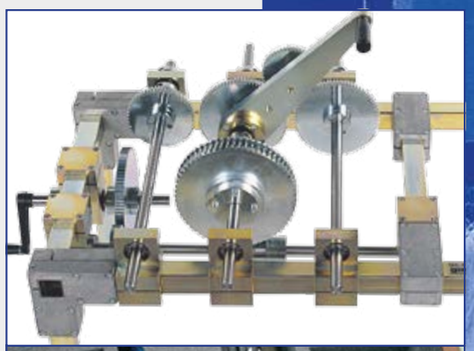
ASSEMBLY PROJECTS



DRIVE ELEMENTS AND GEARS

FITTINGS

PIPING ASSEMBLY

COMPRESSORS

Accompanying instructional material – our policy

We believe that a rounded teaching and training system has to combine hardware (a trainer unit or assembly kit for example) with the accompanying instructional material (technical description, set of drawings, tuition plan, exercises). If the hardware changes, then we update the accompanying documentation as well.

We are not a publishing company so we do not offer the documentation relating to GUNT units as items for separate purchase.

Visit our website www.gunt.de

THE GUNT LEARNING CONCEPTS FOR ASSEMBLY PROJECTS – HOW SPECIALISTS LEARN

How is the concept structured?

THE ASSEMBLY EXERCISES ARE DERIVED FROM FOUR MAIN AREAS

- Drive elements and gears
- Fittings
- Piping systems, pumps
- Compressors

We are dealing with a narrower field of engineering in this section.

Then in the following chapter entitled ‘MAINTENANCE’, we offer more complex, interdisciplinary assembly and maintenance projects that incorporate electrical and electronic features as well as instrumentation and control engineering.

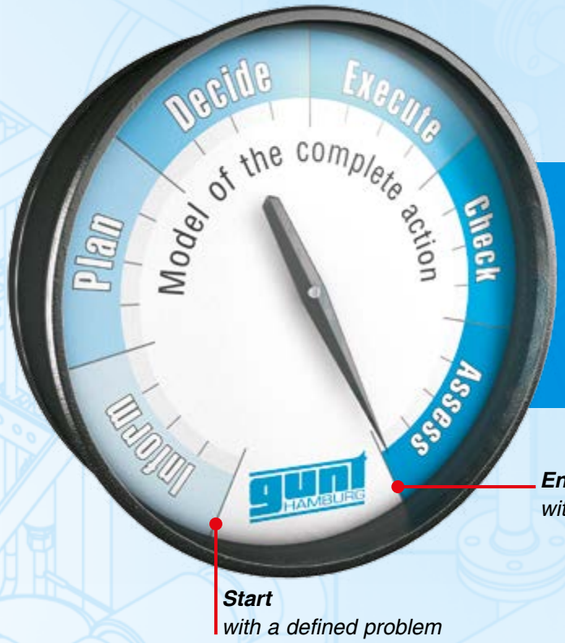
In all areas you will find relatively simply structured exercises as an introduction, as well as more complex and demanding projects.

Inside the assembly shop at GUNT Gerätebau GmbH, where skilled tradesmen and engineers get to grips with tasks that are varied and demanding.
So we know what we’re talking about: apprentices and trainees should develop their skills and abilities with the help of GUNT teaching and training systems.

Didactic criteria

All exercises and projects are ideal for students working together in a team.

Here, a group can work on a project while at the same time pursuing different exercises in parallel, ultimately enabling them to bring together a range of findings.



All the training systems in this series offer an excellent basis for organising hands-on teaching.
The sequence of a complete action – from information, through execution, to assessment – can always be carried out and explained.

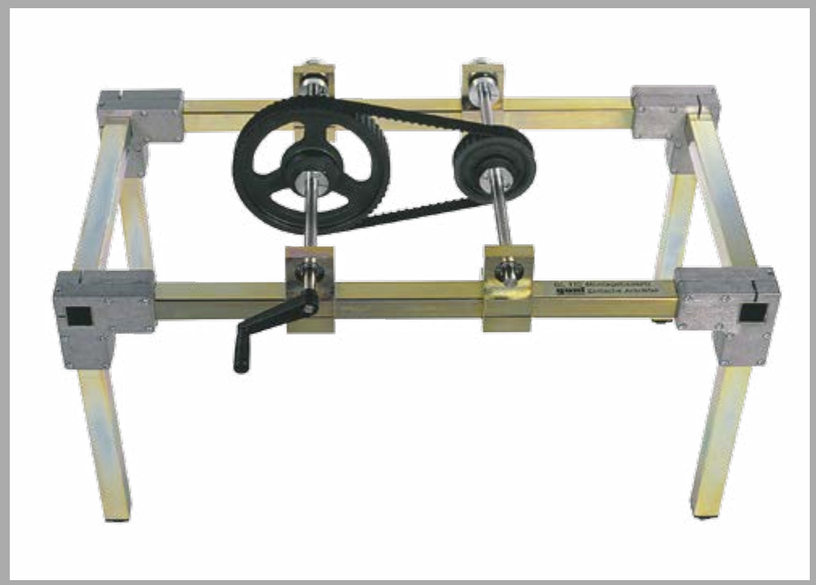
End
with a measurable result for assessment

Start
with a defined problem

Learning goals

To develop a broad knowledge of assembly techniques as a basis for maintenance	To retrieve and apply information from manufacturer’s documentation
To become familiar with machine elements and standard parts	To plan assembly steps and sequences
To identify subassemblies, understand functions, and describe systems	To check and assess work results
Introduction to technical terminology and language	To become familiar with typical tools and jigs
To read and understand engineering drawings	To become familiar with characteristic features of maintenance and repair work

GL 410 Gear Assembly Unit: Simple Drives



*** Flexible and robust assembly system for mechanical drive systems**

*** Practical orientation based on use of standard components**

*** Quick and easy assembly with no jigs and fixtures, just simple tools**

*** Safe drive with hand crank**

*** Comprehensive well-structured instructional material**

Technical Description

This laboratory system is used to introduce the basics of gearing and the correct method of assembling drive elements. The programme of exercises enables familiarisation with six different drive implementation and analysis methods: understanding the brief and the drawing, assembly, setting, adjusting, testing, and making calculations.

The flexibility of the setup and the modularity of the components simplifies experimentation and implementation of the students' own ideas.

A robust tubular steel frame with a square profile and bearing elements provide the accuracy for the setting of precise gearing. All the system components are kept ready to hand and well protected in a storage system.

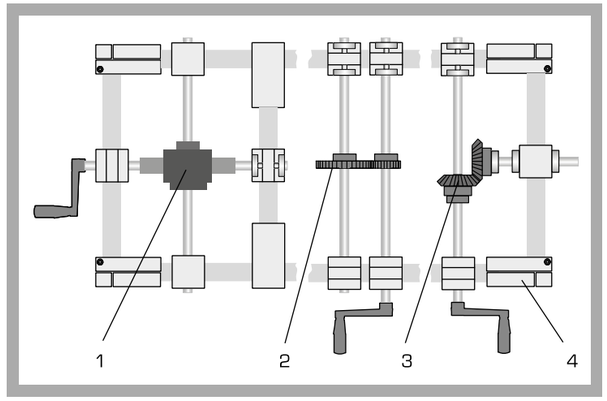
GUNT offers three assembly kits in this product series, each focussing on different aspects: GL 410, GL 420 and GL 430. Each kit is used entirely independently of the other kits within the series.

Learning Objectives / Experiments

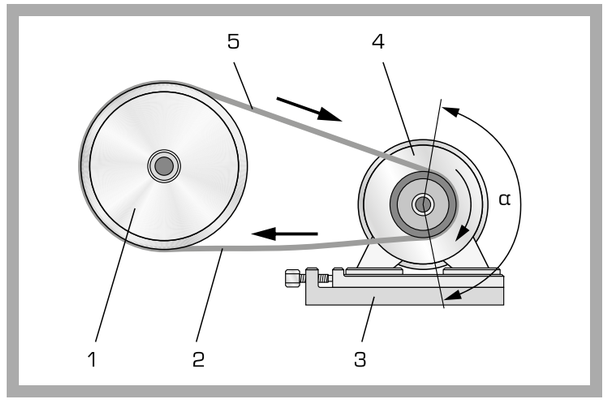
- familiarisation with key components of mechanical drive systems
- basic types of drive
  * simple belt drive
  * simple chain drive
  * simple spur gear drive
  * bevel gear drive
  * worm gear drive
  * rack drive
- calculations on mechanical drives
- practical setup of various drives, linked to simple configuration and alignment exercises
- reading and understanding engineering drawings, familiarisation with technical terminology

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

GL 410 Gear Assembly Unit: Simple Drives



1 worm gear, 2 spur gear, 3 bevel gear set, 4 square steel tube frame



Mode of operation of a belt drive: 1 driven, 2 loose side, 3 slide rail with bolts, 4 drive, 5 load side, α angle of contact

Specification

[1] demonstration and experimentation kit for assembling single drives
[2] simple belt drive
[3] simple chain drive
[4] simple spur gear drive
[5] bevel gear drive
[6] worm gear drive
[7] rack drive
[8] hand operation with crank
[9] usage of standard industrial parts
[10] solid universal frame manufactured from square steel tube

Technical Data

Toothed belt pulleys: z=30, 60
Chain sprockets: z=20, 30, DIN 8192 ISO 10B-1
Spur gears: z=30, 60, m=2mm
Bevel gear pair
- z=30, m=3mm, i=1, angle between axes 90°

Dimensions and Weight

LxWxH: 1000x500x500mm (assembled frame)
Weight: approx. 69kg
LxWxH: 600x400x220mm (storage system)
LxWxH: 600x400x170mm (storage system)

Scope of Delivery

1 base frame
1 crossbar
4x bearing block, single
1 bearing block, double
1 set of drive elements, consisting of
- 2 toothed belt pulleys
- toothed belt
- 2 chain sprockets
- roller chain
- 2 gear wheels
- bevel gear set
- worm gear
- bored worm
- rack
- 2x fixing block with guide bush
- shaft
- 2 shafts with square shaft end
- hand crank
- set of small items (bolts, spacer bushes, clamp rings, reducer bushes, shaft nuts, featherkeys)

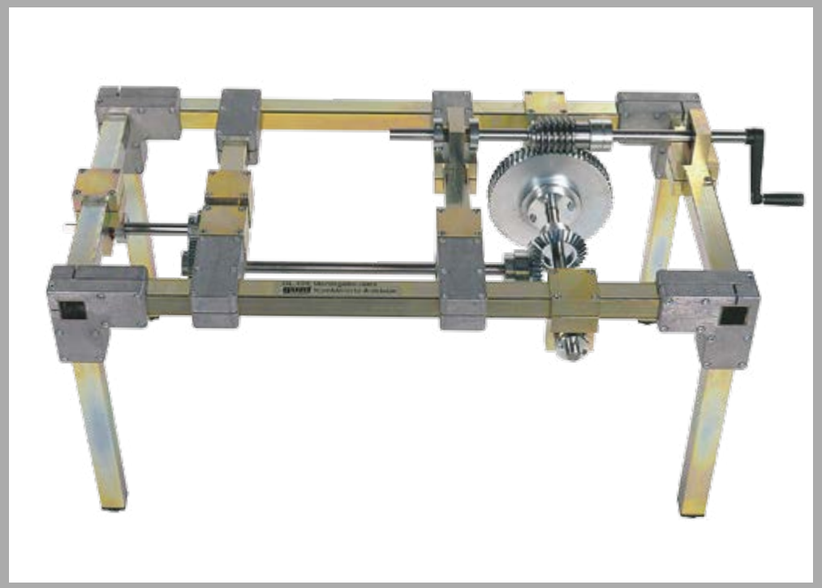
1 set of assembly tools
2 storage systems with foam inlay
1 set of instructional material, consisting of technical description of system, complete set of drawings with individual parts and parts list, description of assembly processes, specimen calculations

Order Details

030.41000	GL 410	Gear Assembly Unit: Simple Drives

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

GL 420 Gear Assembly Unit: Combined Drives



*** Flexible and robust assembly system for mechanical drive systems**

*** Practical orientation based on use of standard components**

*** Quick and easy assembly with no jigs and fixtures, just simple tools**

*** Safe drive with hand crank**

*** Comprehensive well-structured instructional material**

Technical Description

This laboratory system is used to introduce combined drives and their correct assembly. The programme of exercises enables familiarisation with six different drive implementation and analysis methods: understanding the brief and the drawing, assembly, setting, adjusting, testing, and making calculations.

The flexibility of the setup and the modularity of the components simplifies experimentation and implementation of the students' own ideas.

A robust tubular steel frame with a square profile and bearing elements provide the accuracy for the setting of precise gearing. All the system components are kept ready to hand and well protected in a storage system.

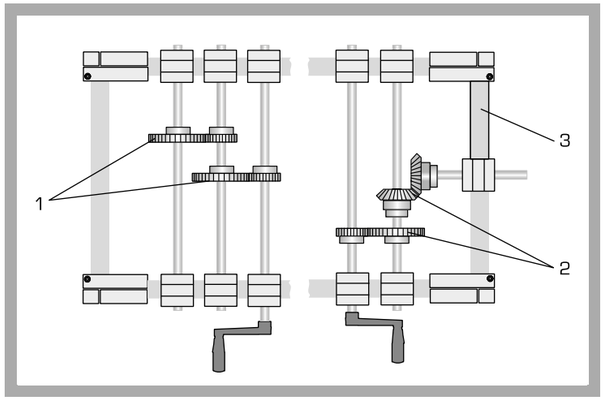
GUNT offers three kits in this product series, each focussing on different aspects: GL 410, GL 420 and GL 430. Each kit is used entirely independently of the other kits within the series.

Learning Objectives / Experiments

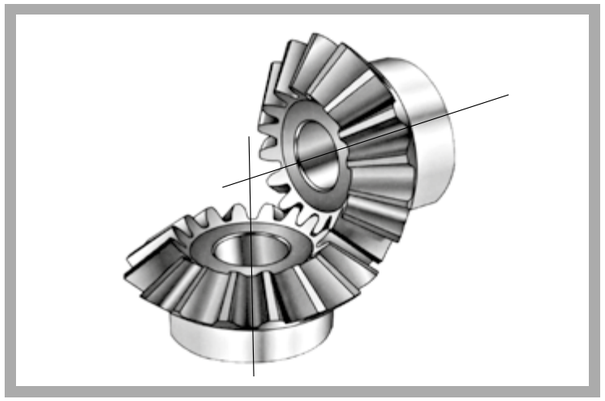
- familiarisation with key components and types of mechanical drive systems
  * dual belt drive
  * chain drive with tensioning sprocket and spur gear transmission
  * dual spur gear drive
  * combined bevel gear and spur gear drive
  * combined worm and bevel gear drive
  * rack drive with spur gear drive
- calculations on mechanical drives
- practical setup of various drives, linked to simple configuration and alignment exercises
- reading and understanding engineering drawings, familiarisation with technical terminology

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

GL 420 Gear Assembly Unit: Combined Drives



1 two-stage spur gear drive, 2 combined spur gear - bevel gear drive, 3 base frame



Bevel gear stage

Specification

[1] demonstration and experimental kit for laying out and assembling multiple and combined drives
[2] dual belt drive
[3] chain drive with tensioning sprocket and spur gear transmission
[4] dual spur gear drive
[5] combined bevel gear and spur gear drive
[6] combined worm gear and bevel gear drive
[7] rack drive with spur gear drive
[8] hand operation with crank
[9] usage of standard industrial parts
[10] solid universal frame manufactured from square steel tube

Technical Data

Toothed belt pulleys: z=30, 32, 48, 60
Chain sprockets: z=20, 30, DIN 8192 ISO 10B-1
Gears: z=30, 36, 50, 60, m=2mm
Bevel gear pair: z=30, m=3mm, i=1, angle between axes 90°

Dimensions and Weight

LxWxH: 1000x500x500mm (assembled frame)
Weight: approx. 91kg
LxWxH: 600x400x120mm (storage system)
LxWxH: 600x400x170mm (storage system)

Scope of Delivery

1 base frame
2x crossbars
8x bearing block, single
1 bearing block, double
1 set of drive elements, consisting of
- 4 toothed belt pulleys
- 2 toothed belts
- 2 sprockets
- roller chain
- 4 gear wheels
- 2x mitre gear set
- worm gear
- bored worm
- rack
- 2x fixing block with guide bush
- shaft
-3 shafts with square shaft end
- hand crank
- set of small items (bolts, nuts, washers, spacer bushes, clamp rings, reducer bushes, featherkeys, etc.)

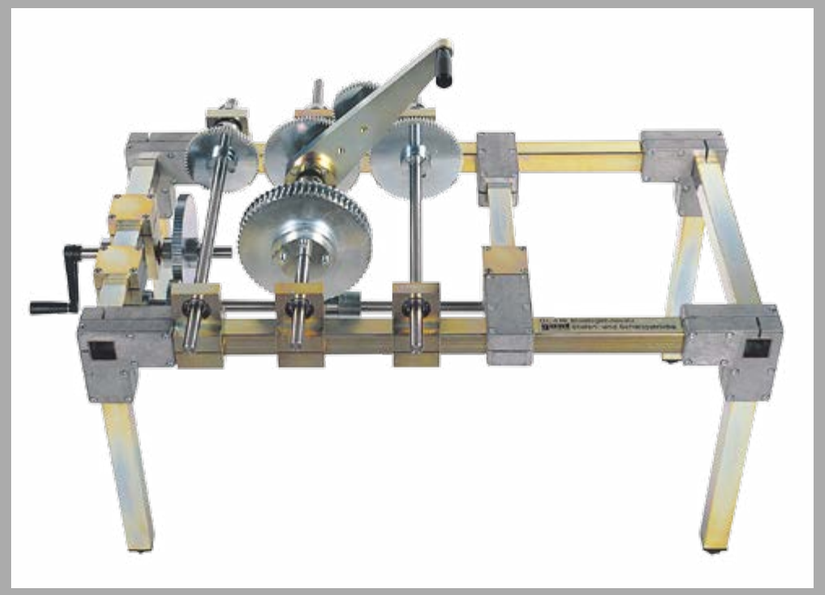
1 set of assembly tools
2 storage systems with foam inlay
1 set of instructional material, consisting of technical description of system, complete set of drawings with individual parts and parts list, description of assembly processes, specimen calculations

Order Details

030.42000	GL 420	Gear Assembly Unit: Combined Drives

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

GL 430 Gear Assembly Unit: Step and Shift Gears



*** Flexible and robust assembly system for mechanical drive systems**

*** Practical orientation based on use of standard components**

*** Quick and easy assembly with no jigs and fixtures, just simple tools**

*** Safe drive with hand crank**

*** Comprehensive well-structured instructional material**

Technical Description

This laboratory system is used to familiarise students with the design and correct assembly of step and shift gears. The programme of exercises enables familiarisation with six different drive implementation and analysis methods: understanding the brief and the drawing, assembly, setting, adjusting, testing, and making calculations.

