User's manual

Supply- and Interface module

VI156

Rev. 2

Gönnheimer Elektronic GmbH

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Zertifiziertes Qualitäts-Managemantsystem nach DIN EN ISO 9001

Zert. Reg. Nr. Q1 0297038

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General information about this instruction manual:

- This document describes how to handle the Supply- and Interface module VI156 and enables safe handling.
- This document serves the carrier, the assembler, the systems integrator, the operator, the user and also the maintenance engineer.
- The system must only be used by qualified and standard skillful professionals in the field of explosion protection.
- This instruction manual must be read and understood in full prior to starting any work with the VI156.
- When using the VI156, the corresponding certificates and valid standards (IEC/EN 60079 series), guidelines (e.g. 2014/34/EU) and national laws and regulations must be observed.
- The instruction manual must be held ready near the place of action of the system.
- The instruction manual must always remain with the product (e.g. in case of forwarding).
- All safety instructions must always be observed.
- Illustrations are for understanding and clarification and may differ from reality.

If you have any questions or problems, contact the manufacturer directly:

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The symbols DANGER, WARNING, ATTENTION

DANGER

The signal word calls a danger with a high risk degree which if it is not avoided can cause death or heavy injury.

WARNING

The signal word calls a danger with a middle risk degree which if it is not avoided can cause death or heavy injury.

ATTENTION

The signal word calls a danger with a low risk degree which if it is not avoided can cause slight or moderate injury.

DANGER

This symbol refers to the danger of an explosion if an explosive atmosphere may be present. Nonobservance of this danger can cause heavy injury or death.

DANGER

This symbol refers to the danger of electric tension which can cause heavy injury or death.

Safety measures: Absolutely read and follow

DANGER

Work at electrical installations and equipment, which are energized are basically forbidden in explosive areas. Work at intrinsically safe circuits (Ex i) is excluded. In special cases work at non intrinsically safe circuits can be carried out if it is ensured that no explosive atmosphere is present during the whole work. The check of the presence of electrical tension should only be done using explosion protected and certified measuring instruments. Grounding and short-circuiting should only be carried out if it is ensured that no hazardous atmosphere is present.

DANGER

During assembly, the local installation regulations, in particular the regulations of EN 60079-14, must be observed.

DANGER

Mains voltage! Serious physical injury or property damage can occur if the warning notices are not observed.

DANGER

The installation regulations and the test certificate PTB 99 ATEX 2085 must be observed.

DANGER

The limit values at the respective terminals must be observed. The limit values can be found in the Ex-certificate.

1 Safety indication for explosion-proof devices

Field of application and regulations

The instructions and warnings given in this instruction manual must be observed in order to ensure safe and proper operation. The equipment should only be used for its intended purpose. The relevant provisions of the standards IEC/EN 60079-0, -11, -14 and -17 apply. The use of the equipment is permitted in potentially explosive atmospheres (Zones 1 and 2). The data provided at the type plate must be observed. When constructing and operating explosion-proof systems and facilities, the applicable national regulations, provisions and valid standards must be observed.

General information

Work at electrical installations and equipment, which are energized is basically forbidden in explosive areas. Work at intrinsically safe circuits (Ex i) is excluded.

In special cases, work can also be carried out on non-intrinsically safe circuits, whereby it must be ensured that no explosive atmosphere is present for the duration of this work.

The absence of voltage must only be checked with explosion-proof approved measuring instruments. Grounding and short-circuiting may only be carried out if there is no danger of explosion at the grounding or short-circuiting point.

Correct transport, storage and installation, as well as careful operation and maintenance, is essential for the safe and trouble-free operation of this device. Any work on the device may only be carried out by professionally trained personnel.

The electrical characteristic values of the type plate and the test certificate PTB 99 ATEX 2085, as well as its special conditions, if applicable, must be observed.

If the device is installed outdoors, it is recommended to protect the device from direct exposure to weather conditions, e.g. by means of a protective roof. Unless otherwise specified, the maximum permissible ambient temperature is 40°C.

