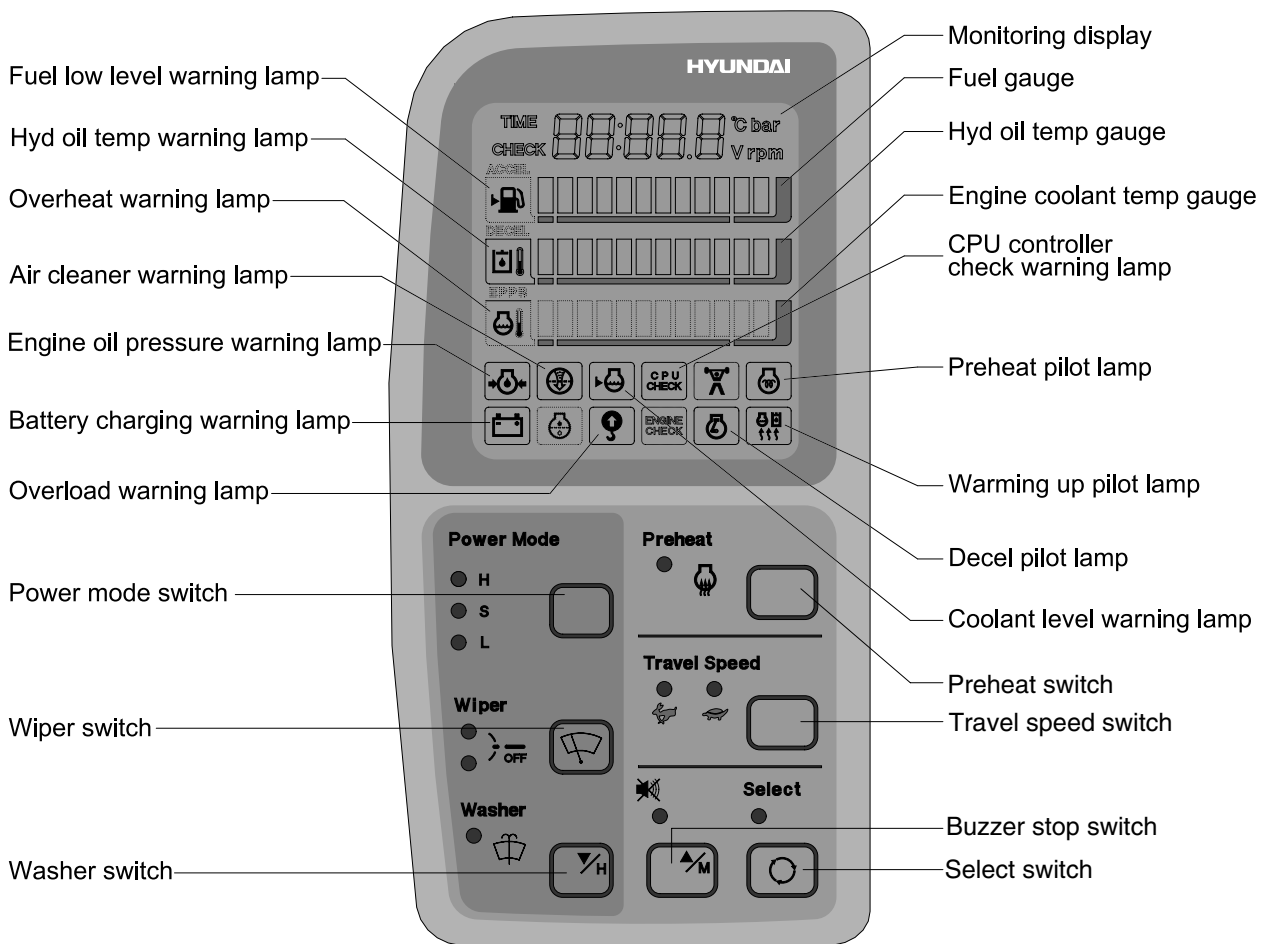## GROUP 9 MONITORING SYSTEM

### 1. OUTLINE

Monitoring system consists of the monitor part and switch part.

The monitor part gives warnings when any abnormality occurs in the machine and informs the condition of the machine.

Various select switches are built into the monitor panel, which act as the control portion of the machine control system.

