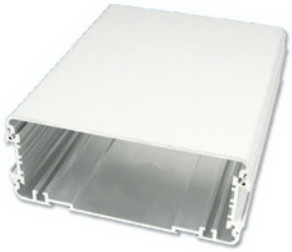
Enclosures & Components

Guardbox 33

Rugged EMC compact case with protection up to IP65.

7: Guardbox 33



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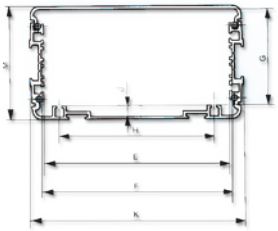

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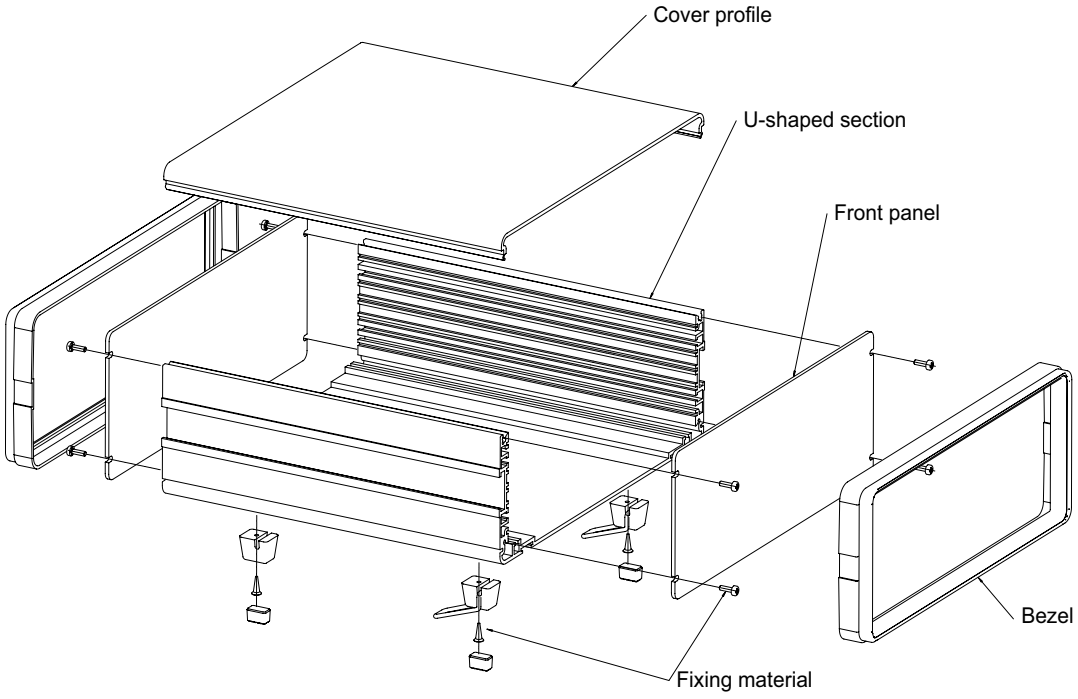
4.1 Guardbox 33 Overview

- The Elma Guardbox 33 is manufactured from 2 aluminium sections only
- A U-shaped section forms the bottom with integrated sides and provides superior strength
- The extruded cover is held in place by the screws used for front/rear panel mounting
- The main features of this vibration-proof case are its rugged construction, ease of assembly and serviceability as well as its modern design
- The four screws used to assemble the Guardbox 33, and the fastenings for the feet and handle, are not visible
- The position of the feet is infinitely variable, allowing the case to be tilted to any angle within certain limits
- The aluminium design provides a high level of interference attenuation
- This compact case is available with or without ventilation slots in the base and front/rear panels
- Protection to IP30 is assured with ventilation slots, IP40 without ventilation slots
- A special sealing set allows the Guardbox 33 to be adapted to conform to protection class IP65
- This compact case is ideally used for test and measurement instruments, drive modules as well as for controls where rugged construction, design, colour and ease of serviceability are important
- The Guardbox 33 can easily accept single and double Eurocards as well as non-standard board sizes or other components



7: Guardbox 33

Sturdy, flexible and portable

Suitable for
- Mounting grooves
- Mounting panels
- Single eurocard
- Double eurocard (direct arrangement with case size 2, 3 and 5)

Application examples
- Measurement, control and test instrumentation
- Laboratory and maintenance equipment
- Equipment on train, trams, etc.

Versions
- EMC as standard
- IP65
- IP54 and EMC combined

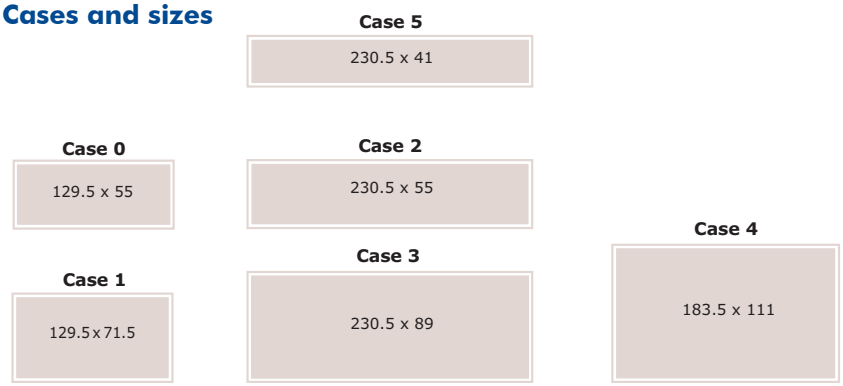
The basic case consists of two aluminium extrusions and guarantees optimal and professional packaging of your boards or components.

Description
- Sturdy
- Handy
- Ease of service access
- Tilt-up feet
- No visible screws
- Optional carrying handle

Thermal Solutions
- Bottom with or without air perforation
- Front/rear panel with or without air perforation

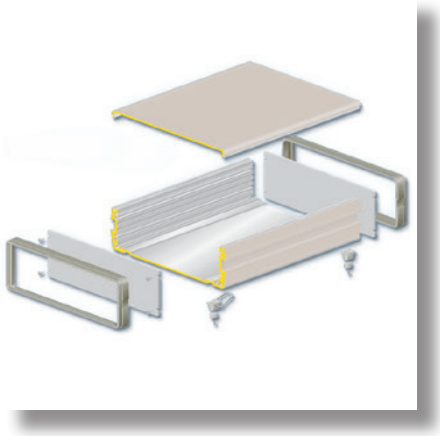
Colours
- Colours bottom and cover: light grey (RAL 7035), black (RAL 9005), pebble grey (RAL 7032), other colours acc. to colour list upon request (MOQ: 10 pcs., no stock)
- Colours bezel: light grey (RAL 7035), black (RAL 9011), stone grey (RAL 7030)

Cases and sizes

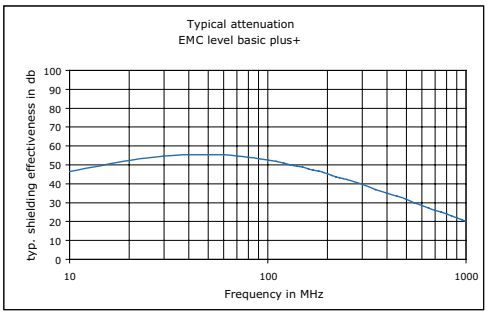


The Guardbox 33 series comes in 3 different widths and overall 6 different sizes to meet many different requirements.

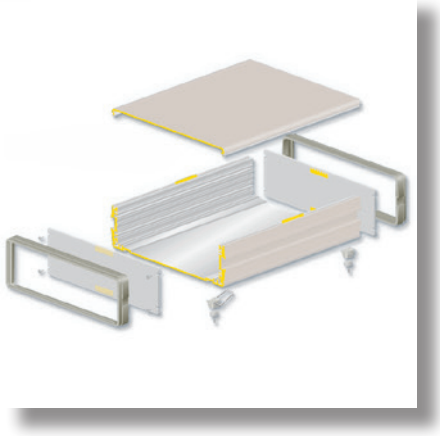
Guardbox 33 Standard



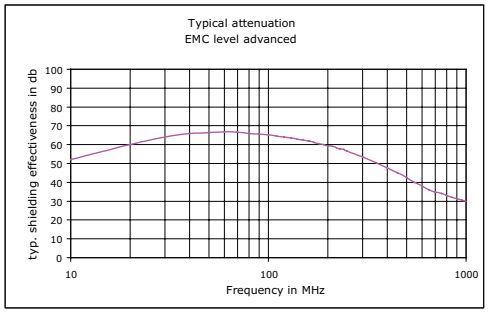
- EMC level basic plus+
- Top and bottom extrusions as well as front panels have conductive connections
- This provides effective EMC protection



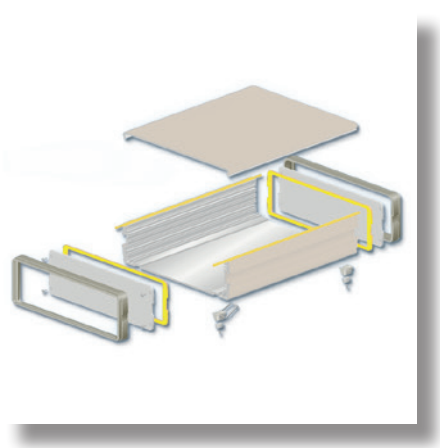
Guardbox 33 EMC



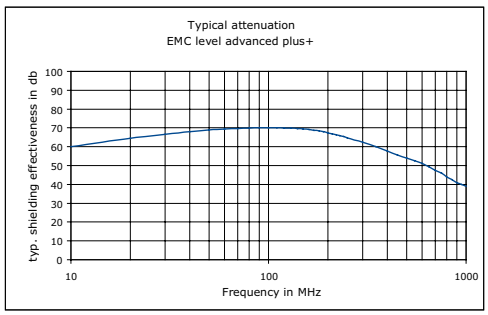
- EMC level advanced
- Standard housing and additional EMC Gasket set
- The EMC case for demanding applications!