Connection housing with increased safety (Ex e)

When closing, make sure that the seals of the connection housings remain effective to ensure IP 54 protection. Unused openings for cable entries must be closed with tested impact-resistant plugs secured against self-loosening and twisting.

The housing must not be opened under voltage in the Ex-area.

Maintenance work

The seal on Ex e enclosures must be checked for damage and replaced if necessary. Screw terminals, especially in the Ex e compartment, must be retightened. Any discoloration indicates increased temperature. Check stuffing box glands, sealing plugs and flanges for tightness and firm seating.

Intrinsically safe circuits

The installation instructions in the test certificates for intrinsically safe electrical equipment must be observed. The safety-related electrical values specified on the type plate must not be exceeded in the intrinsically safe circuit. When interconnecting intrinsically safe circuits, it must be checked whether a voltage and/or current addition occurs. The intrinsic safety of the interconnected circuits must be ensured (EN 60079-14, section 12).

2 Supply interface VI156

The VI156 supply and interface module enables direct control of the DC155 batch controller with non-intrinsically safe signals. The VI156 is an Ex e extension for the DC155.

Mounting in Ex-area

The VI156 is mounted directly in the Ex-area, zone 1. This eliminates the need for complex cabling in the non-Ex area. All necessary components such as input isolators, Ex i isolating amplifiers with contact or electronic outputs are integrated in the VI156.

Ex e auxiliary voltage

For the application of passive control signals, e.g. with an open collector output, an auxiliary voltage of 24 V DC, 10 mA is available at terminal 13/14.

Interface

Non-intrinsically safe control signals, e.g. from a PLC or a mass flow meter with a non-intrinsically safe output, can be isolated via the two input isolators (terminals 17/18 or 19/20) and fed directly to the batch controller via the intrinsically safe outputs (terminals 34/35 or 34/36).
Two isolating switch amplifiers with a contact output (changeover contact 250 V / 5 A), as well as an electronic output (open collector U < 30 V, I < 200 mA) are implemented for the conversion of the digital outputs of the DC155 batch controller.

3 Installation and connection

3.1 Assembly

DANGER

During assembly, the local installation regulations, in particular the regulations of EN 60079-14, must be observed.

3.2 Connection and commissioning

The following points must be observed during connection and commissioning.

DANGER

Mains voltage! Serious physical injury or property damage can occur if the warning notices are not observed.

DANGER

The installation regulations and the test certificate PTB 99 ATEX 2085 must be observed.

DANGER

The limit values at the respective terminals must be observed.

The limit values can be found in the test certificate.

3.3 Overview of the VI156 connections

Terminals	Description
	Non-intrinsically safe terminals (Ex e):
1-6	Power supply
7-9	Contacts of relay 2
10-12	Contacts of relay 1
13, 14	Auxiliary voltage, 24V, 10 mA
15, 16	Open-collector output
17, 18	Input 1
19, 20	Input 2
21-24	TTY / RS232 receiver
25-28	TTY / RS232 transmitter
	Intrinsically safe terminals (Ex i):
29-32	Power Supply (e.g. for DC155)
38	Input 1
37	Input 2
33	Input 3
34, 35	Output 1
34, 36	Output 2
39, 40	TTY transmitter
41, 42	TTY receiver

3.4 Using the screw terminals

When connecting in the Ex e terminal housing, the following limit values must be observed for the screw terminals:

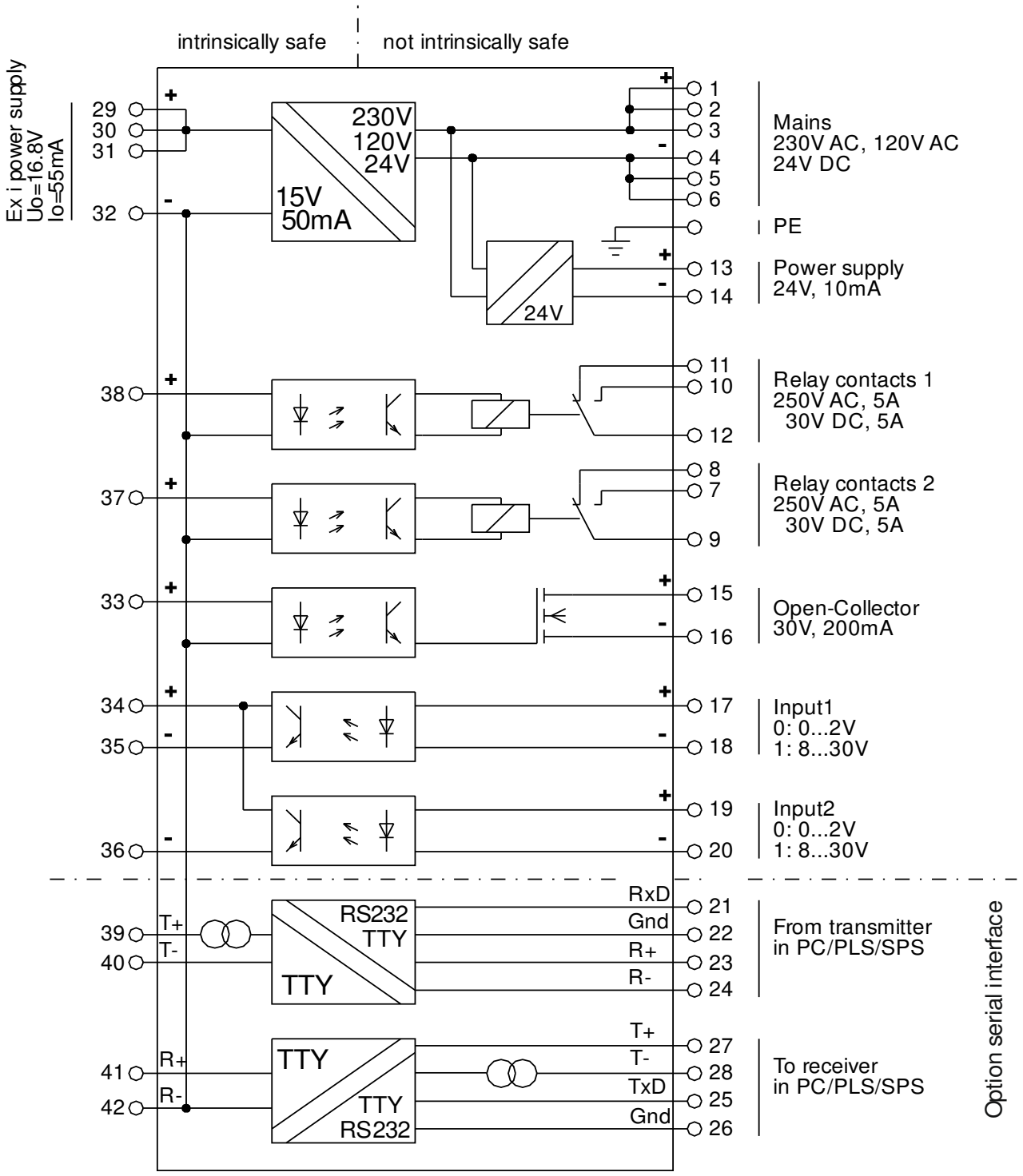
Min. and max. tightening torque	min. 0,3 Nm max. 0,4 Nm
Min. and max. wire cross section	rigid: 0,2 – 2,5 mm² flexible: 0,2 – 2,5 mm²

