WOODWARD

SPM-D2-10 Series

Product Specification
37622A

Synchronizers
for 2/3-phase AC Gen-Sets

DESCRIPTION

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.

FEATURES

- Phase match or slip frequency synchronization with voltage matching
- Two-Phase or three-phase true RMS voltage sensing of generator and bus with Class I accuracy
- Selectable operating modes like SPM-A (Run, Check, Permissive and Off)
- Synch-Check and synchronization time monitoring
- Dead bus closing of CB on demand
- 2 setting blocks, each containing 7 configurable parameters (in PSY5 variants) selectable through DI: Frequency/Voltage control dead-band, Frequency/Voltage control time pulse, Frequency/Voltage control gain, Circuit breaker time compensation
- Control outputs: Discrete raise/lower for speed and voltage in all variants, | X and XN variants: also configurable analog signals (Voltage, Current and PWM)
- Voltage and frequency control in isolated operation
- Two line bright liquid crystal display for operation, alarm, measuring values visualization and parametrization
- Front face with synchronoscope and indication of breaker state/control activity
- Multi-level password protection of parameters
- Woodward ToolKit™ software for configuration via USB
- Two built-in languages: English, German

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

- 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
Power supply  
[Standard] .................................................. 12/24 Vdc (9.5 to 32 Vdc)  
[N; XN and NYB Packages] .......................... 90 to 250Vac / 120 to 375 Vdc;  
............................................................................... 100 to 240 Vac -15%/+10% (UL rating only)  
Intrinsic consumption ................................ max. 10 W  
Ambient temperature (operation) .................. -20 to 70 °C  
[N, XN and NYB Packages] .......................... -20 to 60 °C  
Ambient humidity ....................................... 95%, non-condensing  

**Voltage**  
[1] 100 Vac  Rated (Vrated).......................... 66/115 Vac  
Max. value (Vmax)...................................... 150 Vac  
[or] 400 Vac  Rated (Vrated).......................... 230/400 Vac  
Max. value (Vmax)...................................... 300 Vac  
Rated surge volt. (Vsurge) ........................... [1] 2.5kV, [4] 4.0 kV  

**Accuracy** .............................................. Class 1  
Measuring frequency .................................. 50/60 Hz (40 to 70 Hz)  
Linear measuring range ............................. 1.3 x Vrated  
Input resistance  ..................................... [1]0.21 MOhms, [4]0.696 MOhms  

**Current**  
Rated (I_{rated})......................................... [1].../1A, [5].../5A  
Linear measuring range ............................. 3.0x_{rated}  
Burden ................................................... < 0.15 VA  
Rated short-time overcurrent (1 s)............. [1] 50x_{rated}, [5] 100x_{rated}  

**Discrete inputs**  
Input range ........................................... 12/24 Vdc or 18 to 250 Vac/dc  
Input resistance ....................................... approx. 6.8 kOhms or 68 kOhms  

**Relay outputs** ........................................... isolated  
Contact material ...................................... AgCdO  
Load (GP) (Vcont, relay output) AC: ................... 2.0 A/250 Vac  
DC: 2.0 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)**  
.......................................................... ± 10 V / ± 10 mA / PWM  
.......................................................... freely scalable  
Type ...................................................... ± 10 V / ± 10 mA / PWM  
Resolution ............................................. 12 Bit  
.......................................................... ± 10 V (scalable)  
.......................................................... internal resistance 500 Ohms  
.......................................................... ± 20 mA (scalable)  
.......................................................... maximum load 500 Ohms  

**Housing**  
Front panel flush mounting......................... Type APRANORM DIN 43 700  

**Dimensions**  
WxHxD ............................................. 144 × 72 × 122 mm  
Front cutout  
WxH .................................................. 138 [+1.0] × 68 [+0.7] mm  
Connection (screw/plug terminals depending on connector) 1.5 mm² or 2.5 mm²  
Front .................................................. insulating surface  

**Protection System / Sealing**  
Front .................................................. IP42 with correct installation  
Front .................................................. IP54 (with gasket P/N 8923-1037)  
Back .................................................. IP20  

**Weight** ................................................ approx. 800 g  

**Listings** tested according to applicable IEC standards ............................................. CE, UL/cUL listing for ordinary locations  

**Marine (Pending)**  
.................................................. LR (Type Approval), ABS (Type Approval)
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>
</thead>
</table>

## Control

<table>
<thead>
<tr>
<th>Breaker</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>1 or 2</th>
<th>1 or 2</th>
<th>1</th>
<th>1</th>
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<tbody>
<tr>
<td>Synchronization</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</table>

## Isolated Operation

<table>
<thead>
<tr>
<th>Dead bus start functionality*1</th>
<th>On-demand</th>
<th>On-demand</th>
<th>On-demand</th>
<th>On-demand</th>
<th>On-demand</th>
<th>Enhanced</th>
<th>Enhanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switchable parameter*2</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
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## Controller

<table>
<thead>
<tr>
<th>Discrete raise/lower: Speed</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Discrete raise/lower: Voltage</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tr>
</tbody>
</table>

## Analog Output: Speed*4

| Analog Output: Voltage*4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## PWM Output: Speed*5

<table>
<thead>
<tr>
<th>Discrete outputs</th>
<th>4</th>
<th>4</th>
<th>4</th>
<th>4</th>
<th>4</th>
<th>5</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog outputs: +/- 10 V, +/- 20 mA, PWM, configurable</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
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## Power Supply

<table>
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<th>24 Vdc</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
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<th>✓</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide Range: 90 to 250 VAC / 120 to 375 VDC</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

## Accessories

| Configuration via PC (ToolKit) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## Listings/Approvals

| UL / CUL Listing (D1010, 6200) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## CE Marked

| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## Part Numbers

<table>
<thead>
<tr>
<th>Measuring inputs 100 Vac: 8440...</th>
<th>...-2166</th>
<th>...-2168</th>
<th>...-2174</th>
<th>...-2172</th>
<th>-</th>
<th>-</th>
<th>...-2167</th>
<th>...-2177</th>
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</thead>
<tbody>
<tr>
<td>Measuring inputs 400 Vac*: 8440...</td>
<td>...-2164</td>
<td>...-2171</td>
<td>...-2175</td>
<td>...-2190</td>
<td>...-2170</td>
<td>...-2173</td>
<td>...-2176</td>
<td>...-2189</td>
</tr>
</tbody>
</table>

## Technical Manual

| B37615 | B37616 | B37617 |

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*1 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

*2 Switch from Parameter set #A to #B by activating DI #6

*3 Configurable to either speed or voltage

*4 Analog bias outputs for voltage and speed freely configurable for all levels (+/-1 V, +/-3 V,
  0 to 5 V, 0.5 to 4.5 V, +/-10 V +/-0 V, 0 to 20 mA, +/-20 mA, and much more)

*5 Speed bias output configurable as 500 Hz PWM output with adjustable voltage level

*6 All units with 400 V measuring inputs can also be used for 100 V system voltage

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