

## SEMI-PROFESSIONAL SCOREBOARD SYSTEM — TECHNICAL SPECIFICATION (16 Rows)

### 1. Scope and Purpose

This specification defines the technical and functional requirements for scoreboard systems to be supplied for indoor sports halls. The system shall be usable for Basketball, Volleyball, Handball, Futsal, Water Polo, and various Hockey disciplines. Placement and installation shall be carried out in accordance with the hall architecture.

### 2. Compliance, Approvals, and Event References

**2.1.** The system shall have **FIBA Level 2** approval.

**2.2.** The system shall comply with **IHF** (Handball) and **FIVB** (Volleyball) rules.

**2.3. Usage Reference (Basketball):** The proposed brand's timing, videoboard, or scoreboard systems shall have been used previously in at least **five** large-scale events; examples include **EuroLeague, EuroCup, AfroBasket, BAL (Basketball Africa League), FIBA World Championship**.

**2.4. Basketball Modes: FIBA, EuroLeague, NBA, and 3x3** basketball modes shall be supported.

### 3. System Components

- a) Team Name / Score / Period / Game Time / Team Foul / **Timeout** Time / **Exclusion Time** and Player Foul Main Panel
- b) 24–14 **Shot Clock** Devices
- c) Control Units
- d) Referee Distribution Panel
- e) Backboard Warning Light System (**Backboard Lights**) for Basketball
- f) **Shot Clock** Backboard Mounting Brackets (24–14 devices)
- g) Scoreboard Mounting Bracket

### 4. Main Display Panel (Functional Requirements)

#### 4.1. General Layout

The panel shall consist of three sections; the center section shall display team names, scores, game time, team fouls, period, **Timeout** rights, **Timeout** time, **Exclusion Time**, and the penalized player's jersey number; the right/left wings shall display player jersey numbers and player foul counts. **Ball Possession Arrow** shall be indicated by two arrows. **16 player rows** shall be supported for each team.

#### 4.2. Team Name Indicators

- Team names shall be enterable via an external keyboard or the membrane keypad on the main controller.

- ### 4.3. Score Indicators

- #### 4.4. Game Time Indicator

- #### 4.5. Period / Set Indicator

- #### 4.6. Team Foul Indicators

- **1 digit per team, 0–9.**
- **Color: Red (mandatory);** digit height  $\geq 23$  cm.

- Display behavior after fouls shall comply with **FIBA**; when a player foul is entered, the team foul shall **increase automatically**; automatic adjustment at period changes.

#### 4.7. Timeout Rights (Dot Indicators)

- **3 square dots per team, square side  $\geq 5$  cm.**
- During **Timeout** countdown, the dots shall **flash**; start/end warnings shall be provided; early-warning times shall be configurable.
- **Timeout** time display on **Shot Clock** devices can be programmed from the controller.

#### 4.8. Timeout Time Indicator

- **2 digits (0–99)**, count-down; audible warning at start/end; early-warning time configurable.
- Digit height  $\geq 20$  cm.

#### 4.9. Ball Possession / Service Indicators

- **1 arrow per team**; indicates the attacking/serving team depending on the sport.

#### 4.10. Player Jersey Number Indicators

- **2 digits per player (00–99)**, digit height  $\geq 10$  cm.
- If the team roster has fewer players than rows, the unused rows shall be set fully **off (dimmed)**.
- In Volleyball, this field may be used for set indication.

#### 4.11. Player Foul Indicators

- **1 digit per player (0–9)**, digit height  $\geq 10$  cm.
- Color: **Red (mandatory)**.
- Basketball (FIBA/EuroLeague) max **5**; Handball max **3** supported; indicators remain off before the first foul; on change, **flash at least 3 times**.

#### 4.12. Exclusion Time Indicators (Handball, Hockey Types, Futsal, Water Polo)

- Up to **2 players simultaneously per team: 2-digit jersey number (00–99) + 3-digit Exclusion Time (0:00–9:59)**.
- Digit height  $\geq 16$  cm; runs **synchronized** with the game clock.

- In Basketball, the last foul may be flashed on the **Exclusion Time Indicator** for **10 s**.

