TR3730 10KW Liquid Cooled Charger

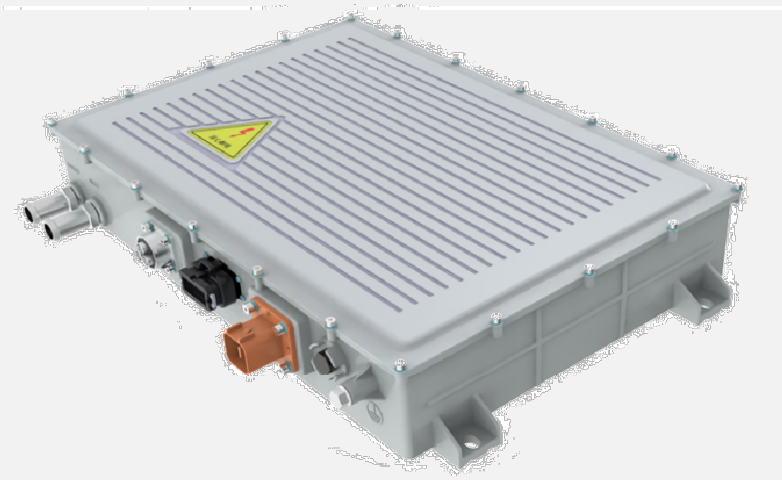


Table of Contents

1. Product Introduction

The TR3730 series on-board charger is a high-power density and high-efficiency charger specially developed for new lithium-ion pure electric logistics vehicles, buses, construction machinery and other new energy vehicles. It is designed and developed with modular, standardized and universal design ideas . The charger supports three-phase AC input and the DC output voltage is fully adjustable .

The product adopts full digital control technology design, with flexible and intelligent control, good protection characteristics and strong system robustness . It has its own microprocessor to communicate with the monitoring unit, and the internal parameters can be set or adjusted by the upper-level monitoring unit through the CAN interface.

multiple protection functions including input over-voltage and under-voltage protection, output over-current protection, output over-voltage protection, output short-circuit protection, and over-temperature protection .

Key specifications:

model	Input voltage range	Rated output power	Rated voltage	Output voltage and current range	3D data model
TR3731	152~456VAC	10KW	72VDC	0-105VDC/0-135A	TBD
TR3732	152~456VAC	10KW	108VDC	0-135VDC/0-105A	TBD
TR3733	152~456VAC	10KW	144VDC	0-180VDC/0-66A	TBD
TR3734	152~456VAC	10KW	360VDC	0-500VDC/0-27A	902.37350000.00
TR3735	152~456VAC	10KW	540VDC	0-720VDC/0-18A	902.37350000.00

