

TRILANE

Tripod turnstile

TECHNICAL MANUAL

(Translated from the original French version)

Rev. 12 • Update 10/2021



 **TriLane**[™]



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1. PRESENTATION

You have chosen a **TriLane** equipment fitted with a tripod turnstile designed and manufactured by **Automatic Systems**, for which we thank you. We are convinced that your acquisition will give you complete satisfaction for many years and, to this end, invite you to read the following information carefully before installing your equipment.

While this manual has been prepared with great care, some information may seem erroneous or unclear to you. In that case, please do not hesitate to contact us with your remarks or questions.

PRIOR WARNING

YOUR TRIPOD TURNSTILE IS MADE UP OF VARIOUS MECHANICAL AND ELECTRICAL COMPONENTS. ANY NEGLIGENCE WHILE WORKING ON IT COULD HAVE SERIOUS CONSEQUENCES FOR YOUR SAFETY. DISCONNECT THE GENERAL POWER SUPPLY FROM THE EQUIPMENT AS SOON AS YOU OPEN THE CASING. BE VERY CAREFUL WHEN HANDLING ANY INTERNAL ELEMENTS THAT CAN BE TURNED ON OR ARE IN MOTION.

2. SAFETY WARNINGS

- This manual must be available to all persons required to work on the equipment: installers, maintenance operators, end users, etc.
- This equipment is designed for pedestrian access control and is not to be used for another purpose without risk to the user and to the integrity of the equipment.
- Automatic Systems cannot be held liable for damage resulting from improper use of the equipment.
- In particular, the equipment is not designed for:
 - Persons with reduced mobility.
 - Unaccompanied young children.
 - Managing a continuous flow of more than 20 persons per minute.
- Do not install this equipment in an explosive area.
- Do not add non-original or non-approved accessories (contact between different metals causes a galvanic effect that adversely affects the corrosion resistance of the equipment).
- The contractor shall comply with local regulations when installing the equipment.
- All operations on the equipment must be carried out by qualified personnel. Any work on this product that is unauthorised or carried out by an unqualified technician will automatically void the manufacturer's warranty.
- Access to the mechanism must be reserved for staff who are aware of the electrical and mechanical risks incurred in case of negligent handling. These personnel are required to lock the access panels to the mechanism after the intervention.
- As soon as the upper casing is opened for maintenance, cut off the power via the circuit breaker.

This manual details how the equipment works and provides information concerning fault diagnosis and maintenance operations in order to ensure the device works at maximum efficiency. We recommend you read it carefully before starting up the equipment.



Keep this manual in a safe place, at the disposal of the operating and maintenance personnel.

3. GENERAL SYMBOLS

The following symbols are used in this manual or as labels on the equipment:



This symbol is used to highlight **a tip** that may help you better understand the product.



Reminder or **quick tip** useful for understanding how the product works.



This symbol is used to highlight **an important instruction** for the correct use and/or maintenance of the product.



Important! : This symbol is used to highlight a **risk of injury or material damage**.



This symbol is used to highlight a **risk of electric shock or electrocution**.



This symbol is used to highlight a **risk of cutting yourself**.



This symbol is used to identify the **principal ground connection point**.
(Either in the form of an affixed label or directly engraved on a mechanical part).



This symbol is used to indicate the **tools** required for the relevant operation.



This symbol indicates that the equipment **conforms to European standards and directives**.



This symbol indicates that the equipment must **be disposed of in accordance with the applicable European Directives** (DEEE 2012/19/EU).

4. INTRODUCTION

The tripod turnstiles in the **TriLane** range are designed for deterrent and economical access control, and allow the incorporation of control equipment such as proximity readers, barcode scanners, badge collectors, etc.

The assembly is finished to a level that ensures proper sealing and acoustic insulation from the surrounding environment.

The rotation control mechanism for the arms is the result of many years' experience in the development and manufacture of access control equipment and the marketing of tens of thousands of units in all corners of the world.

The mechanical and electronic assembly is located in the central part of the tripod, under the protective cover, and therefore out of reach for users; the connection and the fixation to the ground do not require any particular construction work.

The mechanism, which has a robust and reliable design, can be integrated into two bodywork models:

- The compact version with single leg, called **TL1** in this manual.
- The version with two legs, allowing easier integration of one or two readers, and called **TL2** in this manual.

The design is nevertheless modular, because the same kinematic assembly is found in the **TL1** and **TL2** models.

Many configurations and options are available to cover all cases that are likely to be encountered in pedestrian access control: status lights, motorised movement, dropping arms, presence detection, full stainless steel finish...

4.1. TERMINOLOGY

AS	Automatic Systems
CMD	Command
DI	Digital input
DO	Digital output
I/O	Input / Output
O/S	Out of service
HMI	Man-Machine Interface
CRA	Card reader direction A
CRB	Card reader direction B
NC	Normally closed (contact)
NO	Normally open (contact)
OP	Opening
MVT	Movement
RGBW	Red – Green – Blue - White
TL1	TriLane version with single leg
TL2	TriLane version with two legs
TOF	TOF sensor (Time of Fly): This sensor calculates the time necessary for a light beam to reflect on the object or user present in the passage to detect a presence.
TOR	All or nothing
Direction A	By convention, direction A is the direction of passage for which the housing is located to the right of the passage.
Direction B	Passage in opposite direction to direction A. Direction B is the direction of passage for which the housing is located to the left of the passage.

4.2. IDENTIFICATION PLATE

The name plate, an example of which is given below, contains technical information regarding the characteristics of the equipment and its date of manufacture.

The serial number of the equipment is useful in the event of a technical support request.



4.3. CONVENTIONS

The figure below illustrates the recommendations concerning the reader location. The optional reader, which is usually placed to the right of the passage in direction A, will generally be incorporated under the cover of the TriLane in the uncontrolled area.

The optional reader in direction B (exit direction) will generally be placed inside the same housing, even when a battery of several TriLane is installed, in order to avoid connections between housings and installing an additional equipment at the end of the battery. However, other layouts are possible on request.

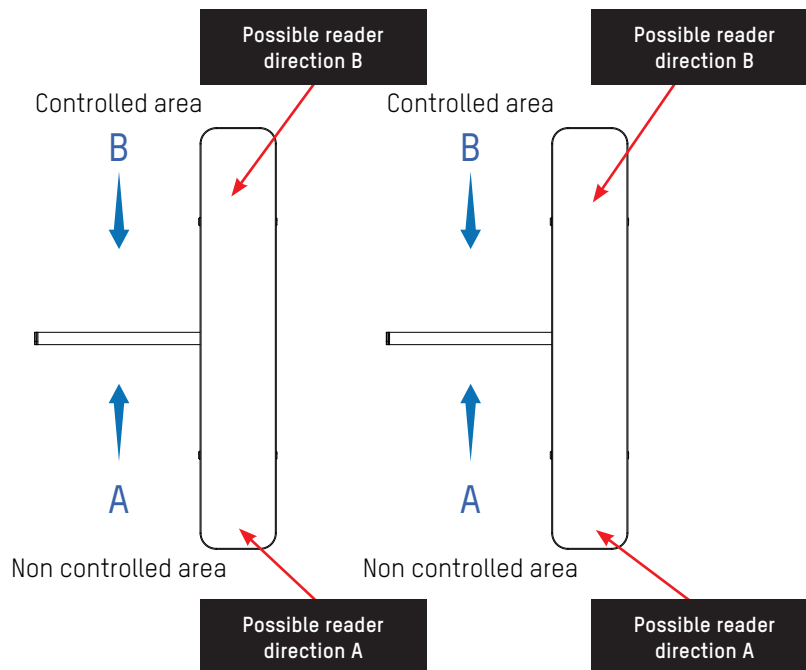


Fig. 1 - Integration of reader for direction A and direction B (recommendation)

The **TriLane** turnstile can be configured in **5 operating modes** in each direction of passage. Some modes have an impact on the assembly of the kinematic assembly, and the desired configuration should therefore be specified when ordering the product.

CODE	DESCRIPTION	COMMENT
1	Access always free.	The locking mechanism is not installed.
2	Access always blocked.	The locking mechanism is present, but without electro-magnet.
3	Access always blocked when power is on, and free when power is off.	The lock and the electro-magnet are present.
4	Access controlled electrically and blocked when power is off.	The lock and the electro-magnet are present.
5	Access controlled electrically and free when power is off.	The lock and the electromagnet are present.

So, for example, a **TriLane A5/B1** will be controlled in the A (entry) direction and always be free in the B (exit) direction. This is the ex-factory configuration if nothing else is specified in the customer's order.

5. GENERAL DESCRIPTION

5.1. EXTERNAL DIMENSIONS

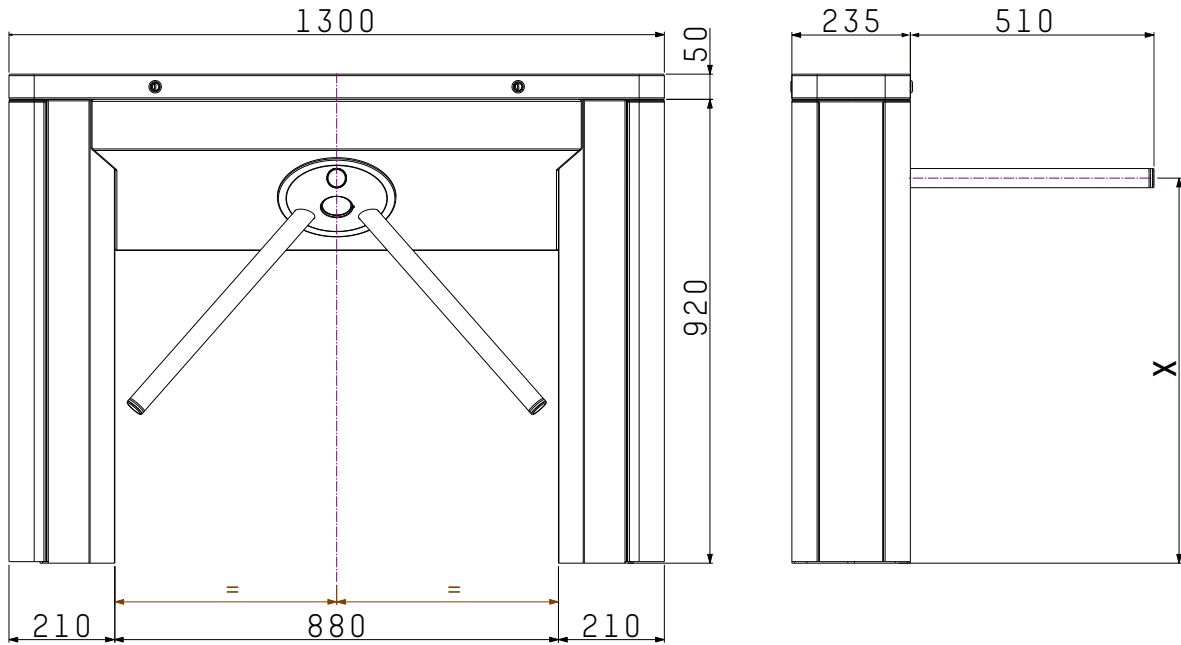


Fig. 2 - External dimensions, 2-leg TL2 version

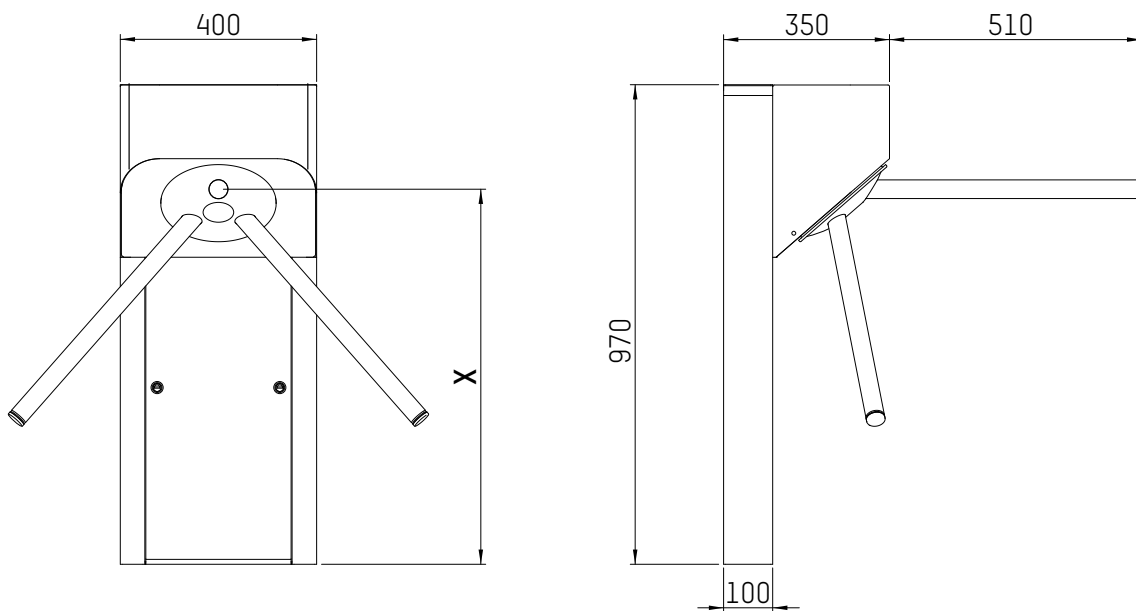


Fig. 3 - External dimensions, 1-leg TL1 version

ARM HEIGHT	X (TL2)	X (TL1)
Dropping arm	750	735
Standard arm	755	740

5.2. OPERATING MODES

5.2.1. WITH POWER ON

The TriLane, which is fitted with an optional detection system (**TL2 only**), has two operating modes when power is on:

MODE	DESCRIPTION
NF (Normally closed)	At rest and in controlled mode, the passage is locked until a user obtains a passage authorisation. The passage is then unlocked to perform a cycle in the authorised direction.
NO (Normally Open)	At rest and in the controlled mode, the passage is unlocked. The lock will be actuated if the system detects a turret rotation without passage authorisation. This mode is only of interest if the electro-magnet has to be powered to lock the turret (which is the case in the NO configuration with power off). There will be energy saving in a rest state.

