

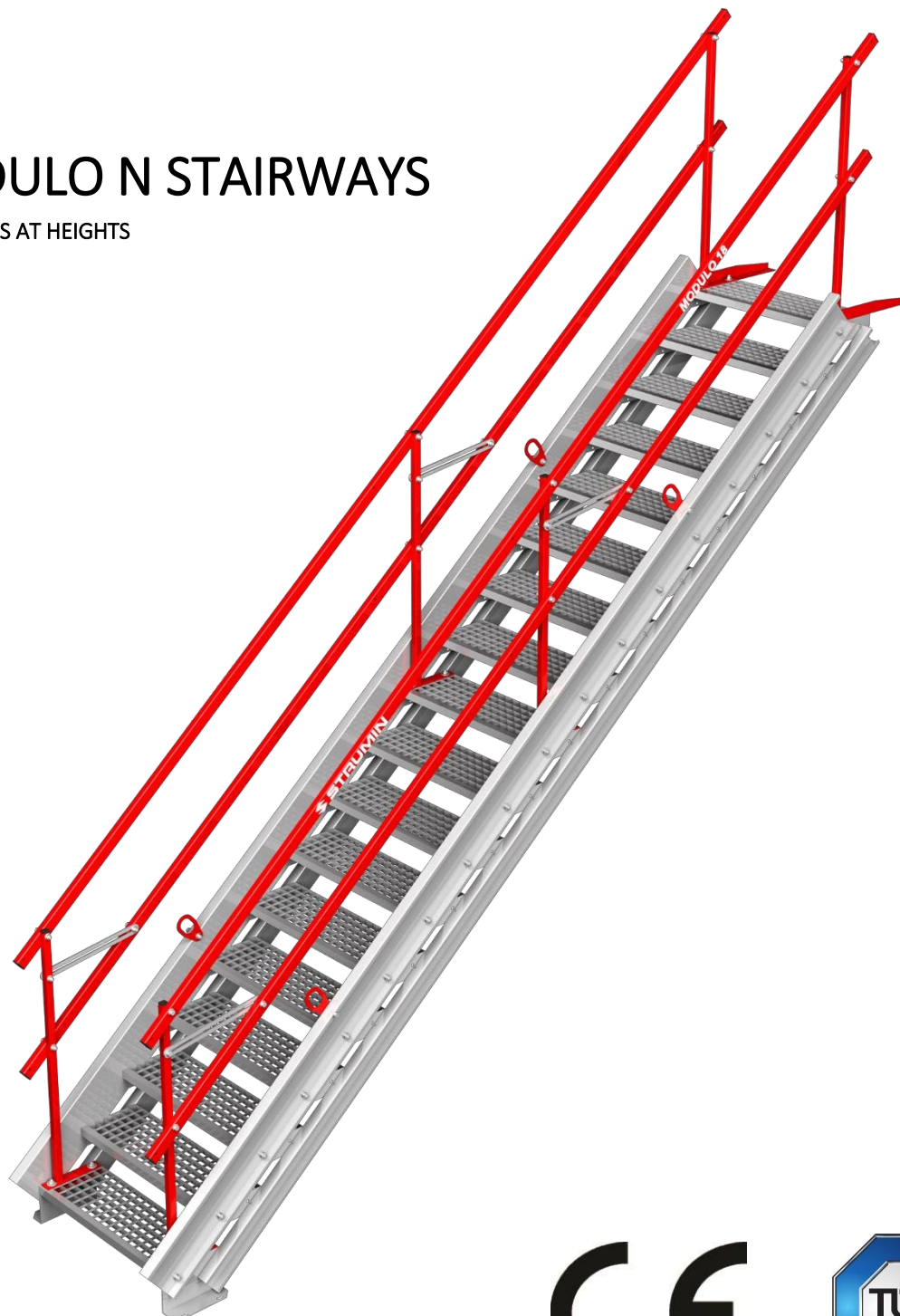


STRUMIN

BUILDING EQUIPMENT

MODULO N STAIRWAYS

SAFE WORKS AT HEIGHTS

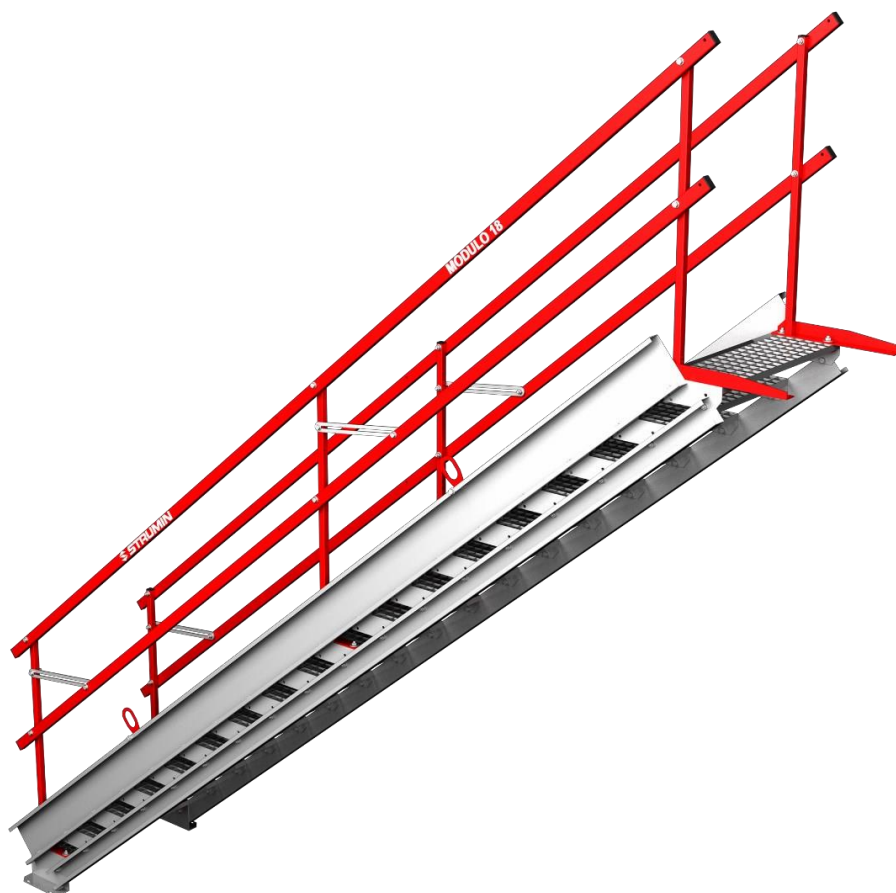


+48 515 515 445
biuro@strumin.pl
www.strumin.pl

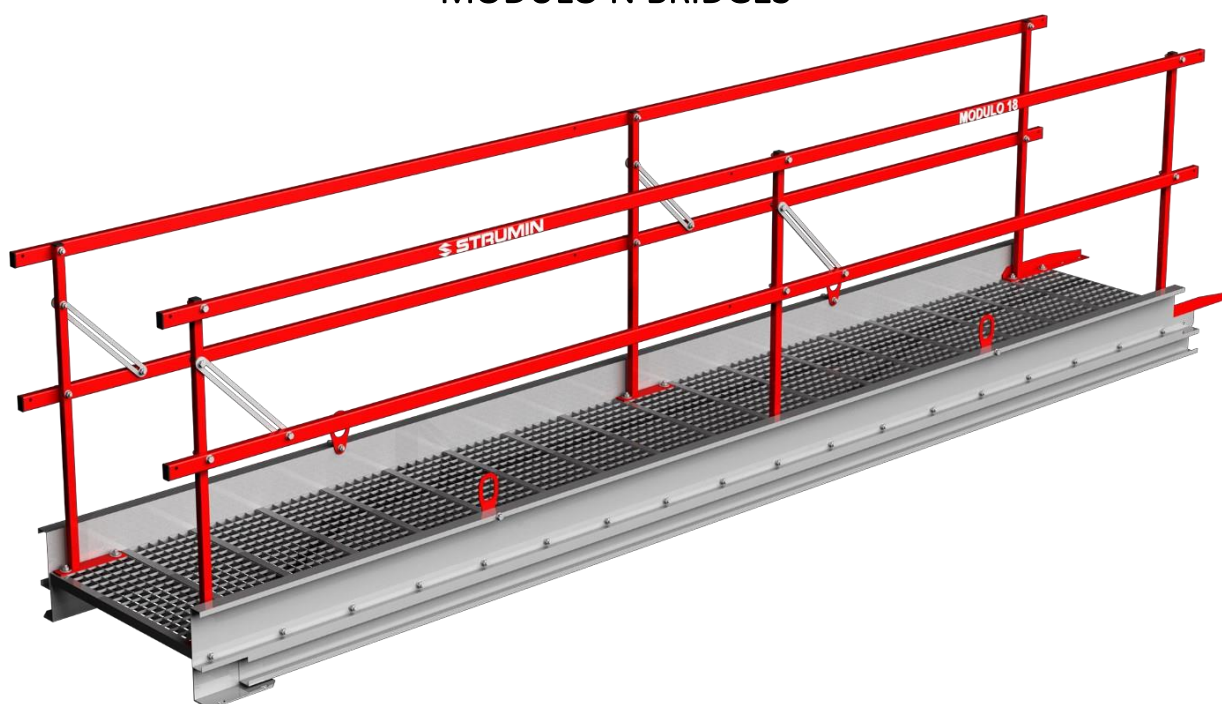
Strumin Equipment
Spółka z ograniczoną odpowiedzialnością
Morawica 191, 32-084 Morawica



MODULO N STAIRWAYS



MODULO N BRIDGES



CONTENTS:

- I. TECHNICAL DOCUMENTATION (DTR)**
- II. MODULO N SYSTEM TECHNICAL DATA**
- III. DESIGNER'S STATEMENT**



I. TECHNICAL DOCUMENTATION

ATTENTION!!!

BEFORE EVERY USE OF THE MODULO N SYSTEM, THE USER SHALL READ THIS TECHNICAL DOCUMENTATION AND ALWAYS STRICTLY FOLLOW THE RULES DESCRIBED HEREIN. THESE INSTRUCTIONS WERE PREPARED FOR ALL WORKERS AND PEOPLE, THAT WILL WORK ON TRANSPORTING, UNLOADING, ASSEMBLING, DISASSEMBLING, STORING, CHECKING AND ANY OTHER WORKS CONNECTED TO THE MODULO N SYSTEM.

CONTENTS:

INTRODUCTION

1. MANUFACTURING BASIS

2. TECHNICAL DESCRIPTION

PURPOSE AND SCOPE OF USAGE,

TECHNICAL CHARACTERISTICS, CONSTRUCTION OF THE STAIRWAYS SYSTEM – MODULO N.

3. USAGE

ACTIONS PERFORMED BEFORE THE USE OF THE STAIRWAYS SYSTEM – MODULO N., QUALIFICATIONS OF WORKERS USING THE STAIRWAYS SYSTEM – MODULO N., ASSEMBLY, DISASSEMBLY, USING.

4. TIPS FOR THE SAFE USAGE OF THE SYSTEM

RISK ANALYSIS

5. CONSERVATION

6. TECHNICAL INSPECTION

ONGOING INSPECTION, DETAILED INSPECTION.



INTRODUCTION

This **Technical Documentation** contains guidelines for the proper use of the **MODULO N stairways system**. Workers and other people using the system shall always observe the guidelines contained herein. In case of any events not described in this document, the occupational safety and health regulations and other regulations, appropriate to the specific situation, shall be observed.

1. MANUFACTURING BASIS

The manufacturing basis for the **MODULO N** stairways system is the need to create a system providing safety while performing works at height.

The **MODULO N** stairways system was manufactured in accordance with the regulations and the technical standards, among others: EN 1090-2:2012, EN ISO 13920:2000, EN 12811-1:2003

2. TECHNICAL DESCRIPTION

2.1 PURPOSE AND SCOPE OF USAGE

