

# IT 10

## Operating Manual Impulse-Divider Cassette

*Please keep for further use !*

Edition date/Rev. date: 27.01.1998  
Document no./Rev. no.: TR - EAK - BA - GB - 0056 - 02  
Software version:  
File name: TR-EAK-BA-GB-0056.DOC  
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## **Printing**

This manual was edited using text formatting software on a DOS personal computer. The text was printed in *Arial*.

## **Fonts**

*Italics* and **bold** type are used for the title of a document or to emphasize text passages.

Passages written in `Courier` show text which is visible on the display as well as software menu selections.

"< >" refers to keys on your computer keyboard (e.g. <RETURN>).

## **Note**

Text following the "NOTE" symbol describes important features of the respective product.

## Revision History



**Note:**

The cover of this document shows the current revision status and the corresponding date. Since each individual page has its own revision status and date in the footer, there may be different revision statuses within the document.

Document created:

27.01.1998

Revision	Date

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## 1 Instructions concerning project work and commissioning

### 1.1 Procedure for commissioning

1. Comparison of the order data with the data on the rating plate.
2. Preparation of the connecting cables using the corresponding cable cross sections.
3. Please pay attention to the interference suppression measures and instructions concerning the shieldwire.

### 1.2 Safety instructions

This operating manual contains instructions which you must closely follow to guarantee your own personal safety and to avoid material damage. The instructions are highlighted by a warning triangle and are represented as follows depending on the degree of exposure to danger:



#### **Warning**

means that death, serious bodily injuries or considerable material damage may arise if the appropriate precautions are not taken.



#### **Caution**

means that slight bodily injuries or material damage may arise if the appropriate precautions are not taken.

Commissioning and operation of a unit may be carried out by qualified personnel only. Qualified personnel in the sense of the safety instructions contained in this operating manual are persons who are authorized to commission, connect to ground and to mark units, systems and electric circuits according to the standards of safety technology.

### 1.3 Instructions concerning project work and installation

As the product is mostly a component of larger systems in its application, these instructions are meant to give guidelines for the safe integration of the product in its environment.



#### **Warning**

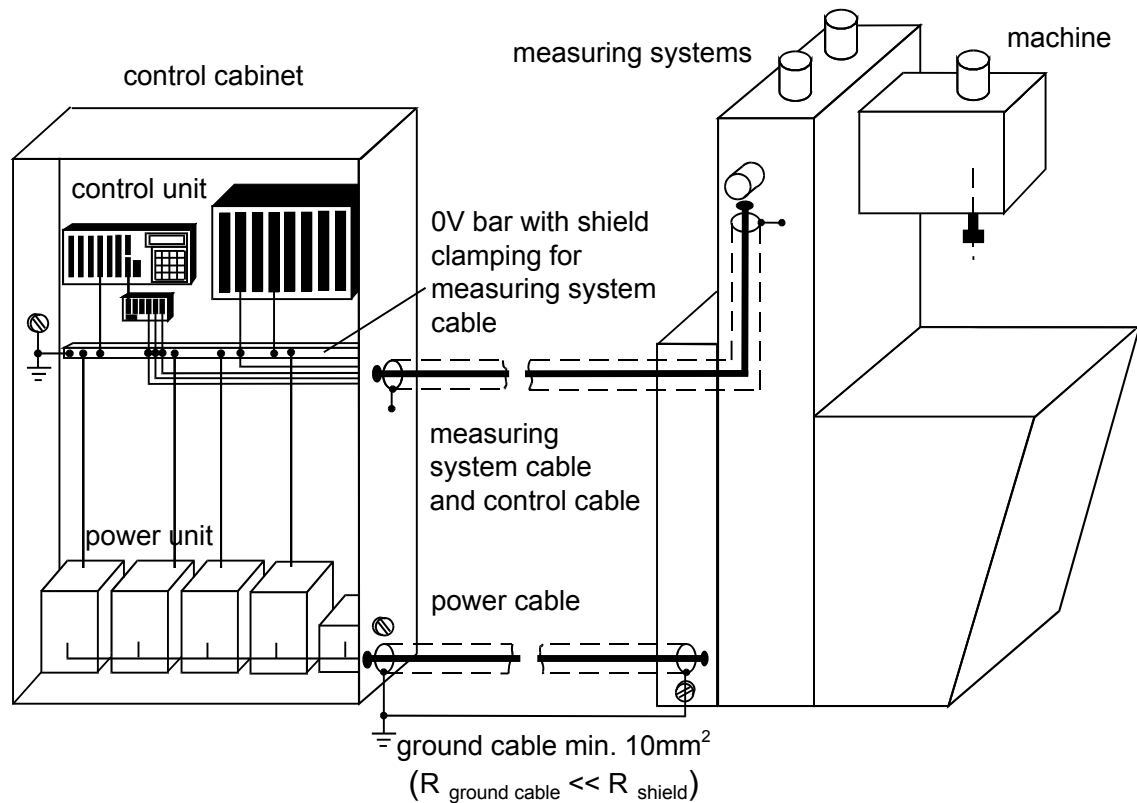
- The safety and accident prevention regulations valid for the specific case of use have to be observed.
- The EN (European Standards), VDE (Association of German Electricians) and DIN standards applying for your plant have to be observed.

