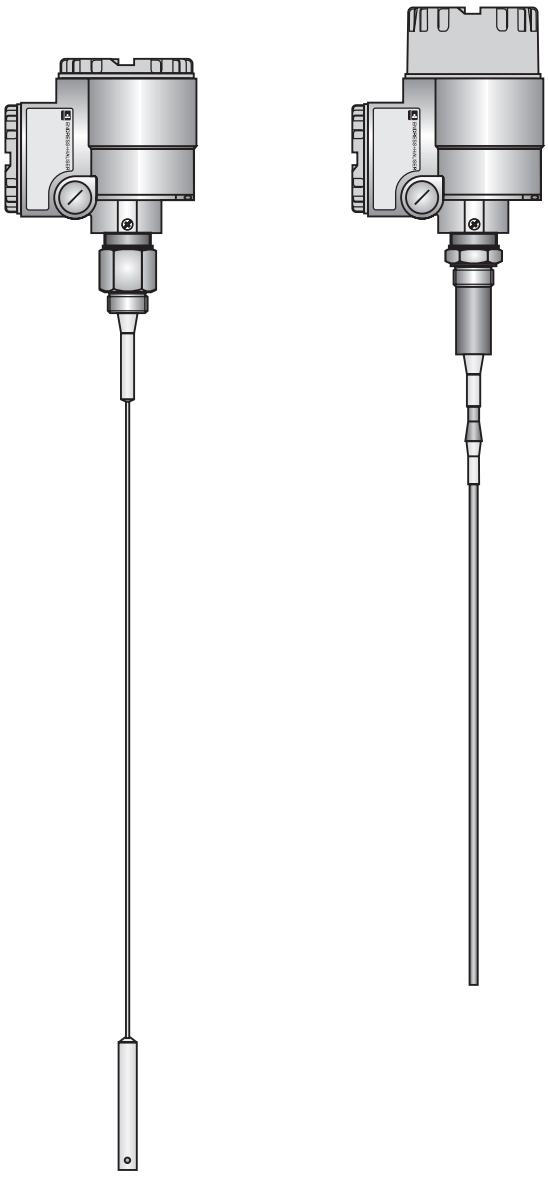
Technical
Information
TI 243F/00/en

Level Probes
multicap DC 11/16/21/26 AN
multicap DC 11/16/21/26 AS

Fully and partially insulated rod and rope probes for capacitive level measurement and limit detection (North American certificates)



Application
Multicap probes are designed for continuous level measurement and limit detection, primarily in liquids. The DC 11 and DC 16 rod probes are also suitable for use in light bulk solids.

The probe rod or probe rope and insulation are made of corrosion-resistant materials able to withstand extremely aggressive products. The tried-and-tested rugged construction is gas-tight for pressure from vacuum to 1450 psi. Seal and insulation materials enable probes to be used at operating temperatures in the vessel of -110°F to +390°F.

Features and Benefits
Certificates from many North American approval authorities
= the probes have universal use

Versions for a wide range of applications
= ideally adapted to your application at a cost effective price

Screened against condensation in the nozzle
= reliable function even with condensation

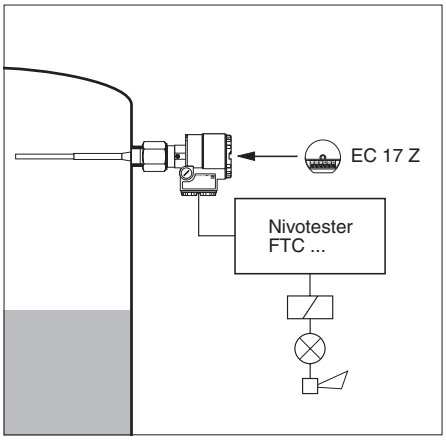
Active build-up compensation for limit detection
= steady and accurate switchpoint even with heavy contamination on the probe, no cleaning or recalibration

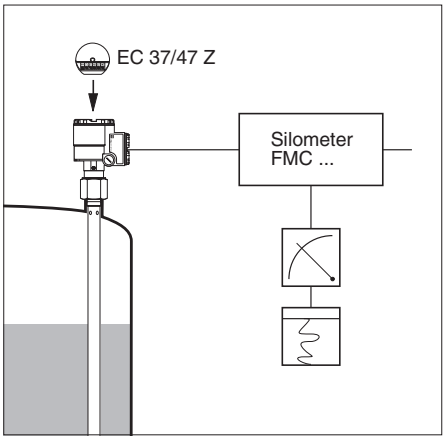
Endress+Hauser
The Power of Know How

Measuring System

Left: Limit detection with separate Nivotester switching unit

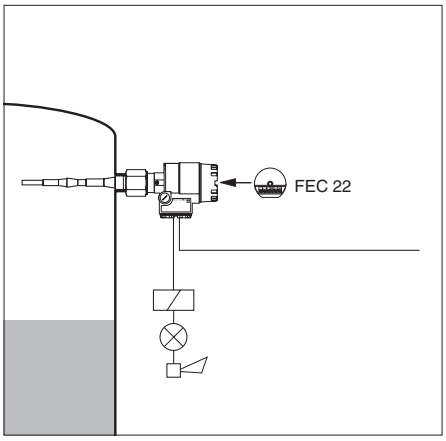
Right: Level measurement with separate Silometer transmitter

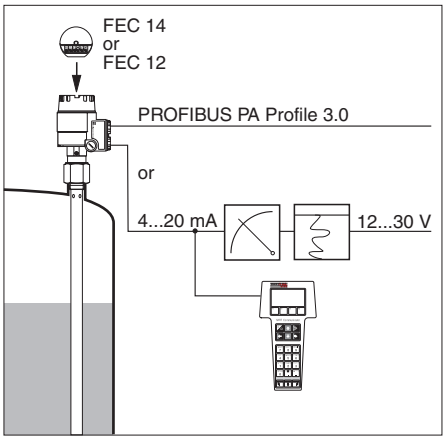




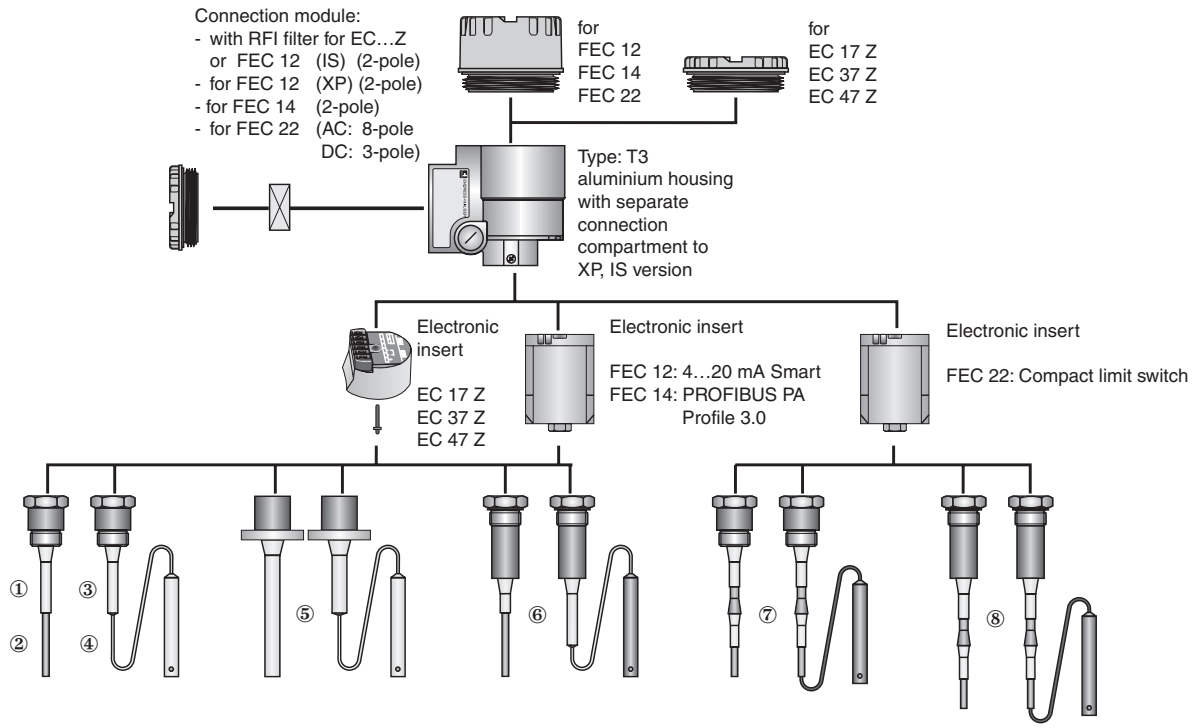
Left: Compact level switch with relay or transistor output

