

EU-TYPE EXAMINATION CERTIFICATE



Equipment or Protective System intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU

EU-Type Examination Certificate Number: **DEMKO 20 ATEX 2370X Rev. 5**

Product: **I/O Modules with Intrinsically Safe Connections**

Manufacturer: **PHOENIX CONTACT GmbH & Co. KG**

Address: **Flachmarktstraße 8, 32825 Blomberg, Germany**

This product and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

UL International Demko A/S, notified body number 0539 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products 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. **US/UL/ExTR20.0047/05.**

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

EN IEC 60079-0:2018

EN IEC 60079-7:2015/A1:2018

EN 60079-11:2012

Where additional criteria beyond those given here have been used, they are listed at item 18 in the Schedule.

If the sign "X" is placed after the certificate number, it indicates that the product is subject to the "Specific Conditions of Use" listed under item 17 of this certificate.

This EU-Type Examination Certificate relates only to the technical design of the specified product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by the certificate.

The marking of the product shall include the following (marking is provided in the Schedule as a part of item 15, if applicable):

**Ex II 3 (1) G Ex ec [ia IIB Ga] IIC T4 Gc (for models AXL F EX IS DO4 SD 21-60 XC 1F
and AXL P EX IS DO4 SD 21-60 1F only)**

Ex II 3 (1) G Ex ec [ia Ga] IIC T4 Gc (for all other models)

Ex II (1) D [Ex ia Da] IIIC (for all models)

Certification Manager
Thomas Wilson

This is to certify that the sample(s) of the Product described herein ("Certified Product") has been investigated and found in compliance with the Standard(s) indicated on this Certificate, in accordance with the ATEX Product Certification Program Requirements. This certificate and test results obtained apply only to the product sample(s) submitted by the Manufacturer. UL did not select the sample(s) or determine whether the sample(s) provided were representative of other manufactured product. UL has not established Follow-Up Service or other surveillance of the product. The Manufacturer is solely and fully responsible for conformity of all product to all applicable Standards, specifications, requirements or Directives. The test results may not be used, in whole or in part, in any other document without UL's prior written approval.

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Description of Product

These devices are open type programmable logic controllers, consisting of I/O modules and intended for Industrial Control applications requiring intrinsically safe circuits. They are intended to be mounted within a suitable enclosure.

The AXL F EX IS DI16 NAM XC 1F and AXL P EX IS DI16 NAM 1F modules each allow connection of up to sixteen intrinsically safe, galvanically isolated NAMUR digital input signals from separately certified intrinsically safe devices such as proximity switches and closed contact switches. The AXL F EX IS DI16 NAM XC 1F and AXL P EX IS DI16 NAM 1F modules each provide the sole source of power via intrinsically safe output entity parameters on each channel of their I/O terminals for any separately certified intrinsically safe devices that are connected.

The AXL F EX IS AI8 HART XC 1F and AXL P EX IS AI8 HART 1F modules each allow connection of up to eight HART-enabled, intrinsically safe, galvanically isolated analog input signals from separately certified intrinsically safe devices such as sensors. The AXL F EX IS AI8 HART XC 1F and AXL P EX IS AI8 HART 1F modules each provide the sole source of power with intrinsically safe output entity parameters on each channel of their I/O terminals for any separately certified intrinsically safe devices that are connected.

The AXL F EX IS AO4 HART XC 1F and AXL P EX IS AO4 HART 1F modules each allow connection of up to four HART-enabled, intrinsically safe, galvanically isolated analog output signals to separately certified intrinsically safe devices such as sensors. The AXL F EX IS AO4 HART XC 1F and AXL P EX IS AO4 HART 1F modules each provide the sole source of power with intrinsically safe output entity parameters on each channel of their I/O terminals for any separately certified intrinsically safe devices that are connected.

The AXL F EX IS DO4 SD 24-48 XC 1F, AXL F EX IS DO4 SD 21-60 XC 1F, AXL P EX IS DO4 SD 24-48 1F, and AXL P EX IS DO4 SD 21-60 1F modules each allow connection of up to four intrinsically safe, galvanically isolated digital output signals to separately certified intrinsically safe devices such as solenoid valves, lights, or indicators. The AXL F EX IS DO4 SD 24-48 XC 1F, AXL F EX IS DO4 SD 21-60 XC 1F, AXL P EX IS DO4 SD 24-48 1F, and AXL P EX IS DO4 SD 21-60 1F modules each provide the sole source of power via intrinsically safe output entity parameters on each channel of their I/O terminals for any separately certified intrinsically safe devices that are connected.

