

TARAsens®
AS2 / AS3

indicator	AS…-CL: Free chlorine
	AS…-CD: Chlorine dioxide
Application	drinking water cold, hot until max. 70 °C
Chlorination agents	inorganic chlorine compounds: NaOCl (=sodium hypochlorite), $Ca(OCl)_2$, chlorine gas, electrolytically generated chlorine
appropriate chlorine dioxide production methods	e. g.: – Acid/Chlorite-method – Chlorine/Chlorite-method
Measuring system	amperometric potentiostatic 3-electrode system
Electronic	Analog version: - voltage output - not galvanically isolated electronics - analog internal data processing - output signal: analog (analog-out/analog) Digital version: - electronic is completely galvanically isolated - digital internal data processing - output signal: analog (analog-out/digital) or digital (digital-out/digital) mA-version: - current output analog - not galvanically isolated electronics - output signal: analog (analog-out/analog)
Information about the measuring range	The actual slope of a sensor can vary production-related between 65% and 150% of the nominal slope Note: With a slope > 100% the measuring range is reduced accordingly. (Ex.: 150% slope → 67% of the specified measuring range)
Working temperature	Measuring water temperature: AS2…: 0 … +50 °C AS3..: 0 … +70 °C (no ice crystals in the measuring water)
	Ambient temperature: 0 … +55 °C
Temperature compensation	Automatically, by an integrated temperature sensor Response time t_{90} = approx. 10 min. Max. change in temperature: 30 °C per hour, sudden temperature changes must be avoided



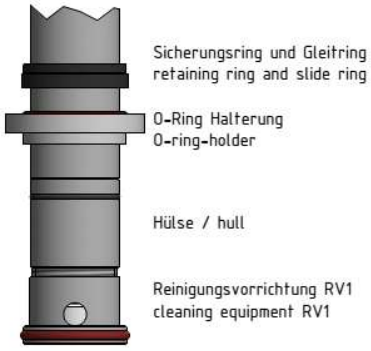
TARAsens® AS2 / AS3

Max. allowed working pressure	Operation without retaining ring: – 0.5 bar – no pressure impulses and/or vibrations
	Operation with retaining ring in TARAflow® FLC: – 8 bar, – no pressure impulses and/or vibrations
Cleaning equipment RV1	Use is recommended for AS…-CL (chlorine) Advantages: - significant extension of maintenance intervals - considerably more stable signal over long term
Flow chamber	TARAflow® FLC (separate data sheet available)
Flow rate (Incoming flow velocity)	Without RV1: min. 15 l/h (15 cm/s), in TARAflow® FLC
	With RV1: 45-90 l/h (45 – 90 cm/s), in TARAflow® FLC
pH-range	AS…-CL: pH 5 – pH 9, pay attention to the dissociation equilibrium HOCL (see diagram “AS-sensors, relative dependence on pH”)
	AS…-CD: pH 1 – pH 12 or the beginning of decomposition of chlorine dioxide at/over pH 12
Run-in time	First start-up approx. 1 h up to 2 days, depending on the water quality
Response time	T_{90}: approx. 30 sec.
Zero point adjustment	Not necessary
calibration	Chlorine: At the device, by analytical determination, DPD-1-Method Chlorine dioxide: At the device, by analytical determination, (without chlorine) DPD-1-Method
Interferences	AS…-CL: Ozone, chlorine dioxide, chlorite are measured
	AS…-CD: Chlorine, chlorite are measured with less than 2 % of their value
Absence of the disinfectant	Max. 24 h
Connection	mV version: 5-pole M12, plug-on flange Modbus version: 5-pole M12, plug-on flange 4-20 mA version: 2-pole terminal or 5-pole M12, plug-on flange



