prosense

PROSENSE ETS SERIES

DIGITAL TEMPERATURE SENSORS

ProSense ETS Series Digital Temperature Sensors				
Part Number	Measuring Range	Thread Size	Length	Output
ETS50N-30-1001	-58 to 302°F (-50 to 150°C)	1/2" MNPT	30mm	Output 1: switch PNP, N.O./N.C., selectable or 4-20 mA* Output 2: switch PNP, N.O./N.C., selectable or 4-20 mA*
ETS50N-50-1001			50mm	
ETS50N-100-1001			100mm	
ETS50N-150-1001			150mm	
ETS25N-30-1001		1/4" MNPT	30mm	
ETS25N-50-1001			50mm	
ETS50N-30-1003		1/2" MNPT	30mm	Output 1: switch PNP, N.O./N.C., selectable Output 2: switch PNP, N.O./N.C., selectable
ETS50N-50-1003			50mm	
ETS50N-100-1003			100mm	
ETS50N-150-1003			150mm	
ETS25N-30-1003		1/4" MNPT	30mm	
ETS25N-50-1003			50mm	

* Only one output can be configured as analog.

OPERATING INSTRUCTIONS

1 Document Information

1.2 Notes on Safety Conventions and Icons

Always refer to the safety instructions in these Operating Instructions labeled with the following symbols:

Symbol	Meaning
⚠ WARNING	WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
⚠ CAUTION	CAUTION! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in a minor or medium injury.
NOTICE	NOTICE This symbol contains information on procedures and other facts which do not result in personal injury.
ℹ	This symbol indicates additional information or tip

2 Basic Safety Instructions

2.1 Designated Use

The ProSense ETS Series digital temperature sensor is for monitoring, displaying and regulating process temperatures. The device has been safely built with state-of-the-art technology and meets the applicable requirements and European Community (EC) Directives. It can, however, be a source of danger if used incorrectly or for anything other than the designated use.

2.2 Installation, Commissioning and Operation

Installation, electrical connection, commissioning, operation and maintenance of the measuring system must be carried out by trained, qualified specialists authorized to perform such work by the facility's owner-operator. The specialist must have read and understood these Operating Instructions and must follow them. The device may only be modified and repair work carried out if this is explicitly permitted in the Operating Instructions. Damaged devices which could be a source of danger may not be commissioned and must be labelled and identified as defective.

2.3 Operational Safety

The measuring device meets the general safety requirements according to EN 61010-1 and the EMC requirements according to IEC/EN 61326 in addition to the NAMUR recommendations NE 21, NE 43 and NE 53.

- Functional safety

  The ProSense ETS Series digital temperature sensors are were developed according to the standards IEC 61508 and IEC 61511-1 (FDIS). The device version with PNP switch output and additional analog output is equipped with fault detection and fault prevention facilities within the electronics and software.

• Hazardous Locations

The ProSense ETS Series is **not** approved for use in Hazardous Locations.

2.4 Certificates and Approvals

CE mark, declaration of conformity

The device is designed to meet state-of-the-art safety requirements and left the factory in a condition in which it is safe to operate. The device complies with the standards EN 61010-1 "Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures" and with the EMC requirements of IEC/EN 61326. The device meets the legal requirements of the EU Directives. The manufacturer confirms a positive completion of all tests by fitting the unit with a CE mark.

UL Approval

UL Listed

3 Installation

3.1 Installation Conditions

NOTICE

Do not thread sensor into process connection by turning the housing. Always use a wrench on the wrench flats to tighten the sensor into the process connection.

3.2 Mounting the Device

Possible installation options for temperature monitoring in pipes:
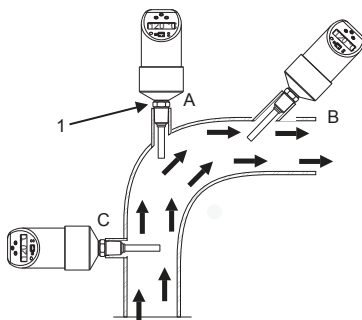
1 Hexagonal screw on sensor module

General mounting instructions:

• Installation at angle pieces, against the direction of flow (item A).

• Installation in smaller pipes, inclined against the direction of flow (item B).

• Installation vertical to the direction of flow (item C).

• The on-site display can be rotated electronically 180°.

• The housing can be rotated up to 310°.