2. Electrical Characteristics

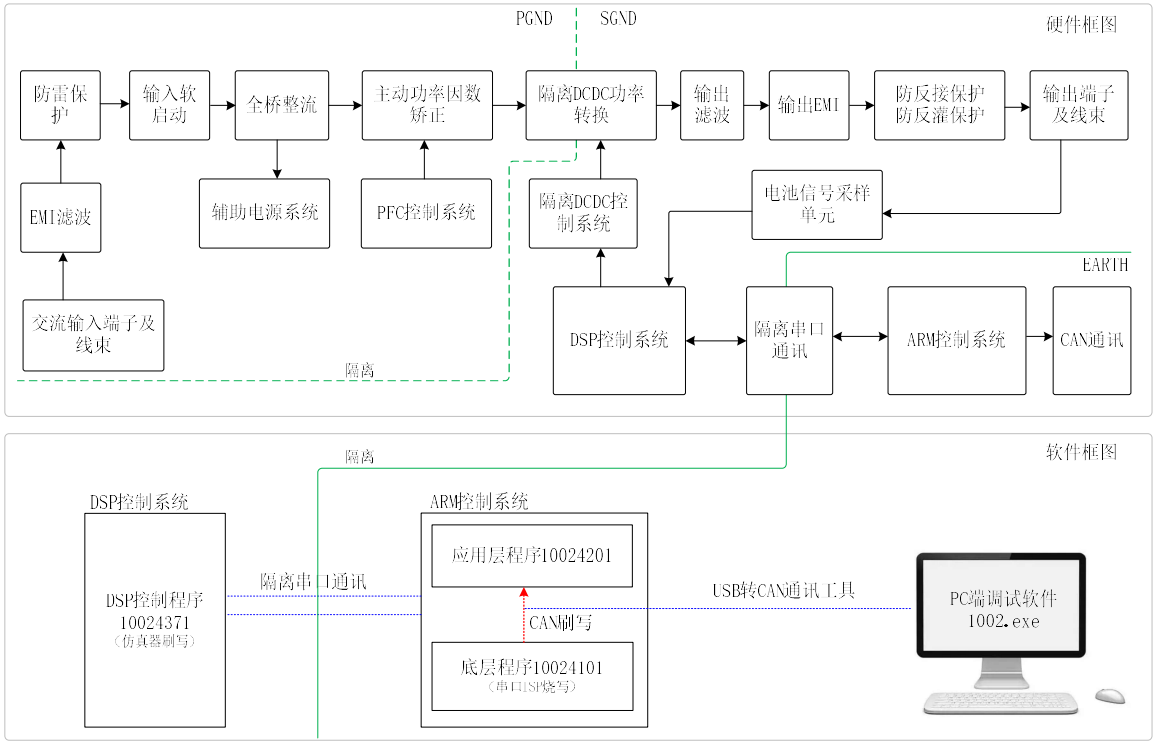
2.1. Electrical Characteristics

model					
Vehicle power type	Water-cooled on-board charger assembly				
Power supply model	TR3731	TR3732	TR3733	TR3734	TR3735
Input characteristics					
Rated input voltage	380VAC three-phase five-wire system (neutral line must be reliably connected) When inputting 220V single-phase electricity, the output power is 3.3KW				
Input voltage range	152～456VAC				
Rated input voltage frequency	50Hz				

Input frequency range	45～65Hz				
Starting surge current	≤32A				
Input power factor	≥0.99 (@380Vin, Pomax)				
Output Characteristics					
Rated output power	10KW				
Output voltage range V	0-105	0-135	0-180	0-500	0～720
Output current range A	0-135	0-105	0-66	0-27	0～18
Voltage stabilization accuracy	±1%				
Steady flow accuracy	±0.5A (Io≤1 0A)&≤± 5 % (Io > 10A)				
Voltage ripple factor	≤1%				
Output response time	≤200mS				
Typical efficiency	≥90%	≥90%	≥92%	≥94%	≥94%
Working noise	≯30dB				
Protection features					
Over-voltage and under-voltage protection	The input over-voltage or under-voltage shutdown can be self-recovered, and the output over-voltage or under-voltage shutdown can be self-recovered.				
Output reverse connection and short circuit protection	Shutdown when output is short-circuited or reverse connected, self-recovery				
Over temperature protection	When the heat sink temperature is higher than 75℃, the output power is reduced. When the temperature is higher than 95℃, the circuit is disconnected. The charger resumes output when the charging temperature returns to below 85℃.				
Environmental conditions					
Operating temperature	Water cooling system liquid temperature ≤ 65℃				
Storage temperature	-40～95℃				
humidity	5%～95%				
IP Rating	IP67				
Cooling function	Liquid Cooling				
Communication function	CAN bus control				
Charging function	Receiving charging command can charge normally; without command, the charger is in standby state				
Safety and reliability					
Dielectric strength	Primary side - secondary side 2000VAC		Primary side, secondary side —case 1500VAC		
Insulation resistance	Primary side - secondary side ≥ 50MΩ				
Harmonic current	Meet the requirements of 6.7.3.1 in GB17625.1-2003				
Vibration resistance	After the X, Y, and Z direction sweep frequency vibration test, the parts were not damaged and the fasteners were not loose.				

Impact resistance	Refer to the requirements of 6.5 in GB/T15139-1994
Industrial solvent resistance	Metal parts have good anti-corrosion layer
Anti-salt spray performance	See GB/T 2423.17
Durability	At no less than the relevant provisions of GB/T 24347-2009
EMC characteristics	
Electromagnetic immunity	Meet the requirements of 11.3.1 in GB/T 18487.3
Electromagnetic disturbance	Meet the requirements of 11.3.2 in GB/T 18487.3

