



Introduction

About this document

The purpose of the document/function check

The purpose of this document is to give the reader information and instructions that will enable him/her to check the control system and the climate system components before the bus is delivered. This function control consists of a static test, and the intention is that this should be conducted in the workshop.

This document is also intended for use when troubleshooting, so that any faults can be localised in a systematic way.

In this static test checks are performed to ensure that the components can be controlled manually from the Viper 2000 and that there is a correct response when given commands are issued, for example to check that the polarity of the electrical installation is not reversed.

Limitations in the use of the document

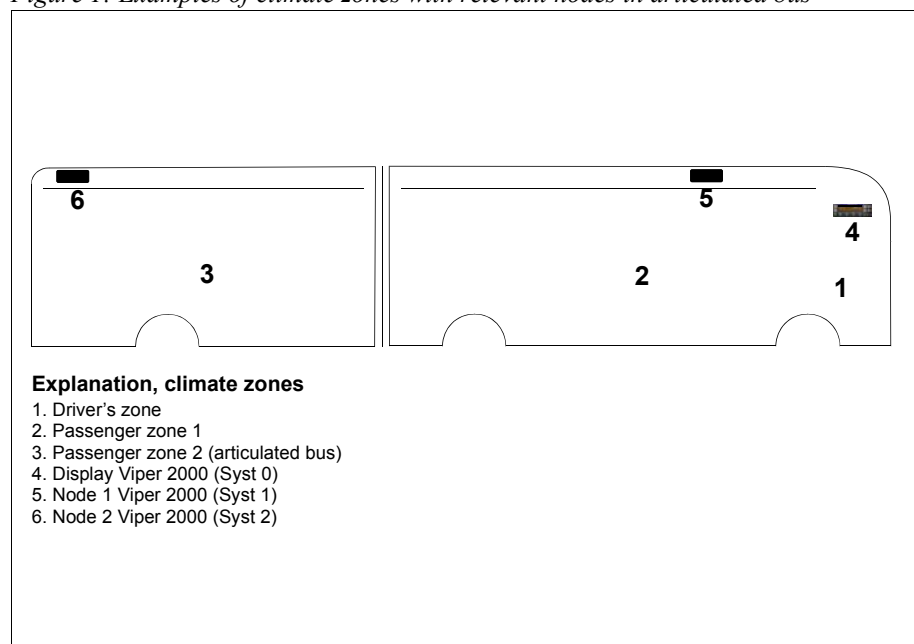
This document is only intended to test climate systems in which the Viper 2000 is installed and controls all climate components. The document describes the maximum scope, and of course there is no need to test components that are not included in the system in question.

Before you start testing

Climate zones

The bus is divided into two or more climate zones, and you have to be sure which zone you are testing at any given time. In a twin-axle bus there are usually two zones, a driver's seat zone and a passenger zone, which in the Viper 2000 are called "syst 0" and "syst 1" respectively. In articulated buses the rear carriage is often a separate zone, which is called "syst 2" in the Viper 2000. Syst 0 is controlled by the display unit, while the front and rear climate zones are controlled by their own nodes, see sketch below.

Figure 1: Examples of climate zones with relevant nodes in articulated bus



For basic information on how to use the Viper 2000, see user description, Prd0130.

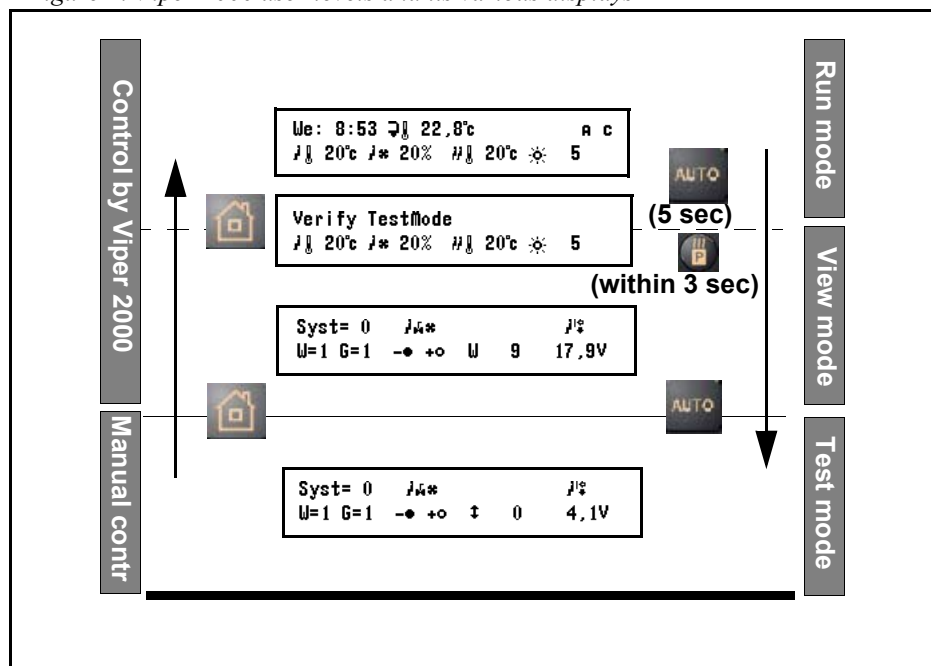
Run/View/Test mode

The first mode that appears when the Viper 2000 starts is run mode (default setting). In this mode the climate system is controlled by the Viper 2000, even though it is possible for the driver to control certain parameters manually.

