ACCESSORIES
PULSE GENERATOR V4.01 • DATA-SHEET

Quick reference

- 2 x 200 pulses per revolution of measuring drum
- For use with TG05 to TG50, **not** for BG types (because of pawl with BG types)
- Bi-directional [(1)]
- Not applicable for ex-proof areas

Application

The Pulse Generator for RITTER Drum-type Gas Meters is a rotary encoder for pulse output. It can be used to transfer the measured gas volume for remote display and/or data processing (calculation of flow rate, data transfer via RS232) to the Electronic Display Unit »EDU 32 FP« (accessory) or to an external measuring system / PC. In the latter case, the external system must provide the power supply (5-24 V) for the photo sensor as well as the evaluation circuit/logic which enables the direct readout of the measured volume and flow rate. For connection to an external system, please refer to the electrical data and wiring diagrams further down the page.

The version V4.01 is a twin channel encoder with bi-directional recognition of the rotation of the measuring drum [(1)]. This feature provides the possibility to recognize a backward rotation of the measuring drum caused by a change of gas flow direction or by vibration of the drum (e.g. due to a pulsating gas flow with negative pressure peaks). (A mono-channel encoder would wrongly cumulate the pulses (= volume) in these conditions.)

Please note however: The ability to measure a backward rotation does not mean that the gas meter can measure a continuing reversed gas flow correctly. The measuring drum is measuring correctly only at standard gas flow direction from the gas inlet towards the gas outlet. This gas flow direction can either be generated by a positive (over)pressure at the gas inlet or by a negative (under)pressure at the gas outlet. The feature of bi-directional recognition of the rotation of the measuring drum is only for compensation of limited reverse flow or vibrations of the measuring drum.

Components

The Pulse Generator is located within the housing of the counter mechanism of the Gas Meter (behind the dial plate) and it consists of the following components:

- Optical encoding film disc
- Sensor unit with integrated twin infrared photo sensors and LED operating indicators
- Round, 5-pin output socket (180°, DIN 41524)

Description

The measuring drum of drum-type meters and the measuring unit of bellow-type meters are coupled 1:1 to the slit disc via a magnetic coupling. The optical encoding bars of the film disc rotate through the U-shaped photo sensor, thereby interrupting the light beam of the photo diode intermittently. Thus, the photo interrupter converts the revolution of the measuring drum into a sequence of pulses. The number of pulses represents the **volume of gas**

which has passed through the Gas Meter, depending on the respective resolution (see »Performance Data« table below). The frequency of the sequence of pulses is a measure of the rotational speed of the measuring drum and thereby a measure of the **flow rate** of the gas.

For operation of the photo sensor, an external electric power supply in the range of 5-28 Volts DC is required. More electrical data are stated in the »Electrical Data« table below. **The output signal is a TTL signal**, whereby the pulse level (= min./max. voltage of the signal) depends on the power supply voltage and current load (please refer to the »Electrical Data« table).

For power supply values between 5 and 28 Volts, the output signal level can be linearly interpolated for the first approximation.

Output Socket

The pin configuration of the 5-pin output socket is shown under »Pin configuration of the Output Socket«. These pin numbers are equivalent to the numbers shown in the diagram of the photo sensor under »Internal wiring«.

Use with Drum-type Gas Meters

Drum-type gas meters are volumetric gas meters. That means, that they are measuring gas volume precisely. When the Pulse Generator is used with drum-type gas meters for recording the gas flow, it is possible for the respective Voltage Output curve (line) to be wavy, even when gas flow is constant. This is (unpreventably) caused by the type of construction of the measuring drum: the drum consists of four separate chambers, which are closed and opened in sequence. The previous chamber **has to be** closed **before** the next chamber will open.

This compulsory measurement is the reason for the high measurement accuracy. However, each closing also causes a little build-up of pressure at the inside of a chamber. The surface tension creates an additional pressure increase during emerging of a chamber (water highest surface tension, oil: lower, CalRix lowest). The resulting pressure increase causes a small reduction in the rotational speed of the measuring drum. This is barely visible to the eye but is documented precisely by a computer/transcriber. Thus, the wavy output line at constant input flow documents the **true** flow through the gas meter.