5.2.2. WITH POWER OFF

When power is off, the unit can be configured as normally open (**NO**) or normally closed (**NC**). This setting depends on the physical orientation of the solenoid coil, as they have an internal return spring. The control of the electro-magnets will therefore be different in each case, and a configuration parameter is provided in the memory of the AS1635 logic.

5.3. AUDIBLE SIGNAL

The buzzer, which is present on the AS1635 logic board, can be activated in 2 cases:

CASE	BUZZER SIGNAL (FACTORY SETTING)
Intrusion	Continuous sound
Fraud	Rapid intermittent (with detection option)

The operation of the buzzer can be changed by a parameter change on the AS1635 control circuit board. For details, refer to the technical manual of the AS1635, in the section on configuration parameters.

5.4. VISUAL SYMBOLS (STATUS LIGHTS)

In order to correctly orient users in obtaining a right of passage, status lights are to be provided in each direction of passage (optional).

In this case, the upper part of the cover has two cut-outs that allow the placement of opal-coloured Plexiglass. These diffuse the light emitted by a set of LEDs of different colours (WBGR for White/Blue/Green/Red).



Fig. 4 - Status light option TL2



Fig. 5 - Status light option TL1

The following are the colour conventions in the factory configuration according to the status of the TriLane:

CASE	COLOUR	FLASHING
Power on	Red	No
Initialisation	White	No
Evacuation	Green	Yes
Maintenance	Orange	No
Not used (free)	Green	No
Forbidden	Red	No
Controlled pending validation	Blue	No
Controlled with authorised passage	Green	No
Controlled without right of passage request	Red	No

5.5. SPACE PROVIDED FOR READER INTEGRATION

The upper inner part of each leg is available for integration of a reader. A plastic support, fixed on two studs, is available as an option. Between 175 mm and 210 mm are available in the length direction. If this volume is insufficient, a cut-out in the closing plate between the leg and the central part is also possible (study available on request).

The other dimensions are shown in the figure below.

Where necessary (to save significant space in the height direction), the reinforcing bar welded to the end of the leg can be cut.

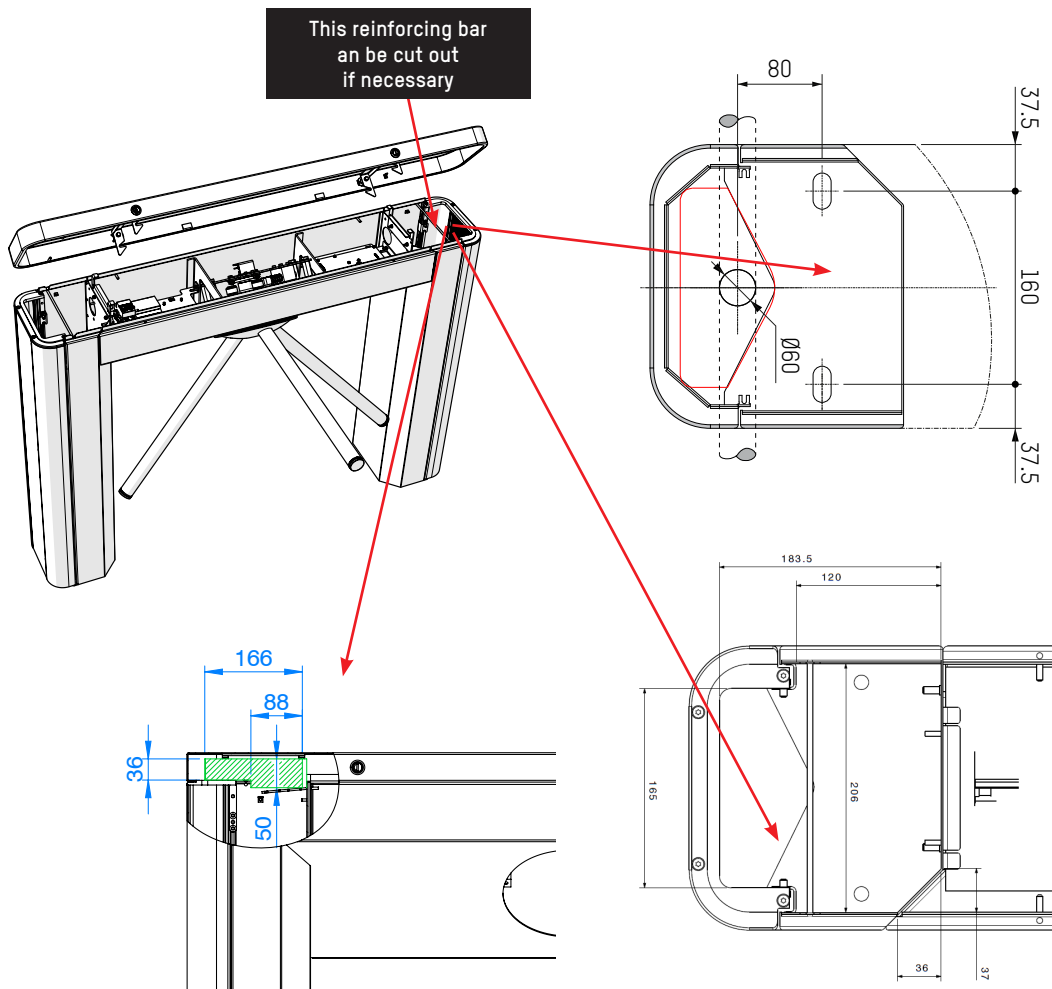


Fig. 6 - Space available under the TL2 hood for reader integration

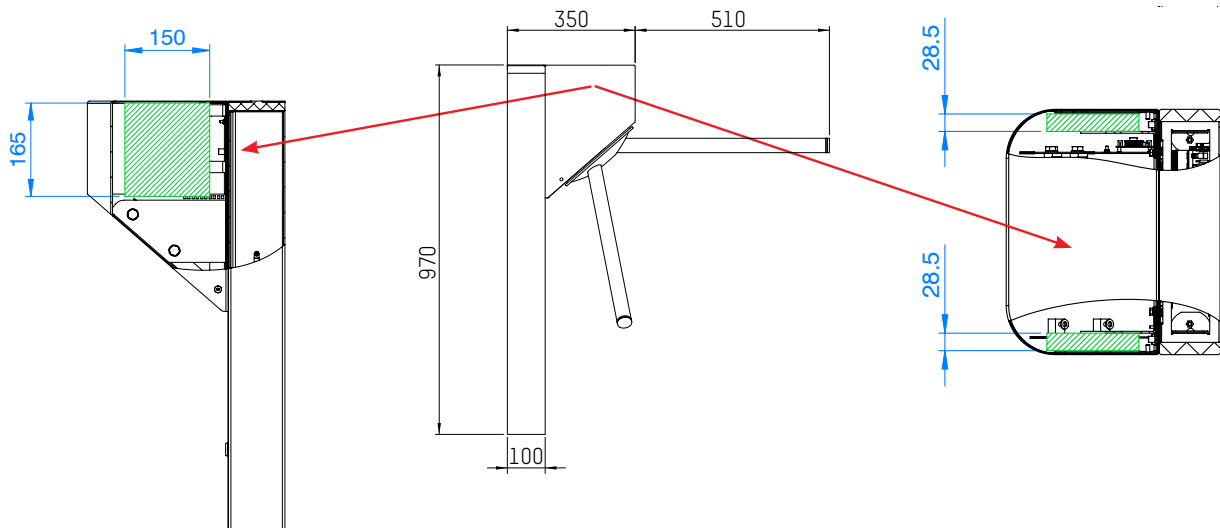


Fig. 7 - Space available under the TL1 hood for reader integration

6. INSTALLATION INSTRUCTIONS

6.1. PACKAGING

In most cases, your turnstile will be delivered in a cardboard box attached to a wooden pallet.

A plastic bag containing the keys and attachments for the last arm is attached to one of the turnstile arms.

In the **TL2** version, the last arm is located inside the turnstile, under the cover. In the **TL1** version this arm is placed in front of the front panel.

6.2. UNPACKING

When the equipment arrives on-site, please check that it is complete and in good condition.

If for some reason damage has occurred during transport, please check that the problem is described in the transport document and, where necessary, report the incident to Automatic Systems for corrective actions.

6.3. SWITCHING ON AND OFF THE EQUIPMENT

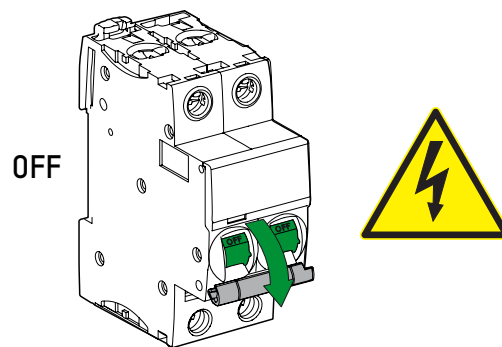


Fig. 8 - Main switch



IF YOU OPEN THE HOUSING, TURN OFF THE POWER SUPPLY BY SWITCHING OFF THE MAIN SWITCH (SEE FIG. 8) ON THE LEFT-HAND CIRCUIT BOARD WHICH IS ACCESSIBLE VIA THE COVER ON THE TL2 AND VIA THE FRONT PANEL ON THE TL1.

6.4. ELECTRICAL DIAGRAMS

See the **Electrical Technical File** supplied with the device.

6.5. GENERAL DIMENSIONS AND INSTALLATION PLAN

With the TL2 housing, the power and data cables can be insert inside the housing through the right or left end box. But we recommend a connection through the left (B) side considering that the main circuit breaker is located to the left.

