Ingenieurtechnische Dienstleistungen

Your partner for test technique
Vibration- / Measurement- / Test
Special Development / Test Benches

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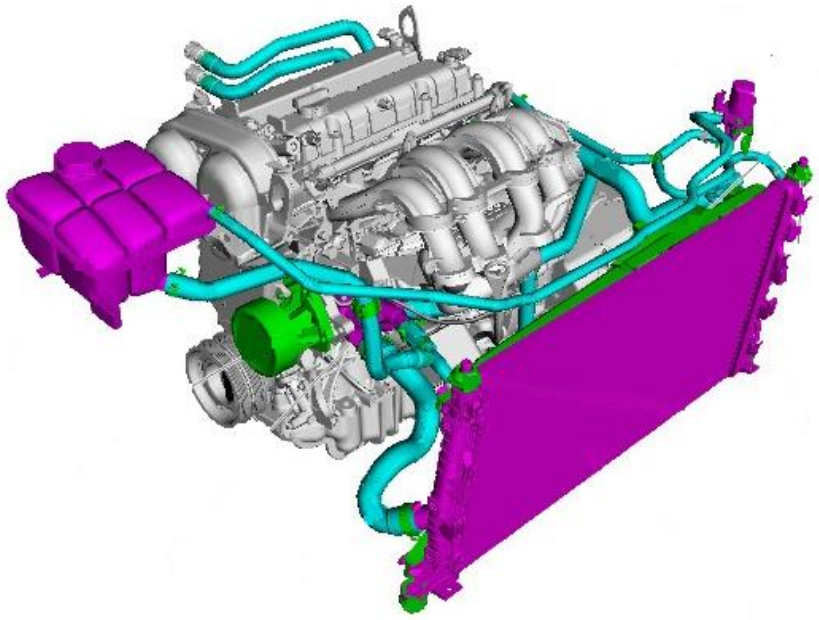
Components Testing Equipment



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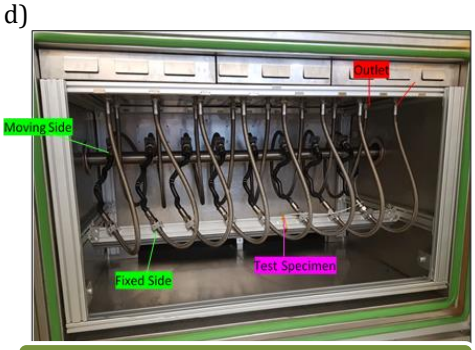
Pressure Fluctuation Test Bench for Cooling Water Circuit Components (With "Linear" and "Eccentric" Moving Unit)

Features:

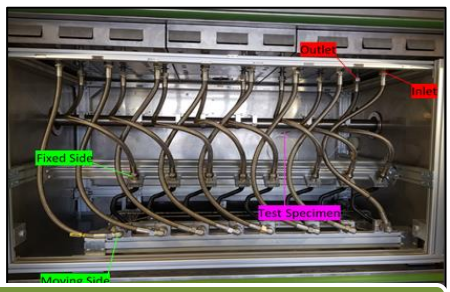
- Pressure Fluctuation test bench with linear and eccentric moving unit
- Pressure in the range from 0.1 to max. 5bar
- Heating of the test chamber with monitoring and limitation of the max. surface temperature
- Automatic leak detect and leak test (with automatic switching off, of failed test parts)
- Automatic backflow pump for coolant leakage
- Windows / LabView based control unit and data recording

- Dimensions test bench: 4350mm x 2520mm x 2150mm (w x h x d)
- Inner dimensions chamber: 1800 x 1000 x 1000mm (w x h x d)
- Rated power: 60 kW
- Operating fluid: Glycol / Water
- Pressure range: 0…5 bar
- Main flow: up to ca. 100 l/min
- Range of movement: ±25mm at 1Hz
  ±12mm at 5Hz
  ±6mm at 10Hz
  ±2mm at 20Hz
- Temperature range fluid: -40°C … +150°C
- Temperature range chamber: -40°C … +150°C
- Number of test channels: 8

- Examples for practicable test specifications:
  - VW: TL 874 (4.4),TL 82002, TL 52682, TL 889 (4)
  - VW: TL 52361, PV 1712 (Ag-99-03)
  - GM: GMW 3155
  - Porsche: PTL 14052, PTL 14100
  - BMW: LH 10356681-000-03, LH 10757369-000-04
  - BMW: QV 17004 (3.2.8), LH 10591317-000-01
  - BMW: LH 10274837-000-03
  - DIN 73411-2



Construction inside the chamber, linear movement



Construction inside the chamber, eccentric movement

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Pressure Fluctuation Test Bench for Cooling Water Circuit Components *(with 3D-moving unit)*

Features:

- Designed for pressure tests on various hose components of the automotive cooling water circuit
- Pressure change test bench with 3D-moving unit. 3D-moving unit installed under the test chamber
- Static and pulse pressures in the range of -0.5 to max. 10bar
- Heating of the test chamber with monitoring and limitation of the max. over temperature
- Automatic leak detect and leak test (with automatic switching off, of failed test parts)
- Automatic backflow pump for coolant leakage
- Windows / LabView based control unit and data recording

- Dimensions test bench: 4700mm x 1900mm x 2500mm (w x h x d)
- Inner dimensions chamber: 1800 x 1000 x 1000mm (w x h x d)
- Rated power: 82 kW
- Operating fluid Glycol / Water
- Pressure range: up to 10 bar
- Main flow: up to ca. 40 l/min per test parts (max. 400 l/min with 10 channels)
- Range of movement: X- axis: max. ±40mm max. 2,0Hz
  Y- axis: max. ±40mm max. 2,5Hz
  Z- axis: max. ±40mm max. 3,0Hz
- Waveform pressure: Sine, Trapezoidal, Static
- Temperature range fluid: -40°C ... +150°C
- Temperature range chamber: -40°C ... +150°C
- Number of test channels: 10

- Examples for practicable test specifications:
  - VW: TL 874 (4.4),TL 82002, TL 52682, TL 889 (4)
  - VW: TL 52361, PV 1712 (Ag-99-03)
  - GM: GMW 3155
  - Porsche: PTL 14052, PTL 14100
  - BMW: LH 10356681-000-03, LH 10757369-000-04
  - BMW: QV 17004 (3.2.8), LH 10591317-000-01
  - BMW: LH 10274837-000-03
  - DIN 73411-2

Construction inside the chamber

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Pressure Fluctuation Test Bench for Automotive Cooling Parts

Four Door Design

Features:

- Designed to test automotive cooling parts, in particular radiators, rubber hoses and surge tanks
- Pressure in the range from 0.1 to max. 5bar
- In explosion protect class 1, because of indirect chamber heating
- Automatic leak detect and leak test (with automatic switching off of failed test parts)
- Automatic backflow pump for coolant leakage
- Chamber entrance front and backside (Front twin door + Rear twin door)
- Windows based control unit and data recording

- Dimensions test bench: 4600 x 2300 x 1950mm (w x h x d)
- Inner dimensions chamber: 2400 x 1200 x 1600mm (w x h x d)
- Rated power: 60 kW
- Operating fluid: Glycol / Water
- Pressure range: 0 ... 5 bar
- Main flow: up to ca. 100 l/min
- Pressure frequency: >0 ... 2Hz
- Waveform pressure: Sine, Trapezoidal, Static
- Temperature range fluid: RT ... +150°C
- Temperature range chamber: RT ... +150°C
- Number of test channels 8

- Examples for practicable test specifications:
  - VW: TL 874 (4.4),TL 82002, TL 52682, TL 889 (4)
  - VW: TL 52361, PV 1712 (Ag-99-03)
  - GM: GMW 3155
  - Porsche: PTL 14052, PTL 14100
  - BMW: LH 10356681-000-03, LH 10757369-000-04
  - BMW: QV 17004, LH 10591317-000-01, LH 10274837-000-03
  - DIN 73411-2

Construction inside the chamber

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Inner Pressure Generator for Parts of Commercial Vehicle Cooling Circuit

Features:

- Designed to test various components of the commercial vehicle cooling water circuit
- Static pressures in the range from 0.1 to max. 7 bar possible
- Dynamic pressures up to max. 3.5 bar possible

- Dimensions test bench: 1200 x 2450 x 1650mm (w x h x d)
- Rated power: 12 kW
- Operating fluid: Glycol / Water
- Pressure range:
  - static: 0 ... 7 bar
  - dynamic: 0 ... 3,5 bar
- Main flow: up to ca. 100 l/min
- Pressure frequency:
  - Expansion volume 0.1 L: up to 5 Hz
  - Expansion volume up to 1.5 L: up to 1 Hz
- Waveform pressure: Sine, Trapezoidal, Static
- Temperature range fluid: RT ... +150°C

- Examples for practicable test specifications:
  - VW: TL 874 (4.4),TL 82002, TL 52682, TL 889 (4)
  - VW: TL 52361, PV 1712 (Ag-99-03)
  - GM: GMW 3155
  - Porsche: PTL 14052, PTL 14100
  - BMW: LH 10356681-000-03, LH 10757369-000-04
  - BMW: QV 17004, LH 10591317-000-01, LH 10274837-000-03
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Test Bench for Cooling Water Surge Tank

Features:

- Designed to perform tests on surge tanks
- Adjustable static pressure in the range from 0 to max. 5bar
- Adjustable flow rate per specimen from min. 0 to max. 8 l/h
- In explosion protect class 1, because of indirect chamber heating
- Automatic leak detect and leak test (with automatic switching off of failed test parts)
- Possibility of manual level control
- Chamber entrance at the front side
- Windows based control unit and data recording

- Dimensions test bench: 2200 x 2240 x 1550mm (w x h x d)
- Inner dimensions chamber: 1000 x 800 x 1000mm (w x h x d)
- Rated power: 9,5 kW
- Operating fluid: Glycol / Water
- Pressure range: 0 ... 5 bar
- Main flow: up to ca. 48 l/min
- Waveform pressure: Static
- Temperature range fluid: 25 ... +150°C
- Temperature range chamber: 25 ... +150°C
- Number of test channels: 6

- Examples for practicable test specifications:
  - VW: TL 889 ($)
  - Ford: ESDG93-8A080-AA (3.6)
  - GM: GMW15310 (3.2.1.2)
  - BMW: QV 17004 (3.2.6)
  - Porsche: PLB-A2B-Z

Construction inside the chamber

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Cooling Water Surge Tank Misuse Test Bench

Features:

- Designed to test surge tanks with extreme test requirements
- Especially build for misuse tests
- Adjustable static pressure in the range from 0 to max. 5bar
- Adjustable flow rate from min. 0 to max. 10 l/min
- In explosion protect class 1, because of indirect chamber heating
- Automatic leak detect (with automatic switching off)
- Stainless steel test chamber with top opening (special lockable access opening)
- Pressure-resistant test chamber up to 5 bar
- Control and measurement data recording realized via PLC

- Dimensions test bench: 1000 x 2200 x 2200mm (w x h x d)
- Inner dimensions chamber: 700 x 750mm (d x h)
- Rated power: 7,5 kW
- Operating fluid: Glycol / Water
- Pressure range: 0 … 5 bar
- Main flow: up to ca. 10 l/min
- Waveform pressure: Static
- Temperature range coolant: 30 … +150°C
- Temperature range chamber: 30 … +160°C
- Number of test channels: 1

- Examples for practicable test specifications:
  - Audi: LAH.4S0.121
  - Build for tests out of specification

Construction inside the chamber

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Perfusion Test Bench

Features:

