FOS-Series Scoreboards Installation and Service Manual

Model		Display	Size [cm] Width x Height x Prof.	Weight [kg]	Power [A] / [VA]
FOS-14 (art.300-14)		Game time [00:00 ÷ 99:59], digits 45cm high	166.5 x 59 x 15	26	1.0-0.5 A 115 VA
FOS-16 (art.300-16)		Game time [00:00 ÷ 99:59], digits 45cm high Team scores [0 ÷ 9], digits 45cm high	314.5 x 59 x 15	43	1.5-0.7 A 155 VA
FOS-18 (art.300-18)		Game time [00:00 ÷ 99:59], digits 45cm high Team scores [00 ÷ 99], digits 45cm high	388.5 x 59 x 15	50	1.9-0.8 A 190 VA
FOS-26 (art.300-26)		Game time [00:00 ÷ 99:59], digits 45cm high Team scores [0 ÷ 9], digits 45cm high	166.5 x 118 x 15	46	1.5-0.7 A 155 VA
FOS-29 (art.300-29)		Game time [00:00 ÷ 99:59], digits 45cm high Team scores [00 ÷ 99], digits 45cm high Period [0 ÷ 9], digit 45cm high	259 x 118 x 15	66	2.1-0.9 A 210 VA
FOS-36 (art.300-36)		Game time [00:00 ÷ 99:59], digits 45cm high Team scores [0 ÷ 9], digits 45cm high Team names, 8 characters, 25cm high	333 x 99 x 15	75	3.1-1.4 A 330 VA
FOS-39 (art.300-39)		Game time [00:00 ÷ 99:59], digits 45cm high Team scores [00 ÷ 99], digits 45cm high Period [0 ÷ 9], digit 45cm high Team names, 8 characters, 25cm high	333 x 158 x 15	110	3.8-1.7 A 385 VA

Table 1: Technical data for FOS-series scoreboards

1. Technical features

Power supply voltage .....: 100 - 240Vac
Frequency .....: 47 - 63Hz
Power .....: see Table 1

Temperature .....: -20 ~ +50 °C (operating)
-40 ~ +85 °C (storage)

Relative humidity without condensation .....: 20 ~ 95% (operating)
10 ~ 95% (storage)

Altitude .....: 2000m (operating)
12000m (storage)

Height of digits .....: 45cm
Height of characters .....: 25cm

Container .....: Anodized aluminum, dust painted
Protection class .....: IP34

Horn volume .....: 115dB @ 1m

Table of contents

2. INTRODUCTION

We would like to thank you for purchasing an outdoor FOS series electronic scoreboard. The scoreboard is designed to be sturdy, reliable, and long-lasting.

2.1 PURPOSE

This manual is intended for users and installers. It concerns the assembly, installation and resolution of problems for outdoor FOS series scoreboards. A list of the various FOS models can be found on page 1.

It is very important that your scoreboard is properly installed. Please read this manual carefully before beginning installation.

We also suggest you keep the manual for the duration of the product's life. In case the manual is lost, you can obtain a copy from the manufacturer at the website (*www.favero.com*). **Favero Electronic Design** reserves the right to update the manual without further notice.

If you should come across any problems not described in this manual while installing or using your scoreboard, please send an email to *support@favero.com* with a detailed description of the problem.

2.2 SYMBOLS USED IN THE MANUAL

Portions of the text which are of particular importance in regards to the safety or proper use of the product are indicated by the following symbols:

Risk of danger or injury to persons if instructions or the necessary precautions are not followed.

Important information on product use.

2.3 SAFETY WARNING

It is absolutely mandatory that the installation of the product and the electrical system are designed and implemented by qualified technicians, in compliance with regulations in effect in the country where installation takes place.

2.4 GUARANTEE

The guarantee is good for two years starting from the date of purchase (see documentation) and includes free repair for any defects in materials or construction. The guarantee does not include shipping costs.
More information on guarantee and post-sale support can be found at *www.favero.com*.

2.5 DISPOSAL OF SCOREBOARDS

Please dispose of your scoreboard in a manner most compatible with the environment and in accordance with federal or state laws, reusing parts and recycling components and materials when possible.

When this crossed-out waste bin symbol is attached to a product it signifies the product should be disposed of in a separate container from other waste.
The sorted waste collection of the present device is organized and managed by the manufacturer.
Users who wish to dispose of their present device should contact the manufacturer and follow the procedure indicated for separate waste collection.
Ensuring proper sorted waste collection, in accordance with environmental standards, for the disposal of further devices helps to protect the environment and the health of persons from any damaging effects. It also favors the reuse and recycling of materials. Administrative sanctions, in accordance with regulations in effect, will be applied for any improper or abusive disposal of the product on part of the holder.

2.6 COMPLIANCE WITH CE REGULATIONS

All FOS scoreboards meet the necessary requirements for electromagnetic Compatibility and Security regarding electronic equipment, according to European directives.

- **2004/108/EC** of 15 December 2004
- **2006/95/EC** of 12 December 2006

2.7 PRODUCT DESCRIPTION

Your FOS series scoreboard is designed for use in sport centers and stadiums. All actions are managed through the Command Console. One can connect to the Command Console via cable or via radio (additional option). When both connections are present, precedence is given to the cable connection.
According to the type of model, all or portions of the following information is displayed: game time, time of day, scores, game period, and team names.

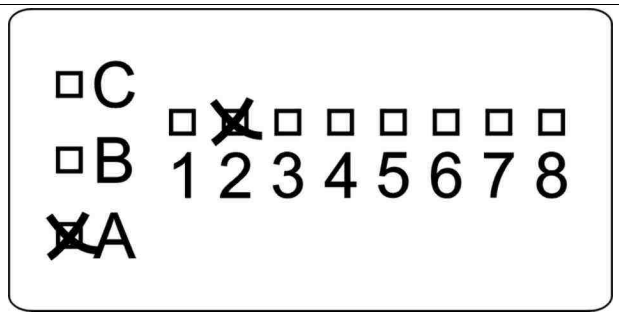
When the Command Console is turned off or disconnected, the clock inside the scoreboard displays the time of day (hours and minutes). The battery inside the clock lasts circa 25 years and the time is automatically updated with the time on the Command Console when the latter is connected.
The structure of each FOS series scoreboard is composed of different modules which can be found in the manual under the following terms (module assembly is described in chapter 3.):

Module identification	Size	Weight	Electronic board and parts contained in the module
• **POWER SUPPLY**	18.5 x 59 cm	5.6 kg	- power supply unit +24V for DIGIT modules - power supply unit +12V for ALPHA modules - electronic control board **HUB+24V** for DIGIT modules - electronic control board **HUB+12V** for ALPHA modules - fan - horn
• **DIGIT** 2 digits	74 x 59 cm	6.8 kg	- 2 electronic display boards **DIGIT** 45cm - electronic control board **DRIVER-DIGIT** - fan
• **DIGIT** 1 digit	37 x 59 cm	4.0 kg	- electronic display board **DIGIT** 45cm - electronic control board **DRIVER-DIGIT** - fan
• **ALPHA** 8 characters	166.5 x 40 cm	11.3 kg	- electronic control board **DRIVER-ALPHA** - 4 electronic display boards **ALPHA** 25cm - 2 fans

As soon as the scoreboard is switched on and powered all LEDs will light up for circa 1 second, allowing the operating status to be checked. Shortly thereafter, the information received from the Command Console will be displayed or, in the case that the console is switched off or disconnected, the current time will be displayed. The brightness of the console can be set or adjusted.

3. ASSEMBLY OF SCOREBOARD

For fast, easy and inexpensive shipping, the scoreboard is separated into several modules and joining brackets before shipping and must be assembled before the installation process.
Once the modules have been removed from their packaging, a label can be found on their rear sides, as in Fig. 1. The assembly position is indicated by a letter and a number on the label: the letter A, B, or C indicates the vertical position, while a number (1-8) indicates the horizontal position. For example, label 1 in Fig. 1 indicates module A2.
The joining brackets also have labels indicating their positions: the first letter (A,B, or C) refers to the modules to which they belong, while the second letter indicates either a lower (L) position or a higher (H) position.



A, B, C: vertical position
1, 2, .., 8: horizontal position
Fig. 1: Identifying label of A2 module

To avoid injuries such as bruises, scrapes, or cuts while handling the scoreboards, we advise wearing protective gloves and safety shoes.

Please remember that while handling and moving equipment a load exceeding 30kg for men, and 20kg for women, is considered too heavy to be managed by a single individual.

3.1 POSITION OF MODULES IN THE SCOREBOARDS

Fig. 2 shows the position of each single module with a rear view of the scoreboards.
- the arrows indicate where to attach the vertical brackets with a '**Ω**' profile,
- the number ① defines the position of the vertical cable conduit (see also numbers ① and ② in Fig. 9).

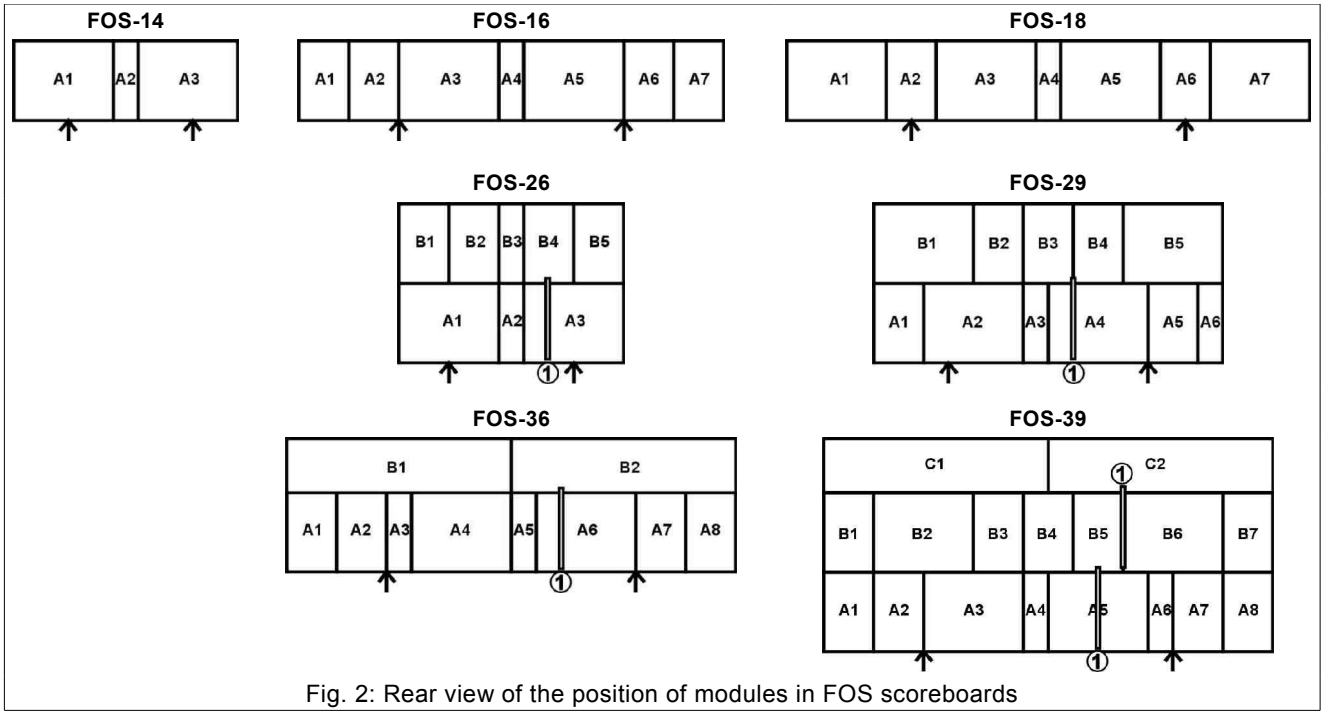


Fig. 2: Rear view of the position of modules in FOS scoreboards

3.2 JOINING THE MODULES VIA BRACKETS

Make sure you have all the necessary pieces at your disposal, which are indicated in the “Parts list” attached to the product.
Assembly should be carried out on the floor. We suggest placing cardboard or other protection on the floor as a supportive base. First assemble each horizontal line of the scoreboard separately, then join them together. For each scoreboard model, the position of each module is indicated by a letter and a number in Fig. 2.

