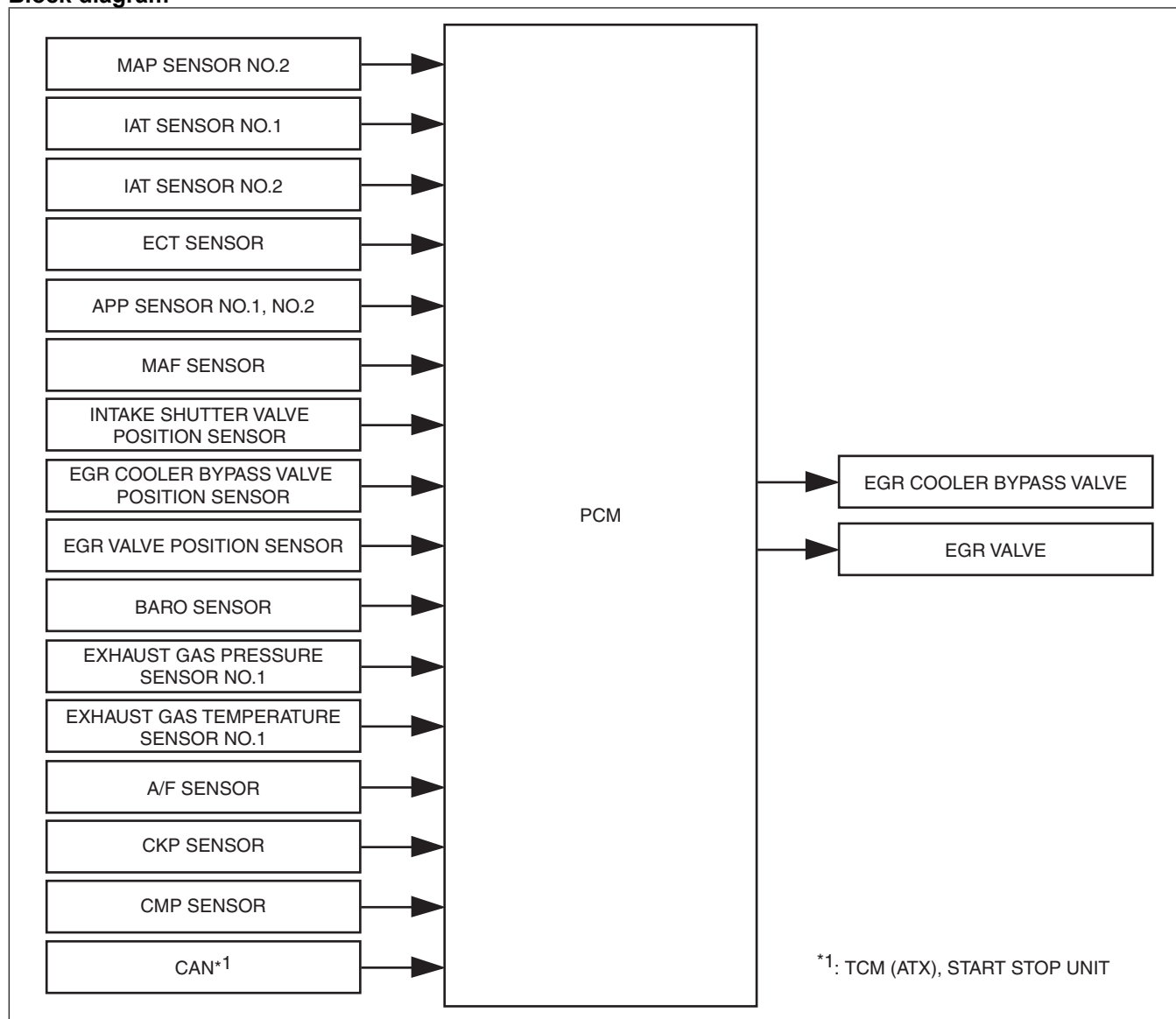


## Outline

- To recirculate an optimum amount of exhaust gas to the combustion chamber according to engine operation conditions, the PCM performs duty control of the EGR valve (DC motor) to open and close the valve.
- The intake air temperature increases or decreases rapidly according to the exhaust gas temperature, and it affects the combustion temperature. To optimize the temperature of the recirculated exhaust gas, opening and closing of the EGR valve and EGR cooler bypass valve are controlled according to the engine coolant temperature.
- During fast idle increase and DPF regeneration control, the EGR valve is controlled so as not to operate to prevent the post-injected fuel from circulating to the intake side. (The EGR control is stopped)

## Block diagram



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## Operation

- Based on the input signal, the PCM calculates the required oxygen concentration of the intake air and EGR amount necessary to achieve the oxygen concentration.
- The EGR valve is duty-controlled to open/close so that the EGR amount follows the targeted amount.

