

-90 -80 -70 -60 -50 -40 -30 -20 -10

-10
-20

Synchronizer SYN-6.2



1	General remarks.....	2
2	Operating principle.....	2
3	Synchronoscope.....	3
4	Parameterisation.....	3
5	Parameters.....	4
6	Connection diagram.....	5
7	Technical data.....	5
8	Connection example.....	6
9	Change of terminals.....	7



1 General remarks

The synchronizer re-feeds voltage and frequency of a synchronous generator from the mains in order to hook up the generator to the mains at minimum difference and similar phase position. In isolated operation the nominal frequency and the nominal voltage are preset internally by the unit.

2 Operating principle

The synchronizer collects by use of a differential amplifier the voltage and the frequency of two AC mains. The measurement takes place between L1 and L2. If the regulation is released using control input E1 (Sync) the unit generates +/- adjustment impulses for the generator voltage and the generator frequency. The impulse length is generated internally, the quiescent period is determined by the deviation to the set value.

If the control input E1 (Sync) is released and if the generator voltage and the generator frequency differ within the preset tolerances to the leading mains, a synchronous impulse is generated at phase balance. In order to compensate delays of the switch elements, the sync impulse is given prematurely by the lead time, prior to the calculated sync time

During operation the voltages and frequencies (middled) are shown continuously in the text display. When mains and generator have been identified, optionally (change-over by UP key) on-state frequency and phase angle can be shown (synchronoscope). LEDs inform on all switch conditions of the inputs and outputs. The observance of – for a synchronization allowable – voltage and frequency deviations will also be displayed by LEDs.

After failure of the measurement voltages the voltage and the frequency are regulated after return of voltage. The first synchronous impulse will be given at the earliest after 2 seconds.

2.1 Isolated operation

If the control input E2 (isle) is released, the generator frequency is regulated by internal frequency control (isolated operation). The nominal frequency is preselectable as a parameter (Para 14). In this operating mode a voltage regulation only takes place when for the nominal voltage (Para 15) a value other than '0' has been selected. The nominal frequency, the actual frequency and the generator voltage are displayed on the display

Alternatively in isolated operation it's possible to activate only the voltage regulation. Thereto lead frequency (Para 14) is to be parameterised at 0 Hz and a nominal voltage > 0 V is to be adjusted.

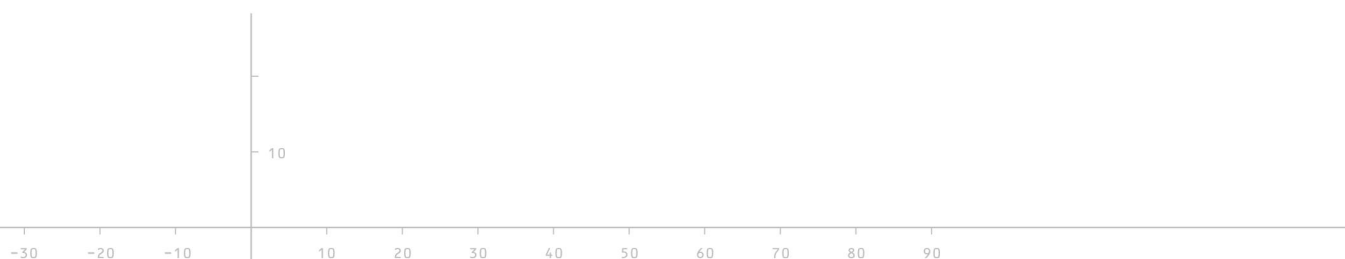
When the actual voltage and / or the actual frequency are within the values preset by the parameterisation this is shown by LED 'ΔF OK' resp. 'ΔU OK'.