If you want to see how the system regulates: how pumps are started and stopped, how valves open and close, go into view mode by pressing the “AUTO” button for approx. 5 seconds, and within 3 seconds press the parking button. Note that the Viper 2000 still regulates when in view mode. View mode is always used for a rolling test.

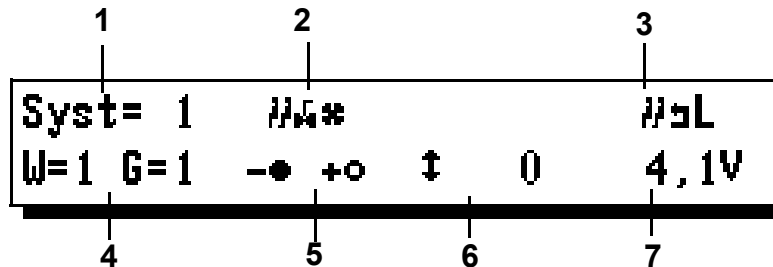
For the static test, however, we will go down one step in the system, and by pressing the “AUTO” button briefly once more we will move into test mode. In this mode automatic control is switched off and it is the tester who controls the individual components. When entering test mode, all components are set to its OFF position, i.e. pumps and fans are shut off, flaps are reset and valves are closed.

Figure 2: Viper 2000 user levels and its various displays



Test mode display overview

Figure 3: The fields of the test mode display



Explanation to the different fields:

1. Climate zone selected for check, i.e. driver's- or passenger zone
2. Component selected for function check
3. Component selected for feedback (value displayed in field 7)
4. Digital inputs (see explanation below)
5. Component status
6. Activation/deactivation (see explanation below)
7. Feedback value from component selected in field 3

Abbreviations

In the tables below the abbreviations used in field 4 (digital inputs) and 6 (activation/deactivation) are explained.

Explanation of field 4 (see above)












Abbr.	Digital inputs	Remark
D	Door signal	Open door=1, Closed door=0
H	High pressure AC	Normal position=1, High pressure=0
L	Low pressure AC	Normal position=1, Low pressure=0
O	Over temperature AC	Normal position=1, Over temperature=0
I	Ice detected AC	Normal position=1, Ice warning=0
W	Wake-up signal	0=no battery voltage i.e. no node communication 1=battery voltage i.e. node communication active
G	Generator voltage	0=no generator voltage i.e. no governing 1=generator voltage i.e. governing active

Explanation of field 6 (see above)












Component for activation/deactivation	Explanation of the alternatives
Flap floor/windscreen	0=windscreen, 100=floor
Flap fresh-/recirculated air	0=fresh air, 100=recirculated air
Valve, convector circuit	0=closed, 1=open
Valve, ventilation circuit	0=closed, 1=open
Fan speed/Condensor fan speed	0=OFF, 33=Speed 1, 66= Speed 2, 100= Speed 3
Recirculation blowers	0=OFF, 100=High speed
Clutch for compressor	0=OFF, 33-100=ON
Pump Viking system	0=closed, 33-100=open
Booster pump	0=OFF, 33-100=ON
Auxiliary heater	0=OFF, 33-100=ON

Symbol legend

Symbols, display node

Symbol	Explanation	Control	Feedback
	Flap floor/screen	X	X
	Flap fresh/recirculated air defroster	X	X
	Valve driver's convector	X	X
	Valve defroster circuit	X	X
	Defroster fan speed	X	
	Blowers, driver's place/stair	X	
	Condensor fan	X	
	Compressor	X	
	Blower, door/travel guide	X	
	Booster pump	X	
	Auxiliary heater	X	
	Defroster air temperature		X
	Driver's place temperature		X
	Outside temperature		X
	Battery voltage, driver's node (display)		X

Symbols, passenger compartment

Symbol	Explanation	Control	Feedback
	Flap fresh/recirculated air TSV right side	X	X
	Flap fresh/recirculated air TSV left side	X	X
	Valve, convector circuit	X	X
	Valve, TSV circuit	X	X
	Fan speed, TSV unit	X	
	Blowers, passenger compartment	X	
	Condensor fan	X	
	Compressor	X	
	Circulation pump, passenger circuit	X	
	Booster pump	X	
	Auxiliary heater	X	
	Temperature, roof duct		X
	Temperature, passenger compartment		X
	Water temperature		X
	Battery voltage, compartment node		X

Static test


The static test comprises first of all checking that the Viper 2000 is running and that there is communication to the nodes. There is then a check on each climate zone in turn, partly to ensure that the components respond to given commands, and partly to ensure that the feedback works as it should, for example control of the temperature transmitter.

