Scoring & Timing Solution for Artistic Swimming

1. Introduction

This is a professional solution for LED scoreboard display in synchronized swimming 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 ARTISTIC SWIMMING RULES 2-17-2021》

2019 September, 10th Asian Age Group Championships 2019 - Artistic Swimming

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, Match Scoring & Timing Host, Referee Scoring & Timing Terminal, Light Indicator, Match Timer, Penalty Timer, etc.

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

The system functions conform to IIHF rules.

● **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.
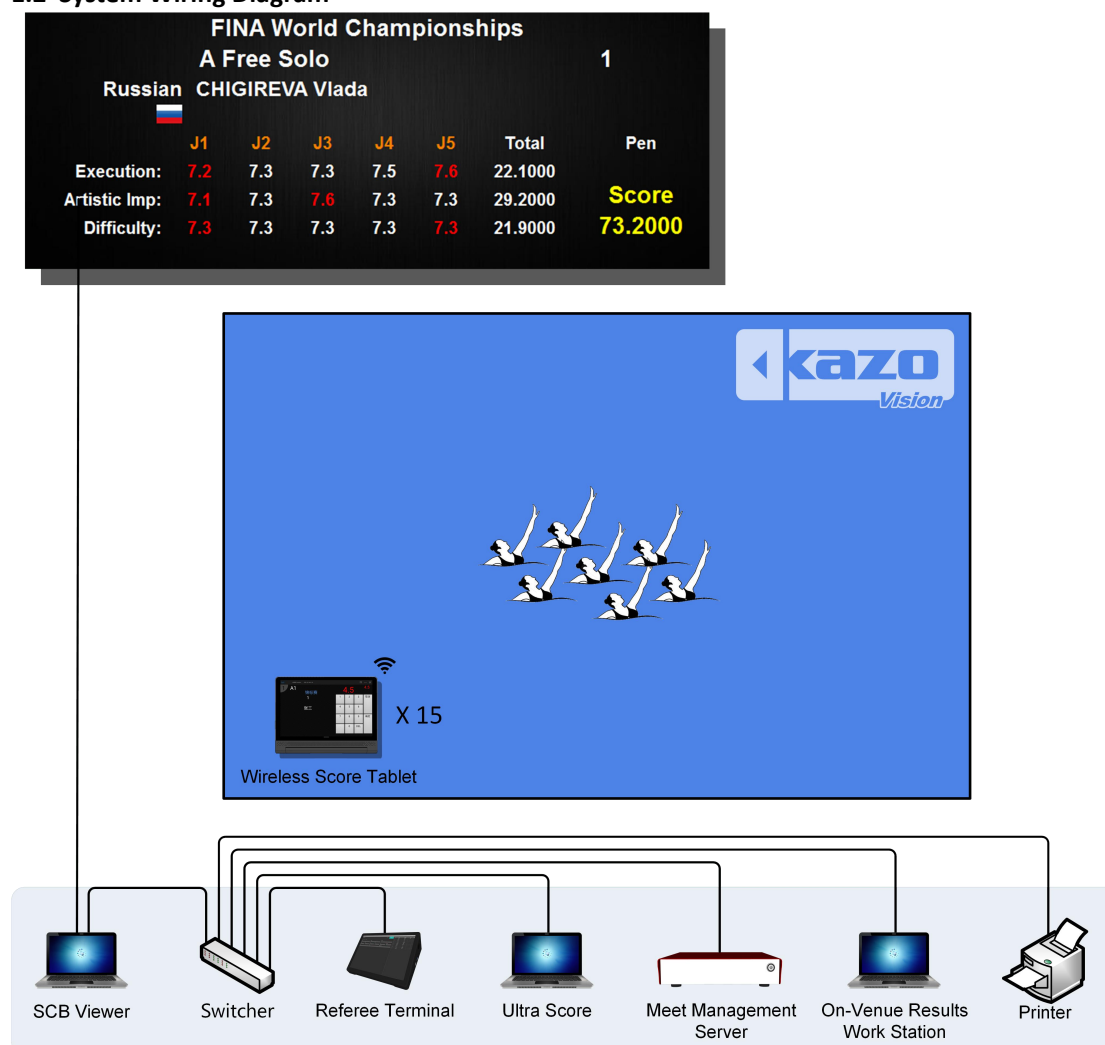
● **Video Arbitration System**

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 Wiring Diagram

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) **Wireless Score Tablet:** 15 Wireless Score Tablets are used together with Ultra Score software for referee scoring.