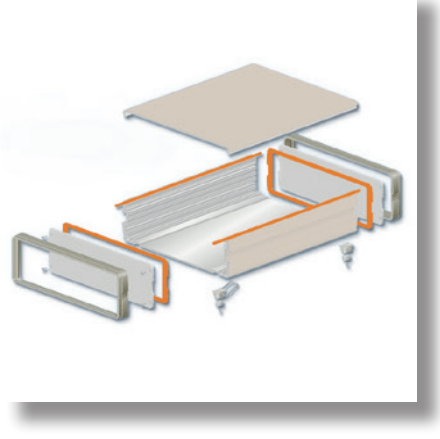
Guardbox 33 IP54 and EMC



- EMC level advanced plus+
- Standard housing and additional IP54/EMC set
- The EMC case for the most demanding applications!
- This version protects your electronics against splashes and dust



Guardbox 33 IP65



- This version protects your electronics against dust and water jets from a nozzle in all directions

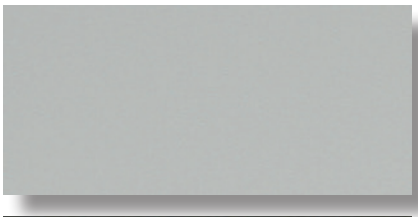
Colours

Powder Coating

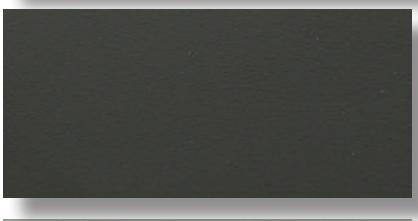
Powder coating is a method of applying coatings to surfaces without using solvents. The coating is applied as a free flowing powder and heated to cause it to flow and adhere to the surface. The powder may be a thermoplastic or a thermoset polymer. It is normally used to create a hard finish on metals. Powder coating is mainly used for coating of metals, such as "white goods", aluminium extrusions and automobiles. The polymer used by Elma is polyester-epoxy.

The most common way of applying the powder coating is to spray the powder using an electrostatic gun. The gun imparts an electric charge on the powder, which is then sprayed to the object which is grounded. The object is then heated, and the powder melts to form a hard coating.

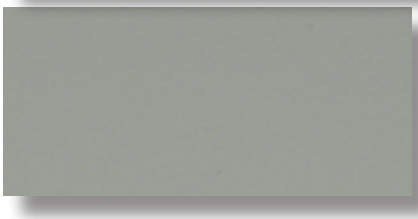
Colour samples (Standard-colours):



- Light grey, RAL 7035, structure, silky lustre

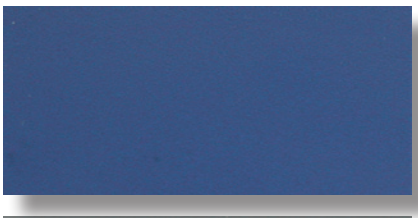


- Jet black, RAL 9005, structure, silky lustre



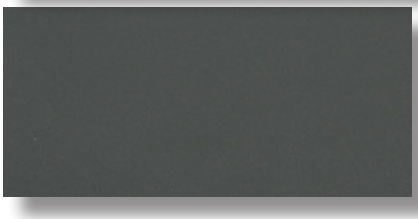
- Pebble grey, RAL 7032

Other colours (options):



- Elma blue, Pantone 280C, structure, silky lustre

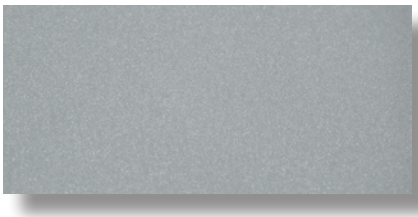
- Blue grey, NCS 5010-R 90B, structure, silky lustre



- Anthrazit, PES5803ME713 85A10, structure, silky lustre

Wet Painting

In a general, lacquer is a clear or coloured coating, that dries by solvent evaporation only which produces a hard, durable finish, that can be polished to a very high gloss, and gives the illusion of depth.



- Silver/Berluran Pantone 043.094.190, smooth

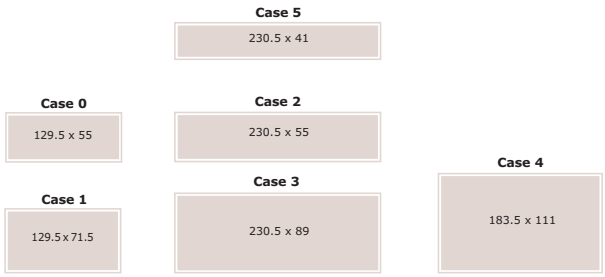
Note: other colours available upon request

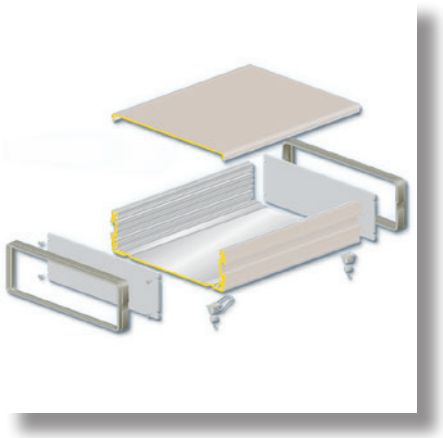
4.1.1 Complete Guardbox 33 Kit's

You find the most used complete kit's below.

With the new order structure (see "Configuration" on next page) you have however the possibility of configure your individual housing in different steps. Use this offer or contact us for further information or any other help.

Cases and sizes





4.1.1 Guardbox 33 Kit EMC Basic

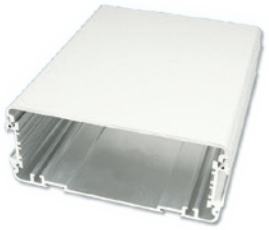
- Scope of delivery:
  - 1 basic case without perforation (detail see 4.2)
  - 2 bezels (detail see 4.3)
  - 2 front / rear panels without perforation (detail see 4.4)
  - 1 set assembly material (detail see 4.5.1)

Case Size	Colour	Depth			
		120 mm 4.72"	180 mm 7.08"	240 mm 9.44"	300 mm 11.81"
0	black	33E012-25	33E018-25	33E024-25	-
0	light grey	33E012-45	33E018-45	33E024-45	-
1	black	33E112-25	33E118-25	33E124-25	-
1	light grey	33E112-45	33E118-45	33E124-45	-
2	black	-	-	33E224-25	33E230-25
2	light grey	-	-	33E224-45	33E230-45
3	black	-	-	33E324-25	33E330-25
3	light grey	-	-	33E324-45	33E330-45
4	black	-	33E418-25	33E424-25	33E430-25
4	light grey	-	33E418-45	33E424-45	33E430-45
5	black	-	33E518-25	33E524-25	-
5	light grey	-	33E518-45	33E524-45	-

Configuration

- The flexible way of setting your Guardbox 33 up:

Basic Case:
- Type
- Depth
- With/without perforation



Colour

4.2.1 Light Grey | **4.2.3 Pebble Grey** | **4.2.2 Black**

4.3 Bezel
(order 2 bezels per case)

4.4 Front-/Rear Panel

Solid
(order 2 panels per case)

With Perforation
(order 2 panels per case)

IP65 incl. gasket
(order 1 set per case)

IP54 / EMC
(order 1 set per case)

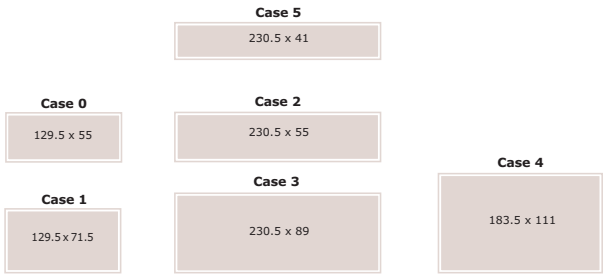
4.5.1 Assembly Material:
- Colour
- Case size

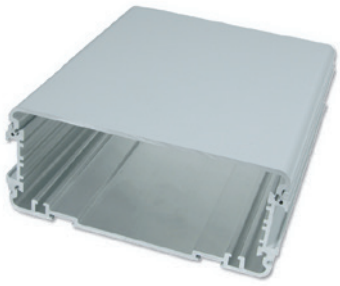
Options
- 4.5.2 Assembly instructions
- 4.5.3 EMC level advanced
- 4.5.4 Carrying handle
- 4.5.5 Case mount
- 4.5.6 Bracket
- 4.5.7 Sliding blocks
- 4.5.8 Eurocard mounting sets
- 4.5.9 Card guides
- 4.5.10 Plug-in Units
- 4.5.11 Card stop
- 4.5.12 Mounting plates
- 4.5.13 Earthing terminal