Check that the Viper 2000 is ready for the test

1. Switch on the bus's main circuit breaker

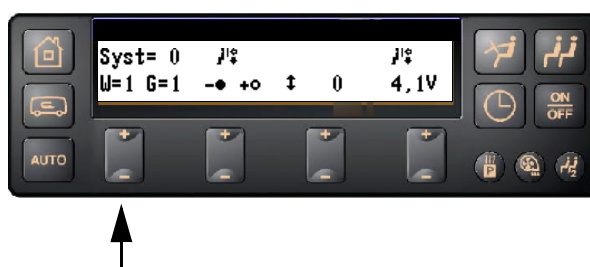
This means that a “wake-up” signal is sent to the Viper 2000 and communication to the nodes starts.

2. Press  for approx. 5 seconds

3. Immediately (within 3 sec) press the parking button 

You are now in view mode

4. Use the function key (see arrow) to move until you get to the display with “W” and “G”




W=1 means that there is a wake-up signal, If the wake-up signal (W=0) is not registered, check why the signal has not registered, check the fuse.

NOTE! Often, the wake-up signal is sufficient to test the climate system (activated by main switch), but if the components have their operation voltage at generator voltage only, you have to start the engine to test these components.

G=1 means that there is generator voltage (only valid in “syst 0”). If there is no generator voltage (G=0) check the cause of this.

Control of components, driver's place

Go to test mode, driver's place

1. Go from view mode to test mode by pressing 

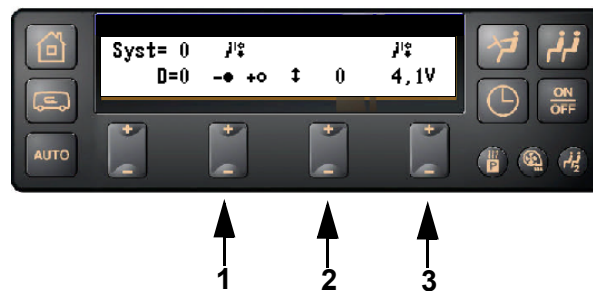
You are now in test mode and all components are set to OFF position

2. Press 

You can now check the components for the driver's place and Syst=0 is displayed in the window of the Viper 2000.

Control of floor/windscreen flap

1. Move using the function key (arrow 1) until the following display appears



2. Check the function of the flap

This is done by moving with the function key (arrow 2) and checking the flap's position in the bus. If reset is installed the flap can be set by moving it along, otherwise the only settings available are open or closed.

Explanation

0=Windscreen only

100=Floor only

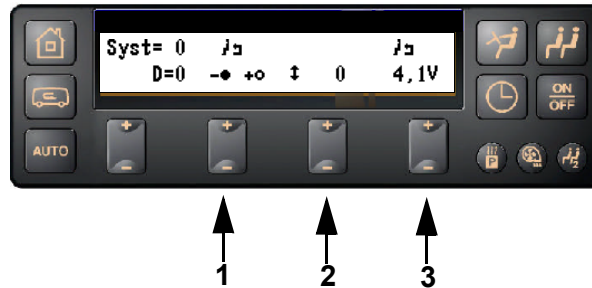
Tip! It is easier to check how the flap is working if you start the defroster fan.

3. Position feedback from flap motor

If you have a flap motor with position feedback, it is possible to check the feedback information. Just toggle with button (arrow nr 3) until you find the same symbol as the one at arrow 1. When the flap is moving towards 100%, the voltage shall increase.

Control of fresh air/recirculated air flap for defroster

1. Move using the function key (arrow 1) until the following display appears



2. Check the function of the flap

This is done by moving with the function key (arrow 2) and checking the flap's position in the bus. If reset is installed the flap can be set by moving it along, otherwise the only settings available are open or closed.

Explanation

0=Fresh air only

100=Recirculated air only

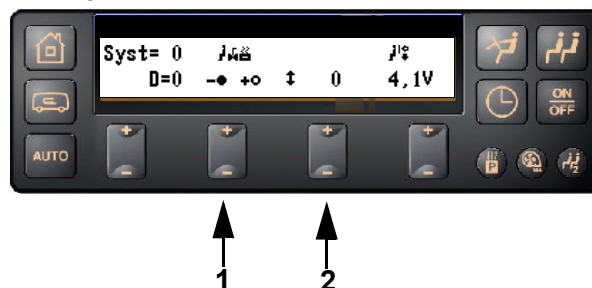
Tip! It is easier to check how the flap is working if you activate the defroster fan.

3. Position feedback from flap motor

If you have a flap motor with position feedback, it is possible to check the feedback information. Just toggle with button (arrow nr 3) until you find the same symbol as the one at arrow 1. When the flap is moving towards 100%, the voltage shall increase.

Control of valve, driver's circuit

1. Move using the function key (arrow 1) until the following display appears



2. Check the function of the valve

This is done by moving with the function key (arrow 2) and hearing/feeling that the valve is responding to the given commands.

