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# HAND-HELD ENCLOSURES

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A Phoenix Mecano Company



## ROSE Systemtechnik GmbH

The company was founded in 1969 and specializes in the development and production of high quality industrial enclosures, which are used in a variety of environmental conditions.

Phoenix Mecano AG / Switzerland is a global company.

The basis of our business success are systems from a wide range of high quality products, innovative design and first class customer service.

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A Phoenix Mecano Company

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# Contents

|   |   | Page    |
|---|---|---------|
|    | <b>Taguan 130</b><br>ABS hand held enclosure for data acquisition and instrumentation                 | 5 - 8   |
|    | <b>Taguan 180/230</b><br>ABS hand held enclosure for data acquisition and instrumentation             | 9 - 16  |
|    | <b>Beluga 180/220</b><br>Polyamide hand held enclosure for MCR- and automation engineering            | 17 - 22 |
|    | <b>Beluga 380</b><br>Polyamide hand held enclosure for MCR- and automation engineering                | 23 - 26 |
|    | <b>Norvent</b><br>Design plastic enclosure for communication and automation engineering               | 27 - 30 |
|   | <b>Pilot 250</b><br>Polyamide hand held enclosure for MCR- and automation engineering                 | 31 - 34 |
|  | <b>Pilot 50</b><br>Polyamide/PVC hand held enclosure for MCR- and automation engineering              | 35 - 38 |
|  | <b>Pilot 10/20/30</b><br>Hand held enclosure for MCR- and automation engineering                      | 39 - 42 |
|  | <b>Pilot 110-150</b><br>Polyamide hand held enclosure for automation and control engineering          | 43 - 46 |
|  | <b>Limanda</b><br>Polyamide hand held enclosure for data acquisition, MCR- and automation engineering | 47 - 52 |
|  | <b>Electro-mechanical components</b>  | 53 - 58 |
|  | <b>General technical informations</b><br><br>Technical modifications reserve!                         | 59 - 63 |



- ABS hand held enclosure for data acquisition and measurement
- With integrated battery compartment
- Version with or without display opening
- Optional EMC version with internal coating

### Technical data

**Material:**

ABS

**Ingress protection:**

IP 40 to EN 60529

**Surface resistance:**

4 x 10<sup>14</sup> Ohm, IEC 60093

**Flammability:**

UL 94 HB

**Colour:**

top and base, battery compartment cover, head/shaft panel: RAL 5020, ocean blue

keyboard cover, battery compartment/battery pack: RAL 7024, graphite grey

**Temperature range:**

-40°C to +80°C

#### Included in delivery

5-part enclosure with top and base, battery compartment, battery compartment cover, head and shaft cover, fixing and enclosure screws. Open version incl. display screen and punched seal.

# Taguan 130

## Product range

| Type          | Order No.          | Version      | Dimensions<br>W x L x H (mm) | Weight<br>(g) |
|---------------|--------------------|--------------|------------------------------|---------------|
| Taguan 130 FO | <b>27.01 02 00</b> | flat, open   | 80/70 x 125 x 36,7 / 28,5    | 130           |
| Taguan 130 FG | <b>27.01 02 01</b> | flat, closed | 80/70 x 125 x 36,7 / 28,5    | 110           |
| Taguan 130 TO | <b>27.01 02 10</b> | deep, open   | 80/70 x 125 x 46,7 / 28,5    | 123           |
| Taguan 130 TG | <b>27.01 02 11</b> | deep, closed | 80/70 x 125 x 46,7 / 28,5    | 140           |



## Accessories

|  |                    |
|--|--------------------|
| Battery holder for 4 micro-cells (AAA)               | <b>27.01 02 80</b> |
| Battery holder for 9 V monobloc                      | <b>27.01 02 81</b> |
| Clip   | <b>27.01 02 82</b> |
| Keypad FT 130b, 12 keys, printed (common connection) | <b>82.10 00 01</b> |
| Keypad FT 130e, 12 keys, with insert (matrix)        | <b>82.10 00 02</b> |
| Connector 13-pole                                    | <b>82.20 00 13</b> |
| Shaft cover in enclosure colour                      | <b>27.01 02 85</b> |
| Shaft cover transparent                              | <b>27.01 02 86</b> |
| Shaft cover for infrared                             | <b>27.01 02 87</b> |
| Spare display screen set                             | <b>27.01 02 88</b> |
| Spare screw set                                      | <b>27.01 00 90</b> |
| Scratch resistant display screen                     | on request         |
| Push-button and switches see page 53 - 58            |                    |

## Electromechanical and electronic components

Upon request we can supply enclosures ready equipped with electromechanical and electronic components such as display, chipcard-acceptor, interface modules etc.

## Component mounting options

| Component options  | Type T130 FO | Type T130 FG | Type T130 TO | Type T130 TG |
|--|--------------|--------------|--------------|--------------|
| Display max. view area 45 x 17,4 mm<br>max. mounting dimensions 65 x 29 mm | •            |              | •            |              |
| Chipcard reader in head section  | •            | •            | •            | •            |
| Scanner  | •            | •            | •            | •            |
| PCMCIA slot  | •            | •            | •            | •            |
| D-Sub interface 9-pin  | •            | •            | •            | •            |
| D-Sub interface 15-pin   | •            | •            | •            | •            |
| 9 V monobloc   | •            | •            | •            | •            |
| 4 R3 micro-cells (AAA)   | •            | •            | •            | •            |
| 1. PCB (main board)  | •            | •            | •            | •            |
| 2. PCB (adapter board)   |              |              | •            | •            |
| Membrane keypad  | •            | •            | •            | •            |

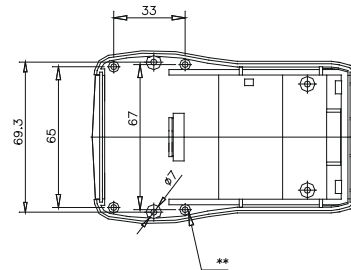
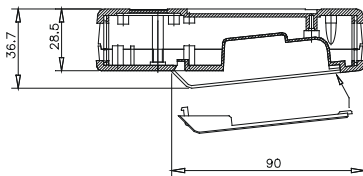
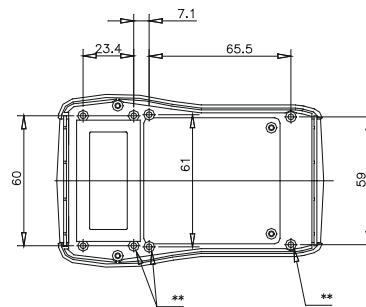
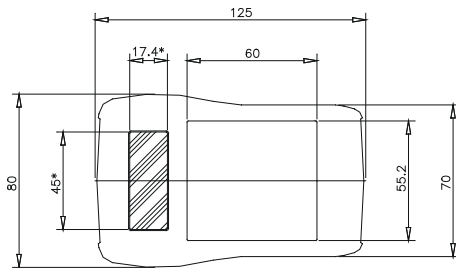
Dimensions



| Type          | Version      | Order No.          |
|---------------|--------------|--------------------|
| Taguan 130 FO | flat, open   | <b>27.01 02 00</b> |
| Taguan 130 FG | flat, closed | <b>27.01 02 01</b> |

(max. PCB size of displays ca. 65 x 29 mm)

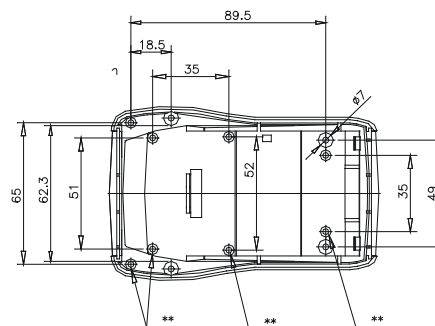
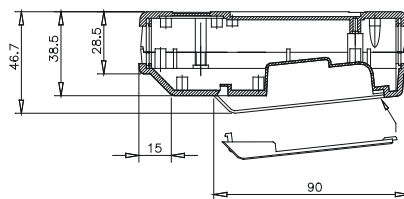
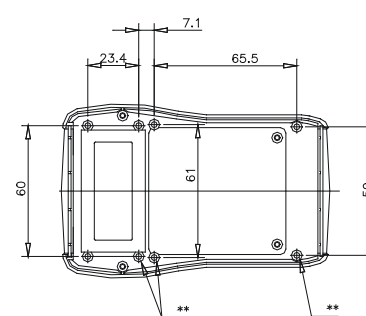
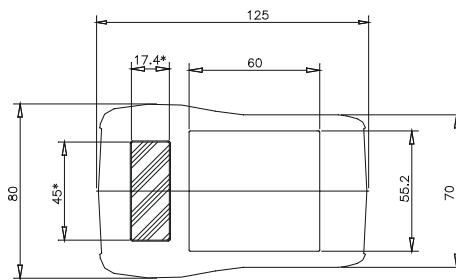
\* = Open version  
\*\* = PCB mounting boss (screw 2.5 x 5)



| Type          | Version      | Order No.          |
|---------------|--------------|--------------------|
| Taguan 130 TO | deep, open   | <b>27.01 02 10</b> |
| Taguan 130 TG | deep, closed | <b>27.01 02 11</b> |

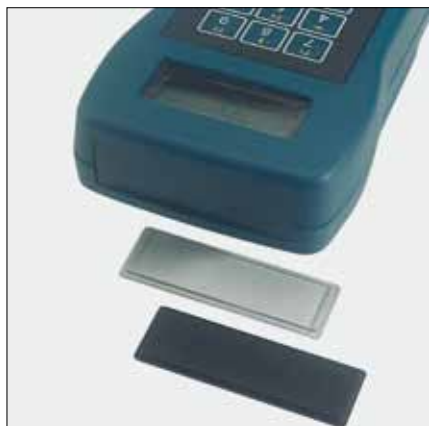
(max. PCB size of displays ca. 65 x 29 mm)

\* = Open version  
\*\* = PCB mounting boss (screw 2.5 x 5)



# Taguan 130

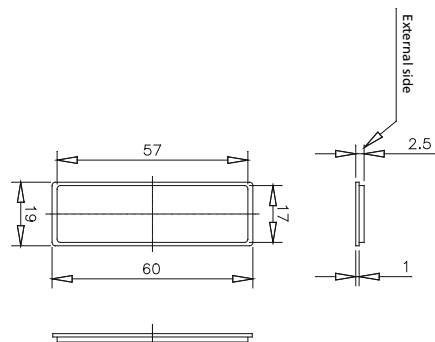
## Accessories



**Cover**  
for use as head or shaft cover

| Version             | Order No.          |
|---------------------|--------------------|
| in enclosure colour | <b>27.01 02 85</b> |
| transparent         | <b>27.01 02 86</b> |
| for infrared        | <b>27.01 02 87</b> |

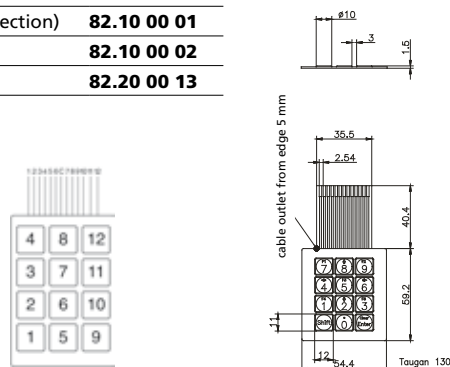
Units per pack: 1 pc



**Keypads**  
12 keys, printed version or plain with insertion facility for custom inscription

| Type    | Version                              | Order No.          |
|---------|--------------------------------------|--------------------|
| FT 130b | 12 keys, printed (common connection) | <b>82.10 00 01</b> |
| FT 130e | 12 keys, with insert (matrix)        | <b>82.10 00 02</b> |
|         | Connector 13-pole                    | <b>82.20 00 13</b> |

Customized keypads on request.



**Clip**  
Metal clip to snap onto battery compartment lid  
Order No. **27.01 02 82**



**Battery holder**  
for mounting in the bottom part, for 4 micro-cells (AAA) side by side or connection contact for 9 V monobloc

| Version                 | Order No.          |
|-------------------------|--------------------|
| for 4 micro-cells (AAA) | <b>27.01 02 80</b> |
| for 9 V monobloc        | <b>27.01 02 81</b> |





- ABS hand held enclosure for data acquisition and measurement
- With integrated battery compartment
- Version with or without display openings
- Optional EMC version with internal coating

## Technical data

**Material:**

ABS

**Ingress protection:**

IP 40 to EN 60529

**Surface resistance:**

$4 \times 10^{14}$  Ohm, IEC 60093

**Flammability:**

UL 94 HB

**Colour:**

top and base, battery compartment cover, head/shaft cover: RAL 5020, ocean blue

keyboard cover, battery compartment/battery pack: RAL 7024, graphite grey

**Temperature range:**

-40°C to +80°C

### Included in delivery

Enclosure with top and base, keyboard cover, head and shaft cover, fastening and enclosure screws. Open version incl. display screen and punched seal.  
Please order battery compartment separately.

# Taguan 180/230

## Product range

| Type         | Order No.          | Version | Dimensions<br>W x L x H (mm) | Weight<br>(g) |
|--------------|--------------------|---------|------------------------------|---------------|
| Taguan 180 O | <b>27.01 04 00</b> | open    | 84/70 x 180 x 52,5/37,5      | 140           |
| Taguan 180 G | <b>27.01 04 01</b> | closed  | 84/70 x 180 x 52,5/37,5      | 170           |
| Taguan 230 O | <b>27.01 06 00</b> | open    | 97/70 x 229 x 52,5/37,5      | 230           |
| Taguan 230 G | <b>27.01 06 01</b> | closed  | 97/70 x 229 x 52,5/37,5      | 400           |



**Electromechanical and electronic components**  
Upon request we can supply enclosures ready equipped with electromechanical and electronic components such as display, chipcard-acceptor, interface modules etc.

## Accessories

|   |                    |   |                    |
|---|--------------------|---|--------------------|
| Battery holder 9 V monobloc                     | <b>27.01 00 94</b> | Hand strap (T 180)                        | <b>27.01 04 84</b> |
| Shaft cover in enclosure colour                 | <b>27.01 02 85</b> | Hand strap (T 230)                        | <b>27.01 06 84</b> |
| Shaft cover transparent                         | <b>27.01 02 86</b> | Spare display screen set (T 180)          | <b>27.01 04 88</b> |
| Shaft cover for infrared                        | <b>27.01 02 87</b> | Spare display screen set (T 230)          | <b>27.01 06 88</b> |
| Battery compartment empty, 30 g                 | <b>27.01 00 80</b> | Spare screws set                          | <b>27.01 00 90</b> |
| Rechargeable battery pack NiMH 4.8 V / 2100 mAh | <b>27.20 00 03</b> | Head cover, stepped, in enclosure colour  | <b>27.01 00 85</b> |
| Connector charger                               | <b>27.20 00 02</b> | Head cover, stepped, for infrared         | <b>27.01 00 87</b> |
| Battery charging station                        | <b>27.20 00 01</b> | Head cover, stepped, transparent          | <b>27.01 00 89</b> |
| Spring contact, 2-pole                          | <b>27.01 00 82</b> | Head cover, straight, in enclosure colour | <b>27.01 00 91</b> |
| Wrist strap                                     | <b>27.01 00 83</b> | Head cover, straight, transparent         | <b>27.01 00 92</b> |
| Display fixing set (T 180)                      | <b>27.01 04 80</b> | Head cover, straight, for infrared        | <b>27.01 00 93</b> |
| Display fixing set (T 230)                      | <b>27.01 06 80</b> | Scratch resistant display screen          | auf Anfrage        |
| Switch mat set 12 keys                          | <b>27.01 00 95</b> | Push-button and switches see page 53 - 58 |                    |
| Switch mat set 24 keys (T 180)                  | <b>27.01 04 81</b> |   |                    |
| Switch mat set 36 keys (T 230)                  | <b>27.01 06 81</b> |   |                    |

## Components mounting options

| Component options  | Type T180 O | Type T180 G | Type T230 O | Type T230 G |
|--|-------------|-------------|-------------|-------------|
| Display (max. view area 56 x 33 mm; max. mounting dimensions 66 x 46 mm) • |             |             |             |             |
| Display (max. view area 66 x 43 mm; max. mounting dimensions 78 x 56 mm)   |             |             | •           |             |
| Chipcard reader in head section  | •           | •           | •           | •           |
| Chipcard reader in shaft section   | •           | •           | •           | •           |
| Magnetic card reader   | •           | •           | •           | •           |
| Scanner  | •           | •           | •           | •           |
| PCMCIA slot  | •           | •           | •           | •           |
| D-Sub interface 9-pin  | •           | •           | •           | •           |
| D-Sub interface 15-pin   | •           | •           | •           | •           |
| D-Sub interface 25-pin   | •           | •           | •           | •           |
| Battery pack   | •           | •           | •           | •           |
| 4 micro-cells R6 (AA)  | •           | •           | •           | •           |
| 9 V monobloc   | •           | •           | •           | •           |
| 1st board (main board)   | •           | •           | •           | •           |
| 2nd board (adapter board)  | •           | •           | •           | •           |
| Membrane keypad  | •           | •           | •           | •           |
| Switching mat, 12 keys, in combination with keypad plate                   | •           | •           | •           | •           |
| Switching mat, 24 keys   | •           | •           |             |             |
| Switching mat, 36 keys   |             |             | •           | •           |

