852533/A
24	FRONT PANEL	1	872502
25	LEFT SIDE KDU-1	1	872500
26	RIGHT SIDE KDU-1	1	872501
27	FLAT CABLE 8 PIN + FERRITE	1	872540
28	FTDI DISPLAY TOUCH BOARD	1	852529
29	DISPLAY TOUCH 5" DLC0500HZR-T-17	1	852532
30	GROUND CABLE	1	800090/E
31	WASHER M3	3	800041
32	M3 BRUSSER NUT	3	800056/O
33	SCREW M2,5X8 ZN TX10	4	872478
34	RUBBER SUPPORT	2	800016
35	GASKET	2	872524
	LABEL	1	818006/SW
	CABLE 3x0,75 H05VVH2-F 2mt. SCHUKO	1	800620

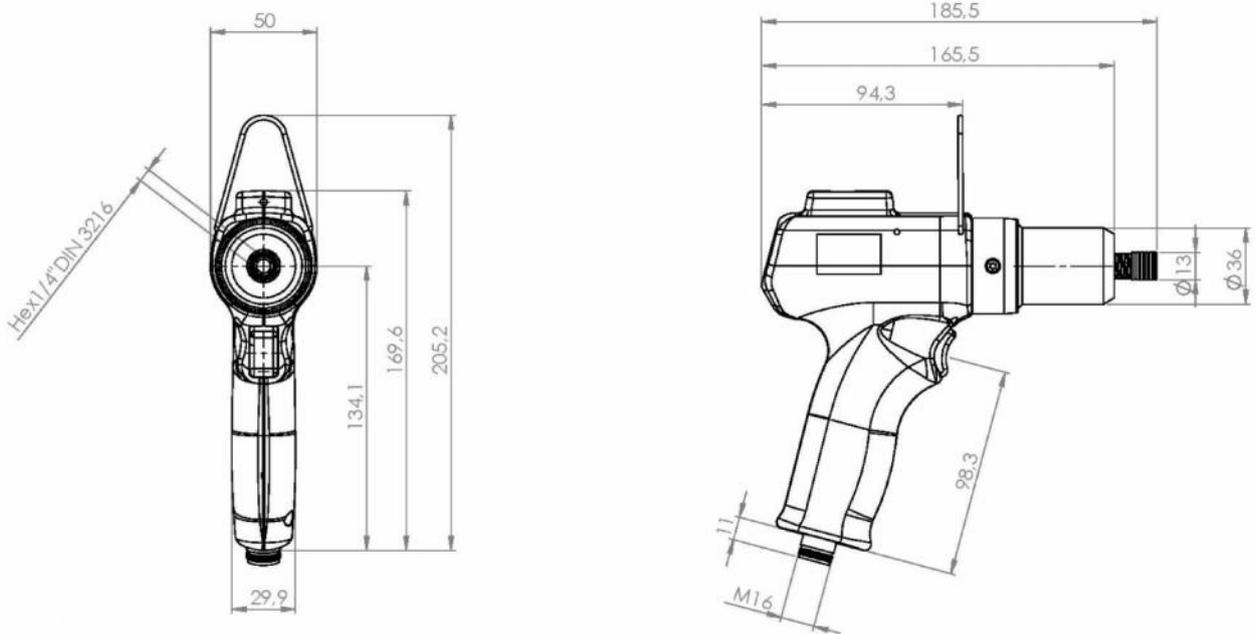
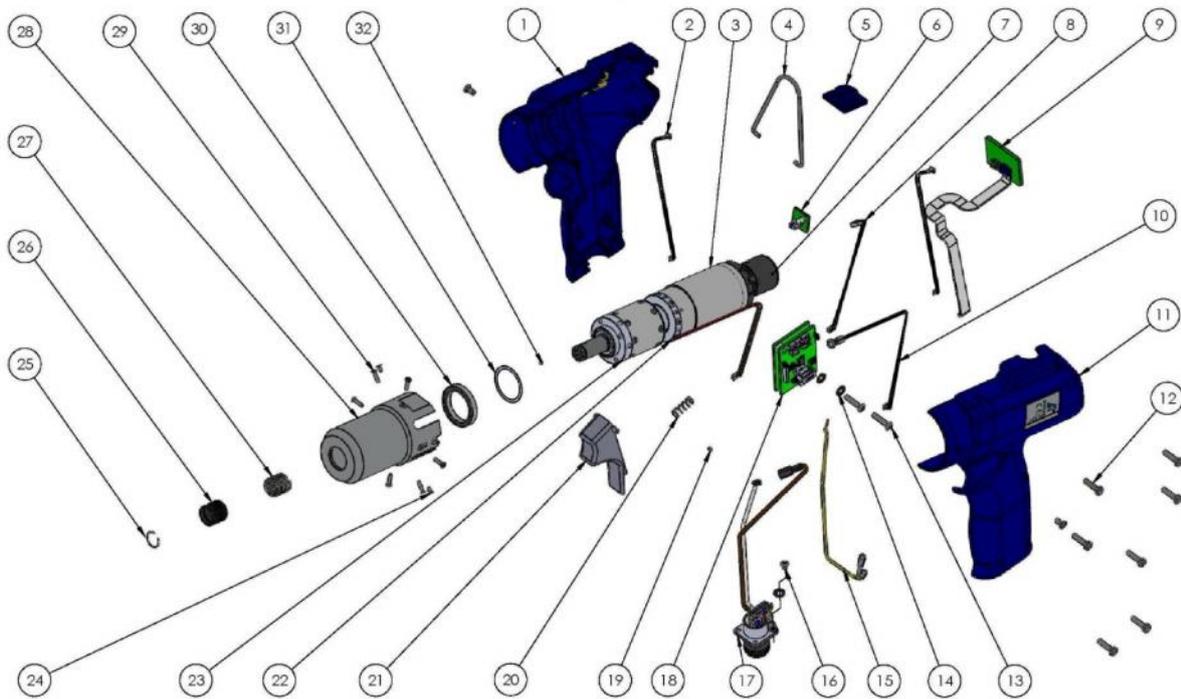
EXPLODED VIEW KDS-PLxx:



