THE DLM-080 FUTURE DIGITAL RECORDER – USER'S MANUAL

VERSION 1.1

MIKSTER

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TABLE OF CONTENTS

TECHNICAL DATA

DIMENSIONS:

- assembly hole size: 142+1mm X 237+1mm
- assembly depth including terminals: 55mm
- outside dimensions: 265x152

WEIGHT:

- 1250 g (RECORDER)
- 800 g (TRANSFORMER)

POWER SUPPLY:

- ~24V(AC), 220-24V TRANSFORMER INCLUDED IN THE SET

STRUCTURE:

- SINGLE ELEMENT, "FRONT PANEL"-TYPE

PROTECTION CLASS: (ACCORDING TO IEC 529)

- from terminal side: IP 20
- from front side: IP 65

HUMIDITY:

- 0..75 % (OF RELATIVE HUMIDITY)

TEMPERATURE:

- ambient: -20..+70 °C
- working: 0..+60 °C

OUTPUTS:

- max 12 RELAY OUTPUTS 250V,
  TOTAL
  CURRENT INTENSITY OF CONNECTED RELAYS: Icmax=4A
- 4 TRANSISTOR OUTPUTS, Iomax=100mA (optionally)

INPUTS:

- 8 MEASUREMENT CHANNELS WITH INPUT
  - PT-100 - MEASUREMENT RANGE FROM -100.0°C TO +400.0°C,
    RESOLUTION (ACCURACY) 0.1°C
  - CURRENT SIGNAL: 0..20 mA , 4..20 mA (RANGE: 3 DIGITS)
- BINARY CONTROL INPUT: 0-220V AC (0-24 V AC)

DIGITAL COMMUNICATION:

- SERIAL PORT
  1xRS-232 (PRINTER)
  1xRS-485 (MASTER COMPUTER)

RECORDING MEMORY:

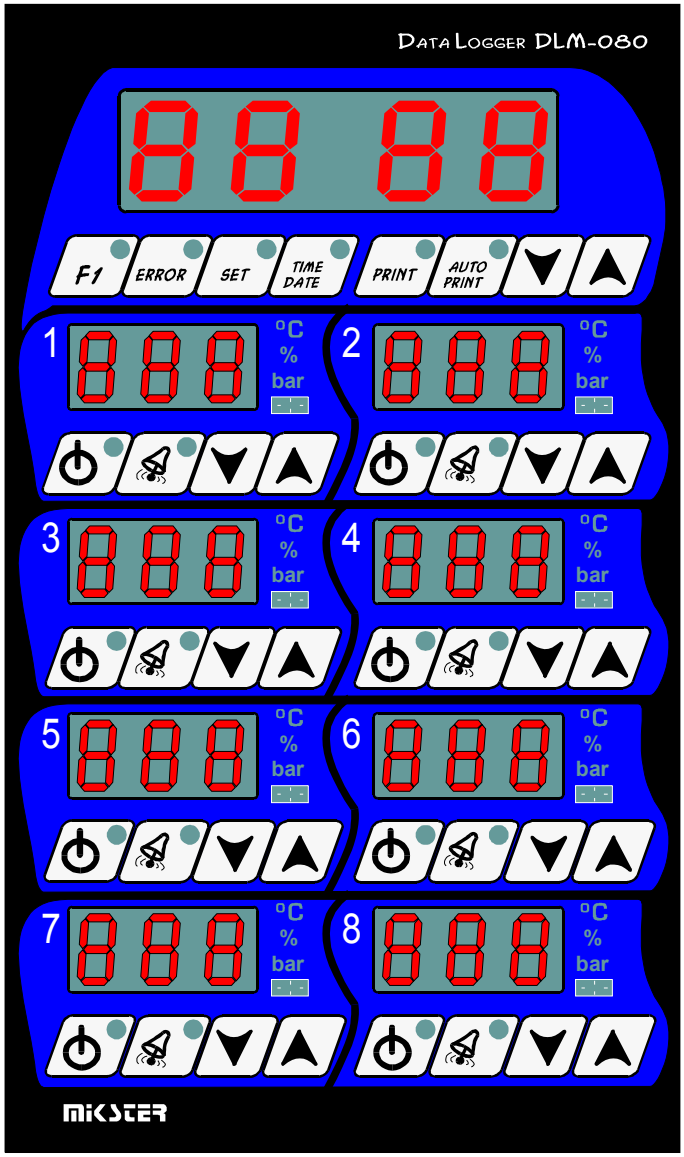
- 2000 samples / channel for RAM memory = 32KB (STANDARD)

1. APPLICATIONS

DLM-080 Digital Recorder is a multifunctional microprocessor device used for the purposes of recording, control and visualisation of manufacturing processes in many branches of industry. In particular it is designed to co-operate with master computer (software for PC computers delivered together with the recorder), which also allows performing analysis of registered data in graphic form. Moreover, it is possible to make printouts in for documentation purposes.

2. THE DLM-080 RECORDER CONSOLE

All operations of the DLM-080 Recorder are initiated from its console (Fig.1).



Keys on the console are arranged in the following keypads :

- the status block -1- with the following functions :
- real-time display 1.1
- function keys 1.2 with signal diodes 1.3
- parameter value increase / decrease keys 2.5
- 8 measurement channel status keypads -2- with the following functions :
- read out / set value display 2.1
- display field showing the measure of a physical value being measured 2.3
- function keys with signal diodes 2.4
- parameter value increasing / lowering keys 2.5

All information as regards working mode of the DLM-080 Recorder (values of preset and read out parameters, equipment ON / OFF signalling, etc.) is displayed on digital displays and by diodes.

It is necessary to press proper keys in order to save data in the DLM-080 Recorder memory, correct data and call required controller functions.

3. THE DLM-080 RECORDER CONFIGURATION

Immediately after turning the Recorder on all of its displays will become active, and then, after approximately 3 sec. the Recorder will switch to the working mode and execute operations according to preset configuration.

In order to ensure that the Recorder work complies with user's guidelines, the following configuration operations must be carried out :

- set (check) the real-time clock readout (the SET CLOCK mode)
- set (check) data setting in the SETUP memory (the SETUP mode)
- scale (check) readouts on measurement channels (the SERVICE [*SERWIS*] mode)
- set (check) displaying of dimension of measured physical values (the DIMENSION [*WYMIAR*] mode)

3.1 SPECIAL FUNCTIONS (RECORDER CONFIGURATION)

In order to modify / initiate settings of the Recorder configuration parameters, whole range of special functions has been introduced. They permit to carry out the above-mentioned operations.

Special functions will be available after carrying out of the following steps :

- press the 

key (a diode built-in in the key blinks)

- press the 

key and hold it for approximately 3 sec.

After 3 seconds the symbol **F-00** will be displayed in the real-time display field.

At this moment enter number of a special function by pressing the  keys in the real-time display field.

Accept the selected special function by pressing the 

key.

3.1.1 SPECIFICATION OF SPECIAL FUNCTIONS

F00	-	switches to the SETUP mode
F01	-	switches to the WYMIAR [*DIMENSION*] mode
F02	-	switches to the SERVICE mode
F03	-	free
F04	-	switches to the SET-CLOCK mode
F05	-	program version
F06-F98	-	free
F99	-	clears recording buffer

3.2 REAL-TIME CLOCK SETTING (THE SET CLOCK MODE)

F04 SPECIAL FUNCTION

The unit will switch to the SET CLOCK mode after selecting the F04 special function. The following will be displayed after selecting this function:

- word **CODE** in time display field
- words **SET UP** in channel 1 and 2 display field

At this moment, by pressing the  keys in channel 3 and 4 display field, enter access code necessary for setting the clock parameters (standard code is: 111 111).

Accept set values by pressing the 

key.

In case if correct value is entered, the DLM-080 will switch to the SET-CLOCK mode (diodes of real-time clock display blinks and the diode built-in in the 

key is on).

3.2.1 Setting hours and minutes (the SET-CLOCK mode)

(the diode built-in in the 

key is **off**)

• by pressing the  keys, set correct hour and minute in the following format: HOUR:MINUTE.

3.2.2 Setting month and day (the SET-CLOCK mode)

- press the 

key (a diode built-in in the 

key will **generate continuous lighting**)

• by pressing the  keys, set correct month and day in the following format: MONTH:DAY.

3.2.3 Setting year

• press the 

key twice – the diode built-in in the key will generate pulsating light.

• by pressing the  keys, set year in the following format: --:YEAR.

3.2.4 Resetting the real-time clock to zero

• press the  key in the display field of channel no. 3 and hold it for approximately 3 sec.

3.3 MODIFICATION OF PARAMETERS IN THE SETUP MEMORY (THE SETUP MODE)

The SETUP mode permits to edit the DLM-080 configuration parameters (as described in Table 1).

The device will switch to the SET-UP mode after selecting the F00 special function. The following will be displayed after selecting this function:

- word **CODE** in time display field
- words **SET UP** in channel 1 and 2 display field
- number **000** in channel 3 display field, and number **000** in channel 4 field

At this moment, by pressing the  keys in channel 3 and 4 display field, enter access code to the SETUP memory (standard code is: 888 888).

Accept set values by pressing the 

key.

In case if correct value is entered, the DLM-080 switches to the SETUP mode.

Word SETUP will be displayed, and:

- SETUP function number in channel 3 display field,
- SETUP value number in channel 4 display field.

