MAGNETIC WORKHOLDING
WORKHOLDING WITH PRECISION AND PERFORMANCE
## CHAPTER 1

### PERMANENT MAGNETIC CHUCKS

<table>
<thead>
<tr>
<th>SAV-ART.-No.</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>220.30</td>
<td>1.9 mm</td>
<td>magnet pallet</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>220.31</td>
<td>6 mm</td>
<td>power magnet pallet</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>220.32</td>
<td>15 mm</td>
<td>standard pallet</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>220.33</td>
<td>19 mm</td>
<td>standard pallet</td>
<td></td>
<td>21</td>
</tr>
</tbody>
</table>

### MAGNETIC TOMBSTONES AND MAGNETIC VERTICAL CHUCKS

<table>
<thead>
<tr>
<th>SAV-ART.-No.</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>242.90</td>
<td>1.9 mm</td>
<td>permanent magnetic vertical chuck</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>242.91</td>
<td>15 mm</td>
<td>magnetic tombstone</td>
<td></td>
<td>22</td>
</tr>
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</table>

### PERMANENT MAGNET CHUCKS, RECTANGULAR

<table>
<thead>
<tr>
<th>SAV-ART.-No.</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>243.01</td>
<td>1.9 mm</td>
<td>standard</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>243.07</td>
<td>1.9 mm</td>
<td>fine transverse poles</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>243.10</td>
<td>6 mm</td>
<td>extreme high holding force</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>243.11</td>
<td>15 mm</td>
<td>enhanced holding force</td>
<td></td>
<td>25</td>
</tr>
</tbody>
</table>

### PERMANENT CIRCULAR MAGNETS, NEODYMIUM CIRCULAR MAGNETS AND LAMINATED TOP PLATES

<table>
<thead>
<tr>
<th>SAV-ART.-No.</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>244.02</td>
<td>parallel poles</td>
<td>with enhanced magnet system</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>248.01</td>
<td>St 3 mm Ms 1 mm</td>
<td>for circular magnetic chucks</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>244.03</td>
<td>7 mm</td>
<td>parallel poles</td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>244.04</td>
<td>2.5 mm</td>
<td>parallel poles</td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>244.05</td>
<td>5/11 mm</td>
<td>parallel poles</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>244.10</td>
<td>13 mm</td>
<td>parallel poles</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>244.06</td>
<td>radial poles</td>
<td>radial poles</td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>248.05</td>
<td>radial poles</td>
<td>for circular magnetic chucks</td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>244.07</td>
<td>6 mm</td>
<td>extreme high holding force</td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

### FLANSCHE

<table>
<thead>
<tr>
<th>SAV-ART.-No.</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>248.90</td>
<td>–</td>
<td>without mounting bolts</td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>248.91</td>
<td>–</td>
<td>with bayonet ring fixing</td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>248.92</td>
<td>–</td>
<td>with camlock fixing</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>248.94</td>
<td>–</td>
<td>–</td>
<td></td>
<td>32</td>
</tr>
</tbody>
</table>

*Explanation of the icons on page 9
HSC machining with magnetic pallet SAV 220.31
Spark-erosion with Neodymium circular magnet.

Circular grinding with permanent circular magnetic chuck. In this application up to 300 different workpieces can be machined using 4 sets of pole raisers.

PERMANENT MAGNETS
DEVELOPED WITH THEIR APPLICATION IN MIND

Permanent magnetic beam with high-energy magnetic system and mechanical actuation with roller bearings. With magnetic isolated stop for grinding of workpieces and 20° angle.
Permanent magnet chucks
With reference system and flushing channels.
We supply clamping devices for EDM operations with all required adaptations.

Permanent magnet chucks
With reference system for use in a dielectric.
The workpieces are set down away from the machine and the position measured.

SAV-PALLET SYSTEMS

SAV-AUTOMATION SOLUTIONS
MAGNET PALLET

Transverse pole pitch \( P = 2 \text{ mm} \)

Use:
For use with zero point clamping systems.
Adaptable to the majority of systems.

Material:
Aluminium base with St 37 / stainless steel (V4A) Pole plate

Technical Specifications:
- Parallelism: < 0.01 mm
- Can be executed with threaded holes for side or angled stops
- Magnetic field height: 4 mm
- Pole plate wearing limit: 3 mm
- Holding force: 80 N/cm²
- Pole pitch: 1.9 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Switchable sections</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C*</td>
</tr>
<tr>
<td>240</td>
<td>240</td>
<td>46</td>
</tr>
<tr>
<td>280</td>
<td>280</td>
<td>67</td>
</tr>
<tr>
<td>320</td>
<td>320</td>
<td>60</td>
</tr>
<tr>
<td>320</td>
<td>160</td>
<td>60</td>
</tr>
</tbody>
</table>

Ordering example:
Magnet Pallet SAV 220.30 - 320 x 160 - 1 - Reference system - Adaption - P
Ordering key SAV - No. - A x B - Switchable sections - Reference system - Adaption - Accuracy

* Dimension C is a guideline value and can be determined exactly using the reference system.

POWER MAGNET PALLET

Transverse pole pitch \( P = 6 \text{ mm} \)

Use:
For use with zero point clamping systems.
Adaptable to the majority of systems.

Material:
Aluminium base with St 37 / stainless steel (V4A) Pole plate

Technical Specifications:
- Low weight with high holding force
- Parallelism: < 0.01 mm
- Pole plate wearing limit: 2 mm
- Holding force: 140 N/cm²
- Also available in stainless steel
- Can be executed with threaded holes for side or angled stops
- Low magnetic field height

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Switchable sections</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C*</td>
</tr>
<tr>
<td>240</td>
<td>240</td>
<td>60</td>
</tr>
<tr>
<td>280</td>
<td>280</td>
<td>66</td>
</tr>
<tr>
<td>320</td>
<td>320</td>
<td>65</td>
</tr>
</tbody>
</table>

Ordering example:
Power Magnet Pallet SAV 220.31 - 320 x 320 - 2 - Reference system - Adaption - P
Ordering key SAV - No. - A x B - Switchable sections - Reference system - Adaption - Accuracy

* Dimension C is a guideline value and can be determined exactly using the reference system.
PERMANENT MAGNET PALLLET

Transverse pole P = 15 mm

Use:
To clamp medium-size and large parts in grinding, milling and EDM operations. Adaptable to the majority of zero point clamping systems.

Technical Specifications:
- Aluminium housing, for attachment or installation
- Stops on 3 sides
- 2 Switching positions
- Hexagon key
- Operating instructions
- Finely milled execution

Pole pitch steel/brass: 11 / 4 mm
Nominal holding force: 130 N/cm²
Magnetic field height: 6 mm
Pole plate wear limit: 6 mm
Re-machining of the bottom face: up to 12 mm
Parallelism: 0.03 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>A</th>
<th>B</th>
<th>C*</th>
<th>D</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>240</td>
<td>240</td>
<td>63.5</td>
<td>200</td>
<td>21.5</td>
<td></td>
</tr>
<tr>
<td>280</td>
<td>280</td>
<td>63.5</td>
<td>230</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>320</td>
<td>320</td>
<td>63.5</td>
<td>290</td>
<td>38</td>
<td></td>
</tr>
</tbody>
</table>

* Exact dimension is determined using the reference system.

Ordering example:
Permanent Magnet Pallet SAV 220.32 - 320 x 320 - Adaption
Ordering key SAV - No. - A x B - Adaption

PERMANENT MAGNET PALLLET

Transverse pole P = 19 mm

Use:
5-face machining operations possible through the use of pole beams.

Technical Specifications:
- Steel body, for attachment or installation
- Stops on 3 sides
- 2 Switching positions
- Threaded bores on all sides
- Hexagon key and instructions
- Finely milled execution

Pole pitch steel/brass: 15 / 4 mm
Nominal holding force: 140 N/cm²
Magnetic field height: 8 mm
Pole plate wear limit: 6 mm
Re-machining of the bottom face: up to 4 mm
Parallelism: 0.03 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>A</th>
<th>B</th>
<th>C*</th>
<th>D</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>240</td>
<td>240</td>
<td>63</td>
<td>200</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>280</td>
<td>280</td>
<td>63</td>
<td>240</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>320</td>
<td>320</td>
<td>63</td>
<td>280</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

* Exact dimension is determined using the reference system.

Ordering example:
Permanent Magnet Pallet SAV 220.33 - 320 x 320 - Adaption
Ordering key SAV - No. - A x B - Adaption
PERMANENT MAGNETIC VERTICAL CHUCK

With fine transverse pole pitch $P = 1.9$ mm

Use:
Primarily for horizontal machining of workpieces.

Features:
T-section block made from St 52-3 and supplied complete with permanent magnetic chuck SAV 243.01.
Laminations 0.5 mm brass / 1.4 mm steel.
The T-section can also be supplied with other permanent, electro or electro-permanent chucks.

Parallelism and angularity: 0.005 / 100 mm
Nominal holding force: 80 N/cm²
Magnetic field height: 6 mm
Pole plate wearing limit: 8 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 150 190 30 156</td>
<td>38,0</td>
</tr>
<tr>
<td>350 150 190 30 156</td>
<td>52,0</td>
</tr>
<tr>
<td>400 200 240 30 175</td>
<td>75,0</td>
</tr>
<tr>
<td>500 200 240 30 175</td>
<td>93,5</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnetic Vertical Chuck SAV 242.90 - 500 - B
Ordering key SAV - No. - A - Type of fixing

MAGNETIC TOMBSTONES

Precision milled workholding tombstones

Use:
For horizontal milling and drilling operations.

Features:
Tombstone made from St 52-3. Precision milled. Complete with 4 permanent magnet chucks SAV 243.11. Enhanced high energy system, 15 mm pole pitch. Mounting holes available upon agreement.

Rectangularity: 0.03 / 1000 mm
Parallelism and angularity: 0.04 / 1000 mm
Nominal holding force: 150 N/cm²
Magnetic field height: 12 mm
Pole plate wear limit: 5 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 150 415 320 200 455</td>
<td>183,0</td>
</tr>
<tr>
<td>500 200 620 400 256 660</td>
<td>395,0</td>
</tr>
<tr>
<td>600 300 660 500 356 700</td>
<td>616,0</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnet Tombstone SAV 242.91 - 600 x 300
Ordering key SAV - No. - A x B
**PERMANENT MAGNETIC CHUCK**

With fine transverse pole pitch \( P = 1.9 \text{ mm} \)

**Use:**
For small, medium and large workpieces.

**Features:**
- Uninterrupted transverse pole arrangement.
- Constant holding force over the entire polesurface area and along the side faces.
- Laminations 0.5 mm brass / 1.4 mm steel.
- Nominal holding force: \( 80 \text{ N/cm}^2 \)
- Magnetic field height: \( 6 \text{ mm} \)
- Pole plate wearing limit: \( 8 \text{ mm} \)

![Image](images/permanen24301.png)

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>140</td>
<td>70</td>
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<tr>
<td>175</td>
<td>100</td>
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<td>200</td>
<td>100</td>
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<tr>
<td>250</td>
<td>100</td>
</tr>
<tr>
<td>255</td>
<td>130</td>
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<tr>
<td>150</td>
<td>150</td>
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<td>250</td>
<td>150</td>
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<td>300</td>
<td>150</td>
</tr>
<tr>
<td>350</td>
<td>150</td>
</tr>
</tbody>
</table>

Available with flushing channels for spark erosion applications.

**Ordering example:**
Permanent Magnetic Chuck SAV 243.01 - 500 x 200

**Ordering key:** SAV - No. - A x B

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**PERMANENT MAGNETIC CHUCK**

With fine transverse pole pitch \( P = 1.9 \text{ mm} \)

**Use:**
Very suitable for thin parts.

**Features:**
- Extremely low height. ON-OFF switching from above.
- Laminations 0.5 mm brass / 1.4 mm steel.
- Flushing channel(s) available at a surcharge.
- Suitable for adaption on zero reference system on request.
- Nominal holding force: \( 80 \text{ N/cm}^2 \)
- Magnetic field height: \( 6 \text{ mm} \)
- Pole plate wearing limit: \( 6 \text{ mm} \)

![Image](images/permanen24307.png)

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>175</td>
<td>100</td>
</tr>
<tr>
<td>255</td>
<td>130</td>
</tr>
<tr>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>250</td>
<td>150</td>
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<td>300</td>
<td>150</td>
</tr>
<tr>
<td>350</td>
<td>150</td>
</tr>
<tr>
<td>450</td>
<td>150</td>
</tr>
<tr>
<td>400</td>
<td>200</td>
</tr>
</tbody>
</table>

**Ordering example:**
Permanent Magnetic Chuck SAV 243.07 - 450 x 150

**Ordering key:** SAV - No. - A x B
**NEODYMIUM MAGNETIC CHUCK**

With transverse pole pitch \( P = 6 \) mm neodymium-iron-boron magnets, extremely high holding force

**Use:**
For workpieces that are particularly difficult to clamp, such as ferrotic and hard metals containing cobalt, as well as very small workpieces.

**Application:**
Suitable for grinding of workpieces that are particularly difficult to clamp magnetically and for hard milling.

**Features:**
developed construction. Stable all-steel body. ON-OFF control on both end faces. Larger models - with power-operated switching mechanism - available on request. Laminations 4 mm St and 2 mm cast resin with NdFeB magnets in the pole gaps.

Nominal holding force: 180 N/cm²
Magnetic field height: ca. 10 mm
Pole plate wearing limit: 3 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = 400</td>
<td>B = 150</td>
</tr>
<tr>
<td>C = 82</td>
<td>D = 171</td>
</tr>
<tr>
<td></td>
<td>35.0</td>
</tr>
</tbody>
</table>

Ordering example:
Neodymium Magnetic Chuck  SAV 243.10
Ordering key  SAV - No.
PERMANENT MAGNETIC CHUCK

SAV 243.11

With transverse pole pitch, $P = 15$ mm, neodymium-magnets, enhanced holding force

Use:
Heavy machining, such as milling and planing. The dense, concentrated magnetic field enables it to be used for small, medium and large workpieces, including those with rough or uneven surfaces. The magnetic field is without any stray fields, preventing magnetization of the tool.

Features:
Exceptionally strong neodymium magnetic system. ON-OFF control by means of hand lever. In the OFF position, a weak opposing field eases the removal of the workpiece. The magnets are equipped with longitudinal and transverse stop rails.

Laminations 3 mm brass / 12 mm steel. Suitable for use with laminated topplates: SAV 248.02 and SAV 248.03

Nominal holding force: 150 N/cm²
Magnetic field height: ca. 12 mm
Pole plate wearing limit: 5 mm

Permanent Magnetic Chuck SAV 243.11 - 600 x 300

Ordering example:
Permanent Magnetic Chuck SAV 243.11 - 600 x 300
Ordering key SAV - No. - A x B

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 x 150 x 56 x 199</td>
<td>17,0</td>
</tr>
<tr>
<td>300 x 150 x 56 x 244</td>
<td>20,0</td>
</tr>
<tr>
<td>350 x 150 x 56 x 289</td>
<td>24,0</td>
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<tr>
<td>400 x 200 x 56 x 349</td>
<td>35,0</td>
</tr>
<tr>
<td>500 x 200 x 56 x 439</td>
<td>44,0</td>
</tr>
<tr>
<td>600 x 200 x 56 x 544</td>
<td>52,0</td>
</tr>
<tr>
<td>600 x 300 x 56 x 544</td>
<td>67,0</td>
</tr>
</tbody>
</table>
Permanent Magnetic Circular Chuck

Use:
Sizes A = 200 to 500 mm for turning and grinding, sizes 100 to 160 mm for grinding.

Features:
Exceptional strong magnetic field. Concentric grooves simplify the centring of the workpiece. A centre drilling of up to diameter E is permissible, depth of drilling must not exceed 8 mm for A = 100 to 200 mm and 15 mm for A = 250 to 500 mm. Also available with flange (see SAV 248.90 to 248.94).

Nominal holding force:
140 N/cm² (A = 200 to 500 mm)
70 N/cm² (A = 100 to 160 mm)

Magnetic field height:
10 mm

Pole plate wearing limit:
8 mm

Laminated Circular Top

For use on circular chucks with parallel pole arrangement

Use:
Clamping of profiled workpieces on circular chucks with parallel pole arrangement.

Features:
Silver brazed steel/brass construction. Can be machined to any required shape, or custom machined during manufacture. Connection to magnet to be agreed upon. Lamination must be parallel to magnetic chuck.

Pole pitch: steel 3 mm, brass 1 mm
PERMANENT MAGNETIC CIRCULAR CHUCK

With parallel pole pitch \( P = 7 \, \text{mm} \), flat edition

**Use:**
Small and medium-sized workpieces.

**Features:**
Special magnetic configuration enabling the maximum holding force to be reached with workpieces as thin as 1 mm. ON-OFF control by means of a detachable socket wrench (radial adjustment). Available with flange on request (see SAV 248.90 to 248.94).

Nominal holding force: 100 N/cm²
Magnetic field height: 6 mm
Pole plate wearing limit: 3 mm

Ordering example:
Permanent Magnetic Circular Chuck  SAV 244.03 - 150
Ordering key  SAV - No. - A

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>max. Drehzahl in 1/min</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 100</td>
<td>B=8,5</td>
<td>C 80</td>
</tr>
<tr>
<td>150</td>
<td></td>
<td>130</td>
</tr>
</tbody>
</table>

**PERMANENT MAGNETIC CIRCULAR CHUCK**

With fine parallel pole pitch \( P = 2.5 \, \text{mm} \)

**Use:**
Clamping of small and thin to medium-sized workpieces.

**Features:**
Extremely low height due to use of neodymium-iron-boron magnets. Pole pitch \( P = 2.5 \, \text{mm} \). Holding force continuously variable. Available with flange on request (see SAV 248.90 to 248.94).

Nominal holding force: 80 N/cm²
Magnetic field height: 8 mm
Pole plate wearing limit: 5 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 100</td>
<td>B=8,5</td>
</tr>
<tr>
<td>130</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
</tr>
<tr>
<td>160</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td></td>
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<tr>
<td>250</td>
<td></td>
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<tr>
<td>300</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td></td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnetic Circular Chuck  SAV 244.04 - 300
Ordering key  SAV - No. - A
PERMANENT MAGNETIC CIRCULAR CHUCK

With parallel pole arrangement P = 5 / 10 mm, enhanced magnet system

Use:
For workpieces that are difficult to clamp.

Features:
Extremely high holding force combined with slim construction. Available with flange on request (see SAV 248.90 to 248.94).
Laminations 3 mm steel / 2 mm brass / 8 mm steel.
Nominal holding force: 120 N/cm²
Magnetic field height: 15 mm
Top plate wearing limit: 10 mm

Dimensions in mm

<table>
<thead>
<tr>
<th>A</th>
<th>B+0,5</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
<td>55</td>
<td>100</td>
<td>112</td>
<td>M6 (4x)</td>
<td>4,5</td>
</tr>
<tr>
<td>160</td>
<td>55</td>
<td>125</td>
<td>140</td>
<td>M8 (4x)</td>
<td>7,5</td>
</tr>
<tr>
<td>200</td>
<td>55</td>
<td>160</td>
<td>180</td>
<td>M8 (4x)</td>
<td>12,0</td>
</tr>
<tr>
<td>250</td>
<td>55</td>
<td>200</td>
<td>224</td>
<td>M10 (4x)</td>
<td>18,0</td>
</tr>
<tr>
<td>315</td>
<td>55</td>
<td>250</td>
<td>280</td>
<td>M10 (4x)</td>
<td>29,0</td>
</tr>
<tr>
<td>400</td>
<td>55</td>
<td>315</td>
<td>355</td>
<td>M10 (4x)</td>
<td>47,0</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnetic Circular Chuck  SAV 244.05 - 400
Ordering key  SAV - No.  - A

PERMANENT MAGNETIC CIRCULAR CHUCK

Switchable

Use:
As an auxiliary magnet to be used on a circular chuck for holding smaller, delicate workpieces. Also suitable for fixtures and as a holding magnet.

Features:
Switchable permanent magnet, holding surface on the upper face.

Dimensions in mm

<table>
<thead>
<tr>
<th>A</th>
<th>B+0,5</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Nominal holding force in N</th>
<th>max. RPM</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>50</td>
<td>25</td>
<td>35</td>
<td>4 x M5</td>
<td>85</td>
<td>450</td>
<td>0,7</td>
</tr>
<tr>
<td>80</td>
<td>65</td>
<td>50</td>
<td>60</td>
<td>4 x M6</td>
<td>500</td>
<td>400</td>
<td>2,2</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnetic Circular Chuck  SAV 244.10 - 80
Ordering key  SAV - No.  - A
PERMANENT MAGNETIC CIRCULAR CHUCK

With radial pole arrangement

Use:
For cylindrical and ring-shaped workpieces.

Features:
High holding force. Concentric grooves to simplify workpiece alignment. Through hole possible up to maximum diameter D. Supplied as standard without through hole in centre. Central region (diameter C) not magnetically active. Available with flange on request (see SAV 248.90 to 248.94). For additional top plates see 248.05 Bigger diameters available with T-slots on request.

Nominal holding force: 100 N/cm²
Pole plate wearing limit:
5 mm (for A = 150 to 300 mm)
10 mm (for A = 350 to 400 mm)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>Number of poles</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>48</td>
<td>14</td>
<td>50</td>
<td>6</td>
<td>76</td>
<td>-</td>
<td>M</td>
<td>6</td>
<td>8</td>
<td>6</td>
<td>2.6</td>
</tr>
<tr>
<td>130</td>
<td>57</td>
<td>16</td>
<td>50</td>
<td>5</td>
<td>80</td>
<td>-</td>
<td>M</td>
<td>6</td>
<td>10</td>
<td>10</td>
<td>5.7</td>
</tr>
<tr>
<td>150</td>
<td>57</td>
<td>20</td>
<td>50</td>
<td>5</td>
<td>80</td>
<td>120</td>
<td>M</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>6.5</td>
</tr>
<tr>
<td>200</td>
<td>57</td>
<td>28</td>
<td>60</td>
<td>5</td>
<td>110</td>
<td>180</td>
<td>M</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td>13.0</td>
</tr>
<tr>
<td>250</td>
<td>70</td>
<td>30</td>
<td>80</td>
<td>5</td>
<td>140</td>
<td>220</td>
<td>M</td>
<td>6</td>
<td>8</td>
<td>16</td>
<td>20.0</td>
</tr>
<tr>
<td>300</td>
<td>73</td>
<td>40</td>
<td>150</td>
<td>6</td>
<td>180</td>
<td>260</td>
<td>M</td>
<td>8</td>
<td>10</td>
<td>16</td>
<td>30.0</td>
</tr>
<tr>
<td>350</td>
<td>73</td>
<td>48</td>
<td>170</td>
<td>6</td>
<td>220</td>
<td>300</td>
<td>M</td>
<td>8</td>
<td>12</td>
<td>20</td>
<td>49.0</td>
</tr>
<tr>
<td>400</td>
<td>75</td>
<td>48</td>
<td>200</td>
<td>8</td>
<td>260</td>
<td>340</td>
<td>M</td>
<td>8</td>
<td>12</td>
<td>20</td>
<td>75.0</td>
</tr>
<tr>
<td>500</td>
<td>92</td>
<td>60</td>
<td>200</td>
<td>8</td>
<td>360</td>
<td>440</td>
<td>M</td>
<td>8</td>
<td>12</td>
<td>26</td>
<td>144.0</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnetic Circular Chuck SAV 244.06 - 400
Ordering key SAV - No. - A

LAMINATED CIRCULAR TOP PLATE

For use on circular chuck 244.06 with radial poles

Features:
Can be machined to any required shape, or custom machined during manufacture. Suitable for SAV 244.06. Mounting to be agreed upon.

Machinable depth: max. 8 mm

For bigger profiling depth, available with size B up to 25 mm.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Number of poles</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>200</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>250</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>300</td>
<td>25</td>
<td>16</td>
</tr>
<tr>
<td>350</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>400</td>
<td>25</td>
<td>20</td>
</tr>
</tbody>
</table>

Larger sizes available on request

Ordering example:
Laminated Circular Top Plate SAV 248.05 - 150
Ordering key SAV - No. - A
NEODYMIUM MAGNETIC CIRCULAR CHUCK

For difficult workpieces, with parallel pole arrangement, P=6 mm

Use:
For workpieces that are particularly difficult to clamp, such as ferrotic and hard metals containing cobalt, as well as very small workpieces.

Features:
Aluminium housing, pole plate made from tool steel. Extremely high holding force through a specially developed construction using neodymium-iron-boron magnets. Available with flange on request (see SAV 248.90 to 248.94).

Nominal holding force on induced steel surface: 180 N/cm²
Magnetic field height: 4 mm
Pole plate wearing limit: 3 mm

Available with adapters for reference system.

Also suitable for small parts.

Ordering example:
Neodymium Magnetic Circular Chuck  SAV 244.07 - 160
Ordering key  SAV - No.  - A

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  B  C  D  E</td>
<td>F  G  H  I  J  K  L</td>
</tr>
<tr>
<td>100 65 70 4 90</td>
<td>M 6 (4x)  -  - 48  -  - 74 2,0</td>
</tr>
<tr>
<td>125 65 95 4 110</td>
<td>M 8 (4x)  - 88 54  - 98 67 3,0</td>
</tr>
<tr>
<td>160 65 125 4 140</td>
<td>M 10 (4x) -104 54 -134 61 4,5</td>
</tr>
<tr>
<td>180 65 125 4 160</td>
<td>M 10 (4x) 124 84 64 134 97 61 6,5</td>
</tr>
<tr>
<td>200 65 125 4 180</td>
<td>M 10 (4x) 134 104 74 158 110 73 8,5</td>
</tr>
</tbody>
</table>

Also suitable for small parts.
**SHORT TAPER ADAPTER**

**To fit circular magnetic chucks to spindle nose**

**Use:**
Mounting of circular magnetic chucks or other clamping tools to short taper spindle noses of type DIN 55026 (55021) form A and B, ISO 702/I A1 and A2, ASA B5.9 A1 and A2.

**Features:**
Mild steel adapter in accordance with DIN, ISO and ASA-standards. Fully prepared on spindle-side. Preparations for chuck side carried out in accordance with customer’s requirements (please supply suitable drawing). Rotary magnets can be supplied ready fitted with adapter.

**Ordering example:**
Short Taper Adapter without mounting bolts (SAV 248.90 - 4 - DIN 55026 and dimensions)

<table>
<thead>
<tr>
<th>Spindle nose size</th>
<th>A in mm</th>
<th>B in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>4*</td>
<td>82,6</td>
<td></td>
</tr>
<tr>
<td>4**</td>
<td>85,0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>104,8</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>133,4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>171,4</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>235,0</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>330,2</td>
<td></td>
</tr>
</tbody>
</table>

Sizes B, C, and D as well as mounting holes pitch circle according requirements or customer specification.

* For spindle nose type DIN 55026
** For spindle nose type DIN 55021

**SHORT TAPER ADAPTER**

**mit Stehbolzen und Bajonetscheibe**

**Use:**
Mounting of circular magnetic chucks or other clamping tools to short taper spindle noses of type DIN 55027 (55022) and ISO 702/III

**Features:**
Mild steel adapter in accordance with DIN, ISO and ASA-standards with studs and bayonet ring fixing. Fully prepared on spindle-side. Preparations for chuck side carried out in accordance with customer’s requirements (please supply suitable drawing). Circular chucks can be supplied ready fitted with adapter.

**Ordering example:**
Short Taper Adapter with Bayonet Ring Fixing (SAV 248.91 - 15 - DIN 55027 and dimensions)

<table>
<thead>
<tr>
<th>Spindelkopfgöße</th>
<th>A in mm</th>
<th>Stehbolzenanzahl</th>
</tr>
</thead>
<tbody>
<tr>
<td>4*</td>
<td>82,6</td>
<td>3</td>
</tr>
<tr>
<td>4**</td>
<td>85,0</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>104,8</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>133,4</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>171,4</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>235,0</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>330,2</td>
<td>6</td>
</tr>
</tbody>
</table>

Sizes B, C, and D as well as mounting holes pitch circle according requirements or customer specification.

* For spindle nose type DIN 55027
** For spindle nose type DIN 55022

**SAV Spann-Automations-Normteiletechnik GmbH • www.sav-spanntechnik.de**
### SHORT TAPER ADAPTER

**with camlock fixing**

**Use:**
Mounting of circular magnetic chucks or other clamping tools to short taper spindle noses of type DIN 55029, ISO 702/II and ASA b5.9 D1.

**Features:**
Mild steel adapter in accordance with DIN, ISO and ASA-standards. Fully prepared on spindle-side. Preparations for chuck side carried out in accordance with customer’s requirements (please supply suitable drawing). Circular chucks can be supplied ready fitted with adapter.

<table>
<thead>
<tr>
<th>Spindle-nose size</th>
<th>A in mm</th>
<th>Number of studs</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>82.6</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>104.8</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>133.4</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>171.4</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>235.0</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>330.2</td>
<td>6</td>
</tr>
</tbody>
</table>

**Ordering example:**
*Short Taper Adapter with camlock fixing*  
SAV 248.92 - 15

**Ordering key**
SAV - No.  - Spindle nose size

Sizes B, C, and D as well as mounting holes pitch circle according requirements or customer specification.

### MORSE TAPER ADAPTER

**to fit circular magnetic chucks to morse taper sockets**

**Use:**
Mounting of circular magnetic chucks or other clamping tools to morse taper sockets of type DIN 228.

**Features:**
Mild steel adapter in accordance with DIN. Fully prepared on spindle-side. Preparations for chuck side carried out in accordance with customer’s requirements (please supply suitable drawing). Circular chucks can be supplied ready fitted with adapter. Hardened and ground version made from case hardening steel available on request.

<table>
<thead>
<tr>
<th>Taper size</th>
<th>Dimensions in mm</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK 0</td>
<td>9,045</td>
<td>6.4</td>
<td>50.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MK 1</td>
<td>12,065</td>
<td>9.4</td>
<td>M 6</td>
<td>53.5</td>
<td></td>
</tr>
<tr>
<td>MK 2</td>
<td>17,780</td>
<td>14.6</td>
<td>M 10</td>
<td>64.0</td>
<td></td>
</tr>
<tr>
<td>MK 3</td>
<td>23,825</td>
<td>19.8</td>
<td>M 12</td>
<td>81.0</td>
<td></td>
</tr>
<tr>
<td>MK 4</td>
<td>31,267</td>
<td>25.9</td>
<td>M 16</td>
<td>102.5</td>
<td></td>
</tr>
<tr>
<td>MK 5</td>
<td>44,399</td>
<td>37.6</td>
<td>M 20</td>
<td>129.5</td>
<td></td>
</tr>
<tr>
<td>MK 6</td>
<td>63,348</td>
<td>53.9</td>
<td>M 24</td>
<td>182.0</td>
<td></td>
</tr>
</tbody>
</table>

**Ordering example:**
*Morse Taper Adapter*  
SAV 248.94 - MK 6 and dimensions

**Ordering key**
SAV - No.  - Morse taper size

Sizes according requirements or customer application.
## CHAPTER 2

### ELECTRO MAGNETIC RECTANGULAR CHUCKS

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>243.40</td>
<td>4 mm</td>
<td>fine transverse poles</td>
<td></td>
<td>36-37</td>
</tr>
<tr>
<td>243.41</td>
<td>4 mm</td>
<td>fine longitudinal poles</td>
<td></td>
<td>38-39</td>
</tr>
<tr>
<td>243.42</td>
<td>13/18/25 mm</td>
<td>transverse poles</td>
<td></td>
<td>40-41</td>
</tr>
</tbody>
</table>

### ELECTRO MAGNETIC CIRCULAR CHUCKS

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>244.40</td>
<td>radial poles</td>
<td>for ring-shaped parts</td>
<td></td>
<td>42-43</td>
</tr>
<tr>
<td>244.41</td>
<td>concentric poles</td>
<td>for thin parts, multiple part loading</td>
<td></td>
<td>44-45</td>
</tr>
<tr>
<td>244.43</td>
<td>parallel poles</td>
<td>for thin parts, magnetically active centre</td>
<td></td>
<td>46</td>
</tr>
</tbody>
</table>

### SLIDE SHOE MAGNETS

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>244.45</td>
<td>ring poles</td>
<td>for slide shoe grinding of small, thin rings</td>
<td></td>
<td>47</td>
</tr>
</tbody>
</table>

### ELECTRONIC POLARITY-REVERSING CONTROL UNIT, HAND-HELD CONTROL UNIT AND RECTIFIER

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>876.10</td>
<td>—</td>
<td>for holding force regulation and demagnetizing</td>
<td></td>
<td>48-49</td>
</tr>
<tr>
<td>876.02</td>
<td>—</td>
<td>for manual control</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>876.06</td>
<td>—</td>
<td>for general purpose and clamping magnets</td>
<td></td>
<td>51</td>
</tr>
</tbody>
</table>

### ELECTRICAL CONNECTIONS TO CIRCULAR CHUCKS

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>248.81</td>
<td>—</td>
<td>for circular magnetic chucks</td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>248.83</td>
<td>—</td>
<td>for circular magnetic chucks</td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>248.86</td>
<td>—</td>
<td>compact electrical adapter plug</td>
<td></td>
<td>52</td>
</tr>
</tbody>
</table>

* Explanation of the icons on page 9
**ELECTRO MAGNETIC** for automated grinding

Dimensions:
Diameter 740 mm

Workpiece:
Ferrite cores

Machining operation:
Automated parallel grinding

Description:
- Magnet with homogenous field for small workpieces
- Rotating magnet, 16 Magnet segments
- Stationary for automated loading and unloading as well as for machining on segment-grinding lathes
- Cooling water circulation in the centre

**ELECTRO MAGNETIC CIRCULAR CHUCK** for soft turning operations

Large magnet construction:
- Solid mono-block design
- Wear-free solid-state design
- Machined from solid metal
- Long-term stability due to the stress-free annealed body
- Accuracy and stability due to the use of pole plate
- High quality level of parallelism and evenness to specification

Ø 3500 mm, for soft turning operations with large takeoff of shavings
ELECTRO MAGNETIC BEAM

Dimensions:
450 x 70 mm

Workpiece:
V-blocks/prisms

Machining operation:
Grinding

Description:
Enhanced electro magnet system for workpieces which are difficult to magnetise

ELECTRO MAGNETIC CIRCULAR CHUCK  for slide shoe grinding

Dimensions:
Diameter 180 or 500 mm

Workpiece:
Rolling bearings with a small bearing face

Machining operation:
For high-precision slide shoe grinding

Description:
- axial workpiece clamping via the driver to transmit the rotary movement
- highly precise workpiece positioning eccentrically above the stationary slide shoe
**ELECTRO MAGNETIC CHUCK**

With fine transverse pole pitch $P = 4 \, \text{mm}$

Electromagnetic system with very narrow pole pitch. Especially suitable for thin workpieces. Workpiece positioning in length direction of the chuck.

