MultiCONT

INSTALLATION AND PROGRAMMING MANUAL

2nd Edition

1418

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TABLE OF CONTENT

1. APPLICATION 4
2. TECHNICAL DATA 4
3. ORDER CODE 6
3.1. DIMENSIONS 7
3.2. SAFETY REGULATION OF EX APPROVED UNITS 8
4. ELECTRIC CONNECTION 9
4.1. ARRANGEMENT OF THE CABLE TERMINALS 9
4.2. WIRING OF THE TRANSMITTERS 10
4.2.1. *Wiring of the 2-wire transmitters* 10
4.2.2. *Wiring 4-wire transmitters* 11
4.2.3. *Wiring of combined system* 12
5. PROGRAMMING OF MULTICONT 13
5.1. STEPS OF PROGRAMMING 14
5.1.1. *Stepping between menu tables and scrolling menu points* 15
5.1.2. *Activation of devices, relays and current generators* 16
5.1.3. *Assignment of (relay and current) output to device* 17
5.1.4. *Editing parameter values* 18
5.1.5. *Editing characters (e.g. Short tag)* 19
5.2. COMMISSIONING OF NETWORK WITH MULTICONT 20
5.2.1. *Preparing transmitters* 20
5.2.2. *Wiring* 21
5.2.3. *Commissioning of MultiCONT* 21
5.3. MAIN MENU 27
5.4. MULTICONT CONFIGURATION 28
5.5. PROGRAMMING DEVICES 34
5.6. REMOTE PROGRAMMING 35
5.6.1. *Editing the linearisation table* 37
5.7. RELAY CONFIGURATION 38
5.8. CURRENT GENERATOR CONFIGURATION 44
5.9. SWITCHING ON 45
5.10. MEASUREMENT MODE 47
6. ERRORS, ERROR MESSAGES, ERROR CODES 48
7. PROTECTION OF SETTINGS BY HARDWARE 50
8. FUSE REPLACEMENT 51

Appendix

1. MANUFACTURER'S IDENTIFICATION CODES (ID) 52
2. MULTICONT PRW-100 MENU SYSTEM 53
3. PROGRAMMING RELAYS 54
4. PROGRAMMING CURRENT GENERATORS 55
5. MEASUREMENT MODE 56

Thank you for choosing a NIVELCO instrument.
We are sure that you will be satisfied throughout its use.

1. APPLICATION

MultiCONT P-100 series is first of all a controller and display capable to provide powering for 2-wire devices (transmitters) and accomplish complex control tasks. Further it is a „MASTER" for all NIVELCO made smart transmitters as well as a universal interface between field devices with HART and other components of the process control system such as PC, PLC, displays and different actuators. MultiCONT P-100 units support communication with a maximum of 15 ordinary or 2 Ex certified HART-capable NIVELCO made 2- or 4-wire transmitters. Should a system contain more transmitters than one MultiCONT can handle further MultiCONT units can be organized in row by RS485. Remote programming of the transmitters and downloading of the measured data is a routine for the MultiCONT. Measured values and new values calculated from the measured ones can control different outputs such as 4 ... 20 mA, relays and digital output. Large DOT matrix LCD panel facilitate a wide variety of display functions including tank content visualization. The output facilities of the basic unit can be extended with external (relay and/or current generator) modules.

Explosion proof certified versions of the MultiCONT should be accommodated in non-hazardous area.

2. TECHNICAL DATA

TYPE			P□□ - 1□□-□
Installation			Wall mounting
Ambient temperature		PRC, PRD, PRW	-20 °C ... +50 °C
		PRH	-30 °C ... +50 °C
Output	Transmitter power supply		30 V DC 60 mA,(for Ex version: 25 VDC / 22 mA)
	Display		120 x 32 Dot-matrix/ 128 x 64
	Analogue		Max. 2 x 4 ... 20 mA, galvanically isolated max load 500 ohm, over-voltage protection
	Relay		Max. 4 x SPDT 250 V AC ; AC 1. 5 A
	RS 485 interface		Galvanically isolated MODBUS protocol
	HART		HART output signal level 0.5 ±0.1 V_{pp} trapezoid 1200 / 2200 Hz Minimal input signal level: 50 mV_{pp} Input sensor resistance 255 ohm.

TYPE		P□□ - 1□□-□
Cables	Powering, relays, analogue 4 ... 20 mA	0.5 ... 2.5 mm^2 core cross section
	RS 485 interface	Shielded, twisted cable pair, cross section: 0.5 ... 2.5 mm^2
	HART cabling	Below 1500 m Shielded, twisted cable pair, min. cross section 0,5mm Over 1500 m Two shielded, twisted cable, min. cross section 0,8mm Resistance max. 75 ohm, capacitance max. 225 nF
Number of transmitters to be powered		15 ordinary or maximum 4 Ex transmitters
Power supply / consumption / maximum voltage		85 ... 255 V AC 50 ... 60 Hz / 12 VA / 255 V_{eff} 11,4 ... 28 V AC 50 ... 60 Hz / 12 VA / 28 V_{eff} 11,4 ... 40 V DC / 11 W / 40 V DC
Fuses		85 ... 255 V AC 50 ... 60 Hz T400 mA 11,4 ... 28 V AC 50 ... 60 Hz and 10,5 ... 40 V DC T1A
Housing material		Polycarbonate (PC)
Installation		Wall mounting
Ambient temperature	P□C, P□D, P□W	- 20 °C ... + 50 °C
	P□H	- 30 °C ... + 50 °C
Ingress protection		IP65
Ex marking		⟨Ex⟩ II (1) G [EEx ia] IIB
Intrinsical safety data		U_0 = 30 V I_0 = 140 mA P_0= 1 W L_0 = 4 mH C_0 = 200 nF
Electric protection		Class I/III
Mass		0.9 kg

2.1. ACCESSORIES

Guarantee certificate
Installation and Programming Manual
Manufacturer's Declaration
2 nos cable gland sealing

3. ORDER CODE

MultiCONT P □□ – 1 □□ – □

EXTENSION	CODE
Standard *	R
Not extendable	E

ENCLOSURE	CODE
IP 65	W
IP 65 with transparent cover	C
IP 65 with lockable transparent cover	D
IP 65 with transparent cover and heating	H**

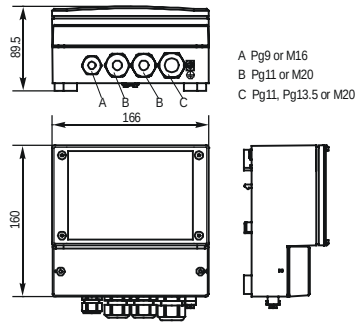
INPUT	CODE
1 tx with HART	1
2 tx with HART	2
4 tx with HART	4
8 tx with HART	8
15 tx with HART	M

OUTPUT	CODE
Display only	0
1 relay	1
2 relays	2
3 relays	3
4 relays	4
1 relay + 1x4…20 mA Analogue output	5
2 relays + 1x4…20 mA Analogue output	6
3 relays+ 1x4…20 mA Analogue output	7
4 relays + 1x4…20 mA Analogue output	8
4 relays + 2x4…20 mA Analogue output	9
RS 485 interface	A
RS 485 + 1x4…20 mA	B

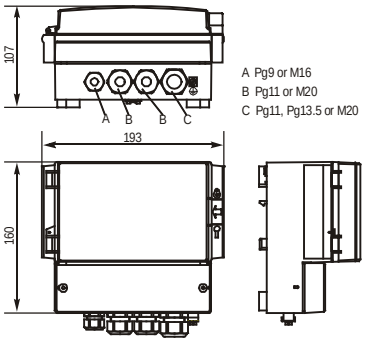
POWER SUPPLY	CODE
85 … 255 V AC	1
24 V AC / DC	2
85 … 255 V AC Ex	5
24 V AC / DC Ex	6

Order codes of the certified units are followed by „Ex" tag.
* Standard units can be extended with relay-, current generator- and combined modules.
**Not available yet, Under development

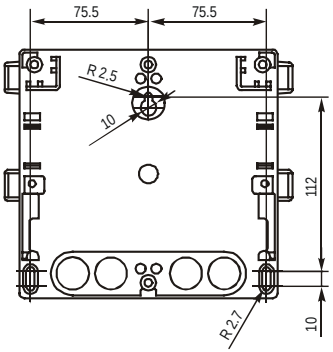
3.1. DIMENSIONS



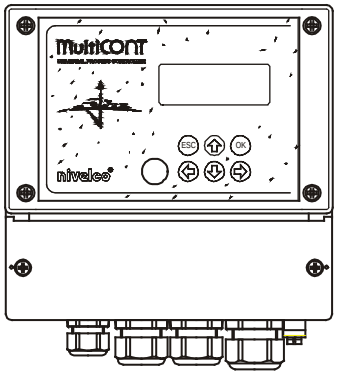
P□W



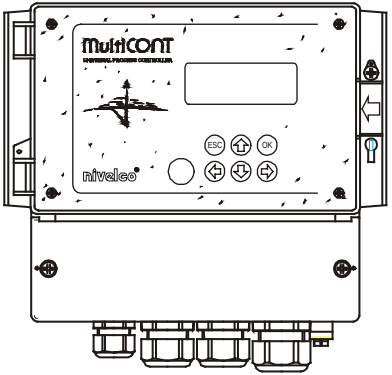
P□C, P□D, P□H



ARRANGEMENT OF MOUNTING BORES



P□W



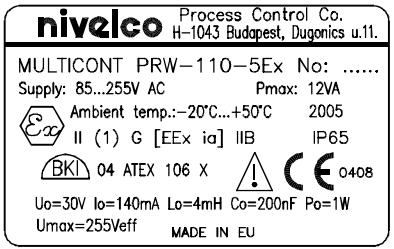
P□C, P□D, P□H

3.2. SAFETY REGULATION FOR THE EX APPROVED UNITS

See arrangement of the Ex certified devices in 4.2.4

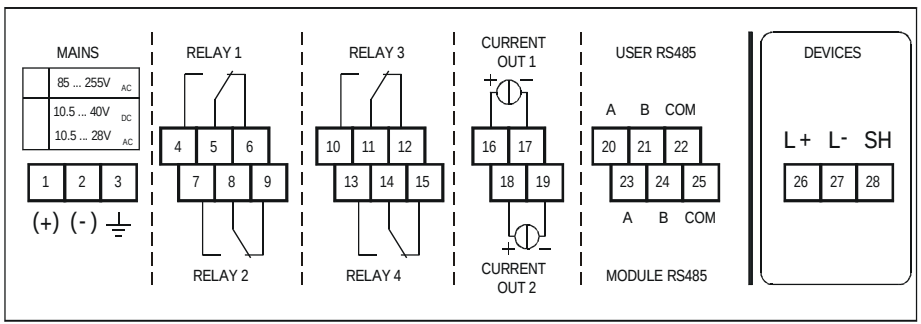
Explosion proof certified versions should be accommodated in non-hazardous area!
Device should be protected against direct sunshine!
Power supply and temperature data must not exceed those given in the Technical Data!
Cable of the Ex certified devices in hazardous area should be connected to the terminals L+ and L- !
Housing of the transmitters should be grounded!
Wiring to the transmitters should be made with shielded, twisted cable pair!

Data table of the Ex device:



4. ELECTRIC CONNECTION

4.1. ARRANGEMENT OF THE CABLE TERMINALS



After loosening threads and removing cover of the wiring terminal the cables can be connected. The same cable should not be used for AC and DC as well as different cables should be applied for SELV and mains voltage.

For wiring of the transmitters shielded, twisted cable pair (STP) should be used with length depending on number of units and technical data of cable.

RS485 interface: A: TRD+
B: TRD–
COM: shielding

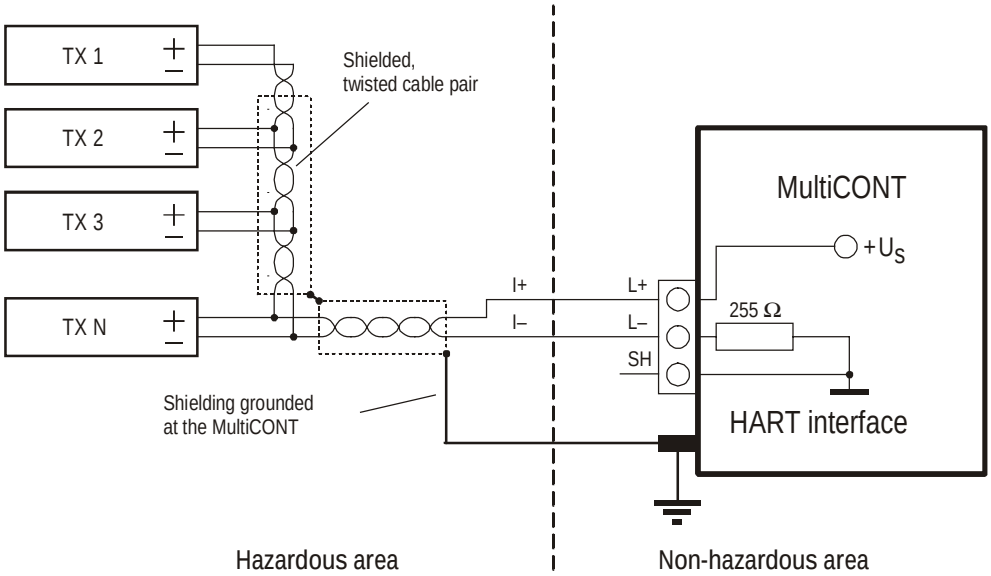
Number of TX	Cable capacity (pF / m)			
	65	95	160	225
1	2800	2000	1300	1000
5	2500	1800	1100	900
10	2200	1600	1000	800
15	1850	1400	900	700

Shielding of the interconnecting cable between the transmitter and the controller should be grounded at one end preferably at the MultiCONT.
Intrinsically safe (Ex) transmitters should be connected through the terminals L+, L– to the controller. These points are galvanically isolated from the other parts of the electronics and the power supply for the Ex transmitter is current, voltage and power limited.

