Low Profile Drive

Cost-Effective Version

Elife-Drive SLC Series

![Elife International logo]

Application
Reference Manual

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Overview

SLC Elife-Drive is the Cost-Effective family of drivers designed to drive the various types of low-voltage servomotors, specifically for use in battery powered devices. The compact form was made possible thanks to the high efficiency of the design, manufactured with state-of-art electronic components.

Elife-Drive is highly configurable, a wide range of programmable parameters allow you to customize your system for your needs.

The main **key features** include:

- Designed to drive from 12 V to 96 V Brushless, Brushed and AC ServoMotors.

- The different versions of feedback are supported: *Hall Sensors*, *SinCos*, *Incremental Encoder*, *Fa-Coder*, *Resolver*, *Absolute Encoder SSI/BiSS*.

- Advanced algorithms for predictive speed and torque control.

- CANopen® modes of operation:[1]: Profile Velocity Mode, Torque Profile Mode, Profile Position Mode, Homing Mode and Cyclic Sync Position Mode

- Electromagnetic Holding Brake Output with DPR System (Dynamic Power Reduction)

- Dedicated Safe Torque Off (STO) input

- Telemetry of the Internal functions

- European Conformity CE, and designed and tested in accordance with the **EMC** emission (EN 61000-6-4) and immunity (EN 61000-6-2) standards. Elife-Drive is compliant with EN 60950-1 safety requirements.

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[1] Elife International is a Member of **CiA® - CAN in Automation**

Specification:

- ☑ Four Quadrant Regenerative Operation
- ☑ Space Vector Modulation Technology
- ☑ Sinusoidal and Trapezoidal Commutation Methods
- ☑ Programmable Gain Setting
- ☑ Fully Configurable Velocity and Position Limits
- ☑ On-the-fly Mode and Gain Set Switching
- ☑ Emergency Deceleration Ramp (Emergency) Input
- ☑ Safe Torque Off (STO) Input

Programmable Input/Output:

- ➡ **Six** Digital *Inputs* Single Ended
- ➡ **One** 12-bit Analog *Input* $0 \div 5\,V$
- ➡ **Three** High Powered Singled Ended *Output*
- ➡ **One** 5V 50mA Throttle *Output*

dimensions: 150x95x30 mm PHASE CURRENT *	NOMINAL BATTERY VOLTAGE - MAX MOTOR POWER			
	12V - 400W $10V \div 22V$	24V - 800W $10V \div 34V$	36V - 1.2kW $10V \div 46V$	48V - 1.6kW $10V \div 54V$
35 Arms (88 Arms peak)	SLC12-35-040-x	SLC24-35-080-x	SLC36-35-1.2-x	SLC48-35-1.6-x
70 Arms (176 Arms peak)	SLC12-70-040-x	SLC24-70-080-x	SLC36-70-1.2-x	SLC48-70-1.6-x

dimensions: 150x95x30 mm PHASE CURRENT *	NOMINAL BATTERY VOLTAGE - MAX MOTOR POWER	
	72V - 2.4kW $10V \div 100V$	96V - 3.2kW $10V \div 140V$
35 Arms (88 Arms peak)	SLC72-35-2.4-x	SLC96-35-3.2-x
70 Arms (176 Arms peak)	SLC72-70-2.4-x	SLC96-70-3.2-x

* The value of the maximum continuous (60 min) RMS phase current is ensured with an appropriate heat sink.

Product Identification Label

Most of information about your Elife-Drive - such as *serial number*, model, customer information, *etc* - can be found on a label located on the front of the Elife-Drive (see figure below). Some of these information might be requested when you contact the technical assistance.
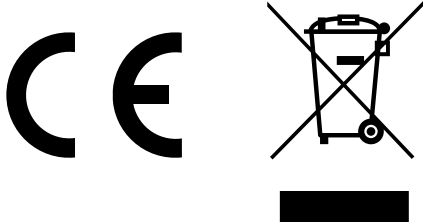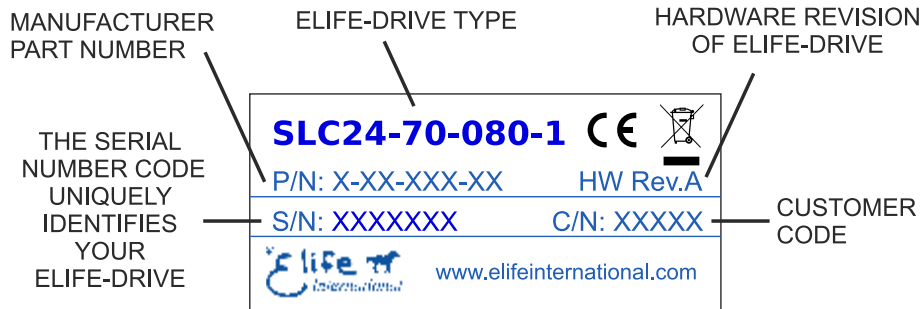
Compliance with the EU regulatory requirement for electrical and electronic equipment. When your Elife-Drive is no more usable, can't be treated as generic garbage, but must be disposed of at a collection point for recycling of electrical and electronic equipment, in compliance with the **WEEE** regulation (Waste of Electrical and Electronic Equipment).

Installation and Wiring

2.1 Mounting Elife-Drive on-board

The Elife-Drive can be mounted in any orientation, but you must choose a location in order to keep the controller **clean** and **dry**, aways from sunlight, water and ice. When you mount the Elife-Drive on-board you should **ensure an effective heat dissipation** between the Elife-Drive and the vehicle surface.

Elife-Drive has a LED light on the front of the device that visually explains what the driver is doing (see Section 3.1), if you want it to be visible you should take this into consideration before choosing the location where your Elife-Drive will be mounted.

> ⚠️ **Warning**
> In order to ensure the proper functioning of the Elife-Drive you must keep the controller clean and dry and ensure an effective heat exchange between the Elife-Drive and the vehicle surface.

The installation must be performed with an adequate heat exchange between the Elife-Drive and the surface on which it will be placed. In Figure 2.1 is shown a suggested installation method in order to ensure an effective heat dissipation between the Elife-Drive and the surface on which it will be placed.

> 💡 **Tips and Advice**
> A thermal grease should be used on the rear side of the Elife-Drive heatsink to improve the heat exchange between Elife-Drive and the surface on which it will be placed.

If the installation method shown in Figure 2.1 is not sufficient to ensure an effective heat dissipation from the Elife-Drive, you should install a Fan Cooler or a Liquid Cooler on your Elife-Drive.
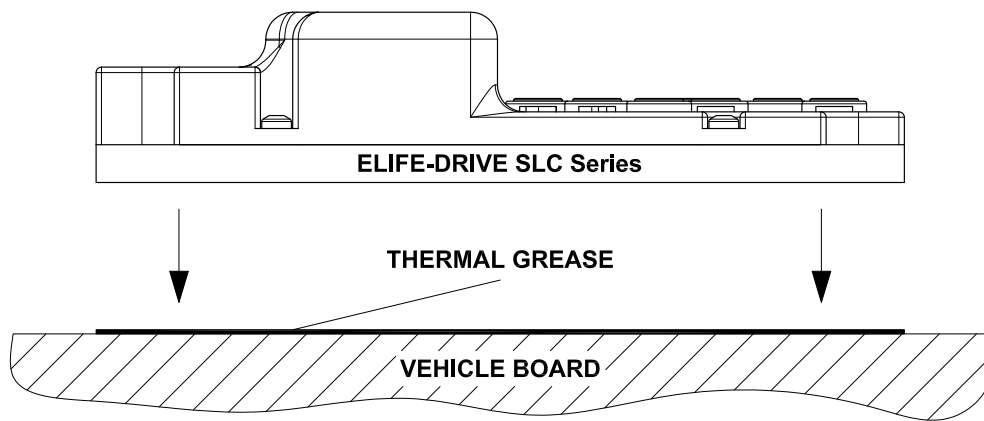
Figure 2.1: A recommended installation method in order to ensure an effective heat dissipation between the Elife-Drive and the surface on which it will be placed. A thermal grease should be used between the Elife-Drive and the surface on which it will be placed.

2.2 Connections

Elife-Drive on the front has different types of connectors:

High Power Connections

The three-phase alternating-current generated by Elife-Drive is supplied through the **U**,**V**,**W** terminals.

The **B+** and **B-** are the positive and negative terminals to connect to your battery.

You must connect an external fuse between the **B+** terminal and the positive battery terminal. (see Section 2.2.1)

Low Power Connections

18 pins female I/O Connector for Digital, Analog Input and Command Signal

6 pins female Feedback Connector for Feedback Interface

8 pins female Service Connector for Digital Communications CANopen® and RS232

2.2.1 High Power Connections

High power connections are provided by: 3-phase supply terminals (**U**,**V**,**W**) and two terminals for battery connections (**B+**,**B-**).

In order to connect correctly Elife-Drive, you should use the following instructions:

1. Connect the **battery negative** cable to the **B-** terminal.

2. An external fuse (See Table 2.1) must be fitted from the **battery positive** to terminal **B+** to avoid damage to the controller.

   ### Note
   Elife-Drive models haven't any fuse already installed.

Table 2.1: Fuse size in accordance with the Elife-Drive SLC Series

ELIFE-DRIVE TYPE	FUSE RATING
SLC	50 A

* All version of SLC Series require an external fuse.

3. Connect the U, V, and W motor phases to the 3-phase supply terminals (**U**,**V**,**W**).

   ### Note
   The **tightening torque** must be:

   $2.5\,\mathbf{Nm}$ for all Power Connections

Table 2.2: A summary table of high-power connections

TERMINAL	CONNECT TO
B+	Battery positive terminal
B -	Battery negative terminal
U,V,W	U, V, and W motor phases

⚠ Warning
When connecting the high power cables, make sure that the feedback cable passes as far as possible from the power cables, possibly with a different path, this to avoid electromagnetic interference.
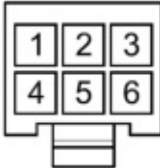
2.2.2 Low Power Connections

The low power logic control connections are provided by 3 female connectors.

- The Feedback Interface Connector
- The Input/Output and General Purpose Connector
- The Service Connector

The pin's description is given in Table below:

6PINS FEEDBACK CONNECTOR (HALL)
PIN	NAME	DESCRIPTION	OPERATING RANGE
1	5VOUT	+5V Supply Output	Imax = 50mA
2	H1	H1 - Hall Sensor Input	From 0 to 5V
3	H2	H1 - Hall Sensor Input	From 0 to 5V
4	H3	H1 - Hall Sensor Input	From 0 to 5V
5	DGND	Digital Common Ground	-
6	THERM	Thermal sensor	-
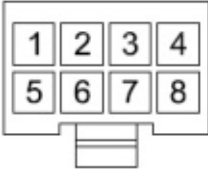
P/N 039012065 - FEMALE, WIRING VIEW

1	2	3
4	5	6

Figure 2.2: **Feedback Sensor Connections**

8PINS SERVICE CONNECTOR

PIN	NAME	DESCRIPTION	OPERATING RANGE
1 *	CAN- *	CAN- *	Standard CAN *
2	DGND	Digital Common Ground	–
3	RX RS232	RX RS232	Standard RS232
4	DGND	Digital Common Ground	–
5 *	CAN+ *	CAN+ *	Standard CAN *
6	DGND	Digital Common Ground	–
7	TX RS232	TX RS232	Standard RS232
8	SERVICE	GND only to upload firmware	–

P/N 039012085 - FEMALE, WIRING VIEW

```
1  2  3  4
5  6  7  8
```

(*) = optional

18PINS I/O CONNECTOR

PIN	NAME	DESCRIPTION	OPERATING RANGE
1	IN STO	STO Input	From 10 to 54V
2	OUT3	Digital Output 3	Active Low, Imax = 2A
3	IN5	Digital Input 5	Vmax = 54V, High > 10V
4 *	IN9 *	Analog/Digital Input 9 *	Vmax = 54V, High > 10V *
5	NC	Not Connected	–
6 *	IN8 *	Analog/Digital Input 8 *	Vmax = 54V, High > 10V *
7	AIN	Analog Input	From 0 to 5V (or 10V)
8	IN4	Digital Input 4	Vmax = 54V, High > 10V
9	IN1	Digital Input 1	Vmax = 54V, High > 10V
10	COM+	Positive Supply for loads	Vout in according to the voltage on "B+" terminal, Imax = 6A
11	OUT1	Digital Output 1	Active Low, Imax = 2A
12	OUT2 (BRAKE)	Digital Output 2 / Brake	Active Low, Imax = 2A
13	DGND	Digital Common Ground	–
14	IN2	Digital Input 2	Vmax = 54V, High > 10V
15	IN6	Digital Input 6	Vmax = 54V, High > 10V
16	VDD POT	Supply Output - Potentiometer	Vout = 5V, Imax = 50mA
17	IN3	Digital Input 3	Vmax = 54V, High > 10V
18 *	IN7 *	Digital Input 7 *	Vmax = 54V, High > 10V *

P/N 039012185 - FEMALE, WIRING VIEW

```
1  2  3  4  5  6  7  8  9
10 11 12 13 14 15 16 17 18
```
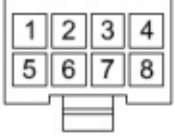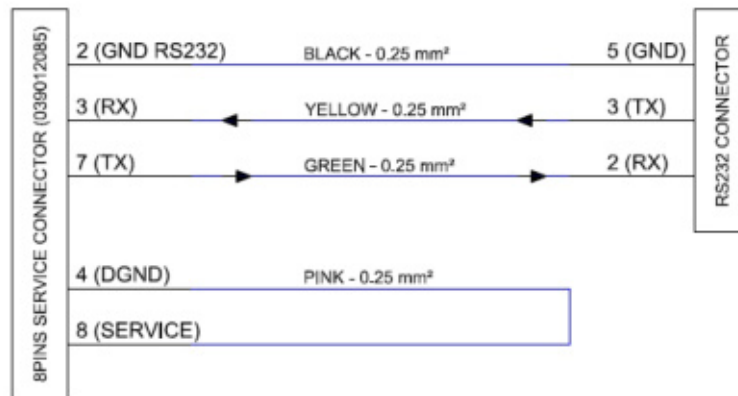
(*) = optional

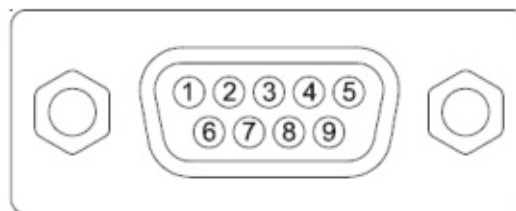**Figure 2.3:** **Signal Command Connections**

The programming connections is provided by an 8 pins male connector and a DB9 female connector. The cable description is given in Table below:

8PINS SERVICE CONNECTOR

PIN	NAME	DESCRIPTION	OPERATING RANGE
1	-	-	-
2	DGND	Digital Common Ground	-
3	RX RS232	RX RS232	Standard RS232
4	DGND	Digital Common Ground	-
5	-	-	-
6	-	-	-
7	TX RS232	TX RS232	Standard RS232
8	SERVICE	GND only to upload firmware	-

P/N 039012085 – FEMALE, WIRING VIEW

| 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 |

8PINS SERVICE CONNECTOR (039012085)

		RS232 CONNECTOR
2 (GND RS232)	BLACK - 0.25 mm²	5 (GND)
3 (RX)	YELLOW - 0.25 mm²	3 (TX)
7 (TX)	GREEN – 0.25 mm²	2 (RX)
4 (DGND)	PINK - 0.25 mm²	
8 (SERVICE)		

RS232 CONNECTOR (DB9) – FEMALE, WIRING VIEW

① ② ③ ④ ⑤
⑥ ⑦ ⑧ ⑨

IMPORTANT: Firmware updating is **ONLY** possible when **STO INPUT** is **LOW**. Make sure to keep **STO SWITCH OPEN** before and during the firmware updating.