The flexibility of the setup and the modularity of the components simplifies experimentation and implementation of the students' own ideas.

A robust tubular steel frame with a square profile and bearing elements provide the accuracy for the setting of precise gearing. All the system components are kept ready to hand and well protected in a storage system.

The multi-step and shift gears in GL 430 are based on those of a conventional lathe. The step gear unit is very similar to the primary drive on a pillar drill.

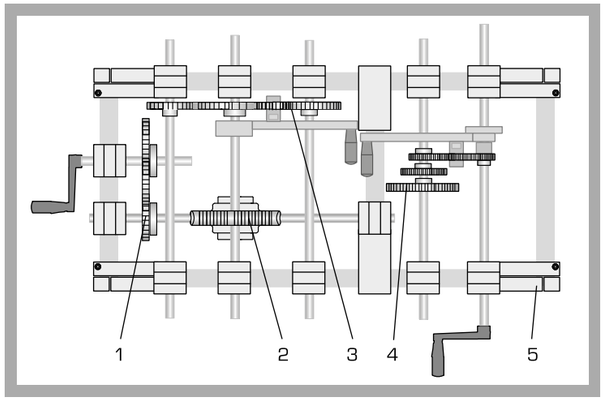
GUNT offers three kits in this product series, each focussing on different aspects: GL 410, GL 420 and GL 430. Each kit is used entirely independently of the other kits within the series.

Learning Objectives / Experiments

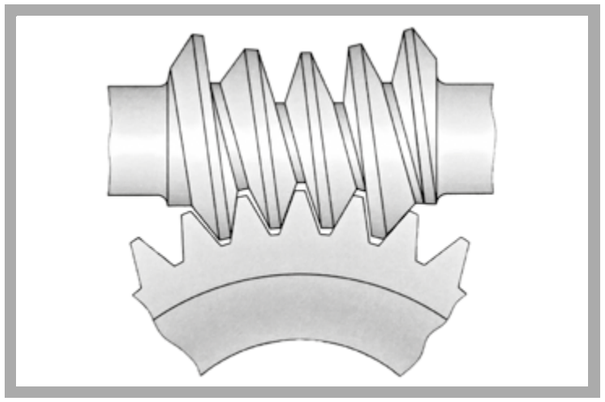
- familiarisation with key components and types of mechanical drive systems
  - * cone pulley drive
  - * sliding gear unit
  - * quick change gear unit
  - * tumbler gear unit
  - * change gear train
  - * cam box (drop worm)
- calculations on mechanical drives
- practical setup of various drives, linked to simple configuration and alignment exercises
- reading and understanding engineering drawings, familiarisation with technical terminology

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

GL 430 Gear Assembly Unit: Step and Shift Gears



1 spur gear, 2 worm gear, 3 change gear train, 4 quick change gear, 5 base frame



Worm gear unit

Specification

[1] demonstration and experimental kit for laying out and assembling 6 different step and shift gear units
[2] cone pulley drive
[3] sliding gear drive
[4] quick change gear
[5] tumbler gear
[6] change gear train
[7] cam box (drop worm)
[8] hand operation with crank
[9] usage of standard industrial parts
[10] solid universal frame manufactured from square steel tube

Technical Data

Spur gears
- z=24, 30, 36, 40, 45, 50, 60, 76, 80, 95
- m=2mm

Worm drive
- worm: z=6
- worm gear wheel: z=62, m=3,15mm

Dimensions and Weight

LxWxH: 1000x500x500mm (assembled frame)
Weight: approx. 80kg
LxWxH: 600x400x120mm (storage system)
LxWxH: 600x400x170mm (storage system)

Scope of Delivery

1 base frame
1 crossbar
8x bearing block, single, 1x bearing block, double
1x pendulum ball bearing, 1x drop worm
1 set of drive elements, consisting of
- 6 V-belt pulleys, 1 V-belt
- worm gear, bored worm
- 10 gear wheels
- swing lever, reversing lever, gear change mechanism
- 3x bearing flange
- change gear axle
- 3x shaft
- 2 shafts with square shaft end
- hand crank, 4 handles
- set of small items (bolts, nuts, washers, spacer bushes, clamp rings, reducer bushes, featherkeys, pressure springs, ball bearings, pins etc.)

1 set of assembly tools
2 storage systems with foam inlay
1 set of instructional material, consisting of technical description of system, complete set of drawings with individual parts and parts list, description of assembly processes, specimen calculations

Order Details

030.43000 GL 430 Gear Assembly Unit: Step and Shift Gears

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 170 Assembly Exercise: Shaft with Journal Bearings

The illustration shows the tool box with parts set. A fully assembled journal bearing is shown in the foreground.

*** Practical exercise based on the assembly of a shaft / journal bearings arrangement**

*** Comprehensive and well-structured instructional material**

Technical Description

Journal bearings execute a sliding motion between a bearing journal and a bearing shell. This sliding motion is usually lubricated by an intermediate medium. The damping effect of the lubricant in the bearing gap means journal bearings run particularly smoothly and quietly. Vibration and shock impact from gear wheels or crank drives are also damped by journal bearings. They are widely used in piston engines, punches and presses as they are insensitive to high shock loads.

The journal bearings in MT 170 are grease-lubricated. Grease lubrication allows for a simple bearing construction. MT 170 consists of a ground steel shaft and two horizontally split pedestal bearings. The upper bearing shell includes a lubrication fitting with a female thread to which a Stauffer lubricator can be screw-fitted by way of an intermediate pipe to supply the bearing with lubricant. The face of the upper bearing shell, which is not subjected to load, contains a flat lubricating slot. This distributes the grease over the full width of the bearing. The grease serves not only as a lubricant but also seals the bearing against external dirt and foreign bodies.

The practice kit MT 170 forms part of the GUNT assembly, maintenance and repair practice line designed for training at technical colleges and in company training centres. A close link between theory and practice is key to the learning content.

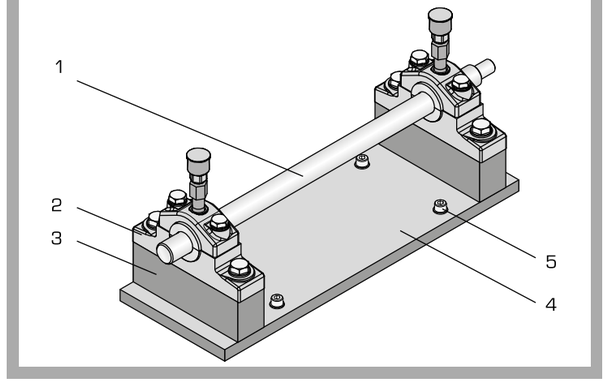
MT 170 enables a simple journal bearing to be assembled and disassembled. Students become familiar with all the components and their modes of operation. The parts are clearly laid out and well protected in a tool box. The accompanying material details the individual steps involved in assembly, and provides additional information on the areas of application, mode of operation and design of the journal bearings.

Learning Objectives / Experiments

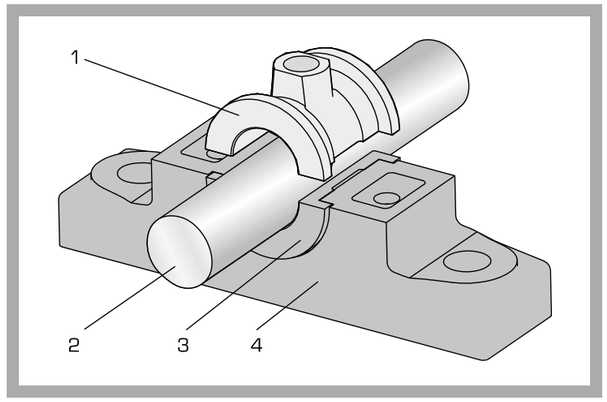
- design and function of a simple journal bearing
- assembly and disassembly, including for the purposes of maintenance and repair
- measuring the bearing play
- checking the alignment
- reading and understanding engineering drawings and operating instructions
- investigating the running properties of the journal bearing (together with MT 172)

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

MT 170 Assembly Exercise: Shaft with Journal Bearings



1 steel shaft, 2 pedestal bearing, 3 spacer, 4 base plate, 5 bolt to fix MT 170 into MT 172



1 upper bearing shell, 2 shaft, 3 bearing block, 4 lower bearing shell

Specification

[1] learning concept for assembly exercises on a shaft with journal bearings
[2] horizontally split pedestal bearing according to DIN 505, grease lubricated
[3] steel shaft, hardened and ground
[4] 2 pedestal bearings with split shells
[5] set of plastic strips to measure bearing play
[6] checking bearing alignment using touch-up paste
[7] complete assembly tool kit
[8] journal bearing parts and tools housed in a sheet-steel tool box
[9] The kit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Shaft
D=25mm, shaft journal for coupling: D=16mm
Materials
- pedestal bearings, bearing covers: grey cast iron
- bearing shells: gunmetal brass according to DIN 8.221
- shaft: hardened, ground steel
- stauffer lubricator: steel

Dimensions and Weight

LxWxH: 640x230x230mm (box)
Weight: approx. 45kg

Scope of Delivery

1 complete set of journal bearing parts
1 metal bellows coupling to join to MT 172
1 base plate
1 set of tools, consisting of
- 1 set of plastic strips to measure bearing play, 0,10...0,25mm
- 1 soft-faced hammer
- 2 open-end wrenches: size 17, 19
1 set of bolts and washers
1 tube of touch-up paste
1 tube of multi-purpose grease
1 rectangular box for small parts
1 sheet-steel tool box with foam inlay
1 set of instructional material, consisting of technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly processes, also in relation to repair operations

Order Details

051.17000 MT 170 Assembly Exercise: Shaft with Journal Bearings

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 171 Assembly Exercise: Hydrodynamic Journal Bearing

The illustration shows the tool box with parts set and tool compartment insert. A fully assembled journal bearing as is assembled from the parts is shown in the foreground.

*** Practical exercise based on the assembly of a hydrodynamic journal bearing**

*** Comprehensive and well-structured instructional material**

Technical Description

Journal bearings execute a sliding motion between a bearing journal and a bearing shell. This sliding motion is usually lubricated by an intermediate medium.

Hydrodynamic journal bearings give wear-free continuous duty for large diameters at high rotational speeds, and are suitable for high and shock-type loading. They are usually constructed as split bearings. Frictional heat occurring during operation must be dissipated by the lubricant.

MT 171 is a horizontally split hydrodynamic pedestal journal bearing. The bearing shells are supported from a face in the spherical bearing housing so as to ensure uniform transfer of any forces that arise to the bottom housing. The journal bearing is lubricated by a loose lubricating ring. Standard commercially available mineral oils can be used.

An auxiliary shaft is supplied together with the bearing as an aid to assembly and functional testing.

The practice kit MT 171 forms part of the GUNT assembly, maintenance and repair practice line designed for training at technical colleges and in company training centres.

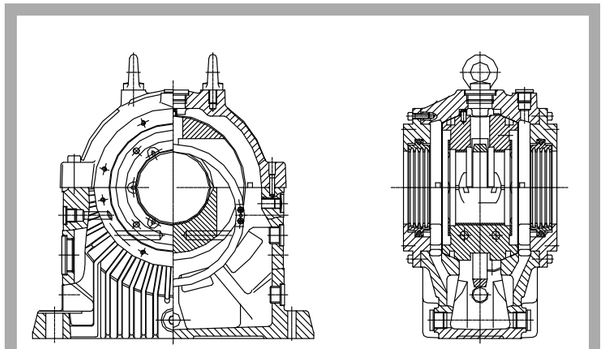
A close link between theory and practice is key to the learning content. MT 171 enables a hydrodynamic journal bearing to be assembled and disassembled. Students become familiar with all the components and their modes of operation. The parts are clearly laid out and well protected in a tool box. The accompanying material details the individual steps involved in assembly, and provides additional information on the areas of application, mode of operation and design of the journal bearing.

Learning Objectives / Experiments

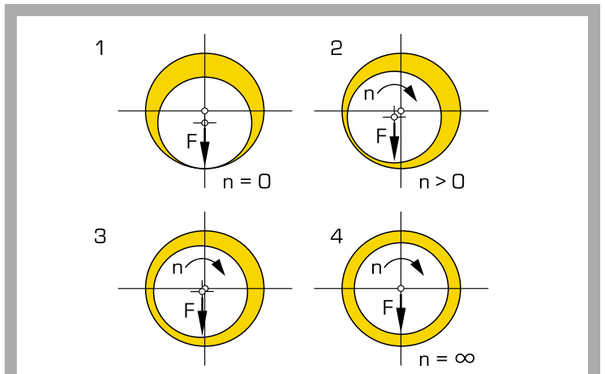
- design and function of a hydrodynamic journal bearing
- principles of lubrication and sealing elements
- assembly and disassembly, including for the purposes of maintenance and repair
- reading and understanding engineering drawings and operating instructions

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

MT 171 Assembly Exercise: Hydrodynamic Journal Bearing



Sectional drawing of a hydrodynamic journal bearing



Operation of a hydrodynamic journal bearing: build-up of a load-bearing oil film at increasing speed

Specification

[1] learning concept for assembly exercises on an upright hydrodynamic journal bearing
[2] journal bearing according to DIN 31690
[3] stainless steel drive shaft
[4] oil lubrication
[5] floating edge seal to seal the face of the shaft
[6] sealing of contact faces of housing halves with non-setting sealing compound
[7] complete assembly tool kit
[8] journal bearing parts and tools housed in a sheet-steel tool box
[9] The kit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Bearing bore: D=80mm
Drive shaft: nominal diameter: D=80mm

Materials
- bearing housing: grey cast iron
- bearing shells: steel supports, coated with white metal
- seal: ultra-heat-resistant, fibre-reinforced plastic
- shaft: stainless steel

Dimensions and Weight

LxWxH: 690x360x312mm (box)
Weight: approx. 60kg

Scope of Delivery

1 complete set of hydrodynamic journal bearing parts
1 drive shaft
1 set of tools, consisting of:
- 1 set of Allen keys, size 3, 5, 10, 22
- 1 hammer
- 1 punch, 4mm

1 tube of non-setting sealing compound
1 rectangular box for small parts
1 sheet-steel tool box with foam inlay
1 set of instructional material, consisting of:
technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly processes, also in relation to repair operations

Order Details

051.17100 MT 171 Assembly Exercise: Hydrodynamic Journal Bearing

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 152 *Assembly Exercise: Spur Gear*

*** Practical exercise based on the assembly of a spur gear unit**

*** Broad scope of learning with interdisciplinary problems**

*** Comprehensive and well-structured instructional material**

Technical Description

Gears transmit rotational movements. They adapt the torques and speeds of a consumer drive according to demand.

The MT 152 is a spur gear unit with helical gear wheels. The gear is single-stage, and has a fixed transmission ratio (fixed gear unit). It is a standalone gear unit, i.e. a self-contained transmission in its own gear case. Self-contained gear units are usually arranged between the motor and the machine, or are used as installation kits in machines. By contrast, open-running gear wheel pairs forming part of a machine are termed non-self-contained gears.

Helical gear wheels run more smoothly and quietly than spur toothed gears because the gear teeth intermesh gradually and multiple teeth are engaged. They are suitable for higher speeds, and can withstand greater loading than comparable spur toothed gears.

The MT 152 training unit serves as an introductory project to the field of assembly techniques. The assembly and disassembly processes can easily be completed within standard lesson times. Basic tools, all supplied with the kit, are required for assembly.

The unit is of most benefit in teaching if small groups of 2 to 3 students work independently. The group has a defined task to perform, with clear assignments to complete.

The comprehensive instructional material is oriented to practical needs. This includes a complete set of drawings with a general arrangement drawing, parts list and single part drawings.

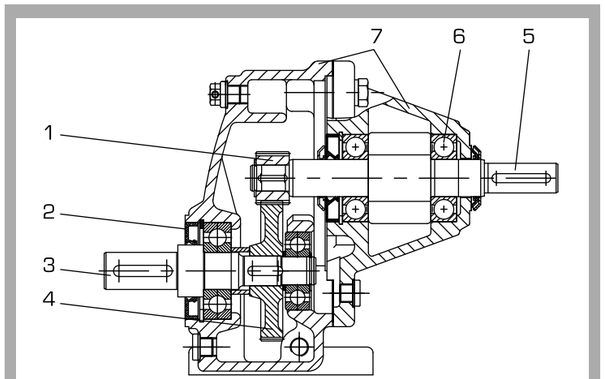
Learning Objectives / Experiments

- design and function of a spur gear, with helical gear wheels
- planning and presentation of the assembly process
- assembly and disassembly, including for the purposes of maintenance and repair
- reading and understanding engineering drawings
- dimensioning exercises, gauging of parts
- familiarisation with various machine elements: ball bearings, shaft seals
- familiarisation with assembly aids and jigs
- material selection criteria

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

MT 152 *Assembly Exercise: Spur Gear*

The illustration shows the completely assembled spur gear unit.



