proense®

▽AUTOMATIONDIRECT.com

SCU-2501/
SCU-2502/
SCU-2503

Universal Frequency Converter

User Manual

Universal frequency converter
SCU-2501 / SCU-2502 / SCU-2503

Table of contents

Warning

This device is designed for connection to hazardous electric voltages. Ignoring this warning can result in severe personal injury or mechanical damage.
To avoid the risk of electric shock and fire, the safety instructions of this guide must be observed and the guidelines followed. The specifications must not be exceeded, and the device must only be applied as described in the following.
Prior to the commissioning of the device, this installation guide must be examined carefully.
Only qualified personnel (technicians) should install this device. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

GENERAL

Warning

Until the device is fixed, do not connect hazardous voltages to the device. The following operations should only be carried out on a disconnected device and under ESD safe conditions:
    General mounting, connection and disconnection of wires.
    Troubleshooting the device.

**HAZARD-
OUS
VOLTAGE**

Warning

Do not open the front plate of the device as this will cause damage to the connector for the SCU-PDM1 or SCU-PDM2 communication interfaces.
This device contains no DIP-switches or jumpers.
SCU-2501 / SCU-2502 / SCU-2503 must be mounted on a DIN rail according to DIN EN 60715.

CAUTION

Symbol identification

Triangle with an exclamation mark: Warning / demand. Potentially lethal situations. Read the manual before installation and commissioning of the device in order to avoid incidents that could lead to personal injury or mechanical damage.

The CE mark proves the compliance of the device with the essential requirements of the directives.

The double insulation symbol shows that the device is protected by double or reinforced insulation.

Safety instructions

Definitions

Hazardous voltages have been defined as the ranges: 75 to 1500 Volt DC, and 50 to 1000 Volt AC.
Technicians are qualified persons educated or trained to mount, operate, and also trouble-shoot technically correct and in accordance with safety regulations.
Operators, being familiar with the contents of this manual, adjust and operate the knobs or potentiometers during normal operation.

Receipt and unpacking

Unpack the device without damaging it and check whether the device type corresponds to the one ordered. The packing should always follow the device until this has been permanently mounted.

Environment

Avoid direct sun light, dust, high temperatures, mechanical vibrations and shock, and rain and heavy moisture. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation.
The device must be installed in pollution degree 2 or better.
The device is designed to be safe at least under an altitude up to 2,000 m.
The device is designed for indoor use.

Mounting

Only technicians, who are familiar with the technical terms, warnings, and instructions in the manual and who are able to follow these, should connect the device. Should there be any doubt as to the correct handling of the device, please contact,

www.automationdirect.com

Mounting and connection of the device should comply with national legislation for mounting of electric materials, i.e. wire cross section, protective fuse, and location.

Stranded wire should be installed with an insulation stripping length of 5 mm or via a suitable insulated terminal such as a bootlace ferrule.

Descriptions of input / output and supply connections are shown in the block diagram and side label.

The following apply to fixed hazardous voltages-connected devices:
The max. size of the protective fuse is 10 A and, together with a power switch, it should be easily accessible and close to the device. The power switch should be marked with a label indicating that it will switch off the voltage to the device.

Year of manufacture can be taken from the first two digits in the serial number.

UL installation requirements

Use 60/75°C copper conductors only
For use only in pollution degree 2 or better
Max. ambient temperature . . . . 60°C
Max. wire size. . . . . AWG 26-14
UL file number E197592

Calibration and adjustment

During calibration and adjustment, the measuring and connection of external voltages must be carried out according to the specifications of this manual. The technician must use tools and instruments that are safe to use.

Normal operation

Operators are only allowed to adjust and operate devices that are safely fixed in panels, etc., thus avoiding the danger of personal injury and damage. This means there is no electrical shock hazard, and the device is easily accessible.

Cleaning

When disconnected, the device may be cleaned with a cloth moistened with distilled water.

Mounting / demounting the SCU-PDM1 or SCU-PDM2
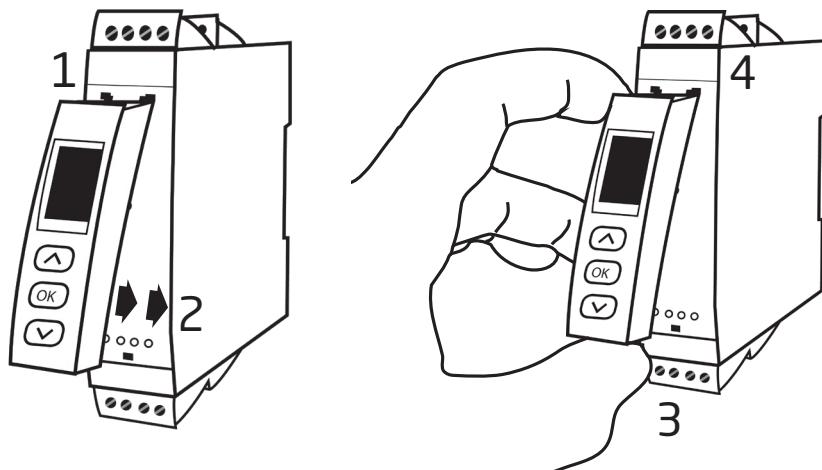
1: Insert the tabs of the SCU-PDM1 or SCU-PDM2 into the slots at the top of the device.
2: Hinge the SCU-PDM1 or SCU-PDM2 down until it snaps into place.

Demounting of the SCU-PDM1 or SCU-PDM2 communication interfaces
3: Push the release button on the bottom of the SCU-PDM1 or SCU-PDM2 and hinge the SCU-PDM1 or SCU-PDM2 out and up.
4: With the SCU-PDM1 or SCU-PDM2 hinged up, remove from the slots at the top of the device.

Universal frequency converter
SCU-2501 / SCU-2502 / SCU-2503

- Front-programmable
- Input: NAMUR, NPN, PNP, Tacho, TTL & S0
- Output: Programmable bipolar mA / V, frequency or relay
- Universal power supply 21.6...253 VAC / 19.2...300 VDC

Functional highlights
- Measures frequencies up to 100 kHz.
- Active and passive current output ±23 mA / 0...23 mA.
- Buffered voltage output ±10 VDC.
- Linearization: Linear or square root function.
- 2-point process calibration.
- Programmable trigger levels -0.05...6.5 V.
- Programmable sensor supply 5...17 V.
- NAMUR sensor error detection.
- Advanced configurable input limits for increased safety.
- Digital output: NPN & PNP; 0...100 kHz with programmable logic level 5...24 V.
- Output relay with windows, setpoint and latch functionality.
- Simulation of process value during commissioning and maintenance.
- All terminals are over-voltage protected (24 VDC), polarity protected and short-circuit protected.

Technical highlights
- Accuracy < 0.06% / span.
- Temperature coefficient 0.006% / C°.
- Response time < 30 ms.
- 2.3 kVAC, 3-port galvanic isolation.
- NAMUR NE21 and NE43.
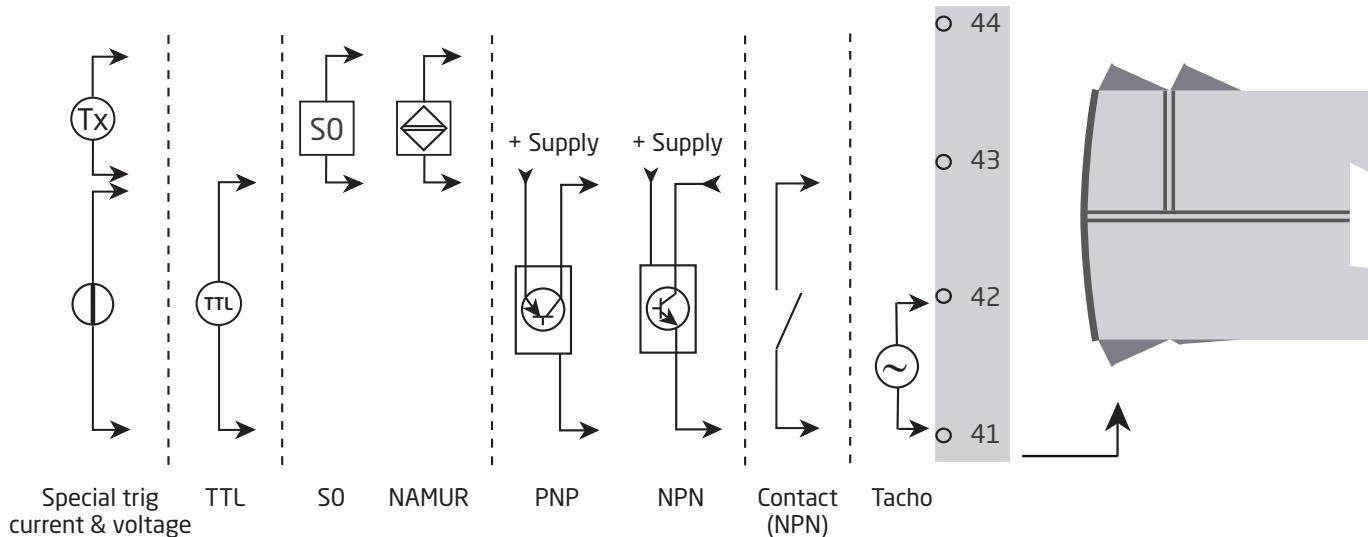
Programming
- Configuration, monitoring and diagnostics using the SCU-PDM1 or SCU-PDM2 detachable communication interfaces.
- All programming can be password-protected.
- Scrolling help text in 7 languages.
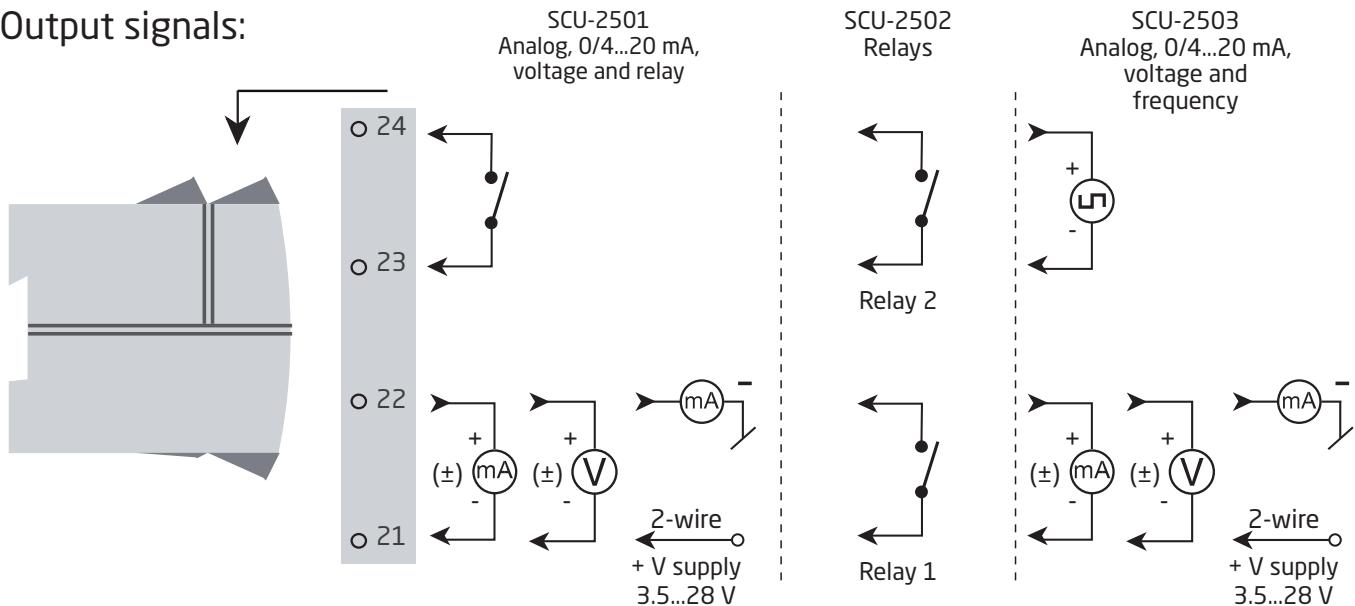
Mounting
- Units can be mounted side by side, horizontally and vertically, without air gap on a standard DIN rail – even at 60°C ambient temperature.

Applications

Input signals:

| Special trig current & voltage | TTL | S0 | NAMUR | PNP | NPN | Contact (NPN) | Tacho |

Output signals:

SCU-2501
Analog, 0/4...20 mA, voltage and relay

SCU-2502
Relays

SCU-2503
Analog, 0/4...20 mA, voltage and frequency

2-wire
+ V supply
3.5...28 V

Relay 2

Relay 1

2-wire
+ V supply
3.5...28 V

Power connection:

21.6...253 VAC
or
19.2...300 VDC
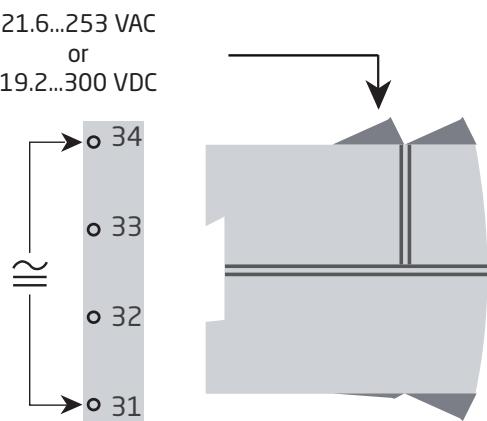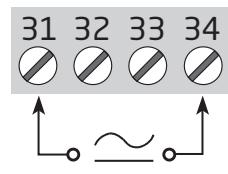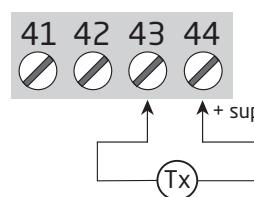
Connections

Supply

31 32 33 34

Inputs:

Special current
41 42 43 44

+ supply 5...17 V

Tx

Special voltage
41 42 43 44

- + + supply 5...17 V

Tacho
41 42 43 44

~

PNP
41 42 43 44

+ supply 5...17 V

+ supply

NPN
41 42 43 44

+ supply 5...17 V

+ supply

Contact (NPN)
41 42 43 44

NAMUR
41 42 43 44

+ supply 8.3 V

S0
41 42 43 44

+ supply 17 V

S0

TTL
41 42 43 44

+
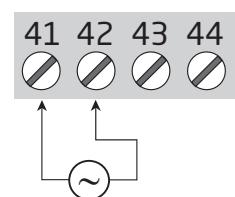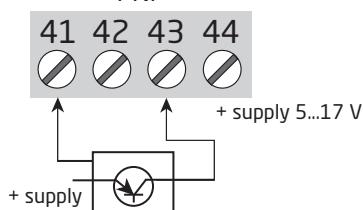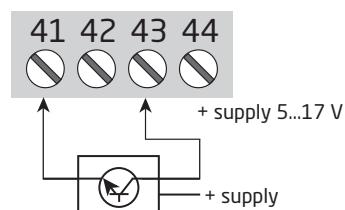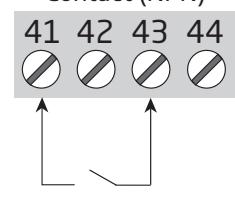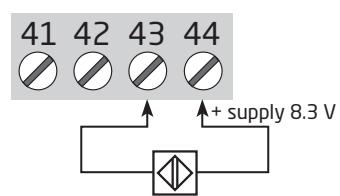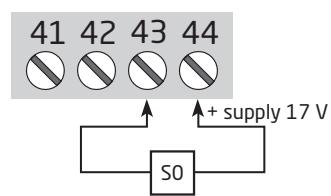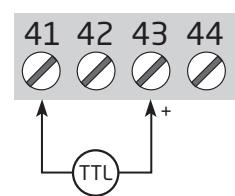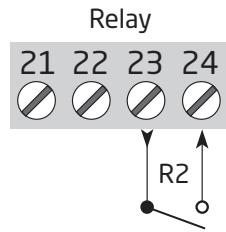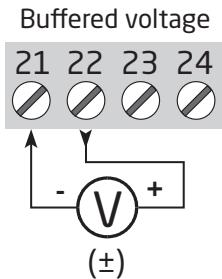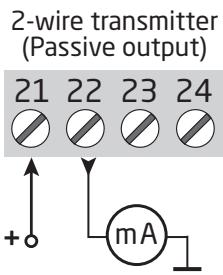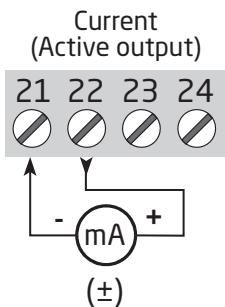
TTL
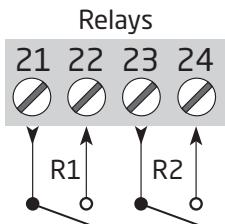
Connections