Figure 2.4: Program Connections
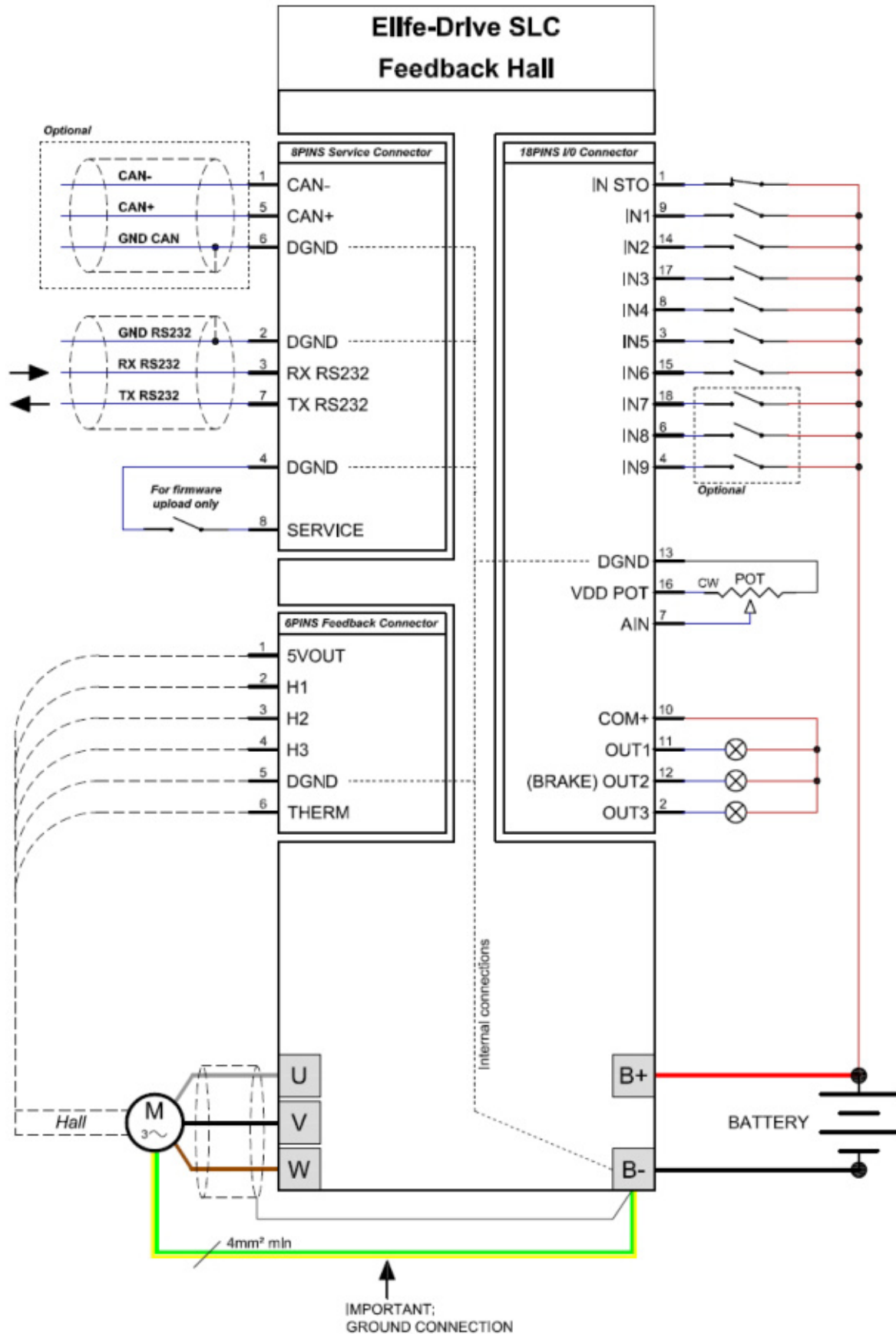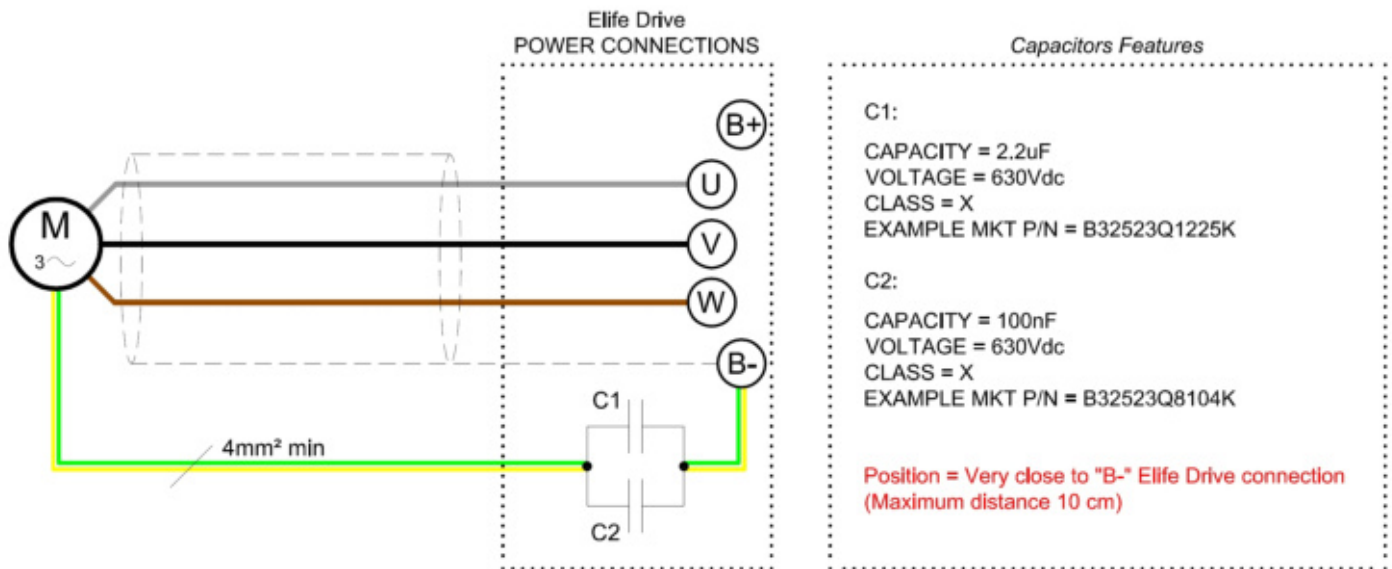
2.3 Standard Wiring Diagrams

Figure 2.5: Standard wiring diagram to connect the **Elife-Drive SLC Series** to your system - Hall Feedback

Alternative wiring diagram for connecting the ground wire from the negative terminal of the converter to the metal frame of the motor.

This solution is used when it's not allowed to connect the potential of the battery to the metal frame of the vehicle, thus allowing the passage of by-pass of the disturbance frequencies caused by the high switched current flowing through the wire through the capacities in series with the wire internal phases of the motor.

Figure 2.6: Alternative wiring diagram to connect the Ground Wire from the **Elife-Drive** to the Motor

2.3.1 Standalone Mode

The *Standalone* mode is divided into two specific functions, traction motor control and steering motor control.

The logic of this mode is to be able to drive the motor independently via the main inputs dedicated to the two specific functions.

Other optional inputs can be used to extend the functionality of these operating modes (See Table 2.3).

For the correct functioning of this operating mode, special attention must be paid to choose the correct value of *Analog Input* in according to the throttle characteristics.

> 📝 **Note**
> If you've installed a 0-5V throttle the rotation direction of the motor should be given through the FORWARD and the BACKWARD input.

When **throttle is put to neutral position** - before bridge activation - you can indicate the speed mode (FAST/SLOW input).
(only for **Standalone Traction** Mode)

> 💡 **Tips and Advice**
> You can setup accurately the levels of your throttle in the **Configuration Standalone Tab**

The Standalone Traction Mode has a **Cruise Control**. The controller - when the Cruise Control is activated by a Rising Edge Signal on IN1 - reads the actual velocity and keeps this velocity stable also when the throttle is released. The Cruise Control is disabled by the following actions:

- A Rising Edge Signal on IN1

- If the Emergency Input is unsupplied.

- For any Alarm Occours.

Table 2.3: Elife-Drive I/O definitions for **Standalone Traction** Mode

I/O TYPE	NAME	DESCRIPTION	
IN1	CRUISE	Rising Edge Signal = Enable/Disable Active or Disable the Cruise Control if a Rising Edge Signal is detected	Optional
IN2	FAST/SLOW	High =Fast mode, Low = Slow mode. This input is processed *only before* bridge activation	Optional[b]
IN3	FORWARD	High = Forward, Low = Stop (only if BACKWARD is low)	Optional[a]
IN4	BACKWARD	High = Backward, Low = Stop. This input is only processed if FORWARD input is low.	Optional[a]
IN5	EMERGENCY	Emergency input should always be supplied, otherwise Elife-Drive stops motor rotation and unlocks motor brake.	**Mandatory**
IN6	SLS	Safe Limited Speed High = maximum configured speed Low = limited speed	Optional
OUT1	BUZZER	It becomes active when the motor runs backwards It deactivates when the motor is running forwwards or stopped	
OUT2	BRAKE OUT	It becomes active when the motor is stopped	
OUT3	ALARM	Alarm output, it changes its current state whenever an alarm is present.	

[a] **Mandatory** only for 0-5V throttle.
[b] **Mandatory** if you want to switch between Fast and Slow mode.

The **Fast** and **Slow** modes are designed to meet two different purposes:

Slow mode It's programmable so that the vehicle indoor moves slowly with accurate operation.

Fast mode It allows a faster velocity for outdoor long distance path.

It's scheduled both the configuration of the maximum motor velocity and the maximum velocity at Slow mode
(See the **Analog adjustment in Configuration Standalone** parameters)

Table 2.4: Elife-Drive I/O definitions for **Standalone Steering** Mode

I/O TYPE	NAME	DESCRIPTION	
IN1	OVERTRAVEL CW	High = Active Overtravel for CW rotation, Low = Inactive Overtravel	Optional[a]
IN2	OVERTRAVEL CCW	High = Active Overtravel for CCW rotation, Low = Inactive Overtravel	Optional[a]
IN3	DIR	High = Clockwise, Low = Counterclockwise	Optional[b]
IN4	RUN / STOP	High = Run, Low = Stop	**Mandatory**
IN5	EMERGENCY	Emergency input should always be supplied, otherwise Elife-Drive stops motor rotation and unlocks motor brake.	**Mandatory**
IN6	SLS	Safe Limited Speed High = maximum configured speed Low = limited speed	Optional
OUT1	- - -	- - -	
OUT2	BRAKE OUT	It becomes active when the motor is stopped	
OUT3	ALARM	Alarm output, it changes its current state whenever an alarm is present.	

[a] It is processed only if *overtravels* are enabled by Telemetry panel
[b] **Mandatory** only for 0-5V throttle.

The table above shows the connections optimized for the Standalone Steering Mode

2.3.2 CANopen®Mode

In **CANopen®** mode you can control your motor through CANopen® bus protocol. For further information about CANopen® protocol, please refer to CiA® DSP402 protocol (version 3.0.1.15) and Elife-Drive CANopen® Manual.
A description of the inputs and outputs connections for this operating mode is shown in Table 2.5

In this operating mode is needed to set the correct CANopen® parameters via Telemetry Panel Configuration CANopen® section

Table 2.5: Elife-Drive I/O definitions for **CANopen®** Mode

I/O TYPE	NAME	DESCRIPTION	
IN1	BWD	It could be used as negative limit switch	Optional[a]
IN2	FWD	It could be used as positive limit switch	Optional[a]
IN3	HOME SENSOR	It could be used as home switch	Optional[a]
IN4	- - -	- - -	
IN5	EMERGENCY	Emergency input should always be supplied, otherwise Elife-Drive stops motor rotation and unlocks motor brake.	**Mandatory**
IN6	SLS	Safe Limited Speed High = maximum configured speed Low = limited speed	Optional
OUT1	- - -	- - -	
OUT2	BRAKE OUT	It becomes active when the motor is stopped	
OUT3	ALARM	Alarm output, it changes its current state whenever an alarm is present.	

[a] It is processed only if CAN modes of operational is Homing Mode.

Please pay particular attention when wiring CANopen® connection: at both ends there must be a 120Ω resistor[1] and the bus length must be the following:

BIT RATE	BUS LENGTH
1 Mbit/s	up to 40 m
500 Kbit/s	up to 100 m
250 Kbit/s	up to 250 m

---

[1] the termination resistor is already set up inside the drive and can be activated in the appropriate configuration section

2.3.3 RS232 Mode

The RS232 Mode allows you to drive your motor via Telemetry Panel or send the control commands[2] to the Elife-Drive through the RS232 protocol.
This operating mode can be useful for testing your motor, without worrying about other devices (e.g: potentiometer) or other controllers (e.g: PLC)
See Table 2.6 for a description of inputs and outputs.

Table 2.6: Elife-Drive I/O definitions for **RS232** Mode

I/O TYPE	NAME	DESCRIPTION	
IN1	- - -	- - -	
IN2	- - -	- - -	
IN3	- - -	- - -	
IN4	- - -	- - -	
IN5	EMERGENCY	Emergency input should always be supplied, otherwise Elife-Drive stops motor rotation and unlocks motor brake.	**Mandatory**
IN6	SLS	Safe Limited Speed High = maximum configured speed Low = limited speed	Optional
OUT1	- - -	- - -	
OUT2	BRAKE OUT	It becomes active when the motor is stopped	
OUT3	ALARM	Alarm output, it changes its current state whenever an alarm is present.	

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[2]For further information, see **Elife-Drive - RS232 Communication Protocol** document

2.3.4 EV Car Mode

Table 2.7: Elife-Drive I/O definitions for **Ev Car** Mode

I/O TYPE	NAME	DESCRIPTION	
IN1	CRUISE	Rising Edge Signal = Enable/Disable Active or Disable the Cruise Control if a Rising Edge Signal is detected	Optional
IN2	SPORT / ECONOMY	High = Sport mode, Low = Economy mode. This input is processed *only before* bridge activation	Optional[a]
IN3	FORWARD	High = Forward, Low = Stop (only if BACKWARD is low)	**Mandatory**
IN4	BACKWARD	High = Backward, Low = Stop. This input is only processed if FORWARD input is low.	**Mandatory**
IN5	EMERGENCY	Emergency input should always be supplied, otherwise Elife-Drive stops motor rotation and unlocks motor brake.	**Mandatory**
IN6	HANDBRAKE	High = Unlocked, Low = Locked. This input is processed *only before* bridge activation	Optional
OUT1	BUZZER	It becomes active and deactivated alternately when the motor runs backward It is deactivated when the motor is running forwwards or stopped	
OUT2	BRAKE OUT	It becomes active when the motor is stopped	
OUT3	ALARM	Alarm output, it changes its current state whenever an alarm is present.	

