EN

Labona®

TECHNICAL MANUAL

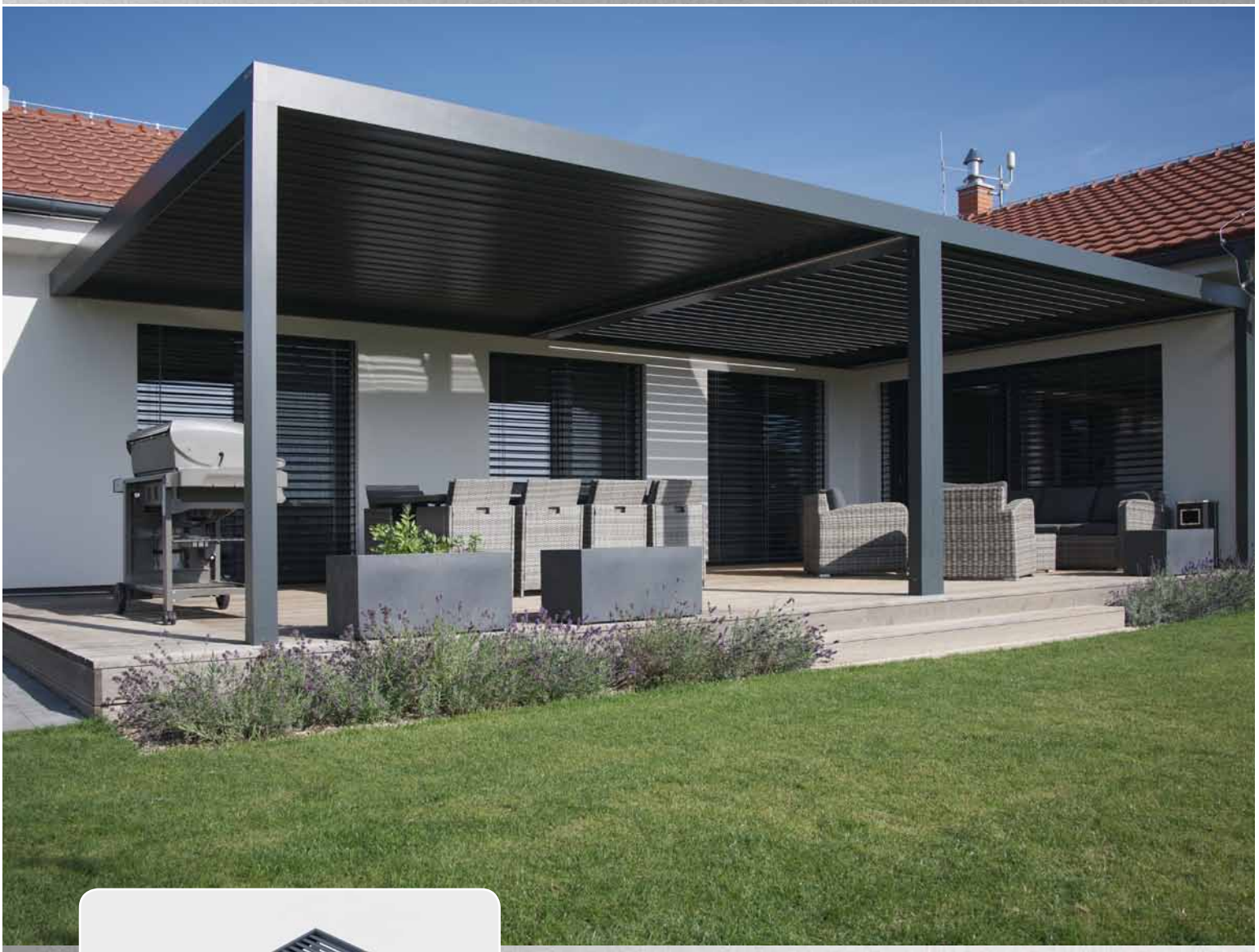
ARTOSI BIOCLIMATIC PERGOLA

Contents

ISOTRA *Quality*

A brand that represents many years of tradition, incalculable investments into own development, use of high-quality materials, technological advancement, competent work of hundreds of employees, and many other parameters constituting a composite whole – the final ISOTRA product.

ARTOSI

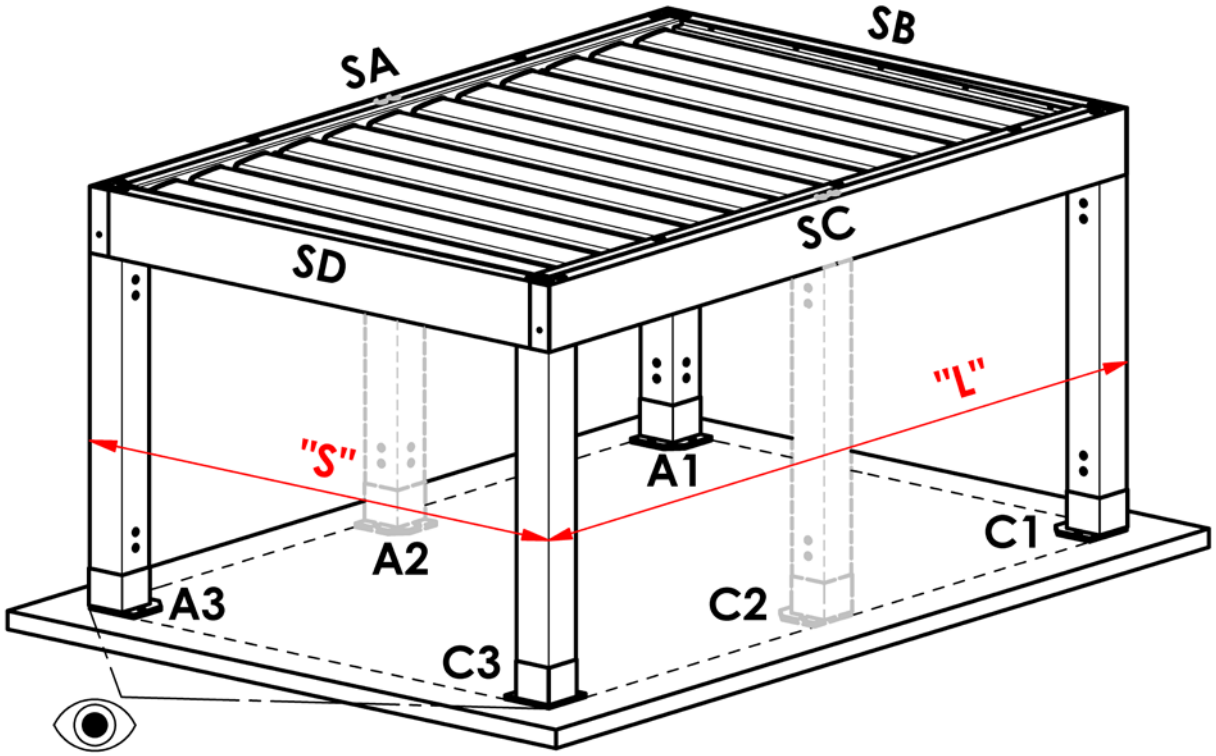


- The bioclimatic pergola is manufactured with high precision
- Possibility to place the poles outside the pergola corners
- Low building height of the roof section incl. slat opening – 25 cm in total
- Possibility to divide the pergola roof slats into several independent sections with individual control
- Pure and elegant design
- Simple slat assembly/disassembly and variability of pergola assembly
- Slat opening angle up to 130°
- Slat weathering 16 mm
- Possibility to install a LED strip along the pergola perimeter, with warm or cold shade
- Possibility to integrate screen shutters, or sliding glass panels
- Wind resistance class 6
- Own development and manufacture

ISOTRA *Quality*

ARTOSI

Basic specification



SA, SC – Perimeter frame – Length
SB, SC – Perimeter frame – Width
A1, A3, C1, C3 – Corner poles
A2, C2 – Additional pole

"S" – Maximum pergola width
"L" – Maximum pergola length

- Viewing direction

Colours

RAL 9006 White aluminium
RAL 9006S White aluminium structure
RAL 9007 Grey aluminium
RAL 9007S Grey aluminium structure
RAL 9010M Pure white matt
RAL 9010S Pure white structure
RAL 7016M Anthracite grey matt
RAL 7016S Anthracite grey structure
RAL 8014M Sepia brown matt
RAL 8014S Sepia brown structure
DB 702 pearl light grey
DB 703 pearl dark grey

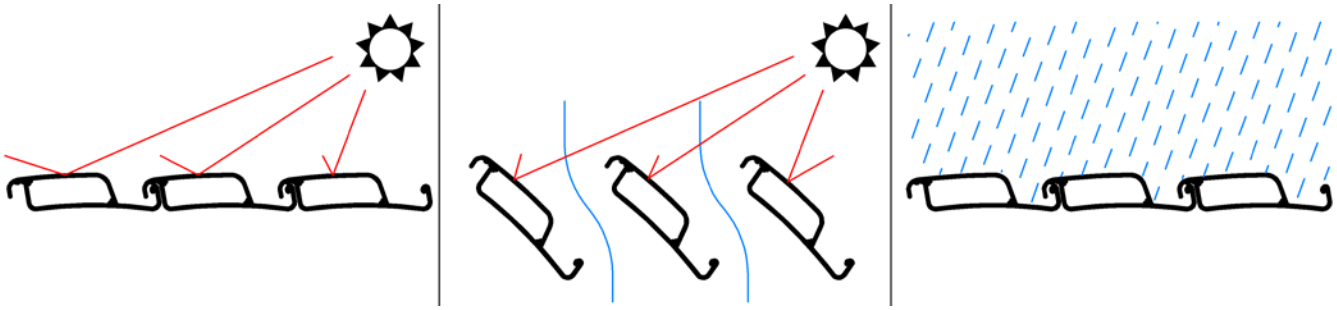
Other RAL colours upon request for an extra charge.