Outputs:

SCU-2501

Current
(Active output)

| 21 | 22 | 23 | 24 |

- mA + (±)

2-wire transmitter
(Passive output)

| 21 | 22 | 23 | 24 |

+ mA -

Buffered voltage

| 21 | 22 | 23 | 24 |

- V + (±)

Relay

| 21 | 22 | 23 | 24 |

R2

SCU-2502

Relays

| 21 | 22 | 23 | 24 |

R1   R2

SCU-2503

Current
(Active output)

| 21 | 22 | 23 | 24 |

- mA + (±)

2-wire transmitter
(Passive output)

| 21 | 22 | 23 | 24 |

+ mA -

Buffered voltage

| 21 | 22 | 23 | 24 |

- V + (±)

Frequency
(Push / pull)

| 21 | 22 | 23 | 24 |

Frequency
(PNP output)

| 21 | 22 | 23 | 24 |

R_{load}

Frequency
(NPN output)

| 21 | 22 | 23 | 24 |

R_{load} + -
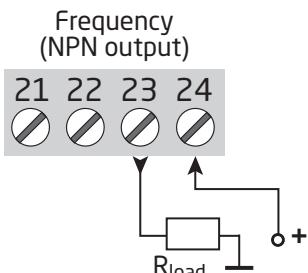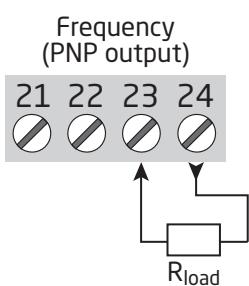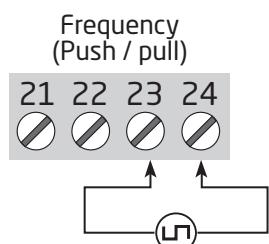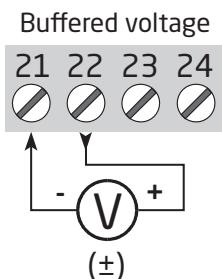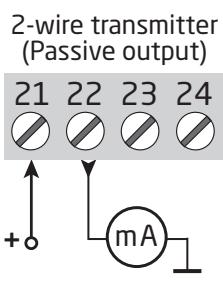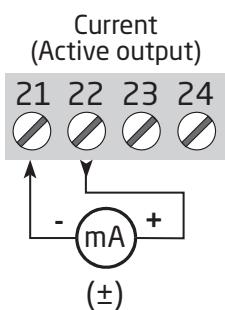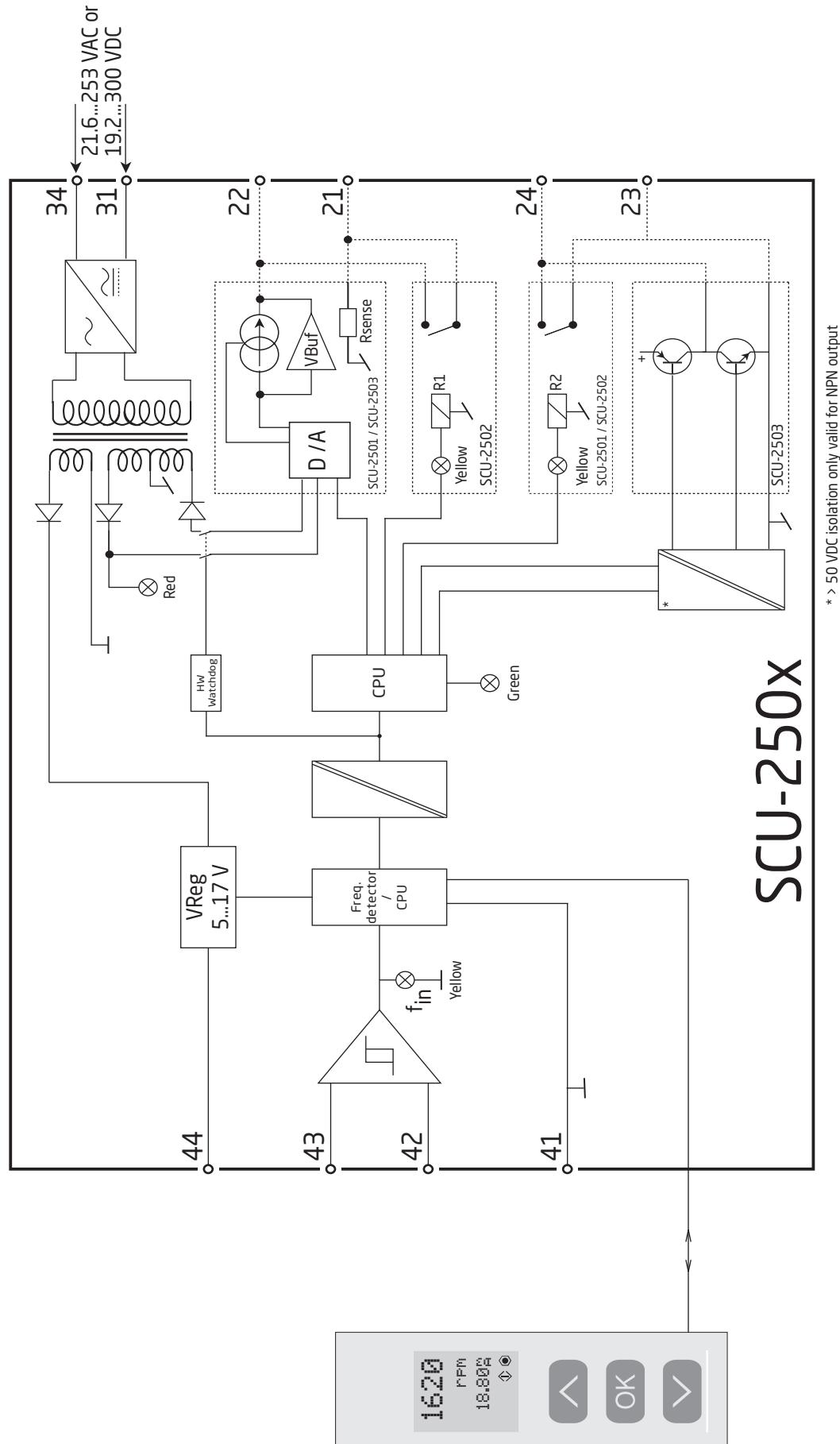
Block diagram

Specifications

Order

Type	Output
SCU-2501	1 analog output and 1 relay
SCU-2502	2 relays
SCU-2503	1 analog output and 1 frequency output

Accessories

SCU-PDM1 or SCU-PDM2 = Display / programming front

Note: The SCU-PDM1 or SCU-PDM2 communication interfaces are approved and certified as an add-on component to the SCU series of devices. All technical characteristics are valid with the SCU-PDM1 or SCU-PDM2 communication interface attached.

Electrical specifications

Environmental conditions:

Operating temperature	-20°C to +60°C
Storage temperature	-20°C to +85°C
Calibration temperature	20...28°C
Relative humidity	< 95% RH (non-cond.)
Protection degree	IP20

Installation in pollution degree 2 & measurement / overvoltage category II.

Mechanical specifications:

Dimensions (HxWxD)	109 x 23.5 x 104 mm
Dimensions (HxWxD) w/ SCU-PDM1 or SCU-PDM2	109 x 23.5 x 116 / 131 mm (SCU-PDM1) or 144 mm (SCU-PDM2) [4.3 x 0.9 x 4.6 / 5.2 in (SCU-PDM1) or 5.67 in. (SCU-PDM2)]
Weight approx., SCU-2501 / SCU-2502 / SCU-2503	160 / 165 / 150 g
DIN rail type	DIN EN 60715 - 35 mm
Wire size	0.13...2.08 mm^2 / AWG 26...14 stranded wire
Screw terminal torque	0.5 Nm

Common electrical specifications:

Supply voltage, universal	21.6...253 VAC, 50...60 Hz or 19.2...300 VDC
Protective fuse	400 mA SB / 250 VAC
Max. required power	≤ 2.6 W
Max. power dissipation	≤ 2.1 W
Isolation voltage - test	2.3 kVAC
Isolation voltage - working	
Input to any	250 VAC (reinforced)
Relay to relay, relay to analog	< 115 VAC (reinforced), > 115 VAC (basic)
NPN to analog	Isolated > 50 VDC
Push-Pull / PNP to analog	Shared ground with analog output
Communications Interface	Programming/display module, SCU-PDM2 (sold separately) or SCU-PDM1 (discontinued and replaced by SCU-PDM2)
Signal dynamics, output	18 bit
Signal / noise ratio	> 60 dB
Response time (0...90%, 100...10%)	≤ 30 ms

Accuracy, the greater of basic and absolute values:

Input			
Type	Basic accuracy	Absolute accuracy	Temperature coefficient
Frequency input	≤ 0.0002 Hz	≤ ±0.01% of input frequency	≤ ±0.0005% / °C

Output			
Type	Basic accuracy	Absolute accuracy	Temperature coefficient
Current output	8 μA	≤ ±0.05% of span	≤ ±0.005% / 0.8 μA / °C
Voltage output	2 mV	≤ ±0.05% of span	≤ ±0.005% / 200 μV / °C
Frequency output	n.a.	≤ ±0.002% of output frequency +0.0004% of $f_{max.}$	≤ ±0.0005% / °C

EMC - immunity influence. . . . . < ±0.5% of span
Extended EMC immunity:
NAMUR NE 21, A criterion, burst . . . . < ±1% of span

of span = of selected standard range

Basic accuracy$_{Input}$ = 0.0002 Hz
Absolute accuracy$_{Input}$ = 0.001%
Calibration temperature = **20...28°C**

Example 1: Analog current output, input low 1 kHz, input high 8 kHz, output span 4...20 mA = 16 mA:

Accuracy$_{Input\_low}$ = 0.01% x 1000 Hz = 0.1 Hz
Accuracy$_{Input\_high}$ = 0.01% x 8000 Hz = 0.8 Hz
Accuracy$_{Output}$ = 0.05% x 7000 Hz = 3.5 Hz

Total accuracy$_{Low}$ = Accuracy$_{Input\_low}$ + Accuracy$_{Output}$
Total accuracy$_{Low}$ = 0.1 Hz + 3.5 Hz = 3.6 Hz

Total accuracy$_{High}$ = Accuracy$_{Input\_high}$ + Accuracy$_{Output}$
Total accuracy$_{High}$ = 0.8 Hz + 3.5 Hz = 4.3 Hz

Example accuracy calculations are based on factory calibration ambient temperature, and do not take into account other potential sources of inaccuracy, e.g. power supply effect, ambient temperature fluctuation etc. which must also be considered.

SCU-2501 / SCU-2502 / SCU-2503

Auxiliary supplies

Sensor supply limitation (terminal 44) . . . . 20 mA, 5...17 V

Input specifications

Frequency input

Frequency range . . . . 0.001 Hz to 100 kHz
Time range, time function . . . . 10 μs to 999.9 s
Max. frequency, with input filter ON . . . . 75 Hz
Min. pulse width with input filter ON . . . . 8 ms
Min. pulse width with input filter OFF . . . . 4 μs
Response time (0...90%, 100...10%) . . . . < 30 ms

NAMUR input

Trig-level LOW . . . . ≤ 1.2 mA
Trig-level HIGH . . . . ≥ 2.1 mA
Input impedance . . . . 1 kΩ || < 220 pF
Breakage detection . . . . ≤ 0.1 mA
Short-circuit detection . . . . ≥ 6.9 mA
Sensor supply - pin 44, fixed. . . . . 8.3 V

Tacho input

Trig-level LOW . . . . ≤ -50 mV
Trig-level HIGH . . . . ≥ +50 mV
Input impedance . . . . 100 kΩ || < 220 pF
Max. input voltage . . . . 80 VAC pp
Sensor supply - pin 44, programmable . . . . 5...17 V / 23 mA

NPN / PNP input

Trig-level LOW . . . . ≤ 4.0 V
Trig-level HIGH . . . . ≥ 7.0 V
Input impedance . . . . 3.48 kΩ || < 220 pF
Trigger edge . . . . NPN = Neg. edge, PNP = Pos. edge.
Sensor supply - pin 44, programmable . . . . 5...17 V / 23 mA

TTL input

Trig-level LOW . . . . ≤ 0.8 V
Trig-level HIGH . . . . ≥ 2.0 V
Input impedance . . . . ≥ 100 kΩ || < 220 pF
Sensor supply - pin 44, programmable . . . . 5...17 V / 23 mA

S0 input

Trig-level LOW . . . . ≤ 2.2 mA
Trig-level HIGH . . . . ≥ 9.0 mA
Input impedance . . . . 758 Ω || < 220 pF
Sensor supply - pin 44, fixed. . . . . 17 V

Special voltage input

User-programmable trig-levels	-0.05...6.50 V
*Hysteresis, min.	50 mV
Input impedance, programmable:	
High Z	≥100 kΩ ‖ < 220 pF
Pull up/down	3.48 kΩ ‖ < 220 pF
Programmable sensor supply - pin 44	5...17 V / 23 mA
Max. input voltage	17 V

Special current input

User-programmable trig-levels	0.0...10.0 mA
*Hysteresis, min.	0.2 mA
Input impedance	1 kΩ ‖ < 220 pF
Sensor supply - pin 44, programmable	5...17 V / 23 mA
Max. input current	17 mA

* For low signal levels with input trigger level hysteresis below 100 mV / 0.1 mA it is recommended to use shielded cables with correct grounding, to avoid false triggering due to induced EMC.

Configurable input limits

Error detection	Enable / disable
Configurable input limits, low	0 Hz...min. configured input frequency
Configurable input limits, high	Max. configured input frequency...100 kHz
Hysteresis	0.5% of max. configured input frequency
Input limit low/high, error indication levels	UP, DOWN, ZERO, NONE
	See tables on pages 19-20

Output specifications

Current output

All standard ranges can be selected as Direct or Inverted action.

