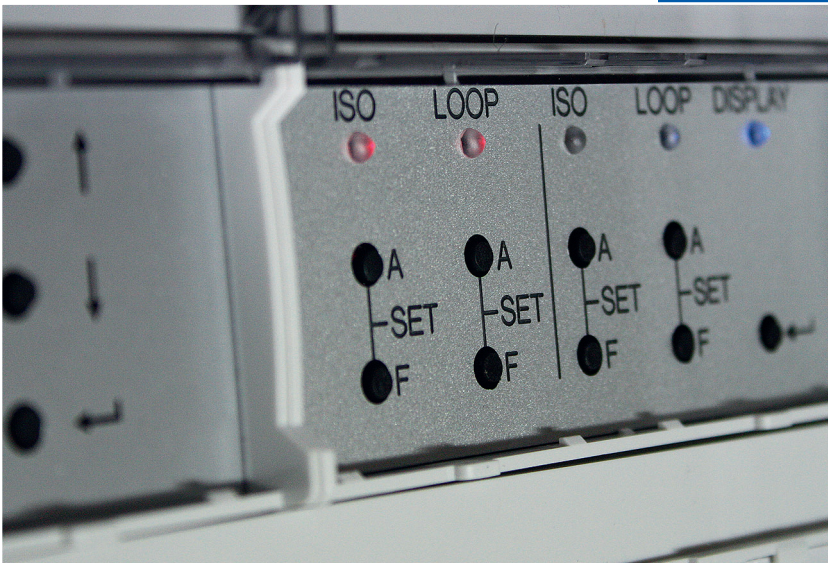


*Operating Instructions*

***RM-PL NiCr***  
***RM-PL NiCr short***  
***RM-PL Cu***  
***RM-PL HDW***

***Insulation and Loop Resistance  
Measuring Module in Pipe Systems  
for Leakage Monitoring and  
Fault Localisation (NiCr)  
in the PipeMonitor System***



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## Important!

It is imperative to read and observe all safety instructions prior to initial operation!

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## Technical Data

Measurement channels	2 (e. g. for flow and return line of a district heat pipe)
Measurement range insulation Resolution	0 .. 50 M $\Omega$ , fault: $\pm 1$ % of measured value, $\pm 5$ Digits 0,001 M $\Omega$
Measurement range Loop Resolution	<b>NiCr, Cu, HDW</b> 0 .. 9,999 k $\Omega$ , fault: $\pm 1$ % of measured value, $\pm 5$ Digits <b>NiCr short</b> 0 .. 5,0 k $\Omega$ , fault: $\pm 1$ % of measured value, $\pm 5$ Digits 0,001 k $\Omega$
Tolerance of localisation	$\pm 0,2$ %, $\pm 1$ m for insulation values < 1M $\Omega$ for sensor wire 5,7 $\Omega$ /m
Measuring voltage	24 V DC, switchable and disengageable
Supply voltage	12 V / 5 V DC by RM-Basic module
Power consumption	max. 4 W
Measurement input Impulse stability 1,2/50 $\mu$ s	1000 V
Operating temperature	-20 $^{\circ}$ C .. +65 $^{\circ}$ C
Storing temperature	-40 $^{\circ}$ C .. +70 $^{\circ}$ C
Admissible ambient humidity	0 .. 95 % rel. humidity, non-condensing
Display	Monochrome LC-Display by RM-Basic module
Signal LEDs 2 x green / red:	<i>red</i> : Alarm insulation resp. loop <i>flashing</i> : Acknowledged alarm insulation resp. loop <i>green</i> : Display insulation resp. loop display operation
1 x blue:	
Signal outputs	2 dry change-over contacts for: insulation resistance, loop resistance
Max. switchable voltage	100 V DC
Max. switchable current	0,1 A DC
Dimensions RM-PL (W x H x T)	108 x 90 x 65 mm

## Ordering Data

<b>Measuring module RM-PL NiCr</b> with fault localisation up to 1500 m	<b>Bestell Nr. 074007.200</b>
<b>Measuring module RM-PL NiCr short</b> with fault localisation up to 750 m	<b>Bestell Nr. 074007.100</b>
<b>Measuring module RM-PL Cu</b> without fault localisation	<b>Bestell Nr. 074702.000</b>
<b>Measuring module RM-PL HDW</b> without fault localisation	<b>Bestell Nr. 074703.000</b>

## General Information

These operating instructions should make it easier for you to become acquainted with the product. They contain important information to ensure safe, appropriate and cost-effective use of the equipment.

This instruction manual applies to modules supplied individually as well as those pre-installed into fully operational PipeMonitoring systems. In the second scenario, users can disregard the following points

- Installation,
- Electrical connection and
- Set up of the measuring module address.

The operating instructions endorse the directives of national regulations for the prevention of accidents and the protection of the environment.



**These operating instructions shall be read and adopted by anyone assigned to work with/on the equipment, e. g. during operation to include setting-up, maintenance trouble-shooting.**

In addition to the operating instructions and the mandatory regulations for the prevention of accidents, applicable in the operator's country and at the place of use, the recognized technical regulations for safe and professional operation shall also be observed.

## Designated Use

RM-PL-NiCr- and RM-PL-NiCr-short measuring modules are intended for the measurement of insulation and loop resistance for the detection of leaks in piping systems and their localisation.

RM-PL-Cu-and RM-PL-HDW measuring modules are intended for the measurement of insulation and loop resistance for the detection of leaks in piping systems.

RM-PL measuring modules are intended for use in residential, business and commercial settings as well as for small businesses.

Any other use is considered improper. The manufacturer is not liable for any resulting damage; the user alone bears the risk!

## Safety Instructions



### Important!

Read and observe safety instructions prior to initial operation!

- Keep the operating instructions ready to hand!



### Accident prevention!

All circuit lines must be dead before mounting or demounting the system and the opening of its housing!

- The unit should only be operated in technically-sound condition, for its designated use, with safety and risk awareness in mind, taking into account the operating instructions. In particular, operational faults, which can compromise safety, should be rectified immediately!
- Do not make any modifications to the equipment!
- Mounting, maintenance and repair work should only be performed by trained personnel!
- Only use original LANCIER Monitoring replacement parts!



### Important!

Obey handling instructions. Electrostatic discharge (ESD) damage.



### WARNING!

The place of installation of the RM module should have a complete lightning protection plan that covers power supply cables as well as data and telecommunications cables.



### WARNING!

When performing welding work on the pipes all measurement and earth lines must be disconnected from the relevant measuring module.