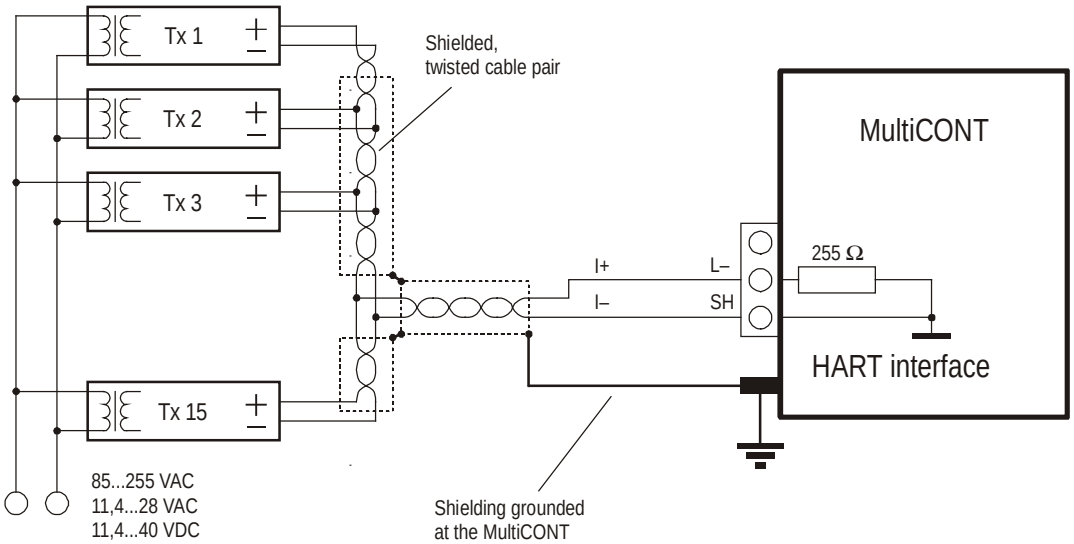
4.2. WIRING

Before wiring the units are suggested to be checked for type (all Tx with HART), value of loop current and Short address (transmitters should have different addresses). See 5.2. Steps of set up

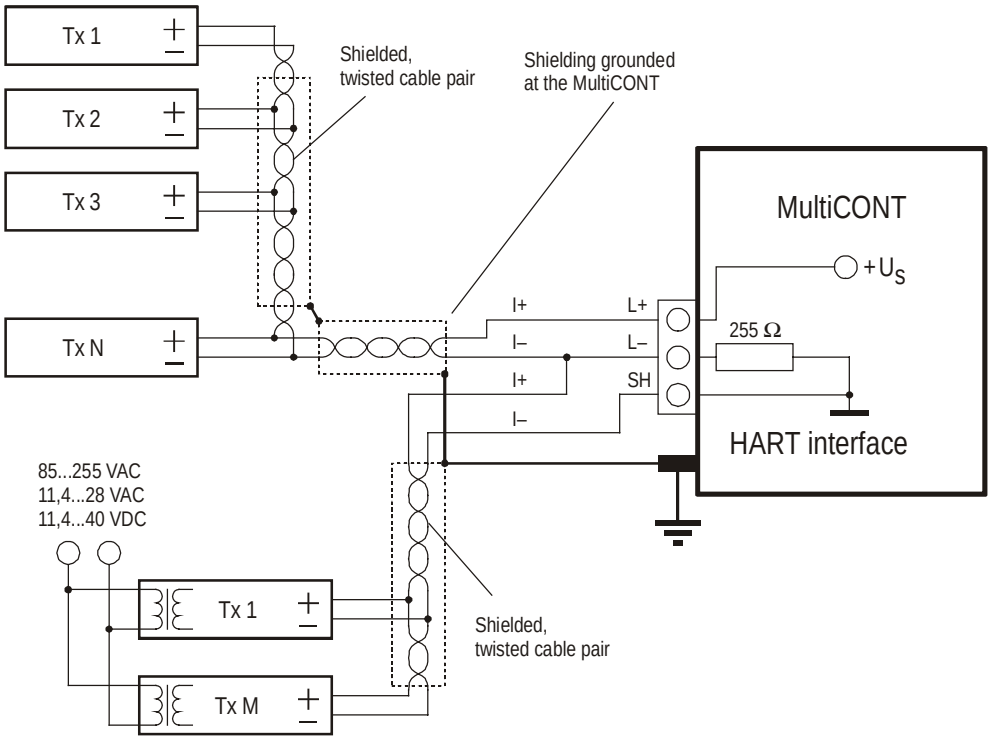
4.2.1. Wiring of the 2-wire transmitters



4.2.2. Wiring of the 4-wire transmitters



4.2.3. Combined system (containing 2- and 4-wire transmitters)



5. PROGRAMMING OF MULTICONT

During programming the following can be performed:

Automatic detection of devices (transmitters)

connected to the MultiCONT, their taking up in the list of devices. Devices not being on the list are part of the system but unable to communicate with the MultiCONT (see 5.2.3 Main menu/MultiCONT config / DEV detect).

Activation, inactivation of devices (transmitters)

Theoretically all devices in the system should be working. For this, however devices should be activated, since MultiCONT will query the activated transmitters only and those, which are inactive not. Devices wishing to be temporarily out of use for any reason can be cut out by inactivation. (See 5.2.3 Main menu/ Devices)

Activation, inactivation of relays and current generators

Relays and current generators of the MultiCONT should also be activated (see Attachment 3 and 4)

Assignment of the MultiCONT outputs (relays, current generators) to devices (transmitters)

or to functional values composed from the measured values

Setting composition of functional values

Functional values can be composed from measured values such as difference (of e.g. two levels), sum of two measurement values, average of measurements.

Remote programming of devices

however programming of devices is supposed to perform in the workshop before their installing and wiring.

(P01, P02, etc. parameters of the transmitters will be used in this Manual the same way as described in their Installation and User's Manual)

Programming of MultiCONT

Relay parameters and current generator parameters of the MultiCONT will be identified as RP1, RP2, RP3 and CR1, CR2, CR3 respectively.

For planning, erection and putting into operation of systems involving MultiCONT sound knowledge of the HART standard and devices applied is required.

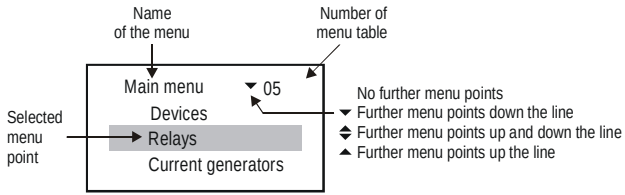
During programming full scale of operation such as polling of devices, function of relays and current generators will be maintained. Modifications will only be effective after clicking OK in Main menu /Save and returning back to measurement. If the MultiCONT is left in Programming Mode by mistake, it will automatically return to measurement after 5 minutes following the last clicking on any key (modifications will be lost!).

5.1. STEPS OF PROGRAMMING

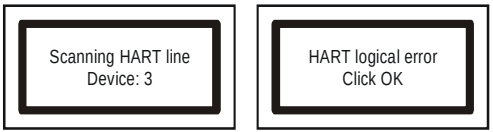
Programming is to perform by the 6 programming keys aided by Menus displayed on the 120x32 point graphic screen. There are three different kinds of images

- Measurement/operation images (marked with capital letters in the upper right corner (Appendix 5):
  M Measurement, see 5.10 Measurement mode
  U User image, see 5.4 MultiCONT configuration
  R Relay assignment table
  C Current generator assignment table
  E Error list, see 6. Error codes

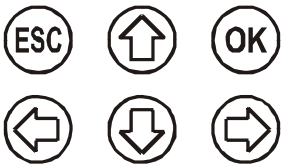
- Images of setting and progr-amming:



- Box messages / warning indicate steps taken by the unit or those to be performed:



See main steps of programming below while the complete menu system is to be found in Appendix 2. Relevant menu point and value to be edited appears inverse.

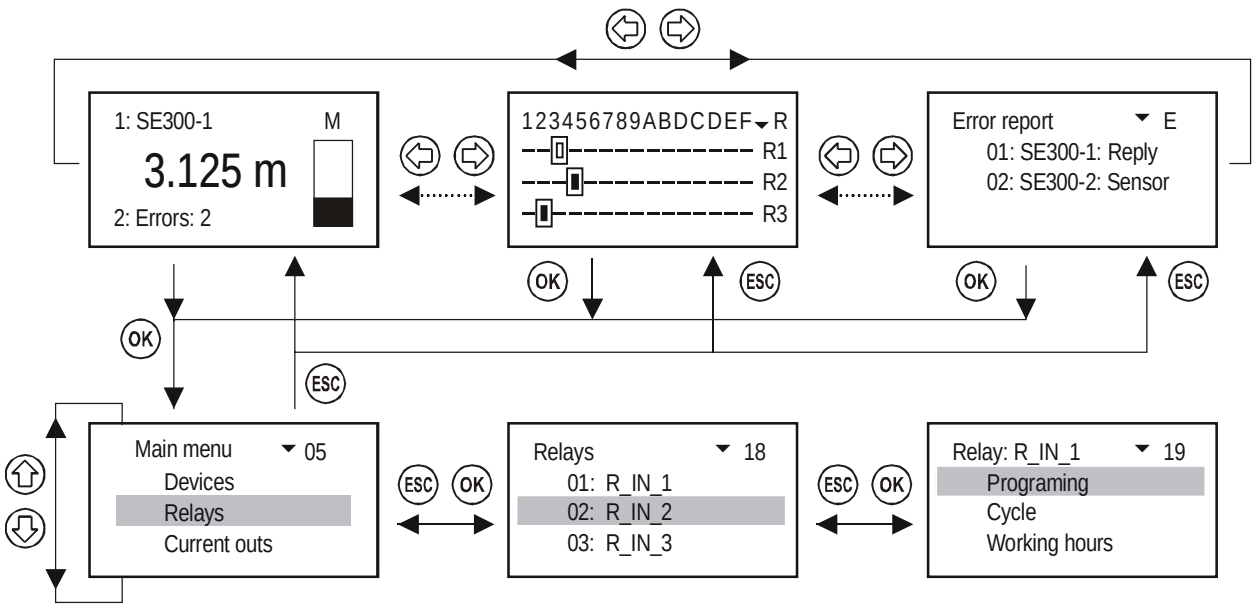


Keys ⇩ and ⇧ are used to step within the menu. The function is of repeating i.e. steady pressing results in continuous stepping (round).
Programming mode can be entered by pressing OK and quitted by pressing ESC.

Keys ⇦ ⇨ are used for editing parameters with numbers or text, choosing local value or position of character to edit and in some menu tables (e.g. in table 18) for marking/activating. Repeating function keys ⇩ and ⇧ are used for scrolling numbers and characters when editing parameters with numbers or text. (steady pressing results in continuous stepping up-down or round).. Use ESC for quitting error messages (deleting error list).

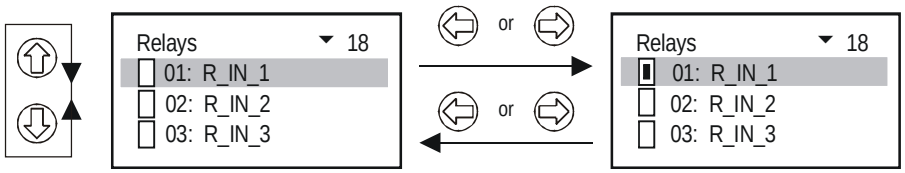
5.1.1. Stepping between menu tables and scrolling menu points

Images (M, U, R, C, E) A can be changed by the keys ⇦ and ⇨ while pressing key
OK and ESC the Main menu can be entered and left respectively.
Keys ⇩ and ⇧ should be used for scrolling menu point. The function is of repeating i.e. steady pressing results in continuous stepping (round).



5.1.2 Activation (of devices, relays and current generators) selection (of language and operation mode)

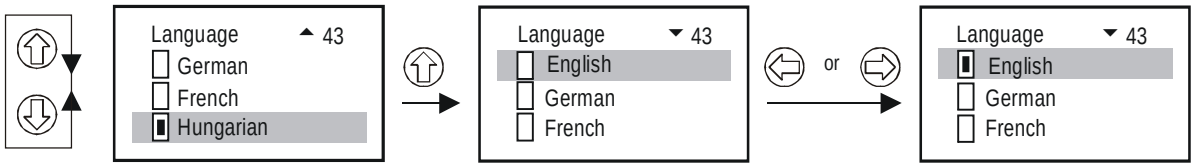
Devices on the list may be active (▮) or inactive (☐). Only active devices will be queried. Active relays and current generators would operate according to their setting, inactive relays are de-energized output of inactive current generator is 0 mA.



No active relay. R_IN_1 is active

Change over between active and inactive relay states with keys ⇦ ⇨ .

Marking/activating of other functions or features (activation of current generator, language, etc.) will be performed the same way.



After activating a language, it will be changed immediately.
IMPORTANT! Setting should be saved under menupoint Main menu/Save

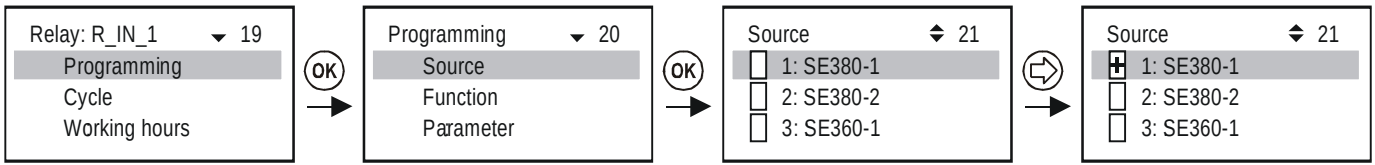
5.1.3. Assignment of (relay and current) output to device

During configuring relays and current generators of the MultiCONT should be assigned to field devices the output value of which should be defined as below:

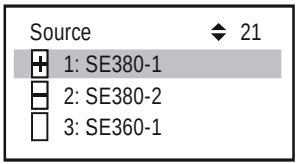
- ⊞ Value is taken with positive sign (for summation)
- ⊟ Value is taken with negative sign (for measuring difference)
- ▯ Average will be calculated with devices of this marking

Above setting can be changed with keys ⇨ and ⇦.

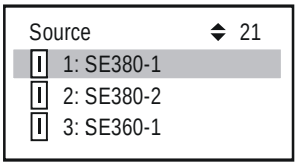
Assignment of device SE380-1 to the relay R_IN_1 in the MultiCONT should be performed as below:



Definition of the output value:



Relay R_IN_1 would be controlled by the **difference** of the measured values of SE380-1 and SE380-2



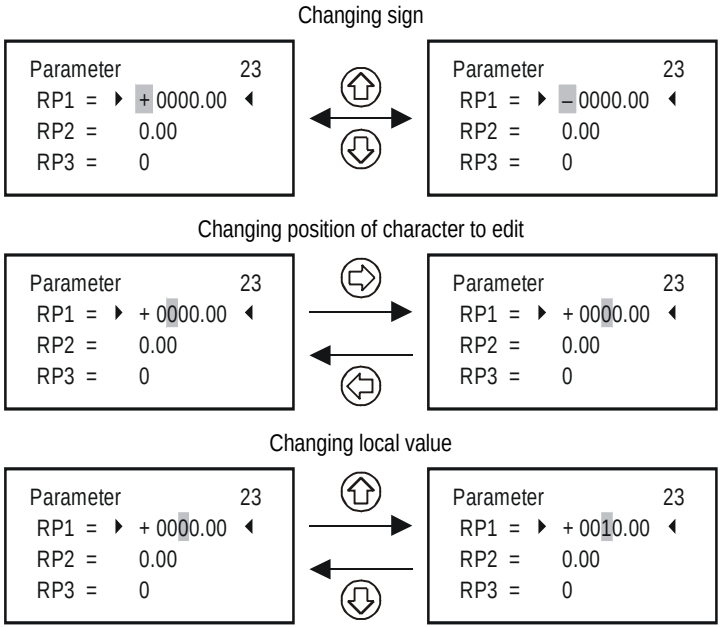
Relay R_IN_1 would be controlled by the **average** of the measured values of SE380-1, SE380-2 and SE360-1

Important: If there are more than one device assigned to a relay (for controlling by difference or average value) all devices should be programmed for measuring the same parameter (DIST, LEV, ...) and in the same engineering unit (m, ft, inch, ...) otherwise MultiCONT would send (Program) error message.

5.1.4. Editing parameter values

MultiCONT parameters have mathematics signs and local values. Signs and value can be modified with keys ⇦ ⇨ .

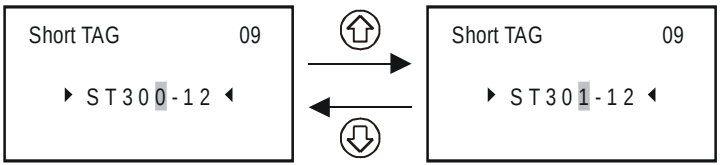
The keys ⇧ and ⇩ are for reversing the sign or changing a character.



5.1.5. Editing characters

Scrolling order of staves:

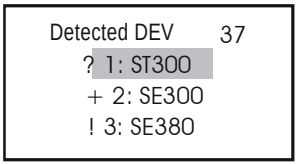
ABCDEFGHIJKLMNOPQRSTUVWXYZ [\ ] ^ _ ! ” # $ % & ’ ( ) * + , - . / 0123456789 : ; < = > ? @



5.2. COMMISSIONING OF NETWORK WITH MULTICONT

Steps of commissioning:

Preparing transmitters. Transmitters should be given a „Short address", see 5.2.1 . For multiple transmitters, this should not be zero (0)
Detecting devices. Devices in the loop should be detected and registered, see 5.2.3. Go to and select "Main Menu/ MultiCONT Config/ DEV Detect". After detection, we get the following list:



"?" not included in the list, but answered
"+" included in the list and answered
"!" included in the list, but failed to answer

The line number of the list may differ from „Short Address" of the device!!!

