

- The control console shall operate on an **embedded architecture without an operating system**; it shall be independent of general-purpose operating systems such as Android / iOS / Windows. This architecture provides high responsiveness and low latency.
- **RF 868 MHz** wireless communication and, when required, **RS485** wired infrastructure shall be supported.
- The console shall have a **membrane keypad**; by connecting an **external keyboard**, team and player data (number, foul, score) can be entered directly.
- The console shall support **Turkish, English, French, and Spanish** languages.
Special character support (for team/player names and menus):
 - **Uppercase:** Ç, Ğ, İ, Ö, Ş, Ü, À, Á, Â, Ã, Ä, Æ, È, É, Ê, Ë, Ì, Í, Î, Ï, Ñ, Ò, Ó, Ô, Õ, Æ, Ú, Û, Ý, Ž, Æ, ß
 - **Lowercase:** ç, ğ, ı, ö, ş, ü, à, á, â, ã, ä, æ, è, é, ê, ë, ì, í, î, ï, ñ, ò, ó, ô, õ, ù, ú, û, ý, ž, æ

4. System Components

- **Team Name Panels**
- **Score and Game Time Panel**
- **Period, Team Foul, and Timeout Panel**
- **Player Information Panels**
- **Cube 24 / 24-14 Second (Shot Clock) Devices** (above backboard, 2×2 faces or single 4 faces)
- **Control Units** (Main Controller, Shot Clock Controller, Game Time Controller)
- **Ball Possession Arrow Indicator**
- **Digital Team Foul Markers** (table-top)
- **Time Keeper For Locker Rooms**
- **Backboard Light Strips for basketball** (red/time and yellow/24-14) — **Backboard Lights**
- **Backboard and scoreboard mounting brackets**

5. Indicator Panels and Detailed Technical Features

5.1 Team Name Panels

- Separate panels for both teams.
- Input: via the membrane keypad on the main controller and/or via an external keyboard.
- Each team name supports **at least 12 characters** depending on character width; **character height ≥ 32 cm**.
- Structure: **LED module**. Color: **White**.
- Full support for the special character set (see Section 3).

5.2 Score and Game Time Panel

Score Indicators

- **3 digits per team**, range **0–199**.
- **Digit height ≥ 40 cm**, color: **White**; unused positions remain dimmed.

Game Time Indicator

- Format **MM:SS** (4 digits), count up/down.
- Setting range **00:00–99:59**; **1/10 second** display during the last **60 s**.
- Time tolerance: **±0.1 s per 100 minutes**.
- Audible signal at expiration; **digit height ≥ 40 cm**, color: **Yellow**.

5.3 Period, Team Foul, and Timeout Panel

Period/Set

- **1 digit**, range **0–9**; **≥ 30 cm**, color: **White**.
- In basketball, overtime is shown with “**O**”. Depending on the sport, linked indicators are automatically adjusted.

Team Foul

- **1 digit per team, 0–9**; **≥ 35 cm**, color: **Red**.
- In basketball, after the **4th foul** and with the start of time, square indication. Automatic increment with player foul entries; automatic reset at period change per rules.

Timeout Rights (Dot Indicators)

- **3 square indicators per team**; **edge ≥ 5 cm**, color: **Yellow**.

Timeout Duration

- **2 digits, 0–99**; **≥ 30 cm**, color: **Yellow**.
- During countdown, the dot indicators flash; start/end and early warning sounds are adjustable.
- If desired, Timeout duration can be shown on **24 s devices**.

Attack/Service Direction

- **Arrow per team**; color: **Red**. (Ball Possession Arrow for basketball; service indicator for volleyball.)

5.4 Player Information Panels

- **12 player rows per team**; from outside to inside: **Name – Jersey No – Player Foul – Player Score**.
- **Names**: up to **16 characters**, **≥ 16 cm**, color: **Yellow**; missing rows dimmed. Special character set supported.