4 Electrical Connection

ETSxxN-xx-1001
ETSxxN-xx-1003

ETSxxN-xx-1001

ETSxxN-xx-1001
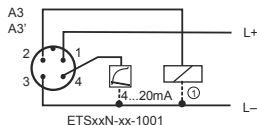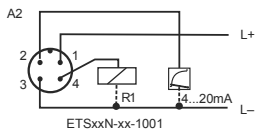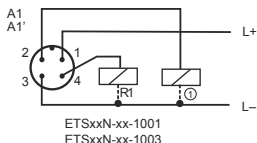
Cable Assembly Wiring Colors:
Pin 1 - Brown
Pin 2 - White
Pin 3 - Blue
Pin 4 - Black
Note: Wiring colors are based on AutomationDirect CD12L
and CD12M 4-pole cable assemblies.
Wiring diagram is based on user selected configuration.

1 — +12 to 30VDC
2 — OUT2
4 — OUT1
3 — 0VDC

A1: 2x PNP switch outputs R1 and ① (R2)
A1': 2x PNP switch outputs R1 and ① (diagnosis/NC contact with "DESINA" setting)
A2: 1x PNP switch output and 1x analog output (4 to 20 mA)
A3: 1x analog output (4 to 20 mA) and 1x PNP switch output ① (R2)
A3': 1x analog output (4 to 20 mA) and 1x PNP switch output
① (diagnosis / NC contact with "DESINA" setting)

NOTICE

To avoid the analog input damaging of a PLC, do not connect the active PNP switch output of the device to the 4...20 mA input of a PLC.

ℹ️ For more information about DESINA, see www.desina.de
(See also Basic Settings section in this manual.)

5 Operating Options

5.1 On-Site Operation

The ProSense ETS Series is programmed and operated by means of three keys or by using XT-SOFT programming software (see the Programming with XT-SOFT Software section of these instructions). The digital display and the light emitting diodes (LEDs) support navigation in the operating menu.

Operating keys
– E +

Digital display
Illumination white (= ok)
Illumination red (= error/fault)

LED for status
Green = ok
Red = error/fault
LED red/ green blinking = warning

Yellow LEDs for switching states
LEDon = switch closed
LEDoff = switch open

Communication jack
for personal computer
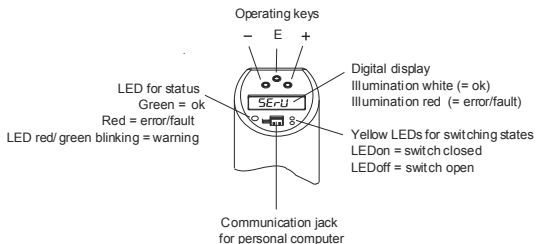
5.2 Navigating in the Operating Menu
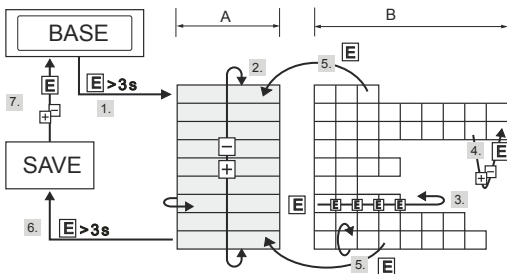
A Function group selection
B Function selection

1. Enter the operating menu.
   Press the E key for longer than 3 seconds.

2. Select the "Function group" with the + or - key.

3. Select the "Function" with the E key.

4. Enter or change parameters with the + or - key.
   Then return to "Function" with the E key.
   Note: If software locking is enabled, it must be disabled before making entries or changes.

5. Press the E key several times to return to the "Function group" - until the appropriate function group is reached again.

6. To exit, press the E key for longer than 3 seconds. If changes were made, see step 7.

7. Query to save data (select "YES" or "NO" with the + or - key) - confirm with the E key.

   [i] Changes to the parameter settings only become effective if you choose 'YES' when asked to save data.