Activation of devices. In the list only activated devices will be continuously queried by the MultiCONT, see 5.2.3
Relay configuration There should the relay be assigned to transmitter(s) (source), the operation mode be selected, the switching points (parameters RP1…RP3) be set, and finally the relay be activated (as the devices), see 5.7.
Current generator configuration. Similar to the relay configuration, see 5.8.
SAVE Modifications should be saved otherwise they vanish on switching off the MultiCONT, see 5.3

5.2.1 Preparing transmitters

It is suggested to check preferably in the workshop the "**Polling** or **Short address**" (in P19 or P13) and **current output** of the transmitters. The loop current of the ordinary MultiCONT is max. 60mA, and max. 22mA with the Ex certified version. If the loop current exceeds this value the voltage will be too low for the transmitters to start to work. In networks with more than one field device the units should be addressed with numbers 1 ... 15 and the current of the transmitters will be limited to 4mA. This constraint can be overwritten with programming in some devices (see table at the right). The loop power must not exceed the above limit.
Further precondition of proper operation is the allocation of different Short addresses for different devices.

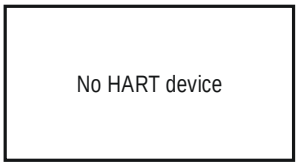
Device data of NIVELCO products				
DEVICE SERIES	SHORT ADDR PARAMETER	FIXED CURRENT PARAMETER	DEVICE TYPE ID	DEFAULT „SHORT TAG"
EchoTREK 4 wire	P19	P08	1	XXXXXX xxxxxx type of the transmitter e.g. STA380
EchoTREK 2 wire			3, 4	
EasyTREK			2	
NIVOCAP			5	
NIVOTRACK			6	
NIVOPRESS	P13		21	DB500
UNICONT			22, 23	PDF400
THERMOCONT			20	TB500

5.2.2. Wiring

Wiring has to be performed according to the previous instructions as per section 2.
Technical Data and section 4. Electric Connection.

5.2.3. Commissioning of MultiCONT

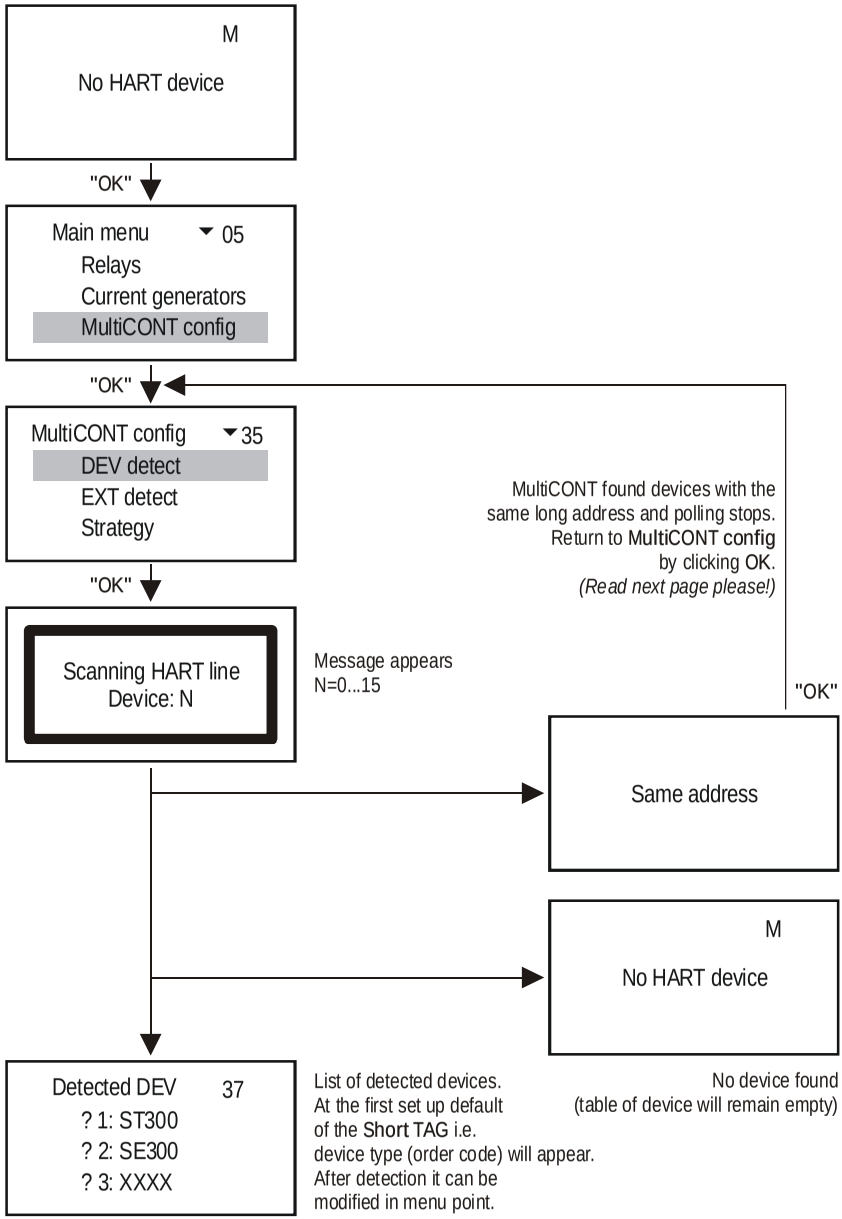
Switching on initiates a test process, during which MultiCONT is checking the memory, which is storing settings of the unit. (See 5.9 Switching on)
This process lasting about 50 sec can be accelerated (time period. 25 sec) by pressing key ESC
In case of positive result the process will continue with polling and finally



message appears on the screen since the table of devices is empty.

To change Language take the route Main menu/MultiCONT config/Language go to and mark the Language required with pressing keys and as well as . To keep this language setting should be saved in Main menu/Save config menupoint otherwise with repowering of the unit default English will return.

To detect devices start program Main menu/Local config/DEV detect


M
No HART device
"OK"
Main menu 05
Relays
Current generators
MultiCONT config
"OK"
MultiCONT config 35
DEV detect
EXT detect
Strategy
"OK"
Scanning HART line
Device: N
Message appears
N=0...15
MultiCONT found devices with the same long address and polling stops. Return to MultiCONT config by clicking OK.
(Read next page please!)
"OK"
Same address
M
No HART device
Detected DEV 37
? 1: ST300
? 2: SE300
? 3: XXXX
List of detected devices.
At the first set up default of the Short TAG i.e. device type (order code) will appear.
After detection it can be modified in menu point.
No device found
(table of device will remain empty)

MultiCONT detects devices by means of the Polling- or Short address (that is why no second or more device must have the same Short address)
After detection query will be performed with the help of the Long address that consists of three parts.

Manufacturer's ID: (See APPENDIX 1. At the end of the Manual (for Nivelco products it is:151)
Device type ID: (See chart under 5.2.1)
Device ID: random number generated during production (0…16777215)

When detection stops with the message Same address there are two ways to find out devices with the same address

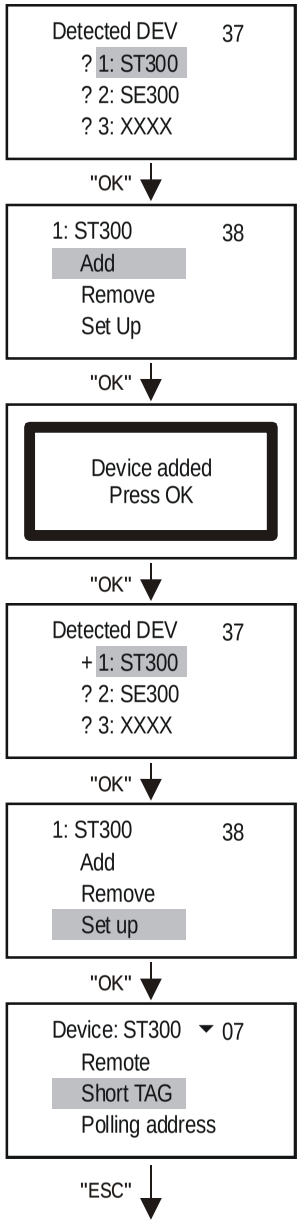
With the Eview configuration software provided with the HART capable devices Long address of the transmitters can be read
Devices should be removed one by one until DEV detect program can run to completion
Obviously the address one of those devices remained in the loop is the same as the address of the unit removed last.
Then removing all devices from the loop and reconnecting them one by one again the three IDs can be read in menu Main menu / Devices (See 5.5 PROGRAMMING DEVICES)

Since the Long address can not be modified such unit will be replaced by the manufacturer.

The question is what to do if the MultiCONT fail to find all devices?

1. In this case one of the transmitters is not HART-capable. Check the name plates and 3.1 Order Code
2. There are more devices in the system than the actual MultiCONT can handle (Check name plate and 3.1 Order Code). Information is provided in menupoint Main menu / MultiCONT config / Report / Devices (See 5.3.) with numbers 0nn/0mm. Number of devices listed is represented by nn" and numbers of devices that can be handled is represented by mm. In this case, any more detected units will not be displayed.
3. Device is out of order. Dismount the unit and check it in the workshop.

Next steps are adding devices to the list, setting devices and activating devices



"?" is to signify that the unit has answered to the query but it is non on the list yet.
Goto to the unit to be added by pressing keys ⇩ and ⇧ click OK

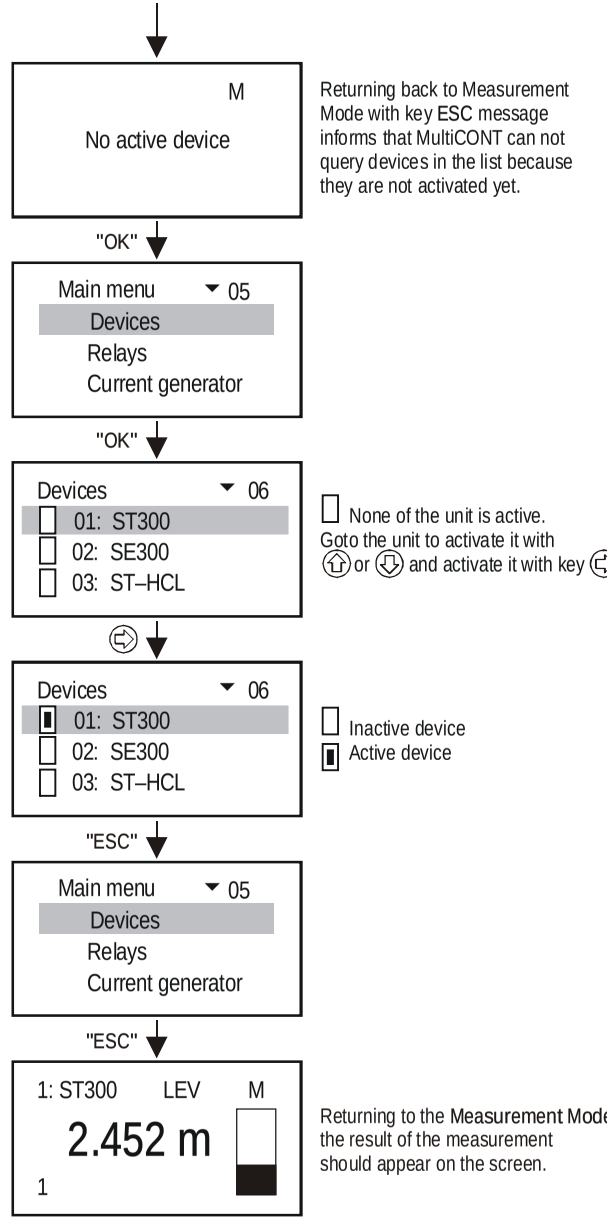
Adding device to the list will be represented by the change of "?" to "+"

Device No 1 has added to the list
Selecting **Remove** "+" will be changed to "?" and device removed from the list.

Setting and viewing of features of devices can only be performed in **Set up** if they are on the list (with "+" marking).

Short TAG being the order code (e.g ST300) can be changed here.

These steps must be carried on by all instruments you wish to add


M
No active device
Returning back to Measurement Mode with key ESC message informs that MultiCONT can not query devices in the list because they are not activated yet.
"OK"
Main menu 05
Devices
Relays
Current generator
"OK"
Devices 06
01: ST300
02: SE300
03: ST–HCL
None of the unit is active.
Goto the unit to activate it with
or and activate it with key
Devices 06
01: ST300
02: SE300
03: ST–HCL
Inactive device
Active device
"ESC"
Main menu 05
Devices
Relays
Current generator
"ESC"
1: ST300 LEV M
2.452 m
1
Returning to the Measurement Mode the result of the measurement should appear on the screen.

IT IS ESSENTIAL not to confuse *Short address* and *List-tag* of the units. Short addresses 1 .... 15 given to devices during their programming (preferably in the workshop before installing) is for the HART detection. MultiCONT registers devices on the basis of the multidecimal List-tags 1, ... 8, 9, A, B, ... F assigned to the units on its detection (registration).

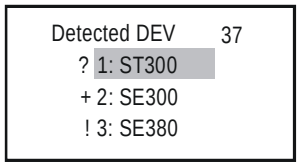
At this stage may the operational features such as display, lighting, etc. be set under Main menu / MultiCONT config (See 5.4 MULTICONT CONFIGURATION).
Relays and current generators should be programmed in accordance with the requirements of the application (See 5.7. and 5.8 RELAY CONFIGURATION and CURRENT GENERATOR CONFIGURATION respectively).

Modifications should be kept by pressing OK in menupoint Main menu / Save config otherwise they will be vanished on switching off.

Setting can be protected with the help of the Main menu/ MultiCONT config / Password (protection by software) and with the program protection switch K1 (see 7. PROTECTION OF SETTINGS BY HARDWARE)

Note:

If the list of Devices was not empty at the starting of the search then the following can appear on the screen

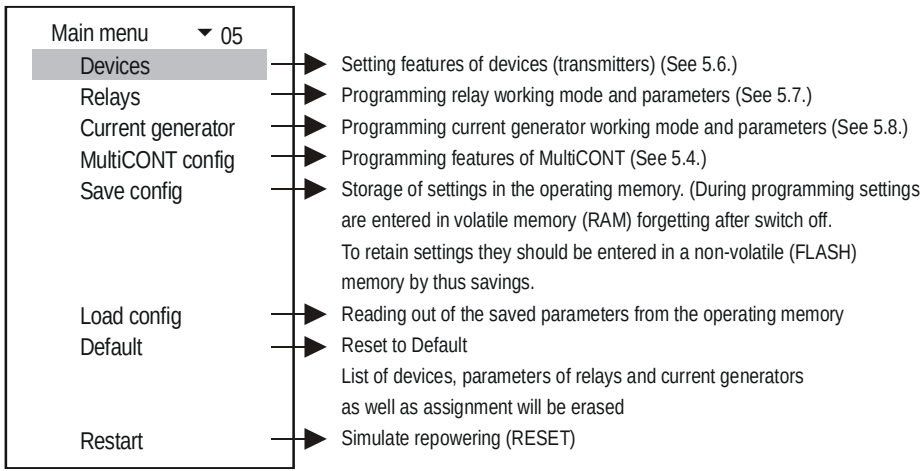


"?" not included in the list, but answered
"+" included in the list and answered
"!" included in the list, but failed to answer

The list can be modified on Menu table 38 in menupoint Add and Remove or the whole list can be erased in Main menu / Default

5.3. MAIN MENU

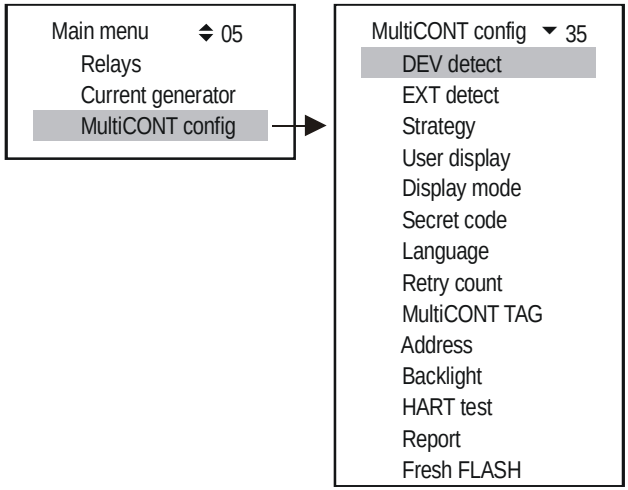
Main menu can always be entered by pressing key OK. See complete menu in 5.5.1



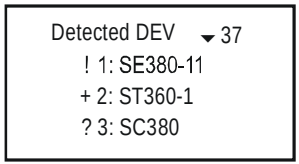
You find this menu network in the Appendix 2.