The **MODULO N** system provides the possibility to move between working levels, i.e. floors of buildings, and creates special passages for workers. It can also secure stairways in buildings and protect them from damages or excessive use due to the construction works performed.

The **MODULO N** system works with the EPS edge protection system, ensuring the safety of users of stairways and bridges.

The **MODULO N** stairways system was designed in order to provide smooth pitch adjustment in order to fit to a given situation.

The stairways can be configured as a communication string between level (floors), as well as a horizontal bridge connecting two sides etc.

The system consists of six stairways modules with the number of stairs increasing by 3.

Modulo 6, 9, 12, 15, 18, 21.

The stairways can also be used to create communication strings for social containers, i.e. entresols, bridges, passages etc.

The system is characterised by an easy, universal and quick assembly to the front and the upper part of a floor, as well as to a wall. Thanks to the lightness and flexibility of the system, it is possible to adjust it to all building conditions.

The **MODULO N** system is an affordable and quick way to secure working areas where there is the need to increase the level of safety.

The use of the **MODULO N** stairways system is allowed only on condition that the user adheres to this Technical Documentation, as well as the proper occupational safety and health regulations.

2.3 TECHNICAL CHARACTERISTICS, CONSTRUCTION OF THE MODULO N SYSTEM

The **MODULO N** stairways system is a metal construction consisting of eight elements working together.

The lower and upper balk (right and left) is a supporting structure. Thanks to using a high upper profile C200, the construction is characterized by a high carrying capacity without the need to use additional supports.

The grating stairs with anti-corrosion layer assembled with an articulated joint allow to freely move and adjust the system with the use of an adjustment pole.

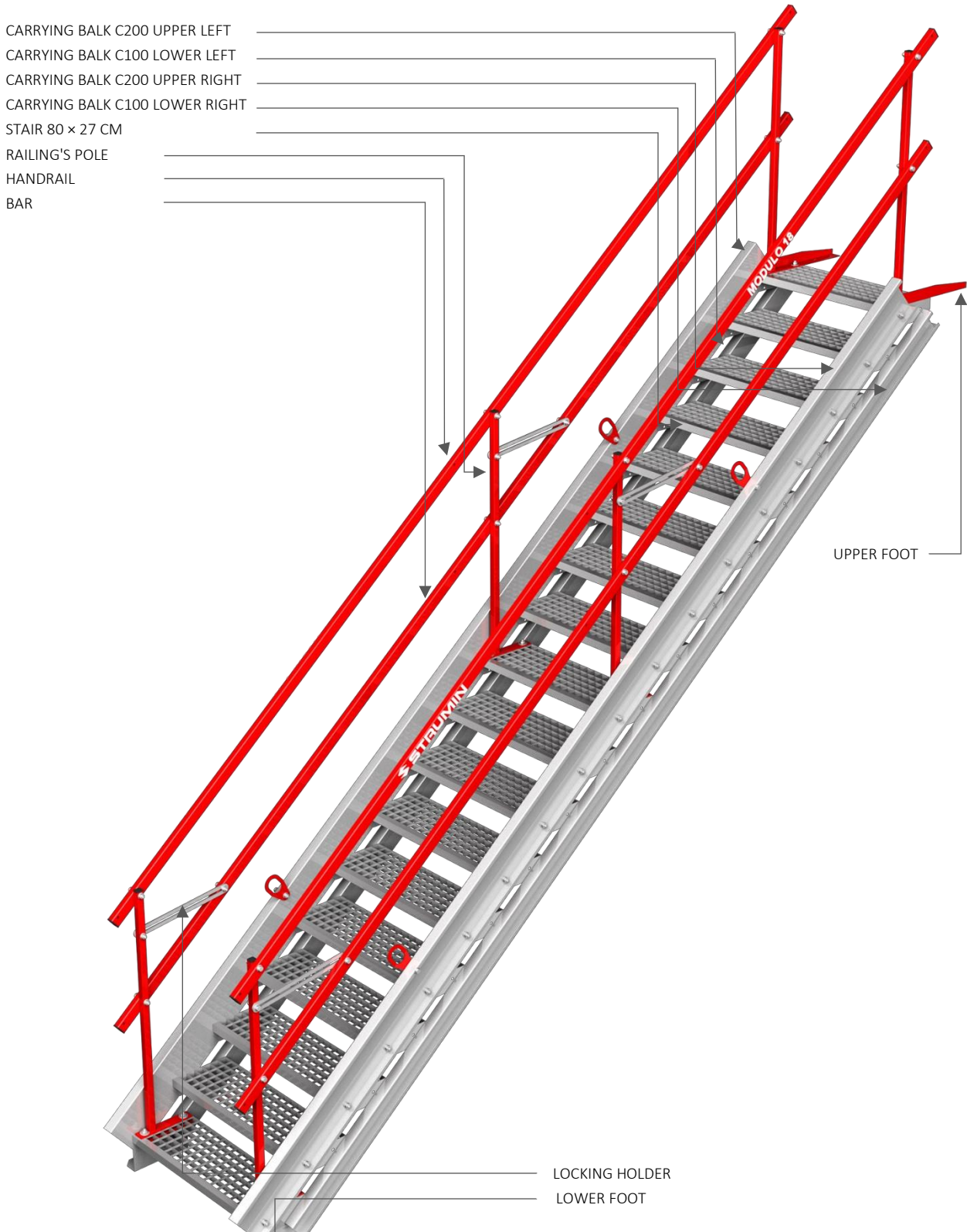
The railing's poles are assembled to the carrying balks and can be adjusted automatically while fitting the stairways to a different angle.