- Designed to test automotive cooling parts, in particular rubber hoses and pipes
- Especially for static long-term tests
- Adjustable static pressure in the range from 0 to max. 5bar
- Adjustable flow rate per specimen from 0 to 5000 l/h / test part
- Maximum total flow rate 50000 l/h
- In explosion protect class 1, because of indirect chamber heating
- Automatic leak detect and leak test (with or without automatic switching off of failed test parts)
- Chamber entrance front and backside (Front twin door + Rear twin door)
- Available with water chiller or with air recooling based on radiators
- Windows based control unit and data recording

- Dimensions test bench: 3400 x 2500 x 1600mm (w x h x d)
- Inner dimensions chamber: 1790 x 1000 x 1200mm (w x h x d)
- Rated power: 46 kW
- Operating fluid: Glycol / Water
- Pressure range: 0 ... 5 bar
- Main flow: up to ca. 50000 l/h
- Waveform pressure: Static
- Temperature range fluid: 40 ... +150°C
- Temperature range chamber: 40 ... +150°C
- Number of test channels: 10

- Examples for practicable test specifications:
  - BMW: LH 10356681-000-03 (6.2.2.13.2)
  - BMW: LH 10356682-000-02 (6.2.2.9)

Construction inside the chamber

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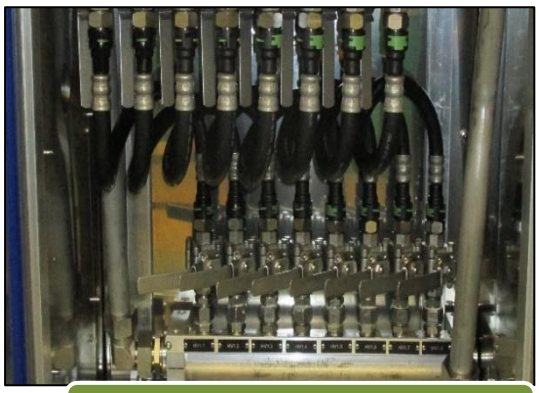
Pressure Pulse Test Bench with Pressure Peak Generator

Features:

- Designed to test automotive motor parts, e. g. Quick Connectors (QC) and SCR-pipes
- Pressure in the range from 0 to max. 50bar
- Especially for highly dynamic pressure pulse tests with electrodynamic shaker and integrated pressure peak generator for superimposed pressure peaks
- Automatic leak detect and leak test (with automatic switching off)
- Orderable with different chambers (Explosion protection because of nitrogen inertisation)
- Windows based control unit and data recording

- Dimensions test bench: 1000 x 2100 x 2300 (w x h x d)
- Inner dimensions chamber: Depends on chamber
- Rated power: 20 kW
- Operating fluid: Hydraulic Oil / Gear Oil
- Pressure range: 0 ... 50 bar
- Main flow: up to ca. 170 l/min
- Pressure frequency: 0 ... 2Hz
- Pressure-Peak-Generator: >0 ... 10 Hz
  - Pulse pauses ratio e. g.: 10ms / 90ms
- Waveform pressure: Sine, Trapezoidal, Triangle
- Temperature range coolant: +20 ... +170°C
- Temperature range chamber: Depends on chamber
- Number of test channels: Depends on chamber

- Examples for practicable test specifications:
  - BMW: LH 10451650-000-02 (6.2.2.3)
  - PSA: No 96 906 692 99 (11.3)
  - VW: TL82041 (7.6), TL82316
  - VW: TL82086 (2009-09), TL82048
  - GM: GMW14319 (4.3.20)



Construction inside the chamber (Depends on chamber)

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Pressure Pulse Test Bench for Oil

Features:

- Designed to perform pressure tests on diverse piping and pipe components
- Pressures with flow possible in the range from 0 to max. 40 bar
- Pressures without flow possible in the range from 0 to max. 170 bar
- Suitable for unsupervised operation
- Automatic leak detection (with automatic switch-off)
- Orderable with different test chambers
- Windows based control and measurement data recording

- Dimensions test bench: 1240 x 2200 x 1350mm (w x h x d)
- Inner dimensions chamber: Depends on chamber
- Rated power: 16,1 kW
- Operating medium: different oils from the automotive industry
- Pressure range:
  - static: 0 … 40 bar
  - dynamic: 0 … 40 (170) bar
- Main flow: up to ca. 120 l/min
- Pressure frequency:
  - Expansion volume 0.1 L: up to 5 Hz
  - Expansion volume up to 1.5 L: up to 1 Hz
- Waveform pressure: Sine, Trapezoidal, Static
- Temperature range fluid: +15°C … +150°C

- Examples for practicable test specifications:
  - BMW: LH 10451650-000-02 (6.2.2.3)
  - PSA: No 96 906 692 99 (11.3)
  - VW: TL82041 (7.6), TL 82086_2009-09 (5.1.1 / 5.1.2)
  - VW: TL 82086_2020-0 (7.2.1 / 7.2.2)
  - GM: GMW14319 (4.3.20)

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Pressure Pulse Test Bench for Oil, 50 bar (with Chamber)

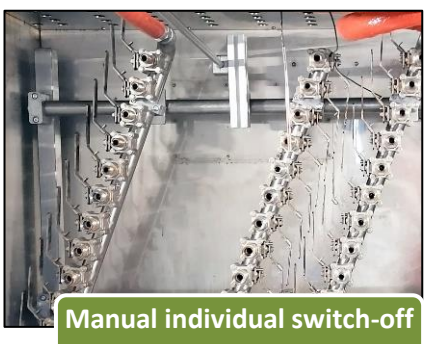
Features:

- Designed to perform pressure tests on various hose components
- Constant pressures as well as pressure pulses in the range of 0 to max. 50 bar possible
- Suitable for unattended operation
- Protection of the highly hygroscopic test medium by nitrogen atmosphere in the medium tank possible
- Automatic leak detection (with automatic central switch-of)
- Windows-based control and measurement data recording

- Dimensions test bench: 3701 x 2434 x 1634mm (w x h x d)
- Inner dimensions chamber: 1500 x 1000 x 1000mm (w x h x d)
- Rated power: 47 kW
- Operating medium: PAG-Oil, POE-Oil, Hydraulic Oil
- Pressure range:
  - static : 0 ... 50 bar
  - dynamic: 0 ... 50 bar
- Main flow: up to ca. 60 l/min
- Pressure frequency:
  - Expansion volume 0.1 L: up to 5 Hz
  - Expansion volume up to 1.5 L: up to 1 Hz
- Waveform pressure: Sine, Trapezoidal, Static
- Max number of test items: 24, manual individual switch-off
- Temperature range fluid: directly: 0°C ... +140°C
  indirectly via chamber: down to -40°C
  chamber: -40°C ... +140°C

- Examples for practicable test specifications:
  - VW: TL82316, TL 82086, TL82041
  - Daimler: A211830060
  - BMW: QV64005, LH 10451650-000-02
  - GM: GMW14319 (4.3.20)

Construction inside the chamber



Manual individual switch-off through Stopcock

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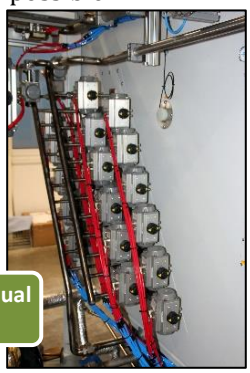
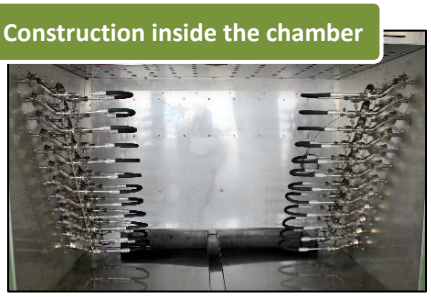
Pressure Pulse Test Bench for Oil, 50 bar LP, 200 bar HP (with Chamber)

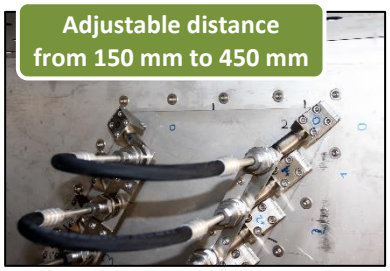
Features:

- Designed to perform pressure tests on various hose components
- Equipped with two pressure units. Constant pressures as well as pressure pulses in the low-pressure range from 0 to max. 50 bar and in the high-pressure range from 0 to max. 200 bar possible
- Suitable for unattended operation. Doors with large observation windows
- Protection of the highly hygroscopic test medium by nitrogen atmosphere in the medium tank possible
- Automatic leak detection and individual switch-off of the test channels
- Test channels with adjustable distance between 150 mm and 450 mm
- Windows-based control and measurement data recording



- Dimensions test bench: 4600 x 2500 x 2300mm (w x h x d)
- Inner dimensions chamber: 1800 x 1000 x 1000mm (w x h x d)
- Rated power: 50 kW
- Operating medium: PAG-Oil, POE-Oil, Hydraulic Oil
- Pressure range LP:
  - static: 0 ... 50 bar
  - dynamic: 0 ... 50 bar
- Pressure range HP:
  - static: 0 ... 200 bar
  - dynamic: 0 ... 200 bar
- Main flow: up to ca. 60 l/min
- Pressure frequency LP: up to 50 bar
  - Expansion volume 0.1 L: up to 5 Hz
  - Expansion volume up to 1.5 L: up to 1 Hz
- Pressure frequency HP: up to 200 bar
  - Expansion volume up to 0.3 L: up to 1 Hz
- Waveform pressure: Sine, Trapezoidal, Static
- Max number of test items: 24, automatic individual switch-off
- Temperature range fluid: directly: -40°C ... +150°C, indirectly via chamber: +150°C ... +170°C
  chamber: -40°C ... +180°C
- Examples for practicable test specifications:
  - for HP: VW: LAH.1EA.816K, DIN SPEC 74102, DIN SPEC 74106
  - for LP: VW: TL82316, Daimler: A211830060, BMW: QV64005





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Air Charge Hose Tester (with Robot)

Features:

- Designed to test automotive motor parts, in particular air charge hoses
- Especially for high temperature pressure pulse tests with hot air
- With a large chamber
- Pressure in the range from -0.5 to max. 5bar
- Automatic leak detect and leak test (with automatic switching off of failed test parts)
- With an integrated robot for tests with a superimposed 3D - moving
- Windows based control unit and data recording

- Dimensions test bench: 4100 x 2400 x 2000 (w x h x d)
- Inner dimensions chamber: 1500 x 1500 x 1000 (w x h x d)
- Rated power: 35 kW
- Operating fluid: Air
- Pressure range: -0.5 ... 5 bar
- Pressure frequency: >0 ... 2Hz
- Waveform pressure: Trapezoidal, near Sine
- Temperature range air: +30 ... +250°C
- Temperature range chamber: +30 ... +250°C
- Number of test channels: 4
- Frequency motion: >0 ... 2 Hz
- Amplitude motion: max. ± 30mm

- Examples for practicable test specifications:
  - GM: GMW16153 (3.2.1.2)
  - VW: VW60562 (5.2.2.1)
  - Fiat: MS 9.02132-01(2.5.9)
  - Ford: ESBB53-6C646-AA (4.3.1)
  - Renault: to customer specification
  - Bosch: BMTS V_0079
  - BMW LH 10403165-000-03 (6.1.2.5)
  - BMW: LH 10354866-000-01 (6.3.4.2)

Construction inside the chamber

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Air Charge Hose Tester (with 3-D Moving Unit)

Features:

- Designed to test automotive motor parts, in particular air charge hoses
- Especially for high temperature pressure pulse tests with hot air
- Pressure in the range from -0.5 to max. 5bar
- Automatic leak detect and leak test (with automatic switching off of failed test parts)
- With an integrated moving unit for tests with a superimposed 3D – moving
- Orderable with different chambers
- Windows based control unit and data recording

