PERFORMANCE
MADE
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Product manual
4184
Universal uni-/bipolar signal transmitter



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CE

TEMPERATURE | I.S. INTERFACES | COMMUNICATION INTERFACES | MULTIFUNCTIONAL | ISOLATION | DISPLAY

No. 4184V101-UK
From serial no.: 181752500

PR electronics

6 Product Pillars
to meet your every need

Individually outstanding, unrivalled in combination

With our innovative, patented technologies, we make signal conditioning smarter and simpler. Our portfolio is composed of six product areas, where we offer a wide range of analog and digital devices covering over a thousand applications in industrial and factory automation. All our products comply with or surpass the highest industry standards, ensuring reliability in even the harshest of environments and have a 5-year warranty for greater peace of mind.



Temperature

Our range of temperature transmitters and sensors provides the highest level of signal integrity from the measurement point to your control system. You can convert industrial process temperature signals to analog, bus or digital communications using a highly reliable point-to-point solution with a fast response time, automatic self-calibration, sensor error detection, low drift, and top EMC performance in any environment.



I.S. Interface

We deliver the safest signals by validating our products against the toughest safety standards. Through our commitment to innovation, we have made pioneering achievements in developing I.S. interfaces with SIL 2 Full Assessment that are both efficient and cost-effective. Our comprehensive range of analog and digital intrinsically safe isolation barriers offers multifunctional inputs and outputs, making PR an easy-to-implement site standard. Our backplanes further simplify large installations and provide seamless integration to standard DCS systems.



Communication

We provide inexpensive, easy-to-use, future-ready communication interfaces that can access your PR installed base of products. All the interfaces are detachable, have a built-in display for readout of process values and diagnostics, and can be configured via push-buttons. Product specific functionality includes communication via Modbus and Bluetooth and remote access using our PR Process Supervisor (PPS) application, available for iOS and Android.



Multifunction

Our unique range of single devices covering multiple applications is easily deployable as your site standard. Having one variant that applies to a broad range of applications can reduce your installation time and training, and greatly simplify spare parts management at your facilities. Our devices are designed for long-term signal accuracy, low power consumption, immunity to electrical noise and simple programming.



Isolation

Our compact, fast, high-quality 6 mm isolators are based on microprocessor technology to provide exceptional performance and EMC-immunity for dedicated applications at a very low total cost of ownership. They can be stacked both vertically and horizontally with no air gap separation between units required.



Display

Our display range is characterized by its flexibility and stability. The devices meet nearly every demand for display readout of process signals, and have universal input and power supply capabilities. They provide a real-time measurement of your process value no matter the industry, and are engineered to provide a user-friendly and reliable relay of information, even in demanding environments.

Universal uni-/bipolar signal transmitter 4184

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Warning



GENERAL

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.

Warning



HAZARD-OUS VOLTAGE

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.

Repair of the device and replacement of circuit breakers must be done by PR electronics A/S only.

Warning



CAUTION

Do not open the front plate of the device as this will cause damage to the connector for the display / programming front PR 45xx.
This device contains no DIP-switches or jumpers.
SYSTEM 4000 must be mounted on a DIN rail according to DIN EN 60715.

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.

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 your local distributor or, alternatively,

PR electronics A/S
www.prelectronics.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.

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 conducters only
For use only in pollution degree 2 or better
Max. ambient temperature . . . . . 60°C
Max. wire size. . . . . AWG 26-14
UL file number E248256

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

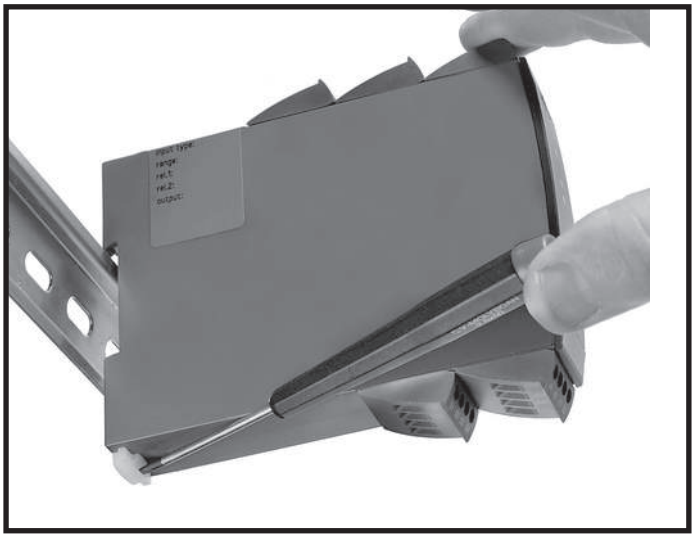
When disconnected, the device may be cleaned with a cloth moistened with distilled water.

Liability

To the extent the instructions in this manual are not strictly observed, the customer cannot advance a demand against PR electronics A/S that would otherwise exist according to the concluded sales agreement.

How to demount system 4000

Picture 1:
The device is detached from the DIN rail by moving the bottom lock down.



Universal uni-/bipolar signal transmitter
4184

- The module measures DC inputs up to ±300 V / ±100 mA with spans as low as 25 mV / 0.5 mA
- Passive/active current output and buffered voltage output
- Fast < 20 ms response time and excellent < 0.05% accuracy
- Configurable input limits
- Universally powered by 21.6...253 VAC / 19.2...300 VDC

Application

- Fast < 20 ms response time for measuring signals produced by torque, position, current & acceleration sensors.
- User configurable bipolar or unipolar I/O means the 4184 is suitable for nearly any DC voltage or current conversion.
- Freely programmable between ±300 VDC and ±100 mA.
- The excitation source allows measurement of a 2-wire or 3-wire transmitter, or a potentiometer.
- The active or passive I/O makes the 4184 perfect for power matching current loops.
- Converts narrow bipolar inputs to wide bipolar or unipolar outputs, e.g., ±1 volt input = ±10 volt or 4...20 mA output.
- Selectable direct or inverse I/O makes the 4184 suitable for proportional control applications.
- Configurable input limits control the output value for increased safety.
- ±20 VDC buffered voltage output for controlling devices like the PVG 32 valve (6...18 VDC).
- Connection for both passive and active inputs and outputs.
- The detachable PR 45xx displays provide enhanced diagnostics.
- The 4184 is designed according to strict safety requirements and is therefore suitable for application in SIL 2 installations.

Technical characteristics

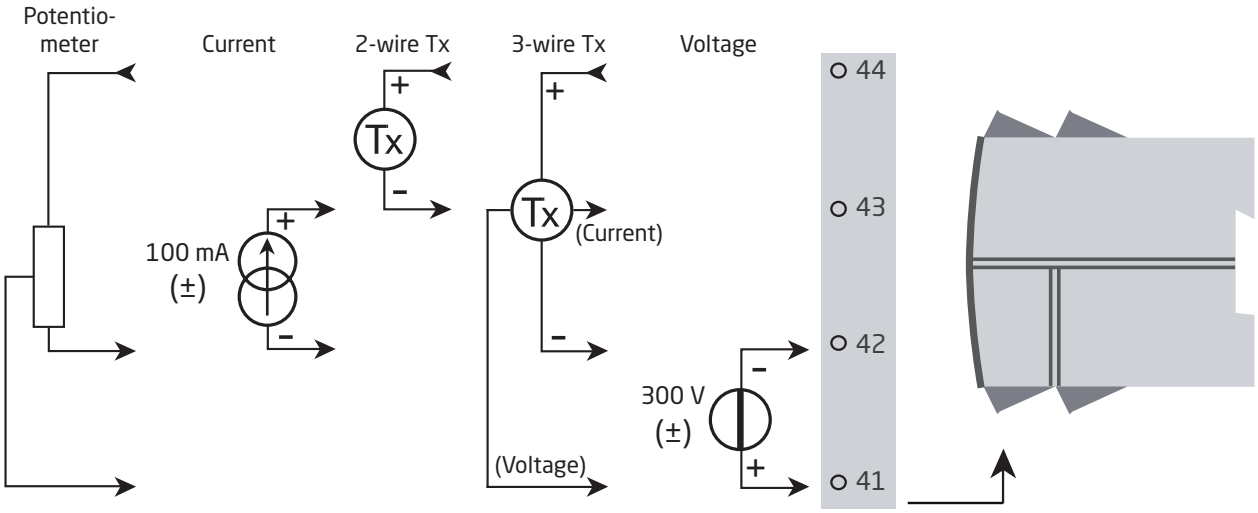
- The latest analog and digital techniques are used to obtain maximum accuracy and immunity to interference.
- Possibility of output safety readback by selecting S4...20 mA output.
- The current output can drive up to 1000 Ohms, with an adjustable response time of 0.0...60.0 seconds.
- Exceptional mA output load stability of < 0.001% of span / 100 Ohm.
- Meets the NAMUR NE21 recommendations, ensuring high accuracy in harsh EMC environments.
- Meets the NAMUR NE43 recommendations, allowing the control system to easily detect a sensor error.
- Each unit is tested to a high 2.3 kVAC, 3-port galvanic isolation level.
- Excellent signal to noise ratio of > 60 dB.