RAL 9006 | RAL 9006 S | RAL 9007 | RAL 9007 S | RAL 9010 M | RAL 9010 S

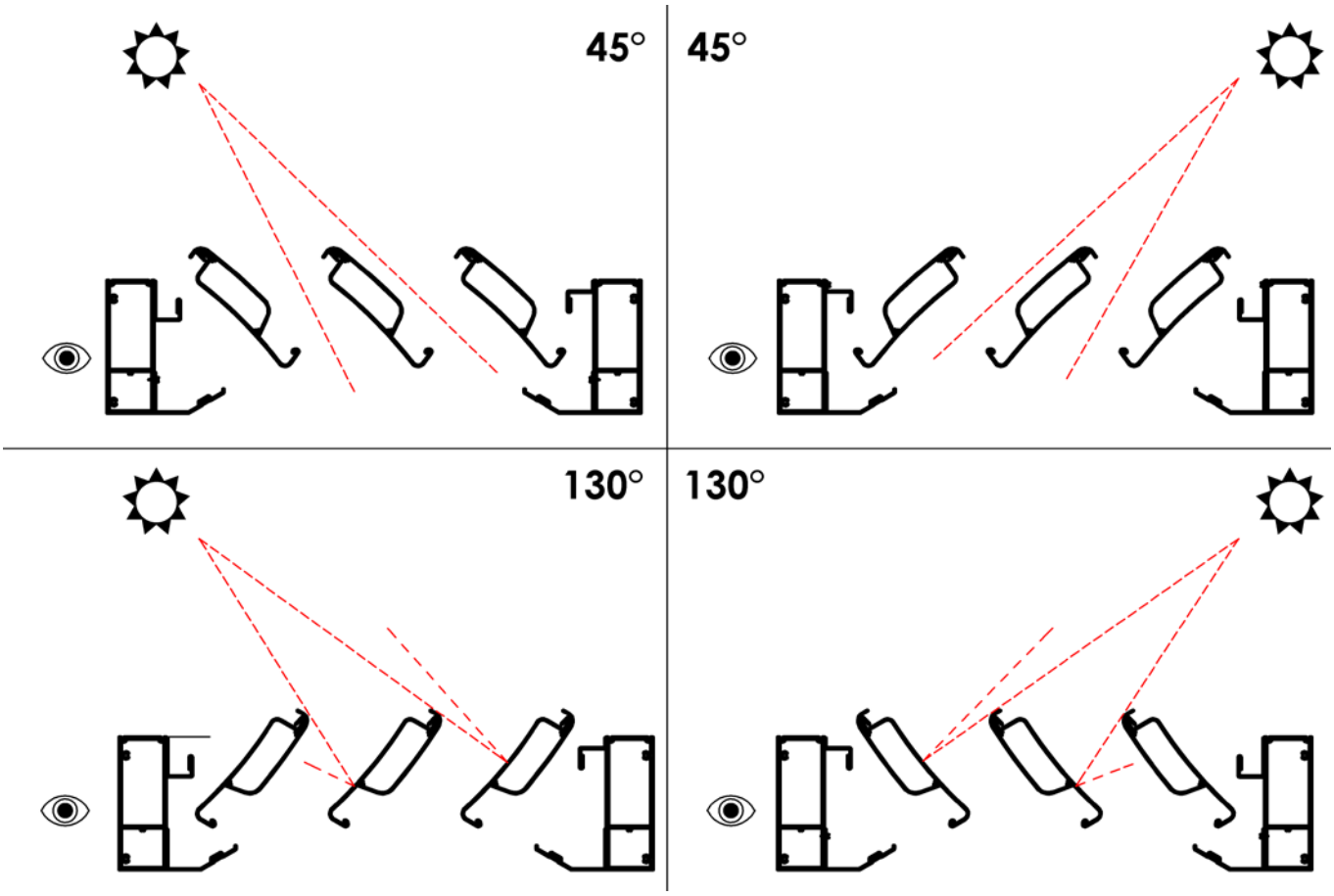
RAL 7016 M | RAL 7016 S | RAL 8014 M | RAL 8014 S | DB 702 | DB 703

Function of the bioclimatic pergola

Sun protection | Sun protection and cooling | Rain protection



The bioclimatic pergola is a shading element intended as sun protection. Slat tilting allows ventilating the space under the roof while retaining the shading function. The pergola also serves as rain protection. However, water-resistance is limited due to the product design. Detailed information can be found in the section Basic specification – Water resistance.



Controls / Slat drive

Motorised control, tilting and shutting of aluminium slats in the pergola roof.
230 V, 50 Hz

The controls can be wired – phase control – or wireless using the SOMFY IO system.

Water resistance

This product is a bioclimatic pergola, not a fully functional roof.
The pergola is an open, outdoor structure, and is incomparable with an enclosed, heat-, water- and wind-resistant conservatory.
Furniture, flooring, equipment, etc. must therefore be suitable for outdoor use.
With respect to the moveable roof structure, the product is not necessarily water-tight in all conditions, although each roof slat has a sealing element over its entire length.
In the rain, water drops dripping in the pergola gutter are likely to splash into the areas under the pergola (this always depends on the rain intensity and weather conditions).

The pergola is capable of draining the following quantities of rain water:
50 l/m^2/hr in case of area up to 12 m2 and side length up to 4 m, with one drain
50 l/m^2/hr in case of area up to 24 m2 and side length up to 7 m, with two drains
70 l/m^2/hr in case of area more than 24m2 and side length up to 7 m, with three drains

The drains are placed in the pergola poles.

The values stated above only apply if all the drains are located opposite the motors.
The values stated above only apply if the pergola is free-standing. If the pergola is added to another structure, it is necessary to take into account that the quantity of water to be drained by the pergola may differ.

Due to the fact that temperatures above and beyond the pergola will differ, it is likely that water will condensate on the lower side and inside the pergola structure.

Wind resistance

When shut, the pergola is capable of withstanding wind exceeding Class 6 acc. to ČSN 13561 (more than 88 km/h).

When open, the pergola is capable of withstanding wind of 40 km/h.

Schneebeständigkeit

Snow regions corresponding to the load-carrying capacity of the pergola's shading surface

a) Snow can freely slide from the pergola's shading surface

Pergola width [mm]	4500	4000	3500	3000
Pn [kN/m^2]	0,98	1,23	1,59	1,88
Snow region	II	III	III	IV

b) There are barriers at the edge of the pergola's shading surface causing snow accumulation on the shading surface.
The pergola is added to one or more higher vertical walls.

Pergola width [mm]	4500	4000	3500	3000
Pn [kN/m^2]	0,98	1,23	1,59	1,88
Snow region	Not suitable for	I	I	II

Pn = load-bearing capacity of the shading area (i.e. maximum permissible load of the pergola roof in kN/m^2)

Details of calculations used in the protocol are archived by the testing laboratory.

Calculation was performed in accordance with ČSN EN 1991-1-3.

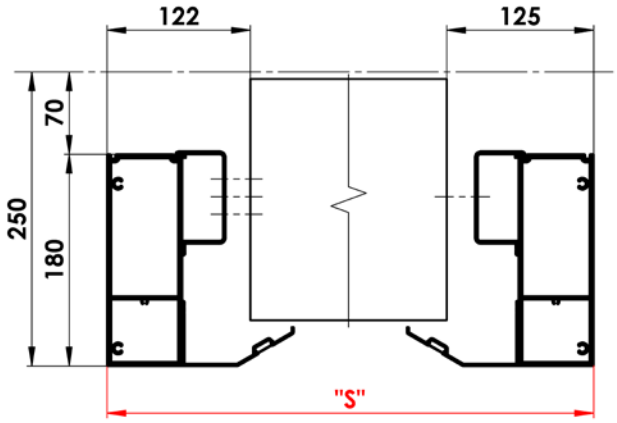
During snowfall, the slats must be open at 90° position.
It is forbidden to move the slats if covered by frost, as this is likely to damage the product.
If the pergola is added to another structure with a sloped roof, it is necessary to take into account the additional quantity of snow which is likely to load the pergola.

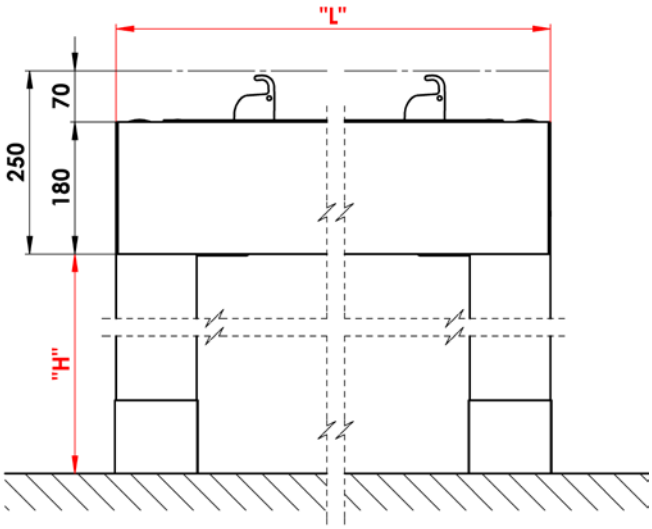
Standard dimensions

Pergola	Version	Length "L"		Width "S" (mm)		Passing height Dimension "H" (mm)		Guaranteed surface (m^2)
		min.	max.	min.	max.	min.	max.	max.
ARTOSI	**motor**	1440	7000*	1000	4500**	500	3000	31,5

*From a length of 6120 mm, the pergola has 6 stands. From a length of 5400 mm, the pergola must be divided into 2 sections (2 motors).
** Up to a width of 4000 mm, the load capacity of the slats is up to 116 kg / m2. From a width of 4000 mm, the load capacity of the slats is up to 90 kg / m^2.

Installation dimensions





"S" – Pergola width
"L" – Pergola length
"H" – Passing height of a specific pole

Linear expansion

When the temperature of aluminium increases, the metal will expand; this phenomenon is called thermal expansion. The coefficient of thermal expansion of aluminium alloy is 23.5 µm/(m*K).
Example:
At 20 °C, an aluminium profile measures 7000 mm. When heated to 50 °C – during a sunny day – it will measure 7005 mm due to thermal expansion. The length will increase by +5 mm as a result of the change in aluminium temperature.
When incorporating the pergola to surrounding structures, it is important to consider change in the pergola dimensions due to ambient temperature.
When taking measurements of screen roller blinds and installing them in the pergola, it is necessary to consider thermal expansion of the aluminium profile in relation to ambient temperature. We recommend that measurements be taken at ambient temperatures of 23 ±5 °C.

Dimensional tolerances

Length	Tolerance	Width	Tolerance	Passing height	Tolerance
up to 2000 mm	± 2,4	up to 2000 mm	± 2,4	from 500 mm to 3000 mm	+20/-10 - adjustable
up to 3000 mm	± 2,6	up to 3000 mm	± 2,6		
up to 4000 mm	± 2,8	up to 4000 mm	± 2,8		
up to 5000 mm	± 3	up to 4500 mm	± 3		
up to 6000 mm	± 3,2				
up to 7000 mm	± 3,4				

Number of slats over pergola length

L	1440	1620	1800	1980	2160	2340	2520	2700	2880	3060	3240	3420	3600	3780	3960	4140
ks	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
L	4320	4500	4680	4860	5040	5220	5400	5580	5760	5940	6120	6300	6480	6660	6840	7000
ks	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	37

Approximate pergola weight [kg]