1. The modules lettered '**A**' on their rear side should be positioned with their front sides facing the floor, from left to right, following the order shown in Fig. 2.
2. Identify all the brackets with a '**Z**' profile and marked with the letters “**AL**” and “**AH**”.
   If the scoreboard is less than 200cm wide, go to point 3. If the scoreboard is wider than 200cm, there are multiple brackets with the same lettering that should be joined in order to obtain the desired width of the scoreboard. In such a case, see Fig. 3:
   - Position two brackets having the same label in such a way that the arrows ③ on them face each other.
   - Fit one bracket into the other by slotting the parts together until the two arrows ③ touch.
   - Join the brackets via a **M8x20** hex screw, two washers and nut (Tightening torque: 20Nm – See Fig. 3).

1. **Horizontal brackets with 'Z' profile brackets**
2. **Label identifying the bracket**
3. **Arrows indicating how to join the brackets**
4. **Hex screw M8x20**
5. **Elastic washers**
6. **Nut**

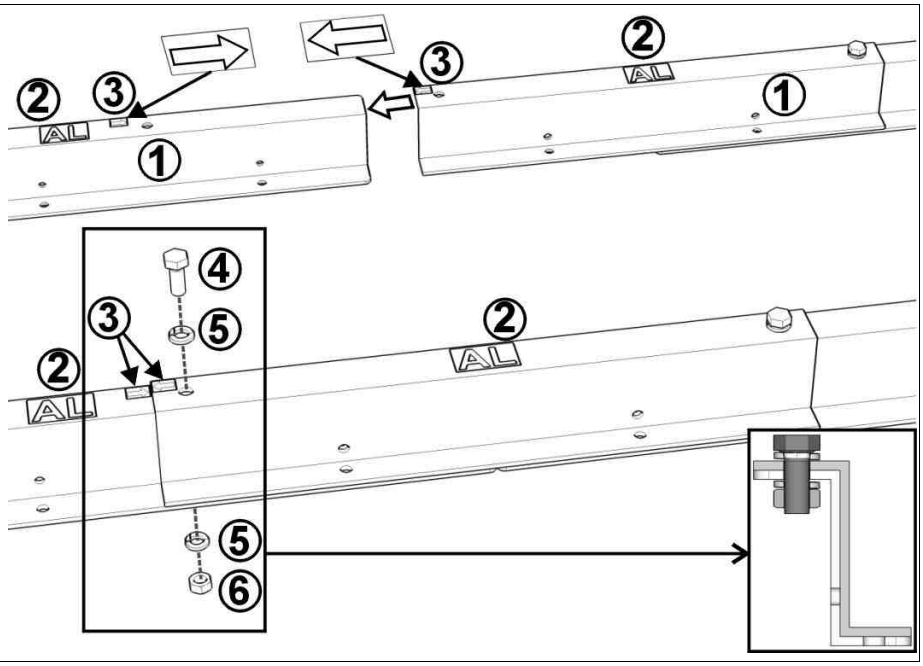


Fig. 3: Joining the '**Z**' profile brackets

3. Place the '**Z**' profile bracket with the label “**AL**” at the bottom edge of the aligned modules so that the fastening holes fit together (see Fig. 4). Then firmly fasten the bracket to the modules by using the **M6x20** screws and washers (Tightening torque: 8Nm). In the example in Fig. 4, modules A1, A2 and A3 correspond to the modules of

the FOS-36 model; therefore, the form of your modules might be different than what is shown in the figure. Repeat the operation for fastening the "**AH**" labeled bracket to the top edge of the modules .

You have now completed the horizontal '**A**' line of the scoreboard.

4. If your scoreboard is composed of only one horizontal line of modules, proceed to point 6. Otherwise, repeat the previous operations (points 1 ~ 3) with the modules and the brackets bearing the letters '**B**' and '**C**', so as to complete the remaining horizontal line of the modules.

1. **Identifying label of modules**
2. **Top bracket "AH" with 'Z' profile**
3. **Bottom bracket "AL" with 'Z' profile**
4. **Elastic washers**
5. **Fastening screw M6x20**

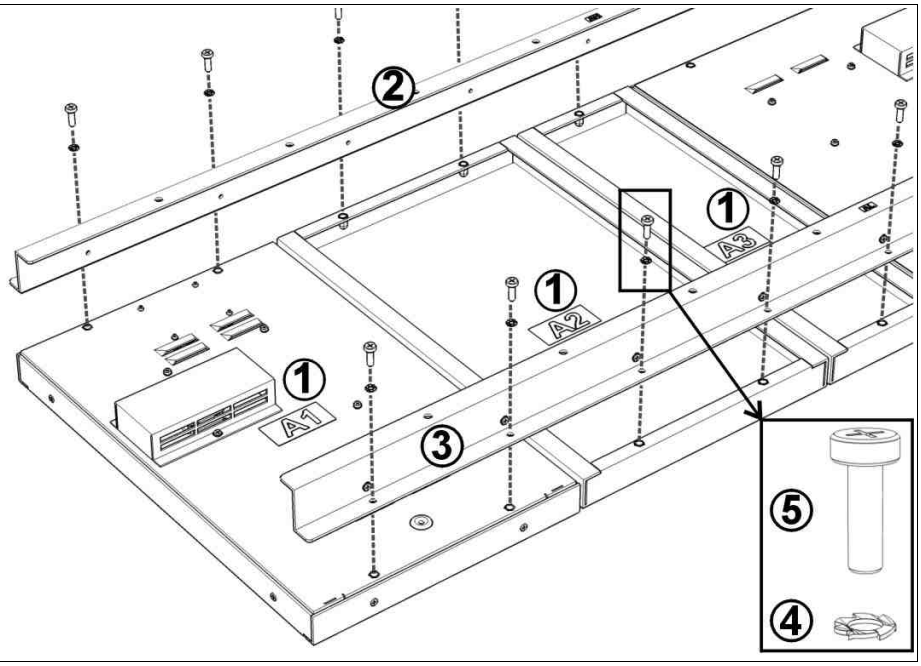


Fig. 4: Fastening the horizontal brackets with '**Z**' profiles

5. After having completed all the line of the modules, position them together following the proper order of lettering (see Fig. 2), so as to form a complete scoreboard.

6. Identify the two large brackets with '**Ω**' profiles, whose form is indicated by the number ② in Fig. 6, and then based on the scoreboard model position them vertically at the two points indicated by the arrows in Fig. 2.
   If the **Radio Receiver** has been purchased along with the scoreboard, it will come already fastened at the top of one of the two '**Ω**' brackets (see Fig. 5). In such a case, position the bracket with the **Radio Receiver** on the right side of the scoreboard (rear view).
   With the **M8x20** screws, washers and nuts (Tightening torque: 20Nm), fasten the two '**Ω**' brackets to all the '**Z**' horizontal brackets as in Fig. 6.

1. **Radio Receiver**
2. **Vertical bracket with 'Ω' bracket**
3. **Cable conduit**

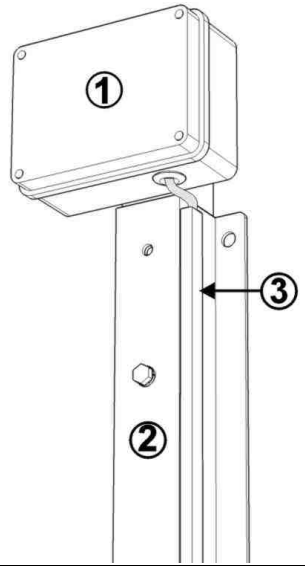


Fig. 5: Vertical bracket and Radio Receiver

7. If the scoreboard is composed of more than one horizontal line of modules, a "cable conduit" should be attached in order to allow the passage of module cables from the top line to the lower line. For modules with more than one line, the position for fastening the "cable conduit" is indicated in Fig. 2 by the numbers ①.
   In Fig. 7 illustrates how to fasten the "cable conduit" by using two **M8x20** screws, as well as the proper washers and nuts (Tightening torque: 20Nm).

   You have now completed the mechanical structure of the scoreboard.

1. **Horizontal brackets with 'Z' profile**
2. **Vertical bracket with 'Ω' profile**
3. **Nut**
4. **Elastic washer**
5. **M8x20 screw**

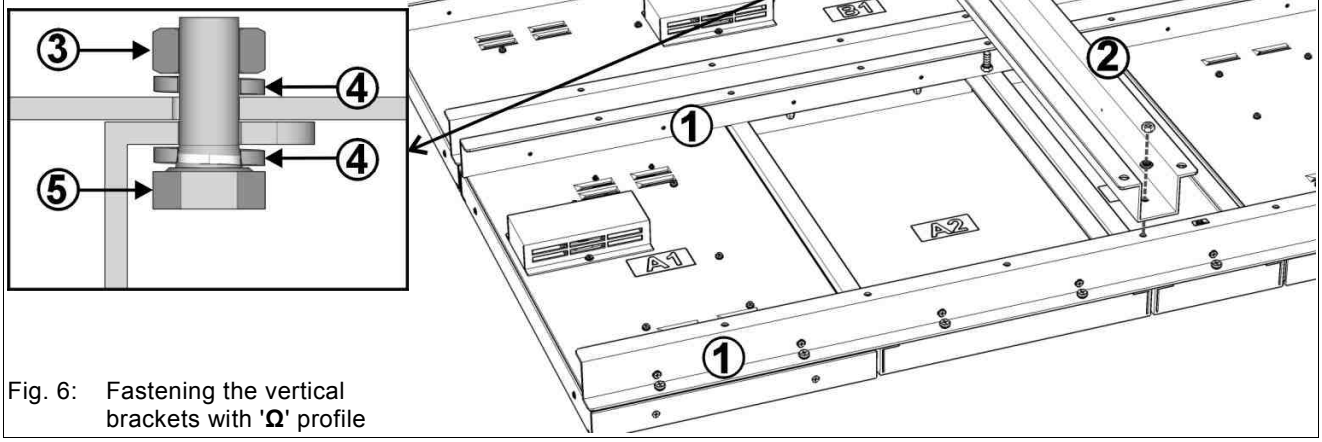


Fig. 6: Fastening the vertical brackets with '**Ω**' profile

1. **Horizontal brackets with 'Z' profile**
2. **Cable conduit (bottom)**
3. **Nut M8**
4. **Elastic washer M8**
5. **Screw M8x20**

