



# Introducing **YURATECH**'s Products



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**YURA T E C H**



# Parts for xEV

\*xEV : Electric Vehicle

1. e-Resolver
2. Multi-Function Resolver
3. Traction Motor Temperature Sensor
4. Inlet Temperature Sensor
5. Battery Temperature Sensor
6. Coolant Heater – Thick Film type
7. Coolant Heater – Sheath type
8. Electronic eXpansion Valve
9. PCB Block Assembly
10. Electronic Relay
11. Inlet Emergency Release Cable



# Parts for ICE

\*ICE : Internal Combustion Engine

1. Ignition Coil (Stick type, Plug top type)
2. Spark Plug
3. Glow Plug
4. EGTS (Exhaust Gas Temperature Sensor)
5. EGRTS (Exhaust Gas Recirculation Temperature Sensor)
6. GCU (Glow Control Unit), GRU (Glow Relay Unit)

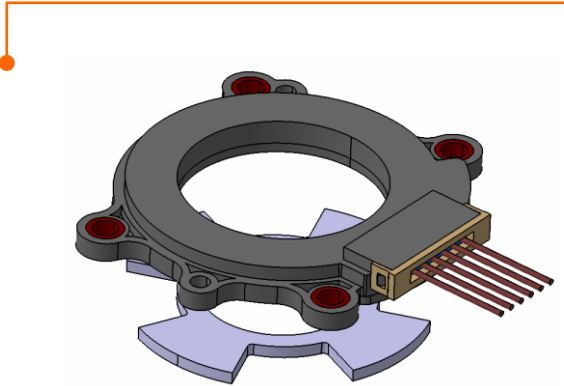


# e-Resolver

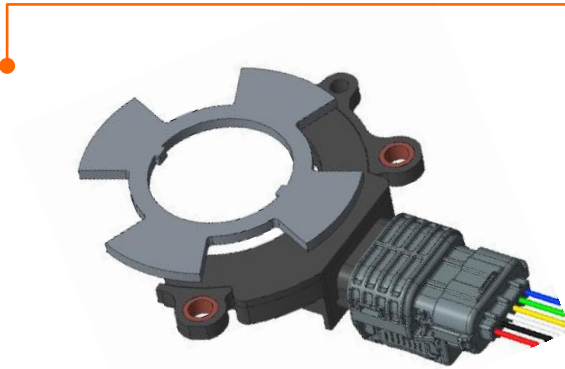
(Absolute Motor Position Sensor)



O type



C type



### ■ Features

	Description	Remark
Electronic Resolver	<ul style="list-style-type: none"><li>• Absolute position sensor for Motor</li><li>• High speed &amp; accuracy &amp; resolution</li><li>• Small &amp; Light</li><li>• Robust design (temp, shock, vib. etc.)</li><li>• Compliant to ISO26262</li></ul>	<ul style="list-style-type: none"><li>• Absolute rotary position sensing (BLDC, PMSM, etc.)</li><li>: Automotive, Industrial, Robot. Etc.</li></ul>

### ■ Specifications

	Description	Remark
Input Voltage	5V ± 10%	DC
Accuracy	Max. ±1°(O type) / Max. ±1.5°(C type)	Electrical
Resolution	12~16 bit	-
Max speed.	240,000 rpm	Electrical
Operating Temp.	-40 ~ 150 °C	-
Poles (Motor)	4 ~ 64	Customization

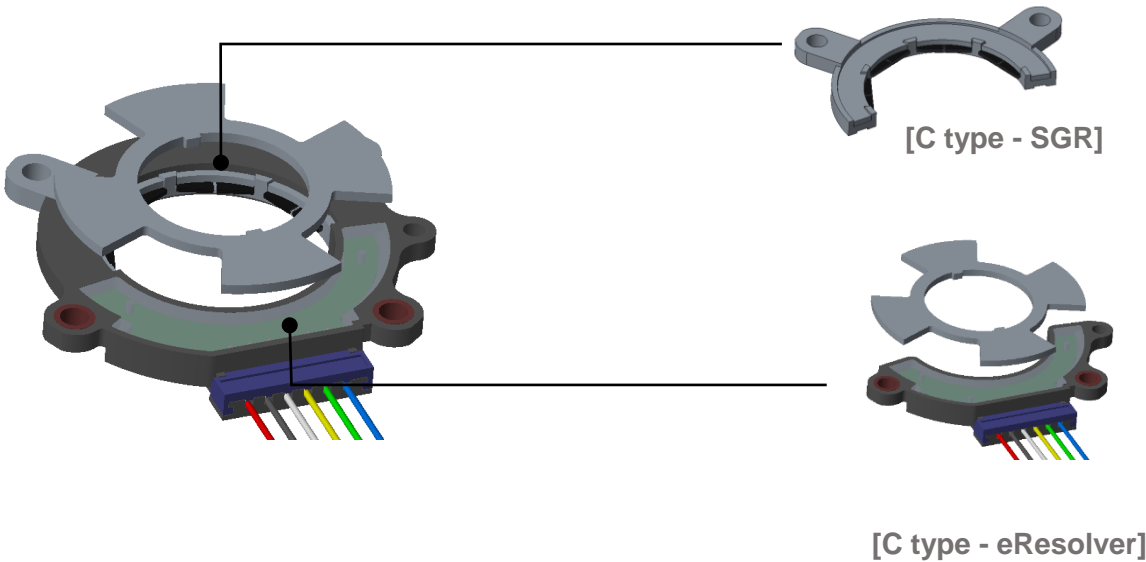
### ■ Customer Benefits

- Can be used in harsh conditions (Robust design)
- System miniaturization and cost reduction (Small & Light design)
- Position sensing of motors that require high speed and accuracy
- Design optimization depending on motor type
- Compliant to Functional Safety (ISO26262)

# Multi-Function Reslover

(e-Resolver + S.G.R)

\*SGR : Shaft Ground Ring



## ■ Features

	Description	Remark
Electronic Resolver	<ul style="list-style-type: none"><li>• Rotor position sensing &amp; Reduce shaft Voltage</li><li>• High speed &amp; accuracy &amp; resolution</li><li>• Small &amp; Light (2 in 1)</li><li>• Robust design (temp, shock, vib. etc.)</li><li>• Compliant to ISO26262</li></ul>	<ul style="list-style-type: none"><li>• Absolute rotary position sensing (BLDC, PMSM, etc.)</li><li>: Automotive, Industrial, . Etc.</li></ul>

