



# MPS380 user manual

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## Introduction

This user manual is an essential part of the dynoKRAFT MPS380 dynamometer.

All functions and settings described apply to the original YourDyno software accordingly.

This product and all its components are a custom built device designed for professional use, and to be used solely at research and development facilities for such purposes.

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Original user manual for the dynoKRAFT dynamometer.

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## Warranty and Disclaimer

This product is meant to be used by trained technicians and tuners only.

Owner/user assumes responsibility for his or her own actions when using these products. dynoKRAFT GmbH hereby expressly disclaims liability and shall not be responsible for incidental, consequential and contingent damages or any kind or nature, including, without limitation: damages to persons or property, whether a claim for such damages is based upon warranty, contract, tort or otherwise; damages due to or arising out of the loss of time; or loss of profits.

dynoKRAFT GmbH shall not be responsible for any damages caused by the presence of error or omission in any of its manuals, instructions or related materials.

## Warnings

### Conventions used in this manual

The conventions used in this manual are designed to protect both user and equipment and to assure a safe work environment.

#### **Warning!**

The warning indicates a serious hazard or risk of machine damage.

## ⚠ Caution.

Caution means that failure to perform or incorrectly perform the described procedure can damage the test bench.

## ℹ Information.

Information gives the user additional useful advice.

### Precautions and dynamometer safety

Your dynoKRAFT engine dyno is a safe and proven way to test the engines performance in a repeatable test conditions. To assure problem free operations you should note these precautions and use common sense at all times!

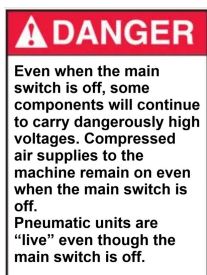
#### Machine warning labels and their meaning



**Hazardous Voltage:** This label warns that dangerous electrical voltages are present in the equipment. The machine may be supplied by more than one power source, including remote or auxiliary connections. To prevent electric shock, serious injury, or death, all electrical power sources must be completely disconnected before any servicing, maintenance, or inspection is performed.



**Electrical Shock Hazard:** This label warns that the equipment presents a risk of electrical shock. Before performing any service or maintenance, the main power switch must be turned off and locked out to prevent accidental re-energization. Failure to follow this instruction may result in serious injury or death.



**Machine energized:** This statement warns that turning the main switch off does not fully isolate all energy sources. Certain electrical components may remain energized at dangerously high voltages, and compressed air supplies continue to be active. As a result, pneumatic components remain operational even when the main switch is off. Additional electrical and pneumatic isolation steps must be taken before servicing to avoid serious injury.

**Do not pull under load**

**Do not pull under load:** This label warns that the electrical component must not be disconnected, unplugged, or withdrawn while electrical current is flowing. Pulling or disconnecting the component under load can cause arcing, equipment damage, or serious injury. Always shut off and isolate electrical power before pulling or removing the component.



**High Voltage:** This yellow triangle warning indicates that the equipment or area contains dangerously high electrical voltages. Contact with these voltages can cause severe injury or death. Only qualified personnel should access or service the area, and all power must be properly isolated before any work is performed.



**Automatic Machine Start:** This yellow triangle warning indicates that the machine may start automatically without warning. Contact with moving parts during automatic start can cause serious injury. Users should stay clear of the machine while it is energized and that all covers are installed, and ensure all safety measures are in place before performing any maintenance or adjustments.



**Hot Surface:** This yellow triangle warning indicates that parts of the machine may become hot during operation. Contact with these surfaces can cause burns. Allow the equipment to cool and use appropriate protective measures before touching or servicing these areas.



**Wear Hearing Protection:** This label indicates that noise levels in the area may be high enough to cause hearing damage. Approved hearing protection must be worn when operating or working near the machine.



**Wear Eye Protection:** This label indicates a risk of eye injury from flying particles, debris, or other hazards. Approved eye protection must be worn when operating or servicing the machine.



**Read User Manual before use:** This label indicates that the user must read and understand the user manual before operating or servicing the machine. The manual contains important safety, operating, and maintenance instructions that must be followed to prevent injury or equipment damage.

### Engines exhaust gasses

Always assure proper dyno room ventilation and use engine exhaust extraction system which is adequately scaled to remove all exhaust gasses from the room in which people are working in.