• Dimensions test bench:	~3300 x 2500 x 3200 mm (w x h x d)
• Inner dimensions chamber:	Depends on chamber
• Rated power:	40 kW, 55kW
• Operating fluid:	Air
• Pressure range:	-0.5 ... 5 bar
• Pressure frequency:	>0 ... 2Hz
• Waveform pressure:	
○ manual regulation:	Trapezoidal with not exact rise-fall time, near Sine
○ option: automatic regulation:	regulated trapezoidal, regulated sine wave
• Temperature range air:	
○ active tempering:	+30 ... +250°C
○ without pulsation:	temp. of air = temp. of chamber
○ option: active cooling:	possible, but normally not necessary (also not for specs below)
• Temperature range chamber:	Depends on chamber
○ normally:	-40°C ... 180°C
○ possible if necessary:	-60°C ... 210°C
• Number of test channels:	4
• Frequency motion:	>0 ... 3Hz
• Amplitude motion:	max. ± 40mm
• Examples for practicable test specifications:	
○ GM: GMW16153 (3.2.1.2)	VW: VW60562 (4.2.2.1-4.2.2.2)
○ Fiat: MS 9.02132/01 (2.5.9)	BMW LH 10403165-000-03 (6.1.2.5), LH 10354866-000-01 (6.3.4.2)
○ Ford: ESBB53-6C646-AA (4.3.1)	to customer specification

Construction inside the chamber (Depends on chamber)

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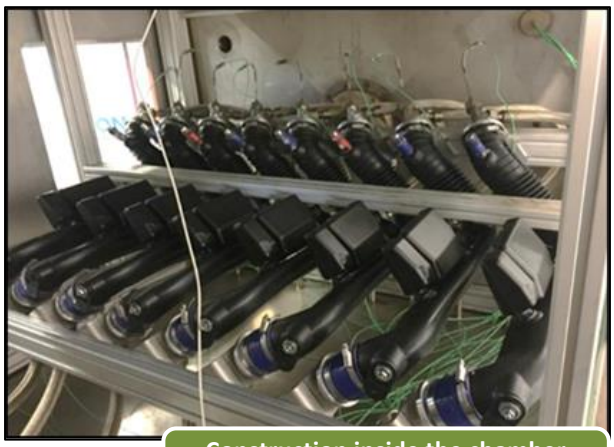
Air Charge Hose Tester (with 3-D Moving Unit)

Extremely Wide Heating and Cooling Range

Features:

- Designed to test automotive motor parts, in particular charge air components
- Especially for high temperature pressure pulse tests with hot air
- Pressures in the range from -0.5 to max. 5 bar possible
- Automatic leak detect and leak test (with automatic switching off of failed test parts)
- Automatic control of the waveform (sinus, trapezoid and static mode)
- With an integrated moving unit for tests with a superimposed 3D – moving
- Windows based control unit and data recording

Dimensions test bench:	5870 x 2648 x 1887mm (w x h x d)
Inner dimensions chamber:	1800 x 1100 x 1500mm (w x h x d)
Weight (empty):	4200 kg
Rated power fluid conditioning	35 kW
Rated power chamber	70 kW
Operating fluid:	Air
Pressure range:	-0.5 … 5 bar
Pressure frequency:	>0 … 2Hz
Waveform pressure:	trapezoid, near sine
Temperature range air	+40 … +250°C
Temperature range chamber:	-40 … +230°C
Number of test channels:	8
Frequency motion:	>0 … 3 Hz
Amplitude motion:	max. ± 40mm



Construction inside the chamber
(Depends on chamber)

- Examples for practicable test specifications:
  - GM: GMW16153 (3.2.1.2)
  - VW: VW60562 (4.2.2.1-4.2.2.2)
  - Fiat: MS 9.02132/01 (2.5.9)
  - BMW LH 10403165-000-03 (6.1.2.5), LH 10354866-000-01 (6.3.4.2)
  - Ford: ESBB53-6C646-AA (4.3.1)
  - to customer specification

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Thermal Shock Test Bench

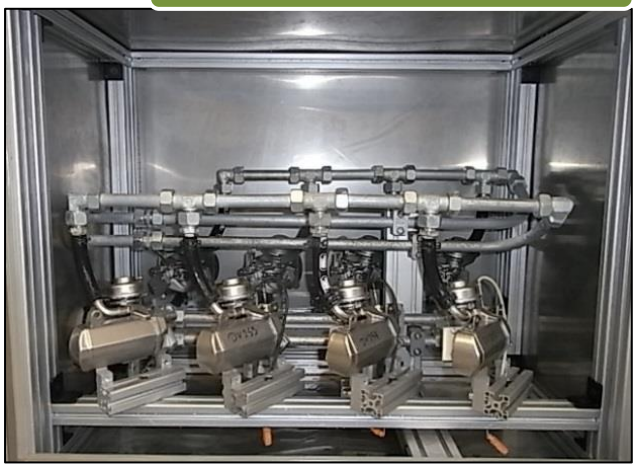
Features:

- Designed to test automotive parts of the exhaust gas cooling system, e. g. heat exchanger
- Designed for thermal shock testing
- Static pressures adjustable in the range from 1 to max. 10 bar
- Flow rate adjustable from 0 to max. 100 l/min
- Automatic leak detect (with automatic switching off)
- Windows based control unit and data recording

- Dimensions test bench: 2500 x 2000 x 1500mm (w x h x d)
- Inner dimensions chamber: 1000 x 800 x 600mm (w x h x d)
- Rated power: 50 kW
- Operating fluid: Glycol / Water
- Pressure range: 1 … 10 bar
- Main flow: up to ca. 100 l/min
- Waveform pressure: Static
- Temperature range coolant: -30 … +125°C
- Number of test channels: 8

- Examples for practicable test specifications:
  - to customer specification

Construction inside the chamber



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Mobile Thermal Shock Test Bench with combined Internal Pressure Generator, static / dynamic

Features:

- Designed and built for testing components of the cooling water circuit of vehicles
- Developed for thermal shock testing
- Static pressures adjustable up to a maximum of 7 bar (relative)
- Suitable for dynamic pressure change tests at maximum expansion volume of ca. 1.5l at sine with 1Hz
- Flow rate adjustable from 0 to a maximum of 100 l/min
- Automatic leak detection
- Windows based control unit and data recording

Dimensions test bench:	1650 x 2350 x 1600mm (w x h x d)
Weight (empty):	ca. 1700 kg
Rated power	28 kW
Operating fluid:	Glycol / Water
Pressure range:	0 … 7 bar (relative), static and dynamic
Waveform pressure:	Static, Sine, Triangle, Square; Sawtooth
Main flow	up to ca. 100l/min
Temperature range of the medium:	-20 … +130°C, dT = 33K/min
Number of test channels:	2

Hot and cold circuit connections

Flow and return connections

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Burst Pressure Test Bench

Features:

- Designed to test any media carrying components, e.g. heat exchangers, pipes, vessels, etc.
- For burst pressure tests, with media according to customer specification
- Pressure range depending on requirements: 0 to max. 30 / 100 / 250/ ... bar
- Automatic burst pressure detection (with automatic switch-off)
- Windows based control unit and data recording

	Type 1	Type 2
Dimensions test bench:	1600 x 1600 x 800mm (w x h x d)	1700 x 1700 x 700mm (w x h x d)
Inner dimensions chamber:	800 x 500 x 700mm (w x h x d)	1200 x 550 x 700mm (w x h x d)
Rated power:	2 kW	2 kW
Operating fluid:	specified Water	low viscosity oils
Pressure range:	0 ... 100 bar	0 ... 250 bar
Waveform pressure:	Ramp	Ramp
Temperature range coolant:	RT	RT
Temperature range chamber:	RT	RT
Number of test channels:	1	1

- Examples for practicable test specifications:
  - BMW: LH 10356682-000-02 (6.2.2.2)
  - GM: GMW14329 (4.2)
  - VW: TL 82086 (6.4), TL 82316 (8.6.2)
  - DIN 73379 (8.5),DIN SPEC 74106 (9.7.12.1)

Construction inside the chamber

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Burst Pressure Aggregate for Functional Tests on Diverse Test Parts (e.g. QC Connectors)

Features:

- Designed to test components from the vehicle cooling water circuit
- For burst pressure tests
- Pressure in the range from 0 to max. 140 bar; other ranges according to customer requirements!
- Automatic burst pressure detection (with automatic switch-off)
- Windows based control unit and data recording

- Dimensions test bench: 1010 x 1160 x 730mm (w x h x d)
- Weight (empty): ca. 180 kg
- Rated power: 300 W
- Operating fluid: Glycol / Water
- Pressure range: 0 ... 140 bar
- Ambient temperature for operation: +10°C ... +35°C
- Number of test channels variable

- Examples for practicable test specifications:
  - BMW: LH 10356682-000-02 (6.2.2.2)
  - GM: GMW14329 (4.2)
  - VW: TL 82086 (6.4), TL 82316 (8.6.2)
  - DIN 73379 (8.5)

Construction inside the chamber

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Burst Pressure Aggregate for Functional Tests on Diverse Test Parts (with Chamber)

Features:

- Designed to test components from the vehicle cooling water and charge air area
- For burst pressure tests
- Pressure in the range from 0 to max. 30 bar
- Automatic burst pressure detection (with automatic switch-off)
- Windows based control unit and data recording

Dimensions test bench:	3100 x 2500 x 1700mm (w x h x d)
Inner dimensions chamber:	1000 x 900 x 1000mm (w x h x d)
Weight (empty):	ca. 2200 kg
Rated power:	27 kW
Operating fluid:	Compressed air / water
Pressure range:	0 … 30 bar
Temperature range water:	0°C … +90°C
Temperature range compressed air:	-40°C … +220°C
Number of test channels	1

- Examples for practicable test specifications:
  - BMW: LH 10356682-000-02 (6.2.2.2)
  - GM: GMW14329 (4.2)
  - VW: TL 82086 (6.4)
  - DIN 73379 (8.5)

Construction inside the chamber

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Burst Pressure Test Bench for Function Tests on Complete Wheels

Features:

- Designed for functional tests on complete wheels only (rims with tyres)
- For burst pressure tests
- Overpressure in the range from 0 to max. 30 bar
- Automatic burst pressure detection (with automatic switch-off)
- Windows-based control and measurement data recording

Test bench dimensions:	1200 x 1850 x 1200mm (w x h x d)
Internal chamber dimensions:	1150 x 1070 x 1150mm (w x h x d)
Test chamber volume:	ca. 1400 L
Weight (empty):	ca. 720 kg
Rated power:	1.1 kW
Operating fluid:	Water
Pressure range:	0 ... 30 bar overpressure
Temperature range water:	+5°C ... +40°C
Ambient temperature range:	+10°C ... +35°C
Temperature range for storage:	+5°C ... +55°C
Number of test specimens:	1

- Examples for practicable test specifications:
  - Built to customer specification
    or to the specifications of the end customer
    in the automotive sector Porsche AG

Test set-up in the chamber

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Burst Pressure Test Bench for High Pressure 5500 bar, Water

