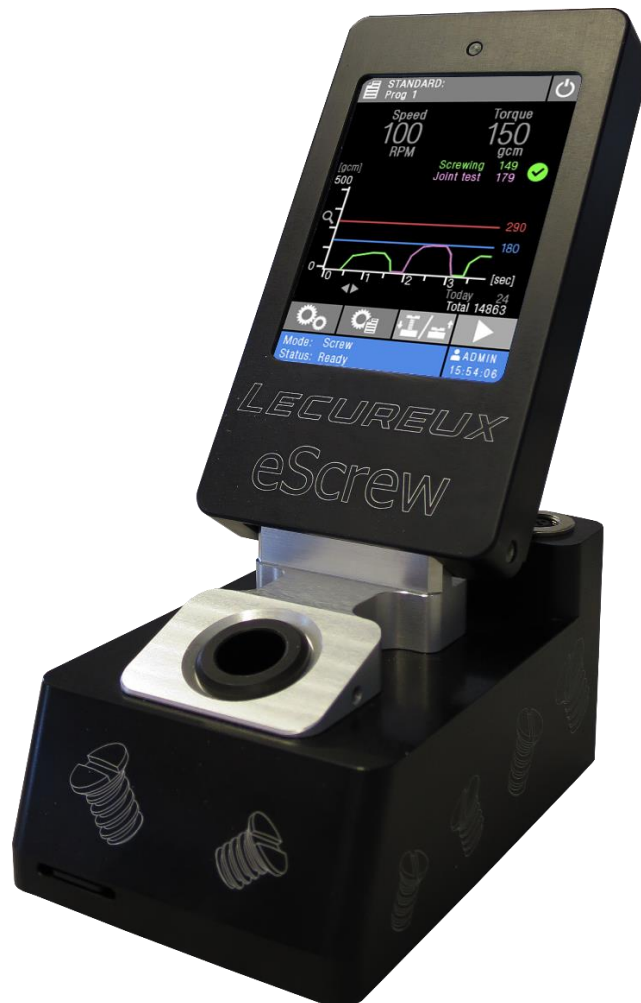


# LECUREUX

## eScrewSpeed

### User Manual

VERSION 1.1  
REV 2



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# 1 The manufacturer

## 1.1 Headquarter

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## 1.2 Represented by:



## 1.3 Copyright and publication

All of the text and diagrams in this document are the intellectual property of the manufacturer and may only be reproduced with the express authorisation of the latter. Anyone found to be breaching this copyright may be prosecuted, at the discretion of the manufacturer.

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## 1.4 Liability

We, the manufacturer, will not be held liable for any damage caused to a third party by the incorrect use of our equipment. We therefore recommend that you read this user manual carefully before starting to use this item.

## 1.5 General hints for reading this manual

In this manual, all touch buttons of the eScrewSpeed touch display are represented between rectangular brackets [touch button], while all descriptive text elements (not touch sensitive) are placed between apostrophes 'descriptive text'.

[ ] : Touch button (may appear as text or as symbol)

' ' : Descriptive text element (not touch sensitive)

 : Press on eScrewSpeed touch display

{basic} : Basic screw application configuration setting, available even when no license is activated (refer to chapter **3.2 License policy**)

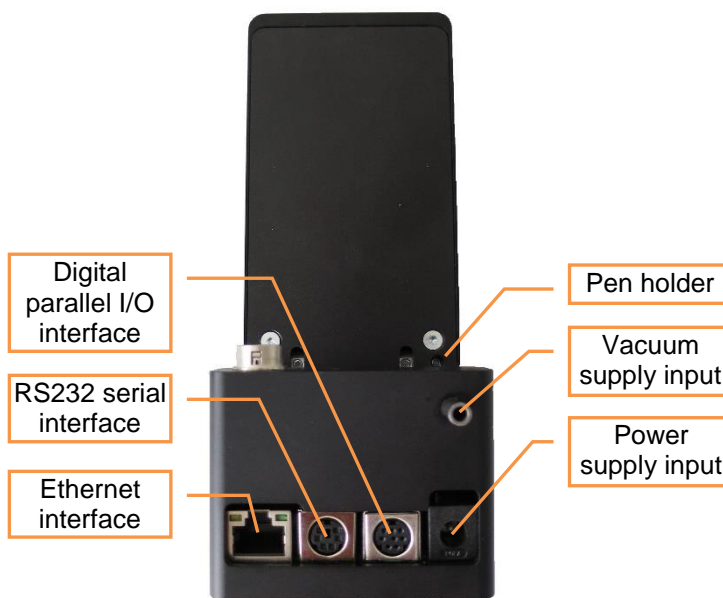
## 2 Brief eScrewSpeed description

### 2.1 Operating elements of the control unit

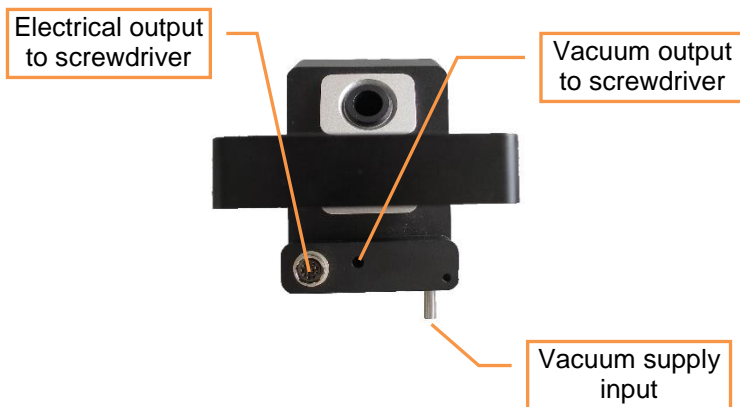
Front side



Rear side



View from above



Side view



Refer to chapter **15 Electrical interface specifications** for more details concerning the eScrewSpeed's interfaces.

### 2.2 Powering on and off

The eScrewSpeed is switched on when softly tapping somewhere on the touch sensitive display surface. To switch it off again, simply keep pressed the power icon in the main menu for more than 200ms. All modified parameters are always permanently saved when returning back to the main menu. In case of power loss while navigating in other menus, last modifications are not saved.

### 2.3 Menus and navigation

Thanks to the TFT touch display an intuitive menu navigation is achieved which makes permanent consulting of this user manual unnecessary. When navigating through menus and parameters, submenus are always represented by upper case letters while lower case letters represent single configuration parameters. Additionally submenus are systematically arranged above configuration parameters, except for the application type selection parameter.

### 2.4 Main menu

The eScrewSpeed main menu contains all mostly used functions and information. In general, all grey surfaces and all grey text strings are touch buttons. The following graph shows all main menu functions and information for a licensed screwing application:

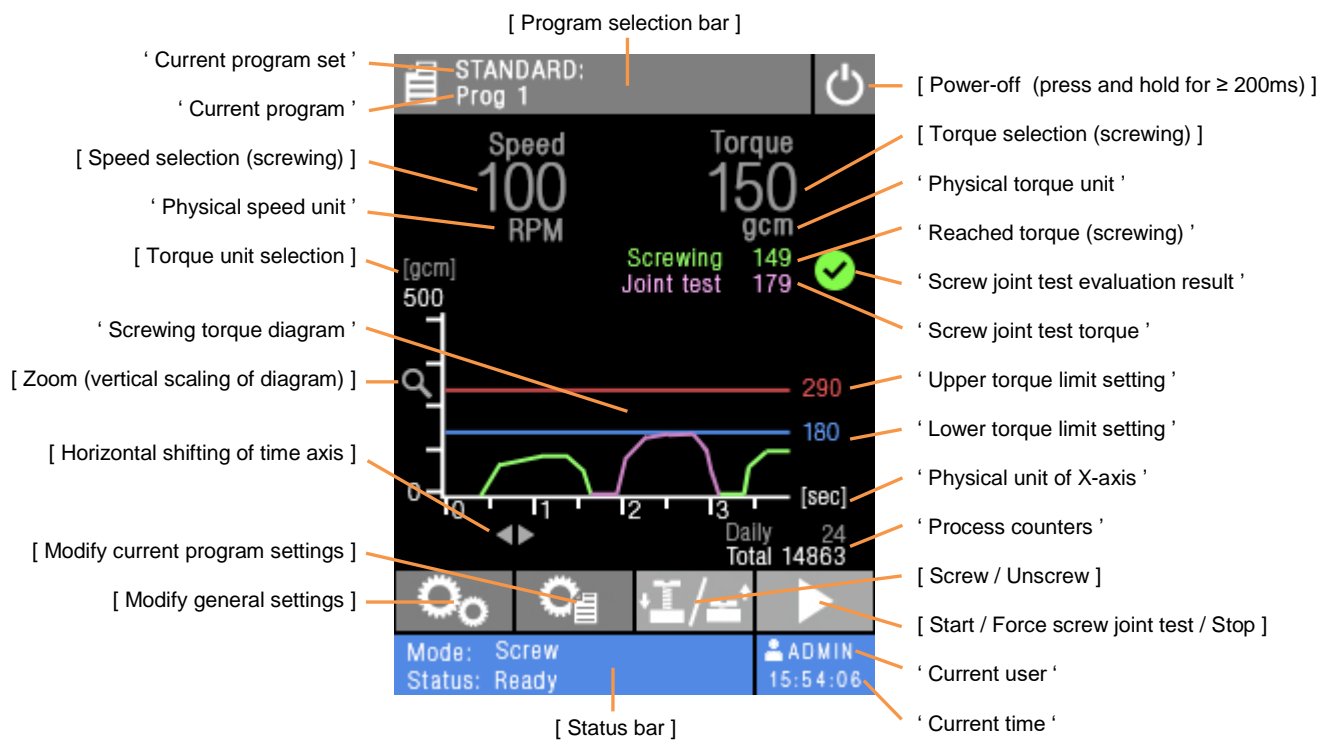


Figure shows a licensed screwing application activated (refer to chapter 3.2 License policy)

### 2.5 MicroSD card

The microSD card contains all configuration settings including access permissions, available firmware and license files and program sets with their respective programs.

To copy configuration settings from one eScrewSpeed to another refer to chapter 12.1.4 Copying the configuration settings from one eScrewSpeed to another using the microSD card.

For details concerning the additional logging of all measurement results onto the microSD card refer to chapter 8.2 Logging process log data in a file on the eScrewSpeed's microSD card.



## 3 Applications and licenses

### 3.1 Using applications

The eScrewSpeed supports various application types who are designed to execute specific processes such as screwing, winding, measuring, etc. Each application process can further consist of a certain number of sub-processes, such as the sub-processes 'screwing' and 'screw joint test' in a typical screw application.

Applications need to be assigned to the various eScrewSpeed programs (refer to chapter **4 Handling Programs**) in order to execute. This is done by setting the program's application type parameter.

### 3.2 License policy

In general, each application type needs its own specific license to be activated in order to be executed by an eScrewSpeed program. Every eScrewSpeed control unit requires its own, dedicated licenses.

#### 3.2.1 Basic screw application

Without any license type activated, the eScrewSpeed is still able to perform a basic screwing process with following major limitations:

- One single program available
- Connection of head holder ZIP41 not available
- Torque progress diagram not available
- Limited configuration settings for the screwing process itself (accessible screwing configuration settings are designated with {basic} in the corresponding heading of this manual)
- No screw joint testing
- Logging of process log data not available
- Configuration settings can not be managed by using the eScrew Commander Software

To bypass these limitations it is necessary to activate the screwing license.

#### 3.2.2 Licensed applications

Activated application licenses give access to the full functionality of the concerned application type.

### 3.3 General licensing procedure

The licensing procedure consists of the following steps in order to activate a new license:


- 1) The customer sends the license request code of his eScrewSpeed control unit (unique for each eScrewSpeed control unit), to Lécureux SA and requests the license key(s) for the desired application type(s).
- 2) Lécureux SA sends the license key(s) purchased for the desired application type(s) to the customer
- 3) The customer activates the license(s) on his eScrewSpeed control unit

The license request code can either be copied and licenses can either be activated using the eScrewSpeed menus (refer to chapter **12.1.3 Activating a license using the eScrewSpeed menus**) or the eScrew Commander Software (refer to chapter **10.9 Activating an eScrew license**).

## 4 Handling Programs

### 4.1 Working principle of eScrewSpeed programs

The eScrewSpeed programs are organized in **program sets** of 8 programs. Each program contains the program specific configuration settings (refer to chapter **6 Program specific configuration settings**) while each set of 8 programs contains all 8 programs plus all general configuration settings (refer to chapter **5 General configuration settings**).

	<p>When configuring and connecting the holder for 4 heads ZIP41 of the eScrewSpeed, only 5 programs instead of 8 are available, according to the control unit's holder and the 4 external head holders of the ZIP41.</p>
---	--

To each one of these programs the desired application type to execute needs to be assigned, which requires a prior activation of the corresponding application license(s) (refer to chapter **3 Applications and licenses**).



Various program sets can be created and stored on the microSD card as independent files while only one of these sets is stored in the non-volatile on-chip memory of the eScrewSpeed itself at one time. Modifying configuration parameters of the currently active program set modifies the content of the non-volatile on-chip memory as well as the corresponding program set on the microSD card. The default program set by factory settings is called "STANDARD" and is stored as file <STANDARD.ESP> on the microSD card.

For copying the currently active program set from one eScrewSpeed to another refer to chapter **12.1.4 Copying the configuration settings from one eScrewSpeed to another using the microSD card**.

Refer to chapter **2.5 MicroSD card** for more details concerning microSD card functionality.

### 4.2 Selecting programs

#### 4.2.1 Selecting programs from the main menu

-  [  ] program selection bar in the main menu
- Select the desired program from the list displayed
- The displayed list shows the names of all 8 programs of the currently active program set.

#### 4.2.2 Selecting programs from the holder for 4 heads ZIP41

When configuring and connecting the external head holder ZIP41 of the eScrewSpeed the programs are automatically selected and started corresponding to the chosen head. There are two configuration options available: One where the base head serves as an alternative deposit position (without program selection) and the 4 external heads select programs 1 to 4 or the second where the base head selects program 1 while the 4 external heads select programs 2 to 5. Please note that only one head out of the 4 resp. 5 should be retracted from its holder. Refer to chapter **5.2.2 Screwdriver holder signal** for an appropriate configuration of the head holder ZIP41.






#### 4.2.3 Selecting programs via the digital parallel I/O interface

When configuring the digital parallel inputs to 'Start prog #1 to 3' the corresponding programs are selected by an active signal applied to these inputs (refer to chapter **5.2.1 Function of digital parallel inputs 1 to 3**).





#### 4.2.4 Selecting programs via the RS232 serial and/or the Ethernet interface

Similar to modifying eScrewSpeed parameters, programs can be selected and started via the RS232 serial and the Ethernet interface. Refer to chapters **9.2 Commanding the eScrewSpeed via its RS232 serial interface** and **9.3 Commanding the eScrewSpeed via its Ethernet interface** for more details on how to command the eScrewSpeed via these interfaces.





### 4.3 Editing a program name

- 1)  [  ] in the main menu
- 2)  [ Edit program name ]
- 3) Enter the program name using the virtual keyboard, confirm by  [  ]







### 4.4 Loading a set of 8 programs

- 1)  [  ] in the main menu
- 2)  [ PROGRAM SET ARCHIVE ]
- 3)  [ Load program set ]
- 4) Select the program set to load from the list displayed







### 4.5 Saving a set of 8 programs

- 1)  [  ] in the main menu
- 2)  [ PROGRAM SET ARCHIVE ]
- 3)  [ Save program set ]

### 4.6 Saving a set of 8 programs as

- 1)  [  ] in the main menu
- 2)  [ PROGRAM SET ARCHIVE ]
- 3)  [ Save program set as ]
- 4) Enter the name of the new program set using the virtual keyboard, confirm by  [  ]

### 4.7 Deleting a set of 8 programs

- 1)  [  ] in the main menu
- 2)  [ PROGRAM SET ARCHIVE ]
- 3)  [ Delete program set ]
- 4) Select the program set to delete from the list displayed, confirm by  [  ]







## 5 General configuration settings

The general configuration settings can also be viewed and modified using the eScrew Commander Software (refer to chapter *10.5 Configuring the eScrew's parameters using the eScrew Commander*).





### 5.1 User interface settings

#### 5.1.1 Date and time


The eScrewSpeed's time and date setting is mainly used for the file system on the microSD card. Time and date can automatically be kept up to date by connecting the eScrewSpeed to a NTP service via its Ethernet interface (refer to chapters *9.3.1 General Ethernet connection requirements* and *9.3.3.3 Setting the NTP server's IP address*). In case the eScrewSpeed is used stand alone, date and time can be manually set:

- 1)  [  ] in the main menu
- 2)  [ SYSTEM ]
- 3)  [ Date ] or [ Time ] to enter the correct date or time, confirm by  [  ]





#### 5.1.2 Language

- 1)  [  ] in the main menu
- 2)  [ USER INTERFACE ]
- 3)  [ Language ] to alter the parameter between 'Français', 'English', 'Italiano or 'Deutsch'.





#### 5.1.3 Physical unit for torques

- 1)  on the unit displayed in brackets (e.g. [Ncm]) on top of the Y-axis of the torque diagram in the main menu to alter between the available units 'gcm' / 'Ncm' / 'mNm' / 'uNm'.





An alternative way to change physical units is:

- 1)  [  ] in the main menu
- 2)  [ USER INTERFACE ]
- 3)  [ Torque unit ] to alter the parameter between between 'gcm' / 'Ncm' / 'mNm' / 'uNm'







#### 5.1.4 Physical unit for angles

- 1)  [  ] in the main menu
- 2)  [ USER INTERFACE ]
- 3)  [ Angle unit ] to alter the parameter between between 'Turns' / 'Degrees' / 'Seconds'

#### 5.1.5 Ambient light compensation

- 1)  [  ] in the main menu
- 2)  [ USER INTERFACE ]
- 3)  [ Ambient light compens. ] to alter the parameter between the following possibilities:
  - 'Yes': display brightness is automatically adapted in function of the ambient light
  - 'No': display brightness is controlled via the parameter 'Brightness'

### 5.1.6 Brightness





- 1)  [  ] in the main menu
- 2)  [ USER INTERFACE ]
- 3)  [ Brightness ] to adjust the value using the slider displayed, confirm by  [  ]



This parameter has no effect and will be hidden if the automatic ambient light compensation is turned on (refer to chapter **5.1.5 Ambient light compensation**).





### 5.1.7 Buzzer

The buzzer indicates the end of a screw joint test and can be enabled or disabled:

- 1)  [  ] in the main menu
- 2)  [ USER INTERFACE ]
- 3)  [ Buzzer ] to alter between 'Yes' or 'No'.

### 5.1.8 Motor LED

The motor LED indicates the end of a screwing process and can be enabled or disabled:

- 1)  [  ] in the main menu
- 2)  [ USER INTERFACE ]
- 3)  [ Motor LED ] to alter between 'Yes' or 'No'.





## 5.2 Hardware settings

### 5.2.1 Function of digital parallel inputs 1 to 3

The digital inputs of eScrewSpeed's digital parallel I/O interface need to be configured according to following situations:

- Connecting a start button or a double foot pedal (refer to chapter **11.3 Start button / single and double foot pedal**)
- Commanding the eScrewSpeed by an external PLC platform (refer to chapter **9.1 Commanding the eScrewSpeed via its digital parallel I/O interface**)

To set the appropriate configuration proceed as follows:

- 1)  [  ] in the main menu
- 2)  [ HARDWARE ]
- 3)  [ Dig. input 1 to 3 ] to alter the parameter between the following possibilities:

'Start curr.prog':	First deletes indicated errors and then starts the process of the currently selected eScrewSpeed program
'Abort prog':	Aborts the process of the currently running eScrewSpeed program or deletes indicated errors when no process is running
'Unscrew':	First deletes indicated errors and then starts the unscrewing function using the configured unscrewing parameters (refer to chapter <b>6.4 Configuration settings for « UNSCREWING »</b> )
'Screw joint test':	Forces a screw joint test after the currently running screwing process (refer to the timing diagrams in chapter <b>9.1 Commanding the eScrewSpeed via its digital parallel I/O interface</b> )
'Start prog #1 to 3':	First deletes indicated errors, then selects the eScrewSpeed program #1 to 3 according to the input #1 to 3 and finally starts the process of the selected program

The abortion of a running program or a running unscrewing function previously triggered by one of these digital inputs is dependent on the setting of the parameter 'Program start signal' (refer to chapter **6.1.2 Program start signal**), the parameter 'Unscrewing mode' (refer to chapter **6.4.1 Unscrew mode**) and the configured screwdriver holder signal (refer to next chapter).





## 5.2.2 Screwdriver holder signal

This parameter allows to define which screwdriver holder signal is considered in order to execute the following holder signal functions:

- Run a motor idle torque calibration process when the screwdriver is placed in its holder
- Directly **start** the selected program when the screwdriver is taken off its holder
- Only **enable** external program start signals when the screwdriver is taken off its holder

These holder signal functions further depend on the configured program start signal (refer to chapter **6.1.2 Program start signal**) and on the configured digital I/O interface (refer to chapter **5.2.1 Function of digital parallel inputs 1 to 3**).



To alter the holder signal parameter proceed as follows:

- 1)  [  ] in the main menu
- 2)  [ HARDWARE ]
- 3)  [ Holder signal ] to alter between the following options:

- '-': No screwdriver holder signal is considered. The screwdriver initializes and starts directly if the configured program start signal is 'Holder'.
- 'Dig. input 2': The screwdriver holder signal connected to digital input 2 is considered.
- 'Internal': The internal screwdriver holder signal is considered.
- 'ZIP41-5': This setting enables the use of the holder for 4 heads ZIP41 (refer to chapter **11.4 Holder for 4 heads ZIP41**) and activates automatic program selection of the programs 1 to 5 according to the currently used head (also refer to chapter **4.2.2 Selecting programs from the holder for 4 heads ZIP41**). The base head selects program 1 while the 4 external heads select programs 2 to 5. Depending on the configuration of ZIP input 2, the screwdriver holder signal of the head holder ZIP41 or the holder externally connected to the head holder ZIP41 is considered (refer to chapter **5.2.4 Function of ZIP41 input 2**).
- 'ZIP41-4': This setting enables the use of the holder for 4 heads ZIP41 (refer to chapter **11.4 Holder for 4 heads ZIP41**) and activates automatic program selection of the programs 1 to 4 according to the currently used head (also refer to chapter **4.2.2 Selecting programs from the holder for 4 heads ZIP41**). The base head serves as an alternative deposit position while the 4 external heads select programs 1 to 4. Depending on the configuration of ZIP input 2, the screwdriver holder signal of the head holder ZIP41 or the holder externally connected to the head holder ZIP41 is considered (refer to chapter **5.2.4 Function of ZIP41 input 2**).

The screwdriver holder signal **starts** the selected program only if the configured program start signal is 'Screwdriver holder' and the screwdriver holder signal is configured different than '-', while the screwdriver holder signal only **enables** external program start signals if the configured program start signal is 'Ext. signal edge' or 'Ext. signal state'.

In both cases no program can start as long as the screwdriver is placed in its holder and an already running program is even immediately aborted when the screwdriver is placed back to its holder, unless the holder signal is configured to '-'.





	This parameter needs to be configured to '-' in applications using an external host platform to command the eScrewSpeed via the digital I/O interface.
	Configured functions of the digital inputs 1 to 3 are no longer active when this parameter is set to 'ZIP41'. Use the configurable functions of ZIP41 inputs 1 to 2 instead.

### 5.2.3 Function of ZIP41 input 1

The digital input configuration of the ZIP41 digital inputs is used in infollowing situations:

- Connecting a start button or a double foot pedal to the ZIP41 inputs (refer to chapter **11.3 Start button / single and double foot pedal**)
- Commanding the eScrewSpeed by an external PLC platform by the ZIP41 inputs (refer to chapter **9.1 Commanding the eScrewSpeed via its digital parallel I/O interface**)

To set the appropriate configuration proceed as follows:

- 1)  [  ] in the main menu
- 2)  [ HARDWARE ]
- 3)  [ ZIP input 1 ] to alter the parameter between the following possibilities:

- ‘Start curr.prog’: Starts the currently selected eScrewSpeed program
- ‘Unscrew’: Starts the unscrewing function using the configured unscrewing parameters (refer to chapter **6.4 Configuration settings for « UNSCREWING »**)





The abortion of a running program or a running unscrewing function triggered by this digital input is dependent on the setting of the parameter ‘Program start signal’ (refer to chapter **6.1.2 Program start signal**), the parameter ‘Unscrewing mode’ (refer to chapter **6.4.1 Unscrew mode**) and the configured screwdriver holder signal (refer to previous chapter).

### 5.2.4 Function of ZIP41 input 2

In addition to the functions of ZIP41 input 1, ZIP input 2 enables the following feature:

- Connecting an external holder signal to the ZIP41

To set the appropriate configuration proceed as follows:

- 1)  [  ] in the main menu
- 2)  [ HARDWARE ]
- 3)  [ ZIP input 2 ] to alter the parameter between the following possibilities:





- ‘Start curr.prog’: Starts the currently selected eScrewSpeed program
- ‘Unscrew’: Starts the unscrewing function using the configured unscrewing parameters (refer to chapter **6.4 Configuration settings for « UNSCREWING »**)
- ‘Holder signal’: Considers the holder signal of the externally to the ZIP41 attached screwdriver holder for executing holder signal functions (refer to chapter **5.2.2 Screwdriver holder signal**).

