KS-Ad SIGNAL TOWER INSTRUCTIONS

The KS-Ad signal tower through the built-in control system enables generating optical as well as acoustic and optical signals such as:

- fixed light,
- pulsed light 1 Hz, 5Hz, irregular (except for the green colour),
- revolving light (“cock” effect) for all colours except for green,
- brightness modulation, only for the green colour,
- in the version without a sound module, the strobe light for the red signal.

OPTICAL SIGNAL	ACOUSTIC SIGNAL
	Increased frequency from 400Hz to 1300Hz during 1s (microswitch SIGNAL/STR in the position ”0”), increased frequency from 2400Hz to 2850Hz during 0.14s (microswitch SIGNAL/STR in the position ”1”),
	frequency 2850Hz: serially 60ms of sound, 120ms of silence
	constant sound 300Hz
	serially sections of 0.5s with the frequency of 800Hz, 700Hz
	frequency 3000Hz, 3 bundles of pulses with the time duration of 32ms each one (sound and silence of 16ms) separated with the silence of 0.5s, and then 1.5s of silence

Table 1. List of acoustic signals

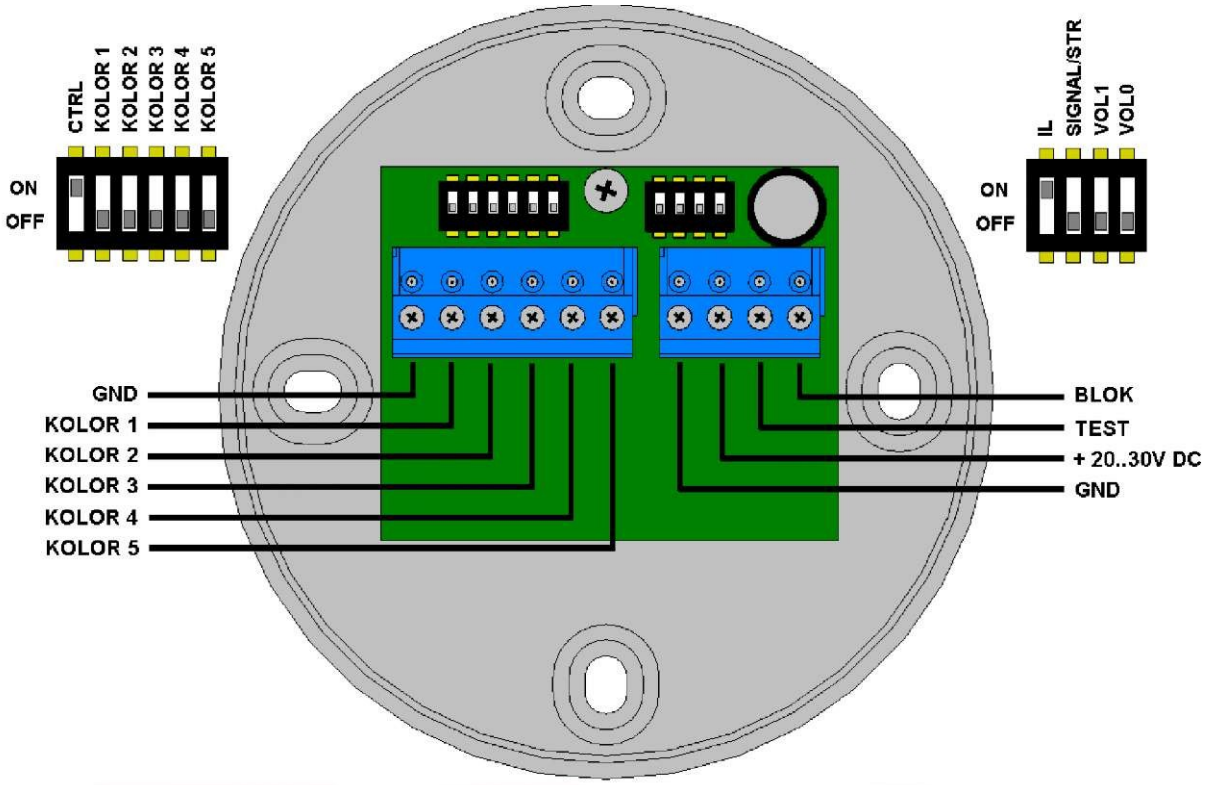

Fig.1. Control element layout in the KS-Ad signal tower

SIGNALS CONTROLLING OPERATION OF THE KS-Ad TOWER

KS-Ad tower has got the number of inputs dependent on the number of colours as well as the presence of sound module.

