Multifunctional-Display

DA 230A

Identification No.: 155 264 (English) 02/2019

Please note:
Unless otherwise stated in this instruction manual, technical alterations, particularly those serving technical progress, may be made without notice.

Warranty can only be assumed if the instrument has not been tampered with and is returned intact to KELLER HCW GmbH for repair and / or service.

© 2009 **KELLER HCW GmbH**
Carl-Keller-Strasse 2 – 10
D-49479 Ibbenbüren-Laggenbeck
Germany
www.keller.de/its

810-het / 842-kle
DA 230A_e.doc
04.02.2019

Safety Instructions

General Instructions

The digital display is designed according to state-of-the-art technology, complies with commonly accepted safety rules and is highly reliable. Improper handling however, may cause damage to the digital display or to other goods involved.

All persons involved with operation and maintenance of the digital display must first read the instruction manual.

The digital display may only be used when it is in good order and condition and under the observance of all local safety regulations. In case the digital display malfunctions, it is imperative that operation be ceased immediately.

Intended Use

The digital display is exclusively built for measuring of temperatures. Any other use is not intended. The manufacturer is not liable for any damages resulting from such unintended use; in this case the risk is solely borne by the user.

Only persons who are familiar with the use of the digital display and who have been informed of possible dangers, are allowed to operate and maintain them.

Arbitrary alterations to the digital display or operation of the digital display beyond the permitted operating conditions exclude the liability of the manufacturer for any damages resulting thereof.

The common regulations for the prevention of accidents must be observed.

Contents

1. Miscellaneous

1.1. Informationen about this manual

The Operating Manual shall enable the user to properly install the pyrometer and those accessories which are necessary.

Before starting installation, be sure to read and understand this entire manual, in particular the chapter on safety! The instructions contained in this manual, especially those concerning safety, as well as site-specific regulations for accident prevention must be complied with at all times!

1.2. Explanation of symbols

Important safety-related references in this manual are marked with a symbol. It is imperative that you observe the safety precautions or instructions indicated by these symbols. Failure to do so might result in accidents involving physical injury and/or material damage.

CAUTION!

This symbol indicates important information which, if neglected, might result in pyrometer damage, malfunction or breakdown.

PLEASE NOTE !

This symbol points out guidelines which should be heeded for efficient and trouble-free operation.

1.3. Liability and Warranty

All information compiled in this manual is in accordance with applicable regulations. The statements made are based on state-of-the-art technology and reflect our extensive knowledge and many years of experience.

PLEASE NOTE !

Always carefully read this Operating Manual before beginning any work on or with the instrument, especially prior to installation and initial setup! The Manufacturer shall not be held liable for any damages or malfunctions arising from a disregard of the warnings and instructions contained herein.

This Operating Manual must be retained for future use. Please ensure that all persons who wish to operate the instrument have access to this manual.

1.4. Copyright

This Operating Manual should be treated as confidential. It is solely intended for use by persons involved with the instrument. This manual may not be made available to a third party without prior Manufacturer's consent. Please contact the Manufacturer if the need should arise.

☞ PLEASE NOTE !

The data, texts, charts, drawings, images or other representations contained in this manual are copyright-protected and furthermore, subject to intellectual property rights. Violators will be prosecuted. Unauthorised use and copyright infringement will be subject to penalty by law.

Reproductions of any kind, in whole or in part, as well as the exploitation or disclosure of this manual's content without the explicit written approval of the Manufacturer are expressly prohibited by law. Violations shall be subject to compensation claims by the Manufacturer. The right to claim additional indemnities remains reserved.

2. Safety

This chapter outlines all important safety aspects to be considered for optimum employee protection and to ensure safe and reliable operations.

2.1. Intended use

The pyrometer is solely intended for non-contact measurement of temperatures as described in this manual. Any other use is not intended. Operational safety can only be ensured when the instrument is used for its intended purpose.

CAUTION !

It is prohibited to use the pyrometer for any other purpose beyond what is specified in this manual. Using the instrument in any other manner will be considered as improper.

The Manufacturer/Authorised Agent shall not be held liable for any damages or loss resulting from such unintended or improper use; in this case the risk is solely borne by the user.

2.2. User's Responsibility

The instrument may only be used when it is in perfect working condition.

2.3. Radio interference suppression / EMC

The instrument complies with the requirements of EC Directive 89/336/EEC changed by 91/263/EEC; 92/31/EEC; 93/68/EEC relating to radio interference suppression and electromagnetic compatibility.

When connecting a power supply unit, make sure that is also conforms to these standards. Radio interference may arise if the pyrometer is interconnected with such peripheral devices which have not been properly interference-suppressed. This may necessitate additional interference suppression measures.

2.4. Quality Management Certification

The KELLER HCW Quality Management System meets the DIN EN ISO 9001 Standards for design, production, repairs and service for non-contact infrared temperature measuring equipment.

TÜV CERT
DIN EN ISO 9001 : 2000
08 100 969557

3. General Information

The microprocessor-controlled digital display was designed to visualise any electrical signal. The unit, manufactured in a 48 x 96 mm flush mounting housing, includes as a standard feature a minimum, maximum and momentary data memory an well as an automatic tare function. Also available are three contacts for monitoring the process.

The connection of all inputs and outputs is made by multi-pin plugs on the rear side of the unit.

The value of the electrical signal is displayed by a 4-digit display, the condition of the binary I/O is shown by LED´s. The operation of the unit is parted in four layers. Each layer is secured by a special password. For programming and data input the unit has a foil covered keyboard.

4. Connection

4.1. Power Supply

The connection of the auxiliary power is a multi-pin plug at the rear side of the unit. Caution! The unit is available in a 95 – 265 V and in a 24 V AC/DC version. **Please check the voltage with the recommended voltage noted on the unit! Also assure a careful grounding of the unit!**

4.2. Display Input

Standardly the unit has a universal input, which is able to display the following signals:

4.3. Pt100 - Input

The connection of a Pt100 temperature sensor can be done in 2- or 3-wire connection. If you choose 2-wire connection, the wire-resistance can be eliminated by the parameter „E0“. The range of the display can be defined in ranges between -100 and 600 °C. Wiring diagram ⇨ Pt 8.

