PRE-GLOW SYSTEM

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GENERAL INFORMATION

1. SPECIFICATIONS

Description		Specification
Glow plug	Rated voltage	4.4 V
	Max. temperature	1100 °C
	Operating temperature	1080 °C ~ 1000 °C
	Resistance	23 °C: 0.39 ~ 0.52Ω
Glow plug control unit	Operating voltage	6 ~ 16 V
	Operating temperature	-40°C ~ 110°C
	Dark current	Max. 1 mA

SSEMBL

ENGINE

INTAKE SYSTEN

EXHAUS

TURBOC HARGER

LUBRICAT ION

COOLING SYSTEM

CHARGE SYSTEM



CRUISE CONTRO

E-EGK SYSTEM

CDPF SYSTEM

> ENGINE CONTRO

Modification basis	
Application basis	
Affected VIN	

OVERVIEW AND OPERATING PROCESS

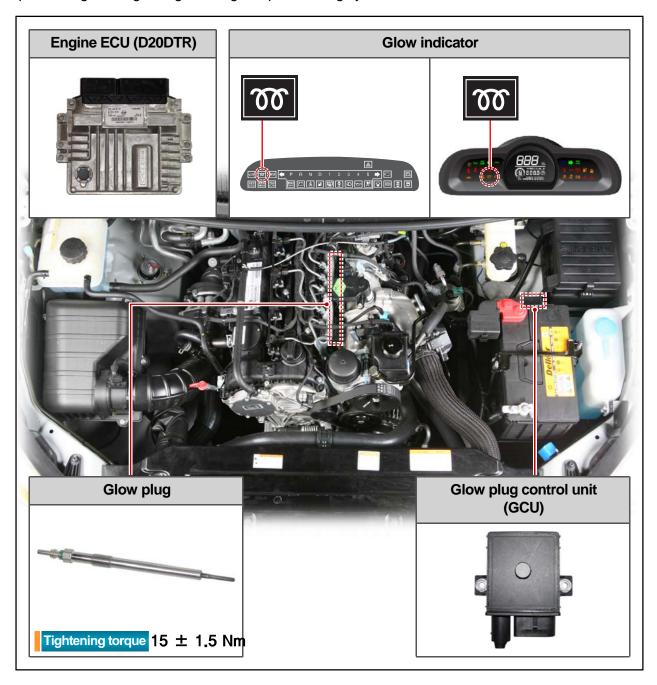
1. OVERVIEW

The pre-heating system for D20DTR engine has the glow plug to the cylinder head (combustion chamber), and improves the cold start performance and reduces the emission level.

The pre-heating resistor (air heater) is used to heat the intake air.

This enables the diesel fuel to be ignited in low temperature condition.

The ECU receives the information such as, engine rpm, coolant temperature, engine torque, etc., through CAN communication during pre-heating process; and the pre-heating control unit controls the pre-heating, heating during cranking and post-heating by the PWM control.



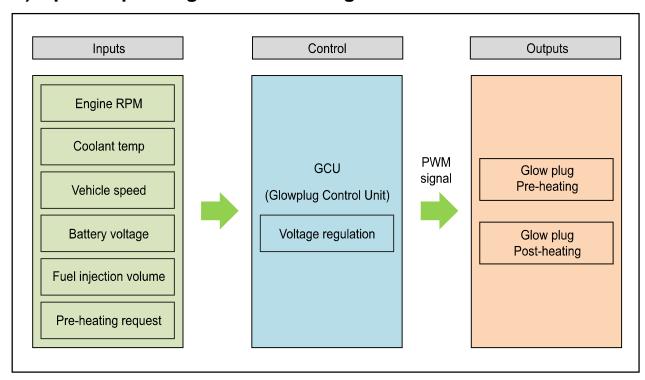
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Modification basis	
Application basis	
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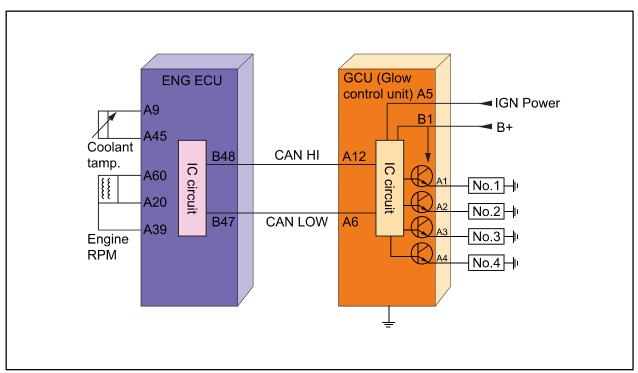
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2. SYSTEM OPERATION

