



## Scoring & Timing Solution for Water polo



## 1. Introduction

This is a professional solution for LED scoreboard display in water polo competition.

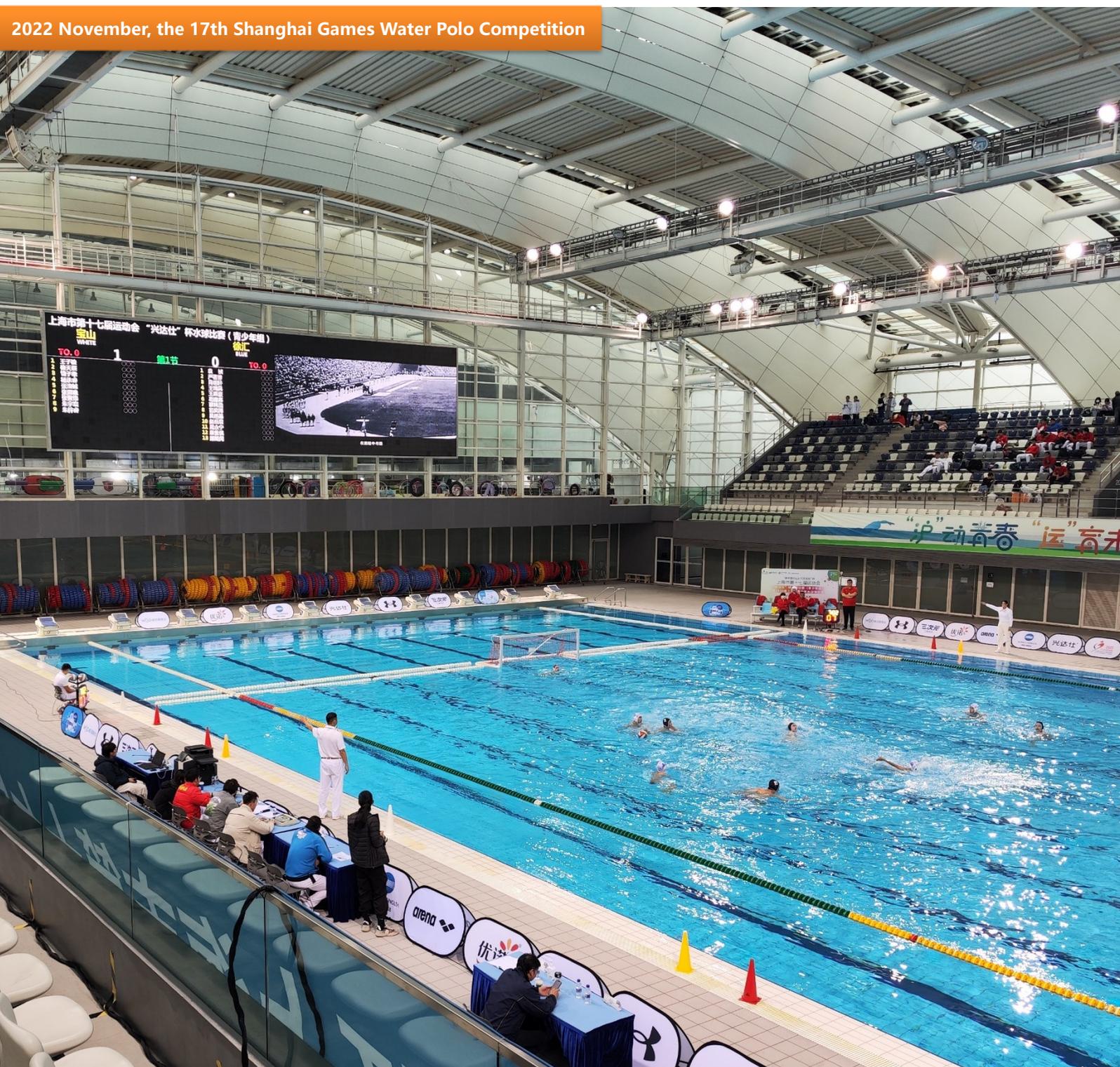
The system functions conform to international competition rules.

Match arrangement, real-time scoring & timing display, players' & referees' info display, rank statistics export & print, slow motion video record & playback, and advertising display can be realized through the coordination of Match Scoring System, Meet Management System, Video Arbitration System, etc.

Applicable rules of the system:

- 《FINA WATER POLO RULES 2022 – 2024》

2022 November, the 17th Shanghai Games Water Polo Competition



## 1.1 System Architecture

The whole system is composed of several subsystems, including: Match Scoring System, Meet Management System and Video Arbitration System.

Each subsystem can not only work independently, but also work together to share the data.

It is flexible for customers to configure according to the actual application.

- **Match Scoring System**

Match Scoring System named ULTRA SCORE is composed of Ultra Score Software, Scoring & Timing Host, Referee Timing and Scoring Terminal, Single Side Shot Clock, Penalty Screen, Electronic Buzzer, Water-polo Timeout Button, etc.

It is mainly operated by the referees to realize the scoring and timing work and real-time scoreboard display.

- **Meet Management System**

It is composed of Meet Management Server, On-Venue Results Workstation, Printer, etc.

Linking with Online Registration System and Match Scoring System, it can realize: participants management, match schedule, result management, court arrangement, rank statistics, etc.