4.4. Current Input

Input current 0 .. 20 mA or 4 .. 20 mA. Display range is user-definable. Wiring diagram ⇨ Pt 8.

4.5. Voltage Input

Input voltage 0 .. 10V or 2 .. 10V. Display range is user-definable. Wiring diagram ⇨ Pt 11.

4.6. 2-wire Transducer with supply

Connection for 2-wire transducer 4 .. 20 mA with 24 V supply voltage. Display range is user-definable. Wiring diagram ⇨ Pt 11.

4.7. Thermocouple Input

Connection for thermocouples Typ K, S, J, T. Compensation is integrated in the unit. Wiring diagram ⇨ Pt 11.

4.8. Pyrometer Input

Connection for radiation pyrometer with output 0 .. 20 mA. A power supply of 24 V / 50 mA is available. Wiring diagram ⇨ Pt 11.

4.9. Binary Inputs

There are two binary inputs with programmable function. Activation can be done by an external voltage (24 V) or you can use the internal supply (24 V switched by contact). Wiring diagram ⇨ Pt 11.

4.10. Analogue Output

The analogue Output provides automatic voltage/current switching depending on the load. The output range is user-definable. Wiring diagram ⇨ Pt 11.

4.11. Binary Outputs

Three potential free contacts (relays) can be defined as NC or NO (internal). Wiring diagram ⇨ Pt 11.

4.12. Serial port

The digital display unit uses either Modbus RTU or Modbus/ASCII serial communications protocol (user configurable). The modbus interface runs on either RS-232 or RS-485 (user configurable). The RS-485 bus must be terminated by a jumper. When configuring the parameters SN, BAU and NOS the user must define the selected interface (RS-232 or RS-485)

5. First-Time Operation

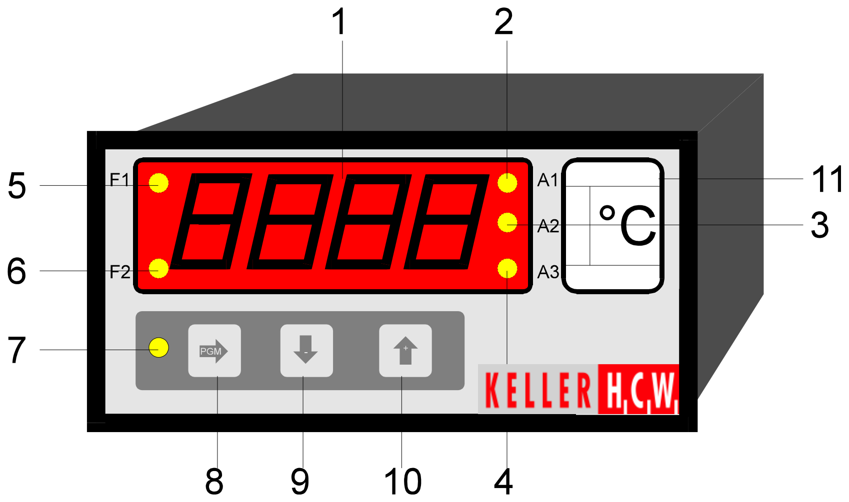
The display unit DA 230A is manufactured with all data and programming in special default values. Before first-time operation the programming should be adapted to the process (⇨ 6.2).

Caution!

Make sure that during programming the unit cannot perform any malfunction of your system!

6. Operation

6.1. Display and Operating Elements

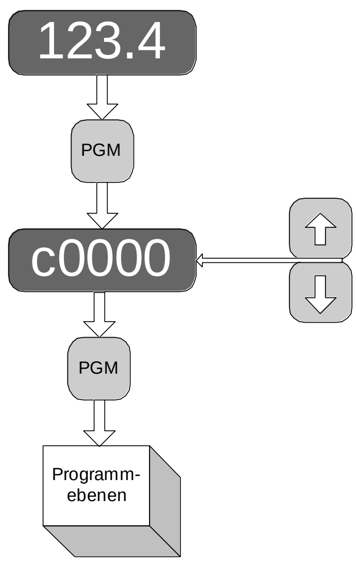


1) Display
2) Condition Alarm output 1
3) Condition Alarm output 2
4) Condition Alarm output 3
5) Condition Binary Input 1
6) Condition Binary Input 2
7) Condition Programming Mode
8) „Program“ Key
9) „-“ Key
10) „+“ Key
11) Label for Dimension and Alarm

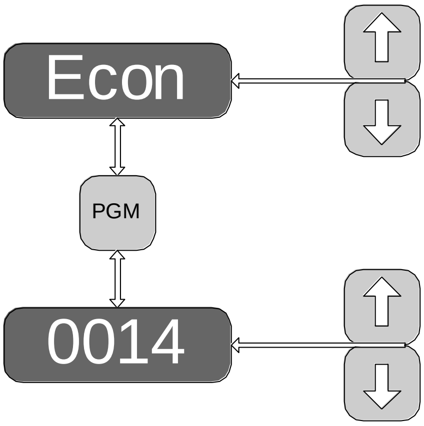
6.2. Operating Structure

The operation of the display unit DA 230A is separated in four layers: in the operating layer the value of the input and the peak memories are displayed, in the three programming layers for configuration, linearisation and alarm definition the system-specific parameters are programmed. All data are stored in memory without power supply. The access of the programming layers is password secured.

For the access to the programming layers a password must be entered. To do this, press the key „PGM“ (8). The display shows „c000“. The correct code for the chosen layer can now be entered by changing the display with the keys „-“ (9) and „+“ (10). If the display shows the correct code, the layer can be opened by pressing the key „PGM“ (8) again.



To enter data in the layer one must differentiate between two display modes: when opening a layer you are in parameter mode. The keys „-“ (9) and „+“ (10) have the function of cursor keys to select the parameter (display alphanumerical). Pressing the key „PGM“ (8) changes to value mode. Now you can change the value of the chosen parameter with the keys „-“ (9) and „+“ (10). Switching back to parameter mode is performed by pressing the key „PGM“ again.



To leave the programming layers select the **End** parameter. Pressing the key „PGM“ (8) switches back to operating layer.

