WOODWARD

SY2-SP **- Synchronizing check relay**

Application

Unit SY2-SP is used to prevent wrong synchronization of alternators at manual operation e.g. by unskilled personnel.

To prevent high current and mechanical stresses at paralleling the following conditions must be fulfilled be-fore switching in parallel:

- voltage difference
- frequency difference
- and phase angle must be inside limits.

Synchronizing check relay SY2-SP monitors these values and provides closure of contact 4 - 12 if these are inside preset limits.

Reference to other Synchronizing Systems

Semi-automatic synchronization by synchronizing unit SY2 means:

Manual speed up or slow down the genset to equalize the frequency / manual setting of alternator voltage / monitoring of frequency difference, voltage difference and phase angle by paralleling unit SY2 / impulse to close alternator c.b. by unit SY2.

Function

Synchronizing check relay SY2-SP is to connect ac-cording to connection diagram: bus voltage to terminals a - 6 alternator voltage to terminals b - 7. All inputs are galvanically insolated and thus connection phase/neutral as well as phase/phase is possible, provided that busbar voltage, generator voltage and the connected neutral points of both systems have identical connection features.

The SY2-SP monitors the difference in frequency and voltage as well as the phase angle of both systems and if these values are in their preset limits, switching on of the generator C.B. is released via contacts 4-12.
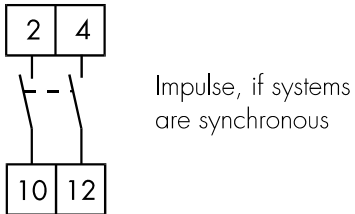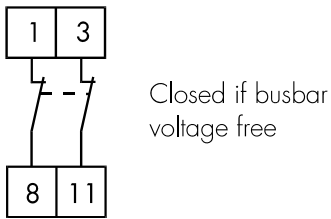
The SY2-SP is additionally provided with a contact (3-11) which is opened when voltage is applied to terminals a-6 and closed when these terminals are dead. This contact allows closing of the generator C.B. with a dead busbar.

The SY2-SP cannot be used for monitoring the parallel connection of synchronous systems, because for this the relay would need a "beat" of the systems to be synchronized. Since synchronous systems do not have such a "beat", the relay cannot provide release impulses even not so if the angular difference of the systems would be "0". For monitoring parallel connection of synchronous systems our synchronizing unit PSY5 applies.

Note for the use in marine design systems

According to German Lloyd approbation the frequency difference setting must not be more than 1 Hz.

Contact positions

```
┌───┬───┐
│ 1 │ 3 │
└───┴───┘      Closed if busbar
               voltage free
┌───┬───┐
│ 8 │11 │
└───┴───┘

┌───┬───┐
│ 2 │ 4 │
└───┴───┘      Impulse, if systems
               are synchronous
┌───┬───┐
│10 │12 │
└───┴───┘
```

Front panel
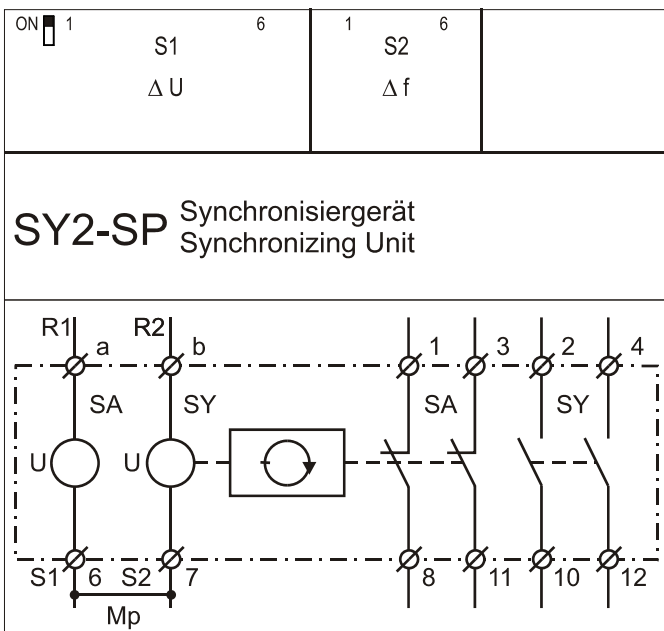
Settings

Dip Switches

At the DIP switch blocks S1 and S2 64 different values for voltage difference and frequency difference can be adjusted

The table on the following page is used for adjusting the above-mentioned quantities.

