

ISUZU

ELECTRONIC HVAC CONTROLLER

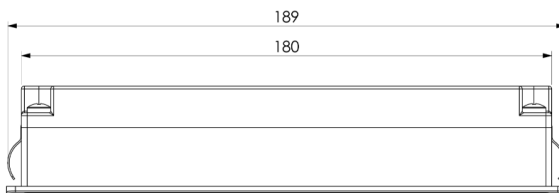
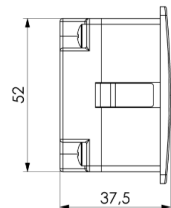
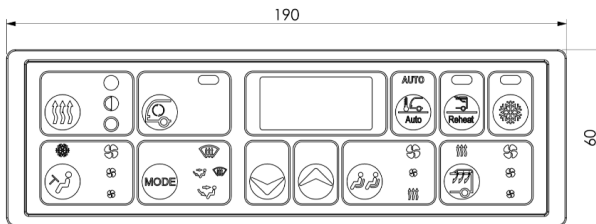
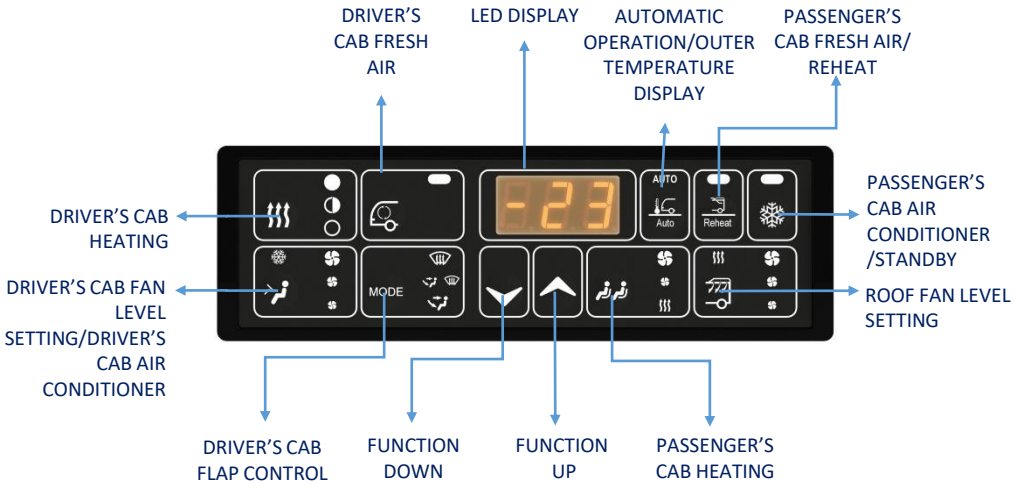


Ver 1.05
29.08.2019

BUTTON FUNCTIONS AND DIMENSIONAL MEASUREMENTS

BAŞKURT PRODUCT CODE: 55000889-890 (A02) WITH ISUZU NOVOCITI LIFE PARAMETERS

ISUZU CODE: **387665354001**

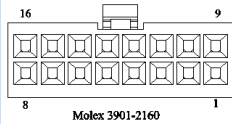


TECHNICAL SPECIFICATIONS

Operational Voltage Range and Communication	16V – 32 V , Physical and CANBus Communications
Inputs	3 10K NTC inputs (For average cab temperature) 2 10K NTC inputs (When usage with Frontbox module, for driver's cab and outer temperature information) 2 HP, LP pressure sensor input 1 door open signal input 1 motor temperature information input 1 air conditioner turning on information input - CAN H , CAN L and CANBus termination resistor input - Optional input 1 , 2
Outputs	2 Flap motor controls (Motorized Water Valve and Passenger's cab Fresh Air Flap) 4 Flap motor controls (When usage with Frontbox Module, Defroster Motorized Water Valve , Air guided Flap 1 , Air guided Flap 2, Driver's Cab Fresh Air Flap) - Frontbox Blower Motor Driver (When usage with Frontbox Module.) - Analog / PWM Output (When usage with Frontbox Module) - Water pump relay output - Open Relay output of Air Conditioner Condenser Fans - Reheat relay output - Compressor relay output - Evaporator Fan level relay outputs (3 Pieces) - Evaporator Fan PWM , Analog Signal Output (For blower fans with Bldc motor) - Passenger's cab heating relay output (2 Pieces) - CAN H , CAN L , CAN Bus Turning down resistance - Optional Output / Driver Compressor Relay Output(When usage with Frontbox Module) ❖ Whole relay contact outputs are 200mA'dir.

