

# INDEX

## INDUSTRIAL ELECTRIC MOTOR SIRENS

MINICELERE – MINICELERE BA	.10
CELERE – CELERE BA	.10
SUPERCELERE - SUPERCELERE BA	.10
MINICELEREST – MINICELEREST BA	.11
CELEREST – CELEREST BA	.11
SUPERCELEREST – SUPERCELEREST BA	.11
CELERSON	.11
MICRO W 10 N	.12
MICRO W 10 R	.12
MICRO W 10 AT	.12
MINIMIDFON – MINIMIDFON BA	.13
MIDFON – MIDFON BA	.13
MAXIFON – MAXIFON BA	.13

## INDUSTRIAL ELECTRONIC SIRENS

SE 12/30 MS 5	.15
SE 12/31 MS 5	.15
SE 12/41 MS 5	.15
SE 25/50 MS 5	.15
SE 25/51 MS 5	.15
SE 4/25 L PLC	.16
SE 4/29 MS 5	.16
SE 10/32 MS 5	.16
SE 10/32 MS 5 PLC	.16
SE 12/35 MS 32	.17
SE 12/36 MS 32	.17
SE PZ/35 MS 32	.17
SE PZ/36 MS 32	.17

## BUZZERS FOR INDUSTRIAL APPLICATIONS

BIMF 5T 2B	.18
BEBIP	.18
BIP 81 – BIP 81 MCA	.19
BIP 92 – BIP 92 MCA	.19
BIP ADAPTER	.19
BIP OS 93	.19
BIP 84	.19

## INDUSTRIAL HORNS

BABYSAI LD6	.20
BABYSAI LD6 PG16	.20
BABYSAI LD6 PG16 SI	.20
MICROSAI	.21
MICROSAI SI	.21
MICROSAI SD	.21
MICROSAI SD SI	.21
MICROSAI R – MICROSAI R SI	.21
MICROSAI SD R – MICROSAI SD R SI	.21
SAI – SAI SI	.22
SAI SD – SAI SD SI	.22
BLINDO SAI – BLINDO SAI M	.22
BLINDO MAXISAI – BLINDO MAXISAI M	.22
SEM	.23
SHV	.23

## INDUSTRIAL BELLS

SIAD 165 – SIADEL 165	.24
SIAD 215 – SIADEL 215	.24
SIAD 265 – SIADEL 265	.24
CEAD 165 – CEADEL 165	.25

## WATERPROOF INDUSTRIAL BELLS

SIAD 215 NAVE – SIADEL 215 NAVE	.25
---------------------------------	-----

## ELECTRONIC SIRENS FOR PREALARM AND EVACUATION WARNING

SEO 2 SEV – SEO 2 SEV/M AA	.26
SEO 1 SEV – SEO 1 SEV/M AA	.26
SEL 1 SEV – SEL 1 SEV/M AA	.27
STROBO 1 SEV AA	.27
BX 65 2 SEV – BX 65 2 SEV AA	.28
BX 65 1 SEV – BX 65 1 SEV AA	.28
F3 SEV AA	.29

## SECURITY RANGE

FIRLARM	.29
---------	-----

## SEV RANGE SERIAL LINE PCS

SEV SERIAL LINE PCS	.30
---------------------	-----

## ROTATING BEACONS

BABYROT	.31
BABYROT H	.31
GF 931	.32
LR 932	.32
ROTALLARM P B L – ROTALLARM P B R	.33
ROTALLARM AL B L – ROTALLARM AL B R	.33
BLINDO ROTALLARM AL B1	.34
BLINDO ROTALLARM P AG	.34
ROTALLARM STAGNO	.35
ROTALLARM A	.35
AT/A8 H1	.36
AT/R5 H1	.36
AT/F6 H1	.36
AT/M7 H1	.36
PG/R/AGR	.37
PG/TOR/AGR	.37
ROTOLUX H	.37

## FLASHING BEACONS

OVOLUX L MT	38
OVOLUX PG9 L MT	38
OVOLUX E L MT	38
MICROLAMP L MT	39
MICROLAMP R L MT	39
CTL 600 L MT	39
CTL 900 L MT	39
CTL 1200 L MT	39
BABYLAMP L MT	40
PG/AGR/L	40
MINIFLASH N	41
MINIFLASH P	41
MINIFLASH E	41
MAXIFLASH N	41
MAXIFLASH P	41
MAXIFLASH E	41
LAMPALLARM FRESNEL P B	42
LAMPALLARM FRESNEL AL B	42
LAMPALLARM FRESNEL A	42
BLINDO LAMPALLARM FRESNEL AL B	43
BLINDO LAMPALLARM FRESNEL P AG	43
LAMPALLARM FRESNEL STAGNO	43
BLINDO LAMP	44
BLINDO FLATLAMP	44
BLINDO FARO	45
FAROLAMP N	45
FAROLAMP P	45
STROBOLAMP N	46
STROBOLAMP AG	46
LAMPOLUX H	46