1 drive shaft, 2 ball bearings, 3 housing parts, 4 pinion, 5 shaft seal, 6 power take-off shaft, 7 gear wheel

Specification

[1] assembly exercise for engineering training
[2] disassembled spur gear with set of small parts and 4 assembly jigs, housed in a sturdy metal case
[3] helical spur gear wheels
[4] gear unit consisting of input housing, pedestal housing, input and output shafts, input gear and output pinion, as well as bearings
[5] the kit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Gear unit dimensions without shaft couplings
- LxWxH: 160x135x175mm

Transmission ratio
- pinion: number of teeth: z=24, real pitch module: m=1mm
- gear wheel: number of teeth: z=68, real pitch module: m=1mm
- transmission ratio: i=2,83

Max. output torque: 54Nm at 494min^{-1}
Materials
- housing: grey cast iron
- shafts: heat treated steel
- spur gears: case-hardened alloy steel

Shaft couplings
- drive: DxL: 16x40mm
- power take-off: DxL: 20x40mm

Dimensions and Weight

LxWxH: 600x450x180mm (case)
Weight: approx. 18kg

Scope of Delivery

1 complete set of spur gear parts
1 box for small parts (bolts, washers, gaskets, circlips, ball bearings, feather keys)
1 set of assembly tools, consisting of
- 4 assembly jigs
- 1 soft-faced hammer
- 2 sets of circlip pliers (DIN 471, DIN 472)
- Allen key, size 5
- 2 combination wrenches, size 10, 13
- screwdriver
- bearing puller

1 case with foam inlay
1 set of instructional material, consisting of technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly sequences, also in relation to repair operations

Order Details

051.15200 MT 152 Assembly Exercise: Spur Gear

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 110.02 Assembly Exercise: Spur Wheel / Worm Gear Mechanism

The illustration shows the tool box with parts set. The compartment insert for tools and small parts is shown in the foreground.

*** Practical exercise on the assembly of a modern industrial gear unit, using simple tools and jigs**

*** Broad scope of learning with interdisciplinary problems**

*** Comprehensive and well-structured instructional material**

Technical Description

The MT 110.02 two-stage gear unit kit contains all the parts required to construct the gear unit. It consists of a spur gear stage as its input, with a downstream worm gear stage (multistage gear combination). The fit seatings of the gear unit are designed to allow the complete assembly process to be carried out by hand. All parts are clearly laid out and well protected in a sheet-steel tool box. Small parts are supplied in a box with a transparent lid.

This assembly exercise permits wide-ranging and, above all, interdisciplinary work to be carried out by the students. The project unit is particularly well suited to action-based teaching. This, in conjunction with students working in an independent capacity, as well as developing teamworking skills, ensures that the unit serves as an excellent learning tool.

The modern style used in the instructional materials outlines comprehensive and in-depth technical information which forms the basis for the teaching process.

The teaching material includes a complete set of drawings with parts lists, single part drawings, an exploded view and assembly drawing. All drawings are to standard, and dimensioned in line with production requirements. Another very useful feature is the extensive set of transparencies for the overhead projector.

A tool kit is also included. The fully assembled gear unit can be function tested together with the optionally available MT 172 unit.

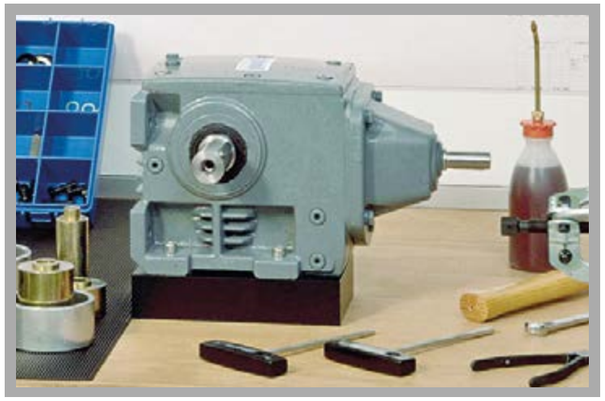
Learning Objectives / Experiments

- design and function of a multistage gear combination
- reading and understanding engineering drawings
- familiarisation with component and assemblies, their design features and functions
- dimensioning exercises, gauging of parts
- work planning, particularly planning and presentation of the assembly process
- familiarisation with assembly aids and jigs
- assembly exercises: component and complete unit assembly
- analysis of faults and damage, in conjunction with maintenance and repair steps
- material selection criteria

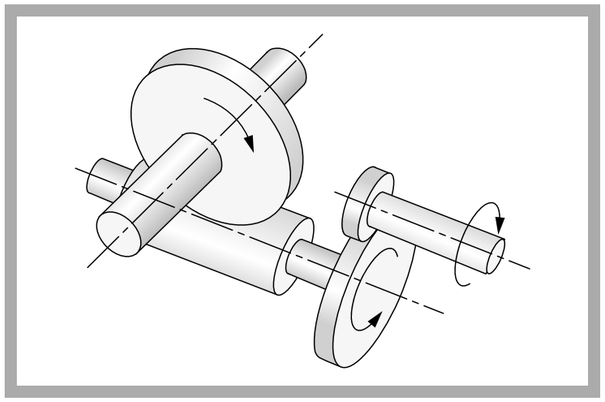
In conjunction with MT 172
- functional testing of the assembled gear unit

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

MT 110.02 Assembly Exercise: Spur Wheel / Worm Gear Mechanism



The illustration shows the fully assembled multistage gear combination.



Principle of operation of the two-stage spur wheel worm gear mechanism

Specification

[1] assembly exercise for engineering training
[2] complete, disassembled multistage gear combination with small parts set and 12 assembly jigs in a box
[3] spur gear stage with helical gear wheels
[4] worm gear stage with cylindrical worm and globoid wheel
[5] gear unit consisting of drive housing, worm pedestal housing, power take-off and drive shafts, spur gear stage and worm gear stage
[6] the kit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Gear unit dimensions without shaft couplings
- LxWxH: 282x138x188mm, approx. 22kg

Transmission ratios
- spur gear stage: i=2,83
- worm gear stage: i=12,33
- total transmission ratio: i=34,89

Spur gear stage
- pinion: number of teeth: z=24, real pitch module: m=1mm
- gear wheel: z=68, m=1mm

Worm gear stage
- worm: z=3
- worm gear wheel: z=37, m=2,578mm

Max. output torque: 212Nm

Materials
- housing: grey cast iron
- shafts: heat treated steel
- spur gear wheels, worm: case-hardened alloy steel

Shaft couplings
- drive: DxL: 16x40mm
- power take-off: DxL: 30x60mm

Dimensions and Weight

LxWxH: 700x380x320mm (box)
Weight: approx. 38kg

Scope of Delivery

1 complete set of multistage gear combination parts
1 box for small and loose parts (e.g. bolts, circlips, feather keys, washers)
1 set of gaskets
12 assembly jigs
1 set of assembly / disassembly tools
1 sheet-steel tool box with foam inlay
1 set of instructional material, consisting of technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly sequences, set of transparencies for overhead projector

Order Details

051.11002	MT 110.02	Assembly Exercise: Spur Wheel / Worm Gear Mechanism

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 172 Alignment of Drives, Shafts and Gears

The illustration shows MT 172 together with a combination gear unit assembled from parts set MT 110.02.

*** Assembling and aligning drive elements**

*** Understanding a wide range of mechanical drives**

*** Functional testing of completed GUNT assembly projects**

Technical Description

The units MT 170 (shaft with journal bearings), MT 110 and MT 110.02 (combination gear units) are tested with unit MT 172. The assembled element system - journal bearing or gear unit - is mounted on the MT 172 test bed. Here, the complete system is properly assembled, with particular regard to the alignment of the system components. A successfully completed assembly project can then be examined in operation with a formal final test. Parameters examined during test procedure are; running noise, heat generation, vibration or leakage.

MT 172 includes a single-phase asynchronous motor drive, a magnetic particle brake with adjustable braking torque, and a rigid machine bed with T-slots on which the motor and the drive element under test are mounted. The T-slots allow the installed length to be varied, and therefore can be easily adapted to the drive element. Two couplings connect the element system to the motor and the brake. The students must align the connections between the motor and the element system, and between the element system and the brake. The controls are on the switch box. The braking torque is set here using a potentiometer.

The exciter current of the magnetic particle brake serves as a measure of the braking torque, and is displayed in digital form. Removable guards protect the couplings.

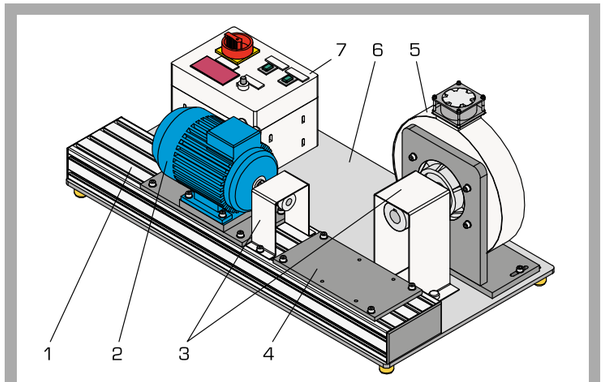
Learning Objectives / Experiments

In conjunction with MT 170 and MT 110.02
- assembling and aligning drive systems
- planning and execution of final testing
  * on a spur wheel/worm gear mechanism (MT 110.02)
  * on a journal bearing-supported shaft (MT 170)
- familiarisation with mechanical and electrical drive elements and their functions

In conjunction with combination gear unit MT 110.02
- checking gear functionality after assembly using a load test
- running of the gear under variable load
  * assessment of running noise
  * checking for heat build-up
  * checking for leaks

In conjunction with MT 170 - shaft with journal bearings
- running properties of a journal bearing

MT 172 Alignment of Drives, Shafts and Gears



1 machine bed, 2 drive motor, 3 coupling guard, 4 combination gear unit mounting plate, 5 magnetic particle brake, 6 base plate with flexible elements for vibration damping, 7 switch box with displays and controls

The illustration shows MT 172 together with the journal bearing-supported shaft MT 170.

Specification

[1] tester for functionality testing mechanical drive systems: journal bearing-supported shaft, combination gear unit
[2] single-phase asynchronous motor with metal bellows coupling
[3] externally vented magnetic particle brake with claw clutch, braking power adjustable by potentiometer
[4] T-slot aluminium profile for adjustable mounting of drive components
[5] switch box with controls and digital display of exciter current
[6] coupling guards
[7] the unit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Drive motor
- 4-pole asynchronous motor
- max. power output: 0,55kW
- speed: 1400min^{-1}

Magnetic particle brake with fan, and temperature sensor
- nominal braking torque at exciter current 0... 0,4A: 0...45Nm
- max. braking torque at 1A: 110Nm
- bi-metallic strip temperature protection: 70°C

Machine bed manufactured from aluminium with T-slots
- installation space: LxW: 640x160mm
- slot spacing: 40mm
- for M8 sliding blocks

Dimensions and Weight

LxWxH: 950x500x450mm
Weight: approx. 75kg

Required for Operation

230V, 50/60Hz, 1 phase

Scope of Delivery

1 drive motor with electrical control housing on base plate
1 magnetic particle brake on base plate
2 claw couplings
1 metal bellows clutch
1 gear base plate
1 set of bolts, slot nuts, washers
1 set of shims
1 instruction manual

Order Details

051.17200 MT 172 Alignment of Drives, Shafts and Gears

2E a division of G.U.N.T Gerätebau GmbH, P.O.Box 1125, D-22885 Barsbüttel, t +49 (40)67 08 54-0, f +49 (40)67 08 54-42, E-mail sales@gunt.de
We reserve the right to modify our products without any notifications. **Visit our Websites: www.gunt.de | www.gunt2e.de**

MT 110 Assembly Station: Spur Wheel / Worm Gear Mechanism

*** Fully equipped mobile teaching station for demonstration purposes, providing an introduction to assembly techniques using an industrial gear unit as an example**

*** Comprehensive and well-structured instructional material**

*** Learning in a practical environment**

*** Highly suitable for developing interdisciplinary technical understanding**

Technical Description

Gears transmit rotational movements. They adapt the torques and speeds of a consumer drive according to demand. MT 110 deals with a fixed gear unit. The gear unit comprises a worm gear with an upstream spur gear stage. Combining the two types of gear in a single box enables high transmission ratios to be attained at high levels of efficiency in a compact space. Worm gears are normally deployed to gear down, and are mostly self-locking. Typical applications include motor vehicle wiper blades, escalators, and cable winches.

The mobile workstation MT 110 forms part of the GUNT assembly, maintenance and repair practice range designed for training at technical colleges and in company training centres. The station includes everything required to provide students with an introduction to a wide range of demanding assembly projects. The drawers in the trolley cabinet contain a disassembled combination gear unit and the tools, assembly aids, small parts and gaskets required for assembly. A second fully functional combination gear unit, permanently mounted to the workbench, can be used for demonstration purposes. This enables components to be compared directly with the complete system. Large-format drawings suitable for workshop practice can be attached to the display board at the rear of the trolley. All steps can be demonstrated to, and then performed by, the students themselves. The comprehensive and clearly structured instructional material, which includes a set of drawings, sets out the individual assembly steps in detail and provides additional information on the areas of application, mode of operation and design of the assemblies.

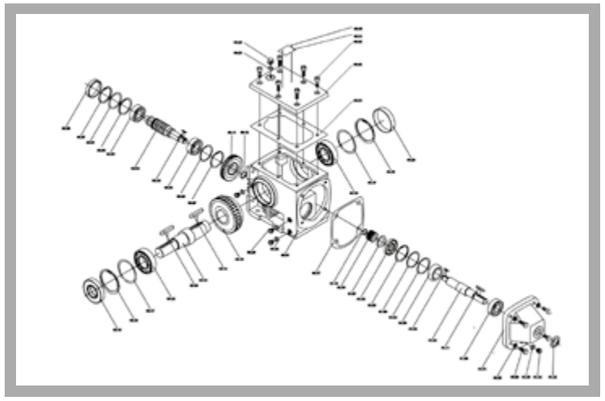
Learning Objectives / Experiments

- design and function of a combination gear unit
- reading and understanding engineering drawings
- familiarisation with components and assemblies, their design features and functions
- dimensioning exercises, gauging parts
- work planning, in particular planning and presentation of the assembly process
- familiarisation with assembly aids and jigs
- assembly exercises: assembly of modules and complete units
- analysis of faults and damage, in conjunction with maintenance and repair steps
- material selection criteria

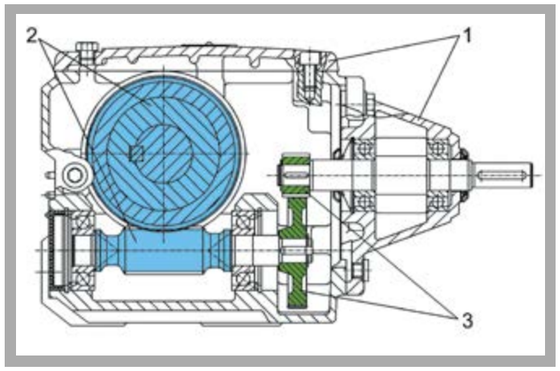
In conjunction with MT 172
- function testing of the assembled gear unit

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

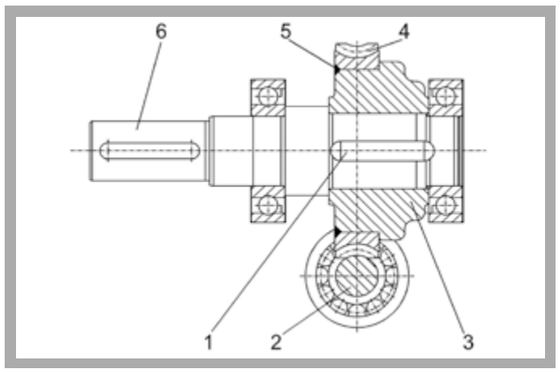
MT 110 Assembly Station: Spur Wheel / Worm Gear Mechanism



The illustration shows a clear exploded drawing which the students can use as an aid to assembling the gear unit. It is designed to be put up on the display board at the rear of the workshop trolley.



Sectional drawing of the combination gear unit: 1 housing function group, 2 worm gear stage function group, 3 spur gear stage function group



Worm gear stage: 1 feather key, 2 worm, 3 hub, 4 worm gear rim, 5 weld seam 6 power take-off shaft

Specification

[1] assembly project for engineering training
[2] 2 combination gear units: 1x set of components for assembly, 1x assembled, mounted on trolley as demonstrator
[3] spur gear stage with helical gear wheels
[4] worm gear stage with cylindrical worm and globoid wheel
[5] workshop trolley with drawing display board at rear, built-under cabinet with 3 lockable drawers and vice with 115mm jaw width
[6] assembly kit, tool kit, assembly aids, accessories and gaskets as well as instructional material contained in built-under cabinet
[7] the assembly station forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Gear unit dimensions without shaft couplings
- LxWxH: 282x138x188mm, approx. 22kg

Transmission ratios
- spur gear stage: i=2,83
- worm gear stage: i=12,33
- total transmission ratio: i=34,89

Spur gear stage
- pinion: number of teeth: z=24, real pitch module: m=1mm
- gear wheel: z=68, m=1mm

Worm gear stage
- worm: z=3; worm gear wheel: z=37, m=2,578mm

Max. output torque: 212Nm at 1.400min^{-1}

Materials
- housing: grey cast iron
- shafts: heat treated steel
- spur gear wheels, worm: case-hardened alloy steel

Shaft couplings
- drive: DxL: 16x40mm
- power take-off: DxL: 30x60mm

Dimensions and Weight

LxWxH: 1.520x750x1.850mm (trolley)
Weight: approx. 150kg

Scope of Delivery

1 workshop trolley with rear drawing display board and built-under cabinet
1 working combination gear unit
1 combination gear unit in parts
1 set of assembly tools and jigs
1 set of small parts and gaskets
1 set of instructional material, consisting of technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly sequences, set of tranparencies for overhead projector

Order Details

051.11000 MT 110 Assembly Station: Spur Wheel / Worm Gear Mechanism

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 154 Assembly Exercise: Shut-off Valve

*** Practical exercise based on the assembly of a shut-off valve**

*** Broad scope of learning with interdisciplinary problems**

*** Comprehensive and well-structured instructional material**

Technical Description

Shut-off valves of the type included in the MT 154 unit are used to shut-off and restrict the flow of media. They must be capable of total flow shut-off. The closing of the valve should be such that the volumetric flow does not suddenly drop to zero so as to prevent shock loads. The valve taper is moved by the spindle and ensures a metallic seal against the seating ring pressed into the housing. The spindle is sealed by a packing gland. The joint between the housing and the clamp cover is sealed by a flat seal.

