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User's Guide



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DRST-UN Universal Transmitter



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Table of Contents

Section	Page
Section 1 Warning	5
Section 2 Instructions	6
2.1 Definitions	6
2.2 Receipt and Unpacking	5
2.3 Environment	6
2.4 Mounting.....	6
2.5 UL Installation Requirements	7
2.6 Calibration and Adjustment	7
2.7 Normal Operation	7
2.8 Cleaning	7
2.9 Liability	7
Section 3 Demounting	8
3.1 How to demount DRST-UN	8
Section 4 Characteristics	9
4.1 Universal Transmitter DRST-UN	9
4.2 Advanced Features	9
4.3 Application	9
4.4 Technical characteristics	9
Section 5 Display and Programming front	10
5.1 Functionality	10
5.2 Application	10
5.3 Technical characteristics	10
Section 6 Mounting and Demounting	11
6.1 Mounting and Installation	11
6.2 Mounting / demounting the DRSL-DISPLAY	11
6.3 Demounting of DRSL-DISPLAY	11
Section 7 Applications	12
7.1 Inputs Signals	12
7.2 Output Signals	12
7.3 Supply	12
Section 8 Specifications	13
8.1 Order codes	13
8.2 Electrical Specifications	13-14
8.3 TC Input	15-18

Table of Contents

Section	Page
Section 9 Diagrams	19
9.1 Connections	19
9.2 Block Diagram	20
9.3 Routing Diagram	21
9.4 Routing Diagram Advanced Settings	22
Section 10 Configuration / Operation	23
10.1 General	23
10.2 Password Protection	23
10.3 Signal and sensor error info (Display front DRSL-DISPLAY)	23
10.4 Signal and sensor error info (no display)	24
10.5 Advanced Functions	24
10.6 Display setup	24
10.7 Two-point process calibration	24
10.8 Process simulation function	25
10.9 Password	25
10.10 Language	25
10.11 Auto diagnosis	26
10.12 Selection of units	26
10.13 Safety readback	26
10.14 CJC	27
10.15 Memory	27



GENERAL

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 manual 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 manual 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.

HAZARDOUS
VOLTAGE**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.



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



INSTALLATION

WARNING

DRST-UN must be mounted on a DIN rail according to DIN 46277.

**WARNING**

Do not open the front plate of the module as this will cause damage to the connector for the display / programming front DRSL-DISPLAY.
This module contains no DIP-switches or jumpers.

1.2 - Symbol Identification

Triangle with an exclamation mark: Warning / demand.
Potentially lethal situations.



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.

Section 2 - Instructions

2.1 - 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 troubleshoot 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.

2.2 - Receipt and Unpacking

Unpack the module without damaging it. The packing should always follow the module until this has been permanently mounted.

Check at the receipt of the module whether the type corresponds to the one ordered.

2.3 - Environment

Avoid direct sunlight, dust, high temperatures, mechanical vibrations and shock, as well as rain and heavy moisture. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation.

All devices fall under Installation Category II, Pollution Degree 1, and Insulation Class II.

2.4 - 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, 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.

Section 2.5 - 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 - E231911

Section 2.6 - 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.

Section 2.7 - 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.

Section 2.8 - Cleaning

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

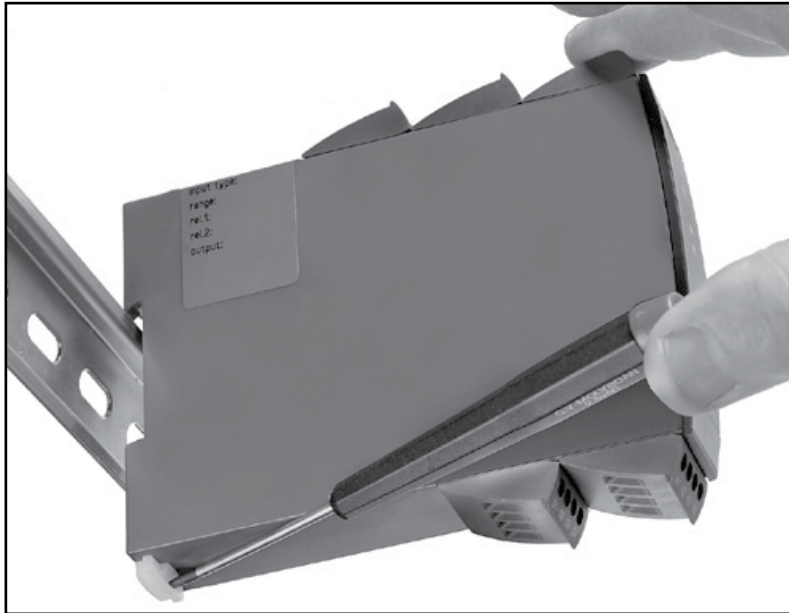
Section 2.9 - Liability

To the extent that 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.

Section 3.1 - How to demount DRST-UN

First, remember to demount the connectors with hazardous voltages.

Picture 1: Detach the device from the DIN rail by lifting the bottom lock.



When front LED lights red / display shows AO.ER

PR DRST-UN is designed as a SIL 2 device with a high safety level. Therefore, a continuous measurement of the outgoing current is carried out on a 4...20 mA and 20...4 mA output signal. If the current output signal is different from the internal calculated output value or the current output is 0 (due to e.g. an open circuit breakage), an error mode switches on the red front LED.

This function is not a default option but must be actively selected via the programming menu (S4-20 & S20-4).

The error mode can only be reset by switching off and then switching on the supply voltage to the device.