The AXL F EX IS AI8 P HART XC 1F and AXL P EX IS AI8 P HART 1F modules each allow up to eight intrinsically safe input connections at their intrinsically safe terminals. They provide galvanically isolated intrinsically safe connections to separately certified intrinsically safe devices. The signals are powered only by the separately certified intrinsically safe field devices with defined intrinsically safe output entity parameters that must comply with the input entity parameters on each of the I/O terminal pairs of models AXL F EX IS AI8 P HART XC 1F and AXL P EX IS AI8 P HART 1F.

The AXL F EX IS RTD8 XC 1F and AXL P EX IS RTD8 1F modules each allow connection of up to eight 2-wire, 3-wire, 4-wire Resistance Temperature Detectors (RTD), intrinsically safe, analog input signals to the Axioline F and Axioline P local buses, respectively.

Performance testing

The optical radiation output of the product with respect to explosion protection, according to Annex II clause 1.3.1 of the Directive 2014/34/EU is covered in this certificate based on Exception 1) to the scope of EN 60079-28:2015.

Temperature range

For all AXL F... models, the ambient temperature range is -25°C to +60°C (but for DO4 models, see Specific Conditions of Use).
For all AXL P... models, the ambient temperature range is -40°C to +70°C (but for DO4 models, see Specific Conditions of Use).

Electrical data

Intrinsically safe specifications:

Model AXL F EX IS DI16 NAM XC 1F:

Supply rating: 24 VDC (19.2-30 VDC), 130 mA; $U_m = 250$ V

Intrinsically Safe Output Entity Parameters:

U_o : 10.6 V

I_o : 11 mA

P_o : 30 mW

C_o : 2.30 μ F (IIC) / 16.0 μ F (IIB, IIIC) / 71.8 μ F (IIA)

L_o : 100 mH (IIC) / 100 mH (IIB, IIIC) / 100 mH (IIA)

Model AXL F EX IS AI8 HART XC 1F:

Supply rating: 24 VDC (19.2-30 VDC), 240 mA; $U_m = 250$ V

Intrinsically Safe Output Entity Parameters:

U_o : 24.8 V

I_o : 85.8 mA

P_o : 532 mW

C_o : 0.113 μ F (IIC) / 0.86 μ F (IIB, IIIC) / 3.05 μ F (IIA)

L_o : 2.95 mH (IIC) / 18.95 mH (IIB, IIIC) / 30.95 mH (IIA)

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AXL F EX IS AO4 HART XC 1F:

Supply rating: 24 VDC (19.2-30 VDC), 150 mA; Um = 250 V

Intrinsically Safe Output Entity Parameters:

Uo: 24.8 V

Io: 86.7 mA

Po: 538 mW

Co: 0.112 uF (IIC) / 0.859 uF (IIB, IIIC) / 3.049 uF (IIA)

Lo: 4.1 mH (IIC) / 18.29 mH (IIB, IIIC) / 37.21 mH (IIA)

AXL F EX IS DO4 SD 24-48 XC 1F:

Supply rating: 24 VDC (19.2-30 VDC), 420 mA; Um = 250 V

Intrinsically Safe Output Entity Parameters:

Uo: 27.3 V

Io: 99 mA

Po: 676 mW

Co: 0.088 uF (IIC) / 0.683 uF (IIB, IIIC) / 2.28 uF (IIA)

Lo: 1.189 mH (IIC) / 12.9 mH (IIB, IIIC) / 27.41 mH (IIA)

AXL F EX IS DO4 SD 21-60 XC 1F:

Supply rating: 24 VDC (19.2-30 VDC), 420 mA; Um = 250 V

Intrinsically Safe Output Entity Parameters:

Uo: 24.8 V

Io: 180 mA

Po: 1116 mW

Co: 0.86 uF (IIB, IIIC) / 3.05 uF (IIA)

Lo: 2.779 mH (IIB, IIIC) / 7.168 mH (IIA)

AXL F EX IS AI8 P HART XC 1F:

Supply rating: 24 VDC (19.2-30 VDC), 27 mA; Um = 250 V

Intrinsically Safe Input Entity Parameters:

Ui: 30.0 V

Ii: 115 mA

Pi: 863 mW

Ci: 0 uF

Li: 0 mH

AXL F EX IS RTD8 XC 1F:

Supply rating: 24 VDC (19.2-30 VDC), 40 mA; Um = 250 V

Intrinsically Safe Output Entity Parameters:

Uo: 10.6 V

Io: 16.8 mA

Po: 45 mW

Co: 2.32 uF (IIC) / 16.2 uF (IIB, IIIC) / 72 uF (IIA)

Lo: 100 mH (IIC) / 100 mH (IIB, IIIC) / 100 mH (IIA)

Model AXL P EX IS DI16 NAM 1F:

Major supply rating via bus base module: 24 VDC (19.2-30 VDC), 130 mA; Um = 250 V

Minor supply rating via bus base module: 5 VDC, 135 mA; Um = 250 V

Intrinsically Safe Output Entity Parameters:

Uo: 10.6 V

Io: 11 mA

Po: 30 mW

Co: 2.30 uF (IIC) / 16.0 uF (IIB, IIIC) / 71.8 uF (IIA)

Lo: 100 mH (IIC) / 100 mH (IIB, IIIC) / 100 mH (IIA)

Model AXL P EX IS AI8 HART 1F:

Major supply rating via bus base module: 24 VDC (19.2-30 VDC), 260 mA; Um = 250 V

Minor supply rating via bus base module: 5 VDC, 135 mA; Um = 250 V

Intrinsically Safe Output Entity Parameters:

Uo: 24.8 V

Io: 85.8 mA

Po: 532 mW

Co: 0.113 uF (IIC) / 0.86 uF (IIB, IIIC) / 3.05 uF (IIA)

Lo: 2.95 mH (IIC) / 18.95 mH (IIB, IIIC) / 30.95 mH (IIA)

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AXL P EX IS AO4 HART 1F:

Major supply rating via bus base module: 24 VDC (19.2-30 VDC), 160 mA; Um = 250 V

Minor supply rating via bus base module: 5 VDC, 135 mA; Um = 250 V

Intrinsically Safe Output Entity Parameters:

Uo: 24.8 V

Io: 86.7 mA

Po: 538 mW

Co: 0.112 uF (IIC) / 0.859 uF (IIB, IIIC) / 3.049 uF (IIA)

Lo: 4.1 mH (IIC) / 18.29 mH (IIB, IIIC) / 37.21 mH (IIA)

AXL P EX IS DO4 SD 24-48 1F:

Major supply rating via bus base module: 24 VDC (19.2-30 VDC), 455 mA; Um = 250 V

Minor supply rating via bus base module: 5 VDC, 135 mA; Um = 250 V

Intrinsically Safe Output Entity Parameters:

Uo: 27.3 V

Io: 99 mA

Po: 676 mW

Co: 0.088 uF (IIC) / 0.683 uF (IIB, IIIC) / 2.28 uF (IIA)

Lo: 1.189 mH (IIC) / 12.9 mH (IIB, IIIC) / 27.41 mH (IIA)

AXL P EX IS DO4 SD 21-60 1F:

Major supply rating via bus base module: 24 VDC (19.2-30 VDC), 455 mA; Um = 250 V

Minor supply rating via bus base module: 5 VDC, 135 mA; Um = 250 V

Intrinsically Safe Output Entity Parameters:

Uo: 24.8 V

Io: 180 mA

Po: 1116 mW

Co: 0.86 uF (IIB, IIIC) / 3.05 uF (IIA)

Lo: 2.779 mH (IIB, IIIC) / 7.168 mH (IIA)

AXL P EX IS AI8 P HART 1F:

Major supply rating via bus base module: 24 VDC (19.2-30 VDC), 27 mA; Um = 250 V

Minor supply rating via bus base module: 5 VDC, 135 mA; Um = 250 V

Intrinsically Safe Input Entity Parameters:

Ui: 30.0 V

Ii: 115 mA

Pi: 863 mW

Ci: 0 uF

Li: 0 mH

AXL P EX IS RTD8 1F:

Major supply rating via bus base module: 24 VDC (19.2-30 VDC), 40 mA; Um = 250 V

Minor supply rating via bus base module: 5 VDC, 135 mA; Um = 250 V

Intrinsically Safe Output Entity Parameters:

Uo: 10.6 V

Io: 16.8 mA

Po: 45 mW

Co: 2.32 uF (IIC) / 16.2 uF (IIB, IIIC) / 72 uF (IIA)

