

The GECO logo is displayed in white text on a red rectangular background in the top right corner of the page.

**USER MANUAL FOR THE  
AUTONOMOUS CONTROL UNIT  
(A.C.U.)**

# **G-406-P11**

**TO CONTROL CENTRAL  
HEATING BOILERS  
FOR PELLETS**

Program version: 10

*You are politely requested for the familiarization with the manual prior to making the connection and activating any of our machines. Should you have any doubts, please do not hesitate to contact our firm between 8 a.m. and 16 p.m..*

*Note:*

*The most recent update release date is provided at the bottom of each following page. Please, always use the most recent version of the manual, which can be obtained by mail free of charge after the previous order.*

## TABLE OF CONTENTS

|           |  |           |
|-----------|--|-----------|
| <b>1.</b> | <b>GENERAL CHARACTERISTICS .....</b>                                       | <b>3</b>  |
| <b>2.</b> | <b>TECHNICAL DATA .....</b>  | <b>3</b>  |
| <b>3.</b> | <b>WIRING SYSTEM AND RULES OF CONNECTION .....</b>                         | <b>4</b>  |
| <b>4.</b> | <b>A.C.U. G-406-P11 OPERATION AND ADJUSTMENT METHODS .....</b>             | <b>4</b>  |
|           | TEMPERATURE MEASUREMENT .....  | 4         |
|           | EXCEEDING THE ALLOWABLE TEMPERATURE OF THE FUEL IN THE FEEDING SCREW ..... | 4         |
|           | POWER FAILURE .....  | 5         |
| <b>5.</b> | <b>TEMPERATURE LIMITER (STB).....</b>                                      | <b>5</b>  |
|           | OPERATION METHOD: .....  | 5         |
|           | STB FUNCTION MANUAL REACTIVATION .....                                     | 6         |
| <b>6.</b> | <b>G-406-P11 HANDLING .....</b>  | <b>6</b>  |
|           | STARTING THE UNIT.....   | 6         |
|           | MANUAL CONTROL.....  | 7         |
|           | FLAME IGNITION.....  | 8         |
|           | AUTOMATIC OPERATION.....   | 8         |
|           | SUSTAINING MODE OPERATION.....   | 9         |
|           | ALARM MODES .....  | 9         |
| <b>7.</b> | <b>USER PARAMETERS CONFIGURATION .....</b>                                 | <b>10</b> |
|           | THE PRESET TEMPERATURE OF THE BOILER OUTLET WATER ( "U0" ) .....           | 10        |
|           | TIME OF THE FUEL FEEDER OPERATION (U1) .....                               | 11        |
|           | TIME OF STOPPING THE FEEDING SCREW (U2) .....                              | 11        |
|           | SUSTAINING TIME (U3) .....   | 11        |
|           | DELAY IN FAN DEACTIVATION UNDER SUSTAINING MODE (U4).....                  | 11        |
|           | THE FAN OPERATION EFFICIENCY (U5).....                                     | 11        |
| <b>8.</b> | <b>METHOD OF CONNECTING THE EQUIPMENT TO THE CONTROLLER.....</b>           | <b>12</b> |
| <b>9.</b> | <b>TROUBLESHOOTING GUIDE .....</b>   | <b>13</b> |

## 1. GENERAL CHARACTERISTICS

The self-dependent controller, hereafter called G-406-P11, is a convenient, modern and easy-to-use equipment. It has been made in microprocessor based techniques, with the application of the automatic surface assembly.

Depending on the installation method, the two-part casing provides the possibility of installing the control panel operating under safe voltage practically everywhere, without the necessity of running power supply cables far away from the equipment controlled.

The G-406-P11 controller has been equipped with:

- temperature sensors
  1. for measuring the temperature of water leaving the boiler;
  2. for measuring the temperature of the fuel feeder
  3. flame optical sensor

The controller is equipped with 4 outputs allowing the direct connection of equipment operating under the voltage of 230 V, such as fan, fuel feeding unit, central heating system pump and flame ignition heater.

If the unit is to act as the central heating system boiler controller, the G-406-P11 stabilizes the temperature of water and controls the process of fuel combustion in the boiler, preventing damping a fire. The regulation parameters may be adjusted to current conditions of operation and kinds of the boiler. The boiler has been equipped with the system of protection from the power failure or several kinds of interference.

