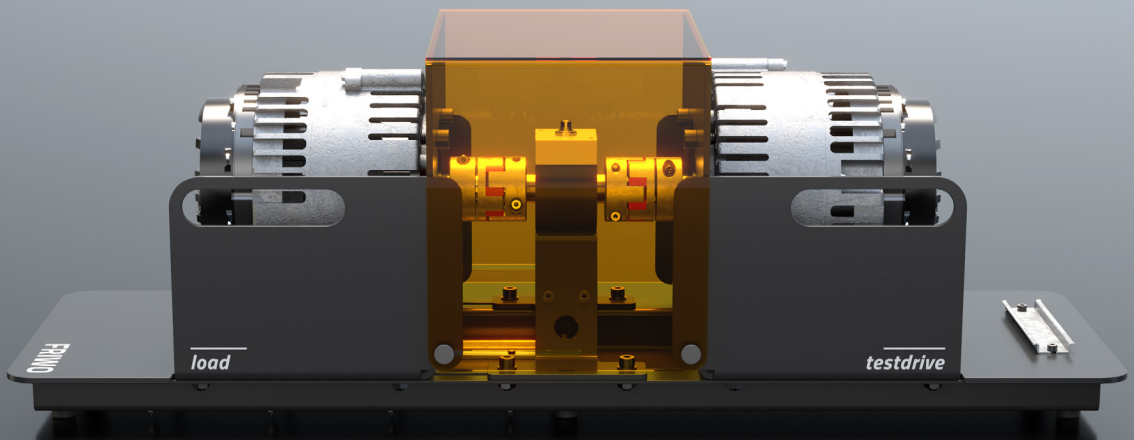
FRIWO

Back-to-Back
Quickstart Guide



SETUP

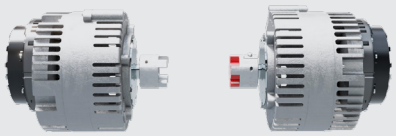
THE B2B PACKAGE COMES FULLY ASSEMBLED AND MUST INCLUDE THE FOLLOWING ITEMS:

SAFETY COVER

1 orange safety cover

DRIVE UNIT

2 PMSM electric machines
2 control units (MC6000) attached to the machines
1 standard clutch for motor shaft connection



FRAME

1 base plate with cable management
1 mount for **LOAD** unit (static)
1 hatrail with electric components
1 mount for **TESTDRIVE** unit (linear moveable)

TECHNICAL EQUIPMENT

1 48V DC connector
2 USB A 2.0 cable (male/male)
1 allen key

TORQUE SENSOR SETUP (OPTIONAL)

1 torque sensor unit
1 compact clutch with one half connected to each side of the torque sensor

SAFETY NOTE

THE BACK-TO-BACK TESTBENCH CONSISTS OF ROTATING PARTS !!

Always make sure that the motor shaft is covered and not directly accessible when connecting the testbench to power supply in order to avoid injuries to persons in any way.

DANGEROUS PARTS ARE MARKED WITH YELLOW STICKERS.

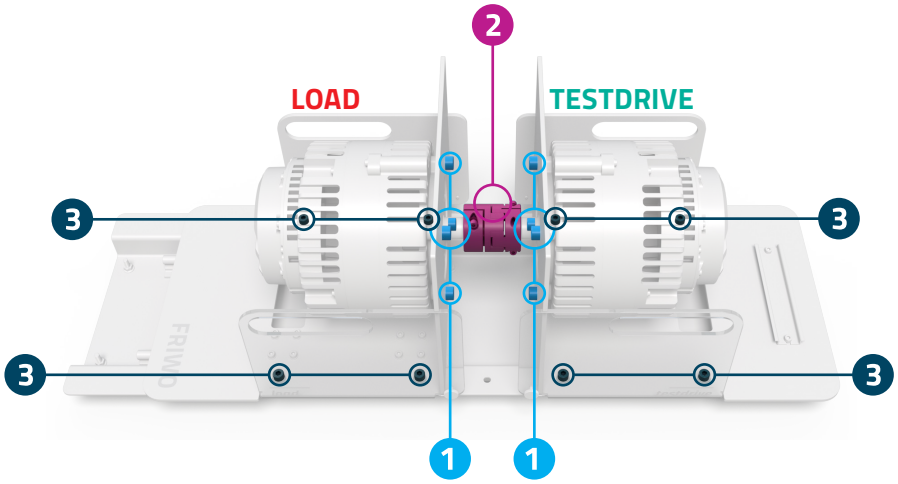
Please make sure to check that components in these areas are proberly mounted and remove the stickers before launch.