Right: Compact level measurement system with standard 4…20 mA current output and superimposed communications signal.
FEC 12: "Smart electronic insert" which allows remote calibration over two-wire cabling (HART protocol)
FEC 14: Communication and commissioning with PROFIBUS PA





Probe Selection



① DC 11 **AN** with fully insulated rod
② DC 16 **AN** with partially insulated rod
③ DC 21 **AN** with fully insulated rope
④ DC 26 **AN** with partially insulated

⑤ DC 11, 21 **AS** with *fully insulated* screening against condensation or material build-up at the process connection

⑥ DC 11, 16, 21, 26 **AS** with *uninsulated* screening against condensation or material build-up at the process connection

⑦ DC 11, 16, 21, 26 **AS** with active compensation of conductive material build-up at the probe

⑧ DC 11, 16, 21, 26 **AS** uninsulated screening and active build-up compensation

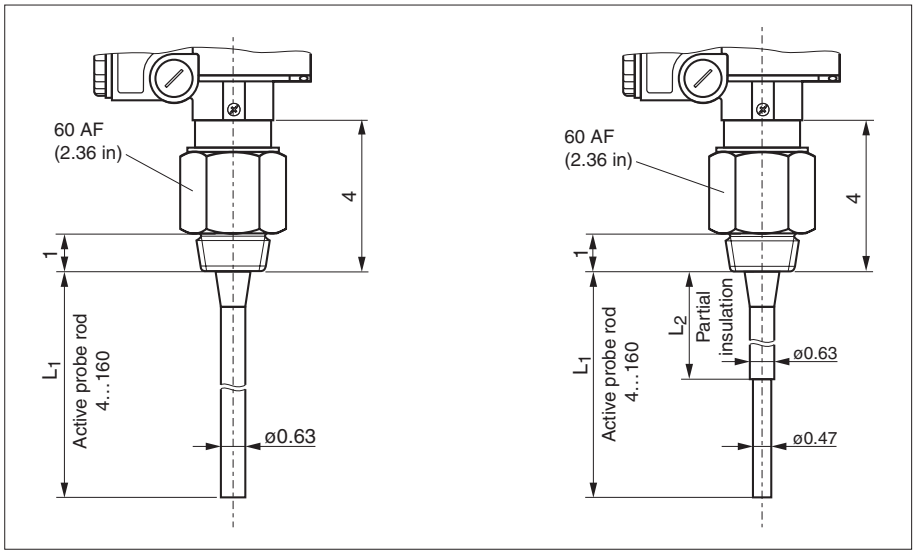
Not shown: Rod probes DC 11, 16 AN and AS with ground tube; not for probes with active build-up compensation

Dimensions

DC 11/16/21/26 AN

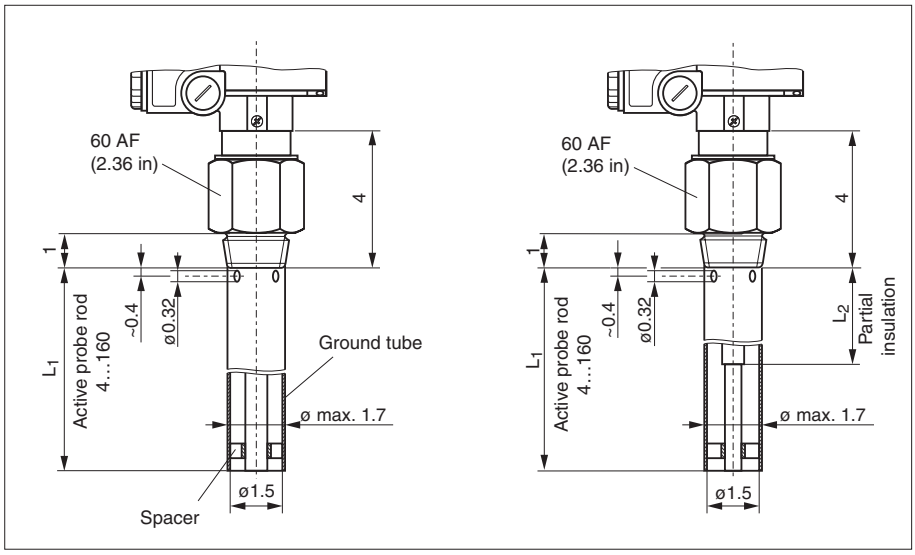
All dimensions in inches.
Threaded process connections: 1½ - 11½ NPT
see Page 6 for other process connections and housing dimensions

L1 = Length of active probe rod or probe rope
L2 = Length of partial insulation
minimum: 3 in
maximum: length L1 minus 2 in



Left: DC 11 AN,
fully insulated rod probe

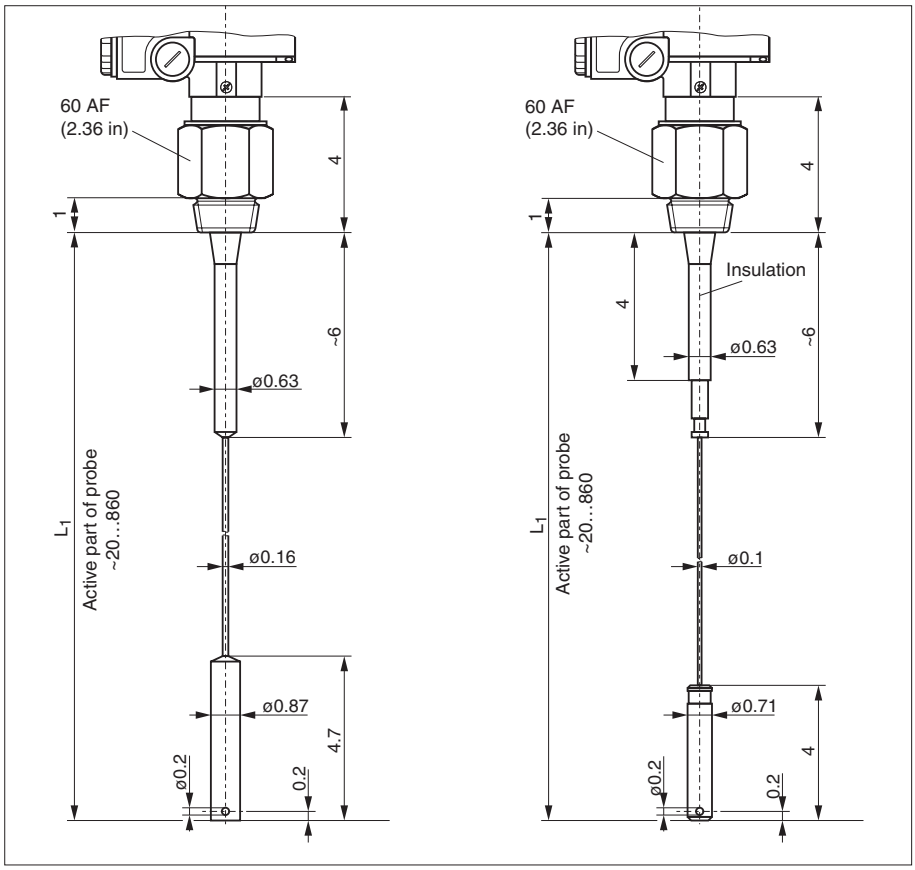
Right: DC 16 AN,
partially insulated rod probe



