

Analoges Ausgangsmodul AO401EX

Weitere Unterlagen

Ergänzend zu diesem Dokument finden Sie im Internet unter www.turck.com folgende Unterlagen:

- Datenblatt
- Handbuch excom – Remote I/O für eigensichere Stromkreise
- Zulassungen
- Konformitätserklärungen (aktuelle Version)

Zu Ihrer Sicherheit

Bestimmungsgemäße Verwendung

Das Gerät ist ein Betriebsmittel der Zündschutzart „Eigensicherheit“ (IEC/EN 60079-11) und darf nur innerhalb des excom-I/O-Systems für eigensichere Stromkreise mit den zugelassenen Modulträgern MT...G (PTB 00 ATEX 2194 U bzw. IECEx PTB 13.0040 U) betrieben werden. Das 4-kanalige, analoge Ausgangsmodul AO401EX dient zum Anschluss von eigensicheren analogen Feldgeräten wie Stellventilen oder Prozessanzeigen. Die Ausgänge sind untereinander galvanisch getrennt. Das Gerät ist für den Einsatz in Zone 1 geeignet. Die Zündschutzart der Ausgänge ist Ex ia IIC. An das Gerät können analoge Aktuatoren wie Stellventile oder Prozessanzeigen angeschlossen werden. Jede andere Verwendung gilt als nicht bestimmungsgemäß. Für daraus resultierende Schäden übernimmt Turck keine Haftung.

Allgemeine Sicherheitshinweise

- Nur fachlich geschultes Personal darf das Gerät montieren, installieren, betreiben, einstellen und instand halten.
- Das Gerät erfüllt die EMV-Anforderungen für den industriellen Bereich. Bei Einsatz in Wohnbereichen Maßnahmen treffen, um Funkstörungen zu vermeiden.
- Nur Geräte miteinander kombinieren, die durch ihre technischen Daten für den gemeinsamen Einsatz geeignet sind.

Hinweise zum Ex-Schutz

- Bei Einsatz des Gerätes in Ex-Kreisen muss der Anwender über Kenntnisse im Explosionsschutz (IEC/EN 60079-14 etc.) verfügen.
- Nationale und internationale Vorschriften für den Explosionsschutz beachten.
- Gerät nur innerhalb der zulässigen Betriebs- und Umgebungsbedingungen (siehe Technische Daten und Vorgaben durch die Ex-Zulassung) einsetzen.

Bei Einsatz in Zone 1 und Zone 2:

- Geräte in ein separat zugelassenes Gehäuse nach IEC/EN 60079-0 mit einer Schutzart mind. IP54 nach IEC/EN 60529 montieren.

Bei Einsatz im sicheren Bereich:

- Wenn Verschmutzungsgrad 2 nicht eingehalten wird: Gerät in ein Schutzgehäuse mind. IP54 einbauen.

Produktbeschreibung

Geräteübersicht

Siehe Abb. 1: Geräteansicht, Abb. 2: Abmessungen

Funktionen und Betriebsarten

Das Modul wandelt einen digitalen Wert von 0...21000 Digits in ein analoges Ausgangssignal von 0...21 mA um. Das entspricht einer Auflösung von 1 μ A pro Digit. An das Modul können HART-fähige Feldgeräte angeschlossen werden. Über ein HART-Modem kann der Anwender das entsprechende Feldgerät direkt über die Anschlussklemmen auf dem Modulträger parametrieren. Eine zusätzliche Impedanz ist nicht erforderlich, da die entsprechende Bürde zur Datenübertragung bereits im Modul integriert ist.

Montieren

Mehrere Geräte können unmittelbar nebeneinander auf den Modulträger gesteckt werden. Ein Wechsel der Geräte ist auch während des laufenden Betriebs möglich.

- Montageort gegen Wärmestrahlung, schnelle Temperaturschwankungen, Staub, Schmutz, Feuchtigkeit und andere Umwelteinflüsse schützen.
- Gerät in die dafür vorgesehene Position auf dem Modulträger stecken und deutlich spürbar einrasten lassen.

