

MSR 12 Basic unit

The basic unit MSR 12 includes the PR3 pressure measurement module and the ACC3 3-axis accelerometer.

Module PR3

Measured parameters:	Pressure Temperature
Display/Measurement range:	0-15 000 mbar -10 °C to +60 °C
Display resolution:	1 mbar 1 °C
Accuracy of internal air pressure sensor:	±2.5 mbar max. (at 750-1100 mbar absolute) ±1 °C (at 20 °C)
Measurement rate:	100 /s, 10 /s, 1 /s, every 10 s, every 30 s, every 60 s
Storage rate:	Every nth measurement value is stored (n = 1-256)
Mode of operation:	Simultaneous measurement of all pressures
Input:	1 x ambient pressure and temperature 2 x external pressure and temperature
Storage capacity:	1 000 000 measurements

Module ACC3

Measured parameters:	Acceleration (3-axis)
Measurement range:	±10 G
Display resolution:	0.001 G
Accuracy:	0.02 G (at 25 °C)
Measurement rate:	50 /s, 20 /s, 10 /s, 1 /s, every 2 s, every 5 s, every 10 s, every 30 s
Storage rate:	Every nth measurement value is stored (n = 1-256)
Mode of operation:	Sequential measurement of the 3 axes
Storage capacity:	1 000 000 measurements

General

Dimensions:	137 x 74 x 27 mm
Weight:	approx. 180 g
Power supply:	3 x rechargeable batteries (NiMH) 880mAh External power pack
Operating conditions:	Temperature: 0-50 °C 30-95 % relative humidity, non-condensing
Storage conditions:	Temperature: -20 °C to +70 °C Humidity: 10-95 % relative humidity, non-condensing

Attachable sensors:	Pressure sensors	Item number
	P2500-4 AIR	B10130
	P14K-3 AIR	B10127
	P2500 WATER	B10121
	P14K WATER	B10110



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Distributor:



MSR 12 plug-in module 3ACCF

The 3ACCF accelerometer module processes and logs measurements from an external acceleration sensor.

Measured parameters: Acceleration (3 axis)

Display/Measurement range: ± 10 G

Display resolution: 0.001 G

Measurement rate:	1000 /s	10 /s
	500 /s	1 /s
	200 /s	every 2 s
	100 /s	every 5 s
	50 /s	every 10 s
	20 /s	every 30 s

Storage rate: Every nth measurement value is stored (n = 1-256)

Mode of operation: Simultaneous measurements

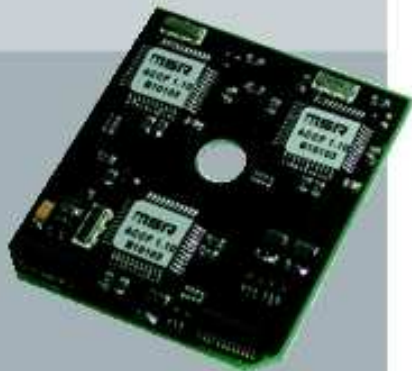
Input: 1 x 3-axis acceleration sensor

Storage capacity: 4 000 000 measurements per axis

Integration with MSR 12: By qualified personnel

Item number: B10103

Attachable sensors:	Acceleration sensors	Item number
	3ACCF-RS232 10 G	B10132
	3ACCF-RS232 2 G	B10137



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Distributor:



Accelerometer 3ACCF

The 3ACCF sensor measures acceleration in the X, Y and Z axes. The sensors are contained in a housing that is linked to the MSR 12 via cable. The sensor housing can best be fixed using the four mounting holes.



3ACCF-RS232 2g

Sensor type:	ADXL202AE
Measured parameters:	Acceleration (3 axis)
Measurement range:	± 2 G
Resolution:	0.001 G
Accuracy:	0.02 G (25 °C)
Item number:	B10137

3ACCF-RS232 10g

Sensor type:	ADXL210AE
Measured parameters:	Acceleration (3 axis)
Measurement range:	± 10 G
Resolution:	0.01 G
Accuracy:	0.1 G (25 °C)
Item number:	B10132

General

Medium:	Air
Dimensions:	See drawing
Cable length:	2 m
Weight exc. cable:	Approx. 15 G
Electrical connections:	Plug for MSR 12 RS232 socket