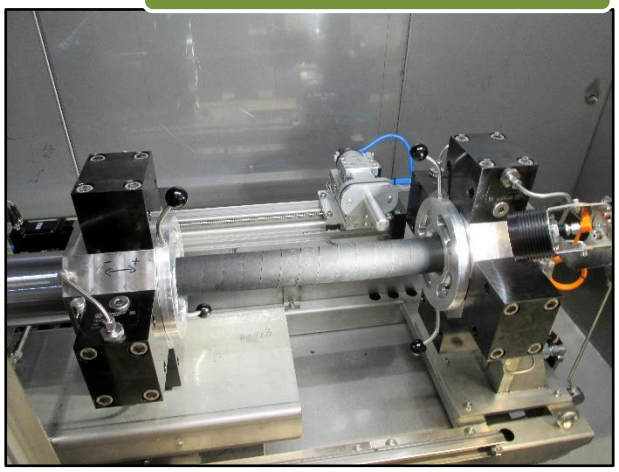
Features:

- The pressure and burst pressure test bench was designed and constructed for functional tests on hoses and hose assemblies.
- For bursting pressure tests
- Overpressure in the range from 0 to max. 5500 bar. Test medium is water
- Hydraulic clamping of the test specimen
- Automatic burst pressure detection (with automatic switch-off)
- Measurement of the expansion volume possible
- Windows-based control and measurement data recording

- Test bench dimensions: 4500 x 3300 x 1500mm (w x h x d)
- Weight (empty): ca. 3800 kg
- Volume collection tank CM2: ca. 75 L
- Volume vacuum tank CM3: 20 L
- Rated power: 8 kW
- Operating fluid: Water
- Pressure range : 0 ... 5500 bar overpressure
- Ambient temperature range: +10°C ... +35°C
- Temperature range for storage: +5°C ... +55°C
- Number of test specimens: 1

- Examples for practicable test specifications:
  - VW: TL 82316 (8.6.2)
  - DIN SPEC 74106 (9.7.12.1)
  - to customer specification

Test set-up in the chamber



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Water Pump Test Bench for Functional Tests on Coolant-Water Pumps

Features:

- Designed to test components of the automotive coolant circuit, in particular coolant-water pumps
- Pressures in the range from 0.1 to max. 6 bar possible
- Automatic leak detect (with automatic switching off of failed test parts)
- Windows based control unit and data recording
- Designed e.g. for functional tests according to VW TL 82165 -4.2

- Dimensions test bench: 2000 x 1800 x 1200mm (w x h x d)
- Dimensions protective cabin: 2200 x 2260 x 1600mm (w x h x d)
- Weight (empty): ca. 1000 kg
- Rated power: 10 kW
- Operating fluid: Glycol / Water
- Pressure range: 0 … 6 bar
- Flow rate: up to ca. 1000 l/min
- Temperature range fluid: +30°C … +150°C
- Number of test channels: 3

- Examples for practicable test specifications:
  - VW:TL82165 (4.1 / 4.2)

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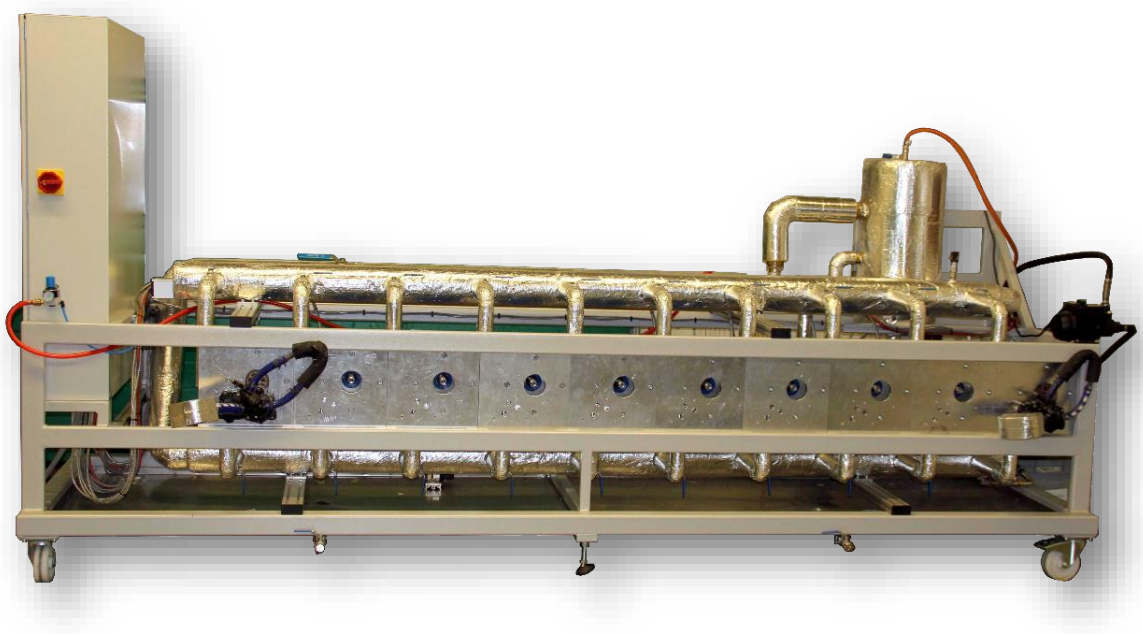
Water Pump Test Bench

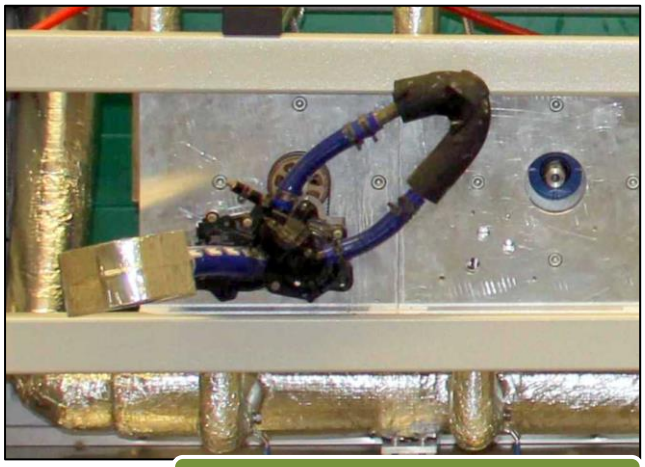


Features:

- Designed to test components of the automotive cooling water circuit, in particular water pumps
- Specially developed for long-term tests on water pumps
- Possibility of thermal shock tests
- Pressurisation of the flow pipe in the range from 0 to max. 8 bar
- Automatic leak detection with automatic switch-off of the test bench
- Control and measurement data recording realized via PLC

- Dimensions test bench: 4200 x 1750 x 1200mm (w x h x d)
- Rated power: 36 kW
- Operating fluid: Glycol / Water
- Pressure range: 0 ... 8 bar
- Waveform pressure: Static
- Temperature range fluid: -25 °C ... 135 °C
- Number of test channels: 10

- Examples for practicable test specifications:
  - VW:TL82165 (4.1 / 4.2)



Installation of a water pump

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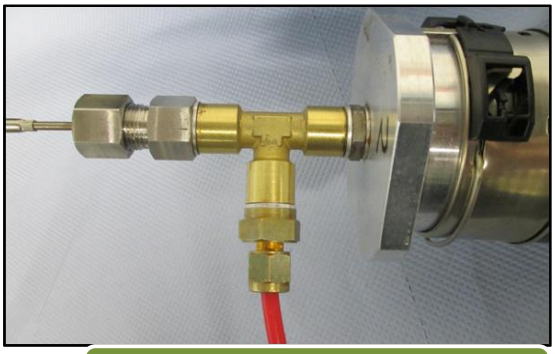
Air Leak Test Unit with 4 Automatic Channels

Features:

- Designed to test automotive motor parts, e.g. charge air, fuel components, etc.
- Especially to measure leak rates between 1.0mm³/s and 80,000mm³/s
- Pressures in the range of -0.98bar (20mbar absolute) to maximum 6 bar possible
- Temperature range from -60°C to 200°C possible (depending on chamber)
- Temperature sensor for chamber included (to take temperature changes into account)
- Automatic leak test of 4 Specimen, one after the other, over more temperature set points
- Automatic calculation of pressure loss in mbar and leak rate in mm³/s
- Data recording in Excel format (.csv), if required with macros for further evaluation, e.g. in "mbar * l / s"
- Delivered with an Excel Macro for fast measurement data evaluation
- Control system based on a high performance industry CPU
- Data recording integrated in control system
- Data transfer over network interface (Web browser)
- Specimen connection parts can optionally been delivered in several forms an diameters

- Dimensions test bench: ~ 600 x 1500 x 500mm (w x h x d)
- Weight: ca. 85kg
- Rated power: 600W
- Operating fluid: Air
- Pressure range: -0,98 ... 6 bar
- Leak Test Time (per channel): 5s ... 120min
- Temperature range chamber: Depending on chamber
  - normally: -40°C ... 180°C
  - possible if necessary -60°C ... 210°C
- Number of test channels: 4

- Examples for practicable test specifications:
  - GM: GMW16153 (3.2.1.4)
  - BMW: LH 10232362-000-03 (5.1), LH 10354866-000-01 (5.1)



Test specimen connection (by means of copper capillary)

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Gas Tightness Test Bench R744 (CO2) and Generally He-Leak Test

Features:

- Designed to test components of R744 (CO2) air conditioning systems, such as metal pipes and rubber hoses
- Especially to measure leakage rates with the measuring accuracy of < 0.05 g/a (R744 / CO2)
- Pressure range test gas from 10 to 180bar (rel.) is automatically controlled by electronic pressure regulator
- test specimen temperatures in the range of -40°C to 180°C possible (depending on test chamber)
- Speed of temperature change, ca. ±2.5°K / minute (depending on test chamber)
- Automatic leak test of six test specimens, one after the other, over several temperature levels. With separate temperature sensors to protect the samples
- Automatic calculation of the CO2 leakage rate from the measured He leakage rate, in [g/a]
- Possibility to save the data directly to file. The format and path of the data can be selected (e.g. Excel)
- Controlled by a very powerful industrial PC with touch display
- Data recording integrated in control system
- Remote maintenance / remote control of the machine can be carried out via an installed remote maintenance router
- Test specimen connections can be supplied in various shapes and diameters

- Dimensions test bench: ≈ 1000 x 1200 x 1400mm (w x h x d)
- Weight: ca. 340kg
- Rated power: ca. 1kW
- Operating medium: helium
- Pressure range: 10 ... 180 bar
- Temperature range chamber: dependent on chamber
  - normal: -40°C ... 180°C
- Number of test cells: 6

- Developed for leak tests, according to:
  - VW: LAH.1EA.816.K (6.4.7), LAH.80A.816.G (6.4.1)
  - DIN SPEC 74102 (9.2.1 / 9.2.2)

Test cells

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Test Bench for Leak Tests under Water, 200bar!