Anschließen

Durch Aufstecken auf den Modulträger ist das Gerät mit der internen Energieversorgung und Datenkommunikation des Modulträgers verbunden. Zum Anschluss der Feldgeräte können Klemmenblöcke in Schraubanschluss- oder Federzuganschluss-technik verwendet werden.

- Feldgeräte gemäß „Wiring diagram“ anschließen.

In Betrieb nehmen

Nach Anschluss der Leitungen und Aufschalten der Versorgungsspannung geht das Gerät automatisch in Betrieb.

Betreiben

Das Gerät ist ein rein eigensicheres Betriebsmittel und kann daher während des laufenden Betriebs auf den zugelassenen Modulträger gesteckt oder gezogen werden.

LED-Anzeigen

LED	Anzeige	Bedeutung
Status	aus	keine Spannungsversorgung
	blinkt rot	Modul nicht für den aktuellen Steckplatz konfiguriert
	grün	Spannungsversorgung und Kommunikation fehlerfrei
	blinkt grün (langsam: 0,5 Hz)	Modul noch nicht vom Gateway konfiguriert, wartet auf Konfigurationsdaten
	blinkt grün (1,0 Hz asym.)	Modul im Fail-Safe-Modus
	blinkt grün (schnell: 2,0 Hz)	Modul konfiguriert, noch kein Datenaustausch zwischen Modul und Master
Kanal	aus	kein Kanalfehler
1...4	rot	Kanalfehler (Drahtbruch, Kurzschluss): Kanal diagnose liegt vor

Einstellen

Das Verhalten der Ausgänge wird je nach übergeordnetem Feldbusssystem über ein zugehöriges Konfigurationstool, FDT-Frame oder Webserver parametrierbar. Für jeden Kanal können u. a. folgende Parameter eingestellt werden:

- Kurzschlussüberwachung
- Drahtbruchüberwachung
- Ersatzwertstrategie
- Messbereich

Analog Output Module AO401EX

Other documents

Besides this document the following material can be found on the Internet at www.turck.com:

- Data sheet
- excom manual — remote I/O for intrinsically safe circuits
- Approvals
- Declarations of conformity (current version)

For your safety

Intended use

The device is a piece of equipment from ignition protection type “Intrinsic safety” (IEC/EN 60079-11) and may be used only as part of the excom I/O system for intrinsically safe circuits with the approved module racks MT...G (PTB 00 ATEX 2194 U or IECEx PTB 13.0040 U). The AO401EX 4-channel analog output module is designed for connection of intrinsically safe analog field devices such as control valves or process indicators. The outputs are galvanically isolated from each other. The device is suitable for operation in Zone 1. The ignition protection type of the outputs is Ex ia IIC. Analog actuators such as control valves or process indicators can be connected to the device.

Any other use is not in accordance with the intended use.

Turck accepts no liability for any resulting damage.

General safety instructions

- The device may only be mounted, installed, operated, configured and maintained by professionally trained personnel.
- The device meets the EMC requirements for the industrial sector. For residential use, take measures to prevent radio interference.
- Only combine devices for which the technical data is suitable for joint use.

Notes on explosion protection

- When using the device in Ex circuits, the user must have knowledge of explosion protection (IEC/EN 60079-14 etc.).
- Observe national and international regulations for explosion protection.
- Only use the device within the permissible operating and ambient conditions (see technical data and Ex approval specifications).

Use of devices in Zone 1 and Zone 2:

- Mount the devices in a separately approved enclosure in accordance with IEC/EN 60079-0 with a degree of protection of at least IP54 as per IEC/EN 60529.

When used in safe areas:

- If pollution degree 2 is not complied with: Install the device in a protective housing with a degree of protection of at least IP54.

