



### New Features

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

## 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

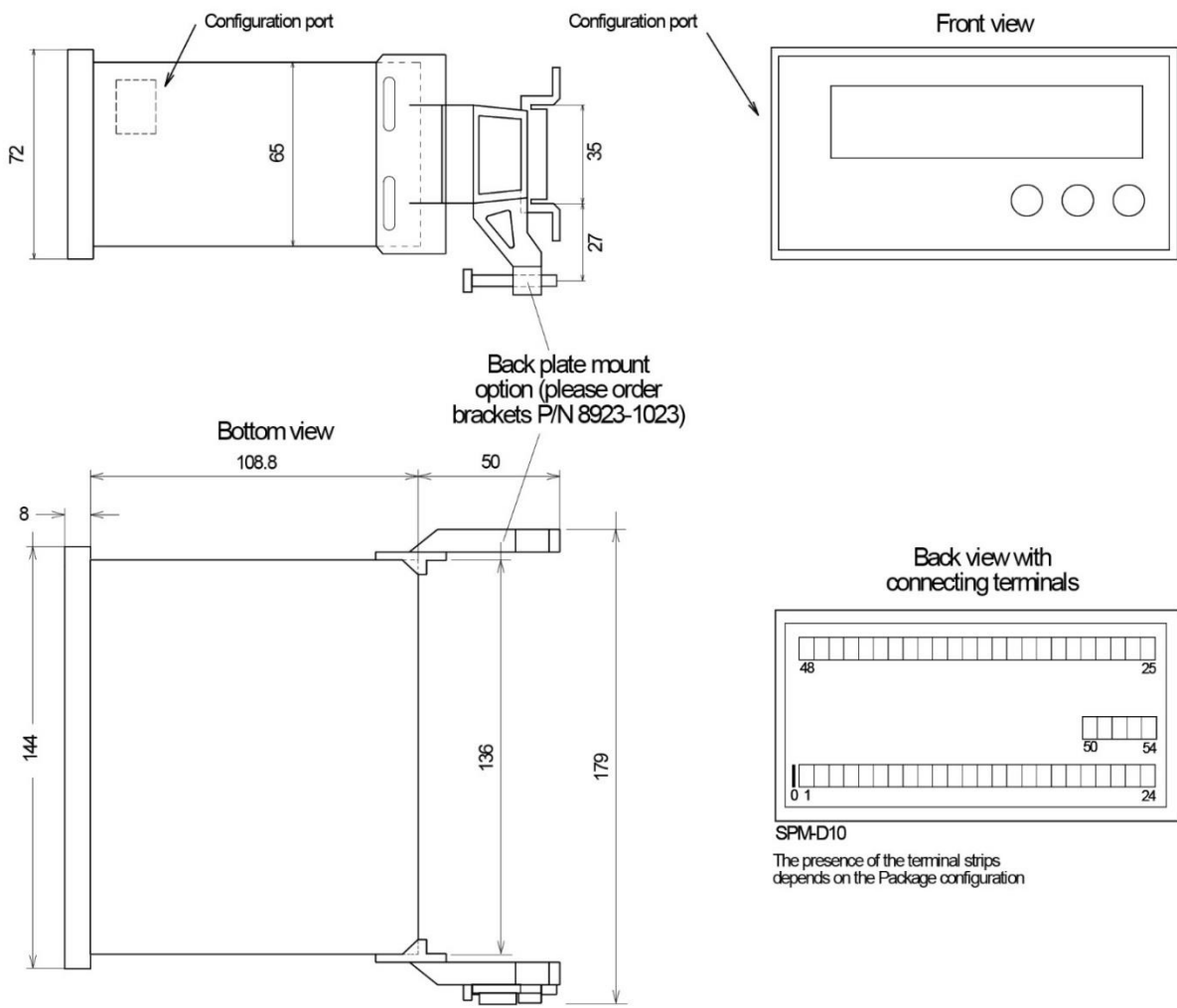
- Synchronization for one or two circuit breakers
- Frequency, Phase and Voltage Matching
- Selectable control outputs for speed and voltage biasing
- Compatible with a wide range of GOVs and AVR's
- Circuit breaker time compensation
- Two lines bright LCD display for generator and bus values
- Front 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 V<sub>DC</sub> (9.5 to 32 V<sub>DC</sub>)  
 [N, XN and NYB Packages] ..... 90 to 250Vac / 120 to 375 V<sub>dc</sub>;  
 ..... 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 temperature (storage) ..... -30 to 80 °C  
 Ambient humidity ..... 95%, non-condensing  
**Voltage** ..... (  $\lambda/\Delta$  )  
 [1] 100 Vac Rated (V<sub>rated</sub>) ..... 66/115 V<sub>AC</sub>  
 Max. value (V<sub>max</sub>) ..... 150 V<sub>AC</sub>  
 or [4] 400 Vac Rated (V<sub>rated</sub>) ..... 230/400 V<sub>AC</sub>  
 Max. value (V<sub>max</sub>) ..... 300 V<sub>AC</sub>  
 Rated surge volt. (V<sub>surge</sub>) ..... [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 V<sub>rated</sub>  
 Input resistance ..... [1]0.21 MOhms, [4]0.696 MOhms  
**Current** Rated (I<sub>rated</sub>) ..... [1].../1A, [5] ... /5A  
 Linear measuring range ..... 3.0 x I<sub>rated</sub>  
 Burden ..... < 0.15 VA  
 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 V<sub>DC</sub> or 18 to 250 Vac/dc  
 Input resistance ..... approx. 6.8 kOhms or 68 kOhms

