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SCU-7900

Universal
AC Transmitter

User Manual

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CE

Universal AC Transmitter SCU-7900

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.

HAZARDOUS VOLTAGE

Warning

Do not open the front plate of the device as this will cause damage to the connector for the display / programming front SCU-PDM1 or SCU-PDM2.

This device contains no DIP-switches or jumpers.

SCU-7900 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.

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.

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 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.
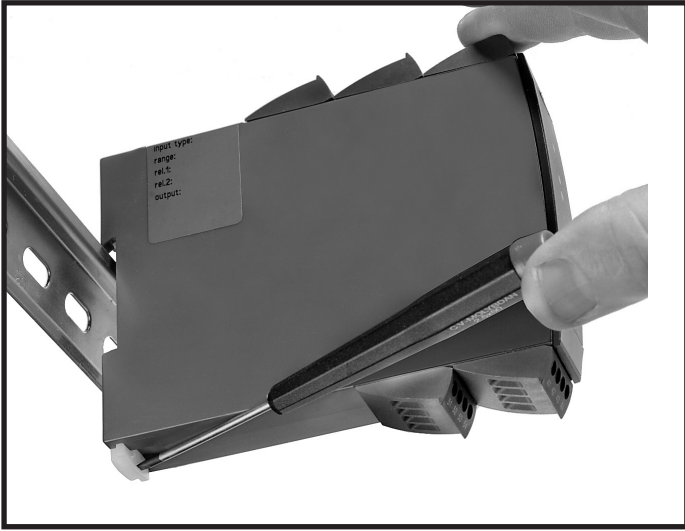
Cleaning

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

How To Detach SCU-7900

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

Universal AC/DC transmitter
SCU-7900

- Measures AC current and voltage signals and converts these into uni-/bipolar DC current and voltage signals

- Outputs passive or active current signals

- Programming, process monitoring and diagnostics via SCU-PDM1 or SCU-PDM2

- Response time < 0.75 s and excellent accuracy better than 0.3%

- Universally powered by 21.6...253 VAC / 19.2...300 VDC

Application

- The 0... 5A AC range makes it possible to accurately measure a typical current transformer.
- The 0...300 VAC range allows accurate supply voltage monitoring.
- The SCU-7900 measures standard input ranges, and can be freely configured to customer-defined input range.
- Converts narrow AC current / voltage inputs to wide bipolar or unipolar outputs, e.g. 0...1 VAC input = ±10 volt or 4...20 mA output with a minimum span of 0.5A AC or 0.5 VAC.
- The detachable SCU-PDM1 or SCU-PDM2 displays provide enhanced diagnostics.
- Configurable input limits control the output value for increased safety.
- The SCU-7900 is designed according to strict safety requirements and is thus 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.
- Response time < 0.75 s for measuring AC current / voltage signals.
- The current output can drive up to 800 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 an input 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 SCU-PDM1 or SCU-PDM2 detachable displays.
- All programming can be password-protected.

Applications

Input signals:

Current   Voltage

○ 44

○ 43

(N)

○ 42

(N)

○ 41

Output signals:

Current & voltage

+ V supply

2-wire

○ 12

○ 14

+

mA

10 V

+
mA
-

10 V

(±)

○ 13

-

1 V

+

V

1 V

+

V

mA

-

○ 11

-

-

Power connection:

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

○ 33

○ 32

○ 31
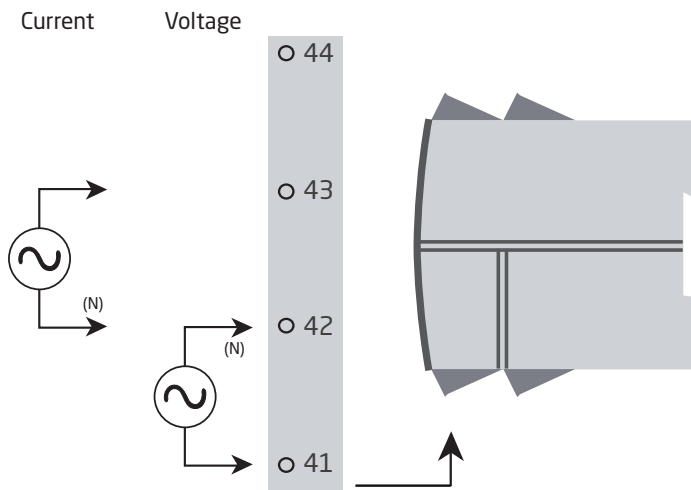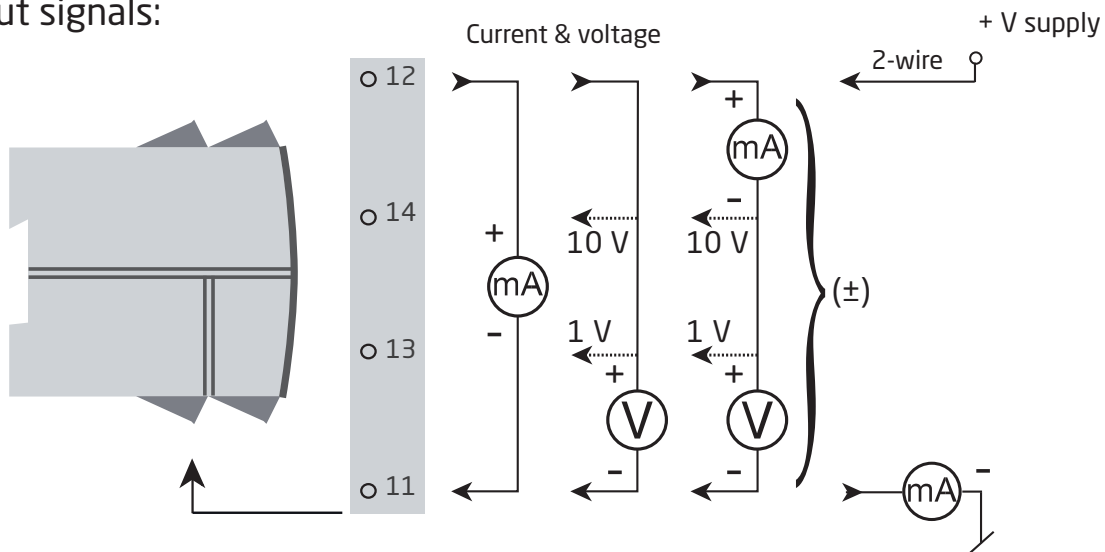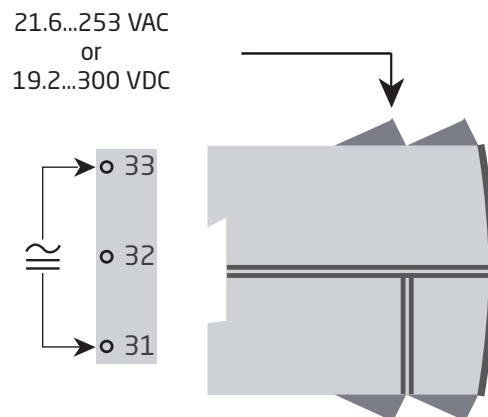
SCU-PDM1 or SCU-PDM2 display / programming front

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". SCU-PDM2 may vary slightly in appearance.

Application

- Communications interface for modification of operational parameters in SCU-7900.
- Can be moved from one SCU-7900 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.

SCU-PDM1   SCU-PDM2

Technical characteristics

- SCU-PDM1 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.
- SCU-PD21 LCD display with 4 lines:
  Line 1 (H=5mm) shows the scaled process value - OK or error.
  Line 2 (H=3.5 mm) shows the selected engineering unit.
  Line 3 (H=3.5 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 SCU-PDM1 or SCU-PDM2

1: Insert the tabs of the SCU-PDM1 or SCU-PDM2 into the holes 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

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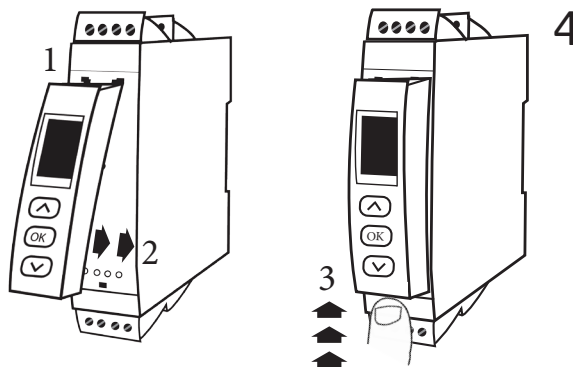
Part Numbers