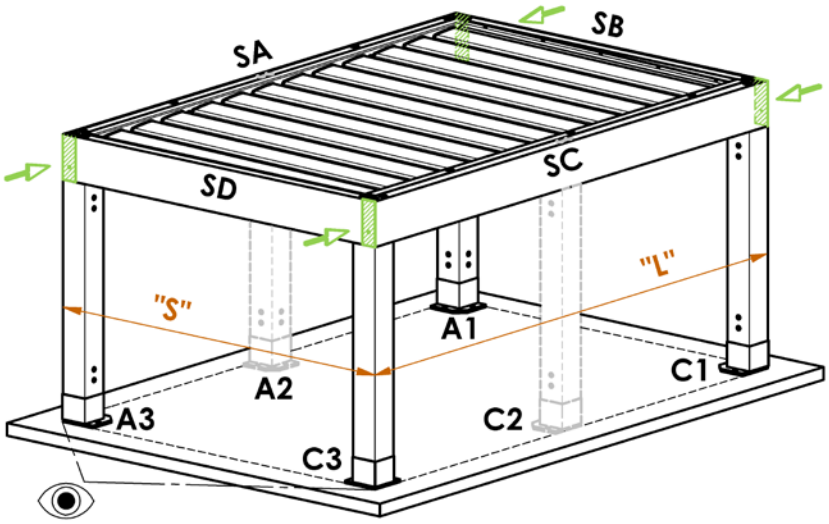
L/S	2000	2500	3000	3500	4000	4500
1440	123	139	155	171	188	204
1620	131	148	166	183	201	218
1800	139	158	176	195	214	232
1980	147	167	187	207	227	247
2160	155	176	197	219	240	261
2340	163	186	208	230	253	275
2520	172	195	219	242	266	289
2700	180	204	229	254	279	303
2880	188	214	240	266	292	318
3060	196	223	250	277	305	332
3240	204	233	261	289	318	346
3420	212	242	271	301	331	360
3600	221	251	282	313	343	374
3780	229	261	293	325	356	388
3960	237	270	303	336	369	403
4140	245	279	314	348	382	417
4320	253	289	324	360	395	431
4500	261	298	335	372	408	445
4680	270	308	345	383	421	459
4860	278	317	356	395	434	473
5040	286	326	367	407	447	488
5220	294	336	377	419	460	502
5400	302	345	388	430	473	516
5580	311	354	398	442	486	530
5760	319	364	409	454	499	544
5940	327	373	419	466	512	558
6120	335	383	430	478	525	573
6300	343	392	441	489	538	587
6480	351	401	451	501	551	601
6660	360	411	462	513	564	615
6840	368	420	472	525	577	629
7000	376	429	483	536	590	643

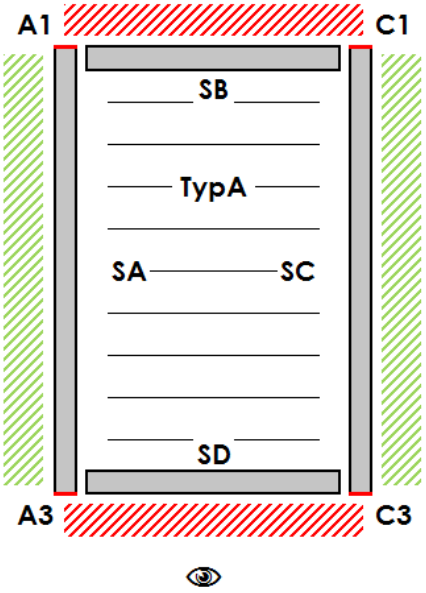
ARTOSI
Technical specification

Types of installation
Three types of installation may be selected for ARTOSI pergolas. Each type of installation is suitable for a different installation area. All types of installation are intended for step-by-step assembly (it is not necessary to assemble the frame in advance and then lift it by hoists).

Type A

Installation possibilities
- Free-standing, supported by 4 to 6 poles
- Possibility of anchoring to the adjacent building using the SA/SC perimeter frame, without having to use poles at the anchored side
- The SA and SC sides may be built up
- Handling area of at least 700 mm must be allowed in front of SB and SD sides



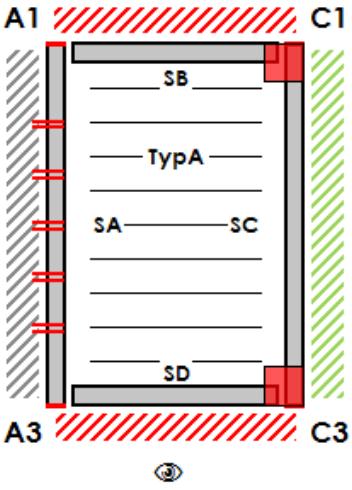


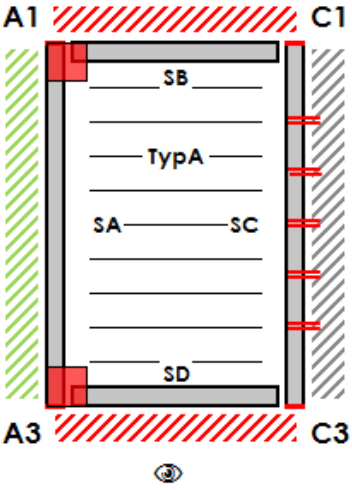
SA, SC – Perimeter frame – Length
SB, SC – Perimeter frame – Width
A1, A3, C1, C3 – Corner poles
A2, C2 – Additional poles

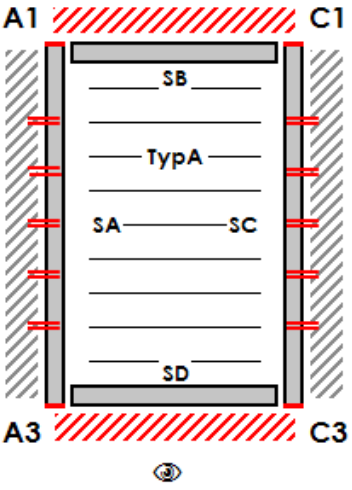
"S" – Maximum pergola width
"L" – Maximum pergola lengt

- Viewing direction

Examples of installation possibilities for Type A pergola with regard to the surroundings







- Anchored side: SA
- Compulsory pole: C1 / C3
- Optional pole: A1 / A2 / A3 / C2

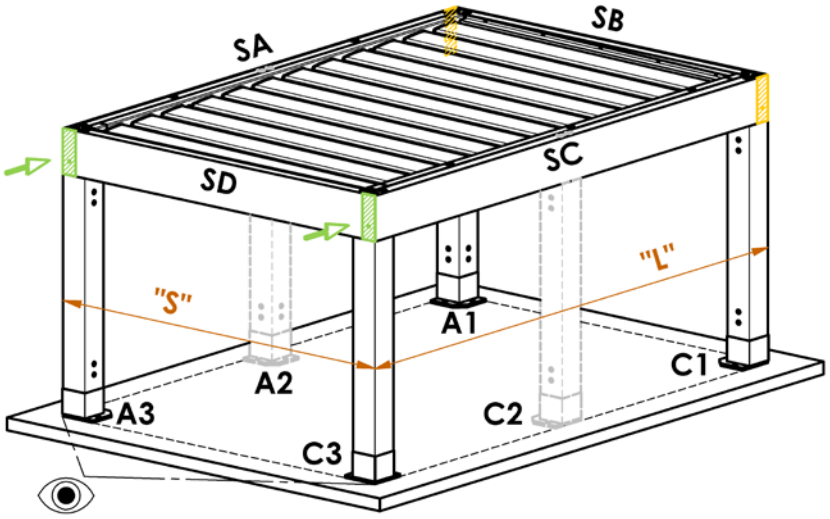
- Anchored side: SC
- Compulsory pole: A1 / A3
- Optional pole: A2 / C1 / C2 / C3

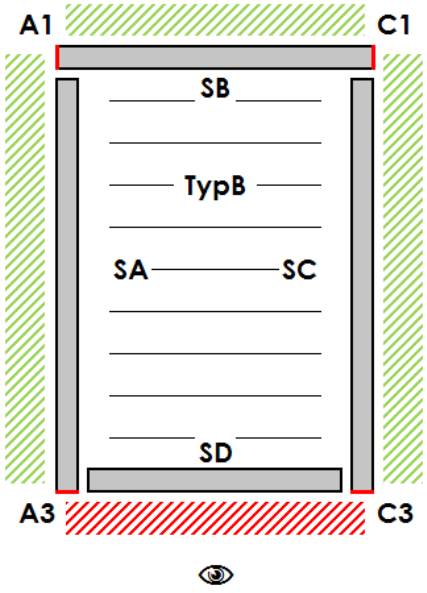
- Anchored side: SA / SC
- Compulsory pole: -
- Optional pole: A1 / A2 / A3 / C1 / C2 / C3

Type B

Installation possibilities

- Free-standing, supported by 4 to 6 poles
- Possibility of anchoring to the adjacent building using the SA/SB/SC perimeter frame, without having to use poles at the anchored side
- The SA/SB/SC sides may be built up
- Handling area of at least 700 mm must be allowed in front of SD side



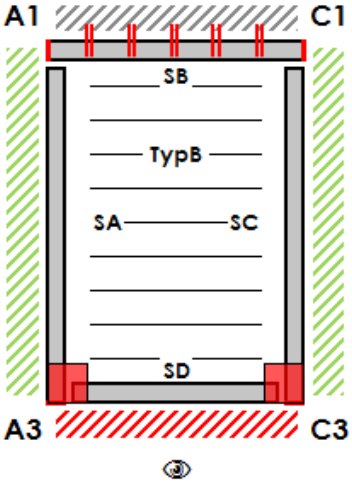


SA, SC – Perimeter frame – Length
SB, SC – Perimeter frame – Width
A1, A3, C1, C3 – Corner poles
A2, C2 – Additional poles

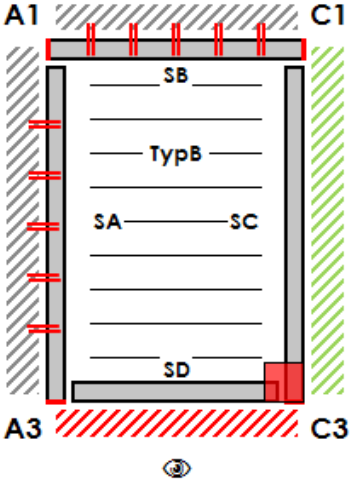
"S" – Maximum pergola width
"L" – Maximum pergola length

- Viewing direction

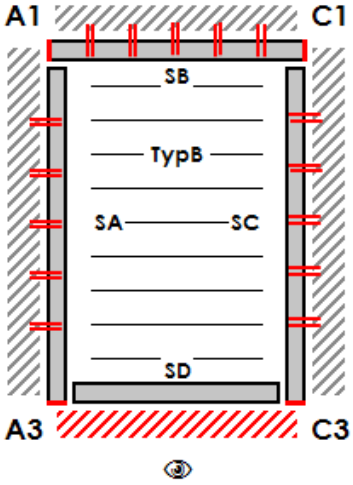
Examples of installation possibilities for Type B pergola with regard to the surroundings



- Anchored side: SB
- Compulsory pole: A3 / C3
- Optional pole: A1 / A2 / A3 / C1/ C2



- Anchored side: SA / SB
- Compulsory pole: C3
- Optional pole: A1 / A2 / C1 / C2/ C3