### Target oxygen concentration

- The target oxygen concentration is calculated by adding corrections to the basic target oxygen concentration which is calculated based on the fuel injection amount.

### Target EGR amount

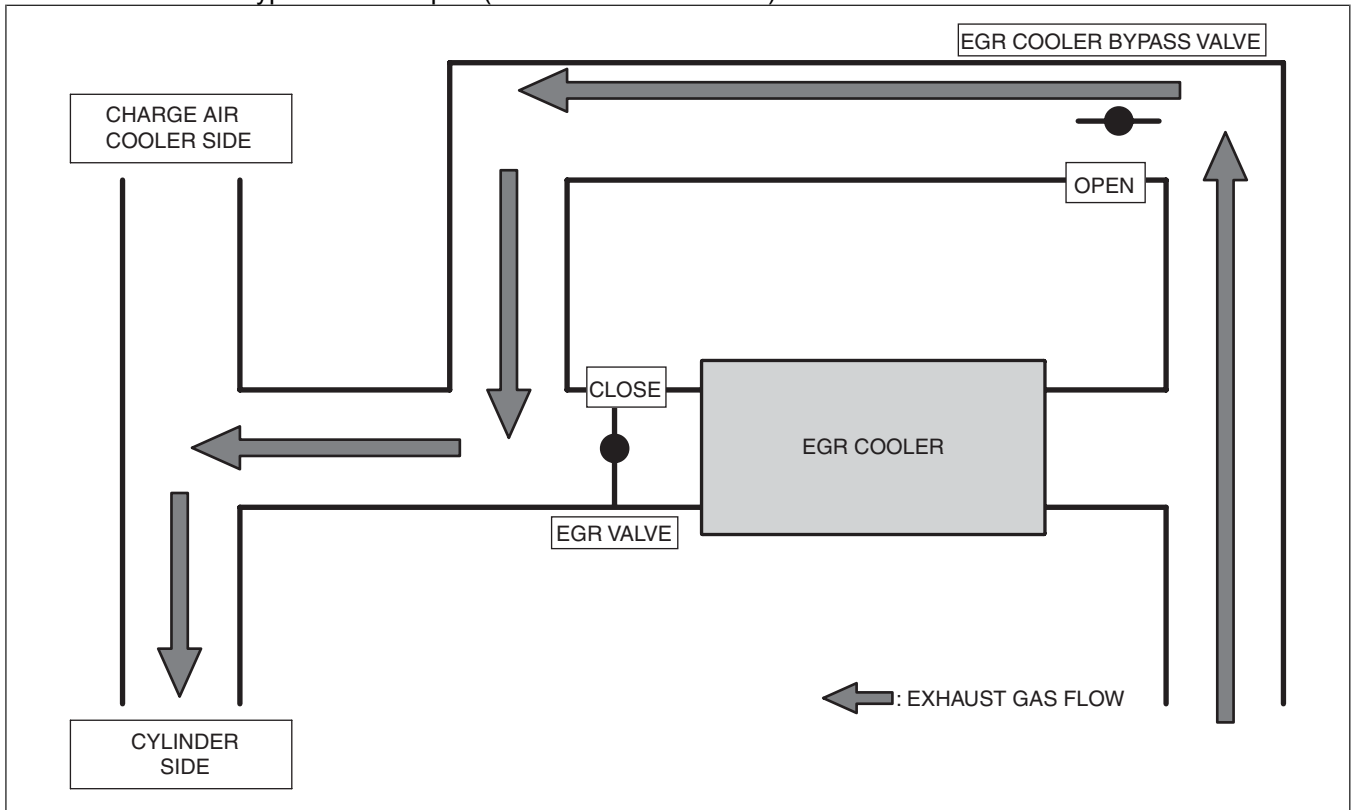
- The target EGR amount is calculated by target intake air oxygen concentration, exhaust gas oxygen concentration, and charging efficiency.