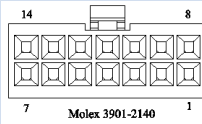
ELECTRONIC CONTROL CONNECTOR DETAIL

SOCKET CU1



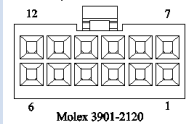
1	P. Fresh Air Flap Pot
2	M. Water Valve Flap Pot
3	P.Flapp Supply +
4	P.Flapp GND
5	Door Diagnostic IN (+)
6	61/D+ Alternator Ind.
7	58 / Illumination
8	15 / Ignition
9	Window Defrost Grid O.
10	P.Fresh Air Open +
11	M.Water Valve F.Motor +
12	M.Water Valve F.Motor -
13	N/A
14	Water Pump Output
15	Motor Diagnostic IN (+)
16	External A/C On IN (+)

SOCKET CU2



1	High P.S.W. IN
2	Low P.S.W. IN
3	NTC Gnd
4	NTC Area 1
5	NTC Area 2
6	NTC Area 3
7	P. Heater . PWM / Analog
8	P. Top Heater Out +
9	Compressor R. Out +
10	A/C R.Con. Fan. Out +
11	Evap Fan First Speed +
12	Evap Fan Second Speed +
13	Evap Fan Third Speed +
14	Evap Fan. PWM / Analog

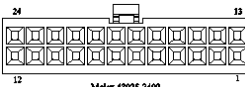
SOCKET CU3



1	30 / Battery Supply +
2	31 / GND
3	CAN H
4	CAN L
5	CAN H
6	P. Heater 1st. S.R. O.
7	30 / Battery Supply +
8	31 / GND
9	CAN H
10	CAN L
11	CAN RES
12	P. Heater 2nd. S.R. O.

FRONTBOX MODULE SOCKET DETAIL

SOKET FBMC



1	CAN RES
2	PWM/ANALOG
3	Flap GND
4	NTC GND
5	OUTLET NTC +
6	INLET NTC +
7	OPTIONAL IN 1
8	OPTIONAL IN 2
9	Water Valve Flap Pot
10	Fresh Air Flap Pot
11	Defrost Flap 2 Pot
12	Defrost Flap 1 Pot
13	CAN H
14	CAN L
15	Flap Supply +
16	Defrost A/C - Optional
17	Water Valve Flap Mot-
18	Water Valve Flap Mot+
19	Fresh Air Flap Mot-
20	Fresh Air Flap Mot+
21	Defrost Flap 2 Mot-
22	Defrost Flap 2 Mot+
23	Defrost Flap 1 Mot-
24	Defrost Flap 1 Mot+

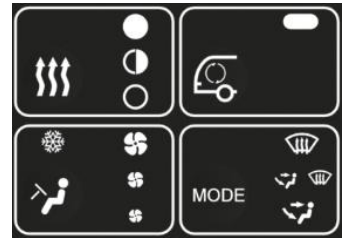
SOKET FBMP



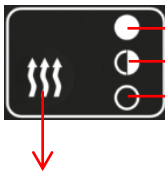
1	BLW -
2	BLW +
3	GND
4	SUPPLY 24V +

BUTTON FUNCTION DETAIL

DRIVER'S CAB SIDE



DRIVER'S CAB HEATING

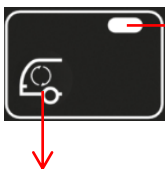


Fully Opened
Half-Opened
Closed

Heating Button

Driver's cab heating button regulates position of front heater valve. Positions are closed, half-opened and fully opened. When it is activated, closing icon '●' blinks until motor temperature information come from (CU1-15 or CANBus). If motor temperature is suitable value, blinking is ended and half-opened position is activated automatically. When the heating button is activated, circulation pump and vehicle main valve become active. Proportional control based on set temperature value. When driver's cab air conditioning function is activated, circulation pump and vehicle main valve are turned down automatically. (Frontbox Valve : CONNECTOR FBMC 3,9,15,17,18 , Vehicle Circulation Pump CU1 – 14 , Vehicle Main Valve CU1 - 2,3,4,11,12 pin.)