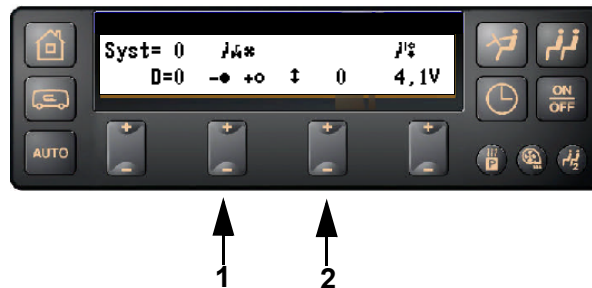
Explanation

0=closed

1=open

Control of valve, defroster circuit

1. Move using the function key (arrow 1) until the following display appears



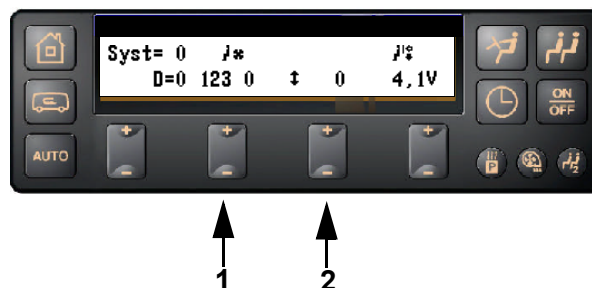
2. Check the function of the valve

This is done by moving with the function key (arrow 2) and hearing/feeling that the valve is responding to the given commands.

Explanation
0=closed
33-100=open

Control of defroster fan

1. Move using the function key (arrow 1) until the following display appears

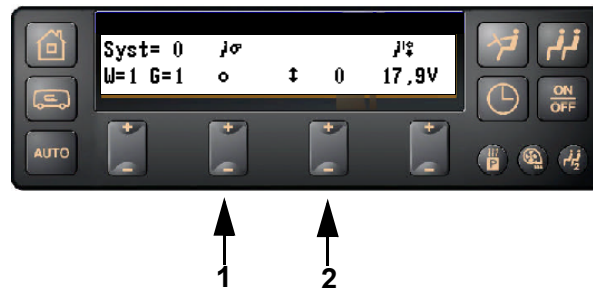


2. Check the function of the fan

This is done by moving with the function key (arrow 2). Start by setting the value to "0", which means that the fan is shut off, then move up to "33", "66" and "100", corresponding to ventilation speeds 1, 2 and 3. Check that the fan starts and the ventilation speeds are correct.

Control of recirculation blower (Whisper) driver

1. Move using the function key (arrow 1) until the following display appears

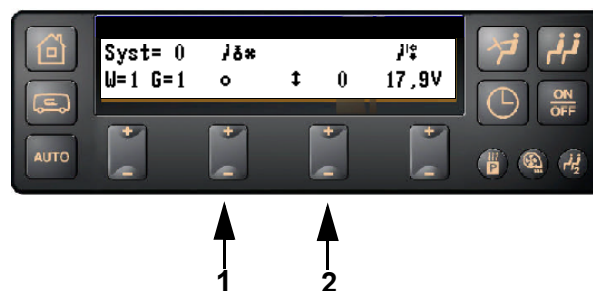


2. Check the function of the fan

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (OFF) and then change to 33-100 (ON), and check that the fan starts.

Control of condenser fan (Driver's place AC)

1. Move using the function key (arrow 1) until the following display appears

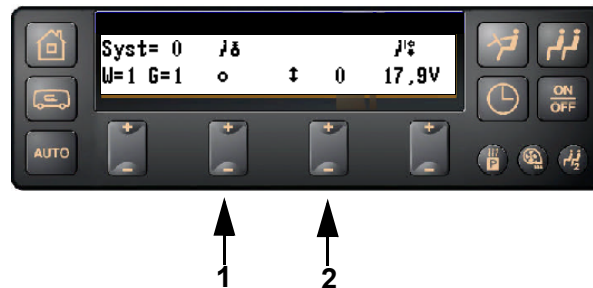


2. Check the function of the condenser fan

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (OFF) and then change to 33-100 (ON), and check that the fan starts.

Control of compressor clutch (Drivers place AC)

1. Move using the function key (arrow 1) until the following display appears

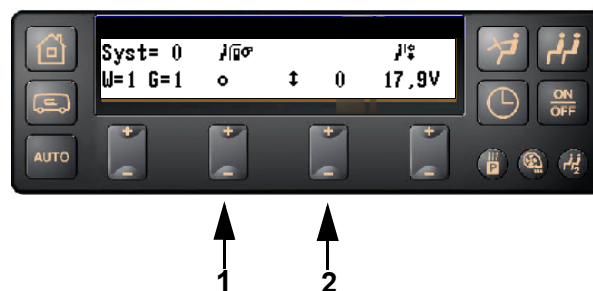


2. Check the function of the clutch

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (off) and then change to 33-100, and check that the clutch engages.

