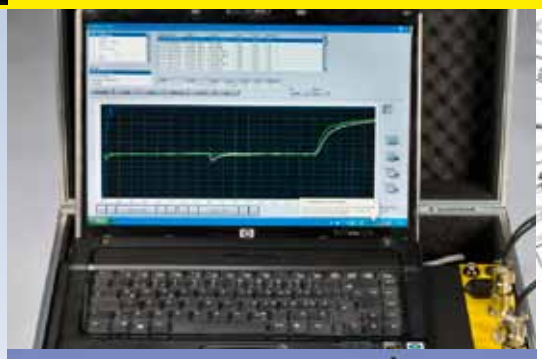
isoplus®

Transporting energy.

LEAK DETECTION



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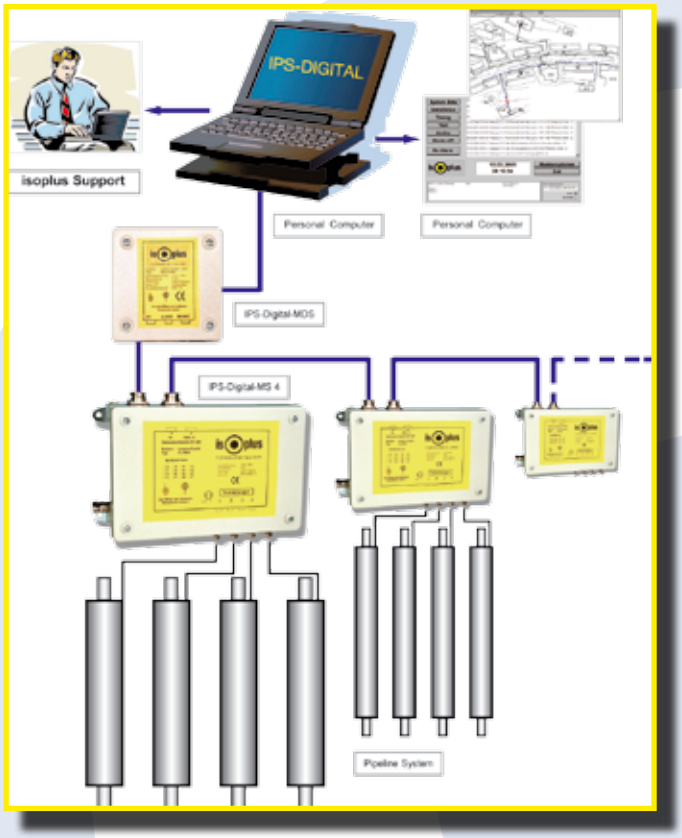
Fully Automatic Leak-Detection-Longterm Monitoring System

The **isoplus Digital-Cu** and **Digital-NiCr** systems are highly effective, completely automated monitoring and detecting systems which have been developed specifically for chilled water and heating pre-insulated pipes. Digital-Cu, whose operation can be extended up to a distance of 320 km of control wires, and NiCr wire up to 153 km, provides an ideal monitoring system for comprehensive pipe networks. The Digital-Cu and the resistance reference systems Digital-NiCr can easily be supervised from one central switchboard. State-of-the-art digitalization technology provides detection with highest accuracy and reliability.

A broad range of equipment is available allowing custom-designed solutions to satisfy all requirements. The software automatically records the general status of the section with all of the values measured. Problems are recognized, assessed and located automatically by the **IPS-Digital-SSW**.

With **IPS-Digital-VISUAL** extended the position of the fault will be automatically mapped. This provides the highest degree of automation and accuracy in the course of monitoring and locating problem areas.



One single software will be sufficient for the control of the complete IPS-Digital-Network. All units of the **IPS-Digital-**Hardware are using this **IPS-Digital-System**-Software. The following basic logic functions will be carried out:

- Acoustical and visual alarm
- Adjustment of the response levels
- Measured value- and failure evaluation
- Print out of all measuring data and failures
- Automatic, software-based detection of failures
- Calibration of different Cu-Wire- and NiCr-Wire-Systems
- Central, menu-driven operation and control of the complete equipment
- Automatic switch between Cu-Wire- and NiCr-Wire-Systems
- Archive of measuring data and failures incl. date and time (time-stamp)
- Direct evaluation of data and plain text announcement of the pipeline condition (moisture / contact /loop failure)

