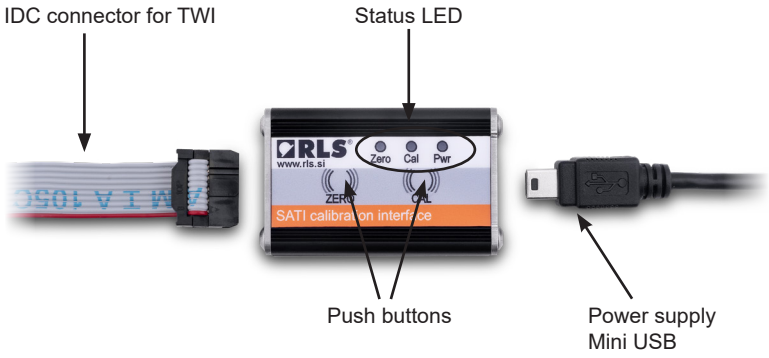
User manual
SATI03D06_01
Issue 1, 13th January 2020

SATI stands for Stand Alone Trimming Interface. It enables zeroing and trimming of the encoder after it has already been installed. Successful trimming process done with SATI improves the system's absolute position error down to ±0.2°. It can be used for encoders made with RLS AM4096 sensor ICs only.

Features

- Stand alone device
- Require external power supply
- Connections to encoder: 4 contacts (Vdd, GND, SDA, SCL)
- Digital inputs for external triggering
- Two functions realized by two push-buttons or external triggering: Trimming the sensor and setting the encoder Zero position
- Three status LEDs
- Digital outputs for device status

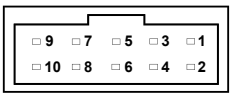
Description, connections and basic requirements



IDC connector pin assignment

Pin nr.	Signals
1	Vdd
2	GND
3	SDA (TWI)
4	SCL (TWI)
5	CAL trigger*

Pin nr.	Signals
6	ZERO trigger*
7	B0 output**
8	B1 output**
9	B2 output**
10	ZERO out



* Trigger is digital input, from high to low pulse.
** For digital status outputs, see table **Status outputs** on page 3.

After power up, SATI03 is reading status of connected encoder.

Basic requirements:

- Encoder current consumption: <100 mA
- TWI lines must be HIGH – the encoder must have pull-up resistors on SDA / SCL lines

SATI03 will not perform without fulfilling the requirements listed.

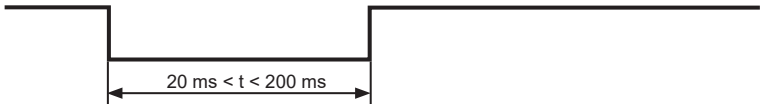
Trimming procedure

Required conditions for successful trimming:
- Basic requirements fulfilled
- Distance to magnet within specified tolerance
- Required rotational speed: 100–8,000 rpm (1.6–133 Hz)

Trimming process can start after required conditions are fulfilled. It starts by pushing the **CAL** push-button or applying adequate trigger pulse to digital input **CAL trigger**.
The results are indicated by status LED **Cal** and digital outputs B0, B1, B2.
LED **Cal** must be off before starting the trimming process (status B0 = 0, B1 = 0, B2 = 0).
To reset the status, press the **CAL** push-button or apply adequate pulse to digital input **CAL trigger**.

Procedure result:
- Absolute position error after successful trimming: < ±0.2°

CAL trigger timing

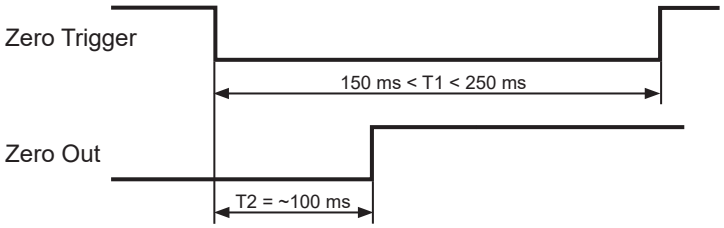


Setting zero position - Zeroing

Required conditions for successful zeroing:
- Basic requirements
- Distance to magnet within specified tolerance
- The encoder position must be steady for >3 s

To set the encoder zero position push and hold the **ZERO** button for >3 s or apply adequate trigger pulse to digital input **ZERO trigger**.

ZEROING timing



When Zeroing procedure is accomplished, the digital output **ZERO Out** goes High after T2 = ~100 ms.
If **ZERO Out** remains Low for time T1, the Zeroing procedure failed; it can be restarted.

Status LEDs

LED Pwr shows the status of SATI / encoder power consumption:	
OFF	No power
Green	The interface is powered, no encoder connected or encoder powered by external power supply
Yellow	Encoder powered by SATI with current consumption between 15 and 100 mA
Red	Too high current consumption (>100 mA); the encoder power supply automatically turned off
LED Cal shows the status of calibration:	
OFF	SATI is ready for use
Red	TWI communication error
Red flashes	Rotational speed out of specification
Yellow flashes	Distance to magnet out of specification
Yellow	Trimming procedure in progress
Red/Green flashes alternately	Not successful trimming, encoder absolute position error greater than ±0.4°
Green flashes	±0.4° > position error > ±0.2°
Green	Successful trimming, position error < ±0.2°
LED Zero shows the status of zeroing procedure:	
Green	Encoder normal operation, not at zero position
OFF	The zeroing procedure in progress
Red	Encoder at zero position

Status outputs

Nr.	B2	B1	B0	Status
1	0	0	0	Encoder / SATI ready for use
2	0	0	1	TWI communication error
3	0	1	0	Rotational speed out of specification
4	0	1	1	Distance to magnet out of specification
5	1	0	0	Too high current consumption (>100 mA); the encoder power supply automatically turned off
6	1	0	1	Not successful trimming, encoder absolute position error bigger than ±0.4°
7	1	1	0	±0.4° > position error > ±0.2°
8	1	1	1	Successful trimming, position error <±0.2°

Setting the factory default parameters

SATI can set (restore) the chip operating parameters to factory default values.
Required conditions for successful setting the factory default parameters:

- Basic requirements

Default parameters can be restored by pressing the CAL button for more than 5 seconds or apply adequate pulse to digital input CAL trigger.

Trigger timing for setting the factory default parameters:

When **CAL** button is used, all three LEDs (Pwr, Cal and Zero) turn red for 1.5 s and then switch back to ready state.
When **CAL trigger** is used, **ZERO output** goes to high state. It remains high for min. 350 ms; maximum time can be several seconds.
After setting the factory default parameters is accomplished, the **ZERO output** goes Low.

Head office

RLS merilna tehnika d.o.o.
Poslovna cona Žeje pri Komendi
Pod vrbami 2
SI-1218 Komenda
Slovenia

T +386 1 5272100
F +386 1 5272129
E mail@rls.si
www.rls.si

Document issues

Issue	Date	Page	Corrections made
1	13. 1. 2020	-	New document