

Instruction Manual for the Microprocessor Terminal

DAT-120

Version: V1.04

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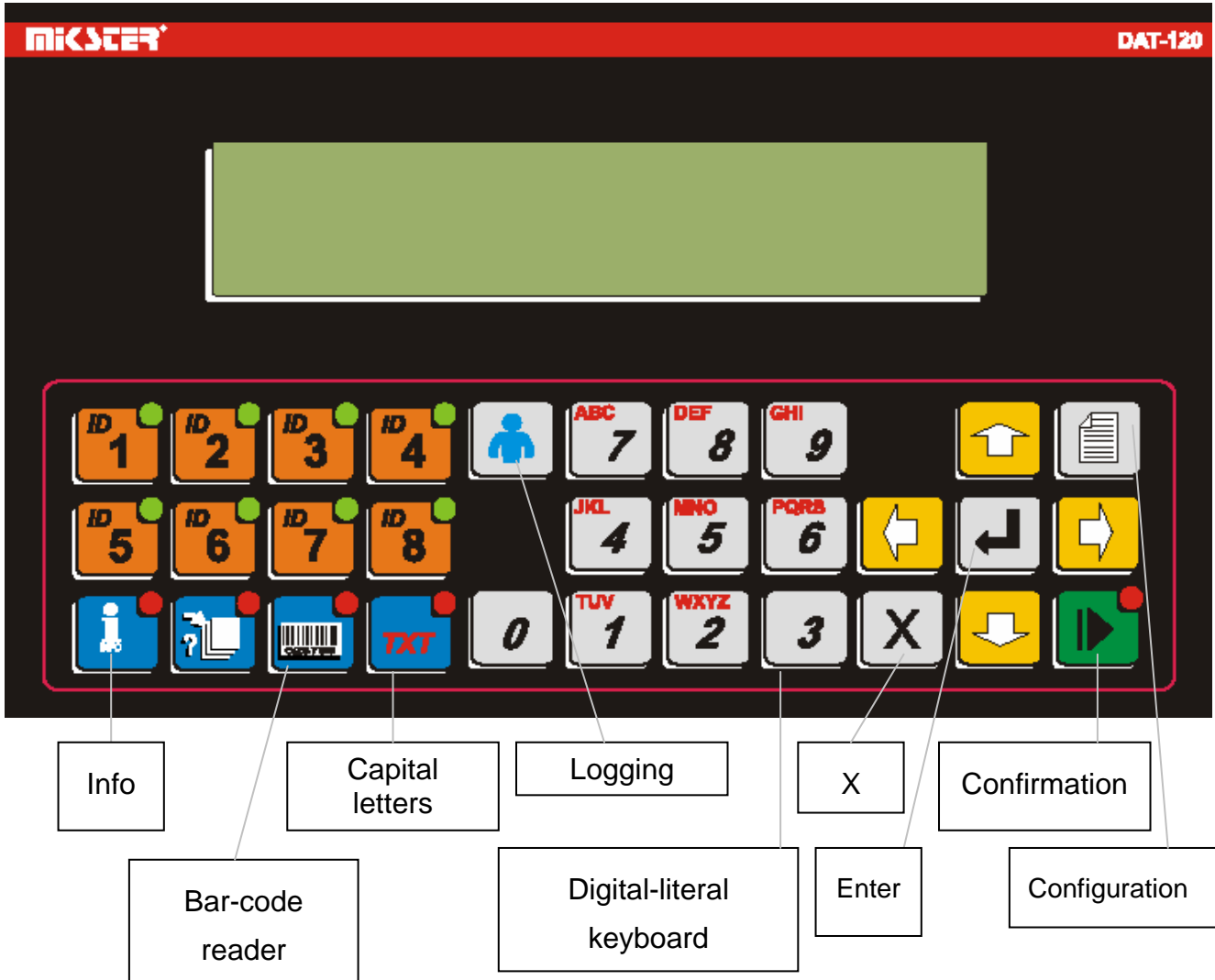
1. **DESTINATION**

Microprocessor terminal DAT 120 is the device operating in parallel to the controller of the smoke-house. Its task is the registration of parameters of the smoking process, such as: chamber temperature, meat-bar temperature and relative humidity. In addition, it registers the parameters, which identify the given process, such as:

- Operator
- Up to 8 different identifiers (ID – e.g.. product code, trolley number), which are introduced before the beginning of the process. (For each identifier 8 different identifying parameters can be ascribed). Identifiers are characterized by:
 - Identifiers as digital codes,
 - Code length established individually for each ID (from 1 to 16 digits),
 - Possibility of ascribing text descriptions to codes (for ID1 – possibility of ascribing description to 1000 codes, for ID2..ID8 – possibility of ascribing descriptions to 100 codes – for each ID separately),
 - Ascribing the descriptions is possible from the Personal Computer (PC) only,
- Date and time of beginning of the process,
- Digital inputs mode.