Section 4.1 - Universal Transmitter DRST-UN

- Input for RTD, TC, Ohm, potentiometer, mA and V
- 2-wire supply > 16 V
- Output for current and voltage
- Universal AC or DC supply

4.2 - Advanced Features

Programmable by way of detachable display front DRSL-DISPLAY, process calibration, signal simulation, password protection, error diagnostics and help text available in several languages.

4.3 - Application

- Linearised, electronic temperature measurement with RTD or TC sensor.
- Conversion of linear resistance variation to a standard analogue current / voltage signal, i.e. from solenoids and butterfly valves or linear movements with attached potentiometer.
- Power supply and signal isolator for 2-wire transmitters.
- Process control with standard analogue output.
- Galvanic separation of analogue signals and measurement of floating signals.
- The DRST-UN is designed according to strict safety requirements and is thus suitable for application in SIL 2 installations.

4.4 - Technical characteristics

- When DRST-UN is used in combination with the DRSL-DISPLAY display / programming front, all operational parameters can be modified to suit any application. As the DRST-UN is designed with electronic hardware switches, it is not necessary to open the device for setting of DIP-switches.
- A green / red front LED indicates normal operation and malfunction.
- Continuous check of vital stored data for safety reasons.
- 3-port 2.3 kVAC galvanic isolation.

Section 5.1 - Functionality

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".

5.2 - Application

- Communications interface for modification of operational parameters in DRST-UN.
- Can be moved from one DRST-UN device to another and download the configuration of the first transmitter to subsequent transmitters.
- Fixed display for readout of process data and status.

5.3 - Technical characteristics

- LCD display with 4 lines; Line 1 (H=5.57 mm) shows input signal, line 2 (H=3.33 mm) shows units, line 3 (H=3.33 mm) shows analogue output or tag no. and line 4 shows communication status.
- Programming access can be blocked by assigning a password. The password is saved in the transmitter in order to ensure a high degree of protection against unauthorised modifications to the configuration.



Section 6.1 - Mounting and Installation

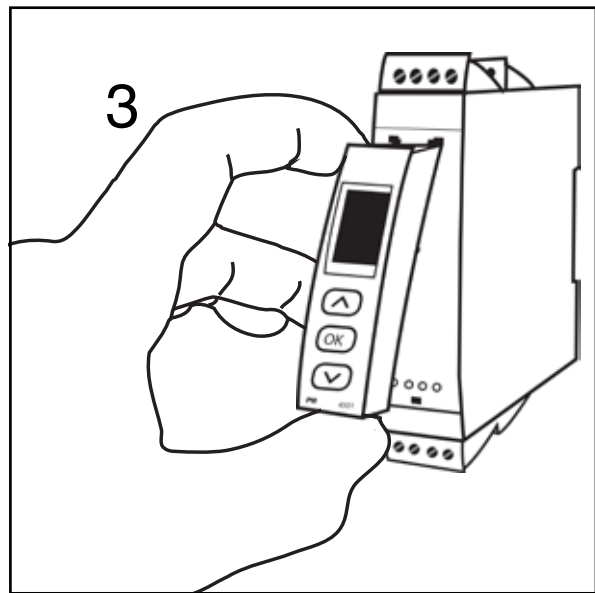
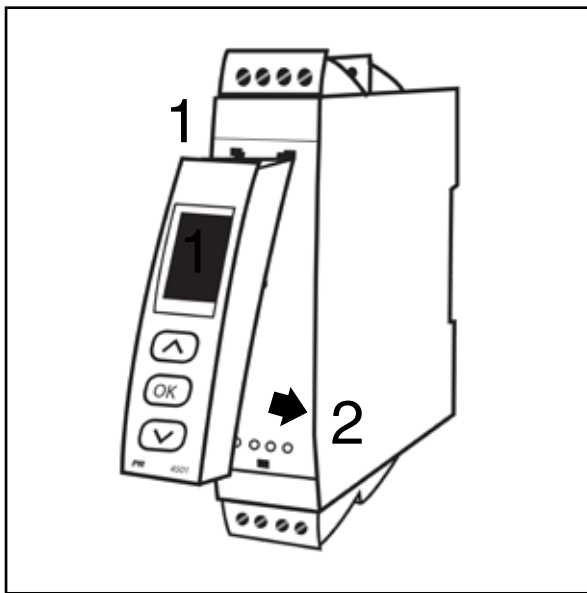
- Click DRSL-DISPLAY onto the front of DRST-UN.