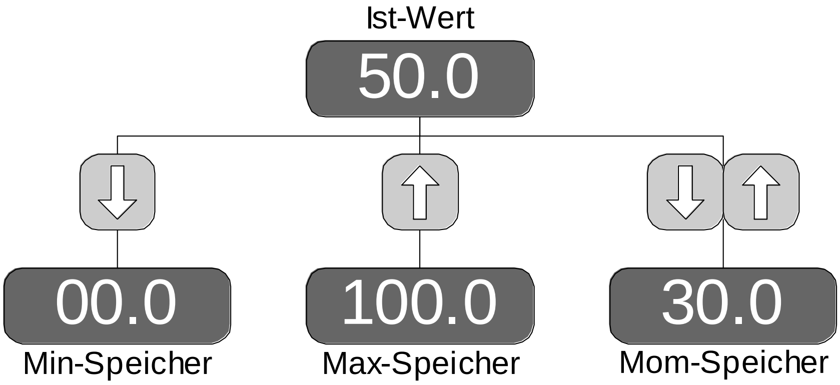
6.3. Operating Layer

Normally the display shows the value of the input. The keys „-“ (9) and „+“ (10) have a special switching function while pressing them. Depending on the parameter **Ano,** which defines whether the input value or a peak is to be displayed, the following definitions are possible:

	Ano = 0	**Ano = 1**	**Ano = 2**	**Ano = 3**	**Ano = 4**
no Key	X	X_{min}	X_{max}	X_{mom}	X_{2max}
Key +	X_{max}	X_{max}	X	X_{max}	X
Key -	X_{min}	X	X_{min}	X_{min}	X_{min}
Key + & -	X_{mom}	X_{mom}	X_{mom}	X	X_{mom}

X = Value, X_{max} = Max-peak Memory, X_{min} = Min-peak Memory,
X_{mom} = Moment-value Memory, X_{2max} = Double-Max-peak Memory

Example for Ano = 0:



6.4. Alarm Layer

The alarm layer provides the possibility of defining the switching point and hysteresis of the three alarm outputs. The password is to be defined in configuration layer at the parameter **coA** (default = **2**).

Para	Description	Range	Default	Custo-mized setting
A1	Switching point output 1	-999 .. 9999	0	
AH1	Hysteresis output 1	0 .. 9999	0	
A2	Switching point output 2	-999 .. 9999	0	
AH2	Hysteresis output 2	0 .. 9999	0	
A3	Switching point output 3	-999 .. 9999	0	
AH3	Hysteresis output 3	0 .. 9999	0	
End	Exit layer			

6.5. Configuration Layer

In the configuration layer the structure of the unit is defined. For proper operation all data input to this layer should be finished correctly before first time operation. The password for this layer is defined by the parameter **coC** (default = **1**).

Para	Description	range	default	Custo-mized setting
Econ	**Input Configuration** **1** ⇨ Pt100, -200 .. 800 °C **2** ⇨ 0 .. 20 mA **3** ⇨ 0 .. 10 V **4** ⇨ 4 .. 20 mA **5** ⇨ 2 .. 10 V **6** ⇨ Reserve **7** ⇨ Reserve **8** ⇨ Thermocouple Pt10Rh-Pt, 400 .. 1800 °C,**Typ B** **9** ⇨ Thermocouple NiCr-Ni, 0 .. 1200 °C,**Typ K** **10** ⇨ Thermocouple NiCr-CuNi, 0 .. 650 °C,**Typ E** **11** ⇨ Thermocouple Pt10Rh-Pt, 0 .. 1700 °C,**Typ S** **12** ⇨ Thermocouple Pt13Rh-Pt, 0 .. 1700 °C,**Typ R** **13** ⇨ Thermocouple Fe-CuNi, 0 .. 900 °C,**Typ J** **14** ⇨ Thermocouple Fe-CuNi, 0 .. 900 °C,**Typ L** **15** ⇨ Thermocouple Cu-CuNi, 0 .. 400 °C,**Typ T** **16** ⇨ Thermocouple Cu-CuNi, 0 .. 600 °C, **Typ U** **17** ⇨ variable Linearisation, Input 0 .. 20 mA **18** ⇨ variable Linearisation, Input 0 .. 10 V **19** ⇨ variable Linearisation, Input 0 .. 50 mV **20** ⇨ Pt100 4-Leiterschaltung	**0 .. 20**	0	

EE	**Input Unit** (no function at **Econ =** 2 - 5) 0 ⇨ °Celsius 1 ⇨ °Fahrenheit	**0 .. 1**	0	
E_	**Display range, lower limit** at **Econ** = 2 - 5: display for minimal signal at **Econ** ≠ 2 - 5: display value for minimum analogue output signal.	**-999 .. 9999**	0	
E¯	**Display range, upper limit** at **Econ** = 2 - 5: display for maximal signal at **Econ** ≠ 2 - 5: display value for maxmum analogue output signal.	**-999 .. 9999**	100,0	
E,	**Display range, point setting** activ at **Econ** = 2 - 5 only **0** ⇨ display XXXX **1** ⇨ display XXX,X **2** ⇨ display XX,XX **3** ⇨ display X,XXX	**0 .. 3**	1	
E0	**Input - Offset** to correct sensor accuracy	**-999 .. 9999**	0	
EP	**Emission capability (Pyrometer)** value in [%]	**0 ... 100**	100	
EL	**Wavelength (Pyrometer)** **0** ⇨ calculation off **1** ⇨ λ = 900 nm **2** ⇨ λ = 1500 nm	**0 .. 2**	0	
YS	**Analogue output, Mode** **0** ⇨ 0 .. 20 mA **1** ⇨ 4 .. 20 mA	**0 .. 1**	0	
Ycon	**Analogue output, Configuration** **0** ⇨ Y = X (Value) **1** ⇨ Y = X_{min} (Minimal Memory) **2** ⇨ Y = X_{max} (Maximal Memory) **3** ⇨ Y = X_{mom} (Moment Memory)	**0 .. 3**	0	
Y_	**Scale Analogue output Y_{min}** Y = 0% for display X = **Y_{min}**	**-999 .. 9999**	0	
Y¯	**Scale Analogue output Y_{max}** Y = 100 % for display X = **Y_{max}**	**-999 .. 9999**	100,0	