The abortion of a running program or a running unscrewing function triggered by this digital input is dependent on the setting of the parameter ‘Program start signal’ (refer to chapter **6.1.2 Program start signal**), the parameter ‘Unscrewing mode’ (refer to chapter **6.4.1 Unscrew mode**) and the configured screwdriver holder signal (refer to previous chapter).



### 5.2.5 Vacuum control

The screwdriver's vacuum is controlled by an internal valve inside the control cabinet of the eScrewSpeed. To set the appropriate configuration proceed as follows:








- 1)  [  ] in the main menu
- 2)  [ HARDWARE ]
- 3)  [ Vacuum control ] to alter the parameter between the following possibilities:

'Always on':	The vacuum is activated as soon as the eScrewSpeed is powered on.
'Always off':	The vacuum is always deactivated
'While process':	The vacuum is activated at each start of a process and deactivated at the end of a process which means the vacuum is activated only while the process is running.

## 5.3 Motor calibration settings

### 5.3.1 Motor torque calibration

By using an external and calibrated torque meter this parameter allows to compensate for motor and control unit manufacturing tolerances in order to achieve better load torque precision:








- 1)  [  ] in the main menu
- 2)  [ HARDWARE ]
- 3)  [ MOTOR CALIBRATION ]
- 4)  [ Torque calibration ] to adjust the value using the slider displayed, confirm by  [  ]



This calibration value is only valid for the specific motor / control unit combination used during the calibration process. It **must** be re-evaluated each time the motor is changed.

### 5.3.2 Periodic calibration of screwdriver motor's idle torque [process]

An automatic calibration of the motor's idle torque is performed each time the eScrewSpeed is powered-on or when reconnecting a motor. Additionnally it is possible to perform a periodic calibration after a configurable number of screwing process:

- 1)  [  ] in the main menu
- 2)  [ HARDWARE ]
- 3)  [ MOTOR CALIBRATION ]
- 4)  [ Idle calib. after ] to adjust the value using the slider displayed, confirm by  [  ]



The periodic calibration is only performed after the configured number of screwing operations, once the screwdriver has been placed back to its holder.




## 6 Program specific configuration settings

The program specific configuration settings can also be viewed and modified using the eScrew Commander Software (refer to chapter *10.5 Configuring the eScrew's parameters using the eScrew Commander*).

### 6.1 General program settings

#### 6.1.1 Application type selection (Screw / Wind / Measure / ...)

















The parameter "Application" is only visible if there is at least one activated application license installed on the eScrew. It defines which type of application is assigned to and executed by the selected program.



- 1)  [  ] in the main menu
- 2)  [ Application ] to alter between applications



#### 6.1.2 Program start signal

This parameters defines the signal source triggering a program start.




- 1)  [  ] in the main menu
- 2)  [ Start signal ] to alter the parameter between the following possibilities:

- 'Holder': The eScrewSpeed starts automatically the selected program when the screwdriver is taken out of its holder and stops after completion of the program. An automatic restart takes place as soon as the configured stop time has elapsed (refer to chapter **6.2.6 Stop time**).
-  [  ] enables the screw joint test and  [  ] alters the mode between screwing and unscrewing.
- 'Digital input edge': The eScrewSpeed starts the program by a **positive edge** of an external start signal (pedal, start button or PLC) applied to one of its digital parallel inputs (Refer to chapter **5.2.1 Function of digital parallel inputs 1 to 3** to configure the digital inputs). The program remains running even if the external signal state goes to inactive level and stops after completion of the application.
- In this configuration the program can alternatively be started by  [  ],  [  ] enables the screw joint test, and  [  ] alters the mode between screwing and unscrewing.
- 'Digital input state': The eScrewSpeed starts the selected program by the **active state** (24V DC) of an external start signal (pedal, start button) applied to one of its digital parallel inputs (refer to chapter **5.2.1 Function of digital parallel inputs 1 to 3** to configure the digital inputs) which must remain active in order to complete the application. The program is aborted as soon as the external signal is goes to inactive level. After completion of the program the external signal needs to go to inactive level and be re-activated again in order to restart the application.
- In this configuration the program can alternatively be started by  [  ],  [  ] enables the screw joint test, and  [  ] alters the mode between screwing and unscrewing.

A running program can always be aborted by placing the screwdriver back to its configured holder (refer to chapter **5.2.2 Screwdriver holder signal**), by  [  ] or by a configured abort signal on one of the digital inputs (refer to chapter **5.2.1 Function of digital parallel inputs 1 to 3**).

	Independently of the setting of the program start signal the program can only start if the configured screwdriver holder signal is NOT interrupted (refer to chapter <b>5.2.2 Screwdriver holder signal</b> ).
	This parameter needs to be configured to 'ext. signal edge' when connecting a PLC to command the eScrewSpeed via the digital I/O interface (refer to chapter <b>5.2.1 Function of digital parallel inputs 1 to 3</b> ).


### 6.1.3 Direction of rotation {basic}

- 1)  [  ] in the main menu
- 2)  [ Direction of rotation ] to alter the parameter between 'CW' and 'CCW':

If configured 'CCW' the screwdriver will turn counter clockwise during the screwing process and clockwise during unscrewing which would correspond to left hand threads.





## 6.2 Configuration settings for « SCREWING »


These parameters apply when using a screwing application. Refer to chapter **6.1.1 Application type selection (Screw / Wind / Measure / ...)** in order to select the screwing application. A typical screwing application consists of the screwing sub-process followed by the screw joint test sub-process. In order to improve productivity the screw joint test sub-process can be disabled (refer to chapter **6.3.1 Test interval**) while for pure screw joint tests the screwing sub-process can be disabled (see chapter below).

	The eScrewSpeed starts drawing and recording the current torque applied to the motor shaft only after having detected a factory defined minimal torque relative to the connected motor type.
---	--

### 6.2.1 Screwing sub-process enable


The screwing sub-process can be disabled in order to uniquely check weather an already tightened screw is properly tightened by performing a screw joint test, without previously carrying out a screw tightening operation on this same screw.

- 1)  [  ] in the main menu
- 2)  [ SCREWING ]
- 3)  [ Screwing process ] to alter the parameter between 'Yes' (enable screwing sub-process) and 'No' (disable screwing sub-process)







	The check interval needs to be set to 1 (refer to chapter <b>6.3.1 Test interval</b> ) when disabling the screwing process.
--	---

### 6.2.2 Screwing speed [rpm] {basic}

Depending on a wide number of factors this value has to be set for each type of screwing joint separately, by seeking the desired trade-off between screwing torque precision and productivity. The lower the speed adjustment, the more precise the screwing torque result (also refer to chapters **6.2.4 Pre-torque** and **6.2.5 Screwing torque**).

- 1)  [ Speed ] in the main menu to adjust the speed in rpm using the slider displayed


An alternative way to configure speed is:

- 1)  [  ] in the main menu
- 2)  [ SCREWING ]
- 3)  [ Speed ] to adjust the value using the slider displayed, confirm by  [  ]



### 6.2.3 Screwing torque {basic}





Best results concerning screwing torque precision are obtained when the used screwdriver type is used in the upper region of its torque range. For this reason, never use an overdimensioned screwdriver type in respect to the desired screwing joint.

When using screwing torques between the specified maximum and the peak torque value (refer to chapter **11.2.1 Overview of available eScrewSpeed screwdrivers**), the limit of the adjustable screwing torque duration is automatically reduced in order to prevent thermal motor overload.

- 1)  [ Torque ] in the main menu to adjust the desired screwing torque using the slider displayed.

An alternative way to configure the desired screwing torque is:







- 1)  [  ] in the main menu

- 2)  [ SCREWING ]
- 3)  [ Torque ] to adjust the value using the slider displayed, confirm by  [  ]

Refer to chapter **5.1.3 Physical unit for torques** to adjust the physical unit of all torques displayed.

### 6.2.4 Pre-torque {basic}







The screwdriver reduces its speed to a factory defined, screwdriver specific minimal speed as soon as this configured pre-torque value is reached (adjustable from 10 to 100 % of the adjusted desired screwing torque). This prevents exceeding the adjusted screwing torque, induced by the screwdriver's rotor inertia within certain limits, why never an overdimensioned screwdriver type should be used. Depending on a wide number of mechanical factors concerning the used materials for the screw and the thread, this value has to be individually set for each type of screwing joint by seeking the desired trade-off between screwing torque precision and productivity. The lower the adjusted pre-torque value, the more precise the screwing torque result. Main factors influencing the screwing torque precision are screwing speed, hardness of materials (screw and thread) and inertia of the screwdriver's rotor itself just to number a few (also refer to chapters **6.2.2 Screwing speed** and **6.2.5 Screwing torque**). In order to achieve acceptable productivity, cutting screws need pre-torque values of at least 50%.

- 1)  [  ] in the main menu
- 2)  [ SCREWING ]
- 3)  [ Pre-torque ] to adjust the value using the slider displayed, confirm by  [  ]

### 6.2.5 Screwing torque duration [ms] {basic}







This is the duration for which the screwdriver holds its torque after having reached the adjusted desired screwing torque. The limit of the adjustable screwing torque duration is automatically reduced when using screwing torques between the specified maximum and the peak torque value (refer to chapter **11.2.1 Overview of available eScrewSpeed screwdrivers**) in order to prevent thermal motor overload.


The eScrewSpeed monitors during this phase all eventual torque drops (refer to chapter **6.2.7 Tolerated torque drop [%] {basic}**) and indicates accordingly the screwing result. Depending on a wide number of mechanical factors concerning the used materials for the screw and the thread, this value has to be individually set for each type of screwing joint by seeking the desired trade-off between screwing torque precision and productivity. The longer this duration, the more precise the screwing torque result (also refer to chapters **6.2.4 Pre-torque** and **6.2.2 Screwing speed**).

- 1)  [  ] in the main menu
- 2)  [ SCREWING ]
- 3)  [ Torque duration ] to adjust the value using the slider displayed, confirm by  [  ]

### 6.2.6 Stop time between screwing processes [ms] {basic}







The stop time defines the minimum time between two consecutive processes. In automatic program start mode (refer to chapter **6.1.2 Program start signal**) the next process automatically starts after the configured stop time has elapsed. It is adjustable between 0 and 2000 ms in steps of 100 ms:


- 1)  [  ] in the main menu
- 2)  [ SCREWING ]
- 3)  [ Stop time ] to adjust the value using the slider displayed, confirm by  [  ]

	<p>If the stop time is set to a value different than 0, the eScrewSpeed tests if the screwdriver's blade is blocked at process start and displays an error message in such a case.</p> <p>This control mechanism is disabled when setting the stop time to 0.</p>
---	---

### 6.2.7 Tolerated torque drop [%] {basic}


The tolerated torque drop defines the maximum torque drop allowed, relative to the desired screwing torque during the screwing torque duration (refer to chapter **6.2.5 Screwing torque duration [ms] {basic}**) and relative to the lower limit torque during the test torque duration (refer to chapter **6.3.3 Test torque duration [ms]**):

- 1)  [  ] in the main menu
- 2)  [ SCREWING ]
- 3)  [ Tolerated torque drop ] to adjust the value using the slider displayed, confirm by   
[  ]

	<p>The lower this value is chosen, the less torque drop will be tolerated.</p> <p>If this value is chosen too high, the screwing joint might not be sufficiently tightened but evaluated as sufficient. If it is chosen too low, a sufficiently tightened screw joint might be evaluated as insufficient.</p>
---	---






### 6.2.8 Configuration settings for « SELF-CUTTING »

When using self-cutting screws the cutting start can be detected due to the remarkable load change upon screw engagement. Therefore the screwing angle of engagement can be controlled and an error message is displayed if the screw couldn't be tightened within a configurable angle tolerance (refer to chapters **6.2.8.3 Screwing angle [angle units]** and **6.2.8.4 Angle tolerance [angle units]**).

	<p>Screws do not necessarily cause the expected load change under all conditions due to manufacturing tolerances and uncleanness of screws and holes.</p> <p>Especially when using <b>no</b> self-cutting screws in threads the load change upon screw engagement usually isn't remarkable enough in order to use this feature.</p>
---	---





#### 6.2.8.1 Self-cutting sub-process enable




The self-cutting screw sub-process must be enabled in order to detect the screw's cutting start (refer to next chapter).

- 1)  [  ] in the main menu
- 2)  [ SCREWING ]
- 3)  [ SELF-CUTTING ]
- 4)  [ Self-cutting process ] to alter the parameter between 'Yes' (enable self-cutting sub-process) and 'No' (disable self-cutting sub-process)

#### 6.2.8.2 Self-cutting start torque [%]








This is the torque threshold in % of the configured screwing torque used to detect the screw's cutting start.

- 1)  [  ] in the main menu
- 2)  [ SCREWING ]
- 3)  [ SELF-CUTTING SCREWS ]

- 4)  [ Cutting start torque ] to adjust the value using the slider displayed, confirm by  [  ]








### 6.2.8.3 Screwing angle [angle units]

This is the desired angle to tighten a screw after screw engagement detection. A screwing joint is accepted if the screw was tightened with this configured angle. A tolerance to this value needs to be configured as it is very unlikely that a screw was tightened after precisely this configured angle (refer to chapter **6.2.8.4 Angle tolerance [angle units]**).

- 1)  [  ] in the main menu
- 2)  [ SCREWING ]
- 3)  [ SELF-CUTTING SCREWS ]
- 4)  [ Angle ] to adjust the value in the configured angle unit (refer to chapter **5.1.4 Physical unit for angles**) using the slider displayed, confirm by  [  ].


### 6.2.8.4 Angle tolerance [angle units]

This is a  $\pm$  tolerance value in respect to the configured screwing angle (refer to chapter **6.2.8.3 Screwing angle [angle units]**) defining the range of an acceptable screwing angle. An error message is displayed if the screw couldn't be tightened within this range.

- 1)  [  ] in the main menu
- 2)  [ SCREWING ]
- 3)  [ SELF-CUTTING SCREWS ]
- 4)  [ Angle tolerance ] to adjust the value in the configured angle unit (refer to chapter **5.1.4 Physical unit for angles**) using the slider displayed, confirm by  [  ].

**Value example:**

If the configured screwing angle is 10 turns and the configured acceptable tolerance for screwing angle is 2 turns, then the acceptable range is between 8 and 12 turns. An error message is displayed if a screw is tightened outside this range.







	In most applications this tolerance needs to be configured higher than 0 in order to prevent useless error messages.
---	--




### 6.3 Configuration settings for « SCREW JOINT TEST »





#### 6.3.1 Test interval

The test interval defines the number of screw joints on which, after completion of the screwing sub-process, a screw joint test sub-process is automatically performed by using the configured test mode (refer to chapter **6.3.2 Test mode**). A value of 1 means each screw joint is tested after the screwing sub-process, 2 means each second screw joint is tested and a value of 0 means that the screw joint test sub-process is always skipped (disabled).

- 1)  [  ] in the main menu
- 2)  [ SCREW JOINT TEST ]
- 3)  [ Test interval ] to adjust the value using the slider displayed and confirm by  [  ]


	The parameter value needs to be configured to '0' when commanding the eScrewSpeed by an external host platform (refer to chapter <b>9 Commanding the eScrewSpeed by an external host platform</b> ).
---	--

#### 6.3.2 Test mode

- 1)  [  ] in the main menu
- 2)  [ SCREW JOINT TEST ]
- 3)  [ Test mode ] to alter the parameter between 'Until lower limit' and 'Until loosening':

'Until lower limit': The eScrewSpeed applies the configured lower limit torque (refer to chapter **6.3.5 Lower limit torque**) for a configured amount of time to the screw joint (refer to chapter **6.3.3 Test torque duration [ms]**) in order to test its tightness. The joint is considered 'good' if the screw could not be loosened under these conditions.

'Until loosening': The eScrewSpeed ramps up torque slowly until the screw joint is loosened. This loosening torque is detected, displayed and compared to the configured torque limits (refer to chapter **6.3.5 Lower limit torque** and **6.3.6 Upper limit torque**). The screw joint is considered 'good' if the detected loosening torque is located between the two limits.







	When the screw joint is too tight, so it can not be loosened even by applying the max. torque of the connected screwdriver, then the eScrewSpeed displays the maximum torque instead of the loosening torque.
---	---

'In tight. direction': The eScrewSpeed retightens the screw using the torque defined by the lower limit torque parameter and the test torque duration parameter (refer to chapter **6.3.5 Lower limit torque** and **6.3.3 Test torque duration [ms]**) while observing if there is slippage during this process. The screw joint is considered 'good' if the detected slippage angle is lower than or equal to the configured slippage tolerance (refer to chapter **6.3.4 Tolerated slippage angle [°]**).

After each screw joint test a configurable action can be executed in function of the test result evaluation 'good' or 'bad' (refer to chapters **6.3.7 Function if test result is 'OK'** and **6.3.8 Function if test result is 'NOK'**).







### 6.3.3 Test torque duration [ms]


This is the adjustable duration between 100 and 2000 ms for which the eScrewSpeed applies the lower torque (refer to chapter **6.3.5 Lower limit torque**) to the screw joint in order to test its tightness during the test mode 'Until lower limit' or 'In tight. direction' (refer to chapter **6.3.2 Test mode**).

- 1)  [  ] in the main menu
- 2)  [ SCREW JOINT TEST ]
- 3)  [ Torque duration ] to adjust the value using the slider displayed, confirm by  [  ]

### 6.3.4 Tolerated slippage angle [°]

This defines the tolerated slippage angle during a screw joint test in tightening direction (refer to chapter **6.3.2 Test mode**).

- 1)  [  ] in the main menu
- 2)  [ SCREW JOINT TEST ]
- 3)  [ Tol.slippage angle ] to adjust the value using the slider displayed, confirm by  [  ]







	If this value is set too low, then even a screwdriver rotation produced by the operator's hand can lead to a 'bad' test result evaluation.
---	--


### 6.3.5 Lower limit torque

Depending on the configured test mode (refer to chapter **6.3.2 Test mode**) this lower limit torque parameter has a slightly different meaning:

If test mode is:

- 'Until lower limit' The lower limit torque represents the max. torque applied during the screw joint test.
- 'Until loosening' The lower limit torque represents the lower torque used to evaluate the screw joint test result after the screw was loosened.

- 1)  [  ] in the main menu
- 2)  [ SCREW JOINT TEST ]
- 3)  [ Lower limit trq ] to adjust the value using the slider displayed, confirm by  [  ]







	The value cannot be set higher than the configured upper limit torque.
---	--

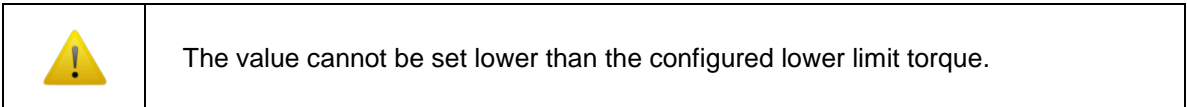
After each screw joint test a configurable action can be executed in function of the test result evaluation 'good' or 'bad' (refer to chapters **6.3.7 Function if test result is 'OK'** and **6.3.8 Function if test result is 'NOK'**). Refer to chapter **6.3.2 Test mode** to understand how test results are evaluated.

Refer to chapter **5.1.3 Physical unit for torques** to adjust the physical unit of all torques displayed.

### 6.3.6 Upper limit torque

The upper limit torque is used only in test mode 'Until loosening' (refer to chapter **6.3.2 Test mode**) in order to evaluate the screw joint test result.





- 1)  [  ] in the main menu
- 2)  [ SCREW JOINT TEST ]
- 3)  [ Upper limit trq ] to adjust the value using the slider displayed, confirm by  [  ]



After each screw joint test a configurable action can be executed in function of the test result evaluation 'good' or 'bad' (refer to chapters **6.3.7 Function if test result is 'OK'** and **6.3.8 Function if test result is 'NOK'**). Refer to chapter **6.3.2 Test mode** to understand how test results are evaluated.

Refer to chapter **5.1.3 Physical unit for torques** to adjust the physical unit of displayed torques.





### 6.3.7 Function if test result is 'OK'

- 1)  [  ] in the main menu
- 2)  [ SCREW JOINT TEST ]
- 3)  [ If test OK ] to alter between the following possibilities:

- 'No action': The screw joint test is terminated with no further action after test result evaluation
- 'Loosen angle': The screw is loosened by always applying unscrew mode 'Def. angle' (refer to chapter **6.4 Configuration settings for « UNSCREWING »**)
- 'Screw': The screw is rescrewed using the configured settings for screwing (refer to chapter **6.2 Configuration settings for « SCREWING »**)

Refer to chapter **6.3.2 Test mode** to understand how test results are evaluated.

### 6.3.8 Function if test result is 'NOK'



- 1)  [  ] in the main menu
- 2)  [ SCREW JOINT TEST ]
- 3)  [ If test NOK ] to alter between the following possibilities:

- 'No action': The screw joint test is terminated with no further action after test result evaluation
- 'Loosen angle': The screw is loosened by always applying unscrew mode 'Def. angle' (refer to chapter **6.4 Configuration settings for « UNSCREWING »**)
- 'Screw': The screw is rescrewed using the configured settings for screwing (refer to chapter **6.2 Configuration settings for « SCREWING »**)

Refer to chapter **6.3.2 Test mode** to understand how test results are evaluated.





## 6.4 Configuration settings for « UNSCREWING »

Several events can trigger the unscrewing function:

-  [  ]
- Applying an active signal on a digital parallel input configured as 'unscrew' (refer to chapter **5.2.1 Function of digital parallel inputs 1 to 3**)
- A 'Loosen angle' function as a result of a screw joint test (refer to chapters **6.3.7 Function if test result is 'OK'** and **6.3.8 Function if test result is 'NOK'**). In this event, always the unscrew mode 'Def. angle' is applied.
- A successfully terminated screwing cycle if unscrew mode 'after screwing' is configured (refer to chapter **6.4.1 Unscrew mode**)

All of these events consider the unscrew speed parameter as unscrew speed. The abortion of a running unscrewing function is dependent on the setting of the parameter 'Program start signal' (refer to chapter **6.1.2 Program start signal**), the parameter 'Unscrewing mode' and the triggering event.

### 6.4.1 Unscrew mode







- 1)  [  ] in the main menu
- 2)  [ UNSCREWING ]
- 3)  [ Unscrew mode ] to alter between the following possibilities:

- 'Def. angle': The screw is unscrewed for the configured unscrew angle by applying the parameters for 'Speed' and 'Unscrew angle' (refer to the chapters below).
- 'while pedal': The screw is unscrewed as long as the pedal is pressed by applying the unscrew speed parameter only. The unscrew angle parameter is ignored.
- 'after screwing': The screw is unscrewed for the configured unscrew angle by applying the parameters for 'Speed', 'Unscrew angle' and 'Backlash' (refer to the chapters below) immediately after the successfully executed screwing process. The parameter for the test interval (refer to chapter **6.3.1 Test interval**) is automatically set to 0 in this case, which means that the screw joint test sub-process is always skipped (disabled).









An unscrew function triggered by a screw joint test always applies unscrew mode 'Def. angle', independently of the setting of the unscrewing mode.

### 6.4.2 Unscrew speed [rpm] {basic}







- 1)  [  ] in the main menu
- 2)  [ UNSCREWING ]
- 3)  [ Speed ] to adjust the value using the slider displayed, confirm by  [  ]

### 6.4.3 Unscrew angle [angle units]

- 1)  [  ] in the main menu
- 2)  [ UNSCREWING ]
- 3)  [ Unscrew angle ] to adjust the value in the configured angle unit (refer to chapter **5.1.4 Physical unit for angles**) using the slider displayed, confirm by  [  ].

#### 6.4.4 Backlash compensation [degrees]


The defined value for backlash compensation is systematically added to the defined unscrew angle value (refer to **6.4.3 Unscrew angle [angle units]**) in order to compensate for backlash.

- 1)  [  ] in the main menu
- 2)  [ UNSCREWING ]
- 3)  [ Backlash comp. ] to adjust the value in degrees using the slider displayed, confirm by   
[  ].

## Configuration settings for « WINDING »





These parameters apply when using a winding application (under development, not implemented yet). Refer to chapter **6.1.1 Application type selection (Screw / Wind / Measure / ...)** in order to select the winding application.

The winding application consists of the pre-wind sub-process, which is mainly used to engage the screwdriver with the watch crown, followed by the wind sub-process execution itself. The operation mode of the wind sub-process can be configured in order to wind until either a configurable angle or a configurable end torque (refer to the chapter below).

	<p>During pre-wind only the configured upper limit torque is taken into account by the eScrewSpeed. The lower limit torque is neglected as the starting torque might be lower than the configured lower limit torque.</p>
---	---

### 6.4.5 Wind mode

The wind mode determines which parameter is considered as the end condition for the wind sub-process:







-  [  ] in the main menu
-  [ WINDING ]
-  [ Mode ] to alter between the following possibilities:

‘Until defined angle’: The wind sub-process executes until the configured angle is reached unless the wind torque falls below the configured lower limit torque or exceeds the configured upper limit torque before. In such cases dedicated error messages are displayed (refer to chapter **13 Error diagnostics**).

‘Until upper limit trq’: The wind sub-process executes until the configured upper limit torque is reached unless the wind torque falls below the configured lower limit torque or the wind angle reaches the configured wind limit angle before (time-out). In such cases dedicated error messages are displayed (refer to chapter **13 Error diagnostics**).







### 6.4.6 Wind speed [rpm]

The configured wind speed is considered during both, pre-wind and wind sub-process execution.