Fail to do so may result in serious hazard to dyno room operators and will impact engine's performance.

## **⚠ Warning! Carbon monoxide / Toxic gasses !**

Combustion engine exhaust gasses contain toxic carbon monoxide. Breathing it can cause death.

Always operate the dynamometer in well ventilated area. Always use exhaust gasses extraction system during test runs.

### **Noise and debris**

Keep in mind that running an engine test at high RPM and Load will create a noisy work environment which may affect one's ability concentrate on task he's performing. Prolonged exposure to noise may result in head ache or nausea.

Always use eye protection to avoid eye damage from any debris or dirt which may be found in the air either because of extensive room ventilation or due to equipment damage.

## **⚠ Warning! Excessive noise / Eye damage.**

Always use eye and ear protection while working with dynamometer. Fail to do so may result in serious health issues, hearing loss or visual impairment.

### **Rotating parts**

All rotating parts are potential source of serious accident. Therefore always operate the dynamometer with all coverings properly installed. Use additional covering or safety means to secure any visible parts of the engine or dynamometer. Always wear tight sleeves to avoid getting dragged by any rotating parts.

## **⚠ Warning! Rotating parts.**

Never operate an dynamometer without properly installed coverings. Always use cloths with tight sleeves.

Fail to do so may result in getting dragged by rotating parts or components.

### **Heat**

During an dynamometer test and substantial amount of heat will be generated by both the engine and dynamometer equipment. The air temperature in the dyno room will rise gradually.

Additionally some surfaces of the combustion or electric engine may get very hot.

dynoKRAFT is encouraging dynamometer operators to use an infrared thermometer to check if the surface temperatures are in safe range. Temperature above 55°C is considered harmful.

## **⚠ Warning! Hot surfaces.**

Avoid touching of hot surfaces during and after the dynamometer tests.

Some areas of combustion engines such as exhaust system can get extremely hot and touching them may cause severe tissue burn.

### **Electric power. Compressed air**

The dynoKRAFT dynamometers are operated using electric power and compressed air (depending on model).

Do not remove any covering panes, perform any service or repairs or open any electric cabinets under power.

Any repairs or service which requires accessing the dynamometers electrical system must be performed by qualified electrician.

## **⚠ Warning! Potentially lethal voltages.**

Never perform any service or remove any protective panels or open electric cabinets without previously disconnecting the main AC power.

Always wait min. 5 minutes after turning off the dynamometer main switch to allow for complete discharge of electromagnetic coils of the Eddy Current Brakes.

Fail to do so may result in lethal electric shock.

Before performing any service operation or repairs to pneumatic components always release the pressure from the pneumatic system.

## **Warning! Eye damage.**

Always use eye protection while working with dynamometers pneumatic systems.  
Fail to do so may result in serious eye damage and visual impairment.

### General precautions

Always keep minimum safe distance while working with dynamometers so that in case of equipment or engine failure, fire or other hazard the risk of accident is minimized.  
Excessive noise or vibration of dynamometer usually indicates serious fault and should be directly solved.

Always verify emergency brake operation before using your dynamometer.  
Before performing any tests always verify if the dynamometer and vehicle you're about to test are properly secured.

Ensure that both the dynamometer and vehicle you're testing are sufficiently cooled.

Never perform any servicing of the dynamometer unless explicitly recommended in manual..

## **Caution. Risk of equipment damage. Potential safety hazard.**

Not obeying to these rules may result in equipment damage, potential safety hazard to dynamometer operators and can result in loss of warranty.

## Specifications and requirements

### Permissible operating limits and requirements

Characteristic	Value	Comments
Max. RPM	5000 1/min	
Rotational inertia (without coupling system)	5,17 kgm <sup>2</sup>	
Recommended eddy current brake load for constant operation	up to 15 Min: 100% up to 30 Min: 85% up to 45 Min: 80% up to 60 Min: 70% over 60 Min: 60%	
Eddy current brake coils temperature	Max. 180 ° C	The thermostat switches off the power supply to the eddy current brake at ~ 167 ° C. At ~ 127 ° C the power supply is switched back on again.

Power supply	Value	Comments
Electric power supply	400V AC / 32A / 50Hz	see nameplate for alternative systems

Environmental and workshop requirements	Value	Comments
Room temperature	+10°C to +50°C	
Relative humidity	10 - 65%	no condensation
PC-System	preferred: Windows 10 64-Bit	
Internet- and Phone		Required for software and firmware updates and technical support.