DRIVER'S CAB FRESH AIR

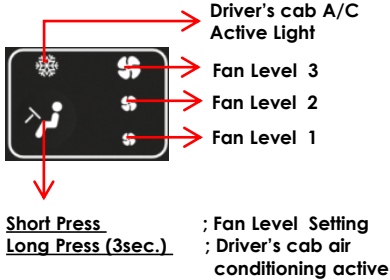


Inside Suction Active

Inside Suction Button

Driver fresh air button allows air suction from inside or outside of vehicle. It shows air suction from inside when led is active. It shows air suction from outside when led is passive. (SOKET FBMC 3,10,15,19,20 Pin)

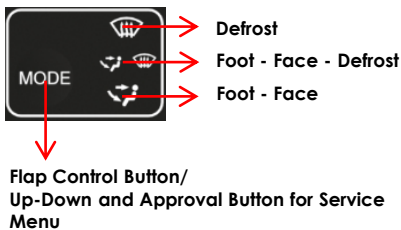
DRIVER'S CAB FAN LEVEL SETTING/ DRIVER'S CAB AIR CONDITIONER



When it is pressed shortly, driver fan setting button allows to adjust front box fan with three level. Levels are %40, %70 and %100. (CONNECTOR FBMC - 2 {PWM / ANALOG} ,FBMP - 1,2 {Motor Driver Output}) If button is pressed over three second driver's cab air conditioning will be activated ' ' and air conditioning led is illuminated with blue light. When driver air conditioning is activated, roof air conditioning is activated automatically too. Roof and defroster fans starts to run with minimum level. If air conditioning fails or outside temperature is below to 5 °C, air conditioning blue light starts to blink and functions will not be activated. If air conditioning is activated, fan levels never comes to closed position. When air conditioning is activated condenser fan, driver air conditioning compressor or gas valve(CONNECTOR FMBC – 16 or CANBus) relay output is activated. Compressor is activated and deactivated according to set value. Time period between activated and deactivated is 30 second as a default (Adjustable.) Press over three seconds to the button for closing air conditioning functions. Heating and cooling functions can not be used together.

(Defrosting function activates heating and cooling functions together.)

DRIVER'S CAB FLAP CONTROL



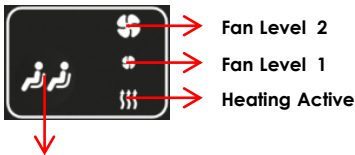
Driver flap control button regulates position of front box heater air flap. The positions are defrost, foot-face and foot-face-defrost ventilation. Active positions are illuminated. When Defrosting function is activated both heating and cooling functions are active and driver's cab fan starts to run at minimum level. Window defrost grid is activated for 10 minutes when defrosting function is activated. At the end of the 10 minutes, function is turned off. To be reactivated this function, it should be exited from defrost position and defrost position should be selected again.(It can be canceled out from service menu.)

(CONNECTOR FMBC - 3,12,15,21,22 or 3,11,15,23,24 pin , Windscreen de-ice resistance; CONNECTOR CUI - 9 pin or CANBus))

PASSENGER'S CAB SIDE



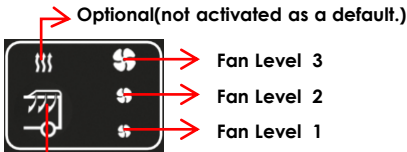
PASSENGER'S CAB HEATING



Passenger Floor Heater Button

Passenger heater button controls heater in passenger's cab. With first press of this button passenger heater function is activated by allowing pump and main hot water valve to be activated. (CONNECTOR Vehicle Circulation Pump CU1 - 14 , Vehicle main valve CU1 - 2,3,4,11,12 pin) Second and third press of this button controls fan level setting. (CONNECTOR CU3- 6,12 {+24V Relay} , CU2 - 7 {ANALOG / PWM} Bldc motor or for motor driver.) Blinking of heating function led means that engine temperature has not reached suitable value.

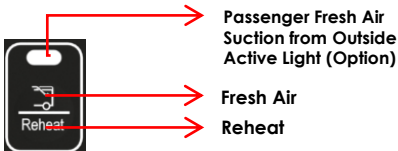
ROOF FAN LEVEL SETTING



Roof Fan Level Setting

Roof fan level setting button allows fan setting of roof air conditioning to regulate as a three level. Levels are %40 %70 and %100. (SOKET CU2 - 11,12,13, {+24V Relay} , 14 {Analog / PWM}) When cooling function is activated, fans start to run at minimum level automatically. It can not be closed. (Optional; If there is roof heating on the vehicle and when it is activated, roof evaporator fans can operate at maximum 1'st level.)

