AReS (All-in-One Real time Instrumentation & Educational System)

Smart Trainer

FEATURES
- All-in-one smart learning platform designed for technical education
- Embedded Microsoft Operating System (OS) for easy operation
- Built-in functions of various measuring instruments such as oscilloscope and function generator
- Internet access through cable or wireless(WiFi) communication
- Full-color TFT touch LCD
- Supports USB and Serial Interface
- Highly efficient test & measurement application software
- Multilingual support
- Various types of experimental modules: electricity, electronics, telecommunication, microprocessor and automation control
- Capable of playing back smart learning video contents
- Comes with contents management software as a part of experimental modules package
- Digital experimental manuals in e-Book format (option)
- Circuit design simulation software: CASPOC (option)

MS Windows embedded System
- Oscilloscope
- Volt & Ampere meter
- Power meter
- Digital multimeter
- Function generator
- Arbitrary waveform generator
- DC source generator
- 3-channel variable DC power supply
- 3-phase variable AC power supply
- 4-channel fixed DC power supply
- Digital I/O devices
- Relay output devices
- Test & measurement application software

Advanced Platform (model: AReS-Advanced)
- Embedded OS of smart learning platform for the measurement
- Equipped with Intel CPU (Atom processor)
- 1.6GHz, 800MHz FSB, 512KB L2 cache
- 2.1W ultra low power system [FCBGA package]
- Hyper-Threading technology [45nm technology]
- Ethernet and Wi-Fi communication
- Serial and USB communication interface
- Touch screen resolution: QXGA (1920 x 1200)
- Connector to link experimental modules: 124 points
- Integrated measuring board with 3-core CPU

Variety GUI of TFT touch LCD software

Basic Platform (model: AReS-Basic)

- Embedded OS of smart learning platform for the measurement
- Equipped with Arm Cortex CPU (Cortex-M4 32 bit RISC processor)
- Serial and USB communication interface
- Connector to link experimental modules: 124 points
- Integrated measuring board with 3-core CPU

Embedded Software

- Embedded OS based application software (*AReS-Advanced)
- Smart touch user interface control function (*AReS-Advanced)
- PC-based application software (*AReS-Basic)
- Supports Multilingual selection and audio/video control
- Real-time measuring instrumentation software [ARES-RTI-01]
- Smart learning contents management software [ARES-SLS-500-01]
- Electronic (e-Book) format experimental manual [Option]
- Circuit design simulation software [Option]

Real-Time Measuring Application Software (AReS Advanced)

PC-Based Application Software (AReS Basic)

AReS (All-in-One Real time Instrumentation & Educational System)

Try our new-concept smart learning platform and enjoy high quality learning experiences!

The AReS Smart Trainer is the all-in-one smart learning platform designed for technical education. This smart learning platform is equipped with 11 types of measuring instruments essential for smart technology education such as oscilloscope, digital multimeter, DC power supply, AC power supply and function generator.

The AReS Smart Trainer features a full-color TFT touch LCD screen for clear view and powerful arithmetic operations based on Atom N270 CPU processor. It was designed to ensure benefit of smart education through the hardware architecture of the built-in integrated measurement board loaded with 3-Core CPU. It provides excellent communication environment through various types of interface: USB, Serial, Ethernet and WI-FI. The 11 types of measuring instruments of the Smart Trainer can be interfaced with the PC as well as software.

In addition, optional e-Book experimental manual and video learning contents integrated with the smart learning platform will build true smart learning environment. With the AReS Smart Trainer, you can improve the quality of technical education beyond your imagination.

Oscilloscope

Voltmeter & Ampere meter

Power Meter

Function Generator

Pulse Generator

Arbitrary Generator

DC Source Generator

DMM (Digital Multimeter)

3-Channel Variable DC Power supply

3-Phase Variable AC Power supply

Advanced 3-Phase Power supply

Digital Input (16-bit)

Digital Output (16-bit)

Digital I/O Control

Relay Output

Quick Menu

ARes (All-in-One Real time Instrumentation & Educational System)

