

# KS3 SYNCHRONIZING UNIT

## FEATURES:

MOD  
BUS

Password  
protection

VT

## INPUTS:

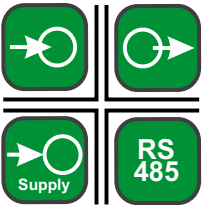
AC

## OUTPUTS:

2x

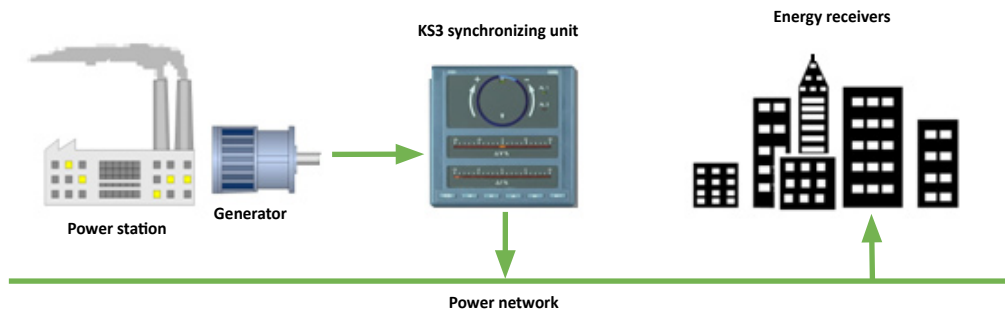
RS  
485

## GALVANIC ISOLATION:



- Destined to automatic synchronizing of three-phase generators connected in parallel with power networks of 50 or 60 Hz rated frequency.
- Measurement through voltage transformers.
- Measurement and visualization of phase, frequency and voltage differences.
- Signaling of the synchronizing conditions (AI1) – programmable parameters.
- Signaling of the generator and network voltage value beyond the 80-120% rated range value (AI2).
- RS-485 interface with MODBUS protocol.
- Measurement of minimum and maximum voltage and frequency values.

## EXAMPLE OF APPLICATION



## MEASURED PARAMETERS AND ADMISSIBLE ERRORS

| Measured value       | Range  | Basic error  | Remarks   |
|----------------------|--|--|---|
| Voltage $U_i^*$      | 100.0 V (Ku=1)<br>110.0 V (Ku=1)<br>240.0 V (Ku=1)<br>400.0 V (Ku=1) | $\pm (0.2\% \text{ m.v} + 0.1\% \text{ range})$  | Ku=1...4000 (max. 400 kV)   |
| Frequency $f^*$      | 15.0...500.0 Hz  | $\pm (0.5\% \text{ m.v} + 2c)$   |   |
| Voltage difference   | -20...0...20%  | KS3.1: $\pm (0.5\% \text{ m.v.} + 2c)$<br>KS3.2: $\pm (0.5\% \text{ range} + 1 \text{ segment})$ | KS3.2: resolution 0.6%  |
| Frequency difference | -10...0...10%  | KS3.1: $\pm (0.5\% \text{ m.v} + 2c)$<br>KS3.2: $\pm (0.2\% \text{ range} + 1 \text{ segment})$  | KS3.2: resolution 0.3%  |
| Phase shift          | 0..360°  | $\pm 1^\circ$  | in KS3.2: resolution 5° for the circle, $\pm 2$ for zero indication $357 < \varphi < 3$ |

in KS3.2, the value monitoring is available through the interface. Ku - voltage transformer ratio, m.v.-measured value, range-measured range, C - the less significant display digit

## OUTPUTS

| Output type | Properties  |
|-------------|---|
| Relay       | • Voltageless NO contacts, load capacity: 0.5 A a.c./250 V a.c. |

## DIGITAL INTERFACE

| Interface type | Transmission protocols | Mode                         | Baud rate             |
|----------------|------------------------|------------------------------|-----------------------|
| RS-485         | MODBUS RTU and ASCII   | 8N2, 8E1, 8O1, 8N1, 7E1, 7O2 | 4,8; 9,6; 19,2 kbit/s |

## EXTERNAL FEATURES

|                    |   |  |
|--------------------|---|--|
| Readout field      | KS3.1:<br>4 x 5 LED digits, 14 mm, red colour | KS3.2:<br>synchroscope: circle with 72 diodes;<br>voltmeter and differential frequency meter: bargraph with zero in the middle (68 diodes) |
| Overall dimensions | 144 x 144 x 77 mm                             | Panel cut-out : $138^{+0,5} \times 138^{+0,5}$ mm  |
| Weight             | 0.8 kg  | with packing   |
| Protection grade   | from frontal side: IP40                       | from terminal side: IP10   |