Left: DC 11 AN,
fully insulated rod probe
with ground tube

Right: DC 16 AN,
partially insulated rod probe
with ground tube

Spacers
every 40 in, of PFA



Left: DC 21 AN,
fully insulated rope probe

Right: DC 26 AN,
partially insulated rope probe

Tensioning weight always
with anchor hole

Dimensions

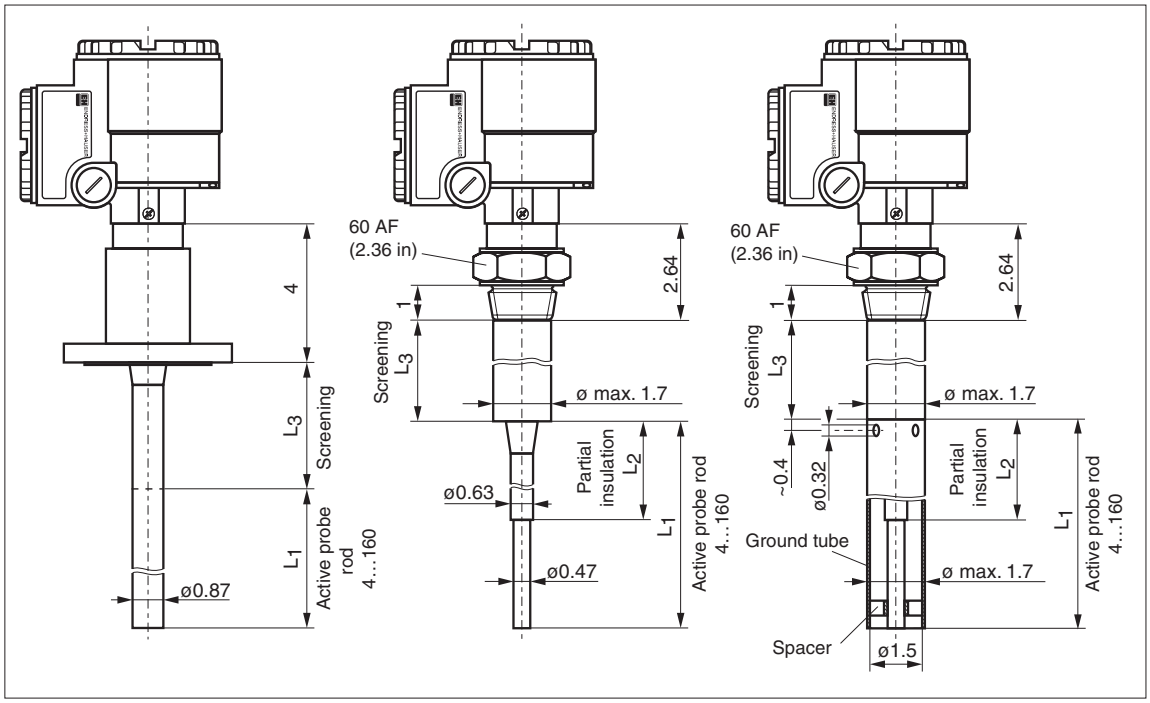
DC 11/16/21/26 AS

All dimensions in inches.
Threaded process connections 1½ - 11½ NPT

Probe with screening L3 against condensation and material build-up at the process connection
(inactive section)

see Page 6 for other process connections

L1 = Length of active probe rod or probe rope
L2 = Length of partial insulation
minimum: 3 in
maximum: length L1 minus 2 in

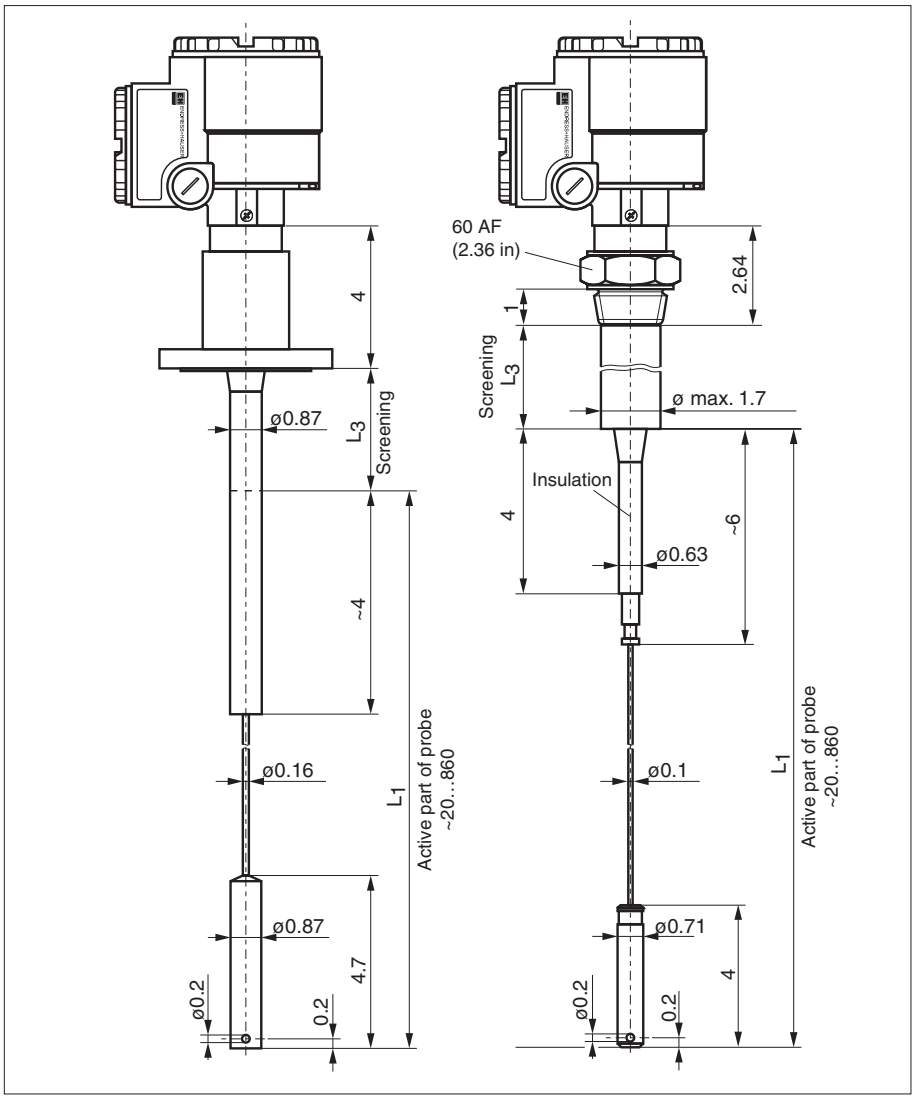


Above left:: DC 11 AS, fully insulated rod probe with **fully** insulated screening and plastic coated flange

