

1004

ELECTRODES

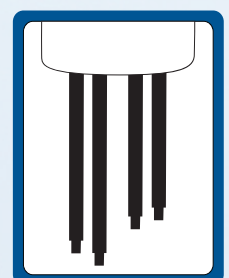
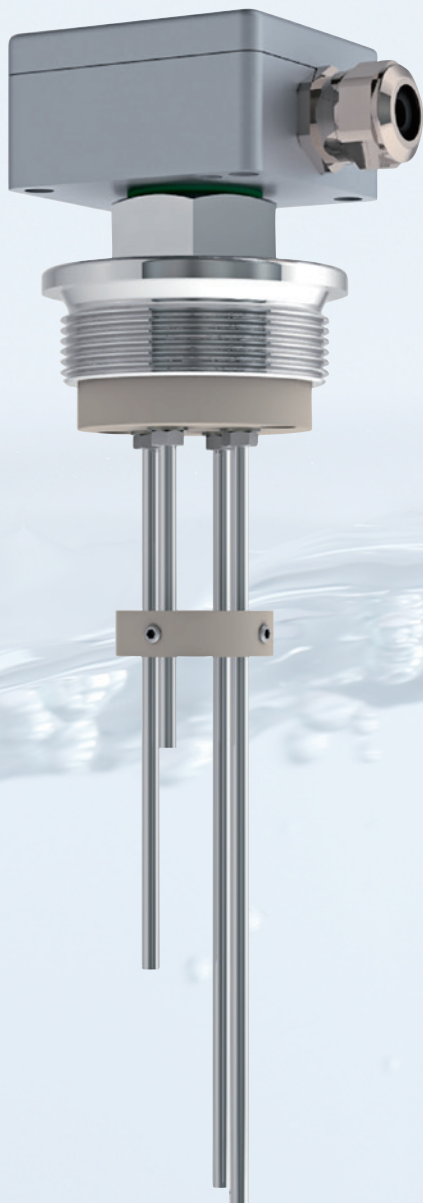
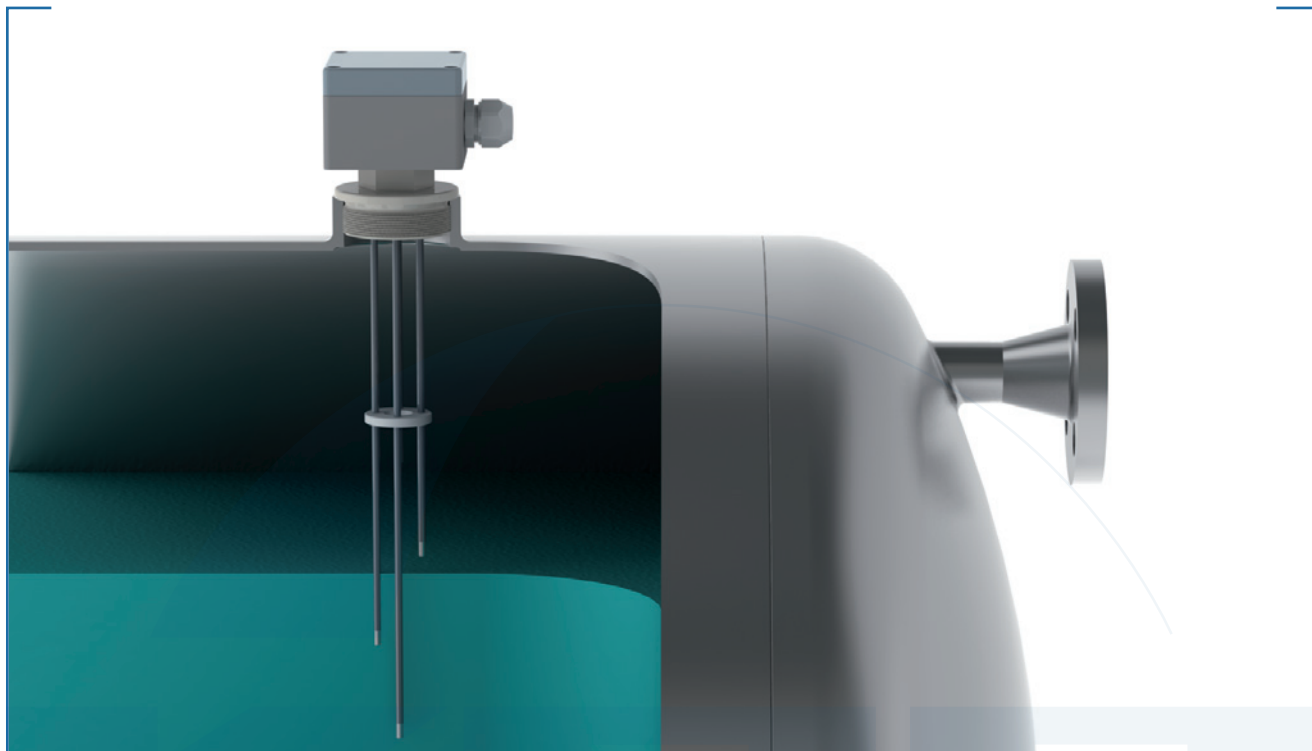