Product description

Device overview

See fig. 1: device view, fig. 2: dimensions

Functions and operating modes

The module converts a digital value of 0...21,000 digits into an analog output signal of 0...21 mA. This corresponds to a resolution of 1 μ A per digit.

HART-compatible field devices can be connected to the module. The user can parameterize the corresponding field device directly via the terminals on the module rack using a HART modem. Additional impedance is not required since the corresponding load for data transmission is already integrated into the module.

Installing

Multiple devices can be inserted directly next to each other in a module rack. The devices can also be changed during operation.

- Protect the mounting location from radiated heat, sudden temperature fluctuations, dust, dirt, humidity and other ambient influences.
- Fit the device at the position intended for it on the rack and snap it fully into position.

Connection

When plugged into the module rack, the device is connected to the module rack's internal power supply and data communication. Screw connection or spring type terminal blocks can be used to connect the field devices.

- Connect the field devices in accordance with the “Wiring diagram”.

Commissioning

The device is operational automatically once the cables are connected and the power supply is switched on.

Operation

The device is a piece of equipment that is purely intrinsically safe and can therefore be plugged in or unplugged from the approved module rack during operation.

LEDs

LED	Indication	Meaning
Status	Off	No power supply
	Flashing red	Module not configured for current slot
	Green	Power supply and communication fault free
	Green flashing (slow: 0.5 Hz)	Module not yet configured by the gateway, awaiting configuration data
	Flashing green (1.0 Hz asym.)	Module in failsafe mode
	Flashing green (fast: 2.0 Hz)	Module configured; no data exchange yet between the module and the master
Channel	Off	No channel error
1...4	Red	Channel error (wire break, short circuit): Channel diagnostics available

Setting

The behavior of the outputs is parameterized via an associated configuration tool, FDT frame or web server, depending on the higher-level fieldbus system. The following parameters can be set for each channel:

- Short circuit monitoring
- Wire-break monitoring
- Failsafe mode
- Measuring range

①

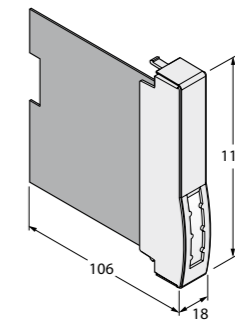


AO401EX
Analog Output Module
Quick Start Guide
Doc. no. D301245 2205

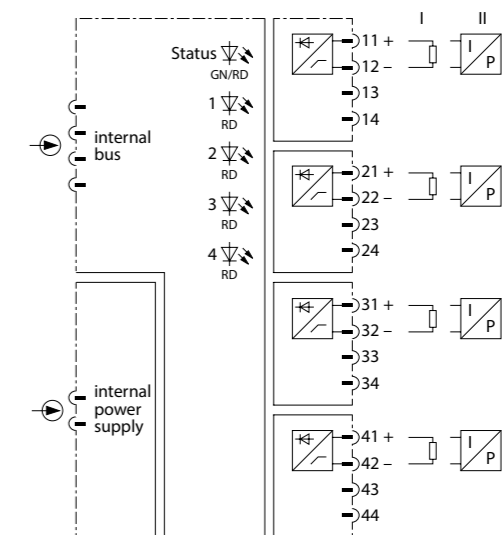
Additional information see



②



Wiring diagram



DE Kurzbetriebsanleitung

Reparieren

Das Gerät ist nicht zur Reparatur vorgesehen. Defekte Geräte außer Betrieb nehmen und zur Fehleranalyse an Turck senden. Bei Rücksendung an Turck beachten Sie bitte unsere Rücknahmebedingungen.

Entsorgen

Die Geräte müssen fachgerecht entsorgt werden und gehören nicht in den normalen Hausmüll.

EN Quick Start Guide

Repair

The device is not intended for repair. Take defective devices out of operation and send them to Turck for fault analysis. Observe our return acceptance conditions when returning the device to Turck.

Disposal

The devices must be disposed of correctly and must not be included in general household garbage.