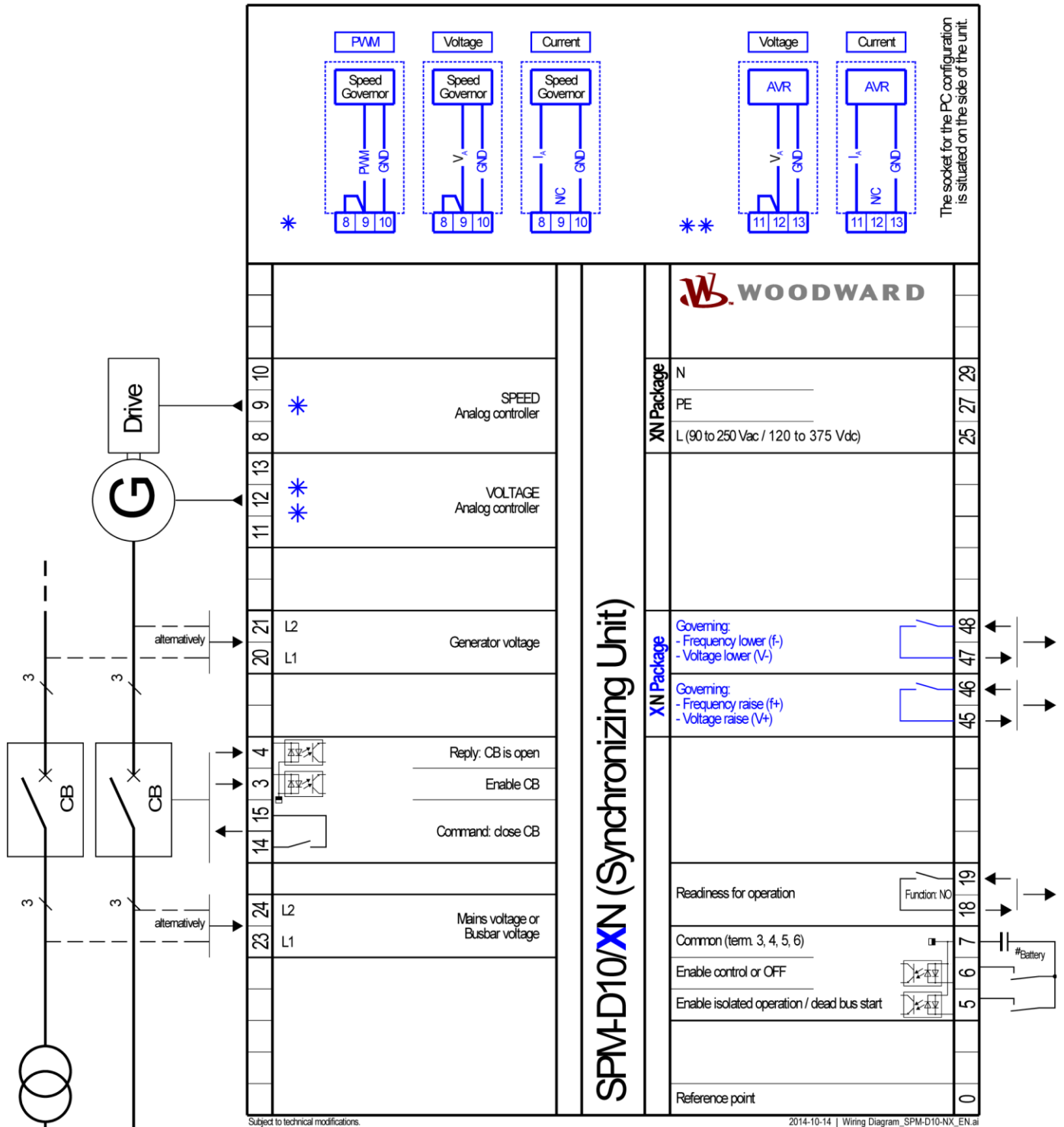
**Relay outputs** ..... isolated  
 Contact material ..... AgCdO  
 Load (GP) (V<sub>cont, relay output</sub>) AC: ..... 2.00 A<sub>AC</sub>@250 V<sub>AC</sub>  
 DC: 2.00 A<sub>DC</sub>@24 V<sub>DC</sub> / 0.36 A<sub>DC</sub>@125 V<sub>DC</sub> / 0.18 A<sub>DC</sub>@250 V<sub>DC</sub>  
 Pilot Duty (PD) AC: ..... B300  
 DC: 1.00 A<sub>DC</sub>@24 V<sub>DC</sub> / 0.22 A<sub>DC</sub>@125 V<sub>DC</sub> / 0.10 A<sub>DC</sub>@250 V<sub>DC</sub>  
**Analog Outputs (isolated)** ..... freely scalable  
 Type .....  $\pm 10 V / \pm 20 mA / PWM$   
 Insulation voltage (continuously, AVR out) ..... 300 V<sub>AC</sub>  
 Insulation voltage (continuously, Gov out) ..... 100 V<sub>AC</sub>  
 Resolution ..... 12 Bit  
 $\pm 10 V$  (scalable) ..... internal resistance 500 Ohms  
 $\pm 20 mA$  (scalable) ..... maximum load 500 Ohms  
**Housing** Front panel flush mounting ..... Type APRANORM DIN 43 700  
 Dimensions WxHxD ..... 144 x 72 x 122 mm  
 Front cutout WxH ..... 138 [+1.0] x 68 [+0.7] mm  
 Connection (screw/plug terminals depending on connector) .. 1.5 mm<sup>2</sup> or 2.5 mm<sup>2</sup>  
 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)

