Heinrichs
KOBOLD Group

magneto-electric transmitter

ES
ES-PPA
ES-FF

Ex-Supplementary Operating Manual

supplementary to the operating manuals
BGN, BGF, TSK, BA, DWF

HART COMMUNICATION FOUNDATION

Fieldbus Foundation

PROFIBUS PROCESS FIELD BUS

This operating manual contains important information for the operation in potentially explosive atmospheres

Please read the instructions carefully and store them in a safe place for future reference

Table of Contents

1. Introduction

I. Shipping and storage; product inspection

The device is to be safeguarded against dampness, dirt, impact and damage.

Product inspection

Upon receipt of the product, check the contents of the box and the product particulars against the information on the delivery slip and order form so as to ensure that all ordered components have been supplied.
Notify us of any shipping damage immediately upon receipt of the product. Any damage claim received at a later time will not be honored.

II. Warranty

Your meter was manufactured in accordance with the highest quality standards and was thoroughly tested prior to shipment. However, in the event that any problem arises with your device, we will be happy to resolve the problem for you as quickly as possible under the terms of the warranty which can be found in the terms and conditions of delivery. Your warranty can only be honored if the device was installed and operated in accordance with the instructions for your device. Any mounting, commissioning and/or maintenance work is to be carried out by qualified and authorized technicians only.

III. Application domain of the operating manual

These supplementary instructions apply to explosion-proof transmitter Types ES, ES-PPA and ES-FF built **from 1st August 2016** onwards.

This manual supplements the operating manual for non-explosion proof level meters. If you do not have a copy of this manual, please request one from Heinrichs Messtechnik GmbH or download the instructions from our website. The instructions herein pertain primarily to explosion-proof level meters. The technical data in the installation and operating instructions for non-explosion proof level meters still apply insofar as the present instructions do not replace them or exclude their application.

IV. Measures to be taken before sending your device to the manufacturer for repair

It is important that you do the following before shipping your meter to Heinrichs Messtechnik GmbH for repair:

- Enclose a description of the problem with your device. Describe in as much detail as possible the application and the physical and chemical properties of the fluid.
- Remove any residues from the device and be sure to clean the seal grooves and recesses thoroughly. This is particularly important if the fluid is corrosive, toxic, carcinogenic, radioactive or otherwise hazardous.

The operator is liable for any costs arising from substance removal or personal damage due to inadequate cleaning of a device that is sent for repair.

2. Steps prior to operation

Prior to installation and operation, it is essential that the operator familiarizes himself with all of the instructions and information contained in the **manual for non-explosion proof level meters as well as the present instructions**.

If any part of either manual is missing, contact Heinrichs Messtechnik to request a new manual. These manuals can also be downloaded from our website.

2.1 Installation, mounting, commissioning and maintenance

Installation, mounting, commissioning and maintenance are to be performed by a technician trained to work with explosion-proof devices, or by a Heinrichs Messtechnik service technician.

Warning
Any maintenance or repair that safety relevant in terms of explosion-protection is to be carried out by the manufacturer, an authorized Heinrichs Messtechnik GmbH service center or under the supervision of an expert in explosion-proof devices.

Heinrichs Messtechnik GmbH accepts no liability for any loss or damage of any kind arising from improper operation of any product, improper handling or use of any replacement part, or from external electrical or mechanical effects, overvoltage or lightning. Any such improper operation, use or handling shall automatically invalidate the warranty for the product concerned.

In the event a problem arises with your device, please contact us at one of the following numbers to arrange to have your device repaired:

☎ Phone: +49 221 49708-0

Fax: +49 221 49708-178

@ Internet: www.heinrichs.eu

Email: info@heinrichs.eu

Contact our customer service department if your device needs repair or if you need assistance in diagnosing a problem with your device.

2.2 Hazard warnings

The purpose of the hazard warnings listed below is to ensure that device operators and maintenance personnel are not injured and that the level meter and any devices connected to it are not damaged.