COLOUR 1	controlling input for the first colour counting from the top of the tower,
TEST	test input (giving the ground introduces the tower into the testing mode),
BLOCK	input of acoustic signal lockout (giving the ground locks the acoustic signal),
VCC	supply voltage input +20..30V DC,
GND	input of supply voltage ground.

The signal tower has also got microswitches installed in the basis, which have the following functions:

COLOUR 1. COLOUR 5	selection of the input configuration,
CTRL	selection of the controlling type for inputs: analogue, volt-free or digital,
IL	selection of the option „Irregular light" – the option of irregular light,
SIGNAL/STR	selection of sound type for the red light, additional optical signal (version without an acoustic module),
VOL 1 VOL 0	selection of volume degree (four-level control).

METHODS OF CONTROLLING THE KS-Ad SIGNAL TOWER OPERATION

The KS-Ad signal tower offers the user three controlling options: analogue (voltage or resistance dialled by means of microswitches COLOUR 1..COLOUR 5), volt-free (binary control by means of relay contacts) as well as digital control (two-stage). The selection of control type is made by means of the microswitch CTRL placed in the device basis.
In case of analogue control each tower input (COLOUR 1..COLOUR 5) can be controlled independently (e.g. 4 inputs in the voltage way, 1 input in the resistance way). In the voltage mode the voltage given on terminals should be included in the range of 0..10V DC. In the volt-free control mode all inputs operate in the two-stage mode: the input fault to frame or leaving the input unplugged. The change of control input state can be made e.g. by means of relay contacts.
The control system of the signal tower prevents generating accidental warning signals as a result of incorrect control. In case of appearing a fault (or breakdown) in the system applying control signals to the tower input (e.g. a situation, when the user wants to receive two acoustic signals at the same time) the tower electronic system operates on a priority basis (reproduces the signal of greater importance). It means that e.g. when there is a warning signal and then there appears the distress signal, the tower will reproduce the distress signal.
Additionally, the KS-Ad signal tower has got: the option of switching off the audible signal, a test mode, the option IL (Irregular light), the possibility of selecting the additional sound for the red light as well as in case of the version without an acoustic mode the option of selecting the strobe light for the red colour.

Switching off an audible sound:
Giving the ground to the input ”BLOCK” causes immediate switching off the acoustic signal regardless of the input state COLOUR 1..COLOUR 5, whereas in the voltage control mode it’s enough to give ”the impulse” of the ground, however in case of free-volt as well as digital control it must be a stable state until the moment of appearing the next control signal.

CAUTION!
In the analogue mode generating a new (different) acoustic and optical signal eliminates a sound blockade.

Test mode:
Entering the test mode takes place through giving the ground to the input: ”TEST”, it causes generating the fixed light of all tower colours as well as simultaneous sound generation with the constant frequency (300Hz). The sound can be switched off by the input of acoustic signal blockade.

CAUTION!
During the test the tower does not react to the input state COLOUR 1...COLOUR 5.

Option IL:
In case of switching on the option of irregular light (microswitch IL placed in the device basis) the revolving light effect is replaced with the irregular light.

Selection of the additional sound for the red light:
SIGNAL put in the position 0: serially increased frequency from 400Hz to 1300Hz during 1s,
SIGNAL put in the position 1: serially increased frequency from 2400Hz to 2850Hz during 0,14s.

Selection of the strobe light for the red colour (only in the version without an acoustic module):
In case of switching over the microswitch SIGNAL/STR in the position ”ON”, there is chosen the strobe light type. This light is active only for the red colour (or the first colour counting from the top of the tower, in case of nonstandard product).

1. Analogue voltage control:

This tower control mode is selected by means of the microswitch CTRL put in the position ”ON", microswitch COLOUR 1..COLOUR 5 in the position ”OFF”.
In case of voltage control the user applies the voltage signal in the range of 0-10V DC to terminals of the tower COLOUR 1..COLOUR 5. Depending on the level of the control signal the tower generates appropriate optical as well as audible signals.