# Dynamometer installation and commissioning

## Installation and commissioning

Before installing remove all packaging material and dispose it per your local trash disposal rules.

The MPS380 dynamometer is bolted to wooden pallet with four (4) bolts. Remove and dispose these too.

The test stand must be installed on a solid concrete floor with sufficient load-bearing capacity (min. 2 T / m<sup>2</sup>).

The floor should have a flatness of 2 mm per 1 m (or better).

The MPS380 dynamometer is not to be operated without adequate fixation of dynamometer chassis, which assures correct transfer of counter-torque generated by retarder. See "Permissible installation scenarios".

❗ Installation and commissioning can only be carried out by a qualified technician.

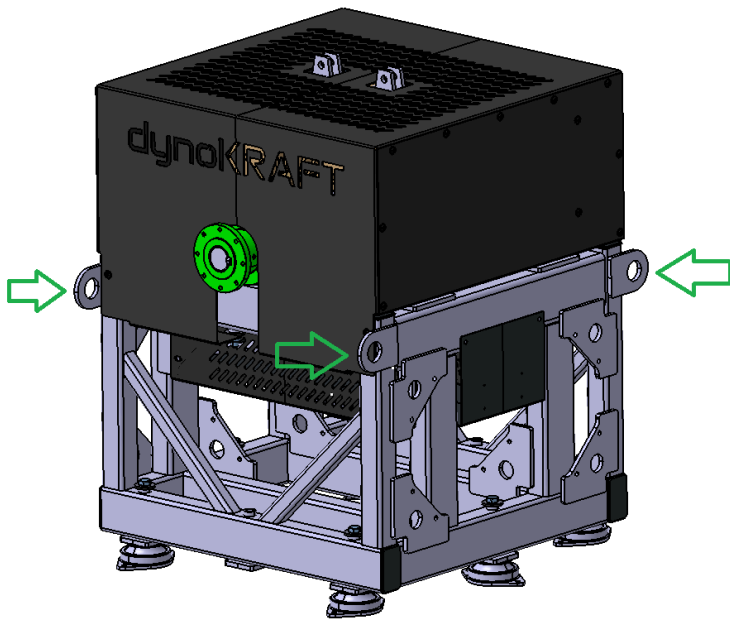
❗ EMC noise

To avoid excessive noise during data transfer, please keep the USB connection / cable between ADAQbase and the computer as short as possible.

## Lifting

To lift the dynamometer please use the four (4) hook-points provided at each corner of the chassis.

Please make sure to use lifting equipment with adequate load capacity (see machine label for total weight).



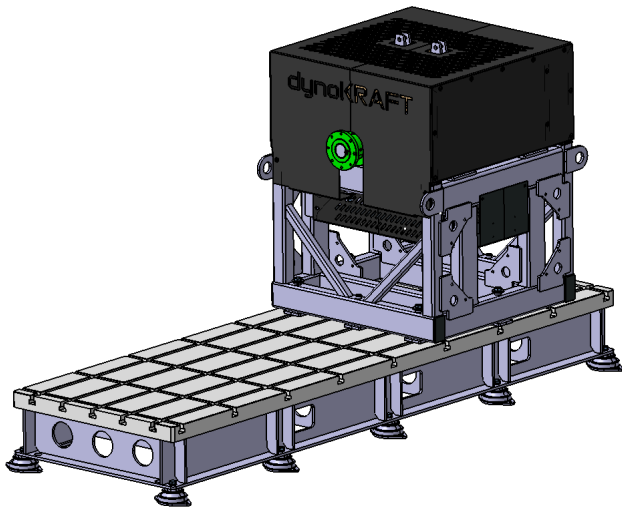
## Permissible installation scenarios

### Installation on T-slot table

This is the **preferred** installation which allows correct counter-torque transfer between engine stand and the dynamometer chassis.

The counter-torque is transferred via the t-slot table, which by itself, should be installed on vibration dampers.

Fix the MPS380 chassis to t-slot table using adequate t-nuts and bolts (min. class 10)



## Installation on concrete floor / foundation

### ⚠ Warning! Risk of equipment damage.

The supplied rubber machine feet **ARE NOT DESIGNED** to transfer counter-torque (reaction forces) from dynamometer chassis directly into foundation!  
DO NOT use the dynamometer without assuring correct counter-torque transfer between test engine and dynamometer chassis!