Above, centre and right: rod probes with uninsulated screening, with partially insulated rod with full insulation also available:

DC 11 AS, ully insulated
DC 16 AS, partially insulated

With ground tube
DC 11 AS, fully insulated
DC 16 AS, partially insulated



Left: DC 21 AS, fully insulated rope probe with **fully** insulated screening and plastic coated flange

Right: DC 26 AS, partially insulated rope probe with uninsulated screening, uninsulated rope and uninsulated tensioning weight (as shown)

With fully insulated active section this probe is designated DC 21 AS

L3
The screening (protection against condensation) is available in three standard lengths:
L3 = 6 in
L3 = 9 in
L3 = 20 in

Other lengths on request
L3 min. 4 in
L3 max. 160 in (uninsulated screening)
L3 max. 80 in (fully insulated screening)

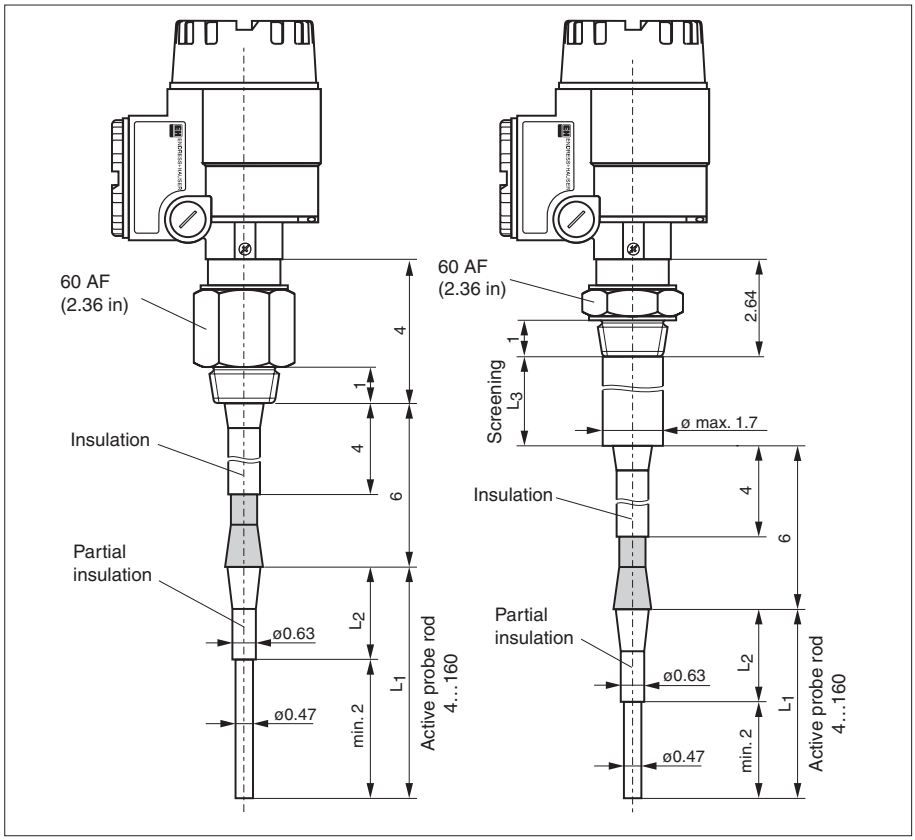
Dimensions

DC 11/16/21/26 AS
Continued

All dimensions in inches.
Threaded process connections: 1½ - 11½ NPT

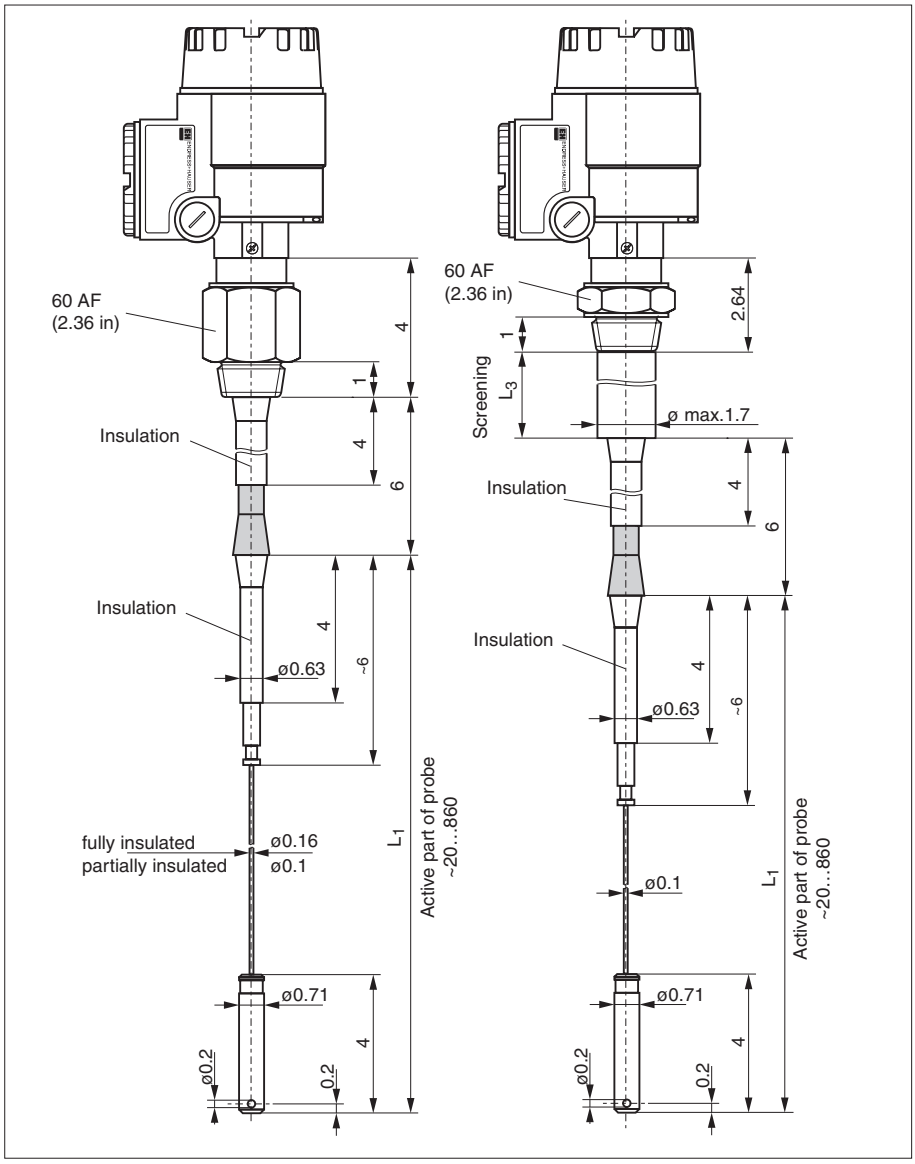
Probes with active build-up compensation
(for limit detection, length always 6 in)

Partially insulated probes shown but fully insulated probes also available where the active part of build-up compensation is always uninsulated. Not available with ground tube.