- 1)  [  ] in the main menu
- 2)  [ WINDING ]
- 3)  [ Speed ] to adjust the value using the slider displayed, confirm by  [  ]

### 6.4.7 Pre-wind angle [angle units]

The pre-wind angle parameter is considered during pre-wind sub-process execution and is defined in the configured angle unit (refer to chapter **5.1.4 Physical unit for angles**). It cannot be set to 0 as this assures the proper engagement of the screwdriver with the watch crown.







- 1)  [  ] in the main menu
- 2)  [ WINDING ]
- 3)  [ Pre-wind ] to adjust the value using the slider displayed, confirm by  [  ]

### 6.4.8 Wind / Wind limit angle [angle units]

The wind / wind limit angle parameter is considered during wind sub-process execution, is defined in the configured angle unit (refer to chapter **5.1.4 Physical unit for angles**) and has a different meaning dependent on the currently configured wind mode. For wind mode:







'Until defined angle' The configured number defines the desired wind angle to reach.

'Until upper limit trq' The configured number serves as a protection (time-out). If the wind angle limit is reached before the configured upper limit torque, then the current process is immediately stopped and a dedicated error message is displayed. A possible cause may be a broken watch spring.

- 1)  [  ] in the main menu
- 2)  [ WINDING ]
- 3)  [ Wind / Wind limit ] to adjust the value using the slider displayed, confirm by  [  ]

### 6.4.9 Lower limit torque

If the torque during wind sub-process execution drops below this configured lower limit, then the current process is immediately stopped and a dedicated error message is displayed. A possible cause may be a broken watch spring.

- 1)  [  ] in the main menu
- 2)  [ WINDING ]
- 3)  [ Lower limit trq ] to adjust the value using the slider displayed, confirm by  [  ]







Refer to chapter **5.1.3 Physical unit for torques** to adjust the physical unit of all torques displayed.

### 6.4.10 Upper limit torque

The upper limit torque parameter is considered during both, pre-wind and wind sub-process execution and has a different meaning dependent on the currently configured wind mode. For wind mode:

'Until wind turns' The upper limit torque serves as a protection. If the torque during the pre-wind or the wind sub-process rises above this configured upper limit, then the current process is immediately stopped and a dedicated error message is displayed. A possible cause may be a blocked watch spring.

'Until upper limit trq' The upper limit torque defines the desired torque value to reach.

- 1)  [  ] in the main menu
- 2)  [ WINDING ]
- 3)  [ Upper limit trq ] to adjust the value using the slider displayed, confirm by  [  ]

Refer to chapter **5.1.3 Physical unit for torques** to adjust the physical unit of all torques displayed.

## 7 Handling access permissions

All access to the various menus and parameters including the main menu navigation can individually be configured for different user's. User names can be chosen as needed. The name of the currently active user is always displayed in the lower right corner of the status bar.



Access permissions can only be configured by connecting the permissions dongle to the RS232 serial interface of the eScrewSpeed.





The defined user access permissions are saved in a dedicated directory on the microSD card (refer to chapter **2.5 MicroSD card** for more details concerning other data stored on the eScrewSpeed's microSD card). For copying access permissions from one eScrewSpeed to another refer to chapter **12.1.4 Copying the configuration settings from one eScrewSpeed to another using the microSD card**.

The access permissions can also be viewed and modified using the eScrew Commander Software (refer to chapter **10.5 Configuring the eScrew's parameters using the eScrew Commander**).

### 7.1 Configuring access permissions of the current user

#### 7.1.1 Start configuring the current user's access permissions




To start editing the current user's access permissions proceed as follows:


- 1)  [  ] in the main menu
- 2)  [ ACCESS PERMISSIONS ]
- 3)  [ Configure current user ]

Now the text string 'EDIT' appears alternatingly with the current user's name in the status bar indicating the successful entering of the access permissions configuration mode.

#### 7.1.2 Configuring the current user's access permissions


Navigation during access permissions configuration mode is identical to the navigation in normal operation mode except for the main menu, which is structured in text form rather than graphical. The symbols displayed at the right of each parameter/menu represent the current access permissions:

- [  ] Parameter/menu is hidden
- [  ] Parameter/menu is viewed but locked (read only)
- [  ] Parameter/menu is editable (read and write access)

Repeated  on one of these symbols alters between these available access permissions.





#### 7.1.3 Exiting configuration of the current user

Exiting the configuration mode saves the currently active access permissions to the current user. To exit the configuration mode proceed as follows:

- 1) return to the 'ACCESS PERMISSIONS' menu
- 2)  [ Exit configuration ]







### 7.1.4 Granting all access for the current user

- 1)  [  ] in the main menu
- 2)  [ ACCESS PERMISSIONS ]
- 3)  [ All access for current user ]



Using this function overwrites all previously made access permissions of the current user.





### 7.2 Save the currently active access permissions to an existing user

- 1)  [  ] in the main menu
- 2)  [ ACCESS PERMISSIONS ]
- 3)  [ Save current user ]
- 4) Select a user from the displayed list in order to save the currently active access permissions to an existing user.









Using this function overwrites all previously made access permissions of the selected user.

### 7.3 Switch to another existing user





- 1)  [  ] in the main menu
- 2)  [ ACCESS PERMISSIONS ]
- 3)  [ Switch user ]
- 4) Select a user from the displayed list in order to switch between users.

### 7.4 Create a new user

The new user is created using the currently active access permissions:

- 1)  [  ] in the main menu
- 2)  [ ACCESS PERMISSIONS ]
- 3)  [ Create new user ]
- 4) Enter the new user name using the virtual keyboard, confirm by  [  ]

### 7.5 Delete an existing user

- 1)  [  ] in the main menu
- 2)  [ ACCESS PERMISSIONS ]
- 3)  [ Delete a user ]
- 4) Select a user from the displayed list in order to permanently delete an existing user

## 8 Logging process log data

Process log data of the eScrewSpeed can be logged in many ways:

- In a file on the eScrewSpeed's microSD card
- Sending it via the RS232 serial interface to a printer
- Sending it via the Ethernet interface to a PC platform with an installed eScrew Commander Software
- Sending it via the Ethernet interface to a server platform with an installed Lec-Uni-Server Software

All these means of logging process log data can be used simultaneously and always use the same data format.

### 8.1 Format of process log data

Process data is logged after completion of the current application process (screw, wind, measure, ...) using ASCII characters and is sent in the following order, separated by semicolons:

- 1) Name of eScrewSpeed
- 2) Current date [dd:mm:yy]
- 3) Current time [hh:mm:ss]
- 4) Name of current program set
- 5) Currently used application type (abbreviated) followed by the name of the current program:
  - S: Screwing
  - W: Winding
  - M: Measureing
- 6) Screwing torque <sup>1</sup>
- 7) Torque <sup>1</sup> of screw joint test (0 when no screw joint test was performed)
- 8) Rescrewing torque <sup>1</sup> (equal to screwing torque when no rescrewing was performed or when the screw joint test result evaluation was 'NOK')
- 9) Torque unit configured by the physical torque unit parameter (refer to chapter **5.1.3 Physical unit for torques**)
- 10) Process result evaluation (OK, NOK, ABORTED, ERROR)

<sup>1</sup> All torques are transmitted in the unit configured by the physical torque unit parameter (refer to chapter **5.1.3 Physical unit for torques**).

#### Examples of a logged process data records of a screwing application with screw joint test:

```
eScrewSpeed00052;28.01.2015;19:41:03;STANDARD;S:Prog 3; 24.3; 24.0; 24.2;mNm;OK  
eScrewSpeed00052;28.01.2015;19:41:21;STANDARD;S:Prog 3; 24.1; 12.0; 24.1;mNm;NOK
```

#### Example of a logged process data record of a screwing application without screw joint test:





```
eScrewSpeed00052;28.01.2015;19:41:03;STANDARD;S:Prog 3; 24.3; 0.0; 24.3;mNm;OK
```

Additionally to this process data, the eScrewSpeed can also send the timing diagram of measured torques after completion of the current application process (screw, wind, measure, ...) via the Ethernet interface (available only in conjunction with the eScrew Commander Software).

## 8.2 Logging process log data in a file on the eScrewSpeed's microSD card

When this feature is enabled the eScrewSpeed generates for each day a separate log file of the type .csv containing the logs of all application processes (screw, wind, measure, ...) executed on that particular day.

To enable saving the logged data on the eScrew's microSD card proceed as follows:

- 1)  [  ] in the main menu
- 2)  [ DATA LOGGING ]
- 3)  [ Save log to  $\mu$ SD card ] to set this parameter to 'Yes'

Refer to chapter **8.1 Format of process log data** for a detailed description of the saved data format. The log file names contain the date and are stored in a directory containing the year in its name.

### Data tree example on the eScrewSpeed's microSD card

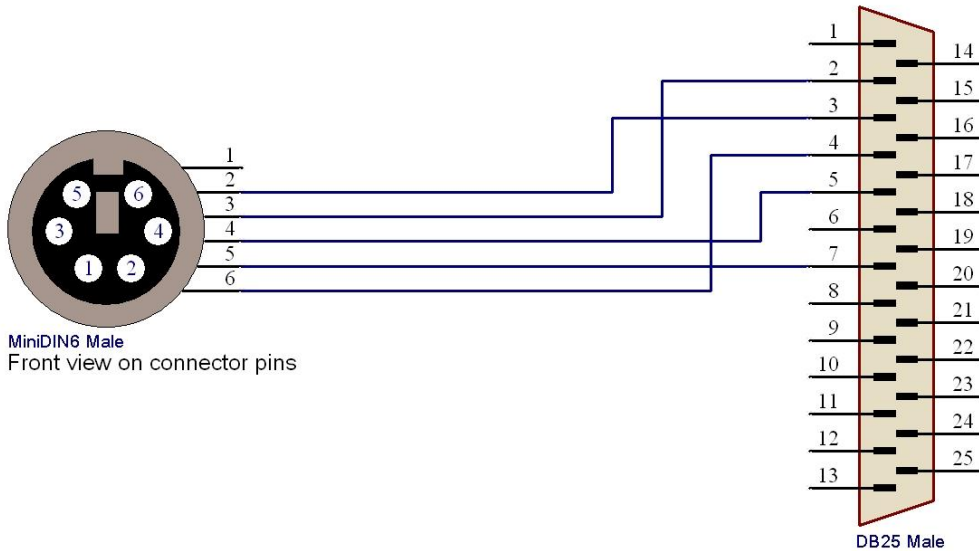
<u>Directories</u>	<u>Files</u>
RESULTS2014	Res31122014.csv
RESULTS2015	Res29072015.csv Res30072015.csv Res31072015.csv

### 8.3 Sending process log data to a printer via the RS232 serial interface

The eScrewSpeed can automatically send the logged data records to a serial printer at the end of each process cycle.

#### 8.3.1 Cable connection

Following typical schematic applies for printer connection:



Lécureux SA recommends using the accessory cable, Article No 8900.600.024

#### 8.3.2 eScrewSpeed settings for printing process log data

To enable sending the process log data to a serial printer via the eScrew’s RS232 serial interface proceed as follows:

- 1) [ ] in the main menu
- 2) [ DATA LOGGING ]
- 3) [ Print log ] to set this parameter to ‘Yes’

Refer to chapter **8.1 Format of process log data** for a detailed description of the printed data format.

	<p>The eScrew’s baudrate is 9’600 Bd by default and can only be modified by sending a system telegram (refer to chapter <b>14.4 System configuration telegrams</b>) either via the RS232 serial interface using the currently configured baudrate or via the Ethernet interface. For all configurable baudrates refer to chapter <b>15.4.2 RS232 protocol specification</b>.</p> <p>The currently configured baudrate can always be viewed in the system info screen (refer to chapter <b>12.1.7 System info</b>).</p>
--	--

#### 8.3.3 Printer settings

The printer’s serial port needs to be configured identically to the eScrew’s RS232 serial interface.

Lécureux SA recommends using the accessory printer Samsung Bixelon SRP500 SER black, Article No 9007.005.005.

### 8.4 Logging process log data via the Ethernet interface using the eScrew Commander Software

Additionally to the standard process log data (refer to chapter **8.1 Format of process log data**), the eScrewSpeed also sends the timing diagram of measured torques via its Ethernet interface to the eScrew Commander after completion of each application process (screw, wind, measure, ...). Torque values are in general transmitted in [1/100 Ncm] unless the physical torque unit is [gcm].

Refer to chapter **9.3 Commanding the eScrewSpeed via its Ethernet interface** for establishing and configuring the Ethernet connection and **10 eScrew Commander Software** for details on the eScrew Commander Software.






### 8.5 Logging process log data via the Ethernet interface onto an external log server platform


The eScrewSpeed can automatically send process log data (refer to chapter **8.1 Format of process log data**) to an external log server platform having installed the Lec-Uni-Server Software, version 1.4 or higher. A similar functionality can be achieved as well by using the eScrew Comander Software (refer to chapter **10.7.5 Modifying the continuous log file's name and location**). In contrast to the eScrew Commander Software, the Lec-Uni-Server Software is capable of simultaneously logging process log data of multiple eScrews but is not able to log the timing diagram data.






This logging of process log data works independently of the use of the eScrew Comander Software on another platform in combination with the same eScrew.

Therefore the IP address of the server platform is separately configured in the eScrewSpeed (log server's IP address), independently of the Ethernet settings in the system configuration.

#### 8.5.1 eScrewSpeed log server settings





- 1) Verify that all the general Ethernet connection requirements are met according to chapter **9.3.1 General Ethernet connection requirements**.
- 2) Verify that:
  - a) The eScrewSpeed has unrestricted access to the TCP port configured in the Lec-Uni-Server Software options.
  - b) The configured port is solely used by eScrewSpeed devices and by NO other devices nor programs.
- 3) Enable the data logging on an external log server platform:
  - a)  [  ] in the main menu
  - b)  [ DATA LOGGING ]
  - c)  [ LOG SERVER ]
  - d)  [ Send log to server ] to set this parameter to 'Yes'

	The Lec-Uni-Server Software needs to run on the log server prior to enabling this feature on the eScrewSpeed. Otherwise restart the eScrewSpeed after having started the Lec-Uni-Server Software on the log server platform.
---	--

- 4) Configure the other log server parameters:
  - a)  [ Server IP ] to set the IP address used by the eScrewSpeed when sending log data (log server's IP address)
  - b)  [ Server port ] to set the port number used by the eScrewSpeed when sending log data (log server's port according to the Lec-Uni-Server Software options)
  - c)  [ Start char ] to set the starting character to 1
  - d)  [ Separator char ] to set the separator character to 2
  - e)  [ End char ] to set the end character to 13

## 9 Commanding the eScrewSpeed by an external host platform

For the use in automation projects, using an external host platform like a PC or a PLC to command the eScrew, it can be desired to start-up the eScrewSpeed automatically with power-on:

- 1)  [  ] in the main menu
- 2)  [ HARDWARE ]
- 3)  [ Auto start-up ] to alter the parameter between the following possibilities:
  - 'Yes': automatically start-up when powered-on
  - 'No': start-up by tapping on touch screen

### 9.1 Commanding the eScrewSpeed via its digital parallel I/O interface

The digital parallel I/O interface allows the control of a process cycle by parallel start, abort and busy signals typically used by PLC's. Additionally a screw joint test can be forced with its respective evaluation result. Parameter settings cannot be read or modified via the digital parallel interface. This can only be done via the eScrew's RS232 serial interface or its Ethernet interface.

#### 9.1.1 Cable connection

Following typical schematic applies:




Lécureux SA recommends using the accessory cable, Article No 8900.600.025 (L=2m)

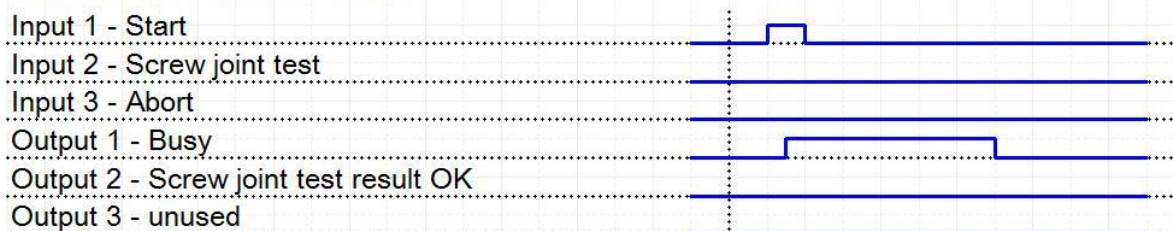
Refer to chapter **15.3.2 Internal circuit of the digital parallel I/O interface** for more details concerning the electrical specification of the eScrew's inputs / outputs.

#### 9.1.2 Timing diagram examples

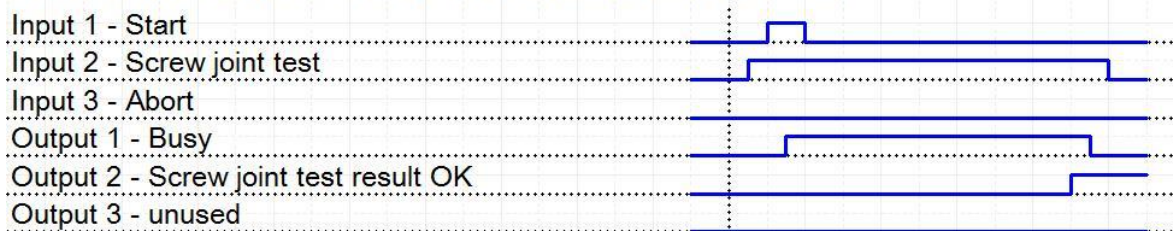
The eScrewSpeed's parameters need correctly to be set in order to obtain the expected reaction of the eScrewSpeed according to the timing diagrams below.

	Refer to chapters <b>5.2.1 Function of digital parallel inputs 1 to 3</b> , <b>6.1.2 Program start signal</b> and <b>6.3.1 Test interval</b> for an appropriate parameter setting.
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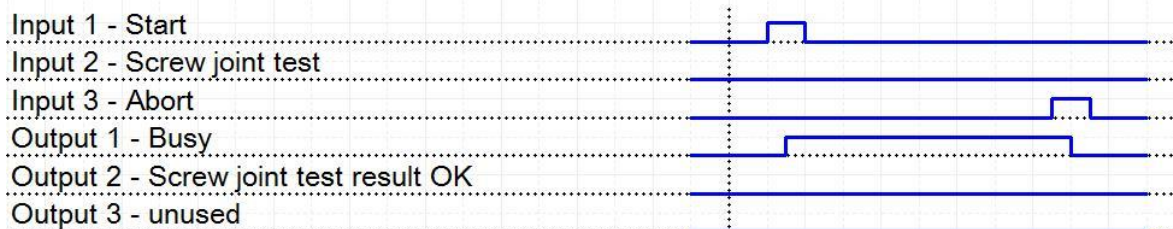
### PROCESS EXECUTION



### SCREWING PROCESS WITH SCREW JOINT TEST



### PROCESS ABORTION






### 9.2 Commanding the eScrewSpeed via its RS232 serial interface

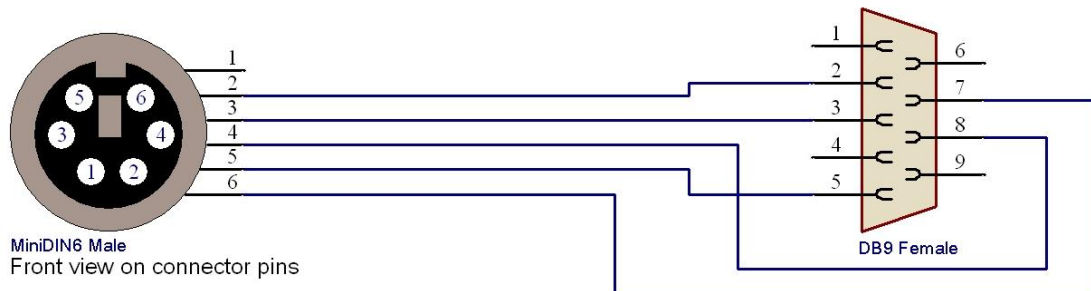
The RS232 serial interface of the eScrewSpeed features the following functionality:

- **Accessing eScrewSpeed parameters and selecting/starting programs from an external host platform.**  
Most eScrewSpeed functions and parameters may be accessed via the RS232 serial interface. This can either be done applying the serial communication telegrams (refer to chapter **14 Communication telegram specifications**) using an external host platform with a standard terminal program or a customer proprietary software solution installed.
- **Logging data by sending them to a serial printer.**  
Refer to chapter **8.3 Sending process log data to a printer via the RS232 serial interface**. Data of the eScrewSpeed can be logged in many other ways, too. For more details on data logging in general refer to chapter **8 Logging process log data**.

	The eScrewSpeed communicates only via its Ethernet communication interface with the eScrew Commander Software (refer to chapter <b>10 eScrew Commander Software</b> ).
---	--

#### 9.2.1 Cable connection





Following typical schematic applies for PC connection:




Lécureux SA recommends using the accessory cable, Article No 8900.600.017

#### 9.2.2 eScrewSpeed’s RS232 serial interface settings

To avoid printer telegrams to be sent via the RS232 serial interface, the data logging to a printer needs to be disabled:

- 1)  [  ] in the main menu
- 2)  [ DATA LOGGING ]
- 3)  [ Print log ] to set this parameter to ‘No’

	<p>The eScrewSpeed’s baudrate is 9’600 Bd by default and can only be modified by sending a system telegram (refer to chapter <b>14.4 System configuration telegrams</b>) either via the RS232 serial interface using the currently configured baudrate or via the Ethernet interface. For all configurable baudrates refer to chapter <b>15.4.2 RS232 protocol specification</b>.</p> <p>The currently configured baudrate can always be viewed in the system info screen (refer to chapter <b>12.1.7 System info</b>).</p>
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#### 9.2.3 Host’s RS232 port configuration

The host’s serial port needs to be configured identically to the eScrewSpeed’s RS232 serial interface.

Please contact the IT Services of your company if you don’t know how to carry out these serial interface configurations on your host’s operating system.



### 9.3 Commanding the eScrewSpeed via its Ethernet interface

In general, the eScrewSpeed acts as a single thread server and sends telegrams only as a reply to a client's request (for interface specifications refer to chapter **15.5 Ethernet interface specifications**). The only exception to this rule represents the transmission of process log data to an external log server platform (refer to chapter **8.5 Logging process log data via the Ethernet interface onto an external log server platform**).

The Ethernet interface is the eScrewSpeed's most advanced communication interface featuring the following functionality:

- **Accessing eScrewSpeed parameters and selecting/starting programs from an external host platform.**  
Most eScrewSpeed functions and parameters may be accessed via the Ethernet interface. This can either be done applying the serial communication telegrams (refer to chapter **14 Communication telegram specifications**) using an external host platform (stand alone or in a LAN) with an installed customer proprietary software solution or by installing the Lécureux's eScrew Commander software on such a platform (refer to chapter **10 eScrew Commander Software**).
- **Logging process log data onto an external host or a log server platform.**  
Refer to chapters **8.4 Logging process log data via the Ethernet interface using the eScrew Commander Software** and **8.5 Logging process log data via the Ethernet interface onto an external log server platform**.

Data of the eScrewSpeed can be logged in many other ways, too. For more details on data logging in general refer to chapter **8 Logging process log data**.

#### 9.3.1 General Ethernet connection requirements

##### 9.3.1.1 Connection cable

The type of cable to be used depends on whether the eScrewSpeed is connected directly or via an intermediate Ethernet switch to the host platform:

- **Direct connection:**  
a crossed RJ45 patch cable of type Cat 5e or higher needs to be used.
- **Via an intermediate Ethernet switch** (not necessarily within a company's network):  
an uncrossed RJ45 patch cable of type Cat 5e or higher needs to be used.

In case the host / Ethernet switch supports the "Auto MDI-X" standard, then both crossed and uncrossed cables can be used.

##### 9.3.1.2 Ethernet configuration

Following Ethernet configuration requirements need to be met:

- The eScrewSpeed's Ethernet interface is enabled.
- The eScrewSpeed's IP address is different than any other IP address in the network and must be reserved to the eScrewSpeed in an address range excluded from delivery by any DHCP server in the network.
- The eScrewSpeed's IP address resides within the external host platform's subnet address range, whether it is connected to a stand-alone external host platform or via a company's LAN.
- Unrestricted access is granted to the TCP and UDP ports used by the eScrewSpeed (refer to chapter **15.5.1 Ethernet protocol**), no other network device accesses these ports and no firewall (Windows® or other, anti-virus applications, hardware firewalls) is blocking the access to these ports.










As there are no DHCP mechanisms implemented in the eScrewSpeed it is the user's responsibility to correctly configure the IP addresses.

### 9.3.2 Using the Ethernet default settings

The Ethernet default settings are recommended when using a stand-alone external host or server platform.

Refer to the next chapter if your external host or server platform is connected to your company's LAN.

To set the eScrewSpeed's Ethernet factory settings proceed as follows:

- 1)  [  ] in the main menu
- 2)  [ SYSTEM ]
- 3)  [ ETHERNET ]
- 4)  [ Load factory settings ] and confirm by  [  ]

The Ethernet factory settings of the eScrewSpeed and the Ethernet default configurations of Windows® both use an IP address starting with 169.254 and the subnet mask 255.255.0.0 and therefore automatically reside, as required, within the same subnet address range:


	eScrewSpeed default setting	Windows® default configuration
IP address	169.254.x.y	169.254.i.j
Subnet mask	255.255.0.0	255.255.0.0
Obtain an IP address automatically	-	yes
Obtain DNS server address automatically	-	yes

Each purchased eScrewSpeed possesses a unique default IP address x.y (see table above) according to its unique MAC address, while Windows® attributes i.j randomly (according to prescription RFC3927).