The welding voltage could otherwise damage the measuring equipment.

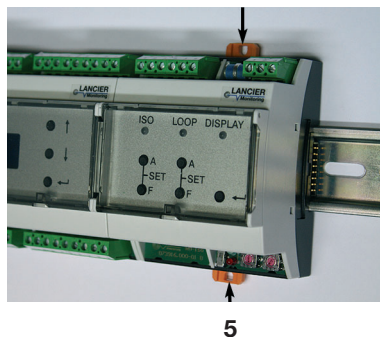
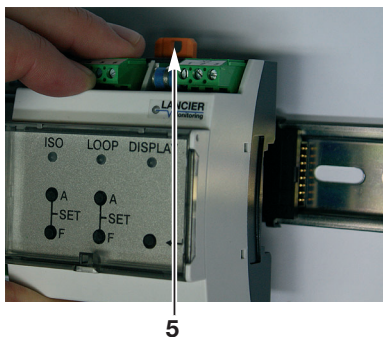
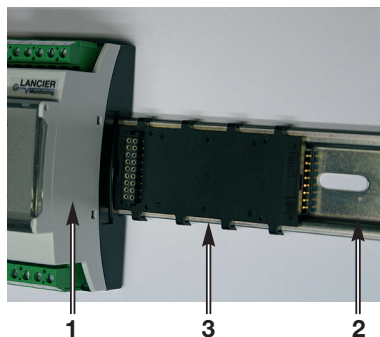
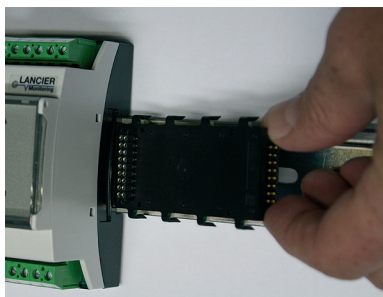
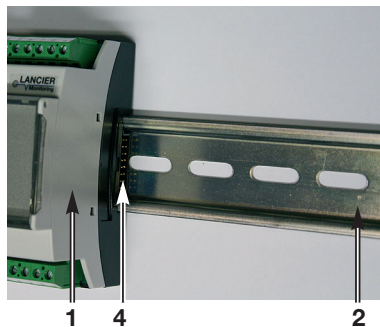
# Installation

## Mounting

The Rail-Module-Bus-System is composed of a basic module and various measuring modules (1), which are clipped on a DIN rail (2). When screwing on the DIN rail (2) make sure that the spacing of the mounting screws matches the spacing of the ports on the back of the connecting plates (3).

Each measuring module (1) has a bus connecting plate (3) that plugs into the interfaces (4) of the existing neighbouring module and subsequently clips into the DIN rail (2).

The measuring module can now be attached to the Bus connecting plate (3) using opened connecting clips (5). The connecting clips (5) must be pushed in until they lock into place to secure them.



## Electrical connection



### Accident prevention!

Before working on the bus system the supply voltage **MUST** be switched off!



### WARNING,

Adhere to EMC directives!

RM-Iso measuring modules are connected to each other using a bus connecting plate (3). Communication between modules is carried out by a CAN bus.

The district heating pipe's measuring wires are connected to the measuring loop's a, b terminals.

Using a separate cable for each, the ground wire is clamped to the ground and reference ground terminals from two different locations. The double connection of the ground wire enables the detection of cable breaks.

### Terminal assignment

#### Measuring channel 1

X1.1 to 1.3

X1.4 to 1.6

X1.7 to 1.8

X1.9

X1.10

#### Measuring channel 2

X2.1 to 2.3 Signal contact Iso

X2.4 to 2.6 Signal contact Loop

X2.7 to 2.8 Measuring loop (a, b - sensor pair loop)\*

X2.9 Ground

X2.10 Reference ground

\*) The cable assignment will differ depending on the individual measuring procedure being used:

#### NiCr:

a: sensor wire,

b: return wire

#### Cu:

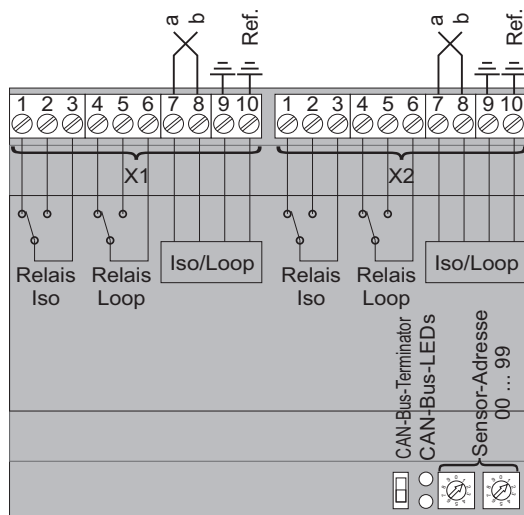
a: bare copper core,

b: tin-coated copper core

#### HDW:

a: red testing wire,

b: white testing wire



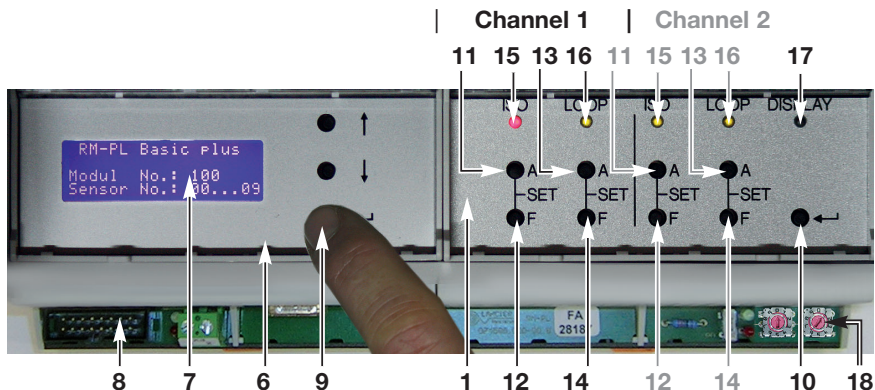
### CAN bus terminator

The last participant on the RM CAN bus (as seen from the basic module) must be equipped with a terminating resistor. Next, flip the "CAN-Bus-Terminator" switch down.

## Assigning measuring module address

Each RM basic module (6) can hold a maximum of 10 measuring modules (1). The measuring modules are connected to the basic module (6) on a DIN rail using a bus connecting plate or using an interface cable with the connecting plug (8).

To assign unique measurement values, the measuring modules (1) must be addressed.



