

**Universal display for
4-20mA or 0-10V - transmitter**

**GIA 010 N
GIA 0420 N**

as of version 1.0

Operating manual

CE
0081



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1 Designated Use

The GIA 0420 N and GIA 010 N are microprocessor controlled display devices.

The different design types of the device have an input for:

- standard signal 4 – 20 mA (GIA 0420 N)
- standard signal 0 – 10 V (GIA 010 N)

The measuring value is displayed on a 4-digit LCD display with max. display area ranging from -1999 to +9999 digits.

The device additional features a switching output (NPN-output) which can be configured as 2-point controller or min-/max alarm. The state of the output is displayed with an arrow at the LCD.

The GIA 0420 ... is designed for the connection of any measuring transducers (with a 4 to 20 mA output). This design type doesn't need an auxiliary supply as it is supplied by the measuring current.

The GIA 010 ... is designed for the connection of any measuring transducers (with a 0 - 10 V output).

The parameters and limit values can be input by buttons accessible at the rear side.

The operating range of the display device can be directly adjusted to the transmitter without any additional accessories by simply entering the maximum and minimum measuring range limits as well as the decimal point position.

All programmable parameters of the device are saved in an EEPROM. In case of a current failure they will remain there for at least 10 years.

The device is equipped with a self-diagnosis system continuously monitoring the essential parts of the device for their perfect functioning. Both the self-diagnosis and the measuring sensor monitoring for values exceeding or falling below permissible limits ensure maximum operational reliability of the device.

Prior to delivery the device will be tested and completely calibrated.

However, prior to you starting your operation make sure to configure the device for your application. Please also refer to chapter "Configuration".

2 General Note

Read this document carefully and get used to the operation of the device before you use it. Keep this document within reach for consulting in case of doubt.

3 Safety Requirements

3.1 General safety advices

This device has been designed and tested in accordance with the safety regulations for electronic devices. However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advices given in this manual will be adhered to when using the device.

1. Trouble-free operation and reliability of the device can only be guaranteed if the device is not subjected to any other climatic conditions than those stated under "Specification".
2. Standard regulations for operation and safety for electrical, light and heavy current equipment have to be observed, with particular attention having to be paid to national safety regulations (e.g. VDE 0100).
3. When connecting the device to other devices (e.g. PC) the interconnection has to be designed most thoroughly as internal connections in third-party devices (e.g. connection GND with protective earth) may lead to undesired voltage potentials.
4. If there is a risk whatsoever involved in running it, the device has to be switched off immediately and to be marked accordingly to avoid re-starting.

Operator safety may be a risk if:

- there is visible damage to the device.
- the device is not working as specified.
- the device has been stored under unsuitable conditions for a longer time.

In case of doubt, please return device to manufacturer for repair or maintenance.

5. The buttons at the rear side are necessary for the configuration of the device.
The device is ESD sensitive at this area!!
The configuration must be done considering adequate ESD safety measures!
6. **Warning:** Do not use these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury or material damage.
Failure to comply with these instructions could result in death or serious injury and material damage.

3.2 Skilled Personnel

Are persons familiar with installation, commissioning and operation of the product and have professional qualification relating to their job.

For example:

- Training or instruction resp. Qualification to switch on or off, isolate, ground and mark electric circuits and devices or systems.
- Training or instruction according to the state.
- First-aid training.

4 Disposal Notes



The device must not be disposed in the unsorted municipal waste!
Send the device directly to us (sufficiently stamped), if it should be disposed.).
We will dispose the device appropriate and environmentally sound.

5 Electric connection

The GIA ... N is connected via screw-type/plug-in terminals on the rear side.

General Note: Screw-type/plug-in terminals have to be mounted while they are still loose and plug them in only afterwards. Soldering lands may be damaged in case of improper assembly of already plugged terminals.