Power supply: Via MSR 12

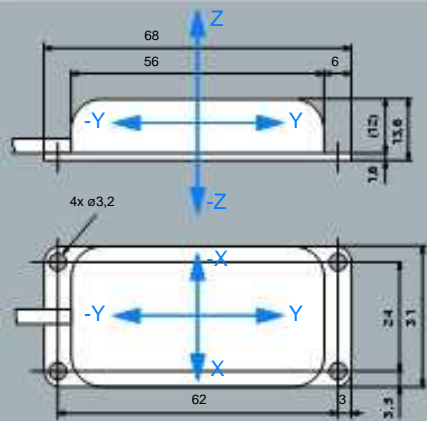
Material:
Sensor housing: Epoxy, ABS

Operating conditions:
Temperature: -20 °C to +70 °C
Humidity: 0-95 % relative humidity, non-condensing

Storage conditions:
Temperature: -20 °C to +70 °C
Humidity: 0-95 % relative humidity, non-condensing

Special feature: Calibration coefficients stored in EEPROM

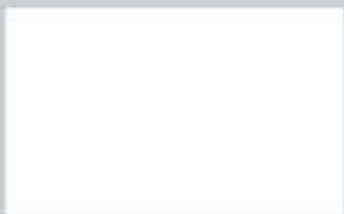
Required additional module: 3ACCF (Item number B10103)



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Distributor:



MSR 12 plug-in module PR8

The PR8 pressure module processes and logs pressure and temperature values from external pressure sensors.



Measured parameters:	Pressure	
	Temperature of the pressure sensors	
Measurement range:	0-15 000 mbar	
	-10 °C to +60 °C	
Display resolution:	1 mbar	
	1 °C	
Measurement rate:	20 /s	every 10 s
	10 /s	every 30 s
	2 /s	every 60 s
	1 /s	
Storage rate:	Every nth measurement value is stored (n = 1-256)	
Mode of operation:	Simultaneous measurements of all pressure values	
Input:	Max. 8 pressure sensors	
Storage capacity:	1 000 000 measurements	
Integration with MSR 12:	By qualified personnel	
Item number:	B10018	
Attachable sensors:	Pressure sensors	Item number
	P2500-4 AIR	B10130
	P2500 WATER	B10121
	P14K-3 AIR	B10127
	P14K WATER	B10110

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Distributor:



Air pressure sensors

The air pressure sensor is linked to the pressure system by means of the rapidaction coupling provided. The sensor is contained within a stainless steel casing and is connected to the MSR 12 via cable.

P2500-4 AIR

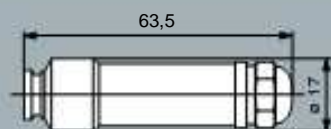
Sensor type:	MS5534A
Measured parameters:	Pressure / temperature
Measurement range:	0-2500 mbar absolute -10 °C to 60 °C
Resolution:	1 mbar 1 °C
Accuracy:	±2.5 mbar max. (at 750-1100 mbar absolute) ±1 °C (at 20 °C)
Item number:	B10130

P14K-3 AIR

Sensor type:	MS5535A
Measured parameters:	Pressure / temperature
Measurement range:	0-14 000 mbar absolute -10 °C to +60 °C
Resolution:	1 mbar 1 °C
Accuracy:	±25 mbar max. (at 0-5 000 mbar, 0 °C to +50 °C) ±160 mbar max. (at 0-14 000 mbar, -10 °C to +60 °C) ±1 °C at 20 °C
Item number:	B10127

General

Medium:	Air
Dimensions:	See drawing
Cable length:	1.6 m
Weight exc. cable:	52 G
Electrical connections:	Plug for MSR 12 (LEMO)
Power supply:	Via MSR 12
Material:	
Sensor housing:	Stainless steel
Operating conditions:	
Temperature:	-10 °C to +60 °C
Humidity:	0-95 % relative humidity, non-condensing
Storage conditions:	
Temperature:	-20 °C to +70 °C
Humidity:	0-95 % relative humidity, non-condensing
Special feature:	Calibration coefficients stored in EEPROM
Required additional module:	PR8 (Item number B10018)



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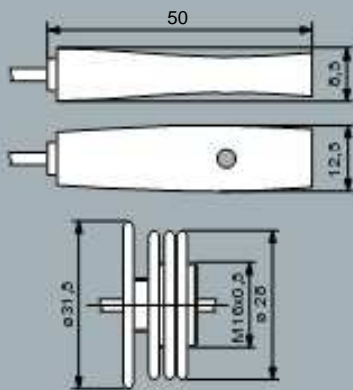
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Distributor:



Water pressure sensors

The pressure sensor is encased in silicon and measures the pressure and temperature of a system filled with water. It is linked to the MSR 12 via cable. An optionally available multi-layer seal allows the cable to be routed through one or more water-tight barriers.



