IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	**IECEx BAS 15.0065X**	Page 1 of 5	Certificate history:
Status:	**Current**	Issue No: 2	Issue 1 (2017-08-04) Issue 0 (2015-06-16)
Date of Issue:	2023-09-07		
Applicant:	**Trolex Limited** 10a Newby Road Hazel Grove Stockport Cheshire SK7 5DY **United Kingdom**		
Equipment:	**TX9042 Programmable Sensor Controller**		
Optional accessory:			
Type of Protection:	**Intrinsic Safety**		
Marking:	**Ex ia I Ma (-20°C ≤ Ta ≤ +40°C)**		

Approved for issue on behalf of the IECEx Certification Body:	**R S Sinclair**
Position:	**Technical Manager**
Signature: (for printed version)	
Date: (for printed version)	7/9/2023

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Certificate issued by:

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IECEx Certificate of Conformity

Manufacturer: **Trolex Limited**
10a Newby Road
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Manufacturing locations: **Trolex Limited**
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This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-11:2023 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition:7.0

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

GB/BAS/ExTR15.0149/00 GB/BAS/ExTR17.0194/00 GB/SGS/ExTR23.0096/00

Quality Assessment Report:

GB/SIR/QAR07.0017/12

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EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

The Programmable Sensor Controller Type TX9042 provides signal conditioning and monitoring for up to 8 transducers. Each transducer is connected via a dedicated Input PCB which provides the signal conditioning. A programmable microprocessor circuit monitors the conditioned signals to provide local display, monitoring and control signals, and digital data transmission.

The electronic circuitry, comprising up to 13 PCBs (Power Supply module, Display PCB, Control PCB, Input PCB, Comms Module and up to 8 'Input' Modules), is housed in a moulded plastic enclosure which is itself housed in a stainless steel outer enclosure that provides facilities such as gland entries for restraining incoming cables. This enclosure has been assessed as providing a degree of protection of not less than IP54.

The Control PCB carries the microprocessor circuitry and control relays and is mounted in the centre of the moulded enclosure; mounted over this, fixed to the top of the enclosure and connected to the Control PCB by a flat ribbon connector, is the Display PCB. An LCD is fitted on the Display PCB along with a connector to interface with a membrane keypad moulded into the top of the unit; the relay status LEDs and a piezo-electric buzzer are also mounted on the Display PCB. Optional data link circuitry is fitted onto a small daughter board (Digital Comms, RS485 Comms) which has pins for connection onto the Control PCB.

An Input PCB, fitted below the Control PCB, carries up to eight transducer 'Input Modules' which can be selected from the following list and fitted in any position on the Input PCB. Each Input Module is a small PCB fitted with input terminals and signal processing circuitry.

Continued on Page 4:

SPECIFIC CONDITIONS OF USE: YES as shown below:
1. The Programmable Sensor Controller Type TX9042 must be mounted in a secondary enclosure as shown on drawing P5423.02 or in an alternative metal enclosure (not light alloys) which is appropriately certified as providing a degree of protection of IP54.

2. Up to 11 RS485 Comms Modules (in separate Programmable Sensor Controllers type TX9042) may be daisy-chained together (i.e. terminals B1 all linked together, terminals B2 all linked together and terminals B3 all linked together). Provided that the number of daisy-chained PSC's is reduced to 10, these comms lines may be connected to unspecified safe area equipment via an appropriately certified shunt zener diode safety barrier (dual channel a.c.), whose output parameters do not exceed the following per channel:

U_o = 9 V, I_o = 100 mA, P_o = 225 mW
OR U_o = 12 V, I_o = 80 mA, P_o = 240 mW

e.g. suitably certified MTL 761, MTL766 to IECEx BAS 05.0019 or MTL7761ac, MTL7766ac to IECEx BAS 04.0025.

For the purposes of this certificate, these shunt zener safety barriers may be considered equivalent to Category I (M1) equipment. The cable parameters shall not exceed the following: C_c = 2.8 µF, L_c/R_c = 222 µH/ Ω.