The safety advisories and hazard warnings in the present document that aim to avoid placing operators and maintenance personnel at risk and to avoid material damage are prioritized using the terms listed below, which are defined as follows in regard to the instructions herein and the advisories pertaining to the device itself:

Warning

means that failure to take the prescribed precautions **could result** in injury, substantial material damage or even death. Always comply to these warnings and proceed with caution.

Caution

means that failure to take the prescribed precaution **could result** in material damage or destruction of the device. We advice always to abide to these instructions!

Note

means that the accompanying text contains important information about the product, handling the product or about a section of the documentation that is of particular importance.

2.3 Proper use of the device

Warning

The operator is responsible for ensuring that the material used in the sensor and transmitter housing is suitable and that such material meets the requirements for the fluid being used and the ambient site conditions. The manufacturer accepts no responsibility in regard to such material and housing.

Warning

In order for the device to perform correctly and safely, it must be shipped, stored, set up, mounted operated and maintained properly.

3. Identification

Manufacturer: Heinrichs Messtechnik GmbH
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@ Internet: www.heinrichs.eu
Email: info@heinrichs.eu

Product type: Magneto-electric transmitter for the angle determination of the magnetic transmission of mechanical measuring instruments.

Product name: Transmitter type: ES, ES-PPA, ES-FF

File name: es-ex_ba_20.01_en.doc

Version:. 20.01,
Date, November 11th, 2020

4. General information about explosion protection

Acc. Directive 94/9/EC (ATEX)

Example designation CE 0158 Ex II 2G Ex ia IIC T6 Gb

Equipment groups

I	Equipment group I applies to equipment intended for use in underground parts of mines as well as those parts of surface installations of such mines endangered by firedamp and/or combustible dust.
II	Equipment group II applies to equipment intended for use in other places liable to be endangered by explosive atmospheres. This group is subdivided into three categories.

Equipment category

Gas	Dust	Definition
1G (0)	1 D (20)	Equipment in this category is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mists or by air/dust mixtures are present continuously, for long periods or frequently.
2 G (1)	2 D (21)	Equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapours, mists or air/dust mixtures are likely to occur.
3G (2)	3D (22)	Equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapours, mists, or air/dust mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only.

(The numbers in round brackets correspond to the IEC Zones.)

Acc. EN 60079-0 ff / IEC 60079-0 ff

Ex = Explosion-proof electrical equipment

Types of protection

	General requirements	IEC 60079-0
„d“	Flameproof enclosure	IEC 60079-1
„e“	Increased safety	IEC 60079-7
„i“	Intrinsic safety (ia, ib)	IEC 60079-11
„t"	Equipment dust ignition protection by enclosure "t" (ta, tb or tc)	EN 60079-31

Explosion groups

Gases and vapours	
IIA	Acetone, benzene, fuel oil, ethanoic acid
IIB	City gas, ethylene, isoprene
IIC	Acetylene, hydrogen, carbon bisulphide
Dust Atmospheres	
IIIA	Fibers and flyings
IIIB	Non-conductive dusts
IIIC	Metal dusts

Temperature classes

Maximum surface temperature		Temperature class
450 °C	842 °F	T1
300 °C	572 °F	T2
200 °C	392 °F	T3
135 °C	275 °F	T4
100 °C	212 °F	T5
85 °C	185 °F	T6

Equipment protection level, EPL	
Gases: Ga, Gb oder Gc	Dust: Da, Db or Dc

Explosion protection designations [square brackets] refer to “Related electrical equipment or circuits.”

5. Scope of application

The ES transducer is used in flow meters of the BGN, BGF and TSK type series in the BA fill level indicator and the DWF density meter. This covers the areas of volume flow rate measurement, fill level measurement according to the principle of positive displacement and density measurement. The ES* transducer is intended for installation in a housing providing a minimum IP class of protection from IP20.

6. Mode of operation and system layout

The electric ES-type transmitter serves to transform the needle position of the mechanical measuring system into a proportional 4-20mA signal or to the field bus interface connection.

6.1 Measuring principle

The position of the float and/or lifting body is transferred to the needle axis through a magnetic system. The ES transducer uses 2 magnetic field sensors to measure the field of a magnet attached to the needle axis in order to generate an output current of 4...20 mA. The usual non-linear scale is in this case linearised with a maximum of 16 data points.