## 5. 24–14 Shot Clock Devices

- Compliant with **FIBA Level 2** standards; mounted above the backboard (ceiling suspension alternative available).
- Shot Clock display **0–99 s; 24 s / 14 s** start/stop/restart.
- While the Shot Clock is stopped, the **game clock continues**; if the game time falls below **24/14 s** and the relevant key is used, Shot Clock digits **turn off**.
- Audible warning: different tone at Shot Clock expiration; **≥120 dBA (1 m)**.
- Digit heights: **Game time ≥13 cm, Shot Clock ≥25 cm**.
- **Colors (mandatory)**: Game time **Yellow**, Shot Clock **Red**.
- **Backboard Lights**: compliant with FIBA — **Red** (game-time end ≥ **2 s**) and **Yellow** (Shot Clock end ≥ **2 s**).
- Devices shall have program/hardware compliant with **EuroLeague** and **EuroCup** competition rules.

## 6. Control Units

### 6.1. Architecture and Communication

- The control console shall operate on an **embedded, OS-less architecture**, independent of Android / iOS / Windows. This provides high responsiveness and low latency.
- Communication: **RF 868 MHz** wireless and **RS485** wired (Half Duplex, single line, up to **1 km**).
- The console shall include a **membrane keypad**; team and player data (number, foul, score) can be entered directly via an **external keyboard**.
- **Language support**: Turkish, English, French, Spanish. (Menus and name entry operate in these languages.)

### 6.2. Main Controller

- Supports the **Shot Clock** and game-time controllers; sport settings are easily configured.
- Supported branches (minimum): Basketball, Volleyball, Handball, Futsal, various Hockey types (Field, Indoor, 5S, Ice, Underwater, Rink, Roller Inline), Water Polo, etc.; **at least 13** branches total.

- For Basketball: **FIBA, EuroLeague, 3x3, and NBA** supported.
- **TFT display:** Color,  $\geq 7''$ ,  $\geq 800 \times 480$  pixels.
- Waterproof printed buttons; aluminum front protection; membrane keypad.
- Name entry via external keyboard and membrane; **full special-character support:**
  - **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, Æ, Ú, Û, Ý, Ž, ß, 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, û, ý, ž, ð
- Wireless (RF) link on/off via software; **100-step brightness**; LED/test modes.
- Game/**Timeout**/period durations and Basketball **24 s / 14 s** values configurable; early **Timeout** warning adjustable; at period transitions, foul/**Timeout** values auto-adjust per **FIBA** rules.
- Period-break **Timeout** automation; team/media **Timeouts** can be staged and started with a single command.
- **Time sync:** Difference between controller, scoreboard, and 24 s devices **< 0.05 s**.
- Reset scenarios: game data / player data / all data can be reset in a single operation.
- Multi-sport memories; score keys (**+1/+2/+3/-**).
- In Handball, tracking of **5** separate penalties; if a new penalty is given to the same player, it is added cumulatively on the same line.
- In Basketball, audible warning and **Backboard Lights** can be managed independently.
- In Volleyball, clock/count-up on main screen and scoreboard; time section can be dimmed if necessary.
- Single-action data refresh after power loss.
- Scoreboard updates via controller software (without opening hardware / remotely where suitable).
- **Enclosure:** Aluminum; **IP54**.

### 6.3. Shot Clock Controller

- Synchronized with the main controller; buttons: **24s, 14s, Start, Stop**.
- When **24s+14s** are pressed simultaneously, the Shot Clock display **turns off**.

- Synchronized stop when the game clock stops; cannot be started before the match.
- **Weight < 0.5 kg**; ABS enclosure; **IP54**.

#### 6.4. Game Time Controller

- Synchronized with the main controller; manual control for game-time start/stop and audible signal.
- **Weight < 0.5 kg**; ABS enclosure; **IP54**.