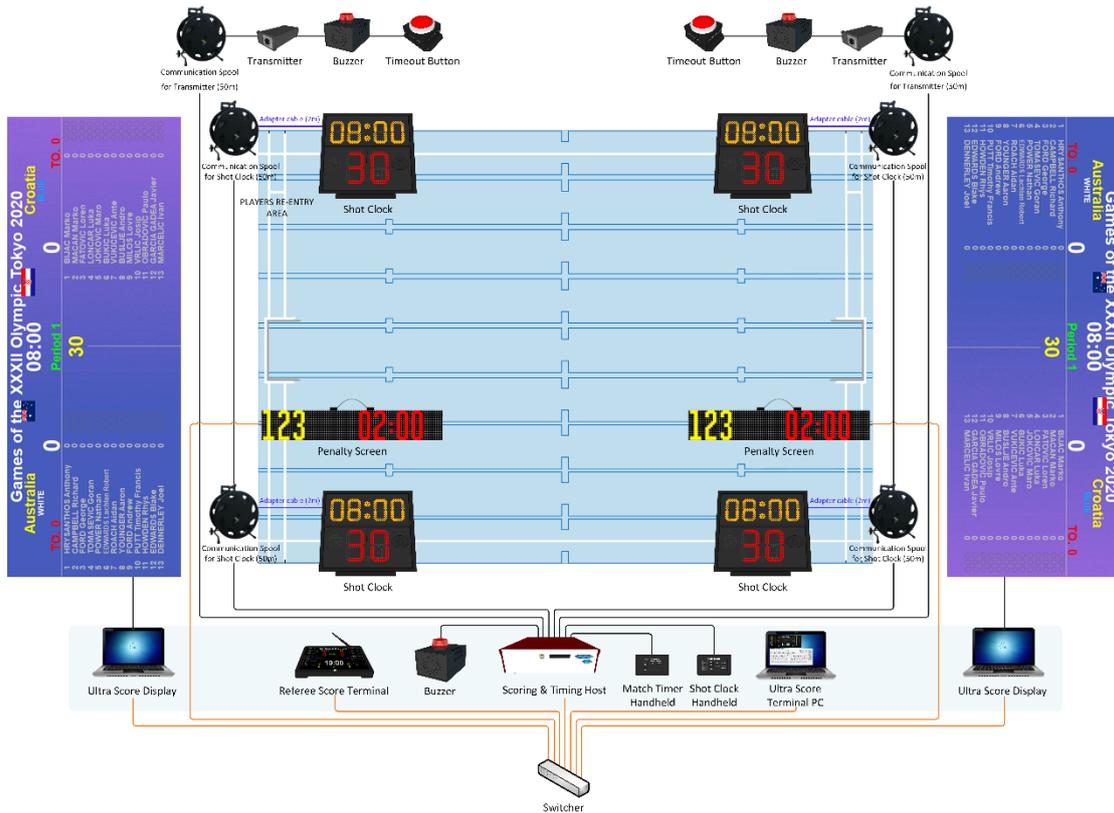
- **Video Arbitration System**

Video Arbitration System named PARROT is composed of video arbitration server, control panel and cameras.

It is operated by the referees during the match. When working with Match Scoring System, referee's score operation will be marked on the frame of video automatically, whilst playback them in slow motion with changes in speed.

It can be used to provide the technical support when dispute happens during the match so as to reduce the misjudging, to ensure fairness and justice of the match.

## 1.2 System Structure



### System Description

- 1) **LAN:** A LAN is set up in the stadium. Connect the LED control PC, Ultra Score Terminal PC, Match Scoring & Timing Host, Referee Scoring & Timing Terminal, Meet Management Server, On-Venue Results Workstation and Printer to the LAN.
- 2) **LED Screen:** One or two LED screens are controlled by separate computers which connect with LED sending cards. Both of the LED screens can show the same contents or different contents as required.
- 3) **Scoring & Timing Host:** It is the core scoring & timing equipment which is installed in the Officials Table and has the function of hot backup. It is used the special cables to connect the Shot Clock and Printer to the host.
- 4) **Referee Timing and Scoring Terminal:** It is Installed in the Officials Table for referee's operation of score and penalty. It can be connected to the LAN through network cable or WIFI.
- 5) **Single Side Shot Clock:** Four shot clocks installed on the basketball backboards and connect with Match Scoring & Timing Host with 5-core cables or through wireless communication.
- 6) **Electronic Buzzer:** They are installed at the near and far ends of the field respectively. Buzzer for tips as the competition required.
- 7) **Timeout Button:** It is used for teams to initiate a suspension.
- 8) **Penalty Screen:** It is installed on both sides of the field to display the player number and penalty time.
- 9) **Meet Management Server:** It is the core data processing equipment which is installed in the Technical Table and connected to the LAN by network cable.

### 1.3 Product Configuration

Product	Model	Qt.
<b>Match Scoring System</b>		
Ultra Score Software	<ul style="list-style-type: none"> <li>◆ Standalone Edition</li> <li>◆ Support: Water-polo</li> </ul>	1
Match Scoring & Timing Host	KS-MONSTER	1
Referee Timing and Scoring Terminal	KS-GC18	1
Score Console (optional)	KS-GC16	1
Single Side Shot Clock	KS-BASH-C/S	4
Stand for Shot Clock	KS-BAST-C/S	4
Shot Clock Communication Spool	KS-WPSH-W	4
Electronic Buzzer	KS-BUZR	3
Timeout Button	KS-TOBN	2
Transmitter	KS-TRANSMITTER	2
Transmitter Communication Spool	KS-TOBN-W	2
Penalty Screen	KS-SCRN-LED960160	2
Meet Management Server	KS-MMS-MINI	1
PC	/	2
<b>Video Arbitration System</b>		
Video Arbitration Server	KS-PARROT-2C	1
Control Panel	KS-PARROT-CP	1
HD Camera	KS-PARROT-CAMERA	2
Tripod for HD Camera	TRIPOD STANDARD	2
SDI Cable	15m	2
LCD Monitor	21.5 inch	1

## 2. Specification for products

### Match Scoring System

Match Scoring System named ULTRA SCORE is composed of Ultra Score Software, Match Scoring & Timing Host, Referee Scoring & Timing Terminal, Shot Clock, Electronic Buzzer, Timeout Button, Penalty Screen, etc.

It is mainly operated by the referees to realize:

- 1) Auto synchronize between the Main and Backup system. Hot switching backup system.
- 2) Unified control of Shot Clock, Electronic Buzzer, Timeout Button, Penalty Screen, with individual brightness adjustment for all devices.
- 3) Timing in high precision. Standalone handhelds for match timer and shot clock timer. Both can be adjusted in 1/10 seconds.
- 4) Modify the team score and player individual score.
- 5) Real-time data output, which can be used for TV broadcast.