3. For the purpose of this certificate, a P+F Cylindrical Inductive Proximity Sensor Type NC… and NJ…. to PTB00ATEX2048X to Ex ia IIC T6 connected to terminals T1 to T4 of a Digital Input Module may be considered equivalent to Ex ia I Mb. In this instance, the power supply selected to power the PSC must have an output voltage not exceeding 16V.

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Equipment (continued):

The Input Modules comprise:

DC Analogue Input (that can be configured for voltage, current or temperature input)
Digital Input (with an option of Vortex input)
Digital Input (Failsafe)
AC (RMS) Analogue Input
Thermocouple Input
Strain Gauge Input
Flow Sensor Input
Alternative Flow Sensor Module (Variation 1)

A Power Supply Module connects to the underside of both the Input PCB and the Control PCB.
Connections between the modules, Input PCB, Power Supply Module and Control PCB are by PCB-mounted two-part connectors.

Connections to external power sources can be made at :

Terminals A17, A18 - input to Power Supply Module
Terminals B1 to B6 - Digital comms
Terminals B7 to B18 - Relay contacts (3 contacts per relay)
Terminals A1 to A16, A19 to A34 - Input Modules (4 terminals per module)

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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)
Variation 1.1

This issue confirms that the current design meets the requirements of IEC 60079-0:2017 & IEC 60079-11:2023; the equipment is already marked in accordance with the requirements of these standards.

ExTR: **GB/SGS/ExTR23.0096/00** File Reference: **23/0161**

Annex:

IECEx BAS 15.0065X Annex.pdf

Power Supply Connection

Terminals A17, A18 (Power)

U_i = 16.5 V
C_i = 0
L_i = 0

Terminals A35, A36 (Control Function)

U_i = 0
I_i = 0
P_i = 0
C_i = 0
L_i = 0

DC Analogue Input Module Connections

This module may be configured, when ordered, for any one of three types of signal input – voltage, current or temperature:

Voltage Input:

Power Output Terminal T1 w.r.t. T4

U_o = U_i (power supply connection)
I_o = *
P_o = *
C_o = *
L_o = *
L_o/R_o = *

Note: parameters marked * are obtained from the certification documents of the power supply connected.

Input Terminals T2, T3 w.r.t. T4

U_i = 16.5 V
C_i = 120 nF
L_i = 0

U_o = 6.51 V
I_o = 1.3 mA
C_o = 300 µF
L_o = 100 mH

Current Input:

Power Output Terminal T1 w.r.t. T2

U_o = U_i (power supply connection)
I_o = *
P_o = *
C_o = *
L_o = *
L_o/R_o = *

Note: parameters marked * are obtained from the certification documents of the power supply connected.

Input Terminal T2 w.r.t. T3 or T4

U_i = 16.5 V
C_i = 120 nF
L_i = 0

U_o = 6.51 V
I_o = 1.3 mA
C_o = 300 µF
L_o = 100 mH

Temperature Input:

Power Output Terminal T1 w.r.t. T2, T3 or T4

U_o = U_i (power supply connection)
I_o = 10mA
P_o = 42mW
C_o = *
L_o = *
L_o/R_o = *

Note: parameters marked * are obtained from the certification documents of the power supply connected.

Input Terminal T2 w.r.t. T3 or T4

U_i = 16.5 V
C_i = 120 nF
L_i = 0

U_o = 6.51 V
I_o = 1.3 mA
C_o =100 µF
L_o = 100 mH

Digital Input Module Connections

This module can be configured as either of two versions, digital and vortex:

Digital Input

Power Output Terminal T1 w.r.t. T4

$U_o = U_i$ (power supply connection)
I_o = 40 mA
P_o = 163 mW
C_o = 5 µF
L_o = 5 mH
L_o/R_o = 100 µH/Ω

Input Terminals T2, T3

U_i = 16.5 V
C_i = 0
L_i = 0

U_o = 6.51 V
I_o = 16 mA
C_o = 100 µF
L_o = 100 mH

Vortex Input

Power Output Terminal T1 w.r.t. T4

U_o = 6.51 V
I_o = 40 mA
P_o = 153 mW
C_o = 100 µF
L_o = 26 mH
L_o/R_o = 240 µH/Ω