**Features:**
- especially fine, uninterrupted transverse pole pitch,
- 3 mm steel and 1 mm brass
- glued lamination with additional pull anchors cross to lamination
- fine grid pole plate to body connection
- 8 mm pole plate wearing limit
- low magnetic field height of only 4 mm
- mounting slots in both short faces
- through holes in sizes over 1000 mm length on specification
- robust and waterproof
- sealed to IP 65
- suitable for continuous (100%) operation
- for use with control unit type SAV 876.10

**Nominal holding force:**
100 N/cm², adjustable with control unit with encoded switch

**Nominal operating voltage:**
- 24 V DC up to 118 W
- 110 V DC for all sizes

**Auxiliary equipment:**
- sidestop rail on short and long face
- connecting cable, 3 m, on the right-hand, short face
- lifting bolts on larger models

**Use:**
Clamping of thin, plate shaped workpieces with form and positional tolerances of 0.01 to 0.02 mm.

- for workpiece positioning cross to pole pitch
- for thin workpieces of min. 2 mm thick
- for flat workpieces with min. dimensions 40 x 40 mm
ELECTRO MAGNETIC CHUCK

With fine transverse pole pitch P = 4 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Power rating in W</th>
<th>Weight in kg</th>
<th>Type of control</th>
</tr>
</thead>
<tbody>
<tr>
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Other sizes and operating voltages available on request. Larger clamping surfaces can be made by flush mounting several units.

Recommended controller and control unit:

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<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
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<tr>
<td>E 1</td>
<td>SAV 876.10-S-T-24/7/230</td>
<td>SAV 876.02-SE3</td>
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<td>SAV 876.10-S-O-110/6/230</td>
<td>SAV 876.02-SE3</td>
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</table>

For built-in or combination control unit see page 48.
ELECTRO MAGNETIC CHUCK

With fine longitudinal pole pitch $P = 4$ mm

Electromagnetic system with very narrow pole pitch. Especially suitable for thin workpieces. Workpiece positioning in cross direction of the chuck.

Features:
- especially fine, uninterrupted longitudinal pole pitch, 3 mm steel and 1 mm brass
- glued lamination with additional pull anchors cross to lamination
- fine grid pole plate to body connection
- 8 mm pole plate wearing limit
- low magnetic field height
- mounting slots in both short faces
- through holes for mounting in sizes over 1000 mm length on specification
- robust and waterproof
- sealed to IP 65
- suitable for continuous (100%) operation
- for use with control unit type SAV 876.10

Nominal holding force:
100 N/cm², adjustable with control unit with encoded switch

Nominal operating voltage:
- 24 V DC up to 118 W
- 110 V DC for all sizes

Auxiliary equipment:
- sidestop rail on short and long face
- connecting cable, 3 m, on the right-hand, short face
- lifting bolts on larger models

Use:
Clamping of thin, plate shaped workpieces with form and positional tolerances of 0.01 to 0.02 mm.

- for workpiece positioning cross to pole pitch

- for thin workpieces of min. 2 mm thick

- for flat workpieces with min. dimensions 40 x 40 mm

- for workpiece positioning cross to pole pitch

- for thin workpieces of min. 2 mm thick

- for flat workpieces with min. dimensions 40 x 40 mm
### Ordering example:

**Electro Magnetic Chuck**  
**SAV 243.41 - 1200 x 500 - 110 V**

**Ordering key**  
SAV - No. - A x B - Nominal voltage

**Ordering example Steuerung:**

- Electronic polarity-reversing control unit: **SAV 876.10 - S-O-110/6/230**
- Hand-held control unit: **SAV 876.02 - SE3**

**Ordering key**  
SAV - No.

---

### Dimensions in mm

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<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Power in W</th>
<th>Weight in kg</th>
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### Electronic polarity-reversing control unit

**SAV 876.10 - S-O-110/6/230**

### Hand-held control unit

**SAV 876.02 - SE3**

For built-in or combination control unit see page 48.
ELECTRO MAGNETIC CHUCK

With transverse pole pitch \( P = 13 \text{ mm}, 18 \text{ mm and 25 mm} \)

This chuck is particularly notable for its high power, robust construction and long life. The pole pitch gives real N and S-poles.

Use:
For universal clamping of workpieces with form and positional tolerances of 0.01 to 0.02 mm.

- for workpiece positioning
cross to pole pitch

- for workpieces with min. thickness = x:
  4.5 mm at \( P = 13 \text{ mm} \)
  6.0 mm at \( P = 18 \text{ mm} \)
  8.5 mm at \( P = 25 \text{ mm} \)

- for flat workpieces with min. dimensions = a:
  25 mm x 25 mm at \( P = 13 \text{ mm} \)
  32 mm x 32 mm at \( P = 18 \text{ mm} \)
  45 mm x 45 mm at \( P = 25 \text{ mm} \)

Nominal holding force:
90 N/cm², at pole pitch \( P = 13 \text{ mm} \)
110 N/cm², at pole pitch \( P = 18 \text{ mm} \)
115 N/cm², at pole pitch \( P = 25 \text{ mm} \)
adjustable with control unit with encoded switch

Nominal operating voltage:
24 V DC up to 120 W
110 V DC for all sizes

Features:
- solid contructed pole plate with either
  13 mm, 18 mm or 25 mm pole pitch
- real magnetic (N/S) poles
- water cooling system on request
- air pressure release system on request
  for \( P = 18 \text{ or 25 mm} \)
- gap free construction of pole plate
- fine grid pole plate to body connection
- 8 mm pole plate wearing limit
- mounting slots in both short faces
- through holes in sizes over
  1000 mm length on specification
- robust and waterproof
- sealed to IP 65
- suitable for continuous (100%) operation
- for use with control unit type SAV 876.10

Auxiliary equipment:
- sidestop rail on short and long face
- connecting cable, 3 m, on the right-hand, short face
- lifting bolts on larger models
ELECTRO MAGNETIC CHUCK
SAV 243.42

With transverse pole pitch P = 13 mm, 18 mm and 25 mm

Ordering example:
Electro Magnetic Chuck SAV 243.42 - 2000 x 800 - 25 - 110 V
Ordering key SAV - No. - A x B - P - Nominal voltage

Ordering example control unit:
Electronic polarity-reversing control unit SAV 876.10 - S-O-110/16/230
Hand-held control unit SAV 876.02 - SE3
Ordering key SAV - No.

Recommended controller and control unit:

<table>
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<tr>
<th>Type</th>
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<th>Hand-held control unit</th>
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</thead>
<tbody>
<tr>
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<td>SAV 876.10-S-T-24/7/230</td>
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For built-in or combination control unit see page 48.

Dimensions in mm

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<th>C</th>
<th>D</th>
<th>P</th>
<th>Power in W</th>
<th>Weight in kg</th>
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Other sizes and operating voltages available on request.
Larger clamping surfaces can be made by flush mounting several units.

Dimensions in mm

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
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ELECTRO MAGNETIC CIRCULAR CHUCK

SAV 244.40

With radial pole arrangement

These circular electro magnets are notable for their very high holding force. Radial T-slots can be provided in the pole plates for added flexibility.

Use:
Grinding of circular and ring-shaped workpieces on carrousel internal and external grinding machines. Also suitable for turning with form and position tolerances of 0.01 to 0.02 mm.

- equal pole pitch within circle range; therefore very suitable for circular and ring shaped workpieces
- for ring-shaped workpieces the minimum height is 35% of the pole pitch at the given circle segment
- also for thin rings

Nominal holding force:
120 N/cm², adjustable by control unit with encoded switch

Nominal operating voltage:
24 V DC up to 90 W
110 V DC all sizes

Features:
- solid designed pole plate
- radial pole arrangement, especially suitable for the use of pole raisers.
  This is absolutely essential for the runout of the tool or the grinding wheel at three side operation.
  Therefore available with T-slots (T) according DIN 650-10H10 on request.
- pole plate wearing limit 8 mm
- sealed to IP 65
- suitable for continuous (100%) operation
- for use with control unit type 876.10
- available with adapter flange on request (SAV 248.90 to 248.94)

Auxiliary equipment:
- Lifting bolts for transportation on larger models.
- T-slots and pole extensions not included as standard.
- Terminals for electrical connection in middle of back side in standard execution.
- Optional with integrated slip ring body for the bigger diameters.
Ordering example:  
Electro Magnetic Circular Chuck   SAV 244.40 - 800 - T - 110 V
Ordering key                                          SAV - No.      -   A   - Execution - Nominal voltage

Ordering example control unit:  
Electronic polarity-reversing control unit   SAV 876.10 - S-O-110/6/230
Hand-held control unit   SAV 876.02 - SE3  
Ordering key                                          SAV - No.
ELECTRO MAGNETIC CIRCULAR CHUCK

With concentric pole arrangement

These circular electro magnets generate a strong, ring-shaped and low magnetic field.

Use:
Mainly for grinding of disc shaped work pieces on internal and external grinders with rotary tables.
Not suitable for thin rings. Because of the concentric pole arrangement it is also suitable for holding groups of randomly placed workpieces. Also suitable for turning with form and position tolerances of 0.01 to 0.02 mm.

- for circular grinding

- uniform holding force distribution due to concentric pole arrangement; therefore suitable for thin and flat workpieces (e.g. saw blades)

- multiple workpiece operation on segments possible

- for workpieces with min. thickness = x:
  2 mm at P = 4.5 mm
  4 mm at P = 9.0 mm
  8 mm at P = 18.0 mm

- for flat workpieces with min. dimensions
  45 mm x 45 mm

Features:
- gap free construction of pole plate
- fine grid poleplate to body connection
- pole plate wearing limit 8 mm
- sealed to IP 65
- suitable for continuous (100%) operation
- for use with control unit type 876.10
- available with adapter flange on request (SAV 248.90 to 248.94)

Auxiliary equipment:
- Lifting bolts for transportation on larger models.
- Terminals for electrical connection in middle of rear side in standard execution.
- Optionally with integrated flat, slip ring body for diameters of 1000 mm and greater.
- Controller and hand-held control unit not included in delivery.

Nominal holding force:
P = 4.5 mm: 80 N/cm²
P = 9 mm: 100 N/cm²
P = 18 mm: 110 N/cm²
adjustable by control unit with encoded switch

Nominal operating voltage:
24 V DC up to 90 W
110 V DC all sizes
With concentric pole arrangement

### Dimensions in mm

<table>
<thead>
<tr>
<th>A</th>
<th>B₁</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>P</th>
<th>Power in W</th>
<th>Weight in kg</th>
<th>Type of control</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100</td>
<td>60</td>
<td>3</td>
<td>80</td>
<td>M8 (3x)</td>
<td>12</td>
<td>22</td>
<td>9</td>
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<td>16</td>
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<tr>
<td>150</td>
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<td>120</td>
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<td>M10 (4x)</td>
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<tr>
<td>250</td>
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<td>140</td>
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<td>170</td>
<td>M12 (4x)</td>
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<td>320</td>
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<td>M16 (6x)</td>
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<td>369,0</td>
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<td>100</td>
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<td>4</td>
<td>620</td>
<td>M16 (8x)</td>
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<td>22</td>
<td>131</td>
<td>23</td>
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<td>E 5</td>
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<tr>
<td>1400</td>
<td>110</td>
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<td>136</td>
<td>26</td>
<td>9</td>
<td>1100</td>
<td>1346,0</td>
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<td>1400</td>
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<td>E 5</td>
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<td>22</td>
<td>138</td>
<td>26</td>
<td>9</td>
<td>1630</td>
<td>1760,0</td>
<td>E 5</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### Recommended controller and control unit:

**Type Control unit** | **Hand-held control unit**
---|---
E 1 | SAV 876.10-S-T-24/7/230 | SAV 876.02-SE3
E 4 | SAV 876.10-S-O-110/6/230 | SAV 876.02-SE3
E 5 | SAV 876.10-S-O-110/16/230 | SAV 876.02-SE3

For built-in or combination control unit see page 48.

**Ordering example:**

**Electro Magnetic Circular Chuck** | SAV 244.41 - 800 - 18 - 110 V
**Ordering key** | SAV - No. - A - Pole pitch - Nominal voltage

**Ordering example Steuerung:**

**Electronic polarity-reversing control unit** | SAV 876.10 - S-O-110/6/230
**Hand-held control unit** | SAV 876.02 - SE3
**Ordering key** | SAV - No.
With parallel pole pitch \( P = 4 \) mm

**Use:**
- Grinding of thin plates and thin, broad rings with a min. width of 40 mm
- For workpieces of 2 mm and above
- For flat workpieces with a min. surface area of 40 x 40 mm\(^2\)

**Features:**
- Pole plate especially fine, uninterrupted pole pitch, 3 mm steel and 1 mm brass
- Low build height
- Glued laminations reinforced with additional pull anchors
- High precision due to fine grid pole plate to body connection
- Low field height of 4 mm
- De-activation via the demagnetizing cycle
- Fixing hole template for tapped holes on the rear or through holes upon agreement
- 8 mm pole plate wear limit
- Robust and waterproof
- Protection classification IP 65
- Suitable for use with control unit SAV 876.10

**Nominal operating voltage:**
110 V DC

**Nominal holding force:**
100 N/cm\(^2\).
Adjustable using the holding force coding switch on the control unit

**Auxiliary equipment:**
- Lifting bolts for transportation on larger models.
- In the standard format the electrical connector is on the rear side, centred with clamps.
- Controller and hand-held control unit not included in delivery.

---

### Recommended controller and control unit:

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E 4</td>
<td>SAV 876.10-S-O-110/6/230</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in control unit see page 48.
SLIDE SHOE MAGNETIC CHUCK

With pot magnet system for a larger workpiece spectrum

Use:
- To grind small rings with a small workpiece contact area
- Extremely low wall thickness deviations due to eccentric clamping and positioning of workpiece over the stationary slide shoe
- Easy changeovers due to the universal workpiece driver
- Universally applicable for large diameter workpieces
- To clamp workpieces of up to 500 mm diameter
- Workpiece positioned eccentrically to the spindle
- Magnet for rotary movement, precision through working-side slide shoes

Features:
- Extreme magnetic field for grinding of a large workpiece spectrum
- Supplied with drivers or adaptation to existing drivers upon agreement
- Spindle adaptation upon agreement
- Supplied with polarity-reversing pole plate for a large clamping range on request
- Simple to automate for easy workpiece handling
- Internal cooling water supply available
- Controller and hand-held control unit not included in delivery.

Nominal operating voltage:
- 24 V DC up to 250 mm diameter
- 110 V DC above 250 mm diameter

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
<th>Power rating in W</th>
<th>Type of control</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td></td>
<td></td>
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<tr>
<td>150</td>
<td>130</td>
<td>23</td>
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<td>180</td>
</tr>
<tr>
<td>500</td>
<td>200</td>
<td>390</td>
<td>250</td>
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</table>

Recommended controller and control unit:

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E 1</td>
<td>SAV 876.10-S-T-24/7/230</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>E 4</td>
<td>SAV 876.10-S-O-110/6/230</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in control unit see page 48.

Ordering example:

Slide shoe magnetic chuck  SAV 244.45 - 500 - 110 V
Ordering key  SAV - No. - A - Voltage

Ordering example control unit:

Electronic polarity-reversing control unit  SAV 876.10 - S-O-110/6/230
Hand-held control unit  SAV 876.02 - SE3
Ordering key  SAV - No.
With integrated microprocessor and holding force control

Use:
For electro magnetic clamping systems. Also suitable for subsequent installation.

Application:
Electronic polarity-reversing control units supply continuous DC-current to electro-magnetic chucks. For electro-permanent magnetic chucks this control unit is supplying the current impulse for switching the chuck on and off. The integrated, microprocessor controlled, pole reversing function demagnetizes the magnetic system and also eliminates the remanence magnetism in the workpiece. Due to this the workpieces can easily be released from the chuck, any chips are easy to remove, and, even more important, separate demagnetization of the workpiece is no longer required. Additional pole reversing programs are available for workpieces which are extremely difficult to (de)magnetize. When control unit and magnetic chuck are ordered as a set, it will be programmed with the most optimum settings in time and function. The control unit continuously monitors the main supply voltage / current, its outputs, all connecting cables and magnet coils. Status indications are presented on the LCD-display.

Features:
This device complies with the following regulations:
- EMC Directive 92/31/EEC ABI No. L126

A safety contact can be used in the control unit to prevent the machining of workpieces when the clamping device is not activated. Manual operation via illuminated push buttons. The optional connection to a CNC controller is achieved using a 24 Volt signal voltage.
A stepped-level, holding force regulator is installed as standard. It is adjusted by means of a coding switch. When using the lower step levels of the holding force regulator, it should be noted that the operational safety level may not comply with local accident prevention regulations e.g. German UUV. The clearance level can be altered and should be adjusted for each workpiece accordingly.

Maximum ambient temperature: 45°C
Input voltage: 230 / 400 Vac
Frequency: 50 / 60 Hz
Duty cycle for electro magnets: 100 %

Power rating characteristics:
- small and compact
- fully closed (IP 54 with Box version S) and shock-proof
- operator-friendly LCD display, indicating operation status and fault messages in text
- foil covered keys for simple and easy setting of parameters
- universal use for all magnet types and voltages
- safe and reliable

---

### ELECTRICAL DETAILS

<table>
<thead>
<tr>
<th>Ordering no.</th>
<th>Type of control</th>
<th>Mains voltage DC in V</th>
<th>Magnet current max in A</th>
<th>Mains voltage AC in V</th>
<th>Max. magnet rating DC in W</th>
<th>Fuse in A</th>
<th>Mains transformer required</th>
</tr>
</thead>
<tbody>
<tr>
<td>876.10 - - T-24 / 7/230</td>
<td>E 1</td>
<td>24</td>
<td>7</td>
<td>230</td>
<td>168</td>
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<tr>
<td>876.10 - - T-24 /15/230</td>
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<td>15</td>
<td>230</td>
<td>360</td>
<td>6,3</td>
<td>yes (1)</td>
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<tr>
<td>876.10 - - T-24 /25/230</td>
<td>E 3</td>
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<td>25</td>
<td>230</td>
<td>600</td>
<td>6,3</td>
<td>yes (1)</td>
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<tr>
<td>876.10 - - O-110/ 6 /230</td>
<td>E 4</td>
<td>110</td>
<td>6</td>
<td>230</td>
<td>660</td>
<td>4</td>
<td>no (C)</td>
</tr>
<tr>
<td>876.10 - - O-110/16/230</td>
<td>E 5</td>
<td>110</td>
<td>16</td>
<td>230</td>
<td>1760</td>
<td>16</td>
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<td>30</td>
<td>230</td>
<td>3300</td>
<td>25</td>
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<td>6</td>
<td>400</td>
<td>660</td>
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<td>30</td>
<td>400</td>
<td>3300</td>
<td>25</td>
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</tbody>
</table>
ELECTRONIC POLARITY-REVERSING CONTROL UNIT

With integrated microprocessor and holding force control

Magnet terminals
Control signal
Terminals
Mains terminals

LCD-Display:
Indicates operation status and fault messages in text.

Foil covered keys:
For simple setting of parameters
- Magnet type and voltage
- Demagnetizing cycle (coarse)
- Demagnetizing cycle (fine)
- Holding force characteristic (1-16 steps)
- Number of voltage impulses
- Impulse length
- Holding force value for machine clearance

### D I M E N S I O N S

<table>
<thead>
<tr>
<th>Ordering no.</th>
<th>Box version (S) with protection IP54</th>
<th>Build-in version (E) with protection IP00</th>
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<td></td>
<td>List of contacts</td>
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<tr>
<td>876.10-S-T-24/7/230</td>
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<td>876.10-S-T-24/15/230</td>
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<td>876.10-S-O-110/6/230</td>
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</tr>
<tr>
<td>876.10-S-T-110/6/400</td>
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<tr>
<td>876.10-S-T-110/30/400</td>
<td>E 9</td>
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</table>

Ordering example:
Electronic Polarity-Reversing Control Unit
SAV 876.10 - E - 0 - 110 / 6 / 230
Ordering key
SAV No. - Version - Transformer - Magn. nom. voltage / Max. current / Mains voltage

SAV Spann- Automations-Normteiletechnik GmbH • www.sav-spanntechnik.de
Kapitel 2 49
CONTROL UNIT

SAV 876.02

For switching of direct current magnets in connection with polarity reversing unit type SAV 876.10

Application:
For switching of direct current magnets in connection with electronic polarity-reversing control unit SAV 876.10. The control unit is switched on by pushing the green and yellow keys. The polarity-reversing process is initiated by a red and yellow key. Possible fault indications as monitored by the polarity-reversing unit are also presented to the red illuminated key by means of a coded blinking signal. Required holding force can set to 8 levels. (16 levels on request).

Execution:
In order to comply with accident prevention regulations for machine tools, the release of the machine feed through auxiliary contacts can only be authorised when magnet is switched on and when the “on” position is indicated by a signal light. This control unit complies with these regulations. The signal lamp is integrated into the foil covered keys of the control unit. The auxiliary contacts (interlock) for the machine feed are integrated in the polarity-reversing control unit. Coding switch SE2-1.

Technical data:
Housing dimensions (LxWxH): 130 x 60 x 60 mm
Operating voltage: 24 V
Protection classification: IP 63
Protection class: III

Control unit type SE3
With coding switch for holding force setting in 8 levels using inverse BCD-coding, including 2 integrated signal lamps and 2 m coded cable, 9 pole. Additional coded cable against price adder.

Build-in version type SE2-1 to SE2-3
Consisting of 2 signal push buttons and coding switch for holding force setting in 8 levels using inverse BCD-coding. Complete set can be ordered under type SE2-8.

Ordering example:
Control Unit SAV 876.02 - SE3
Ordering key SAV No. - Type
RECTIFIER UNIT

For general purpose and clamping magnets

Use:
For power supply of general purpose and clamping magnets. For electro magnets as low-cost alternative for polarity-reversing controls in case holding force control and demagnetizing are not required.

Execution:
With silicon bridge rectifier and transformer with insulated separate windings.
Version in switching box for wall assembly (S) protection class IP54. Also available in build-in version (E) protection class IP00.
In standard version switching by mains supply. Optional available with control element in box door (B). The dimensions for build-in version differ slightly from table.

Ambient temp. max: 35 °C

Power supply, switchable: 230 V AC / 400 V AC
Frequency: 50 / 60 Hz

<table>
<thead>
<tr>
<th>Magnetic nom. voltage DC in V</th>
<th>Max. magnet current in A</th>
<th>Mains voltage in AC</th>
<th>Max. power at the magnet DC in W</th>
<th>Weight in kg</th>
<th>Dimensions in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>24</td>
<td>4,5</td>
<td>230 / 400</td>
<td>108</td>
<td>4,0</td>
<td>210</td>
</tr>
<tr>
<td>24</td>
<td>7</td>
<td>230 / 400</td>
<td>168</td>
<td>9,0</td>
<td>318</td>
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<tr>
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<td>15</td>
<td>230 / 400</td>
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<td>418</td>
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<tr>
<td>24</td>
<td>30</td>
<td>230 / 400</td>
<td>720</td>
<td>34,0</td>
<td>618</td>
</tr>
<tr>
<td>110</td>
<td>1,5</td>
<td>230 / 400</td>
<td>165</td>
<td>9,0</td>
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<tr>
<td>110</td>
<td>6</td>
<td>230 / 400</td>
<td>660</td>
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<td>110</td>
<td>16</td>
<td>230 / 400</td>
<td>1760</td>
<td>34,0</td>
<td>618</td>
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<tr>
<td>110</td>
<td>30</td>
<td>230 / 400</td>
<td>3300</td>
<td>65,0</td>
<td>818</td>
</tr>
</tbody>
</table>

Ordering example:
Rectifier Unit SAV 876.06 - E - 110 V / 30 A / 230 V - B
Ordering key SAV No. - Box / Nom. Magnet voltage / Max. current / Mains voltage
SLIP-RING BODY

For electric power supply to circular electromagnetic chucks

Use:
To supply electrical current to rotating, circular electro magnetic chucks. For separate installation to the lathe’s hollow spindle. The electrically insulated parts must not come into contact with fluids. It should be ensured that the electrically conducting parts are protected by a shock-proof cover. The power supply is connected to the support nuts using cable eyes.

Mounting:
shrinking at 130°C, pressing with 0.5 mm oversize, glueing.

Execution:
The slip-ring body is supplied with a small through hole only. The required adapter through-bore is to be machined in accordance with the machine spindle dimensions and taking the maximum size E into account.

<table>
<thead>
<tr>
<th>For circular magnet - Ø in mm</th>
<th>Number of contacts</th>
<th>Dimensions in mm A B C D E F</th>
<th>Max. r.p.m.</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>to 300</td>
<td>2</td>
<td>80 40,0 20 M5 28 - 38 3600</td>
<td>1,1</td>
<td></td>
</tr>
<tr>
<td>to 900</td>
<td>3</td>
<td>90 61,5 22 M6 30 - 45 3200</td>
<td>2,0</td>
<td></td>
</tr>
<tr>
<td>to 1600</td>
<td>3</td>
<td>120 84,0 25 M8 40 - 65 2500</td>
<td>3,5</td>
<td></td>
</tr>
</tbody>
</table>

Ordering example:
Slip Ring Body SAV 248.81 - 1600 - 110 V
Ordering key SAV - No. - Max. circular chuck diameter

CARBON BRUSH HOLDER

For electric power supply to circular electromagnetic chucks

Use:
Transmits the electrical current to the slip ring body.

Execution:
Carbon contacts, spring-loaded. It is fixed at a distance G from the mounting rod.

<table>
<thead>
<tr>
<th>For circular magnet - Ø in mm</th>
<th>Number of contacts</th>
<th>Dimensions in mm A B C D E F G</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>to 300</td>
<td>2</td>
<td>140 40 M8 12,5 6,3 20 27,0</td>
<td>0,10</td>
</tr>
<tr>
<td>to 900</td>
<td>3</td>
<td>140 40 M8 12,5 6,3 20 25,0</td>
<td>0,17</td>
</tr>
<tr>
<td>to 1600</td>
<td>3</td>
<td>140 60 M8 20 8,0 25 36,5</td>
<td>0,20</td>
</tr>
</tbody>
</table>

Ordering example:
Carbon Brush Holder SAV 248.83 - 1600 - 110 V
Ordering key SAV - No. - Max. chuck size - Operating voltage

COMPACT ELECTRICAL ADAPTER PLUG

For use in electro magnetic circular chuck power supplies

Use:
For fitting to the spindle end. Alternatively in the magnet centre for custom designs.

Features:
Compact design, encapsulated, maintenance-free.

Technical Specifications:
- Protection rating IP 51
- Low transfer resistance

Fixing:
By radial clamping around Diameter D.

<table>
<thead>
<tr>
<th>No. of contacts</th>
<th>max. continuous current in A</th>
<th>Voltage in V (AC/DC)</th>
<th>max. RPM A B C D</th>
<th>Dimensions in mm A B C D</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>30</td>
<td>0 - 250</td>
<td>1200</td>
<td>31,6 46,2 27,9 15,87</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>0 - 500</td>
<td>300</td>
<td>45 69,1 29 31,70</td>
</tr>
</tbody>
</table>

Ordering example:
Compact electrical adapter plug SAV 248.86 - 4
Ordering key SAV 248.86 - 4 - No. of contacts
### Chapter 3

#### Ordering example:

EP

#### Electro-Permanent Magnetic Rectangular Chucks

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>243.70</td>
<td>13/18/25 mm</td>
<td>Transverse poles</td>
<td></td>
<td>58-59</td>
</tr>
<tr>
<td>243.71</td>
<td>4 mm</td>
<td>Fine longitudinal poles</td>
<td></td>
<td>60-61</td>
</tr>
<tr>
<td>243.72</td>
<td>4 mm</td>
<td>With magnetically active stops</td>
<td></td>
<td>62-63</td>
</tr>
<tr>
<td>243.73</td>
<td>4 mm</td>
<td>Fine transverse poles</td>
<td></td>
<td>64-65</td>
</tr>
<tr>
<td>243.76</td>
<td>35/65/85 mm</td>
<td>With demagnetisation, for hard milling</td>
<td></td>
<td>66-67</td>
</tr>
<tr>
<td>220.76</td>
<td>35/65 mm</td>
<td>With demagnetisation, for hard milling</td>
<td></td>
<td>66-67</td>
</tr>
<tr>
<td>243.77</td>
<td>27,5 mm</td>
<td>Fine transverse poles</td>
<td></td>
<td>68-69</td>
</tr>
<tr>
<td>243.77</td>
<td>55 mm</td>
<td>For univ. applications with poles shoes</td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>243.77</td>
<td>85 mm</td>
<td>For thick workpieces with poles shoes</td>
<td></td>
<td>71</td>
</tr>
<tr>
<td>248.70</td>
<td>–</td>
<td>Pole extensions cubic / round</td>
<td></td>
<td>73</td>
</tr>
<tr>
<td>243.77-RAIL</td>
<td>–</td>
<td>For machining of rails</td>
<td></td>
<td>74</td>
</tr>
</tbody>
</table>

#### Electro Permanent Magnetic Chucks / Pallets

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>243.79</td>
<td>Hexagonalpol for univ. use, with pole shoes</td>
<td>75</td>
</tr>
<tr>
<td>220.79</td>
<td>Hexagonapol for univ. machining, HSC-milling</td>
<td>76</td>
</tr>
</tbody>
</table>

#### Tombstones with Electro Permanent Magnetic Chucks

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>242.92</td>
<td>Tombstone for horizontal machining operations</td>
<td>77</td>
</tr>
</tbody>
</table>

#### Electro Permanent Magnetic Circular Chucks

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>Pole Pitch</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>244.70</td>
<td>Radial pole arr.</td>
<td>for thin rings</td>
<td></td>
<td>78-79</td>
</tr>
<tr>
<td>244.71</td>
<td>Radial pole arr.</td>
<td>for hard turning of thin rings</td>
<td></td>
<td>80-81</td>
</tr>
<tr>
<td>244.72</td>
<td>Conc.pole arr.</td>
<td>for thin parts, multiple part loading</td>
<td></td>
<td>84-85</td>
</tr>
<tr>
<td>244.73</td>
<td>Parall. pole pitch</td>
<td>for thin parts, magnetically active centre</td>
<td></td>
<td>86</td>
</tr>
</tbody>
</table>

#### Electronic Polarity-Reversing Control Units / Power Switching Units

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>876.12</td>
<td>For the electronic control of EP-chucks</td>
<td>–</td>
</tr>
<tr>
<td>876.02</td>
<td>To switch DC magnets</td>
<td>–</td>
</tr>
</tbody>
</table>

#### Carbon Contact Holder / Slip Ring Body

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>248.84</td>
<td>Carbon contact holder</td>
<td>–</td>
</tr>
<tr>
<td>248.85</td>
<td>Separate slip ring body</td>
<td>–</td>
</tr>
<tr>
<td>248.86</td>
<td>Compact electrical adapter plug</td>
<td>–</td>
</tr>
</tbody>
</table>

* Explanation of the icons on page 9
**ELECTRO PERMANENT MAGNET CUBE**

**Dimensions:**
1400 x 1400 mm

**Workpiece:**
Castings for crankshafts

**Machining operation:**
Hard milling of mould cavities

**Description:**
- 4 Magnet sides, each with 2 active magnets
- Wear protection with pole beams
- Electrical connection with industrial plug for index tables

**ELECTRO PERMANENT MAGNETIC PALLET**

**Dimensions:**
1000 x 1000 mm

**Workpiece:**
Castings for gear box covers

**Machining operation:**
Drilling and milling of the sealing faces

**Description:**
- Initial clamping using movable pole shoes and support elements
- Second clamping using fixed pole beams to achieve exact parallelism
**HIGH ENERGY MAGNET MILLING CHUCK**

- **Dimensions:**
  1900 x 750 mm

- **Workpiece:**
  Front plates for forklift trucks

- **Machining operation:**
  Milling operations on 5 sides incl. the apertures

- **Description:**
  - Powerful neodymium magnet system
  - Full workpiece access with pole beams
  - Retractable side stops with position monitoring

---

**ELECTRO PERMANENT MAGNETIC FIXTURE**

- **Dimensions:**
  Length 1000 mm

- **Workpiece:**
  Moulds/tools for hydraulic press brakes

- **Machining operation:**
  Grinding of contours and feet

- **Description:**
  - Bridge on indexer with rotational parallelism of 0.01/1000 mm
  - Workpiece holding using pole blocks with either longitudinal or transverse poles
PRODUCT APPLICATIONS

**ELECTRO PERMANENT MAGNETIC CHUCK** with adapter pole beams

- **Dimensions:** 4000 x 180 mm
- **Workpiece:** Linear guides
- **Machining operation:** Grinding of the guide surfaces
- **Description:**
  - With longitudinal poles for a homogenous magnetic field over the full length
  - Made from a single piece
  - High energy system
  - Full workpiece access with adapter pole plates

**ELECTRO PERMANENT MAGNETIC PALLETS**

- **Dimensions:** 2310 x 260 mm
- **Workpiece:** Linear guides
- **Machining operation:** Grinding of the guide surfaces
- **Description:**
  - 2 magnets in pallet operation per machine
  - Automatic docking of electrical connection
ELECTRO PERMANENT MAGNETIC CIRCULAR CHUCKS

Magnets for large component machining:
- 3-face machining operations
- Minimal clamping and set-up times
- Universal and precise
- Extremely high holding forces even for heavy machining operations
- Chuck surface completely active
- High accuracy and damping through surface proportional force transfer
- Large magnetically active areas in the circumferential direction
- Very small inactive range in the centre
- Individual spindle adaption
- Produced from a single piece
- High RPM
- Extremely large diameters e.g. 12 m in segment design

SAV LARGE MAGNET CONSTRUCTION

ø 4000 mm, 2-part execution

ø 2800 mm, produced from a single piece
ELECTRO-PERMANENT MAGNETIC CHUCK

With continuous transverse pole arrangement \( P = 13, 18 \) and \( 25 \) mm

This range of magnetic chucks belongs to the new generation of electro-permanent magnetic chucks and is notable for its very robust, homogeneous design and its precision. The magnetic force is produced by permanent magnets that are magnetized and demagnetized by short electric current pulses. This chuck is particularly notable for its high power and longlife. The pole pitch gives real N and S-poles.

Use:
For universal clamping of precision workpieces.

