



Operating Instructions

Electronic totalizing counter N 214

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General

Meanings of symbols used in these operating instructions:

Explanation of symbols:

- ➔ This symbol represents an activity to be carried out.
- This symbol represents supplementary technical information.



This symbol indicates instructions or information which is of particular importance to ensure the correct use of the N 214 and to exclude possible hazards.



This symbol indicates important additional information.

Italics

To permit you to find information quickly, key terms are indicated in italics in the left-hand column.

1 Safety indications

The electronic counter, controller and monitor has been designed to the latest state of the art.

Use the instrument only

- in an absolutely correct technical state,
- for the intended purpose,
- when conscious of relevant safety and danger, by observing the operating instructions.

Intended purpose

The instrument is to be used only indoors as built-in model. Its fields of application are industrial processes and controls on production lines of the metal, wood, plastic, paper, glass and textile industries; the overvoltage protection of the terminals must be limited to the voltages of category II.

Description of the overvoltage category under DIN VDE 0110, Part 2.

The instrument may only be operated in a correctly mounted state.

The instrument may only be operated as described under chapter „Technical Data“.



The instrument may not be used in hazardous areas, for medical apparatus, nor for applications expressly declared under EN 61010.

If the instrument is to be used to control machines or processes, where the machine could be damaged or the operator could be injured due to a breakdown of the instrument or to a failure in operation, then relevant safety precautions will have to be taken.

Organizational measures

Make sure that all operators have read and understood the operating instructions, especially the chapter „Safety indications“.

In addition to the operating instructions, please make sure that generally applicable legal and other mandatory regulations relevant to accident prevention and environment protection are observed.

Be conscious of operation

In the event of safety-relevant modifications (including changes in the behavior of the instrument during operation), immediately stop operation of instrument.

Installation

The installation may only be effected as described under the chapter „Connection“.

When installing the instrument, take care to cut off the power supply. The instrument may only be installed by a skilled expert.

Prior to initial operation of the instrument, please control the voltage selection. Set the switch to the required a. c. voltage. During installation, make sure that supply voltage and connection of the output contacts are provided from the same MAINS phase.
Max. voltage 250 V terminal – terminal, earth – terminal.

<i>Initial operation</i>	The instrument is ready for use after it has been correctly mounted and installed.
<i>Maintenance/Servicing/ Trouble shooting</i>	Cut off power supply of all connected instruments. This kind of work may only be effected by a skilled expert. In case of unsuccessful trouble shooting, interrupt use of instrument and contact your dealer.
<i>Getting acquainted</i>	After successful initial operation, make yourself familiar with the operation of your instrument by studying the chapter „Getting to know“.






2 Getting to know the N 214

2.1 The N 214 consists of the following:

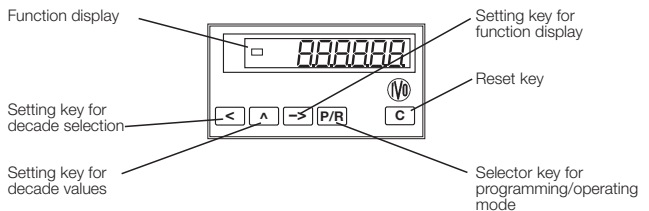
- Totalizing counter with scaling factor and start count value
- Start or zero signal output
- Serial interface

N 214 components

Control panel

-  Selector key for function display
-  Setting key for decade selection
-  Setting key for decade values
-  Selector key for programming/operating mode
-  Reset key

Front view



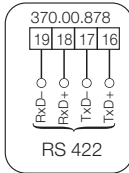
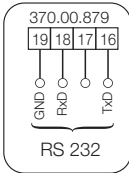
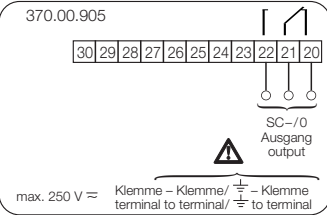
3 Connecting the N 214

This section first describes the terminal assignments, followed by some typical connections.

Sections 3.1 to 3.5 contain specific instructions and the specifications for the individual terminals.