[a] **Mandatory** if you want to switch between SPORT and ECONOMY mode

The *EV* mode is specially designed to control motors mounted in Electric Vehicles (EV). This operating mode employs sophisticated proprietary algorithms to offer you a driving experience as much as possible similar to traditional gasoline engine vehicles.

For the correct functioning of this operating mode, you must install only 0-5V throttle and choose the correct value of *Analog Input* in according to the throttle characteristics.

🖋 **Note**

In this operating mode the rotation direction of the motor should be given through the FORWARD and the BACKWARD input.

When **throttle is put to neutral position** - before bridge activation - you can indicate if the brake should be locked or unlocked (HANDBRAKE input), the rotation direction (BACKWARD or FORWARD) and the speed mode (SPORT/ECONOMY input).

The **SPORT** and **ECONOMY** modes are designed to meet two different purposes:

ECONOMY mode This operating mode is specially designed in order to extend the battery life. The *acceleration ramp* is smoother than Sport Mode and the max power available is limited.

SPORT mode The SPORT mode is designed to get the maximum performance as possible.

It's scheduled both the configuration of the maximum motor velocity and the maximum velocity at ECONOMY mode.

2.3.5 EV Bike Mode

📝 **Note**

This operating mode is reserved and unavailable

Monitoring Elife Drive 3

After wiring up correctly Elife-Drive and adjusting the programmable parameters , you are finally ready to test your system.

> ⚠️ **Warning**
> Before starting the test, you had better lift your vehicle up. The driving wheels must be off the ground and free to rotate. All testing and adjustment must be done in safe condition.

3.1 LED Diagnostics

Elife-Drive has an LED light on the front of the device that visually explains what the driver is doing. Below is the explanation of the different LED's status:

Blinking ORANGE Elife-Drive works correctly, motor is stopped

Blinking GREEN Elife-Drive works correctly, motor is running

Steady RED Elife-Drive detects one or more alarms. In this case, Elife-Drive stops motor rotation (disabling power relay and three-phase bridge) and unlocks motor brake.

Steady BLUE Elife-Drive is in the FW programming function, motor is stopped

If **CANopen**® mode is set, and the CANopen® FSA State is *Switch on disabled*, led will be **steady ORANGE** until it will receive shutdown command from PLC, independently from alarms or motor state.

3.2 Telemetry - Monitoring and Setting of Data

The telemetry panel allows you to set and view different types of telemetry data for each selected operating mode (Standalone, CANopen®, RS232, Bike EV, Car EV).
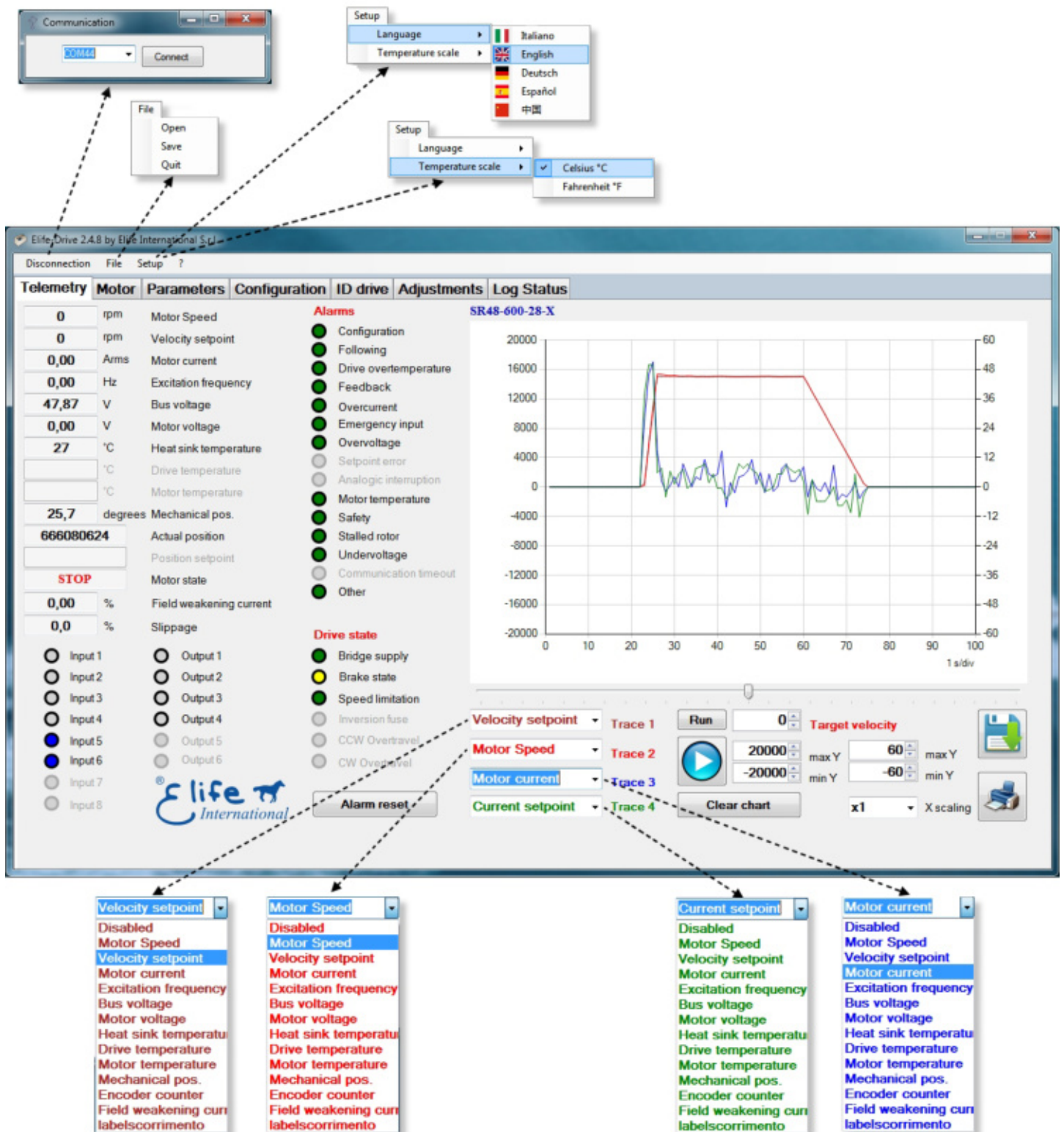
Figure 3.1: Telemetry Panel displays a wide range of telemetry data and enables you to plot or log these data over time.

3.2.1 Motor Setting

Telemetry Motor Setting
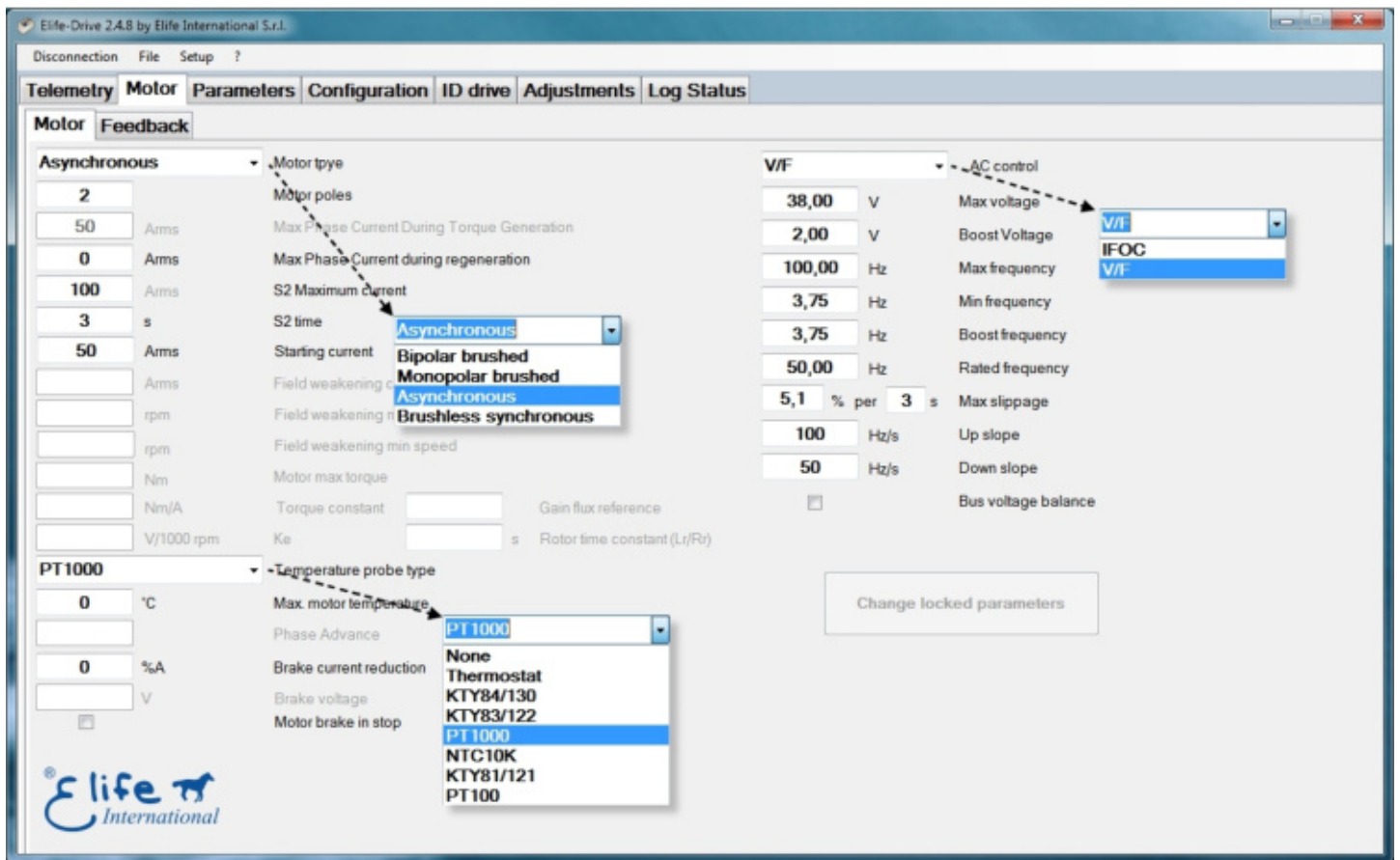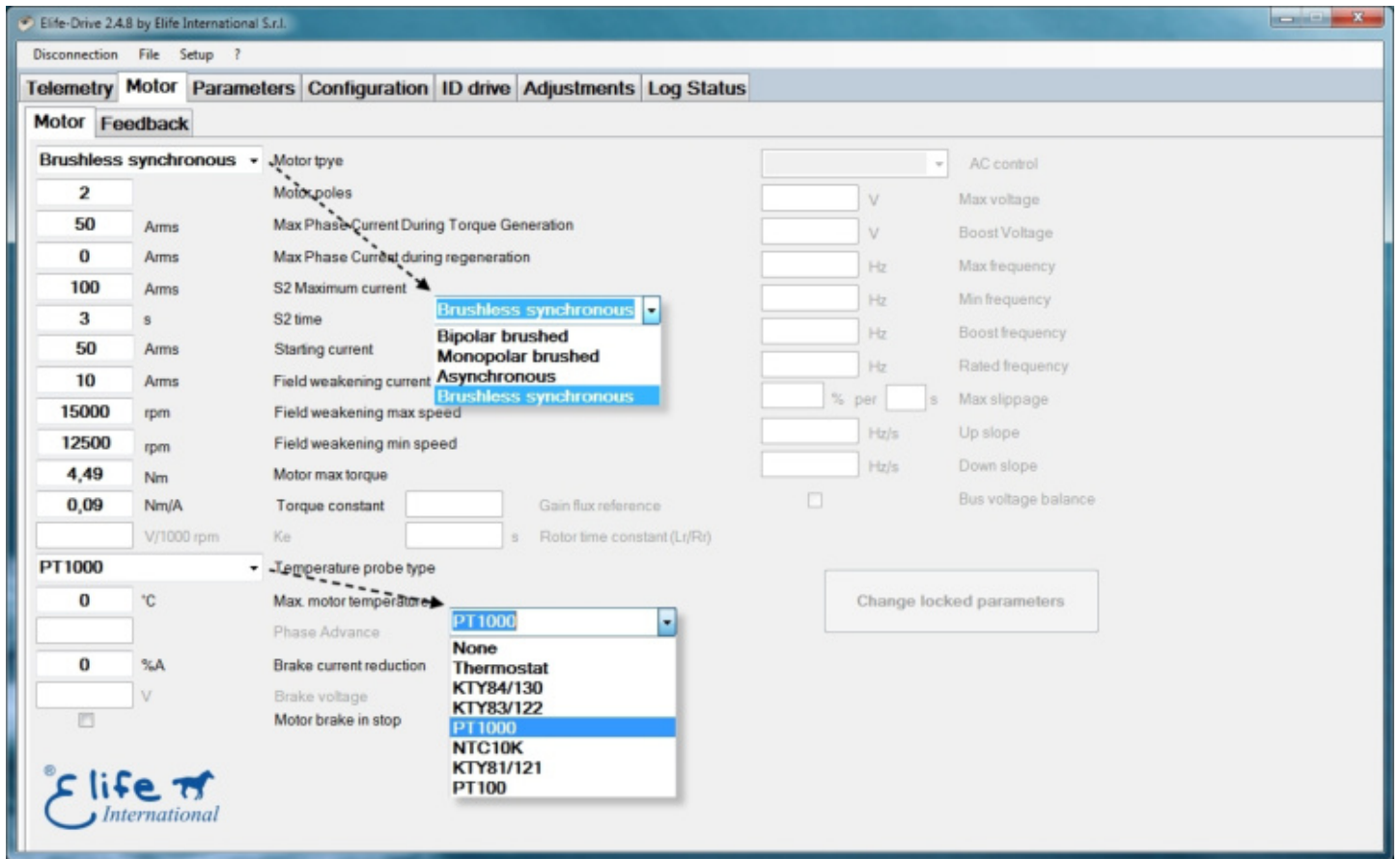
Figure 3.2: Telemetry Panel displays the Motor Parameters

3.2.2 Feedback Setting

Telemetry Motor Feedback Setting

All of our drives have the ability to interface with different types of Feedback sensors, in some models you can have multiple feedback interfaces at the same time, while other models only have one possible interface and must be explicitly requested when ordering.

Hall Sensors are devices that exploit the Hall effect, which is the change in an electrical voltage in the presence of a magnetic field. Hall sensors are used to detect the position of the rotor of an electric motor, particularly a brushless motor, which has permanent magnets on the rotor. Hall sensors are placed on the stator, at the electrical phases, and generate digital signals that change state when the rotor passes in front of them. These signals are used to switch the electrical phases and keep the motor in synchronism.

SinCos is a type of incremental encoder, that is, a device that generates electrical signals proportional to the angular displacement of the rotor of an electric motor. Unlike conventional incremental encoders, which generate digital signals in the shape of a square wave, SinCos encoders generate analog signals in the shape of a sine and cosine wave, offset from each other by 90 degrees. These signals can be processed by an electronic circuit to achieve higher resolution and greater noise immunity.