PASSENGER'S CAB FRESH AIR / REHEAT



Short Press ; Passenger's Cab Fresh Air (Option)
Long Press (3sec.) ; Reheat (Passenger Defrosting)

Passenger fresh air button allows air suction from inside or outside of vehicle. If led is activated it means that suction from outside, if led is not activated it means that suction from inside of vehicle. (CONNECTOR CU1- 10) When external suction is active, If passenger air conditioning is opened, flap is positioned internal suction automatically. External suction can be activated manually again. If button is pressed for three seconds Passenger defrosting is activated and display shows that with inside temperature alternately. It is active throughout 6 minutes. Reheat function is passive by pressing for 3 seconds again. Reheat function is provided with maximum fan level of heating and cooling functions.

PASSENGER'S CAB AIR CONDITIONER/STANDBY



→ Air Conditioning
Active (Blue)
→ Air Conditioning
Button

Short Press; Air Conditioning Active/
Deactivate
Long Press(3sec.) ; Standby

AUTOMATIC OPERATION / OUTER TEMPERATURE DISPLAY



→ Automatic Mode
Active Light
→ Outside Temperature
→ Automatic Mode

Short Press; Outside Temperature
Long Press(3sec.) ; Automatic Mode

Passenger air conditioning button allows to activate air conditioning in the passenger's cab. When the passenger air conditioner is activated, the fan level is never turned off. When the air conditioner is activated (CONNECTOR CU2 - 10 {+24V Relay}), Evaporator fans (CONNECTOR CU2 - 11 {+24V Relay}) and air conditioner compressor (CONNECTOR CU2 - 9 {+24V Relay}) is activated. Compressor output is activated or deactivated according to the set value. Time period between activated and deactivated is 30 second as a default. Heating and cooling functions can not be used together. (Except reheat mode) When the air conditioner is on, passenger fresh air mode is turned off automatically. It can be turned on again later. If button is pressed over three seconds, electronic controller unit is turned off whole functions in standby mode. It is enough to press on button over three seconds for turning on of electronic controller unit again.

Short pressing, outer temperature display button shows outer temperature value by blinking for five seconds. When press over three seconds **AUTO** led is illuminated and automatic mode is activated. When automatic mode is activated, ambient temperature is controlled according to set values in driver and passenger's cab. It is allowed by changing fan level according to temperature values from sensors to control ambient temperature. If the ambient temperature is 2° or more than 2° from set value, fans operate at maximum level. If it is above 1° from set value fans operate at mean level, if it is equal to the set value fans operate at minimum level. At the cooling automatic mode function, fans can be operated from maximum to minimum level. It can not be turned off. At the heating automatic mode function if ambient temperature above 1° from set value, fans totally turned off and heating valves, circulation pumps are turned off.

LED DISPLAY



→ Led
Display

→ Function
Up
→ Function
Down

Temperature adjustment button is used to set temperature and to change functions. Set values are adjusted manually between 18°C and 28°C values. In permanent mode, it is displayed ambient mean temperature. When function down button  is pressed for more than three seconds, set value starts to blink on screen and it is allowed to adjust temperature set value of driver's cab. Unless any button is pressed in three seconds, recent set value which blinks on screen is saved. When function up button  is pressed for more than three seconds, set value starts to blink on screen and it is allowed to adjust temperature set value of passenger's cab. Unless any button is pressed in three seconds, recent set value which blinks on screen is saved.

OPERATIONAL FUNCTIONS



Temperature Control

- Driver's and passenger's cabs can be controlled separately, temperature set values can be adjusted specifically for each cab.(Detailed information is available in temperature up-down button function section.). Upper and lower set values limits can be changed from service manual. (S01, S02) Limit value of summer-winter mode is 21°C as a default. If outside temperature is below to the 21°C, automatic mode starts at heating mode. If outside temperature is above to the 21°C, automatic mode starts at cooling mode. Limit values can be adjusted from service manual. (S03) When automatic switching between heating and cooling modes, it is specified hysteresis. This time period is 1 minutes as a default. It can be adjusted from service manual.(S62) Temperature information of driver's cab is taken from one sensor. Temperature information of passenger's cab is taken from second or third sensor. The average of temperature information which taken from 4 sensors is reflected in display of the control unit. Outside temperature information is taken from single sensor or CANbus. When outside temperature display button is pressed, outside temperature is showed on the screen for 5 seconds by blinking. Driver's cab set value performs function only by taking information from the driver cab sensor. Passenger's cab set value performs function by taking information from average value of passenger's cab sensors. If there is a sensor failure one or more, function is performed by averaging values of lasting sensor. When the sensor breakage, error message is showed on the display screen and countdown is seen. After the error message, average values of lasting sensors will be showed on the display screen. If none of the sensors are connected or in fault condition, this signal  appears on the screen. Sensors can be canceled from service manual.(S12,S13,S14,S15,S16) Sensor quality and vehicle isolation are factors to affect to control comfort.