In the coincidence that both IP addresses should be exactly identical, the x or y part of the eScrewSpeed's IP address needs to be changed (refer to the chapter below).






### 9.3.3 Modifying the eScrewSpeed's Ethernet settings

The eScrewSpeed's Ethernet default settings need to be modified when your external host or server platform can't use the Windows® Ethernet default configuration, which often is the case in LAN environments.

	The eScrewSpeed needs to be restarted after every modification of its Ethernet configuration settings in order to activate the new configuration.
---	---








#### 9.3.3.1 Enabling the eScrewSpeed's Ethernet interface

The eScrewSpeed's Ethernet interface, enabled by the factory settings, can manually be disabled as follows:

- 1)  [  ] in the main menu
- 2)  [ SYSTEM ]
- 3)  [ ETHERNET ]
- 4)  [ Ethernet ] to set this parameter to 'No'







### 9.3.3.2 Setting the eScrewSpeed's IP address, subnet mask and gateway

When connecting the eScrewSpeed to a company's LAN, please contact the IT Services of the company to obtain the correct IP address and subnet mask for your eScrewSpeed in order to configure the eScrewSpeed's Ethernet interface:

- 1)  [  ] in the main menu
- 2)  [ SYSTEM ]
- 3)  [ ETHERNET ]
- 4)  [ IP address ]
- 5) Enter the eScrewSpeed's IP address using the virtual keyboard and confirm by   
[  ]










When using the eScrew Commander Software, enter this IP address in the list of eScrewSpeeds (refer to chapter **10.2.1 Adding your eScrew to the list of eScrews**).

- 6)  [ Net mask ]
- 7) Enter the subnet mask using the virtual keyboard, confirm by  [  ]
- 8)  [ Gateway ]
- 9) Enter the gateway IP address using the virtual keyboard, confirm by  [  ]

### 9.3.3.3 Setting the NTP server's IP address

The eScrewSpeed can collect time and date from a NTP server in order to keep its time and date information automatically up to date. The NTP server's default address is set to 162.23.41.55 and can be modified as follows:

- 1)  [  ] in the main menu
- 2)  [ SYSTEM ]
- 3)  [ ETHERNET ]
- 4)  [ NTP server ]
- 5) Enter the NTP server's IP address using the virtual keyboard, confirm by   
[  ]

## 10 eScrew Commander Software

The eScrew Commander for Windows® eases following operations for both products, eScrew and eScrewSpeed (the term “eScrew” stands therefore in this chapter for both products, eScrew and eScrewSpeed):


- Configuring the eScrew’s parameter settings including access permissions
- Managing the eScrew’s programs and program sets
- Viewing, logging and archiving eScrew process data including timing diagrams of measured torques
- Updating the eScrew’s firmware
- Adding new eScrew licences

### 10.1 Installing and starting the eScrew Commander Software on your PC

Follow these steps to install the eScrew Commander on your PC:

- 1) Run the file « eScrewCommander SETUP.exe » which is found on the eScrew Commander CD and follow the instruction displayed on your screen.
- 2) After successful installation, clicking on the « Exit » button will automatically start the eScrew Commander Software unless you disable the launch checkbox. In such a case the eScrew Commander Software can be started by clicking on the automatically generated desktop icon or by clicking on Windows® Start button, « All apps > Lecureux > eScrew Commander ».

### 10.2 Establishing the connection between your eScrew and the eScrew Commander

	<p>Only one single instance of the eScrew Commander is allowed to simultaneously run on your PC platform.                  Connection problems will occur if this requirement is not respected (refer to chapter <b>10.2.3 Troubleshooting in case of connection problems</b>).</p>
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The chapters below describe how to establish the connection between your eScrew and the eScrew Commander assuming the following situation:

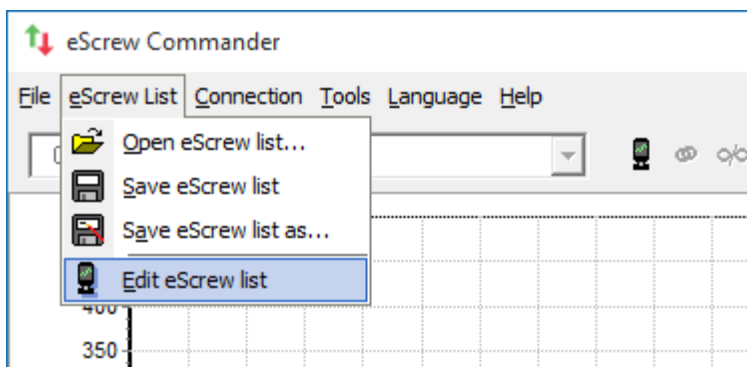
- The eScrew is directly wired to the Ethernet port of the external host platform using a crossed RJ45 patch cable of type Cat 5e or higher
- The eScrew and Windows® are both set to Ethernet default configuration according to chapter **9.3.2 Using the Ethernet default settings**.

For all other situations refer to chapter **9.3.1 General Ethernet connection requirements** and **9.3.3 Modifying the eScrewSpeed’s Ethernet settings** before continuing.

#### 10.2.1 Adding your eScrew to the list of eScrews






Your eScrew needs first to be added to the list of eScrews before it can be connected to the eScrew Commander. To edit the list of eScrews follow the steps below:

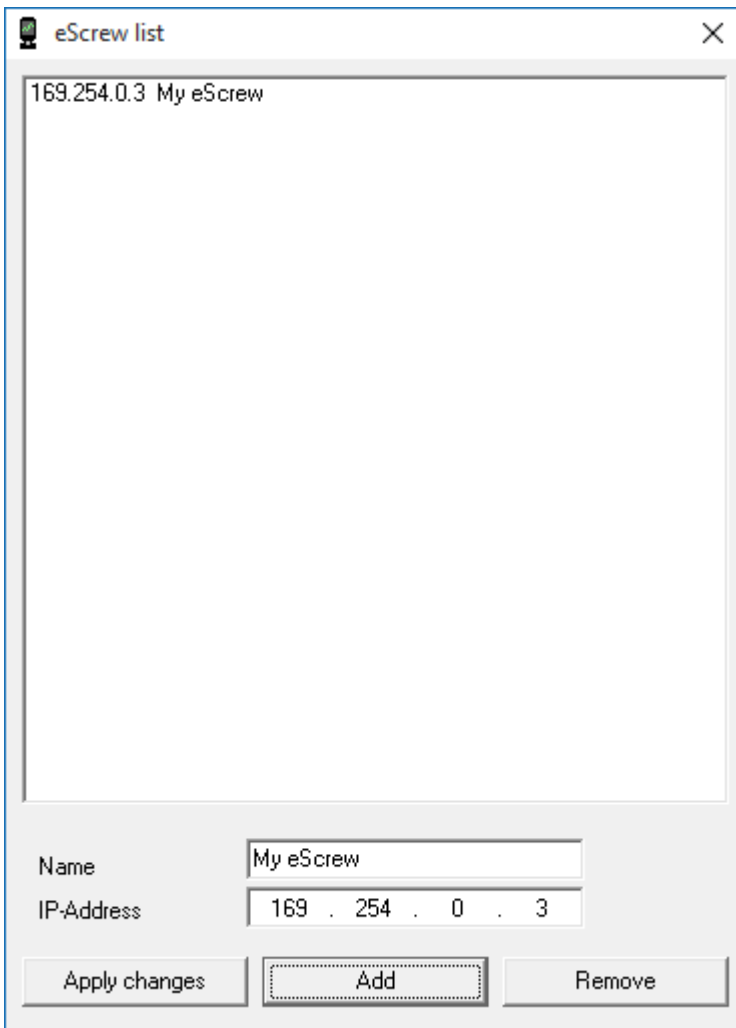
- 1) Click « Edit eScrew list » to open the current eScrew list:



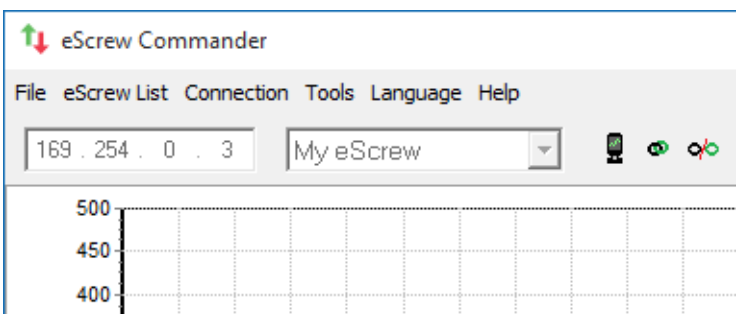
- 2) Enter a name of your choice for eScrew identification and add the configured IP address of your eScrew in the window below and confirm with « Add ».

The IP address of your eScrew can be reviewed on your eScrew:

- a)  [  ] in the main menu
- b)  [ SYSTEM ]
- c)  [ ETHERNET ]
- d)  [ IP address ]





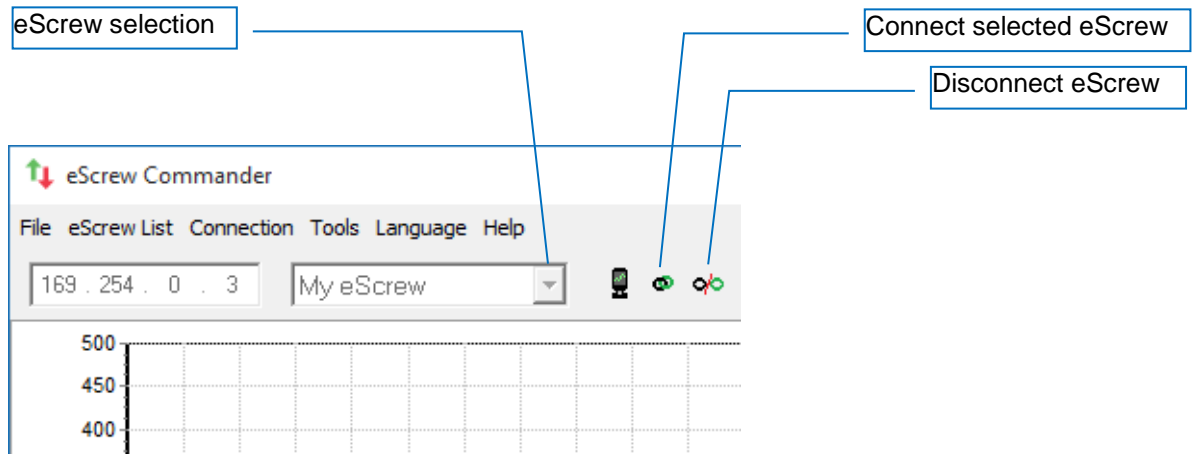
At this point the entered eScrew identification name and IP address appear in the main window under the navigation bar:



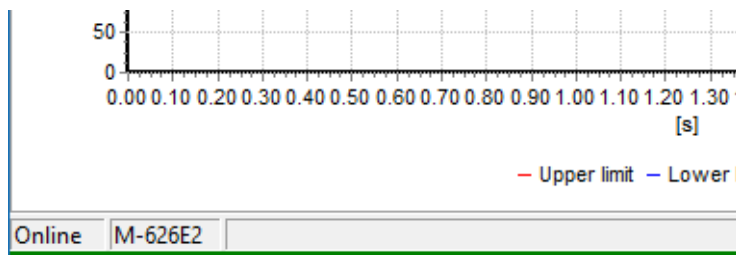
### 10.2.2 Connecting your eScrew to the eScrew Commander

Verify that your eScrew is powered-on with no errors displayed before proceeding.

- 1) Disconnect an eventually connected eScrew by clicking on .
- 2) Select your eScrew using the drop down selection
- 3) Establish the connection between your eScrew and the eScrew Commander by clicking on .



If the connection was successfully established, the text « Online » followed by the screwdriver type wired to your eScrew is displayed in the status bar on the bottom of the main window:



### 10.2.3 Troubleshooting in case of connection problems

Verify following connection requirements in case of connection problems:

- Your eScrew is powered-on with no errors displayed.
- The Ethernet patch cable is properly connected to both, the eScrew and the PC or network switch (refer to chapter **9.3.1.1 Connection cable**).
- Your eScrew's Ethernet is enabled and the eScrew's IP address corresponds to the IP address entered in the eScrew list of the eScrew Commander Software.
- Your eScrew's and your PC's Ethernet configurations are properly set (refer to chapter **9.3.1.2 Ethernet configuration**).
- Only one single instance of the eScrew Commander is running on your PC.
- Unrestricted access is granted to the TCP and UDP ports used by the eScrew (refer to chapter **15.5.1 Ethernet protocol**), no other program or network device accesses these ports and no firewall (Windows® or other, anti-virus applications, hardware firewalls) is blocking the access to these ports.

Power off and re-power on your eScrew in case you continue to experience communication problems and retry to connect.

### 10.3 The eScrew Commander's main window

Most eScrew commander's functions are directly accessible via the main window without the need of using the menu bar.

The screenshot shows the eScrew Commander interface with several callout boxes pointing to specific features:

- Disconnect eScrew**: Points to the top-left button.
- Connect selected eScrew**: Points to the top-left button.
- eScrews list**: Points to the top-left area.
- eScrew selection**: Points to the top-left area.
- eScrew's identification name**: Points to the top-left area.
- eScrew's IP address**: Points to the top-left area.
- Torque unit selection**: Points to the top-right button.
- Diagram vertical zoom in and out**: Points to the top-right area.
- Configuration Manager**: Points to the top-right button.
- Access Permissions Manager**: Points to the top-right button.
- License Manager**: Points to the top-right button.
- Firmware Manager**: Points to the top-right button.
- Torque Unit Converter**: Points to the top-right button.
- List of eScrew process log data**: Points to the log list on the right.
- Overview diagram of eScrew process log data**: Points to the top chart.
- Timing diagram of measured torques of recent or selected process log data entry**: Points to the bottom chart.
- Type of screwdriver currently wired the the eScrew**: Points to the status bar at the bottom.
- Connection status**: Points to the status bar at the bottom.

The interface includes a menu bar (File, eScrew List, Connection, Tools, Language, Help), a toolbar with various icons, and a status bar at the bottom showing 'Online' and 'M-626E2'.


## 10.4 Handling multiple eScrews

Although the eScrew Commander can connect **at once** to only one single eScrew it is still possible to:

- connect to a multitude of eScrews **one by one**
- establish and even archive lists of eScrews to connect to. These lists may represent a company's department, a production line, a person, etc.

Enabling automatic connection on application start (under « Connection > Auto Connect on application start ») establishes automatic connection with the last connected eScrew on each start of the eScrew Commander.

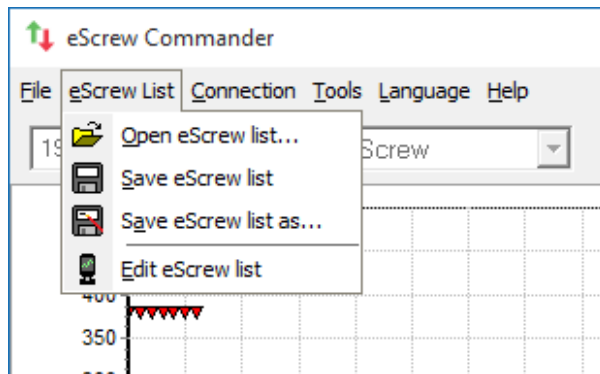
### 10.4.1 Adding a new eScrew to the current list of eScrews

To add a new eScrew click on  and proceed as described in chapter **10.2.1 Adding your eScrew to the list of eScrews**.

### 10.4.2 Archiving lists of eScrews

The data contained in an eScrew list are the IP addresses and the names of all entered eScrews as well as the IP address of the last connected eScrew.

Save your eScrew list or open an existing eScrew list by using the menu « eScrew List »:





### 10.4.3 Switching connection between eScrews

To switch from one eScrew to another proceed as described in chapter **10.2.2 Connecting your eScrew to the eScrew Commander**.











### 10.5 Configuring the eScrew’s parameters using the eScrew Commander

All configuration settings of the eScrew can be viewed and modified using the following eScrew Commander Managers:


- The Configuration Manager  for general and program specific settings
- The Access Permission Manager  for user permission settings

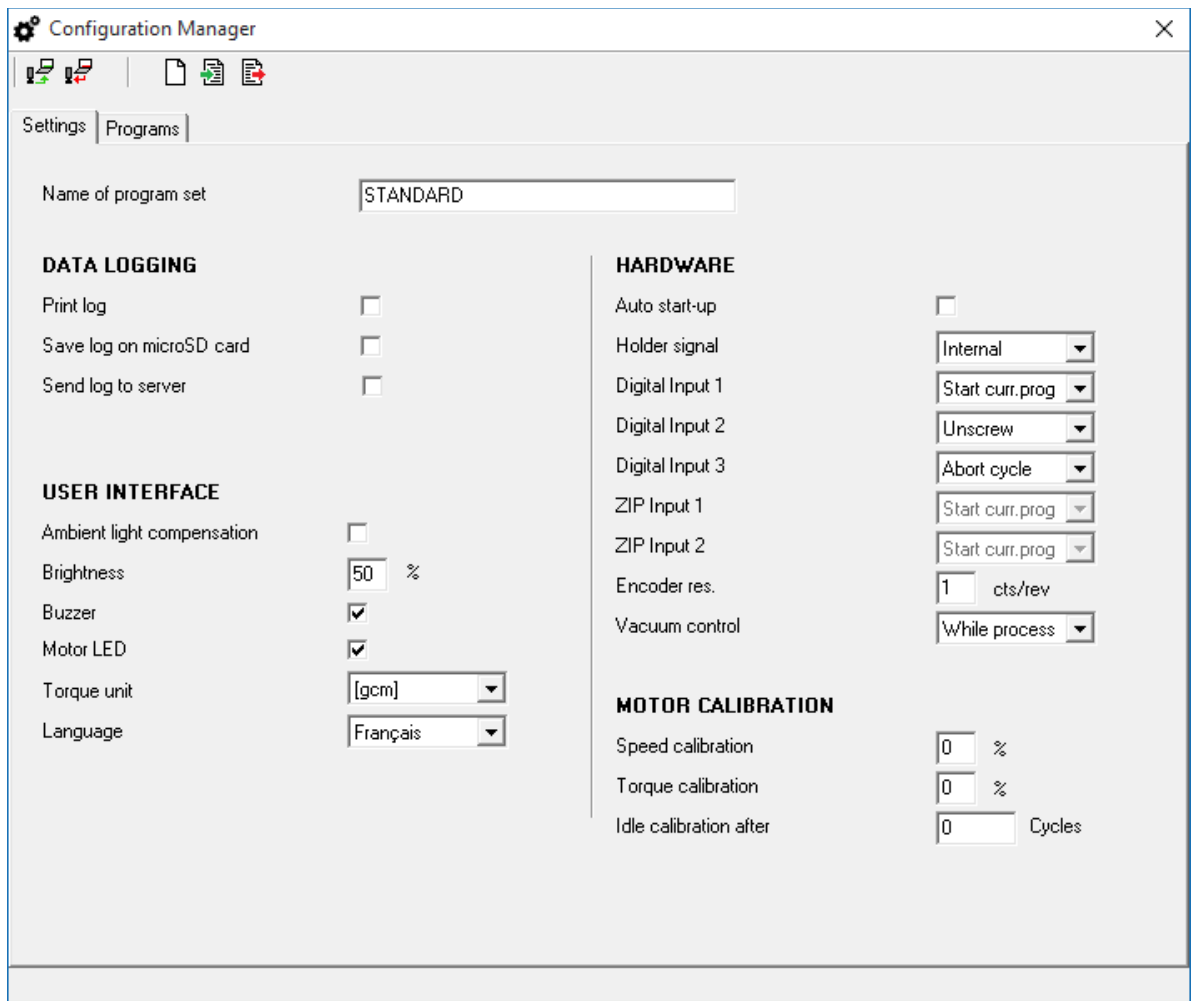
Both Managers can either be started by their shortcut buttons or via the [ Tools ] menu in the main window. Each Manager uses an independant configuration file. They have following function buttons in common:

-  Upload current settings of the eScrew to the active eScrew Commander Manager
-  Download settings of the active eScrew Commander Manager to the eScrew
-  Reset the settings of the active eScrew Commander Manager to the factory default settings
-  Import settings from a file on one of the PC’s drives to the active eScrew Commander Manager
-  Export settings from the active eScrew Commander Manager to a file on one of the PC’s drives

	The eScrew accepts uploading  and downloading  of settings only when put in its main menu.
---	---



#### 10.5.1 Configuration Manager

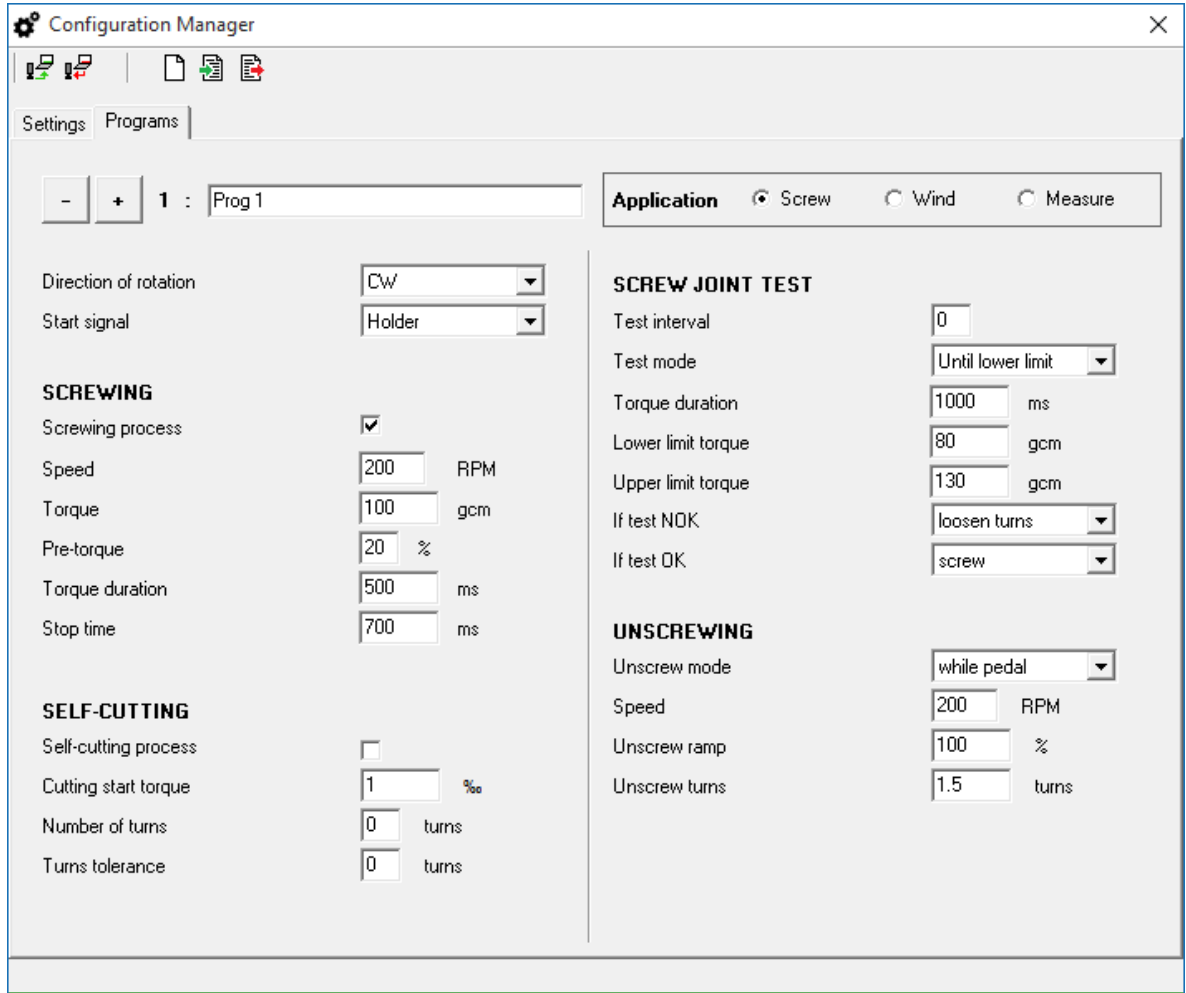
The Configuration Manager  allows to create new and modify existing program sets.



« Settings » tab: Allows to view / modify eScrew’s configuration parameters that are used in common by **all** of the 8 programs of the current program set (refer to chapter **5 General configuration settings**).



The program set name can contain up to 22 characters.