CHECKLIST

PLEASE CHECK THE FOLLOWING REQUIREMENTS BEFORE PROCEEDING
IMPORTANT: BEFORE STARTING, MAKE SURE THE POWER SUPPLY IS TURNED OFF!

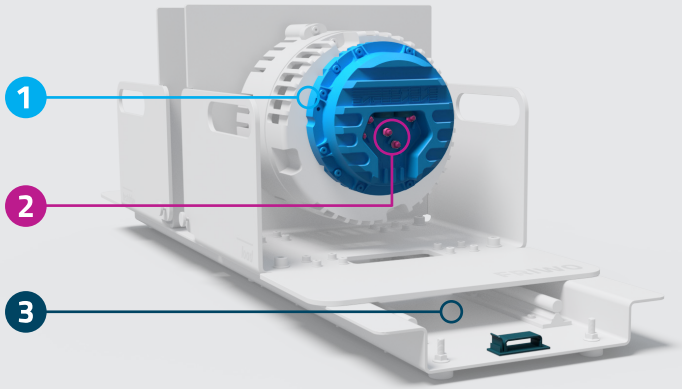
MECHANICS

1. Each drive unit is attached to the respective module (**LOAD**/**TESTDRIVE**).
2. Both shafts of the electric machines are connected via the clutch.
3. The **LOAD** and **TESTDRIVE** modules are firmly attached to the basic plate.



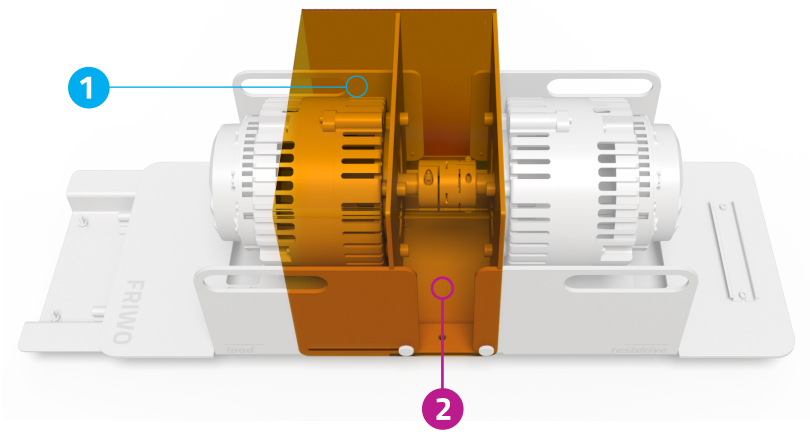
ELECTRONICS

1. Each motor control unit is mounted to the respective electric machine.
2. Machine phases are connected.
3. Sensor wiring and power supply cables are properly attached and stowed away in the cablemanagement clamps inside the baseframe.



SAFETY

1. The orange safety cover is attached and fixed properly.
2. No cable is looming into the test area.

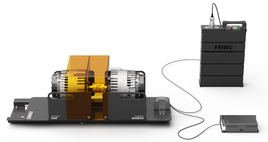


NOTE: FOR THE TORQUE SENSOR SETUP PLEASE CHECK THE ADDITIONAL LEAFLET

1. CONNECT

CONNECT TO POWER

Connect the testbench via the 48V DC connector to a 48V power supply or to the FRIWO battery pack.