## 1.4 Shielding

The use of electronic-sensor active systems in modern machines requires a concept for interference suppression and cabling which must be implemented correctly and consistently.

A plant containing electronic measuring systems as well as the cassette may only run smoothly if these requirements are met.

### Recommendation for shield cabling



## 1.5 Configuring instructions

- Feed the connecting line to the cassette at a large distance, or separately, from power lines carrying interference.
- For data transmission, use cable sections of at least 0.22 mm<sup>2</sup>.
- The cable section of the ground cable must be at least 10 mm<sup>2</sup> to avoid potential equalizing currents via the shield. Make sure that the resistance of the ground cable is much lower than that of the shield.
- Cabling of the shield must be continuous, with large areas resting on special shield terminals.

## 1.6 Commissioning instructions

- Cabling at the mating connector or in the control cabinet may be carried out in dead condition only.
- Before commissioning the plant, check all connections between the mating connector and the control cabinet.
- Plug in or unplug mating connectors of signal or supply lines in dead condition only.
- Do not make mechanical or electrical modifications to the cassette or the measuring systems.
- Carry out commissioning according to the safety instructions.

## 2 General information about the unit

The impulse divider IT 10 is used in complex plants together with incremental encoders for extending the signal path and for individual assimilation to mechanical conditions.

The unit allows distribution of the signals K1, /K1 and K2, /K2 as well as K0, /K0 of a single encoder to max. two outputs with each different output potentials.

To cover a wide application range, a level conversion of +5V differential, +11V..30V push-pull, open collector resp. open emitter at the input to +5V TTL differential or +11V..30V push-pull at the output is enabled.

An assimilation of the impulse number to mechanical components is enabled by an individually adjustable dividing factor within a range of 1:1 to 1:4096. The reset impulse is not divided but output according to the selected level at the output.