Then take these steps:

- in order to modify function number press the

 keys in channel 3 display field,

- in order to modify function value press the

 keys in channel 3 display field.

3.3.1 SET UP memory reset and setting of initial parameters

In order to initialise the DLM-080 and reset the recording memory, take the following steps (while remaining in the SETUP mode):

- press the 

key and hold it until the 00:00 symbol is shown on the real-time display; execution of this operation results in resetting of all configuration values, the recording memory and preset standard values of the SETUP function.

3.3.2 Exiting the SETUP mode

• press the 

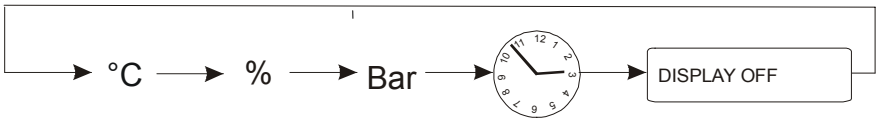
key (the SET EEP message will be displayed, and at the same time configuration parameters will be stored in memory).

3.4 The MEASURE Mode

This mode permits to preset for individual channels the measure of displayed / controlled physical quantity, e.g. (°C, bar, %, etc.), which will be displayed in the measure display field. In order to switch to the MEASURE [WYMIAR] mode, select the F01 special function:

• then (as appropriate for a selected channel) set the measure of the measured / controlled quantity by pressing the  key.

Follow the sequence below in order to change the display



Attention! The above applies only to standard version of the Recorder.

3.4.1 Exiting the MEASURE mode

• press the 

key (the SET EEP message will be displayed, and at the same time configuration parameters will be stored in memory).

3.5 MEASUREMENT CHANNEL SCALING, THE -SERVICE- MODE

ATTENTION: <u>Prior to commencement of measurement channel tuning, check whether location of switches defining type of input is in compliance with guidelines...!</u>

In order to scale (set zero and amplify) indications in individual measurement channels it is necessary to switch to the SERVICE mode by selecting the F02 special function.

The following information will be displayed after selecting this function :

- readout from the AC converter in the real-time clock display field
- letters **ch.** and measurement channel number in channel no. 1 display field
- readout value in units matching the configuration (in channel no. 2 display field)

• then, in case if channel is defined as 0.20 mA or 4.20 mA input, channel no. 4 display field will show value indicated for 0 mA (4 mA) current, and channel no. 6 display field will show value indicated for 20 mA current.

3.5.1 Change of active measurement channel

• in order to change currently active measurement channel press the  keys in channel 1 display field.

3.5.2 Measurement channel tuning procedure for the PT-100 input.

ATTENTION: <u>Check position of measurement input type switch on the back panel of the Recorder.</u>

<u>1</u> - select channel to tune by pressing the  keys in channel 1 display field.

<u>2</u> - preset model signal value (0°C; Ro=100 Ω) or place sensing element in water and ice mix, which permits additional correction of sensing element error.

<u>3</u> - carry out correction of zero by pressing the  key in channel 1 display field.

(in order to cancel the correction press the  key in channel 2 display field)

completed correction will be indicated by blinking of the diode built-in in the  key in channel 2 display field.

<u>4</u> - preset model signal value in a selected point of the PT-100 sensor characteristic curve.

Recommended values are:

- R100 = 138.5 Ω - which corresponds to the indication of 100 °C

then, by turning potentiometers (for respective channels Ch1,Ch2,Ch3,Ch4,Ch5,Ch6,Ch7,Ch8) on the back panel of the Recorder, ensure that correct read out value is being displayed.

3.5.3 Measurement channel tuning procedure for the 0..20,4..20mA input

1 - select channel to tune by pressing the  keys in channel 1 display field.

2 - preset model signal value, e.g. **20mA**

3 - enter indicated value for 0 mA (4 mA) current by pressing the  keys in channel 4 display field.

4 - enter indicated value for model signal by pressing the  keys in channel 6 display field (e.g. 20 mA)

5 - as soon as the above-mentioned operations are complete, carry out correction of amplification by pressing the  key in channel 2 display field.

(in order to cancel the correction press the  key in channel 2 display field)

completed correction will be indicated by blinking of the diode built-in in the  key in channel 2 display field.

Attention ! Do not carry out correction of **zero** for the 0..20 mA, 4..20 mA input **!**

3.5.3 Saving corrections in memory, exiting the SERVICE mode

Press the 

key in order to exit the service mode and to save correction value.

4. THE DLM-080 RECORDER MEASUREMENT AND CONTROL CHANNELS

The DLM-080 Recorder enables to define channel type for each of the channels as:

a) the **PT-100** measurement channel (measurement range from -99.9 to +399.9° C, scale interval 0.1 ° C)

b) the **0..20 mA** measurement channel (measurement range from -99 to 999)

c) the **4..20 mA** measurement channel (measurement range from -99 to 999)

d) a second-meter (range from 0 to 999)

e) a minute-meter (range from 0 to 999)

f) an hour-meter (range from 0 to 999)

g) multivibrator (second or minute or hour base)

4.1 THE PT-100 MEASUREMENT CHANNEL

In case if a measurement channel is defined as PT-100, readout values will be displayed in a dynamic way, that is:

- within range from -99.9 to -10.0 with accuracy of 1 °C
- within range from -9.9 to +99.9 with accuracy of 0.1 °C
- within range from +100.0 to +399.9 with accuracy of 1 °C

4.2 THE 0..20 (4..20) mA MEASUREMENT CHANNEL

In case if a measurement channel is defined as 0..20 (4..20) mA, readout values will be displayed according to the value of the F54-F61(SETUP) function.

that is:

- if F54-F61 = **3**, then display range is **0.00** to **9.99** (0..20 mA)
- if F54-F61 = **4** , then display range is **00.0** to **99.9** (0..20 mA)
- if F54-F61 = **5** , then display range is **000** to **999** (0..20 mA)
- if F54-F61 = **6** , then display range is **0.00** to **9.99** (4..20 mA)
- if F54-F61 = **7** , then display range is **00.0** to **99.9** (4..20 mA)
- if F54-F61 = **8** , then display range is **000** to **999** (4..20 mA)

4.3 CHANNEL AS TIME-METER

In case if a measurement channel is defined as time-meter, then method of time metering will be defined in the F38-F40 (SETUP) functions, that is:

- if F54-F61 = 11 , then second-meter
- if F54-F61 = 12 , then minute-meter
- if F54-F61 = 13 , then hour-meter

Moreover, it is necessary to define in the F62-F69 functions the method for time-meter release, that is:

- F62-F69 = **0** time-meter reset, and it is released "manually" after pressing and holding the  key (for proper channel) for approximately 2[s].
- F62-F69 = **1** then, if Tini contact closed, time-meter counts down until reaching the set value, if time-meter reaches the set value and Tini contact opens, then the

time-meter will be reset to zero and as soon as Tini contact closes the count down will be repeated, if the time-meter does not reach the set value and Tini contact will open, time count down will stop and as soon as Tini contact closes the count down will be further repeated

- F62-F69 = **2** then - if Tini contact closed, time-meter counts down until reaching the set value – each opening of the Tini contact will result in resetting the time-meter to zero and as soon as Tini contact closes again, the count down will go on

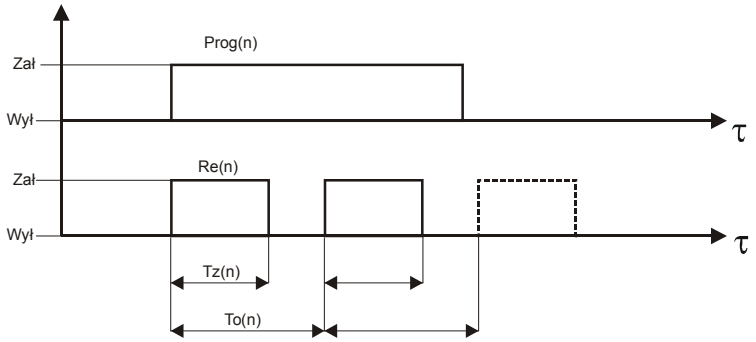
  ATTENTION: **Reaction to change of Tini contact state takes approximately 3 seconds !**

  In order to connect Tini contact follow the procedure described on the DLM-080 back panel!

In order to ensure correct work of the channel as time-meter, the To(n) value saved in the F14 – F21 cells and referring to work of the channel as a multivibrator must be equal.

4.4 CHANNEL AS MULTIVIBRATOR

The DLM-080 enables to declare relay output as a multivibrator operating according to the algorithm shown below.



where:

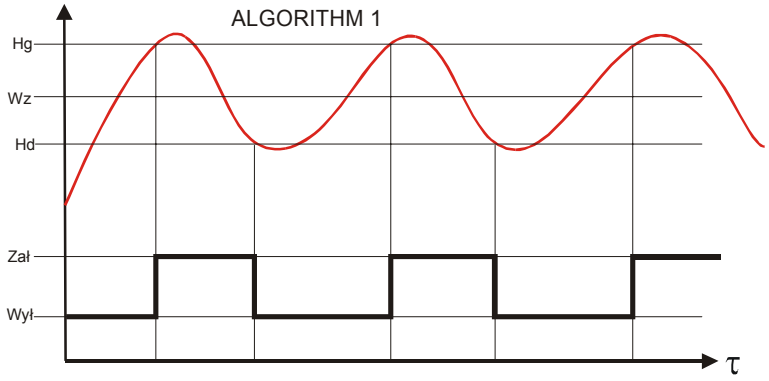
- **n – channel number**
- **PROG(n) – state of diode in the PROG key for channel n**
- **RE(n) – state of relay for channel n**
- **tz(n) – preset time for channel n**
- **To(n) – multivibrator period for channel n given in the F14-F21 SETUP functions**
- τ - time in compliance with definition in the F14-F21 SETUP functions

Press and hold the  key for approximately 3 sec. to reset time-meter and start the time count-down process (diode built-in in the key is on). Press the  key in order to stop time count-down. Press the  key to restart channel operation as a multivibrator.