- for workpiece positioning
  cross to pole pitch

- for workpiece with min. thickness = \( x \)
  4.5 mm at \( P = 13 \) mm
  6.0 mm at \( P = 18 \) mm
  8.5 mm at \( P = 25 \) mm

- for flat workpieces with min. dimensions = \( a \):
  25 mm x 25 mm at \( P = 13 \) mm
  32 mm x 32 mm at \( P = 18 \) mm
  45 mm x 45 mm at \( P = 25 \) mm

Nominal holding force:
90 N/cm², at pole pitch \( P = 13 \) mm
110 N/cm², at pole pitch \( P = 18 \) mm
115 N/cm², at pole pitch \( P = 25 \) mm

adjustable with control unit with encoded switch

Nominal operating voltage:
210 V DC up to size \( A \times B = 600 \times 400 \)
360 V DC above size \( A \times B = 450 \times 175 \)

Features:
- solid constructed pole plate with either 13 mm, 18 mm or 25 mm transverse pole pitch
- real magnetic (N/S) poles
- switching off through demagnetizing cycle
- heat treated tension free body
- electro-permanent system, guaranteeing safe operation during power failure
- air pressure release system on request for \( P = 18 \) or 25 mm
- gap free construction of pole plate
- fine grid pole plate to body connection
- extra enhanced systems available on request
- pole plate wearing limit 8 mm
- pole plate exchangeable
- mounting slots in both short faces
- through holes for mounting in sizes over 1000 mm length on specification
- robust and waterproof
- sealed to IP 65
- for use with control unit type SAV 876.03 / SAV 876.10

Auxiliary equipment:
- Sidestop rail on a short and long face.
- Connecting cable, 3 m, on the right-hand, short face at the rear.
- With industrial watertight plug-in type connector on request
- Lifting bolts for transportation on larger models.
- Controller and hand-held control unit not included in delivery.
ELECTRO-PERMANENT MAGNETIC CHUCK

With continuous transverse pole arrangement P = 13, 18 and 25 mm

Ordering example:
Electro-Permanent Magnetic Chuck  SAV 243.70 - 2000 x 800 - 25 - 360 V
Ordering key  SAV - No. - A x B - Pole pitch - Chuck voltage

Ordering example Steuerung:
Electronic polarity-reversing control unit  SAV 876.12 - S-O-360/60/400
Hand-held control unit  SAV 876.02 - SE3
Ordering key  SAV - No.

Dimensions in mm

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>P</th>
<th>Weight</th>
<th>Chuck voltage in V</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>100</td>
<td>80</td>
<td>120</td>
<td>13</td>
<td>11.0</td>
<td>210</td>
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<tr>
<td>300</td>
<td>100</td>
<td>80</td>
<td>224</td>
<td>13</td>
<td>17.0</td>
<td>210</td>
</tr>
<tr>
<td>300</td>
<td>150</td>
<td>80</td>
<td>224</td>
<td>13</td>
<td>25.0</td>
<td>210</td>
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<tr>
<td>400</td>
<td>150</td>
<td>80</td>
<td>328</td>
<td>13</td>
<td>34.0</td>
<td>210</td>
</tr>
<tr>
<td>450</td>
<td>175</td>
<td>80</td>
<td>381</td>
<td>18</td>
<td>44.0</td>
<td>210 / 360</td>
</tr>
<tr>
<td>400</td>
<td>200</td>
<td>80</td>
<td>309</td>
<td>18</td>
<td>45.0</td>
<td>210 / 360</td>
</tr>
<tr>
<td>500</td>
<td>200</td>
<td>80</td>
<td>417</td>
<td>18</td>
<td>56.0</td>
<td>210 / 360</td>
</tr>
<tr>
<td>600</td>
<td>200</td>
<td>80</td>
<td>525</td>
<td>18</td>
<td>67.0</td>
<td>210 / 360</td>
</tr>
<tr>
<td>800</td>
<td>200</td>
<td>80</td>
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<td>18</td>
<td>90.0</td>
<td>210 / 360</td>
</tr>
<tr>
<td>500</td>
<td>250</td>
<td>80</td>
<td>417</td>
<td>18</td>
<td>70.0</td>
<td>210 / 360</td>
</tr>
<tr>
<td>600</td>
<td>250</td>
<td>80</td>
<td>525</td>
<td>18</td>
<td>84.0</td>
<td>210 / 360</td>
</tr>
<tr>
<td>800</td>
<td>250</td>
<td>80</td>
<td>741</td>
<td>18</td>
<td>112.0</td>
<td>210 / 360</td>
</tr>
<tr>
<td>500</td>
<td>300</td>
<td>80</td>
<td>417</td>
<td>18</td>
<td>90.0</td>
<td>210 / 360</td>
</tr>
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<td>600</td>
<td>300</td>
<td>80</td>
<td>525</td>
<td>18</td>
<td>108.0</td>
<td>210 / 360</td>
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<td>145.0</td>
<td>210 / 360</td>
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<td>921</td>
<td>18</td>
<td>180.0</td>
<td>210 / 360</td>
</tr>
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<td>350</td>
<td>80</td>
<td>525</td>
<td>18</td>
<td>126.0</td>
<td>210 / 360</td>
</tr>
<tr>
<td>800</td>
<td>350</td>
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<td>210 / 360</td>
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<td>80</td>
<td>921</td>
<td>18</td>
<td>210.0</td>
<td>210 / 360</td>
</tr>
</tbody>
</table>

Recommended controller and control unit:

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held contr. unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 1</td>
<td>SAV 876.12-S-O-210/30/230</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 2</td>
<td>SAV 876.12-S-O-360/30/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 3</td>
<td>SAV 876.12-S-O-360/60/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.
Electro-permanent magnetic system with very small pole pitch. The magnetic force is produced by permanent magnets that are magnetized and demagnetized by short electric current pulses. This chuck is particularly notable for its high power, robust construction and long-life. Especially suitable for thin parts; workpieces cross to length of chuck.

**Use:**
For clamping of thin and flat high precision workpieces.

- for workpiece positioning cross to pole pitch
- for thin workpieces of min. 2 mm thick
- for flat workpieces with min. dimensions of 40 mm x 40 mm

**Nominal holding force:**
100 N/cm², adjustable with control unit with encoded switch

**Nominal operating voltage:**
- 210 V DC up to size A x B = 600 x 250
- 360 V DC above to size A x B = 600 x 250

**Features:**
- pole plate with very small longitudinal pole pitch of 3 mm steel and 1 mm brass
- glued lamination with additional pull anchors in length direction of chuck
- gap free construction of pole plate

**Auxiliary equipment:**
- side stop rail on short and long face
- connecting cable, 3 m, on the right-hand, short face
- with industrial watertight plug-in type connector on request
- lifting bolts on larger models
**ELECTRO-PERMANENT MAGNETIC CHUCK**

With fine longitudinal pole pitch $P = 4$ mm

Other sizes and operating voltages available on request. Larger clamping surfaces can be made by flush mounting several units. Please refer to SAV 876.10 to SAV 876.03, for details regarding suitable control units, based on max. current or control voltage.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
<th>Chuck voltage in V</th>
<th>Type of control</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>300</td>
<td>100</td>
<td>77</td>
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<td>D</td>
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<td>1000</td>
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<tr>
<td>1200</td>
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<td>453</td>
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</table>

**Recommended controller and control unit:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 1</td>
<td>SAV 876.12-S-O-210/30/230</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 2</td>
<td>SAV 876.12-S-O-360/30/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 3</td>
<td>SAV 876.12-S-O-360/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.

**Ordering example:**

**Electro-Permanent Magnetic Chuck**  SAV 243.71 - 1200 x 500 - 360 V

**Ordering key**  SAV - No.  -  A  x  B  -  Chuck voltage

**Ordering example Steuerung:**

**Electronic polarity-reversing control unit**  SAV 876.12 - S-O-260/60/400

**Hand-held control unit**  SAV 876.02 - SE3

**Ordering key**  SAV - No.
With fine longitudinal pole pitch $P = 4$ mm and magnetizable stop rails

This newly developed clamping system with magnetic stop rails provides a simple, reliable and secure method for positioning and clamping workpieces for machining. This helps to avoid positioning errors, particularly when used in multi-shift operation. The magnetic force is produced by permanent magnets that are magnetized and demagnetized by short electric current pulses. Especially suitable for thin parts.

**Use:**
Best suited for precision grinding of mass production components. For toolmaking, the system facilitates μm-precise machining with respect to the datum edge. Also for light milling.

- control of magnetizable side stops can be operated in time sequence
- for thin workpieces of up to 12 mm thick. (depends on height of stoppers)
- for flat workpieces with min. dimensions 40 mm x 40 mm.

**Nominal holding force:**
100 N/cm², adjustable with control unit with encoded switch

**Nominal operating voltage:**
360 V DC

**Features:**
- 2 strong bipolar magnets for the stop rails and 2 longitudinal pole magnets to provide accurate and secure alignment of the workpieces
- the magnetization of the stop rails takes place prior to that of the main clamping surface, using a special control routine. The workpiece is thus pulled firmly into the lower edge of the stop rail
- especially fine, uninterrupted longitudinal pole arrangement
- glued lamination with additional pull anchors in length direction of chuck
- gap free construction of pole plate
- high precision due to fine grid pole plate to body connection
- switching off through demagnetizing cycle
- pole plate wearing limit 8 mm
- low magnetic field height
- heat treated tension free body
- electro-permanent system, guaranteeing safe operation during power failure
- mounting slots in both short faces
- extra enhanced systems available on request
- robust and waterproof
- sealed to IP 65
- for use with control unit type SAV 876.10

**Standard equipment:**
- 1 or 2 magnetizable stop rails
- connecting cable, 3 m, on the right-hand, short face
- with industrial watertight plug-in type connector on request
- lifting bolts on larger models
**ELECTRO-PERMANENT MAGNETIC CHUCK**

With fine longitudinal pole pitch $P = 4$ mm and magnetizable stop rails

The magnetizing cycle starts with magnetizing just the stop rails. The workpiece is thus pulled with a force $F_A$, at an angle of $45^\circ$, into the corner between the stop rail and the chuck surface. Approximately 1 second later, the main chuck surface is switched on to generate the main clamping force $F_H$.

### Dimensions in mm

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D*</th>
<th>Number of stop rails</th>
<th>Weight in kg</th>
<th>Type of control</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
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<td>77</td>
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<td>2</td>
<td>183.0</td>
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</table>

* Other heights on request. The table gives a summary of the standard sizes available. Custom-made versions are available on request. Please refer to SAV 876.10 for control unit details.

### Recommended controller and control unit:

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 4</td>
<td>SAV 876.12-S-O-360/30x2/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.

**Ordering example:**

**Electro-Permanent Magnetic Chuck**

SAV 243.72 - 800 x 400 - 360 V

**Ordering key**

SAV - No.  -  A  x  B  -  Chuck voltage

**Ordering example control unit:**

**Electronic polarity-reversing control unit**

SAV 876.12 - S-O-300/30x2/400

**Hand-held control unit**

SAV 876.02 - SE3

**Ordering key**

SAV - No.
ELECTRO-PERMANENT MAGNETIC CHUCK

With fine transverse pole pitch \( P = 4 \text{ mm} \)

Electro-permanent magnetic system with very small pole pitch. The magnetic force is produced by permanent magnets that are magnetized and demagnetized by short electric current pulses. Especially suitable for thin parts; workpiece positioning in length direction of chuck.

**Use:**
For clamping of thin and flat high precision workpieces.
- for workpiece positioning cross to pole pitch
- for thin workpieces of min. 2 mm thick.
- for flat workpieces with min. dimensions of 40 mm x 40 mm.

**Nominal holding force:**
100 N/cm², adjustable with control unit with encoded switch

**Nominal operating voltage:**
- 210 V DC up to size \( A \times B = 600 \times 250 \)
- 360 V DC above size \( A \times B = 600 \times 250 \)

**Features:**
- pole plate with very small longitudinal pole pitch of 3 mm steel and 1 mm brass
- glued lamination with additional pull anchors in length direction of chuck
- gap free construction of pole plate
- high precision due to fine grid pole plate to body connection
- switching off through demagnetizing cycle
- pole plate wearing limit 8 mm
- low magnetic field height
- heat treated tension free body
- electro-permanent system, guaranteeing safe operation during power failure
- mounting slots in both short faces
- extra enhanced systems available on request
- through holes for mounting in sizes over 1000 mm length on specification
- robust and waterproof
- sealed to IP 65
- for use with control unit type SAV 876.03-SF0-EP up to size \( A \times B = 600 \times 300 \)
- SAV 876.10 above size \( A \times B = 600 \times 300 \)

**Auxiliary equipment:**
- side stop rail on short and long face
- connecting cable, 3 m, on the right-hand, short face
- with industrial watertight plug-in type connector on request
- lifting bolts on larger models
ELECTRO-PERMANENT MAGNETIC CHUCK

SAV 243.73

With fine transverse pole pitch \( P = 4 \) mm

Ordering example:

Electro-Permanent Magnetic Chuck  
SAV 243.73 - 1200 x 500 - 360 V

Ordering key  
SAV - No. - A x B - Chuck voltage

Ordering example control unit:

Electronic polarity-reversing control unit  
SAV 876.12 - S-O-360/60/400

Hand-held control unit  
SAV 876.02 - SE3

Recommended controller and control unit:

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 1</td>
<td>SAV 876.12-S-O-210/30/230</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 2</td>
<td>SAV 876.12-S-O-360/30/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 3</td>
<td>SAV 876.12-S-O-360/60/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.
ELECTRO PERMANENT MAGNETIC CHUCKS

with continuous transverse pole pitch \( P = 35, 65, 85 \)

Enhanced magnet system with demagnetisation cycle.
Optimised system for high holding forces.
Fully magnetically saturated system through flux concentration.
Version 220.76 quadratic (Pallet), Version 243.76 rectangular.

**SAV 220.76**

Pole pitch 35, 65

**SAV 243.76**

Pole pitch 35, 65, 85

**Use:**
Heavy machining operations also on adapter pallet systems.
With demagnetisation cycle, therefore also for high alloy materials or hardened materials.

- for workpieces to a min. thickness \( x \):
  - 8.0 mm at \( P = 35 \) mm
  - 20.0 mm at \( P = 65 \) mm
  - 32.0 mm at \( P = 85 \) mm

- for flat workpieces min. area:
  - 70 mm x 70 mm at \( P = 35 \) mm
  - 130 mm x 130 mm at \( P = 65 \) mm
  - 180 mm x 180 mm at \( P = 85 \) mm

**Nominal holding force:**
- 80 N/cm\(^2\) at \( P = 35 \) mm
- 100 N/cm\(^2\) at \( P = 65 \) mm
- 160 N/cm\(^2\) at \( P = 85 \) mm

Regulated by use of the holding force coding switch on the control unit.

**Nominal operating voltage:**
210 V

**Features:**
- Optimised holding force system with demagnetisation cycle
- Complete surface is magnetically active, no “dead zones”
- Solid monoblock design
- “True” pole spacings N/S
- Electro permanent system for absolute safety in the case of a power cut
- Electrical connection with industrial plug on front right side
- Pole gap with brass, wear protected
- 8 mm pole plate wear limit
- Optionally with grid tapped-hole pattern for pole beams or pole shoes possible (M)
- Pole pitches 65 mm and 85 mm optionally available with T-slots DIN 650-10H10 (T)
- Mounting slots on the short faces
- The quadratic design SAV 220.76 optionally available with zero point clamping system upon agreement
- Robust and waterproof
- Protection rating IP65
- Suitable for use with control unit SAV 876.12

**Scope of delivery:**
- Electrical connection with industrial plug
- Adaption for zero point reference system upon agreement at a surcharge
- Lifting bolts for transportation on larger models.
- Robot flange on request
## ELECTRO PERMANENT MAGNETIC CHUCKS

with continuous transverse pole pitch for hard milling

### SAV 220.76-35

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
<th>Control unit max. imp. current in A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 320</td>
<td>B 320</td>
<td>C 90 35</td>
</tr>
<tr>
<td>A 400</td>
<td>B 400</td>
<td>C 90 35</td>
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### SAV 243.76-35

<table>
<thead>
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<th>Dimensions in mm</th>
<th>Weight in kg</th>
<th>Control unit max. imp. current in A</th>
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</thead>
<tbody>
<tr>
<td>A 600</td>
<td>B 400</td>
<td>C 90 35</td>
</tr>
<tr>
<td>A 800</td>
<td>B 500</td>
<td>C 90 35</td>
</tr>
<tr>
<td>A 1000</td>
<td>B 500</td>
<td>C 90 35</td>
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</table>

### SAV 220.76-65

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
<th>Control unit max. imp. current in A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 320</td>
<td>B 320</td>
<td>C 90 65</td>
</tr>
<tr>
<td>A 400</td>
<td>B 400</td>
<td>C 90 65</td>
</tr>
</tbody>
</table>

### SAV 243.76-65

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
<th>Control unit max. imp. current in A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 580</td>
<td>B 400</td>
<td>C 90 65</td>
</tr>
<tr>
<td>A 815</td>
<td>B 500</td>
<td>C 90 65</td>
</tr>
<tr>
<td>A 960</td>
<td>B 500</td>
<td>C 90 65</td>
</tr>
</tbody>
</table>

### SAV 243.76-85

<table>
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<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
<th>Control unit max. imp. current in A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 610</td>
<td>B 400</td>
<td>C 100 85</td>
</tr>
<tr>
<td>A 800</td>
<td>B 500</td>
<td>C 100 85</td>
</tr>
<tr>
<td>A 980</td>
<td>B 500</td>
<td>C 100 85</td>
</tr>
</tbody>
</table>

For use with control unit SAV 876.12

Ordering example:
**Electro Permanent Magnetic Chuck**  
SAV 243.76 - 980 x 500 - 85 - 210 V - T

Ordering key:  
SAV - No. - A x B - Pole pitch - Nominal voltage - Option
This clamping system with neodymium-iron-boron magnets was developed in accordance with the most modern standards in magnet technology. Exceptionally high holding forces arise through the use of AlNiCo/Neodymium magnets in an electro-permanent magnetic configuration. Magnetization and demagnetization are achieved through short electric current pulses.

**Use:**
For heavy milling work with coarse chip removal. Ideal for use on indexing palette systems

- for workpiece with min. thickness = x:
  - 8.0 mm at P = 27.5 mm
  - 20.0 mm at P = 55.0 mm
  - 35.0 mm at P = 85.0 mm

- for flat workpieces with min. dimensions a:
  - 45 x 45 mm² at P = 27.5 mm
  - 95 x 95 mm² at P = 55.0 mm
  - 150 x 150 mm² at P = 85.0 mm

**Nominal holding force:**
195 N/cm² on full induceable steel load
110 N/cm² at P = 27.5 mm
150 N/cm² at P = 55.0 mm
170 N/cm² at P = 85.0 mm
adjustable with control unit with encoded switch

**Nominal operating voltage:**
360 V DC

**Features:**
- Optimized high energy magnet system
- Holding forces at maximum physically possible level
- The deep field magnet system even bridges large air gaps

**Scope of delivery:**
- Connecting cable, 3 m, on the right-hand, short face
- with industrial watertight plug-in type connector on request
- lifting bolts on larger models

---

**Industrial plug with quick-lock action**
optional at a surcharge

**Easy to use plug connection**

- Complete surface is magnetically active, no “dead zones”
- Solid monoblock design
- “True” pole spacings N/S
- Electro permanent system for absolute safety in the case of a power cut
- Pole gap with brass in-lays for optimal wear protection
- 8 mm pole plate wear limit
- Optionally with grid tapped-hole pattern for pole beams or movable pole shoes possible (M)
- Mounting slots on both short faces
- For lengths greater than 1000 mm with drilled through holes for fixing, upon agreement
- Robust and waterproof
- Protection rating IP65
- Suitable for use with control unit SAV 876.12
ELECTRO-PERMANENT MAGNETIC CHUCK

with continuous transverse pole pitch for milling

SAV 243.77 - 27,5
Small transverse pole arrangement

Use:
Heavy milling of thin plates
- min. thickness of workpiece: 5 - 8 mm
- min. size of workpiece: 45 x 45 mm²
- nominal holding force: 110 N/cm²

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Nom. holding force fully loaded in daN</th>
<th>Optional number of threads per pole M</th>
<th>Number of poles M</th>
<th>Number of threads total M</th>
<th>Weight in kg</th>
<th>Type of control</th>
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<tbody>
<tr>
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<td>15</td>
<td>30</td>
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<td>129</td>
<td>331.0</td>
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</table>

Recommended controller and control unit:

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 2</td>
<td>SAV 876.12-S-O-360/30/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 3</td>
<td>SAV 876.12-S-O-360/60/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 5</td>
<td>SAV 876.12-S-O-360/60x2/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
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<td>SAV 876.12-S-O-360/60x3/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.

Ordering example:
Electro-Permanent Magnetic Chuck  SAV 243.77 - 1180 x 500 - 27.5 - 360 V - M
Ordering key  SAV - No. - A x B - Pole pitch - Chuck voltage - Option

Ordering example Steuerung:
Electronic polarity-reversing control unit  SAV 876.12 - S-O-360/60x3/400
Hand-held control unit  SAV 876.02 - SE3
Ordering key  SAV - No.
### ELECTRO-PERMANENT MAGNETIC CHUCK

with continuous transverse pole pitch for milling

**SAV 243.77 - 55**

Middle transverse pole arrangement

**Use:**
For universal machining and heavy milling.
- min. thickness of workpiece: 20 mm
- min. size of workpiece: $95 \times 95 \text{ mm}^2$
- nominal holding force: $150 \text{ N/cm}^2$

#### Dimensions in mm

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>P</th>
<th>Nom. holding force fully loaded in daN</th>
<th>Optional number of threads per pole M</th>
<th>Number of poles M</th>
<th>Number of threads total M</th>
<th>Weight in Kg</th>
<th>Type of control</th>
</tr>
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<tbody>
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<td>480</td>
<td>300</td>
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<td>60</td>
<td>55</td>
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<td>36</td>
<td>94.0</td>
<td>EP 2</td>
</tr>
<tr>
<td>590</td>
<td>300</td>
<td>97</td>
<td>60</td>
<td>55</td>
<td>26.550</td>
<td>4</td>
<td>11</td>
<td>44</td>
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<tr>
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<tr>
<td>1140</td>
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<td>55</td>
<td>85.500</td>
<td>7</td>
<td>23</td>
<td>161</td>
<td>373.0</td>
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</tr>
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<tr>
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<td>7</td>
<td>37</td>
<td>259</td>
<td>661.0</td>
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</tr>
</tbody>
</table>

**Recommended controller and control unit:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 2</td>
<td>SAV 876.12-S-O-360/30/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 3</td>
<td>SAV 876.12-S-O-360/60/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 5</td>
<td>SAV 876.12-S-O-360/60x2/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 6</td>
<td>SAV 876.12-S-O-360/60x3/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.

**Ordering example:**

**Electro-Permanent Magnetic Chuck**

SAV 243.77 - 1580 x 500 - 55 - 360 V - M

**Ordering key**

SAV - No. - A x B - Pole pitch - Chuck voltage - Option

**Ordering example Steuerung:**

**Electronic polarity-reversing control unit**

SAV 876.12 - S-O-360/60x3/400

**Hand-held control unit**

SAV 876.02 - SE3

**Ordering key**

SAV - No.
ELECTRO-PERMANENT MAGNETIC CHUCK

with continuous transverse pole pitch for milling

SAV 243.77 - 85
Large transverse pole arrangement

Use:
For heavy milling of large and thick workpieces.
For large air gaps.
- min. thickness of workpiece: 35 mm
- min. size of workpiece: 150 x 150 mm²
- nominal holding force: 170 N/cm²

Ordering example:

SAV 243.77 - 85
 fullName loaded in daN
- Option M number of threads per pole M
- Pole pitch
- Chuck voltage
- Option

Dimensions in mm
Nom. holding force
fully loaded in daN
Optional number of
threads per pole M
Number of
poles M
Number of threads
total M
Weight
in Kg
Type of control

580 300 110 90 85 29.500 3 7 21 129,0 EP 2
750 300 110 90 85 38.250 3 9 27 167,0 EP 2
51.000 4 9 36 203,0 EP 3
750 400 100 90 85 74.120 4 13 52 294,0 EP 3
97.240 4 17 68 386,0 EP 3
108.800 4 19 76 432,0 EP 3
750 500 110 90 85 63.750 5 9 45 278,0 EP 3
1090 500 110 90 85 92.650 5 13 65 405,0 EP 3
1430 500 110 90 85 121.550 5 17 85 531,0 EP 3
1600 500 110 90 85 136.000 5 19 95 594,0 EP 3
1090 600 110 90 85 111.180 6 13 78 486,0 EP 3
1430 600 110 90 85 145.860 6 17 102 637,0 EP 5
1600 600 110 90 85 163.200 6 19 114 713,0 EP 5

Recommended controller and control unit:

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 2</td>
<td>SAV 876.12-S-0-360/30/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 3</td>
<td>SAV 876.12-S-0-360/60/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 5</td>
<td>SAV 876.12-S-0-360/60x3/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 6</td>
<td>SAV 876.12-S-0-360/60x3/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.
**SAV POLE BEAM TECHNOLOGY / TOP-TOOLING**

---

### Mechanical or hydraulic stops

- Mechanical stop with pressure control monitoring
- Hydraulic retractable stop
- Adapter pole plate 4 mm transverse pole pitch to mill thin beams

- Movable for 5-face machining
- Automatable
- With positional monitoring
- For mechanical part positioning

---

### Adapter top plates

**Electro permanent magnet**
With profiled special adapter top plate

- Recesses to drill through-holes in the workpiece are possible
- Wear protection
- Easy cleaning of chips through automation
- No magnetic short-circuit through chips
- Positioning of parts and heavy machining through mechanical/magnetic stops

---

### Pole beams

**Electro permanent magnet**
With pole beams

- 5-face machining possible
- Recesses to drill through-holes in the workpiece are possible
- Construction with magnetically active stop
- Wear protection
- Simple and low-cost
- Easy to clean
- Short set-up times

**Electro permanent magnet**
With magnetically active stop rails for small parts
POLE EXTENSIONS – CUBIC

for adjustment to the geometry of the workpiece

Use:
As a raised support for workpieces on a magnetic chuck. Only useable on magnetic chucks SAV 243.77-55 and SAV 243.77-85.

Features:
Made of cold-drawn steel, the pole raisers can be machined to any shape. The table shows an extract from our standard range.
Can be supplied with specific machined dimensions, prepared for customer’s workpiece dimension.
Custom designs available on request.

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions in mm</th>
<th>Execution</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVS 3</td>
<td>A 48 B 40 C 53,5</td>
<td>Rigid</td>
<td>0,8</td>
</tr>
<tr>
<td>PVF 3</td>
<td>A 48 B 56,0</td>
<td>Flexible</td>
<td>0,8</td>
</tr>
</tbody>
</table>

Ordering example:
Pole Raisers: SAV 248.70 - 70 - PVS 3
Ordering key: SAV - No. - A - Type

POLE EXTENSIONS – ROUND

for adjustment to the geometry of the workpiece

Use:
As a raised support for workpieces on a magnetic chuck. Only for use with magnetic chucks SAV 220.79 and SAV 243.79.

Features:
Made of cold-drawn steel, the pole extensions can be machined to any shape. The table shows an extract from our standard range.
Can be supplied with specific machined dimensions, prepared for customer’s workpiece dimensions.
Custom designs available on request.

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions in mm</th>
<th>Execution</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVS-RV</td>
<td>A 55 B 75</td>
<td>Rigid, full</td>
<td>1.8</td>
</tr>
<tr>
<td>PVS-RH</td>
<td>A 55 B 75</td>
<td>Rigid, half</td>
<td>1.4</td>
</tr>
<tr>
<td>PVF-RV</td>
<td>55 B 70 - 80</td>
<td>Flexible, full</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Ordering example:
Pole Raisers: SAV 248.70 - 60 - PVF - RV
Ordering key: SAV - No. - A - Type
ELECTRO PERMANENT MAGNETIC CHUCK

SAV 243.77-RAIL

Clamping at the web and foot, single-side – for rail and switch machining

Applications:
For heavy chip removal of gauge line, feet and fishplate area of rail. In the first stage the double acting magnetic system aligns in the transverse direction ($F_A$). After this the main magnet in the base is activated ($F_H$).

Features:
- Double magnet, high energy system
- Holding forces at maximum physically possible level
- The deep field magnet system also bridges large air gaps up to 10 mm
- Solid mono-block design
- Pole gap with brass in-lays for optimal wear protection

Nominal operating voltage:
360 V DC

Nominal holding force:
195 N/cm² on inductive steel surfaces
With hexagonal poles for milling

**Features:**
- Optimised high energy magnet system
- Low build height
- Electro permanent system for absolute safety in the case of a power cut
- Optionally with Grid tapped-hole pattern for optional pole shoes
- Protection rating IP65
- 8 mm pole plate wear limit

**Use:**
- For milling operations, especially for universal machining with high level of chip removal
- HSC-milling
- Also for large air gaps
- Minimum workpiece thickness 15 mm
- Minimum workpiece size 100 x 100 mm

**Technische Angaben:**
Nominal holding force:
- On the workpiece 150 N/cm²
- Per pole pair 900 daN

**Chuck voltage:**
- 360 V DC Magnet voltage
- 400 V AC Power supply

Due to the magnetic clamping and the free access from the sides, by using pole shoes it is possible to machine the workpiece on 5-sides. See also SAV 248.70; P 73 bottom.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>No. of poles</th>
<th>Weight in kg</th>
<th>Type of control</th>
</tr>
</thead>
<tbody>
<tr>
<td>360 A</td>
<td>250 B</td>
<td>74 C</td>
<td>12</td>
</tr>
<tr>
<td>360 A</td>
<td>350 B</td>
<td>74 C</td>
<td>20</td>
</tr>
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<td>500 A</td>
<td>350 B</td>
<td>74 C</td>
<td>30</td>
</tr>
<tr>
<td>630 A</td>
<td>450 B</td>
<td>74 C</td>
<td>48</td>
</tr>
<tr>
<td>770 A</td>
<td>500 B</td>
<td>74 C</td>
<td>70</td>
</tr>
<tr>
<td>920 A</td>
<td>500 B</td>
<td>74 C</td>
<td>84</td>
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</tbody>
</table>

**Recommended controller and control unit:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 2</td>
<td>SAV 876.12-S-Ø-360/30/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 3</td>
<td>SAV 876.12-S-Ø-360/60/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 5</td>
<td>SAV 876.12-S-Ø-360x2/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.
ELECTRO PERMANENT MAGNETIC PALLET CHUCK

SAV 220.79

with hexagonal pole pitch

Use:
- For milling operations, especially for universal machining with high level of chip removal
- HSC-milling
- Also for large air gaps
- Minimum workpiece thickness 15 mm
- Minimum workpiece size 100 x 100 mm

Features:
- Optimised high energy magnet system
- Low build height
- Also bridges large air gaps
- Electro permanent system for absolute safety in the case of a power cut
- With grid tapped-hole pattern for optional pole shoes. See also SAV 248.70; P. 73 bottom.
- Electrical connection supplied with industrial plug

Technische Angaben:
- Nominal holding force Per pole pair 800 daN
- Nominal holding force on the workpiece 140 N/cm²
- Pole plate wear limit: 6 mm
- Parallelism in the executions:
  Standard (S): 0.03 fine milled
  Precision (P): 0.01 ground

Chuck voltage empfohlen:
- 210 V DC Magnet voltage
- 230 V AC Power supply

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>No. of poles</th>
<th>Weight in kg</th>
<th>Type of control</th>
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<tbody>
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<td>A  B  C *</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>160 100 64</td>
<td>2</td>
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<td>240 240 64</td>
<td>6</td>
<td>29</td>
<td>EP 1</td>
</tr>
<tr>
<td>240 240 64</td>
<td>6</td>
<td>23</td>
<td>EP 1</td>
</tr>
<tr>
<td>320 320 64 64</td>
<td>10</td>
<td>52</td>
<td>EP 1</td>
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<td>400 400 64 64</td>
<td>20</td>
<td>84</td>
<td>EP 2</td>
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<tr>
<td>500 500 64 64</td>
<td>24</td>
<td>124</td>
<td>EP 3</td>
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</table>

* without reference system

Adaptation examples Zero point system

Ordering example:
Electro Permanent Magnetic Pallet SAV 220.79 - 400 x 400 - 20 - 210 V - Clamping system - Adaption - P
Ordering key SAV - No. - A x B - No. of poles - Nominal voltage - Clamping system - Adaption - Accuracy
PERMANENT MAGNET TOMBSTONES, ANGLE PLATES

SAV 242.92

Tombstones, precision milled

Use:
For horizontal milling and drilling operations

Features:
Tombstones made from St52-3, precision milled.
With electro permanent magnetic chucks
SAV 243.77.
Electrical connection with industrial plug

Mounting holes available upon agreement.
Rectangularity: 0.03/1000 mm
Parallelism: 0.04/1000 mm
Nominal holding force: 150 N/cm²
Magnet field height: 12 mm
Pole plate wear limit: 5 mm

Technical data on magnets - see SAV 243.77

Chuck voltage:
- 360V DC Magnet voltage
- 400V AC Power supply

Auxiliary equipment:
- Tombstone with industrial connector plug
- For use with control unit SAV 876.12
- Control unit not included in delivery.

Electro Permanent Magnetic Tombstone    SAV 242.92-4 - 810 x 400 - 55 - 360V

Ordering example:
Electro Permanent Magnetic Tombstone    SAV 242.92-4 - 810 x 400 - 55 - 360V

Ordering key
SAV - No.    -   A   x   B - Pole pitch – Magnet voltage

Dimensions in mm

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Pole pitch</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>630</td>
<td>400</td>
<td>660</td>
<td>500</td>
<td>150</td>
<td>700</td>
<td>27.5</td>
<td>859</td>
</tr>
<tr>
<td>590</td>
<td>400</td>
<td>620</td>
<td>400</td>
<td>150</td>
<td>660</td>
<td>27.5</td>
<td>812</td>
</tr>
<tr>
<td>580</td>
<td>400</td>
<td>620</td>
<td>400</td>
<td>150</td>
<td>660</td>
<td>85</td>
<td>728</td>
</tr>
</tbody>
</table>

Angle plate SAV 242.92-2 with 2 magnets Type SAV 243.77

Dimensions in mm

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Pole pitch</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>200</td>
<td>415</td>
<td>320</td>
<td>200</td>
<td>455</td>
<td>27.5</td>
<td>287</td>
</tr>
<tr>
<td>520</td>
<td>200</td>
<td>420</td>
<td>400</td>
<td>256</td>
<td>455</td>
<td>27.5</td>
<td>437</td>
</tr>
<tr>
<td>630</td>
<td>300</td>
<td>660</td>
<td>500</td>
<td>356</td>
<td>700</td>
<td>27.5</td>
<td>776</td>
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<td>590</td>
<td>300</td>
<td>660</td>
<td>500</td>
<td>356</td>
<td>700</td>
<td>55</td>
<td>812</td>
</tr>
<tr>
<td>810</td>
<td>400</td>
<td>815</td>
<td>630</td>
<td>454</td>
<td>860</td>
<td>55</td>
<td>1408</td>
</tr>
<tr>
<td>580</td>
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<td>660</td>
<td>500</td>
<td>356</td>
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<td>400</td>
<td>660</td>
<td>500</td>
<td>454</td>
<td>700</td>
<td>85</td>
<td>1372</td>
</tr>
</tbody>
</table>

Angle plate SAV 242.92-4 with 4 magnets Type SAV 243.77

Dimensions in mm

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Pole pitch</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>200</td>
<td>415</td>
<td>320</td>
<td>200</td>
<td>455</td>
<td>27.5</td>
<td>287</td>
</tr>
<tr>
<td>520</td>
<td>200</td>
<td>420</td>
<td>400</td>
<td>256</td>
<td>455</td>
<td>27.5</td>
<td>437</td>
</tr>
<tr>
<td>630</td>
<td>300</td>
<td>660</td>
<td>500</td>
<td>356</td>
<td>700</td>
<td>27.5</td>
<td>776</td>
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<tr>
<td>590</td>
<td>300</td>
<td>660</td>
<td>500</td>
<td>356</td>
<td>700</td>
<td>55</td>
<td>812</td>
</tr>
<tr>
<td>810</td>
<td>400</td>
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<td>454</td>
<td>860</td>
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<td>1408</td>
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<td>660</td>
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<td>356</td>
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<td>864</td>
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<tr>
<td>750</td>
<td>400</td>
<td>660</td>
<td>500</td>
<td>454</td>
<td>700</td>
<td>85</td>
<td>1372</td>
</tr>
</tbody>
</table>
**ELECTRO-PERMANENT MAGNETIC CIRCULAR CHUCK**

**SAV 244.70**

With radial pole arrangement

These circular electro magnets are not able for their very strong, evenly distributed holding force. The magnetic force is produced by permanent magnets which are magnetized and demagnetized by short electric current pulses.

