

Product Name :
Machinery Diagnostic System, Base Unit

Product Code :
TN698



Description :

Machinery Diagnostic System, Base Unit

Technical Specification :

Machinery Diagnostic System, Base Unit

The unit is perform the following experiments and investigations:

Learning Objectives / Experiments:

Introduction to vibration measuring methods on rotating machinery systems

Fundamentals of measurement of shaft and bearing vibrations

Basic variables and parameters

Sensors and measuring devices

Influences of speed and shaft layout

Influence of sensor positioning

Field balancing of rigid shafts

Influence of alignment between motor and coupling

Understanding and interpreting frequency spectra

Use of a computerised vibration analyser

Supplied with follow Accessories for experiments;

Computerised vibration analyser

Elastic shaft kit

Crack detection in rotating shaft kit

Roller bearing faults kit

Couplings kit
Belt drive kit
Damage to gears kit
Crank mechanism kit
Cavitation in pumps kit
Vibrations in fans kit
Electromechanical vibrations kit
Brake & load unit
Laboratory trolley
Two displacement sensors
PC1 Computer-System with 21" TFT-Monitor Win 10 engl.

Specification:

Base unit for machinery diagnostic training system
Rigid base plate with workpiece holder slots
Drive motor with variable speed via frequency converter
Digital speed and power display
2 shafts: 1x short, 1x long
2 unbalanced flywheels with interchangeable balance weights
Bearing blocks, roller bearings, interchangeable
Fixing holes for vibration measuring sensor
Flexible claw coupling and controlflex^{^r^} coupling
Motor can be aligned obliquely and transversally
Transparent protective hood
Stackable system for components

Technical Data:

Base plate Length x Width: 1100x800mm
M8-slots, spacing 50mm
Asynchronous motor with frequency converter
Drive power output: 0,37kw
Nominal speed: 2800rpm
Speed range via frequency converter 100...6000rpm
Display and control unit with digital power and speed display
2 shafts: Ø=20mm, length 300mm, 500mm
2 unbalanced flywheels: Ø=150mm, each 1675g, with interchangeable balance weights (bolts)
2 bearing blocks with roller bearings 6004 (can be exchanged)
Control flex ^{^r^} coupling: nominal torque: 15Nm
230V, 50Hz, 1 phase
230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase
230V, 60Hz, 3 phases
Dimensions and Weight
Length x Width x Height: 1100x800x500mm (base plate + hood)
Length x Width x Height: 475x420x200mm (control unit)
Length x Width x Height: 600x390x325mm (storage system)
Weight: 95kg (total)
1. Laboratory trolley
Trolley for the Machinery diagnostic system,
Blocan section, aluminium
4 castors, with brake

Technical Data:

Top area, Length x Width: 1100x770mm

Dimensions and Weight

Length x Width x Height: 1100x770x820mm

Weight: 39kg

2. Computerised vibration analyser

Within the context of the experiments in the complete Machinery diagnostic system, the following learning can be covered:

Familiarisation with vibration signals

Correct application of FFT analysis

Measurement of speed, vibration displacement, vibration velocity and acceleration

Assessment of the vibration state of a machine

Damage analysis of roller bearings and gears by means of envelope spectra

Detection of cracks in shafts by means of run-up curves and order analysis

Measurement of imbalance vibrations and field balancing of rigid rotors in 1 and 2 planes

Software for data acquisition via USB under Windows 7, 8.1, 10

Including PC1 Computer-System with 21" TFT-Monitor Win 10 engl.

Technical Data:

Acceleration sensors

Frequency range: 1...10000hz

Sensitivity: 100mv/g

Resonance frequency: 32khz

Optical speed sensor

Sampling width: 3...150mm

Laser class ii, 675nm

Measuring amplifier

Adjustable gain: x1, x10, x100

Powered by 12vdc power supply unit

Length x Width x Height: 230x220x80mm

USB box

16x analogue in, 2x analogue out

Each 4x digital in/out

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase

Dimensions and Weight

Length x Width x Height: 600x400x220mm (storage system)

Weight: 6kg

3. Brake & load unit

Technical Data

Continuous braking power: 450W/3000rpm

Transmission ratio between brake shafts: $i=3$

Direct brake operation

Speed range: 200...2000rpm

Braking torque: 1...10nm

Operation via belt drive

Speed range: 600...6000rpm

Braking torque: 0,3...3,3nm

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase

Dimensions and Weight

Length x Width x Height: 460x410x200mm (display and control unit)

Length x Width x Height: 600x400x320mm (storage system)

Weight: 30kg

4. Elastic shaft kit

Technical Data:

Elastic shaft

Min. Diameter: $\varnothing=10\text{mm}$

Diameter at bearings: $\varnothing=20\text{mm}$

Length: 530mm

Nominal length between bearings: 450mm

Dimensions and Weight

Length x Width x Height: 600x400x120mm (storage system)

Weight: 6kg

5. Crack detection in rotating shaft kit

Technical Data:

Flange diameter: $\varnothing=90\text{mm}$

6 hexagon flange bolts M8x20

Shafts

Diameter: $\varnothing=20\text{mm}$

Short shaft: L=85mm

Long shaft: L=200mm

Max. Permissible bending torques

Short shaft for belt pulley: 15,9Nm

Long shaft for mass disk: 3,9Nm

Dimensions and Weight

Length x Width x Height: 400x300x120mm (storage system)

Weight: 3kg

6. Roller Bearing Faults Kit

Technical Data:

Pendulum ball bearing

Inside diameter: $\varnothing=20\text{mm}$

Outside diameter: $\varnothing=47\text{mm}$

Width: 14mm

Number of rollers: 12

Dimensions and Weight

Length x Width x Height: 400x300x120mm (storage system)

Weight: 4kg

7. Couplings kit

Technical Data:

Pin coupling

1x centric pin

1x eccentric pin

Eccentricity of pin: 1mm

Max. Pitch fault: $180^\circ \pm 1,909^\circ$

Coupling stars for claw coupling

98 Shore A (red)

92 Shore A (yellow)

64 Shore D (green)

80 Shore A (blue, included in Machinery diagnostic system)

Flange coupling

Radial run-out (centre offset): 0,2mm

Axial run-out: 0,4 ±0,1mm
Dimensions and Weight
Length x Width x Height: 400x300x170mm (storage system)
Weight: 6kg

8. Belt drive kit

Technical Data:
V-belt pulleys
Large: Ø=125mm
Small: Ø=63mm
Small, eccentric: Ø=63mm
Axle centres: 300mm
V-belt
SPZ, 10mm wide
Belt length: 912mm
Dimensions and Weight
Length x Width x Height: 600x400x170mm (storage system)
Weight: 6kg

9. Damage to gears kit

Technical Data:
Transmission ratio i: 1:3
Centre distance adjustable
Reference profile to DIN 867
Spur toothed gear sets
Gear wheel: 75 teeth on each, m=2mm
Pinion: 25 teeth on each, m=2mm
Helical gear sets
Gear wheel: 75 teeth on each, m=2mm
Pinion: 25 teeth on each, m=2mm
Helix angle: 10°
Dimensions and Weight
Length x Width x Height: 600x400x320mm (storage system)

10. Crank mechanism kit

Technical Data:
Stroke: 50 - 75 - 100mm
Balance mass total
490g, rated for operation with 50mm stroke
Bearing clearance: 0...1mm
Pressure spring
Relaxed length: 170mm
Spring stiffness: r=0,55N/mm
Dimensions and Weight
Length x Width x Height: 600x400x170mm (storage system)
Weight: 8kg

11. Cavitation in pumps kit

Technical Data:
Centrifugal pump
Max. Flow rate at 3300rpm: 17l/min
Max. Head at 3300rpm: 12m
Impeller with 3 blades

Min. Speed for cavitation: 2240rpm (with restriction on intake side)

Tank

Material: HDPE

Capacity: 20L

Manometer

Delivery side: 0...4bar

Intake side: -1...1,5bar

Dimensions and Weight

Length x Width x Height: 600x400x320mm (storage system)

Weight: 16kg

12. Vibrations in fans kit

Technical Data:

Sheet-steel fan rotor

3 blades

5 blades

7 blades

Ø 204mm

Speed: 3000rpm

Protective disk, made of aluminium

Ø 220mm

Dimensions and Weight

Length x Width x Height: 400x300x320mm (storage system)

Weight: 6kg

13. Electromechanical Vibrations Kit & Two Displacement Sensors

Influence of the gap on vibration behaviour

Influence of electromagnetic asymmetry on vibration behaviour

Influence of the load on the level of vibration

Influence of the gap on electromagnetic losses and efficiency

Influence of speed on vibration behaviour

Understanding and interpreting frequency spectra

Use of a computerised vibration analyser

In conjunction with a current measuring probe

Measurement of current consumption per phase

Technical Data:

Asynchronous motor with variable speed

Speed range: 100...6000rpm

Nominal power output: 370w

Eccentricity of armature: 0...0,2mm

Dimensions and Weight

Length x Width x Height: 400x300x320mm (storage system)

Weight: 11kg.

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