SPARE PARTS:

Pos.	Description	Qty	Code
1	HOOK	1	200060
2	MALE CONNECTOR M16 10 PIN	1	201667
3	PCB FLEX – LED BOARD	1	852537
4	SCREW ZN M3X12 TX10	1	231545
5	LED BOARD KDS/D	1	852535
6	SCREW ZN M3X12 TX10	6	231541
7	LED KDS-XX/D	2	231553
8	BOARD	1	852528
9	SCREW M3X12 ZN TX10	1	231547
10	REVERSE BUTTON KDS	1	231535
11	HOUSING KDS-XX/D	1	231551
	HOUSING ESD KDS-XX/D	1	231551/ESD
12	MOTOR KDS-6x	1	231509/L
	MOTOR KDS-10x	1	231509/L
	MOTOR KDS-15x	1	231509/15L
13	SENSOR	1	231534
14	TRANSDUCER	1	231522/E
15	SCREW TSP M2X4 TX6 ZN	21	231531
16	MOTOR SEAT	1	234505/TD
17	SCREW TSP M2X6 TX6 ZN	8	231527
18	BEARING	1	231533
19	WASHER	1	231532
20	RING	1	200007
21	RING	1	230020/1
22	BALL 2.5MM	1	219817
23	SPRING	1	230021
24	REDUCTION GEARS KDS-6x	1	231510/6D
	REDUCTION GEARS KDS-10x	1	231510/10D
	REDUCTION GEARS KDS-15x	1	231510/15D
25	HOUSING KDS-XX/D	1	231550
	HOUSING ESD KDS-XX/D	1	231550/ESD
26	ENCODER	1	231528
27	ENCODER WIRING	1	231536
28	LEVER SPRING	1	221061
29	LEVER	1	231552
	LEVER ESD	1	231552/ESD
30	MAGNET KDS-XX/D	1	231540
31	SCREW M2,2X6 TX6	2	231538
32	WASHER	1	800041
33	GROUND WIRING	1	231546
34	SCREW M2,5X4 TX8 ZN	1	872487
	LABEL	1	800199
	LABEL ESD	1	800199/ESD