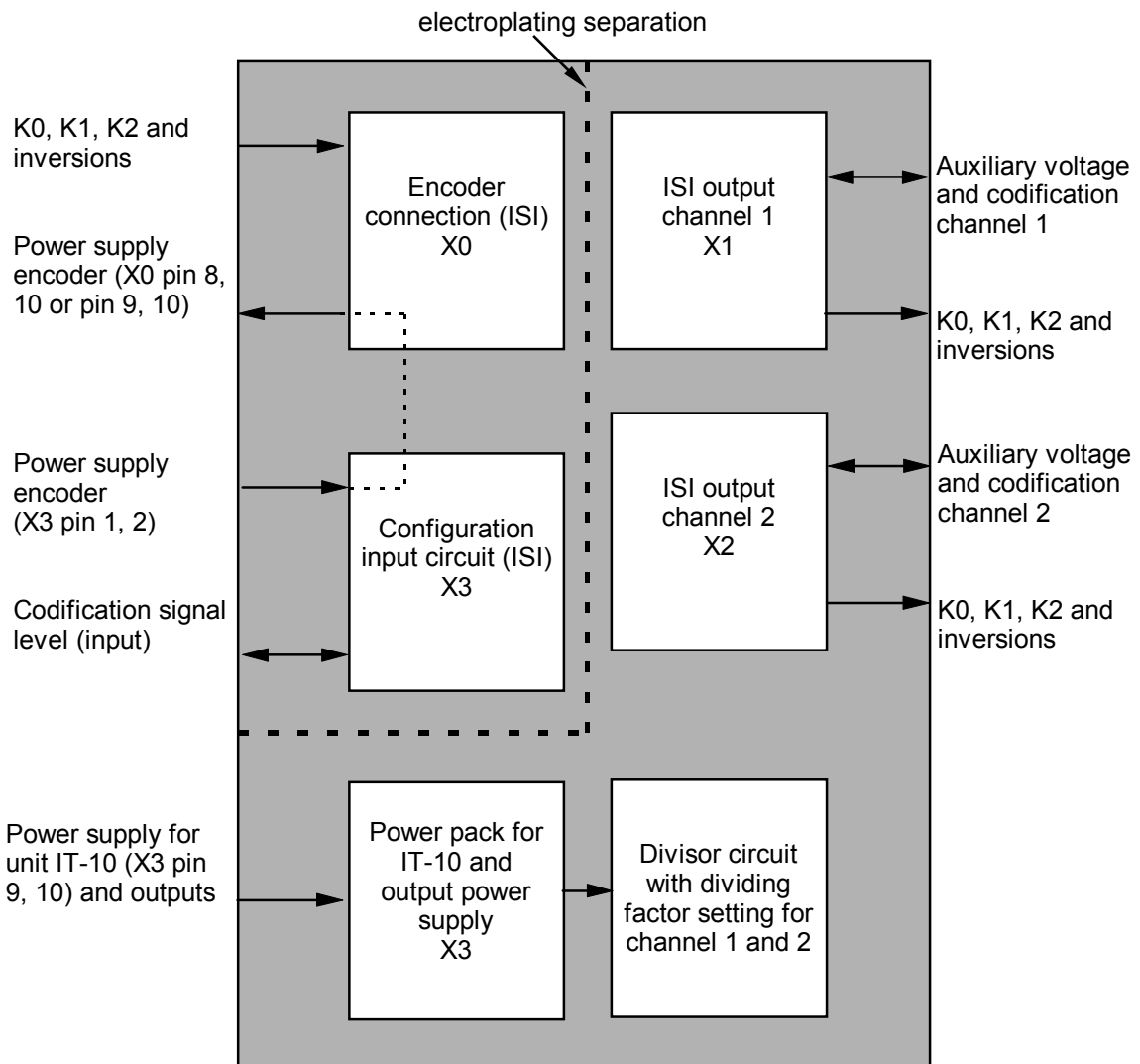
The division ratio is adjusted via DIP switches.

All adjustable voltage levels are output via the same contacts. Since the unit is designed individually, the respective connection levels in the affiliated mating connector must be encoded by jumpers.

