Title: Yaskawa Sigma Trac II Installation Guide

Product(s): ST2F Sigma Trac II Linear Stages | **Doc. No.** TN.ST2.01

Packing List:

A. Yaskawa Provided

1) Fully assembled Sigma Trac II (Base Plate Length Varies by Order)
2) Encoder Installation Manual (Fagor 14460198; 14460210)
3) Fagor encoder alignment shim (0.2 mm and 0.6 mm)
4) Mounting aid tool – USP-0376 (screw insertion tube) Ø15.5 (ID) x Ø19.5 mm (OD) x 100 mm (See *Figure 3*)
   **Only provided when carriage plate covers the mounting holes
5) Yaskawa linear motor safety precaution manual (TOBP C230842 00B)

B. Customer Provided

1) Mounting bolts – Socket head cap screw recommended (see *Table 1* for size & torque specs)
2) Mounting base, see Page 4, *Mounting Surface Recommendation*
   **Yaskawa units are tested on laboratory grade A granite surface plate (surface flatness 0.584 μm)
3) Lifting method: Jergens, Hoist Ring, FTCP, M6x1.0, 200 KG (J213405) or similar.
4) Air pressure (brake models only): air pressure required to operate brake is 5.5-6.5 bar (80-95 psi), See Page 5-7

Carriage Type	Description	Material	Finish	Grade	Tensile Strength (psi)	Bolt Torque Required (N*m)	Recommended Minimum Thread Engagement			
							Standard Base (0.5")		Thick Base (1.5")	
							Aluminum Plate	Steel or S.S Plate	Aluminum Plate	Steel or S.S Plate
C1, C2, C3	SHCS M8x1.25	Steel	Black Oxide	Class 12.9	140,687	41.32	16 mm (20 mm bolt length)	12 mm (16 mm bolt length)	16 mm (46 mm bolt length)	12 mm (42 mm bolt length)
		Steel	Zinc Plated	Class 12.9	140,687	41.32				
		Stainless Steel	18-8 (**)	DIN 912	39,305	11.55				
		Stainless Steel	316	DIN 912	45,832	13.46				
A1, A2, A3	SHCS M6x1.0	Steel	Black Oxide	Class 12.9	140,687	16.94	12 mm (18 mm bolt length)	9 mm (15 mm bolt length)	12 mm (44 mm bolt length)	9 mm (41 mm bolt length)
		Steel	Zinc Plated	Class 12.9	140,687	16.94				
		Stainless Steel	18-8 (**)	DIN 912	39,305	4.73				
		Stainless Steel	316	DIN 912	45,832	5.52				

Table 1. Bolt Torque Requirement at Specific Grade

**Yaskawa uses 18-8 Stainless Steel bolts for the prevention of damage to the magnet plate.

Title: Yaskawa Sigma Trac II Installation Guide	
Product(s): ST2F Sigma Trac II Linear Stages	**Doc. No.** TN.ST2.01

Installation:

1) Carefully remove Sigma Trac II from the packaging crate by using the lifting method suggested above or a similar method.

   ***CAUTION:

   • Do not place any magnetic objects such as iron particles close to the magnet track. Failure to observe this caution may result in injury.

   • Do not place any electronic devices such as clocks, magnetic cards, storage media, or measuring devices close to the magnet track. Failure to observe this caution may result in malfunction or mechanical failure of the electronic devices.

   • Pay attention to the magnetic attraction and confirm that there are not any magnetic objects such as iron particles attached before mounting the Sigma Trac II. Failure to observe this caution may result in injury or damage to the magnet track. (See *Figure 2*)