Voltage on the signal tower terminal [V] DC	Effect
0	No reaction
1.5 ±0.3V	sound
2.5 ±0.3V	Fixed light, no sound
3.5 ±0.3V	Fixed light + sound
4.5 ±0.3V	Blinking light 1 Hz, no sound
5.5 ±0.3V	Blinking light 1 Hz + sound
6.5 ±0.3V	Blinking light 5Hz, no sound
7.5 ±0.3V	Blinking light 5Hz + sound
8.5 ±0.3V	Revolving light without sound
9.5 ±0.3V	Revolving light + sound (or irregular light in case of choosing this option)
CAUTION! In case of the green colour the revolving light is replaced with the effect of light intensity modulation.	

Table 1.1. Voltage signal values in the analogue voltage control

2. Analogue resistance control

This tower control mode is selected by means of the microswitch CTRL put in the position ”ON”, the microswitch COLOUR 1 ..COLOUR 5 in the position ”ON”.
In case of resistance control the user connects the given resistance value to terminals of the tower COLOUR 1..COLOUR 5. Depending on this value the tower generates appropriate optical as well as audible signals.

Value of the resistance connected to the signal tower terminal	**Effect**
0 or not connected	No reaction
470Ω ±5%	sound
910Ω ±5%	Fixed light, no sound
1.5kΩ ±5%	Fixed light + sound
2.2kΩ ±5%	Blinking light 1 Hz, no sound
3kΩ ±5%	Blinking light 1 Hz + sound
4.3kΩ ±5%	Blinking light 5Hz, no sound
6.2kΩ ±5%	Blinking light 5Hz + sound
10kΩ ±5%	Revolving light without sound
15kΩ ±5%	Revolving light + sound (or irregular light in case of choosing this option)
CAUTION! In case of the green light the revolving light is replaced with the effect of light intensity modulation.	

Table 2.1. Resistance values in the analogue voltage control

3. Free-volt control

This tower control mode is selected by means of the microswitch CTRL put in the position ”OFF”, microswitches COLOUR 1..COLOUR 5 in the position ”ON”. In this mode tower inputs operate in the free-volt way. Inputs are shorted to ground or they are left unplugged. This control type can be done e.g. by means of relay contacts.
In the free-volt control the compact input to ground means the fixed light generation with the sound for the appropriate colour. The input opening does not eliminate the acoustic signal. In order to eliminate the acoustic signal one should use the input of the acoustic signal blockade. If it is necessary to generate the pulsed light, the user self-controls the contact, shorting the input to ground in a pulsed way. In case of restricted sequences (e.g. red and green colours simultaneously) the device generates the light effect consistent with the table below.

COLOUR 1	COLOUR 2	COLOUR 3	COLOUR 4	COLOUR 5	EFFECT
R	Z	Z	x	X	Revolving light with the sound for the red COLOUR (or irregular light), for the white as well as blue COLOUR the presence of optical signal is dependent on the state of inputs COLOUR 4, 5.
Z	R	Z	x	x	Revolving light with the sound for the yellow COLOUR (or irregular light), for the white as well as blue COLOUR the presence of optical signal is dependent on the state of inputs COLOUR 4, 5.
Z	Z	R	x	x	Light intensity modulation with the sound for the green COLOUR, for the white as well as blue COLOUR the presence of optical signal is dependent on the state of inputs COLOUR 4, 5.
Z	Z	Z	Z	R	Revolving light with the sound for the blue COLOUR (or irregular light).
Z	Z	Z	R	Z	Revolving light with the sound for the white COLOUR (or irregular light).
Z	Z	Z	Z	Z	All COLOURs with the cock effect and the gradient for the green colour, without sound
Z	Z	Z	R	R	Demo effect without sound

Table 3.1. Combinations in the free-volt control

Legend:

Z compact input to ground,
R enable input (unplugged),
X optional input state (Z or R).

4. Digital control

This tower control mode is selected by means of the microswitch CTRL put in the position ”OFF”, microswitches COLOUR 1..COLOUR 5 in the position ”OFF”. In this mode the user applies two voltage levels (logical) to tower inputs. The level ”0” of the logical one corresponds with the voltage 6..10V, the level ”1” of the logical one – the voltage of 0..2V DC.

The application to terminals of the logical tower ”1” causes the fixed light generation for the appropriate COLOUR.

In case of restricted sequences the system generates effects consistent with the **Table 3.1.**, whereas:

Z means giving the logical (tower) to the input ”1”
R means giving the logical (level) to the input ”0”
X optional logical state

Caution!!!
Exemplary control circuit diagrams are on the website.