

15W0132B100

# Guide for SINUS S Crane Application

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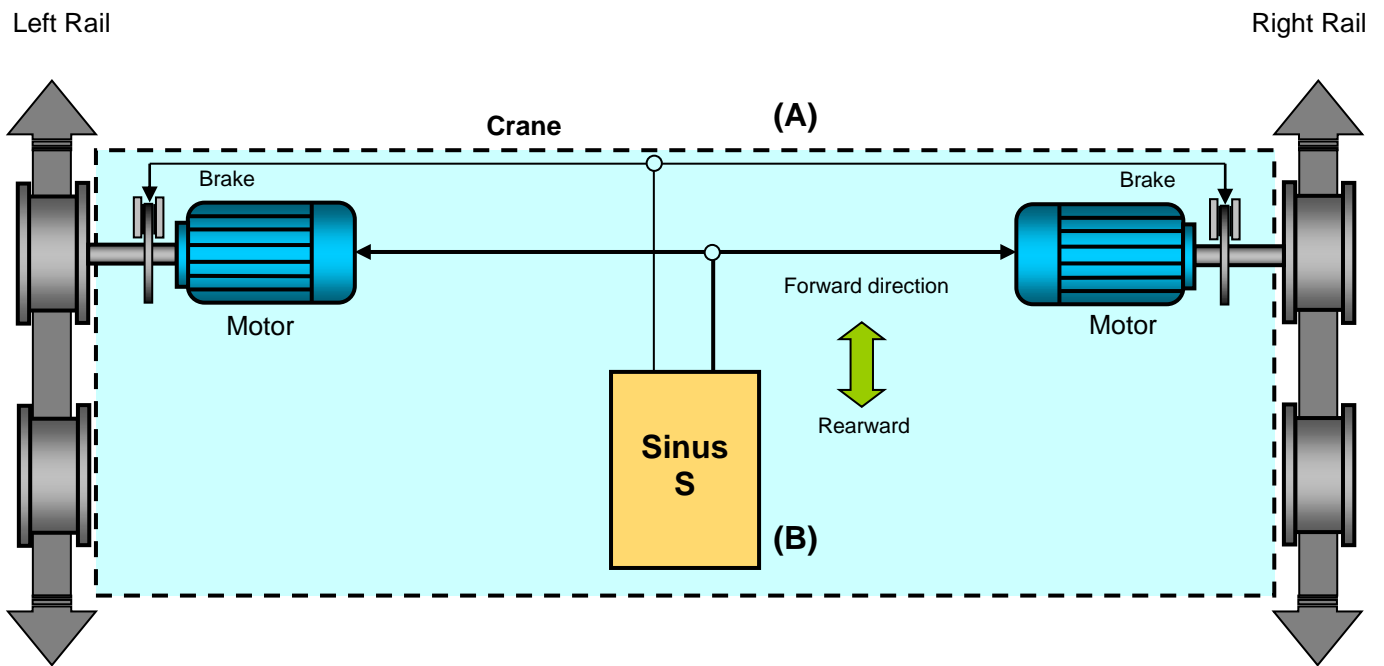


