MCK...4S0   MCK...1K0

$C\epsilon$

M-Series
Humidity/-temperature compact sensors
with cable or plug-in connection
Miniature sensors / for assembly in non-visible areas

These sensors are especially adapted to the requirements of measurement tasks which only have limited space available. They are suitable for measuring the relative humidity and temperature in air and other non-aggressive gases. Using the sensors for outdoor applications is not recommended.

The sensors are based on our miniature sensors in the calHT series (product info B1.10). They are fitted with a filter and a 4-pin plug (MCK...4S0) or with a permanently connected 1.5 m long cable (MC(P)K...1Kn). Suitable cables for the model MCK...4S0 can be supplied in different lengths as an option.

The sensors feature high long-term stability, small hysteresis and good dynamic performance.

Technical Data

Humidity
measuring range .... 0...100%rh
resolution 0.5%rh
accuracy .... ±2.5%rh (10...40 °C, 10...90 %rh) ±1 digit
other range .... ±5% rh ±1 digit
influence of temperature ...... ±0.1% rh/K for < 10 °C and > 40 °C

Temperature
measuring ranges .... colour code
resolution .... 0.125 °C
accuracy .... ± 0.5 K @ 23 °C ±1 digit
(details see diagramm)

General data
operating voltage .... 5...30 V DC
output signal :
    MC(P)K1 .... 2 x 0...1 V (at RL ≥ 100 kΩ)
    MC(P)K6 .... digital (similar I^2C)
        I^2C-bus-voltage .... 3.3 VDC
storage temperature .... -40...85°C
working temperature .... -40...85°C
working temperature (with permanent cable) .... -20...70°C
power consumption .... < 250 µA

degree of protection
sensor with PTFE filter ZE05 .... IP40/IP64 (cable versions)
sensor with protective basket ZE07.................................. IP00
sensor with protective basket ZE08 .... IP30

Maximum cable lengths:
    MC(P)K1 .... 5 m at RL >= 100kOhm [1]
    MC(P)K6 .... 0.5m at a clock rate f = 100kHz [1]

    [1]   longer cables possible depending on the load or clock rate

Series	Compact sensors	M
Design	with tube extension	P
	direct connection plug or cable	C
Physical output	rel. humidity and temperature	K
Output signal	0...1 V	1
	I^2C	6
Special edition	none	00
	seal for increased requirements	0S
Measuring range H	0...100 % r.h.	F1
Measuring range T	-30...70 °C	37
	-20...80 °C	28
	0...100 °C	01
	-40...60 °C	46
	-40...85 °C (I^2C)	48
Operating voltage	5...30 VDC	5
Filter	PTFE filter ZE05	05
	open ZE07 (standard)	07
	with membrane ZE08	08
Type of connection and characteristics of the design	4-pin plug	4S0
	permanent cable 0,5 m	0K(n)
	permanent cable 1,5 m	1K(n)
	special lengths of cable in m	yy(n)
	other specialities of design	Xyy

n: additional tube extension depending on sensor type and special design
(n) = 0:   no tube extension
(n) = 1:   total length sensor 53 mm
(n) = 4:   total length sensor 95 mm

Special versions available on request.

User instructions
Install the sensors at a place in the room where characteristic levels of humidity occur. Avoid installing them close to heaters or windows or against outside walls.

In general, the sensors are maintenance-free. If the PTFE filter is contaminated with dust, grease and oils, this can have a negative impact on the dynamic behaviour. In this case the sensor head of the plug version needs to be disconnected from the cable and to be cleaned by blowing or carefully rinsing off with distilled water. After removing the filter, make sure that the sensitive sensor surface is not touched, as this can lead to irreparable damage. An exact measured value can only be attained again after being completely dried; this also applies to condensation.

Please consult „application instructions for the sensing elements" (product info sheet no. A 1) for further information.
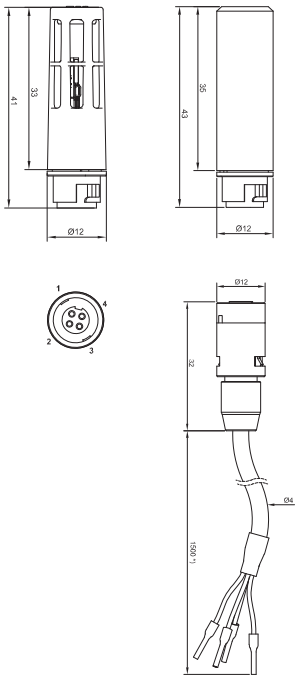
Working range of humidity and temperature

% r.h.
100%
80%
60%
40%
20%
0%

recommended working range

-40°C   0°C   40°C   80°C

Operating the sensor in these areas can damage it!
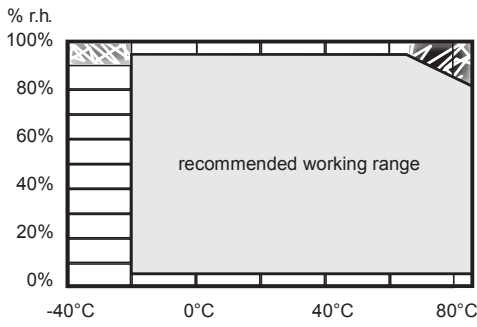
Temperature accuracy of the sensors