4.5 CONTROLLER RELAY OUTPUTS

As a standard the DLM-080 uses the algorithm of on-off controller with hysteresis. The hysteresis value must be specified in the F14-F29 (SETUP) functions. Depending on parameter setting in functions F30-F37 it is possible to define controller relay state as NR (normally open, algorithm 1) or NZ (normally closed, algorithm 2).

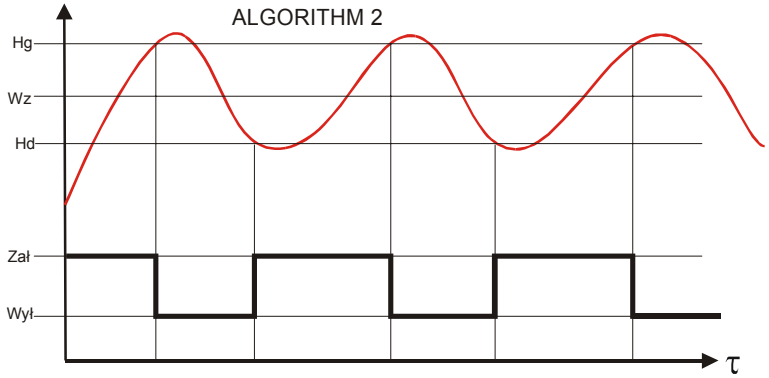
Press the  key (for proper channel) in order to ensure that control for a given channel is carried out according to setting of the set value – the diode is on. In case if a diode built-in the  key (for proper channel) is off, then the control channel is blocked and controller relay is open.



Wz – set value

Hg – "upper" hysteresis (F30-F45, SETUP)

Hd – "lower" hysteresis (F30-F45, SETUP)

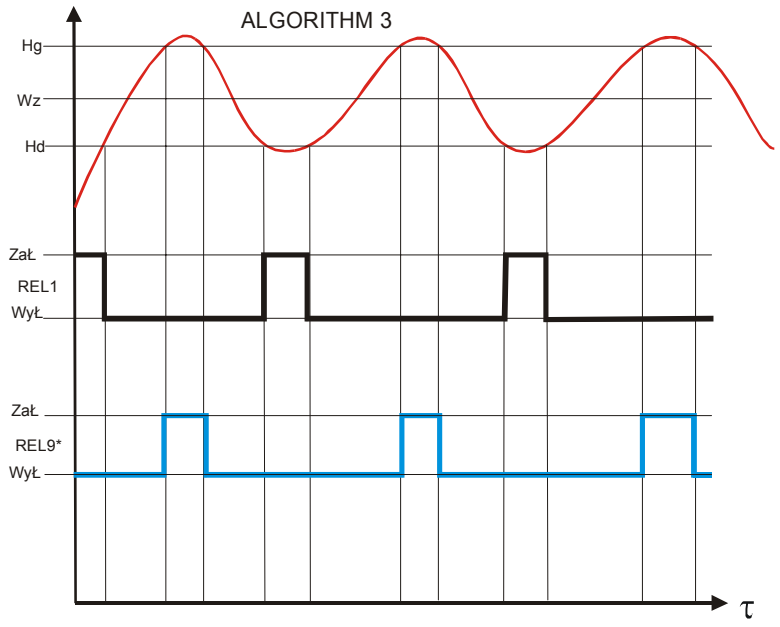


Wz – set value

Hg – "upper" hysteresis (F14-F29, SETUP)

Hd – "lower" hysteresis (F14-F29, SETUP)

(Algorithm 3) 3-state controller according to algorithm



* for F46 → REL9 ; for F47 → REL10 ; for F48 → REL11 ; for F49 → REL12

ATTENTION! In case if channel is defined as time-meter, relay contact state changes immediately after reaching the set value.

Blinking message in the MEASURE field indicates controller contact closed state!

4.6 MODIFICATION OF CONTROLLER SET VALUE

Press the  keys (for proper channel) in order to set and modify already set values for individual control channels. If any of these keys is pressed once, the set value will be displayed, which is indicated by blinking of the displayed value. The display will return automatically to read out value after approximately 2 seconds from the moment any key was pressed last time.

5. HUMIDITY MEASUREMENT USING THE PSYCHROMETER METHOD

The Recorder permits humidity measurement using the psychrometer method. However, in order to make it possible it is necessary to follow guidelines listed below:

1. if channel 1 is declared as humidity readout, (**F54 = 1**)
   then "dry" temperature sensor is connected to channel no. 1
   and "wet" temperature sensor is connected to channel no. 2

2. if channel 1 is declared as humidity readout, (**F55 = 1**)
   then "wet" temperature sensor is connected to channel no. 2
   and "dry" temperature sensor is connected to channel no. 1

3. if channel 1 is declared as humidity readout, (**F56 = 1**)
   then "dry" temperature sensor is connected to channel no. 3
   and "wet" temperature sensor is connected to channel no. 4

4. if channel 1 is declared as humidity readout, (**F57 = 1**)
   then "wet" temperature sensor is connected to channel no. 4
   and "dry" temperature sensor is connected to channel no. 3

5. if channel 1 is declared as humidity readout, (**F58 = 1**)
   then "dry" temperature sensor is connected to channel no. 5
   and "wet" temperature sensor is connected to channel no. 6

6. if channel 1 is declared as humidity readout, (**F59 = 1**)
   then "wet" temperature sensor is connected to channel no. 6
   and "dry" temperature sensor is connected to channel no. 5

7. if channel 1 is declared as humidity readout, (**F60 = 1**)
   then "dry" temperature sensor is connected to channel no. 7
   and "wet" temperature sensor is connected to channel no. 8

8. if channel 1 is declared as humidity readout, (**F61 = 1**)
   then "wet" temperature sensor is connected to channel no. 8
   and "dry" temperature sensor is connected to channel no. 7

6. ALARMS

The DLM-080 Recorder enables setting of alarm thresholds in relation to set value. It is required to preset the alarm threshold value in the F70-F77 (SETUP) functions. In order to activate alarm press the  key in field of the channel, for which exceeded threshold value is to be signalled. In case if value = 0 is set in the F70-F77 functions, threshold exceeding control is off, and alarm is off no matter what is current state of the  key.

Blinking diodes in the  keys (for proper channels) and intermittent signal on the RE9 relay output indicate occurrence of an alarm.

*Alarm enable unit, which is preset in SETUP (**F70-F77** cells), depends on measurement resolution !*

E.g.: Channel 4 is defined as temperature measurement carried out with the Pt-100 sensor. Measurement resolution (accuracy) is 0.1°C. Set value: 27 °C. In order to activate alarm in the F73 cell value 5 has been entered. Then alarm will be activated as soon as read out temperature value exceeds 27.5°C.

7. CO-OPERATION OF THE RECORDER WITH MASTER COMPUTER (RS-485)

In order to connect the Recorder to master computer (RS-485) it is necessary to make suitable connections between the Recorder and master computer according to Drawing No. 1, and then to install the DLM-SIMPLE communication application. Each DLM-080 recorder connected to master computer with the RS-485 network shall have attributed its own number in the RS-485 network (0-31). Specify this number in the F00 (SETUP) function.

In case, if there are two or more recorders in the network, which have the same network number attributed, communication with these recorders will be impossible !

8. PRINTING OF RECORDS

Printing data transmission to printer is carried out through the RS-232 serial connector, with the following transmission parameters :

- transmission speed: 9600 BAUD
- no parity control
- 8 data bits

- 1 stop bit

Correct method of making cable connections is shown on Drawing 2

Press the 

key in order to print the recording heading and current readouts.

Press the 

key and hold it for approximately 2 [s] (diode built-in in the key is on) in order to make periodic printouts of data from the recorder.

In this case the recording heading will be printed and readouts from the recorder will be printed with frequency specified in the F05 (SETUP) function.

Press the 

key again, holding it for approximately 2 [s], in order to disable periodic printout option.

9. KEYBOARD INTERLOCK

The DLM-080 enables interlocking of keyboard in order to protect it against access of unauthorised persons, which is obtained in the following way :

HOW TO ACTIVATE INTERLOCK

- press the 

key (a diode built-in in the key blinks)
- press and hold the  key in the display field of channel no. 2
- press and hold the  key in the display field of channel no. 5
- release the  key in the display field of channel no. 2
- release the  key in the display field of channel no. 5

Word **CLOS.** will be displayed in the real-time display field.