The controller does not require any maintenance, and the keyboard has been made from the special kind of a film resistant to high-level temperatures and the majority of chemicals. The keyboard, however, must not be cleaned with sharp edge objects. Instead, a humid cloth should be used for cleaning the front panel.

In summertime, the controller should be kept connected to the power supply system, however, it should be disconnected from the power for the period of storms.

## 2. TECHNICAL DATA


|                   |   |  |
|-------------------|---|--|
| Operating voltage | — | 230V +10% -15%                         |
| Temperature       | — | From +5 °C to + 40 °C                  |
| Relative humidity | — | From 20% to 80%                        |
| Protection degree | — | IP65 on the front of the control panel |

| Output               | Maximum constant carrying capacity |      |     |
|----------------------|------------------------------------|------|-----|
| P1 – Electric heater | 4A                                 | 750W | 1HP |
| P2 – C.H. pump       | 4A                                 | 750W | 1HP |
| O – Container Feeder | 4A                                 | 750W | 1HP |
| W - Fan              | 3A                                 | 600W | 1HP |

### Important:

**The total current consumed by the equipment must not exceed 10A !!!**

### 3. WIRING SYSTEM AND RULES OF CONNECTION

1. The boiler house should be equipped with the 230V/50Hz wiring system, in accordance with applicable regulations.
2. Irrespective of the wiring system kind, the plug-in sockets should be equipped with the protective terminal. **The application of the socket without the protective terminal connected is a shock hazard!**
3. The controller should be connected to the separate power supply line, protected by means of the 2-4A rapid fuse and the residual current circuit breaker, with activation current 20 mA maximum. **The connection of any other equipment to this line is not allowed!**
4. The clamp conductor joints used are certified for continuous load of 16 A. As the fine thread and special metal sheets preventing conductors cutting have been applied, a perfect contact is achieved with slight screwing of the conductor. Applying larger force may lead to breaking the thread.
5. The power supply cables must be firmly attached along their entire length and should not catch the water coat or the outlet to the chimney.
6. Following the connection of the unit to the power supply, the unit may be energized irrespective of switching on or off by means of the  pushbutton, *therefore any repairs may be performed only when the voltage is disconnected from the fuse!*

### 4. A.C.U. G-406-P11 OPERATION AND ADJUSTMENT METHODS

#### Temperature measurement

The controller measures the temperature within the range of 0 degree Centigrade to 100 degree Centigrade. The temperature is displayed with the delay of one second. Where the malfunction occurs to the temperature sensor, or temperature value is found beyond the above-mentioned range and the equipment is not found in the mode of 60 second-waiting for power supply voltage stabilization following power failure, the controller reports the malfunction to the sensor. This causes both the deactivation of all activated equipment, i.e. fan, electric heater, feeding screw and pump, and switching to the manual operation mode, the following symbols being then displayed:

AL1 symbol, if the flow water temperature sensor has got broken,

AL2 symbol, if the feeding screw temperature sensor has got broken,

AL3 symbol, if the lack of fuel in the feeding screw has occurred,

The occurrence of the temperature exactly equal to 100 degrees Celsius will cause the display to show 00°.

#### Exceeding the allowable temperature of the fuel in the feeding screw

The controller has been equipped with the sensor reporting that the allowable temperature of fuel in the feeding screw has been exceeded. The controller operates owing to the measurement of the feeding screw pipe temperature. If the temperature in question reaches the level of 95 degrees Centigrade, the controller reports the AL6 alarm, deactivating the fan and activating the continuous operation of the feeding screw for the period of 20 minutes so that the burning fuel may be removed from the feeder and the furnace may be put down.

### **Power failure**

Following power failure, the controller will start operations depending on its status prior to the occurrence of the power failure. The controller will wait for the period of one minute so that the electric grid can stabilize, after which the operation with the previously programmed values of parameters will be resumed.

## **5. TEMPERATURE LIMITER (STB)**

The G-406-P11 controller has been equipped with additional mechanical protection, independent of automatics, called the safety temperature limiter (STB).