Figure 1

Lateral side view

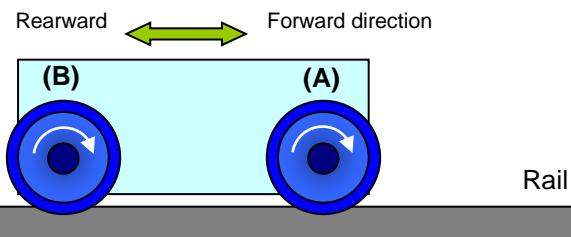


Figure 2

# 1. Wirings and configuration

## I/O configuration

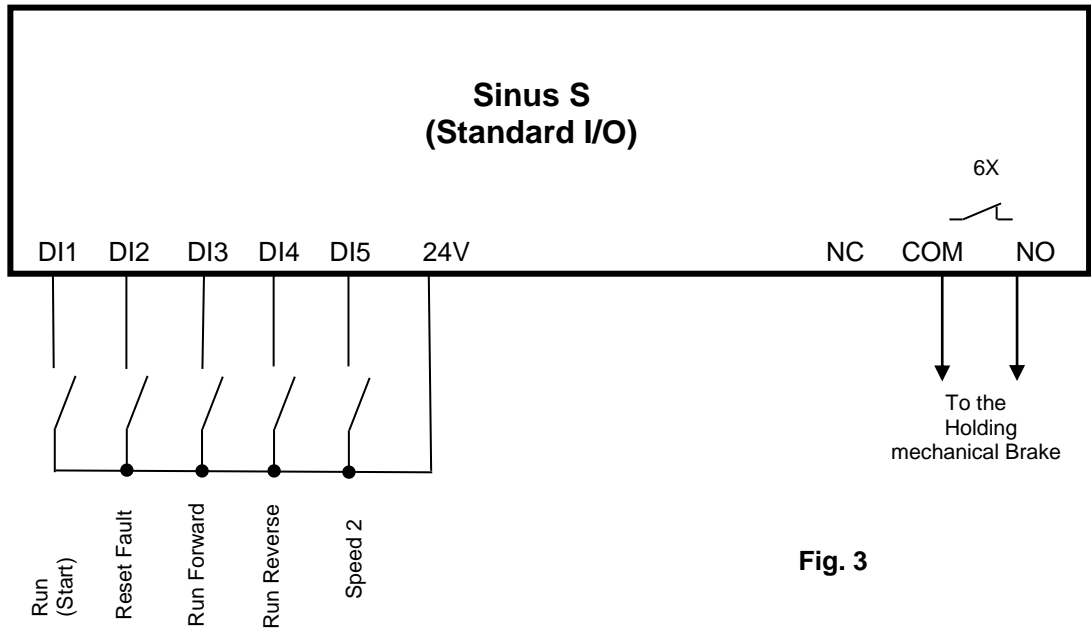


Fig. 3

## Power Supply

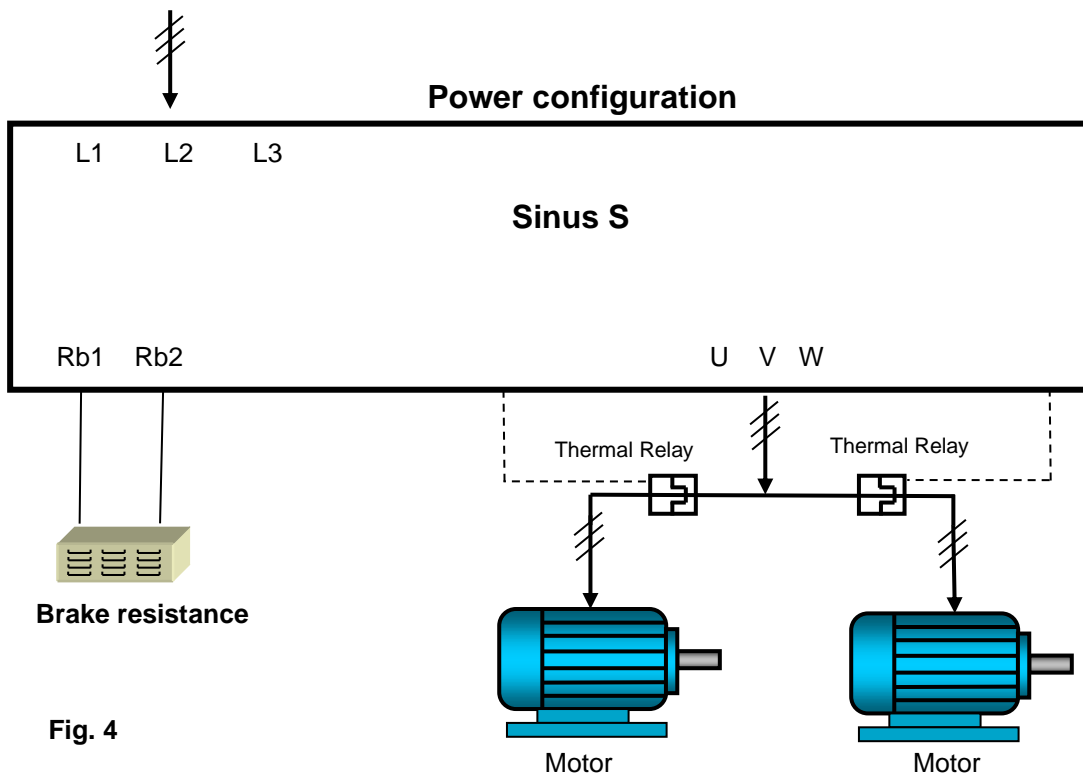


Fig. 4

## 2. Description

This guide is made for the translation (gantry and trolley) of a crane. The drive can control one or more motors connected in parallel (in this guide 2 motors are shown), the important thing is that the power of the motors **MUST NOT** be greater than the inverter nominal power.

