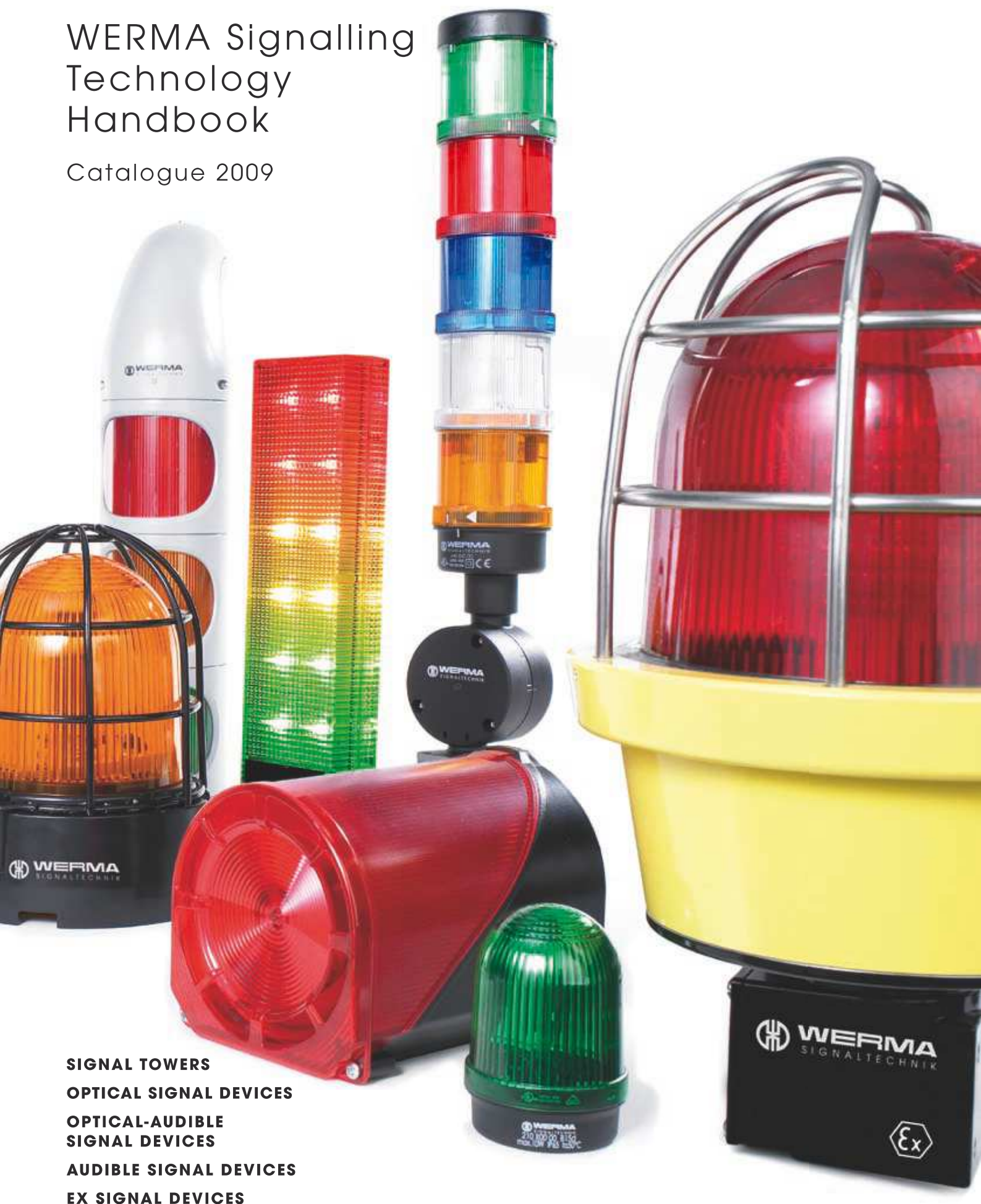


WERMA Signalling Technology Handbook

Catalogue 2009



SIGNAL TOWERS






OPTICAL SIGNAL DEVICES

**OPTICAL-AUDIBLE
SIGNAL DEVICES**

AUDIBLE SIGNAL DEVICES

EX SIGNAL DEVICES

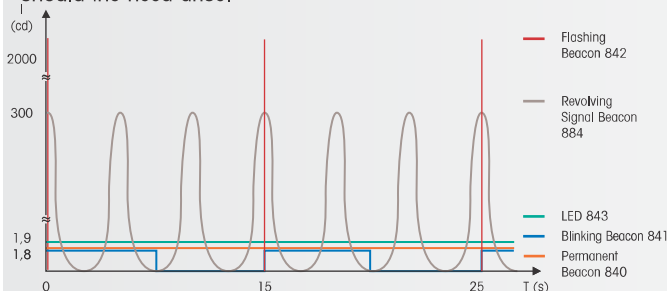
Key to optical and audible signals

optical signals		audible signals	
colour	meaning	signal tone	meaning
red 	extreme danger / hazardous conditions	MULTI-TONE: scale in differing frequencies (various high / low frequencies) with regular, cyclical intervals	extreme danger / immediate action
yellow 	beware / dangerous conditions imminent	TWO-TONE: scale in differing frequencies (one high, one low frequency) with regular, cyclical intervals	extreme danger / immediate action
green 	normal conditions	ALTERNATING TONE: continuous tone with graduated decrease and increase of sound frequencies	danger / immediate action
blue 	conditions requiring defined action	PULSE TONE: regular intervals between on and off cycle	danger / immediate reaction
white/clear 	no particular meaning	CONTINUOUS TONE: continuous tone in specific frequency	safety

Light intensity of optical signal devices

Light intensity of LED

Details pertaining to beacons with LED are based on a standing of December 2000. Component-related improvements are continually developing; please enquire as to the current light intensity should the need arise.



Light intensity of beacons with bulbs

Light intensity pertains to the bulbs used by WERMA; the use of other bulbs may lead to discrepancies.



Specifications made on product pages

The light intensity of optical signal devices is given in the form of a pictogram. Specifications are based generally on signal beacons with 24 V DC with a clear dome. Exceptions to the operating voltage are rotating mirror beacons 880, 881, 883 and rotating signal beacon 884. These are quoted in the most common version with 230 V AC. Testing is carried out with the beacons in the most frequent working position and therefore in the observer's field of vision.

	Voltage	Dome colour	Light intensity in candela
Permanent light	24 V \equiv	clear	max. value
Flashing light	24 V \equiv	clear	Blondel-Rey*
LED permanent light	24 V \equiv	clear	max. value
Rotating mirror beacon	230 V \sim	clear	Blondel-Rey*
Revolving beacon 884	230 V \sim	clear	Blondel-Rey*

*The Blondel-Rey value defines the physiological perception of brightness.

Light in Signalling technology –