The MT 154 project unit presents an introduction exercise to the area of assembly techniques. The assembly and disassembly processes can easily be completed within standard lesson times. Basic tools, all supplied with the kit, are required for assembly.

The unit is of most benefit in teaching if small groups of 2/3 students work independently. The group has a defined task to perform, with clear assignments to complete.

The comprehensive instructional material is oriented to practical needs. It includes a complete set of drawings with a general arrangement drawing, parts list and individual part drawings.

Together with the hydraulic valves and fittings test stand MT 162, the assembled valve can be subjected to a pressure test.

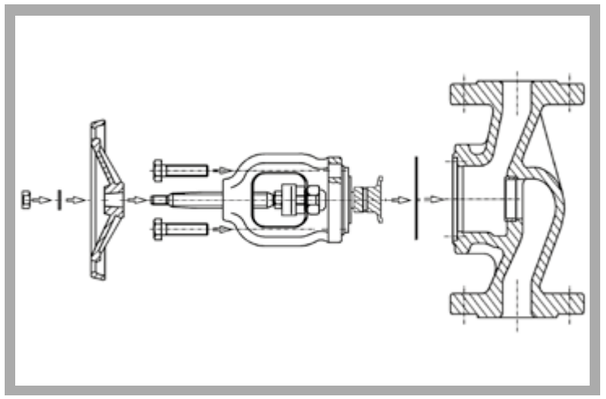
Learning Objectives / Experiments

- design and function of a shut-off valve
- assembly and disassembly, including for the purposes of maintenance and repair
- reading and understanding engineering drawings
- planning and presentation of the assembly process
- familiarisation with various machine elements: thread mechanism, seals, packing gland
- material selection criteria
- leak testing (together with the hydraulic valves and fittings test stand MT 162)

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

MT 154 Assembly Exercise: Shut-off Valve

The illustration shows the shut-off valve fully assembled.



Shut-off valve assembly drawing

Specification

[1] assembly exercise for engineering training
[2] shut-off valve PN 16 as parts set, with associated set of small parts, in a sturdy case
[3] shut-off valve consisting of housing, hand wheel, clamp cover, packing gland frame, taper and spindle
[4] spindle sealing based on the gland principle
[5] the kit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Shut-off valve with flange connections:
- DN25
- PN16
- stroke: 13mm
- housing, hand wheel, clamp cover, packing gland frame: grey cast iron
- taper, seating ring, spindle, ring segment etc.: stainless steel

Dimensions and Weight

LxWxH: 600x450x180mm (case)
Weight: approx. 16kg

Scope of Delivery

1 complete set of shut-off valve parts
1 box for small parts (bolts, washers, nuts, gaskets)
1 set of assembly tools, consisting of:
- 3 open-end wrenches: size 13, 16, 22
- soft-faced hammer
- punch

1 case with foam inlay
1 set of instructional material, consisting of: technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly sequences, also in relation to repair operations

Order Details

051.15400 MT 154 Assembly Exercise: Shut-off Valve

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 156 Assembly Exercise: Wedge Gate Valve and Angle Seat Valve

The illustration shows the tool box with parts sets and tools. In the foreground the valves and fittings as they are assembled from the parts sets.

*** Practical exercise based on the assembly of a wedge gate valve and an angle seat valve**

*** Comprehensive and well-structured instructional material**

Technical Description

Wedge gate valves are used as fittings for water, water vapour, oil and other non-aggressive liquids. Operating temperatures of up to 200°C are possible. Wedge gate valves in this design are operated by a hand-wheel turned spindle. During closing, the slider is pushed by the spindle nut into the sealing rings in the housing.

Angle seat valves are the typical fittings used in drinking water pipes. Angle seat valves are also used in many areas of industry. They are designed for neutral fluids and gaseous media. Stainless steel versions are suitable for mildly and highly aggressive media. The valves can be used for high flow rates, and are non-sensitive to lightly contaminated and high-viscosity media. The valve spindle is usually arranged at a 45° angle to the direction of flow. Angle seat valves generate substantially lower pressure loss than screw down valves or corner valves owing to the less tortuous flow path of the fluid.

The MT 156 practice kit forms part of the GUNT assembly, maintenance and repair practice line designed for training at technical colleges and in company training centres. A close link between theory and practice is key to the learning content.

MT 156 enables two typical industrially relevant valves and fittings to be assembled and disassembled. Students become familiar with all the components and their modes of operation. The parts are clearly laid out and well protected in a tool box. Systematic assembly and disassembly of the valves is practiced. The accompanying material details the individual steps involved in assembly, and provides additional information on the areas of application, mode of operation and design of the valves and fittings.

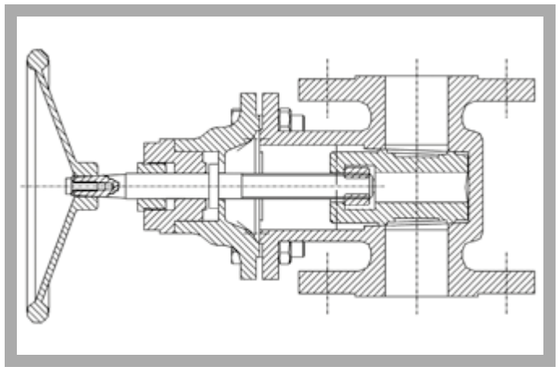
Learning Objectives / Experiments

- design and function of a wedge gate valve
- design and function of an angle seat valve
- assembly and disassembly, including for the purposes of maintenance and repair
- replacing components (e.g. seal)
- comparison of 2 different valves and fittings
- reading and understanding engineering drawings and operating instructions
- leak testing (together with hydraulic valves and fittings test stand MT 162)

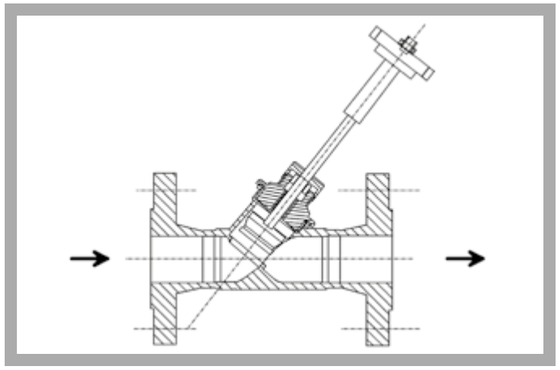
G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

MT 156 Assembly Exercise: Wedge Gate Valve and Angle Seat Valve

Assembly of the slider



Sectional drawing of the wedge gate valve



Sectional drawing of the angle seat valve

Specification

[1] learning concept for assembly exercises on valves and fittings
[2] wedge gate valve with hand wheel, as set of parts
[3] angle seat valve with manual drive, as set of parts
[4] complete assembly tool kit
[5] valve parts and tools housed in a sheet-steel tool box
[6] the kit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Wedge gate valve with flange connections
- DN40, PN10
- materials
  housing, cover, taper: grey cast iron
  spindle, sealing surfaces of housing and taper: stainless steel
  packing rings: graphite

Angle seat valve with flange connections
- DN25, PN16
- materials
  housing: stainless steel
  metallic inner parts: stainless steel
  seals: PTFE

Dimensions and Weight

LxWxH: 720x360x310mm (box)
Weight: approx. 35kg

Scope of Delivery

1 complete set of wedge gate valve parts
1 set of replacement parts, consisting of:
- 3x flat seal
- 3x packing gland seal
- 2x packing gland

1 complete set of angle seat valve parts
1 seat seal for angle seat valve
1 set of tools, consisting of:
- 1 combination wrench, size 10
- 4 single-end wrenches: size 24, 30, 2x 17
- 2 open-ended wrenches: size 27, 50
- 1 Allen key, size 2,5

1 set of bolts, nuts, washers
3 rectangular boxes for small parts
1 sheet-steel tool box with foam inlay
1 set of instructional material, consisting of:
technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly processes, also in relation to repair operations

Order Details

051.15600	MT 156	Assembly Exercise: Wedge Gate Valve and Angle Seat Valve

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 157 Assembly Exercise: Butterfly Valve and Non-Return Valve

The illustration shows the tool box with parts sets and tools. In the foreground the valves and fittings as they are assembled from the parts sets.

*** Practical exercise based on the assembly of a butterfly valve and a non-return valve**

*** Comprehensive and well-structured instructional material**

Technical Description

Non-return valves are used where flow reversal is not permitted. They must fully seal off the reverse direction while offering the lowest possible resistance in the forward flow direction. If the differential pressure of the medium falls below the value as dictated by the spring force, the valve closes. Non-return valves are installed in pipelines, and must close if the pressure drops or if a high back-pressure occurs. They are largely maintenance-free and low-wearing.

Butterfly valves are installed in the pipelines of water supply pumping stations and filter systems; in power plant cooling circuits; in the chemical industry for process water, including acidic and alkaline media; and in sewage treatment plants. They seal drip-tight like gate valves, and take up little space, as they are usually similar in size to the pipe cross-section.

Butterfly valves are constructed for ultra-large nominal widths (DN5300). Their operating pressure is normally in the range 4...16bar. Butterfly valves may be operated by hand, by electric motor via a spur gear segment or worm gear, or by a hydraulic piston. The valve is closed by rotating its shaft through 90°.

The MT 157 practice kit forms part of the GUNT assembly, maintenance and repair practice line designed for training at technical colleges and in company training centres. A close link between theory and practice is key to the learning content.

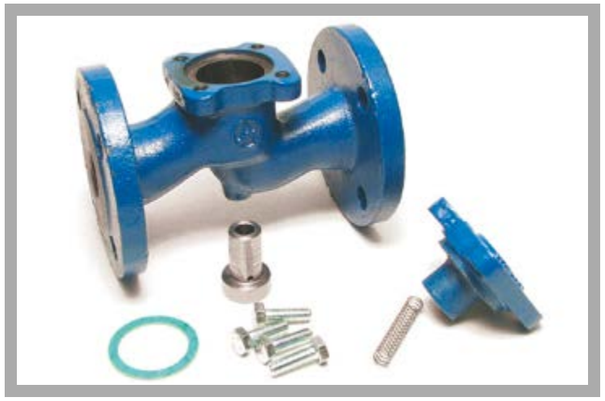
MT 157 enables two typical industrially relevant valves and fittings to be assembled and disassembled. Students become familiar with all the components and their modes of operation. The parts are clearly laid out and well protected in a tool box. Systematic assembly and disassembly of the valves and fittings is practiced. The accompanying material details the individual steps involved in assembly, and provides additional information on the areas of application, mode of operation and design of the valves and fittings.

Learning Objectives / Experiments

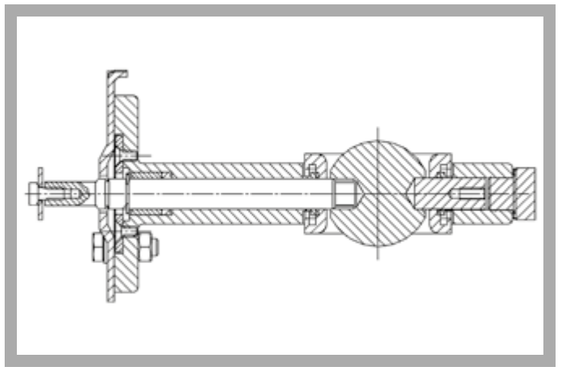
- design and function of a butterfly valve
- design and function of an a non-return valve
- assembly and disassembly, including for the purposes of maintenance and repair
- replacing components (e.g. seal)
- comparison of 2 different valves and fittings
- reading and understanding engineering drawings and operating instructions
- leak testing (together with hydraulic valves and fittings test stand MT 162)

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

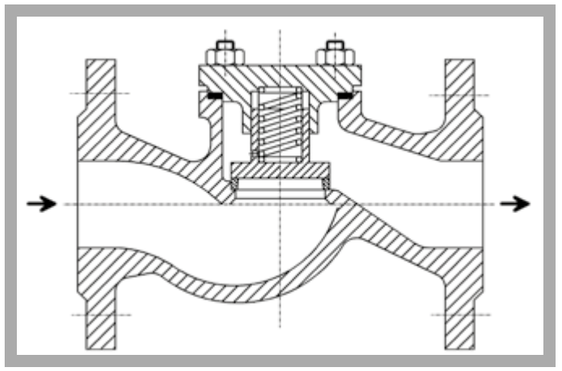
MT 157 Assembly Exercise: Butterfly Valve and Non-Return Valve



Non-return valve, disassembled



Sectional drawing of the butterfly valve



Sectional drawing of the non-return valve

Specification

[1] learning concept for assembly exercises on valves and fittings
[2] butterfly valve with manual adjuster, as set of parts
[3] typical non-return valve, as set of parts
[4] complete assembly tool kit
[5] valve parts and tools housed in a sheet-steel tool box
[6] the kit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Butterfly valve with flange connections
- DN40, PN16
- materials
  housing: grey cast iron
  disk, shafts: stainless steel
  sleeve: rubber
  hand lever: aluminium
  bush: bronze

Non-return valve with flange connections:
- DN25, PN16
- materials
  housing: grey cast iron
  taper, spring: stainless steel
  flat seal: graphite

Dimensions and Weight

LxWxH: 720x360x310mm (box)
Weight: approx. 35kg

Scope of Delivery

1 complete set of butterfly valve parts
1 set of replacement parts, consisting of:
- 1 seal
- 1 sleeve
- 8 bolts M8x25

1 complete set of non-return valve parts
1 set of tools, consisting of:
- 3 single-end wrenches: size 10, 13, 22
- 1 Allen key, size 3
- 1 slotted screwdriver 5,5x1
- 1 set of circlip pliers
- 1 soft-faced hammer

2 rectangular boxes for small parts
1 sheet-steel tool box with foam inlay
1 set of instructional material, consisting of:
technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly processes, also in relation to repair operations

Order Details

051.15700 MT 157 Assembly Exercise: Butterfly Valve and Non-Return Valve

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 158 Assembly Exercise: Ball Valve and Shut-off Valve

The illustration shows the tool box with parts sets and tools. In the foreground the valves and fittings as they are assembled from the parts sets.

*** Practical exercise based on the assembly of a ball valve and a shut-off valve**

*** Comprehensive and well-structured instructional material**

Technical Description

Shut-off valves, of the design presented here, are used to shut off and restrict the flow of media. They must be capable of complete flow shut-off. Closure of the valve should be such that the volumetric flow does not suddenly drop to zero in order to prevent shock loads. The valve taper is moved by the spindle and makes a metallic seal against the seating ring pressed into the housing. The spindle is sealed by a packing gland. The joint between the housing and the clamp cover is sealed by a flat seal.

Ball valves are used where media flows or pressures in pipelines need to be stopped quickly and easily, e.g. when valves and fittings are to be removed from a pressurised pipeline. They have a very low flow resistance when open, require little space due to the compact design, and have a self-cleaning sealing face. The sealing body is a ball with a cylindrical bore allowing full flow when the valve is fully open. The ball is rotated through 90° by way of a lever with spindle, enabling it to open or close the valve fully.

The practice kit MT 158 forms part of the GUNT assembly, maintenance and repair practice line designed for training at technical colleges and in company training centres. A close link between theory and practice is key to the learning content.

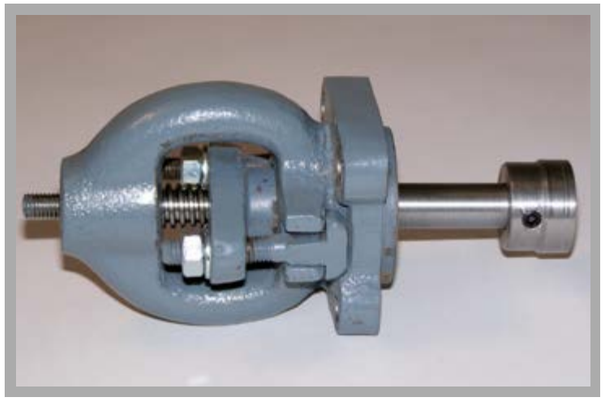
MT 158 enables two typical shut-off valves to be assembled and disassembled. Students become familiar with all the components and their modes of operation. The parts are clearly laid out and well protected in a tool box. Systematic assembly and disassembly of valves and fittings is practiced. The accompanying material details the individual steps involved, and provides additional information on the areas of application, mode of operation and design of the fittings.