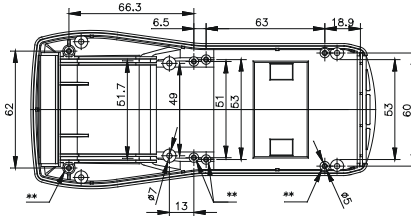
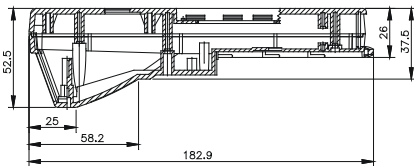
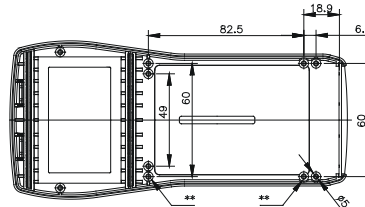
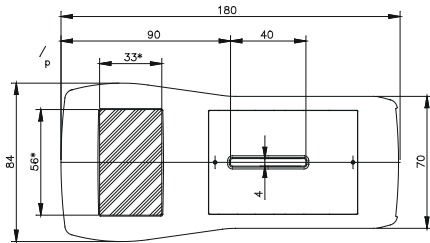
Abmessungen



| Type         | Version | Order No.          |
|--------------|---------|--------------------|
| Taguan 180 O | open    | <b>27.01 04 00</b> |
| Taguan 180 G | closed  | <b>27.01 04 01</b> |

(max. PCB size of displays ca. 66 x 46 mm)

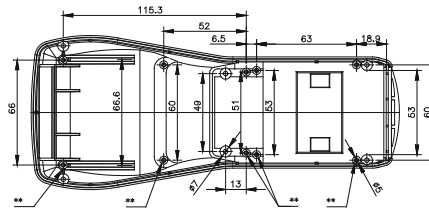
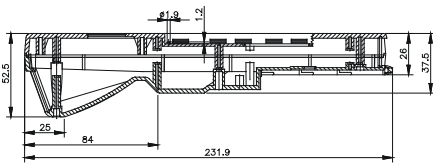
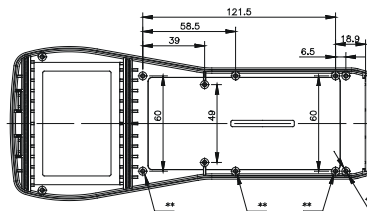
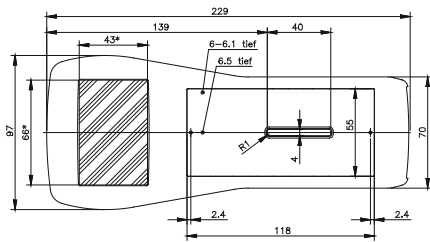
\* = Open version  
\*\* = PCB mounting boss (screw 2.5 x 5)



| Type         | Version | Order No.          |
|--------------|---------|--------------------|
| Taguan 230 O | open    | <b>27.01 06 00</b> |
| Taguan 230 G | closed  | <b>27.01 06 01</b> |

(max. PCB size of displays ca. 78 x 56 mm)

\* = Open version  
\*\* = PCB mounting boss (screw 2.5 x 5)

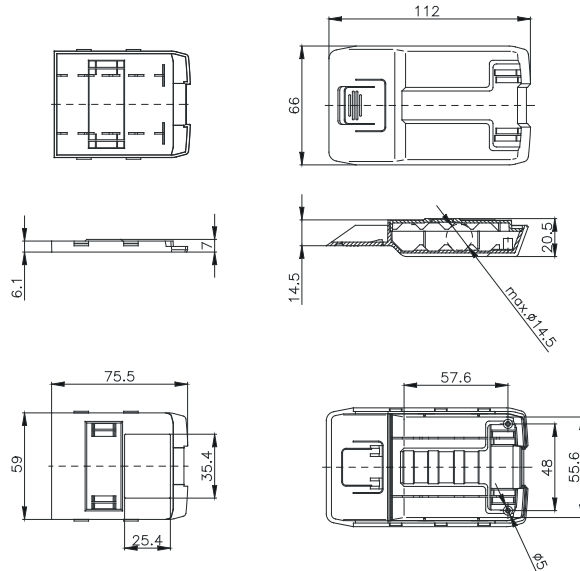


## Accessories



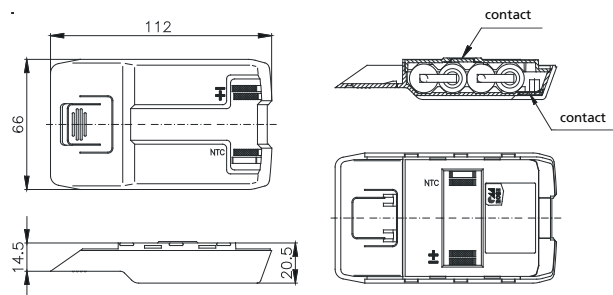
**Battery compartment empty**  
consisting of battery compartment and lid space for 4 micro-cells R6 (AA) side by side

Order No. **27.01 00 80**



**Rechargeable battery pack**  
NiMH 4.8 V / 2100 mAh

Order No. **27.20 00 03**



**Battery holder**  
for mounting in the bottom part for 9 V monobloc

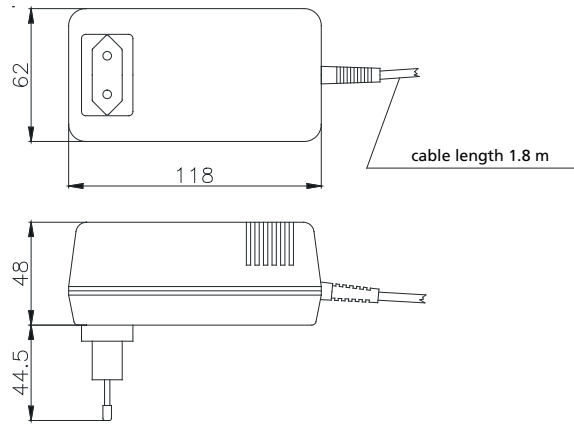
Order No. **27.01 00 94**

Accessories



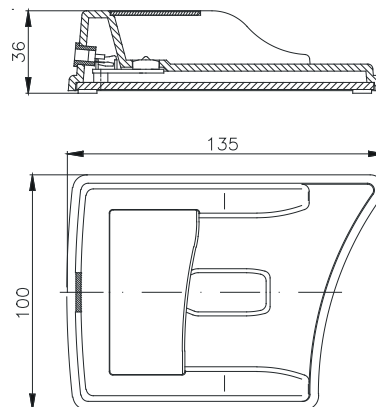
**Connector charger**  
with primary adapter

Order No. **27.20 00 02**



**Battery charging station**

Order No. **27.20 00 01**



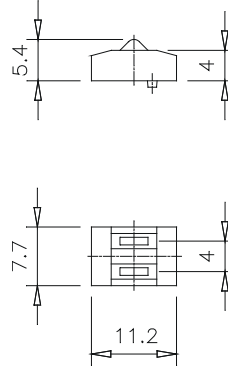
## Accessories



### Spring contact 2-pole

Counter-contacts for the battery pack (Company Bourns, type 70ADJ002ML1), for mounting in enclosure bottom part

Order No. **27.01 00 82**

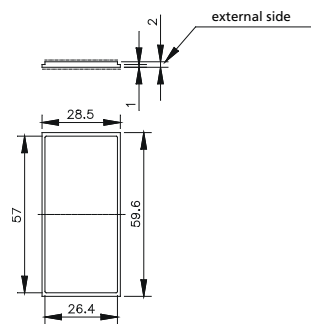


### Head cover

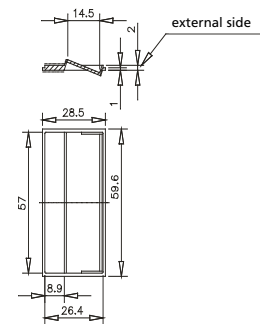
| Version                      | Order No.          |
|------------------------------|--------------------|
| stepped in enclosure colour  | <b>27.01 00 85</b> |
| stepped transparent          | <b>27.01 00 89</b> |
| stepped for infrared         | <b>27.01 00 87</b> |
| straight in enclosure colour | <b>27.01 00 91</b> |
| straight transparent         | <b>27.01 00 92</b> |
| straight for infrared        | <b>27.01 00 93</b> |

units per pack: 1 pc

even



stepped



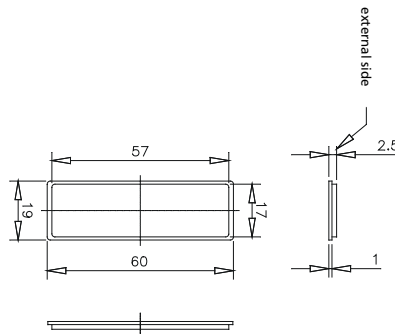
Accessories



Shaft cover

| Version             | Order No.          |
|---------------------|--------------------|
| in enclosure colour | <b>27.01 02 85</b> |
| transparent         | <b>27.01 02 86</b> |
| for infrared        | <b>27.01 02 87</b> |

units per pack: 1 pc

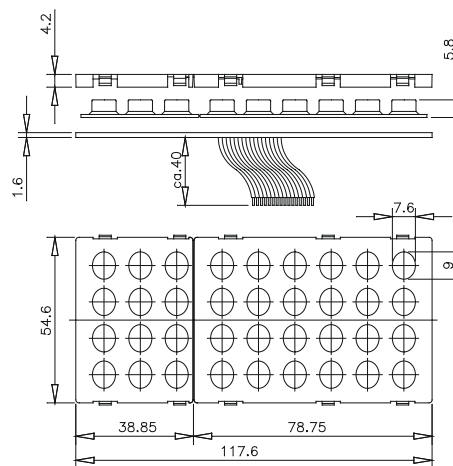


Switch mat set

consisting of keypad plate, silicone switching mat and keypad circuit board with connecting cable

| for type       | No. of keys | Order No.          |
|----------------|-------------|--------------------|
| Taguan 180/230 | 12*/**      | <b>27.01 00 95</b> |
| Taguan 180     | 24**        | <b>27.01 04 81</b> |
| Taguan 230     | 36          | <b>27.01 06 81</b> |

\* Please remember the modification of the toppart for the flat cable  
 \*\* Please not different heights by combination with closed cover



# Taguan 180/230

## Accessories



**Display fixing set**  
for variable display mounting

| Version for | Order No.          |
|-------------|--------------------|
| Taguan 180  | <b>27.01 04 80</b> |
| Taguan 230  | <b>27.01 06 80</b> |



**Hand strap**  
with Velcro fastener for adjustment, consisting of holding strap, adapter and screws

| Version for | Order No.          |
|-------------|--------------------|
| Taguan 180  | <b>27.01 04 84</b> |
| Taguan 230  | <b>27.01 06 84</b> |



**Wrist strap**  
to prevent falling down, or as carrying aid

Order No. **27.01 00 83**





- Polyamide hand held enclosure for MCR- and automation engineering
- Version with or without display opening
- Prepared for acceptance of keypads/silicone switch mats
- Optional EMC version with internal coating and EMC seal

#### Included in delivery

Double-skinned enclosure with top and base unit, each with fixing domes, fastening and enclosure screws.  
Open version incl. display screen and punched seal.

#### Technical data

**Material:**

Polyamide

**Ingress protection:**

IP 65 to EN 60529

**Surface resistance:**

$10^{12}$  Ohm, IEC 60093

**Flammability:**

UL 94 V-2

**Colour:**

RAL 7021, black grey

**Temperature range:**

-40°C to +60°C

# Beluga 180/220

## Product range

| Type         | Order No.          | Version | Dimensions<br>W x L x H (mm) | Weight (g) |
|--------------|--------------------|---------|------------------------------|------------|
| Beluga 180 O | <b>27.02 02 00</b> | open    | 106/75 x 187 x 50            | 290        |
| Beluga 180 G | <b>27.02 02 01</b> | closed  | 106/75 x 187 x 50            | 228        |
| Beluga 220 O | <b>27.02 04 00</b> | open    | 116/85 x 220 x 51            | 262        |
| Beluga 220 G | <b>27.02 04 01</b> | closed  | 116/85 x 220 x 51            | 254        |

## Accessories

|   |                    |
|---|--------------------|
| Hook set without magnet   | <b>27.02 00 80</b> |
| Hook set with magnet  | <b>27.02 00 81</b> |
| Keypad FT 180b, 15 keys, printed (Matrix) (B 180)                 | <b>82.10 00 03</b> |
| Keypad FT 180e, 15 keys, with insert (Matrix) (B 180)             | <b>82.10 00 04</b> |
| Keypad FT 220b, 18 keys, printed (Matrix) (B 220)                 | <b>82.10 00 05</b> |
| Keypad FT 220e, 18 keys, with insert (Matrix) (B 220)             | <b>82.10 00 06</b> |
| Keypad FT 180ge, 12 keys, with insert (common connection) (B 180) | <b>82.10 00 07</b> |
| Connector (B 180)   | <b>82.20 00 08</b> |
| Connector (B 220)   | <b>82.20 00 09</b> |
| Display fixing set (B 180)  | <b>27.01 06 80</b> |
| Display fixing set (B 220)  | <b>27.02 04 82</b> |
| Cable gland with bending protection M 16 x 1,5                    | <b>08.10 01 16</b> |
| Cable gland with bending protection M 20 x 1,5                    | <b>08.10 01 20</b> |
| Hand strap  | <b>27.02 00 83</b> |
| Spare screw set   | <b>27.02 00 82</b> |
| Spare display screen set (B 180)                                  | <b>27.01 06 88</b> |
| Spare display screen set (B 220)                                  | <b>27.02 04 83</b> |
| Battery compartment without contacts                              | <b>27.02 00 85</b> |
| Battery holder for 4 round cells for battery compartment          | <b>27.02 00 86</b> |
| Battery holder for 9 V monobloc for battery compartment           | <b>27.02 00 87</b> |
| Wall holder set (B 180/220)                                       | <b>27.02 00 84</b> |
| Enabling switch 2-step, blue                                      | <b>83.50 00 10</b> |
| Scratch resistant display screen                                  | on request         |
| Push-button and switches see page 53 - 58                         |                    |



### Electromechanical components

On request, we offer the enclosures ready equipped with electromechanical components such as emergency stop button, confirm keys, hand wheel, step switch, display.

