Cellocator 1-Wire Proximity Reader

Product Overview

Cellocator Division
Pointer Telocation Ltd.

POINTER

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IMPORTANT

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1 Introduction

1.1 Scope and Purpose

The purpose of this document is to describe the features and capabilities of the AR0281 Cellocator 1-wire Proximity Reader. It includes a description, installation instructions and Proximity Reader technical specifications.

This document also describes the integration of the Cellocator unit with the Proximity Reader, in order to provide the back-end Telematics application with the information generated by the sensor.

The document is intended for TSP or IT integrators who want to use the information provided by the proximity reader within their Telematics applications. It is intended to provide all the required information for customers, customer support, and sales personnel.

1.2 Abbreviations

Abbreviation	Description
ID	Identification
Dallas	Dallas 1-Wire interface (slave) utilizing the DS1990A standard
Driver-ID	6 bytes identification sent from the reader to the Cello.
CSN	Card Serial Number
TSP	Telematics Service Provider
IT	Information Technology

1.3 References

All the reference documents listed in the following table can be downloaded from the Knowledge Base section of the Cellocator website.

#	Reference	Description
1.	CelloFamily Hardware Installation Guide	
2.	Cellocator Keypad Overview	
3.	Dallas Reader with LED and Push Button Overview	
4.	Trailer ID Overview	

1.4 Revision History

Version	Date	Description
1.0	26/12/2015	Initial version

Version	Date	Description
1.1	01/02/2016	Change wires colors in section 3.2
1.2	12/04/2016	Add PN and change name of Proximity Indication Labels in section 2.3.
		Add note to avoid attaching the reader to metal surface in section 3.2.
		Add note that adhesive tape is not included in the product content in section 3.2.
		Rewrite the evaluation section (section 4.3)
1.3	02/01/2017	**Added improvements of HW 6 and FW 3.5:**
		Support for 1-wire Bus (sections 2.2, 2.7.1, 4.1)
		Driver-ID can be based on CSN, user-defined authentication code or combination of both (sections 2.2, 2.9).
		Driver-ID bytes can be scrambled (sections 2.2, 2.9).
		Card detection indication is configurable (section 2.6)
		Configuration card detection indication (section 2.6).
		LED protocol (section 2.7)
		When multiple devices are connected to the same 1-wire interface, the user has to hold the card/tag for 2 seconds (section 6)
		Supports FW upgrade via PC COM port (section 2.2).

2 General Description

2.1 Overview

The AR0281 Cellocator 1-wire Proximity Reader uses passive RFID technology, and serves as an external wireless front-end for the Cellocator unit, with support for proximity cards or tags.

The Cellocator 1-wire Proximity Reader offers a high-end solution with a range of features (see the *Highlights* section below). All solutions are integrated seamlessly with Cellocator devices, providing the ability to upgrade even existing installations.

The unit handles the card information the same way it handles the Dallas key or the Cellocator Keypad information. Therefore all the driver ID functionality is also available for the Proximity Reader.

This section describes the main features and capabilities of the Cellocator 1-wire Proximity Reader, including details on the reader and its enclosure, the reader buzzer and LED, the reader interface, DRIVER-ID detection and advanced authentication.

2.2 Highlights

- Supports Mifare® Classic, Mifare® DESFire, Mifare® Ultralight, Calypso, iClass and NFC cards
- Supports 1-WIRE and 1-WIRE Bus interface (DS1990 emulation)
- Wide power supply range
- Built-in RF antenna
- Low power consumption
- Built-in dual color LED indicator
- Built-in buzzer
- Configurable by a configuration card
- Thin, compact enclosure
- Driver-ID can be based on CSN, user-defined authentication code, or a combination of both
- Driver-ID bytes can be scrambled for better security
- Supports FW upgrade via PC COM port

2.3   Product Content

The Cellocator 1-Wire Proximity Reader includes the items listed in Table 1.

Name/Part Number	Description	Picture
Cellocator 1-Wire Proximity Reader PN: AR0281	A 13.56M Proximity Reader, which support various card standards and integrates with the Cello unit via 1-wire interface.	
Proximity Indication Labels (optional) PN: 712-00015	A pack of 20 stickers which should be attached to the dashboard to indicate the location of the Proximity Reader incase of installation behind the dashboard.	

Table 1: Cellocator 1-Wire Proximity Reader Content

3 Proximity Reader Description

3.1 Reader Enclosure and Cable

The reader is housed in a well-designed enclosure, which also supports the visual LED and the cable. It is designed for installation above or behind the vehicle dashboard. The location of the LED is shown in the picture below.

The reader is equipped with a 30cm cable that supports GND, VCC, Buzzer / LED input, 1-WIRE and is terminated with the female connector CVILUX CI3304S0010. The connector pinouts are shown below.
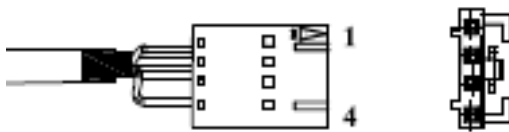
Connector Pin	Function
1	Ground
2	Power
3	Buzzer / LED input
4	1-wire (Dallas)

Table 2: Connector Pinouts

3.2 Reader Buzzer and LED

The Proximity Reader is equipped with an LED and Buzzer.