	Entering a new program set name, creates it on the eScrew's microSD card upon download  , while entering an existing program set name overwrites its settings.
---	---




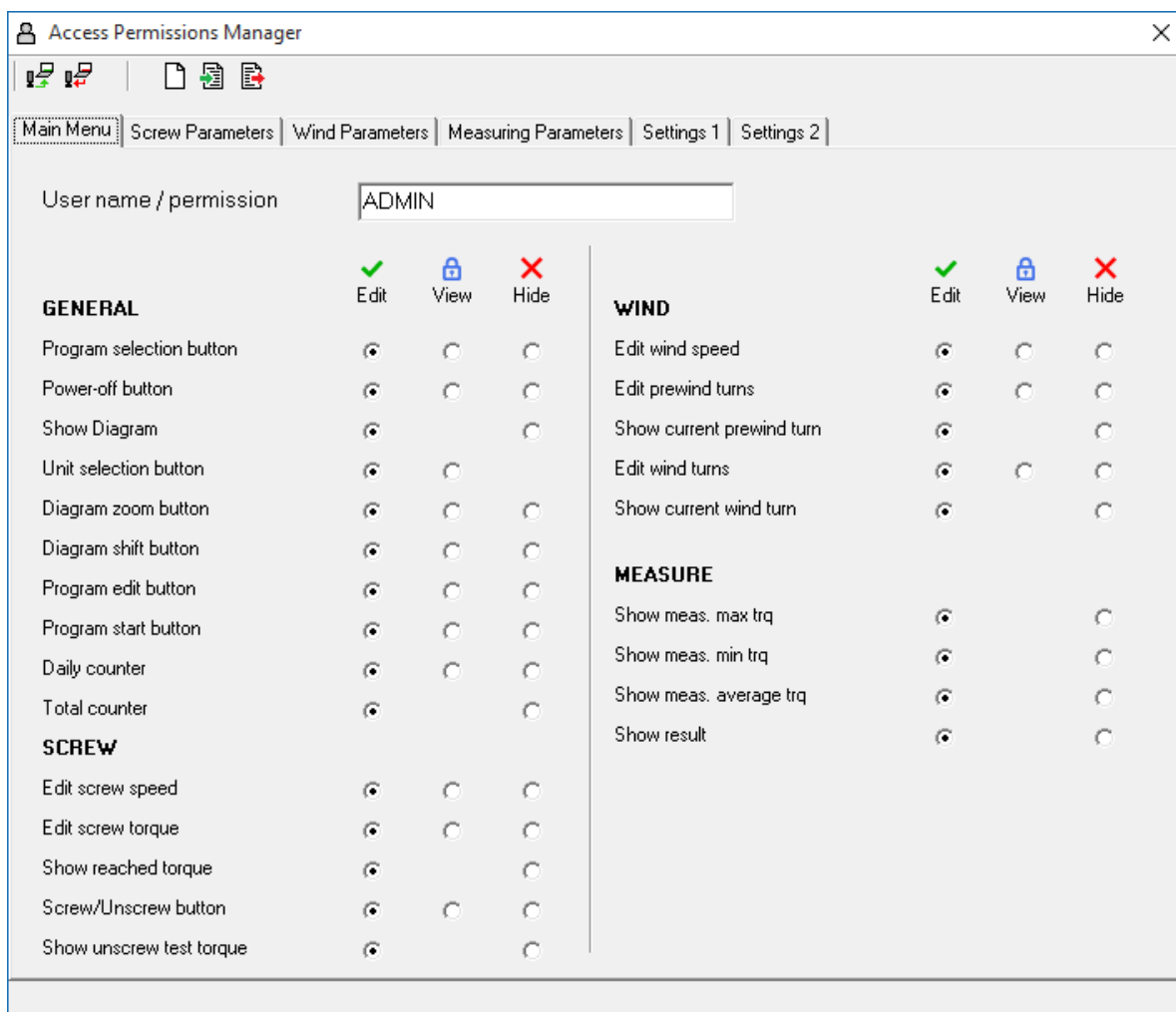
« Programs » tab: Allows to view / modify all the program specific parameters (refer to chapter 6 **Program specific configuration settings**).

Clicking the - / + buttons selects the desired eScrew program to view / modify. The program name can contain up to 22 characters.

	Upon  download, always all 8 programs are downloaded at once.
---	--



### 10.5.2 Access Permission Manager

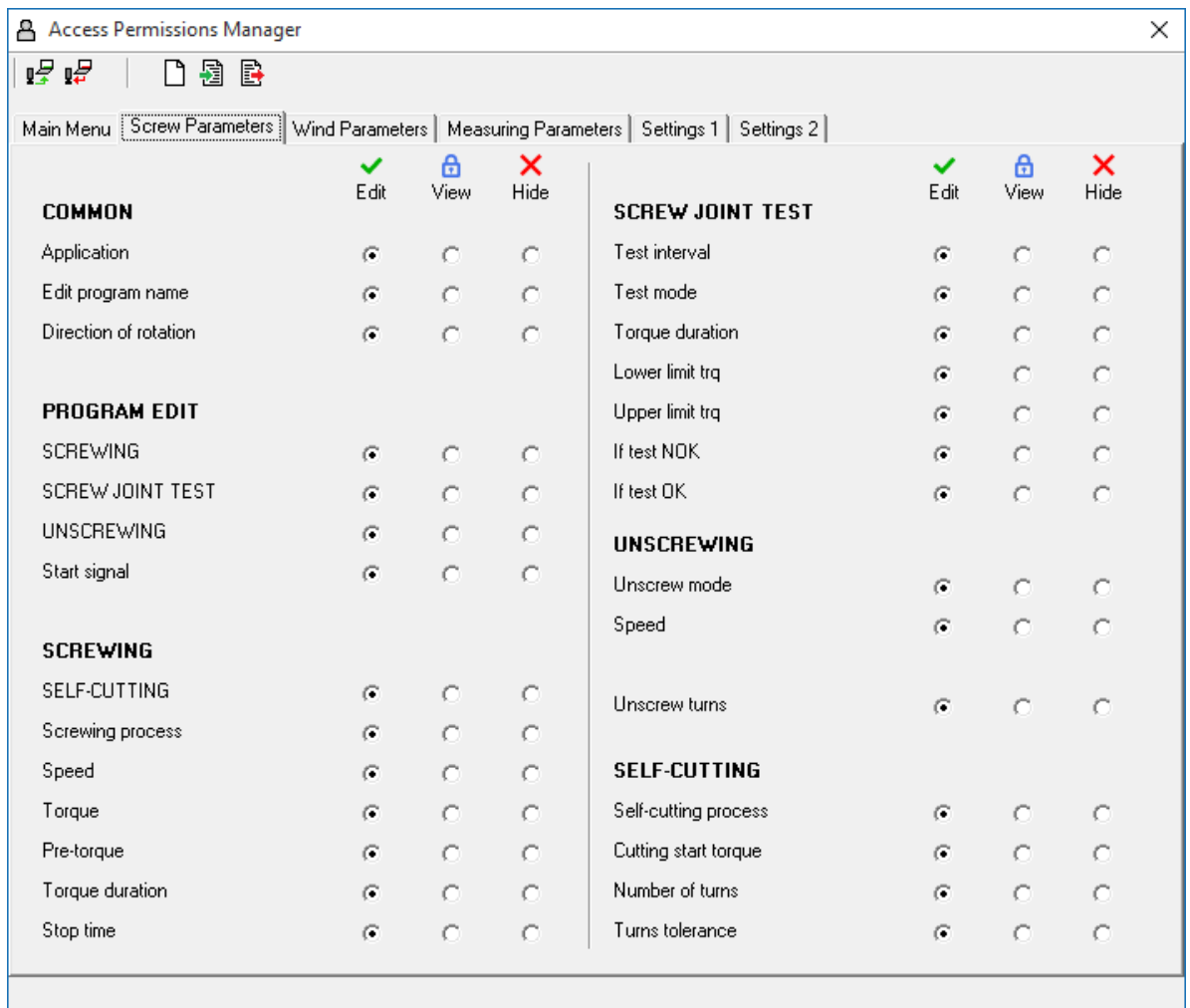
The Access Permission Manager  allows to create new and modify existing user permissions (refer to chapter 7 *Handling access permissions*).



« Main Menu » tab: Allows to view / modify the access permissions of eScrew's main menu.

The User name can contain up to 22 characters.

	Entering a new user name, creates it on the eScrew's microSD card upon download  , while entering an already existing user name overwrites its settings.
---	---



« Screw Parameters » tab: Allows to view / modify the access permissions concerning the screwing application.

Menus are represented using upper case text (capital letters), parameters using lower case text.


### 10.6 Viewing process log data

The eScrew Commander represents process log data in different forms:

- Log list showing the process log data in detailed text form
- Log diagram showing the process log data in a reduced form
- Timing diagram of measured torques showing the detailed torque progress of a process

Usually, the process log data of the current eScrew Commander session is displayed which may represent many logged application processes. For archiving this data refer to chapter **10.7 Archiving process log data**.


#### 10.6.1 Zooming the diagrams

Clicking on the  buttons performs a vertical zoom in / out of both diagrams.

Vertical AND horizontal zoom is done by directly describing a rectangular surface within the desired diagram using your computer mouse:

- Zoom IN: Describe a rectangle to the RIGHT while keeping the left mouse button pressed
- Zoom OUT: Describe a rectangle to the LEFT while keeping the left mouse button pressed

#### 10.6.2 Selecting the physical torque unit

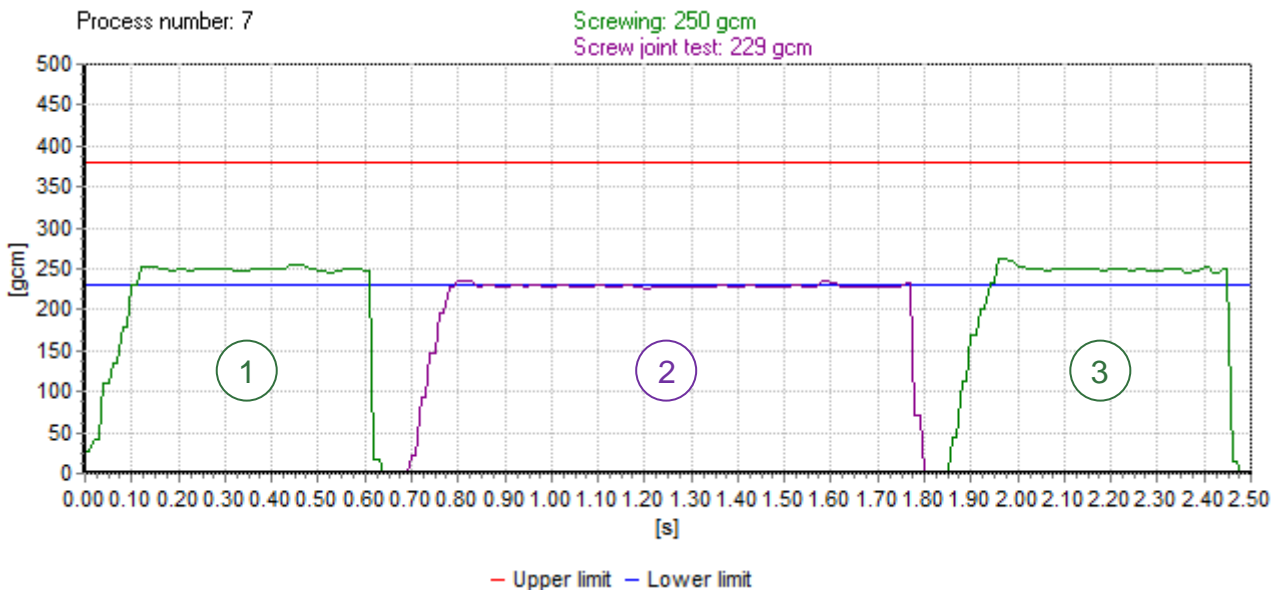
The preferred torque unit is selected by this dropdown  button in the main window.

The selected torque unit applies for all displayed and printed diagrams.

#### 10.6.3 Timing diagram of measured torques of a process

The timing diagram shows the torque progress of all sub-process phases of the current eScrew application process (screw, wind, measure, ...) after its completion.

Previous processes can be viewed as well by simply clicking on the desired process either in the overview diagram of logged process data (refer to chapter **10.6.4 Log diagram of process log data**) or in the list of logged process data (refer to chapter **10.6.5 Log list of process log data**).



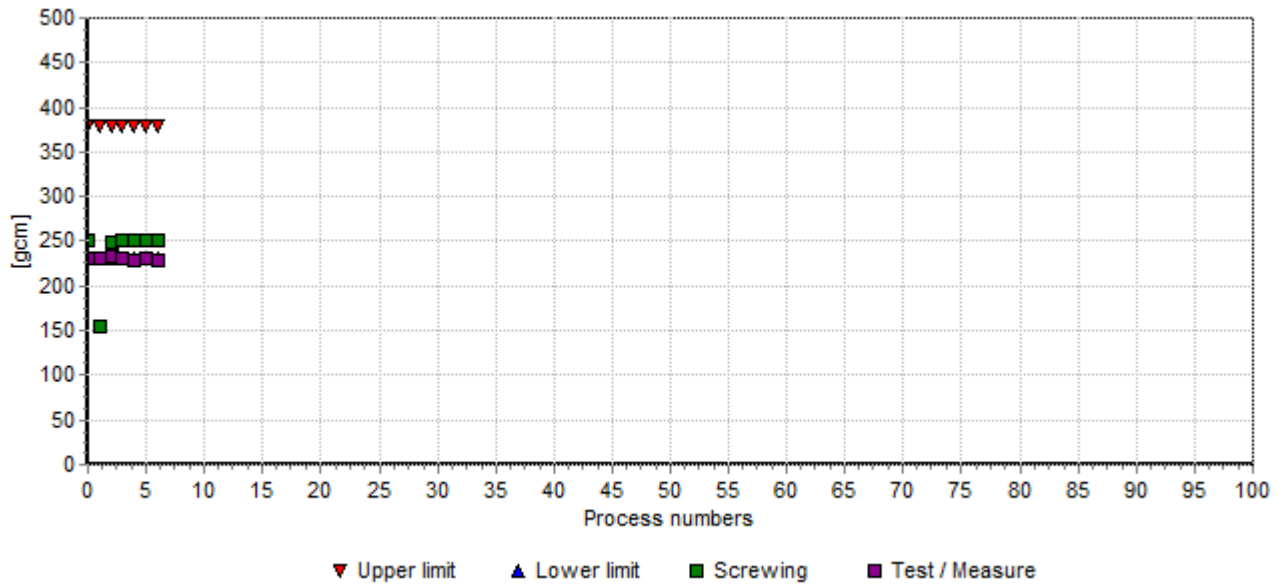
The above diagram shows all sub-process phases of a typical screwing application:

- 1 — Screwing sub-process with a desired torque duration of 0.5s
- 2 — Screw joint test sub-process with a test torque duration of 1.2s
- 3 — Rescrewing sub-process applying identical parameters as first screwing phase

### 10.6.4 Log diagram of process log data

The log diagram shows the eScrew application process log data (screw, wind, measure, ...) in a reduced form.

Additionally to this reduced form, the entire log informations are displayed in the log list plus the timing diagram.



### 10.6.5 Log list of process log data

This log list shows the entire eScrew application process data (screwing, winding, measuring) in text form without the timing diagram data (refer to chapter 8.1 *Format of process log data*):

```
1 eScrew00052;07.10.2015;13:24:52;STANDARD;S;Prog 1; 249; 230; 252;gcm;OK
2 eScrew00052;07.10.2015;13:25:54;STANDARD;S;Prog 1; 249; 230; 155;gcm;ERROR
3 eScrew00052;07.10.2015;13:26:20;STANDARD;S;Prog 1; 249; 233; 249;gcm;OK
4 eScrew00052;07.10.2015;13:27:09;STANDARD;S;Prog 1; 249; 230; 252;gcm;OK
5 eScrew00052;07.10.2015;13:27:21;STANDARD;S;Prog 1; 249; 229; 252;gcm;OK
6 eScrew00052;07.10.2015;13:27:41;STANDARD;S;Prog 1; 249; 230; 251;gcm;OK
7 eScrew00052;07.10.2015;13:27:50;STANDARD;S;Prog 1; 249; 229; 250;gcm;OK
```

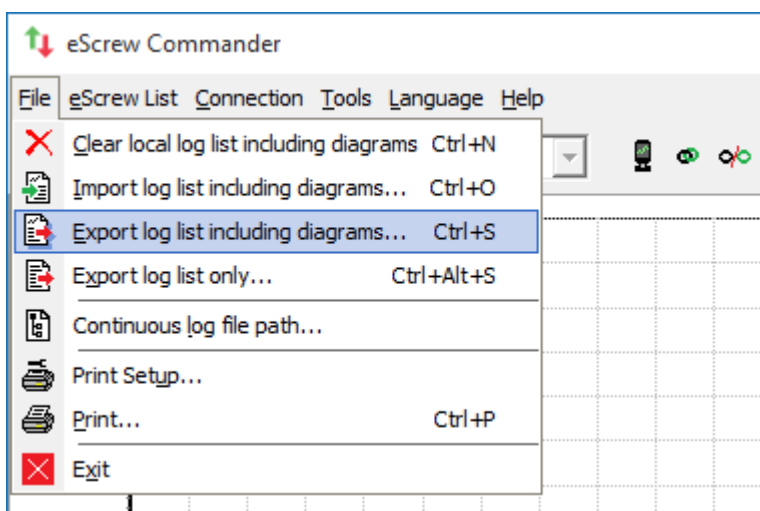
## 10.7 Archiving process log data

The eScrew Commander logs eScrew process log data as follows:


- Log into local eScrew Commander memory containing the log list of process log data **and** the timing diagram data of measured torques  
The eScrew process log data can be exported from local memory or be imported to local memory in order to create new or view already existant log archives.
- Log similar to a log server into a specified continuous log file on one of the PC's drives (refer to chapter **10.7.5 Modifying the continuous log file's name and location**), containing **only** the log list of process log data.

For other methods of logging process log data and what data is logged refer to chapter 8 **Logging process log data**.

The various archiving possibilities are accessed under the [ File ] menu:




### 10.7.1 Exporting only the log list

 Export log list only:

This exports the log list of process log data (without the corresponding timing diagram data), stored in local memory of the eScrew Commander, to a CSV file on one of the PC's drives.


This operation can be used to extract a log list from an archive containing timing diagram data.

### 10.7.2 Exporting the log list including corresponding timing diagram data


 Export log list including diagrams:

This exports the list of process log data including the corresponding timing diagram data, both stored in local memory of the eScrew Commander, to a file on one of the PC's drives.

### 10.7.3 Importing a log list including corresponding timing diagram data

 Import log list including diagrams:

This imports a file, containing the list of process log data including the corresponding timing diagram data, from one of the PC's drives to the local memory of the eScrew Commander.

	Importing a log list including corresponding timing diagram data <b>overwrites</b> the locally stored list of process log data including the corresponding timing diagram data of the eScrew Commander's memory. Therefore the <b>prior</b> export of all desired currently stored log data is needed <b>before</b> importing new log data in order to prevent losing any log data.
---	---


### 10.7.4 Clear the log list and the corresponding timing diagram data

 Clear local log list including diagrams:


This deletes the locally stored list of process log data including the corresponding timing diagram data from eScrew Commander's memory.

The continuous log file's content is not deleted by this action.

### 10.7.5 Modifying the continuous log file's name and location


 Continuous log file path:

This shows the current continuous log file's path and name and allows to modify it. Similar to a log server (refer to chapter **8.5 Logging process log data via the Ethernet interface onto an external log server platform**) or to logging process log data on the eScrew's microSD card (refer to chapter **8.2 Logging process log data in a file on the eScrewSpeed's microSD card**), the eScrew Commander logs the received process log data (excluding the timing diagram data) in a continuous file.

	Modifying the continuous log file's name and location does not delete the log file's content, but creates a new empty continuous log file.
---	--





### 10.8 Updating the eScrew’s Firmware

The Firmware Manager  allows to:


- Download a firmware file from one of the PC’s drives or, if your PC has internet access, from the Lécureux’s eScrew firmware server to the eScrew’s microSD card.
- Start the firmware updating process without the need of accessing the eScrew touch display.

Refer to chapter **12.1.2 Firmware update** for an alternative way to update the eScrew’s firmware without the use of the eScrew Commander.



The Firmware Manager  can only be accessed when a connection between your eScrew and the eScrew Commander is established (refer to chapter **10.2.2 Connecting your eScrew to the eScrew Commander**).

#### 10.8.1 Download a firmware file to the eScrew’s microSD card

Start the Firmware Manager  to download eScrew firmware files to the eScrew’s microSD card from different locations:

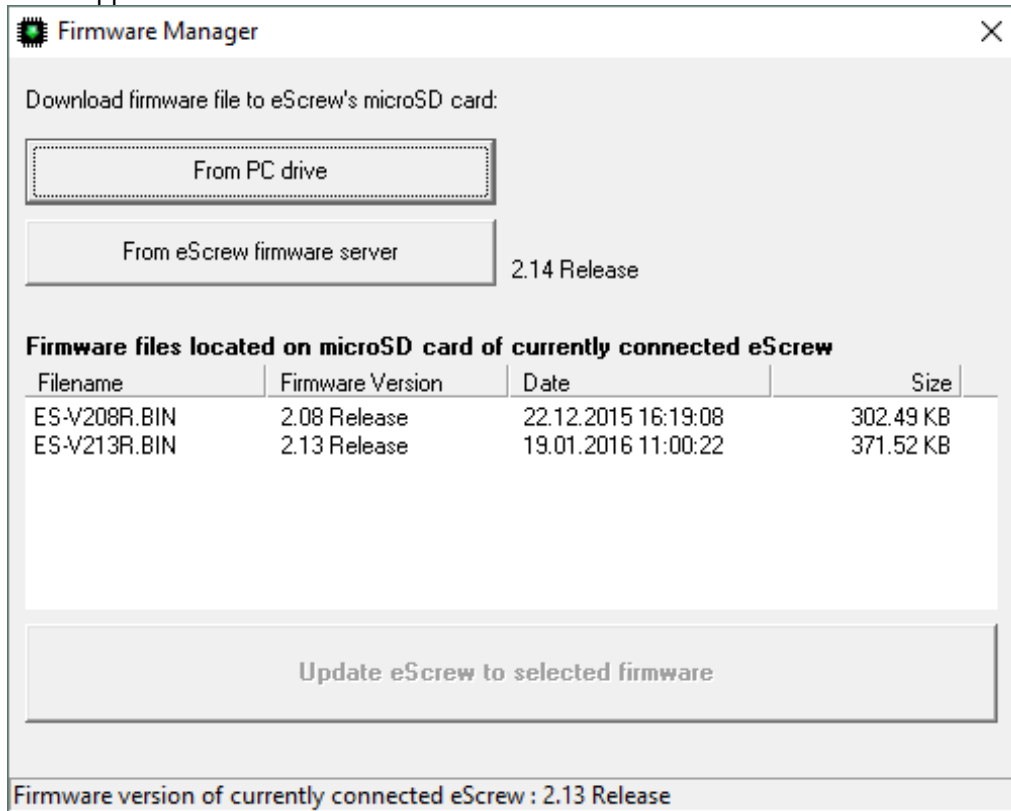
- **From PC drive:**  
Click the button « From PC drive », then select the desired file and click « Open » to directly start the download process to the eScrew’s microSD card.

All eScrew firmware files are named « ES-VnnnX.BIN », while ‘nnn’ representing the version number and ‘x’ the version status:

- R: Release
- D: Beta
- B: Backup

- **From eScrew firmware server:**  
Click the button « From eScrew firmware server » to directly start the download process to the eScrew’s microSD card.

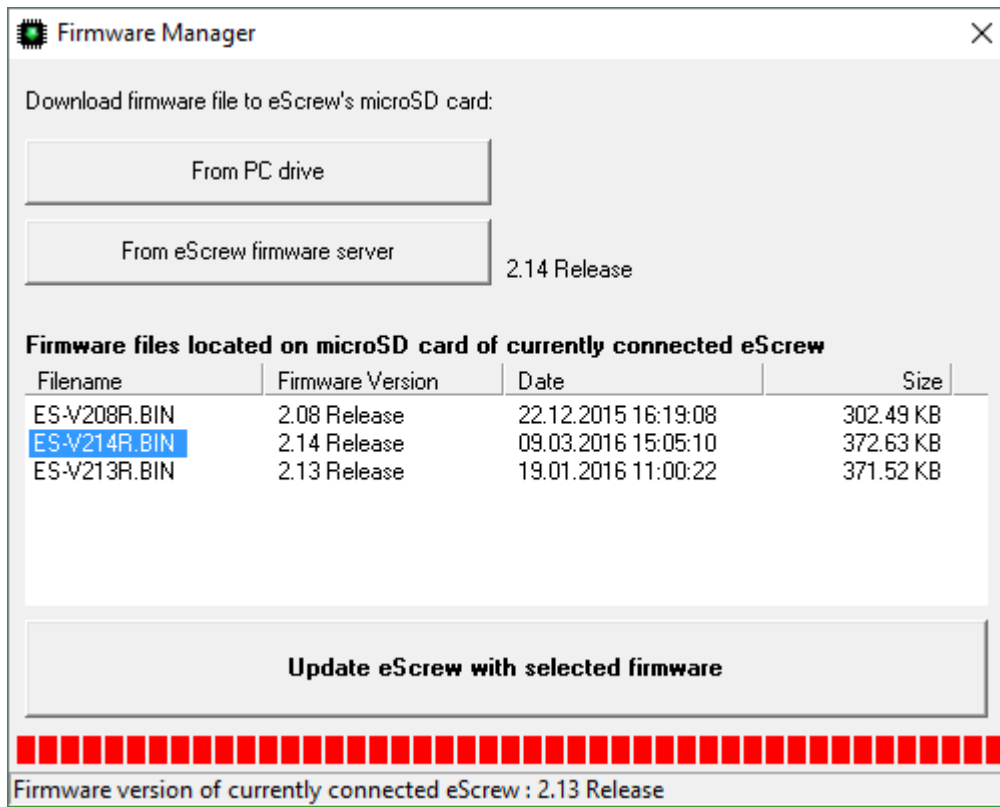
The status bar indicates the file download process. After successful download the firmware file name appears in the list of firmware files located on the eScrew’s microSD card.