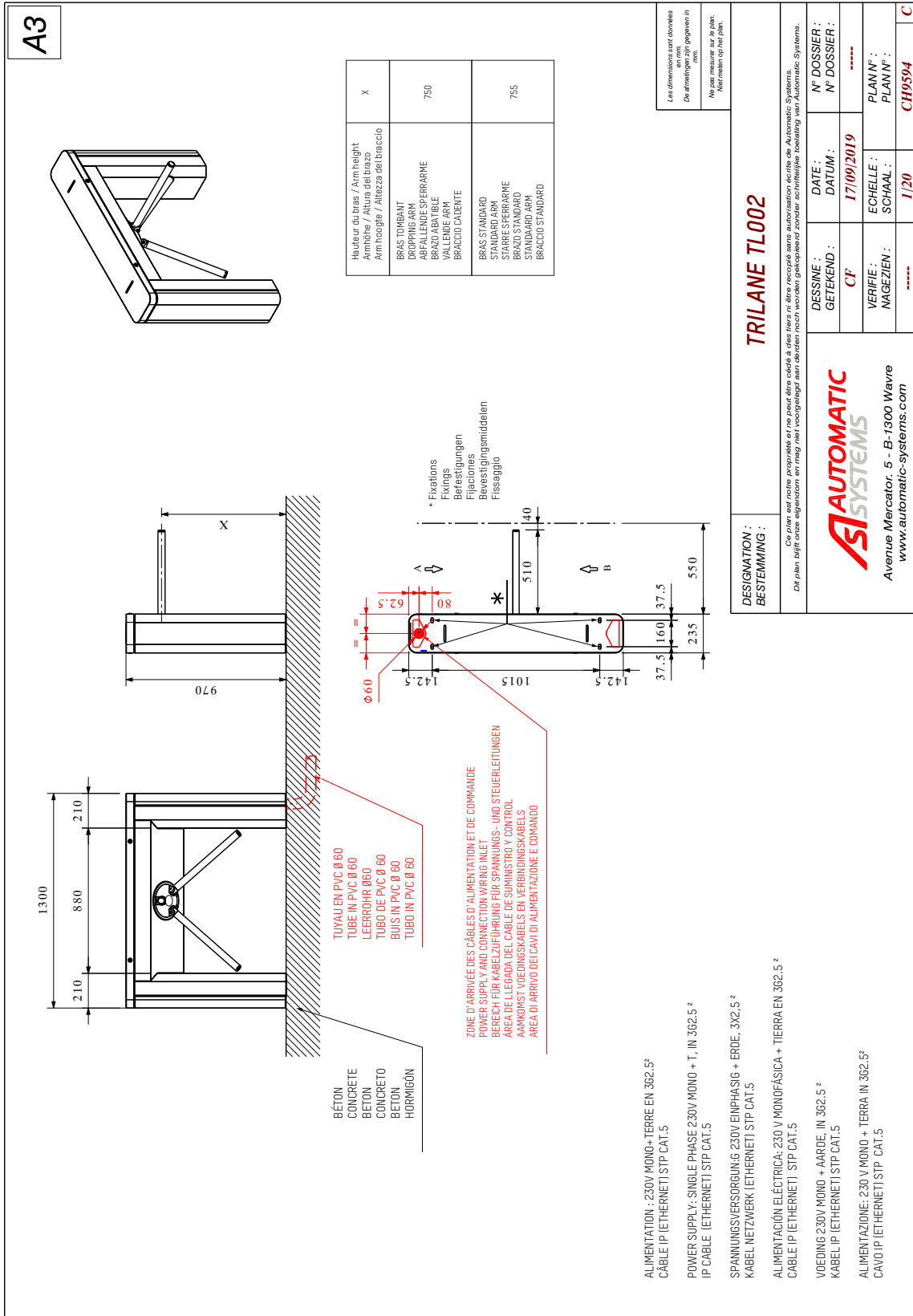


Fig. 9 - TL2 general dimensions and installation drawing

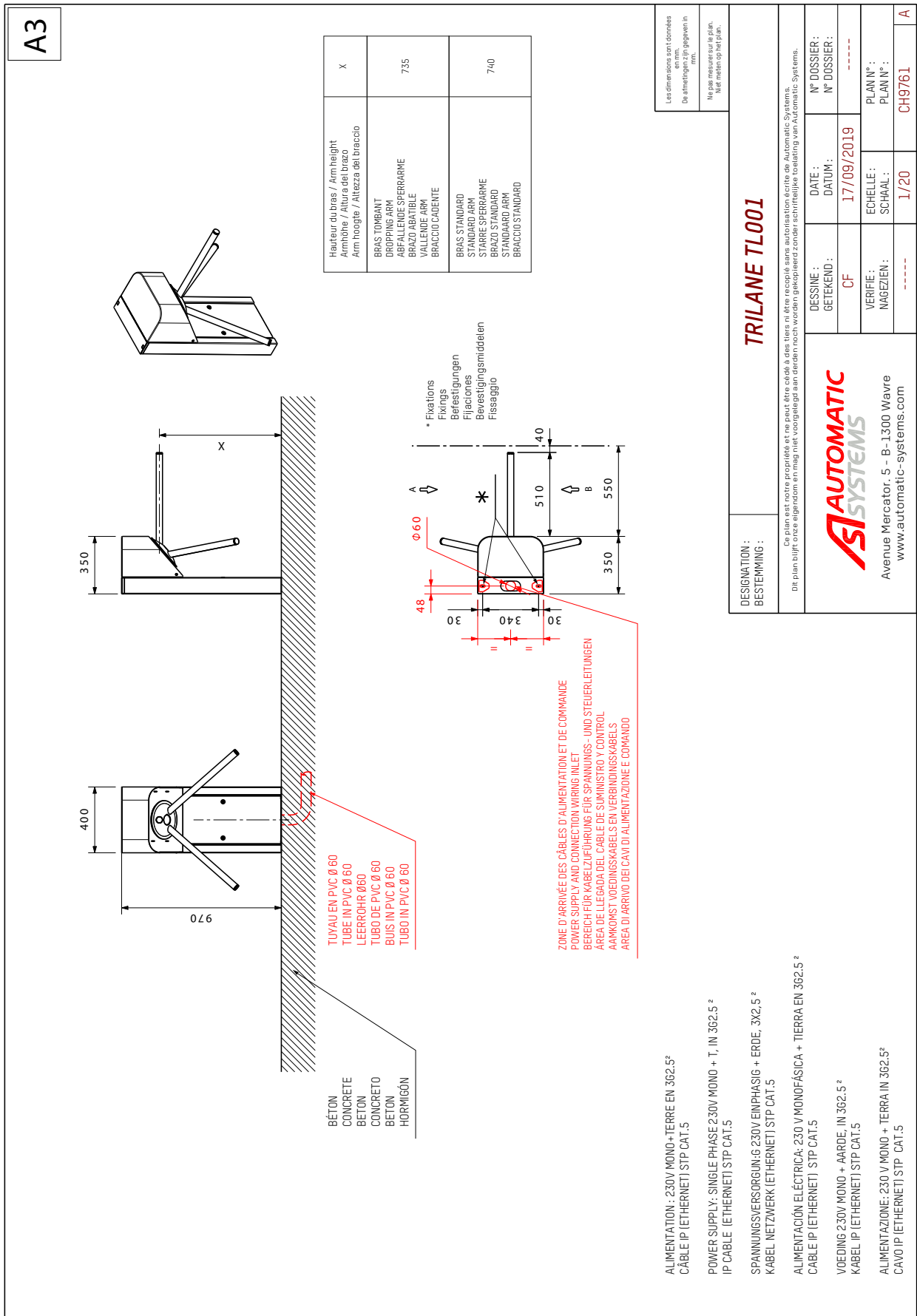


Fig. 10 - TL1 general dimensions and installation drawing

6.6. RECOMMENDED TOOLS



- Standard electrical tools.
- Flat spanner set.
- Set of Allen keys.
- Spirit level.
- Hammer drill + concrete drill bit - Ø 15 x 100
- Standard protective equipment: gloves, goggles, hard hat and safety shoes.

6.7. PRELIMINARY WORK

- The turnstile has been specially packaged for transport. Bring the material to the installation site with the help of a forklift truck and remove the packing material.
- Unlock the cover and open it (TL2) or the front panel (TL1). The keys are supplied as accessories in a separate bag.
- Lift and remove the 2 feet (TL2) and the top cover (TL1).

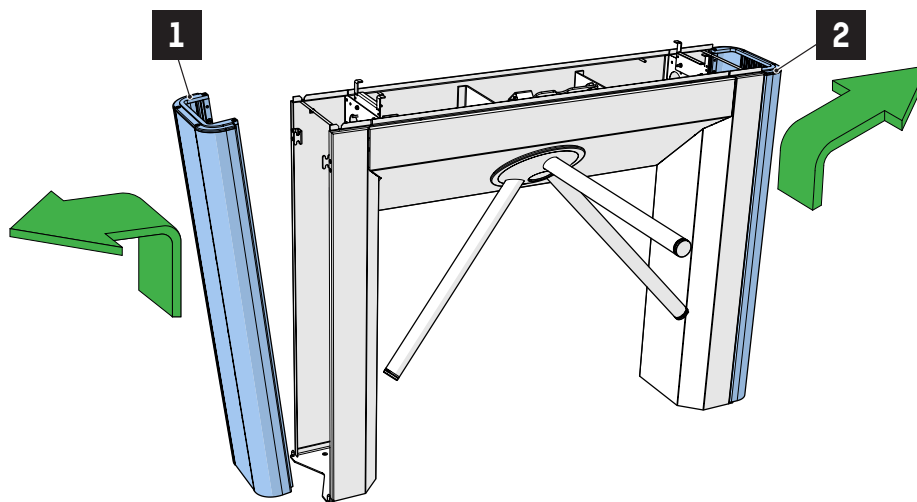


Fig. 11 - Removing the feet (TL2)

- Check the condition of the material - although it has been carefully packed, damage may have occurred during transport.

6.7.1. SITE PREPARATION WORK

This is basically the following:

- Study the set-up and positioning of the equipment according to the general layout of the site.
- Prepare the holes in the floor according to the specifications of the installation drawing.
- Be sure to drill the holes with a diameter suitable for the expandable dowels that you are going to use (recommended type: model B15/30, ref. -/3413/000).

TL1	2x expandable dowels (provided) (⇒ Fig. 10, page 17)
TL2	4x expandable dowels (provided) (⇒ Fig. 9, page 16)

- Check the correct location of the cable passage according to the installation drawing. .
- Prepare the passage for the electrical control cables of the Central Controller Station (not supplied) and the mains supply cables (230V single-phase + earth, i.e. 3G x 2.5). Provide 1.5 metres extra.

If you add any elements to the feet of the turnstile that could ignite (see EN60950 standard), ensure that the installation surface is non-flammable.

6.7.2. INSTALLING THE TURNSTILE

- Position the turnstile precisely.
- Ensure that the turnstile remains attached to the ground by tightening the expandable dowels. Ensure that the cables can pass through.
- Make sure that all the housings of the battery are perfectly aligned and horizontal. If needed, add shims between the housings and the floor to ensure that they are perfectly level.

6.7.3. INSTALLING THE STAINLESS STEEL ARM

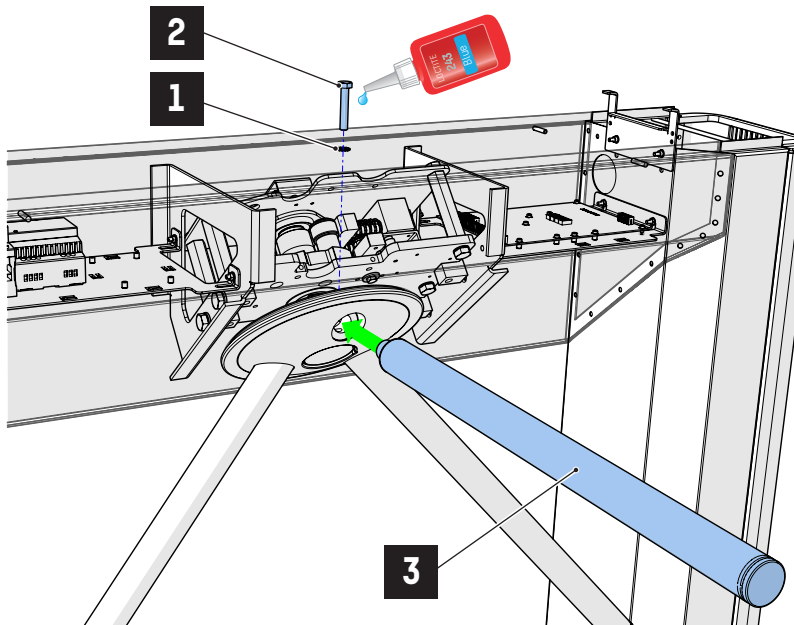


Fig. 12 - Installing the stainless steel arm

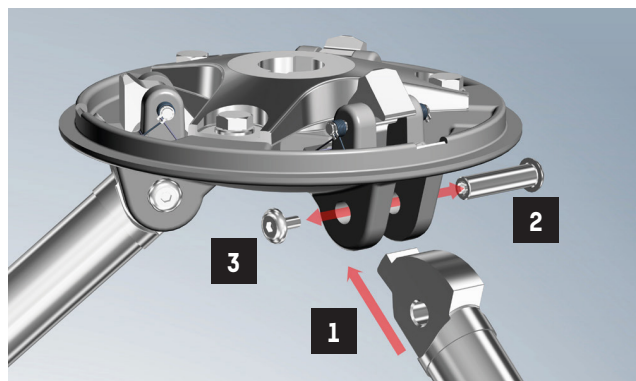
- Put the arm (3) in place and push it into the housing until it stops.
- Align the threaded hole in the arm with the hole in the turret.
- Install the fan washer (1).
- Apply one drop of Loctite® 243 (blue) to the screw thread (2), and tighten.

6.7.4. INSTALLING THE DROPPING ARM



The installation of the 2 arms is only done on the TL1.

- Put the arm in place and align the hole in the arm with the hole in the turret (1).
- Next, insert nut (2).



- Apply one drop of Loctite® 243 to the screw thread (3), and tighten.

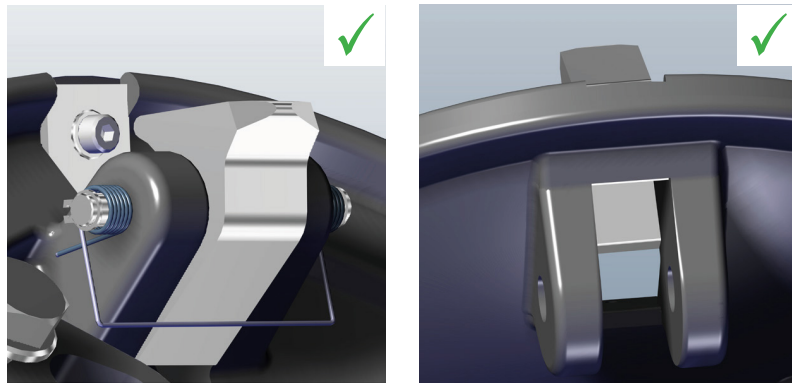


Fig. 13 - Correct positioning of the pawl before inserting the arm

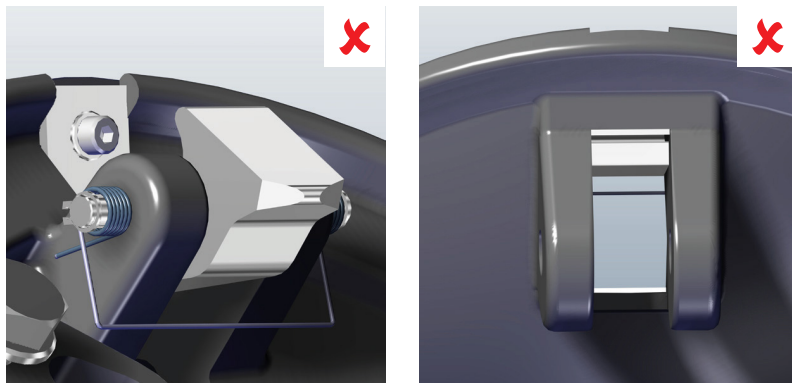
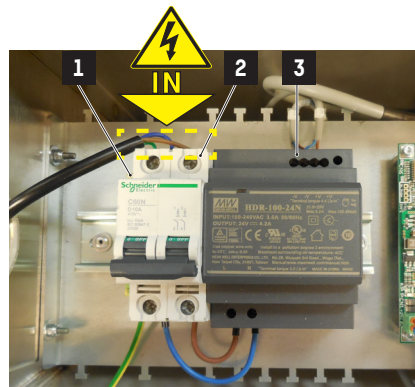


Fig. 14 - Incorrect positioning of the pawl before inserting the arm



MAKE SURE THAT THE PAWL IS CORRECTLY POSITIONED SO THAT WHEN THE ARM IS INSERTED, IT DOES NOT BREAK THE SPRING BY PRESSURE.