### 1. Determining the basic module number

Press and hold the “Enter” button (9) on the basic module for 5 s until “Module No.” appears on the display (7).

### 2. Reading the module No.

For the

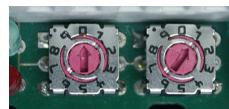
- basic module No. 100 measuring module addresses 01 to 09 are acceptable,
- basic module No. 101 measuring module addresses 10 to 19 are acceptable, etc., until
- basic module No. 109 measuring module addresses 90 to 99 are acceptable

The basic module automatically returns to the normal display mode after a preset amount of time.

### 3. Entering measuring module addresses

Using a small screwdriver, enter the module number on the address rotary switch (18) (left switch in the 10th position, right switch in the 1st position).

For technical reasons the measuring module address 00 is not allowed.



10th, 1st pos.

Example: Module address 01

**The measuring module address remains identical when connected to another CAN or module bus.**



### IMPORTANT!

After entering the measurement module addresses, the basic module should be reset by switching the power supply off and then on again.



## Function/commissioning

RM-PL-NiCr modules measure and monitor insulation and loop resistance values, in order to detect and locate leaks in pipe systems. RM-PL-Cu and RM-PL-HDW modules can only detect leaks, they cannot, however, locate them.

Furthermore, all RM-PL modules monitor the ground connection for the detection of line interruptions. RM-PL modules are part of LANCIER's monitoring RM-buses. Here, a number of different measuring modules are mounted on a top-hat rail and interlinked directly via integrated plug-in connectors. The power supply, measurement evaluation and display as well as data transmission to remote control rooms are managed via the RM-PL basic module. Communication between the modules takes place via a CAN bus.

The threshold levels for the insulation and loop resistance values are freely programmable via a built-in keypad and the display on the basic module. All settings are stored securely in an internal EEPROM memory.

For troubleshooting purposes the measuring voltage can be reversed.

RM-PL modules have built-in, potential-free output contacts for remote alarming.

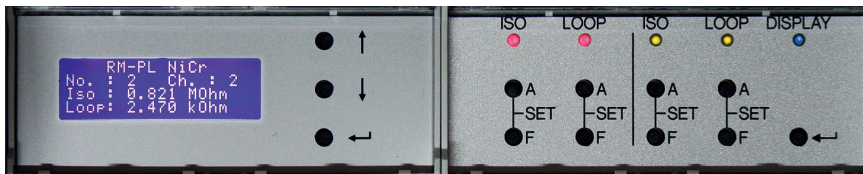
The measuring modules on the pipes can be temporarily disabled for certain servicing purposes.

---

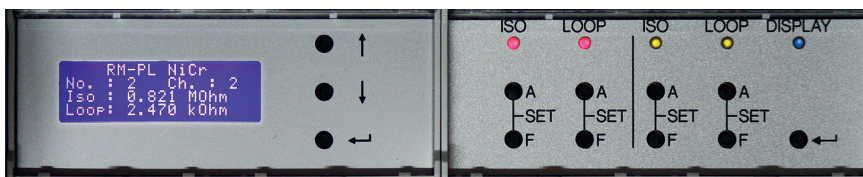
## Basic functions of the measuring module RM-PL

### 1. System start/Self test

- When the power supply is switched on, the system carries out a self test, which is indicated by the display (7) on the basic module (6).



### 2. Measured value display



### RM-PL NiCr (short)

- When the "Enter" key (10) is pressed on the measuring module (1), the current ISO and loop measurement values of measurement channel 1 are shown on the display (7) of the basic module (6).

```

RM-PL NiCr
No.: 2   Ch.: 1
Iso : 0.821 MOhm
Loop: 2.470 kOhm
  
```

If the measured values exceed the tolerance threshold value, then only the latter value is displayed:

When the "Enter" key (10) is pressed once more, the display will change to the fault localisation mode of measurement channel 1.

```

RM-PL NiCr short
No.: 3   Ch.: 1
Iso : > 50.000 MOhm
Loop: > 5.000 kOhm
  
```

- The fault localisation mode shows:
  - The length of the measuring section
  - The fault's distance from the start of the measuring section (a->f)
  - The fault's distance from the end of the measuring section (f<-b)

```

Fault Locat. Ch. 1
Loop: 427m 100.0%
a->f: 142m 33.3%
f<-b: 284m 66.7%
  
```

- If the insulation value exceeds 5 M $\Omega$ , it is not reasonably possible to detect the fault location. This is shown accordingly on the display.

```

Fault Locat. Ch. 1
not possible
Iso: > 5.000 MOhm
  
```

- If the measuring loop is interrupted, it is not possible to determine the fault location. This is shown accordingly on the display.

```
Fault Locat. Ch. 1
not possible
Loop break
```

When the "Enter" key (10) is pressed once more, the display will change to

- The current ISO and loop measurement values of measurement channel 2
- The fault localisation mode of measurement channel 2.

- The blue "Display" LED (17) on the active measuring module will light up.

### RM-PL HDW

- When the "Enter" key (10) on the measuring module (1), the current ISO and loop measurement values of measurement channel 1 are shown on the display (7) of the basic module (6).

```
RM-PL HDW
No.: 1   Ch. : 1
Iso : 9.950 MOhm
Loop: 2.748 kOhm
```

The **insulation resistance value** is determined using a -> pipe down measurement. This value is decisive for the evaluation of the alarm status and will be transmitted for remote monitoring.

The **loop resistance value** is determined using an a->b measurement.

If the measured values exceed the measuring range, only its upper limit will be displayed:

```
RM-PL HDW
No.: 1   Ch. : 1
Iso : > 50.000 MOhm
Loop: > 9.999 kOhm
```

When the "Enter" key (10) is pressed once more, the display will change to measurement channel 2.

When the "Enter" key (10) is pressed once more, the display will change to the **insulation resistance values** a<->b for both measurement channels.

These values are used to check the humidity indicators. If these reveal low resistance values for one of the two channels, this indicates at least one defective humidity indicator.

```
RM-PL HDW
No.: 1   Iso a<->b
Ch1 : > 50.000 MOhm
Ch2 : > 50.000 MOhm
```

- The blue "Display" LED (17) on the active measuring module will light up.

