Temperature Sensor (AR0259 & AR0260) Product Overview

Cellocator Division
Pointer Telocation Ltd.

Proprietary and Confidential

Version 1.2

Revised and Updated: November 22, 2014

POINTER

Pointer Telocation Ltd. 14 Hamelacha St., Rosh Ha'ayin 48091, Israel • Tel: 972-3-5723111 • Fax: 972-3-5723100 • www.pointer.com

Legal Notices

IMPORTANT

1. All legal terms and safety and operating instructions should be read thoroughly before the product accompanying this document is installed and operated.
2. This document should be retained for future reference.
3. Attachments, accessories or peripheral devices not supplied or recommended in writing by Pointer Telocation Ltd. may be hazardous and/or may cause damage to the product and should not, in any circumstances, be used or combined with the product.

General

The product accompanying this document is not designated for and should not be used in life support appliances, devices, machines or other systems of any sort where any malfunction of the product can reasonably be expected to result in injury or death. Customers of Pointer Telocation Ltd. using, integrating, and/or selling the product for use in such applications do so at their own risk and agree to fully indemnify Pointer Telocation Ltd. for any resulting loss or damages.

Warranty Exceptions and Disclaimers

Pointer Telocation Ltd. shall bear no responsibility and shall have no obligation under the foregoing limited warranty for any damages resulting from normal wear and tear, the cost of obtaining substitute products, or any defect that is (i) discovered by purchaser during the warranty period but purchaser does not notify Pointer Telocation Ltd. until after the end of the warranty period, (ii) caused by any accident, force majeure, misuse, abuse, handling or testing, improper installation or unauthorized repair or modification of the product, (iii) caused by use of any software not supplied by Pointer Telocation Ltd., or by use of the product other than in accordance with its documentation, or (iv) the result of electrostatic discharge, electrical surge, fire, flood or similar causes. Unless otherwise provided in a written agreement between the purchaser and Pointer Telocation Ltd., the purchaser shall be solely responsible for the proper configuration, testing and verification of the product prior to deployment in the field.

POINTER TELOCATION LTD.'S SOLE RESPONSIBILITY AND PURCHASER'S SOLE REMEDY UNDER THIS LIMITED WARRANTY SHALL BE TO REPAIR OR REPLACE THE PRODUCT HARDWARE, SOFTWARE OR SOFTWARE MEDIA (OR IF REPAIR OR REPLACEMENT IS NOT POSSIBLE, OBTAIN A REFUND OF THE PURCHASE PRICE) AS PROVIDED ABOVE. POINTER TELOCATION LTD. EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, SATISFACTORY PERFORMANCE AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL POINTER TELOCATION LTD. BE LIABLE FOR ANY INDIRECT, SPECIAL, EXEMPLARY, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING WITHOUT LIMITATION LOSS OR INTERRUPTION OF USE, DATA, REVENUES OR PROFITS) RESULTING FROM A BREACH OF THIS WARRANTY OR BASED ON ANY OTHER LEGAL THEORY, EVEN IF POINTER TELOCATION LTD. HAS BEEN ADVISED OF THE POSSIBILITY OR LIKELIHOOD OF SUCH DAMAGES.

Intellectual Property

Table of Contents

1 Product Description

1.1 Overview

The Temperature Sensor connects to the analog input of the Cellocator unit and enables temperature-monitoring in Fleet Management applications.

The Sensor is installed in the area that requires temperature monitoring, and sends analog information to the Cellocator unit's analog input as a function of the temperature level. The Cellocator unit sends the received voltage level to the control server on every location update message. The server-side software translates the information to a visual indication of temperature level, alerting the user of breached thresholds and any other application layer activities.

Two Temperature Sensor models are supported:

- AR0259 which supports 5 meter cable
- AR0260 which supports 20 meter cable

Note: The Temperature Sensor can be ordered with customized cable length subject to order quantities and maximum permitted measurement accuracy limitations. For further information please refer to your contact person at Pointer or send an email to sales@pointer.com.