SCU-7900 = Universal AC / DC transmitter

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

Electrical specifications

Environmental conditions:

Operating temperature	-20°C...60°C (-4°F...140°F)
Storage temperature	-20°C...85°C (68°F...82.4°F)
Calibration temperature	20...28°C (68°F...82.4°F)
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 (4.3 x 0.9 x 4.1 in)
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.	155 g
Weight incl. SCU-PDM1 or SCU-PDM2 (approx.)	170 g / 180 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	≤ 1.8 W nom.
Max. power dissipation	≤ 2.5 W
Isolation voltage - test	2.3 kVAC
Isolation voltage - working	250 VAC (reinforced) / 500 VAC (basic)
Programming	Programming/display module, SCU-PDM2 (sold separately) or SCU-PDM1 (discontinued and replaced by SCU-PDM2)
Signal dynamics, input / output	20 bit / 18 bit
Signal / noise ratio	> 60 dB
Response time (0...90%, 100...10%)	< 0.75 s
Output referred common mode rejection ratio	0.02 ppm / VHz

Accuracy, the greater of general and basic values:

General values		
Input type	Absolute accuracy	Temperature coefficient
All	≤ ±0.3% of span*	≤ ±0.01% of span* / °C

Basic values		
Input type	Basic accuracy	Temperature coefficient
Current	1.5 mA	50 µA/ °C
Voltage	1.5 mVAC	50 µVAC /°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
* For custom signals, general accuracy and EMC specifications are 0.3% of full scale

Input specifications:

Current input:
Signal range. . . . . 0...5A AC / 40...400 Hz
Maximum input limit. . . . . 6.00A AC @ 40°C
Programmable measurement ranges . . . . 0...0.5, 0...1, 0...2.5 & 0...5A AC
Custom configurable signal range. 0....5A AC / 40...400 Hz
Min. span . . . . 0.5A AC
Input resistance . . . . Nom. < 0.07 Ω

Voltage input:
Signal range. . . . . 0...300 VAC / 40...400 Hz
Programmable measurement ranges . . . . 0...0.5, 0...1, 0...2.83, 0...5, 0...120, 0...230 &
                                                                      0...300 VAC
Custom configurable signal range. 0...300 VAC / 40...400 Hz
Min. span . . . . 0.5 VAC
Input resistance . . . . Nom. 3 MΩ ∥ 100 pF

Configurable input limits:
Configurable input limits, low:
  VOLT . . . . 0 VAC to 'Minimum selected input'
  CURR. . . . . 0 AAC to 'Minimum selected input'
Configurable input limits, high:
  VOLT . . . . 'Maximum selected input' to 300 VAC
  CURR. . . . . 'Maximum selected input' to 5 AAC
Input limit low/high, error indication levels:
  UP . . . . See table on page 12
  DOWN . . . . See table on page 12
  ZERO. . . . . See table on page 12
  NONE . . . . See table on page 12
Hysteresis. . . . . 0.5% of 'Max. output'
Error detection release delay . . . . < 2.5 s

Current output specifications:

Active unipolar and bipolar mA:
Programmable ranges . . . . 0...20, 4...20, S4...20, ±10 and ±20 mA
                                                                      Direct or Inverted action
V-curve function, 100-0-100% . . . . 20-0-20 mA
Load. . . . . ≤ 800 Ω

Passive 2-wire mA:

Programmable ranges . . . . 0...20 and 4...20 mA
Direct or Inverted action
V-curve function, 100-0-100% . . . . 20-0-20 mA
External 2-wire loop supply . . . . 3.5...30 V

Common specifications current output:

All standard and custom ranges can be selected as Direct or Inverted action.
V-function can be selected for fixed output ranges starting at zero.