## ■ Specifications

Multi-Function Resolver		Description	Remark
Operating Temp.		-40 ~ 150°C	
Max speed.		240,000 rpm	Electrical
Shaft Grounding Device	Voltage reduction rate	Min. 90%	
E-Resolver	Input Voltage	5V ± 10%	DC
	Accuracy	Max. ±1.5°	Electrical
	Poles (Motor)	4 ~ 64	Customizable

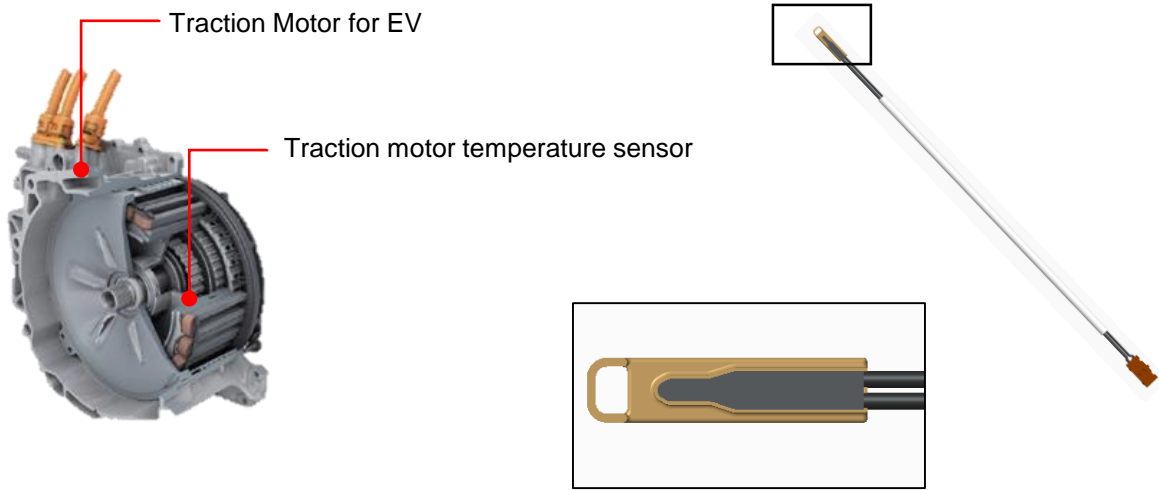
## ■ Customer Benefits

- Can be used in harsh conditions (Robust design)
- 2 in 1 design : System miniaturization and cost reduction (Small & Light design)
- Improved traction motor lifespan
- Reduction of electromagnetic radiation noise
- Position sensing of motors that require high speed and accuracy
- Compliant to Functional Safety (ISO26262)



# Temperature Sensor

(For Traction motor)

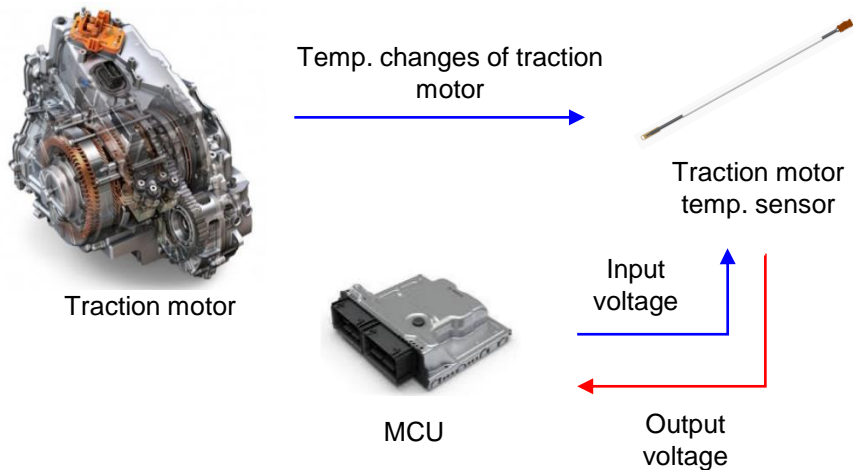


## ■ Features

	Description	Remark
<b>Traction motor Temp. sensor</b>	<ul style="list-style-type: none"><li>• Wire length adjustable (150mm~900mm)</li><li>• Temperature Range : -40 ~ 200°C</li></ul>	<ul style="list-style-type: none"><li>• B (25 / 85°C) = 2240K ± 1%</li><li>• R (100°C) = 3.766kΩ ± 3%</li><li>• Response time (25°C → 200°C, Oil) : 10sec.</li></ul>

- ※ The resistance value and B constant can be changed, when requested by the customer.
- ※ Thermistor can be changed to RTD, when requested by the customer.

## ■ Principle of operation

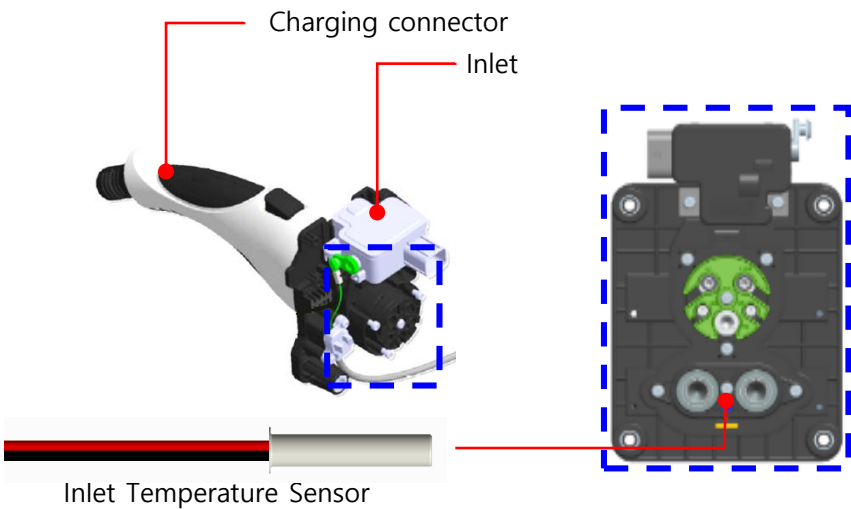


## ■ Customer Benefits

- It measures the temperature changes to prevent overheating of EV traction motor