### Actual EGR amount

- The actual EGR amount is calculated by the mass air flow sensor, intake air temperature sensor No.2, and the boost air temperature sensor.
- The PCM controls the opening/closing condition of the EGR valve and the EGR cooler bypass valve according to the engine coolant temperature.

**When engine coolant temperature is less than 55 °C {131 °F}**

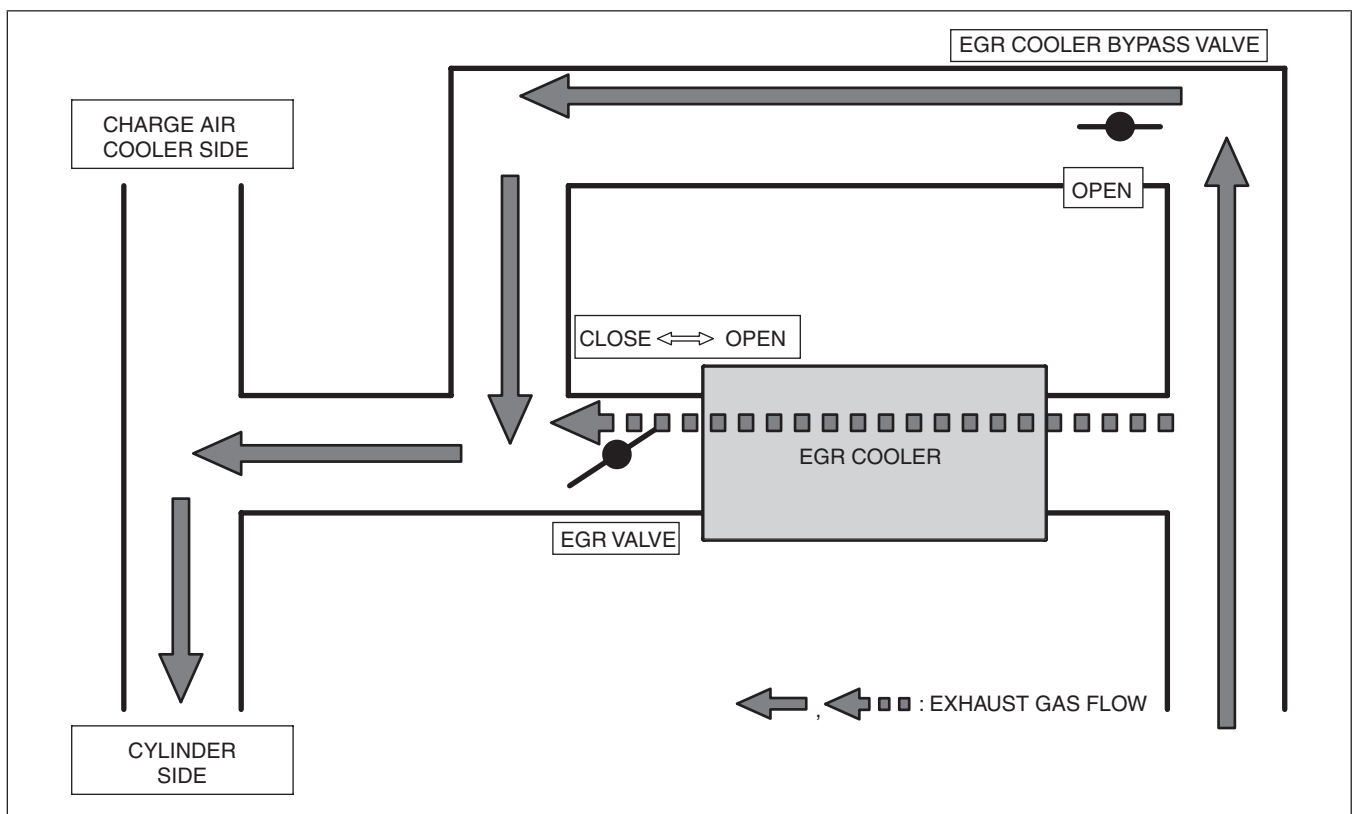
- The engine coolant temperature is low and warming of the intake air is required, therefore, the exhaust gas is recirculated without passing through the EGR cooler.
  - EGR valve: Closed
  - EGR cooler bypass valve: Open (Flow amount controlled)