4.2 Basic Case

- Extruded aluminium
- Powder coated
- With or without air perforation slots in bottom
- **Scope of delivery:**
  - 1 U-shaped bottom
  - 1 cover

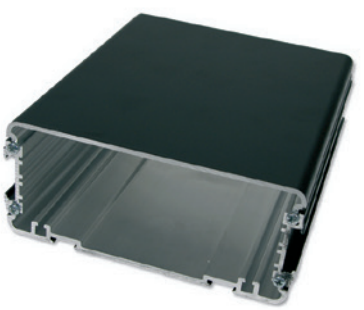
Cases and sizes





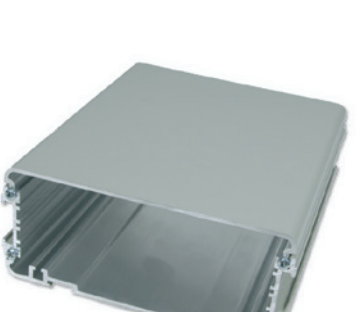
4.2.1 Basic Case Light Grey

Case Size	Without Air Perforation				With Air Perforation	
Depth mm	120	180	240	300	240	300
Depth inch	4.72	7.08	9.44	11.81	9.44	11.81
0	33E717	33E721	33E725	-	-	-
1	33E705	33E709	33E713	-	-	-
2	-	-	33E733	33E737	33E734	33E738
3	-	-	33E757	33E761	33E758	33E762
4	-	33E777	33E781	33E785	33E782	33E786
5	-	33E741	33E744	-	-	-



4.2.2 Basic Case Black

Case Size	Without Air Perforation				With Air Perforation	
Depth mm	120	180	240	300	240	300
Depth inch	4.72	7.08	9.44	11.81	9.44	11.81
0	33E717-06	33E721-06	33E725-06	-	-	-
1	33E705-06	33E709-06	33E713-06	-	-	-
2	-	-	33E733-06	33E737-06	33E734-06	33E738-06
3	-	-	33E757-06	33E761-06	33E758-06	33E762-06
4	-	33E777-06	33E781-06	33E785-06	33E782-06	33E786-06
5	-	33E741-06	33E744-06	-	-	-



4.2.3 Basic Case Pebble Grey

Case Size	Without Air Perforation				With Air Perforation	
Depth mm	120	180	240	300	240	300
Depth inch	4.72	7.08	9.44	11.81	9.44	11.81
0	33E717-00	33E721-00	33E725-00	-	-	-
1	33E705-00	33E709-00	33E713-00	-	-	-
2	-	-	33E733-00	33E737-00	33E734-00	33E738-00
3	-	-	33E757-00	33E761-00	33E758-00	33E762-00
4	-	33E777-00	33E781-00	33E785-00	33E782-00	33E786-00
5	-	33E741-00	33E744-00	-	-	-

Note: Throughout the catalogue we put all EMC parts in a yellow table

4.3 Bezel

- Guards the complete case
- Moulded highquality plastic, UL94 V-0
- **Scope of delivery:**
  - 1 plastic bezel
- Note: For 1 Guardbox two bezels have to be ordered

4.3 Bezel

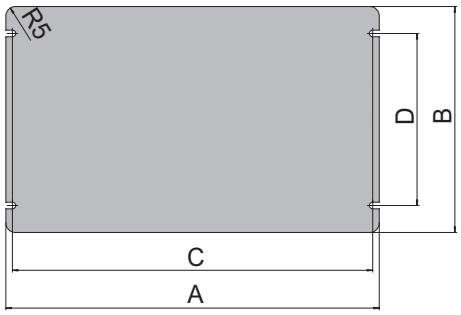
Case Size	Light grey	Black	Stone grey
0	33-000-03	33-000-06	33-000
1	33-001-03	33-001-06	33-001
2	33-002-03	33-002-06	33-002
3	33-003-03	33-003-06	33-003
4	33-004-03	33-004-06	33-004
5	33-005-03	33-005-06	33-005

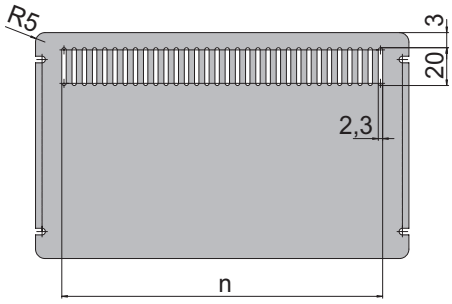
4.4 Front / Rear Panel

- The 2.5 mm (0.9") front panels of anodised aluminium serve both as front and rear panels
- They are screwed to the front end of the case profiles to give the snap-on bezel the required stability
- The panels are available with or without perforations
- IP54 / EMC and IP65: A special seal matching the Guardbox 33 ensures reliable sealing of the box
- **Scope of delivery:**
  - 1 Front- / Rear panel with or without perforation (Note: for one Guardbox 33 two panels have to be ordered)
  - IP65 and IP54 / EMC set: 1 Front- and 1 rear panel, 2 self-adhesive seals, sealing hose, washers
- Replacement seals IP65 see 4.4.2 / IP54 / EMC see 4.4.3
- Torque of mounting screws to ensure IP protection: 0.70Nm - 0.75Nm

4.4.1 Front / Rear Panel

Case Size	Without Perforation	With Perforation	IP65 Set incl. Gasket	IP54 / EMC Set incl. Gasket
EMC level	basic advanced (4.5.3)	basic (4.5.3)	-	advanced plus
0	33E400-50	33E400-51	33-520	33E520
1	33E401-50		33-521	33E521
2	33E402-50	33E402-51	33-522	33E522
3	33E403-50	33E403-51	33-523	33E523
4	33E404-50	33E404-51	33-524	33E524
5	33E405-50		33-525	33E525





Case Size	A		B		C		D		n	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
0	142.3	5.60	63.5	2.50	137.0	5.39	35	1.37	126.5	4.98
1	142.3	5.60	80	3.14	137.0	5.39	51.5	2.02		
2	243.3	9.57	63.5	2.50	238.4	9.38	35	1.37	212.9	8.38
3	244.4	9.62	97.5	3.83	238.4	9.38	69	2.71	212.9	8.38
4	197.5	7.77	119.5	4.70	190.6	7.50	91	3.58	169.7	6.68
5	243.3	9.57	49.5	1.94	238.4	9.38	21	0.82		

4.4.2 Replacement Seals IP65

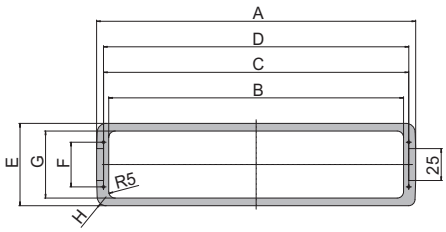
- As spare part
- Foamed plastic PVC grey, UL94 V-0
- Self-adhesive seals

4.4.2 Replacement Seals IP65

Case Size	Part-No.
0	33-510
1	33-511
2	33-512
3	33-513
4	33-514

4.4.3 Replacement Seals IP54/EMC

- As spare part
- Foamed plastic conductive PET-PU black, UL94 V-0
- Self-adhesive seals

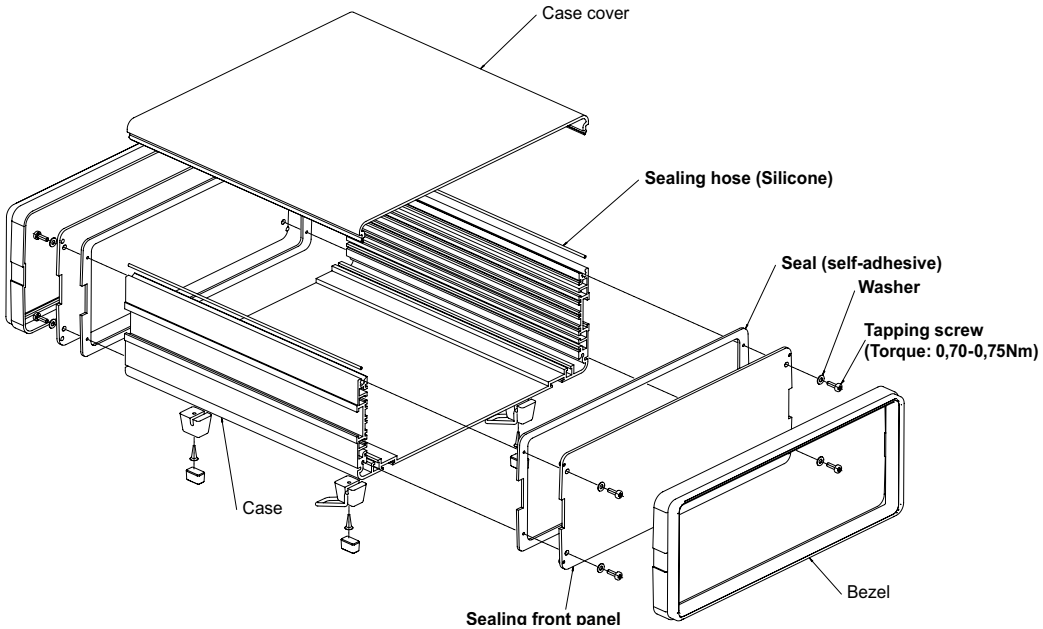


4.4.3 Replacement Seals IP54/EMC

Case Size	Part-No.
0	33E510
1	33E511
2	33E512
3	33E513
4	33E514
5	33E515

Case	A		B		C		D		E		F		G		H	
Type	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
0	149	5.86	130	5.11	137	5.39	138	5.43	64.5	2.53	35	1.37	52.5	2.06	R6.5	0.25
1	149	5.86	130	5.11	137	5.39	138	5.43	81	3.18	51.5	2.02	69	2.71	R6.5	0.25
2	250	9.84	231	9.09	239	9.40	239	9.40	64.5	2.53	35	1.37	52.5	2.06	R7	0.27
3	251	9.88	231	9.09	239	9.40	240	9.44	98	3.85	69	2.71	86	3.38	R7	0.27
4	204	8.03	184	7.24	191	7.51	193	7.59	120.5	4.74	91	3.58	108.5	4.27	R7.5	0.29
5	249.5	9.82	231	9.09	239	9.40	239	9.40	50	1.96	21	0.82	38	1.49	R7	0.27