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Function description



Operating principle

Electrodes work according to the conductive principle in connection with filling level controllers (see chapter 1011). When the electrodes are immersed into an electrically conducting liquid, a control current will flow through the liquid. Via a measuring amplifier a switching contact will be activated by the controlling current. The current circuit is galvanically isolated from the mains and is operated by protective extra-low-voltage. In order to avoid an electrolytic effect on the electrodes, they are operated with alternating voltage. Depending on the types of electrodes and the filling level controllers in use these controls are suited for

- High level alarm
- Low level alarm
- Filling up and pumping dry
- Controlling with locking
- Valve opening / closing with locking and protection against dry running

Application

By the help of electrodes controlling may be applied in electrically conducting liquids like e.g. milk, fruit juices, beer, water, sewages, acids, alkaline solutions etc.

Areas of application

- Food industry
- Mechanical engineering
- Building of thermo systems
- Heating systems
- Domestic appliances
- Water treatment
- Vehicle manufacturing
- etc.

Advantages

- No mechanically moved parts
- Compact design
- Independent of specific weight
- Depending on the model, suitable for different types of pressure and temperatures
- Highly efficient cost-benefit ratio

Design limits

Design pressure:	-1 bar ... 60 bar
Design temperature:	-60°C ... 180°C

Electrodes / Type key

Code 1

Key 1 ... / ... / ... -	Key 2 ... / ... / ... -	Key 3 ... / ... / ... -
Electrical connection	Process connection material quality	Process connection
ALE Aluminium terminal box 64 x 58 x 34 mm	V Stainless steel	E Thread upwards, G/BSP
ALF Aluminium terminal box 80 x 75 x 57 mm	TI Titanium	R Thread downwards, G/BSP
ALG Aluminium terminal box 100 x 100 x 81 mm	HC Alloy C	ENPT Thread upwards, NPT
AVA Stainless steel terminal box Ø 82 x 110 mm	P PVC	RNPT Thread downwards, NPT
APA Polyester terminal box 80 x 75 x 55 mm	PP Polypropylene	EM Thread upwards, metric
ABA ABS terminal box 80 x 82 x 55 mm	PF PVDF	RM Thread downwards, metric
K Connection cable		FE Flange according to EN
K68 Connection cable IP68 (≥ G 3/8")		FA Flange according to ANSI
		F Flange according to ...
		FS Flange according to drawing
		OP Without process connection
		BK Aseptic blind cone according to DIN 11851
		BKN Aseptic blind cone according to DIN 11851 with groove nut
		BKD Aseptic blind cone according to DIN 32676
		BKND Aseptic blind cone according to DIN 32676 with groove nut

Code 2

Key 1 ... -	Key 1 ... -
Threaded connection	Aseptic cone
... Threaded connection size	... Nominal size