Signal range, active / passive	±23 mA / 0...23 mA
Programmable standard ranges	0...20, 4...20, S4-20, ±10 mA, ±20 mA
Load, max.	±23 mA / 600 Ω / ±13.8 VDC
External 2-wire loop supply	3.5...28 V
Response time, programmable	0...60 s
Load stability	≤ 0.001% of span / 100 Ω
Sensor error indication	0 / 3.5 / 23 mA / none
Output limitation at outside range	See tables on pages 19-20
Current limit	≤ 28 mA

Buffered voltage output
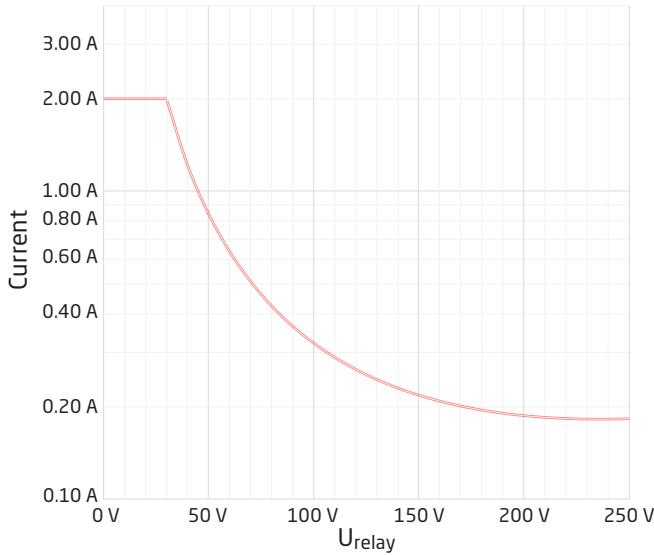
All standard ranges can be selected as Direct or Inverted action

Signal range	±11.5 VDC
Programmable standard ranges	0...5, 1...5, 0...10, 2...10, ±5, ±10 VDC
Load, min.	> 2 kΩ
Response time, programmable	0...60 s
Output limitation at outside range	See tables on pages 19-20

Relay outputs

Relay functions . . . . Setpoint, Window, Sensor error, Latch, Power and Off
Hysteresis . . . . 0...100%
On and Off delay . . . . 0...3600 s
Power on delay . . . . 0...9999 s
NAMUR sensor error detection . . . . Break / Make / Hold
Max. voltage . . . . 250 VAC / VDC
Max. AC current . . . . 2 A
Max. AC power . . . . 500 VA
Max. DC current, resistive load:
    @ $U_{relay} \leq$ 30 VDC . . . . 2 ADC
    @ $U_{relay} >$ 30 VDC . . . . $[1380 \times U_{relay}^{-2} \times 1.0085^{U_{relay}}]$ ADC

Graphic depiction of $[1380 \times U_{relay}^{-2} \times 1.0085^{U_{relay}}]$:

Frequency output

Frequency range . . . . 0.001 Hz...100 kHz
Duty cycle f ≤ 500 Hz . . . . < 90%
Programmable pulse time (f ≤ 500 Hz) . . . . 1...1000 ms
Pulse time > 500 Hz . . . . Fixed 50%

PNP output

**I_{source} max. . . . . 30 mA
V_{out} . . . . 24 VDC ± 10%
C_{out} . . . . 10 nF
R_{out} typ. . . . . 30 Ω

NPN output
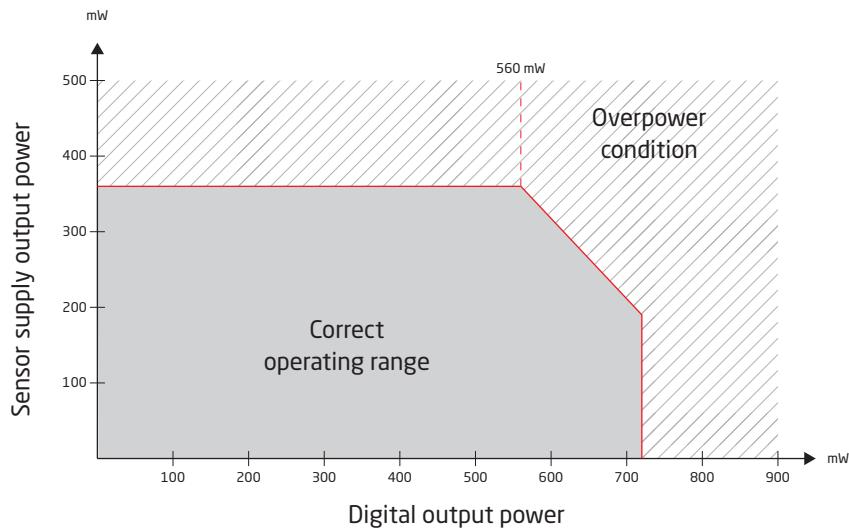
I_{sink} max. . . . . 130 mA
I_{sink} max. peak . . . . 500 mA
Voltage drop 130 mA . . . . < 1.5 VDC
External voltage (terminal 24) max. . . . . 30 VDC
C_{out} . . . . 10 nF
R_{out} typ. . . . . 10 Ω

Push-Pull output
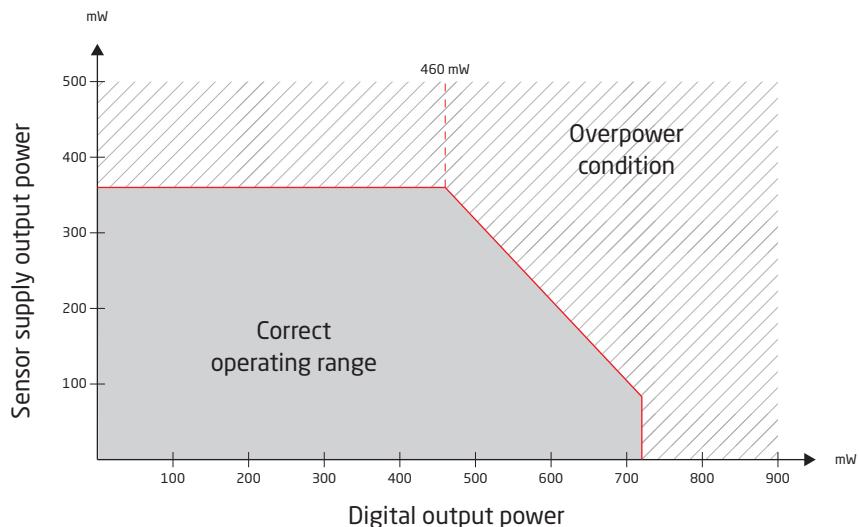
Voltage . . . . 5...24 VDC

Power output limitations - SCU-2503
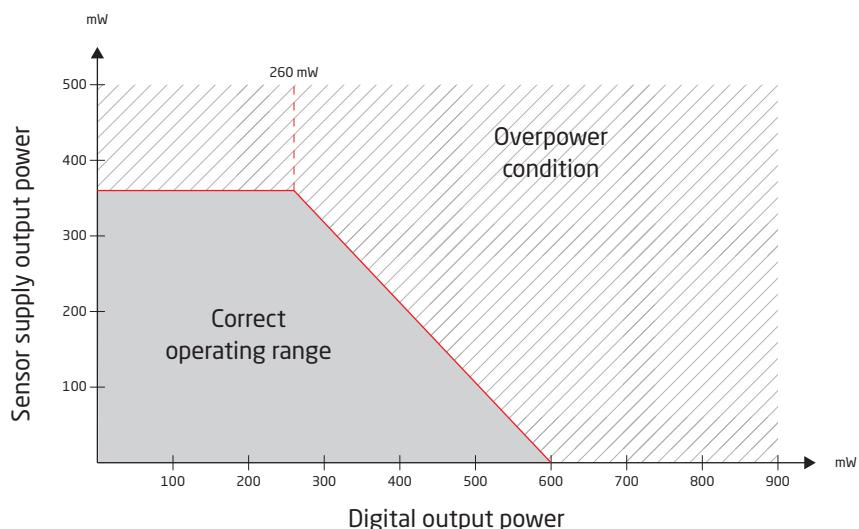
Power limitations when using buffered voltage output (SCU-2503 only)

Power limitations when using current output with 10 mA maximum output (SCU-2503 only)

Power limitations when using current output with 20 mA maximum output (SCU-2503 only)

Supported output configurations
For the SCU-2501 / SCU-2502 a concurrent and independent operation of analog output and relay is possible. For SCU-2503 the output is either presented on the analog or frequency output. In case of SCU-2503 being configured for analog output, the frequency output can be configured for 'relay mode'.
When both analog and frequency output is used, and frequency output is configured for PNP or push-pull, a common ground is not possible for terminal 21 and 23.

Observed authority requirements
EMC. 2014/30/EU
LVD 2014/35/EU
RoHS 2011/65/EU
Approvals
c UL us, UL 508. . . . . E197592

Programming

The SCU-PDM1 or SCU-PDM2 communication interfaces provide complete module programming and access to a wide range of operational features that help you when using the device.
This chapter deals with the SCU-2501 / SCU-2502 / SCU-2503 advanced features. The complete menu structure and programming options can be found in the Routing diagram section.

Configurable input error indication and input limits

Configurable input error detection

To increase system safety and integrity, you can program a high and low input error detection level. Input signals outside the low and high limits will cause the output of the device to go to the programmed error state.
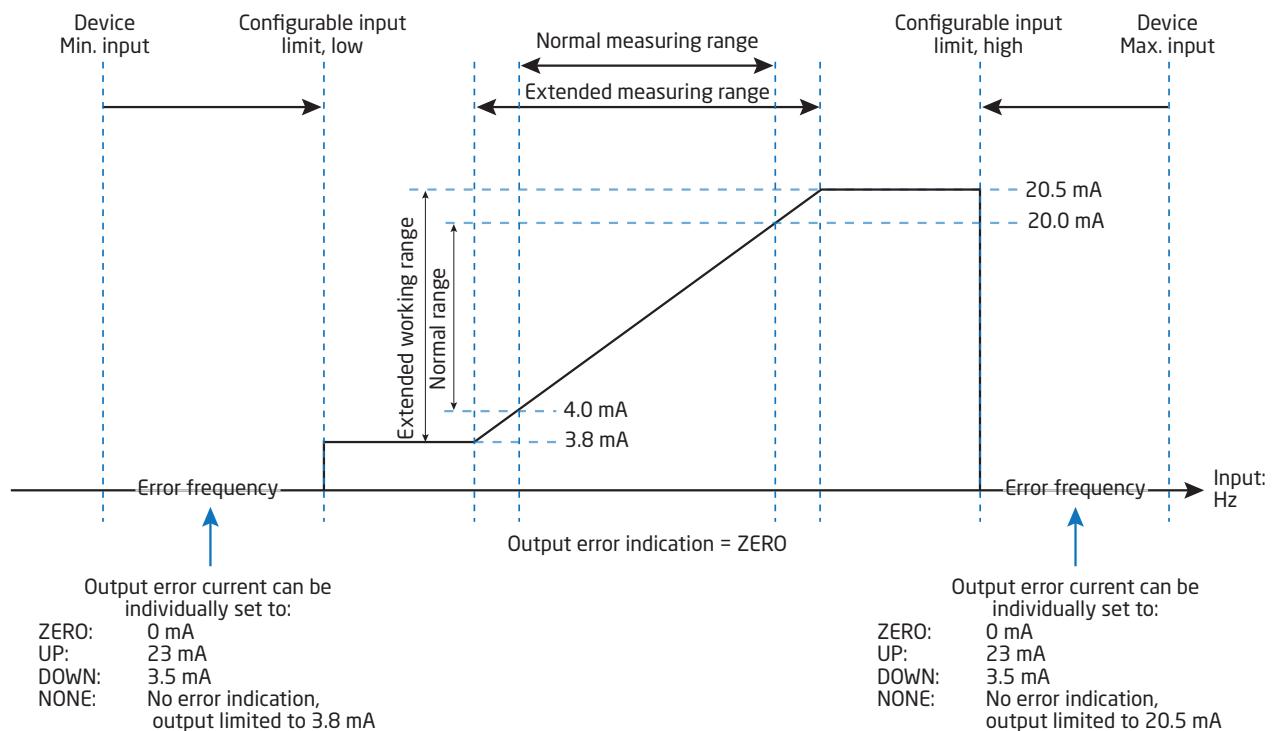
The two configurable input error detection levels can be set and enabled individually, just as it is possible to individually set the output error indication for each of the two detection levels. This allows users to differentiate process faults, broken or short input wires.

Available output error states for low and high limit: UP, DOWN, ZERO and NONE.
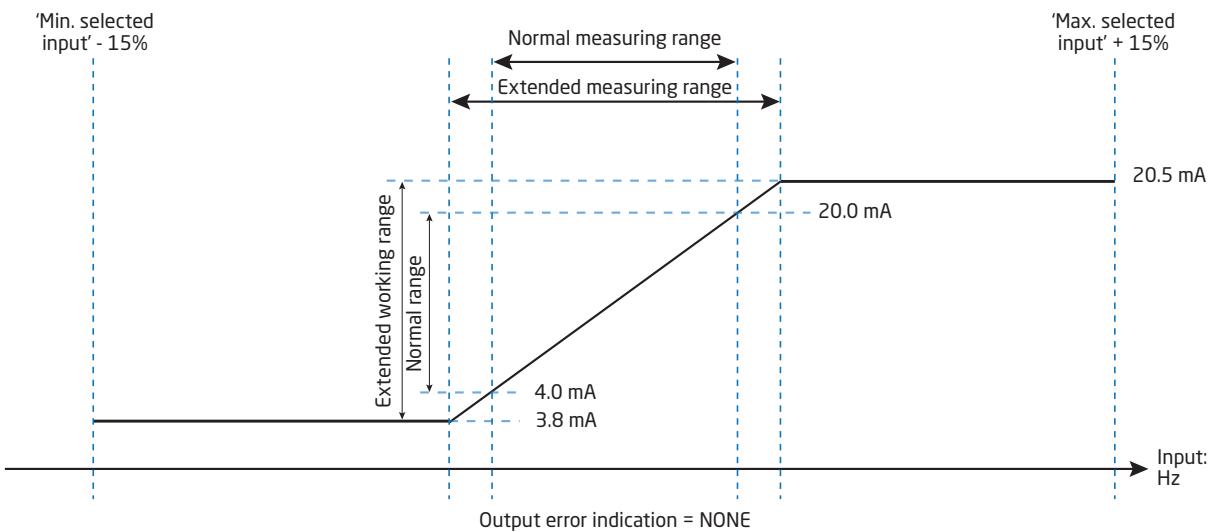
Output error indication uses the error states defined by NAMUR NE43 for a 4...20 mA output. For all other output spans equivalent output error indications are used (see tables on pages 19-20).

When input limit is enabled and error state NONE is selected, the input error is detected and presented to you on the display with IN.ER and flashing display, but not indicated on the output signal.