SPECIFICATIONS
• AReS Main Unit (Advanced & Basic)

|		
Signal input (2CH)	**Oscilloscope**	Impedance : 1MΩ 20pF Max voltage : ±50V Band width : 4MHz Sample rate : 40MS/s ADC resolution : > 10bit Voltage DIV : ±10V / 5V / 2V / 1V / 0.5V / 0.2V / 0.1V /5 0mV / 20mV Time DIV : > 22 times 1μs - 10s Trigger mode: AUTO / SINGLE / STOP Memory : Streaming to host
	Voltmeter & Ampere meter	Measurement : AC/DC voltage, current and power (V/A) Function : Mean, rectified, root mean, peak, peak to peak, root mean square value Range : AUTO & MANUAL (> 9 step 100mV - 50V)
Signal output (1CH)	**• Function generator** **• Pulse generator** **• Arbitrary generator**	Impedance : 50Ω 200mA Amplitude : 200mVpp, 2Vpp, 20Vpp Frequency : 0.1Hz - 1MHz Range : 0.1Hz / 1Hz / 10Hz /100Hz / 1kHz /10kHz /100kHz step Function generator waveform : Sine, Square, Triangle, Logic (TTL), DC Positive, DC Negative
	DC source output	Range : 100mV / 1V / 10V Volt Source : ± 0 ~ 10V
Digital input (digital analyzer / counter)		Number of channels : 16 (Int. + Ext.) Input voltage : TTL / CMOS Max voltage : 20V Sampling frequency : 100kHz Trigger mode : LOW / HIGH / DC Function : BIN, OCT, DEC, HEX (8-bit or 16-bit) Memory : Streaming to host
Digital output (signal generator / timer)		Number of channels : 16 (Int. + Ext.) Output voltage : TTL / CMOS Output current : 3mA Max voltage : ±15V Function : BIN, OCT, DEC, HEX (8-bit or 16-bit) Output frequency: 100kHz Memory : Streaming to host
Relay output		8-relay COM Max. 24VDC / 1A Normally Open/Closed (NO/NC)
Variable supply	**3-channel DC power**	V1 voltage : DC 0 ~ ± 20V 1A V2 voltage : DC 0 ~ ± 20V 1A V3 voltage : DC 0 ~ ± 20V 1A
	3-phase AC power	AC voltage : AC 14Vrms 2A (Resolution : 0.1V) Frequency : 1Hz - 150Hz (Resolution : 1 Hz)
	Advanced 3-phase power	Function : Sine, V-Sine, Block, Pulse V1 voltage : AC 0 ~ 100% V2 voltage : AC 0 ~ 100% V3 voltage : AC 0 ~ 100% V2 phase shift : 0 ~ 359 degree V3 frequency : 1 ~ 150Hz V2 clock frequency : 10 ~ 32kHz

Digital multi meter		Voltage : [DC] 1V / 10V / 100V, AUTO
		             [AC] 700mV / 7V / 70Vrms / AUTO, 40Hz ~ 20kHz
		Current : [DC] 500mA / 2A / AUTO
		             [AC] 500mA / 2Arms / AUTO, 40Hz ~ 5kHz
		Resistance : 100Ω / 1kΩ / 10kΩ / 100kΩ / 1MΩ / 10MΩ, AUTO
		Capacitance : 10nF / 100nF / 1μF / 10μF / 100μF / 1000μF, AUTO
		Continuity diode : 1V, 10V

Fixed power supply		Fixed Voltage : +3.3V 1A / +5V 1A / ± 15V 500mA

EXPERIMENTAL MODULES
• Basic Electronics Package (EO Series)

DC Circuit (AReS-EO-M01)

1) Ohm's Law
2) Serial/Parallel Circuit
3) Kirchhoff's Law
4) Galvanometer
5) Wheatstone Bridge
* Note: The AReS-EO-M01 DC Circuit Module requires a set of voltmeter, amphere meter, ohm meter and galvano meter for proper experiments.

Measurement (AReS-EO-M02)

1) DC Volt Meter
2) V, A, R Indicator
3) DC Ampere meter
4) Ohm meter

AC Circuit (AReS-EO-M03)

1) Capacitance
2) Inductance
3) RC/RL circuit
4) LC resonance (Series/Parallel)
5) Filter circuit

Transformer (AReS-EO-M04)
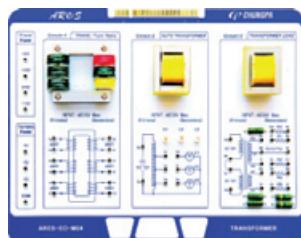
1) Trans. turn Ratio
2) Auto Transformer
3) Transformer Load

Semiconductor-1 (AReS-EO-M05)

1) Diode Characteristics
2) Zener diode
3) NPN Transistor
4) PNP Transistor

Semiconductor-2 (AReS-EO-M06)