Mounting / installation / programming

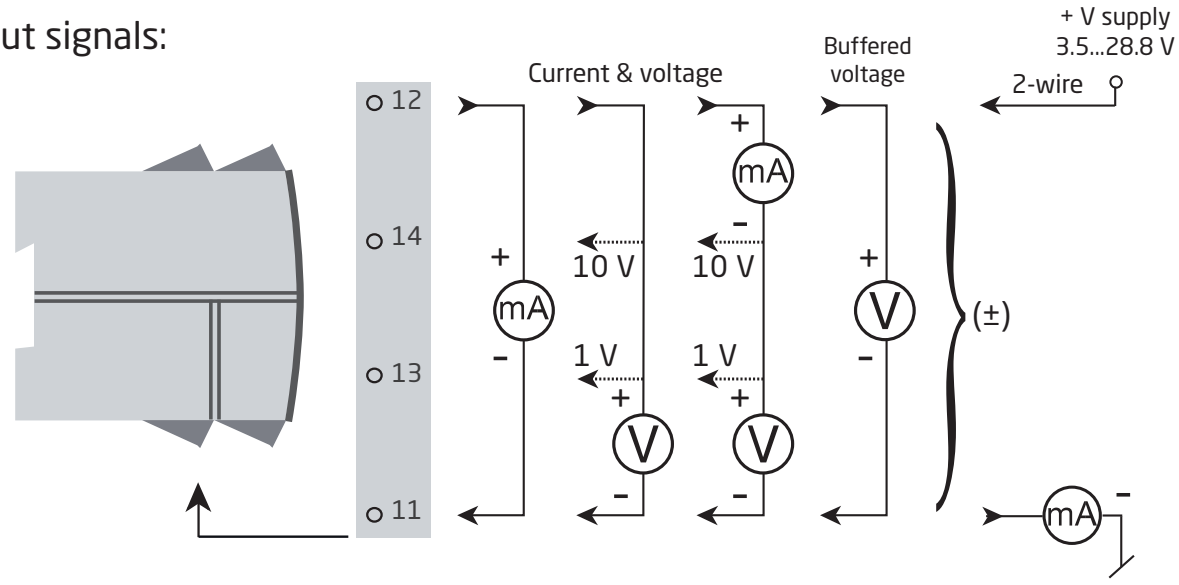
- Very low power consumption means units can be mounted side by side without an air gap – even at 60°C ambient temperature.
- Configuration, monitoring, 2-point process calibration and more are accomplished using PR's 45xx detachable displays.
- All programming can be password-protected.

Applications

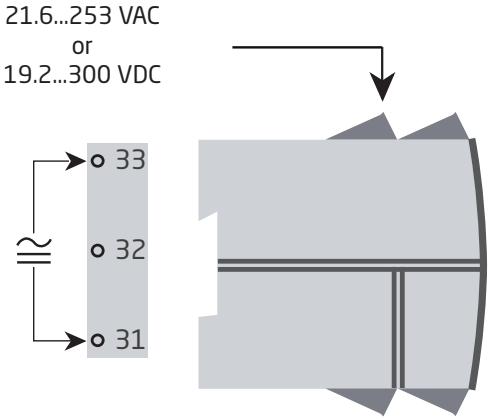
Input signals:



Output signals:



Power connection:



PR 45xx display / programming front



Functionality

The simple and easily understandable menu structure and the explanatory help texts guide you effortlessly and automatically through the configuration steps, thus making the product very easy to use. Functions and configuration options are described in the section "Configuration / operating the function keys".

Application

- Communications interface for modification of operational parameters in 4184.
- Can be moved from one 4184 device to another and download the configuration of the first unit to subsequent units.
- When mounted in the process, the display shows process values and device status.



Technical characteristics

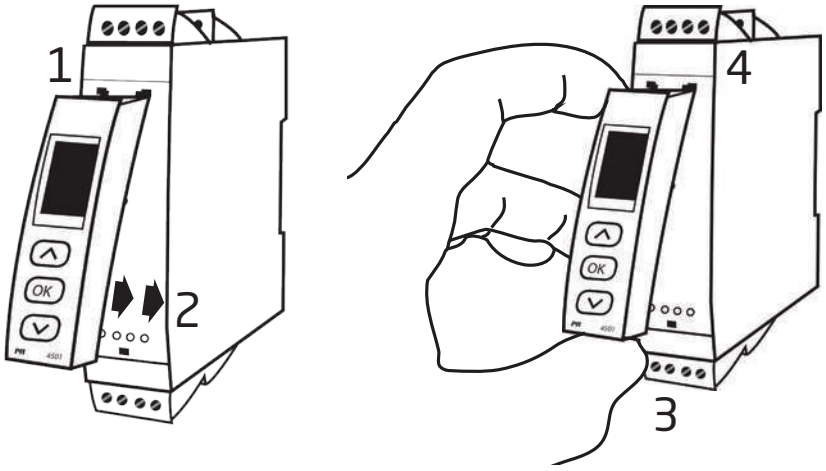
- LCD display with 4 lines:
  Line 1 (H=5.57 mm) shows the scaled process value - OK or error.
  Line 2 (H=3.33 mm) shows the selected engineering unit.
  Line 3 (H=3.33 mm) shows analog output or TAG no.
  Line 4 shows status for communication and signal trending.
- Programming access can be blocked 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.

Mounting / demounting the PR 45xx

1: Insert the tabs of the PR 45xx into the holes at the top of the device.
2: Hinge the PR 45xx down until it snaps into place.

Demounting of the PR 45xx

3: Push the release button on the bottom of the PR 45xx and hinge the the PR 45xx out and up.
4: With the PR 45xx hinged up, remove from holes at the top of the device.



Order

4184 = Universal uni-/bipolar signal transmitter

Accessories

4501 = Display / programming front
4511 = Communication enabler

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/ 4501 / 451x	109 x 23.5 x 116 / 131 mm
Weight approx.	155 g
Weight incl. 4501 / 451x (approx.)	170 g / 185 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
Max. required power	≤ 2.5 W
Max. power dissipation	≤ 2.0 W
Isolation voltage - test	2.3 kVAC
Isolation voltage - working	250 VAC (reinforced) / 500 VAC (basic)
Programming	PR 45xx
Signal dynamics, input / output	24 bit / 18 bit
Signal / noise ratio	> 60 dB
Bandwidth (3 dB)	> 40 Hz
Response time (0...90%, 100...10%)	< 20 ms

Auxiliary supplies:

2-wire loop supply (terminal 43, 44)	> 16 V @ 23 mA
3-wire loop supply (terminal 42, 44)	> 18...< 28 V @ 23...0 mA
Loop supply limitation (terminal 42, 44)	27...35 mA avg., < 80 mA peak
Reference voltage	2,5V ±0.5%
Reference voltage, load	0...15 mA
Current limit, reference voltage	< 60 mA

Accuracy, the greater of general and basic values:

General values*		
Input type	Absolute accuracy	Temperature coefficient
All	≤ ±0.05% of span	≤ ±0.01% of span / °C

Basic values		
Type	Basic accuracy	Temperature coefficient
Current input	±0.334 µA	±0.067 µA / °C
Voltage input	±8.33 µV	±1.67 µV / °C
Current output	±1.33 µA	±0.266 µA / °C
Buffered voltage output	±267 µV	±53.4 µV / °C
Shunted voltage output (±1 V)	±267 µV	±53.4 µV / °C
Shunted voltage output (±10 V)	±1333 µV	±0.267 µV / °C

EMC - immunity influence	< ±0.5% of span
Extended EMC immunity:	
NAMUR NE 21, A criterion, burst	< ±1% of span
Conducted emission, class A	150 kHz...10 MHz

of span = of selected standard range
* For custom input and output ranges, values for accuracy, temperature coefficient and EMC performance are valid with a maximum input offset of 50% and a maximum output offset of 20%.