TARAsens®
AS2 / AS3

max. length of sensor cable (depending on internal signal processing)	analog	< 30 m
	digital	> 30 m are permissible Maximum cable length depends on application.
Protection type	5-pole M12 plug-on flange: IP68 2-pole terminal with mA-hood: IP65	
material	AS2: PVC-U	
	AS3: PEEK	
Size	diameter: approx. 25 mm Length: mV version approx. 190 mm (analog signal processing) approx.. 205 mm (digital signal processing) Modbus version approx. 205 mm 4-20 mA version approx. 220 mm (2-pole-terminal) approx. 190 mm (5-pole-M12)	
Transport	+5 … +50 °C (Sensor, electrolyte)	
storage	Sensor: - wet up to one year at +5 … +35 °C (filled with electrolyte and electrolyte-filled protection-cap) - only for AS2: dry no limit at +5 … +40 °C (without electrolyte)	
	Electrolyte: in original bottle protected from sunlight at >+5 - <+35 °C min. 1 year or until specified EXP-Date	
maintenance	Regularly control of the measuring signal, min. once a week The following specifications depend on the water quality: – Cleaning of the gold electrodes: without RV1 every 4 – 12 weeks with RV1 every 6-12 months – Change of the electrolyte: every 3 - 6 months	
	Option: Factory service/maintenance (return the sensor to the manufacturer)	
CE	EMC tested RoHS compliant	

Option	**Cleaning equipment RV1-M** – direct installation on the sensor – approaching flow to the sensor through RV1 – cleaning effect of RV1 is moderate, i. e. weak deposits on the electrodes will be removed, e. g. weak rust films – for a correct and proper operation of sensor with cleaning equipment RV1 flow chamber FLC-3 has to be used!! – flow rate min. 45 l/h – Sensor can be upgraded at any time <u>Advice:</u> – Using with AS…-CL: => slope is approx. 3 times higher (see diagram “AS-Chlorine Sensor with and without RV1”) – Using with AS…-CD: => slope is approx. 2 times higher	

(Subject to technical changes.)

Accessories

Component	Art. No.
Cleaning equipment RV1-M • Cleaning equipment RV1 • 2 bags with each 3 cleaning balls • emery S3 	12112

(Subject to technical changes.)

Spare Parts

Type	Hull	Electrolyte	Emery	O-ring
All AS2	Hull AS2 Art. No. 11103	EAS1/GEL, 50 ml Art. No. 11905	S3 Art. No. 11904	20 x 1.5 silicone Art. no. 11803
All AS3	Hull AS3 Art. No. 11019			

(Subject to technical changes.)

Technical Data

A) Chlorine

1. AS – CL (analog output, analog internal signal processing)

	**Measuring range** **in ppm** **Without RV1**	**with RV1**	**Resolution** **in ppm**	**Output** **Output resistance**	**Nominal slope** (at pH 7.2) **in mV/ppm** **Without RV1**	**with RV1**	**Voltage supply**	**Galvanic isolation required in the measuring device/controller ***	**Connection**
AS2H-CL-M12	0.005… 2.000	0.005… 0.700	0.001	analog 0…-2000 mV 1 kΩ	-1000	-3000	±5 - ±15 VDC 10 mA	yes	5-pole M12 plug-on flange Function of wires: PIN1: measuring signal PIN2: +U PIN3: -U PIN4: signal GND PIN5: n. c.
AS2N-CL-M12	0.03… 20.00	0.03… 7.00	0.01		-100	-300			
AS2Up-CL-M12	0.03… 20.00	0.03… 7.00	0.01	analog 0…+2000 mV 1 kΩ	+100	+300	10 - 30 VDC 10 mA		5-pole M12 plug-on flange Function of wires: PIN1: measuring signal PIN2: +U PIN3: power GND PIN4: signal GND PIN5: n. c.
AS3H-CL-M12	0.005… 2.000	0.005… 0.700	0.001	analog 0…-2000 mV 1 kΩ	-1000	-3000	±5 - ±15 VDC 10 mA		5-pole M12 plug-on flange Function of wires: PIN1: measuring signal PIN2: +U PIN3: -U PIN4: signal GND PIN5: n. c.
AS3N-CL-M12	0.03… 20.00	0.03… 7.00	0.01		-100	-300			
AS3Up-CL-M12	0.03… 20.00	0.03… 7.00	0.01	analog 0…+2000 mV 1 kΩ	+100	+300	10 - 30 VDC 10 mA		5-pole M12 plug-on flange Function of wires: PIN1: measuring signal PIN2: +U PIN3: power GND PIN4: signal GND PIN5: n. c.