Example – 4...20 mA output span and both Limit high and Limit low set to ZERO

Output error current can be individually set to:
ZERO: 0 mA
UP: 23 mA
DOWN: 3.5 mA
NONE: No error indication, output limited to 3.8 mA

Output error current can be individually set to:
ZERO: 0 mA
UP: 23 mA
DOWN: 3.5 mA
NONE: No error indication, output limited to 20.5 mA

Example – Input limits disabled

Output limits and error indications – current output

Output span	Input limit disabled		NAMUR sensor error detection / input limit enabled					
	Output limit low	Output limit high	Output limit low	Output limit high	Output error indication, UP	Output error indication, DOWN	Output error indication, ZERO	Output error indication, NONE
4-20 mA	0 mA	23 mA	3.8 mA	20.5 mA	23 mA	3.5 mA	0 mA	No error indication
S4-20 mA	0 mA	23 mA	3.8 mA	20.5 mA	23 mA	3.5 mA	0 mA	No error indication
0-20 mA	0 mA	23 mA	0 mA	20.5 mA	23 mA	0 mA	0 mA	No error indication
±10 mA	-11.5 mA	11.5 mA	-10.25 mA	10.25 mA	11.5 mA	-11.5 mA	0 mA	No error indication
±20 mA	-23 mA	23 mA	-20.5 mA	20.5mA	23 mA	-23 mA	0 mA	No error indication

Output limits and error indications – voltage output

Output span	Input limit disabled		NAMUR sensor error detection / input limit enabled					
	Output limit low	Output limit high	Output limit low	Output limit high	Output error indication, UP	Output error indication, DOWN	Output error indication, ZERO	Output error indication, NONE
0-5 V	0 V	5.75 V	0 V	5.125 V	5.75 V	0 V	0 V	No error indication
1-5 V	0 V	5.75 V	0.975 V	5.125 V	5.75 V	0.875 V	0 V	No error indication
0-10 V	0 V	11.5 V	0 V	10.25 V	11.5 V	0 V	0 V	No error indication
2-10 V	0 V	11.5 V	1.95 V	10.25 V	11.5 V	1.75 V	0 V	No error indication
±5 V	-5.75 V	5.75 V	-5.125 V	5.125 V	5.75 V	-5.75 V	0 V	No error indication
±10 V	-11.5 V	11.5 V	-10.25 V	10.25 V	11.5 V	-11. 5V	0 V	No error indication

Output limits and error indications – custom frequency output, 50% duty cycle

Output span	Input limit disabled		NAMUR sensor error detection / input limit enabled			
	Output limit low	Output limit high	Output limit low	Output limit high	Output error indication, UP / DOWN	Output error indication, NONE
Output low = 0	0 Hz	Output High * 700%, cap at 115 kHz	0 Hz	Output high * 102.5%	Customer configurable	No error indication
Output low > 0	0 Hz	Output High * 700%, cap at 115 kHz	Output low * 95%	Output high * 102.5%	Customer configurable	No error indication
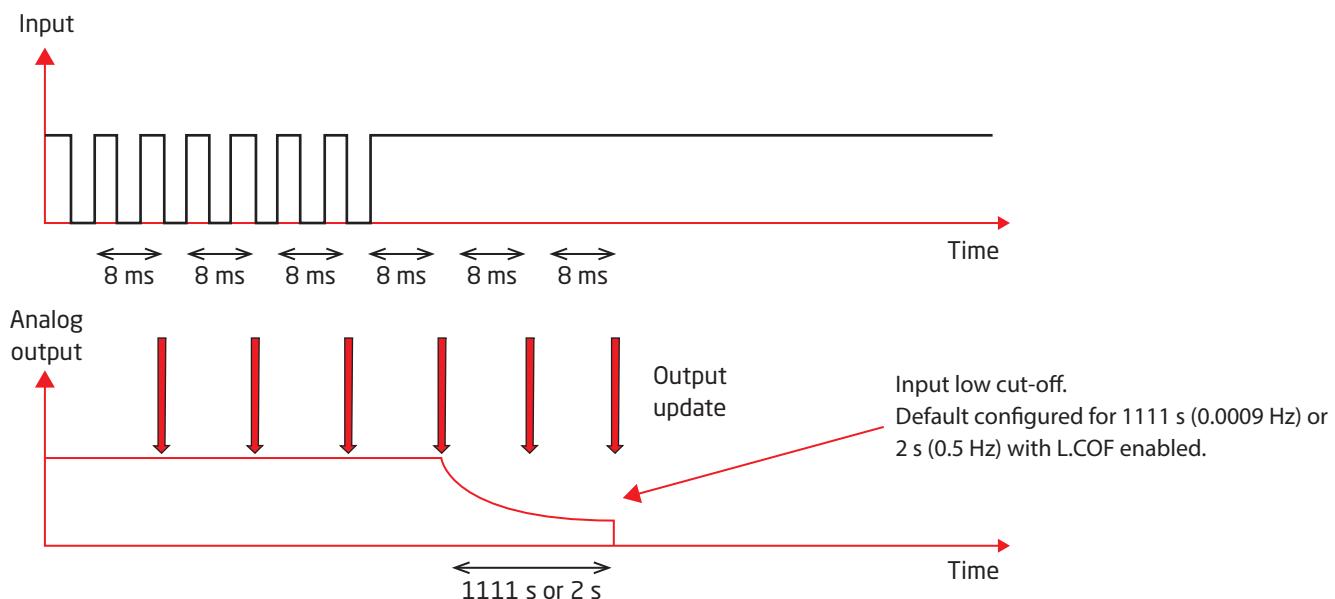
Output limits and error indications – custom frequency output, configurable duty cycle

Output span	Input limit disabled		NAMUR sensor error detection / input limit enabled			
	Output limit low	Output limit high	Output limit low	Output limit high	Output error indication, UP / DOWN	Output error indication, NONE
Output low = 0	0 Hz	'Max Output' * 105%.	0 Hz	Output high * 102.5%	Customer configurable	No error indication
Output low > 0	0 Hz	'Max Output' * 105%.	Output low * 95%	Output high * 102.5%	Customer configurable	No error indication

Low cut-off function
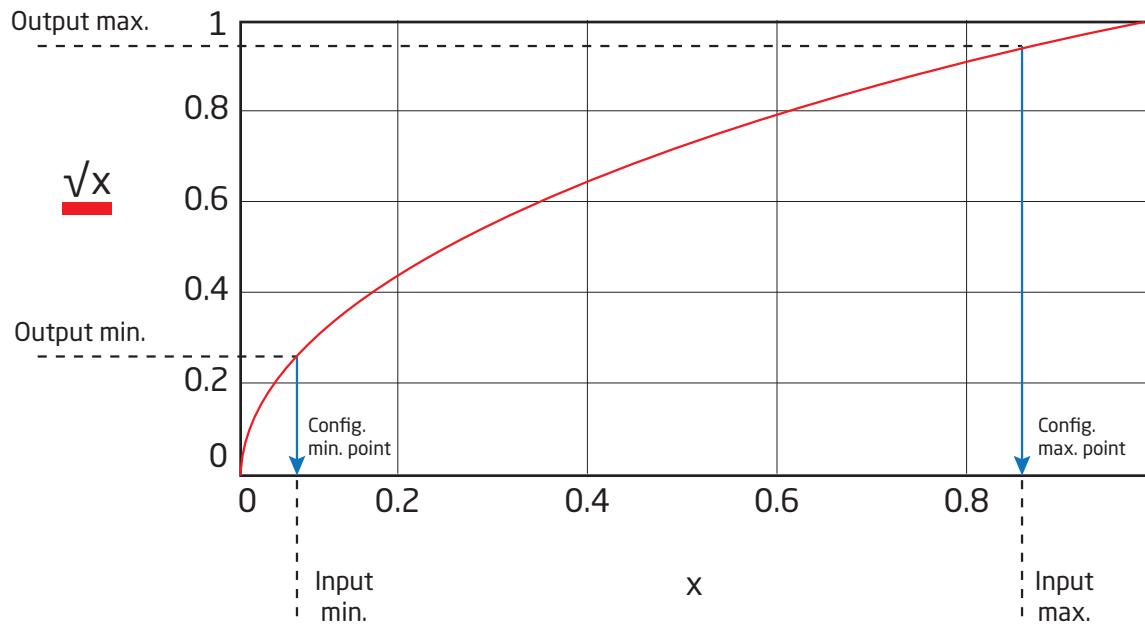
Default configured for 1111 s (0.0009 Hz) or 2 s (0.5 Hz) with L.COF enabled. Drives input to 0 Hz when Low Cut-Off time is reached.
For the frequency output of SCU-2503, an output low cut-off can be configured independently of the input low cut-off.
The LO.CUT point can be configured between output low and output hi frequency.

Square root function

A Square root function can be applied to the input.
Scaling of the function can be done as illustrated below:
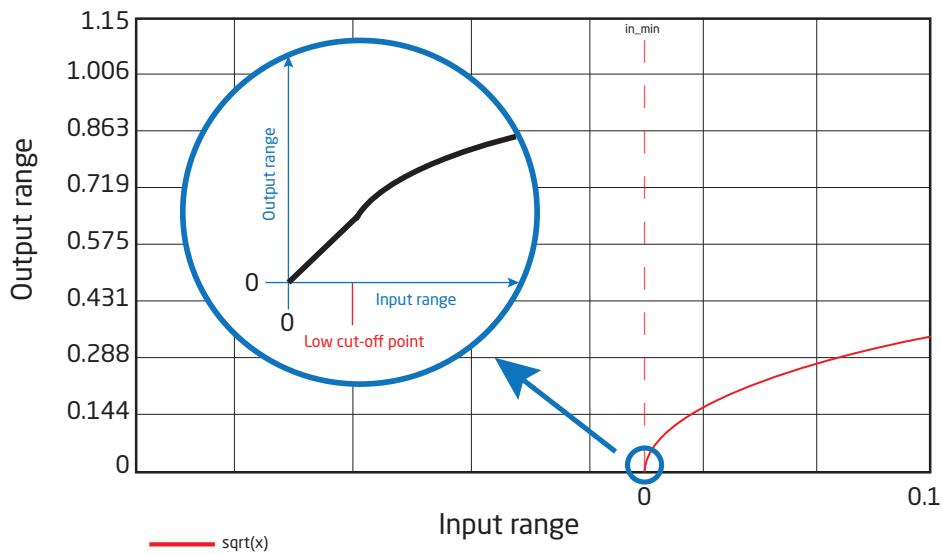
Low cut-off function:
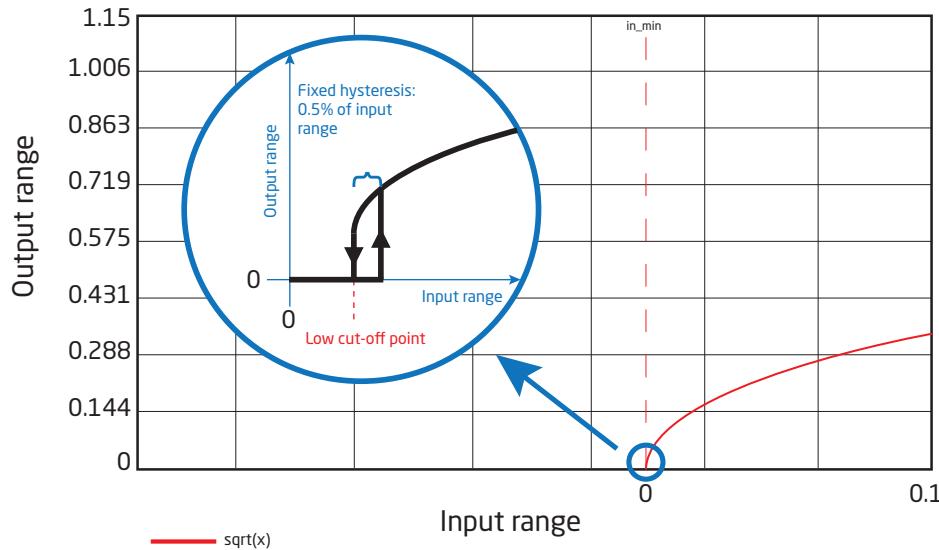
As a part of the square root function of the SCU-2501 / SCU-2502 / SCU-2503 it is possible to manually configure a low cut-off point. The feature is often used to suppress noise in the system.
The low cut off point defines a point where the input/output relationship either changes to a linear relationship or the output is truncated to zero. The two principles are illustrated below:

Linear cut-off:

Truncation to zero:

Configuration	Parameter	Specification	Condition
Low cut-off point	Linear cut-off	0.0 to 50.0% of selected input range	Independent of square root settings
	Truncation to zero	0.0 to 50.0% of selected input range Fixed hysteresis of 0.5% of the selected input range	

Over range / under range operation:

Configuration	Parameter	Specification	Condition
Normal square root action	Input low limit	'Minimum of selected input range'	'Square root point max.' > 'Square root point min.'
	Input high limit	'Maximum of selected input range' + 20%	
Inverted square root operation	Input low limit	'Minimum of selected input range' – 20%	'Square root point max.' < 'Square root point min.'
	Input high limit	'Maximum of selected input range'	

Relay functions

6 different settings of relay function can be selected.

Setpoint:	The device works as a single limit switch.
Window:	The relay has a window that is defined by a low and high setpoint. On both sides of the window the relay has the same status.
Error function:	The relay is activated by sensor error.
Power:	The relay is activated if power is on.
Off:	The relay is deactivated.
Latch:	The relay is latched. Valid for Setpoint, Window and Error function (advanced settings).

Note: For SCU-2503 configured for analog output, a full relay feature set is available at the frequency output terminals, with electrical output specifications as the frequency output.

Setpoint and window configuration

Common parameters:

Delay:	An ON and an OFF delay can be set on both relays in the range 0...3600 s.
Hysteresis:	0.0...100.0%.
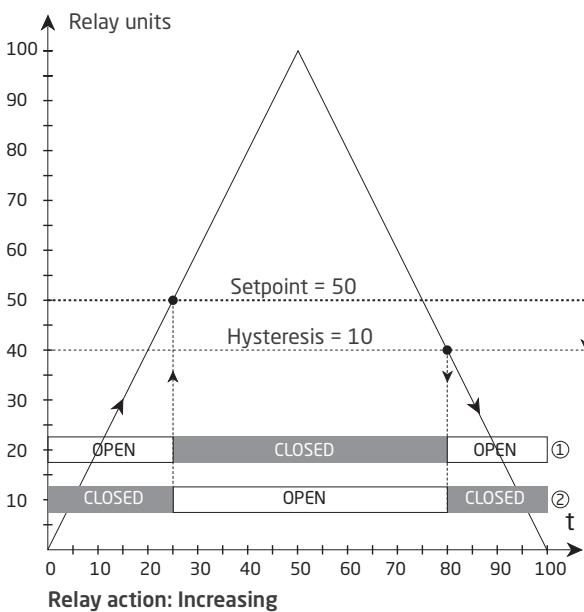
The active relay can be set as either normally open or normally closed.

The device works as a single limit switch when selecting 'setpoint' in the menu and entering the desired limit. For setpoint the relays can be set to activate on increasing or decreasing input signal.
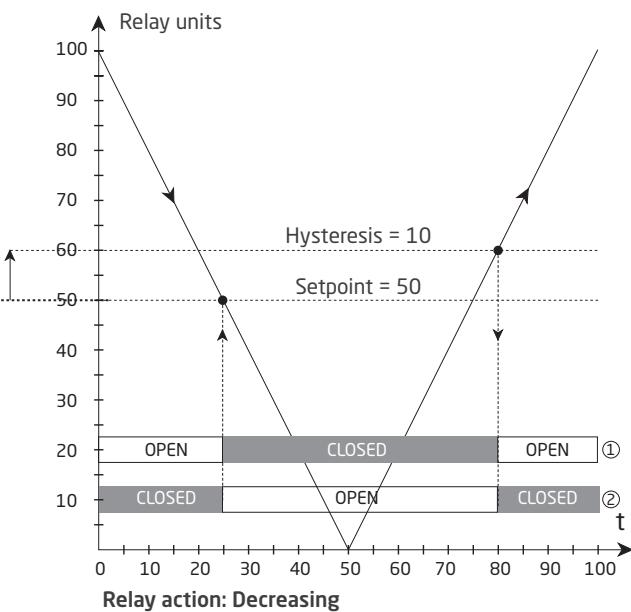
The window function is selected by choosing 'window' in the menu and defining a high and a low setpoint. The relay can be configured as active inside the window or outside the window.

