

# OPERATING INSTRUCTIONS SMART



## Notes for the first inauguration:

By putting into operation of SMART-indicating and controlling instrument you are already in main menu.

By pressing the keys  or  +  you can increase or decrease the contrast of the display-indication. (Only in main menu - measurement value display)

If you want to jump from one menu item to another please press  .

If you want to alter a menu item, or go to a submenu press  .

After this you can increase the value by  or decrease by  +   
and by the keys  or  +  you can shift the cursor to the right or the left.

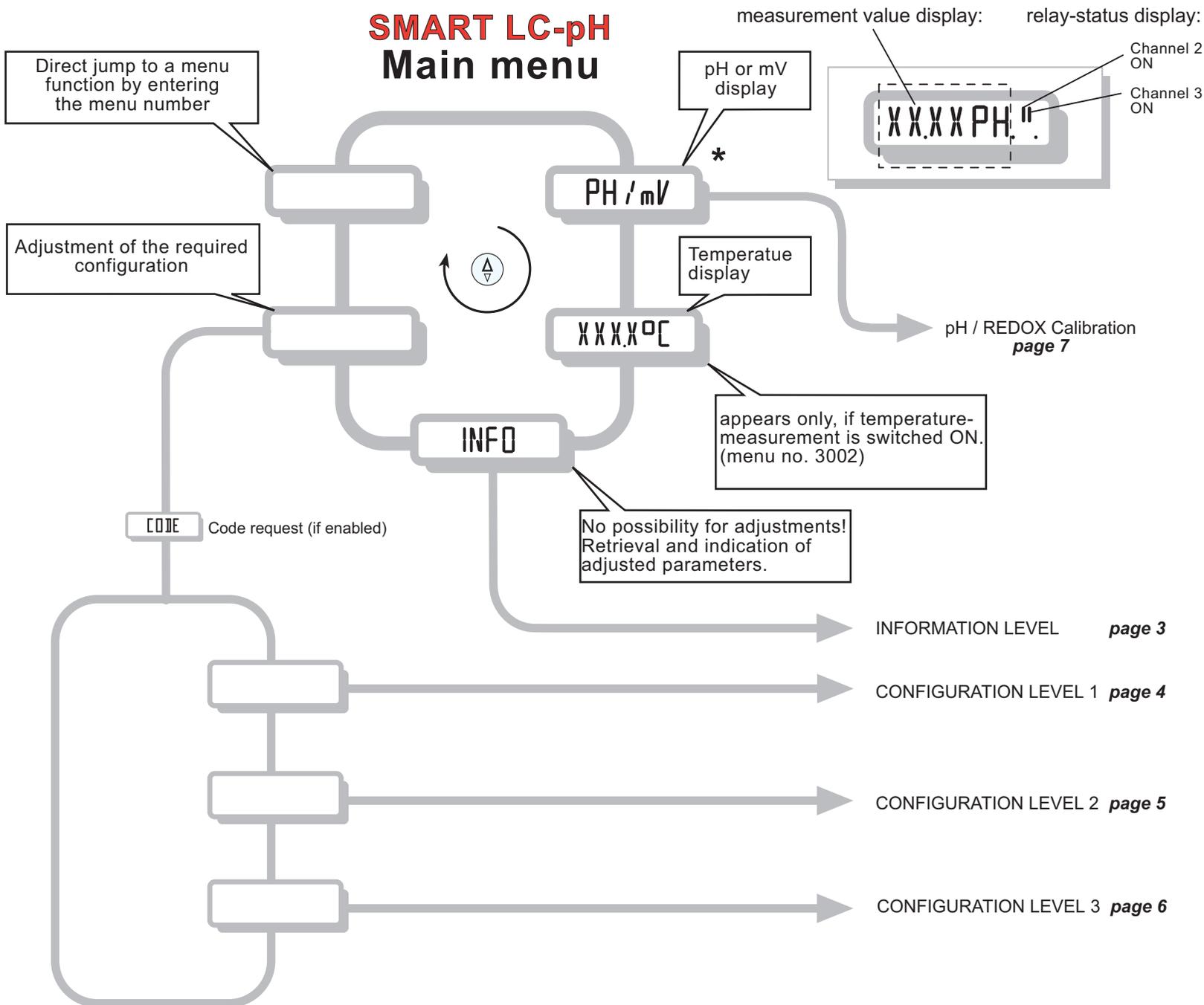
If you want to enter the adjusted value, press  , sometimes this key has to be pressed twice (e.g. limit), or reject the value by  +  .

In order to go back to main menu, please press the key combination

 +  twice.



# SMART LC-pH Main menu



## Key descriptions

- Enter and select
- \* Alarm reset
- Cancel / Back
- Scroll menu / increment
- Decrement
- Move cursor right
- \* (Set display contrast 1 to 12)
- Move cursor left

INFORMATION LEVEL *page 3*

CONFIGURATION LEVEL 1 *page 4*

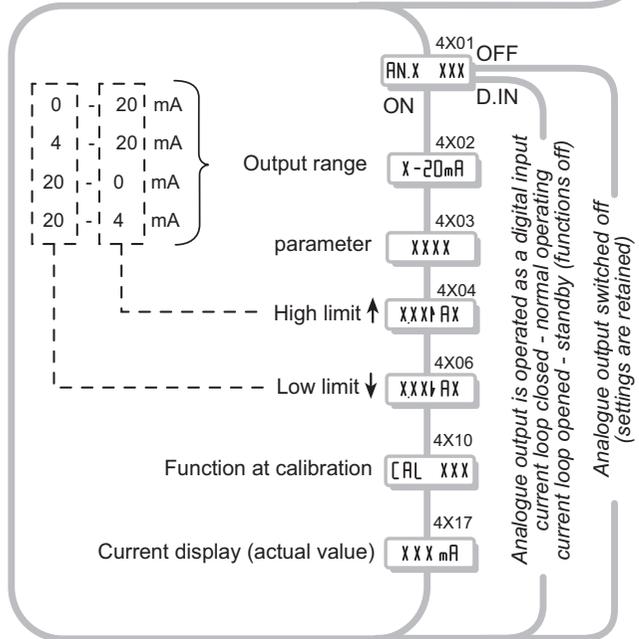
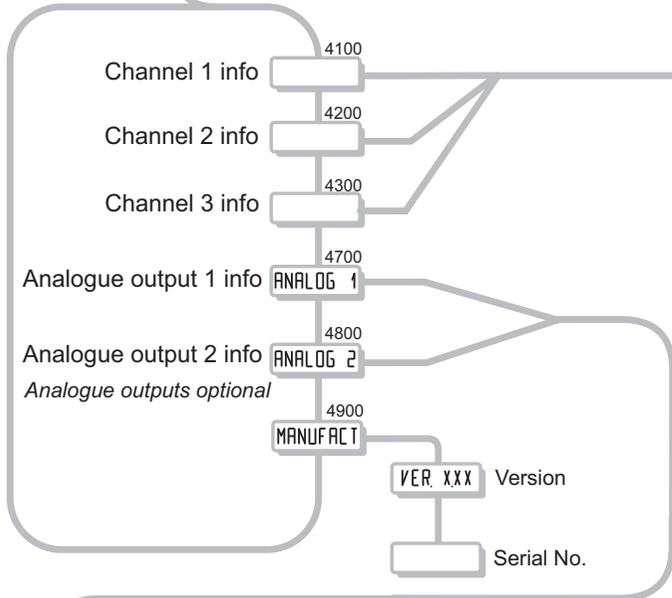
CONFIGURATION LEVEL 2 *page 5*