The pole is also used for locking the stairways adjusted to a given angle. The device is equipped with an adjustment pole which makes it easier to spread out the stairways. The simple operation of the device ensures its reliability and quick assembly.

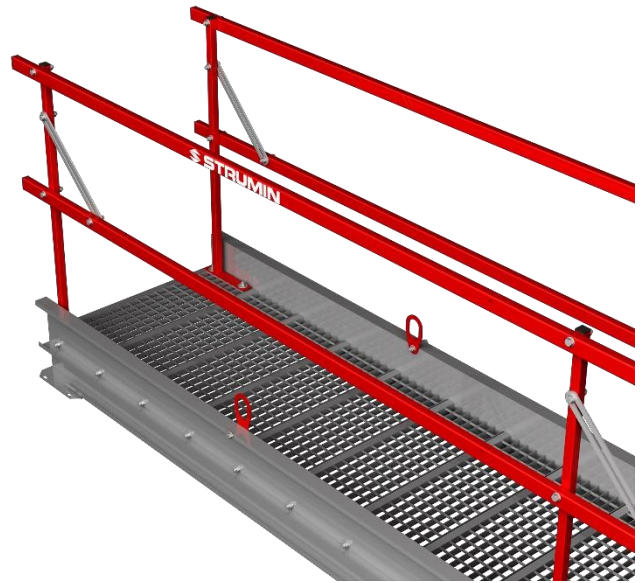
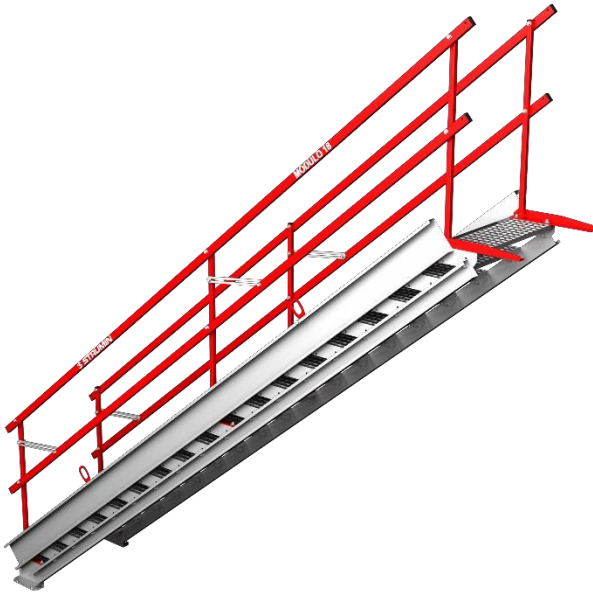
The handrail and the bar of the railing provide security and allow to automatically adjust the position of the device towards the poles.

The carrying balks are equipped with universal assembly feet, which allow to assemble the stairways to different constructional elements.



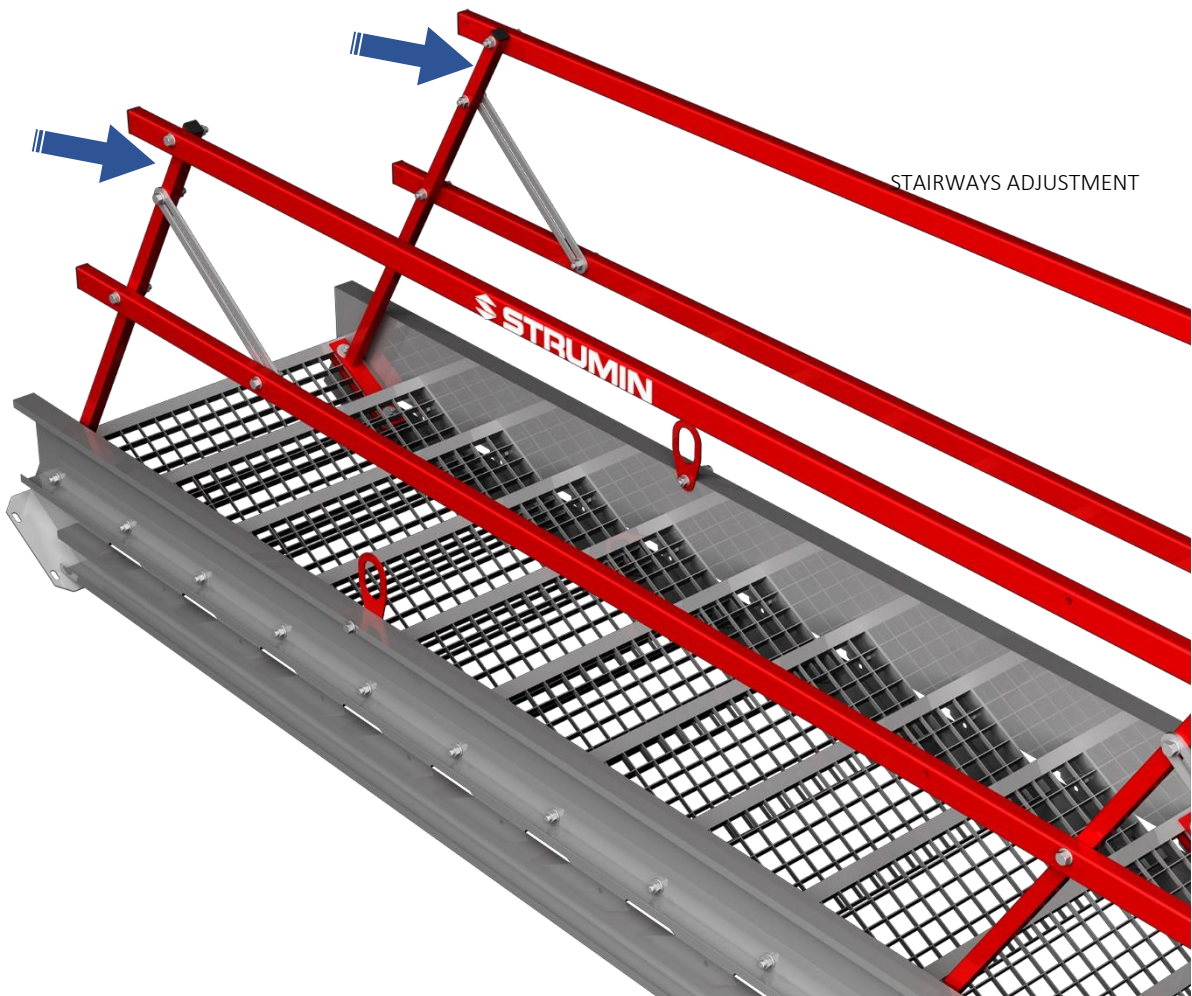
2.3.1 MODULO N SYSTEM'S CONFIGURATIONS

The MODULO stairways are available in two basic configurations: as stairways connecting two different levels (floors) and as a bridge connecting e.g. two side of a trench.