Optical Signals in everyday life

The field of signalling technology offers us not only the possibility of audible signals, but also that of optical signals. These are to be found everywhere in everyday life; at traffic lights, in alarm systems or where obstructions arise. Countless uses can also be found in the industrial sector, above all in the signalisation of a machine operating status.



The generation of light – a summary of the possibilities

Light can be generated in various ways. Signalling technology mostly uses bulbs, halogen bulbs, electric discharge tubes and LEDs.



Bulbs

A tungsten filament is heated up to a high temperature, so radiating energy over a wide wavelength. This is perceived as light similar to sunlight. The tungsten filament evaporates with time. When the tungsten content falls below a certain level, the maximum life duration of the bulb is reached. As tungsten oxidises quickly and is destroyed when it comes into contact with air, the filament must be kept in a non-oxidising atmosphere such as vacuum. This leads us to the familiar light bulb with its sealed glass body.



Halogen bulbs

These are bulbs wherein the tungsten filament is enclosed by a small amount of halogen. The resulting chemical reaction has the effect of lengthening the life of the tungsten and stabilising the light output throughout the entire life duration of the bulb.



Electric discharge tubes

Xenon flash tubes are widely used in signalling technology. They consist of a glass tube filled with the inert gas xenon. A sufficiently high voltage leads to a discharge of energy with a spark gap and a flash of high intensity.



LED

Light emitting diodes are constructed using certain semiconductors. Foreign atoms are built into the semiconductor with the purpose of optimising the conductivity. Half of the semiconductor (n-region) is doped with foreign atoms that contain one bonding electron more than the semiconductor atom. This surplus atom can move freely and increases conductivity. The other half (p-region) is doped with foreign atoms containing one electron less than the semiconductor. When the LED is switched on, these faults ("holes") fill up with free electrons (recombination). Energy in the form of radiant photons is hereby released. The energy and therefore the colour of the light emitted is determined by the material the semiconductor is made of; e.g. GaAsP (Gallium Arsenic Phosphide) results in red light.