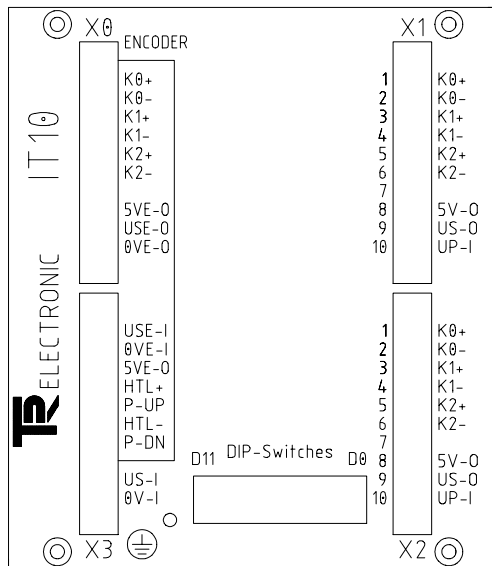
At the input, pull-up resp. pull-down resistors are available. They are activated on the connector by a jumper to the corresponding auxiliary voltage. The input in its basic configuration is designed for differential 5V signals (RS 422). If single-channel signals with levels from 11V onwards shall be processed, the counter potential of the differential input must also be created by a corresponding codification in the connector.



### 3 Block diagram



## 4 Cassette design



Front view

### Mode selection connector / Device supply X3

#### Input connector X0

Supply of the incremental signals K0, K1, K2 and their negated signals as well as an optional supply of the signal source (encoder) with +5V (optional) resp. with + (11-30)V.

**Note:** Supply for the signal source via input connector X0 can only be performed if the voltage has been supplied at mode selection connector X3.

The input levels of the incremental traces can be selected according to the operational mode of the unit:

#### Mode 1

differential +5V, +(11-30)V

#### Mode 2

+ (11 - 30)V push - pull (single-phase)

#### Mode 3

+ (11 - 30)V open - collector (single-phase)

#### Mode 4

+ (11 - 30)V open - emitter (single-phase)

Explanations concerning the operational modes see chapter **Operational modes**

The operational mode of the unit can be adjusted by a corresponding jumper codification (see chapter Operational modes). The power supply for the unit and the signal source is also performed via this connector.

#### Output connector X1 (channel 1)

According to the set division ratio, the incremental signals for this channel can be received optionally with +5V or with +(11-30)V levels.

#### Output connector X2 (channel 2)

According to the set division ratio, the incremental signals for this channel can be received optionally with +5V or with +(11-30)V levels.

#### DIP switches

The setting of the division ratio (1:1 to 1:4096) is determined via the DIP switches and must be adjusted in binary code.

## 5 Commissioning

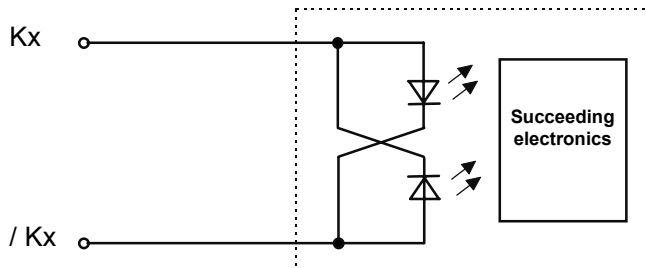
### 5.1 Operational modes

#### 5.1.1 Mode 1, differential +5V, +(11-30)V

This mode complies with the basic configuration of the unit for differential signal input levels. The unit requires all incremental traces for this mode (K0, K1, K2 and their negated signals).

As this mode is the basic configuration of the unit, the mode selection connector X3 requires no jumpers.

#### Principle wiring diagram for input circuit

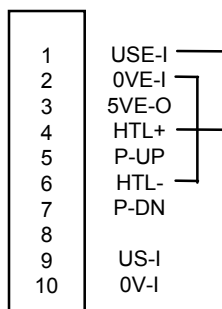


#### 5.1.2 Mode 2, +(11 - 30)V push - pull (single-phase)

This mode is designed for single-phase push-pull operation. The unit requires the incremental traces K0, K1 and K2 with high levels ( +(11-30)V ). To create the counter potential of the differential input, a corresponding codification is required in connector X3:

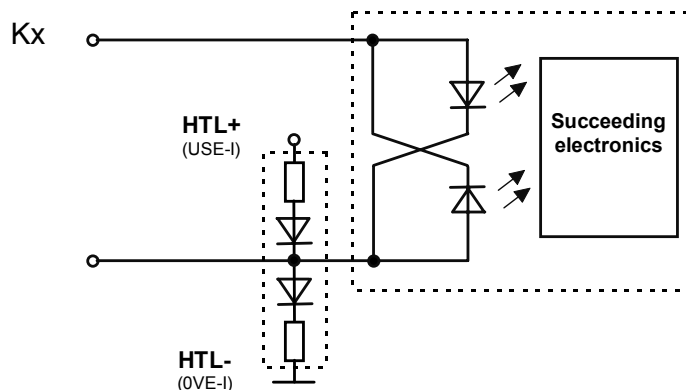
#### Principle wiring diagram for input circuit

#### Connector X3



Jumper 1: 1/4

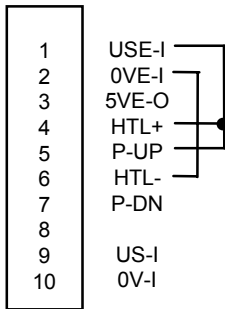
Jumper 2: 2/6



### 5.1.3 Mode 3, +(11 - 30)V open collector (single-phase)

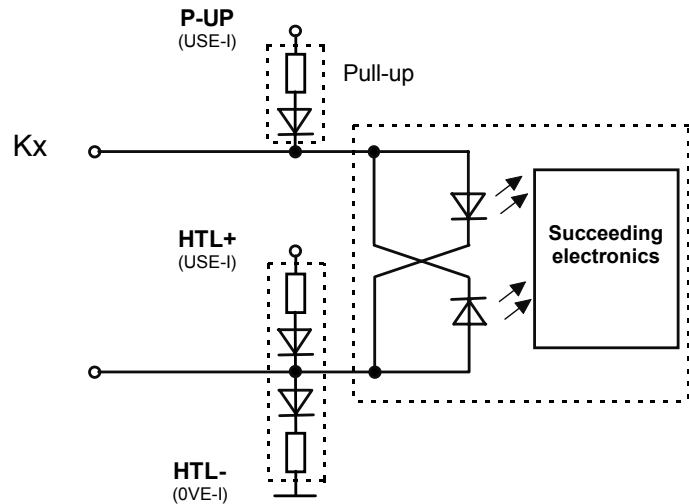
This mode is designed for single-phase open-collector operation. The unit requires the incremental traces K0, K1 and K2 with high levels ( +(11-30)V ). To create the counter potential of the differential input, a corresponding codification is required in connector X3, furthermore, a pull-up resistor must be assigned internally for this mode:

#### Connector X3



Jumper 1: 1/4/5  
Jumper 2: 2/6

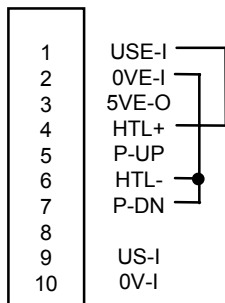
#### Principle wiring diagram for input circuit



### 5.1.4 Mode 4, +(11 - 30)V open emitter (single-phase)

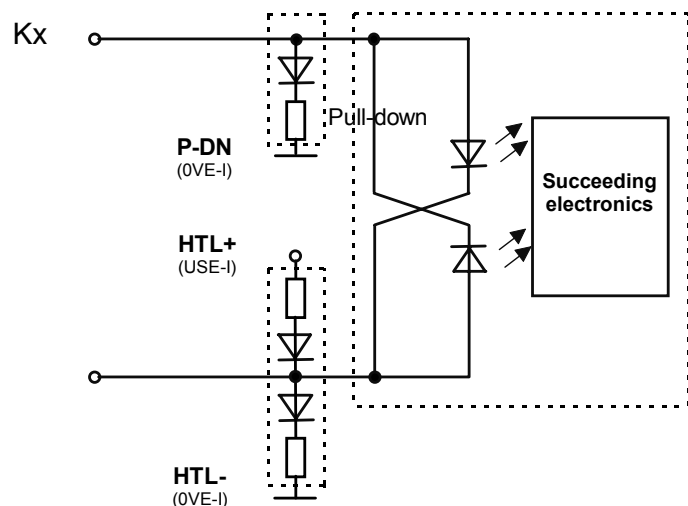
This mode is designed for single-phase open-emitter operation. The unit requires the incremental traces K0, K1 and K2 with high levels ( +(11-30)V ). To create the counter potential of the differential input, a corresponding codification is required in connector X3, furthermore, a pull-down resistor must be assigned internally for this mode:

#### Connector X3



Jumper 1: 1/4  
Jumper 2: 2/6/7

#### Principle wiring diagram for input circuit



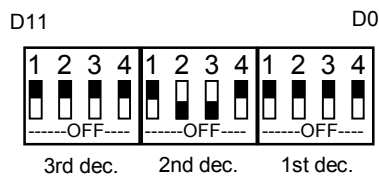
### 5.2 Set division ratio

The divisor is adjusted via 12 DIP switches in binary code. The setting 000h (hexadecimal notation) complies with a divisor divided by one and the setting FFFh corresponds to the division by 4096. The value to be set is calculated from the desired divisor - 1.

**Example:**

Desired division = 1:4000  
 Setting = 4000 - 1 = 3999  
 hexadecimal = **F9F**

**Unit adjustment:**



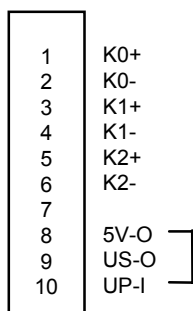
### 5.3 Set output level

The output level can be selected separately for each channel by a corresponding jumper codification in the mating connector:

**1. 5V output level**

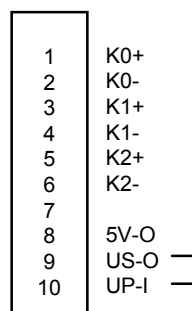
**2. (11-30)V output level**

**Connector X1/X2**



Jumper 1: 8/10

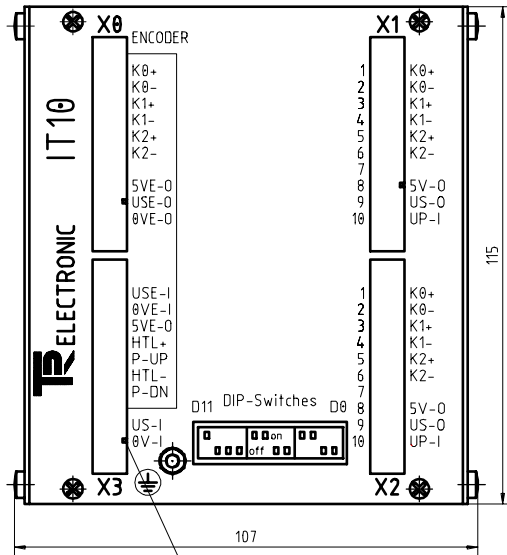
**Connector X1/X2**



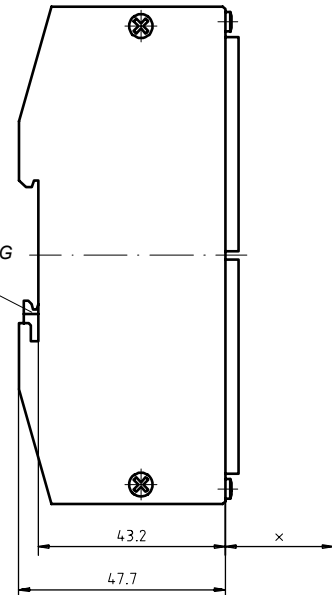
Jumper 1: 9/10

## 6 Appendix

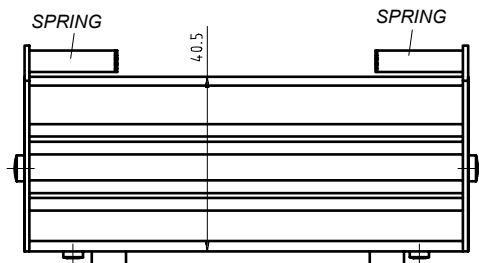
### 6.1 Cassette dimensions



SPRING FOR FASTENING  
RAIL NS35/7.5



CODED CONNECTOR



X = NEEDED HEIGHT:  
~25 (MATING CONNECTOR + CABLE)  
~60 (MATING CONNECTOR + HOUSING + CABLE)

#### Connector types

Mating connector 10-pole (type Minicombicon)	Order no.: 62-005-017 (not included)*
Connector housing 10-pole (type Minicombicon)	Order no.: 64-035-003 (not included)
Mating connector set	Order no.: 62-220-004 (not included)*

\* When ordered separately, remove coding tabs according to the provided slot.

## 6.2 Pin assignments

### 6.2.1 Incremental input X0

Pin number	Pin name	Function	Level
1	K0+	Input reset impulse	5V diff., 11V..30V
2	K0-	Input reset impulse, neg.	5V diff., 11V..30V
3	K1+	Input signal1	5V diff., 11V..30V
4	K1-	Input signal1, negated	5V diff., 11V..30V