INTERLOCK DISABLE

- press and hold the  key in the display field of channel no. 2

- press and hold the  key in the display field of channel no. 5

- release the  key in the display field of channel no. 2

- release the  key in the display field of channel no. 5

Word **OPEN.** will be displayed in the real-time display field

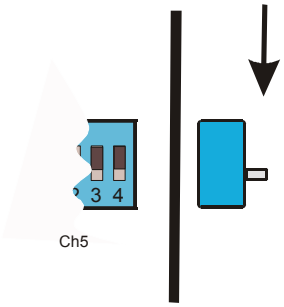
ATTENTION ! In case if keyboard interlock is on, pressing of any key results in word **CLOS.** being displayed in the real-time display field, and set values for all channels are shown.

10. EXAMPLES HOW TO CONFIGURE THE DLM-080

10.1 CHANNEL No. 5 AS THE PT100 MEASUREMENT INPUT

The procedure:

1- set position of the A/D converter input type switch (back panel of the Recorder, the switch in lower position)



2- turn on the Recorder

3- switch to the SETUP mode

- press the  key (a diode built-in in the key blinks)

- press the  key and hold it for approximately 3 sec.

(After 3 seconds the symbol **F-00** will be displayed in the real-time display field.)

- keep pressing the  keys in the real time field until **F-00** is shown

- press the  key (the Recorder displays will show [CODE set-up])

- keep pressing the  keys in the display field of channel no. 3 until **888** is shown

- keep pressing the  keys in the display field of channel no. 4 until **888** is shown

- press the  key (the following will be displayed: **SET-UP**, function number – **F00**, and function value)

4- define channel (5) as the PT-100 type

- keep pressing the  keys in the display field of channel no. 3 until **F58** is shown

- keep pressing the  keys in the display field of channel no. 4 until **0** is shown

- press the  key (parameters will be stored in memory)

5- switch to the SERVICE mode

- press the  key (a diode built-in in the key blinks)

- press the  key and hold it for approximately 3 sec.

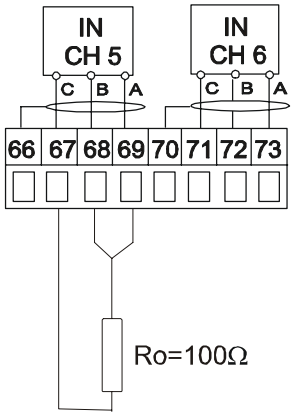
(After 3 seconds the symbol **F-00** will be displayed in the real-time display field.)

- keep pressing the  keys in the real time field until **F-02** is shown

- press the  key (information specified in Point 3.6 will be displayed)

- keep pressing the  keys in the display field of channel no. 1 until **ch5** is shown

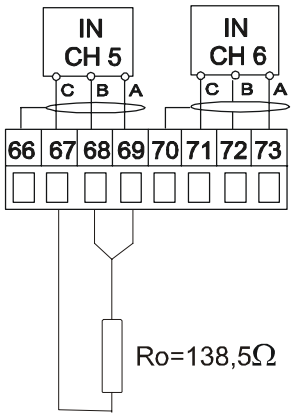
6- connect model resistor R0=100 Ω to Recorder terminals nos. 67,68,69



7- carry out correction of zero for the converter

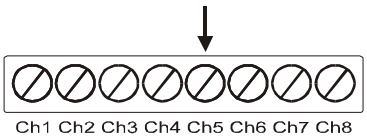
- press the  key in the display field of channel no. 2 (a diode in the  key blinks)

8- connect model resistor R100=138.5 Ω to Recorder terminals nos. 67,68,69



9- carry out correction of amplification for the converter

- turn the ch5 potentiometer on the back panel of the controller



until **100** value is shown (on the display of channel no. 2)

10- finish configuring measurement channel no. 5

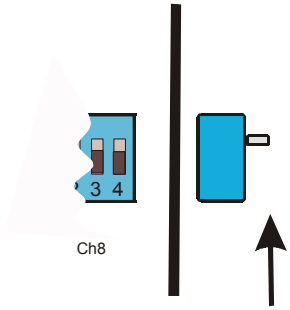
- press the  key (parameters will be stored in memory)

10.2 CHANNEL No. 8 AS THE 0..20 mA MEASUREMENT INPUT

(with measured values ranging from 100 to 500)

The procedure:

1- set position of the A/D converter input type switch (back panel of the Recorder, the switch in upper position)



2- turn on the Recorder

3- switch to the SETUP mode

- press the F1 key (a diode built-in in the key blinks)

- press the SET key and hold it for approximately 3 sec.

(After 3 seconds the symbol **F-00** will be displayed in the real-time display field.)

- keep pressing the ▼ ▲ keys in the real time field until **F-00** is shown

- press the SET key (the Recorder displays will show [CODE set-up])

- keep pressing the ▼ ▲ keys in the display field of channel no. 3 until **888** is shown

- keep pressing the ▼ ▲ keys in the display field of channel no. 4 until **888** is shown

- press the SET key (the following will be displayed: **SET-UP**, function number – **F00**, and function value)

4- set channel type as 0..20mA, display accuracy: 1

- keep pressing the ▼ ▲ keys in the display field of channel no. 3 until **F61** is shown

- keep pressing the  keys in the display field of channel no. 4 until **5** is shown

- press the  key (parameters will be stored in memory)

5- switch to the SERVICE mode

- press the  key (a diode built-in the key blinks)

- press the  key and hold it for approximately 3 sec.

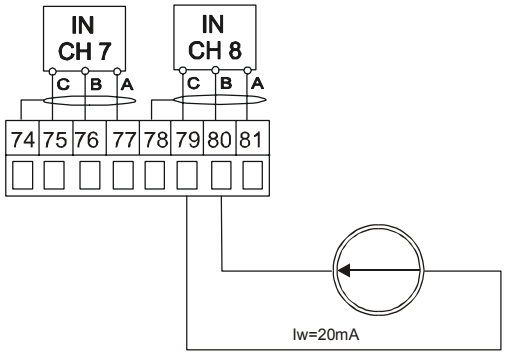
(After 3 seconds the symbol **F-00** will be displayed in the real-time display field.)

- keep pressing the  keys in the real time field until **F-02** is shown

- press the  key (information specified in Point 3.6 will be displayed)

- keep pressing the  keys in the display field of channel no. 1 until **ch8** is shown

6- preset model signal (Iw=20mA) for Recorder terminals nos. 79,80



7- preset displayed value [100] for the I=0mA current

- keep pressing the  keys in the display field of channel no. 4 until **100** is shown

8- preset displayed value [500] for the I=20mA current

- keep pressing the  keys in the display field of channel no. 6 until **500** is shown

9- carry out correction of amplification for the converter

- press the  key in the display field of channel no. 2 (a diode in the  key blinks)

10- finish configuring measurement channel no. 8

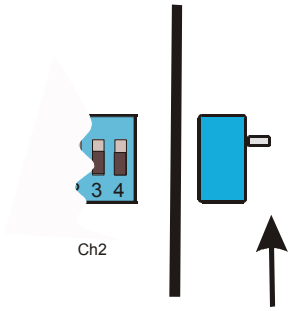
- press the  key (parameters will be stored in memory)

10.3 CHANNEL No. 2 AS THE 4..20 mA MEASUREMENT INPUT

(with measured values ranging from 5.50 to 8.00)

The procedure:

1- set position of the A/D converter input type switch (back panel of the Recorder, the switch in upper position)



2- turn on the Recorder

3- switch to the SETUP mode

- press the  key (a diode built-in in the key blinks)

- press the  key and hold it for approximately 3 sec.

(After 3 seconds the symbol **F-00** will be displayed in the real-time display field.)

- keep pressing the  keys in the real time field until **F-00** is shown

- press the  key (the Recorder displays will show [CODE set-up])

- keep pressing the  keys in the display field of channel no. 3 until **888** is shown

- keep pressing the  keys in the display field of channel no. 4 until **888** is shown

- press the  key (the following will be displayed: **SET-UP**, function number – **F00**, and function value)

4- set channel type as 4..20mA, display accuracy: 0.01

- keep pressing the  keys in the display field of channel no. 3 until **F55** is shown

- keep pressing the  keys in the display field of channel no. 4 until **6** is shown

- press the  key (parameters will be stored in memory)

5- switch to the SERVICE mode

- press the  key (a diode built-in in the key blinks)

- press the  key and hold it for approximately 3 sec.

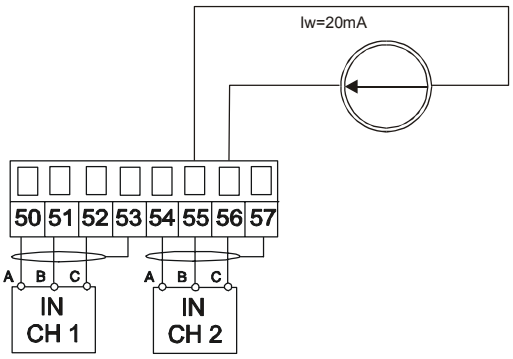
(After 3 seconds the symbol **F-00** will be displayed in the real-time display field.)