For adjusting the max. permissible voltage difference ΔU (DIP switch block S1) the rated voltage U_N of the device has to be observed.

| U$_N$ = 110 V	U$_N$ = 230 V	U$_N$ = 400 V							
S1 ΔU [V]	S1 ΔU [V]	S1 ΔU [V]	S2 Δf [Hz]	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6
45.0	90.0	135.0	0.10	0	0	0	0	0	0
44.6	89.2	133.7	0.10	0	0	0	0	0	1
43.9	87.8	131.6	0.11	0	0	0	0	1	0
43.2	86.4	129.6	0.12	0	0	0	0	1	1
42.5	85.0	127.5	0.13	0	0	0	1	0	0
41.9	83.7	125.6	0.14	0	0	0	1	0	1
41.2	82.4	123.6	0.15	0	0	0	1	1	0
40.6	81.1	121.7	0.16	0	0	0	1	1	1
39.9	79.9	119.8	0.17	0	0	1	0	0	0
39.3	78.6	117.9	0.18	0	0	1	0	0	1
38.7	77.4	116.1	0.20	0	0	1	0	1	0
38.1	76.2	114.3	0.21	0	0	1	0	1	1
37.5	75.0	112.6	0.23	0	0	1	1	0	0
36.9	73.9	110.8	0.24	0	0	1	1	0	1
36.4	72.8	109.1	0.26	0	0	1	1	1	0
35.8	71.7	107.5	0.27	0	0	1	1	1	1
35.3	70.6	105.9	0.29	0	1	0	0	0	0
34.8	69.5	104.3	0.31	0	1	0	0	0	1
34.2	68.5	102.7	0.32	0	1	0	0	1	0
33.7	67.5	101.2	0.34	0	1	0	0	1	1
33.2	66.5	99.7	0.35	0	1	0	1	0	0
32.8	65.5	98.3	0.37	0	1	0	1	0	1
32.3	64.6	96.8	0.38	0	1	0	1	1	0
31.8	63.6	95.4	0.40	0	1	0	1	1	1
31.4	62.7	94.1	0.42	0	1	1	0	0	0
30.9	61.9	92.8	0.43	0	1	1	0	0	1
30.5	61.0	91.5	0.45	0	1	1	0	1	0
30.1	60.2	90.2	0.46	0	1	1	0	1	1
29.7	59.3	89.0	0.47	0	1	1	1	0	0
29.3	58.6	87.8	0.49	0	1	1	1	0	1
28.9	57.8	86.7	0.50	0	1	1	1	1	0
28.5	57.0	85.6	0.52	0	1	1	1	1	1
28.2	56.3	84.5	0.53	1	0	0	0	0	0
27.8	55.6	83.4	0.55	1	0	0	0	0	1
27.5	54.9	82.4	0.57	1	0	0	0	1	0
27.1	54.3	81.4	0.58	1	0	0	0	1	1
26.8	53.6	80.5	0.60	1	0	0	1	0	0
26.5	53.0	79.6	0.62	1	0	0	1	0	1
26.2	52.4	78.7	0.64	1	0	0	1	1	0
25.9	51.9	77.8	0.66	1	0	0	1	1	1
25.7	51.3	77.0	0.68	1	0	1	0	0	0
25.4	50.8	76.2	0.70	1	0	1	0	0	1
25.2	50.3	75.5	0.73	1	0	1	0	1	0
24.9	49.8	74.8	0.75	1	0	1	0	1	1
24.7	49.4	74.1	0.78	1	0	1	1	0	0
24.5	49.0	73.4	0.81	1	0	1	1	0	1
24.3	48.5	72.8	0.85	1	0	1	1	1	0
24.1	48.2	72.2	0.88	1	0	1	1	1	1
23.9	47.8	71.7	0.92	1	1	0	0	0	0
23.7	47.5	71.2	0.97	1	1	0	0	0	1
23.6	47.1	70.7	1.01	1	1	0	0	1	0
23.4	46.8	70.3	1.06	1	1	0	0	1	1
23.3	46.6	69.8	1.12	1	1	0	1	0	0
23.2	46.3	69.5	1.18	1	1	0	1	0	1
23.0	46.1	69.1	1.24	1	1	0	1	1	0
22.9	45.9	68.8	1.31	1	1	0	1	1	1
22.8	45.7	68.5	1.39	1	1	1	0	0	0
22.8	45.5	68.3	1.47	1	1	1	0	0	1
22.7	45.4	68.1	1.55	1	1	1	0	1	0
22.6	45.3	67.9	1.65	1	1	1	0	1	1
22.6	45.2	67.7	1.75	1	1	1	1	0	0
22.5	45.1	67.6	1.86	1	1	1	1	0	1
22.5	45.0	67.6	1.97	1	1	1	1	1	0
22.5	45.0	67.5	2.00	1	1	1	1	1	1

