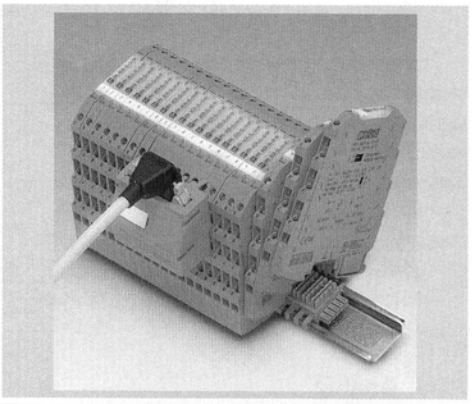
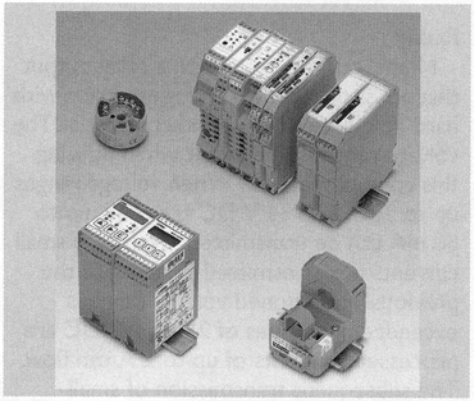


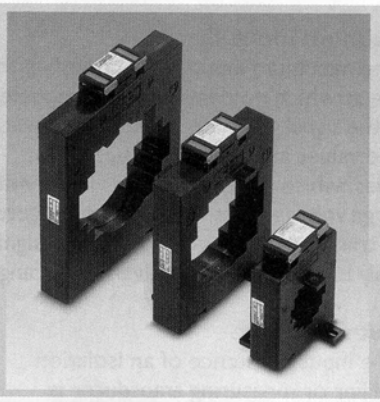
Product type	Product details	MINI Analog	
Isolation			Page
3-way isolation amplifier	- Configurable	MINI MCR-SL-U...-...-UI	330
		MINI MCR-SL-SHUNT-UI	332
	- Fixed signal combinations	MINI-MCR-SL-...-...	335
4-way signal duplicator	- Configurable	MINI-MCR-SL-UI-2I	336
3-way repeater power supply		MINI-MCR-SL-RPS...	337
2-way passive isolator	- Power supplied to input loops	MINI-MCR-SL-...CP-I-I	338
	- Power supplied to output loops		
Temperature			Page
Temperature transducers	Universal, active		
	Universal, passive		
	RTD (e.g. Pt 100), active	MINI-MCR-SL-PT100-UI...	339
	RTD (e.g. Pt 100), passive	MINI-MCR-SL-PT100-LP	341
	Thermocouples, active	MINI-MCR-SL-TC-UI	342
Conversion			Page
Frequency transducers		MINI-MCR-SL-UI-F	343
Potiposition transducers		MINI-MCR-SL-R-UI	344
Control			Page
Threshold value switches	Temperature signals		
	Analog standard signals	MINI-MCR-SL-UI-REL	346
Isolating switching amplifiers	NAMUR sensors	MINI-MCR-SL-NAM-2RNO	345
Setpoint adjusters	Current, voltage		
	Setpoint potentiometer		
	Constant voltage source		
Digital display	Analog standard signals		
	Frequencies, pulses, times		
Power			
Current transducers	Universal, AC/DC currents		
	Alternating current, AC, active		
	Alternating current, AC, passive		
	Current protectors		
Voltage transducers	DC voltage		
	AC voltage		
Current transformers (cannot be calibrated)	Bus-bar transformers		
	Plug-in transformers		
	Winding transformers		
Current transformers (can be calibrated)	Bus-bar transformers		
	Plug-in transformers		
Accessories			Page
Configuration	Configuration software		
	Cables		
DIN rail adapters			
System cabling	System components	Adapters, cables	350
	1:1 feed-through terminal block	MINI-MCR-SL-TB	347
Bridging the supply voltage	System components	Power terminal, system power supply unit, DIN rail connectors	348
Marking material		Transparent cover, insert strips, Zack marker strip for flat-ribbon labeling	347
Mounting material	Current transformers		

MACX Analog / MCR Analog



Digital displays

PACT Analog



Input

Maximum input signal

The maximum input signal describes the value at which no damage to the module and the signal generator has occurred yet. If these values are exceeded, suppressor diodes, which short circuit this input when a surge voltage is detected, can be triggered. The transmission range of the analog signals is only located within the given input ranges.

