Level measurement – Ultrasonic

Contents	Page

Application examples: Level measurement with ultrasonic

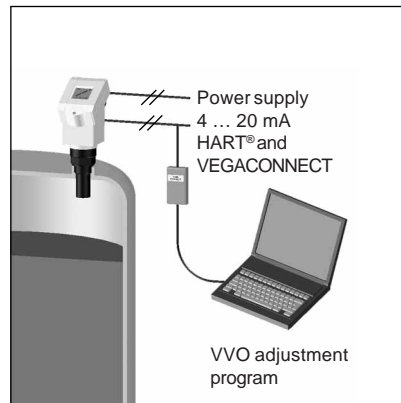### Continuous measurement with local processing unit

0/4 ... 20 mA
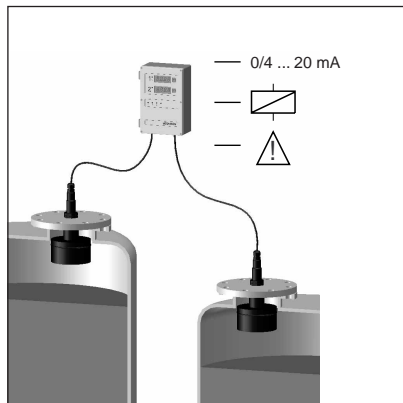
Measuring system with VEGASON series 70

A measuring system consists of:
- one VEGASON 72 … 75 in single or double channel version for level or differential measurement, or
- one VEGASON 71D for flow measurement in open flumes

Continuous measurement with compact instrument

Power supply
4 … 20 mA
HART® and
VEGACONNECT

VVO adjustment program

Measuring system with VEGASON series 50K

A measuring system consists of:
- one VEGASON 51K … 56K compact instrument with separate power supply and current output

Profibus PA or
4 … 20 mA loop powered
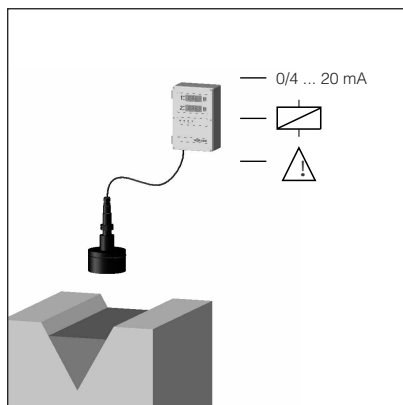HART® and
VEGACONNECT

VVO adjustment program
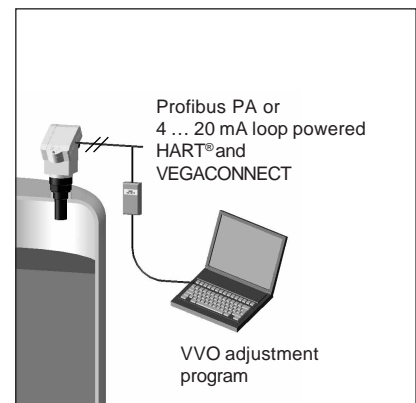
Measuring system with VEGASON series 50K

A measuring system consists of:
- one VEGASON 51K … 53K compact two-wire sensor loop powered with power supply via 4 … 20 mA, or
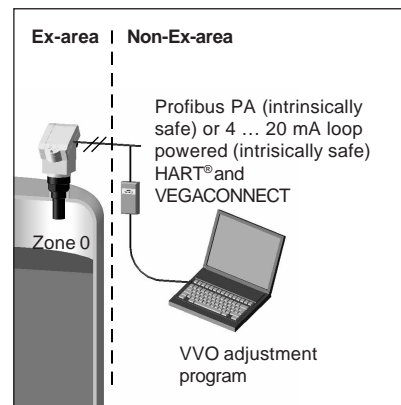- one Profibus PA sensor VEGASON 51P … 56P and one segment coupler for connection to Profibus DP/ connection to PLC

0/4 ... 20 mA

Flow measurement with VEGASON 71D

A measuring system consists of:
- one VEGASON 71D for flow measurement in open flumes, or
- one VEGASON 51 for flow measurment in open flumes

Continuous measurement for use in hazardous areas

Ex-area | Non-Ex-area

Profibus PA (intrinsically safe) or 4 … 20 mA loop powered (intrisically safe) HART® and VEGACONNECT

Zone 0

VVO adjustment program

Measuring system with VEGASON series 50K also for use in Ex areas

A measuring system consists of:
- one VEGASON 51K … 52K compact two-wire sensor loop powered ia and suitable separator for use in Ex area, or
- one Profibus PA sensor VEGASON 51P … 52P and one segment coupler for connection to Profibus DP/ connection to PLC

Continuous measurement of solids

Power supply
4 … 20 mA
HART® and
VEGACONNECT

VVO adjustment program
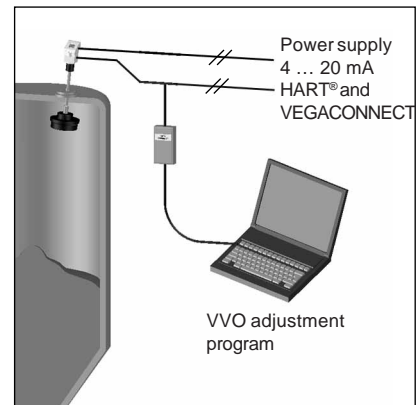
Measuring system with VEGASON series 50K for use in solids

A measuring system consists of:
- one VEGASON 51K … 56K compact sensor with separate power supply and current output, or
- one Profibus PA sensor VEGASON 51P … 56P and one segment coupler for connection to Profibus DP/ connection to PLC

