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Railway applications — Communication, signalling and processing systems — European Rail Traffic Management System — Driver-Machine Interface

Part 3: Ergonomic arrangements of
non ETCS information

National foreword

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**Railway applications - Communication, signalling and processing
systems - European Rail Traffic Management System - Driver-
Machine Interface - Part 3: Ergonomic arrangements of non
ETCS information**

Applications ferroviaires - Systèmes de signalisation, de
télécommunications et de traitement - Système européen
de gestion du trafic ferroviaire - Interface de conduite -
Partie 3: Principes généraux pour la présentation des
informations non ETCS

Bahnanwendungen - Telekommunikationstechnik,
Signaltechnik und Datenverarbeitungssysteme -
Europäisches Leitsystem für den Schienenverkehr -
Mensch-Maschine Schnittstelle - Teil 3: Ergonomische
Anordnung der Nicht-ETCS Informationen

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European foreword

This document (CLC/TS 50459-3:2016) has been prepared by CLC/SC 9XA “Communication, signalling and processing systems”, of Technical Committee CLC/TC 9X “Electrical and electronic applications for railways”.

This document supersedes CLC/TS 50459-3:2005.

The main changes with respect to the previous edition are listed below:

- Update general principles for the presentation of non ETCS information correlated with ERA document ERA_ERTMS_015560.
- Update ergonomic arrangements with prEN 16186 series.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This Technical Specification has been prepared under mandates M/024 and M/334 given to CENELEC by the European Commission and the European Free Trade Association.

Introduction

This Technical Specification should be read in conjunction with ERA_ERTMS_015560:2014 "ETCS Driver Machine Interface" and prEN 16186 series, "Railway applications — Driver's Cab".

This Technical Specification is Part 3 of a series with the following parts:

CLC/TS 50459-1 General principles for the presentation of ERTMS/ETCS/GSM-R information

CLC/TS 50459-2 Ergonomic arrangements of ERTMS/GSM-R information

CLC/TS 50459-3 Ergonomic arrangements of non ETCS information

This part of this Technical Specification contains the ergonomic arrangements of non ETCS information. Annex A of this part shows examples of existing NTC DMI layouts.

Annex B of this part lists the sound examples for NTC and other train functions (not exhaustive).

1 Scope

This Technical Specification describes from an ergonomic point of view how non ETCS information are arranged and displayed on the CCD. More specifically, it covers information that is not within the scope of ERA document ERA_ERTMS_015560.

This Technical Specification describes two possible technologies for implementing the ETCS DMI namely touch screen and soft key.

National systems not integrated within ETCS DMI are not within the scope of this specification.

Redundancy concepts are not within the scope of this document.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

prEN 16186-3:2014, *Railway applications — Driver's cab — Part 3: Design of displays*

CLC/TS 50459-1:2015, *Railways applications – Communication, signalling and processing systems – European Rail Traffic Management System – Driver-Machine Interface – Part 1: General principles for the presentation of ERTMS/ETCS/GSM-R information*

EUROPEAN RAILWAY AGENCY - ERTMS/ETCS - ETCS Driver Machine Interface - Reference: ERA_ERTMS_015560 - Version 3.4.0 - 2014-05-12

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in CLC/TS 50459-1 and the following apply.

3.1.1

ETCS DMI

CCD that allows communication between ETCS on-board equipment and the driver

3.1.2

ETCS DMI default window

total image display area with the allocation of objects, text messages and buttons as described in ERA ERTMS 015560 chapter 8 and 9

3.1.3

NTC default window

a NTC default window is shown in NTC operation (Level NTC, modes SN or NL)

Note 1 to entry: The layout of a NTC default window may differ to an ETCS default window.

3.2 Abbreviated terms

For the purpose of this document, the abbreviated terms given in CLC/TS 50459-1, CLC/FprTS 50459-2 and _ERTMS_015560 and the following apply.