Input E2 is subordinated to input E1, i.e. when simultaneously actuating E1 and E2 a synchronization takes place

2.2 Surveillance of synchronization time

The SYN-6.2 may monitor the synchronization of the release. (Parameter 17)

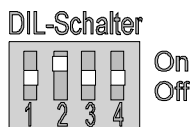
- Monitoring of impulse**
 After completed release of synchronization the SYN-6.2 monitors, if a synchronous impulse has been given within the adjusted surveillance time. When no synchronization takes place during the adjusted time, relay 6 falls off and LED 't sync.' turns off. After 4 s relay 6 picks up again and the LED is lighted. This procedure repeats as long as E1 is closed and no synchronization has taken place.
- Monitoring of release (E1)**
 In this adjustment the SYN-6.2 monitors the release time. After elapse of the adjusted time relay 6 falls off and LED 't syn' turns off





2.3 DIL-switches

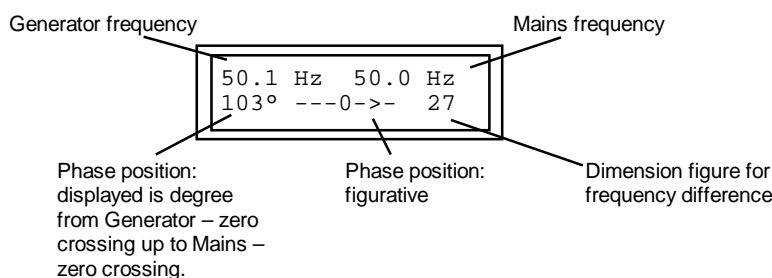
The Dil-switches have following function:



- S1:** – without Function
- S2:** ON – entry of parameters
- S3:** – without Function
- S4:** OFF – indication $F_{GEN} \geq F_{Netz} + \Delta F_{min}$ active
ON – deactivated

3 Synchronoscope

By using the UP-key the synchronoscope is selected. The SYN-6.2 shows following information on the display:



Display symbols for the phase position:

If mains or generator are no longer detected, automatic re-activation of the standard display (voltages and frequencies) takes place.

$F_{netz} > F_{gen.}$	>
$F_{netz} < F_{gen.}$	<
$F_{netz} = F_{gen.}$	

4 Parameterisation

For correct adjustment to the respective application a parameterisation is required. Prior to first commissioning the triggering values, the date and time have to be parameterised and adjusted.

4.1 Adjustment of parameters

By closing DIL-S2 (ON), the parameterisation will be reached. Resetting of DIL-S2 (OFF) leaves the parameterisation. All setting values are stored in an EEPROM. A battery buffer is not necessary

4.1.1 Selection of parameters

Within the parameterisation the parameters are scrolled through the display with the UP-key until the value to be altered has been reached.

4.1.2 Entry

The entry or alteration respectively of the selected parameter is started with the ENT-key. The cursor position also is changed with the ENT-key. The digit at which position the cursor is placed is counted up resp. changed with the UP-key. When all cursor position have been keyed through, return to the parameter selection mode is done by using the ENT-key.

4.1.3 Coding

In order to aggravate an unauthorized change the parameterisation may also be quitted encoded.

Text display:

PARAMETER SELECT
CODING WITH ENT

then press the ENT-key.

After a codification the selection of parameters is entered as follows:
Actuate DIL-S2, maintain ENT-key pressed and press UP-key 3 times.