For example, there are 2 motors and each motor is 2 kW. If the inverter is 5.5 kW, the inverter will control both the motors without problems, if the inverter is less than 4kW, it will be damaged.

Moreover, it is possible to have different preset speeds (in this guide will be shown a 2 speeds crane) and it is also possible to control a mechanical brake.

When there is more than 1 motor, we suggest you to protect each motor with a thermal overload relay. This must not open the circuit, but it must stop the inverter. It is possible to give an external alarm to the inverter through a NO contact.

### *2.1. Installation*

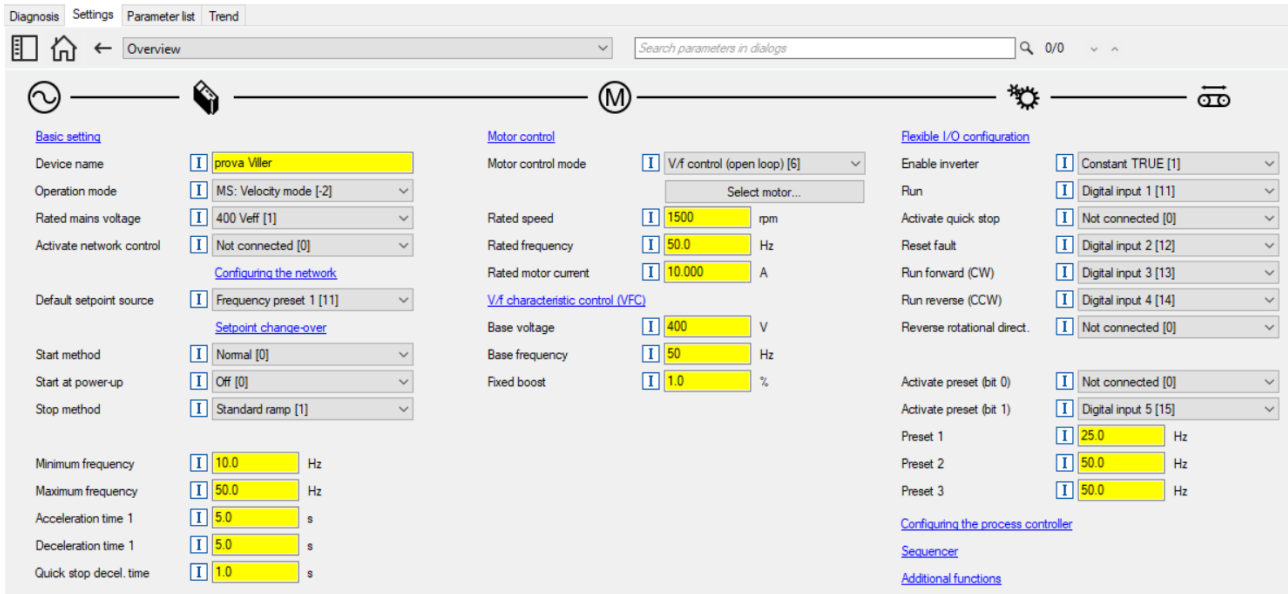
Connect the grid and the motor to the inverter as shown in the pictures.

**The motor must always be directly connected to the inverter without fuses or switches.**

Connect the braking resistor, using Rb1 and Rb2. Be sure that the resistance value is greater than the minimum admissible value for that size of inverter. See the manual for the minimum resistance values.

The mechanical brake is directly controlled by the inverter through the digital output or relay.

