MOS200 1359 NRZ
248XXB3019

Safety Localization Readers
SIL4 certified *

DESCRIPTION

The Safety Localization Reader is both a transceiver and a beacon localization safety system, specially designed for railway applications. This Safety Localization Reader has an integrated antenna and is used onboard, mounted under the carriage or the bogie, in order to localize a radiofrequency OMS beacon and to read the data of this radiofrequency beacon « on the fly ». These beacons are mounted along the tracks, between the rails, and the non-reading of a beacon installed on the adjacent track is guaranteed

The localization is performed using two complementary digital signals (S1 and S2) sent to the onboard controller. A RS485 serial link is used to transmit data (Data_Tx) to the onboard controller. These functions ensure localization in real time. The data format for Data_Tx is NRZ.

The 3 interfaces S1,S2 and Data_Tx are duplicated at the output of the VGE1 type 19pins connector, so different architectures can be used with the controller(s) : association of 1 MOS200 1359 reader with 1 controller or 2 controllers, or 2 MOS200 1359 in association with 1 or 2 controllers.
The system uses two working frequencies: 125 kHz unmodulated for remote powering of beacons, and 6.78MHz modulated for data reception. The Beacon Localization Reader has an auto-test system that can be activated by a command through the supervisor serial link (CdeTest_RS485).

* : for the safety instructions see the user manual ref.15648
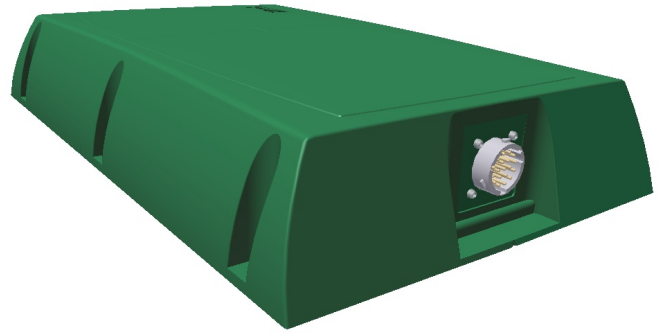
## FUNCTIONAL DATA

Beacon OMS must be secured on the ground between the rail in the transverse direction and reader MOS200 1359 must be mounted under the train in the longitudinal direction.

The distance between the higher face of the beacon and the lower face of the reader lies between 100mm and 250mm.

The reader can locate Beacon with a precision better than +/- 50mm functionally and up to +/- 200mm in safety.

MOS200
(lower face)

OMS201
(higher face)
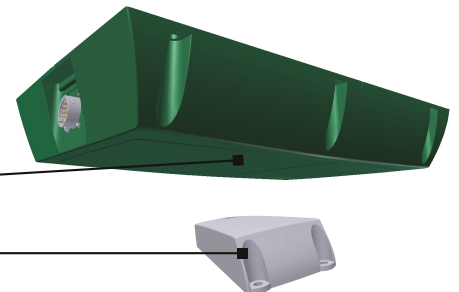
DIMENSIONS

Serial number

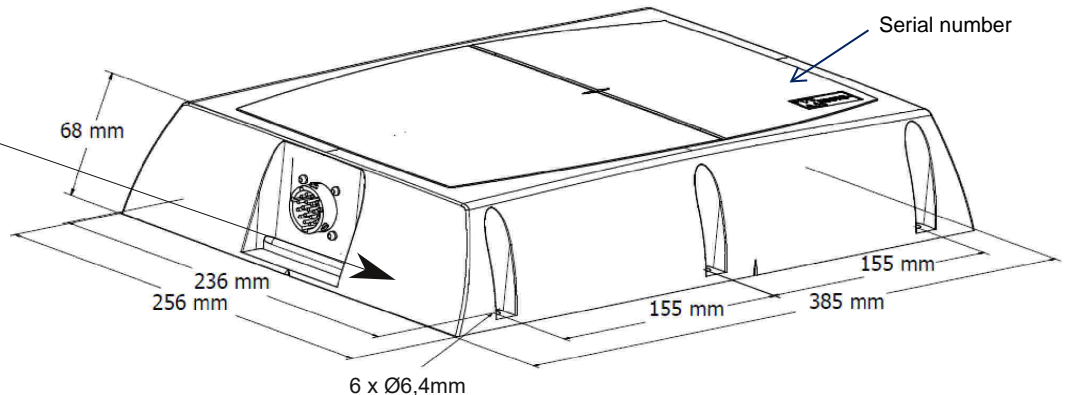**Marking :**

Part number identification :
MOS200 1359 NRZ

Serial number identification :
yywwxxxxxx-nnn-v
yy = year
ww=week
xxxxxx= factory order
nnn=serial number
v=revision index