Learning Objectives / Experiments

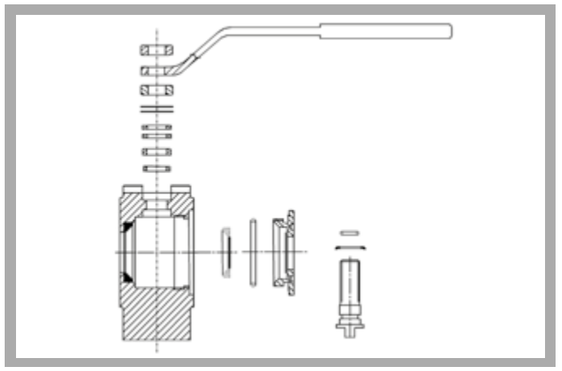
- design and function of a ball valve
- design and function of a shut-off valve
- assembly and disassembly, including for the purposes of maintenance and repair
- replacing components (e.g. seal)
- comparison of 2 different valves and fittings
- reading and understanding engineering drawings and operating instructions
- leak testing (together with hydraulic valves and fittings test stand MT 162)

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

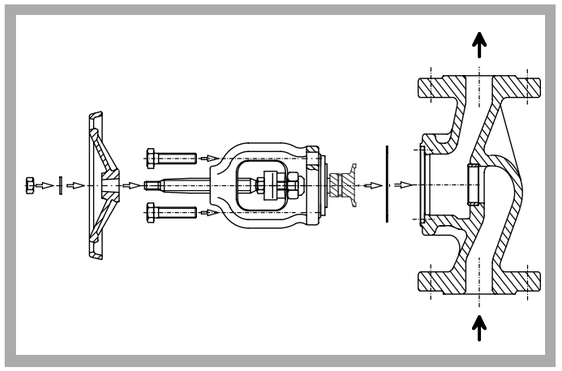
MT 158 Assembly Exercise: Ball Valve and Shut-off Valve



Assembly unit 2 of the shut-off valve, assembled



Assembly drawing of the ball valve



Assembly drawing of the shut-off valve

Specification

[1] learning concept for assembly exercises on valves and fittings
[2] shut-off valve, as set of parts
[3] 2-way ball valve, as set of parts
[4] complete assembly tool kit
[5] valve parts and tools housed in a sheet-steel tool box
[6] the kit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Shut-off valve with flange connections
- DN25, PN16
- housing, hand wheel, clamp cover, packing gland frame: grey cast iron
- taper, seating ring, spindle, ring segment etc.: stainless steel

Ball valve with flange connections
- DN25, PN16
- housing: C22
- ball: brass
- spindle, lever, disks etc.: galvanized steel

Dimensions and Weight

LxWxH: 720x360x310mm (box)
Weight: approx. 35kg

Scope of Delivery

1 complete set of shut-off valve parts
1 set of replacement parts, consisting of:
- 2 packing glands for spindle sealing
- 16 steel balls for seating ring assembly
- 2 seals

1 complete set of ball valve parts
1 set of replacement parts, consisting of:
- 2 seal sets

1 set of tools, consisting of:
- 2 single-end wrenches: size 13, 17
- 1 Allen key, size 3
- 1 pin-type face wrench, adjustable
- 1 slotted screwdriver 5,5x1
- 1 punch
- 1 soft-faced hammer

1 set of nuts and bolts
2 rectangular boxes for small parts
1 sheet-steel tool box with foam inlay
1 set of instructional material, consisting of:
technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly processes, also in relation to repair operations

Order Details

051.15800 MT 158 Assembly Exercise: Ball Valve and Shut-off Valve

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 162 Hydraulic Valves and Fittings Test Stand

The illustration shows MT 162 together with the gate valve from MT 156.

*** Mobile test stand for pressure testing of valves and fittings**

*** Final testing for the GUNT MT 154, MT 156, MT 157 and MT 158 assembly projects**

Technical Description

MT 162 is used for pressure testing of various types of valves and fittings. The unit can be used to test if the valve opens and closes easily under pressure, and if the housing and seals can withstand the test pressure. A manually operated piston pump draws water from the storage tank, fills the valve interior, and generates the test pressure. A manometer indicates the test pressure. The welded-in collector tray is fitted with a ball valve to allow it to be drained. The valve under test is attached to a mounting flange and sealed by a blank flange. The piston pump and mounting flange are interconnected via a pressure hose. The test stand includes its own storage tank so it can be operated independently of a water pipe supply. The tank must be topped up occasionally.

The test stand is used in particular for the final testing of the valves assembled and disassembled in the GUNT MT 154, MT 156, MT 157 and MT 158 assembly projects series. This ensures that a successfully completed assembly project can be examined for operability with a formal test procedure.

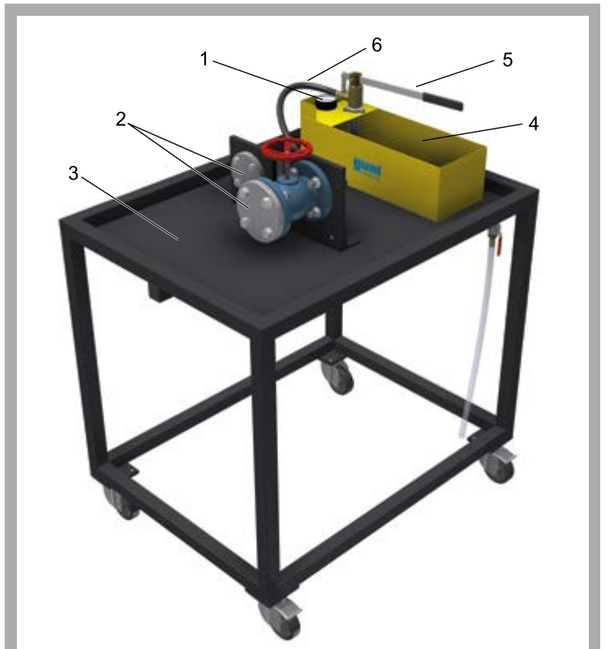
Learning Objectives / Experiments

the following experiments can be conducted together with valves and fittings, such as a wedge gate valve or angle seat valve (MT 156), butterfly valve or non-return valve (MT 157), ball valve or shut-off valve (MT 158)

- correct connection of valves to a flange coupling
- familiarisation with the terms "nominal pressure" and "test pressure"
- performing the final test for the GUNT MT 154, MT 156, MT 157 and MT 158 assembly projects
- checking the free movement of the valves and fittings
- pressure testing
  * leak testing of housing and flange seals
  * leak testing of the valve seat
- drafting a test report

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

MT 162 Hydraulic Valves and Fittings Test Stand



1 manometer, 2 mounting flanges with blank flange, 3 benchtop tray with drain, 4 pressure test pump with water tank, 5 hand lever, 6 hose

A	B
4bar	5.2bar
6bar	7.8bar
10bar	13.0bar
16bar	20.8bar
40bar	52.0bar

Column A: nominal pressure, column B: test pressure

Specification

[1] test stand on which to mount industrial valves and fittings
[2] pressure testing of valves and fittings
[3] hand-operated piston pump to generate the test pressure, a return valve to relieve the system pressure, and a manometer for pressure measurement
[4] 2 different sizes of mounting flange with blank flange and flange seal
[5] connection of pump and test flange via pressure hose
[6] test medium: water
[7] mobile frame with collector tray and ball valve to drain
[8] water storage tank
[9] the test stand forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Piston pump with tank
- test pressure: 0...60bar
- tank capacity: 12L
- manometer: 0...60bar

Mounting flanges for valves and fittings under test
- DN25
- DN40

Dimensions and Weight

LxWxH: 1000x750x1200mm
Weight: approx. 80kg

Scope of Delivery

1 test stand, complete with pump, tank, pressure hose
1 blank flange DN25 with flange seal
1 blank flange DN40 with flange seal
1 blank flange DN40 with spacer and flange seal for butterfly valve
1 set of bolts for flange connections
1 set of tools
1 instruction manual

Order Details

051.16200 MT 162 Hydraulic Valves and Fittings Test Stand

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

HL 960 Assembly Station: Pipes and Valves and Fittings

Technical Description

HL 960 is a practical exercise and training system which provides an entirely authentic introduction to industrial pipes and valves and fittings. The assembly kit comprises a wide variety of valve and fittings, piping elements and one pressure tank, as well as sealing and fastening components. A sturdy U-shaped mounting frame permits assembly of a variety of piping systems, plant components and functional units. The piping elements are prepared ready for assembly, and matched to installation lengths and flange connections. The components permit multiple assembly and disassembly.

The training system is designed for students to work together in a learning group. The complete process of constructing a system may take several days if all the steps are followed: obtaining information, planning, deciding, executing, checking and assessing.

The detailed instructional material assists in creating an effective and ordered learning process. It contains technical descriptions of all the system components as well as various specimen systems and installations.

Finished setups can be subjected to real testing with water. The pump system HL 960.01 (closed circuit) is available for this purpose.

Learning Objectives / Experiments

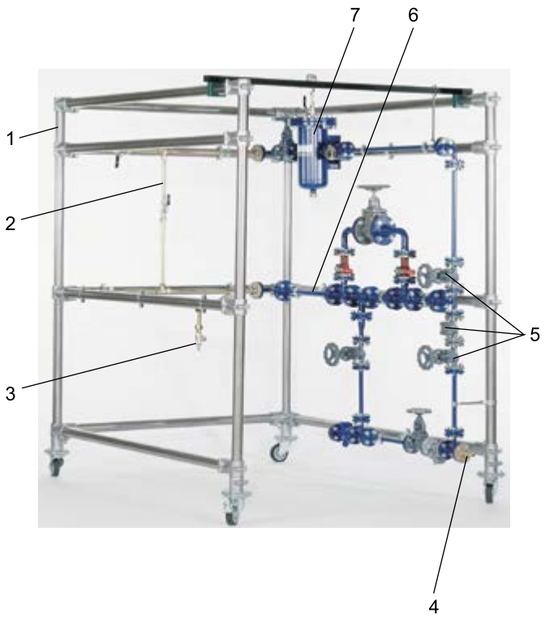
- design and function of valves and fittings, piping elements and system components
- planning of piping and system installations according to specification, e.g. a process schematic
- selection of components and drafting of requirement lists
- technically correct preparation and execution of system assembly
- reading and understanding engineering drawings and technical documentation
- operational testing of the constructed systems (in conjunction with suitable water supply and disposal)

*** Practically oriented assembly of real piping and system installations**

*** Detailed, practically-based familiarisation with system components**

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

HL 960 Assembly Station: Pipes and Valves and Fittings



1 mobile frame, 2 DN15 pipe, 3 connection for HL 960.01 (outlet), 4 connection for HL 960.01 (inlet), 5 various valves and fittings, 6 DN25 pipe, 7 pressure vessel with manometer

The picture shows HL 960 with a completed specimen installation.
In the foreground: pump system HL 960.01.

Specification

[1] assembly exercise for engineering training
[2] piping network comprising pipe bends, elbows, T-pieces and transitions in nominal widths DN15, 25, 40
[3] pipe connections via flanges or cutting ring screw fittings
[4] standard commercially available flanged fittings: shut-off valve, non-return valve, strainer, condensation drain, inspection glass, ball valve, gate valve
[5] ball valve with cutting ring screw fitting
[6] pressure vessel with manometer, connection via DN15 flanges
[7] connection to water supply via hose with coupling
[8] mobile frame for mounting of pipe network
[9] the kit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Flange fittings
- grey cast iron
- nominal pressure: PN16 for DN15, 25 / PN10 for DN40

Ball valve with cutting ring screw fitting
- brass, nickel-plated
- nominal pressure: PN25
- nominal size: G1/2"

Manometer: 0...4bar

Dimensions and Weight

LxWxH: 1540x1840x2020mm
Weight: approx. 300kg

Required for Operation

Water connection and drain via hoses with couplings

Scope of Delivery

1 frame
1 set of valves and fittings, pipes, piping elements with sealing and fastening material
1 set of tools
1 set of instructions, comprising drawing set and instructional material

Order Details

065.96000 HL 960 Assembly Station: Pipes and Valves and Fittings

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

HL 960.01 Assembly and Alignment of Pumps and Drives

*** Installing a pump in a system**

*** Alignment of electric motor and pump by different methods**

Technical Description

A complete work process when repairing work machines such as pumps consists of the following steps: assembly – alignment – test. The trainer described here was designed with industrial conditions in mind and is primarily intended for the practical training of maintenance engineers. It also offers a variety of topics and starting points for training in vocational schools.

The HL 960.01 trainer enables students to practise the entire maintenance process. On its own, the trainer can be used for assembly exercises with the option of aligning the drive and the pump. Combined with HL 960 Assembly Station Pipes and Valves and Fittings, the HL 960.01 trainer can be used as a test system for the completely assembled piping system.

The trainer consists of an electric drive motor, a standard pump and a piping system with storage tank and can be operated independent of the water supply mains. Students can practise exchanging pumps for inspection or repair as part of the assembly exercise. The exercises cover the entire system and its individual subassemblies. A manometer displays the pressure at the outlet of the pump.

The position of the electric motor can be adjusted in three directions for alignment purposes. The alignment can either be checked in a conventional manner with a straight edge or with the reverse alignment method using two dial gauges. Non-contact, microprocessor-aided methods can also optionally be used (specific alignment systems are not included in the scope of delivery).

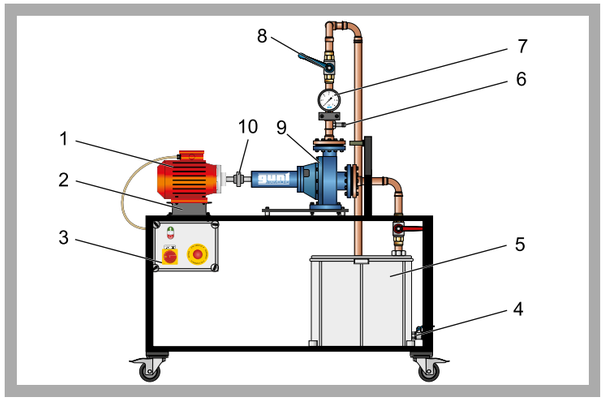
The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

Learning Objectives / Experiments

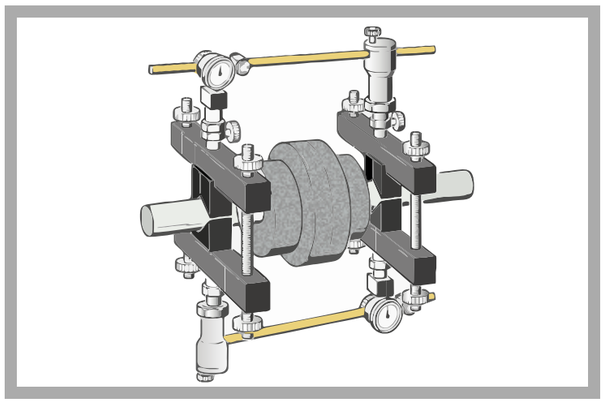
- installing a pump in a system
- connecting and aligning motor and pump
- familiarisation with various alignment methods: straight edge, dial gauges
- familiarisation with key system components
- electrical installation of motor and switching elements
- assembly of pipes and instrumentation
- detail installation on a standard centrifugal pump
- reading and understanding engineering drawings, product documentation and circuit diagrams
- familiarisation with maintenance procedures
- planning assembly and maintenance steps

in conjunction with HL 960
- operational testing in a pipe network

HL 960.01 Assembly and Alignment of Pumps and Drives



1 electric motor, 2 foundation for electric motor, 3 switch box, 4 HL 960 return connection, 5 storage tank, 6 HL 960 inlet connection, 7 manometer, 8 shut-off valve, 9 pump, 10 coupling



The illustration shows the principle of the dual radial dial gauge method of aligning shafts.

Specification

[1] mobile system for alignment of a standard pump and its drive motor
[2] asynchronous electric motor with constant speed
[3] electric motor with positioning frame and fit plates for alignment
[4] pump and motor connected via coupling
[5] checking of alignment using straight-edge or dial gauges
[6] manometer at pump outlet
[7] pump with ball valves at inlet and outlet
[8] closed water circuit
[9] the system forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Centrifugal pump
- max. flow rate: 300L/min
- max. head: 16,9m
- power consumption: 750W

Asynchronous motor, single phase
- power output: 1100W
- speed: 3000min^{-1}

Storage tank: 96L

Measuring ranges
- dial gauges: 0...3mm / 0...20mm, resolution: 0,01mm
- manometer: 0...1,6bar

Dimensions and Weight

LxWxH: 1250x830x1520mm
Weight: approx. 122kg

Required for Operation

230V, 50/60Hz, 1 phase

Scope of Delivery

1 trainer with centrifugal pump and drive
1 set of measuring aids, consisting of
- 2 dial gauges 0...3mm
- straight-edge
- test shaft for sag measurement
- dial gauge with magnetic holder, 0...20mm

1 set of tools
1 set of instructional material

Order Details

065.96001	HL 960.01	Assembly and Alignment of Pumps and Drives

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 140 Assembly Station: Piston Compressor

*** Fully equipped mobile teaching station for demonstration purposes. Provides an introduction to assembly techniques using a piston compressor as an example**

*** Comprehensive and well-structured instructional material**

*** Learning in a practical environment**

*** Highly suitable for developing interdisciplinary technical understanding**

Technical Description

Compressors are at the core of compressed air generator plants. These plants are used where compressed air is used as a source of energy. Compressed air is often used instead of electrical energy, particularly in workplaces where there is a risk of explosion of combustible gases. The heat generated by compression is dissipated by cooling fins. The compressor is driven by a V-belt.

The mobile workstation MT 140 forms part of the GUNT assembly, maintenance and repair practice line designed for training at technical colleges and in company training centres. The station includes everything required to provide students with an introduction to a wide range of demanding assembly projects. A disassembled piston compressor is contained in the drawers of the trolley cabinet which also holds the tools and assembly aids, small parts and gaskets required for assembly. A second fully functional compressor, permanently mounted to the workbench, can be used for demonstration purposes. This enables references to be made between individual components and the complete assembled system at any time during teaching.

Large-format drawings suitable for workshop practice can be attached to the display board at the rear of the trolley. All steps involved can be demonstrated to, and then performed by, the students. The comprehensive and clearly structured instructional material, including a set of drawings, sets out the individual steps in detail. It also provides additional information on the areas of application, mode of operation and design of the assemblies.