6.7.5. ELECTRICAL CONNECTIONS AND INITIAL POWER-UP



- The electrical connections must be carried out in accordance with the diagram provided with the equipment.
- Make sure that the power supply cables are not live. All the internal connections have already been made in the factory.
- Cut off the excess cable length if necessary; connect the 230V single-phase power supply wires to the main switch terminals (2) and the ground wire to the adjacent terminal (1).
- Check that the equipment is properly grounded (casing, etc.)
- Make any other connections according to the specifications of the installation (control cables, etc.)
- Check that there are no cables that could break or be damaged by the movement of the mechanism, and that they all are properly held in the trunking or wire clamps provided for this purpose.
- Turn on the equipment by switching the main switch (2) [to the ON position].

7. MECHANISM

7.1. OPERATING PRINCIPLE

The mechanical assembly, mounted on a mini chassis, allows the turret to perform rotational movements of 120°, which corresponds to the passage of a user. During the movement, the stainless steel arm that is located horizontally releases the passage by moving down.

This rotation can be carried out in the clockwise or anti-clockwise direction in order to control the flow of users in the entry direction (direction A) and/or the exit direction (direction B).

The actuation of 2 mechanical locks, controlled by electromagnets, releases or blocks the passage in each direction.

An angular sensor detects the rotational movements of the turret in order to grant only one right of passage at a time, by locking the mechanism again after a rotation of 120°.

In the event of a power failure, the electromagnets release the pressure on the locks, to release passage in both directions. Optionally, the customer can reverse the operating logic by locking the passage in case of absence of supply voltage.

In the **dropping arm** option, each arm has a rotational axis at its attachment point to the turret. An electromagnetic suction cup holds the arm in a horizontal position, and releases the arm in the event of a power failure, which completely releases the passage in both directions (for an emergency evacuation).

An optional **motorisation module** performs a dual function:

- Rearming the TriLane dropping arm version after power failure by carrying out a complete rotation of the turret following the initialisation process at power-up.
- Accompanying the user in transit; the motor engages automatically as soon as the angular sensor detects the start of a rotation that follows the pressure of the user on the horizontal arm.

7.2. DESCRIPTION OF THE STANDARD MECHANISM

7.2.1. REMOVING THE COVER

Access to the mechanism in **TL2** version is obtained by removing the cover of the turnstile with two identical keys.

To do this, proceed as follows:

1. Unlock the locks (**A**) and open the cover (**B**)



The keys are supplied as accessories in a separate bag.

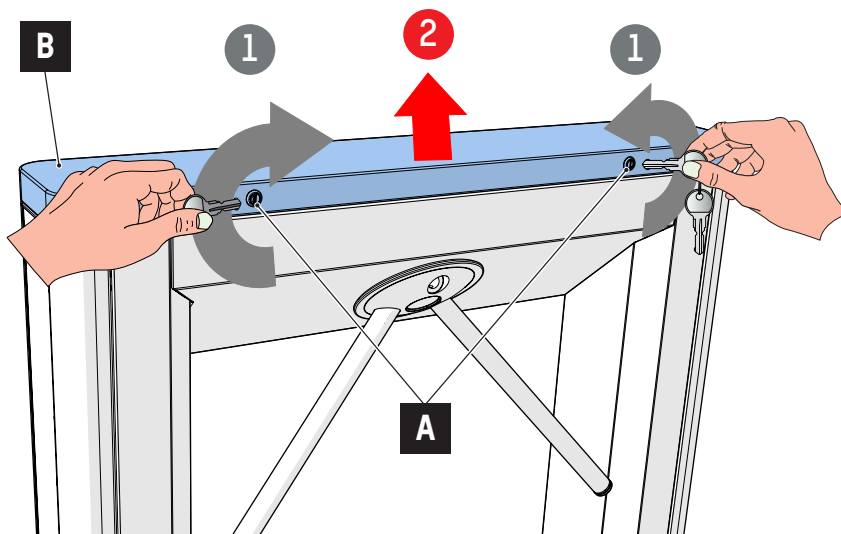


Fig. 15 - Removing the cover.

2. Remove the cover.

NB: The mechanical system is located in the central part of the bodywork.

In the **TL1** version, the cover delivers an easy access to the mechanism and the status lights (option). Two M6 fixing screws allow to remove the cover (see picture below).

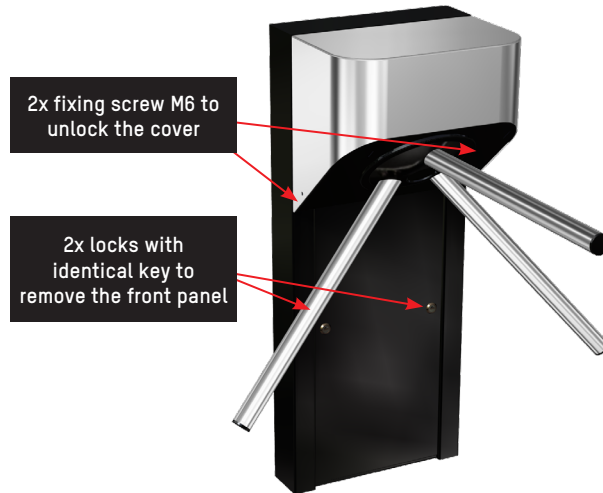


Fig. 16 - Access to the mechanism and electronic board (TL1)

7.2.2. OVERVIEW OF THE KINEMATICS

This is an overview of the mechanism, without options:

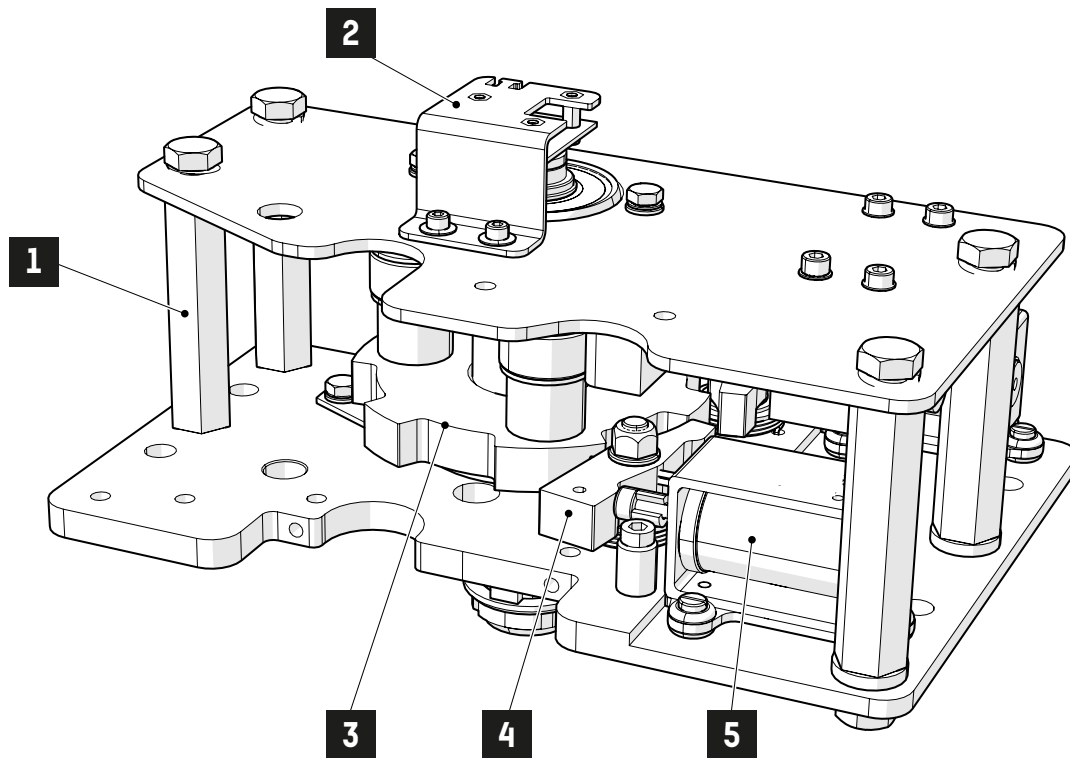


Fig. 17 - View of the kinematic assembly

REF.	DESCRIPTION
1	Kinematic chassis
2	Angular sensor assembly
3	Motor tree assembly
4	Lock
5	Electromagnet

7.2.3. LOCKING AND UNLOCKING PRINCIPLE

The main axis is integrated with the tray with cut-outs containing the 3 rollers. (⇒ Fig. 18, page 23)

If the TriLane is in the controlled mode in both directions, both locks are actuated and make it impossible to rotate in either direction.

Following a passage authorisation, one of the locks pivots on its axis, and rotation can be carried out in one direction. Halfway through, the electromagnet retracts and the lock, which is fitted with a return spring, will return to its locking position after a 120° rotation of the turret.

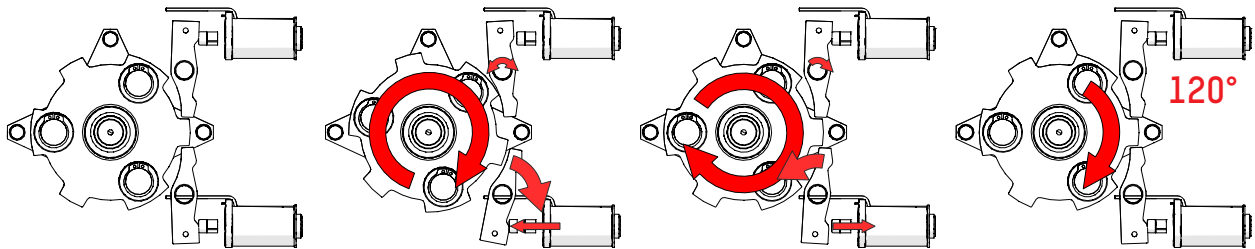


Fig. 18 - View of the locking/unlocking assembly

In order to reduce the noise level, each electro-magnet axis is equipped with a nylon spacer (see the figure below). However, this spacer reduces the impact force during the unlocking operation, which can be a problem if the user exerts significant pressure on the arm at this precise moment.

If this scenario occurs frequently, it is advisable to remove (unclip) these two spacers to increase the impact force on the locks.

To gain access to the electro-magnet located at the back, remove the top plate of the mechanism, which is attached with 4 M10 hex-head bolts and 2 M6 upper bearing bolts.

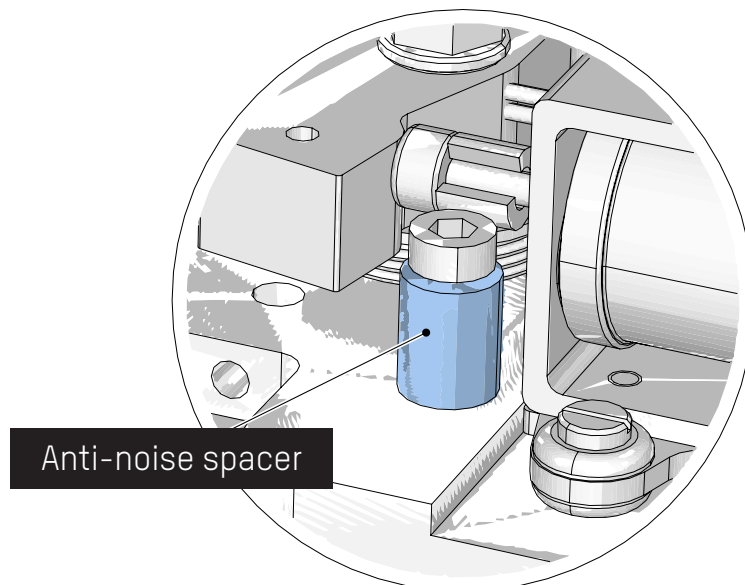


Fig. 19 - Anti-noise spacer on the axis of the electro-magnets

7.2.4. CENTRING MECHANISM

The figure below illustrates the function of the centring mechanism: The plate is provided with three rollers, which support the stop of the centring mechanism. The two springs located at the rear distribute the pressure on the two rollers, which ensures perfect centring corresponding to the rest position (one of the three arms is perfectly horizontal in order to block the passage).

This centring mechanism is not present on a motorised TriLane.