Declarations of conformity

EU-Konformitätserklärung Nr.
UK Declaration of Conformity No. 5003-3M
 EU Declaration of Conformity No.:

Wir / We Hans Turck GmbH & Co. KG
 Witzlebenstr. 7, 45472 Mülheim an der Ruhr, Germany

erklären in alleiniger Verantwortung, dass das Produkt
 declare under our sole responsibility that the product

Analoges Ausgangsmodul / Analog Output Module
 für das / for the: Remote – I/O – System excom®

Typ / Type: **AO401EX**
 ID: **6884205**

Ex-Kennzeichnung / Ex-marking:
 Gas / gas Ⓜ II 2 (1) G Ex ib [ia Ga] IIC T4 Gb
 Staub / dust Ⓜ II (1) D [Ex ia Da] IIIC

auf die in der von uns in Verkehr gebrachten Ausführung sich diese Erklärung bezieht, den Anforderungen der
 folgenden EU-Richtlinien und den Anforderungen der folgenden UK-Statutory Instruments durch Einhaltung der
 folgenden harmonisierten / designierten Normen genügen:

to which this declaration relates in the configuration placed on the market by us, are in conformity with the requirements of
 the following EU-directives and the requirements of the following UK Statutory Instruments by compliance with the following
 harmonized / designated standards:

Richtlinie / Directive EMC **2014 / 30 / EU** **26. Feb. 2014**
EMC SI* and part. sign. changes** **SI 2016/1091**
 EN 61326-1:2013

Richtlinie / Directive ATEX **2014 / 34 / EU** **26. Feb. 2014**
ATEX SI* and part. sign. changes** **SI 2016/1107**
 EN IEC 60079-0:2018 EN 60079-11:2012

Richtlinie / Directive RoHS **2011 / 65 / EU** **08. Jun. 2011**
RoHS SI* and part. sign. changes **SI 2012/3032** **and SI 2019/188**
 EN IEC 63000:2018

*: SI = Statutory Instrument **: SI 2019/696, SI 2020/1460

Weitere Normen, Bemerkungen / additional standards, remarks:

Die aufgeführten benannten Stellen haben die Konformitätsbewertung durchgeführt und Zertifikate ausgestellt.
 The listed notified bodies have carried out conformity assessment and issued certificates:

EU-Baumusterprüfbescheinigung (Modul B) / EU-type examination certificate (module B): PTB 00 ATEX 2179
 ausgestellt von / issued by: Physikalisch Technische Bundesanstalt, Kenn-Nr. / ID no.: 0102
 Bundesallee 100, 38116 Braunschweig, Germany

Zertifizierung des QS-Systems (Modul D) / Certification of the QS-system (module D):
 ausgestellt von / issued by: Physikalisch Technische Bundesanstalt, Kenn-Nr. / ID no.: 0102
 Bundesallee 100, 38116 Braunschweig, Germany

UK-Baumusterprüfbescheinigung / UK-type examination certificate : TÜV 21 UKEX 7055
 ausgestellt von / issued by: TÜV Rheinland Industrie Service GmbH, Kenn-Nr. / ID no.: 0035
 Alfredstraße 81, 45130 Essen, Germany

UK Erklärung zur Qualitätssicherung / UKCA Quality Assurance Notification:
 ausgestellt von / issued by: Eurofins E&E CML Limited, Kenn-Nr. / ID no.: 2503,
 New Port Road, Ellesmere Port CH65 4LZ, United Kingdom

Mülheim, den 02.05.2022

i.V. O. Barabas, Zulassungsbeauftragter /
 Certification Representative
 Name, Funktion und Unterschrift des Befugten /
 Name, function and signature of authorized person

Ort und Datum der Ausstellung /
 Place and date of issue

FM 7.3-12

09.11.21

Certification data | Technical data

Approvals and markings

Approvals	Marking parts in acc. with	
	ATEX directive	IEC/EN 60079-0/ -11
	UK Statutory Instruments (SI)	
ATEX Certificate number: PTB 00 ATEX 2179	Ⓜ II 2 (1) G	Ex ib [ia Ga] IIC T4 Gb
UKEX Certificate number: TÜV 21 UKEX 7055	Ⓜ II (1) D	[Ex ia Da] IIIC