#### 7. General Technical Matters

- **Panel body:** Aluminum.
- **Dimensions:** Height  $\geq 215$  cm, width  $\geq 220$  cm, thickness  $\leq 8.5$  cm.
- **Indicators:** SMD LED, 7-segment; if one/several LEDs in a segment fail, the entire segment shall **not** go dark.
- **Drive:** Static drive technology for clarity in camera footage.
- **Installation:** On a solid base, visible to spectators/referees/players, with safety provisions.
- **Connectors:** Easy to plug/unplug, moisture-resistant.
- **Front protection:** Anti-glare transparent **plexiglass** (reflective/lexan type) to prevent reflections.
- **Internal wiring:** Neat/clean with grouped data cables; **no** cut/spliced/unsocketed cables.
- **Driver boards:** Short-circuit protected.
- **Power supplies:** CE-certified.
- **LED lifetime:**  $\geq 50,000$  hours.
- **IC/Processor brands:** ST, Toshiba, Texas, NXP, or Green Micro.
- **Operating temperature:**  $-40 \dots +55$  °C.
- **Cabling/Installation:** External power and data cables shall be to manufacturer-approved dimensions and standards; installation diagrams and fusing shall be manufacturer-approved; data/power cables shall be protected and not visible.
- **Data output** for broadcasters shall be present on the controller.
- **Certification:** Products shall have **RoHS** and **CE** certificates.

- **Documentation/Warranty:** User manual and warranty certificate shall be delivered; system warranty is **2 years**.

---

#### SUMMARY TABLE – System Overview (Highlighted Mandatory Items)

| Component / Area                                | Digit / Symbol Height (min) | Mandatory Color                                     | Other Mandatory Items                                                                              |
|-------------------------------------------------|-----------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Team Name                                       | <b>16 cm</b>                | No color requirement                                | LED module; entry via external keyboard & membrane; full special-character support (complete list) |
| Score (per team, 3 digits)                      | <b>25 cm</b>                | Single color within team (color type not specified) | <b>0–199</b> ; empty positions dimmed                                                              |
| Game Time (main panel)                          | <b>25 cm</b>                | No color requirement                                | <b>MM:SS</b> ; last <b>60 s</b> with <b>1/10 s</b> ; <b>±0.1 s/100 min</b> ; audible end signal    |
| Period/Set                                      | <b>20 cm</b>                | No color requirement                                | <b>0–9</b> ; overtime “ <b>0</b> ”                                                                 |
| Team Foul                                       | <b>23 cm</b>                | <b>Red</b>                                          | <b>0–9</b> ; automatic increment/adjustment                                                        |
| <b>Timeout</b> Rights (dot)                     | <b>5 cm</b> (side)          | No color requirement                                | <b>3</b> per team; flashing/alerts integrated                                                      |
| <b>Timeout</b> Time                             | <b>20 cm</b>                | No color requirement                                | <b>0–99</b> ; countdown; early-warning adjustable                                                  |
| Ball Possession / Service Arrows                | —                           | No color requirement                                | <b>1</b> per team                                                                                  |
| Player Jersey No.                               | <b>10 cm</b>                | No color requirement                                | <b>00–99</b> ; unused rows dimmed                                                                  |
| Player Foul                                     | <b>10 cm</b>                | <b>Red</b>                                          | <b>0–9</b> ; <b>≥3</b> flashes on change                                                           |
| <b>Exclusion Time Indicator</b> (jersey + time) | <b>16 cm</b>                | No color requirement                                | Jersey: <b>2 digits</b> ; Time: <b>3 digits</b> ; synchronized counting                            |

| Component / Area         | Digit / Symbol Height (min) | Mandatory Color | Other Mandatory Items                                                            |
|--------------------------|-----------------------------|-----------------|----------------------------------------------------------------------------------|
| 24-14: Game Time         | <b>13 cm</b>                | <b>Yellow</b>   | FIBA-compliant; <b>Backboard Lights</b> red ( $\geq 2$ s)                        |
| 24-14: <b>Shot Clock</b> | <b>25 cm</b>                | <b>Red</b>      | <b>0-99 s</b> ; 24/14 control; <b>Backboard Lights</b> yellow ( $\geq 2$ s)      |
| Audible Warnings         | —                           | —               | Different tone for Shot Clock expiration; <b><math>\geq 120</math> dBA (1 m)</b> |
| Time Sync                | —                           | —               | Controller-panel-24/14 difference < <b>0.05 s</b>                                |
| Control & Comms          | —                           | —               | OS-less embedded; <b>RF 868 MHz + RS485 (1 km)</b>                               |
| Durability / Environment | —                           | —               | <b>-40...+55 °C, CE/RoHS, IP54</b>                                               |