ASC	Automatic Speed Control
ATC2	Swedish/Norwegian ATP system
ATO	Automatic Train Operation
ATP	Automatic Train Protection
ATTO	Activated Train Trip Override
AWS	Automatic Warning System (UK)
DAC	Driver Activity Control
DAS	Driver Advisory System
DMI	Driver-Machine Interface
JKV	Junien Kulunvalvonta (Finnish ATP system)
LZB	Linienzugbeeinflussung (German ATP system)
NL	Non Leading mode
NTC	National Train Control
OM	Operative Mode
PZB	Punktzugbeeinflussung (German ATP system)
PLZB	LZB/PZB or PZB
SCMT	Sistema Controllo Marcia Treno (Italian ATP system)
SHP	Samoczynne Hamowanie Pociągu (Polish ATP system)
SN	National System mode
SSC	Sistema di Supporto alla Condotta (Italian ATP System)
STM	Specific Transmission Module
TPWS	Train Protection and Warning System (UK)

4 General principles

4.1 Purpose of document

4.1.1 General

A clear and consistent definition of the non ETCS driver machine interface helps the driver to better understand the tasks he has to perform. This increases the speed and the accuracy of interactions between the driver and the non ETCS on-board equipment (NTC and/or other on-board systems), hence reducing the probability of human errors.

Moreover, harmonizing the presentation of displayed information and the driver's interactions with the equipment, contributes to a unified operation of the trains regardless of which suppliers products they are fitted with. This reduces further the potential for human errors, reduces the driver training requirement and facilitates cross-acceptance of equipment.

Annex A gives existing examples for the integration of NTC and/or other on-board systems.

Annex B gives existing examples of the sounds for NTC and other train functions.

The lists given in Annex A and Annex B are not exhaustive.

4.1.2 Ergonomic arrangements of areas of the ETCS layout

For the definition of non ETCS screen layouts (NTC or other on-board systems) the basic layouts described in CLC/TS 50459-1 and ERA ERTMS 015560 should apply.

The basic layouts apply for a 'Unified DMI' as defined in ERA ERTMS 015560. For a 'Customised DMI' it is possible to modify these layouts for NTC operation.

The basic layouts for touch screen technology and soft key technology are shown in Figure 1 and Figure 2. These layouts are taken from the ERA ERTMS 015560 document to aid the use of this document.

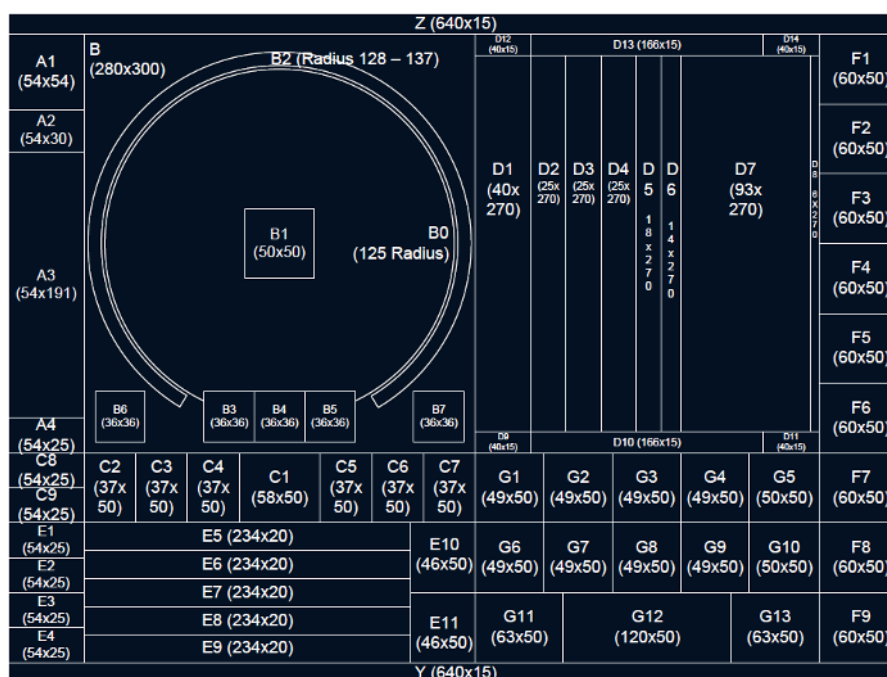


Figure 1 — The sub areas of the ERTMS/ETCS layout (touch screen technology)