68 mm

236 mm
256 mm

155 mm

155 mm
385 mm

6 x Ø6,4mm

PRINCIPLE OF OPERATION

The transmitter at 125kHz of the reader allows to remotely power an OMS beacon when the train is passing over it. When the beacon is powered, it sends information to the reader MOS200 1359

The receiver at 6.78MHz of the MOS200 1359 reader allows to :
- process the identification signal sent by the beacon. After analog processing, the signal "Data" is sent directly to an on-board calculator. This signal is duplicated towards two unidirectionnal differential ouputs "Data1_Tx" and "Data2_Tx" (RS485).
- process the localisation signal sent by the beacon. After analog processing the localization signals S1 and S2 are sent to an on-board calculator. The localization signal S1 is duplicated towards two unidirectional differential outputs (RS485) "S1_1" and "S1_2", and the localization signal S2 is duplicated towards two digital outputs "S2_1" and "S2_2".

A RS485 (CdeTest RS485) serial link can be used for the maintenance of the reader.
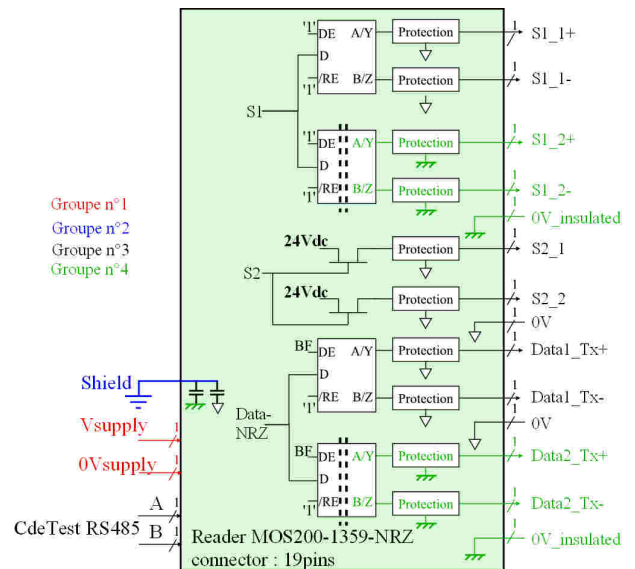
TECHNICAL SPECIFICATIONS

Radiofrequency communication with OMS beacon

	min	typ	max	unit
Nominal range Δz (1)	100		250	mm
Precision of localization		+/-50		mm
Longitudinal transmission zone length (X axis) (1) (2)	600		2000	mm
Radius beyond which there is no identification (guarantee for adjacent track)			1000	mm
Emission carrier frequency		125		kHz
Reception carrier frequency		6,78		MHz
Identification data size of the OMS beacon and read by the MOS200 1359			144	bits
Maximum speed relative to OMS beacon			160	km/h

(1) : With metallic environment as indicated page 5
(2) : Operational tolerances with respect to the beacon :
maximum angular offset θx: +/-10°; θy: +/-15°; θz: +/-8°, and maximum shift Δy =+/-60mm ;
Δz is the distance between the two opposite faces of the reader and the beacon

Insulated Power supply (Vsupply and 0Vsupply)

	min	typ	max	unit
DC power supply (according to EN50155) : Vsupply	16,8		137,5	Vdc
Consumption @ 24Vdc		1200	1650	mA
Consumption @ 110Vdc		280	360	mA
Protection against reverse polarity	protected			.
Peak current at startup	<2,5A after 1ms			

Data_Tx RS485 : Serial link "Data1_Tx" and insulated "Data2_Tx"

	min	typ	max	unit
Transmission speed		62,5		kbit/s
Impedance internally adapted		120		Ω
Short circuit	protected			-

CdeTest RS485 Serial link "A" and "B"

	min	typ	max	unit
Transmission speed		19,2		kbit/s
Impedance internally adapted		120		Ω
Short circuit	protected			-

