



**SLOVENSKI STANDARD**  
**SIST EN 14116:2007+A1:2009**  
**01-marec-2009**

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**Posode za prevoz nevarnih snovi - Digitalni vmesnik za prepoznavno napravo polnjenja**

Tanks for transport of dangerous goods - Digital interface for the product recognition device

Tanks für die Beförderung gefährlicher Güter - Digitale Schnittstelle für das Produkterkennungssystem

Citernes destinées au transport de matières dangereuses - Interface numérique du dispositif de reconnaissance de produits

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**Ta slovenski standard je istoveten z: EN 14116:2007+A1:2008**

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**ICS:**

13.300	Varstvo pred nevarnimi izdelki	Protection against dangerous goods
23.020.20	Posode in vsebniki, montirani na vozila	Vessels and containers mounted on vehicles
35.240.60	Uporabniške rešitve IT v transportu in trgovini	IT applications in transport and trade

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 14116:2007+A1**

November 2008

ICS 13.300; 23.020.20; 35.240.60

Supersedes EN 14116:2007

English Version

## Tanks for transport of dangerous goods - Digital interface for the product recognition device

Citernes destinées au transport de matières dangereuses -  
Interface numérique du dispositif de reconnaissance de  
produits

Tanks für die Beförderung gefährlicher Güter - Digitale  
Schnittstelle für das Produkterkennungssystem

This European Standard was approved by CEN on 12 February 2007 and includes Amendment 1 approved by CEN on 15 October 2008.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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## Foreword

This document (EN 14116:2007+A1:2008) has been prepared by Technical Committee CEN/TC 296 “Tanks for transport of dangerous goods”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2009, and conflicting national standards shall be withdrawn at the latest by May 2009.

This document includes Amendment 1, approved by CEN on 2008-10-15.

This document supersedes A1 EN 14116:2007 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

This European Standard forms part of a coherent standards program comprising the following European Standards:

EN 13922, *Tanks for transport of dangerous goods — Service equipment for tanks — Overfill prevention systems for liquid fuels.*

EN 13616, *Overfill prevention devices for static tanks for liquid petroleum fuels.*

EN 15207, *Tanks for transport of dangerous goods — Plug/socket connection and supply characteristics for service equipment in hazardous areas with 24 V nominal supply voltage.*

EN 15208, *Tanks for transport of dangerous goods — Sealed parcel delivery systems — Working principles and interface specifications.*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

**EN 14116:2007+A1:2008 (E)**

## **Introduction**

Product recognition, the subject of this European Standard, is the digital interface that allows product data and/or other information to be transferred between transport tanks and other installations.

This European Standard has been extended by the possibility of bidirectional communication and defined messages were added.

Annex B gives more detailed information concerning patent rights for hose communication methods.

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## 1 Scope

This European Standard covers the digital interface at the product loading and/or discharge coupling which is used for the transfer of product related information and specifies the performance requirements, critical safety aspects and tests to provide compatibility of devices.

This European Standard specifies a digital interface which is suitable for use with liquid fuels.

## 2 Normative references

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

EN 50020, *Electrical apparatus for potentially explosive atmospheres — Intrinsic safety "i"*

EN 60079-0, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements (IEC 60079-0:2004)*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 8601, *Data elements and interchange formats — Information interchange — Representation of dates and times*

OIML R 117, *Measuring systems for liquids other than water*

## 3 Terms, definitions and abbreviations

### 3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1.1

##### **message**

defined data set

#### 3.1.2

##### **telegram**

frame that contains at least one standardized message

#### 3.1.3

##### **maximum input voltage ( $U_i$ )**

according to EN 50020

#### 3.1.4

##### **maximum output voltage ( $U_0$ )**

according to EN 50020

#### 3.1.5

##### **maximum input current ( $I_i$ )**

according to EN 50020

**EN 14116:2007+A1:2008 (E)****3.1.6****maximum output current ( $I_0$ )**

according to EN 50020

**3.1.7****maximum input power ( $P_i$ )**

according to EN 50020

**3.1.8****maximum output power ( $P_0$ )**

according to EN 50020

**3.1.9****maximum internal capacitance ( $C_i$ )**

according to EN 50020

**3.1.10****maximum internal inductance ( $L_i$ )**

according to EN 50020

**3.1.11****Multiple Product Identification Device****MultiPID**

electronic device emulating at least one PID, extended by the ability of bi-directional communication

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**3.2 Abbreviations**

For the purposes of this document, the following abbreviations apply.