VEGASON 51

Compact ultrasonic sensor for continuous level measurement
Suitable for measurement of liquids and solids in virtually all industries
as well as for gauge measurement in the water/waste water industry

- transducer of PVDF with EPDM seal
- integrated temperature sensor for running time correction
- accuracy +/- 10 mm
- ECHOFOX® signal processing with Fuzzy-Logic
- adjustment via VEGACONNECT and PC, via detachable
  adjustment module
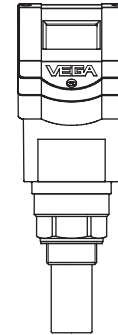
Measuring range:
- Liquids	: 0.25...4 m
- Solids	: 0.25...2 m
Process pressure	: max 3 bar (300 kPa)
Protection transducer	: IP68 (-1...3 bar/-100...300 kPa)
Process temperature	: -40...80°C

SPEED

Instrument version
K Compact instr. with analogue current output 4...20mA
P Digital signal transmission f.connection to Profibus PA
  Approval
  .X without
  EX0.X ATEX II 1G,1/2G,2G EEx ia IIC T6
  EX.U FM Division I
  .U FM Division II
    Electronics
    C Two-wire-loop powered/4...20mA
    D Two-wire-loop powered/4...20mA HART®
    A 4-wire 20...72VDC,20...250VAC/4...20mA [1]
    B 4-wire 20...72VDC,20...250VAC/4...20mA HART® [1]
    G Profibus PA
      Adjustment module MINICOM (plug-in)
      X without
      B mounted
        Indication
        X without
        A mounted
          Process connection
          G Thread G1½A/PVDF
          N Thread 1½NPT/PVDF
          A Tri-Clamp 2"/1.4571(316Ti)
          B Tri-Clamp 3"/1.4571(316Ti)
          J Bolting DN50/1.4571(316Ti)
          L Bolting DN80/1.4571(316Ti)
            Housing/Cable entry
            K Plastic PBT/M20x1,5
            N Plastic PBT/½NPT
            A Alu powder-coated/M20x1,5

| SON51						

[1] No Ex approval

• Further process connections upon request
• Profibus accessory see chapter "Signal conditioning instruments and communication"

VEGASON 52

Compact ultrasonic sensor for continuous level measurement
Suitable for measurement of liquids and solids in virtually all industries
as well as for gauge measurement in the water/waste water industry
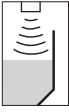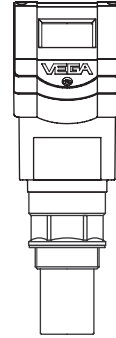
- transducer of PVDF with EPDM seal
- integrated temperature sensor for running time correction
- accuracy +/- 10 mm
- ECHOFOX® signal processing with Fuzzy-Logic
- adjustment via VEGACONNECT and PC, via detachable
  adjustment module

Measuring range:
- Liquids   : 0.4...7 m
- Solids   : 0.4...3.5 m
- Protection transducer   : IP68 (-1...3 bar/-100...300 kPa)
- Process temperature   : -40...80°C

Instrument version
K Compact instr. with analogue current output 4...20mA
P Digital signal transmission f.connection to Profibus PA

Approval
  .X without
EX0.X ATEX II 1G,1/2G,2G EEx ia IIC T6
  EX.U FM Division I
    .U FM Division II

Electronics
  C Two-wire-loop powered/4...20mA
  D Two-wire-loop powered/4...20mA HART®
  A 4-wire 20...72VDC,20...250VAC/4...20mA [1]
  B 4-wire 20...72VDC,20...250VAC/4...20mA HART® [1]
  G Profibus PA

Adjustment module MINICOM (plug-in)
  X without
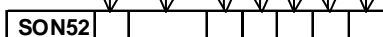 **B** mounted

Indication
  X without
  A mounted

Process connection/Material
  G Thread G2A/PVDF
  N Thread 2NPT/PVDF

Housing/Cable entry
  K Plastic PBT/M20x1,5
  N Plastic PBT/½NPT
  A Alu powder-coated/M20x1,5

| SON52						

[1] No Ex approval

• Further process connections upon request
• Profibus accessory see chapter "Signal conditioning instruments and communication"

VEGASON 53

Compact ultrasonic sensor for continuous level measurement
Suitable for measurement of liquids and solids in virtually all industries

- transducer of UP with stainless steel diaphragm (1.4571)
- integrated temperature sensor for running time correction
- accuracy +/- 10 mm
- ECHOFOX® signal processing with Fuzzy-Logic
- adjustment via VEGACONNECT and PC, via detachable
  adjustment module
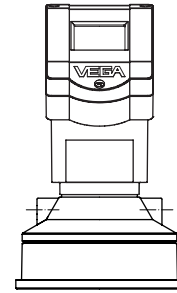
Measuring range:
- Liquids   : 0.6...15 m
- Solids   : 0.6...7 m
Protection transducer   : IP68 (-1...2 bar/-100...200 kPa)
Process temperature   : -40...80°C

Instrument version
K Compact instr. with analogue current output 4...20mA
P Digital signal transmission f.connection to Profibus PA

   Approval
    .X without
   EXS.Z ATEX II 1/2D IP67T, Ex zone 2 [1]
    .U FM Division II

    Electronics
    C Two-wire-loop powered/4...20mA
    D Two-wire-loop powered/4...20mA HART®
    A 4-wire 20...72VDC,20...250VAC/4...20mA
    B 4-wire 20...72VDC,20...250VAC/4...20mA HART®
    G Profibus PA