3.5 Current load of the relay contacts

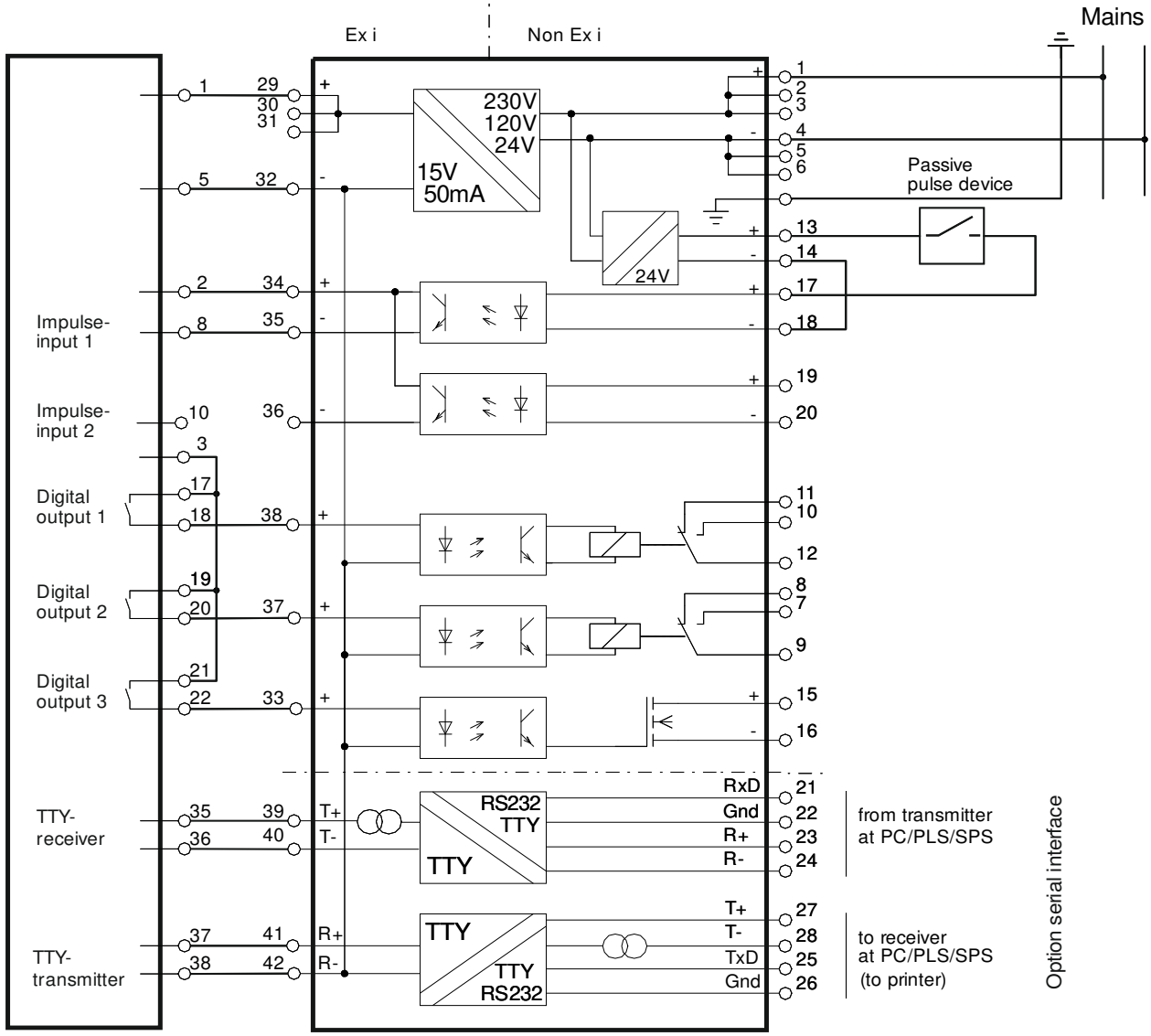
The load that is switched via the relay contacts must not exceed 5A at any time.

When switching on an electrical device, the inrush current can be many times higher than the nominal current consumption. In this case, an inrush current limiter must be installed to prevent the inadmissibly high current. Otherwise, there is a risk that the relay contacts will stick together or weld.