4) **Referee Scoring Software:** It is installed in the court side referee seat, which can monitor the scoring of referees in multiple venues in real time and correct unreasonable scoring.

5) **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

(For one court)

Product	Type	Quantity
Match Scoring System		
Ultra Score Software	Standard Network Edition	1
Score Display Software	SCB VIEWER	1
Referee Terminal	KS-RETM	1
Wireless Score Tablet	KS-GC14	15
Meet Management Server	KS-MMS-MINI	1
PC	/	2
Video Arbitration System		
Video Arbitration Server	KS-PARROT-2C	1
Control Panel	KS-PARROT-CP	1
HD Camera	KS-PARROT-CAMERA	2
Tripod for camera	TRIPOD STANDARD	2
SDI Cable	CABLE-SDI-15	2
Monitor	Dell	1

2. Specification for products

2.1 Ultra Score Software

Products	Details
Standalone edition	◆ Installed on one PC. ◆ Supports: Artistic Swimming ◆ English version ◆ Including 1 dongle
Standard network edition	◆ Terminal + 1 Display ◆ Supports: Artistic Swimming ◆ English version ◆ Including 1 dongle
Professional network edition	◆ Terminal + Referee + 2 Display ◆ Supports: Artistic Swimming ◆ English version ◆ Including 1 dongle

Difference:

Standalone Edition:

Match management, Scoring, and Media display functions, all in one installed on a PC. Referee must do operation on the PC for display directly.

It is suitable for the stadium where has just one screen, which doesn't have strict needs of the scoring and timing accuracy.

Network Standard 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.

Network Professional 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).

Scoring interface for Artistic Swimming

Welcome:

Order:

Score:

FINA World Championships
A Free Solo 1
Russia Natalia Ishchenko

J1	J2	J3	J4	J5	J6	J7	Score	Pen

Result:

FINA World Championships
A Free Solo

Rank	Team	Athletes	#1	#2	#3	#4	Total
	Russia	Natalia Ishchenko					
	England	Olivia Federici					
	China	Chen Xiaojun					
	England	Vicki Lucass					
	America	Sarah Bombell					
	China	Jiang Wenwen					

2.2 Score Display Software

Products	Detail
Score Display Software	Type: SCB VIEWER Support: Artistic Swimming Functions: ◆ Layout of scoreboard can meet international game rules. ◆ All contents on the scoreboard including fonts, color and layout can be modified to meet clients' needs. ◆ Used for displaying player information, score and bureau score of a single court. ◆ Used for displaying player information, score and bureau score of multiple sites. ◆ The summary display screen can automatically adjust the display layout according to the competition process. ◆ The picture is updated in real time according to the referee's operation. ◆ Automatic data backup. In case of computer failure or power failure, the previous screen will be restored after restart.

Rank	Team	Name	Score
1	Brazil	Adela	20.5
2	India	Nanettle	19.8
3	Liberia	Rebekah	19.7
4	Nepal	Magnolia	18.8
5	America	Gerda	18.3
6	Malta	Wendy	17.5
7	Japan	Bealty	17.1
8	France	Helen	17.1

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2.3 Referee Terminal

Products	Details
Referee Terminal	Type: KS-RETM Size: 281 x 173 x 39 (mm) Touch LCD: 11.6 inch Resolution: 1920*1080 OS: WIN 10 Communication: LAN / WLAN Hard Disk: SSD 180GB RAM: 8GB Video Output: HDMI*1 ◆ Monitor the scores of judges on the court in real time. ◆ Modify or remind the unreasonable grades. ◆ Achieve the overall control of the display score. ◆ View the current real-time ranking info.