### 10.8.2 Update the eScrew to the newest firmware


Once the eScrew's microSD card contains the newest firmware version the updating process can either be started via the eScrew menu (refer to chapter **12.1.2 Firmware update**) or by using the eScrew Commander's Firmware Manager:

- 1) Select the desired firmware file on the eScrew's microSD card in the list, which activates the Updating button. It is strongly recommended to select the newest firmware version available, although it is possible to downgrade to an older firmware version if desired.
- 2) Click the button « Update eScrew to selected firmware » and verify the flashing process on the eScrew's touch display.



	<ul style="list-style-type: none"><li>• Use exclusively OFFICIAL eScrew firmware files from Lécureux to update your eScrew. Otherwise damage can occur to Hard- and Software of your eScrew.</li><li>• Make sure that your eScrew is properly supplied with power during the entire firmware flashing process.</li><li>• The connection between the eScrew and the eScrew Commander is interrupted and the Firmware Manager Window is automatically closed as soon as the flashing process of the eScrew's firmware starts.</li><li>• Please contact your local eScrew dealer if the flashing process of your eScrew's firmware fails and your eScrew ceases working properly.</li></ul>
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## 10.9 Activating an eScrew license

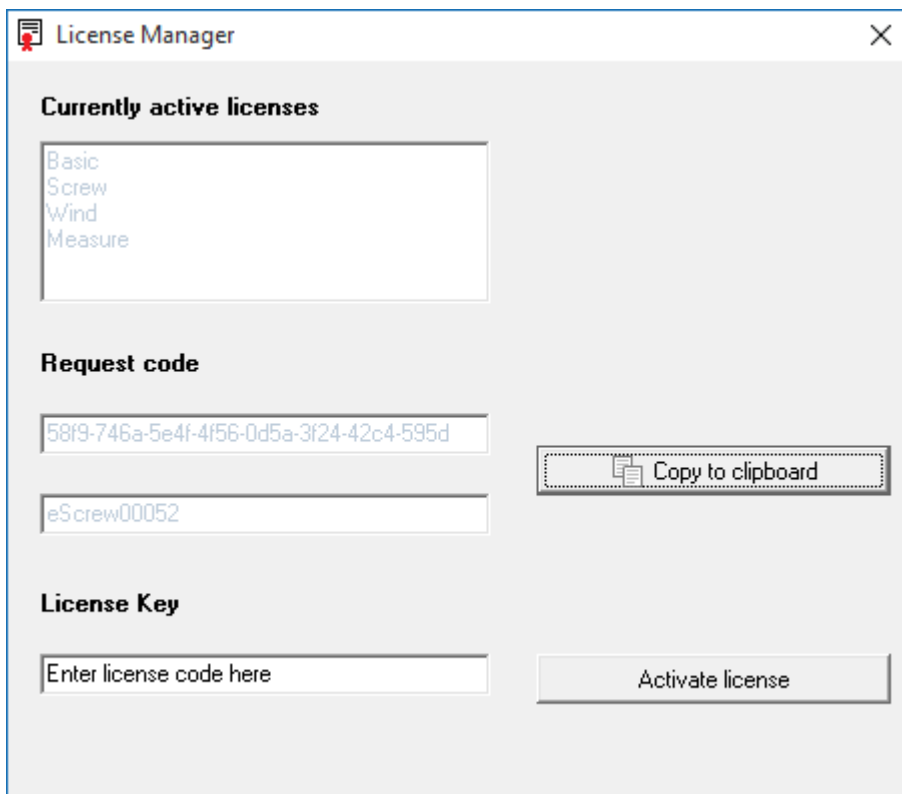
The License Manager  allows to:

- View all activated licenses of the connected eScrew.
- View and copy the Request code of the connected eScrew in order to send it to Lécureux SA.
- Activate a license by entering the license key received from Lécureux SA.

Refer to chapter **3 Applications and licenses** for general information about eScrew licenses.

Follow the steps below to activate a new license:

- 1) Start the License Manager  in order to view all your active licenses and to copy the license request code of your eScrew to the clipboard:



- 2) Transmit this request code by email to Lécureux SA.
- 3) Once a license key was received from Lécureux SA, copy the code in the « License Key » field and click on « Activate license »
- 4) Verify in the « Currently active licenses » field that your new license has been activated.

Refer to chapter **12.1.3 Activating a license using the eScrewSpeed menus** for an alternative way to activate licenses by using eScrew's touch display only (without the use of the eScrew Commander).

## 11 Accessories

### 11.1 Power supply unit




Input: 100-240V AC    Output: 24V DC 3.75A  
No. 9001.008.014

Suitable for screwdriver type TE-626B

## 11.2 Screwdrivers

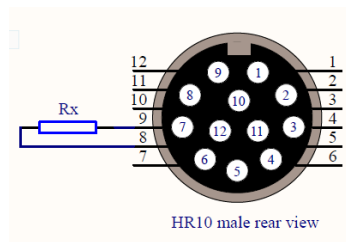
### 11.2.1 Overview of available eScrewSpeed screwdrivers

Type	U	Rx ( $\pm 2\%$ )	RPM min	RPM max	TRQ min	TRQ max	TRQ peak
	Volt	Ohm	U/min	U/min	Ncm	Ncm	Ncm
TE-626B	24	22k	50	1000	0.5	3.50 @ 0.5sec	5.00 @ 0.1sec

	<p>TRQ peak values can only be applied for a reduced time under torque in order to prevent thermal motor overload. The allowed values for time under torque are automatically reduced when choosing screwing torque values above the TRQ max values (refer to chapter <b>6.2.3 Screwing torque {basic}</b>).</p> <p>All values in this table are subject to change without notice due to future developments and product improvements.</p>
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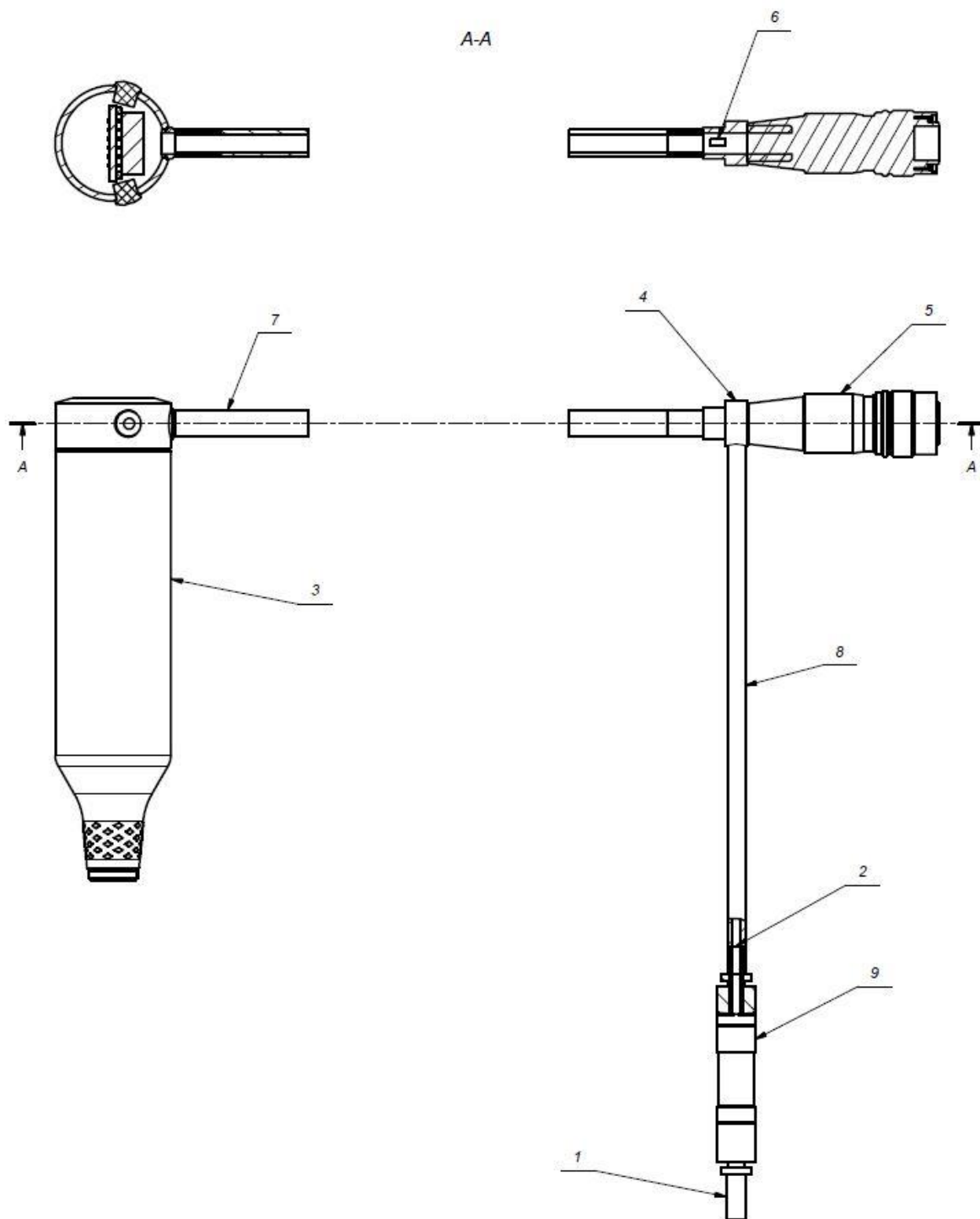
### 11.2.2 Electrical wiring of the screwdriver's cable connector

Pin number	Signal name
1	Red LED
2	Motor Phase B
3	Encoder Channel nA
4	Encoder Channel A
5	Encoder Channel nB
6	Encoder Channel B
7	Green LED
8	GND
9	Rx
10	Motor Phase C
11	Encoder Power (+5VDC)
12	Motor Phase A



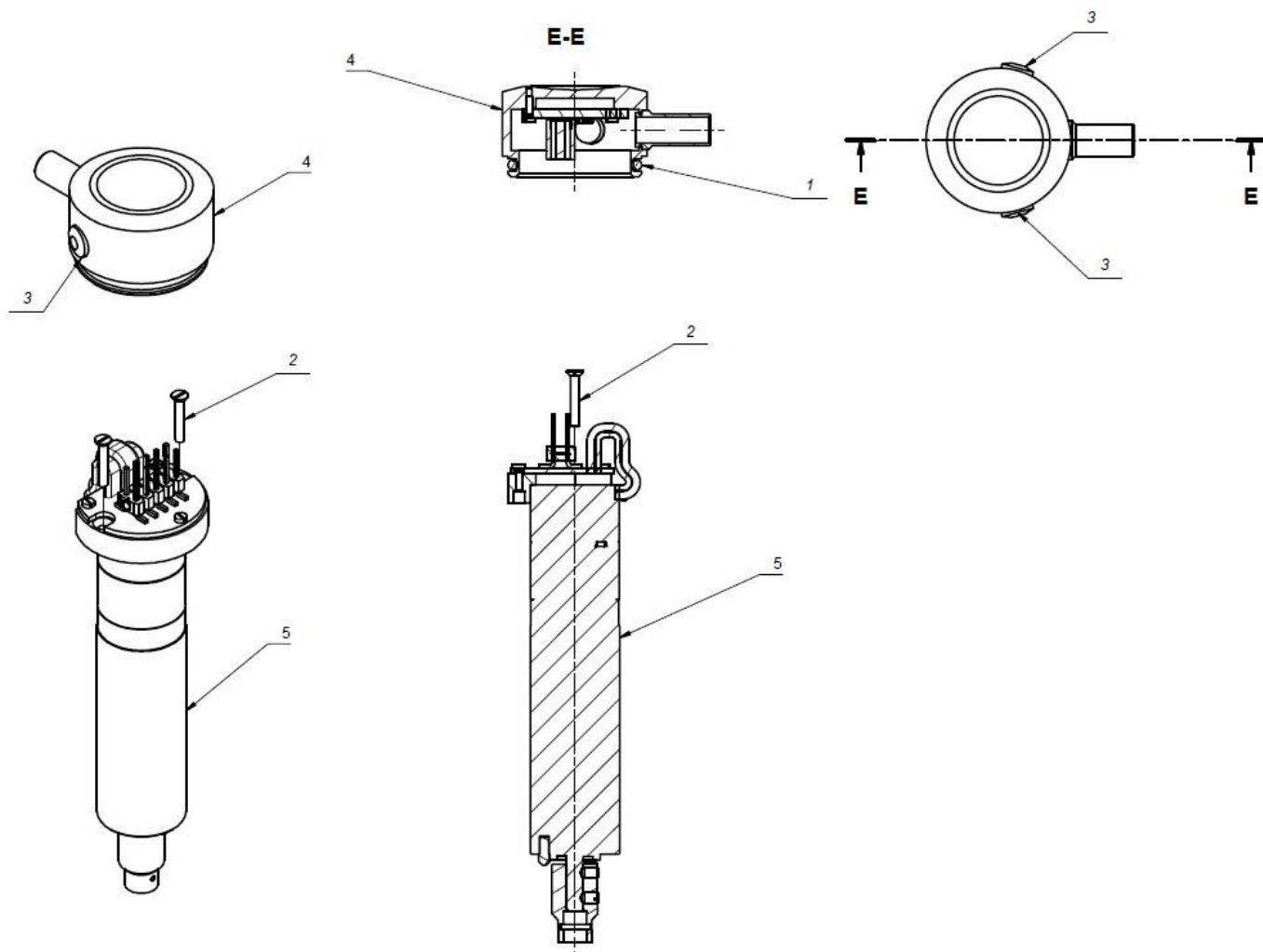
Rx is used for automatic screwdriver type recognition (refer to chapter **11.2.1 Overview of available eScrewSpeed** screwdrivers).

11.2.3 Vacuum connection



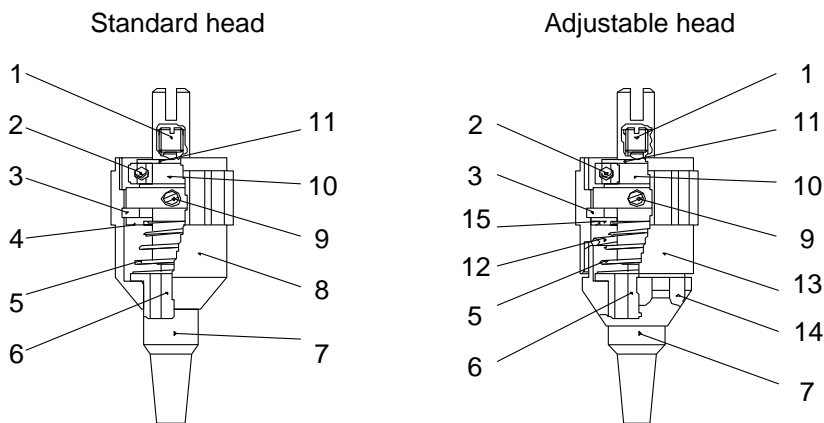
Article designator	Number of parts	Article specification	Drawing N°	Drawing revision
1	1	Plug-on connection for tube	0003.073.010	00
2	1	Filter	0003.073.011	00
3	1	Motor tube		01
4	1	Vacuum junction	0003.110.001	00
5	1	Cable connector 12p M11	9001.007.336	00
6	1	Resistor Rx		00
7	0.68m	Flexible hose Ø4-6	9003.002.038	00
8	0.12m	Flexible hose Ø2-4	9003.002.044	00
9	1	ZFC12	9003.003.125	00

11.2.4 Brushless Motor TE-626B



Article designator	Number of parts	Article specification	Drawing N°	Drawing revision
1	1	O-Ring NBR 60.5 Ø1.78-20.35	9002.006.062	00
2	2	Screw M1.6x10 BN357	9002.010.041	-
3	2	LED lens	0003.103.004	00
4	1	Assembly unit for cover TE-626B	0003.108.010	00
5	1	Assembly unit for motor TE-626B	0003.108.010	00

11.2.5 Screwdriver heads

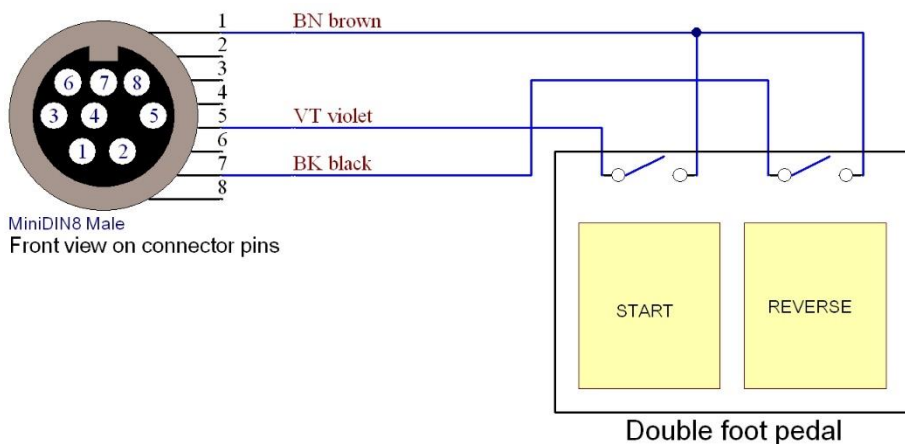


No.	Part number	Spare part
1	9002.011.007	Headless screw - M 2.5 x 2
2	9002.000.003	Ball bearing - S 684
3	9002.003.004	Washer Seeger for inside - Ø 10
4	0003.041.008	Filter
5	0003.041.006	Head spring - Ø 0.45
6	0003.041.350	T-Blade (Set number)
6	0003.041.300	V-Blade (Set number)
7	0003.041.400	Aspiration drill (Set number)
8	0003.041.003	Standard head drill (Set number)
	0003.041.801	Fast change standard head drill (Set number)
9	9002.011.005	Slotted headless screw - M 2 x 3
10	0003.041.002-a	Blade holder
11	9002.003.001	Benzing washer - Ø M 3.2
12	0003.048.304	Spring for the adjustable head - Ø 0.8
13	0003.048.301	Adjustable head drill (Set number)
	0003.048.801	Fast change adjustable head drill (Set number)
14	0003.048.302-a	Adjusting ring with a bearing
15	0003.048.305	Filter



### 11.3 Start button / single and double foot pedal

These accessories can either be connected to the digital parallel I/O interface of the control unit itself or to the holder for 4 heads ZIP41:



Article No. 8900.500.003 (start button)  
 Article No. 9001.000.056-a (single foot pedal)  
 Article No. 9001.000.057-a (double foot pedal)

	Refer to chapters <b>5.2.1 Function of digital parallel inputs 1 to 3</b> and <b>6.1.2 Program start signal</b> for an appropriate parameter configuration.
--	---

### 11.4 Holder for 4 heads ZIP41

The holder for 4 heads ZIP41 is connected to the digital parallel I/O interface of the control unit.



The ZIP41 enables automatic program selection according to the head in use and is equipped with a socket connector for either connecting an external start button, an external foot pedal or an external photocell.

Article No. 0003.074.000 (ZIP41)

	Refer to chapter <b>5.2.2 Screwdriver holder signal</b> and <b>6.1.2 Program start signal</b> for an appropriate parameter configuration.
--	---


## 11.5 List of available accessories

Accessory	Dimensions	Article No
<b>Heads</b>		
	<b>mm</b>	
Standard head	0,50-4,00	0003.041.600
Large diameter standard head	4,10-7,00	
Head undercut	0,70-7,00	0003.041.400-a
Drawn out charges	0,50-7,00	0003.041.400-b
Head with a nylon protection	0,50-7,00	0003.041.400-e
Adjustable head	0,50-4,00	0003.041.400-d
Special head for nuts		0003.048.000-a
SET Head TE complete for winding		0003.048.100
Head complete with chuck		0003.048.200
Special head		on request
Crown for fast change head		0003.041.802
<b>Blades</b>		
	<b>mm</b>	
V-blade	0,50-4,00	0003.041.300
T-blade	0,50-4,00	0003.041.350
Cross blade TORX etc.	1,00-4,00	0003.041.250
Special blade	-	on request
<b>Screwtrays</b>		
	<b>mm</b>	
Screwtray with slots 50 x 50 mm	0,50-2,00	0008.012.102
Screwtray with slots 150 x 150 mm	2,50-4,50	0008.012.010
Screwtray with holes 50 x 50 mm	0,40-1,20	0008.012.101
Net screwtray 50 x 50 mm	1,00-2,00	0008.012.103
Rubbered screwtray 50 x 50 mm		0008.012.104
<b>Footswitches</b>		
Single foot pedal (Screw On or Unscrew On)		9001.000.056-a
Double foot pedal (Screw On and Unscrew On)		9001.000.057-a
Start button		8900.500.003
<b>Software</b>		
eScrew-Commander		0004.002.003
<b>Printer</b>		
Samsung Bixolon SRP500 SER black		9007.005.005
Paper for printer		9005.000.045
<b>Cables</b>		
	<b>m</b>	
Multi-connector power supply cable		9001.006.144
eScrew/eScrewSpeed to PC connector cable (RS232)		8900.600.017
eScrew/eScrewSpeed to PC connector cable (Ethernet RJ45)	1.5	9001.006.045
Printer connector cable (RS232)		8900.600.024
eScrew/eScrewSpeed to PLC cable (digital parallel I/O interface)	2	8900.600.025
<b>Vacuum pumps</b>		
	<b>bar / m<sup>3</sup>/h</b>	
Vacuum pump SP 302 for 1 screwdriver	-0,3	9000.002.021
Vacuum pump for more than 1 screwdriver	-0,85 / 1,5	9000.002.010
Vacuum pump for more than 1 screwdriver	-0,85 / 2,2	on request
Holder for 4 heads ZIP41		0003.074.000
Articulated arm L-L compl. mounted for eScrew/eScrewSpeed		0067.000.000-c

# 12 Maintenance operations

## 12.1 Control unit software





### 12.1.1 Restoring factory settings

To access the factory settings the touch display needs to be pressed and kept pressed during start-up as soon as the Lécureux company logo appears on the screen. After 2 seconds a dialog window is displayed which offers a few options (refer to chapter **12.1.4 Copying the configuration settings from one eScrewSpeed to another using the microSD card**). Select from the list the option 'Reset eScrewSpeed to factory settings' and  to confirm your selection which automatically starts the reset process.





### 12.1.2 Firmware update


The firmware file needs first to be stored on the eScrew's microSD card under the directory 'FIRMWARE' in order to update your eScrew. This can either be done using a card reader on a PC or by using the eScrew Commander (refer to chapter **10.8 Updating the eScrew's Firmware**), which can also directly start the firmware update process without the need of accessing the eScrewSpeed touch display.

Proceed as follows to update the eScrew's firmware by using the eScrew's menus, once the newest eScrewSpeed firmware file is stored on the eScrew's microSD card and properly inserted in the eScrewSpeed card slot:

- 1)  [  ] in the main menu
- 2)  [ SYSTEM ]
- 3)  [ FIRMWARE UPDATE ]





In case there exists a newer firmware on the microSD card than the one actually running on the eScrew, a pop-up window will appear on screen showing the text 'Update available' as soon as the menu [ FIRMWARE UPDATE ] is entered:

-  [  ] to select automatic update to the newest version **or**
-  [  ] to manually choose a desired file from the appearing list of all available firmware files located on the eScrew's microSD card







	<ul style="list-style-type: none"> <li>• Use exclusively OFFICIAL eScrewSpeed firmware files from Lécureux to update your eScrew. Otherwise damage can occur to Hard- and Software of your eScrew.</li> <li>• Make sure that your eScrewSpeed is properly supplied with power during the entire firmware flashing process.</li> <li>• Please contact your local eScrewSpeed dealer if the flashing process of your eScrewSpeed's firmware fails and your eScrewSpeed ceases working properly.</li> </ul>
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### 12.1.3 Activating a license using the eScrewSpeed menus

In order to receive a license key it is first necessary to send the license request code to Lécureux SA (refer to chapter **3 Applications and licenses** for general information about eScrewSpeed licenses). Follow the steps below in order to view the license request code of your eScrewSpeed as well as the status of all licenses:

- 1)  [  ] in the main menu
- 2)  [ SYSTEM ]
- 3)  [ SYSTEM INFO ]

Once a license key was received from Lécureux SA, follow the steps below in order to activate the license:

- 1)  [  ] in the main menu
- 2)  [ SYSTEM ]
- 3)  [ ADD APLICATION LICENSE ]
- 4) Enter the license key using the virtual keyboard, confirm by  [  ]

Licenses can also be added using the eScrew Commander (**10.9 Activating an eScrew license**), which eases copying the license request code from and pasting the received license key to the eScrew.

### 12.1.4 Copying the configuration settings from one eScrewSpeed to another using the microSD card

By using the “Load” function, the locally stored configuration settings can be overwritten by the configuration settings stored on the microSD card. This feature enables the user to copy configuration settings including access permissions and program sets from a reference eScrewSpeed to a destination eScrewSpeed using the reference microSD card, without the need of any other additional tool.

Follow this step by step instruction to copy configuration settings from one eScrewSpeed to another:

- 1) Power off the destination eScrewSpeed, retract its microSD card and keep it in a safe place until the end of this instruction sequence.
- 2) Configure the reference eScrewSpeed with the desired reference configuration settings then return to main menu.
- 3) Retract this reference microSD card from the reference eScrewSpeed and insert it into the destination eScrew.
- 4) In order to access the load options menu press and keep pressed the touch display of the destination eScrewSpeed during start-up as soon as the Lécureux company logo appears on the screen. After 2 seconds a dialog window is displayed which offers a few options.
- 5) Select the desired load function from the list displayed:

- ‘Load ONLY program set from  $\mu$ SD’
- ‘Load ONLY access permissions from  $\mu$ SD’
- ‘Load program set AND access permissions from  $\mu$ SD’

and  [  ] to confirm your selection which automatically starts the loading process.