1) J-FET characteristics
2) MOS-FET characteristics
3) SCR characteristics
4) TRIAC characteristics

Transistor Amplifier (AReS-EO-M07)

1) AMP. biasing
2) Complementary AMP
3) Common emitter AMP
4) Darlington AMP

OP Amplifier (AReS-EO-M08)
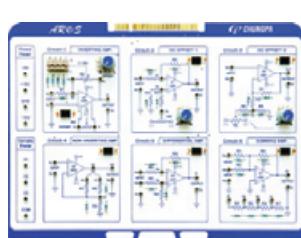
1) Inverting amplifier
2) DC OFFSET 1, 2
3) Non-Inverting AMP
4) Differential AMP
5) Summing AMP

AReS (All-in-One Real time Instrumentation & Educational System)

• Basic Electronics Package (EO Series)

Active Filter (AReS-EO-M09)
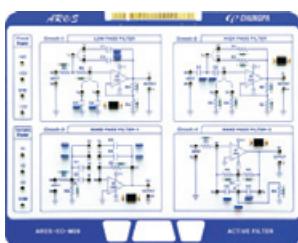
1) Low pass filter
2) High pass filter
3) Band pass filter 1, 2

Power Supply (AReS-EO-M10)

1) Bridge rectifier
2) Voltage regulator
3) Variable V-regulator (Transistor)
4) Variable V-regulator (OP Amp.)

Oscillator (AReS-EO-M11)

1) Phase shift oscillator
2) Wien bridge oscillator
3) Colpitts oscillator
4) Hartley oscillator
5) Cristal osicillator

Pulse Circuit (AReS-EO-M12)

1) Clipper 1, 2
2) Schmitt trigger
3) Bistable multivibrator
4) Monostable multivibrator

Digital Logic (AReS-EO-M13)

) Diode logic
2) AND gate (CMOS)
3) OR/XOR gate (CMOS)
4) Inverter (CMOS)

Sequential Logic (AReS-EO-M14)
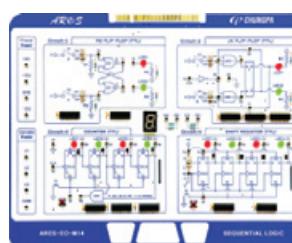
1) RS flip-flop (TTL)
2) JK flip-flop (TTL)
3) Counter (TTL)
4) Shift Register (TTL)

Combination Logic (AReS-EO-M15)
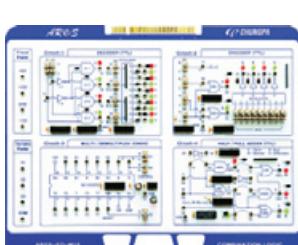
1) Decoder (TTL)
2) Encoder (TTL)
3) Multiplexder / Demultiplexer (CMOS)
4) Half Adder / Full Adder (TTL)

Signal Converter (AReS-EO-M16)
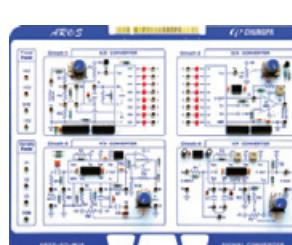
1) A/D converter
2) D/A converter
3) F/V converter
4) V/F converter

• Basic Electronics Package (EO Series)

* OPTION
Analog Meters (AReS-EO-OP1)

1) Galvanometer
2) Voltmeter
3) Amphere meter
4) Ohm meter
* Note: The "AReS-EO-OP1 Analog Meters Module" is suggested for experiments on the AReS-

## • Basic Electronics Package (EI Series)

RLC Circuits (AReS-EI-M01)

1) AC/DC voltage measurement
2) AC/DC current measurement
3) Ohm's Law
4) Kirchhoff's Law
5) Series-parallel combination circuit
6) Power conversion theories
7) Characteristics of transformer
8) DC circuit (RC) and transient phenomenon
9) AC circuit (RC/RL/RLC)
10) Characteristics of transformer
11) Resonant circuit (series/parallel) and LC filter

Electromagnet (AReS-EI-M02)
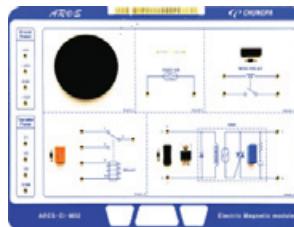
1) Magnetic system characteristics
2) Magnetic field characteristics
3) Switch and relay in use of a magnet
4) Basic principles of electromagnet

### Electromagnetic Field Circuit (AReS-EI-M03)

1) Magnetic field
2) Drawing magnetic lines
3) Strength of the magnetic field
4) Lenz Law
5) Faraday Law

Characteristics of Magnetic Field (AReS-EI-M04)

1) Amphere's Law
   You can use a compass to practice the direction of the magnetic fields according to the flow of current.