Signal range. . . . . 0...23 mA (unipolar) /
-23...+23 mA (bipolar)
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 table on page 12

Voltage output specifications:

All standard and custom ranges can be selected as Direct or Inverted action.
V-function can be selected for fixed output ranges starting at zero.
Programmable ranges. . . . . 0/0.2...1, 0/1...5, 0/2...10, ±1, ±5 and ±10 V
Direct or Inverted action
V-curve function, 100-0-100% . . . . 1-0-1 V, 5-0-5 V and 10-0-10 V
Load, min . . . . > 500 kΩ
Response time, programmable. . . . . 0.0...60.0 s
Output limitation at outside range . . . . See table on page 12

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

Configurable input error indication and input limits
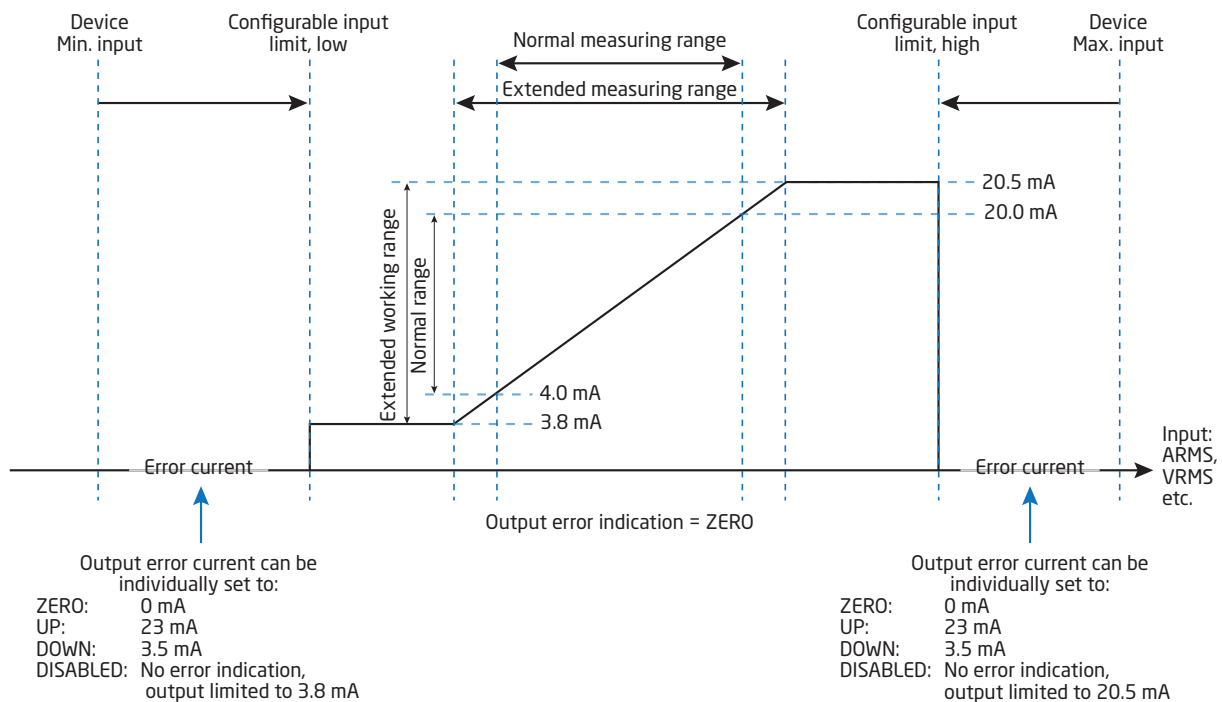
Configurable input error detection

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 table on page 12).

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

Output error current can be individually set to:

ZERO:	0 mA
UP:	23 mA
DOWN:	3.5 mA
DISABLED:	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
DISABLED:	No error indication, output limited to 20.5 mA

Example - input limits disabled:

Output limits and error indications - current output:

| Output span | Input limit check disabled | | Input limit check Low and / or High 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
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	20.5 mA	23 mA	-23 mA	0 mA	No error indication

Output limits and error indications – voltage output:

| Output span | Input limit check disabled | | Input limit check Low and / or High 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...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

SCU-PDM1 or SCU-PDM2 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 table on page 12
VOLT	All	IN.ER	See table on page 12

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 SCU-PDM1 or SCU-PDM2 and SCU-7900	NO.CO	Connection error
Configuration error	CO.ER	Default configuration is loaded
Configuration error	CO.ER	Invalid configuration**
Check that saved configuration in SCU-PDM1 or SCU-PDM2 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 ⊙ᴋ 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

Voltage

Outputs:

Current

2-wire transmitter

Voltage, 1 V

Voltage, 10 V
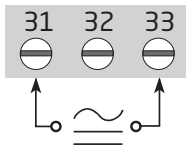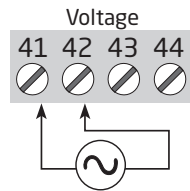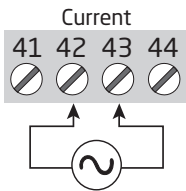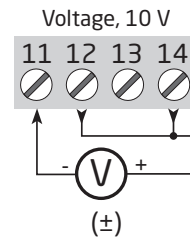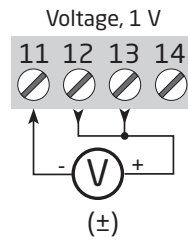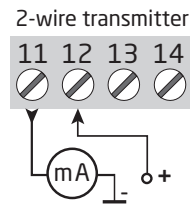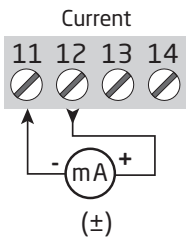
Block diagram
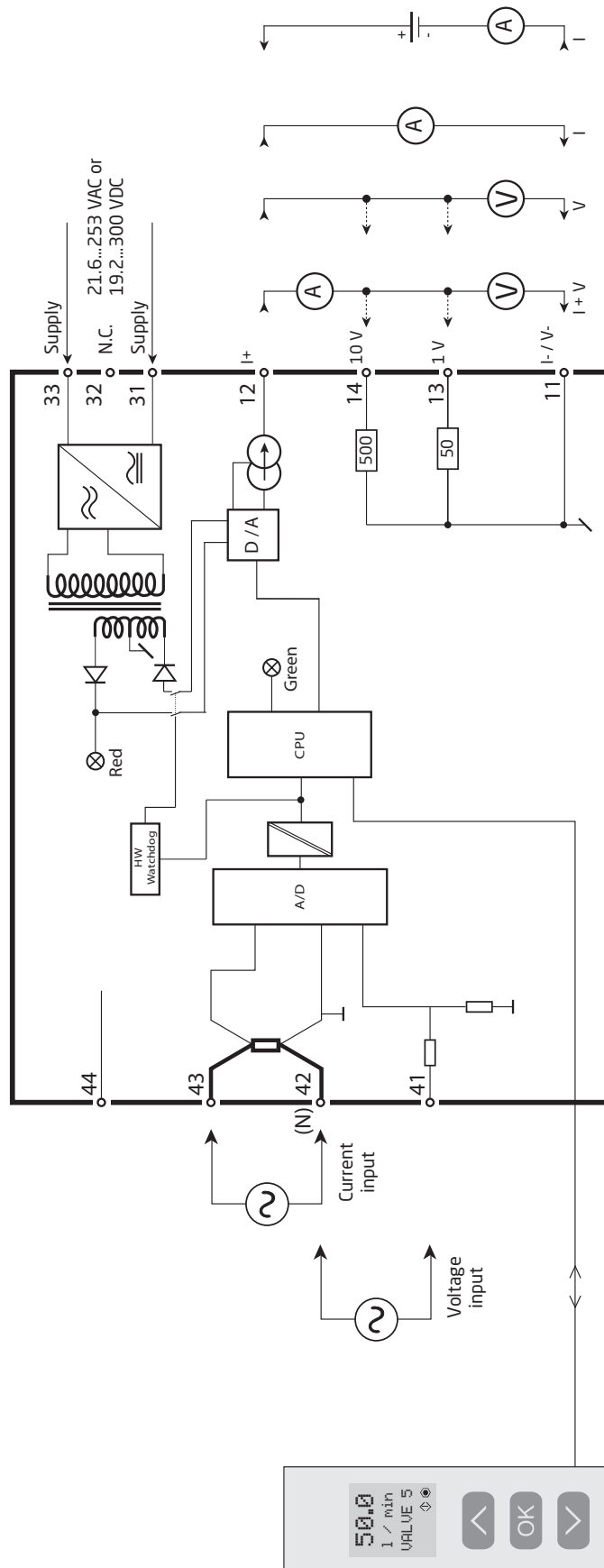
Configuration / operating the function keys

Documentation for routing diagram.

In general

When configuring the SCU-7900, 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
- ⊛   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 ⊛ 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 unauthorized modifications to the configuration.

Signal and sensor error indication via display front SCU-PDM1 or SCU-PDM2

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 SCU-PDM1 or SCU-PDM2.