Configuration: STAIRWAYS

Configuration: BRIDGE



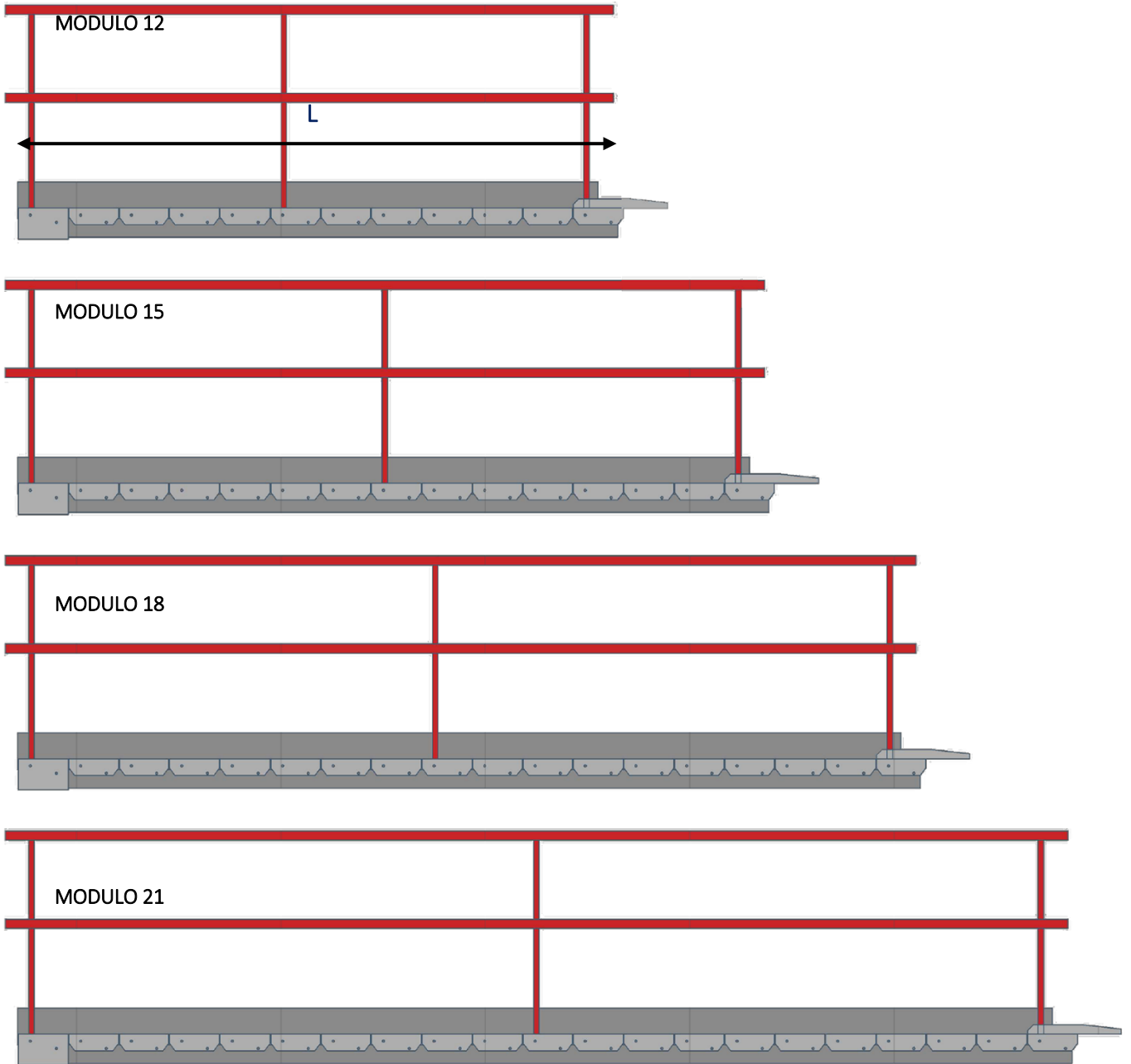
+48 515 515 445
biuro@strumin.pl
www.strumin.pl

Strumin Equipment
Spółka z ograniczoną odpowiedzialnością
Morawica 191, 32-084 Morawica



2.3.3 MODULO N STAIRWAYS SYSTEM-DIMENSIONS

The MODULO N stairways system has four basic modules with the number of stairs increasing by 3. The explanatory figure below shows the dependencies between modules.



name	Cat. No.	L [m]				
MODULO 12	1103	3.3				
MODULO 15	1104	4.1				
MODULO 18	1105	4.9				
MODULO 21	1106	5.8				

--	--	--	--	--	--	--

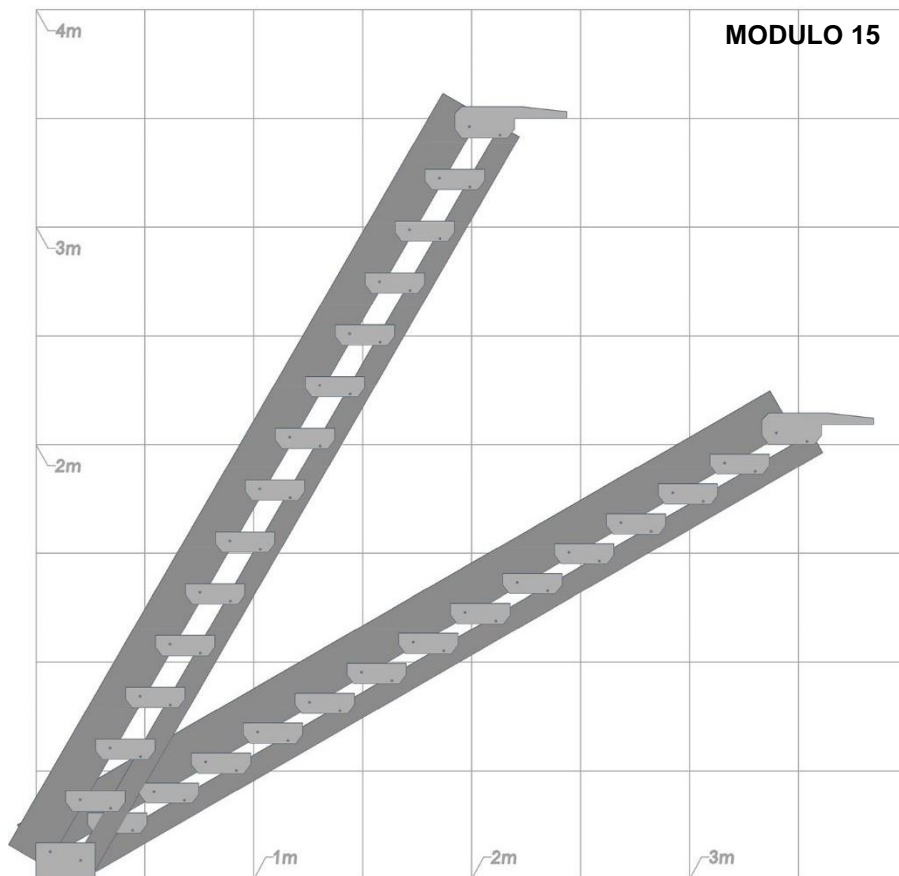
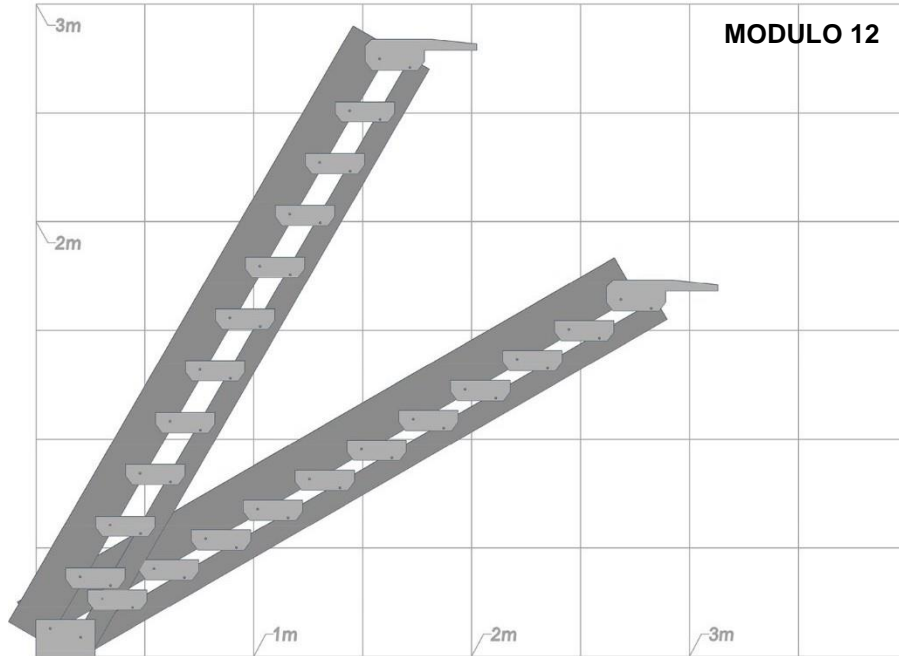
+48 515 515 445
biuro@strumin.pl
www.strumin.pl