CONFIGURATION LEVEL 3 *page 6*

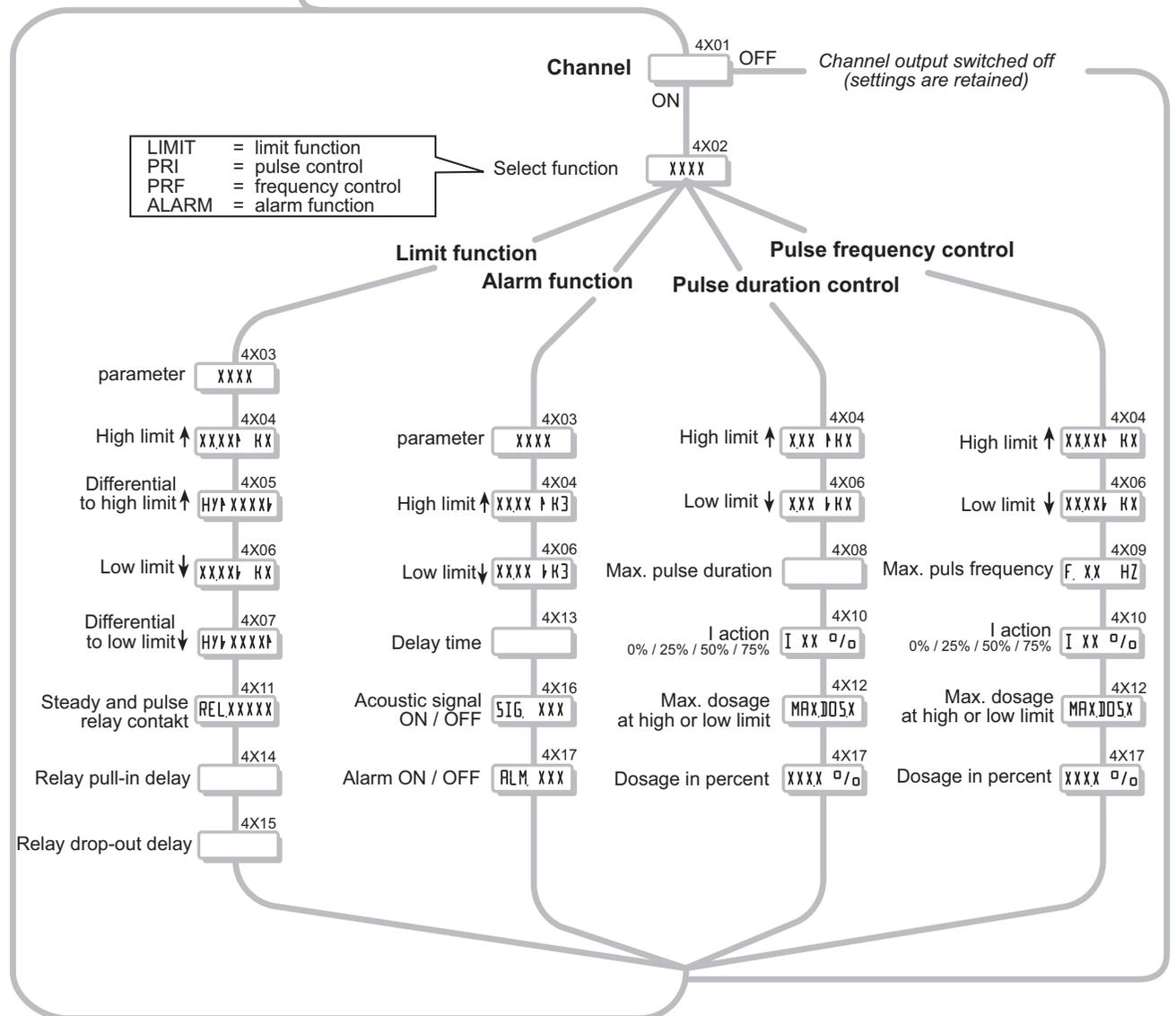
# Information Level

0003  
INFO

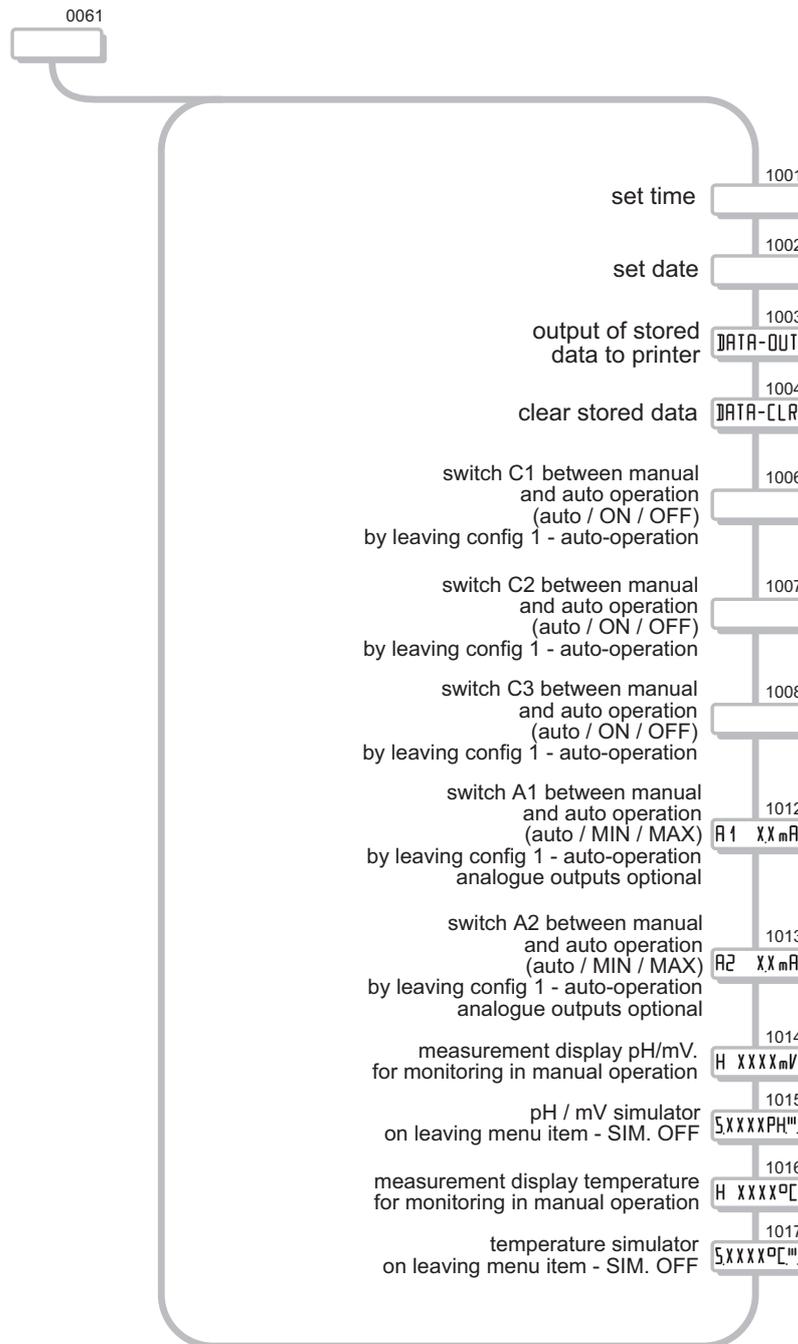
No possibility for adjustments!  
Retrieval and indication of adjusted parameters.  
**X= channel number**