Section 6.2 - Mounting/Demounting the DRSL-DISPLAY

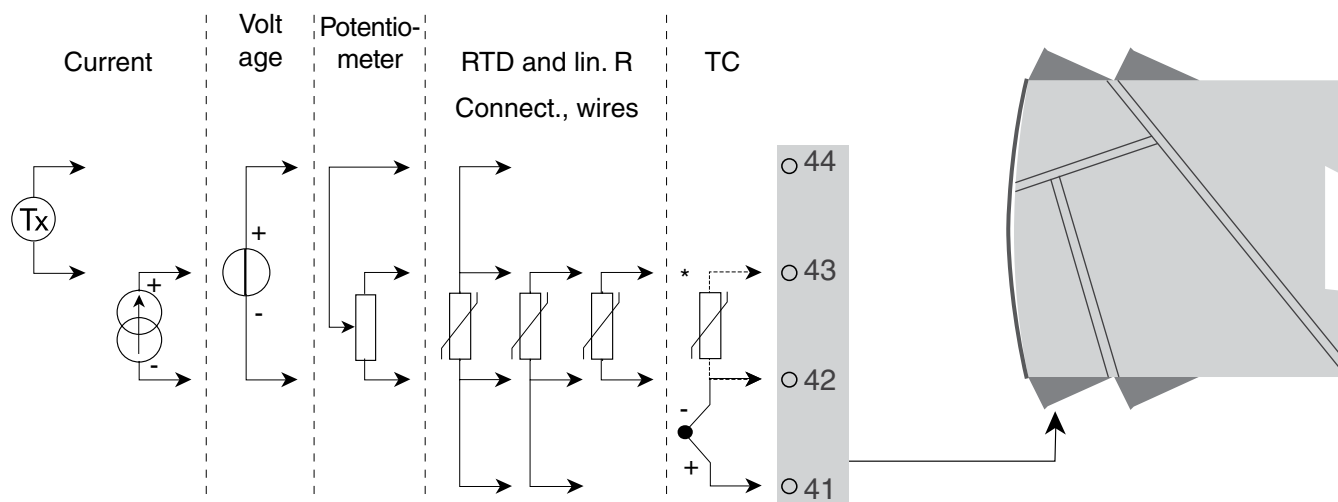
- 1: Insert the tabs of DRSL-DISPLAY into the holes at the top of the device.
- 2: Swing DRSL-DISPLAY into place.

Section 6.3 - Demounting of DRSL-DISPLAY

- 3: Push the release button on the bottom of DRSL-DISPLAY and swing DRSL-DISPLAY up.

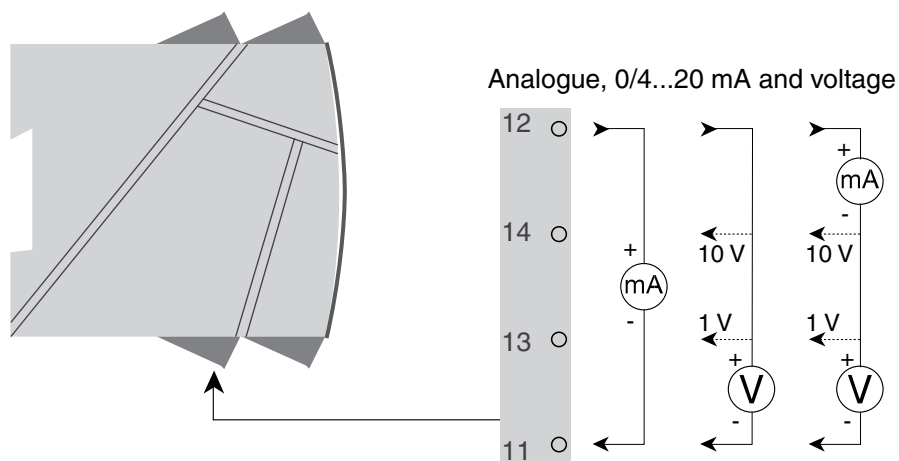


Section - 7.1 - Inputs Signals

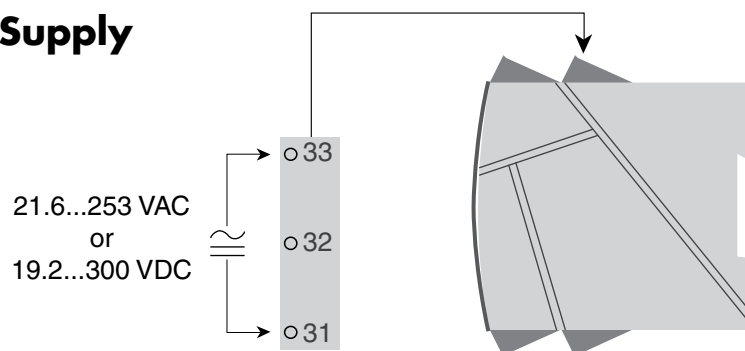


Order separately: 5910 CJC connector.
See the connection drawing on page 15.

Section - 7.2 - Output Signals



Section - 7.3 - Supply



Section - 8.1 - Order Codes

DRST-UN = Universal transmitter

DRSL-DISPLAY = Display / programming front

5910 = CJC connector

Section - 8.2 - Electrical Specifications

Environmental conditions

Specifications range -20°C to +60°C

Calibration temperature..... 20...28°C

Relative humidity..... < 95% RH (non-cond.)

Protection degree IP20

Mechanical specifications

Dimensions (HxBxD) 109 x 23.5 x 104 mm

Dimensions, with DRSL-DISPLAY / DRST-CM (H x B x D), 109 x 23.5 x 116 / 131 mm

Weight..... 145 g

Weight with DRSL-DISPLAY / DRST-CM 160 g / 245 g

Max. wire size..... 1 x 2.5 mm² stranded wire

Screw terminal torque 0.5 Nm

Vibration..... IEC 60068-2-6 : 2007

2...13.2 Hz..... ±1 mm

13.2...100 Hz..... ±0.7 g

Common specifications

Supply voltage, universal .. 21.6...253 VAC, 50...60 Hz or
19.2...300 VDC

Max. consumption ≤ 2.0 W

Fuse 400 mA SB / 250 VAC

Isolation voltage, test / operation 2.3 kVAC / 250 VAC

Communications interface. Communication enabler DRST-CM
Programming front DRSL-DISPLAY

Signal / noise ratio..... Min. 60 dB (0...100 kHz)

Response time (0...90%, 100...10%):

Temperature input ≤ 1 s

mA / V input ≤ 400 ms

Accuracy, the greater of the general and basic values:

General values		
Input type	Absolute accuracy	Temperature coefficient
All	≤ ±0.1% of span	≤ ±0.01% of span / °C