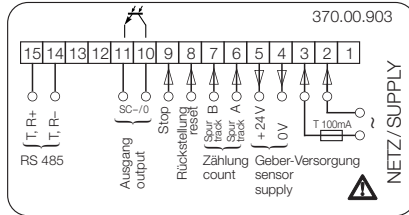
The inputs and outputs are assigned to plug-in screw terminals. These are coded to prevent reversed polarity.

Connection examples



Terminal assignments

Terminal	Function
1	Not assigned
2	Power supply
3	Power supply
4	Encoder power supply 0 volts
5	Encoder power supply +24 volts
6	Signal input, track A
7	Signal input, track B
8	Reset
9	Signal stop/hold/print option
10	SC-/zero signal (collector)
11	SC-/zero signal (emitter)
12	Not assigned
13	Not assigned
14	Reserved for optional RS 485 T, R-
15	Reserved for optional Rs 485 T, R+
16-19	Reserved for optional RS 232 or RS 422
20-22	Reserved for optional relay contact



For protection against shock hazards as specified in VDE 0411 part 100, stranded conductors may only be connected using wire end ferrules with insulating caps. Terminals which are not assigned in the factory must not be otherwise assigned by the user. We recommend shielding all encoder connecting leads and earthing the shield at one end. Earthing at both ends is recommend to avoid RF interference or if equipotential bonding conductors are installed over long distances. Encoder connecting leads should not be laid in the same trunking as the mains power supply cable and output contact leads.

3.1 Connecting the power supply

AC voltage connection

Power supply AC voltage	Recommended external fuse
24 V ± 10% 50/60 Hz	T 400 mA
48 V ± 10% 50/60 Hz	T 400 mA
115 V ± 10% 50/60 Hz	T 100 mA
230 V ± 6%, -10% 50/60 Hz	T 100 mA

It is possible to switch between two different alternating voltage ratings (see adjoining table) by means of the voltage selector switch at the side of the unit. The higher of the two alternating voltage ratings (48V or 230V) is preset by the factory.

- ➔ Set the required alternating voltage with the voltage selector switch.
- ➔ Connect the alternating voltage supply to terminals 2 and 3 in accordance with the N 214 wiring diagram.

DC voltage connection

Power supply DC voltage	Recommended external fuse
24 V ± 10% max. 5 % RW	T 500 mA

Connect an interference-free power supply, i.e. do not use it for the parallel connection of drive systems, contactors, solenoid valves, etc.

→ Connect the DC voltage in accordance with the N 214 wiring diagram.



Fire protection: Operate the instrument using the recommended external fusing indicated in the terminal diagram. VDE 0411 specifies that 8A/150 VA(W) must never be exceeded in the event of a fault.



3.2 Assigning the electronic output

The electronic output (terminals 10, 11) is an optocoupler output.

Max. switching voltage +40 V	Max. switching current 15 mA	Max. rsidual voltage < 1 V
------------------------------------	------------------------------------	----------------------------------



The electronic output is not short-circuit proof.

→ Assign terminals 10, 11 accordingly.



3.3 Assigning the relay contact (option)

Terminals 20, 21 and 22 are no-potential changeover contacts. The signal output can be assigned in accordance with the adjoining wiring diagram.

Max. switching capacity 150 VA/30 W	Max. switching voltage 250 V	Max. switching current 1 A
---	------------------------------------	----------------------------------



The user is responsible for ensuring that a switching load of 8A/150 VA (W) is not exceeded in the event of a fault. Internal spark suppression by means of two zinc oxide varistors (275 V). The output relays of the instrument (1 relay or several) may only be disengaged in total 5 x per minute at the most. Admissible clicks according to Interference Suppression Standard EN 55011 EN 50081-2 for the industrial sector. In case of a higher switching rate, the operator must take care of interference suppression on the spot and under his own responsibility by observing the load to be switched.

→ Assign terminals 20, 21 and 22 accordingly.

3.4 Assigning the signal inputs

Terminals 6 to 9 are signal inputs. Terminals 6 (track A) and 7 (track B) are signal inputs for the counter. The type of signal and signal logic are programmed in lines 25 and 28.