## XENON FLASHING BEACONS

OVOLUX X	54
OVOLUX PG9 X	54
OVOLUX E X	54
MICROXENOLAMP	55
MICROXENOLAMP R	55
CTL X 900	56
CTL X 1200	56
XENOFASH N	57
XENOFASH P	57
XENOFASH E	57
MAXIXENOFASH N	57
MAXIXENOFASH P	57
MAXIXENOFASH E	57
BABYFLASH	58
LAMPALLARM XENOFRESNEL P B	58
LAMPALLARM XENOFRESNEL AL B	58
PG/X/AGR	59
STROBOLUX	59
STROBOFLASH N	60
STROBOFLASH AG	60
FAROLAMP XENO N	61
FAROLAMP XENO P	61
BLINDO FLATFLASH	61
BLINDO FLASH	62
BLINDO STROBOFLASH AL N	62
BLINDO STROBOFLASH AL AG	62
LAMPALLARM XENOFRESNEL STAGNO	63
BLINDOFLASH A	63
STROBOFLASH A	63

## CONTINUOUS LIGHT BEACONS

OVOLUX F MT	47
OVOLUX PG9 F MT	47
OVOLUX E F MT	47
MICROLAMP F MT	48
MICROLAMP R F MT	48
CTL 600 F MT	48
CTL 900 F MT	48
CTL 1200 F MT	48
BABYLAMP F MT	49
PG/AGR/F MT	49
MINIFLASH N F MT	50
MINIFLASH P F MT	50
MINIFLASH E F MT	50
MAXIFLASH N F MT	50
MAXIFLASH P F MT	50
MAXIFLASH E F MT	50
LAMPALLARM FRESNEL P B F MT	51
BLINDO LAMPALLARM FRESNEL AL B F MT	51
BLINDO FARO LF	51
FAROLAMP N LF	52
FAROLAMP P LF	52
STROBOLAMP N LF	52
STROBOLAMP AG LF	52
STROBOLAMP AG PA	53
2 STR AG A R A 100W	53
1 STR AG A R A 2H 75W	53

## DOUBLE WARNING SIGNALS AUDIBLE/VISUAL

MICROLAMP A FCL	64
MICROXENOLAMP A	64
CTL A 600 FCL	65
CTL A 900 FCL	65
CTL A 1200 FCL	65
CTL XA 900	65
CTL XA 1200	66
LD 85 SLH	66
SLEM L	67
SLEM F	67
SLEM X	67
SIRLAMP MS 5	68
SIRLAMP X 1F MS 5 – SIRLAMP X 2F MS 5	68

## INDUSTRIAL TRAFFIC LIGHTS

SMFR 6.3 F	.69
SMFR 9.3 F	.69
SMFR 12.3 F	.69
SMFR 9.3 X 1J 1F	.70
SMFR 12.3 X 6J 1F	.70
SMFR 6.3 F A	.71
SMFR 9.3 F A	.71
SMFR 12.3 F A	.71
SMFR 9.3 X 1J 1F A	.72
SMFR 12.3 X 6J 1F A	.72
SMFR 6.2 F	.73
SMFR 9.2 F	.73
SMFR 12.2 F	.73
SMFR 9.2 X 1J 1F	.74
SMFR 12.2 X 6J 1F	.74
SMFR 6.2 F A	.75
SMFR 9.2 F A	.75
SMFR 12.2 F A	.75
SMFR 9.2 X 1J 1F A	.76
SMFR 12.2 X 6J 1F A	.76

## PRODUCTS FOR FORKLIFT TRUCKS

ELEBLITZ 10÷100V 1F	.77
FLASH ELEV 10÷100V 1F – 2F	.77
FLC 1200 10÷100V 1F	.77
MICROROT ISO B ELEV 10÷100V 1F	.77
MINIFRESNEL ISO B ELEV 10÷100V 1 F	.78
MINITRUCK 120 10÷100V 1F	.78
SFEROFLASH 10÷100V 1F	.78
TOUR ELEV 10÷100V 1F	.78
FLASH ELEV SL 10÷100V 1F – 2F	.79
MICROROT ISO B ELEV SL 10÷100V 1F	.79
MINIFRESNEL ISO B ELEV SL 10÷100V 1F	.79
RES 10÷100V	.80
RETRO ALLARM 10÷100V	.80
SEN 10÷100V	.80
SVAR 10÷100V	.80
KIT FMA N	.81
KIT FMA A	.81
KIT FMA M	.81
VOLTAGE CONVERTER	.81