     Adjustment module MINICOM (plug-in)
     X without
     B mounted

      Indication
      X without
      A mounted

       Accessory process connection
       X without
       A Compression flange DN100PN16/PPH
       B Compression flange DN100PN16/1.4571(316Ti)
       C Mounting loop/1.4301(StSt)
       D Compression flange 4"150lb/PPH
       E Compression flange 4"150lb/1.4571(316Ti)

        Housing/Cable entry
        K Plastic PBT/M20x1,5
        N Plastic PBT/½NPT
        A Alu powder-coated/M20x1,5

SON53							

[1] Only when mounted with metal compression flange and Aluminium housing

• Further process connections upon request
• Profibus accessory see chapter "Signal conditioning instruments and communication"

VEGASON 54

Ultrasonic sensor for continuous level measurement
Especially suitable for the measurement of solids with optional swivelling
holder for optimum adaption to the vessel geometry and material cone

- transducer of PPA with stainless steel diaphragm (1.4571)
- integrated temperature sensor for running time correction
- accuracy +/-10mm
- ECHOFOX® signal processing with Fuzzy-Logic
- adjustment via VEGACONNECT and PC, via detachable
  adjustment module

Version A   Version B   Version C   Version D
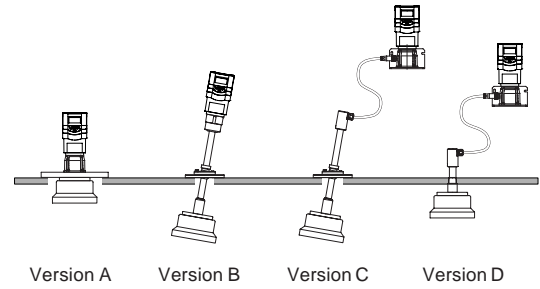
Measuring range:
- Liquids   : 1.0...25 m
- Solids   : 1.0...15 m
Protection transducer   : IP68 (-1...1.5 bar/-100...150 kPa)
Process temperature   : -40...80°C; (-20...80°C with
                                      StEx approval)

SPEED

Instrument version
K Compact instr. with analogue current output 4...20mA
P Digital signal transmission f.connection to Profibus PA
   Approval
    .X without
   EXS.X ATEX II 1/2D IP68 T [1]
     Electronics
      A 4-wire 20...72VDC,20...250VAC/4...20mA
      B 4-wire 20...72VDC,20...250VAC/4...20mA HART®
     G Profibus PA
      Adjustment module MINICOM (plug-in)
      X without
     B mounted
      Indication
      X without
     A mounted
      Version/Process connection/Material
      FEP Version A/flange DN200/PP
      FEA Version A/flange DN200/Aluminium
      FLP Version A/flange 8"/PP
      FLA Version A/flange 8"/Aluminium
      SAS Vers.B/swiv.holder w.flange DN50/2"/galvanized steel
      SBS Vers.B/swiv.holder w.flange DN80/3"/galvanized steel
      GAS Vers.C/swiv.holder w.flange DN50/2"/galvanized steel
      GBS Vers.C/swiv.holder w.flange DN80/3"/galvanized steel
      RGS Version D/thread G1A
      Housing/Cable entry
      K Plastic PBT/M20x1,5
      N Plastic PBT/½NPT
      A Alu powder-coated/M20x1,5

SON54						

[1] Not with PP flange and plastic housing

Connection cable in m
Connection cable > 5 m f. version C or D, per m > 5 m

- Connection cable between electronics and transducer up to 80°C (version C and D), (max. 300 m); standard length 5 m;
  (preferred lengths 5 m, 10 m, 15 m, 20 m); all other lengths have a delivery time of 10 working days
- Further process connections upon request
- Profibus accessory see chapter "Signal conditioning instruments and communication"

VEGASON 55

Ultrasonic sensor for continuous level measurement
Especially suitable for measurement of solids with optional swivelling
holder for optimum adaption to the vessel geometry and material cone

- transducer of UP with diaphragm of AI/PE, in compact version
  together with the sensor or in separate version
- integrated temperature sensor for running time correction
- accuracy +/- 10 mm
- ECHOFOX® signal processing with Fuzzy-Logic
- adjustment via VEGACONNECT and PC, via detachable
  adjustment module

Version A   Version B   Version C   Version D
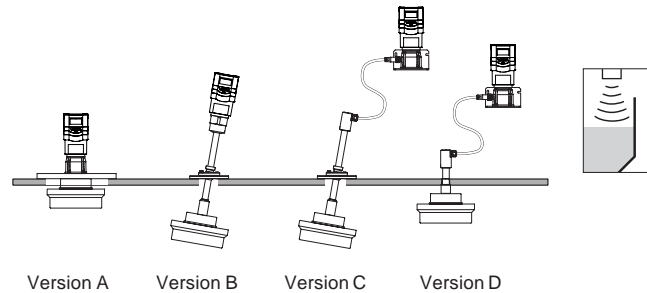
Measuring range:
- Liquids   : 0.8...45 m
- Solids   : 0.8...25 m
Protection transducer   : IP68 (-1...1.5 bar/-100...150 kPa)
Process temperature   : -40...80°C; (-20...80°C with
                                       StEx approval)