Graphic depiction of relay action setpoint

Relay action: Increasing

Relay action: Decreasing
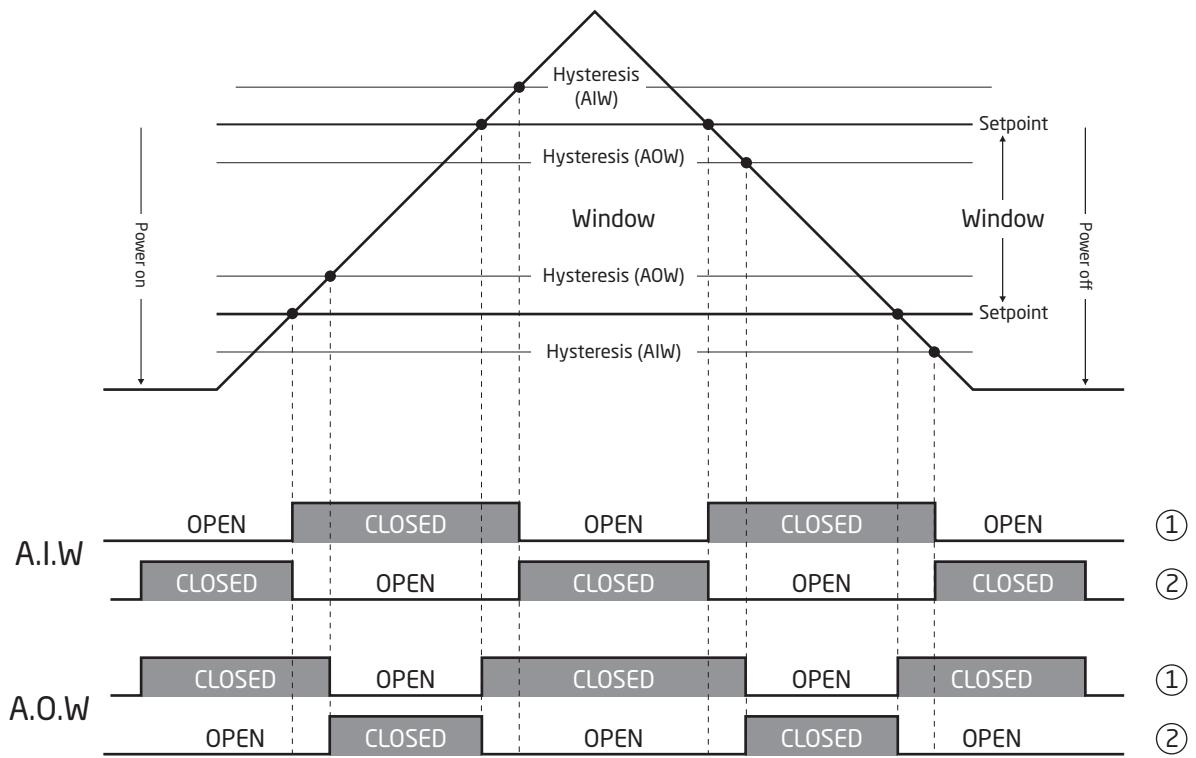
① = Normal function. Relay configured for N.O.
② = Inverse function. Relay configured for N.C.

Graphic depiction of relay action window

Relay function: Active Inside Window / Active Outside Window

① = Normal function. Relay configured for N.O.
② = Inverse function. Relay configured for N.C.

Advanced settings menu

Password protection (PASS): Programming access can be blocked by assigning a password. The password is saved in the device in order to ensure a high degree of protection against unauthorized modifications to the configuration.

Memory (MEM): In the memory menu you can save the configuration of the device in the SCU-PDM1 or SCU-PDM2 and then move the SCU-PDM1 or SCU-PDM2 onto another device of the same type and download the configuration in the new device.

Display setup (DISP): Here you can adjust the brightness contrast and the backlight. Setup of TAG numbers with 6 alphanumerics. Selection of functional readout in line 3 of the display - choose between readout of analog output or tag no.
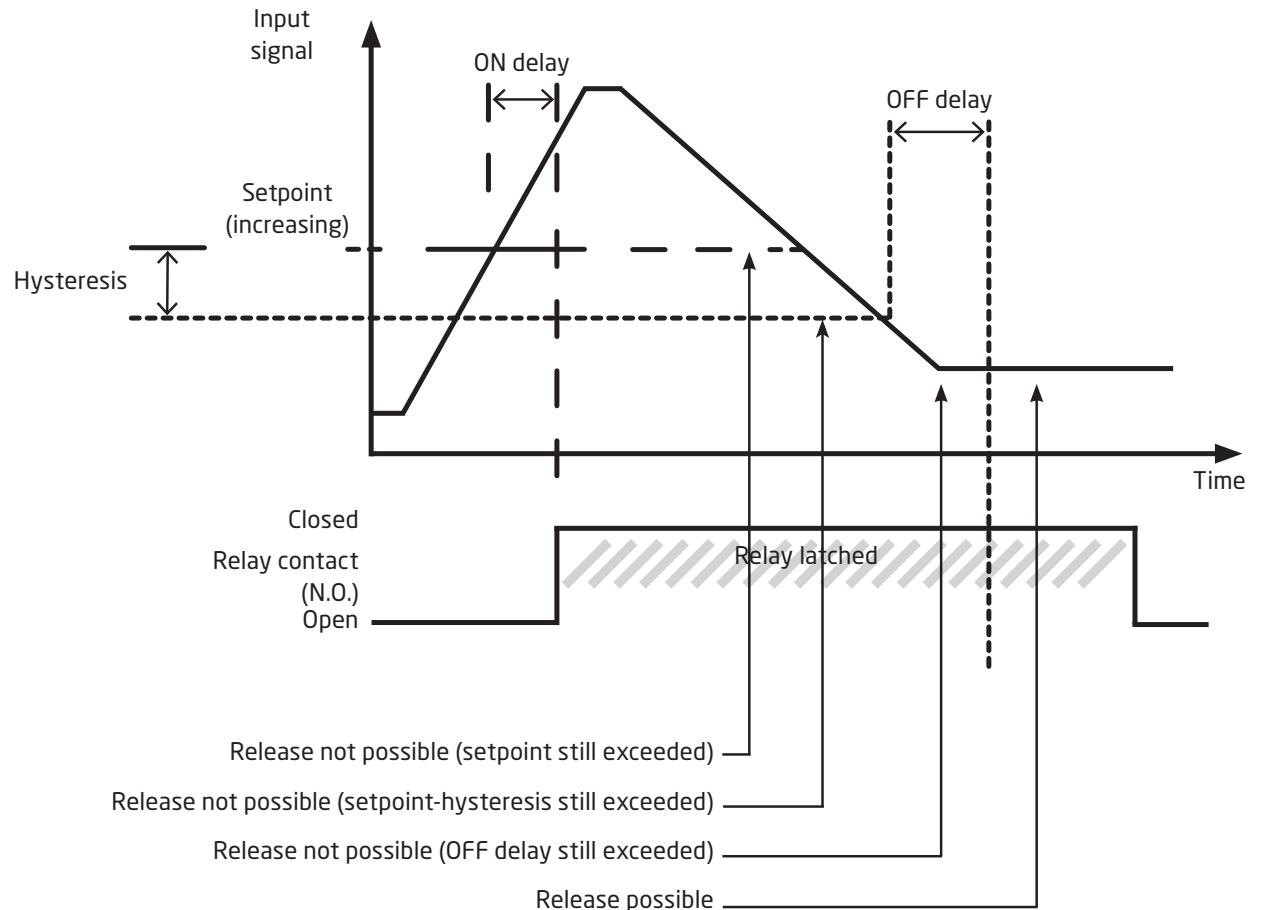
Two-point process calibration (CAL): The device can be process-calibrated in 2 points to fit a given input signal. A low input signal (not necessarily 0%) is applied and the actual value is entered via the SCU-PDM1 or SCU-PDM2. Then a high signal (not necessarily 100%) is applied and the actual value is entered via the SCU-PDM1 or SCU-PDM2. If you accept to use the calibration, the device will work according to this new adjustment. If you later reject this menu point or choose another type of input signal the device will return to factory calibration. Process-calibration is cleared if you edit either of the parameters: input type, input low, input high, display low or display high. Process calibration data are not saved to the configuration repository of the SCU-PDM1 or SCU-PDM2.

Process simulation function (SIM): Simulation of process value is possible via the up and down arrows, thus controlling the output signal. The point REL.SIM allows you to activate relay/-s by means of the arrow-keys up/down. You must exit the menu by pressing ⊛ (no time-out). The simulation function exits automatically if the SCU-PDM1 or SCU-PDM2 is detached.
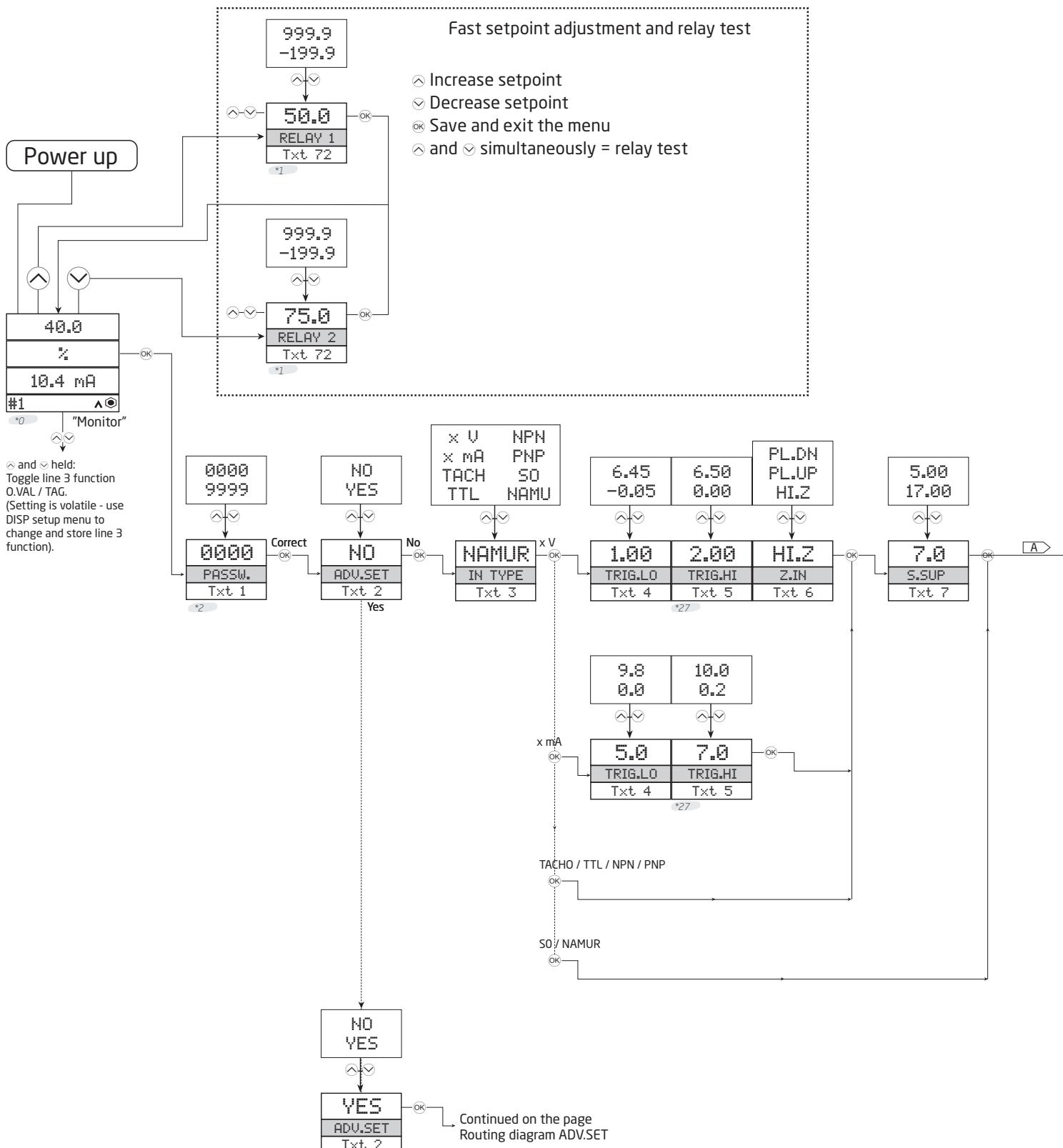
Orientation setup (ORIEN): When the device is mounted upside down the display orientation of the the SCU-PDM1 or SCU-PDM2 can be programmed to be rotated 180 degrees and reverse the up/down button functions.

Latch function (LATC): The latch function can be applied for a relay when combined with the setpoint, windows or error function. The latch function will hold the relay in its active/alarm state until latch is released via the SCU-PDM1 or SCU-PDM2. If the setpoint, window or error function demands an active relay you cannot release the latch.
If the configuration is copied from one device to another by way of the SCU-PDM1 or SCU-PDM2, the latch function must be reconfigured.

Example setpoint function with latch

This page intentionally blank

Fast setpoint adjustment and relay test

```
999.9
-199.9
  ⌃⌄
 50.0
RELAY 1
 Txt 72
  *1
```

```
999.9
-199.9
  ⌃⌄
 75.0
RELAY 2
 Txt 72
  *1
```

- ⌃ Increase setpoint
- ⌄ Decrease setpoint
- OK Save and exit the menu
- ⌃ and ⌄ simultaneously = relay test

Power up

```
 40.0
   %
10.4 mA
#1        ∧◉
 *0      "Monitor"
```

⌃ and ⌄ held:
Toggle line 3 function
O.VAL / TAG.
(Setting is volatile - use
DISP setup menu to
change and store line 3
function).

```
0000
9999
 ⌃⌄
0000
PASSW.
Txt 1
 *2
```
Correct →

```
 NO
YES
 ⌃⌄
 NO
ADV.SET
Txt 2
```
No →
Yes ↓

```
x V    NPN
x mA   PNP
TACH   SO
TTL    NAMU
   ⌃⌄
 NAMUR
IN TYPE
 Txt 3
```
x V →

```
6.45
-0.05
 ⌃⌄
1.00
TRIG.LO
Txt 4
```

```
6.50
0.00
 ⌃⌄
2.00
TRIG.HI
Txt 5
 *27
```

```
PL.DN
PL.UP
HI.Z
 ⌃⌄
HI.Z
Z.IN
Txt 6
```

```
5.00
17.00
 ⌃⌄
 7.0
S.SUP
Txt 7
```
→ A ▷

x mA
```
9.8
0.0
 ⌃⌄
5.0
TRIG.LO
Txt 4
```

```
10.0
0.2
 ⌃⌄
7.0
TRIG.HI
Txt 5
 *27
```

TACHO / TTL / NPN / PNP

SO / NAMUR

```
 NO
YES
 ⌃⌄
YES
ADV.SET
Txt 2
```

---

*0 "Monitor" menu.
    Line 1 shows the scaled process value - OK or error.
    Line 2 shows the selected engineering unit.
    Line 3 shows analog output or TAG no.
    Line 4 shows status for communication and signal trending.

*1 If FastSet is disabled, the setpoints cannot be changed.
    (values are read-only)

*2 Only shown if password is enabled.

*27 TRIG.HI must be set 0.05 V or 0.2 mA greater
    than TRIG.LO

Routing diagram
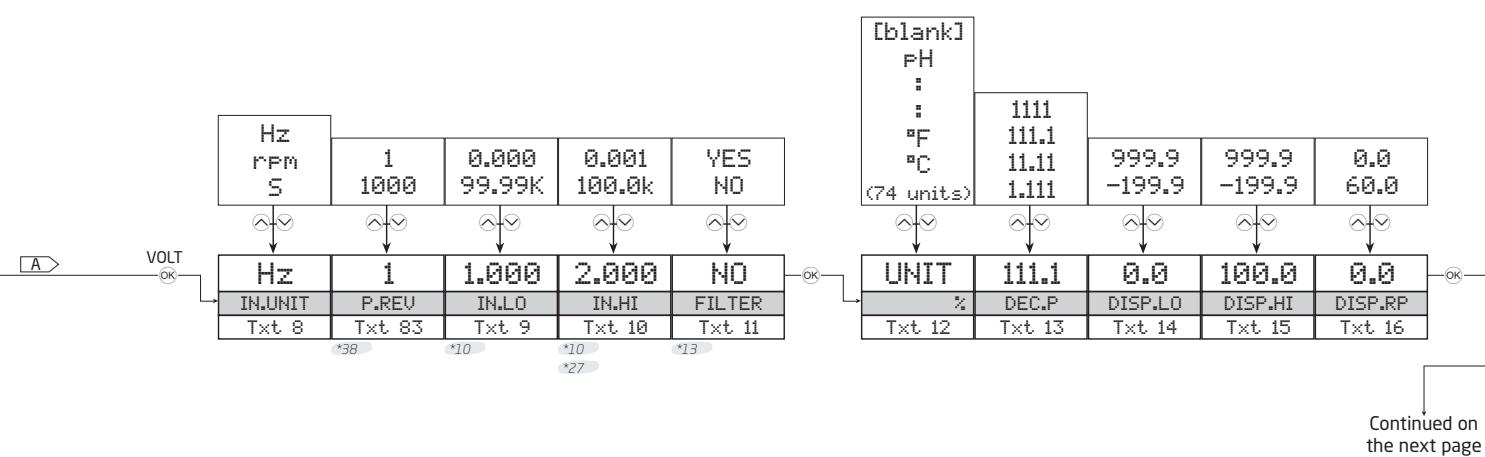
If no key is activated for 1 minute, the display will return to the "Monitor" menu without saving configuration changes.