# Temperature Sensor

(For EV Inlet)

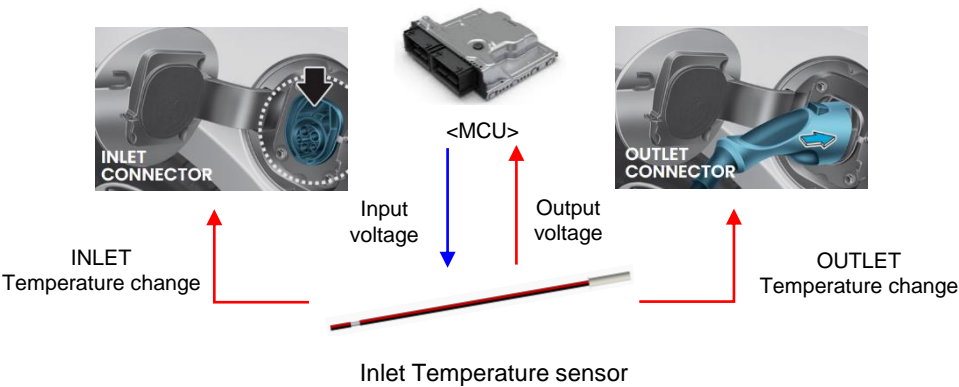


## ■ Features

	Description	Remark
Inlet Temp. sensor	<ul style="list-style-type: none"><li>• Wire length adjustable (150mm~900mm)</li><li>• Temperature Range : -40 ~ 150℃</li></ul>	<ul style="list-style-type: none"><li>• B (25 / 85℃) = 3435K ± 1%</li><li>• R (25℃) = 10kΩ ± 1%</li><li>• Response time (25℃ → 150℃, Oil) : 10sec.</li></ul>

- ※ The resistance value and B constant can be changed, when requested by the customer.
- ※ Thermistor can be changed to RTD, when requested by the customer.

## ■ Principle of operation

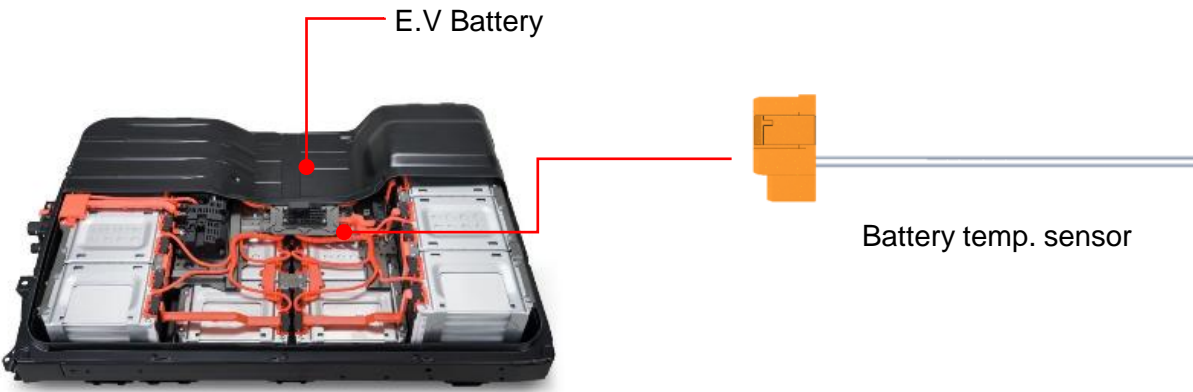


## ■ Customer Benefits

- It measures the temperature of the connector(INLET, OUTLET), Used to prevent overheating of the connector

# Temperature Sensor

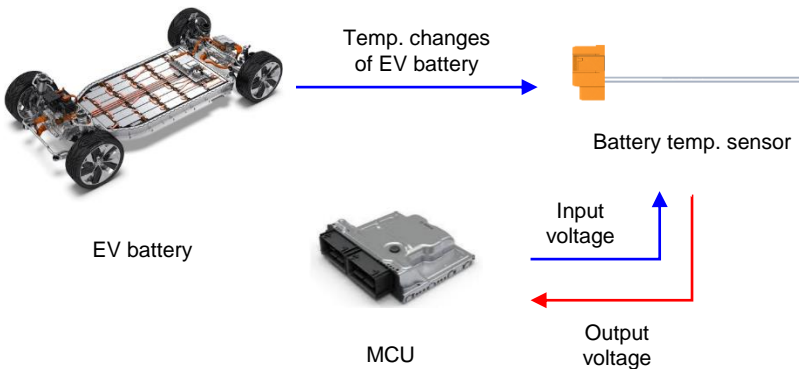
(For EV Battery Pack)



## ■ Features

	Description	Remark
Battery Temp. sensor	<ul style="list-style-type: none"><li>• Wire length adjustable (150mm~900mm)</li><li>• Temperature Range : -40 ~ 200°C</li></ul>	<ul style="list-style-type: none"><li>• B (25 / 85°C) = 2240K ± 1%</li><li>• R (100°C) = 3.766kΩ ± 3%</li><li>• Response time (25°C → 200°C, Oil) : 10sec.</li></ul>