2. CONTROL DESKTOP DAT 120

All operations concerning the terminal are being done from the control desktop. It consists of the display and the keyboard.



All information concerning the mode of operation of DAT 120 are shown in the LCD display and signalled by control lamps.

3. ACCESS CODE

The access code is introduced in order to protect the data stored in DAT 120 from unauthorized persons. When we want to introduce changes in the system configuration we have to enter the access code.

Digits of the access code are established by the smoke-chamber service and should be given to the user. At the beginning the access code is: **002010**

4. BEGINNING OF WORK OF DAT 120

When the power supply is ON the display shows the name of the device and the software version. These words disappear after several seconds and the screen of the basic operation mode is displayed.

The following functions can be activated in this mode:

- Operator logging in, or logging out – in the case when the operator was logged in,
- Identification data entry (ID),
- Display of information concerning the entered identification data (ID),
- Controller configuration setup.

All those information can be called when the registration is not being done. During the registration it is only possible to perform:

- Operator logging out,
- Display information concerning the entered identification data.

4.1. Logging in

The identification of a person operating the terminal DAT 120 is the aim of the operator logging in function. Data concerning up to 100 operators can be entered into the terminal. The operator's data contain: identification number (ID), PIN and description and the code (optional – when the bar-code reader is used). The information can be entered into the memory of the controller DAT 120 either manually from the desktop or remotely by the PC with adequate software.

The logging in procedure should be performed as follows:

- Press the „Logging” key,
- When the logging menu appears the operator's ID number should be entered, which causes the appearance of the operator's description.
- Then the PIN of the operator should be entered.
- All this data should be confirmed by „Enter”.

- If the bar-code reader is used then after pressing the „Logging” key - instead of manual data entering we use the reader – we scan the operator’s bar-code, which - depending on the configuration - causes the following:
 - a) The ID number of operator, description and PIN (as stars) will be displayed. Data should be confirmed by pressing the „Enter” key.
 - b) If the operator of the entered code will be found in the operators’ base he will be auto logged without the necessity of pressing the „Enter” key.

The logging procedure can end with one of the two results:

- If the identifying number (ID) and PIN are correctly entered, the operator will be logged in, which will cause the display of the basic mode of operation with the information concerning the logged in operator.
- If the identifying number (ID), or PIN were wrongly entered, the screen will display information on logging in error, the operator will not be logged in and the logging procedure must be repeated from the beginning.

4.1.1. Entering Data of the New Operator

As it was already mentioned, there is a possibility of entering data of the new operator, or changing the data of already existing – with the use of the control desktop. Introduction of the new operator should be done in the following way:

- Press the „Logging” key,
- When the logging menu appears the „Configuration” key should be pressed,
- When the question about the access code appears the code should be entered and the „Enter” key pressed,
- Then the menu of entering data of the new operator will be displayed, in which:
 - a) ID number, which we would like to give to the operator should be entered (from 0 do 99),
 - b) Then PIN (4 digits) for the operator of the above given ID should be entered,
 - c) Then the operator’s description should be entered (up to 16 characters¹) e.g. name and surname,
 - d) If the bar-code reader is used and we would like to perform logging by it, then before confirming the data the operator’s code should be scanned. This code will appear in the line near the operator’s ID – as 16 digits.
 - e) The last step is the data confirmation by pressing the „Enter” key. The device stores the entered data and moves to the ID line and is ready for the data of the next operator. If we would like to enter data of the new operator we have to repeat points

¹ Additional information concerning the keyboard:

- Pressing 0 key we can get additional symbols: "space", "_", "@", "quotation-marks"
- Pressing 3 we can additionally obtain symbols: "dot", "coma", "&", "apostrophe"

a-d, while when there is no need of introducing the next operator we should press „X” – to move to the basic operation mode.

4.2. Logging out

When the operator ends work he should log out by pressing the „Logging” key. As a result near the word ‘Operator’ on the basic screen should appear words: „Logged out”.

4.3. ID Entry

All operations connected with the ID entry should be done before starting the process!

To identify the production process the terminal has the possibility of registration up to 8 different identifiers – described as IDs (e.g. ID1- product name, ID2- quantity of trolleys, ID3- batch code). We can give the name to each ID – how it should be done will be explained later. Introduction of the name is very important since on this base the terminal states, which identifiers should be entered before the smoking process will start – it is signalled by blinking lamps, near the keys of individual IDs. For one identifier (ID), during one smoking process can be stored up to 8 identifying parameters. For such ID as in the example given above it can be presented in the Table:

Position	ID1– Product name	ID2- Quantity of trolleys	ID3-Batch code
1	Silesian sausage	2	201004
2	Silesian sausage “long”	1	201006
3	Silesian sausage „special”	2	201005
4	Grill sausage	1	201003
5	Bonfire sausage	1	201015
6	Camp-fire sausage	1	201011
7	Regular sausage	1	201026
8	Regular sausage “discs”	1	201018

Of course, not all positions must be filled; the number of utilised positions depends on the quantity and variety of products undergoing the same process. E.g. let’s assume that 8 trolleys with products enter the smoke-house: thus,

- If on all trolleys will be e.g. „ Krakowska sausage” – we will use only one position in each ID.