5.3 Structure of the Operating Menu for 2x Switch Outputs

A   B   C

```
BASE  E  UNIT  +  °C   +  °F   +  K
          → ZERO  +  0.0
          → GET'Z  +  0.0
   -      → DISP  +  PV  +  PVRO  +  SP  +  SPRO  +  OFF  +  OFFR
   +      → TAU   +  0.0
          → DESI  +  NO  +  YES

OUT   E  FUNC  +  WINC  +  HYNC  +  WINO  +  HYNO
          → SP   +  0.0
   -      → RSP  +  0.0
   +      → TSP  +  0.0
          → TRSP  +  0.0

OUT2  E  FNC2  +  WINC  +  HYNC  +  WINO  +  HYNO
          → SP2   +  0.0
   -      → RSP2  +  0.0
   +      → TSP2  +  0.0
          → TRS2  +  0.0

SERV  E  LOCK  +  0
          → CODE  +  0
          → PRES  +  NO  +  YES
          → REV'C  +  0
   -      → LST'A  +  0
   +      → SIM   +  OFF  +  OPEN  +  CLOS
          → SIM2  +  OFF  +  OPEN  +  CLOS
          → MAX'  +  0.0
          → MIN'  +  0.0
```
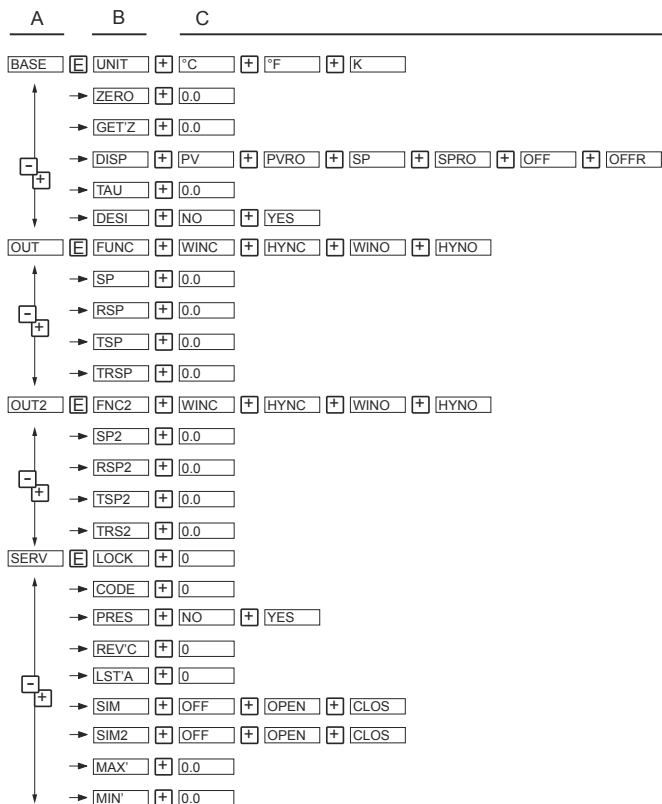
Operating menu: A=function groups, B=functions, C=settings