Basic values		
Input type	Basic accuracy	Temperature coefficient
mA	$\leq \pm 4 \mu\text{A}$	$\leq \pm 0.4 \mu\text{A} / ^\circ\text{C}$
Volt	$\leq \pm 20 \mu\text{V}$	$\leq \pm 2 \mu\text{V} / ^\circ\text{C}$
Pt100	$\leq \pm 0.2^\circ\text{C}$	$\leq \pm 0.01^\circ\text{C} / ^\circ\text{C}$
Linear resistance	$\leq \pm 0.1 \Omega$	$\leq \pm 0.01 \Omega / ^\circ\text{C}$
Potentiometer	$\leq \pm 0.1 \Omega$	$\leq \pm 0.01 \Omega / ^\circ\text{C}$
TC type: E, J, K, L, N, T, U	$\leq \pm 1^\circ\text{C}$	$\leq \pm 0.05^\circ\text{C} / ^\circ\text{C}$
TC type: R, S, W3, W5, LR	$\leq \pm 2^\circ\text{C}$	$\leq \pm 0.2^\circ\text{C} / ^\circ\text{C}$
TC type: B 85...200°C	$\leq \pm 4^\circ\text{C}$	$\leq \pm 0.4^\circ\text{C} / ^\circ\text{C}$
TC type: B 200...1820°C	$\leq \pm 2^\circ\text{C}$	$\leq \pm 0.2^\circ\text{C} / ^\circ\text{C}$

EMC immunity influence.....< $\pm 0.5\%$ of span Extended EMC immunity: NAMUR NE 21, A criterion, burst.....< $\pm 1\%$ of span

Auxiliary supplies:

2-wire supply (terminal 44...43) 25...16 VDC / 0...20 mA

RTD, linear resistance and potentiometer input

Input for RTD types:

Pt10, Pt20, Pt50, Pt100, Pt200, Pt250, Pt300, Pt400, Pt500, Pt1000

Ni50, Ni100, Ni120, Ni1000, Cu10, Cu20, Cu50, Cu100

Input type	Min. value	Max. value	Standard
Pt10...Pt1000	-200°C	+850°C	IEC 60751
Ni50...Ni1000	-60°C	+250°C	DIN 43760
Cu10...Cu100	-200°C	+260°C	$\alpha = 0,00427$
Lin. R	0 Ω	10000 Ω	-
Potentiometer	10 Ω	100 k Ω	-

Cable resistance per wire (max.), RTD..... 50 Ω

Sensor current, RTD..... Nom. 0.2 mA

Effect of sensor cable resistance

(3- / 4-wire), RTD..... < 0.002 Ω / Ω

Sensor error detection, RTD Yes

Short circuit detection, RTD < 15 Ω

Section 8.3 - TC input

Type	Min. value	Max. value	Standard
B	0°C	+1820°C	IEC 60584-1
E	-100°C	+1000°C	IEC 60584-1
J	-100°C	+1200°C	IEC 60584-1
K	-180°C	+1372°C	IEC 60584-1
L	-200°C	+900°C	DIN 43710
N	-180°C	+1300°C	IEC 60584-1
R	-50°C	+1760°C	IEC 60584-1
S	-50°C	+1760°C	IEC 60584-1
T	-200°C	+400°C	IEC 60584-1
U	-200°C	+600°C	DIN 43710
W3	0°C	+2300°C	ASTM E988-90
W5	0°C	+2300°C	ASTM E988-90
LR	-200°C	+800°C	GOST 3044-84

Cold junction compensation (CJC)	
via external sensor in connector 5910	20...28°C ≤ ±1°C
-20...20°C /	
28...70°C ≤ ±2°C	
via internal CJC sensor	±(2.0°C + 0.4°C * Δt)
Δt = internal temperature - ambient temperature	
Sensor error detection, all TC types	Yes
Sensor error current:	
when detecting.....	Nom. 2 μA
else	0 μA
Current input	
Measurement range	0...20 mA
Programmable measurement ranges	0...20 and 4...20 mA
Input resistance	Nom. 20 Ω + PTC 50 Ω
Sensor error detection:	
Loop break 4...20 mA	Yes
Voltage input	
Measurement range	0...12 VDC
Programmable measurement ranges	0...1 / 0.2...1 / 0...5 / 1...5 /
0...10 and 2...10 VDC	
Input resistance	Nom. 10 MΩ
Current output	
Signal range (span)	0...20 mA
Programmable signal ranges	0...20 / 4...20 / 20...0 / 20...4 mA
Load (max.)	20 mA / 800 Ω / 16 VDC
Load stability	≤ 0.01% of span / 100 Ω
Sensor error detection.....	0 / 3.5 / 23 mA / none
NAMUR NE 43 Upscale / Downscale	23 mA / 3.5 mA
Output limitation:	
on 4...20 and 20...4 mA signals	3.8...20.5 mA
on 0...20 and 20...0 mA signals	0...20.5 mA
Current limit	≤ 28 mA
Voltage output	
Signal range.....	0...10 VDC
Programmable signal ranges	0...1 / 0.2...1 / 0...10 / 0...5 / 1...5 /
2...10 / 1...0 / 1...0.2 / 5...0 / 5...1 /	
10...0 and 10...2 V	
Load (min.).....	500 kΩ
Ex / I.S. approval	
FM, applicable in.....	Class I, Div. 2, Group A, B, C, D
Class I, Div. 2, Group IIC	
Zone 2	
Max. ambient temperature for T5	60°C
Marine approval:	
Det Norske Veritas, Ships & Offshore	Standard for Certification No. 2.4