Connection diagram
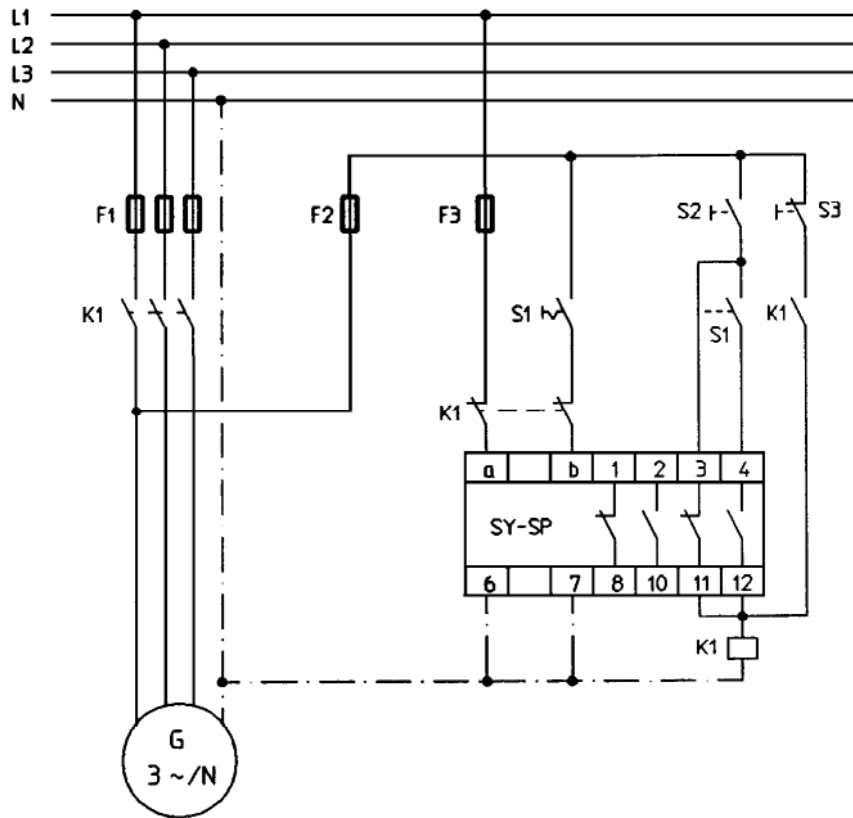
S1 - Synchronization ON - OFF
S2 - Generator switch ON
S3 - Generator switch OFF
K1 - Generator contactor