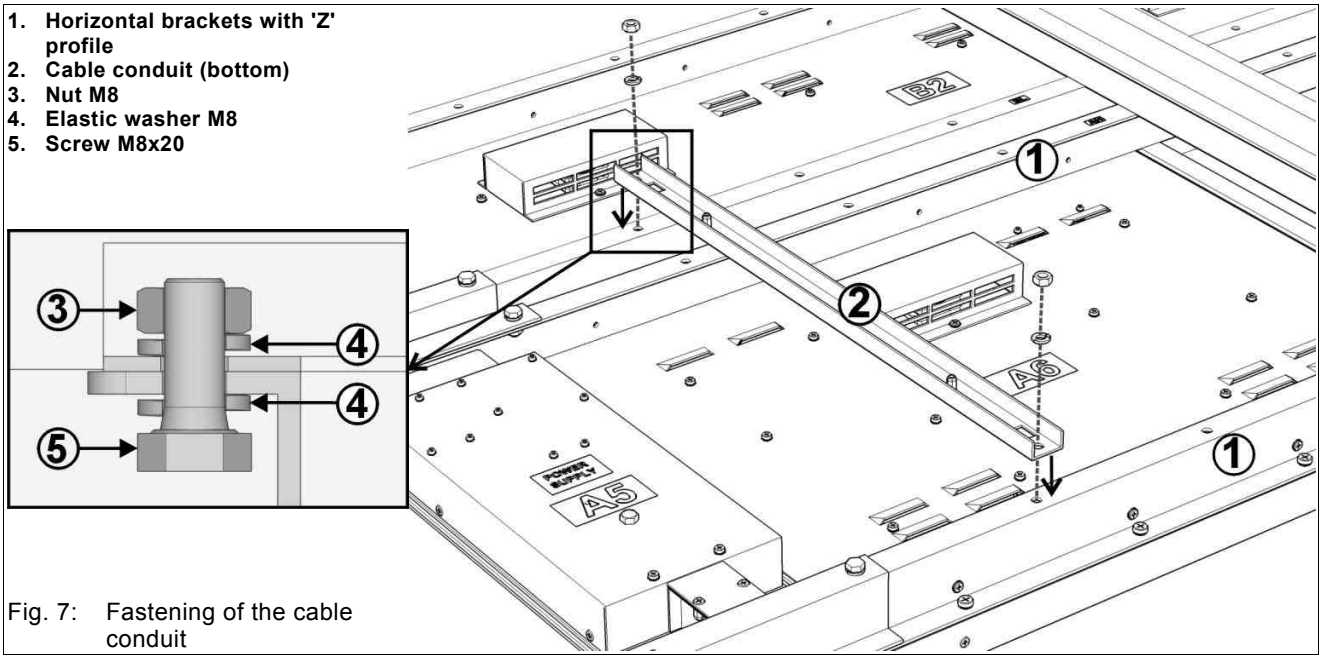


Fig. 7: Fastening of the cable conduit

3.3 ELECTRICAL CONNECTION OF MODULES

After having joined all the scoreboard modules with the various brackets, you can proceed with the electrical connection of the modules. The cable leading out of each module must reach the **POWER SUPPLY** module, which is indicated by the corresponding label.

1. Introduce the cables of all the modules into the cable conduits through the proper hole (see Fig. 8), until you are able to bring the cables in close proximity of the **POWER SUPPLY** module. At this point, with the proper cover and two **M5x16** screws, close the vertical “cable conduits” for the passage of the cables of the top modules as indicated in Fig. 9.
2. Unscrew the two **M5x16** screws and remove the cover of the cable entry conduit, located at the bottom of the **POWER SUPPLY** module (see Fig. 10), in order to make the opening where the cables should be introduced more visible.
   Introduce, one by one and to their full available length, all the cables from the various modules. If there is a **Radio Receiver**, introduce its cable. Otherwise introduce the serial data cable provided (length 5m) for circa 40cm. Then close the cover to the cable entry conduit.

3. Turn the scoreboard over so that the front faces upwards, being careful not to cause any damage or injuries.

1. **Horizontal brackets with 'Z' profile**
2. **Horizontal cable conduit**
3. **Vertical cable conduit (bottom)**
4. **Opening for cable entry**
5. **Connecting cable**
6. **Window for passage of cables**

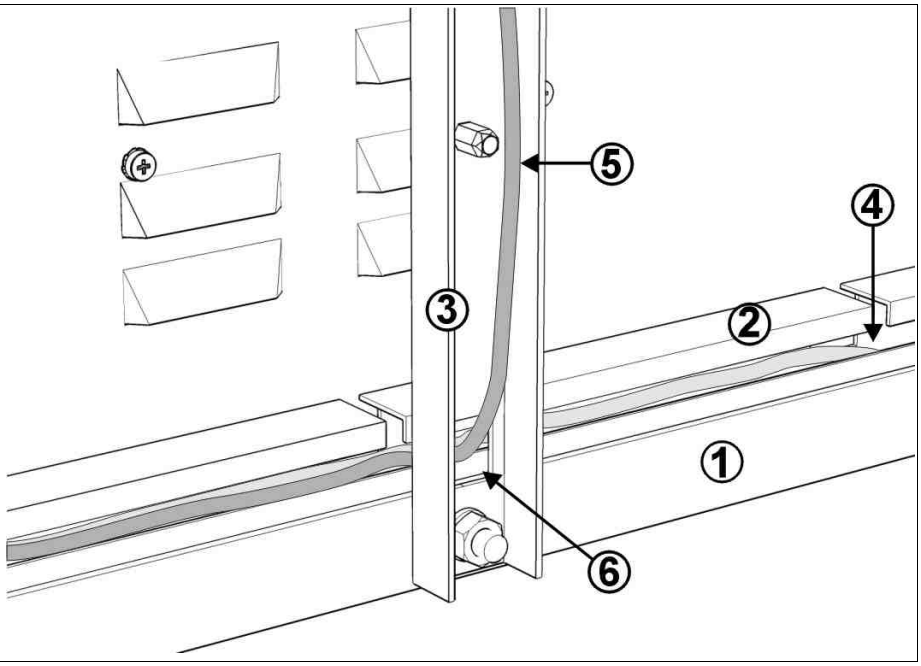


Fig. 8: Insertion of cables in the conduits

1. **Vertical cable conduit (bottom)**
2. **Cover of the vertical cable conduit**
3. **M5x16 screw**

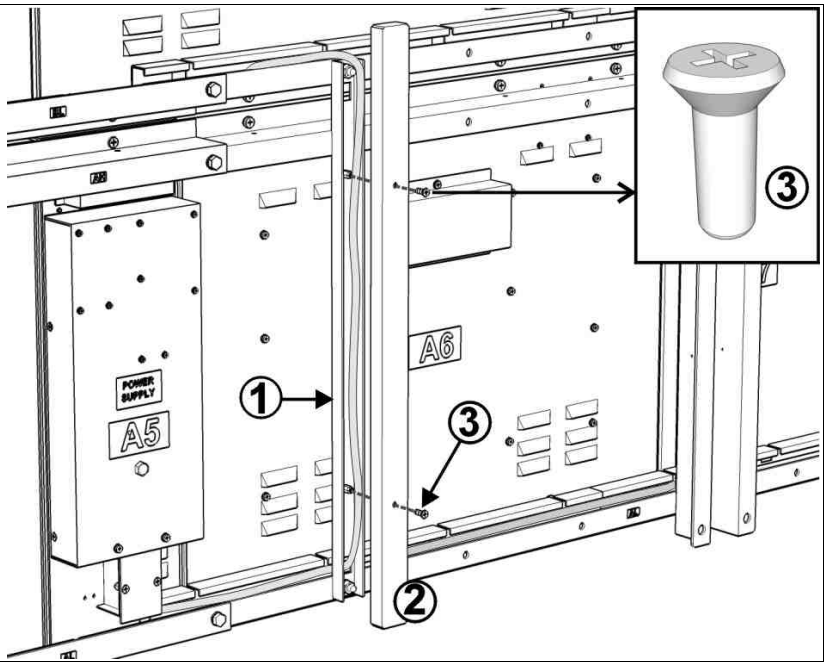


Fig. 9: Closure of the vertical cable conduits

4. Remove the front of the **POWER SUPPLY** module by unscrewing the 4 fastening screws (see Fig. 11).
5. Allow for the previously introduced cables to pass under the horn and insert them into the connectors of the boards, following the directions at the bottom of the module (Fig. 11 and Fig. 19). Connect each cable to one of the connectors of the board with the same label. For example, connect the cable labeled '**JD**' to one of any of the connectors on the board labeled '**JD**'.
   In the connectors of the **HUB+12V** board, which is present only if there are **ALPHA** modules displaying team names, you should insert the cables labeled '**JA**' belonging to those modules.
   Connect the serial data cable into the connector labeled '**DATA IN**'. While the cable for the **Radio Receiver** should be connected to the connector labeled '**RR**'.
6. Tighten the nuts of the cable clamps to firmly fasten the cables (Fig. 11, number ⑧), then close the module with the front piece.

1. **POWER SUPPLY module**
2. **Cable entry port**
3. **Cover of the cable entry conduit**
4. **M5x16 screws**
5. **Serial data cable (belonging to the Console)**

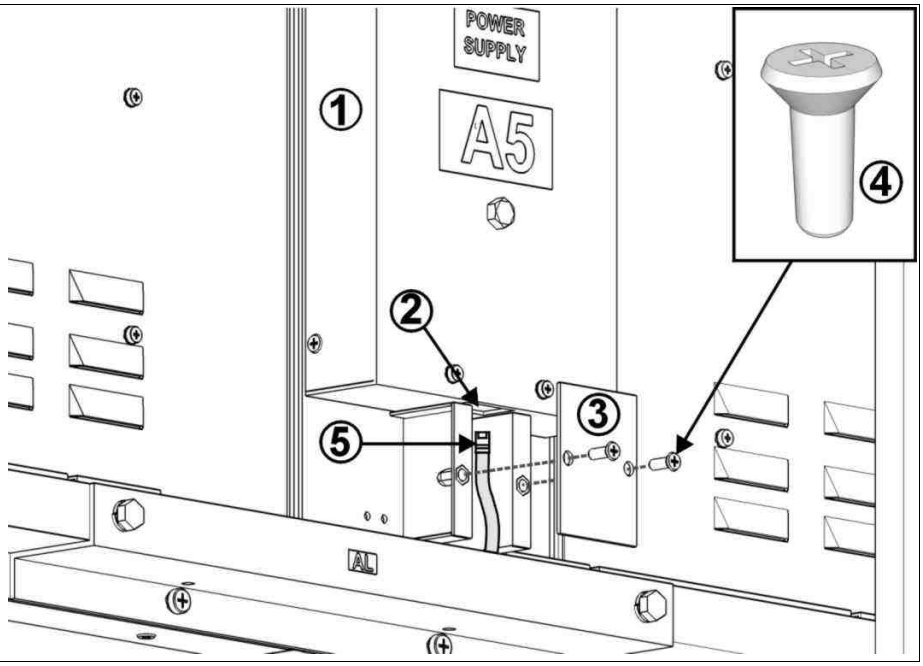


Fig. 10: Rear side of the **POWER SUPPLY** module

1. **Front piece of POWER SUPPLY module**
2. **M5x16 screws**
3. **Power supply +24V**
4. **Power supply +12V (present only in some modules)**
5. **HUB+24V Board**
6. **HUB+12V Board (present only in some modules)**
7. **Horn**
8. **Cable clamps**
9. **Fan**
10. **Cable connector (a: yellow, b: blue, c: brown)**