P2500 WATER

Sensor type:	MS5534A
Measured parameters:	Pressure Temperature
Measurement range:	0-2500 mbar absolute -10 °C to +60 °C
Resolution:	0.1 mbar 1 °C
Accuracy:	±2,5 mbar max. (750-1100 mbar absolute) ±1 °C at 20 °C
Item number:	B10121

P14 K WATER

Sensor type:	MS5535A
Measured parameters:	Pressure Temperature
Measurement range:	0-14 000 mbar absolute -10 °C to +60 °C
Resolution:	0.1 mbar 1 °C
Accuracy:	±25 mbar max. (0-5000 mbar, 0 °C to 50 °C) ±160 mbar max. (0-14 000 mbar, -10 °C to +60 °C) ±1 °C at 20 °C
Item number:	B10110

General

Medium:	Water
Dimensions:	See drawing
Cable length:	1.6 m
Weight exc. cable:	7 G
Electrical connections:	Plug for MSR 12 (LEMO)
Sensor sheath material:	Silicon
Operating conditions:	Temperature: -10 °C to +60 °C Humidity: 0-95 % relative humidity, non-condensing
Storage conditions:	Temperature: -20 °C to +70 °C Humidity: 0-95 % relative humidity, non-condensing
Required additional module:	PR8 (Item number B10018)

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Distributor:



MSR 12 plug-in module T24HUM8

The T24HUM8 additional module for the MSR 12 processes and logs the values measured by external temperature or humidity sensors.

Module T24

Measured parameters:	Temperature
Display/measurement range:	±150 °C
Display resolution:	0.01 °C
Measurement rate:	1 s intervals every 10 s every 30 s every 60 s
Storage rate:	Every nth measurement value is stored (n = 1-256)
Mode of operation:	Simultaneous measurement of all temperatures
Input:	Max. 24 temperature sensors
Storage capacity:	1 000 000 measurements

Module HUM8

Measured parameters:	Relative humidity Temperature of humidity sensor
Display/measurement range:	0-100 % relative humidity ±100 °C
Display resolution:	0.01 % 0.01 °C
Measurement rate:	1 s intervals every 10 s every 30 s every 60 s
Storage rate:	Every nth measurement value is stored (n = 1-256)
Mode of operation:	Simultaneous measurements of all humidities
Input:	Max. 8 humidity sensors
Storage capacity:	1 000 000 measurements

General

Integration with MSR 12:	By qualified personnel	
Item number:	B10006	
Attachable sensors:	Sensors	Item number
	Temperature sensor T-3	B10012, B10013
	Core temperature sensor	B10014
	Humidity sensor HUM	B10011

Distributor:

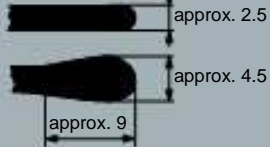


Temperature sensors

The temperature sensor is encased in epoxy and measures the temperature even in inaccessible places such as inside a glove. The core temperature sensor was designed to take anal/rectal temperatures. Both temperature sensor types are linked with the MSR 12 via cable.

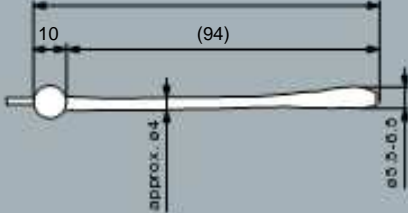


Temperature sensor T-3



Core temperature sensor

approx. 104



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Distributor:



Temperature sensor T-3

Cable length:	3 x 1.1 m or 3 x 1.6 m or 3 x 2.5 m
Weight exc. cable:	5 G
Item number:	Cable length 1.1 m: B10013 Cable length 1.6 m: B10012-2 Cable length 2.5 m: B10012-3