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ASCII American Standard Code for Information Interchange

CPDP Comité Professionnel du Pétrole

CFPP Cold Filter Plugging Point

ESD Electro-Static Discharge

LSB Least Significant Bit

MSB Most Significant Bit

PID Product Identification Device

PRD Product Recognition Device

RON Research Octane Number

**4 Functions**

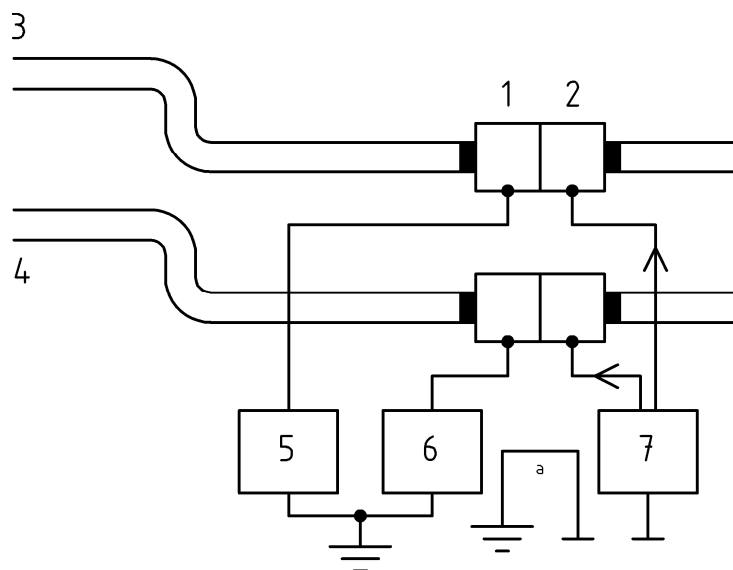
Whenever a physical connection according to Figure 1 or Figure 2 is made, the digital interface enables the transfer of product recognition data to the transport tank. The purpose of this digital interface is to provide the data for the following types of applications:

a) automatic product identification for each compartment or tank;

b) cross over prevention.



Bi-directionality may add the ability of communication between the stationary parts and the tank vehicle, e.g. the transfer of data of measured quantities in both directions.



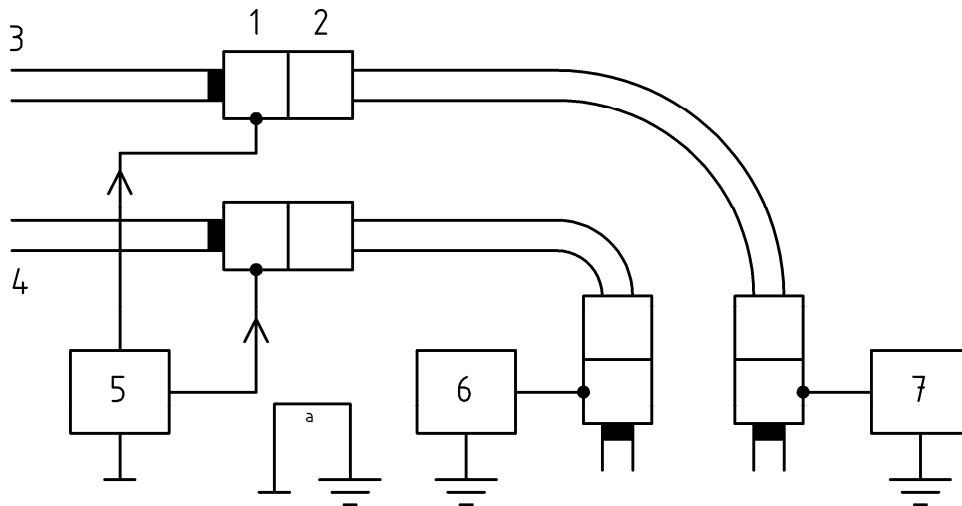
### Key

- 1 pipework of loading arm with insulated coupling
- 2 pipework of transport tank with insulated coupling
- 3 vapour line
- 4 product line
- 5 PID, vapour
- 6 PID, product
- 7 PRD
- <sup>a</sup> required, if only one connection is established