Input specifications:

Current input:

Signal range	±100 mA
Programmable measurement ranges	0...1, 0...5, 1...5, 0...20, 4...20, ±1, ±5, ±10, ±20, ±50, ±100 mA
Custom configurable signal range	±100 mA
Min. span	0.5 mA
Input resistance	Nom. 20 Ω + PTC 10 Ω
Input voltage drop, nom.	0.6 V @ 20 mA

Voltage input:

Signal range	±300 VDC
Programmable measurement ranges	0...0.1, 0...1, 0.2...1, 0...2.5, 0...5, 1...5, 0...10, 2...10, 0...100, 0...300, ±0.1, ±1, ±2.5, ±5, ±10, ±100, ±300 V
Custom configurable signal range	±300 V
Min. span	25 mV
Input resistance, nom.	
> 2.5 V input	3 MΩ nom.
≤ 2.5 V input	> 10 MΩ

Potentiometer input:

3-wire potentiometer input (terminal 41, 42 & 44)	0...100%
Reference voltage (terminal 42, 44)	2.5 V
Calibration resistance	5 kΩ
Min. potentiometer resistance	200 Ω

Configurable input limits:

Error detection	Enable / disable
Configurable input limits, low:	
VOLT	'Minimum selected input' to -300 V
CURR	'Minimum selected input' to -100 mA
POTM	'Minimum selected input' to 0%
Configurable input limits, high:	
VOLT	'Maximum selected input' to 300 V
CURR	'Maximum selected input' to 100 mA
POTM	'Maximum selected input' to 100%
Input limit low/high, error indication levels:	
UP	See tables on pages 15-16
DOWN	See tables on pages 15-16
ZERO	See tables on pages 15-16
NONE	See tables on pages 15-16
Hysteresis	0.5% of 'Max. input'
Error detection release delay	0.7...0.8 s

Output specifications

Common specifications current output:

All standard and custom ranges can be selected as Direct or Inverted action or V-Function.

Active / passive output range	±23 mA / 0...23 mA
Programmable standard ranges	0...5, 1...5, 0...10, 2...10, 0...20, 4...20, S4-20 mA ±5, ±10, ±20 mA
Custom configurable output range	±20 mA
Min. span	4 mA
Load, max.	≤ 1000 Ω / ± 20 V @ ±20 mA
Current limit	≤ 28 mA (unipolar) / ±28 mA (bipolar)
Load stability	0.001% of span / 100 Ω
Response time, programmable	0.0...60.0 s
Output limitation at outside range	See tables on pages 15-16

Passive 2-wire mA:

Programmable ranges	0...20 and 4...20 mA Direct or Inverted action
External 2-wire loop supply	3.5...28.8 V

Voltage output specifications:

All standard and custom ranges can be selected as Direct or Inverted action or V-Function.

Programmable ranges	0/0.2...1, 0/1...5, 0/2...10, ±1, ±5 and ±10 V Direct or Inverted action
Load, min	> 500 kΩ
Response time, programmable	0.0...60.0 s
Output limitation at outside range	See tables on pages 15-16

Shunted voltage output:

Signal range	± 1.2 V / ± 12 V
Programmable standard ranges	0...1, 0...2.5, 0...5, 1...5, 0...10, 2...10 V ±1, ±2.5, ±5, ±10 V
Custom configurable output range	±10 V
Min. span	0.8 V
Load, min.	> 500 kΩ

Buffered voltage output:

Signal range	± 23 V
Programmable standard ranges	0...1, 0.2...1, 0...2.5, 0...5, 1...5, 0...10, 2...10, 0...20, 4...20 V ±1, ±2.5, ±5, ±10, ±20 V
Custom configurable output range	±20 V
Min. span	0.8 V
Current limit	< 50 mA
Load, min.	> 2 kΩ

Observed authority requirements:

EMC	2014/30/EU
LVD	2014/35/EU
RoHS	2011/65/EU

Approvals:

c UL us, Standard for Safety	UL 508 / C22.2 No. 14

Functional Safety:

Hardware assessed for use in SIL applications
FMEDA report - www.prelectronics.com

Configurable input error indication and input limits

Configurable input error detection

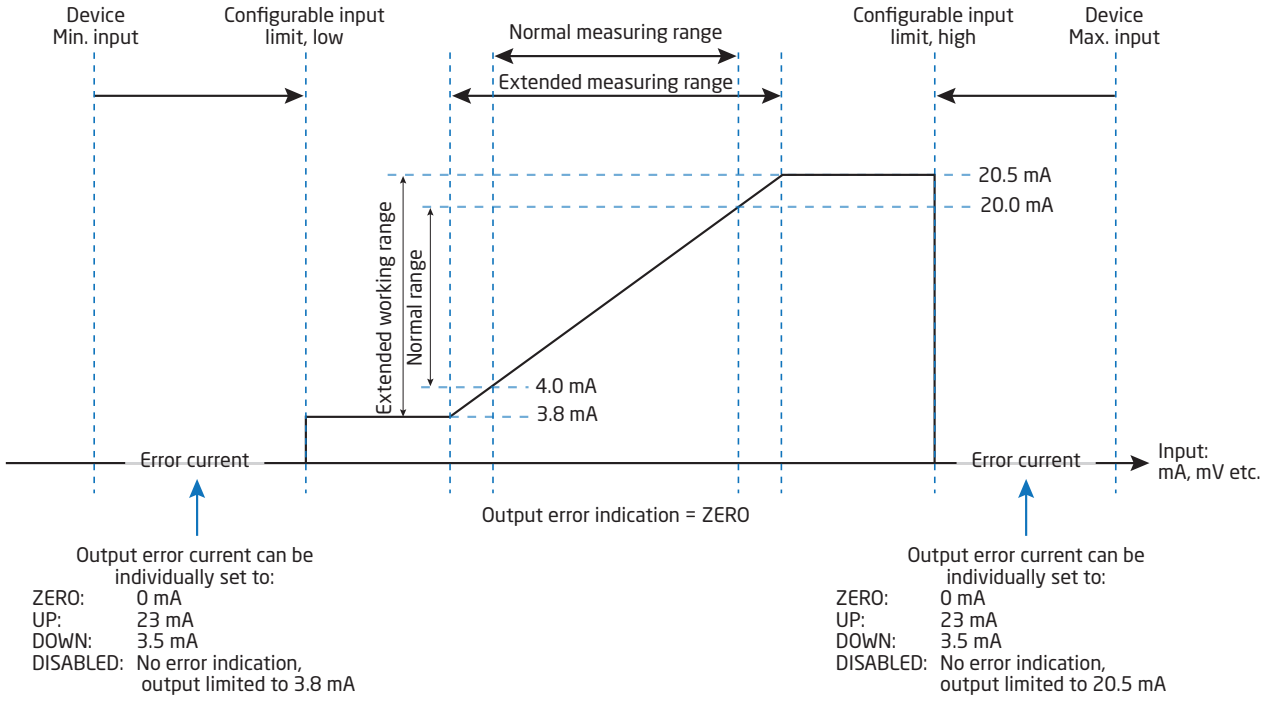
To increase system safety and integrity, users can program a high and low input error detection level. Input signals outside the selected error indication levels will cause the output of the device to go to the programmed error state. The error is indicated in display line 1 as IN.ER and at the same time the backlight flashes.

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 input wires, etc.

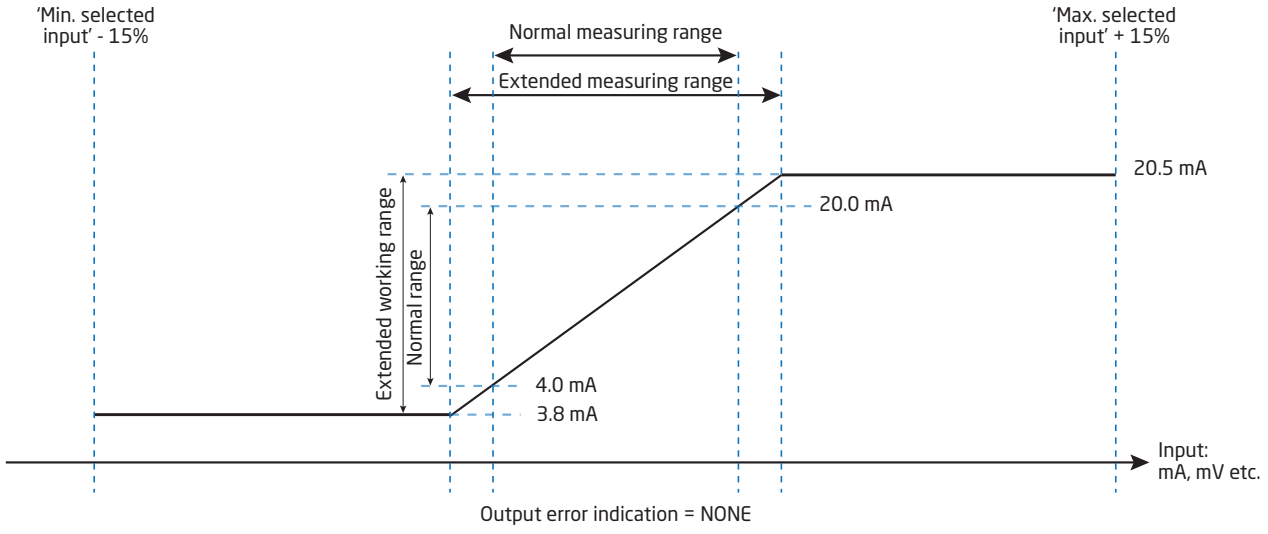
Available output error states for each of the two detection levels are: UP, DOWN, ZERO and NONE.