- 6) Retract the reference microSD card from the destination eScrewSpeed and insert its own microSD card.

### 12.1.5 Self test

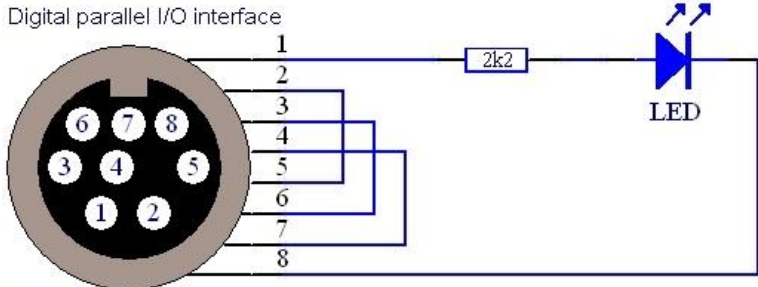
The self test is designed for production reasons in order to check the main functions of the eScrewSpeed in the manufacturing process. All interfaces and sensors are checked during this test.

In order to obtain a successful test result it is absolutely necessary to connect following items to the eScrewSpeed under test:

1. A fully functional brushless motor of any type (e.g. TE-626B)
2. The specifically designed interface adapters shown below. These adapters are not included in the scope of delivery.



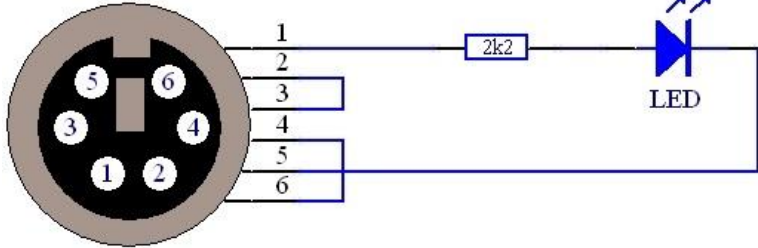
**Digital parallel I/O interface**



MiniDIN8 Male  
Front view on connector pins





  

**RS232 serial interface**







MiniDIN6 Male  
Front view on connector pins

To run the automatic self test procedure:

- 1)  [  ] in the main menu
- 2)  [ SYSTEM ]
- 3)  [ SELF TEST ]





Successful test results are displayed using green, unsuccessfull test results using red colored text. Please follow instructions displayed on the touch screen.

### 12.1.6 Touch calibration

- 1)  [  ] in the main menu
- 2)  [ SYSTEM ]
- 3)  [ TOUCH CALIBRATION ] and follow the instructions displayed on the screen

### 12.1.7 System info

This menu indicates maintenance relevant information like eScrewSpeed name, firmware version and MAC address of the eScrew.

- 1)  [  ] in the main menu
- 2)  [ SYSTEM ]
- 3)  [ SYSTEM INFO ]

## 12.2 Control unit hardware

All surfaces of the eScrew's control unit can be cleaned with a damp cloth (not wet).



Before cleaning the control unit, the power supply unit must be disconnected from the control unit.

## 12.3 Screwdrivers

### 12.3.1 Vacuum connection

Execute the following steps twice a month or when a reduced vacuum function is noticed (refer to drawing in chapter **11.2.3 Vacuum connection**):

- 1) Inspect all the tubes from the motor housing to the vacuum connection including the transparent vacuum filter ZFC12.
- 2) If necessary clean the vacuum filter or replace it.

If the problem persists, please contact Lécureux's after sales service.

### 12.3.2 Screwdriver head

Execute the following steps twice a month or when, during calibration, the error message 'Idle torque too high' appears (refer to drawing in chapter **11.2.5 Screwdriver heads**):

- 1) Remove the colored head drill from the screwdriver.
- 2) Pull out the bit holder.
- 3) Inspect that all parts are clean and if not, remove the washers to access and carefully clean all parts with petrol.
- 4) Oil ball bearings before reassembling all the parts.
- 5) Place the screwdriver back to its holder and switch on the control unit in order to repeat the idle torque measurement.

If the error message message 'Idle torque too high' still remains, continue with the maintenance steps for the motor section of the concerned screwdriver.

### 12.3.3 Motor tube TE-626B

Execute the steps below **ONLY** in case the error message 'Idle torque too high' remains, despite the correct execution of the procedure described in the chapter **12.3.2 Screwdriver head.71**

For the different replacement parts please refer to chapter **11.2.4 Brushless Motor TE-626B**.

- 1) Remove the electrical cable including the vacuum connection from the control unit.
- 2) Remove the top cover of the motor housing by pulling in direction away from the motor axis. Please do not turn the top cover when pulling.
- 3) Unscrew the two screws holding the motor unit in the housing
- 4) Pull the motor unit out of the housing
- 5) Inspect that all parts are clean and if not, clean them carefully.
- 6) Push the motor unit back in its housing while assuring that the anti-rotation pins fit in their respective holes
- 7) Rescrew the two screws holding the motor unit in the housing
- 8) Place the top cover on the motor housing so that the motor's connector pins perfectly align with the top cover connector. Push the top cover on the motor housing so that there remains no air gap.
- 9) Reconnect the electrical cable including the vacuum connection to the control unit.
- 10) Place the screwdriver back to its holder and switch on the control unit in order to repeat the idle torque measurement.


If the error message message 'Idle torque too high' still remains, please contact Lécureux's after sales service.

## 13 Error diagnostics

Error messages are indicated in the status bar of the eScrewSpeed's touch display in white colored text on a red background. Refer to chapter **14.4.1 Status messages description** for more details on how to request error messages via the RS232 serial or the Ethernet interface.

Find below a detailed analysis of all possible error causes and how to solve the indicated problems.

Error messages can then be reset by one of the following methods:

-  on the status bar indicating the error message or on the start button in the main menu
- Activating a digital abort or start signal on the eScrewSpeed's digital parallel I/O interface (for proper configuration refer to chapter **5.2.1 Function of digital parallel inputs 1 to 3**)
- Via the RS232 serial or the Ethernet interface using the CSTOP or CSTART telegram (refer to chapter **14.4 System configuration telegrams**)

Error code	Error message	Error situation / analysis	Solution
1	Idle torque too high. Repeat calibration, please.	On each power-on, when changing a screwdriver or after a configured number of executed processes, the idle torque is determined by measuring the motor's idle current when placing the screwdriver in its holder.  Possible error causes: <ul style="list-style-type: none"> <li>• motor shaft externally blocked</li> <li>• gripped motor bearing</li> <li>• gripped motor gear box</li> </ul>	Execute the screwdriver maintenance procedures according to chapter <b>12.3 Screwdrivers</b> and then place the screwdriver back to its holder in order to repeat the idle torque measurement.  If the problem remains, please contact Lécureux's after sales service.
3	Screw could not be loosened with max. motor torque	The eScrewSpeed executes the unscrewing function in various situations. During this function the motor torque is increased until the screw is loosened.  Possible error causes: <ul style="list-style-type: none"> <li>• the screw was tightened too much or has gripped (glue, rust, welding, etc)</li> <li>• the chosen screwdriver's max. torque is too low</li> </ul>	Check: <ul style="list-style-type: none"> <li>• appropriate screwdriver model is used for the concerned screw</li> <li>• screw is not gripped</li> </ul>
4	No tightened screw was detected	The eScrewSpeed executes the unscrewing function in various situations. During this function the motor torque is increased until the screw is loosened.  Possible error causes: <ul style="list-style-type: none"> <li>• the screw was broken before trying to loosen it</li> <li>• the screwdriver is not placed on the screw head</li> </ul>	Check: <ul style="list-style-type: none"> <li>• screw and hole thread are in good condition</li> <li>• screwdriver is properly placed on screw head</li> </ul>



Error code	Error message	Error situation / analysis	Solution
9	Place the screwdriver in its holder, please.	On each power on, when changing a screwdriver or after a configured number of executed processes, the eScrewSpeed measures the motor's idle torque if the screwdriver is placed in its holder.	Place the screwdriver in its holder.  When using the head holder ZIP41, make sure that all 4 heads are properly placed in the holder.
11	Screw is not tightened (torque drop detected)	While tightening a screw, after having reached the desired torque, the eScrewSpeed checks, if a significant torque drop happens during the configured torque duration.  Possible error causes: <ul style="list-style-type: none"> <li>• the screwdriver blade slipped off the screw's head or broke</li> <li>• the screw's thread or the screw's slot broke</li> <li>• the threaded hole rooted out</li> <li>• the screw or the hole is not clean enough</li> <li>• the desired torque is set too high for the concerned screw joint</li> </ul>	Check: <ul style="list-style-type: none"> <li>• screwdriver blade is sufficiently pressed on the screw's head during the entire tightening process</li> <li>• screwdriver blade and screw heads are in good condition</li> <li>• screws and holes are sufficiently clean containing no chips</li> <li>• screw and hole thread are in good condition</li> <li>• correct setting of the desired torque adapted to the concerned screw joint</li> </ul>
12	Motor blocked at start	At each start of a screwing cycle, the eScrewSpeed checks if the motor shaft is externally refrained.  Possible error causes: <ul style="list-style-type: none"> <li>• the screwdriver's blade remains too long on the screw's head after completion of the current screwing process (at start of the next screwing process)</li> <li>• stop time between processes is set too low</li> </ul>	Check: <ul style="list-style-type: none"> <li>• motor shaft is free to turn</li> <li>• screwdriver's blade does not remain too long on the screw's head after completion of the screwing process</li> <li>• correct setting of stop time between processes</li> </ul> <p>If the problem remains, execute the idle torque calibration by placing the screwdriver in its holder and powering off and on again the control unit.</p>

Error code	Error message	Error situation / analysis	Solution
13	Screw is tightened before reaching min. angle to turn	<p>During self-cutting, the eScrewSpeed checks if the screw was tightened before the lower limit of the configured tolerated angle range was performed.</p> <p>Possible error causes:</p> <ul style="list-style-type: none"> <li>• screw is too short</li> <li>• hole is too short or clogged</li> <li>• desired torque is set too low for the concerned screw joint</li> <li>• angle is set too high (including angle tolerance)</li> </ul>	<p>Check:</p> <ul style="list-style-type: none"> <li>• screw length</li> <li>• hole is long enough and clean</li> <li>• correct setting of the desired screwing torque adapted to the concerned screw joint</li> <li>• correct setting of the angle (including angle tolerance)</li> </ul>
14	Insufficient power supply (voltage drop detected)	<p>The eScrewSpeed periodically verifies its power supply voltage.</p> <p>Possible error causes:</p> <ul style="list-style-type: none"> <li>• power adapter is damaged or not specified for the use with the connected screwdriver</li> <li>• control unit is damaged</li> <li>• insufficient mains supply</li> </ul>	<p>Check:</p> <ul style="list-style-type: none"> <li>• mains supply 230V/115V</li> <li>• power adapter specification for the use with the connected screwdriver</li> </ul> <p>If the problem remains, please contact Lécureux's after sales service.</p>
15	Missing microSD card	<p>The eScrewSpeed verifies if the microSD card is present and properly working each time before reading or writing data.</p> <p>Possible error causes:</p> <ul style="list-style-type: none"> <li>• microSD card was removed</li> <li>• damaged microSD card</li> </ul>	<p>Insert a working microSD card.</p> <p>If the problem remains, please contact Lécureux's after sales service.</p>
16	Invalid configuration settings value	Configuration settings entered are checked before validation (e.g. time, date, IP address, etc).	Enter valid configuration settings
17	Applied torque dropped below lower limit	<p>During the wind sub-process, the eScrewSpeed checks if the actual torque falls below the configured lower limit torque.</p> <p>Possible error causes:</p> <ul style="list-style-type: none"> <li>• broken watch spring</li> <li>• insufficient coupling between the screwdriver and the watch crown</li> <li>• lower limit torque is set too high</li> </ul>	<p>Check:</p> <ul style="list-style-type: none"> <li>• watch spring condition</li> <li>• coupling between the screwdriver and the watch crown</li> <li>• correct setting of the lower limit torque</li> </ul>

Error code	Error message	Error situation / analysis	Solution
18	Applied torque rose above upper limit	<p>During the pre-wind and when wind mode is set to 'Until defined wind' also during the wind sub-process, the eScrewSpeed checks if the actual torque exceeds the configured upper limit torque.</p> <p>Possible error causes:</p> <ul style="list-style-type: none"> <li>• blocked watch spring</li> <li>• upper limit torque is set too low</li> </ul>	<p>Check:</p> <ul style="list-style-type: none"> <li>• watch spring condition</li> <li>• correct setting of the upper limit torque</li> </ul>
19	Upper lim. torque not reached during defined limit angle	<p>When winding mode is set to 'Until upper limit trq' the eScrewSpeed stops winding, if the angle performed reaches the configured wind limit angle (timeout condition).</p> <p>Possible error causes:</p> <ul style="list-style-type: none"> <li>• broken watch spring</li> <li>• insufficient coupling between the screwdriver and the watch crown</li> <li>• higher limit torque is set too high</li> <li>• wind limit angle is set too low</li> </ul>	<p>Check:</p> <ul style="list-style-type: none"> <li>• watch spring condition</li> <li>• coupling between the screwdriver and the watch crown</li> <li>• correct setting of the upper limit torque</li> <li>• correct setting of the wind limit turns</li> </ul>
20	Screw is not tightened after performing max. angle	<p>During self-cutting, the eScrewSpeed stops screwing if the angle performed exceeds the upper limit of the configured tolerated angle range (timeout condition).</p> <p>Possible error causes:</p> <ul style="list-style-type: none"> <li>• screw is too long</li> <li>• watch spring is broken</li> <li>• insufficient coupling between the screwdriver and the watch crown</li> <li>• screwing torque is set too high</li> <li>• angle is set too low (including angle tolerance)</li> </ul>	<p>Check:</p> <ul style="list-style-type: none"> <li>• screw length</li> <li>• watch spring condition</li> <li>• coupling between the screwdriver and the watch crown</li> <li>• correct setting of the desired screwing torque adapted to the concerned screw joint</li> <li>• correct setting of the angle (including angle tolerance)</li> </ul>

Error code	Error message	Error situation / analysis	Solution
21	Process timed out, please restart	<p>After having detected the process start, the eScrewSpeed aborts the process if it couldn't complete within the timeout limit.</p> <p>Possible error causes:</p> <ul style="list-style-type: none"> <li>• the screwdriver blade slipped off the screw's head or broke</li> <li>• the screw's thread or the screw's slot broke</li> <li>• the threaded hole rooted out</li> <li>• the screw or the hole is not clean enough</li> <li>• the desired torque is set too high for the concerned screw joint</li> </ul>	<p>Check:</p> <ul style="list-style-type: none"> <li>• screwdriver blade is sufficiently pressed on the screw's head during the entire tightening process</li> <li>• screwdriver blade and screw heads are in good condition</li> <li>• screws and holes are sufficiently clean containing no chips</li> <li>• screw and hole threads are in good condition</li> <li>• correct setting of the desired torque adapted to the concerned screw joint</li> </ul>
22	Only one head may be taken off the holders at a time	<p>The eScrewSpeed selects the program to execute in function of the head in use when using the head holder ZIP41. Therefore, only one single head may be in use at one time (including the head of the base holder).</p>	<p>Make sure that only one of five heads is missing in the head holder (including the head of the base holder).</p>

# 14 Communication telegram specifications

## 14.1 General telegram description

All telegrams contain ASCII text characters and can either be sent/received via the RS232 serial or the Ethernet interface (also refer to chapters **9.2 Commanding the eScrewSpeed via its RS232 serial interface** and **9.3 Commanding the eScrewSpeed via its Ethernet interface**). They are constructed respecting the following rules dependant on their access type:

- **read (r)** access telegrams in order to read configuration settings are composed of the desired instruction followed by the '?' character.
- **write (w)** access telegrams in order to modify configuration settings are composed by the desired instruction followed by the '=' character and the desired value to set (refer to chapter **14.2 Modifying configuration settings using write access telegrams**).
- **execute (e)** access telegrams in order to run functions normally don't use '?' nor '=' characters.

### 14.1.1 Telegram construction for communication via RS232 serial interface

When using the RS232 serial interface, telegrams received by the eScrewSpeed must always terminate with a <CR>, while telegrams sent by the eScrewSpeed always terminate with a <CR><LF>.

#### Communication examples of valid eScrewSpeed telegrams:

- **Read (r)** access: Host request: LANG?<CR> eScrewSpeed reply: 2<CR><LF>
- **Write (w)** access: Host request: LANG=2<CR> eScrewSpeed reply: OK<CR><LF>
- **Execute (e)** access: Host request: R101<CR> eScrewSpeed reply: OK<CR><LF>

The eScrewSpeed replies with 'NOK' in case of an invalid telegram. Telegrams are also considered as invalid if the telegram concerning application license is missing.

#### Communication example of an invalid eScrewSpeed telegram:

Host request: BADTEL<CR> eScrewSpeed reply: NOK<CR><LF>

### 14.1.2 Telegram construction for communication via Ethernet interface

All telegrams via the Ethernet interface must begin with an ID followed by an ASCII string without string terminator. This is valid for both communication directions. The ID for all telegrams of this chapter is 0x0A which corresponds to <LF> according to the ASCII character set.

#### Communication examples of valid eScrewSpeed telegrams:

- **Read (r)** access: Host request: <LF>LANG? eScrewSpeed reply: <LF>2
- **Write (w)** access: Host request: <LF>LANG=2 eScrewSpeed reply: <LF>OK
- **Execute (e)** access: Host request: <LF>R101 eScrewSpeed reply: <LF>OK



The eScrewSpeed replies with 'NOK' in case of an invalid telegram. Telegrams are also considered as invalid if the telegram concerning application license is missing.

#### Communication example of an invalid eScrewSpeed telegram:

Host request: <LF>BADTEL eScrewSpeed reply: <LF>NOK


### 14.2 Modifying configuration settings using write access telegrams

A modified configuration setting due to a write access telegram is first saved on the eScrewSpeed’s on-chip RAM. It is then saved to the eScrewSpeed’s non-volatile memory NV (NV = on-board serial FRAM and if available microSD card) only 500ms after the last write access to any of the configuration settings. In case main menu relevant configuration settings were modified, the main menu is refreshed at the same instance than saving the modified configuration setting to the eScrewSpeed’s NV. This behavior enables performing consecutive write operations without delaying the communication response as the eScrewSpeed cannot communicate during main menu refresh nor NV memory saving operation. The ENDP telegram (refer to chapter **14.4 System configuration telegrams**) allows forcing the saving process on NV before the 500ms have elapsed as well as the refreshing of the main menu.


	<p>The modified configuration settings can <b>NOT</b> be saved to the eScrewSpeed’s NV memory if its write access is disabled by the NVMEM parameter (refer to chapter <b>14.4 System configuration telegrams</b>). This may although be desired in order to enhance communication response. Please consider that all modified configurations are lost on power-down in such a case.</p> <p>To prevent undesired loss of configuration settings, the eScrewSpeed automatically re-enables write accesses to the NV memory on each power-on.</p>
	<p>The eScrewSpeed does not verify configuration setting values before replying its reception. Therefore, in case of reception of an invalid configuration setting value, the eScrewSpeed still replies with OK.</p> <p>In order to verify modified configuration settings, the host needs to request the modified configuration setting from the eScrewSpeed to compare it to its logged data.</p>

### 14.3 eScrewSpeed’s data structure revisions

Due to Lécureux’s continuous product improvements new configuration settings may be added, modified or replaced in newer firmware versions which result in a new eScrewSpeed data structure revision. In order to achieve the best possible backward compatibility, the eScrewSpeed is able to perform automatic conversions of the incoming host’s communication from older to newer data structure revisions. This enables, within certain limits, to update the eScrewSpeed firmware version containing a newer data structure revision, without necessarily needing to update all the host’s communication. To obtain this functionality, the Rnnn telegram was introduced in data structure revision 1.01, while nnn represents the desired data structure revision used by the host’s communication (e.g. R101 for revision 1.01).

	<p>On each power-on the eScrewSpeed assumes data structure revision 1.00 used by the host’s communication.</p> <p>In case the host uses a newer data structure revision for communication than 1.00 (R100), it is therefore necessary for the host to redefine the newer data structure revision before each consecutive configuration of parameters.</p>
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Although, to take advantage of all the eScrewSpeed’s features, it is recommended for the host to use the newest data structure revision specified in this manual for communication.

	<p>Using an older or a newer data structure revision by the host’s communication than the one specified in this manual can in some cases lead to reduced or unexpected eScrewSpeed behavior.</p>
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This manual specifies the eScrewSpeed data structure revision 1.04 which is the data structure used in firmware version 1.13.

## 14.4 System configuration telegrams

Please note that not all system telegrams possess the same access types.

Telegram name	Telegram description	Assigned application(s)	Access type	Value examples	Remarks
VERSION?	Get firmware version	All	r	Version: 1.04r	
MACADDR?	Get MAC address	All	r	00:50:C2:96:30:10	
DONGLE?	Get connection of access permission dongle	All	r	0: not connected 1: connected	only available via the Ethernet interface
BAUD	RS232 serial baud rate [bd]	All	r/w	9600 19200 38400 57600 115200	The eScrewSpeed always replies using the current baud rate before modifying it to the requested value
ACPNAM	Get / Rename currently active user	All except Basic	r/w	max. 21 ASCII chars	The previous settings of an existing user are overwritten when renaming the currently active user with the already existing user's name
ACPSW= existing user	Switch to an existing user	All except Basic	w	max. 21 ASCII chars	
STATUSNUM?	Get general eScrewSpeed status number	All	r	100	refer to chapter <b>14.4.1 Status messages</b> description
STATUS?	Get general eScrewSpeed status in text form (text language is dependent on the LANG parameter)	All	r	e.g. Screw: Ready	refer to chapter <b>14.4.1 Status messages</b> description
CNTTOT?	Total counter of processes	All	r	0..999'999'999	
CNTTOD	Daily counter of processes	All	r/w	0..999'999'999	Resettable with command: CNTTOD=0

Telegram name	Telegram description	Assigned application(s)	Access type	Value examples	Remarks
MOTOR?	Get motor type of connected motor	All	r	e.g. TE-626B	
RESULT?	Get log data string	All except Basic	r	refer to chapter <b>8.1 Format of process log data</b>	
NVMEM	Enable / Disable saving of parameter changes on eScrew's non-volatile memory NV (NV = on-board serial FRAM and if available microSD card)	All except Basic	r/w	0: disable 1: enable (automatically defined on each power-on)	refer to chapter <b>14.2 Modifying configuration settings using write access telegrams</b>
Rnmm	Define the data structure revision assumed for the host's communications.  Incoming host data is automatically converted to the data structure revision set by this parameter.	All	e	R100: original data structure revision (automatically defined on each power-on)  R103: data structure revision specified in this manual (recommended revision to use)	refer to chapter <b>14.3 eScrewSpeed's data structure revisions</b>
ENDP	Force an immediate saving of configurations to the eScrew's non-volatile memory NV (NV = on-board serial FRAM and, if available, on microSD card) <b>as well as</b> a refreshing of the main menu	All	e	-	refer to chapter <b>14.2 Modifying configuration settings using write access telegrams</b>
FIRMWAREUP DATE= filename	Execute firmware update using the firmware file on the eScrewSpeed's microSD card	All	e	-	filename WITHOUT file extension
CSTART	Start process of current program	All except Basic	e	-	
CSTOP	Abort running process / Reset errors	All except Basic	e	-	
CREVERSE	Start unscrewing	All except Basic	e	-	




### 14.4.1 Status messages description

The eScrewSpeed's status messages indicate either status or error details. The status message number is built using the following arithmetic formula:

$$\text{STATUSNUM} = \text{Mode number} + \text{status/error code}$$

while the status message name is composed as follows:

$$\text{STATUS} = \text{Mode name} + \text{status name}$$

	<p>It is not reasonable to use status names for other purposes than pure user information, as status names are transmitted in the currently configured eScrewSpeed language. Host synchronization procedures should ONLY use the status number.</p>
---	---

Examples of possible STATUSNUM number values and their respective STATUS names:

- 000 Busy
- 100 Screw: Ready
- 102 Screw: Running + test
- 201 Wind: Running
- 1011 Error: Screw is not tightened (torque drop detected)
- 1015 Error: Missing microSD card

#### 14.4.1.1 Mode numbers

Mode number (decimal)	Mode name (ASCII text)
000	Busy
100	Screw:
200	Wind:
300	Loosen:
400	Calibration:
500	Measure:
1000	Error:

#### 14.4.1.2 Status codes

Status code (decimal)	Status name (ASCII text)
0	Ready
1	Running...
2	Running + Test
3	Running...
4	No motor!
5	Maintenance
6	In Holder
7	Running + Loosen

### 14.4.1.3 Error codes

Error code (decimal)	Error message (ASCII text)
1	Idle torque too high. Repeat calibration, please.
3	Screw could not be loosened with max. motor torque
4	No tightened screw was detected
11	Screw is not tightened (torque drop detected)
12	Motor blocked at start
13	Screw is tightened before reaching min. angle to turn
14	Insufficient power supply (voltage drop detected)
15	Missing microSD card
16	Invalid configuration settings value
17	Applied torque dropped below lower limit
18	Applied torque rose above upper limit
19	Upper lim. torque not reached during defined limit angle
20	Screw is not tightened after performing max. angle
21	Process timed out, please restart
22	Only one head may be taken off the holders at a time

Error messages can be reset using the CSTOP or CSTART telegram (refer to chapter **14.4 System configuration telegrams**).