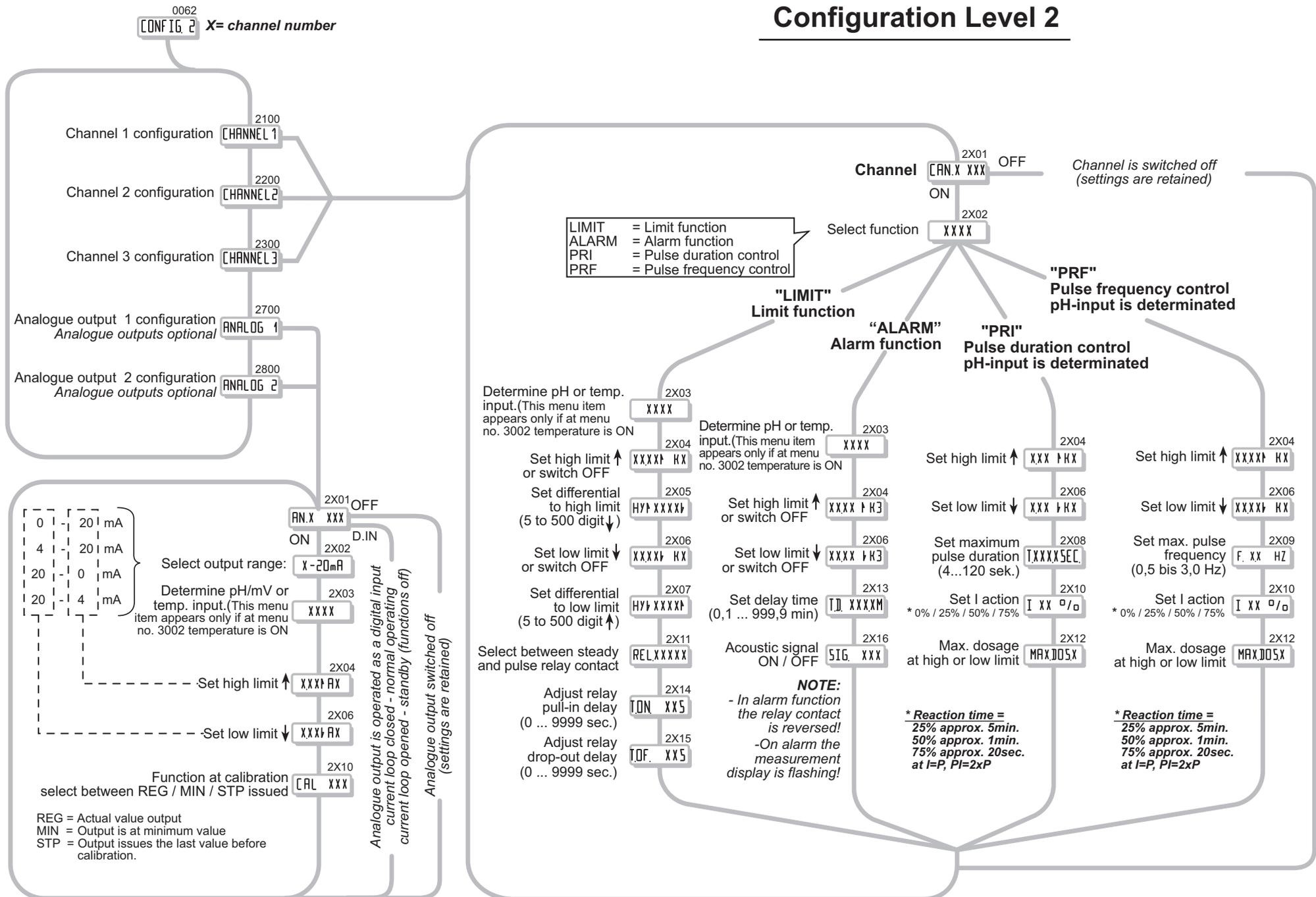
LIMIT = limit function  
PRI = pulse control  
PRF = frequency control  
ALARM = alarm function