Output error indication uses the error states defined by NAMUR NE43 for 4...20 mA output span, and for all other output spans equivalent output error indications are used (see tables on pages 15-16).

Example - 4..20 mA output span and both high and low configurable input error limit enabled with output error indication set to ZERO:



Example - Error indication set to NONE:



Output limits and error indications – current output:

	Input error indication disabled		Configurable input limits low or high enabled					
Output span	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
0...20 mA	0 mA	23 mA	0 mA	20.5 mA	23 mA	0 mA	0 mA	No error indication
2...10 mA	0 mA	11.5 mA	0.195 mA	10.25 mA	11.5 mA	0 mA	0 mA	No error indication
0...10 mA	0 mA	11.5 mA	0 mA	10.25 mA	11.5 mA	0 mA	0 mA	No error indication
0...5 mA	0 mA	5.75 mA	0 mA	5.125 mA	5.75 mA	0 mA	0 mA	No error indication
1...5 mA	0 mA	5.75 mA	0.975 mA	5.125 mA	5.75 mA	0.875 mA	0 mA	No error indication
±5 mA	-5.75mA	5.75 mA	-5.125 mA	5.125 mA	5.75 mA	5.75 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	20.5 mA	23 mA	-23 mA	0 mA	No error indication

Output limits and error indications – shunted voltage output:

	Input error indication disabled		Configurable input limits low or high enabled					
Output span	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...1 V	0 V	1.15 V	0 V	1.025 V	1.15 V	0 V	0 V	No error indication
0.2...1 V	0 V	1.15 V	0.195 V	1.025 V	1.15 V	0.175 V	0 V	No error indication
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
±1 V	-1.15 V	1.15 V	-1.025 V	1.025 V	1.15 V	-1.15 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	-11.5 V	0 V	No error indication

Output limits and error indications – buffered voltage output:

	Input error indication disabled		Configurable input limits low or high enabled					
Output span	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...1 V	0 V	1.15 V	0 V	1.025 V	1.15 V	0 V	0 V	No error indication
0.2...1 V	0 V	1.15 V	0.195 V	1.025 V	1.15 V	0.175 V	0 V	No error indication
0...2.5 V	0 V	2.875 V	0 V	2.5625 V	2.875 V	0 V	0 V	No error indication
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
0...20 V	0 V	> 21 V	0 V	20.5 V	> 21 V	0 V	0 V	No error indication
4... 20 V	0 V	> 21 V	3.8 V	20.5 V	> 21 V	3.5 V	0 V	No error indication
±1 V	-1.15 V	1.15 V	-1.025 V	1.025 V	1.15 V	-1.15 V	0 V	No error indication
±2.5 V	-2.875 V	2.875 V	-2.5625 V	2.5625 V	2.875 V	-2.875 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	-11.5 V	0 V	No error indication
±20 V	< -21 V	> 21 V	-20.5 V	20.5 V	> 21 V	< -21 V	0 V	No error indication

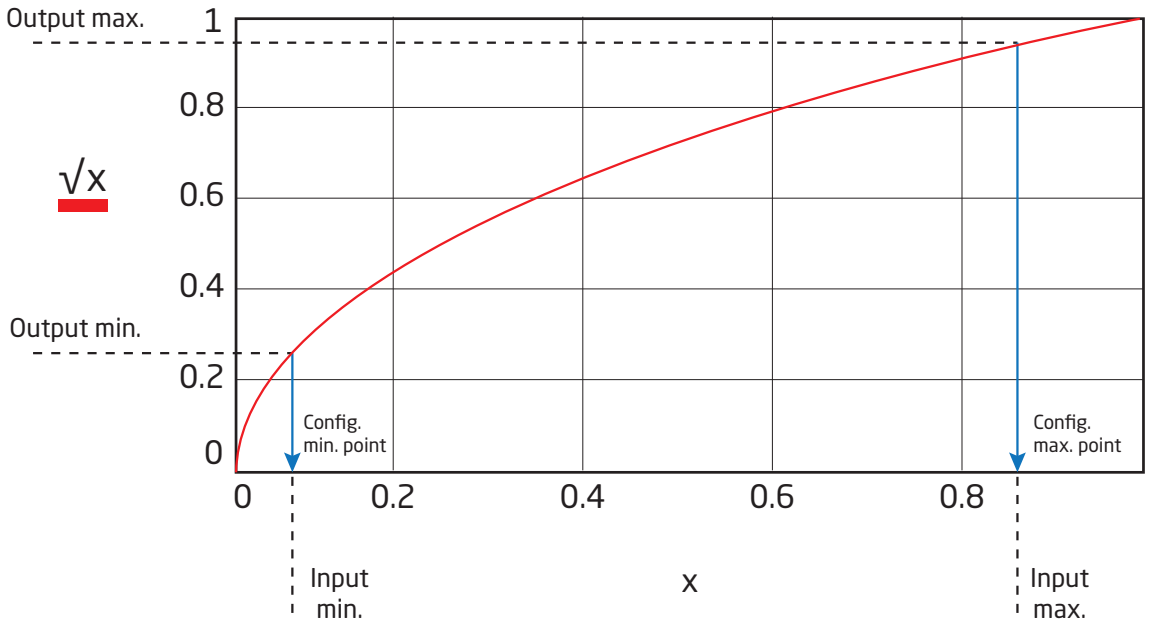
Output limits and error indications – custom outputs (applies to both voltage and current outputs):

	Input error indication disabled		Configurable input limits low or high enabled					
Output span	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
Outputs starting at zero	0 V / 0 mA	'Max. output'* 115%	0 V / 0 mA	'Max. output'* 102.5%	'Max. output'* 115%	0 V / 0 mA	0 V / 0 mA	No error indication
Offset output span *)	0 V / 0 mA	'Max. output'* 115%	'Min. output'* 95%	'Max. output'* 102.5%	'Max. output'* 115%	'Min. output'* 87.5%	0 V / 0 mA	No error indication
Bipolar output span	'Min. output'* 115%	'Max. output'* 115%	'Min. output'* 102.5%	'Max. output'* 102.5%	'Max. output'* 115%	'Min. output'* 115%	0 V / 0 mA	No error indication

*) An output is considered offset if the span does not include zero or a zero crossing.

Square root function

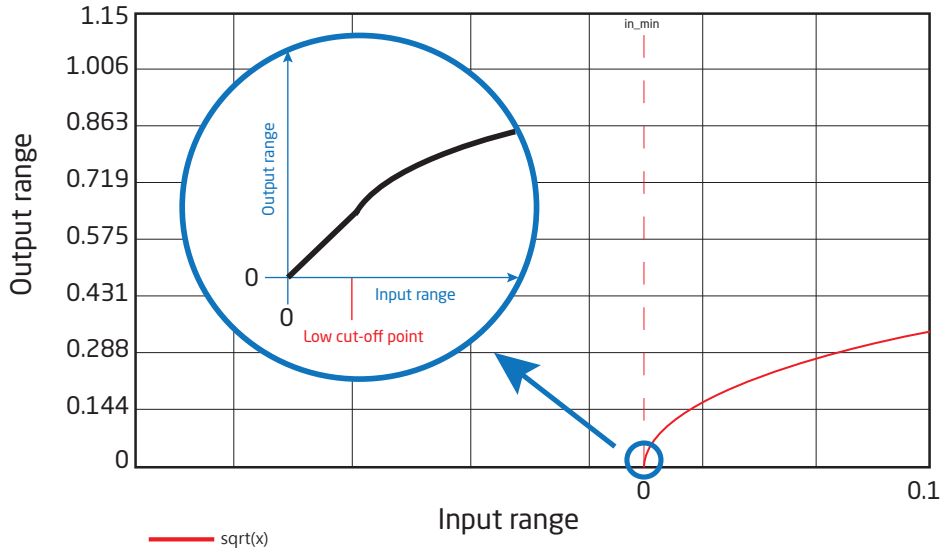
The 4184 features the possibility of configuring a square root relationship between the input and output.
It is possible to use the full square root relationship, or to select a fraction of the square root function, by manually choosing 'Input min.' and 'input max.' of the square root function, as shown in the figure below:



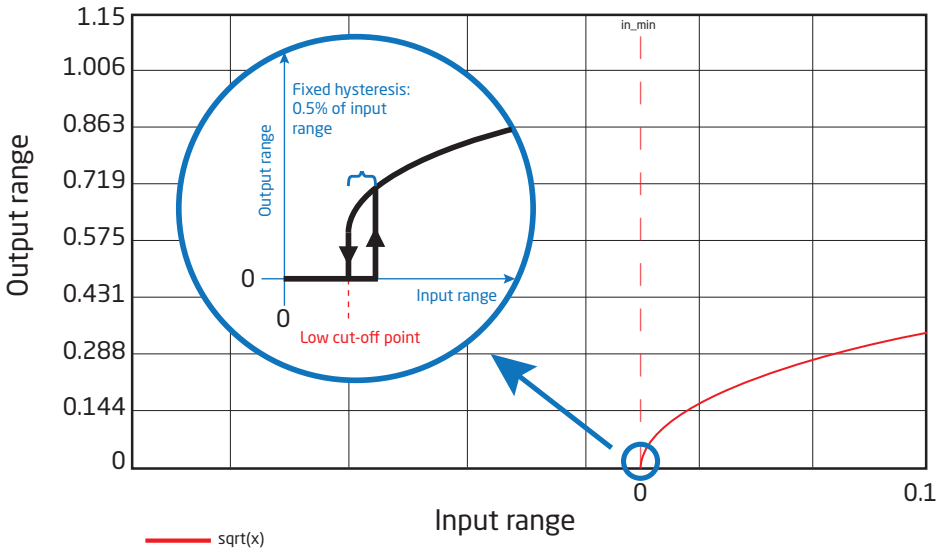
Low cut-off function:

As a part of the square root function of the 4184 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'	

45xx display readout of input error detection and signal "outside range"

Configurable input error detection - readout (IN.ER):			
Input	Range	Readout	Limit
CURR	All	IN.ER	See tables on pages 15-16
VOLT	All	IN.ER	See tables on pages 15-16
POTM	All	IN.ER	See tables on pages 15-16

Display readout at "outside range" limits			
Input	Range	Readout	Limit
All	All	IN.LO	Depending on input type
		IN.HI	Depending on input type

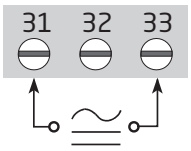
Display readout below min. / above max. (-1999, 9999):			
Input	Range	Readout	Limit
All	All	-1999	Display readout <-1999
		9999	Display readout >9999

Readout at hardware error		
Error search	Readout	Cause
Check measurement of analog output	AO.ER	No load on the current output (only S4...20 mA)*
Communications test between 45xx and 4184	NO.CO	Connection error
Configuration error	CO.ER	Default configuration is loaded
Configuration error	CO.ER	Invalid configuration**
Check that saved configuration in 45xx matches device	TY.ER	Invalid type or rev. no.
Hardware error	RA.ER	RAM error*
Hardware error	AD.ER	A/D converter error*
Hardware error	AO.SU	Analog output supply error*
Hardware error	EF.ER	External flash error*
Hardware error	IF.ER	Internal flash error*

!	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 OK 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.

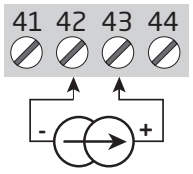
Connections

Supply

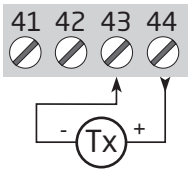


Inputs:

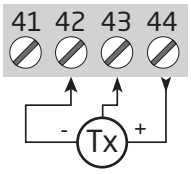
Current



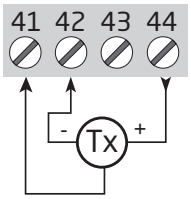
2-wire transmitter



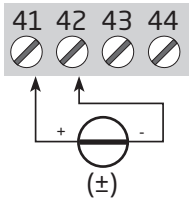
3-wire current transmitter



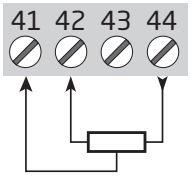
3-wire voltage transmitter



Voltage

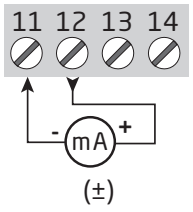


Potentiometer

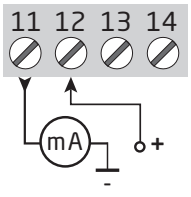


Outputs:

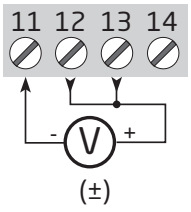
Current (Active output)



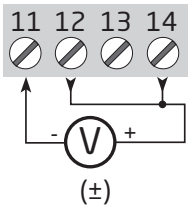
2-wire transmitter (Passive output)



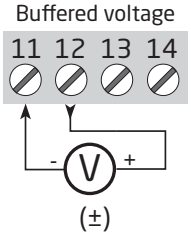
Voltage, 1 V



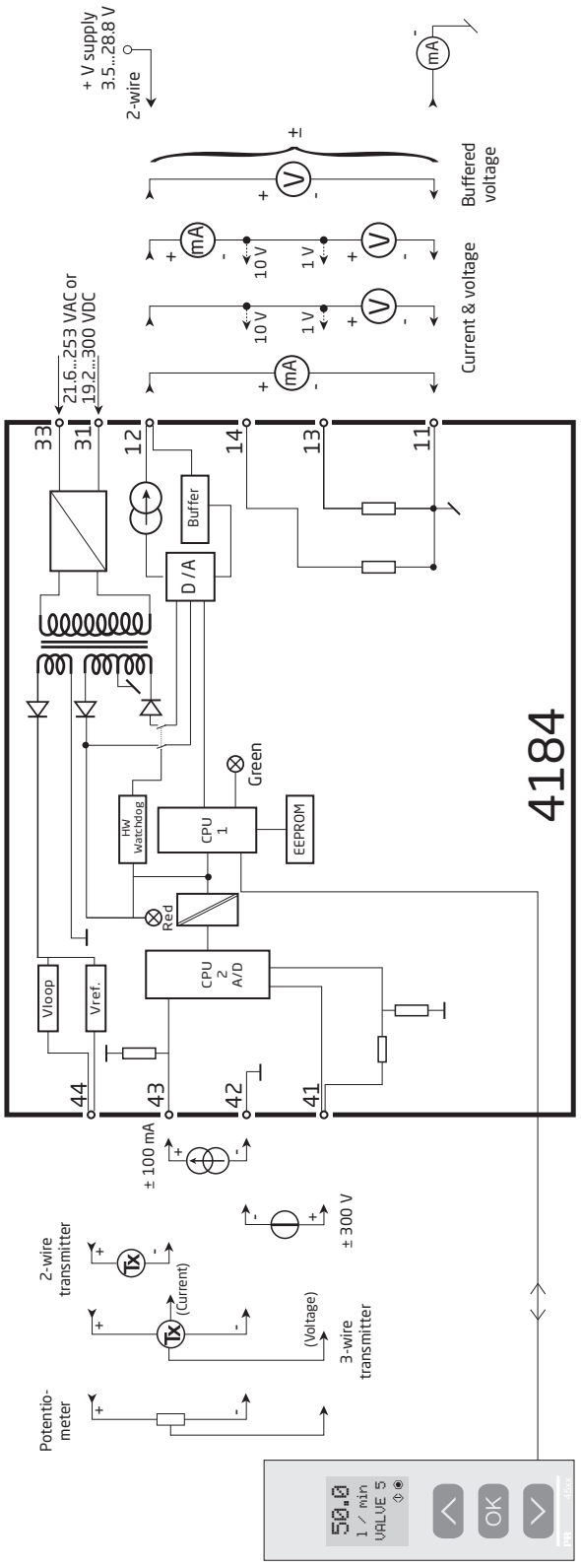
Voltage, 10 V



Buffered voltage



Block diagram



Configuration / operating the function keys

Documentation for routing diagram.

In general

When configuring the 4184, you will be guided through all parameters and you can choose the settings which fit the application. For each menu there is a scrolling help text which is automatically shown in line 3 on the display.

Configuration is carried out by use of the 3 function keys:

- ⌃ will increase the numerical value or choose the next parameter
- ⌄ will decrease the numerical value or choose the previous parameter
- OK will save the chosen value and proceed to the next menu

When configuration is completed, the display will return to the default state 1.0. Pressing and holding OK will return to the previous menu or return to the default state (1.0) without saving the changed values or parameters.

If no key is activated for 1 minute, the display will return to the default state (1.0) without saving the changed values or parameters.

Further explanations

Password protection: 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 unauthorised modifications to the configuration. Default password 2008 allows access to all configuration menus.