SPEED

WE'VE GOT HART ABILITY   PROFIBUS

Instrument version
K Compact instr. with analogue current output 4...20mA
P Digital signal transmission f.connection to Profibus PA
   Approval
     .X without
   EXS.X ATEX II 1/2D IP68 T **¹⁾**
     Electronics
     A 4-wire 20...72VDC,20...250VAC/4...20mA
     B 4-wire 20...72VDC,20...250VAC/4...20mA HART®
     G Profibus PA
       Adjustment module MINICOM (plug-in)
       X without
       B mounted
         Indication
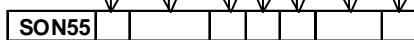   **X** without
         A mounted
           Version/Process connection/Material
           FFP Version A/flange DN250/PP
           FFA Version A/flange DN250/Aluminium
           FMP Version A/flange 10"/PP
           SAS Vers.B/swiv.holder w.flange DN50/2"/galvanized steel
           SBS Vers.B/swiv.holder w.flange DN80/3"/galvanized steel
           GAS Vers.C/swiv.holder w.flange DN50/2"/galvanized steel
           GBS Vers.C/swiv.holder w.flange DN80/3"/galvanized steel
           RGS Version D/thread G1A
            Housing/Cable entry
            K Plastic PBT/M20x1,5
            N Plastic PBT/½NPT
            A Alu powder-coated/M20x1,5

SON55

¹⁾ Not with PP flange and plastic housing

Connection cable in m
     Connection cable > 5 m f. version C or D, per m > 5 m

- Connection cable between electronics and transducer up to 80°C (version C and D), (max. 300 m); standard length 5 m;
  (preferred lengths 5 m, 10 m, 15 m, 20 m); all other lengths have a delivery time of 10 working days
- Further process connections upon request
- Profibus accessory see chapter "Signal conditioning instruments and communication"

VEGASON 56

Ultrasonic sensor for continuous level measurement
Especially suitable for the measurement of solids with optional swivelling holder for optimum adaption to the vessel geometry and material cone

- transducer of UP, in compact version together with the sensor or in separate version
- integrated temperature sensor for running time correction
- accuracy +/- 10 mm
- ECHOFOX® signal processing with Fuzzy-Logic
- adjustment via VEGACONNECT and PC, via detachable adjustment module

Version A   Version B   Version C   Version D

Measuring range:
- Liquids   : 1.4...70 m
- Solids   : 1.4...45 m
Protection transducer   : IP68 (-1...1.5 bar/-100...150 kPa)
Process temperature   : -40...150°C; (-40...140°C with
                                       StEx approval)
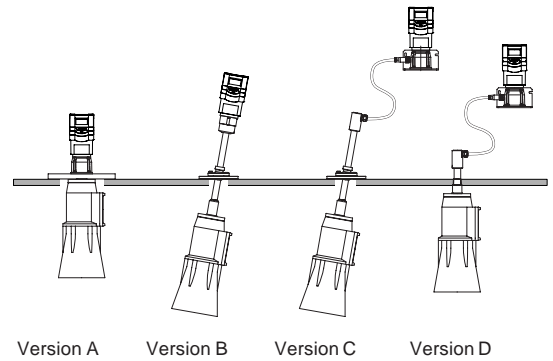
Instrument version
K Compact instr. with analogue current output 4...20mA
P Digital signal transmission f.connection to Profibus PA
    Approval
    .X without
    EXS.X ATEX II 1/2D IP68 T [1]
    EX.X ATEX II 2G EEx m II T6 [2]
    EXS.K ATEX II 1/2D IP68 T + ATEX II 2G EEx m II T6 [1]
        Electronics
        A 4-wire 20...72VDC,20...250VAC/4...20mA
        B 4-wire 20...72VDC,20...250VAC/4...20mA HART®
        G Profibus PA
            Adjustment module MINICOM (plug-in)
            X without
            B mounted
                Indication
                X without
                A mounted
                    Version/Process connection/Material
                    FEP Version A/flange DN200/PP
                    FEA Version A/flange DN200/Aluminium
                    FLP Version A/flange 8"/PP
                    FLA Version A/flange 8"/Aluminium
                    SAS Vers.B/swiv.holder w.flange DN50/2"/galvanized steel
                    SBS Vers.B/swiv.holder w.flange DN80/3"/galvanized steel
                    GAS Vers.C/swiv.holder w.flange DN50/2"/galvanized steel
                    GBS Vers.C/swiv.holder w.flange DN80/3"/galvanized steel
                    RGS Version D/thread G1A
                        Housing/Cable entry
                        K Plastic PBT/M20x1,5
                        N Plastic PBT/½NPT
                        A Alu powder-coated/M20x1,5

| SON56 | | | | | | | |

[1] Not with PP flange and plastic housing
[2] Delivery time more than 5 working days

Connection cable in m
    Connection cable > 5 m f. version C or D, per m > 5 m

- Connection cable between electronics and transducer up to 80°C (version C and D), (max. 300 m); standard length 5 m; (preferred lengths 5 m, 10 m, 15 m, 20 m); all other lengths have a delivery time of 10 working days
- Further process connections upon request
- Profibus accessory see chapter "Signal conditioning instruments and communication"

VEGA

VEGASON 71 - 75

Ultrasonic sensors with processing electronics for continuous level measurement of liquids and solids

- non-contact and maintenance-free
- adjustment without vessel filling and emptying
- for level, difference or flow measurement
- relay output and pulse counter as option
- transducer and electronics connected with coax cable

Process fitting	: G1A
Transducer housing	: PVDF
Process temperature	: -20...80°C
Process pressure	: up to 1 bar (100 kPa)
Protection transducer	: IP68