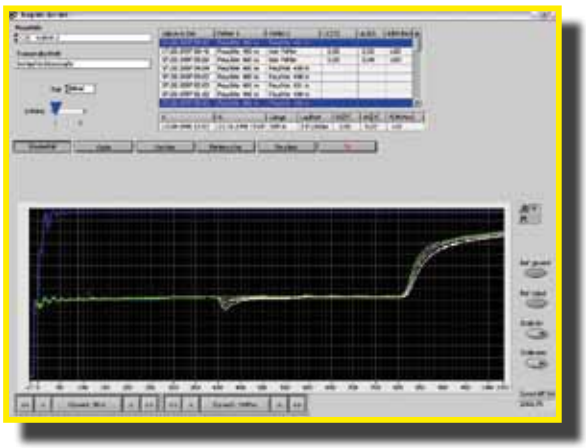
Optional extension with different **IPS-Digital**-Software-Modules will be possible.

IPS-CU

DIGITAL Monitoring System with Automatic Fault Detection for Copper Conduits

The **IPS-Cu** - system is especially suitable for network monitoring of pipelines. An effective safety could be reached due to a simple construction and a consequent further development. Lasting for decades of experience and developments will enable a compatible and manufacturer predominant wire system of the “Nordic Monitoring Technology”.

This standard and the popularity of **IPS-Cu** allows an economic useful production and installation. A standard assembling in the pipe and in the coupler connection will allow a optimum product and function control and will secure the quality requirement. The resulting minimization of the assembling failures will increase the expected life time of the complete pipeline.



Because of its architecture the **IPS-Cu** is already offering a very high degree of failure security. An interrupted loop will i. e. not limit the function because the excavation of the located failure position can be avoided for the time being, due to a simple change over in the wire. Therefore an extreme economical operation of the equipment will be possible during the complete life time.

The special characteristic of **IPS-Cu** are the both bare copper wires. Both wires are available with their complete surface for failure determination in the total pipeline. This will be an essential advantage for an early recognition of a tendency change. The **IPS-Cu** - system offers the optimum solution for various problems, due to a permanent further developing equipment technology, which offers an early and safe recognition and detection.

DIGITAL Monitoring System with Automatic Fault Detection for Resistance-Wire-Systems (NiCr)

The **IPS-NiCr** - System will be suitable like **IPS-Cu** especially for the monitoring of pipeline networks of all sizes. For extension of an existing NiCr-detection or for application for a steel jacket-pipe system **IPS-NiCr** can be also used.

Our experience and development will enable a compatible and manufacture extending monitoring system in the resistance reference technology.

Due to a simple construction, avoiding of active components within the pipeline as well as a standard assembling in the pipe and coupler connection, a high processing safety will be guaranteed. The **IPS-NiCr** stands for a continuous detecting of the pipe and coupler area with parallel high sensitivity.

The special characteristic of the **IPS-NiCr** is the perforated NiCr-wire as sensor technology. This NiCr-wire will be available with its perforation in the total pipeline network. Therefore individual moistures can be exactly detected. In connection with the permanent further developing **IPS**-equipment technology a high degree of safety concerning detecting and monitoring will be guaranteed.

During production of pre-insulated jacket-pipes the two wires will be foamed in. Through the yellow, perforated NiCr-wire the moisture will be detected. The PTFE-isolation (Polytetrafluorethylen resp. Teflon®) which is covering the 0,5 mm^2 NiCr-wire (NiCr 8020) is resistant up to 260° C and is perforated in regular distances. Due to a special alloying the wire has a constant longitudinal resistance of 5,7 Ω/m.

IPS-Digital

The **IPS-Digital** - system is the optimal complete solution for a fully automatic monitoring and parallel permanent detection. **IPS-Digital** will be suitable for copper wire- and resistance wire systems **IPS-Cu** and **IPS-NiCr** as well as for technical comparable systems. **IPS-Digital** offers a central leak detecting management for medium- up to big respectively branched pipeline networks.

The modular structure will assist the economical construction of a corresponding adapted monitoring installation. With **IPS-Digital** several specific wire characteristics may be chosen free of any restrictions. Due to this an essential and unique safety at the central recording and evaluation of different sensor-wire-systems can be reached.