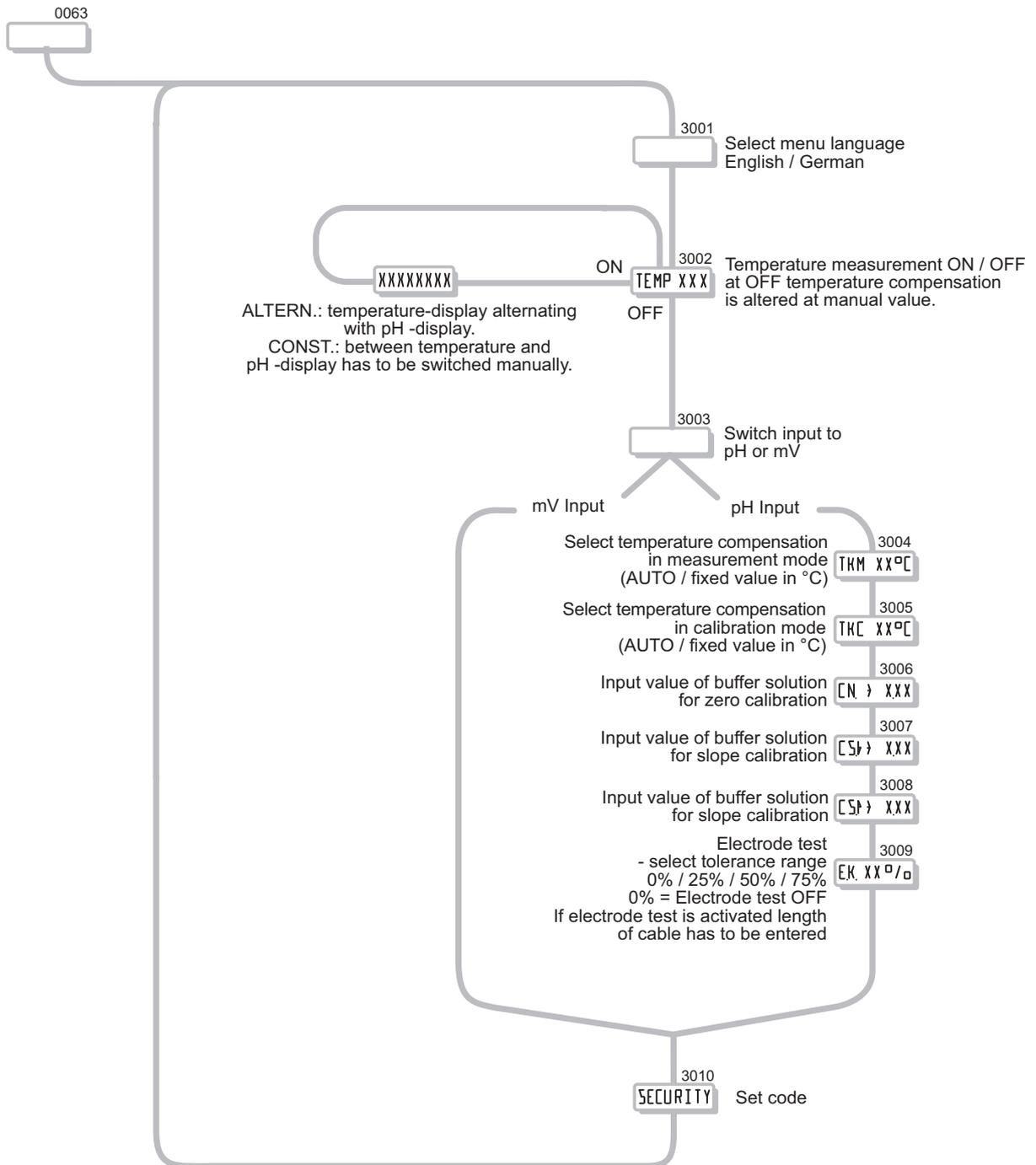
# Configuration Level 1



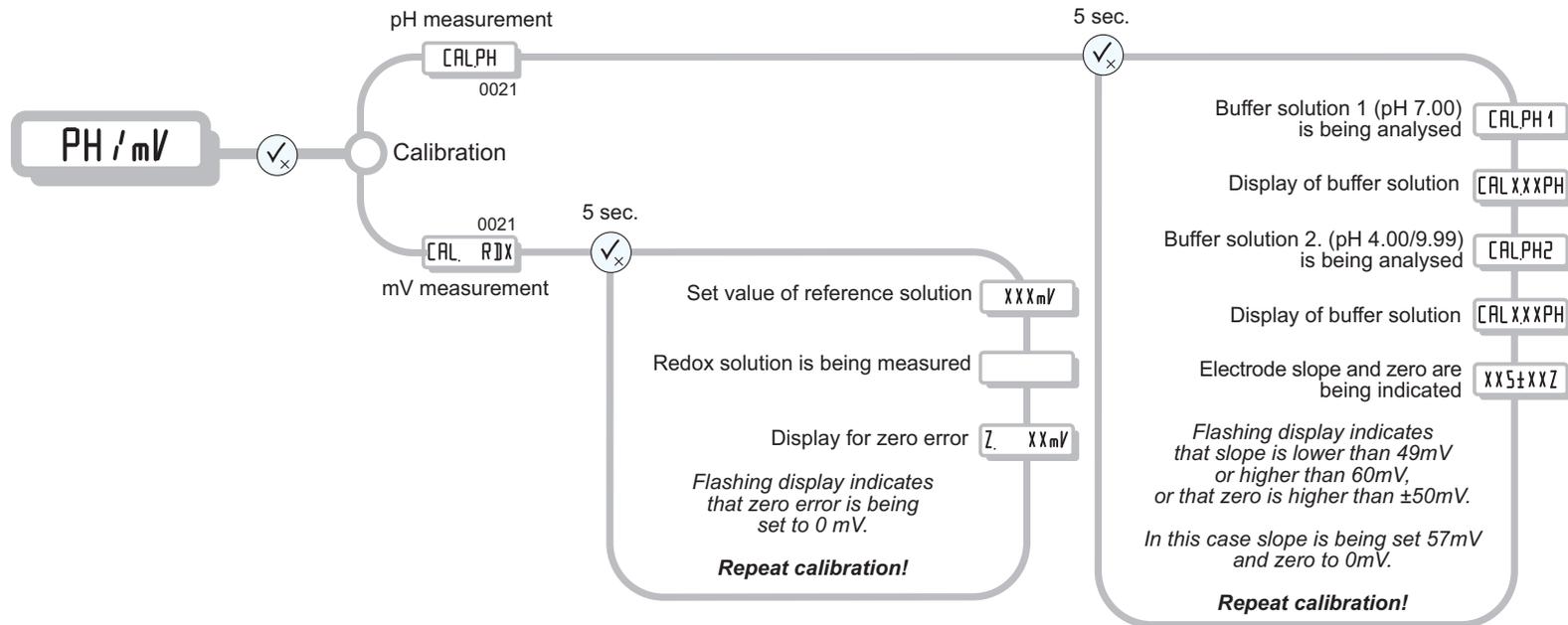
# Configuration Level 2



# Configuration Level 3

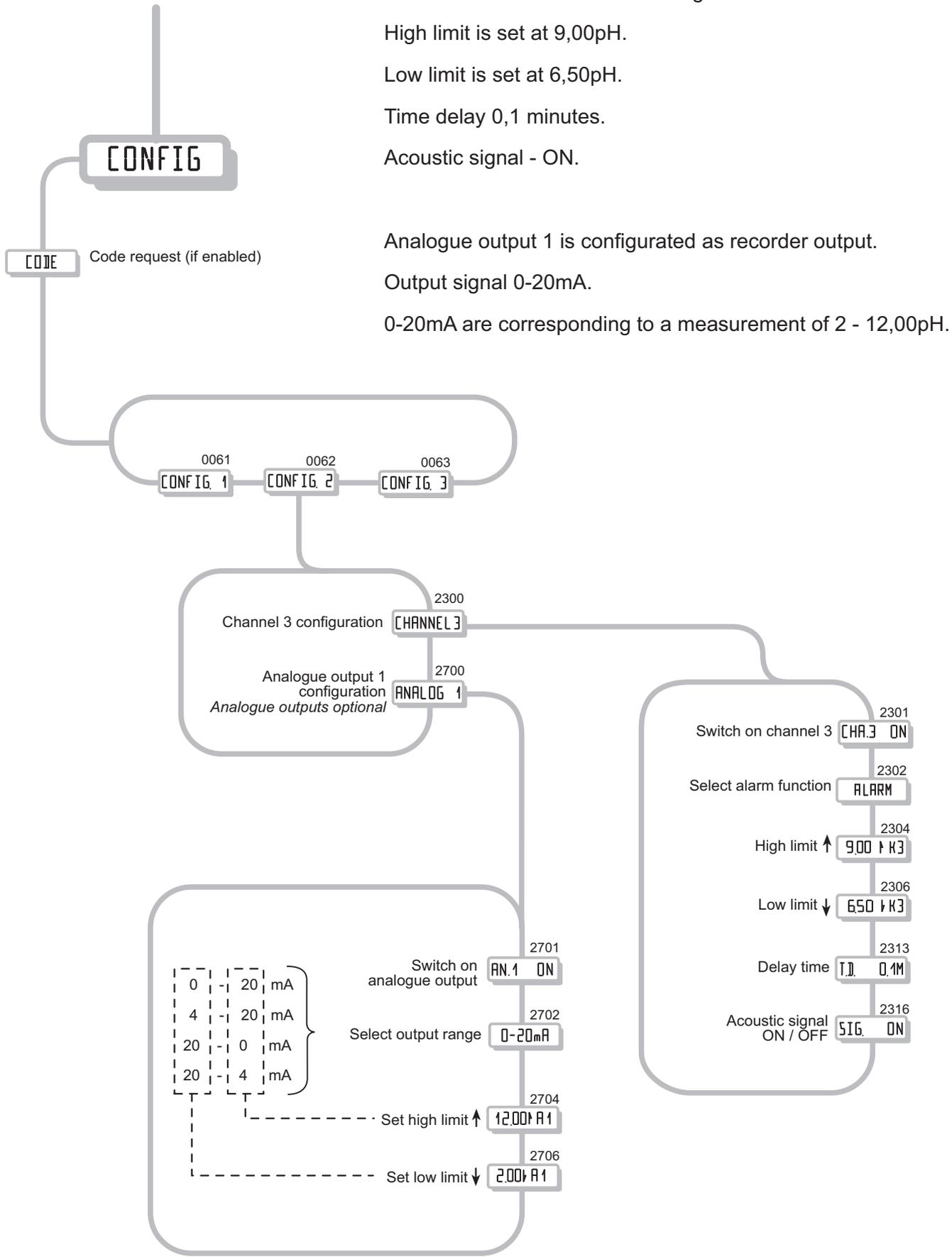


# pH / Redox - Calibration



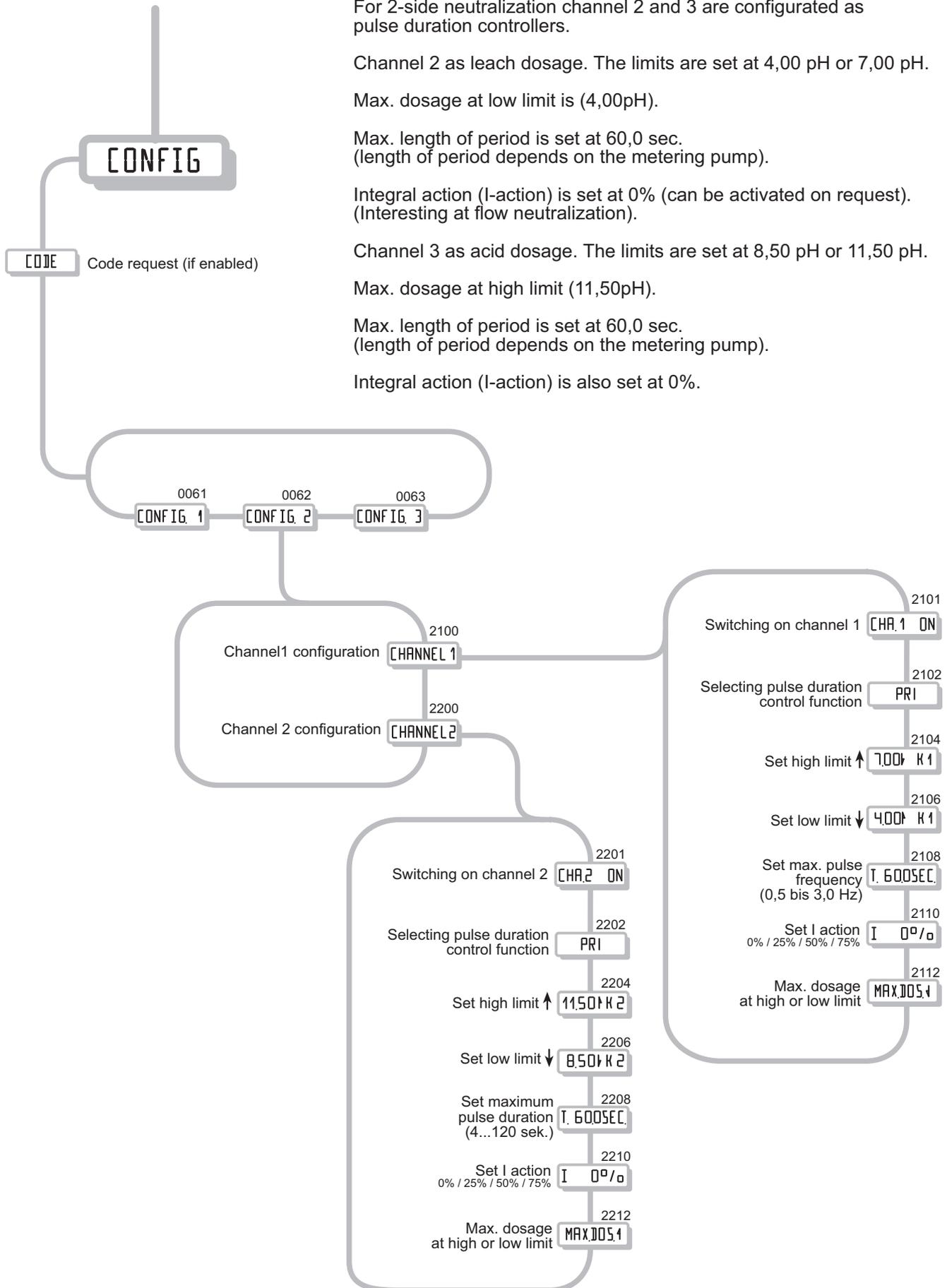
# Configuration example for end control with recorder output

## Main menu



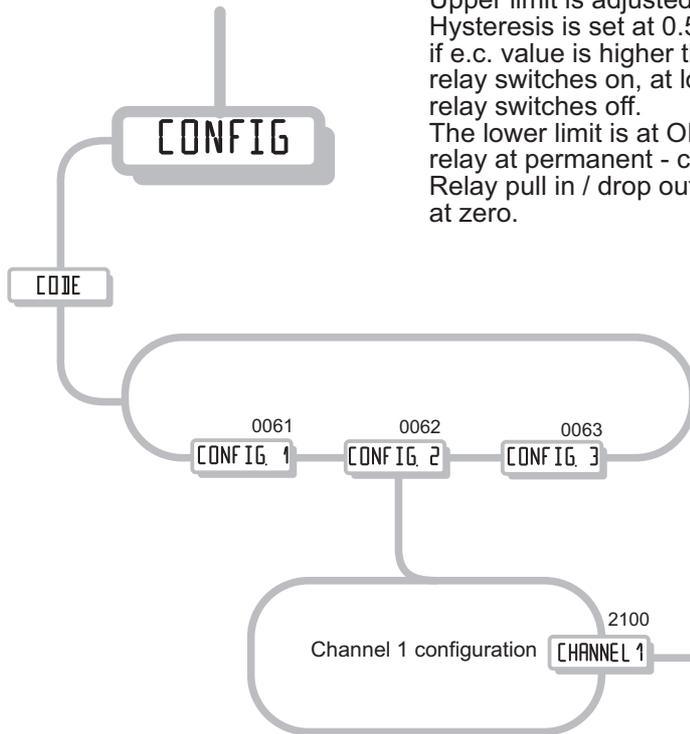
# Configuration example 2-side neutralization

## Main menu

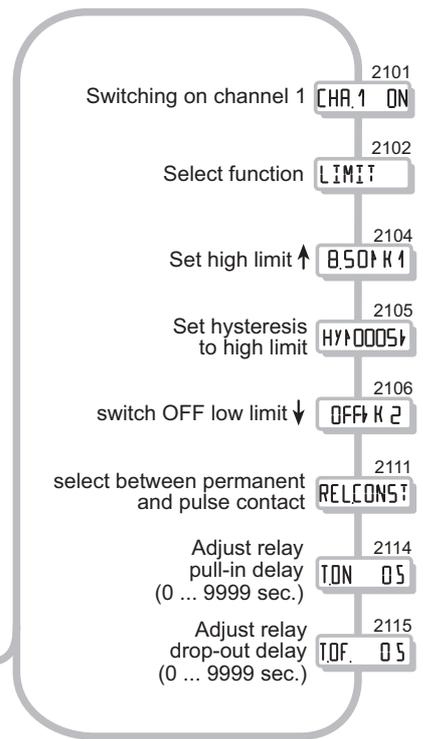