5.4 Structure of the Operating Menu for 1x Switch Output and 1x Analog Output (4 to 20mA)

Devices with analog output either output 1 or output 2 can be configured as an analog output. It is possible to configure both output 1 and output 2 as a switch output.
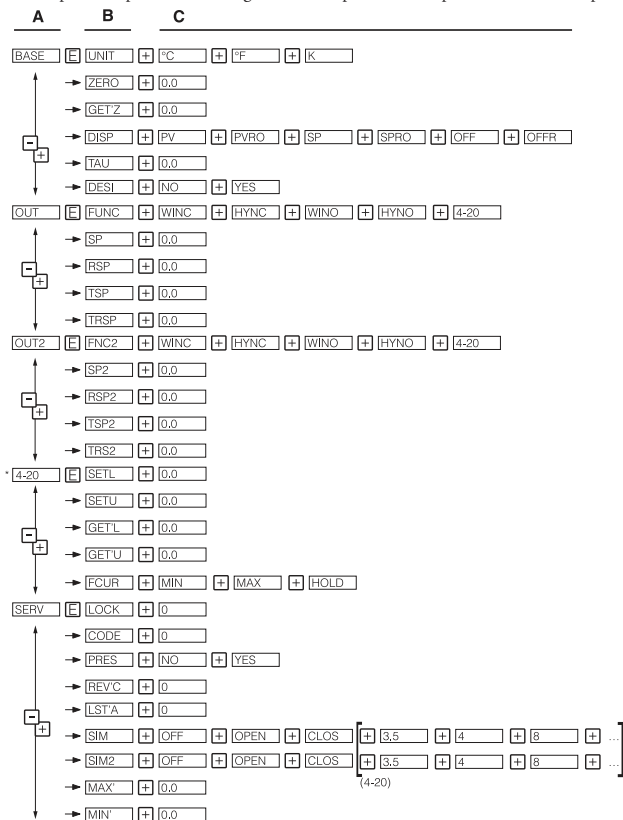

```
    A        B       C
 ─────── ─────── ───────────────────────────────────────────────────────

 BASE  E  UNIT  +  °C  +  °F  +  K

       →  ZERO  +  0.0

       →  GET'Z  +  0.0

 -     →  DISP  +  PV  +  PVRO  +  SP  +  SPRO  +  OFF  +  OFFR
 +
       →  TAU  +  0.0

       →  DESI  +  NO  +  YES

 OUT   E  FUNC  +  WINC  +  HYNC  +  WINO  +  HYNO  +  4-20

       →  SP  +  0.0

 -     →  RSP  +  0.0
 +
       →  TSP  +  0.0

       →  TRSP  +  0.0

 OUT2  E  FNC2  +  WINC  +  HYNC  +  WINO  +  HYNO  +  4-20

       →  SP2  +  0.0

 -     →  RSP2  +  0.0
 +
       →  TSP2  +  0.0

       →  TRS2  +  0.0

 * 4-20  E  SETL  +  0.0

       →  SETU  +  0.0

 -     →  GET'L  +  0.0
 +
       →  GET'U  +  0.0

       →  FCUR  +  MIN  +  MAX  +  HOLD

 SERV  E  LOCK  +  0

       →  CODE  +  0

       →  PRES  +  NO  +  YES

       →  REV'C  +  0

 -     →  LST'A  +  0
 +
       →  SIM  +  OFF  +  OPEN  +  CLOS  [ +  3,5  +  4  +  8  +  ...
                                                (4-20)
       →  SIM2  +  OFF  +  OPEN  +  CLOS  [ +  3,5  +  4  +  8  +  ...

       →  MAX'  +  0.0

       →  MIN'  +  0.0
```

Operating menu: A=function groups, B=functions, C=settings

> ℹ️ *The function group 4-20 is available only if the 4 to 20mA analog output
> (4-20) is selected in the function group OUT or OUT2 under FUNC or
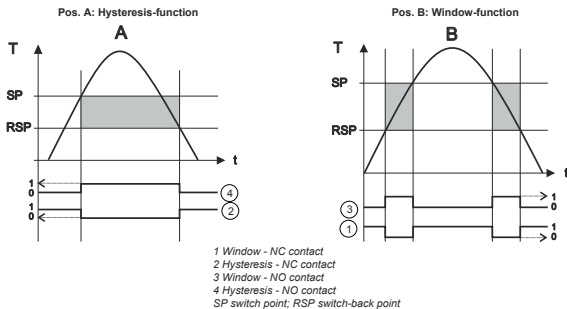> FNC2.*

5.5 Basic Settings

Function Group	Function		Settings	Description
BASE	UNIT	Technical unit	°C °F K	Select technical unit: °C, °F, K Factory setting: °F
	ZERO	Configure zero point	0.0	Position adjustment: within ±18°F/K (±10°C) of the upper range limit
	GET'Z	Accept zero point	0.0	No settings possible (not available in XT-SOFT)
	DISP	Display	PV PVRO SP SPRO OFF OFFR	PV: measured value display PVRO: measured value display rotated 180° SP: set switch point display SPRO: set switch point display rotated 180° OFF: display off OFFR: display off rotated 180° Factory setting: measured value PV
	TAU	Damping: display value, output signal	0.0	Measured value damping with regard to display value and output: 0 (no damping) or 9 to 40s (in increments of 1 second) Factory setting: 0s
BASE	DESI	DESINA	NO YES	PIN assignment of the M12 connector is in accordance with the guidelines of DESINA Factory setting: No

5.6 Settings for Output - 2x Switch Output

- Hysteresis function
  The hysteresis function enables two-point control via a hysteresis. Depending on the temperature (T), the hysteresis can be set via the switch point (SP) and the switch-back point (RSP).

- Window function
  The window function enables the monitoring of a process temperature range.

- NO contact or NC contact
  This switch function is freely selectable.

- Delay times for switch point (SP) and switch-back point (RSP) can be set in increments of 1 second to filter out undesirable temperature peaks of short duration or high frequency.