Due to the software based control and evaluation of the complete system, a simple up-date and configuration to the project-typical factors will be possible. The automatic recognition of the kind of measuring unit, i. e. **IPS-Cu** or **IPS-NiCr**, the friendly operation as well as an optimum of safety in monitoring and detecting, are additional essential advantages of **IPS-Digital**.

IPS-Digital-Cu is able to detect and locate leakages at an early stage because of it´s impedance based location particularly at the fully prepared transport medium (heating water / no Ohmic conductance) which is used in heating systems.

Depending from application the following **IPS-Digital** - components will be available:

Units for an expandable monitoring network IPS-Digital

⇒ IPS-Digital-MDS Central measuring data acquisition
⇒ IPS-Digital-Cu-MS Measuring spot for Cu-systems
⇒ IPS-Digital-NiCr-MS Measuring spot for NiCr-systems
⇒ IPS-Digital-TV Data T-distributor
⇒ IPS-Digital-MODEM Modem extension for IPS-MS
⇒ IPS-Digital-PFA Alarm-reporting-module
⇒ IPS-Digital-FSV Distant voltage supply

Single units for smaller monitoring networks without extension

⇒ IPS-Digital-Cu-KMS Compact measuring spot for Cu-systems
⇒ IPS-Digital-NiCr-KMS Compact measuring spot for NiCr-systems

Portable units for application at site as well as for unstructured networks

⇒ IPS-Digital-Cu-MBS Mobile unit for Cu-systems
⇒ IPS-Digital-NiCr-MBS Mobile unit for NiCr-systems
⇒ IPS-Digital-UNI-MBS Mobile unit for Cu- and/or NiCr-systems

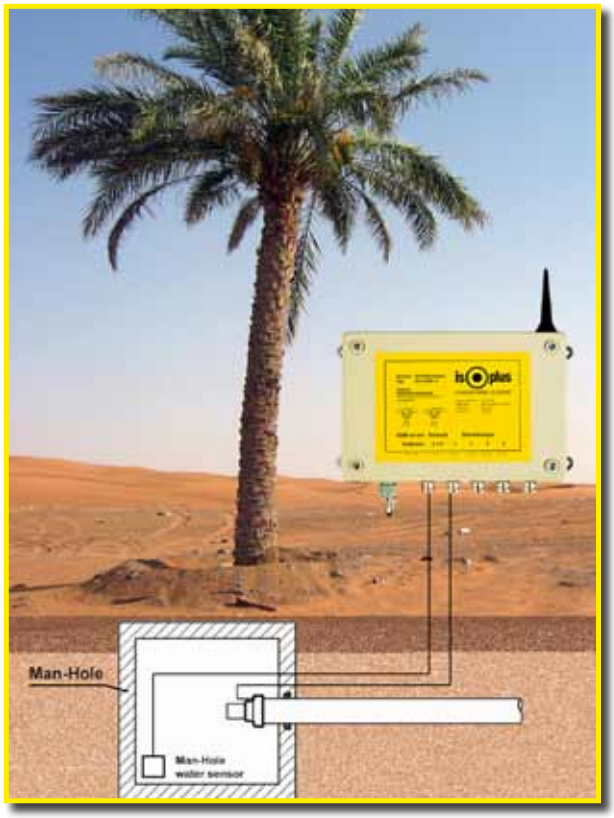
Software modules for control, extension and adaptation

⇒ IPS-Digital-SSW / AUTARK Control software for IPS-Digital and AUTARK
⇒ IPS-Digital-VISUAL Failure visualisation with design presentation

Stand-Alone

ST3000 – AUTARK is the first analog isoplus-leak-monitoring-modul which is fully integrated into the **„isoplus-digital-family“**. It will be used locally and totally **AUTARK** – that means no current supply by conduction wires and no fix data-line (copper-bus or LWL) will be required. The product is equipped with a GSM-unit for data transmission via mobile phone network and with a powerful lithium battery (Li-SoCl$_2$).

ST 3000 – AUTARK is able to monitor up to four Cu-wires of 2.500 mtr. each as well as four NiCr-wires of 1.300 mtr. each and to low point sensors, depending from kind of type. All data will be evaluated and displayed with our proved **isoplus-Digital** software.