### 2. CLUSTER

#### 1) MONITOR PANEL



Fuel low level warning lamp

Hyd oil temp warning lamp

Overheat warning lamp

Air cleaner warning lamp

Engine oil pressure warning lamp

Battery charging warning lamp

Overload warning lamp

Power mode switch

Wiper switch

Washer switch

Monitoring display

Fuel gauge

Hyd oil temp gauge

Engine coolant temp gauge

CPU controller check warning lamp

Preheat pilot lamp

Warming up pilot lamp

Decel pilot lamp

Coolant level warning lamp

Preheat switch

Travel speed switch

Buzzer stop switch

Select switch

7075MS11

## 2) CLUSTER CHECK PROCEDURE

### (1) Start key : ON

① Check monitor initial 5 seconds

    a. All lamps light up.
    b. Buzzer sound.

② Check monitor after 5 seconds : Indicate cluster version and machine condition

    a. Cluster program version : CL : 2.0 ◄— Indicates program version 2.0 for 2 seconds.
    b. Tachometer : 0rpm
    c. Fuel gauge : All light up below appropriate level
    d. Hydraulic temperature : All light up below appropriate level
    e. Engine coolant temperature gauge : All light up below appropriate level
    f. Warning lamp
    ※ During start key **ON** the engine oil pressure lamp and battery charging lamp go on, but it is not
       abnormal.
    ※ When engine coolant temperature below 30℃, the warming up lamp lights up.

③ Indicating lamp state

    a. Power mode selection : S mode
    b. Preheat : No LED ON
    c. Wiper : No LED ON
    d. Washer : No LED ON
    e. Travel speed pilot lamp : Low(Turtle)

### (2) Start of engine

① Check machine condition

    a. Tachometer indicates at present rpm
    b. Gauge and warning lamp : Indicate at present condition.
    ※ When normal condition : All warning lamp OFF
    c. Preheat : No LED ON
    d. Power mode selection : S mode
    e. Wiper : No LED ON
    f. Washer : No LED ON
    g. Travel speed pilot lamp : Low(Turtle)

② When warming up operation

    a. Warming up lamp : ON
    b. 10 seconds after engine started, engine speed increases to1200 rpm
    ※ Others same as above ①.

③ When abnormal condition

    a. The lamp lights up and the buzzer sounds.
    b. If **BUZZER STOP** switch is pressed, buzzer sound is canceled but the lamp light up until normal
       condition.
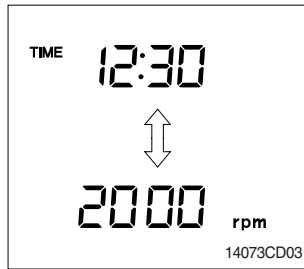
## 3. CLUSTER CONNECTOR

| No. | Signal | Input / Output |
|-----|--------|----------------|
| 1 | Power IG(24V) | Input(20~32V) |
| 2 | GND | Input(0V) |
| 3 | Serial-(RX) | Input(Vpp=12V) |
| 4 | Serial+(TX) | Output(Vpp=4V) |



Cluster

21075MS16
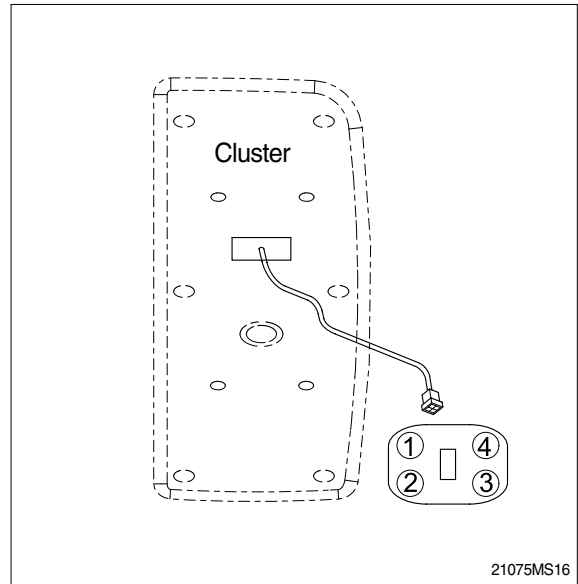
# 4. CLUSTER FUNCTION

## 1) MONITORING DISPLAY

① This displays the current time and machine information such as engine rpm, coolant/hydraulic oil temperature, hydraulic oil pressure and also error codes.