2) Assemble Sigma Trac II on the mounting plate (Customer-provided)

   a. See *Figure 1*, tighten the bolts in the torque pattern shown (See *Table 1* for torque requirement of each grade bolt)
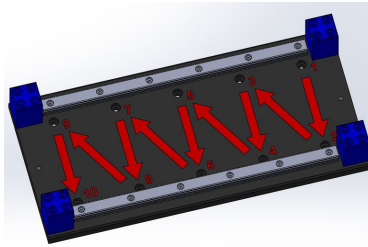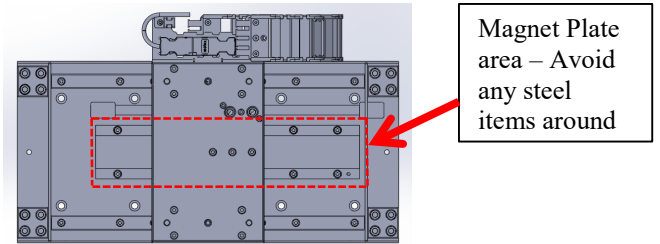

Figure 1. Sigma Trac II - Torque Pattern Order

Magnaetic Plate and Carriage Omitted for clarity

Magnet Plate area – Avoid any steel items around

Figure 2. Sigma Trac II - Magnet Plate Caution Area

   b. See *Figure 3*, for some C2 and C3 carriage / base combinations (see *Table 2*), it is necessary to pass mounting bolts through the large holes in the carriage in order to access all mounting locations. Use of the provided screw insertion tube(s) is highly recommended to prevent any possible magnet damage to the unit.

Figure 3. Screw Insertion Tube Example

Title: Yaskawa Sigma Trac II Installation Guide

Product(s): ST2F Sigma Trac II Linear Stages	**Doc. No.** TN.ST2.01

Carriage Type	Base Length (Unit: mm)				
C2	800	900	1000	1105	--
C3	1000	1105	1205	1310	1410

Table 2. Mounting Tube Requirement in Slide Combination

**For the C2x0800 and the C3x1000 combinations, either end-stop bumpers (Torque to 2.2 Nm when replacing) or bellows will have to be removed to be able to access specific mounting holes locations (see bolt clearance diagrams) (See *Figure 4* and *Figure 5*)
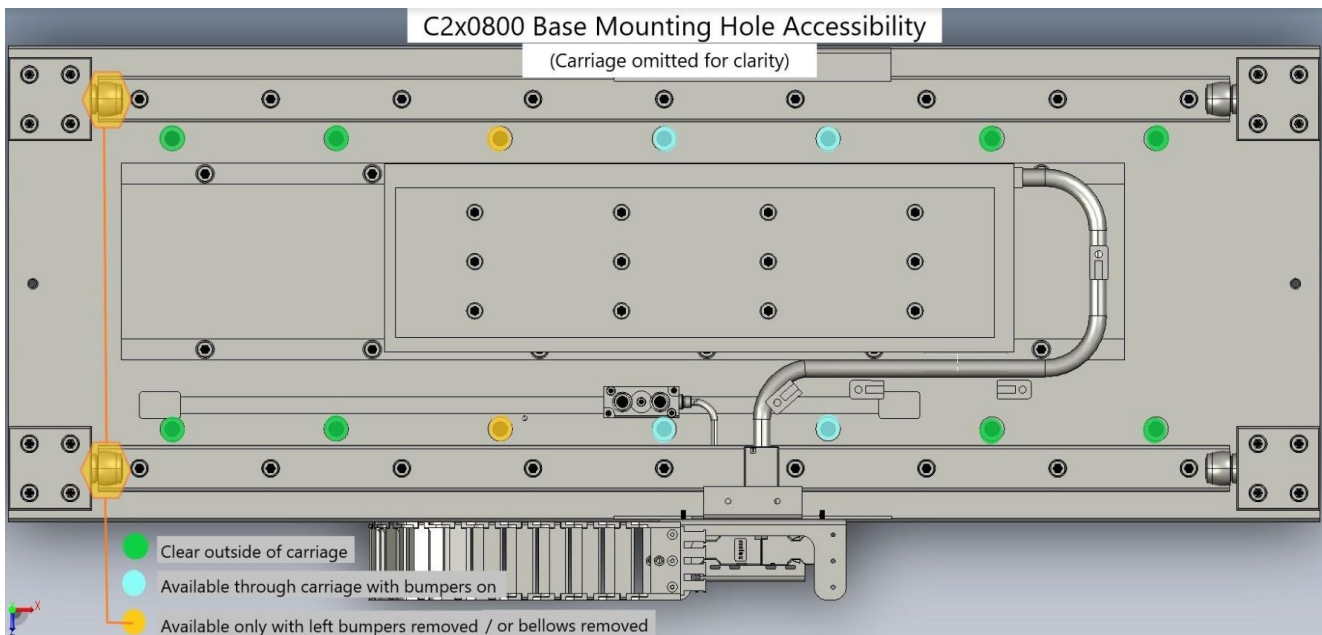