## RM-PL Cu

- When the "Enter" key (10) on the measuring module (1), the current ISO and loop measurement values of measurement channel 1 are shown on the display (7) of the basic module (6).

```

RM-PL Cu
No.: 1  Ch. : 1
Iso : 0.821 MOhm
Loop: 2.470 kOhm
  
```

If the measured values exceed the measuring range, only its upper limit will be displayed:

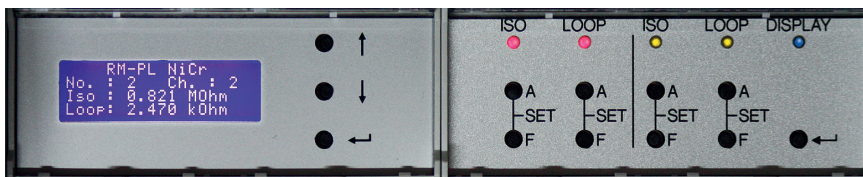
```

RM-PL Cu
No.: 1  Ch. : 1
Iso : > 50.000 MOhm
Loop: > 9.999 kOhm
  
```

When the "Enter" key (10) is pressed once more, the display will change to measurement channel 2.

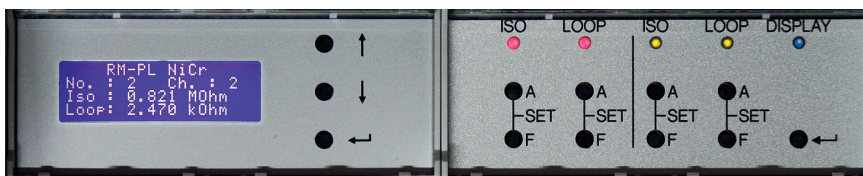
- The blue "Display" LED (17) on the active measuring module will light up.

### 3. ISO alarm value indicator



- When the "Iso A" key (11) on the measuring module (1) is pressed, the programmed Iso alarm value of the corresponding measurement channel will appear on the display (7) of the basic module (6).

### 4. Loop alarm value indicator



- When the "Loop A" key (13) on the measuring module (1) is pressed, the programmed loop alarm value of the corresponding measurement channel will appear on the display (7) of the basic module (6).

## Alarms and acknowledgements

As soon as a measured value falls below the set threshold or the measurement line is interrupted, the RM-PL module triggers an alarm:

- An alarm relay triggers a remote alarm
- The corresponding alarm diode lights up or flashes

With the exception of the "Shift in fault location" alarm, all alarms (regardless of the display alert) can be acknowledged directly on the module by pressing the "F" key positioned below the diode in alarm status.

### Error message "Con-Error"

If there is a faulty ground loop ( $R > 1 \text{ k}\Omega$ ) on the ground and reference ground terminals, e.g. due to damage, corrosion etc., the PL module system will display the "Con-Error" (connect error) message.

```
RM-PL NiCr
No.: 1   Ch. : 1
Iso : Con-Error
Loop: 5.628 kOhm
```

The fault is also transmitted to the control room as an Iso alarm, as no insulation resistance measurement is possible without the ground loop.

### "Shift in fault location" error message

The "Iso" LED (15) flashes quickly.

The "Shift in fault location" alarm is so serious that conscious operator intervention is required here. Therefore, the fault must be called up on the display for the alarm to be acknowledged:

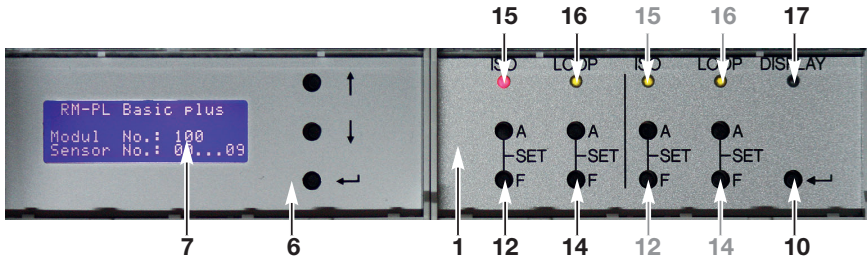
```
Fault Locat. Ch. 2
Location has
changed
push ISO-F to ack
```

- In the corresponding module press the "Enter" key (10) repeatedly until the fault is displayed.
- Acknowledge the fault by pressing the "F" key below the diode in alarm status.
- The current measured values are displayed.

```
Fault Locat. Ch. 2
Loop: 427m   100.0%
a->f: 142m  33.3%
f<-b: 284m  66.7%
```

**In the event of a "Shift in fault location" alarm, the log file stored in the basic module must be consulted for fault isolation purposes.**

## Signification of the LEDs



### 15 LED „Iso“

- glows **green** if the insulation resistance value is within the target range.
- glows **red** if the insulation resistance value is in alarm condition, or if the fault „Con-Error“ is pending.
- Alternately flashes **red** and **green** if the “Iso” signal contact is acknowledged by pressing the “Iso F” button (12) but the insulation resistance value is still in alarm condition.
- It will flash **red** quickly, if the fault location has shifted (indication of a second leakage point).

**In the event of a "Shift in fault location" alarm, the log file stored in the basic module must be consulted for fault isolation purposes.**

### 16 LED „Loop“

- glows **green** if the loop resistance value is within the target range.
- glows **red** if the loop resistance value is in alarm condition.
- Alternately flashes **red** and **green** if the “Loop” signal contact is acknowledged by pressing the “Loop F” button (14) but the loop resistance value is still in alarm condition.

### 17 LED „Display“

- glows **blue** if the “Enter” button (10) on the measuring module (1) is pressed in order to display the measurement value on the display (7) of the basic module (6).

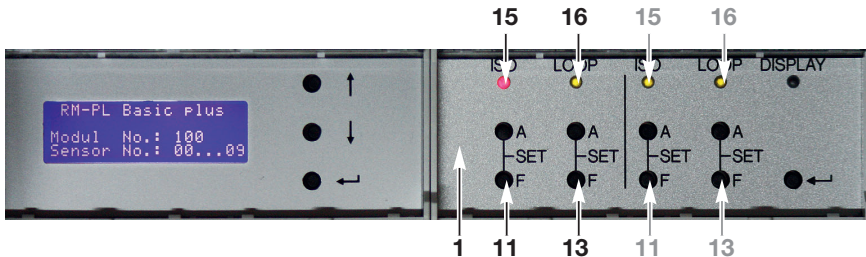
## Deactivation of the measuring module

The measuring module on the pipes can be temporarily disabled completely for certain servicing purposes. It is bridged internally, in order not to distort the measurement results of later insulation continuity checks.



### WARNING!

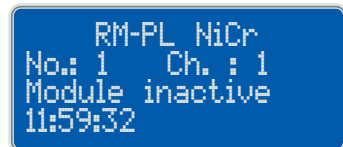
When performing welding work on the pipes all measurement and ground lines **MUST** be disconnected from the relevant measuring module.