## Components mounting options

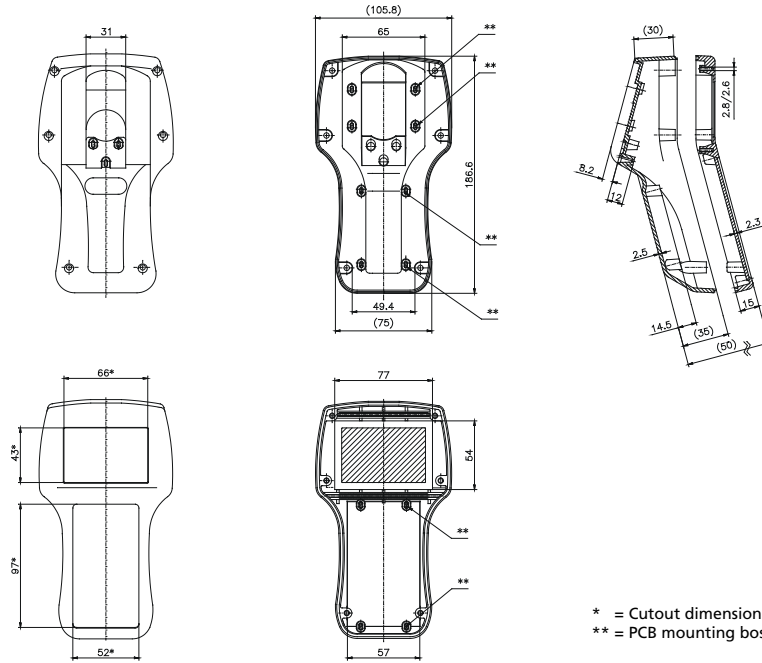
| Component options  | Type B180 O | Type B180 G | Type B220 O | Type B220 G |
|--|-------------|-------------|-------------|-------------|
| Display max. view area 42 x 65 mm<br>max. mounting dimensions 56,4 x 74 mm or 54 x 80 mm   | •           |             |             |             |
| Display max. view area 49 x 78 mm<br>max. mounting dimensions 71,5 x 84 mm or 70,5 x 86 mm |             |             | •           |             |
| Emergency stop button  | •           | •           | •           | •           |
| Confirm key  | •           | •           | •           | •           |
| Hand wheel   |             | •           |             | •           |
| Step switch  |             | •           |             | •           |
| Joy stick  | •           |             | •           |             |
| Cable outlet up to M 16  | •           | •           | •           | •           |
| Cable outlet up to M 20  |             |             | •           | •           |
| 1st board (main board)   | •           | •           | •           | •           |
| Other boards   | •           | •           | •           | •           |

Dimensions



| Type         | Version | Order No.          |
|--------------|---------|--------------------|
| Beluga 180 O | open    | <b>27.02 02 00</b> |
| Beluga 180 G | closed  | <b>27.02 02 01</b> |

(max. PCB size of displays ca. 74 x 56,4 mm or 80 x 54 mm)

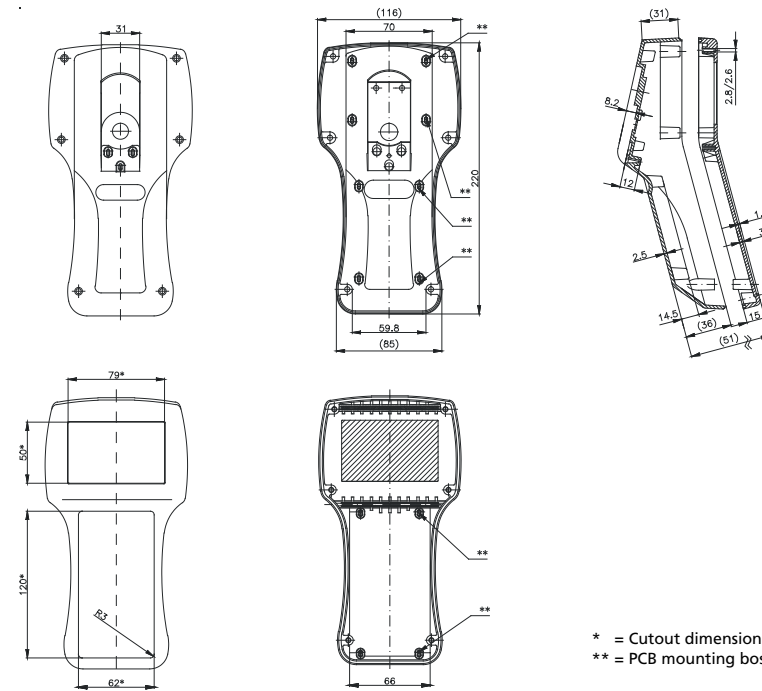


\* = Cutout dimension  
 \*\* = PCB mounting boss (screw 3 x 8)



| Type         | Version | Order No.          |
|--------------|---------|--------------------|
| Beluga 220 O | open    | <b>27.02 04 00</b> |
| Beluga 220 G | closed  | <b>27.02 04 01</b> |

(max. PCB size of displays ca. 84 x 71,5 mm or 86 x 70,5 mm)



\* = Cutout dimension  
 \*\* = PCB mounting boss (screw 3 x 8)

# Beluga 180/220

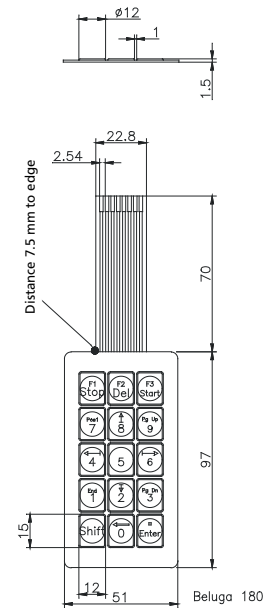
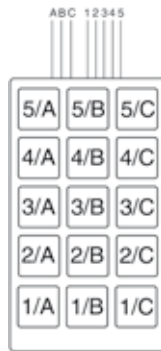
## Accessories



### Keypads for Beluga 180

Standard membrane keypad with 15 keys as printed version or plain. Insertion facility for custom inscription

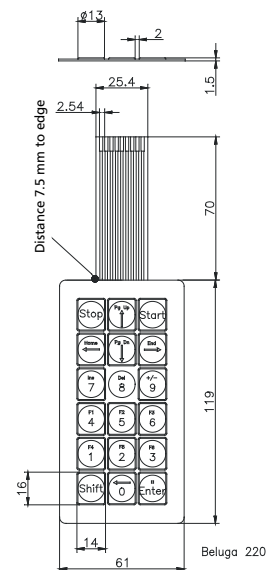
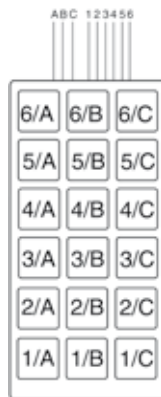
| Type      | Version                     | Order No.          |
|-----------|-----------------------------|--------------------|
| FT 180b   | 15 keys, Matrix printed     | <b>82.10 00 03</b> |
| FT 180e   | 15 keys, Matrix with insert | <b>82.10 00 04</b> |
| Connector |                             | <b>82.20 00 08</b> |



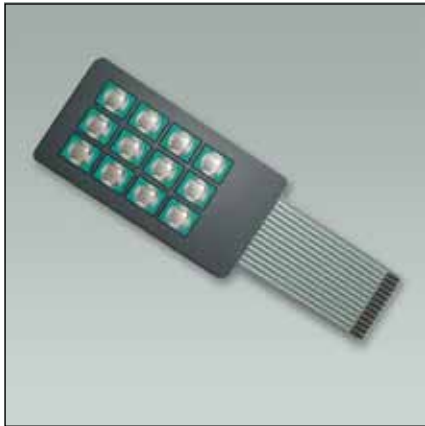
### Keypads for Beluga 220

Standard membrane keypad with 18 keys as printed version or plain. Insertion facility for custom inscription

| Type      | Version                     | Order No.          |
|-----------|-----------------------------|--------------------|
| FT 220b   | 18 keys, Matrix printed     | <b>82.10 00 05</b> |
| FT 220e   | 18 keys, Matrix with insert | <b>82.10 00 06</b> |
| Connector |                             | <b>82.20 00 09</b> |



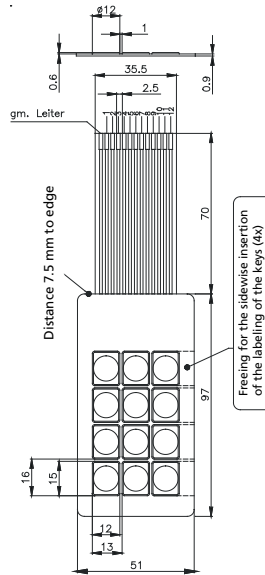
Accessories



**Keypads for Beluga 180**

Standard membrane keypad with 12 keys as plain version. Insertion facility for custom inscription

| Type     | Version                                  | Order No.          |
|----------|--|--------------------|
| FT 180ge | 12 keys, with insert (common connection) | <b>82.10 00 07</b> |



**Hook set**  
consisting of mounted hook and fixing screws

| Version        | Order No.          |
|----------------|--------------------|
| without magnet | <b>27.02 00 80</b> |
| with magnet    | <b>27.02 00 81</b> |



**Display fixing set**  
for variable display mounting

| Version for | Order No.          |
|-------------|--------------------|
| Beluga 180  | <b>27.01 06 80</b> |
| Beluga 220  | <b>27.02 04 82</b> |



**Battery compartment**  
without contacts

Order No. **27.02 00 85**

Adhesion by version with magnet

| plate thickness | force |
|-----------------|-------|
| 2 mm            | 20 N  |
| 5 mm            | 30 N  |

Applications





- Polyamide hand held enclosure for MCR- and automation engineering
- Version with or without display opening
- Prepared for acceptance of keypads/silicone switch mats
- Optional EMC version with internal coating and EMC seal

### Technical data

**Material:**

Polyamide

**Ingress protection:**

IP 65 to EN 60529

**Surface resistance:**

$10^{12}$  Ohm, IEC 60093

**Flammability:**

UL 94 V-2

**Colour:**

RAL 7021, black grey

**Temperature range:**

-40°C to +60°C

#### Included in delivery

Double-skinned enclosure with top and base unit, each with fixing domes, mounting / hook set, fastening and enclosure screws.

# Beluga 380

## Product range

| Type       | Order No.          | Version | Dimensions<br>W x L x H (mm) | Weight<br>(g) |
|------------|--------------------|---------|------------------------------|---------------|
| Beluga 380 | <b>27.02 05 01</b> | closed  | 380 x 117 x 68               | 670           |

## Accessories

|  |                    |
|--|--------------------|
| Cable gland with bending protection M 16 x 1,5 | <b>08.10 01 16</b> |
| Cable gland with bending protection M 20 x 1,5 | <b>08.10 01 20</b> |
| Carrying strap                                 | <b>27.02 05 80</b> |
| Hand strap                                     | <b>27.02 05 81</b> |
| Wall holder set, stainless steel               | <b>27.02 05 82</b> |
| Spare screw set                                | <b>27.02 05 83</b> |
| Push-button and switches see page 53 - 58      |                    |



### Wall holder set

stainless steel angle bracket set, +/- 45° inclination slope adjustable by means of knurled screws.

Order No. **27.02 05 82**



### Electromechanical components

On request, we can supply equipment fitted with electro-mechanical components such as emergency stop button, acknowledge keys, hand wheel, switches, display

## Component mounting options

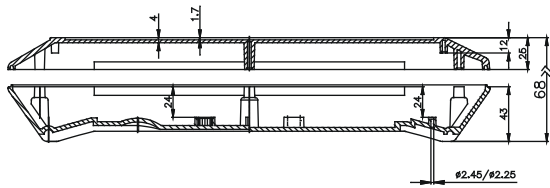
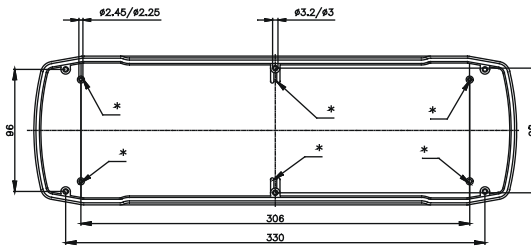
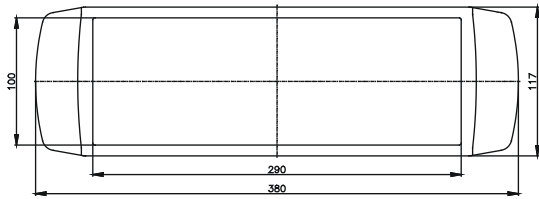
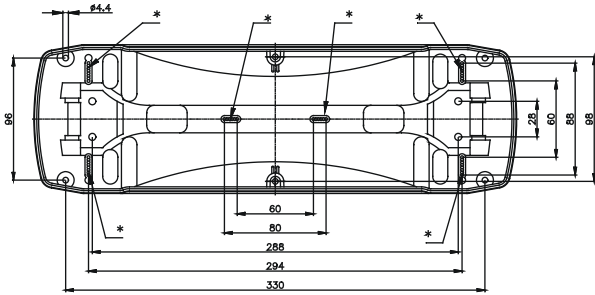
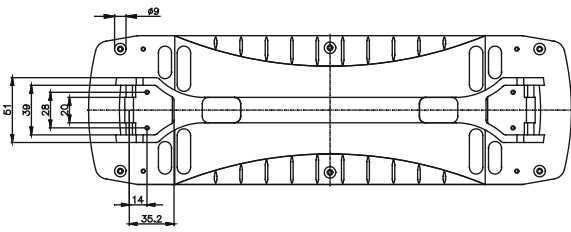
| Component options   | Type B380 |
|---|-----------|
| Display (max. view area / max. mounting dimensions see drawing on page 53 - 58) | •         |
| Emergency stop button   | •         |
| Confirm key   | •         |
| Enabling switch   | •         |
| Hand wheel  | •         |
| Step switch   | •         |
| Joy stick   | •         |
| Cable outlet up to M 20   | •         |
| 1st board (main board)  | •         |
| Other boards  | •         |



Dimensions



| Type       | Version | Order No.   |
|------------|---------|-------------|
| Beluga 380 | closed  | 27.02 05 01 |



\* = PCB mounting boss (screw 3 x 8)

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## Beluga 380

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Large displays mounted (1/4 VGA)



Integrated hook set



Large mounting space for electronic devices



Hook set, can be used as a stand



- Design plastic enclosure for communication and automation engineering
- Optional with recess for membrane keypads
- Space for automation components

**Included in delivery**

Enclosure with top, base and side elements

**Technical data**

**Material:**

PC / ABS

**Ingress protection:**

IP 65 to EN 60529

**Colour:**

black (side part silver)

**Temperature range:**

-20°C to +60°C

# Norvent

## Product range

| Type         | Order No.          | Dimensions<br>W x L x H (mm) | Weight<br>(g) |
|--------------|--------------------|------------------------------|---------------|
| Norvent S    | <b>27.04 01 00</b> | 274 x 121 x 35               | 292           |
| Norvent L    | <b>27.04 02 00</b> | 274 x 166 x 35               | 370           |
| Norvent XL   | <b>27.04 13 00</b> | 274 x 166 x 50               | 459           |
| Norvent S-F  | <b>27.04 01 01</b> | 274 x 121 x 35               | 292           |
| Norvent L-F  | <b>27.04 02 01</b> | 274 x 166 x 35               | 370           |
| Norvent XL-F | <b>27.04 13 01</b> | 274 x 166 x 50               | 459           |

F = with recess for foil

## Accessories

|                           |                    |
|---------------------------|--------------------|
| Norvent quiver S / L / XL | <b>27.04 99 01</b> |
| Wall holder               | on request         |



### Electromechanical components

On request, we can supply equipment fitted with electro-mechanical components such as emergency stop button, acknowledge keys, hand wheel, switches, display