## ■ Principle of operation

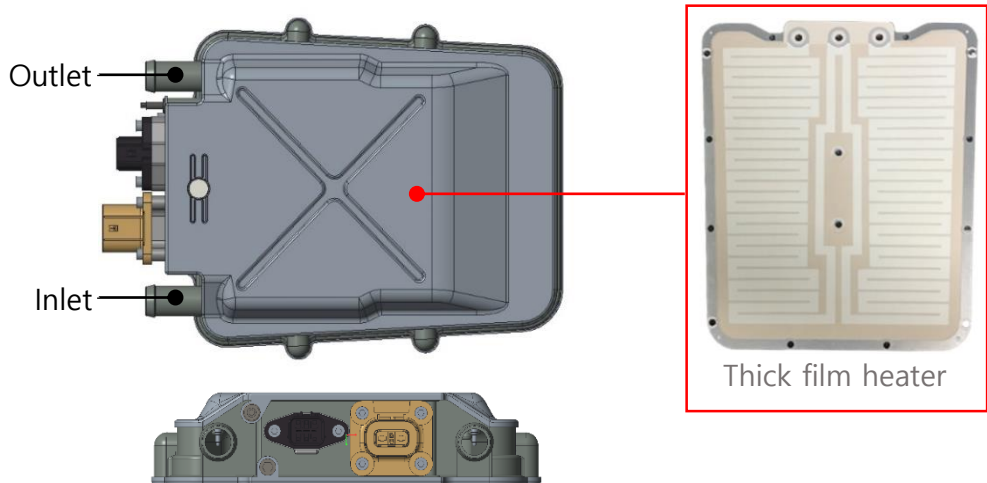


## ■ Customer Benefits

- It measures the temperature changes to prevent overheating of EV battery

# Coolant Heater

(Thick Film type)



## ■ Features

	Description	Remark
Coolant Heater	<ul style="list-style-type: none"><li>• Cabin Heater for the cabin in vehicles</li><li>• COD Heater for Fuel-cell system</li><li>• LIN / CAN Communication</li><li>• Coolant temp. monitoring (In / Out)</li></ul>	<ul style="list-style-type: none"><li>• Applications<ul style="list-style-type: none"><li>- Cabin Heater for EV and PHEV</li><li>- COD Heater for FCEV and UAM</li></ul></li></ul>

## ■ Specifications

	Description		Description
Size	200(W) × 264(L) × 52.5(H)	Heating Power	Max. 10 kW
Weight	1.9kg (without BRKT)	Communication	LIN 2.2, CAN
Type	Thin Film Heater	HV In	100 ~ 450V (360V)
Dust / Sealing	IP6K9K	LV In	9 ~ 16V (12V)
Operating Temp.	-40 ~ 120°C	Insulation Res.	> 50MΩ

## ■ Customer Benefits

- Thermal and electrical safety
- High heat efficiency than other heaters.
- Current and Temp. monitoring
- Small packaging and Light weight



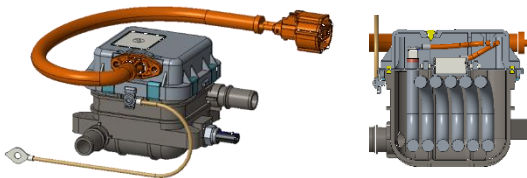
# Coolant Heater

(Sheath type)



## Battery Heater

6.2kW @650V

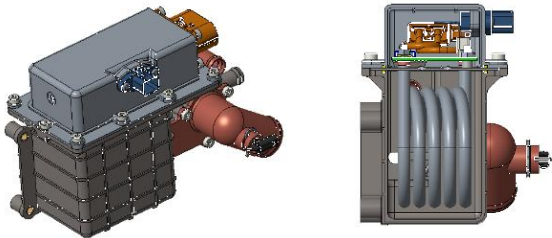


Heater : Sheath Type

For BEV (Battery Electric Vehicle)

## \*COD Heater (\*Cathode Oxide Depletion)

10kW @240V



Heater : Sheath Type

For FCEV (Fuel Cell Electric Vehicle)

### ■ Features

	Description	Remark
Coolant Heater	<ul style="list-style-type: none"><li>Improved battery charging &amp; efficiency</li><li>Improved stack durability</li></ul>	<ul style="list-style-type: none"><li>Mounting position<ul style="list-style-type: none"><li>Battery Heater : Engine Room</li><li>COD Heater : Fuel Cell Stack</li></ul></li></ul>

### ■ Specification

	Battery Heater	COD Heater
Heating Power	3.0kW ~ 9.5kW	10kW ~ 16kW
High Volt. Range	270V ~ 800V	240V ~ 450V
Heater	Sheath Type	
Control	Thermal Fuse (Protection)	PCB (CAN)
HV Connector	Extension (Female)	Direct (Male)
Coolant Temp. Monitor	WTS Sensor (Response Max. 5sec)	
Dust / Sealing	IP67, IP69K	

### ■ Customer Benefits

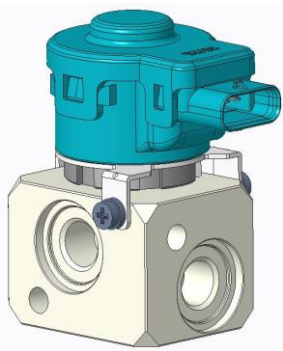
- Improved battery charging & efficiency
- Improved stack durability / Indoor heating

# Electronic eXpansion Valve

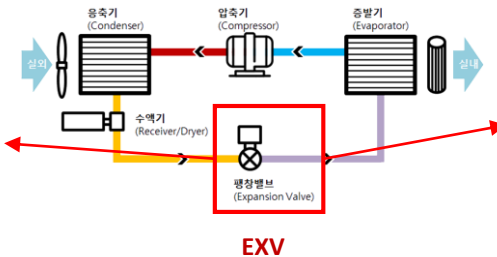
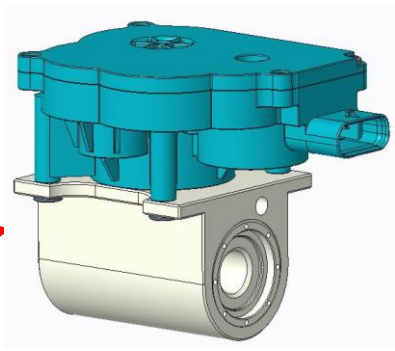
(for EV Battery pack)



Needle type EXV



Ball type EXV



## Features

	Description	Remark
E.X.V	<ul style="list-style-type: none"><li>Bidirectional expansion mode : Port1 → Port2 / Port 2 → Port 1</li><li>Self diagnosis (Ball Type only) : Voltage (Low/High), Current, Temp. etc.</li><li>LIN Communication (Ball Type only)</li><li>Light Body : Engineering Plastic (Option)</li></ul>	<ul style="list-style-type: none"><li>Application : (Non) Heat Pump system for EV</li></ul>