※ **Refer to the page 5-24 for details.**

## 2) FUEL GAUGE
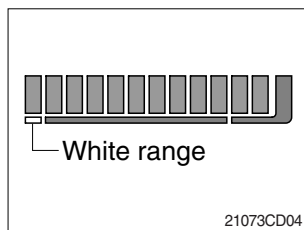
① This gauge indicates the amount of fuel in the fuel tank.
② Fill the fuel when the white range or warning lamp 🛢 blinks.

※ **If the gauge illuminates the white range or warning lamp 🛢 blinks even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.**
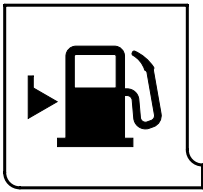
## 3) HYDRAULIC OIL TEMPERATURE GAUGE
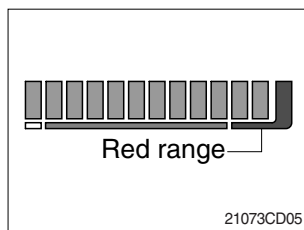
① This indicates the temperature of coolant.
· White range : 30℃(86℉) below
· Green range : 30-105 ℃(86-221℉)
· Red range : 105℃(221℉) above
② The green range illuminates when operating.
③ Keep idling engine at low speed until the green range illuminates, before operation of machine.
④ When the red range illuminates, reduce the load on the system. If the gauge stays in the red range, stop the machine and check the cause of the problem.

## 4) ENGINE COOLANT TEMPERATURE GAUGE
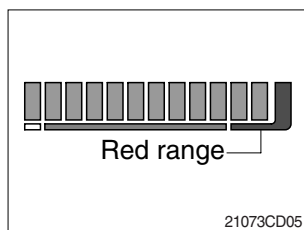
① This indicates the temperature of coolant.
· White range : 30℃(86℉) below
· Green range : 30-105 ℃(86-221℉)
· Red range : 105℃(221℉) above
② The green range illuminates when operating.
③ Keep idling engine at low speed until the green range illuminates, before operation of machine.
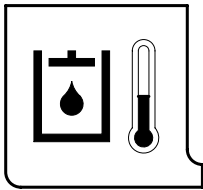④ When the red range illuminates, turn OFF the engine, check the radiator and engine.

## 5) FUEL LOW LEVEL WARNING LAMP

21073CD04A

① This lamp blinks and the buzzer sounds when the level of fuel is below 21.5 $l$ (5.7U.S. gal).
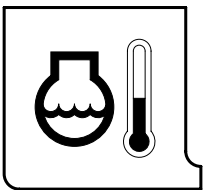② Fill the fuel immediately when the lamp blinks.

## 6) HYDRAULIC OIL TEMPERATURE WARNING LAMP

21073CD05A

① This warning lamp operates and the buzzer sounds when the temperature of hydraulic oil is over 105 ℃( 221 ℉) .
② Check the hydraulic oil level when the lamp blinks.
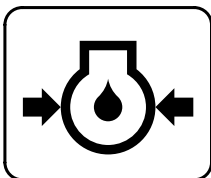③ Check for debris between oil cooler and radiator.

## 7) OVERHEAT WARNING LAMP

21073CD06A

① This lamp blinks and the buzzer sounds when the temperature of coolant is over the normal temperature 110℃( 230℉) .
② Check the cooling system when the lamp blinks.

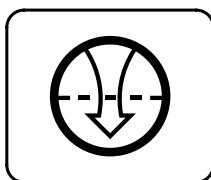## 8) ENGINE OIL PRESSURE WARNING LAMP

21073CD07

① This lamp blinks and the buzzer sounds after starting the engine because of pressure.
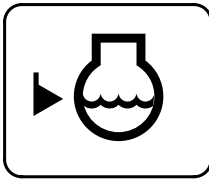② If the lamp blinks during engine operation, shut OFF engine immediately. Check oil level.

## 9) AIR CLEANER WARNING LAMP

21073CD08

① This lamp is operated by the vacuum caused inside when the filter of air cleaner is clogged which supply air to the engine.
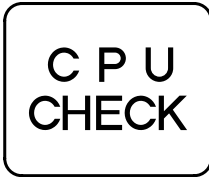② Check the filter and clean or replace it when the lamp blinks.