### 3. Example of setup



The screenshot shows the 'Parameter list' interface with the following settings:

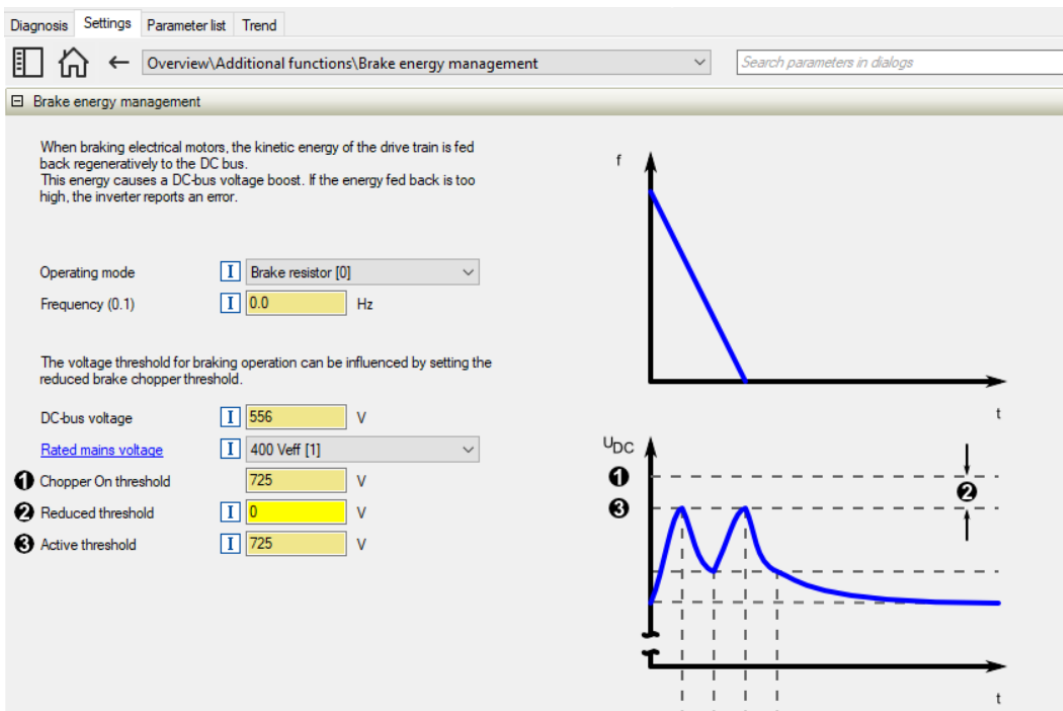
- Basic setting:** Device name: prova Viller; Operation mode: MS: Velocity mode [-2]; Rated mains voltage: 400 Veff [1]; Activate network control: Not connected [0]; Default setpoint source: Frequency preset 1 [11]; Start method: Normal [0]; Start at power-up: Off [0]; Stop method: Standard ramp [1]; Minimum frequency: 10.0 Hz; Maximum frequency: 50.0 Hz; Acceleration time 1: 5.0 s; Deceleration time 1: 5.0 s; Quick stop decel. time: 1.0 s.
- Motor control:** Motor control mode: V/f control (open loop) [6]; Rated speed: 1500 rpm; Rated frequency: 50.0 Hz; Rated motor current: 10.000 A; V/f characteristic control (VFC): Base voltage: 400 V; Base frequency: 50 Hz; Fixed boost: 1.0 %.
- Flexible I/O configuration:** Enable inverter: Constant TRUE [1]; Run: Digital input 1 [11]; Activate quick stop: Not connected [0]; Reset fault: Digital input 2 [12]; Run forward (CW): Digital input 3 [13]; Run reverse (CCW): Digital input 4 [14]; Reverse rotational direct.: Not connected [0]; Activate preset (bit 0): Not connected [0]; Activate preset (bit 1): Digital input 5 [15]; Preset 1: 25.0 Hz; Preset 2: 50.0 Hz; Preset 3: 50.0 Hz.

#### 3.1. Overview

In the Overview are shown the main parameters to set: motor power, current, digital input, frequency reference etc.

In this example, preset speeds have been programmed. In this way, when the user will close Start (DI1) and Run Forward (DI3), the setpoint will be 25 Hz.

If the user will close Active preset (DI5), the setpoint will become 50Hz.