# KS3 SYNCHRONIZING UNIT

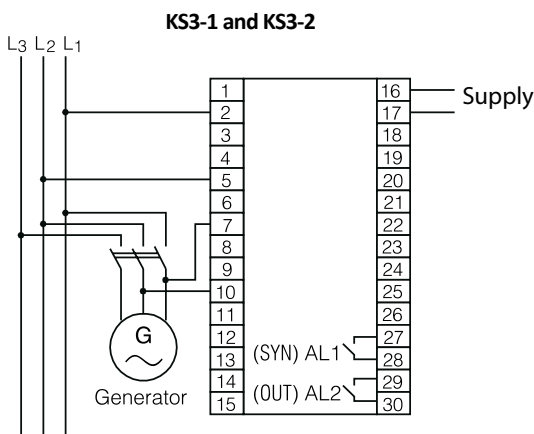
## RATED OPERATING CONDITIONS

|                                 |  |   |
|---------------------------------|--|---|
| Supply voltage                  | 18...30 V d.c./a.c. 40...400 Hz              | 85...250 V d.c./a.c. 40...400 Hz                                |
| Input power                     | Supply circuit : ≤12 VA                      | Voltage circuit: ≤0.5 VA  |
| Input signal                    | • 0...0.1...1.2 Un for voltage and frequency | • frequency 15...45...65...500 Hz;<br>• sinusoidalny (THD ≤ 8%) |
| Temperature                     | ambient : 0...23...55°C                      |   |
| Relative humidity               | 25...95%                                     | inadmissible condensation                                       |
| Operating position              | any  |   |
| External magnetic field         | 0...40...400 A/m                             |   |
| Short duration overload (5 sec) | 2 Un (max. 1000 V)                           |   |
| Admissible voltage peak factor  | 2  |   |

## SAFETY AND COMPABILITY REQUIREMENTS

|  |                 |                      |
|--|-----------------|----------------------|
| Electromagnetic compatibility            | noise immunity  | acc. to EN 61000-6-2 |
|  | noise emissions | acc. to EN 61000-6-4 |
| Isolation ensured by the casing          | double          | acc. to EN 61010-1   |
| Isolation between circuits               | basic           |                      |
| Polution level                           | 2               |                      |
| Installation category                    | III             |                      |
| Maximum phase-to-earth operating voltage | 600 V a.c.      |                      |
| Altitude above sea level                 | < 2000 m        |                      |

## CONNECTIONS DIAGRAMS



## TYPES OF VERSIONS



**KS3-1 type**  
Synchronizing unit  
with digital indications



**KS3-2 type**  
Synchronizing unit with bargraph

## ORDERING

|  | KS3 | X | XX | X  | X | XX | X  |
|--|-----|---|----|----|---|----|----|
| <b>Kind of display:</b>                      |     |   |    |    |   |    |    |
| LED digits                                   |     | 1 |    |    |   |    |    |
| bargraphs (diode lines)                      |     | 2 |    |    |   |    |    |
| <b>Input voltages:</b>                       |     |   |    |    |   |    |    |
| 100 V  |     |   |    | 01 |   |    |    |
| 110 V  |     |   |    | 02 |   |    |    |
| 240 V  |     |   |    | 03 |   |    |    |
| 400 V  |     |   |    | 04 |   |    |    |
| <b>Digital output:</b>                       |     |   |    |    |   |    |    |
| without interface                            |     |   |    |    |   | 0  |    |
| with RS-485 interface                        |     |   |    |    |   | 1  |    |
| <b>Supply voltage:</b>                       |     |   |    |    |   |    |    |
| 85 ... 250 V d.c./a.c.                       |     |   |    |    |   |    | 0  |
| 24 V d.c./a.c.                               |     |   |    |    |   |    | 1  |
| <b>Version:</b>                              |     |   |    |    |   |    |    |
| standard                                     |     |   |    |    |   |    | 00 |
| custom-made                                  |     |   |    |    |   |    | xx |
| <b>Acceptance tests:</b>                     |     |   |    |    |   |    |    |
| without additional quality requirements      |     |   |    |    |   |    | 8  |
| with an extra inspection quality certificate |     |   |    |    |   |    | 7  |
| acc.to customer's request*                   |     |   |    |    |   |    | x  |

### Order example 1:

The code: **KS3 - 1.04.1.0.00.8** means:

- KS3** - synchronizing unit of KS3 type
- 1** - with digital displays
- 04** - input voltage 400 V
- 1** - digital output with RS-485 interface
- 0** - supply voltage : 85...250 V d.c./a.c.
- 00** - standard version
- 8** - without additional quality requirements

### Order example 2:

The code: **KS3 - 2.04.1.0.00.8** means:

- KS3** - synchronizing unit of KS3 type
- 2** - with diode lines
- 04** - input voltage 400 V
- 1** - digital output with interface RS-485
- 0** - supply voltage 85...250 V d.c./a.c.
- 00** - standard version
- 1** - without additional quality requirements

## SEE ALSO:



P43 - 3 - phase  
transistor  
of power network  
parameters



ND20 - meter  
of power network  
parameters



ND1 - analyser  
of power network  
parameters

\* - only after agreeing with the manufacturer