Code 2

Key 1.1 (only for flange) ... / ... / ... -	Key 1.2 (only for flange) ... / ... / ... -	Key 1.3 (only for flange) ... / ... / ... -
Flange connection	Flange connection	Flange connection
... Flange nominal bore	... Flange pressure rating	... Flange facing

Code 3

Key 1 ... / ... -	Key 2 ... / ... -
Electrodes material quality	Number of electrodes
V Stainless steel	1 1 piece
TI Titanium	2 2 pieces
HC Alloy C	3 3 pieces
	4 4 pieces
	5 5 pieces
	6 6 pieces

Example

Code	1	2	3
Key	1 / 2 / 3 -	1.1 / 1.2 / 1.3 -	1 / 2 -
Example	ALE / V / FE -	80 / 16 / B1 -	V / 5 -

Black = not possible according to Atex / Blue = possible according to Atex Exia / Blue¹ = possible according to Atex Exia and Exd / Black¹ = possible according to Atex Exd

Code 4

Key 1 ... / ... / ... / ... / ... - 1. Length of electrode	Key 2 ... / ... / ... / ... / ... - 2. Length of electrode	Key 3 ... / ... / ... / ... / ... - 3. Length of electrode
L... Length of electrode in mm	L... Length of electrode in mm	L... Length of electrode in mm

Code 4

Key 4 ... / ... / ... / ... / ... - 4. Length of electrode	Key 5 ... / ... / ... / ... / ... - 5. Length of electrode	Key 6 ... / ... / ... / ... / ... - 6. Length of electrode
L... Length of electrode in mm	L... Length of electrode in mm	L... Length of electrode in mm

Code 4

Key 7 ... / ... / ... / ... / ... - Diameter of electrode(s)
04 Ø 4 mm
10 Ø 10 mm

Code 5

Key 1 ... - Additional design
VE Adjustable version with cutting ring union
HD High pressure version

Code 6

Key 1 ... / ... / ... - Length of cable	Key 2 ... / ... / ... - Connection cable	Key 3 ... / ... / ... - Connection cable option
... Length of cable in meter	PVC PVC connection cable SIL Silicone connection cable PUR PUR connection cable	KA Shielded KB Shielded / oil-resistant KC Shielded / oil-resistant / halogen-free KD Oil-resistant KE Oil-resistant / halogen-free KF Halogen-free

Code 7

Key 1 ... - Approvals
PEDII According to PED 97/23/EC, category II
PEDIV According to PED 97/23/EC, category IV

Example

4	5	6	7	Code
1 / 2 / 3 / 4 / 5 / 6 / 7 -	1 -	1 / 2 / 3 -	1	Key
L100 / L200 / L300 / L400 / L500 /	04 -	VE -	1 / PVC / KA -	Example

Black = not possible according to Atex / Blue = possible according to Atex Exia / Blue¹ = possible according to Atex Exia and Exd / Black¹ = possible according to Atex Exd

Type

K/V/R-1/4-V/1-L../04-../PVC

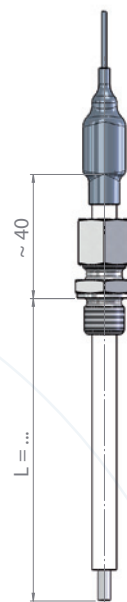
Material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)
Electrical connection:	Connection cable
Ambient temperature	
- with PVC connection cable:	-5°C ... 80°C
- with Silicone connection cable:	-5°C ... 100°C
- with PUR connection cable:	-5°C ... 80°C
Process connection:	G 1/4"
Process connection material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)

Electrode

Diameter of electrode(s):	Ø 4 mm / with insulation Ø 8 mm
Solid:	-
Length of electrode(s):	≤ 3000 mm
Number of electrodes:	1 piece
Insulation:	PTFE
Thickness of insulation:	2 mm
Adjustable:	-

Design pressure:	0 bar ... 1 bar
Design temperature:	-5°C ... 100°C
Ingress protection class:	IP 55