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(Subject to technical changes!)

2. AS – CL (analog output, digital internal signal processing)

analog-out / digital

	**Measuring range in ppm**		**Resolution**	**Output** **Output resistance**	**Nominal slope** (at pH 7.2) **in mV/ppm**		**Power supply**	**Galvanic isolation required in the measuring device/controller ***	**Connection**
	Without RV1	**with RV1**	**in ppm**		**Without RV1**	**with RV1**			
AS2H-CL-An-M12	0.005… 2.000	0.005… 0.700	0.001	analog 0…-2 V (max. -2.5 V) 1 kΩ	-1000	-3000	9-30 VDC approx. 7-30 mA	no	5-pole M12 plug-on flange Function of wires: PIN1: measuring signal PIN2: +U PIN3: power GND PIN4: signal GND PIN5: n. c.
AS2N-CL-An-M12	0.03… 20.00	0.03… 7.00	0.01		-100	-300			
AS3H-CL-An-M12	0.005… 2.000	0.005… 0.700	0.001		-1000	-3000			
AS3N-CL-An-M12	0.03… 20.00	0.03… 7.00	0.01		-100	-300			
AS2H-CL-Ap-M12	0.005… 2.000	0.005… 0.700	0.001	analog 0…+2 V (max. +2.5 V) 1 kΩ	+1000	+3000			
AS2N-CL-Ap-M12	0.03… 20.00	0.03… 7.00	0.01		+100	+300			
AS3H-CL-Ap-M12	0.005… 2.000	0.005… 0.700	0.001		+1000	+3000			
AS3N-CL-Ap-M12	0.03… 20.00	0.03… 7.00	0.01		+100	+300			

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(Subject to technical changes!)

3. AS – CL (digital output, analog internal signal processing)

	**Measuring range in ppm**		**Resolution in ppm**	**Output** **Output resistance**	**Power supply**	**Galvanic isolation required in the measuring device/controller ***	**Connection**
	Without RV1	**with RV1**					
AS2H-CL-M0c	0.005… 2.000	0.005… 0.700	0.001	Modbus RTU There are no terminating resistors in the sensor.	9-30 VDC approx. 7-30 mA	no	5-pole M12 plug-on flange Function of wires: PIN1: reserved PIN2: +U PIN3: power GND PIN4: RS485B PIN5: RS485A
AS2N-CL-M0c	0.03… 20.00	0.03… 7.00	0.01				
AS3H-CL-M0c	0.005… 2.000	0.005… 0.700	0.001				
AS3N-CL-M0c	0.03… 20.00	0.03… 7.00	0.01				

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(Subject to technical changes!)

4. AS – CL 4-20 mA (analog output, analog internal signal processing)

4.1 Electrical connection: 2 pole terminal clamp

	**Measuring range** **in ppm**		**Resolution**	**Output** **Output resistance**	**Nominal slope** (at pH 7.2) **in mA/ppm**		**Voltage supply**	**Galvanic isolation required in the measuring device/controller ***	**Connection**
	Without RV1	**with RV1**	**in ppm**		**Without RV1**	**with RV1**			
AS2MA1-CL	0.003… 1.000	0.003… 0.400	0.001		16.0	48.0			
AS2MA2-CL	0.003… 2.000	0.003… 0.700	0.001		8.0	24.0			
AS2MA5-CL	0.03… 5.00	0.03… 1.70	0.01		3.2	9.6			
AS2MA10-CL	0.03… 10.00	0.03… 4.00	0.01		1.6	4.8			2-pole terminal (2 x 1 mm²)
AS2MA20-CL	0.03… 20.00	0.03… 7.00	0.01	4…20 mA	0.8	2.4	12…30 VDC		
AS3MA1-CL	0.003… 1.000	0.003… 0.400	0.001	uncalibrated	16.0	48.0	R_L 50Ω…R_L 900Ω	yes	Recommended: Round cable ∅ 4 mm 2 x 0.34 mm²
AS3MA2-CL	0.003… 2.000	0.003… 0.700	0.001		8.0	24.0			
AS3MA5-CL	0.03… 5.00	0.03… 1.70	0.01		3.2	9.6			
AS3MA10-CL	0.03… 10.00	0.03… 4.00	0.01		1.6	4.8			
AS3MA20-CL	0.03… 20.00	0.03… 7.00	0.01		0.8	2.4			

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(Subject to technical changes!)