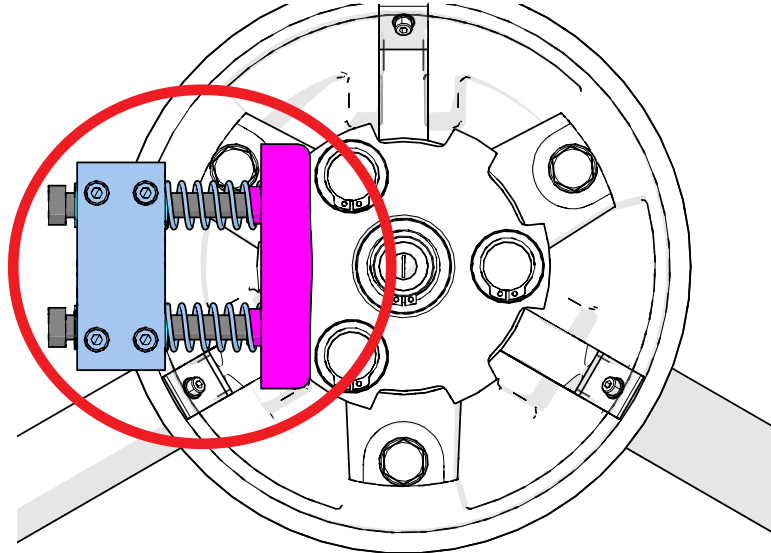


Fig. 20 - View of the centring mechanism

7.2.5. SHOCK ABSORBER

The cam fixed at the end of the shock absorber makes pressure on one of the rollers, which slows down the movement at the end of the cycle and dampens the shock against the lock at the point of impact.

The rotation cycle is quieter and the kinematic parts undergo less mechanical stress.

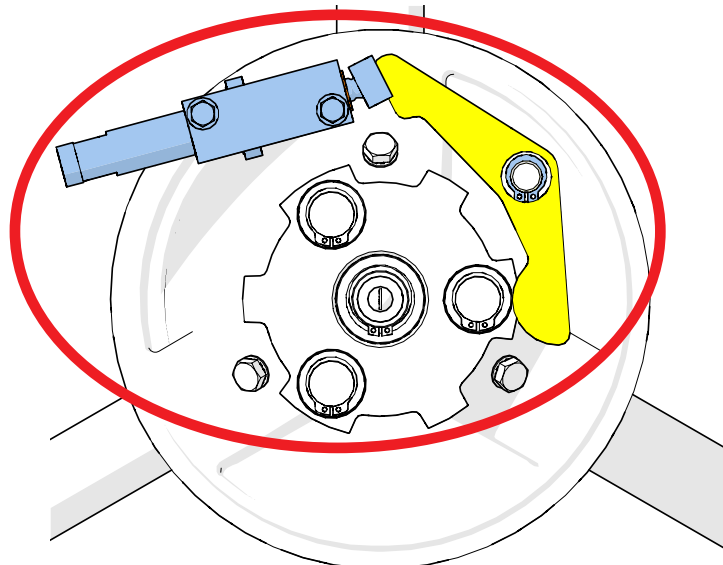


Fig. 21 - Shock absorber option

7.2.6. FIXED ARM TURRET ASSEMBLY

The fixed arm turret (1) is held in place on the main axle by a spacer, two wedges (5) and a locking nut (3).

The stainless steel fixed arms (4) are fitted with a steel sleeve at one end and a black plug (7) at the other end.

Three screws M8 x 45 (8) secure the arms; the sleeves have a threaded hole and the aluminium turret has a hole passing through it for inserting the screw.

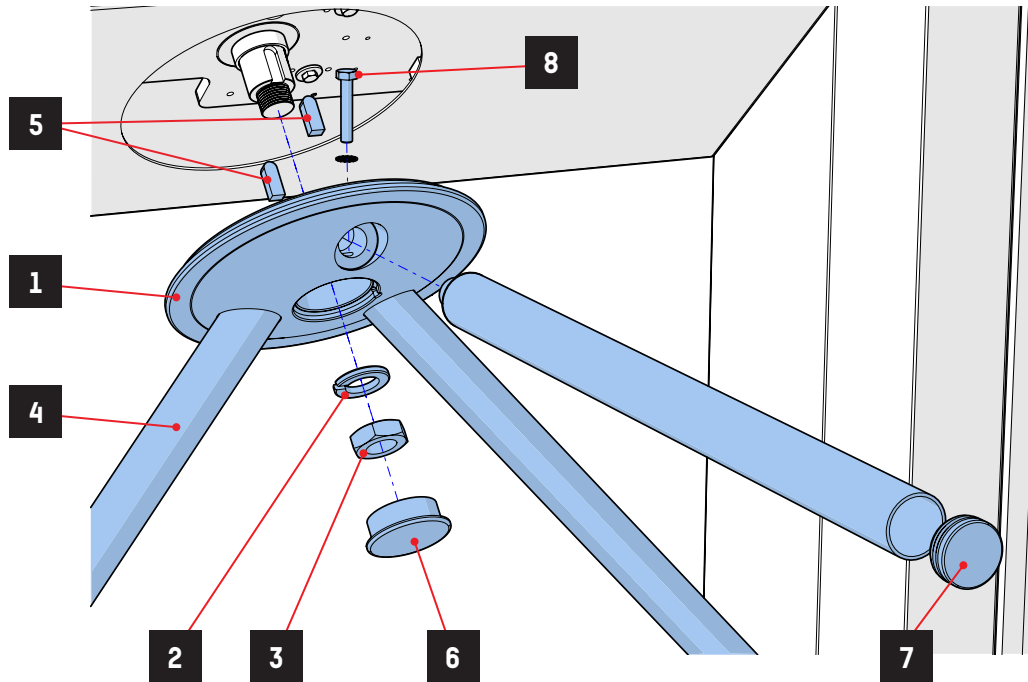


Fig. 22 - Fixed arm turret

REF.	DESCRIPTION	COMMENT
0	Turret assembly	Turret with screw, nut and cap
1	Fixed arm turret	
2	M24 washer	
3	M24 nut	
4	Fixed arm	Arm fitted with sleeve and end cap
5	Retainer lock	
6	Turret cap	
7	Fixed arm cap	
8	Arm fixing screw	M8x45

7.3. DESCRIPTION OF THE OTHER MECHANICAL OPTIONS

7.3.1. DROPPING ARM OPTION

The dropping arm option requires the installation of a suitable turret, equipped with an axis of rotation at the point of attachment of each arm.

When the TriLane is powered, each of the three arms is held in position by a small latch fitted with a return spring.

In normal operation, an electro-magnetic suction cup keeps the latching actuator under pressure.

If there is a power failure, the suction cup is no longer powered and the stop of the dropping arm device hits one of the three locks, which causes the horizontally-oriented arm to fall. The passage becomes totally free.

The fall of the arm automatically returns the stop into contact with the suction cup, thus preparing the correct positioning to the re-energisation.

A manual intervention is necessary at re-energisation, rotating the turret in order to position the arm horizontal, which also resets the actuating device.

If the motorised option is selected, a turret rotation takes place automatically, which will reset the actuating device without any external intervention.

In the dropping-arm option, the arm is attached at the height of the pivot, using a screw and an Allen nut (see the codes below).

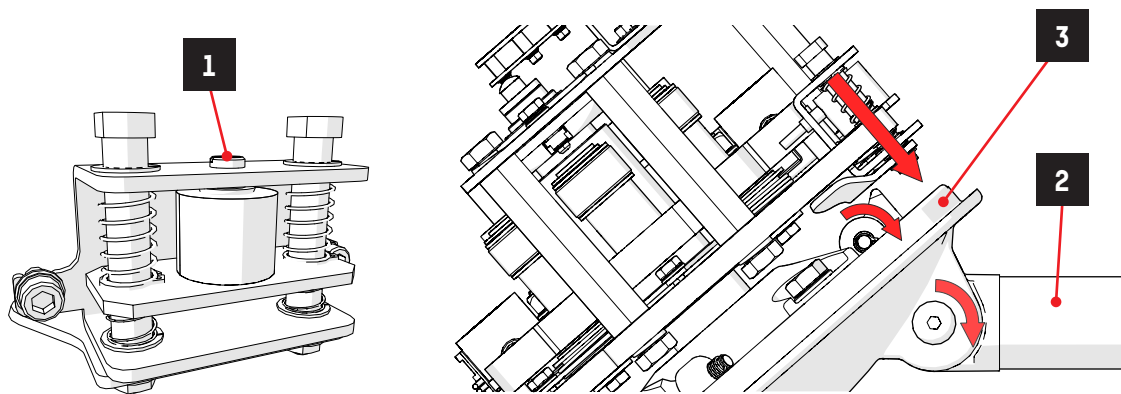


Fig. 23 - Dropping arm device

REF.	DESCRIPTION	COMMENT
1	Dropping arm device with suction cup	Suction cup with support, stop and springs
2	Dropping arm	Arm with pivot and cap
3	Dropping arm turret assembly	Turret with pawls and springs

7.3.2. MOTORISATION OPTION

In the motorisation option, a gear set is inserted into the kinematic assembly between the plate and the rollers.

The gear motor is controlled by the AS1636 electronic circuit board connected to the AS1635 control electronics by a CAN bus and can act in two cases (subject to an option):

- In a passage cycle, the AS1636 circuit board activates the motor as soon as a rotation of the turret is detected by the angular sensor. The passage cycle starts with a manual action (pressure on the horizontal arm) and continues automatically by engaging the motor. The parameters available in the memory on the AS1635 circuit board make it possible to define the starting angle of the motor, as well as the acceleration and deceleration curve to complete the 120° rotation. Refer to the AS1635 technical manual for more details. The kinematic assembly is not equipped with the centring device or the damping option, because the rotational movement is controlled entirely by the motor control electronics.
- The motor is also used to allow automatic rearming of the arm, without human intervention.

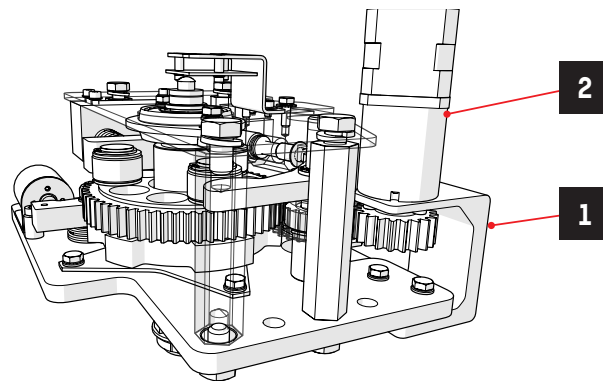


Fig. 24 - Motorisation option

REF.	DESCRIPTION
1	Motor support
2	Gear motor

7.3.3. TOF SENSOR DETECTION OPTION

A TOF sensor can be installed (option) on a stainless steel profile to be fixed between the two legs of the trilane. This sensor is used to detect intrusion and fraud occurrences.

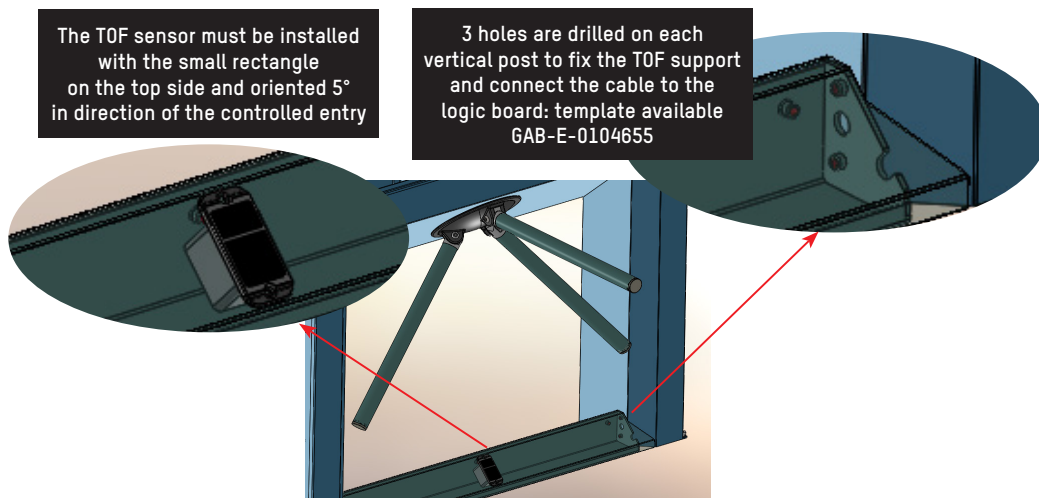


Fig. 25 - TOF sensor option on TL2

7.3.4. OTHER HOUSING OPTIONS

In its standard version, the central part of the two-feet TriLane (TL2) is delivered in black painted steel, RAL9005. The front and rear end legs are made from aluminium in the same colour, and the top cover is made of stainless steel AISI304.

TL1 standard housing is also steel black painted RAL9005 and the cover is in AISI304L stainless steel.