2.2. System Block Diagram



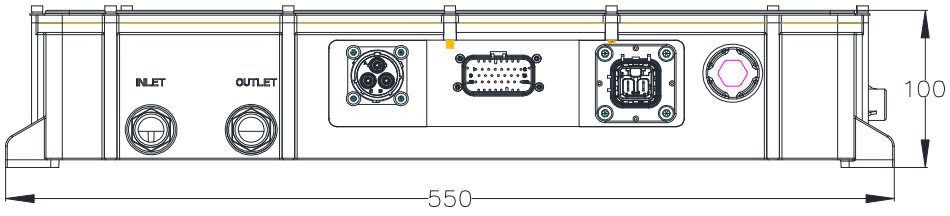
2.3. External characteristic curve

3. Dimensions and weight

3.1. Product size

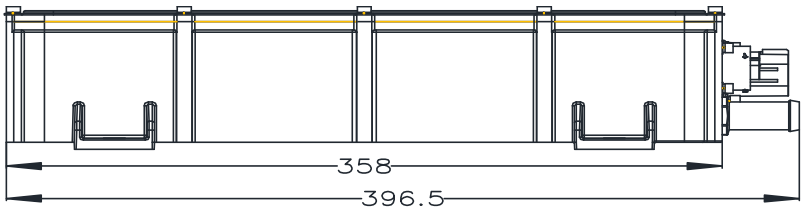
Top view

Front view



Connector section is for reference only

Side View



3.2. Product Weight

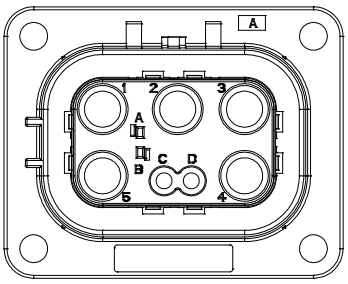
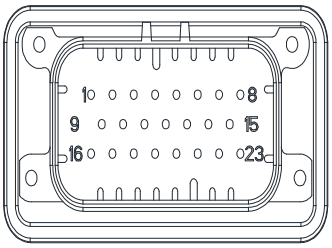
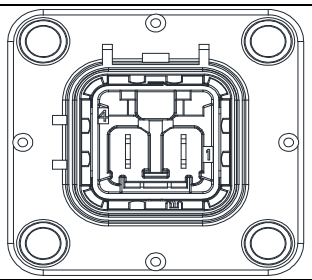
20Kg±0.3Kg

4. Definition of connector and connection terminal

4.1. Match TR3731 TR3732 TR3733

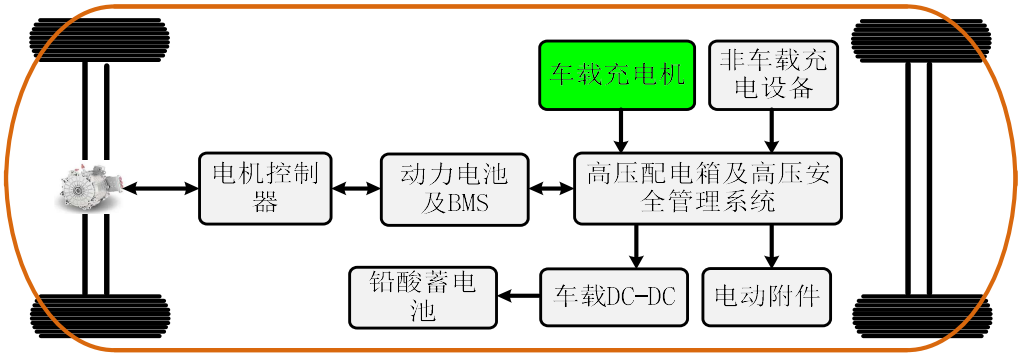
TBD

4.2. Match TR3734 TR3735

serial number	type	Connector Definition		Connector drawing
1	BHL10-E401X-S6 Domestic brands	1	AC-L1	
		2	AC-L2	
		3	AC-L3	
		4	AC-N	
		5	PE	
		factory		Sichuan Baile New Energy
		Wire end to plug		BHL18-E40X1-S6
2	1-776228-1	1-3	N/A	
		4	**Enable Key (KL15)**	
		5-6	N/A	
		7	**LV Battery always hot (KL30)**	
		8-10	N/A	
		11	**HVIL 1**	
		12	**HVIL 2**	
		13-15	**Ground (KL31)**	
		16-18	N/A	
		19	**CAN Shield**	
		20	**CAN L**	
		twenty one	**CAN H**	
		22-23	N/A	
		factory		TE
		Wire end to plug		Sheath: 770680-1; Terminal: 770520-1
3	1-2141272-1 Terminal: 5-1418758-3	1	positive electrode	
		2	negative electrode	
		3	Interlock	
		4	Interlock	
		factory		TE
		Plug		YHVA630-2PHM-6MM-A

5. User Guide

5.1. Electrical connection diagram



5.2. Product Installation

Mounting Screws	Mounting hole diameter	11mm
	Number	4
	Bolt model recommendation	M10 hexagonal bolt

Install and fix this product

Align the mounting holes, tighten the fixing screws, and secure the power supply.

