

## Product Information NCS-0xP, NCS-3xP, NCS-6xP, NCS-8xP

## PHARMA

# Capacitive Limit Switch Pharma NCS




## Application/Specified usage

- Limit detection of liquid media even with low or no water content e.g. alcohols or oils with a dielectric constant  $\epsilon_r$  ( $D_k$ )  $\geq 2$

## Application examples

- Limit detection in vessels or pipes
- Product monitoring in pipes
- Pump/dry running protection
- Detection of WFI (water for injection)

## Hygienic design/Process connection

- Hygienic process connection with CLEANadapt
- Conforming to 3-A Sanitary Standard for versions with DIRECTadapt
- All wetted materials are FDA-conform
- Sensor completely made of stainless steel, sensor tip made of PEEK
- Complete overview of process connections: see order code
- The Anderson-Negele CLEANadapt system offers a flow-optimized, hygienic and easily sterilizable installation solution for sensors.

## Features

- CIP/SIP cleaning up to 143 °C/120 min (289 °F/120 min)
- Capacitive measuring principle
- Independent of the conductivity
- Short response time ( $< 1$  s)
- Defined position of the M12-plug
- Reversible output (full / empty active)
- Heated electronic to avoid condensation
- Insensitive to foam and adherence
- Simulation of sensor status possible

## Options/Accessories

- Version with spacer (option H) for isolated vessels or permanent process temperatures up to 143 °C
- NPN output (Open Collector)
- M12-plug and matching cable assembly
- Heating element switched off for extension of the temperature range

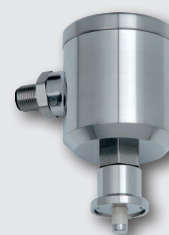
## Measuring principle

The capacity of a capacitor is affected by 3 factors: **distance** and **size of the electrodes** as well as the **kind of medium** between the electrodes. Using the capacitive sensors only the kind of medium is of interest cause the others are constant. The electrode of the sensor and surface of tank can be seen as capacitor, the medium as dielectric fluid. Caused by the higher  $D_k$ -value of the medium compared to air the capacity increases if the sensor is covered with the medium. The change of capacity is evaluated by electronics and converted into a corresponding switching order. This functional principle requires that the sensor tip is completely covered with medium. That way the sensor is insensitive to foam and adherences.