Observed authority requirements Standard
 EMC 2004/108/EC EN 61326-1
 LVD 2006/95/EC EN 61010-1
 UL, Standard for Safety UL 508
 EAC TR-CU 020/2011 EN 61326-1

of span = of the currently selected measurement range

Display readout on the DRSL-DISPLAY of sensor error detection and input signal outside range

Sensor error check:		
Device:	Configuration	Sensor error detection:
DRST-UN	OUT.ERR=NONE.	OFF
	Else:	ON

Outside range readout (IN.LO, IN.HI): If the valid range of the A/D converter or the polynomial is exceeded			
Input	Range	Readout	Limit
VOLT	0...1 V / 0.2...1 V	IN.LO	< -25 mV
		IN.HI	> 1.2 V
	0...10 V / 2...10 V	IN.LO	< -25 mV
		IN.HI	> 12 V
CURR	0...20 mA / 4...20 mA	IN.LO	< -1.05 mA
		IN.HI	> 25.05 mA
LIN.R	0...800 Ω	IN.LO	< 0 Ω
		IN.HI	> 1075 Ω
	0...10 k Ω	IN.LO	< 0 Ω
		IN.HI	< 110 k Ω
POTM	-	IN.LO	< -0.5 %
		IN.HI	> 100.5 %
TEMP	TC / RTD	IN.LO	< temperature range -2°C
		IN.HI	> temperature range +2°C

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

Sensor error detection limits

Sensor error detection (SE.BR, SE.SH):			
Input	Range	Readout	Limit
CURR	Loop break (4...20 mA)	SE.BR	$\leq 3.6 \text{ mA}$; $\geq 21 \text{ mA}$
POTM	All, SE.BR on all 3-wire	SE.BR	$> \text{ca. } 126 \text{ k}\Omega$
LIN.R	0...800 Ω	SE.BR	$> \text{ca. } 875 \text{ }\Omega$
	0...10 k Ω	SE.BR	$> \text{ca. } 11 \text{ k}\Omega$
TEMP	TC	SE.BR	$> \text{ca. } 750 \text{ k}\Omega / (1.25 \text{ V})$
	RTD, 2-, 3-, and 4-wire	SE.BR	$> \text{ca. } 15 \text{ k}\Omega$
	No SE.SH for Cuxx, Pt10, Pt20 and Pt50	SE.SH	$< \text{ca. } 15 \text{ }\Omega$

Error indications

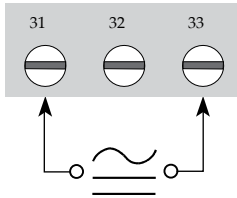
Readout at hardware error		
Error search	Readout	Error cause
Test of internal CJC sensor	CJ.ER	CJC sensor defect or temperature outside range
Checksum test of the configuration in FLASH	FL.ER	Error in FLASH
Check measurement of analogue output current	AO.ER	1) No load on the current output (only S4...20/S20...4 mA)
Communications test DRSL-DISPLAY/DRST-UN	NO.CO	Connection error
Check that input signal matches input configuration	IN.ER	1) Error levels on input
Check that saved configuration in DRSL-DISPLAY/ matches device	TY.ER	Configuration is not DRST-UN

! Error indications in the display flash once per second. The help text explains the error.

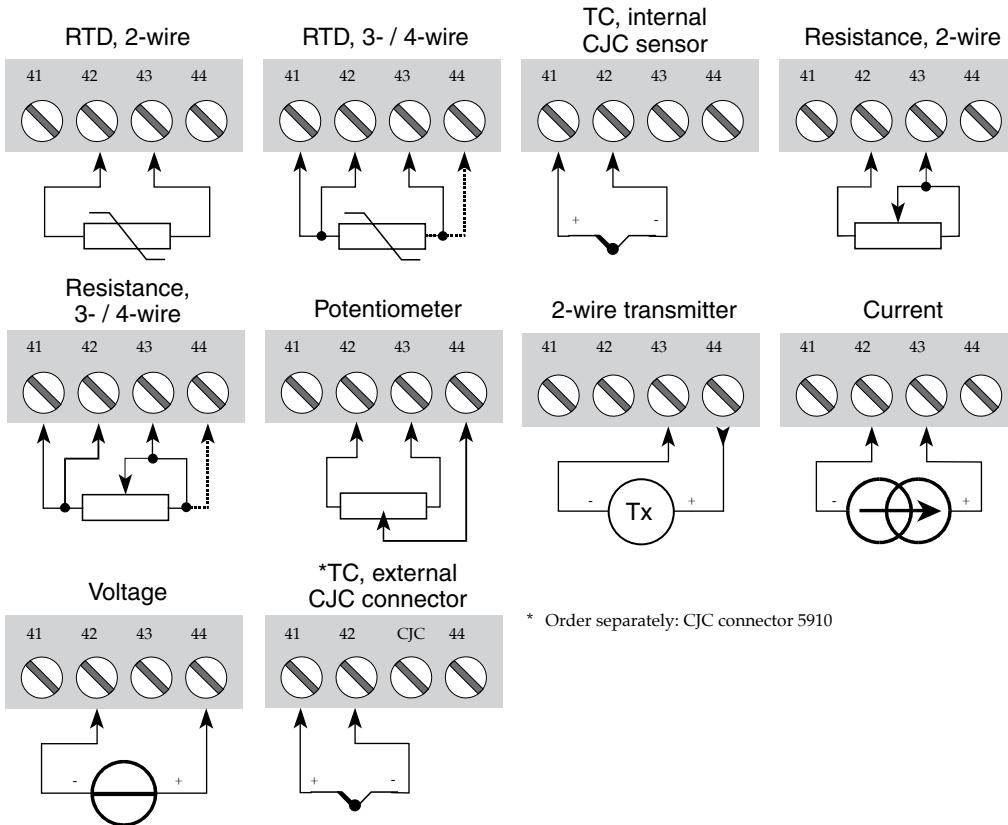
1) The error is reset by switching off and then switching on the supply voltage to the device.