Conductive level controller:	Control units 1011 / 7201...
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Type

K/V/R-1/4-V/1-L../04-VE../PVC

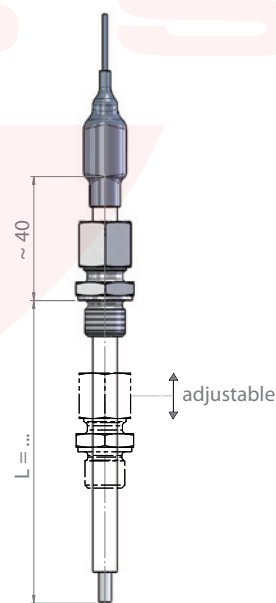
Material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)
Electrical connection:	Connection cable
Ambient temperature	
- with PVC connection cable:	-5°C ... 80°C
- with Silicone connection cable:	-5°C ... 100°C
- with PUR connection cable:	-5°C ... 80°C
Process connection:	G 1/4"
Process connection material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)

Electrode

Diameter of electrode(s):	Ø 4 mm / with insulation Ø 8 mm
Solid:	Yes
Length of electrode(s):	≤ 3000 mm
Number of electrodes:	1 piece
Insulation:	PTFE
Thickness of insulation:	2 mm
Adjustable:	Yes

Design pressure:	0 bar ... 1 bar
Design temperature:	-5°C ... 100°C
Ingress protection class:	IP 55

Conductive level controller:	Control units 1011 / 7201...
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The electrodes are based on a modular design and can be arranged individually.

Type key page 142 - 143

Type **K/V/R-3/8-V/1-L../10-../PVC**

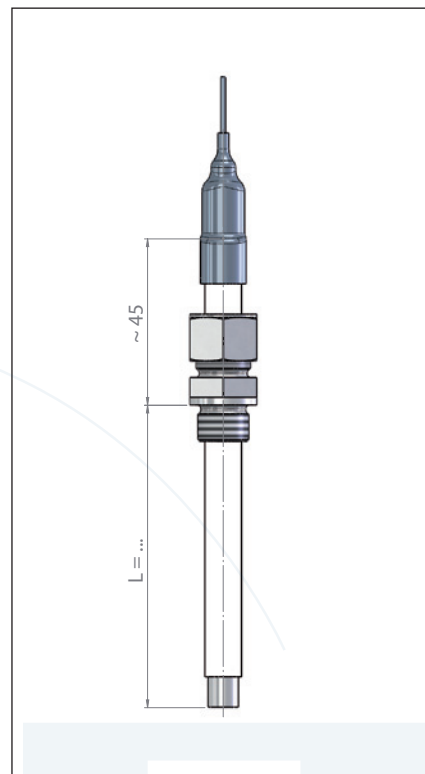
Material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)
Electrical connection:	Connection cable
Ambient temperature	
- with PVC connection cable:	-5°C ... 80°C
- with Silicone connection cable:	-5°C ... 100°C
- with PUR connection cable:	-5°C ... 80°C
Process connection:	G 3/8"
Process connection material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)

Electrode

Diameter of electrode(s):	Ø 10 mm / with insulation Ø 12 mm
Solid:	-
Length of electrode(s):	≤ 3000 mm
Number of electrodes:	1 piece
Insulation:	PTFE
Thickness of insulation:	1 mm
Adjustable:	-

Design pressure:	0 bar ... 1 bar
Design temperature:	-5°C ... 100°C
Ingress protection class:	IP 55

Conductive level controller:	Control units 1011 / 7201...
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**Type** **K/V/R-3/8-V/1-L../10-VE../PVC**