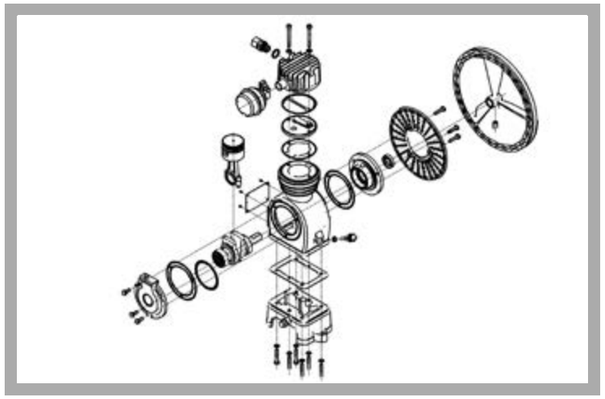
The MT 140.01 test stand is required for functional testing after assembly is complete. Multimedia learning software MT 140.20 is also available.

Learning Objectives / Experiments

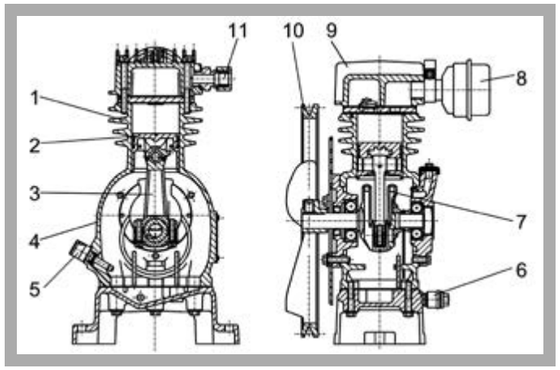
- design and function of a compressor
- reading and understanding engineering drawings
- familiarisation with components and assemblies, their design features and functions
- dimensioning exercises, gauging parts
- work planning, in particular planning and presentation of the assembly process
- familiarisation with assembly aids and jigs
- assembly exercises: assembly of modules and complete units
- analysis of faults and damage, in conjunction with maintenance and repair steps
- material selection criteria

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

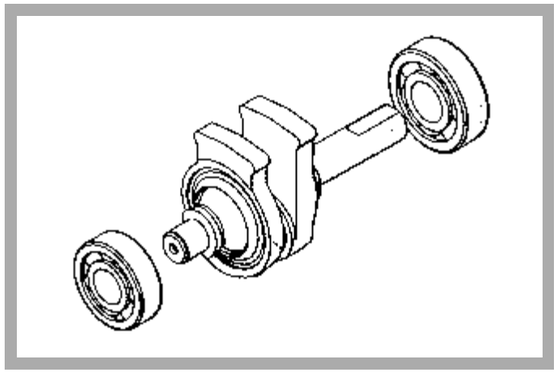
MT 140 Assembly Station: Piston Compressor



The illustration shows the graphic explosion drawing which serves as an aid to the students in the assembly of the compressor. It is designed to be put up on the display board at the rear of the workshop trolley.



1 cylinder, 2 piston, 3 connecting rod, 4 crankcase, 5 dipstick, 6 oil drain plug, 7 crankshaft, 8 air filter, 9 cylinder cover, 10 V-belt pulley, 11 pressure joint



Crank mechanism

Specification

[1] assembly project for engineering training
[2] 2 piston compressors: 1x set of components for assembly, 1x assembled, mounted on trolley as demonstrator
[3] single-stage compressor, air-cooled, with fan flywheel, intake filter and pipe unions
[4] compressor consisting of piston and cylinder, housing, driving gear, cylinder cover with valves
[5] workshop trolley with rear drawing display board, built-under cabinet with 3 lockable drawers and vice with 115mm jaw width
[6] assembly kit, tool kit, assembly aids, accessories and gaskets as well as instructional material contained in built-under cabinet
[7] the assembly station forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Air-cooled single-cylinder piston compressor
- cylinder bore: 50mm
- stroke: 32mm
- displacement volume: 63cm³
- speed: 1.850min^{-1}
- max. pressure: 10bar
- intake capacity: 115L/min
- drive power output: 700W
- dimensions, assembled: LxWxH: 223x256x314mm

Dimensions and Weight

LxWxH: 1.520x800x1.850mm (trolley)
Weight: approx. 150kg

Scope of Delivery

1 workshop trolley with rear drawing display board and built-under cabinet
1 working piston compressor
1 compressor in parts
1 set of assembly tools and jigs
1 set of small parts and gaskets
1 set of instructional material, consisting of
- technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly sequences, set of transparencies for overhead projector

Order Details

051.14000 MT 140 Assembly Station: Piston Compressor

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 140.01 Assembly Exercise Piston Compressor: Functional Test

The illustration shows MT 140.01 together with the compressor MT 140.02 under test.

*** Test device for the piston compressor assembly exercise from the parts sets MT 140.02 or MT 140**

*** Permits assessment of the assembly**

Technical Description

The MT 140.01 test device is used in conjunction with the piston compressor assembly exercises, MT 140.02 or MT 140. The fully assembled compressor is placed on the test device. Here the complete system is professionally assembled, including alignment of the motor and compressor. The electrical connection of the compressor can also be demostrated if required as part of the teaching process. A successfully completed assembly exercise can then be examined for operability using a formal test procedure. During the functionality test, the pressure rise in the tank and the current consumption of the drive motor are recorded over time.

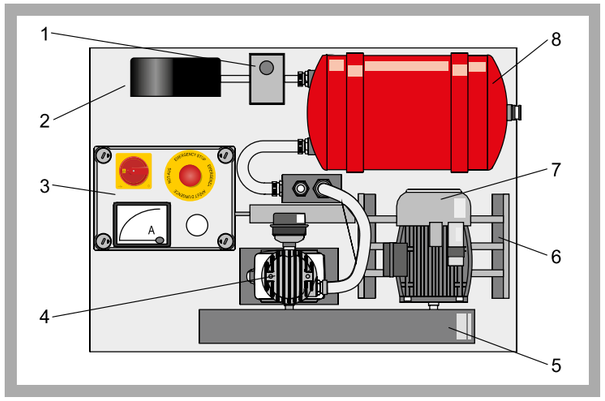
The components of MT 140.01 are clearly laid out on a base plate. The unit contains an electric motor with belt pulley and protective screen. A switch box is included with displays and controls as well as a pressure vessel with display, safety valve and pressure switch. An ammeter on the switch box indicates the current consumption of the drive motor. The compressor being checked is installed on the test bed and connected to the drive motor via a belt drive.

Learning Objectives / Experiments

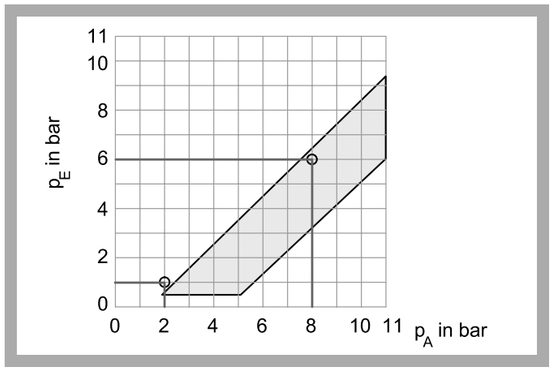
in conjunction with a piston compressor (MT 140 or MT 140.02)
- functional testing of a piston compressor
- pressure rise in tank over time
- current consumption of drive motor as function of pressure
- familiarisation with a compressed air generator and its components
- function and mode of operation of safety elements
  * safety valve
  * pressure switch
  * non-return valve
- professional installation of the compressor in the test device, including setting and alignment

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

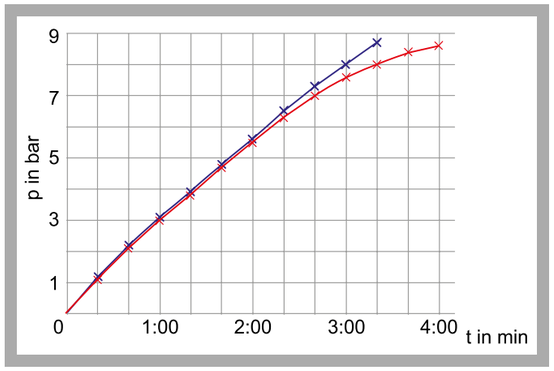
MT 140.01 Assembly Exercise Piston Compressor: Functional Test



1 pressure switch, 2 manometer, 3 switch box with ammeter, 4 compressor MT 140, 5 belt guard, 6 motor carriage, 7 electric motor, 8 pressure vessel



Pressure diagram of the pressure switch: p_E switch-on pressure, p_A switch-off pressure, grey area: permissible pressure switch values



Tank pressure p in bar over pumping time t in minutes;
blue: good assembly, red: poor assembly

Specification

[1] unit for functionality testing of the piston compressor from assembly exercises MT 140.02 or MT 140
[2] driven by electric motor and belt drive
[3] single-phase electric motor on adjustable carriage
[4] pressure vessel with adjustable pressure switch and manometer
[5] switch box with controls and ammeter to indicate current consumption
[6] safety devices: pressure switch, safety valve, protective screen for belt drive, emergency-off switch
[7] the unit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Single-phase motor
- power output: 250W
- speed: 1405min^{-1}

Pressure vessel
- capacity: 10L
- max. pressure: 10bar

Measuring ranges
- manometer: 0...16bar
- ammeter: 0...4A, class 2,5

Dimensions and Weight

LxWxH: 820x550x500mm
Weight: approx. 45kg

Required for Operation

230V, 50Hz, 1 phase or 120V, 60Hz, 1 phase

Scope of Delivery

1 experimental unit
1 stopwatch
1 set of assembly/disassembly tools
0,5L compressor oil
1 manual

Order Details

051.14001 MT 140.01 Assembly Exercise Piston Compressor: Functional Test

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 140.02 Assembly Exercise: Piston Compressor

The illustration shows the tool box with parts set. The compartment insert for tools and small parts is shown in the foreground.

*** Practical assembly of an industrial compressor, using simple tools and jigs**

*** Broad scope of learning with interdisciplinary problems**

*** Comprehensive and well-structured instructional material**

Technical Description

The MT 140.02 kit contains all the parts required to construct the compressor. The compressor fits are designed so as to allow the complete assembly process to be carried out by hand. All parts are clearly laid out and well protected in a sheet-steel tool box. Small parts and tools are contained in a box with a transparent plastic lid.

The nature of this assembly exercise permits wide-ranging, and in particular, interdisciplinary work to be carried out by the students. The exercise is particularly well suited to action-based teaching, in conjunction with students working both independently and in teams.

The well-structured instructional materials set out comprehensive and in-depth technical information which forms the basis for the teaching process. The teaching material included consists of a complete set of drawings with parts lists, individual part drawings, an exploded view and assembly drawing. All drawings are to standard, and dimensioned in line with production requirements. The comprehensive set of transparencies for the overhead projector is another very useful feature.

The fully assembled compressor can be tested for functionality using the optionally available MT 140.01 test bed unit. Interactive learning software (MT 140.20) supports effective learning by means of graphics, animations and vocal support.

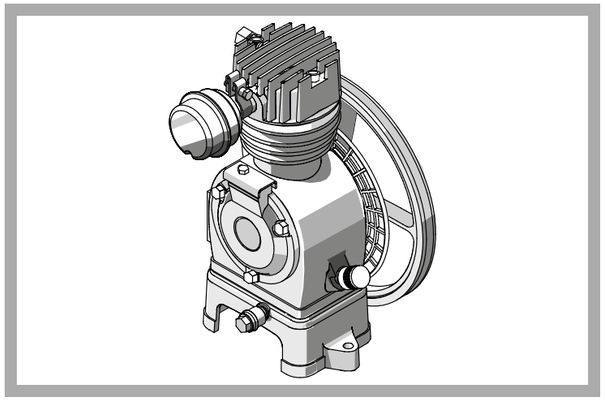
Learning Objectives / Experiments

- design and function of a compressor
- reading and understanding engineering drawings
- familiarisation with components and assemblies, their design features and functions
- dimensioning exercises, gauging of parts
- work planning, particularly planning and presentation of the assembly process
- familiarisation with assembly aids and jigs
- assembly exercises: component and complete unit assembly
- analysis of faults and damage, in conjunction with maintenance and repair steps
- material selection criteria

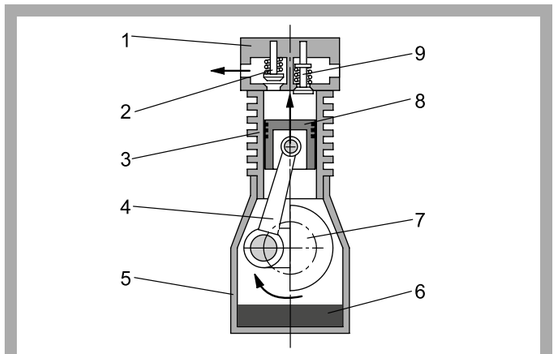
in conjunction with MT 140.01
- functional testing of the assembled compressor

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

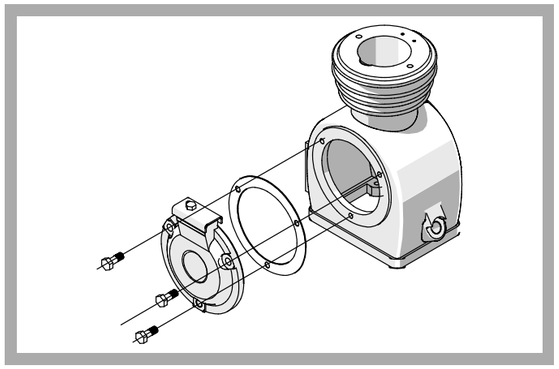
MT 140.02 Assembly Exercise: Piston Compressor



Three-dimensional view of the assembled compressor



1 cylinder cover, 2 pressure valve, 3 cylinder, 4 connecting rod, 5 crankcase, 6 oil sump, 7 crankshaft, 8 piston, 9 intake valve



Assembly of the side cover

Specification

[1] assembly exercise for engineering training
[2] complete, disassembled piston compressor with small parts set and 6 assembly jigs in a storage case
[3] single-stage compressor, air-cooled, with fan flywheel, intake filter and pipe unions
[4] compressor consisting of piston and cylinder, housing, driving gear, cylinder cover with valves
[5] the kit forms part of the GUNT assembly, maintenance and repair practice line

Technical Data

Air-cooled single-cylinder piston compressor
- cylinder bore: 50mm
- stroke: 32mm
- displacement volume: 63cm³
- speed: 1850min^{-1}
- max. pressure: 10bar
- intake capacity: 115L/min
- drive power output: 700W
- dimensions, assembled, LxWxH: 223x256x314mm

Dimensions and Weight

LxWxH: 720x360x310mm (box)
Weight: approx. 28kg

Scope of Delivery

1 complete set of compressor parts
1 box for small and loose parts (e.g. bolts, circlips, washers)
1 set of gaskets
6 assembly jigs
1 set of assembly / disassembly tools
1 sheet-steel tool box with foam inlay
1 set of instructional material, consisting of
- technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly sequences, set of transparencies for overhead projector

Order Details

051.14002 MT 140.02 Assembly Exercise: Piston Compressor

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

MT 140.20 Multimedia Learning Software: Piston Compressor

*** Learning software with calculations and AutoCAD drawings**

*** Computer animated demonstration of complex correlations: Functions and assembly steps**

*** Comprehensive package with clear menu structure**

Technical Description

The MT 140.20 learning software was developed specially for the piston compressor assembly trainers MT 140.02 and MT 140. It is designed for use in teaching at technical colleges, and is intended to motivate students using demonstration and illustration. The piston compressor assembly project is analysed under a number of headings: assembly/disassembly; functional descriptions; modules and components; calculations and technical data. The user is guided through the assembly process with clear, descriptive computer animations. Various functions are explained by computer-generated visualisation of the moving compressor. Students can also access the supplied AutoCAD or Excel files with drawings and parts lists. The calculation module is used to detemine screw sizes, determine forces, and design the connecting rod. Password-protected configuration files permit custom adaptation to the specific teaching situation by allowing or barring access to modules and files. The software also includes a quiz with a variable set of questions.

Note:
Only if the hardware is used together with this learning software, the didactic function of the software becomes completely apparent to the user. The software is therefore only available together with the assembly trainers.

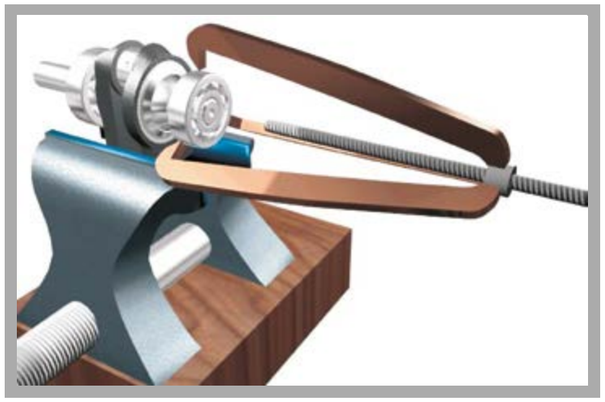
Learning Objectives / Experiments

- understanding engineering drawings, exercises with AutoCAD files
- printout of parts lists
- planning the assembly sequence
- familiarisation with single parts and modules
- virtual assembly and disassembly
- explanation of functions
- computer-aided calculations
- dealing with design aspects
- use of Technical English on a real project

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de

MT 140.20 Multimedia Learning Software: Piston Compressor

The illustration is a screenshot of an animation showing lubrication of the compressor.



The illustration is a screenshot of an animation showing a bearing being pulled.

Specification

[1] multimedia learning software as an accessory to assembly projects MT 140.02 and MT 140
[2] simple operation with user interfaces similar to MS Windows
[3] access to parts lists and drawings with AutoCAD or MS Excel
[4] editable drawings and parts lists
[5] password-protected configuration files
[6] language options: German and English
[7] integrated quiz with catalogue of questions (order of questions can be varied to suit lesson/test)

Technical Data

Language options
- German and English

Minimum hardware and software requirements
- PC with Windows XP or higher

Scope of Delivery

2 CDs
1 instruction manual

Order Details

051.14020	MT 140.20	Multimedia Learning Software: Piston Compressor

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

Assembly exercises

Assembly process

In industrial manufacturing, the repeated fashioning of individual prefabricated components and assemblies into a finished product, unit or device is called assembly.