Core temperature sensor

Cable length:	1.6 m
Weight exc. cable:	3 G
Item number:	B10014

General

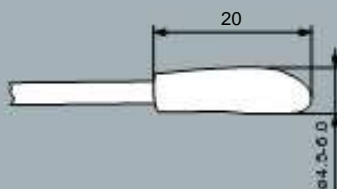
Sensor type:	DS18B20
Measured parameters:	Temperature
Measurement range:	-40 °C to +70 °C (optional -40 °C to +125 °C)
Resolution:	0.0625 °C
Accuracy:	±0.5 °C max. (at -10 °C to +85 °C) optional ±0.2 °C max. (at 20 °C to 40 °C)
Electrical connections:	Plug for MSR 12 (LEMO)
Power supply:	Via MSR 12
Sensor sheath material:	Polyolefin
Medium:	Air, water
Dimensions:	See drawing
Operating conditions:	Temperature: -40 °C to +70 °C With special cable: -40 °C to +125 °C
Storage conditions	Temperature: -20 °C to +70 °C Humidity: 0-95 % relative humidity, non-condensing
Required additional module:	T24HUM8 (Item number B10006)

Humidity sensor HUM

The humidity sensor measures relative humidity and temperature even in places that are difficult to access such as inside a jacket. The sensor is linked with the MSR 12 via cable.

Humidity sensor HUM

Sensor type:	SHT15
Measured parameters:	Relative humidity Temperature
Measurement range:	0-100 % relative humidity -20 °C to +60 °C
Resolution:	0.05 % relative humidity 0.01 °C
Accuracy:	< ±2 % relative humidity (at 10-90 % relative humidity, 0 °C to 40 °C) ±0.5 °C (at 0 °C to 40 °C)
Electrical connections:	Plug for MSR 12 (LEMO)
Power supply:	Via MSR 12
Dimensions:	See drawing
Cable length:	1.6 m 2.5 m
Weight exc. cable:	Approx. 5 G
Sensor sheath:	Silicon
Medium:	Air
Operating conditions:	Temperature: -20 °C to +60 °C
Storage conditions:	Temperature: -20 °C to +70 °C Humidity: 0-95 % relative humidity, non-condensing
Item number:	Cable length 1.6 m: B10011-1 Cable length 2.5 m: B10011-2
Required additional module:	T24HUM8 (Item number B10006)



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Distributor:



MSR 12 plug-in heart rate module HR

The HR plug-in module processes and logs the heart rate (pulse) measured by the POLAR transmitter chest strap.



MSR 12 plug-in heart rate module HR



POLAR transmitter chest strap

Measured parameters:	Pulse (heart beats per minute)
Display resolution:	1 bpm (beat per minute)
Measurement rate:	1 / s, every 10 s, every 30 s, every 60 s
Storage rate:	Every nth measurement value is stored (n = 1-256)
Mode of operation:	Following each heart beat the heart rate (heart beats per minute) is recalculated. The measurement rate determines how often the MSR 12 logs the last calculated heart rate. The storage rate determines how often the heart rate is stored.
Input:	Radio signal from the POLAR transmitter chest strap
Storage capacity:	1 000 000 measurements
Integration with MSR 12:	By qualified personnel
Item number:	B10017
Attachable sensors:	POLAR T61 coded transmitter chest strap

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Distributor:



MSR 12 plug-in ECG module

This plug-in module serves to record an ECG signal. The unit can also compute the pulse (heart rate).



Measured parameters:	ECG Pulse
Resolution:	ECG: 1 value Pulse: 1 bpm
Measurement rate:	200 Hz
Storage rate:	ECG: 200 /s, 100 /s, 50 /s Pulse: 1 /s, every 10 s, every 30 s, every 60 s
Input:	ECG signal with 3 electrodes (optional 2 ECG)
Storage capacity:	4 000 000 measurements
Integration with MSR 12:	By qualified personnel
Item number:	B10100
Attachable sensors:	ECG cable with 3 electrodes B10126



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Distributor:



MSR 12 valve-tester plug-in module

The valve tester measures the delay time between the control pulse and the output signal. It logs this time together with the value of the output signal and a time stamp. In addition, the delay time is analysed.