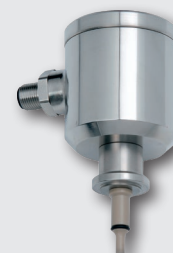
## Authorizations



## NCS-3xP with Tri-Clamp



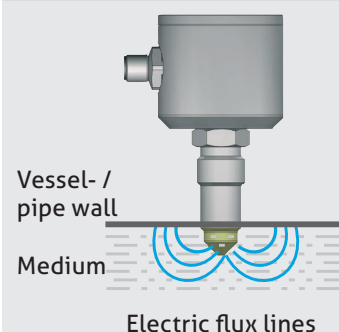
## NCS-6xP for EPA-8



## NCS-8xP for EPA-18

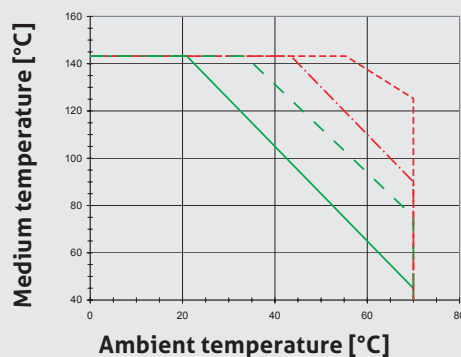


## Measuring principle



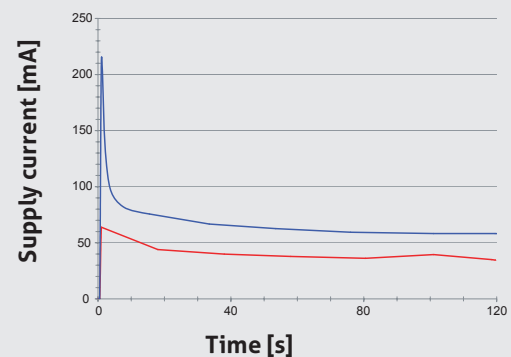
Specification		
Process connection	thread NCS-0xP Clamp NCS-6xP Clamp NCS-8xP direct connection NCS-3xP	M12 x 1.5, G1/2" CLEANadapt tightening torque max. 5...10 Nm EPA-8 PHARMadapt EPA-8 PHARMadapt overview see order code on page 8
Materials	connection head connection piece spacer sensor tip NCS-0xP sensor tip NCS-3xP sensor tip NCS-6xP sensor tip NCS-8xP sealing (depending on type)	stainless steel 1.4301 (AISI 304) stainless steel 1.4301 (AISI 304) stainless steel 1.4301 (AISI 304) PEEK acc. to USP class VI, 1.4435 (AISI 316L) with 3.1 cert. PEEK acc. to USP class VI PEEK acc. to USP class VI, 1.4435 (AISI 316L) with 3.1 cert. PEEK acc. to USP class VI EPDM
FDA approval	PEEK EPDM	21 CFR 177.2415 21 CFR 177.2600
Surface	product contacting optional	$R_a \leq 0.8 \mu\text{m}$ $R_a \leq 0.6 \mu\text{m}$ (not available for -0xP, -6xP, -3xP...TC3/4)
Delta Ferrite DF		< 1.0 %
Weight		approx. 500 g (depending on process connection)
Operating pressure		max. 10 bar
Protection class		IP 69 K
Electrical connection		M12-plug 1.4301 (AISI 304)
Supply		16...32 V DC
Output	optional	PNP (active 50 mA, short-circuit-proof) NPN (active 50 mA, short-circuit-proof)
Switching function	adjustable by polarity of support	high active (sensor wetted: 'high') low active (sensor free : 'high')
Status display		LED
Measuring range	NCS-01P, -31P, -61P, -81P NCS-02P, -32P...TC3/4, -62P NCS-32P...TC1, -32P...TC2, -82P	$D_k \geq 20$ $D_k \geq 5$ $D_k \geq 2$
Switching threshold		see page 5: "Adjustment of threshold"

## Temperature range



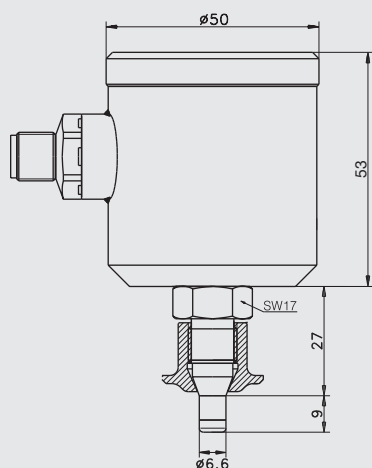
- Continuous temperature limit with heater
- - - Temperature excursion (60 min) with heater
- Continuous temperature limit without heater
- - - Temperature excursion (60 min) without heater

## Supply/Power input

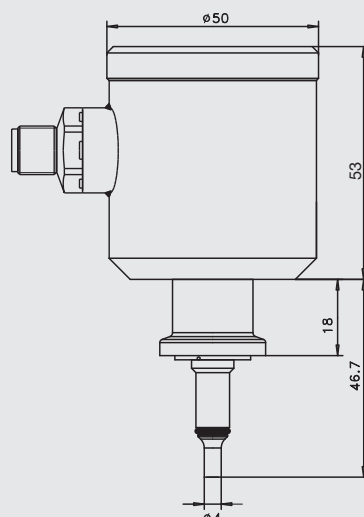


- - -  $U_b = 24 \text{ V}$ ,  $T_u = 20 \text{ °C}$
- $U_b = 32 \text{ V}$ ,  $T_u = -15 \text{ °C}$
- $U_b$ : Supply voltage
- $T_u$ : Ambient temperature