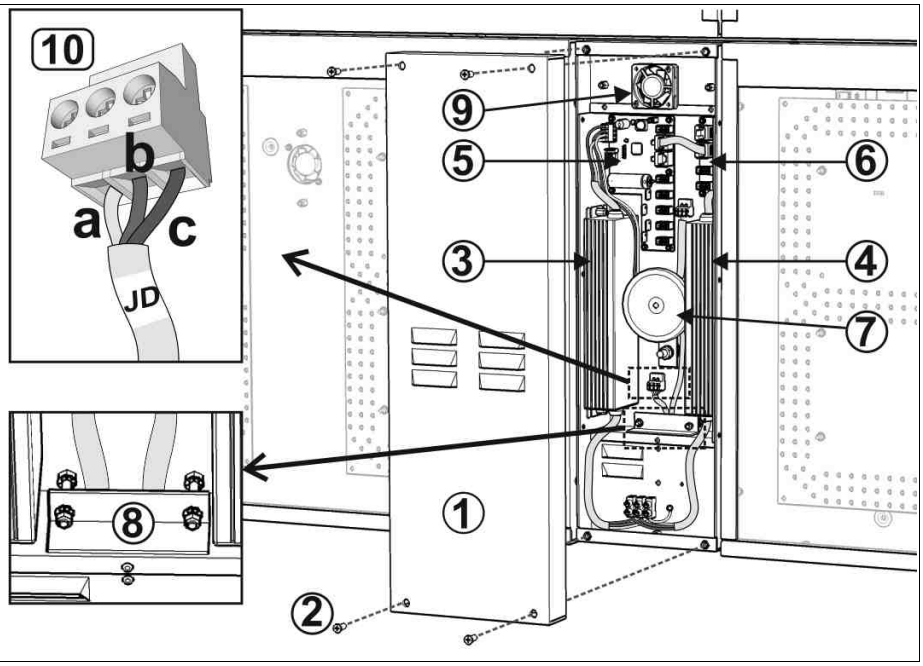


Fig. 11: Interior view of **POWER SUPPLY** module

3.4 PRELIMINARY OPERATING TEST

Before proceeding to fasten the assembled scoreboard to the support structure, we advise making a preliminary test in order to verify that the scoreboard operates correctly. For that purpose, in order to connect to the power supply network please use a temporary power supply cable with a cross section of 1.5 mm^2, such as an H05VV-F type. For testing the scoreboard, see chapter 8.2.

4. SUPPORT STRUCTURE

The support structure of the scoreboard depends on several factors, such as the size and weight of the scoreboard, the height with respect to the ground, the type and seismicity of the zone, the wind speed, etc... Therefore, it MUST be designed and certified by a qualified technician according to the regulations of the country in which the scoreboard is installed.

4.1 CHOICE OF POSITION

When possible, in order to avoid glare and reflection during sunset, we suggest that the scoreboard be positioned with its front side facing North-East if you are north of the equator, and facing South-East if you are south of the equator. Choose the height with respect to the ground so as to:

- favor the spectator's view;
- avoid acts of vandalism;
- facilitate maintenance.

Please be reminded that your FOS series scoreboard is resistant to blows from balls and therefore requires no additional front protection.

4.2 SUPPORT SYSTEM

We suggest that the structure used for supporting the FOS series scoreboards be composed of two vertical 'H' UNI 5397-78 beams (not provided), which should be fixed into the ground in a foundation of reinforced concrete.
Following are some suggestions (Fig. 12, Table 2, Table 3) regarding the support structure which may help when making an estimate of installation costs, but which should not be quoted for production purposes. In certain cases (for example for wind speed of over 140km/h) three support beams may be necessary.

Please remember that the support structure should be designed and certified by a qualified technician.

Scoreboard					Wind: 115 [km/h]		Wind: 140 [km/h]	
Model	Weight [kg]	Height 'h' [cm]	Width 'w' [cm]	Distance 'd' [cm]	Foundation F [cm] x D [cm]	Beam (UNI 5397-78) - Length [cm]	Foundation F [cm] x D [cm]	Beam (UNI 5397-78) - Length [cm]
FOS-14	26	59	166.5	92.5	100 x 50	HE120A - 460	100 x 50	HE120A - 460
FOS-16	43	59	314.5	166.5	100 x 50	HE120A - 460	150 x 50	HE120A - 510
FOS-18	50	59	388.5	203.5	100 x 50	HE120A - 460	150 x 50	HE120A - 510
FOS-26	46	118	166.5	92.5	100 x 50	HE120A - 520	150 x 50	HE120A - 570
FOS-29	66	118	259	148	150 x 50	HE120A - 570	180 x 50	HE120A - 600
FOS-36	75	99	333	185	150 x 50	HE120A - 550	180 x 50	HE120A - 580
FOS-39	110	158	333	185	180 x 50	HE120A - 640	200 x 50	HE140A - 660

Table 2: Mounting the scoreboard at elevation (H) = 300cm

Scoreboard					Wind: 115 [km/h]		Wind: 140 [km/h]	
Model	Weight [kg]	Height 'h' [cm]	Width'w' [cm]	Distance 'd' [cm]	Foundation F [cm] x D [cm]	Beam (UNI 5397-78) - Length [cm]	Foundation F [cm] x D [cm]	Beam (UNI 5397-78) - Length [cm]
FOS-14	26	59	166.5	92.5	100 x 50	HE120A - 660	100 x 50	HE120A - 660
FOS-16	43	59	314.5	166.5	100 x 50	HE120A - 660	100 x 50	HE120A - 710
FOS-18	50	59	388.5	203.5	100 x 50	HE120A - 660	150 x 50	HE140A - 710
FOS-26	46	118	166.5	92.5	100 x 50	HE120A -720	150 x 50	HE140A - 770
FOS-29	66	118	259	148	150 x 50	HE140A - 770	180 x 50	HE160A - 800
FOS-36	75	99	333	185	150 x 50	HE140A - 750	180 x 50	HE160A - 780
FOS-39	110	158	333	185	200 x 50	HE160A - 840	220 x 50	HE180A - 860

Table 3: Mounting the scoreboard at elevation (H) = 500cm

w: width of scoreboard
h: height of scoreboard
d: distance between support beams
H: elevation of scoreboard
F: depth of foundation
D: diameter of foundation

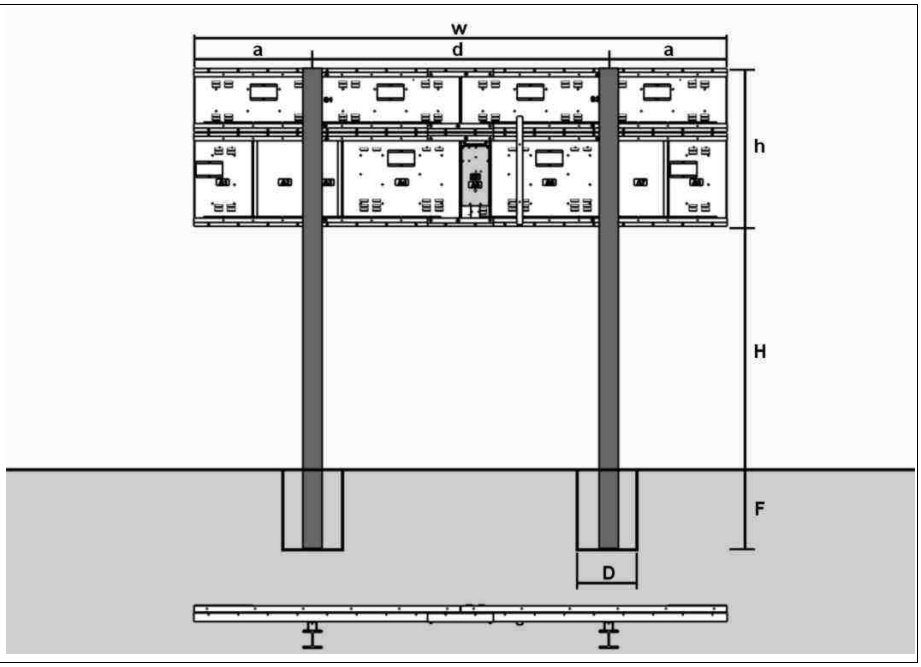


Fig. 12: Example of support structure

5. MOUNTING TO THE SUPPORT STRUCTURE

Once the support structure is completed you may proceed with mounting the scoreboard to it.

5.1 LIFTING THE SCOREBOARD

To lift the scoreboard pass the lifting ropes under the point where the top horizontal bracket and the vertical brackets meet (Fig. 13). We highly recommend:

- that all methods/devices used are certified and checked according to regulations in effect;
- that the angle made by the ropes is greater than 45° (see Fig. 13) so as to limit strain on the scoreboard brackets;
- not to exceed the maximum load indicated for the lifting devices and particularly for the ropes, keeping in mind that a 45° angle increases the strain on the ropes by nearly 50%.
- that you lift the scoreboard slowly and check that the ropes are adequately positioned and the load is stable.

Favero Electronic Design will not assume any responsibility for possible injury or damage caused to persons or things if the instructions for lifting outlined in this manual are not properly followed.