### 2.1 Ultra Score Software

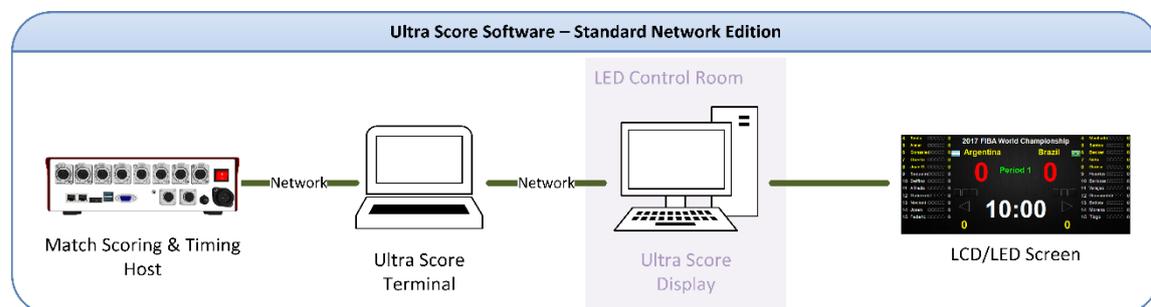
Products	Details
Standard network edition	<ul style="list-style-type: none"> <li>◆ Terminal + 1 Display</li> <li>◆ Supports: Water-polo, Diving, Artistic Swimming, Swimming</li> <li>◆ Including 1 dongle</li> </ul>
Professional network edition	<ul style="list-style-type: none"> <li>◆ Terminal + Referee + 2 Display</li> <li>◆ Supports: Water-polo, Diving, Artistic Swimming, Swimming</li> <li>◆ Including 1 dongle</li> </ul>

#### Difference:

##### Standard Network Edition:

Score terminal and media player functions can be installed on 2 PCs respectively. So that one independent PC can be setup on the courtside special for referee's operation, the other PC running as media player to manage the LED display.

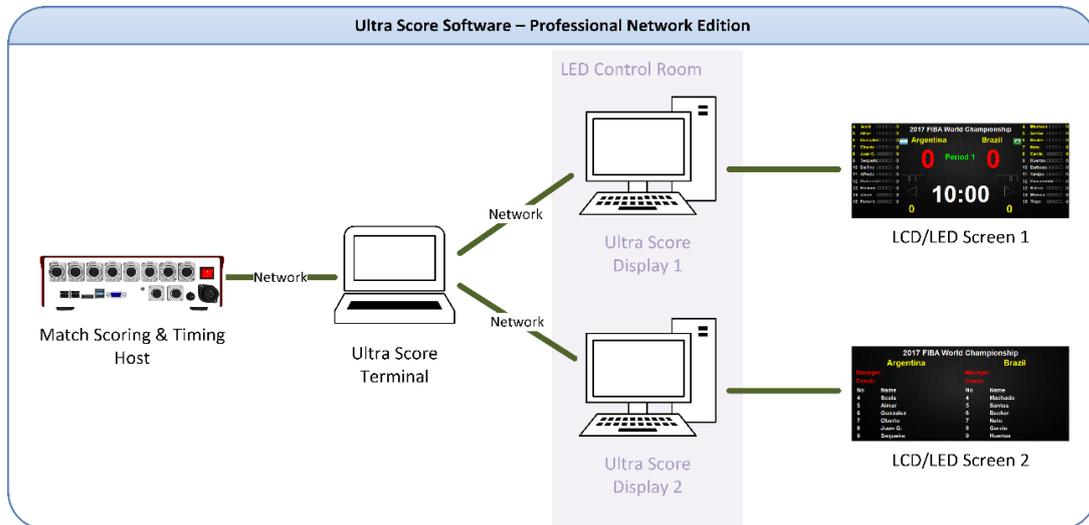
- It is suitable for the stadium where has one screen, needs to do the scoring and timing on the courtside.



### Professional Network Edition:

Except the function of score terminal, 1-3 media players can be equipped on PCs separately, in order to display different contents on several LED screens.

- It is suitable for the stadium where has more than 2 screens where referee need to do scoring on the courtside and LED screens need to display different contents separately. (For example, one LED screen is for scoreboard and another is for advertising or player info).



### Features:

- (1) Professional scoreboard display: Scoring and timing operation, layout of scoreboard can meet international game rules.
- (2) Match management: Information of match, team, team members and coaches can be saved in advance. And referee's scoring operation during the match can be recorded and output.
- (3) Scoring functions: Include operation and display of teams' and players' points, fouls and substitutions.
- (4) Timing functions: Include operation and display of game time, pause, break time, count down time and system time.
- (5) Convenient operation feeling: Referees can do operation on a special score console as well as by using shortcuts on the keyboard.
- (6) Powerful media player: Kinds of media formats are supported. It is easy to switch between scoreboard and video.
- (7) Notification: Rolling to display short notice on the screen which allows to set the speed, colors, fonts freely.
- (8) Customization: All contents on the scoreboard including fonts, color and layout can be modified to meet clients' needs.
- (9) Self-adaptation: With easy configuration, score information can be displayed on kinds of LED and LCD screen by using this system which can adjust the layout to meet any sizes of screen.
- (10) Security: Auto backup function will help you recover the match immediately from the computer fault.