SPEED
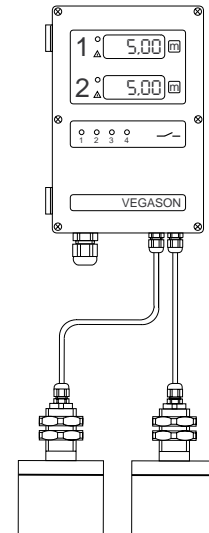
Instrument type
71-D VEGASON71-D (meas. range 0,4...4m flow measurement)
72-1 VEGASON72-1 (meas. range 0,5...5m 1 channel)
72-2 VEGASON72-2 (meas. range 0,5...5m 2 channels)
73-1 VEGASON73-1 (meas. range 0,8...10m 1 channel)
73-2 VEGASON73-2 (meas. range 0,8...10m 2 channels)
74-1 VEGASON74-1 (meas. range 0,8...20m 1 channel)
74-2 VEGASON74-2 (meas. range 0,8...20m 2 channels)
75-1 VEGASON75-1 (meas. range 1,0...30m 1 channel)
75-2 VEGASON75-2 (meas. range 1,0...30m 2 channels)

   Approval
   .X without
   EX.X CENELEC EEx m II T6 (per channel) [2]
   EX.K CENELEC EEx m II T6, StEx zone 10 (per channel) [1]

      Supply voltage
      M 16...42VAC/16...60VDC
      L 90...250VAC/120...250VDC

      Material transducer
      D PVDF

      Current output
      X without
      L 4...20mA, galvanically separated
      J 4...20mA, individually galvanically separated

      Relay output
      X without
      1 1 module, 2 relays(1 count.rel., 1 relay with type ..D)
      2 2 modules, 4 relays (1 count. rel., 3 relays w.type ..D

      Integrated pulse counter
      C with (on VEGASON ..D and relay output 1 or 2)
      X without

SON						

[1] Not for VEGASON 71...73
[2] Not for VEGASON 74 and 75

Cable measurement loop 1 in m
      deviating from standard length (5 m) per m
Cable measurement loop 2 in m
      deviating from standard length (5 m) per m

Swivelling holder VEGASON 70

Swivelling holder for transducer SW 71...75 suitable for counter flange
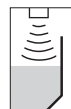DIN - DN150 PN16, ANSI - 6" 150psi
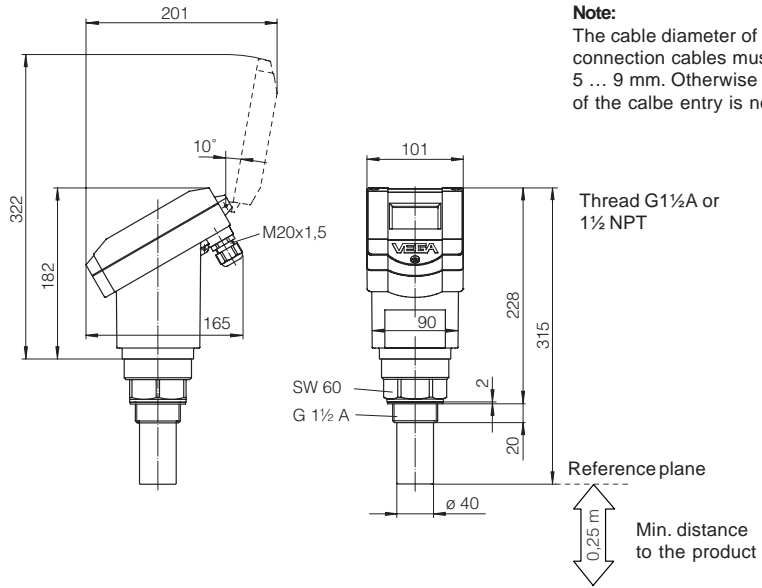
Holder material
V StSt 1.4571(316Ti)
S Galvanized steel

SONHALT.	

• Mounting accessory see chapter "Accessory"

VEGASON 51

Plastic housing PBT
(dimensions Aluminium housing,
see next page)

Note:
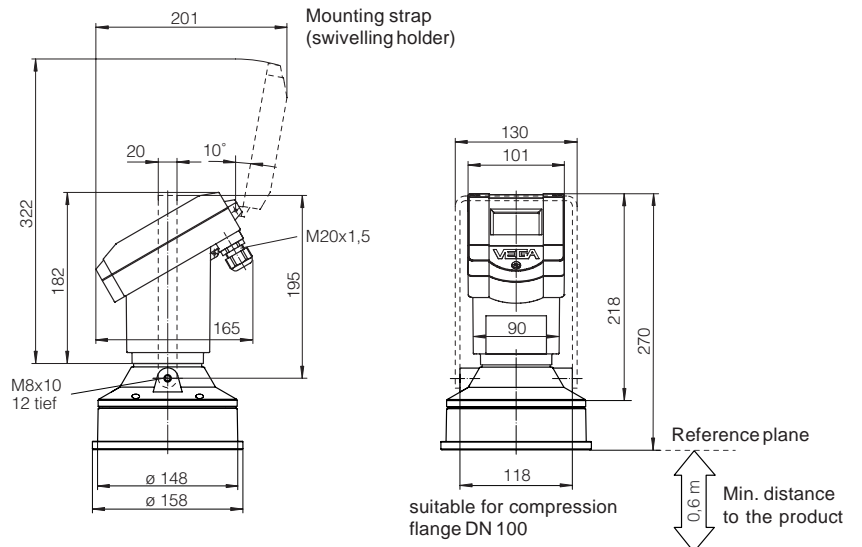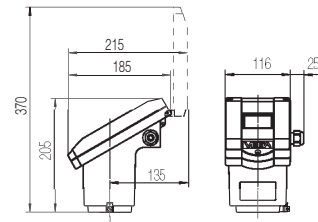The cable diameter of the
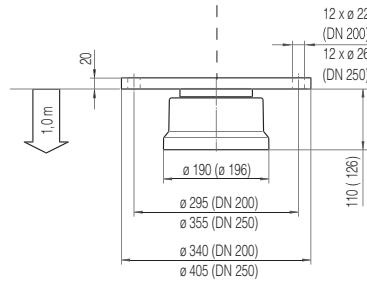connection cables must be
5 … 9 mm. Otherwise the sealing
of the calbe entry is not ensured.