3.6 Electrical block diagram of the VI156



3.7 Connection to dosing controller DC155



4 Annex

4.1 Technical details and terminal limits

		Supply and Interface module VI156
General	Mounting	Inside hazardous area
	Ex-protection	II 2 G Ex e q [ib] IIC T6
	Ex-certificate	PTB 99 ATEX 2085
	Ambient temperature	-20°C ...+40°C within T6
Housing	Dimensions H x B x T	VI156.x.x.0: 160mm x 160mm x 90mm VI156.x.x.1: 260mm x 160mm x 90mm
	Protection class	IP65
	Material	Polyester, RAL 7035
Non intrinsically safe terminals **Ex e**	Power Supply (1-6)	230V AC / 120V AC +/- 10% 48-62Hz 24V DC +/- 10% Power consumption: approx. 5VA / 5W
	Relay contacts (7-9, 10-12)	250V AC, 5A, cos φ > 0,7 30V DC, 5A
	Auxiliary power (13, 14)	24V DC, max. 10mA, not intrinsically safe
	Open-Collector output (15,16)	U < 30V, I < 200mA
	Control circuits (17/18, 19/20)	Low: 0...2 V, High: 8...30 V, max. 2 kHz
	Serial Interface (21-28)	TTY, RS232, Transmitter active, Receiver passive, max. baud rate = 9600 Baud
Intrinsically safe terminals **Ex i**	Power Supply (29-32)	U_{nom} = 15V, I_{nom} = 50mA, intrinsically safe (U_0 = 16,8V, I_0 = 55mA)
	Control inputs (33, 37, 38)	1-Signal = 8...30 V 0-Signal = 0...2 V
	Control outputs (34, 35, 36)	Terminal 34: U_{max} = 30V Terminals 35, 36: U_{max} = 30V
	Serial Interface (39-42)	TTY, RS232, Transmitter active, Receiver passive, max. baud rate 9600
Additional Ex e-terminal array	Additional Ex e terminals (51-68)	Only for VI156.x.x.1 Terminal assembly according to customer requirements
Ex e-screw terminals	Tightening torque	min. 0,3 Nm / max. 0,4 Nm
	Wire cross section	rigid or flexible: 0,2 – 2,5 mm²

For further details, see EU type examination certificate.

4.2 Type Codes

Supply and Interface module VI156	**.**	**.**	**.**
Power Supply:			
230V AC.....	**.0**		
120V AC	**.2**		
24V DC.....	**.6**		
Ex TTY/RS232 interface separation:			
without.....		**.0**	
with		**.1**	
Extended Ex e terminal compartment (18 terminals):			
without.....			**.0**
with			**.1**

4.3 Marking

	II 2 G Ex e q [ib] IIC T6

4.4 Transport, storage, disposal and repairs

Transport	Vibration-free in original package, do not pitch, handle carefully.
Storage	Store the device dry, inside of the original package.
Disposal	For disposal, the applicable national waste disposal regulations must be observed.
Repairs	Defective parts may only be replaced by the manufacturer or specially trained and supervised personnel by the manufacturer. Only original spare parts of the manufacturer may be used.