Performance Data

Gas Meter [Type]	Pulses per Revolution * [P/R]	Gas Flow per Revolution * [ltr/R]	Resolution [ltr/Pulse]	Pulses per Liter [Pulse/ltr]	Maximum Pulse Frequency [Pulse/min]
TG 01	not applicable				
TG 05	200	0.5	0.0025	400	400
TG 1	200	1.0	0.005	200	400
TG 3	200	3.0	0.015	66.7	400
TG 5	200	5.0	0.025	40	400
TG 10	200	10	0.05	20	400

TG 20	200	20	0.1	10	467
TG 25	200	25	0.125	8	933
TG 50	200	50	0.25	4	1,200
BG 4	200	10	0.05	20	2,000
BG 6	200	20	0.1	10	1,667
BG 10	200	50	0.25	4	1,067
BG 16	200	100	0.5	2	833
BG 40	200	100	0.5	2	2,167
BG 100	200	100	0.5	2	2,167

* **TG types**: Revolution of measuring drum (= revolution of large needle of dial plate)

BG types: Revolution of large needle of dial plate

Temperature range

- 0 to +55°C
- At higher temperatures the Pulse Generator can be cooled by flushing the counter mechanism casing with room air. Necessary equipment: Optional connection nozzle at counter mechanism casing.

Dimensions of encoding disc

	TG05 to TG50 / BG [mm]
Diameter:	144
Slit width:	1.2
Bar width:	1.0

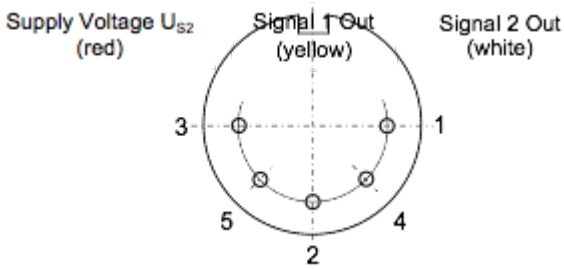
Electrical Data

Supply Voltage U_s		5 – 28	V DC
Supply Current Us = 5 V:		< 2	mA
Us = 28 V:		< 4	mA
Voltage Output Us = 5 V, no load:	high level	4.95	V
Us = 5 V, load I_{Source} 4.7 mA:	high level	3.56	V
Us = 5 V, no load:	low level	0.01	V
Us = 5 V, load I_{Sink}7 mA:	low level	1.05	V
Voltage Output Us = 28 V, no load:	high level	26.8	V

Us = 28 V, load I_{Source} 7 mA:	high level	26.5	V
Us = 28 V, no load:	low level	0.01	V
Us = 28 V, load I_{Sink} 7 mA:	low level	1.2	V
Current Output Us = 5 V:	source	4.7	mA
Us = 28 V:	source	7	mA
Us = 5-28 V:	sink	7	mA
Operating frequency photo diode		0 – 500	Hz

Pin configuration of the Output Socket

(View to **plug-side** of the socket)



3 → Supply Voltage U_{S1} (red)

5 → Supply Voltage U_{S2} (red)

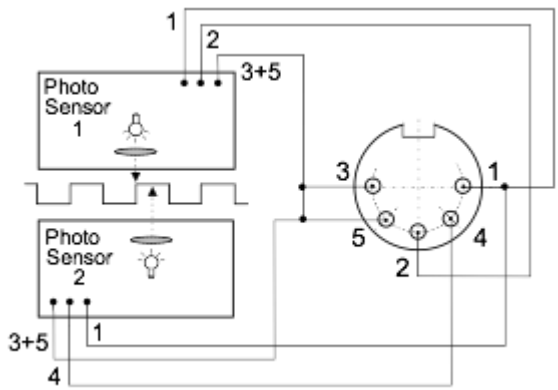
2 → Signal 1 Out

4 → Signal 2 Out

1 → GND (black)