Automatic Mode

- There is an automatic mode in control unit. Ambient is heat control according to the set value in automatic mode. Manual operation in automatic mode can be selected from the service manual. If manual operation is selected in automatic mode for specific cab this function removed the automatic mode. Manual operation can be used in driver's cab and can not be used in passenger's cab as a default.

Battery Protection

- Battery protection function is active in manual mode. In battery protection function If speed information taken from CANBus is lower than 1km ,namely vehicle is stationary, at the end of the 5 minutes, fans are operated one level lower. If vehicle is stationary for 10 minutes, fan levels are updated by reducing one more level. If the vehicle is stationary for 15 minutes, all controlled fans and air conditioner compressor are fully switched off. If the speed value comes the last setting parameters activated automatically . Time periods can be adjusted from the service manual. (S25,S26,S27,S28) it is closed as a default

OPERATIONAL FUNCTIONS

Compressor Protection

- Compressor protection is switched on or off according to set values of driver's and passenger's air conditioning unit. There is a 30 seconds time period between switching on or off. This time period can be adjusted from service manual. (S04) Information is taken from high and low pressure sensors for compressor protection. If there is a fault condition or nominal pressure is exceeded, an error message is issued. This is attempted 3 times with 5 seconds time interval, If there is still fault condition, air conditioner is switched off. If the sensor is not used it can be switched off from service manual. (S17, S18)

Fan Control

- There is a driver internal brushed dc motor in frontbox unit. Brushed motors up to 15 Ampere can be controlled with this driver as a three level (%0 ,%40,%70,%100). If brushless motor is used in the unit brushless motors can be controlled with 0-10V analog output. It can be selected internal driving or external signal. (S19)

- Passenger's cab heating fans are controlled as a 2 level (%0 ,%50,%100). Control method is performed with output relay or analog signal (0-10V) for each fan level.

- Air conditioning condenser fans have relay output for operation as long as the air conditioner is on. Air conditioner evaporator fans are controlled as a three level (%0 ,%40,%70,%100). There is a relay outputs and analog signal for every level of control. Analog Signal can be selected 0-10V , 24-0V, 0-24V for staging from service manual (S00)

Defrosting (Defrost , Reheat)

- If flap is placed in defrost position  driver air conditioning and heating are operated together. In this position driver air conditioning function can be turned off manually. This function can be switched off totally from service manual.(S22) Defrosting window grid is activated with defrost function. Default time is 10 minutes. It can be changed from service manual.(CU1 -9 , S52)

- There is a reheat function  for defrosting of passenger's cab. When the reheat function is activated passenger's cab roof air conditioner and heater, passenger's cab another heater (convector, side-Wall heater etc.) are activated and fans are operated at maximum level. Reheat time is 6 minutes as a default. It is returned last set values after the 6 minutes. Reheat time is adjusted from service manual. (S05)

Motorized Valve Protection

- When the heating function is activated, the main motor valve, the frontbox valve and the circulation pump are activated. When the circulation pump is switched on, there is 1 second delay to prevent high pressure in closed system as a default. This delay time can be adjusted from service manual. (S21)

Air Guiding and Motorized Valve Control

- Control unit controls 2 motors and Frontbox module controls 4 motors. Flap control motors and motorized valves should be potentiometer controlled. Potentiometer values between 4,7 kΩ ~ 5kΩ.(Motor current value is maximum 1 Ampere) When the system is first energized or the connected motors in the system are replaced, motor position angle is calibrated automatically. Calibration positions are kept in memory and motor life is protected. when the ignition is switched on and off, air-guiding motor is positioned final location, the motorized valves and the fresh-air valve motors are set to their off position by default. All motor drivers have feedback control. When the motor is disconnected , motor failure ,uncompleted calibration condition (timed out 6sn) or piece stacking condition, error message is issued by blinking of relevant button lights. When the fault condition ends, operation continues normally with automatic calibration. If there is a unused motor it can be switched off from service manual. (S06,S07,S08,S09,S10,S11)