Section 9.1 - Connections

Supply:

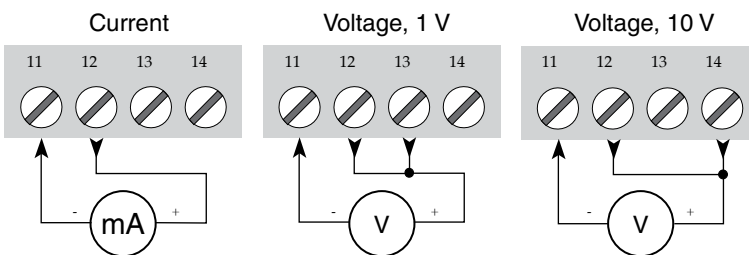


Inputs



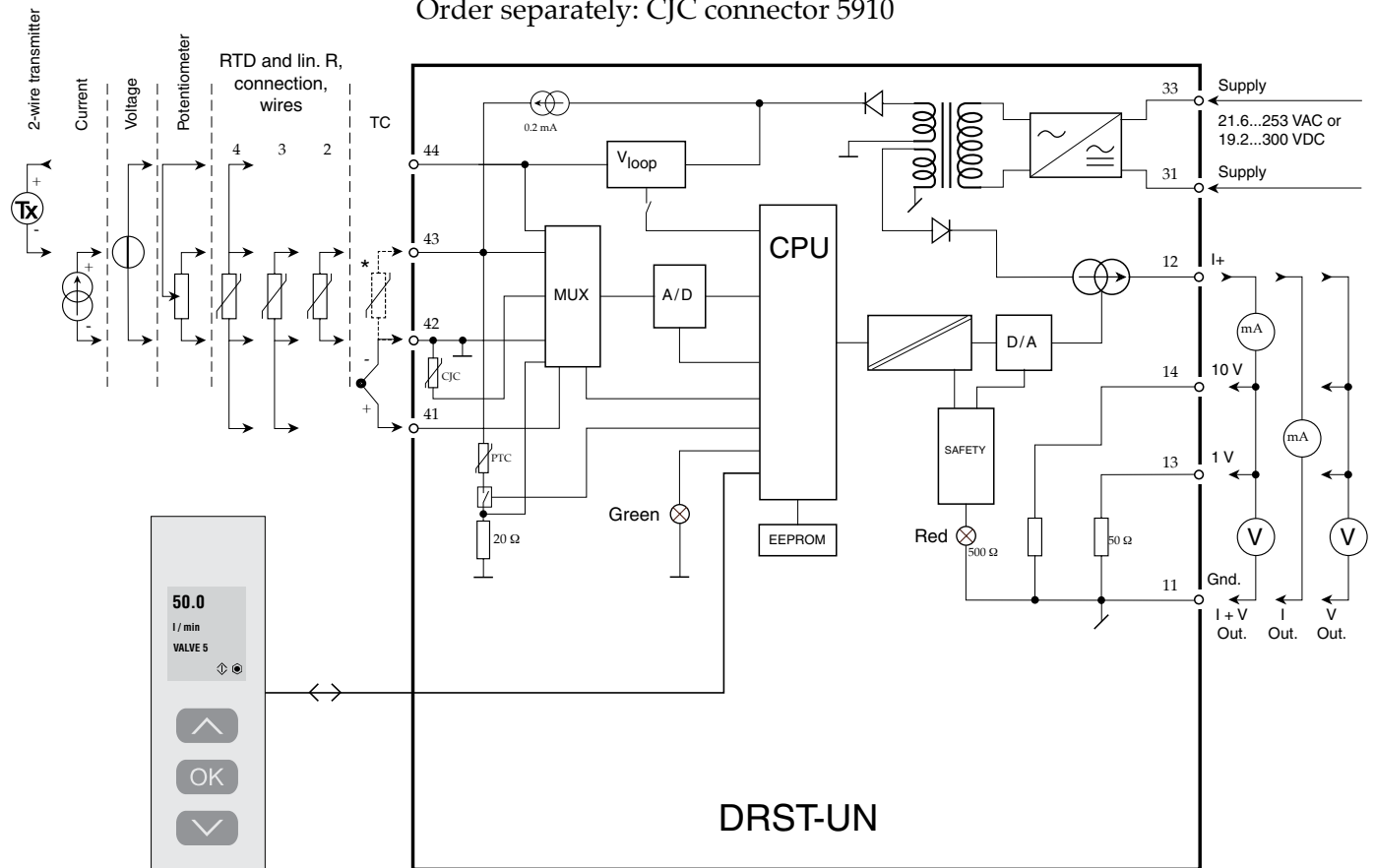
* Order separately: CJC connector 5910

Outputs



Section 9.2 - Block Diagram