Internal wiring

Encoding Disc ⟶ (Direction of Rotation)

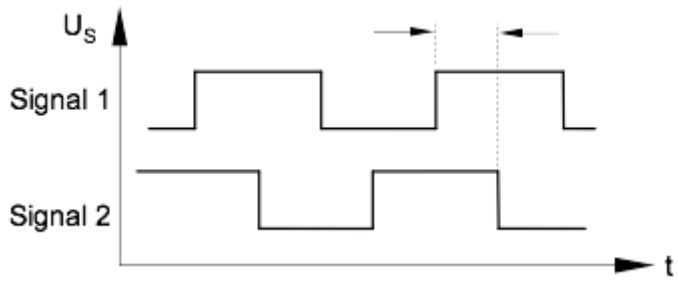


	Pin No.	Function	Lead Colour
Photo Sensor 1	3+5	Supply Voltage U_{S1} + U_{S2}	red

	2	Signal 1 Out	yellow
	1	Ground	black
Photo Sensor 2	3+5	Supply Voltage U_{S1} + U_{S2}	red
	4	Signal 2 Out	white
	1	Ground	black

Signal Output

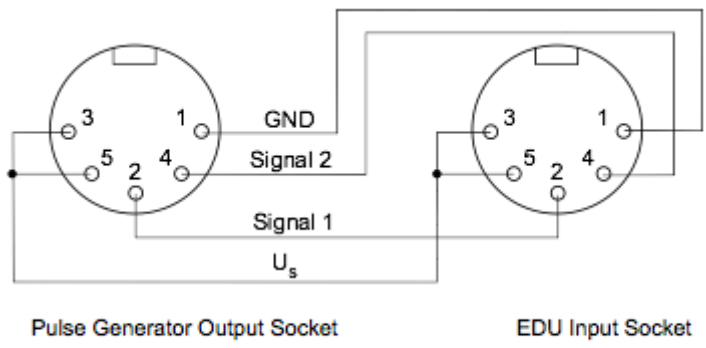
0.5 x bar width



Connection of the Pulse Generator to the Electronic Display Unit »EDU 32 FP« (optional accessory)

The Pulse Generator can be connected to the optional accessory »Electronic Display Unit« (V 5.0 or higher) by means of the 5-pin connection cord, which is supplied in conjunction with the Electronic Display Unit. The **maximum possible length** of the connection cable is **10 m** (unshielded cable) or **100 m** (shielded cable). The Electronic Display Unit contains the power supply for the photo sensor as well as the evaluation circuit/logic which enables the direct readout of the measured volume [ltr] and flow rate [ltr/h].

Wiring of the Pulse Generator to the EDU socket
(view to **plug-side** of the sockets):



The measurement results displayed by the Electronic Display Unit can be transmitted to a computer via the standard-type interface RS 232 (please refer to the EDU Operation Instructions, paragraph 7.3 as well). Additionally, the value of the flow rate can be transmitted to an analog measurement device via the standard-type analog output (0-1 Volt or 4-20 mA).

Set-up of EDU:

› Programming of sensor type: Select sensor type »PG V4.0«
(please refer to the EDU Operation Instructions par. 6.2.4 as well)
› Programming of slit disc / encoding disc: Select »2 x 200 Pulses/Rev«
(please refer to the EDU Operation Instructions par. 6.2.5 as well)

(1) The recognition of the rotating direction is done by evaluating the signals of the two channels. The logic for this feature is incorporated in the Electronic Display Unit EDU 32, i. e. the EDU 32 indicates the resulting volume (= volume forward rotation minus volume backward rotation). If connected to an external data acquisition system the evaluation of the two channels has to be done by the data acquisition system.

V 4.01 / Rev. 2019-02-11 / Subject to alterations.

The most recent version of this data-sheet can be found at https://www.ritter.de/en/data-sheets/pulse-generator-v4-01/

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