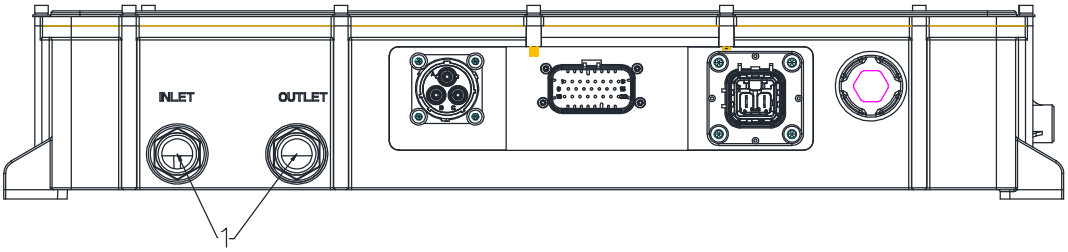
Tightening torque requirements

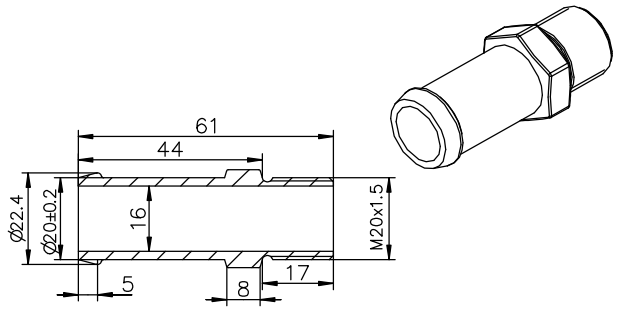
During installation, use appropriate torque according to screw size, connection method, etc., refer to the following table for details:

Specifications		Tightening torque (torque range: ±10%)/(unit: Kgf.cm)						
Major categories	Subclass	Plastic-Plastic	Steel-Plastic Copper-Copper	General Connections		High density connection		
				Steel-Steel	Copper-cast aluminum Steel-Aluminum Profile Steel-Copper	Steel-Steel	Steel-cast aluminum Steel-Copper	Steel-Aluminum Profile
Hexagon socket screw	M2		0.8	1.5	1.5	2.5	2.5	1.5
	M2.5		1.6	3	3	5.5	4.5	3
	M3	1.5	3	5.5	5	10	8	6
	M4		6	12	10	16	14	12
	M5		10	20	13	30	28	20
	M6		15	30	28	50	48	30
	M8					80	80	-

	M10					100	100	

5.3. Water Cooling System Design Guide



No.	Type	Size
1		

Thermal / Cooling system	TR3610	Unit
Amount of coolant in device	1.6	L
External diameter of cooling water connection pieces	20	mm
Minimum coolant temperature at inlet	-25	°C
Maximum coolant temperature at inlet	50	°C
Coolant pressure drop @ 5l/min, Tcoolant = 25°C (with a water to glycol mixture ratio of 50 / 50)	0.4	bar
Maximum cooling system pressure	1	bar
Cooling water flow rate	6 to 20	l/min
Ambient temperature range for storage	-40 to +95	°C
Ambient temperature range for extreme storage (less than 12 hours at a time)	-40 to +125	°C
Ambient temperature range in operation	-40 to +85	°C
Power stage temperature range full operation	-40 to +110	°C
Control stage temperature range full operation	-40 to +80	°C

5.4. CAN communication protocol

project	Technical indicators	Remark
Crystal tolerance	± 0.15%	In the operating temperature range
Communication rate	Configurable through background software, the configuration will not be lost after power failure	Tolerance is ±0.375 Kbit/s
Sampling point	The sampling point should be set close to but not later than 7/8 of the bit time.	
Transceiver	Maximum transceiver "ring delay" (from transmit to receive) is 300 ns	CAN transceivers should comply with ISO 11898-2 standard
Terminal resistance	The charger CAN communication circuit has no 120 ohm terminal resistor by default.	
CAN communication protocol	TBD	