Facts

- Independent from current and data network, central monitoring system for district heating / cooling lines
- Including integrated monitoring of men-holes by using man-hole water sensor (2x)
- Current supply via battery with guaranteed lifetime up to 5 years (*)
- Data transmission via GSM-modem via mobile phone network
- Failure evaluation via isoplus-digital-software (without locating!)
  - Moisture / contact / loop interference
  - Man-hole monitoring
  - Battery status
  - Indication of location
  - configured for operational control rooms
- Suitable for all known copper- and NiCr-wire-systems
- Variable configurations:
  - 230V operation with power unit
  - Network usable with COM-Server
  - 2/4 measurement channels
  - 1-2 man-hole monitoring
- Multiple usable:
  - Central monitoring of remotelines (so called “outside-lines”)
  - Central monitoring of not reachable lines (i.e in man-holes, private houses)
  - Central site-monitoring (nocturnal control measurement)

(*) One measurement per day and one transmission per week to central unit

Additional module ST3000 - AUTARK / SÜ:
Module for pure monitoring man-holes with two digital inputs for water level detectors or other signal transmitters (hourly measurement control)

Types:
ST3000 - AUTARK 2500-Cu with 2 or 4 channels (2.500m copper wire length per channel)
ST3000 - AUTARK 500-NiCr with 2 or 4 channels (500m pipe length per channel)
ST3000 - AUTARK 1300-NiCr with 2 or 4 channels (1.300m pipe length per channel)

Technics

Analog

isoplus - Device Type IPS-	HST	ST 3000	ST 3000 - AUTARK	MSG 500	MSG 1000
Monitoring manually / automatically	√ / -	- / √	√ / √	√ / √	√ / √
Detection Cu / NiCr	-	-	-	- / √	- / √
Measurement (L x B x H) in mm	230 x 85 x 35	215 x 245 x 115	150 x 300 x 80	230 x 85 x 35	230 x 85 x 35
Weight in kg	0,5	2,0	3,0	0,5	0,5
Casing	Aluminium diecasting	Polycarbonate	Steel plate	Aluminium diecasting	Aluminium diecasting
Powder coated and dip-impregnated	-	-	√	-	-
Operating temperature	0 °C to + 40 °C	+ 5 °C to + 40 °C	- 20° C to + 50° C	0 °C to + 40 °C	0 °C to + 40 °C
Temperature for guaranteed exactness	+ 20 °C ± 8 °C	+ 20 °C ± 8 °C	+ 20° C ± 8° C	+ 20 °C ± 8 °C	+ 20 °C ± 8 °C
Store- resp. ambient temperature	- 10 °C to + 50 °C	- 10 °C to + 50 °C	- 10° C to + 50° C	- 10 °C to + 50 °C	- 10 °C to + 50 °C
Humidity until + 31° C	max. 80 %	max. 80 %	max. 80 %	max. 80 %	max. 80 %
Akku- / Battery Voltage	9 V	-	3,6 V / 12 Ah	9 V	9 V
Akku- / Battery type	6LR61 (9V Block)	-	Li-SoCl2	6LR61 (9V Block)	6LR61 (9V Block)
230 V ± 10 % / 50 Hz net voltage	-	√	- / √	√	√
Euro-plug connection	-	√	- / √	√ / Plug-power-pack	√ / Plug-power-pack
Fuse	-	250 V / T 315 AL	250 V / T 100 mA	-	-
Power consumption operation / standby	35 mA / -	8 VA / -	4,5 VA / 2 VA	35 mA / -	35 mA / -
Consump. per year at 1 measurement per day	-	30 kWh	17 kWh	-	-
Protection Class	III	I	I	III	III
Kind of protection	-	IP 54	IP 66	-	-
Measuring category	I	I	I	I	I
Potential Free Relay Contact	-	Opener / Turnkey	-	Opener	Opener
Contact carrying capacity	-	30 V / 1 A	-	30 V / 1 A	30 V / 1 A
RS 485 - Interface Input / Output	-	-	-	-	-
Voltage level maximum	-	-	0 / 10 V	-	-
Data cable length maximum to MS / MDS	-	-	-	-	-
Data rate 2400 - 38400 baud	-	-	9600 baud	-	-
Automatic selection	-	-	-	-	-
Half duplex transmission at 2-wire RS 485	-	-	-	-	-
Full duplex transmission at 4-wire RS 485	-	-	-	-	-
RS 232 - Interface Input	-	-	-	-	-
Voltage level maximum	-	-	-	-	-
Data cable length maximum to PC	-	-	-	-	-
Data rate 2400 - 38400 baud	-	-	-	-	-
Measure Entries / -Channels	1	1, 2, 3 or 4	2 / 4	1	1
Voltage strength of entries	1.000 Veff	1.000 Veff	-	1.000 Veff	1.000 Veff
Maximum Cu-sensor wire per channel	2.500 m	2.500 m	2.500 m	-	-
Recommended max. Cu-wire lengths / channel	2.500 m	2.500 m	1.000 m	-	-