## SWIVEL LIGHT BEAMS MANUAL ORIENTATION

FO 195 H1 MV	.82
FO 195 H1 B	.82
FO 230 HID MV	.83
FO 230 HID B	.83

## WORK BEAMS

WORK BEAM M	.84
WORK BEAM A	.84
WORK BEAM P	.84

## SWIVEL LIGHT BEAMS ELECTRICALLY POWERED

FORC S B – FOTC S B	.85
FORC S A – FOTC S A	.85
FORC S WITH GRID	.85
FORC INOX S	.86
B2 FORC S B H1 100W - B2 FOTC S B H1 100W	.86
B2 FORC S B HID - B2 FOTC S B HID	.86

## PORTABLE SEARCH BEAMS

BILIGHT	.87
FPH H1	.87
FPHS H1	.87

## LED WARNING/LIGHTING DEVICES

BMX AA	.88
BMX AA RECHARGE MODULAR SUPPORT	.88
P6 CARRYING BOX	.88
V4 CARRYING BOX	.88
TRX AA	.89
TRX AA RECHARGE MODULAR SUPPORT	.89
PLX AA	.90
PLX AA RECHARGE MODULAR SUPPORT	.90
PLX	.91
MICRO PLX	.91
RECHARGE CABLES	.91
MAINS FEEDERS	.91

## SPARE PARTS

DOMES	.92-93
BULBS	.94-95

## ACCESSORIES

BASE P	.96
BASE E	.96
BAP	.96
BP	.96
AG	.96
SAP	.96
SA	.96
GR STF/STL	.96
GR RA/LA AL B1	.96
TWS AFF	.97
TWS BS	.97
TWS PR	.97
TWS BP1	.97
TWS BP2	.97
TWS KIT	.97
TWS BOX PG9	.97
N TWS PF2	.98
TWS KIT INOX L / 400	.98
TWS KIT INOX L / 200	.98
TWS KIT INOX L / 100	.98

# SPECIFICATIONS

- **European Machine Directive 89/392** requires the installation of appropriate audible and visual warning devices as an essential safety requirement for the operator in industrial environments.
- **European norms EN 457 and EN 842** (machine safety: audible and visual danger signalling) specify the technical, design and functional characteristics the audible and visual signal must have to be effective, i.e. audible or visible, distinguishable and unequivocal.
- SIRENA acoustic (electric and electronic sirens, bells and industrial horns) and luminous devices (continuous, blinking, rotating and flashing beacons) conform in every aspect to the technical and functional requirements of Norms EN 457 and EN 842.
- The installation of Sirena's range of audible and visual products onto machines conforms in every way to the safety standards set out in current norms.

## GUIDELINES FOR INTERPRETATION AND APPLICATION OF THE NORMS - ACOUSTIC LINE

Current international standards for safety require the installation of an audible warning device in order to attract the attention of the operator and to indicate a dangerous or emergency situation.

These standards have specific rules regarding the installation of audible warning devices in industrial environments. Two important factors determine the capability of the sound to be heard in any environment:

- **the distance between the audible warning device and the operator**
- **the existing ambient noise.**

The suitability of an audible alarm for a specific application is determined by its specification, i.e.:

- **sound output DECIBEL (dB)**
- **sound frequency HERTZ (Hz).**

International standards for industrial warning devices have established minimum differential sound output levels that must be complied with. **The dB level** of the siren must be at least **15 dB higher** than that of the measured ambient noise. The siren must, however, have a **minimum sound output of 65 dB**. The sound frequency of the siren, at the point where the sound output is greatest, must differ as much as possible to the frequency of the ambient noise. Sound frequency, however, must be between 300 and 3000 Hz.

The use of a **PHONOMETER** is necessary to measure ambient sound levels, in order to comply with these regulations and to select the most suitable siren. Once this data is available the selection of a siren can be done very simply, by using the data shown in the Sirena catalogue and by making the required adjustments to compensate for the ambient noise levels.

The sound output dB (A) levels of Sirena's audible warning devices are accurately measured in an anechoic testing chamber at a distance of one meter from the axis of the device.

The ratings given in the Sirena catalogue for electric motor sirens give a maximum sound output. This is also valid for the horns and electronic sirens.

The Hz frequencies shown in the Sirena catalogue refer to a specific frequency for the electric motor and

electronic sirens, and for a range of applicable frequencies for the other types of warning devices, i.e. horns and electronic sirens.

Further information regarding the sound spectrum of Sirena's range of audible warning devices is available on request. When selecting an audible warning device the sound spectrum of the siren must be superimposed upon the sound spectrum of the ambient noise. The differential dB level and the differential frequencies are therefore immediately recognised.