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5 Parameters

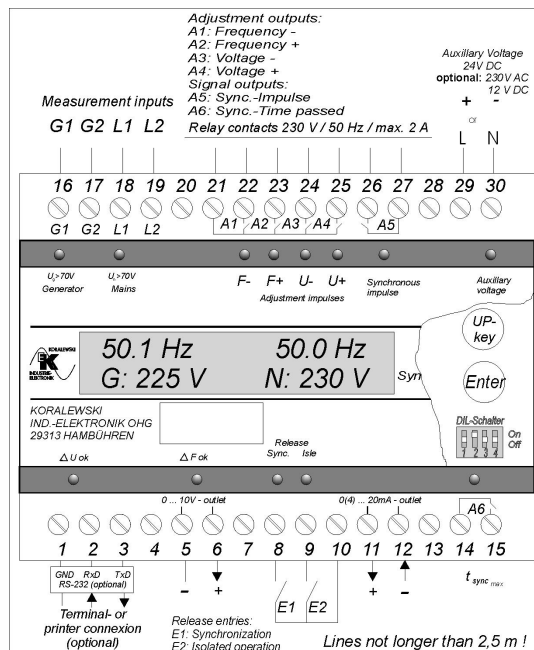
	Display	Remarks	Range & Unit	Factory preset	set
1	Voreilz:	Lead time – serves as balance for the switch elements delays. The sync. impulse is given 'prematurely' at the lead time, prior to the expected sync. time. Typical delay of the generator switch: 50 ms.	10 ... 500ms	50ms	
2	DFmax :	max. difference frequency – maximum allowable frequency deviation at high hook up may take place.	0.01 ... 0.99Hz	0.10Hz	
3	DFmin: ¹⁾	min. difference frequency – in the synchronization operation the generator is always regulated to a small frequency deviation to the mains, so that the generator frequency is maintained in beat in regards to the mains frequency and so synchronization becomes possible.	0.05 ... 0.50Hz	0.05Hz	
4	DUmax.:	max. difference voltage – maximum allowable deviation of the generator voltage from the mains voltage at which hook up may take place.	1 ... 15%	5%	
5	N-Korr:	correction value mains voltage measurement – for correction of possibly interposed voltage transformers.	0.50 2.00	1.000	
6	G-Korr:	correction value generator voltage measurement – for correction of possibly interposed voltage transformers.	0.50 2.00	1.000	
7	SYNCIMP:	Duration of the synchronous impulse	50 ... 999ms	200ms	
8	SPGIMP.:	Impulse length of voltage change impulses – min. duration of quiescent period of the voltage change impulses: if the quiescent period is smaller than the impulse, a continuous impulse occurs.	50 ... 999ms	100ms	
9	FRQIMP.:	Impulse length of frequency change impulses – min. duration of quiescent period of the frequency change impulses: if the quiescent period is smaller than the impulse, a continuous impulse occurs.	50...999ms	100ms	
10	V-FRQ .:	Reinforcement of the frequency control circuit – the reinforcement influences the reaction speed of the regulator in case of frequency deviations.	1 ... 600 (IMP./min)/Hz	60 IPM/Hz	
11	V-SPG.:	Reinforcement of the voltage control circuit – the reinforcement influences the reaction speed of the regulator in case of voltage deviations.	1 ... 100 (IMP./min)/V	60 IPM/V	
12	F-INTEG: ²⁾	Integration time for frequency regulation – the frequency used as actual value for the frequency regulation is muddled over several periods in order to maintain the control circuit calm.	1 ... 999 PER	50 PER	
13	TSYNmax:	Maximum synchronization time –when after release the synchronization will not be completed after passing of this time, relay 6 releases for 4 seconds. Retriggered automatically as long as the release (E1) lasts.	1 ... 999s	180s	
14	GEN.-FRQ:	Leading frequency in isolated operation – if the input E2 is switched and the nominal frequency is > '0 Hz', the generator will be regulated to this frequency..	0 / 45 ... 65Hz	50Hz	
15	GEN.-SPG:	Nominal voltage in isolated operation – if input E2 is switched and the nominal voltage is > '0 V', the generator will be regulated to this voltage.	0 V ... 500 V	400V	
16	SYN-BEG.:	Start of Synchronization – delay time start of synchronization after release.	0 ... 99s	0,5s	
17	IMPULSE – SURVEIL.	Monitoring function 'TSYNmax' – surveillance of synchronous impulse or of release. Relay 6 falls off after the time adjusted in Para 13 has elapsed.	IMPULSE-SURVEIL. E1 – SURV.	IMPULSE – SURVEIL-LANCE	
18	Change language	Display text – Sprache Deutsch or Language English	Deutsch / English	SPRACHE DEUTSCH	
19	Coding	Coding with ENT		CODING with ENT	

1) In case of synchronization it has to be at least once after the release $F_{GEN} \geq F_{Netz} + \Delta F_{min}$, so that the synchronization may take place. (Identification when inputs for mains and generator are switched in parallel.) May be switched off by DIL-S4.

2) No influence on the calculation of the synchronization time – here always a muddling takes place over a duration of 5 periods.