For other methods of resetting errors, as well as for analysis and solving of indicated errors refer to chapter **13 Error diagnostics**.

## 14.5 General configuration telegrams

The parameters of the general configuration telegrams are valid for all eScrewSpeed programs. Also refer to chapter **14.2 Modifying configuration settings using write access telegrams**.

Telegram name	Telegram description	Assigned application(s)	Access type	Value range	Remarks
PNAM	Name of currently active program set	All	r/w	max. 21 chars	ASCII chars
APRG	Number of currently active program	All except Basic	r/w	1..8	For program names refer to chapter <b>14.6 Program specific configuration telegrams</b>
TRQC	Torque calibration value	All	r/w	-30..+30 [%]	% of nominal
ACAR	Periodic idle torque calibration value	All	r/w	0..999 [processes]	
LANG	User language	All	r/w	0: Deutsch 1: français 2: english 3: italiano	
TRQU	Displayed physical torque unit	All	r/w	0: gcm 1: Ncm 2: mNm 3: uNm	
ANGU	Displayed physical angle unit	All	r/w	0: Turns 1: Degrees 2: Seconds	
BUZZ	Buzzer	All	r/w	0: disabled 1: enabled	
MLED	Motor LED	All	r/w	0: disabled 1: enabled	
PRNO	Print logged data	All except Basic	r/w	0: disabled 1: enabled	
SRTS	Send logged data to server	All except Basic	r/w	0: disabled 1: enabled	
SAVR	Save logged data on microSD card	All except Basic	r/w	0: disabled 1: enabled	
CONS	Ambient light compensation	All	r/w	0: manual 1: automatic	
CONV	Display brightness	All	r/w	1..100 [%]	
APON	Automatic start-up upon power-on	All	r/w	0: disabled 1: enabled	

Telegram name	Telegram description	Assigned application(s)	Access type	Value range	Remarks
1INP	Function of digital parallel input 1	All except Basic	r/w	0: Start curr.prog 1: Abort prog 2: Start unscrew 3: Screw joint test 4: Start prog 1	
2INP	Function of digital parallel input 2	All except Basic	r/w	0: Start curr.prog 1: Abort prog 2: Start unscrew 3: Screw joint test 4: Start prog 2	
3INP	Function of digital parallel input 3	All except Basic	r/w	0: Start curr.prog 1: Abort prog 2: Start unscrew 3: Screw joint test 4: Start prog 3	
1ZIN	Function of ZIP41 input 1	All except Basic	r/w	0: Start curr. prog 1: Start unscrew	
2ZIN	Function of ZIP41 input 2	All except Basic	r/w	0: Start curr. prog 1: Start unscrew 2: Holder	
VAFU	Vacuum control	All	r/w	0: While process 1: Always on 2: Always off	
CELS	Screwdriver holder signal	All	r/w	0: None 1: Dig. input 2 2: Intern 3: ZIP41	
ETHN	Ethernet communication interface	All except Basic	r/w	0: disabled 1: enabled	

## 14.6 Program specific configuration telegrams

All program specific configuration telegram names end with the desired program number n (n = 1..8) of the currently active program set.

For modifying configuration settings see chapter **14.2 Modifying configuration settings using write access telegrams**.

Telegram name [n = 1..8]	Telegram description	Assigned application(s)	Access type	Value range	Remarks
ATAn	Self-cutting sub-process	Screw	r/w	0: disabled 1: enabled	
PATn	Self-cutting start torque	Screw	r/w	1..1000 [%]	% of TRQn
ATUn	Nominal self cutting screwing angle	Screw	r/w	[ANGU] <sup>2</sup>	1..50 [turns] 1..18000 [deg] 1..3000 [sec]
ATOn	Acceptable tolerance for the nominal self cutting screwing angle	Screw	r/w	[ANGU] <sup>2</sup>	1..50 [turns] 1..18000 [deg] 1..3000 [sec]
DSCn	Screwing sub-process	Screw	r/w	0: disabled 1: enabled	
SPDn	Desired speed	All	r/w	[rpm]	Range depends on screwdriver type
TRQn	Screwing torque	Basic, Screw	r/w	[TRQU] <sup>1</sup>	Range depends on screwdriver type
PTQn	Screwing pre-torque	Basic, Screw	r/w	10..100 [%]	% of TRQn
TUTn	Screwing torque duration	Basic, Screw	r/w	100..2000 [ms]	
TDTn	Torque drop tolerance	Basic, Screw	r/w	5..80 [%]	% of TRQn
STTn	Stop time between two programs	Basic, Screw	r/w	100..2000 [ms]	
REPn	Test interval for screw joint tests	Screw	r/w	0: never test 1: each screw 2: each 2 <sup>nd</sup> screw 3: each 3 <sup>rd</sup> screw	Max. value: 100
TTLn	Screw joint test mode	Screw	r/w	0: until loosening 1: until lower limit 2: in tightening direction	
TULn	Test torque duration	Screw	r/w	100..2000 [ms]	
TSAAn	Tolerated slippage angle	Screw	r/w	0..360 [°]	Used only when TTLn = 2
LLIn	Lower limit torque	All except Basic	r/w	[TRQU] <sup>1</sup>	Range depends on screwdriver type
ULIn	Upper limit torque	All except Basic	r/w	[TRQU] <sup>1</sup>	Range depends on screwdriver type
BFUn	Function if test result is 'OK'	Screw	r/w	0: no action 1: loosen angle 2: rescrew	

Telegram name [n = 1..8]	Telegram description	Assigned application(s)	Access type	Value range	Remarks
GFUn	Function if test result is 'NOK'	Screw	r/w	0: no action 1: loosen angle 2: rescrew	
USSn	Unscrew speed	Basic, Screw	r/w	[rpm]	Range depends on screwdriver type
USMn	Unscrew mode	Basic, Screw	r/w	0: Def. angle 1: While pedal pressed 2: After screwing	
USTn	Not used <sup>3</sup>	-			
USRn	Unscrew angle	Screw	r/w	[ANGU] <sup>2</sup>	1..500 [1/10 turns] 1..18000 [deg] 1..3000 [sec]
BLCn	Backlash compensation	Screw	r/w	0..360 [°]	
NAMn	Program name	All	r/w	max. 21 chars	ASCII chars
STAn	Program start signal	All	r/w	0: dig.inp.edge 1: holder 2: dig.inp.state	
TRLn	Direction of rotation	All	r/w	0: CW 1: CCW	
WKMn	Application selection	All except Basic	r/w	0: Screw 1: Wind 2: tbd	
WMOn	Wind mode	Wind	r/w	0: Until defined angle 1: Until upper limit trq	
PWTn	Pre-winding angle / Start angle	Wind, Measure	r/w	[ANGU] <sup>2</sup>	1..1000 [turns] 1..99999 [deg] 1..60000 [sec]
TWTn	Winding angle / Measure angle	Wind, Measure	r/w	[ANGU] <sup>2</sup>	1..1000 [turns] 1..99999 [deg] 1..60000 [sec]
MCMn	Measure cycle mode	Measure	r/w	0: Simple 1: Go & return	
ATQn	Desired average torque	Measure	r/w	[TRQU] <sup>1</sup>	Range depends on screwdriver type
ATTn	Accepted torque tolerance	Measure	r/w	[TRQU] <sup>1</sup>	Range depends on screwdriver type

<sup>1</sup> Torques are generally transmitted in [1/100 Ncm] unless the physical torque unit set by the TRQU parameter is [gcm]. This is equally valid for both read and write access.

<sup>2</sup> Angles are transmitted in the physical angle unit configured by the ANGU parameter. This is equally valid for both read and write access.

The allowed range varies in function of the physical angle unit.

<sup>3</sup> For test purposes only




































































## 14.7 Access permission configuration telegrams

The list below shows the telegrams allowing to configure all elements giving access to the various menus and parameters including the main menu navigation elements. In general, following configuration options exist while not all elements possess all of these options:

-  = edit
-  = view
-  = hide

To create a new user and to switch users refer to chapter **14.4 System configuration telegrams**.

For modifying configuration settings see chapter **14.2 Modifying configuration settings using write access telegrams**.







Telegram name	Element description	Element location in eScrewSpeed menu	Access type	Value range
AUNCHA	Torque unit selection button	Main menu	r/w	0 =  / 1 = 
ADIAZO	Diagram zoom button	Main menu	r/w	0 =  / 1 =  / 2 = 
ADIASH	Diagram shift button	Main menu	r/w	0 =  / 1 =  / 2 = 
NCONFI	General settings navigation button	Main Menu	r/w	0 =  / 1 =  / 2 = 
NFCONF	Program settings navigation button	Main menu	r/w	0 =  / 1 =  / 2 = 
ASTART	Program start button	Main menu	r/w	0 =  / 1 =  / 2 = 
APGSEL	Program selection button	Main menu	r/w	0 =  / 1 =  / 2 = 
APOWOF	Power-off button	Main menu	r/w	0 =  / 1 =  / 2 = 
EDIAGR	Show diagramm	Main menu	r/w	0 =  / 2 = 
ECNTOT	Show total counter	Main menu	r/w	0 =  / 2 = 
ECNTOD	Edit today counter	Main menu	r/w	0 =  / 1 =  / 2 = 
PMMSPD	Edit screw speed	Main menu (Screw)	r/w	0 =  / 1 =  / 2 = 
PMMSTR	Edit screw torque	Main menu (Screw)	r/w	0 =  / 1 =  / 2 = 
ASCREW	Screw / Unscrew button	Main menu (Screw)	r/w	0 =  / 1 =  / 2 = 
ESCRRE	Show screwing torque	Main menu (Screw)	r/w	0 =  / 2 = 
ESCTRE	Show screw joint test torque	Main menu (Screw)	r/w	0 =  / 2 = 
PWINSP	Edit wind speed	Main menu (Wind)	r/w	0 =  / 1 =  / 2 = 
PPWITU	Edit pre-wind angle	Main menu (Wind)	r/w	0 =  / 1 =  / 2 = 
PWINTU	Edit wind angle	Main menu (Wind)	r/w	0 =  / 1 =  / 2 = 
EPWTRE	Show current pre-wind angle	Main menu (Wind)	r/w	0 =  / 2 = 
EWITRE	Show current wind angle	Main menu (Wind)	r/w	0 =  / 2 = 
EMEMAT	Show measured maximum torque	Main menu (Measure)	r/w	0 =  / 2 = 
EMEMIT	Show measured minimum torque	Main menu (Measure)	r/w	0 =  / 2 = 
EMEAVT	Show measured average torque	Main menu (Measure)	r/w	0 =  / 2 = 
EAVTRQ	Show average torque result	Main menu (Measure)	r/w	0 =  / 2 = 
PAPPLI	Application parameter	Program Name	r/w	0 =  / 1 =  / 2 = 

Telegram name	Element description	Element location in eScrewSpeed menu	Access type	Value range
PEDPRO	Edit program name parameter	Program Name	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PTHLEF	Direction of rotation parameter	Program Name	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSTART	Start signal parameter	Program Name (Screw)	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
NSCREW	SCREWING navigation	Program Name (Screw)	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
NCHSCR	SCREW JOINT TEST navigation	Program Name (Screw)	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
NUSCRE	UNSCREWING navigation	Program Name (Screw)	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PWSTAR	Start signal parameter	Program Name (Wind)	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
NWINDI	WIND navigation	Program Name (Wind)	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
NMEASU	MEASURE navigation	Program Name (Measure)	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
NAUTHR	SELF-CUTTING navigation	SCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PDOSCR	Screwing sub-process parameter	SCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSCSPD	Screwing speed parameter	SCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSCTRQ	Screwing torque parameter	SCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PPRTRQ	Pre-torque parameter	SCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PTIUTR	Screwing torque duration parameter	SCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSTOTI	Stop time between two programs parameter	SCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSTODT	Tolerated torque drop parameter	SCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PUNSMO	Unscrew mode parameter	UNSCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PUNSPD	Unscrew speed parameter	UNSCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PUNSTU	Unscrew angle parameter	UNSCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PUNSBL	Backlash compensation parameter	UNSCREWING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PCHINT	Test interval parameter	SCREW JOINT TEST	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PTEMOD	Test mode parameter	SCREW JOINT TEST	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PTEDUR	Test torque duration parameter	SCREW JOINT TEST	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PLOWLI	Lower limit torque parameter	SCREW JOINT TEST	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PUPPLI	Upper limit torque parameter	SCREW JOINT TEST	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PTENOK	Function if test result is 'OK' parameter	SCREW JOINT TEST	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PTESOK	Function if test result is 'NOK' parameter	SCREW JOINT TEST	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PTSLIA	Tolerated slippage angle parameter	SCREW JOINT TEST	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗



Telegram name	Element description	Element location in eScrewSpeed menu	Access type	Value range
PDATAHR	Self-cutting sub-process parameter	SELF-CUTTING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PTHDET	Self-cutting start torque parameter	SELF-CUTTING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PATHTU	Screwing angle parameter	SELF-CUTTING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PATTO	Acceptable tolerance for the screwing angle parameter	SELF-CUTTING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PWIMOD	Wind mode parameter	WIND	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PWISPD	Wind speed parameter	WIND	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PPWTUR	Pre-wind angle parameter	WIND	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PWITUR	Wind / Wind limit angle parameter	WIND	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PWLOLI	Wind lower limit parameter	WIND	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PWUPLI	Wind upper limit parameter	WIND	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PMMMMSP	Measure speed parameter	MEASURE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSTTUR	Start turns parameter	MEASURE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PMETUR	Measure turns parameter	MEASURE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PAVTRQ	Desired average torque parameter	MEASURE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PATRQT	Accepted torque tolerance parameter	MEASURE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PMELOL	Lower limit torque parameter	MEASURE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PMEUPL	Upper limit torque parameter	MEASURE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PMECMO	Measure cycle parameter	MEASURE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
ALOPRO	Load program set action	PROGRAM SET ARCHIVE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
ASAPRO	Save program set action	PROGRAM SET ARCHIVE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
ASPRAS	Save program set as action	PROGRAM SET ARCHIVE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
ADEPRO	Delete program set action	PROGRAM SET ARCHIVE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
NMOCAL	MOTOR CALIBRATION navigation	HARDWARE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PAUSTA	Auto start-up parameter	HARDWARE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PHOCEL	Holder signal parameter	HARDWARE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PINPU1	Digital / ZIP41 input 1 parameter	HARDWARE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PINPU2	Digital / ZIP41 input 2 parameter	HARDWARE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PINPU3	Digital input 3 Paramete	HARDWARE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗


Telegram name	Element description	Element location in eScrewSpeed menu	Access type	Value range
PVAFUN	Vacuum control parameter	HARDWARE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PCATRQ	Torque calibration parameter	HARDWARE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PAUCAR	Idle current calibration after # of processes parameter	HARDWARE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PLICOM	Ambient light compensation parameter	USER INTERFACE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PBRIGH	Brightness parameter	USER INTERFACE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PBUZZE	Buzzer parameter	USER INTERFACE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PMOLED	Motor LED parameter	USER INTERFACE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PUNCHA	Torque unit parameter	USER INTERFACE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PANGUT	Angle unit parameter	USER INTERFACE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PLANGU	Language parameter	USER INTERFACE	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSERES	Send log to server parameter	LOG SERVER	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSERIP	Server IP parameter	LOG SERVER	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSERPO	Server port parameter	LOG SERVER	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSTCHA	Start char parameter	LOG SERVER	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSECHA	Separator char parameter	LOG SERVER	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PENCHA	End char parameter	LOG SERVER	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
NRESER	LOG SERVER navigation	DATA LOGGING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PPRES	Print log parameter	DATA LOGGING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PSARES	Save log on µSD card parameter	DATA LOGGING	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
NSYSIN	SYSTEM INFO navigation	SYSTEM	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
ASELFT	SELF TEST action	SYSTEM	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
ATOCAL	TOUCH CALIBRATION action	SYSTEM	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
NETHER	ETHERNET navigation	SYSTEM	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
NFIUPD	FIRMWARE UPDATE navigation	SYSTEM	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
AADLIC	ADD APPLICATION LICENSE navigation	SYSTEM	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PADATE	Date parameter	SYSTEM	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PATIME	Time parameter	SYSTEM	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PETHON	Ethernet parameter	ETHERNET	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PIPADD	IP address parameter	ETHERNET	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PNETMA	Net mask parameter	ETHERNET	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PGATEW	Gateway parameter	ETHERNET	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
PNTPSE	NTP server parameter	ETHERNET	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗
AIPRST	Load factory settings action	ETHERNET	r/w	0 = ✓ / 1 = 🔒 / 2 = ✗

Telegram name	Element description	Element location in eScrewSpeed menu	Access type	Value range
NPROGR	PROGRAMS navigation	SETTINGS	r/w	0 = ✓ / 1 =  / 2 = ✗
NPROAR	PROGRAM SET ARCHIVE navigation	SETTINGS	r/w	0 = ✓ / 1 =  / 2 = ✗
NDATLO	DATA LOGGING navigation	SETTINGS	r/w	0 = ✓ / 1 =  / 2 = ✗
NUSEIN	USER INTERFACE navigation	SETTINGS	r/w	0 = ✓ / 1 =  / 2 = ✗
NHASET	HARDWARE SETTINGS navigation	SETTINGS	r/w	0 = ✓ / 1 =  / 2 = ✗
NSYSYE	SYSTEM navigation	SETTINGS	r/w	0 = ✓ / 1 =  / 2 = ✗

# 15 Electrical interface specifications

## 15.1 Power supply interface specifications

Please take notice that the power consumption displayed on the bottom of the control unit refers solely to the control unit itself and does not include the connected screwdriver.

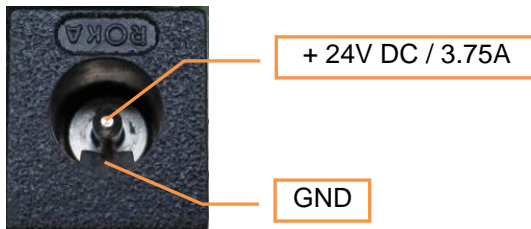
	The power supply unit may heat up during prolonged use. This is not a malfunction.
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Please refer to chapter **11.1 Power supply unit** to choose from the available power supply units.

Note:

Depending on the suitable power consumption rating, several control units can be connected to the same power supply unit using a multi-connector cable Article No 9001.006.144 (refer to chapter **11.5 List of available accessories**).

### 15.1.1 Connector pinning




Front view on control unit socket

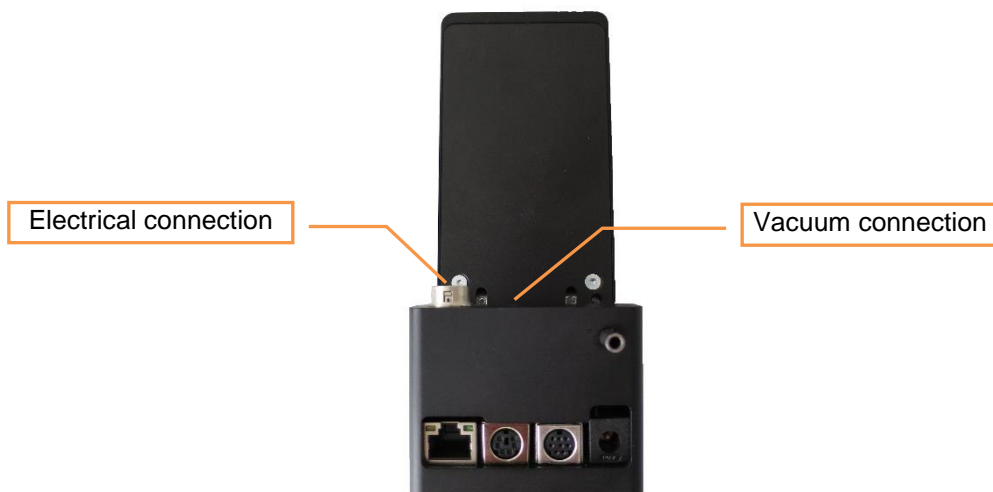
For details on power consumption refer to chapter **16 General specifications**.

### 15.1.2 Precaution when using power supply units

When using and handling the power supply unit, you must always take the following precautions otherwise there is risk of fire or electrocution:

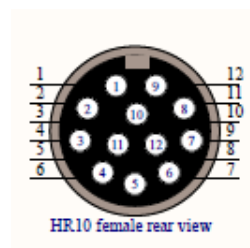
	<ul style="list-style-type: none"> <li>• Connect to a 230 V<math>\approx</math> (115V<math>\approx</math>) power socket.</li> <li>• Connect the power supply unit correctly to the power socket.</li> <li>• Never plug in or disconnect the power supply unit with wet hands.</li> <li>• Immediately disconnect the power supply unit if it becomes unduly hot, smells of smoke or gives off smoke and contact your representative/supplier.</li> <li>• Do not use this power supply unit for any other equipment and do not use any other power supply unit for this device.</li> <li>• Lécureux SA cannot be held liable for damage and consequential loss due to incorrect use of this or any unauthorised power supply unit.</li> <li>• Hold the power supply unit when removing it from the power socket. Do not pull the cable.</li> <li>• Never pull, bend or twist the cable.</li> <li>• If the cable insulation, power supply unit housing or plug are damaged contact your representative/supplier immediately.</li> <li>• Ensure that the device is switched off before disconnecting the power supply unit.</li> <li>• - Disconnect the power supply unit when it is not in use.</li> </ul>
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## 15.2 Screwdriver interface specifications



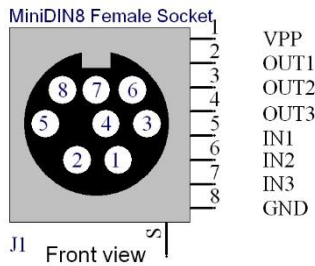
### 15.2.1 Screwdriver socket connector pinning

Pin number	Signal name
1	Red LED
2	Motor Phase B
3	Encoder Channel nA
4	Encoder Channel A
5	Encoder Channel nB
6	Encoder Channel B
7	Green LED
8	GND
9	Motor Type
10	Motor Phase C
11	Encoder Power (+5VDC)
12	Motor Phase A



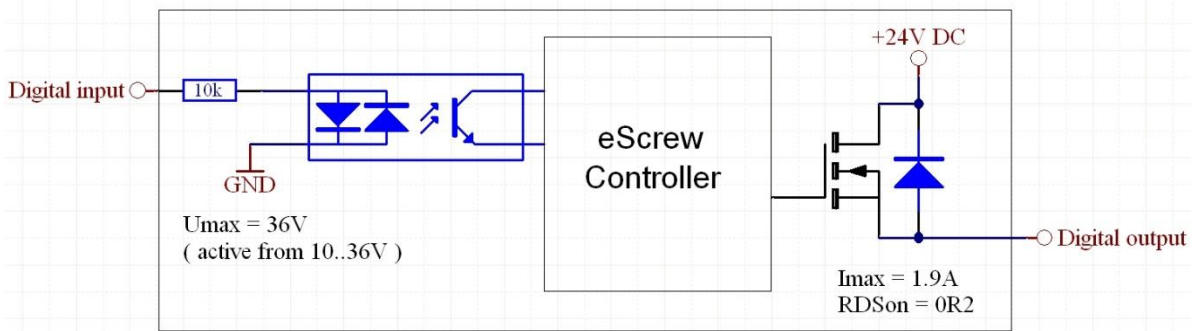
### 15.3 Digital parallel I/O interface specifications

#### 15.3.1 Digital parallel I/O interface connector pinning



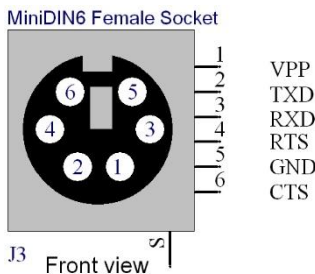
#### 15.3.2 Internal circuit of the digital parallel I/O interface

PNP logic is applied for all inputs and outputs:



### 15.4 RS232 serial interface specifications

#### 15.4.1 RS232 serial interface connector pinning



#### 15.4.2 RS232 protocol specification

Configurable baudrates:	9'600 (default), 19'200, 38'400, 57'600, 115'200 Baud
Data length:	8 Bits
Parity:	-
Stopbits:	1
Flow control:	XON / XOFF

### 15.5 Ethernet interface specifications

#### 15.5.1 Ethernet protocol

Number of threads:	single thread
Data rate:	10/100 MBit/s
Protocol:	TCP/IPv4
TCP port number:	50100
UDP port number:	50200
Connection type:	single socket

## 16 General specifications

Description	Value	Unit
Power supply voltage	24	V DC
Power consumption <sup>1</sup>	0,6 – 3.75	A
Casing	aluminium	---
TFT Touch-Display	3.2	"
Weight	500	g
Overall dimensions (Depth x width x height)	105 x 70 x 165	mm
Operating temperature	0-40	°C
Tolerance of measured torques after calibration <sup>2</sup>	± 5	%
Tolerance of angular speed	± 0.1	%
Tolerance of angular position	± 1	°

<sup>1</sup> Dependent on connected screwdriver type.

<sup>2</sup> The calibration process certified by Lécureux does not compensate for effects of the motor's rotational inertia.

To reduce negative effects of the motor's rotational inertia on a particular screw joint please consider the recommendations of this manual (refer to chapter **6.2.4 Pre-torque {basic}**).