Scoring interface for water polo

## Games of the XXXII Olympic Tokyo 2020

**Australia**  
WHITE

**0**

**TO. 0**

**08:00**

**Period 1**

**30**

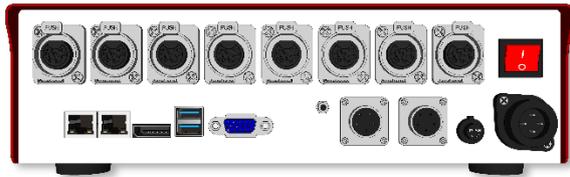
**Croatia**  
BLUE

**0**

**TO. 0**

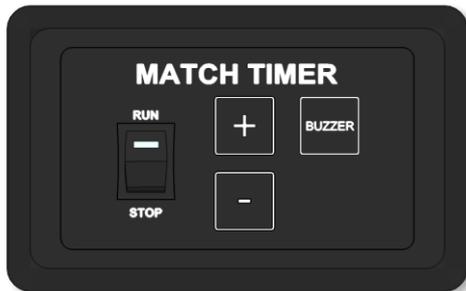
1	HRYANTHOS Anthony	0	○○○		1	BIJAC Marko	0	○○○
2	CAMPBELL Richard	0	○○○		2	MACAN Marko	0	○○○
3	FORD George	0	○○○		3	FATOVIC Loren	0	○○○
4	TOMASEVIC Goran	0	○○○		4	LONCAR Luka	0	○○○
5	POWER Nathan	0	○○○		5	JOKOVIC Maro	0	○○○
6	EDWARDS Lachlan Robert	0	○○○		6	BUKIC Luka	0	○○○
7	ROACH Aidan	0	○○○		7	VUKICEVIC Ante	0	○○○
8	YOUNGER Aaron	0	○○○		8	BUSLJE Andro	0	○○○
9	FORD Andrew	0	○○○		9	MILOS Lovre	0	○○○
10	PUTT Timothy Francis	0	○○○		10	VRLIC Josip	0	○○○
11	HOWDEN Rhys	0	○○○		11	OBRADOVIC Paulo	0	○○○
12	EDWARDS Blake	0	○○○		12	GARCIA GADEA Javier	0	○○○
13	DENNERLEY Joel	0	○○○		13	MARCELIC Ivan	0	○○○

## 2.2 Match Scoring & Timing Host



### Match Scoring & Timing Host

Model	KS-MONSTER
Size	260 x 280 x 80 (mm)
Support	Water-polo
Other	Supports hot switching between the main and backup system.



### Match Timer Handheld

Model	KS-G-MT
Size	120x80x25(mm)
Communication	Wired
Function	Match timer start, pause, adjustment and buzzer control.



### Shot Clock Handheld

Model	KS-G-ST
Size	120x80x25(mm)
Communication	Wired
Function	Shot Clock Timer start, pause, adjustment, close and reset.

Item	Details	Item	Details
Product	Match Scoring & Timing Host	Model	KS-MONSTER
Size	260 x 280 x 80 (mm)	Net Weight	3 KG
Material	Iron	Power	60W
CPU	Intel J3160	RAM	8GB
Communication	RJ45×2	Hard Disk	64GB
Video Output	VGA×1, DP×1	Input Voltage	AC 100~240V
Working Temp	0-60°C	Relative Humidity	5%-95%, non-condensing
Language	English	Timing Accuracy	<=10ms
Port	G-Port×8, Shot Clock port×2, Audio×1, USB×2, Serial port×1		
Accessories	Match Timer Handheld *1, Shot Clock Handheld *1		
Supporting Games	Basketball, Volleyball, Football, Futsal, Handball, Water-polo, Ice-hockey, etc.		
Supporting Rules	FIBA, FIBA 3X3		
Functions	<ol style="list-style-type: none"> <li>1. Timer functions: Timing in minute, second, tenth of a second, 14S &amp; 24S and timing in count up and count down, start, pause, reset, correct are available.</li> <li>2. Scoring functions: Modify the score of the team and player.</li> <li>3. Penalty functions: Team foul control, Player foul control, Player penalty time control, Substitution control, yellow/red card control, etc.</li> <li>4. Supports match rule setup.</li> <li>5. Synchronous control of 24s Shot Clock, Possession Display, Foul Display and Electronic Buzzer.</li> <li>6. Adjust the brightness of 24s Shot Clock, Possession Display and Foul Display.</li> <li>7. Provides buzzer sound output, which can be connected to the venue's public address system or speakers.</li> <li>8. Supports hot switching of the main and backup servers. In case of the main server fails, just manually switch to the backup server to ensure the data intact. And in case of power failure, the previous screen will be restored after restarting.</li> <li>9. Supports real-time data output, which can be used for live broadcast.</li> <li>10. Monitoring the status of scoring devices, providing convenient fault diagnosis (with a separate monitor).</li> <li>11. Anti-loose port ensures the safety of match data.</li> </ol>		

### 2.3 Referee Timing & Scoring Terminal

Item	Details	Item	Details
Product	Referee Timing & Scoring Terminal	Model	KS-GC18
Size	281 x 173 x 39 (mm)	Material	PVC+Metal
Touch LCD	11.6 inch	Resolution	1920*1080
OS	WIN 10	Battery	No Built-in Battery
Communication	LAN / WLAN	Hard Disk	SSD 180GB
Video Output	HDMI*1	RAM	8GB
Functions	<ol style="list-style-type: none"> <li>1. Timer: Includes minute, second, deci-second, 14S and 24S timing function. And also have count up, count down, start/pause/reset/correct timing functions.</li> <li>2. Scoring function: Modify the score of the team and player.</li> <li>3. Penalty function: Team foul control, Player individual foul control, Player Penalty control, Substitution control, Player yellow/red card control, etc.</li> </ol>		



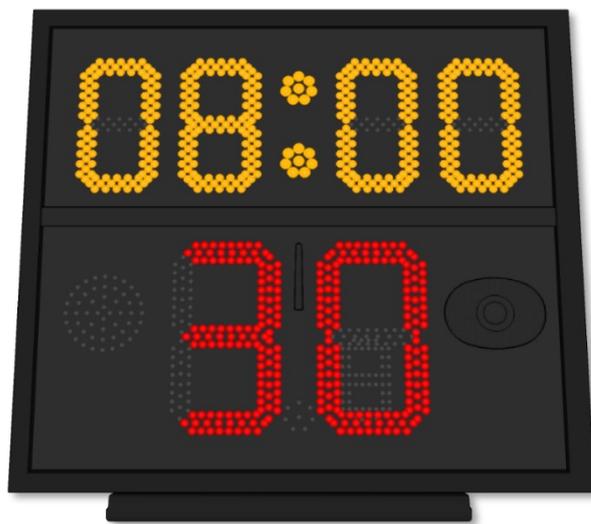
## 2.4 Score Console

Item	Details	Item	Details
Product	Score Console	Model	KS-GC16
Size	330x290x140 (mm)	Weight	3KG
Port	LAN*1, WLAN*1, USB*1, AUDIO*1, Aviation interface*2	Communication	LAN / WLAN
Support	Water Polo	Accessories	Match Timer Handheld *1, Shot Clock Handheld *1
Functions	<ol style="list-style-type: none"> <li>1. Modify score, foul, control the competition clock and shot clock, etc.</li> <li>2. The console should be worked together with Ultra Score software</li> <li>3. It should be connected to LAN in wire or wireless way.</li> <li>4. It supports multiple scoring functions in ball games, such as: the team score, team foul, players' score, players' foul, match timer, shot clock and cancellation There are external match timer controller and shot clock controller, which can be operated by timekeeper.</li> <li>5. There is a scoring console with a Game Clock controller and shot clock controller, which can support more than 3 judges at the same time.</li> <li>6. It can be used in wired or wireless mode.</li> <li>7. Include Product Liability Insurance.</li> </ol>		