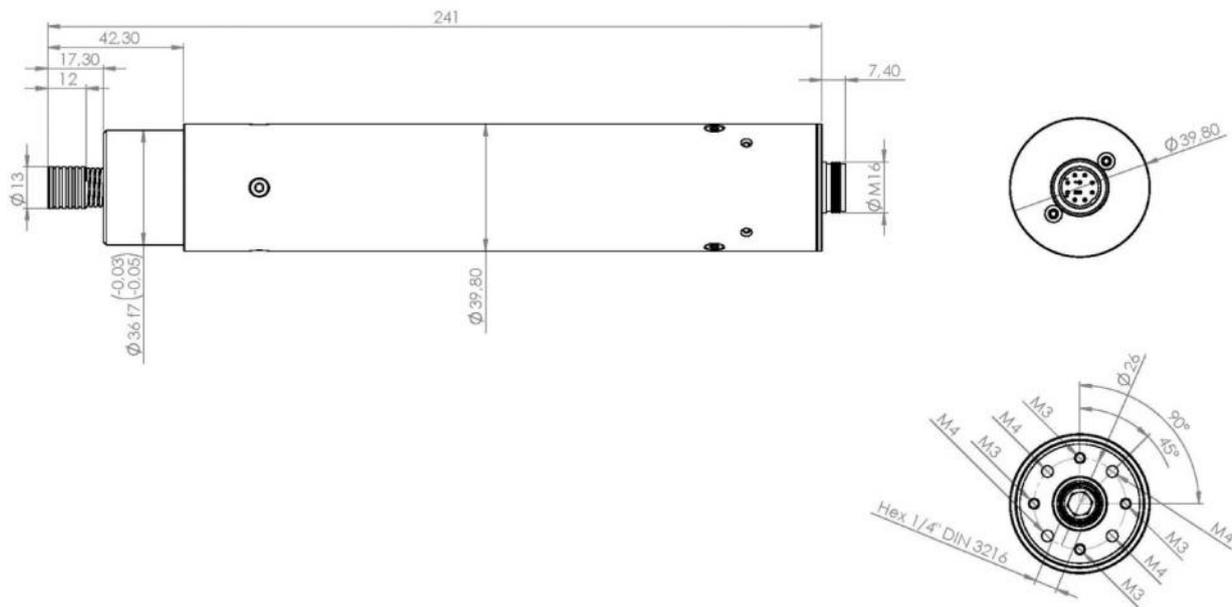
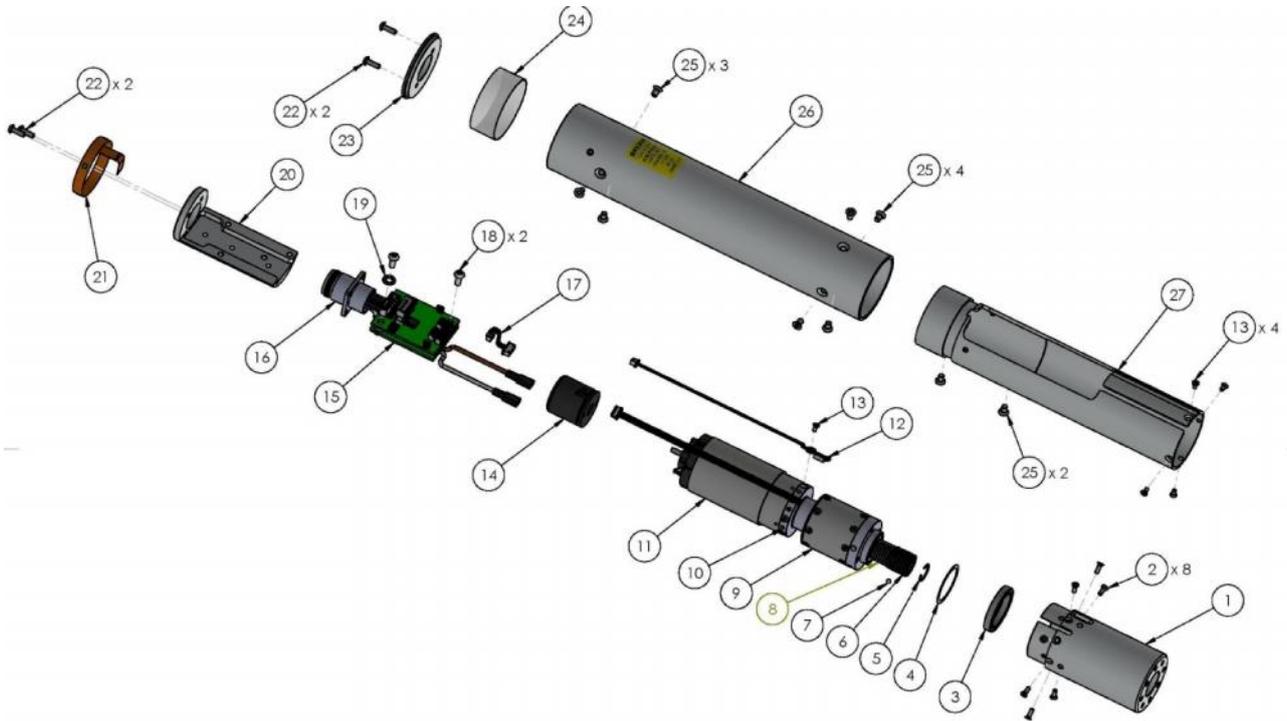
EXPLODED VIEW KDS-PLxxP:



SPARE PARTS:

Pos.	Description	Qty	Code
1	HOUSING KDS-XX/P	1	231560
	HOUSING KDS-XX/P-ESD	1	231560/ESD
2	PICOBLADE	2	231557
3	MOTOR KDS-6x	1	231509/L
	MOTOR KDS-10x	1	231509/L
	MOTOR KDS-15x	1	231509/15L
4	HOOK	1	200060
5	CONNECTOR COVER KDS-XX/P	1	231562
	CONNECTOR COVER KDS-XX/P-ESD	1	231562/ESD
6	WHITE LED BOARD KDSXX/P	1	852538
7	ENCODER	1	231528
8	ENCODER WIRING (KDS-PLxxP)	1	231536/L
9	REVERSE SWITCH + LED KDS-PLxxP	1	231535/P
10	SENSOR	1	231534
11	HOUSING KDS-XX/P	1	231561
	HOUSING KDS-XX/P-ESD	1	231561/ESD
12	SCREW ZN M3X10 TX10	7	231539
13	SCREW M3X12 TESTA ZN TX10	2	231547
14	WASHER M3	2	800041
15	GROUND WIRING KDS-P	1	231546/P
	GROUND WIRING KDS-PU	1	231546/PU
16	SCREW M2,5X6 TX8 ZN TX8	1	872487
17	MALE CONNECTOR M16 10 PIN KDS-PLxxP	1	201667/P
	MALE CONNECTOR M16 10 PIN KDS-PLxxPU	1	201667/PU
18	BOARD KDS-P	1	852528/P
19	MAGNET	1	231540/P
20	SPRING LEVER	1	221061
21	LEVER KDS-XX/P	1	231563
	LEVER KDS-XX/P-ESD	1	231563/ESD
22	TRANSDUCER	1	231522/E
23	REDUCTION GEARS KDS-6x	1	231510/6D
	REDUCTION GEARS KDS-10x	1	231510/10D
	REDUCTION GEARS KDS-15x	1	231510/15D
24	SCREW TSP M2X4 TX6 ZN	18	231531
25	RING	1	200007
26	RING	1	230020/1
27	SPRING	1	230021
28	MOTOR SEAT KDS-PLxxP	1	234505/TP
29	SCREW TSP M2X8 TX6 ZN	8	231554
30	BEARING	1	231533
31	WASHER	1	231532
32	BALL 2.5MM	1	219817
33	SCREW TSP M3X5 TX10 ZN	2	801003
	LABEL	1	800199
	LABEL ESD	1	800199/ESD