YSEC	**Security output** Y = YSEC when sensor is broken	**0 .. 100,0**	0	
Efi	**Input Filter** Pt1 - Filter, [sec]	**0 .. 20,0**	0,1	
AS1	**Alarm Output1, Mode** **0** ⇨ Alarmcondition: [**Ac1**] < **A1**, Contact closed When condition true **1** ⇨ Alarmcondition: [**Ac1**] > **A1**, Contact closed When condition true **2** ⇨ Alarmcondition: [**Ac1**] < **A1**, Contact opened When condition true **3** ⇨ Alarmcondition: **Ac1**] > **A1**, Contact closed When condition true	**0 .. 3**	0	
Ac1	**Alarm Output 1, Configuration** **0** ⇨ Alarm off **1** ⇨ Alarm on X (Value) **2** ⇨ Alarm on X_{min} (Minimal Memory) **3** ⇨ Alarm on X_{max} (Maximal Memory) **4** ⇨ Alarm on X_{mom} (Moment Memory) **5** ⇨ Alarm when sensor is broken Contact open or close defined by **AS1** = 0 or **AS1** = 2	**0 .. 5**	0	
AS2	**Alarm Output 2, Mode** **0** ⇨ Alarm condition: [**Ac2**] < **A2**, Contact closed When condition true **1** ⇨ Alarm condition: [**Ac2**] > **A2**, Contact closed When condition true **2** ⇨ Alarm condition: [**Ac2**] < **A2**, Contact opened When condition true **3** ⇨ Alarm condition: **Ac2**] > **A2**, Contact closed When condition true	**0 .. 3**	0	

Ac2	**Alarm Output 2, Configuration** **0** ⇨ Alarm off **1** ⇨ Alarm on X (Value) **2** ⇨ Alarm on X_{min} (Minimal Memory) **3** ⇨ Alarm on X_{max} (Maximal Memory) **4** ⇨ Alarm on X_{mom} (Moment Memory) **5** ⇨ Alarm when sensor broken contact open or close defined by **AS2** = 0 or **AS2** = 2	**0 .. 5**	0	
AS3	**Alarm Output 3, Mode** **0** ⇨ Alarm condition: [**Ac3**] < **A3**, Contact closed When condition true **1** ⇨ Alarm condition: [**Ac3**] > **A3**, Contact closed When condition true **2** ⇨ Alarm condition: [**Ac3**] < **A3**, Contact opened When condition true **3** ⇨ Alarm condition: **Ac3**] > **A3**, Contact closed When condition true	**0 .. 3**	0	
Ac3	**Alarm Output 3, Configuration** **0** ⇨ Alarm off **1** ⇨ Alarm on X (Value) **2** ⇨ Alarm on X_{min} (Minimal Memory) **3** ⇨ Alarm on X_{max} (Maximal Memory) **4** ⇨ Alarm on X_{mom} (Moment Memory) **5** ⇨ Alarm when sensor is broken contact open or close defined by **AS3** = 0 or **AS3** = 2	**0 .. 5**	0	

bE1S	**Binary - Input 1, Mode Function „external Memory Reset“** **0** ⇨ level triggered BE1 = „High“ **1** ⇨ transition triggered BE1 = „Low“ to „High“ **2** ⇨ level triggered BE1 = „Low“ **3** ⇨ transition triggered BE1 = „High“ to „Low“	**0 .. 3**	0	
bE2C	**Binary - Input 2, Configuration** **0** ⇨ Set Moment Memory, level triggered BE2 = „High“ **1** ⇨ Tare Function, Value is placed in Parameter **E0** with negative sign. Transition triggered „Low“ to „High“. Caution! Tare value **E0** is stored residently. Keep this in mind when changing the configuration!	**0 .. 1**	0	
SreS	**Time Memory reset** Time in [sec] 0 = off	**0 .. 120**	0	
coC	**Password Configuration layer**	**0 .. 999**	1	
coA	**Password Alarm layer**	**0 .. 999**	2	
coL	**Password Linearisiation Layer**	**0 .. 999**	3	
Ano	**Normal Display Mode** **0** ⇨ display X (value) **1** ⇨ display X_{min} (Minimal Memory) **2** ⇨ display X_{max} (Maximal Memory) **3** ⇨ display X_{mom} (Moment Memory) **4** ⇨ display X_{2max} (double Max. Memory)	**0 .. 4**	0	
Sn	Channel #, Interface,	**0 .. 99**	0	

bAu	Baud-Rate, Interface, **0** ⇨ 4800 Baud **1** ⇨ 9600 Baud **2** ⇨ 19200 Baud **3** ⇨ 38400 Baud **4** ⇨ 57600 Baud **5** ⇨ 115200 Baud	**0 .. 1**	0	
noS	Mode Interface **0** ⇨ Interface passive **1** ⇨ MODBUS-protocol **2** ⇨ ASCII value output (current value ,CR, LF) **3** ⇨ Transmit ASCII data time registered (binary input B2) **4** ⇨ Transmit ASCII data output of the double max. memory at time registered (timecontrolled (SreS)) **+ - 5** ⇨ Output of ASCII value by pressing ↑ key, (see also bE1S and bE2C)	**0**	0	
t-tr	Time-transmit Cycle-time ASCII-out in [sec]	**0..9999**	0	
End	Exit Layer			

6.6. Linearisation Layer

The linearisation layer makes it possible to define n input-display list to linearise a non-linear sensor. The password for this layer is defined by the parameter **coL** (default = **3**).

Para	Description	Range	Default	Custo-mized setting
LP0	Linearisation Point 0	0	0	
LA0	display at point 0	-999..9999	0	
LP1	Linearisation Point 1	0 .. 99.99	1.00	
LA1	display at point 1	-999..9999	100	
LP2	Linearisation Point 2	0 .. 99.99	2.00	
LA2	display at point 2	-999..9999	200	
LP3	Linearisation Point 3	0 .. 99.99	3.00	
LA3	display at point 3	-999..9999	300	
LP4	Linearisation Point 4	0 .. 99.99	4.00	
LA4	display at point 4	-999..9999	400	
LP5	Linearisation Point 5	0 .. 99.99	5.00	
LA5	display at point 5	-999..9999	500	
LP6	Linearisation Point 6	0 .. 99.99	6.00	
LA6	display at point 6	-999..9999	600	
LP7	Linearisation Point 7	0 .. 99.99	7.00	
LA7	display at point 7	-999..9999	700	
LP8	Linearisation Point 8	0 .. 99.99	8.00	
LA8	display at point 8	-999..9999	800	
LP9	Linearisation Point 9	0 .. 99.99	9.00	
LA9	display at point 9	-999..9999	900	
LP10	Linearisation Point 10	0 .. 99.99	10.00	
LA10	display at point 10	-999..9999	1000	
AS_F	factor thermocouple-ompensation	0 .. 9,999	0	
END	Exit Layer			

7. Peak und Momentary Memory, Taring Function

The display DA 230A has, as a standard feature, **Minimal**, **Maximal** and a **Momentary Memory**. All memory modes are available simultaneously and can be displayed via keystroke-combinations (-> 6.3). Furthermore all memory modes can be monitored by an alarm contact and can be connected to the analogue output. (-> 6.4).