201

322

182

10°

165

M20x1,5

101

228

315

90

Thread G1½A or
1½ NPT

SW 60

G 1½ A

2

20

ø 40

Reference plane

0,25 m

Min. distance
to the product

VEGASON 52

Plastic housing PBT
(dimensions Aluminium housing,
see next page)

201

322

182

10°

165

M20x1,5

101

232

315

90

Thread G2A or 2 NPT

SW 60

G 2 A

2

20

ø 50

Reference plane

0,4 m

Min. distance
to the product
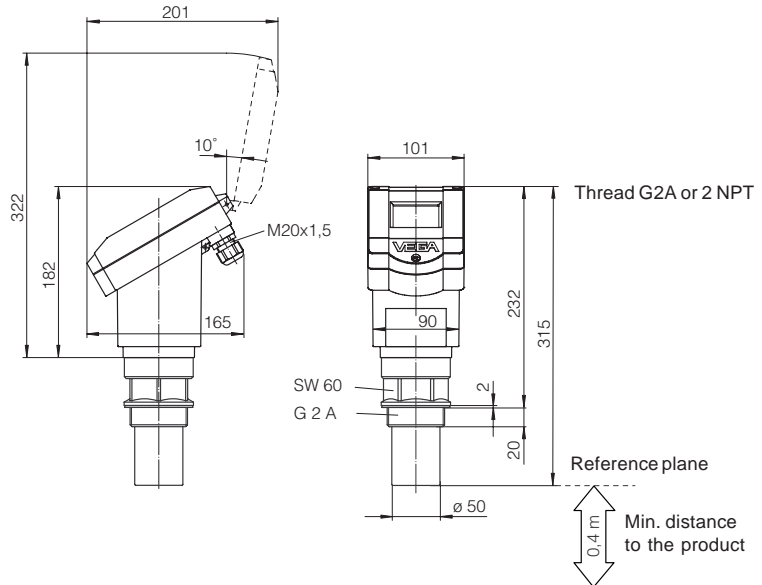
VEGASON 53

Plastic housing PBT
(dimensions Aluminium housing,
see next page)

201

Mounting strap
(swivelling holder)

322

182

20

10°

165

M20x1,5

195

M8x10
12 tief

ø 148

ø 158

130

101

218

270

90

118

suitable for compression
flange DN 100

Reference plane

0,6 m

Min. distance
to the product

VEGASON 54 … 56 version A and B

Plastic housing

Aluminium housing
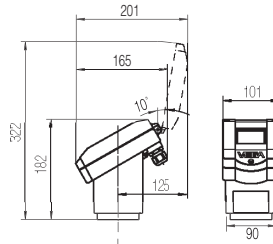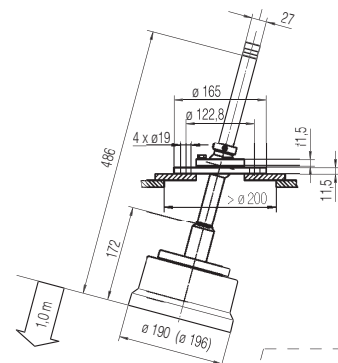
VEGASON 54
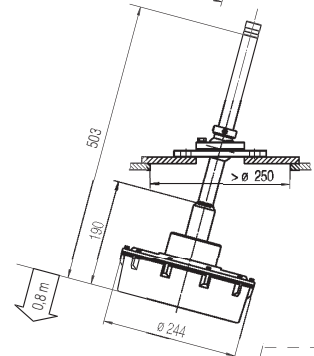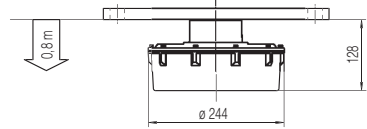
VEGASON 55

VEGASON 56

Version A

Version B

• Adapter flanges for swivelling holder (version B) see page 61

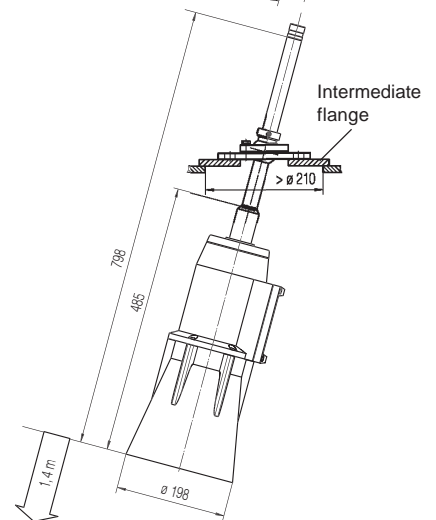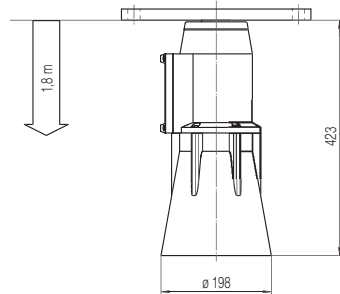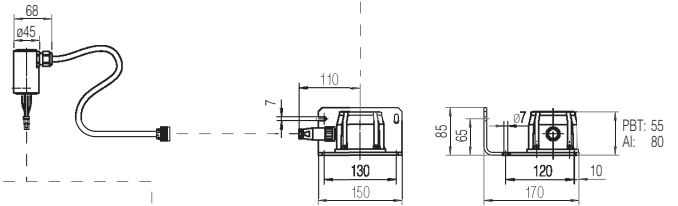**VEGASON 54 … 56 version C and D**