## 10) COOLANT LEVEL WARNING LAMP

① This lamp blinks and the buzzer sounds when the coolant is below LOW in the reservoir tank of radiator.
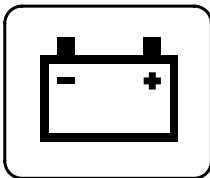② Check the reservoir tank when the lamp blinks.

21073CD09

## 11) CPU CONTROLLER CHECK WARNING LAMP

① Communication problem with CPU controller makes the lamp blinks and the buzzer sounds.
② With lamp blinks all of the lamp on the cluster LCD will be OFF.

21073CD10

## 12) BATTERY CHARGING WARNING LAMP

① This lamp blinks and the buzzer sounds when the starting switch is ON, it is turned OFF after starting the engine.
② Check the battery charging circuit when this lamp blinks, during engine operation.

21073CD13

## 13) OVERLOAD WARNING LAMP
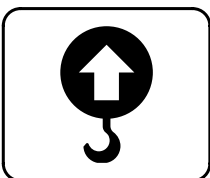
① When the machine is overload, the overload warning lamp blinks during the overload switch ON.

21073CD15

## 14) ONE TOUCH DECEL PILOT LAMP

① Operating auto decel or one touch decel makes the lamp ON.
② The lamp will be ON when pushing one touch decel switch on the LH RCV lever.

21073CD17

## 15) WARMING UP PILOT LAMP



21073CD18

① This lamp is turned ON when the coolant temperature is below 30℃(86 ℉).
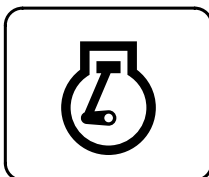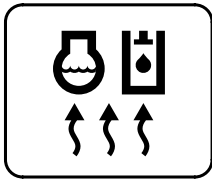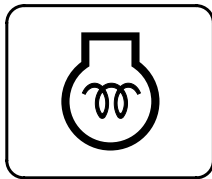② The automatic warming up is cancelled when the engine coolant temperature is above 30 ℃, or when 10 minutes have passed since starting.
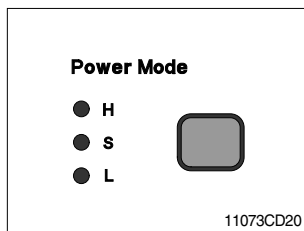
## 16) PREHEAT PILOT LAMP



21073CD12

① This lamp is turned ON when the preheating function is actuated in cold weather.
② Start the engine as this lamp is OFF.

## 17) POWER MODE SWITCH

**Power Mode**

- H
- S
- L

11073CD20

① This switch is to select the machine power mode, which shifts from high power work to standard power work and light power work in a raw by pressing the switch.
  · H : This is used for high power work
  · S : This is used for standard power work
  · L : This is used for light power work

## 18) WIPER SWITCH

**Wiper**

OFF
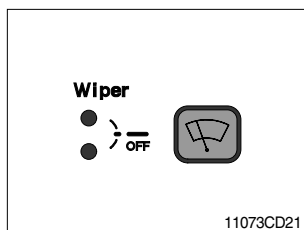
11073CD21

① This switch is used to operate wiper.
  · Press the switch once to operate wiper.
  · Press the switch once more to intermittently operate wiper low speed.
  · Press the switch more than one second to turn off wiper.
※ **Wiper motor doesn't operate with front sliding door open.**
※ **If wiper does not operate with the switch in the ON position, turn the switch off immediately. Check the cause.**
  **If the switch remains ON, it can result in motor failure.**

## 19) WASHER SWITCH
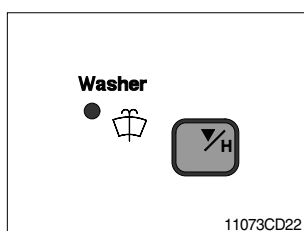
**Washer**

11073CD22

① The washer liquid is sprayed and the wiper is operated only while pressing this switch.
② The indicator lamp is turned ON when operating this switch.

## 20) PREHEAT SWITCH

**Preheat**

11073CD23

① This switch is used for starting the engine in cold weather.
   If pressed, grid heater is activated to get easier engine starting.
※ **Never hold the push button switch in for more than 30 seconds, as this can damage the grid heater.**
② The indicator lamp is turned ON when operating this switch.