6 Connection diagram

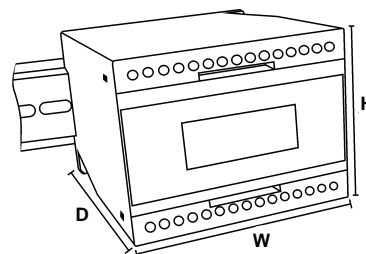


7 Technical data



**Installation and first commissioning only by trained experts.
Connection in accordance with VDE 0160.**

Auxiliary voltage	24 V DC / optional 230 V AC (-10% + 6%) or 12 V DC	
Power consumption	3 W at 24 V DC / ca. 5 VA at 230 V AC	
digital Inputs	12 V, 8 mA (opto-decoupled), lines not longer than 2,5 m	
Relay outputs	230 V / 50 Hz / 2 A	
Output impulses	adjustable 50 ... 999 ms	
Lead time	adjustable 10 ... 500 ms	ex works: 50 ms
max. difference frequency	adjustable 0,01 ... 0,99 Hz	ex works: 0,10 Hz
min. difference frequency	adjustable 0,05 ... 0,50 Hz	ex works: 0,05 Hz
Difference voltage	adjustable 1 ... 15 %	ex works: 5 %
min. measurem. voltage	70 V	
Kind of Protection	Housing: IP40 Terminals: IP20	
Ambient temperature	-22 ... +55 °C	
Housing dimensions	W / H / D : 100 x 75 x 110 mm standard bar installation 35 mm (Depth with Terminals 85 mm)	
Special accessory	Switch boards mounting frame	