Position	ID1-Product name	ID2-Quantity of trolleys	ID3-Batch code
1	Krakowska sausage	8	201111

- If on 3 trolleys will be e.g. " Cottage ham" and on 5 „ Grandma's ham" – two positions will be used.

Position	ID1- Product name	ID2- Quantity of trolleys	ID3-Batch code
1	Cottage ham	3	221235
2	Grandma's ham	5	221210

- If on each trolley will be a different product all 8 positions will be used – as in the first table.

However, the process can be identified in another way. For example, instead of giving the quantity of trolleys in position ID2 we can put there an individual number of a trolley (assuming that all trolleys are numbered). In such case the process for 8 trolleys will require introduction of 8 positions regardless of the assortment.

Position	ID1-Product name	ID2-Number of a trolley	ID3-Batch code
1	Krakowska sausage	956	091111
2	Krakowska sausage	008	091111
3	Krakowska sausage	257	091111
4	Krakowska sausage	159	091111
5	Krakowska sausage	782	091111
6	Beer sausage	451	091125
7	Beer sausage	369	091125
8	Beer sausage	014	091125

Introduction of identifying data can be done in many ways, however the beginning is always the same. The terminal must be in the basic operation mode and diodes at ID keys, for which the data are needed, should be blinking. To start the data entering one should press that ID key, which data are to be entered (the best is ID1) – identifier's menu will appear. The first line of the display shows: ID number, which position in ID and the name of ID, the second line: entered code, the third line: description for the code (if it is found).

The way of data entry depends on:

- Configuration „ID entry”,
- Whether the bar-code reader is used or not used.

Ways of data entry will be illustrated by examples based on the Table:

Position	ID1–Product name	ID2-Quantity of trolleys	ID3-Batch code
1	Regular sausage	2	140976
2	Camp-fire sausage	1	140904
3	Silesian sausage	4	140914

Codes for ID1: Regular sausage -125, Camp-fire sausage -287, Silesian sausage -007

A) The first method – without the bar-code reader and when „ID entry” is set at: „Move to the next ID”.

- Identifier’s code should be entered – by means of digital keys – the identifier’s description is searched (it can take up to 2 seconds). If it is found it will be displayed in the line with the description.
- Then the entered code should be confirmed by the „Enter” key - terminal automatically moves to the next required ID. When the last required ID is entered the terminal moves to the next position of the first ID.
- When all required data are entered, one should move to the basic operation mode by means of the „Confirmation”, or ”X” key.

For the example presented in the Table above, it should be done in the following way (the terminal is in the basic operation mode):

- Press ID1 key (the first line in the display will show ID1_1: Product name – which means ID1 - first position, ID name means: „Product name”),
- Enter code: 125 by consecutive pressing: „1”, ”2”, ”5” key.
- The description „ Regular sausage” will be found and displayed,
- Press „Enter” (the first line in the display will show ID2_1:Quantity of trolleys – which means ID2 -first position, ID name means: „Quantity of trolleys”),
- Enter code: 2 by pressing ”2”,
- Press „Enter” (the first line in the display will show ID3_1: Batch code – which means ID3 - first position, ID name means: „Batch code”),
- Enter code: 140976,
- Press „Enter” (the first line in the display will show ID1_2: Product name – which means ID1 – second position, ID name means: „Product name”),
- Enter code: 287, the description „ Camp-fire sausage” will appear, press „Enter”,
- Enter code: 1 (quantity of trolleys), press „Enter”,
- Enter code: 140904, press „Enter”,
- Enter code: 007, the description “Silesian sausage” will appear, press „Enter”,
- Enter code: 4 (quantity of trolleys), press „Enter”,

- Enter code: 140914, press „Enter”,
- Press "X".

All data were entered and confirmed.

B) The second method – without the bar-code reader – and when „ID entry” is set on: „Move to the next position of the same ID”.

- Identifier’s code should be entered – by means of digital keys – the identifier’s description is searched (it can take up to 2 seconds). If it is found, it will be displayed in the line with the description.
- Then the entered code should be confirmed by the „Enter” key - terminal automatically moves to the next position of the same ID.
- When all positions for one ID are entered and confirmed, the key of the next ID should be pressed, e.g. ID2 and the procedure should be repeated for all IDs.
- When all required data are entered and confirmed, one should move to the basic operation mode by pressing „Confirmation”, or "X" key.