Technical Data

Type:	SY2-SP
Connection voltage:	110 V, 230 V, 400 V
Nominal frequency:	50 Hz, 60 Hz
adjustable limit of frequency difference:	0,1 ... 2 Hz
adjustable limits of voltage difference:	22.5 ... 45 V AC at U_N = 110 V
	45 ... 90 V AC at U_N = 230 V
	67.5 … 135 V AC at U_N = 400 V
Consumption:	approx. 3 VA
Permissible voltage limit:	+10/-15%
Permissible switch-on time:	100%
Adjustability:	DIP switch
Contacts:	2 NO-contact for switching in parallel
	2 NC-contact for bus bar voltage
Contact power:	max. 660 VA at 230 V AC
Dimensions:	H x W x D: 141 x 105 x 91 mm
Connection terminals:	metric 4, max. wires 2,5 mm^2
Type of protection:	case IP10, terminals IP00
Mounting:	independent
Weight:	0.4 kg
Service life:	10^6 switching operations
Maintenance:	none
temperature range at	
storage:	- 25°C bis + 70°C
operation:	- 25°C bis + 55°C

Dimensions and drill-holes
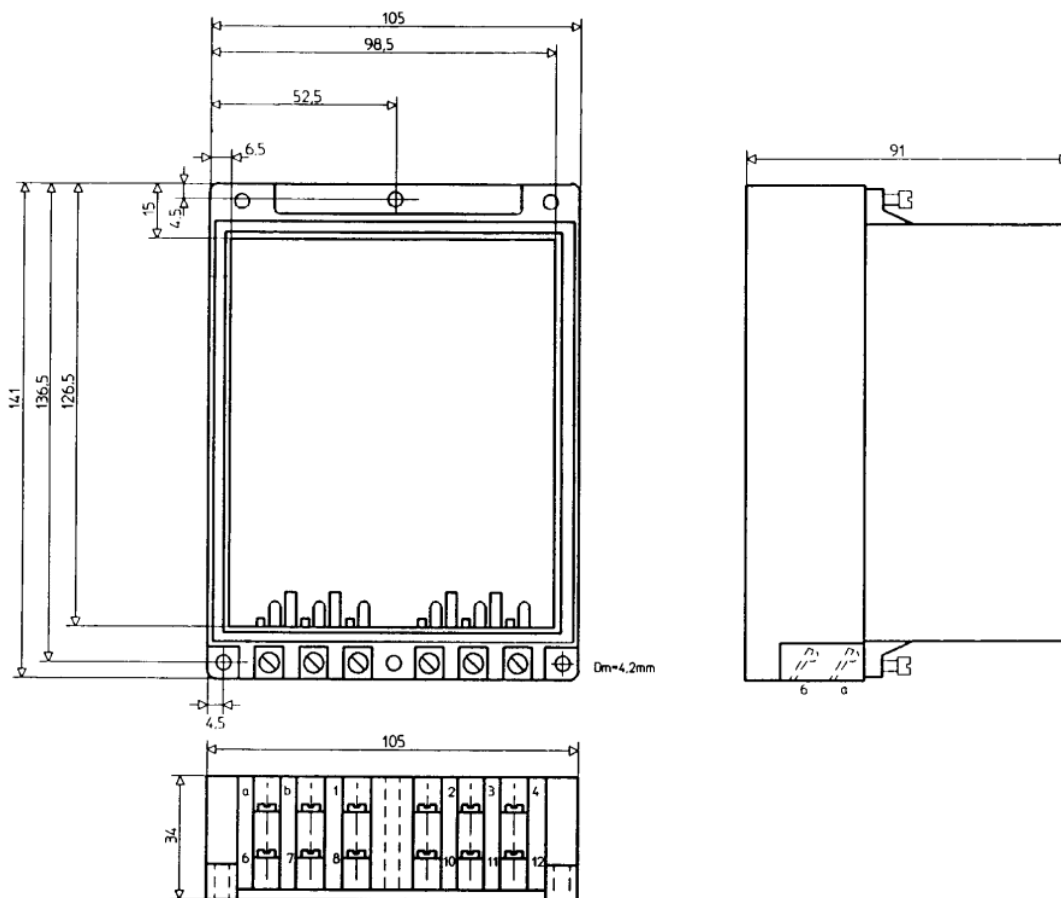
Order form

Synchronizing check relay		SY2SP		
Prevents asynchronous connection with manual operation				
Measuring voltage	110 V/ AC		**110**	
	127 V/ AC		**127**	
	230 V/ AC		**230**	
Rated frequency	50 Hz			**50**

Order form

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