The entire assembly process comprises the assembly operations:

Joining (DIN 8593)

- joining together
- filling
- pressing on and impressing
- joining by moulding
- joining by forming
- welding
- soldering
- bonding
- textile joining

Handling (VDI 2860)

- retaining
- changing quantities
  - dividing
  - merging
- moving
  - turning
  - positioning
- securing
  - holding
  - detaching
- inspecting
  - checking

Special operations

- cleaning
- aligning
- marking
- lubricating
- ...

Design based on assembly requirements

An optimum design based on assembly requirements is characterised by the fact that only a few simple, unique or essential steps are required to assemble a product. Similarly, a parallel assembly of components should be planned at the design stage. If fully automated assembly is planned, this requires sophisticated solutions especially for the automated, safe grasping of the workpiece. In design based on assembly requirements, the prerequisites and constraints have to be taken into account when building the product in assembly. Design based on assembly cannot be learned by theoretical teaching, but must be practised.

Specifications for the design

Excerpt from the book, Grundlagen der Konstruktionslehre, Klaus-Jörg Conrad

When designing individual parts:

- design parts so that the ordering of the parts before assembly is not needed
- simplify position and orientation of the parts by external features, such as symmetrical shape
- simplify positioning by bevels, grooves, recesses, guides, etc.
- design joints so as to be easily accessible for tools and observation of the assembly process

When designing assemblies:

- structure product division with clear, testable assemblies in order to perform assembly operations with simple types of movement
- choose functional tolerances, but not too tight
- take note of disassembly and recycling in the design stage
- simplify or avoid calibration processes by means of good accessibility
- reduce number of individual components and joints
- design repetitive assemblies

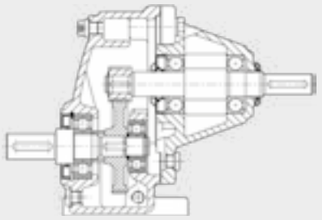
Assembly exercises

The assembly exercises from GUNT are part of the GUNT-Practice Line. This series of units has been designed specifically for the areas of assembly, maintenance and repair (see also catalogue 2). Together with cutaway models, these units represent a practical addition to the field of engineering design. With our assembly exercises, we offer lecturers an interface between general, rather theoretical learning content and application-based, practical work.

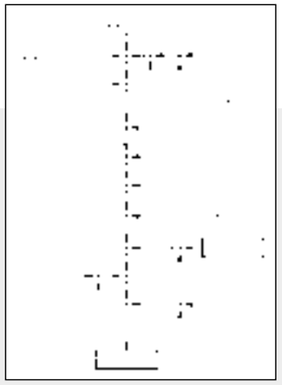
Learning objectives
Develop broad knowledge of assembly technology as a basis for the design of assemblies
Introduction to technical terms and technical language
Familiarisation with machine elements and standard parts
Recognise assemblies, understand functions, describe systems
Read and understand technical documentation
Plan and execute assembly steps and sequences
Familiarisation with typical tools and devices
Check and evaluate work results

The typical scope of delivery of our assembly exercises is shown using the example of the MT 152 spur gear:

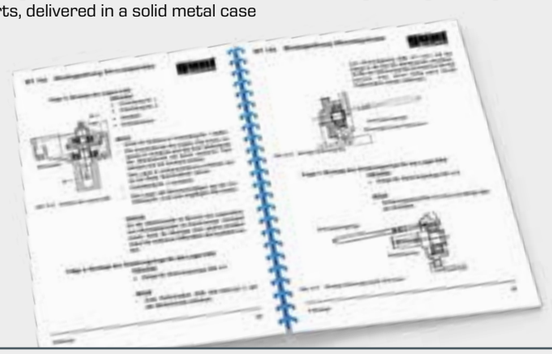
Spur gear deconstructed into individual parts, delivered in a solid metal case



Engineering drawing



Assembly plan



Extract from the documentation

Assembled spur gear

MT 170
Assembly shaft with journal bearings

The illustration shows the tool box with the kit and, in the foreground, the fully assembled journal bearing.

Description

- **practical kit based on the assembly of a shaft / journal bearings arrangement**
- **part of the GUNT-Practice Line for assembly, maintenance and repair**

Journal bearings execute a sliding motion between a bearing journal and a bearing shell. This sliding motion is usually lubricated by an intermediate medium. The damping effect of the lubricant in the bearing gap means journal bearings run particularly smoothly and quietly. Vibration and shock impact from gear wheels or crank mechanisms are also damped by journal bearings. They are widely used in piston engines, punches and presses as they are insensitive to high shock loads.

The MT 170 unit comprises a ground steel shaft and two horizontally split pedestal bearings. The journal bearings in MT 170 are grease-lubricated ones. Grease lubrication allows for a simple bearing construction. The upper bearing shell includes a lubrication fitting with a female thread to which a Stauffer lubricator can be screw-fitted by way of an intermediate pipe to supply the bearing with lubricant.

The face of the upper bearing shell, which is not subjected to load, contains a flat lubricating slot.

This distributes the grease over the full width of the bearing. The grease serves not only as a lubricant but also seals the bearing against external dirt and foreign bodies.

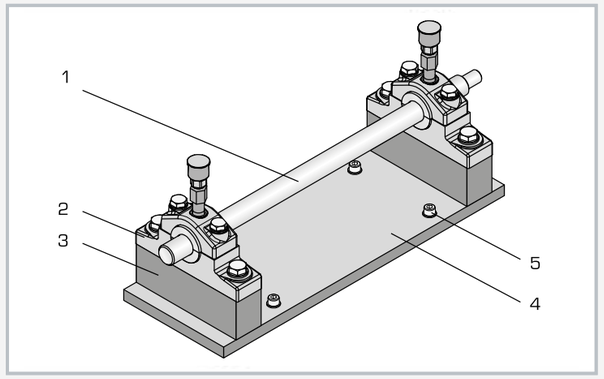
The MT 170 kit is part of the GUNT-Practice Line for assembly, maintenance and repair, which has been designed for technical colleges and company training centres. The close link between theory and practice-based learning content is evident.

MT 170 enables a simple journal bearing to be assembled and disassembled. Students become familiar with all the components and how they work. The individual parts are laid out clearly and are well protected in a tool box. The accompanying material details the individual steps involved in assembly, and provides additional information on the areas of application, mode of operation and design of the journal bearing.

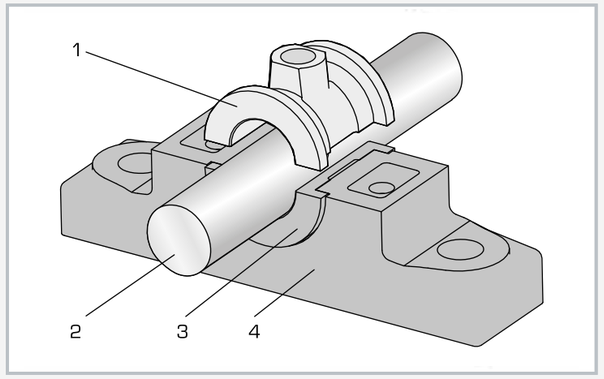
Learning objectives/experiments

- function and design of a simple journal bearing
- assembly and disassembly, including for the purposes of maintenance and repair
- measure the bearing clearance
- check the alignment
- read and understand engineering drawings and operating instructions

- together with MT 172
  - ▸ investigate the running properties of the journal bearing



1 steel shaft, 2 pedestal bearing, 3 spacer, 4 base plate, 5 bolt to fix MT 170 into MT 172



1 upper bearing shell, 2 shaft, 3 lower bearing shell, 4 bearing block

Specification

[1] kit of a shaft with journal bearings
[2] part of the GUNT-Practice Line for assembly, maintenance and repair
[3] horizontally split pedestal bearing according to DIN 505, grease lubricated
[4] steel shaft, hardened and ground
[5] 2 pedestal bearings with split shells
[6] set of plastic strips to measure bearing clearance
[7] checking bearing alignment using touch-up paste
[8] complete set of tools for assembly
[9] journal bearing parts and tools housed in a sheet-steel tool box

Technical data

Shaft
- Ø 25mm
- shaft journal for coupling: Ø 16mm

Materials
- pedestal bearing, bearing cap: grey cast iron
- bearing shells: red bronze to DIN 8221
- shaft: hardened and ground steel
- Stauffer lubricator: steel

LxWxH: 640x230x230mm (tool box)
Weight: approx. 45kg

Scope of delivery

1 kit
1 metal bellows coupling for connection to MT 172
1 set of tools
1 set of small parts
1 1 tool box with foam inlay
1 set of instructional material

MT 171
Assembly hydrodynamic journal bearing

The illustration shows the tool box with kit and parts compartment insert. A fully assembled journal bearing is shown in the foreground.

Description

- **practical kit of a hydrodynamic journal bearing**
- **part of the GUNT-Practice Line for assembly, maintenance and repair**

Journal bearings generally execute a sliding motion between a bearing journal and a bearing shell. This sliding motion is usually lubricated by an intermediate medium. Hydrodynamic journal bearings give wear-free continuous duty for large diameters at high speeds, and are suitable for high and shock-type loading. They are usually constructed as split bearings. Frictional heat occurring during operation must be dissipated by the lubricant.

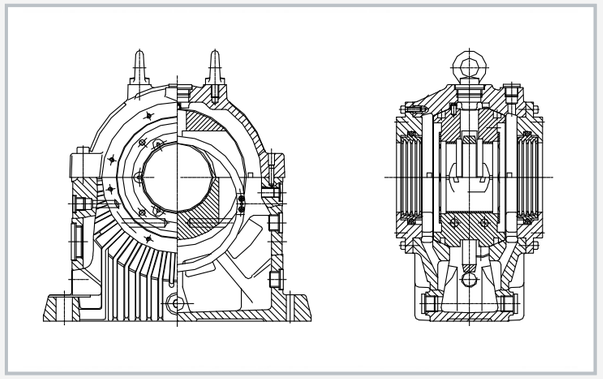
MT 171 is a horizontally split hydrodynamic pedestal journal bearing. The bearing shells are supported by a spherical face in the bearing housing so as to ensure uniform transfer of any forces that arise on the bottom part of the housing. The journal bearing is lubricated by a loose lubricating ring. Standard commercially available mineral oils can be used. An auxiliary shaft is supplied together with the bearing as an aid to assembly and functional testing.

The MT 171 kit is part of the GUNT-Practice Line for assembly, maintenance and repair, which has been designed for technical colleges and company training centres. The close link between theory and practice-based learning content is evident. MT 171 enables a hydrodynamic journal bearing to be assembled and disassembled. Students become familiar with all the components and how they work.

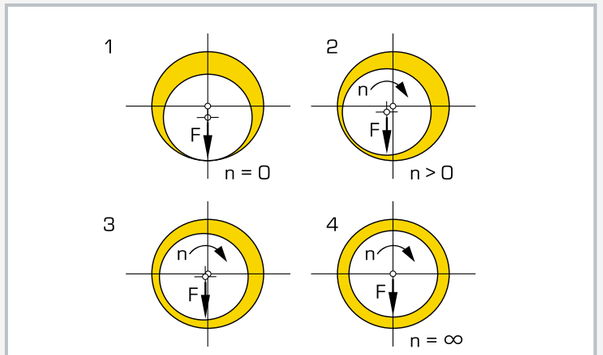
The individual parts are laid out clearly and are well protected in a tool box. The accompanying material details the individual steps involved in assembly, and provides additional information on the areas of application, mode of operation and design of the journal bearing.

Learning objectives/experiments

- function and design of a hydrodynamic journal bearing
- principles of lubrication and sealing elements
- assembly and disassembly, including for the purposes of maintenance and repair
- read and understand engineering drawings and operating instructions



Sectional drawing of a hydrodynamic journal bearing



Operation of a hydrodynamic journal bearing: 1 to 4 build-up of a load-bearing oil film at increasing speed

Specification

[1] kit of an upright hydrodynamic journal bearing
[2] part of the GUNT-Practice Line for assembly, maintenance and repair
[3] journal bearing to DIN 31690
[4] stainless-steel drive shaft
[5] lubrication via oil lubricating ring
[6] floating edge seal to the face of the shaft seal
[7] contact surfaces of the housing halves sealed with non-hardening sealant
[8] complete set of tools for assembly
[9] journal bearing parts and tools housed in a sheet-steel tool box

Technical data

Bearing bore
- Ø 80mm

Drive shaft
- nominal diameter: Ø 80mm

Materials
- bearing housing: grey cast iron
- bearing shells: steel supports, coated with white metal
- seal: ultra-heat-resistant, fibre-reinforced plastic
- shaft: stainless steel

LxWxH: 690x360x312mm (tool box)
Weight: approx. 60kg

Scope of delivery

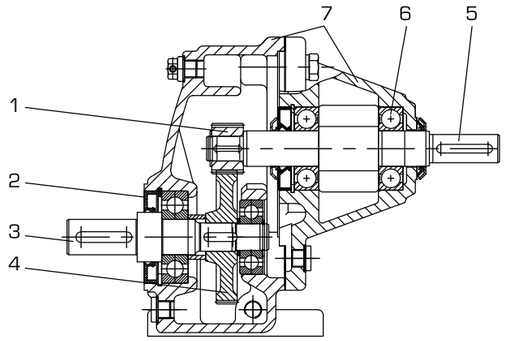
1 kit
1 drive shaft
1 set of tools
1 set of small parts
1 tool box with foam inlay
1 set of instructional material

MT 152
Assembly spur gear

Learning objectives/experiments

- function and design of a helical spur gear unit
- planning and presentation of the assembly process
- assembly and disassembly, including for the purposes of maintenance and repair
- read and understand engineering drawings
- dimensioning exercises, gauging of parts
- familiarisation with various machine elements: ball bearings, shaft seals
- familiarisation with assembly aids and jigs
- material selection criteria

The illustration shows the assembled spur gear unit



1 pinion, 2 shaft seal, 3 driven shaft, 4 gear wheel, 5 drive shaft, 6 ball bearings, 7 housing parts

Specification

[1] kit of a spur gear unit
[2] part of the GUNT-Practice Line for assembly, maintenance and repair
[3] disassembled spur gear with set of small parts and 4 assembly jigs, housed in a sturdy case with foam insert
[4] helical spur gear wheels
[5] gear unit comprising input housing, pedestal housing, input and output shafts, input gear and output pinion, as well as bearings

Technical data

Gear dimensions without shaft connections
- LxWxH: 160x135x175mm

Transmission ratio
- pinion
  - number of teeth: z=24
  - real pitch module: m=1mm
- gear wheel
  - number of teeth: z=68
  - real pitch module: m=1mm
- transmission ratio: i=2,83

Max. drive torque
- 54Nm at 494min^{-1}

Materials
- housing: cast iron
- shafts: tempered steel
- spur wheels: alloyed case-hardened steel

Shaft connections
- drive: ØxL: 16x40mm
- driven: ØxL: 20x40mm

LxWxH: 600x450x180mm (case)
Weight: approx. 18kg

Scope of delivery

1 kit
1 set of tools
1 set of assembly jigs
1 set of small parts
1 case
1 set of instructional material with complete set of drawings with individual parts and parts list

Description

- **practical kit based on a spur gear unit**
- **broad scope of learning with interdisciplinary problems**
- **part of the GUNT-Practice Line for assembly, maintenance and repair**

Gears transfer rotary motion. They adapt the torques and speeds of a consumer drive according to demand.

The MT 152 unit is a spur gear unit with helical gear wheels. The gear is single stage and has a fixed transmission ratio (fixed gear unit). It is a standalone gear unit, i.e. a self-contained transmission in its own gear housing. Self-contained gear units are usually arranged between the motor and the driven machine, or are used as installation kits in machines.

By contrast, open-running gear-wheel pairs forming part of a machine are termed non-self-contained gears.

Helically cut gear wheels run more smoothly and quietly than straight-toothed gears because the gear teeth intermesh gradually and multiple teeth are engaged. They are suitable for higher speeds, and can withstand greater loading than comparable straight-toothed gears.

The MT 152 kit is part of the GUNT-Practice Line for assembly, maintenance and repair, which has been designed for technical colleges and company training centres. The close link between theory and practice-based learning content is evident.

The assembly and disassembly processes can be completed easily within standard lesson times. Only basic tools are required for assembly, all of which are supplied with the kit. The fit seatings of the gear unit are designed to allow the complete assembly process to be performed by hand.

The unit is of most benefit in teaching if two or three students work together in a small group. The group has a defined task to perform, with clear assignments to complete.

The comprehensive instructional material focuses on practical needs. It includes a complete set of drawings with a general arrangement drawing, parts list and single-part drawings.

MT 110.02
Assembly spur wheel / worm gear mechanism

The illustration shows the tool box with the kit. The compartment insert for tools and small parts is shown in the foreground.

Description

- **practical assembly of an industrial gear unit, using simple tools and devices**
- **broad scope of learning with interdisciplinary problems**
- **part of the GUNT-Practice Line for assembly, maintenance and repair**

The MT 110.02 unit deals with a two-stage gear. The kit contains all the individual parts to build the gear. The gear comprises a spur gear stage as its input, with a downstream worm gear stage (combined gear). The fit seatings of the gear unit are designed to allow the complete assembly process to be performed by hand. All parts are laid out clearly and are well protected in a sheet-steel tool box. Small parts are contained in a box with a transparent lid. A set of tools is included.

The project-based nature of this assembly kit allows for varied and above all interdisciplinary work in the classroom. The project is particularly recommended for a practical-based teaching organisation, in conjunction with independent student activity and teamwork.