## 2.5 Shot Clock

Item	Details
Shot Clock	<p>Model: KS-BASH-C/S            Size: 710x610x60 (mm)</p> <ul style="list-style-type: none"> <li>◆ Single side</li> <li>◆ Weight: 10KG*4</li> <li>◆ Power: 60W*w4</li> <li>◆ Buzzer: 110dB</li> <li>◆ Material: Aluminium</li> <li>◆ Communication: Wired + Wireless(433MHz)</li> <li>◆ Match Timer: Decisecond display in last 1 minute</li> <li>◆ Shot Clock: Decisecond display in last 5 second; Switch 20s/30s display</li> <li>◆ Buzzer: Two different buzzer sound for match timer and shot clock</li> <li>◆ Synchronous controlled by score console</li> </ul>
Stand for Shot Clock	<p>Model: KS-BAST-C/S            Size: 398x250x30(mm)            Material: Aluminum alloy</p>



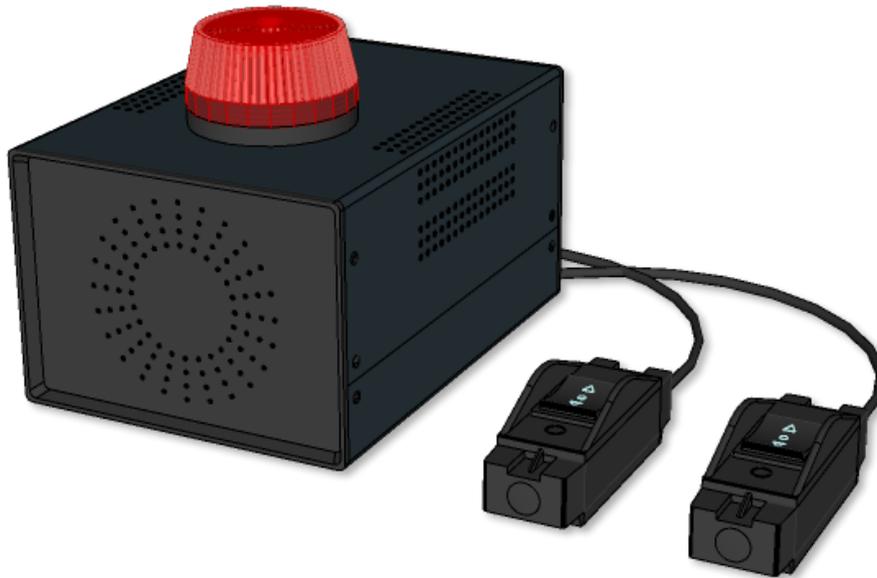
## 2.6 Shot Clock Communication Spool

Item	Details
Communication Spool	Model: KS-WPSH-W ◆ Size: 365x240x415 (mm) ◆ Material: Iron ◆ Cable length: 50m



## 2.7 Electronic Buzzer

Item	Details
Electronic Buzzer	Model: KS-BUZR Buzzer for tips as the competition required.

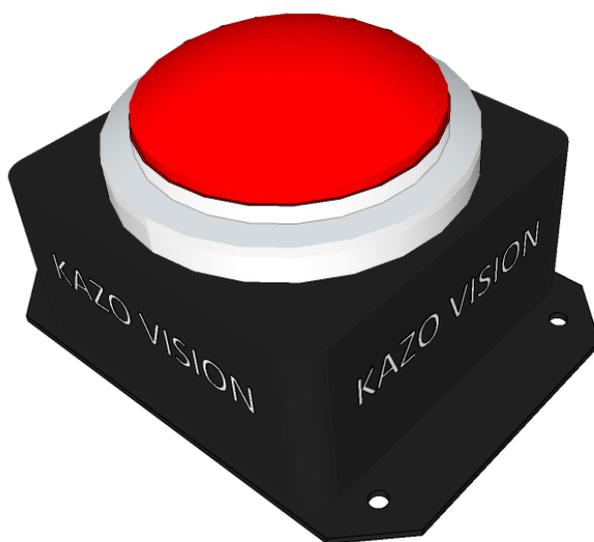


### Parameters

Buzzer	KS-BUZR
<b>Basic parameters</b>	
Input Voltage	AC~220V±5%
Total Power	35W
Color	Black
Weight	1KG
Buzzer	110dB
<b>Product Configuration</b>	
Packing List	Host*1 Handheld*2 Power Cable*1 Power Adapter*1
Refresh frequency	80HZ--90HZ

## 2.8 Water-polo Timeout Button

Item	Details
Timeout Button	<p>Model: KS-TOBN</p> <p>Size: 100x100x110 (mm)</p> <p>Material: PVC + Aluminum</p> <p>Function:</p> <ul style="list-style-type: none"><li>◆ It can be connected to the scoring software and timing can be paused.</li></ul>



## 2.9 Transmitter

Item	Details
Transmitter	<p>Model: KS-TRANSMITTER</p> <p>Material: PVC+Aluminum</p> <p>Function:</p> <ul style="list-style-type: none"><li>◆ Connect the buzzer and timeout button to enhance remote signal transmission.</li></ul>



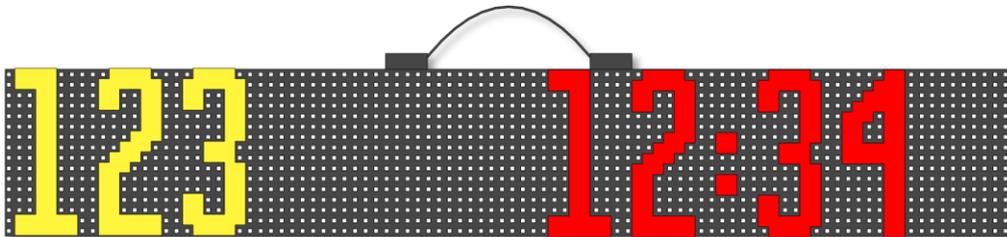
## 2.10 Transmitter Communication Spool

Item	Details
Transmitter Communication Spool	Model: KS-TOBN-W ◆ Size: 365x240x415 (mm) ◆ Material: Iron ◆ Cable length: 50m