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TECHNICAL SPECIFICATIONS

	min	typ	max	unit

RS485 differential outputs S1 : "S1_1" and insulated "S1_2"

	min	typ	max	unit
Compatibity with RS485 Driver	electrically compatible			-
Impedance internally adapted		120		Ω
Short circuit	protected			-

Digital outputs S2 : "S2_1" and "S2_2"

		min	typ	max	unit
High level output voltage V_{OH}	@I_{OH}=10mA		24	25	V
	@I_{OH}=40mA		19		V
Low level output voltage V_{OL} (with a load of 10kΩ)				1	V
Continuous output current I_{OH}				40	mA
Short circuit		protected			-

Insulated groups

	min	typ	max	unit
N°1 : power supply : Vsupply ; 0Vsupply				-
N°2 : Connector body - cable shield				-
N°3 : Serial link Data1_Tx ; S1_1 ; S2_1; S2_2 ; 0V ; Serial link CdeTest				-
N°4 : Serial link Data2_Tx ; S1_2 ; 0V_insulated				-
Insulation voltage between each group	1.000			Veff
Insulation resistance between each group @500V	10			MΩ

### Others Electrical service conditions

Interruption of voltage supply : EN 50155:2016 ; STM-E-001-B	Class S1 compliant & Class S2 compliant	-
Power supply fluctuation around Vsupply : EN 50155:2016 ; STM-E-001-B	0,6 Un to 1,4 Un : Criterion A	-
Supply change over : EN 50155:2016 ; STM-E-001-B	Class C1 compliant & Class C2 compliant	-

Interfaces of the reader

1- The data format on Data1_Tx and Data2_Tx is NRZ

2- The BF signal indicates correct operation of the reader, this information is carried by the Data1_Tx and Data2_Tx signals :
- When BF='1', reader operates correctly, so the data can be sent.
- When BF='0', reader does not operate correctly, so the data can not be sent, and the two signals Tx+ and Tx- of the serial link Data1_Tx and Data2_Tx are both fixed to 0V and 0V_insulated respectively.
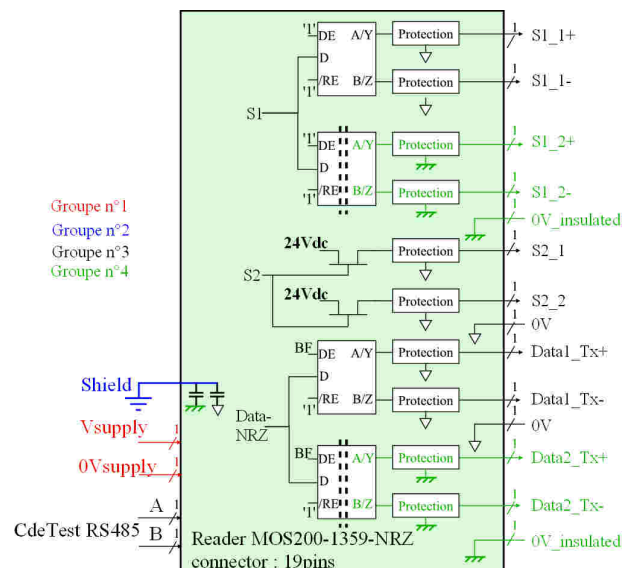
TECHNICAL SPECIFICATIONS

Environment

	min	typ	max	unit
Operating temperature class Tx : EN 50155:2016 ; STM-E-001-B	-40 (3)		+70 (4)	°C
Storage temperature : EN 50155:2016 ; STM-E-001-B	-40		+85	°C
Electromagnetic (EMC) : EN 50155 ; STM-E-001-B	EN 50121-3-2			-
Radiofrequency	EN 300330			-
Human exposure	EN 50364			-

		unit
Shock and vibrations: mounting on bogie : EN 50155:2016 ; STM-E-001-B	EN 61373	-
Flammability grade : EN 50155:2016 ; STM-S-001-D	EN 45545-2 : R23 HL2	-
Ingress protection rating EN 50155:2016 -STM-E-001-B	EN 60529 : IP67	-
Temperature cold test - dry heat test : EN 50155:2016	EN 60068-2-1 & EN 60068-2-2	-
Temperature damp heat test : EN 50155:2016;; STM-E-001-B ; EN 60068-2-30	55°C insulation resistance>10MΩ	-
Humidity EN 50125-3 - EN 60068-2-78	95% insulation resistance>10MΩ	-
Altitude : EN 50155:2016 - EN 50125-1	1 200	m
Low temperature storage test : EN 50155:2016 ; STM-E-001-B	EN 60068-2-1 : -40°C	-
Salt mist test : EN 50155:2016 : ; STM-E-001-B	EN 60068-2-11 : 500h	
Burn-in test : EN 50155:2016 (routine test)	16	h
RoHS European directive 2011/65/EU and REACH European directive n°1907/2006	Compliance	-
RED European directive 2014/53/UE	Compliance	-