5	K2+	Input signal2	5V diff., 11V..30V
6	K2-	Input signal2, negated	5V diff., 11V..30V
7	---	---	---
8	5V-O	Encoder supply 5V	5V / 0,5 A (optional)
9	USE-O	Encoder supply US	11V .. 30V
10	0VE-O	Encoder supply 0V	0V

### 6.2.2 Mode selection connector / Device supply X3

Pin number	Pin name	Function	Level
1	USE-I	Input encoder supply	11V .. 30V
2	0VE-I	Input encoder supply	0V
3	5VE-O	Encoder supply 5V	5V / 0,5 A (optional)
4	HTL +	Codification HIGH level	11V..30V
5	P-UP	Pull-up resistor	11V..30V
6	HTL -	Codification HIGH level	0V
7	P-DN	Pull-down resistor	0V
8	---	---	---
9	US-I	Device supply voltage / Output supply US	11V .. 30V
10	0V-I	Device supply voltage / Output supply 0V	0V

### 6.2.3 Incremental outputs X1/X2

Pin number	Pin name	Function	Level
1	K0+	Output reset impulse	5V diff., 11V..30V
2	K0-	Output reset impulse, negated	5V diff., 11V..30V
3	K1+	Output signal1	5V diff., 11V..30V
4	K1-	Output signal1, negated	5V diff., 11V..30V
5	K2+	Output signal2	5V diff., 11V..30V
6	K2-	Output signal2, negated	5V diff., 11V..30V
7	---	---	---
8	5V-O	Output codification Signal supply 5V	5V
9	US-O	Output codification Signal supply US	11V .. 30V
10	UP-I	Input codification Signal supply	+5V /+11..30V



### 6.3 Technical data

Unit supply .....	Power pack for 11 to 30V
Aux. voltage output (optional).....	+5V for galvanically uncoupled +5V encoders, max. 200mA
Reverse battery protection .....	yes
Transient voltage protection .....	ESD
Excess current release .....	VDE 0113
Filter groups.....	IEC 1000-4-x
Power consumption (unloaded).....	approx. 100 mA
min./max. input current per trace.....	1,5mA / 20mA (diode current photocoupler)
Output level .....	5V differential, (11-30)V 30mA each
Divisor ratio.....	adjustable from 1:1 to 1:4096
max. input impulse frequency.....	150 kHz
Pull-up/pull-down resistor .....	1kOhm
Weight.....	approx. 400g