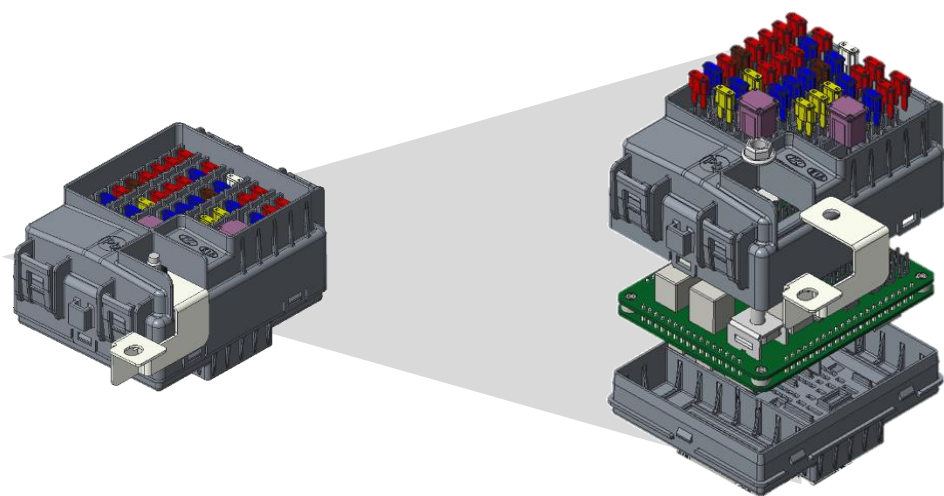
## Specification

	Description	Remark
Refrigerant	R-134a / R-1234yf	
Motor type	Step motor	Bipolar, 4pin
Operating Temp.	-40 ~ 120 °C	
Operating current	Max 500mA	
Operating voltage	9 ~ 16 VDC	
External leakage	No Bubble 1min in the water @ 20bar air	
Internal leakage	< 0.3 lpm @ 10bar air	
Communication	LIN2.1	Ball Type only
Noise	Max 50dB @ 300mm distance	

## Customer Benefits

- Fast and accurate valve open/close
- Available both system, Heat-pump and Non heat-pump
- Self diagnosis (Under/over voltage, Over current, Stall detection. Etc.) – Ball Type only
- Light weight (option – Plastic body)

# PCB Block Assembly



### ■ Features

	Description	Remark
PCB Block	<ul style="list-style-type: none"><li>• Distribution of battery and alternator power to each unit and electronics in the engine room</li><li>• Protection of wires and electrical devices against overcurrent</li></ul>	<ul style="list-style-type: none"><li>• Mounting Location: Inside the engine room junction block</li></ul>

### ■ Specification

	PCB Block
Operating Voltage	8V ~ 16V
Operating Temp.	-35°C ~ 75°C
Storage Temp.	-40°C ~ 85°C
Size (L x D x H)	106.0mm x 144.0mm x 64.6 mm

### ■ Customer Benefits

- Automotive electrical electronics system circuit protection and control

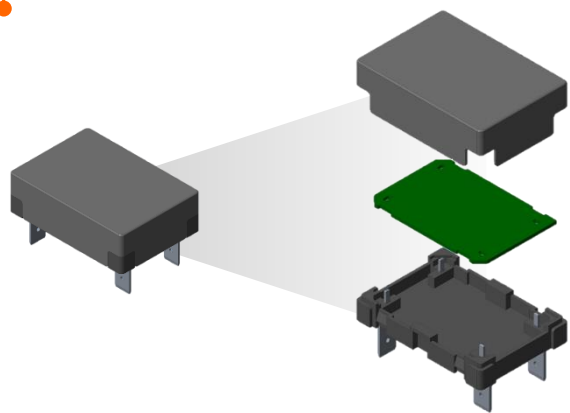
# Electronic Relay

(for 800V / 400V Battery System)



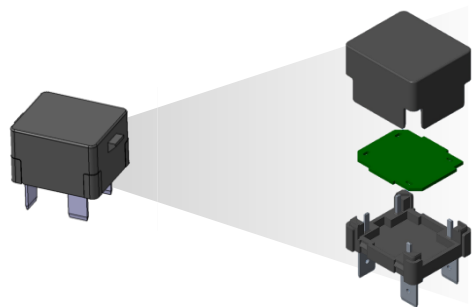
## 800V Pre-Charge Relay

For 800V battery system



## 400V Pre-Charge Relay

For 400V battery system



### ■ Features

	Description	Application
Electronic Pre-Charge Relay	<ul style="list-style-type: none"><li>The electronic relay for pre-charge function to prevent overloading (inrush current / voltage) when high voltage battery power is connected directly to the electronic equipment (Load)</li></ul>	<ul style="list-style-type: none"><li>Power-Relay-Assembly of xEV</li><li>HV junction box / On-board charger</li><li>Battery management system</li></ul>