**Use:**

Mainly for precision grinding of small to large workpieces on rotary tables and circular grinders.

- for circular grinding and turning
- equal pole pitch within circle range; therefore very suitable for circular workpieces
- the minimum workpiece height; 35% of the pole pitch at the given circle segment
- also for thin rings

**Nominal holding force:**

120 N/cm², adjustable by control unit

**Nominal operating voltage:**

210 V DC up to 250 mm diameter
360 V DC above to 250 mm diameter

**Features:**

- solid designed pole plate
- switching off through demagnetizing cycle
- electro-permanent magnetic system, guaranteeing safe operation during power failure
- high precision due to fine grid pole-plate-to-body connection
- pole separation with brass in-lays for optimal wear behaviour
- pole plate exchangeable
- radial pole arrangement, especially suitable for the use of pole raisers. This is absolutely essential for the runout of the tool or the grinding wheel at three side operation. Therefore available with T-slots (T) according DIN 650-10H10 on request.
- pole plate wearing limit 8mm
- sealed to IP 65
- suitable for use with control unit type 876.10
- available with adapter flange on request (SAV 248.90 to 248.94, see chapter 01)

**Scope of supply:**

- Lifting bolts for transportation on larger models.
- Standard execution without T-slots and pole shoes.
- Terminals for electrical connection in middle of rear side in standard execution.
- Optionally with integrated flat, slip ring body for diameters of 1000 mm and greater.
- With industrial watertight plug-in type connector on request
- Controller and hand-held control unit not included in delivery.
### ELECTRO-PERMANENT MAGNETIC CIRCULAR CHUCK

With radial pole arrangement

#### Ordering example:

**EP**

#### Dimensions in mm

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>P</th>
<th>Weight in kg</th>
<th>Chuck voltage in VDC</th>
<th>Type of control</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>90</td>
<td>60</td>
<td>3</td>
<td>80</td>
<td>M8 (3x)</td>
<td>12</td>
<td>35</td>
<td>10</td>
<td>3</td>
<td>4.0</td>
<td>210</td>
<td>EP 1</td>
</tr>
<tr>
<td>150</td>
<td>90</td>
<td>90</td>
<td>3</td>
<td>120</td>
<td>M10 (3x)</td>
<td>14</td>
<td>35</td>
<td>10</td>
<td>3</td>
<td>9.0</td>
<td>210</td>
<td>EP 1</td>
</tr>
<tr>
<td>200</td>
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<td>12</td>
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</tr>
</tbody>
</table>

* For execution with T-slots, the height increases with 10 mm.

Bigger sizes up to A = 5,5 m available on request.
The assignment of the correct control unit depends upon the power consumption, SAV 876.12.

#### Recommended controller and control unit:

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 1</td>
<td>SAV 876.12-S-O-210/30/230</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 2</td>
<td>SAV 876.12-S-O-360/30/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 3</td>
<td>SAV 876.12-S-O-360/60/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 5</td>
<td>SAV 876.12-S-O-360/60x2/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.

#### Ordering example:

**Electro-Permanent Magnetic Circular Chuck**

**SAV 244.70 - 1600 - T - 360 V**

**Ordering key**

**SAV - No.** - **A - Execution** - **Chuck voltage**

#### Ordering example control unit:

**Electronic polarity-reversing control unit**

**SAV 876.12 - S-O-360/60x2/400**

**Hand-held control unit**

**SAV 876.02 - SE3**

**Ordering key**

**SAV - No.**
This new design of circular magnet, using high-energy magnetic materials, provides extremely high holding forces. Magnetization and demagnetization through a short electric direct current pulse. The homogeneous nature and precision of this circular magnet makes it suitable for turning hardened steels as well as general heavy cutting.

**Features:**
- electro-permanent magnetic system, guaranteeing safe operation during power failure
- high precision due to fine grid pole-plate-to-body connection
- pole separation with brass in-lays for optimal wear behaviour
- pole plate exchangeable
- radial pole arrangement, especially suitable for the use of pole raisers. This is absolutely essential for the runout of the tool or the grinding wheel at three side operation. Therefore available with T-slots (T) according DIN 650-10H10 on request.
- pole plate wearing limit 8mm
- sealed to IP 65
- suitable for use with control unit type 876.10
- available with adapter flange on request (SAV 248.90 to 248.94, see chapter 01)

**Use:**
Turning of hardened steel and heavy cutting of small to large workpieces. Also for highest precision grinding.

- for turning and hard turning
- equal pole pitch within circle range; therefore very suitable for circular and ring-shaped workpieces
- the minimum workpiece height is 35% of the pole pitch at the given circle segment
- also for thin rings

**Nominal holding force:**
170 N/cm², adjustable by control unit with encoded switch.

**Nominal operating voltage:**
360 V

**Scope of supply:**
- Lifting bolts for transportation on larger models.
- T-slots and pole extensions not included as standard.
- Terminals for electrical connection in middle of back side in standard execution.
- Optional with integrated slip ring body for the bigger diameters.
- With industrial watertight plug-in type connector on request.
**ELECTRO-PERMANENT MAGNETIC CIRCULAR CHUCK**

Enhanced magnetic system with radial pole arrangement and exceptional holding force

**Ordering example:**
Electro permanent magnetic circular chuck  SAV 244.71 - 1600 - T - 360 V
Ordering key  SAV - No. - A - Execution - Nom. voltage

**Ordering example control unit:**
Electronic polarity-reversing control unit  SAV 876.12 - S-O-360/60x2/400
Hand-held control unit  SAV 876.02 - SE3
Ordering key  SAV - No.

---

**Table: Dimensions in mm**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>P</th>
<th>Weight in kg</th>
<th>Chuck voltage in V</th>
<th>Type of control</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
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<td>110</td>
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<td>4</td>
<td>24,0</td>
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</tr>
<tr>
<td>250</td>
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<tr>
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<td>280</td>
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<td>150,0</td>
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</table>

Bigger sizes up to \( A = 5.5 \) m available on request. Please refer to SAV 876.10, for details regarding suitable control units, based on the power rating.

* For execution with T-slots, the height increases with 10 mm.

---

**Recommended controller and control unit:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
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<tbody>
<tr>
<td>EP 2</td>
<td>SAV 876.12-S-O-360/30/400</td>
<td>SAV 876.02-SE3</td>
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<td>SAV 876.12-S-O-360/60/400</td>
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<td>EP 5</td>
<td>SAV 876.12-S-O-360/60x2/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.
**POLE EXTENSIONS**

**Use:**
Hard turning of thin, rolling bearing rings on 3 sides with fixed and movable pole shoes.

**Features:**
- Pole extensions in segment design allow the free-running of the tool to enable thin rings to be machined on 3-faces.
- A larger diameter range can be covered due to the radial adjustability.
- Machined recesses for non-planar workpieces or for through holes are possible.
- Depending on the workpiece rigidity, flexible pole shoes available for uneven contact surfaces.
- The pole shoes for circular magnets must be individually adapted.
- We dimension and produce pole shoes for special applications on request.

Spring-loaded, movable pole shoe for initial tensioning
**ADAPTER TOP PLATES**

- No loss of workpiece contact area
- Good holding forces even with small diameters
- Easy to exchange
- Good chip removal, easy to clean
- Preliminary set-up of pole shoes away from the machinery
- Exchange of pole plates can be automated
- Also with T-slots for pole extensions

**POLE BEAMS**

- As wear protection of the magnet pole plate
- Easy to clean
- With T-slots on request
- Tothing to aid the positioning of heavy rings possible

**ADAPTER POLE RINGS**

- Up to diameter 650 mm
- No loss of workpiece contact area
- Good holding forces even with small diameters
- Easy to exchange
- Low cost
These circular magnets with concentric magnetic poles permit the clamping of several workpieces outside the central region. The strong magnetic field is distributed evenly over the entire surface.

**Use:**
Mainly for precision grinding of small to large workpieces on rotary tables and cylindrical grinders. Because of the concentric pole arrangement it is also suitable for holding groups of randomly placed mass-production pieces.

- uniform holding force distribution due to concentric pole arrangement; therefore suitable for thin and flat workpieces (e.g. saw blades)
- multiple workpiece operation on segments possible
- for workpieces with min. thickness $x$:
  - 2 mm at $P = 4.5$ mm
  - 4 mm at $P = 9.0$ mm
  - 8 mm at $P = 18$ mm
- for flat workpieces with min. dimensions
  - 45 mm x 45 mm

**Nominal holding force:**
100 N/cm², adjustable by control unit with encoded switch

**Nominal operating voltage:**
- 210 V DC up to 500 mm diameter
- 360 V DC above to 500 mm diameter

**Features:**
- gap free construction of pole plate
- evenly distributed, strong magnetic field
- solid constructed pole plate
- switching off through demagnetizing cycle
- electro-permanent system,
guaranteeing safe operation during power failure
- high precision due to fine grid
- pole-plate-to-body connection
- pole separation with brass
- in-lays for optimal wear behaviour
- pole plate exchangeable
- pole plate wearing limit 8 mm
- sealed to IP 65
- suitable for use with control unit type 876.10
- available with adapter flange on request (SAV 248.90 to 248.94, see chapter 01)

**Scope of supply:**
- Lifting bolts for transportation on larger models.
- Terminals for electrical connection in middle of backside in standard execution.
- Optional with integrated slip ring body for the bigger diameters.
**ELECTRO-PERMANENT MAGNETIC CIRCULAR CHUCK**

With concentric pole arrangement

![Diagram of electro-permanent magnetic circular chuck](image)

**Dimensions in mm**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>P</th>
<th>Weight in kg</th>
<th>Chuck voltage in V</th>
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</thead>
<tbody>
<tr>
<td>300</td>
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<td>M12 (6x)</td>
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<td>550</td>
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<td></td>
<td></td>
<td>1350.0</td>
<td>360</td>
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<td></td>
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<td>1550.0</td>
<td>360</td>
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<tr>
<td>1600</td>
<td>120</td>
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<td>1765.0</td>
<td>360</td>
</tr>
</tbody>
</table>

Larger sizes on request. Please refer to SAV 876.12, for details regarding suitable control units, based on the power rating.

**Recommended controller and control unit:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 1</td>
<td>SAV 876.12-S-O-210/30/230</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 2</td>
<td>SAV 876.12-S-O-360/30/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 3</td>
<td>SAV 876.12-S-O-360/60/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 5</td>
<td>SAV 876.12-S-O-360/60x2/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.

**Ordering example:**

**Electro permanent magnetic circular chuck**

SAV 244.72 - 1600 x 18 - 360 V

**Ordering key**

SAV - No. A x Pole pitch – Nom. voltage

**Ordering example control unit:**

**Electronic polarity-reversing control unit**

SAV 876.12 - S-O-360/60x2/400

**Hand-held control unit**

SAV 876.02 - SE3

**Ordering key**

SAV - No.
**ELECTRO-PERMANENT MAGNETIC CIRCULAR CHUCK**

**SAV 244.73**

**With parallel pole pitch P=4 mm**

**Use:**
- Grinding of thin plates, wide rings with small thickness and minimum width of 40 mm
- suitable for simultaneous loading with several small parts
- for workpieces with minimum thickness X = 2 mm
- for flat workpieces with min. dimensions of a = 40 x 40 mm²

**Execution:**
- pole plate with very small pole pitch, 3 mm steel and 1 mm brass
- low height
- laminations glued and reinforced with tie bars
- high precision due to fine grid pole plate to body connection
- low magnetic field height
- switching off through demagnetizing cycle
- heat treated tension free body
- threaded mounting holes in backside. Through holes on request.
- electro-permanent magnetic system for absolute safe operation during power failure
- pole plate surface wearing limit 8 mm
- robust and waterproof
- sealed to IP 65
- for use with control unit type SAV 876.10

**Auxiliary equipment:**
- Lifting bolts for transportation on larger models.
- Terminals for electrical connection in middle of rear side in standard execution.
- With industrial watertight plug-in type connector on request
- Controller and hand-held control unit not included in delivery.

**Nominal operating voltage:**
360 V DC

**Nominal holding force:**
100 N/cm², adjustable with control unit with encoded switch

---

**Dimensions in mm**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>Weight in kg</th>
<th>Type of control</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>100</td>
<td>160</td>
<td>4</td>
<td>190</td>
<td>M12 (4x)</td>
<td>16</td>
<td>213</td>
<td>55</td>
<td>EP 1</td>
</tr>
<tr>
<td>400</td>
<td>100</td>
<td>210</td>
<td>4</td>
<td>250</td>
<td>M12 (6x)</td>
<td>16</td>
<td>301</td>
<td>98</td>
<td>EP 1</td>
</tr>
<tr>
<td>500</td>
<td>100</td>
<td>280</td>
<td>4</td>
<td>320</td>
<td>M12 (6x)</td>
<td>16</td>
<td>401</td>
<td>153</td>
<td>EP 1</td>
</tr>
<tr>
<td>600</td>
<td>100</td>
<td>350</td>
<td>4</td>
<td>390</td>
<td>M12 (6x)</td>
<td>18</td>
<td>481</td>
<td>220</td>
<td>EP 1</td>
</tr>
<tr>
<td>700</td>
<td>100</td>
<td>400</td>
<td>4</td>
<td>450</td>
<td>M12 (6x)</td>
<td>18</td>
<td>581</td>
<td>300</td>
<td>EP 1</td>
</tr>
<tr>
<td>800</td>
<td>100</td>
<td>450</td>
<td>4</td>
<td>500</td>
<td>M16 (6x)</td>
<td>18</td>
<td>681</td>
<td>392</td>
<td>EP 1</td>
</tr>
</tbody>
</table>

**Recommended controller and control unit:**

<table>
<thead>
<tr>
<th>Typ</th>
<th>Control unit</th>
<th>Hand-held control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 2</td>
<td>SAV 876.12-S-O-360/30/400</td>
<td>SAV 876.02-SE3</td>
</tr>
<tr>
<td>EP 3</td>
<td>SAV 876.12-S-O-360/60/400</td>
<td>SAV 876.02-SE3</td>
</tr>
</tbody>
</table>

For built-in or combination control unit see page 88.

**Ordering example:**

**Electro permanent magnetic circular chuck**
Ordering key

**Ordering example Steuerung:**

**Electronic polarity-reversing control unit**
Hand-held control unit
Ordering key

**SAV 244.73 - 300 - 360 V**
**SAV - No.**
**A** - Magnet voltage

**SAV 876.12 - S-O-360/30/400**
**SAV 876.02 - SE3**
**SAV - No.**
**ELECTRO-PERMANENT MAGNETIC CIRCULAR CHUCK**

Possible electrical connections

> **POWER SUPPLY TO CIRCULAR MAGNETS WITH EXTERNAL SLIP-RING BODY AND CARBON BRUSHES**

![Diagram of electro-permanent magnetic circular chuck with external slip-ring body and carbon brushes]

> **POWER SUPPLY TO CIRCULAR MAGNETS WITH INTEGRATED FLAT SLIP-RING BODY FOR VERTICAL SPINDLES**

![Diagram of electro-permanent magnetic circular chuck with integrated flat slip-ring body for vertical spindles]
ELECTRONIC POLARITY-REVERSING CONTROL UNIT

SAV 876.12

With integrated microcontroller and holding force control

Use:
For electro permanent magnet systems with 210 V or 360 V magnet voltage.
Also suitable for subsequent installation.
Operation via hand held control unit SAV 876.02-SE3,
The operating controls are built-in or PLC signals to the machinery.

Funktion:
- As impulse control for the magnetisation of electro permanent magnetic chucks
- Control of the demagnetisation cycle
- Optimised for all SAV electro permanent magnetic chucks
- Monitoring of the mains voltage, the power components and all cables, including the magnet coil.
Some internal components are provided redundantly.
- Machinery enabling via two channel safety contact.
- Clamping and release via redundant input signals with feedback following magnetisation and demagnetisation.
- Holding force regulation according to inverse BCD-coding, 8- or 16-stage

Features:
- Small and compact
- Easily integrated into any machine
- User-friendly through LCD-plain text display German/English
- Foil keypad allows easy menu selection
- Signal input and outputs indicated via SMD-LED’s
- Plug for signal input and outputs
- Magnet connection with potential-free switching
- Safe to operate and reliable
- The switching box version has an isolating switch, terminal block and automatic circuit breaker

Benefits:
- Short-circuit proof
- Fully electronic control and power circuit boards
- Additional potential-free switching relays for magnet connection
- Extended diagnostics
- Earth short circuit test
- Very compact design
- Pre-programmed settings
- Individually programmable
- Short demagnetisation cycle
- High level of demagnetisation quality for single magnet systems
- Automatic mains frequency recognition
- Functional arrangement and user interface

CE-compliant
According to Machinery Directive 2006/42/EG
Low Voltage Directive 2006/95/EG
EMC-Directive 2004/108/EG
ROH- compliant

Industrial plug with quick-lock action
optional at a surcharge
Easy to use plug connection

Optional:
The control unit in the switching box can be supplied with an industrial plug. Socket with cover on the magnet, 5 m cable with plug on the control unit.
The cable assemblies are 8-poled, to fit the control unit sizes maximum 60Ax2.
Ordering key: SAV 876.12-SS9

Optional:
If the control unit and magnet are used for palleting operations, an optional park station prohibits the movement of pallets if the plug is plugged in.
Ordering key: SAV 876.12-PS9

Control unit in switching box
With integrated microcontroller and holding force control

**ELECTRICAL DATA**

<table>
<thead>
<tr>
<th>Order number</th>
<th>Magnet voltage DC in V</th>
<th>Magnet current max. in A</th>
<th>Input voltage AC in V</th>
<th>Mains side line fuse in A (slow-blow)</th>
<th>Connecting cable cross section in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>876.12-E-O-210/30/230</td>
<td>210</td>
<td>30</td>
<td>230 / L1 N PE</td>
<td>6.3</td>
<td>16</td>
</tr>
<tr>
<td>876.12-E-O-210/30/400</td>
<td>210</td>
<td>30</td>
<td>400 / L1 L2 PE</td>
<td>6.3</td>
<td>16</td>
</tr>
<tr>
<td>876.12-E-O-360/30/400</td>
<td>360</td>
<td>30</td>
<td>400 / L1 L2 PE</td>
<td>10.8</td>
<td>16</td>
</tr>
<tr>
<td>876.12-E-O-360/30x2/400</td>
<td>360</td>
<td>30x2</td>
<td>400 / L1 L2 PE</td>
<td>10.8x2</td>
<td>16</td>
</tr>
<tr>
<td>876.12-E-O-360/60/400</td>
<td>360</td>
<td>60</td>
<td>400 / L1 L2 PE</td>
<td>21.6</td>
<td>32</td>
</tr>
<tr>
<td>876.12-E-O-360/60x2/400</td>
<td>360</td>
<td>60x2</td>
<td>400 / L1 L2 PE</td>
<td>21.6x2</td>
<td>32</td>
</tr>
<tr>
<td>876.12-E-O-360/60x3/400</td>
<td>360</td>
<td>60x3</td>
<td>400 / L1 L2 PE</td>
<td>21.6x3</td>
<td>32</td>
</tr>
</tbody>
</table>

**GEOMETRIC DATA**

(Dimensions in mm)

**Switching box version (S)**

<table>
<thead>
<tr>
<th>Order number</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>876.12-S-O-210/30/230</td>
<td>600</td>
<td>400</td>
<td>200</td>
<td>558</td>
<td>355</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>876.12-S-O-210/30/400</td>
<td>600</td>
<td>400</td>
<td>200</td>
<td>558</td>
<td>355</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>876.12-S-O-360/30/400</td>
<td>600</td>
<td>400</td>
<td>200</td>
<td>558</td>
<td>355</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>876.12-S-O-360/30x2/400</td>
<td>600</td>
<td>400</td>
<td>200</td>
<td>558</td>
<td>355</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>876.12-S-O-360/60/400</td>
<td>600</td>
<td>400</td>
<td>200</td>
<td>558</td>
<td>355</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>876.12-S-O-360/60x2/400</td>
<td>600</td>
<td>400</td>
<td>200</td>
<td>558</td>
<td>355</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>876.12-S-O-360/60x3/400</td>
<td>600</td>
<td>400</td>
<td>200</td>
<td>558</td>
<td>355</td>
<td>10</td>
<td>21</td>
</tr>
</tbody>
</table>

**Built-in version (E)**

<table>
<thead>
<tr>
<th>Order number</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>876.12-E-O-210/30/230</td>
<td>220</td>
<td>120</td>
<td>95</td>
<td>210</td>
<td>85</td>
<td>5</td>
<td>2.0</td>
</tr>
<tr>
<td>876.12-E-O-210/30/400</td>
<td>220</td>
<td>120</td>
<td>95</td>
<td>210</td>
<td>85</td>
<td>5</td>
<td>2.0</td>
</tr>
<tr>
<td>876.12-E-O-360/30/400</td>
<td>280</td>
<td>120</td>
<td>95</td>
<td>270</td>
<td>85</td>
<td>5</td>
<td>3.5</td>
</tr>
<tr>
<td>876.12-E-O-360/30x2/400</td>
<td>280</td>
<td>120</td>
<td>95</td>
<td>270</td>
<td>85</td>
<td>5</td>
<td>3.5</td>
</tr>
<tr>
<td>876.12-E-O-360/60/400</td>
<td>360</td>
<td>120</td>
<td>95</td>
<td>350</td>
<td>85</td>
<td>5</td>
<td>4.5</td>
</tr>
<tr>
<td>876.12-E-O-360/60x2/400</td>
<td>440</td>
<td>120</td>
<td>95</td>
<td>430</td>
<td>85</td>
<td>5</td>
<td>5.5</td>
</tr>
<tr>
<td>876.12-E-O-360/60x3/400</td>
<td>440</td>
<td>120</td>
<td>95</td>
<td>430</td>
<td>85</td>
<td>5</td>
<td>5.5</td>
</tr>
</tbody>
</table>

To comply with European standards, a mains filter must be installed in the power supply:

<table>
<thead>
<tr>
<th>Order number</th>
<th>Magnet voltage DC in V</th>
<th>Magnet current max. in A</th>
<th>Input voltage AC in V</th>
<th>ca. Dimensions in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Length</td>
</tr>
<tr>
<td>876.12-EPF-210/30/230</td>
<td>210</td>
<td>30</td>
<td>230 / L1 N PE</td>
<td>250</td>
</tr>
<tr>
<td>876.12-EPF-210/30/400</td>
<td>210</td>
<td>30</td>
<td>400 / L1 L2 PE</td>
<td>250</td>
</tr>
<tr>
<td>876.12-EPF-360/30/400</td>
<td>360</td>
<td>30</td>
<td>400 / L1 L2 PE</td>
<td>250</td>
</tr>
<tr>
<td>876.12-EPF-360/60/400</td>
<td>360</td>
<td>60</td>
<td>400 / L1 L2 PE</td>
<td>250</td>
</tr>
</tbody>
</table>

Ordering example:
Electronic polarity-reversing control unit SAV 876.12-S-O-360/60x2/400

Ordering example:
Mains filter SAV 876.12-EPF-360/60/400
Ordering key SAV - No. - Execution - Magnet voltage - max. Magnet current - Mains voltage
ELECTRONIC POLARITY-REVERSING CONTROL UNIT

With integrated microcontroller and holding force control

CE-compliant
According to Machinery Directive 2006/42/EG
Low Voltage Directive 2006/95/EG
EMC-Directive 2004/108/EG
ROH- compliant

Hand-held control unit SAV 876.02-SE3

Clear text display German/English for operating status and error messages

Simple menu navigation via plastic foil keypad

Panel suitable for installation in the machine console.

- Short-circuit proof
- Earth short-circuit test
Chapter 3

Ordering example:

For switching of direct current magnets in connection with polarity reversing unit type SAV 876.10.

Application:
For switching of direct current magnets in connection with electronic polarity-reversing control unit SAV 876.10. The control unit is switched on by pushing the green and yellow keys. The polarity-reversing process is initiated by a red and yellow key. Possible fault indications as monitored by the polarity-reversing unit are also presented to the red illuminated key by means of a coded blinking signal. Required holding force can set to 8 levels. (16 levels on request).

Execution:
In order to comply with accident prevention regulations for machine tools, the release of the machine feed through auxiliary contacts can only be authorised when magnet is switched on and when the “on” position is indicated by a signal light. This control unit complies with these regulations. The signal lamp is integrated into the foil covered keys of the control unit. The auxiliary contacts (interlock) for the machine feed are integrated in the polarity-reversing control unit. Coding switch SE2-1.

Technical data:
- Housing dimensions (LxWxH): 130 x 60 x 60 mm
- Operating voltage: 24 V
- Protection classification: IP 63
- Protection class: III

Control unit type SE3
With coding switch for holding force setting in 8 levels using inverse BCD-coding, including 2 integrated signal lamps and 2 m coded cable, 9 pole. Additional coded cable against price adder.

Build-in version type SE2-1 to SE2-3
Consisting of 2 signal push buttons and coding switch for holding force setting in 8 levels using inverse BCD-coding. Complete set can be ordered under type SE2-S.

Ordering example:

Control Unit: SAV 876.02 - SE3
Ordering key: SAV - No. - Type

SAV Spann-Automations-Normteletechnik GmbH • www.sav-spanntechnik.de
CARBON BRUSH HOLDER

For electric power supply to Electro-Magnetic Circular Chucks

Use:
The illustrated carbon contacts transmit the electrical current to the slip ring body used with electro permanent circular magnetic chucks. They are available in 3 sizes, including fixing bolts.

Features:
Carbon contacts, spring-loaded. Fixing is by means of threaded pins.

<table>
<thead>
<tr>
<th>For circular magnet-Ø</th>
<th>Chuck voltage in V</th>
<th>Control unit max. current in A</th>
<th>Number of contacts</th>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>to 800</td>
<td>210 / 360</td>
<td>30</td>
<td>3</td>
<td>140</td>
<td>20</td>
</tr>
<tr>
<td>to 1000</td>
<td>360</td>
<td>60</td>
<td>3</td>
<td>140</td>
<td>20</td>
</tr>
<tr>
<td>to 1600</td>
<td>360</td>
<td>60 x 2</td>
<td>4</td>
<td>140</td>
<td>20</td>
</tr>
</tbody>
</table>

Ordering example:
Carbon Brush Holder  SAV 248.84 - 1600
Ordering key  SAV - No.  - Max. circular chuck diameter

SLIP-RING BODY

For electric power supply to Electro-Magnetic Circular Chucks

Use:
Slip-ring bodies are used in connection with carbon brushes to supply power to circular electro-permanent magnets. The slip-ring body can be mounted separately to the hollow machine spindle. While installing it must be assured that the insulation components do not come into contact with coolant or other fluids. Suitable protection must be provided to prevent contact with live components.

Mounting method:
- shrinking at 130 °C
- pressing with 0.5 mm oversize
- gluing

Features:
The slip-ring bodies are delivered with only one small centre-drilling. This has to be machined to suit the spindle of the machine, within range E.

<table>
<thead>
<tr>
<th>For circular magnet-Ø</th>
<th>Chuck voltage in V</th>
<th>Control unit max. current in A</th>
<th>Number of contacts</th>
<th>Dimensions in mm</th>
<th>Weight in Kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>to 800</td>
<td>210 / 360</td>
<td>30</td>
<td>3</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>to 1000</td>
<td>360</td>
<td>60</td>
<td>3</td>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>to 1600</td>
<td>360</td>
<td>60 x 2</td>
<td>4</td>
<td>100</td>
<td>25</td>
</tr>
</tbody>
</table>

Ordering example:
Slip Ring Holder  SAV 248.85 - 1600
Ordering key  SAV - No.  - Max. circular chuck diameter
COMPACT ELECTRICAL ADAPTER PLUG

SAV 248.86

For use in electro permanent magnetic circular chuck power supplies

Features:
- Compact design
- Encapsulated
- Maintenance-free

Use:
- For fitting to the spindle end.
- Alternatively in the magnet centre for custom designs.

Technical data:
- Protection rating IP 51
- Low transfer resistance

Fixing:
- By radial clamping around diameter D.

Electrical adapter plug

<table>
<thead>
<tr>
<th>No. of contacts</th>
<th>max. continuous current in A</th>
<th>Voltage in V (AC/DC)</th>
<th>max. RPM</th>
<th>Dimensions in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>30</td>
<td>0 - 250</td>
<td>1200</td>
<td>31.6 46.2 27.9 15.87</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>0 - 500</td>
<td>300</td>
<td>45 69.1 29 31.70</td>
</tr>
</tbody>
</table>

Plug

<table>
<thead>
<tr>
<th>No. of contacts</th>
<th>Dimensions in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-S</td>
<td>46.2</td>
</tr>
<tr>
<td>4-S</td>
<td>65.8</td>
</tr>
</tbody>
</table>

Installation examples:

Ordering example:
Compact electrical adapter plug  SAV 248.86 - 4
Ordering key  SAV - No.  - No. of contacts

Ordering example Stecker:
Plug  SAV 248.86 - 4-S
Ordering key  SAV - No.  - Type
SAV-Lifting
The product spectrum covers the comprehensive area of magnetic lifting, workholding and handling. Our main focus is on standard and specific, individual customer solutions.

The area of SAV-Lifting covers:
- Heavy lifting systems, electro- and electro-permanent
- Battery-powered lifting systems, electro- and electro-permanent
- Pneumatic, switchable permanent-lifting systems
- Manual, switchable permanent-lifting systems
- Magnetic handling aids

Our product overview offers you a wide range of application examples to promote ideas and highlight the range of possibilities available to you. These specific solutions help you to find a concept for your lifting operations.

We will be happy to assess your requirements. We will naturally take into account and calculate all the technical parameters required to supply you with a detailed offer.
### COMBINED SOLUTIONS

<table>
<thead>
<tr>
<th>Criteria for combined solutions</th>
<th>96</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electro permanent magnetic fixture with pneumatic clamps</td>
<td>97</td>
</tr>
<tr>
<td>Electro permanent magnetic system with hydraulic stops</td>
<td>98</td>
</tr>
<tr>
<td>High energy milling magnet with hydraulic stop</td>
<td>98</td>
</tr>
<tr>
<td>Multi-function clamping fixture</td>
<td>99</td>
</tr>
<tr>
<td>Magnetic – hydraulic clamping system</td>
<td>100</td>
</tr>
<tr>
<td>Electro permanent magnetic chuck with zero point system</td>
<td>100</td>
</tr>
<tr>
<td>Magnetic – vacuum pole beam</td>
<td>101</td>
</tr>
<tr>
<td>Magnetic – pneumatic – hydraulic fixture</td>
<td>101</td>
</tr>
<tr>
<td>Combination fixture for clamping rail tracks</td>
<td>102</td>
</tr>
<tr>
<td>Magnetic – hydraulic fixture</td>
<td>104</td>
</tr>
<tr>
<td>Mechatronic chucks</td>
<td>106</td>
</tr>
<tr>
<td>Special combination chuck</td>
<td>107</td>
</tr>
<tr>
<td>Combined chucks</td>
<td>108</td>
</tr>
<tr>
<td>Electro permanent circular chuck with centring fixture</td>
<td>108</td>
</tr>
</tbody>
</table>
Different clamping methods have different advantages and disadvantages. Through differentiated combinations even difficult workholding problems can be solved, the range of possible machining operations broadened the spectrum of workpieces that can be machined extended.