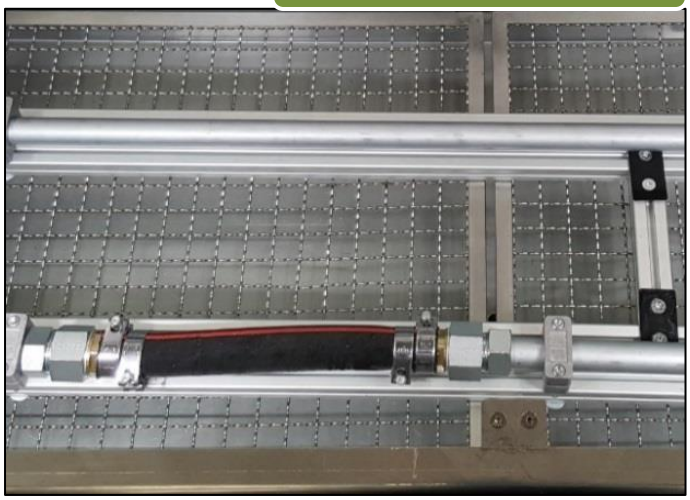
Features:

- Designed to test several different automotive parts, e. g. hoses and lines
- Especially for leak tests under water, with air or CO_2
- Pressure range from 0 to 200 bar
- Certified safety for a max. pressure content product up to 120 bar litres
- Automatic leak detection (with adjustable limits) during the test
- With huge windows in the housing for an optimal view on the test part
- With permanently installed and additional freely movable LED light for optimum illumination of the test specimen
- Windows based control unit and data recording

- Dimensions test bench: 3100 x 1300 x 1000mm (w x h x d)
- Inner dimensions chamber: 2000 x 700 x 800 (w x h x d)
- Rated power: 0,75 kW
- Operating fluid: Air, CO_2
- Pressure range Air / CO_2: 0 ... 200 bar
- Waveform pressure: Ramp, Static
- Temperature range Air / CO_2: RT
- Temperature Water: RT
- Number of test channels: 1

- Examples for practicable test specifications:
  - to customer specification

Construction inside the chamber (Test part on a steel grid)



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Test Bench for Pressure Retention Valves and Leakage Oil Lines

Features:

- Designed to test components of the automotive fuel system, in particular pressure retention valves and leakage oil lines
- Especially for testing opening pressures and flow characteristics
- Adjustable static pressure in the range from 0 bar to 50 bar
- Windows based control unit and data recording

- Dimensions test bench: 2500 x 2000 x 1300mm (w x h x d)
- Inner dimensions chamber: 1200 x 600 x 600mm (w x h x d)
- Rated power: 3 kW
- Operating fluid: Diesel
- Pressure range: 0 … 50 bar
- Main flow: 2 … 60 l/h
- Waveform pressure: Static
- Temperature range coolant: 20 … 80°C
- Number of test channels: 1

- Examples for practicable test specifications:
  - to customer specification

Construction inside the chamber

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Pressure Fluctuation Test Bench for AdBlue-Components

Features:

- Designed to test automotive parts of the exhaust gas post processing. e. g. SCR-, AdBlue- or Coolant-pipes
- Specially designed for testing with AdBlue
- Heating of the AdBlue with the help of the hose-integrated heaters of the test specimen
- Pressure range from 0 to 30 bar
- Possibility of different pressure waveforms
- Automatic leak detect and leak test (with automatic switching off of the test bench)
- Orderable with different test chambers (explosion protection by inerting)
- Windows based control unit and data recording

- Dimensions test bench: 1500 x 2000 x 1100mm (w x h x d)
- Inner dimensions chamber: Depends on chamber
- Rated power: 23 kW
- Operating fluid: AdBlue / Glycol / Water
- Pressure range AdBlue: 0 ... 30 bar
- Pressure range Glycol / Water: 0 ... 10 bar
- Pressure frequency: >0 ... 2Hz
- Waveform pressure: Sine, Trapezoid, Static
- Temperature range AdBlue: Depends on test item
- Temperature range Glycol / Water: 20 ... 135°C
- Temperature range chamber: Depends on chamber
- Number of test channels: Depends on chamber

- Examples for practicable test specifications:
  - VW: TL 52361 (9.3.1)

Construction inside the chamber
(Depends on chamber)

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AdBlue Refuelling System

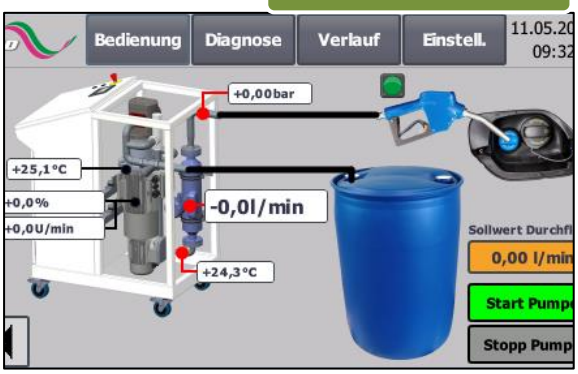
Features:

- The system is used for "refuelling simulation" with varying flow rates and test media on different test specimens. Available with different nozzles
- Functional principle of the refuelling system as controlled pump unit
- Use of AdBlue®, ShellSol TD® and water as test media possible
- The flow rate in the range of 5 l/min to a maximum of 100 l/min is possible
- Temperature monitoring with automatic switch-off
- Control and operation via a touch panel

- Dimensions test bench: 600 x 995 x 1176mm (w x h x d)
- Weight (empty): ca. 280kg
- Rated power: 2500 W
- Operating fluid: AdBlue / ShellSol TD® / Water
- Flow rate: 5 ..... 100 l/min
- Temp. ambient during operation: min. +10 ... max. +25°C
- Temp. medium during operation: min. +10 ... max. +29°C
- Allowable recording temperature: min. +10 ... max. +25°C
- Number of nozzles: all available

- Examples of tests that can be carried out:
  - Customer requirements
  - Specification for mobile filling station for AUS 32 and synthetic fuel

Functional Principle



Ingenieurtechnische Dienstleistungen

Your partner for test technique
Vibration- / Measurement- / Test
Special Development / Test Benches

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Test Chamber with Indirect Heating 1000 Litre for e.g. Oil Pulser

Features:

- An incomplete test chamber specially designed and constructed for applications in conjunction with pressure pulse aggregates
- Ex-protection by avoiding excessive surface temperatures
- Indirect heat transfer heating
- Easy operation and control via LCD touch panel
- Use of intrinsically safe sensors
- The test chamber may only be operated in accordance with country-specific laws, regulations and standards

- Inner dimensions chamber: 1000 x 1000 x 1000mm (w x h x d)
- External dimensions test chamber: 1400 x 2400 x 1800mm (w x h x d)
- Weight: ca. 750 kg
- Rated power: 12 kW
- Temperature range chamber: +20°C ... +160°C
- Temperature rate of change:
  - Heating: up to 5K/min
  - Cooling: up to 3K/min
- Examples for practicable test specifications:
  - DIN 53508, DIN SPEC 74106 (9.10)
  - BMW: QV 64 005 (3.13)
  - Mercedes-Benz: A 211 830 06 00 (9.6)
  - VW: VW 80000 (5.6.8), TL 82316 (8.3 / 8.9 / 8.13)
  - VW: LAH.1EA.816.K (6.4.11.1)

Test chamber inside

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Test Chamber with Indirect Heating 4600 Litre for e.g. Oil Pulser

Features:

- The test chamber is designed for integration into other machines and systems and serves only as a heat chamber
- With indirect heat transfer heating and cooling
- With temperature limiter
- With humidification
- Easy operation and control via LCD touch panel
- With RJ45 interface

- Inner dimensions chamber: 2400 x 1200 x 1600mm (w x h x d)
- External dimensions: 3500 x 2500 x 1900mm (w x h x d)
- External dimensions with doors open: 3500 x 2500 x 4600mm (w x h x d)
- Weight: ca. 1300kg
- Rated power: 35 kW
- Temperature range chamber: RT ... +150°C
- Temperature rate of change:
  - Heating: up to 5K/min
  - Cooling: up to 3K/min
- Temperature deviation temporal: max. ±1K
- Temperature deviation spatial: max. ±2,5K
- Humidity range (at 5°C – 95°C): 50% - 100%

- Examples for practicable test specifications:
  - DIN 53508, DIN SPEC 74106 (9.10)
  - BMW: QV 64 005 (3.13)
  - Mercedes-Benz: A 211 830 06 00 (9.6)
  - VW: VW 80000 (5.6.8), TL 82316 (8.3 / 8.9 / 8.13)
  - VW: LAH.1EA.816.K (6.4.11.1)

Test chamber inside

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Test Chamber with Indirect Heating 1500 Litre for e.g. Oil Pulser

Features:

- The test chamber is designed for integration into other machines and systems and serves only as a heat chamber
- With indirect heat transfer heating and cooling
- With temperature limiter
- Easy operation and control via LCD touch panel
- With RJ45 and RS 485 interfaces

- Inner dimensions chamber: 1500 x 1000 x 1000mm (w x h x d)
- External dimensions: 2500 x 2200 x 1500mm (w x h x d)
- External dimensions with doors: 3500 x 2200 x 2500mm (w x h x d)
- Weight: ca. 950 kg
- Rated power: 25 kW
- Temperature range chamber: RT ... +180°C
- Temperature rate of change:
  - Heating: up to 5K/min
  - Cooling: up to 3K/min
- Temperature deviation temporal: max. ±1K
- Temperature deviation spatial: max. ±3K

- Examples for practicable test specifications:
  - DIN 53508, DIN SPEC 74106 (9.10)
  - BMW: QV 64 005 (3.13)
  - Mercedes-Benz: A 211 830 06 00 (9.6)
  - VW: VW 80000 (5.6.8), TL 82316 (8.3 / 8.9 / 8.13)
  - VW: LAH.1EA.816.K (6.4.11.1)

Test chamber inside

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Temperature Test Chamber with Electrodynamic Shaker

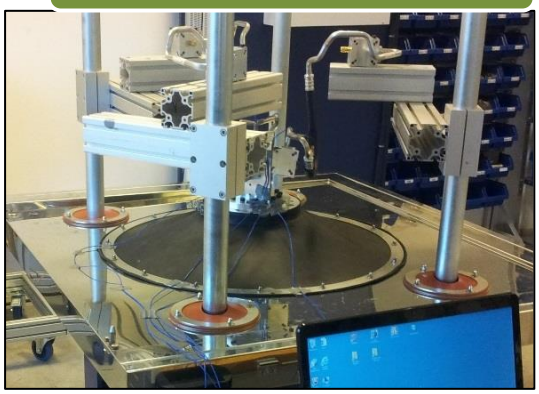
Features:

- Designed to test automotive parts
- Especially for tests with high frequency vibration profiles
- Possible frequencies from 5Hz to 3000Hz
- Possible amplitude of ±25mm
- Temperature test chambers according to customer requirements (stationary and movable chambers available)
- Windows based control unit and data recording

• Dimensions shaker:	1000 x 2500 x 1000 (w x h x d)
• Dimensions test bench	Depends on chamber
• Inner dimensions chamber:	Depends on chamber
• Nominal force:	10 kN / 20 kN / 30 kN / etc.
• Operating modes:	RSTD, Sine sweep, Random, Sine random,
• Temperature range chamber:	Depends on chamber
• Frequency motion:	5Hz … 3000 Hz
• Amplitude motion:	max. ± 25mm

- Examples for practicable test specifications:
  - Renault: 31-05-103/--A, 32-02-027/--B, 32-02-028/---
  - Renault: 32-02-840/--C, 34-00-039/--C, 37-06-097/---
  - Ford: ESDG93-8260-AA (3.15), ESHL3E-8A520-AA (3.11 / 3.12)
  - Ford: ESGK2Q-6K679-BA (3.3 / 3.4)
  - BMW: GS 95003-3 (4), GS 97073-2 (4.3.4)
  - BMW: PR 603.1, LH 10356682-000-02
  - Fiat: PS 9.02245 (2.10)
  - VW: VW80000 (5.5.4)

Specimen build up outside the chamber (only with movable chamber)



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Height-adjustable shaker chamber, with heating and cooling 500 Litre

Features:

- The test chamber is designed for temperature control of the environment of test fixtures or test specimens.
- Can be used e.g. for internal pressure and vibration resistance tests in industrial environments
- With floor lead-through to accommodate a device for the introduction of axial forces
- With electric heating and coolant evaporator
- With temperature limiter
- Easy operation and control via LCD touch panel
- With RJ45 and RS 232 interfaces