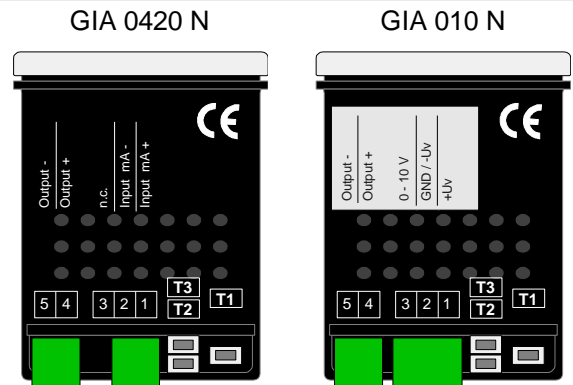
Please use applicable screwdriver and do not forcibly tighten the screws.

Supply voltage: GIA 0420 N device takes power from measuring current
GIA 010 N 12 ... 28 V or according device declaration

*Electric connection and commissioning of the device must be carried out by trained and skilled personnel. Wrong connection may lead to the destruction of the display device, in which case we cannot assume any warranty! **! Mind for the GIA 0420 ... the maximum input current rating of 40mA under any circumstances !***

5.1 Terminal assignment

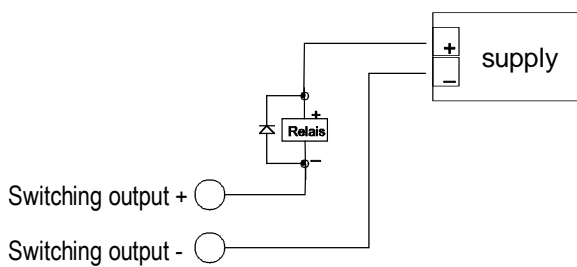
connection number	GIA 0420 N	GIA 010 N
1	signal +	supply +
2	signal -	supply -, GND
3	--- (inexistent)	signal +
4	switching output +	switching output +
5	switching output -	switching output -



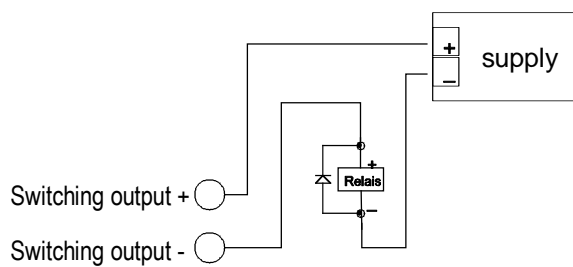
5.2 Connection example for optionally switching output

Please note: The max. permitted voltage and switching current of the switching output must not be exceeded (even not for a short time).

5.2.1 Example assignment for switching output (i.e. switching of relays)



Assignment as low-side switch



Assignment as high-side switch

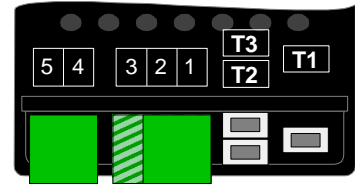
6 Configuration

Note: The device can be ESD sensitive at the area of the buttons.
The configuration must be done considering adequate ESD safety measures!

Please note: measuring current should be at least 4 mA during configuration of a GIA 0420 N!

Follow these instructions to configure the device:

- Press **button 2** for 2 seconds during actual value display, „dP“ is displayed.
- Set parameter value with **button 2** and **button 3**.
- Save the set with **button 1**, the parameter name is displayed again.
- Proceed to the next parameter with **button 1**, the name of that parameter is displayed.



If there is no key pressed within 60 seconds the configuration is cancelled.
The settings already entered are lost.

