Woodward understands the time-intensive nature of Power Generation projects. Ensuring the longevity of components is one way we can make our customers successful. Woodward has supplied and supported the well-established SPM-D line of synchronizers for 20+ years. With the state of the art Drop-In replacement successor, SPM-D2 the life of this synchronizer line is now extended. All of the SPM-D2 synchronizers are password protected and are configurable either through HMI as before or through ToolKit configuration tool with USB connectivity.

The SPM-D2-10 series are microprocessor-based synchronizers designed for use on two or three phase AC generators equipped with Woodward or other compatible speed controls and automatic voltage regulators. The SPM-D2-10 synchronizers provide automatic frequency, phase and voltage matching using either analog- or discrete output bias signals. These synchronizers are applied to a wide range of prime movers and generators, as its control signals may be set to fit several types of gensets - from fast reacting diesel engines to soft reacting gas turbines.

The SPM-D2-10 synchronizers are available in 3 base models:
- SPM-D2-10 … : provides 1-phase / 2-wire voltage measurement with options for analog and/or discrete biasing signals and wide range power supply
- SPM-D2-10 …/YB: provides 3-phase / 4-wire voltage measurement with discrete biasing signals and option for wide range power supply
- SPM-D2-10 …/PSY5: provides 1-phase / 2-wire voltage measurement with discrete biasing signals, option for wide range power supply and 2 sets of switchable parameter set.

NEW FEATURES
- USB connectivity to PC
- ToolKit configuration support
- Password protection to all variants
- Same look & feel as SPM-D
- Drop-In replacement

FEATURES
- Synchronization for one or two circuit breakers
- Frequency, Phase and Voltage Matching
- Selectable control outputs for speed and voltage biasing
- Compatible with a wide range of GOVs and AVRs
- Circuit breaker time compensation
- Two lines bright LCD display for generator and bus values
- Front face synchronoscope for easy commissioning
- True RMS measurement for reliable operation
- Configurable through HMI or PC
- Wide range power supply available
- Switchable parameter sets available
- CE Marked (RoHS 2 compliant)
- UL/cUL Listed
### SPECIFICATIONS

- **Power supply**: [Standard] 12/24 Vac (9.5 to 32 Vdc) [N, XN and NYB Packages] 90 to 250Vac / 120 to 375 Vdc
- **Intrinsic consumption**: max. 10 W
- **Ambient temperature (operation)**: -20 to 70 °C
- **Ambient temperature (storage)**: -30 to 60 °C
- **Ambient humidity**: 95%, non-condensing
- **Voltage**: Input range
- **Rated short circuit current (1 s)**: [1] 100 Vac Rated (V<sub>ref</sub>) 66/115 VAC, [4] 400 Vac Rated (V<sub>ref</sub>) 230/400 VAC
- **Max. value (V<sub>max</sub>)**: 150 VAC
- **Rated surge volt. (V<sub>surge</sub>)**: 12/24 Vac or 18 to 250 Vac/dc
- **Max. value (I<sub>max</sub>)**: 300 Vac
- **Accuracy**:
  - Measuring frequency: 50/60 Hz (40 to 70 Hz)
  - Linear measuring range: 1.3 x Vrated
- **Input resistance**: [1] 0.21 MOhm, [4] 0.69 MOhm
- **Current Resolution**: [1] ±1 mA, [5] ±5 mA
- **Burden**: 3.0 x I<sub>rated</sub>
- **Rated short-time overcurrent (1 s)**: [1] 50 x I<sub>rated</sub>, [5] 10 x I<sub>rated</sub>
- **Discrete inputs**: Isolated
- **Input range**: 12/24 Vac or 18 to 250 Vac/dc
- **Input resistance**: approx. 6.8 kOhms or 68 kOhms

**Relay outputs**: Isolated
- Contact material: AgCdO
- Load (GP) (V<sub>cont</sub>, relay output) AC: 2.00 A@250 Vac DC: 2.00 A@24 Vac / 0.36 A@125 Vac / 0.18 A@250 Vac
- Pilot Duty (PD) AC: B500
- DC: 1.00 A@24 Vac / 0.22 A@125 Vac / 0.10 A@250 Vac

**Analog Outputs (isolated)**: freer scalable
- Type: ± 10 V / ± 20 mA / PWM
- Insulation voltage (continuously, AVR out): 300 VAC
- Insulation voltage (continuously, Gov out): 100 VAC
- Resolution: 12 Bit
- ± 10 V (scalable)
- Internal resistance 500 Ohms
- Maximum load 500 Ohms

**Housing**: Front panel flush mounting
- Type: APRANORM DIN 43 700

**Dimensions**: 144 x 72 x 122 mm
- Front cutout: 138 [±1.0] x 68 [±0.7] mm
- Connection (screw/plug terminals depending on connector): 1.5 mm² or 2.5 mm²
- Insulating surface: approx. 800 g

**Listings**: according to applicable IEC standards
- CE, UL/cUL listing for ordinary locations
- LR (Type Approval), ABS (Type Approval)

**Marine (Pending)**: LR (Type Approval), ABS (Type Approval)

### DIMENSIONS
NOTE The terminals used for connection depend on the implemented functionality of each package. The drawing below gives an overview with sample package XN – for details please see the dedicated Technical Manual listed in the features table at the rear page.