- Factory setting: Switch point SP 1: 113.0°F (45°C); Switch-back point RSP 1: 112.1°F (44.5°C) Switch point SP 2: 131.0°F (55°C); Switch-back point RSP 2: 130.1°F (54.5°C)

- Range of adjustment
  LRL = Lower Range Limit
  URL = Upper Range Limit
  LRV = Lower Range Value
  URV = Upper Range Value

Pos. A: Hysteresis-function   **Pos. B: Window-function**

1 Window - NC contact
2 Hysteresis - NC contact
3 Window - NO contact
4 Hysteresis - NO contact
SP switch point; RSP switch-back point

Function Group	Function		Settings	Description
OUT Output 1 OUT 2 Output 2	FUNC FNC2	Switching characteristic	WINC HYNC WINO HYNO	WINC: window/NC contact HYNC: hysteresis/NC contact WINO: window/NO contact HYNO: hysteresis/NO contact Factory setting: HYNO
	SP SP2	Switch point value	0.0	Switch point: -57.1 to 302°F (-49.5 to 150°C) in increments of 0.18°F (0.1°C)
	RSP RSP2	Switch-back point value	0.0	Switch-back point: -58 to 300°F (-50 to 149°C) in increments of 0.18°F (0.1°C)
	TSP TSP2	Switch point delay	0.0	Delay time: 0...99s in increments of 0.1s Factory setting: 0s
	TRSP TRS2	Switch-back point delay	0.0	Delay time: 0...99s in increments of 0.1s Factory setting: 0s
Min. distance between SP and RSP: 0.9°F/K (0.5°C)				

5.7 Settings for Output - 1x switch output and 1x analog output (4 to 20mA)

Function Group	Function		Settings	Description
OUT Output 1 OUT 2 Output 2	FUNC FNC2	Switching characteristic	WINC HYNC WINO HYNO 4-20	WINC: window/NC contact HYNC: hysteresis/NC contact WINO: window/NO contact HYNO: hysteresis/NO contact 4-20: analog output Factory setting: HYNO
	SP SP2	Switch point value	0.0	Switch point -57.1 to 302°F (-49.5 to 150°C) in increments of 0.18°F (0.1°C)
	RSP RSP2	Switch-back point value	0.0	Switch-back point -58 to 300°F (-50 to 149°C) in increments of 0.18°F (0.1°C)
	TSP TSP2	Switch point delay	0.0	Delay time 0...99s in increments of 0.1s Factory setting: 0s
	TRSP TRS2	Switch-back point delay	0.0	Delay time 0...99s in increments of 0.1s Factory setting: 0s
Min. distance between SP and RSP: 0.9°F/K (0.5 °C)				

| Function Group	Function		Settings	Description
4-20 Analog output	SETL	Value for 4mA (LRV)	0.0	-58 to 266°F (-50 to 130°C) Lower range value in increments of 0.18°F (0.1°C) Factory setting: 32.0°F (0.0°C)
	SETU	Value for 20mA (URV)	0.0	-22 to 302°F (-30 to 150°C) Upper range value in increments of 0.18°F (0.1°C) Factory setting: 302°F (150°C)
	GETL	Temperature applied for 4mA (LRV)	0.0	Take temperature value as lower range value (not via XT-SOFT)
	GETU	Temperature applied for 20mA (URV)	0.0	Take temperature value as upper range value (not via XT-SOFT)
	FCUR	Error current	min MAX HOLD	Current value in event of error: MIN = ≤ 3.6 mA MAX = ≥ 21.0 mA HOLD = last value Factory setting: MAX
Min. distance between SETL and SETU: 36°F/K (20°C)				

ℹ The function group 4-20 is available only if the 4 to 20mA analog output (4-20) is selected in the function group OUT or OUT2 under FUNC or FNC2.

5.8 Settings for Service Functions

Function Group	Function		Settings	Description
SERV Service functions	LOCK	Locking code	0	Enter the locking code for enabling the device.
	CODE	Change locking code	0	Freely selectable code 1...9999. 0 = no locking A locking code already assigned can only be changed by first entering the old code for enabling the device.
	PRES	Reset	no YES	Resets all entries to the factory setting (not via XT-SOFT)
	REVC	Revision counter	0	Increases by 1 with each configuration
	LSTA	Last device status	0	Displays the last device status to occur ≠ 0
	SIM1 SIM2	Simulation output 1 or 2	OFF OPEN CLOS 3.5 (if analog output available)	OFF: No simulation OPEN: Switch output open CLOS: Switch output closed 3.5: Simulation values for analog output in mA (3.5 / 4.0 / 8.0 / 12.0 / 16.0 / 20.0 / 21.7)
	MAX'	Max. indicator	0.0	Display of max. measured process value
	min'	Min. indicator	0.0	Display of min. measured process value

5.9 Programming with XT-SOFT Software

The ETS Series can be programmed using XT-SOFT programming software, available as a free download at www.automationdirect.com, and an XT-USB configuration cable (purchased separately). The operating options listed in the previous "On-Site Operation" section are available via XT-SOFT except as noted.