Parameter	Value	Description
Button 1	Button 2 and 3	
dP	Position of decimal point	
	----	Max. display range: -1999 ... 9999
	---.-	Max. display range: -199,9 ... 999,9
	--.---	Max. display range: -19,99 ... 99,99
	-.---	Max. display range: -1,999 ... 9,999
d _i .Lo	Lower display range limit (display low)	
	-9999 ... 9999	This value is displayed for input signal = 4mA.
d _i .Hi	Upper display range limit (display high)	
	-9999 ... 9999	This value is displayed for input signal = 20mA.
L	(Measuring range) limit	
	oFF	deactivated: Exceeding of the measuring range limit is tolerable as long as value is within measuring range (p.r.t. note).
	on.Er	active, (display error): The measuring range limit is exactly bounded by the input signal. When exceeding or short falling the input signal the device will display an error message.
	on.rÜ	active, (display measuring range limit): The measuring range limit is exactly bounded by the input signal. When exceeding or short-falling the input signal the device will display the selected lower/upper display value. <i>e.g. humidity: when shortfalling or exceeding, the device will display 0% or 100%.</i>
	<i>Note:</i> When exceeding the measuring range, the device will always display an error message (.Err.1. or .Err.2.) independent of the current limit settings. The measuring range is from approx 3,7 and 20,8 mA respective 10.5 V (a falling below 0V will not be detected).	
FILt	Filter	
	oFF	Filter deactivated
	0.1 ... 2.0	Filter active: Prevents "jumping" of the last digit and filters short noise pulses. Higher numbers imply stronger filtering <i>Attention: this causes higher response times of the switching functions!</i>

outP	Output function	
	<i>no</i>	No output, device used as display
	<i>2P</i>	2-point-controller
	<i>ALF1</i>	Min- / max- alarm, together

Depending on the selected output function further parameters have to be adjusted. The configuration menu automatically skips parameters not needed for the selected output function. The following diagram shows which parameters are successively displayed for each output function.

A description of the single parameters follows afterwards.

Parameter	Value	Description
Button 1	Button 2 and 3	
l.on only at outP = 2P	Switch-on point of output 1	
	<i>d₁.Lo ... d₁.Hi</i>	Value at which output 1 should be switched on. Value has to be between upper and lower measuring range limit set at the beginning of the configuration menu.
l.off only at outP = 2P	Switch-off point of output 1	
	<i>d₁.Lo ... d₁.Hi</i>	Value at which output 1 should be switched off. Value has to be between upper and lower measuring range limit set at the beginning of the configuration menu.
l.dEL only at outP = 2P	Delay of switching function of output 1	
	<i>0.0 ... 999.9</i>	The set value is the time [in seconds] the device waits at least after switching-off output 1 to switch it on again.
l.Err only at outP = 2P	Preferred position of output 1	
	<i>on, off</i>	If an error occurs, the device switches output 1 to "active" (on) or "inactive" (off)
ALHi only at outP = ALF1	Max-alarm point	
	<i>ALLo ... d₁.Hi</i>	Value, at which max-alarm should be triggered. Value has to be between upper and lower measuring range limit set at the beginning of the configuration menu.
ALLo only at outP = ALF1	Min-alarm point	
	<i>d₁.Lo ... ALHi</i>	Value, at which min-alarm should be triggered. Value has to be between upper and lower measuring range limit set at the beginning of the configuration menu.
A.dEL only at outP = ALF1	Alarm delay	
	<i>0 ... 9999</i>	The set value is the alarm delay in seconds. The alarm case has to last for the set time to trigger the alarm.

After having set and confirmed the last point (depending on the selected output function) the configuration is done.

Press **button 1** one more time after the input of the last parameter to close the configuration menu.

The devices restarts (segment test).

7 Selection of switching and alarm points

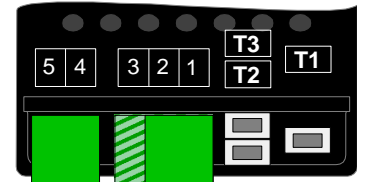
Note: *The device can be ESD sensitive at the area of the buttons.
The configuration must be done considering adequate ESD safety measures!*

Note: All relevant switching and alarm points can be set at this menu.
(Preferred output position and delay of the output can only be set at configuration menu)
Depending on the selected output function different parameters have to be adjusted.
The configuration menu automatically skips parameters not needed for the selected output function.