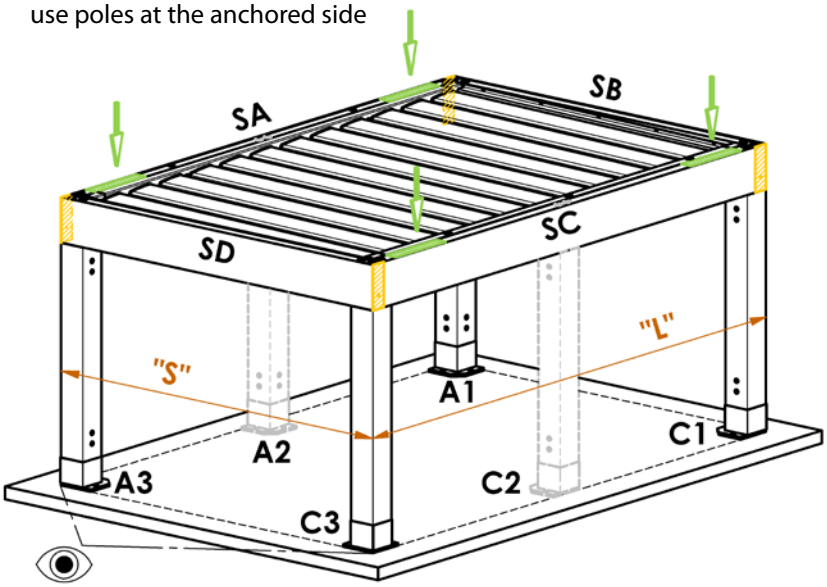


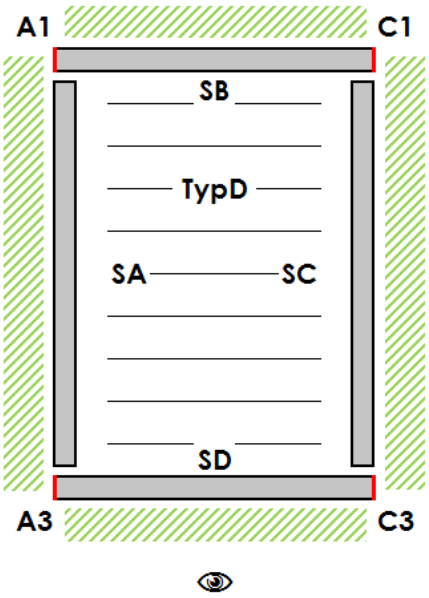
- Anchored side: SA / SB / SC
- Compulsory pole: -
- Optional pole: A1 / A2 / A3 / C1 / C2 / C3

Type D

Installation possibilities

- Free-standing, supported by 4 to 6 poles
- Possibility of anchoring to the adjacent building using the SA/SB/SC/SD perimeter frame, without having to use poles at the anchored side
- The SA/SB/SC/SD sides may be built up
- Handling area of at least 700 mm must be allowed above SA/SC sides



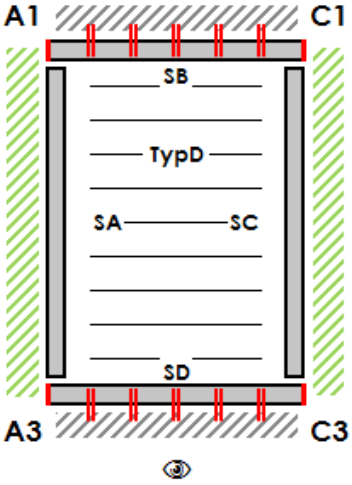


SA, SC – Perimeter frame – Length
SB, SC – Perimeter frame – Width
A1, A3, C1, C3 – Corner poles
A2, C2 – Additional poles

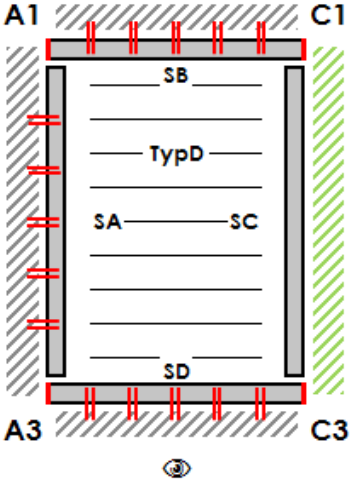
"S" – Maximum pergola width
"L" – Maximum pergola length

- Viewing direction

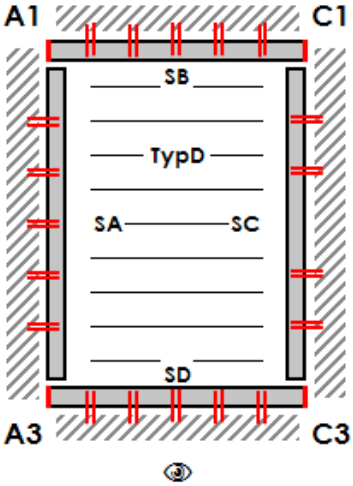
Examples of installation possibilities for Type D pergola with regard to the surroundings



- Anchored side: SB / SD
- Compulsory pole: -
- Optional pole: A1 / A2 / A3 / C1 / C2 / C3



- Anchored side: SA / SB / SD
- Compulsory pole: -
- Optional pole: A1 / A2 / A3 / C1 / C2 / C3



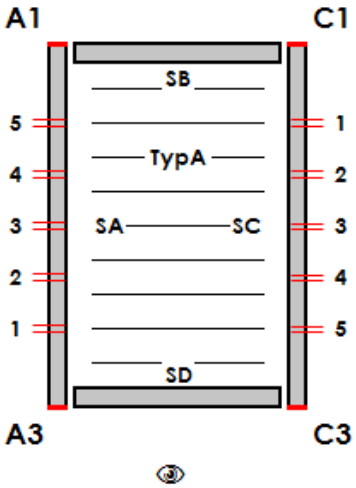
- Anchored side: SA / SB / SC / SD
- Compulsory pole: -
- Optional pole: A1 / A2 / A3 / C1 / C2 / C3

Frame anchoring

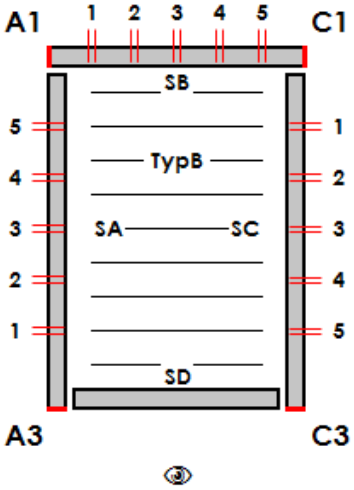
Frame anchoring means load-bearing fastening of the pergola frame to the adjacent supporting structures through anchoring holes. The pergola is supplied with pre-drilled anchoring holes. The pergola exerts load forces at these holes in accordance with the dimensions and external conditions, see attached table.
In order to consider the pergola frame load-bearing, it is necessary to select fasteners that are suitable for the given supporting structures and have sufficient dimensions to transfer the load forces, see attached table.
The manufacturer shall not be liable for incorrectly selected fasteners.
The manufacturer shall not be responsible for consequences of incorrect or insufficient anchoring in the adjacent supporting structures.
The user acknowledges that adverse effect may occur, such as water entry between the pergola structure and the building façade.

Anchored sides of pergola

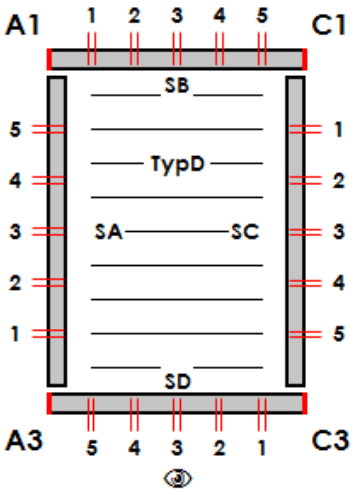
Type A
possible side anchoring
SA / SC



Type B
possible side anchoring
SA / SB / SC

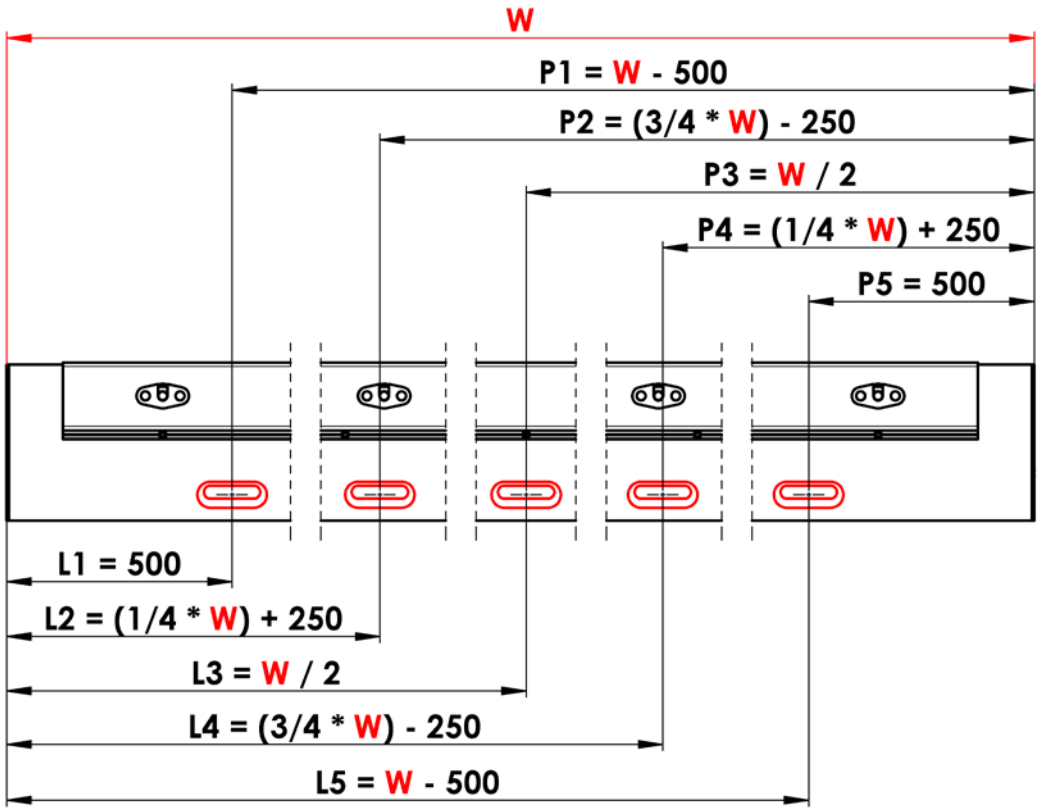


Type D
possible side anchoring
SA / SB / SC / SD



Arrangement of anchoring holes in the perimeter frame

This hole arrangement applies to all sides of the pergola.