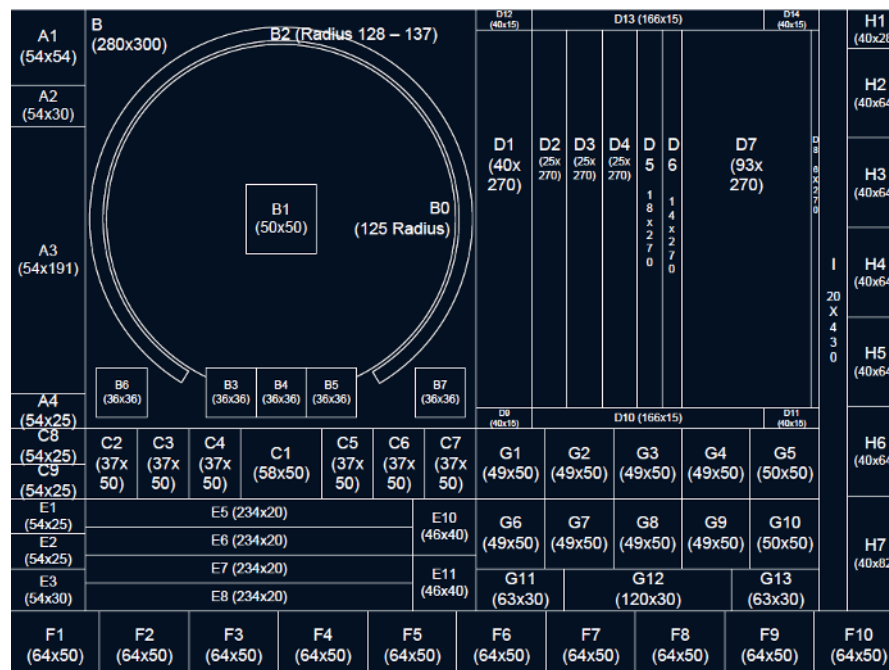


Figure 2 — The sub areas of the ERTMS/ETCS layout (soft key technology)

4.1.3 ETCS objects

Even if authorized by other standards, for ergonomic reasons the size and location of ETCS objects should not be changed.

4.1.4 Non ETCS objects

For displaying a NTC and other on-board systems (e.g. DAC) together, the position and size of the objects shall be arranged to prevent overlapping.

4.2 Audible information for non ETCS systems

According to ERA ERTMS 015560 audible information for a non ETCS system should be sent specified by a sequence of segments defined by a duration and an associated frequency sent to the ERTMS/ETCS on-board system (Unified DMI).

For a customized DMI the audible information should be sent by *.wav files.

If a non ETCS system requires its own audible information this is mentioned in the corresponding section.

Examples of audible information mentioned in this document are described in Annex B.

4.3 Data entry

Data entry repetition of same data should be avoided.

5 Non ETCS symbols

5.1 General requirements for unified DMI service

According to ERA ERTMS 015560 only areas of the ETCS DMI default window that are not used for ETCS information in NTC levels and modes NL or SN can be used for NTC buttons and indicators.

The available areas for buttons are

- for soft key technology: F8, F9, F10, H2, H3, H4;
- for touch screen technology: F8, F9, C2, C3, C4, C5, C6, G1-G10.

The available areas for indicators are

- for soft key technology: B3, B4, B5, C2, C3, C4, C5, C6, G1-G13, H1;
- for touch screen technology: B3, B4, B5, C2, C3, C4, C5, C6, G1-G13.

The available button and indicator areas shall be mapped to a corresponding position identifier (see Figure 1 and Figure 2).

Speed and distance supervision information sent by the NTC shall be displayed by the ETCS DMI according to ERA ERTMS 015560.

NOTE For touch screen technology, some areas can be used for buttons or indicators, depending on the need of the National System.

5.2 Symbols for other train functions

The symbols for other train functions (e.g. DAC, Passenger Alarm initiated brake application, Open Door Alarm, Main Circuit Breaker) may be displayed in area G.

The usage of area G shall not be in contradiction with prEN 16186-3:2014, Annex A.

Annex A (informative)

Integration of NTC and/or other on-board systems

A.1 Usage of screen areas

All areas marked in yellow colour are used by NTC and/or other on-board systems as shown in the examples.