Note: *The menu cannot be called if output function is set off.*

Follow these instructions to adjust switching and alarm points:

- Press **button 1** for 2 seconds during actual value display, „1.on“ or „AL.Hi“ is displayed.
- Set parameter value with **button 2** and **button 3**.
- Save the set with **button 1**, the parameter name is displayed again.
- Proceed to the next parameter with **button 1**, the name of that parameter is displayed.



*If there is no key pressed within 60 seconds the configuration is cancelled.
The settings already entered are lost.*

Parameter	Value	Description
Button 1	Button 2 and 3	
1.on only at outP = 2P	Switch-on point of output 1	
	$d_i . Lo \dots d_i . Hi$	Value at which output 1 should be switched on. Value has to be between upper and lower measuring range limit set at the beginning of the configuration menu.
1.off only at outP = 2P	Switch-off point of output 1	
	$d_i . Lo \dots d_i . Hi$	Value at which output 1 should be switched off. Value has to be between upper and lower measuring range limit set at the beginning of the configuration menu.
AL.Hi only at outP = AL.F I	Max-alarm point	
	$ALLo \dots d_i . Hi$	Value, at which max-alarm should be triggered. Value has to be between upper and lower measuring range limit set at the beginning of the configuration menu.
AL.Lo only at outP = AL.F I	Min-alarm point	
	$d_i . Lo \dots AL.Hi$	Value, at which min-alarm should be triggered. Value has to be between upper and lower measuring range limit set at the beginning of the configuration menu.
A.dEL only at outP = AL.F I	Alarm delay	
	$0 \dots 9999$	The set value is the alarm delay in seconds. The alarm case has to last for the set time to trigger the alarm.

After having set and confirmed the last point (depending on the selected output function) the configuration is done.

Press **button 1** one more time after the input of the last parameter to close the configuration menu. The devices re-starts (segment test).

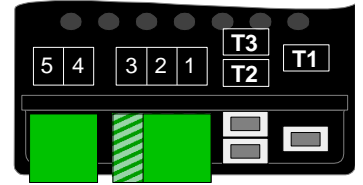
8 Offset and slope adjustment

Note: *The device can be ESD sensitive at the area of the buttons.
The configuration must be done considering adequate ESD safety measures!*

The offset and slope-adjustment function can be used for compensating the tolerance of the used sensor, resp. for vernier adjustment of the used transducer / transmitter.

Follow these instructions to run the offset and slope adjustment of the device:

- Press **button 3** for 2 seconds during actual value display, „OFFS“ is displayed.
- Set parameter value with **button 2** and **button 3**.
- Save the set with **button 1**, the parameter name is displayed again.
- Proceed to the next parameter with **button 1**, the name of that parameter is displayed.



Parameter	Value	Description
Button 1	Button 2 and 3	
OFFS	Offset	
	-5.00 ... 5.00	The offset in digit The set offset value is subtracted from measured value.
SCALE	Scale	
	-5.00 ... 5.00	The scale in %. The displayed value is calculated according to the following formula: Display = (measured value - offset - di.Lo) * (1 + slope adjustment [% / 100]) + di.Lo

Example for offset and slope adjustment:

Connection of pressure transmitter.

The device displays without offset and slope adjustment: at 0 bar = 0.08, at 20 bar = 20.02

From this calculated:

offset:	0.08	
slope:	$20.02 - 0.08 = 19.94$	
difference:	0.06	(= ideal slope - actual slope = 20.00 - 19.94)

Therefore this values should be set:

offset =	0.08	
scale =	0.30	(= difference / actual slope = 0.06 / 19.94 = 0.0030 = 0.30%)

9 Min-/max- value memory

The device features a minimum/maximum-value storage. In this storage the highest and lowest performance data is saved.

Calling of the minimum value:

Press button 3 shortly: the device will display “Lo” briefly, after that the min-value is displayed for about 2 sec.

Calling of the maximum value:

Press button 2 shortly: the device will display “Hi” briefly, after that the max-value is displayed for about 2 sec.