Ambient temperature: T_{amb}: -20...+70 °C

Electrical data

Max. output voltage U _o	18.9 V		
Max. output current I _o	80 mA		
Max output power P _o	510 mW		
Characteristic	Trapezoidal		
Internal inductance L _i	Negligibly low		
Internal capacitance C _i			
External inductance L _o / capacitance C _o		IIC	IIB
	L _o	C _o	C _o
	2 mH	-	1 µF
	1 mH	-	1 µF
	0.5 mH	0,13 µF	1 µF
	0.2 mH	0,17 µF	1.2 µF
	0.1 mH	0,21 µF	1.3 µF

Technical data

Type designation	AO401EX
ID	6884205
Supply voltage	Via module rack, central power supply
Power consumption	≤ 2.5 W
Galvanic isolation	Complete galvanic isolation acc. to IEC/EN 60079-11
Number of channels	4-channel
Output circuits	Intrinsically safe acc. to IEC/EN 60079-11 0/4...20 mA
No-load voltage	≥ 16 VDC
External load	≤ 640 Ω
Switching frequency	≤ 50 Hz
Short circuit	≥ 50 Ω (only in live zero mode)
Wire break	< 2 mA (only in live zero mode)
Max. output current	22 mA

Resolution	2 µA
Reference temperature	25 °C
Full range	0...20 mA
Rel. actuating inaccuracy (including linearity, hysteresis and repeatability)	≤ 0.06 % of full range at 25 °C
Abs. actuating inaccuracy (including linearity, hysteresis and repeatability)	≤ ± 12 µA at 25 °C
Linearity deviation	≤ 0.05 % of full range at 25 °C
Temperature drift	≤ 0.005 % of full range/K
Rise time/fall time	≤ 50 ms (10...90 %)
Max. actuating inaccuracy under EMC influence	≤ 0.1 % of full range at 25 °C
Connection mode	Module, plugged on rack
Protection class	IP20
Relative humidity	≤ 93 % at 40 °C acc. to EN 60068-2-78
EMC	Acc. EN 61326-1 Acc. to Namur NE21

Module de sortie analogique AO401EX

Documents supplémentaires

Vous trouverez les documents suivants contenant des informations complémentaires à la présente notice sur notre site Web www.turck.com :

- Fiche technique
- Manuel de l'excom – Système E/S déporté pour circuits à sécurité électrique intrinsèque
- Homologations
- Déclarations de conformité (version actuelle)

Pour votre sécurité

Utilisation conforme

L'appareil est un équipement du mode de protection « sécurité intrinsèque » (CEI/EN 60079-11) et ne peut être raccordé qu'au sein du système E/S excom pour des circuits électriques à sécurité intrinsèque avec les supports de modules autorisés MT...-...G (PTB 00 ATEX 2194 U ou IECEx PTB 13.0040 U). Le module de sortie analogique AO401EX à 4 canaux est conçu pour le raccordement d'appareils de terrain analogiques à sécurité intrinsèque tels que les vannes de commande ou les indicateurs de processus. Les sorties sont séparées galvaniquement l'une de l'autre. L'appareil est destiné à une utilisation en zone 1. Le mode de protection des sorties est Ex ia IIC. Des actionneurs analogiques tels que des vannes de commande ou des indicateurs de processus peuvent être raccordés à l'appareil. Toute autre utilisation est considérée comme non conforme. La société Turck décline toute responsabilité en cas de dommages causés par une utilisation non conforme.

Consignes de sécurité générales

- Seul un personnel qualifié est habilité à monter, installer, utiliser, configurer et entretenir l'appareil.
- L'appareil répond aux exigences CEM pour le domaine industriel. En cas d'utilisation dans des zones résidentielles, prendre des mesures pour éviter les interférences radioélectriques.
- Ne raccordez des appareils entre eux que si leurs caractéristiques techniques le permettent.