The ergonomics of the examples are based on the area arrangements for the ETCS layout (see Figure 1 and Figure 2).

A.2 LZB/PZB NTC

A.2.1 Scope and field of specification

This example shows the interface between the driver and the LZB/PZB on-board regarding to the use in context with ERTMS/ETCS and as standalone system (LZB/PZB in fallback mode).

The specification describes two possible technologies for implementing the LZB/PZB DMI, namely touch screen or soft key.

The requirements regarding LZB/PZB are defined in [20], [21], [28] and [29].

A.2.2 Overview

Figure A.1 and Figure A.2 explain the usage of the ETCS DMI areas.

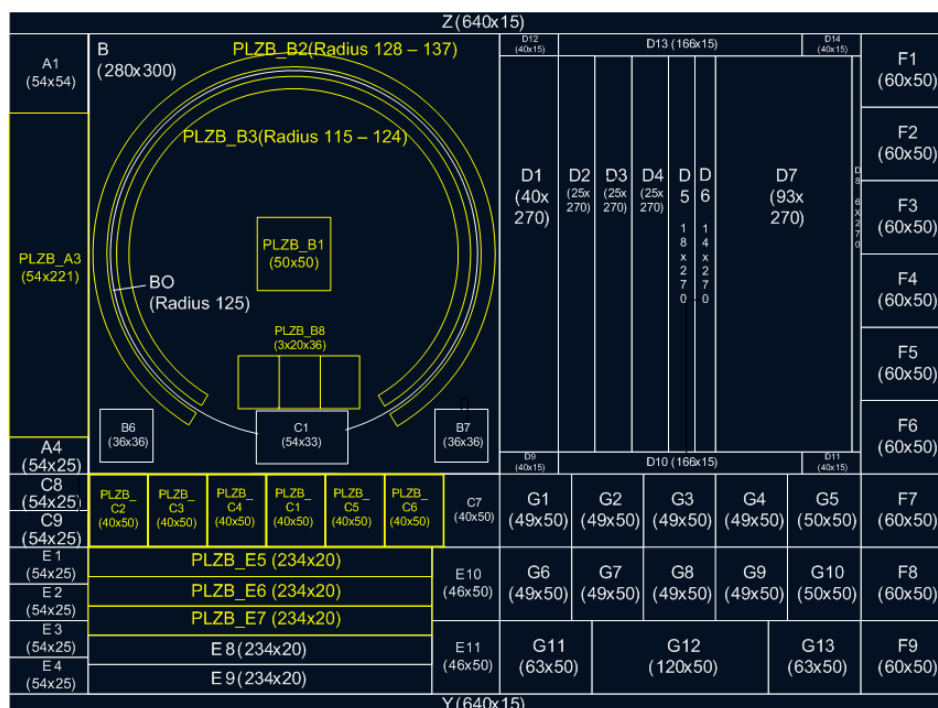


Figure A.1 — The sub areas of the LZB/PZB layout (touch screen technology)