The buzzer can be heard clearly by the driver even if the reader is installed behind the dashboard. The LED uses dual colours (red and green) and is visible to the driver if mounted on the vehicle window or dashboard near the driver seat.

The buzzer and LED are controlled by reader internal logic, and by the buzzer/LED input. The buzzer/LED input controls either the green / red LED and/or the buzzer according to a configurable parameter. The buzzer/LED activation follows the buzzer/ LED input signal status.

The reader is configured to automatically activate the buzzer / LEDs upon power up and on proximity card detection indications.

- **Power on indication** – 2 short (0.5 second) beeps; each beep is followed by 0.5 seconds of silence. The red LED is activated in parallel to the beeps for 2 seconds.

- **Card detection indication** – activation of red LED, green LED, buzzer and the cadence of each is configurable. The default indication includes one short (0.5 second) beep followed by 0.5 seconds of silence. The red LED is activated in parallel to the beep for one second.

- **Configuration card detection indication** – 3 short (0.5 second) beeps; each beep is followed by 0.5 seconds of silence. The red LED is activated in parallel to the beeps for 3 seconds.

3.3 Reader Interfaces

The following reader interfaces are available:

- **Power in and GND** – connected to vehicle battery or relay for powering the reader.

- **Buzzer / LED input** – configurable functionality:
  - Pull-up input used for activating the reader buzzer / LED. The active state is GND (Default).
  - Unique protocol enabling the control of LED/buzzer indications.

- **Dallas 1-wire** – used to transfer the Driver ID (up to 6 Bytes) to the Cellocator unit.

3.3.1 Dallas 1-Wire Interface

The reader uses a Dallas 1-Wire interface (slave), utilizing the DS1990A standard, for transferring the detected DRIVER-ID to the Cellocator unit. The reader also supports 1-wire bus configuration, allowing the installation of multiple readers as well as any other device supporting a 1-wire bus (such as 1-wire temperature sensor) on the same 1-wire interface.

3.3.2 Wireless Interface

The reader supports the following standards:

Protocol	ISO	Frequency	SCN Length	Comment
MIFARE Classic	14443A	13.56M	4 bytes	

Protocol	ISO	Frequency	SCN Length	Comment
Mifare Ultralite C	14443A	13.56M	4 bytes	
Mifare DESFire	14443A	13.56M	7 bytes	
Calypso	14443B	13.56M	8 bytes	
HID iCLASS	15693	13.56M	8 bytes	
Smartphone NFC	18092	13.56M	8 bytes	

Table 3: Wireless Interface Standards

Note the following:

♦ The reading range is 5cm for a maximum of one readout per second.

♦ The wireless interface includes the appropriate chip and antenna.

♦ The reader reads the Card Serial Number (CSN) from all mentioned cards.

♦ In case of HID iCLASS, the reader supports the Card/Chip Serial Number and not the special unique HID credential.

3.4 Preparing the Driver-ID - Default procedure

The reader reads the card CSN and prepares a DRIVER-ID of 6 bytes out of the detected CSN. If the detected CSN is greater than 6 bytes, the least significant 6 bytes are taken. If the detected CSN is less than 6 bytes, zero bytes are inserted as the most significant bytes. The 6 bytes Driver-ID are packaged in accordance to the DS1990A frame and sent to the Cellocator unit via the 1-wire interface.

3.5 Preparing the Driver-ID - Advanced steps

The reader enables the use of Company/Group ID in order to exclude random Mifare cards from being used as driver cards. It also allows the use of 6 bytes of user-defined authentication code instead of the card CSN, as well as the use of a combined Driver-ID made from the card CSN and a user-defined authentication code according to a configurable combination rule. The reader also enables the scrambling of Driver-ID bytes for better security according to a configurable scrambling rule.

Please note that Company ID and authentication code are supported only by Mifare cards.

Each card should be programmed with the Company/Group ID and the user-defined authentication code in one of its data sectors.

The reader should be programmed via a configuration card with the sector number, Company/Group ID, the combination rule and the scrambling rule.

When a card is detected, the reader reads the Company/Group ID from the pre-programmed sector of the card and compares it to its pre-programmed Company/Group ID. If the match fails, the reader ignores the card. Thus, only the cards provided by the specific company will alert the Cello and the application.

If the match succeeds, the reader reads the CSN, and then according to the combination rule, reads the authentication code and prepares the combined Driver-ID.

At this stage, the reader scrambles the Driver-ID bytes according to the scrambling rule and sends the scrambled Driver-ID via the 1-wire interface.

4   Installation Instructions

4.1   Pre-installation Information

Prior to commencing any installation procedures, technicians should study and be aware of the following:

CAUTION:

- To avoid possible bodily injury, or damage to the vehicle, the installer must be a certified technician who has been qualified to install the system.