Additional factors to be considered when selecting an audible warning device:

**Electric motor sirens** have a short duty cycle, produce a single tone sound and reach their specified operating frequency quickly. A single sound is very effective but can, after a short time, lose effectiveness as the human ear may become accustomed to it. A more effective method of audible alarm can be obtained by applying an electronic modulator (ME) which would allow a modulated or intermittent sound.

**Horns and bells** produce distinct sounds which are easily distinguishable from typical everyday sounds. They have low frequencies and are suitable for a variety of signalling applications especially long distance, short call signals or danger signals. They produce a continuous sound that can be changed to intermittent by using an electronic modulator (ME).

**Magnetodynamic and exponential horn electronic sirens** have high frequency sound output suitable for short distance use. In general, electronic sirens have the following advantages over electric motor sirens:

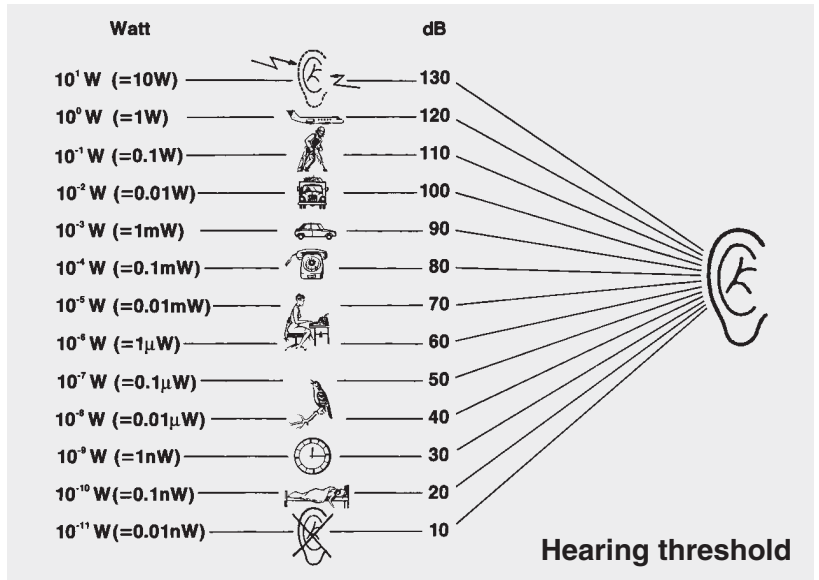
- low power consumption
- greater sound output
- variable tone in the sound frequency (i.e. modulated, bi-tone, or multi-tone)
- cyclic and pause option
- intermittent sound option
- progressive sound option controlling the level of the final blast
- continuous operation
- combined audible/visual signal option.

## Decibel dB (1m) - Measurement of sound output

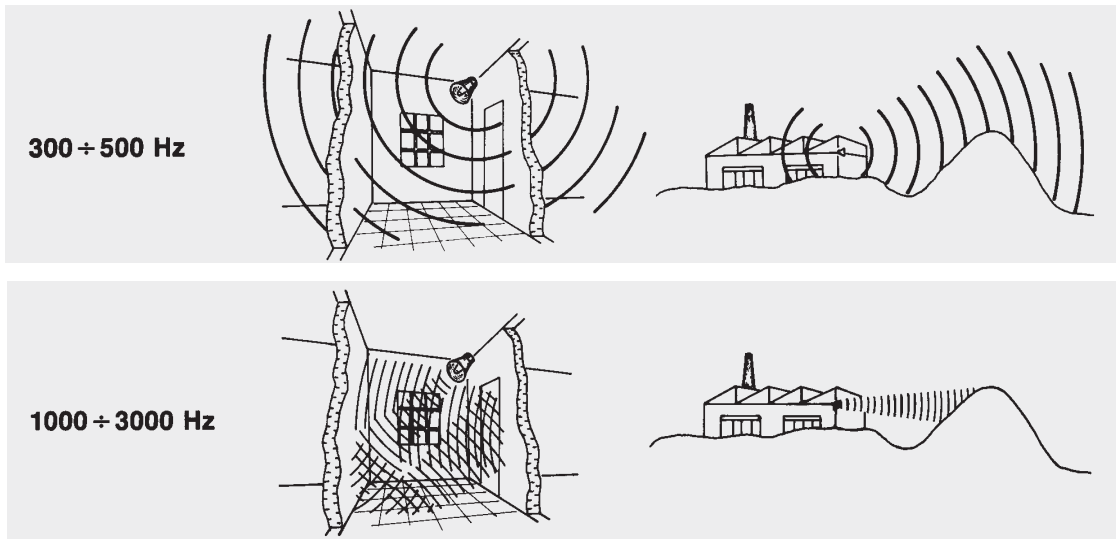
The sound level can be measured but no precise indication exists for the range of the sound. Too many unknown factors affect this value: type of sound, speed and direction of the wind, humidity, fog, rain etc. etc. The data shown in the following table are useful as theoretical indication.