Resetting the peak memory, which means storing the current input to the memory, can be done in two ways. First, the binary input can be defined as reset input (->**bE1S**, 6.5) , or the reset can be performed in equal time intervals defined by parameter **SreS**, 6.5.

A double maximum memory (active at **Ano** = 4) provides for the realisation of an envelope curve detection. The maximum value is stored during an interval and then displayed during the next interval. If a current value exceeds the maximum value of the last interval (which is displayed in the current interval), then the displayed value will follow this increase accordingly in times increments of one interval.

The binary input 2 is responsible (->**bE2S** = 0) for controlling the momentary memory. During **BE2** = 1 the value of the moment memory is identical to the current value. When **BE2** is switched from high to low the current value is stored in momentary memory.

The tare function (->**bE2S** = 1) causes the current value to be stored within the parameter Input-Offset (**E0)**. (This value will have a negative algebraic sign). This parameter will remain stored even after the unit is switched off; therefore make sure to change the value when deactivating the taring function. By switching on the BE2 while the taring function is activated, the original input value can be displayed with a voltage of 12 V. (If you use internal supply, connect a series-resistance of 22 kΩ to the switch).

8. Serial Interface

Activate and control the serial interface with parameter noS.

ASCII value output with cycle time

In the **noS = 2** operating mode the ASCII value output occurs in the t-tr set cycle time, i.e. the DA 230 continuously sends measurement values via the RS 485 interface (screw terminals 25 and 26).
Protocol: current measurement value, CR.

ASCII momentary value memory output at the time value is registered (binary input BE 2 (screw terminals 23 and 24))

In the **noS = 3** operating mode the ASCII momentary value memory output is externally triggered via the binary input **BE 2**.
Protocol: measurement value, CR
The binary output 2 (**BE 2**) is intended to control the output of the momentary value memory. Measurement values will not be transmitted if **BE 2** = 1 (+24V). When switching from **BE 2 = 1** to **BE 2 = 0** the momentarily measured value is indicated via the RS 485 interface.

The Digital Display shows the value selected with the Ano parameter. The high signal must exist for a time period of at least 20 ms.

ASCII value output of the double maximum memory at the moment the value is registered (time controlled)

In the **noS = 4** mode the ASCII value output takes place via the double maximum memory. The Ano parameter must be set to **Ano = 4**.

The measurement value output occurs after the end of the internal holding time (SreS) (see also chapter 5, double maximum memory function)
Protocol: maximum measured value, CR

9. Variable Linearisation

The display unit DA 230A has the possibility to linearise a non-linear sensor by defining the characteristic curve. The physical input signal can be chosen freely. The input of the characteristic curve is done by the following scheme. To understand this, it is explained by the example of the thermocouple Cu-CuNi, Type T.

Choosing the input signal, the variable linearisation is activated (**ECON** = 17 - 19). The curve data input is made in the layer „Linearisation“. Here you can define a current value of the input (**LPx**) and the value to be displayed at this point (**LAx**). The value of the input as well as the order of the input is random. The only exception is the first point, which must be identical to the zero-point of the input range (LP0 = 0). Unused points should be defined to Lpx = 0. If the range of linearisation is less than the input range, values greater then the last segment are linearised in the same way as the last segment. To activate a compensation for thermocouples you can adapt the internal compensation by a factor (**AS_F**) described by the following formula:

$$AS\_F = \frac{0.5}{thermoelectrical.\,force[50°C]}$$

For the example the input should be done like this.
The values are taken from DIN 43710 for Thermocouple Cu-CuNi, Typ T.

x	LPx [mV]	LAx [°C]
0	0	0
1	2.48	60
2	5.18	120
3	8.15	180
4	11.41	240
5	14.90	300
6	18.53	360
7	22.25	420
8	26.09	480
9	30.11	540
10	34.31	600

Econ = 19

The factor for compensation is AS_F = 0.5 / 2.05 = 0.244

10. Technical Data

10.1. General

Power supply	95 V .. 265 V / 45 .. 65 Hz, opt. 24 V / 0 .. 62 Hz (AC / DC) Tolerance +10 %, -15 %
Power consumption	8 VA
Housing	Flush mounting housing DIN, 48 x 96 x 117(123) mm H xW x D (D w. connectors)
Weight	0,5 kg
Temperature range	Operating temperature -10 .. 50 °C Storing temperature -25 .. 65 °C
Protective system	IP 54 (when panel mounted, with seal)
EMV	EMV conforms to EG -Directive 89/336/EWG

10.2. Inputs

General data for all inputs	Measuring cycle 20 msec Resolution 16 bit Temperature influence 0.05 % / 10 K Sensor break monitoring (flash display)
Pt100	Connection in 2- 3 or 4-wire mode Range -200 .. 800 °C Linearity error < 0.1 % range
mA V	0(4) .. 20mA, Ri = 50 Ω 0(2) .. 10V, Ri ≥ 100 kΩ Range user-definable
Pyrometer	Input 0(4) .. 20 mA, supply 24 V / 250 mA