Guardbox 33 with IP54 / EMC Set or IP65 Set



4.5 Accessories

4.5.1 Assembly Material

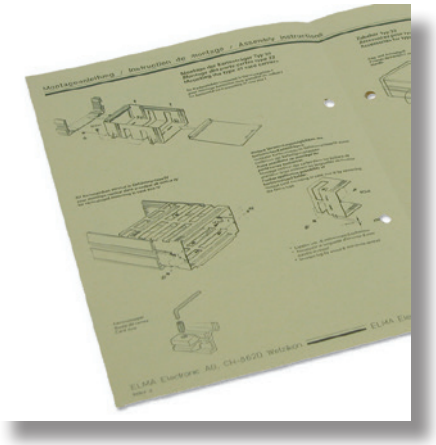
- One set with all necessary materials for mounting one Guardbox 33
- **Scope of delivery:**
  - 4 feet (2 tilted) incl. screws, UL94 V-0
  - 4 tapping screws to assemble the case
  - Assembly material for internal extension (10 screws M3 x 8, 10 screw nuts M3, 10 nut holders)

4.5.1 Assembly Material

Case Size	Light Grey	Black	Stone Grey
0 - 4	33-640	33-620	33-621
5	33-641	33-624	33-622

4.5.2 Assembly Instructions

- For a fast and secure assembly of the Guardbox 33
- **Scope of delivery:**
  - Detailed assembly instruction (1 Page)



4.5.2 Assembly Instructions

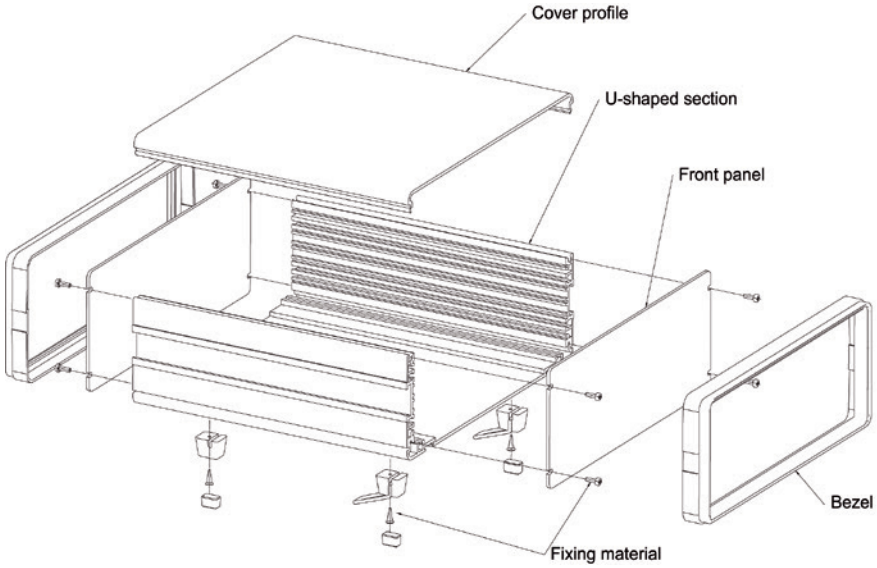
Description	Part-No.
Version: EMC only	33E100
Version: For Standard, IP65 and IP54/EMC	33-200

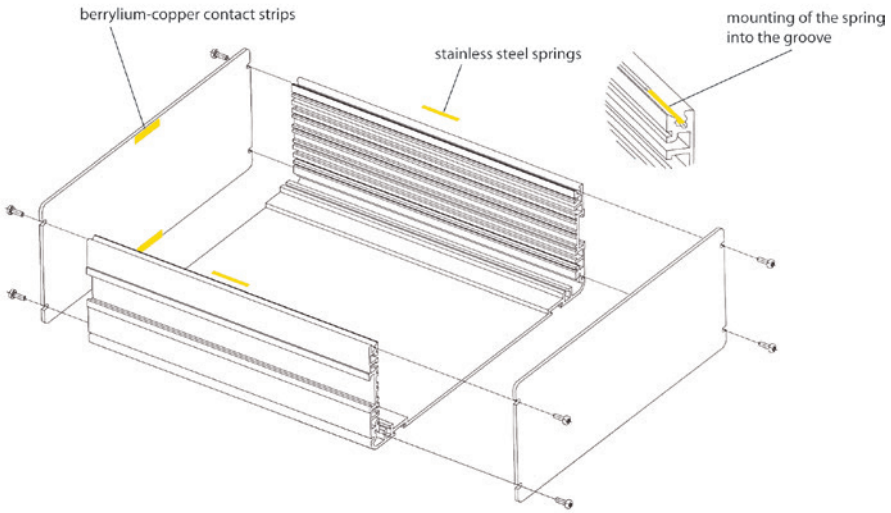
4.5.3 Supplementary EMC Gasket Set

- For EMC level advanced when using no perforations
- For EMC level basic when using perforations
- Increased EMC level by approximate 10 dB
- **Scope of delivery:**
  - 4 berrylium-copper contact strips
  - 2 stainless steel springs

4.5.3 Supplementary EMC Gasket Set

Case Size	Description	Part-No.
0 - 5	Increased by approx. 10 dB	33-642

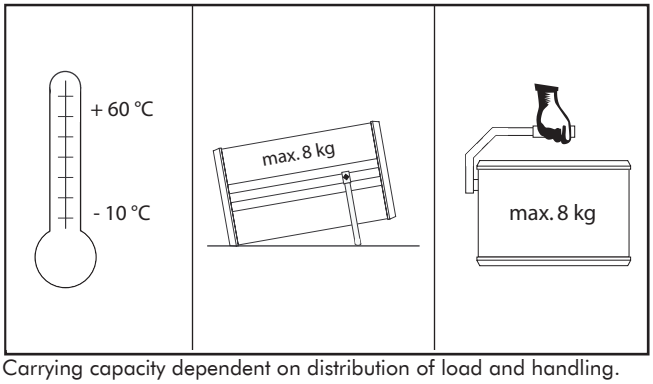




4.5.4 Handles

4.5.4.1 Carrying Handle

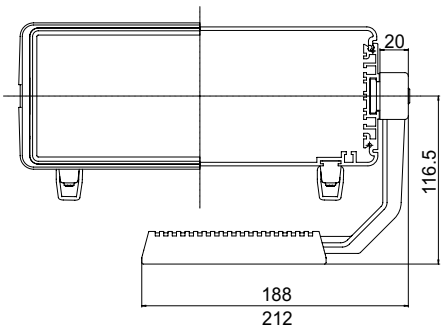
- Zinc die-cast, powder-coated
- Handle piece: Black polyurethane, UL94 V-0
- The handle is inserted into the side groove on the case and can be fixed in any position
- The handle is looking at 90°, while the carrying position has a slight detent only
- Following the case size, there are handles available in two different widths
- **Scope of delivery:**
  - Pre-assembled handle with assembly material

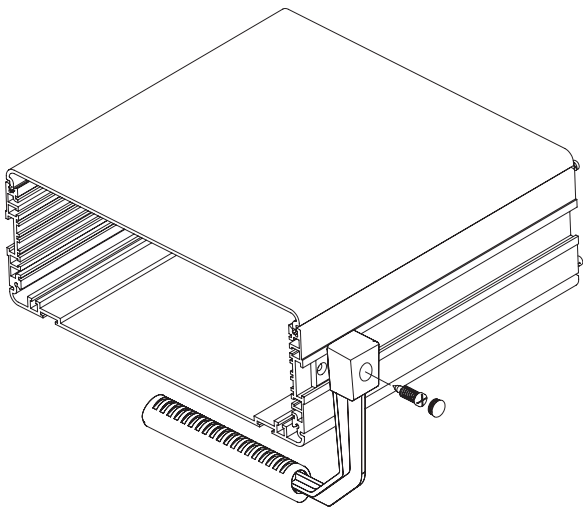


Carrying capacity dependent on distribution of load and handling. Decreases with dynamic stress