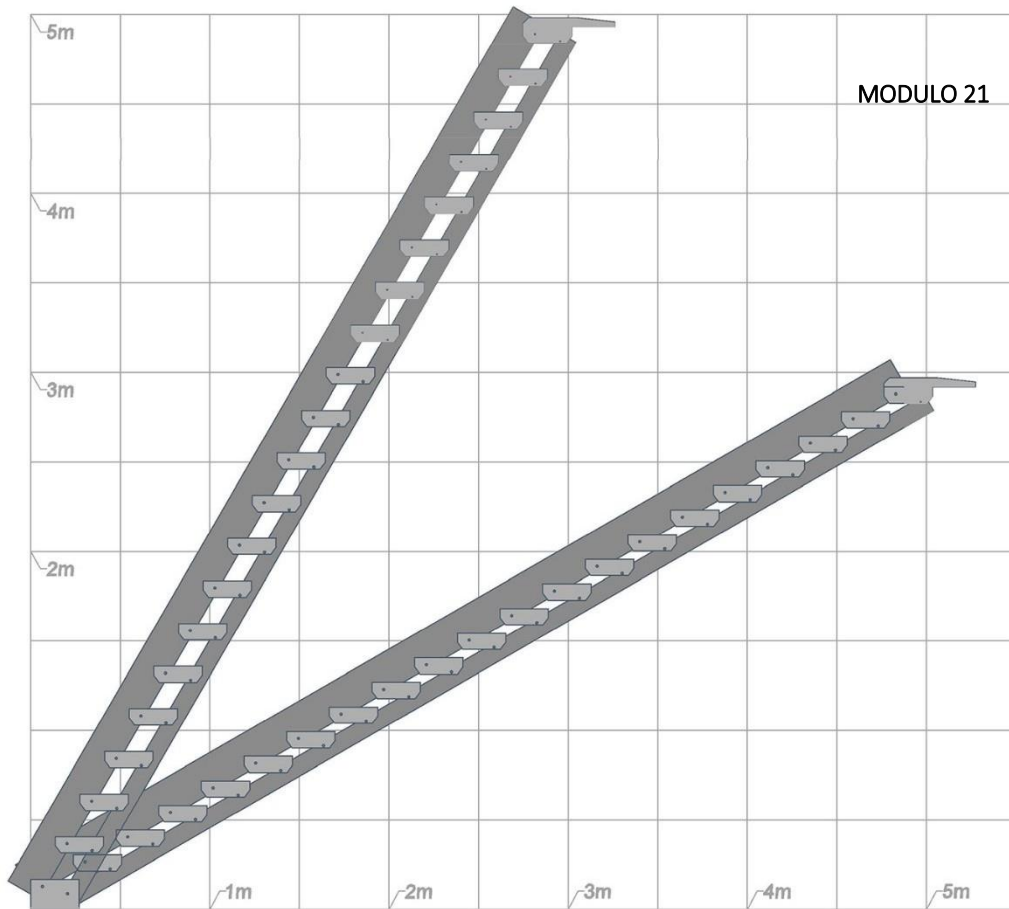
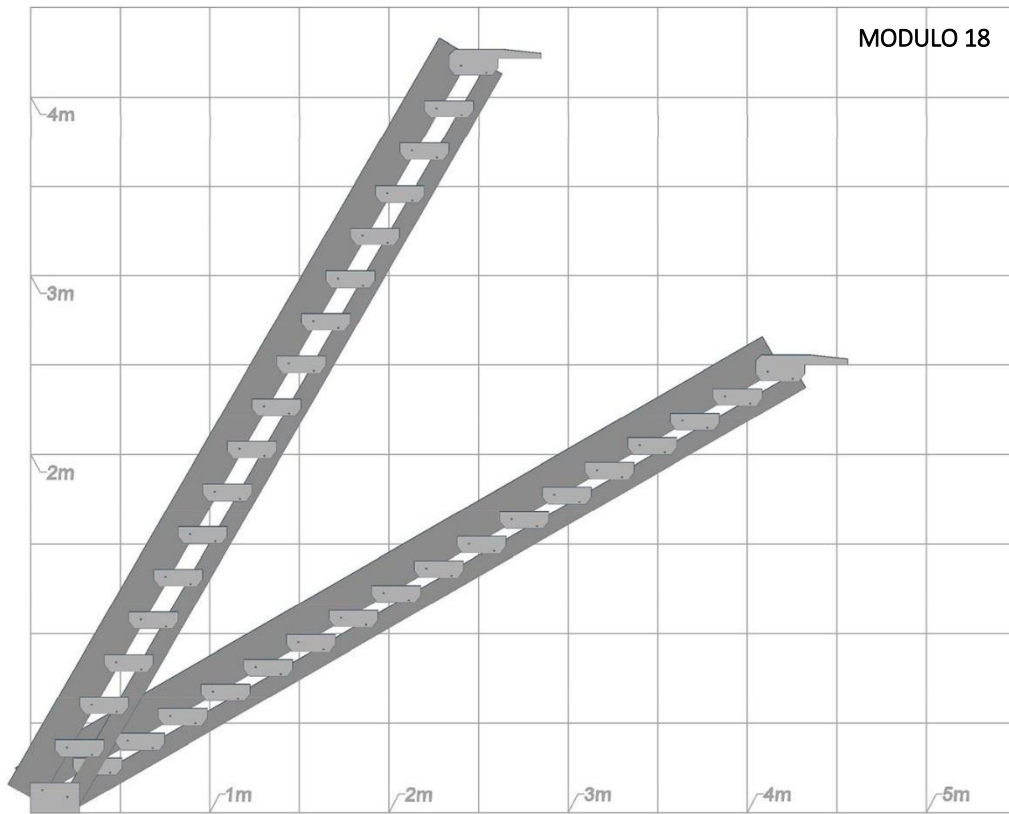
Strumin Equipment
Spółka z ograniczoną odpowiedzialnością
Morawica 191, 32-084 Morawica



2.3.3 MODULO N SYSTEM DIMENSIONS

The stairways allow for smooth regulation of their pitch. The figures below show the dimensions of different modules of the system for two angles: $\alpha=30^\circ$ and $\alpha=60^\circ$.