4.2 Electrical connection: 5 pole M12 plug-on flange

	**Measuring range in ppm**		**Resolution**	**Output** **Output resistance**	**Nominal slope** (at pH 7.2) **in mA/ppm**		**Voltage supply**	**Galvanic isolation required in the measuring device/controller ***	**Connection**
	Without RV1	**with RV1**	**in ppm**		**Without RV1**	**with RV1**			
AS2MA1-CL-M12	0.003… 1.000	0.003… 0.400	0.001		16.0	48.0			
AS2MA2-CL-M12	0.003… 2.000	0.003… 0.700	0.001		8.0	24.0			
AS2MA5-CL-M12	0.03… 5.00	0.03… 1.70	0.01		3.2	9.6			
AS2MA10-CL-M12	0.03… 10.00	0.03… 4.00	0.01		1.6	4.8			5-pole M12 plug-on flange
AS2MA20-CL-M12	0.03… 20.00	0.03… 7.00	0.01	4…20 mA	0.8	2.4	12…30 VDC		Function of wires: PIN1: n. c. PIN2: +U PIN3: -U PIN4: n c. PIN5: n. c.
AS3MA1-CL-M12	0.003… 1.000	0.003… 0.400	0.001	uncalibrated	16.0	48.0	R_L 50Ω…R_L 900Ω	yes	
AS3MA2-CL-M12	0.003… 2.000	0.003… 0.700	0.001		8.0	24.0			
AS3MA5-CL-M12	0.03… 5.00	0.03… 1.70	0.01		3.2	9.6			
AS3MA10-CL-M12	0.03… 10.00	0.03… 4.00	0.01		1.6	4.8			
AS3MA20-CL-M12	0.03… 20.00	0.03… 7.00	0.01		0.8	2.4			

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(Subject to technical changes!)

B) Chlorine Dioxide

1. AS – CD (analog output, analog internal signal processing)

	**Measuring range in ppm**		**Resolution**	**Output Output resistance**	**Nominal slope in mV/ppm**		**Voltage supply**	**Galvanic isolation required in the measuring device/controller ***	**Connection**
	Without RV1	**with RV1**	**in ppm**		**Without RV1**	**with RV1**			
AS2H-CD-M12	0.005…2.000	0.005…1.000	0.001	analog 0…-2000 mV 1 kΩ	-1000	-2000	±5 - ±15 VDC 10 mA	yes	5-pole M12 plug-on flange Function of wires: PIN1: measuring signal PIN2: +U PIN3: -U PIN4: signal GND PIN5: n. c.
AS2N-CD-M12	0.03…20.00	0.03…10.00	0.01		-100	-200			
AS2Up-CD-M12	0.03…20.00	0.03…10.00	0.01	analog 0…+2000 mV 1 kΩ	+100	+200	10 - 30 VDC 10 mA		5-pole M12 plug-on flange Function of wires: PIN1: measuring signal PIN2: +U PIN3: power GND PIN4: signal GND PIN5: n. c.
AS3H-CD-M12	0.005… 2.000	0.005… 1.000	0.001	analog 0…-2000 mV 1 kΩ	-1000	-2000	±5 - ±15 VDC 10 mA		5-pole M12 plug-on flange Function of wires: PIN1: measuring signal PIN2: +U PIN3: -U PIN4: signal GND PIN5: n. c.
AS3N-CD-M12	0.03… 20.00	0.03… 10.00	0.01		-100	-200			
AS3Up-CD-M12	0.03… 20.00	0.03… 10.00	0.01	analog 0…+2000 mV 1 kΩ	+100	+200	10 - 30 VDC 10 mA		5-pole M12 plug-on flange Function of wires: PIN1: measuring signal PIN2: +U PIN3: power GND PIN4: signal GND PIN5: n. c.

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(Subject to technical changes!)