4.5.4 Carrying Handle

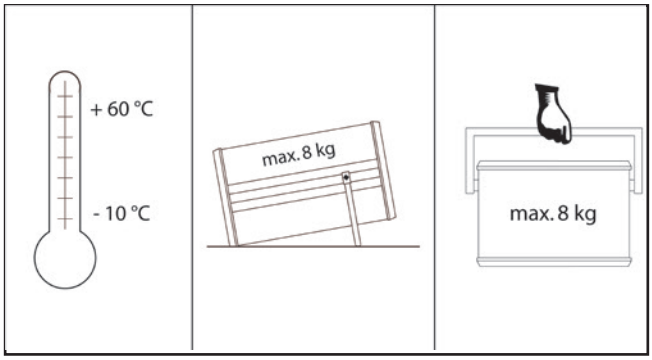
Colour	Part-No. 212 mm (8.34") for case size 2 + 3	Part-No. 188 mm (7.40") for case size 4
Light grey	33-635	33-636
Black	33-645	33-646
Pebble grey	33-630	33-631



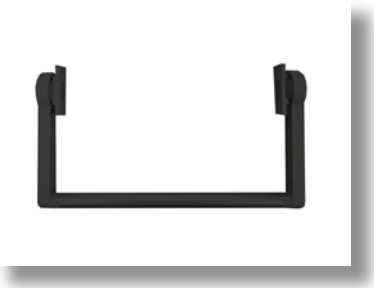


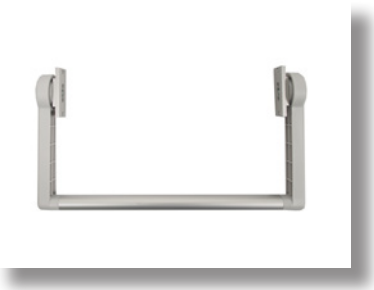
4.5.4.2 Bow Handle

- for Guardbox 33, sizes 1–4
- Side parts made of plastic black or grey
- Handle extrusion in aluminium, anodized black or clear
- The handle can be attached at any position on the lateral groove
- The handle latches every 30 °
- **Scope of delivery:**
  - 1 pre-assembled handle with assembly material



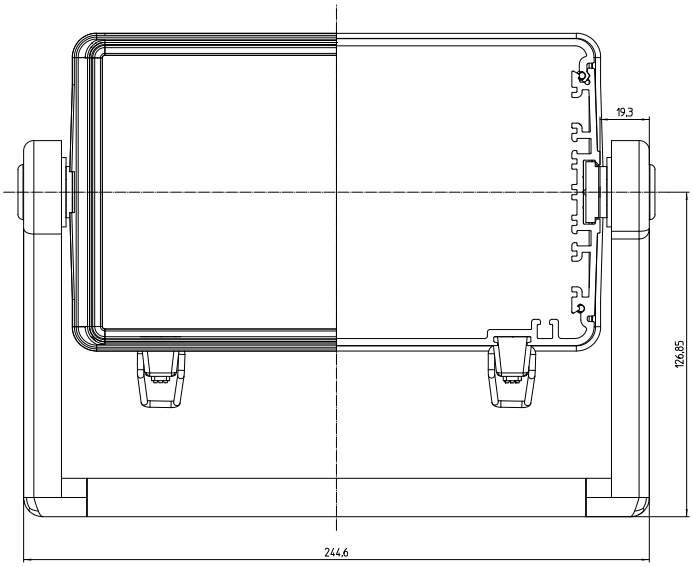
Carrying capacity dependent on distribution of load and handling.
Decreases with dynamic stress





4.5.4.2 Bow Handle

Description	Black Part-No.	Grey Part-No.
Bow handle for Guardbox 33, sizes 0 + 1	33-647	33-651
Bow handle for Guardbox 33, sizes 2 + 3	33-648	33-652
Bow handle for Guardbox 33, size 4	33-649	33-653



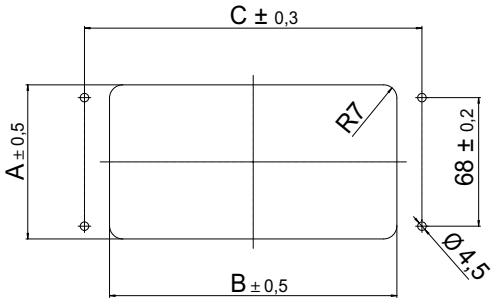
4.5.5 Bracket for Mounting in Consoles

- 3 mm (0.11") sheet aluminium mounting bracket
- Inserted into the slots on the sides of the Guardbox 33 and positioned using two M4 x 6 mm set screws
- Using the mounting brackets, the compact case can be mounted in consoles, etc.
- **Scope of delivery:**
  - 2 mounting brackets
  - 4 screws M4 x 6

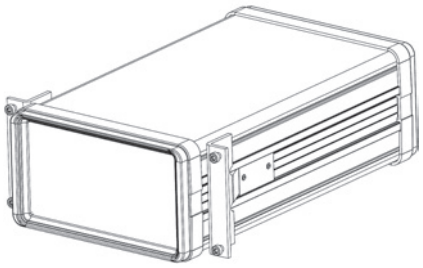
4.5.6 Bracket for Mounting in Consoles

Description	Part-No.
For case sizes 0 - 4	33-650

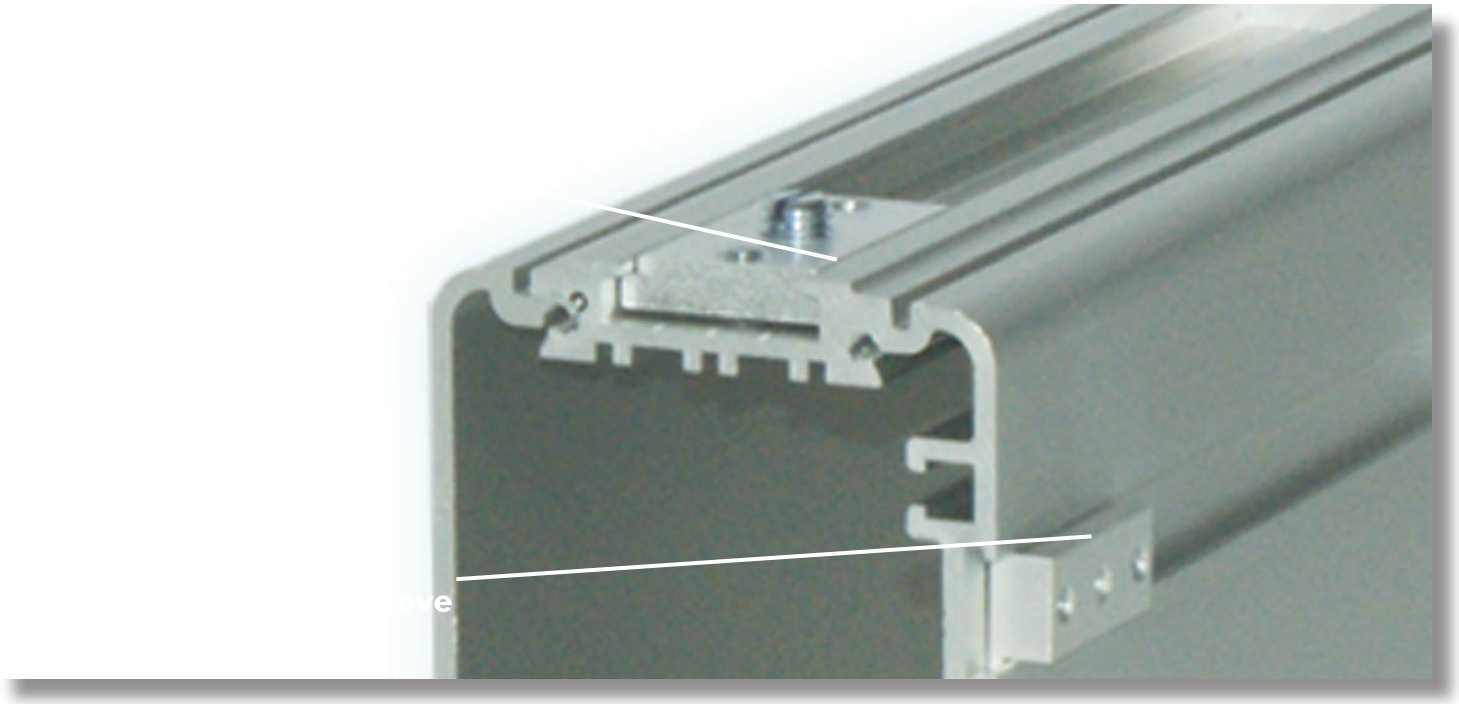
Cut-out drawing:



Mounting position of brackets:

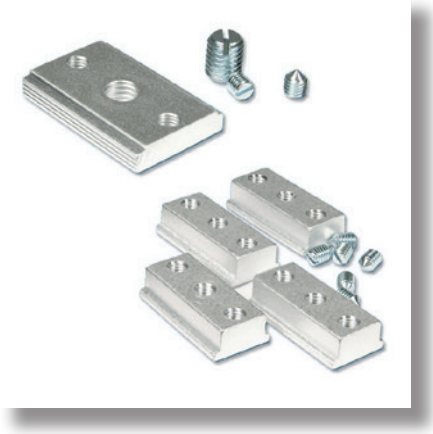


Case Size	A		B		C	
	mm	inch	mm	inch	mm	inch
0	65	2.55	152	5.98	178.5	7.02
1	81.5	3.20	152	5.98	178.5	7.02
2	65	2.55	253	9.96	279.5	11.00
3	99	3.89	254	10.00	280.5	11.02
4	121	4.76	207	8.14	233.5	9.19