- keep pressing the  keys in the real time field until **F-02** is shown

- press the  key (information specified in Point 3.6 will be displayed)

- keep pressing the  keys in the display field of channel no. 1 until **ch2** is shown

6- preset model signal (Iw=20mA) for Recorder terminals nos. 55,56



7- preset displayed value [5.50] for the I=4mA current

- keep pressing the  keys in the display field of channel no. 4 until **5.50** is shown

8- preset displayed value [8.00] for the I=20mA current

- keep pressing the  keys in the display field of channel no. 4 until **8.00** is shown

9- carry out correction of amplification for the converter

- press the  key in the display field of channel no. 2 (a diode in the  key blinks)

10- finish configuring measurement channel no. 2

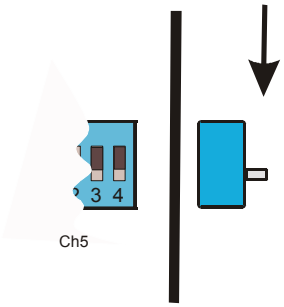
- press the  key (parameters will be stored in memory)

10.4 CHANNEL No.1 AS HOUR-METER

(released by pressing the  key)

The procedure:

1- set position of the A/D converter input type switch (back panel of the Recorder, the switch in lower position)



2- turn on the Recorder

3- switch to the SETUP mode

- press the  key (a diode built-in in the key blinks)

- press the  key and hold it for approximately 3 sec.

(After 3 seconds the symbol **F-00** will be displayed in the real-time display field.)

- keep pressing the  keys in the real time field until **F-00** is shown

- press the  key (the Recorder displays will show [CODE set-up])

- keep pressing the  keys in the display field of channel no. 3 until **888** is shown

- keep pressing the  keys in the display field of channel no. 4 until **888** is shown

- press the  key (the following will be displayed: **SET-UP**, function number – **F00**, and function value)

4- set output type as hour-meter

- keep pressing the  keys in the display field of channel no. 3 until **F54** is shown

- keep pressing the  keys in the display field of channel no. 4 until **13** is shown

5- set method of meter release

- repeat pressing the  keys in the display field of channel no. 3 until **F62** is shown

- keep pressing the  keys in the display field of channel no. 4 until **0** is shown

- press the  key (parameters will be stored in memory)

6- finish configuring measurement channel no. 1

- press the  key (parameters will be stored in memory)

11. DLM-080 – SPECIAL APPLICATIONS

11.1 DLM-080 AS PARAMETER RECORDER USED AT POULTRY SLAUGHTERHOUSES.

Due to necessity to record technological parameters while slaughtering poultry it is possible to configure the DLM-080 so that it meets requirements set in this case.

Typical system hardware configuration required for recording the above-mentioned parameters is as follows:

- impulse sensor (counting number of pieces - quantity) – connection to 0/1 control input

- flowmeter (water meter) with 0..20mA current output; impulse sensor (counting number of pieces - quantity) – connection to 0/1 control input

THE SETUP FUNCTIONS – SPECIFICATION

FUNC-TION No.	TYPICAL VALUE	PARA-METER RANGE	FUNCTION DEFINITION	COMMENTS
F00	0	0..31	Recorder number in the RS-485 network	
F01	111	0..999	First digit of safety code for CLOCK setting	
F02	111	0..999	Second digit of safety code for CLOCK setting	
F03	888	0..999	First digit of safety code for SETUP setting	
F04	888	0..999	Second digit of safety code for SETUP setting	
F05	0 [min]	0..255	Recording printing frequency	In case if F05=0 is set, printing is interlocked.
F06	1 [min]	0..999	Digital recording frequency (the same for all channels)	
F07			Free	
F08			Free	
F09			Free	
F10			Free	
F11			Free	
F12			Free	
F13			Free	
F14	0	0..999	The *To* time length for CHANNEL 1 (see Point 4.4)	
F15	0	0..999	The *To* time length for CHANNEL 2 (see Point 4.4)	
F16	0	0..999	The *To* time length for CHANNEL 3 (see Point 4.4)	
F17	0	0..999	The *To* time length for CHANNEL 4 (see Point 4.4)	
F18	0	0..999	The *To* time length for CHANNEL 5 (see Point	

			4.4)	
F19	0	0..999	The *To* time length for CHANNEL 6 (see Point 4.4)	
F20	0	0..999	The *To* time length for CHANNEL 7 (see Point 4.4)	
F21	0	0..999	The *To* time length for CHANNEL 8 (see Point 4.4)	
F22	1.0		Meter constant	If the value set in setup function F85 is (1), then the real-time clock display shows value obtained from impulse counter according to the formula: Displayed value = quantity
F23	0	0..1	Transmission protocol	
F24	0	0..1	Temperature unit	0-celcius 1-fahrenhait
F25	0		Free	
F26	0		Free	
F27	0		Free	
F28	0		Free	
F29	0		Free	
F30	2	0..25.5	The controller's lower hysteresis value for CHANNEL 1.	Depending on measurement input type : For PT-100 F30=2 corresponds to 0.2°C; for 0..20mA (4..20mA) F30=2 corresponds to 0.02/00.2/002 of measured value (depending on configuration)
F31	2	0..25.5	The controller's upper hysteresis value for CHANNEL 1.	Depending on measurement input type : For PT-100 F31=2 corresponds to 0.2°C; for 0..20mA (4..20mA) F31=2 corresponds to 0.02/00.2/002 of measured value (depending on configuration)
F32	2	0..25.5	The controller's lower hysteresis value for CHANNEL 2.	similarly as before
F33	2	0..25.5	The controller's upper hysteresis value for CHANNEL 2.	similarly as before
F34	2	0..25.5	The controller's lower hysteresis value for CHANNEL 3.	similarly as before
F35	2	0..25.5	The controller's upper hysteresis value for CHANNEL 3.	similarly as before
F36	2	0..25.5	The controller's lower hysteresis value for CHANNEL 4.	similarly as before

F37	2	0..25.5	The controller's upper hysteresis value for CHANNEL 4.	similarly as before
F38	2	0..25.5	The controller's lower hysteresis value for CHANNEL 5.	similarly as before
F39	2	0..25.5	The controller's upper hysteresis value for CHANNEL 5.	similarly as before
F40	2	0..25.5	The controller's lower hysteresis value for CHANNEL 6.	similarly as before
F41	2	0..25.5	The controller's upper hysteresis value for CHANNEL 6.	similarly as before
F42	2	0..25.5	The controller's lower hysteresis value for CHANNEL 7.	similarly as before
F43	2	0..25.5	The controller's upper hysteresis value for CHANNEL 7.	similarly as before
F44	2	0..25.5	The controller's lower hysteresis value for CHANNEL 8.	similarly as before
F45	2	0..25.5	The controller's upper hysteresis value for CHANNEL 8.	similarly as before
F46	0	0..2	Controller output definition for CHANNEL 1	F46=0 controller contact normally closed (algorithm 1) F46=1 controller contact normally open (algorithm 2) Cell value = 2 → 3-state controller (according to algorithm 3)
F47	0	0..2	Controller output definition for CHANNEL 2	as before
F48	0	0..2	Controller output definition for CHANNEL 3	as before
F49	0	0..2	Controller output definition for CHANNEL 4	as before
F50	0	0..1	Controller output definition for CHANNEL 5	F50=0 controller contact normally closed (algorithm 1) F50=1 controller contact normally open (algorithm 2)
F51	0	0..1	Controller output definition for CHANNEL 6	as before
F52	0	0..1	Controller output definition for CHANNEL 7	as before
F53	0	0..1	Controller output definition for CHANNEL 8	as before
F54	0	0..13	Analogue input type definition and display range definition for CHANNEL 1	Definition: 0 – PT-100 RANGE: (- 99,0..400,0); 1 – RANGE OF HUMIDITY FROM PSYCHROMETER: 0..99 2 – NOT USED 3 – RANGE 0,00..9,99 (0..20mA) 4 – RANGE 00,0..99,9 (0..20mA) 5 – RANGE 000..999 (0..20mA) 6 – RANGE 0,00..9,99 (4..20mA) 7 – RANGE 00,0..99,9

				(4..20mA) 8 – RANGE 000..999 (4..20mA) 9 – NOT USED 10 – NOT USED 11 – TIME RANGE: 0..999 SECONDS (forward counting) 12 – TIME RANGE: 0..999 MINUTES (forward counting) 13 – TIME RANGE: 0..999 HOURS (forward counting)
F55	0	0..13	Analogue input type definition and display range definition for CHANNEL 2	as before
F56	0	0..13	Analogue input type definition and display range definition for CHANNEL 3	as before
F57	0	0..13	Analogue input type definition and display range definition for CHANNEL 4	as before
F58	0	0..13	Analogue input type definition and display range definition for CHANNEL 5	as before
F59	0	0..13	Analogue input type definition and display range definition for CHANNEL 6	as before
F60	0	0..13	Analogue input type definition and display range definition for CHANNEL 7	as before
F61	0	0..13	Analogue input type definition and display range definition for CHANNEL 8	as before
F62	0	0..2	Procedure of operation for CHANNEL 1 defined as time-meter (F38)	0 – time-meter initiating (PROG+2seconds) 1 – while time-meter is counting and Tini contact opens, counting will be stopped. Closing the contact again will result in continuation of time metering. In case if time-meter reaches set value, after opening Tini contact the time-meter will be reset to zero. Closing the contact again will make the time-meter start counting. 2 – if Tini contact opens, time-meter will be reset to zero. Closing the contact again will make the time-meter start counting.
F63	0	0..2	Procedure of operation for CHANNEL 2 defined as time-meter (F39)	as before
F64	0	0..2	Procedure of operation for CHANNEL 3 defined as time-meter (F40)	as before
F65	0	0..2	Procedure of operation for CHANNEL 4 defined as time-meter (F41)	as before
F66	0	0..2	Procedure of operation for CHANNEL 5 defined as time-meter (F42)	as before
F67	0	0..2	Procedure of operation for CHANNEL 6 defined as time-meter (F43)	as before
F68	0	0..2	Procedure of operation for CHANNEL 7 defined as	as before