## Configuration example for limit function with one limit (relay switches at exceeding)

### Main menu

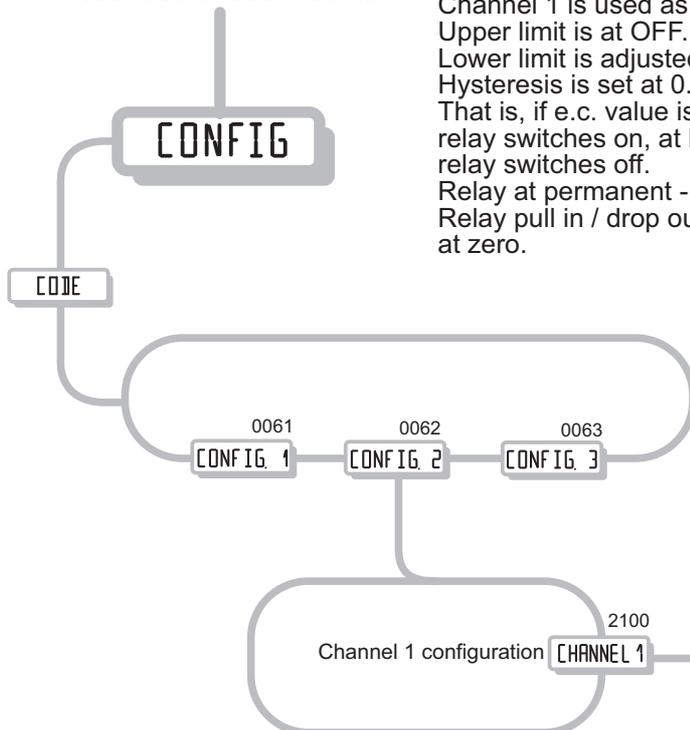


Channel 1 is used as limit switch.  
 Upper limit is adjusted at 8.50pH  
 Hysteresis is set at 0.50pH  
 if e.c. value is higher than 8.50pH  
 relay switches on, at lower than 8.00pH  
 relay switches off.  
 The lower limit is at OFF.  
 relay at permanent - contact.  
 Relay pull in / drop out delay are set  
 at zero.