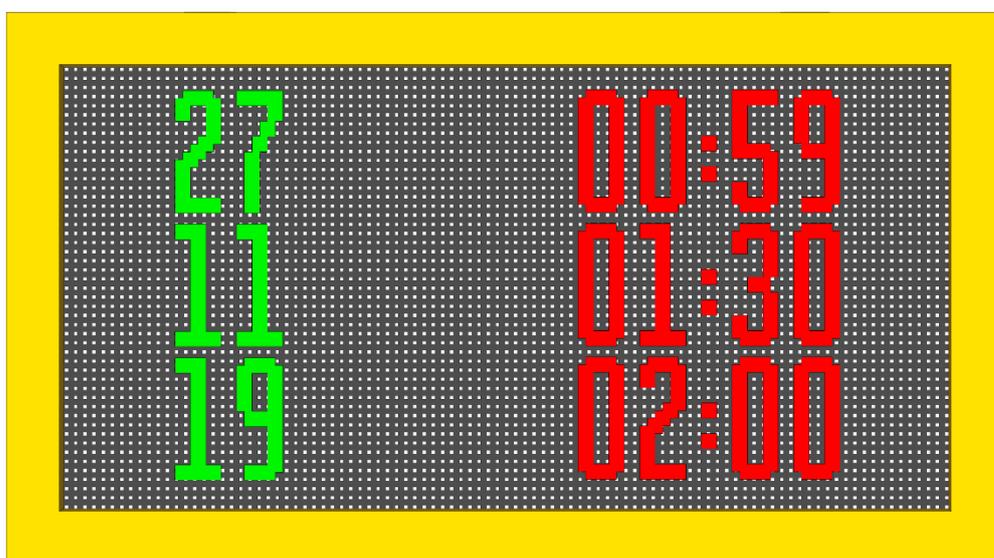
### 2.11 Water Polo Penalty Screen (Single Line)

Item	Details
Water Polo Penalty Screen (Single Line)	Model: KS-SCRN-LED960160 Size: 960*160*100(mm) Material: Aluminum Input: 48V DC Function: <ul style="list-style-type: none"><li>◆ Must be used together with Water-polo Scoring Software.</li><li>◆ Display athlete's number and penalty time.</li></ul>



## 2.12 Water Polo Penalty Screen (Triple Line)

Item	Details
Water Polo Penalty Screen (Triple Line)	Model: KS-SCRN-LED960480 Size: 1080*600*145(mm) Material: Aluminum Function: <ul style="list-style-type: none"><li>◆ Must be used together with Water-polo Scoring Software.</li><li>◆ Display athlete's number and penalty time.</li></ul>

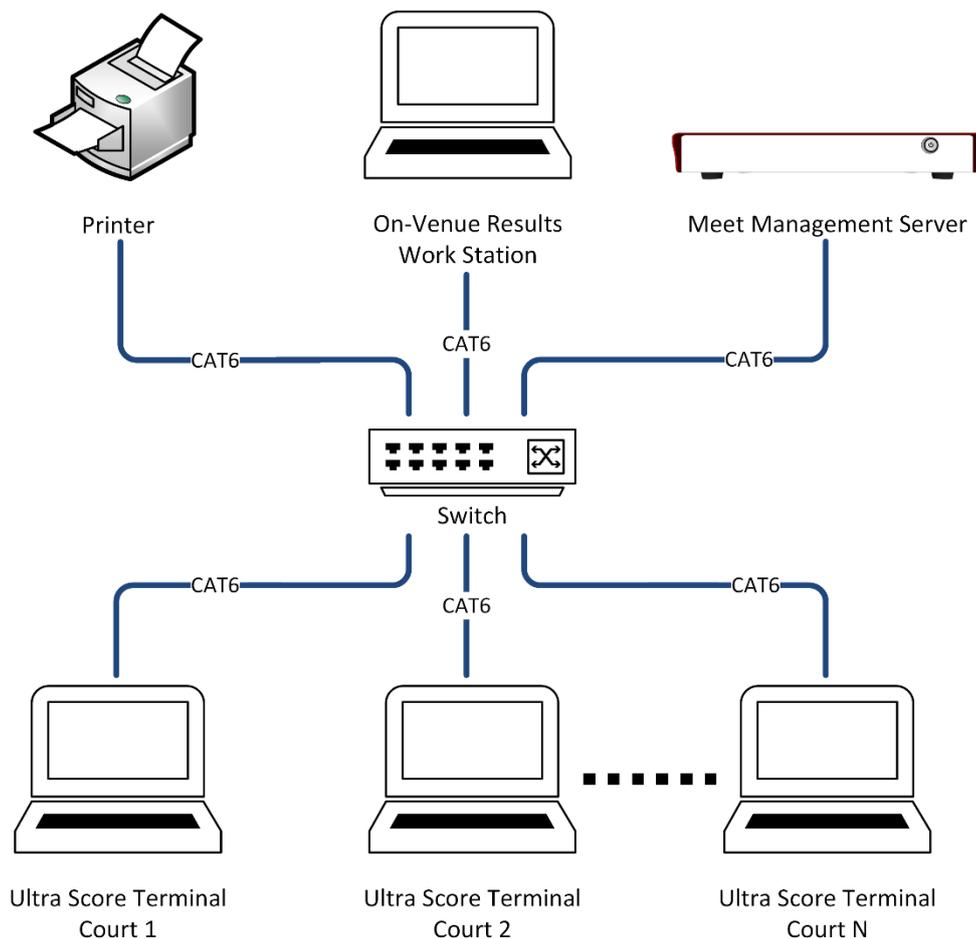


### 2.13 Meet Management System

It is composed of Meet Management Server, On-Venue Results Workstation, Printer, etc. Linking with Online Registration System, Match Scoring System and Basketball Stats System, it can realize:

- 1) **Participants Management:** Information management of players, teams and referees. Both import and input registration form are available. And auto generate the order form.
- 2) **Match Schedule:** Auto draw the players' lots. Multi-project arrangement make the schedule more smoothly. Auto generate the bracket, order form and round form.
- 3) **Result Management:** Receive or record the results. Determine the players' rank, admission or elimination at each stage. Print the results announcement and send to the LED display system, TV broadcasting system and comprehensive meet manage system.
- 4) **Technical Statistics Arrangement:** Combine with the basketball stats software, it can summarize the info of teams' score, teams' timeout, teams' foul, players' substitution, players' foul, players' comprehensive results, and generate the integrated report.