XT-USB Configuration Cable
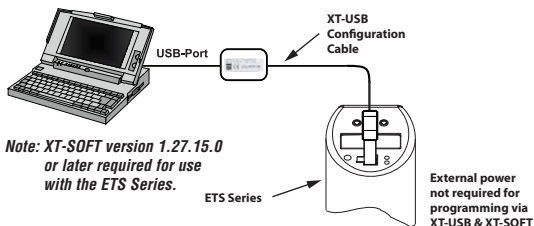
USB-Port

Note: XT-SOFT version 1.27.15.0 or later required for use with the ETS Series.

ETS Series

External power not required for programming via XT-USB & XT-SOFT

ℹ️ *External power not required for programming via XT-USB & XT-SOFT*

5.10 Additional Operating Options

In addition to the operating options listed in the previous "On-Site Operation" section, the XT-SOFT software provides the following read-only information.

Function Group	Description
Service Setting	Number of switch changes for output 1
	Number of switch changes for output 2
	Device status
Identification	Tag number
	Order code
	Limit switch serial number
	Sensor serial number
	Electronics serial number
	Device release (change status)
	Hardware version
	Software version

6 Diagnostics and Troubleshooting

6.1 Diagnostic Information on Local Display

If an error in the device occurs, the color of the status LED changes from green to red and the digital display illumination changes from white to red. A status LED flashing red and green signals a warning. The display shows:

- E-code for errors
  In the event of an error message, the measured value is uncertain.

- W-code for warnings
  In the event of a warning, the measured value is reliable.

Code	Explanation	Remedy
E011	Device configuration faulty	Reset device (See Settings for Service Functions).
E012	Error in measurement or medium temperature outside specification	Check medium temperature. Contact AutomationDirect's Returns Department for warranty status.
E019	Power supply outside specification	Check operating voltage
E015		
E020	Memory error	Contact AutomationDirect's Returns Department for warranty status.
E021		
E022	Power is only supplied to the device via the communication interface (measurement is deactivated)	Check operating voltage
E025	Switching contact 1 is not open although it should be	Switching contact defective. Contact AutomationDirect's Returns Department for warranty status.
E026	Switching contact 2 is not open although it should be	Switching contact defective. Contact AutomationDirect's Returns Department for warranty status.
E040	VCC (Controller voltage) is out of working area	Contact AutomationDirect's Returns Department for warranty status.
E042	Output current can no longer be generated (only for 4 to 20 mA output, e.g. load at analog output too high or open analog output).	Check load. Switch off analog output via configuration, if it isn't required, see Settings for Output section.
E044	Output current drifts too much (± 0.5 mA)	Contact AutomationDirect's Returns Department for warranty status.
W107	Simulation active	Switch off the output simulation for output 1 and output 2
W202	Measured value outside of the sensor range	Operate the device in the specified temperature range
W209	Device starts	
W210	Configuration modified (warning code will be displayed for approximately 15 seconds)	
W212	Sensor signal outside the permitted range	Operate the device in the specified temperature range
W250	Number of switch cycles exceeded	Contact AutomationDirect's Returns Department for warranty status.
W270	Short-circuit or overload at output 1	Check output wiring. Increase the load resistance at output 1
W280	Short-circuit or overload at output 2	Check output wiring. Increase the load resistance at output 2

7 Maintenance

Any buildup on the sensor can have a negative effect on the sensor response time. For this reason, check the sensor for buildup at regular intervals.

⚠ CAUTION

Removing the device

Make sure the process is unpressurized before you remove the device! Do not twist the device out of the process connection thread at the housing. Always use a suitable open-ended wrench on the wrench flats for disassembly work.

8 Technical Data

For further technical data and scale drawing visit: www.automationdirect.com.