The AR0259 / AR0260 Temperature Sensors are provided in addition to the AR0204 / AR0202 Temperature Sensor. The new temperature sensor eliminates the need for the Power Protection Device (FL0012), which is particularly needed for 24v installation when the AR0204 / AR0202 Temperature Sensors are used.

1.2 Highlights

- The Temperature Sensor measures temperatures in the range of -40ºC to +75ºC and when integrated with Cellocator unit gives a maximum error range of ±2 ºC (the Sensor itself generates an error of 1 ºC, and the Cellocator unit adds an error of 1 ºC; the summary of both errors is ±2 ºC).
- The Temperature Sensor generates a linear output of 0.2-2.5 volts in a resolution of 20mV per 1ºC. A temperature of -40°C results in 0.2V output, 0ºC - 1V and 75°C – 2.5V.
- The Temperature Sensor output is short circuit protected and matches the analog input of the Cellocator unit in the specified temperature range.
- The Temperature Sensor is housed in an IP67 stainless metal tube.
- Two variants of 5M and 20M cable are provided.
- The Temperature Sensor features Low Current Consumption and no calibration is required.
- The Temperature Sensor supports 12/24V power supply and has built-in protection against reverse polarity feed and electrical disturbances in the vehicle environment.

1.3 Temperature / Voltage Response Table

Voltage	Temp.	Voltage	Temp.	Voltage	Temp.	Voltage	Temp.
0.2	-40ºC	0.8	-10ºC	1.4	20ºC	2	50ºC
0.22	-39ºC	0.82	-9ºC	1.42	21ºC	2.02	51ºC
0.24	-38ºC	0.84	-8ºC	1.44	22ºC	2.04	52ºC
0.26	-37ºC	0.86	-7ºC	1.46	23ºC	2.06	53ºC
0.28	-36ºC	0.88	-6ºC	1.48	24ºC	2.08	54ºC
0.3	-35ºC	0.9	-5ºC	1.5	25ºC	2.1	55ºC
0.32	-34ºC	0.92	-4ºC	1.52	26ºC	2.12	56ºC
0.34	-33ºC	0.94	-3ºC	1.54	27ºC	2.14	57ºC
0.36	-32ºC	0.96	-2ºC	1.56	28ºC	2.16	58ºC
0.38	-31ºC	0.98	-1ºC	1.58	29ºC	2.18	59ºC
0.4	-30ºC	1	0ºC	1.6	30ºC	2.2	60ºC
0.42	-29ºC	1.02	1ºC	1.62	31ºC	2.22	61ºC
0.44	-28ºC	1.04	2ºC	1.64	32ºC	2.24	62ºC
0.46	-27ºC	1.06	3ºC	1.66	33ºC	2.26	63ºC
0.48	-26ºC	1.08	4ºC	1.68	34ºC	2.28	64ºC
0.5	-25ºC	1.1	5ºC	1.7	35ºC	2.3	65ºC
0.52	-24ºC	1.12	6ºC	1.72	36ºC	2.32	66ºC
0.54	-23ºC	1.14	7ºC	1.74	37ºC	2.34	67ºC
0.56	-22ºC	1.16	8ºC	1.76	38ºC	2.36	68ºC
0.58	-21ºC	1.18	9ºC	1.78	39ºC	2.38	69ºC
0.6	-20ºC	1.2	10ºC	1.8	40ºC	2.4	70ºC
0.62	-19ºC	1.22	11ºC	1.82	41ºC	2.42	71ºC
0.64	-18ºC	1.24	12ºC	1.84	42ºC	2.44	72ºC
0.66	-17ºC	1.26	13ºC	1.86	43ºC	2.46	73ºC
0.68	-16ºC	1.28	14ºC	1.88	44ºC	2.48	74ºC
0.7	-15ºC	1.3	15ºC	1.9	45ºC	2.5	75ºC
0.72	-14ºC	1.32	16ºC	1.92	46ºC		
0.74	-13ºC	1.34	17ºC	1.94	47ºC		
0.76	-12ºC	1.36	18ºC	1.96	48ºC		
0.78	-11ºC	1.38	19ºC	1.98	49ºC		

1.4 Cellocator Unit Integration

The following rules should be followed for proper Temperature Sensor operation:

- The temperature sensor can be supported only by Cellocator unit providing one or two analog inputs.
- The temperature sensor should be connected to one of these analog inputs
- The relevant input port must be programmed as analog input in the Compact unit and as analog backward compatible in the Cello unit.