NOTE:

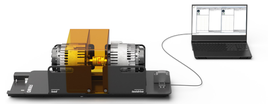
If you are using a power supply it is recommended to connect a 60V sink in parallel to allow regenerative operation of the load.

CONNECT TO PC

Use both USB A 2.0 cables to connect units to your computer.

Open Enable Tool Application on your computer and press STRG + S.

An application window is opened for each motor control unit on the load and the testdrive side.



NOTE:

Make sure that the correct variable description file (.xml) is selected fitting the programmed firmware version at delivery: **V1000021024**

2. CALIBRATE

INITIAL CALIBRATION - LOAD SIDE

In the Enable Tool Application go to the application window for the **LOAD SIDE**.

Set the parameter

1. *APP_C_Ride_Mode_2_Speed_Limit* to *30 1/s*

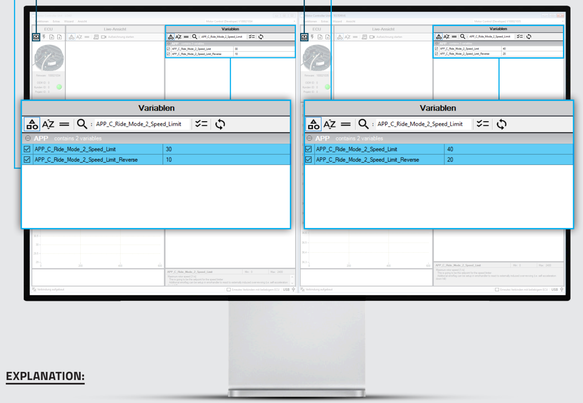
in order to limit the rotor speed to **1800 1/min**.

Set the parameter

2. *APP_C_Ride_Mode_2_Speed_Limit_Reverse* to *10 1/s*

in order to limit the reverse rotor speed to **600 1/min**.

3. Press the button *Save on ECU* to store the values permanently.



INITIAL CALIBRATION - TESTDRIVE SIDE

In the Enable Tool Application go to the application window for the **TESTDRIVE SIDE**.

Set the parameter

1. *APP_C_Ride_Mode_2_Speed_Limit_Reverse* to *40 1/s*

in order to limit the rotor speed to **2400 1/min**.

Set the parameter

2. *APP_C_Ride_Mode_2_Speed_Limit_Reverse* to *20 1/s*

in order to limit the reverse rotor speed to **1200 1/min**.

3. Press the button *Save on ECU* to store the values permanently.

EXPLANATION:

The rotor speed limits on **TESTDRIVE** side must be higher than on the **LOAD** side in order to avoid speed controller interference of **TESTDRIVE**.

3. LAUNCH

TURN POWER SUPPLY ON

If you are using a power supply, set the output to a constant voltage of **48V** with maximum current of at least **20A**.

In case of using a battery pack, the maximum output current must be set to at least **20A**.

Switch on the voltage output of the power supply or the battery pack.

BOTH MACHINES ARE GENERATING A STARTUP SOUND ON EACH SIDE.

CALIBRATE ROTOR OFFSET - LOAD SIDE

In the Enable Tool Application go to the application window for the **LOAD SIDE**.

Before starting the calibration make sure the following parameter is set to:

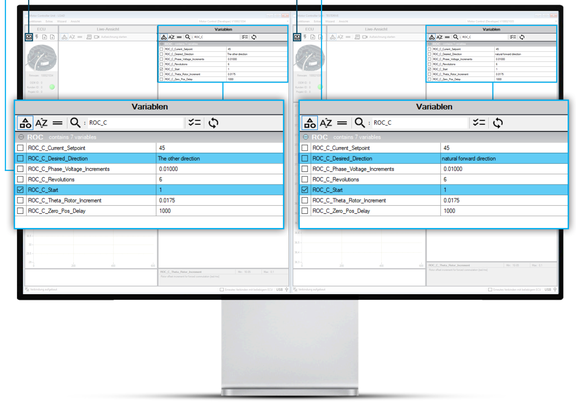
1. *ROC_C_Desired_Direction = -1 (the other direction)*

Start rotor offset calibration by setting the parameter

2. *ROC_C_Start to 1.*

The **LOAD SIDE** starts to rotate in order to determine rotor offset value.