Left: Rod probe
DC 11 AS
(fully insulated) or
DC 16 AS
(partially insulated)

Right: active build-up compensation combined with screening L3



Left: Rope probe
DC 21 AS
(fully insulated)
or DC 26 AS
(partially insulated)

Right: active build-up compensation combined with screening L3

L3
The screening (protection against condensation) is available in three standard lengths:
L3 = 6 in
L3 = 9 in
L3 = 20 in

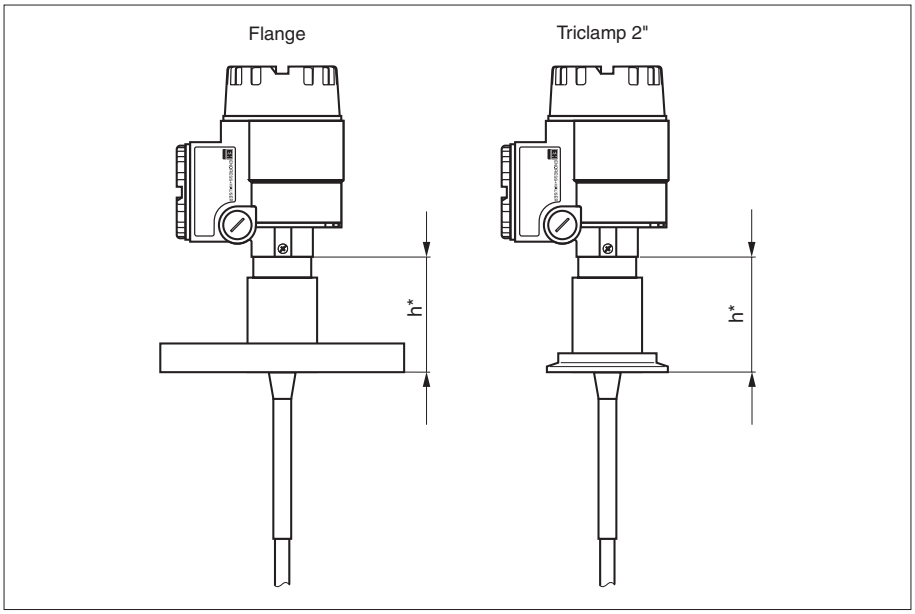
Other lengths on request
L3 min. 4 in
L3 max. 160 in

Additional Process Connections and Accessories

Other process connections:
- Flange
- Triclamp 2"

*h = 4 in for probes
- DC…AN
- DC…AS with fully insulated screening (protection against condensation)
- DC…AS with active build-up condensation

*h = 1.85 in for probes
- DC…AS with uninsulated screening (protection against condensation)
- DC…AS with uninsulated screening and active build-up compensation



Addtional equipment:

A Temperature spacer for probes
- DC…AN
- DC…AS with fully insulated screening (protection against condensation)
- DC…AS with active build-up condensation

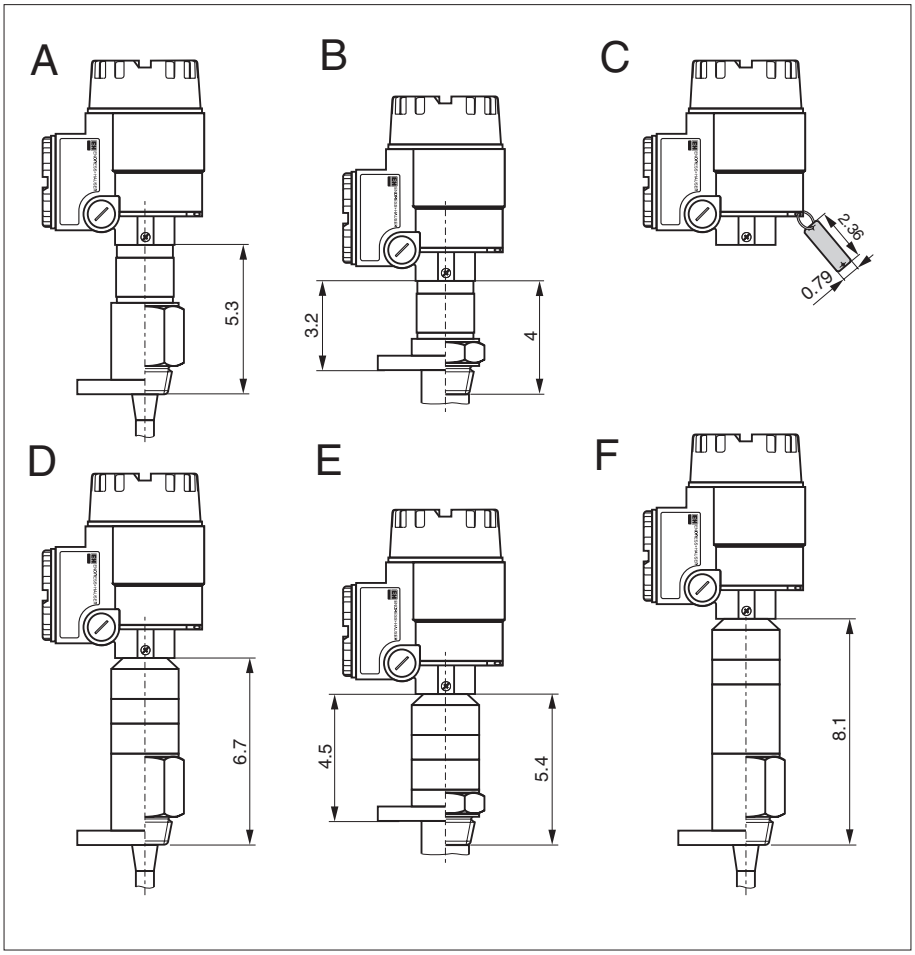
B Temperature spacer for probes
- DC…AS with uninsulated screening (protection against condensation)
- DC…AS with uninsulated screening and active build-up compensation

C Corrosion-resistant steel tag

D Gas-tight gland for probes
- DC…AN
- DC…AS with active build-up condensation

E Gas-tight gland for probes
- DC…AS with uninsulated screening (protection against condensation)
- DC…AS with uninsulated screening and active build-up compensation

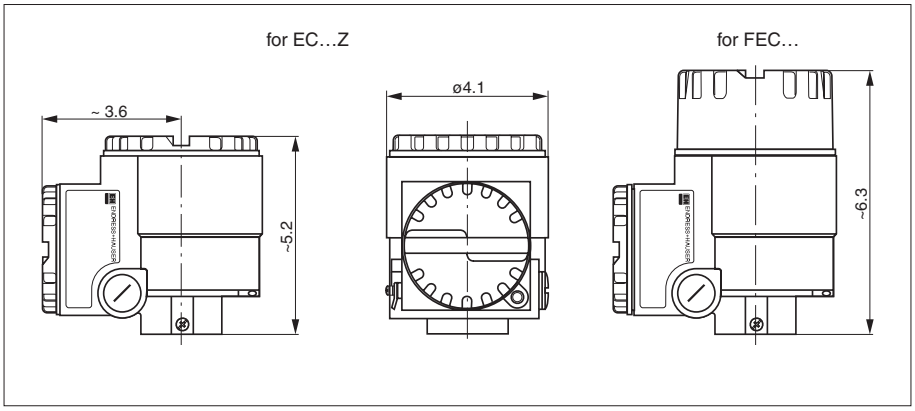
F Gas-tight gland for probes
- DC…AS with fully insulated screening (protection against condensation)