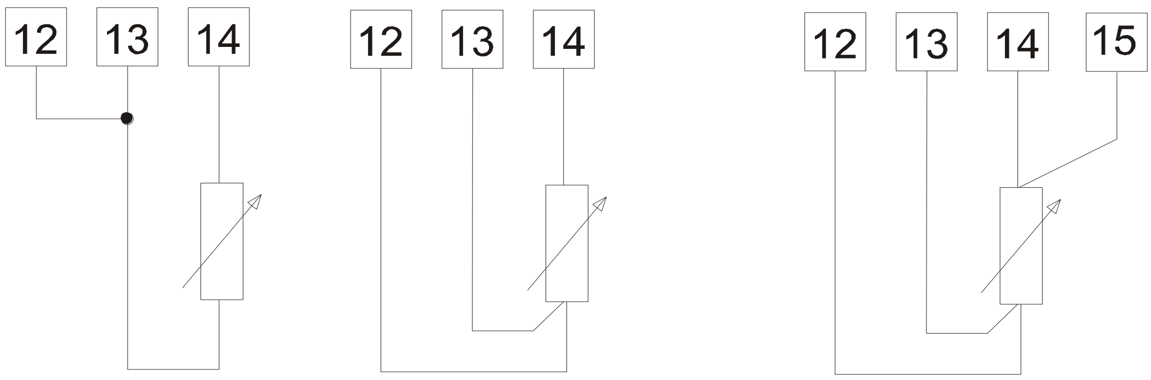
Thermocouple	Input 0 .. 50 mV with linearisation for the following Thermocouples NiCr-Ni 0 .. 1200°C, Type K NiCr-CuNi 0 .. 650°C, Type E Pt10Rh-Pt 0 .. 1700°C, Type S Pt13Rh-Pt 0 .. 1700°C, Type R Pt30Rh-Pt 400 .. 1800°C, Type B Fe-CuNi 0 .. 900°C, Type J Fe-CuNi 0 .. 900°C, Type L Cu-CuNI 0 .. 400°C, Type T Cu-CuNI 0 .. 600°C, Type U Temperature compensation by internal sensor Linearity error < 0.3% range
Binary input 1	24 V= vs Ground, Ri ≥ 20 kΩ Level- or transition- triggered High- or low-active Function „Memory - Reset“
Binary input 2	24 V=/12 V= vs Ground, Ri ≥ 20 kΩ Function „Moment Memory“ or „Tare“ or „Original Value“

10.3. Outputs

Alarm outputs A1 .. A3	Potential-free relay contact Contact 230 V / 3 A (optional 6A) NO or NC Optional open-collector output With isolation, Ui = 5 .. 30 V
Analogue output	0(4) .. 20 mA, load ≤ 500 Ω 0(2) .. 10 V, load ≥ 1 kΩ With automatic voltage/current switch