Erasing of the min/max values:

Press button 2 and 3 for 2 sec.: The device will display “CLr” briefly, after that the min/max-values are set to the current displayed value.

10 Error Codes

When detecting an operating state which is not permissible, the device will display an error code. The following error codes are defined:

Err.1: Exceeding of measuring range

Indicates that the valid measuring range of the device has been exceeded.

Possible causes:

- Input signal to high
- Sensor shorted (at 0(4)-20mA)

Remedies:

- The error-message will be reset if the input signal is within the limits.
- Check transmitter and device configuration (e.g. input signal).

Err.2: Values below measuring range

Indicates that the values are below the valid measuring range of the device.

Possible causes:

- Input signal is to low or negative
- Current below 4mA
- Sensor broken (at 4-20mA)

Remedies:

- The error-message will be reset if the input signal is within the limits.
- Check transmitter and device configuration (e.g. input signal).

Err.3: Display range has been exceeded

Indicates that the valid display range (9999 digit) of the device has been exceeded.

Possible causes:

- Incorrect scale

Remedies:

- The error-message will be reset if the display value is below 9999.

Err.4: Values below display range

Indicates that display value is below the valid display range of the device (-1999 digit).

Possible causes:

- Incorrect scale

Remedies:

- The error-message will be reset if the display value is above -1999.

Err.7: System error

The device features an integrated self-diagnostic-function which checks essential parts of the device permanently. When detecting a failure, error-message Err.7 will be displayed.

Possible causes:

- Actual temperature is below / above the valid temperature range
- Device defective

Remedies:

- Stay within valid temperature range
- Exchange the defective device.

Er.11: Value could not be calculated

Indicates a measuring value, needed for calculation of the display value, is faulty or out of range.

Possible causes:

- Incorrect scale

Remedies:

- Check settings and input signal

11 Specifications

	GIA 0420 ...	GIA 010 ...
Input signal:	4 ... 20 mA (2-wire)	0 ... 10 V (3-wire)
Voltage load:	3.0 – 3.5 V (typ.)	
Input resistance:		approx. 100 kOhm
max. permissible input:	25 mA (40mA short time)	15 V
Supply voltage:		12 - 28 V
Supply current:	from current loop	< 10 mA
Display:	approx. 10 mm high LCD-display	
Display range:	limits freely adjustable	
Max. display value:	9999 digit	
Min. display value:	-1999 digit	
Recommended range:	≤ 2000 digit	
Decimal point:	any position	
Accuracy: (at 25°C)	< 0.2% ±1 digit	
Temperature drift:	< 100 ppm / K	
Measuring range:	approx. 5 measurements / second	
Filter:	adjustable	
Operation:	via 3 buttons	
Min-/max-value memory:	callable via buttons	
Switching output:	1 electrically isolated open collector output, Test voltage: 50 V	
Switching point, hysteresis:	freely adjustable	
Switching voltage:	max. 28 V	
Switching current:	max. 50 mA <i>Please note: the switching output is not short-circuits protected</i>	
Reaction time:	≤ 250 ms	
Nominal temperature:	25 °C	
Working conditions:	-20 ... 50 °C, 0 ... 80 % (non condensing)	
Connection:	via 2- or 3-pin screw-type/plug-in terminal max. wire cross selection: 1.5 mm ²	
Housing:	glass fibre reinforced noryl, front panel PC 24 x 48 x approx. 65 mm (H x W x D)	
Panel cut-out:	21.7 ^{+0.5} x 45 ^{+0.5} mm (H x W)	
IP rating:	IP20 by front-flush mounting: front side IP54 (IP65 by means of additional silicone o-rings)	
EMC:	The device corresponds to the essential protection ratings established in the Regulations of the Council for the Approximation of Legislation for the member countries regarding electromagnetic compatibility (2004/108/EG). In accordance with EN61326-1 (table 2, class B), additional fault: < 1% FS When connecting long leads adequate measures against voltage surges have to be taken. The device is ESD sensitive at the area of the buttons at the rear side.	