The screenshot shows the 'Brake energy management' settings and two graphs:

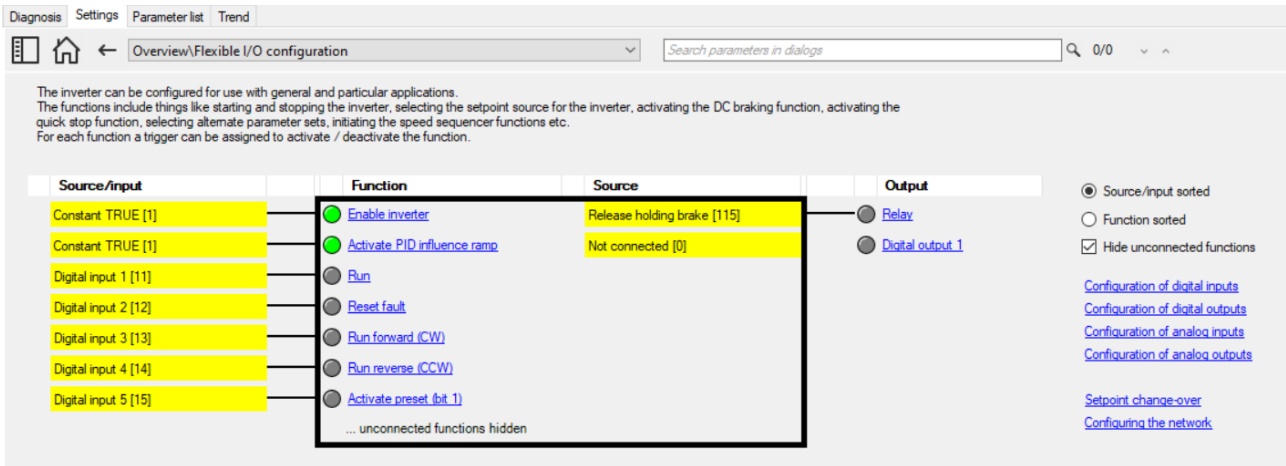
- Operating mode:** Brake resistor [0]
- Frequency (0.1):** 0.0 Hz
- DC-bus voltage:** 556 V
- Rated mains voltage:** 400 Veff [1]
- Chopper On threshold:** 725 V
- Reduced threshold:** 0 V
- Active threshold:** 725 V

The top graph shows frequency (f) vs. time (t) with a linear deceleration curve. The bottom graph shows DC-bus voltage (U<sub>bc</sub>) vs. time (t) with a sawtooth-like waveform during braking, showing peaks and troughs. Three thresholds are marked: 1 (Chopper On), 2 (Reduced), and 3 (Active).

### 3.2. Brakes

In the example, the brake resistor has been programmed to stop quickly the motors. It is possible to set the voltage threshold in order to fix the maximum DC bus voltage level.

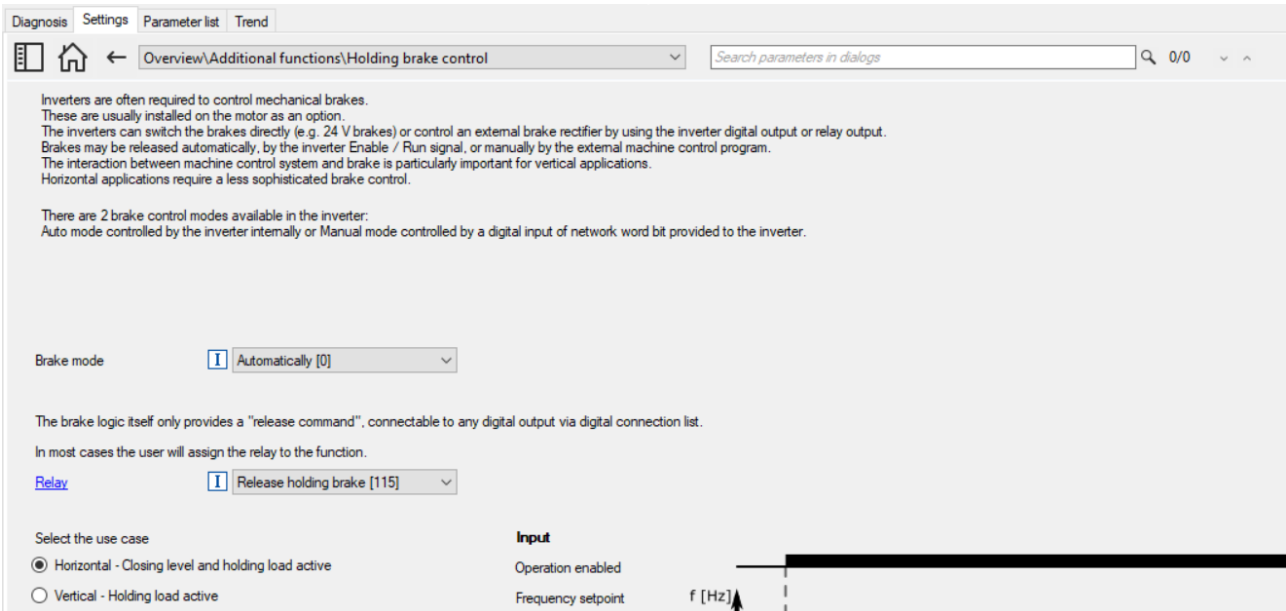
Moreover, also the holding mechanical brake has been programmed. In the following pictures it is shown how the output relay can be programmed to open this brake.