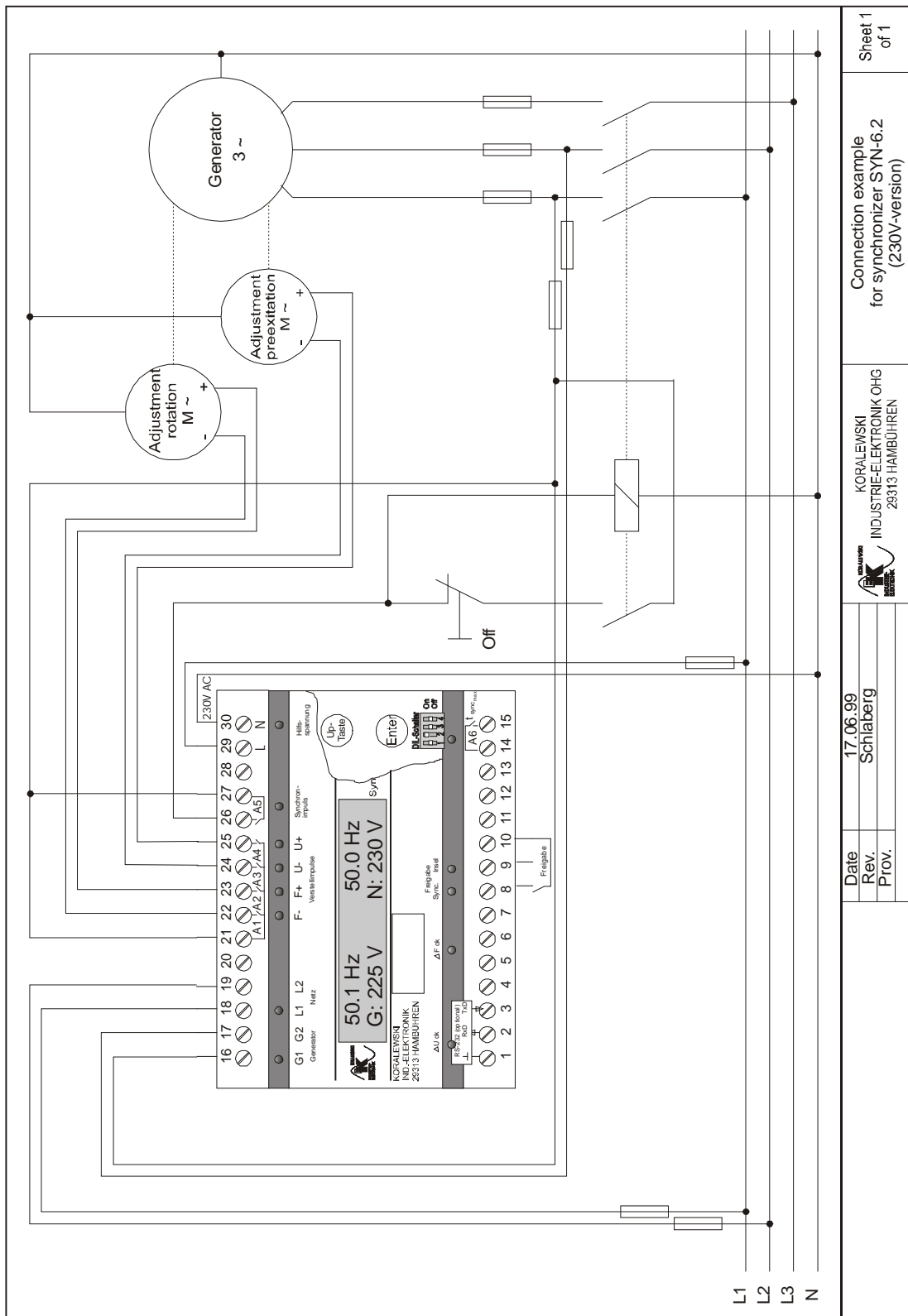
7.1 Ordering information

Synchronizer SYN-6.2	Part number
12 V DC – version:	E1835
24 V DC – version:	E1846
230 V AC – version:	E1847
<i>Note:</i>	A variant of SYN-6.2 in 100 V AC – version is optional available.

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8 Connection example



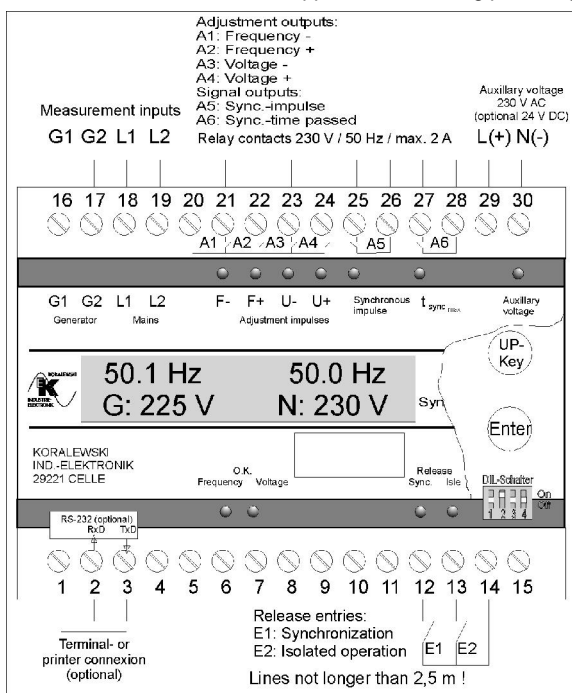
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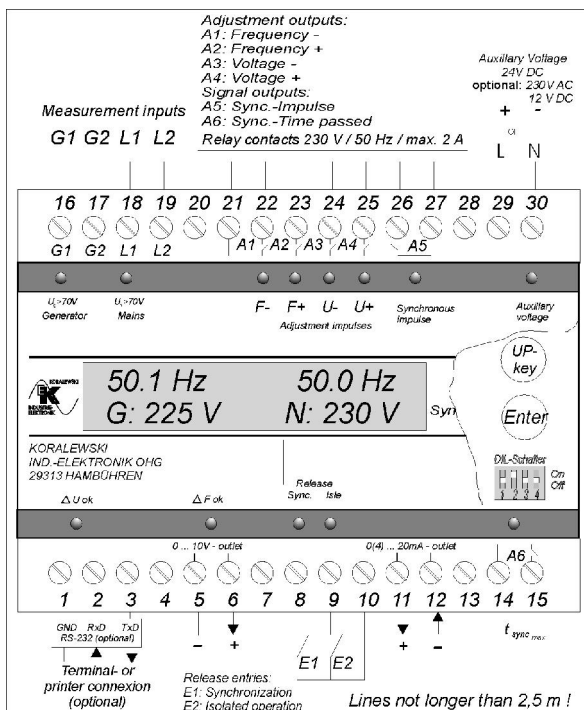
9 Change of terminals



The SYN-6.2 so far has been supplied with following pin configuration:



The SYN-6N is no longer manufactured by our company. In future we are producing the SYN-6.2. Changes in pin configuration are resulting:



Please take note of this change and take it into consideration in your switch documents.

Status 25.02.1999