Signal error indication via display front 45xx

Signal error is displayed as LO.ER (see table page 19). Input signals outside the selected range are displayed as IN.LO indicating low input signal or IN.HI indicating high input signal (see table page 19). Error indication is displayed in line 1 as text and at the same time the backlight flashes. A flashing bullet in line 4 is indicating correct functioning of 45xx.

Signal error indication without display front

Status of the unit can also be read from the red/green LED in the front of the device.

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

Advanced functions

The unit gives access to a number of advanced functions which can be reached by answering "Yes" to the point "ADV.SET".

Memory (MEM): In the memory menu you can save the configuration of the device in the 45xx, and then move the 45xx 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 analogue 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 45xx Then a high signal (not necessarily 100%) is applied and the actual value is entered via 45xx. 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 simulation function (SIM): In the menu point "EN.SIM" it is possible to simulate an input signal by means of the arrow keys and thus control the output signal up or down. You must exit the menu by pressing OK (no time-out).
The simulation function exits automatically, if the 45xx is detached.

Password (PASS): Here you can choose a password between 0000 and 9999 in order to protect the unit against unauthorised modifications to the configuration. The unit is delivered default without password.

Language (LANG): In the menu "LANG" you can choose between 7 different language versions of help texts that will appear in the menu. You can choose between UK, DE, FR, IT, ES, SE and DK.

Output function (OFUN): Here the output characteristics can be set to either Direct (DIR) or Inverted (INV) function. Output type and range are set in the normal programming menu. If the selected output range is starting at zero, V-curved output function (VFUN) can also be selected. The output characteristics will then be 100-0-100% on the basis of a linear 0-100% input signal.

Square root and low cut-off function (IFUN): Here it is possible to choose a square root relationship between input and output and decide which section of the square root function that has to be used. The function includes a low cut-off point for limiting "small" input signals. Cut-off type and cut-off value are also selected in this menu point.

Auto diagnostics

The device performs an advanced auto diagnosis of the internal circuits - check tables on page 19.

Routing diagram

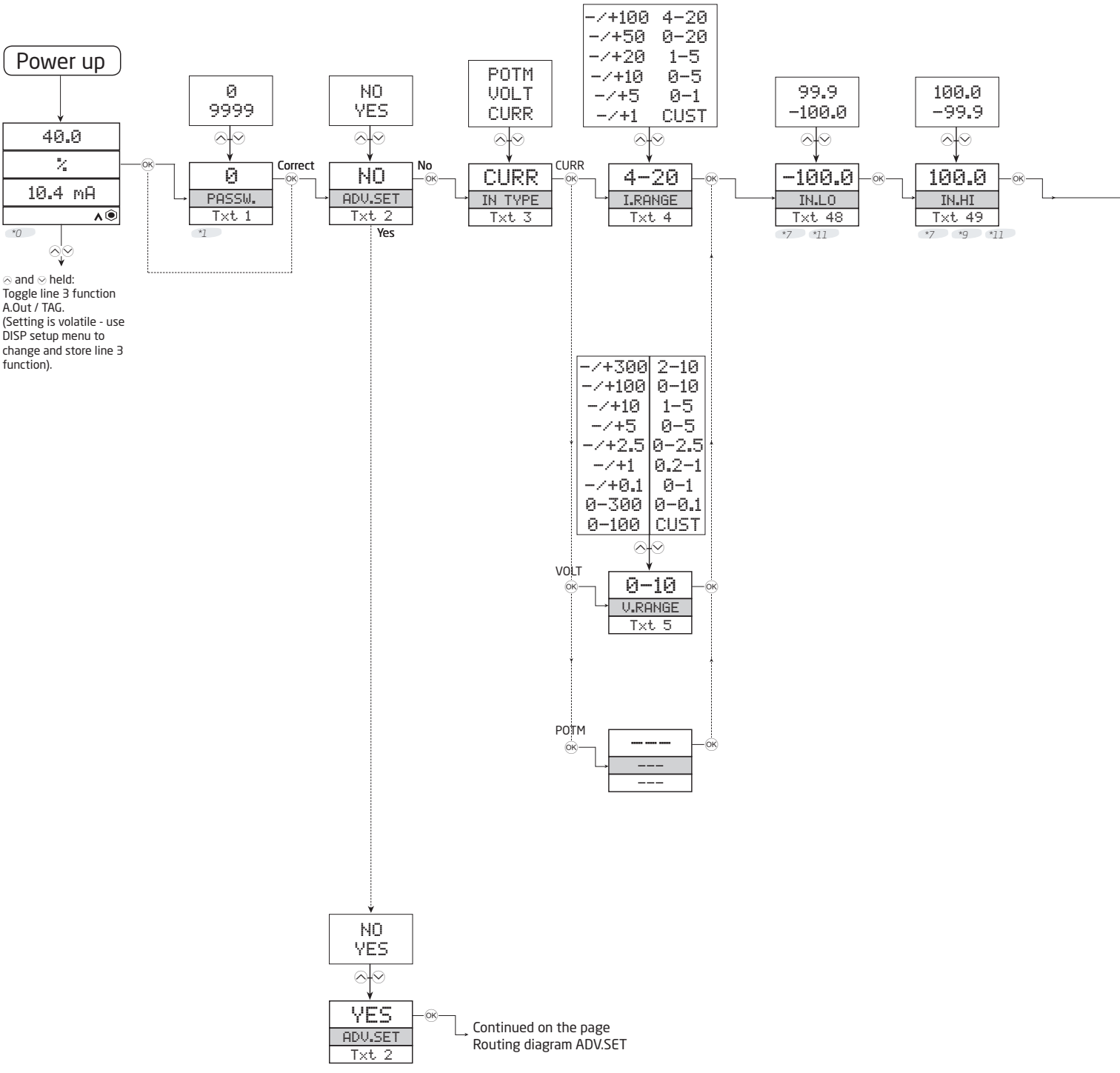
If no key is activated for 1 minute, the display will return to the default state 1.0 without saving configuration changes.

▲ Increase value / choose next parameter

▼ Decrease value / choose previous parameter

OK Save the chosen value and proceed to the next menu

Hold OK Back to previous menu / return to menu 1.0 without saving.



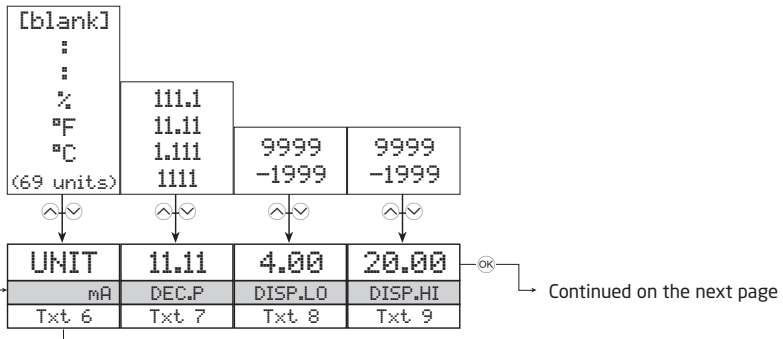
*0 Default state.
Line 1 shows the scaled process value - OK or error.
Line 2 shows the selected engineering unit.
Line 3 shows analogue output or TAG no.
Line 4 shows status for communication and signal trending.

*1 Only displayed if password is enabled.

*7 Only displayed if CUST input range or POTM is selected.
This menu will change range automatically.

*9 Value will be forced to be greater than xx.LO.