a WERMA key competency

LED – Beacons with many advantages

LEDs offer many advantages when compared with conventional light bulbs:

- ✓ Minute dimensions
- ✓ Low current consumption
- ✓ Low heat generation
- ✓ Extremely high life duration of up to 50,000 hours
- ✓ All major colours can be realised
- ✓ Vibration and shock resistance
- ✓ Immediate illumination



Fundamental units of light magnitude

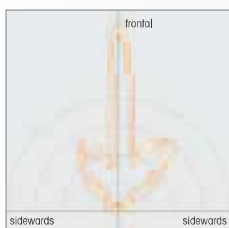
The fields of lighting and signalling technology differentiate between fundamental units to define light itself. The most important of these are the units Lumen, Candela and Lux.

✓ Lumen (unit lm)

Light current is measured in Lumen; this is the unit for the entire visible light output of a light-emitting source. The light current is defined by the following formula known as the brightness characteristic:

Light current ϕ [in lm] = radiation capacity x brightness characteristic $V(\lambda)$

The brightness impression upon the human eye is based on a sensitivity curve $V(\lambda)$ which reproduces the sensation felt by the eye in relation to the wavelength. The maximum point on this curve is at about 555 nm; we see best at this wavelength; $V(555 \text{ nm}) = 1$.



✓ Candela (unit cd)

In signalling technology only the part of the light current that is emitted in a certain direction is of importance. This light intensity is measured in Candela. It is defined by the light current of a lamp and the steradian measure $\frac{1}{4\pi \text{ sr}}$.

Light intensity [in cd] = light current ϕ x steradian measure

A complete sphere has a dihedral angle of $\Omega = 4\pi \text{ sr}$. sr stands for the steradian and is the unit for the dihedral angle.

Example: a household candle emitting a light intensity of 12,566 Lumen has a light intensity in relation to the steradian measure $\frac{12,566 \text{ lm}}{4\pi \text{ sr}} \approx 1 \text{ cd}$.

This explains the name: candela is the Latin word for candle.



✓ Lux (unit lx)

Illumination density is an important unit in lighting installations. It is the measure of the brightness with which an area is illuminated. Whereas light intensity (in cd) is a property of a light source, illumination density is calculated in regard to the area to be illuminated.

Where the light current emitted is constant, the following formula is applicable:

Light density E [in lux] = $\frac{\text{Light current } \phi}{\text{Surface A}}$

Acoustics in Signalling technology –

Audible signals are everywhere!

Audible signals warn, protect and guide us in the modern industrial world. They function where caution, prudence and clarity are imperative, indicate emergencies and demand direct action. They are globally understood, irrespective of language, written or spoken.

Audible signals are deployed where an optical signal is insufficient or inappropriate. A wide range of products belong to this essential group of audible signal devices: The car horn, indispensable for driving in traffic, the buzzer of an egg timer, the school bell signalling break times and the siren on emergency vehicles.

Audible devices also enjoy a wide range of applications in industrial environments where they are deployed to indicate malfunctions or to provide a warning in dangerous situations. The basic signal is provided by one or more tones or a sequence of tones, and is to raise awareness and alert to a specific danger.



Types of audible signals



WERMA provides a wide range of audible signal devices for the most diverse fields of use:

- ✓ Sirens and multi-tone sirens
- ✓ Buzzers and installation buzzers
- ✓ Signal horns
- ✓ Three-tone gongs
- ✓ Alarm bells



Double safety with optical-audible signals

Under certain conditions, operational sites with a high or changing noise level require a coloured, optical stimulus in addition to the audible signal.

The combination of optical and audible signals leads to greater effectiveness as both the eyes and ears are addressed by the sensory stimuli. The combination of an optical and an audible signal rules out the possibility of mistakes or the audible signal being overheard.





Signal Towers

Signal

Modular Signal Towers

- Modular system allows a completely free combination of optical and audible signal elements.
- Mechanical and electrical connection of the elements in the space of seconds using a bayonet connection system.
- Completely safe bulb changes (contact-voltage proof) without the need for tools.



KombiSIGN 71



Ø 70 mm

- Protection rating IP 65
- For use in extreme conditions

Page 40 onwards.

KombiSIGN 70



Ø 70 mm

- Protection rating IP 54
- For use in normal conditions

Page 56 onwards.

KombiSIGN 50



Ø 50 mm

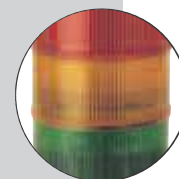
- Protection rating IP 54
- For use on smaller machines.