The intensity of a signal is always respective - see table on the right.

**An increase in sound of 3 dB is heard as a double sound level.**



## Diffusion of sound waves - Sound intensity



## Distance




m	dB (A)																									
	65	70	75	80	85	90	92	94	96	98	100	102	104	106	108	110	112	114	116	118	120	122	124	126	128	130
1	65	70	75	80	85	90	92	94	96	98	100	102	104	106	108	110	112	114	116	118	120	122	124	126	128	130
2	59	64	69	74	79	84	86	88	90	92	94	96	98	100	102	104	106	108	110	112	114	116	118	120	122	124
3	55	60	65	70	75	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110	112	114	116	118	120
5	51	56	61	66	71	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110	112	114	116
10	45	50	55	60	65	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
20	39	44	49	54	59	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104
30	35	40	45	50	55	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100
50	=	36	41	46	51	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96
100		=	=	40	45	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90
200				=	39	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84
300					=	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80
500						=	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76
1000							=	=	=	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70
2000										=	=	=	38	40	42	44	46	48	50	52	54	56	58	60	62	64
3000													=	=	38	40	42	44	46	48	50	52	54	56	58	60
5000															=	=	38	40	42	44	46	48	50	52	54	56

## GUIDELINES FOR INTERPRETATION AND APPLICATION OF THE NORMS - LUMINOUS LINE

Visual warning signals establish a code communication through two variables, i.e. different degrees of brightness and the use of different colours. Through these features the operator receives information.

According to different characteristics we can classify various types of luminous signals in the Sirena product range:

- The degree of brightness changes according to:
  - the distance between the luminous point and the observer
  - the different type of diffuser lens used
  - the colour of the dome selected.
- The light intensity of Sirena warning signals is measured in Cd (p) in a photometric chamber. The Cd (p) represents a peak luminous intensity using a clear dome. To establish the actual output when installing the beacon, the distance and the colour of the dome must be taken into consideration. For example, if the viewing distance is doubled, the light intensity observed is reduced by a quarter and if the distance is quadrupled the light intensity is reduced by a sixteenth. Furthermore, the Cd (p) rate is measured using a clear dome that allows 100% brightness. The brightness is reduced dependant upon the colour of the dome, for example:

		6	5	2	3	1	4
Light transmission		100%	95%	70%	30%	17%	12%
		100%	94%	70%	27%	20%	15%
		100%	93%	70%	23%	24%	25%

- The current standards regarding visual signals used in industrial applications state that warning signals must be five times brighter than the ambient light level. Emergency signals must be ten times brighter than the ambient light level. In order to ensure that the correct beacon is selected the ambient light level must be measured. The ambient light level is measured in LUX and can be easily established by using a "LUXOMETER".

By using the following formula the "LUX" measurement is obtained:

$$Cd = LUX \times DISTANCE^2$$

$$LUX = \frac{Cd}{DISTANCE^2}$$

For example 10.000 Cd = 10.000 LUX at 1 m. = 100 LUX at 10 m.

- The degree of brightness from a **continuous light** beacon is given by the power of the bulb. The brightness can be increased by using a Fresnel lens.

The flashing light can be obtained in three ways:

- by the on/off cycle of the filament bulb
- through periodic rotation of a parabolic mirror around the axis of a continuously lit bulb
- through the flash of a xenon discharge tube.

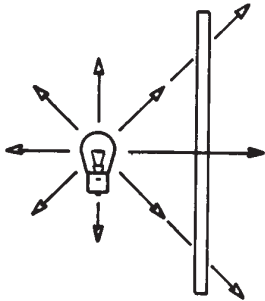
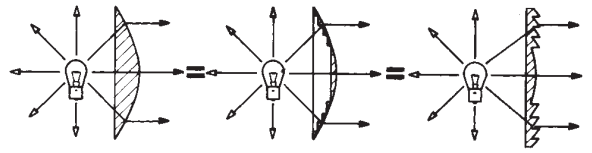
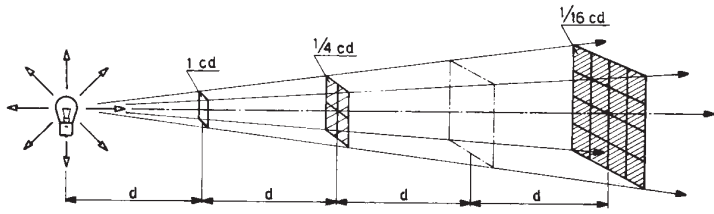
**Flashing beacons** generally take more time to light up the bulb and give a lower degree of brightness.

The efficiency of the signal is due to the fact that when the bulb is lit, the whole surface of the beacon is illuminated giving light at 360°.