5.4. MULTICONT CONFIGURATION

On Menu Tables 35 the configuration of the MultiCONT can be changed. Grey field represents default (manufacturer's setting). Main menu/**MultiCONT config** will reset default.



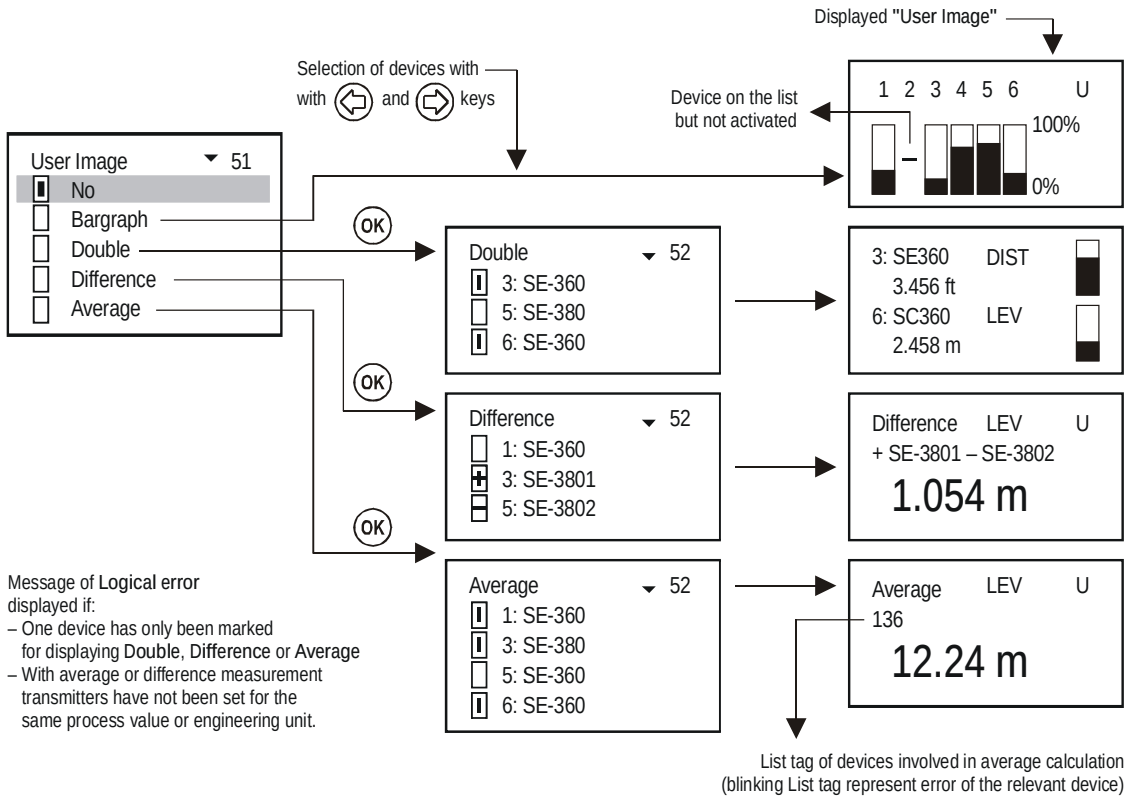
Detect DEV: MultiCONT will detect transmitters (max 15) in the HART network and compile a list with multidecimal marking 1,… ,8,9,A,B,…,F (See also 5.2.3 Setting up MultiCONT)



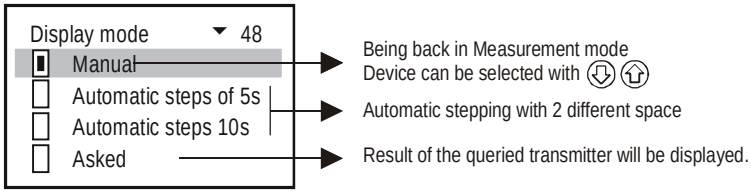
"!" = included in the list, but failed to answer
"+" = included in the list and answered
"?" = not included in the list, but answered

Detect EXT: Detection of extension modules such as Relay-, Current Generator- or Combined Modules

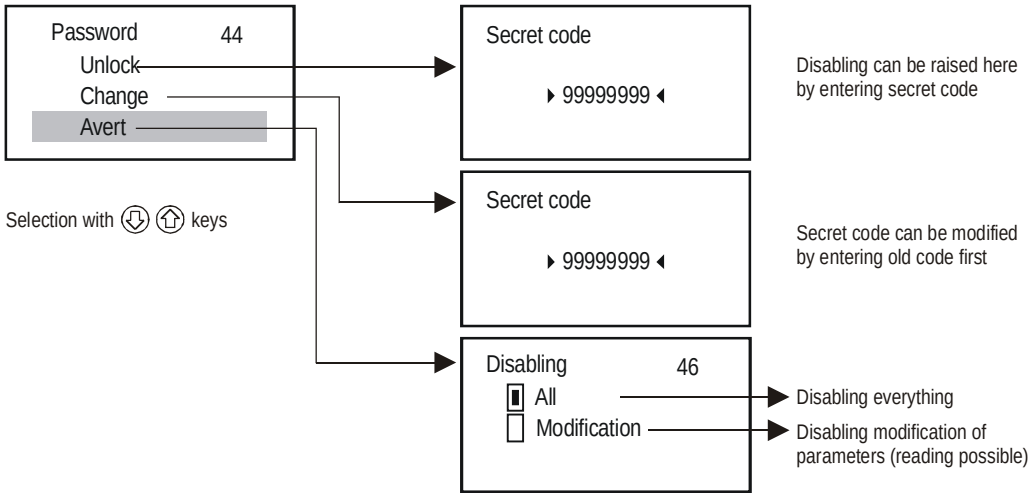
User's image: Beyond the Measurement image for the measurement mode display of the below users images can be selected in Menu table 51



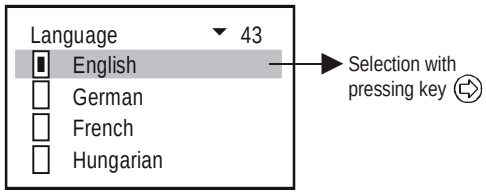
Display Mode: Steps of displaying measurement results



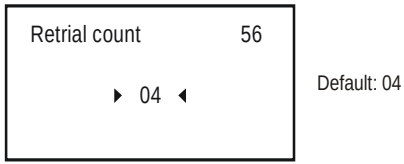
Secret code: Reading or modification of the configuration of the MultiCONT can be protected with eight-digit secret code other than zero. Key next to the menu table number represents presence of secret code. If the key is blinking access is enabled.



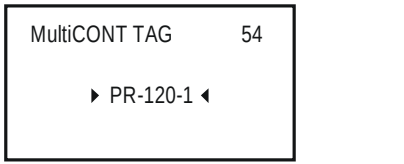
Language: Selection of the language of programming and measurement.



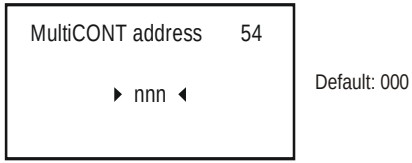
Number of repetition: MultiCONT would query transmitters on the HART line repeatedly (4…8) i.e. if there is or erroneous reply. Number of retrials before giving error reply message can be set here.



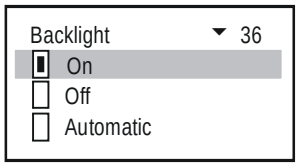
MultiCONT TAG: Tight character identification TAG for systems with more than one MultiCONT. (Default = order code)



MultiCONT address: Address (1…254) for systems with several MultiCONT units connected together over RS485 interface

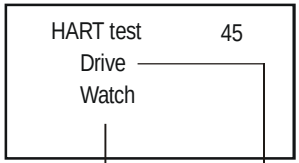


Backlight: Operation of the display backlight can be set here.

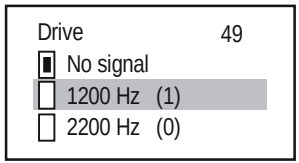


In position Automatic clicking of any key switches on the backlight. Backlight will be switched off automatically about 10sec after the last button clicking.

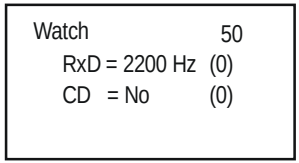
HART test: HART line can be tested



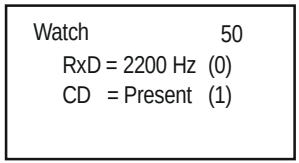
Frequent occurance of error Answer can be caused by noisy HART line that is checked in menu point watch Ideally CD=0, if CD=1 steadily communication is impossible devices would not answer.



Continuous HART signal can be given to the system
Selection with ⇦ ⇨ keys

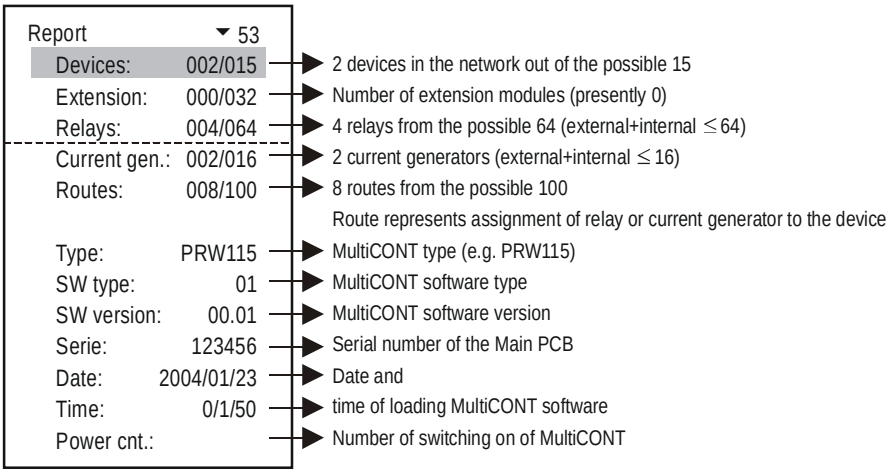


Watching the line continuously result detection of trouble will be indicated
RxD= pickup



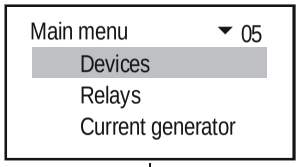
CD = Carrier detect, if the line is noisy 1 will prevail or waggling device may not answer.
(See: HART test function of the transmitters)

Report: Report provides information on the network such as number of devices (transmitters), relays, current outputs, extension modules involved and capable to handle. Assignment of a relay or current generator to a device will be called route.

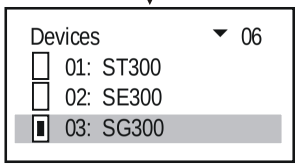


Fresh FLASH: For trouble free operation of the program-memory this program should be run once a year

IMPORTANT! Do not forget to save settings in menu point Main menu/Save.

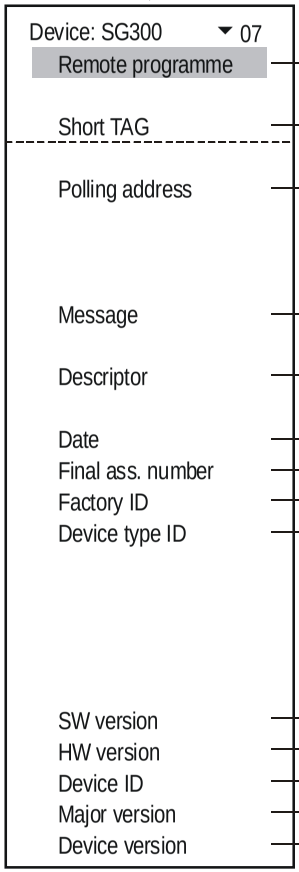


"OK"



Go to the required devices with keys ⇧ and ⇩ and click OK
to enter its file in order to view and/or change parameters
Table of the inactive device will not appear!!

"OK"



Remote programme → To perform remote programming.
See details in 5.6.

Short TAG → To view and change Short TAG with
⇦ ⇨ ⇧ ⇩ and OK

Polling address → Short address: 1...15 for HART detection of devices.
It can be modified even with active access lock*
Modification requires special care
thus it is not recommended!

Message → 32 character field offered to the user to edit
any message relating to the technology or operation

Descriptor → 16 character field offered to the user to
identify the process medium

Date → Date to be assigned to the unit

Final ass. number → n.a.

Factory ID → Assigned to NIVELCO by HART Communication Foundation (fixed 151)

Device type ID → NIVELCO code

1=ST300 EchoTREK (4 wire)	6=MT300 NIVOTRACK
2=SC300 EasyTREK	20=TB THERMOCONT
3=SE300 EchoTREK (2 wire)	21=NB NIVOPRESS
4=SG300	22=PDT (2) univ. controller
5=CT300 THERMOCONT	23=PDT (4) univ. controller

SW version → Software version of the unit (transmitter) (See relevant Manual)

HW version → Hardware version of the unit (transmitter) (See relevant Manual)

Device ID → Electronic serial number of device assigned by the factory.