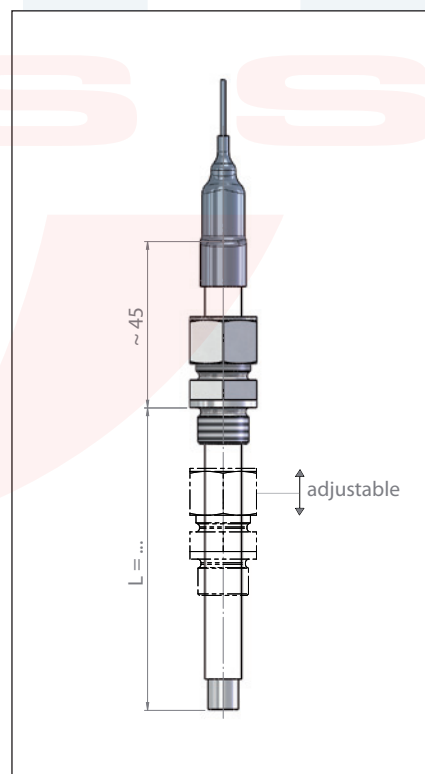
Material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)
Electrical connection:	Connection cable
Ambient temperature	
- with PVC connection cable:	-5°C ... 80°C
- with Silicone connection cable:	-5°C ... 100°C
- with PUR connection cable:	-5°C ... 80°C
Process connection:	G 3/8"
Process connection material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)

Electrode

Diameter of electrode(s):	Ø 10 mm / with insulation Ø 12 mm
Solid:	-
Length of electrode(s):	≤ 3000 mm
Number of electrodes:	1 piece
Insulation:	PTFE
Thickness of insulation:	1 mm
Adjustable:	Yes

Design pressure:	0 bar ... 1 bar
Design temperature:	-5°C ... 100°C
Ingress protection class:	IP 55

Conductive level controller:	Control units 1011 / 7201...
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The electrodes are based on a modular design and can be arranged individually.

Type key page 142 - 143

Type

K/V/R-1/2-V/1-L../10-../PVC

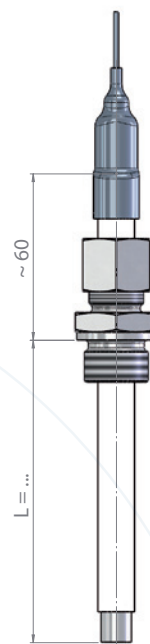
Material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)
Electrical connection:	Connection cable
Ambient temperature	
- with PVC connection cable:	-5°C ... 80°C
- with Silicone connection cable:	-5°C ... 100°C
- with PUR connection cable:	-5°C ... 80°C
Process connection:	G 1/2"
Process connection material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)

Electrode

Diameter of electrode(s):	Ø 10 mm / with insulation Ø 12 mm
Solid:	-
Length of electrode(s):	≤ 3000 mm
Number of electrodes:	1 piece
Insulation:	PTFE
Thickness of insulation:	1 mm
Adjustable:	-

Design pressure:	0 bar ... 1 bar
Design temperature:	-5°C ... 100°C
Ingress protection class:	IP 55

Conductive level controller:	Control units 1011 / 7201...
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Type

K/V/R-1/2-V/1-L../10-VE../PVC

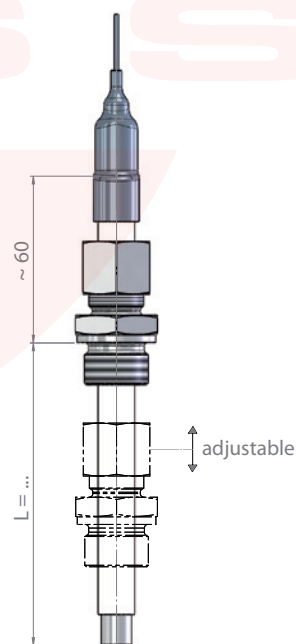
Material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)
Electrical connection:	Connection cable
Ambient temperature	
- with PVC connection cable:	-5°C ... 80°C
- with Silicone connection cable:	-5°C ... 100°C
- with PUR connection cable:	-5°C ... 80°C
Process connection:	G 1/2"
Process connection material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)

Electrode

Diameter of electrode(s):	Ø 10 mm / with insulation Ø 12 mm
Solid:	Yes
Length of electrode(s):	≤ 3000 mm
Number of electrodes:	1 piece
Insulation:	PTFE
Thickness of insulation:	1 mm
Adjustable:	Yes

Design pressure:	0 bar ... 1 bar
Design temperature:	-5°C ... 100°C
Ingress protection class:	IP 55

Conductive level controller:	Control units 1011 / 7201...
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The electrodes are based on a modular design and can be arranged individually.