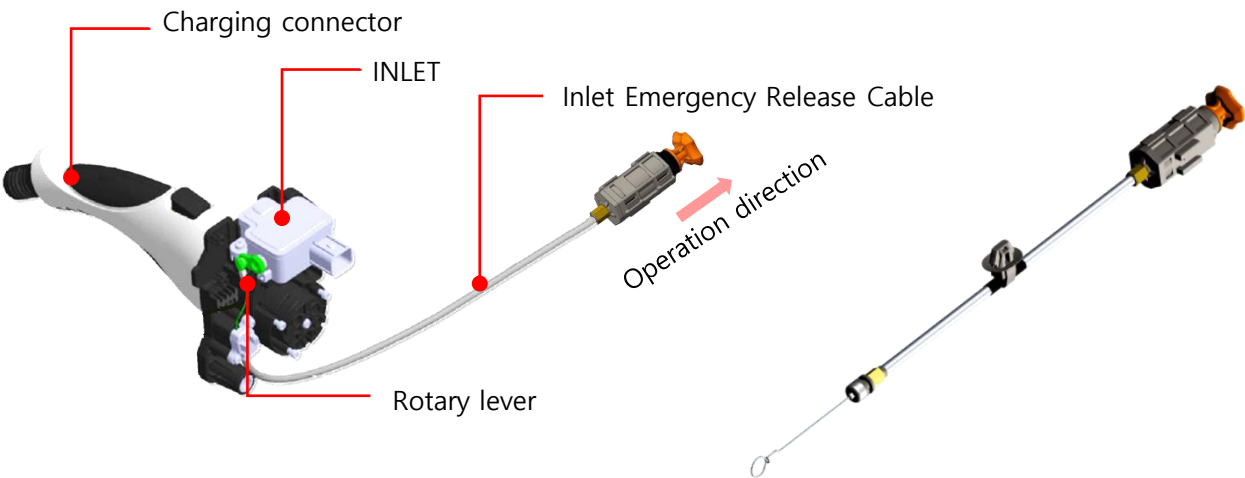
### ■ Specification

	800V Pre-Charge Relay	400V Pre-Charge Relay
Max. Voltage	~ 825V	~ 465V
Max. Current	15A @ 825V (Pre-Charge Resistor 55 Ω)	11A @ 465V (Pre-Charge Resistor 40 Ω)
Weight	27g	13g
Size (L x D x H)	25.2 x 34 x 29.4 mm	35 x 53 x 29.4 mm
Insulation Voltage	3,750Vrms (AC, 60s)	
Control Voltage / Rated	9 ~ 16VDC (12V)	
Operating Temp.	-40 ~ 75°C	
Storage Temp.	-40 ~ 85°C	

### ■ Customer Benefits

- Improved durability over systems with mechanical relay
- Improved system performance with fast relay operation time
- Reduced size and weight of system

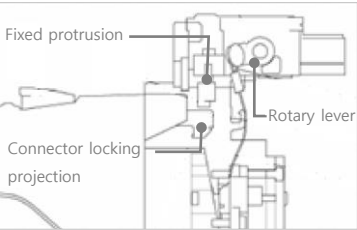
# Inlet Emergency Release Cable



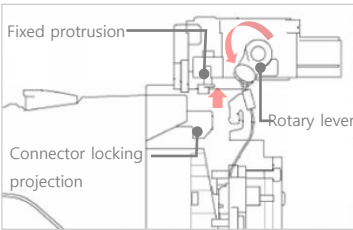
## ■ Features

	Description	Remark
Inlet Emergency Release Cable	<ul style="list-style-type: none"><li>• Wire length adjustable</li><li>• Apparatus for emergency disconnect of a battery charge inlet of an electric vehicle</li></ul>	Charging connector type <ul style="list-style-type: none"><li>- 5 pin : Korea, USA</li><li>- 7 PIN : Europe</li><li>- CHAdMo : Japan</li></ul>

## ■ Principle of operation



[before operation]



[after operation]

1. External force applied in the longitudinal direction of the handle of the emergency release cable.
2. The hook at the end of the wire connected to the handle forcefully rotates the inlet lever.
3. Fixed projection upward to inlet lever rotation.
4. Unlocking the charging connector locking part.

## ■ Customer Benefits

- It is a device that forcibly releases the charging connector when the unlock button on the charging connector does not work.

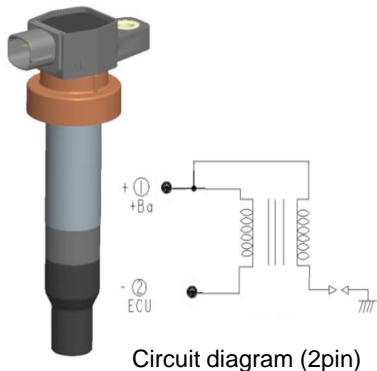
# Ignition Coil

(Stick type / Plug Top type)



## Stick Type

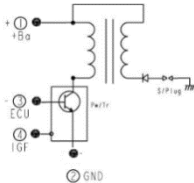
30mJ@RT



Circuit diagram (2pin)

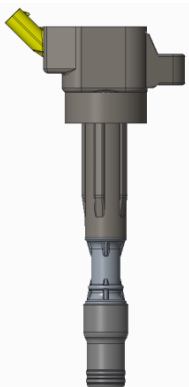
## Plug Top Type

80mJ@RT



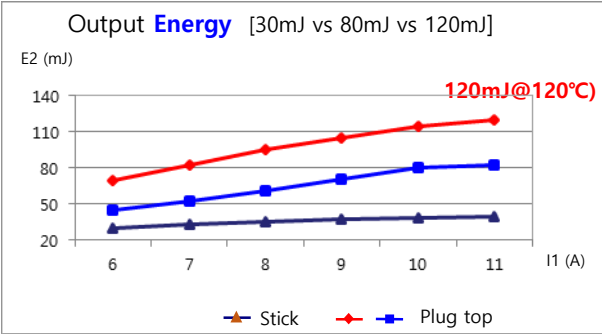
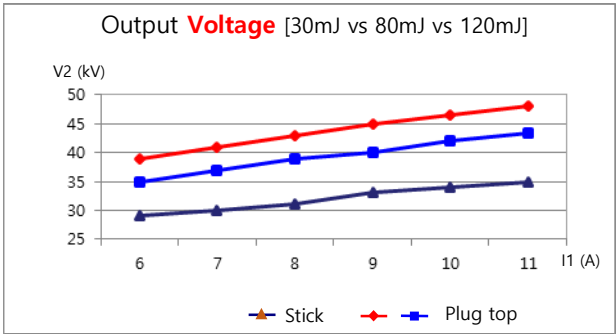
Circuit diagram (4pin & 3pin)

120mJ@120°C



## Features

	Description	Remark
Stick Type Ignition Coil	<ul style="list-style-type: none"><li>A Slim Body [Energy 30~38mJ]</li><li>Streamlining The Engine Lay-out</li><li>Defect Free Quality</li></ul>	Test Condition - Vbatt : 14V (RT) - Load : 10MΩ/20pF, Vz[800V] - Ambient Temp. : R.T. * Ignitor Clamp Voltage ; 400~560V
Plug Top Ignition Coil	<ul style="list-style-type: none"><li>Down Sizing Design</li><li>Energy : 80mJ / 100mJ / 120mJ /200mJ</li><li>Current Limit / Over Temperature Protection / Thermal Shutdown (Optional)</li></ul>	

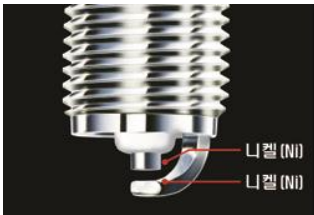


## Customer Benefits

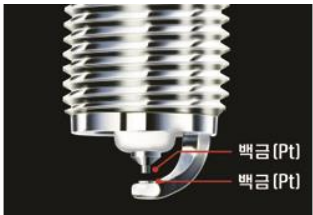
- Improving ignition and combustion efficiency.
- Ignition improvement in cold start, emission reduction and improvement in fuel efficiency.
- High EGR use area acceptable.