**Rotating beacons** have a greater degree of brightness, however, the light intensity at each point of observation is reduced as each point is illuminated only when the mirror rotates in its direction.

**Xenon beacons**, on the contrary, allow maximum brightness due to the fact that the bulb takes less time to light up. Visibility at 360° is guaranteed and can also be increased by using a Fresnel lens.

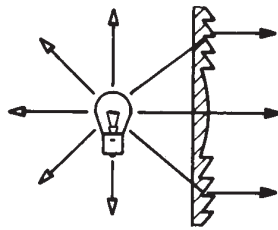
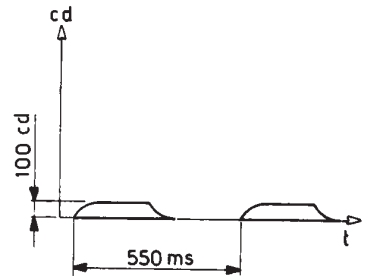
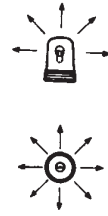
# THE LIGHT



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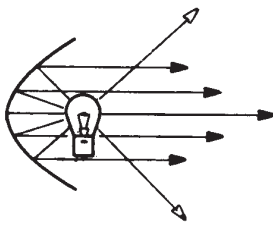
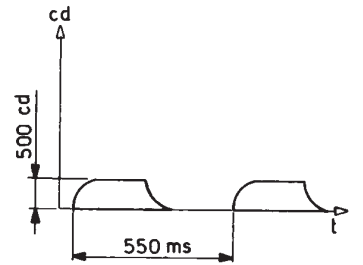
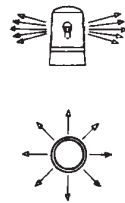
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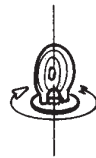
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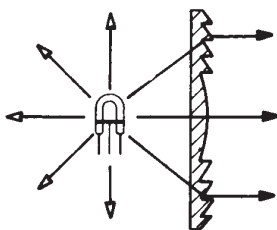
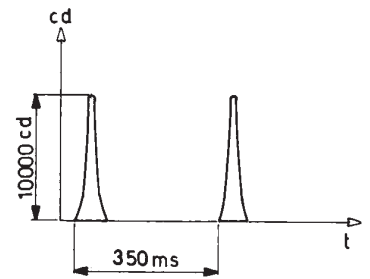
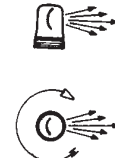
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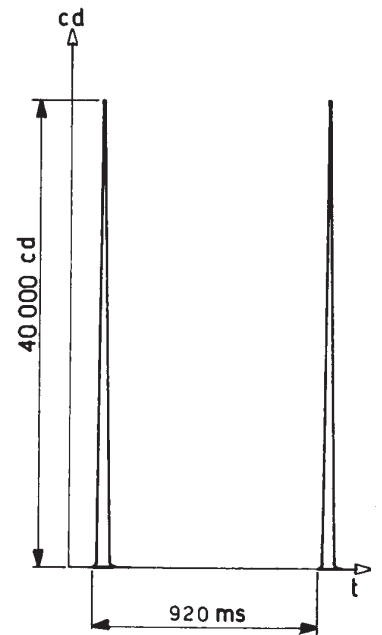
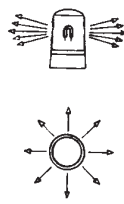
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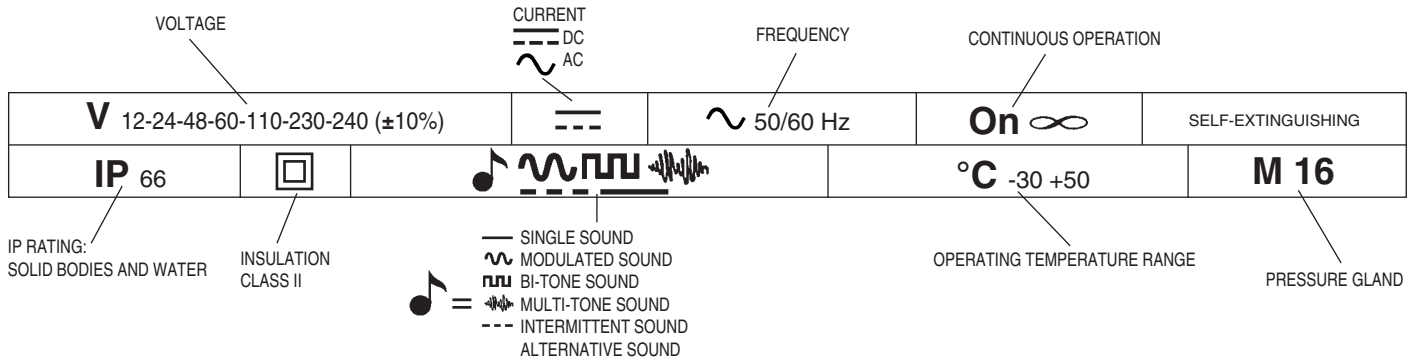
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# LEGEND