Control of recirculation blower (Whisper) at entrance door

1. Move using the function key (arrow 1) until the following display appears



2. Check the function of the fan

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (OFF) and then change to 33-100 (ON), and check that the fan starts.

Control of components, passenger circuit 1.

Go to test mode passenger circuit 1

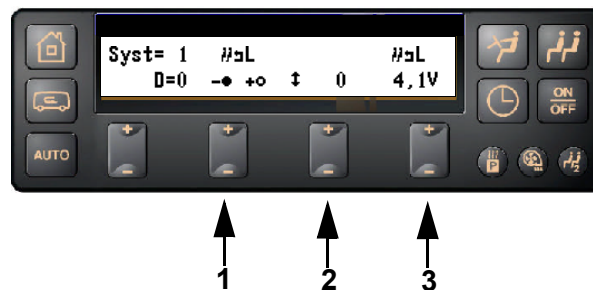
1. Remain in test mode

2. Press 

You can now check the components in the passenger zone and Syst=0 is displayed in the window of the Viper 2000.

Control of fresh air/recirculated air flap for TSV unit

1. Move using the function key (arrow 1) until the following display appears



2. Check the function of the flap

This is done by moving with the function key (arrow 2) and checking the flap's position in the bus. If reset is installed the flap can be set by moving it along, otherwise the only settings available are open or closed.

Explanation

0=Fresh air only

100=Recirculated air only

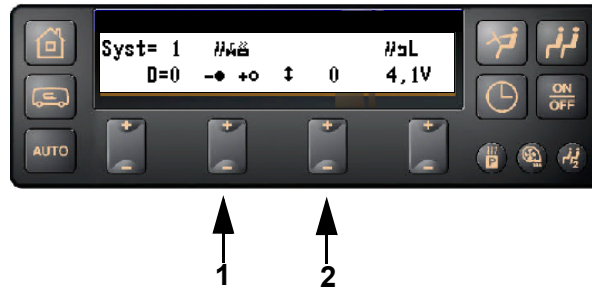
Tip! It is easier to check how the flap is working if you activate the TSV fan.

3. Position feedback from flap motor

If you have a flap motor with position feedback, it is possible to check the feedback information. Just toggle with button (arrow nr 3) until you find the same symbol as the one at arrow 1. When the flap is moving towards 100%, the voltage shall increase.

Control of valve, passenger circuit

1. Move using the function key (arrow 1) until the following display appears



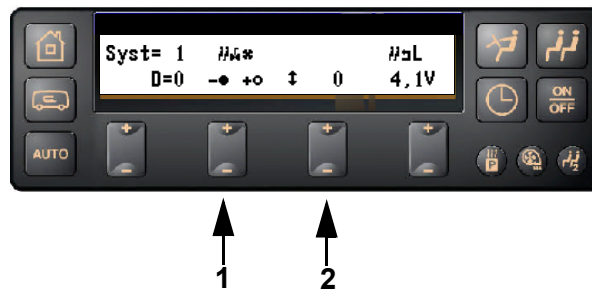
2. Check the function of the valve

This is done by moving with the function key (arrow 2) and hearing/feeling that the valve is responding to the given commands.

Explanation
0=closed
33-100=open

Control of valve, TSV circuit

1. Move using the function key (arrow 1) until the following display appears



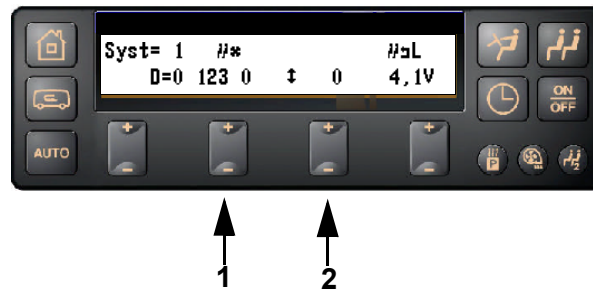
2. Check the function of the valve

This is done by moving with the function key (arrow 2) and hearing/feeling that the valve is responding to the given commands.

Explanation
0=closed
33-100=open

Control of fan, TSV unit

1. Move using the function key (arrow 1) until the following display appears

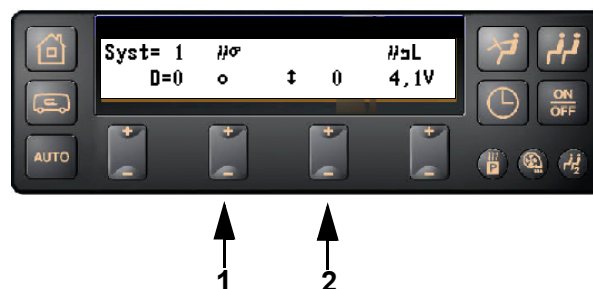


2. Check the function of the fan

This is done by moving with the function key (arrow 2). Start by setting the value to "0", which means that the fan is shut off, then move up to "33", "66" and "100", corresponding to ventilation speeds 1, 2 and 3. Check that the fan starts and the ventilation speeds are correct.