- Inner dimensions chamber: 800 x 800 x 800mm (w x h x d)
- External dimensions: 1350 x 2450 x 1450mm (w x h x d), Height adjustable
- Weight: ca. 840kg
- Rated power: 18 kW
- Temperature range chamber: -40°C ... +170°C
- Temperature rate of change:
  - Heating: up to 6K/min
  - Cooling: up to 6K/min
- Temperature deviation temporal: max. ±1K
- Temperature deviation spatial: max. ±2K
- Distance of travel of the chamber in Z: 500mm
- Refrigerant / filling quantity: R452a / 5kg

- Examples for practicable test specifications:
  - DIN 53508, DIN SPEC 74106 (9.10.1)
  - VW: LAH.1EA.816.K (6.4.11.1), TL 82316 (8.3 / 8.9 / 8.13)
  - BMW: QV 64 005 (3.13)
  - Mercedes-Benz A 211 830 06 00 (9.6 / 9.10.2)

Test chamber inside

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3-D Moving Unit Solo

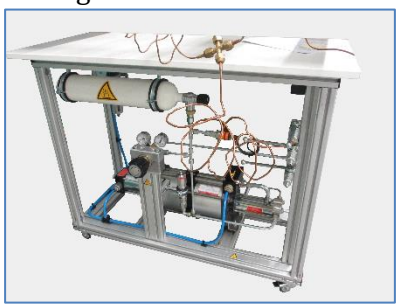
Features:

- Designed to test automotive motor parts (in particular air charge hoses) and also hoses and pipes of the air conditioning system
- Especially for motion tests in various test chambers
- For motion frequencies up to 3 Hz and a max amplitude of ± 35mm, separately adjustable for each axis
- With an integrated measurement system for measurements of a superimposed pressurization up to 250 bar
- Possibility of communication with external chambers and pressure controllers
- Orderable with or without test chamber (different manufacturers / types possible)
- Windows based control unit and data recording

- Dimensions test bench: 2600 x 2200 x 1300 (w x h x d)
- Inner dimensions chamber: Depends on chamber
- Rated power: 8 kW
- Temperature range chamber: Depends on chamber
- Frequency motion: >0 … 3 Hz
- Amplitude motion: max. ± 35mm
- Examples for practicable test specifications:
  - Low frequency 3-D motor movement

Accessory Equipment

- High Pressure Generator



Equipment shown without housing

- For pressures up to 250 bar
- Pressure reservoir contains 3 litres
- Manually pressure adjustment

Introduction into the chamber (depends on chamber)

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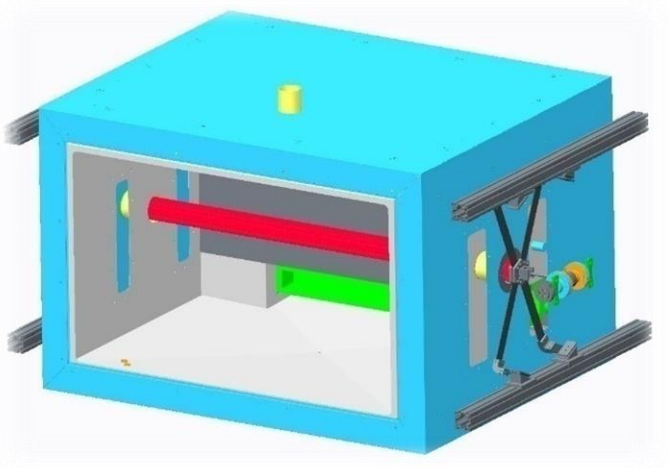
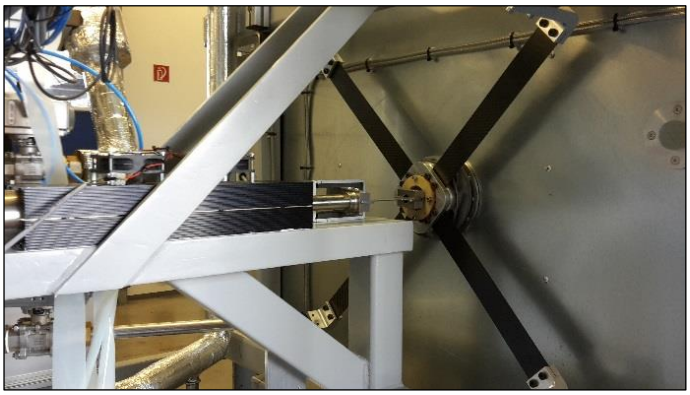
For Each Test Chamber: Variably Usable Linear Moving Unit

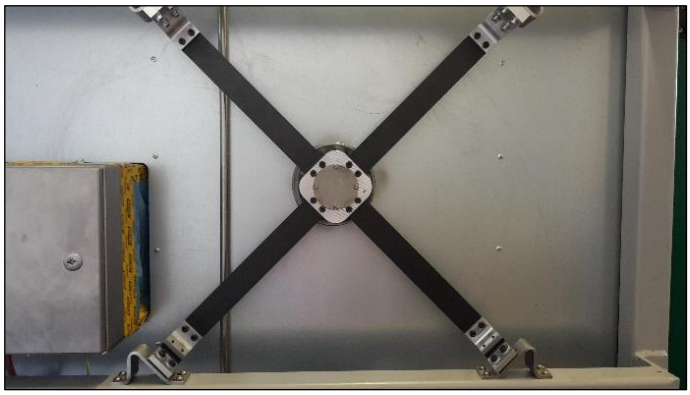


Principle drawing

Moving profile in the chamber



Drive via steplessly adjustable linear servo Drive



Carbon spring bearing

Features:

- Designed to test automotive parts, in a temperature-chamber with a superimposed low frequency vibration profile
- Can be installed in any test chamber
- Adjustable frequency from >0 to 20Hz
- Adjustable amplitude from ±30mm (depends on frequency)

- Motion amplitude: ± 30mm
- Motion frequency: >0 … 20Hz

- Examples for practicable test specifications:
  - GM: GMW14329 (4.3)

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Test Bench for Joint Play Measurement on Windscreen Wipers

Features:

- Designed to determine the tolerance of the hinge of the windscreen wiper
- Especially for measurements on the wiper arm and the wiper rubber
- Measurement on wiper arm and wiper rubber possible at the same time
- Max. traverse angel of ± 30°
- Rotation speed continuously adjustable
- Monitoring of torque limits
- Real-time control and data recording (Linux based)

- Dimensions test bench: 1300 x 1200 x 750mm (w x h x d)
- Rated power: 0.5 kW
- Angle range: ±30°
- Max Torque: 0.5 Nm
- Number of test parts: 2

- Examples of tests that can be carried out:
  - Customer requirements

Test build up
(Test of the wiper rubber)

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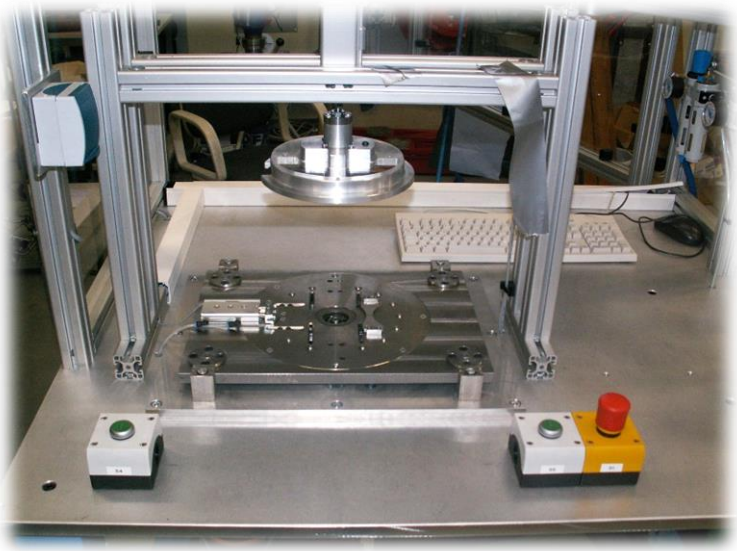
Test Bench for Determining the Backlash in Seat Back Adjusters

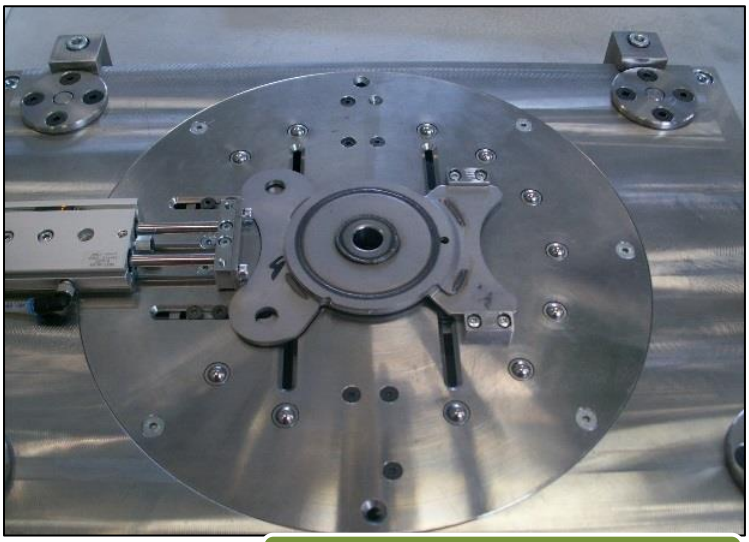


Features:

- Designed to measure and compensate backlash in seat back adjustment gears of car seats in the production process
- Strain-Gauge-Supported measurement of the tolerances with a defined subcomponent
- Automatically evaluation of the measurement and selection of the right component to compensate the tolerance
- Operator safety ensured by two-hand control
- Windows based control unit and data recording

- Dimensions test bench: 1000 x 1600 x 700mm (w x h x d)
- Rated power: 0.5 kW
- Number of test parts: 1

- Examples of tests that can be carried out:
  - Customer requirements



Test specimen at the testing device

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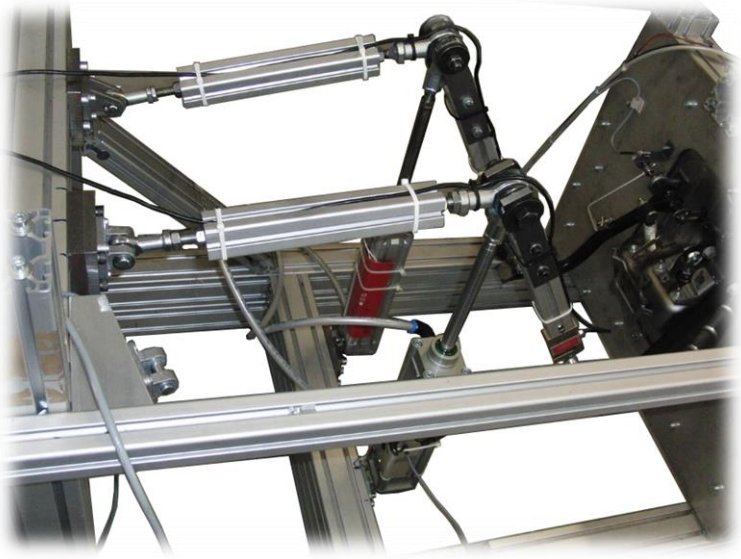
Test Bench for Pedals



Test bench shown without housing

Features:

- Designed for long term tests on pedals with a defined load spectrum
- Adjustable pedal load from 0 to 2 kN
- Automatic detect of failed test specimen
- PLC based control unit and data recording

- Dimensions test bench: 1000 x 1000 x 1500mm (w x h x d)
- Rated power: 0.5 kW
- Force range: 0 ... 2000 N
- Number of test parts: 3

- Examples for practicable test specifications:
  - Daimler: SFPP D17.30.01 (4.1 / 4.2 / 4.3 / 4.4)
  - Daimler: SFPP D17.30.02 (4.1 / 4.2 / 4.3)