Terminal 8 serves as the reset input. The counter is reset by way of an external signal (signal width > 30 ms).

Terminal 9 (stop) serves as a stop/hold/print input (line 31).

Input resistance	3 kOhms
Max. input level	+/- 40 V
Max. frequency	10 kHz
Min. attenuation	3 Hz

→ Assign terminals 6 to 9 accordingly.

For suitable pulse generators, see the IVO Pulse Generator Catalogue.

3.5 Connecting the encoder supply



Connect the encoder supply at terminals 4 and 5. Do not use the encoder supply to supply non-earthed inductive or capacitive loads.



The encoder supply is not short-circuit proof.

Terminal	Voltage	Maximum residual ripple	Maximum permissible current
4	0V	–	–
5	+24 VDC +10% /-50%	Depending on	100 mA

3.6 Connecting the interfaces

The serial interface is capable of executing the following functions:

- Accessing data
- Programming parameters

Interface parameters include:

- Data transmission rate (baud rate)
 - Parity bit
 - Number of stop bits
 - Address used to access the control unit from a master computer.
- These interface parameters can be set in the programming mode.

The following standard interfaces (no plug connector standard) can be connected to the N 214:



- RS232
- RS422
- RS485


Interface characteristics:

- RS232 Full duplex transmission with the following characteristics:
- Asymmetric
 - Three leads
 - Point-to-point connection – 1 transmitter and 1 receiver
- RS422 Full duplex transmission with the following characteristics:
- Symmetrical
 - Four leads
 - Multi-point connection – 1 transmitter and 32 receivers
 - Max. data transmission distance: 1500 m
- RS485 Semi-duplex transmission with the following characteristics:
- Symmetrical
 - Two leads
 - Multi-point connection – transmitters and receivers (max. 32 units)
 - Max. data transmission distance: 1500 m
- ➔ Assign terminals 14 and 15 and, where applicable, 16-19 to the corresponding interface.

3.7 Executing the test routine

The test routine is described below.

- To start test* → Press the  and  keys simultaneously.
 → Switch on the N 214 (hold down the above keys at the same time)
 ● All the display segments will be displayed automatically in sequence and are thereby tested for functional capability.

- Test extension* → Using the  key, test the keyboard, the inputs, outputs and interface in sequence.



No machine functions may be connected when the outputs are tested.



Keyboard test





Input test

- Inputs can be controlled simultaneously or individually. A display is only provided when a signal is applied.






Output test

- Press the  key.
 The output is now activated. Reset the output using the  key.

Typical displays



Test the interface (where applicable)

Start key ; test O.K.: ; test failed 



Display: program number and version number.



Display: program date. e.g. 08.11.94



Test for various input levels (operating points), signal forms and the phase discriminator (test numbers 1-8).

- Terminate test* The test routine can only be terminated by switching off the instrument. As soon as the power supply has been switched on again, the N 214 is in operating mode.

- Test program version* Press the  key, switch on the N 214 (holding the key down at the same time).



Display: Program number and version number



Display: Program date

4 Operating the N 214

















The operation and use of the N 214 are described in this section.

- As soon as the power supply has been switched on, the NE 214 is automatically set to the operating mode.