The inverter can be configured for use with general and particular applications. The functions include things like starting and stopping the inverter, selecting the setpoint source for the inverter, activating the DC braking function, activating the quick stop function, selecting alternate parameter sets, initiating the speed sequencer functions etc. For each function a trigger can be assigned to activate / deactivate the function.

Source/input	Function	Source	Output
Constant TRUE [1]	Enable inverter	Release holding brake [115]	Relay
Constant TRUE [1]	Activate PID influence ramp	Not connected [0]	Digital output 1
Digital input 1 [11]	Run		
Digital input 2 [12]	Reset fault		
Digital input 3 [13]	Run forward (CW)		
Digital input 4 [14]	Run reverse (CCW)		
Digital input 5 [15]	Activate preset (bit 1)		
	... unconnected functions hidden		

Source/input sorted  
 Function sorted  
 Hide unconnected functions  
[Configuration of digital inputs](#)  
[Configuration of digital outputs](#)  
[Configuration of analog inputs](#)  
[Configuration of analog outputs](#)  
[Setpoint change-over](#)  
[Configuring the network](#)



Inverters are often required to control mechanical brakes. These are usually installed on the motor as an option. The inverters can switch the brakes directly (e.g. 24 V brakes) or control an external brake rectifier by using the inverter digital output or relay output. Brakes may be released automatically, by the inverter Enable / Run signal, or manually by the external machine control program. The interaction between machine control system and brake is particularly important for vertical applications. Horizontal applications require a less sophisticated brake control.

There are 2 brake control modes available in the inverter:  
 Auto mode controlled by the inverter internally or Manual mode controlled by a digital input of network word bit provided to the inverter.

Brake mode:  Automatically [0]

The brake logic itself only provides a "release command", connectable to any digital output via digital connection list.

In most cases the user will assign the relay to the function.  
 Relay:  Release holding brake [115]

Select the use case

Horizontal - Closing level and holding load active  
 Vertical - Holding load active

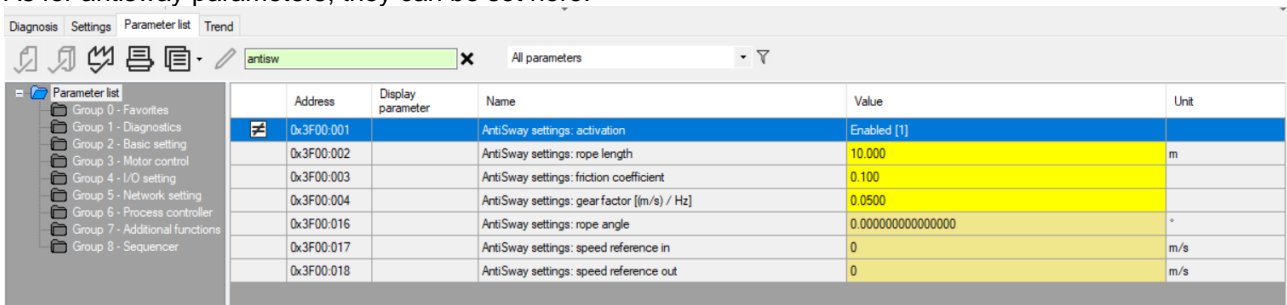
Input

Operation enabled

Frequency setpoint  $f$  [Hz]