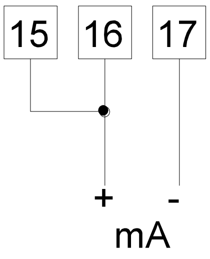
11. Wiring Diagrams

11.1. Pt100 - Input

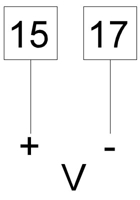


2-wire connection 3-wire connection 4-wire connection

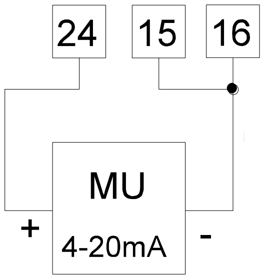
11.2. mA - Input



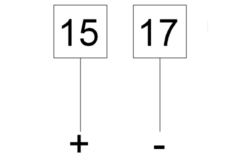
11.3. Voltage - Input



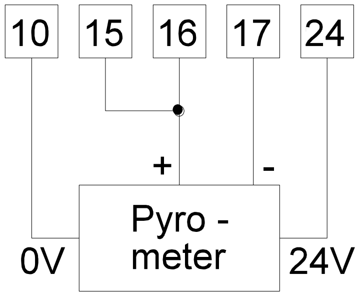
11.4. 2 - Wire Transducer with Supply



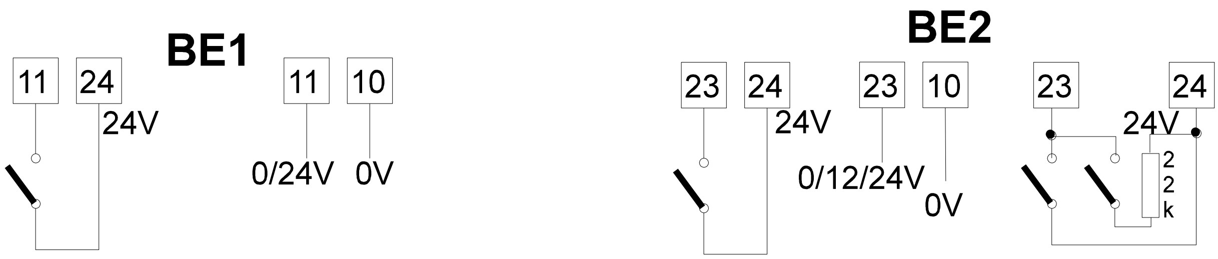
11.5. Thermocouple - Input



11.6. Pyrometer - Input



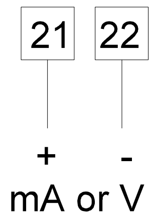
11.7. Binary - Inputs



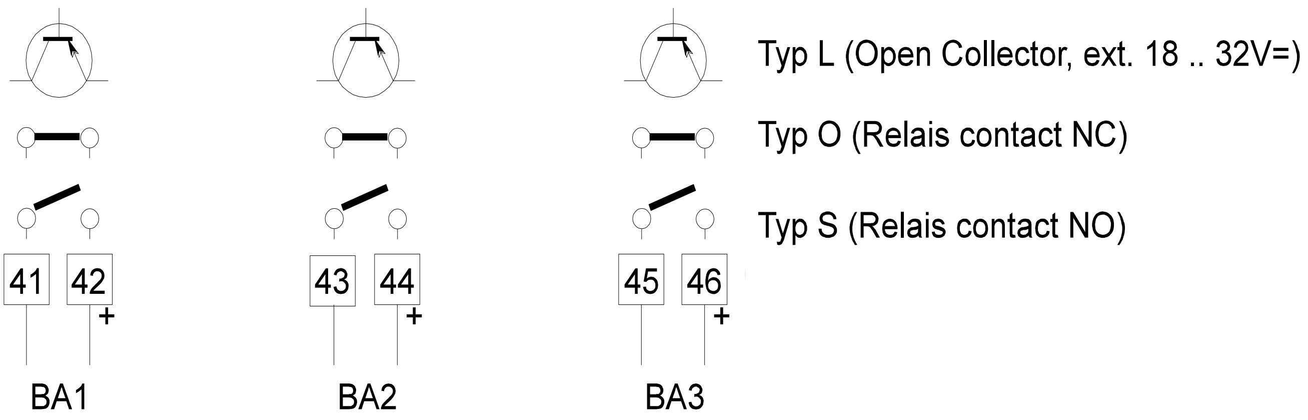
Switching contact or Switching voltage

Switching contact or Switching voltage

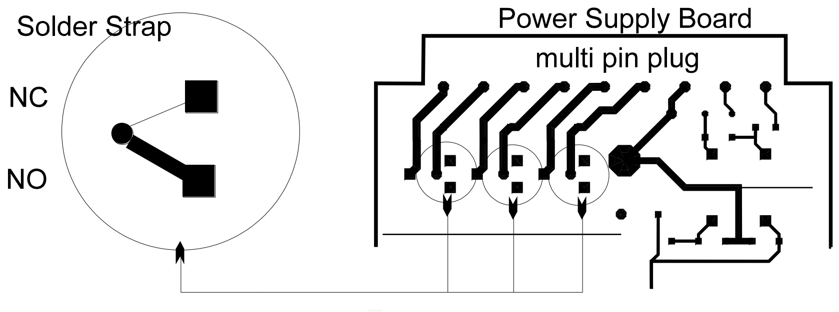
11.8. Analogue - Output



11.9. Contact - Outputs

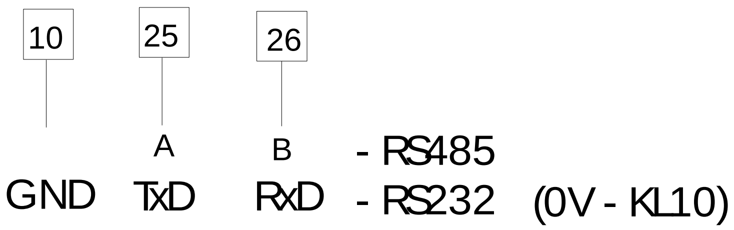


11.10. Configuration NC/NO

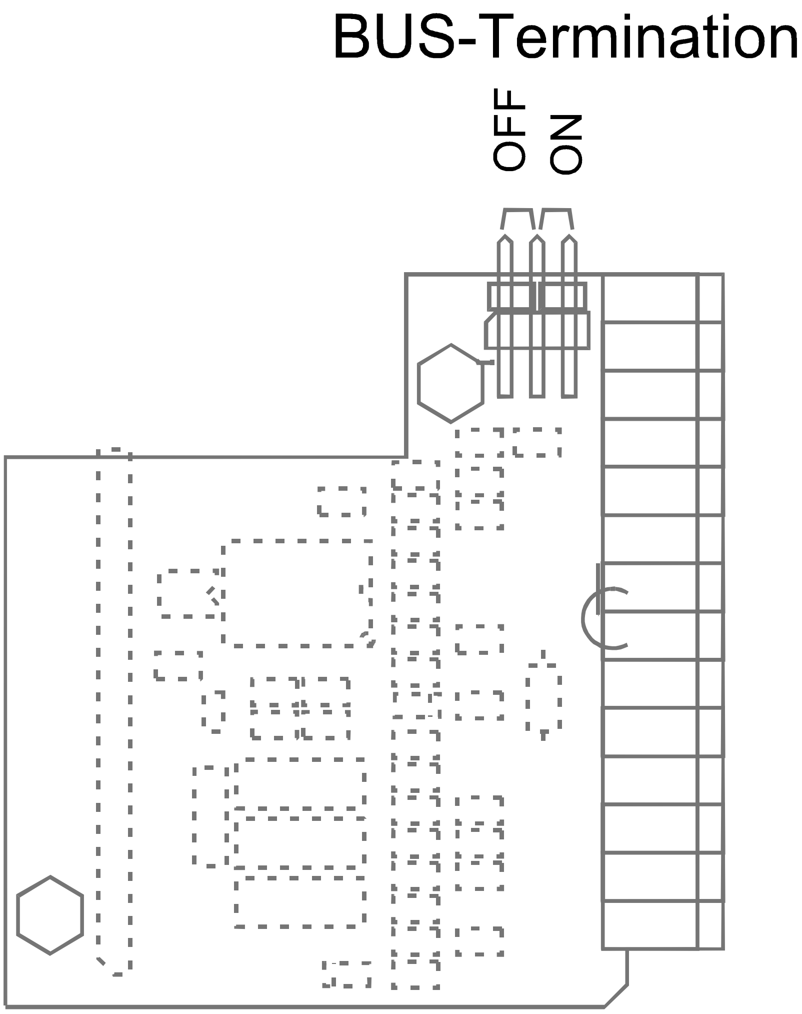


11.11. Serial Interface according to RS 485

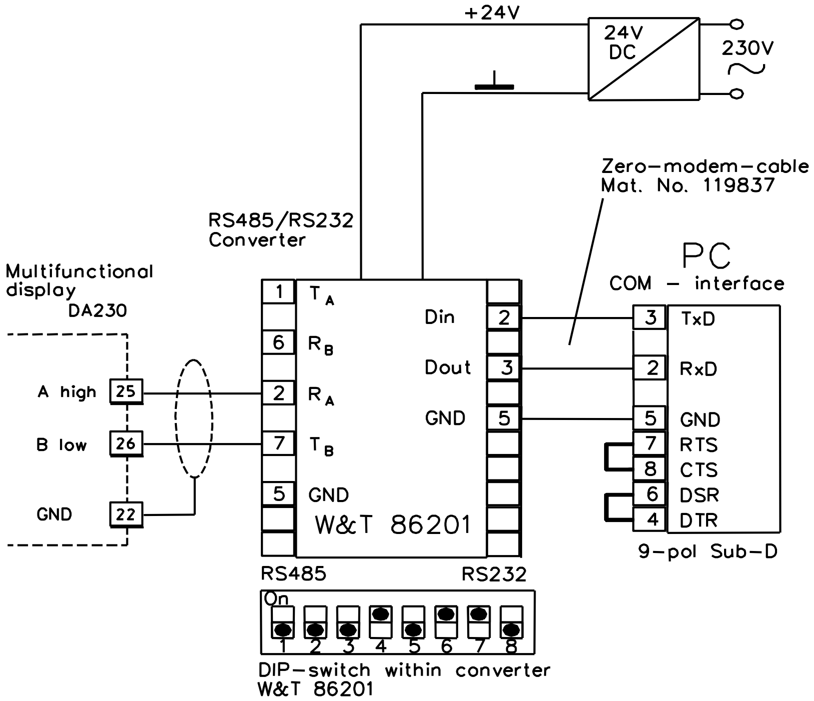
Configuration noS (please observe Chapter 6.5 !)



