

### Specification:

Typ		FDIS100E	Einheit Unit
Output-Signal		ECL	V
Diskriminator 1 UDS	Discriminator Level LLD	3 - 20	mV
Diskriminator 2 ODS	Discriminator Level ULD	3 - 30	mV
Pulsauflösung	Puls pair resolution	10	ns
Zählrate	Count rate	100	MHz
Spannungsversorgung	power supply	-5,2/+5	V
Leistungsaufnahme	power requirements	max. 1200	mW
Connector Input	Connector Input	BNC	
Connector Output	Connector Output		ECL
Technische Änderungen, die das Produkt verbessern, vorbehalten.			
In order to improve the product, technical changes reserved.			

### General:

A photomultiplier tube (PMT) consists of a photoemissive surface (photocathode). Each photon emits electrons by the photoelectric effect. This process is repeated throughout the series of dynodes until finally a large charge is available at the anode as the output signal.

### For example:

Charge of one electron:  $Q_{e^-} = 1,6 \times 10^{-19} \text{ C}$      $1 \text{ C} = 1 \text{ As}$

Gain PMT :  $V = 4,3 \times 10^5$

Charge at the anode:  $Q = Q_{e^-} \times V$

$$Q = 1,6 \times 10^{-19} \times 4,3 \times 10^5 \text{ As}$$

$$Q = 6,88 \times 10^{-14} \text{ As}$$

By a calculated pulse duration of  $8 \times 10^{-9} \text{ s}$  and equation  $Q = I \times t$

Output current PMT:

$$Q = 6,88 \times 10^{-14} \text{ As}$$

$$t = 8 \times 10^{-9} \text{ s}$$

$$I = 8,6 \times 10^{-6} \text{ A}$$

$$I = 8,6 \mu\text{A}$$

By using a resistor in front of the amplifier the input current generates a input voltage.

Input signal  $U_E = R \times I$

$I = 8,6 \times 10^{-6} \text{ A}$

$R = 300 \Omega$

$U_E = 300 \times 8,6 \times 10^{-6} \text{ V}$

$U_E = 2,58 \times 10^{-3} \text{ V}$

$U_E = 2,58 \text{ mV}$

When the light intensity is so low that the incident photons are seen at (Fig. 1), this condition is called single photon counting.

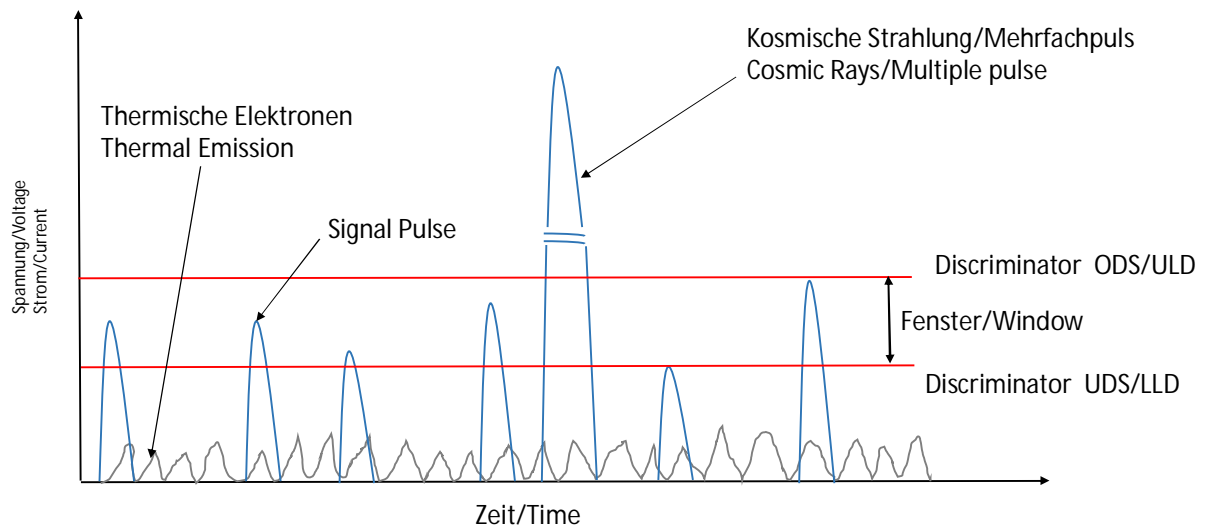


Fig.:1 Signal output photomultiplier

In order to eliminate thermal electrons emitted from the dynodes a lower level discriminator (LLD) is set. High energy particles from outer space (generate a large number of photons) are eliminated too. This is done by a upper level discriminator (ULD). The FDIS100E consists of two adjustable thresholds.

Only inside this window photons are counted. Figure 2 shows a block diagram of the Amplifier/Discriminator FDIS100E. Figure 3 shows the connections.

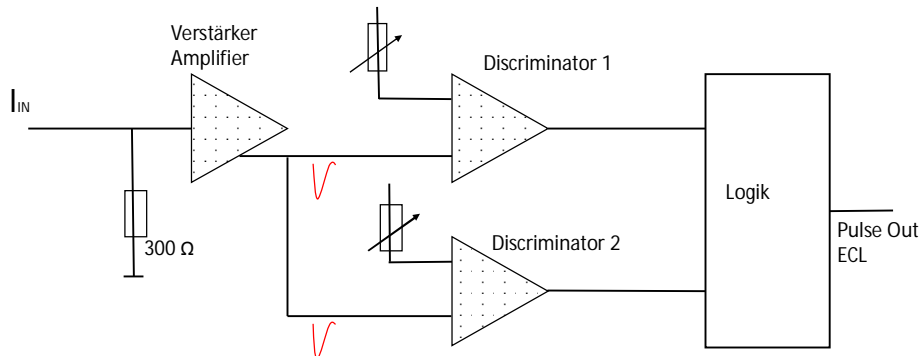


Fig.2: Block diagram FDIS100E

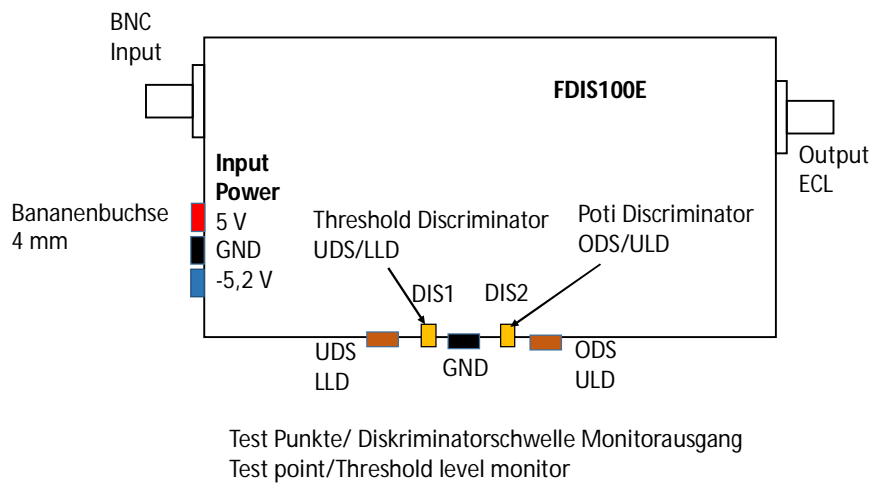


Fig.3: Connections

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