## ACOUSTIC RANGE: MAIN TECHNICAL AND FUNCTIONAL CHARACTERISTICS OF THE PRODUCTS



### CODIFICATION: e.g. SCTBA24D

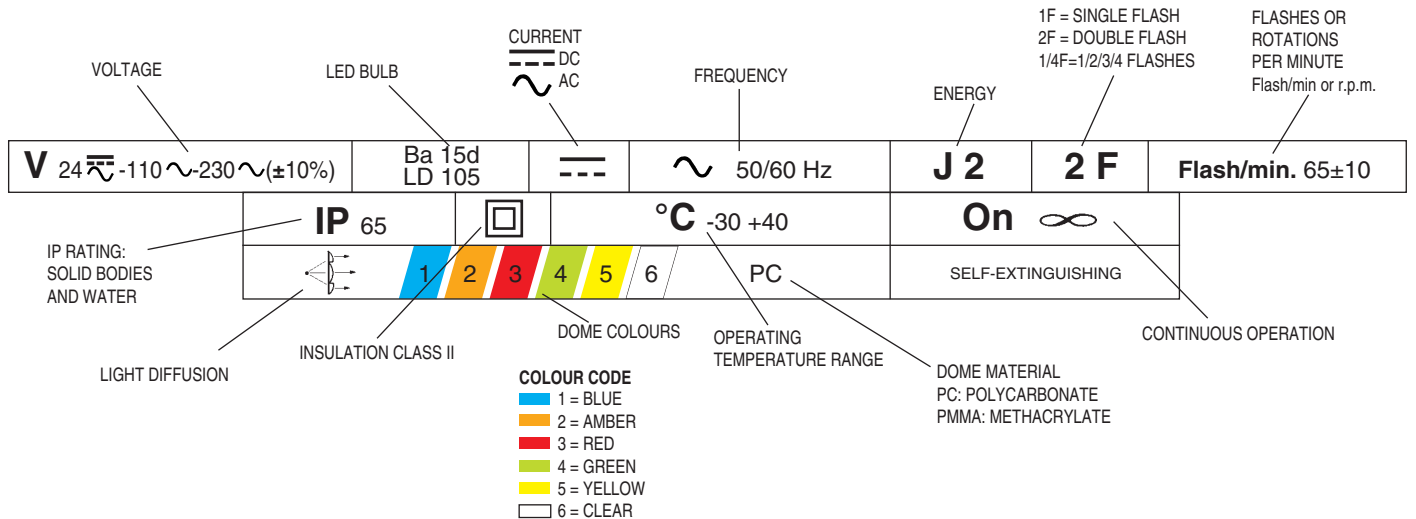
- D** = direct current
- A** = alternating current
- DA** = direct and alternating current
- AT** = high voltage
- SL** = sound - light
- A** = with acoustics
- BA** = low consumption
- R** = flush mounting
- FCL** = supplied with bulb

### TECHNICAL INFORMATION REGARDING THE MOST IMPORTANT FUNCTIONAL AND ELECTRICAL CHARACTERISTICS

DIRECT CURRENT VOLTAGE	V	12	24
ALTERNATING CURRENT VOLTAGE	V	12	24
CURRENT CONSUMPTION	A	0.8	0.5
SOUND OUTPUT IN DECIBEL (A) MEASURED AT 1m	dB(A)1m	94	98
SOUND FREQUENCY IN HERTZ	Hz	1150	1300
OPERATING TYPE	On	∞	

A=Ampere  
1mA=0,001A

## LUMINOUS RANGE: MAIN TECHNICAL AND FUNCTIONAL CHARACTERISTICS OF THE PRODUCTS



### CODIFICATION: e.g. MFNFMT12240DA1

- D** = direct current
- A** = alternating current
- DA** = direct and alternating current
- 1F** = single flash
- 2F** = double flash
- 1/4F** = 1/2/3/4 flashes
- DOME**  
**L** = smooth  
**R** = engraved
- BASE**  
**B** = flat ISO DIN B1  
**N** = flat  
**P** = pole ISO C  
**AG** = tubular  
**E** = Edison  
**R** = flush mounting
- AT** = high voltage
- SL** = sound - light
- L** = flashing light
- F** = continuous light
- X** = xenon flashing light
- A** = with acoustics
- L MT** = multi voltage flashing beacon supplied without bulb 12÷48 V DC 24÷240 V AC
- F MT** = multi voltage continuous light beacon supplied without bulb 12÷240 V DC/AC
- FCL** = supplied with bulb