## 21) TRAVEL SPEED CONTROL SWITCH

**Travel Speed**

21073CD24
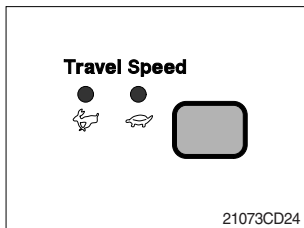
① This switch is to control the travel speed which is changed to high speed(Rabbit mark) by pressing the switch and low speed(Turtle mark) by pressing again.


## 22) BUZZER STOP SWITCH

21073CD25

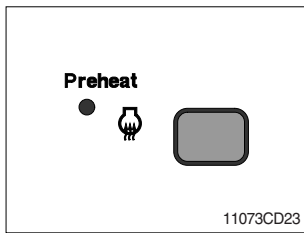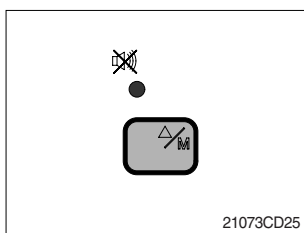① When the starting switch is turned ON first, normally the alarm buzzer sounds for 5 seconds during lamp check operation.
② The red lamp lights ON and the buzzer sounds when the machine has a problem.
   In this case, press this switch and buzzer stops, but the red lamp lights until the problem is cleared.


## 23) SELECT SWITCH

**Select**

21073CD25A
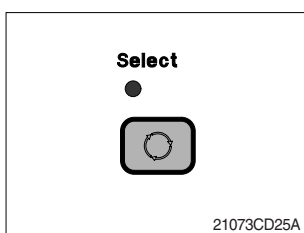
① This switch is used to select the monitor display function.
※ **Refer to the page 5-24 for details.**
② If the switch is pressed for 3 seconds in time display mode, it is selected time adjusting function, as below.
   · Hour by auto decel switch
   · Minute by buzzer stop switch.
③ After time set, the switch is pressed, it is returned clock.

# 5. MONITORING DISPLAY

## 1) OUTLINE

Information of machine performance as monitored by the CPU controller can be displayed on the cluster when the operator selects a display mode by touching **SELECT** switch alone or with **BUZZER STOP** switch on the cluster as below.

| Display group | How to select display mode | | Name | Display on the cluster |
|---|---|---|---|---|
| | Group selection | Display mode selection | | |
| **Group 0** (Default) | Way 1 Key switch **ON** or **START** Way 2 Touch **WASHER** switch while pressing **BUZZER STOP** at group 1~4. | Initial | Engine rpm | `1750` rpm |
| | | Touch **SELECT** 1 time | Time | TIME `12:30` |
| | | Touch **SELECT** 2 times | CPU model & version | `08:C 1.0` |
| **Group 1** (Volt, temp, EPPR press, version) | Touch **SELECT** switch **once** while pressing **BUZZER STOP**. In this group **SELECT** LED **ON** | Default | Battery voltage(V) | `b:24.8`v |
| | | Touch **SELECT** 1 time | Potentiometer voltage(V) | `Po: 2.5`v |
| | | Touch **SELECT** 2 times | Accel dial voltage(V) | `dL: 3.8`v |
| | | Touch **SELECT** 3 times | Hydraulic oil temperature(℃) | `Hd: 105`℃ |
| | | Touch **SELECT** 4 times | Coolant temperature(℃) | `Ct: 107`℃ |
| **Group 2** (Error code) | Touch **SELECT** switch **twice** while pressing **BUZZER STOP**. In this group **BUZZER STOP** LED blinks | Default | Current error | CHECK `Er: 03` |
| | | Touch **SELECT** 1 time | Recorded error (Only key switch ON) | TIME `Er: 03` |
| | | Press down(▼) & **SELECT** at the same time | Recorded error deletion (Only key switch ON) | TIME `Er: 00` |
| **Group 3** (Switch input) | Touch **SELECT** switch **3 times** while pressing **BUZZER STOP**. In this group **SELECT** LED blinks at 0.5sec interval | Default | One touch decel switch | `od:on` or `oFF` |
| | | Touch **SELECT** 1 time | Preheat switch | `PH:on` or `oFF` |
| | | Touch **SELECT** 2 times | Overload pressure switch | `ol:on` or `oFF` |
| **Group 4** (Output) | Touch **SELECT** switch **4 times** while pressing **BUZZER STOP**. In this group **SELECT** LED blinks at 1sec interval | Default | Hourmeter | `Ho:on` or `oFF` |
| | | Touch **SELECT** 1 time | Neutral relay (Anti-restart relay) | `nr:on` or `oFF` |
| | | Touch **SELECT** 2 times | Travel speed solenoid | `SS:on` or `oFF` |
| | | Touch **SELECT** 3 times | Preheat relay | `PR:on` or `oFF` |