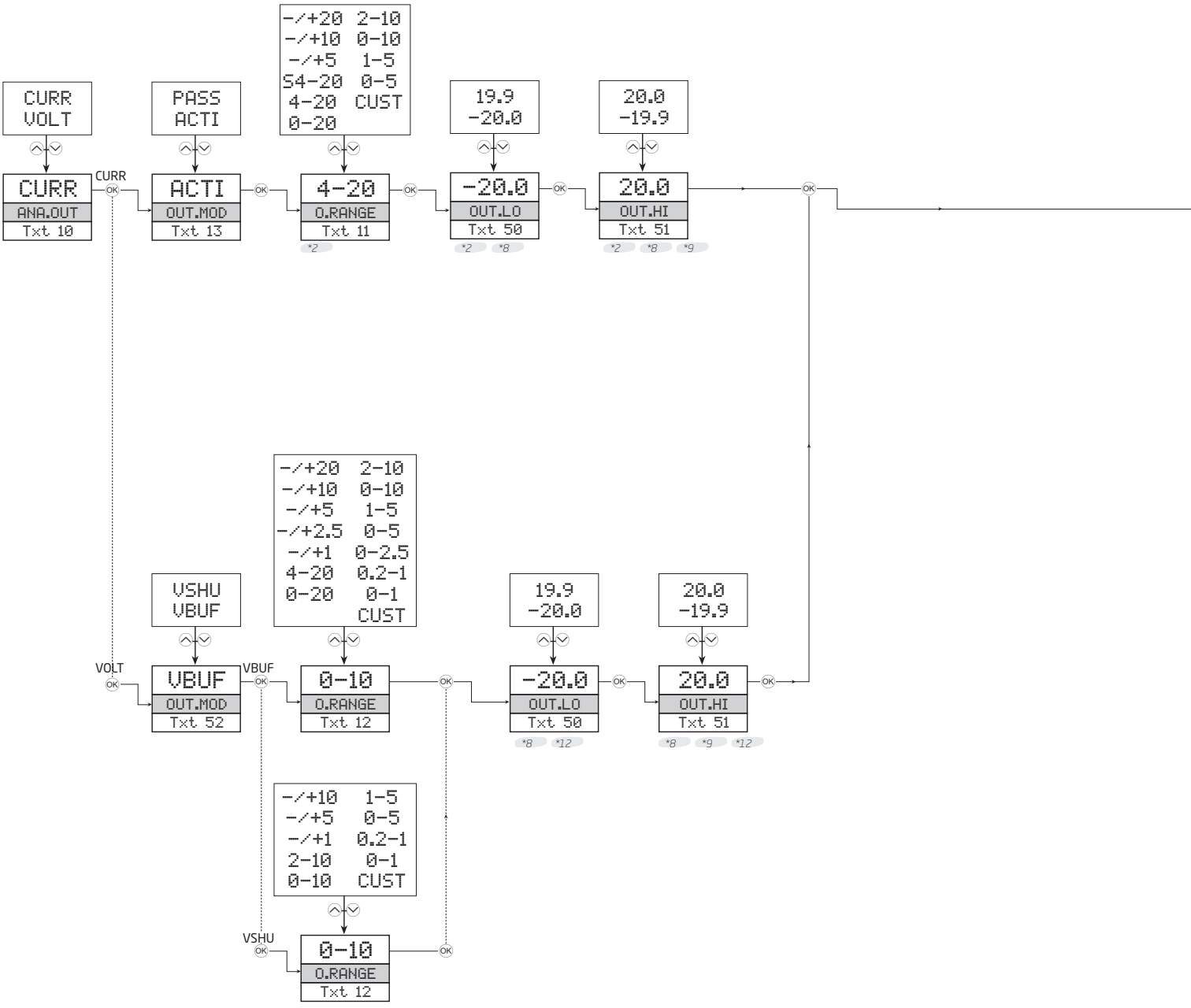
*11 Limits are dependent on input type:
CURR limits are: ±100.0
VOLT limits are: ±300
POTM limits are: 0 and 100.0



Continued on the next page

Selectable UNITS:

°C	hP	kW	mA	pH
°F	hPa	kWh	mbar	rpm
%	Hz	l	mils	s
A	in	l/h	min	S
bar	in/h	l/min	mm	t
cm	in/min	l/s	mm/s	t/h
ft	in/s	m	mol	uA
ft/h	ips	m/h	MPa	um
ft/min	K	m/min	mV	uS
ft/s	kA	m/s	MW	V
g	kg	m/s2	MWh	W
gal/h	kJ	m3	N	Wh
gal/min	kPa	m3/h	Ohm	yd
GW	kV	m3/min	Pa	[blank]

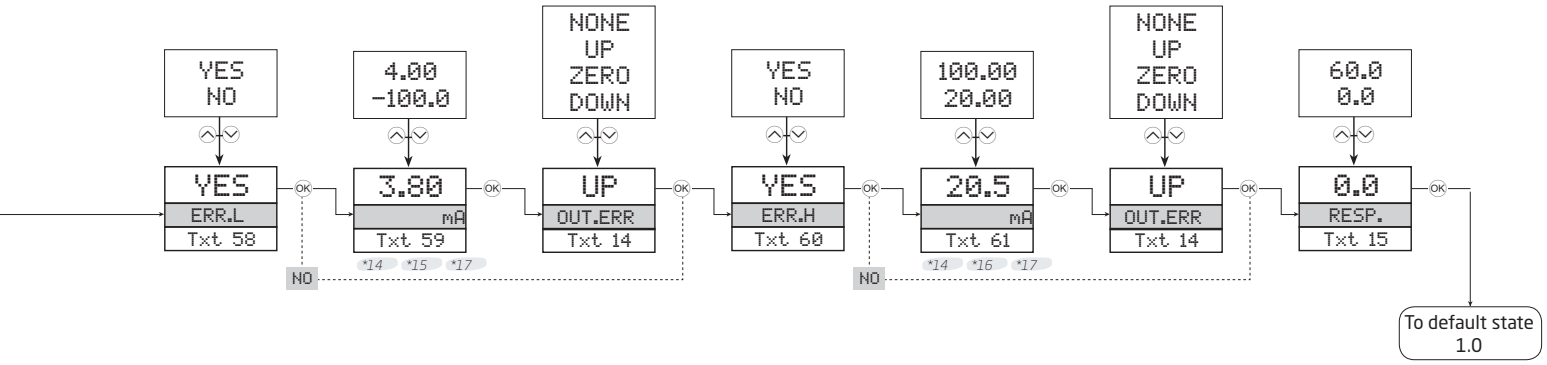


*2 If passive is selected, the values are limited to only positive span.

*8 Only displayed if CUST output range is selected. This menu will change range automatically.

*9 Value will be forced to be greater than xx.LO.

*12 Limits are dependent on output type:
VBUF limits are: ±20.0
VSHU limits are: ±10.0



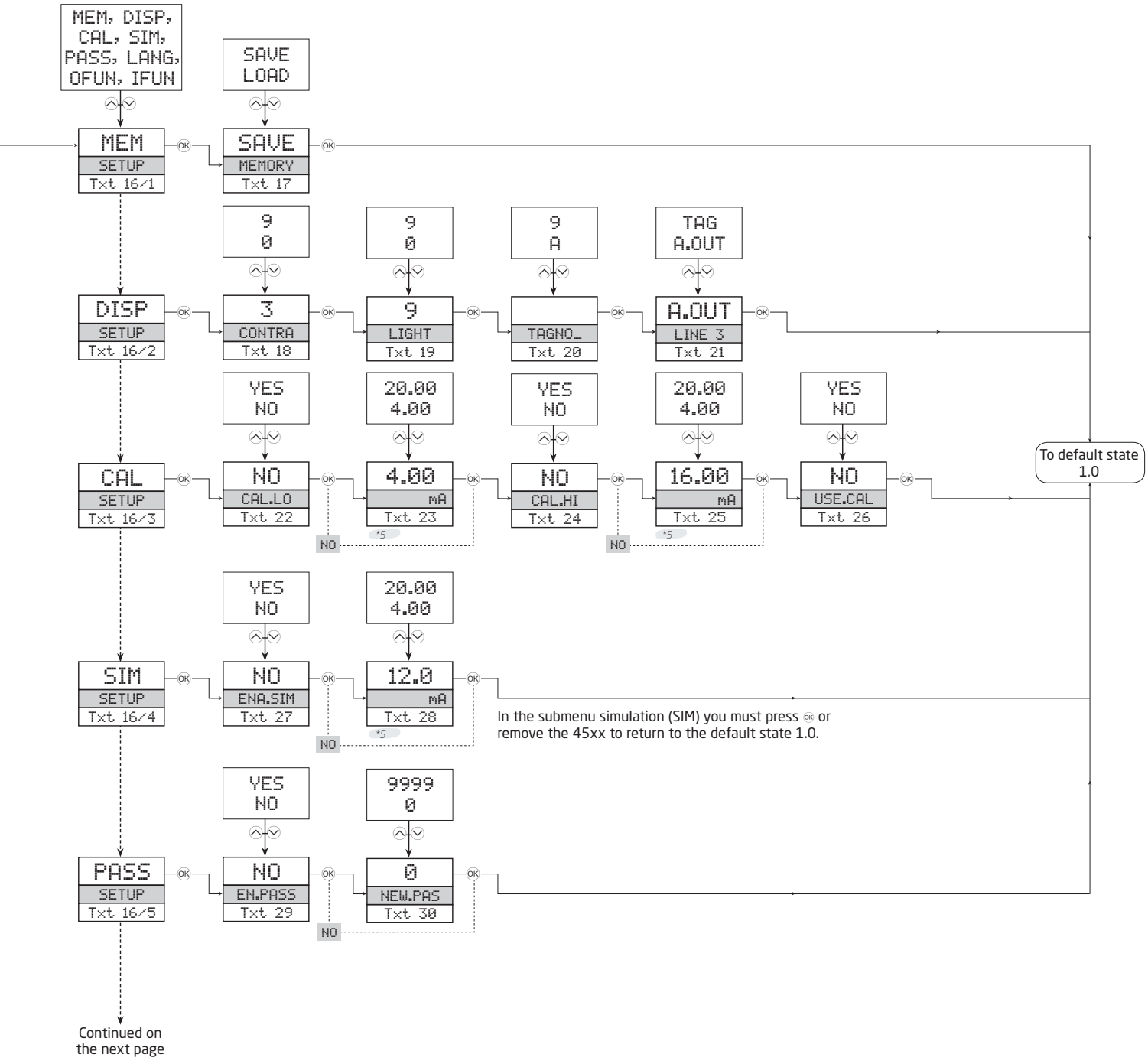
*14 Selectable in engineering units, i.e. Volt (V), Current (mA) or Potentiometer (%).