3. Press the button *Save on ECU* to store the values permanently.



CALIBRATE ROTOR OFFSET - TESTDRIVE SIDE

In the Enable Tool Application go to the application window for the **TESTDRIVE SIDE.**

Before starting the calibration make sure the following parameter is set to:

1. *ROC_C_Desired_Direction = 1 (natural forward direction)*

Start rotor offset calibration by setting the parameter

2. *ROC_C_Start to 1.*

The **TESTDRIVE SIDE** starts to rotate in order to determine rotor offset value.

3. Press the button *Save on ECU* to store the values permanently.

4. MONITOR

START SPINNING

In the Enable Tool Application go to the application window for the **TESTDRIVE SIDE.**

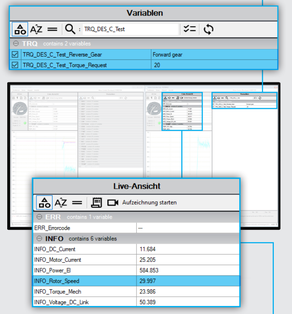
Before starting the calibration make sure the following parameter is set to:

TRQ_DES_C_Test_Reverse_Gear = 0 (forward gear)

Set the parameter

TRQ_DES_C_Test_Torque_Request to *20%.*

The motor starts rotating while the rotor speed is limited to **1800 1/min** by load side.



MONITORING

In the Enable Tool Application go to the application window for the **TESTDRIVE SIDE**.

In the variables window search for the parameter *INFO_Rotor_Speed* and double-click it.

INFO_Rotor_Speed is displayed in the Live View.

This parameter shows the actual rotor speed of around **30 1/s** and is monitored within the scope. Proceed with other display parameters of interest in the same way.

5. SHUT DOWN

STOP SPINNING

In the Enable Tool Application go to the application window for the **TESTDRIVE SIDE.**

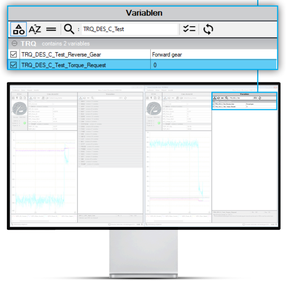
Set the parameter

TRQ_DES_C_Test_Torque_Request to *0%.*

The machine stops rotating.

Turn off the power supply to put the system in a safe state.

Close Enable Tool Application.



TROUBLESHOOTING

IF ANY PROBLEM OCCURS DURING THE SETUP OR LAUNCH PLEASE CHECK THE FOLLOWING ACTIONS.

MECHANICAL BLOCKADE

- ☐ Loosen the screws between clutch and each machine shaft.
- ☐ Loosen the connection between the **TESTDRIVE** mount and the baseframe.
- ☐ Slide back the **TESTDRIVE** mount and disassemble the clutch from the motor shaft.
- ☐ Make sure the components are axial alligned.
- ☐ Reassemble.

ELECTRIC ISSUES

- ☐ Check power supply cable connection on each drive unit.
- ☐ Check sensor wiring on each drive unit.
- ☐ Check power supply limit configuration (source and sink).

FOR ANY OTHER PROBLEM PLEASE CHECK THE MANUALS LINKED TO THE QR-CODES.

B2B-Manual

Enable-Tool-Application-Manual

IMPRINT/KONTAKT

FRIWO Gerätebau GmbH
Von-Liebig-Straße 11
48346 Ostbevern
Deutschland

www.friwo.com