Incremental Encoder is a device that generates electrical signals proportional to the angular displacement of the rotor of an electric motor. An incremental encoder consists of an optical or magnetic disk, which has alternating lines or poles, and an optical or magnetic sensor, which detects the passage of the lines or poles. The incremental encoder generates two digital signals in the shape of a square wave, offset from each other by 90 degrees, called channel A and channel B. The number of pulses per revolution determines the resolution of the encoder. In addition, the incremental encoder can have a third signal, called the Z or index channel, which generates one pulse per revolution and serves as the zero reference.

Fa-Coder is a type of incremental encoder, patented by Tamagawa Seiki, that is based on the principle of frequency modulation. A Fa-Coder consists of an optical disk, which has concentric lines with a variable frequency, and an optical sensor, which detects the passage of the lines. The Fa-Coder generates two analog signals in the form of a sine and cosine wave, 90 degrees out of phase with each other, with a frequency proportional to the angular speed of the rotor. These signals can be converted to digital signals in the form of a square wave, with a resolution equal to the number of lines on the disk.

Resolver is a device that generates electrical signals proportional to the absolute angular position of the rotor of an electric motor. A resolver consists of a rotor, which has a coil energized by an alternating voltage, and a stator, which has two orthogonal coils that sense the voltage induced by the rotor. The resolver generates two analog signals in the form of a sine and cosine wave, 90 degrees out of phase with each other, with an amplitude proportional to the position of the rotor. These signals can be converted into a serial digital signal with a resolution equal to the number of bits of the converter.

Absolute encoder SSI/BiSS is a device that generates electrical signals that uniquely identify the angular position of the rotor of an electric motor. An absolute encoder consists of an optical or magnetic disk, which has lines or poles coded in binary, and an optical or magnetic sensor, which detects the code of the lines or poles. The absolute encoder generates a serial digital signal, which transmits the position code in binary format. The number of bits in the code determines the resolution of the encoder. There are several serial communication protocols for absolute encoders, including SSI (Synchronous Serial Interface) and BiSS (Bidirectional Serial Synchronous Interface).
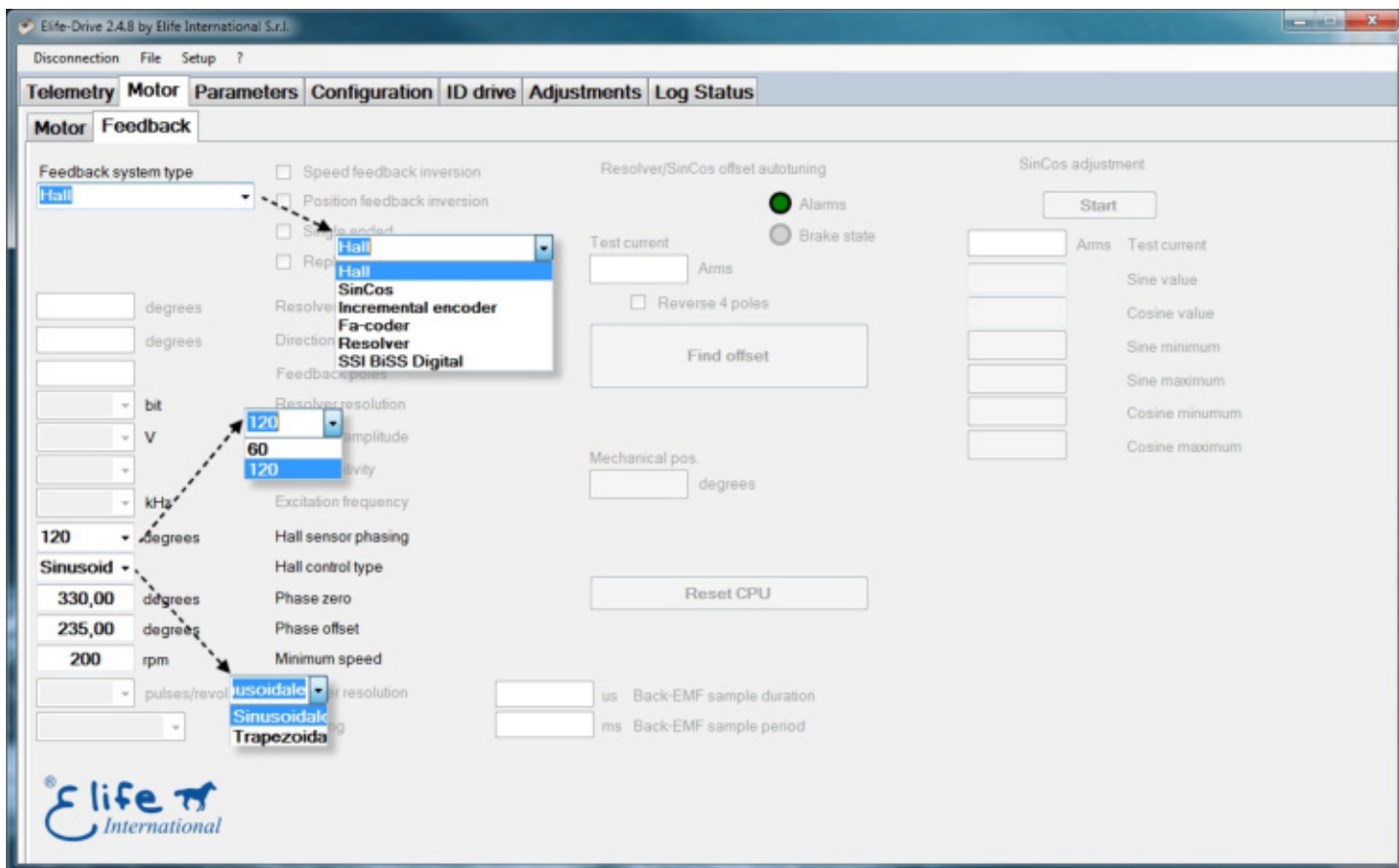
Figure 3.3: Telemetry Panel displays the Motor Feedback Hall Parameters
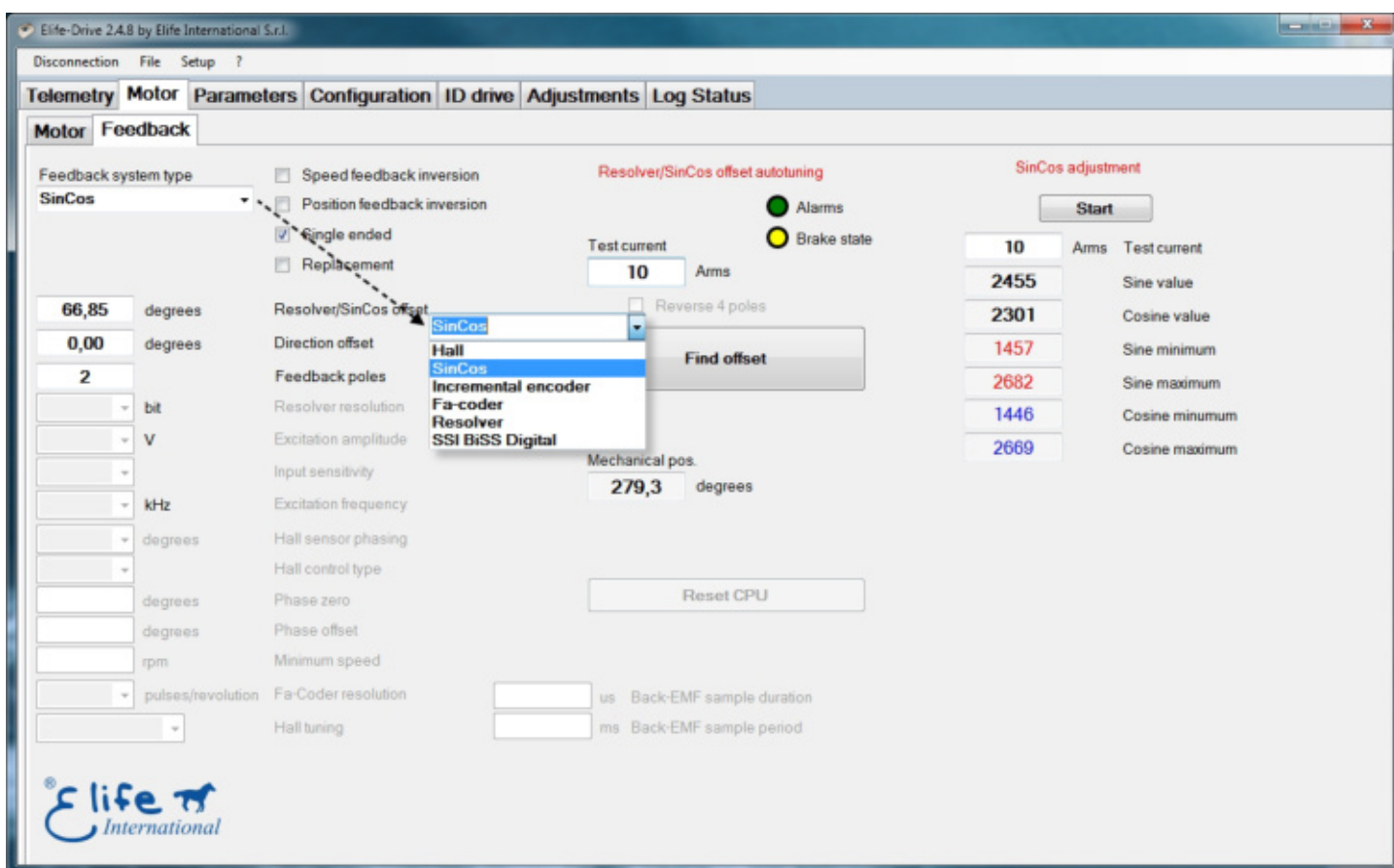
Figure 3.4: Telemetry Panel displays the Motor Feedback SinCos Parameters
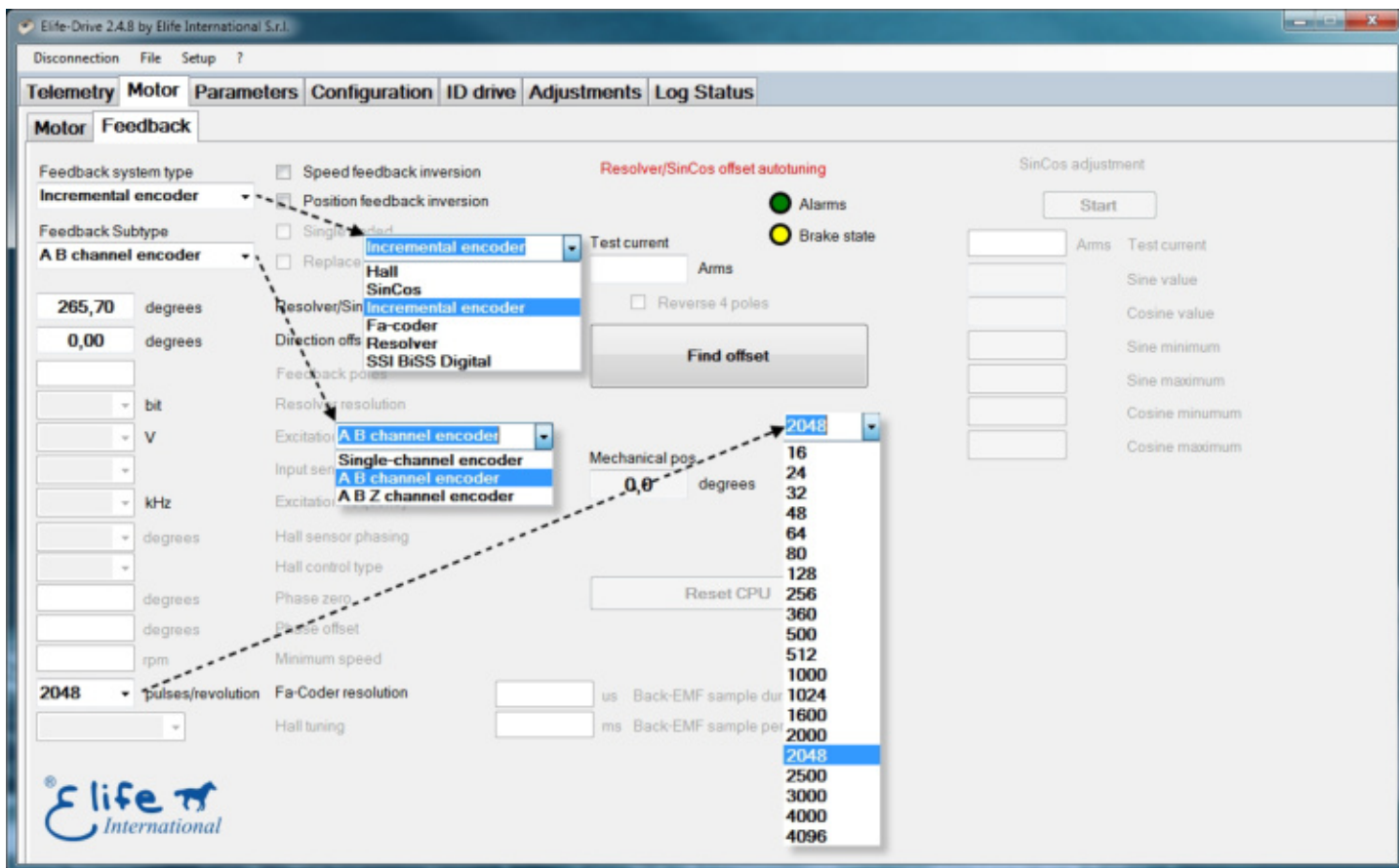
Figure 3.5: Telemetry Panel displays the Motor Feedback Incremental Encoder Parameters
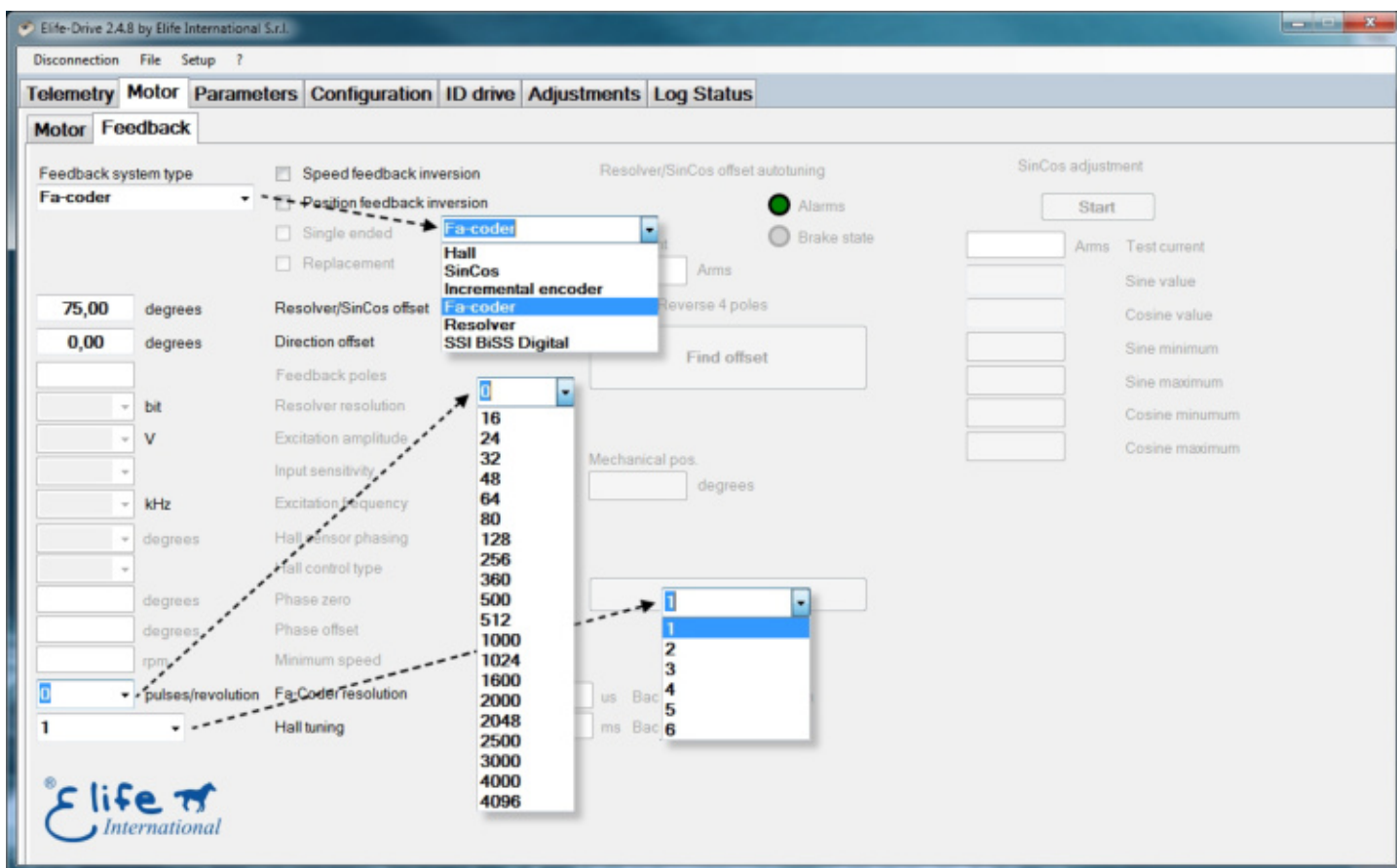
Figure 3.6: Telemetry Panel displays the Motor Feedback FaCoder Parameters
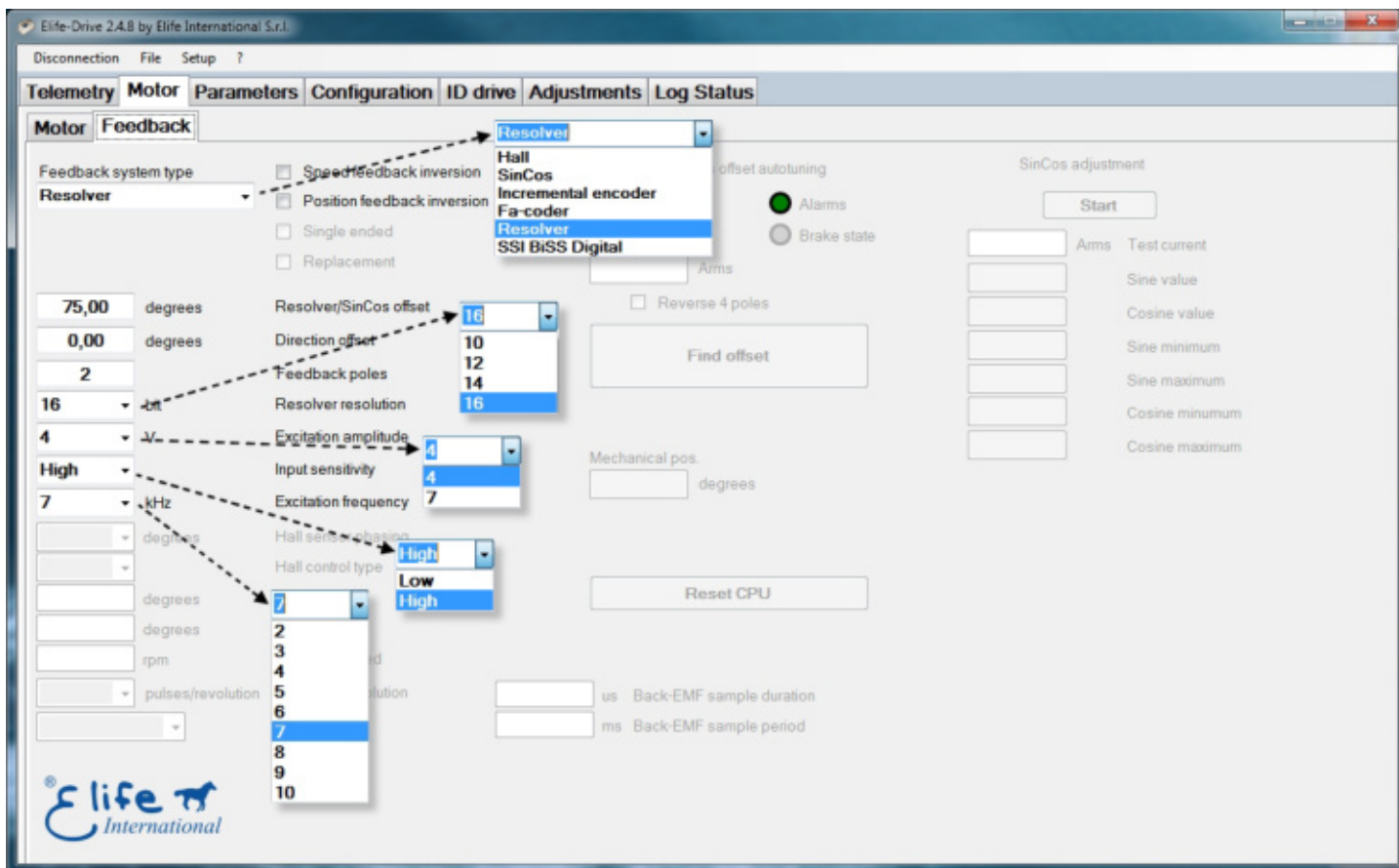
Figure 3.7: Telemetry Panel displays the Motor Feedback Resolver Parameters
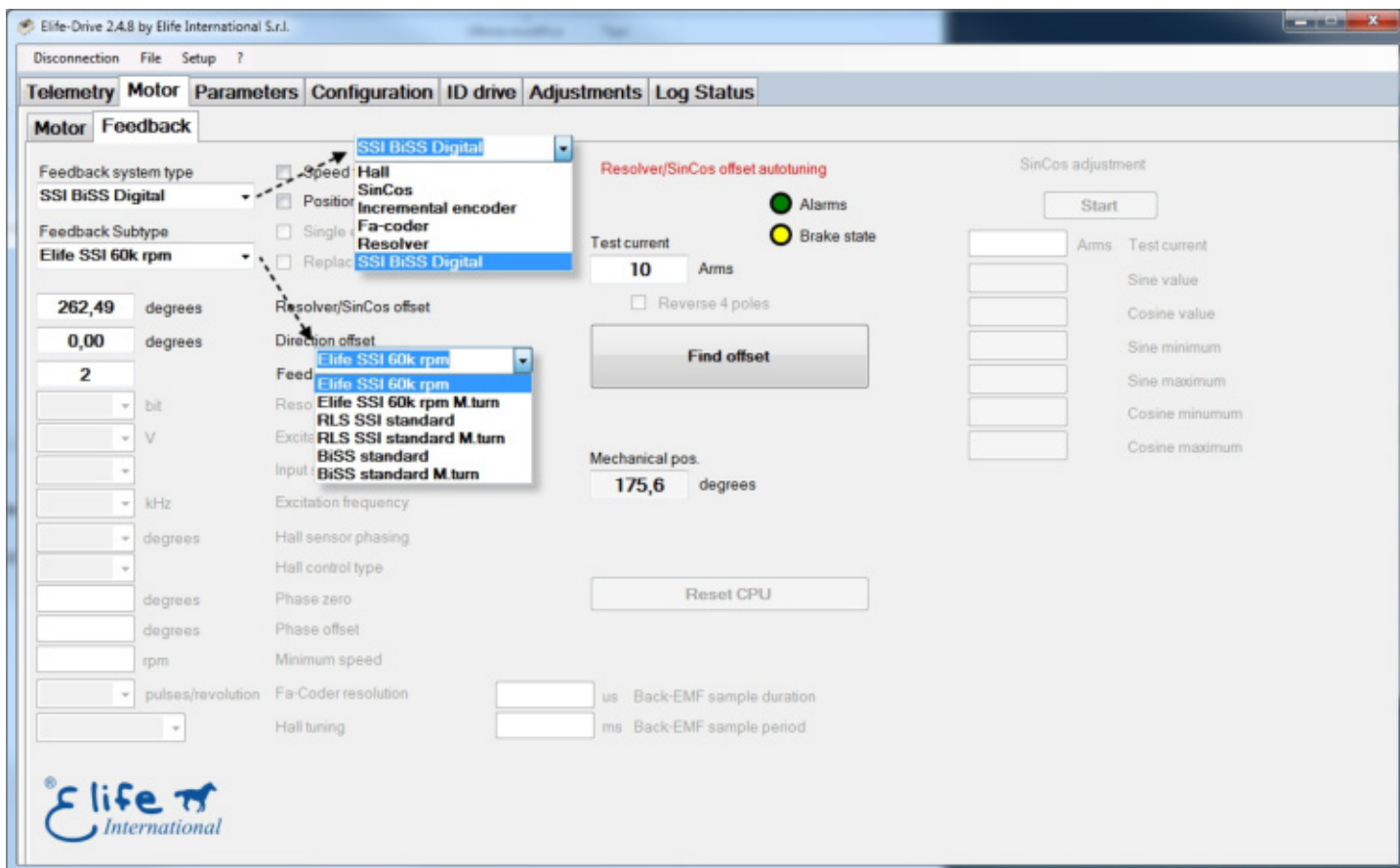
Figure 3.8: Telemetry Panel displays the Motor Fedback Absolute Encoder SSI Parameters