Figure 4. C2x800 Bolt Clearance Diagram

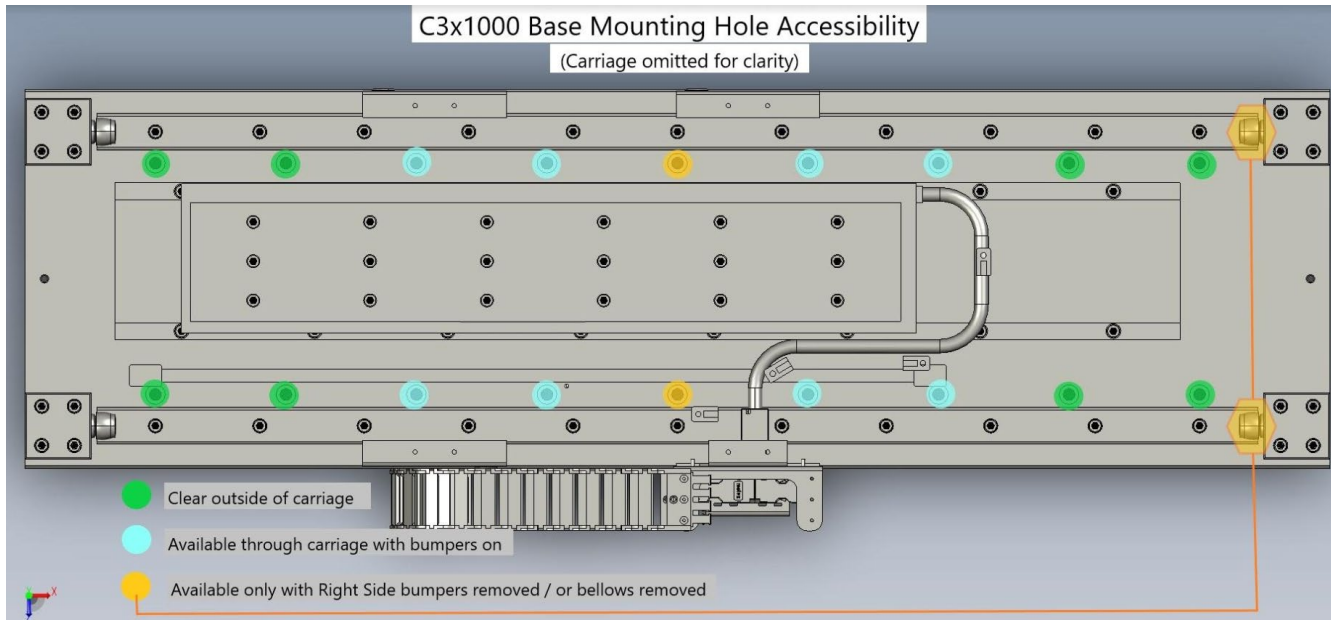| **Title:** Yaskawa Sigma Trac II Installation Guide	
Product(s): ST2F Sigma Trac II Linear Stages	**Doc. No.** TN.ST2.01

Figure 5. C3x1000 Bolt Clearance Diagram

Mounting Surface Recommendation:

This is a precision device that may flex when not securely mounted to a flat surface.

1) Ensure that your mounting surface has 30 μm flatness over the area of the moving carriage for the entire surface of the base. Mounting surface quality will impact the life and performance of the linear stage. If any binding is detected, check the mounting surface and adjust by shimming or lapping as necessary.
    **Keep in mind that these are general guidelines and the customer is responsible for installation.

2) Poor accuracy may result in producing a larger load than the calculated load, and eventually lead to short life, etc.