#### 2.13.1 System Diagram



### 2.13.2 Meet Management Server

Item	Details
Meet Management Server	<p>Model: KS-MMS-MINI</p> <p>Size: 260x135x35 (mm)</p> <p>Weight: 1.0 KG</p> <p>Input Voltage: 12V DC</p> <p>RAM: 4GB</p> <p>CPU: Intel J3160</p> <p>Hard Disk: 64G</p> <p>Communication: LAN*1</p> <p>Port: VGA*1, DP*1, USB*2</p> <p>Features:</p> <ul style="list-style-type: none"><li>◆ Multi-court arrangement, auto generate the order form.</li><li>◆ Multi-project arrangement, make the schedule more smoothly.</li><li>◆ Monitor the status of each court in real time, including the current field, rotation and player info.</li><li>◆ Court adjustment, can manually modify the match court and session info.</li><li>◆ Summary and print integrated report.</li></ul>



## 2.14 Video Arbitration Server

Video Arbitration System named PARROT is composed of video arbitration server, control panel and cameras.

It is operated by the referee during the match. When working with Match Scoring System, referee's score operation will be marked on the frame of video automatically, whilst playback them in slow motion with changes in speed.

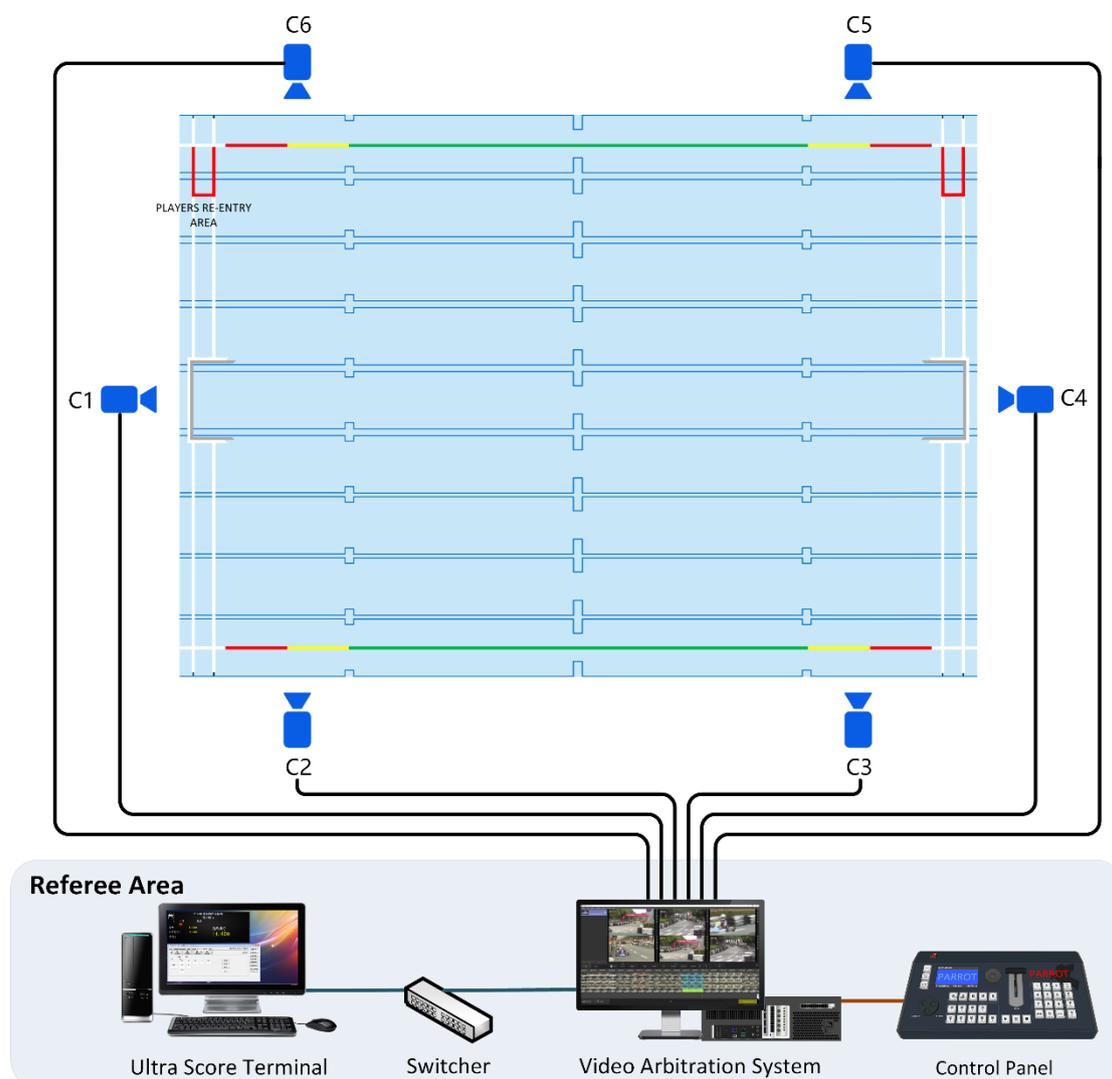
It can be used to provide the technical support when dispute happens during the match so as to reduce the misjudging, to ensure fairness and justice of the match.

### Application:

Aerobics, Basketball, Volleyball, Soccer, Handball, Boxing, Wrestling, Wushu, Judo, Jujitsu, Karate, Taekwondo, Gymnastics, Swimming, Diving, Ice-hockey, Weightlifting, etc.



### 2.14.1 System Diagram



### 2.14.2 System Description

- 1) Ultra Score software is installed on the control computer. Connect the control computer and the video arbitration server to the local network.
- 2) 1-8 sets of HD cameras are installed around the court which connects to video arbitration server via SDI cable.
- 3) Control panel is connected to video arbitration server via a USB cable which makes referee easy to check the playback process and control the speed of slow motion.
- 4) Video arbitration server provides an output video signal which can be connected to LED/LCD display for live slow motion replay.