2.4 Wireless Score Tablet

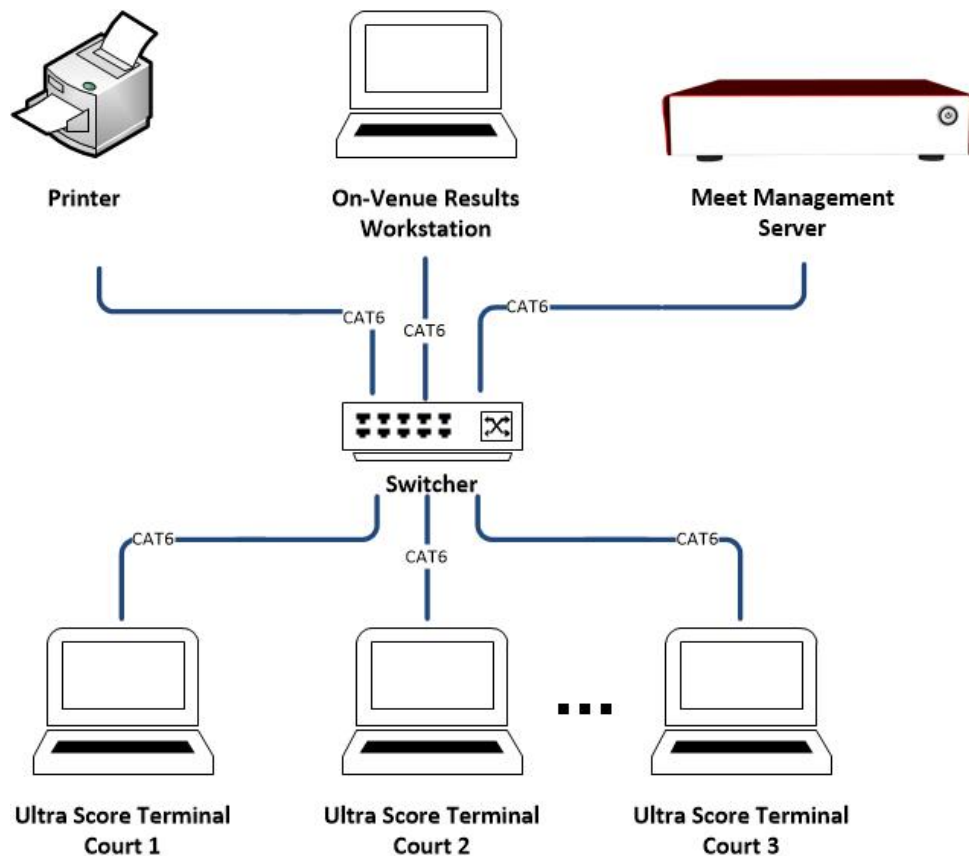| Products	Details
Wireless Score Tablet	Type：KS-GC14 ◆ Including one license of Lightscore software ◆ Screen: 10"inch 2560*1600IPS ◆ Ram：3GB ◆ Storage: 32GB ◆ Battery: 9300mAh ◆ System: Android 6.0 ◆ Supports：Artistic Swimming ◆ Communication: WIFI ◆ Full colored touch screen

2.5 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.

2.5.1 System Diagram

2.5.2 Meet Management Server

Products	Details
Meet Management Server	Type：KS-MMS-MINI Size: 170x150x35 (mm) Weight: 1.0 KG Features: ◆ Multi-court arrangement, auto generate the order form. ◆ Multi-project arrangement, make the schedule more smoothly. ◆ Monitor the status of each court in real time, including the current field, rotation and player info. ◆ Court adjustment, can manually modify the match court and session info. ◆ Summary and print integrated report.

