

PROFESSIONAL SCOREBOARD AND GAME TIME SYSTEM TECHNICAL SPECIFICATION FOR MULTI-PURPOSE HALLS (WITH EXCLUSION TIME INDICATORS)

1) Scope and Application Area

This technical specification covers the supply, installation, commissioning, and operation of integrated scoreboard, game time, and **Shot Clock** (24–14 s) indicators with control units to be used in indoor sports halls.

The system shall be applicable for Basketball (FIBA, NBA, EuroLeague, 3x3), Volleyball, Handball, Futsal, Water Polo, and various hockey disciplines (e.g., field hockey, indoor hockey, hockey 5S, ice hockey, underwater hockey, rink hockey, roller inline hockey). It shall comply with the current game rules of the relevant sports federations (FIBA, IHF, FIVB).

2) Compliance, Approval, and International Compatibility

- The system shall be of a quality that ensures FIBA approval; 24–14 second **Shot Clock** devices shall be FIBA Level 2 approved.
- Basketball control and display software shall support FIBA, NBA, EuroLeague, and 3x3 game modes.
- The device and software shall be programmable to comply with EuroLeague and EuroCup competition rules.

3) System Components

The system shall consist of the following main components:

- Score, Game Time, and **Timeout** Panel
- Period, Team Foul, and **Exclusion Time Indicator** Panel
- Player Foul and Score Panels (two teams)
- 24–14 Second **Shot Clock** Devices (mounted on opposite backboards)
- Control Units: Main Console, **Shot Clock** Console, Game Time Console
- Mounting brackets for 24–14 Second **Shot Clock** Devices
- Scoreboard mounting brackets and complementary accessories

4) Score, Game Time, and Timeout Panel

a) Score

3 digits per team, range 0–199; color: white; digit height ≥ 30 cm. Unused digits shall remain blank.

b) Game Time

MM:SS (4 digits). Count up / countdown selectable; adjustment range 00:00–99:59. Display of 1/10 seconds during the last 60 seconds. Max. tolerance ± 0.1 s per 100 minutes. Audible signal at the end of period; color: yellow; digit height ≥ 30 cm.

c) Timeout Indicators (rights)

3 square dots per team; side ≥ 5 cm; color: yellow.

d) Timeout Duration

2 digits, range 0–99; color: yellow; digit ≥ 20 cm. Timeout duration operates as a countdown; during a timeout, the dot indicators flash. Audible signal at timeout start/end; adjustable pre-warning for remaining time.

5) Period, Team Foul, and Exclusion Time Indicator Panel

a) Period/Set

1 digit, 0–9; color: white; digit ≥ 20 cm. In basketball, overtime is displayed with the letter “O”. In volleyball, the played set is displayed. Depending on increase/decrease of period/set, game and timeout indicators automatically adjust in accordance with the relevant sport rule.

b) Team Foul

1 digit per team, 0–9; color: red; digit ≥ 23 cm. In basketball, after the 4th foul, a square is shown. With player foul input, team foul increases automatically; manual correction is possible from the main console.

c) Ball Possession Arrow

Arrow sign per team; color: red. In basketball, indicates the attacking/possession direction; in volleyball, indicates the serving team direction.

d) Exclusion Times (Handball, Hockey types, Futsal, Water Polo)

For each team, up to two players simultaneously; jersey number 2 digits (0–99) and **Exclusion Time** 3 digits (0:00–9:59). Digit ≥ 16 cm; jersey number yellow, **Exclusion Time** red. **Exclusion Times** are synchronized with game time. In basketball, the last foul is displayed on the relevant panel with 10 s flashing.

6) Player Foul and Score Panels (Two Teams)

Panels shall be arranged in an asymmetric layout; 12 player rows per team: from outside to inside jersey no. (2d), foul (1d), score (2d).

- **Jersey No.:** 00–99; color: yellow; digit ≥ 12 cm. Can also be used as a set indicator in volleyball.
- **Player Foul:** 0–9; color: red; digit ≥ 12 cm. Max. 5 in Basketball/EuroLeague, max. 3 in Handball. At match start, player fouls are blank; when a foul is given, only the related player becomes visible; flashes at least 3 times upon substitution.