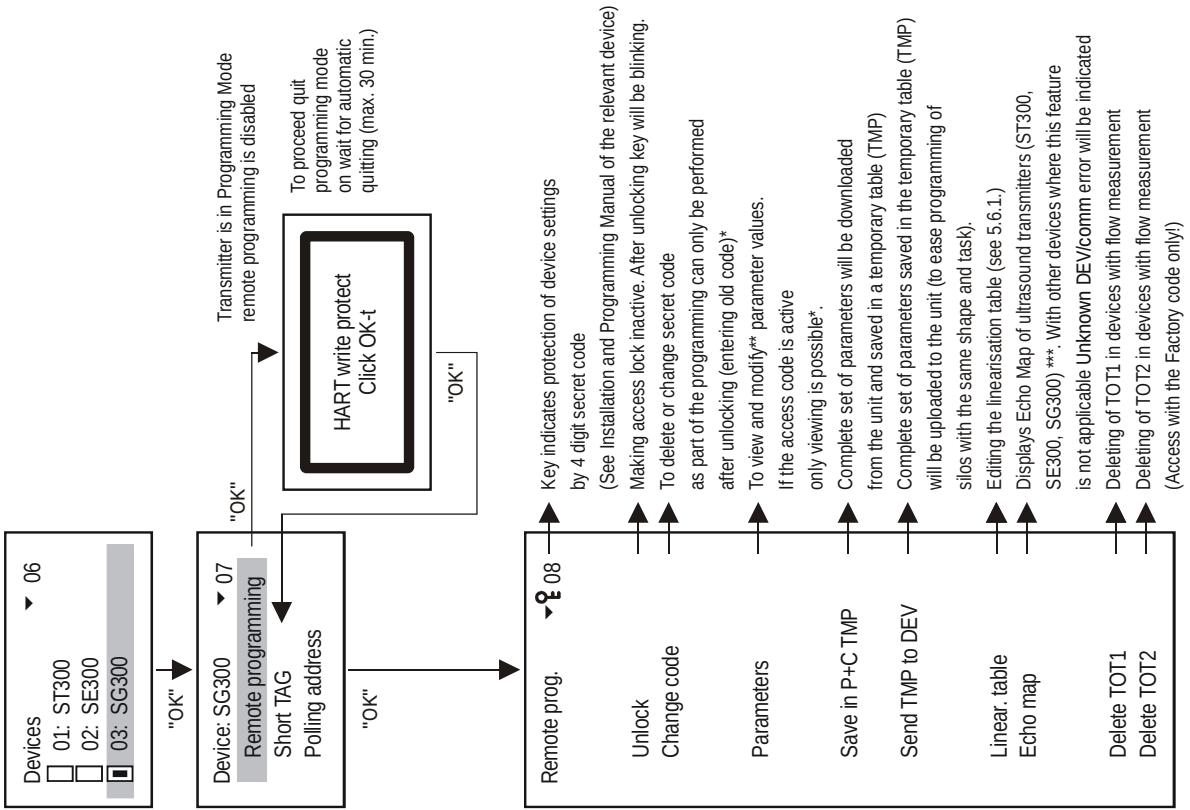
Major version → n.a.

Device version → n.a.

Parameter address of the Short address and Access lock may be
different with different devices.

5.6. REMOTE PROGRAMMING

Select required device as described above.



For explanation of * , ** , *** see next page

* If the access is disabled the following message appears

After entering secret code and clicking OK access is free for programming.

** Parameters entered during remote programming via MultiCONT will be sent immediately to and checked in the field device only. If the parameter value is incorrect or not applicable the following message appears:

Installation and Programming Manual of the relevant device should be consulted.

*** Explanation of the Echo Map of the ultrasound devices

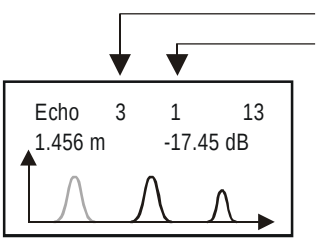
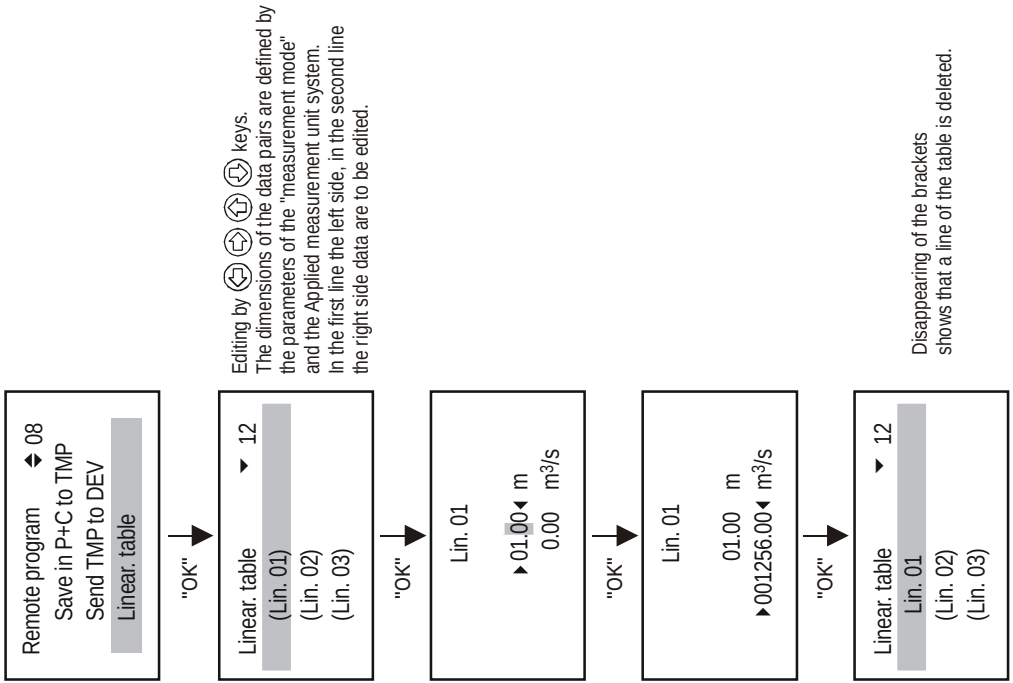


Image will be displayed as stored on entering into the relevant parameter with blinking echo measured in that very moment. Refresh screen with click ESC and OK.

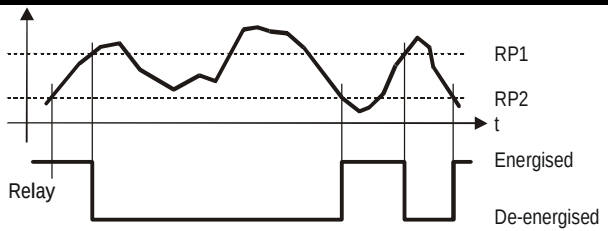
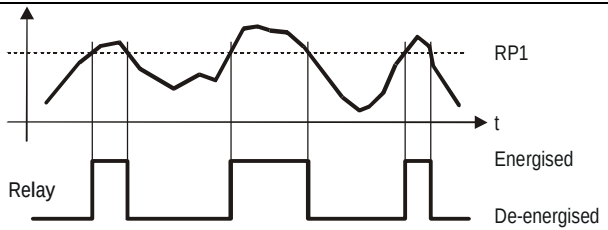
5.6.1. Editing the linearisation table

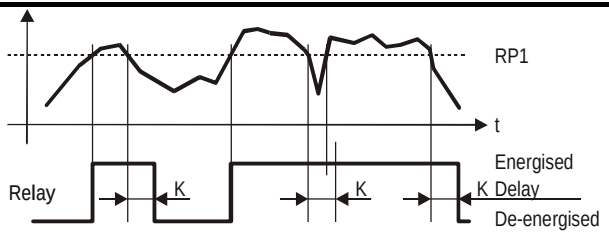
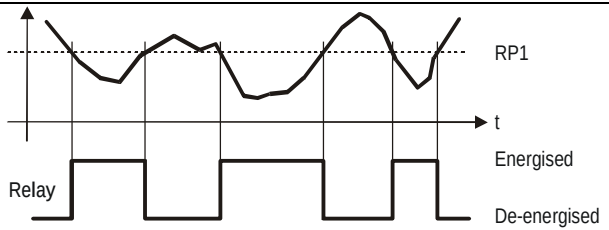
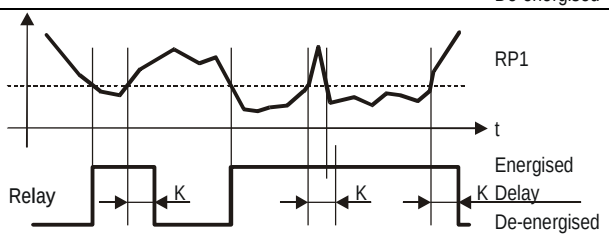
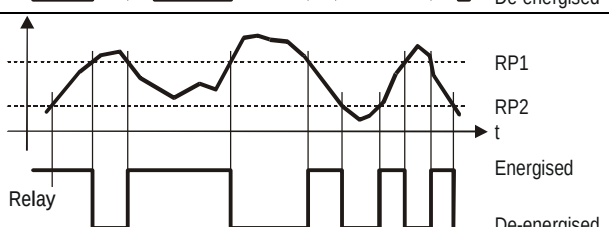


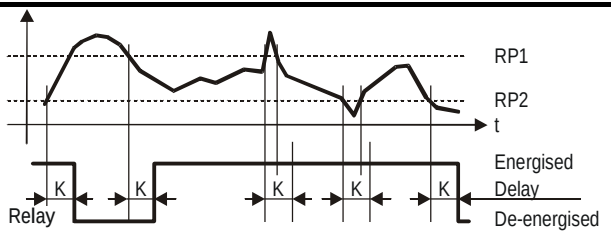
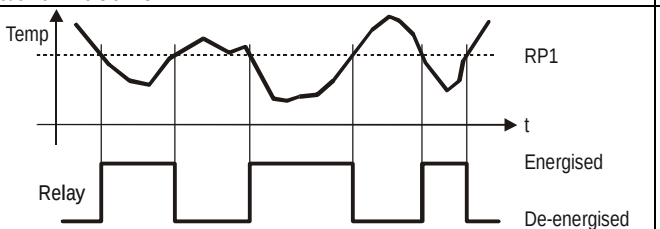
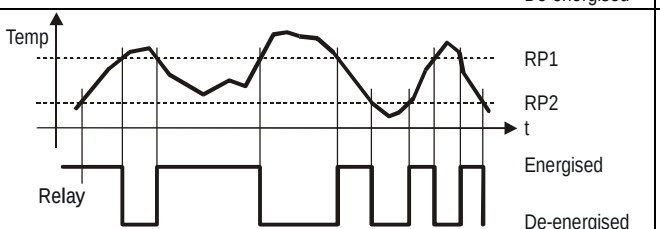
Warning! To let the transmitter compute the measurement results according to the linearisation table, linearisation has to be enabled in parameter P47 (See the Installation and Programming Manual of the given transmitter).

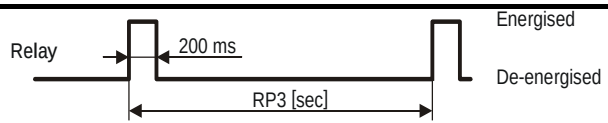
5.7. RELAY CONFIGURATION

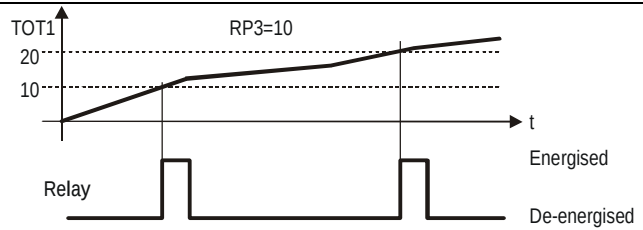
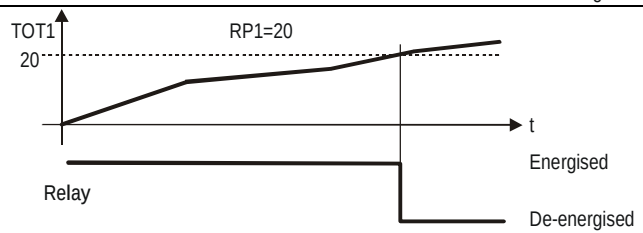
First of all relays should be ***assigned to a field device(s)***, which will be performed in the menu point Main menu/Relays/ Program/Source. (Relay operation can also be assigned to the difference value of two devices or to the average of more devices). Secondly relevant function is to ***select*** in the menu point Main menu/Relays/Program/***Function***. Finally ***parameters have to be programmed*** in Main menu/Relays/Program/***Parameter*** i.e. values of the switching points P1 and P2 entered in dimensions defined by the Measurement Mode of the field device to which the relay has been assigned. Thus if the measurement mode is LEVEL [m] (e.g. with a device of SE-300 i.e. P01=x1 and P00=00x), switching points have to be entered in LEVEL [m]. For overview see Menu system of the MultiCONT Attachment 3. The relay functions in detail are as below (default cursive in gray background).

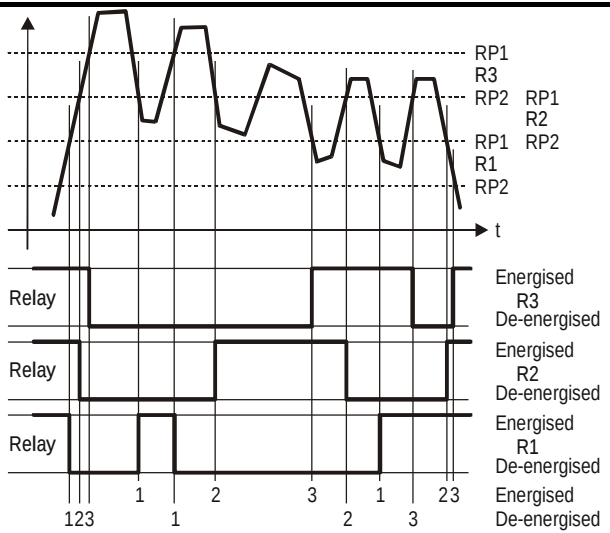
Function	Operation	Prog. Par
Switching diff. (2-point control) *Default: filling with energized relay:* *Inversion = OFF,* *over RP1 relay will be de-energized below RP2 energized* Inversion of the operation with change over of RP1 and RP2 or with selection of Inversion = ON Main menu/Relays/Program/***Invert*** RP1 = RP2 represents is high fail safe function		RP1,RP2
ALARM low *Default: Inversion = OFF* *Below RP1 relay will be de-energized* Inversion of the operation (below RP1 relay will be energized) with selection of Inversion = ON Switching difference = 2.5% of RP1 If RP1 = 0 relay is persistently energized		RP1

ALARM low with delayed switching *Default: Inversion = OFF* *below RP1 relay will be de-energized with 0 sec delay* Delay can be set under RP3 in sec		RP1, RP3
ALARM high *Default: Inversion = OFF* *over RP1 relay will be de-energized* Inversion of the operation (over RP1 relay will be energized) with selection of Inversion = ON Switching difference = 2.5% of RP1 If RP1 = 0 relay is persistently de-energized		RP1
ALARM high with delayed switching *Default: Inversion = OFF* *over RP1 relay will be de- energized with 0 sec delay* Delay can be set under RP3 in sec		RP1, RP3
Window comparator *Default: Inversio n= OFF* *Within the range of RP1..RP2 relay will be energized* Inversion of the operation (within the range of RP1..RP2 relay will be de-energized) with selection of Inversion = ON		RP1, RP2

Window D comparator with delayed switching *Default*: *Inversion = OFF* *Within the range of RP1..RP2 relay will be energized with 0 sec delay* Inversion of the operation (Within the range of RP1..RP2 relay will be de-energized) with selection of Inversion = ON		RP1, RP2, RP3
Error *Default*: *Inversion = OFF* *In case of error relay will be de-energized. RP3=0 with any error RP3=n with error of **n** code* Inversion of the operation (in case of error relay will be energized) with selection of Inversion=ON		RP3
Temperature *Default*: *Inversio n= OFF* *RP1 over temperature of relay will be de-energized* Inversion of the operation (over temperature of RP1relay will be energized) with selection of Inversion=ON Switching difference = 2.5% of RP1		RP1
Temperature W (window comp) *Default*: *Inversion = OFF* *Within the range of RP1..RP2 relay will be energized* Inversion of the operation: (within the range of RP1..RP2 relay will be de-energized) with selection of Inversion = ON		RP1, RP2

Impulse C *Default*: *Inversion = OFF* *relay will be energized for appr. 200ms in 0 intervals*		RP3

Inversion of the operation with selection of Inversion = ON Interval can be set under RP3 in sec If RP3=0 message of Programming error will be displayed		
Impulse F *Default: Inversion = OFF* *relay will be energized for appr. 200ms with each amount of flow set under RP3 (default=0)* Inversion of the operation with selection of Inversion = ON Message of Programming error will be displayed if: – more than one device is marked as source – RP3=0		RP3
TOT1 *Default: Inversion = OFF* *relay will be de-energized when TOT1 reaches value of RP1* Inversion of the operation (relay will be energized) with selection of Inversion = ON		RP1

Alt (optimized pump control) *Default*: *Inversion = OFF* More relays are assigned to one device (transmitter) so that the number Of switching-on will be the same for all relays. Relays connected in series will be energized and de-energized One after the other irrespectively of fulfillment of the condition Relays programmed for this work would operate in the following sequence for: Alt S 1 23 1 23 Energised 123 1 2 3 De-energised Switching diff 3 32 2 21 Energised 123 3 2 2 De-energised		RP1, RP2

Notes:

1.

```
Parameter              23
 RP1 = ▶ 0001.25 ◀
 RP2 =   12.45
 RP3 =   0
```

Parameter are to program in the Main menu/Relays/Relay/Program/**Parameter** menu table by going to the relevant parameter with entering value in between pointers and clicking **OK**. Programming parameters can only be completed with clicking **OK** after setting RP3 (even if it is zero or not applicable in the given function!)