Various finishing are available as an option:

- Other color than RAL9005 (can be RAL5008, RAL6014, RAL7003, RAL7016, RAL9010)
- Stainless steel AISI 304L legs (in both passage directions)
- Full stainless steel housing AISI 304L or AISI 316L.
- Cut-out of access doors in the feet in stainless steel (in the passage direction)



Fig. 26 - Other housing options (TL2)



Fig. 27 - Other housing options (TL1)

It is also possible to install readers inside the housing, together with the status lights:

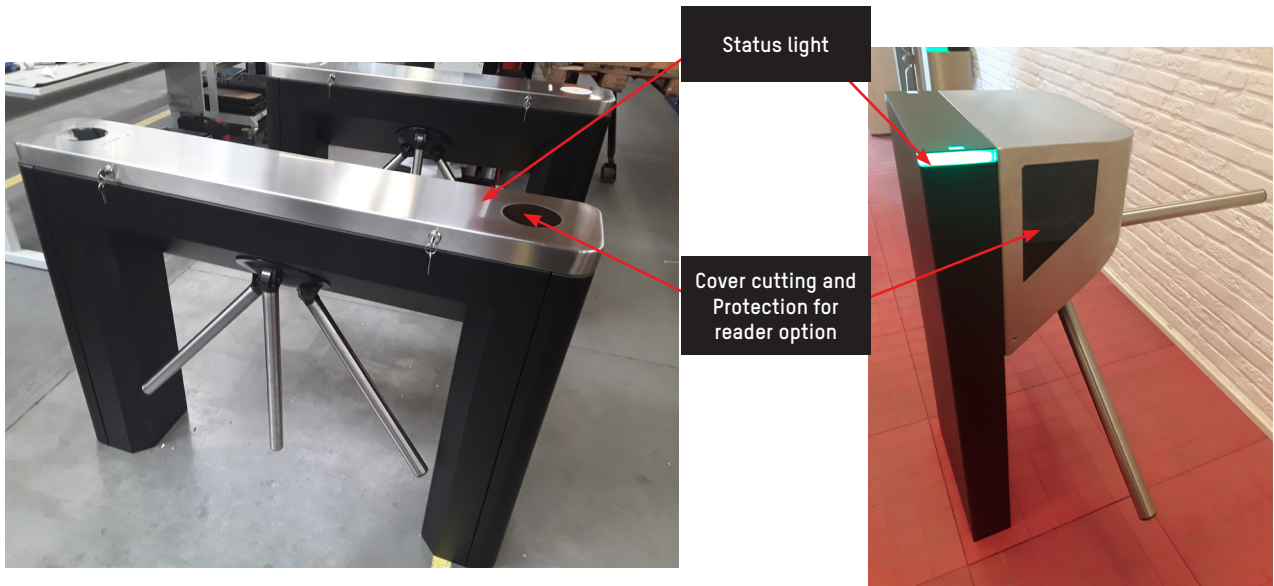


Fig. 28 - Readers option

7.4. DESCRIPTION OF THE ELECTRONIC ASSEMBLY

Two circuit boards are incorporated in the central part of the TL2 casing: The power supply circuit board on the left side and the electronics circuit board on the right side.

The 230 VAC power cable rises from the ground into the left foot of the turnstile. A hole is provided to connect the cable to the main circuit breaker.

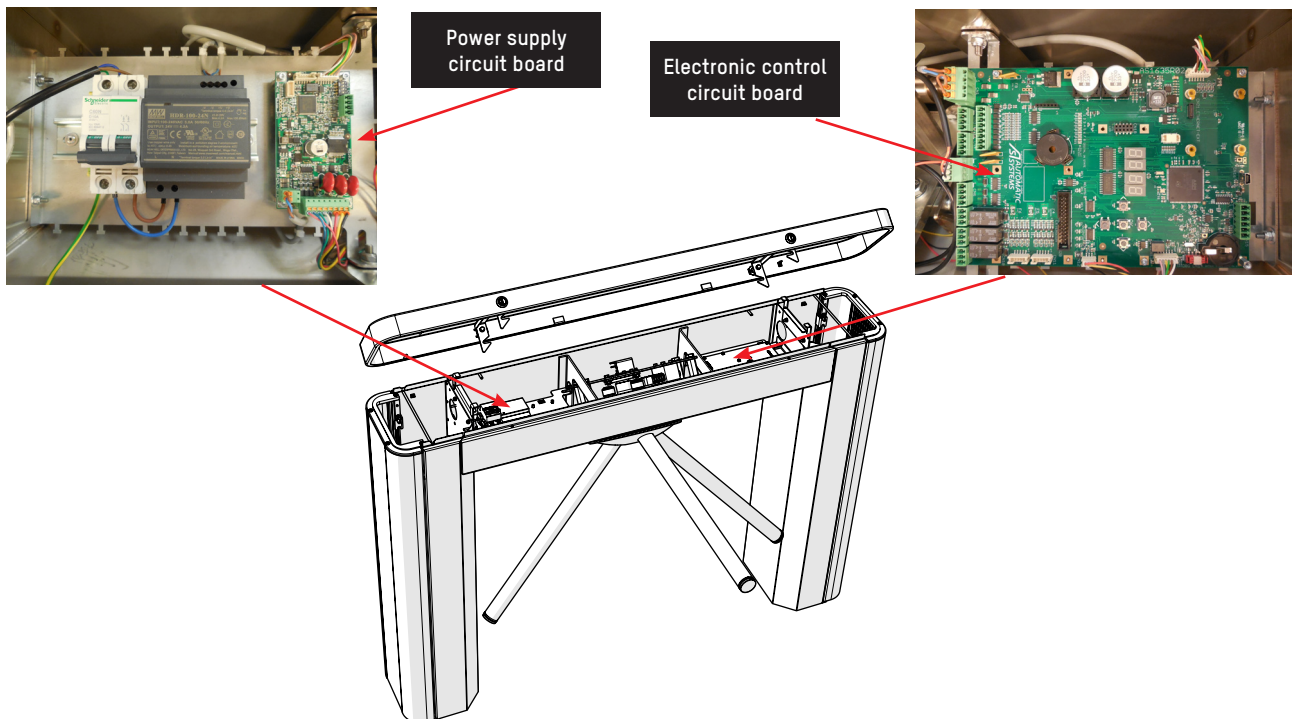


Fig. 29 - General overview of the electrical and electronic panels

On the **TL1** version, the power cables are in the middle on the housing fixing points. The power supply circuit board, the main circuit breaker (**3**) and the logic board are located inside the foot and the optional motor control board (**1**) is located inside the top cover (⇒ Fig. 30 and Fig. 31) .

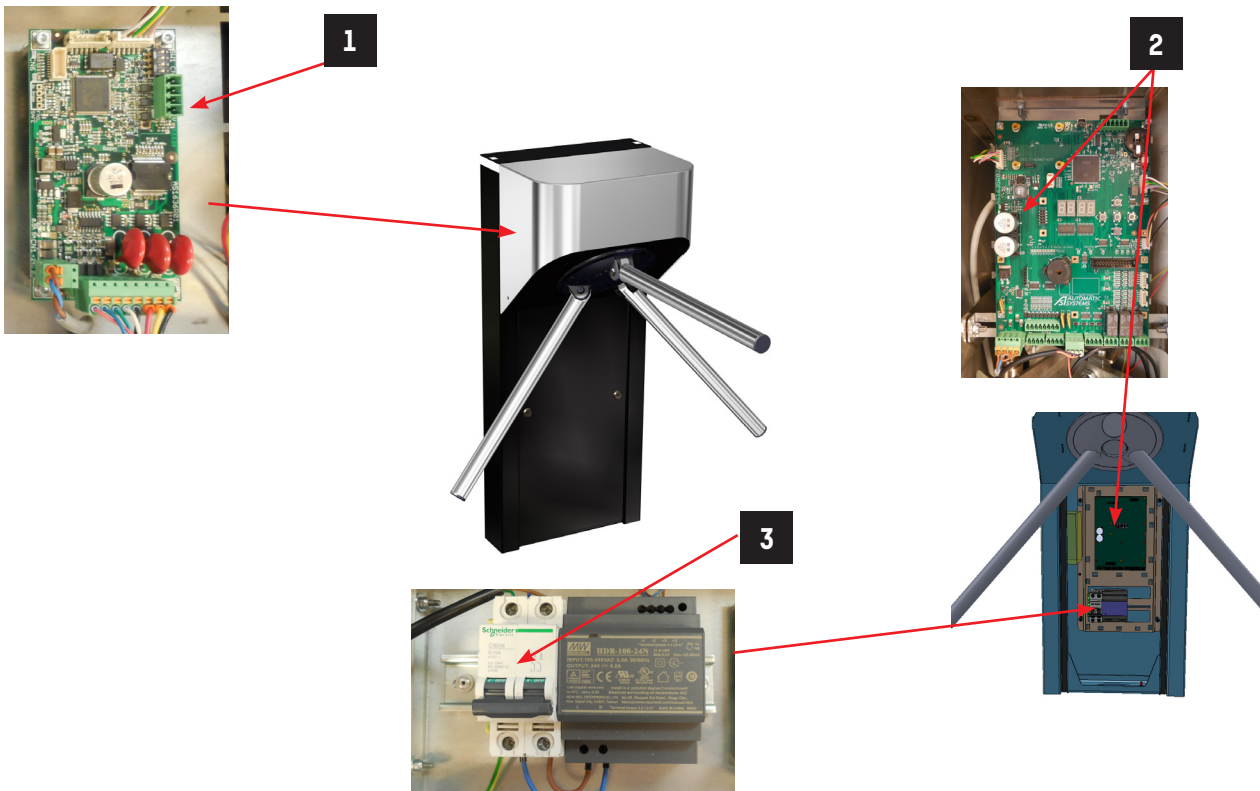


Fig. 30 - Overview of the electronic plates (TL1)

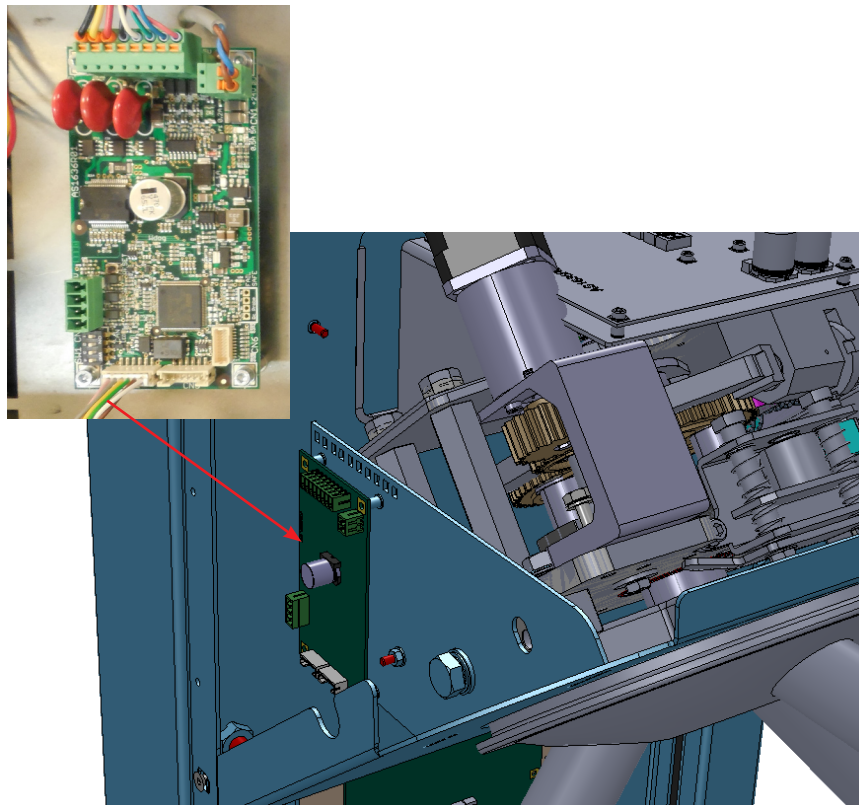


Fig. 31 - Motor control board position on the TL1

7.4.1. POWER SUPPLY CIRCUIT BOARD

The **TL2** circuit board in the left holds the main circuit breaker and the 24 VDC power source. The motor electronics ensuring the rotation of the turret.

It is recommended to cut the power before carrying out any work on the mechanical parts.

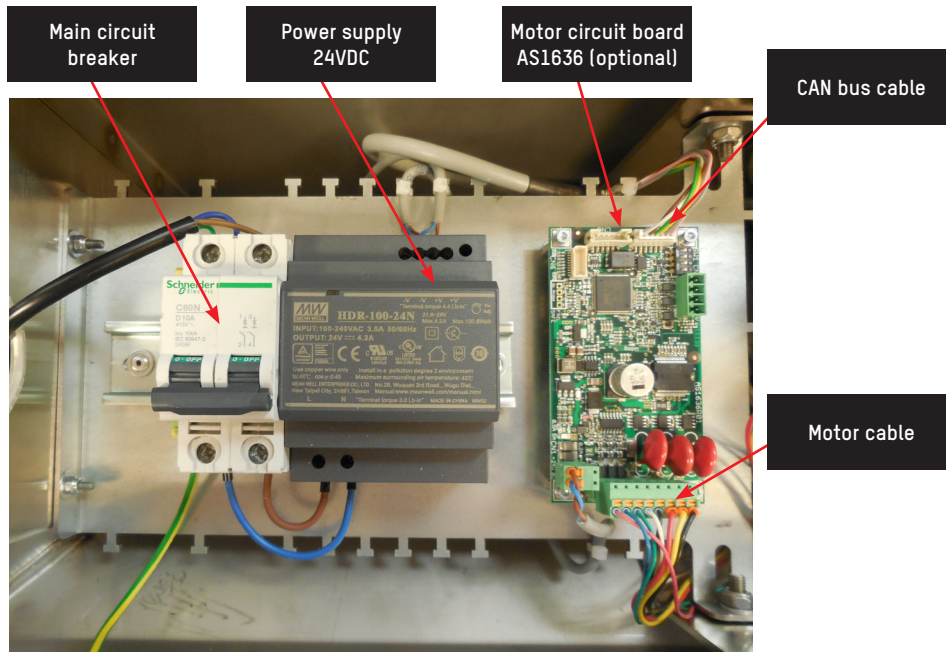


Fig. 32 - Power supply circuit board

The sub-assembly parts are identical for the **TL1** version (circuit breaker, power supply and motor control board) but the circuit breaker and the power supply are accessible removing the front panel and the AS1636 motor control board (optional) is located inside the stainless steel cover.

