DIGREG 03

DISPLAY MODULE WITH ACTIVE OUTPUT AND RELAY

- designed for mounting on DIN rail 35
- the input and the keypads are galvanically isolated from the power circuit, switching elements and output
- analog output according to 0 / 4..20mA, 0..10V or without output
- auxiliary power supply in the range of 19 to 300VDC and 90 to 250VAC
- setting limits by using the keyboard for up to 2 switching relays, input and its transfer
- view the signal display in the interval -999 ... 9999

The module is used to convert an active signal monitoring and alarm limit for 2 switching relays. Using the keyboard and display can be changed and the value of the switching relay opening, number of decimal places, and the filter according to the embodiment of the input signal and converting it:

Variant R: Pt100, Pt1000, Ni100, Ni1000, resistance to 320Ω or to 2600Ω
Variant A: Current ±20mA, voltage ±10V and ±1V DC with user value conversions
Variant T: Thermocouple type J, K (other types upon request)
Variant P: Potentiometer to value 150Ω, 1kΩ3, 11kΩ
Variant D: By design: sensors e.g. NTC, KTY, voltage from ±60mV to ±50VDC, current to ± 10A DC or resistor to 11kΩ, Thermocouples S, B, …

Electrical specifications:

- operating temperature range:	-30...+ 60°C
- input signal according to design:	Pt100, Pt1000 by DIN IEC 751, Ni100, Ni1000, OV 0..320Ω, 0..2600Ω
	±1V, ±10V,±20mA
	Thermocouple J (-50..900°C), K (-40..1200°C)
	Potentiometer 150Ω, 1300Ω a 11kΩ
	NTC, KTY, Tc (S, B..), voltage to ±50V, current to ±10A, resistance to 11kΩ
- max. lead resistance for 3wire	< 10 Ω /1 wire
- Input resistance of the voltage input:	1MΩ
- Input connections:	2 or 3 wire / two-wire for thermocouple
- input current input resistance:	27Ω
- current through the RTD sensor:	< 0,5mA
- parameters for thermocouples	cold junction compensation: -40 ..80°C, accuracy ± 1°C
- output:	active 0..20mA, 4..20mA, 0..10V
- output resolution:	< 0,01%
- output limitation:	2,5..22mA, 0..22mA, 0..12,5V
- damping:	0,1..20s (nominal setting: OV, Pot < 0,2s, RTD, Tc 0,3s)
- accuracy:	error: ±(0,07% +0,1°C)
	temperature drift:0,03%/10K
	non-linearity: 0,012%, Tc: 0,1%, Tc J: 0,3°C
	Tc type B (300..400°C error 15°C, 400..1800°C, nonlinearity 0,2%)
	Tc type S (0..70°C error 10°C, 70..1650°C, nonlinearity 0,1%)
- storage temperatures	-40..+80°C
- supply voltage	standard: 19 – 300VDC a 90 – 250 VAC
	on request: 20 – 60VAC
- power consumption:	max. 2VA
- Output loop excitation: min.	15V (Rz = 750ohm for 20mA)
- voltage output load:	max. 10mA
- current input voltage drop:	0,54V for 20mA
- coverage cabinet / terminal box:	IP40 / IP10
- weight:	150g
- relay parameters:	switching contact, load max. 230V AC/ 60V DC, max. 5A
	minimum switching values 100mA by 5V DC
- signaling	relay I. closed - red LED
	relay II. closed - green LED
- electrical insulation strength:	4000Vef, 50Hz/1 min – power against output contacts and input
	4000Vef, 50Hz/1 min – input against output contacts
	Attention - the input and keyboard are at the same potential!
- environment:	degree of pollution 2, installation overvoltage class III

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Software:

The program menu consists of the following basic functions:

Mode [rE]	- 0: measuring mode, 1: service mode (without relay control)
Input [In]	- selection of the conversion characteristic for the input signal (see tab. 1)
Decimal point [dt]	- position of the decimal point in the display
Conversion function	- they do not contain temperature inputs
[IL], [Ir]	- lower range of input range and range (e.g. 4.00=IL, 16.00=Ir (the input range is 4-20mA))
[CL], [Cr]	- lower limit display value [IL] and displayed range [Ir]
Number of windows [PO]	- on / off window mode for one or two relays
Hysteresis width [SH]	- value of hysteresis for mode window. Is valid for both relays.
Upper limit [H1, H2]	- setting an upper limit switching relays I. and II.
Lower limit [d1, d2]	- setting a lower limit switching relays I. and II.
Output current [oi]	- output setting 0=> 0..20mA, 1=> 4..20mA
Output [oL, or]	- lower range of output range and range e.g. 0..100°C/0..10V)
Filter [Fi]	- damping in the interval <0,1.. 22s> (change time from 0 to 63%)