4.5 Dimensions

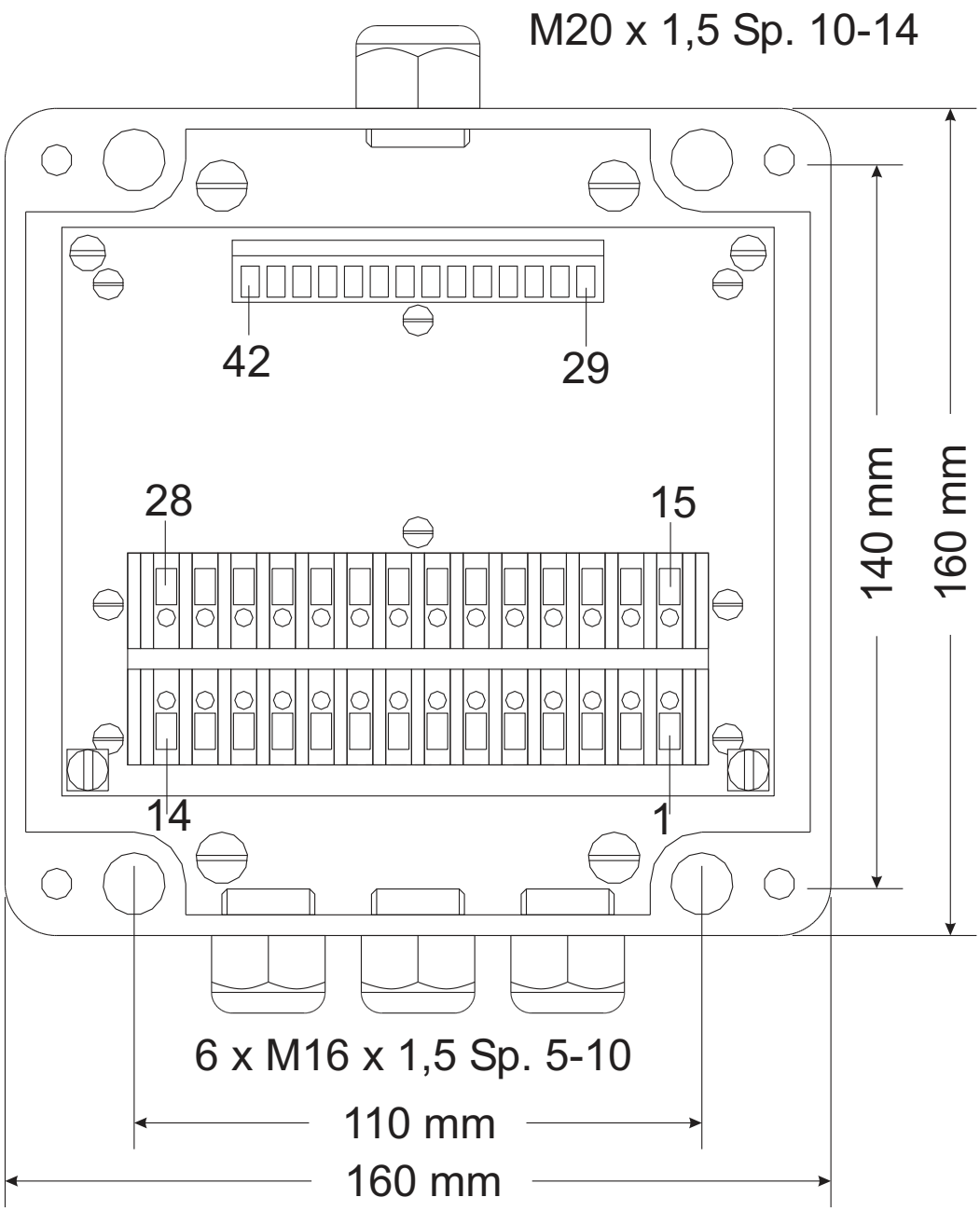


Figure 1: VI156.x.x.0

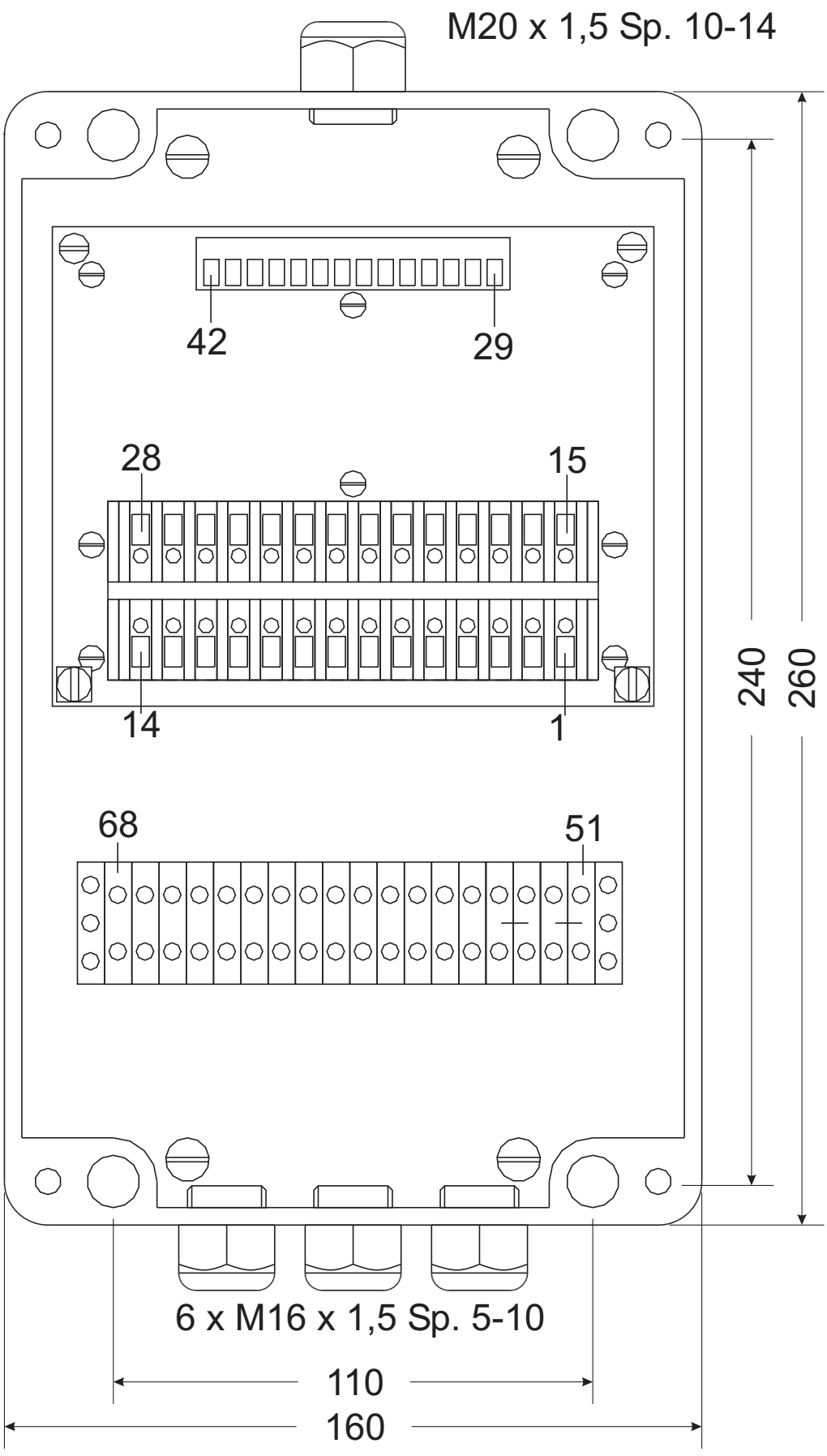


Figure 2: VI156.x.x.1

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(Non authorized translation)

(1) **EC- TYPE- EXAMINATION CERTIFICATE**

(2) Equipment and protective systems intended for use in potential explosive Atmospheres – **Directive 94/9/EC**

(3) EC- type- examination Certificate number

PTB 99 ATEX 2085

(4) Equipment: Supply and interface module VI156

(5) Manufacturer: Gönnheimer Elektronic GmbH

(6) Address: D- 67433 Neustadt an der Weinstraße
Dr.-Julius-Leberstr. 2

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of March 1994, certifies that equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report No. PTB Ex 99-29044

(9) Compliance with to essential Health and Safety Requirements has been assured by compliance with:

EN 50 014:1997 General directives
EN 50 017:1998 Powder filling ‘q’
EN 50 019:1994 Increased Safety ‘e’
EN 50 020:1994 Intrinsically safety ‘i’

(10) If the sign “X” is places after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC- type- examination Certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

(12) The marking of the equipment shall include the following:

II 2 G EEx eq [ib] IIC T6

Zertifizierungsstelle Explosionsschutz
In behalf

Braunschweig, June 22 1999

Dr. Ing U. Johannsmeyer
Regierungsdirektor

(Non authorized translation)

(13) Annex to

(14)

EC- TYPE- EXAMINATION CERTIFICATE No.