- Press one of the "A" keys (**11, 13**) on the measuring module (**1**) for 5 seconds to deactivate it.
- The 4 LEDs (**15, 16**) of both measurement channels will flash **green** until the measuring module is disabled.

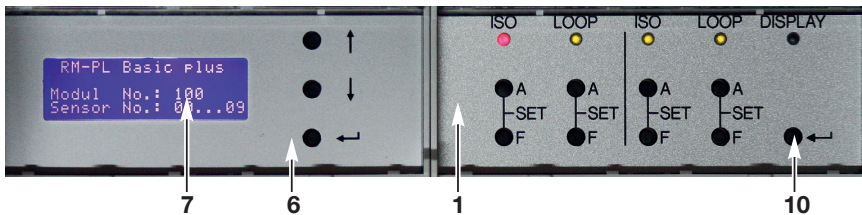
*Simultaneously a timer will start, which will automatically reactivate the module after 12 hours.*

- Pressing one of the "A" keys (**11, 13**) on the measuring module (**1**) for 2 seconds will reactivate it again immediately.



## RM-PL measuring module settings

### How to enter the service mode



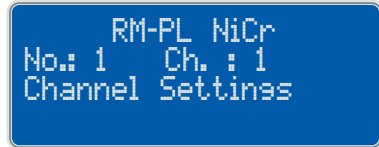
- Press the "Enter" key (**10**) on the measuring module (**1**) to call up the service mode of the channel shown on the display (**7**) of the basic module (**6**).
- Every time the "Enter" key (**10**) on the measuring module (**1**) is pressed again quickly, the next service menu item will be displayed.
  - A** - Channel settings (measuring module settings)
  - B** - Service measurem. (service measurements)
  - C** - Fault location (manual fault location)
  - D** - Software version/Global settings
- *The blue "Display" LED on the active measuring module will light up.*

**After 10 seconds without key input, the module will automatically store the last entry and return to the measurement mode.**

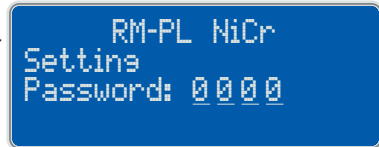


## A. Display and change the measuring module settings

- The menu item "Channel settings" must be shown on the display.

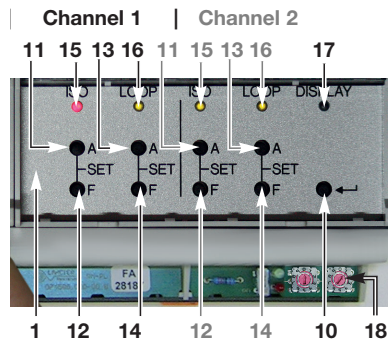


- Press the "Enter" key (10) on the measuring module (1) for 5 seconds to display the password prompt. Factory settings: **1919**



The entry is changed via the keys on the active measuring module:

- Change 1st digit using the keys of measuring channel 1 „Iso A“ (11) (to go up) and „Iso F“ (12) (to go down).
- Change 2nd digit using the keys of measuring channel 1 „Loop A“ (13) (to go up) and „Loop F“ (14) (to go down).
- Change 3rd digit using the keys of measuring channel 2 „Iso A“ (11) (to go up) and „Iso F“ (12) (to go down).
- Change 4th digit using the keys of measuring channel 2 „Loop A“ (13) (to go up) and „Loop F“ (14) (to go down).



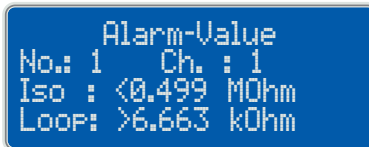
- Quickly press the "Enter" key (10) on the measuring module (1) once more to show the settings on the display (7) of the basic module (6).  
The "No." item always shows the active measuring module's number.  
The "No." item always shows the active measurement channel's number.
- Every time the "Enter" key (10) on the measuring module (1) is pressed again quickly, the following settings will be displayed in succession.

**To make changes the corresponding measurement channel's keys must be pressed!**

## 1. „Alarm-Value”

- **To increase the alarm value for the insulation resistance**

Keep the "Iso A" key (11) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Iso F" key (12) of the same measurement channel on the measuring module (1) until the desired value (0 to



50.000 MΩ) has been reached. The longer the "Iso F" key (12) is pressed, the faster the alarm value will go up. Once the maximum value of 50.000 has been reached, the value on the display will return to 0.000.

- **To decrease the alarm value for the insulation resistance**

Keep the "Iso A" key (11) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Loop F" key (14) of the same measurement channel on the measuring module (1) until the desired value (0 to 50.000 MΩ) has been reached. The longer the "Loop F" key (14) is pressed, the faster the alarm value will go down. Once the new minimum value 0.000 has been reached, the value on the display will return to 50.000.

- **To increase the alarm value for the loop resistance**

Keep the "Loop A" key (13) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Loop F" key (14) of the same measurement channel on the measuring module (1) until the desired value (0 to 9.999 kΩ) has been reached. The longer the "Loop F" key (14) is pressed, the faster the alarm value will go up. Once the maximum value of 9.999 (RM-PL NiCr short: 5.000) has been reached, the value on the display will return to 0.000.

- **To decrease the alarm value for the loop resistance**

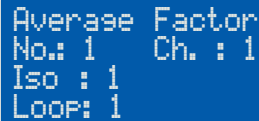
Keep the "Loop A" key (13) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Iso F" key (12) of the same measurement channel on the measuring module (1) until the desired value (0 to 9.999 kΩ) has been reached. The longer the "Iso F" key (12) is pressed, the faster the alarm value will go down. Once the minimum value of 0.000 has been reached, the value on the display will return to 9.999 (RM-PL NiCr short: 5.000).

### **The new, reset value is saved automatically.**

Proceed accordingly for every other measurement channel.

## 2. „Average Factor”

- Strongly fluctuating measurement, values, which occur on the line due to interference voltages, can be steadied by forming an average of 2 to 16 measurements for display. The mean value is adjusted separately for the insulation and loop resistance measurement.



```
Average Factor
No.: 1   Ch.: 1
Iso : 1
LOOP: 1
```

- **To change the number of measurements for the mean Iso value formation**

- Keep the "Iso A" key (**11**) pressed, while
- Pressing the "Iso F" key (**12**) repeatedly until the desired value (1 to 16) has been reached. Once the maximum value of 16 has been reached, the value on the display will return to 1.