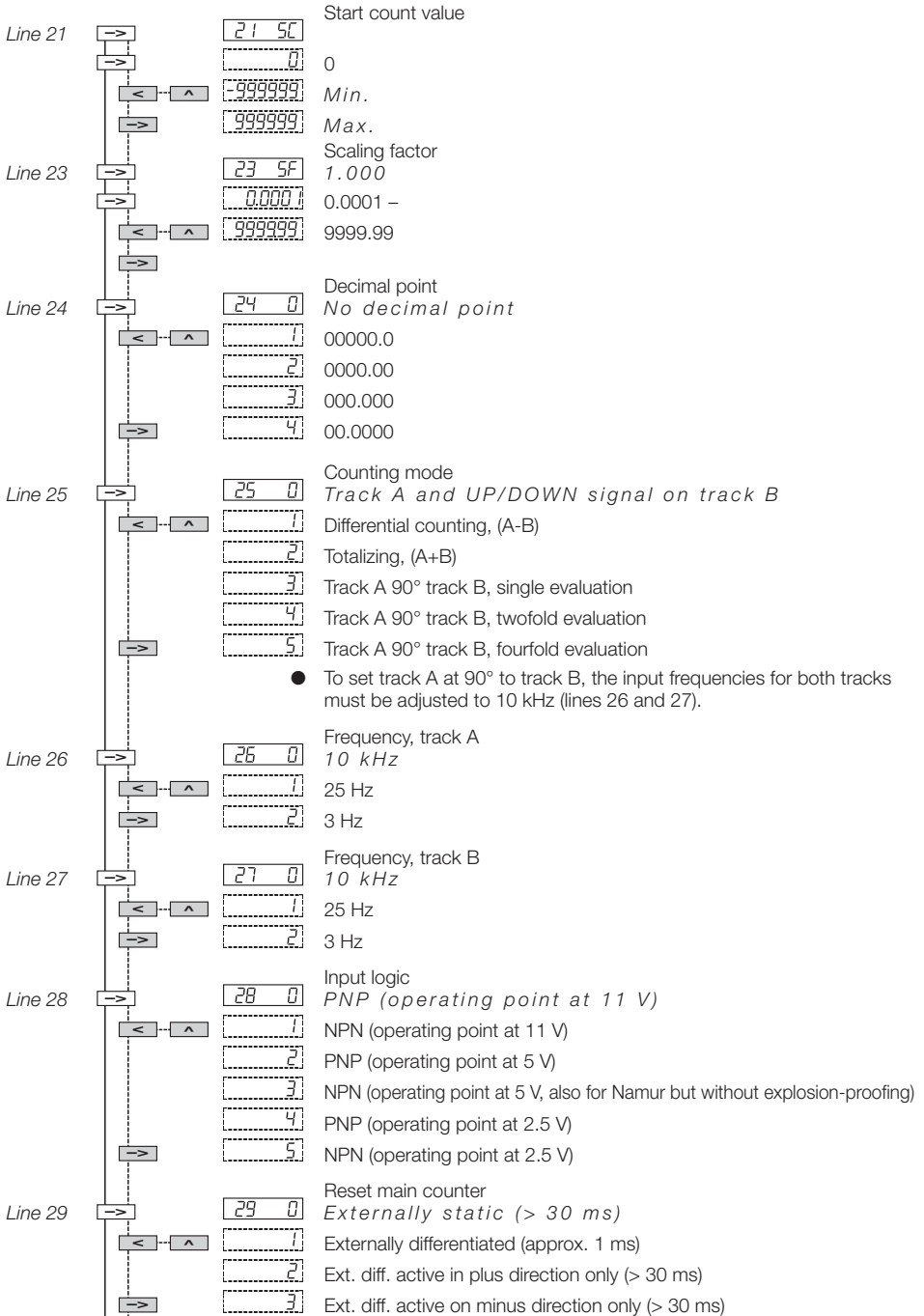
- Operating mode* In the operating mode
 – the current counter status can be read and reset;