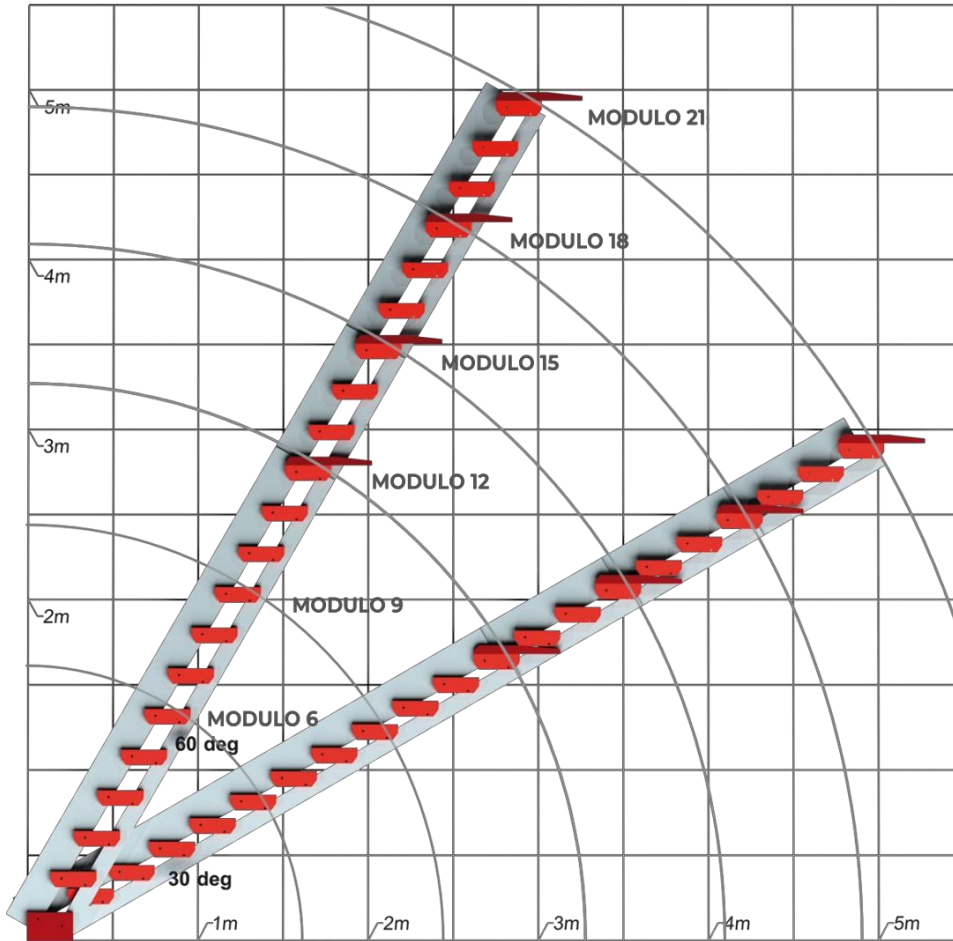






The table below shows the regulation scopes for the height and lengths of the stairways in two angles. The limitations of those angles come from the standard and are aimed at providing safety:

- too small pitch means too low height of a stair. It makes the steps shorter and not adjusted to an average length which is 65 cm and can result in tripping.
- too big pitch means too big height of a stair and lowering its useful depth. It makes the steps shorter (similarly to the previous point). Too big height of the stair may result in blocking a step (tripping) and too low height poses the danger of slipping from the edge of the stair – what is especially dangerous while walking down, when the stairs are not visible and their visibility is hugely limited. It causes discomfort and the risk of a fall, especially dangerous while moving around the place where constructional works are performed, while carrying or transporting tools, materials etc.



name	Cat. No.	L [m] for $\alpha=30^\circ$ i $\alpha=60^\circ$	H [m] for $\alpha=30^\circ$ i $\alpha=60^\circ$	h [cm]	g [cm]
MODULO 12	1103	2.9 / 1.8	1.7 / 2.8	13.7/23.8	23.8/13.7
MODULO 15	1104	3.6 / 2.2	2.1 / 3.5	13.7/23.8	23.8/13.7
MODULO 18	1105	4.3 / 2.6	2.5 / 4.2	13.7/23.8	23.8/13.7
MODULO 21	1106	5 / 3	2.9 / 4.9	13.7/23.8	23.8/13.7

L – length
H – height
h – stair's height
g – stair's depth

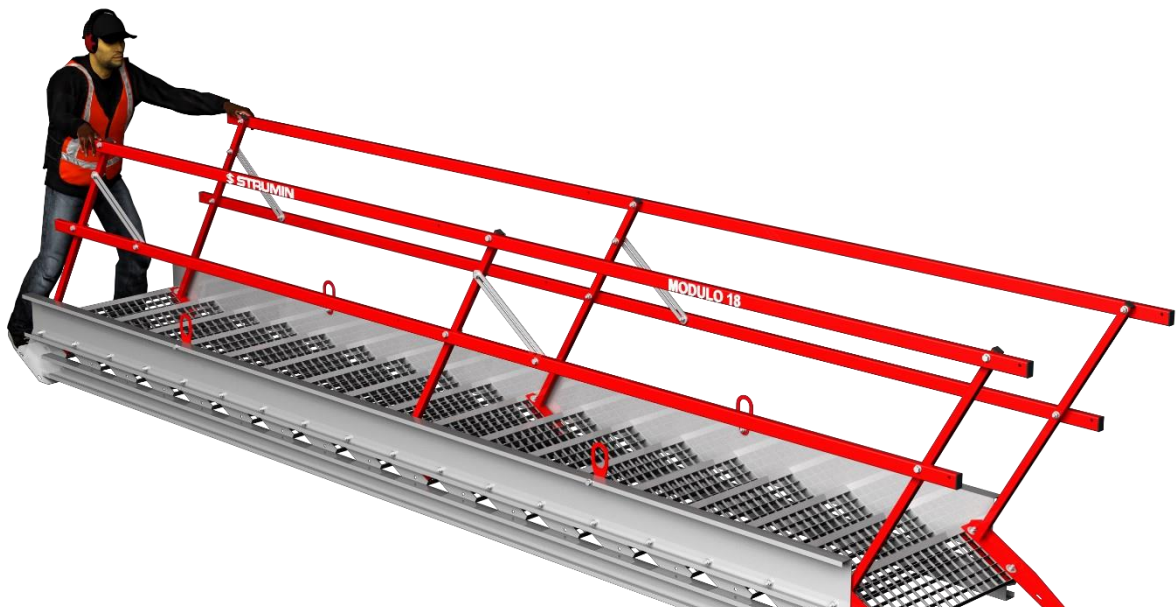
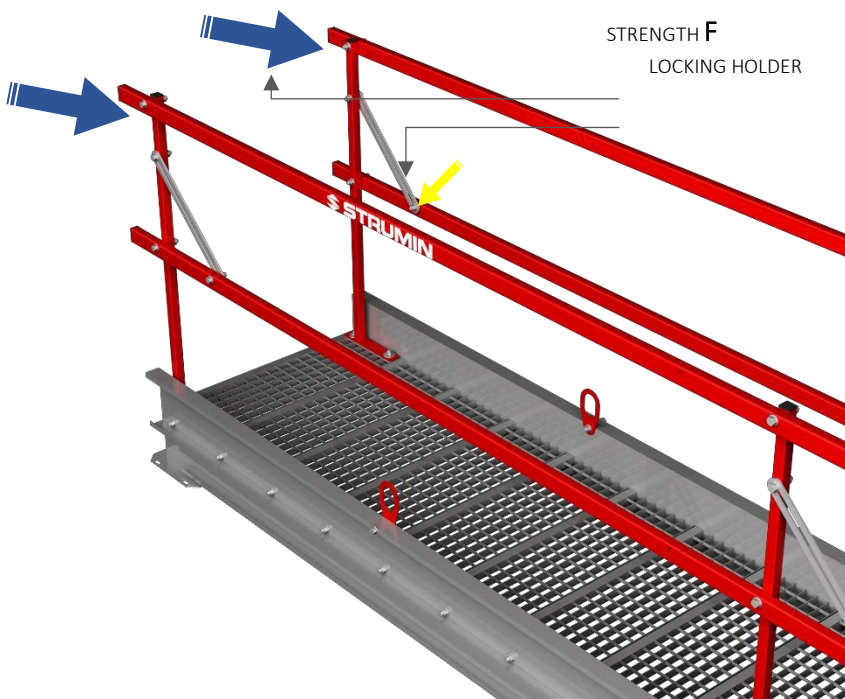