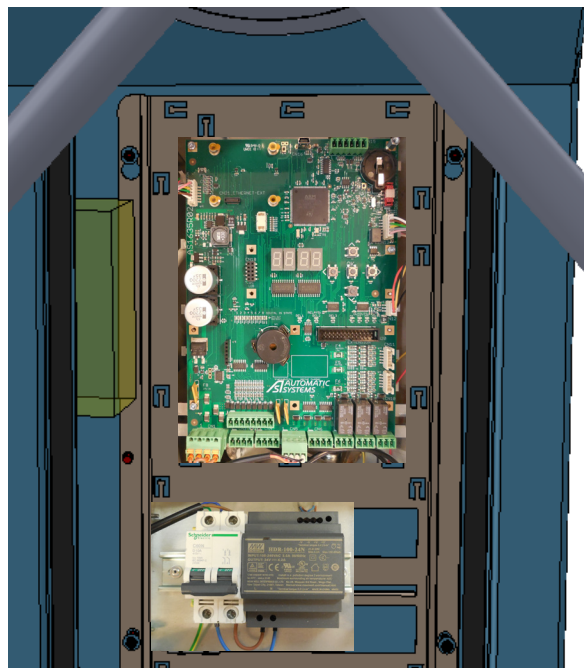


Fig. 33 - Power supply plate on TL1

7.4.2. ELECTRONIC CIRCUIT BOARD

The electronic circuit board contains a human machine interface (HMI) composed of 4 digits and a keyboard with 5 keys. The figure below shows the purpose of the main connectors. Some of them are reserved for the options available on the TriLane (status light, detection cells, light strips, control card motorisation, Ethernet connection, etc.), and others are not used on the TriLane, because the AS1635 control electronics are also used in other products.

For complete information on the AS1635 circuit board, please refer to the technical manual for the product.

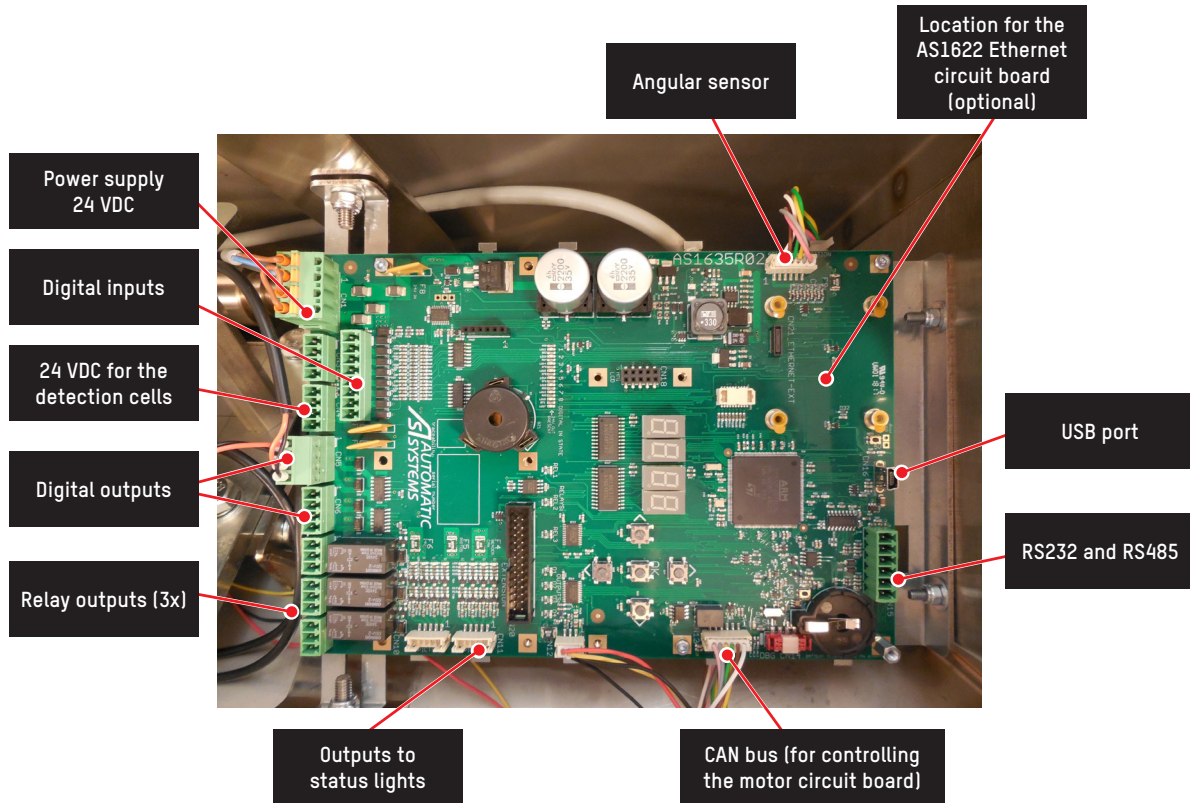


Fig. 34 - Control circuit board

7.4.3. STATUS LIGHT (OPERATING SYMBOLS)

The status light consists of 6 sets of 4 LEDs of different colours (GRBW) soldered on a flexible support glued to the inside of the frame (double face tape):



Fig. 35 - Electronic circuit of the status light

7.4.4. LIST OF THE ELECTRICAL AND ELECTRONIC SUB-ASSEMBLIES

REF.	DESCRIPTION	COMMENT
1	Control logic circuit board AS1635	Without the female connectors
2	Angular sensor assembly with AS1637 circuit board	With support and fixing screw
3	Power module 24VDC	
4	Main circuit breaker	
5	Electro-magnet assembly	With support and end stop
6	Status light (option)	Circuit and connecting cable
7	Gear motor assembly	
8	Motor control circuit board AS1636 (optional)	

8. MAINTENANCE

8.1. FIRST CHECK AFTER 50,000 PASSAGES

This is an initial routine check, a simplified version of the routine maintenance:

Ground stability and cleanliness	Check the stability of the equipment and the external cleanliness of the equipment. Use cleaning agents if necessary (non-chlorinated)
Access to the TriLane mechanism	Remove the cover as described in Chap. 7.2.1: "Removing the cover", page 21 and the TL1 front panel.
Check for any anomalies in the moving parts of the mechanism during the rotation of the arms	As a reminder, rotation of the arms is always possible in the free mode (no locking). In the controlled mode, unlocking is easily achieved by pressing the Up and Down buttons on the HMI. Make sure there is no abnormal noise during the rotation of the turret. Check for any play in the mechanism's moving components. Check that the turret lock is working properly after rotation.
Motorisation option	If the motorisation option is present, make a few passages in each direction to ensure that the motor is working correctly.
Remote control and reader presence.	If readers or remote controls are present, check their proper operation.
Fixation of the arms	Check that there is no play in the fixation of the arms and the turret. If the dropping arm option is present, check their correct operation in the event of a power failure. If the motor option has also been selected, check the automatic reset when power is turned on.

8.2. ROUTINE MAINTENANCE

Check the following every 500,000 passages and at least every 6 months:

Ground stability and cleanliness	Check the stability of the bodywork and the external cleanliness of the equipment. Use cleaning agents if necessary (non-chlorinated)
Access to the TriLane mechanism	Remove the cover as described in Chap. 7.2.1: "Removing the cover", page 21 and the TL1 front panel.
Check for any anomalies in the moving parts of the mechanism during the rotation of the arms	<p>As a reminder, rotation of the arms is always possible in the free mode (no locking). In the controlled mode, unlocking is easily achieved by pressing the Up and Down buttons on the HMI.</p> <p>Make sure there is no abnormal noise during the rotation of the turret.</p> <p>Check for any play in the mechanism's moving components.</p> <p>Check that the shock absorber is working properly (option).</p> <p>Check that the turret lock is working properly after rotation.</p>
Motorisation option	<p>If the motorisation option is present, make a few passages in each direction to ensure that the motor is working correctly.</p> <p>Check that there is no deformation in the shafts, gearing bearings and other transmission components.</p>
Electrical circuit boards and cables	<p>Check that no liquids have entered the central part of the box.</p> <p>Check that no connector has become detached.</p> <p>Check the condition of the cables and ensure that they cannot interfere with the moving mechanical parts.</p> <p>Check that there has been no overheating of the components.</p>
Remote control and reader presence.	If readers or remote controls are present, check their proper operation.
Status light option	Check that the status lights are working in both directions.
Fixation of the arms	<p>Check that there is no play in the arm mounting.</p> <p>If the dropping arm option is present, check their correct operation in the event of a power failure. If the motor option has also been selected, check the automatic reset when power is turned on.</p>
Locks and keys	Check the correct operation of the cover locking and unlocking system with the key.

9. SETTINGS AND TECHNICAL INTERVENTIONS



YOUR TRIPOD TURNSTILE IS MADE UP OF VARIOUS MECHANICAL AND ELECTRICAL COMPONENTS. ANY NEGLIGENCE WHILE WORKING ON THE MACHINE MAY SERIOUSLY ENDANGER YOUR SAFETY. DISCONNECT THE GENERAL POWER SUPPLY FROM THE EQUIPMENT AS SOON AS YOU OPEN THE CASING. BE CAREFUL IN HANDLING ANY ELEMENT THAT MIGHT BE UNDER POWER OR COULD BE SET IN MOTION.

9.1. FAULT DIAGNOSIS

FAILURE DESCRIPTION	POSSIBLE CAUSE	COMMENT
The Trilane is not powered (status light not lit, drive not lit, free passage in both directions, etc.)	Remove the cover (TL2) or the front panel (TL1) and check the 230 VAC connection and the position of the main circuit breaker. Check the correct 24 VDC supply voltage.	In the A5/B5 configuration, the de-energised TriLane is free in both directions of passage.
A status light is not lit.	On the AS1635 circuit board, check the connection of the CN10 connectors (status light direction A) and CN11 (status light direction B). Replace the status lights if necessary.	CN10(or 11)-1 red CN10(or 11)-2 green CN10(or 11)-3 blue CN10(or 11)-4 white CN10(or 11)-5 0V ref
The TriLane does not lock itself (in direction A or direction B)	Check the programmed operating mode in direction A and B via the HMI (free, controlled, blocked). Check that the TriLane is not in Emergency mode (connection between CN1.3 and 4 for normal operation). Check the supply voltage of the electro-magnet, between CN5-1 and CN5-2 (direction A) or CN5-3 and CN5-4 (direction B). If the electro-magnet is functioning correctly, check the locking mechanism	Note: the 24 VDC voltage is only applied during the first moments The holding voltage is reduced to prevent the electro-magnet from heating up.
The passage authorisation is not taken into consideration.	Using the HMI, check that the TriLane is not in blocked mode. Check the connection between the reader and the AS1635 circuit board (24 VDC pulse in CN2-1 for authorisation in the A direction and in CN2-2 for authorisation in the B direction).	Default configuration of the inputs, can be modified via the PC interface.
The electro-magnet works properly, but the turret does not unlock.	An anti-noise ring is placed on the axis of the electromagnet. But it limits the impact force. (⇒ Fig. 19, page 23) Remove the ring if necessary.	
The turret will not re-lock during rotation.	Check the operation of the angular sensor and the connecting cable (CN17 on the AS1635 circuit board).	In the case of an angular sensor problem, an error appears on the HMI display.
The TriLane does not operate and the LED LD1 on the AS1635 circuit board is off.	The AS1365 control circuit board is not powered with 24 VDC. Check the 24 VDC power supply module and the connection cable to CN1-1 and CN1-2.	

FAILURE DESCRIPTION	POSSIBLE CAUSE	COMMENT
The TriLane does not work and the LED LD6 on the AS1635 circuit board is off.	The program is not running. Turn off the power to reinitialise the program or press the Reset button (see the position in the technical manual of the AS1635). As a last resort, replace the AS1635 control circuit board.	If the control circuit board is replaced, a new calibration operation will be required at power on. Refer to the unit test chapter in the AS1635 manual.
The horizontal arm does not fall in the case of a power failure or an emergency. (Dropping-arm option retained)	Check the condition of the two actuating springs of the arm release mechanism (⇒ Chap. 7.3.1: "Dropping arm option", page 26)	
The motor does not engage. (motorisation option retained)	Check that the CAN bus cable W6 is connected to the CN13 connector of the AS1635 circuit board. Check the connection between the motor circuit board AS 1636 and the motor. If necessary, replace the motor circuit board or the gear motor.	

9.2. REPLACING COMPONENTS

9.2.1. REPLACING A FIXED ARM (BARRIER)

To replace a fixed arm, remove the fixing screw of the arm inserted into the turret:

- Using the two locking keys, remove the central casing cover (⇒ Chap. 7.2.1: "Removing the cover", page 21).
- Place the defective arm in the horizontal position
- Remove the M 8x 45 fixing bolt
- Extract the arm and perform the operation in the opposite direction for the new arm, not forgetting the Loctite glue (⇒ Chap. 7.2.6: "Fixed arm turret assembly", page 25)

9.2.2. REPLACING A DROPPING ARM

In this case, removing the cover is not necessary because the fixing screws are accessible from the outside.

Use two Allen keys to release the damaged arm.