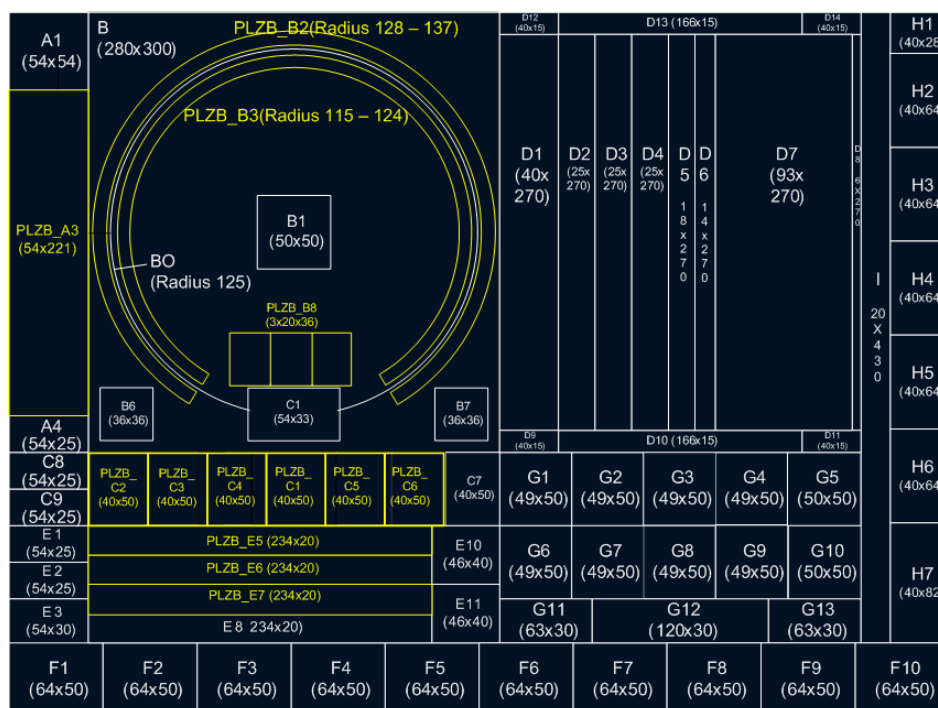


Figure A.2 — The sub areas of the LZB/PZB layout (soft key technology)

To avoid competitive use of the text area, the LZB/PZB text messages are displayed as private areas (PLZB_E5/6/7) outside ETCS scrolling. For ETCS messages only areas E8/9 (touch screen technology) respectively area E8 (soft key technology) are available.

A.2.3 Positioning onto the grid array

A.2.3.1 Area description

All areas not defined here are in positions and dimension according to ERA ERTMS 015560.

Area A (total size: 54 x 300 cells (w x h)) is composed of:

- PLZB_A3 instead of A2 and A3 (54x221).

Area B (total size: 280 x 300 cells (w x h)) is composed of:

- PLZB_B2 (radius 128 to 137);
- PLZB_B3 (radius 115 to 124);
- PLZB_B8 (60x36) (the centre of PLZB_B8 is positioned (140,239));
- C1 (54x33) (the centre of C1 is positioned (140,277)).

NOTE B3/4/5 are not described in this layout because currently not used.

Area C (total size: 334 x 50 cells (w x h)) is composed of:

- C1 (58x50) not used in area C, is defined in area B;
- PLZB_C2/3/4/1/5/6 (6x (40x50));
- C7(40x50).

For touch screen technology:

Area E (total size 334 x 100 cells (w x h)) are composed of:

- PLZB_E5/6/7 (3x (234x20)) placed instead of E5/6/7;
- E8/9 (2x (234x20)).

For soft key technology:

Area E (total size 334 x 80 cells (w x h)) are composed of:

- PLZB_E5/6/7 (3x (234x20)) placed instead of E5/6/7;
- E8 (234x20).

A.2.3.2 Speed and distance monitoring – supervision status

For the speed and distance monitoring on touch screen and soft key technology the following areas are used:

- PLZB_B1 (50x50) placed instead of B1 showing actual speed;
- PLZB_B8 (3x20x36) placed above C1 showing the target speed of LZB;
- PLZB_B2 (radius 128 to 137) showing the permitted speed of LZB;

- PLZB_B3 (radius 115 to 124) showing the permitted speed of ASC or the permitted speed of Cruise Control.

A.2.4 ETCS and LZB/PZB information shown on a LZB/PZB default window

A.2.4.1 Introduction

The layers on the LZB/PZB default window have different or additional requirements to ERA ERTMS 015560 as follows:

- Layer 0: no change;
- Layer -1: PLZB_A3, PLZB_C2, PLZB_C3, PLZB_C4, PLZB_C1, PLZB_C5, PLZB_C6;
- Layer -2: PLZB_B8, C1 (in area B).

A.2.4.2 ETCS objects

The area C1 is moved to area B.

A.2.4.3 NTC objects

A.2.4.3.1 General

The LZB/PZB text messages are displayed in area PLZB_E5/6/7.

The cursor buttons E10 and E11 are without effect to the area PLZB_E5/6/7. The scrolling has only effect to the text messages in area E8/9 (touch screen technology) respectively in area E8 (soft key technology).

The LZB/PZB text messages have to remain different from ETCS text messages, because they always have to be seen in the context of the indicators in PLZB_C2/3/4/5/6.