# Spark Plug

(Nickel type / Platinum type / Iridium type)



Nickel Type



Platinum Type





Iridium Type

■ Features

	Description	Remark
Spark plug	<ul style="list-style-type: none"><li>Nickel Type Spark Plug</li><li>Platinum Type Spark Plug</li><li>Iridium Type Spark Plug.</li></ul>	<ul style="list-style-type: none"><li>C/E &amp; G/E : Nickel Alloy)</li><li>C/E : Platinum Tip, G/E Platinum Ball</li><li>C/E : Iridium Tip, G/E : Platinum Ball</li></ul>

■ Specification

	M12 Type	M14 Type
Thread Length	19mm / 26.5mm	19mm
Hex Size	16 Hex	16 / 21 Hex
Internal Resistance	3 ~ 7.5 kΩ 7 ~ 16 kΩ	3 ~ 7.5 kΩ
Dielectric Strength	Min. 25 ~ 40kV	Min. 30 ~ 40 kV
Insulator Dia.	Φ9 / Φ10.5mm	Φ10.5 / Φ12.3mm
Center Electrode Dia.	Φ2.2	Φ2.7
Shell Design		

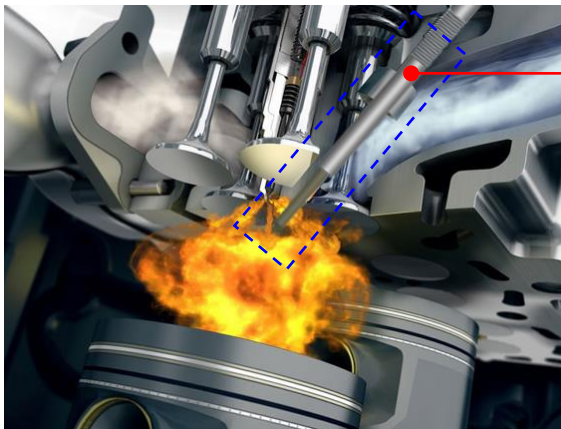
■ Customer Benefits

- Long life (durability excellence)
- Ignitability improvement
- Maintenance cost reduction

# Glow Plug



Diesel Engine Cylinder

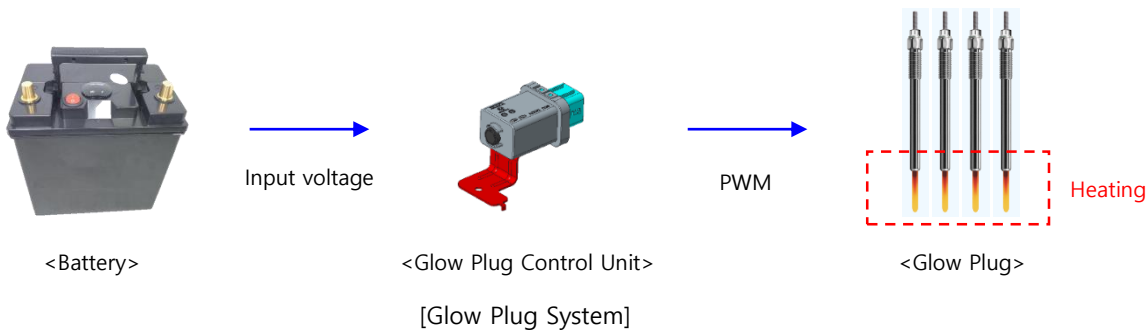


Glow Plug

## ■ Features

	Description	Remark
Glow Plug	<ul style="list-style-type: none"><li>length adjustable (110mm~160mm)</li><li>M10 X P1.25, M8 X P1</li></ul>	<ul style="list-style-type: none"><li>Reach Temperature(3sec) 1,000°C</li><li>Max Temp. 1,100°C</li><li>Rated Voltage Rms 4 ~ 7V</li></ul>

## ■ Principle of operation



※ PWM: Pulse Width Modulation

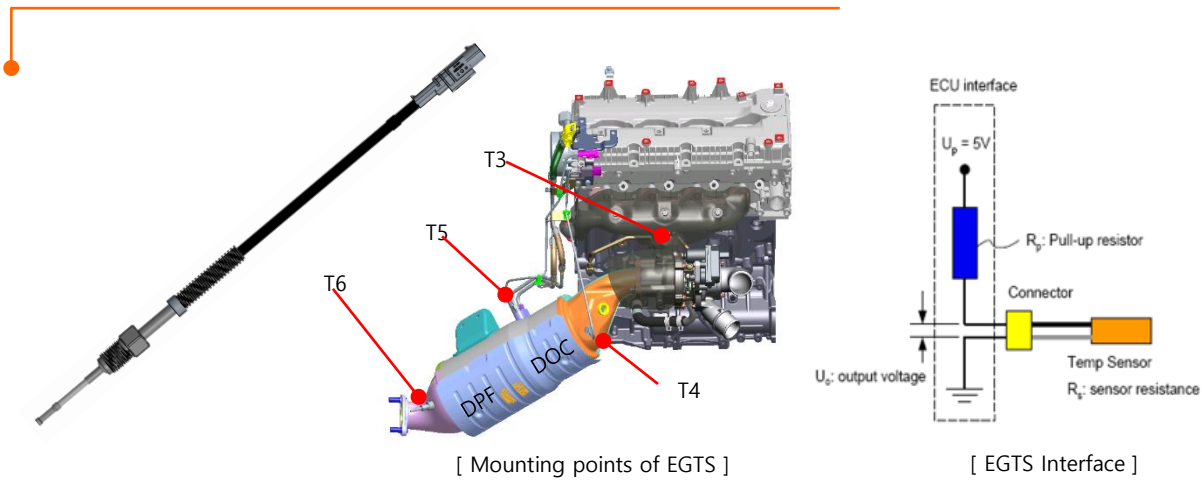
## ■ Customer Benefits

- Diesel engine starter  
(Supplying heat energy to improve the ignition efficiency of combustion room air and fuel)