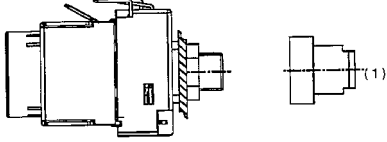
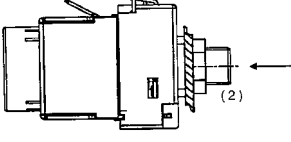
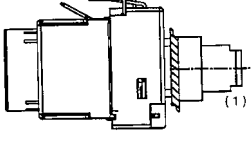
### **Operation method:**

Where the heating water has obtained the temperature of **95°C**, the temperature limiter will be triggered automatically (the STB function will be activated), the fan disconnected and the **AL 5** alarm displayed on the display.

When the temperature at the limiter drops down by some **20°C**, the STB function may be manually reactivated.

## STB function manual reactivation

When the STB temperature limiter has been triggered and fan deactivated, its operation must unconditionally be restored in order to ensure the proper functioning of the G-406-P11 controller. In order for the unit to be reactivated, proceed as follows:

|   |  |   |
|---|--|---|
| 1. Unscrew the black protective nut (1).  | 2. Press RESET pushbutton (2) to unblock.  | 3. Apply and secure protective nut (1).   |
|  |  |  |



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**Damage or breaking to the capillary tube means the leaks of the temperature limiter filled with liquid, which leads to the G-406-P11 misperformance.**

**Should such fault be found, the temperature limiter should be disconnected from the G-406-P11 controller, dismantled and replaced with the brand new one.**

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## 6. G-406-P11 HANDLING

### Starting the unit

1. Connect the unit to the power supply network (insert the plug to the plug-in socket).


The display will show four horizontal dashes. All functions, in particular, the equipment controlling the boiler operation, i.e. pump, fan and feeding screw, are deactivated.

The unit will ignore pressing all pushbuttons except for the  pushbutton.



2. Turn the controller on by pressing the  pushbutton.

When this pushbutton is pressed, the controller enters the status of manual controlling of the central heating system boiler and reads the most recent user-defined settings of the boiler operation parameters (see item 6).


## Manual control

Following pressing the  pushbutton, the controller enters the manual mode of central heating system boiler control. All equipment connected to the controller is deactivated, and the display shows the central heating system boiler water temperature, measured by means of the sensor. This mode allows activating the following equipment, notably:


1. Fuel feeding screw.

Pressing the  pushbutton causes the activation of the feeding screw connected to the controller, as well as the illumination of the **bottom** control diode found on the  pushbutton. When the pushbutton is pressed again, the feeding screw is deactivated and the control diode goes off.


2. The fan.





When the  pushbutton is pressed, the fan connected to the controller is activated, and the corresponding top control diode goes on. When the pushbutton is pressed again, the fan is deactivated and the control diode goes off.

In this operation mode, the feeding screw and the fan may be activated and deactivated irrespective of one another.

Pressing the  pushbutton causes the controller to abandon the automatic operation mode (heating and sustaining) and to enter the manual operation mode, involving the immediate stop of the operation of the fan, feeding screw and pump.



## Flame ignition

Following pressing the  pushbutton, the controller enters the flame ignition mode.



1. This operation mode is signaled by two blinking diodes on the button .
2. The flame ignition mode is based on control over the pellets screw feeder from the fuel tank, the fan and the electric heater in the way to turn into automatic operation mode without additional service.
3. During this mode the controller additionally indicates turning on the fuel feeder and/or the fan by the illumination of corresponding diodes on the  button, and the electric heater operation by the illumination of the bottom part of the fourth digit display.
4. The fan operates constantly during the flame ignition mode.
5. The ignition cycle starts from fuel supply into the burner, after that the feeder is stopped and the heater is turned on for the time set in service parameter, and after that we wait for the boiler response.
6. The ignition cycle is repeated three times ( on the beginning of the third cycle the fuel supply is omitted ) and if there is no flame the controller will signal the lack of fuel and show the alarm sign „AL3”.
7. **If the flame sensor recognizes the flame during the ignition mode the flame ignition is finished and the controller turns into the automatic mode of operation.**
8. **If the flame sensor recognizes lack of flame during the automatic mode of operation, the controller will again turn into the flame ignition mode.**
9. The display will show the temperature of water measured. When the  pushbutton is pressed, all the equipment is deactivated and the manual operation mode resumed.
10. When the  pushbutton is pressed, the controller enters the programming mode which does not affect the automatic operation mode.