Housing Dimensions

Housings in aluminium (Type T3) with separate connection compartment;
- RFI filter with small electronic inserts EC 17 Z, EC 37 Z, EC 47 Z and FEC 12 (IS),
- safety barriers with FEC 12 (XP).
- terminal connection module for FEC 22

With low cover for small electronic inserts EC...Z, with raised cover for electronic inserts FEC 12, FEC 14, FEC 22 with two cable entries, one sealed with a blind plug



Technical Data

General information

Manufacturer	Endress+Hauser GmbH+Co. D-79689 Maulburg
Instrument family	Multicap
Instrument types	DC 11, 16, 21, 26 AN / AS
Function	Probes for capacitive level measurement and limit detection

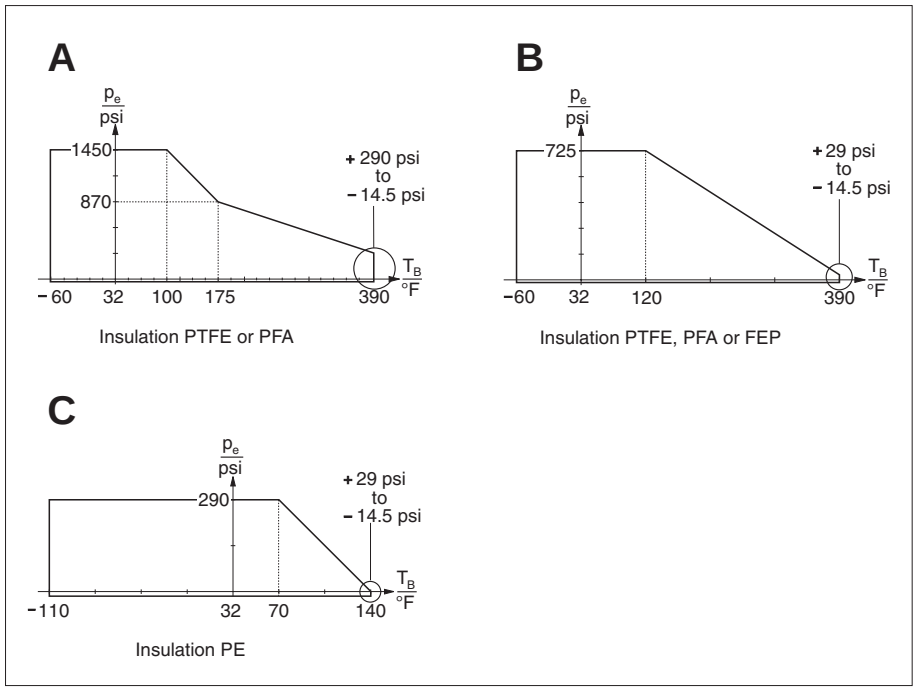
Operating data

Operating pressure	to 1450 psi depending on material - see below
Operating temperature	to 390 °F, depending on material - see below
Testing pressure	to 2175 psi / temperature 70 °F by repetitive test as requested

Permitted operating pressures p_e and temperatures T_B

The graph **A do not** applys to:
- DC 21 AN / DC 21 AS,
- DC 26 AN / DC 26 AS,
- probes with active build-up compensation,
- probes with fully insulated screening.

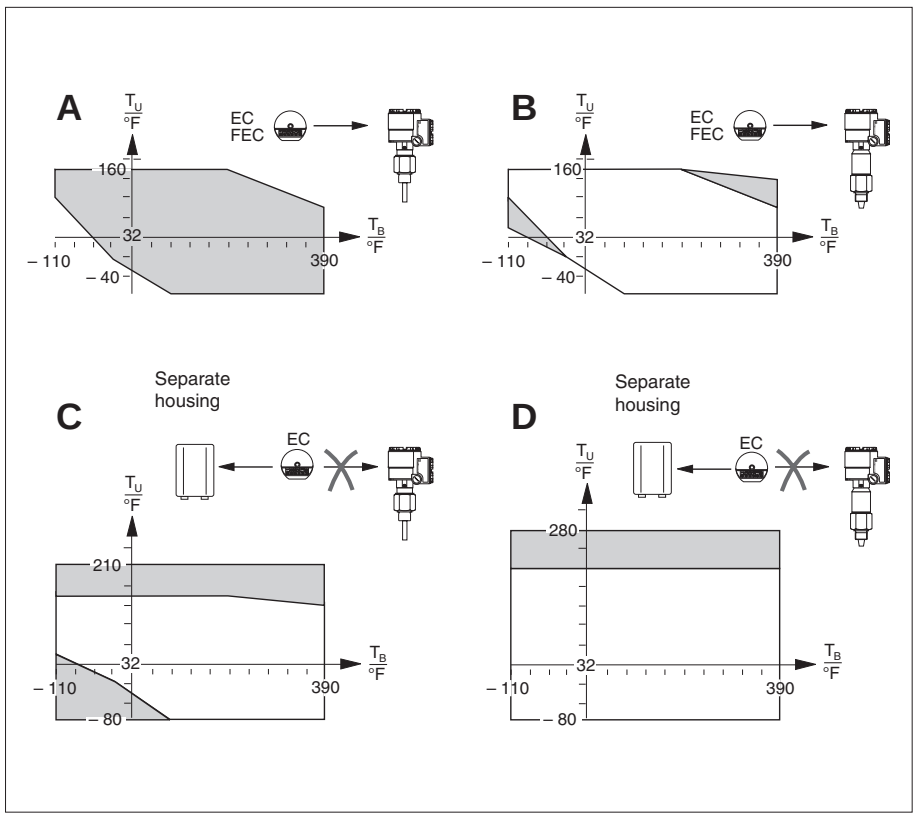
The graph **B** applys to:
- DC 21 AN / DC 21 AS,
- DC 26 AN / DC 26 AS,
- probes with active build-up compensation,
- probes with fully insulated screening.



Mounting of the electronic insert as a function of operating temperature T_B and ambient temperature T_U:
- A Probe without temperature spacer
- B Probe with temperature spacer or gas-tight gland
- C Electronic insert in separate housing
- D Probe with temperature spacer or gas-tight gland and electronic insert in separate housing