1. **Scoreboard**
2. **Lifting ropes**

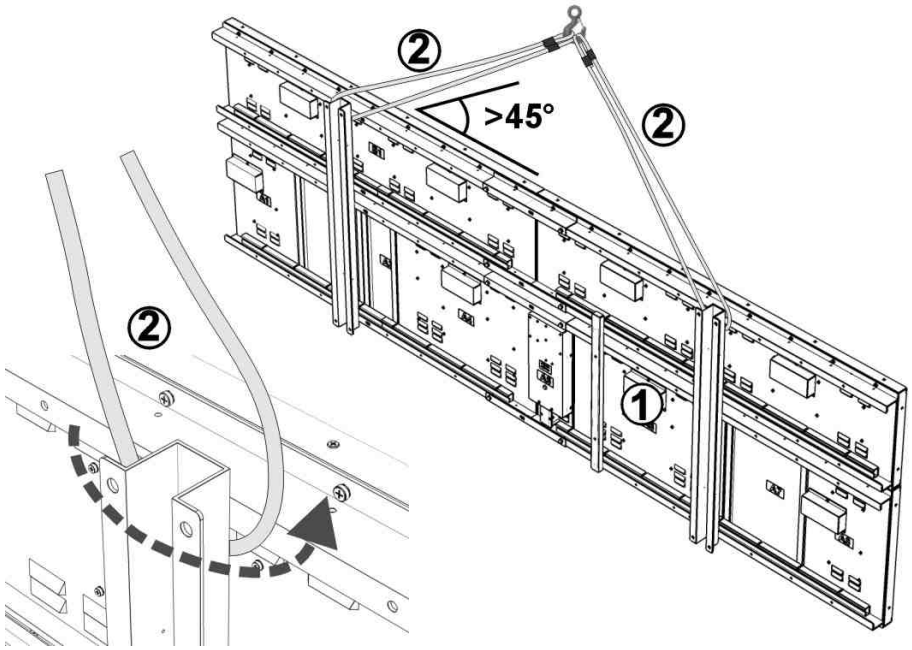


Fig. 13: Lifting the scoreboard

1. **Scoreboard**
2. **Horizontal bracket with 'Ω' profile**
3. **'H' support beam**
4. **Fastening hole**

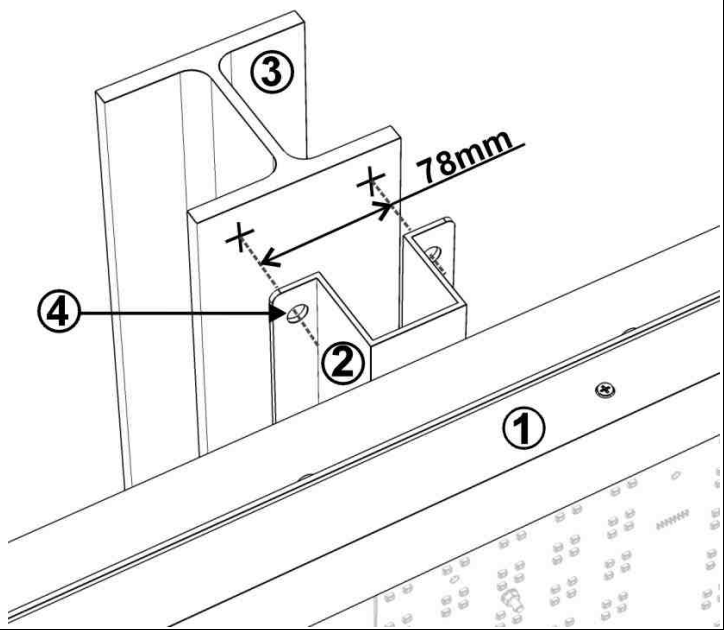


Fig. 14: Position of holes on the support beams

5.2 MOUNTING THE SCOREBOARD

After having raised the scoreboard to the desired height, proceed as follows:

1. Position the scoreboard near the support beams so that the vertical '**Ω**' profile brackets touch it.
   Make sure that the scoreboard is horizontal. Lock it temporarily to the beams with the brackets and then mark the corresponding points to which the holes of the brackets should be fastened (Fig. 14). For each bracket there should be two upper holes and two bottom holes, and for the higher brackets (FOS-39 scoreboard) there should also be two holes at middle height.
2. Distance the scoreboard from the support beams. Make the holes (10mm diameter) in the support beams at the points marked out in step 1 above.

3. Reposition the scoreboard near the beams and fasten it with the **M8x50** screws, the washers, and the nuts (see Fig. 15 – Tightening torque: 20Nm).

Check periodically that the mounting of the scoreboard is absolutely secure, making sure it cannot fall and cause injury or damage.

1. **Scoreboard**
2. **Vertical bracket with 'Ω' profile**
3. **Support beam**
4. **Nut M8**
5. **Elastic washer**
6. **Hex screw M8x50**

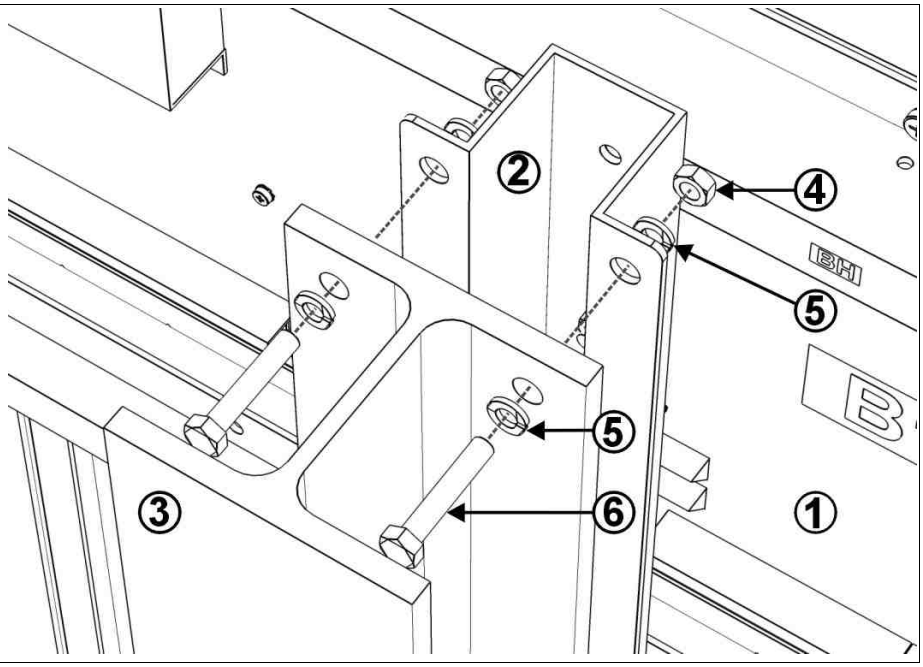


Fig. 15: Mounting the scoreboard

6. ELECTRICAL POWER SUPPLY

Please remember that the electrical power supply system MUST be designed and implemented by qualified technicians.

6.1 POWER SUPPLY CABLE

The power supply cable (not provided) must be of the H05VV-F type, with three conductors (Line, Neutral, and PE), and a cross section area of 1.5 ~ 6.0 mm^2 (AWG 14 ~ 8). One must also keep in mind the decrease in voltage due to the power absorbed by the scoreboard (see Ch. 1.) and the length of the cable.

6.2 POWER SWITCH DEVICE

There MUST be a power switch device (isolating switch) in the electrical system in order to switch off the scoreboard when it is not being used or while under maintenance. The power switch device must:

- conform with federal/state installation regulations;
- be a double pole type to ensure separation between Line and Neutral;
- have a distance between contacts which ensures the complete disconnection of the power supply network under conditions of overvoltage category III;
- be easily accessible.

At any rate, we suggest placing an automatic residual current circuit breaker with overload protection in front of the scoreboard which has:

- a tripping current that complies with regulations in force (30mA),
- class A status and a type C thermal instantaneous tripping current,
- 230Vac nominal voltage,
- 6A nominal current,
- 4.5kA breaking capacity.

6.3 GROUNDING

The scoreboard MUST be connected to a grounding system via the power supply cable and in compliance with the technical regulations of the country where it is installed.

If the installation area is subject to lightning, we advise creating a further grounding connection of the scoreboard's metallic structure (see Fig. 16), using a proper ground rod or other adequate measures. Follow the directions of a competent technician to obtain a proper grounded electrical conduction.
Nonetheless, this does not guarantee protection against direct lightning caused by the presence of high energy levels. Please note that the support structure cannot be used as a grounding rod, in that the cement foundation is not a proper electrical ground plate.

1. **Scoreboard**
2. **POWER SUPPLY module**
3. **Power switch**
4. **Grounding rod**
5. **Serial data cable**
6. **Power supply cable**

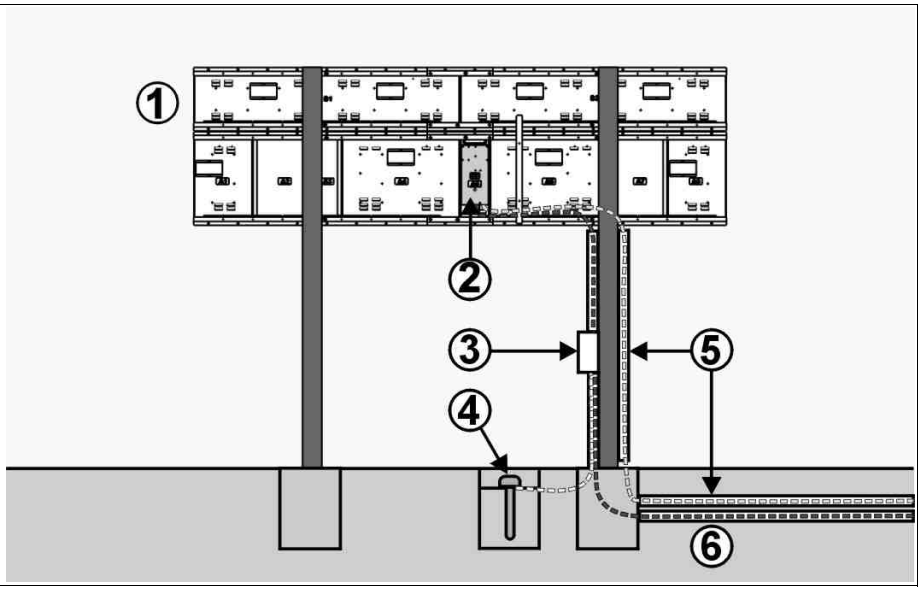


Fig. 16: Grounding

6.4 Fuses

There are two fuses housed on the **Hub+12V** board with the following characteristics: **Glass 5x20mm, F 6.3A L 250V**.

7. Serial data cable system

This system is not necessary if you have a Command Console with the radio transmitter and corresponding **Radio Receiver** connected to the scoreboard. In such a case, and if you do not wish to make a connection via cable to the Console, go to chapter 8.

Each scoreboard is provided with a serial data cable of the required length (from 60 to 200m) for connection to the Command Console. To install this cable, follow the indications below:

- **do not under any circumstances pass the cable through the same conduits used for the cables of the electrical system**, both for safety reasons as well as to avoid electrical disturbances from motors, air conditioners, generators, etc.;
- **we highly suggest that you lay the conduits underground** in order to reduce outside interference;
- avoid routes that expose the cable to the possibility of mechanical damage, high temperatures, or acts of vandalism;
- make sure the serial data cable reaches the proximity of the scoreboard's **POWER SUPPLY** module, leaving a space of 60-80cm;
- if you need a disconnection point a few meters from the side of the Command Console, use a short extension cable such as the 5m cable provided.

It is easy to create a cable of the desired length with a pliers for RJ-45 connecters: use a cat. 5 or 6 network cable and connect the single wires of the cable as indicated in Fig. 17. For distances of under 50m, a straight-through network cable (EIA/TIA-568A/B) can also be used. You can find cables of various lengths for sale on the market.

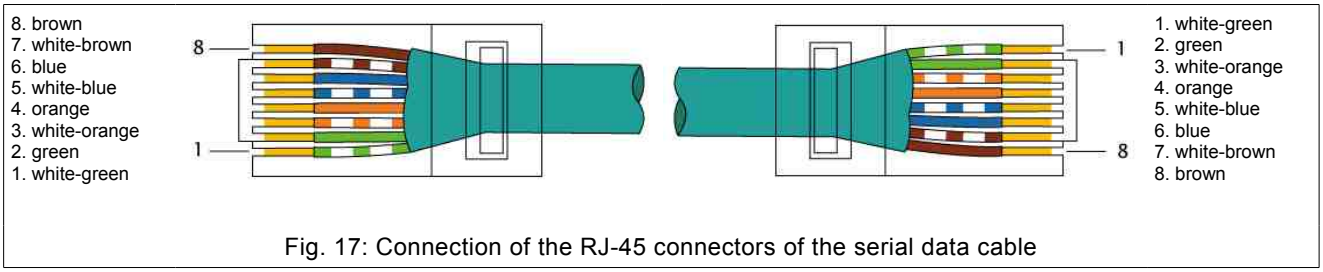


Fig. 17: Connection of the RJ-45 connectors of the serial data cable

8. Final connections and scoreboard testing

After having realized the electrical systems for the power supply cable and serial data cable, you can now connect them to the scoreboard.