2. AS – CD (analog output, digital internal signal processing)

analog-out / digital

	**Measuring range in ppm**		**Resolution**	**Output** **Output resistance**	**Nominal Slope in mV/ppm**		**Power supply**	**Galvanic isolation required in the measuring device/controller ***	**Connection**
	Without RV1	**with RV1**	**in ppm**		**Without RV1**	**with RV1**			
AS2H-CD-An-M12	0.005… 2.000	0.005… 1.000	0.001	analog 0…-2 V (max. -2.5 V) 1 kΩ	-1000	-2000	9-30 VDC approx. 7-30 mA	no	5-pole M12 plug-on flange Function of wires: PIN1: measuring signal PIN2: +U PIN3: power GND PIN4: signal GND PIN5: n. c.
AS2N-CD-An-M12	0.03… 20.00	0.03… 10.00	0.01		-100	-200			
AS3H-CD-An-M12	0.005… 2.000	0.005… 1.000	0.001		-1000	-2000			
AS3N-CD-An-M12	0.03… 20.00	0.03… 10.00	0.01		-100	-200			
AS2H-CD-Ap-M12	0.005… 2.000	0.005… 1.000	0.001	analog 0…+2 V (max. +2.5 V) 1 kΩ	+1000	+2000			
AS2N-CD-Ap-M12	0.03… 20.00	0.03… 10.00	0.01		+100	+200			
AS3H-CD-Ap-M12	0.005… 2.000	0.005… 1.000	0.001		+1000	+2000			
AS3N-CD-Ap-M12	0.03… 20.00	0.03… 10.00	0.01		+100	+200			

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3. AS – CD (digital output, analog internal signal processing)

	**Measuring range** **in ppm** **Without RV1**	**with RV1**	**Resolution** **in ppm**	**Output** **Output resistance**	**Power supply**	**Galvanic isolation required in the measuring device/controller ***	**Connection**
AS2H-CD-M0c	0.005… 2.000	0.005… 1.000	0.001	Modbus RTU There are no terminating resistors in the sensor.	9-30 VDC approx. 7-30 mA	no	5-pole M12 plug-on flange Function of wires: PIN1: reserved PIN2: +U PIN3: power GND PIN4: RS485B PIN5: RS485A
AS2N-CD-M0c	0.03… 20.00	0.03… 10.00	0.01				
AS3H-CD-M0c	0.005… 2.000	0.005… 1.000	0.001				
AS3N-CD-M0c	0.03… 20.00	0.03… 10.00	0.01				

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(Subject to technical changes!)

4. AS – CD 4-20 mA (analog output, analog internal signal processing)

4.1 Electrical connection: 2 pole terminal clamp

	**Measuring range in ppm**		**Resolution**	**Output Output resistance**	**Nominal slope in mA/ppm**		**Voltage supply**	**Galvanic isolation required in the measuring device/controller ***	**Connection**
	Without RV1	**with RV1**	**in ppm**		**Without RV1**	**with RV1**			
AS2MA1-CD	0.003… 1.000	0.003… 0.500	0.001		16.0	32.0			
AS2MA2-CD	0.003… 2.000	0.003… 1.000	0.001		8.0	16.0			
AS2MA5-CD	0.03… 5.00	0.03… 2.50	0.01		3.2	6.4			2-pole terminal (2 x 1 mm²)
AS2MA20-CD	0.03…20.00	0.03… 10.00	0.01	4…20 mA	0.8	1.6	12…30 VDC		
AS3MA1-CD	0.003… 1.000	0.003… 0.500	0.001	uncalibrated	16.0	32.0	R_L 50Ω…R_L 900Ω	yes	Recommended: Round cable ∅ 4 mm 2 x 0.34 mm²
AS3MA2-CD	0.003… 2.000	0.003… 1.000	0.001		8.0	16.0			
AS3MA5-CD	0.03… 5.00	0.03… 2.50	0.01		3.2	6.4			
AS3MA20-CD	0.03…20.00	0.03… 10.00	0.01		0.8	1.6			