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**Figure 1 — Loading**

## EN 14116:2007+A1:2008 (E)

**Key**

- 1 pipework of transport tank with insulated coupling
- 2 conductive hoses<sup>b</sup> and pipework of stationary tank with insulated couplings
- 3 vapour line
- 4 product line
- 5 PRD
- 6 PID, product
- 7 PID, vapour
- <sup>a</sup> required, if only one connection is established

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<sup>b</sup> if the discharge hoses are not conductive then the conductivity of these hoses shall be achieved by other means

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**Figure 2 — Unloading**

PRD supplies an intrinsically safe circuit.

Hazardous area zoning vicinity of coupling and swivels - Zone 1, inside pipework - Zone 0.

## 5 Design characteristics

### 5.1 General

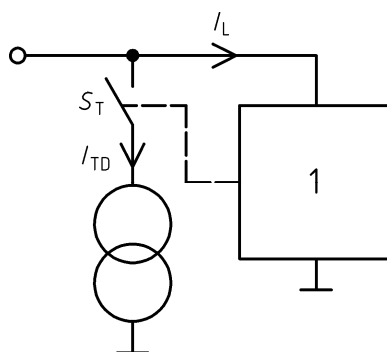
The PRD shall be located on the transport tank. The PID shall be connected in series to a current loop with the PRD.

The PRD reads the PID by powering the PID through the hose or loading arm. The PID then sends its data by modulating the supply current, which is sensed by the PRD, see Figure 3.

The PID sends its data, using messages, which are numbered from 1 to 255.

The PID always transmits "message #1". By implementing more messages, it is possible to program the PID with other types of information, see 6.6.

Since the PID modulates the supply current, PIDs shall not be connected in parallel.



### Components

- 1 electronic circuit
- $S_T$  modulating switch
- $I_L$  supply current without modulation
- $I_{TD}$  supply current amplitude

Figure 3 — Basic circuit diagram of PID

### 5.2 Temperature range

Unless otherwise specified, the operating temperature range shall be  $-20\text{ °C}$  to  $+50\text{ °C}$ .

Where the product recognition device is subjected to temperatures outside the specified temperature range all applicable temperature values shall be extended. All other requirements shall remain unchanged.

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### 5.3 Materials of construction

The manufacturer shall provide with the equipment a full material specification for those parts, which may come into contact with the substances according to Clause 1.

### 5.4 PRD

The PRD shall provide an intrinsically safe power supply with the values according to Table 1 to the PID.

Table 1 — DC electrical characteristics of PRD

Parameter	Unit	Min.	Nom.	Max.	Ex-values <sup>a</sup>
Open-circuit voltage	V	11	12	15	$U_0 = 15$
Short-circuit current	mA	-	-	300	$I_0 = 300$
Output power	W	-	-	1,1	$P_0 = 1,1$
<sup>a</sup> Maximum value to ensure compliance with EN 50020.					

Explosive protection shall be at least EEx ia IIA according to EN 60079-0 and EN 50020.

## EN 14116:2007+A1:2008 (E)

## 5.5 PID

## 5.5.1 General specification

Explosive protection shall be at least EEx ia IIA according to EN 60079-0 and EN 50020.