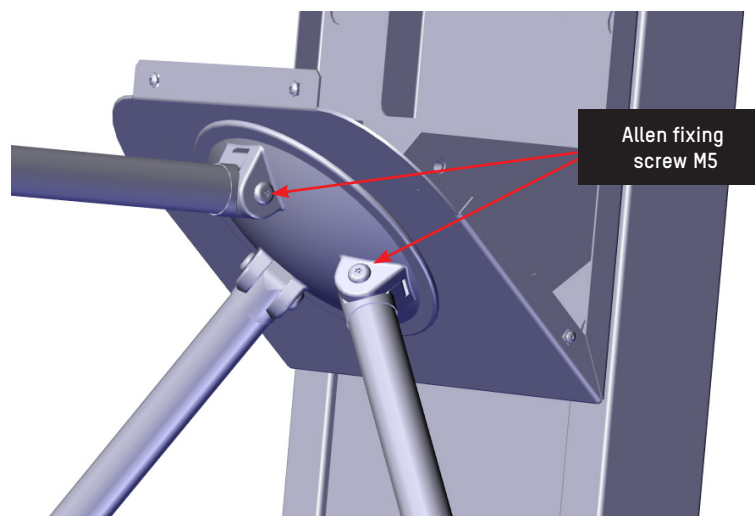


Fig. 36 - Fixing the dropping arm

9.2.3. REPLACING THE ANGLE SENSOR ASSEMBLY

The replacement of the sensor assembly does not pose any particular problems.

- Using the two locking keys, remove the central casing cover (⇒ Chap. 7.2.1: "Removing the cover", page 21)
- Disconnect the power supply (main circuit breaker)
- Disconnect the connecting cable between the sensor and the AS1635
- Using an Allen key, remove the two mounting screws on the support and replace with the new sensor.
- A calibration operation is required at power-on. Refer to the unit test chapter in the AS1635 manual.

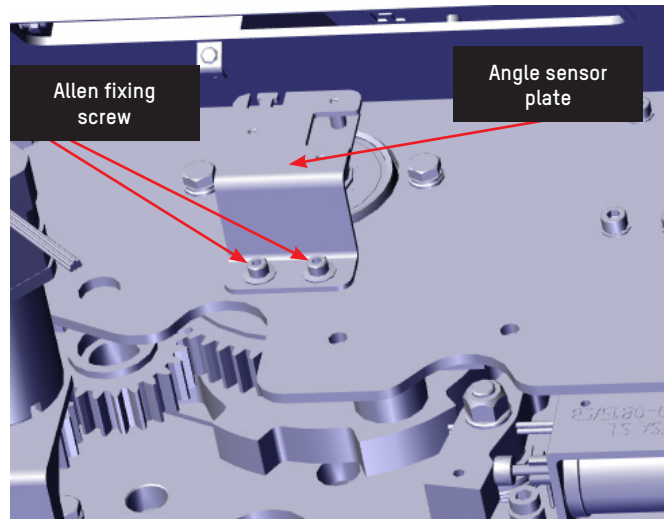
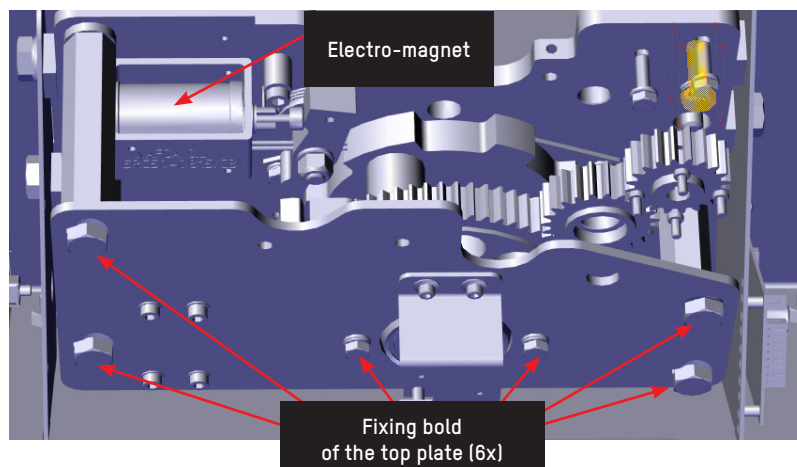


Fig. 37 - Angle sensor

9.2.4. REPLACING OR INVERTING THE DIRECTION OF AN ELECTRO-MAGNET

The axes of the electro-magnets are symmetrical. By reversing the direction of the coil, which has an internal return spring, it is therefore possible to go from configuration 4 (locked with power off) to configuration 5 (free with power off). (⇒ Chap. 4.3: "Conventions", page 8).

- Remove the cover.
- Disconnect the power supply (main circuit breaker).
- Remove the upper frame (6 bolts).
- Disconnect the electro-magnet cable.
- Remove the two M4 x 6 fixing screws
- Locate the new electro-magnet or reverse the position for a solution change between 4 and 5. In this case, it is necessary to change the parameters in the control logic.



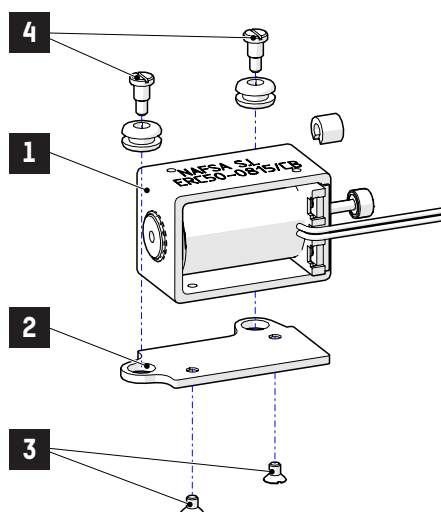


Fig. 38 - Electro-magnet

REP.	DESCRIPTION
1	Electro-magnet
2	Electro-magnet support
3	Screw ZN DIN 963 TFR M4 x6
4	Shoulder screw IX DIN 923 M4 x6

9.2.5. REPLACEMENT OF A GEAR MOTOR (OPTION)

The gear motor and its support are fixed on the upper frame using two M6 x 20 bolts with hexagonal heads.

- Remove the cover.
- Disconnect the power supply (main circuit breaker).
- Disconnect the motor cable.
- Remove the two M6x20 bolts and locate the new gear motor with its support.

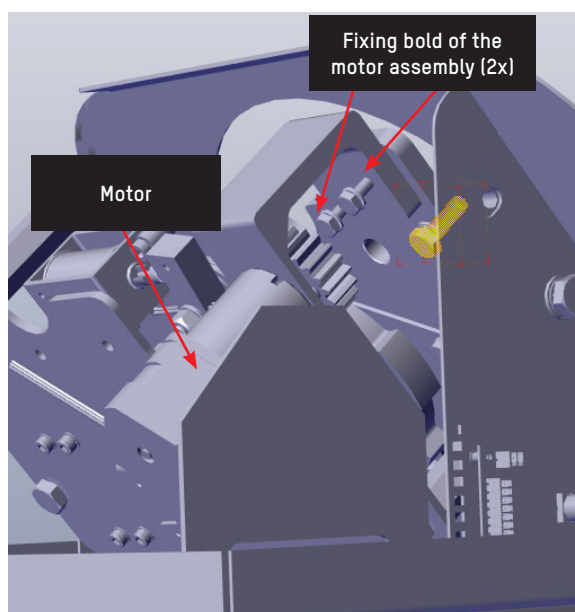


Fig. 39 - Fixing the motor

9.2.6. REPLACEMENT OF RINGS, WASHERS, SPRINGS AND OTHER WEAR PARTS

After a few million operations, some rings, washers and springs may show signs of wear; their replacement does not pose any particular problem. In the event of wear, Automatic Systems suggests replacing certain sub-assemblies containing several wear parts at the same time. For example:

REF.	ARTICLE CODE	DESCRIPTION	COMMENT
1	AEM-E-0010960	Centring assembly	Contains the fixing block, stop, two compression springs and bearings.
2	AME-E-0010983	Shock absorber assembly (option)	Contains the shock absorber and the movement transmission system with its support.
3	AEM-E-0011574	Dropping-arm actuator assembly	Contains the suction cup, bracket, pads and 4 springs.
4	E/7002/914	Electro-magnet assembly	With support

To obtain access to these sub-assemblies, remove the upper frame CHS-E18495 (4x M10 bolts and 2x M6 bolts near the upper bearing).

9.2.7. REPLACING A STATUS LIGHT

Status lights are glued to the SUP-E20471 support fixed into the upper part of the uprights of the central frame.

- Remove the cover.
- Disconnect the power supply (main circuit breaker).
- Disconnect the status light cable.
- Remove the defective circuit from its support (glued with a double face tape).
- Insert the replacement status light, connect the cable and switch on again.

9.3. SETTING THE TOF SENSOR (OPTIONAL)

To avoid false detection (if installed outside or in a veranda exposed to the sun), the TOF Niva sensor from the CEDES brand, must be set up as follows:

Adjustment of the two potentiometers of the detection zone:

- X axis = near the minimum.
- Y axis = in the middle.

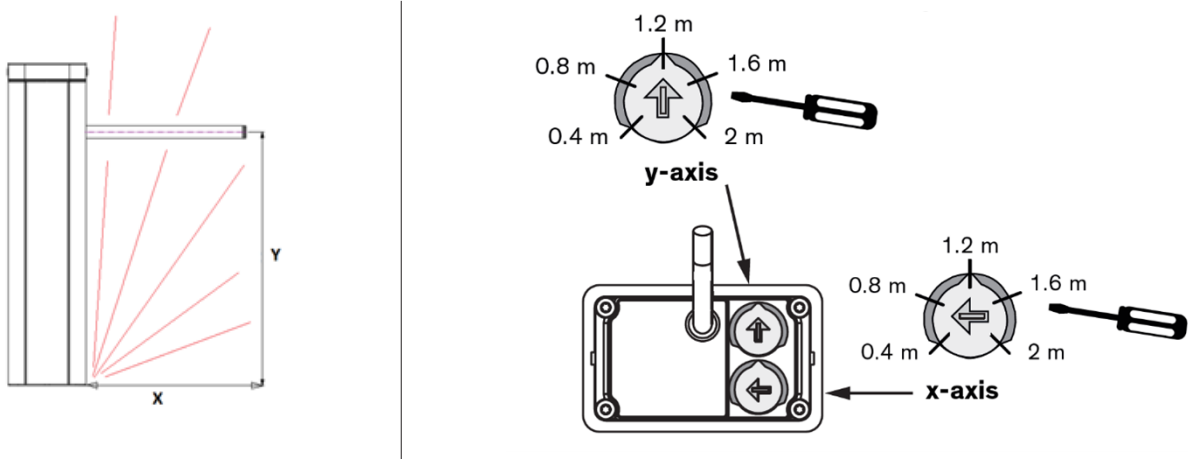


Fig. 40 - TOF sensor settings.

AS1635 board setting:

- AS1635 board WEB page setting: Delay filtered CEDES A : 300ms.

Sensor settings:

- Object size : 25.
- Object separation size : 1
- Angle 0 = 45.
- Angle 1 = 0
- History Length : 1
- Delay AS1635 : 300ms.



Since July 2021, the TOF sensors are factory-set by the manufacturer (specific tooling).
The AS technician does not have access to these settings.

The factory settings are indicated on the sensor label (SW:1.01⇒ 1.02 to identify the downloaded settings)

Conclusions

With the above settings, for the detection of "jump over" and "crawl under" the ToF Niva sensor provides fairly reliable detection. However, the ToF Niva has detection limitations in the case of a very fast "jump over".

Despite the above settings, in case of false detection on site, the following setting can be increased:

- AS1635 board WEB page setting: Delay filtered CEDES A (from 300ms -> 1000ms).

In this case, the detected object must stay longer in the area (1000ms), which reduces false detection but also reduces the detection speed (making fraud easier).

10. TECHNICAL DATA

TYPE	CHARACTERISTICS	VALUE
Weight	Weight without options and without packaging (TL2)	60Kg
	Weight without options and without packaging (TL1)	46kg
Electrical	Electrical power supply	100 - 230 V single-phase 50/60 Hz
	Control circuit	24VDC
	Electro-magnets	30% duty cycle in order to reduce heating
Consumption	Standby mode	< 15W
	Duty cycle	< 55W
	Max	< 85W
Ambient	Operating temperature	-10 °C to + 50 °C
	Relative humidity in operation	< 90%, without condensation
	IP rating	IP44
	Noise level	60 dB at 1 metre
MCBF	Average number of cycles between breakdowns	5,000,000 cycles
MTTR	Mean time to repair	30 minutes
	Flow (beyond reader response time)	Up to 20 passages/minute, depending on the reader type and authorization speed
CE	Complies with EC standards	

11. EC DECLARATION OF CONFORMITY



EC declaration of conformity

We, undersigned,

AUTOMATIC SYSTEMS s.a.
Avenue Mercator, 5
1300 Wavre
BELGIQUE



Herewith declare that the following machine

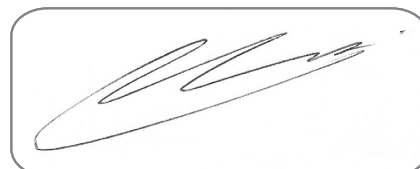
Tripod turnstile

TL1, TL2

is in accordance with the conditions of the following Directives, standards and other specifications:

- Machinery Directive 2006/42/CE.
- Low-voltage Directive 2014/35/UE.
- Electromagnetic compatibility Directive 2014/30/UE.
- Directive RoHS (Restriction of Hazardous Substances) 2011/65/EU.
- EN 12100:2010: Safety of machinery – General principles for design - Risk assessment and risk reduction (ISO 12100:2010).
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Made in WAVRE,
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