⌃ Increase value / choose next parameter
⌄ Decrease value / choose previous parameter
⊙ᴋ Save the chosen value and proceed to the next menu
Hold ⊙ᴋ Back to previous menu / return to "Monitor" menu without saving.

	Hz rpm S	1 1000	0.000 99.99K	0.001 100.0k	YES NO		[blank] pH : : ºF ºC (74 units)	1111 111.1 11.11 1.111	999.9 −199.9	999.9 −199.9	0.0 60.0	
VOLT	⌃⌄	⌃⌄	⌃⌄	⌃⌄	⌃⌄			⌃⌄	⌃⌄	⌃⌄	⌃⌄	⌃⌄
A ⊙ᴋ →	**Hz**	**1**	**1.000**	**2.000**	**NO**	⊙ᴋ →	**UNIT**	**111.1**	**0.0**	**100.0**	**0.0**	⊙ᴋ →
	IN.UNIT	P.REV	IN.LO	IN.HI	FILTER		%	DEC.P	DISP.LO	DISP.HI	DISP.RP	
	Txt 8	Txt 83	Txt 9	Txt 10	Txt 11		Txt 12	Txt 13	Txt 14	Txt 15	Txt 16	
		*38	*10	*10 *27	*13							

Selectable UNITS:
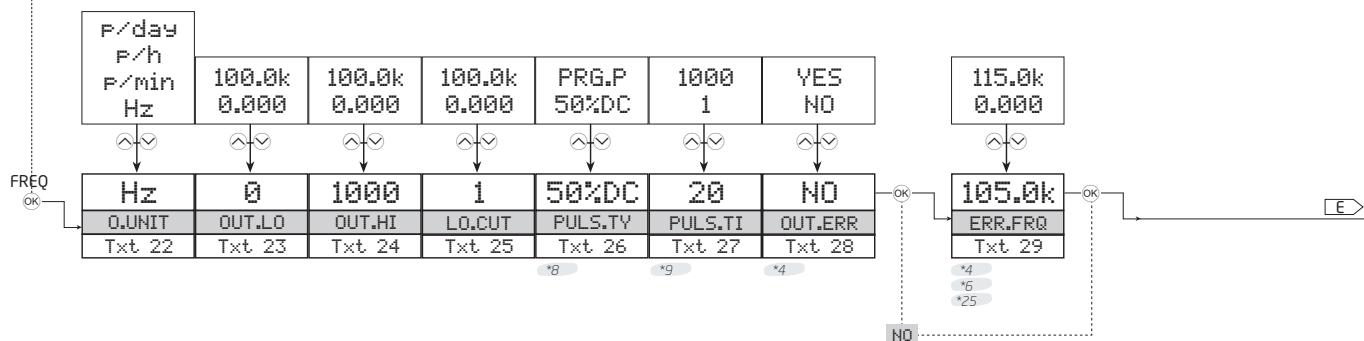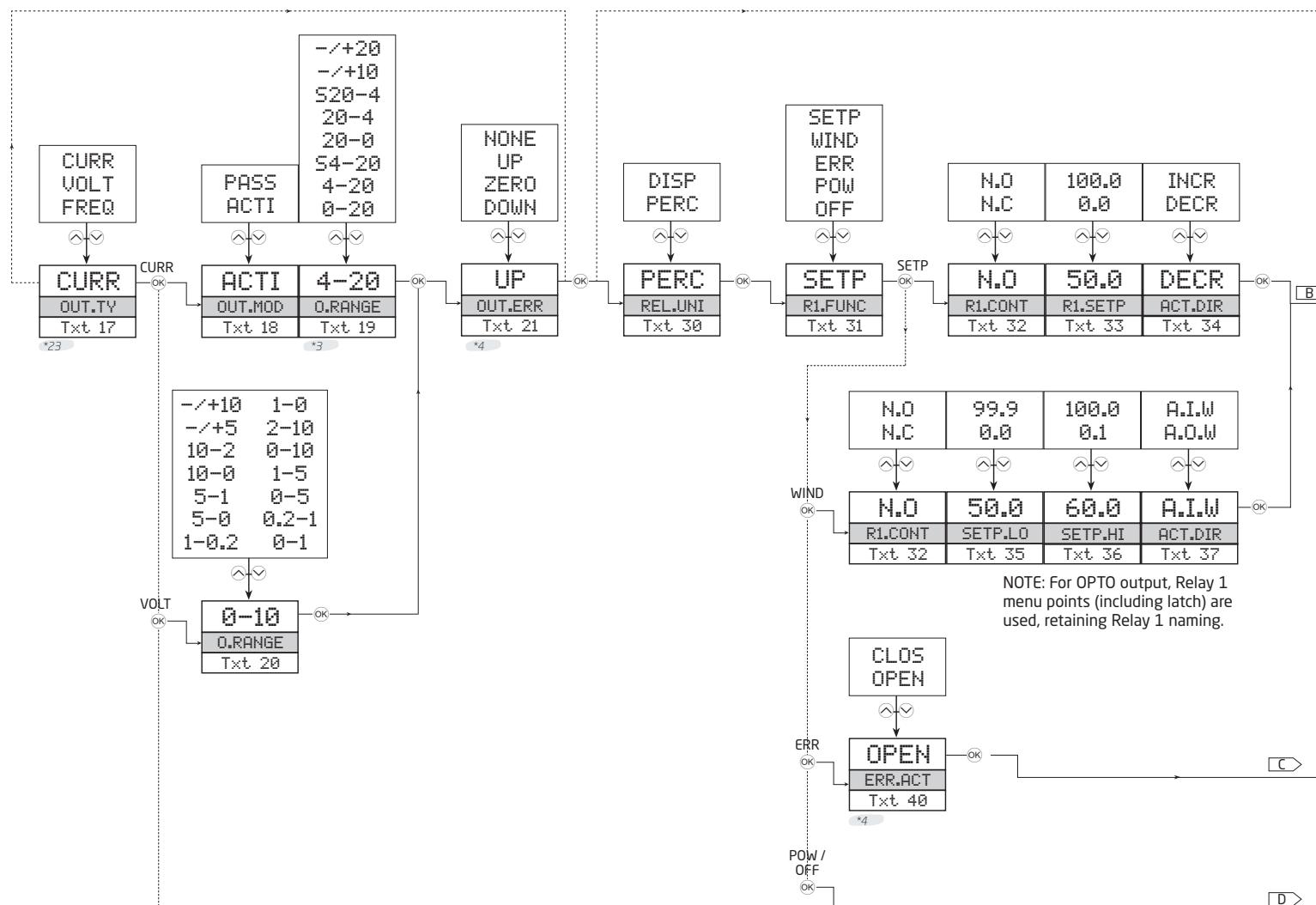
ºC	min	kHz	kJ	mV
ºF	m/s	mHz	Wh	ohm
K	mm/s	p/m	MWh	S
%	m/min	p/h	kWh	uS
m	m/h	p/d	W	m3/min
cm	in/s	t	GW	m3/h
mm	ips	kg	MW	l/s
um	ft/s	g	kW	l/min
ft	in/min	N	hp	l/h
in	ft/min	Pa	A	gal/min
mils	in/h	MPa	kA	gal/h
yd	ft/h	kPa	mA	t/h
m3	m/s2	hPa	uA	mol
l	rpm	bar	V	pH
s	Hz	mbar	kV	blank

*10 Valid min. and max. input range depends on input type:

Input unit	Hz	rpm	S
Minimum value	0.000 Hz	0.000 rpm	10 µs
Maximum value	100.0 KHz	See note	999.9 s

Note: For RPM, upper limit is the lesser of 100 krpm or 60*100 krpm/P.REV

*13 Only show if both input range values conform to:

Input unit	Hz	rpm	s
Only shown if:	≤ 50 Hz	See note	≥ 0.02 s

NOTE: For rpm, condition is ≤ 3.00 krpm/P.REV

*27 TRIG.HI must be set 0.05 V or 0.2 mA greater than TRIG.LO

*38 Only shown for rpm input.

CURR path

```
-/+20
-/+10
S20-4
20-4
20-0
S4-20
4-20
0-20
```

CURR		PASS	4-20		NONE		DISP		SETP		N.O	100.0	INCR
VOLT		ACTI			UP		PERC		WIND		N.C	0.0	DECR
FREQ					ZERO				ERR				
					DOWN				POW				
									OFF				

CURR

CURR		ACTI	4-20		UP		PERC		SETP		N.O	50.0	DECR
OUT.TY		OUT.MOD	O.RANGE		OUT.ERR		REL.UNI		R1.FUNC		R1.CONT	R1.SETP	ACT.DIR
Txt 17		Txt 18	Txt 19		Txt 21		Txt 30		Txt 31		Txt 32	Txt 33	Txt 34
*23			*3		*4									

B ▷

SETP

VOLT path

```
-/+10   1-0
-/+5    2-10
10-2    0-10
10-0    1-5
5-1     0-5
5-0     0.2-1
1-0.2   0-1
```

| 0-10 |
| O.RANGE |
| Txt 20 |

VOLT

WIND section

| N.O | 99.9 | 100.0 | A.I.W |
| N.C | 0.0 | 0.1 | A.O.W |

N.O	50.0	60.0	A.I.W
R1.CONT	SETP.LO	SETP.HI	ACT.DIR
Txt 32	Txt 35	Txt 36	Txt 37

WIND

NOTE: For OPTO output, Relay 1 menu points (including latch) are used, retaining Relay 1 naming.

ERR section

| CLOS |
| OPEN |

| OPEN |
| ERR.ACT |
| Txt 40 |
| *4 |

ERR

C ▷

POW / OFF

D ▷

FREQ path

```
P/day
P/h
P/min
Hz
```

| | 100.0k | 100.0k | 100.0k | PRG.P | 1000 | YES | | 115.0k |
| | 0.000 | 0.000 | 0.000 | 50%DC | 1 | NO | | 0.000 |

FREQ

Hz	0	1000	1	50%DC	20	NO		105.0k
O.UNIT	OUT.LO	OUT.HI	LO.CUT	PULS.TY	PULS.TI	OUT.ERR		ERR.FRQ
Txt 22	Txt 23	Txt 24	Txt 25	Txt 26	Txt 27	Txt 28		Txt 29
				*8	*9	*4		*4 *6 *25

E ▷

NO

Footnotes

*3 If passive is selected, the values are limited to only positive span.

*4 Only shown if input type = NAMUR.

*8 Only shown when highest value of fmin / max <= 500 Hz or <= 30k p/min. Always shown for p/hour and p/day.
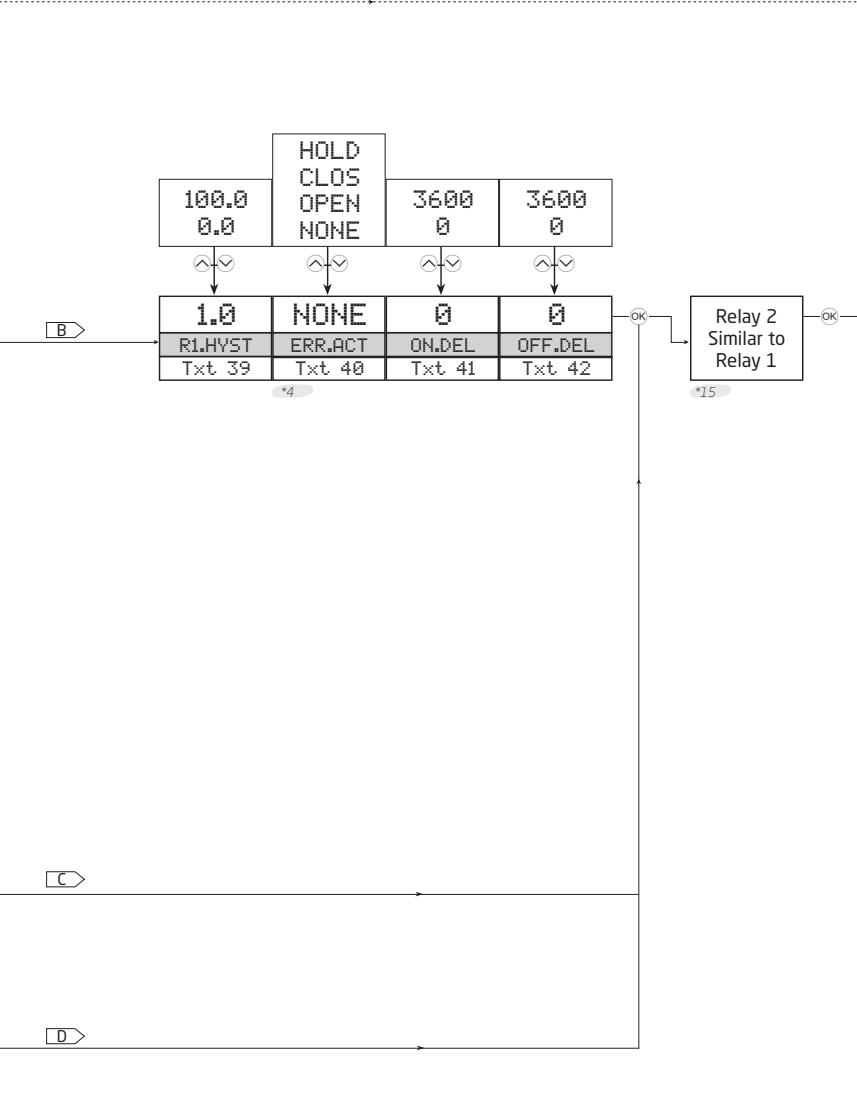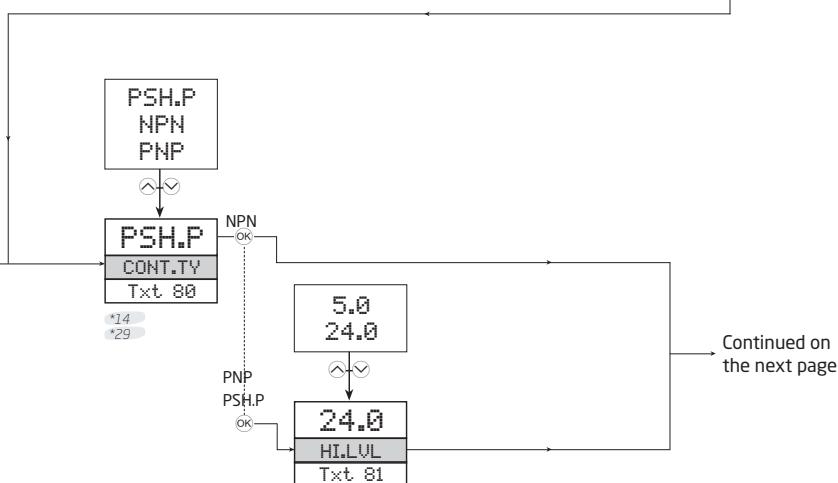
*9 Only shown if programmable pulse time is selected. Maximum value is the smallest of T_f.max*90% or 1 sec.

