1 # EC - TYPE EXAMINATION CERTIFICATE

2 **Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

3 EC - Type Examination Certificate Number: **Baseefa03ATEX0292X – Issue 8**

4 Equipment or Protective System: **TX9042 Programmable Sensor Controller**

5 Manufacturer: **Trolex Limited**

6 Address: **Stockport, Cheshire, SK7 5DY**

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Baseefa, Notified Body number 1180, in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system 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 in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential Report No. **See Certificate History**

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2012+A11:2013 **EN 60079-11: 2012** **EN 50303: 2000**

except in respect of those requirements listed at item 18 of the Schedule.

10 If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system 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 or protective system. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment or protective system shall include the following :

Ⓔx **I M1 Ex ia I Ma**

Baseefa Customer Reference No. **1159**

Project File No. **15/0262**

This certificate is granted subject to the general terms and conditions of Baseefa. It does not necessarily indicate that the equipment may be used in particular industries or circumstances.

pp Allan Cooper

R S SINCLAIR
DIRECTOR
On behalf of
Baseefa

Baseefa
Rockhead Business Park, Staden Lane,
Buxton, Derbyshire SK17 9RZ
Telephone +44 (0) 1298 766600 Fax +44 (0) 1298 766601
e-mail info@baseefa.com web site www.baseefa.com
Baseefa is a trading name of Baseefa Ltd
Registered in England No. 4305578. Registered address as above.

13 # Schedule

14 ## Certificate Number Baseefa03ATEX0292X – Issue 8

15 Description of Equipment or Protective System

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 the 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.

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

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:

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

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 $\quad U_i = 0$V
$I_o = 3.4$ 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
$L_i = 0$

$U_o = 6.51$ 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

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

.

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
P_i = 0.53 W
C_i = 10 nF
L_i = 0

U_o = 6.88 V
I_o = 21 mA
C_o = 100 µF
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
C_i = 1.1 nF
L_i = 0

U_o = 6.88 V
I_o = 3.3 mA
C_o = 100 µF
L_o = 100 mH

.

Input Terminal T3 w.r.t. T4

U_i = 16.5 V
C_i = 1.1 nF
L_i = 0

U_o = 6.88 V
I_o = 3.3 mA
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
I_o = 154 mA
P_o = 265 mW
C_o = 10 µF
L_o = 4 mH
L_o/R_o = 139 µH/Ω

U_i = 12 V
P_i = 1.41 W
C_i = 0
L_i = 0

Relay Output Connections

U_i = 23 V

16 Report Number

10(C)0863

17 Special Conditions for Safe Use

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 BAS01ATEX7202 or MTL7761ac, MTL7766ac to BAS01ATEX7217.

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 inductive sensor to PTB00ATEX2048X to Category II 1G Ex ia IIC T6 connected to terminals T1 to T4 of a Digital Input Module may be considered equivalent to Category I M1. In this instance, the power supply selected to power the PSC must have an output voltage not exceeding 16V.

18 Essential Health and Safety Requirements

All relevant Essential Health and Safety Requirements are covered by the standards listed at item 9.

19 Drawings and Documents

New drawings submitted for this issue of certificate:

Number	Sheet	Issue	Date	Description
P5423.270	1	C	18.05.15	Certification Label details

This drawing is also associated and held with IECEx BAS 15.0065X.

Current drawings which remain unaffected by this issue:

Number	Sheet	Issue	Date	Description
P5093.27	1	C	21.01.97	Reed Relay
P5093.27.01	1	A	14.03.07	Reed Relay
P5423.09	1 & 2	J	27.02.07	Power Supply PCB certified Circuit Diagram
P5423.06	1	J	19.09.06	PCB, Power Supply
P5423.547	1	B	02.12.03	P5423.06 Issue E PCB Salvage Modifications
P5423.01	1 to 2	E	13.07.11	Control PCB Certified Circuit Diagram
P5423.01	1 to 2	F	14.07.11	Control PCB Certified Circuit Diagram
P5423.02	1	J	04.07.11	General Arrangement
P5423.03	1	C	18.04.97	Control PCB Artwork
P5423.03	1	D	06.05.11	Control PCB Artwork
P5423.08	1	C	23.05.11	Display PCB Certified Circuit Diagram
P5423.05	1	A	08.05.96	Display PCB Artwork
P5423.47	1 of 1	C	13.07.11	Battery PCB Certified Circuit Diagram
P5423.29	1	C	22.07.02	Battery PCB Artwork
P5423.46	1	B	05.09.02	Digital Comms PCB Certified Circuit Diagram
P5423.28	1	A	08.05.96	Digital Comms PCB Artwork
P5423.45	1	D	22.01.03	RS485 Comms PCB Certified Circuit Diagram
P5423.254	1	D	10.06.03	RS485 Comms PCB Artwork
P5423.550	1	A	11.11.03	P5423.254 issue D PCB Salvage Modifications
P5423.07	1	C	22.01.03	Input PCB Certified circuit Diagram
P5423.04	1	C	22.07.02	Input PCB Artwork
P5423.42	1 & 2	C	06.09.03	Digital Input Module Certified Circuit Diagram
P5423.22	1	D	06.09.03	Digital Input Module PCB Artwork
P5423.549	1	A	11.11.03	P5423.22 Issue C PCB Salvage Modifications
P5423.139	1 & 2	B	12.06.03	Digital Input (Fail Safe) Module Certified Circuit Diagram
P5423.135	1	B	22.07.02	Fail Safe Digital Input Module PCB Artwork
P5423.41	1 & 2	B	09.06.03	DC Analogue Input Module Certified Circuit Diagram
P5423.21	1	B	22.07.02	DC Analogue Input Module PCB Artwork
P5423.43	1	E	22.01.03	AC (rms) Input Module PCB Certified Circuit Diagram
P5423.23	1	F	01.06.03	AC (rms) Analogue Input Module PCB Artwork
P5423.548	1	A	11.11.03	P5423.23 Issue E PCB Salvage Modifications
P5423.248	1 & 2	B	03.06.03	Thermocouple Input Module Certified Circuit Diagram
P5423.25	1	B	03.06.03	Thermocouple Input Module PCB Artwork
P5423.178	1 & 2	B	01.04.03	Flow Sensor Input Module Certified Circuit Diagram
P5423.179	1	B	09.06.03	Flow Sensor Input Module PCB Artwork
P5423.138	1 & 2	C	10.06.03	Strain Gauge Input Module Certified Circuit Diagram
P5423.131	1	C	22.07.02	Strain Gauge Input Module PCB Artwork
P5423.555	1 & 2	A	02.08.05	Circuit Diagram Flow Sensor Input Module for Rosemount DP Sensor
P5423.554	1	A	28.07.05	Flow Sensor Input Module (Rosemount) PCB Artwork

The original drawings as listed above are held with this certificate. These drawings are also associated with (and copies of these drawings are held with) IECEx BAS 15.0065X.

20 Certificate History

Certificate No.	Date	Comments
Baseefa03ATEX0292X	18 June 2003	The release of the prime certificate. The associated test and assessment is documented in Test Report No. 02(C)0346.
Baseefa03ATEX0292X	18 June 2003	Re-issued 26 January 2004 to replace original.
Baseefa03ATEX0292X/1	14 December 2005	To permit the addition of an alternative Flow Sensor Module for connection to a Rosemount Pressure Sensor 3051S to Certificate No. Baseefa05ATEX0193U. Documented in report 05(C)0460.
Baseefa03ATEX0292X/2	27 February 2007	To permit a re-design of the Power Supply Module; the Input/Output parameters are not affected. Documented in report 06(C)0985.
Baseefa03ATEX0292X/2	27 February 2007	Re-issued 6 September 2007 to replace original.
Baseefa03ATEX0292X/3	7 September 2007	To permit the use of an alternative relay module. This alternative relay uses the same operating coil and protection diodes but has a reed that is normally open (instead of change-over) which is capable of handling a higher current of 1A.
Baseefa03ATEX0292X/4	8 November 2007	To permit the use of an alternative LCD in the Display PCB.
Baseefa03ATEX0292X Issue 5	2 September 2011	This issue of the certificate incorporates previously issued primary & supplementary certificates into one certificate; confirms the current design meets the requirements of EN 60079-0: 2009, EN 60079-11: 2007 & EN 50303: 2000 including the revision of the marking in accordance with these standards; incorporates minor drawing reference corrections; introduces an alternative Control PCB; permits the use of an alternative LCD in the Display PCB and permits minor electrical changes to the Battery PCB.
Baseefa03ATEX0292X Issue 6	2 September 2011	To permit the entity parameters of the "Alternative Flow Sensor Input Module" to be extended to include C_o, L_o & L_o/R_o.
Baseefa03ATEX0292X Issue 7	26 September 2012	To remove the restriction "The relay contacts must only be connected to an IS circuit which is powered by the same IS Power Supply as the PSC" associated with the relay output connections, detailed on page 6 of this certificate. This change is also applicable to Issue 5 & Issue 6 of this certificate.
Baseefa03ATEX0292X Issue 8	16 June 2015	This issue of the certificate confirms the current design meets the requirements of EN 60079-0:2012+A11:2013 & EN 60079-11:2012; and included corrections the terminal parameters for the Temperature Input Module, Io and Po added, no change to actual module. Documented in report GB/BAS/ExTR15.0149/00.
For drawings applicable to each issue, see original of that issue.		