3.2.3 System Parameters

Telemetry System Parameters
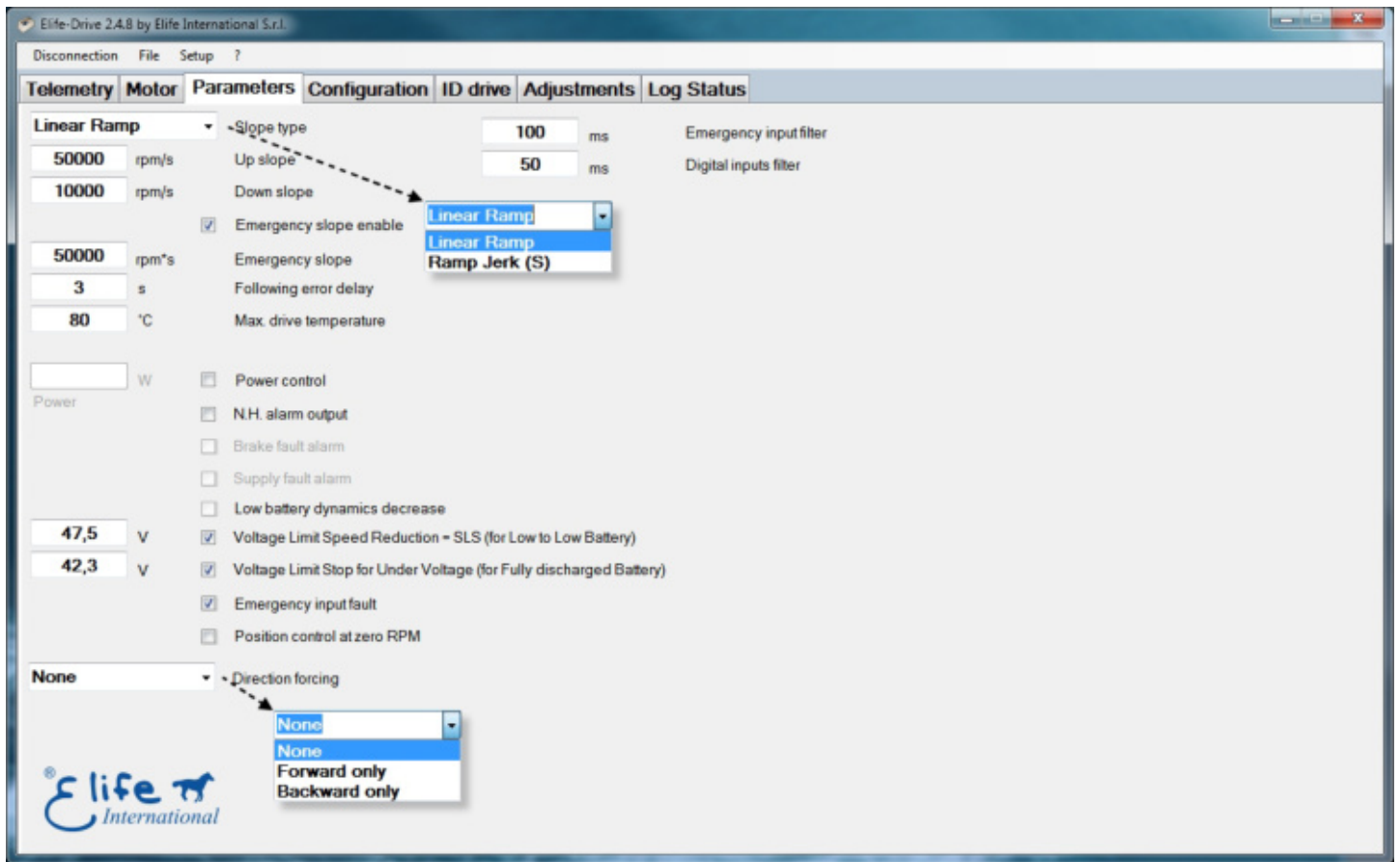
Figure 3.9: Telemetry Panel displays the System Parameters