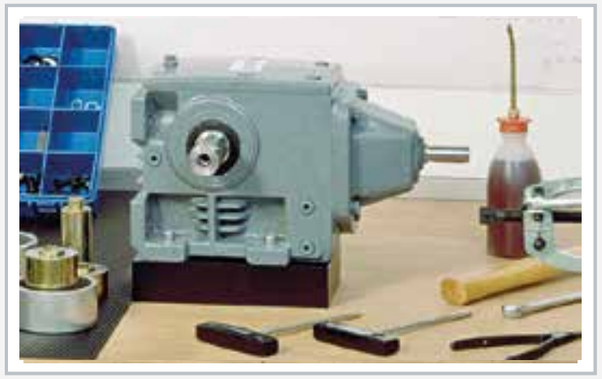
The contemporary instructional materials provide extensive technical information that provides the basis for lesson design. The core element of the teaching materials is a complete set of drawings with lists of parts, individual part designations, exploded views and assembly drawings. All drawings are to standard and are dimensioned in accordance with production requirements. Pdf files and assembly videos are also useful features.

The fully assembled gear can be tested for functionality using the optionally available MT 172.

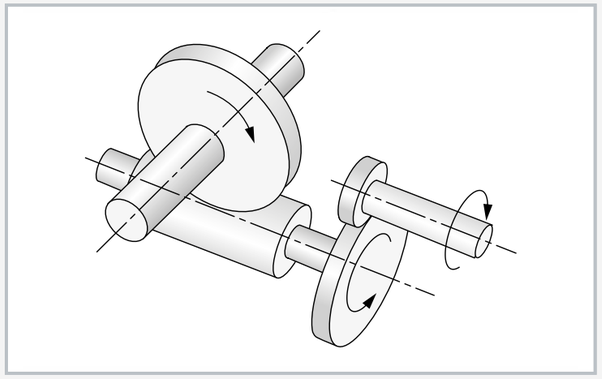
Learning objectives/experiments

- function and design of a combined gear unit
- reading and understanding engineering drawings
- familiarisation with components and assemblies, their design features and functions
- dimensioning exercises, gauging of parts
- work planning, in particular planning and representation of the assembly process
- familiarisation with assembly aids and jigs
- assembly exercises: assembly of modules and complete units
- analysis of faults and damage, in conjunction with maintenance and repair steps
- material selection criteria

- in conjunction with MT 172
  - ▸ functional testing of the assembled gear unit



The illustration shows the assembled gear unit.



Drive principle of the two-stage spur wheel / worm gear mechanism

Specification

[1] kit of a spur wheel / worm gear mechanism
[2] part of the GUNT-Practice Line for assembly, maintenance and repair
[3] complete, disassembled gear unit with set of small parts and 12 assembly jigs in a storage box
[4] spur gear stage with helical gear wheels
[5] worm gear stage with cylindrical worm and globoid wheel
[6] gear unit comprising drive housing, worm pedestal housing, driving and driven shafts, spur gear stage and worm gear stage

Technical data

Gear dimensions without shaft couplings
- LxWxH: 282x138x188mm, approx. 22kg

Transmission ratios
- spur gear stage: i=2,83
- worm gear stage: i=12,33
- total gear ratio: i=34,89

Spur gear stage
- pinion: number of teeth: z=24, real pitch module: m=1mm
- gear wheel: z=68, m=1mm

Worm gear stage
- worm: z=3
- worm gear wheel: z=37, m=2,578mm

Max. output torque: 212Nm

Materials
- housing: cast iron
- shafts: tempered steel
- spur gear wheels, worm: alloyed case-hardened steel

Shaft connections
- drive: ØxL: 16x40mm
- driven: ØxL: 30x60mm

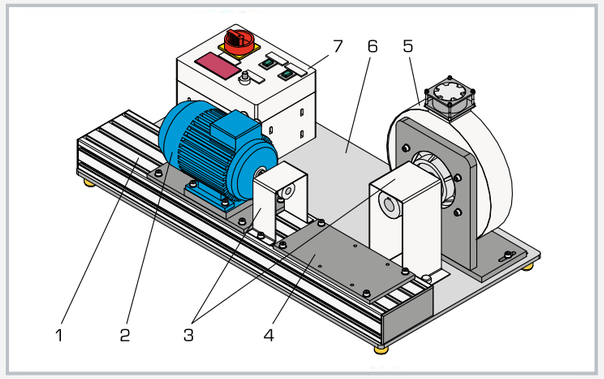
LxWxH: 700x380x320mm (tool box)
Weight: approx. 38kg

Scope of delivery

1 kit
1 set of tools
1 set of assembly jigs
1 set of small parts
1 set of gaskets
1 tool box with foam inlay
1 set of instructional material, consisting of technical description of system, complete set of drawings with individual parts and parts list, description of assembly and disassembly sequences, pdf files, assembly videos

MT 172
Alignment of drives, shafts and gears

The illustration shows MT 172 together with a combination gear unit assembled from the kit MT 110.02.



1 machine bed, 2 drive motor, 3 coupling guard, 4 combination gear unit mounting plate, 5 magnetic particle brake, 6 base plate with flexible elements for vibration damping, 7 switch box with displays and controls

The illustration shows MT 172 together with the journal bearing-mounted shaft MT 170.

Description

- **assembly and alignment of drive elements**
- **understanding a wide range of mechanical drive systems**
- **functional testing of completed GUNT assembly kits**

The MT 172 unit is used to perform functional tests on MT 170 (shaft with journal bearings), MT 110 and MT 110.02 (combination gear units). The assembled element system — journal bearing or gear unit — is mounted on the MT 172 test bed. Here, the complete system is properly assembled, with particular regard to the alignment of the system components. A successfully completed assembly project can then be examined in operation with a formal final test. Parameters examined during test procedure are running noise, heat generation, vibrations or leakage.

MT 172 includes a single-phase asynchronous motor drive, a magnetic particle brake with adjustable braking torque, and a rigid machine bed with T-slots on which the motor and the drive element under test are mounted.

The T-slots allow the installed length to be varied, and therefore can be easily adapted to the drive element. Two couplings connect the element system to the motor and the brake. The students must align the connections between the motor and the brake. The controls are located on the switch box.

The braking torque is set here using a potentiometer. The exciter current of the magnetic particle brake serves as a measure of the braking torque, and is displayed in digital form. Removable guards protect the couplings.

The MT 172 unit is part of the GUNT-Practice Line for assembly, maintenance and repair, which has been designed for technical colleges and company training centres.

Learning objectives/experiments

- in conjunction with MT 170 and MT 110.02
  - assembly and alignment of gears or shafts with journal bearings
  - planning and execution of final testing on a helical worm gear (MT 110.02)
  - planning and execution of final testing on a journal-bearing-mounted shaft (MT 170)
  - familiarisation with gear components and their functions
- in conjunction with combined gear unit MT 110.02
  - checking gear functionality after assembly using a load test
  - running of the gear under variable load: assessment of running noise; checking for heat build-up; checking for leaks
- in conjunction with MT 170 shaft with journal bearings
  - running properties of a journal bearing

Specification

[1] experimental unit for functional testing of mechanical gear units: shaft on journal bearing, combined gear unit
[2] part of the GUNT-Practice Line for assembly, maintenance and repair
[3] single-phase asynchronous motor with metal bellows coupling
[4] externally vented magnetic particle brake with claw clutch, braking power adjustable by potentiometer
[5] machine-bed T-slot aluminium profile for adjustable mounting of gear components
[6] switch box with controls and digital display of exciter current of the magnetic particle brake
[7] coupling guards

Technical data

Drive motor
- 4-pole asynchronous motor
- max. power: 0,55kW
- speed: 1400min^{-1}

Magnetic particle brake with fan and temperature sensor
- nominal braking torque at exciter current 0...0,4A
  - 0...45Nm
- max. braking torque at 1A: 110Nm
- bi-metallic strip temperature protection: 70°C

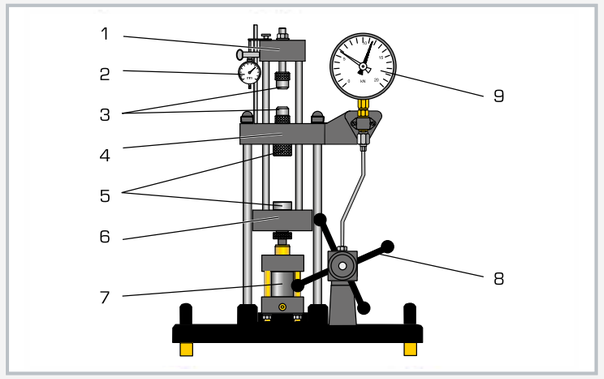
Aluminium machine bed with T-slots
- installation space: LxW: 640x160mm
- slot spacing: 40mm
- for M8 sliding blocks

230V, 50Hz, 1 phase
120V, 60Hz, 1 phase; 230V, 60Hz, 1 phase
UL/CSA optional
LxWxH: 950x500x450mm
Weight: approx. 75kg

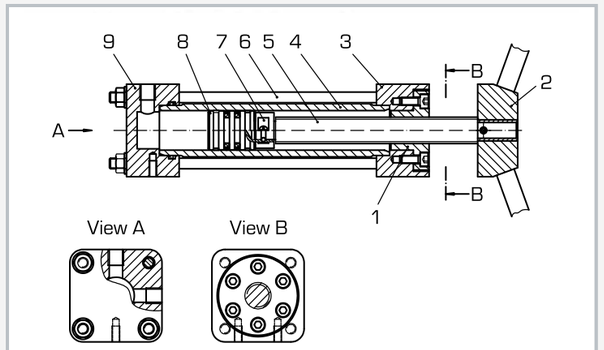
Scope of delivery

1 experimental unit
1 set of small parts
1 set of tools
1 set of instructional material

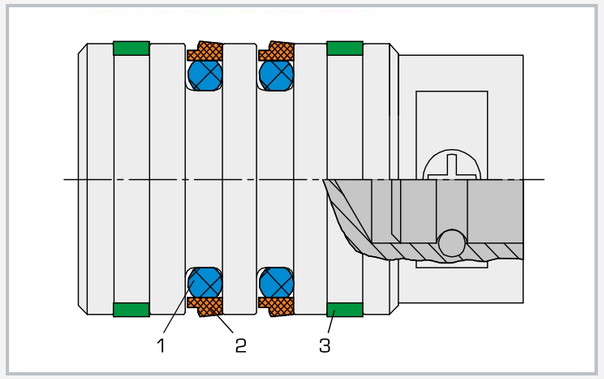
MT 190
Assembly materials tester



1 upper cross-member, 2 dial gauge for elongation, 3 clamp, 4 crosshead, 5 compression piece and pressure plate, 6 lower cross-member, 7 hydraulic cylinder, 8 hand wheel, 9 force gauge



Sectional drawing of the horizontal hydraulic cylinder: 1 trapezoidal nut, 2 hand wheel axle, 3 crank side flange, 4 cylindrical tube, 5 trapezoidal threaded spindle, 6 clamping bolt, 7 retainer, 8 piston, small, 9 pressure side flange



Piston in detail: 1 O-ring, 2 piston sealing ring, 3 guide ring

Description

- **kit of a unit for basic experiments in materials testing**
- **can be expanded with electronic data acquisition**
- **part of the GUNT-Practice Line for assembly, maintenance and repair**

The MT 190 unit is supplied as a kit and contains all mechanical parts, measuring units, hydraulic components with seals and pipe material with all connecting parts. Assembly comprises the mechanical structure, the hydraulic assembly of both cylinders and the piping installation. All tools and aids required are included, as well as extensive teaching materials.

The MT 190.01 assembly set allows for data acquisition as an extension to the range of experiments. Using MT 190, students can learn about working on a complex project. This involves the planning, implementation and checking of processes related to assembly, commissioning and repair.

The assembled MT 190 experimental unit represents a real, fully functional materials tester that can be used to conduct tensile tests and Brinell hardness tests. The experimental unit has been developed specifically for experiments in small groups and is characterised by a clear design, simple operation and accessories that are easy to exchange.

The tensile specimens are clamped between the upper cross member and the crosshead. The hardness specimens are secured between the crosshead and lower cross member. The test force is generated by means of a hand-operated hydraulic system and displayed on a large force gauge with a drag indicator. A dial gauge measures the elongation of the specimens.

Learning objectives/experiments

- read and understand technical documentation
- plan and execute assembly steps and sequences
- familiarisation with machine elements and components
- commission and inspect materials tester after successful assembly
- plan, implement and evaluate maintenance operations
- fault analysis: troubleshooting, fault analysis and remedy

- after successful assembly
  - tensile test on metallic specimens
  - plot load–extension diagrams
  - Brinell hardness test

Specification

[1] assembly kit of a materials tester
[2] part of the GUNT-Practice Line for assembly, maintenance and repair
[3] hydraulic assembly of two cylinders
[4] pipework assembly of the hydraulic system
[5] classic destructive tests from the field of materials testing: tensile tests, Brinell hardness test
[6] generation of tensile and compressive forces
[7] forces generated by hand-operated hydraulic system; no power supply required
[8] force gauge, pointer instrument with drag indicator
[9] dial gauge for determining the elongation
[10] hardness specimens: aluminium, copper, steel, brass
[11] tensile specimens according to DIN 50125: aluminium, copper, steel, brass
[12] assembly kit for MT 190.01 data acquisition available as an option

Technical data

Test force: max. 20kN
Stroke: max. 45mm
Free installation space for specimens: 165x65mm
Tensile specimens: B6x30mm, DIN 50125
Hardness specimens: LxWxH 30x30x10mm
Sphere for hardness testing: Ø 10mm

Measuring ranges
- force: 0...20kN, graduation: 0,5kN
- travel: 0...10mm, graduation: 0,01mm

LxWxH: 610x520x850mm (assembled)
Weight: approx. 53kg

Scope of delivery

1 kit
1 set of tools
1 set of assembly jigs
1 set of small parts
1 set of accessories
1 set of specimens (4 tensile specimens, 4 hardness specimens)
1 set of instructional material, consisting of: technical description of system, complete set of drawings with individual parts and parts list, description of maintenance and repair processes, suggested exercises

MT 190.01
Assembly data acquisition for materials tester

Description

- **interdisciplinary and interlinking kit from the fields of mechanics and electronics**
- **fully functional data acquisition system for a materials tester with USB connection and software**

The MT 190.01 unit is supplied as a kit and contains all components and materials to build a professional data acquisition system. Assembly comprises the mechanical structure and the wiring according to the circuit diagram. All tools and aids required are included, as well as extensive teaching materials.

The assembled MT 190.01 system represents a real, fully functional data acquisition system and can be used to measure pressure (forces) and changes in length.

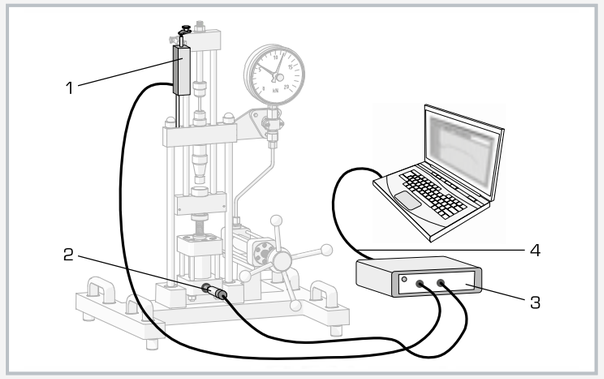
These values are processed further on a PC by means of analysis software. The data acquisition system enhances the options of the MT 190 project considerably. Both projects together give a modern materials tester with data acquisition, which is suitable for a variety of experiments.

Using MT 190.01 students can learn about working on a complex project. This involves the planning, implementation and checking of processes related to assembly, commissioning and repair.

Learning objectives/experiments

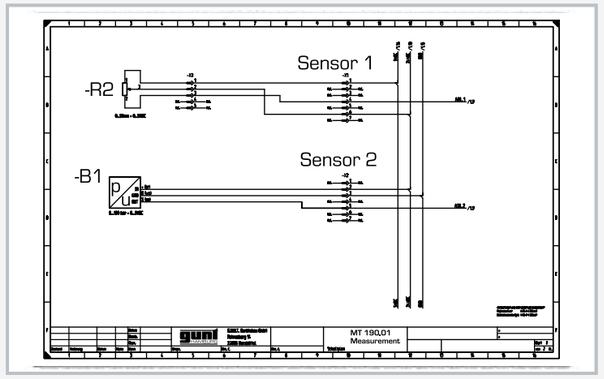
- fundamentals of data acquisition: familiarisation with sensors, electronics for recording and outputting measured values, interfaces, software
- read and understand technical documentation
- plan and execute assembly steps and sequences
- commissioning and inspection of a data acquisition system following assembly
- system integration: connect materials tester and data acquisition

- together with MT 190
  - record load–extension diagrams or stress–strain diagrams
  - prepare, display and store data
  - output diagrams to printer



Port for connecting data acquisition to the basic unit: 1 displacement sensor, 2 pressure sensor for force measurement, 3 measuring amplifier, 4 USB cable

Assembled data acquisition system with software CD; in the foreground: left: pressure sensor, right: displacement sensor



Circuit diagram: port for pressure and displacement sensor

Specification

[1] kit for assembly of a data acquisition system for a materials tester
[2] part of the GUNT-Practice Line for assembly, maintenance and repair
[3] linear potentiometer for displacement measurement
[4] force measurement by pressure sensor
[5] GUNT software for data acquisition via USB under Windows 7, 8.1, 10
[6] software for recording, preparing and storing stress–strain diagrams

Technical data

Pressure sensor for force measurement
- 0...100bar

Displacement sensor
- 0...50mm

Measuring amplifier with USB port
- input: 0...5V
- resolution: 12bit

230V, 50Hz, 1 phase
120V, 60Hz, 1 phase; 230V, 60Hz, 1 phase
UL/CSA optional
LxWxH: 225x200x75mm (measuring amplifier)
Weight: approx. 5kg

Required for operation

PC with Windows

Scope of delivery

1 kit
1 set of tools
1 set of accessories
1 GUNT software CD + USB cable
1 set of instructional material, consisting of: technical description of system, complete set of drawings with individual parts and parts list, circuit diagram,description of maintenance and repair processes, suggested exercises