8.1 Connection of power supply cable and serial data cable

Proceed as follows:

1. From the **POWER SUPPLY** module remove the front piece and the rear cable entry conduit cover (Fig. 10, Fig. 11), then loosen the screws of the cable clamps (Fig. 18).

2. Position the power supply cable at the rear entrance of the **POWER SUPPLY** module by passing it through a conduit (not provided) that has no rough edges. Do not use the conduits for the module cables.
3. Introduce the permanent power supply cable and connect the wires, terminating with the proper pin terminals, to the screw terminals as indicated in Fig. 18.
4. Introduce the serial data cable into the **POWER SUPPLY** module (Fig. 19) and make sure it passes under the horn. Then insert it into the board connector labeled "**DATA IN**".
5. Secure the cable clamps by tightening the two nuts (Fig. 11, Fig. 18), making sure that the cable cover is properly closed to prevent insects from entering. Then close the front piece and the rear cover of the **POWER SUPPLY** module.

1. **Line (brown, black or grey)**
2. **Neutral (blue)**
3. **Ground - PE (yellow/green)**
4. **Earthing terminal – PE**
5. **POWER SUPPLY module**
6. **Cable clamps**
7. **Holding nuts for the cable clamps**

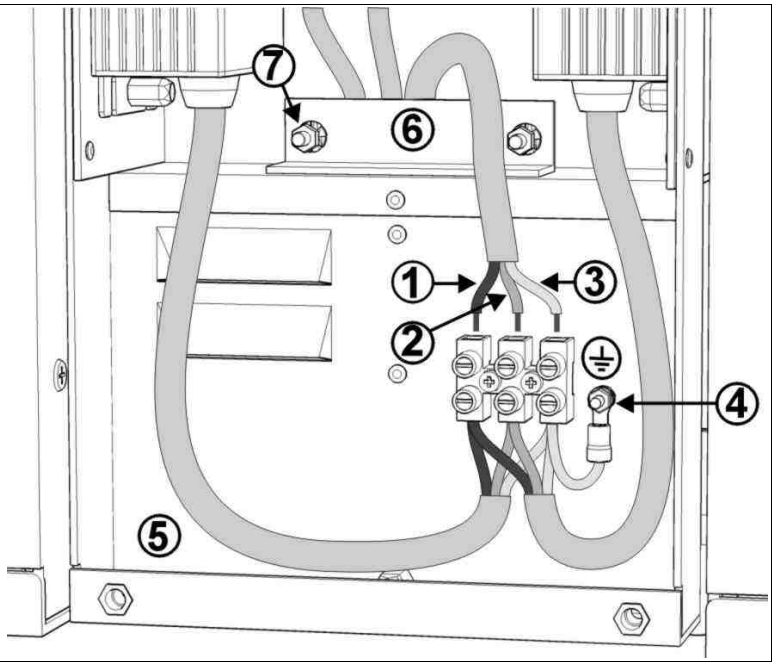


Fig. 18: Connecting the power supply cable to the **POWER SUPPLY** module

1. **HUB+24V board**
2. **HUB+12V board (present only in some models)**
3. **Fuses of the HUB+12V board**
4. **Serial data cable**
5. **Cable for connection to modules**
6. **Terminal block power supply +24V**
7. **Terminal block power supply +12V (present only in some models)**
8. **Red LED**

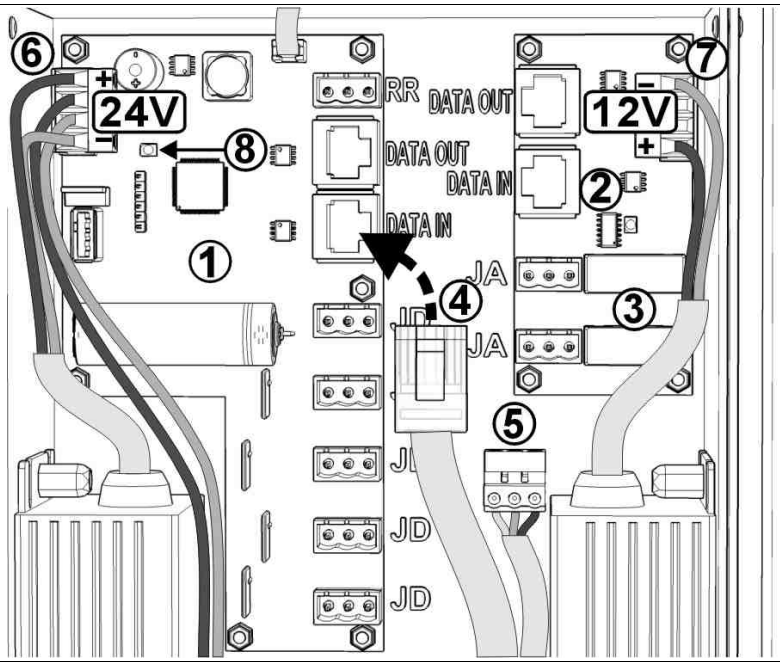


Fig. 19: Connection of serial data cable

8.2 SCOREBOARD TEST

Once the electrical connections are completed, you can proceed to checking the overall functioning of the scoreboard, i.e., that all information displays correctly.

1. The first check takes place the moment you activate the scoreboard's "switch on" button while the Console is turned off. All displays should remain lit up for circa 1 second, followed by the display of the time of day. If there is no sign that the mechanism has been switched on, go to paragraph 9.1.1
2. Next turn on the console and, if you do not have radio communication, connect the serial data cable belonging to the scoreboard to one of the two "**Data Serial Outputs**" of the Console. The scoreboard will display all the information present on the Console screen. If the information is not displayed, see paragraph 9.1.5

3. Once you have verified that the connection to the Console functions correctly, you may make a complete switch on test of all the scoreboard's displays. On the Command Console press the Setup Menu ➔ SYSTEM buttons, then with the ⇧ and ⇩ buttons select the "Scoreboard test" parameter. Lastly, with the ⊕ and ⊖ buttons, modify this parameter in order to activate and deactivate the complete switching on of the scoreboard. If you have any problems, please refer to the Command Console manual.

If you find that some information is not displayed in full, go to chapter 9.1

9. PROBLEM SOLVING

This chapter contains information concerning the principal problems that may arise during the scoreboard's life. It is aimed at helping you to quickly resolve such problems. If you encounter a problem that is not explained here, please contact us, describing the problem in detail, at *support@favero.com*.
For all malfunctions, the following is a list of operations, ranked according to priority, to be carried out in order to re-establish the scoreboard's proper functioning.

9.1 OPERATING MALFUNCTIONS

9.1.1 The scoreboard does not light up when switched on.

When the scoreboard is supplied with electricity, all the displays should light up for circa 1 second, even if the Command Console is turned off or disconnected. If this does not occur, proceed as follows:

1. Check that there is power supply at the scoreboard's power switch.
2. Make sure that the power supply cable is properly connected.
3. Have a qualified technician carry out the following operations:
   a) open the **POWER SUPPLY** module (see Fig. 11);
   b) if with a multimeter you discover there is no power supply at the terminals (see Fig. 18), check the power supply cable;
   c) if there is no +24Vdc voltage in the terminal block at the upper left side of the **HUB+24V** board (see Fig. 19), replace the power supply +24V (ch. 9.6);
   d) if the red LED of the **HUB+24V** board does not light up, replace the board (ch. 9.5).

9.1.2 The scoreboard does not display the data from the Console but only the time of day.

This malfunction is due to the scoreboard not being connected to the Console. The time of day will display if the scoreboard does not receive data when the Console is turned off or disconnected.
If a connection via radio (Radio Console and Scoreboard with Radio Receiver) is used, please refer to the manual for the **Radio Receiver.** Otherwise:

1. Check that the Console is connected and that the display for the time of day has not been activated (see ch. 4.6 of the Console manual).
2. Check that the serial data cable is properly connected, both to the scoreboard as well as to the Command Console, and that it shows no signs of abrasions, cuts or other types of damage.
3. Try using the other "**Data serial outputs**" of the Command Console.
4. If you have another Console, try using it.
5. Open the **POWER SUPPLY** module (see Fig. 11). Temporarily disconnect the serial data cable, which is inserted in the "**DATA IN**" connector, from the fixed system and then directly connect the Console via the 5m serial data cable provided with the scoreboard, or via a standard straight-through network cable (EIA/TIA-568A/B). If the scoreboard functions correctly, then replace the serial data cable from the fixed system, otherwise replace the **HUB+24V** board (ch. 9.5).

9.1.3 An entire digit (DIGIT board) or part of a digit does not light up.

1. Open the module containing the **DIGIT** board (see ch. 9.2).
   If the red LED of the **DRIVER** board is illuminated or flashing (see Fig. 23):
   a) replace the **DIGIT** board (ch. 9.3);
   b) replace the **DRIVER** board (ch 9.4);
   c) change the flat cable connecting to the **DIGIT** board.

   If the red LED of the **DRIVER** board is not illuminated:
   a) check the connection to the **POWER SUPPLY** module;
   b) replace the **DRIVER** board (ch. 9.4);
   c) replace the **HUB+24V** board (ch. 9.5).

9.1.4 The digits (DIGIT boards) display a flashing '**E1**'.

This is an error message indicating an excess of temperature in the **POWER SUPPLY** module.

1. If the fan of the **POWER SUPPLY** module does not turn on automatically, replace it.
2. Replace the **HUB+24V** board (ch. 9.5).

9.1.5 A digit (DIGIT board) displays '**E**' and '**2**' alternatively.

This is an error message indicating that the module is not receiving correct data.

1. Check the connection between the **DIGIT** module and the **POWER SUPPLY** module.

2. Replace the module's **DRIVER** board (see ch. 9.4).
3. Replace the **HUB+24V** board (see ch. 9.5).

9.1.6 The brightness of the scoreboard, or a part of the scoreboard, is weak.

The brightness is controlled by the Command Console; however, if the temperature inside a module of the scoreboard is too high, the brightness of the LEDs is diminished to avoid deterioration.

1. On the Command Console press the Setup Menu ➔ SYSTEM buttons and check the programmed level [from 0 to 9] under the heading "Scoreboard brightness".
2. Check that the ventilation ports of the modules are not dirty. If necessary, clean them with a brush or with compressed air.
3. Each time the scoreboard is switched on, the fans of all the modules (also of the **POWER SUPPLY**) begin operating for several minutes. Check that they are functioning and replace any that may not be operating.

9.1.7 An entire DIGIT or ALPHA module of the scoreboard does not light up.

1. Check the connection of the module to the **POWER SUPPLY** module.
2. For **ALPHA** modules, check that the fuses present on the **HUB+12V** board are connected properly (see Fig. 19).
3. Replace the **DRIVER** board of the module (see ch. 9.4).