*23 Not shown for SCU-2502.

*25 If PULS.TY is set to 50%DC, high limit is: max(OUT.LO,OUT.HI)*7 (max. 115.0k). Otherwise high limit is max(OUT.LO,OUT.HI)*1.05.

```
        ┌──────┐
        │ HOLD │
 ┌──────┤ CLOS ├──────┬──────┐
 │100.0 │ OPEN │ 3600 │ 3600 │
 │  0.0 │ NONE │    0 │    0 │
 └──────┴──────┴──────┴──────┘
   ⌃⌄     ⌃⌄     ⌃⌄     ⌃⌄
 ┌──────┬──────┬──────┬──────┐          ┌──────────┐
 │ 1.0  │ NONE │  0   │  0   │──OK──▶   │ Relay 2  │──OK──▶
▷├──────┼──────┼──────┼──────┤          │ Similar to│
B│R1.HYST│ERR.ACT│ON.DEL│OFF.DEL│        │ Relay 1  │
 ├──────┼──────┼──────┼──────┤          └──────────┘
 │Txt 39│Txt 40│Txt 41│Txt 42│             *15
 └──────┴──────┴──────┴──────┘
           *4
```

C ▷

D ▷

```
        ┌──────┐
        │PSH.P │
        │ NPN  │
        │ PNP  │
        └──────┘
           ⌃⌄         NPN
        ┌──────┐     ──OK──
        │PSH.P │──
     E ▷├──────┤
        │CONT.TY│          ┌──────┐
        ├──────┤          │ 5.0  │
        │Txt 80│          │ 24.0 │          Continued on
        └──────┘          └──────┘          the next page
          *14               ⌃⌄
          *29       PNP   ┌──────┐
                    PSH.P │ 24.0 │
                   ──OK── ├──────┤
                          │HI.LVL│
                          ├──────┤
                          │Txt 81│
                          └──────┘
```

*4 Only shown if input type = NAMUR.
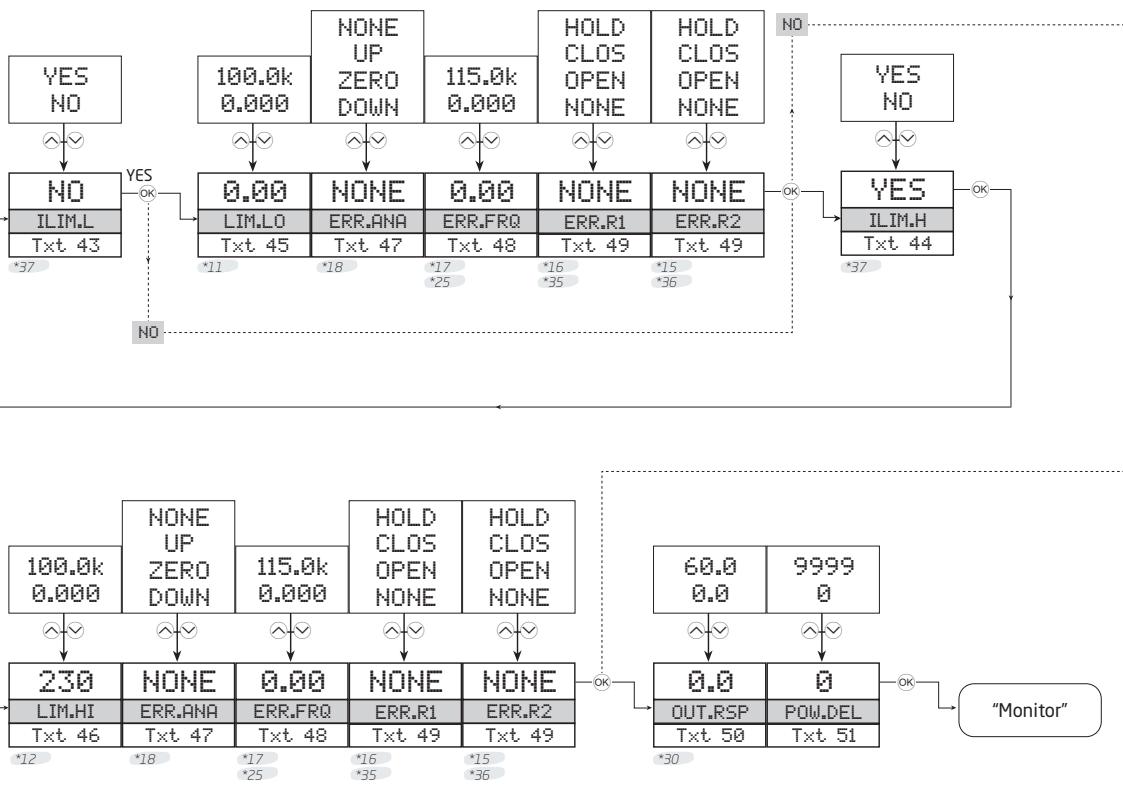
*14 Only shown for SCU-2503.

*15 Only shown for SCU-2502.

*29 Only shown for SCU-2503 while OUT.TY is VOL/CURR and Relay 1 is not set to OFF.

Flowchart menu options (top row):

- YES / NO → **NO** — ILIM.L — Txt 43 *37
- 100.0k / 0.000 → **0.00** — LIM.LO — Txt 45 *11
- NONE / UP / ZERO / DOWN → **NONE** — ERR.ANA — Txt 47 *18
- 115.0k / 0.000 → **0.00** — ERR.FRQ — Txt 48 *17 *25
- HOLD / CLOS / OPEN / NONE → **NONE** — ERR.R1 — Txt 49 *16 *35
- HOLD / CLOS / OPEN / NONE → **NONE** — ERR.R2 — Txt 49 *15 *36
- NO
- YES / NO → **YES** — ILIM.H — Txt 44 *37

Flowchart menu options (lower section):

- 100.0k / 0.000 → **230** — LIM.HI — Txt 46 *12
- NONE / UP / ZERO / DOWN → **NONE** — ERR.ANA — Txt 47 *18
- 115.0k / 0.000 → **0.00** — ERR.FRQ — Txt 48 *17 *25
- HOLD / CLOS / OPEN / NONE → **NONE** — ERR.R1 — Txt 49 *16 *35
- HOLD / CLOS / OPEN / NONE → **NONE** — ERR.R2 — Txt 49 *15 *36
- 60.0 / 0.0 → **0.0** — OUT.RSP — Txt 50 *30
- 9999 / 0 → **0** — POW.DEL — Txt 51
- "Monitor"

Footnotes:

*11 Range depends on selected input type + range:
Minimum value: - Minimum valid input value (see *10) -
Maximum value: -- Selected input range low (IN.LO) --

*12 Range depends on selected input type + range:
Minimum value: -- Selected input range high (IN.HI) --
Maximum value: - Maximum valid input value (see *10) -

*15 Only shown for SCU-2502.

*16 Not shown for SCU-2503 if FREQ output is selected.

*17 Only shown if FREQ output is selected.

*18 Only shown if CURR or VOLT output is selected.

*25 If PULS.TY is set to 50%DC, high limit is:
max(OUT.LO,OUT.HI)*7 (max. 115.0k).
Otherwise high limit is max(OUT.LO,OUT.HI)*1.05.

*30 Only shown for SCU-2501 and SCU-2503.

*35 Not shown if R1.FUNC is set to POW or OFF.
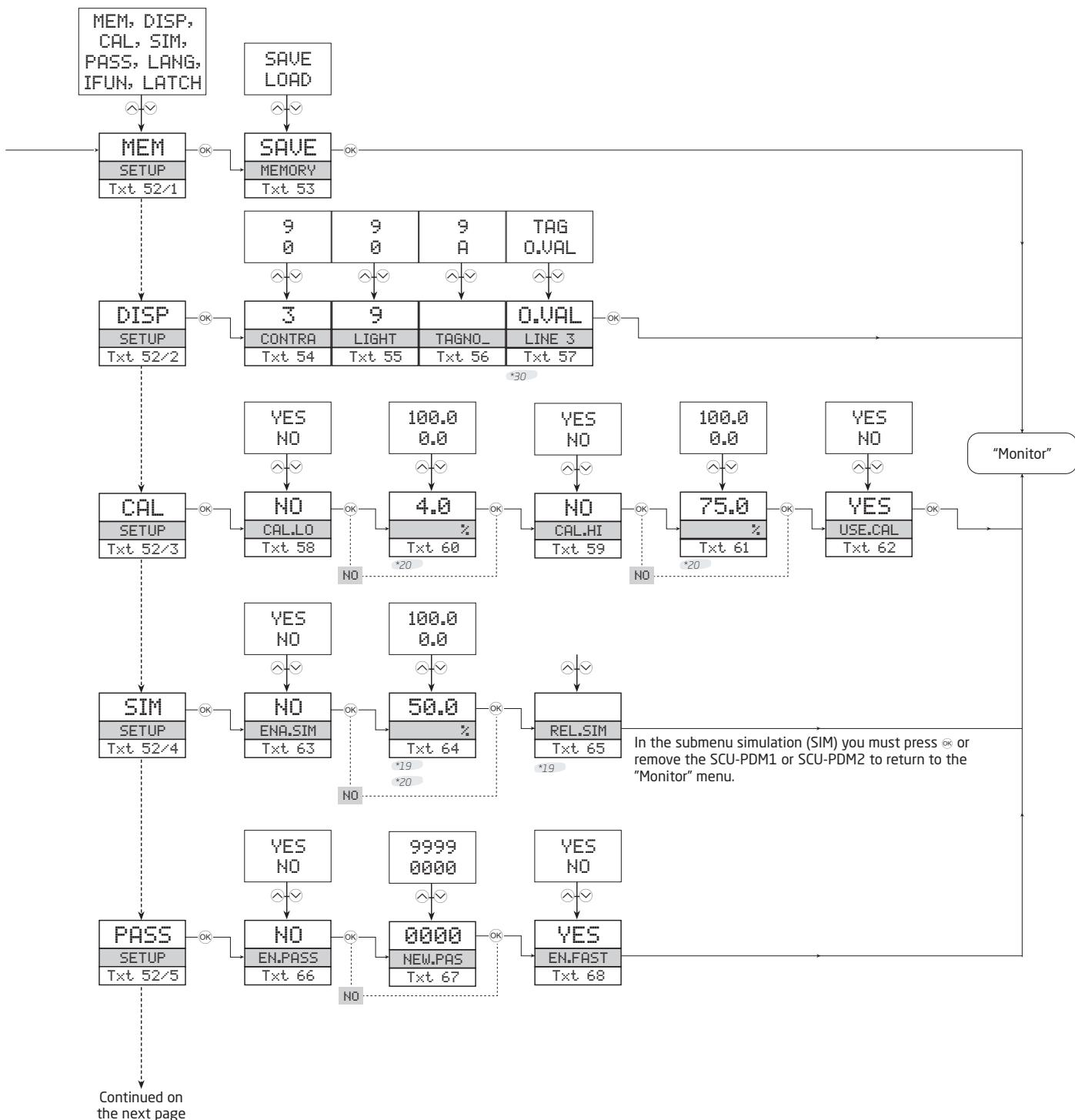
*36 Not shown if R2.FUNC is set to POW or OFF.

*37 Not shown on SCU-2502, if both R1.FUNC and R2.FUNC is set to POW or OFF.
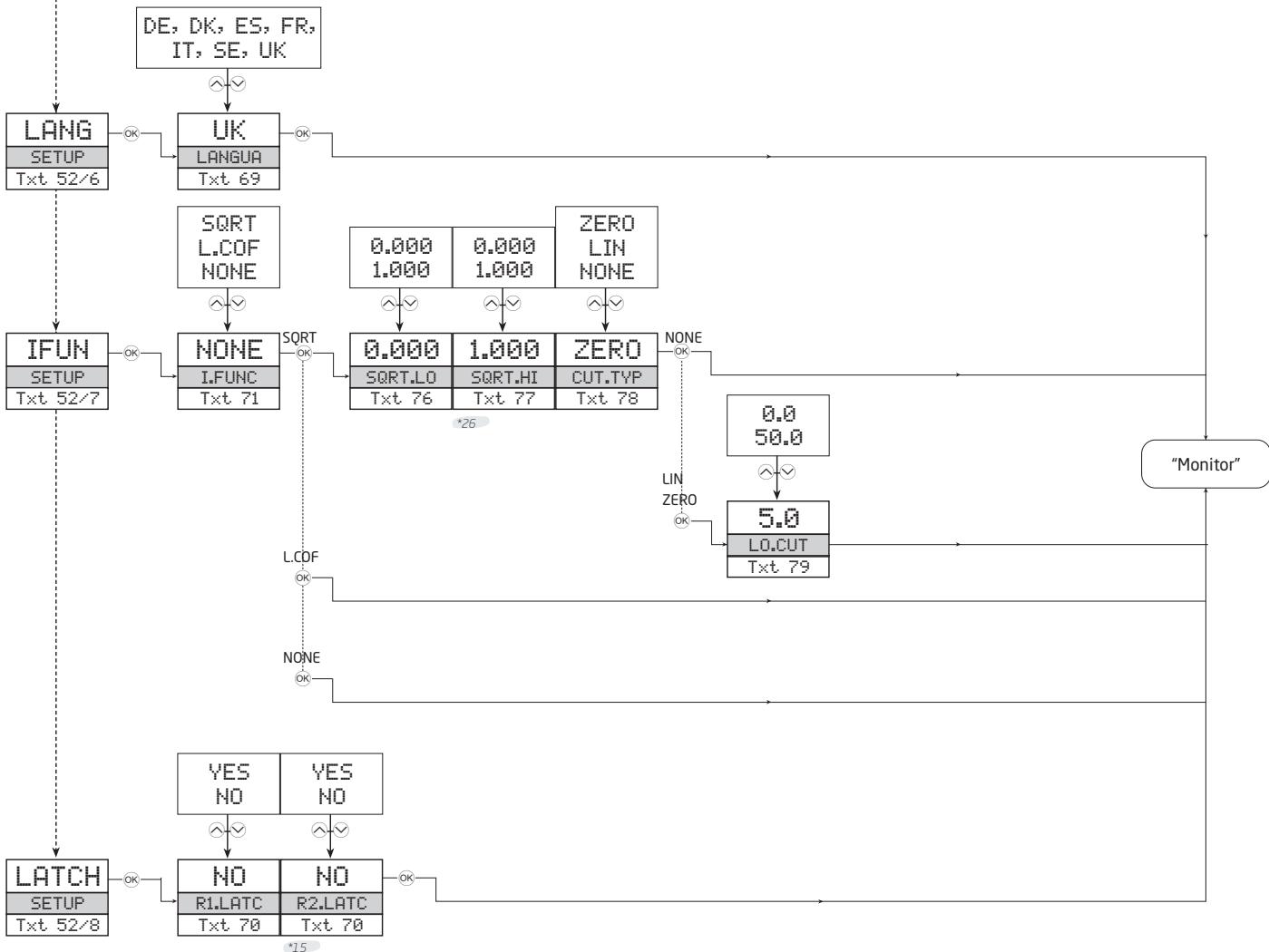
Routing diagram, advanced settings (ADV.SET)

```
MEM, DISP,
CAL, SIM,
PASS, LANG,
IFUN, LATCH
    ∧∨
```

```
         SAVE
         LOAD
          ∧∨
```

```
MEM  —OK→  SAVE  —OK→ ──────────────────────────────────────────────
SETUP       MEMORY
Txt 52/1    Txt 53
```

```
            9      9      9      TAG
            0      0      A      O.VAL
           ∧∨     ∧∨     ∧∨      ∧∨
```

```
DISP —OK→   3      9            O.VAL  —OK→
SETUP      CONTRA  LIGHT  TAGNO_  LINE 3
Txt 52/2   Txt 54  Txt 55 Txt 56  Txt 57
                                   *30
```

```
           YES    100.0   YES    100.0   YES
           NO      0.0     NO      0.0     NO
           ∧∨     ∧∨      ∧∨     ∧∨      ∧∨
```

```
CAL —OK→   NO  —OK→ 4.0 —OK→ NO  —OK→ 75.0 —OK→ YES —OK→
SETUP      CAL.LO      %      CAL.HI      %      USE.CAL
Txt 52/3   Txt 58    Txt 60   Txt 59   Txt 61   Txt 62
                NO    *20           NO    *20
```

"Monitor"

```
           YES    100.0
           NO      0.0
           ∧∨     ∧∨              ∧∨
```

```
SIM —OK→   NO  —OK→ 50.0 —OK→           —OK→
SETUP      ENA.SIM     %      REL.SIM
Txt 52/4   Txt 63    Txt 64   Txt 65
                     *19
                NO   *20        *19
```

In the submenu simulation (SIM) you must press OK or remove the SCU-PDM1 or SCU-PDM2 to return to the "Monitor" menu.

```
           YES    9999    YES
           NO     0000     NO
           ∧∨     ∧∨      ∧∨
```

```
PASS —OK→  NO  —OK→ 0000 —OK→ YES
SETUP      EN.PASS   NEW.PAS    EN.FAST
Txt 52/5   Txt 66    Txt 67     Txt 68
                NO
```

Continued on
the next page

*19 Menu timeout is disabled while this menu is displayed.