**Characteristics - magnetic:**
- only for ferro-magnetic workpieces
- the holding force is limited (physically limited)
- high normal force, low tangential force
- force transmission across the whole surface
- holding of thin, uneven workpieces
- high damping level
- good access, cleanability and automation
- large workpiece spectrum
- distortion-free workholding
- complete support of the workpiece (high damping, high precision)
- residual magnetism in the workpiece
- multi-sided machining in one clamping operation
- compact build design
- short set-up times
- ergonomic and safe to operate, wear-free
- economical in comparison to power actuated clamping

**Characteristics – hydraulic / mechanical:**
- suitable for all workpieces
- high to very high energy density
- point transmission of force
- high energy density
- low distortion clamping of blanks
- also suitable for non-magnetic workpieces
- low damping levels
- access and cleanability restricted
- risk of workpiece deformation / damage
- limited workpiece spectrum
- more complex systems with the corresponding energy supply

**Characteristics – vacuum:**
- also suitable for non-magnetic workpieces
- force transmission across the whole surface
- lower energy density, holding force physically limited
- good damping
- multi-sided machining possible
- easy to clean
- safe to operate, wear-free

**Characteristics - pneumatic:**
- point transmission of force
- lower energy density compared to hydraulic systems
- low distortion clamping of blanks
- also suitable for non-magnetic workpieces
- low damping levels
- access and cleanability restricted
- limited workpiece spectrum
- large clamping elements
- more complex systems,
- simpler power supply compared to hydraulic systems
- lower cost than hydraulic systems

**Characteristics - electrical:**
- very flexible and easy to control
- wide range of automation possibilities
- no second media supply in combination with magnet
MAGNETIC PNEUMATIC FIXTURE for laser welding

**Dimensions:**
1320 x 1100 mm

**Workpiece:**
Thin sheets

**Machining operation:**
Laser welding

**Description:**
- enhanced electro-magnet system
- with compressed air lifting
- pneumatic clamping jaws around the circumference
- on a mobile base fixture
**APPLICATIONS**

**ELECTRO PERMANENT MAGNETIC SYSTEM** with hydraulic stops

**Dimensions:**
2000 x 157 mm

**Workpiece:**
Linear guides

**Machining operation:**
Grinding of the rail guide surfaces

**Description:**
- 2 x 3 magnets on the horizontal indexer
- with hydraulic swing clamps for workpiece positioning
- adapter pole beams for full workpiece access

**HIGH ENERGY MILLING MAGNET** with pole plate and hydraulic stop

**Dimensions:**
1725 x 300 mm

**Workpiece:**
Scrapers for printing machines

**Machining operation:**
Milling of thin parts

**Description:**
- High energy magnet with 33 mm transverse pole pitch
- profiled top plate with fine lamination for low field heights
- hydraulic retractable stop
MULTI-FUNCTION CLAMPING FIXTURE

Dimensions:
2800 x 1030 mm

Workpiece:
Workpieces for packaging machines

Machining operation:
Milling

Description:
- Magnetic – hydraulic - mechanical – vacuum combination
- Hydraulic vices with a large clamping stroke
- Grid clamping system for fixture blocks
- Grid vacuum chuck
- Multi-function control panel
> MAGNETIC – HYDRAULIC CLAMPING SYSTEM

Dimensions: 1000 x 1000 mm  
Workpiece: P-Plates  
Machining operation: Surface and face heavy milling in chip removal  
Description:  
- Magnetic – hydraulic combination  
- High energy magnetic blocks, height adjustable, hydraulically clamped  
- Additional hydraulic supports and side clamping  
- Beam design, adjustable longitudinally

> ELECTRO PERMANENT CHUCK WITH ZERO POINT SYSTEM

Dimensions: 400 x 230 mm  
Workpiece: Rib-shaped pushers for textile machines  
Machining operation: Grinding of needle contours  
Description:  
- Magnetic system with integrated zero point reference system  
- Workpiece support in profiled adapter pole plate  
- Weight optimised pallet, can be loaded away from the machine
**APPLICATIONS**

**MAGNETIC VACUUM POLE BEAMS**

- **Dimensions:** 750 x 100 mm
- **Workpiece:** Hard metal knives
- **Machining operation:** Grinding
- **Description:**
  - High energy magnetic system with longitudinal poles
  - Vacuum in pole gap

**MAGNETIC – PNEUMATIC – HYDRAULIC FIXTURE**

- **Dimensions:** Length 800 mm
- **Workpiece:** Thin knives
- **Machining operation:** Grinding
- **Description:**
  - Damping with fine pole magnet
  - Pneumatic actuation
  - Hydraulic clamping and locking
APPLICATIONS

COMBINATION FIXTURE  magnetic - hydraulic – electro actuated

Dimensions:  
Length 24 m  

Workpiece:  
- Switch and stock rails  
- Heart sections  
- Block sections  

Machining operation:  
Milling for switch manufacture  

Description:  
- Set up for extreme chip removal  
- Combination of magnetic, hydraulic and electro actuated principles  
- Remote, touch-screen control  
- Machine power 2x 100kW

A) Milling of the switch and stock rails  
- Each 24 m magnet clamping  
- Separate control of side stop and base

B) Welding preparation of heart sections  
- Each 1.25 m fixed and 3.75 m motorised angle setting  
- Magnetic clamping to foot and shoulder  
- Hydraulic support of foot for high chip removal

C) Finishing of the heart sections and milling of block sections  
- Each 3 centric clamps with exchangeable jaws  
- Each 3 milling magnets for rail foot clamping
A) Milling of the switch and stock rails to length 2 x 24 m

- Enhanced high-energy system
- Exchangeable pole beams
- Pole blocks for head support
- Head, foot and drilling operations

B) Welding preparation of heart sections to length 2 x 5 m

- Electrical angle setting
- High-energy system for extreme chip removal (half of rail section)
- Hydraulic supports in special execution to support the rail foot

C) Finishing of the heart sections

- Hydraulic vices in special execution with high throat depth
- Jaws with quick-exchange system
- Magnetic system for clamping at the foot
APPLICATIONS

MAGNETIC – HYDRAULIC FIXTURE with pole plate for thin parts

Dimensions:
System length 12 m

Workpiece:
V-Block sections

Machining operation:
Very heavy milling operations

Description:
- Clamping and damping with high-energy magnets
- Centring and clamping of thin sections with hydraulic vices, centred and floating
MAGNETIC – HYDRAULIC FIXTURE

Dimensions:
System length 8.5 m

Workpiece:
Switch and stock rails

Machining operation:
Extreme milling operations

Description:
- Magnetic clamping at the foot, downward and sideways
- Optional sideways clamping at the web with adapter pole beam
- Solid hydraulic swing clamp in special execution for clamping at the foot or web
- Chip removal in one cut with a Cross-section 60 x 35 mm
- Machine power 2 x 75 kW
APPLICATIONS

MECHATRONIC CHUCKS  SAV 244.75

Use:
- For automation
- Precise centering, reproducible with high accuracy
- High power chip removal and finishing
- Combination of first and second clamping set-up
- Radial and/or axial clamping
- Clamping of eccentric parts

Combination circular magnet – electric linear axes:
- Servo drive with integrated brakes
- 300 daN clamping force per actuator at D 1000 mm
- Direct measurement system with a 0.001mm resolution
- 50 mm clamping stroke with quick-change jaws
- Electronic centrifugal force compensation
- Enhanced magnetic system with optimized pole division
- Magnetic material under each pole for minimal field heights
- 350 mm minimal magnetic area
- Smallest available chuck diameter 800 mm at 100 daN clamping force per jaw
- With 165 mm minimum height

Variant A
- 3 axis centred
- 3 axes engage internally or externally

Variant B
- 6 axis centred
- Internal or external engagement

Variant C
Clamping of oval parts

Variant D
- Manual workpiece positioning with dial gauge
- Magnetic pre-clamping
- 6 axis independent engagement and clamping

Variant E
Centred per 2 opposing axes

Variant F
Clamping of eccentric parts at changing orientations to the spindle

Patent granted!
Patent-No. 10 2009 047 996
- Special combination chuck

Dimensions:
ø 1500 mm

Workpiece:
Seal ring bushings

Machining operation:
Grinding

Description:
- Electro permanent circular chuck with hydraulic couplers as table
- Hydraulic support fixture with large setting range
- Combination clamping axial and/or radial
- Sensitive axial supports
- 64 channel oil distribution
COMBINATION CHUCKS

Dimensions:
Diameter 350 mm

Workpiece:
Truck gearbox parts

Machining operation:
Circular grinding

Description:
- Sensitive centring at the centre of area
- Clamping via electro permanent circular chuck
- Free workpiece access with pole shoes

ELECTRO PERMANENT CIRCULAR CHUCK

Dimensions:
Diameter 640 mm

Workpiece:
Rings for high-precision aircraft bearings

Machining operation:
Hard turning

Description:
- 3 point centring fixture
- Levelling via sensitive, movable pole shoes, individually clamping
### ORDERING EXAMPLE

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLATE DEMAGNETISERS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>890.02</td>
<td>for use in measuring rooms, workshops and production lines</td>
<td></td>
<td>111</td>
</tr>
<tr>
<td>878.05</td>
<td>Tesla meter</td>
<td></td>
<td>111</td>
</tr>
<tr>
<td><strong>TUNNEL-ENTMAGNETISIERGERÄTE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>890.42</td>
<td>for demagnetising of thin-walled batch workpieces with a large surface area</td>
<td></td>
<td>112</td>
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<tr>
<td>890.43</td>
<td>for automatic demagnetising of workpieces on the production lines</td>
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<tr>
<td><strong>HAND-ENTMAGNETISIERGERÄTE</strong></td>
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<tr>
<td>890.70</td>
<td>for demagnetising the surface of large workpieces, mobile use</td>
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<td>113</td>
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<tr>
<td>890.71</td>
<td>for demagnetising of workpieces, tools, stamps, milling tools etc.</td>
<td></td>
<td>113</td>
</tr>
<tr>
<td><strong>PRÜFGERÄTE</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>486.04</td>
<td>Mini-Gauss meter</td>
<td></td>
<td>114</td>
</tr>
<tr>
<td>486.40</td>
<td>Holding force tester</td>
<td></td>
<td>114</td>
</tr>
</tbody>
</table>

* Explanation of the icons on page 9
**APPLICATIONS**

### DEMAGNETISER WITH BELT FOR ROLLING BEARINGS

**Dimensions:**
Belt width 800 mm

**Workpiece:**
Rolling bearing rings

**Machining operation:**
Demagnetising

**Description:**
- Demagnetiser with two vertically opposing plates
- Variable height top plate
- Conveyor belt with optical barrier control
- Low frequency generator for low residual remanence

### DEMAGNETISING TABLE

**Dimensions:**
Width of opening 400 x 350 mm

**Workpiece:**
Cylinders

**Machining operation:**
Demagnetising

**Description:**
- Workpiece positioning on V-blocks
- Tunnel demagnetiser, lengthwise travelling carriage

### TABLE DEMAGNETISER WITH BELT

**Dimensions:**
Belt width 250 mm

**Workpiece:**
Automotive parts

**Machining operation:**
Demagnetising

**Description:**
- Adjustable table height and angle
- High energy level with a low frequency generator for low residual remanence levels
### DEMAGNETISING UNITS

**Standard Unit**

**Use:**
The demagnetising units are suitable for use in measuring rooms, workshops and production lines and exhibit a strong effect in the demagnetising of bearing rings, punches, dies and other tools.

**Features:**
- **Power supply:** 230 V/50 Hz AC
- **Protection rating:** IP 20
- **Duty cycle:** 100 ED
- **Power consumption:** max. 920 W
- **Penetration depth:** ca. 50 mm

#### Dimensions and Weight

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
<th>Power in VA</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 A 180 B 87 C 150</td>
<td>11</td>
<td>920</td>
</tr>
<tr>
<td>280 A 266 B 87 C 220</td>
<td>18</td>
<td>920</td>
</tr>
<tr>
<td>400 A 306 B 87 C 260</td>
<td>24</td>
<td>920</td>
</tr>
</tbody>
</table>

**Ordering example:**
- **Demagnetising unit** SAV 890.02 - 250
- **Ordering key** SAV - No. - A

---

### TESLA METER

**Compact device with large measurement range**

**Use:**
For residual remanence measurement on workpieces and tools, in drillings and fixtures. Suitable for both micro-magnetic and very strong magnetic fields. Also for measuring magnetic flux and field structure on magnetic chucks.

**Design:**
Light and compact design. Dirt protective housing. Economized energy use for long battery life. Liquid-crystal display with digital reading. Sensor can easily be exchanged and ordered separately (SAV 878.05 - S)

**Features:**
- automatic ranging
- display is either Tesla (T) of Gauss (G)
- static and dynamic measurement
- max. indication for dynamic measurement
- pole indication (N/S)
- zero setting

**Ordering example:**
- **Tesla Meter** SAV 878.05
- **Ordering key** SAV - No.
To demagnetise thin-walled parts with large surface areas

**Use:**
An unwanted residual magnetism can remain after machining in steel and cast workpieces. If these parts must be demagnetised before being used for other purposes, in most cases this can be achieved without any problems by using the tunnel demagnetiser.

**Features:**
The demagnetising coil is cast in polyurethane. Optionally with low frequency generator for workpieces which are difficult to demagnetise.

**Protection rating:** IP 55
**Mains voltage:** 230V AC
**Mains frequency:** 50 to 60 Hz
**Other voltages available on request.**

### Ordering example:
- Tunnel demagnetiser: SAV 890.42 - 400 x 300 - 230V AC
- Ordering key: SAV - No. - A x B - Mains voltage

---

To demagnetise thin-walled parts with large surface areas

**Use:**
For automatic demagnetising on the production line through a continuously running plastic conveyor belt and drive motor. The workpieces are transported through the tunnel at a speed of ca. 0.2 m/sec. A low frequency generator can be positioned in series for workpieces which are difficult to demagnetise.

**Features:**
The demagnetising coil is cast in polyurethane. Optionally with low frequency generator for workpieces which are difficult to demagnetise. Conveyor belt and table versions upon agreement or according to workpiece dimensions and weights.

**Protection rating:** IP 65
**Mains voltage:** 400V
**Mains frequency:** 50 to 60 Hz
**Other voltages available on request.**

### Ordering example:
- Tunnel demagnetiser with belt: SAV 890.43 - 500 x 300 - 400V
- Ordering key: SAV No. - A x B - Mains voltage
MANUAL DEMAGNETIZER

For individual use

Use:
For demagnetizing the surfaces of bigger workpieces. Mobile use.

Execution:
Light-weight housing for easy use. 3 m cable with plug.

Nom. voltage: 230 V / 50 Hz
Rating: 220 VA
Protection rating: IP 42
Automatic shut-down at: > 50 °C
Duty cycle: 30%

Ordering example:
Manual demagnetizer SAV 890.70 - HD 2
Ordering key SAV No. - Type

MANUAL DEMAGNETIZER

For bar material and tools

Use:
For demagnetizing of workpieces, tools, punches, cutters, etc.

Execution:
Stable, plastic housing, with high power. Usage also in rough environment. Not suitable for continuous duty!
Including thermo-fuse and LED for operation mode.

Hole diameter: 40 mm
Nominal voltage: 230V / 50Hz
Duty cycle: 10 % ED
Max. operation time: 10 seconds

Ordering example:
Manual demagnetizer SAV 890.71
Ordering key SAV No.
MINI GAUSS-METER

SAV 486.04

For measurement of fields with small flux density

**Use:**
For residual remanence measurement on workpieces and tools.

**Attention:**
The device is only to be used for residual field measurement and not for concentrated magnetic fields.

Measurement range: \( \pm 50 \) Gauss (\( \pm 5 \) mT)
Diameter: 65 mm
Weight: 0.14 kg

Other measurement ranges available on request.

**Ordering example:**
Mini Gauss-Meter SAV 486.04
Ordering key SAV No.

HOLDING FORCE TESTER

SAV 486.40

For comparison of magnetic clamping systems

**Use:**
For measuring the holding force of:
- permanent magnetic chucks
- electro magnetic chucks
- electro permanent magnetic chucks

**Application:**
By turning the screw clockwise with an Allen key, the necessary pressure is built up. The built-in piston is displaced until the holding force limit is reached and the measuring cylinder is lifted from the magnetic plate. The indicated pressure given in Bar corresponds to the comparative break-away force in daN/cm².

Measurement range:
0 – 25 Bar equals 0 – 25 daN/cm²

Weight: 2.0 kg

**Ordering example:**
Holding Force Tester SAV 486.40
Ordering key SAV No.
### CHAPTER 6

**CHAPTER OVERVIEW**

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<thead>
<tr>
<th>SAV-ART.-NO.</th>
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<th>COMMENTS</th>
<th>MACHINING OPERATION*</th>
<th>PAGE</th>
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</thead>
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<tr>
<td>245.01</td>
<td>P = 1,9 mm</td>
<td>Swivel on longitudinal axis</td>
<td></td>
<td>118</td>
</tr>
<tr>
<td>245.02</td>
<td>P = 1,9 mm</td>
<td>Swivel on long./transv. axis</td>
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<tr>
<td>245.03</td>
<td>P = 1,9 mm</td>
<td>Swivel on transv. axis</td>
<td></td>
<td>120</td>
</tr>
<tr>
<td>245.04</td>
<td>P = 1,9 mm</td>
<td>Swivel on longitudinal axis</td>
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</tr>
<tr>
<td>245.05</td>
<td>P = 1,9 mm</td>
<td>Swivel on transv. axis</td>
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<tr>
<td>245.06</td>
<td>P = 1,9 mm</td>
<td>Swivels about the centre axis to both sides</td>
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<tr>
<td>245.09</td>
<td>P = 4; 13 mm</td>
<td>Swivels about the longitudinal axis, fixed to the machining table</td>
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</tr>
<tr>
<td>245.10</td>
<td>P = 13;18,25mm</td>
<td>Swivels about the longitudinal axis, fixed to the machining table</td>
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</tr>
<tr>
<td>245.40</td>
<td>P = 4 mm</td>
<td>Swivels about the longitudinal axis, with switchable permanent magnet block SAV 242.11</td>
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<td>126</td>
</tr>
<tr>
<td>245.41</td>
<td>P = 4 mm</td>
<td>Swivels about the longitudinal axis, with switchable permanent magnet block SAV 242.11</td>
<td></td>
<td>126</td>
</tr>
</tbody>
</table>

* Explanation of the icons on page 9
 APPLICATIONS

HIGH PRECISION SINE TABLE

Dimensions:
1000 x 600 mm

Workpiece:
Thin plates

Machining operation:
Grinding

Description:
- Swivels about the short axis
- With mechanical adjustment mechanism
- Distortion-free clamping, hydraulic
- Levelness and parallelism 1μm/100mm
- Integrated length measuring system with resolution 1μm

PRECISION MEASUREMENT TABLE

Dimensions:
600 x 150 mm

Workpiece:
Turbine blades

Machining operation:
Measuring

Description:
- 3 swivel axes with adjustment mechanism
- Rotation axis with angle scale and vernier
- Transversal axis according to sine principle
**APPLICATIONS**

**PRECISION SINE TABLE**

**Dimensions:**
1000 x 150 mm

**Workpiece:**
Knives

**Machining operation:**
Grinding

**Description:**
- Swivels about the centre axis +/-20°
- Distortion-free clamping using Spieth-sleeves, both sides

---

**PRECISION SWIVELLING FIXTURE**

**Dimensions:**
Length 12 m

**Workpiece:**
Carriages

**Machining operation:**
Milling and grinding on combination machine

**Description:**
- Swivelling fixture with electro permanent magnet and pole blocks, motor driven with rotary encoder
- Direct measuring system
- Axes with hydrostatic bearings
- With hydraulic clamping
Swivels on the longitudinal axis

Design:
Swivel on the longitudinal axis. The base plate of the sine table is made of hardened steel (HRC 60), black-finished and precision ground. High accuracy due to extreme flat construction. Standard execution with permanent magnetic chuck. The sine tables are supplied in wooden storage cases up to and including size 450 x 150.

With sine chart degrees / minutes in mm, precision long side stop and short side stop.

Angle precision: ± 5 sec.
Planar parallelism: ± 0.005 / 100 mm
Shimming measure at 0°: 3 mm
Angle range: 0° to 45°
Nominal holding force: 80 N/cm²
Pole pitch: 1.9 mm
Magnetic field height: 6 mm
Pole plate wearing limit: 8 mm

Application:
The angle is set according the sine principle, using an end-gauge.
Fixation is achieved by side mounted pincers and by tightening the upper bearing clamps.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
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<tbody>
<tr>
<td>A</td>
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<tr>
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<td>500</td>
<td>250</td>
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<tr>
<td>600</td>
<td>300</td>
</tr>
</tbody>
</table>

Other dimensions and executions – also with electro magnetic or other magnetic system – and all sizes of permanent magnetic chucks SAV 243.01 are available as sine table.

Execution with flushing channel(s) available at a surcharge.

Ordering example:
Precision Sine Table SAV 245.01 - 300 x 150
Ordering key SAV - No. - A x B
Swivel about longitudinal and transverse axis, with fine pole chuck

**Design:**
Swivel about the longitudinal and transverse axis. The base plate of the sine table is made of hardened steel (HRC 60), black-finished and precision ground.

High accuracy due to extreme flat type construction. Standard execution with permanent magnetic chuck. The sine tables are supplied in wooden storage cases with 2 sine charts degrees / minutes in mm, precision long side stop and short side stop.

- **Angle precision:** ± 5 sec.
- **Planar parallelism:** ± 0.005 / 100 mm
- **Shimming measure at 0°:** 3 mm
- **Angle range longitudinal axis:** 0° to 45°
- **Angle range transversal axis:** 0° to 30°
- **Nominal holding force:** 80 N/cm²
- **Pole pitch:** 1.9 mm
- **Magnetic field height:** 6 mm
- **Pole plate wearing limit:** 8 mm

**Application:**
The angle is set according the sine principle, using an end-gauge.
Fixation is achieved by side mounted pincers and by tightening the upper bearing clamps.

**Execution with flushing holes available against price adder.**
Other dimensions and executions – also with electro magnetic or other magnetic system – and all sizes of permanent magnetic chucks SAV 243.01 are available as sine table.

**Ordering example:**
**Precision Sine Table**
SAV 245.02 - 400
**Ordering key**
SAV - No. - A

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<th>Dimensions in mm</th>
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<td>350</td>
<td>150</td>
</tr>
<tr>
<td>400</td>
<td>200</td>
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</tbody>
</table>
Swivels about the transverse axis

Design:
Swivels about the transverse axis. The base plate of the sine table is made of hardened steel (HRC 60), black-finished and precision ground. High accuracy due to extremely flat construction.
Standard execution with permanent magnetic chuck.
Delivery in wooden storage case.
With sine table in degrees / minutes in mm, precision long-side stop and transverse side stop.

Angle precision: ± 5 sec.
Planar parallelism: ± 0.005 / 100 mm
Shimming measure at 0°: 3 mm
Angle range: 0° to 30°
Nominal holding force: 80 N/cm²
Pole pitch: 1.9 mm
Magnetic field height: 6 mm
Pole plate wearing limit: 8 mm

Application:
The angle is set according the sine principle, using an end-gauge.
Fixation is achieved by side mounted pincers and by tightening the upper bearing clamps.

Other dimensions and executions – also with electro magnetic or other magnet systems – and all standard sizes of the permanent magnet chuck SAV 243.01 (chapter 1) can be supplied as a sine table.

Execution with flushing channel(s) available at a surcharge.
Swivel about longitudinal axis, with extreme low height

Design:
Swivel about the longitudinal axis. The base late of the sine table is made of hardened steel (HRC 60), black-finished and precision ground. High accuracy due to extreme flat construction. Standard execution with permanent magnetic chuck. ON/OFF-switching on top. The sine tables are supplied in wooden storage cases, with sine chart degrees / minutes in mm, precision long side stop and short side stop.

Angle precision: ± 5 sec.
Planar parallelism: ± 0.005 / 100 mm
Shimming measure at 0°: 3 mm
Angle range: 0° to 45°
Nominal holding force: 80 N/cm²
Pole pitch: 1.9 mm
Magnetic field height: 6 mm
Pole plate wearing limit: 6 mm

Application:
The angle is set according the sine principle, using an end-gauge. Fixation is achieved by side mounted pincers and by tightening the upper bearing clamps.

Execution with flushing holes available against price adder.
Swivels about the transverse axis

**Design:**
Swivels about the transverse axis. The base plate of the sine table is made of hardened steel (HRC 60), black-finished and precision ground. High accuracy due to extremely flat construction.
Standard execution with permanent magnetic chuck.
On/off switch on the top.
Delivery in wooden storage case.
With sine table in degrees / minutes in mm, precision long-side stop and transverse side stop.

Angle precision: ± 5 sec.
Planar parallelism: ± 0.005 / 100 mm
Shimming measure at 0°: 3 mm
Angle range: 0° to 30°
Nominal holding force: 80 N/cm²
Pole pitch: 1.9 mm
Pole plate wearing limit: 6 mm

**Application:**
The angle is set according the sine principle, using an end-gauge.
Fixation is achieved by side mounted pincers and by tightening the upper bearing clamps.

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<tr>
<td>400</td>
<td>200</td>
</tr>
<tr>
<td>450</td>
<td>150</td>
</tr>
</tbody>
</table>

Execution with flushing channel(s) available at a surcharge.
Swivel about middle-axis to both sides

For grinding and measuring precision workpieces in every angle position without the need to reclamp the parts.

**Design:**
Swivel about longitudinal axis. Sine table base plate and other parts made from tool steel. Hardened to HRC 60, black finished and precision ground. Standard execution with permanent magnetic chuck 243.01. Highest accuracy and stability in every position. Delivery in wooden storage case up to dimension 350 x 150 mm. With sine table in of degrees / minutes in mm, precision long side stop and transverse side stop.

Angle precision: ± 5 sec.
Planar parallelism: ± 0.005 / 100 mm
Angle range: -90° to +90°
Nom. holding force: 80 N/cm²
Pole pitch: 1.9 mm
Magnetic field height: 6 mm
Pole plate wearing limit: 8 mm

**Application:**
Setting of angles according sine principle, using an end-gauge up to 90°.

---

**Ordering example:**
SAV 245.06 - 600
Ordering key: SAV - No. - A

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>255</td>
<td>130</td>
</tr>
<tr>
<td>350</td>
<td>150</td>
</tr>
<tr>
<td>400</td>
<td>200</td>
</tr>
<tr>
<td>500</td>
<td>200</td>
</tr>
<tr>
<td>600</td>
<td>200</td>
</tr>
</tbody>
</table>

Other dimensions and executions also available with electro-magnet or other magnetic systems.
Swivel about longitudinal axis, with electro or electro-permanent chuck

**Design:**
Swivel about the longitudinal axis. The base plate of the sine table is made of hardened steel (HRC 60), black-finished and precision ground. Magnetic chuck housing stress-free annealed. High accuracy due to extreme flat construction.

- 4-point support for optimal security. The delivery includes a lifting support and setting table degrees / minutes in mm.
- Fluting stones for fixing on the machine table on bottom side of base plate. Side stops on back and side face sides.
- This sine table is executed either with electro-magnetic with integrated water cooling (EM) or electro-permanent chuck (EP).

- **Angle precision:** ± 5 sec.
- **Planar parallelism:** ± 0.005 / 100 mm
- **Shimming measure at 0°:** 3 mm
- **Angle range:** 0° to 45°
- **Nominal holding force:** 100 N/cm²
- **Pole pitch:**
  - 4 mm for Electro Permanent Chuck
  - 13 mm for Electro Magnetic Chuck
  - SAV 243.73
  - SAV 243.42

**Application:**
The angle is set according the sine principle, using an end-gauge.

**Dimensions in mm**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E (at C)</th>
<th>F</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>450</td>
<td>175</td>
<td>448</td>
<td>203</td>
<td>125.5</td>
<td>175</td>
<td>55.0</td>
</tr>
<tr>
<td>500</td>
<td>175</td>
<td>498</td>
<td>203</td>
<td>125.5</td>
<td>175</td>
<td>61.0</td>
</tr>
<tr>
<td>500</td>
<td>200</td>
<td>498</td>
<td>228</td>
<td>125.5</td>
<td>200</td>
<td>70.0</td>
</tr>
</tbody>
</table>

Other dimensions on request.
Also available with other magnet systems.

**Ordering example:**
Precision Sine Table  SAV 245.09 - 500 x 200 - EP
Ordering key  SAV No. - A x B - Execution
Swivel about longitudinal axis, firmly attached on the machine table

**Design:**
The base plate of the sine table is made of steel, stress-free annealed. All built-on parts are hardened (HRC 60) and precision ground. Stable construction with high accuracy. Depending on size fitted with mechanical adjusting gear or hydraulic swivel support. High accuracy due to extreme flat construction. 4-point support for optimal security. Available with angle gauge and additional fixation on request. This sine table is standard executed with electro-permanent chuck SAV 243.70. Delivery with sine chart with degrees / minutes in mm, precision long side stop and short side stop, 3 m connecting cable, lacquered magnet body.

Shimming measure at 0°: 5 mm
Angle range: 0° bis 45°
Angle precision: ± 5 sec.
Planar parallelism: ± 0,005 / 100 mm
Pole Pitch: 13 / 18 / 25 mm
Nominal holding force: 90 / 110 / 115 N/cm²
Magnet voltage: 360V

**Application:**
The angle is set according the sine principle, using an end-gauge.

**Dimensions in mm**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Weight in Kg</th>
<th>Control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>200</td>
<td>460</td>
<td>280</td>
<td>165</td>
<td>175</td>
<td>90</td>
<td>EP 2</td>
</tr>
<tr>
<td>500</td>
<td>200</td>
<td>560</td>
<td>280</td>
<td>176</td>
<td>175</td>
<td>120</td>
<td>EP 2</td>
</tr>
<tr>
<td>500</td>
<td>250</td>
<td>560</td>
<td>315</td>
<td>165</td>
<td>225</td>
<td>138</td>
<td>EP 2</td>
</tr>
<tr>
<td>600</td>
<td>200</td>
<td>660</td>
<td>280</td>
<td>165</td>
<td>175</td>
<td>170</td>
<td>EP 2</td>
</tr>
<tr>
<td>600</td>
<td>300</td>
<td>660</td>
<td>370</td>
<td>170</td>
<td>275</td>
<td>200</td>
<td>EP 2</td>
</tr>
<tr>
<td>800</td>
<td>300</td>
<td>860</td>
<td>370</td>
<td>186</td>
<td>375</td>
<td>250</td>
<td>EP 2</td>
</tr>
<tr>
<td>800</td>
<td>400</td>
<td>860</td>
<td>455</td>
<td>186</td>
<td>375</td>
<td>320</td>
<td>EP 2</td>
</tr>
</tbody>
</table>

*Depending on magnet type. The given heights refer to electro-permanent (EP) magnetic chuck SAV 243.70.

Other sizes and executions on request. Also available with electro-magnet (E) or other magnetic systems.

Please specify type of magnet when ordering.
(see chapter 1, 2, 3)

The assignment of the correct control unit according to page 48 or 90.

**Ordering example:**

**Precision Sine Table**  
SAV 245.10 - 800 x 300 - 18 - 360 V  
**Ordering key**  
SAV No. - A x B - Pole Pitch - Voltage
PRECISION SINE TABLE
Also in tool-steel execution

Swivels about the longitudinal axis, with switchable Permanent magnet block SAV 242.11

Design:
Swivels about the longitudinal axis. The base plate of the sine table is made of hardened steel (HRC 60), black-finished and precision ground.
Delivery in wooden storage case.
With sine table in degrees / minutes in mm, Tool steel execution (RF) can be supplied.

Angle precision: ± 5 sec.
Planar parallelism: ± 0,005 / 100 mm
Shimming measure at 0°: 3 mm
Angle range: 0° bis 45°
Nominal holding force: 50 N/cm²
Nominal holding force tool steel: 30 N/cm²

Application:
The angle is set according the sine principle. The switchable magnet block is detachable and can be used without the sine table. All four clamping surfaces of the magnet block are magnetically active.

<table>
<thead>
<tr>
<th>Dimension in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>140</td>
<td>118.5</td>
</tr>
</tbody>
</table>

Ordering example:
Precision Sine Table SAV 245.40 - RF
Ordering key SAV - No. - Execution

PRECISION SINE TABLE
Also in tool-steel execution

Swivels about the transverse axis, with switchable Permanent magnet block SAV 242.11

Design:
Swivels about the transverse axis. The base plate of the sine table is made of hardened steel (HRC 60), black-finished and precision ground.
Delivery in wooden storage case.
With sine table in degrees / minutes in mm, Tool steel execution (RF) can be supplied.

Angle precision: ± 5 sec.
Planar parallelism: ± 0,005 / 100 mm
Shimming measure at 0°: 3 mm
Angle range: 0° bis 45°
Nominal holding force: 50 N/cm²
Nominal holding force tool steel: 30 N/cm²

Application:
The angle is set according the sine principle. The switchable magnet block is detachable and can be used without the sine table. All four clamping surfaces of the magnet block are magnetically active.

<table>
<thead>
<tr>
<th>Dimension in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>140</td>
<td>118.5</td>
</tr>
</tbody>
</table>

Ordering example:
Precision Sine Table SAV 245.41 - RF
Ordering key SAV - No. - Execution
### CHAPTER 7

#### CHAPTER OVERVIEW

#### ELECTRO HOLDING MAGNETS

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>241.29</td>
<td>Flat design, used primarily in handling applications</td>
<td>129</td>
</tr>
<tr>
<td>241.31</td>
<td>With 2 types of electrical connection, Applications in fixtures and the production process</td>
<td>130</td>
</tr>
<tr>
<td>241.32</td>
<td>Electro-magnetic holding beams with high holding forces</td>
<td>131</td>
</tr>
<tr>
<td>241.40</td>
<td>Electrically deactivated permanent magnets</td>
<td>132</td>
</tr>
<tr>
<td>241.41</td>
<td>Electrically deactivated permanent magnets</td>
<td>133</td>
</tr>
</tbody>
</table>

#### STROKE MAGNETS

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>241.50</td>
<td>High power single stroke magnets</td>
<td>134</td>
</tr>
<tr>
<td>241.51</td>
<td>Single stroke magnets</td>
<td>135</td>
</tr>
<tr>
<td>241.52</td>
<td>Locking magnets</td>
<td>136</td>
</tr>
<tr>
<td>241.53</td>
<td>Locking magnets</td>
<td>137</td>
</tr>
<tr>
<td>241.90</td>
<td>Accessories</td>
<td>138</td>
</tr>
</tbody>
</table>
HOLDING MAGNET SYSTEMS  Special solutions

Magnetic welding fixture in a special execution. For details, see below.

Detail: Positioning using mechanical stops. The holding force is exerted by the electro magnetic holding beams SAV 241.32, Type D.
Flat design

Use:
Due to the extremely low construction design, these Holding magnets are used primarily in handling applications. When switched on, the active magnet enables the holding of ferro-magnetic workpieces. To reach the nominal holding force, the steel poles of the holding surface must be completely covered by the workpiece.

Features:
The holding magnets consist of an electromagnetic holding system. Depending upon the area of application, the corresponding accident prevention regulations must be complied with. For devices in safety class 1, the user must ensure that the equipment grounding conductor corresponds with the provisions of VDE 0100 § 6.

When using the devices, the technical notes (chapter 10) should be noted.

- Nominal Voltage: 24 V DC
- Duty cycle: 100 % ED
- Protection rating: IP 65 according to DIN 40050
- Isolation class: E

Notes to technical data:
The maximum holding forces are given for St 37 and are based on optimal workpiece thickness, at an air gap $\delta L = 0$ and 100% coverage of clamping surface.

The values are given for 90% nominal voltage and at an operating state temperature (approx. 60 °C over-temperature without additional heat transfer).

If the application is based on other conditions, the holding force is reduced (see technical notes, chapter 10). For safety reasons and depending on the application, a safety factor is to be taken into account.

The nominal power values in the table are intended to determine the correct electronic accessories and are based on 20°C excitation winding temperature at nominal voltage (VDE 0580/ 10.70 § 9.1). During operation the power decreases in relation to the length of the duty cycle. The holding magnets are fixed from the front using cylinder screws.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Nominal Force in N</th>
<th>Optimum workpiece thickness in mm</th>
<th>Power in W</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A + 0,1 B C D E F G H I K</td>
<td>750</td>
<td>&gt;4.0</td>
<td>7.1</td>
<td>0.17</td>
</tr>
<tr>
<td>96</td>
<td>23.0</td>
<td>32.0</td>
<td>51.5</td>
<td>4</td>
</tr>
<tr>
<td>110</td>
<td>53.5</td>
<td>65.3</td>
<td>103.5</td>
<td>10</td>
</tr>
<tr>
<td>170</td>
<td>90.7</td>
<td>110.3</td>
<td>158.0</td>
<td>19</td>
</tr>
</tbody>
</table>

Ordering example:
Electro Holding Magnet  SAV 241.29 - 170
Ordering key  SAV - No. - A
Usage:
Electro holding magnets can hold ferrous magnetic workpieces. Their application is found in steel construction, production and have significant advantages in handling small and medium mass products. To reach the nominal holding force, the steel poles of the holding surface must be completely covered by the workpiece.

Notes to technical data:
The maximum holding forces are given for St 37 and are based on optimal workpiece-thickness, at airgap dL= 0 and 100% coverage of clamping surface. The values are given for 90% nominal voltage and warmed condition (approx. 60 K over-temperature without additional heat transfer). If the application is based on other conditions, the holding force is reduced.