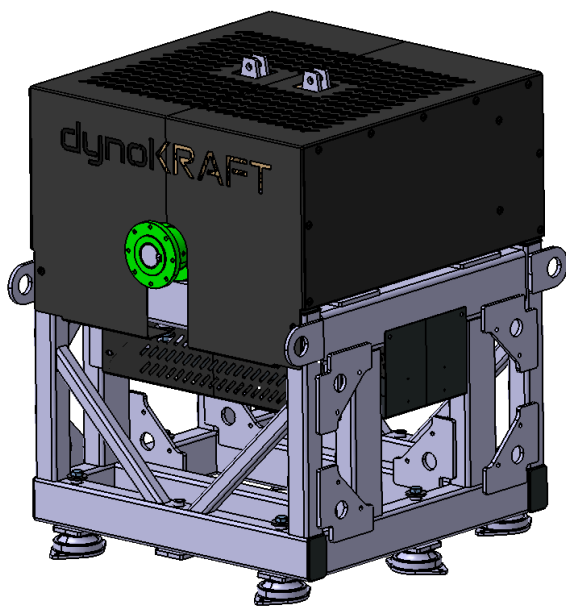
This is the **non preferred** installation as all the vibrations from dynamometer and tested engine may be transferred directly into floor / foundation.

Further more **it is absolutely necessary** to assure correct counter-torque transfer between dynamometer chassis and engine stand, for example the engine stand must be firmly bolted to the dynamometer chassis.

To support such installation scenario the dynamometer chassis **must be equipped with counter-torque arms**. Please contact dynoKRAFT GmbH for details if such installation scenario is required for further assistance.

Fix the dynamometer chassis to concrete floor by anchoring the rubber feet to prevent excessive movement of the chassis. At min. 4 corner feet should be anchored.

Use adequate concrete anchors available locally - for example UPAT IMC 10 -series.



## Connecting test engine to the dynamometer

The MPS380 dynamometer is equipped with 150mm flange attachment similar to DIN 15451 - Part 2.

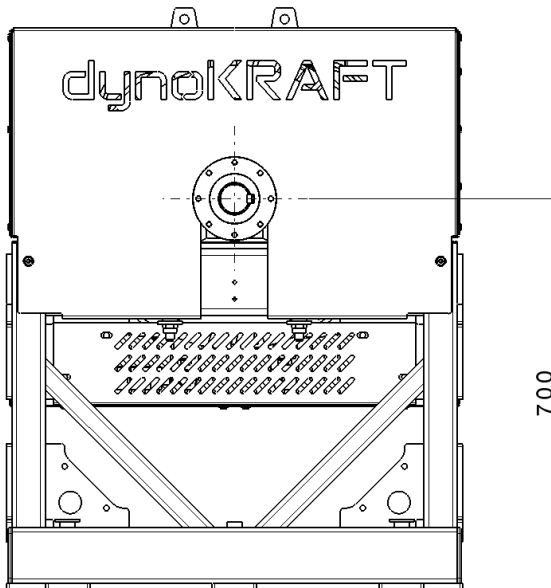
Please use suitable shaft (cardan-shaft or CV-shaft) to connect the engine to dynamometer flange.

In most cases it is necessary to use elastic torsion clutch to dampen the engine vibrations.

The dynoKRAFT MPS380 is an bi-directional dynamometer.

You can relocate the input flange to any side of the dynamometer - please bare in mind the load cell calibration direction (use "Reverse Load Cell calibration" option in software accordingly).

Axis center height (above t-slot table level) is 700mm.



### ⚠ Caution.

It is in the sole responsibility of the dynamometer operator to cover all rotating parts or use other adequate means to prevent accidents.

## Connecting to Electric Power Supply and Compressed Air Supply

1. Please connect a power cable to dynamometer main power inlet "MAINS" using adequate extension cable. Please make sure to use proper electric power source matched to the electric system of the dynamometer. If in doubt please check the machine label for information on power system used and consult licensed electrician.

The test bench must be connected to a suitable type B residual current circuit breaker, followed by a three-pole 400V 32A fuse, to the mains (EU only)  
See Machine Plate for other systems.