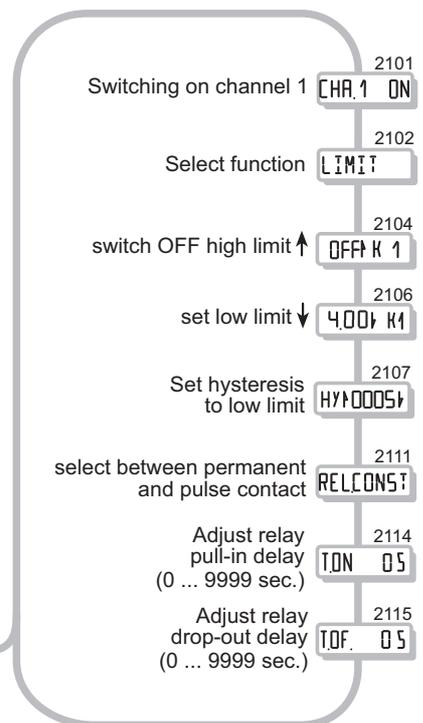


## Configuration example for limit function with one limit (relay switches at falling below)

### Main menu



Channel 1 is used as limit switch.  
 Upper limit is at OFF.  
 Lower limit is adjusted at 4.00pH.  
 Hysteresis is set at 0.50pH  
 That is, if e.c. value is lower than 4.00pH  
 relay switches on, at higher than 4.50pH  
 relay switches off.  
 Relay at permanent - contact.  
 Relay pull in / drop out delay are set  
 at zero.



# Operating Instructions

The operating instructions must be read before starting up the equipment. All information concerning hazards when using the equipment must be observed. We accept no liability for damage and operating problems arising from non-observation of the operating instructions. Before connecting the equipment to the supply, check that the voltage (V) and supply type (AC or DC) agree with the data on the instrument label.



The unit is intended for fitting into control panels, cabinets or wall-mounted housings and must only be operated when fitted into position. There must be no covers removable by hand whose removal permits contact with hazardous voltages. According to DIN/VDE 0411 the supply for the unit must be controlled by a 2-pole mains switch.

The SMART series incorporates a protective earth connection. The earth conductor must be connected with a ring cable connector to the M4 insert nut on the back of the unit (see diagramm). The earth conductor must not be disconnected while the supply voltage is connected to the unit.

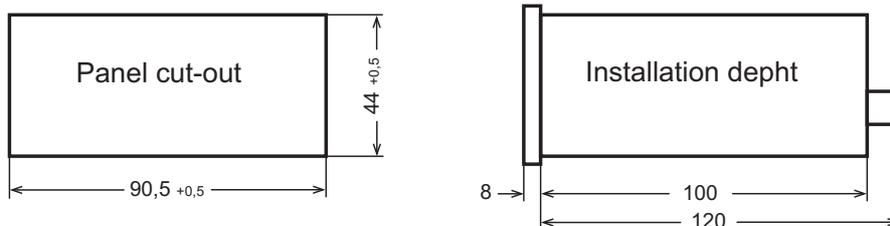
Any repair or replacement of parts, changes in the standard settings or calibration of the circuit cards in the module housing must only be carried out by a qualified engineer who is fully aware of the dangers involved and the VDE regulations.

The instrument conforms to protection class 1, is constructed and tested according to DIN/VDE 0411 and leaves the factory in perfect condition after final test and soak test.

We declare, that the instruments conform to directive 89/ 336/ EEC, 73/ 32/ EEC, 89/ 392/ EEC and EN50081-1, EN50082-1 und EN61010-1.



## Fitting dimensions:



# Error messages

Error messages				
	Fault cause	Display indication	Effect	Printer message
1	Electrode fault (cable break)	 Display alternating with measurement	Alarm initiated, all channels OFF.	F1
2	Electrode fault (glass fracture)	 Display alternating with measurement	Alarm initiated, all channels OFF.	F1
3	Temperature probe fault (cable break)	 Display alternating with measurement	Alarm initiated, all channels OFF.	F2
4	Temperature probe fault (short-circuit)	 Display alternating with measurement	Alarm initiated, all channels OFF.	F2
5	Calibration error	 Display alternating with measurement	Alarm is initiated, remaining control functions ON.	F3
6	Error analogue output 1	 Display alternating with measurement	Alarm is initiated, remaining control functions ON.	F4
7	Error analogue output 2	 Display alternating with measurement	Alarm is initiated, remaining control functions ON.	F5
	measuring range exceeding		_____	



**pH/Redox**

range: 0,00 ... 14,00 pH / ±1800 mV (Redox)  
 accuracy: 0,02 pH / 2 mV  
 input impedance >10<sup>12</sup> Ohm  
 - electrodes and cable monitored for short circuit, interruption and glass breakage.  
 - measuring input to equipment galvanically isolated.

**Temperature**

range: 0,0 ... 100,0°C  
 accuracy: 0,5°C  
 sensor: Pt100 in 2- or 4-wire circuit  
 - cable break / short circuit identified

**Outputs:**

3 volt - free relay contacts (change-over):  
 250VAC / 8A resistive load  
 for free assignment to inputs,  
 possible configurations:  
 Rel. 1-2-3 - LIMIT: limit switch  
 Rel. 3 - Alarm: monitor  
 Rel. 1-2-3 - PRI: proportional pulse duration control  
 Rel. 1-2-3 - PRF: proportional pulse frequency control

**LIMIT: limit switch adjustable:**

- possible switching characteristic: / /   
 - permanent or pulse contact  
 - switching delay 0 ... 9999 sec.  
 - switching hysteresis: 5 ... 500 Digit

**Alarm: monitor adjustable:**

- visual signal  
 - acoustic signal  
 - time delay 0,1 ... 999,9 min.  
 - manual reset

**PRI: proportional pulse duration control. adjustable:**

- integral action in 3 steps  
 - length of period: 4 ... 120 sec.

**PRF: proportional pulse frequency control. adjust.:**

- integral action in 3 steps  
 - pulse frequency: 0 ... 3 Hz  
 - pulse duration: 170 ms fixed



Water resistant front film  
 Illuminated display

article number: **13000300**

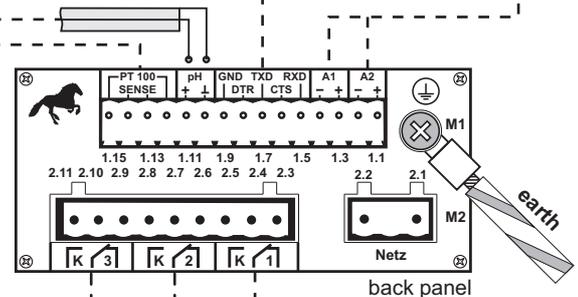
**1 - 2 Analogue outputs** option  
 (has to be ordered additionally)