Signal and sensor 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 loop 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 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 SCU-PDM1 or SCU-PDM2 Then a high signal (not necessarily 100%) is applied and the actual value is entered via 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 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 ⊛ (no time-out).
The simulation function exits automatically, if the SCU-PDM1 or SCU-PDM2 is detached.

Password (PASS): Here you can choose a password between 0000 and 9999 in order to protect the unit against unauthorized 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.

Auto diagnostics

The device performs an advanced auto diagnosis of the internal circuits - check tables on page 13.

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.

Power up

```
40.0
%
10.4 mA
         ∧◉
```
*0

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

```
0000
9999
⌃⌄
0000
PASSW.
Txt 1
```
*1

Correct →

```
NO
YES
⌃⌄
NO
ADV.SET
Txt 2
```

No →

Yes ↓

```
CURR
VOLT
⌃⌄
VOLT
IN TYPE
Txt 3
```

CURR →

VOLT ↓

```
0-5
0-2.5
0-1
0-0.5
CUST
⌃⌄
0-5
I.RANGE
Txt 4
```

```
0-300
0-230
0-120
0-5
0-2.83
0-1
0-0.5
CUST
⌃⌄
0-230
V.RANGE
Txt 5
```

```
300
0.00
⌃⌄
0.00
IN.LO
Txt 48
```
*7 *9

```
300
0.00
⌃⌄
230
IN.HI
Txt 49
```
*7 *8 *9

```
NO
YES
⌃⌄
YES
ADV.SET
Txt 2
```

Continued on the page
Routing diagram ADV.SET

---

*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 is selected!
This menu will change range automatically.

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

*9 Maximum and minimum value selectable from menu must be
based on input type
VOLT: Min: 0.000   Max: 300
CURR: Min: 0.000   Max: 5.00

Menu flow diagram

```
blank
  :                                         -/+20
  :      111.1                              -/+10
  %      11.11                              54-20
 °F      1.111   9999    9999     CURR      4-20      PASS
 °C      1111   -9999   -9999     VOLT      0-20      ACTI
 ⌃⌄      ⌃⌄      ⌃⌄      ⌃⌄        ⌃⌄        ⌃⌄        ⌃⌄
```

UNIT	1.111	0.00	5.000	→OK→	CURR	CURR→	4-20	→OK→	ACTI	→OK→
A RMS	DEC.P	DISP.LO	DISP.HI		ANA.OUT		O.RANGE		OUT.MOD	
Txt 6	Txt 7	Txt 8	Txt 9		Txt 10		Txt 11 *3		Txt 13 *2	

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

VOLT→	0-10	→OK→
	O.RANGE	
	Txt 12 *3	

Selectable UNITS:

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

---

*2 — Menu not displayed if a Bipolar Output Range is selected.

*3 — Direct or Inverted output characteristics must be set in the
ADV setting OFUN menu.
Only ranges starting at zero are available for OFUN = V.FUNC
- refer to *6.

```
            ┌──────┐                          ┌──────┐                          ┌──────┐
            │ UP   │                          │ UP   │                          │      │
  ┌──────┐  │ ZERO │              ┌──────┐    │ ZERO │              ┌──────┐     │      │
  │ YES  │  │ DOWN │    ┌──────┐  │ YES  │    │ DOWN │    ┌──────┐  │ 60.0 │     │      │
  │ NO   │  │ NONE │    │ 300  │  │ NO   │    │ NONE │    │ 0.0  │  │ 0.0  │
  └──────┘  └──────┘    │ 230  │  └──────┘    └──────┘
   ⌃ ⌄       ⌃ ⌄        └──────┘   ⌃ ⌄         ⌃ ⌄        ⌃ ⌄
```