4.5.6 Sliding Blocks for Handle Slots and Feet Slots

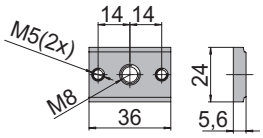
- The sliding blocks (extruded aluminium) provide an optional means of attachment for the Guardbox 33
- The blocks are inserted in the handle slot on the side of the case or in place of the feet
- **Scope of delivery:**
  - Sliding blocks incl. screws



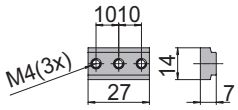
4.5.7 Sliding Blocks for Handle and Feet Slots

Case Size	Description	Scope of Delivery	Part-No.
0 - 4	Handle groove	1 pc.	33-665
0 - 5	Foot groove	4 pcs.	33-666

Handle groove slot nut

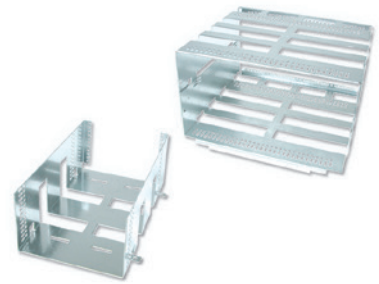


Foot groove slot nut



4.5.7 Single-Eurocard Mounting Sets

- Card carrier of 1 mm (0.03") galvanised sheet steel for mounting in case sizes 0 - 4
- Card guides are the same as used in Elma Type 23 cassettes
- For 100 x 160 mm (3.93 x 6.29") eurocards with plug-in connectors acc. to IEC 60603-2
- Other use is: for vertical mounting of cards in case size 4 (fastening lugs have to be removed)
- **Scope of delivery:**
  - 1 card carrier
- Assembly material included in set see 4.5.1
- Please note: A mounting plate (see 4.5.12) has to be ordered if cards are to be mounted horizontally in case sizes 2, 3 and 4

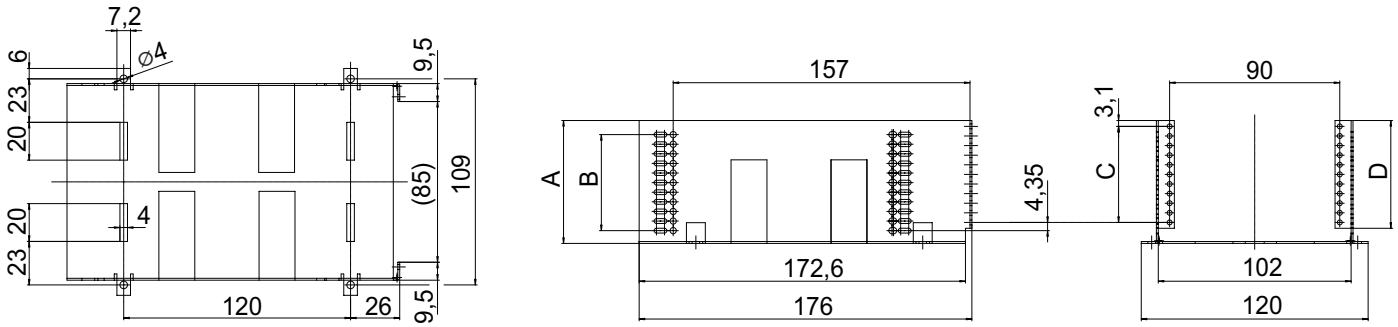


4.5.8 Single-Eurocard Mounting Sets

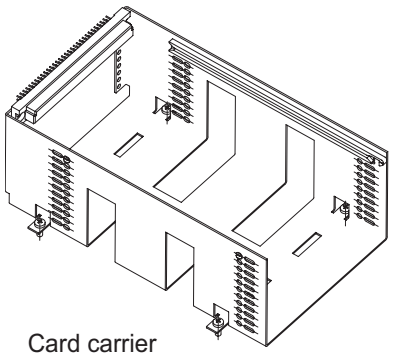
Case Size	Mounting of Cards	Part-No.
1, 3 and 4	horizontally	33-205

Other versions available on request.

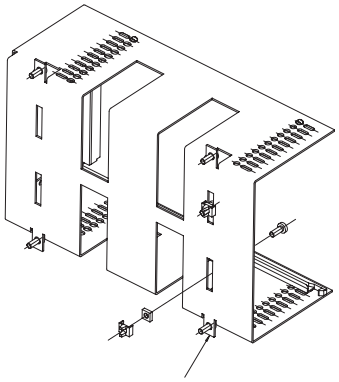
Line drawing, cards mounted horizontally



Case Size	A		B		C		D	
	mm	inch	mm	inch	mm	inch	mm	inch
0 + 2	49.76	1.95	7 x 5.08	0.20	7 x 5.08	0.20	41.76	1.64
1, 3, 4	65	2.55	10 x 5.08	0.20	10 x 5.08	0.20	57	2.24



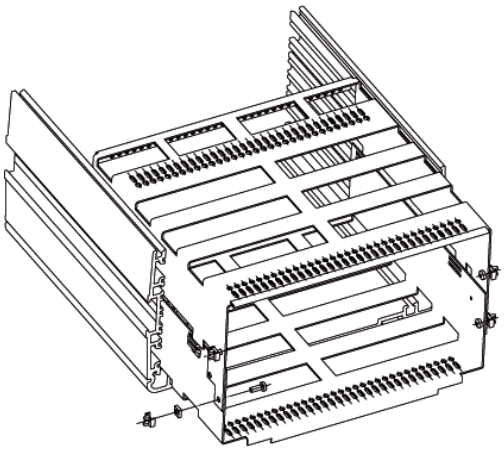
Card carrier

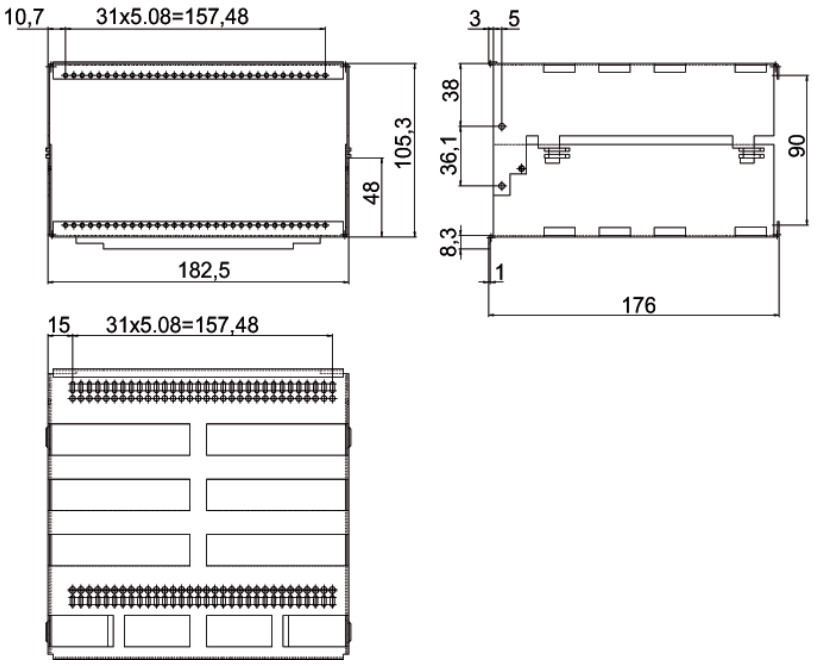


Fastening lugs
Cards mounted vertically

Note: For vertical mounting of cards in case size 4, fastening lugs have to be removed

Line drawing, case size 4, card mounted vertically



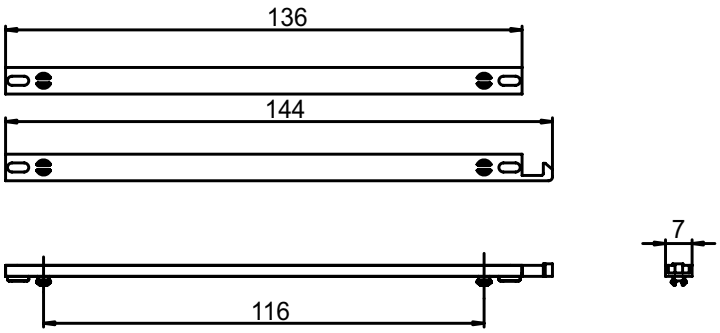


4.5.8 Card Guides

- In each pair, one card guide is fitted with a card locking mechanism
- Light Grey UL94 V-0
- **Scope of delivery:**
  - 1 pair of card guides
- Card handles see 4.5.9.1