			time-meter (F44)	
F69	0	0..2	Procedure of operation for CHANNEL 8 defined as time-meter (F45)	as before
F70	0	0..255	Allowable difference between set value and read out value for channel 1. Alarm will indicate cases, when this difference is exceeded.	
F71	0	0..255	Allowable difference between set value and read out value for channel 2. Alarm will indicate cases, when this difference is exceeded.	
F72	0	0..255	Allowable difference between set value and read out value for channel 3. Alarm will indicate cases, when this difference is exceeded.	
F73	0	0..255	Allowable difference between set value and read out value for channel 4. Alarm will indicate cases, when this difference is exceeded.	
F74	0	0..255	Allowable difference between set value and read out value for channel 5. Alarm will indicate cases, when this difference is exceeded.	
F75	0	0..255	Allowable difference between set value and read out value for channel 6. Alarm will indicate cases, when this difference is exceeded.	
F76	0	0..255	Allowable difference between set value and read out value for channel 7. Alarm will indicate cases, when this difference is exceeded.	
F77	0	0..255	Allowable difference between set value and read out value for channel 8. Alarm will indicate cases, when this difference is exceeded.	
F78			Free	
F79			Free	
F80	0	0..1	PT-100 measurement range	0 – range up to 400°C 1 – range up to 600°C
F81	0	0..1	Recording base	0 – seconds 1 – minutes
F82	0	0..1	Digital filter for the AC converter on / off	0 – filter off 1 – filter on
F83	1	0..1	Transmission speed	0 – 9600 bps 1 – 19200 bps (THE ONLY TRANSMISSION SPEED AVAILABLE FOR MODBUS RTU PROTOCOL IS 9600; SET PROPER VALUE)
F84	0	0/1	Printing base	0 – seconds 1 – minutes
F85	0	0..1	Clock / time-meter	"0"- displays real-time clock "1" – displays impulse counter on the 0/1 24V DC input
F86	0	0..1	Relay status – REL 9	"0" – relay as an alarm signalling device

				"1" – relay as the 3-rd state in a 3-state algorithm for channel 1
F87	0	0..1	Relay status – REL 10	"0" – relay off "1" – relay as the 3-rd state in a 3-state algorithm for channel 2
F88	0	0..1	Relay status – REL 11	"0" – relay as an alarm signalling device "1" – relay as the 3-rd state in a 3-state algorithm for channel 3
F89	0	0..1	Relay status – REL 12	"0" – relay as an alarm signalling device "1" – relay as the 3-rd state in a 3-state algorithm for channel 4
F 90	0	0..3	Measurement processing type for channel 1	"0" – actual value at the moment of recording "1" – average value in sampling period (measurement every two seconds) "2" – maximum value "3" – minimum value Functions are inactive when seconds are the time base
F 91	0	0..3	Measurement processing type for channel 2	
F 92	0	0..3	Measurement processing type for channel 3	
F 93	0	0..3	Measurement processing type for channel 4	
F 94	0	0..3	Measurement processing type for channel 5	
F 95	0	0..3	Measurement processing type for channel 6	
F 96	0	0..3	Measurement processing type for channel 7	
F 97	0	0..3	Measurement processing type for channel 8	
F 98		0..1	Impulse counter recording on / off	0 – Impulse counter recording off 1 – Impulse counter recording on Attention ! If impulse counter recording is on then it takes memory area normally used by measurement channel no. 8, that is in this case measurements from channel 8 cannot be registered !!!
F 99		0..999	Time of measurement cycle end	

Other SETUP functions are not used in current recorder version !!!

MODBUS RTU

The DLM-080 digital recorder communicates with master systems through two-wire serial link (RS-485) using two transmission protocols: MIKSTER-BUS (protocol used in-house by MIKSTER) and MODBUS RTU.

MODBUS RTU FRAME

T1 T2 T3	**Device Address**	**Function**	**Data**	**Control Total** **CRC-16**	**T1 T2 T3**
	8 bit	**8 bit**	**n x 8 bit**	**16 bit**	

Functions available from the DLM-080 recorder using the MODBUS protocol:

Function number	**Definition**
0	*Reserved*
1	*Reserved*
2	*Reserved*
3	*Reserved*
4	**Readout of DLM-080 records**
5..64	*Reserved*
65	**RTC clock setting in the DLM-080**
66	**Setting of highlighted measure using the DLM-080 keyboard**
67	**Transmission of SETUP settings to the DLM-080**
68	**Clearing of recording buffer**
69..255	*Reserved*

Function 4 (Recorder Register Reading)

Master >>> Slave

Byte number	Value / variable	Definition
1	ADDEV	Slave address in the rs485 network (range 1..32)
2	04 (04h)	Function number
3	Adres_h	(h) address of the beginning of currently read out register block
4	Adres_l	(l) address of the beginning of currently read out register block
5	Długość_H	Number of two-byte registers
6	Długość_l	
7	CRC_h	Control total CRC-16
8	CRC_l	

Master <<< Slave

Byte number	Value / variable	Definition
1	ADDEV	Slave address in the rs485 network (range 0..31)
2	04 (04h)	Function number
3	ByteCNT	Byte counter
4	Rej 0	Block of data (registers) determined by start address and data volume in a frame sent by MASTER device
5	rej 1	
	. . . . .	
n+2	rej n	
n+3	CRC_H	Control total
n+4	CRC_L	

Function 65 (Real-time Clock – RTC Setting)

Master >>> Slave

Byte number	Value / variable	Range	Definition
1	ADDEV	0..31	Slave address in the rs485 network
2	65 (41h)	0..255	Function number
3	RTC_rok	00..99	Year
4	RTC_miesiąc	1..12	Month
5	RTC_dzień	1..31	Day
6	RTC_ godzina	0..23	Hour
7	RTC_ minuta	0..59	Minute
8	RTC_ sekunda	0..59	Second
9	CRC_h	0..255	CRC-16 control total
10	CRC_l	0..255	

Function 66 (Measure)

Master >>> Slave

Byte number	Value / variable	Range	Definition
1	ADDEV	0..31	Slave address in the rs485 network
2	66 (42h)	0..255	Function number
3	Wym_kan_1	0..3	0- °C 1- % 2- bar 3- „clock"
4	Wym_kan_2	0..3	As before
5	Wym_kan_3	0..3	As before
6	Wym_kan_4	0..3	As before
7	Wym_kan_5	0..3	As before
8	Wym_kan_6	0..3	As before
9	Wym_kan_7	0..3	As before
10	Wym_kan_8	0..3	As before
11	CRC_h	0..255	CRC-16 control total
12	CRC_l	0..255	

Function 67 (Saving Setup Parameters)

Master >>> Slave

Byte number	Value / variable	Range	Definition
1	ADDEV	0..31	Slave address in the rs485 network
2	67 (43h)	0..255	Function number
3 . . . 130	Setup_Reg	0..255	Block of setup registers transmitted from MASTER to SLAVE, length: 128 bytes. Data format same as SETUP area in the memory map.
131	CRC_h	0..255	CRC-16 control total
132	CRC_l	0..255	

Function 68 (Clearing of Recording Buffer)

Master >>> Slave

Byte number	Value / variable	Range	Definition
1	ADDEV	0..31	Slave address in the rs485 network
2	68 (44h)	0..255	Function number
3	CRC_h	0..255	CRC-16 control total
4	CRC_l	0..255	

The Memory Map : Multipurpose Registers

ADDRESS	Definition	Range	Format
0000H	**RTC – second**	**0..59**	
0001H	**RTC – minute**	**0..59**	
0002H	**RTC – hour**	**0..23**	
0003H	**RTC – day**	**1.31**	
0004H	**RTC – month**	**1..12**	
0005H	**RTC – YEAR**	**0.99**	
0006H	**reserved**		
0007H	**reserved**		
0008H	**reserved**		
0009H	**reserved**		
000AH	**reserved**		
000BH	**reserved**		
000CH	**reserved**		
000DH	**reserved**		
000EH	**reserved**		
000FH	**reserved**		
0010H	**Set value (L); Channel 1**	**0..255**	**Set value for Channel 1 is stored in four successive memory bytes in the following format:** **Set value (real) = [Wz(hhh) Wz(hh) Wz(h) Wz(l)]/1000**
0011H	**Set value (H); Channel 1**	**0..255**	
0012H	**Set value (HH); Channel 1**	**0..255**	
0013H	**Set value (HHH); Channel 1**	**0..255**	
0014H	**As before for channel 2**	**0..255**	**As before for channel 2**
0015H			
0016H			
0017H			
0018H	**As before for channel 3**	**0..255**	**As before for channel 3**
0019H			
001AH			
001BH			
001CH	**As before for channel 4**	**0..255**	**As before for channel 4**
001DH			
001EH			
001FH			
0020H	**As before for channel 5**	**0..255**	**As before for channel 5**
0021H			
0022H			
0023H			
0024H	**As before for channel 6**	**0..255**	**As before for channel 6**
0025H			
0026H			
0027H			
0028H	**As before for channel 7**	**0..255**	**As before for channel 7**
0029H			
002AH			