Fleming's Law (AReS-EI-M05)
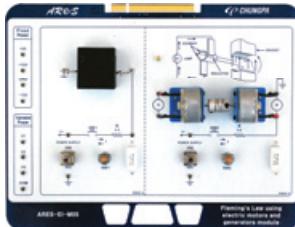
1) Experiment on motors and generators
2) Experiment on Fleming's Law

Characteristics of Coil (AReS-EI-M06)

1) Magnetic induction
2) Mutual induction
3) Magnetic flux induction

AReS (All-in-One Real time Instrumentation & Educational System)

• **Basic Electronics Package (EI Series)**

Basic Circuit of Semiconductor (AReS-EI-M07)

1) Diode/Zener diode characteristics
2) Rectifier circuits
3) Filter circuits
4) TR/ FET/SCR/UJT/LED characteristics
5) Multimeter

Basic Electrical Circuit (AReS-EI-M08)

1) Amplifier / Multistage amplifier / Cascade amplifier
2) Constant voltage
3) Light control circuit
4) Relay characteristics
5) Touch control switch

Electrical Acoustic Amplification Circuit (AReS-EI-M09)
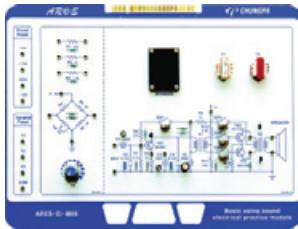
1) Push-pull amplifier
2) Wheatstone bridge

Characteristic Circuit of Electric Elements (AReS-EI-M10)
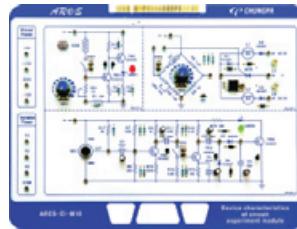
1) CDS characteristics
2) Light control switch
3) Thermistor characteristics
4) Temperature control circuit
5) Sound control circuit

Oscillator Circuit (AReS-EI-M11)

1) Blocking generator
2) Electronic bird sound generator
3) Astable multivibrator
4) LED light circuit
5) LC resonant circuit

Breadboard Module (AReS BD-M01)
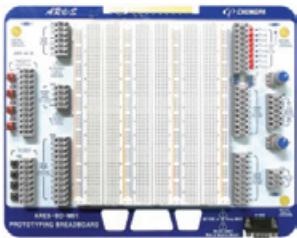
- Voltage: DC 5V, -15V, +15V / variable voltage (V1, V2, V3)
- Variable resistor: 1kΩ
- Toggle switch, Tact switch
- RS-232 communication
- LED indicator lamp
- Digital I/O
- Relay output

PLC Module (AReS-AT-M01)

- Voltage: DC 5V, -15V, +15V / variable voltage (V1, V2, V3)
- Input simulator: Toggle switch, Tact switch
- Output simulator: LED (4ea)
- D-SUB I/O port
- Digital I/O port: Input (16ea), output (16ea)

AReS (All-in-One Real time Instrumentation & Educational System)

Microprocessor Module (AReS-MC-M01)

- LCD screen: 16 x 2-line (backlight)
- 7-segment
- A/D Converter: 12-bit (MCP3202)
- D/A Converter: 8-bit (DAC0800)
- Relay: 12V-2C (1ea), 5V-2C (1ea)
- Temperature sensor: LM35, TO-92 type
- Dot /Key matrix
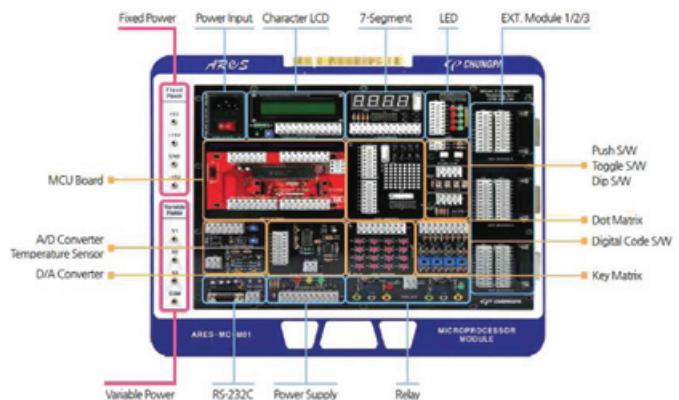
Communication Module (AReS-EC-M01)