2. Inactive relays are de-energized (See: Main menu/**Relays**).
3. More than one device can be assigned to any of the relays (Main menu/Relays/Program/**Source**)
   The result will be the mathematical combination of sources marked with + or – signed in the menu point **Source**.
   If the measurement mode or dimension of devices are different MultiCONT will send error message **Program** (See 6. Errors, Error messages)
   The result of the transmitters marked with [+] are added.
   The result of the transmitters marked with [–] is deducted from the added result of the transmitters marked with [+]
   Computes the average of the results of the transmitters marked with [|]
   The instrument indicates error if the dimension or the measurement mode of the transmitters is different.
4. If **Error** function selected no (source) assignment is required since errors of all devices will be monitored.
5. Relay state will not be changed if its source does not reply!

For a detailed overview of the Programming s. Appendix 3.

5.8. CURRENT GENERATOR CONFIGURATION

First of all current generators should be *assigned to a field device*, which will be performed in the menupoint
Main menu / Current generators / Program / Source.

The result of the transmitters marked with ⊞ are added.

The result of the transmitters marked with ⊟ is deducted from that result of the transmitters marked with ⊞ are added.

Computes the average of the results of the transmitters marked with |

Secondly relevant function is to ***select*** in the menupoint Main menu/ Current generators /Program/***Function.*** Finally ***parameters have to be programmed*** i.e. values of the switching points RP1 and RP2 entered in dimensions defined by the Measurement Mode of the field device to which the current generators has been assigned. Thus if the measurement mode is LEVEL [m] (e.g. with a device of SE-300 i.e. P01=x1 P00=00x), switching points have to be entered in LEVEL [m].
Operation of the current generator can also be assigned to the difference value of two devices or to the average of more devices.
For overview see Menu system of the MultiCONT Appendix 4. The functions of the current generators in detail are as below.

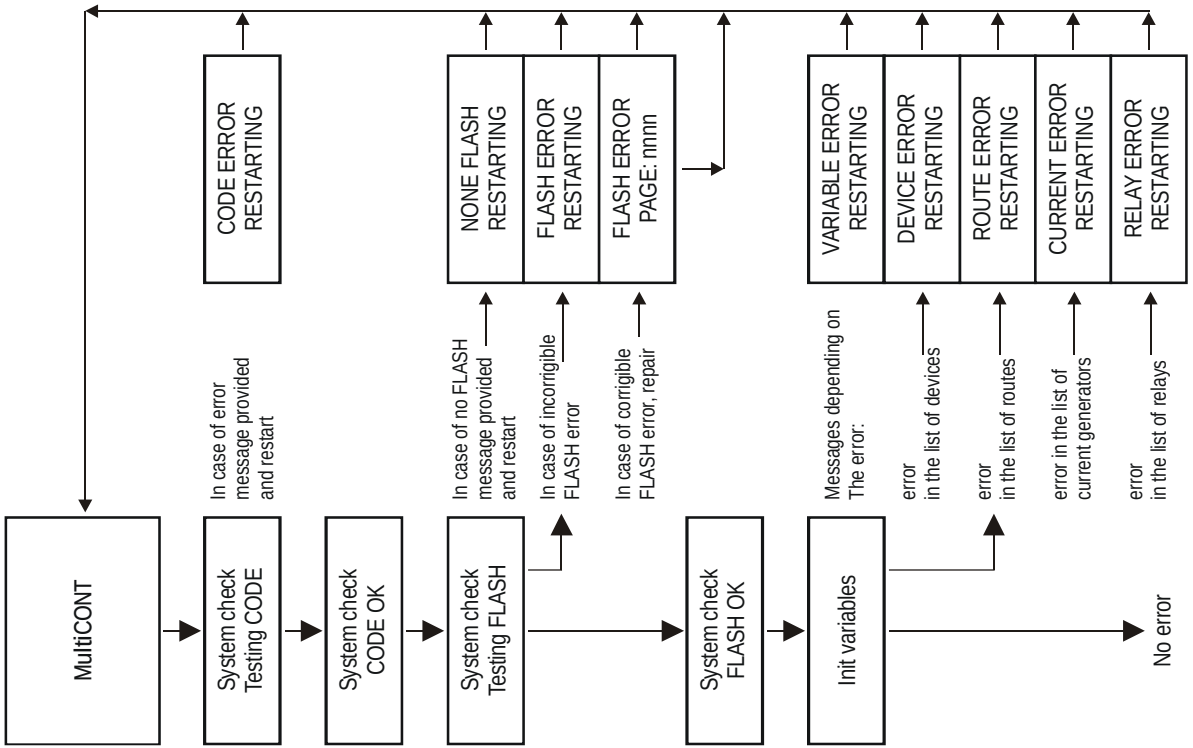
FUNCTION	OPERATION	PROG.PAR.
Analogue Output	Current output is proportional to the primary measured value selected in the device (DIS, LEV, VOL, FLOW, etc.) CP1 is assigned to 4mA, CP2 is assigned to 20mA.	CP1,CP2
Error 3.6mA	CP3=0 current output will be provided with any error	CP3
Error 22mA	CP3=n current output will be provided in case of error with code „n" For error codes see 6. Error codes During trouble free operation the current output is 4mA	

Remark:

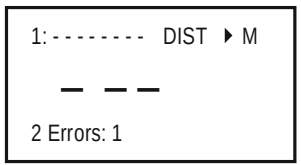
1. Programming error will be indicated if in analogue output operation mode CP1=CP2
2. Value of the output current will not change if the unit assigned does not answer!
3. If the current output is not activated the output will be 0 mA.
4. If Error function selected no (source) assignment is required since errors of all devices will be monitored
5. The programd parameters can only be saved at CP3 by pressing OK.

5.9. SWITCHING ON

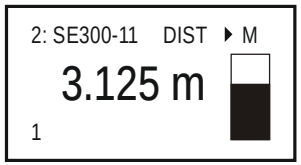
On powering a test program checking the hardware of MultiCONT will be run that can be followed on the screen by the (English) messages displayed. The procedure takes about 50s and it can be accelerated by click on ESC (time approximately 25 s).



In case of FLASH error the unit will be restarted repeatedly thus device should be sent to the service.
After the successfully completed test polling and query will be performed on the basis of the previous configuration and the MultiCONT will enter Measurement Mode and it will work in accordance with setting of 5.4 Main menu/MultiCONT config (See 5.10 Measurement Mode)



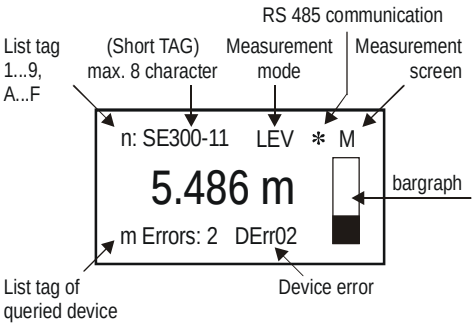
There is no response from device with List TAG 1. (there is no result to display)
Error “Response” can be red in the error list. See 6. ERROR CODES



The result of the device with List TAG 2. is on the display.
Device List TAG 1. Is under asking. (See 5.10 MEASUREMENT MODE)

5.10. MEASUREMENT MODE

After successfully completed test following the switch-on the MultiCONT will automatically enter the Measurement Mode and display Measurement image. Measurement values will be queried and displayed in accordance with the device list and settings in menupoint Main menu / MultiCONT config. /Display mode. In the upper row list-tag (1,…9,A.,...F) and Short TAG abbreviation of the measurement (DIST, LEV, VOL, etc.), in the middle measurement value and dimension, bargraph, in the bottom row list-tag of the unit being under query, number of errors as well as code of device error (See chart in 6 ERRORS, ERROR MESSAGES, ERROR CODES).
Beyond the Measurement Image, User Images, relay–device, current generator-device assignment and error list can be viewed in this operation mode (See Attachment 5).
Flashing star "*" left to the letter "M" represents query and reply on RS485.



Error messages can be erased with key ESC

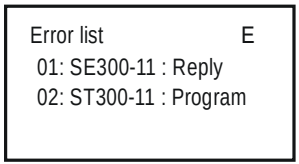
Besides the above image one of the four user's images (Bargraph, Double, Difference, Average) can be selected in the menupoint Main Menu / MultiCONT config / User display. (See APPENDIX 5).
Assignment of relays and current generators of the MultiCONT to devices can also be performed in the measurement mode.

Error will remain displayed (even after ceasing the error) until clearing it by pressing key ESC

During programming full scale of operation such as inquiring of devices, function of relays and current generators will be maintained. If the MultiCONT is left unintentionally in Programming Mode, it will automatically return to Measurement mode after 5 minutes following last clicking on any key.

6. ERRORS, ERROR MESSAGES, ERROR CODES

In case of failure (blinking) error message appears immediately on the Measurement image even if the error does not occur to the transmitter being on the screen. (See M image above) Failures will be collected in the Error list with list number of the error, short TAG and description of the failure.



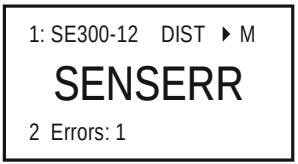
Error messages Sensor and Reply will automatically erased from the list on ceasing the error.
Other errors will remain until confirmation by pressing ESC. Thus for instance relay or current generator set for function Error will indicate error even after correction of failure until the error is confirmed as above.

ERROR CODE	MESSAGE	ERROR DESCRIPTION	CORRECTION
1	Init	Device does not reply after switching-on*	Check wiring of device
2	Reply	Device with normal operation fail to provide replies **	Check wiring of device
3	Sensor	Sensor failure on the device ***	Check device (transmitter)
4	Device	Other device failure (See next page chart)	Check programming of device (See relevant Install and Prog. Manual), and measurement conditions
5	Program	Error occurred during programming of relay or current generator ****	Check programming
6	Save	Error occurred in the course of saving in the memory	Send device to the service by repeated occurrence.

* Device, being on the list and activated does not reply after switching-on. Possible reasons:
- network has been modified before re-powering (device was disconnected, wiring changed, etc.)
- device failed to reach operation conditions (not able to provide measurement results) thus this error message appears (e.g. STD-300 can not measure until amplification reaches operation conditions).

** Device with normal operation fail to provide replies. Possible reasons:
- breaking down of device
- broken cable
- noisy HART line (See Main menu/MultiCONT config/HART test)

*** Special indication belongs to the failure of the sensors. This information appears on breaking down of the transducer in the ultrasound transmitter or cracking of the magnet disc, break of the magnetostrictive wire in the magnetostrictive transmitter. On the other hand this is the message displayed when echo loss condition occurs with the ultrasonic measurement.



Device answers but there is no valid result because of sensor error.

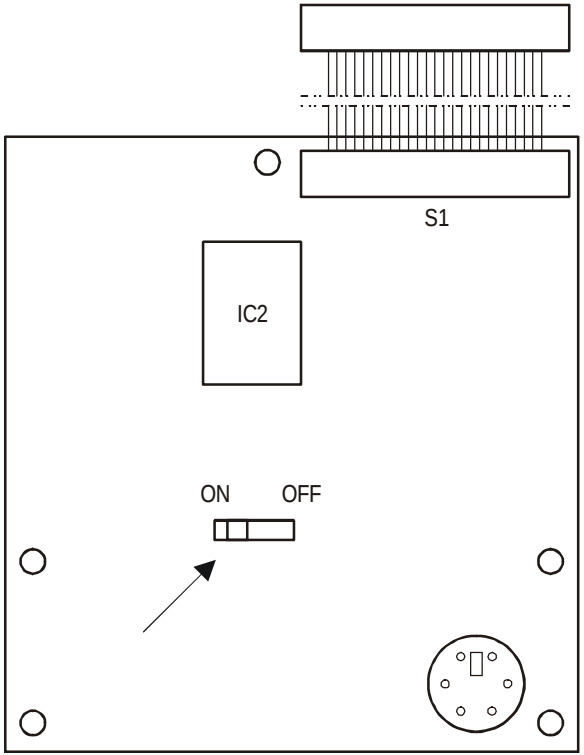
**** Programming error will be caused:

- assignment of sources with different measured values and/or with different dimension to a relay or current generator
- current generator programd to analogue output and CP1=CP2 (see 5.8 Current generation configuration)
- assignment of (Impulse F) relay to flow and there are more than one source (see 5.7 Relay configuration)
- assignment of (Impulse F) relay to flow and RP3=0 (see 5.7 Relay configuration)
- mistaken RP3 = 0 setting for Impulse C relay function (See 5.7 RELAY CONFIGURATION)

MultiCONT message	TRANSMITTER ERORS						
	EchoTREK EasyTREK	EchoTREK 2 - wire	NIVOCAP	NIVOTRACK	THERMOCONT	NIVOPRESS	UNICONT
DErr15							
DErr14		Err17 Parameter consonance error					
DErr13							
DErr12	Err4 display overflow						
DErr11	Thermometer failure						
DErr10	SUB0						
DErr09	Err5 Felsz. hiba						
DErr08	Err7						
DErr07		Err18 Hardware failure					
DErr06	Err15 Linearisation Chart failure missing r(i)						
DErr05	Err12 Linearisation Chart failure no valid data pair						
DErr04	Err14 Linearisation. Chart failure r(i) not ascendant						
DErr03	Err13 Linearisation Chart failure two equivalent L(i)				Err3 Display overflow		
DErr02	Err16 Parameter CRC failure				Err2 Parameter table failure		
DErr01	Err3 hardware failure (EECOM)				Err1 CRC failure		
DErr00	Err2 no ECHO		Err2 sensor failure		Err0 Pt100 failure	Err0 Bridge failure	Err0 Lin. failure

Closed	Hardware protection switch closed (See 7. HARDWARE PROTECTION SWITCH)

7. PROTECTION OF SETTING BY HARDWARE



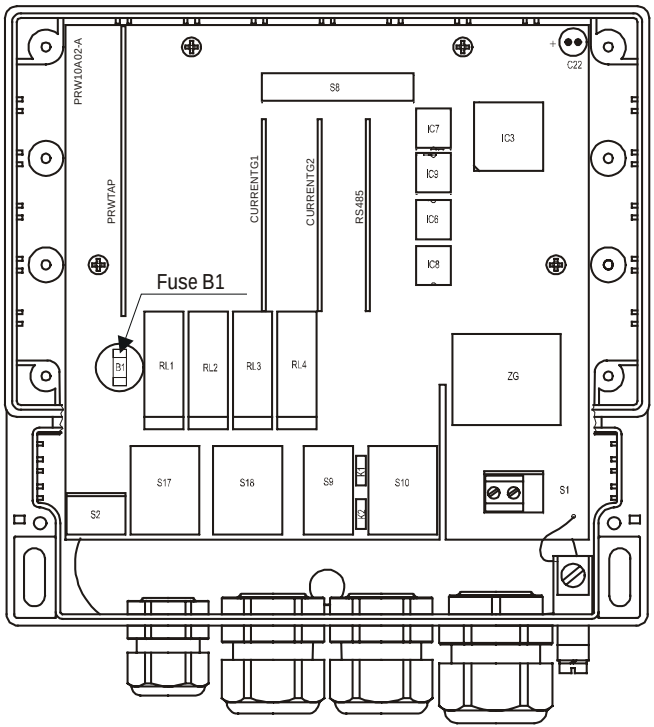
Protection switch can be accessed after loosing nuts fastening the front panel.