Mounting of the pedals in the test bench

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Brake Dust Generator for Defined Contamination of Rims

Features:

- Designed to create a defined and reproducible break dust contamination on wheel rims
- Adjustable speed from 0 to 200 km/h
- Adjustable break pressure and breaking time
- Simulated airstream to distribute the break dust like in a real automobile
- Integrated wastewater pump to simulate rain and wet roads
- Visualization of all relevant states of the system
- Monitoring and displaying of the actual values
- PLC based control unit and data recording

- Dimensions test bench: 1000 x 2000 x 1500 mm (w x h x d)
- Inner dimensions chamber: 800 x 800 x 400 (w x h x d)
- Rated power: 18 kW
- Additional fluid: Dirty water
- Orbital speed of the wheel rim: 0 … 200 km/h
- Temperature range chamber: Resultant temperature
- Number of test parts: 1

- Examples of tests that can be carried out:
  - Customer requirements

Drive axle inside the chamber
(view on the break system)

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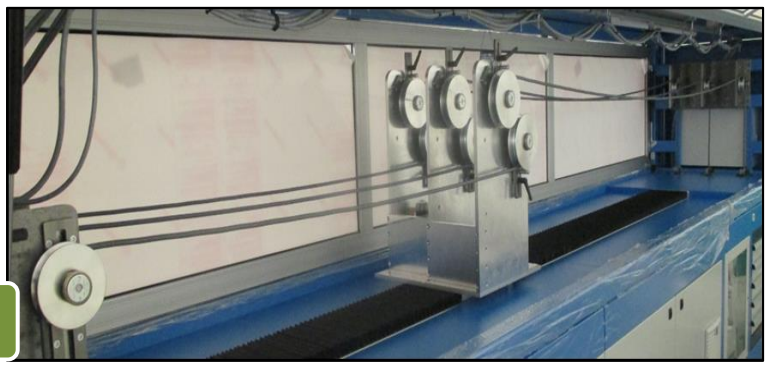
Bending Cycle and Spiral Cable Test Bench

Features:

- The "bending cycle and spiral cable test bench" is designed and built for functional tests on various test parts (cables).
- Specially developed for long-term tests
- Tests of the main wires with a defined current strength up to 32A and superimposed mains voltage as well as of the secondary wires with 100 mA can be carried out without superimposed mains voltage
- Automatic stretching (spiral cable) or bending (normal cable)
- Operation of the test bench via a touch panel on the swivel arm

- Test bench dimensions (without pendulum): 6000 x 2178 x 1100mm (w x h x d)
- Weight ca. (empty): 2300 kg
- Displacement movement unit: 0 ... 3000 mm
- Displacement speed movement unit: 0 ... 0,5 m/s
- Rated power: 6870 W
- Rated current: 30 A
- Pre-fuse by customer: 32 A
- Test specimens: normal cables, spiral cables, Car charging cables
- Number of test specimens: 3 identical test specimens

- practicable tests :
  - exclusively for function tests according to DIN EN 50396: (6.2 / 9.2)



Installation of the Test specimens

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Test Bench for Spray Nozzles

The test bench components (nitrogen generator / control unit / test cell)

Features:

- Designed to test automotive spray nozzles in climatic chambers, e.g. windshield cleaning nozzles (WCS) and headlight cleaning nozzles (HCS)
- Especially developed for tests with explosive / flammable fluids
- Consists of three separate components, (test cell, control unit, nitrogen generator)
- In explosion protect class 1, because of the nitrogen inertisation of the test cell
- Suction with explosion prevention to remove flammable fumes and smells from the test cell
- Tempering of the test cell and the fluid depends on the ambient temperature
- Visualization of all relevant states of the system
- Monitoring and displaying of the actual values
- PLC based control unit and data recording

- Dimensions test cell: 2030 x 2550 x 1600 mm (w x h x d)
- Inner dimensions test cell: 1900 x 1150 x 1450 (w x h x d)
- Rated power: 4 kW
- Operating fluid: Water-Ethanol mixture
- Allowable ambient temp. test cell: min. -25 °C / max. 80 °C
- Number of test parts: 20 (10 HCS / 10 WCS)

- Exemplary tests:
  - Washer fluid reservoir
    VO (EU) 1008/2010 Climate change test

Specimen inside test cell
(Windshield cleaning system above, headlight cleaning system below)

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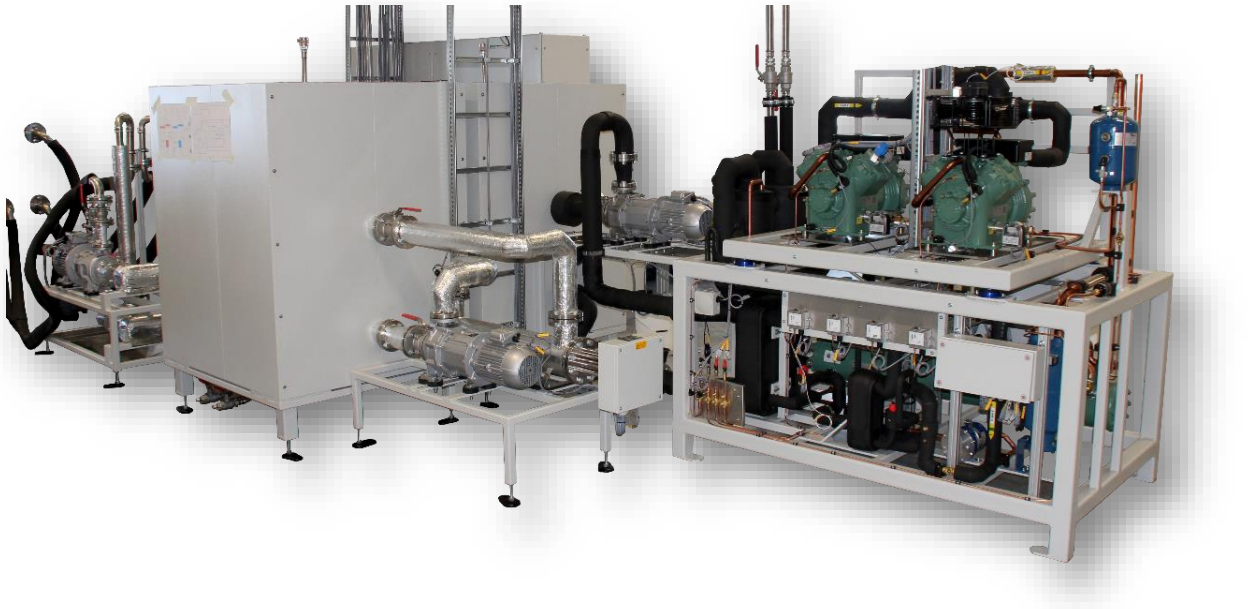
Plant for Medium Conditioning



Features:

- Media conditioning makes it possible to temper different test media via heat exchangers for internal pressure and thermal shock test benches; e.g. glycol-water mixtures (hot and cold)
- The system is designed and built for use in a test laboratory
- With temperature and leak monitoring
- It is controlled either via a test stand or can be entered via the HMI control panel

- Required space: 6700 x 8875 mm (w x d)
- Weight (empty): ca. 6100 kg
- Rated power: 84,5 kW
- Hot circuit:
  - Temperature range: up to max. +160°C
  - Reservoir volume: 1000 l
  - Operating medium: Heat transfer oil: Fragoltherm Q-7
- Cold circuit:
  - Temperature range: up to min. -40°C
  - Reservoir volume: 1000 l
  - Operating medium: Heat transfer oil: Fragoltherm F-12

Pumping station

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Multi Impact Test Unit (Gravelometer)

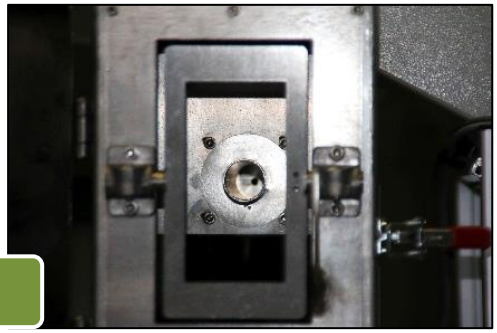
Features:

- Designed to assess the resistance of automotive paints and media-carrying pipes to bombardment with a chilled cast iron granulate as a simulated stone impact. The stone impact resistance of the coating or the pipes is tested by many small, sharp-edged impact bodies which strike in rapid succession and largely independently of each other
- Especially according to DIN EN ISO 20567-1 for continuous operation in multi-impact process. Usable for DIN and SAE standards; DIN → with metal granules, SAE → with crushed stone
- Pressures from 0 to 11 bar. Pressures > 11 bar possible, depending on the container Pressure accumulator
- SPS-control

- Dimensions test bench: 1350 x 1300 x 600 mm (b x h x t)
- Acceleration tube diameter: 30 mm
- Distance between acceleration tube
- and test specimen: 290 mm
- Rated power: < 500 W
- Operating fluid: Air
- Pressure range 0 ... 11 bar, > 11 bar possible
- Number of test parts: 1

- Examples for practicable test specifications:
  - DIN EN ISO 20567-1:2007-01
  - SAE: J400 (4.1.1)
  - BMW: GS 95024-3-1 (4.2)
  - Tesla: TS-0002476-2
  - Customer specification

Loading container



Muzzle of acceleration tube

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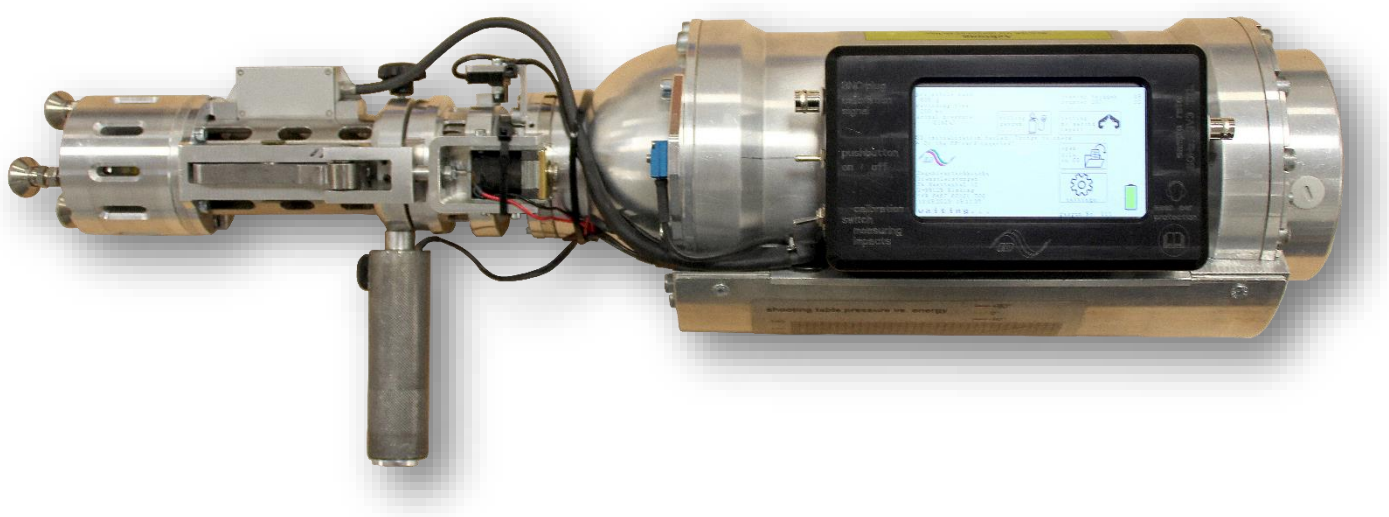
Mobile Impactor