002BH			
002CH **002DH** **002EH** **002FH**	**As before for channel 8**	**0..255**	**As before for channel 8**
0030H	**Read out value (L); Channel 1**	**0..255**	**Set value for Channel 1 is stored in four successive memory bytes in the following format:** **Read out value (real) = [Wo(hhh) Wo(hh) Wo(h) Wo(l)]/1000**
0031H	**Read out value (H); Channel 1**	**0..255**	
0032H	**Read out value (HH); Channel 1**	**0..255**	
0033H	**Read out value (HHH); Channel 1**	**0..255**	
0034H **0035H** **0036H** **0037H**	**As before for channel 2**	**0..255**	**As before for channel 2**
0038H **0039H** **003AH** **003BH**	**As before for channel 3**	**0..255**	**As before for channel 3**
003CH **003DH** **003EH** **003FH**	**As before for channel 4**	**0..255**	**As before for channel 4**
0040H **0041H** **0042H** **0043H**	**As before for channel 5**	**0..255**	**As before for channel 5**
0044H **0045H** **0046H** **0047H**	**As before for channel 6**	**0..255**	**As before for channel 6**
0048H **0049H** **004AH** **004BH**	**As before for channel 7**	**0..255**	**As before for channel 7**
004CH **004DH** **004EH** **004FH**	**As before for channel 8**	**0..255**	**As before for channel 8**
0050H..007F	**Reserved**		
0080H	**State of output relays [SP(L)]**	**00000000B..11111111B**	**Two registers, in which current state of relay outputs is indicated.** **0B – relay off 1B – relay on** **SP(H) SP(L)** **xxxx0000 00000000 > Rel. 0 Rel. 12 >>|**
0081H	**State of output relays [SP(H)]**		

The Memory Map: SETUP

Address	FUNCTION No.	VALUE	PARA-METER RANGE	FUNCTION DEFINITION	COMMENTS
0200h	**F00**	(L)	0..32	Recorder number in the RS-485 network	
0201h		(H)			
0202h	**F01**	(L)	0..999	First digit of safety code for CLOCK setting	
0203h		(H)			
0204h	**F02**	(L)	0..999	Second digit of safety code for CLOCK setting	
0205h		(H)			
0206h	**F03**	(L)	0..999	First digit of safety code for SETUP setting	
0207h		(H)			
0208h	**F04**	(L)	0..999	Second digit of safety code for SETUP setting	
0209h		(H)			
020Ah	**F05**	(L)	0..255	Recording printing frequency	In case if F05=0 is set, printing is interlocked.
020Bh		(H)			
020Ch	**F06**	(L)	0..999	Digital recording frequency (the same for all channels)	
020Dh		(H)			
020Eh	**F07**	(L)		Free	
020Fh		(H)			
0210h	**F08**	(L)		Free	
0211h		(H)			
0212h	**F09**	(L)		Free	
0213h		(H)			
0214h	**F10**	(L)		Free	
0215h		(H)			
0216h	**F11**	(L)		Free	
0217h		(H)			
0218h	**F12**	(L)		Free	
0219h		(H)			
021Ah	**F13**	(L)		Free	
021Bh		(H)			
021Ch	**F14**	(L)	0..999	The *To* time length for CHANNEL 1 (see Point 4.4)	
021Dh		(H)			
021Eh	**F15**	(L)	0..999	The *To* time length for CHANNEL 2 (see Point 4.4)	
021Fh		(H)			

0220h	**F16**	(L)	0..999	The *To* time length for CHANNEL 3 (see Point 4.4)	
0221h		(H)			
0222h	**F17**	(L)	0..999	The *To* time length for CHANNEL 4 (see Point 4.4)	
0223h		(H)			
0224h	**F18**	(L)	0..999	The *To* time length for CHANNEL 5 (see Point 4.4)	
0225h		(H)			
0226h	**F19**	(L)	0..999	The *To* time length for CHANNEL 6 (see Point 4.4)	
0227h		(H)			
0228h	**F20**	(L)	0..999	The *To* time length for CHANNEL 7 (see Point 4.4)	
0229h		(H)			
022Ah	**F21**	(L)	0..999	The *To* time length for CHANNEL 8 (see Point 4.4)	
022Bh		(H)			
022Ch	**F22**	(L)		Meter constant	If the value set in setup function F85 is (1), then the real-time clock display shows value obtained from impulse counter according to the formula: Displayed value = quantity
022Dh		(H)			
022Eh	**F23**	(L)	0.1	Transmission protocol	0 – MIKSTER-BUS 1 – MODBUS RTU (THE ONLY TRANSMISSION SPEED AVAILABLE FOR MODBUS RTU PROTOCOL IS 9600; SET PROPER VALUE IN FUNCTION F-83)
022Fh		(H)			
0230h	**F24**	(L)		Free	
0231h		(H)			
0232h	**F25**	(L)		Free	
0233h		(H)			
0234h	**F26**	(L)		Free	
0235h		(H)			
0236h	**F27**	(L)		Free	
0237h		(H)			
0238h	**F28**	(L)		Free	
0239h		(H)			

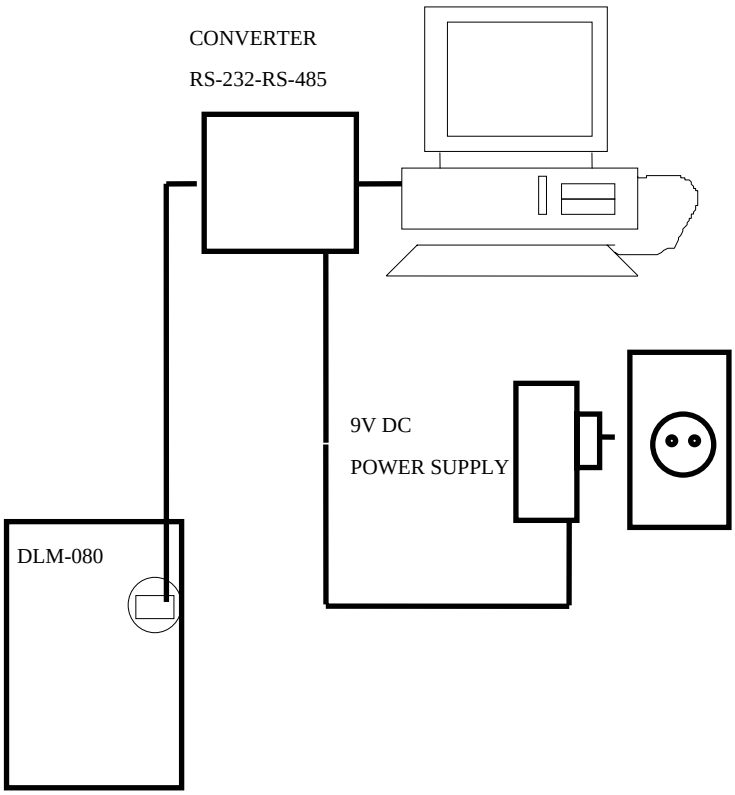
023Ah	**F29**	(L)		Free	
023Bh		(H)			
023Ch	**F30**		0..25.5	The controller's lower hysteresis value for CHANNEL 1.	Depending on measurement input type : For PT-100 F30=2 corresponds to 0.2°C; for 0..20mA (4..20mA) F30=2 corresponds to 0.02/00.2/002 of measured value (depending on configuration)
023Dh	**F31**		0..25.5	The controller's upper hysteresis value for CHANNEL 1.	Depending on measurement input type : For PT-100 F31=2 corresponds to 0.2°C; for 0..20mA (4..20mA) F31=2 corresponds to 0.02/00.2/002 of measured value (depending on configuration)
023Eh	**F32**		0..25.5	The controller's lower hysteresis value for CHANNEL 2.	similarly as before
023Fh	**F33**		0..25.5	The controller's upper hysteresis value for CHANNEL 2.	similarly as before
0240h	**F34**		0..25.5	The controller's lower hysteresis value for CHANNEL 3.	similarly as before
0241h	**F35**		0..25.5	The controller's upper hysteresis value for CHANNEL 3.	similarly as before
0242h	**F36**		0..25.5	The controller's lower hysteresis value for CHANNEL 4.	similarly as before
0243h	**F37**		0..25.5	The controller's upper hysteresis value for CHANNEL 4.	similarly as before
0244h	**F38**		0..25.5	The controller's lower hysteresis value for CHANNEL 5.	similarly as before
0245h	**F39**		0..25.5	The controller's upper hysteresis value for CHANNEL 5.	similarly as before
0246h	**F40**		0..25.5	The controller's lower hysteresis value for CHANNEL 6.	similarly as before
0247h	**F41**		0..25.5	The controller's upper hysteresis value for CHANNEL 6.	similarly as before
0248h	**F42**		0..25.5	The controller's lower hysteresis value for CHANNEL 7.	similarly as before
0249h	**F43**		0..25.5	The controller's upper hysteresis value for CHANNEL 7.	similarly as before
024Ah	**F44**		0..25.5	The controller's lower hysteresis value for CHANNEL 8.	similarly as before
024Bh	**F45**		0..25.5	The controller's upper hysteresis value for CHANNEL 8.	similarly as before
024Ch	**F46**		0..2	Controller output definition for CHANNEL 1	F46=0 controller contact normally closed (algorithm 1) F46=1 controller contact normally open (algorithm 2) Cell value = 2 → 3-state controller