This method should be used when we have to enter several identifiers for one ID only and just one identifier each for the other IDs.

For the example presented in the Table above, it should be done in the following way (the terminal is in the basic operation mode):

- Press ID1 (ID1_1 will appear in the first line of the display),
- Enter code: 125, the description „ Regular sausage” will be seen, press „Enter” (ID1_2 will appear in the first line of the display),
- Enter code: 287, the description „ Camp-fire sausage” will be seen, press „Enter” (ID1_3 will appear in the first line of the display),
- Enter code: 007, the description “Silesian sausage” will be seen, press „Enter” (ID1_4 will appear in the first line of the display),
- Press ID2 (quantity of trolleys), (ID2_1 will appear in the first line of the display),
- Enter code: 2, press „Enter”,
- Enter code: 1, press „Enter”,
- Enter code: 4, press „Enter”,
- Press ID3 (batch code), (ID3_1 will appear in the first line of the display),
- Enter code: 140976, press „Enter”,
- Enter code: 140904, press „Enter”,
- Enter code: 140914, press „Enter”,
- Press "X".

C) The third method – with the bar-code reader.

When the bar-code reader is used we have to scan the relevant bar-code, instead of its manual introduction. In dependence of the setting of the function „Code reading” in the configuration function:

- If this function is set on an automatic confirmation of codes we move to the next identifier, directly after scanning of the code.
- If the automatic confirmation of codes is not ON we move to the next identifier by pressing the „Enter” key– after scanning of the code.
- When all codes are entered “Confirmation” or ”X” should be pressed.

Changes of ID and the position in ID should be done according to the information given in A and B.

If changing of the entered data are needed, we may proceed in two different ways:

- a) We can reset all entered data (by pressing and holding „0” key – until the cursor will settle in the first position in the entered code – then the transfer into the first position in the current ID occurs) and start the data entry from the very beginning.
- b) The position as well as ID can be changed (ID change is being done by pressing this particular ID e.g. ID3, position change by up–and–down arrows) and the erroneous data corrected in the particular place. Changes should be confirmed by pressing the „Enter” key.

The diode of that ID, for which the data are being entered currently, is blinking.

When at least one position is introduced for the given ID, the diode of this ID will light without blinking – in the basic operation mode.

4.3.1. Entry the ID name

Ascribing the name for the given ID causes that the terminal expects the entry of identifying codes of this particular ID before the beginning of the registration. The lack of these data in the moment of beginning of the registration can activate the relay output – alarm (more information will be in the part discussing the error signalling). To enter the name for the given ID one should:

- Press the selected ID key, e.g.: ID2,
- When the ID menu appears the „Configuration” key should be pressed,
- Then the access code should be provided and „Enter” pressed,
- Now the name should be entered by means of digital-literal keys,
- Blinking cursor indicates a letter being entered,
- Each pressing of the same key within 3 seconds, from the previous one, causes moving to other characters ascribed to the key.
- Pressing the other key within those 3 seconds causes the cursor movement to the next position and introduction of the selected character in this position.
- When none of the keys is pressed for 3 seconds the cursor shifts to the next position.
- The cursor can be shifted to the selected place by means of the right-and-left arrows.
- Pressing the „TXT” key – causes a transfer from small to capital letters – when the diode at the key lights capital letters can be written.

- At the end one confirms and exits from the function – by the „Enter” key.

4.3.2. Delete the ID name

When one wants to delete the ID name the same procedure as at the entering the name should be followed – with the only difference being the usage of spaces instead of characters.

4.4. Display of information concerning the entered IDs

There is a possibility of reviewing the entered data identifying the process. This function is called by pressing the „Info” key. If no data are entered the adequate information will be seen on the screen, if certain data are entered they will be shown on the screen. However, only one position from one ID will be displayed on the screen. The change of the position within the same ID is being done by pressing the up-and-down arrows, while moving in between IDs – by pressing the right-and-left arrows.

Exit from the function is done by pressing „X”.

4.5. Configuration Setup

This function allows adjusting the terminal to the needs of the client and the conditions at the plant. Function call is done by pressing the „Configuration” key. Then the access code should be given and the „Enter” key pressed. The accessible functions are seen on the screen. Shifting from one function to another is done by means of the up-and-down arrows, while the selected function is called by pressing „Enter”. Exit from the configuration function – by pressing „X”.

Several parameters configured manually can be configured by means of the Personal Computer.