Lo: 100 mH (IIC) / 100 mH (IIB, IIIC) / 100 mH (IIA)

Routine tests

For all models, routine dielectric strength tests according to EN 60079-11 Clause 11.2 are required for infallible transformers T2 on Power PCB and T2000 on IO PCB as follows:

Test Potential Applied Between	Test Potential, V @ Frequency Hz, for Min. Hold Time, s	Alternative Test Potential, V @ Frequency Hz, for Min. Hold Time, s
Input Windings (tied together) and Output Windings (tied together)	1500 V @ 60 Hz for 60 s	1800 V @ 60 Hz for 1 s
All Windings (tied together) and Core	500 V @ 60 Hz for 60 s	600 V @ 60 Hz for 1 s

The current flowing during the test shall not exceed 5 mA r.m.s. at any time.

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Descriptive Documents

The scheduled drawings are listed in the report no. provided under item no. [8] on page 1 of this EU-Type Examination Certificate.

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Specific conditions of use:

- The equipment must be installed in a suitably-certified tool-secured enclosure providing a minimum ingress protection of IP54 in accordance with EN 60079-0.
- The equipment shall only be used in an area of not more than pollution degree 2, as defined in EN 60664-1.
- The equipment must be supplied by a circuit of Overvoltage category II, as defined in EN 60664-1.

- (For Model AXL F EX IS DO4 SD 24-48 XC 1F only):

When installed on a vertical DIN rail, the maximum ambient operating temperature is reduced in relation to the load:

Maximum load current	Maximum ambient temperature
48 mA	45°C
40 mA	50°C
32 mA	55°C
24 mA	60°C

The derating curve is linear. Specific temperature ratings can be interpolated between specified temperatures. Do not allow the product to operate above the designated temperature range.

When installed on a horizontal DIN rail, the maximum load current is limited to 48 mA for the entire ambient temperature range marked on the AXL...EX IS... station.

- (For Model AXL F EX IS DO4 SD 21-60 XC 1F only):

When installed on a vertical DIN rail, the maximum ambient operating temperature is reduced in relation to the load:

Maximum load current	Maximum ambient temperature
60 mA	45°C
50 mA	52.5°C
40 mA	60°C

The derating curve is linear. Specific temperature ratings can be interpolated between specified temperatures. Do not allow the product to operate above the designated temperature range.

When installed on a horizontal DIN rail, the maximum load current is limited to 60 mA for the entire ambient temperature range marked on the AXL...EX IS... station.

- (For Model AXL P EX IS DO4 SD 24-48 1F only):

When installed on a vertical DIN rail, the maximum ambient operating temperature is reduced in relation to the load:

NOTE: The maximum ambient temperature when installed on a vertical DIN rail is 60°C.

Maximum load current	Maximum ambient temperature
48 mA	45°C
40 mA	50°C
32 mA	55°C
24 mA	60°C

When installed on a horizontal DIN rail, the maximum ambient operating temperature is reduced in relation to the load:

Maximum load current	Maximum ambient temperature
48 mA	60°C
36 mA	65°C
24 mA	70°C

The derating curve is linear. Specific temperature ratings can be interpolated between specified temperatures. Do not allow the product to operate above the designated temperature range.

- (For Model AXL P EX IS DO4 SD 21-60 1F only):

When installed on a vertical DIN rail, the maximum ambient operating temperature is reduced in relation to the load:

NOTE: The maximum ambient temperature when installed on a vertical DIN rail is 60°C.

Maximum load current	Maximum ambient temperature
60 mA	45°C
50 mA	52.5°C
40 mA	60°C

When installed on a horizontal DIN rail, the maximum ambient operating temperature is reduced in relation to the load:

Maximum load current	Maximum ambient temperature
60 mA	60°C
50 mA	65°C
40 mA	70°C

The derating curve is linear. Specific temperature ratings can be interpolated between specified temperatures. Do not allow the product to operate above the designated temperature range.

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Essential Health and Safety Requirements

The Essential Health and Safety Requirements (EHSRs) covered by the standards listed at item 9.

Additional information



The trademark  will be used as the company identifier on the marking label.

The manufacturer shall inform the notified body concerning all modifications to the technical documentation as described in Annex III to Directive 2014/34/EU of the European Parliament and the Council of 26 February 2014.