W – Pergola width or length

Anchoring hole detail

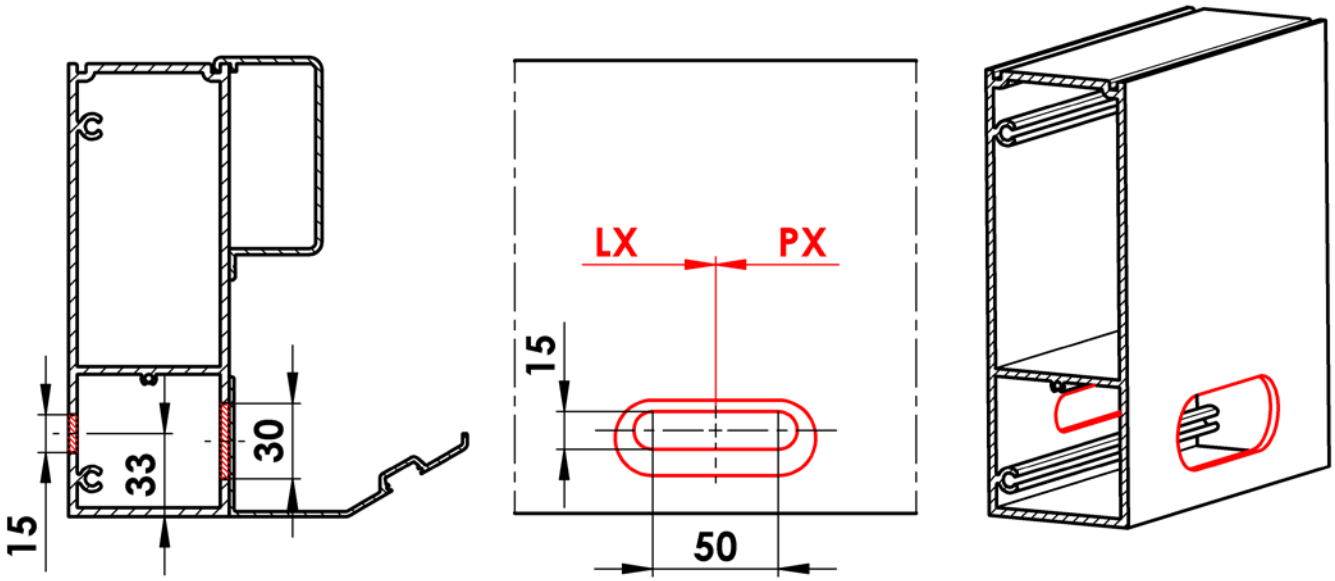


Table of load forces per one anchoring hole

Anchoring on SA/SC side

Shear stress of each fastener [kN]

L / S	2000	2500	3000	3500	4000	4500
1440	0,64	0,77	0,89	1,02	1,15	1,28
1980	0,85	1,02	1,19	1,37	1,55	1,72
2520	1,05	1,27	1,49	1,72	1,94	2,16
3060	1,26	1,53	1,79	2,06	2,33	2,60
3420	1,40	1,70	1,99	2,29	2,59	2,90
3960	1,61	1,95	2,29	2,64	2,99	3,34
4500	1,82	2,20	2,59	2,99	3,38	3,78
5040	2,03	2,46	2,90	3,34	3,78	4,22
5400	2,16	2,63	3,10	3,57	4,04	4,51
5940	2,37	2,88	3,40	3,91	4,43	4,95
6480	2,58	3,14	3,70	4,26	4,83	5,39
7000	2,79	3,39	4,00	4,61	5,22	5,83

Tensile stress of each fastener [kN]

L / S	2000	2500	3000	3500	4000	4500
1440	3,39	4,39	5,44	6,57	7,75	8,99
1980	1,83	2,39	2,98	3,60	4,27	4,97
2520	1,39	1,81	2,27	2,75	3,27	3,81
3060	1,18	1,54	1,93	2,35	2,80	3,27
3420	1,09	1,43	1,79	2,18	2,60	3,04
3960	1,00	1,31	1,65	2,01	2,40	2,81
4500	0,94	1,23	1,55	1,89	2,26	2,65
5040	0,90	1,18	1,48	1,81	2,16	2,54
5400	0,87	1,15	1,45	1,77	2,11	2,48
5940	0,85	1,11	1,40	1,72	2,05	2,41
6480	0,83	1,09	1,37	1,68	2,00	2,35
7000	0,81	1,07	1,34	1,64	1,97	2,31

Anchoring on SB/SD side

Shear stress of each fastener [kN

L / S	2000	2500	3000	3500	4000	4500
1440	0,65	0,79	0,92	1,06	1,20	1,34
1980	0,83	1,01	1,20	1,38	1,57	1,75
2520	1,02	1,25	1,48	1,71	1,94	2,17
3060	1,21	1,49	1,77	2,14	2,32	2,60
3420	1,34	1,65	1,96	2,26	2,57	2,88
3960	1,54	1,89	2,25	2,60	2,95	3,31
4500	1,74	2,14	2,54	2,94	3,34	3,74
5040	1,93	2,38	2,83	3,27	3,72	4,17
5400	2,06	2,54	3,02	3,50	3,98	4,45
5940	2,26	2,79	3,31	3,84	4,36	4,88
6480	2,46	3,03	3,60	4,17	4,74	5,32
7000	2,66	3,28	3,89	4,51	5,13	5,75

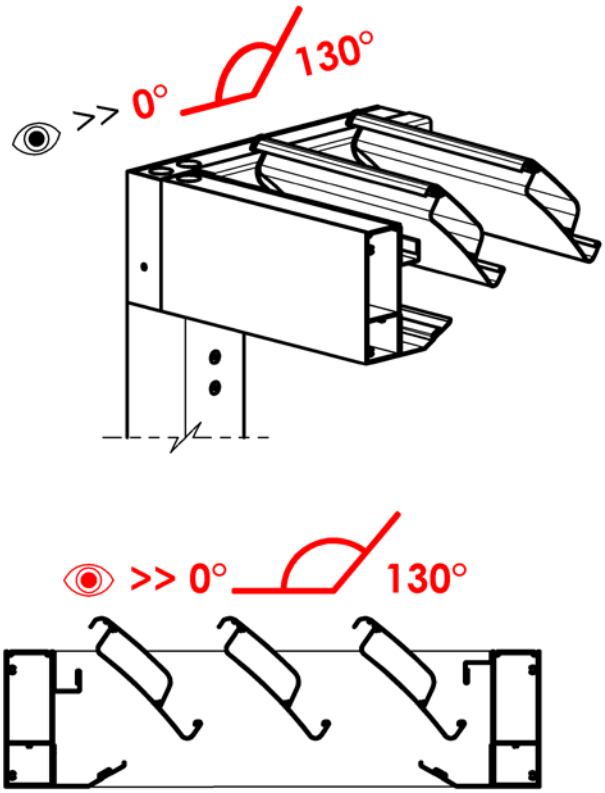
Tensile stress of each fastener [kN]

L / S	2000	2500	3000	3500	4000	4500
1440	1,16	0,90	0,78	0,71	0,66	0,64
1980	1,61	1,25	1,08	0,99	0,93	0,89
2520	2,08	1,62	1,40	1,27	1,19	1,14
3060	2,55	1,99	1,72	1,57	1,47	1,41
3420	2,88	2,24	1,94	1,77	1,66	1,59
3960	3,37	2,63	2,27	2,07	1,95	1,87
4500	3,88	3,03	2,62	2,39	2,24	2,15
5040	4,39	3,43	2,97	2,71	2,55	2,44
5400	4,74	3,71	3,21	2,93	2,75	2,64
5940	5,28	4,13	3,58	3,26	3,07	2,94
6480	5,82	4,56	3,95	3,60	3,40	3,25
7000	6,38	5,00	4,33	3,95	3,72	3,57

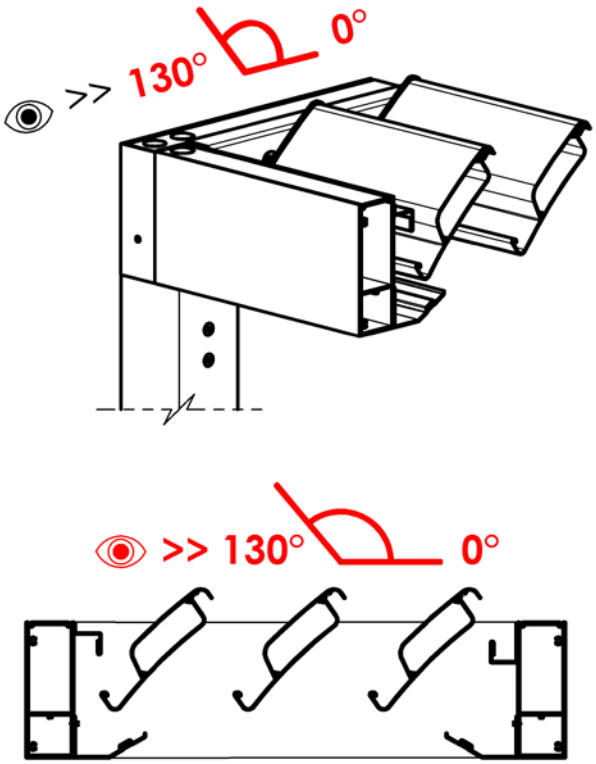
Orientation of slats

It is possible to select two directions of slat tilting. The tilting direction influences the possibility to regulate the amount of light, shade and air flow between the slats.

Tilting direction A



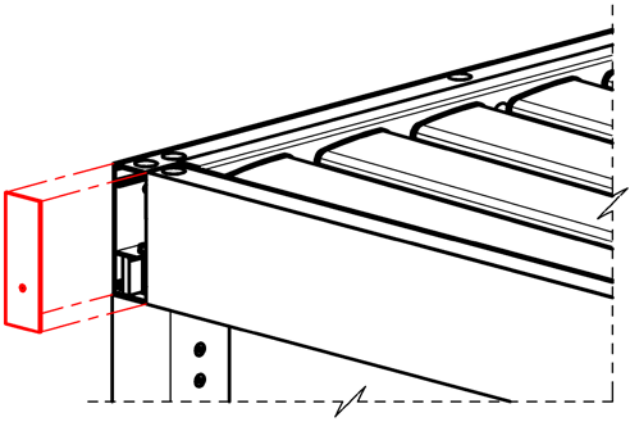
Tilting direction B



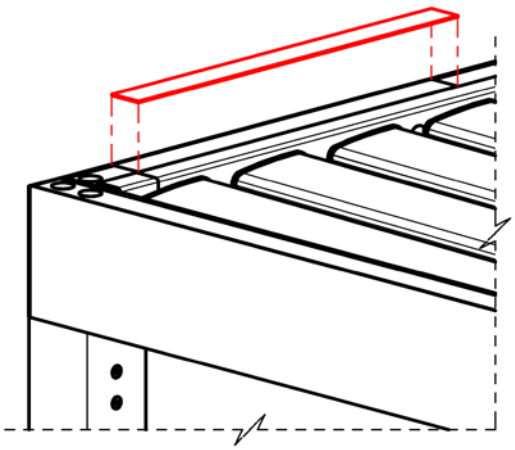
Access point

Serves for connecting the pergola electrical installation with power supply.
This point also serves for service works on the pergola drive and electrical installation.

for Type A / Type B
- Access via a cover in the front side of the profile on the selected side.
- Handling area of at least 700 mm must be allowed in front of the cover.
- This area must remain accessible after the installation.



for Type D
- Access via a cover and opening in the upper side of the profile on the selected side.
- Handling area of at least 700 mm must be allowed in front of the cover.
- This area must remain accessible after the installation.

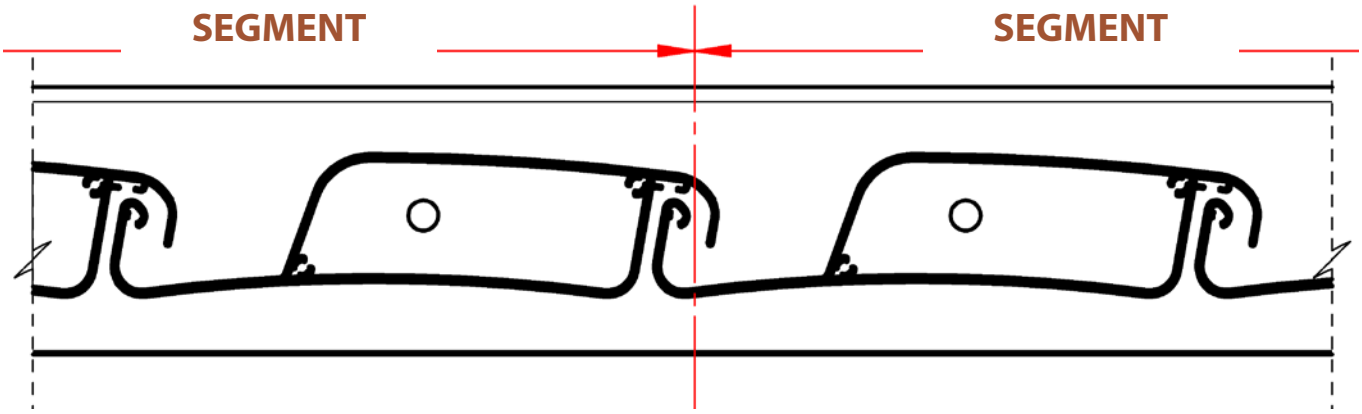


Slat segments

The individual slats are interconnected, comprising a slat segment.
One slat segment is driven by one motor. The pergola can have one or two slat segments.
The motor synchronously tilts the whole slat segment from 0° (slat shut) to 130° (slats fully open).
The slats may be stopped at any position within the range.
In case of two segments, it is possible to tilt each segment individually.