Order separately: CJC connector 5910



Section 9.3 - Routing Diagram

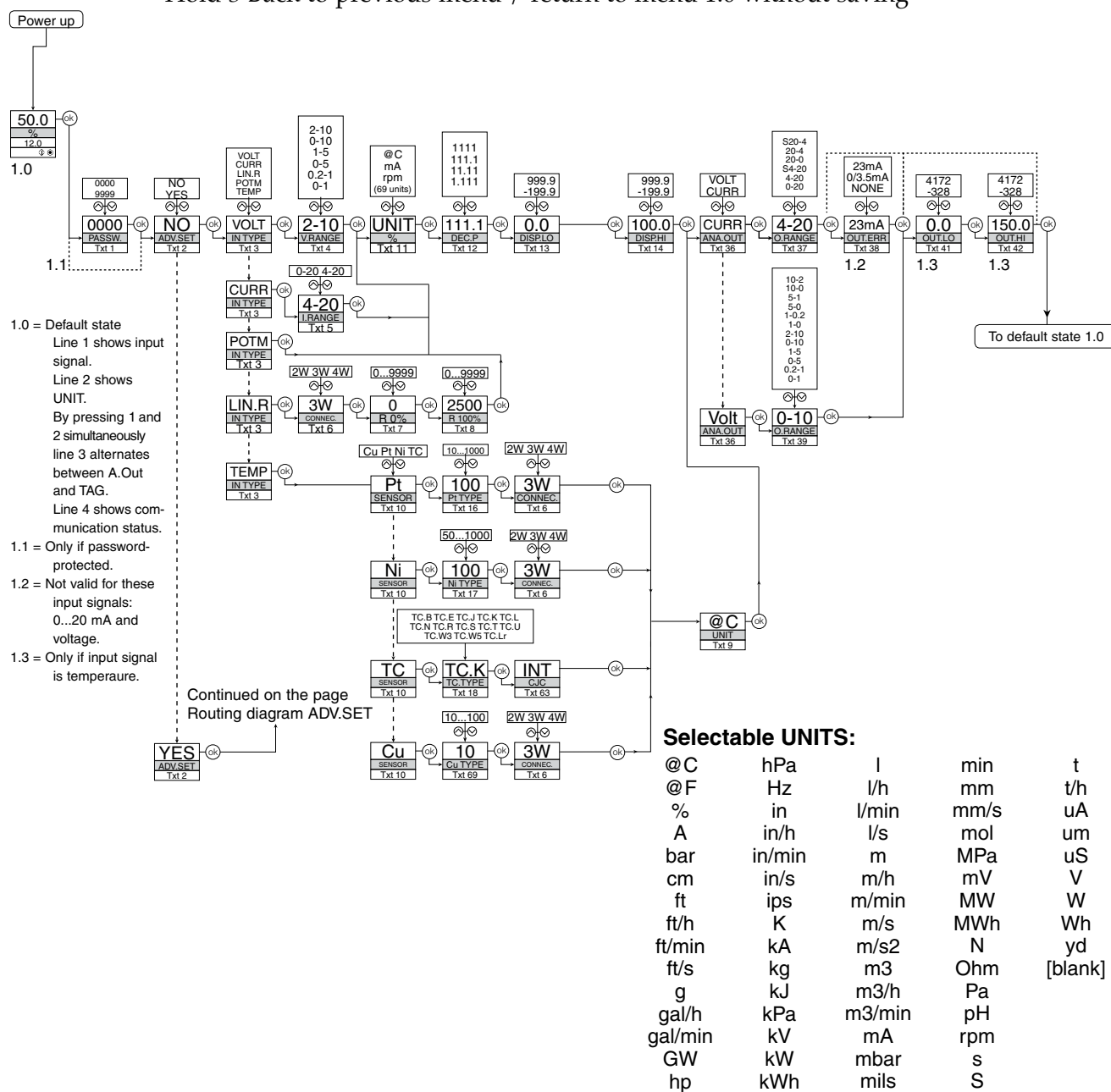
If no key is activated for 1 minute, the display will return to the default state 1.0 without saving configuration changes.