- **Player Score:** 0–99; color: white; digit ≥ 12 cm. Upon entry, the team score increases automatically; blank at start; flashes at least 3 times when changed. In volleyball, player score indicators are used for set scores.

7) 24–14 Second (Shot Clock) Devices

One single-sided device for each backboard side, mounted opposite each other. FIBA Level 2 approved.

While the **Shot Clock** is stopped, the game time indicators continue to run.

When game time drops below 24 s, the **Shot Clock** either remains blank or is displayed synchronized with the game time.

Shot Clock range 0–99 s; reset/start/stop at 24; resume. Audible signal at expiry; game time digits ≥ 13 cm, **Shot Clock** digits ≥ 25 cm; game time color yellow, **Shot Clock** color red.

Backboard Lights: At game time expiry, red; at **Shot Clock** expiry, yellow **Backboard Lights** remain on for at least 2 s.

End-of-**Shot Clock** and end-of-period warning tones are different; sound pressure ≥ 120 dBA (1 m).

Pressing 24s and 14s simultaneously turns the **Shot Clock** display off. If game time is below 24 s/14 s and the relevant keys are used, **Shot Clock** digits switch off automatically.

Hardware/software is programmable in accordance with EuroLeague/EuroCup competition rules.

8) Control Units

8.1 Main Console

- Embedded, operating-system-free architecture; independent of Android / iOS / Windows; provides high responsiveness and low latency.
- Communication: RF 868 MHz wireless and, when required, RS485 Half Duplex single-line wired communication up to 1 km.
- Interface: ≥ 7 -inch color TFT ($\geq 800 \times 480$).
- Input: Membrane keypad; additionally, an external keyboard can be used to enter team/player information (number, foul, score) without a PC.
- Language support: Turkish, English, French, Spanish.

Special character support (full use in menus and names):

Uppercase: Ç, Ğ, İ, Ö, Ş, Ü, À, Á, Â, Ä, Æ, È, É, Ê, Ë, Ì, Í, Î, Ï, Ñ, Ò, Ó, Ô, Õ, Ù, Ú, Ý, Ž, Æ, ß

Lowercase: ç, ğ, ı, ö, ş, ü, à, á, â, ä, æ, è, é, ê, ë, ì, í, î, ï, ñ, ò, ó, ô, õ, ù, ú, ý, ž, æ, ß

- Brightness level: 100-step brightness adjustment on the scoreboard.
- Test/service: Turn off/on all indicators; LED/address test functions.

- Time management: Game/timeout/interval/24–14 s durations customizable according to sport rules; automatic transitions at period ends and automatic adjustment of foul/timeout values in accordance with FIBA rules; inter-period timeouts can be preloaded and started with a command.
- Team/player management: Score +1/+2/+3 / – ; manage 14 players in Basketball and 16 in Handball; in Handball, cumulative penalties for a player are tracked on the same row.
- In Basketball, the last foul is displayed with 10 s flashing; audible signal and independent control of **Backboard Light Strips**.
- Clock/time display (in Volleyball, both on the main screen and the scoreboard); can be disabled.
- After an interruption, all data on the console can be refreshed with a single operation.
- Remote update: Hardware capable of OTA update without opening the case.
- Enclosure: Aluminum; IP54 protection.

8.2 Shot Clock Console

- Synchronized with the main console; 24s/14s/Start/Stop buttons.
- Pressing 24s+14s simultaneously turns the **Shot Clock** off; when the game stops, the **Shot Clock** stops in sync; cannot be started before the match begins.
- ≤ 0.5 kg, ABS enclosure, IP54.

8.3 Game Time Console

- Synchronized with the main console; manual control of game time start/stop and audible signals.
- ≤ 0.5 kg, ABS enclosure, IP54.