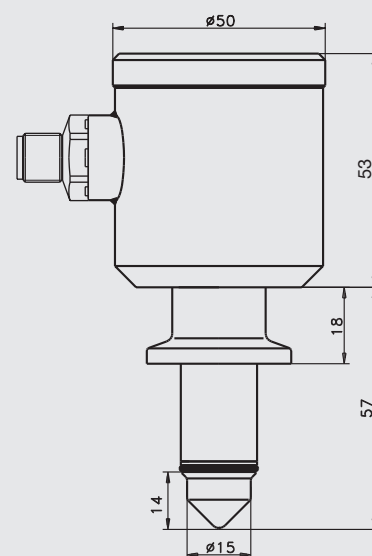
NCS-0xP with EMK-032



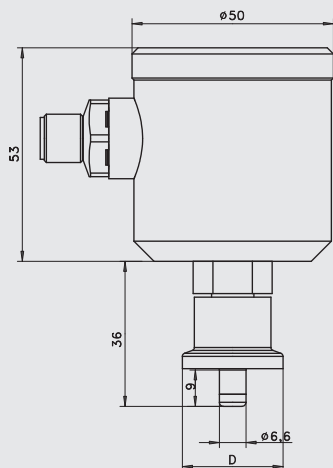
NCS-6xP (EPA-8)



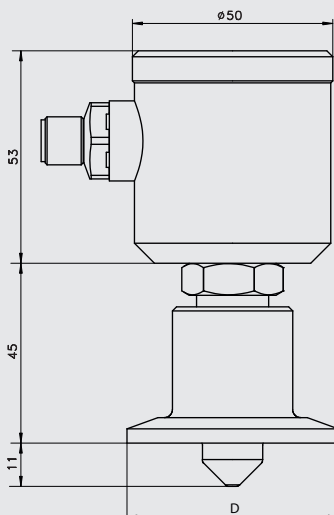
NCS-8xP (EPA-18)



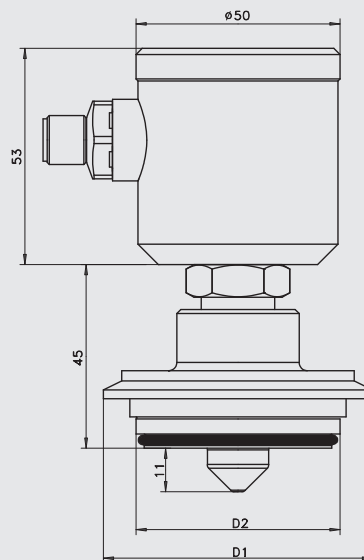
NCS-3xP Tri-Clamp TC3/4



NCS-3xP Tri-Clamp TC1 / TC2



NCS-3xP Varivent®



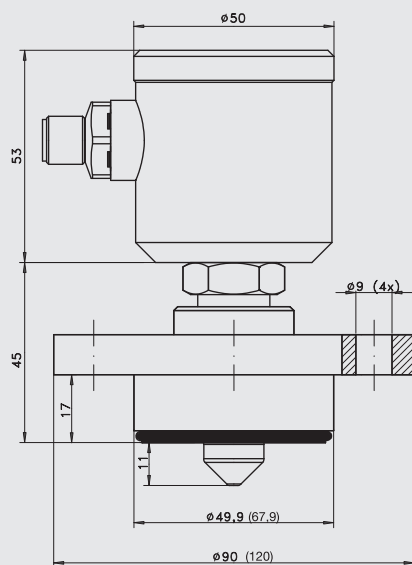
Dimension table Tri-Clamp

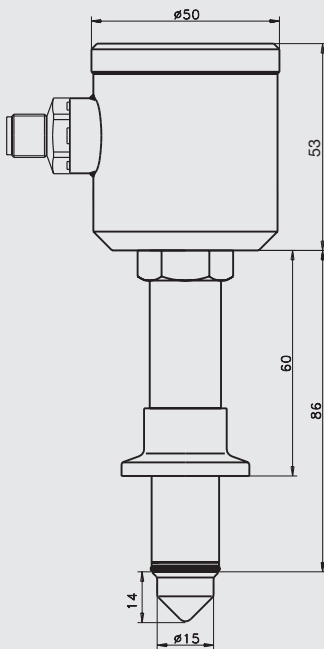
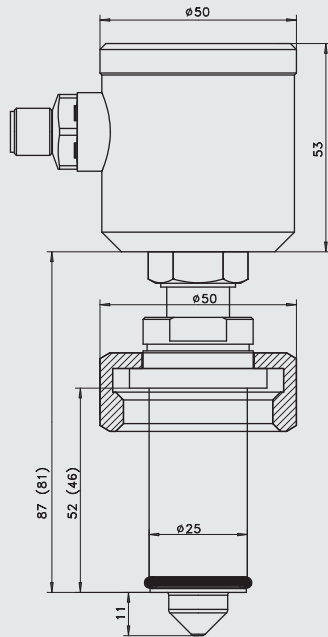
Type	D [mm]
TC3/4	25
TC1	50.5
TC2	64