Plastic housing

Aluminium housing
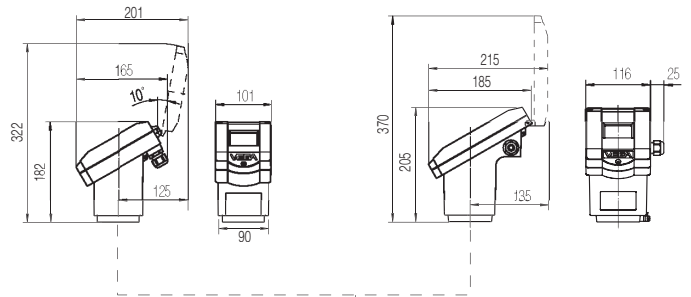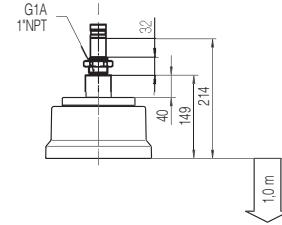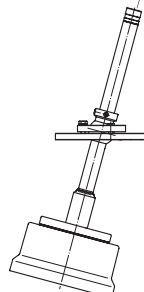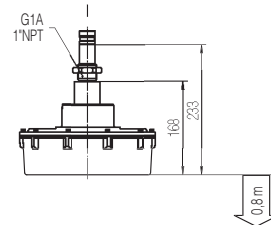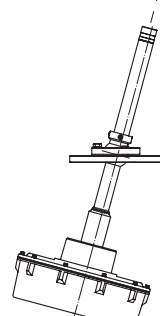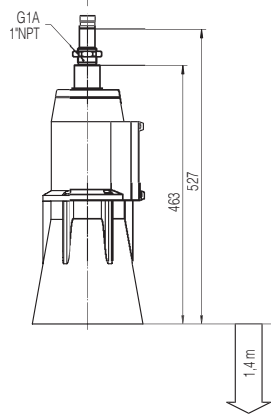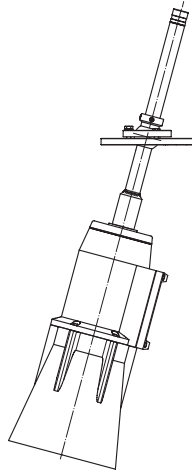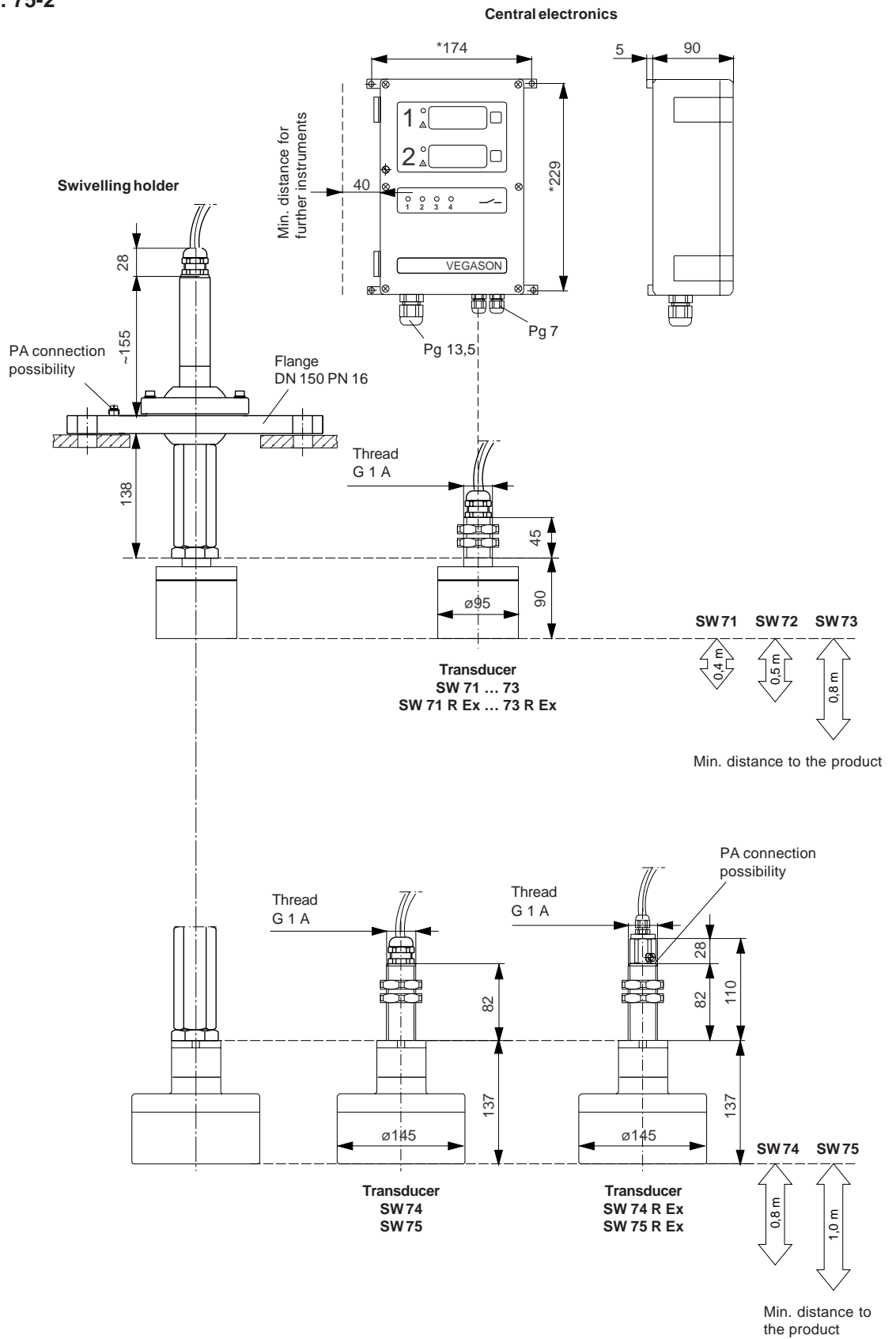
VEGASON 54