3.2.4 Configuration - Connection

Telemetry Connection Configuration
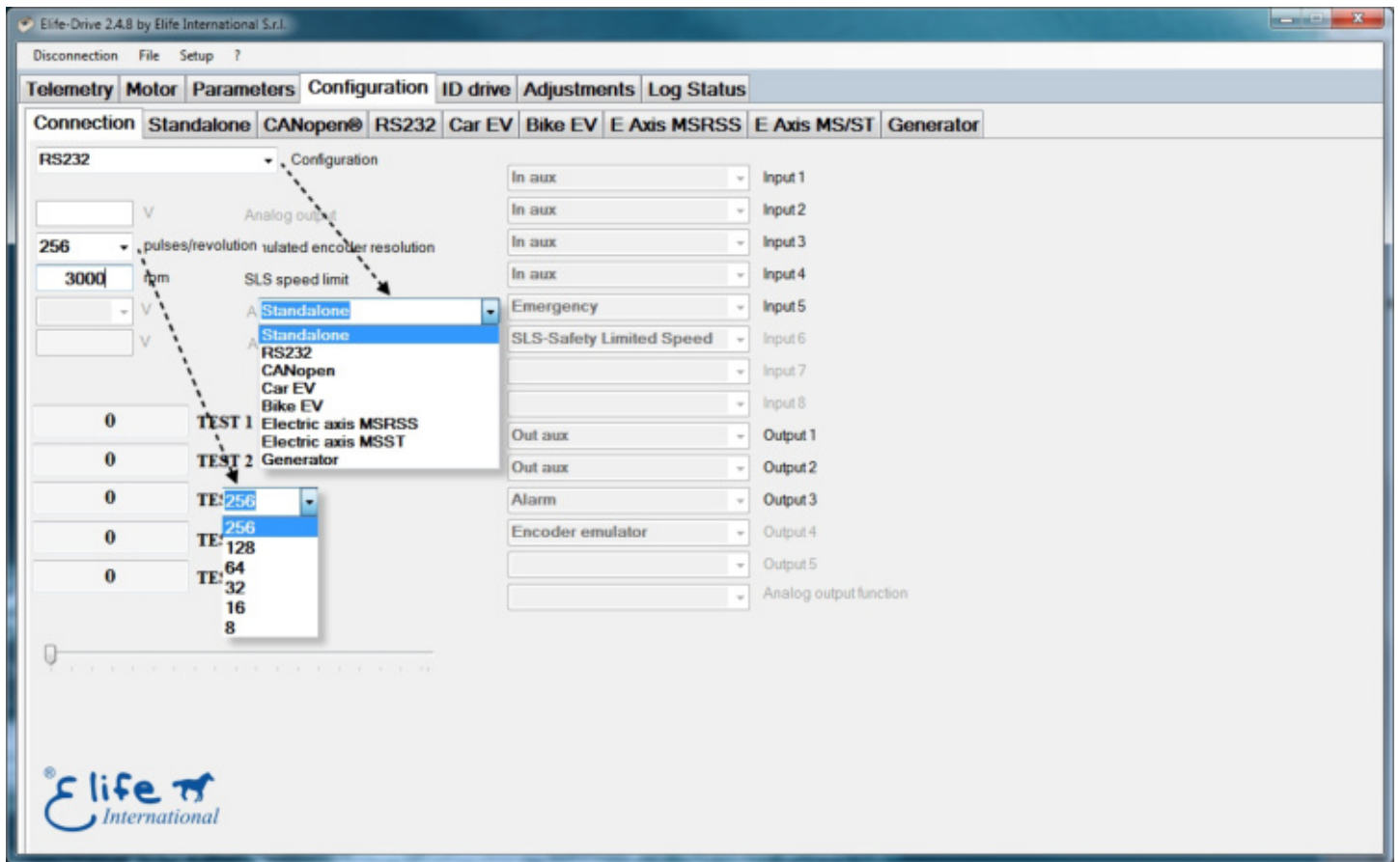
Figure 3.10: Telemetry Panel Connection Configuration

3.2.5 Configuration - Standalone

Telemetry Standalone Configuration
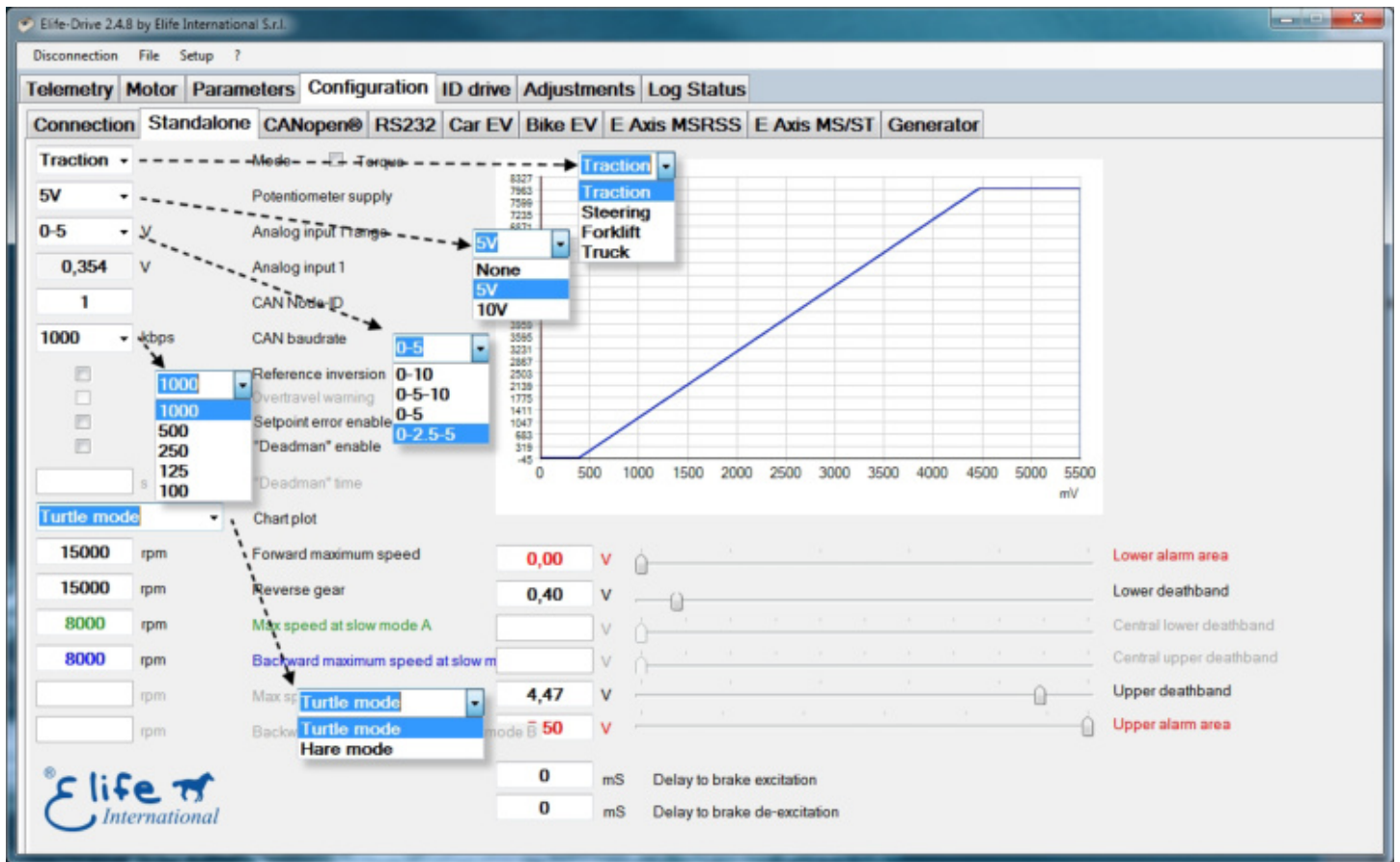
Figure 3.11: Telemetry Panel displays the Standalone Configuration

3.2.6 Configuration - CANopen®

Telemetry CANopen® Configuration
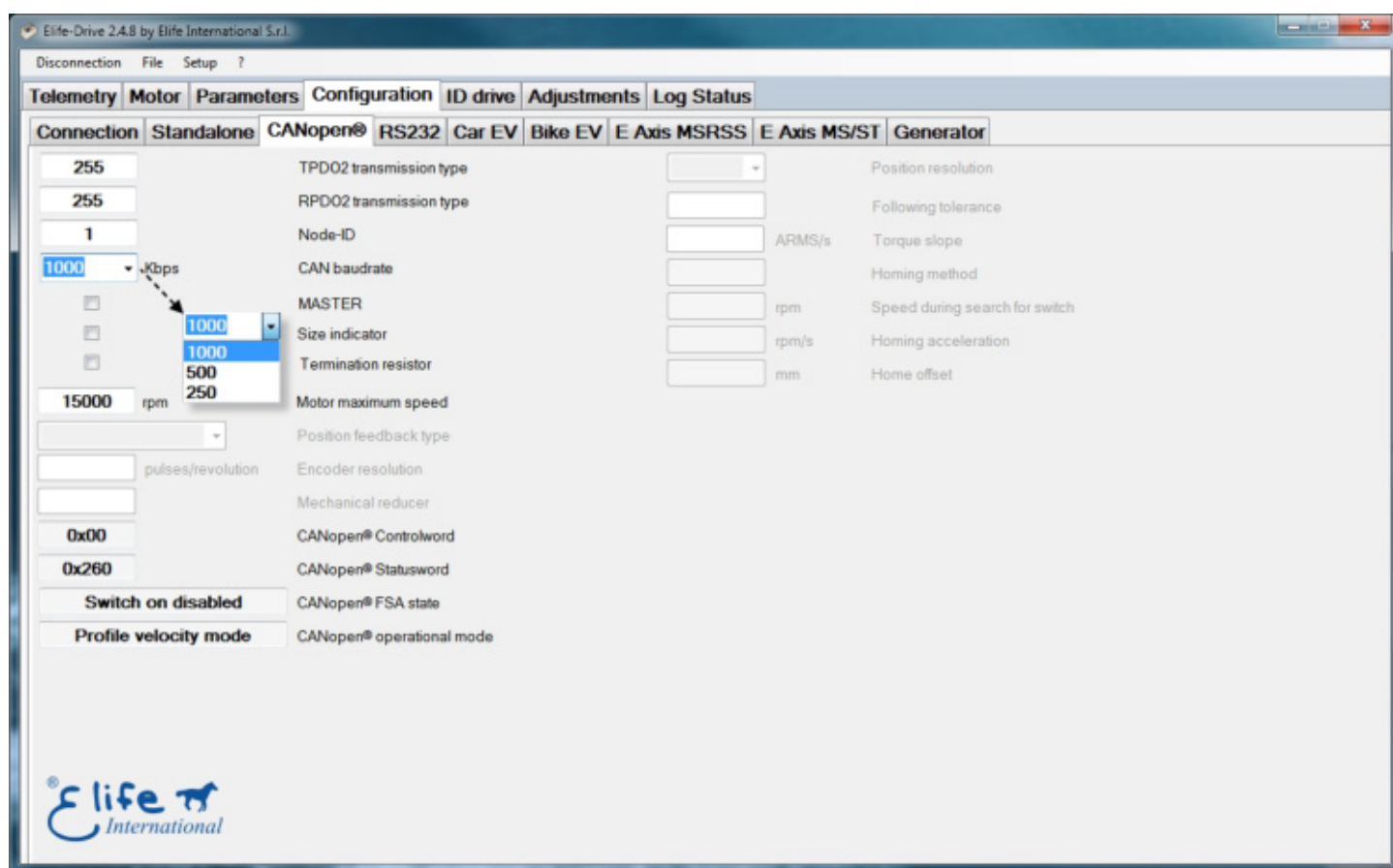
Figure 3.12: Telemetry Panel displays the CANopen® Configuration

3.2.7 Configuration - RS232

Telemetry RS232 Configuration
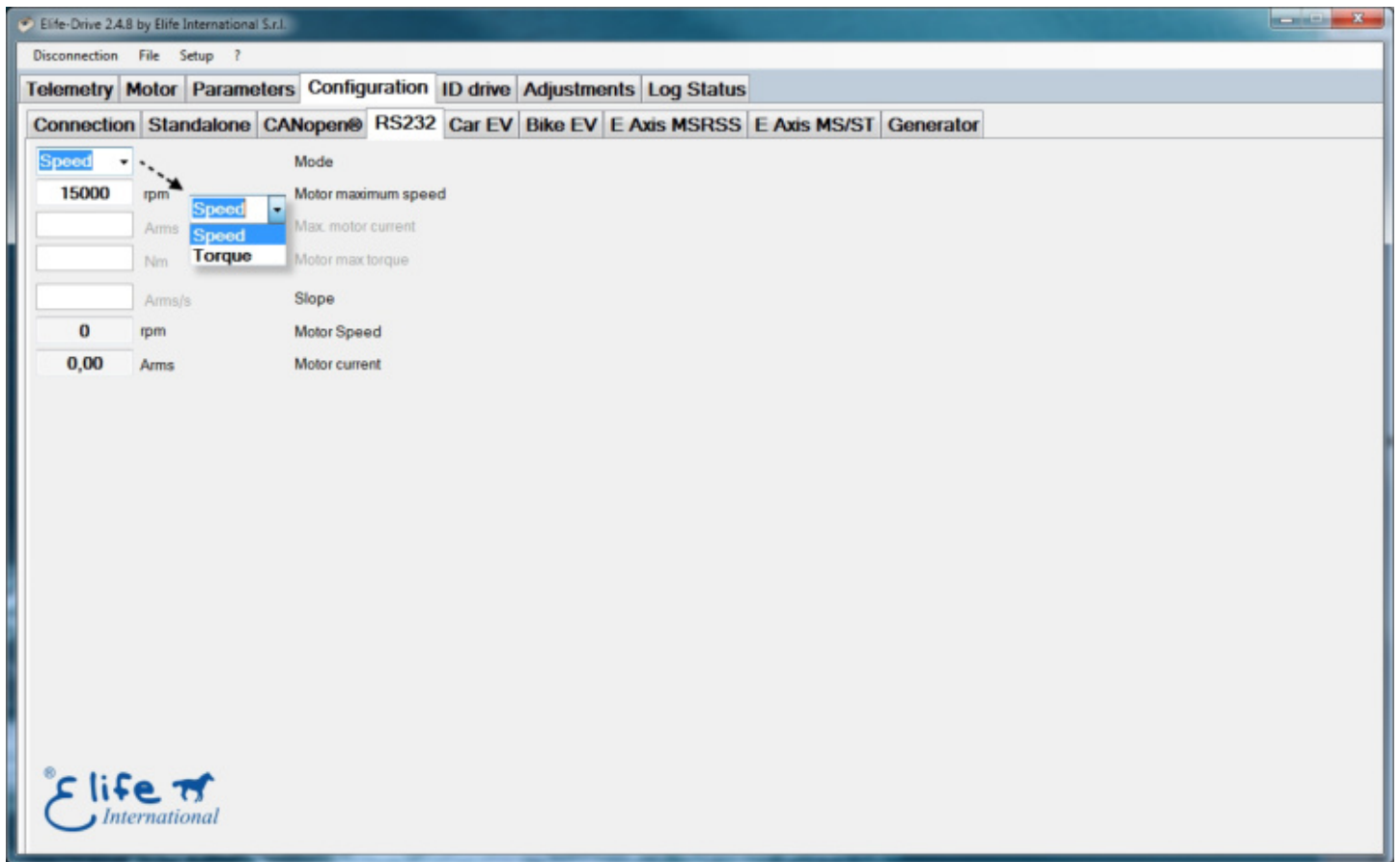
Figure 3.13: Telemetry Panel displays the RS232 Configuration