# DIMENSIONS



# TERMINAL DIAGRAM

**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 **DSL-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

**CONTACT**
**North & Central America**

Tel.: +1 970 962 7331  
 ✉ [SalesPGD\\_NAandCA@woodward.com](mailto:SalesPGD_NAandCA@woodward.com)

**South America**

Tel.: +55 19 3708 4800  
 ✉ [SalesPGD\\_SA@woodward.com](mailto:SalesPGD_SA@woodward.com)

**Europe**

Tel. Stuttgart: +49 711 78954 510  
 Tel. Kempen: +49 2152 145 331  
 ✉ [SalesPGD\\_EUROPE@woodward.com](mailto:SalesPGD_EUROPE@woodward.com)

**Middle East & Africa**

Tel.: +971 2 6275185  
 ✉ [SalesPGD\\_MEA@woodward.com](mailto:SalesPGD_MEA@woodward.com)

**Russia**

Tel.: +7 812 319 3007  
 ✉ [SalesPGD\\_RUSSIA@woodward.com](mailto:SalesPGD_RUSSIA@woodward.com)

**China**

Tel.: +86 512 8818 5515  
 ✉ [SalesPGD\\_CHINA@woodward.com](mailto:SalesPGD_CHINA@woodward.com)

**India**

Tel.: +91 124 4399 500  
 ✉ [SalesPGD\\_INDIA@woodward.com](mailto:SalesPGD_INDIA@woodward.com)

**ASEAN & Oceania**

Tel.: +49 711 78954 510  
 ✉ [SalesPGD\\_ASEAN@woodward.com](mailto:SalesPGD_ASEAN@woodward.com)

[www.woodward.com](http://www.woodward.com)

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For more information contact:

# FEATURES OVERVIEW

SPM-D2-10 Series	Package	SPM-D2-10 Series							
		-	X	N	XN	PSY5	PSY5...W	YB	NYB
<b>Measuring / Display</b>									
Generator/System A voltage		2-ph	2-ph	2-ph	2-ph	2-ph	2-ph	3/2-ph	3/2-ph
Busbar/System B voltage		2-ph	2-ph	2-ph	2-ph	2-ph	2-ph	3/2-ph	3/2-ph
<b>Control</b>									
Breaker		1	1	1	1	1 or 2	1 or 2	1	1
Synchronization		2-ph	2-ph	2-ph	2-ph	2-ph	2-ph	3/2-ph	3/2-ph
Isolated Operation		✓	✓	✓	✓	✓	✓	✓	✓
Dead bus start functionality#1		On-demand	On-demand	On-demand	On-demand	Enhanced	Enhanced	Enhanced	Enhanced
Switchable parameter#2		-	-	-	-	✓	✓	-	-
<b>Controller</b>									
Discrete raise/lower: Speed		✓	✓#3	✓	✓#3	✓	✓	✓	✓
Discrete raise/lower: Voltage		✓	✓#3	✓	✓#3	✓	✓	✓	✓
Analog Output: Speed#4		-	✓	-	✓	-	-	-	-
Analog Output: Voltage#4		-	✓	-	✓	-	-	-	-
PWM Output: Speed#5		-	✓	-	✓	-	-	-	-
<b>I/Os</b>									
Discrete alarm inputs		4	4	4	4	4	4	5	5
Discrete outputs		2	2	2	2	3	3	3	3
Analog outputs: +/- 10 V, +/- 20 mA, PWM; configurable		-	2	-	2	-	-	-	-
USB Serial interface		1	1	1	1	1	1	1	1
<b>Power Supply</b>									
24 Vdc		✓	✓	-	-	✓	-	✓	-
Wide Range: 90 to 250 V <sub>AC</sub> / 120 to 375 V <sub>DC</sub>		-	-	✓	✓	-	✓	-	✓
<b>Accessories</b>									
Configuration via PC (ToolKit)		✓	✓	✓	✓	✓	✓	✓	✓
<b>Listings/Approvals</b>									
UL / cUL Listing (61010, 6200)		✓	✓	✓	✓	✓	✓	✓	✓
CE Marked		✓	✓	✓	✓	✓	✓	✓	✓
<b>Part Numbers</b>									
Measuring inputs 100 Vac:	8440-...	...-2166	...-2168	...-2174	...-2172	-	-	...-2167	...-2177
Measuring inputs 400 Vac#6:	8440-...	...-2164	...-2171	...-2175	...-2190	...-2170	...-2173	...-2176	...-2189
	Technical Manual	B37615				B37616		B37617	

- #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 +/-5 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