Dimension table Varivent®

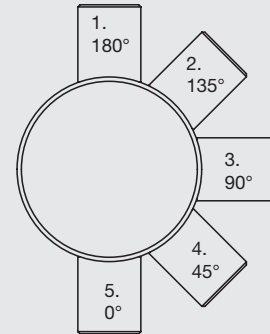
Type	Varivent® Type	D1 [mm]	D2 [mm]
V10	B	53	31
V25	F	66	50
V40	N	84	68

NCS-3xP BioControl



**NCS-8xP / H****NCS-3xP Ingold®/Fermenter****Conventional usage**

- Not suitable for applications in explosive areas.
- Not suitable for applications in security-relevant equipments (SIL).


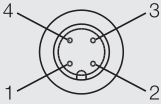
**Fig. 1: Build-in positions****Mechanical connection/installation**


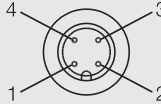
To guarantee a definite function, the sensor tip must be completely covered by the medium! A minimum filling level in the pipe is necessary to ensure that the sensor operates. This varies according to the mounting position:

- for position 1: 100 %
  - for position 2: ca. 92 %
  - for position 3: ca. 60 %
  - for position 4: ca. 30 %
  - for position 5: min. 11 mm
- Position 2: Ideal installation as high alarm in horizontal lines; ensures that isolation of sensor tip by air bubble is prevented.
- Position 4: Ideal installation as low alarm in horizontal lines; ensures that sensor tip is not covered with residues of medium.
- Do not use non-conducting sealants such as PTFE (Teflon) or similar.

**Conditions for a measuring point according to 3-A Sanitary Standard 74-06**

- The sensors NCS-0xP, NCS-3xP with process connection TC and V, NCS-6xP and NCS-8xP conforming to the 3-A Sanitary Standard.
- The sensors are designed for CIP-/ SIP-cleaning. Maximum 143 °C / 120 minutes.
- Only with the build-in system CLEANadapt (EMZ, EMK, EHG with pipe diameter > DN25, ISO 20 and 1", Adapter AMC and AMV) allowed.
- Using the weld in sleeve EMZ, EMK the weld must comply to the requirements of the current 3-A Sanitary Standard.
- Mounting position, self draining and the position of the leakage hole must be in accordance to current 3-A Sanitary Standard.

Electrical connection NCS-x1P (for $U_b$ 24 V DC)		
Strip terminal	High active	Low active
	1: +24 V DC 2: 0 V 3: output	1: 0 V 2: +24 V DC 3: output
M12-plug	High active	Low active
	1: +24 V DC 2: not connected 3: 0 V 4: output	1: 0 V 2: not connected 3: +24 V DC 4: output

Electrical connection NCS-x2P (for $U_b$ 24 V DC)		
Strip terminal	High active	Low active
	1: control input 2: +24 V DC 3: 0 V 4: output	1: control input 2: 0 V 3: +24 V DC 4: output
M12-plug	High active	Low active
	1: +24 V DC 2: control input 3: 0 V 4: output	1: 0 V 2: control input 3: +24 V DC 4: output

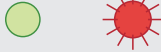


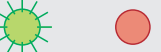


### Handling/operation NCS-x2P



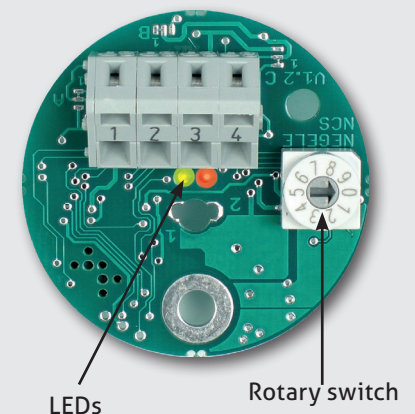
With the control input, the threshold of the limit switches with enhanced measurement range can be switched to threshold of  $D_k = 50$  while operating.