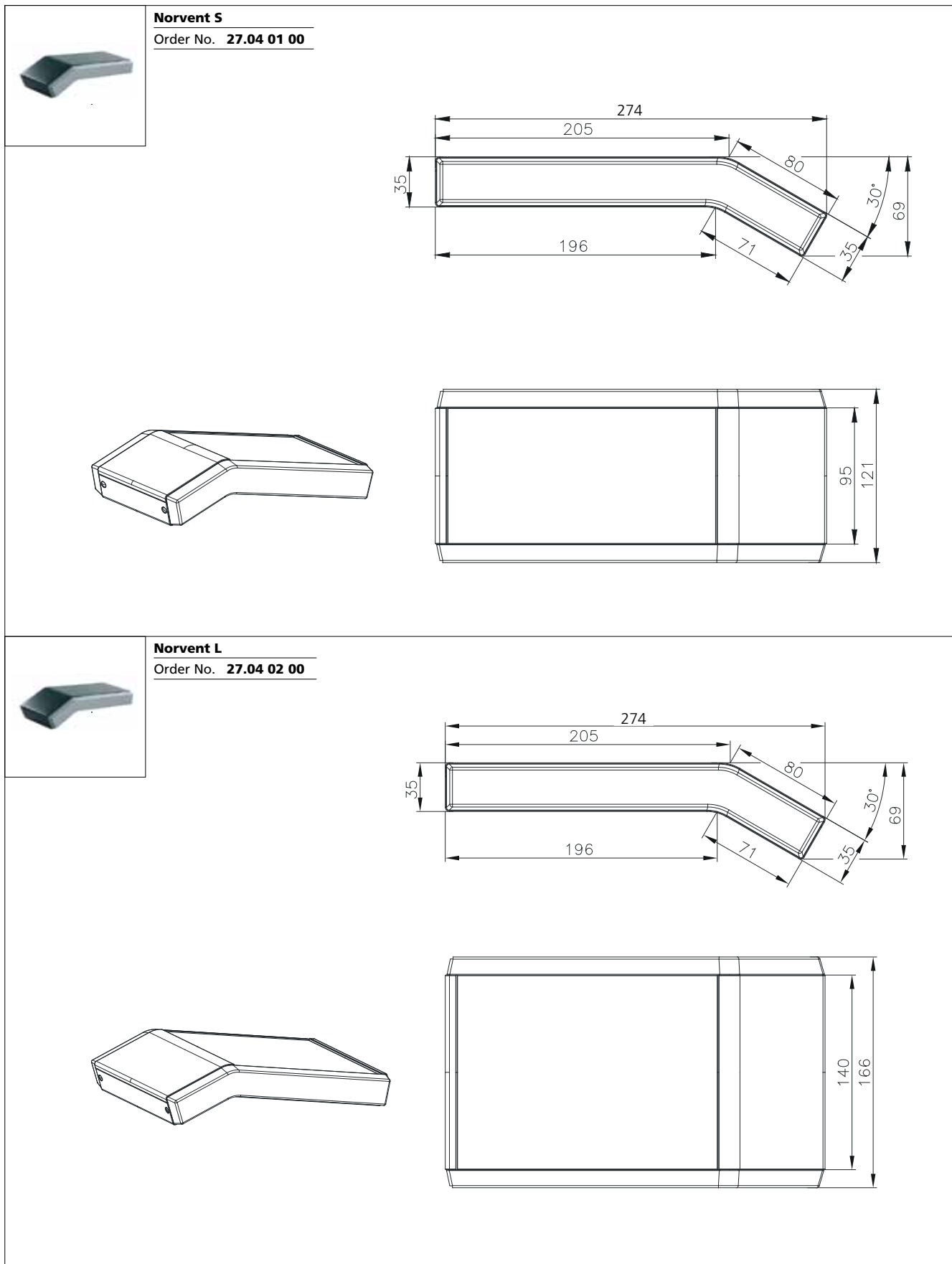
### Quiver

Order No. **27.04 99 01**

## Applications

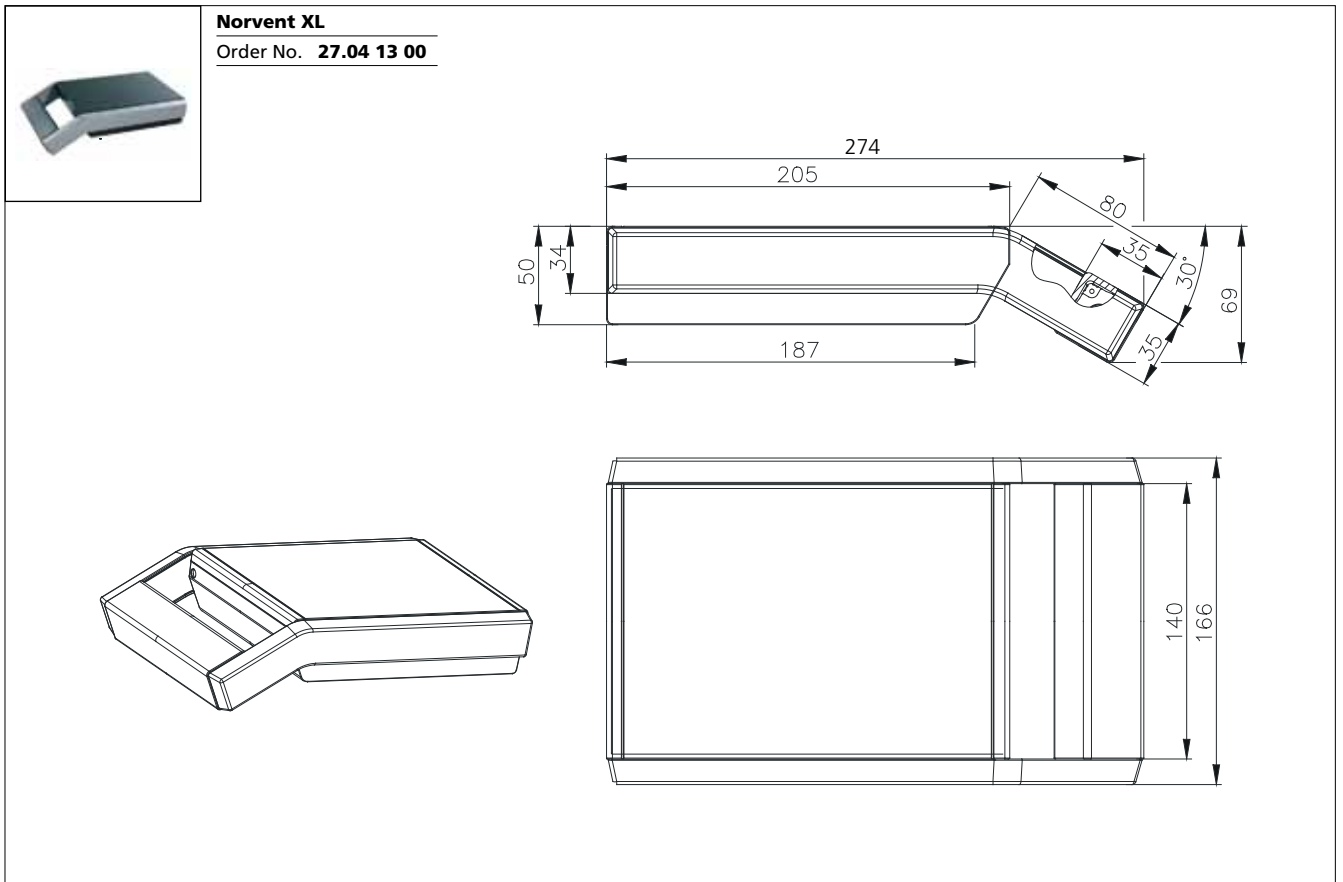


Dimensions



# Norvent

## Dimensions





- Polyamide hand held enclosure for MCR- and automation engineering
- Version with closed or front frame lid
- Rear battery compartment
- Optional EMC version with internal coating and EMC seal

#### Included in delivery

Double-skinned enclosure with top and base unit, each with fixing domes, battery compartment lid, fastening and enclosure screws

#### Technical data

**Material:**

Polyamide

**Ingress protection:**

IP 65 to EN 60529

**Impact resistance:**

7 Joule to EN 60079-0

**Flammability:**

UL 94 HB

**Colour:**

Base and lid: RAL 7021, black grey

Rear cover: RAL 5003, sapphire blue

**Temperature range:**

-40°C to +60°C

# Pilot 250

## Product range

| Type        | Order No.          | Version top part | Dimensions W x L x H (mm) | Weight (g) |
|-------------|--------------------|------------------|---------------------------|------------|
| Pilot 250/1 | <b>29.25 00 01</b> | closed           | 140/120 x 280 x 86        | 700        |
| Pilot 250/2 | <b>29.25 00 02</b> | lid frame        | 140/120 x 280 x 86        | 460        |

## Accessories

|   |                    |
|---|--------------------|
| Front panel, aluminium for Pilot 250/2                            | <b>29.25 01 01</b> |
| Magnet holder round   | <b>29.25 01 02</b> |
| Battery holder for fixing in the enclosure base for 4 micro-cells | <b>29.25 01 03</b> |
| Battery holder for fixing in the enclosure base for 9V monobloc   | <b>29.25 01 04</b> |
| Wall holder (2 hooks, 2 bolts with screws)                        | <b>29.25 01 05</b> |
| Cable gland with bending protection M 16 x 1,5                    | <b>08.10 01 16</b> |
| Cable gland with bending protection M 20 x 1,5                    | <b>08.10 01 20</b> |
| Enabling switch (3-steps)   | on request         |



### Electromechanical components

On request, we can supply equipment fitted with electro-mechanical components such as emergency stop button, acknowledge keys, hand wheel, switches, display



### Battery holder

for fixing in enclosure base for 4 micro-cells or 9 V monobloc

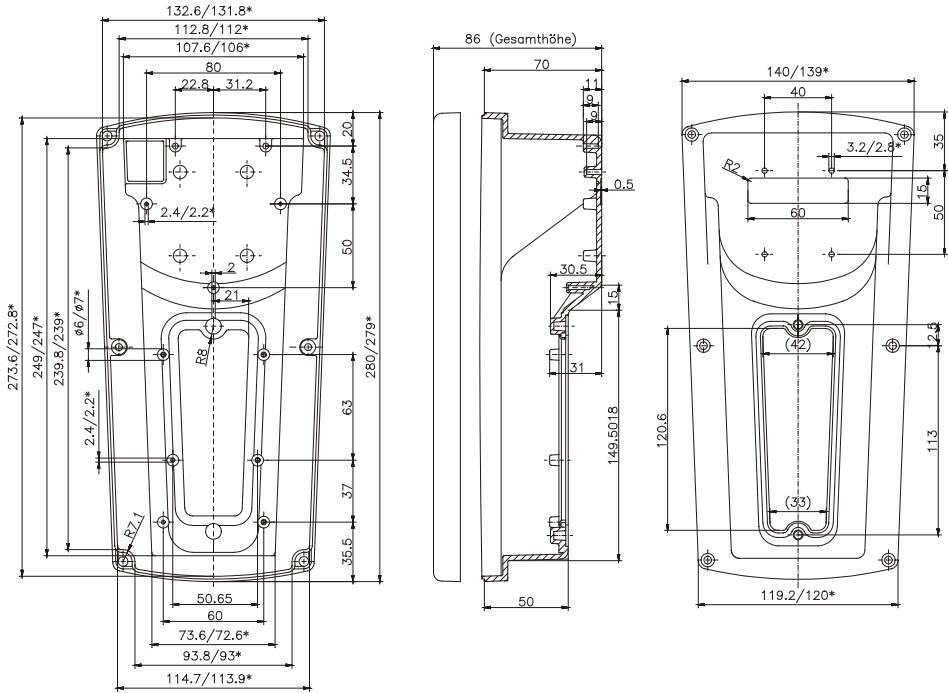
| Version           | Order No.          |
|-------------------|--------------------|
| for 4 micro-cells | <b>29.25 01 03</b> |
| for 9 V monobloc  | <b>29.25 01 04</b> |



Dimensions



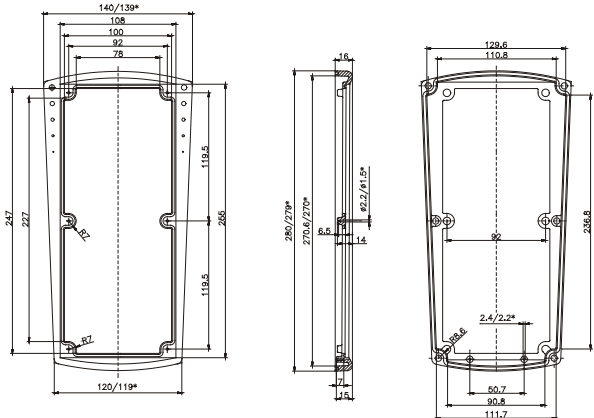
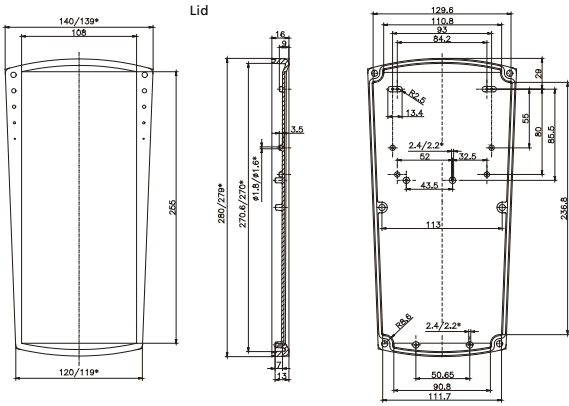
| Type        | Version   | Order No.   |
|-------------|-----------|-------------|
| Pilot 250/1 | closed    | 29.25 00 01 |
| Pilot 250/2 | lid frame | 29.25 00 02 |



\* = Conical form tapering downwards

Closed lid

Lid frame



# Pilot 250



Pilot with membrane keypad



Rear cover



Large mounting space for electronic assemblies



Wall holder

Order No. **29.25 01 05**



Magnetic holder round

Order No. **29.25 01 02**



Cable gland

| Size       | Order No.          |
|------------|--------------------|
| M 16 x 1,5 | <b>08.10 01 16</b> |
| M 20 x 1,5 | <b>08.10 01 20</b> |



- Polyamide / PVC hand held enclosure for MCR and automation engineering
- Large fitting space
- Variable length using profile technology

#### Included in delivery

Enclosure system consisting of polyamide internal enclosure with end covers, two side PVC cover profiles, Alucobond composite front plate, rear wall, 2 external end covers, with M 25 x 1,5 threaded hole for cable gland

#### Technical data

##### Material:

Polyamide / PVC

##### Ingress protection:

IP 65 to EN 60529

##### Impact resistance:

5 Joule to EN 60079-0

##### Flammability:

End covers: UL 94 HB

##### Colour:

End covers: RAL 1021, rape yellow

PVC-profile: RAL 9005, jet black

##### Temperature range:

-20°C to +70°C

# Pilot 50

## Product range

| External enclosure dimensions<br>W x L x H (mm) | Order No.<br>Standard complete | Standard enclosure body<br>without front plate/<br>without rear wall | Standard rear wall<br>seperate | Standard front plate<br>seperate | Standard rear wall<br>recessed |
|---|--------------------------------|--|--------------------------------|----------------------------------|--------------------------------|
| 280 x 191 x 76                                  | <b>29.11 10 00</b>             | <b>29.11 00 00</b>   | <b>29.11 00 01</b>             | <b>29.11 00 02</b>               | -                              |
| 330 x 191 x 76                                  | <b>29.12 10 00</b>             | <b>29.12 00 00</b>   | <b>29.12 00 01</b>             | <b>29.12 00 02</b>               | -                              |
| 440 x 191 x 76                                  | <b>29.13 10 00</b>             | <b>29.13 00 00</b>   | <b>29.13 00 01</b>             | <b>29.13 00 02</b>               | <b>29.13 00 03</b>             |
| Sonderlänge                                     | <b>29.19 10 00</b>             | <b>29.19 00 00</b>   | <b>29.19 00 01</b>             | <b>29.19 00 02</b>               | -                              |

## Accessories

|  |                    |
|--|--------------------|
| Cable gland with bending protection M 25 x 1,5           | <b>08.10 01 25</b> |
| Cable gland reduction M 25 / M 12                        | <b>08.01 25 12</b> |
| Cable gland reduction M 25 / M 16                        | <b>08.01 25 16</b> |
| Cable gland reduction M 25 / M 20                        | <b>08.01 25 20</b> |
| Spring nut set of M4 for internal mounting, set of 4 pcs | <b>29.00 00 50</b> |
| PCB fixings, set of 4 pcs incl. spring nuts              | <b>29.00 00 60</b> |
| Wall holder (set single)                                 | <b>29.00 00 70</b> |
| Magnetic wall holder, 1 pc                               | <b>29.00 00 80</b> |
| Wall holder incl. enclosure modification                 | <b>29.00 10 00</b> |
| Push button and switches see page 53 - 58                |                    |



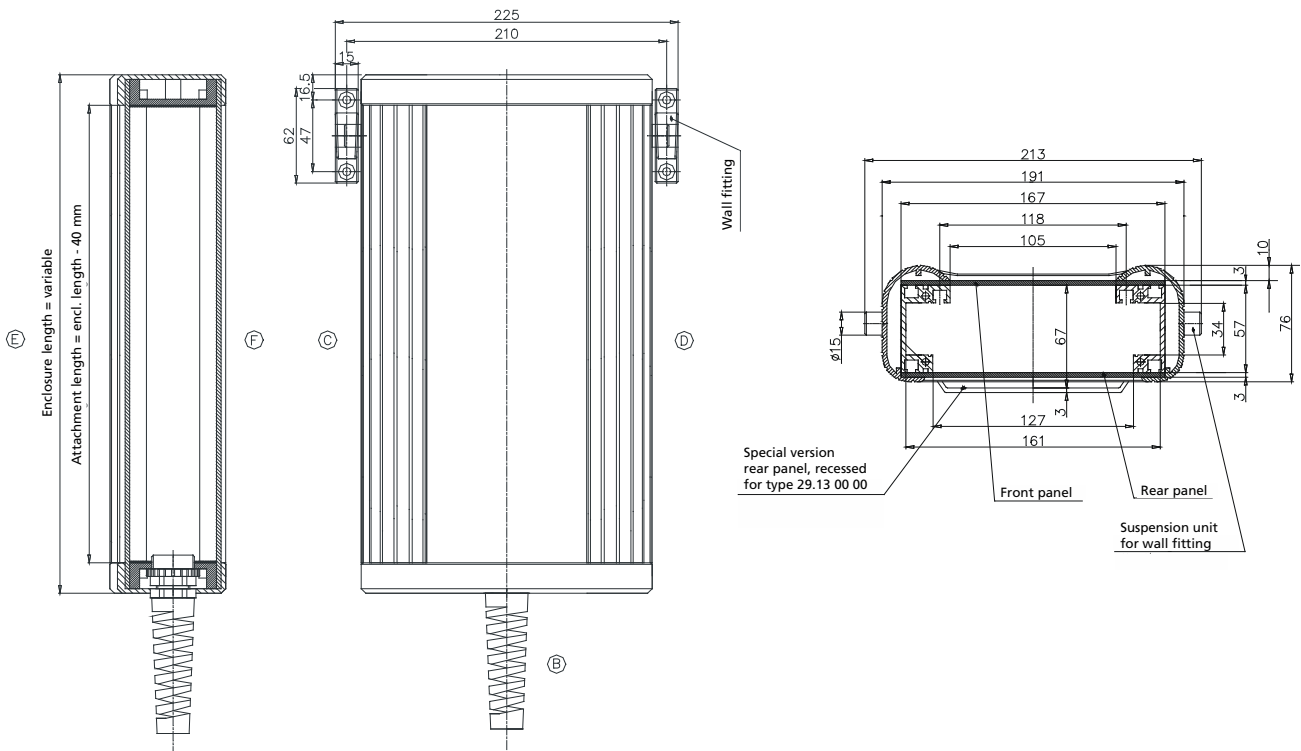
### Electromechanical components

On request, we can supply equipment fitted with electro-mechanical components such as emergency stop button, acknowledge keys, hand wheel, switches, display