Features:

- Designed for material tests in the aviation and the railway sector
- Designed for one-man operation
- Material testing by generating an impact with a defined energy level using compressed air
- Available with different projectiles (different weights, different projectile heads)
- Effective energy adjustable from 3 to 140 Joule, by means of supplied filling station
- Analysis and display directly on the built-in touch screen (4.3", 480x272 pixels)
- Measurement data recording on SD card
- Data recording with 50kHz sampling rate for distance, speed, acceleration
- A mobile compressor is available on request if no compressed air supply is available

- Dimensions Impactor: 270 x 600 x 200mm (w x h x d)
- Weight: 10 kg
- Impact energy: 3 J to max. 180 J at 6 bar

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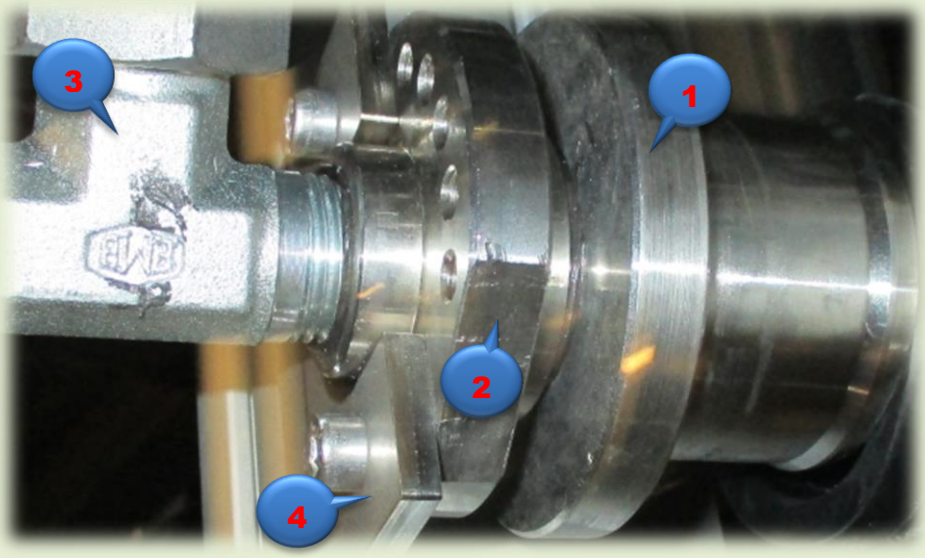
Accessories for Test Benches

Steel braided flexible connection line

- **Available in different nominal sizes**
- **Available with insulation**
- **Connection fittings available in galvanized or stainless steel version**
- **Available for a diverse range of test benches and applications**

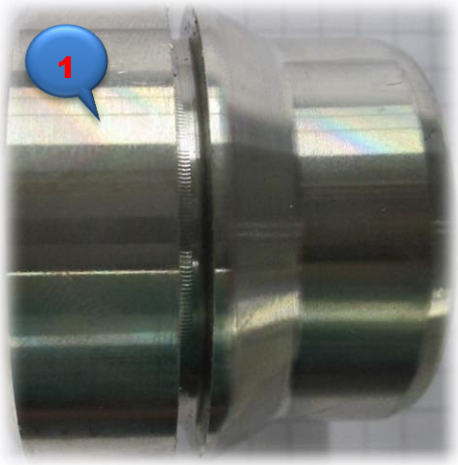
Test piece connection for hot Air Charge Hose Tester

- **Exchangeable connection part for different samples** (1)
- **Fixing component to the fixed frame or moving hand in stainless steel** (2)
- **T-fitting for connection line and temperature sensor** (3)
- **Stainless steel bracket for mechanical fixation** (4)



Connection parts for Air Charge Hose Tester

- **Different geometries possible**
- **Available in aluminium or stainless steel**
- **Different QC (quick coupling) connection parts available** (1)
- **Different hose spouts possible** (2) **in accordance to different TLs**



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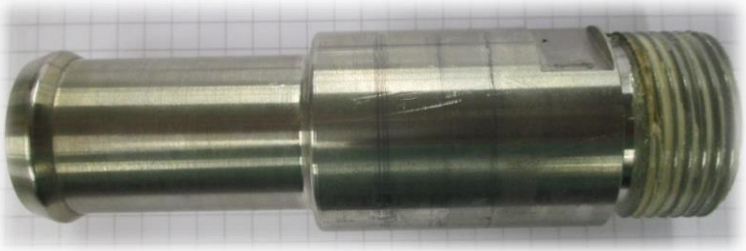
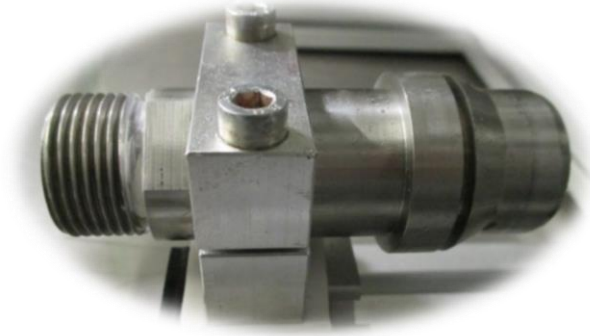
Hose spouts for Coolant Test benches

- **Hose spouts, different nominal width available**
- **In accordance to variant TLs (VW TL78007)**
- **Direct connection to steel flex hose**
- **No cross-section narrowing**
- **Fast modification to different specimen, because of same basic construction**



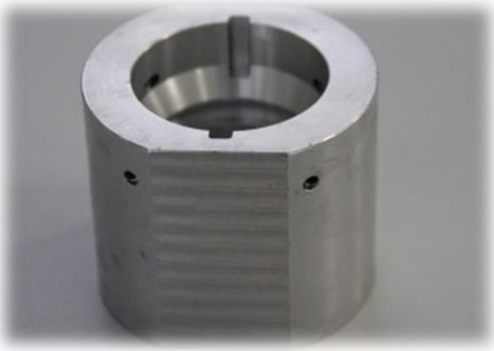


VDA - Connection parts for Coolant Test benches

- **VDA standard (male): Available in different nominal width**
- **Connection fittings made in stainless steel**
- **Direct connection to steel braided lines**
- **No cross-section narrowing**
- **Fast modification to different specimen, because of same basic construction**

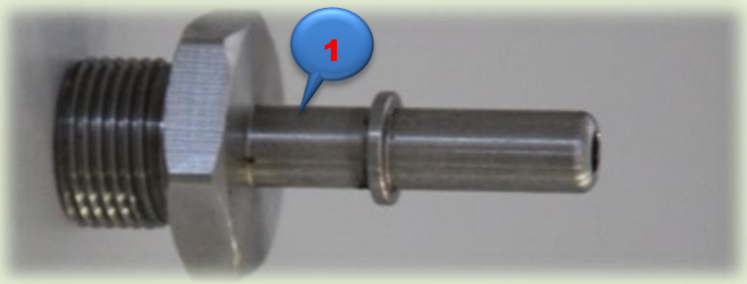
VDA - Connection parts for Coolant Test benches

- **VDA standard (female): Available in different nominal width**
- **Connection fittings made in aluminium (stainless steel available)**
- **Direct connection to steel braided lines possible**
- **No cross-section narrowing**



Various connection parts available

- **Fittings made in aluminium or stainless steel**
- **Direct connection to steel braided lines possible**
- **No cross-section narrowing**
- **E.g. SAE fitting** (1)



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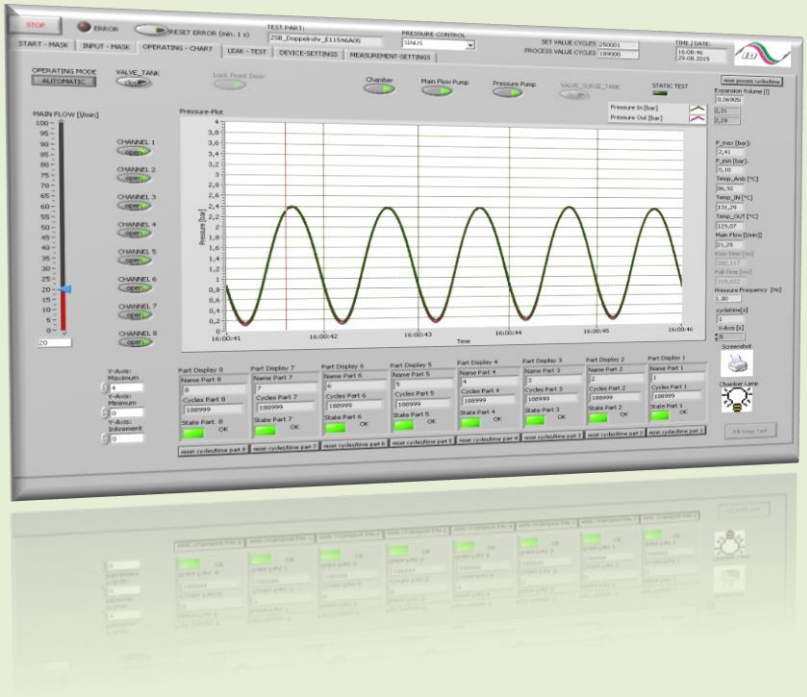
Software

Input Mask Chart:

- 10 Step sequencer
- Ramp functions
- Time settings
- Temperature control
- Start temperature selection
- Pressure control
- Movement control
- Pressure Curve selection
- Storing of all entered values in a Config file



Operating Chart:

- Pressure curve display
- Overview all actual values
- Several manual control options
- Auto/Man operation mode selection
- Channel state overview
- Display the long-term Max and Min Pressure (Inlet + Outlet)
- Pressure curve display settings (both axes)
- Screenshot button
- Chamber light

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We introduced measures for a quality management. Thus, we are ISO 9001-certified.

We are currently working on accreditation as a testing laboratory according to ISO 17025

QAS International

ZERTIFIKAT

Dieses Dokument bescheinigt, dass das Management-System von

Ingenieurtechnische Dienstleistungen
Gallus Lindner Dipl.-Ing. (FH)
Im Hüttental 12, 85125 Kinding

durch die QAS International GmbH geprüft und genehmigt wurde.
Die Anforderungen der Managementnorm

ISO 9001:2015

sind erfüllt.

Geltungsbereich:
Die Firma Ingenieurtechnische Dienstleistungen Gallus Lindner Dipl.-Ing. (FH Kinding ist tätig in der Erbringung von Dienstleistungen und Entwicklungen in den Bereichen:

Messtechnik	Prüftechnik	Sonderentwicklung
Schwingungsmesstechnik	Druckwechselprüfung	Prüfstandbau
Akustische Messung	Dauerschwingfestigkeitsprüfungen	Stationäre u. mobile Impact-Anlagen
Geometriedatenerfassung	Temperaturlagerungen	Sondersensoren
	Funktionsprüfungen	Sondermessgeräte

Erstmalige Zulassung: 06. Juli 2012
Bestehendes Zertifikat: 06. Juli 2020
Dieses Zertifikat ist gültig bis: 06. Juli 2023
Zertifikat Nr: GM2207

Unterschrift:

Im Auftrag von QAS International GmbH

Dieses Zertifikat setzt voraus, dass das Unternehmen sein Management-System nach den oben angegebenen Normen und Regeln anwendet und aufrechterhält. QAS International GmbH überwacht die Einhaltung während der jährlichen Überprüfungen. Es ist dem Unternehmen gestattet, dieses Zertifikat innerhalb der Gültigkeit öffentlich auszustellen. Dieses Zertifikat muss auf begründete Anfragen an die QAS International GmbH zurückgegeben werden.
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