9.1.8 The acoustic signal (Horn) does not work.

1. On the Command Console press the buttons Setup Menu ➔ SYSTEM, then select level 3 from the line "Sound volume".
2. On the Command Console press the buttons Setup Menu ➔ SPORT, then select a number other than 0 from the line "Duration of end game sound".
3. Check the sound by pressing the button SOUND.
4. Have a qualified technician conduct the following operations:
   a) remove the front cover of the **POWER SUPPLY** module (Fig. 11);
   b) protect your own hearing and then, while paying attention to the polarity (red cable: +), disconnect the cables of the horn and directly supply power with a DC voltage of +24 V;
   c) if the horn still does not emit a sound, replace it. Otherwise replace the **HUB+24V** board (ch. 9.5).

9.2 OPENING A DIGIT MODULE

1. Disconnect the scoreboard´s power supply and make sure it cannot be re-enabled.
2. If the module is located at the top part of the scoreboard, go to point 3; Otherwise, when it is located under another module:
   a) at the rear, unscrew the top fastening screws of the module from the horizontal bracket (Fig.20);
   b) tilt the module forward slightly so that the screws of the top profile of the transparent front piece stick slightly out (Fig. 21).
3. Unscrew the fastening screws and remove the top profile blocking the transparent panel (Fig. 21).
4. Slide the transparent front panel out in an upwards direction.

1. Module
2. Fastening screws

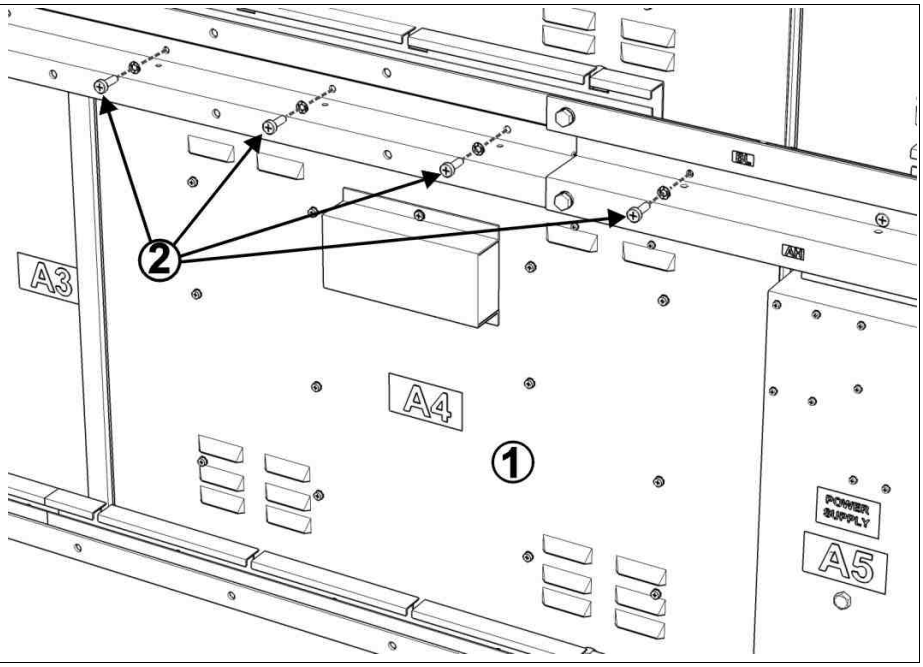


Fig.20: Top fastening screws of the module

1. **Module**
2. **Blocking profile of front panel**
3. **Fastening screws of the profile**
4. **Transparent front panel**

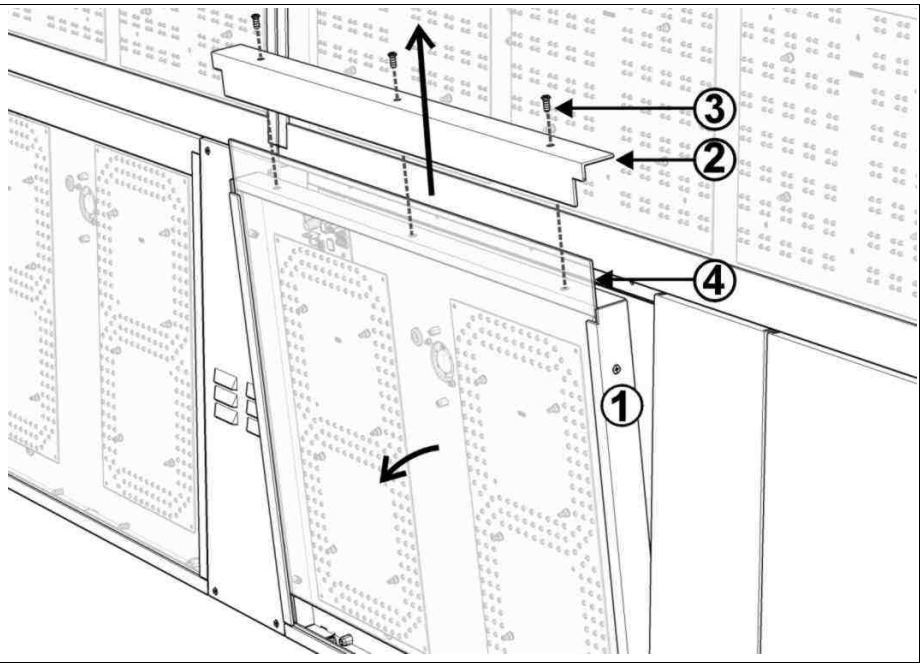


Fig. 21: Blocking profile of the transparent front panel

9.3 REPLACING A LED DISPLAY BOARD

The procedure for replacing a LED display board regarding digits (**DIGIT** board) or characters (**ALPHA** board) is the same.

1. Open the module (par. 9.2) containing the board that needs replacing.
2. Unscrew the fastening screws of the board, remove the board from its place, and disconnect the flat cable. The example in Fig. 22 refers to a **DIGIT** board.
3. Insert the flat cable connector into the new board, then fasten it in place again.
4. Close the module and supply power again to the scoreboard in order to check the functioning of the new board.

1. **Digit board**
2. **M4 fastening nuts of the board**
3. **Driver board**
4. **Flat connecting cable**

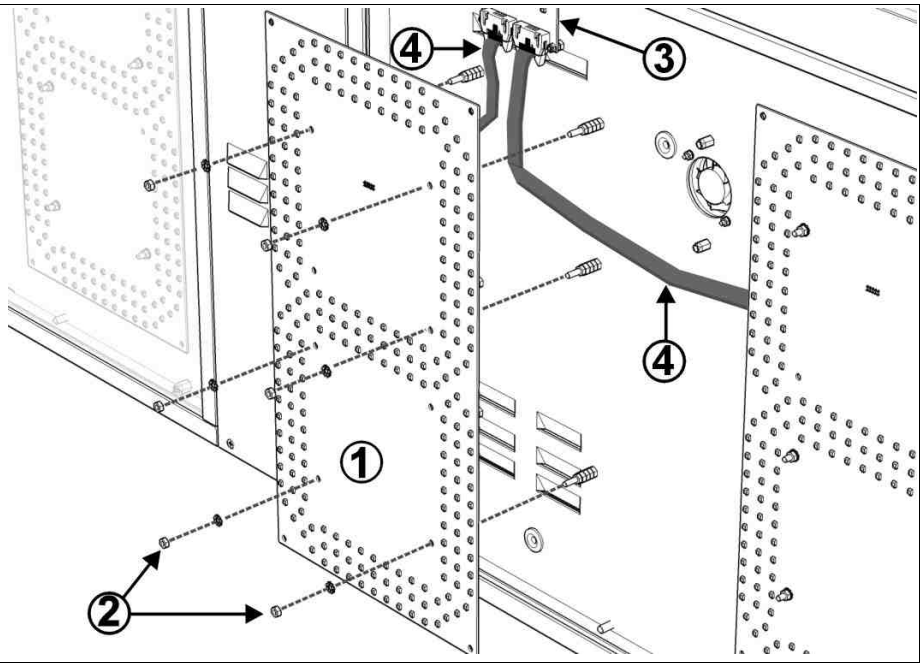


Fig. 22: Replacing a **DIGIT** board

9.4 REPLACING A DRIVER BOARD

Each display module contains a **DRIVER** board. The board can be different based on the command of the LED boards which display either digits (**DIGIT** boards) or characters (**ALPHA** boards). The procedure for replacing **DRIVER** boards is the same in both cases. The following figures refer to a **DIGIT** module.

1. Open the module (par. 9.2) containing the board that needs replacing.
2. Unscrew the fastening screws and remove the **DIGIT** board (Fig. 22) located in front of the **DRIVER** board.

3. Remove all connectors from the **DRIVER** board, making note of their position, then unscrew the nuts (Fig. 23) and remove the **DRIVER** board from its place.
4. Set the Dip-Switches of the new **DRIVER** board as those of the replaced board (see ch. 10.) and fasten the new **DRIVER** board into place. Then reinsert the connectors in their original position in the **DRIVER** board.
5. Reposition and fasten the previously removed **DIGIT** board.
6. Close the module and supply energy to the board to check the functioning of the new **DRIVER** board.

1. **The DRIVER board**
2. **Dip-Switch**
3. **M3 nuts**
4. **Connections to the DIGIT board**
5. **Power supply and data connection**
6. **Connection to the fan**
7. **Red LED**

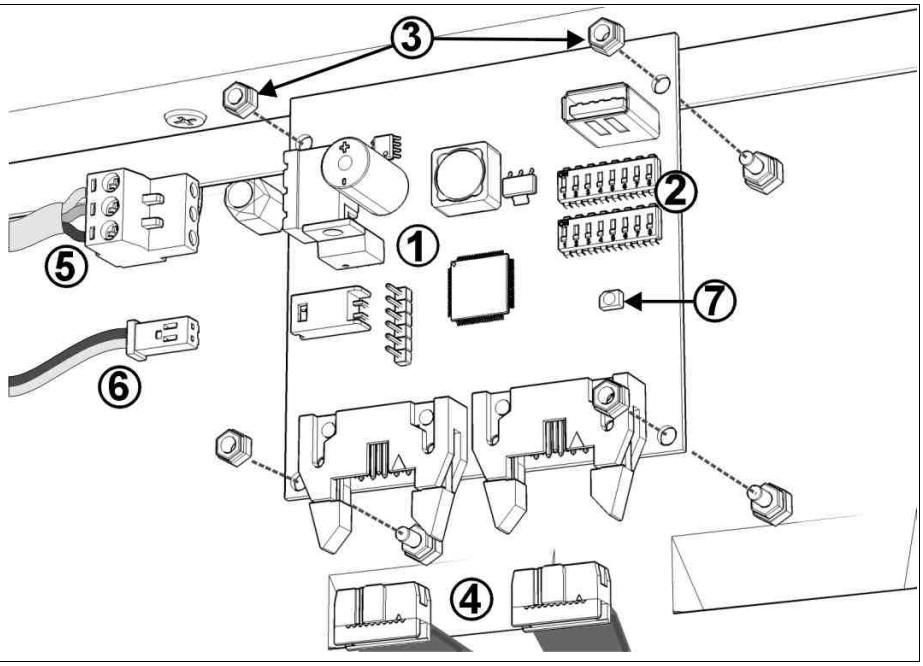


Fig. 23: Replacing a **DRIVER** board

9.5 REPLACING A HUB BOARD

All the scoreboards have a **HUB+24V** board and, in those which display team names, also a **HUB+12V** board. The replacement procedure is the same for both boards.