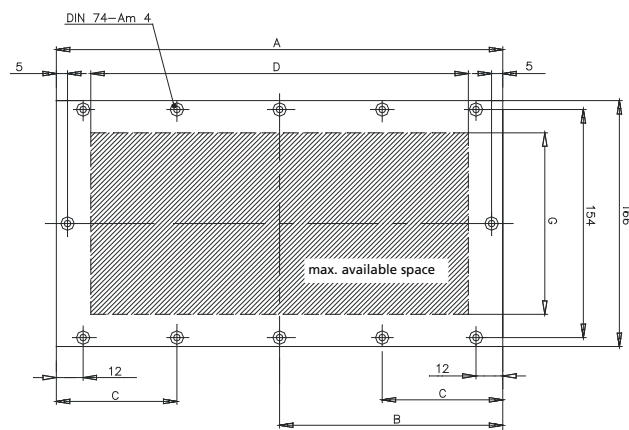
Dimensions



| Standard           | Dimensions     | Weight (g) |
|--------------------|----------------|------------|
| <b>29.11 10 00</b> | 280 x 191 x 76 | 1660       |
| <b>29.12 10 00</b> | 330 x 191 x 76 | 1900       |
| <b>29.13 10 00</b> | 440 x 191 x 76 | 2200       |
| <b>29.19 10 00</b> | Special length |            |



| Type                          | A                    | B   | C   | D      | G       |
|-------------------------------|----------------------|-----|-----|--------|---------|
| <b>29.11 10 00</b>            | 274                  | -   | 92  | 240    | 105/127 |
| <b>29.12 10 00</b>            | 324                  | 162 | 81  | 290    | 105/127 |
| <b>29.13 10 00</b>            | 434                  | 217 | 109 | 400    | 105/127 |
| Special size, $A \leq 300$ mm | Enclosure length - 6 | -   | A/3 | A - 34 | 105/127 |
| Special size, $A \geq 300$ mm | Enclosure length - 6 | A/2 | A/4 | A - 34 | 105/127 |



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# Pilot 50

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## Zubehör



**PCB fixing set**  
Set = 4 pcs with spring nuts  
Order No. **29.00 00 60**



**Set of spring nuts**  
Spring nuts (M4) for internal mounting;  
set = 4 pcs  
Order No. **29.00 00 50**



**Wall holder set**  
Order No. **29.00 00 70**



Pilot with small control device



Inner T-slots offer mounting facilities on all sides



EMC version



Variable fittings



- Hand held enclosure for MCR and automation engineering
- Robust design (Polyamide or Polyester)
- Version with handle and integrated cable entry (Pilot 10, 20 standard)

#### Included in delivery

Pilot 10/20: enclosure with handle, including cable gland M 20 x 1,5, front plate with fastening screw and wall holder

Pilot 30: two-part Polyester enclosure with self-adhesive aluminium front plate, enclosure screws and wall holder

#### Technical data

##### Material:

Pilot 10 and Pilot 20: Polyamide

Pilot 30: Polyester

##### Ingress protection:

Pilot 10 and Pilot 20: IP 65 to EN 60529

Pilot 30: IP 66 to EN 60529

##### Impact resistance:

7 Joule to EN 60079-0

##### Flammability:

Pilot 10 and 20: UL 94 HB

Pilot 30: UL 94 V-0

##### Colour:

RAL 1021, rape yellow

##### Temperature range:

Pilot 10 and Pilot 20: -40°C to +60°C

Pilot 30: -25°C to +90°C

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# Pilot 10/20/30

---

## Product range

| Type     | Order No.          | Enclosure dimensions incl. handle<br>W x L x H (mm) | Front plate dimensions<br>W x H (mm) | Mounting depth<br>(mm) |
|----------|--------------------|---|--------------------------------------|------------------------|
| Pilot 10 | <b>29.40 02 00</b> | 70 x 93 x 190                                       | 61 x 59                              | 67                     |
| Pilot 20 | <b>29.30 01 00</b> | 115 x 93 x 200                                      | 106 x 69                             | 67                     |
| Pilot 30 | <b>29.50 01 00</b> | 164 x 116 x 295                                     | 70 x 280                             | 71                     |

## Accessories

|   |                    |
|---|--------------------|
| Mounting plate (Pilot 20)                 | <b>29.31 00 00</b> |
| Wall holder (2 pcs. with screws)          | <b>29.60 01 00</b> |
| Cable gland M 20 x 1,5 (Pilot 30)         | <b>08.10 01 20</b> |
| Push button and switches see page 53 - 58 |                    |



### Electromechanical components

On request, we can supply equipment fitted with electro-mechanical components such as emergency stop button, acknowledge keys, hand wheel, switches, display

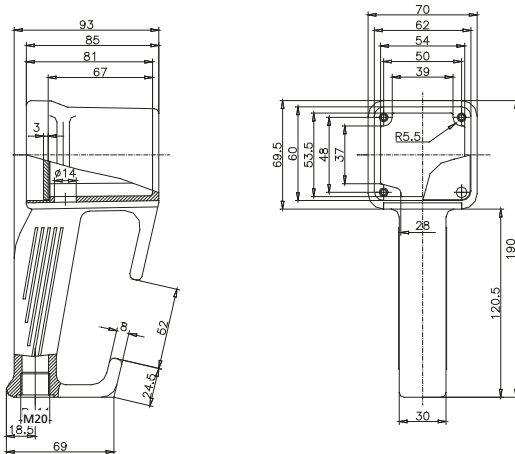


Dimensions

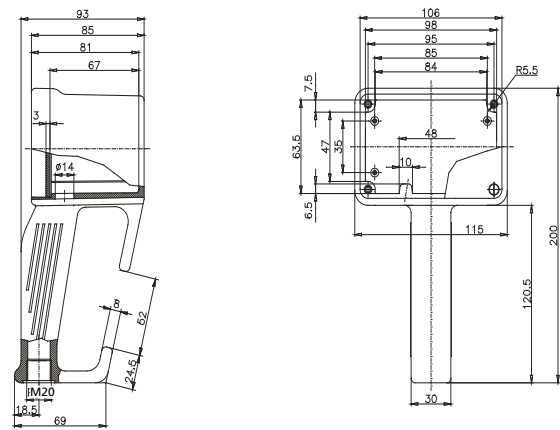


| Type     | Order No.          | Weight (g) |
|----------|--------------------|------------|
| Pilot 10 | <b>29.40 02 00</b> | 380        |
| Pilot 20 | <b>29.30 01 00</b> | 440        |

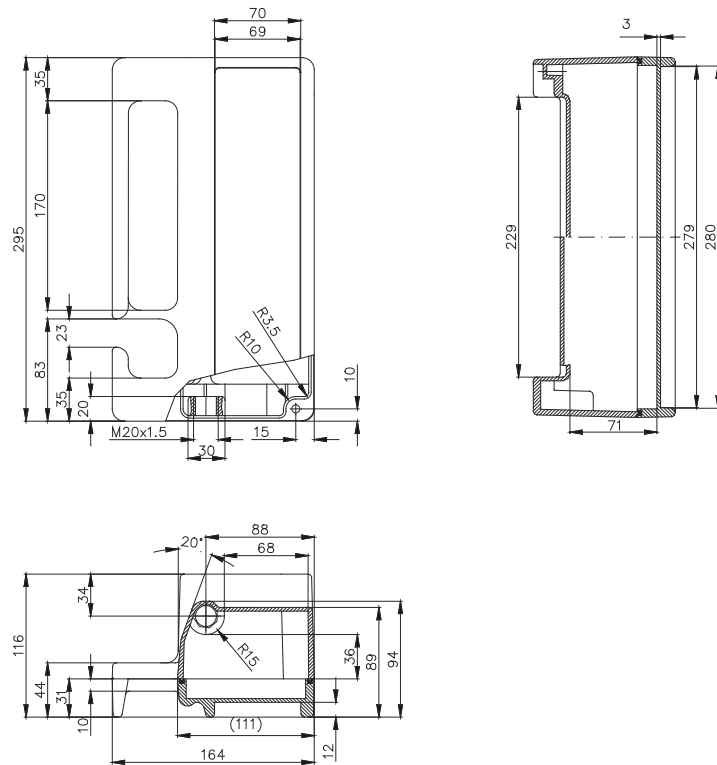
Pilot 10



Pilot 20



| Type     | Order No.          | Weight (g) |
|----------|--------------------|------------|
| Pilot 30 | <b>29.50 01 00</b> | 1700       |



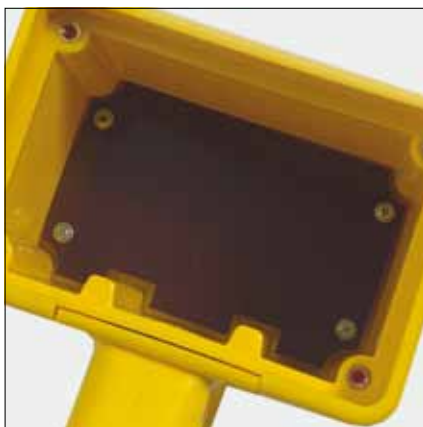
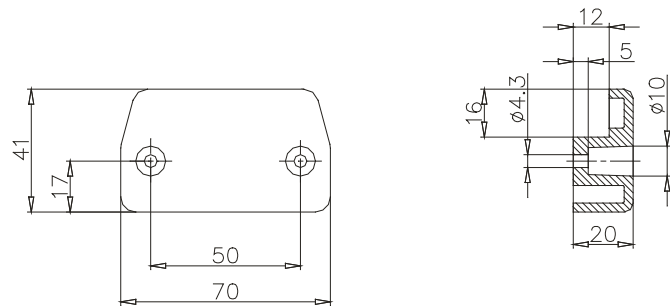
# Pilot 10/20/30

## Accessories



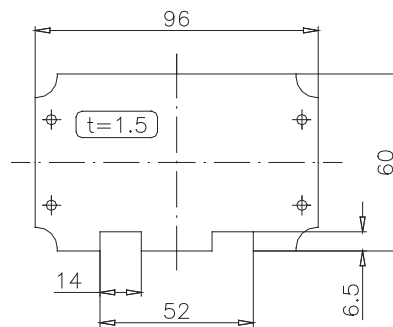
**Wall holder**  
Set complete with 2 fittings and screws

Order No. **29.60 01 00**



**Mounting plate Pilot 20**

Order No. **29.31 00 00**



One and two button enclosures Pilot 10 / Pilot 20



Integrated handles on Pilot 10 and Pilot 20



Multi button enclosure Pilot 30



- Polyamide hand enclosure for automation and control engineering
- Version with handle and integrated cable entry
- Large fitting space

### Technical data

**Material:**

Polyamide

Front plate: Polystyrol

**Ingress protection:**

IP 65 to EN 60529

**Impact resistance:**

7 Joule to EN 60079-0

**Flammability:**

UL 94 HB

**Colour:**

RAL 1021, rape yellow

**Temperature range:**

-40°C to +60°C

### Included in delivery

Enclosure with handle, including cable gland M 20 x 1.5, front plate, enclosure and front panel screws, and wall holder

# Pilot 110 - 150

## Product range

| Type      | Order No.          | Enclosure dimensions incl. handle<br>W x L x H (mm) | Front plate dimensions<br>W x H (mm) | Mounting depth<br>(mm) |
|-----------|--------------------|---|--------------------------------------|------------------------|
| Pilot 110 | <b>29.21 10 00</b> | 85 x 85 x 191                                       | 77 x 77                              | 63,5                   |
| Pilot 120 | <b>29.21 20 00</b> | 115 x 85 x 191                                      | 107 x 77                             | 63,5                   |
| Pilot 130 | <b>29.21 30 00</b> | 85 x 85 x 221                                       | 77 x 107                             | 63,5                   |
| Pilot 140 | <b>29.21 40 00</b> | 160 x 85 x 211                                      | 152 x 97                             | 63,5                   |
| Pilot 150 | <b>29.21 50 00</b> | 105 x 85 x 266                                      | 97 x 152                             | 63,5                   |

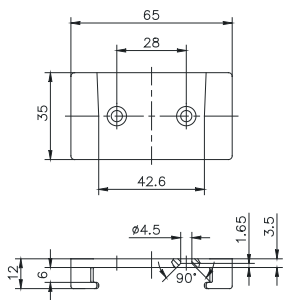
## Accessories

|   |                    |
|---|--------------------|
| Magnetic holder (for Pilot 120 - 150)     | <b>29.00 00 80</b> |
| Push button and switches see page 53 - 58 |                    |



### Electromechanical components

On request, we can supply equipment fitted with electro-mechanical components such as emergency stop button, acknowledge keys, hand wheel, switches, display



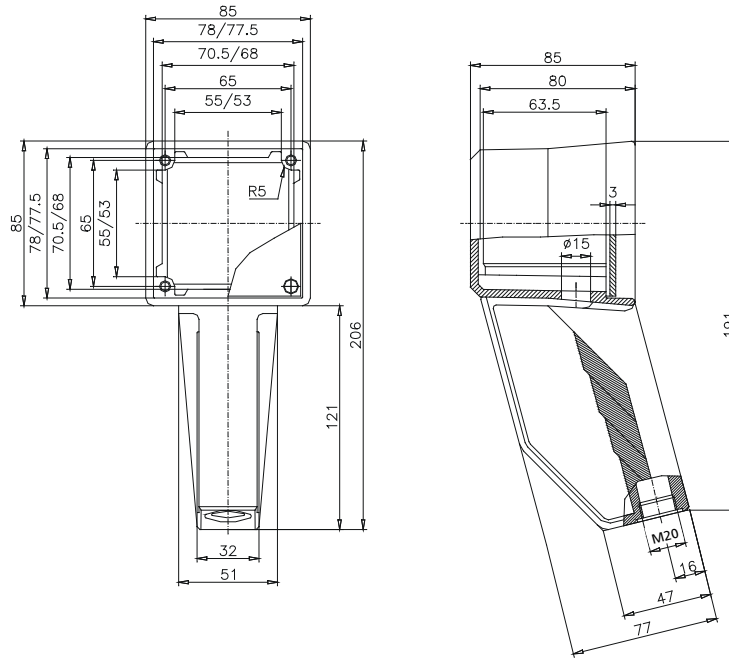
### Wall holder

included in delivery

Dimensions

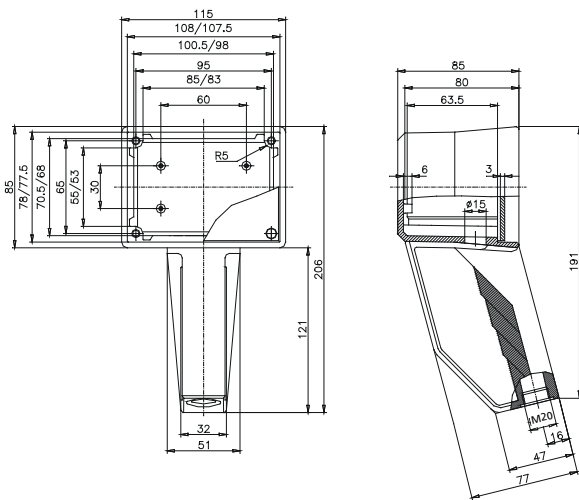


| Type      | Order No.          | Weight (g) |
|-----------|--------------------|------------|
| Pilot 110 | <b>29.21 10 00</b> | 500        |

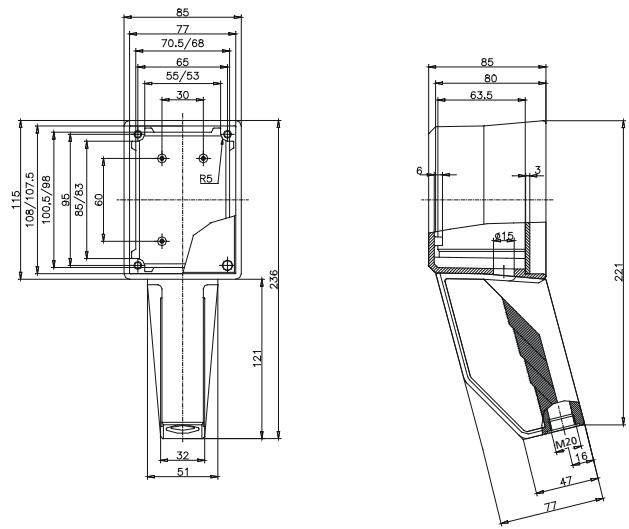


| Type      | Order No.          | Weight (g) |
|-----------|--------------------|------------|
| Pilot 120 | <b>29.21 20 00</b> | 341        |
| Pilot 130 | <b>29.21 30 00</b> | 341        |