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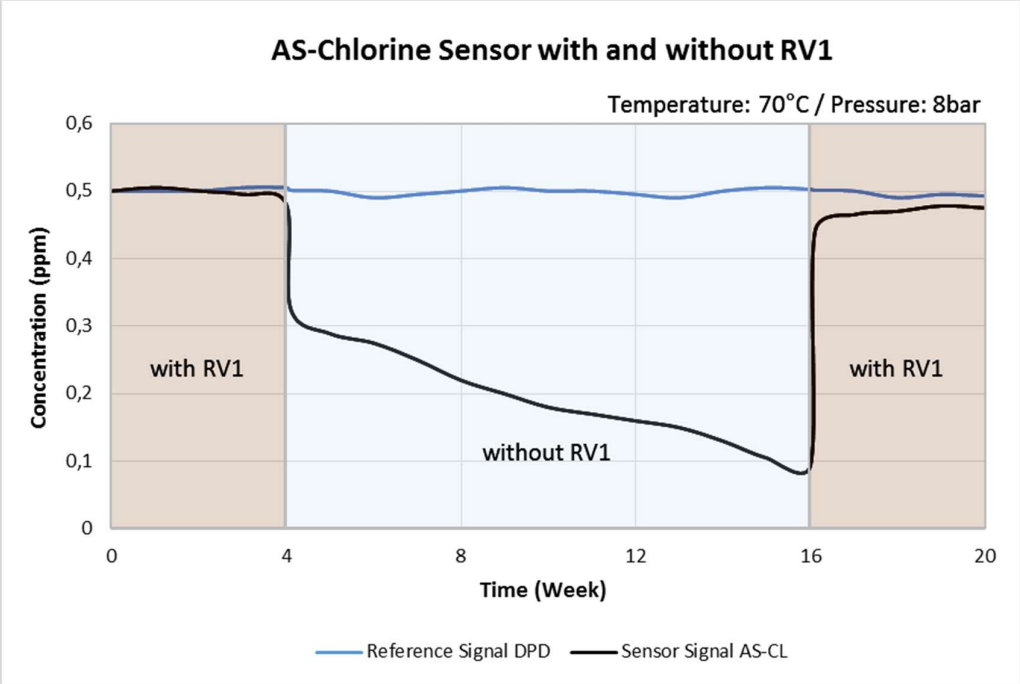
4.2 Electrical connection: 5 pole M12 plug-on flange

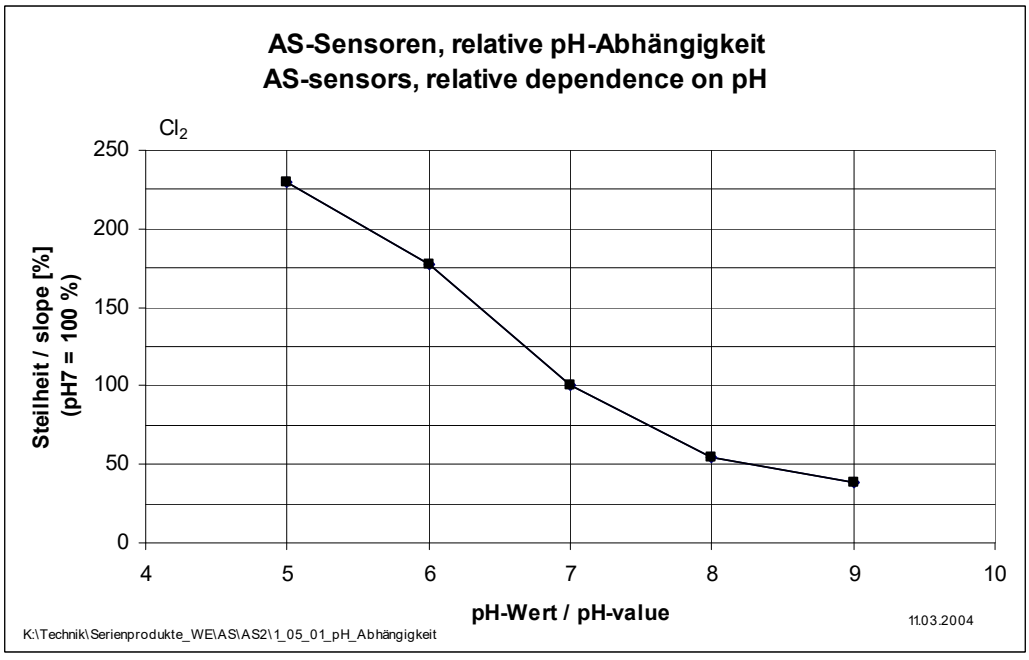
	**Measuring range in ppm**		**Resolution in ppm**	**Output Output resistance**	**Nominal slope in mA/ppm**		**Voltage supply**	**Galvanic isolation required in the measuring device/controller ***	**Connection**
	Without RV1	**with RV1**			**Without RV1**	**with RV1**			
AS2MA1-CD-M12	0.003… 1.000	0.003… 0.500	0.001		16.0	32.0			
AS2MA2-CD-M12	0.003… 2.000	0.003… 1.000	0.001		8.0	16.0			
AS2MA5-CD-M12	0.03… 5.00	0.03… 2.50	0.01		3.2	6.4			5-pole M12 plug-on flange
AS2MA20-CD-M12	0.03… 20.00	0.03… 10.00	0.01	4…20 mA	0.8	1.6	12…30 VDC		Function of wires:
AS3MA1-CD-M12	0.003… 1.000	0.003… 0.500	0.001	uncalibrated	16.0	32.0	R_L 50Ω…R_L 900Ω	yes	PIN1: n. c. PIN2: +U PIN3: -U PIN4: n c. PIN5: n. c.
AS3MA2-CD-M12	0.003… 2.000	0.003… 1.000	0.001		8.0	16.0			
AS3MA5-CD-M12	0.03… 5.00	0.03… 2.50	0.01		3.2	6.4			
AS3MA20-CD-M12	0.03… 20.00	0.03… 10.00	0.01		0.8	1.6			