Device Type IPS-	HST	ST 3000	ST 3000 - AUTARK	MSG 500	MSG 1000
Maximum NiCr-sensor wire per channel	1.400 m	1.400 m	600 / 1.200 m	500 m	1.300 m
Recomm. max. NiCr-wire lengths per channel	1.200 m	1.200 m	500 / 1.000 m	500 m	1.300 m
Isolation Resistance Measurement	√	√	√	√	√
Measuring range	10 kΩ to 40 MΩ	10 kΩ to 2,5 MΩ	20 kΩ to 20 MΩ	10 kΩ to 10 MΩ	10 kΩ to 10 MΩ
Dissolution	1 kΩ / 10 kΩ / 100 kΩ	10 kΩ / 100 kΩ	10 kΩ	1 kΩ / 10 kΩ / 100 kΩ	1 kΩ / 10 kΩ / 100 kΩ
Measuring voltage maximum	12 V	12 V	10 V	12 V	12 V
Measuring current maximum	3 mA	1 mA	10 mA	3 mA	3 mA
Exactness	± 3 % ± 1 Digit	± 3 % ± 1 Digit	± 3%	± 3 % ± 1 Digit	± 3 % ± 1 Digit
Alarm threshold value "Isolation" adjustable	√	√	am Gerät	√	√
Alarm threshold value from / to in steps	10 kΩ to 39,9 MΩ	20 kΩ to 2,5 MΩ	20 kΩ to 2,5 MΩ	200 kΩ to 10 MΩ	200 kΩ to 10 MΩ
Loop Resistance Measurement	√	√	√	√	√
Measuring range	0 Ω to 8 kΩ	0 Ω to 8 kΩ	0 Ω to 7 kΩ	0 Ω to 2,85 kΩ	0 Ω to 7,40 kΩ
Dissolution	1 Ω	100 kΩ	1 Ω	1 Ω	1 Ω
Voltage level maximum	12 V	12 V	10 V	12 V	12 V
Measuring current maximum	5 mA	1 mA	10 mA	5 mA	5 mA
Exactness	± 0,5 % ± 1 Digit	± 0,5 % ± 1 Digit	1%	± 0,2 % ± 1 Digit	± 0,2 % ± 1 Digit
Alarm threshold value "Loop" adjustable	8 kΩ solid	8 kΩ solid	-	8 kΩ solid	8 kΩ solid
Impulse Running Period Measurement	-	-	-	-	-
Dissolution / Exactness	-	-	-	-	-
Voltage level maximum	-	-	-	-	-
Pulse wave shape	-	-	-	-	-
Impulse running period adjustable from / to (V/2)	-	-	-	-	-
Direct Voltage Measurement (DC)	-	-	-	√	√
Measuring range	-	-	-	± 2 V	± 2 V
Exactness	-	-	-	0,01 V	0,01 V
Dissolution	-	-	-	± 0,6 %	± 0,6 %
Alternating Voltage Measurement (AC)	-	-	-	-	-
Measuring range	-	-	-	-	-
Exactness	-	-	-	-	-
Dissolution	-	-	-	-	-
USB-Interface	-	-	-	-	-
Power distant supply voltage maximum	-	-	-	-	-
Working range power distant supply	-	-	-	-	-
Addressability standard / extended	-	-	-	-	-
Radio interface / GSM	-	-	√	-	-
TC / IP - Ethernet interface	-	-	-	-	-