Table 2 — DC electrical characteristics of PID

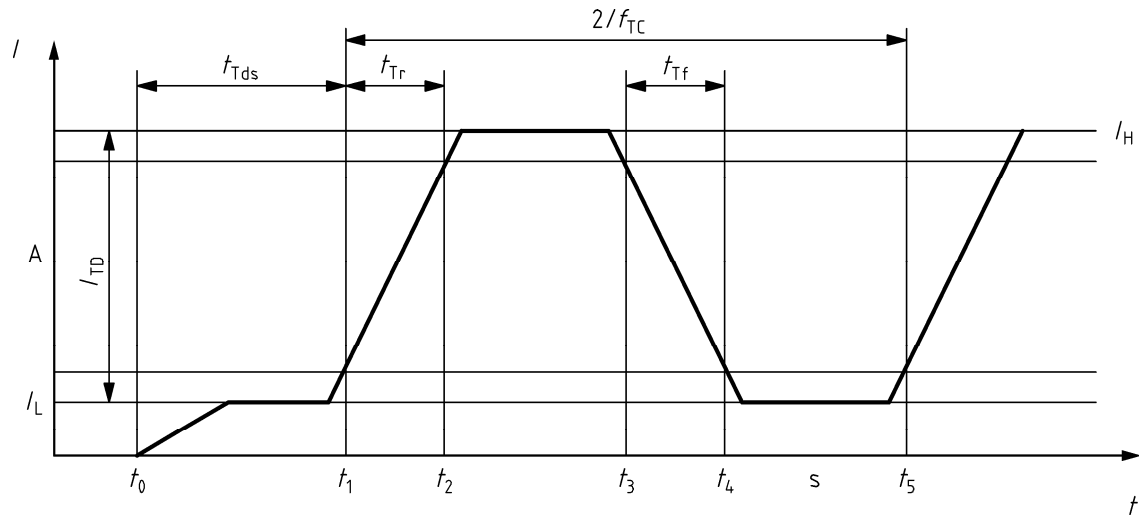
Parameter	Symbol	Unit	Min.	Nom.	Max.	Ex-values <sup>a</sup>
Supply voltage	$U$	V	6	12	15	$U_i = 15$
Supply current without modulation	$I_L$	mA	0	5	10	$I_i = 300$
Supply current at $U_+ < 3$ V	$I_{OFF}$	mA	-	-	5	-
Maximum input power	$P_i$	W	-	-	-	= 1,1
Maximum internal capacitance	$C_i$	nF	-	-	-	= 600
Maximum internal inductance	$L_i$	$\mu$ H	-	-	-	= 10

<sup>a</sup> Maximum value to ensure compliance with EN 50020.

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 Table 3 — AC electrical characteristics of PID  
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Parameter	Symbol	Unit	Min.	Nom.	Max.
Supply current amplitude	$I_{TD}$	mA	10	15	20
Clock rate	$f_{TC}$	Hz	4 800	4 880	4 960
Duty cycle	$cd_T$	%	40	50	60
Rise time of output signal	$t_{Tr}$	$\mu$ s	0	-	30
Fall time of output signal	$t_{Tf}$	$\mu$ s	0	-	30
Transmission delay after power on	$t_{Tds}$	ms	0	-	0,9

The timing diagram of PID is shown in Figure 4.

**Key**

$f_{TC} = 2 \times \text{baud rate } (f_{bit})$

$I_H$  supply current with modulation

$I_L$  supply current without modulation

$t_0 = t$  at power ON

$t_1, t_4, t_5 = t$  at  $i = I_L + 10\% I_{TD}$

$t_2, t_3 = t$  at  $i = I_L + 90\% I_{TD}$

$I_{TD}$  supply current amplitude

$t_{Tds}$  transmission delay after power on

$t_{Tf}$  fall time of output signal

$t_{Tr}$  rise time of output signal

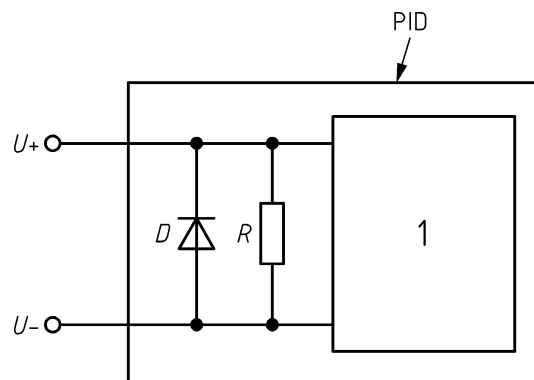
Figure 4 — Timing diagram of PID

**5.5.2 Diode and ESD protection**

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To maintain ESD protection, a resistor has to be implemented into the PID, see Figure 5 and Table 4.

**Components**

1 electronic circuit

$D$  diode

$R$  ESD resistor

Figure 5 — PID schematic wiring diagram