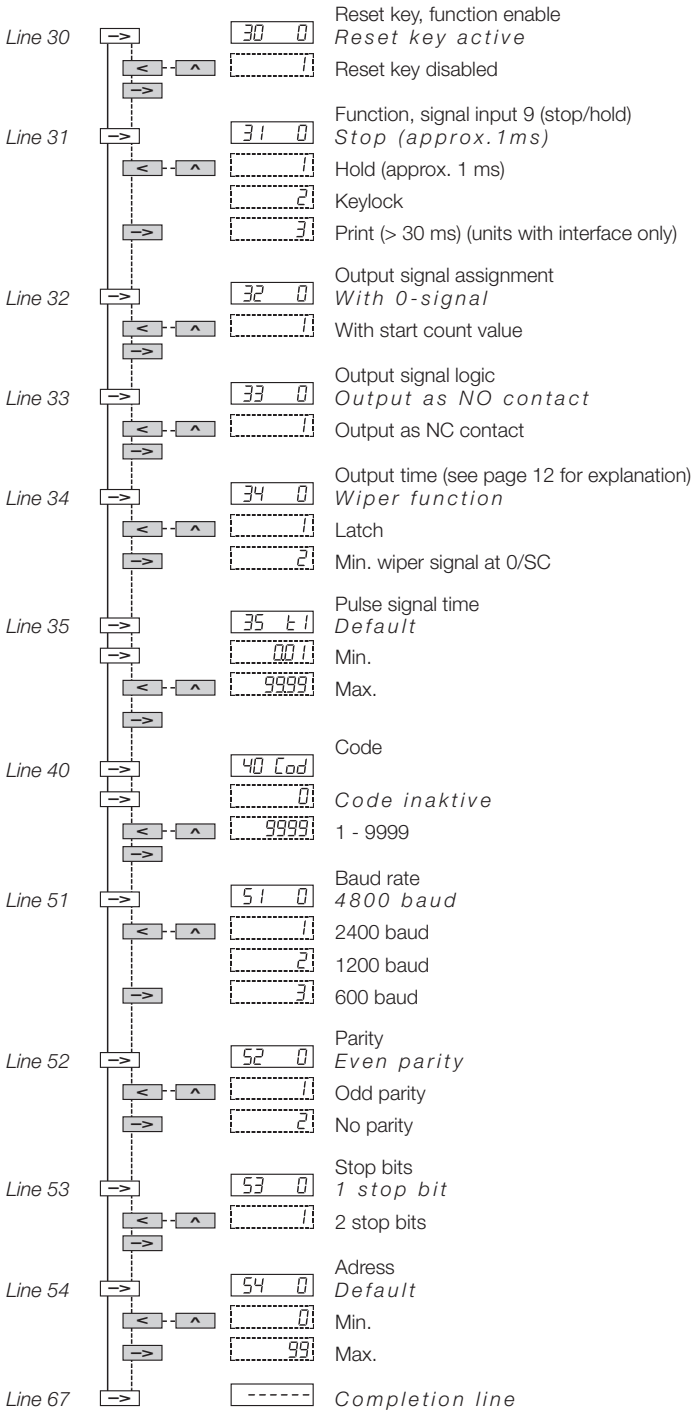
5 Programming the N 214

This section describes the procedure for programming the NE 214.

<i>Programming segment</i>	In the programming segment, all the machine-related functions and values can be programmed, together with the interface parameters.
<i>Key assignments</i>	The same key assignments apply to the individual programming segments. Since key functions may vary in the operating and programming modes, however, all the functions are described in full below.
<i>Function in the operating and programming modes</i>	Key  Transfer to the next operating parameter in the operating and programming modes. For a fast run-through, hold the key down (in programming mode only).
<i>Function in the operating and programming modes</i>	Key  Transfer from programming to operating mode and vice versa.
<i>Function in the operating and programming modes</i>	Key  Select the first or next required decade. The selected decade position flashes.
<i>Function in the operating mode</i>	Key  Deletes the display if the  key is enabled in the 'Reset key' line.
<i>Function in the programming mode</i>	Deletes the display. Value reset to zero. Reset of possible programmed operating parameters.
<i>Function in the operating mode</i>	Key  When this key is pressed, the respective decade position advances by one value.
<i>Function in the operating and programming modes</i>	When the key is pressed, the respective decade position advances by one value until the maximum set value is reached.
<i>To access programming</i>	The programming process is described below in the order in which it is carried out <ul style="list-style-type: none"> → Press the  key. ● The system transfers from the operating to the programming mode. ●  is displayed. → Input code  and . → Press the  key. <hr/>
	No code is entered before delivery.
<i>Incorrect code</i>	If an incorrect code has been input: <ul style="list-style-type: none"> ●  appears in the display when the  key is pressed. ● After 15 seconds, the system will automatically revert to the operating mode. → If the 15 seconds have expired, press the  key. → Input the correct code.
<i>Correct code unknown</i>	If the correct code is not known: <ul style="list-style-type: none"> → Return the N 214 to the factory.
<i>Correct code</i>	→ When the correct code has been input, press the  key.