1) Input/Output Diagram of Glow Plug Control Unit



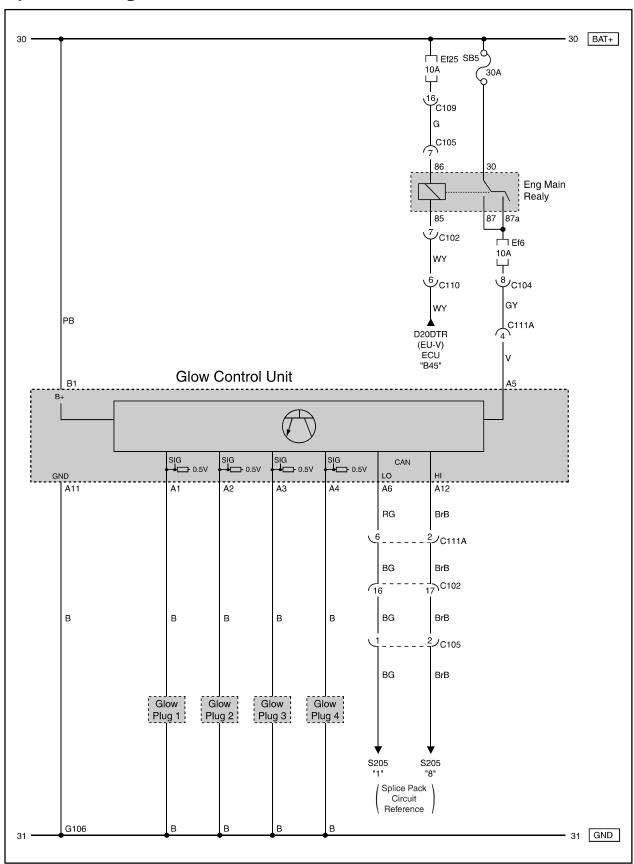
2) System Diagram



Modification basis	
Application basis	
Affected VIN	



3) Circuit Diagram



Modification basis	
Application basis	
Affected VIN	

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4) Operation

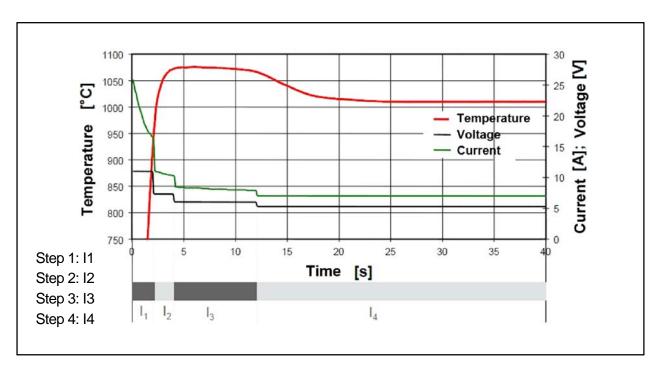
Glow plug is installed in the cylinder head. It enhances the cold starting performance and reduces the exhaust gas during cold starting.

ECU receives the data (engine rpm, coolant temperature, vehicle speed) through CAN lines. Based on the data, GCU controls the pre-glow, cranking and post-glow. It also checks the glow plugs, and sends the result to ECU.

(1) Temperature/Current Properties of GCU

- Step 1: GCU increases the temperature of glow plug very rapidly (approx. 2 seconds up to 1000°C)
- Step 2 & 3: FETs (similar to transistor) for each cylinder are integrated in GCU. During the pre-glow period, battery voltage is supplied to the glow plugs directly to heat them rapidly. After getting the desired temperature by pre-glowing, the temperature is controlled by duty





- This shows the supplying voltage and time by GCU in each step. The step 4 is the period to keep the temperature.

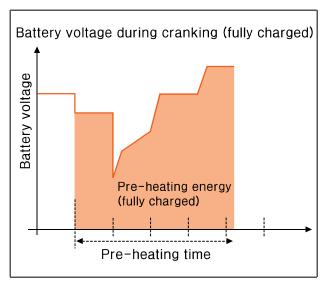
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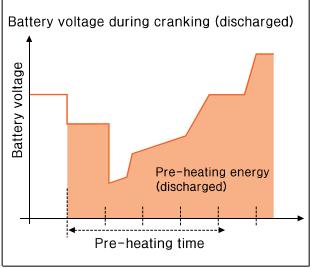