$\Delta \vartheta$

(°C)
+3
+2
+1
0
-1
-2
-3

-40   -20   0   20   40   60   80°C
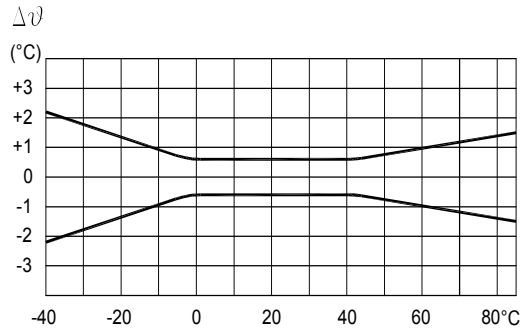
Dimensions diagrams

MCK...4S0

MCK.02-xx.x

order designation cable with jack:

MCK.02-xx.x

length of cable in meter

MCK...1K0

MPK...yy4
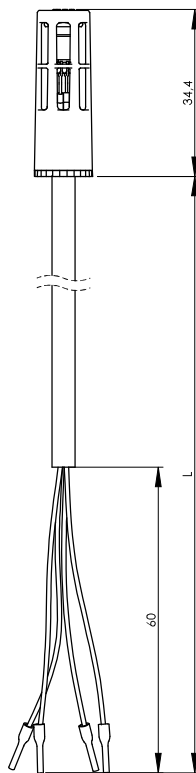
special type MPK...N34
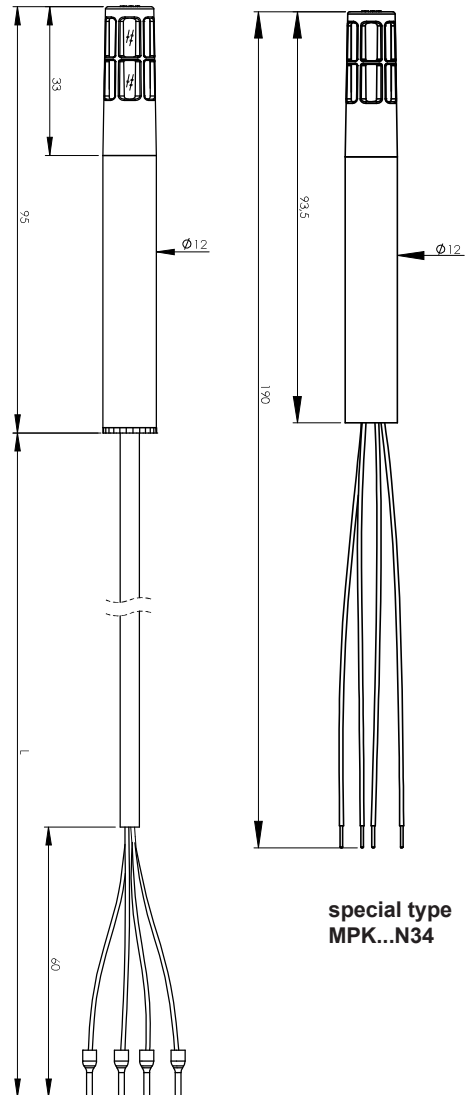
Colour code for output range and characteristics of types MCK...4S0

		colour code
measuring range [°C]	0...100	green
	-20...80	red
	-30...70	black (without)
	-40...60	yellow
	-40...85	white
additional: seal for increased requirements		blue

Configurations of cable versions

Variable	Pin	Pin configuration analogue	Pin configuration digital	conductor colour
UB +	1	5...30 VDC	+ UB	green (red)
UB - (GND)	2	GND	GND	brown (brown)
Humidity	3	0...100% r.h.	SDA	white (black)
Temperature	4	1)	SCL	yellow (orange)

1) depending on sensor head selected (see table page 1)

Protocol for MC(P)K6.* (similar to I²C-output)

Microcontroller sends command for read-out of one byte

S	1	0	0	1	0	0	0	0	A	0	0	0	0	C4	C3	C2	C1	A	P

C4	C3	C2	C1	
0	0	0	0	**Read-Out Humidity**
0	0	1	0	**Read-Out Temperature Byte 1**
0	0	1	1	**Read-Out Temperature Byte 2**

Microcontroller requests data byte according control command and reads out

S	1	0	0	1	0	0	0	1	A	D7	D6	D5	D4	D3	D2	D1	D0	NA	P

☐ from sensor

D7	D6	D5	D4	D3	D2	D1	D0	
0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	**Humidity**
0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	**Temperature Byte 1**
X	X	X	X	0/1	0/1	0/1	0/1	**Temperature Byte 2**

x will not be evaluated

Humidity $= decimal\ value\ humidity * 0.5$
Temperature $= (decimal\ value\ temp.* 0.125) - 40$
(decimal value DV temp. = DV Byte 1 + DV Byte 2 * 256)

Symbol	Parameter	min	max	
t_{BUF}	idle period between BUS actions	4,7		µs
$t_{D:SU}$	data set-up time	250		ns
$t_{D:HD}$	data hold time	50		ns
$t_{ST:HD}$	start hold time	4		µs
$t_{ST:SU}$	start set-up time	4,7		µs
$t_{SCL:L}$	SCL „low" time	4,7		µs
$t_{SCL:H}$	SCL „high" time	4		µs
f_{SCL}	SCL frequency		100	kHz
t_r	SDA, SCL LOW/HIGH time		1	µs
t_f	SDA, SCL HIGH/LOW time		0,3	µs
$t_{STO:SU}$	stop set-up time	4		µs
t_{SP}	interference signal rejection		100	ns
CL	capacity SDA, SCL BUS (internal pull-up 120 kΩ)		10	pF
t_{MUPD}			150	ms
t_{SMPL}			5	ms
t_{Hold}	blocking time after device access	200		ms

Signal characteristics at 25 °C and 3.3 V I²C BUS voltage

BUS Timing