## Automatic operation


After the fire starting phase is finished successfully, the controller enters the automatic operation mode.

1. This operation mode is signalled through the **bottom** control diode going on the button . The automatic operation in false controlling the fuel feeding screw and fan so that the temperature of the water in the boiler is maintained at the level preset by the user.
2. In this operation mode, the controller will additionally show whether the feeding screw and/or fan is activated through the activation of the corresponding control diodes arranged on the  pushbutton.




3. When the automatic operation mode is activated, the controller will start the central heating system circulation pump, if the boiler water temperature is more or equal to the factory set value (40°C). Also the pump operation control diode (the vertical dash on the left hand side of the display) goes on.
4. The controller will stop the pump if the temperature of water drops to the temperature of pump activation minus 4 degrees Centigrade.
5. When the feeding screw stop time set has elapsed, the controller causes the feeding screw to start operation for the preset loading time, after which the feeding screw is deactivated, etc. (the cycle is repeated).
6. The screw feeder in the burner operates constantly.
7. The display will show the temperature of water measured. When the  pushbutton is pressed, all the equipment is deactivated and the manual operation mode resumed.
8. When the  pushbutton is pressed, the controller enters the programming mode which does not affect the automatic operation mode.


### Sustaining mode operation

This state is signalled by the bottom and top control diode on the  pushbutton.


In this state the pump is working in the same way as in the automatic mode.

After the sustaining time has elapsed (“u3” user parameter), the controller will start the feeding screw and the fan for the factory set time. The fan will operate correspondingly longer (“u4” parameter) than the feeding screw so that the added fuel can start burning.

When the  pushbutton is pressed, the programming mode is entered, similarly to the automatic operation mode.

When the  pushbutton is pressed, all the equipment is deactivated and the manual control operation mode is resumed.

### Alarm modes





Five alarm modes are recognized by the controller. Except for AL4, the number of alarm will be shown, as well as the acoustic alarm output will be activated for the period of two seconds. Then this output will be deactivated for the period of two seconds, to be activated again, etc.. Except for the AL4, the abandonment of the alarm modes is possible only when the  pushbutton is pressed.

Kinds of alarms:

- AL1 → Damage to the boiler outlet water temperature sensor;
- AL2 → Damage to the feeding screw temperature sensor;
- AL3 → Lack of fuel in the feeding screw or ignition failure.
- AL4 → The outlet water has reached the temperature exceeding 85 degrees Centigrade;
- AL6 → The maximum temperature in the feeding screw has been exceeded or the feeding screw temperature sensor has broken down.




Where the AL4 alarm has occurred, the temperature measured and the alarm message (AL4 text) is displayed alternately. If the controller detected the alarm in the course of manual operation mode, the central heating system circulation pump will be activated. This alarm will automatically go off when the temperature in the boiler drops below 85 degrees Centigrade.

## 7. USER PARAMETERS CONFIGURATION


When the  pushbutton is pressed, the controller will enter the programming mode which will be signalled by the activation of the control diode on the  pushbutton. The programming does not affect the current operation of the controller. While in the programming mode, the controller cannot change between the manual and automatic operation modes (the controller does not response to pressing the  and  pushbuttons).

### The preset temperature of the boiler outlet water ( "u0" )

The following procedure allows to change the preset {  $T^{zad}$  } temperature of the boiler outlet water:


1. Press the  pushbutton.  
The illumination of the diode on the pushbutton signals commencing the temperature setting. The display shows the temperature set to date.
2. Set the desired temperature by means of the  pushbutton (down) and  (up).




The allowable range of changes is programmed by the boiler manufacturer. When this level of temperature is reached, the controller will enter from the automatic operation mode to the sustaining mode.

3. Press the  pushbutton again so that the new level of temperature is stored.

At the same time, the controller will enter the programming mode of the subsequent u1 parameter.





### Comments:

- if the  pushbutton is not pressed again, the changes will be discarded;


- if, in the course of setting the new temperature, any of the , , , is not pressed for the period of 20 seconds, the new temperature will not be stored and the controller will abandon the programming mode.

### Time of the fuel feeder operation (u1)

This parameter shows the time for which the feeding screw will be activated in the automatic operation mode. The value of these parameters may be modified in the same way as is the case for the u0 parameter.