A.2.4.3.2 Indicators PLZB_C2/3/4/5/6

The indicators PLZB_C2/3/4/5/6 are displayed according to [21] and [28].

A.2.4.3.3 Supervision information

A.2.4.3.3.1 Current train speed pointer

The current speed is displayed in area PLZB_B1 as grey needle object. The dimension of the needle object is according to ERA ERTMS 015560.

A.2.4.3.3.2 Vperm of LZB

Vperm of LZB is displayed in area PLZB_B2 as red equilateral triangle with needle in direction to the centre of PLZB_B1.

A.2.4.3.3.3 Vtarget of LZB

Vtarget of LZB is displayed in PLZB_B8 as three digit value in yellow.

A.2.4.3.3.4 Vperm of ASC

Vperm of ASC is displayed in PLZB_B3 as a yellow rhombus pointing to the centre of PLZB_B1.

A yellow rhombus means: Dynamic brake and pneumatic brake are involved.

A.2.4.3.3.5 Vperm of 'Cruise Control'

Vperm of 'Cruise Control' is displayed in PLZB_B3 as a magenta circle.

A magenta filled circle means: Only the dynamic brake is involved.

A.2.5 LZB/PZB sub-level windows

A.2.5.1 Introduction

For all equipment where the LZB and PZB function is implemented, all requirements in ERA ERTMS 015560 described with the label "NTC X" are described with the label "LZB/PZB".

For all equipment where the PZB function is implemented only, all requirements in ERA ERTMS 015560, described with the label "NTC X" are described with the label "PZB".

In the following figures of this annex for all equipment where the LZB and PZB function is implemented the following replacements are used:

Table A.1 — LZB/PZB terms in figures

Term in Figures	Term in LZB/PZB
NTC X	LZB/PZB
label 1	BRA
label 2	BRH
label 3	ZL
label 4	VMZ
data 1	value BRA
data 2	value BRH
data 3	value ZL
data 4	value VMZ

For all equipment where only the PZB function is implemented the following replacements will be used:

Table A.2 — PZB terms in figures

Term in Figures	Term in PZB
NTC X	PZB
label 1	BRA
label 2	BRH
data 1	value BRA

Term in Figures	Term in PZB
data 2	value BRH

A.2.5.2 Menu windows

A.2.5.2.1 LZB/PZB data entry windows)

NTC X data

label 0 data 0

label 1 data 1
label 2 data 2
label 3 data 3
label 4 data 4

NTC X data entry complete?

Yes

1 2 3
4 5 6
7 8 9
Del 0 .

X

Figure A.3 — LZB/PZB data entry window (1st window) in touch screen technology

NTC X data

label 0 data 0

label 1 data 1
label 2 data 2
label 3 data 3
label 4 data 4

NTC X data entry complete?

Yes

1 2 3 4 5 6 7 8 9 0

Del X

Figure A.4 — LZB/PZB data entry window (1st window) in softkey technology

A.2.5.2.2 LZB/PZB data validation windows

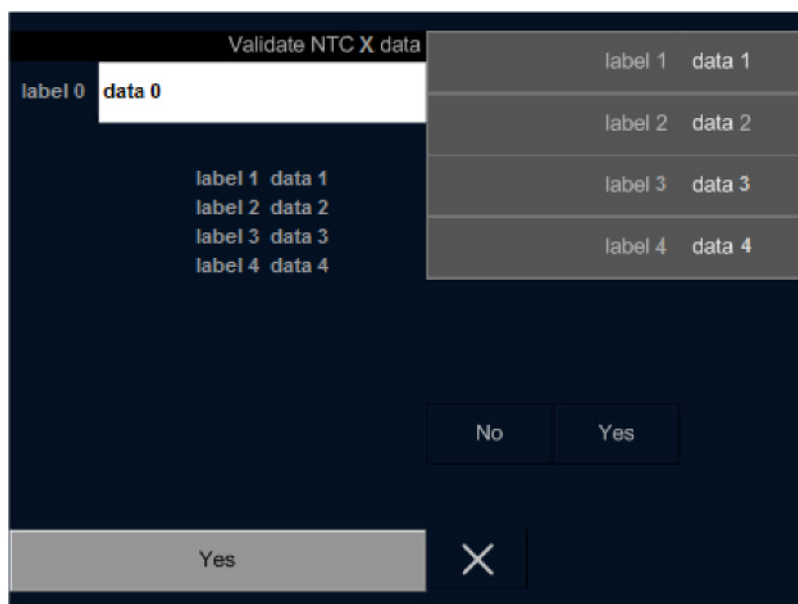


Figure A.5 — LZB/PZB data validation window in touch screen technology



Figure A.6 — LZB/PZB data validation window in softkey technology

To inform the driver about LZB adjustment proposals in soft key technology the 'info' hard key button is used.