### TECHNICAL INFORMATION REGARDING THE MOST IMPORTANT FUNCTIONAL AND ELECTRICAL CHARACTERISTICS


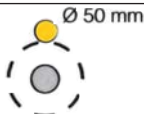

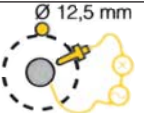

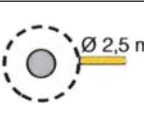





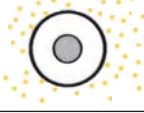


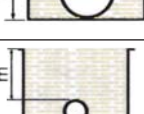
TYPE OF LUMINOUS SOURCE	DIRECT CURRENT VOLTAGE	ALTERNATING CURRENT VOLTAGE	110			230			240			
			V	12	24	-	-	-	-	-	-	-
FILAMENT BULB	HALOGEN BULB	XENON TUBE 1J	XENON TUBE 2J	XENON TUBE 6J	XENON TUBE 15J	0,2			0,1			
						A	2,4	1,5	0,2	0,1	0,1	0,1
BA 15d 25W	PEAK CANDELAS		500			50			75			
	SOUND OUTPUT IN DECIBEL (A) MEASURED AT 1m		85			85			85			
CURRENT CONSUMPTION		SOUND FREQUENCY IN HERTZ		SOUND INTERMITTENCE FREQUENCY		-F/m 110			-F/m 0			
A=Ampere 1mA=0,001A		Hz 3600		-			-			-		



# EXTERNAL MATERIALS

1. Base - ISO DIN B1: PC
2. Base - ISO DIN B1: Aluminium
3. Base - ISO DIN B1: PA
4. Base - ISO DIN B1: PVC
5. Base: PVC
6. Base: PC
7. Tube mount: Aluminium
8. Base: ABS
9. Base: Metal plate
10. 3/4" G threaded mount: Stainless steel
11. Body: PC
12. Body: ABS
13. Body-base: PA
14. Body: Aluminium
15. Container: PVC
16. Container: PA
17. Grid: Zinc coated steel
18. Grid: Aluminium
19. Sound diffuser: ABS
20. Directional sound diffuser: Aluminium
21. Directional sound diffuser: ABS
22. Sound diffuser: Aluminium
23. Sound diffuser: Painted metal plate
24. Sound diffuser: PC
25. Light diffuser: Glass
26. Magnet mount: Metal plate
27. ISO DIN A mount: Metal plate
28. Bayonet mount: PC
29. Bracket: Zinc coated metal plate
30. Bracket: Painted metal plate
31. Bracket: Painted steel
32. Flange: PA
33. Flange: Painted metal plate
34. Cap: Aluminium
35. Cap: ABS
36. Ring: PC
37. Ring: Aluminium
38. Bell: Painted steel
39. Bell: Stainless steel
40. Stud mount
41. Box: UP
42. Hammer: Aluminium
43. Flexible Extension: Steel
44. Extension: Stainless Steel
45. ISO DIN A mount: PA
46. Bracket: PC
47. Body: PP
48. Rear covers: PP
49. Body, washer, ring: ABS
50. Base gasket: Forprene
51. Gasket for sound diffuser: NBR
52. Body: ASA
53. Front and rear rubber parts: EPDM
54. Handle: ABS
55. Body: TPE
56. Suction pad: EPDM
57. Magnet cover: PA
58. Circuit holder: PC
59. Anti-shock protection: PVC
60. Tubular structure: Forprene
61. Base: Forprene
62. Body: Anodised black aluminium
63. Anti-shock protection: Forprene
64. Signalling diffuser: PP Low Density
65. Gasket: PVC
66. Base: Tecnoprene

## DEGREE OF PROTECTION (EN 60529)

First digit: protection against accidental contact and penetration by solid foreign bodies			Second digit: protection against penetration of liquids		
IP			IP		
0		No particular protection	0		No particular protection
1		Protection against solid bodies over 50 mm and against contacts by large surfaces of the human body (e.g. the hands)	1		Protection against the vertical fall of drops of water (e.g. condensation)
2		Protection against solid bodies over 12,5 mm and against finger contact	2		Protection against the vertical fall of drops of water with a maximum incline of 15°
3		Protection against solid bodies over 2,5 mm (e.g. tools, wires)	3		Protection against the vertical fall of drops of water with a maximum incline of 60°
4		Protection against penetration of solid bodies with a diameter or thickness over 1 mm (e.g. wires)	4		Protection against splashes of water from all directions
5		Dust penetration is not fully excluded, but the quantity that penetrates causes no damaging effects	5		Protection against jets of water from all directions
6		No dust penetration is permitted	6		Protection against waves of water or powerful jets
			7		Protection against the effects of immersion
			8		Protection against the effects of prolonged immersion under pressure