2.6 Video Arbitration System

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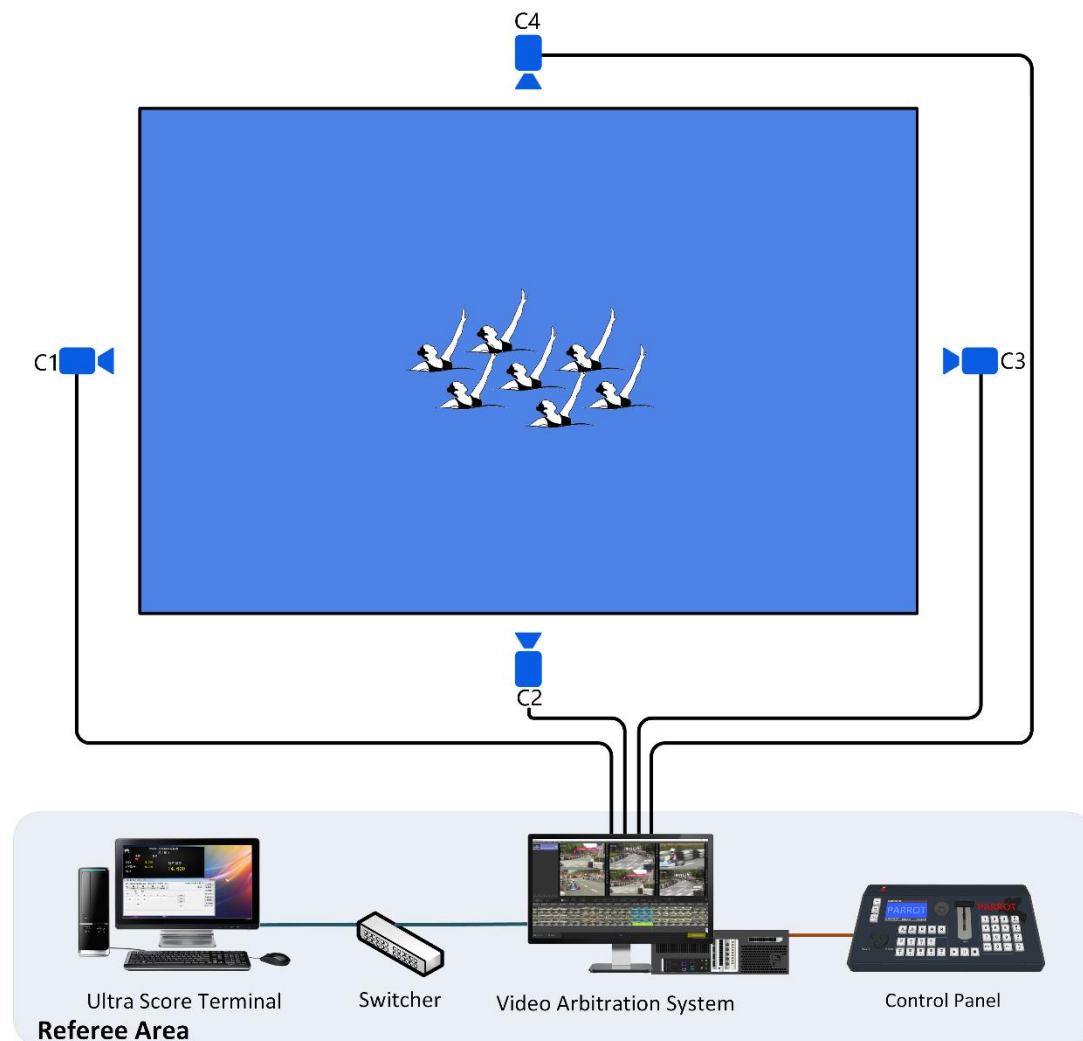
It can be used to provide the technical support when dispute happens during the match so as to reduce the misjudging, to ensure fairness and justice of the match.

Application:

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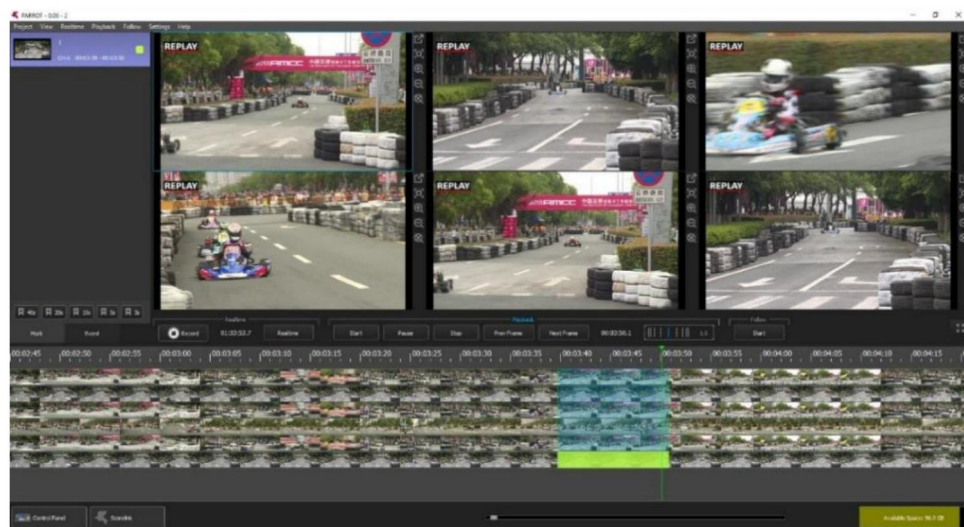
2.6.1 System Diagram

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 count 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.

2.6.2 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.
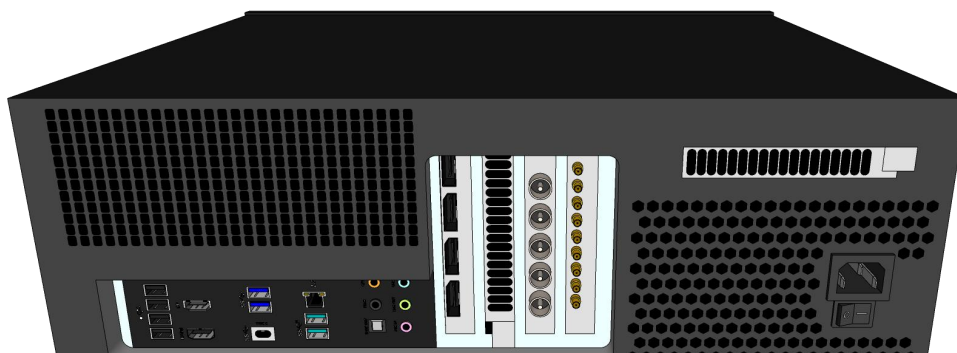
Working with Ultra Score System to realize:

● **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.

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2.6.3 Video Arbitration Server

Products	Details
Video Arbitration Server	Type: 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: ≥ 10 hours; Multi-screen monitoring: supported; Weight: 8kg.

Software interface

![Kazo Vision logo] **Kazo Vision**
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Device Specification

Type	KS-PARROT-2C/4C/6C/8C
Size	485x480×90(mm)
Net Weight	8 KG
Color	Black
Cabinet	Iron
Interface	
Input	SDI*2/4/6/8
Output	DP*2
Environmental	
Operating Temp	-5℃～45℃
Storage Temp	-40℃～80℃
Relative Humidity	5%～95%, non-condensing
Input Voltage	AC 100V~240V
Functions	

◆ **Nonstop video recording in the background:** 2/4/6/8 channels of HD video are recorded simultaneously in the background, nonstop for 10 hours. Video retrieval and playback is unaffected.

◆ **Synch-playback of multi-channel video:** Supports playback mode of single channel video in full screen and multi-angle video in 2/4/6/8 windows.

◆ **Speed change in slow motion:** support 50 frame/s video playback and capture motion in a grid of 0.02s.

◆ **Video event query:** video stream can be divided into several video events, storing in the event list, which can be renamed for retrieve easily.

◆ **Video segment marker:** Important or controversial moments can be marked in video stream which will be replayed quickly when clicking the marked records.

◆ **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.

2.6.4 Control Panel

Products	Details
Control Panel	Type: KS-PARROT-CP Function: ◆ Support one touch replay, deferred replay, in/out replay. ◆ Preset speed button. ◆ T-Bar for dynamic slow motion. ◆ Professional dynamic jog wheel. ◆ Key to mark the last 10s/20s of the video content. ◆ Flexible select the marked video and playback.

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Device Specification

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

2.6.5 HD Camera

Products	Details
HD Camera	Type: KS-PARROT-CAMERA

Device Specification

Product Type	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