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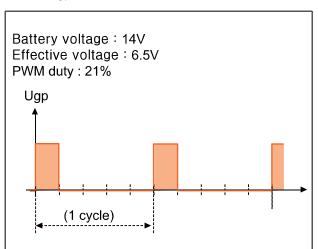
(2) Pre-heating time control based on battery voltage

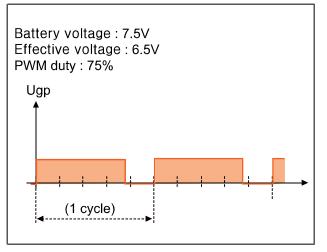
- GCU monitors the battery voltage. If it is low, GCU extends the pre-heating time.
- GCU monitors the energy to glow plugs (the amount of pre-heating energy is always same).





- GCU monitors the battery voltage. If it is low, GCU extends the pre-heating time to get enough energy.

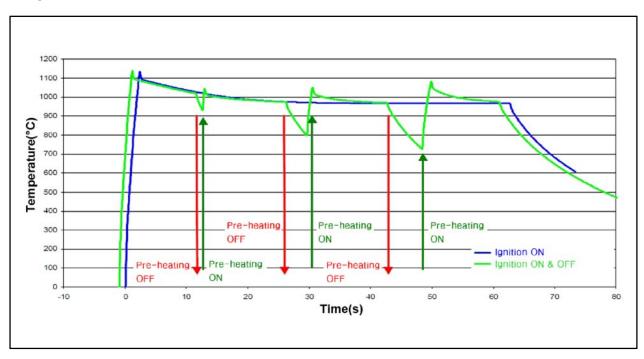




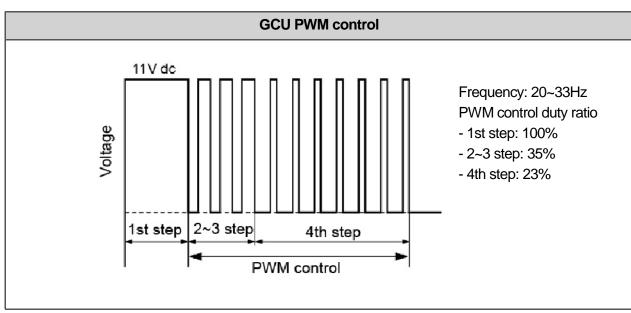
- GCU monitors the battery voltage. If it is low, GCU increases PWM duty..

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- GCU estimates the temperature of glow plug for pre-heating. To avoid the power loss and overheat, GCU supplies the lowest power for getting target temperature when turning ON the ignition from OFF.



(4) Operation



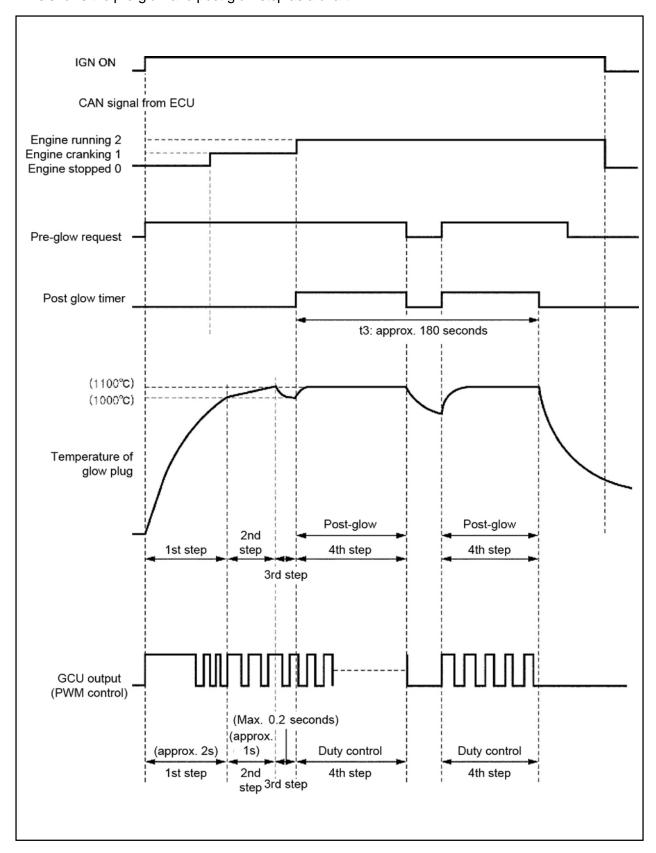
- This describes the voltage supplying types to glow plugs.

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(5) Pre-glow and Post-glow

This shows the pre-glow and post-glow step as a chart.



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