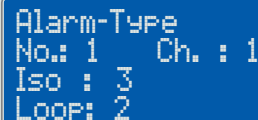
- **To change the number of measurements for the mean loop value formation**

- Keep the "Loop A" key (**13**) pressed, while
- Pressing the "Loop F" key (**14**) repeatedly until the desired value (1 to 16) has been reached. Once the maximum value of 16 has been reached, the value on the display will return to 1.

**The new, reset value is saved automatically.**

## 3. „Alarm-Type”

- 0 = measured value > set alarm value,  
In the event of an alarm,  
the relay is energised
- 1 = measured value < set alarm value,  
In the event of an alarm,  
the relay is energised
- 2 = measured value > set alarm value,  
In the event of an alarm, the relay is de-energised
- 3 = measured value < set alarm value,  
In the event of an alarm, the relay is de-energised



```
Alarm-Type
No.: 1   Ch.: 1
Iso : 3
LOOP: 2
```

- **To change the alarm type for the Iso measurement**

- Keep the "Iso A" key (**11**) pressed, while
- Pressing the "Iso F" key (**12**) repeatedly until the desired value (0 to 3) has been reached. Once the maximum value of 3 has been reached, the value on the display will return to 0.

- **To change the alarm type for the Loop measurement**

- Keep the "Loop A" key (**13**) pressed, while
- Pressing the "Loop F" key (**14**) repeatedly until the desired value (0 to 3) has been reached. Once the maximum value of 3 has been reached, the value on the display will return to 0.

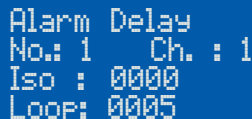
**The new, reset value is saved automatically.**

#### 4. „Alarm Delay”

- Under certain circumstances it may not be desirable to receive alarms for short-term events. In this case a preset "alarm delay" value in minutes can be created.

If the alarm state is shorter than the preset delay period, no alarm will be triggered.

A delayed alarm will be signalled by fast flashing of the respective alarm LED until after the preset time period has ended, at which point the LED will change to a permanent light and the alarm is then triggered.



```
Alarm Delay
No.: 1   Ch.: 1
Iso : 0000
Loop: 0005
```

- **To increase the alarm value for the insulation resistance**

Keep the "Iso A" key (11) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Iso F" key (12) of the same measurement channel on the measuring module (1) until the desired value (0 to 9999 min.) has been reached. The longer the "Iso F" key (12) is pressed, the faster the alarm value will go up. Once the maximum value of 20.000 has been reached, the value on the display will return to 0000.

- **To decrease the alarm value for the insulation resistance**

Keep the "Iso A" key (11) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Loop F" key (14) of the same measurement channel on the measuring module (1) until the desired value (0 to 9999 min.) has been reached. The longer the "Loop F" key (14) is pressed, the faster the alarm value will go down. Once the new minimum value 0000 has been reached, the value on the display will return to 9999 min.

- **To increase the alarm value for the loop resistance**

Keep the "Loop A" key (13) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Loop F" key (14) of the same measurement channel on the measuring module (1) until the desired value (0 to 9999 min.) has been reached. The longer the "Loop F" key (14) is pressed, the faster the alarm value will go up. Once the maximum value of 9999 has been reached, the value on the display will return to 0000.

- **To decrease the alarm value for the loop resistance**

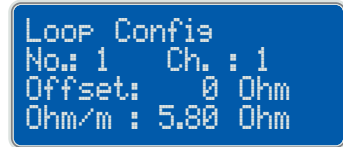
Keep the "Loop A" key (13) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Iso F" key (12) of the same measurement channel on the measuring module (1) until the desired value (0 to 9999 min.) has been reached. The longer the "Iso F" key (12) is pressed, the faster the alarm value will go down. Once the minimum value of 0000 has been reached, the value on the display will return to 9999.

**The new, reset value is saved automatically.**

Proceed accordingly for every other measurement channel.

## 5. „Loop Config” !! only for NiCr (short) !!

- In order to increase the module's location accuracy, it is possible to adjust the line resistance of the supply and accompanying (offset) cables and the sensor wire's line resistance ( $\Omega/m$ ):



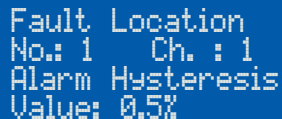
- Offset: 0 - 1000
- Ohm/m: 0,00 - 10,00
- **To increase the supply line's resistance (offset)** Keep the "Iso A" key (11) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Iso F" key (12) of the same measurement channel on the measuring module (1) until the desired value (0 to 1000  $\Omega$ ) has been reached. The longer the "Iso F" key (12) is pressed, the faster the alarm value will go up. Once the maximum value of 1000 has been reached, the value on the display will return to 0.
- **To decrease the supply line's resistance (offset)** Keep the "Iso A" key (11) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Loop F" key (14) of the same measurement channel on the measuring module (1) until the desired value (0 to 1000  $\Omega$ ) has been reached. The longer the "Loop F" key (14) is pressed, the faster the alarm value will go down. Once the new minimum value 0 has been reached, the value on the display will return to 1000.
- **To increase the sensor wire's resistance (Ohm/m)**  
Keep the "Loop A" key (13) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Loop F" key (14) of the same measurement channel on the measuring module (1) until the desired value (0 to 10  $\Omega$ ) has been reached. The longer the "Loop F" key (14) is pressed, the faster the alarm value will go up. Once the maximum value of 10.0 has been reached, the value on the display will return to 0.0.
- **To decrease the sensor wire's resistance (Ohm/m)**  
Keep the "Loop A" key (13) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Iso F" key (12) of the same measurement channel on the measuring module (1) until the desired value (0 to 10  $\Omega$ ) has been reached. The longer the "Iso F" key (12) is pressed, the faster the alarm value will go down. Once the new minimum value 0.0 has been reached, the value on the display will return to 10.0.

**The new, reset value is saved automatically.**

Proceed accordingly for every other measurement channel.

## 6. „Fault Location” **!! only for NiCr (short) !!**

- In the event of a second leakage point, the fault location will begin to shift. Here, you can set above which shift value threshold the corresponding alarm will be triggered (factory setting 0.5 % maximum value 100 %).



```
Fault Location
No.: 1   Ch. : 1
Alarm Hysteresis
Value: 0.5%
```

- **To increase the hysteresis value** Keep the "Iso A" key (11) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Iso F" key (12) of the same measurement channel on the measuring module (1) until the desired value (0.5 to 100 %) has been reached. The longer the "Iso F" key (12) is pressed, the faster the alarm value will go up. Once the maximum value of 100.0 has been reached, the value on the display will return to 0.5.
- **To decrease the hysteresis value** Keep the "Iso A" key (11) of the corresponding measurement channel on the measuring module (1) pressed and also press the "Loop F" key (14) of the same measurement channel on the measuring module (1) until the desired value (0.5 to 100 %) has been reached. The longer the "Loop F" key (14) is pressed, the faster the alarm value will go down. Once the new minimum value 0.5 has been reached, the value on the display will return to 100.0.