Input Terminals T2, T3

U_i = 16.5 V
C_i = 0
L_i = 0

U_o = 6.51 V
I_o = 7 mA
C_o = 100 µF
L_o = 100 mH

Digital Input (Failsafe) Module Connections

Power Output Terminals T1 or T3 w.r.t. T2 or T4

U_o = 12.51 V U_i = 0V
I_o = 3.4 mA
P_o = 10.5 mW
C_o = 5 µF
L_o = 10 mH

Input Terminals T2, T4

U_i = 16.5 V
C_i = 12 nF
Li = 0

U_o = 6.51 V
I_o = 3.6 mA
C_o = 100 µF
L_o = 100 mH

AC (rms) Analogue Input Module Connections

Power output Terminal T1 w.r.t. T4

U_o = U_i (power supply connection)
I_o = *
P_o = *
C_o = *
L_o = *
L_o/R_o = *

Note: parameters marked * are obtained from the certification documents of the power supply connected.

Loop power Output Terminal T2 w.r.t. T3 or T4

U_i = 16.5 V
C_i = 12 nF
L_i = 0

$U_o = U_i$ (power supply connection)
I_o = 121 mA at U_i = 16.5 V
P_o = 497 mW at U_i = 16.5 V
C_o = *
L_o = 30 mH

Thermocouple Input Module Connections

Power output Terminal T1 w.r.t. T4

U_o = U_i (power supply connection)
I_o = *
P_o = *
C_o = *
L_o = *
L_o/R_o = *

Note: parameters marked * are obtained from the certification documents of the power supply connected.

Input Terminals T2, T3 w.r.t. T4

U_i = 6.88 V
C_i = 0
L_i = 0
L_o = 100 mH

U_o = 6.51 V
I_o = 16 mA
C_o = 100 µF

.

Strain Gauge Input Module Connections

Power Output Terminal T1 w.r.t.T4

$U_o = U_i$ (power supply connection)
I_o = 129 mA at U_i = 16.5 V
P_o = 0.53 W at U_i = 16.5 V
C_o = *
L_o = *
L_o/R_o = *
Note: parameters marked * are obtained from the certification drawings of the power supply connected.

Input Terminals T2, T3 w.r.t. T4

U_i = 16.5 V U_o = 6.88 V
P_i = 0.53 W I_o = 21 mA
C_i = 10 nF C_o = 100 µF
L_i = 0 L_o = 100 mH
.

Flow Sensor Input Module Connections

Power Output Terminal T1 w.r.t.T4

U_o = 7.14 V
I_o = 131 mA
P_o = 234 mW
C_o = 100 µF
L_o = 10 mH
L_o/R_o = 1834 µH/Ω

Input Terminal T2 w.r.t.T4

U_i = 7.14 V U_o = 6.88 V
C_i = 1.1 nF I_o = 3.3 mA
L_i = 0 C_o = 100 µF
L_o = 100 mH
.

Input Terminal T3 w.r.t. T4

U_i = 16.5 V U_o = 6.88 V
C_i = 1.1 nF I_o = 3.3 mA
L_i = 0 C_o = 100 µF
L_o = 100 mH

Alternative Flow Sensor Input Module Connections for connection to a Rosemount Pressure Sensor 3051S to Certificate No. Baseefa05ATEX0193U

U_o = 16.5 V
I_o = 242 mA
P_o = 1 W
C_i = 0
L_i = 0
C_o = 6.9µF Based on U_o = 16.5V, using Tables for Group I, and reducing to 50%
L_o = 4.4mH Based on I_o = 242mA, using 0.5 x L x I^2 = 260µJ, and reducing to 50%
L_o/R_o = 468µH/Ω Based on formula in Standard, using R_s = 68.4Ω, *e* = 525µJ, U_o = 16.5V

RS485 Comms Connections

Terminals B2,B3 w.r.t. B1

U_o = 6.88 V U_i = 12 V
I_o = 154 mA P_i = 1.41 W
P_o = 265 mW C_i = 0
C_o = 10 µF L_i = 0
L_o = 4 mH
L_o/R_o = 139 µH/Ω

Relay Output Connections

U_i = 23 V