YES		0.00	UP		YES		230	UP		60.0		

```
┌─────────┐      ┌──────┬──────┐      ┌─────────┐      ┌──────┬──────┐      ┌──────┐
│   NO    │ (OK) │ 0.00 │  UP  │ (OK) │   YES   │ (OK) │ 230  │  UP  │ (OK) │ 0.0  │ (OK) ─→ ( To default state )
│ ILIM.L  │      │ VRMS │OUT.ERR│     │ ILIM.H  │      │ VRMS │OUT.ERR│     │ RESP.│           (     1.0        )
│ Txt 50  │      │ Txt51│ Txt54│      │ Txt 52  │      │ Txt53│ Txt54│      │Txt 15│
└─────────┘      └──────┴──────┘      └─────────┘      └──────┴──────┘      └──────┘
      NO ┄┄┄┄┄ *15 ┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄          NO ┄┄┄┄┄ *16 ┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄┄
```
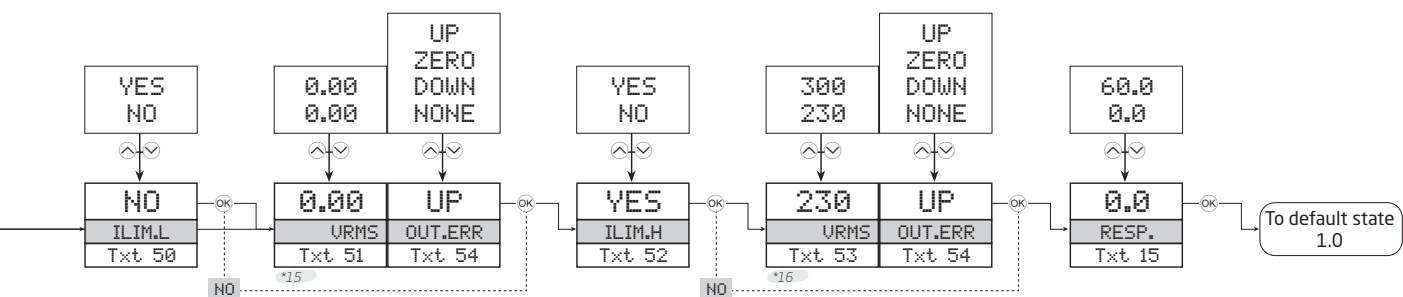
*15 Limits are dependent on input type and the selected input range:
High limit: 'Minimum input'
Low limit, CURR: 0A AC
Low limit, VOLT: 0 VAC

*16 Limits are dependent on input type and the selected input range:
Low limit: 'Maximum input'
High limit, CURR: 5.00A AC
High limit, VOLT: 300 VAC

Routing diagram, advanced settings (ADV.SET)

```
MEM, DISP,
CAL, SIM,
PASS, LANG,
OFUN
  ⌃⌄
```

```
SAVE
LOAD
 ⌃⌄
```

```
┌─────────┐      ┌─────────┐
│  MEM    │ OK   │  SAVE   │ OK
│ SETUP   │─────▶│ MEMORY  │──────────────────────────────────────────▶
│ Txt 15/1│      │ Txt 16  │
└─────────┘      └─────────┘
```

```
   9        9        9       TAG
   0        0        A       A.OUT
  ⌃⌄       ⌃⌄       ⌃⌄       ⌃⌄
```

```
┌─────────┐    ┌─────────┐   ┌─────────┐   ┌─────────┐   ┌─────────┐
│  DISP   │ OK │   3     │OK │   9     │OK │         │OK │ A.OUT   │ OK
│ SETUP   │───▶│ CONTRA  │──▶│ LIGHT   │──▶│ TAGNO_  │──▶│ LINE 3  │────────▶
│ Txt 15/2│    │ Txt 17  │   │ Txt 18  │   │ Txt 19  │   │ Txt 20  │
└─────────┘    └─────────┘   └─────────┘   └─────────┘   └─────────┘
```

```
  YES      5.000     YES      5.000     YES
  NO       0.000     NO       0.000     NO
 ⌃⌄       ⌃⌄        ⌃⌄       ⌃⌄        ⌃⌄
```

```
┌─────────┐   ┌─────────┐   ┌─────────┐   ┌─────────┐   ┌─────────┐   ┌─────────┐
│  CAL    │OK │   NO    │OK │  0.000  │OK │   NO    │OK │  5.000  │OK │   NO    │OK
│ SETUP   │──▶│ CAL.LO  │──▶│ A RMS   │──▶│ CAL.HI  │──▶│ A RMS   │──▶│ USE.CAL │──▶
│ Txt 15/3│   │ Txt 21  │   │ Txt 22  │   │ Txt 23  │   │ Txt 24  │   │ Txt 25  │
└─────────┘   └─────────┘   └─────────┘   └─────────┘   └─────────┘   └─────────┘
               NO ·········· *5            NO ·········· *5
```

```
  YES      5.000
  NO       0.000
 ⌃⌄       ⌃⌄
```

```
┌─────────┐   ┌─────────┐   ┌─────────┐
│  SIM    │OK │   NO    │OK │  2.500  │OK
│ SETUP   │──▶│ ENA.SIM │──▶│ A RMS   │─────▶
│ Txt 15/4│   │ Txt 26  │   │ Txt 27  │
└─────────┘   └─────────┘   └─────────┘
               NO ·········· *5
```