GENERAL SPECIFICATIONS

- If there is no CANBus on the vehicle, the control unit and the Frontbox module have CANBus hardware to communicate with each other.
- The units generate operational function diagnostic message for whole flap motors via CANBus. Error message is generated for every flap motor specifically.
- The units generate operational function diagnostic message for whole sensors via CANBus. Error message is generated for every sensor specifically.
- If bldc radial blower fan of BAŞKURT is used in Frontbox and air conditioning unit, operational function diagnostic message is generated for blower fans. Error message is generated for every blower fan motor specifically.
- In manual mode, driver can control whole functions except compressor output.
- If there is no signal which 61/D+ refers whether charging generator works or not, electronic controller functions can not be used. It is showed only measured temperature on screen. (CONNECTOR CU1 -6)
- If there is no 15 – Contact input, electronic controller is fully closed. (CONNECTOR CU1 -8)
- If there is no 58 input, electronic controller backlight is passive. (CONNECTOR CU1 -7)
- If door open signal input is active, whole fans are operated at minimum level. When the signal is deactivated fans return to last positions. (CONNECTOR CU1 -5)
- When the unit is first powered (At the default mode) air guided flap is at the foot-face position, driver's cab fresh air flap is at the outside suction mode, passenger's cab fresh air flap is at the inside suction mode, taps and circulation pumps are closed, whole fans and relay outputs are closed.
- The electronic controller stores the last settings unless the main power supply is interrupted, If the main power supply is interrupted, it is returned to the default mode. When the vehicle ignition is switched on and off, last settings are valid.
- The CANBus message map is provided separately from the user's manual.
- The CANBus error message map is provided separately from the user's manual.
- Two sensor readings are active as a default in passenger's cab. If three sensor are used, it should be activated from service manual. (S16)

SENSORS

NTC TEMPERATURE SENSORS OF DRIVER'S CAB

- 1 NTC with 10K %1 R25 (K=3977) accuracy should be connected to NTC ambient temperature sensor input. this sensor is used to measure driver's cab temperature. (CONNECTOR FBMC 4, 6)
- 1 NTC with 10K %1 R25 (K=3977) accuracy should be connected to NTC environment temperature sensor input. (CONNECTOR FBMC 4, 5). Vehicle environment temperature sensor can be used via CANBus . (S12)

NTC TEMPERATURE SENSORS OF PASSENGER'S CAB

- 3 NTC with 10K %1 R25 (K=3977) accuracy should be connected to NTC passenger's cab ambient temperature sensor input. These sensors are used to measure passenger's cab temperature. The average value of 3 sensors are used for measuring temperature. Unused sensors can be switched off. (CONNECTOR CU2 - 3, 4, 5, 6)

HIGH / LOW PRESSURE SENSORS

- +24V signal from pressure switches are connected to inputs of high and low pressure sensors. If pressure switch is not used, It should be switched off from service manual.

CANBUS MESSAGES FROM THE VEHICLE FOR FUNCTIONS

- AUXIO2 SPN3868 message should be 01 or 11 for the air conditioning function to work.
- When additional heater is active AUXIO2 SPN3868 message should be 10 or 11 for providing heating function.
- Motor temperature information must be issued via ET1 SPN110 for heating function operation. Motor information should be come from via CSM1 D4.

ERROR MESSAGES

Heater-Air Conditioner Control Unit Error Messages Chart

Date 26.09.2018
Version 1.2
Signature M.S.

Error No	Error Description
E01	Low supply voltage (< 21 VDC)
E02	High supply voltage (> 32 VDC)
E03	Low Gas Pressure
E04	High Gas Pressure
E05	Driver's cab NTC connection problem
E06	Passenger's cab NTC-1 connection problem
E07	Passenger's cab NTC-2 connection problem
E08	Passenger's cab NTC-3 connection problem
E09	Outer temperature NTC connection problem
E10	Air conditioner does not work
E11	Driver's cab pressure problem (A03)

- Error message is issued by blinking of electronic controller button lights for air guided flap motors and motorized valves. These buttons are shown below.

 Frontbox Valve	 Frontbox Fresh Air Motor	 Frontbox Flap Motor	 Main Valve Motor	 Passenger Fresh Air Motor(If its used.)
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- If there is a communication fail between Frontbox and CANBus, whole button below starts to blink. If there is a fault in the system, the dot of bottom right-hand corner of display blinks. If faults are resolved, this blink goes out. All error messages are issued via CANBus alternatively.