- Installation in vehicles having computerized systems may have unexpected results. Please consult with your local car dealer before performing any vehicle OEM invasive installation.

For extensive installation instructions of Cellocator products, including complete descriptions of prerequisites, preparations, recommended installation practices, recommended installation locations, forbidden installation schemes etc, please refer to the relevant product installation manual on the Knowledge Base section of the Cellocator website.

4.2   Proximity Reader Installation

➤ **To install the Proximity Reader:**

1. Allocate an area in the dashboard where the reader can be installed behind the panel and its front side can be reached easily by the driver when seated. The reader can also be attached to the upper side of the panel or to the window.

    NOTE: the reader should not be attached to metal surface as it might reduce the reading distance up to 80%.
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2. Connect the Proximity Reader wires as described in the table below:

Connector Pin	Wire color	Function	Connected to
1	Green	GND	Vehicle GND
2	Yellow	Power	Vehicle Battery
3	Brown	Buzzer / Led Input	Can be connected to any dry contact signal.
4	Blue	Dallas 1-wire	Cellocator unit 1-wire (Dallas) interface (Cello – pin #20, CR300 – pin #10)

Table 4: Connecting Sensor Wires

3. Mount the reader behind the dashboard using double-coated adhesive tape.

NOTE: the double coated adhesive tape is not included in the device package and should be provided by the installer.

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4. Stick the indication label on the front side of the dashboard next to the Proximity Reader in order to mark the area the card should be applied to when you are installing behind the dashboard.

NOTE: You cannot connect any other device to the 1-wire interface of the Cellocator unit in addition to the Proximity Reader.

Review the CelloFamily Hardware Installation Guide for instructions regarding connecting the sensors to the Cello Harness.

Review the Harness Selection Wizard to select the best harnesses for your specific application.

5   Integration Description

The CSN sent to the Cellocator unit is treated as the driver ID as part of the Driver Authentication feature.

The Dallas wire of the reader should be connected to the 1-wire interface of the Cellocator unit (Cello – pin 20, CR300 – pin 10).

The Cellocator unit provides driver ID detection feedback (if programmed to) on its outputs:

- Cello-IQ on Global Output / Blinker (pin 18) and Siren (pin 8).
- Cello-CANiQ on Global Output / Blinker (pin 18).
- CR300 on Global Output / Lights (pin 3).

Connecting the Cellocator unit output to the Buzzer / Led Input of the reader provides the authentication feedback via the reader's led/buzzer.

5.1   Cellocator Unit Programming

The driver authentication parameter can be set in the Programmer address *03 Time & Trip events \ Driver Authentication.*

The Dallas bus mode should be enabled or disabled as per the required configuration. It is also recommended to enable an alert message on any new card detection by setting the Enable Authentication Updated Alert parameter to *enable*.

Review the Driver Authentication section in the Cellocator Cello Programming Manual for further information about programming the Driver Authentication feature.

5.2   Cellocator Unit Messages

The Driver ID is one of the parameters reported in message 0.

For further information regarding the messages description and format, refer to the Cellocator Wireless Communication Protocol.

5.3   Evaluation

You may evaluate the performance and behaviour of the Proximity Reader via appropriate evaluation environment.

➢ **To setup the evaluation environment:**

1. Connect the appropriate Cellocator unit to the 711-00317 Cello 9 Wires Harness, which utilized proximity reader connector.

   NOTE: the power wire toward the proximity reader is connected to the ignition switch and not to the battery power.
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2. Connect the proximity reader to that connector.

3. Connect the harness DFD connector to the PC COM port of the Cellocator Programmer using the 711-00313 DFD to DB9 Adapter. If the PC supports only USB ports, the 711-30017 USB to RS-232 Adapter should be used as well.

For further information regarding the setting the evaluation environment, refer to the Evaluation Suite Manual.

6   Operating Instructions

To identify himself, the driver should hold the card / tag next to the indication label or touch the reader and wait till the indication beep is heard and the red LED is lit for a short time. Note that when multiple devices are connected to the same 1-wire interface, the user has to hold the card/tag for 2 seconds.

If the Cellocator unit is programmed with the driver ID functionality and the buzzer input is connected to the appropriate output of the Cellocator unit, when the received Driver ID code is authorized a one second authorization tone will follow the indication beep.

7 Technical Specifications

Parameter	Value
Operating radio frequency	13,56MHz
Supported standards	MIFARE Classic, Mifare Ultralite C, Mifare DESFire, Calypso, HID iCLASS, NFC
Read range	Up to 10cm (depends on transponder)
Interface	1-wire
Operating voltage range	9V to 32V
Average power consumption	5mA (from 12VDC power supply)
Green LED power consumption	3mA
Red LED power consumption	6.5 mA
Working temperature range	-25ºC ÷ +70ºC
Storage temperature range	-40°C to +85°C
Humidity	95% non-condensing
Dust and water protection	IP50
Dimension	54mm x 85mm x 7mm
Cord length	30cm
Connector	Molex 50-57-9404

Table 5: Technical Specifications