5.1 Programming routine





At the conclusion of these programming lines, a broken line will appear in the display, signifying the completion of the programming segment.

To leave the programming mode → Press the **[P/R]** key.
 ● The N 214 now reverts to the operating mode.

Reprogramming the N 214 to the default settings → Switch on the instrument and press the **[<]** and **[>]** keys simultaneously.
 ● All the programmed values will now revert to their default settings. The message **[ClrPrd]** appears briefly in the display.

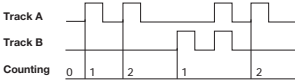
5.2 Programming lines

Line	Default setting	Customer's program	Short description
01	<input type="text" value="0"/>		XP Main counter status
20	<input type="text" value="-----"/>		Completion line
21	<input type="text" value="21 50"/> <input type="text" value="0"/>	<input type="text" value="21"/> <input type="text" value=""/>	Start count value
23	<input type="text" value="23 5F"/> <input type="text" value="1000"/>	<input type="text" value="23"/> <input type="text" value=""/>	Scaling factor
24	<input type="text" value="24 0"/>	<input type="text" value="24"/>	Decimal point
25	<input type="text" value="25 0"/>	<input type="text" value="25"/>	Counting mode
26	<input type="text" value="26 0"/>	<input type="text" value="26"/>	Frequency, track A
27	<input type="text" value="27 0"/>	<input type="text" value="27"/>	Frequency, track B
28	<input type="text" value="28 0"/>	<input type="text" value="28"/>	Input logic
29	<input type="text" value="29 0"/>	<input type="text" value="29"/>	Reset
30	<input type="text" value="30 0"/>	<input type="text" value="30"/>	Reset key, function enable in operating mode
31	<input type="text" value="31 0"/>	<input type="text" value="31"/>	Function signal input 9 (stop/hold/print)
32	<input type="text" value="32 0"/>	<input type="text" value="32"/>	Output contact assignment
33	<input type="text" value="33 0"/>	<input type="text" value="33"/>	Digital output logic
34	<input type="text" value="34 0"/>	<input type="text" value="34"/>	Output contact access
35	<input type="text" value="35 1.1"/> <input type="text" value="0.25"/>	<input type="text" value="35"/> <input type="text" value=""/>	Self-adjusting signal time
40	<input type="text" value="40 C00"/> <input type="text" value="0"/>	<input type="text" value="40"/> <input type="text" value=""/>	Code
51	<input type="text" value="51 0"/>	<input type="text" value="51"/>	Baud rate
52	<input type="text" value="52 0"/>	<input type="text" value="52"/>	Parity
53	<input type="text" value="53 0"/>	<input type="text" value="53"/>	Stop bit
54	<input type="text" value="54 0"/>	<input type="text" value="54"/>	Address
67	<input type="text" value="-----"/>		Completion line

5.3 Counting modes (Input modes)

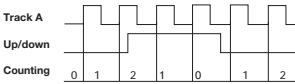
The counter is able to count in either direction. The counting direction is independent of the adding or subtracting operating mode.

The exception to this is totalizing (A+B).

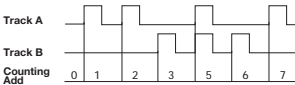


Differential counting, track A adding, track B subtracting (A-B)

Any signal and duration and time.

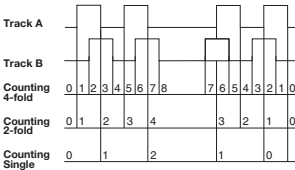


Up/down counting with one counting track A and external up/down signal on track B



Totalizing, tracks A and B adding (A+B)

The operating mode and consequent counting direction are selected in the programming mode.

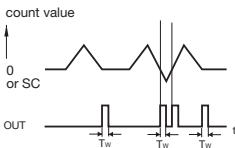


Up/down counting with two counting signals, phase-offset by 90 degrees.