This could be useful to avoid false alarm at process steps with increasing frothing, CIP-cycles or similar.

Control input	Threshold (for $U_b$ 24 V DC)
0 V or not connected	like setting with rotary switch
+24 V DC	$D_k = 50$ fix

LED status display			
Sensor tip	NCS-x1P	NCS-x2P control input 0 V	NCS-x2P control input 24 V
covered			
not covered			

### Electronics NCS-x2P



### Adjustment of threshold with rotary switch

Switch setting	$D_k$ -value $\geq 20$ NCS-x1P	$D_k$ -value $\geq 5$ NCS-02P NCS-32P ... TC3/4 NCS-62P	$D_k$ -value $\geq 2$ NCS-32P ... TC1 NCS-32P ... TC2 NCS-82P
0	output off	output off	output off
1	output on	output on	output on
2	20	5	2
3	25	6	3
4	30	7	4
5	35	8	5
6	40	9	10
7	50	10	12
8	60	15	15
9	70	20 *	20 *

\* Please note information box above.

Showcase of media and specific  $D_k$ -value:  
(the exemplarily  $D_k$ -values can vary acc. to different outside influences like temperature, fabrication, source etc.)

Medium	$D_k$ -value
water	81
formic acid	57
methanol	33
water (demineralized)	29
ethanol	25
isopropanol	18
glycerin	13
fatty acid	2

### Example

At switch setting 5 ( $D_k = 35$ ) the NCS-x1P will detect media with a dielectric constant of  $D_k \geq 35$ .

### Information process connection



The complete assortment as well as the order code for build-in systems, weld-in sleeves and adapters you will find in the product information CLEANadapt.

### Samples of possible process connections

Type	NCS-0xP				
Process connection	Build-in system EHG (DIN 11850 series 2)	Weld-in sleeve	Weld-in ball	Collar sleeve	APV-Inline

### Information process connection



Detailed information for process connection PHARMadapt EPA you will find in product information build-in system PHARMadapt EPA.

### Process connections PHARMadapt EPA

Type	NCS-6xP	NCS-8xP
Process connection	EPA-8	EPA-18

### Order code

**Clamp-tension ring, material 1.4301 bright**

**SRC-05** for NCS-6xP

**SRC-10** for NCS-8xP

#### Please note:

The clamp ring is not included in delivery and must be ordered separately!

**Sealing ring, material EPDM**

**DRE-5** for NCS-6xP

**DRE-15** for NCS-8xP

### TAG

labeled acc. to customer preference, material 1.4301 (AISI 304) bright

### Clamp ring SRC-10 for EPA-18



### Identification with TAG-plate



## Accessories

**M12-K/4**

M12-connection 4-pin, IDC technique,  
with plastic knurled screw

**PVC-cable with M12-connection made of 1.4305, IP 69 K, unshielded****M12-PVC / 4-5 m**

PVC-cable 4-pin, length 5 m

**M12-PVC / 4-10 m**

PVC-cable 4-pin, length 10 m

**M12-PVC / 4-25 m**

PVC-cable 4-pin, length 25 m

**PVC-cable with M12-connection, brass nickel-plated, IP 67, shielded****M12-PVC / 4G-5 m**

PVC-cable 4-pin, length 5 m

**M12-PVC / 4G-10 m**

PVC-cable 4-pin, length 10 m

**M12-PVC / 4G-25 m**

PVC-cable 4-pin, length 25 m

## PVC-cable with M12-connection



## Cleaning/Maintenance



- In case of using pressure washers, don't point nozzle directly to electrical connections!

## Reshipment



- Sensors shall be clean and must not be contaminated with dangerous media!
- Use suitable transport packaging only to avoid damage of the equipment!

## Transport/storage



- No outdoor storage
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage temperature 0...40 °C
- Relative humidity max. 80 %

## Standards and guidelines



- You have to comply with applicable regulations and directives.