5.5. Background debugging software description

Backend software coding	3610.exe	
Backend software communication method	CAN communication	Baud rate 125K/250K/500K adjustable
Installation and usage help		上位机使用说明.pdf
Support CAN box Brand 1	1. Beijing Aitai USBCAN-2I 2. Beijing Aitai USBCAN-I	USBCAN Driver for Windows 10-amd64-1.0.1.exe
Support CAN box Brand 2	TBD	

5.6. Troubleshooting and confirmation

Fault phenomenon	Common causes of failure	troubleshooting
The charger does not power on	AC gun has no AC input	Check the input circuit breaker or socket before AC
	The AC connector is not plugged in properly	Reseat the connector
	The charging guide signal connector is not properly plugged in.	Reseat the signal connector
No message from charger	The signal connector is not connected properly	Reseat the signal connector
	CAN line is connected reversely	Adjust the CAN line sequence

	Communication protocol does not match	Compare whether the protocols match
	Baud rate mismatch	Compare baud rates to see if they match
No high voltage output	The high voltage output terminal is not connected to the battery	Check high voltage connectors and wiring harnesses
	The charger did not receive the BMS command.	View Messages
	The positive and negative poles of the battery are connected in reverse	Check high voltage connectors and wiring harnesses
Over temperature fault	Air-cooled machine: fan is blocked or air duct is blocked	Check the fan and air duct
	Water-cooled machine: no coolant or coolant temperature is too high	Check whether the coolant is normal

6. User Instructions and Precautions

Please pay attention to the warnings and precautions before using the product. Improper operation may cause electric shock or fire. Please make sure you have read the warnings and precautions before using the product.

warn:

It is strictly forbidden to dismantle the product for repair, debugging or modification without authorization;

When the power is on, please keep your hands and face away from the product to avoid accidental injury;

There is high voltage and high temperature inside the product. Please do not touch the internal components, as this may cause electric shock or burns.

During use, if there is any unusual sound or smell from the power supply, please turn off the input immediately;

Connectors that meet the specifications must be used to ensure that all plugs and sockets are tightly connected. Loose connections may cause local heating and fire.

Never charge a damaged or unchargeable battery;

Please use the power supply within the technical parameter range. If it is used beyond the range, it may cause product damage;

When the battery is charging normally, please keep away from fire and flammable and explosive items;

Please avoid placing the product in a location exposed to rain for a long time;

For AC power supply, choose a three-core cable with a ground wire and install the ground wire correctly;

Please make sure the casing is intact before installation. If it is damaged, please replace it immediately or contact the manufacturer.

Note:

Confirm that the product input/output terminals and signal terminals are connected correctly according to the product manual; when wiring, please cut off the input power and never plug or unplug the connector when it is powered on;

This power input/output terminal needs to be equipped with a blown fuse or other over-current protection device;

The possible electrical hazards at the output end of the product must be considered when it is in use to ensure that the end user does not come into contact with the product; the terminal equipment manufacturer must design corresponding protection schemes to ensure that there will be no danger caused by accidental contact between the power terminal and the engineer or tool during operation;

Once the safety protection of the equipment is damaged, the equipment must be stopped and handled in accordance with relevant maintenance regulations.

When power equipment is transferred from a cold environment to a warm environment, condensation may cause leakage hazards, so grounding requirements must be strictly enforced;

Only qualified personnel may connect the device to the power supply.

After cutting off the power supply, the machine must be shut down for five minutes to allow the capacitors sufficient discharge time before maintenance can be performed on the power supply equipment.

Pay attention to safety when using: Avoid touching places with safety warning signs and high voltage signs with your hands to avoid electric shock or burns.