Digital

isoplus - Device Type IPS-	Digital-MDS	Digital-Cu-MS	Digital-NiCr-MS	Digital-Cu-MBS	Digital-NiCr-MBS	Digital-UNI-MBS	Digital-Cu-KMS	Digital-NiCr-KMS	Digital-TV	Digital-MODEM	Digital-PFA	Digital-FSV
Monitoring manually / automatically	- / √ (1)	- / √ (2)	- / √ (2)	√ / √	√ / √	√ / √	- / √	- / √	-	-	- / √ (1)	-
Detection Cu / NiCr	-	√ / -	- / √	√ / -	- / √	√ / √	√ / -	- / √	-	-	-	-
Measurement (L x B x H) in mm	150 x 150 x 80	150 x 300 x 80	150 x 300 x 80	410 x 490 x 180	410 x 490 x 180	410 x 490 x 180	150 x 300 x 80	150 x 300 x 80	150 x 150 / 300 x 80	150 x 150 x 80	150 x 150 x 80	150 x 150 x 80
Weight in kg	2,0	3,0	3,0	4,0 without PC	4,0 without PC	4,0 without PC	3,0	3,0	2,0 / 3,0	2,0	2,0	2,0
Casing	Steel plate	Steel plate	Steel plate	Plastic suitcase	Plastic suitcase	Plastic suitcase	Steel plate	Steel plate	Steel plate	Steel plate	Steel plate	Steel plate
Powder coated and dip-impregnated	√	√	√	-	-	-	√	√	√	√	√	√
Operating temperature	- 20° C to + 50° C	- 20° C to + 50° C	- 20° C to + 50° C	- 20° C to + 50° C	- 20° C to + 50° C	- 20° C to + 50° C	- 20° C to + 50° C	- 20° C to + 50° C	- 20° C to + 50° C	- 20° C to + 50° C	- 20° C to + 50° C	- 20° C to + 50° C
Temperature for guaranteed exactness	-	+ 20° C ± 8° C	+ 20° C ± 8° C	+ 20° C ± 8° C	+ 20° C ± 8° C	+ 20° C ± 8° C	+ 20° C ± 8° C	+ 20° C ± 8° C	-	-	-	-
Store- resp. ambient temperature	- 10° C to + 50° C	- 10° C to + 50° C	- 10° C to + 50° C	- 10° C to + 50° C	- 10° C to + 50° C	- 10° C to + 50° C	- 10° C to + 50° C	- 10° C to + 50° C	- 10° C to + 50° C	- 10° C to + 50° C	- 10° C to + 50° C	- 10° C to + 50° C
Humidity until + 31° C	max. 80 %	max. 80 %	max. 80 %	max. 80 %	max. 80 %	max. 80 %	max. 80 %	max. 80 %	max. 80 %	max. 80 %	max. 80 %	max. 80 %
Akku- / Battery Voltage	-	-	-	8,4 V / 1,7 Ah	8,4 V / 1,7 Ah	8,4 V / 1,7 Ah	-	-	-	-	-	-
Akku- / Battery type	-	-	-	NiCd	NiCd	NiCd	-	-	-	-	-	-
230 V ± 10 % / 50 Hz net voltage	√	√	√	√	√	√	√	√	√	√	√	√
Euro-plug connection	√	√	√	√	√	√	√	√	√	√	√	√
Fuse	250 V / T 100 mA	250 V / T 100 mA	250 V / T 100 mA	250 V / T 100 mA	250 V / T 100 mA	250 V / T 100 mA	250 V / T 100 mA	250 V / T 100 mA	250 V / T 100 mA	250 V / T 100 mA	250 V / T 100 mA	250 V / T 100 mA
Power consumption operation / standby	2,5 VA / -	4,5 VA / 2 VA	8 VA / 2 VA	9 VA / -	9 VA / -	9 VA / -	4,5 VA / 2 VA	8 VA / 2 VA	2,5 VA / -	4 VA / -	2,5 VA / -	10 VA / -
Consump. per year at 1 measurement per day	21 kWh	17 kWh	17 kWh	17 kWh	17 kWh	17 kWh	17 kWh	17 kWh	21 kWh	15 kWh	17 kWh	30 kWh
Protection Class	I	I	I	I	I	I	I	I	I	I	I	I
Kind of protection	IP 66	IP 66	IP 66	-	-	-	IP 66	IP 66	IP 66	IP 66	IP 66	IP 66
Measuring category	-	I	I	I	I	I	I	I	-	-	-	-
Potential Free Relay Contact	Turnkey	-	-	-	-	-	Turnkey	Turnkey	-	-	Turnkey	-
Contact carrying capacity	48 V / 1 A	-	-	-	-	-	48 V / 1 A	48 V / 1 A	-	-	48 V / 1 A	-
RS 485 - Interface Input / Output	0 / 1	1 / 1	1 / 1	-	-	-	-	-	1 / 1 bis 6	0 / 1	0 / 1	-
Voltage level maximum	0 / 5 V	0 / 5 V	0 / 5 V	-	-	-	-	-	0 / 5 V	0 / 5 V	0 / 5 V	-
Data cable length maximum to MS / MDS	3.000 m	3.000 m	3.000 m	-	-	-	-	-	3.000 m	3.000 m	3.000 m	-
Data rate 2400 - 38400 baud	√	√	√	-	-	-	-	-	√	√	√	-
Automatic selection	√	√	√	-	-	-	-	-	√	√	√	-
Half duplex transmission at 2-wire RS 485	√	√	√	-	-	-	-	-	√	√	√	-
Full duplex transmission at 4-wire RS 485	√	√	√	-	-	-	-	-	√	√	√	-
RS 232 - Interface Input	1	-	-	1	1	1	1	1	-	-	1	-