There are the following configuration functions:

4.5.1. Company Name

This function allows introducing the name of the Company displayed on the screen (maximum 25 characters). It should be done as follows:

- Introduce the name by means of digital-literal keys,
- Blinking cursor indicates the letter being entered,
- Each pressing of the same key within 3 seconds, from the previous one, causes shifting between consecutive characters ascribed to the key,
- When within these 3 seconds another key is pressed, the cursor moves to the next position and the selected character is placed in there.
- When none of the keys is pressed for 3 seconds the cursor moves to the next position,

- The cursor can be shifted to the selected place by means of the right-and-left arrows,
- Pressing the „TXT” key – causes switching between small and capital letters - when the diode at the key lights the capital letters are written,
- Confirmation of the entered data and exit – by pressing „Enter”.

4.5.2. Name and Number of the Device

This function allows introducing the name of the device (maximum 20 characters) and its number (from 0 to 99) displayed on the screen:

- Introduction of the name by means of digital-literal key – as in paragraph 4.5.1,
- Introduction of the device number as a 2-digit number, e.g.: for number 1 we write „01”,
- Shifting between the name and the number is done by means of the up-and-down arrows,
- Confirmation of entered data and exit – as in paragraph 4.5.1.

4.5.3. Transmission Parameters

This function enables setting of the transmission parameters RS-485. The transmission is used for the communication with the computer. Communication is being done according to the MODBUS-RTU protocol. The following two parameters should be set:

- a) MODBUS address, at which the device will be seen – by means of the digital keys the address should be entered as a 3-digit number: e.g.: for address 1 the number „001” should be written (an address can be any number in the range: 1 to 245).
- b) Transmission rate of the communication – by means of 0-1 digits (0 corresponds to 9600 b/s, 1 corresponds to 19200 b/s).

The up-and-down arrows are doing shifting between the MODBUS address and the transmission rate. When the data are introduced the confirmation and exit is done by pressing the „Enter” key.

4.5.4. Time and Date

This function is used for setting the time and date.

Setup:

- Introduce the proper time and date by the digital keys,
- The blinking cursor indicates the position being entered,
- There is no possibility of setting seconds – it is always 00,
- All available arrows can be used for moving the cursor.

As usually, the „Enter” key is used for the confirmation of the entered data and for exit from the function.

4.5.5 Code Length Setup

This function allows to setup the length of the code entered for the given ID. The length of the code can have 1 to 16 characters and must be introduced as a 2-digit number. When the code for the given ID is entered, the device automatically shifts to the next ID. The up-and-down arrows enable shifting between values for the consecutive IDs. Exit – by pressing the „Enter” key.

4.5.6. Registration Frequency

This function allows setting how often the registration of the process parameters will be done. The number of minutes is introduced as a 2-digit number (01 to 99). Confirmation of the entered data and exit – by pressing the „Enter” key.

4.5.7. Access Code

This function allows to setup a new access code. Six digits of a new code should be introduced by the digital keys and the „Enter” key pressed.

4.5.8. Temperature Unit

This function allows to setup the unit in which the temperature is shown and registered. Either Celsius or Fahrenheit degree can be chosen. The selection is being done by the up-and-down arrows; the selected unit is blinking. Then the choice should be confirmed and exit from the function done by pressing the „Enter” key.

4.5.9 Default Values Recovery

Due to this function the default configuration setup can be recovered. The selection of this function causes the following setup of the configuration functions:

- MODBUS address: 1,
- Transmission rate RS-485: 9600 b/s,
- Registration frequency: every 1 minute,
- Length of codes: 16 characters for all IDs,
- Language – Polish,
- Error signal – yes,
- Bar-code reading – no,
- ID entry– yes,
- Access code - 000000

4.5.10. Sensors

Due to this function we can change the type of the temperature sensor connected to the analogue input. However, currently there is no possibility of connecting other sensors than PT100.

4.5.11. Language

Due to this function we can change the language of the displayed information. Available languages are:

- Polish
- English

4.5.12. Error Signalling

Due to this function there is a possibility of switching ON and OFF the error signalling. (signalling is described below). Confirmation and exit – after pressing the „Enter” key.

4.5.13. Input Logic

This function enables a determination in which way the terminal should interpret input signals, e.g. whether 24V at the Start input should activate the registration (Start input active – high state), or it is a quiescent state and the registration should be done when the voltage is not connected (Start input active – low state). The method of interpretation of each input can be set separately; the input which logic we would like to set can be found by the up-and-down arrows. The logic for input can be changed by the right-and left arrows. Confirmation and exit – by pressing the „Enter” key.

4.5.14. Bar-code Reading

This function determines the reaction of the terminal on the codes entered by the bar-code reader. If „Yes” is set then, after the code for the given ID is already entered, the device will automatically move to the next ID. However, if „No” is set the terminal will wait – after each reading – for the confirmation of the entered code done by pressing the „Enter” key.