Nominal Voltage: 24 V DC
Duty: 100%
Isolation class: E

Electro Holding Magnet
SAV 241.31 - A 01
with connecting wire

SAV 241.31 - A 02
Type A with stripped connecting wire

SAV 241.31 - A 03
Type B with connection terminals

Ordering example:
Electro Holding Magnet SAV 241.31 - A 01
Ordering key SAV - No. - Type and Dimensions

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Nominal Force in N</th>
<th>optimum work-piece thickness in mm</th>
<th>Power in W</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 01</td>
<td>45</td>
<td>&gt;2.0</td>
<td>1.4</td>
<td>0.02</td>
</tr>
<tr>
<td>A/B 02</td>
<td>140</td>
<td>&gt;3.0</td>
<td>3.2</td>
<td>0.06</td>
</tr>
<tr>
<td>A/B 03</td>
<td>230</td>
<td>&gt;3.6</td>
<td>3.6</td>
<td>0.11</td>
</tr>
<tr>
<td>A/B 04</td>
<td>475</td>
<td>&gt;4.5</td>
<td>5.2</td>
<td>0.20</td>
</tr>
<tr>
<td>A/B 05</td>
<td>750</td>
<td>&gt;6.0</td>
<td>6.5</td>
<td>0.30</td>
</tr>
<tr>
<td>A/B 06</td>
<td>1000</td>
<td>&gt;7.0</td>
<td>9.0</td>
<td>0.55</td>
</tr>
<tr>
<td>A/B 08</td>
<td>1800</td>
<td>&gt;9.0</td>
<td>15.0</td>
<td>1.20</td>
</tr>
<tr>
<td>A 10</td>
<td>3400</td>
<td>&gt;10.5</td>
<td>20.5</td>
<td>2.10</td>
</tr>
<tr>
<td>A 15</td>
<td>9300</td>
<td>&gt;17.0</td>
<td>37.0</td>
<td>6.40</td>
</tr>
<tr>
<td>A 18</td>
<td>15000</td>
<td>&gt;21.0</td>
<td>50.0</td>
<td>10.5</td>
</tr>
<tr>
<td>A 25</td>
<td>30000</td>
<td>&gt;29.0</td>
<td>90.0</td>
<td>25.9</td>
</tr>
</tbody>
</table>

Ordering key:
SAV 241.31 - Type A
SAV 241.31 - Type B

Dimensions:

<table>
<thead>
<tr>
<th>Type and Dimensions</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 01</td>
<td>18±0.1</td>
<td>11.0</td>
<td>8.0</td>
<td>16.1</td>
<td>200</td>
<td>M</td>
<td>3</td>
<td>5</td>
<td>2.5</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>A/B 02</td>
<td>25±0.1</td>
<td>20.0</td>
<td>11.1</td>
<td>22.3</td>
<td>200</td>
<td>M</td>
<td>4</td>
<td>6</td>
<td>3.5</td>
<td>1</td>
<td>28.5</td>
</tr>
<tr>
<td>A/B 03</td>
<td>32±0.1</td>
<td>22.0</td>
<td>14.3</td>
<td>28.6</td>
<td>200</td>
<td>M</td>
<td>4</td>
<td>6</td>
<td>5.0</td>
<td>3</td>
<td>32.5</td>
</tr>
<tr>
<td>A/B 04</td>
<td>40±0.1</td>
<td>25.5</td>
<td>17.9</td>
<td>35.8</td>
<td>200</td>
<td>M</td>
<td>5</td>
<td>8</td>
<td>5.0</td>
<td>3</td>
<td>37.0</td>
</tr>
<tr>
<td>A/B 05</td>
<td>50±0.1</td>
<td>27.0</td>
<td>20.4</td>
<td>44.7</td>
<td>200</td>
<td>M</td>
<td>5</td>
<td>8</td>
<td>5.5</td>
<td>3</td>
<td>42.0</td>
</tr>
<tr>
<td>A/B 06</td>
<td>63±0.1</td>
<td>30.0</td>
<td>28.2</td>
<td>56.3</td>
<td>200</td>
<td>M</td>
<td>8</td>
<td>12</td>
<td>6.0</td>
<td>3</td>
<td>49.0</td>
</tr>
<tr>
<td>A/B 08</td>
<td>80±0.1</td>
<td>38.0</td>
<td>34.0</td>
<td>72.8</td>
<td>200</td>
<td>M</td>
<td>8</td>
<td>12</td>
<td>8.5</td>
<td>3</td>
<td>57.5</td>
</tr>
<tr>
<td>A 10</td>
<td>100±0.1</td>
<td>43.0</td>
<td>42.8</td>
<td>91.3</td>
<td>300</td>
<td>M</td>
<td>10</td>
<td>15</td>
<td>10.0</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>A 15</td>
<td>150±0.1</td>
<td>56.0</td>
<td>67.9</td>
<td>134.0</td>
<td>300</td>
<td>M</td>
<td>16</td>
<td>24</td>
<td>16.5</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>A 18</td>
<td>180±0.1</td>
<td>63.0</td>
<td>84.8</td>
<td>161.0</td>
<td>300</td>
<td>M</td>
<td>24</td>
<td>36</td>
<td>20.5</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>A 25</td>
<td>250±0.1</td>
<td>80.0</td>
<td>117.5</td>
<td>223.0</td>
<td>300</td>
<td>M</td>
<td>24</td>
<td>36</td>
<td>28.5</td>
<td>3</td>
<td>-</td>
</tr>
</tbody>
</table>
ELEKTRO MAGNETISCHE SấHLAGBEAMTE

with high holding forces

Application:
The apparatus type C is suitable for holding parts with straight surfaces, while Type D can be used for parts with rough or scaled surface. To reach the nominal holding force, the steel poles of the holding surface must be completely covered by the workpiece.

Design:
The electro magnetic holding beams are direct current holding systems. The magnetic circuit is open in switched-on position and makes it possible to hold ferrous magnetic workpieces. For mounting the magnets are provided with threaded holes in the bottom of the housing. Electrical connection through 2 connection bolts, which are fitted in the housing of the magnet and have easy access. Further a stud is available for mounting of a steel wire as stress release. These studs can be screwed on the side or bottom. When working with electromagnetic holding beams, one should follow the appropriate rules for the prevention of accidents.

Nominal voltage: 24 V DC
Protection: Housing IP 53 according DIN 40 050 connection IP 00
Isolation class: E
Duty: 100 %

Ordering example:

Electro Magnetic Holding Beam SAV 241.32 - D 09
Ordering key SAV - No. - Type and Dimensions

Notes to technical data:
The nominal power values in the table above are intended to determine the correct electronic accessories and are based on 20°C winding temperature at nominal voltage (VDE 0580/10.70 § 9.1). During operation the power decreases, depending on the duty. The pole pitch as well as their influence on the operation is described in the technical notes. The maximum holding forces FH are given for St 37 and are based on a plate thickness of > 8 mm for Type C and > 10 mm for Type D.

The forces are for an airgap dL=0 and 100% coverage of clamping surface. 90% Nominal voltage and warmed condition (approx. 50 K over-temperature) without additional heat transfer. If the application is based on other conditions, the holding force is reduced. Due to safety reasons and depending on the application a safety factor is to be taken into account.

<table>
<thead>
<tr>
<th>Type and Dimensions</th>
<th>Dimensions in mm</th>
<th>Pole pitch</th>
<th>Nominal force in N</th>
<th>Nominal Power in W</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>C 01</td>
<td>101.5</td>
<td>32</td>
<td>31</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>C 02</td>
<td>151.5</td>
<td>32</td>
<td>31</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>C 03</td>
<td>201.5</td>
<td>32</td>
<td>31</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>C 04</td>
<td>401.5</td>
<td>32</td>
<td>31</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>C 05</td>
<td>501.5</td>
<td>32</td>
<td>31</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>C 06</td>
<td>601.5</td>
<td>32</td>
<td>31</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>D 07</td>
<td>151.5</td>
<td>60</td>
<td>49</td>
<td>30</td>
<td>75</td>
</tr>
<tr>
<td>D 08</td>
<td>201.5</td>
<td>60</td>
<td>49</td>
<td>35</td>
<td>120</td>
</tr>
<tr>
<td>D 09</td>
<td>501.5</td>
<td>60</td>
<td>49</td>
<td>35</td>
<td>140</td>
</tr>
</tbody>
</table>

Ordering example:

Electro Magnetic Holding Beam SAV 241.32 - D 09
Ordering key SAV - No. - Type and Dimensions
**PERMANENT ELECTRO HOLDING MAGNETS**

**SAV 241.40**

**Electrically deactivated permanent magnets**

**Use:**
Due to the permanent magnetic holding system, which is effective in a de-energized state, these holding magnets are used primarily in applications where long holding periods are required and only for short periods or occasionally no holding force is required. Additionally, they are used as safety magnets in transport equipment and lifting gear as the load is reliably held in the case of a power failure. To reach the nominal holding force, the steel poles of the holding surface must be completely covered by the workpiece.

**Features:**
The holding magnets consist of a permanent magnetic holding system to hold ferro-magnetic workpieces and an excitation winding, which neutralises the magnetic field on the holding surface when activated and allows the removal or setting down of loads. Depending upon the area of application, the corresponding accident prevention regulations must be complied with.

When using the devices, the technical notes (chapter 10) should be noted.

| Nominal Voltage: | 24 V DC |
| Isolation class: | E |
| Protection rating: | Housing IP 65 according to DIN 40050 |

**Duty cycle:**
25% at a cycle time of < 2 min or 40% at a cycle time of < 0.5 min

The relative duty cycle is:

\[
\text{rel. duty cycle} = \frac{\text{duty cycle}}{\text{cycle time}} \times 100 \%
\]

Adherence to the specified values for the duty cycle and cycle time and a nominal voltage of +5% or -10%, ensures that a reliable deactivation of the permanent magnetic system is achieved. This ensures the safe release of the load. The prevailing residual force then represents max. 3% of the nominal holding force. The holding magnet is not thermally overloaded during continuous operation. The thereby resulting over-temperature of the excitation winding however causes an increase in the residual force.

**Dimensions in mm**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>Nominal Force in N*</th>
<th>Optimum workpiece thickness in mm</th>
<th>Nominal power in W</th>
<th>Inductivity unloaded in H</th>
<th>Inductivity loaded in H</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>22</td>
<td>9.0</td>
<td>18.0</td>
<td>200</td>
<td>M 4</td>
<td>5</td>
<td>1</td>
<td>40</td>
<td>&gt;2.5</td>
<td>3.6</td>
<td>0.11</td>
<td>0.8</td>
<td>0.04</td>
</tr>
<tr>
<td>35</td>
<td>28</td>
<td>11.2</td>
<td>33.0</td>
<td>200</td>
<td>M 4</td>
<td>5</td>
<td>2</td>
<td>160</td>
<td>&gt;3.0</td>
<td>4.6</td>
<td>1.12</td>
<td>4.9</td>
<td>0.20</td>
</tr>
<tr>
<td>55</td>
<td>36</td>
<td>18.0</td>
<td>52.0</td>
<td>200</td>
<td>M 5</td>
<td>6</td>
<td>2</td>
<td>420</td>
<td>&gt;4.5</td>
<td>9.0</td>
<td>0.82</td>
<td>4.65</td>
<td>0.50</td>
</tr>
<tr>
<td>70</td>
<td>45</td>
<td>24.0</td>
<td>65.6</td>
<td>200</td>
<td>M 8</td>
<td>8</td>
<td>2</td>
<td>720</td>
<td>&gt;6.0</td>
<td>13.3</td>
<td>0.72</td>
<td>4.42</td>
<td>0.90</td>
</tr>
<tr>
<td>90</td>
<td>48</td>
<td>30.0</td>
<td>84.7</td>
<td>200</td>
<td>M 8</td>
<td>8</td>
<td>2</td>
<td>1200</td>
<td>&gt;7.5</td>
<td>21.8</td>
<td>0.60</td>
<td>4.12</td>
<td>1.70</td>
</tr>
<tr>
<td>105</td>
<td>56</td>
<td>37.0</td>
<td>98.0</td>
<td>300</td>
<td>M 10</td>
<td>10</td>
<td>3</td>
<td>1600</td>
<td>&gt;9.0</td>
<td>28.0</td>
<td>0.52</td>
<td>3.13</td>
<td>2.60</td>
</tr>
<tr>
<td>150</td>
<td>63</td>
<td>55.0</td>
<td>140.0</td>
<td>300</td>
<td>M 16</td>
<td>16</td>
<td>3</td>
<td>3500</td>
<td>&gt;12.5</td>
<td>44.0</td>
<td>0.46</td>
<td>3.04</td>
<td>6.40</td>
</tr>
</tbody>
</table>

* The nominal holding force values are based upon a 100 % loading of the contact surface with a St 37 workpiece, ground and of optimal loading thickness.

**Ordering example:**
Permanent Electro Holding Magnet  SAV 241.40 - 150
Ordering key  SAV - No.  -  A
Electrically deactivated permanent magnets

Use:
Due to the permanent magnetic holding system, which is effective in a de-energized state, these holding magnets are used primarily in applications where long holding periods are required and only for short periods or occasionally no holding force is required. Additionally, they are used as safety magnets in transport equipment and lifting gear as the load is reliably held in the case of a power failure. To reach the nominal holding force, the steel poles of the holding surface must be completely covered by the workpiece.

Features:
The holding magnets consist of a permanent magnetic holding system to hold ferro-magnetic workpieces and an excitation winding, which neutralises the magnetic field on the holding surface when activated and allows the removal or setting down of loads. If the winding is switched in the same direction, this increases the nominal force. Depending upon the area of application, the corresponding accident prevention regulations must be complied with.
When using the devices, the technical notes (chapter 10) should be noted.

Nominal Voltage: 24 V DC
Isolation class: E
Protection rating: Housing IP 65 according to DIN 40050
Duty cycle: 100 % ED

Notes to technical data:
The maximum holding forces are given for St 37 and are based on optimal workpiece thickness, at an air gap ¡L = 0 and 100% coverage of clamping surface. The values are given for an operating state temperature. There is no thermal overloading during continuous operation. However the thereby resulting over-temperature causes an increase in the residual force. If the application is based on other conditions, the nominal holding force is reduced (see technical notes, chapter 10).

For safety reasons and depending on the application, a safety factor is to be taken into account. The nominal power values in the table are intended to determine the correct electronic accessories and are based on 20°C excitation winding temperature at nominal voltage (VDE 0580/ 10.70 § 9.1). During operation the power decreases in relation to the length of the duty cycle.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>Nominal Force in N</th>
<th>Optimum work-piece thickness in mm</th>
<th>Switch off voltage in V</th>
<th>Power in W</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.2</td>
<td>40</td>
<td>28</td>
<td>15.5</td>
<td>2</td>
<td>M 4</td>
<td>5</td>
<td>200</td>
<td>260</td>
<td>&gt;10.0</td>
<td>24</td>
<td>6</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Electro Holding Magnet  SAV 241.41
Ordering key  SAV - No.
**High Power Single Stroke Magnets**

**SAV 241.50**

**High power design**

**Features:**
The quadratic magnets (solenoids) are particularly notable due to their enormous stroke work density and modular design. They are used in applications where large forces are required in a restricted space, such as:
- High power circuit breakers
- Locking of train doors
- Automation technologies
- General types of actuating functions
- Park systems
- Modular construction

**Executions:**
- Wires or DIN-plug
- Options: see accessories

**Features:**
- The anchor is moved through the whole length of the stroke travel by electro magnetic force
- Return from the stroke end position to the start position through external forces or by an internal return spring
- Maximum stroke work through optimal magnetic circuit design
- Can be installed in any position, axial force reduction (transversal forces lead to increased bearing wear)
- Devices can be used in push or pull executions
- Stroke limitation to stroke start and end positions (adjustable through optional screw nuts)

The products and devices are constructed and tested according to DIN VDE 0580/07.2000.

**Standard voltage:** 24 V DC

Other non-standard values available at a surcharge.

**Thermal class:** F (Limit temperature 155 °C)

---

**Ordering example:**
High Power Single Stroke Magnet SAV 241.50 - 10

**Ordering key:** SAV - No. - Hub

---

**Technical data without over-excitation**

<table>
<thead>
<tr>
<th>Stroke s in mm</th>
<th>Lift. power P20 in W</th>
<th>Nom. stroke work W in Ncm</th>
<th>Pick-up time t1 in ms</th>
<th>Release time t2 in ms</th>
<th>Nom. stroke work W in Ncm</th>
<th>Pick-up time t1 in ms</th>
<th>Release time t2 in ms</th>
<th>Nom. stroke work W in Ncm</th>
<th>Pick-up time t1 in ms</th>
<th>Release time t2 in ms</th>
<th>Nom. stroke work W in Ncm</th>
<th>Pick-up time t1 in ms</th>
<th>Release time t2 in ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Technical data with over-excitation**

---

**Dimensions in mm**

**Weights in g**

**Ordering example:**
Sealing ring on the side of axle (only size 0.3), Gaiter on cylinder side (with adapter), Return spring (integrated), Clevis on axle side
**Features:**
In these single stroke magnets, the stroke travel from the stroke end position to the start position is by means of electro magnetic force and the return through external forces.

With increasing magnetic force progression.

These magnets do not include a stroke limiter for the anchor. The limitation must be provided by the device that is to be attached.

Can be installed in any position, the force reduction is only intended in the axial direction.

For devices in safety class 1, the user must ensure that the equipment grounding conductor corresponds with the provisions of DIN VDE 0100.

The products and devices are constructed and tested according to DIN VDE 0580/07.2000.

**Standard voltage:** 24 V DC

Other voltages up to max. 60 V DC and duty cycles not listed in the table are available at a surcharge.

**Protection rating:** IP 20

**Isolation class:** F

---

**Dimensions in mm**

<table>
<thead>
<tr>
<th>A</th>
<th>C</th>
<th>E₁</th>
<th>E₂</th>
<th>F₁</th>
<th>G</th>
<th>H</th>
<th>I₂</th>
<th>K₁</th>
<th>K₂</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>28</td>
<td>12</td>
<td>10</td>
<td>18</td>
<td>M 2.5</td>
<td>4</td>
<td>10</td>
<td>7</td>
<td>M 3</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>32</td>
<td>15</td>
<td>13</td>
<td>22</td>
<td>M 2.5</td>
<td>5</td>
<td>10</td>
<td>8</td>
<td>M 3</td>
<td>34</td>
</tr>
<tr>
<td>25</td>
<td>40</td>
<td>22</td>
<td>17</td>
<td>28</td>
<td>M 3</td>
<td>5</td>
<td>10</td>
<td>9.5</td>
<td>M 4</td>
<td>45</td>
</tr>
<tr>
<td>30</td>
<td>46.5</td>
<td>20.5</td>
<td>17</td>
<td>33</td>
<td>M 3</td>
<td>5</td>
<td>10</td>
<td>11.5</td>
<td>M 4</td>
<td>50</td>
</tr>
</tbody>
</table>

---

**Magnet force, switching times and input power**

<table>
<thead>
<tr>
<th>Stroke s in mm</th>
<th>100 % Duty cycle</th>
<th>40 % Duty cycle</th>
<th>25 % Duty cycle</th>
<th>5 % Duty cycle</th>
<th>Anchor ca. m in g</th>
<th>Total ca. m in g</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>4</td>
<td>4.5</td>
<td>6</td>
<td>8</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>8</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
<td>11</td>
<td>15</td>
<td>20</td>
<td>18</td>
<td>170</td>
</tr>
<tr>
<td>10</td>
<td>55</td>
<td>45</td>
<td>45</td>
<td>20</td>
<td>40</td>
<td>260</td>
</tr>
</tbody>
</table>

---

Ordering example:
Single Stroke Magnet SAV 241.51 - 8 - 4.5
Ordering key SAV - No. Hub Nominal power
LOCKING MAGNETS

SAV 241.52

für hohe Querkräfte, stromlos entriegelt

Use:
Electro-magnetic locking unit especially for use in safety mechanisms on all types of machinery and automation systems. During development, particular importance was placed on a compact construction, universal range of fastening options and the integrated feedback of the locking function. These devices reliably fulfill the requirements of the accident prevention regulations.

Features:
Magnet anchor and locking bolts are separately guided in maintenance-free bearings with a high resistance to wear. The built-in micro-switch signals the position of the locking bolt approx. 0.5 to 1mm after leaving the stroke start position and before reaching the stroke end position. The return of the locking bolt to the locked position is by means of an integrated return spring.

In order to ensure a quick and safe electrical connection to the magnet and for the feedback signal, a built-in plug according to DIN 43651 has been used.

For operation of the locking unit with a voltage of over 48 V DC, the magnet connection is via an additional plug, according to DIN EN 175301-803 (DIN 43650), mounted on the magnet housing.

The magnetic force values are achieved at 90% of the nominal voltage and at an operating state temperature in accordance with DIN VDE 0580/07.2000 and apply to a connection voltage of 24 V DC. Operating at 100% of the nominal voltage increases the magnetic forces by approx. 20%. For other connection voltages, the magnetic forces may lie above or below the stated values due to the differences in the copper fill factor. The release times apply to DC switching. In operation with an in-line rectifier and AC switching, the release times are a factor of 2-3 higher.

Device plug sockets are not supplied as standard and must be ordered separately.

Surface: Solenoid galvanized
Housing: Aluminium

Technical data:
- Thermal class according to DIN VDE 0580/07.2000 (F)
- Duty cycle 100%
- Protection rating according to IEC 60529: IP 64
- Initial force / locking bolts \( F = 7 \ N \)
- Holding force / locking bolts \( F_h = 35 \ N \)
- Return force / locking bolts \( F_r = 20 \ N \)
- Attraction time \( t_1 = 120 \ \text{msec} \)
- Release time \( t_2 = 100 \ \text{msec} \)
- Radial force / static 3000 N

<table>
<thead>
<tr>
<th>Ordering key</th>
<th>Function (no current)</th>
<th>Stroke in mm</th>
<th>Power in W</th>
<th>Locking bolts ( \varphi ) in mm</th>
<th>Signaller ( H_s )</th>
<th>( H_l )</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAV 241.52</td>
<td>Released</td>
<td>10</td>
<td>18.5</td>
<td>14</td>
<td>x</td>
<td>x</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Custom executions on request.

Ordering example:

Locking Magnet SAV 241.52
Ordering key SAV - No.
LOCKING MAGNETS

For high transversal forces, locked in a de-energized state

Use:
Electro-magnetic locking unit especially for use in safety mechanisms on all types of machinery and automation systems. During development, particular importance was placed on a compact construction, universal range of fastening options and the integrated feedback of the locking function. These devices reliably fulfill the requirements of the accident prevention regulations.

Features:
Magnet anchor and locking bolts are separately guided in maintenance-free bearings with a high resistance to wear. The built-in micro-switch signals the position of the locking bolt approx. 0.5 to 1mm after leaving the stroke start position and before reaching the stroke end position. The return of the locking bolt to the locked position is by means of an integrated return spring.

In order to ensure a quick and safe electrical connection to the magnet and for the feedback signal, a built-in plug according to DIN 43651 has been used.

For operation of the locking unit with a voltage of over 48 V DC, the magnet connection is via an additional plug, according to DIN EN 175301-803 (DIN 43650), mounted on the magnet housing.

The magnetic force values are achieved at 90% of the nominal voltage and at an operating state temperature in accordance with DIN VDE 0580/07.2000 and apply to a connection voltage of 24 V DC. Operating at 100% of the nominal voltage increases the magnetic forces by approx. 20%. For other connection voltages, the magnetic forces may lie above or below the stated values due to the differences in the copper fill factor. The release times apply to DC switching. In operation with an in-line rectifier and AC switching, the release times are a factor of 2-3 higher.

Device plug sockets are not supplied as standard and must be ordered separately.

Surface: Solenoid galvanized
Housing: Aluminium

Technical data:
- Thermal class according to DIN VDE 0580/07.2000 (F)
- Duty cycle 100%
- Protection rating according to IEC 60529: IP 64
- Initial force / locking bolts \( F_H = 7 \) N
- Holding force / locking bolts \( F_H' = 35 \) N
- Return force / locking bolts \( F_R = 20 \) N
- Attraction time \( t_1 = 120 \) msec
- Release time \( t_2 = 100 \) msec
- Radial force / static 3000 N

<table>
<thead>
<tr>
<th>Ordering key</th>
<th>Function (no current)</th>
<th>Stroke in mm</th>
<th>Power in W</th>
<th>Locking bolts ø in mm</th>
<th>Signaller ( H_s ) ( H_t )</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAV 241.53</td>
<td>Locked</td>
<td>10</td>
<td>18,5</td>
<td>14 x x</td>
<td>x x</td>
<td>1,4</td>
</tr>
</tbody>
</table>

Custom executions on request.

Ordering example:
Locking Magnet SAV 241.53
Ordering key SAV - No.
Round connector plug according to DIN 43651

Use:
Round connection sockets, according to DIN 43651, are used for electrical connections to locking units. The connection plug is supplied in a 6-pin design including ground connection. Fixing is via a cylinder screw (supplied). This ensures the effective sealing of the combination and prevents the unintentional disconnection of the plug connector.

Features:
A cable gland PG 11 is used to seal the cable connection. The wires are connected using crimps. The max. wire cross section is 1.5 mm². When plugged-in and secured, the connection has a protection rating of IP 65 according to IEC 60529. The permissible continuous limit temperature is 90°C. A limit of 120°C is permissible for short periods without damaging the plug connector.

Ordering example:
Round Connector Plug  SAV 241.90
Ordering key  SAV - No.

<table>
<thead>
<tr>
<th>Accessories - quadratic</th>
<th>Standard</th>
<th>Special accessories on request</th>
<th>Limited application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plug connector</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free wire ends 200 mm</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without gaiter</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gaiter pull-side/sealing ring push-side</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threaded bolt push-side</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threaded bolt pull-side*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexagon nut push-side</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without return spring</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With return spring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without clevis</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clevis with ES-bolts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With clevis GKO M3 (with/without ES-bolts)</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With clevis GKO M4 (with/without ES-bolts)</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With clevis GKO M5 (with/without ES-bolts)</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With clevis GKO M6 (with/without ES-bolts)</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With clevis GKO M8 (with/without ES-bolts)</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With clevis GKO M10 (with/without ES-bolts)</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With clevis GKO M12 (with/without ES-bolts)</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plug connector with bridges-GR GDSB 211 2A</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plug connector with bridges -GR GDSB V211 4A</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plug connector without bridges -GR GD311 2A</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching unit with over-excitation – Nom. power max. 48 W</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* only in connection with a gaiter on the pull-side/sealing ring push-side
# CHAPTER 8

## LAMINATED TOP PLATES / CLAMPING BEAMS / LAMINATED BLOCKS

<table>
<thead>
<tr>
<th>SAV-ART.NO</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>248.01</td>
<td>4 mm</td>
<td>for use on circular magnetic chucks</td>
<td>141</td>
</tr>
<tr>
<td>248.02</td>
<td>4 mm</td>
<td>for magnetic chucks with transverse poles</td>
<td>141</td>
</tr>
<tr>
<td>248.03</td>
<td>4 mm</td>
<td>for use on magnetic chucks</td>
<td>142</td>
</tr>
<tr>
<td>248.40</td>
<td>–</td>
<td>for clamping of non-magnetic workpieces</td>
<td>142</td>
</tr>
<tr>
<td>248.60</td>
<td>4 mm</td>
<td>for use on magnetic chucks</td>
<td>143</td>
</tr>
<tr>
<td>248.61</td>
<td>4 mm</td>
<td>in storage case</td>
<td>143</td>
</tr>
</tbody>
</table>

## PERMANENT-MAGNET CLAMPING BLOCKS

<table>
<thead>
<tr>
<th>SAV-ART.NO</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>242.01</td>
<td>1.3 - 4 mm</td>
<td>with fine and super-fine pole pitch</td>
<td>144</td>
</tr>
<tr>
<td>242.02</td>
<td>1.5 mm</td>
<td>with 3 magnetic sides, switchable</td>
<td>144</td>
</tr>
<tr>
<td>242.07</td>
<td>–</td>
<td>with 1 magnetic sides, switchable</td>
<td>145</td>
</tr>
<tr>
<td>242.11</td>
<td>4 mm</td>
<td>with 4 magnetic sides, also stainless</td>
<td>145</td>
</tr>
</tbody>
</table>

## NEODYMIUM MAGNET CLAMPING BLOCKS

<table>
<thead>
<tr>
<th>SAV-ART.NO</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>242.05</td>
<td>6 mm</td>
<td>extreme high holding force</td>
<td>146</td>
</tr>
<tr>
<td>242.12</td>
<td>6 mm</td>
<td>for wire erosion, rust-free, with extreme high holding force</td>
<td>146</td>
</tr>
</tbody>
</table>

## MAGNETIC BEAMS

<table>
<thead>
<tr>
<th>SAV-ART.NO</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>240.62</td>
<td>–</td>
<td>for universal use</td>
<td>147</td>
</tr>
<tr>
<td>243.15</td>
<td>1.3 mm</td>
<td>switchable, for EDM applications</td>
<td>147</td>
</tr>
</tbody>
</table>

## PERMANENT MAGNET V-BLOCKS

<table>
<thead>
<tr>
<th>SAV-ART.NO</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>242.21</td>
<td>bipol</td>
<td>with 4 magnetic surfaces, 2 opposite-facing switching points</td>
<td>148</td>
</tr>
<tr>
<td>242.22</td>
<td>bipol</td>
<td>2 magnetic contact surfaces, switched on and off together</td>
<td>148</td>
</tr>
<tr>
<td>242.25</td>
<td>bipol</td>
<td>2 magnetic contact surfaces, switched on and off together</td>
<td>149</td>
</tr>
<tr>
<td>242.29</td>
<td>–</td>
<td>3 magnetic clamping surfaces, in sealed execution</td>
<td>149</td>
</tr>
<tr>
<td>242.31</td>
<td>bipol</td>
<td>4 magnetic clamping surfaces; strongly holding V-block, switchable</td>
<td>150</td>
</tr>
</tbody>
</table>

## PRECISION ANGLE-SETTING TOOL

<table>
<thead>
<tr>
<th>SAV-ART.NO</th>
<th>POLE PITCH</th>
<th>COMMENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>487.40</td>
<td>–</td>
<td>easy to use due to its magnetic adhesion</td>
<td>150</td>
</tr>
</tbody>
</table>
APPLICATIONS

**ELECTRO PERMANENT MAGNET** with adapter pole plate

**Dimensions:**
600 x 400 mm

**Workpiece:**
Runner blocks

**Machining operation:**
Grinding of head and side surfaces

**Description:**
- Loaded in V-block
- With stops and magnetically active positioning
- Exchangeable pole plate

**GEAR DRIVEN POLE PLATE** in special execution

**Dimensions:**
Diameter 830 mm

**Workpiece:**
Rolling bearings

**Machining operation:**
Parallel grinding on segment lathes

**Description:**
- Pole plate driven via a geared rim
- Stationary magnet system for automated grinding
- 24 individually actuated segments
LAMINATED CIRCULAR TOP PLATE

For use on circular chucks with parallel pole arrangement

Use:
Clamping of profiled workpieces on circular chucks with parallel pole arrangement.

Features:
Any required profiled shape can be machined into the top plate by the user, or custom machined during manufacture. Connection to magnet to be agreed upon. Lamination must be parallel to magnetic chuck.

Pole pitch: steel 3 mm, brass 1 mm
Maximum profile depth: 8 mm

Discolourations can occur during the production process. These do not constitute a technical fault.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 155 B 25</td>
<td>4.0</td>
</tr>
<tr>
<td>A 200 B 25</td>
<td>6.0</td>
</tr>
<tr>
<td>A 250 B 25</td>
<td>10.0</td>
</tr>
<tr>
<td>A 300 B 25</td>
<td>14.0</td>
</tr>
<tr>
<td>A 350 B 25</td>
<td>19.0</td>
</tr>
<tr>
<td>A 400 B 30</td>
<td>30.0</td>
</tr>
</tbody>
</table>

Other dimensions on request.

Ordering example:
Laminated Circular Top Plate SAV 248.01 - 400
Ordering key SAV - No. - A

LAMINATED BARS

For use on magnetic chucks with transverse pole arrangement

Use:
To provide a suitable mounting surface for difficult workpieces. Only usable in conjunction with a magnetic chuck with a transverse pole arrangement. Especially suited for use with magnetic chuck SAV 243.11 (Chapter 1)

Features:
The silver brazed pole plates can be machined to any desired shape.

Pole pitch: steel 3 mm, brass 1 mm
Profile depth: max. 8 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 250 B 150 C 25</td>
<td>7.5</td>
</tr>
<tr>
<td>A 300 B 150 C 25</td>
<td>9.0</td>
</tr>
<tr>
<td>A 400 B 150 C 25</td>
<td>12.0</td>
</tr>
<tr>
<td>A 300 B 200 C 25</td>
<td>12.0</td>
</tr>
<tr>
<td>A 400 B 200 C 25</td>
<td>16.0</td>
</tr>
<tr>
<td>A 250 B 250 C 25</td>
<td>12.5</td>
</tr>
<tr>
<td>A 400 B 250 C 25</td>
<td>19.5</td>
</tr>
</tbody>
</table>

Custom sizes can be supplied.

Ordering example:
Laminated Bars SAV 248.02 - 250 x 150
Ordering key SAV - No. - A x B
**LAMINATED BARS**

**SAV 248.03**

**For use on magnetic chucks**

**Use:**
In conjunction with magnetic chucks, to guide the magnetic field into the workpiece. Can be machined into any shape required.

**Features:**
Connection to magnet to be agreed upon.

Pole arrangement: 3 mm steel, 1 mm brass

Profile depth: max. 8 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 75 25</td>
<td>3.8</td>
</tr>
<tr>
<td>500 75 25</td>
<td>7.5</td>
</tr>
<tr>
<td>250 75 25</td>
<td>5.0</td>
</tr>
<tr>
<td>500 100 25</td>
<td>10.0</td>
</tr>
</tbody>
</table>

With transverse pole arrangement

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 75 25</td>
<td>4.8</td>
</tr>
<tr>
<td>500 75 40</td>
<td>6.0</td>
</tr>
<tr>
<td>250 75 40</td>
<td>6.0</td>
</tr>
<tr>
<td>400 75 40</td>
<td>12.0</td>
</tr>
<tr>
<td>200 100 40</td>
<td>6.4</td>
</tr>
<tr>
<td>400 100 40</td>
<td>12.8</td>
</tr>
<tr>
<td>500 100 40</td>
<td>16.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 75 25</td>
<td>3.8</td>
</tr>
<tr>
<td>500 75 25</td>
<td>7.5</td>
</tr>
<tr>
<td>250 100 25</td>
<td>5.0</td>
</tr>
<tr>
<td>500 100 25</td>
<td>10.0</td>
</tr>
</tbody>
</table>

**Ordering example:**
Laminated Bars SAV 248.03 - 400 x 100 x 40
Ordering key SAV - No. - A x B x C

**CLAMPING BEAMS**

**SAV 248.40**

**Used to clamp non-magnetic workpieces**

**Use:**
For the secure clamping of non-magnetic materials on magnets.

**Features:**
The clamping beams are produced from ferro-magnetic metal and have a spring-loaded strip on the long side. When the magnet is activated, this strip causes the workpiece to be pressed onto the support surface (pull-down effect). Supplied in pairs.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 4.0 45</td>
<td>0.30</td>
</tr>
<tr>
<td>150 1.0 40</td>
<td>0.10</td>
</tr>
<tr>
<td>150 1.6 43</td>
<td>0.20</td>
</tr>
<tr>
<td>150 2.8 43</td>
<td>0.35</td>
</tr>
<tr>
<td>250 3.7 52</td>
<td>0.70</td>
</tr>
</tbody>
</table>

**Ordering example:**
Clamping Beam SAV 248.40 - 250 x 3.7
Ordering key SAV - No. - A x B
SAV 248.60

Laminated Block

For use on magnetic chucks

Use:
In conjunction with magnetic chucks for machining of irregularly shaped workpieces. Can be machined to any required shape.