*20 Selectable range as defined by DEC.P, DISP.LO and DISP.HI.

*30 Only shown for SCU-2501 and SCU-2503.

```
                        ┌──────────────────┐
                        │ DE, DK, ES, FR,  │
                        │   IT, SE, UK     │
                        └──────────────────┘
                               ⌃ ⌄

┌────────┐        ┌────────┐
│ LANG   │ ─OK─   │  UK    │ ─OK─────────────────────────────────────────────────────┐
│ SETUP  │        │ LANGUA │                                                          │
│ Txt 52/6│       │ Txt 69 │                                                          │
└────────┘        └────────┘                                                          │
                                                                                      │
               ┌────────┐    ┌────────┐ ┌────────┐  ┌────────┐                        │
               │ SQRT   │    │ 0.000  │ │ 0.000  │  │ ZERO   │                        │
               │ L.COF  │    │ 1.000  │ │ 1.000  │  │ LIN    │                        │
               │ NONE   │    └────────┘ └────────┘  │ NONE   │                        │
               └────────┘       ⌃⌄         ⌃⌄       └────────┘                        │
                  ⌃⌄                                   ⌃⌄                             │
┌────────┐    ┌────────┐ SQRT ┌────────┐ ┌────────┐  ┌────────┐ NONE                  │
│ IFUN   │─OK─│ NONE   │──────│ 0.000  │ │ 1.000  │  │ ZERO   │──OK────────────────┐  │
│ SETUP  │    │ I.FUNC │      │ SQRT.LO│ │ SQRT.HI│  │ CUT.TYP│                    │  │
│ Txt 52/7│   │ Txt 71 │      │ Txt 76 │ │ Txt 77 │  │ Txt 78 │                    │  │
└────────┘    └────────┘      └────────┘ └────────┘  └────────┘       ┌────────┐   │  │
                                           *26                        │ 0.0    │   │ "Monitor"
                                                                      │ 50.0   │   │
                                                     LIN              └────────┘   │
                                                     ZERO                ⌃⌄        │
                                                      OK               ┌────────┐  │
                                                                       │ 5.0    │  │
                                         L.COF                         │ LO.CUT │  │
                                          OK                           │ Txt 79 │  │
                                                                       └────────┘  │
                                         NONE                                      │
                                          OK                                       │

               ┌────────┐ ┌────────┐
               │ YES    │ │ YES    │
               │ NO     │ │ NO     │
               └────────┘ └────────┘
                  ⌃⌄         ⌃⌄
┌────────┐    ┌────────┐ ┌────────┐
│ LATCH  │─OK─│ NO     │ │ NO     │ ─OK─────────────────────────────────────────────┐
│ SETUP  │    │ R1.LATC│ │ R2.LATC│
│ Txt 52/8│   │ Txt 70 │ │ Txt 70 │
└────────┘    └────────┘ └────────┘
                  *15
```

*15 Only shown for SCU-2502.

*26 *.HI must not be equal to corresponding *.LO.
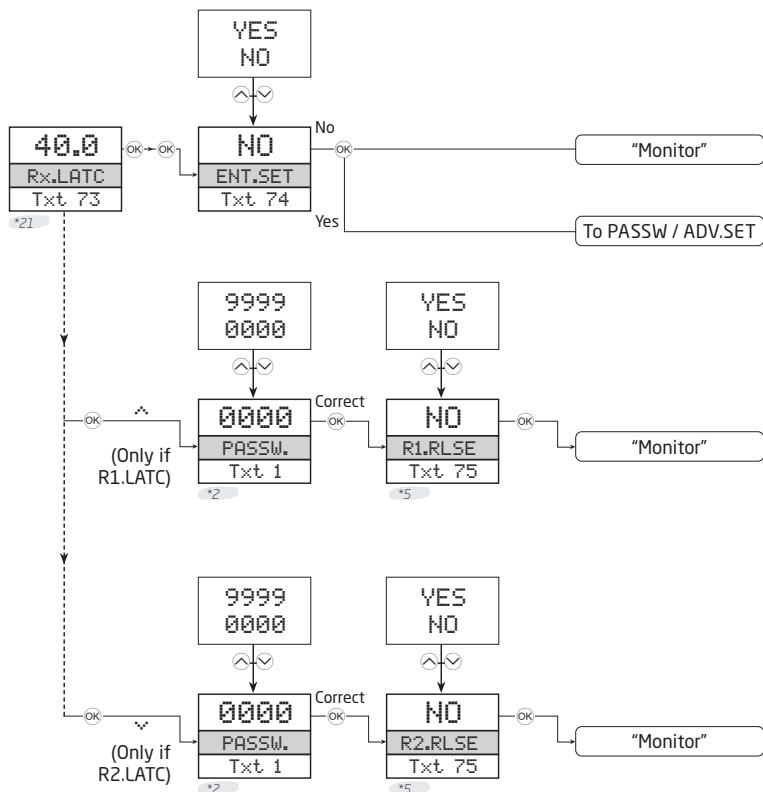
Routing diagram,
manual release of latched relays

Indication of a latched relay in monitor mode

Rx.LATC = R1.LATC or R2.LATC
or R1.LATC / R2.LATC alternating.

*2	Only shown if password is enabled.	

*5	"YES" can only be selected if the reason for the latched relay is no longer present. "NO" will not release the relay.	

*21	Backlight flashes untill OK is pressed once.	

Help text overview

[1]   Set correct password
[2]   Enter advanced setup menu?
[3]   Select NAMUR sensor input
       Select S0 sensor input
       Select PNP sensor input (or Contact to supply)
       Select NPN sensor input (or Contact to ground)
       Select TTL sensor input
       Select Tacho sensor input
       Select custom current trigger input
       Select custom voltage trigger input
[4]   Set low trigger level for input signal
[5]   Set high trigger level for input signal
[6]   Set input high impedance (high resistance)
       Enable internal pull-up on input
       Enable internal pull-down on input
[7]   Set sensor supply voltage
[8]   Set up input for period time measurement
       Set up input for rpm measurement
       Set up input for frequency measurement
[9]   Set input range, low
[10] Set input range, high
[11] Enable input filter (50/60 Hz low-pass / BW-limiter)
[12] Select display unit
[13] Select decimal point position
[14] Set display range, low
[15] Set display range, high
[16] Set display response time [seconds]
[17] Set up output as frequency output
       Set up output as current output
       Set up output as voltage output
[18] Select active output mode
       Select passive output mode
[19] Select 20..-20 mA output range
       Select 10..-10 mA output range
       Select 20..4 mA output range with safety readback
       Select 20..4 mA output range
       Select 20..0 mA output range
       Select -20..20 mA output range
       Select -10..10 mA output range
       Select 4..20 mA output range with safety readback
       Select 4..20 mA output range
       Select 0..20 mA output range
[20] Select 10..-10 V output range
       Select 5..-5 V output range
       Select 10..2 V output range
       Select 10..0 V output range
       Select 5..1 V output range
       Select 5..0 V output range
       Select -10..10 V output range
       Select -5..5 V output range
       Select 2..10 V output range
       Select 0..10 V output range
       Select 1..5 V output range
       Select 0..5 V output range

[21] Select output downscale at NAMUR sensor error
       Select output zero output at NAMUR sensor error
       Select output upscale at NAMUR sensor error
       Select no error action - output undefined - at NAMUR sensor error
[22] Select Hz as output unit
       Select pulses/minute as output unit
       Select pulses/hour as output unit
       Select pulses/day as output unit
[23] Set output frequency for 0% input
[24] Set output frequency for 100% input
[25] Set output low cut off frequency
[26] Use 50% duty cycle output
       Use programmable static pulse time
[27] Set pulse time [milliseconds]
[28] Set output at specific frequency on NAMUR sensor error?
[29] Set output frequency at NAMUR sensor error
[30] Set up relay in % of input range
       Set up relay in display units
[31] Select OFF function - relay is permanently off
       Select POWER function - relay indicates power status OK
       Select ERROR function - relay indicates sensor error only
       Select WINDOW function - relay is controlled by 2 setpoints
       Select SETPOINT function - relay is controlled by 1 setpoint
[32] Select Normally Closed contact
       Select Normally Open contact
[33] Set relay setpoint
[34] Activate relay on decreasing signal
       Activate relay on increasing signal
[35] Set relay window setpoint, low
[36] Set relay window setpoint, high
[37] Select relay to be Active Outside Window
       Select relay to be Active Inside Window
[38] - NOT USED -
[39] Set relay hysteresis
[40] Select no error action - undefined relay state - at NAMUR sensor error
       Open relay contact at NAMUR sensor error
       Close relay contact at NAMUR sensor error
       Hold relay status at NAMUR sensor error
[41] Set relay ON delay [seconds]
[42] Set relay OFF delay [seconds]
[43] Enable configurable input limit, low
[44] Enable configurable input limit, high
[45] Set configurable input limit, low
[46] Set configurable input limit, high
[47] Select downscale at limit error
       Select zero output at limit error
       Select upscale at limit error
       Select no error action - output undefined - at limit error
[48] Set output frequency at limit error

[49]   Select no error action - undefined relay state - at limit
          error
          Open relay contact at limit error
          Close relay contact at limit error
          Hold relay status at limit error
[50]   Set output response time [seconds]
[51]   Set output and relay power-on delay [seconds]
[52]   Enter Relay Latch setup
          Select Analog Input Function
          Enter Language setup
          Enter Password setup
          Enter Simulation mode
          Perform Process calibration
          Enter Display setup
          Perform Memory operations
[53]   Load saved configuration into module
          Save configuration in display front
[54]   Adjust LCD contrast
[55]   Adjust LCD backlight
[56]   Write a 6-character device TAG
[57]   Output value is shown in display line 3
          Device TAG is shown in display line 3
[58]   Calibrate Input low to process value?
[59]   Calibrate Input high to process value?
[60]   Set value for low calibration point
[61]   Set value for high calibration point
[62]   Use process calibration values?
[63]   Enable input simulation?
[64]   Set the input simulation value
[65]   Relay simulation - use ⊗ and ⊙ to toggle relay 1 and 2
[66]   Enable password protection?
[67]   Set new password
[68]   Enable Fastset functionality?
[69]   Select language
[70]   Enable Relay Latch function?
[71]   Select no input function
          Select 0.5 Hz low cut off on input. (No effect on period
          time input)
          Select Square Root Input Function
[72]   Relay setpoint - press ⊛ to save
          Relay setpoint - read only
[73]   Relay is latched - press ⊛ to acknowledge
          Relay 1 is latched - press ⊗ to release
          Relay 2 is latched - press ⊙ to release
          Relays are latched - press ⊗ or ⊙ to release relay 1 or 2
[74]   Enter setup menu? (Latched relays may release!)
[75]   Release relay? (if conditions allow)
[76]   Select low value of square root
[77]   Select high value of square root
[78]   Disable low cut-off
          Set low cut-off type to linear
          Set low cut-off type to zero
[79]   Select low cut-off point in % of input range
[80]   Select PNP open collector output
          Select NPN open collector output
          Select Push-Pull output
[81]   Set high-level voltage on PNP / Push-Pull output
[83]   Set input pulses per revolution

Operation

The SCU-250x series devices provide multiple features for easy user operation, and to perform efficient troubleshooting. Monitoring the operational status is easy from either the front LEDs or the SCU-PDM1 or SCU-PDM2.

Status indicators without SCU-PDM1 or SCU-PDM2

Power	Red / green LED indicates system status
f in	Yellow LED indicates an active input
Dig. out 1	Yellow LED indicates that relay 1 is energized / f output
Dig. out 2 (only SCU-2502)	Yellow LED indicates that relay 2 is energized

Power green flashing LED 13 Hz indicates normal operation.
Power green flashing LED 1 Hz indicates configurable input limit error.
Power steady green LED indicates internal error.
Power steady red LED indicates fatal error.

Status, error detection and signal 'out-of-range' with SCU-PDM1 or SCU-PDM2

SCROLLING ERROR MESSAGE	INDICATION Text	CONDITION	ACTION
Process and application errors			
Input error	IN.ER - flashing display	Input out of configured input limits	Check input signal value and configured input limits
Input underrange	IN.LO	Input below low cut-off	Check input signal source
Input overrange	IN.HI	Input above valid measurement range	Check input signal source
Display out of range	-1999 or 9999	Display saturation	Check configuration and input values
Analog output error	AO.ER	Error in analog output current (S4-20 mA output only)	Check wiring of analog output and recycle power *
Sensor supply overloaded	SE.OL	Sensor supply overload condition detected	Check sensor supply specifications
Sensor short circuit	SE.SH	Sensor short circuit condition	Check sensor for short circuit
Sensor wire break	SE.BR	Sensor open loop / broken wire condition	Check sensor for open loop / broken wire
Device errors			
No communication between device and the SCU-PDM1 or SCU-PDM2	NO.CO	No communication (SCU-PDM1 or SCU-PDM2)	Reattach the SCU-PDM1 or SCU-PDM2 to the product. If attached, disconnect and reattach
Configuration error	CO.ER	Invalid configuration downloaded to module	Step through menu to create valid configuration **
Invalid configuration type or version	TY.ER	Configuration read from the SCU-PDM1 or SCU-PDM2 has invalid type or rev. no.	Save correct device type and revision configuration to the SCU-PDM1 or SCU-PDM2 **
Analog output supply error	AO.SU	Analog output supply error	Verify output configuration and output connection *
RAM error	RA.ER	Internal RAM error	Replace signal conditioner
A/D converter error	AD.ER	Internal A/D converter error	Replace signal conditioner
Internal flash error	IF.ER	Internal flash error	Replace signal conditioner
Frequency input error	FI.ER	Internal frequency circuit error	Replace signal conditioner
EEPROM Error	EE.ER	Internal EEPROM error	Replace signal conditioner
Storing of configuration failed - previous configuration used	CO. WARN	Writing configuration to internal device memory failed.	Device configuration reverts to last known valid configuration. Cycle through menu to retry writing new configuration.

!	All error indications in the display flash once per second. The help text explains the error. If the error is an input loop error, the display backlight flashes as well - this is acknowledged (stopped) by pushing the ⊚ button.
*	Error is acknowledged by either stepping through the basic setup, or by resetting the device power. Some types of errors can only be acknowledged by resetting the device power.
**	Error is acknowledged by stepping through the basic setup.