- **Jersey No: 2 digits, 00–99, ≥ 16 cm**, color: **Yellow**; can be used for sets in volleyball.
- **Player Foul: 1 digit, 0–9, ≥ 16 cm**, color: **Red**; in basketball/EuroLeague max **5**, in handball max **3**; at change, flash at least **3** times.
- **Player Score: 2 digits, 0–99, ≥ 16 cm**, color: **White**; at change, flash at least **3** times.

5.5 Cube 24 / 24-14 Second (Shot Clock) Devices (Above Backboard)

- **FIBA Level 1** approved; **2×2 faces or 1×4 faces** per basket.
- **Shot Clock: 0–99 s**, 24/14 start, stop, resume from where it left off.
- When game time falls below **24**, Shot Clock display can be turned **off/synchronized**.
- **Digit heights:** Game time ≥ 13 cm, Shot Clock ≥ 25 cm.
- Colors: **Game time Yellow**, Shot Clock **Red** (game time color same as main panel).
- **Backboard Lights: Red** (on for ≥ 2 s at game time end), **Yellow** (on for ≥ 2 s at 24/14 end).
- **Sound signals:** Different tones for Shot Clock and game time; intensity ≥ 120 dBA (1 m).
- When **24s + 14s** are pressed simultaneously, Shot Clock digits turn **off**.
- Hardware/software in compliance with **EuroLeague/EuroCup** competition rules.

6. Control Units

6.1 Main Controller

- Supports Shot Clock and game time controllers; sports settings are easy to configure.
- **Supported sports:** basketball (FIBA, EuroLeague, NBA, 3x3), volleyball, handball, futsal, field hockey, indoor hockey, Hockey 5S, ice hockey, underwater hockey, rink hockey, roller inline hockey, floorball, water polo (**at least 13 disciplines**).
- **Display:** Color **TFT**, $\geq 7''$, $\geq 800 \times 480$.
- **Keypad:** Waterproof printed-button membrane, aluminum front protection.
- **Input:** External keyboard and membrane; team/player names and menus with full special character set.

- **Power:** Li-ion battery ≥ 7 hours, full charge ≤ 2 hours with CE-certified charger; battery level shown on screen.
- **Communication:** RF 868 MHz wireless; signal can be disabled via software. RS485 data transmission supported.
- **Languages:** TR/EN/FR/ES.
- **Brightness:** 100 levels. Ability to **black out all indicators** and address/LED test function.
- **Times:** Game, Timeout, halftime, and **24/14** durations customizable; early warning times adjustable.
- **Period transition:** Automatic; foul and Timeout values auto-adjusted per FIBA; inter-period Timeouts stand by and start on referee signal.
- **Score control:** +1 / +2 / +3 / -; tracking up to **14** players in basketball and **16** in handball.
- **Handball penalties:** Up to **5** simultaneous **Exclusion Time** counters per team; a second penalty for the same player is added and shown cumulatively.
- **Event indicators:** In basketball, the **last foul**—jersey number and which foul—**flashes for 10 s** on the penalty/Exclusion Time panel.
- **Sound/Backboard Lights:** Independent control (during Timeout and manual audible alerts, sound can be given without activating Backboard Lights).
- **Volleyball:** Clock/count-up can be shown on main screen and scoreboard; the time area can be dimmed if needed.
- **Power loss:** Data can be refreshed in a single step with controller data.
- **Software updates:** Remote, without opening the device.
- **Enclosure/IP:** Aluminum body, **IP54**.

6.2 Shot Clock Controller

- Operates synchronized with the main controller.
- **Buttons:** 24s, 14s, Start, Stop (**24+14 together = Shot Clock off**).
- When game time stops, the Shot Clock stops in sync; cannot be started before the match begins.
- **Mass** < 0.5 kg, ABS body, **IP54**.