For touch screen technology an info button is inside an unused area of the data window.

A.2.5.2.3 LZB/PZB data view window

The red equilateral triangle with needle in direction to the centre of the speedometer represents Vperm of LZB.

Vtarget of LZB is displayed as three digit value in yellow.

Vperm of ASC is displayed as a rhombus, see A.2.4.3.3.4.

Vperm of 'Cruise Control' is displayed as magenta filled circle, see A.2.4.3.3.5.

In case an ASC or 'Cruise Control' system is active, Vperm of ASC or Vperm of Cruise Control respectively is shown together with Vperm of LZB.



Figure A.7 — LZB/PZB data view window in touch screen technology

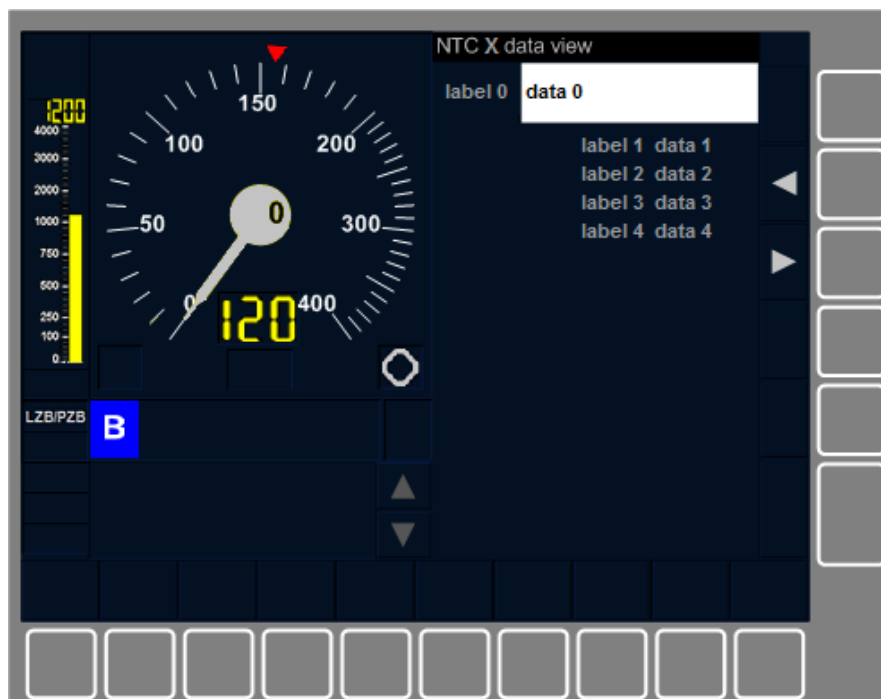


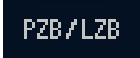
Figure A.8 — LZB/PZB data view window in softkey technology

A.2.6 LZB/PZB symbols

A.2.6.1 Level symbols

Level symbols according to ERA_ERTMS_015560 for LZB/PZB are presented in Table A.3.

Table A.3 — Level symbols for LZB/PZB

Symbol number	Symbol form/shape	Bitmap file	Symbol colour description	and	Symbol size (cells)	Symbol area(s)	Remarks
A01		lev01.bmp	level grey	LZB/PZB;	52 x 21	C8	For National System where LZB and PZB functions are available
A02		lev02.bmp	level grey	PZB;	52 x 21	C8	For National System where only PZB functions are available

A.2.6.2 Mode symbols

No different or additional requirements to ERA_ERTMS_015560.

A.2.6.3 Status symbols

The following special status symbols are used in ERTMS/ETCS level LZB/PZB or PZB in mode SN or in LZB/PZB fallback mode.