(3) : at power on, operational after a time of up to 30 minutes
(4) : including the possible effects of altitude and solar radiation of 1120W/m^2

Enclosure

		typ		unit
Weight		8.000		g
Enclosure material		PA6 (Polyamide 6)		-
Coating		Polyurethane		-
Recommended tightening torque		5		N.m

RAMS features

		typ		unit
MTBF according to IEC62380 railways mobile : Mean ambient temperature of the equipment : 15°C Mean variation of the temperature day/night : 10°C Operating : 20h per day Number of on/off : 1 per day		300.000		h

CONNECTING

□ **Recommadation for cable:**
● 18 wires.
● Overall shielding: it must be in contact over 360° to the metallic cable connector housing.
● Preferably twisted pairs for serial links.
● Connection of conductors wires to connector pins by crimping; conductor cross section : 0,75 to 1,5mm2
● Length: 200 m max. (according to the supply voltage and conductor cross section (must be at least 0,75mm2) the length could be less : for example with Vsupply=24Vdc, the length would be 60m max with 0.75mm2 or 120m max with 1.5mm2)
● Outer diameter of cable: 13,5 to 18 mm (see § accessories).

□ **Connection:**

Pin	Description
A	Data1_Tx+
B	0V
C	S1-1+
D	0V
E	S2-2
F	S2-1
G	NC *
H	0V_insulated
J	Data2_Tx+
K	0V_insulated

Pin	Description
L	Vsupply
M	0Vsupply
N	Data1_Tx-
P	CdeTest RS485 B
R	S1-1-
S	S1-2+
T	S1-2-
U	Data2_Tx-
V	CdeTest RS485 A

* : NC = Not Connected

Pins : A-B-C-D-E-F-N-P-R and V are referenced to 0V (pins B and D internally connected)
Pins : H-J-K-S-T and U are referenced to 0V_insulated (pins H and K are internally connected)
Pins : L and M are referenced to 0Vsupply
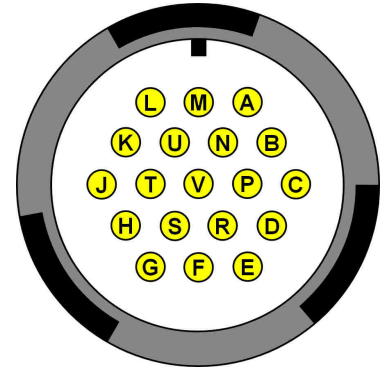
VGE1 type connector from Souriau
orientation position : N (0°)
Pin side view of the male receptacle
(or wiring side view of the female plug)

MOUNTING SPECIFICATIONS

● The Safety Localization Reader must get a precise location in relation with the Safety Localization Beacon on the track, the operational tolerances of each beacon installed on the track in relation with each reader installed under the carriage are summarized in the opposite table.

● **Metallic Environment:**
The reader must be fixed on a metal support of at least 385mm x 296mm (overrun of 20mm on the two large sides of the reader).

● **Fixing:**
Fixing will be carried out by 6 screws Ø6 (not provided).

● **Important:**
Minimum distance between two readers : 5 m

ΔZ	Vertical offset		100 to 250 mm
ΔY	Lateral offset		+/- 60mm
ΘX	Tilt in vertical (lateral) plane		+/- 10°
ΘY	Tilt in vertical (longitudinal) plane		+/- 15°
ΘZ	Rotation in horizontal plane (top view)		+/- 8°

ACCESSORIES (to order separately)

● 19 pins straight female plug for a 13,5mm to 18mm cable, ref. FFM SOU VGE1/19p
● 19 pins elbow female plug for a 13,5mm to 18mm cable, ref. FFM C SOU VGE1/19p

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