In the submenu simulation (SIM) you must press OK or remove the SCU-PDM1 or SCU-PDM2 to return to the default state 1.0.

```
  YES      9999
  NO       0
 ⌃⌄       ⌃⌄
```

```
┌─────────┐   ┌─────────┐   ┌─────────┐
│  PASS   │OK │   NO    │OK │   0     │OK
│ SETUP   │──▶│ EN.PASS │──▶│ NEW.PAS │─────▶
│ Txt 15/5│   │ Txt 28  │   │ Txt 29  │
└─────────┘   └─────────┘   └─────────┘
               NO ··········
```

```
DE, DK, ES, FR,
IT, SE, UK
  ⌃⌄
```

```
┌─────────┐   ┌─────────┐
│  LANG   │OK │   UK    │OK
│ SETUP   │──▶│ LANGUA. │──────────────────────▶
│ Txt 15/6│   │ Txt 30  │
└─────────┘   └─────────┘
```

```
VFUN
INV
DIR
 ⌃⌄
```

```
┌─────────┐   ┌─────────┐
│  OFUN   │OK │   DIR   │OK
│ SETUP   │──▶│ O.FUNC  │─────────────▶
│ Txt 15/7│   │ Txt 31  │
└─────────┘   └─────────┘
                *6
```

```
To default state
1.0
```

---

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

*6 VFUN (V-shaped output function) is only available when a fixed output range starting at zero is selecected. DIR (direct) and INV (inverted) output can be combined with all fixed or CUST output ranges.

Help text overview

[1]   Set correct password
[2]   Enter advanced setup menu?
[3]   Select current input
      Select voltage input
[4]   Select 0...5 A input range
      Select 0...2.5 A input range
      Select 0...1 A input range
      Select 0...0.5 A input range
      Select custom current input range
[5]   Select 0...230 V input range
      Select 0...120 V input range
      Select 0...2.83 V input range
      Select 0...1 V input range
      Select 0...0.5 V 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 0...20 mA output range
      Select 4...20 mA output range
      Select 4...20 mA with safety readback
      Select -10...10 mA output range
      Select -20...20 mA output range
[12] Select 0.0...1 V output range
      Select 0.2...1 V output range
      Select 0...5V output range
      Select 1...5V output range
      Select 0...10V output range
      Select 2...10V output range
      Select -1...1 V output range
      Select -5...5 V output range
      Select -10..10 V output range
[13] Select active output mode
      Select passive output mode
[14] Set Analog output response time in seconds
[15] Select Analog Output Function
      Enter Language setup
      Enter Password setup
      Enter Simulation mode
      Perform Process calibration
      Enter Display setup
      Perform Memory operations
[16] Load saved configuration into module
      Save configuration in display front
[17] Adjust LCD contrast
[18] Adjust LCD backlight
[19] Write a 6-character device TAG
[20] Analog output value is shown in display line 3
      Device TAG is shown in display line 3
[21] Calibrate Input low to process value?
[22] Set value for low calibration point
[23] Calibrate Input high to process value?
[24] Set value for high calibration point
[25] Use process calibration values?
[26] Enable simulation mode?

[27] Set the input simulation value
[28] Enable password protection?
[29] Set new password
[30] Select language
[31] Select direct output mode
      Select inverted output mode
      Select V-function output mode
[32] Display underrange
[33] Display overrange
[34] Input underrange
[35] Input overrange
[36] Analog output supply error
[37] Analog output error - check output connections and reset power
[38] Configuration error - default configuration is loaded
[39] RAM memory error
[40] Invalid configuration
[41] A/D converter error
[42] 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] Enable configurable input limit, low
[51] Set configurable input limit, low
[52] Enable configurable input limit, high
[53] Set configurable input limit, high
[54] Select downscale at error
      Select zero output at error
      Select upscale at error
      Select no error action - output undefined at error