



1 **TYPE EXAMINATION CERTIFICATE**

2 **IEC 61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety Related Systems
- Equipment forming a defined Subsystem -**

3 Type Examination Certificate Number: **Baseefa09SR0140**

4 Equipment: **MTL4501-SR / MTL5501-SR**

5 Manufacturer: **Measurement Technology Limited**

6 Address: **Great Marlings, Butterfield, Luton, Bedfordshire, LU2 8DL, UK**

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

8 Baseefa certifies that this equipment has been found to comply with the requirements of the following standard.

IEC 61508-1:1998 & IEC 61508-2:2000 (in respect of requirements related to sub-systems)

9 The examination and test results are recorded in confidential Report No. **08(C)0295**

10 If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions of safe use specified in the schedule to this certificate.

11 This TYPE EXAMINATION CERTIFICATE has been prepared using the CASS methodology and relates only to the design of the specified equipment. Provided that the manufacturer maintains a production system in accordance with the ATEX Directive, extended to include the requirements of IEC 61508 and confirmed by the issue of a Quality Assurance Notification from Baseefa, the equipment may be marked with the Baseefa IEC 61508 certification mark reproduced above.

12 The highest Safety Integrity Level that can be claimed for a safety function in which this equipment is an essential single in-line subsystem is:

SIL 3

Note that the SIL of the Safety System in which this equipment is integrated may vary from that indicated for the equipment alone, according to the method of integration and other factors.

This certificate may only be reproduced in its entirety, without any change, schedule included.

Baseefa Customer Reference No. **0703**

Project File No. **08/0295**

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.

A handwritten signature in blue ink, appearing to read "R S Sinclair", written over a blue circular stamp that contains the word "CASS" in a stylized font.

Baseefa

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R S SINCLAIR

DIRECTOR
On behalf of
Baseefa



Schedule

15 Equipment Description

The MTL4501-SR and MTL5501-SR are intrinsic safety isolators that interface proximity detector devices or switches, located in a hazardous area of a process plant with non intrinsic safety equipment located in a non hazardous area. Each module enables a voltage-source output in the safe area to be controlled by a switch or proximity detector located in the hazardous area, and includes line fault detection, although this function is not safety-related. The units are designed to turn on a voltage-source output of nominally 24V for input currents between 2.9mA and 3.9mA, and turn the output off for input currents less than 1.9mA or greater than 5.1mA.

The equipment comprises of a single PCB, housed in a plastic enclosure. The MTL4501-SR and MTL5501-SR are functionally identical units, the MTL4501-SR being designed for backplane mounted applications and the MTL5501-SR for DIN rail mounting.

Electrical connections are made to the apparatus via suitable terminals, plugs and sockets.

The MTL4501-SR/MTL5501-SR are also certified for connection to intrinsically safe equipment or simple apparatus located in potentially explosive atmospheres and this is covered by certificates; IECEx BAS 08.0031 and Baseefa08ATEX0081 (MTL4501-SR), IECEx BAS 08.0032 and Baseefa08ATEX0082 (MTL5501-SR).

The safety function under consideration is the ability to de-energise the voltage output under defined input current and fault conditions.

16 Subsystem Parameters in accordance with IEC 61508-2 Clause 7.4.7.3

a) Functional Specification

The MTL4501-SR and MTL5501-SR are intrinsic safety isolators that interface switch or proximity detector devices located in a hazardous area of a process plant with non intrinsic safety equipment located in a non hazardous area. An input current between 2.9mA and 3.9mA produces an output of approximately 24V and an input current of less than 1.9mA or more than 5.1mA produces an output voltage of approximately 0V ($\leq 5V$). A false 24V output when the input is less than 1.9mA or more than 5.1mA is the only condition considered to be a dangerous failure. The device is intended to be used in a functional safety loop meeting the requirements of IEC61508 for up to SIL3.

b) Estimated Rates of Dangerous Failure Detected by Diagnostic Tests

$\Sigma\lambda_{DD} = 0$ failures/million hours. The device contains no internal diagnostics.