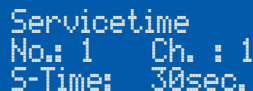
### The new, reset value is saved automatically.

Proceed accordingly for every other measurement channel.

## 7. „Servicetime”

S-Time = service time in seconds.

If service measurements have been taken (see page 20), the sensor will return to normal operation after the expiration of the service time period.



```
Servicetime
No.: 1   Ch. : 1
S-Time: 30sec.
```

### To extend the service time period:

- Keep the "Iso A" key (11) pressed, while
- Pressing the "Iso F" key (12) repeatedly until the desired value (0 to 999) has been reached. Once the maximum value of 999 has been reached, the value on the display will return to 0.

### To shorten the service time:

- Keep the "Loop A" key (13) pressed, while
- Pressing the "Loop F" key (14) repeatedly until the desired value (999 to 0) has been reached. Once the new minimum value 0 has been reached, the value on the display will return to 999.

### The new, reset value is saved automatically.

## B1. Service measurements on the NiCr- and Cu-modules

- The "Service measur. " menu item must be shown on the display.
- Press the "Enter" key (10) on the measuring module (1) for 5 seconds to call up the service measurements on the display (7) of the basic module (6).

```
RM-PL NiCr
No.: 1   Ch. : 1
Service Measur.
```

*The "No." item always shows the active measuring module's number.*

*The "Ch." item always shows the active measurement channel's number.*

- Every time the "Enter" key (10) on the measuring module (1) is pressed again quickly, the following settings will be displayed in succession:

### 1. „Inverse Polarity Iso”

When measuring resistance with inverse polarity, the same measured value should be achieved, just like with a normal measurement.

Deviations may indicate a fault on the measuring section

```
Service
Inverse Polarity
No.: 1   Ch. : 1
Iso : 20.000 MOhm
```

### 2. „Inverse Polarity Loop”

When measuring resistance with inverse polarity, the same measured value should be achieved, just like with a normal measurement.

Deviations may indicate a fault on the measuring section.

```
Service
Inverse Polarity
No.: 1   Ch. : 1
Loop : 9.999 kOhm
```

### 3. „External Voltage Iso” (function available on request only)

The external voltage should be 0 V (display: <1.0 V).

Higher values may indicate a fault on the measuring section.

```
Service
External Voltage
No.: 1   Ch. : 1
Iso : <1.0 V
```

### 4. „External Voltage Loop” (function available on request only)

The external voltage should be 0 V (display: <1.0 V).

Higher values may indicate a fault on the measuring section.

```
Service
External Voltage
No.: 1   Ch. : 1
Loop : <1.0 V
```

### 5. „Earth Connection”

The ground loop resistance should be less than 1kΩ.

Higher values may indicate a faulty ground loop.

```
Service
Earth Connection
No.: 1   Ch. : 1
R-Earth: 0.02 kOhm
```

**Once the service time has ended the sensor will automatically return to normal operation.**

## B2. Service measurements on the HDW module

- The "Service measur. " menu item must be shown on the display.
- Press the "Enter" key (**10**) on the measuring module (**1**) for 5 seconds to call up the service measurements on the display (**7**) of the basic module (**6**).

```
RM-PL HDW
No.: 1   Ch. : 1
Service Measur.
```

*The "No." item always shows the active measuring module's number.*

*The "Ch." item always shows the active measurement channel's number.*

- Every time the "Enter" key (**10**) on the measuring module (**1**) is pressed again quickly, the following settings will be displayed in succession:

### 1. „Loop a -> b”

During loop resistance measurements that use positive voltage (terminal a = + | connection b = -) the same measured value should be achieved, just like with a normal measurement.

Deviations may indicate a fault on the measuring section.

```
Service
Loop a -> b
No.: 1   Ch. : 1
Loop: 5.565 kOhm
```

### 2. „Loop a <- b”

During insulation resistance measurements that use negative voltage (terminal a = - | connection b = +) the same measured value should be achieved, just like with a normal measurement.

Deviations may indicate a fault on the measuring section.

```
Service
Iso a <- b
No.: 1   Ch. : 1
Iso: 10.049 MOhm
```

### 3. „Loop ab -> Earth”

During insulation resistance measurements of the **a and b connection against the ground** the same measured value should be achieved, just like with a normal measurement.

Deviations may indicate a fault on the measuring section.

```
Service
Iso ab -> Earth
No.: 1   Ch. : 1
Iso: 20.001 MOhm
```

### 4. „External Voltage a -> b” (function available on request only)

The external voltage should be 0 V (display: <1.0 V).

Deviations may indicate a fault on the measuring section.

```
Service
External Voltage
No.: 1   Ch. : 1
a->b: <1.0 V
```



## 5. „External Voltage ab -> Earth” (function available on request only)

The external voltage should be 0 V

(display: <1.0 V)

Deviations may indicate a fault on the measuring section.

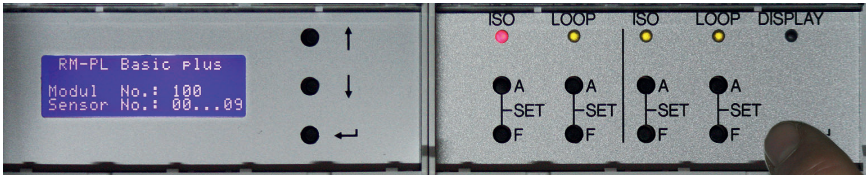
**Once the service time has ended the sensor will automatically return to normal operation.**

```
Service
External Voltage
No.: 1   Ch.: 1
ab->Earth: <1.0 V
```

## C. Manual fault location

In certain cases, for better evaluation, a manual fault location procedure may be considered useful, since additional values, such as RL1 and RL2, will be displayed here. Measurements in quick succession are possible.