Type key page 142 - 143

Type

APA/V/R-3/8-V/1-L../10

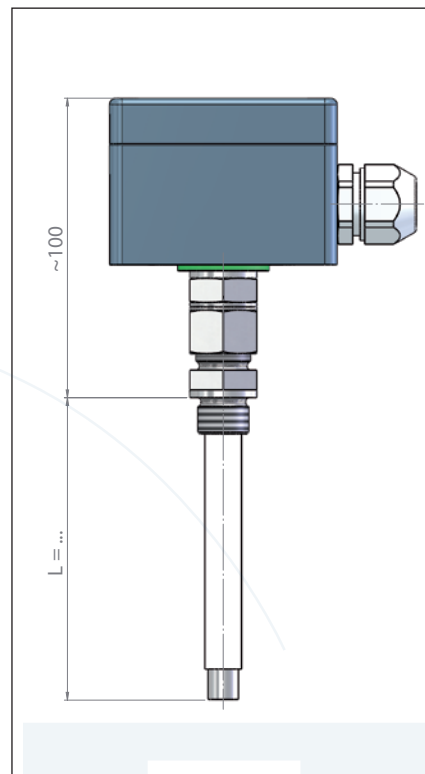
Material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)
Electrical connection:	Polyester terminal box
Ambient temperature:	-10°C ... 100°C
Cable entry:	M20 x 1.5
Process connection:	G 3/8"
Process connection material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)

Electrode

Diameter of electrode(s):	Ø 10 mm / with insulation Ø 12 mm
Solid:	-
Length of electrode(s):	≤ 3000 mm
Number of electrodes:	1 piece
Insulation:	PTFE
Thickness of insulation:	1 mm
Adjustable:	-

Design pressure:	0 bar ... 1 bar
Design temperature:	-5°C ... 100°C
Ingress protection class:	IP 65

Conductive level controller:	Control units 1011 / 7201...
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Type

ALE/V/R-1/2-V/1-L../10-HD

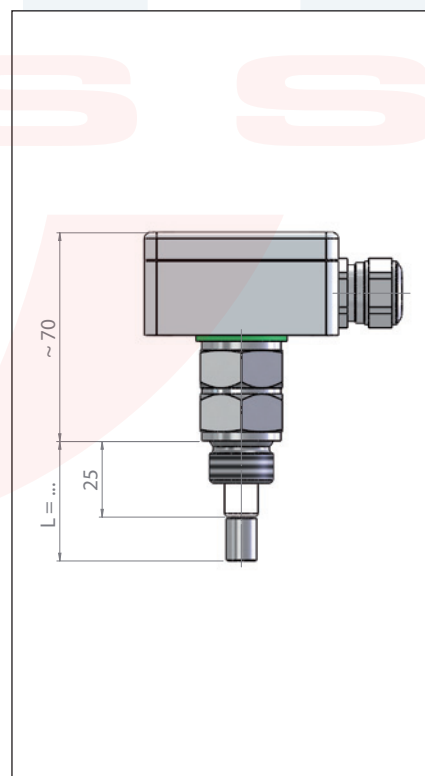
Material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)
Electrical connection:	Aluminium terminal box
Ambient temperature:	-10°C ... 100°C
Cable entry:	M20 x 1.5
Process connection:	G 1/2"
Process connection material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)

Electrode

Diameter of electrode(s):	Ø 10 mm
Solid:	-
Length of electrode(s):	≤ 1000 mm
Number of electrodes:	1 piece
Insulation:	ceramic
Thickness of insulation:	-
Adjustable:	-

Design pressure:	0 bar ... 60 bar
Design temperature:	-5°C ... 150°C
Ingress protection class:	IP 65

Conductive level controller:	Control units 1011 / 7201...
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The electrodes are based on a modular design and can be arranged individually.