Voltage level maximum	± 10 V	-	-	± 10 V	± 10 V	± 10 V	± 10 V	± 10 V	-	-	± 10 V	-
Data cable length maximum to PC	15 m	-	-	15 m	15 m	15 m	15 m	15 m	-	-	15 m	-
Data rate 2400 - 38400 baud	√	-	-	√	√	√	√	√	-	-	√	-
Measure Entries / -Channels	-	2 or 4	2 or 4	4	4	2 Cu + 2 NiCr	2 or 4	2 or 4	-	-	-	-
Voltage strength of entries	-	-	-	-	-	-	-	-	-	-	-	-
Maximum Cu-sensor wire per channel	-	2.500 m	-	2.500 m	-	2.500 m	2.500 m	-	-	-	-	-
Recomm. max. Cu-wire lengths / channel	-	2.500 m	-	2.500 m	-	2.500 m	2.500 m	-	-	-	-	-
Maximum NiCr-sensor wire per channel	-	-	1.400 m	-	1.400 m	1.400 m	-	1.400 m	-	-	-	-
Recomm. max. NiCr-wire lengths per channel	-	-	1.200 m	-	1.200 m	1.200 m	-	1.200 m	-	-	-	-
Isolation Resistance Measurement	-	√	√	√	√	√	√	√	-	-	-	-
Measuring range	-	200 kΩ to 20 MΩ	1 kΩ to 20 MΩ	200 kΩ to 20 MΩ	1 kΩ to 20 MΩ	1 kΩ to 20 MΩ	200 KΩ to 20 MΩ	1 kΩ to 20 MΩ	-	-	-	-
Dissolution	-	1 kΩ / 100 kΩ	1 kΩ	1 kΩ / 100 kΩ	1 kΩ	1 kΩ	1 kΩ / 100 kΩ	1 kΩ	-	-	-	-
Measuring voltage maximum	-	5 V	10 V	5 V	10 V	10 V	5 V	10 V	-	-	-	-
Measuring current maximum	-	20 mA	20 mA	20 mA	20 mA	20 mA	20 mA	20 mA	-	-	-	-
Exactness	-	± 3 %	± 0,01 %	± 3 %	± 0,01 %	± 0,01 %	± 3 %	± 0,01 %	-	-	-	-
Alarm threshold value "Isolation" adjustable	-	-	via control software	-	via control software	via control software	-	via control software	-	-	-	-
Alarm threshold value from / to in steps	-	-	1 MΩ to 10 MΩ	-	1 MΩ to 10 MΩ	1 MΩ to 10 MΩ	-	1 MΩ to 10 MΩ	-	-	-	-
Loop Resistance Measurement	-	-	√	-	√	√	-	√	-	-	-	-
Measuring range	-	-	0 Ω to 8 kΩ	-	0 Ω bis 8 kΩ	0 Ω bis 8 kΩ	-	0 Ω to 8 kΩ	-	-	-	-
Dissolution	-	-	1 Ω	-	1 Ω	1 Ω	-	1 Ω	-	-	-	-
Voltage level maximum	-	-	10 V	-	10 V	10 V	-	10 V	-	-	-	-
Measuring current maximum	-	-	20 mA	-	20 mA	20 mA	-	20 mA	-	-	-	-
Exactness	-	-	± 0,02%	-	± 0,02%	± 0,02%	-	± 0,02%	-	-	-	-
Alarm threshold value "Loop" adjustable	-	-	automatic	-	automatic	automatic	-	automatic	-	-	-	-
Impulse Running Period Measurement	-	√	-	√	-	√	√	-	-	-	-	-
Dissolution / Exactness	-	0,5 m / 0,2 %	-	0,5 m / 0,2 %	-	0,5 m / 0,2 %	0,5 m / 0,2 %	-	-	-	-	-
Voltage level maximum	-	0 / 5 V to 270 Ω	-	0 / 5 V to 270 Ω	-	0 / 5 V to 270 Ω	0 / 5 V to 270 Ω	-	-	-	-	-
Pulse wave shape	-	-	-	-	-	-	-	-	-	-	-	-
Impulse running period adjustable from / to (V/2)	-	90 to150 m/µs	-	90 to 150 m/µs	-	90 to 150 m/µs	90 to 150 m/µs	-	-	-	-	-
Direct Voltage Measurement (DC)	-	√	√	√	√	√	√	√	-	-	-	-
Measuring range	-	± 2 V	± 2 V	± 2 V	± 2 V	± 2 V	± 2 V	± 2 V	-	-	-	-
Exactness	-	0,01 V	0,01 V	0,01 V	0,01 V	0,01 V	0,01 V	0,01 V	-	-	-	-
Dissolution	-	± 3 %	± 0,2 %	± 3,0 %	± 0,2 %	± 0,2 %	± 3 %	± 0,2 %	-	-	-	-
Alternating Voltage Measurement (AC)	-	√	√	√	√	√	√	√	-	-	-	-
Measuring range	-	2 Vss	2 Vss	2 Vss	2 Vss	2 Vss	2 Vss	2 Vss	-	-	-	-
Exactness	-	± 3 %	± 0,2 %	± 3,0 %	± 0,2 %	± 0,2 %	± 3 %	± 0,2 %	-	-	-	-
Dissolution	-	0,01 V	0,01 V	0,01 V	0,01 V	0,01 V	0,01 V	0,01 V	-	-	-	-
USB - Interface	√ / via adapter	-	-	√ / via adapter	√ / via adapter	√ / via adapter	√ / via adapter	√ / via adapter	-	-	-	-
Power distant supply voltage maximum	-	-	-	-	-	-	-	-	-	-	-	30 V
Working range power distant supply	-	-	-	-	-	-	-	-	-	-	-	ca. 1.800 m
Addressability standard / extended	-	16- / 32-fold	16- / 32-fold	16-fold	16-fold	16-fold	16- / 32-fold	16- / 32-fold	-	-	-	-
Radio interface / GSM	-	-	-	-	-	-	-	-	-	-	-	-
TC / IP - Ethernet interface	-	possible	possible	-	-	-	-	-	-	-	-	-