4.5.15. Temperature Offset

Due to this function the shift of the temperature indication by +/- 9,9 degree for each channel can be done. The up-and-down arrows serve for the channel selection, while the sign can be changed by the „Configuration” key. Confirmation and exit – by pressing the „Enter” key.

4.5.16. ID Entry

This function allows determining the reaction of the terminal for the entry and confirmation of the ID code. If „Move to the next ID” is set and the names were given to at least two IDs then after the code for the first “ID with name” is entered and confirmed, the device will automatically move to the next „ID with name”. When the code for the last „ID with name” is entered the device will automatically move to the next position of the first „ID with name”. However, if „Move to the next position in the same ID” is set the terminal – after the code entry and the confirmation for the given ID – will move to the next position of the same ID. Confirmation and exit – by pressing the „Enter” key.

5. BAR-CODE READER

The DAT-120 terminal is adapted for the cooperation with the bar-code readers. Such reader should be connected to the RS-232 connector of the terminal. The reader should be properly configured-in for the adequate cooperation with the terminal. The following setup is needed for a reader:

- Interface – RS-232
- Transmission rate – 9600 bauds
- Transmission format – 8 bits of data, 1 bit of stop, lack of parity,
- Data transmission control – none,
- When the whole code is transmitted the reader should send the signs of the line end „CR” „LF” – in various readers it is named in different way, three examples: „suffix”, „termination”, „postamble”.

Usually the bar-code readers need an external power supply. The power supply recommended in the instruction for the particular reader should be used. There is no output of the supplying voltage on RS-232, since various readers require different voltage.

The DAT-120 software serves the reader when the lamp at the „Bar-code reader” key lights. If the lamp does not light and the reader is to be used - this key should be pressed.

In order to have the proper interpretation of the scanned bar-codes, those codes should consist of digits only. All other characters are considered by DAT-120 as 0.

Bar-codes can be coded in any system recognisable by the reader. Maximal length of the code can be of 16 digits.

6. REGISTRATION PROCESS PROCEDURE

- The beginning of the registration occurs when the proper signal appears at the „Start” input.
- No changes, apart from logging out of the operator, are possible during the registration.
- Sample registration is done with the frequency determined at the configuration.
- The information concerning the chamber temperature, meat-bar temperature, humidity and the state of digital inputs is contained in each sample.

- When not all data are introduced an error is signalled.

After finishing the process the identifying data are to be entered again, but there is no necessity of relogin.

7. ERROR SIGNALLING

The main task of the terminal is the registration of parameters identifying the smoking process. Signalling of errors is based on the relay, into which an optical or acoustic signal should be connected. The beginning of the process without the operator being logged-in as well as the lack of the identifying data for ID, to which the name is ascribed – are signalled.

8. TECHNICAL DATA

POWER SUPPLY:

- ~24V(AC)

CONSTRUCTION:

- SINGLE UNIT, "FRONT PANEL" TYPE

OUTPUTS:

- 1 RELAY OUTPUT, SHORT-CIRCUIT VOLTAGE 250V OF A LOAD CAPACITY UP TO 4A

INTERFACES:

- SERIAL PORT RS-485, FOR THE COMMUNICATION WITH THE SUPERIOR COMPUTER
- SERIAL PORT RS-232, FOR CONNECTING THE BAR-CODE READER

INPUTS:

- 3 MEASURING CHANNELS, TEMPERATURE SENSOR PT-100 (MEASURING RANGE FROM -100°C TO +400°C, RESOLUTION 0.1°C, BI- OR TRI- CONDUCTOR FOR MEASUREMENT, MEASUREMENT UNCERTAINTY LESS THAN 0.5°C)
- ONE CONTROL INPUT, SHORT-CIRCUIT
- TWO BISTABLE VOLTAGE CONTROL INPUTS OF STANDARD 0-24V AC/DC („1"-12...24V, „0" – 0..3V)

CASING:

- PROTECTION DEGREE: IP65 (FROM THE FRONT)
- FRAME OUTSIDE DIMENSIONS: 270mm x 177mm
- ASSEMBLING HOLE DIMENSIONS: 235mm x 140mm

TEMPERATURE RANGE - OPERATION:

- -30 .. 85 °C

TEMPERATURE RANGE - STORAGE:

- -40 .. 85 °C

9. CONNECTION OF THE TERMINAL TO THE PERSONAL COMPUTER

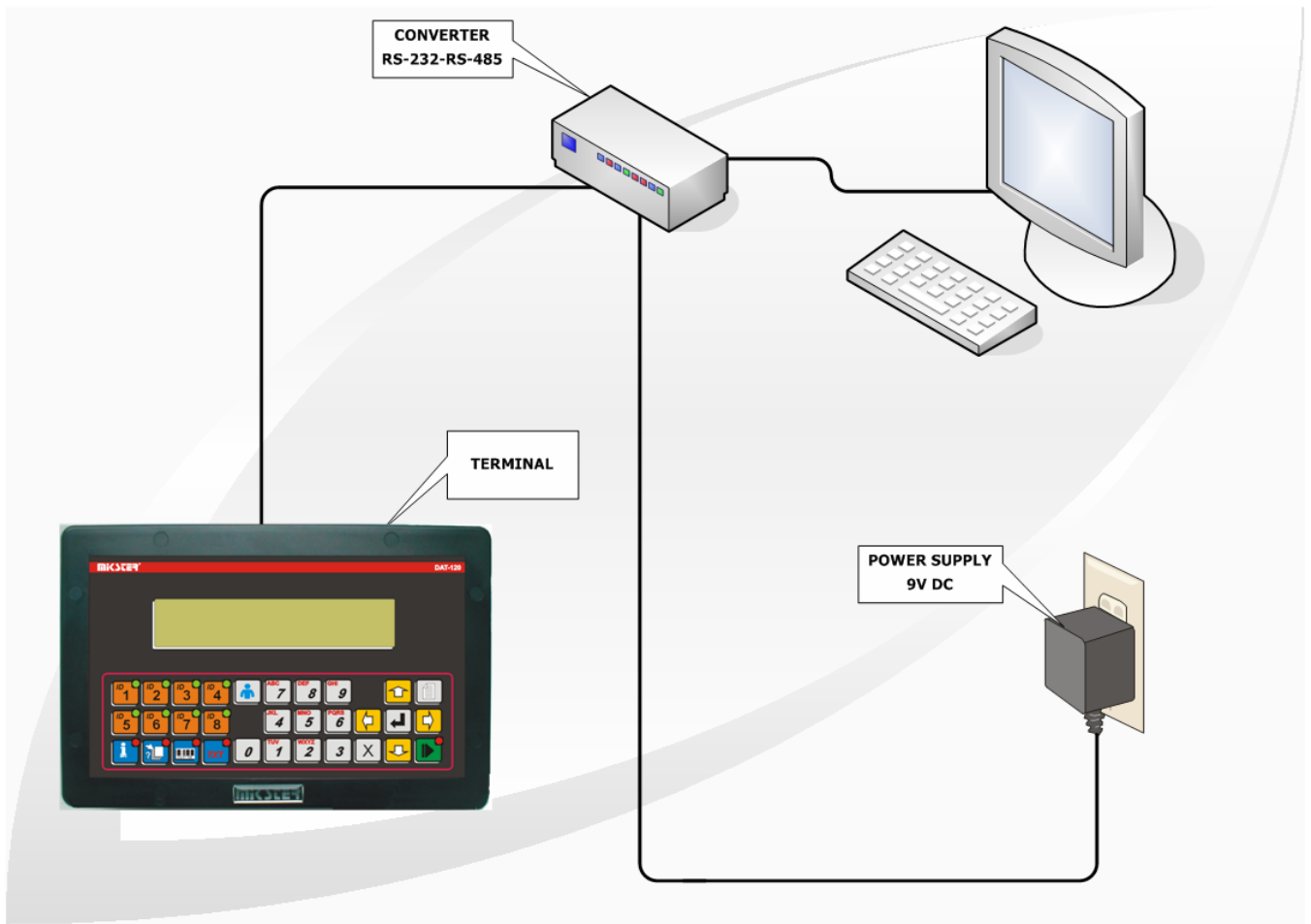


FIGURE NO 1 CONNECTION OF THE TERMINAL TO THE PERSONAL COMPUTER (PC)