6.3 Game Time Controller

- Operates synchronized with the main controller.
- Start/stop game time; manual control of audible signal.
- **Mass < 0.5 kg, ABS body, IP54.**

7. Auxiliary Indicators

7.1 Ball Possession Arrow Indicator

- Right/left arrow form; **SMD LED**, color: **Red**.
- **FIBA-approved; width and height ≥ 11 cm; 12 V operation; rear direction LED; direction selection by switch.**

7.2 Digital Team Foul Markers (table-top)

- Placed on the right/left of the scorer's table; operate synchronized with the main controller or independently.
- **FIBA-approved; color: Red; digit height ≥ 25 cm, width 12.5 cm.**
- Aluminum housing; no sharp edges.
- After the **4th foul** and when the game is started, full red area display.

7.3 Time Keeper For Locker Rooms

- Synchronized with the main game time; **digit height ≥ 13 cm.**
- **MM:SS (4 digits), 00:00–99:59; 1/10 s display for the last 60 s.**

8. General Technical Issues

- Full aluminum panel body.
- **Panel dimensions:** Height ≥ 325 cm, width ≥ 675 cm, thickness ≤ 8.5 cm.
- Indicators are **SMD LED, 7-segment**; with partial LED failure, the entire segment does not go dark.
- **Static drive technology** for clarity in camera recordings.
- Manufacturer-approved mounting on a solid base within a safe viewing area.
- Connectors easy to plug/unplug, moisture-resistant.
- Front protection: **anti-glare transparent** (reflective/lexan type) plexiglass.
- Internal wiring: grouped data cables, tidy and clean; **no cut/spliced/unsocketed** cabling.

- Driver boards protected against short circuit.
- **CE-certified** power supplies; **LED lifetime $\geq 50,000$ hours.**
- IC/processor brands: **ST, Toshiba, Texas, NXP, or Green Micro.**
- Operating temperature: **$-40^{\circ}\text{C} \dots +55^{\circ}\text{C}$.**
- External power and data cables per manufacturer-approved sizes and norms.
- Wiring diagrams and fuse values manufacturer-approved.
- Data and power cables routed in protective ducts, hidden.
- **Data output for broadcasters** available on the controller.
- Scoreboards shall be suspended from **at least two points** with **hoists/motors of ≥ 500 kg capacity.**
- Manufacturer: **ISO 9001** quality system certificate.
- Product: **RoHS and CE** certified.
- **User manual and warranty certificate** shall be delivered; **warranty: 2 years.**

9. Installation and Placement

- Above-backboard 24/14 second devices shall be mounted at positions compliant with **FIBA** conditions; if above-backboard mounting is not possible, they shall be suspended from the ceiling positioned above the backboard.
- The scoreboard shall be positioned to ensure optimum visibility considering hall architecture and sightlines.

10. Summary Table

Indicator / Section	Digit / Character Height (min)	Color	Note
Team Name	32 cm	White	LED module, special character support
Score (3 digits per team)	40 cm	White	0–199, unused digit dim
Game Time (MM:SS, 4 digits)	40 cm	Yellow	Last 60 s 1/10 s; ± 0.1 s/100 min
Period/Set (1 digit)	30 cm	White	“O” overtime in basketball

Indicator / Section	Digit / Character Height (min)	Color	Note
Team Foul (1 digit)	35 cm	Red	Square indication after 4th foul
Timeout Rights (3 dot indicators)	5 cm (edge)	Yellow	Flash supported
Timeout Duration (2 digits)	30 cm	Yellow	0–99, early warning
Player Names	16 cm	Yellow	12 players/on-court
Player Jersey No (2 digits)	16 cm	Yellow	00–99
Player Foul (1 digit)	16 cm	Red	BB max 5, HB max 3
Player Score (2 digits)	16 cm	White	0–99
24/14s – Game Time	13 cm	Yellow	Same color as main panel
24/14s – Shot Clock	25 cm	Red	0–99 s
Digital Team Foul Markers	25 cm (digit)	Red	Width 12.5 cm
Ball Possession Arrow Indicator (arrow)	—	Red	W×H ≥ 11 cm