Page 70 onwards.

Towers

Completely pre-assembled Signal Towers

- Completely pre-assembled LED signal towers.
- The complete tower can be ordered using a single number, considerably simplifying the ordering process.
- Available in the most commonly used signal combinations.
- LED technology with a life duration of up to 70,000 hours. The replacement of elements or light bulbs is therefore no longer necessary.



NEW

VarioSIGN



62 x 220 x 30.5 mm

- Protection rating IP 65
- Electronic modularity
- Unique design

Page 78 onwards.

deSIGN 42



Ø 42 mm

- Protection rating IP 65
- 2 or 3 tier
- High-quality stainless steel housing

Page 82 onwards.

KOMPAKT 36



Ø 36 mm

- Protection rating IP 65
 - 2 or 3 tier
 - Also available in plastic housing with aesthetic silver finish
- Page 84 onwards.

KOMPAKT 71



Ø 70 mm

- Protection rating IP 65
- 2 or 3 tier

Page 86 onwards.



KOMPAKT

THE COMPLETE SIGNAL TOWER SOLUTION – AVAILABLE IN 2 SIZES



THE ADVANTAGES AT A GLANCE



- ✓ Completely pre-assembled LED Signal Tower
- ✓ Cost-effective LED solution
- ✓ Simplified ordering – the complete tower can be ordered with just one number
- ✓ Life duration of up to 70,000 hours
- ✓ Available in the most common signal combinations
- ✓ High protection rating IP 65



KOMPAKT 36 – ALSO AVAILABLE IN AESTHETIC SILVER FINISH

The LED Signal Tower KOMPAKT 36 is also available with aesthetic silver coating. These signal towers are a fusion of modern metal design with high functionality and efficiency

The clear domes ensure an unequivocal signal even in bright light conditions thus ruling out errors even in bad light conditions.

The aesthetically pleasing and innovative plastic housing with metallic coating also makes the signal towers an excellent choice in areas where the optical effect is of importance.

Ordering details see page 85.





KOMPAKT 36
(plug connection)



KOMPAKT 36 in silver finish,
base with integrated tube
(accessory)



Bracket (accessory)

- Completely pre-assembled
- LED Permanent light
- 36 mm diameter
- Available with user-friendly plug connection
- Also available in aesthetic silver finish



TECHNICAL SPECIFICATIONS:

Dimensions (Diameter x Height):	2 tier: 36 x 113 mm	Life duration up to 50,000 hrs
	3 tier: 36 x 147 mm	
Housing:	Housing parts PC	
Fixing:	Surface mounting, Tube mounting, Bracket mounting	
Connection:	Cable connection: Cable, 2 m long, with adapter M 25 / M 12 for fixing incl. rubber seal	
	Plug Connection: M 12 plug with adapter M 25 / M 20 for fixing incl. rubber seal	
Operating voltage:	24 V=	
Current consumption:	40 mA per tier	
Starting current:	< 500 mA can be triggered via PLC	



ORDER SPECIFICATIONS:

KOMPAKT 36

		Connection	Order no.
2 tier	red/green	Cable	693 010 55
	red/yellow	Cable	693 020 55
	red/green	Plug	693 510 55
	red/yellow	Plug	693 520 55
3 tier	red/yellow/green	Cable	693 000 55
	red/yellow/green	Plug	693 500 55

KOMPAKT 36 in silver finish

		Connection	Order no.
2 tier	red/green	Cable	693 080 55
	red/green	Plug	693 580 55
3 tier	red/yellow/green	Cable	693 070 55
	red/yellow/green	Plug	693 570 55

KOMPAKT 36 available on request with negative logic.



ACCESSORIES:

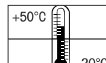
Fixing bracket	960 693 01
To maintain IP 65 the cable gland 960 693 32 must be fitted to the cable version.	
Cable gland M 12 x 1.5 mm	960 693 02
Base with integrated tube M 25 x 1.5 mm incl. rubber seals	960 693 03
Base with integrated tube, silver, M 25 x 1.5 mm incl. Rubber seals	960 693 06
M 12 counter-plug with 5 m cable	960 693 05



TECHNICAL DIAGRAMS:

see page 273

Also available in a ready-to-use version with the widely used M12 plug



2 tier



3 tier



697

LED Signal Tower KOMPAKT 71



Base with tube (accessory)

- Completely pre-assembled
- Three colour combinations
- LED Permanent light
- 70 mm diameter
- Life duration up to 70,000 hrs
- Also available with USB Interface