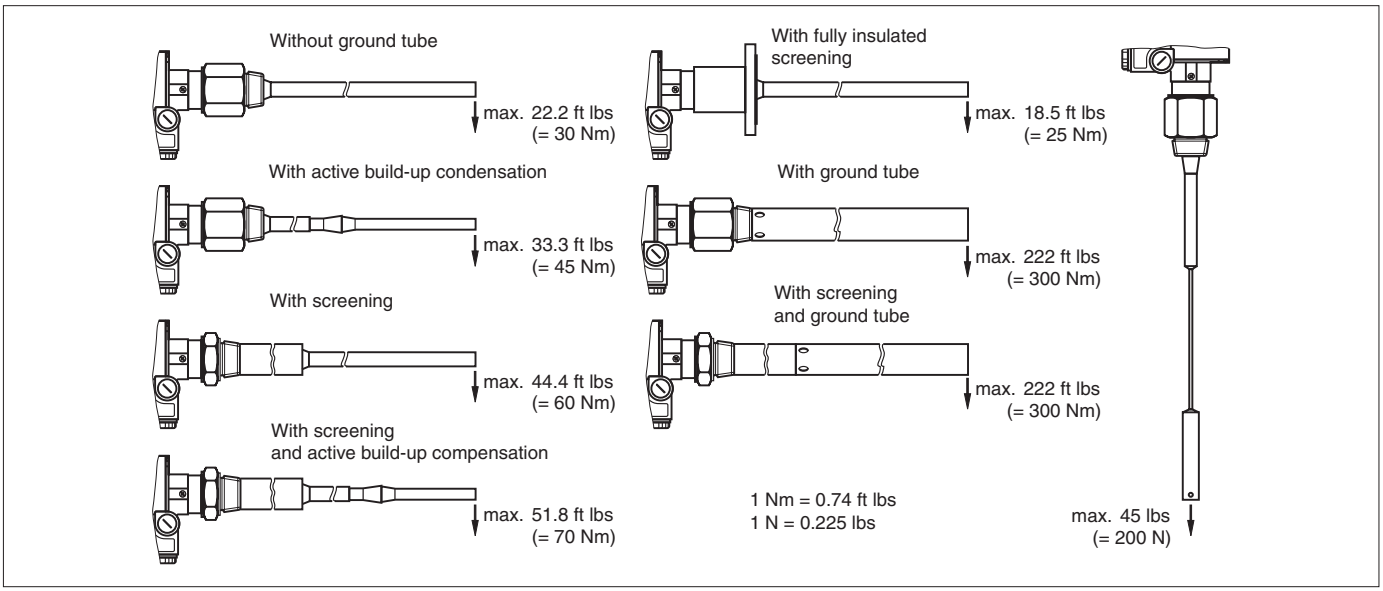
The graphs A and B apply to **all** electronic inserts.

The graphs C and D apply to the small electronic inserts EC 17 Z, EC 37 Z, EC 47 Z



Other Operating Data

Lateral load on the probe rod	see below
Strain on the probe rope	45 lbs at 70 °F, static



Permissible lateral load
on the probes

Probe lengths

Total length of a´rod probe	min. 4 in, max. 230 in, see dimensions
Total length of a rope probe	min. 20 in, max. 1020 in, see dimensions

Capacitance values of the probe

Basic capacitance	approx. 30 pF
Temperature spacer	approx. 20 pF
Air-tight entry	approx. 20 pF
Active build-up compensation	approx. 10 pF

Additional capacitances

Probe 10 in from a conductive vessel wall	insulated probe rod	in air approx. 0.33 pF/in, in water approx. 9.5 pF/in
	uninsulated probe rod	in air approx. 0.33 pF/in
	insulated probe rope	in air approx. 0.25 pF/in, in water approx. 5 pF/in
	unisulated probe rope	in air approx. 0.25 pF/in
	insulated tensioning weight	in air approx. 2 pF in water approx. 60 pF
	uninsulated tensioning weight	in air approx. 2 pF
Rod probe in ground tube	insulated probe rod	in air approx. 1.4 pF/in, in water approx.8.8 pF/in
	uninsulated probe rod	in air approx. 1.3 pF/in
Uninsulated screening	approx. 0.8 pF/in	
Fully insulated screening	approx. 1.5 pF/in	

Probe lengths for continuous measurement in conducting liquids

EC with $C_{max.}$ = 2000 pF (EC 47 Z, FEC 12)	rope probe up to 315 in (up to 1020 in in non-conducting liquids) rod probe up to 230 in
EC with $C_{max.}$ = 4000 pF (EC 37 Z)	rope probe up to 780 in (up to 1020 in in non-conducting liquids) rod probe up to 230 in

Other Operating Data

Accuracy

Length tolerances	up to 40 in:	+0 in,	–0.2 in rod probe, –0.4 in rope probe
	up to 120 in:	+0 in,	–0.4 in rod probe, –0.8 in rope probe
	up to 240 in:	+0 in,	–0.8 in rod probe, –1.2 in rope probe
	up to 1020 in:	+0 in,	–1.6 in rope probe
The following specifications only apply to the capacitance of fully insulated probes when used in conductive liquids. **The deviation is insignificant for applications in non-conductive materials**.			
Linearity error in water	< 1 % at 40 in length		
Temperature dependence of the probe rod	< 0.1 % per K		
Pressure dependence of the probe rod	approx.1.4 % per 100 psi		
Temperature dependence of the probe rope	< 0.1 % per K		
Pressure dependence of the probe rope	< 0.7 % per 100 psi		

Process connections

Parallel thread 1½ - 11½ NPT	ANSI B 1.20.1
Triclamp coupling	ISO 2852
ANSI flanges	ANSI B 16.5

Materials

Aluminium housing (Type T3)	GD-Al Si 10 Mg, DIN 1725, with plastic coating (blue / grey)
Seal for housing cover	O-ring of EPDM (elastomer)
Temperature spacer	Stainless steel AISI 304 or similar
Gas-tight gland	Stainless steel AISI 304
Further material specifications	see Product Structure on Page 10…11

Product Structure

1 lb = 0.45 kg	1 in = 25.4 mm
1 oz = 28.35 g	

DC 11 AN- MULTICAP DC 11 AN
Fully isolated rod probe for standard applications — Basic weight including process connection 1½" NPT and housing, for rope probes with tensioning weight — 6,6 lbs

DC 16 AN- MULTICAP DC 16 AN
Partially insulated rod probe for standard applications — 6,6 lbs

DC 21 AN- MULTICAP DC 21 AN
Fully isolated rope probe for standard applications — 7,3 lbs

DC 26 AN- MULTICAP DC 26 AN
Partially insulated rope probe for standard applications — 7,1 lbs

DC 11 AS- MULTICAP DC 11 AS
Fully isolated rod probe with protection features — 6,6 lbs

DC 16 AS- MULTICAP DC 16 AS
Partially insulated rod probe with protection features — 6,6 lbs

DC 21 AS- MULTICAP DC 21 AS
Fully isolated rope probe with protection features — 7,3 lbs

DC 26 AS- MULTICAP DC 26 AS
Partially insulated rope probe with protection features — 7,1 lbs

Certificate

A	For non-hazardous areas		
J	FM IS	Class I, II, III;	Div. 1; Groups A-G
K	FM XP	Class I;	Div. 1; Groups A-D
Q	CSA IS	Class I, II, III;	Div. 1; Groups A-G
R	CSA XP	Class I;	Div. 1; Groups B-D
Y	Special version		

Build-up protection

			additional weights
A	Ohne Abschirmung / Ansatzkompensation		
	DC 11, 16, 21, 26 AS		
B	6 inch active guard,	316Ti	1,1 lbs
M	6 inch L3 screening,	316Ti	0,7 lbs
N	9 inch L3 screening,	316Ti	1,1 lbs
P	20 inch L3 screening,	316Ti	2,2 lbs
R	.....inch (3 in...160 in) L3 screening,	316Ti	0,11 lbs/in
S	6 inch L3 screening and 6 inch active guard,	316Ti	1,8 lbs
T	6 inch L3 screening and 9 inch active guard,	316Ti	2,2 lbs
U	20 inch L3 screening and 6 inch active guard,	316Ti	3,3 lbs
V	.....inch (3 in...160 in) L3 screening and 6 inch active guard,	316Ti	0,11 lbs/in + 1,1 lbs
1	6 inch active guard,	Alloy C	1,1 lbs
2	.....inch (3 in...160 in) L3 screening,	Alloy C	0,11 lbs/in
4	.....inch (3 in...160 in) L3 screening and 6 inch active guard,	Alloy C	0,11 lbs/in + 1,1 lbs
6	.....inch (3 in...160 in) L3 screening, fully insulated		0,06 lbs/in
Y	Special version		