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**When engine coolant temperature is between 55 °C {131 °F} and 70 °C {158 °F}**

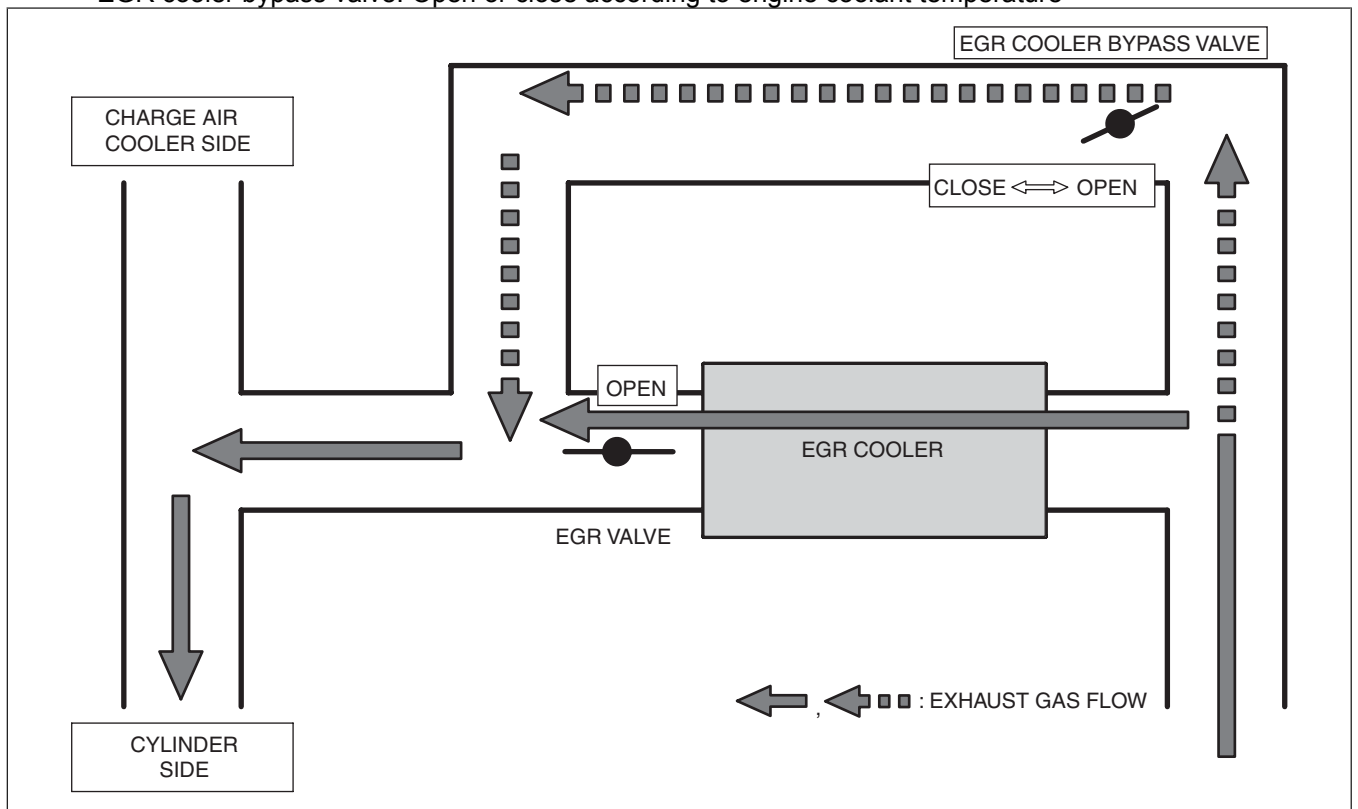
- The EGR valve is open according to the increase in the engine coolant temperature. The temperature of the recirculated exhaust gas is adjusted by the EGR cooler.
  - EGR valve: Open or closed according to engine coolant temperature
  - EGR cooler bypass valve: Open (Flow amount controlled)