TECHNICAL SPECIFICATIONS:

Dimensions (Diameter x Height):	2 tier: 70 x 138 mm
	3 tier: 70 x 172 mm
Housing:	Housing parts PC Terminal element: PA fibreglass, high-impact
Fixing:	Base / Bracket mounting Tube mounting
Connection:	Screwable connection max 2.5 mm ² Contact protection according to VDE
Cable entry:	Cable diameter max. 14 mm
Operating voltage:	24 V =
Current consumption:	40 mA per tier
Starting current:	< 500 mA can be triggered via PLC

Life duration
up to 70,000 hrs

ORDER SPECIFICATIONS:

KOMPAKT 71

		Mounting	Order no.
2 tier	red/green	base / bracket mouting	697 010 55
		tube mounting	697 410 55
3 tier	red/yellow/green	base / bracket mouting	697 000 55
		tube mounting	697 400 55

KOMPAKT 71 with negative logic (common +)

		Mounting	Order no.
3 tier	red/yellow/green	base / bracket mouting	697 100 55
		tube mounting	697 500 55

KOMPAKT 71 WITH USB INTERFACE

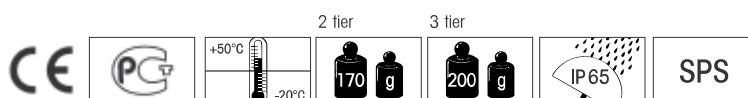
		Mounting	Order no.
3 tier	red/yellow/green	tube mounting	697 430 53

Completely pre-assembled tower with integrated USB terminal element.
No additional voltage supply or hardware is required.
Further information see page 39.



TECHNICAL DIAGRAMS:

see page 275

Kompakt with USB Interface
(Assembly without laptop
and accessories)



ORDER SPECIFICATIONS ACCESSORIES:

Contact box for cable exit at side, with mounting material	975 840 01
Contact box with magnetic base and cable exit at side	975 840 04
Bracket for tube mounting with cable gland	960 000 01
Bracket for surface mounting with cable gland	960 000 02
Bracket for base mounting with concealed cable entry, incl. rubber seals	960 000 14
Bracket for 1-sided mounting, incl. rubber seals	975 840 85
Bracket for 2-sided mounting, incl. rubber seals	975 840 86
Tube with clamp, Ø 25 mm 250 mm long, with cable gland	960 000 18
Tube Ø 25 mm, all anodized aluminium	
100 mm long	975 845 10
250 mm long	975 840 25
400 mm long	975 840 40
600 mm long	975 840 60
800 mm long	975 840 80
1000 mm long	975 840 03
NEW Foldaway Base incl. rubber seals, suitable for tube, Ø 25 mm, all anodized aluminium (Technical specifications see page 48)	960 000 30
NEW Tube Ø 25 mm, plastic for mounting the Terminal Element directly on the Foldaway Base	960 000 31
Base for tube mounting Ø 25 mm, plastic, incl. rubber seal	975 840 90
Base for tube mounting Ø 25 mm, metal, incl. rubber seal, recommended for tube lengths of 400 mm and longer	975 840 91
Base with integrated tube, Ø 25 mm, 110 mm long, plastic, incl. rubber seal	975 840 10
Adapter for tube mounting, Ø 25 mm / 1/2" NPT thread	975 840 02
Adapter for single hole mounting Ø 25 mm, M 18	960 000 25
Cable gland for surface mounting M 16 x 1.5 mm	960 000 04



TECHNICAL DIAGRAMS:

see page 301



- Buzzer in combination with LED Permanent Beacon
- Long life duration up to 50,000 hrs
- Optical and audible signals can be triggered separately
- Continuous or pulse tone selectable
- Easy to mount
- High protection rating IP 65



TECHNICAL SPECIFICATIONS:

Dimensions (Diameter x Height):	89 mm x 101 mm
Housing:	PC, black
Dome:	PC, transparent
Connection:	Screwable connection with wire protection max. 1.5 mm ²
Cable entry:	Cable diameter max. 9 mm
Starting current:	< 0.5 A at 24 V
Tone type:	Continuous or pulse tone, selectable
Tone frequency:	2.3 kHz
Fixing:	Surface mounting
Life duration:	50,000 hrs



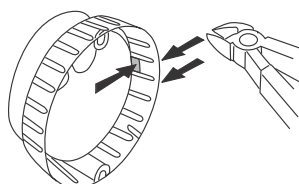
Life duration
up to 50,000 hrs

ORDER SPECIFICATIONS:

Voltage	12 V=	24 V=	115 V~	230 V~
Current consumption LED	80 mA	45 mA	25 mA	25 mA
Current consumption Buzzer	40 mA	15 mA	15 mA	25 mA
red	420 110 54	420 110 75	420 110 67	420 110 68
yellow	420 310 54	420 310 75	420 310 67	420 310 68

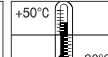
TECHNICAL DIAGRAMS:

see page 260



Piece of rim can be broken out to allow for cable entry from the side.