EGTS



Features

	Description
EGTS	<ul style="list-style-type: none"><li>Monitoring of Exhaust gas temperature</li><li>Thin film platinum temperature sensors displaying high linearity</li><li>Catalyst front/rear mounted to protect the exhaust system</li></ul>

Specification

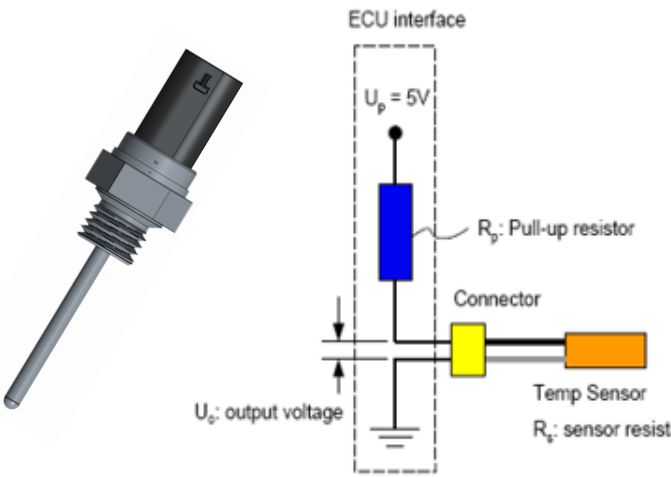
	EGTS
Temperature range	Continuous: -40°C to 1000°C, Peak: 1050°C
Operating voltage	5V
Sensor Element	PT200 platinum RTD
TCR	3770K, 3850K
Response time	5 seconds (Ambient→850°C, air velocity of 70m/s)
Insulation resistance	> 1MΩ at 25°C, DC 500V
Pull up resistance	1 kΩ

Customer Benefits

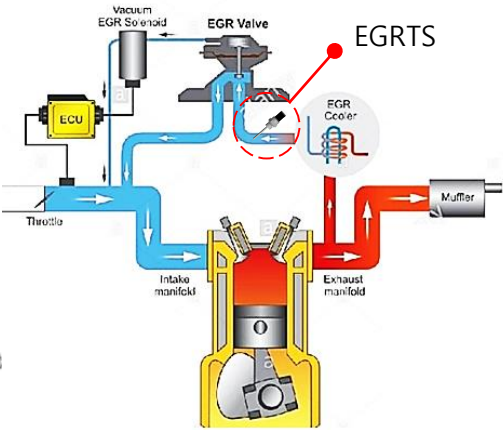
- It is a device monitoring exhaust gas temperature and protecting catalyst

# E.G.R.T.S

(Exhaust Gas Recirculation Temperature Sensor)



EGRTS Interface



EGR Cooler system

## ■ Features

	Description
EGRTS	<ul style="list-style-type: none"><li>• Monitoring of EGR-exhaust gas temperature</li><li>• Installed in between the EGR cooler and EGR valve</li></ul>

## ■ Specification

	EGRTS
Temperature range	Continuous: -40°C to 200°C, Peak: 250°C
Operating voltage	5V
Sensor Element	NTC Thermistor, RTD type
B value(25/50) / TCR	2220K, 3435K, 3770K
Response time (τ <sub>63</sub> )	5 seconds (Ambient → 250°C, Oil bath)
Pull up resistance	4.64kΩ

## ■ Customer Benefits

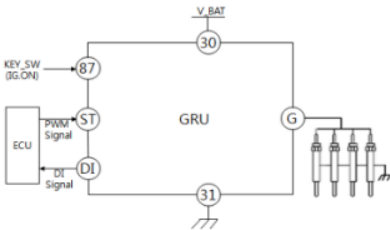
- Reduce Nox by increasing the efficiency of the EGR system

# G.C.U / G.R.U

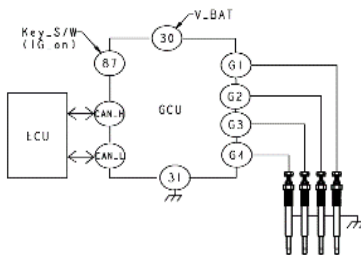
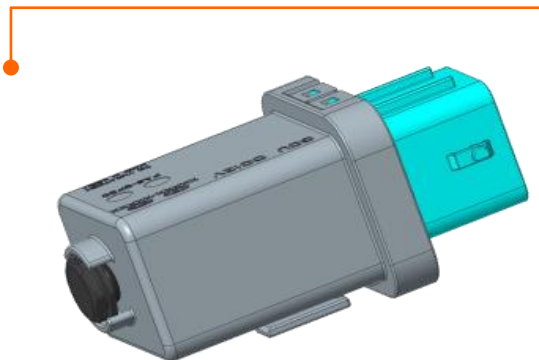
(Glow Relay Unit / Glow Control Unit)



**GRU** Glow Relay Unit



**GCU** Glow Control Unit



## Features

	Description	Remark
Glow Relay Unit	• Control and diagnosis of glow plug at a time through PWM control	Glow plug : fast-heating type (1,000°C(3sec))
Glow Control Unit	• Control and diagnosis of each glow plug through CAN	

## Specification

	Glow Relay Unit	Glow Control Unit
Control of glow plug	Simultaneous control	Each control
Communication with ECU	ST(PWM) / DI(On/Off)	CAN
Diagnosis of glow plug	Diagnosis is possible when three or more glow plugs are disconnected	Each glow plug can be diagnosed
Mounted location	Car body in engine room	

## Customer Benefits

- Quick engine start is possible in winter
- It can be heated with high temperature during engine cranking  
(Reduction of HC/CO when engine starting)