※ By touching **SELECT** switch once while pressing **BUZZER STOP**, display group shifts.
  Example : Group 0 ➝ 1 ➝ 2 ➝ 3 ➝ 4 ➝ 0

## 2) DESCRIPTION OF MONITORING DISPLAY

| Group | Display | Name | Description |
|---|---|---|---|
| Group 0 | 2200 rpm | Engine speed | It displays current engine speed detected by engine speed sensor from 500 to 3000rpm.<br>Range : 500~3000rpm by 10rpm |
| | TIME 12 : 30 | Time | It displays current time(12 is hour and 30 is minute)<br>Range : Hour(1~12), minute(00~59) |
| | 08 : C1.0 | Model and CPU program version | It shows that machine model(R80-7) and the program version of the CPU controller is 1.0.<br>Version display range : 0.0~9.9 by 0.1 |
| Group 1 | b24 : 8V | Battery voltage | It shows that battery power of 24.8V is supplied into CPU controller.<br>Range : 00.0~48.0V by 0.1V |
| | Po : 2.5V | Potentiometer voltage | It shows that potentiometer signal voltage is 2.5V.<br>Range : 0.0~5.0V by 0.1V |
| | dL : 3.8V | Accel dial voltage | It shows that accel dial signal voltage is 3.8V.<br>Range : 0.0~5.0V by 0.1V |
| | Hd : 50℃ | Hydraulic oil temperature | It shows that hydraulic oil temperature detected by temperature sensor is 50℃.<br>Range : 0~150℃ by 1℃ |
| | Ct : 85℃ | Coolant temperature | It shows that coolant oil temperature detected by temperature sensor is 50℃.<br>Range : 0~150℃ by 1℃ |
| Group 2 | CHECK Er : 01 | Current error | It shows that current error of 01(Short circuit in accel actuator motor system) is diagnosed by self diagnosis system in the CPU controller.<br>If more than 2 errors, when pressing ▼ or ▲ switch, other error codes show.<br>Range : 00~58 |
| | TIME Er : 03 | Recorded error | It shows recorded error code of 03 which is diagnosed before.<br>If more than 2 error codes, when pressing ▼ or ▲ switch, other error codes show.<br>Range : 00~58 |
| | TIME Er : 00 | Recorded error deletion | It shows all recorded error codes are removed in the CPU controller memory. |

| Group | Display | Name | Description |
|---|---|---|---|
| Group 3 | od : on or oFF | One touch decel switch | **od : on** Shows that one touch decel switch is pressed.<br>**od : oFF** Shows that one touch decel switch is released. |
| | PH : on or oFF | Preheat switch | **PH : on** Shows that preheat switch is pressed.<br>**PH : oFF** Shows that preheat switch is released. |
| | ol : on or oFF | Overload pressure switch | **ol : on** Shows that overload pressure switch is turned ON.<br>**ol : oFF** Shows that overload pressure switch is turned OFF. |
| Group 4 | Ho : on or oFF | Hourmeter | **Ho : on** Shows that hourmeter is activated by CPU controller.<br>**Ho : oFF** Shows that hourmeter is turned off. |
| | nr : on or oFF | Neutral relay (Anti-restart relay) | **nr : on** Shows that neutral relay for anti-restarting function is activated(Engine start is possible).<br>**nr : oFF** Shows that neutral relay is turned off to disable the engine restart. |
| | ts : on or oFF | Travel speed solenoid | **ts : on** Shows that travel speed solenoid is activated (High speed).<br>**ts : oFF** Shows that travel speed solenoid is released (Low speed). |
| | PR : on or oFF | Preheat relay | **PR : on** Shows that preheat relay is activated.<br>**PR : oFF** Shows that preheat relay is released. |