In preparation
420 X10 54
420 X10 75



Award-winning design



- Electronic Horn in combination with LED Permanent Beacon
- Horn with long life duration up to 5,000 hrs
- Optical and audible signal can be triggered separately
- Adjustable sound output (24 V version)



TECHNICAL SPECIFICATIONS:



Dimensions (D x W x H):	91.4 mm x 82.75 mm x 234.5 mm
Housing:	PC/ABS-Blend; PC grey
Dome:	PC, transparent
Conenction:	Screwable conn. with wire protection max. 1.5 mm ²
Cable entry:	Cable diameter max. 9 mm
Fixing:	Bracket mounting, sound outlet facing downwards
Life duration:	50,000 hrs (LED Permanent light) 5,000 hrs (Horn)
Tone frequency:	110 Hz



ORDER SPECIFICATIONS:

Voltage	24 V ~	115 V ~	230 V ~
Current consumption LED	45 mA	25 mA	25 mA
Current consumption Horn	80 mA	70 mA	70 mA
red	424 120 75	424 120 67	424 120 68
yellow	424 320 75	424 320 67	424 320 68

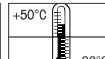
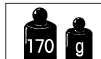


TECHNICAL DIAGRAMS:

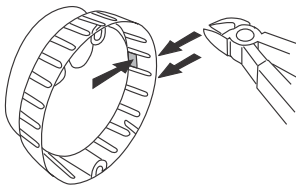
see page 262



In preparation



- Continuous or pulse tone selectable
- Cable entry from the side possible
- Easy to mount
- High protection rating IP 65



Piece of rim can be broken out to allow for cable entry from the side.



Top view: Mounting holes integrated into the product rim allow easy mounting without having to remove the dome.



TECHNICAL SPECIFICATIONS:

Dimensions (Diameter x Height):	89 mm x 64 mm	
Housing:	PC, black	
Fixing:	Base mounting	
Installation position:	Sound outlet facing downwards	
Connection:	Screwable connection with wire protection max. 1.5 mm ²	
Cable entry:	Cable diameter max. 9 mm	
Starting current:	< 500 mA at 24 V	
Tone type:	Continuous or pulse tone, selectable	
Tone frequency:	2.3 kHz	
Sound output:	92 dB	
Life duration:	> 5,000 hrs	
Duty cycle:	100 %	



ORDER SPECIFICATIONS:

Voltage	24 V ~	115 - 230 V ~
Current consumption	≤ 15 mA	≤ 15 mA
	127 000 75	127 000 68



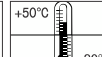
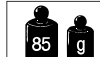
TECHNICAL DIAGRAMS:

see page 250



Buzzer in combination with Xenon Flash or LED Permanent Light
see page 164 and 162

In preparation



- Loud electronic horn
- High life duration up to 5,000 hrs
- Integrated mounting bracket
- High protection rating IP 65



TECHNICAL SPECIFICATIONS:



Dimensions (D x W x H):	91.5 mm x 82.5 mm x 198 mm
Housing:	PC, PC/ABS-Blend, grey
Fixing:	Bracket mounting
Installation position:	Sound outlet facing downwards
Connection:	Screwable connection with wire protection max. 1.5 mm ²
Cable entry:	Cable diameter max. 9 mm
Starting current:	< 1 A (at 24 V < 500 mA)
Tone frequencies:	c. 110 Hz
Life duration:	> 5,000 h
Duty cycle:	100 %



ORDER SPECIFICATIONS:

Voltage	24 V ~	115 V ~	230 V ~
Current consumption	≤ 80 mA	≤ 70 mA	≤ 70 mA
	584 000 75	584 000 67	584 000 68



TECHNICAL DIAGRAMMS:

see page 267



Horn in combination with Xenon Flash or LED Permanent Light see page 170 and 171.

In preparation