For pergolas of ≤ 5400 mm length – 1 or 2 segments may be selected.
For pergolas of > 5400 mm length – only 2 segments may be selected.

One segment may have min. 5 slats and max. 28 slats.

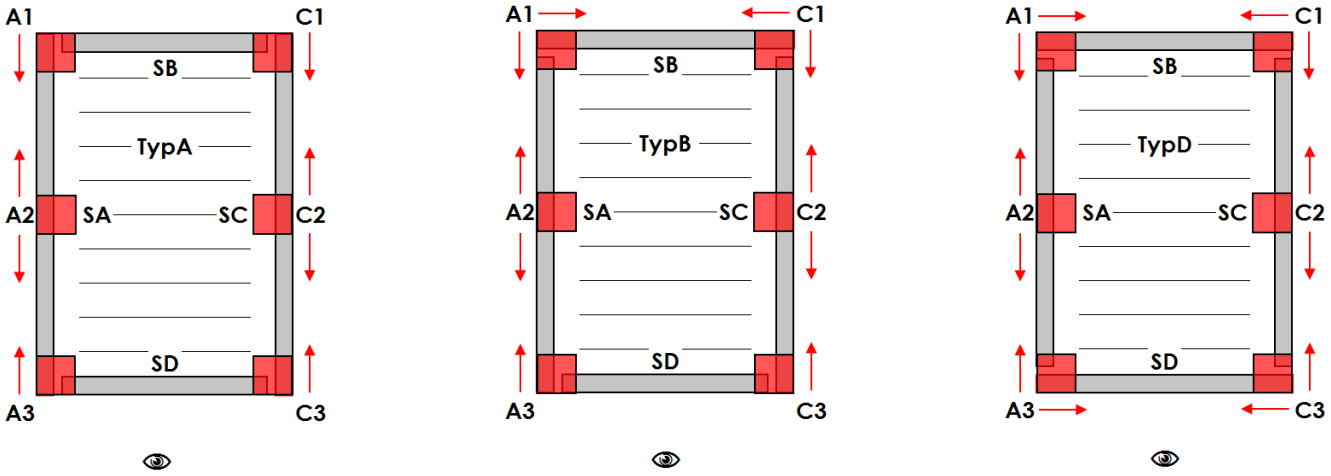


Dividing plane between two segments

Poles – Basic information

Pole is the basic supporting element of the pergola. It transfers the roof load to the anchoring point through a foot. The anchoring point must be sufficiently load-bearing in order to withstand all loads transferred by the pole foot. Fasteners connecting the pole foot and the anchoring point must have strength sufficient to withstand and transfer all load forces. The manufacturer shall not be liable for incorrectly selected fasteners.
Only guide rails of screen roller shutters or glazing rails supplied by the pergola manufacturer can be anchored in the poles.

Position and displacement of poles



Lengthwise displacement the "Z" corner poles:

• type of installation A,B,D:	poles A1 / A3 / C1 / C3:	min. 255 mm / max. 1055 mm

Widthwise displacement the "Z" corner poles:

• type of installation B:	poles A1 / C1	min. 255 mm / max. 555 mm
• type of installation D:	poles A1 / A3 / C1 / C3	min. 255 mm / max. 555 mm

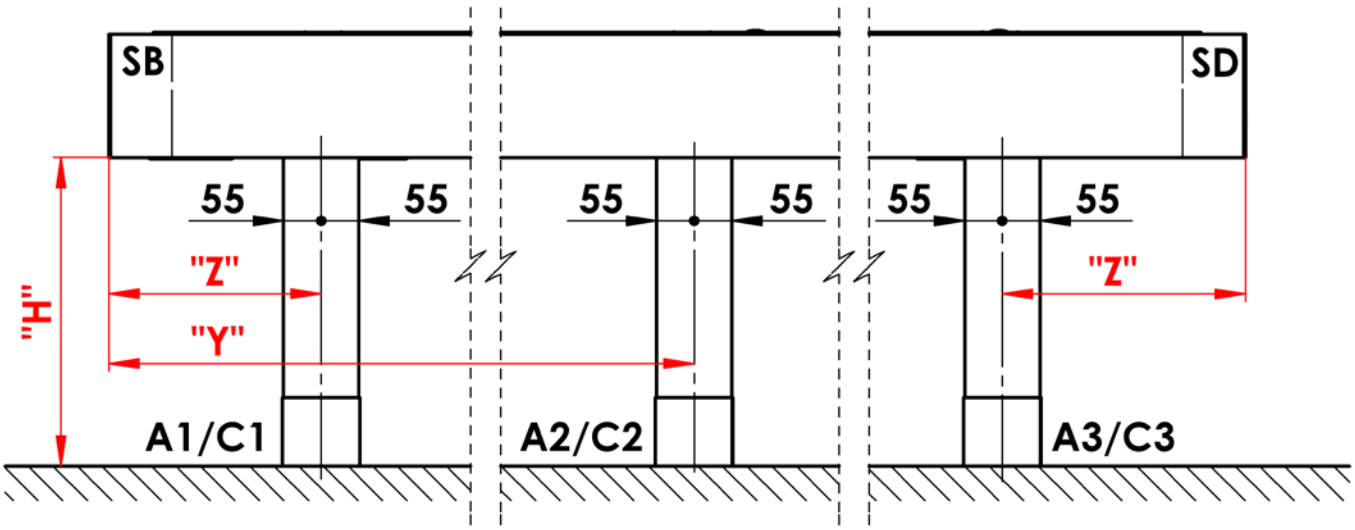
Lengthwise displacement the "Y" middle poles:

• type of installation A,B,D from the end of SB side:	poles A2 / C2	min. 1165 mm
• type of installation A,B,D from the end of SD side:	poles A2 / C2	min. 1165 mm

Passing height "H"

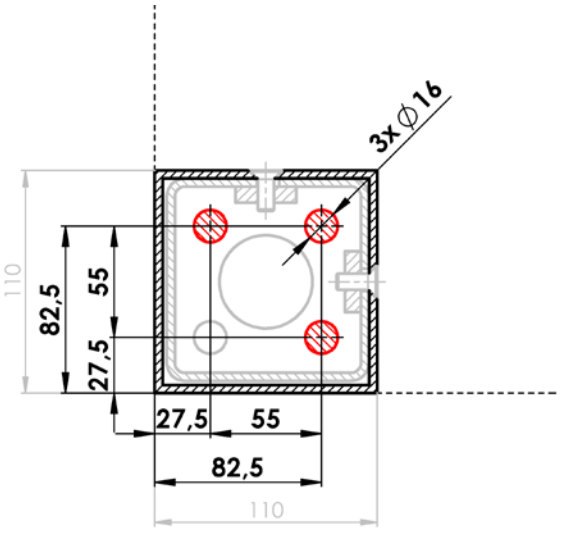
• type of installation A, B, D:	poles A1 / A2 / A3 / C1 / C2 / C3	min. 500 mm / max. 3000 mm

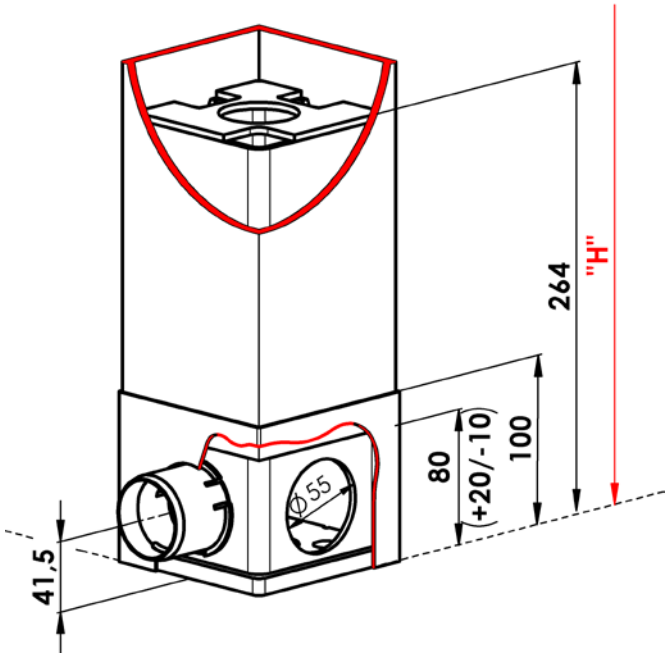
The displacement of the "Z" corner poles is always specified from the pergola's outer edge to the pole's axis.
The displacement of the "Y" middle pole A2 is always specified from the SB side's outer edge to the axis of this pole.
The displacement of the "Y" middle pole C2 is always specified from the SB side's outer edge to the axis of this pole.
The passing height "H" of the poles is always specified from the lower edge of the perimeter frame to the anchor point plane.



Concealed foot

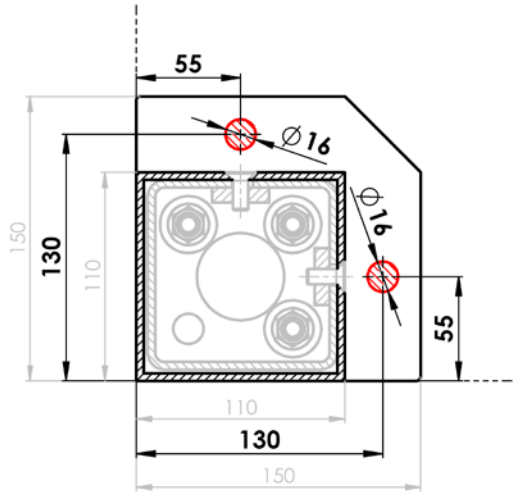
The anchoring holes for the fasteners are hidden in the foot.
The lower end of the foot with access to the anchoring holes is covered by a sheet-metal trim.
The foot allows additional adjustment of the passing height "H" by +20/-10 mm.
Foundation for anchoring the foot is part of neither the offer nor the delivery. The implementation of the foundation with regard to specific terrain conditions must be solved individually in cooperation with an authorized person (architect, construction company, etc...)