10. CONNECTION OF THE TERMINAL TO THE AUTOMATICS OF THE SMOKE-HOUSE

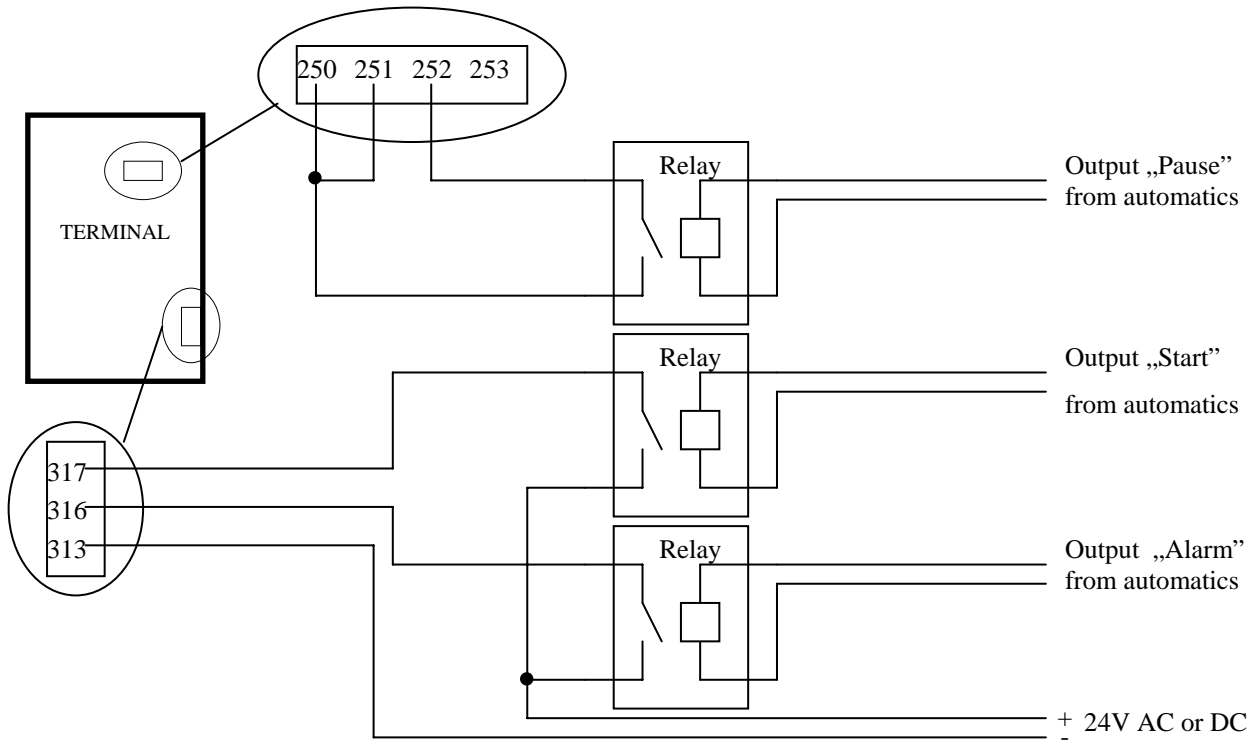


FIGURE NO 2 CONNECTION OF THE TERMINAL TO THE AUTOMATICS - VIA THE RELAYS

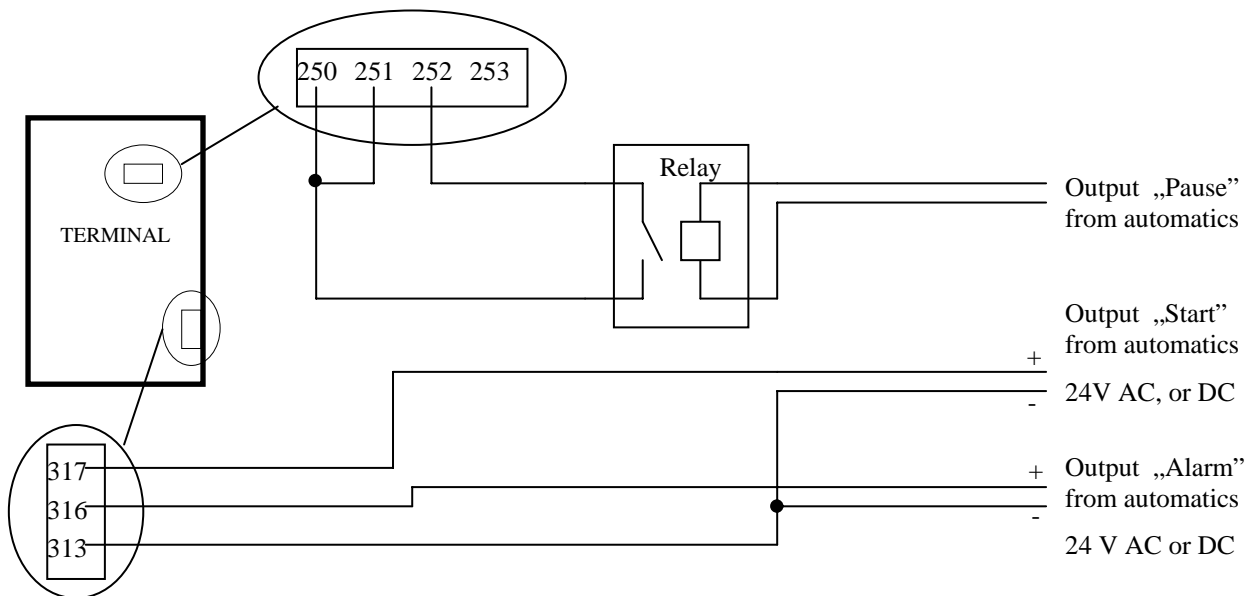


FIGURE NO 3 CONNECTION OF THE TERMINAL TO THE AUTOMATICS, WITHOUT THE RELAYS – DIRECT VOLTAGE CONTROL