2.3.4 REGULATION OF THE STAIRWAYS' PITCH / HEIGHT

The regulation of the stairways pitch, the adjustment of the working height of the MODULO N system, is simple.

In the newest version of the stairways, the regulation is performed with the use of a railing used as an adjustment lever. Thanks to six poles in the railing, the pressure on the front of the railing (F) is divided on six points, creating a torque in the hinges. Thanks to it the regulation in the newest version of the stairways is much easier and quicker.

The locking of the stairways in a given position is performed with a locking holder, situated on four poles. The demanded height of the stairways can be determined with a simple control measurement. If a given height of the MODULO 12 = 250 cm, it should be divided by 12 (250/12) and the result is the height of the stairways' step. That procedure allows to initially determine the stairways' pitch. It can be later adjusted on the stairs placed on the floor.



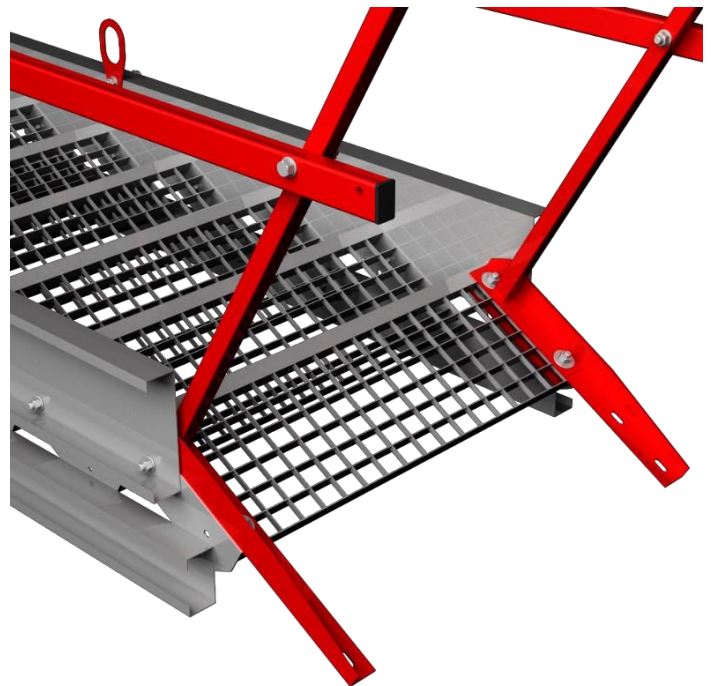
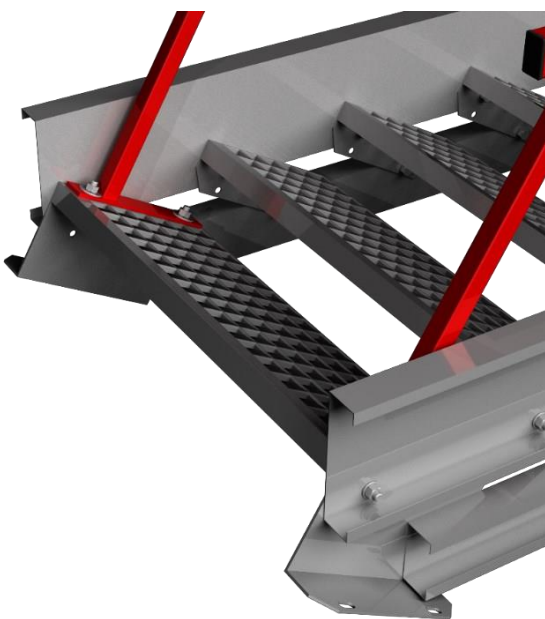
2.3.5 STAIRWAYS' STEPS

In the newest version of the MODULO N stairways were used two self-adjusting feet. The first stair (lower) is also the bottom foot of the stairs, assembled to the surface. The position of the foot (the first stair) with its regulation is always set parallelly to the surface (bottom), what determines the height of the stairways during the assembly. It is very useful while adjusting the stairways to a given construction site conditions. The upper foot is assembled to the upper stair and constitutes the whole unit, together with the upper pole, and, similarly to the bottom foot, is always placed parallelly to the upper level. These conditions were prepared in order to make the assembly procedure as simple as possible.

The assembly of the top and bottom feet to a concrete surface: with self-tapping screws for concrete fi10x100.
The anchoring strength = 10kN.

The assembly of the top and bottom feet to a wooden surface: with screws for wood fi12x100.
The anchoring strength = 10kN.

The assembly of the top and bottom foot the ground surface:
with e.g. reinforcing bars fi 12x500.
The anchoring strength = 1kN.



3.0 USAGE

The **MODULO N** stairways system shall be used only for the purposes described in this manual. Any use not in compliance with this manual entails risk of accidents and poses threat to health and life.

Any use not in compliance with the Technical Documentation voids the guarantee.

The device is used to create temporary communication routes in accordance with the EN 12811-1:2003 standard

In case on an improper use of the system, it poses a risk for the user as well as other people near the user.

Before using the MODULO N system, the worker shall read this manual.

During the use of the MODULO N system, the workers shall meet all the requirements described in the Technical Documentation and in any laws and regulations that apply

Any works connected to the assembly, installation of elements and anchoring to the floor

lie within the responsibility of the site manager.

The whole scope of works connected to the everyday use of the product lies within the responsibility of the site manager. Such actions like a daily and weekly inspection of the system shall be entered into a system's control card.

After an accident that resulted in damaging any elements of the system, it should be immediately withdrawn from further use. The damaged elements shall be replaced with new elements.

IMPORTANT NOTES:

- The device shall not be used as a barrier protecting form being hit by a vehicle and other equipment and devices and was not designed in order to carry fixed loads as well as storing.
- The device was not designed as a barrier protecting from sliding down materials, hardcore, snow etc.
- The MODULO N system cannot be used as a protection in places where crowds of people gather.
- Elements not delivered with the complete device shall not be attached to the system. It may have a negative impact on mechanical parameters and affect the operational safety.
- The place where the MODULO N system is used shall have a rescue plan implemented, in case of an event that led to an accident, e.g. a fall, tripping etc.
- The MODULO N stairways system was designed in accordance with the EN 12811-1:2003 standard
The detailed data concerning the strength and load capacity are defined in the abovementioned standard. Exceeding the allowed parameters leads to uncontrolled and unpredictable deformations and damages to the parts of the system.
- In case of selling the device, the seller shall provide the product's manual in the language of a country where the equipment is to be used.
- For elements not produced by STRUMIN, please adhere to a given element's product manual.