The switch for protection of settings in its ON position will hinder modification of parameters effecting operation of the MultiCONT such as:

- relay parameters
- current generator parameters
- involving activation of devices
- remote programming
- refusing access to Service menu
- refusing access to the menus DEV detect, EXT detect and Strategy under MultiCONT config

The switch is not influencing changes not effecting operation of the MultiCONT such as language, backlight, user image, etc)

8. REPLACING FUSE



Loosen four nuts, which are fastening the front panel. Tilt forward the front panel carefully, in order not to span cable band and replace the fuse.

MultiCONT has one fuse the value of which depends on the power supply

POWER SUPPLY	FUSE
85…255 V AC 50…60Hz	T400mA
10,5…28 V AC 50…60Hz 10,5…40 V DC	T1A

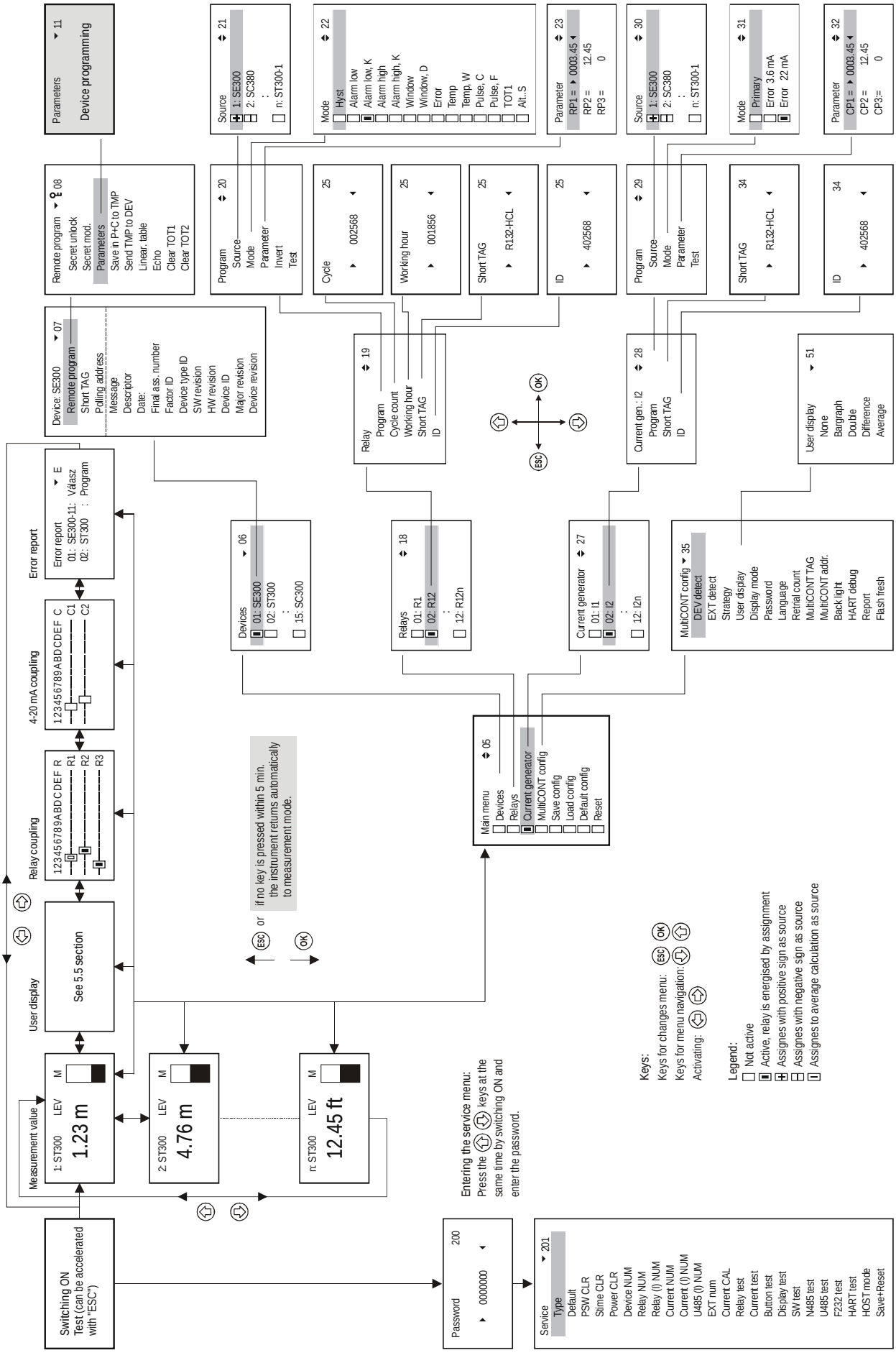
Warning!
Only fuses as per the table above can be used for replacement.

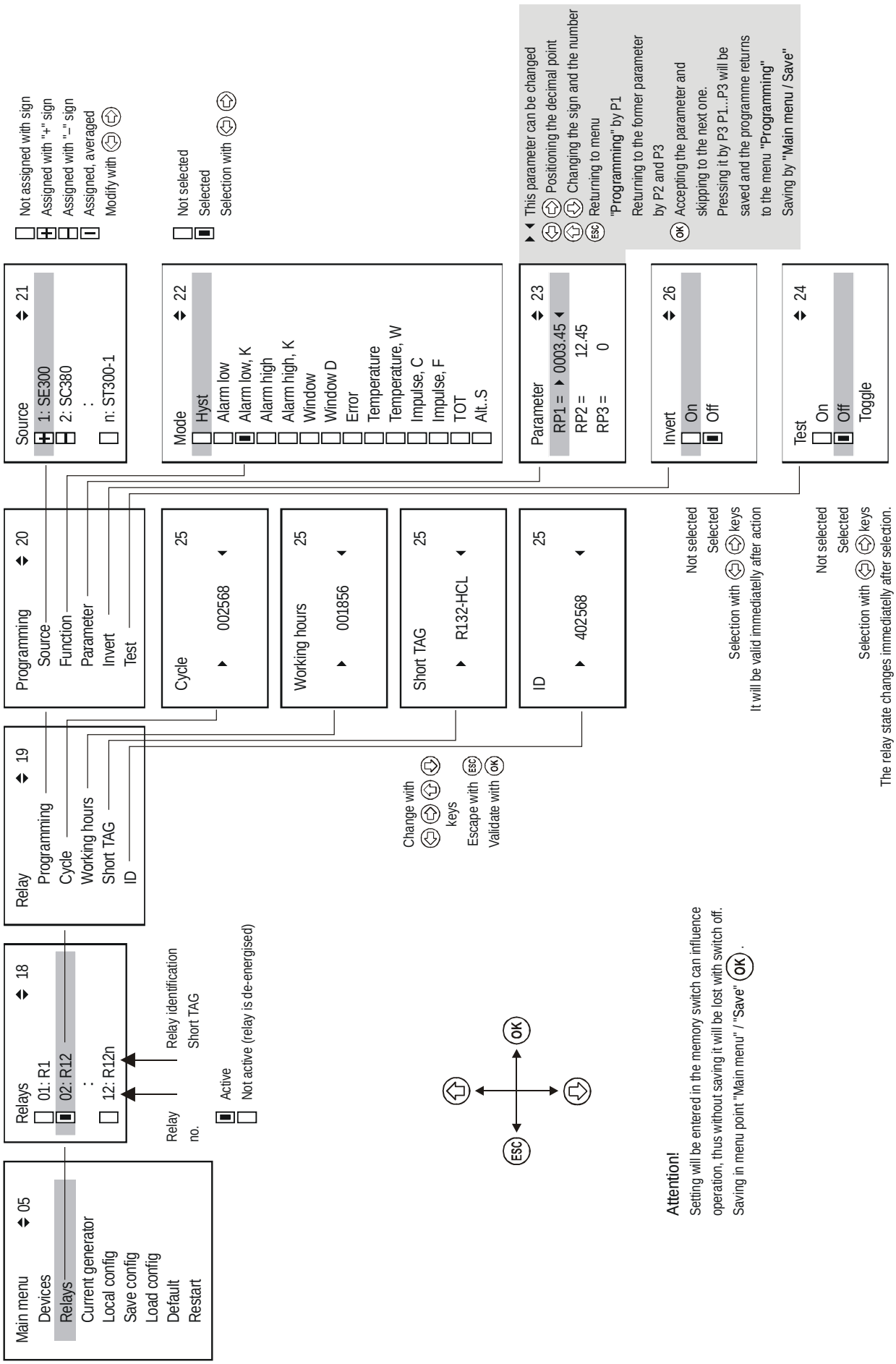
APPENDIX 1. THE ID IDENTIFICATION CODES OF THE MANUFACTURERS

1 "Acromag",
2 "Allen Bradley",
3 "Ametek",
4 "Analog Devices",
5 "Elsag Bailey",
6 "Beckman",
7 "Bell Microsensor",
8 "Bourns",
9 "Bristol Babcock",
10 "Brooks Instrument",
11 "Chessel",
12 "Combustion Engineering",
13 "Daniel Industries",
14 "Delta",
15 "Dieterich Standard",
16 "Dohrmann",
17 "Endress & Hauser",
18 "Elsag Bailey",
19 "Fisher Controls",
20 "Foxboro",
21 "Fuji",
22 "ABB Automation",
23 "Honeywell",
24 "ITT Barton",
25 "Kay Ray/Sensall",
26 "ABB Automation",
27 "Leeds & Northrup",
28 "Leslie",
29 "M-System Co.",
30 "Measurex",
31 "Micro Motion",
32 "Moore Industries",
33 "Moore Products",
34 "Ohkura Electric",
35 "Paine",
36 "Rochester Instrument Systems",
37 "Ronan",
38 "Rosemount",
39 "Peek Measurement",
40 "Schlumberger",
41 "Sensall",
42 "Siemens",
43 "Weed",
44 "Toshiba",
45 "Transmation",
46 "Rosemount Analytic",
47 "Metso Automation",
48 "Flowserve",
49 "Varec",
50 "Viatran",
51 "Delta/Weed",
52 "Westinghouse",
53 "Xomox",
54 "Yamatake",
55 "Yokogawa",
56 "Nuovo Pignone"
57 "Promac",
58 "Exac Corporation",
59 "Meggitt Mobrey",
60 "Arcom Control System",
61 "Princo",
62 "Smar",
63 "Foxboro Eckardt",
64 "Measurement Technology",
65 "Applied System Technologies",
66 "Samson",
67 "Sparling Instrumnets",
68 "Fireye",
69 "Krohne",
70 "Betz",
71 "Druck",
72 "SOR",
73 "Elcon Instruments",
74 "EMCO",
75 "Termiflex Corporation",
76 "VAF Instruments",
77 "Westlock Controls",
78 "Dexelbrook",
79 "Saab Tank Control",
80 "K-TEK",
81 "Flowdata",
82 "Draeger",
83 "Raytek",
84 "Siemens Milltronics PI",
85 "BTG",
86 "Magnetrol",
87 "Metso Automation",
88 "Milltronics",
89 "HELIOS",
90 "Anderson Instrument Company",
91 "INOR",
92 "ROBERTSHAW",
93 "PEPPERL+FUCHS",
94 "ACCUTECH",
95 "Flow Measurement",
96 "KAMSTRUP",
97 "Knick",
98 "VEGA",
99 "MTS Systems Corp.",
100 "Oval",
101 "Masoneilan-Dresser",
102 "BESTA",
103 "Ohmart",
104 "Harold Beck and Sons",
105 "Rittmeyer Instrumentation",
106 "Rossel Messtechnik",
107 "WIKA",
108 "Bopp & Reuther Heinrichs",
109 "PR Electronics",
110 "Jordan Controls",
111 "Valcom s.r.l.",
112 "US ELECTRIC MOTORS",
113 "Apparatebau Hundsbach",
114 "Dynisco",
115 "Spriano",
116 "Direct Measurement",
117 "Klay Instruments",
118 "Action Instruments",
119 "MMG Automatiky DTR",
120 "Buerkert Fluid Control Systems",
121 "AALIANT Process Mgt",
122 "POUNDS INSTRUMENT",
123 "ZAP S.A. Ostrow Wielkopolski",
124 "GLI",
125 "Fisher-Rosemount Performance Technologies",
126 "Paper Machine Components",
127 "LABOM",
128 "Danfoss",
129 "Turbo",
130 "TOKYO KEISO",
131 "SMC",
132 "Status Instruments",
133 "Huakong",
134 "Duon Systems",
135 "Vortek Instruments, LLC",
136 "AG Crosby",
137 "Action Instruments",
138 "Keystone Controls",
139 "Thermo Electric Co.",
140 "ISE-Magtech",
141 "Rueger",
142 "Mettler Toledo",
143 "Det-Tronics",
144 "TN Technologies",
145 "DeZURIK",
146 "Phase Dynamics",
147 "WELLTECH SHANGHAI",
148 "ENRAF",
149 "4tech ASA",
150 "Brand Instruments",
151 "NIVELCO",
152 "Camille Bauer",
153 "Metran",
154 "Milton Roy Co.",
155 "PMV",
156 "Turck",
157 "Panametrics",
158 "Stahl",
159 "Analytical Technology Inc.",
160 "Fieldbus International",
161 "BERTHOLD",
162 "InterCorr",
163 "China BRICONTE Co Ltd",
164 "Electron Machine",
165 "Sierra Instruments",
166 "Fluid Components Intl",

prw1101a0600p_01.doc
2005. march 22.
Technical specification may be changed without notice.