Input resistance

The input resistance of an isolation amplifier or measuring transducer is designed such that the input signal is loaded only slightly. This yields a low-resistance input for current inputs and a high-resistance input for voltage inputs.

Voltage drop

In case of passive isolators, the input voltage drop occurs as a result of the voltage drop of the operational load and the auxiliary power requirements of the module. The more the auxiliary power requirements of the passive isolator, the smaller the operational output load may be. Low auxiliary power requirements are the measure of the quality of a device.

Common mode rejection

In case of isolation amplifiers, operational amplifiers are used internally for transmission. Theoretically, operational amplifiers have an ideal transmission and amplification behavior. In practice, however, things are different. When both input voltages are changed in the same direction, i.e. exactly the same voltage to ground is applied to both input terminal blocks, this leads to an unintended output signal. Theoretically, no output signal should appear with an ideal operational amplifier, since the differential input signal is "0 V". The common mode rejection indicates the factor (in dB) by which the common input voltage at both inputs is amplified less than the difference in voltage between the two inputs.

(True) r.m.s. value

According to the definition, the r.m.s. value of an alternating current has the same magnitude as a direct current that develops the same heat energy and has the same force effects on other conductors carrying a current.

Many measuring transducers measure the rectified mean value which is then adapted to the r.m.s. value. However, this measuring technique is precise only with sinusoidal signals. If distorted and higher frequency and mixed signals can be measured accurately, this is known as true r.m.s. measurement.

Analog output

Maximum output signal

If the devices operate without disturbances, an override at the input cannot cause greater values at the output.

Zero/span adjustment

When the zero point is set, the zero point of an analog output is adjusted and set in relation to the input signal.

When the "amplification" span is set, the analog output is adjusted in relation to the input signal. In this case, the output characteristic curve is increased or decreased by an amplification factor.

Load

The load on the output side indicates the load-carrying capacity of a measuring transducer or an isolation amplifier. Current outputs can generally drive a maximum of 500 Ω; voltage outputs can be loaded with a minimum of up to 10 kΩ.

Residual ripple / ripple

A superposed ripple can appear on the output signal due to signal conditioning required by the circuit. The residual ripple is given in mV_{PP} or mV_{rms}.

Open circuit response

With some measuring transducers, the input signal is permanently monitored for possible open circuits in the signal cable. If the signal exceeds or falls below a tolerance limit, an open circuit is detected and a defined output signal is sent. With programmable devices, the output signal can be freely selected.

Binary output

Relay

Numerous products with a relay output that are shown in the catalog are made with hard-gold-plated relay contact material. The voltage range is important when utilizing this contact material. When voltage ranges up to 30 V AC/ 36 V DC are used, up to 50 mA can be transmitted. Even very small currents are transmitted perfectly. If the previously mentioned voltage range is exceeded and values of 250 V AC/DC are processed, currents of up to 2 A can flow. The subsequent transmission of small currents, however, can then no longer be guaranteed.

Transistor

A PNP transistor switching output transmits 24 V DC switching signals from up to approximately 100 mA.

General data

Supply voltage

In the product range, DC and AC power supply units are offered depending on the item. A 24 V DC version is available as a standard power supply unit that works in the voltage range of 20...30 V DC. The different supply voltages can be found in the technical data.

Current consumption

The value given here describes the auxiliary power requirements of the devices. In addition, there are the output current and the load of the switching output, if any.

Transmission error

The transmission precision is a gauge of the quality of a measuring transducer. It is the deviation from the ideal transmission characteristic curve and includes linearity, span, and offset errors.

Non-linearity

Non-linearity is the deviation from the ideal transmission precision without span and offset errors.