Control of Whisper recirculation blower

1. Move using the function key (arrow 1) until the following display appears

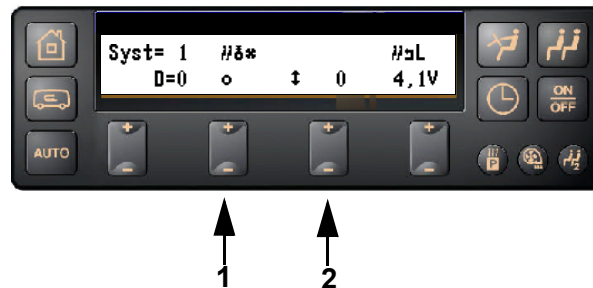


2. Check the function of the fan

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (OFF) and then change to 33-100 (ON), and check that the fan starts.

Control of condenser fan (AC)

1. Move using the function key (arrow 1) until the following display appears

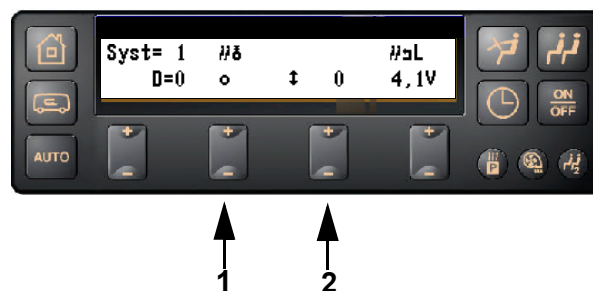


2. Check the function of the condenser fan

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (OFF) and then change to 33-100 (ON), and check that the fan starts.

Control of clutch (AC)

1. Move using the function key (arrow 1) until the following display appears

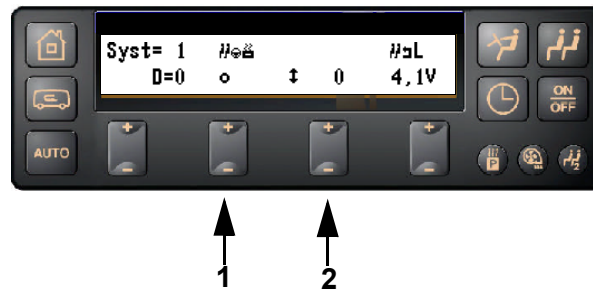


2. Check the function of the clutch

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (off) and then change to 33-100, and check that the clutch engages.

Control of circulation pump

1. Move using the function key (arrow 1) until the following display appears

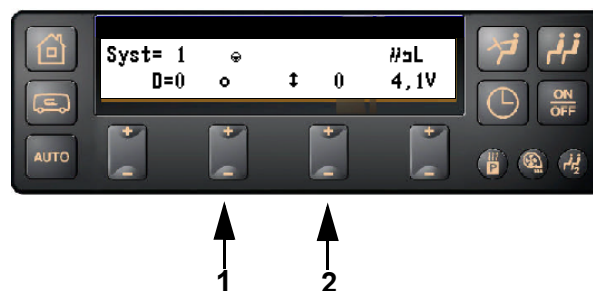


2. Check the function of the circulation pump

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (OFF) and then change to 33-100 (ON), and check that the pump starts.

Control of booster pump

1. Move using the function key (arrow 1) until the following display appears

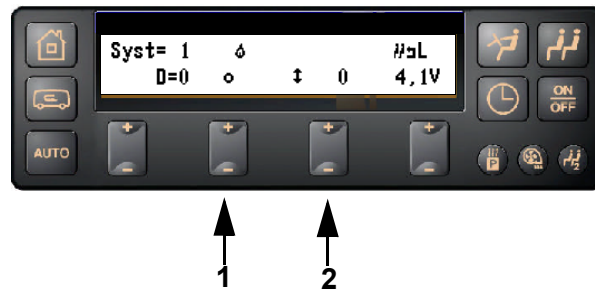


2. Check the function of the booster pump

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (OFF) and then change to 33-100 (ON), and check that the pump starts.

Control of auxiliary heater

1. Move using the function key (arrow 1) until the following display appears



2. Check the function of the auxiliary heater

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (OFF) and then change to 33-100 (ON), and check that the auxiliary heater starts.

Control of components, passenger circuit 2 (articulated bus).

Go to test mode passenger circuit 2

NOTE! Only applies to buses fitted with two nodes, for example articulated buses.

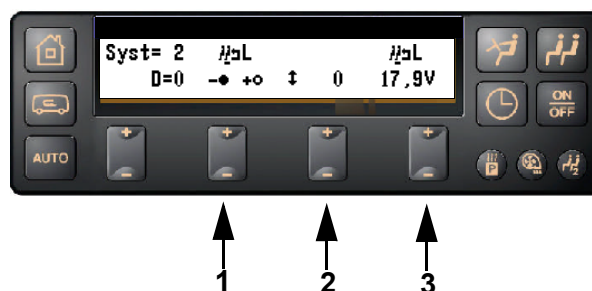
1. Remain in test mode

2. Press

You can now check the components in passenger zone 2 and Syst=2 is displayed in the window of the Viper 2000.