					(according to algorithm 3)
024Dh	**F47**		0..2	Controller output definition for CHANNEL 2	as before
024Eh	**F48**		0..2	Controller output definition for CHANNEL 3	as before
024Fh	**F49**		0..2	Controller output definition for CHANNEL 4	as before
0250h	**F50**		0..1	Controller output definition for CHANNEL 5	F50=0 controller contact normally closed (algorithm 1) F50=1 controller contact normally open (algorithm 2)
0251h	**F51**		0..1	Controller output definition for CHANNEL 6	as before
0252h	**F52**		0..1	Controller output definition for CHANNEL 7	as before
0253h	**F53**		0..1	Controller output definition for CHANNEL 8	as before
0254h	**F54**		0..13	Analogue input type definition and display range definition for CHANNEL 1	Definition: 0 – PT-100 RANGE: (-99,0..400,0); 1 – RANGE OF HUMIDITY FROM PSYCHROMETER: 0..99 2 – NOT USED 3 – RANGE 0,00..9,99 (0..20mA) 4 – RANGE 00,0..99,9 (0..20mA) 5 – RANGE 000..999 (0..20mA) 6 – RANGE 0,00..9,99 (4..20mA) 7 – RANGE 00,0..99,9 (4..20mA) 8 – RANGE 000..999 (4..20mA) 9 – NOT USED 10 – NOT USED 11 – TIME RANGE: 0..999 SECONDS (forward counting) 12 – TIME RANGE: 0..999 MINUTES (forward counting) 13 – TIME RANGE: 0..999 HOURS (forward counting)
0255h	**F55**		0..13	Analogue input type definition and display range definition for CHANNEL 2	as before
0256h	**F56**		0..13	Analogue input type definition and display range definition for CHANNEL 3	as before
0257h	**F57**		0..13	Analogue input type definition and display range definition for CHANNEL 4	as before
0258h	**F58**		0..13	Analogue input type definition and display range definition for CHANNEL 5	as before
0259h	**F59**		0..13	Analogue input type definition and display range definition for CHANNEL 6	as before
025Ah	**F60**		0..13	Analogue input type definition and display range definition for CHANNEL 7	as before
025Bh	**F61**		0..13	Analogue input type definition and display range definition for CHANNEL 8	as before
025Ch	**F62**		0..2	Procedure of operation for CHANNEL 1 defined as time-meter (F38)	0 – time-meter initiating (PROG+2seconds)

					1 – while time-meter is counting and Tini contact opens, counting will be stopped. Closing the contact again will result in continuation of time metering. In case if time-meter reaches set value, after opening Tini contact the time-meter will be reset to zero. Closing the contact again will make the time-meter start counting. 2 – if Tini contact opens, time-meter will be reset to zero. Closing the contact again will make the time-meter start counting.
025Dh	**F63**		0..2	Procedure of operation for CHANNEL 2 defined as time-meter (F39)	as before
025Eh	**F64**		0..2	Procedure of operation for CHANNEL 3 defined as time-meter (F40)	as before
025Fh	**F65**		0..2	Procedure of operation for CHANNEL 4 defined as time-meter (F41)	as before
0260h	**F66**		0..2	Procedure of operation for CHANNEL 5 defined as time-meter (F42)	as before
0261h	**F67**		0..2	Procedure of operation for CHANNEL 6 defined as time-meter (F43)	as before
0262h	**F68**		0..2	Procedure of operation for CHANNEL 7 defined as time-meter (F44)	as before
0263h	**F69**		0..2	Procedure of operation for CHANNEL 8 defined as time-meter (F45)	as before
0264h	**F70**		0..255	Allowable difference between set value and read out value for channel 1. Alarm will indicate cases, when this difference is exceeded.	
0265h	**F71**		0..255	Allowable difference between set value and read out value for channel 2. Alarm will indicate cases, when this difference is exceeded.	
0266h	**F72**		0..255	Allowable difference between set value and read out value for channel 3. Alarm will indicate cases, when this difference is exceeded.	
0267h	**F73**		0..255	Allowable difference between set value and read out value for channel 4. Alarm will indicate cases, when this difference is exceeded.	
0268h	**F74**		0..255	Allowable difference between set value and read out value for channel 5. Alarm will indicate cases, when this difference is exceeded.	
0269h	**F75**		0..255	Allowable difference between set value and read out value for channel 6. Alarm will indicate cases, when this difference is exceeded.	
026Ah	**F76**		0..255	Allowable difference between set value and read out value for channel 7. Alarm will	

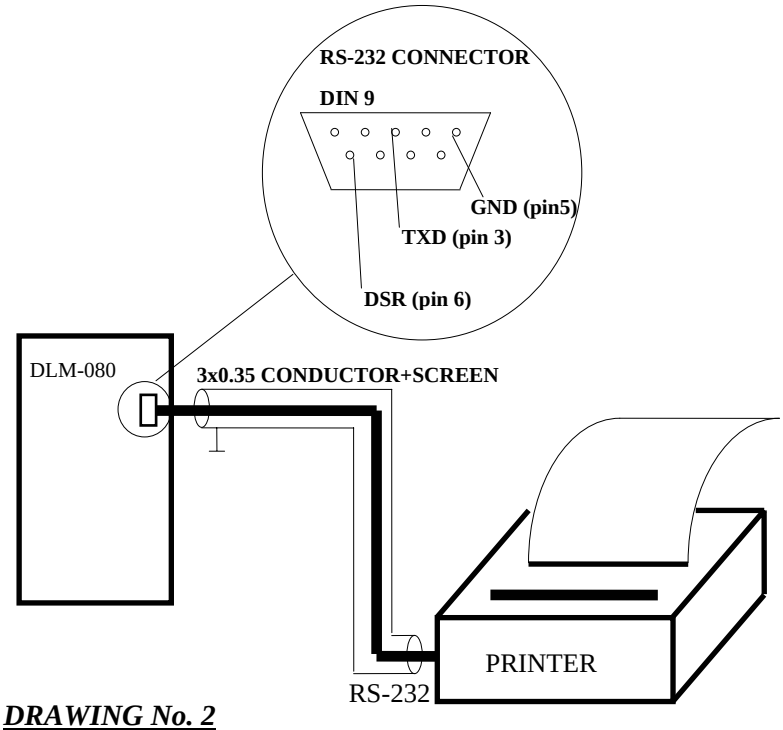
				indicate cases, when this difference is exceeded.	
026Bh	**F77**		0..255	Allowable difference between set value and read out value for channel 8. Alarm will indicate cases, when this difference is exceeded.	
026Ch	**F78**			Free	
026Dh	**F79**			Free	
026Eh	**F80**		0..1	PT-100 measurement range	0 – range up to 400°C 1 – range up to 600°C
026Fh	**F81**		0..1	Recording base	0 – seconds 1 – minutes
0270h	**F82**		0..1	Digital filter for the AC converter on / off	0 – filter off 1 – filter on
0271h	**F83**		0..1	Transmission speed	0 – 9600 bps 1 – 19200 bps (THE ONLY TRANSMISSION SPEED AVAILABLE FOR MODBUS RTU PROTOCOL IS 9600, SET PROPER VALUE)
0272h	**F84**		0/1	Printing base	0 – seconds 1 – minutes
0273h	**F85**		0..1	Clock / time-meter	"0"- displays real-time clock "1" – displays impulse counter on the 0/1 24V DC input
0274h	**F86**		0..1	Relay status – REL 9	"0" – relay as an alarm signalling device "1" – relay as the 3-rd state in a 3-state algorithm for channel 1
0275h	**F87**		0..1	Relay status – REL 10	"0" – relay off "1" – relay as the 3-rd state in a 3-state algorithm for channel 2
0276h	**F88**		0..1	Relay status – REL 11	"0" – relay as an alarm signalling device "1" – relay as the 3-rd state in a 3-state algorithm for channel 3
0277h	**F89**		0..1	Relay status – REL 12	"0" – relay as an alarm signalling device "1" – relay as the 3-rd state in a 3-state algorithm for channel 4
0278h	**F 90**		0..3	Measurement processing type for channel 1	"0" – actual value at the moment of recording "1" – average value in sampling period (measurement every two seconds) "2" – maximum value "3" – minimum value

					Functions are inactive when seconds are the time base
0279h	**F 91**		0..3	Measurement processing type for channel 2	
027Ah	**F 92**		0..3	Measurement processing type for channel 3	
027Bh	**F 93**		0..3	Measurement processing type for channel 4	
027Ch	**F 94**		0..3	Measurement processing type for channel 5	
027Dh	**F 95**		0..3	Measurement processing type for channel 6	
027Eh	**F 96**		0..3	Measurement processing type for channel 7	
027Fh	**F 97**		0..3	Measurement processing type for channel 8	
0280h	**F 98**		0..1	Impulse counter recording on / off	
0281h	**F 99**		0..999	Time of measurement cycle end	



DRAWING No. 1

CONNECTING THE DLM-080 RECORDER TO A PC COMPUTER



DRAWING No. 2

CONNECTING PRINTER TO THE DLM-080 RECORDER