## Note on CE



- Applicable directives:  
Electromagnetic Compatibility Directive 2014/30/EU
- Compliance with the applicable EU directives is identified by the CE label on the product.
- The operating company is responsible for complying with the guidelines applicable to the entire installation.

## Disposal



- Electrical devices should not be disposed of with household trash. They must be recycled in accordance with national laws and regulations.
- Take the device directly to a specialized recycling company and do not use municipal collection points.



## Order code

<b>NCS-01P</b>	(CLEANadapt M12, measurement range $D_k \geq 20$ , wetted parts PEEK (acc. to USP class VI) and stainless steel 1.4435 (AISI 316L) with 3.1 certificate acc. to EN 10204)
<b>NCS-02P</b>	(CLEANadapt M12, measurement range $D_k \geq 5$ , wetted parts PEEK (acc. to USP class VI) and stainless steel 1.4435 (AISI 316L) with 3.1 certificate acc. to EN 10204)
<b>NCS-31P</b>	(Direct connection, measurement range $D_k \geq 20$ , wetted parts PEEK (acc. to USP class VI) and stainless steel 1.4435 (AISI 316L) with 3.1 certificate acc. to EN 10204)
<b>NCS-32P</b>	(Direct connection, measurement range $D_k \geq 2$ except NCS-32P...TC3/4 here $D_k \geq 5$ , wetted parts PEEK (acc. to USP class VI) and stainless steel 1.4435 (AISI 316L) with 3.1 certificate acc. to EN 10204)
<b>NCS-61P</b>	(PHARMadapt EPA-8, measurement range $D_k \geq 20$ , wetted parts PEEK (acc. to USP class VI) and stainless steel 1.4435 (AISI 316L) with 3.1 certificate acc. to EN 10204)
<b>NCS-62P</b>	(PHARMadapt EPA-8, measurement range $D_k \geq 5$ , wetted parts PEEK (acc. to USP class VI) and stainless steel 1.4435 (AISI 316L) with 3.1 certificate acc. to EN 10204)
<b>NCS-81P</b>	(PHARMadapt EPA-18, measurement range $D_k \geq 20$ , wetted parts PEEK (acc. to USP class VI))
<b>NCS-82P</b>	(PHARMadapt EPA-18, measurement range $D_k \geq 2$ , wetted parts PEEK (acc. to USP class VI))

## Output

<b>PNP</b>	(standard, active 16...32 V DC)
<b>NPN</b>	(active 16...32 V DC)

## Temperature Version (see diagram on page 2)

<b>X</b>	(standard, for process temp. up to 100 °C, CIP/SIP 143 °C / 120 min)
<b>H</b>	(high temperature version with spacer, for process temperatures up to 143 °C)
<b>D</b>	(heater deactivated at higher ambient temperature)
<b>HD</b>	(for process temperatures up to 143 °C at higher ambient temperature, with spacer and heater deactivated)

## Process Connection (only for NCS-3xP)

<b>I46</b>	(Fermenter connection length 46 mm, not with temperature version H and HD)
<b>I52</b>	(Fermenter connection length 52 mm, not with temperature version H and HD)
<b>TC3/4</b>	(Tri-Clamp ¾")
<b>TC1</b>	(Tri-Clamp 1...1½")
<b>TC2</b>	(Tri-Clamp 2")
<b>B50</b>	(BioControl DN 40...DN 100)
<b>B65</b>	(BioControl DN 40...DN 100)
<b>V10</b>	(Varivent® DN 10...DN 15)
<b>V25</b>	(Varivent® DN 25)
<b>V40</b>	(Varivent® DN 40)

## Surface quality of wetted process connection (only for NCS-3xP)

<b>X</b>	(standard, 0.8 µm)
<b>-06</b>	(0.6 µm)
<b>-04</b>	(0.4 µm)

NCS-32P / PNP / H / TC1 -06

## Note



- All Types of NCS-...P will be delivered with window in lid and electrical connection with M12 plug.
- Varivent® is a registered trademark of GEA Tuchenhausen GmbH.
- Ingold® is a registered trademark of Mettler-Toledo GmbH.