Pilot 120



Pilot 130



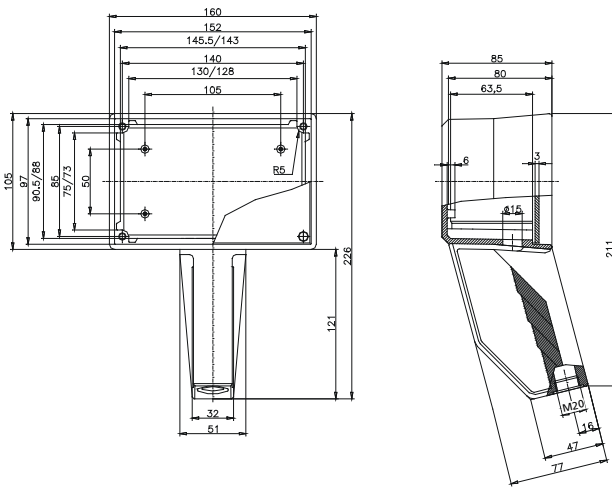
# Pilot 110 - 150

## Accessories

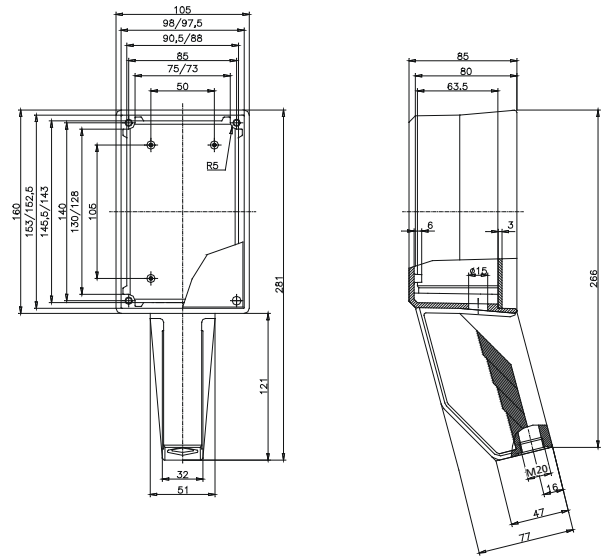


| Type      | Order No.          | Weight (g) |
|-----------|--------------------|------------|
| Pilot 140 | <b>29.21 40 00</b> | 780        |
| Pilot 150 | <b>29.21 50 00</b> | 780        |

**Pilot 140**



**Pilot 150**



## Accessories



**Magnetic holder**  
for Pilot 120 - 150, self-adhesive  
dimensions: 90 x 30 x 7.5 mm

Order No. **29. 00 00 80**



- Polyamide hand held enclosures for data acquisition, MCR and automation engineering
- For installations and command devices mobile and stationary applicable
- Variable mounting depths

### Technical data

**Material:**

Enclosure: Polyamide

Border profile : NBR, black

**Ingress protection:**

IP 65 to EN 60529

**EMC:**

Optional

**Surface resistance:**

10<sup>12</sup> Ohm, IEC 60093

**Flammability:**

UL 94 V-2

**Colour:**

RAL 7021, black grey

**Temperature range:**

-20°C to +60°C

**Included in delivery:**

Clam shell enclosure with top and base, each with fixing domes incl. seals and border profile, 3 cover flaps for interface garages, screws and fixing materials for front panel mounting.

# Limanda

## Product range

| Order No.          | Type               | Dimensions (mm)<br>W x L x H | Weight (g) |
|--------------------|--------------------|------------------------------|------------|
| <b>27.03 03 00</b> | Limanda I          | 311 x 281 x 72               | 1200       |
| <b>27.03 03 01</b> | Limanda I EMV      | 311 x 281 x 72               | 1200       |
| <b>27.03 03 17</b> | Limanda I für OP17 | 311 x 281 x 97               | 1500       |
| <b>27.03 02 00</b> | Limanda II         | 270 x 248 x 64               | 800        |
| <b>27.03 02 01</b> | Limanda II EMV     | 270 x 248 x 64               | 800        |

## Accessories

|  | Order No.          |
|--|--------------------|
| Limanda I Aluminium front plate, natural anodized finish               | <b>27.03 03 80</b> |
| Limanda I EMC front plate  | <b>27.03 03 90</b> |
| Limanda II Aluminium front plate, natural anodized finish              | <b>27.03 02 80</b> |
| Limanda II EMC front plate   | <b>27.03 02 90</b> |
| Limanda I intermediate frame   | <b>27.03 03 81</b> |
| Limanda II intermediate frame  | <b>27.03 02 81</b> |
| Limanda II mounting set for Siemens TP 170 / TP 070                    | <b>27.03 02 82</b> |
| Limanda I EMC intermediate frame                                       | <b>27.03 00 88</b> |
| Limanda II EMC intermediate frame                                      | <b>27.03 02 88</b> |
| Limanda I handle set without push button                               | <b>27.03 00 83</b> |
| Limanda holder   | <b>27.03 00 84</b> |
| Limanda carrying strap   | <b>27.03 00 85</b> |
| Limanda carrying strap comfort   | <b>27.03 00 92</b> |
| Limanda I quiver   | <b>27.03 00 86</b> |
| Limanda II table stand (set = 2 pcs.)                                  | <b>27.03 00 87</b> |
| Limanda II quiver  | <b>27.03 00 89</b> |
| Limanda I quiver with intermediate frame                               | <b>27.03 00 90</b> |
| Limanda II quiver with intermediate frame                              | <b>27.03 00 91</b> |
| Limanda I handle set with 3 step enabling switch (right-hand version)  | <b>27.03 00 71</b> |
| Limanda I handle set with 3 step enabling switch (left-hand version)   | <b>27.03 00 72</b> |
| Cable connection with bending protection M 16                          | <b>08.10 01 16</b> |
| Cable connection with bending protection M 20                          | <b>08.10 01 20</b> |
| Cable connection with bending protection M 25                          | <b>08.10 01 25</b> |
| Inclining adapter for mounting directly on wall or machine             | <b>50.02 00 01</b> |
| Inclining adapter for mounting directly onto GT 48/2 tube              | <b>50.02 00 02</b> |
| Inclining adapter for mounting directly onto GTK electronic tube       | <b>50.02 00 03</b> |
| Inclining adapter for mounting directly onto GT 48/2 or GTK electronic | <b>50.02 00 04</b> |
| Inclining adapter for holder onto GT 48/2 tube                         | <b>50.02 00 05</b> |
| Inclining adapter for holder onto GTK electronic tube                  | <b>50.02 00 06</b> |
| Inclining adapter for holder on wall or machine                        | <b>50.02 00 07</b> |
| Push button and switches see page 53 - 58                              |                    |



Limanda enclosure systems enable installation of many manual operation panels.



**Limanda I for OP17** - Supplied ready for installation of the Siemens OP17 Operator Panel without additional fitting materials.



**Limanda II** with fitted command unit

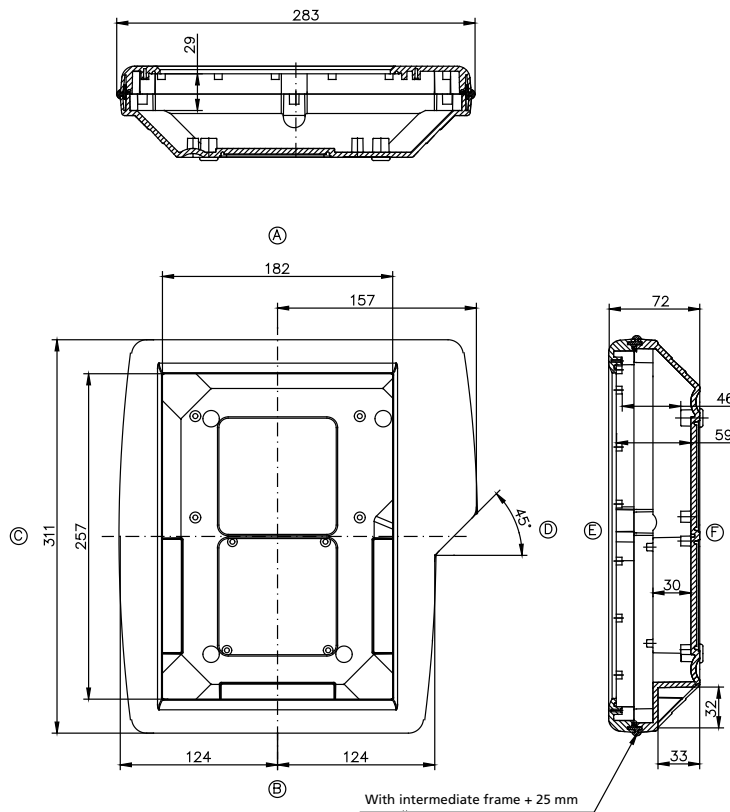


Dimensions



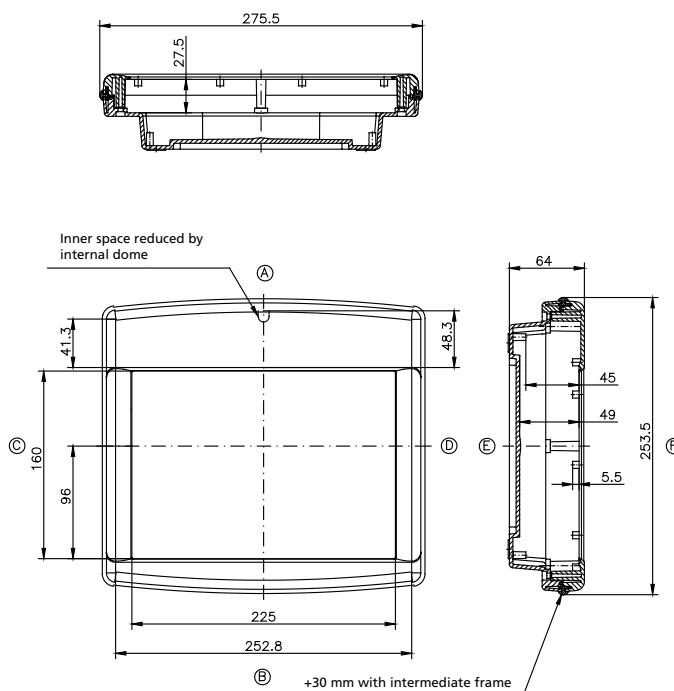
Limanda I

Order No. **27.03 03 00**



Limanda II

Order No. **27.03 02 00**



# Limanda

## Accessories

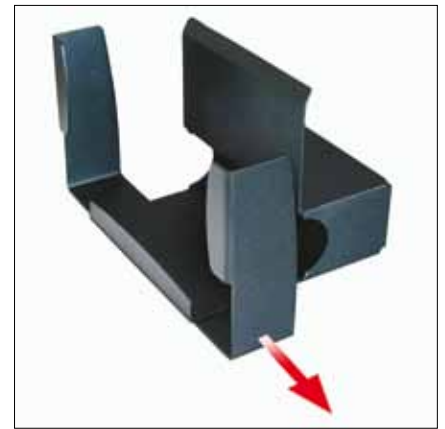
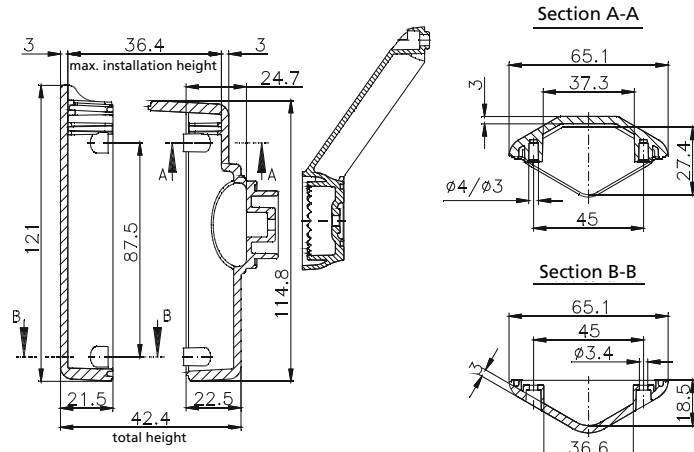


### Limanda I handle set without push button

For installation on all four rear corners of the enclosure. The handle incorporates a stepped engaging mechanism which allows it to be optimally adjusted for the operator during installation.

IP 65 once assembled.

Order No. **27.03 00 83**



**Limanda I handle set with 3-step enabling switch**  
(2-channel) for use in service, set up and programming operations.  
Included in delivery: handle set with fixed enabling switch

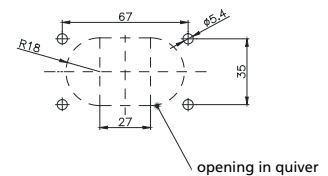
| Order No.          | Type               |
|--------------------|--------------------|
| <b>27.03 00 71</b> | Right-hand version |
| <b>27.03 00 72</b> | Left-hand version  |

Technical data see page 53 - 58

### Limanda quiver

Wall holder - adjustable in width, can be adapted to inclining adapter.  
Material sheet steel.

| Order No.          | for version                        |
|--------------------|------------------------------------|
| <b>27.03 00 86</b> | Limanda I                          |
| <b>27.03 00 89</b> | Limanda II                         |
| <b>27.03 00 90</b> | Limanda I with intermediate frame  |
| <b>27.03 00 91</b> | Limanda II with intermediate frame |



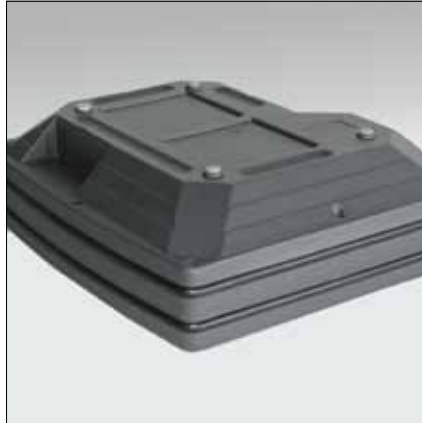
## Accessories



### Limanda holder

Enables rapid removal of the Limanda from the inclining adapter (for Limanda I and II). There is a gap of 19.5 mm between the Limanda and the holder for assembly purposes.

Order No. **27.03 00 84**



### Limanda I intermediate frame

To increase the mounting depth

| Order No.          | Depth | for version    |
|--------------------|-------|----------------|
| <b>27.03 03 81</b> | 25 mm | Limanda I      |
| <b>27.03 02 81</b> | 30 mm | Limanda II     |
| <b>27.03 00 88</b> | 25 mm | Limanda I EMC  |
| <b>27.03 02 88</b> | 30 mm | Limanda II EMC |



### Limanda carrying strap

Carrying strap in 2 versions: Standard and comfort: strengthened execution with shoulder pad

| Order No.          |                        |
|--------------------|------------------------|
| <b>27.03 00 85</b> | Carrying strap         |
| <b>27.03 00 92</b> | Carrying strap comfort |



### Inclining adapter

| Order No.          | Type   | Weight (g) |
|--------------------|--|------------|
| <b>50.02 00 01</b> | For mounting directly on wall or machine             | 1286       |
| <b>50.02 00 02</b> | For mounting directly onto GT 48/2 tube              | 986        |
| <b>50.02 00 03</b> | For mounting directly onto GTK electronic tube       | 1004       |
| <b>50.02 00 04</b> | For mounting directly onto GT 48/2 or GTK electronic | 900        |

### Technical data

|                            |                               |
|----------------------------|-------------------------------|
| Material                   | 2.5 mm sheet steel            |
| Bellow                     | PVC (T-50M), RAL 9005 (black) |
| Surface                    | black powder-coated           |
| Temperature range          | -40°C to +60°C                |
| Stepped engaging mechanism | 22,5°-steps                   |



### Cable connection with bending protection (no lock nut)

| Order No.          | Type  |
|--------------------|---|
| <b>08.10 01 16</b> | M 16 cable connection with bending protection |
| <b>08.10 01 20</b> | M 20 cable connection with bending protection |
| <b>08.10 01 25</b> | M 25 cable connection with bending protection |

### Technical data

|                   |                    |
|-------------------|--------------------|
| Material          | Polyamide          |
| Moulded seal      | NBR                |
| Enclosure rating  | IP 68 - 5 bar      |
| Temperature range | -20°C to +100°C    |
| Colour            | RAL 9005 jet black |

## Accessories



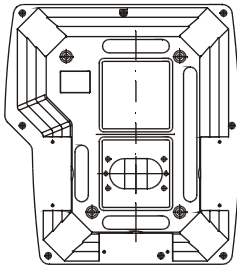
**Inclining adapter for holder**

| Order No.          | Type   | Weight (g) |
|--------------------|--|------------|
| <b>50.02 00 05</b> | For mounting directly onto GT 48/2 tube        | 776        |
| <b>50.02 00 06</b> | For mounting directly onto GTK electronic tube | 804        |
| <b>50.02 00 07</b> | For mounting directly on wall or machine       | 490        |

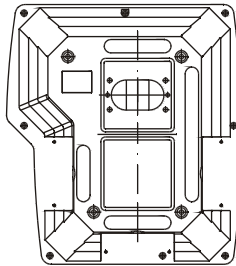
**Technical data**

|                   |                                     |
|-------------------|-------------------------------------|
| Material          | 2.5 mm sheet steel (black powdered) |
| Knurled handles   | reinforced thermoplastic            |
| Temperature range | -40°C to +60°C                      |

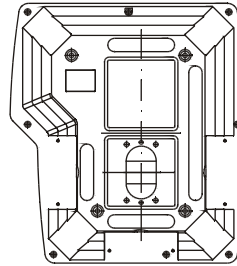
Variant 1



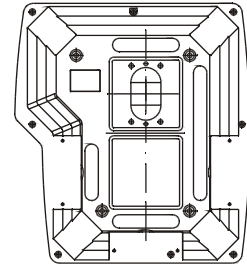
Variant 2



Variant 3

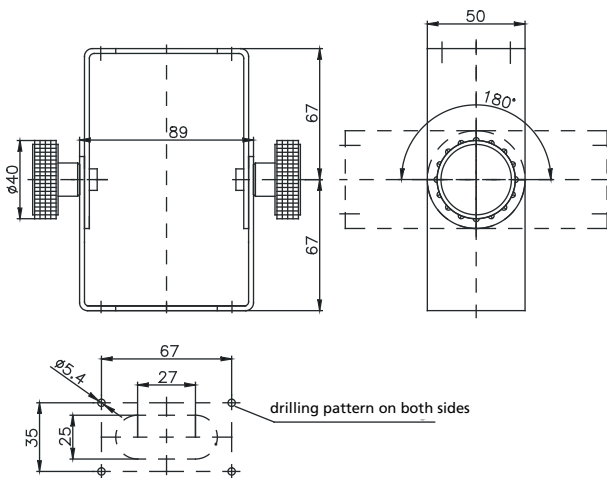


Variant 4



Specific Limanda drilling pattern required!