Probe insulation

	DC 11, 21 AN/AS	
1	Fully insulated probe	
	DC 16 AN/AS	
F	.....inch (3 in...160 in) L2, PTFE insulated	0,09 oz/in
G	.....inch (3 in...160 in) L2, PFA insulated	0,09 oz/in
H	.....inch (3 in...160 in) L2, PE insulated	0,09 oz/in
	DC 26 AN/AS	
K	1/10 inch diameter, rope type	
Y	Special version	

Active length L1, Material

	DC 11 AN/AS		
A	.....inch (4 in...860 in), PTFE+316Ti		0,9 oz/in
B	.....inch (4 in...860 in), PE+steel		0,9 oz/in
C	.....inch (4 in...860 in), PTFE+steel		0,9 oz/in
D	.....inch (4 in...860 in), PFA+316Ti		0,9 oz/in
E	.....inch (4 in...860 in), PTFE+Alloy C		0,9 oz/in
F	.....inch (4 in...860 in), PFA+Alloy C		0,9 oz/in
G	.....inch (4 in...860 in), PTFE+316Ti,	with ground tube	2,7 oz/in
H	.....inch (4 in...860 in), PFA+316Ti,	with ground tube	2,7 oz/in
K	.....inch (4 in...860 in), PE+steel,	with ground tube	2,7 oz/in
L	.....inch (4 in...860 in), PTFE+Alloy C,	with ground tube	2,7 oz/in
M	.....inch (4 in...860 in), PFA+Alloy C,	with ground tube	2,7 oz/in

Continued Page 11

Product designation (first part)

Product Structure (Continued)

Active length L1, Material (continued)

DC 16 AN/AS

N	.....inch (4 in...860 in), 316Ti		0,8 oz/in
P	.....inch (4 in...860 in), steel		0,8 oz/in
R	.....inch (4 in...860 in), Alloy C		0,8 oz/in
S	.....inch (4 in...860 in), 316Ti	and ground tube	2,6 oz/in
T	.....inch (4 in...860 in), steel	and ground tube	2,6 oz/in
U	.....inch (4 in...860 in), Alloy C	and ground tube	2,6 oz/in

DC 21 AN/AS

1	.....inch (4 in...860 in), PE+316Ti tensioning weight with anchor hole	0,04 oz/in
2	.....inch (4 in...860 in), FEP+316Ti tensioning weight with anchor hole	0,04 oz/in
3	.....inch (4 in...860 in), PFA+316Ti tensioning weight with anchor hole	0,04 oz/in

DC 26 AN/AS

4	.....inch (4 in...860 in), 316Ti tensioning weight with anchor hole	0,03 oz/in
5	.....inch (4 in...860 in), Alloy C tensioning weight with anchor hole	0,03 oz/in
9	Special version	

Process connection, Material

F	DN 40-51 (2"), ISO 2852, Tri-Clamp connection		304	1,1 lbs
M	1½" NPT,	Thread ANSI,	steel	
N	1½" NPT,	Thread ANSI,	316Ti	
P	1½" NPT,	Thread ANSI,	Alloy C	
Y	Special version			
5	Flanged process connection			

Flange type, Material

AE1	2" 150 psi, RF, ANSI B16.5, steel	3,5 lbs
AE2	2" 150 psi, RF, ANSI B16.5, 316Ti	3,5 lbs
AE3	2" 150 psi, RF, ANSI B16.5, PTFE >316Ti	3,5 lbs
AG2	2" 300 psi, RF, ANSI B16.5, 316Ti	6,6 lbs
AL1	3" 150 psi, RF, ANSI B16.5, steel	7,0 lbs
AL2	3" 150 psi, RF, ANSI B16.5, 316Ti	7,0 lbs
AL3	3" 150 psi, RF, ANSI B16.5, PTFE >316Ti	7,0 lbs
AN2	3" 300 psi, RF, ANSI B16.5, 316Ti	12,3 lbs
AP1	4" 150 psi, RF, ANSI B16.5, steel	11,9 lbs
AP2	4" 150 psi, RF, ANSI B16.5, 316Ti	11,9 lbs
AP3	4" 150 psi, RF, ANSI B16.5, PTFE >316Ti	11,9 lbs
AR2	4" 300 psi, RF, ANSI B16.5, 316Ti	16,1 lbs
AV2	6" 150 psi, RF, ANSI B16.5, 316Ti	
A12	6" 300 psi, RF, ANSI B16.5, 316Ti	
YYY	Special version	

Electronic insert

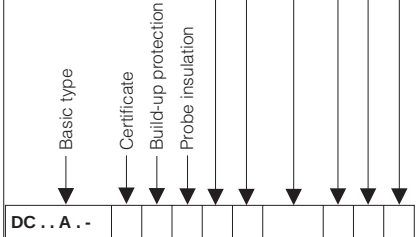
E	with EC 17 Z, 2-wire PFM	0,44 lbs
G	with EC 37 Z, 2-wire PFM 33 kHz	0,44 lbs
H	with EC 47 Z, 2-wire PFM 1 MHz	0,44 lbs
K	with FEC 12, 2-wire 4…20 mA HART	0,66 lbs• + 0,66 lbs
M	with FEC 22, 90...253 V AC, DPDT relay	0,66 lbs• + 0,66 lbs
N	with FEC 22, 10...55 V DC, 3-wire PNP	0,66 lbs• + 0,66 lbs
P	with FEC 14, PROFIBUS PA	
V	with FEC 14, local operation FHB 20 and PROFIBUS PA	
Y	Special version	

Housing

P	Aluminium, T3 Housing, PA-plug M12, IP66
S	Aluminium, T3 Housing, Nema 4X, NPT ¾"
Y	Special version

Option

1	Basic version	
2	TAG number	
3	Temperature spacer	1,1 lbs
4	Temperature spacer and TAG number	1,1 lbs
5	Gas-tight probe seal	1,1 lbs
6	Gas-tight probe seal and TAG number	1,1 lbs
9	Special version	



• Additional weight for raised cover

Complete product designation for DC . . AN, DC . . AS

Please don't forget:

Length of		
Screening	L3	in
Partial insulation	L2	in
Probe length	L1	in

Accessories

- ❏ Slip-on sheet for partially insulated probes for increasing the switching safety for limit detection
  see Technical Information “Probe accessories”
- ❏ Rope shortening kit for fully insulated probes
- ❏ Rope shortening kit for partially insulated probes

Supplementary Documentation

Technical Information

- ❏ Probe accessories
  Technical Information TI 229F/00/en
- ❏ Electronic insert FEC 12
  Technical Information TI 250F/00/en
- ❏ Electronic insert FEC 14
  Technical Information TI 376F/00/en
- ❏ Electronic insert FEC 22
  Technical Information TI 251F/00/en
- ❏ Electronic insert EC 17 Z
  Technical Information TI 268F/00/en
- ❏ Electronic insert EC 37 Z, EC 47 Z
  Technical Information TI 271F/00/en
- ❏ Transmitters for limit detection and continuous level measurement on request

Certificates

See product structure on page 10.

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