2. Please connect power cable from dynamometer chassis to electric cabinet - use any available power OUT socket.



3. Install YourDyno / ADAQ Software on your PC and follow instructions in respective Software User Manual.

## **⚠ Warning! Obligatory use of residual current circuit breaker.**

A residual current circuit breaker is an obligatory part of the electrical connection of the dynamometer. Failure to comply with this rule can result in severe electric shock or death, e.g. if the insulation is damaged! If the test stand is operated without a residual current circuit breaker, the guarantee expires!

Should your dynamometer be equipped with Air Inlet please connect a suitable compressed air hose to the compressed air inlet adapter. The inlet is a standard 7.4mm workshop quick connector normally found in auto repair shops.

To switch on the dynamometer, please turn the main switch on the side of the switch cabinet to the ON position.

## **Dyno room**

### **Noise control. Dynamometer room requirements**

dynoKRAFT is recommending to setup your dynamometer in noise control room. It is not uncommon, that during combustion engine testing under full load and high RPM the generated noise level may be well in excess of 110dB.

Another important requirement is flammability resistance of your dynamometer room and any equipment you will install inside the room. The room must also consist of emergency exit wired to the e-stop circuit of your dynamometer. Please consult your local health and safety requirements.

Ensure minimum work space around the dynamometer-test engine setup. dynoKRAFT is recommending a minimum of 2 meters around the dynamometer and engine to allow easy access to all controls and equipment.

### **Fire hazard**

Please ensure that there are a sufficient number of suitable fire extinguishers in the dyno room. If in doubt, speak to your local health and safety requirements authorities or fire department.

### **Setting up your workspace**

Please setup your workspace so that at least one emergency stop button is within your range at all times, while working with dynamometer.

## **Basic dynamometer operation**

### **Controls**

The dynoKRAFT dynamometer is equipped with various external indicators and controls. Please refer to table below for their meaning and operation.

Control	Function	Comments
Emergency stop button (yellow-red)	Emergency STOP or emergency OFF button.	By pressing this button the dynamometer will be switched off (retarder power will be cut off). In addition, the pneumatic brakes (if your test bench is equipped with such) are applied.  The emergency stop button is released by pulling it out.
"Reset" button (green)	With the reset button, the dynamometer is reset to normal working conditions after the emergency stop procedure.	Once all e-stop buttons are released pressing the "reset" button will enable normal dynamometer operation and release the emergency brake.
"E-brake ON" LED (yellow)	This indicator lamp shows that the emergency stop button has been depressed and/or Reset button has not been depressed.	