**Dimensions (wall mounted version)**





For assembling of enclosures there is available a huge programme range of switches / push buttons:

- enabling switches
- emergency stop button
- accessories

# Electro-mechanical components



2-step enabling switch (1NO), blue

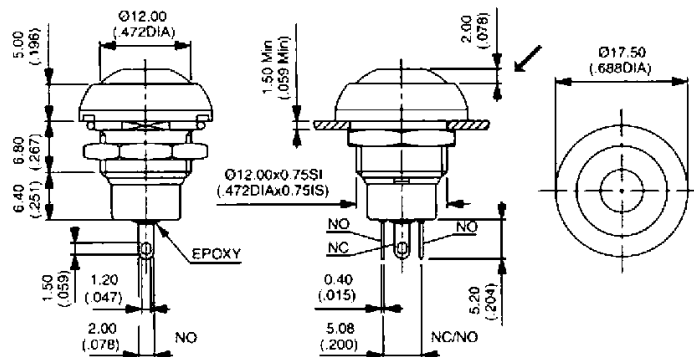
Order No. **83.50 00 10**

2-step enabling switch (1NC/1NO), blue

Order No. **83.50 00 09**

**Technical data**

|                    |  |
|--------------------|--|
| Contact loading    | 48 V (AC), 500 mA<br>250 V (AC), 200 mA<br>50 V (DC), 200 mA |
| Ingress protection | IP 67 front side   |
| Temperature range  | -40°C to +125°C (no condensation)                            |
| Volume resistance  | max. 50 mW (initial value)                                   |
| Service life       | ≥ 5 x 10 <sup>5</sup> switchings                             |

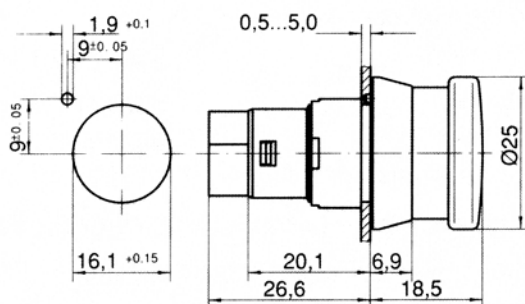


Emergency stop button (2NC), Ø 25mm, red

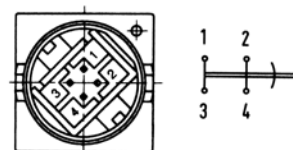
Order No. **83.50 00 02**

**Technical data**

|                            |  |
|----------------------------|--|
| Contact system and fitting | 2 NC   |
| Ingress protection         | IP 65 front side   |
| Temperature range          | -25°C to +70°C (no condensation)                           |
| Connections                | galvanized, suitable to 4-pole multipoint socket connector |
| Switching voltage          | 0,02 to 25 V AC/DC   |
| Switching current          | 0,1 to 1 A   |
| Volumne resistance         | < 100 mW   |
| Duration of bounce         | < 10 ms  |
| Service life               | > 1,5 x 10 <sup>4</sup> switchings                         |



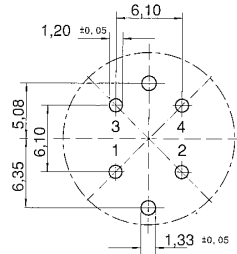
Connection diagram (view from down)





PCB plug-socket for emergency stop button, Ø 25 mm

Order No. **83.90 00 01**



Contact fitting area

NC 1: Pin 1 - blue  
Pin 2 - black  
NC 2: Pin 3 - blue  
Pin 4 - black



Ribbon cable

10 cm with multipoint socket connector and strip, AMP 4-pole for emergency stop button Ø 25 mm

Order No. **83.90 00 02**

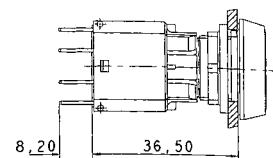
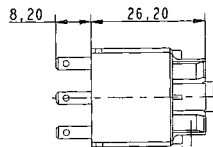
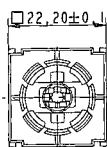
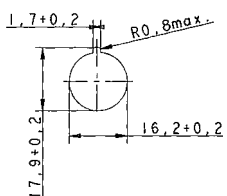


Emergency stop button with switch unit (2NC), Ø 28 mm, red

Order No. **83.50 00 03**

### Technical data

|                            |   |
|----------------------------|---|
| Contact system and fitting | self cleaning bridge forming contact (Ag), 2 NC   |
| Ingress protection         | IP 65 front side                                  |
| Temperature range          | -25°C to +70°C (no condensation)                  |
| Connections                | Flat plug 2.8 x 0.8                               |
| Switching voltage          | AC: 250 V / DC: 24 V (further voltage on request) |
| Switching current          | AC: 1,5 A / DC: 2,0 A                             |
| Volume resistance          | max. 20 mW (initial value)                        |
| Service life               | ≥ 3 x 10 <sup>4</sup> switchings                  |



# Elektro-mechanical components



Emergency stop button (3NC/1NO), Ø 29 mm, red

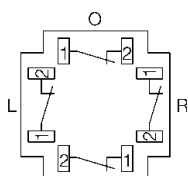
Order No. **83.50 00 04**

Stop push button (3NC/1NO), Ø 29 mm, grey

Order No. **83. 50 00 05**

**Technical data**

|                                      |                                       |
|--------------------------------------|---------------------------------------|
| Contact system and fitting           | obligation-led contacts (3 NC / 1 NO) |
| Ingress protection                   | IP 65 front side                      |
| Temperature range                    | -25°C to +60°C (no condensation)      |
| Connections                          | soldered connection                   |
| Switching voltage (direct contact)   | AC(12): 250 V / DC(12): 30 V          |
| Switching current (direct contact)   | AC(12): 3,0 A / DC(12): 2,0 A         |
| Switching voltage (indirect contact) | AC(12): 250 V / DC(12): 30 V          |
| Switching current (indirect contact) | AC(12): 0,6 A / DC(12): 2,0 A         |
| Volume resistance                    | max. 50 mW (initial value)            |
| Service life                         | ≥ 1 x 10 <sup>5</sup> switchings      |



Direct contact

1 NC: connections right

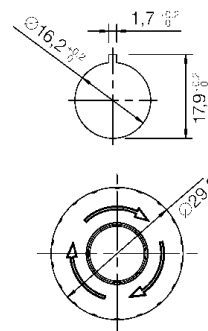
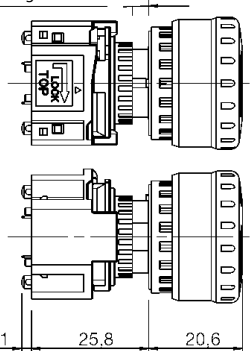
2 NC: connections right and left

3 NC: connections right, left and above

Emergency stop label for command element,  
16 mm, yellow, 4 speeches, 40 x 40 mm

Order No. **83.90 00 07**

front panel strength 0.5 to 3.7



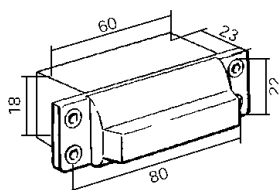
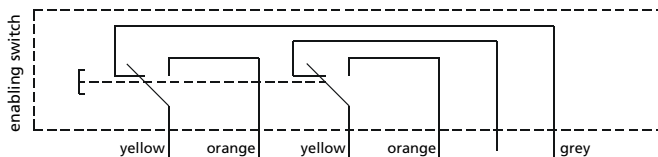
3-steps enabling switches (2 changer), 80 x 22, black

Order No. **83.50 00 06**

**Technical data**

|                            |  |
|----------------------------|--|
| Contact system and fitting | 2 main switches (changer)  |
| Contact rating             | 30 V DC, max. 0,5 A  |
| Ingress protection         | IP 65  |
| Temperature range          | 0°C to +50°C   |
| Fullfilled standards       | 89/392/EWG; IEC 204-1: EN 60204/DIN VDE 0113;<br>DIN VDE 0110: EN292 |

**Connection diagram**



|                 |         |        |        |        |      |      |    |  |
|-----------------|---------|--------|--------|--------|------|------|----|--|
| enabling switch | yellow  | orange | yellow | orange | grey | grey |    |  |
| evaluator       | JSBR4   | S13    | S14    | S24    | S23  | X2   | X3 |  |
|                 | JSBT4   | S13    | S14    | S24    | S23  |      |    |  |
|                 | RT6     | S13    | S14    | S24    | S23  |      |    |  |
|                 | RT7     | S13    | S14    | S24    | S23  |      |    |  |
|                 | JSBRT8  | A1     | S14    | S24    | A2   |      |    |  |
|                 | JSBRT11 | S13    | S14    | S24    | S23  |      |    |  |
|                 | JSHT2   | S13    | S14    | S24    | S23  |      |    |  |



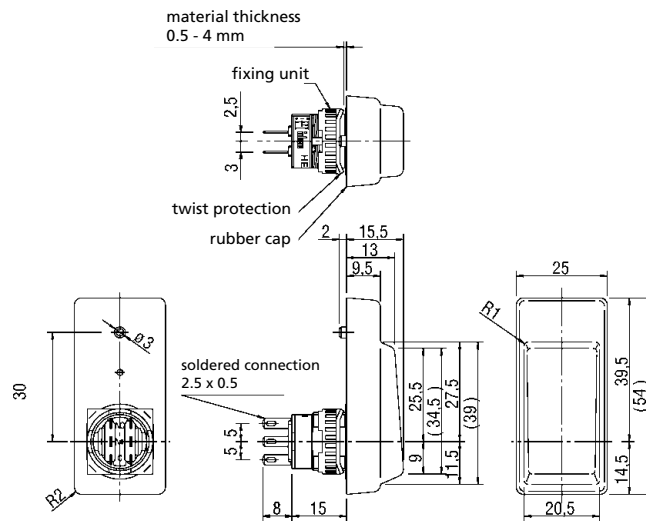
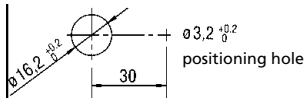


3-steps enabling switches (2 changers), 55 x 25, yellow

Order No. **83.50 00 07**

**Technical data**

|                            |                                  |
|----------------------------|----------------------------------|
| Contact system and fitting | 2 main switches (changer)        |
| Ingress protection         | IP 65 (with rubber cap)          |
| Temperature range          | -25°C to +60°C (no condensation) |
| Connections                | soldered condensation            |
| Switching voltage          | AC(12): 125 V / DC(12): 30 V     |
| Switching current          | AC(12): 1,0 A / DC(12): 1,0 A    |
| Volume resistance          | max. 50 mW (initial value)       |
| Service life               | ≥ 1 x 10 <sup>5</sup> switchings |

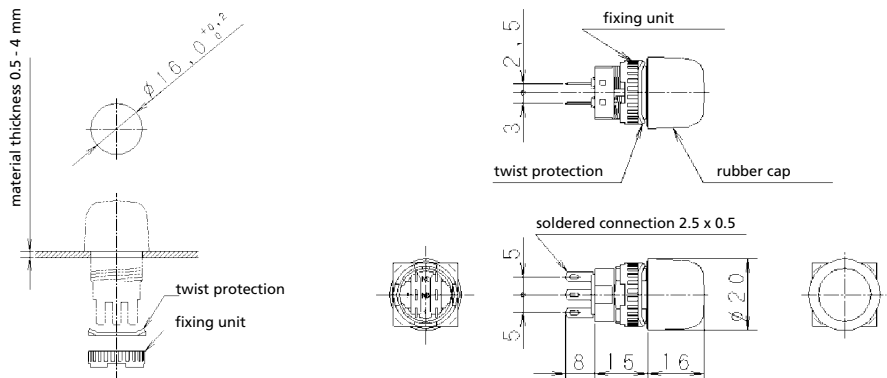


3-steps enabling switches (2 changer),  $\varnothing 20$  mm, yellow

Order No. **83.50 00 08**

**Technical data**

|                            |                                   |
|----------------------------|-----------------------------------|
| Contact system and fitting | 2 main switches (changer)         |
| Ingress protection         | IP 65 (with rubber cap)           |
| Temperature range          | -10°C bis +60°C (no condensation) |
| Connections                | soldered connection               |
| Switch voltage             | AC(12): 125 V / DC(12): 30 V      |
| Switch current             | AC(12): 0,5 A / DC(12): 1,0 A     |
| Volume resistance          | max. 50 mW (initial value)        |
| Service life               | ≥ 1 x 10 <sup>5</sup> switchings  |



# Elektro-mechanical components

## Product allocation

| Products           | 2-steps enabling switches (1NO), blue | 2-steps enabling switches (1NC/1NO), blue | Emergency stop button (2NC), Ø 25 mm, red | PCB-plug-socket for emergency stop button Ø 25 mm | Ribbon cable 10 cm with multipoint socket connector and strip, AMP 4-pole for emergency stop button Ø 25 mm | Emergency stop button with contact block (2NC), Ø 28 mm, red |
|--------------------|---------------------------------------|---|---|---|---|--|
| Order No.          | <b>83.50 00 10</b>                    | <b>83.50 00 09</b>                        | <b>83.50 00 02</b>                        | <b>83.90 00 01</b>                                | <b>83.90 00 02</b>  | <b>83.50 00 03</b>   |
| Taguan 130         |                                       |   | x   | x   | x   |  |
| Taguan 180         |                                       |   | x   | x   | x   |  |
| Taguan 230         |                                       |   | x   | x   | x   |  |
| Beluga 180         | x                                     | x   | x   | x   | x   | x  |
| Beluga 220         | x                                     | x   | x   | x   | x   | x  |
| Beluga 380         | x                                     | x   | x   | x   | x   | x  |
| Pilot 250          | x                                     | x   | x   | x   | x   | x  |
| Pilot 50           |                                       |   | x   | x   | x   | x  |
| Pilot 10           |                                       |   | x   | x   | x   | x  |
| Pilot 20           |                                       |   | x   | x   | x   | x  |
| Pilot 30           |                                       |   | x   | x   | x   | x  |
| Pilot 110          |                                       |   | x   | x   | x   | x  |
| Pilot 120          |                                       |   | x   | x   | x   | x  |
| Pilot 130          |                                       |   | x   | x   | x   | x  |
| Pilot 140          |                                       |   | x   | x   | x   | x  |
| Limanda I Griffset | x                                     | x   |   |   |   |  |
| Limanda I          | x                                     | x   | x   | x   | x   | x  |
| Limanda II         | x                                     | x   | x   | x   | x   | x  |
| Norvent            | x                                     | x   | x   | x   | x   | x  |

| Products           | Emergency stop button (3NC/1NO), Ø 29 mm, red | Stop button (3NC/1NO), Ø 29 mm, grey | 3-steps enabling switches (2 changer), 80 x 22, black | 3-steps enabling switches (2 changer), 55 x 25, yellow | 3-steps enabling switches (2 changer), Ø 20 mm, yellow |
|--------------------|---|--------------------------------------|---|--|--|
| Order No.          | <b>83.50 00 04</b>                            | <b>83.50 00 05</b>                   | <b>83.50 00 06</b>                                    | <b>83.50 00 07</b>                                     | <b>83.50 00 08</b>                                     |
| Taguan 130         |   |                                      |   |  |  |
| Taguan 180         |   |                                      |   |  |  |
| Taguan 230         |   |                                      |   |  |  |
| Beluga 180         | x   | x                                    |   |  |  |
| Beluga 220         | x   | x                                    |   |  | x  |
| Beluga 380         | x   | x                                    |   |  |  |
| Pilot 250          | x   | x                                    | x   | x  | x  |
| Pilot 50           | x   | x                                    |   |  |  |
| Pilot 10           | x   | x                                    |   |  | x  |
| Pilot 20           | x   | x                                    |   |  |  |
| Pilot 30           | x   | x                                    |   |  |  |
| Pilot 110          | x   | x                                    |   |  | x  |
| Pilot 120          | x   | x                                    |   |  |  |
| Pilot 130          | x   | x                                    |   |  |  |
| Pilot 140          | x   | x                                    |   |  |  |
| Limanda I Griffset |   |                                      | x   |  | x  |
| Limanda I          | x   | x                                    | x   |  | x  |
| Limanda II         | x   | x                                    | x   | x  | x  |
| Norvent            | x   | x                                    | x   | x  | x  |

## The way to the right enclosure

Various criteria must be taken into account when selecting an enclosure:

- the fitting location (internal or external use, explosion zone, sea-water use etc.)
- the size (depends on the contents)
- the protective functions (ingress protection, EMC toughness, Ex)

The listings below should help you to select the right enclosure to match your special requirements.