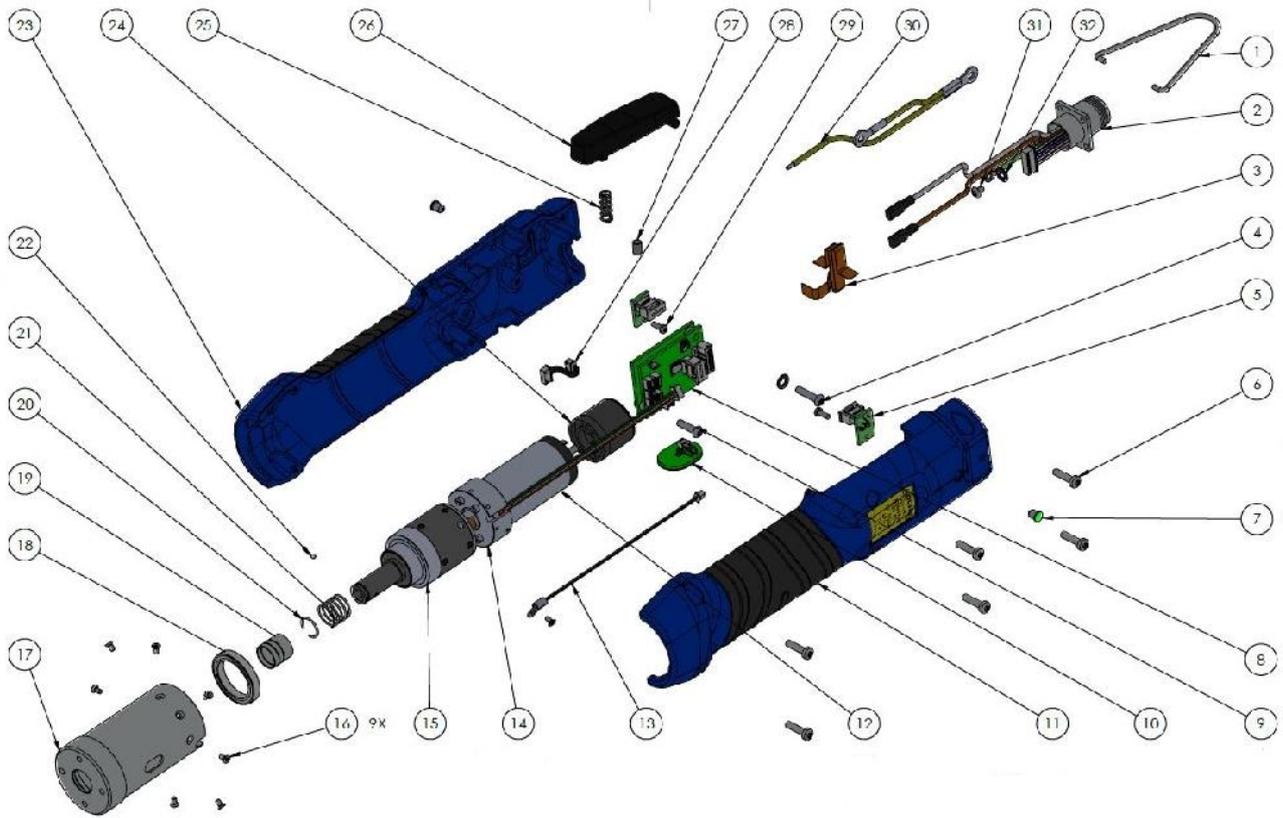
EXPLODED VIEW KDS-PLxxCA:



SPARE PARTS:

Pos.	Description	Qty	Code
1	MOTOR SEAT	1	234505/TCA
2	SCREW TSP M2X6 TX6 ZN	8	231527
3	BEARING	1	231533
4	WASHER	1	231532
5	RING	1	230020/1
6	RING	1	200007
7	BALL 2.5MM	1	219817
8	SPRING	1	230021
9	REDUCTION GEARS KDS-6x	1	231510/6D
	REDUCTION GEARS KDS-10x	1	231510/10D
	REDUCTION GEARS KDS-15x	1	231510/15D
10	TRANSDUCER	1	231522/E
11	MOTOR KDS-6x		231509/L
	MOTOR KDS-10x	1	231509/L
	MOTOR KDS-15x	1	231509/15L
12	SENSOR	1	231534
13	SCREW TSP M2X4 TX6 ZN	20	231531
14	ENCODER	1	231528
15	BOARD	1	852528
16	MALE CONNECTOR M16 10 PIN	1	201667
17	ENCODER WIRING	1	231536
18	SCREW M3X10 ZN TX10	2	231530
19	WASHER	1	800041
20	SCREW M3X5 TX10 ZN	1	872444
21	BOARD SUPPORT	1	231523
22	PCB FLEX LED	1	852531
23	SCREW M2,5X8 TX8 ZN	4	872478
24	COVER KDS-XXCA	1	231526
25	LED RING KDS-XXCA	1	231537
26	SCREW TSP M3X5 TX10 ZN	9	801003
27	ALUMINIUM BODY KDS-XXCA	1	231525
28	ALUMINIUM BODY (BOARD SUPPORT)	1	231524

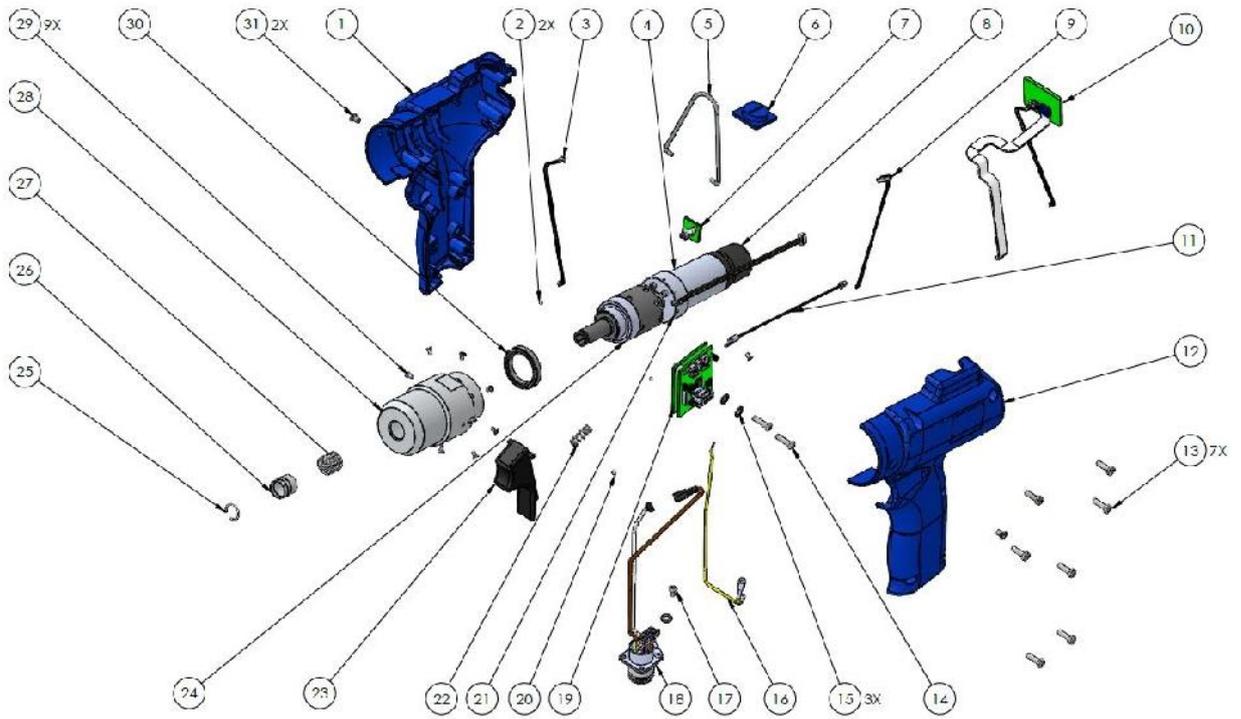
EXPLODED VIEW KDS-MT1.5:



SPARE PARTS:

Pos.	Description	Qty	Code
1	HOOK	1	200060
2	MALE CONNECTOR M16 10 PIN	1	201667
3	PCB FLEX – LED BOARD	1	852537
4	SCREW ZN M3X12 TX10	1	231545
5	LED BOARD KDS/D	1	852535
6	SCREW ZN M3X12 TX10	6	231541
7	LED KDS-XX/D	2	231553
8	BOARD	1	852528
9	SCREW M3X12 ZN TX10	1	231547
10	REVERSE BUTTON KDS	1	231535
11	HOUSING KDS-XX/D	1	231551
	HOUSING ESD KDS-XX/D	1	231551/ESD
12	MOTOR KDS-MT1.5	1	231509/2L
13	SENSOR	1	231534
14	TRANSDUCER	1	210050/T
15	REDUCTION GEARS KDS-MT1.5	1	250040/TMT
16	SCREW TSP M2X4 TX6 ZN	3	231531
17	MOTOR SEAT	1	234504/TD
18	BEARING	1	231533
19	RING	1	230020/1
20	RING	1	200007
21	SPRING	1	200009
22	BALL 2 MM	1	200011
23	HOUSING KDS-XX/D	1	231550
	HOUSING ESD KDS-XX/D	1	231550/ESD
24	ENCODER	1	231528
25	LEVER SPRING	1	221061
26	LEVER	1	231552
	LEVER ESD	1	231552/ESD
27	MAGNET KDS-XX/D	1	231540
28	ENCODER WIRING	1	231536
29	SCREW 2,2X6 TX6	1	231538
30	ENCODER WIRING	1	231546
31	SCREW M2,5X4 TX8	1	872487
32	WASHER	2	800041
	LABEL	1	800199
	LABEL ESD	1	800199/ESD

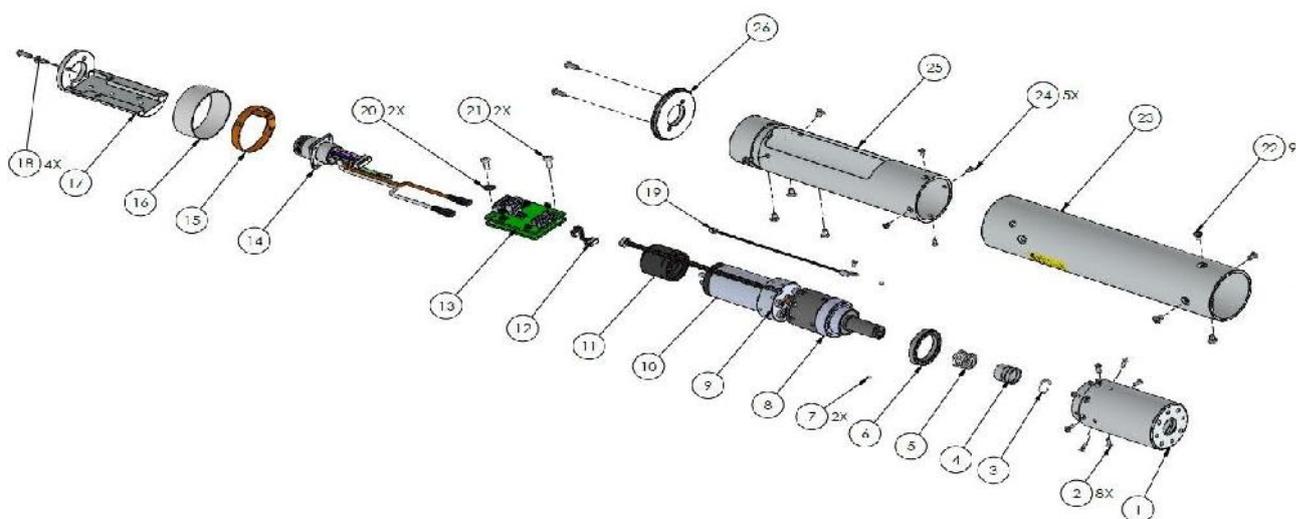
EXPLODED VIEW KDS-MT1.5P:



SPARE PARTS:

Pos.	Description	Qty	Code
1	HOUSING KDS-XX/P	1	231560
	HOUSING KDS-XX/P-ESD	1	231560/ESD
2	BALL 2 MM	2	200011
3	PICOBLADE	2	231557
4	MOTOR KDS-MT1.5	1	231509/2L
5	HOOK	1	200060
6	CONNECTOR COVER KDS-XX/P	1	231562
	CONNECTOR COVER KDS-XX/P-ESD	1	231562/ESD
7	WHITE LED BOARD KDSXX/P	1	852538
8	ENCODER	1	231528
9	ENCODER WIRING (KDS-PLxxP)	1	231536/L
10	REVERSE SWITCH + LED KDS-PLxxP	1	231535/P
11	SENSOR	1	231534
12	HOUSING KDS-XX/P	1	231561
	HOUSING KDS-XX/P-ESD	1	231561/ESD
13	SCREW ZN M3X10 TX10	7	231539
14	SCREW M3X12 TESTA ZN TX10	2	231547
15	WASHER M3	3	800041
16	GROUND WIRING KDS-P	1	231546/P
	GROUND WIRING KDS-PU	1	231546/PU
17	SCREW M2,5X6 TX8 ZN TX8	1	872487
18	MALE CONNECTOR M16 10 PIN KDS-PLxxP	1	201667/P
	MALE CONNECTOR M16 10 PIN KDS-PLxxPU	1	201667/PU
19	BOARD KDS-P	1	852528/P
20	MAGNET	1	231540/P
21	TRANSDUCER	1	210050/T
22	SPRING LEVER	1	221061
23	LEVER KDS-XX/P	1	231563
	LEVER KDS-XX/P-ESD	1	231563/ESD
24	REDUCTION GEARS KDS-MT1.5	1	250040/TMT
25	RING	1	200007
26	RING	1	230020/1
27	SPRING	1	230021
28	MOTOR SEAT KDS-MT1.5	1	234505/TPMT
29	SCREW TSP M2X8 TX6 ZN	8	231554
30	BEARING	1	231533
31	SCREW M3X5 TX10 ZN	2	801003
	LABEL	1	800199
	LABEL ESD	1	800199/ESD

EXPLODED VIEW KDS-MT1.5CA:



SPARE PARTS:

Pos.	Description	Qty	Code
1	MOTOR SEAT	1	234505/TCAMT
2	SCREW TSP M2X6 TX6 ZN	8	231527
3	RING	1	200007
4	RING	1	230020/1
5	SPRING	1	230021
6	BEARING	1	231533
7	BALL 2 MM	1	200011
8	REDUCTION GEARS KDS-MT1.5	1	250040/TMT
9	TRANSDUCER	1	210050/T
10	MOTOR KDS-MT1.5	1	231509/2L
	REDUCTION GEARS KDS-15x	1	231510/15D
10	TRANSDUCER	1	231522/E
11	ENCODER	1	231528
12	ENCODER WIRING	1	231536
13	BOARD	1	852528
14	MALE CONNECTOR M16 10 PIN	1	201667
15	PCB FLEX LED	1	852531
16	LED RING KDS-XXCA	1	231537
17	BOARD SUPPORT	1	231523
18	SCREW M2,5X8 TX8 ZN	4	872478
19	SENSOR	1	231534
20	WASHER	2	800041
21	SCREW M3X10 ZN TX10	2	231530
22	SCREW M3X5 TX10 ZN	9	801003
23	ALUMINIUM BODY	1	231525/MT
24	SCREW M3X5 TX10 ZN	5	801003
25	ALUMINIUM BODY (BOARD SUPPORT)	1	231524/MT
26	COVER	1	231526
	LABEL	1	800199

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.

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