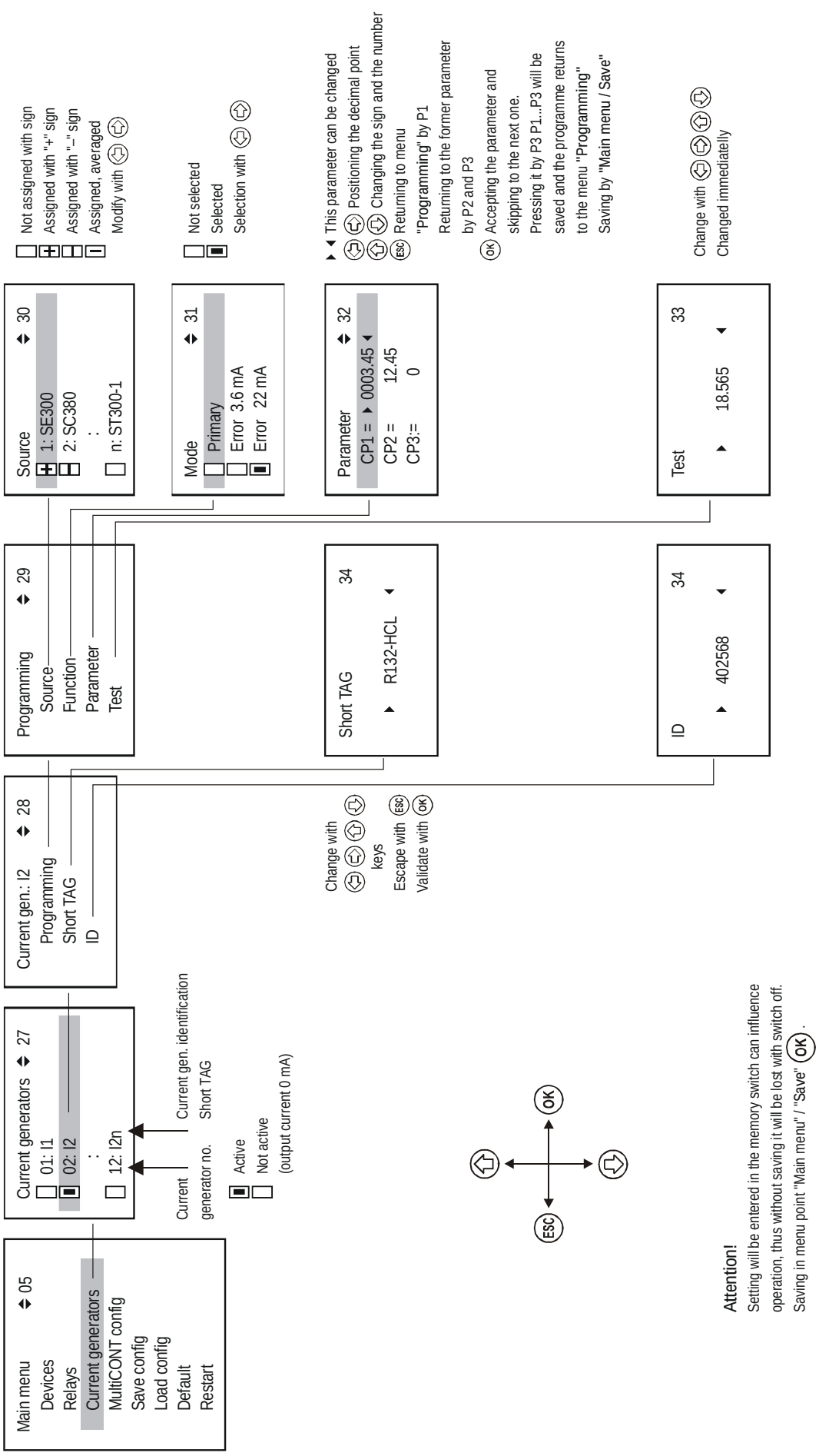
APPENDIX 2. MULTICONT PRW-100 MENU SYSTEM



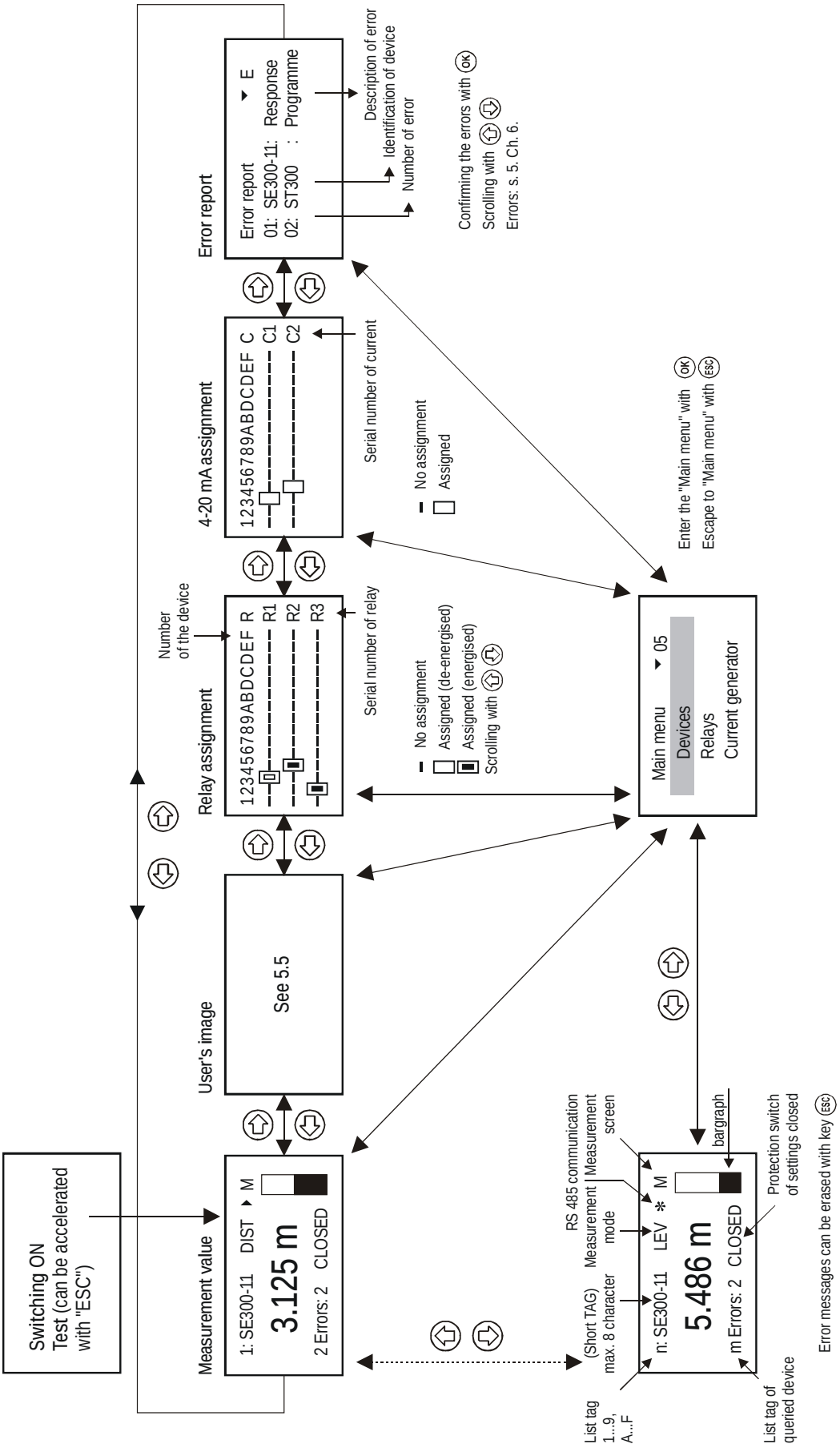


Attention!

Setting will be entered in the memory switch can influence operation, thus without saving it will be lost with switch off. Saving in menu point "Main menu" / "Save" (OK).

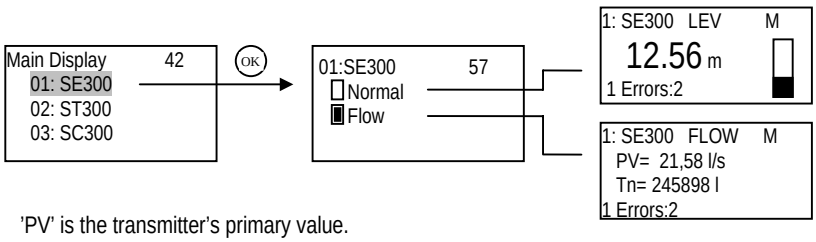


Attention!
Setting will be entered in the memory switch can influence operation, thus without saving it will be lost with switch off.
Saving in menu point "Main menu" / "Save" (OK) .


Switching ON
Test (can be accelerated with "ESC")
Measurement value
1: SE300-11 DIST M
3.125 m
2 Errors: 2 CLOSED
User's image
See 5.5
Relay assignment
123456789ABDCDEF R
R1
R2
R3
Number of the device
Serial number of relay
No assignment
Assigned (de-energised)
Assigned (energised)
Scrolling with
4-20 mA assignment
123456789ABDCDEF C
C1
C2
Serial number of current
No assignment
Assigned
Error report
Error report E
01: SE300-11: Response
02: ST300 : Programme
Description of error
Identification of device
Number of error
Confirming the errors with OK
Scrolling with
Errors: s. 5. Ch. 6.
Enter the "Main menu" with OK
Escape to "Main menu" with ESC
Main menu 05
Devices
Relays
Current generator
RS 485 communication
Measurement screen
bargraph
Protection switch of settings closed
(Short TAG) Measurement mode
max. 8 character
n: SE300-11 LEV * M
5.486 m
m Errors: 2 CLOSED
List tag 1...9, A...F
List tag of queried device
Error messages can be erased with key ESC

Normal/Flow mode switching: („Main menu"/"MultiCONT Config."/"Main Display")

How to select the Display in Measuring Mode:



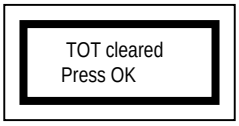
'PV' is the transmitter's primary value.
'Tn' is the transmitter's TOT1 (n=1) or TOT2 (n=2) value.
The TOT1 and TOT2 values are alternately displayed almost every second
The value of TOT1 and TOT2 can be maximum 2^{32}, if the value goes above 99999999 the display switches to exponential display.

TOTAL, PULSE relay variables: Quantity (TOT1 and TOT2) summation is done in the flow-measuring transmitters. In the MultiCONT it is possible to transmit the TOT2 in preset units in the form of relay impulses .In order to do this, the relay has to be switched to **'Impulse F'** mode. In the **'RP3'** parameter (belonging to the relay), specify the volume that will trigger 1 impulse (the length of 1 impulse is about 200 ms). There is a **'PULSE'** and a **'TOTAL'** variable for each relay programmed to work in **'Impulse F'** mode. The **'TOTAL'** variable of the relay watches the **'TOT2'** variable of the transmitter. The volume difference between the 2 variables, given in **'RP3'** is put into the 'PULSE' variable. The value in the 'PULSE' variable is transmitted to the output of the relay. The contents of 'TOTAL' and 'PULSE' can be viewed in the 'TOT Information' menu. The 'TOTAL' and 'PULSE' relay variables get into the "non-forgetting" memory even in the event of a power failure, as a result of the (automatic) saving done every 6 minutes.The relay impulses that occur in the time lapse between the last save and the return of power get counted again after the power supply is put on. In order to avoid such situation, use a UPS.

Example: Let the TOT2 value of the transmitter be 1000m³. Let the TOTAL value of the relay also be 1000m³. Let the PULSE value of the relay be 0. At the same time, assume the RP3 parameter of the relay to be 10m³. In this case, no impulses appear at the relay output, because the TOT2 value of the transmitter is the same as the TOTAL value of the relay. Based on the measurement of the transmitter the TOT2 value changes from 1000m³ to 1050m³, the change being 50m³. Also, based on the RP3 parameter of the relay (10m³ unit volume), 5 is added to the value of the PULSE variable, with the change being 5*10=50m³. As a result, the 5 impulses to be transmitted appear on the relay output. After this, the value of the relay's PULSE becomes 0, while that of TOTAL becomes 1050m³

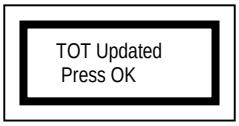
Deleting TOT: Once in this menu, pressing 'OK' will delete the values of the relay's **'TOTAL'** and **'PULSE'** variables. This results in the total volume in the transmitter's **'TOT2'** variable to be counted to the output of the relay based on the unit set in the **'RP3'**.

The delete operation is followed by the window below:.

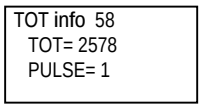


Refreshing TOT: Once in the menu, pressing 'OK' will copy the transmitter's 'TOT2' value into the relay's 'TOTAL' variable, and then delete the contents of the relay's 'PULSE'. Thus, if there was a counting of impulses, it will be halted.

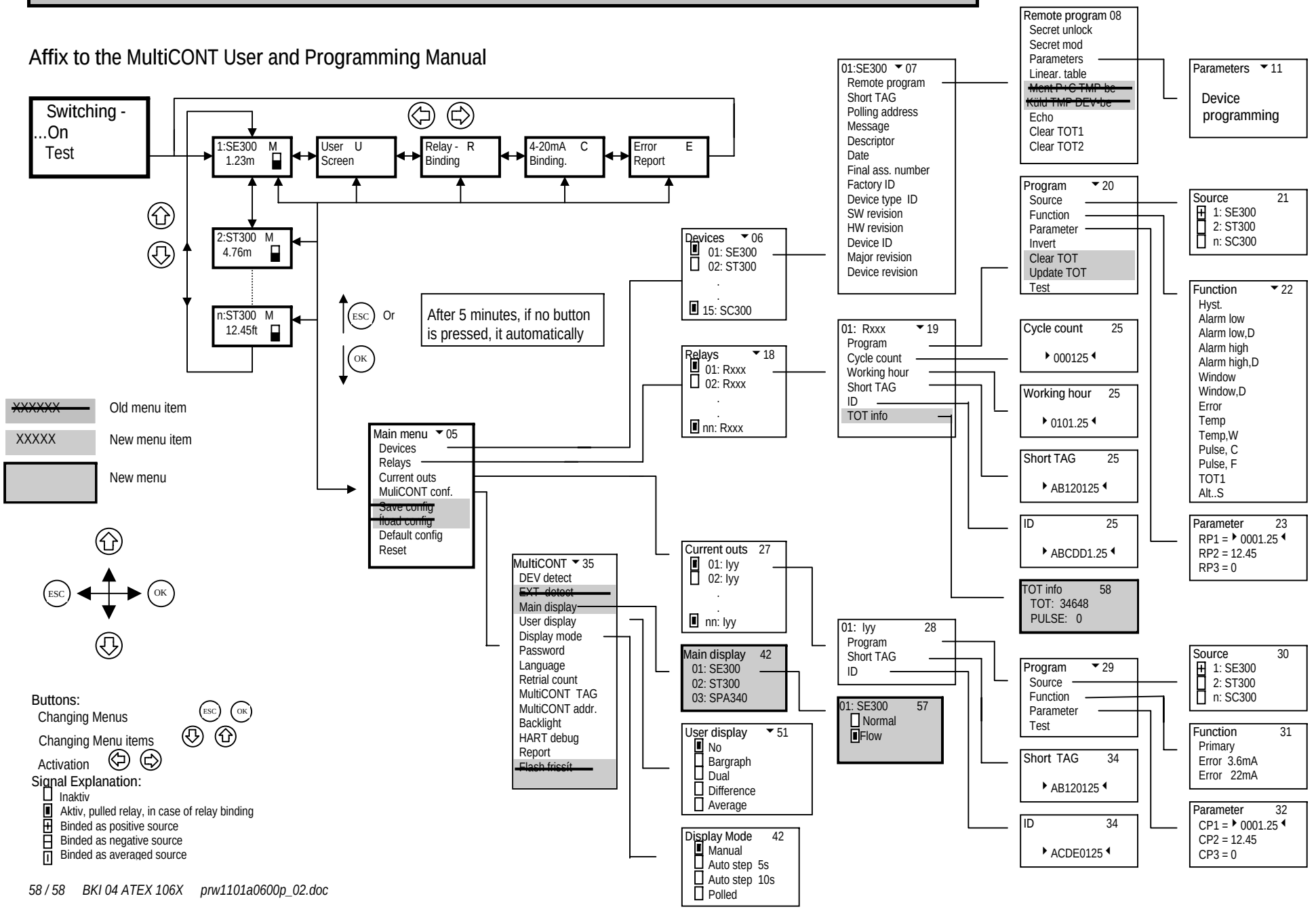
The update operation is followed by the window below.



TOT information: At this menu, clicking 'OK' will display the values of the relay's **'PULSE'** and **'TOTAL'** variables. The variables are refreshed approximately every 0.5 seconds. The value of **'TOTAL'** always tends towards the transmitter's **'TOT2'** value. The **'PULSE'** variable shows how many impulses need to be sent for the transmitter's **'TOT2'** value and the relay's **'TOTAL** value to be the same. If the value of the **'PULSE'** variable increases continuously, that means that the transmiter's **'TOT2'** value is increasing faster than the relay is capable of sending impulses. The **'PULSE'** variable can store a maximum of 65536 relay impulses, while the maximum value of the **'TOTAL'** variable is 2^{32} .



Affix to the MultiCONT User and Programming Manual



Buttons:
Changing Menus
Changing Menu items
Activation

Signal Explanation:
- Inaktiv
- Aktiv, pulled relay, in case of relay binding
- Binded as positive source
- Binded as negative source
- Binded as averaged source