isoplus - Device Type IPS-	Digital-MDS	Digital-Cu-MS	Digital-NiCr-MS	Digital-Cu-MBS	Digital-NiCr-MBS	Digital-UNI-MBS	Digital-Cu-KMS	Digital-NiCr-KMS	Digital-TV	Digital-MODEM	Digital-PFA	Digital-FSV

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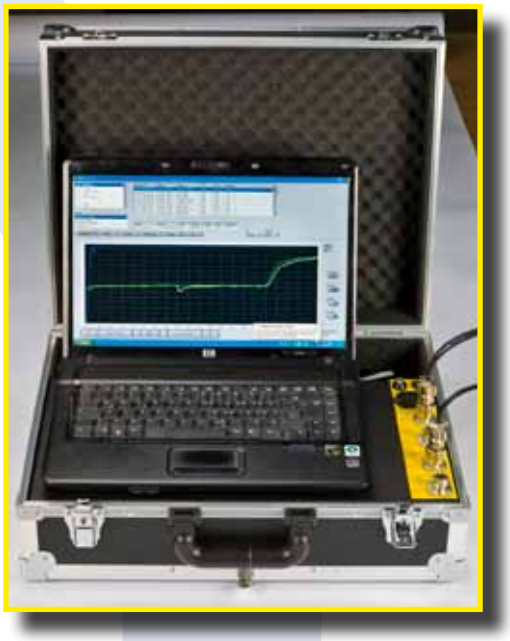

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