Measured parameters: Voltage
 Delay time between control pulse and output signal
 Analysis of the delay time during the test

Measurement range: Voltage: 0-2.7 V
 Delay time: 0-30 000 ms
 Counter: 23 Bit

Resolution: Voltage: 12 bit
 Delay time: 1 ms
 Counter: 1 bit

Measurement rate: Selectable - up to 10 kHz

Storage rate: All measured delay times

Mode of operation: Each measured delay time is recorded and logged together with the output signal

Input: 4 analogue inputs for optional use as

- Voltage input
- Analogue pressure input
- Digital input 0-10
- √ Digital optoelectronic coupler input
- Digital input with photo diode

Each input can be defined as a control pulse of an output signal

Storage capacity: 1 000 000 measurements

Integration with MSR 12: By qualified personnel

Item number: B10106

Accessories: Docking station DS1 B10135

Attachable sensors:	Sensors	Item number
	Pressure sensor PA-21SR/16bar	S10015
	Optoelectronic coupler DS1 IF OPTO	B10136
	Photo diode DS1 IF FOTO	B10139



Docking station



Pressure sensor



Optoelectronic coupler

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Distributor:



MSR 12 plug-in module AIN4-12

The universal module AIN4-12 records and logs four input voltages.



Measured parameters:	Voltage
Measurement range:	Voltage: 0-2.4 V Input voltage divider, optional (max. 48 V)
Resolution:	Voltage: 12 bit
Measurement rate:	1000/s, 200/s, 500/s, 100 /s, 50 /s, 20 /s, 10 /s, 5 /s, 2 /s, 1 /s
Storage rate:	Every nth measurement value is stored (n = 1-256)
Mode of operation:	Voltages are measured sequentially
Input:	4 analogue inputs
Storage capacity:	4 000 000 measurements
Special feature:	Linear transfer function for voltage measurements is switchable
Integration with MSR 12:	By qualified personnel
Item number:	B10106

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Distributor:



MSR 12 plug-in module AIN4-10

The universal module AIN4-10 records and logs four input voltages.



Measured parameters:	Voltage
Measurement range:	Voltage: 0-3.0 V Input voltage divider, optional (max. 48 V)
Resolution:	Voltage: 10 bit
Measurement rate:	100 /s, 50 /s, 20 /s, 10 /s, 5 /s, 2 /s, 1 /s
Storage rate:	Every nth measurement value is stored (n = 1-256)
Mode of operation:	Voltages are measured sequentially
Input:	Up to 4 analogue inputs
Storage capacity:	1 000 000 measurements
Special feature:	Linear transfer function for voltage measurements is switchable
Integration with MSR 12:	By qualified personnel
Item number:	B10019

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Distributor:



MSR 12 plug-in module A2D5HUM1

The A2D5HUM1 plug-in module records two input voltages, the level of five digital inputs, the signal from one humidity sensor and the temperature of the humidity sensor. Either the instantaneous value or the average, minimum and maximum values can be logged. In addition, a threshold value can be set and an event triggered should this threshold be exceeded.



MSR 12 - plug-in module A2D5HUM1



Combined pressure and humidity sensor

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Distributor:



Module A2D5

Measured parameters:	Voltage Digital level
Measurement range:	Voltage: 0-3 V Digital level: 0-3 V
Resolution:	Voltage: 10 Bit Digital level: 1 Bit
Measurement rate:	100 /s, 10 /s, 1 /s, every 10 s, every 30 s, every 60 s
Storage rate:	Every nth measurement value is stored (n = 1-256)
Mode of operation:	Voltages are measured sequentially
Input:	2 x voltage 5 x digital level
Storage capacity:	1 000 000 measurements

Module HUM1

Measured parameters:	Humidity Temperature
Measurement range:	Humidity: 0-100 % relative humidity Temperature: -20 °C to 60 °C
Display resolution:	Humidity: 0.01 % Temperature: 0.01 °C
Measurement rate:	1 / s, every 10 s, every 30 s, every 60 s
Storage rate:	Every nth measurement value is stored (n = 1-256)
Mode of operation:	Humidity and temperature are measured sequentially
Input:	1 x humidity and temperature
Storage capacity:	1 000 000 measurements

General

Integration with MSR 12:	By qualified personnel	
Item number:	B10107	
Attachable sensors:	Sensors Pressure and humidity sensor H-P14K-2 AIR	Item number B10104-2