4.5.9 Card guides

Card Depth	Part-No. 1 Pair
160 mm (6.29")	61-034

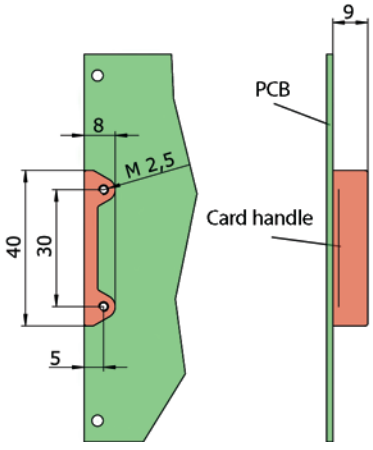


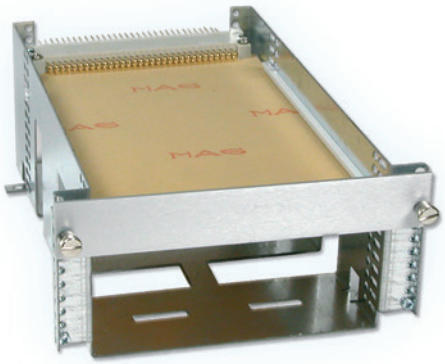
4.5.9.1 Card Handles

- Coloured, transparent handles which will accept labels and facilitate the handling and identification of PCBs
- **Scope of delivery:**
  - 1 card handle
- Two screws M2.5 x 5 are needed per handle and have to be ordered separately

Description	Colour	Part-No.
Card handle	clear	1091-51
	red	1091-54
Cylindrical screw M2.5 x 5		5571-05
Torx cylinder head screw M2.5 x 5, size T8		5470-07

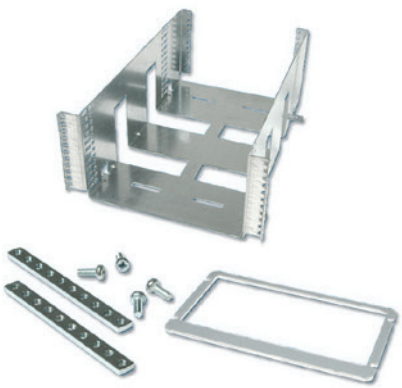
- Other colours (blue, yellow, green, orange) upon request





4.5.9 Mounting Set for Plug-In Units (Single Eurocards)

- Galvanised sheet steel plug-in sub-unit allowing 3U plug-in units (eurocards 100 x 160 mm with IEC 60603-2 connectors and flat or extruded front panels) to be mounted horizontally in the Guardbox 33
- The usable height is 12 HP
- The case front panel with the 129.2 x 61 mm (5.08 x 2.40") opening is made from 2.5 mm (0.07") thick anodised sheet aluminium
- **Scope of delivery:**
  - 1 plug-in card carrier sub-unit
  - 1 front panel with opening for case size 1
  - Assembly material for sub-unit
- Sub-unit for case size 3 and 4 see 4.5.10.1
- Card guides see 4.5.9



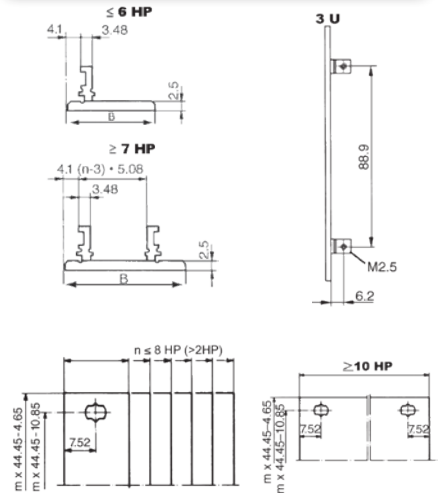
4.5.10 Mounting Set for Plug-In Units (single eurocard)

Description	Part-No.
Complete sub-unit for case 1	33-207

4.5.10.1 Sub-unit for case size 3 and 4

- The sub-unit can also be used for case size 3 and 4. The case front panel can be manufactured with openings to your own specifications
- An appropriate mounting plate (see 4.5.12) is required to mount the sub-unit. The mounting plate has to be ordered separately
- For front panels for single eurocards see 4.5.10.2

Description	Part-No.
Plug-in card carrier sub-unit	33-206
Assembly material for plug-in unit	33-616



4.5.10.2 Extruded Front Panels

- Aluminium 2.5 mm, clear anodised (non-conductive)
- PCB mounting lugs are formed on the rear face of the panel
- No PCB fixing screws on the front face of the panel, leaving more space for silk screening and mounting front panel components
- Suitable for all sub racks and cases
- Thickness of the mounting lugs (3.48 mm) allows PCBs to be mounted on either side of the lugs
- At rear drill marks for handle-fixing holes
- **Scope of delivery:**
  - Extruded front panel, clear anodised
- Front panel screws see below

Width	B		Part-No. 3 U
	mm	inch	
3 HP	15.0	0.59	26N303
4 HP	20.1	0.79	26N304
5 HP	25.2	0.99	26N305
6 HP	30.3	1.19	26N306
7 HP	35.3	1.38	26N307
8 HP	40.4	1.59	26N308
10 HP	50.6	1.99	26N310
12 HP	60.7	2.38	26N312

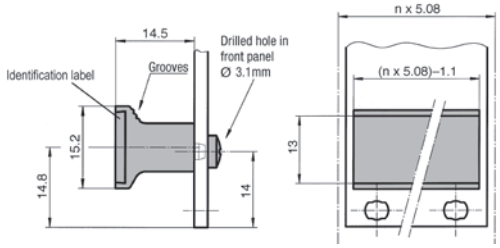
Front Panel Screws

- Set of 10 screws
- With screw retainer
- Front panel width up to 9 HP = 2 screws; ≥ 10 HP = 4 screws

Description	Part-No. 10 pcs.
Torx screws M2.5 x 11.3, size T8, with plastic screw retainer	63K159
Milled edge screws recessed M2.5 x 11.3, with plastic screw retainer	63-159

4.5.10.3 Rigid-Mounted Handle with Identification Label

- Black, plastic UL94 V-0, label aluminium anodised
- **Scope of delivery:**
  - Rigid-mounted handle
  - Identification label
- Assembly material see below



Width	Scope of Delivery	Part-No.
4 HP	10 pcs.	60-200-04
5 HP	10 pcs.	60-200-05
6 HP	10 pcs.	60-200-06
7 HP	10 pcs.	60-200-07
8 HP	10 pcs.	60-200-08
10 HP	10 pcs.	60-200-10
12 HP	10 pcs.	60-200-12

- Other sizes (up to 84 HP) are available upon request

Assembly Material

Description	Part-No.
Cross recessed rounded head screw	61-276

Other front panels and handles see chapter C "Front Panels, Handles and Plug-In Units"

4.5.10 Card Stop Set

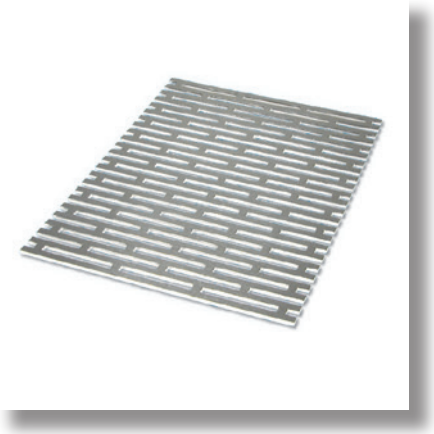
- Card stoppers are used for card fixation when direct horizontal insertion of double euro-cards (case size 2, 3 and 5) or other inserted cards is required
- **Scope of delivery:**
  - 4 extruded card stoppers
  - 4 hexagon socket set screws
  - 1 hexagon socket key

4.5.11 Card Stop Set

Case Size	Part-No.
0 - 5	33-618

4.5.11 Mounting Plates

- Made of 2 mm (0.07") thick sheet aluminium
- Dimensions correspond to the respective case size
- The position of the slots allows various mounting arrangements
- The mounting plate is screwed to the grooved case profile
- **Scope of delivery:**
  - Mounting plate, blank aluminium
- Assembly material included with in set see 3.5.1

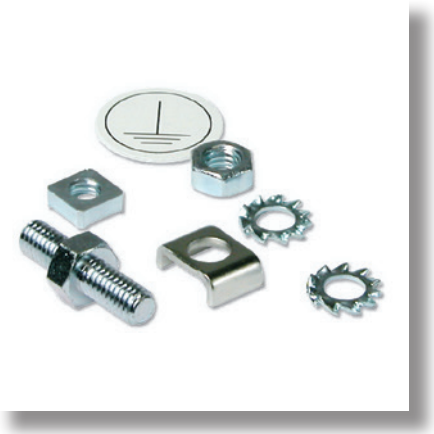


4.5.12 Mounting Plates

Case Size	Part-No. 180 mm 7.08 inch	Part-No. 240 mm 9.44 inch	Part-No. 300 mm 11.81 inch
0 + 1	33-313	33-314	-
2, 3, 5	-	33-324	33-325
4	-	33-344	-