Control of fresh air/recirculated air flap for TSV unit, passenger circuit 2

1. Move using the function key (arrow 1) until the following display appears



2. Check the function of the flap

This is done by moving with the function key (arrow 2) and checking the flap's position in the bus. If reset is installed the flap can be set by moving it along, otherwise the only settings available are open or closed.

Explanation

0=Fresh air only

100=Recirculated air only

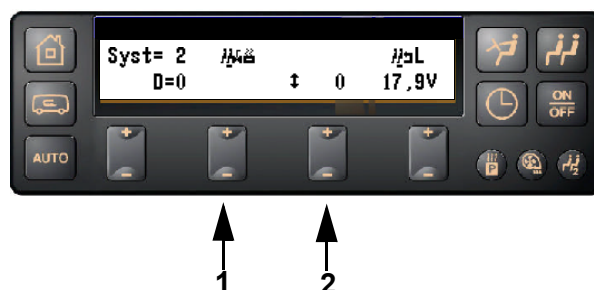
Tip! It is easier to check how the flap is working if you activate the TSV fan.

3. Position feedback from flap motor

If you have a flap motor with position feedback, it is possible to check the feedback information. Just toggle with button (arrow nr 3) until you find the same symbol as the one at arrow 1. When the flap is moving towards 100%, the voltage shall increase.

Control of valve, passenger circuit 2

1. Move using the function key (arrow 1) until the following display appears



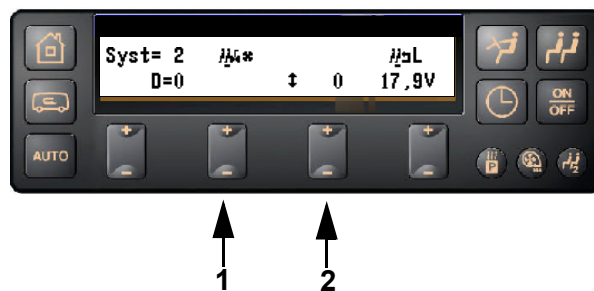
2. Check the function of the valve

This is done by moving with the function key (arrow 2) and hearing/feeling that the valve is responding to the given commands.

Explanation
0=closed
33-100=open

Control of valve, TSV circuit for passenger circuit 2

1. Move using the function key (arrow 1) until the following display appears



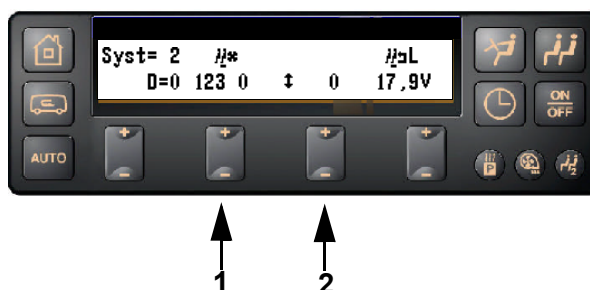
2. Check the function of the valve

This is done by moving with the function key (arrow 2) and hearing/feeling that the valve is responding to the given commands.

Explanation
0=closed
33-100=open

Control of fan, TSV unit, passenger circuit 2

1. Move using the function key (arrow 1) until the following display appears

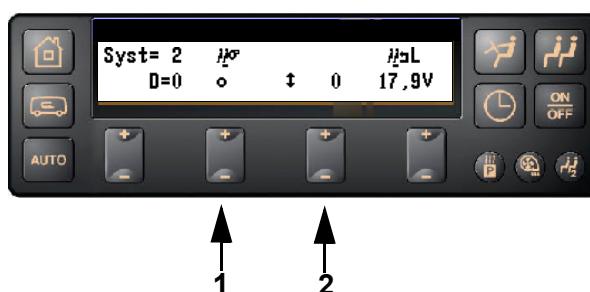


2. Check the function of the fan

This is done by moving with the function key (arrow 2). Start by setting the value to "0", which means that the fan is shut off, then move up to "33", "66" and "100", corresponding to ventilation speeds 1, 2 and 3. Check that the fan starts and the ventilation speeds are correct.

Control of recirculation blower (Whisper) pass. circuit 2

1. Move using the function key (arrow 1) until the following display appears

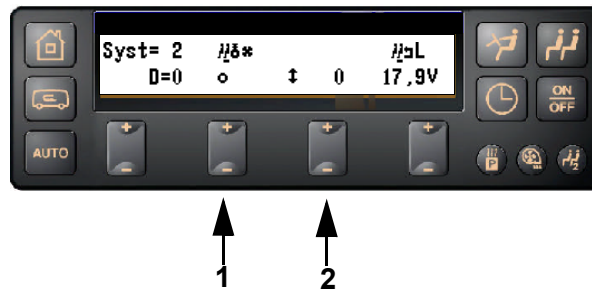


2. Check the function of the fan

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (OFF) and then change to 33-100 (ON), and check that the fan starts.