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**When engine coolant temperature is 70 °C {158 °F} or more**

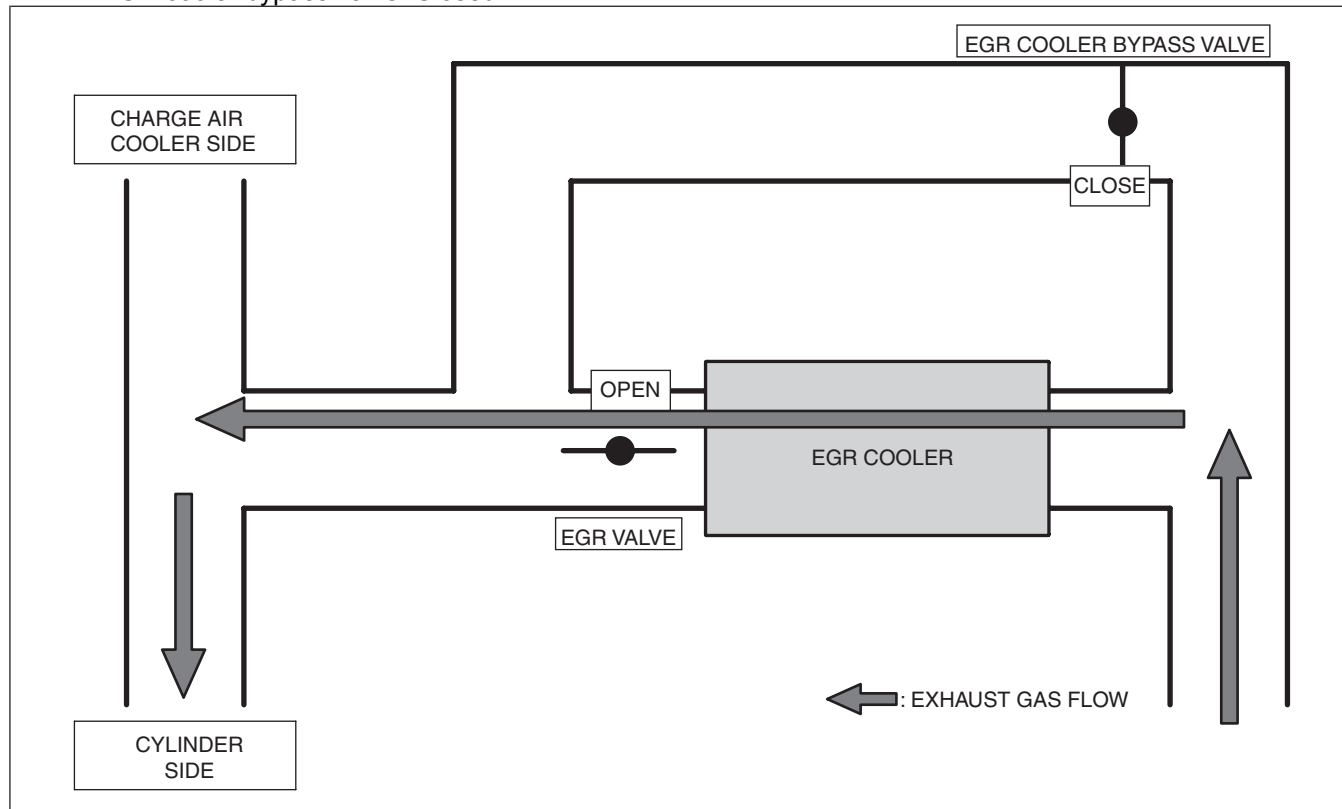
- After engine warm-up, exhaust gas is cooled by the EGR cooler. The EGR cooler bypass valve is open/closed to adjust the exhaust gas temperature.
  - EGR valve: Open (Flow amount controlled)
  - EGR cooler bypass valve: Open or close according to engine coolant temperature



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**When EGR cooler bypass valve operation is inhibited (Exhaust gas temperature is 440 °C {824 °F} or more)**

- If the exhaust gas temperature is too high, the EGR valve opens to prevent damage to the EGR cooler bypass valve.
  - EGR valve: Open (Flow amount controlled)
  - EGR cooler bypass valve: Closed



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