3.2.8 Configuration - EV CAR

Telemetry EV Car Configuration
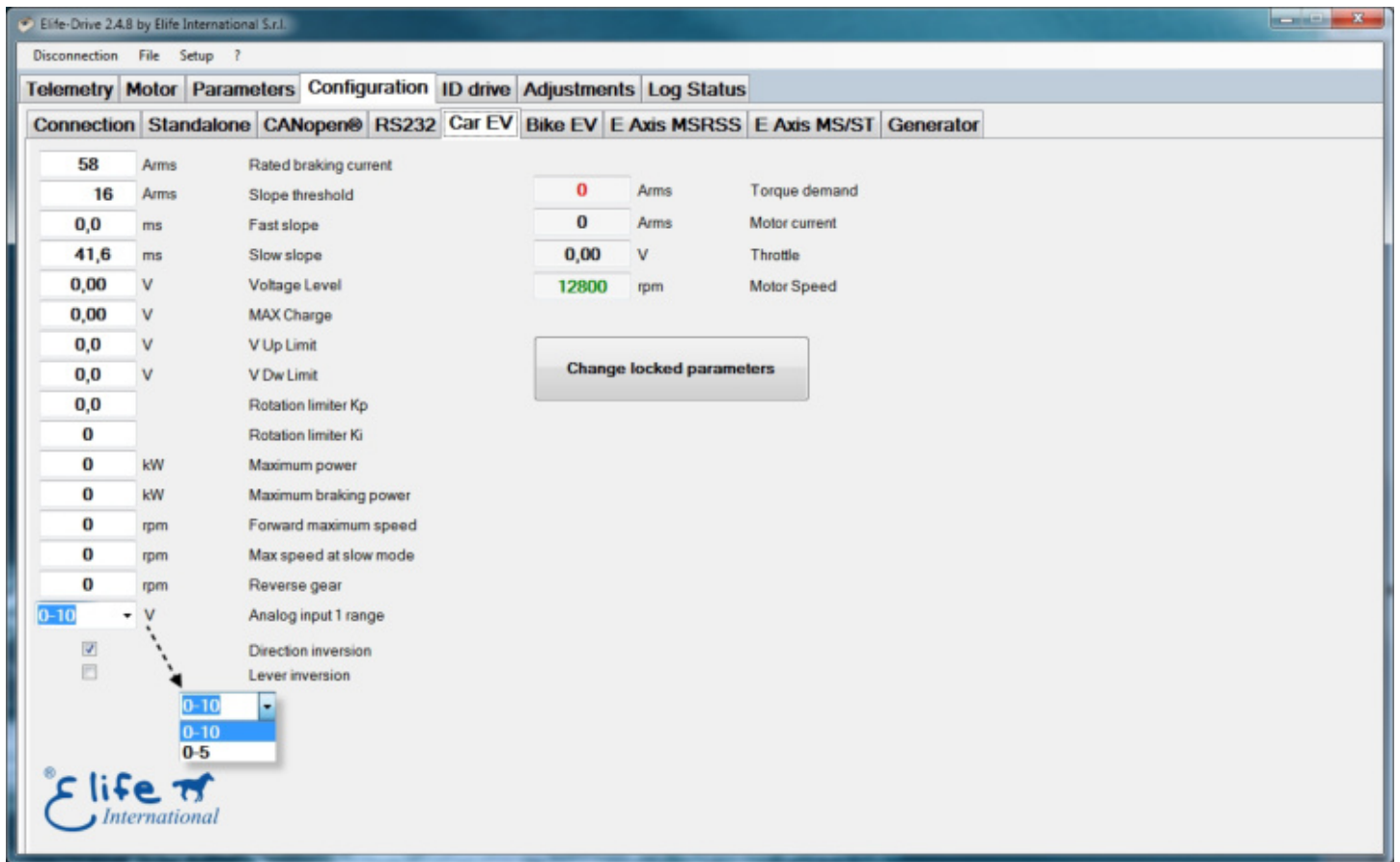
Figure 3.14: Telemetry Panel EV Car Configuration

3.2.9 Configuration - EV BIKE

Telemetry EV Bike Configuration
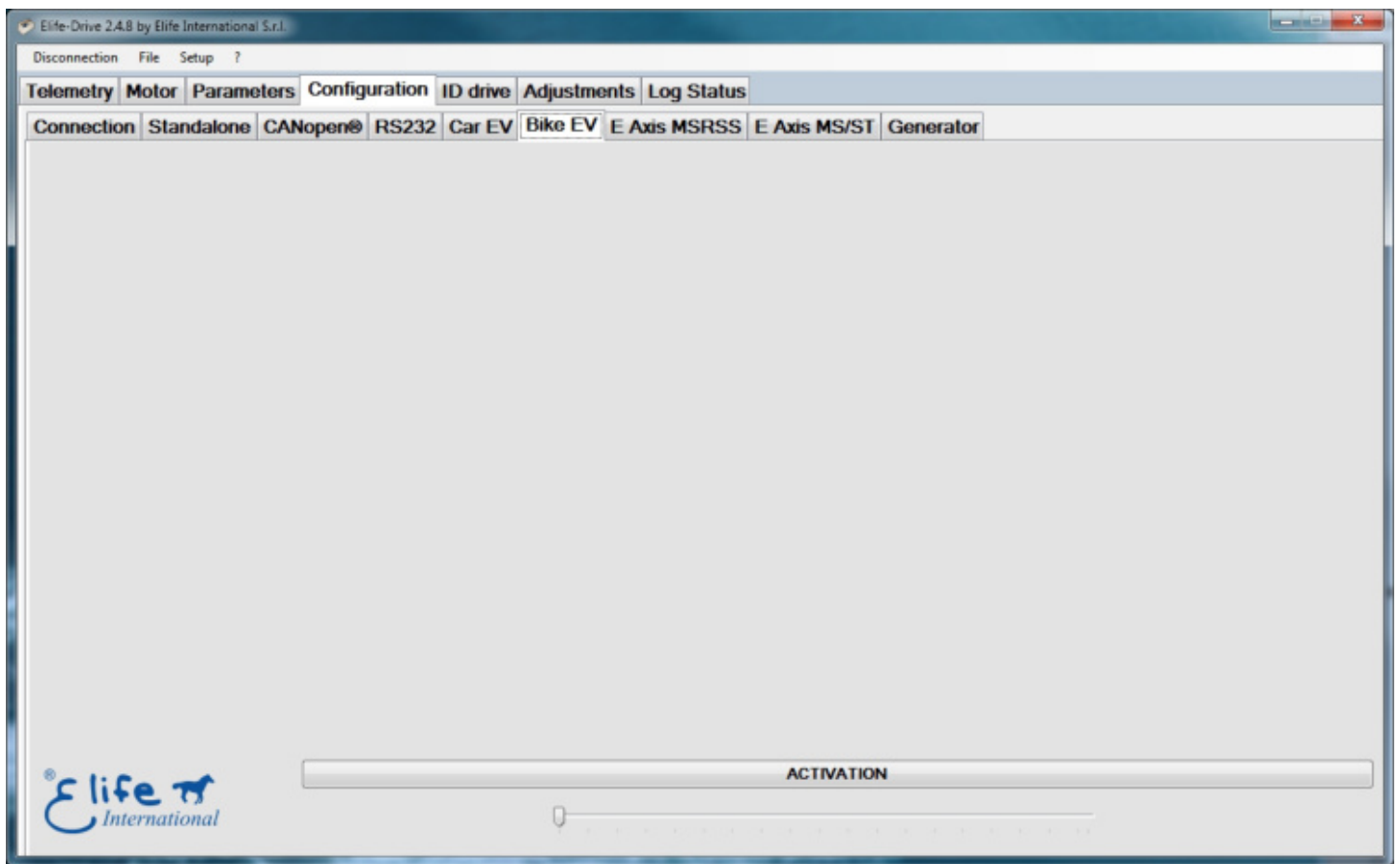
Figure 3.15: Telemetry Panel EV Bike Configuration

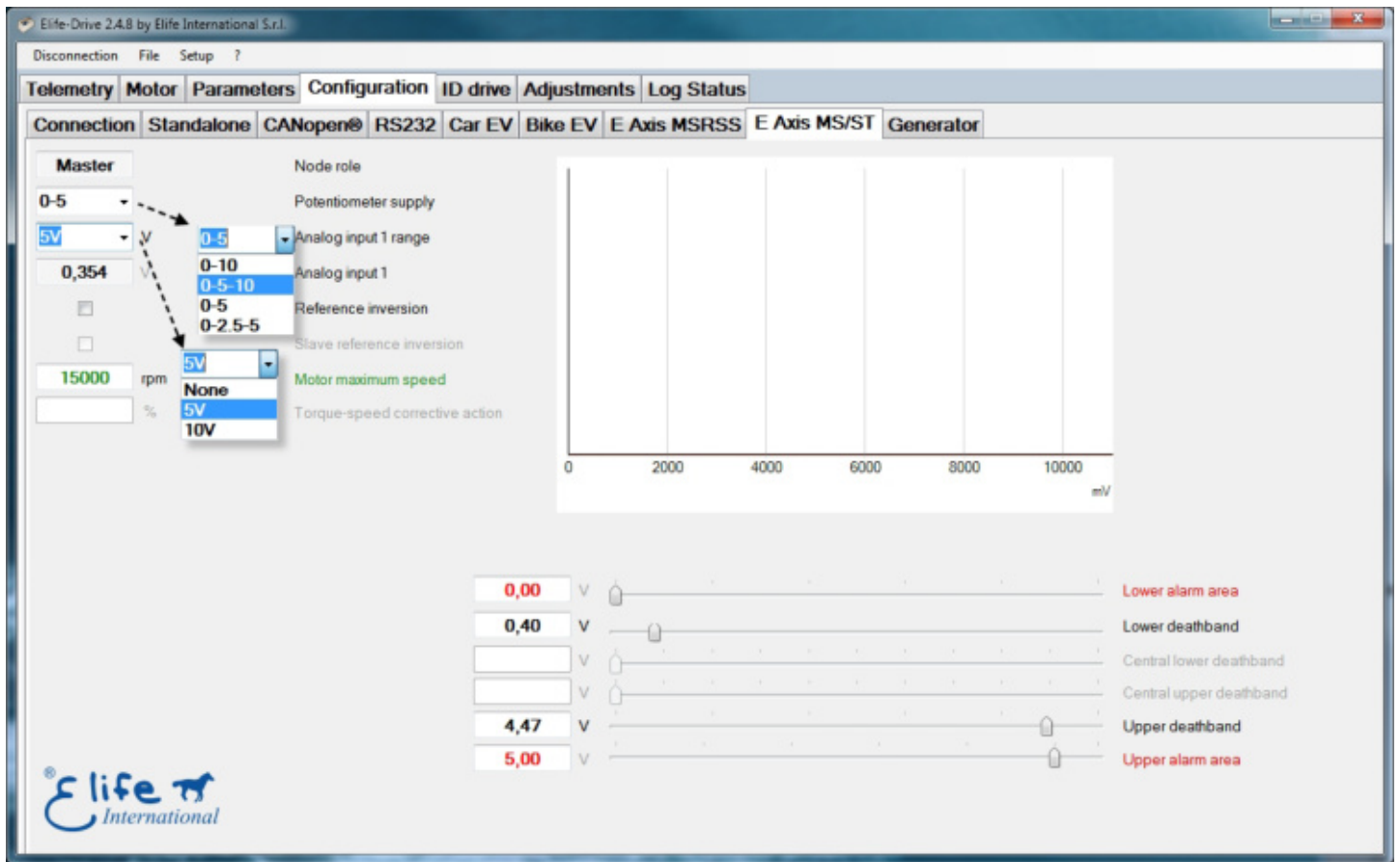## 3.2.10 Configuration - E Axis MSRSS

Telemetry E Axis MSRSS Configuration
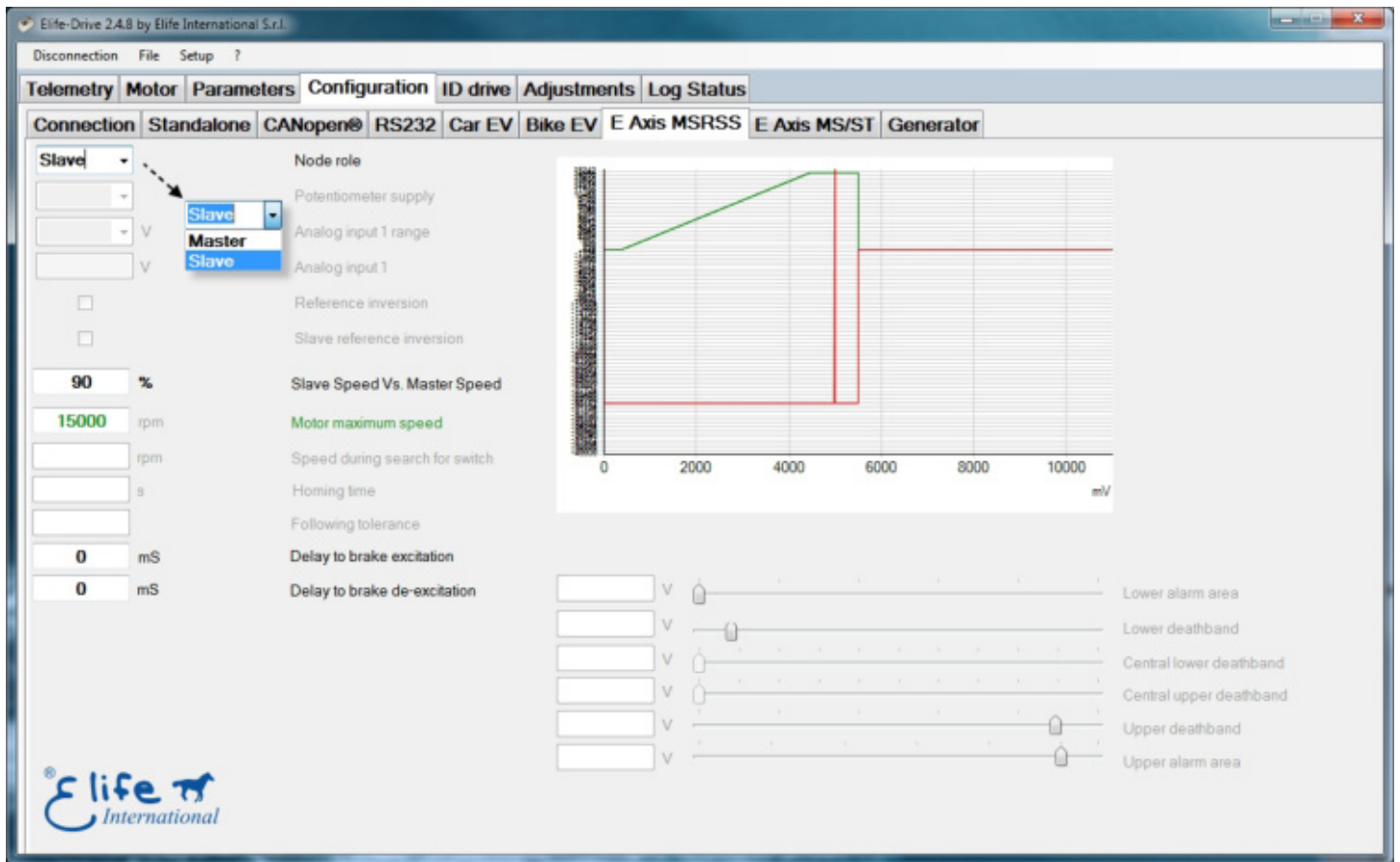
Figure 3.16: Telemetry Panel E Axis MSRSS Configuration