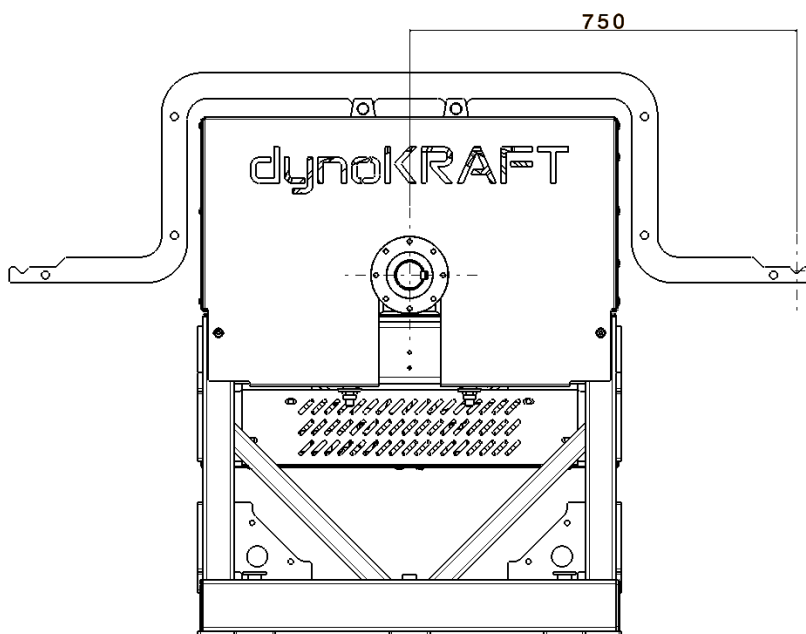
## Load Cell calibration

### Old models

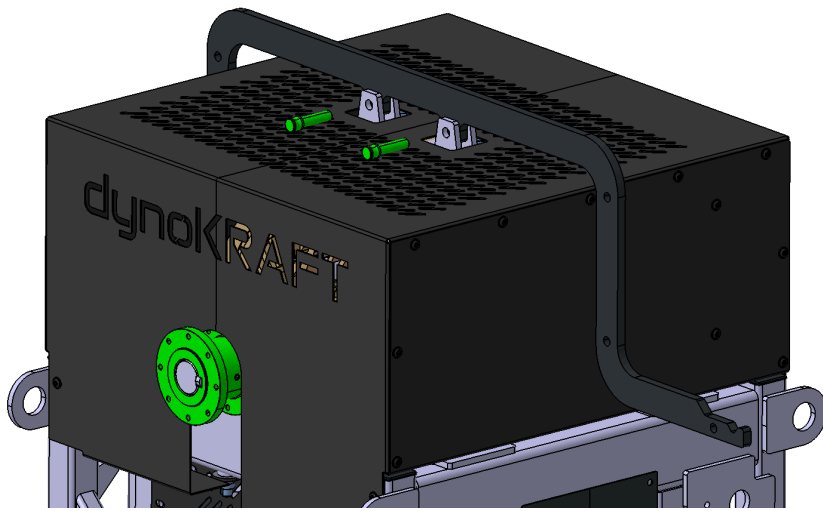
Please follow the steps described in ADAQ Software manual to calibrate the load cell.

**Reference load:** ~25kg (see supplied calibration weight for exact value or any other weight you use for calibration process).

**Torque arm length:** 750mm



To install the calibration tool please use the two supplied pins:



### New models (Serial-Number: 2248 and above)

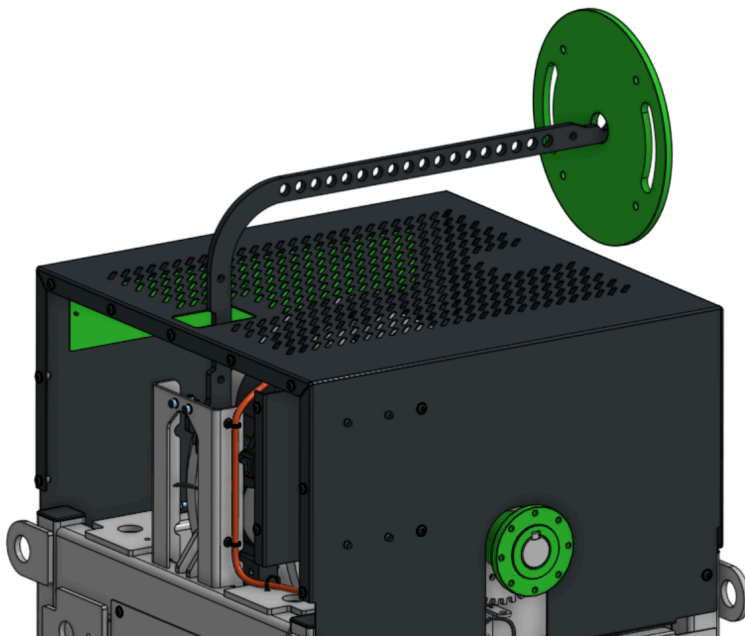
Please follow the steps described in ADAQ Software manual to calibrate the load cell.

**Calibration weight (Reference load): ~229kg** (see supplied calibration weight for exact value or enter other weight you use for calibration process).

**Distance to calibration weight (Torque arm length): 32,6cm**

Calibration process steps:

1. Connect dynamometer, start YourDyno software and open Load Cell calibration settings.
2. Press "Zero calibrate"
3. Install calibration tool and weight (front cover removed for clarity), enter the "Distance to calibration weight" and "Calibration weight" values in software.



4. Press "Load calibrate" and "Save calibration"
5. Remove calibration tool and weight and close dialog window in software.

### E-Stop procedure and reset

The following steps / functions are executed while the emergency stop button (emergency OFF button) is pressed:

- the test power supply to retarder is switched off

**To reset the dynamometer after emergency stop event into normal operation mode please follow these steps:**

- Examine the engine and dynamometer and fix any issues with the setup
- Investigate the room for potential hazard
- If you're not able to identify any potential hazard please release all e-stop buttons and press the "RESET" button

## ⓘ **Caution.**

Always investigate if the dynamometer chassis and engine stand are firmly fixed and that all bolts are properly tighten after executing E-stop procedure from RPM in excess of 2000.