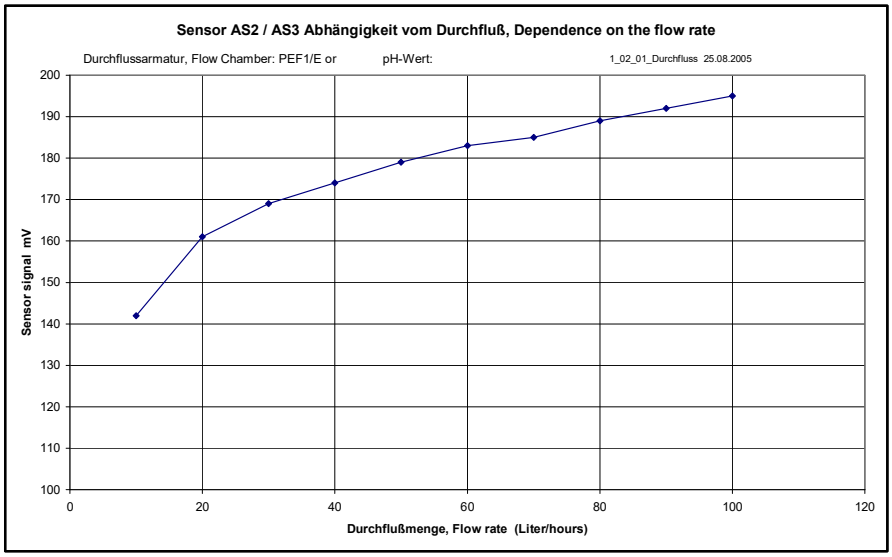
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(Subject to technical changes!)

Reiss GmbH
Eisleber Str. 5
D – 69469 Weinheim
Germany


AS-Chlorine Sensor with and without RV1
Temperature: 70°C / Pressure: 8bar
Concentration (ppm)
0,6
0,5
0,4
0,3
0,2
0,1
0
with RV1
without RV1
with RV1
0
4
8
12
16
20
Time (Week)
Reference Signal DPD
Sensor Signal AS-CL


AS-Sensoren, relative pH-Abhängigkeit
AS-sensors, relative dependence on pH
Cl2
Steilheit / slope [%]
(pH7 = 100 %)
250
200
150
100
50
0
4
5
6
7
8
9
10
pH-Wert / pH-value
11.03.2004
K:\Technik\Serienprodukte_WE\AS\AS2\1_05_01_pH_Abhängigkeit



(Subject to technical changes.)