### 2.14.3 Functions

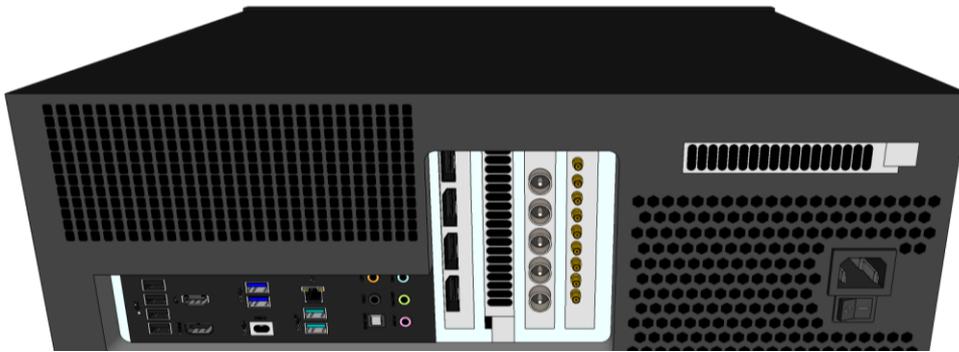
- 1) **Nonstop video recording in the background:** 1-8 channels of HD video are recorded simultaneously in the background, nonstop for 10 hours. Video retrieval and playback is unaffected.
- 2) **Synch-playback of multi-channel video:** Supports playback mode of single channel video in full screen and multi-angle video in 6 windows.
- 3) **Speed change in slow motion:** supports 20 frame/s video playback and capturing motion in a grid of 0.05s. The function of frame freeze, fast playback, 1/2 slow playback, 1/4 slow playback and dragging progress bar is available.
- 4) **Video event query:** video stream can be divided into several video events, storing in the event list, which can be renamed for retrieve easily.
- 5) **Video segment marker:** Important or controversial moments can be marked in video stream which will be replayed quickly when clicking the marked records.
- 6) **Professional playback control panel:** configuring T-bar, slow moving wheel, speed preset function keys to make the process more convenient.
- 7) **Video signal output:** provides 2 video output signals, one of which is for preview, the other of which can be connected to LED/LCD display for live slow motion replay.

#### Working with Ultra Score System to realize:

- ◆ **Auto generate video event:** Video events will be generated automatically for quick query according to the match data that has been preset in Ultra Score.
- ◆ Real-time match timer will be superimposed on the video.
- ◆ **Referee's operation record:** Referee's every scoring and timing operation can be recorded into the video, showed below the frame when that moment happened.
- ◆ **Player's point record:** Player's point can be recorded into the video, showed below the frame when that moment happened.
- ◆ **Open developer API:** Just connect your own scoring system onto this Video Arbitration System, so you may record all kinds of events together with the videos.

#### 2.14.4 Video Arbitration Server

Products	Details
Video Arbitration Server	Model: KS-PARROT-2C/4C/6C/8C Video Input: 2/4/6/8 channels input synchronously; Input port: SDI; Output port: DP*2; Video Format: 1080P; Recording capacity: $\geq 10$ hours; Multi-screen monitoring: supported; Weight: 8kg.



#### Software interface



## Device Specification

<b>Model</b>	<b>KS-PARROT-2C/4C/6C/8C</b>
Size	485x480x90(mm)
Net Weight	8 KG
Color	Black
Cabinet	Iron
<b>Interface</b>	
Input	SDI*2/4/6/8
Output	DP*2
<b>Environmental</b>	
Operating Temp	-5°C~45°C
Storage Temp	-40°C~80°C
Relative Humidity	5%~95%, non-condensing
Input Voltage	AC 100V~240V
<b>Functions</b>	
<ul style="list-style-type: none"><li>◆ <b>Nonstop video recording in the background:</b> 2/4/6/8 channels of HD video are recorded simultaneously in the background, nonstop for 10 hours. Video retrieval and playback is unaffected.</li><li>◆ <b>Synch-playback of multi-channel video:</b> Supports playback mode of single channel video in full screen and multi-angle video in 2/4/6/8 windows.</li><li>◆ <b>Speed change in slow motion:</b> support 50 frame/s video playback and capture motion in a grid of 0.02s.</li><li>◆ <b>Video event query:</b> video stream can be divided into several video events, storing in the event list, which can be renamed for retrieve easily.</li><li>◆ <b>Video segment marker:</b> Important or controversial moments can be marked in video stream which will be replayed quickly when clicking the marked records.</li><li>◆ <b>Video signal output:</b> provides 2 video output signals, one of which is for preview, the other of which can be connected to LED/LCD display for live slow motion replay.</li></ul>	

## 2.14.5 Control Panel

Products	Details
Control Panel	<p>Model: KS-PARROT-CP</p> <p>Function:</p> <ul style="list-style-type: none"> <li>◆ Support one touch replay, deferred replay, in/out replay.</li> <li>◆ Preset speed button.</li> <li>◆ T-Bar for dynamic slow motion.</li> <li>◆ Professional dynamic jog wheel.</li> <li>◆ Key to mark the last 10s/20s of the video content.</li> <li>◆ Flexible select the marked video and playback.</li> </ul>



## Device Specification

<b>Model</b>	<b>KS-PARROT-CP</b>
Size	365 x 200 x 98 (mm)
Net Weight	1 KG
Cabinet	Iron
Display	Color LCD(4.3Inch)
Sound	None
<b>Communication</b>	
USB	≤5m
RS232	≤10m
<b>Environmental</b>	
Operating Temp	-5~45°C
Relative Humidity	5~95 %, non-condensing
Storage Temp	-40~80°C
Input Voltage	AC 100V-240V
Total Power	15W

### 2.14.6 HD Camera

Products	Details
HD Camera	Model: KS-PARROT-CAMERA



### Device Specification

Product Model	KS-PARROT-CAMERA
Video output	3G-SDI
Effective pixels	3.0 million
Max Resolution	1920*1080
Max Frame rate	60FPS
Sensor	CMOS
Focal length	4.2MM
Size	62.5*50*50MM