Control of condenser fan (AC)

1. Move using the function key (arrow 1) until the following display appears

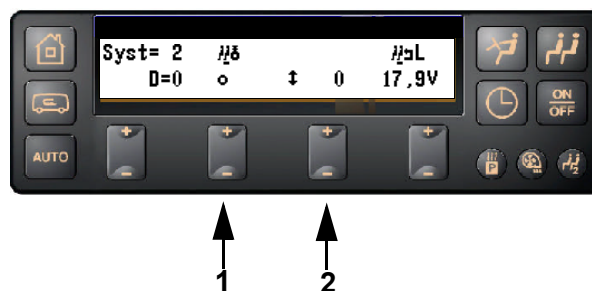


2. Check the function of the condenser fan

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (OFF) and then change to 33-100 (ON), and check that the fan starts.

Control of clutch (AC)

1. Move using the function key (arrow 1) until the following display appears

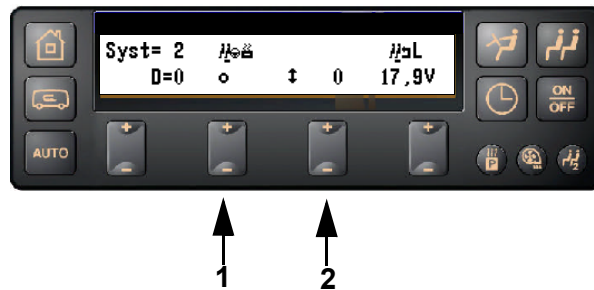


2. Check the function of the clutch

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (off) and then change to 33-100, and check that the clutch engages.

Control of circulation pump for passenger circuit 2

1. Move using the function key (arrow 1) until the following display appears



2. Check the function of the circulation pump

This is done by moving with the function key (arrow 2). Start by setting the value at 0 (OFF) and then change to 33-100 (ON), and check that the pump starts.


Control of analogue in signals

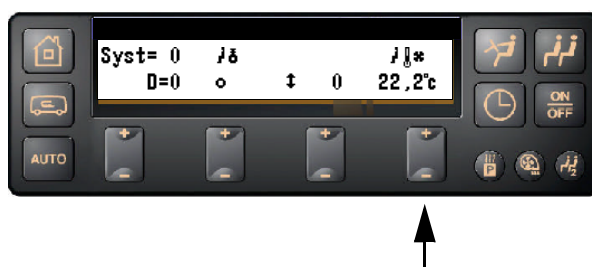
Analogue in signals can either be feedback from components as voltage or information from a transmitter, e.g. temperature.




General information about control of temperature transmitters

During the control of temperature transmitters, checks are performed to ensure that they are connected and functional. If this is the case a “reasonable” value appears; if the transmitter is not working or connected an error code appears, either NC (no connection) or SH (short-circuit). If any transmitter displays NC or SH you should check both the transmitter and the cables to the transmitter; for more information see troubleshooting sheet, transmitter.


Check temperature transmitter, driver’s seat

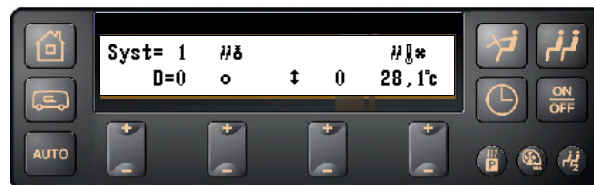
1. **Remain in test mode**
2. **Press** 
3. **Move using the function key (see arrow) to the correct transmitter according to the instructions below**




4. **Check transmitter value, defroster channel**
Move to  and read off the temperature
5. **Check transmitter value, driver’s seat**
Move to  and read off the temperature
6. **Check transmitter value, external temperature**
Move to  and read off the temperature

Check temperature transmitter, passenger circuit 1

1. Remain in test mode
2. Press 
3. Move using the function key (see arrow) to the correct transmitter according to the instructions below



4. Check transmitter value, air channel (after TSV)

Move to  and read off the temperature

NOTE! This transmitter is only installed if there is a separate TSV circuit.


5. Check transmitter value, compartment temperature

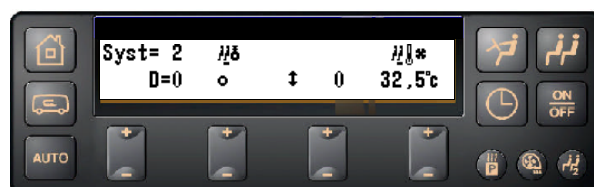
Move to  and read off the temperature

6. Check transmitter value, feed water temperature


Move to  and read off the temperature

Check temperature transmitter, passenger circuit 2


1. Remain in test mode
2. Press 
3. Move using the function key (see arrow) to the correct transmitter according to the instructions below



4. Check transmitter value, air channel (after TSV, zone 2)

Move to  and read off the temperature. NOTE! This transmitter is only installed if there is a separate TSV circuit.

5. Check transmitter value, compartment temperature, zone 2

Move to  and read off the temperature.