Features:
- Longitudinal and transverse pole arrangement, as well as prisms.
- Pole arrangement: 3 mm steel, 1 mm brass
- Profile depth: max. 8 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Pole arrangement</th>
<th>Execution</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>Trans. pole (Q)</td>
</tr>
<tr>
<td>65</td>
<td>60</td>
<td>40</td>
<td>Q</td>
</tr>
<tr>
<td>72</td>
<td>45</td>
<td>22</td>
<td>Q</td>
</tr>
<tr>
<td>75</td>
<td>60</td>
<td>30</td>
<td>L</td>
</tr>
<tr>
<td>80</td>
<td>60</td>
<td>30</td>
<td>Q</td>
</tr>
<tr>
<td>80</td>
<td>80</td>
<td>50</td>
<td>Q</td>
</tr>
<tr>
<td>90</td>
<td>52</td>
<td>33</td>
<td>L</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
<td>40</td>
<td>L</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
<td>40</td>
<td>L</td>
</tr>
<tr>
<td>100</td>
<td>70</td>
<td>41</td>
<td>Q</td>
</tr>
<tr>
<td>100</td>
<td>70</td>
<td>48</td>
<td>L</td>
</tr>
<tr>
<td>120</td>
<td>80</td>
<td>50</td>
<td>Q</td>
</tr>
</tbody>
</table>

Custom sizes on request.

Ordering example:
- Laminated Block SAV 248.60 - 75 x 60 x 30 - L - E

Ordering key:
- SAV No. - A x B x C - Pole arrangement - Execution

SAV 248.61

Laminated Blocks (Set)

In storage case

Use:
In conjunction with magnetic chucks for machining of irregularly shaped workpieces. Can be machined to any required shape.

Features:
- Longitudinal and transverse pole arrangement, as well as prisms.

Pole arrangement: 3 mm steel, 1 mm brass
- Profile depth: max. 8 mm
- Total weight: 7.6 kg

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Aus-führung</th>
<th>Anzahl der Polblöcke</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>56</td>
<td>32</td>
<td>15</td>
</tr>
<tr>
<td>96</td>
<td>57</td>
<td>26</td>
</tr>
<tr>
<td>96</td>
<td>53</td>
<td>22</td>
</tr>
<tr>
<td>56</td>
<td>68</td>
<td>47</td>
</tr>
</tbody>
</table>

Ordering example:
- Laminated Blocks (Set) SAV 248.61

Ordering key:
- SAV - No.
PERMANENT MAGNETIC BLOCK

With fine and extra fine pole pitch, non-switchable

For machining and shaping of small workpieces, such as punches etc. For clamping of thin components type MH 204 is recommended which has an extra fine pole pitch.

Features:
Two or three magnetic clamping surfaces, pole pitch 4 mm, or 1.3 mm for type MH 204.
Types MH 201S to MH 203S use SmCo-magnets with extremely high holding forces for materials that are difficult to magnetize.

Nominal holding force:
80 N/cm² for MH 201 to MH 204
180 N/cm² for MH 201-S to MH 204-S

Field height: 6 mm

Pole plate wearing limit:
14 mm for MH 201 and MH 202
6 mm for MH 203 and MH 204

Permenant Magnetic Block SAV 242.01

Ordering example:
Permanent Magnetic Block SAV 242.01 - MH 201
Ordering key SAV - No. - Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions in mm</th>
<th>Max. angular deviation</th>
<th>Magnetice faces</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH 201</td>
<td>100 100 50</td>
<td>5'</td>
<td>1 face 100 x 100</td>
<td>3,6</td>
</tr>
<tr>
<td>MH 202</td>
<td>100 50 50</td>
<td>5'</td>
<td>2 faces 100 x 50</td>
<td>1,7</td>
</tr>
<tr>
<td>MH 203</td>
<td>100 25 25</td>
<td>5'</td>
<td>2 faces 100 x 25</td>
<td>0,5</td>
</tr>
<tr>
<td>MH 204</td>
<td>100 25 25</td>
<td>5'</td>
<td>2 faces 100 x 25</td>
<td>0,5</td>
</tr>
</tbody>
</table>

PERMANENT MAGNETIC SWITCHABLE BLOCK

With 3 magnetic clamping surfaces

Use:
Angular and parallel grinding of small and medium-sized workpieces.

Features:
ON-OFF control with rotary switch.
Three magnetic faces.

Nominal holding force: 60 N/cm²
Magnetic field height: 2 mm
Laminations: 0,5 mm Ms / 1,0 mm St

Switchable Magnetic Block SAV 242.02

Ordering example:
Permanent Magnetic Switchable Block SAV 242.02 - 55
Ordering key SAV - No. - A

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>55  90,5 125,5 146 0,5+1</td>
<td>2,8</td>
</tr>
<tr>
<td>70  90,5 125,5 151 0,5+1</td>
<td>4,0</td>
</tr>
</tbody>
</table>

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PERMANENT MAGNETIC BLOCK

**Switchable**

**Use:**
In combination with magnetic chucks, for grinding workpieces with protruding features, narrow sides, positioning templates etc.

**Features:**
Switchable permanent magnet with clamping face on the upper side. Side faces are ground square to one-another.

---

**Ordering example:**
Permanent Magnetic Block  **SAV 242.07 - 135 x 50**
Ordering key  **SAV** - No.  - A x B

---

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 115 B 40 C 40 D 75 E 30 F 5 G 7</td>
<td>1.3</td>
</tr>
<tr>
<td>A 135 B 50 C 60 D 80 E 40 F 6 G 10</td>
<td>2.9</td>
</tr>
</tbody>
</table>

---

**SAV 242.07**

---

**PERMANENT MAGNETIC SWITCHABLE BLOCK**

**With 4 magnetic clamping surfaces, also in stainless execution**

**Use:**
Angular and parallel grinding of small and medium-sized workpieces.

**Features:**
Robust construction with good holding force. Laminations 2 mm brass / 2 mm steel.

Nominal holding force standard:  50 N/cm²
Nom. holding force stainless (RF):  30 N/cm²
Magnetic field height:  2 mm
Pole plate wearing limit:  4 mm

**SAV 242.11 - RF** Can be supplied with stainless, high-alloyed chrome steel pole plates. Best suited for use on wire erosion machines.

---

**Ordering example:**
Permanent Magnetic Switchable Block  **SAV 242.11 - 140 - RF**
Ordering key  **SAV** - No.  - A - Execution

---

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 140 B 115 C 64 D 64 P 2 + 2</td>
<td>3.1</td>
</tr>
<tr>
<td>A 160 B 135 C 64 D 64 P 2 + 2</td>
<td>4.0</td>
</tr>
</tbody>
</table>
NEODYMNIUM MAGNETIC BLOCK

With $P = 6$ mm transverse pole pitch, Neodymium-iron-Boron magnets, extremely high holding force

Use:
For workpieces that are particularly difficult to clamp, such as ferrotic and hard metals containing cobalt (carbides), as well as very small workpieces.
For quick and easy clamping – also for workpieces with complicated erosion contours or difficult to clamp workpieces.

Features:
Extremely high holding force due to a specially developed construction. Stable all-steel body. ON-OFF control on end face. Larger models – with optional power-operated switching mechanism – available on request.
Laminations 4 mm steel and 2 mm brass with NdFeB magnets in the pole gaps.

Nominal holding force
on inductive steel surface: 180 N/cm²
Magnetic field height: ca. 4 mm
Pole plate wearing limit: 3 mm

Available with adaption for Zero-Reference-System.

In tool steel execution SAV 242.12:
Extremely high holding force due to a specially developed construction. Stable all-steel body. ON-OFF control on end face. Precision-ground execution. Rust-free housing, activation switch and pole grid. Steel poles.

Multiple clamping of small parts using a non-magnetic template

<table>
<thead>
<tr>
<th>Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND 100</td>
<td>140</td>
<td>70</td>
<td>51.0</td>
<td>102</td>
<td>118.0</td>
<td>35</td>
<td>62</td>
<td>12</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Ordering example:
Neodymium Magnetic Block SAV 242.05 - ND 100
Ordering key SAV - No. - Type

Ordering example:
Neodymium Magnetic Block, Rust-free SAV 242.12 - ND 100
Ordering key SAV-No. - Type
HOLDING MAGNET BEAMS

For universal use

Features:
Very strong holding force. Can be used with normal tools without any influence on the magnetic force.

Tapped fixing holes on the rear side, for M6 screw.

Maximum operating temperature: 85 °C

<table>
<thead>
<tr>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Nom. holding force in daN</th>
<th>No. fixing holes</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>30</td>
<td>30</td>
<td>25</td>
<td>1</td>
<td>0.35</td>
</tr>
<tr>
<td>100</td>
<td>30</td>
<td>30</td>
<td>50</td>
<td>2</td>
<td>0.70</td>
</tr>
<tr>
<td>200</td>
<td>30</td>
<td>30</td>
<td>100</td>
<td>3</td>
<td>1.35</td>
</tr>
</tbody>
</table>

Ordering example:
Holding Magnet Beams  SAV 240.62 - 200
Ordering key SAV - No. - Length

PERMANENT MAGNETIC BEAM

With transverse pole pitch

Use:
As a clamping device for holding workpieces securely on spark erosion (EDM) machines and other machining applications, or as part of a fixture.

Features:
Two clamping surfaces on opposite faces, individually switchable. Low magnetic field due to fine pole pitch. Supplied in pairs.

Planar parallelism: 0.02 mm
Pole pitch: 1.3 mm
Magnetic field height: 6 mm
Pole plate wearing limit: 6 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Nom. holding force in N</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>125</td>
<td>98</td>
<td>13.5</td>
</tr>
<tr>
<td>180</td>
<td>153</td>
<td>13.5</td>
</tr>
<tr>
<td>250</td>
<td>225</td>
<td>12.5</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnetic Beam  SAV 243.15 - 125
Ordering key SAV - No. - A
PERMANENT MAGNET V-BLOCKS

With four magnetic contact surfaces

Use:
Positioning

Features:
4 magnetic contact surfaces (top and bottom sides and 2 shoulders), which are switched on and off simultaneously. 2 opposite-facing switching points incl. removable socket key. Available in wooden storage case SAV 539.02 - HK2 at a surcharge. Available singly (S) or in pairs (P). The V-block pair is ground to the same height.

Planar parallelism: < 0.01 mm

<table>
<thead>
<tr>
<th>Length</th>
<th>Dimensions in mm</th>
<th>Nom. hold. force in daN</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>60 73 6 - 50 38</td>
<td>30 2.0</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>60 73 6 - 50 45</td>
<td>45 3.3</td>
<td></td>
</tr>
</tbody>
</table>

Ordering example:
Permanent-Magnet-Prisma SAV 242.21 - 125
Ordering key SAV - No. - Length

SAV 242.21

SAV Workholding and Automation • www.sav-workholding.com

SAV 242.22

SAV Workholding and Automation • www.sav-workholding.com

Single or in pairs

Use:
Positioning

Features:
2 magnetic contact surfaces (large „V“-block and opposite face), which are switched on and off simultaneously. Available single (S) or in pairs (P). Available in wooden storage case SAV 539.02 (for S) and SAV 539.04 (for P) against price adder.

Rectangularity: 0.004 mm
Planar parallelism: 0.004 mm

<table>
<thead>
<tr>
<th>Length</th>
<th>Dimensions in mm</th>
<th>Nom. hold. force V-block in daN</th>
<th>Nom. hold. force to surface in daN</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>67 96 6 - 66 40</td>
<td>40 90 2.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>70 96 6 - 70 40</td>
<td>40 120 3.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnet V-Blocks SAV 242.22 - 100 - S
Ordering key SAV - No. - Length - Single or pair
PERMANENT MAGNET V-BLOCKS

SAV 242.25

Single or in pairs, hardened execution

Use:
Positioning

Features:
2 magnetic faces, which are switched on and off simultaneously (main and small prisms). Hardened contact surfaces and "V"-s. Available in single (S) or in pairs (P). Available in wooden storage case SAV 539.04-HK4 against price adder.

Rectangularity: 0.004 mm
Planar parallelism: 0.004 mm

<table>
<thead>
<tr>
<th>Length</th>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>Width</td>
<td>Height</td>
</tr>
<tr>
<td>67</td>
<td>96</td>
<td>6 - 66</td>
</tr>
<tr>
<td>100</td>
<td>70</td>
<td>96</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent magnet V-block SAV 242.25 - 100 - S
Ordering key SAV - No. - Length - Single or pair

---

PERMANENT MAGNET V-BLOCKS

SAV 242.29

In sealed execution

Features:

<table>
<thead>
<tr>
<th>Length</th>
<th>Dimensions in mm</th>
<th>Nom. holding force in daN</th>
<th>Weight in kg</th>
<th>Wooden storage case SAV No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>Height</td>
<td>Width</td>
<td>Height</td>
<td>V-block</td>
</tr>
<tr>
<td>70</td>
<td>40</td>
<td>50</td>
<td>36</td>
<td>50</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
<td>80</td>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>150</td>
<td>50</td>
<td>100</td>
<td>90</td>
<td>125</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnet V-block SAV 242.29 - 100
Ordering key SAV - No. - Length
PERMANENT MAGNETIC CLAMPING BLOCK

SAV Workholding and Automation

SAV 242.31

With powerful cross prisms

Features:
4 magnetic contact surfaces (top and bottom sides and 2 shoulders). 2 opposite-facing switching points incl. removable socket key. Strong, switchable permanent magnet.

Rectangularity: 0,025 / 100 mm
Planar parallelism: 0,015 / 100 mm

Available in wooden storage case at a surcharge.
Length 80: SAV 539.04-HK4
Length 125: SAV 539.05-HK5
Length 180: SAV 539.17-HK17

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Workpiece diameter in mm</th>
<th>Nom. hold. force in daN</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length</strong></td>
<td><strong>Width</strong></td>
<td><strong>Height</strong></td>
<td><strong>Main V-block</strong></td>
</tr>
<tr>
<td>80</td>
<td>80</td>
<td>80</td>
<td>10 - 25</td>
</tr>
<tr>
<td>125</td>
<td>125</td>
<td>125</td>
<td>10 - 40</td>
</tr>
<tr>
<td>180</td>
<td>180</td>
<td>180</td>
<td>14 - 50</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnetic Clamping Block SAV 242.31 - 180
Ordering key SAV - No. - Length

PRECISION ANGLE-SETTING TOOL

SAV Workholding and Automation

SAV 487.40

Easy to use due to its magnetic adhesion

Use:
For the precise setting of any angle between 0° and 45° on production machinery and for checking parts as well as to extend the adjustment range above 45° on sine tables.

Features:
The measuring arm can be removed and re-inserted so that it can be used in any position. The angles are determined according to the sine principle by using an end-gauge. All parts are made from alloyed steel, precision-ground and hardened to HRC 60.

Axis spacing: 100 mm
Angle precision: 3 sec.
Planar parallelism: ± 0,005 / 100 mm

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight ca. in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td><strong>B</strong></td>
</tr>
<tr>
<td>100</td>
<td>20</td>
</tr>
</tbody>
</table>

Ordering example:
Precision Angle-Setting Tool SAV 487.40
Ordering key SAV - No.
## Permanent-Magnet Hilfen

<table>
<thead>
<tr>
<th>SAV-ART.-NO.</th>
<th>Comments</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>246.40</td>
<td>Permanent-Magnet jointed V-block clamp</td>
<td>152</td>
</tr>
<tr>
<td>246.41</td>
<td>Permanent magnet jointed clamp</td>
<td>152</td>
</tr>
<tr>
<td>246.42</td>
<td>Permanent magnet protractor</td>
<td>153</td>
</tr>
<tr>
<td>246.50</td>
<td>Permanent magnet mitred holder</td>
<td>153</td>
</tr>
<tr>
<td>246.53</td>
<td>Permanent magnet mitred holder</td>
<td>154</td>
</tr>
<tr>
<td>246.54</td>
<td>Permanent magnet mitred holder</td>
<td>154</td>
</tr>
<tr>
<td>246.60</td>
<td>Permanent magnet welding angle</td>
<td>155</td>
</tr>
<tr>
<td>246.61</td>
<td>Permanent magnet welding angle</td>
<td>156</td>
</tr>
<tr>
<td>532.03</td>
<td>Permanent magnet float system</td>
<td>157</td>
</tr>
<tr>
<td>482.70</td>
<td>Permanent magnetic bases</td>
<td>158</td>
</tr>
<tr>
<td>532.11</td>
<td>Hand plate lifter with belt</td>
<td>158</td>
</tr>
</tbody>
</table>
PERM. MAGNET JOINTED V-BLOCK CLAMP

Magnetic aid for welding and mounting operations

Use:
Indispensable welding aid sheets/plates, round and flat materials. For any desired angle. In order that the magnetic clamps are not thermally overloaded, it is recommended that they should only be used for holding during the welding process and then removed.

Features:
2 single ON/OFF switchable V-blocks. Supplied singly (S) or in pairs as jointed clamps (G).

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Nom. holding force per block in daN</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Width</td>
<td>Height</td>
</tr>
<tr>
<td>60</td>
<td>50</td>
<td>55</td>
</tr>
</tbody>
</table>

Permanent Magnet Jointed V-Block Clamp SAV 246.40 - G
Ordering key SAV - No. - Piece or as jointed clamp

PERMANENT MAGNET JOINTED CLAMP

Magnetic aid for welding and mounting operations

Use:
As a welding aid to hold sheets/plates, iron bars etc. In order that the magnetic clamps are not thermally overloaded, it is recommended that they should only be used for holding during the welding process and then removed.

Features:
Two permanent magnetic clamping blocks connected by bracing arms. Allows clamping at any angle. Tightened using two winged-nuts. Supplied singly (S) or as jointed clamp (G).

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Nom. holding force per block in daN</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Width</td>
<td>Height</td>
</tr>
<tr>
<td>60</td>
<td>26</td>
<td>25</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnet Jointed Clamp SAV 246.41 - G
Ordering key SAV - No. - Piece or as jointed clamp
**PERMANENT MAGNET PROTRACTOR**

**SAV 246.42**

**Magnetic aid for welding and mounting operations at various angles**

**Use:**

As a welding and mounting aid for frame processing at any angle between 25 degrees and 280 degrees. With markings for the angles 90 degrees, 60 degrees, 45 degrees and 30 degrees.

If increased holding forces are required, multiple magnetic protractors can be used. As the maximum application temperature of 120 °C should not be exceeded, it is recommended that the magnetic protractors should only be used for holding during the welding process and then removed.

**Features:**

All edges are magnetic.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Nom. Holding force per arm in daN</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Width</td>
<td>Height</td>
</tr>
</tbody>
</table>

**Ordering example:**

Permanent Magnet Protractor   SAV 246.42
Ordering key                                SAV - No.

**PERMANENT MAGNET MITRED HOLDER**

**SAV 246.50**

**Magnetic aid for welding and mounting operations at set angles**

**Use:**

As a welding and mounting aid for frame processing at angles of 180 degrees, 90 degrees, 75 degrees, 60 degrees, 45 degrees and 30 degrees.

If increased holding forces are required, multiple magnetic protractors can be used. As the maximum application temperature of 120 °C should not be exceeded, it is recommended that the magnetic protractors should only be used for holding during the welding process and then removed.

**Features:**

All edges are magnetic. The pre-bored holes enable quick and easy positioning.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Nom. Holding force in daN</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Width</td>
<td>Bore holes</td>
</tr>
</tbody>
</table>

**Ordering example:**

Permanent magnet Mitred Holder   SAV 246.50
Ordering key                                SAV - No.
PERMANENT MAGNET MITRED HOLDER

SAV 246.53

Magnetic aid for welding and mounting operations at 45° and 90°

Use:
As a welding and mounting aid for frame processing at angles of 45 degrees and 90 degrees. In order that the mitred holders are not thermally overloaded, it is recommended that they should only be used for holding during the welding process and then removed.

Features:
All contact surfaces including the V-block faces are magnetic. SAV 246.53 - 145 without V-profile.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Width</td>
</tr>
<tr>
<td>145</td>
<td>44.5</td>
</tr>
<tr>
<td>178</td>
<td>44.5</td>
</tr>
</tbody>
</table>

Permanent Magnet Mitred Holder
Ordering key
SAV 246.53 - Length

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PERMANENT MAGNET MITRED HOLDER

SAV 246.54

Magnetic aid for welding and mounting operations at 45°, 90° and 135°

Use:
As a welding and mounting aid for pipes, round materials, flat and profiled iron. As a clamping aid for drilling jigs. In order that the mitred holders are not thermally overloaded, it is recommended that they should only be used for holding during the welding process and then removed.

Features:
Very strong magnetic forces. With variable angle settings for positioning of the workpieces.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Nom. holding force / surface in daN</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Width</td>
<td>Height</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>42</td>
</tr>
<tr>
<td>108</td>
<td>108</td>
<td>94</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent magnet Mitred Holder
Ordering key
SAV 246.54 - Length

SAV Workholding and Automation • www.sav-workholding.com
Magnetic aid for welding and mounting operations at 90°

Use:
For the efficient holding of welding parts at an angle of 90 degrees. Application dependent on size – from small, light parts to heavy plates. In order that the welding angles are not thermally overloaded, it is recommended that they should only be used for holding during the welding process and then removed.

Features:
Stable construction, both contact faces are magnetic, easily removed by exerting sideways pressure. The execution normal (N) is intended for workpieces with smooth surfaces. The execution enhanced (V) is also suitable for workpieces with soiled or scale covered surfaces. The welding angles in pipe execution (R) have V-shaped pole shoes and are therefore especially suited for working round materials and pipes. The 2-pole (2) welding angles have 2 protruding magnetic rails for use in heavy machinery construction, steel manufacture, ship building, crane construction etc. Both sides have an anvil to ease positioning using a hammer. The welding angles are suitable for – beginning with SAV 246.60 - 116 – small, light parts to applications in heavy machinery construction, ship building, crane construction etc. – and ending with SAV 246.60 - 450.

Ordering example:
Permanent Magnet Welding Angle  SAV 246.60 - 450 - 2
Ordering key SAV - No. - max. Side length - Execution

* The nominal holding force and displacement force values apply to a sheet thickness of 4 mm. Details of other influencing factors can be found in the technical notes (chapter 10).
**Use:**
For the efficient holding of welding parts at various angles. With an angle scale from 45 degrees to 225 degrees.
Application dependent on size – from small, light parts to heavy plates.
In order that the welding angles are not thermally overloaded, it is recommended that they should only be used for holding during the welding process and then removed.

**Features:**
Stable construction, both contact faces are magnetic, easily removed by exerting sideways pressure.
The execution normal (N) is intended for workpieces with smooth surfaces. The execution enhanced (V) is also suitable for workpieces with soiled or scale covered surfaces.
The welding angles in pipe execution (R) have V-shaped pole shoes and are therefore especially suited for working round materials and pipes.

<table>
<thead>
<tr>
<th>Execution</th>
<th>Dimensions in mm</th>
<th>Normal (N)</th>
<th>Enhanced (V)</th>
<th>Pipe (R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side length in mm</td>
<td>130/130 180/180 260/180</td>
<td>130/130 180/180 260/180</td>
<td>130/130 180/180 260/180</td>
<td></td>
</tr>
<tr>
<td>Width in mm</td>
<td>38 45 45</td>
<td>38 45 45</td>
<td>38 45 45</td>
<td></td>
</tr>
<tr>
<td>Nom. Holding force* in daN</td>
<td>32 58 95/88</td>
<td>48 87 142/132</td>
<td>- 48 -</td>
<td></td>
</tr>
<tr>
<td>Displacement force* in daN</td>
<td>14 38 44/42</td>
<td>21 57 65</td>
<td>- 22 -</td>
<td></td>
</tr>
<tr>
<td>Weight in kg</td>
<td>0.75 1.50 2.00</td>
<td>0.80 1.55 2.10</td>
<td>0.90 1.70 2.20</td>
<td></td>
</tr>
</tbody>
</table>

* The nominal holding force and displacement force values apply to a sheet thickness of 4 mm. Details of other influencing factors can be found in the technical notes (chapter 10).
**PERMANENT MAGNET FLOAT SYSTEM**

**SAV 532.03**

To separate metal sheets/plates

**Use:**
To separate stacks of iron and steel sheets for insertion in sheet processing machines. The sheets are laid between the magnets and magnetised with the same polarity. The sheets repel each other and float in the air making them easy to grasp.

In order to prevent the sheets from jamming, the magnets should be positioned so that an air gap of 1 to 2 mm is ensured.

**Features:**
The strong permanent magnets have a stable, steel housing. The pre-bored holes enable the attachment to fixtures.

Supplied singly.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>For sheet thicknesses to</th>
<th>Weight ca. in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>75</td>
<td>73</td>
<td>28</td>
<td>50</td>
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<td>M8</td>
<td>0.7</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>275</td>
<td>73</td>
<td>28</td>
<td>200</td>
<td>2</td>
<td>M8</td>
<td>0.7</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>342</td>
<td>73</td>
<td>28</td>
<td>250</td>
<td>2</td>
<td>M8</td>
<td>0.7</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>104</td>
<td>103</td>
<td>28</td>
<td>50</td>
<td>2</td>
<td>M8</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>208</td>
<td>103</td>
<td>28</td>
<td>100</td>
<td>2</td>
<td>M8</td>
<td>1.0</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>308</td>
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<td>28</td>
<td>200</td>
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<td>M8</td>
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<td>250</td>
<td>2</td>
<td>M8</td>
<td>1.0</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>143</td>
<td>104</td>
<td>49</td>
<td>100</td>
<td>2</td>
<td>M8</td>
<td>2.0</td>
<td>6.0</td>
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<tr>
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<td>277</td>
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<td>M8</td>
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<td>11.0</td>
</tr>
<tr>
<td></td>
<td>310</td>
<td>104</td>
<td>49</td>
<td>200</td>
<td>2</td>
<td>M8</td>
<td>2.0</td>
<td>12.0</td>
</tr>
<tr>
<td></td>
<td>104</td>
<td>155</td>
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<td>2</td>
<td>M8</td>
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<td>6.0</td>
</tr>
<tr>
<td></td>
<td>143</td>
<td>155</td>
<td>47</td>
<td>100</td>
<td>2</td>
<td>M8</td>
<td>3.0</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>210</td>
<td>155</td>
<td>47</td>
<td>150</td>
<td>2</td>
<td>M8</td>
<td>3.0</td>
<td>12.0</td>
</tr>
<tr>
<td></td>
<td>277</td>
<td>155</td>
<td>47</td>
<td>200</td>
<td>2</td>
<td>M8</td>
<td>3.0</td>
<td>16.0</td>
</tr>
<tr>
<td></td>
<td>310</td>
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<td>411</td>
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<td>47</td>
<td>150</td>
<td>3</td>
<td>M8</td>
<td>3.0</td>
<td>24.0</td>
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<tr>
<td></td>
<td>444</td>
<td>155</td>
<td>47</td>
<td>250</td>
<td>3</td>
<td>M8</td>
<td>3.0</td>
<td>25.0</td>
</tr>
<tr>
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<td>511</td>
<td>155</td>
<td>47</td>
<td>200</td>
<td>3</td>
<td>M8</td>
<td>3.0</td>
<td>29.0</td>
</tr>
<tr>
<td></td>
<td>277</td>
<td>179</td>
<td>88</td>
<td>200</td>
<td>2</td>
<td>M12</td>
<td>4.0</td>
<td>34.0</td>
</tr>
<tr>
<td></td>
<td>400</td>
<td>179</td>
<td>88</td>
<td>150</td>
<td>3</td>
<td>M12</td>
<td>4.0</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>344</td>
<td>279</td>
<td>94</td>
<td>100</td>
<td>3</td>
<td>M12</td>
<td>6.0</td>
<td>71.0</td>
</tr>
<tr>
<td></td>
<td>545</td>
<td>279</td>
<td>94</td>
<td>150</td>
<td>4</td>
<td>M12</td>
<td>6.0</td>
<td>112.0</td>
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<tr>
<td></td>
<td>612</td>
<td>279</td>
<td>94</td>
<td>150</td>
<td>4</td>
<td>M12</td>
<td>6.0</td>
<td>126.0</td>
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<tr>
<td></td>
<td>813</td>
<td>279</td>
<td>94</td>
<td>200</td>
<td>4</td>
<td>M12</td>
<td>6.0</td>
<td>168.0</td>
</tr>
</tbody>
</table>

The float magnet height should be selected so that the height of the sheet stack is approx. half the height of the float magnets.

If using the maximum stated plate thickness, a plate area of approx. 30 dm² can be separated per float magnet. The plate area for thick, oily sheets is reduced to approx. 15 dm² and more float magnets will be required.

**Ordering example:**
Permanent Magnet Float System  SAV 532.03 - 813 x 279
Ordering key  SAV - No. - A x B
PERMANENT MAGNETIC BASE

SAV 482.70

Switchable

Use:
For supports, truing device, dial gauge stands etc.

Features:
Permanent magnet with ON-OFF switch. Magnetic holding surfaces on the rear and underside. Additional mitred contact surface on the underside. SAV 482.70 - M 10 x 117 does not have a mitred underside.

<table>
<thead>
<tr>
<th>Thread</th>
<th>Dimensions in mm</th>
<th>Nom. clamping force in daN</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 8</td>
<td>58</td>
<td>50 55</td>
<td>20 1.0</td>
</tr>
<tr>
<td>M 8</td>
<td>73</td>
<td>50 55</td>
<td>30 1.3</td>
</tr>
<tr>
<td>M 10</td>
<td>73</td>
<td>50 55</td>
<td>30 1.3</td>
</tr>
<tr>
<td>M 8</td>
<td>120</td>
<td>60 52</td>
<td>50 1.8</td>
</tr>
<tr>
<td>M 10</td>
<td>117</td>
<td>60 55</td>
<td>40 2.0</td>
</tr>
</tbody>
</table>

Ordering example:
Permanent Magnetic Base SAV 482.70 - M 10 x 117
Ordering key SAV - No. - Thread x Length

HAND PLATE LIFTER WITH BELT

SAV 532.11

For separating sheets

Use:
For depiling and lifting of sheets up to 2mm thickness. For carrying on the right or left inner flat of the hand. Can also be put on the outer flat of the hand for holding of screws or similar small parts.

Features:
The permanent magnetic system, which is kept in a stable pressure casing, guarantees high holding forces. Spare belts are available on request.

<table>
<thead>
<tr>
<th>Dimensions in mm</th>
<th>Nom. Holding force in daN*</th>
<th>Weight in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length Width Height</td>
<td>64 37 14</td>
<td>20 0.1</td>
</tr>
</tbody>
</table>

* measured at vertical pull-off

Ordering example:
Hand Plate Lifter with belt SAV 532.11
Ordering key SAV - No.
## CHAPTER 10

### PHYSICAL PRINCIPLES OF MAGNETIC WORKHOLDING

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<th>Section</th>
<th>Page</th>
</tr>
</thead>
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<td>Workpieces in the Magnetic Field</td>
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</tr>
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<td>173</td>
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<td>Demagnetizing</td>
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<td>Technical Explanations and Terms</td>
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<td>Terms and conditions of sale and delivery</td>
<td>178</td>
</tr>
</tbody>
</table>
1. Physical principles of magnetic workholding

1.1. Influences upon the magnetic holding force

The magnetic holding forces are dependent upon several influences which are sometimes difficult to assess in practice and therefore the design of magnetic systems requires great experience. The following criteria have an effect:

- **Workpiece geometric characteristics**
  Contact surface, roughness, workpiece thickness, coefficient of friction

- **Temperature and environm. influences**
  Application temperature, Curie temperature, opposing fields, radioactivity

- **Type of magnet**
  Permanent magnet, electro-magnet, electro-permanent magnet

- **Workpiece material**
  Alloying, heat treatments

- **Type of pole plate configuration**
  Number of poles employed, pole orientation, stops, pole shoes

- **Permanent magnet characteristics**
  Magnet material, geometry, manufacturing process

Fig. 1: Influences upon the magnetic holding forces

1.2. Maximum possible holding forces

Ferromagnetic materials can only conduct a limited density of magnetic flux. This results in a saturation effect after which it is impossible, within reasonable expense, to achieve further significant increases in the holding force. This lies in the region of 180 N/m² for St 37.

Fig. 2: Magnetisation characteristic St37
1.3.2.1. The magnetic field

The space in which magnetic forces work is known as magnetic field. The magnetic effect is, at the same time, dependent on place and direction. A magnetic field develops between two or more poles, like poles repel each other and unlike poles attract each other. The clearest and easiest way to demonstrate a magnetic field is by sprinkling iron powder over a separating layer, e.g. paper or glass, that is lying within a magnetic field.

![Fig. 3: Field line course of a bipolar rod magnet](image)

By storing a rod magnet appropriately, it adjusts itself to the magnetic field of earth in known way. The pole which points in the geographically north direction is known as the “north pole” of the magnet. If a rod magnet is bent to a U-shape, a bipolar magnet system is created (horse shoe magnet Fig. 4).

1.4. Magnetic lines of force

Magnetic lines of force run from the north to the south pole of a magnet. The magnetic field tries with the help of its leakage and effective flux to close over the air gap (Fig. 3). If the magnetic field extends beyond the soft iron it always happens vertical to the surface. The lines of force course searches for the shortest occupiable distance between the poles.

![Fig. 4: Illustration of the magnetic lines of force of a horse shoe magnet](image)

However, air offers the magnetic field a very high resistance, so that the magnetic lines of force prefer to proceed in ferromagnetic material (e.g. iron).

The lines of force stand for the illustration of the magnetic flux \( \Phi \) in Wb (Weber). For the effect of the magnetic field, e.g. the achievable holding force, the concentration of the lines of force per surface, or rather the magnetic flux density \( B \) in mT (1 Tesla = 1 Wb/m\(^2\)) or G (1 Gauss = 0.1 mT) is the deciding factor.

The cause of the magnetic field with its lines of force is the magnetic field strength \( H \) in A/m or Oe (1 kA/m = 12,56 Oersted).

The connections between field strength and flux density can be seen as similar to the conditions between the electric voltage and the electric current.
WORKPIECES IN THE MAGNETIC FIELD

1.5. Iron workpieces in the magnetic field

Resting iron workpieces offer the magnetic field just a low resistance and therefore shorten the path of the lines of force. Therefore the magnetic field does not need to take the awkward path through the air any more (fig. 5). In comparison to e.g. air, the magnetic conductivity (permeability) of steel (St 37, A570, 4360-40) is approx 2000 times better.

If the resting iron part is removed from the magnet, the force of the magnetic field opposes an enlargement of the magnetic resistance and therefore also a change in the magnetic energy.