3) Reliable operation of linear motion is ensured by providing high manufacturing and mounting accuracy of mounting parts and designing a mounting structure so as to keep the accuracy and performance, while considering the required linear motion accuracy, rigidity and other related operating conditions.

4) Please contact Yaskawa engineering if you have further questions or concerns.
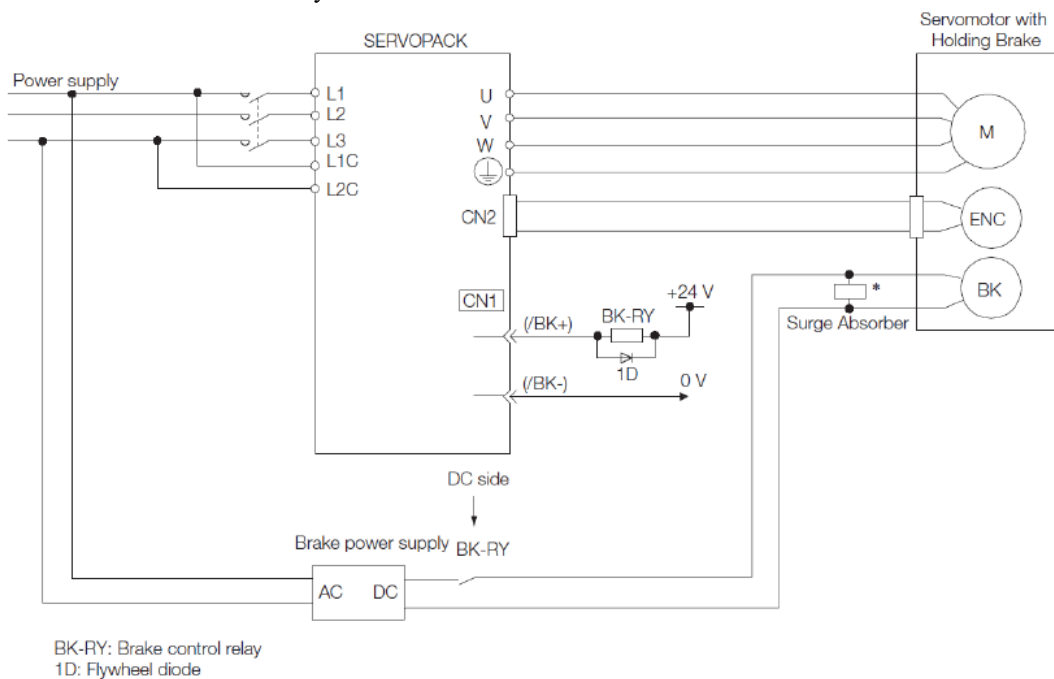
Title: Yaskawa Sigma Trac II Installation Guide

Product(s): ST2F Sigma Trac II Linear Stages | **Doc. No.** TN.ST2.01

Pneumatic Brake

The STII brake models will have a 4mm hose protruding out of the end of the cable carrier next to the sensor and power cables. Ensure that a fitting is properly securing the hose to air supply. Air supply must be clean, dry, and oil free. Brake operating pressure range is 5.5 – 6.5 bar (80 – 95 psi).

Servomotor brake control for Yaskawa SERVOPACKs is handled by an external relay or SSR (solid state relay) controlled by the /BK output from the SERVOPACK. The exception to this is the Sigma-7 400V SERVOPACK with holding brake option "026" which has a built in relay for controlling the brake. Figure 6 below provides an overview of how to design a recommended brake circuit and parameterize the SERVOPACK to use the brake effectively and reliably. The brake signal should control a solenoid valve that provides air to the pneumatic brake on the Sigma Trac. It is important to note that the /BK output can only supply 50mA, the brake coil is an inductive load, and if the brake is cycled every 10 seconds or sooner, an SSR is recommended instead of a relay.
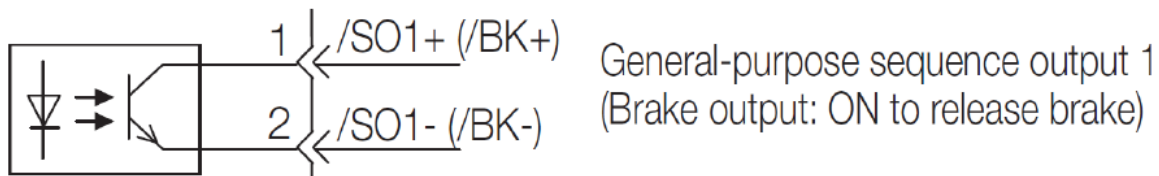
Figure 6: Brake Relay Circuit