1. Press the  pushbutton. The controller will display the u0 parameter value.
2. Press the  pushbutton again. The controller will store the value of the u0 parameter and will switch to u1.
3. Set of the desired value by means of the  pushbutton (down) and  (up).

The allowable range of changes of the parameter is between 2 seconds and 250 seconds.

4. Press the  pushbutton again so that the new value is stored.

At the same time the controller will switch to programming the subsequent u2 parameter.

### Time of stopping the feeding screw (u2)

This parameter shows the time between the subsequent supplies of the fuel to the boiler in the automatic operation mode. The range of changes is between 2 seconds and 250 seconds. The parameter in question may be modified in the same way as shown in item 6.1 and 6.2.

### Sustaining time (u3)


This parameter will show the time after elapsing of which the controller will activate the feeding screw and fan for the factory preset time (c2 servicing parameter), in the sustaining time, so as to prevent the furnace from putting down. The range of changes is between 5 minutes and 250 minutes. The parameter in question may be modified in the same way as shown in item 6.1 and 6.2.

### Delay in fan deactivation under sustaining mode (u4)

This delay is aimed at allowing the added fuel to burn in the sustaining mode. The range of changes is between 5 seconds and 250 seconds. The parameter in question may be modified in the same way as shown in item 6.1 and 6.2.

### The fan operation efficiency (u5)

**The fan operation efficiency is adjusted depending on the quality of the fuel and the heat removed. The range of changes is between 1 and 10 which corresponds to 10% and 100%. The parameter in question may be modified in the same way as shown in item 6.1 and 6.2.**

The subsequent pressing of the  pushbutton will cause the return to the mode from which the programming mode was called for, as well as the deactivation of the programming control diode.