Access to the program menu is enabled by simultaneously pressing the buttons ⊛ + ▼
The display shows the function MODE (mark rE) and then you can switch (0 – standard mode, 1 – service mode). This opens the entry into the program menu. Switching between functions is possible only in one direction i.e. only in the direction indicated in the figure by simultaneously short press ⊛ + ▼
Entry to the setting of the function is done by pressing button ▶. The display shows a four-digit function value.

The first step is to set the highest order numbers, which can be changed by the button ▼ and over and over again in descending order. Another pressing button ▶ we move to set the digit in descending order, the set digit always flashing. In the same way, to set the remaining digits. Only after pressing the button ▶ when the lowest order flashing, the value is written to the instrument, this is how the function setting is completed. Now you can continue by selecting the function on the main menu bar.

Cancellation of setting values can be done by simultaneously pressing ⊛ + ▼ before saving to your device. In this way we go to the next function without saving the value to the device.

By scrolling through the main menu of the program menu, there are no changes to the settings and this can be used to check the device settings.

In the following description, the feature will be marked with the mark that appears on the display (enumerated in square brackets).

Function **MODE** *[rE]*

For proper operation of the instrument, it is necessary to set the function value to 0. The value 1 is only for the service mode.

Function *INPUT [In]*

This function determines the type of the measured quantity. The value depends on the design and the value given in Table 1 or the label of the instrument.

Function *DECIMAL POINT [dt]*

This function determines the position of the dots displayed on the display. For [dt] = 0, the shape of the xxxx., For [dt] = 1 has the shape number xxx.x, etc.

Function **DISPLAY CONVERSION** *[IL, Ir, CL, Cr]*

This group of values used to convert the input signal to the desired view. We can describe it by: y=(x-*[IL]*)/*[Ir]**[Cr]*+*[CL]*. The input interval is set by lower value *[IL]* and its range *[Ir]*. E.g. input 4..20mA save the numbers to de device *[IL]*=4 and *[Ir]*=16. The value that is displayed is the interval given by the minimum *[CL]* and range *[Cr]*. E.g. for display renge 300...1300 we save to the device numbers *[CL]*= 300 and *[Cr]*=1000.
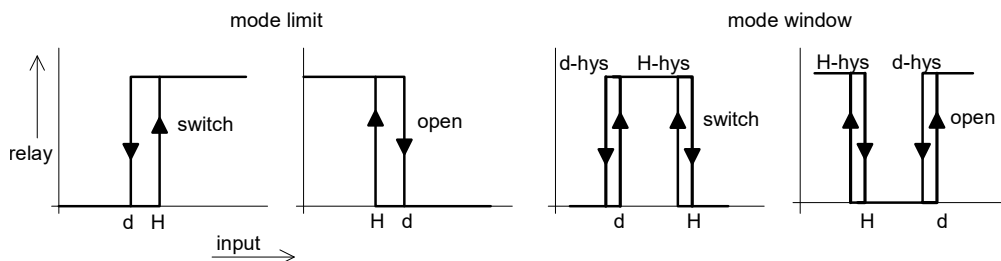
If you do not want to make a conversion, just enter value *[IL]*=0, *[Ir]*=100, [CL]=0, *[Cr]*=100.

Note: values respect the decimal point values set in the previous step.
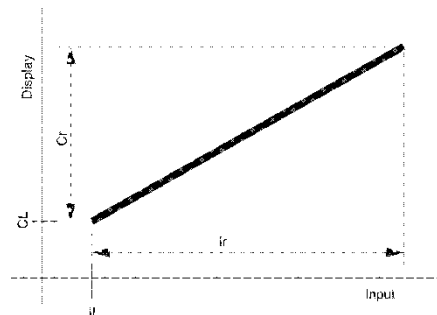
Function **NUMBER OF WINDOWS [PO]**

Each relay can operate in limit or window mode (see figure).

If this function has a value PO=0, it is possible to set both relays only to limit mode (switching or opening). With a value of PO=1, the first relay is in window mode and the second is in limit mode. If the value is PO=2, both relays are in window mode. In connection with setting the dx and Hx values, it is then possible to use the window as switching or opening, similar to the limit mode.