Type key page 142 - 143

Type

APA/PP/R-1½-V/3-L../L../L../04

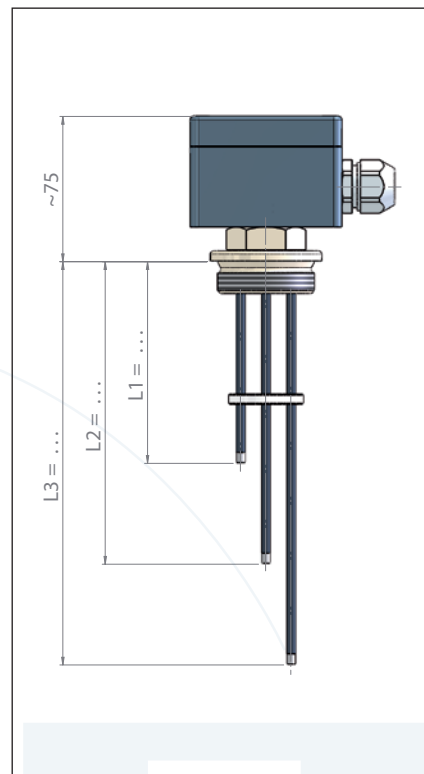
Material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)
Electrical connection:	Polyester terminal box
Ambient temperature:	-10°C ... 100°C
Cable entry:	M20 x 1.5
Process connection:	G 1½"
Process connection material quality:	Polypropylene

Electrode

Diameter of electrode(s):	Ø 4 mm / with insulation Ø 6 mm
Solid:	-
Length of electrode(s):	≤ 3000 mm
Number of electrodes:	3 pieces
Insulation:	Polyolefin
Thickness of insulation:	1 mm
Adjustable:	-

Design pressure:	0 bar ... 1 bar
Design temperature:	-5°C ... 80°C
Ingress protection class:	IP 65

Conductive level controller:	Control units 1011 / 7201...
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Type

APA/PP/R-2-V/5-L../L../L../L../04

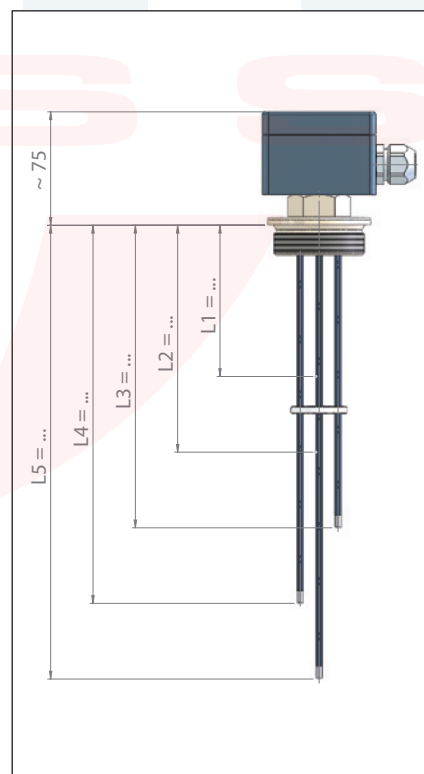
Material quality:	1.4404 / 1.4435 / 1.4571 (316L / 316Ti)
Electrical connection:	Polyester terminal box
Ambient temperature:	-10°C ... 100°C
Cable entry:	M20 x 1.5
Process connection:	G 2"
Process connection material quality:	Polypropylene

Electrode

Diameter of electrode(s):	Ø 4 mm / with insulation Ø 6 mm
Solid:	-
Length of electrode(s):	≤ 3000 mm
Number of electrodes:	5 pieces
Insulation:	Polyolefin
Thickness of insulation:	1 mm
Adjustable:	-

Design pressure:	0 bar ... 1 bar
Design temperature:	-5°C ... 80°C
Ingress protection class:	IP 65