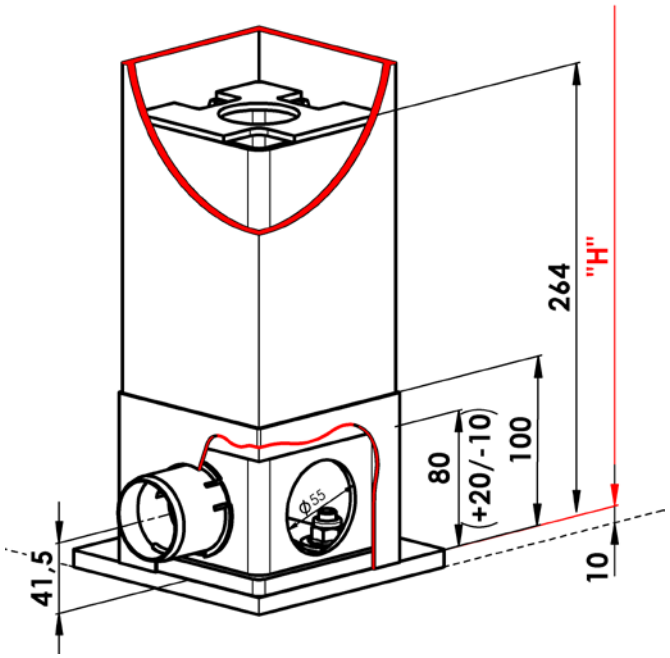




Extended foot

The anchoring holes for the fasteners are visible on the foot.
The lower end of the foot is covered by a sheet-metal trim.
The foot allows additional adjustment of the passing height "H" by +20/-10 mm.
Foundation for anchoring the foot is part of neither the offer nor the delivery. The implementation of the foundation with regard to specific terrain conditions must be solved individually in cooperation with an authorized person (architect, construction company, etc...)





Draining system – Basic information

The pergola is equipped with a system for the draining of rain water. From the slats, water flows to gutters installed inside the pergola around the perimeter frame, and then to poles intended for this purpose. Water leaves the pole foot via a drain hole (see below).

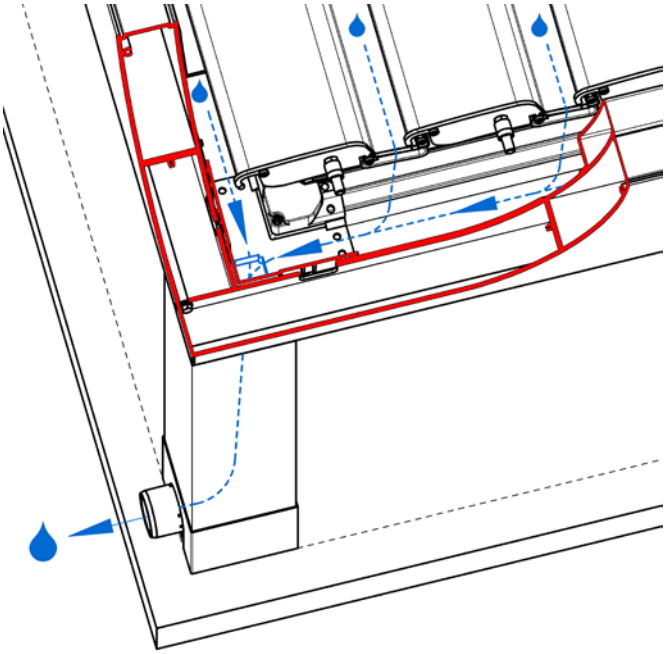
The pergola is primarily a shading element with limited rain protection. Detailed information can be found in the section Basic specification – Water resistance.

The pergola slats are always weathered away from their drive.

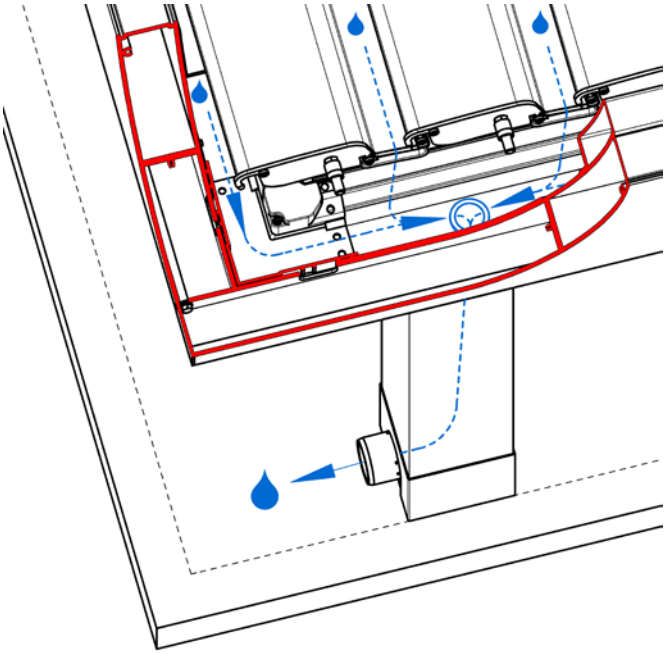
The minimum number of drains located opposite the motors:
- Surface up to 12 m^2 – 1 drain
- Surface up to 24 m^2 – 2 drains
- Surface up to 24 m^2 – 3 drains

Each pergola pole can include a drain. The maximum number of drains is only limited by the number of poles.

Direction of water flow in the pergola structure



Water flow direction to the pole with a drain located in the pergola corner

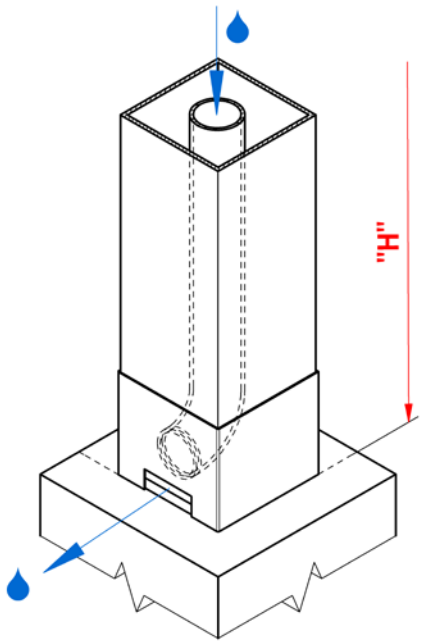


Water flow direction to the pole with a drain located outside the pergola corner

Draining system – Pole drains

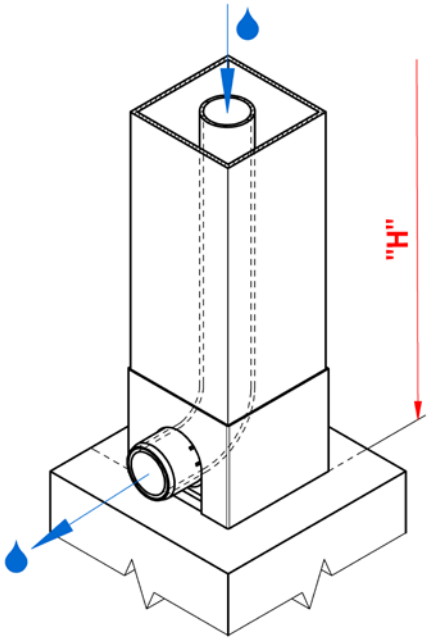
Uncontrolled draining (rectangular opening)

- The spout hose outfall is directed outside the pergola
- The hose has a loose end
- The hose ends just after the sheet-metal trim inside the pole
- Water flows freely through the rectangular opening in the trim
- Hose length = "H" + min. 300 mm



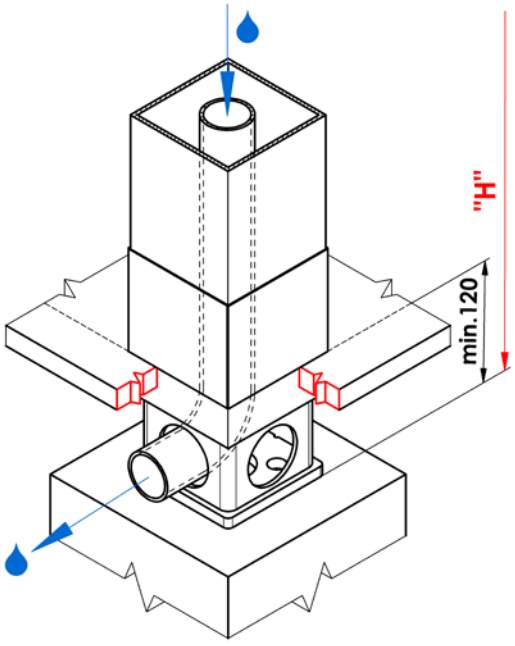
Controlled draining (half-round opening)

- The spout hose outfall is directed outside the pergola
- The hose has a plastic socket
- The hose with the socket ends outside the sheet-metal trim
- Water flows freely through the plastic socket
- DN50 drain pipe may be connected to the plastic socket (not part of delivery)
- Hose length = "H" + min. 300 mm



Draining outside the trim (full trim)

- This type of draining is primarily intended for cases where the foot is anchored under the final terrain level and further connection of the spout hose is under the final terrain level
- The spout hose outfall is directed outside the pergola
- The hose has a loose end
- Hose length = "H" + min. 300 mm



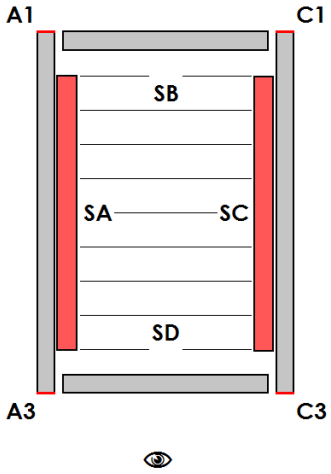
Lighting

The pergola may be illuminated from the inside by a LED lighting system, which is to be installed in the groove of the gutter profile and covered by a light diffuser.
Light colour:

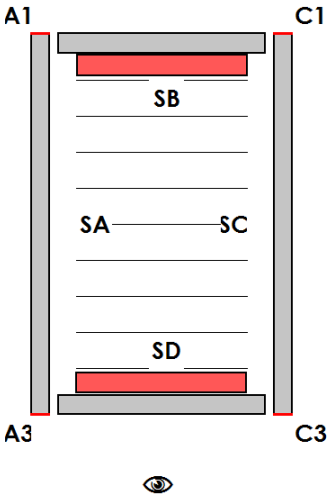
- Warm white
- Cold white

Lighting placement

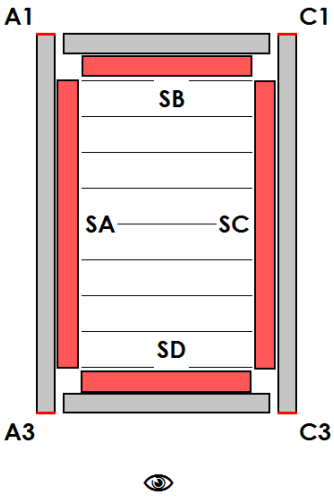
Lengthwise



Widthwise



Lengthwise and widthwise



ARTOSI
Optional accessories

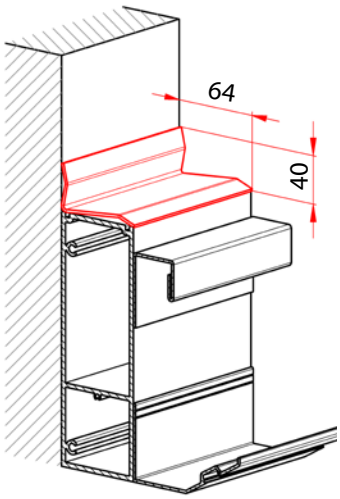
Cover sheets

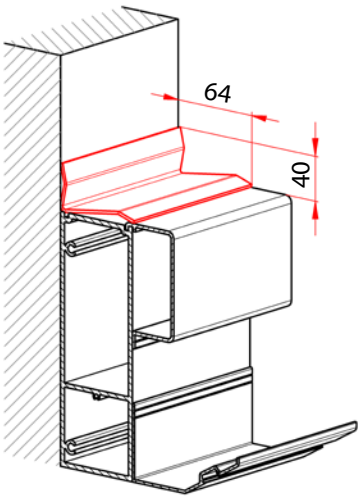
This fitting element is intended to cover the gaps between the pergola and the adjacent structure.
The sheets are manufactured to length, with max. length of one sheet being 4000 mm; material: AL.
Surface treatment of the sheet may be selected from the standard ARTOSI colour card; other RAL colours are upon request for an extra charge.

