Variations and options

<table>
<thead>
<tr>
<th>Variations</th>
<th>SAP2000</th>
<th>E</th>
<th>M</th>
<th>MF</th>
<th>ACT</th>
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<tbody>
<tr>
<td>Accelerator</td>
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<td>Brake</td>
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<td>Clutch</td>
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<tr>
<td>Gear shift arm with hand drive</td>
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<tr>
<td>Gear shift arm right-hand drive</td>
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<td>Gear shift arm semi-automatic shift</td>
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<td>Keypads MM/MS (0/07) first – safe</td>
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<td>Keypads MM/MS (push-button) first – safe</td>
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<td>Pedal/touch detection switch accelerator &amp; brake</td>
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<td>Adapter for drawings – column shift N – D</td>
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<td>Actuation steering wheel paddle +/- shifting</td>
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<td>Steering actuator systems</td>
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<td>Gear shift lever release</td>
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<td>Gear shift lever release &amp; control</td>
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<td>Trunk actuator</td>
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<td>Hand-hold terminal</td>
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<td>Universal vehicle software cycle (basic)</td>
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<td>Universal vehicle software cycle with Auto tune</td>
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<td>Signal generator output</td>
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<td>Inclined/horizontal drives styles</td>
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<td>Manual steering mode</td>
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<td>Manual semi-auto mode</td>
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<td>Braking via chassis dynamometer</td>
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<td>Load gradient output to chassis dynamometer</td>
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<td>Drive acquisition &amp; triggering cycle output</td>
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<td>Hybrid &amp; Fuel Cell &amp; electric engine support</td>
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<td>Plug &amp; Start engine support</td>
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<td>WEGONDB user interface MEN/DB</td>
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<td>Analog signals for MAN / traction effort</td>
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<td>Analog signals for cam mounting</td>
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<td>Digital analog output</td>
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<td>Optional system interfaces</td>
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<td>Reset computer interface: Ethernet Adp. protocol: serial / TCP/IP</td>
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<td>Field interface – packet / data exchange interface</td>
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<td>Field interface to vehicle on-board data through OBD / CAN interface</td>
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<td>Field interface to chassis dins for exchange plugs</td>
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<td>Field interface to data acquisition system</td>
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<td>Interface to refining system for refining process defined by cycle and fuel tanks level</td>
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<td>USB or OPC Server / Client interface</td>
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<td>Customized interface on request</td>
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Further products

- Robot Shifter AP-SA
- Throttle actuator AP-G 2.10
- Robot Shifter SA-RAPID
- Throttle actuator AP-G F.10
- Autonomous driving package

Company portrait

STÄHLE GmbH was founded in 1987. It is a high-performance family-run enterprise with a wealth of experience in mechatronics, development of hardware and software goes on at the engineering offices of Ing. Kurt Stähle. We are a supplier of mechatronic systems, being conservative only in the sense of being obliged to our customers to be a competent and reliable partner.

Development of hardware and software goes on at the engineering offices of Ing. Kurt Stähle. Further products only in the sense of being obligated to our customers to be a competent and reliable partner.

Design work is performed at 3D-CAD work stations with FE optimization. We see ourselves as being conservative machines. Development of hardware and software goes on at the engineering offices of Ing. Büro Kurt Stähle.

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Features

- Stand-alone system
- Can be installed on the driver’s seat without any modification to the vehicle (approx. 8 min.)
- Hardware and software designed for one-man operation
- Self-learning function in special selflearn cycle
- Constant control behavior during tests
- Mechanism designed for continuous operation and any climate
- Automatic compensation for installation tolerances between robot and accelerator pedal
- Continuous learning of the clutch bite point when clutch is released during start-up (compensates for clutch wear)
- Highest safety standards:
  - Without power
    - Clutch pedal is depressed
    - Accelerator pedal is released
  - With power
  - Driving style options: smooth – accurate – high-accurate

Technical specifications

Robot driver SAP2000

- Total weight 30 kg approx.
- Component weight max. 16 kg
- Control voltage 24 V
- Working temperature
  - Accelerator actuator: 40°C...+80°C
  - Brake actuator: 40°C...+80°C
  - Clutch actuator: 40°C...+80°C
  - Shift actuator: 40°C...+80°C
- Accelerator actuator
  - Stroke max. 150 mm
  - Force max. 100 N
  - Velocity max. 0.45 m/s
- Brake actuator
  - Stroke max. 150 mm
  - Force max. 350 N
  - Velocity max. 0.3 m/s
- Clutch actuator
  - Stroke max. 200 mm
  - Force max. 200 N
  - Velocity max. 0.35 m/s
- Shift actuator
  - Stroke max. 250 mm (X-axis)
  - Lateral Stroke (Y-axis) max. 200 mm
  - Force max. 250 N
  - Velocity max. 0.6 m/s

Features + technical specifications

AUTOPILOT SAP 2000

for computer-controlled driving on chassis dynamometers

Objective measuring procedure = clear results

After many years of development work, the new generation of robot drivers – exemplified by the AUTOPILOT SAP2000 – can take advantage of control software that has now fulfilled in reality what was once set up as visionary targets.

Targets
- Human driving style with comparable emissions results
- High driving accuracy
- Selectable driving styles
- Ultra-high reproducibility

Reality
- Emission values are within the central cluster of the results obtained from test cycles driven by human drivers
- Typical driving accuracy is <±0.25 km/h in “high-accurate” driving style mode
- Driving style options: smooth – accurate – high-accurate
- The typical distance error in an 11-kilometer driving cycle is <±2 m

Features + technical specifications

Robot driver SAP2000

- Total weight
  - Component weight
  - Control voltage
- Working temperature
- Accelerator actuator
  - Stroke
  - Force
  - Velocity
- Brake actuator
  - Force
  - Velocity
- Clutch actuator
  - Force
  - Velocity
- Shift actuator
  - Force
  - Velocity

Features

- Emission measurements
- Acoustic measurements
- Durability testing mileage accumulation
- Transmission testing
- Calibration of engine control systems
- Climate measurements
- Running-loss measurements