7. Reference standards and specifications

QC/T 413-2002 Basic technical requirements for automotive electrical equipment

QC/T 895-2011 Conductive on-board charger for electric vehicles

GB/T 2423.1-2001 Environmental testing for electric and electronic products, Part 2: Test methods/Test A: Low temperature

GB/T 2423.2-2001 Environmental testing for electric and electronic products, Part 2: Test methods/Test B: High temperature

GB/T 2423.3-1993 Basic environmental testing procedures for electrical and electronic products - Test Ca: Steady state damp heat test method;

GB/T 2423.4.1993 Basic environmental testing procedures for electrical and electronic products - Test Db: Cyclic damp heat test method

GB/T 2423.5-1995 Environmental testing for electric and electronic products, Part 2: Test methods/Test Ea and guidance: Shock

GB/T 2423.6-1995 Environmental testing for electric and electronic products, Part 2: Test methods/Test Ea and guidance: Bump

GB/T 2423.8-1995 Environmental testing for electric and electronic products, Part 2: Test methods/Test Ed: Free fall

GB/T 2423.10-1995 Environmental testing for electric and electronic products, Part 2: Test methods/Test Fc and guidance: Vibration (sinusoidal)

GB/T 2423.11-1997 Environmental testing for electric and electronic products, Part 2: Test methods/Test Fd : Broadband random vibration

GB/T 2423.22-2002 Environmental testing for electric and electronic products, Part 2: Test N: Temperature change

GB/T 14508-93 Mechanical environmental conditions for freight transport on graded highways

GB/T 18384.3-2001 Safety requirements for electric vehicles Part 3: Protection against electric shock

GB/T 17619 Electromagnetic radiation immunity limits and measurement methods for electronic and electrical components in motor vehicles

GB/T 18488.1-2006 Drive motor system for electric vehicles Part 1: Technical requirements

GB/T 24347-2009 Electric vehicle DC/DC converter

GB/T 18655-2010 Measurement, limits and measurement methods for radio disturbance characteristics of ships and internal combustion engines for protection of vehicle-mounted receivers

Q/FT B102-2005 Vehicle Product Parts Traceability Labeling Regulations

GB/T 17626.2-2006 Electromagnetic compatibility test and measurement technology Electrostatic discharge immunity test

GB/T 17626.3-2006 Electromagnetic compatibility test and measurement technology Radio frequency electromagnetic field radiation disturbance immunity test

GB/T 17626.4-2008 Electromagnetic compatibility test and measurement technology Electrical fast transient pulse group immunity test

GB/T 17626.5-2008 Electromagnetic compatibility test and measurement technology Surge (impact) immunity test

GB4943-2001 Safety of information technology equipment

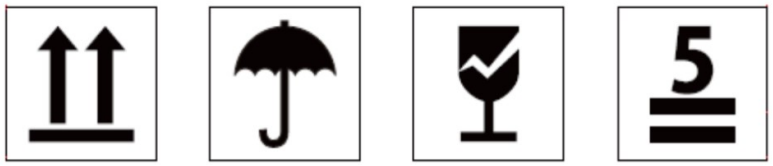
8. Packaging, transportation and storage

Product packaging information is as follows:

Packing quantity and box information	Single module net weight Kg	20Kg
	External dimensions of packaging box (mm)	620*485*165
	Number of modules per box	1
	Total weight after packaging Kg	20.7Kg

The packaging box shall have the product name, product model, and manufacturer name; the technical documents supplied along with the product in the packaging box shall include the product factory certificate.

The product should be transported in a solid packaging box. The packaging box should comply with the relevant national standards and should have signs such as "Handle with care" and "Moisture-proof". The packaging box containing the product can be transported by various means of transportation. During transportation, it should be avoided from direct rain and snow and mechanical impact. The transportation mark should be attached, as shown in Figure 7-2 below:



Transport signs

When the product is not in use, it should be stored in the packaging box. The warehouse environment temperature should be -10-40℃ and the relative humidity should not be greater than 80%. Noxious gases, flammable, explosive products and corrosive chemicals are not allowed in the warehouse, and there should be no strong mechanical vibration, impact and strong magnetic field. The packaging box should be padded at least 20cm above the ground and at least 50cm away from the wall, heat source, window or air inlet. The storage period under the specified conditions is generally 2 years, and re-inspection should be carried out after more than 2 years.

The product should be stored in a ventilated and dry place. At the same time, it must be kept away from high temperature sources, fire sources and chemicals. Store neatly and avoid throwing or smashing.

9. Version update history

date	Version	Reason for change	Remark
20 23/10/11	V1.0		
2023/12/18	V1.1	Add serialized product list	
2024/3/6	V1.2	Added Amphenol brand input connector definition	
2024/7/22	V1.3	Update signal connector definition	