The sheets are not part of the pergola; they are optional accessories and must be ordered separately.

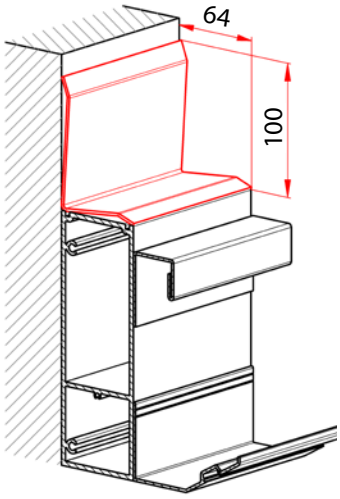
The manufacturer shall not be responsible for failures and defects caused by incorrect incorporation of the pergola to adjacent structures.

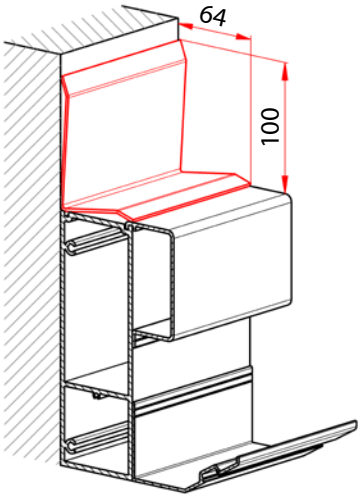
Sheet PG PK_01





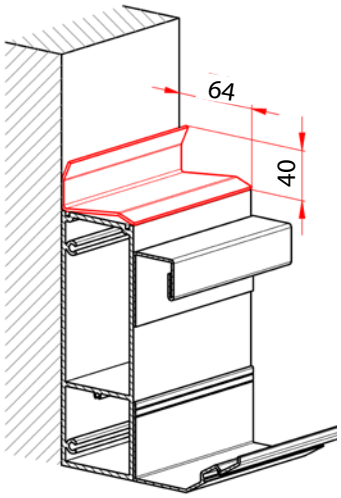
Sheet PG PK_01/1

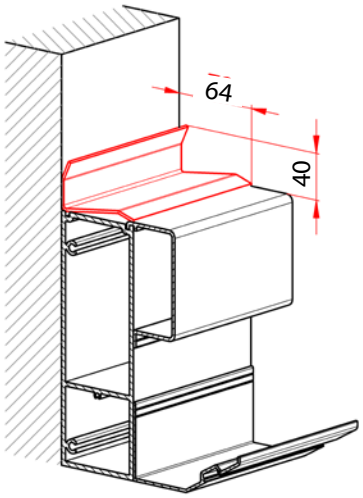




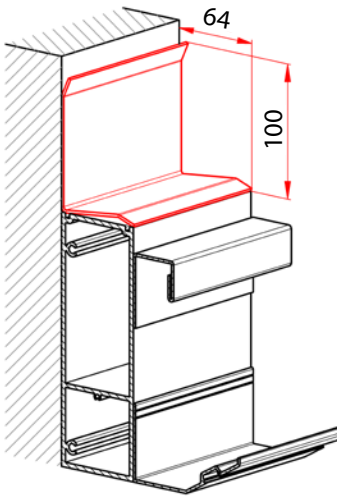
Cover sheets

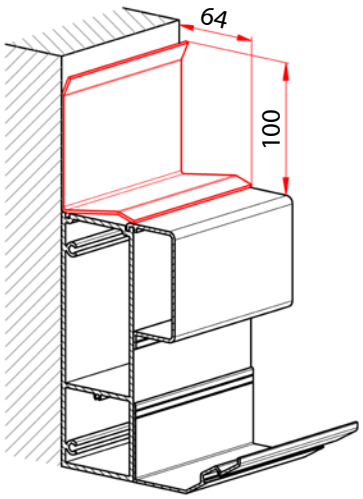
Sheet PG PK_02





Sheet PG PK_02/1



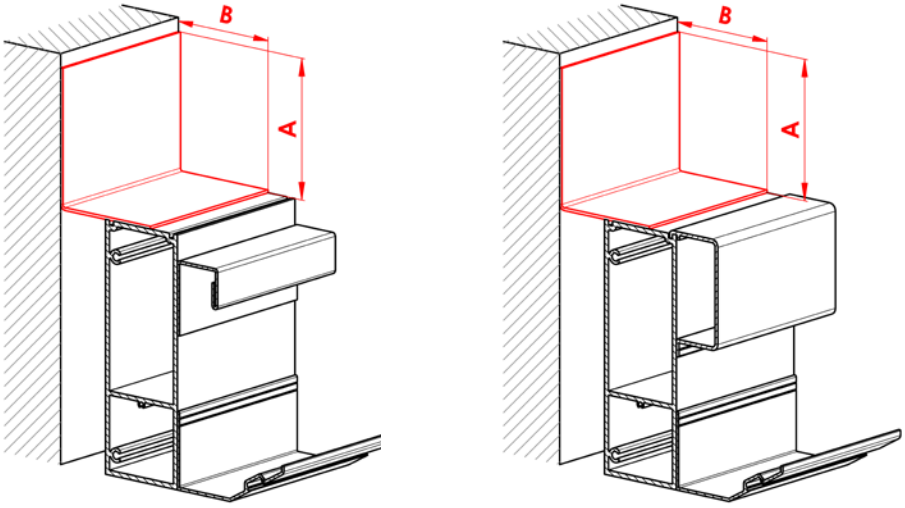


Cover sheets

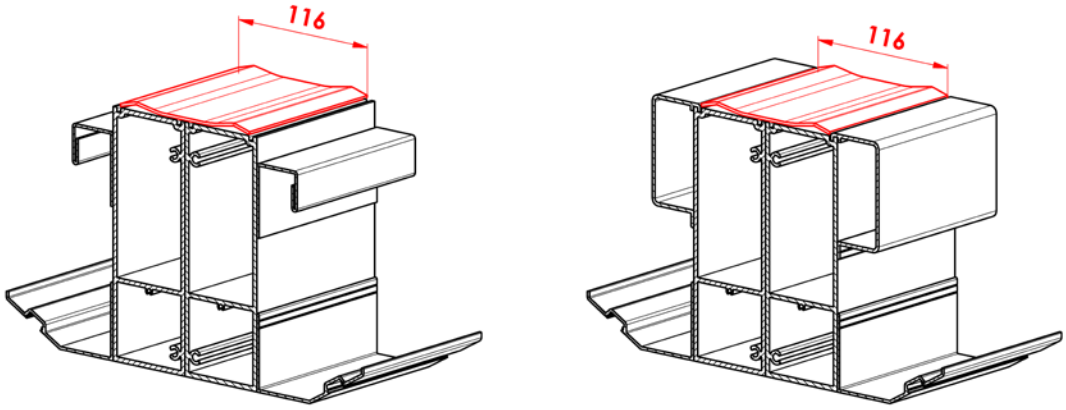
Sheet PG PK_03

Dimension A optional
min. 25 mm, max. 300 mm

Dimension B optional
min. 25 mm, max. 300 mm

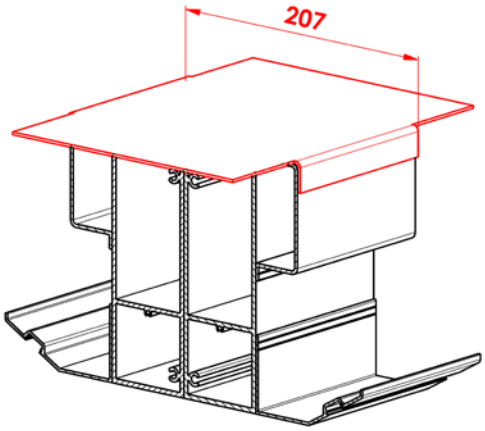


Sheet PG PK_04



Sheet PG PK_05

Cannot be combined with sealing brushes.



Sealing brushes

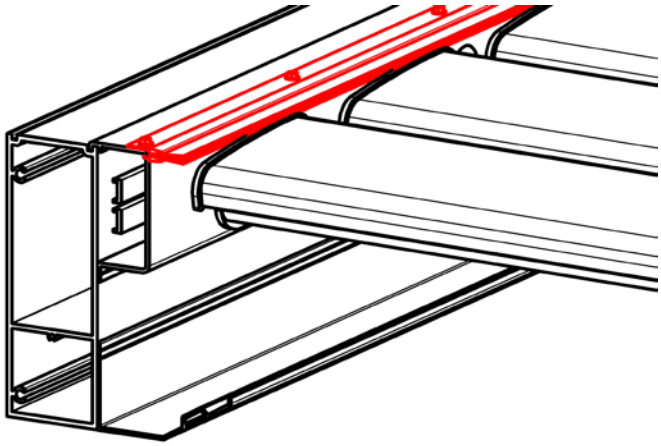
Prevent light transmission and rain water flow between the slat and the perimeter frame.

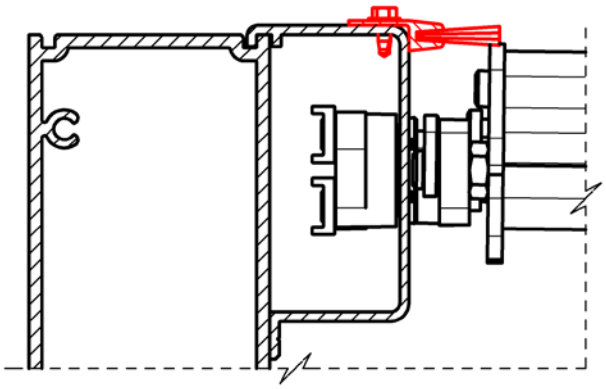
The brush consists of an aluminium bearing profile and UV-stable black polypropylene bristles.
They are attached to the perimeter frame by TEX screws 3.5×9.5 (part of delivery).
Surface treatment of the aluminium profile may be selected from the standard ARTOSI colour card; other RAL colours are upon request for an extra charge.

The sealing brushes consist of several segments and they are to be ordered according to the pergola length "L" and supplied in a set for both long sides of the pergola.

The brushes are not part of the pergola; they are optional accessories and must be ordered separately.

Motor side sealing brush





NON-motor side sealing brush