- standard signal 0/4 ... 20 mA
- for free assignment to indication
- max. load: 500 Ohm
- galvanically isolated from input
- cable break indication

article number: **1300000036**

**serial interface:**  
 (RS 232)

- integrated memory store for more than 4900 pH/redox-values with date and time.
- output of measurement values to PC or serial printer
- equipment configuration via PC



power supply: 230 V AC -20% / +10%

power consumption: 50/60 Hz < 6 VA

ambient temperature: 0...50 ° C

housing: panel mounting to, DIN 43 700  
 material: antflamable Noryl  
 front dimensions: 48 x 96 mm  
 panel cut-out: 44,0 x 90,5 mm  
 installation depth: 120 mm

connections: connector- srew terminals

weight: approx. 450g

climatic resistance: rel. humidity ≤ 75% condensation to EN 61 010

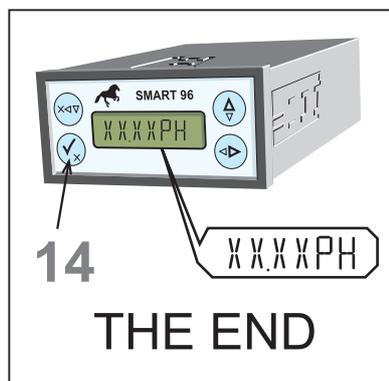
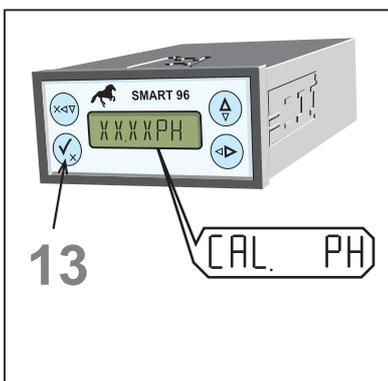
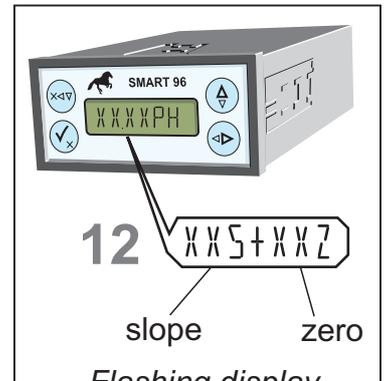
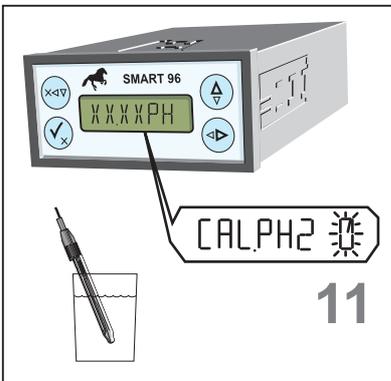
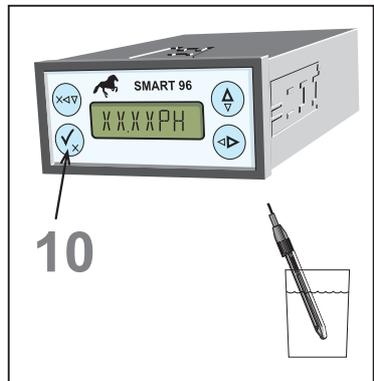
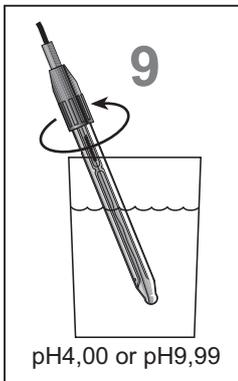
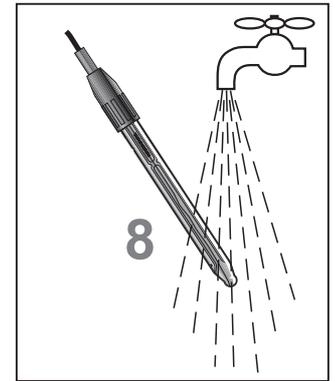
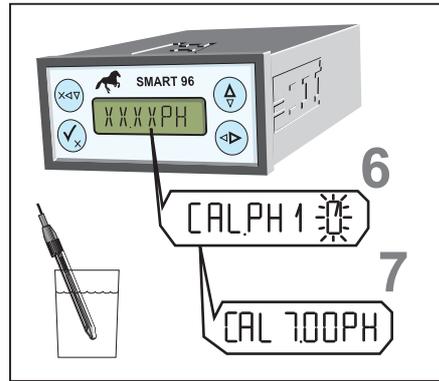
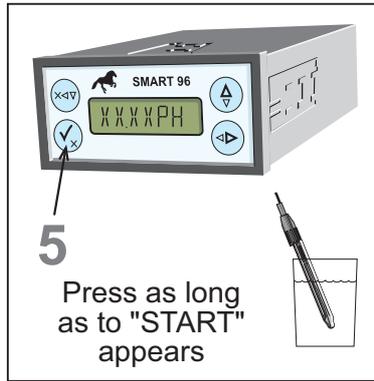
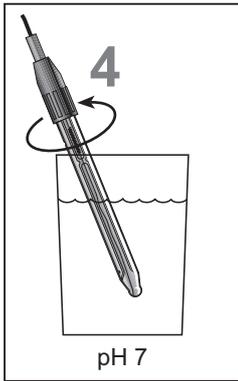
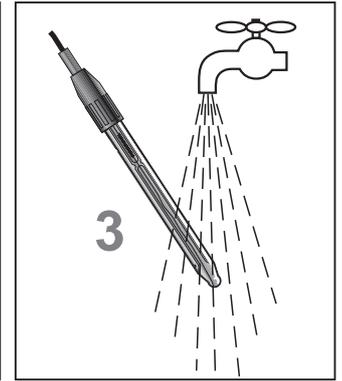
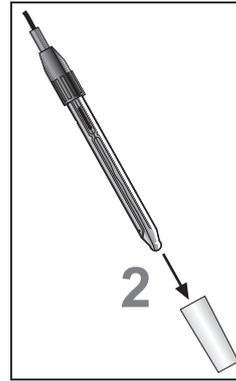
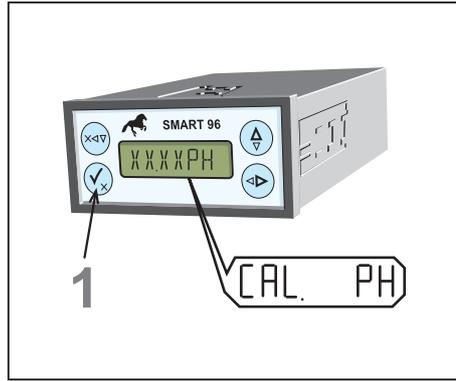
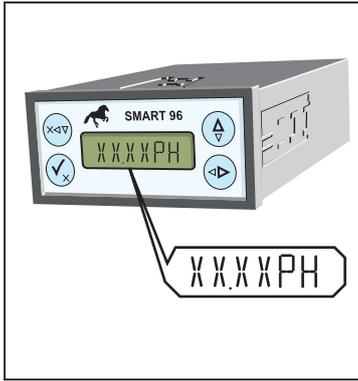
electric tests: air and creep distances for - overvoltage categorie II - contamination grade 2

protection class: 1  
 enclosure rating: to EN 60 529 front IP65

electromagnetic compatibility: on NAMUR recommendation NE21, EN 50 081 Part 1, EN 50 082 Part 2