The counting direction is automatically identified from the leading/lagging 90o phase offset. The internal phase discriminator performs the necessary evaluation. Twofold or fourfold evaluation is possible.

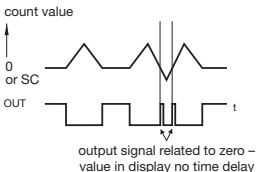
5.4 Output modes

The switching behaviour of the output is being determined by the programmed parameters in the corresponding lines.



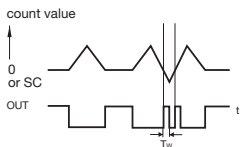
Parameter setting „0“

The output signal related to countvalue „0“ or „offset SC“ (see line 32) has a duration according to the time set in line 35.



Parameter setting „1“

The output signal related to countvalue „0“ or „offset SC“ (see line 32) stays activated as long as the countvalue „0“ or „offset SC“ is being displayed.



Parameter setting „2“

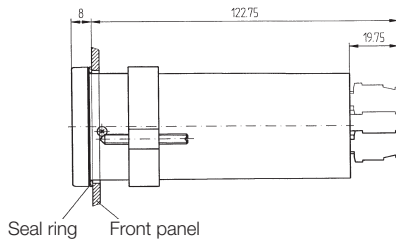
The output signal related to countvalue „0“ or „offset SC“ (see line 32) stays activated as long as the countvalue „0“ or „offset SC“ is being displayed, but minimum for the time set in line 35.

6 Technical data

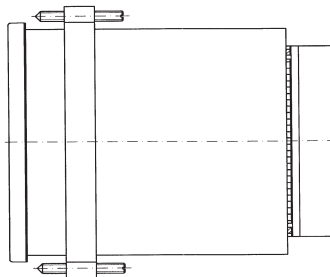
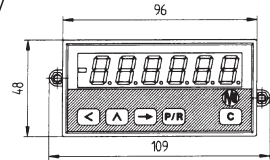
Display	7-segment LED display 6-digit, red with prefix zero suppression and minus sign
Digit height	14 mm
Power supply	As per purchase order
Power consumption	7 VA, 5W
Encoder power supply	+24 VDC, +10%/-50% max. 100 mA
Programmable signal inputs	PNP, NPN, (NAMUR not explosion-proof)
Input resistance	approx. 3 kOhms
Max. input level	+/- 40 V
Max. input frequency	10 kHz
Signal outputs	Optocouplers for "0" or "SC" output (relay as option)
Max. switching voltage	40 V
Max. switching current	15 mA
Max. residual voltage	< 1 V
Data storage	> 10 years (via EEPROM)
Mounting	With clamping frame
Dimensions	96 x 48 mm, housing for front panel mounting
Wire size	1.5 mm ²
Housing material	Macrolon 6485
Front membrane	Polyester
Weight	AC version: approx. 350 g DC version: approx. 250 g
Protection	According to EN 61010, category II
Type of protection per DIN 40050	From the front, when mounted, with seal: IP 65
Operational requirements	According to contamination factor 2
Overvoltage protection	According to EN 61010, category II
Interference immunity	Acc. to EN 50082-2
Emitted interference	Acc. to EN 50081-2
Ambient temperature	0 °C ... +50 °C
Storage temperature	-20 °C ... +70 °C
Relative humidity	Max. relative humidity 80%, non-condensing
General rating	According to EN 61010

6.1 Dimensional diagrams

Dimensions in mm



Supplementary plug for configuration with relay outputs, analog output and interface (RS 422, RS 232).



Installation aperture:
92+0.8 x 45+0.6

6.2 Default settings

The following parameters are programmed into the N 214 by the factory, prior to delivery:

Start count value	0
Scaling factor	1,0000
Display	No decimal point
Pulse signal time, min counter	0,25 s
Counter inputs	Track A and UP/DOWN on track B
Counting frequency	10 kHz

6.3 Error messages

N 214 error messages Err 1 and Err 2: Fault must be rectified by the factory.

Err 5: Excessively fast sequences, e.g. inadequate intervals between presets at high counting frequency.

7 Order designation