PTB 99 ATEX 2085

(15) Description of equipment

The supply and interface module type VI156 serves as a power supply for intrinsically safe field devices and to separate intrinsically safe and non-intrinsically save electric circuits galvanically.

Electrical details

Mains (Terminals 1,2,3 to 4,5,6)	AC: 230 V, 220 V, 120 V, 110 V, 24 V AC; ca 5 VA DC: 24 V; ca 5W Um = 250 V	
Relay contacts (Terminals 7,8,9 and 10,11,12	Each contact Um = 250 V	AC: 250 V / 5 A, cos φ > 0,7 DC: 30 V / 5 A
Support output (Terminals 13, 14)	U = 24 V Um = 250 V	
Open collector output (Terminals 15, 16)	Um = 40 V	
OC- control outputs (Termials 17, 18 and 19, 20)	Um = 40 V	
RS232- Receiver loop (Terminals 21, 22)	Um = 250 V	
TTY- Receiver loop (Terminals 23, 24	Um = 250 V	
RS232- Transceiver loop (Terminals 25, 26)	Um = 250 V	
TTY- Transceiver loop (Terminals 27, 28	Um = 250 V	

Annex to EC- TYPE- EXAMINATION CERTIFICATE No. PTB 99 ATEX 2085

Power supply loop
(Terminals 29,30,31,32)

Ex- protection class intrinsically safety EEx ib IIC/IIB

Maximum ratings:
U_0 = 16,8 V
I_0 = 55 mA
P_0 = 924 mW
rectangle characteristic

	EEx ib IIC		EEx ib IIB		
L_o [mH]	1	0,5	10	5	2
C_o [nF]	100	130	290	360	570

OC- control output
(Terminals 32,33)

Ex- protection class intrinsically safety EEx ib IIC/IIB
Only to connect to certified intrinsically safe circuit

Maximum ratings:
Ui = 30 V
Ii = 160 mA
Li = 10 µH
Ci = 1 nF

Relay control inputs
(Terminals 32, 37, 38)

Ex- protection class intrinsically safety EEx ib IIC/IIB
Only to connect to certified intrinsically safe circuit

Maximum ratings:
Ui = 30 V
Ii = 160 mA
Li = 10 µH
Ci = 10 nF

OC control inputs
(Terminals 34, 35, 36)

Ex- protection class intrinsically safety EEx ib IIC/IIB
Only to connect to certified intrinsically safe circuit

Maximum ratings:
Ui = 30 V
Ii = 160 mA
Li = 20 µH
Ci is negligible

(Non authorized translation)

Annex to EC- TYPE- EXAMINATION CERTIFICATE No. PTB 99 ATEX 2085

TTY- output (Terminals 39, 40)	Ex- protection class intrinsically safety EEx ib IIC/IIB Maximum ratings: U_0 = 16,8 V I_0 = 74 mA P_0 = 311 mW; linear characteristic Li = 3 mH C_0 = 390 nF
TTY- input (Terminals 41, 42)	Ex- protection class intrinsically safety EEx ib IIC/IIB Only to connect to certified intrinsically safe circuit Maximum ratings: Ui = 30 V Ii = 160 mA Li = 20 µH Ci is negligible small

The intrinsically safe TTY- input and the intrinsically safe OC- outputs are to each other and to the residual connected intrinsically safe circuits galvanically separated.

All intrinsically safe circuits are separated to the non-intrinsic safe OC- output and the non-intrinsic safe OC- control outputs up to a voltage of 40 V. They are also safely galvanically separated to all other non-intrinsic safe circuits up to a voltage of 375 V.

(16) Test report PTB Ex 99-29045

(17) Special conditions

None

(18) Basic safety and health requests

Accomplished through the norms named above

Zertifizierungsstelle Explosionsschutz
In behalf

Braunschweig, June 22. 1999

Dr. Ing U. Johannsmeyer
Regierungsdirektor