11.12. RS 485 BUS-Termination



11.13. RS 485 / RS 232 Converter

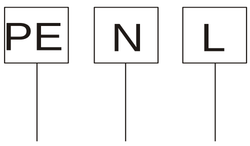


After a new measured value has been recorded it is serially transmitted via screw terminals 25 and 26. The converter 86201 converts the RS 485 signal into a RS 232 signal, so that the data can be reprocessed at a PC.

Transmission parameters:

4800 or 9600 Baud, non-parity, 2 Stop bits, 7 data bits.

11.14. Power Supply



PE N L at 95 .. 265V AC
PE - + at 24V AC/DC

It is imperative to compare the voltage of the power supply of the digital display with the label on the unit housing!

Furthermore make certain that the unit has been correctly grounded (Terminal PE).

Please observe all on-site safety regulations.

12. Notice

Para	Description	Range	Default	Custo-mized setting
A1	Switching point 1	-999 .. 9999	0	
AH1	Hysteresis 1	0 .. 9999	0	
A2	Switching point 2	-999 .. 9999	0	
AH2	Hysteresis 2	0 .. 9999	0	
A3	Switching point 3	-999 .. 9999	0	
AH3	Hysteresis 3	0 .. 9999	0	
Econ	Input - Configuration	0 .. 20	0	
EE	Input - Unit	0 .. 1	0	
E_	Display range, lower limit	-999 .. 9999	0	
E¯	Display range, upper limit	-999 .. 9999	100,0	
E,	Display range, point setting	0 .. 3	1	
E0	Input - Offset	-999 .. 9999	0	
YS	Analogue output, Mode	0 .. 1	0	
EP	Emision capability	0 .. 100	0	
EL	Wavelength	0 .. 2	0	
Ycon	Analogue output, Configuration	0 .. 3	0	
Y_	Scale Analogue output Y_{min}	-999 .. 9999	0	
Y¯	Scale Analogue output Y_{max}	-999 .. 9999	100,0	
YSEC	Security output	0 .. 100,0	0	
Efi	Input Filter	0 .. 20,0	0,1	
AS1	Alarm 1, Mode	0 .. 3	0	
Ac1	Alarm 1, Configuration	0 .. 5	0	
AS2	Alarm 2, Mode	0 .. 3	0	
Ac2	Alarm 2, Configuration	0 .. 5	0	
AS3	Alarm 3, Mode	0 .. 3	0	
Ac3	Alarm 3, Configuration	0 .. 5	0	
bE1S	Binary - Input 1, Mode	0 .. 3	0	
bE2C	Binary - Input 2, Configuration	0 .. 1	0	
SreS	Time memory reset	0 .. 120	0	
coC	Password Configuration layer	0 .. 999	1	
coA	Password Alarm layer	0 .. 999	2	
coA	Password Linearisation layer	0 .. 999	2	
Ano	Normal Display Mode	0 .. 4	0	
Sn	Channel #, Interface	0 .. 99	0	
bAu	Baud-Rate, Interface	0 .. 1	0	
noS	Mode Interface	0 .. 1	0	
t-tr	Time- Transmit	0...9999	0	

Para	Description	Range	Default	Custo-mized setting
LP0	Linearisation Point 0	0	0	
LA0	display at point 0	-999..9999	0	
LP1	Linearisation Point 1	0 .. 99.99	1.00	
LA1	display at point 1	-999..9999	100	
LP2	Linearisation Point 2	0 .. 99.99	2.00	
LA2	display at point 2	-999..9999	200	
LP3	Linearisation Point 3	0 .. 99.99	3.00	
LA3	display at point 3	-999..9999	300	
LP4	Linearisation Point 4	0 .. 99.99	4.00	
LA4	display at point 4	-999..9999	400	
LP5	Linearisation Point 5	0 .. 99.99	5.00	
LA5	display at point 5	-999..9999	500	
LP6	Linearisation Point 6	0 .. 99.99	6.00	
LA6	display at point 6	-999..9999	600	
LP7	Linearisation Point 7	0 .. 99.99	7.00	
LA7	display at point 7	-999..9999	700	
LP8	Linearisation Point 8	0 .. 99.99	8.00	
LA8	display at point 8	-999..9999	800	
LP9	Linearisation Point 9	0 .. 99.99	9.00	
LA9	display at point 9	-999..9999	900	
LP10	Linearisation Point 10	0 .. 99.99	10.00	
LA10	display at point 10	-999..9999	1000	
AS_F	Factor thermocouple-compensation	0 .. 9,999	0	

13. Shipping, Packaging and Disposal

13.1. Inspecting your shipment

Unpack and inspect the entire shipment immediately upon receipt to make sure it is complete and undamaged.

If the container/package shows visible signs of damage, please refuse the shipment. If this is not possible, accept the shipment on the condition that the freight carrier's delivery record is noted with the extent of the damage in order to file a claim.

Should you discover a concealed loss or damage, report it to KELLER HCW and to the freight carrier immediately. If the period for filing claims has expired, you will no longer be able to make any claims for compensation of damage or loss.

13.2. Packaging

The packages used by KELLER HCW are made of carefully selected, environmentally compatible materials and are thus recyclable. We suggest you retain the packaging for possible future use; otherwise please ensure that they are disposed of in an ecologically sound manner.

13.3. Disposal of used apparatus

Used electrical and electronic equipment often contain valuable components. The owner/user may either return such an instrument to the manufacturer for disposal, or he must dispose of it himself in a professional and nonpolluting manner.

KELLER HCW will not be held accountable for any inappropriate disposal carried out by the user/owner of KELLER HCW instruments.