## I. Enclosure material specifications

### Aluminium enclosures (Pilot 50, EMC)

- light-weight, robust metal enclosures
- good resistance to chemicals (see chart)
- can be used in a wide temperature range
- basic EMC screening (full screening optional)
- machining operations easy to carry out
- application areas: suitable for indoor and outdoor use

### Polyester enclosures (Pilot 30)

- plastic enclosures for hostile atmospheres
- good resistance to chemicals (see chart)
- can be used in a wide temperature range
- good insulating properties
- VO design (to UL)
- application areas: suitable for indoor and outdoor use

### PVC enclosures

- light-weight plastic enclosures
- good resistance to chemicals (see chart)
- machining operations easy to carry out
- application areas: suitable for indoor and outdoor use

### ABS enclosures (Taguan)

- light-weight plastic enclosure
- good resistance to chemicals (see chart)
- used within a normal temperature range
- application areas: hand-held operating enclosures for data acquisition and measurement

### Polyamide enclosures (Beluga, Pilot 10 / 20, Pilot 110 / 150)

- light-weight plastic enclosure
- good insulating properties
- high impact resistance
- application areas: hand-held operating enclosures for machine control

## II. Temperature range

The definition of temperature resistance for enclosures is based on the maximum continuous temperature at which the enclosure remains dimensionally stable and the ingress protection remains guaranteed. Admissible short term peak temperatures are often considerably higher.

The definition of temperature resistance in the case of the components of the process automation is based to the maximum continuous temperature, provided that the factory-installed (electronic) components are functioning correctly and the enclosure rating is maintained.

Further classifications apply to storage and transport, and are listed in the respective product descriptions.

## III. Corrosion resistance

### We offer the following for critical external areas:

SWB version (seawater-resistant):

Purified - chromated - powder-coated

Standard colour RAL 5009, other colours on request.

For application areas with extreme UV radiation we recommend coating with a special Polyester powder.

SBG/SBGL version only for wet painting processes

SBG = washed - chromated - priming

SBGL = washed - chromated - priming - painting

Stainless steel socket inserts available on request.

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# General technical informations

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## IV. Ingress protection

ROSE enclosures are classified in ingress protection to the generally applicable guidelines contained in EN 60529 and IEC 144.

The ingress protection is indicated by an abbreviation, which is always composed of the two letters IP and two digits relating to the protection level.

### Protection class for contact and foreign body protection

| First digit | Designation                                    |
|-------------|--|
| 0           | No protection                                  |
| 1           | Protection against large foreign bodies        |
| 2           | Protection against medium-sized foreign bodies |
| 3           | Protection against small foreign bodies        |
| 4           | Protection against grain-shaped foreign bodies |
| 5           | Protection against dust deposits               |
| 6           | Protection against dust entry                  |

### Protection class for water protection

| Second digit | Designation                                     |
|--------------|---|
| 0            | No protection                                   |
| 1            | Protection against vertical falling drip water  |
| 2            | Protection against obliquely falling drip water |
| 3            | Protection against water spray                  |
| 4            | Protection against splashing water              |
| 5            | Protection against water jets                   |
| 6            | Protection when flooded                         |
| 7            | Protection when immersed                        |
| 8            | Protection when submerged                       |

Note: The ingress protection indicated for the enclosures is based on non-processed enclosures as supplied. Aging and temperature fluctuations can lead to a diminution of the ingress protection.

## V. Chemical resistance

### Enclosure material chemical resistance

| Chemicals                                   | Aluminium | Stainless steel | Polycarbonate | Polyester | Polystyrene | Polyamide |
|---|-----------|-----------------|---------------|-----------|-------------|-----------|
| Acetone                                     | +         | +               | -             | -         | -           | •         |
| Formic acid                                 | •         | +               | 30 %          | 10 %      | •           | -         |
| Ammonia                                     | +         | +               | -             | -         | +           | 20 %      |
| Petrol                                      | +         | +               | •             | +         | •           | +         |
| Benzene                                     | +         | +               | -             | +         | -           | -         |
| Brake fluid                                 | /         | /               | -             | +         | /           | 60°       |
| Butane                                      | +         | /               | +             | /         | -           | +         |
| Butanol                                     | /         | /               | /             | +         | /           | +         |
| Calcium chloride                            | +         | +               | +             | +         | +           | +         |
| Chloral benzene                             | +         | /               | -             | +         | -           | •         |
| Diesel oil                                  | /         | /               | •             | +         | •           | /         |
| Acetic acid                                 | +         | +               | 10 %          | 40 %      | + max. 50 % | -         |
| Formaldehyde                                | +         | +               | /             | 30 %      | + max. 40 % | +         |
| Freon 113                                   | /         | /               | +             | +         | /           | /         |
| Fruit juice                                 | /         | +               | +             | +         | /           | +         |
| Glycerine                                   | +         | +               | •             | +         | +           | +         |
| Fuel oil                                    | +         | +               | •             | +         | •           | +         |
| Hydraulic oil                               | /         | /               | +             | +         | •           | +         |
| Caustic potash solution                     | /         | +               | -             | -         | + max. 50 % | -         |
| Potassium chloride                          | •         | +               | +             | +         | +           | +         |
| Potassium hydroxide                         | -         | +               | /             | -         | +           | /         |
| Linseed oil                                 | +         | +               | +             | +         | +           | +         |
| Methane                                     | +         | +               | -             | -         | +           | •         |
| Methylene chloride                          | +         | +               | -             | -         | -           | -         |
| Lactic acid                                 | +         | +               | 10 %          | +         | + max. 80 % | 10 %      |
| Mineral oils                                | /         | /               | +             | +         | +           | +         |
| Motor oils                                  | /         | /               | +             | +         | +           | +         |
| Sodium carbonate                            | •         | +               | +             | +         | +           | +         |
| Sodium chloride                             | •         | •               | +             | +         | +           | 10 %      |
| Sodium hydroxide                            | +         | +               | /             | -         | /           | /         |
| Soda lye                                    | /         | +               | -             | 40 %      | + max. 50 % | 10 %      |
| Nitric acid                                 | +         | +               | 10 %          | 10 %      | + max. 25 % | -         |
| Hydrochloric acid                           | /         | +               | 20 %          | +         | + max. 10 % | -         |
| Lubricating oil                             | +         | +               | +             | +         | /           | +         |
| Carbon bisulphide                           | +         | +               | -             | -         | -           | •         |
| Sulphuric acid                              | •         | +               | 50 %          | 70 %      | + max. 50 % | -         |
| Suds  | /         | +               | •             | +         | /           | +         |
| Cleansing agent                             | /         | +               | +             | /         | /           | /         |
| Terpentine oil                              | /         | /               | /             | +         | -           | +         |
| Carbon tetrachloride                        | +         | /               | /             | +         | -           | •         |
| Toluene                                     | +         | /               | -             | +         | -           | +         |
| Trichlorethylene                            | +         | /               | /             | -         | -           | -         |
| Water (dest. water, river, tap or seawater) | /         | +               | +             | +         | +           | +         |
| Tartaric acid                               | /         | /               | 10 %          | +         | +           | +         |
| Xylene                                      | +         | /               | -             | +         | -           | +         |
| Zinc sulfate                                | •         | /               | +             | +         | +           | /         |
| Citric acid                                 | +         | /               | 10 %          | +         | +           | 10 %      |

#### Explanation of symbols

- + resistant against all concentrations
- + resistant against maximum % concentration
- C° resistant to maximum C°
- limited resistance
- not resistant
- / no information

# General technical informations

## Enclosure seal and accessory chemical resistance

| Chemicals                                   | Chloroprene | EPDM | NBR      | Pocane | Polyurethane | PVC    | Silicone |
|---|-------------|------|----------|--------|--------------|--------|----------|
| Acetone                                     | +           | +    | -        | +      | -            | -      | •        |
| Formic acid                                 | +           | +    | -        | 10 %   | /            | < 50 % | •        |
| Ammonia                                     | +           | +    | +        | 10 %   | /            | •      | +        |
| Petrol                                      | +           | •    | +        | +      | +            | +      | +        |
| Benzene                                     | -           | -    | -        | +      | +            | -      | -        |
| Brake fluid                                 | •           | -    | /        | +      | /            | /      | +        |
| Butane                                      | +           | /    | +        | +      | /            | 50 %   | -        |
| Butanol                                     | +           | /    | -        | +      | /            | •      | -        |
| Calcium chloride                            | /           | /    | /        | 10 %   | /            | +      | /        |
| Chloral benzene                             | -           | -    | -        | -      | -            | -      | -        |
| Diesel oil                                  | •           | •    | /        | +      | +            | •      | •        |
| Acetic acid                                 | -           | /    | -        | 10 %   | /            | 25 %   | -        |
| Formaldehyde                                | -           | /    | +        | /      | /            | 40 %   | +        |
| Freon 113                                   | +           | /    | +        | +      | /            | /      | /        |
| Fruit juice                                 | +           | +    | /        | +      | +            | +      | +        |
| Glycerine                                   | +           | +    | +        | +      | +            | +      | +        |
| Fuel oil                                    | •           | •    | +        | +      | +            | •      | •        |
| Hydraulic oil                               | +           | /    | /        | +      | /            | /      | •        |
| Caustic potash solution                     | +           | /    | /        | 10 %   | /            | +      | /        |
| Potassium chloride                          | +           | +    | +        | 10 %   | +            | +      | +        |
| Potassium hydroxide                         | +           | +    | +        | -      | -            | /      | •        |
| Linseed oil                                 | +           | +    | +        | +      | +            | +      | •        |
| Methane                                     | +           | /    | •        | +      | /            | /      | +        |
| Methylene chloride                          | -           | /    | -        | -      | -            | -      | -        |
| Lactic acid                                 | +           | +    | +        | /      | /            | 10 %   | /        |
| Mineral oils                                | •           | •    | +        | +      | +            | +      | +        |
| Motor oils                                  | •           | •    | +        | +      | +            | /      | +        |
| Sodium carbonate                            | /           | /    | /        | 10 %   | /            | /      | /        |
| Sodium chloride                             | +           | +    | +        | 10 %   | +            | +      | +        |
| Sodium hydroxide                            | +           | +    | •        | -      | -            | •      | •        |
| Soda lye                                    | 50 %        | /    | -        | /      | /            | 60 %   | -        |
| Nitric acid                                 | •           | +    | •        | 10 %   | -            | 30 %   | -        |
| Hydrochloric acid                           | +           | +    | < 65 % • | 10 %   | -            | 30 %   | /        |
| Lubricating oil                             | •           | •    | +        | +      | +            | +      | +        |
| Carbon bisulphide                           | -           | /    | -        | +      | /            | •      | -        |
| Sulphuric acid                              | 50 %        | /    | 25 %     | 10 %   | /            | 80 %   | 25 %     |
| Suds  | +           | /    | +        | 10 %   | •            | •      | +        |
| Cleansing agent                             | +           | •    | /        | +      | •            | /      | +        |
| Terpentine oil                              | -           | /    | +        | +      | /            | +      | -        |
| Carbon tetrachloride                        | -           | -    | -        | +      | -            | •      | -        |
| Toluene                                     | -           | -    | -        | •      | -            | -      | -        |
| Trichlorethylene                            | -           | -    | -        | •      | -            | -      | -        |
| Water (dest. water, river, tap or seawater) | +           | +    | 80 C°    | +      | +            | 40 C°  | +        |
| Tartaric acid                               | +           | +    | +        | /      | +            | 10 %   | +        |
| Xylene                                      | -           | -    | -        | •      | -            | -      | -        |
| Zinc sulfate                                | +           | +    | +        | /      | /            | 40 %   | +        |
| Citric acid                                 | +           | +    | +        | 10 %   | /            | 10 %   | +        |

Die Untersuchungen sind, wenn nichts Gegenteiliges angegeben ist, bei Raumtemperatur durchgeführt worden. Bei einem Zusammentreffen verschiedener Medien können sich die Beständigkeiten ändern. Daher können wir für die Angaben keine Gewähr übernehmen.

### Explanation of symbols

- + resistant against all concentrations
- + resistant against maximum % concentration
- C° resistant to maximum C°
- limited resistance
- not resistant
- / no information

## EMC in enclosure technology

### General information

In electrical/electronic engineering, enclosures assume two tasks:

- protection of the installed components from mechanical hazards and adverse radiation from outside
- protection of the surroundings from occurring mechanical and electrical hazards and adverse interference radiation from the components installed

Especially the electromagnetic compatibility (EMC) has an increasing effect on the selection of enclosures because of the ongoing development of the electronic components and the increased equipment density on the PCB's - which increasingly generates „pollution“ by electromagnetic interference radiation in the environment.

### Legal regulations

Within the framework of harmonising the European standards, an EC guideline directive (05.89/336/EEC) was passed in May 1989, which took effect in the Federal Republic of Germany on the 9th Nov. 1992 in the EMC law (EMVG).

This law is applicable to all units which might cause electromagnetic interference or the operation of which could be impaired by such interference.

The EMC directive came into effect on 1.1.1996 EC-wide - from which date all new electrical and electronic units brought into circulation within the EC had to fulfil these regulations.

As an external sign that the EC relevant laws (EMC law and further design basics), these units have to show the CE symbol.

### Requirements from the enclosure

Enclosures as such are not subjected to the EMC law, as by definition they are not electrical or electronic units.

However, enclosures are to a large extent responsible for the intensity of interference emission (receipt and transmission of interference waves) of a unit.

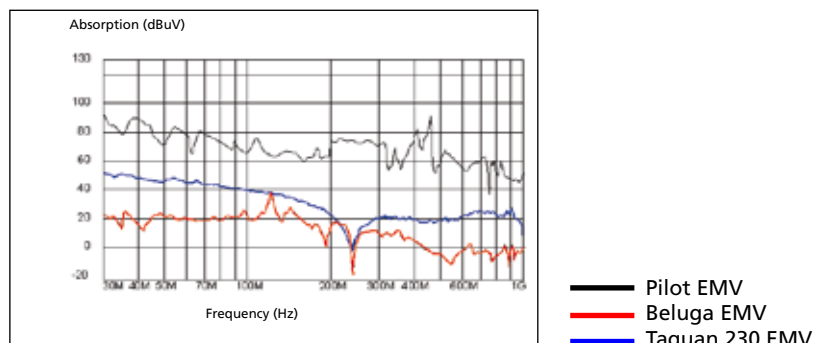
At this point, the choice of the enclosure material is also decisive for the screening effect which is composed of a reflection and an absorption damping of an enclosure.

Synthetic materials (plastics) alone have no filtering effect on interference radiation. A screening effect can be achieved by additional costly treatment (metal flashing or application of a conductive lacquer).

Metal enclosures, on the other hand, offer a highly effective basic protection against interference radiation. (Here an important factor is a large contact surface of the individual components of the enclosure (cover, enclosure shells).

To meet special protection requirements, the EMC compatibility can be increased by

- conductive seals,
- contact bare front surfaces as well as
- EMC compatible cable screw connections.



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