1.5 Temperature Information in Cellocator Unit Messages

The Cellocator unit reports the measurement of an analog input (containing the temperature information) in each location update (message type 0, time event, input trigger, etc).

The analog reading is reported in the 4th byte of Analog Inputs (byte 29 of 70) for the first analog input, and in byte 28 for the second analog input, with a resolution of 9.8mV per bit.

Listed below are examples of the message content:

- -20°C will be reported as 0.6V, i.e. 0x3D
- -10°C will be reported as 0.8V, i.e. 0x51
- 0°C will be reported as 1V, i.e. 0x66
- 10°C will be reported as 1.2V, i.e. 0x7A
- 70°C will be reported as 2.4V, i.e. 0xF5

Note: In the Cello family the location and resolution of the measurement report varies per configuration. The default is backward compatible to Compact, i.e. report in byte 29 and resolution of 9.8mV per bit.

---

2 Installation Instructions

The Temperature Sensor is equipped with a 3-channel cable, which should be configured as according to the following connection diagram:

Wire Color	Connection
Green	V+
Brown	GND
White	Vout

To install the temperature sensor perform the following:

1. Connect the Brown wire to the vehicle's chassis (GND).
2. Connect the Green wire to the vehicle's V+.
3. Connect the White wire to the Cellocator unit's analog input.

The GND and the V+ of the Temperature Sensor and those of the Cellocator unit harness must share the same power source.

Note: Incorrect connections may lead to malfunction and damage.

---

3 Technical Specifications

3.1 Mechanical Specifications

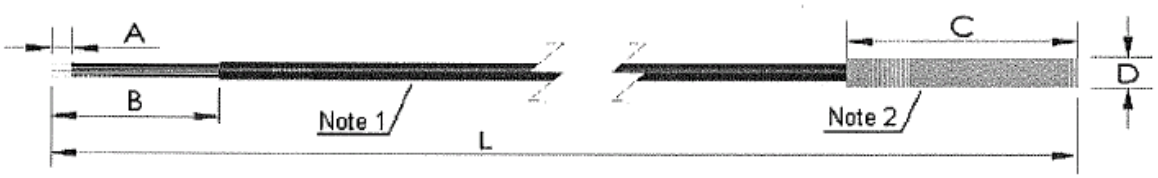

Figure 1: Mechanical Diagram

Pointer PN	A	B	C	D	L
AR0259	5mm±1mm	35mm±1mm	60 mm Max	8 mm Max	5M±50mm
AR0260	5mm±1mm	35mm±1mm	60 mm Max	8 mm Max	20M±200mm

- **Note 1** = 3 Core 0.34mm^2 (Oil and chemical resistant PVC) double insulated twisted wires.
- **Note 2** = 8.5x60mm stainless steel water proof can.

3.2 Performance Specification

Electrical Ratings	Min	Typical	Max	Units
Supply Voltage	8		31	V
Continuous extended VDC supply			80	V
Supply Current	0.6 @8V		3.6 @31V	mA
Temperature range	-40	-	+75	ºC
Output short-circuit current			2.5	mA
Maximum voltage on Vout			2.5	V
Temperature response gradient (depends on thermal conduction)	4			ºC/Min
Measurement error		±1	±2	ºC
Maximum short term (up to 200 microseconds) reverse voltage protection			600	V

Electrical Ratings	Min	Typical	Max	Units
Maximum Spikes as in load dump pulse			100	V
Temperature voltage output response		20		mV/°C
Ingress Protection	IP67			

The temperature measurement error includes the errors generated in the Temperature Sensor and the errors generated in the analog input of the Cellocator unit.