## **ADAQbase installation. Basic software configuration**

- ⓘ Please refer to the relevant operating instructions:
- ADAQbase user manual
  - ADAQ Software user manual

## **Check routine before performing a test run**

**Before performing a test run or starting-up the engine please follow these steps to assure safe dynamometer operation:**

- Check if the engine is properly secured on the t-slot table.
- Check if there are no visible leaks or fluid losses in the dynamometer or the engine
- Check the overall technical condition of the engine to be tested (oil level, coolant temperature etc)
- Check if there are not loose parts or tools left on the dynamometer or the engine
- Ensure that any personnel is standing clear of dynamometer or the engine
- Ensure that the dynamometer and engine cooling as well as the exhaust gasses extraction system are operating correctly

Once you have performed these basic checks you should be clear to start up the engine.

These check routine should be performed before every test!

Before you will apply any load to the engine please warm it up. The engine oil temperature should be at least 70°C.

## ⚠ **Warning! Lethal hazard.**

Leaving any loose parts or tools on the dynamometer or vehicle/engine may result in serious lethal hazard.

## **Special considerations for Quick-Shifter systems**

Many modern vehicles / gearboxes are equipped with dual-clutch transmissions or so called quick-shifter system which allows changing gears under load without using clutch. Usually these systems operate by cutting ignition which results in reducing load in transmission thus enabling gear change.

Since the dynamometer controller calculates the engine RPM by measuring the retarder RPM and multiplying it by total ratio, changing the gear during a test run will result in incorrect calculated RPM value and may lead to unpredictable conditions.

This is especially true while performing "Manual" or "Power Sweep" tests where the eddy current brake is used to control the calculated engine RPM.

Changing gears with quick-shifter removes the load from the system (ignition cut). The ADAQbase dyno control system will react to these load changes instantly by reducing Eddy Current brake output to 0 and - once the ignition system is back on - applying excessive load to stabilize the sudden change in engine RPM.

The fact that during gear change also the ratio has changed will exaggerate the brake reaction even further.

As a result the excessive load from eddy current brake may be so high that the tie-down straps or cardan-shaft connecting the engine may break!

## ⚠ **Warning! Lethal hazard.**

DO NOT use quick-shifter or change gears while recording test runs under full load.

During "Manal" or "Power Sweep" test do not perform any gear changes - especially using quick-shifter mechanism.

This will lead to unstable running conditions and may result in total equipment damage as well as severe injury to operator or death.

# Maintenance

## Periodic maintenance by the dyno operator


All dynoKRAFT test stands have been developed with a minimum of maintenance to enable problem-free operation for years. However, as with any high-performance equipment an basic, periodic maintenance is required to ensure problem-free operation.

### **Warning! Lethal hazard.**

Before carrying out maintenance or repair work, always switch off the main power supply of the test bench and unplug the power cord. Please follow the warnings listed in the "Warnings" chapter!

What to do	OK condition	When to do
Check the function of the emergency stop system by pressing the emergency stop button.	OK condition: - Orange LED is on	daily
Check whether all covering panels are correctly fixed.	OK condition: - all bolts are hand-tightened	daily
Check that the retarder rotate freely and without any unusual noises. To do this, please press the "Reset" button beforehand.	OK condition: - retarder can be turned freely and without unusual noises	daily
Check weather the fixing bolts to t-slot table are tighten.	OK condition: - all bolts are tighten at required torque (depending on bolt size and class)	daily
Check weather the fixing bolts at input flanges are tighten.	OK condition: - all bolts are tighten at required torque (depending on bolt size and class)	before each test run

## Yearly maintenance

 The annual maintenance may only be carried out by a qualified technician in accordance with the maintenance plan and reported to dynoKRAFT GmbH by E-mail with date, time and technician name. Any unauthorized maintenance of the dynoKRAFT test stand or failure to perform it will result in the immediate loss of warranty.

An initial maintenance must be carried out after 20 operating hours after commissioning.  
The maintenance interval is 2000 operating hours or once per year.

**It is the customer's responsibility to ensure that annual maintenance is carried out as planned.**