The non-linearity of a signal makes it possible to evaluate the course from zero to span. Normally, the linearity errors that are given indicate a deviation from the ideal transmission characteristic curve as a percentage.

Temperature coefficient

The temperature coefficient evaluates the deviating precision if the ambient temperature around an isolation amplifier or measuring transducer changes. In most cases this data is given as a percentage. An alternative definition is ppm/K (parts per million/Kelvin). Example: 250 ppm/K correspond to 0.025%/K.

Limit frequency

Isolating amplifiers are basically designed to transmit DC signals. Signal changes, though, require a dynamic behavior that is determined by the limit frequency and therefore offer the possibility of transmitting small AC quantities (normally: 30 Hz) as well. At the same time, a low limit frequency suppresses higher-frequency AC components.

Step response

The step response indicates the response time of the output signal when an input signal step occurs (10...90%). The step response is inversely proportional to the limit frequency. This means that the response time decreases when the limit frequency increases.

Test voltage

The test voltage defines the dielectric strength of an isolated distance and is determined by type tests. In this test, a 50 Hz voltage is applied for one minute, and it describes a value at which no disruptive electrical charge to another potential level takes place in the device.

Safe isolation

"Safe isolation" is defined as protection from currents dangerous to the human body. When modules are specified in accordance with EN 61010, one distinguishes between faultless and disturbed operation. With faultless operation, nominal supply voltages of 30 V AC/ 60 V DC are valid.

Ambient temperature range

The temperature limits given here are only for operation. These limits do not apply to storage and transport. The temperature limits of the materials used are decisive for those cases. If the devices should be outside of the given temperature range during assembly, they must be brought back to the given temperature range first before the system startup. It is important to make sure that no condensation occurs.

Protective circuit

In order to protect the MCR modules against surge voltage, suppressor diodes are connected upstream of the signal and supply paths. These diodes behave in a similar manner to conventional Zener diodes. In contrast, the suppressor diode has faster response times and a higher maximum current.

Information regarding directives and standards

When non-independent items (components) are further processed, the applicable specifications for installation must be observed.

For installation in devices, the specifications of the respective device also apply. (Standards that are applicable at the time of printing the catalog)

Directives	EU	International
Electromagnetic Compatibility Directive (EMC)	2004/108/EC	-
Low-voltage directive (LVD)	2006/95/EC	-
Ex directive (ATEX)	94/9/EC	-
Product standards		
Electronic equipment for use in electrical power installations and their assembly into electrical power installations	EN 50178:1997	-
Safety regulations for electrical measurement, control and laboratory equipment Part 1: General requirements	EN 61010-1:2001	IEC 61010-1:2004
Programmable logic controllers - Part 2: Equipment requirements and tests	EN 61131-2:2007	IEC 61131-2:2007
EMC		
EMC - Part 6-2: Generic standards - noise immunity for industrial sectors	EN 61000-6-2:2005	IEC 61000-6-2:2005
EMC - Part 6-4: Generic standards - noise emission for industrial sectors	EN 61000-6-4:2007	IEC 61000-6-4:2006
Electrical equipment for measurement systems, control systems and laboratory use EMC requirements	EN 61326-1:2006	IEC 61326-1:2005
ATEX		
Electrical operating equipment for potentially gas-explosive areas - Part 0: General requirements	EN 60079-0:2006	IEC 60079-0:2007
Explosive atmosphere - Part 11: Device protection through intrinsic safety "i"	EN 60079-11:2007	IEC 60079-11:2006
Electrical operating equipment for potentially gas-explosive areas - Part 15: construction, testing and labeling of electrical equipment of the protection type "n"	EN 60079-15:2005	IEC 60079-15:2005
Environmental tests		
Environmental factors - Part 2-1: Test method - test A: cold	EN 60068-2-1:2007	IEC 60068-2-1:2007
Environmental factors - Part 2-2: Test method - test B: heat	EN 60068-2-2:2007	IEC 60068-2-2:2007
Environmental factors - Part 2-6: Test method - test Fc: waves (sinusoidal)	EN 60068-2-6:2008	IEC 60068-2-6:2008