- RS485, LAN, Wi-Fi, Bluetooth, ZigBee
- LED Lamp, USB port
- Temperature control
- Color detection, illumination sensor, humidity sensor
- Atmega 128, ADR & IP setting

Antenna Module (AReS-EC-M04)
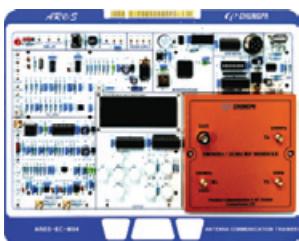
- Frequency range: 500Mhz, 2GHz (standard), 10GHz (option)
- Rotational angle: 360 degree
- 16 x 2 test LCD backlight
- AC power input: 90 ~ 240V / 50 ~ 60Hz
- DC power input: ±5V, 12V

• Sensor Module

Photo Electric Sensor - 1 (AReS-SN-M01)

- Photoelectric sensor (Direct reflection type-PNP)
- Photoelectric sensor (Permissive type-PNP)
- DC motor system
- Virtual conveyor system

Photo Electric Sensor - 2 (AReS-SN-M02)
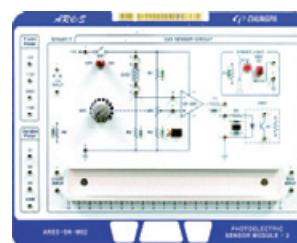
- CdS sensor
- Photo coupler
- Streetlight control system

Photo Electric Sensor - 3 (AReS-SN-M03)
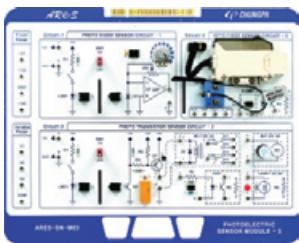
- Photo diode
- Photo transistor
- Fiber optic sensor (Direct reflection type)
- Sequence control

Photo Electric Sensor - 4 (AReS-SN-M04)

- Capacitive proximity sensor (PNP)
- Capacitive proximity sensor (NPN)

ARes (All-in-One Real time Instrumentation & Educational System)

• **Sensor Module**

Photo Electric Sensor - 5 (AReS-SN-M05)
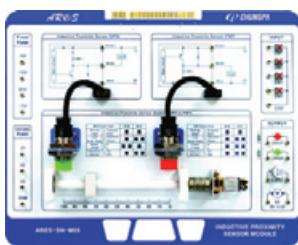
• Inductive proximity sensor (PNP)
• Inductive proximity sensor (NPN)

Chemical Sensor - 1 (AReS-SN-M06)

• Gas sensor
• pH sensor

Chemical Sensor - 2 (AReS-SN-M07)
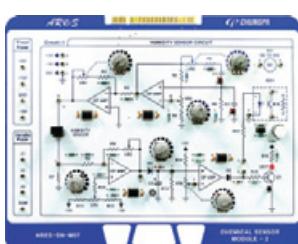
• Humidity sensor

Temperature Sensor (AReS-SN-M08)
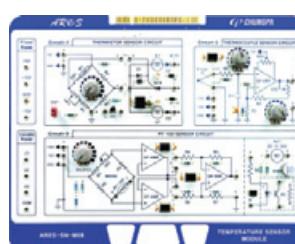
• Thermistor sensor
• Thermocouple sensor
• PT-100 sensor

Temperature Sensor (AReS-SN-M08-1)

• Temperature control (heating & cooling)
• Digital thermometer

Hall Sensor (AReS-SN-M09)


• Hall Sensor - 1
• Hall Sensor - 2

• Arduino Module

Arduino Application Board (AReS-MP-M00)
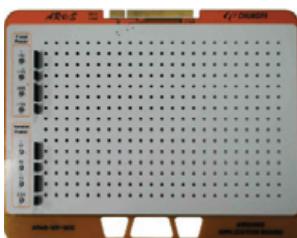
- Power: 5V, variable voltage
- Slot hole: 1mm (each)
- Size: 280(W) x 216(D)mm