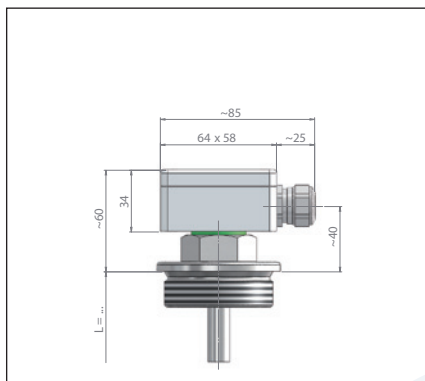
Conductive level controller:	Control units 1011 / 7201...
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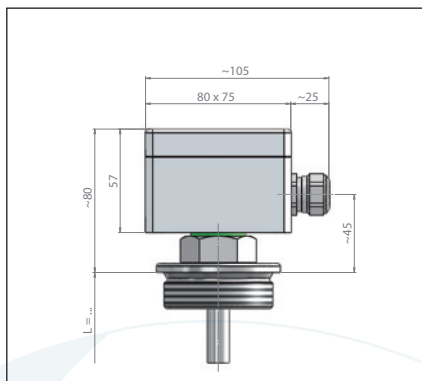
The electrodes are based on a modular design and can be arranged individually.

Type key page 142 - 143

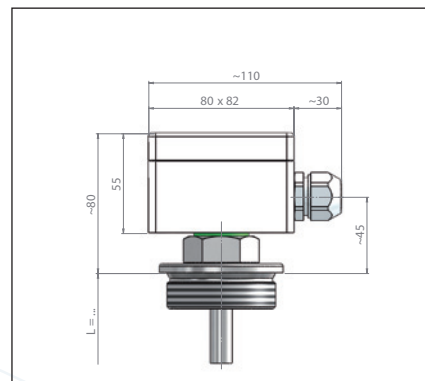
Electrical connection



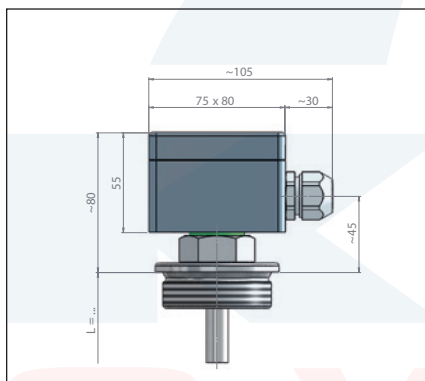
Connection type: ALE
Material quality: Aluminium coated RAL 7001
Cable entry: M20 x 1.5
Ingress protection class: IP 65
Ambient temperature: -40°C ... 100°C



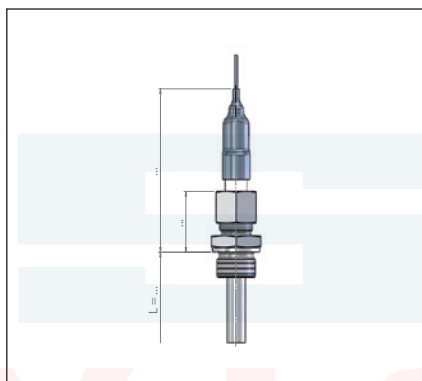
Connection type: ALF
Material quality: Aluminium coated RAL 7001
Cable entry: M20 x 1.5
Ingress protection class: IP 65
Ambient temperature: -40°C ... 100°C



Connection type: ABA
Material quality: ABS
Cable entry: M20 x 1.5
Ingress protection class: IP 65
Ambient temperature: -10°C ... 80°C



Connection type: APA
Material quality: Polyester
Cable entry: M20 x 1.5
Ingress protection class: IP 65
Ambient temperature: -10°C ... 100°C



Connection type: K
Material quality: According as cable type
Cable entry: PG or metric
Ingress protection class: IP 55 (optional IP 68)
Ambient temperature: -65°C ... 200°C

The electrodes are based on a modular design and can be arranged individually.

Type key page 142 - 143