1. Disconnect the scoreboard´s power supply and make sure it cannot be re-enabled.
2. Open the **POWER SUPPLY** module and unscrew the 4 front screws (Fig. 11).
3. Remove all the connectors of the board needing replacement, making note of their positions. Then unscrew the locking nuts of the board and remove the board from its place (Fig. 24).
4. Fasten the new board into the previous board's place and reinsert the connectors in their original positions.
5. Close the module again and supply power to check that the new board operates properly.

1. **HUB+24V board**
2. **Connection to the fan**
3. **+24V power supply connection**
4. **M3 nut**
5. **Serial data connection**
6. **Connections towards the modules**

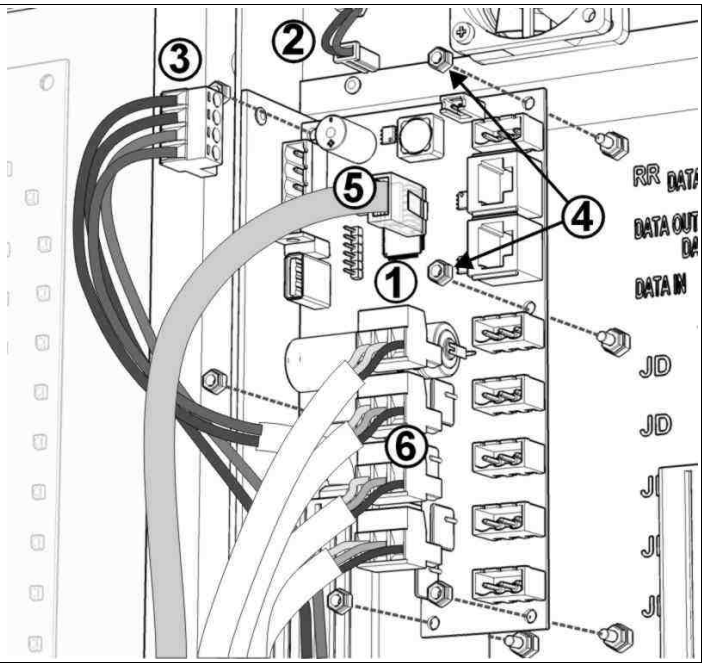
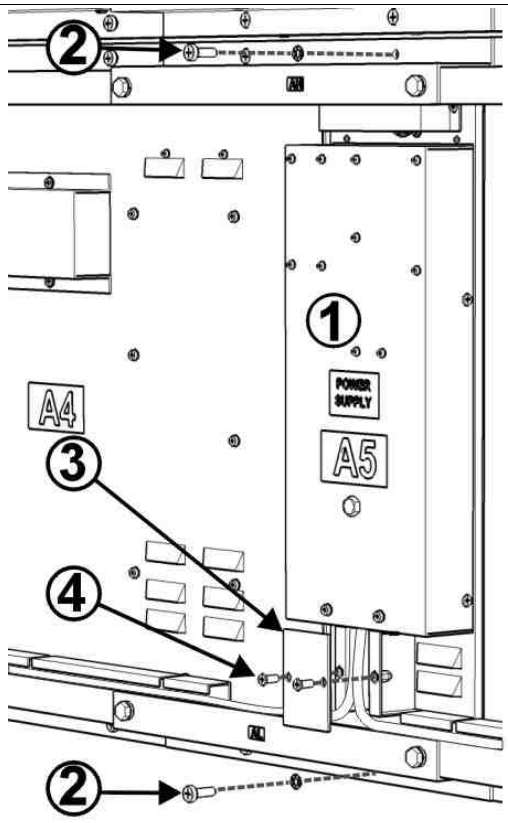


Fig. 24: Replacing a **HUB** board

9.6 REPLACING THE POWER SUPPLY UNIT

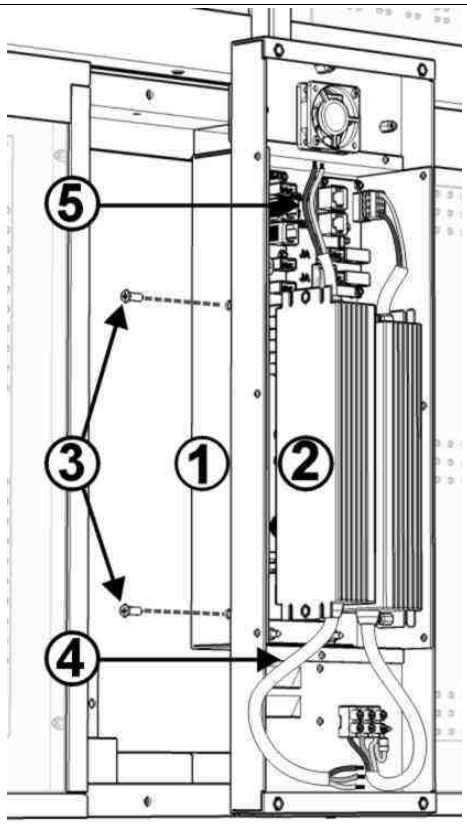
All the scoreboards have a power supply unit with voltage of +24V and, in those displaying team names (FOS-36, FOS-39), there is also a power supply unit with voltage of +12V. The replacement process for both power supply units is the same and requires that the entire **POWER SUPPLY** module be temporarily removed from the scoreboard.

1. Disconnect the scoreboard´s power supply and make sure it cannot be re-enabled.
2. Open the **POWER SUPPLY** module by unscrewing the 4 front screws (Fig. 11).
3. Disconnect all cables entering the **POWER SUPPLY** module, making note of their positions. Loosen the two nuts of the cable clamps (Fig. 18) and, on the rear side of the module, unscrew the two screws of the cover of the cable entry conduit (Fig. 25). Then pull out all of the cables of the module.
4. At the back of the scoreboard, unscrew the two fastening screws of the **POWER SUPPLY** module located on the horizontal brackets (Fig. 25) and remove the module in a forward position.
5. Disconnect the input and output cables of the power supply unit needing replacement, taking note of the colors and positions of the wires.
6. Unscrew the two fastening screws from the power supply unit and remove the unit from its place (see Fig. 26).
7. Position the new power supply unit in place, fasten it with the screws, and connect the cables to their original position.
8. Reinsert the **POWER SUPPLY** module into the scoreboard and secure it to the horizontal brackets with the two screws and elastic washers.
9. Reinsert and connect all the cables of the module. Close the cover of the cable entry conduit at the rear and screw in the two nuts of the cable clamps. Lastly, close the front piece of the module.



1. **POWER SUPPLY module**
2. **Fastening screws of module**
3. **Cover of the cable entry conduit**
4. **Fastening screws of the conduit's cover**

Fig. 25: Fastening the **POWER SUPPLY** module



1. **POWER SUPPLY module**
2. **Power supply unit**
3. **Fastening screws of the power supply unit**
4. **Input of electrical power supply**
5. **Output of DC voltage**

Fig. 26: Replacing the power supply unit

10. CONFIGURATION OF THE DIP-SWITCHES OF THE MODULES

Fig. 27 shows the configuration of the Dip-Switches of the **DRIVER** command boards, located inside each **DIGIT** module of the scoreboard. This configuration defines which information from the module will be displayed.

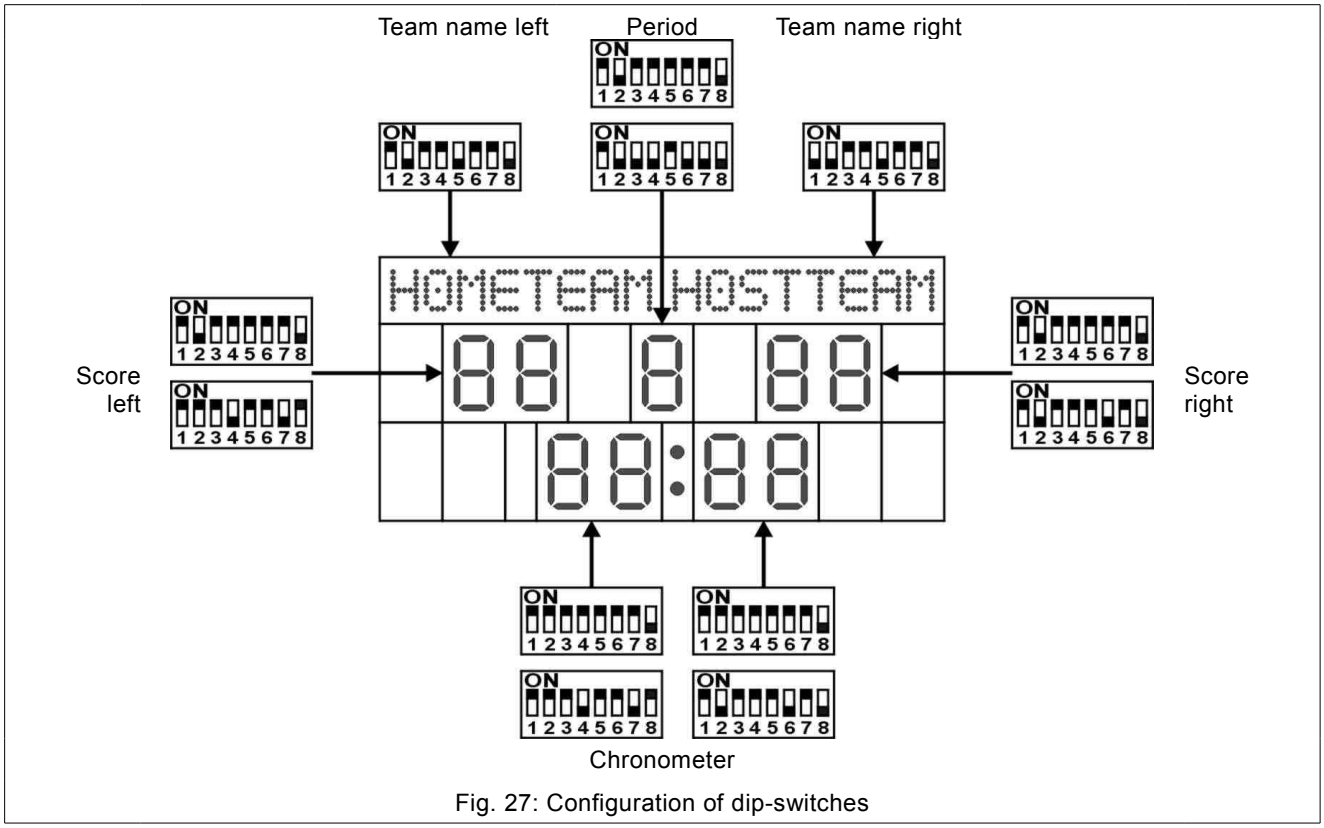


Fig. 27: Configuration of dip-switches