VEGASON 55

VEGASON 56

Version C

Version D

• Adapter flanges for swivelling holder (version B) see page 61

VEGASON 72-1 … 75-1
VEGASON 72-2 … 75-2
VEGASON 71D

Central electronics

Swivelling holder

Min. distance for further instruments

PA connection possibility

Flange
DN 150 PN 16

Thread
G 1 A

*174

40

*229

1
2

○ ○ ○ ○
1 2 3 4

VEGASON

Pg 13,5

Pg 7

5   90

28

~155

138

45

90

ø95

Transducer
SW 71 … 73
SW 71 R Ex … 73 R Ex

SW 71 **SW 72** **SW 73**

0,4 m   0,5 m   0,8 m

Min. distance to the product

Thread
G 1 A

Thread
G 1 A

PA connection possibility

82

137

ø145

28

82

110

137

ø145

Transducer
SW 74
SW 75

Transducer
SW 74 R Ex
SW 75 R Ex

SW 74 **SW 75**

0,8 m   1,0 m

Min. distance to the product

VEGADIS 50

External indication and adjustment unit for connection of
VEGAPULS series 40 and 50, VEGASON 50 and VEGAFLEX 50 sensors
Suitable for external indication of the measured values and
external adjustment of sensors

- digital and quasi-analogue indication of measured values
- can be mounted up to 25 m away from the sensor
- module for adjustment module MINICOM

Indicating range   : -9999...9999, with
                                   individually adjustable decimal point
Housing protection   : IP66/IP67

SPEED

Approval
EX.X ATEX II 1 G EEx ia IIC T6
         Adjustment module MINICOM (plug-in)
         X without
         B mounted
              Indication
              X without
              A mounted

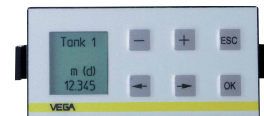| DIS50			

• Dimensions see chapter "Indication and adjustment"

MINICOM

Pluggable adjustment module for VEGASON, VEGAPULS and
VEGAFLEX series 50 and VEGAPULS series 40 sensors
Suitable for adjustment directly on the sensor or separate in
conjunction with VEGADIS 50 for 4...20mA or Profibus PA sensors

- 6-key adjustment
- 4-line display for menu-driven clear text parameter adjustment

SPEED

MINICOM.

Adapter flange

Adapter flange for VEGASON 54, 55, 56 in conjunction with flange DN50

Flange	Material	D	k	d2	No. of d2
DN 150 PN 16	1.4571	ø285	ø240	ø22	8
DN 200 PN 16	1.4571	ø340	ø295	ø22	12
DN 250 PN 16	1.4571	ø405	ø355	ø26	12
DN 300 PN 16	1.4571	ø460	ø410	ø26	12
DN 350 PN 16	1.4571	ø520	ø470	ø26	16
ANSI 5" 150 psi	1.4571	ø254.0	ø215.9	ø22.4	8
ANSI 6" 150 psi	1.4571	ø279.4	ø241.3	ø22.4	8
ANSI 8° 150 psi	1.4571	ø342.9	ø298.5	ø22.4	8
ANSI 10" 150 psi	1.4571	ø406.4	ø362.0	ø25.4	12
ANSI 12" 150 psi	1.4571	ø482.6	ø431.8	ø25.4	12
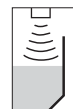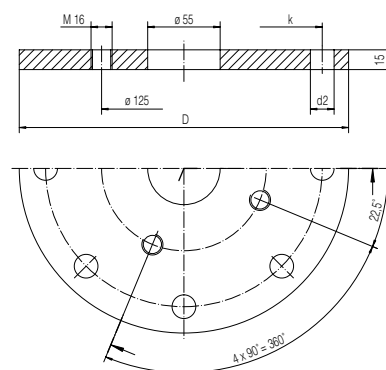
Flange size / Material

CBV DN150PN16/1.4571(316Ti)
BBV DN200PN16/1.4571(316Ti)
ABV DN250PN16/1.4571(316Ti)
FBV DN300PN16/1.4571(316Ti)
EBV DN350PN16/1.4571(316Ti)
ZBV 6"150lb/1.4571(316Ti)
ZCV 8"150lb/1.4571(316Ti)
ZDV 10"150lb/1.4571(316Ti)
ZEV 12"150lb/1.4571(316Ti)

↓

AFL.