RELATED PRODUCTS

- Load Share Synchronizer SPM-D2-11 (Product Specification # 37623)
- Digital Synchronizer and Load Control DSLC-2 (Product Specification # 37493)
- Master Synchronizer and Load Control MSLC-2 (Product Specification # 37494)
- Load Share speed control 2301E (Product Specification # 03404)
- Load Sharing Module LSM (Product Specification # 82686)
- SPM-A Synchronizer (Product Specification # 82383)
- Power Generation Learning Module (Product Specification # 03412): P/N 8447-1012
## Features Overview

### SPM-D2-10 Series

<table>
<thead>
<tr>
<th>Package</th>
<th>X</th>
<th>N</th>
<th>XN</th>
<th>PSYS</th>
<th>PSYS...W</th>
<th>YB</th>
<th>NYB</th>
</tr>
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### Control

<table>
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<tr>
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<tbody>
<tr>
<td>Breaker</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1 or 2</td>
<td>1 or 2</td>
<td>1</td>
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<tr>
<td>Isolated Operation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Dead bus start functionality&lt;sup&gt;1&lt;/sup&gt;</td>
<td>On-demand</td>
<td>On-demand</td>
<td>On-demand</td>
<td>On-demand</td>
<td>On-demand</td>
<td>Enhanced</td>
<td>Enhanced</td>
</tr>
<tr>
<td>Switchable parameter&lt;sup&gt;2&lt;/sup&gt;</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>-</td>
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### Controller

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<tbody>
<tr>
<td>Discrete raise/lower: Speed</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Discrete raise/lower: Voltage</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Analog Output: Speed&lt;sup&gt;3&lt;/sup&gt;</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Analog Output: Voltage&lt;sup&gt;4&lt;/sup&gt;</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
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<tr>
<td>PWM Output: Speed&lt;sup&gt;5&lt;/sup&gt;</td>
<td>-</td>
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<td>-</td>
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### IOs

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<tr>
<td>Discrete alarm inputs</td>
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<tr>
<td>Analog outputs: +/- 10 V, +/- 20 mA, PWM; configurable</td>
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<td>2</td>
<td>-</td>
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<td>-</td>
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<td>USB Serial interface</td>
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### Power Supply

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<tbody>
<tr>
<td>24 Vdc</td>
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<tr>
<td>Wide Range: 90 to 250 V&lt;sub&gt;AC&lt;/sub&gt; / 120 to 375 V&lt;sub&gt;DC&lt;/sub&gt;</td>
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<td>✓</td>
<td>ç</td>
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### Accessories

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<tbody>
<tr>
<td>Configuration via PC (ToolKit)</td>
<td>✓</td>
<td>✓</td>
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### Listings/Approvals

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<tbody>
<tr>
<td>UL / CUL Listing (61010, 6200)</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>CE Marked</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
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</tbody>
</table>

### Part Numbers

| | 5440-... | …-2166 | …-2168 | …-2174 | …-2172 | - | - | …-2167 | …-2177 |
|---|---|---|---|---|---|---|---|---|---|---|
| Measuring inputs 100 Vac | 5440-... | …-2164 | …-2171 | …-2175 | …-2190 | …-2170 | …-2173 | …-2176 | …-2189 |
| Measuring inputs 400 Vac<sup>6</sup>: | 5440-... | …-2164 | …-2171 | …-2175 | …-2190 | …-2170 | …-2173 | …-2176 | …-2189 |

**Notes:**

- <sup>1</sup> Dead bus start functionality
  - On-Demand: Closing of CB on demand
  - Enhanced: Black start (closing to de-energized second side of a breaker for following conditions):
    - dead system 1 - live system 2
    - live system 1 - dead system 2
    - dead system 1 - dead system 2
- <sup>2</sup> Switch from Parameter set #A to #B by activating DI #6
- <sup>3</sup> Configurable to either speed or voltage
- <sup>4</sup> Analog bias outputs for voltage and speed freely configurable for all levels (+/-2 V, 0 to 5 V, 0.5 to 4.5 V, +/-0 V +/5 V, 0 to 20 mA, +/-20 mA, and much more)
- <sup>5</sup> Speed bias output configurable as 500 Hz PWM output with adjustable voltage level
- <sup>6</sup> All units with 400 V measuring inputs can also be used for 100 V system voltage

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Subject to alterations, errors excepted.

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