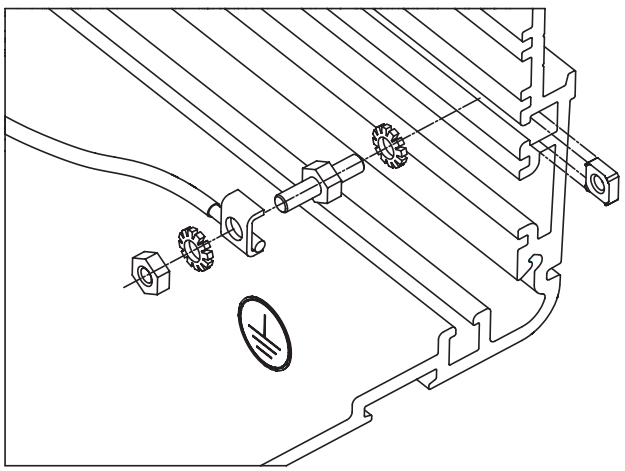
4.5.12 Earthing Terminal

- The earthing terminal facilitates grounding of the Guardbox 33 in accordance with EN / VDE / SEV standard
- **Scope of delivery:**
  - 1 earthing nut M3.5
  - 1 threaded bolt M3.5
  - 1 clamping yoke
  - 2 serrated washers
  - 1 nut M3.5
  - 1 earthing symbol



4.5.13 Earthing Terminal

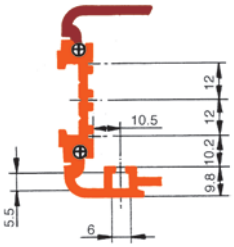
Case Size	Description	Part-No.
0 - 5	Earthing terminal	33-619



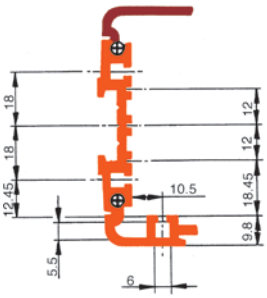
4.6 Dimensions / Technical Information

4.6.1 Cross Sections of Extrusions

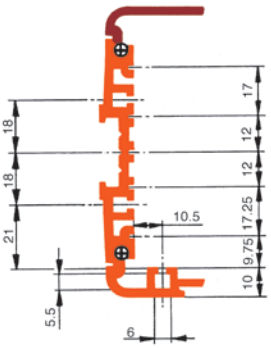
Case size 0 and 2



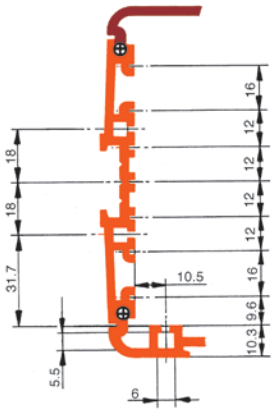
Case size 1



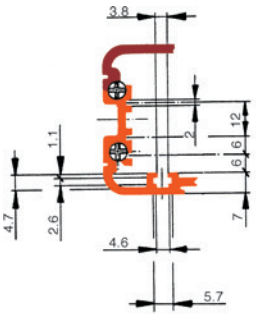
Case size 3



Case size 4

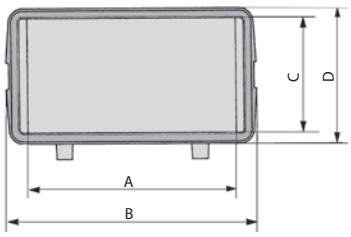


Case size 5

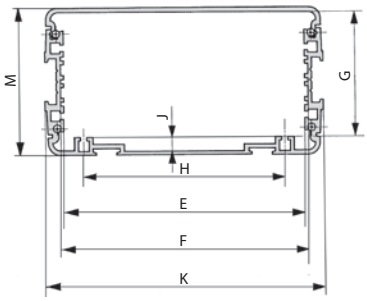


4.6.2 Line Drawings

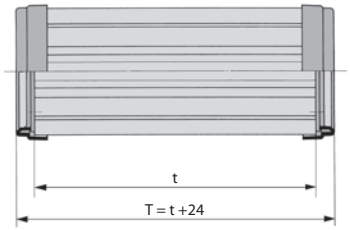
Front View



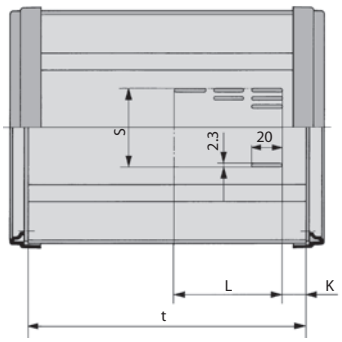
Internal Dimensions



Side View



Bottom Air Perforation



Type		A	B	C	D	E	F Intern. Width	F Board Width	G	H	J	K	M±0.5	S	L if t=240 9.44"	L if t=300 11.81"	t=120 4.72"	t=180 7.08"	t=240 9.44"	t=300 11.81"
0	mm	129.5	155.5	55	69	130	134	133	51.7	109	7.5	151	64					✓	✓	
	inch	5.10	6.12	2.16	2.71	5.12	5.27	5.23	2.03	4.29	0.29	5.94	2.52							
1	mm	129.5	155.5	71.5	85.5	130	134	133	68.4	109	7.5	151	80.5				✓	✓	✓	
	inch	5.10	6.12	2.81	3.37	5.12	5.27	5.23	2.69	4.29	0.29	5.94	3.17							
2	mm	230.5	256.5	55	69	231	235	233.35	51.7	210	7.5	252	64	148.1	45	45			✓	✓
	inch	9.07	10.10	2.16	2.71	9.09	9.25	9.18	2.03	8.26	0.29	9.92	2.52	5.83	1.77	1.77				
3	mm	230.5	257.5	89	103	231	235	233.35	85.5	210	7.5	253	98	148.1	45	70			✓	✓
	inch	9.07	10.14	3.50	4.05	9.09	9.25	9.18	3.36	8.26	0.29	9.96	3.86	5.83	1.77	2.75				
4	mm	183.5	210.5	111	125	184	188	186.6	106.9	163	7.5	206	120	104.9	70	70		✓	✓	✓
	inch	7..22	8.29	4.37	4.92	7.24	7.40	7.34	4.21	6.41	0.29	8.11	4.72	4.13	2.75	2.75				
5	mm	230.5	256.5	41	56	231	235	233.35	43	210	4.7	249.5	50					✓	✓	
	inch	9.07	10.10	1.61	2.20	9.09	9.25	9.18	1.69	8.26	0.18	9.82	1.97							

4.6.3 IP Protection Classes

- Protection against contact and foreign bodies
- Protection against water
- Acc. to IEC 60529

Evaluation of classification

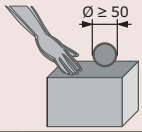
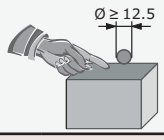
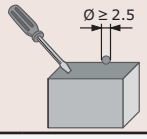
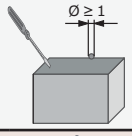
- The test results according to the standard do not entirely exclude leaks and an individual test is therefore recommended in critical cases (with the actual equipment layout)
- The protection class for cabinets and enclosures is specified by IP (International Protection) and two indices

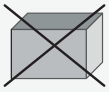
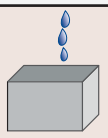
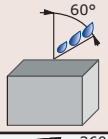
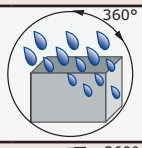
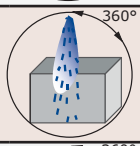
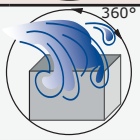
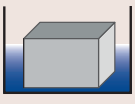
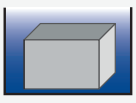
Example IP 55

Protection against penetration by water jets from all directions

Complete protection against contact with internal parts and against dust deposition

3.6.3 IP Protection Classes

First Index	Contact Protection	Foreign-Body Protection
0	No special protection	
1 	Against large areas of body	Large foreign bodies Ø ≥ 50 mm (1.97")
2 	Against fingers or objects of similar size	Medium-sized foreign bodies Ø ≥ 12.5 mm (0.49")
3 	Against tools, wires, etc. with a thickness of ≥ 2.5 mm	Granular foreign bodies Ø ≥ 2.5 mm (0.10")
4 	Against tools, wires, etc. with thickness ≥ 1.0 mm	Granular foreign bodies Ø ≥ 1.0 mm (0.04")
5	Complete protection	Dust-protected; dust deposits are permitted, but their volume must not affect the function of the unit
6	Complete protection	Dust-proof

Second Index	Water Protection
0 	No special protection
1 	Against water dripping vertically
2	Against water dripping at an angle (up to 15° from the vertical)
3 	Against spray water (any direction up to 60° from the vertical)
4 	Against spray water from all directions
5 	Against water jets from a nozzle in all directions
6 	Against inundation
7 	Against immersion
8 	Against submersion

4.6.4 Climatic and Mechanical Tests

The Guardbox 33 fulfils the following test according to:

- Vibration EN 50155 (EN 61373)
- Shock EN 60068-2-27
- IP Protection IEC 60529
- Salt Spray Test DIN 50021

The functionality of the box was ensured during all tests

Detail information to climatic and mechanical tests:

- **Vibration** EN 50155 (EN 61373, Cat. 1, Class B)
  Eff. Acceleration: 7.9m/s², Duration: 5h/Axis
  Frequency: 5Hz to 150Hz
  Axis of stimulation: X, Y, Z

- **Shock** EN 60068-2-27
  Shockform: Halfsinus Acceleration: 150m/s² Duration: 11ms
  Number of Shocks: 3 per Axle Total: 18 Shocks

- **IP Protection IEC 60529**
  IP65: Guardbox 33 with IP65 sealing kit
  IP54: Guardbox 33 with IP54/EMC sealing kit

- **Salt Spray Test** DIN 50021
  Salt concentration: 5g/l Duration: 96h Temperature: +35°C

Source: Ellisys, Switzerland