3.2.11 Configuration - E Axis MS/ST

Telemetry E Axis MS/ST Configuration

Figure 3.17: Telemetry Panel E Axis MS/ST Configuration
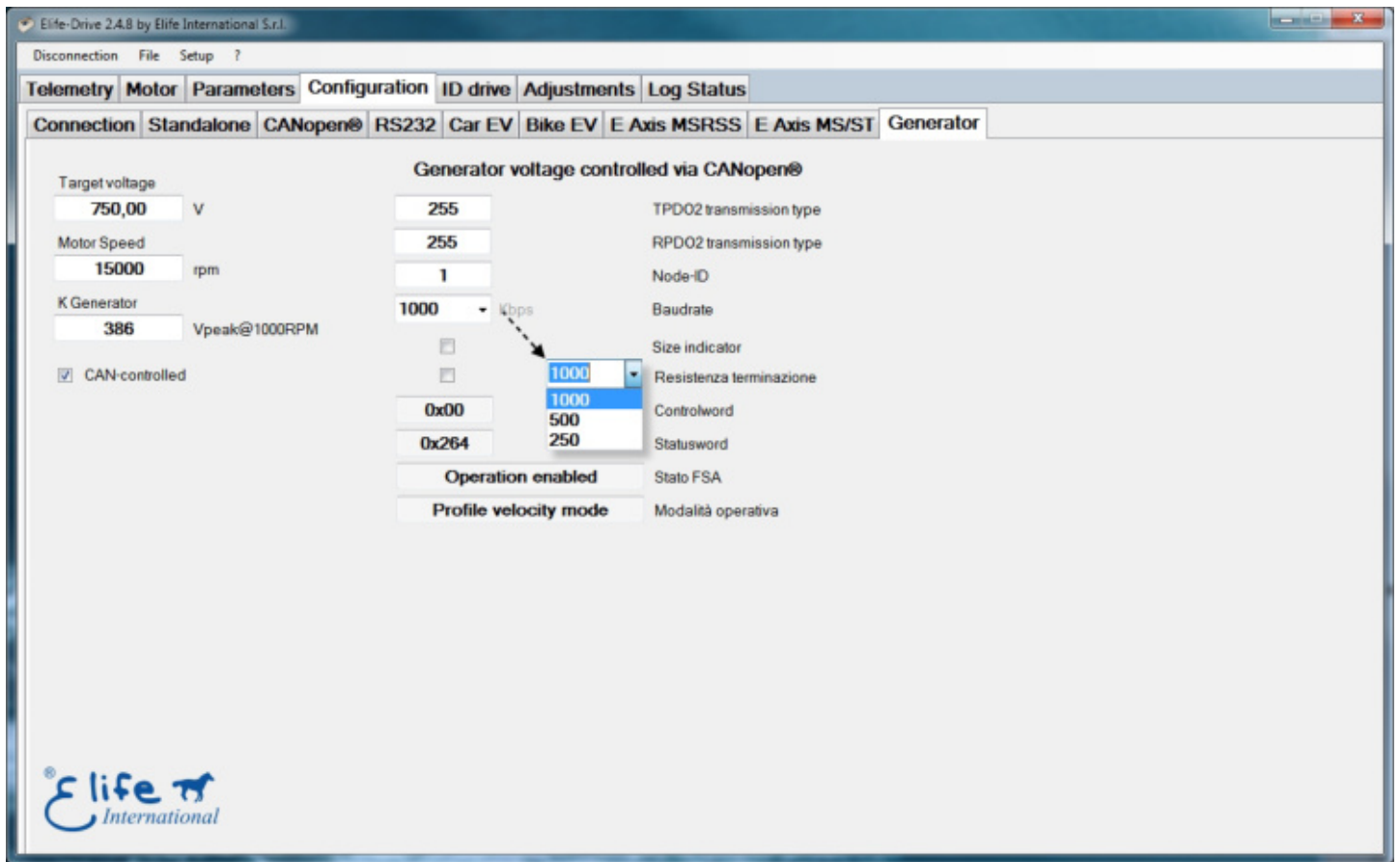
3.2.12 Configuration - Generator

Telemetry Generator

Figure 3.18: Telemetry Panel Generator Configuration
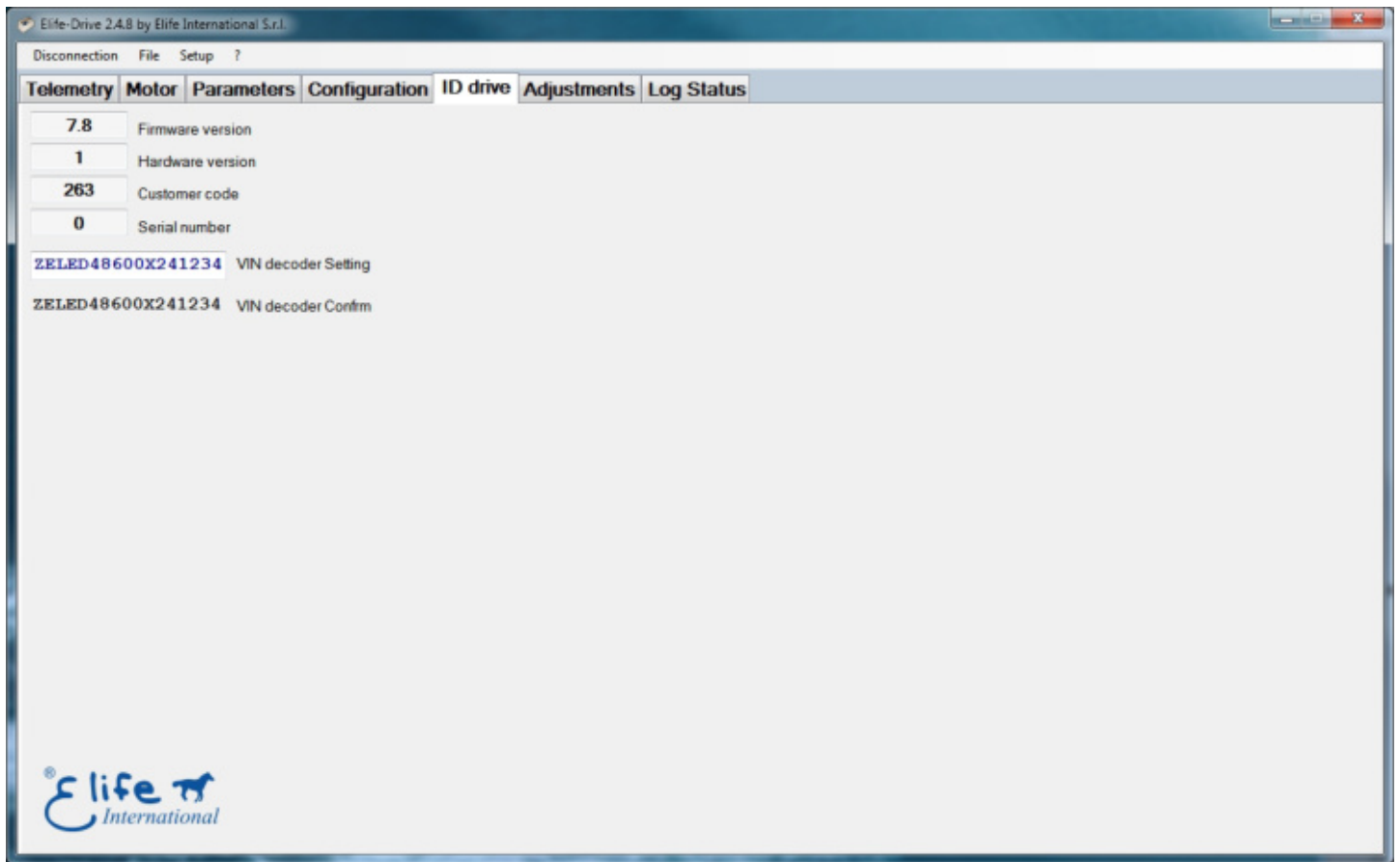
3.2.13 ID Drive

Telemetry ID Drive

Figure 3.19: Telemetry Panel displays the ID Drive
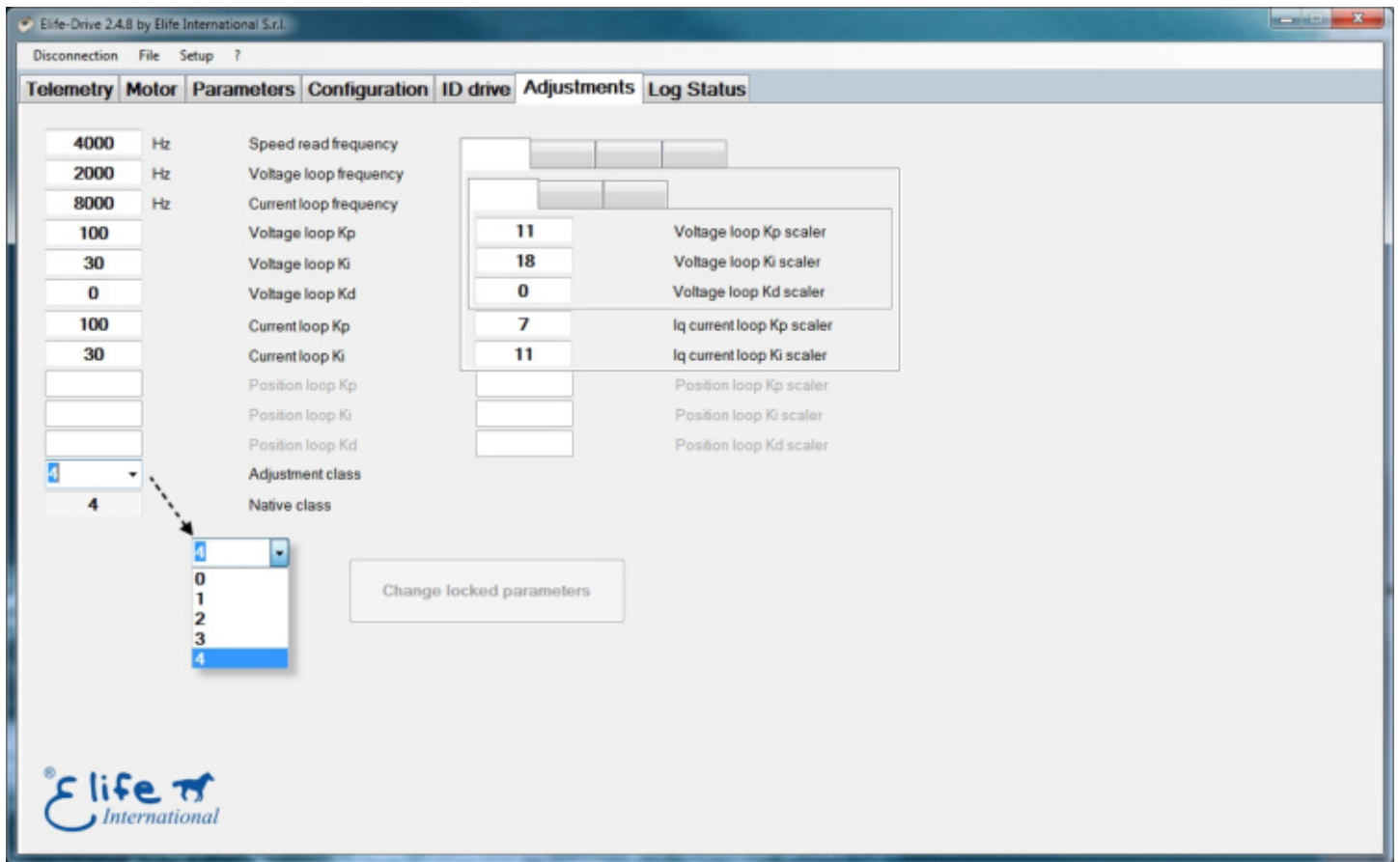
3.2.14 Adjustments

Telemetry Adjustments

Figure 3.20: Telemetry Panel Adjustments

3.2.15 Log Status

Telemetry Log Status
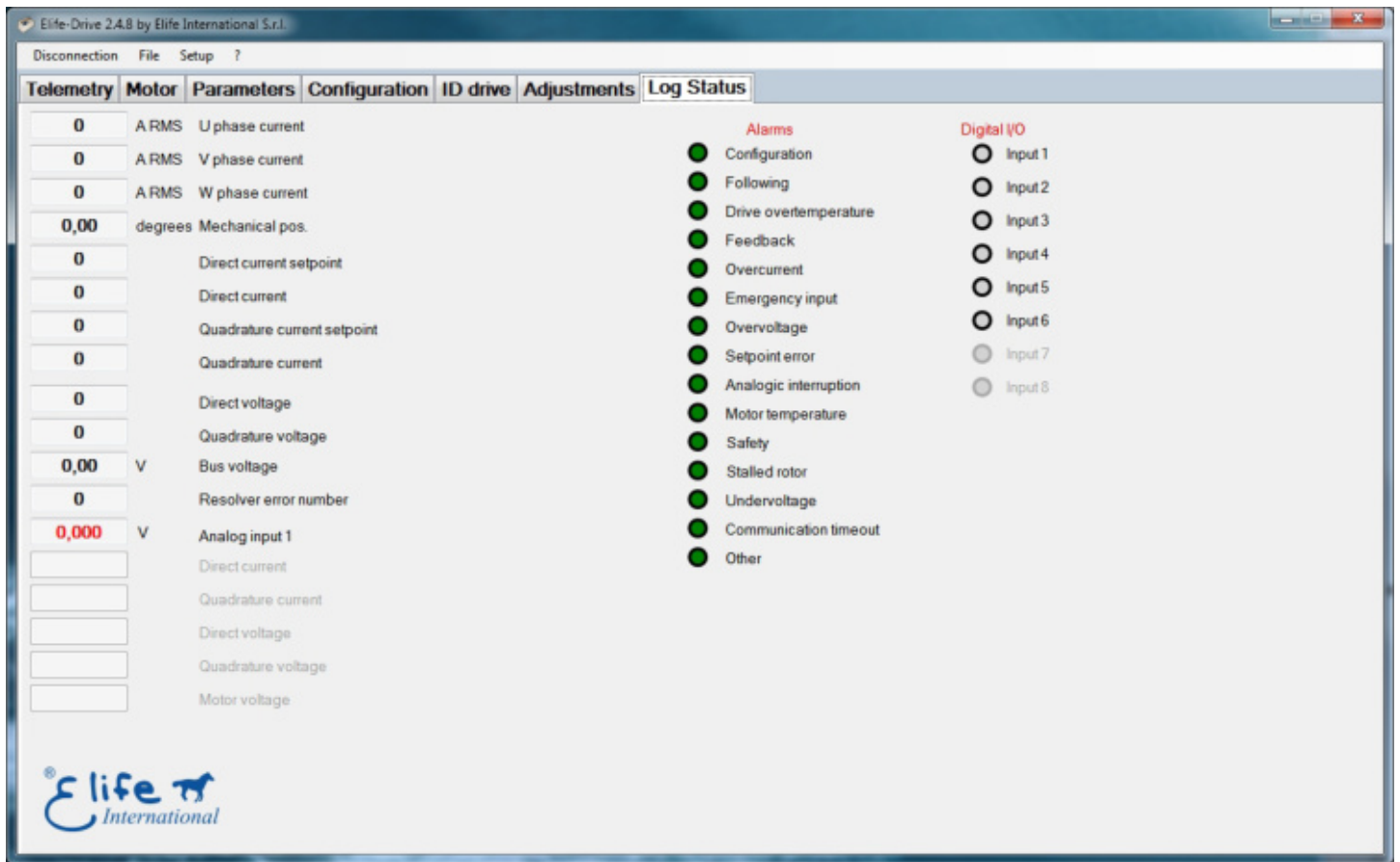

Figure 3.21: Telemetry Panel displays the Log Status