TECHNICAL NOTE **YASKAWA**

Title: Yaskawa Sigma Trac II Installation Guide	
Product(s): ST2F Sigma Trac II Linear Stages	**Doc. No.** TN.ST2.01

Pneumatic Brake (Continued)

The Brake Release Time will be used in the user's motion controller program to delay motion until the brake has been fully released. The /BK output turns ON as soon as the SERVOPACK enables the Servomotor. It is recommended to wait for at least 50ms plus the brake release time before commanding motion.

The Brake Close Time will be used to set Pn506 (Brake Reference-Servo OFF Delay Time). Pn506 sets the time for how long the motor stays enabled after the servo off command. This is used for applications in which the load might fall with the motor disabled and the brake released. Set this to the time it takes for the brake to close, plus 50ms to account for delays.

Note: **The motor must be stopped before the servo off command.** A time delayed safety relay should be used so that the motion controller can decelerate a moving servomotor before the SERVOPACK is given a controlled servo off command.

Parameter for /BK Output Selection

Parameter Pn50F.2 determines the SERVOPACK output used for the /BK signal.

- Make sure there is no other functions for that output
- If you allocate more than one signal to the same output connector pin, a logical OR of the signals is output. Allocate the /BK signal to its own output connector pin, i.e., do not use the same output terminal for another signal.
- For example, never allocate the /TGON (Rotation Detection) signal and /BK signal to the same output connector pin. If you did so, the /TGON signal would be turned ON by the falling speed on a vertical axis, and the brake would not operate.

The default setting for Pn50F.2 varies by the interface of the SERVOPACK

- SGDV/SGD7S
  - Analog voltage/pulse train reference
    - /BK signal is disabled by default
    - CN1-25 and CN1-26 is the first output, but has two default signals that need to be disabled or moved before /BK can be allocated.
      - /COIN (Positioning Completion Output) Pn50E.0 = 0 to disable
      - /V-CMP (Speed Coincidence Output) Pn50E.1 = 0 to disable
      - /BK (Brake Output) Pn50F.2 = 1 for CN1-25 and CN1-26
  - MECHATROLINK-II/MECHATROLINK-III/EtherCAT/Option
    - CN1-1 and CN1-2
- SGD7W
  - 200V (MECHATROLINK-III)
    - Axis A: CN1-23 and CN1-24
    - Axis B: CN1-25 and CN1-26
  - 400V (MECHATROLINK-III/EtherCAT)
    - Axis A: CN1-1 and CN1-2
    - Axis B: CN1-23 and CN1-24

Title: Yaskawa Sigma Trac II Installation Guide	
Product(s): ST2F Sigma Trac II Linear Stages	**Doc. No.** TN.ST2.01

- SGDV with DC Power Input
  - Analog voltage/pulse train reference
    - /BK signal is disabled by default
    - CN1-7 and CN1-11 is the first output, but has two default signals that need to be disabled or moved before /BK can be allocated.
      - /COIN (Positioning Completion Output) Pn50E.0 = 0 to disable
      - /V-CMP (Speed Coincidence Output) Pn50E.1 = 0 to disable
      - /BK (Brake Output) Pn50F.2 = 1 for CN1-7 and CN1-11
  - MECHATROLINK-II/MECHATROLINK-III
    - CN1-11 and CN1-5

SGD7 400V Hardware Option "026" adds a built-in brake relay to the SERVOPACK

- Pn023.0 = 0 (Use the built-in brake relays.)
- SGD7W with built-in brake relay only supports Axis A
- Built-in Brake Relay Specifications
  - Service life (number of operations): 30,000 operations
  - Allowable number of operations: 30 operations per minute max.
  - No external suppression is needed as it is already built-in