As the magnetic energy is related directly to the work to be used, in order to remove a ferromagnetic workpiece from magnets, it opposes an enlargement of the air gap or, the magnetic energy. That is why materials containing iron are attracted and hold.

In order to keep a workpiece magnetic, at least a north and south pole must be overbridged with it.

Fig. 5: Magnetic flux and the holding forces becoming effective while overbridging of a N- and a S-pole

1.6. Atomic interpretation of the magnetization

In magnetisable (ferromagnetic) materials, there are tiny magnetic fields, so called "molecular magnets", available. Within the atoms, electrons circle the nucleus as tiniest electric charges, as well as also circling their own axis and generate - from the connection first observed by Oersted - a magnetic moment, or rather, a magnetic dipole.

Without the influence of an external field, these magnetic dipoles are arranged at random in ferromagnetic materials and neutralize themselves extensively in their effect. By feeding an external magnetic field, there follows an exact arrangement of the dipoles.

A large number of arranged dipoles in small areas, the so-called "Weiss domain", figure the smallest magnetic bodies. These molecular magnets arrange themselves under the influence of external magnetic fields and remain more or less in the imposed formation, depending on material, even after being distanced from the external field. The arrangement of the "molecular magnets" illustrates over and above that the demagnetizing effect of heat, impact, radioactive radiation or magnetic foreign fields.

The relevant body, which areas arranged to such an extent contains, works together as one magnet. By complete arrangement of elementary magnets, further magnetizing is impossible. The material is "saturated".

Fig. 6: Arrangement of the "molecular magnets" in Weiss domains by an adjacent magnetic field

Also see Pt 1.4.
MAGNETIC MATERIALS

2. Magnetic properties of materials

If one investigates the behaviour of various substances in a magnetic field, it becomes clear that these substances fall into three categories;

<table>
<thead>
<tr>
<th>Non-magnetic materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft magnetic materials</td>
</tr>
<tr>
<td>Hard magnetic materials</td>
</tr>
</tbody>
</table>

2.1. Non-magnetic materials
These include materials such as brass, copper, aluminium, wood, glass, plastics and other metals which do not react at all to a magnetic field or in which the reaction is negligible. The magnetic field can flow through such materials in exactly the same way as it does through air or a vacuum. Thus there is no interaction (attractive force) between the magnetic field and the material. These materials can not be held/clamped magnetically.

2.2. Soft magnetic materials
The main materials in this group include iron, low-alloy steels, nickel and cobalt. Magnetic fields are concentrated and intensified in these materials. After removal of the magnetic field they lose their effect to a large extent. A low level of residual magnetism can still remain however, depending upon the alloying components.

2.3. Hard magnetic materials
These are "permanent magnetic materials". After being magnetised they exhibit their own magnetic field with a high energy density which, in static or dynamic magnetic circuits i.e. in magnetic circuits with a constant or variable air gap, can be used for technical applications. A permanent magnetic material must therefore exhibit two properties. Firstly, it must absorb sufficient magnetism (high remanence Br or saturation Bs) and secondly, the stored magnetism must remain in the material (high coercive field strength coercivity HC). Permanent magnetic materials are used for workholding and clamping systems as well as motors, loudspeakers, measuring instruments etc.

Today, hard ferrites, AlNiCo and SmCo are used for permanent magnets. In addition to SmCo, NdFeB – which has an even greater coercivity and remanence – is also used.

3. Permanent magnet materials

3.1. Hard ferrite magnets in accordance with German industrial Standard DIN 17 410

They are composed of ca. 80% iron oxide and 20% barium- or strontium carbonate. These raw materials are widely available and are therefore relatively cheap.

Like all ceramic materials, these magnets are very hard and brittle. This means that they can only be machined using diamond-tipped tools. Hard ferrite magnets are manufactured as either anisotropic or isotropic i.e. with or without a preferred magnetic direction.

After magnetisation, isotropic magnets exhibit only a low level of energy density.

In anisotropic magnets, the coercivity relative to the remanence is high. This necessitates a large magnet pole area.

The maximum operating temperature is +200 °C.
3.2. Metallic permanent magnets
Made from AlNiCo:

The main alloying components are aluminium, nickel, cobalt, iron, copper and titanium. This hard material is manufactured in a sinter or casting process and can only be machined by grinding. AlNiCo-magnets are almost exclusively manufactured as anisotropic. During the manufacturing process they acquire a preferred magnetic direction, which leads to an improved alignment of the “elementary magnets” and therefore to better magnetic values. The anisotropy is achieved by producing crystal columns during the casting process and through a heat treatment under the application of a magnetic field.

The dimensional ratio of length to diameter L : D in an open magnetic circuit should be 4 : 1, in order to exhibit a good level of demagnetisation resistance. This ratio permits the greatest possible holding forces per magnet volume to be achieved for AlNiCo. The more the magnetic circuit is closed, the shorter the chosen construction length possible.

AlNiCo magnets have a high remanence, but a low coercive force. Due to this property, these magnets can take up a strong magnetic field, but they are also easily demagnetized again. For this reason, they are used in electrically switchable permanent-magnetic chucks.

AlNiCo magnets can be used within a relatively high temperature range of up to ca. +400 °C. At the so-called ‘Curie-temperature’ they irreversibly lose their magnetization.

3.3. High energy “rare earth magnets”
Made from samarium cobalt (SmCo5/SmCo17) or neodymium-iron-boron (Nd2Fe14B)

These are sintered, metallic, permanent magnets with a very high energy product from the “rare earth” group of elements. The rare earths are 15 elements with the atomic numbers 57- 71 in the periodic table of elements.

The costly processing and the expensive raw materials result in a relatively high price. In the course of the production process, these magnets always acquire a preferred magnetic direction (anisotropy). Even strong retarding potentials have no influence on the magnetic field.

a) Samarium Cobalt
This magnetic material exhibits excellent magnetic values. It is very hard and brittle and can therefore only be machined by grinding or by using diamond-tipped tools. The maximum operating temperature is ca. +200 °C.

b) Neodymium-iron-boron
Using this magnetic material, which is the strongest currently available, the highest possible magnetic values that can be economically produced are achieved. The energy product is approx. twice as high as the samarium-cobalt. The energy product indicates the quality of the magnets and is the product of the flux density and the field strength (WxH). The maximum operating temperature is approx. +80 °C.

3.4. Comparison between permanent magnetic materials

The example shows the volume reduction at only 4.4% or 1.6% of the output volume during the use of high-energy magnetic materials SmCo or NdFeB.

At a distance of 5 mm, an equally strong magnetic field of B = 100 mT arises at any time, which leads to equal holding forces at any time.
MAGNETIC CHUCKS

4. Magnetic chucks

4.1. Permanent Magnetic chucks
- Activation and de-activation by the mechanical switching of magnet cores and the separation and combination of field lines
- For grinding, milling and EDM operations
- For turning operations, the max. RPM should be noted
- No thermal expansion
- Low pole plate elasticity levels possible

4.2. Electro magnetic chucks
- The holding force is generated by supplying a continuous current to the coil in the iron core
- For grinding work requiring a lower degree of precision
- A permanent current supply is required
- Thermal expansions can occur
- A deep magnetic field is possible e.g. for lifting magnets

4.3. Electro permanent magnetic chucks, Single System
- Activation and de-activation by defined magnetisation and de-magnetisation of the AlNiCo cores
- For grinding, milling and EDM operations
- No thermal expansion
- Maximum safety levels
- Electrical connection can be disconnected from the automation system

4.4. Electro permanent magnetic chucks, Double system
- In addition to AlNiCo cores, milling magnets in high energy systems are equipped with neodymium magnets in the pole gap. This allows the generation of extreme holding forces.
- Activation and de-activation by reversing the polarity of the AlNiCo cores through impulses
- No de-magnetisation, just a neutralisation of the field
- No thermal expansion
- Maximum safety levels
- Electrical connection can be supplied with a connector plug
5. Magnetic clamping of workpieces

5.1. Holding and sliding forces in the magnet technology

Pole pitch, workpiece shape, surface quality and material have a large influence on the holding and sliding force of a workpiece.

a) The **holding force** is the break-off force of a clamped workpiece vertical to the clamping surface.

b) The **sliding force** is the force necessary to slide a workpiece parallel to the clamping surface. Depending on the surface quality, the sliding force comes to about ca. 15 to 30% of the holding force.

Unless specifically mentioned, the given nominal holding forces for our products, they are valid for a ground test specimen of St37, with the dimensions 100 x 100 x 40 mm.

![Diagram of holding and sliding forces of magnetic chucks](image)

Fig. 12: Holding and sliding forces of magnetic chucks

5.2. Influence of the pole pitch and workpiece thickness

In order to achieve a consistent holding force over the entire clamping surface and also to clamp smaller workpieces, magnetic chucks are produced with various pole pitches and pole clearances. Therefore the clamping surface is designed with alternating north and south poles (Fig. 12). The pole gap consists of a non-magnetic material, like brass or epoxy.

![Diagram of pole gap and pole pitch in magnetic chucks](image)

Fig. 13: Definition of pole gap and pole pitch in magnetic chucks
The magnetic field of the rested workpiece goes from one pole to the next in half circles.

If the workpiece thickness is significantly smaller than the pole clearance, the workpiece will not entirely absorb the magnetic field. This results in a reduction of the holding force. When all lines of force are running within the workpiece, the best holding forces are attained.

When there are larger pole pitches, a larger penetration of the magnetic field can be attained for thicker and raw workpieces and therefore a larger holding force is attained.

5.3. Influence of contact surface and surface condition

Any surface of the workpiece which is actually touched by the magnet surface is to be seen as a contact surface (Fig. 17).

a) Dependence of holding force on the workpiece shape:

Fig. 17: Rough illustration of the reduction of holding force because of unfavourable workpiece shapes.
b) Holding force dependence of surface quality

The surface quality is very important for the holding force of a workpiece, as it decreases rapidly with increasing roughness. The best values are achieved with a finely polished surface without air gap (Fig. 18).

![Fig. 18: Influence of workpiece surface on the attainable holding forces](image)

**Fig. 18:** Influence of workpiece surface on the attainable holding forces

**Holding forces vertical to the magnet**

- 20 % - 50 %
- 50 % - 70 %
- 70 % - 80 %
- 80 % - 90 %

Workpieces: Rₐ 3,2, Rₐ 1,6, Rₐ 0,8

Magnet

**c) Holding force dependence on air gap**

Air gaps on workpieces can never be prevented. They are for instance caused by material deformation in the pre-manufacturing, shrink holes and unevenness on casted parts, roughness after mechanical machining, layers of paint and non-magnetic protection surfaces.

As air creates a very large magnetic resistance, fewer field lines can be built-up and the holding forces will reduce quickly. This can be seen in the example diagram below.

![Fig. 19: Influence of air gap on the attainable holding forces SAV 243.70 / 243.73](image)

**Fig. 19:** Influence of air gap on the attainable holding forces SAV 243.70 / 243.73

Holding force

<table>
<thead>
<tr>
<th>Airgap in mm</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100%</td>
<td>90%</td>
<td>80%</td>
<td>70%</td>
<td>60%</td>
<td>50%</td>
<td>40%</td>
<td>30%</td>
<td>20%</td>
<td>10%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The air gap sensitivity is mainly depending on the workpiece size in relation to the magnet size, the material properties and the pole pitch of the magnet. Generally speaking, magnetic systems with bigger primary pole pitch can easier bridge the air gaps. In comparison to electro-permanent magnetic chucks, the electromagnetic chucks create deeper magnetic fields and are therefore less sensitive to air gaps.
The following air gap behaviour characteristics apply to milling magnets:

**Fig. 20: Air gap diagram for electro permanent chucks SAV 243.77**

**Fig. 21: Air gap diagram for electro permanent milling magnets SAV 243.79**
5.4. Material composition of workpieces and heat treatments

In technically pure iron, high magnetic flux values can be achieved and thereby the highest holding forces. In practice, there are a number of materials with various magnetic properties. In addition, heat treatments influence the magnetisation characteristics of materials as they alter the physical structure of the materials. Hardened workpieces conduct the magnetic flux worse.

Fig. 22: Influence of the unmagnetized alloy proportion on the holding forces

Fig. 23: Influence of heat treatment on the holding forces (example)
## MATERIALS AND HOLDING FORCES

<table>
<thead>
<tr>
<th>Description</th>
<th>Abbreviation DIN</th>
<th>Material-No.</th>
<th>max. unmagnetized alloy proportion</th>
<th>Heat treatment</th>
<th>Holding force</th>
</tr>
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<tbody>
<tr>
<td>Pure iron</td>
<td></td>
<td></td>
<td>0.00%</td>
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<td>100%</td>
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<tr>
<td>Construction steels</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>St37-2</td>
<td>1.0037</td>
<td></td>
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<tr>
<td>St52-3 N</td>
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<td></td>
<td></td>
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<td>St50-2</td>
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<td></td>
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<td>Case-hardened steels</td>
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<td>C10</td>
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<td>1.22%</td>
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<tr>
<td>C15</td>
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<td>1.27%</td>
<td>Soft</td>
<td>93%</td>
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<tr>
<td>17CrNiMo6</td>
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<td>5.43%</td>
<td>Soft</td>
<td>72%</td>
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<td>16MnCr5</td>
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<td>20MnCr5</td>
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<td>3.40%</td>
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<td>Machining steels</td>
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<td>1.77%</td>
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<td>90%</td>
</tr>
<tr>
<td>9SMn28</td>
<td>1.0715</td>
<td></td>
<td>1.92%</td>
<td>Untreated</td>
<td>89%</td>
</tr>
<tr>
<td>45S20</td>
<td>1.0727</td>
<td></td>
<td>2.21%</td>
<td>Untreated</td>
<td>88%</td>
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<tr>
<td>60SPb20</td>
<td>1.0758</td>
<td></td>
<td>2.71%</td>
<td>Untreated</td>
<td>85%</td>
</tr>
<tr>
<td>Quenched and tempered steels</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>C22</td>
<td>1.0402</td>
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<td>2.96%</td>
<td>Soft</td>
<td>84%</td>
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<tr>
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<td>1.0503</td>
<td></td>
<td>3.20%</td>
<td>Soft</td>
<td>83%</td>
</tr>
<tr>
<td>Ck45</td>
<td>1.1191</td>
<td></td>
<td>3.50%</td>
<td>Soft</td>
<td>81%</td>
</tr>
<tr>
<td>C60</td>
<td>1.0601</td>
<td></td>
<td>3.57%</td>
<td>Soft</td>
<td>81%</td>
</tr>
<tr>
<td>Ck60</td>
<td>1.1221</td>
<td></td>
<td>3.65%</td>
<td>Soft</td>
<td>80%</td>
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<tr>
<td>43CrMo4</td>
<td>1.3563</td>
<td></td>
<td>3.62%</td>
<td>Soft</td>
<td>80%</td>
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<tr>
<td>36CrNiMo4</td>
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<td>4.37%</td>
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<td>49%</td>
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<td>Roller bearing steels</td>
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<tr>
<td>X82WMoCrV6-5-4</td>
<td>1.3553</td>
<td></td>
<td>11.40%</td>
<td>Soft</td>
<td>44%</td>
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<tr>
<td>Spring steels</td>
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<td></td>
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<td>Ck67</td>
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<td>2.04%</td>
<td>Hardened</td>
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<td>60SiMn5</td>
<td>1.5142</td>
<td></td>
<td>3.15%</td>
<td>Hardened</td>
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<td>51MnV7</td>
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<td>2.87%</td>
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<tr>
<td>Cold extrusion steels</td>
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<td>Cp15</td>
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<td>1.10%</td>
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<tr>
<td>41Cr4</td>
<td>1.7035</td>
<td></td>
<td>3.55%</td>
<td>Soft</td>
<td>81%</td>
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5.5. Influence of pole raisers

In case pole raisers are necessary for solving a workholding problem, these are not only effective as magnetic resistance but also increase the leakage flux simultaneously. It should therefore be observed that, for instance, pole raisers with a height up to 140 mm can have a drop in holding force of up to 20%.

Due to the effects described in 6 e.) this loss of holding force is balanced out with suitable dimensioning, and can possibly even increase. Under all circumstances the pole raisers are not allowed to bridge the pole gap, because then there will be no magnetic flux available in the workpiece.

5.6. Influence of the application temperature

Temperature influences can significantly influence the qualities of a magnetic clamping system, so they are to be taken in consideration when choosing and constructing a magnetic clamping device. Increasing temperatures lead to reduction of the remanence and therefore the holding forces and to an increase of the coercive force. Above the Curie-temperature, the magnetic materials lose their magnetization irreversibly.

<table>
<thead>
<tr>
<th>Material</th>
<th>Max. application temperature</th>
<th>Curie-temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard ferrite</td>
<td>200 °C</td>
<td>ca. 450 °C</td>
</tr>
<tr>
<td>AlNiCo</td>
<td>450 °C</td>
<td>ca. 850 °C</td>
</tr>
<tr>
<td>SmCo</td>
<td>350 °C</td>
<td>ca. 750 °C</td>
</tr>
<tr>
<td>NdFeB</td>
<td>80 °C</td>
<td>ca. 300 °C</td>
</tr>
</tbody>
</table>

Fig.24: Influence of the pole raiser height on the attainable holding forces
### 6. Maximum rotational speeds for circular magnets

#### 6.1. For circular permanent magnets

<table>
<thead>
<tr>
<th>Magnet</th>
<th>SAV 244.02</th>
<th>SAV 244.03</th>
<th>SAV 244.04</th>
<th>SAV 244.05</th>
<th>SAV 244.06</th>
<th>SAV 244.07</th>
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<td>-</td>
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<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
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<td>-</td>
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<td>780</td>
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<td>ø160</td>
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#### 6.2. For electro- and electro permanent circular magnets

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<tr>
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<td>3850</td>
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<td>ø 300</td>
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<tr>
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<table>
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<tr>
<td>ø 4000</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
7. Demagnetizing of materials

When ferromagnetic workpieces are magnetically clamped or held, the still retain a low residual magnetism (remanence) after the magnetic field has been switched off.

In practice, this side effect, which is often disturbing, can be removed with the following equipment:

7.1. Electronic polarity-reversing control units

The units serve both as a direct current supply and a demagnetizing fixture for all electro and electro-permanent magnets. During polarity-reversing and demagnetizing, a process (excitation and counter excitation) occurs with progressively decreasing energy until the residual fields are eliminated. Therefore the magnetization created by the holding magnet can be mostly removed.

It is guaranteed thereby, that workpieces without residual force can be lifted from the holding magnet. The use of equipment such as holding or transporting magnets guarantees an immediate and precise loosening of the parts.

If, however, a high demagnetization quality is required, an additional treatment of the workpieces with a demagnetizer must be carried out.

7.2. Demagnetizers

This equipment serve to remove the often disturbing residual magnetism in the workpieces. An extensive demagnetization is necessary for many products like cutting, punching and measuring tools or roller bearings.

The unoriented ground state of the molecular magnets is thereby achieved, by exposing the workpiece to a permanently alternating, strong magnetic field with a decaying amplitude. Therefore demagnetizers are operated with alternating current, where the polarity alternates in the mains frequency 50/60 Hz.

The decaying amplitude can be attained by leading the workpiece out of the alternating field slowly and steadily.

The part to be demagnetized should be moved through the alternating field at ca. 0.2 m/s. At a distance of 20-30 cm, the alternating amplitude is approx. 0.

Fig. 25: Decreasing magnetic alternating field for demagnetization
a) Table demagnetizers

With this equipment a laminated iron system leads the alternating field on to the plate surface. Thereby a very strong magnetic field with large penetration is achieved. The pole surface is halved by a non-magnetic gap. The workpiece must be led over this parting line.

Table devices are suitable for the demagnetizing of parts up to approx. 50 mm thickness. Thicker parts must be treated from both sides. The apparatus serve as table equipment or can be installed in automatic conveying devices.

If the parts are very heavy, it is possible to lead the demagnetizer over the workpiece. Mass production parts can also be led over the device in plastic containers.

b) Tunnel demagnetizers

Tunnel demagnetizers consist of a coil protected by non-magnetic material. The equipment is especially suited to the demagnetizing of parts with large surfaces like, e.g. tubes, bars, profiles - and to bundled and packaged parts. They can likewise be installed in conveying devices or be arranged ca. 30 degrees diagonally, so that the parts can slip through.

c) Low-frequency generators

As already described, table and tunnel demagnetizers operate with the normal mains frequency of 50/60 Hz. Better demagnetizing results can possibly be attained by using a lower frequency, especially on high alloyed and hardened materials. Low-frequency generators lower the mains frequency to 16 Hz. Such devices can simply be connected before the table and tunnel demagnetizers.
8. Technical explanations and terms from magnet technology

**AlNiCo:**
Aluminium-nickel-cobalt magnetic material. Metallic permanent magnet with high remanence and comparatively lower coercive force.

**Air gap δ:**
Clearance between magnet and counter pole (workpiece).

**Anisotropy:**
Anisotropic materials are described as preferential-directed. During their production (casting, sintering and alloying-in) they are exposed to a magnetic field or particular layering process.

**A/m:**
Ampere per meter; unit of the magnetic field strength (1 A/m = 0,01256 Oersted)

**(BxH)max.:**
Biggest product from B and H on the demagnetization curve in kJ/m³ or GOe (1 GOe = 79,6 10 kJ/m³). The bigger the (B x H)max-value, the smaller the volume of the magnetic material for the same holding force can be, but under unchanged conditions.

**Coercive force BH:**
Size of required retarding potential strength in kA/m or Oe, to bring a saturated magnetic material back to zero with the existing retarding potential.

**Coercive force JH:**
Size of required retarding potential strength in kA/m or Oe, to bring a saturated magnetic material back to zero, even after the retarding potential has been switched off.

**Curietemperature:**
At this temperature magnetic materials irreversibly lose their magnetization.

**Demagnetizer:**
Equipment to remove the residual magnetism (see remanence) from workpieces which have been effected by a magnetic field.

**Demagnetizing:**
Reduction of magnetization by using a retarding potential or a decaying alternating field or also by using temperature influences.

**Demagnetizing curve:**
That part of a hysteresis loop, which runs in the second quadrant of a rightangled coordinate system. The course of the demagnetizing curve and its targets Br (remanence) and H(coercive force) mark the significant magnetic qualities of a permanent magnet.

**Diamagnetism:**
Term for all materials who only react insignificantly to a magnetic field eg. plastics, fluids, organic materials etc.

**Dimension ratio:**
The ratio L/D = length/diameter of a rod magnet, has an optimal value for every magnetic material in the optimal work point.

**Dispersion coefficient α:**
The dispersion coefficient takes into consideration that part of magnetic flux which is not available for, eg. clamping of the workpiece. It is heavily dependent on the clamping system and workpiece.

**Ferromagnetism:**
Generic term for all materials which shows a more or less large magnetization after the feeding of an external magnetic field.

**Flux density:**
Density of the lines of force of the induction field. Unit: 1 Tesla = 10 Gauss.

**Gauss (G):**
Old unit of magnetic induction.

**Hard ferrite magnet:**
Oxide magnet made from iron oxide, barium or strontium carbonate with relatively low remanence and coercive force.

**Holding force FH:**
Work force of a magnet or magnet system. The holding force refers to a vertical workpiece break-off and a precisely defined test specimen.

**Hysteresis loop:**
Graphic representation of the magnetizing and demagnetizing cycle.

**Induction:**
Induction is the change which is effected on a material by a feded magnetic field.
9. Technical explanations and terms
from magnet technology

Isotropy:
The equality of magnetic characteristics in all directions of magnetic material.

Lines of force:
Graphic representation of the magnetic field.

Magnetic flux $\Phi$:
The magnetic flux in Wb (Weber). Stands for the “number” of lines of force.

Magnetic system:
Magnet with one or more fastened pole shoes as well as two or more magnets which operate in a functional unit.

Magnetization $M$:
Value in kA/m. The magnetization by the aligned elementary magnets. For practical use it is considered by the relative permeability.

Magnetizing:
Alignment of elementary magnet ranges by feeding an external magnetic field.

NdFeB:
Neodymium-iron-boron magnetic material. High-energy magnet with the highest remanences at present. workpiece.

Oersted:
Old unit of the magnetic field strength.
1 Oersted = 79,6 Nm.

Operating temperature max:
A magnet can be used up to this temperature without losing its magnetization.

Permanence $B_r$:
The permanence gives the maximum flux density of the magnetic material by 0 kA/m field strength. The difference between this and remanence $B_r$ is that permanence adjusts itself to continually changing air gaps. The permanence is always smaller than remanence.

Permeability $\mu$:
Also known as induction constant. “Conductivity” for magnetic lines of force in a vacuum. Ratio between magnetic induction $B$ and magnetic field strength $H$ in a vacuum.

Permeability, relative $\mu_r$:
The relative permeability considers the magnetization of the material.

Permeability, absolute $\mu$:
“Conductivity” for magnetic lines of force, ratio between magnetic induction $B$ and magnetic field strength $H$.
$\mu = \mu_r \times \mu_0$.

Pole gap $S$:
Clearance between a north and a south pole which consists of non-magnetic materials – mostly brass, epoxy or stainless steel.

Pole pitch $P$:
Clearance from one north to one south pole. The pole pitch always contains a pole gap.

Pole shoes:
Also known as pole extensions or raisers. They are always used in connection with magnet systems to lead the magnetic field into the workpiece. Pole shoes facilitate a 5-sided machining and also allow complicated workpiece shapes to be clamped.

Remanence $B_r$:
Size of the remaining field strength of a magnet in a closed circuit.

Saturation:
The saturation flux density $B_s$ is achieved, when the workpiece cannot absorb any more magnetization.

Screened magnet system:
Leading and concentration of the magnetic field through an iron pot around the back and lateral surfaces of a magnet.

SmCo:
Samarium-cobalt magnetic material. High energy magnet with large remanence and large coercive field strength.

Temperature coefficient of the remanence $T_{K_{Br}}$:
Value given in % which illustrates the lowering of the remanence during increasing ambient temperatures.

Temperature coefficient of the coercive force $T_{K_{Hc}}$:
Value given in % which illustrates the increasing of the coercive force during increasing ambient temperature.

Tesla:
Unit of magnetism induction. 1 Tesla = $10^4$ Gauss.

Sliding force:
Force of a magnetic clamping system which stands vertical to the holding force and therefore lies parallel to the pole plate.

Resistance factor $\tau$:
Factor which considers the loss of field strength at the transmission point and in the workpiece.
1. General and contract conclusion
a) all agents and offers are based on our conditions; they apply as accepted through placement of order or acceptance of the supply. Deviating conditions of the customer, which we do not accept expressly in writing, are noncontractual for us, even if we do not contract explicitly.
b) For the scope of supply our confirmation of order is determining. Verbal, telephonically, telex, fax, telexmachine and telegraphic agreements and additional contract modifications have validity only if they are confirmed in writing by us. The same applies to assured properties of the supplied article. All data in our designs, illustrations, measurement tables, weight tables etc. are - so far not explicitly confirmed by us - only approximate values. The documents belonging to the offers remain our property, are subordinate to our copyright and may not be accessible to third parties or only with our written approval.
c) The order acceptance by us takes place in writing. If we should deviate slightly in our order confirmation in relation to the order of the customer, then our order confirmation is obligatory, if within eight days - in urgent cases can be confirmed by telephone call, telegram or telexulf - one does not contradict to these. Hereunder applies the principle that a wrong transmission always goes debit to the customer, and will not be borne by us.

d) Place of delivery for all obligations developing from the contractual relation is Nuremberg Germany. Area of jurisdiction for all from the contractual relation as well as law cases arising on contract or concerning the performance of the contract, in which the customer has seat, is the German court of the county of Nuremberg.

2. Prices
The prices are in Euro. The prices apply, if not explicitly differently agreed, purely net ex works including loading, excluding packing, freight, insurance, assembly and other additional expenses. All increase of freight and tariffs, value added tax, material prices and wages are for the account of the customer. With supplementary orders the prices are newly agreed upon.

3. Delivery time.
The delivery time is specified after best discretion and is therefore to be understood as approximately, explicitly firm designated agreements. The time for delivery starts only from the time, in which written agreement exists over the final supply and all questions necessary for the trouble-free execution of the order are clarified. The time for delivery does not begin before the time that all documents are made available to us, the necessary official and private explanations, permissions and releases etc. are available and the customer has fulfilled the agreed payments and other obligations.

The delivery time is considered as firm, if the shipment has left our works within the agreed delivery time. If the delivery is delayed because we do not can be attributed to us, then the time for delivery is considered as firm with the message that goods are ready for dispatch within the agreed delivery time.

The time for delivery extends - also within a delivery delay appropriate at occurrence of unforeseen events, which we could reasonably not prevent despite the circumstances of the case – equally to events in our work or at possible subcontractors - for example operational disturbances, wasting of an important working part, delays in the delivery of substantial raw materials, shortage of sales, strike, sabotage, mobilization, war and riot as well as delay in the shipment from this or another contract.

At later changes of the contract, which can affect the delivery time, the delivery time extends, unless special agreements concerning this can be made, to appropriate extent. Consequential loss or damage because of late supply with negligent behaviour by us or by our personal are explicitly excluded.

In any case we are responsible for such damage only up to the invoice amount excluding V.A.T., whose cause and extent could have been foreseen by us. Partial deliveries are permissible. For special and customer specific products a withdrawal is not possible.

4. Terms of payment
Our invoices are payable within eight days from invoice date with 2% discount or within 30 days net. Repair and spare part invoices are immediately due, if the customer with a due payment is over 10 days in delay or in his financial circumstances occurs. Immediate due, if the customer with a due payment is over 10 days in delay or in his financial circumstances occurs.

5. Transfer of risk
The risk is passed on to the customer, even if freight-free delivery was agreed:

a) at delivery of the supplies by us or one of our assigned transporters, however latest at leaving of our works or warehouse. The packing takes place with best care. The dispatch takes place according to the purpose of the supplier. On request and for the account of the customer the delivery is insured by the supplier against breakage, transportation- and fire damage.

b) If the dispatch, the delivery or the acceptance are delayed for reasons, which are not attributable to us, then the risk is transferred to the customer on the day of readiness for dispatch; however we are prepared to take out a desired insurance on request and for the account of the customer.

6. Receipt
Delivered articles are to be received by the customer, even if they show insignificant defects. Partial deliveries are permissible.

7. Guarantee
If a commodity is defective, is missing assured characteristics or will lose characteristics during the guarantee period due to production or material failures or will it become defective during the guarantee period due to production or material failures, then we will, under exclusion of further guarantee claims of the customer, according our choice supply a replacement or have the commodity reworked.

If this is not possible, the rework fails or is refused by us or unreasonably delayed, then the customer has the right to a replacement or reduction. Damage claims because of non-fulfillment or consequential damage are explicitly not accepted, except for mandatory liability because of guilt.

For consequential damages we only take responsibility, if the customer should be secured by the warranty against such consequences and if the damages have existed.

8. Other claims for damages, resignation
Claims for damages from impossibility of the performance, delay, positive violation of contract, debts at completion contract or terrors loss are excluded, unless, these are based on intent or gross negligence of us. Claims for damages are limited in each case to the value of the supply.

When the performance becomes impossible to us or the customer, then general rights of law apply under the following condition:

If the impossibility is due to our fault, then the customer is entitled to require compensation of damages. This is limited to half of the value of the supply, excluding value added tax, of the part of the supply or performance, which cannot be taken in useful service because of the impossibility.

The right of the customer to the resignation remains unaffected. If unexpected events in the sense of number 3 from the economic meaning or the contents of the supply or performance change substantially or considerably affect our, on our company, the contract will be changed proportionally.

As far as this is economically not justifiable, a right of resignation is entitled to us. If we want to make use from this right, then we will communicate this to the customer immediately after determination of significance, and also then, when even at first with this an extension of the delivery time was agreed upon.

In all cases only such damages, whose origin and extent were foreseeable for us, are replaced.

9. Right of ownership
The supplied commodity remains our full property until full payment, also the future developing demands, indifferent from whatever argument this developed, even if payments for particularly designated demands were made. With open invoices the reserved property applies as security of our demand for balance.

a) By machining and processing of the reserved commodities, the customer does not acquire the property of the new material in accordance with § 950 BGB. The processing is performed by the customer for us, without resulting in any obligations to us. If the reserved commodities are processed, connected, mixed or integrated with other items not belonging to us, we acquire the property of the new item in relationship to the value of the reserved commodity to the other finished items.

b) The allowances of the customer from resale or rental of the reserved commodities are directly assigned to us and without consideration, if the reserved commodities are without or after processing, connection, mixture or integration and if they are resold to one or multiple customers.

These demands serve as protection only up to the value of the already sold reserved commodities. In case that the reserved commodities are sold with other items not belonging to us, with or without processing, the transfer of the demand for purchase price applies only to the amount of the reserved commodities, which is, together with other items, the subject of this contract.

Regardless of the transfer and our right to resignation, the customer is entitled for resignation in so far, when he fulfills his obligations to us and does not come into financial collapse. On request the customer has to give us the details necessary for the resignation of the resigned demands, and communicate the resignation to the debtors.

The customer has to inform us immediately about the execution measures of third parties in the reserved commodities or in the advance resigned demands, by handing over the documents necessary for an immediate substitution. The customer bears the cost of our intervention.

C) The customer has the obligation to keep the commodities in proper condition during the duration of the right of ownership and will directly have the necessary repairs - apart from emergencies – performed by us or by one of our certified repair workshops at own expense.

10. Transfer of the contract
The transfer of demands on us to third parties is impossible, if we do not agree in writing.
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THE SAV PRODUCT RANGE

CATALOGUE I: SAV–MAGNETIC WORKHOLDING
Permanent, electro and ep-magnetic, mechanical, hydraulic, vacuum, multi-technique. Demagnetisers, sine tables, magnetic tools

CATALOGUE II: SAV–STATIONARY WORKHOLDING
Vices and clamping equipment, vacuum clamping, Angle plates and tombstone fixtures, stationary chucks and attachments

CATALOGUE III: SAV–ROTARY WORKHOLDING
Manually and power operated chucks, lever compensating, finger, console and column chucks

CATALOGUE IV: SAV–PRODUCTION AUTOMATION
Pallet changers, transfer lines, deburring cells, tool changers, loading/unloading robots

CATALOGUE V: SAV–STANDARD PARTS
Semi-finished parts, spanners, positioning elements, actuating, guiding and driving components

CATALOGUE VI: SAV–MAGNETIC LIFTING
Heavy duty magnetic lifting equipment, Permanent lifting magnets, battery lifting magnets, handling tools

CATALOGUE VII: SAV–CUSTOM SOLUTIONS
Customized magnetic, mechanical, hydraulic, vacuum, stationary and rotary workholding

CATALOGUE VIII: SAV–SMALL MAGNETS
Flat and holding magnets, pot magnets, magnet cores and office magnets

CATALOGUE IX: SAV–DRESSING AND CIRCULAR GRINDING
Dressing, circular grinding, indexing tables

CATALOGUE X: SAV–QMC
Mould holding and changing systems for injection moulding and presses
POWERFUL
PRECISE
DURABLE