3.1 ACTIONS PERFORMED BEFORE THE USE OF THE MODULO N SYSTEM

- During the transport, workers shall act carefully in order to avoid possible impact to the constructional elements. In case of damaging any elements of the device, it shall be immediately withdrawn from further operation,
- The assembly shall be performed with due care. In case of damaging any element of the device, it shall be immediately withdrawn from further operation or checked by a trained person.
- If the device is transported with a crane, workers shall pay special attention to any movements of a crane and keep safe distance from it.
- In case of using a crane, all works connected to joining the sling to the device shall be performed by a person holding the permissions for a hook operator.
- Check all elements of the system for damages, check the Technical Documentation and the net's certificate.



3.2 QUALIFICATIONS OF THE PEOPLE USING THE MODULO N SYSTEM

Workers operating the system should:

- Read the complete TECHNICAL DOCUMENTATION OF THE MODULO N SYSTEM – the training shall be confirmed in writing,
- Finish a training on the occupational safety and health (work at heights, position training).
- Undergo a training about using the personal and collective protective equipment.
- Hold current medical examinations proper for a given work.

3.3 THE ASSEMBLY OF THE MODULO N SYSTEM

Any works connected to the assembly of the **MODULO N** system shall be performed in accordance with this manual and under a supervision of people that finished the required trainings.

The assembly of the **MODULO N** system shall be performed by minimum 2 people equipped with the right tools and PPE which protects them during the assembly works.

Before commencing the works, the deployment and assembly plan of the **MODULO N** system shall be prepared, individually for each construction site and for each variant of the system. It allows to properly use the safety system.

The assembly of the **MODULO N** system can be performed only by a worker that has read the system's Technical Documentation. The site manager or a different person that obtained the permission from the site manager is responsible for the deployment and the choice of places that are to be protected.

Before the assembly, it shall be checked if the system is complete and has no visible signs of damage.

The assembly shall be performed with caution. In case of damaging any elements of the system, it shall be immediately replaced or checked by a trained person.

Before starting any assembly works, there shall be determined a danger zone within the area where there is a danger of falling objects – 1/10 of the height, but no less than 6 m.

No elements that do not belong to the device can be assembled to the Safety System.

3.4 DISASSEMBLING AND MOVING THE DEVICE BETWEEN WORKPLACES

During the disassembly of the **MODULO N** system workers shall keep all security measures and comply with the same regulations as during the assembly process.



4.0 TIPS FOR A SAFE USE

During the operation workers shall bear in mind the safety of the users, any personnel or people that may be affected by the operation of the device.

During any works with the **MODULO N** system the personnel:

- shall read the system's Technical Documentation,
- shall verify if the modules attached to the floor are stable and the elements have no visible signs of damages,
- shall wear proper personal protective equipment.

4.1 RISK ANALYSIS

No.	Danger	Risk	Risk assessment	Safety measures
1	Not sufficient mechanical durability.	Using of a damaged or destroyed floor foot.	Fall of the construction. Danger to health and life.	Check, control and properly store the elements of the system.
		Using of a damaged or destroyed supporting beam of a stair.	Fall of the construction. Danger to health and life.	Check, control and properly store the elements of the system.
		Damaging or destroying the elements of the railing due to overloading.	Fall of the construction. Danger to health and life.	Check, control and properly store the system's elements. Do not allow the risk of heavy objects falling from heights to arise.
2	Smashing, squeezing, injuring.	Placing a foot, hand or other body part under the holders while twisting or tightening.	Smashing, cutting, injuring or scraping any part of the body. Danger to health and life.	Be careful while assembling and, especially, while placing the modules on the floor. The risk of falling from height, use personal protective equipment. Use gloves, shoes and protective helmets with a chin strap.
3	Hitting	The risk of being hit by the system's elements during transport and moving.	Hitting by the construction or other working surface, especially the balks of the net (length 6 m). Danger to health and life.	Be careful while moving and avoid carrying long elements by only one worker. Use a protective helmet with a chin strap.
		Not-securing the elements of the construction while the assembly.	Hitting with head or any other part of the body of people that are on the bottom level. Danger to health and life.	Be careful while assembling, take notice of any protective measures of elements and avoid uncontrolled movements, i.e. turning, moving, slipping etc.
		Not securing the elements of the system from sliding out.	Risk for people on the lower levels of hitting a head or any other part of the body. Danger to health and life.	Be careful while assembling, take notice of any protective measures of elements and avoid uncontrolled movements, i.e. turning, moving, slipping etc.



4	Falling or thrown away objects	Improper securing of the objects around the workspace.	Hitting, breaking, injuring or burning any part of the body. Danger to health and life.	Wear proper personal protective equipment. Define the safe work's system. Define a safety area during the assembly and disassembly of the system, which amounts to (horizontally) 1/10 height of the building, but no less than 6 m.
5	Weather conditions	Hitting by a lightning, wind.	Electrocuting, burning. Danger to health and life.	Avoid performing any works near the system during storm and strong wind (over 10 m/s).

5. MAINTENANCE

Parts of the system are covered with zinc and/or lacquered layers (depending on the type).

In case of any chips, they should be filled with the proper lacquered layer (zinc paste or top coat).

It is forbidden to use corroded or mechanically damaged elements.

6. TECHNICAL INSPECTION

6.1 QUICK INSPECTION

Before the assembly of the system, its technical condition shall be checked in terms of:

- a) completeness of the system's elements,
- b) completeness of screws, connectors,
- c) no damages to any welds,
- d) any bent, broken, cut or otherwise damaged elements,
- e) check if all assembly holes are unobstructed.

Weekly inspection.

After the assembly of the **MODULO N** stairways system there should be performed a weekly inspection of the connections and technical condition of the system.

Such inspection shall be performed by a competent person (technician, e.g. a master workman or a site manager who has read the technical documentation). Such check shall be documented in the system's control card.

The aim of the weekly inspection is to ensure that no changes have been made to the system's construction that could lead to a construction disaster or pose a threat to people using it.

Daily inspection.

Shall be documented by employees working within the area equipped with the system. Daily inspection includes:

- checking if the construction has no visible damages (e.g. caused by storms, winds etc.),
- parts of the system: balks, stairs, railings were not damaged,
- checking if the anchoring elements are properly assembled,
- checking if there were no factors that have had a direct influence on the user's safety (e.g. if the connections were damaged, there was a deformation of constructional elements due to strong winds, heavy rains, hailstorms or snowfall etc.

It is forbidden to individually repair parts of the system, the elements of the module, balks or other parts of the system. Assembly of a system that was repaired by unauthorized people causes threat to health and life.



If any of these requirements are not met, the user shall stop using the system and inform the manufacturer about the need to perform a detailed inspection.

In case of a dangerous event, e.g. fall from heights, any works shall be stopped and the incident shall be reported to the site manager.

6.2 DETAILED CHECK

The detailed check of the MODULO N stairways system shall be performed by the manufacturer or any appropriate entity:

- always before delivering the system to a construction site,
- after 12 months of using,
- always when the system has not been used for longer than 3 months,
- after every information from the user about the need to perform the detailed check (for the detailed check, performed at the request of the user, shall be charged a fee),
- after a fall that was secured by the system.



III. DESIGNER'S STATEMENT

According to art. 20(4) of the "Building Code" I hereby declare that
this project documentation of the constructional part of the
MODULO N system

was drawn in accordance with the provisions of the code, rules and guidelines of technical knowledge (art. 20 point 4 of the 16 April 2004 Act, amending the 7 July 1994 Act – "Building Code" Journal of Laws no. 6, pos. 41/2004), binding technical and building provisions, as well as Polish and European Standards, and was handed in full to serve its purpose.


mgr inż. Jan Bąba
Uprawnienia budowlane do projektowania
i kierowania robotami budowlanymi
bez ograniczeń w specjalności
konstrukcyjno-budowlanej
czytelny podpis inżyniera projektanta

Projektant

Kraków, October 2020