# BRIEF INSTRUCTIONS pH-CALIBRATION



Measurement			
problem	possible causes	no	hints
Wrong measuring value	electrode is not correctly connected	M1	Control the connection of the electrode  Smart LC pH  clamp 1.3 ← protection clamp 1.4 ← inside conductor  Smart 96 pH  clamp 1.10 ← protection clamp 1.11 ← inside conductor  Completely remove the black, semi-conductive coating under the protection. (Avoid finger prints on the inner isolation)
	pH cable faulty	M2	Only use special ph-electrode cable. Avoid piecing, protect against humidity. Do not strongly bend the cable.
	System is not calibrated with the electrode	M3	Calibrate the system according to "SHORT INSTRUCTION PH-CALIBRATION"
	temperature compensation is not set correctly	M4	menu no 3004 <b>TKM</b> mode of temperature compensation during measurement  menu no 3005 <b>TKC</b> mode of temperature compensation during calibration  Smart LC pH  Pt 100 on clamp 1.5 + 1.6 → TKM/TKC auto  clamp 1.5 + 1.6 open → TKM/TKC set medium temperature  Smart 96 pH  Pt 100 on clamp 1.12 + 1.15 → TKM/TKC auto  clamp 1.12 + 1.15 open → TKM/TKC set medium temperature
calibration error flashing signal after calibration	electrode dirty or faulty (resp. used)	M5	Check the electrode on dirtiness or glass breakage Clean resp. change Avoid humidity within plug-in head
	Buffer solutions are not set correctly	M6	Always use a buffer solution for zero point and slope
		M7	Set available buffer solutions in the system:  menu no 3006 zero point e.g. (standard pH 7,00) menu no 3007 slope e.g. (standard pH 4,00) menu no 3008 slope e.g. (standard pH 9,99)
	Buffer solutions old and used	M8	Change buffer solutions



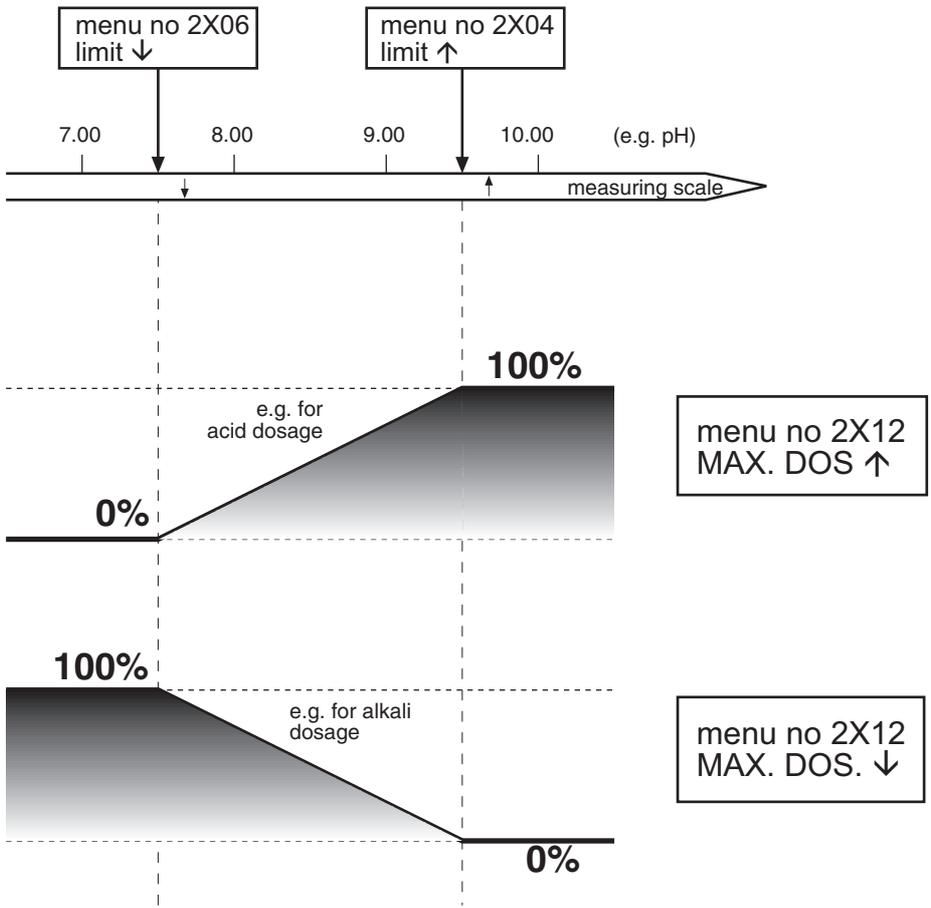
Measurement			
problem	possible causes	no	hints
<b>Smart LC pH only</b>			
Wrong measuring value only for analogue output (not for ISO analogue output)	Signal of analogue output interferes as there is no galvanic separation	M9	Disconnect the analogue output. If now the measuring value is correct, the analogue output has to be changed with an ISO analogue output. (Order no 1300B1050)
<b>Smart 96 pH only</b>			
E.L. fault (electrode fault)	Control of electrodes is not correctly set	M10	menu no 3009
	electrode cable is not correctly connected	M11	look at no M1
	pH cable defect	M12	look at no M2
	Electrode defect	M13	Control the electrode on glass breakage and exchange if necessary
	interruption	M14	Electrode used or cable interrupted
E.L. fault ↓	end	M15	glass breakage or cable end resp. humidity within the plug or cable
pH/mV-indication changes with temperature indication	indication is set on change	M16	menu no 3002 press enter two times, then choose between <b>PERMANENT</b> : no automatic change of indication, manual change possible <b>CHANGE</b> : indication of pH/mV value changes with indication of temperature
Data output does not work		M17	Conductions: Connect RXD of SMART with TXD at (PC) and connect TXD of SMART with RXD of (PC).
Data output: wrong date and time	On mains failure time and date will be set back.	M18	set menu no 1001: time set menu no 1002: date



Relay outputs				
problem	possible causes	no	hints (X = channel number)	
Limit cannot be set  (EC systems only)	Limits cross	R1	A upper $\uparrow$ and a lower $\downarrow$ limit can be set at every channel. Please ensure that the upper limit $\uparrow$ is to be set higher than the lower limit $\downarrow$ , resp. that the limit which is not needed is switched off. (look configuration examples)	
	Limit exceeds the measuring range chosen	R2	Limits have to be within the chosen measuring range; expand the measuring range if necessary  menu no 3008	
Relay does not switch on resp. not controlled	Channel is not switched on	R3	menu no 2X01 Control channel	
	Limit is not set correctly	R4	Control limits: $\uparrow$ = Relay will get active upon exceeding. $\downarrow$ = Relay will get active upon dropping below	
	Wrong fonction chosen	R5	menu no 2X02 :  <b>GW</b> : limit <b>PRI</b> : proportional control of pulse length <b>PRF</b> : proportional control of pulse frequency <b>Alarm</b> : alarm (signal on/off)	
	Relay is set on pulse contact instead of permanent contact	R6	menu no 2X11  <b>PERMANENT</b> set (standard) (The relay will remain active during the limit exceeding) or <b>PULSE</b> set (On limit exceeding the relay switches on and switches off afterwards.)	
	Time delay is set	R7	menu no 2X14 <b>T.E.V.</b> (switch-on delay)  menu no 2X15 <b>T.A.V.</b> (switch-off delay)  (values in seconds)  possibly: If zero is indicated, confirm with enter by pressing two times	
	Upper and lower limit are exchanged	R8	<b>GW<math>\uparrow</math></b> On dropping below the set limit, the relay switches on. On exceeding it switches off including the hysteresis set.	
	Upper and lower limit are exchanged	R9	<b>GW<math>\downarrow</math></b> On exceeding the set limit, the relay switches on. On dropping below it switches off including the hysteresis set.	
	alarm time delay is not correctly set	R10	menu no 2X13 <b>T.V.</b> (values in seconds)	
	PRI/PRF	R11	look page proportional control	
	I-Anteil	R12	menu no 2X10 only important to remove remaining P-deviation e.g. for continous neutralization (standard 0 %)	
	Wrong measuring value assigned	R13	menu no 2X03 Pay attention to assignment.	
	(Smart 96 only)			



## Proportional-control (PRI/PRF) (X = channel number)



menu no 2X02	PRI = proportional control of pulse length PRF = proportional control of pulse frequency
Output signal at PRI  menu no 2X10 Time of period	
Output signal at PRF  menu no 2X10 maximum pulse frequency (Hz)  Hz = pulses per second pulse length = 170 ms	