Arduino Swtich Board (AReS-MP-M01)
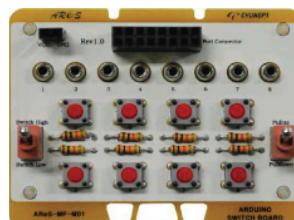
- Tact switch: 8ea
- Test point (2ø): 8ea
- Pull-up / Pull-down resistance (adjustable)
- Size: 70(W) x 54(D)mm

Arduino LED Board (AReS-MP-M02)
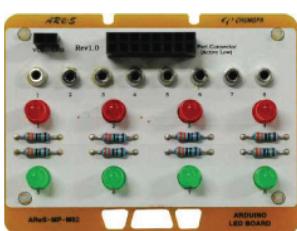
- 5ø round LED: 8ea
- Test point (2ø): 8ea
- Size: 70(W) x 54(D)mm

Arduino LED Board (AReS-MP-M03)
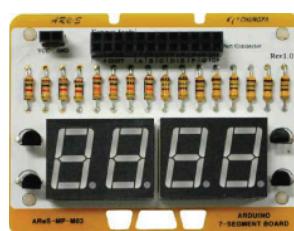
- 7-segment (2 x 2): 2ea
- Common Anode
- Size: 70(W) x 54(D)mm

Arduino Dot-Matrix Board (AReS-MP-M04)
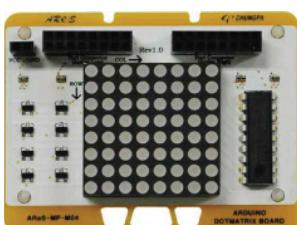
- 8 x 8 dot matrix (Red)
- Size: 70(W) x 54(D)mm

Arduino TFT Screen (AReS-MP-M05)

- 1.77″ TFT LCD
- 168 x 120 pixels
- Micro SD card
- Size: 70(W) x 54(D)mm

Arduino Servo Motor (AReS-MP-M06)
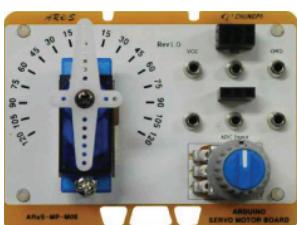
- 10kΩ potentiometer
- Speed: 0.1 / 60°
- Operating power: 4.8V (~ 5V)
- Size: 70(W) x 54(D)mm

Arduino Keypad Board (AReS-MP-M07)

- 3 x 4 keypad matrix
- Size: 58(W) x 90(D)mm

# AReS (All-in-One Real time Instrumentation & Educational System)

• **Arduino Module**

Arduino Breadboard (AReS-MP-M08)
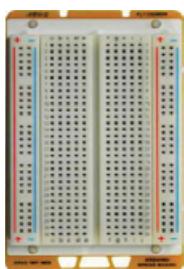
• 300 terminal holes
• Size: 58(W) x 90(D)mm

Arduino PCB Board (AReS-MP-UNO)
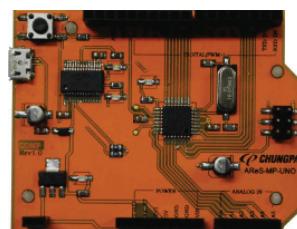
• 3 x 4 keypad matrix
• Size: 58(W) x 90(D)mm

ORDERING INFORMATION

Category	Products	Ordering cord No.
System platform **(*select Advanced or Basic type)**	AReS-Advanced	AReS-AD-01
	AReS-Basic	AReS-BA-01
PC Software (standard)	Smart Learning Contents Manager	AReS-SLS-500-01
Breadboard (standard)	AReS-Breadboard	AReS-BB-01
Options	Basic Electronics Modules (16 pcs) [AReS-EO-M01 ~ M16]	AReS-EO-MDP-1
	Basic Electricity Modules (11 pcs) [AReS-EI-M01 ~ M11]	AReS-EI-MDP-1
	PLC Modules [AReS-AT-M01]	AReS-AT-M01
	Microprocessor Module [AReS-MC-M01]	AReS-MC-M01
	Communication Module [AReS-EC-M01]	AReS-EC-M01
	Antenna Module [AReS-EC-M04]	AReS-EC-M04
	Sensor Modules (10 pcs) [AReS-SN-M01 ~ M09]	AReS-SN-MDP1
	Arduino Modules (10 pcs) [AReS-MP-M00 ~ UNO]	AReS-MP-MDP1
	Circuit Design Simulation Software (CASPOC Starter)	AReS-CASPOC-BA-01
	Circuit Design Simulation Software - Educational Package (Single-user)	AReS-CASPOC-FA-01
	e-Book Experimental manual	AReS-EB-01