9) General Technical Requirements

- Scoreboard body aluminum; height ≥ 190 cm, width ≥ 330 cm, thickness ≤ 8.5 cm.
- Indicators are SMD LED, 7-segment; a single LED failure does not extinguish the entire segment.
- Static driving technology ensures clarity in broadcast recordings.
- Installation is carried out on a stable base ensuring comfortable visibility for spectators/referees/players, with safety measures.

- Connectors are easy to plug/unplug and moisture-resistant; transparent plexi (reflect/lexan type) protection on the front to reduce reflections.
- Internal wiring is organized with grouped data cables; no cut/splice/socketless wiring; driver boards are short-circuit protected.
- Power supplies are CE certified; LED lifetime $\geq 50,000$ hours.
- Integrated/processor brands: ST, Toshiba, Texas, NXP, or Green Micro.
- Operating temperature $-40\text{ }^{\circ}\text{C} \dots +55\text{ }^{\circ}\text{C}$.
- External power and data cables and installation diagrams/fuse values are manufacturer-approved; data and power cables are protected and concealed.
- The console provides a data output for broadcasters.
- For safety and maintenance, the scoreboard is suspended at least at one point with a hoist/motor of at least 500 kg capacity.

10) Installation, Commissioning, and Acceptance

Products are supplied complete with mounting brackets; the RS485 line, RF coverage, and **Backboard Lights** are positioned in accordance with the rules.

Functional tests are performed for all sports modes and indicators; audible signals and lights are verified separately.

11) Certification, Warranty, and Documentation

- ISO 9001 quality management certificate; products are RoHS and CE compliant.
- User manual and warranty certificate are delivered; warranty period: 2 years.

12) International Reference Requirement

The proposed brand shall document that its timing, videoboard, or scoreboard systems have been used in at least five separate top-level international organizations (examples: EuroLeague, EuroCup, AfroBasket, BAL – Basketball Africa League, World Championship).

SUMMARY TABLE – System Overview (Highlighted Mandatory Features)

Component	Indicator/Function	Color	Digit/Size	Mandatory Feature(s)
Team Score	0–199 (3 digits/team)	White	$\geq 30\text{ cm}$	Hide unused digits

Component	Indicator/Function	Color	Digit/Size	Mandatory Feature(s)
Game Time	MM:SS, 1/10 in last 60 s	Yellow	≥ 30 cm	±0.1 s/100 min; audible signal
Timeout Rights (dot)	3 dots/team	Yellow	≥ 5 cm sq.	Flash during Timeout
Timeout Duration	0–99 (2 digits)	Yellow	≥ 20 cm	Adjustable pre-warning
Period/Set	0–9, overtime “O”	White	≥ 20 cm	Automatic adjustments based on increase/decrease
Team Foul	0–9	Red	≥ 23 cm	Square indicator after 4th foul
Ball Possession Arrow	Arrow indicator	Red	—	Usage according to sport
Exclusion Times	No (2d) + Time (3d)	Yellow/Red	≥ 16 cm	Synchronized with game time
Player Jersey No	00–99 (2d)	Yellow	≥ 12 cm	—
Player Foul	0–9 (1d)	Red	≥ 12 cm	Max. 5 (Basketball), 3 (Handball); flash warning
Player Score	0–99 (2d)	White	≥ 12 cm	Entry increases team score
24–14 s: Game Time Display	Synchronized display	Yellow	≥ 13 cm	If game <24 s, sync/blank
24–14 s: Shot Clock	0–99 s	Red	≥ 25 cm	24/14/Start/Stop; dual tone; 24+14 = off
Backboard Lights	End of game / end of shot	Red / Yellow	—	Remain on ≥ 2 s

Component	Indicator/Function	Color	Digit/Size	Mandatory Feature(s)
Main Console	Embedded, OS-free	—	—	RF 868 MHz + RS485 (1 km), 7" TFT ≥800×480, 100-step brightness, OTA update
Language/Orthography	TR/EN/FR/ES & special characters	—	—	Full support of all listed special characters
Enclosure/Environment	Aluminum; IP54 (consoles)	—	—	−40...+55 °C; CE, RoHS; LED lifetime ≥ 50,000 h