*15 Limits are dependent on input type and the selected input range:
High Limit: 'Minimum input'
Low limit, CURR: -100.0 mA
Low limit, VOLT: -300 V
Low limit, POTM: 0 %

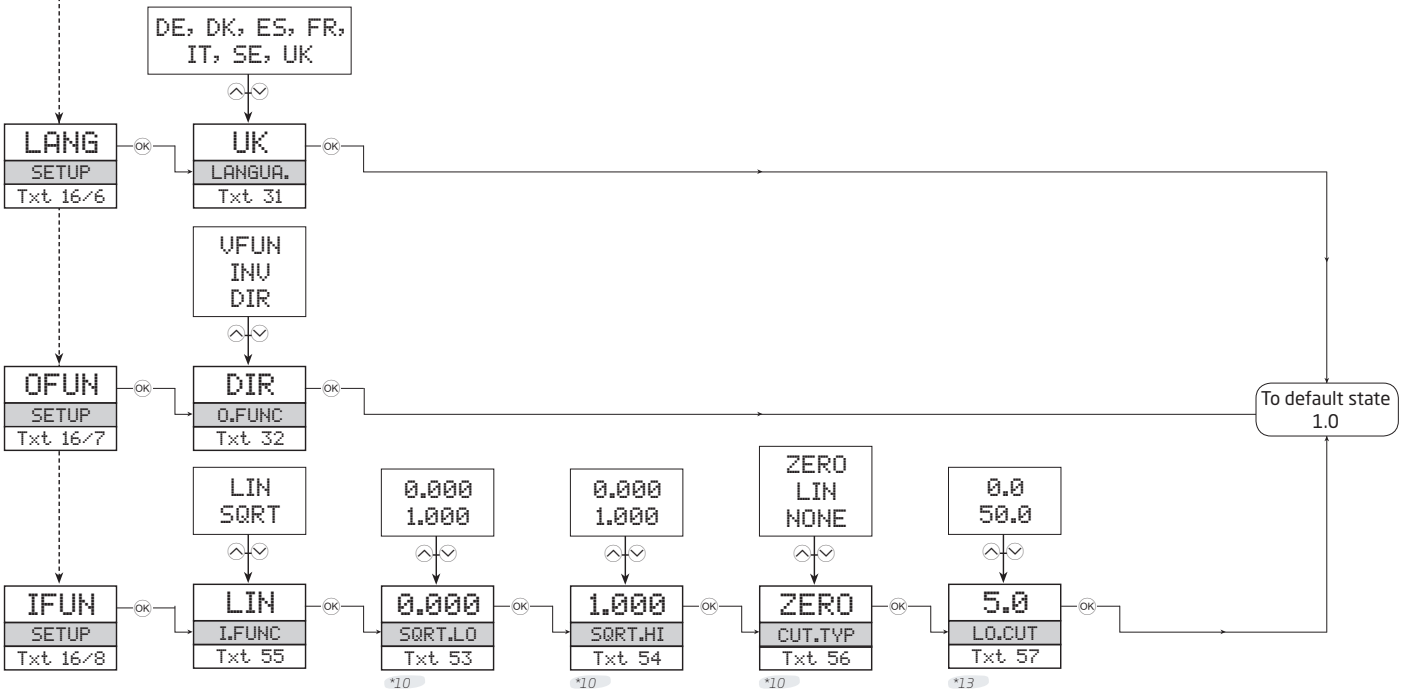
*16 Limits are dependent on input type and the selected input range:
Low Limit: Maximum input'
High limit, CURR: 100.0 mA
High limit, VOLT: 300 V
High limit, POTM: 100.0 %

*17 If the selected input range is changed to 4...20 mA the configurable limits are initially set to the following:
Range limit, Low 3.6 mA
Range limit, High 21 mA

Routing diagram, advanced settings (ADV.SET)



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



*10 Only displayed if SQRT is selected!
SQRT.LO and SQRT.HI must not be equal.

*13 Only shown if CUT.TYP is NOT set to NONE.

Help text overview

[1] Set correct password
[2] Enter advanced setup menu?
[3] Select current input
Select voltage input
Select potmeter input
[4] Select -100...100 mA input range
Select -50...50 mA input range
Select -20...20 mA input range
Select -10...10 mA input range
Select -5...5 mA input range
Select -1...1 mA input range
Select 4...20 mA input range
Select 0...20 mA input range
Select 1...5 mA input range
Select 0...5 mA input range
Select 0...1 mA input range
Select custom current input range
[5] Select -300...300 V input range
Select -100...100 V input range
Select -10...10 V input range
Select -5...5 V input range
Select -2.5...2.5 V input range
Select -1...1 V input range
Select -100...100 mV input range
Select 0...300 V input range
Select 0...100 V input range
Select 2...10 V input range
Select 0...10 V input range
Select 1...5 V input range
Select 0...5 V input range
Select 0...2.5 V input range
Select 0.2...1 V input range
Select 0...1 V input range
Select 0...100 mV input range
Select custom voltage input range
[6] Select display unit
[7] Select decimal point position
[8] Set display range low
[9] Set display range high
[10] Select current as analog output type
Select voltage as analog output type
[11] Select -20...20 mA output range
Select -10...10 mA output range
Select -5...5 mA output range
Select 4...20 mA output range with safety readback
Select 4...20 mA output range
Select 0...20 mA output range
Select 2...10 mA output range
Select 0...10 mA output range
Select 1...5 mA output range
Select 0...5 mA output range
Select custom current output range
[12] Select -20...20 V output range
Select -10...10 V output range
Select -5...5 V output range
Select -2.5...2.5 V output range
Select -1...1 V output range
Select 4...20 V output range
Select 0...20 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
Select 0...2.5 V output range
Select 0.2...1 V output range
Select 0...1 V output range
Select custom voltage output range
[13] Select active output mode
Select passive output mode
[14] Select downscale at error
Select zero output at error
Select upscale at error
Select no error action - output undefined at error
[15] Set analog output response time in seconds
[16] Select analog output function
Enter Language setup
Enter Password setup
Enter Simulation mode
Perform Process calibration
Enter Display setup
Perform Memory operations
Select analog input function
[17] Load saved configuration into module
Save configuration in display front
[18] Adjust LCD contrast
[19] Adjust LCD backlight
[20] Write a 6-character device TAG
[21] Analog output value is shown in display line 3
Device TAG is shown in display line 3
[22] Calibrate Input low to process value?
[23] Set value for low calibration point
[24] Calibrate Input high to process value?
[25] Set value for high calibration point
[26] Use process calibration values?
[27] Enable simulation mode?
[28] Set the input simulation value
[29] Enable password protection?
[30] Set new password
[31] Select language
[32] Select direct output mode
Select inverted output mode
Select V-function output mode
[33] Display underrange
[34] Display overrange
[35] Input underrange
[36] Input overrange
[37] Analog output supply error
[38] Analog output error - check output connections and reset power
[39] Configuration error - default configuration is loaded
[40] RAM memory error
[41] Invalid configuration

[42] A/D converter error
[43] No communication
[44] Input range limit error - Input outside configurable input range limit
[45] Invalid configuration type or version
[46] External flash error
[47] Internal flash error
[48] Set input range low
[49] Set input range high
[50] Set output range low
[51] Set output range high
[52] Select buffered voltage output
Select shunted voltage output
[53] Select low value of square root
[54] Select high value of square root
[55] Select linear input function
Select square root input function
[56] Set low cut-off type to zero
Set low cut-off type to linear
Disable low cut-off
[57] Select low cut-off point in % of input range
[58] Enable configurable input error limit, low
[59] Set configurable input limit, low
[60] Enable configurable input error limit, high
[61] Set configurable input limit, high

Document history

The following list provides notes concerning revisions of this document.

Rev. ID	Date	Notes
100	1825	Initial release of the product
101	1914	SIL HW assessment added

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