1 Increase value / choose next parameter

2 Decrease value / choose previous parameter

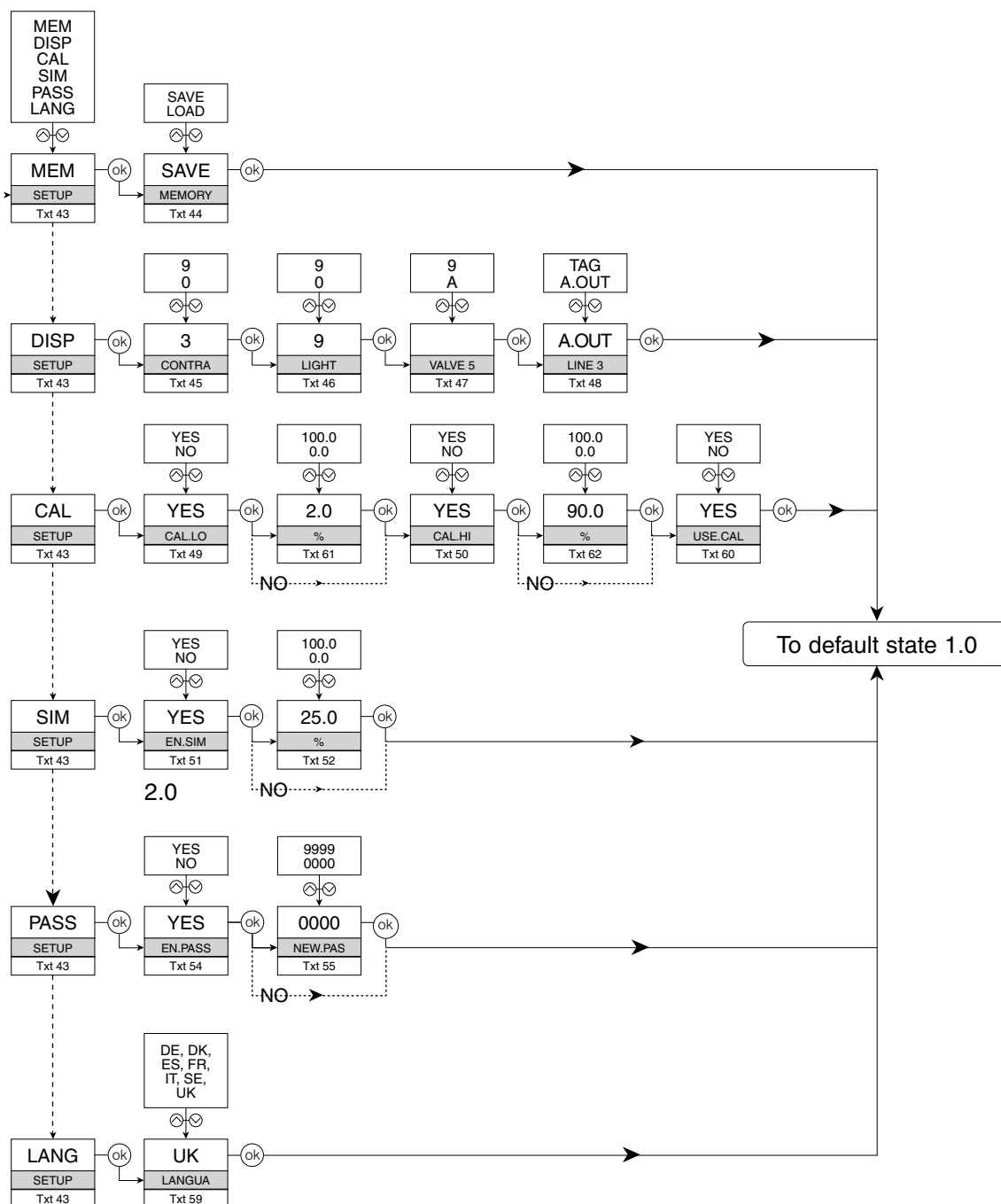
3 Accept the chosen value and proceed to the next menu

Hold 3 Back to previous menu / return to menu 1.0 without saving



Section 9.4 - Routing Diagram Advanced Settings

2.0 In the submenu simulation (SIM) you must press 3 to return to the default state 1.0.



Section 10.1 - General

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 using 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 accept 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.

Section 10.2 - Password protection

mitter in order to ensure a high degree of protection against unauthorised modifications to the configuration. Default password 2008 allows acces to all configuration menus

Section 10.3 - Signal and sensor error info (Display front DRSL-DISPLAY)

Sensor error (see limits in the table) is displayed as SE.BR (sensor break) or SE.SH (sensor short). Signals outside the selected range (not sensor error, see table for limits) are displayed as IN.LO indicating low input signal or IN.HI indicating high input signal. The error indication is displayed in line 3 as text and at the same time the backlight flashes. Line 4 of the display is a status line which displays COM (flashing bullet) indicating correct functioning of DRSL-DISPLAY, and arrow up/down which indicates tendency readout of the input signal.

Section 10.4 - Signal and sensor error info (no display)

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 sensor error.

Steady green LED indicates internal error.

Steady red LED indicates fatal error.

Section 10.5 - Advanced Functions

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


Section 10.6 - Display setup

Here you can adjust the brightness contrast and the backlight. Setup of TAG number with 6 alphanumerics. Selection of functional readout in line 3 of the display - choose between readout of analogue output or TAG number.

Section 10.7 - Two-point process calibration

The unit 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 DRSL-DISPLAY. Then a high signal (not necessarily 100%) is applied and the actual value is entered via DRSL-DISPLAY. If you accept to use the calibration, the unit will work according to this new adjustment. If you later reject this menu point or choose another type of input signal the unit will return to factory calibration.

Section 10.8 - Process simulation function

If you say "yes" to the 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. When you finalise the point with , the unit returns to normal mode.

Section 10.9 - Password

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. If you have locked the unit with a password by mistake, you can always open the menu by using the master password 2008.

Section 10.10 - Language

In the menu "lang.setup" 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.

Section 10.11 - Auto diagnosis

The unit performs an advanced auto diagnosis of the internal circuits.

The following possible errors can be displayed in the front unit DRSL-DISPLAY.

CJ.ER - CJC sensor defect or CJC temperature outside range

FL.ER - Flash error

AO.ER - No load on the current output (only for S4...20 mA / S20...4 mA)

NO.CO - Connection error

IN.ER - Error levels on input

TY.ER - Configuration in DRSL-DISPLAY / DRST-CM does not match this product type

Section 10.12 - Selection of units

After choosing the input signal type you can choose the process units which will be displayed in text line 2 (see table). By selection of temperature input the process value is always displayed in Celsius or Fahrenheit. This is selected in the menu point after selection of temperature input.

Section 10.13 - Safety readback

When the device is delivered with default configuration, the SIL function is disabled. The safety readback function (loop surveillance) can be selected in the menu O.RANGE, thus enabling the device to run in SIL mode. In order to enable the SIL functionality, the menu item S4...20 mA must be selected. Please note, however, that when safety readback is enabled, a sensor error will be indicated as an error on the analogue output signal.

Section 10.14 - CJC

In the CJC menu you can choose between external CJC connector and internal cold junction compensation. The external CJC connector (5910) must be ordered separately.

Section 10.15 - Memory

In the memory menu you can save the configuration of the device in the DRSL-DISPLAY, and then move the DRSL-DISPLAY onto another device of the same type and download the configuration in the new device.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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