### To open the service menu



- Press the "Enter" key (10) on the measuring module (1) for 5 seconds to call up the displayed channel's service menu on the display (7) of the basic module (6).
- Every time the "Enter" key (10) on the measuring module (1) is pressed again quickly, the next service menu item will be displayed.
- *The active measuring module's blue „Display“ LED will light up.*

- Press the "Enter" key (10) repeatedly until the "Fault Location" menu item is displayed
- Press the "Enter" key (10) on the measuring module (1) for 5 seconds to call up the fault location on the display (7) of the basic module (6).

```
RM-PL NiCr
No.: 1   Ch.: 1
Fault Location
```

*The "No." item always shows the active measuring module's number.*

*The "Ch." item always shows the active measurement channel's number.*

- The fault localisation mode automatically starts with a loop resistance measurement.

```
No.: 1   Ch.: 1
Fault Location
Measure R-Loop a->f
wait..
```

- After the measurement the following determined values are displayed automatically:  
 Loop = Total resistance  
 RL1 = Resistance for measurement direction1  
 RL2 = Resistance for measurement direction2

```
No.: 1   Ch.: 1
Loop : 5.628 kOhm
RL1 : 1.127 kOhm
RL2 : 4.501 kOhm
```

- Quickly press the "Enter" key (10) on the measuring module (1) once more to display the fault location:

```
No.: 1   Ch. : 1
Loop: 987 m 100 %
a->f: 197 m 20.0 %
f<-b: 789 m 80.0 %
```

**Once the service time has ended the sensor will automatically return to normal operation.**

#### D. Software / Global settings

The global settings shall apply on a higher level for the measurement channels 1 and 2 of the RM-PL module.

##### To open the service menu

- Press the "Enter" key (10) on the measuring module (1) for 5 seconds to call up the displayed channel's service menu on the display (7) of the basic module (6).
- Every time the "Enter" key (10) on the measuring module (1) is pressed again quickly, the next service menu item will be displayed.
- *The active measuring module's blue „Display“ LED will light up.*

- Press the "Enter" key (10) repeatedly until the "Software" menu item is displayed. Information about the version and build date of the internal software (firmware) will be displayed.

```
RM-PL NiCr
Software V1.00
Build: Jan 26 2011
```

**These values cannot be changed.**

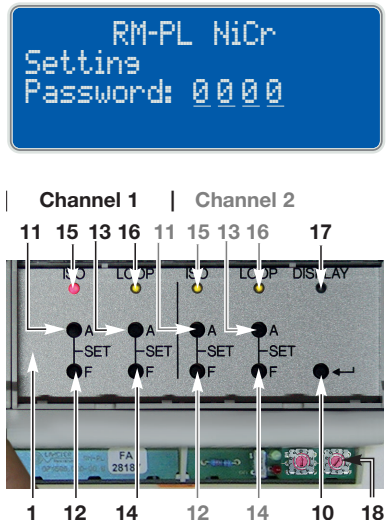
##### To open the global settings now

- Press the "Enter" key (10) on the measuring module (1) for 5 seconds to display the password prompt.

Factory settings: **1919**

The entry is changed using the active measuring module's keys:

- Change 1st digit using the keys of measuring channel 1 „Iso A“ (11) (to go up) and „Iso F“ (12) (to go down).
- Change 2nd digit using the keys of measuring channel 1 „Loop A“ (13) (to go up) and „Loop F“ (14) (to go down).
- Change 3rd digit using the keys of measuring channel 2 „Iso A“ (11) (to go up) and „Iso F“ (12) (to go down).
- Change 4th digit using the keys of measuring channel 2 „Loop A“ (13) (to go up) and „Loop F“ (14) (to go down).



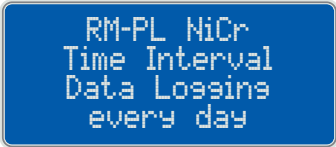
```
RM-PL NiCr
Setting
Password: 0000
```

- Quickly press the "Enter" key (10) on the measuring module (1) once to call up the global settings on the display (7) of the basic module (6).
- Here you can change
  - The modules' storage intervals (only applies to RM-PL Basic plus modules) and
  - The access password.
- Every time the "Enter" key (10) on the measuring module (1) is pressed again quickly, the following settings will be displayed in succession:

### • Storage interval

By pressing any "A" or "F" key the value can be changed sequentially:

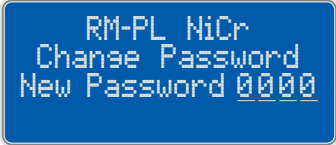
- every 10 min = every 10 minutes
- every hour = hourly
- every day = daily (default setting)
- every week = weekly



RM-PL NiCr  
Time Interval  
Data Lossing  
every day

The new, reset value is saved automatically by pressing the "Enter" key (10) on the measuring module (1) or by letting the service time elapse.

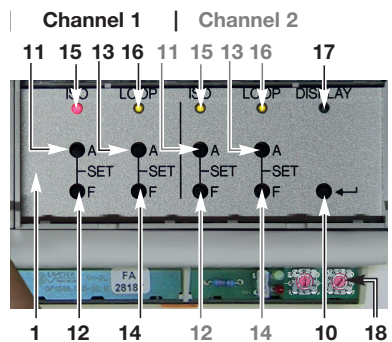
### • To change the password



RM-PL NiCr  
Change Password  
New Password 0000

The entry is changed using the active measuring module's keys:

- Change 1st digit using the keys of measuring channel 1 „Iso A“ (11) (to go up) and „Iso F“ (12) (to go down).
- Change 2nd digit using the keys of measuring channel 1 „Loop A“ (13) (to go up) and „Loop F“ (14) (to go down).
- Change 3rd digit using the keys of measuring channel 2 „Iso A“ (11) (to go up) and „Iso F“ (12) (to go down).
- Change 4th digit using the keys of measuring channel 2 „Loop A“ (13) (to go up) and „Loop F“ (14) (to go down).



The new, reset value is saved automatically by pressing the "Enter" key (10) on the measuring module (1) or by letting the service time elapse.



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## EC Declaration of Conformity

We declare under our sole responsibility, that the product

**Make:** LANCIER Monitoring  
**Type:** Measuring module RM-PL NiCr  
Measuring module RM-PL NiCr short  
Measuring module RM-PL Cu  
Measuring module RM-PL HDW

to which this declaration refers, meets the relevant health and safety requirements of the following EC directives:

**2014/30/EU**                      **Electromagnetic compatibility**  
**2011/65/EU**                      **RoHS-II**

For proper implementation of the health and safety requirements named in the EC directives the following standard(s) and/or technical specification(s) have been consulted:

**EN 61326-1**                      **Electrical equipment for measurement, control and laboratory use - EMC requirements (class B)**

Münster, 07.11.2016

  
Research and Development

  
Managing Director