The terrestrial magnetic field and moderately sized homogenous external magnetic fields are largely compensated by the applied differential measurement of the 2 magnetic field sensors.

7. Electrical connection

7.1 ES type

The electrical connection of the ES type is provided through an intrinsically safe 2-wire supply and signal circuit of 4-20 mA.

7.2 ES-PPA and ES-FF type

The ES-PPA and/or ES-FF types are "FISCO field devices" and the electrical connection is realised via an intrinsically safe 2-wire field bus circuit according to the FISCO model.

As an option, devices may also be connected to intrinsically safe field bus circuits that do not correspond to the FISCO model. In this case careful attention must be paid to the maximum electrical values (Ui, Ii, Pi, Li and Ci) as described below.

8. Ex-Marking in accordance to ATEX directive 2014/34/EU and IECEx

DMT 00 ATEX E 075
II 2G Ex ia IIC T6 Gb

IECEx BVS 16.0072
Ex ia IIC T6 Gb

9. Electrical and thermal characteristics

9.1 For the version ES

9.1.1 Supply and signal circuit (terminals 1 and 2)

Voltage	Ui	DC	30	V
Current	Ii		150	mA
Power	Pi		1	W
Effective internal inductance	Li		0,24	mH
Effective internal capacitance	Ci		16	nF

9.1.2 Binary outputs 1 and 2: potential-free optocoupler output circuit (terminals 3-4 and 5-6)

each

Voltage	U_i	DC	30	V
Current	I_i		20	mA
Power	P_i		100	mW
Effective internal inductance	L_i		4	µH
Effective internal capacitance	C_i		16	nF
Ambient temperature range	Ta		-40 °C to + 70 °C	

9.2 For the versions ES-PPA (terminals 7 and 8) or ES-FF (terminals 9 and 10)

For the use as a field device in an intrinsically safe field bus system in acc. FISCO (IEC 60079-11, Annex G), or for the connection to intrinsically safe electric circuits.

Parameters for the transmitter:

U_i = 32 V
I_i = 280 mA
P_i = 2W

C_i < 5nF
L_i < 10µH

The ambient temperature range amounts to -40 °C to +70 °C.

10. Special conditions for safe application

10.1 Environmental impacts on the transmitter.

Environmental impacts, like the process temperature of the flow meter and the installed ES* transmitter must be considered. See also item 7 of the measuring device's general instruction manual.

10.2 Atmospheric conditions

In accordance with EN 1127, a "potentially explosive atmosphere" is defined as a mixture of air and combustible gases, vapour, mist or dust under atmospheric conditions. Such conditions are defined in EN 13463-1, para. 1, with values Tatm = -20 °C to +60 °C and Patm = 0.8 to 1.1 bar. Outside this range, safety parameters for most ignition sources are not available.

Usually, variable-area flow meters operate under operating conditions outside the atmospheric conditions of 0.8 to 1.1 bar. Irrespective of the zone classification –safety parameters of explosion protection – are basically not applicable to the inside of the measuring tube.

Therefore operation with combustible products is only allowed if a potentially explosive air mixture is not formed inside the flow meter. Where this condition is not met, the operator will need to assess the ignition hazard in each individual case and give due consideration to existing parameters (e.g. pressure, temperature, process product, materials of construction for the measuring tube).

10.3 Ground connection

In variable-area flow meters, it is possible under operating conditions for charge separation to occur in the measuring tube due to the transport of non-conductive fluids and/or when the flow comes into contact with non-conductive internals (e.g. liners, floats). For that reason, variable-area flow meters must be permanently grounded by the operator by way of the process connections (flanges) in order to discharge electrostatic build-up. The operator is also responsible for extending the ground continuity of the process pipeline. If grounding cannot be made via the process connections (plastic process connections or undefined connections), the flow meter must be connected to the local ground potential via the flanges. This connection only ensures electrostatic grounding of the device and does not meet the requirements for equipotential bonding.

11. Marking

Only devices bearing the Ex label may be operated in explosive environments.

Example type plates for the ES standard and ES-FF versions are presented below.