### 3.3. Antisway

As for antisway parameters, they can be set here:



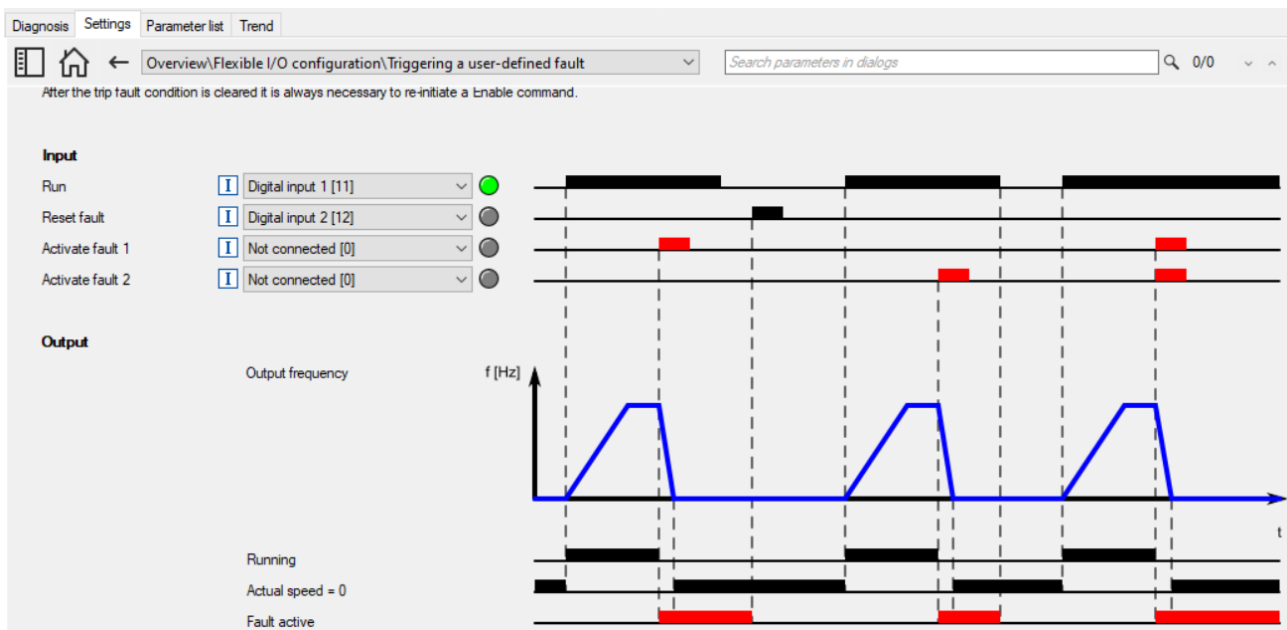
Address	Display parameter	Name	Value	Unit
0x3F00.001		AntiSway settings: activation	Enabled [1]	
0x3F00.002		AntiSway settings: rope length	10.000	m
0x3F00.003		AntiSway settings: friction coefficient	0.100	
0x3F00.004		AntiSway settings: gear factor [(m/s) / Hz]	0.0500	
0x3F00.016		AntiSway settings: rope angle	0.0000000000000000	°
0x3F00.017		AntiSway settings: speed reference in	0	m/s
0x3F00.018		AntiSway settings: speed reference out	0	m/s

The important parameters are 2: Enable to activate the function, Length to set the maximum length of the rope. The friction coefficient is useful only to adjust the oscillation if the antisway function is not working well. The gear factor is only a scaling factor and it does not influence the performance of the function.

### 3.4. External alarm

In addition, an external alarm can be set to stop the crane for emergency or if the thermal relay of the motor trips to protect them.

“Activate fault 1” or “Activate fault 2” can be used for these aims.



**NOTE:**

If I/O are not enough, another control unit with other 2 Digital Input is available (Application I/O option).