Function **HYSTERESIS WIDTH [SH]**

The hysteresis value is another parameter for setting the window mode. This value is always subtracted from the relevant limit and is the same for all set windows. If the PO parameter is 0, this parameter is not offered during setup.
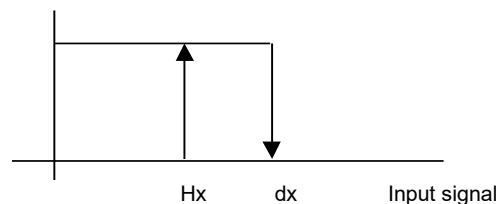
Function *UPPER LIMIT* and *LOWER LIMIT [H1/H2* and *d1/d2]*

These functions are closely related. Their settings can affect the relationship in case of power failure and a zero signal. The following pictures show the interrelation.
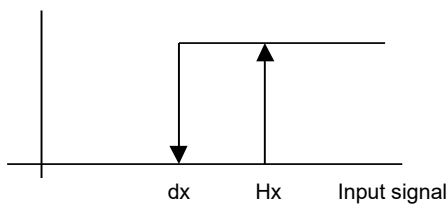
Relay Switch   Relay Open

We recommend changing the limits within the input signal range. If [dx] = [Hx], [dx] is automatically set by 1/2 digit below. The limits are set in the indicated units. The device has two independent limits. They are labeled 1 and 2. In the settings menu, then the device indicates *[H1]/[d1] a [H2]/[d2]*.

Function **OUTPUT CURRENT** *[oi]*

Function for switching current output 0 => 0..20mA, 1=> 4..20mA

Function **OUTPUT** *[oL, or]*

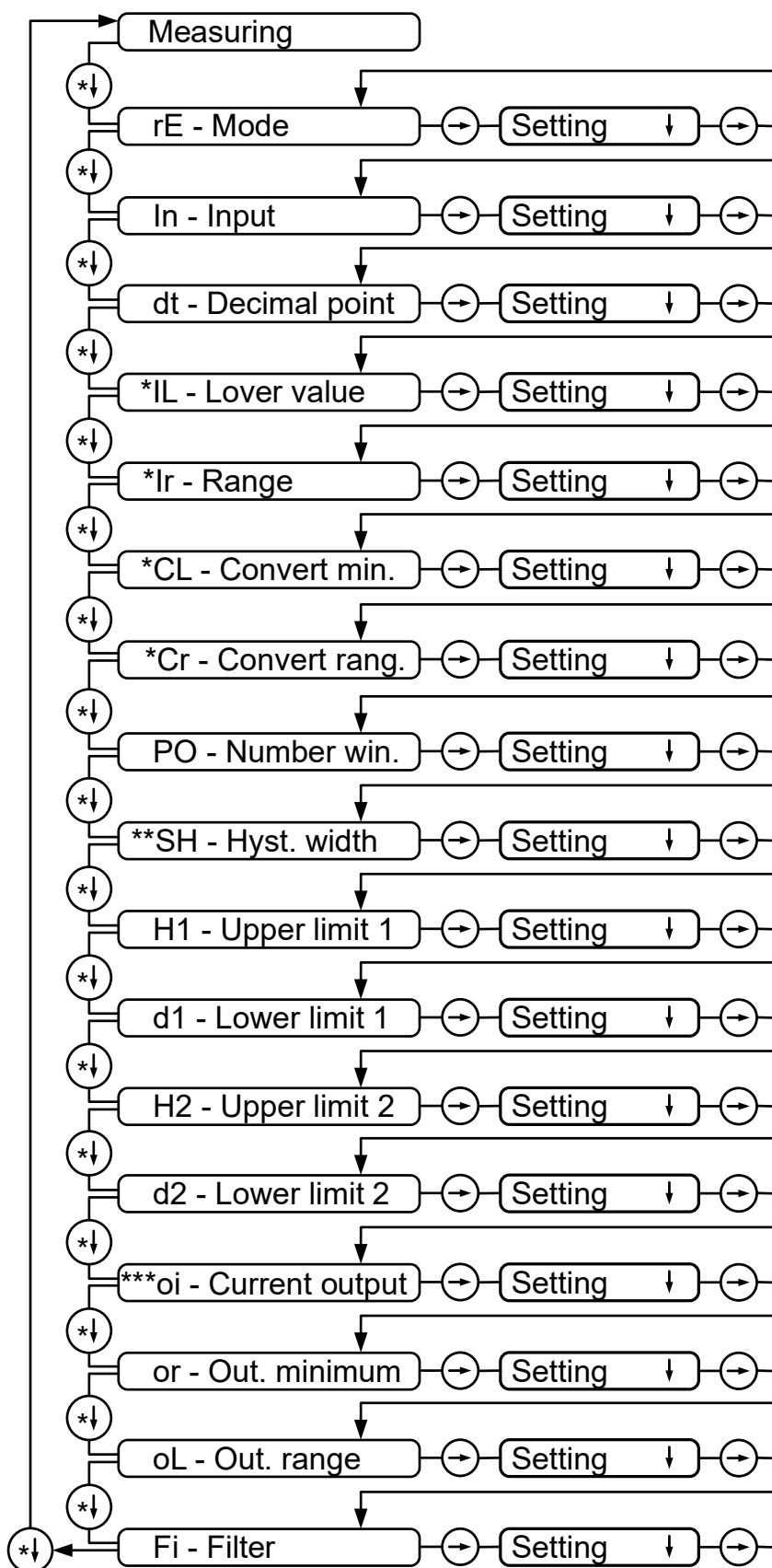Function for setting the output signal. Function *[oL]* stores the value input at which the output signal should be at the lower and function *[or]*, then the measured range. E.g. for range -20..100°C *[oL]*=-20 and *[or]* =120.
Note: When used Conversion function, the value set in the displayed values.