c) Estimated Rates of Dangerous Failure Undetected by Diagnostic Test

$\Sigma\lambda_{DU} = 0.0074$ failures/million hours,
failures that prevent the output from being de-energised (representing 7.45% of the allowed $\Sigma\lambda_{DU}$ for a SIL of 3)

d) Environmental Limits

Maximum ambient is 60°C. All other environmental limits are defined in the Installation, Operating, Maintenance and Safety Instructions for the MTL 4501-SR/MTL5501-SR.

e) Lifetime Limits

The units have an anticipated lifetime of 15 years.



f) Periodic Proof Test and Maintenance

There is no limit on the proof test interval although the manufacturer recommends as good practice that a proof test to the procedure detailed in Appendix B of the Safety Manual be carried out at least once every 3 years. The system designer is responsible for specifying a proof test interval appropriate to the application.

(For the purpose of calculating a notional probability of failure on demand it has been assumed that the Proof Test Procedure will be performed at regular intervals not exceeding 1 year.)

Physical deterioration is inspected for at the proof test interval.

g) Diagnostic Coverage

The Diagnostic Coverage is 0%.

h) Diagnostic Test Interval

Not applicable as there are no diagnostics.

i) Additional Information

j) Safe Failure Fraction

The Safe Failure Fraction for the function described at (a) is 99.4%

The overall failure rate $\Sigma\lambda$ is 1.27 E-6 failures/ hour

The safe failure rate $\Sigma\lambda_s$ is 1.27 E-6 failures/ hour

The dangerous detected failure rate $\Sigma\lambda_{DD}$ is 0 failures/ hour

The dangerous undetected failure rate $\Sigma\lambda_{DU}$ is 7.45 E-9 failures/ hour

k) Hardware Fault Tolerance

The Hardware Fault Tolerance of the components capable of preventing the voltage output from being de-energised is 0 (1001).

l) Application Limits

None other than those covered in d) above.

m) Safety Integrity Level (systematic)

The highest Safety Integrity Level that can be claimed for a safety function which uses this equipment in respect of: measures, techniques, design features, mitigating the effects of systematic faults is SIL3.

Probability of Failure on Demand (PFD_{avg})

The following information regarding PFD_{avg} has been included at the request of the manufacturer.

The PFD_{avg} is $(\Sigma\lambda_{DU}/2)*T_p$ (where T_p is the proof test interval). As an example if the T_p is 1 year, then this would give a PFD_{avg} of 3.26E-5 which represents 3.26% of the PFD_{avg} allowed for SIL3.

n) Configuration Management

The hardware is identified by the documentation listed in section 18 below which is applicable to all manufacture from the date of this certificate. Applicability of the certificate to future modifications will be confirmed by the issue of supplementary certification, listing updated documentation.



o) Documentary Evidence of Validation.

This certificate provides documentary evidence of validation. Associated confidential Certification Report 08(C)0295 details the evidence used in the validation process.

17 Special Conditions for Safe Use

None.

18 Drawings and Documents

Drawing	Sheets	Date	Revision	Title
AD4500-1	1 to 4	09/2008	6	MTL4500 FINAL ASSEMBLY- Top level assembly drawing
AD5500-1	1 to 4	01/2009	5	MTL5500 FINAL ASSEMBLY – Top level assembly drawing
00010558	1 of 1	04/07/08	1	MTL4501 Functional Block Diagram
TC4501-1	1 of 1	11/2008	1	MTL4501 FINAL ASSEMBLY - Schematic
001-1317	1 of 1	11/2008	1	MTL4501 PCB level assembly drawing
PLE4501-3	1 to 3	01/10/2008	1	PCB ASSEMBLY – Bill of materials for PCB level assembly
AD4501-3	1 of 1	11/2008	1	PCB ASSEMBLY – PCB level assembly drawing
TP4501-3/1	1 to 6	11/2008	1	INTERMEDIATE ASSEMBLY – Test procedure
00012147	1 to 10	29/6/9	2	MTL4501-SR MTL5501-SR Safety Manual