### 8. METHOD OF CONNECTING THE EQUIPMENT TO THE CONTROLLER.

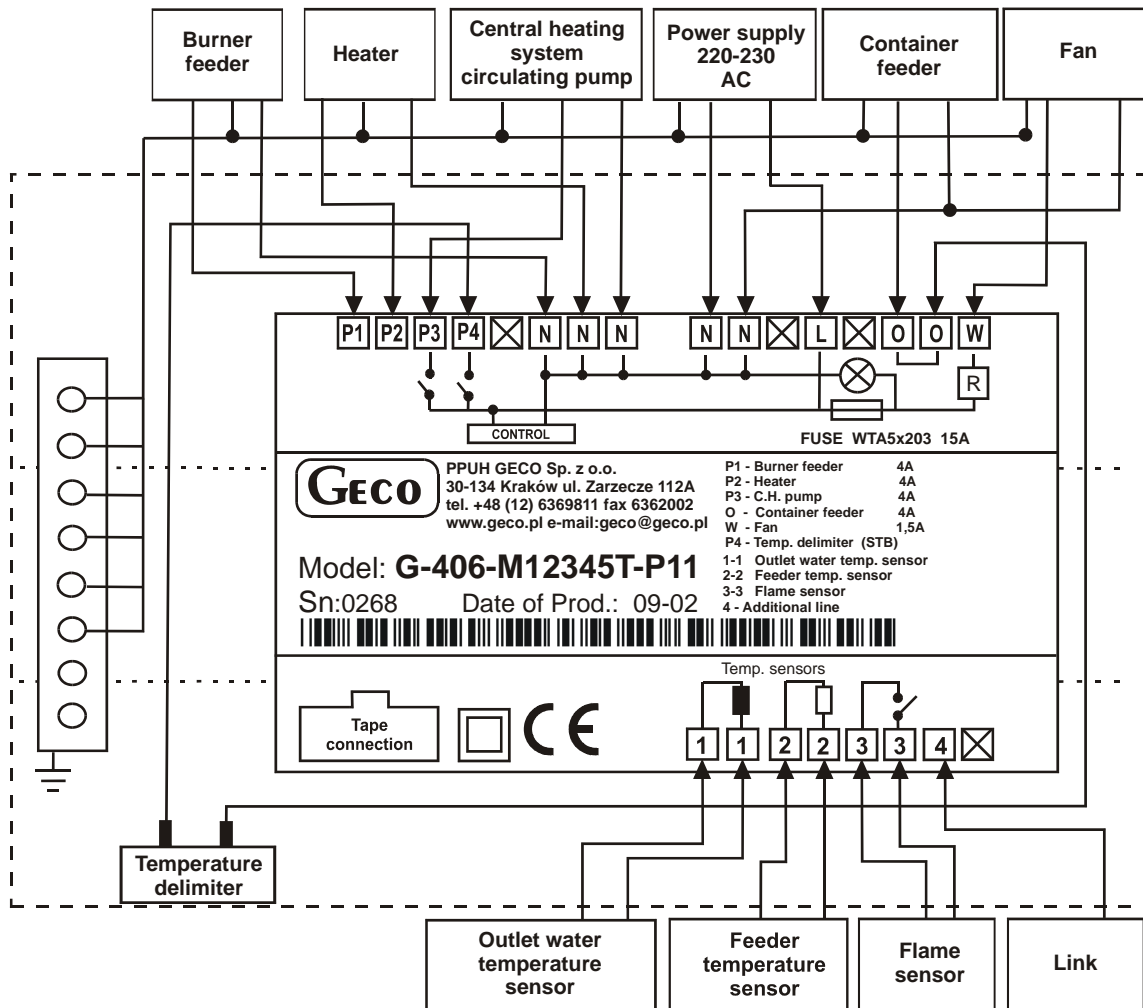


Figure 1. Diagram of equipment connection to the G-406-P11 controller

## 9. TROUBLESHOOTING GUIDE

| Symptoms  | Remedy methods   |
|---|--|
| 1. The display remains dim, but the controller is connected to the mains.                                     | Check: <ul style="list-style-type: none"> <li>• whether the 230 V voltage is present on the terminals L and N</li> <li>• the correctness of the connection of the actuating module with the control panel</li> <li>• remove and apply again the data transfer tape sockets</li> <li>• connect another data transfer tape</li> </ul>  |
| 2. The feeding screw does not start in spite of the fact that its activation is signalled by the green diode. | Check: <ul style="list-style-type: none"> <li>• whether the 230V voltage is present on the terminals in accordance with the description provided on the upper wall of the actuating module</li> <li>• feeding screw operability</li> <li>• the correctness of the connection of the actuating module with the control panel</li> <li>• connect another data transfer tape</li> </ul>   |
| 3. The fan does not start in spite of the fact that its activation is signalled by the green diode.           | Check: <ul style="list-style-type: none"> <li>• whether the 230V voltage is present on the terminals in accordance with the description provided on the upper wall of the actuating module</li> <li>• fan operability</li> <li>• the correctness of the connection of the actuating module with the control panel</li> <li>• connect another data transfer tape</li> </ul>   |
| 4. The pump does not start in spite of the fact that its activation is signalled by the red diode.            | Check: <ul style="list-style-type: none"> <li>• whether the 230V voltage is present on the terminals in accordance with the description provided on the upper wall of the actuating module</li> <li>• pump operability</li> <li>• the correctness of the connection of the actuating module with the control panel</li> <li>• connect another data transfer tape</li> </ul>  |
| 5. Erroneous temperature indications  | Check: <ul style="list-style-type: none"> <li>• the connection of the sensors to the connector</li> <li>• the correctness of the sensor fastening</li> <li>• sensor cable condition; <b>no</b> damages to the cable are allowed</li> <li>• carefully the appearance of the external surface of the sensor shell, i.e. check for mechanical injuries</li> <li>• connect another data transfer tape</li> </ul>   |
| 6. Controller "abnormal" or "strange" operation   | Check: <ul style="list-style-type: none"> <li>• whether the 230 V voltage is present on the terminals L and N</li> <li>• the condition of feeding connectors</li> <li>• the condition of wiring system and the number of equipment connected to one phase</li> <li>• whether the control panel, actuating module or tapes plugs have not been exposed to water or other liquid</li> <li>• whether the control panel, actuating module or tapes plugs are not exposed to moisture or sudden temperature fluctuations</li> <li>• the correctness of the connection of the actuating module with the control panel</li> <li>• connect another data transfer tape</li> </ul> |
| 7. Display is blinking, and cannot be turned on   | Check <ul style="list-style-type: none"> <li>• the value of the power supply voltage</li> <li>• condition of the feeding connectors</li> <li>• the condition of feeding connectors screwing in</li> <li>• the correctness of the connection of the actuating module with the control panel</li> <li>• connect another data transfer tape.</li> </ul>   |

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