Function **FILTER** *[Fi]*

change from 0 to 63% of the value for a time in the interval <0.1..22s>

Control menu:

Measuring

*↓   rE - Mode   →   Setting ↓   →

*↓   In - Input   →   Setting ↓   →

*↓   dt - Decimal point   →   Setting ↓   →

*↓   *IL - Lover value   →   Setting ↓   →

*↓   *Ir - Range   →   Setting ↓   →

*↓   *CL - Convert min.   →   Setting ↓   →

*↓   *Cr - Convert rang.   →   Setting ↓   →

*↓   PO - Number win.   →   Setting ↓   →

*↓   **SH - Hyst. width   →   Setting ↓   →

*↓   H1 - Upper limit 1   →   Setting ↓   →

*↓   d1 - Lower limit 1   →   Setting ↓   →

*↓   H2 - Upper limit 2   →   Setting ↓   →

*↓   d2 - Lower limit 2   →   Setting ↓   →

*↓   ***oi - Current output   →   Setting ↓   →

*↓   or - Out. minimum   →   Setting ↓   →

*↓   oL - Out. range   →   Setting ↓   →

*↓   Fi - Filter   →   Setting ↓   →

*) item is not included in the menu if the input signal is temperature
**) item is not included in the menu if the number of windows = 0
***) item is included in menu only for current output

Some of the items may be omitted if they are not relevant to the supplied variant.
When performing D, it is not possible to change the input signal; the In item is not available!

Installation:

The application wiring of the limit switch for the individual input signals is shown in the figure. The terminal block used allows connecting conductors up to a 3.5 mm^2 cross section. We recommend to use a cable with a core cross section of 1.5 or 2.5 mm^2 depending on the desired winding resistance. The screw terminals are M2,5 screws, it is therefore necessary to use **only an adequate force to tighten the clamp**.

Mechanically, the transducer is mounted on a 35 mm DIN rail. First mount the housing with the upper part of the DIN rail. Then, with the screwdriver, lower the latch and press the housing on the DIN rail. After releasing the screwdriver and locking the spring mechanism, the assembly is over.

Terminal connection:

1..3	Relay 1
4..6	Relay 2
10..12	Input
13(-), 14(+):	Output 0..10V,0/4..20mA
19,21:	Supply 230V AC, 24VDC
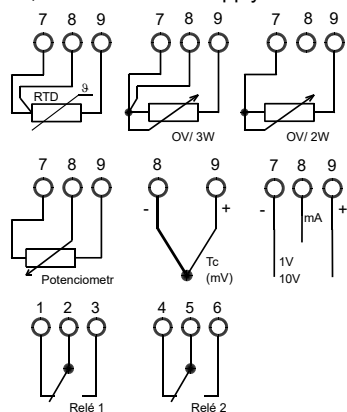
Dimension:
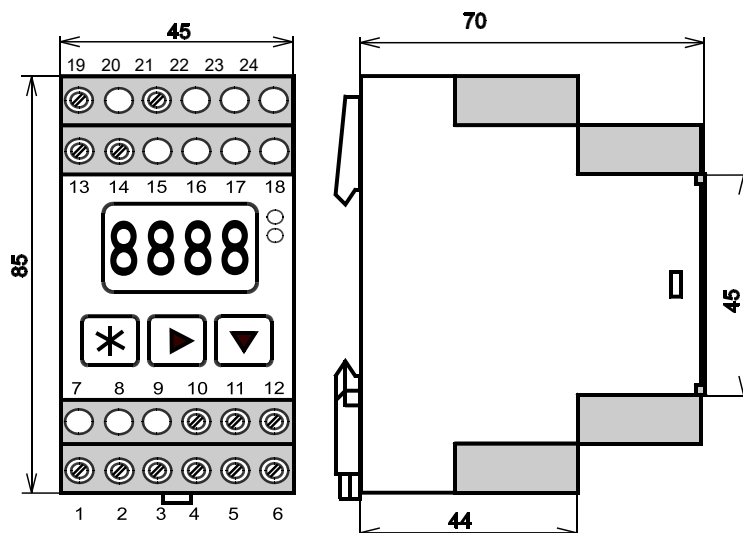
Table 1.

	Type of variable and range by function **In**			
	DIGIREG 03.R - RTD	**DIGIREG 03.T - Tc**	**DIGIREG 03.A - UI**	**DIGIREG 03.P - Potenciometr**
0	Pt100 2W, -99..600°C	Tc J, -50..920°C	±1V	0..150Ω
1	Pt100 3W, -99..600°C	Tc K, -40..1260°C	±10V	0..1300Ω
2	Pt1000 2W, -99..450°C	-9,99..73mV	±20mA	0..11kΩ
3	Pt1000 3W, -99..450°C			
4	Ni100 Tk 5k 2w, -60..250°C			
5	Ni100 Tk 5k 3w, -60..250°C			
6	Ni1000 Tk 5k 2w, -60..250°C			
7	Ni1000 Tk 5k 3w, -60..250°C			
8	Ni100 Tk 6k8 2w, -60..250°C			
9	Ni100 Tk 6k8 3w, -60..250°C			
A	Ni1000 Tk 6k8 2w, -60..250°C			
b	Ni1000 Tk 6k8 3w, -60..250°C			
C	Resistor 2w, 0..320Ω			
d	Resistor 3w, 0..320Ω			
E	Resistor 2w, 0..2600Ω			
F	Resistor 3w, 0..2600Ω			

Table 2

Outputs DIGIREG 03			
	Relay I.	**Relay II.**	**U/I output**
0	Yes	-	-
1	Yes	Yes	-
2	Yes	Yes	Yes
3	Yes	-	Yes
4	-	-	Yes
5	-	-	-

Table 3

Analog output		
	0/4-20mA	**0-10V**
A	Yes	-
B	-	Yes
C	-	-

Type tests:
Basic type test: according ČSN EN 60688 ed.3
EMC: according ČSN EN 61326-1 ed.3
Safety: according ČSN EN 61010-1 ed.2

Ordering:
Variants of inputs of standard devices supplied by *tab. 1*
inputs of varietal D must be discussed before ordering!
Outputs: combination without relay, 1x relay, 2x relay, analogue output *tab. 2*
Analog output: 0 / 4..20mA, 0..10V or without output *tab. 3*

The ordered input specification can be changed in the range of uploaded linearizations,
          e. g.: for R, Table 1 applies to the first column.
The ordered output specification is factory set and can not be changed and must be selected when ordering.
Special requirements need to be discussed in advance.

Examples:
      2ks **DIGIREG 03.A14B** 0-10V   = input 0-10V, without relay/output 0-10V
      1ks **DIGIREG 03.R12A** Pt100 / 4-20mA   = input Pt100 3w, 2x relay, output 4-20mA
      4ks **DIGIREG 03.R02A** 0...250°C /0-20mA   = input Pt100 2w, 2x relay, output 0-20mA
      3ks **DIGIREG 03.T20C** 0...1200°C   = input Tc"K", 1x rele, without analog output
      1ks **DIGIREG 03.P11C** 0-1k Ohm   = input potentiometer 0-1k Ohm, 2x relay, without analog output
      1ks **DIGIREG 03.A22A** 4-20mA / 4-20mA   = input 4-20mA, 2x relay, output 4-20mA
      2ks **DIGIREG 03.Dx3B** 0-2A / 0-10V   = input 0-2A, 1x relay, output 0-10V
For other inputs, contact the manufacturer!