Indications relatives à la protection contre les explosions

- En cas d'utilisation de l'appareil dans des zones à risque d'explosion, vous devez disposer des connaissances requises en matière de protection contre les explosions (CEI/EN 60079-14, etc.).
- Respectez les consignes nationales et internationales relatives à la protection contre les explosions.
- Utilisez l'appareil uniquement dans un environnement et dans les conditions de fonctionnement autorisés (voir les caractéristiques techniques et les directives imposées par l'homologation Ex).

Utilisation en zone 1 et en zone 2 :

- Montez les appareils dans un boîtier séparé homologué conformément à la norme CEI/EN 60079-0 et avec un indice de protection IP54 minimum, conformément à la norme CEI/EN 60529.

Utilisation en zone sécurisée :

- Si le degré de pollution 2 n'est pas respecté : Installez l'appareil dans un boîtier de protection d'indice IP54 minimum.

Description du produit

Aperçu de l'appareil

Voir fig. 1 : Vue de l'appareil, fig. 2 : Dimensions

Fonctions et modes de fonctionnement

Le module convertit une valeur numérique de 0...21 000 chiffres en un signal de sortie analogique de 0...21 mA. Cela correspond à une résolution de 1 µA par chiffre.

Des appareils de terrain compatibles HART peuvent être raccordés au module. Avec un modem HART, vous pouvez paramétrer l'appareil de terrain correspondant directement via les bornes de raccordement du support de module. Une impédance supplémentaire n'est pas nécessaire, car la charge correspondante pour la transmission des données est déjà intégrée dans le module.

Montage

Plusieurs appareils peuvent être branchés directement en parallèle sur le support de module. Un changement d'appareils est également possible pendant le fonctionnement.

- ▶ Protégez la zone de montage contre les rayonnements thermiques, les variations rapides de température, la poussière, l'humidité et d'autres facteurs ambiants.
- ▶ Branchez l'appareil dans la position prévue à cet effet sur le support de module et emboîtez-le jusqu'à enclenchement.

Raccordement

Lors de sa fixation sur le support de module, l'appareil est connecté à l'alimentation interne et à la communication de données du support de module. Pour le raccordement des appareils de terrain, des borniers de raccordement à vis ou à ressort peuvent être employés.

- ▶ Raccordez les appareils de terrain conformément au schéma de câblage (« Wiring diagram »).

Mise en service

L'appareil se met automatiquement en marche après le raccordement des câbles et l'activation de la tension d'alimentation.

Fonctionnement

L'appareil est un dispositif à sécurité intrinsèque pur et peut donc être branché ou débranché du support de module autorisé en cours de fonctionnement.

Affichage LED

LED	Indication	Signification
Status	Eteinte	Pas d'alimentation en tension
	Clignote rouge	Module non configuré pour l'emplacement actuel
	Vert	Alimentation en tension et communication correctes
	Clignote vert (lent : 0,5 Hz)	Module pas encore configuré par la passerelle, en attente de données de configuration
	Clignote vert (1,0 Hz asym.)	Module en mode Fail safe
	Clignote vert (rapide : 2,0 Hz)	Module configuré, pas encore de partage de données entre le module et le maître
Canaux 1...4	Eteinte	Pas d'erreur au niveau du canal
	Rouge	Erreur au niveau du canal (rupture de câble, court-circuit) : Diagnostique des canaux effectué

Réglages

Le comportement des sorties est paramétré selon le système de bus de terrain supérieur à l'aide d'un outil de configuration correspondant, d'un cadre FDT ou d'un serveur Web. Pour chaque canal, les paramètres suivants peuvent, entre autres, être réglés :

- Surveillance de court-circuit
- Surveillance de rupture de câble
- Stratégie de valeur de remplacement
- Plage de mesure

Módulo de saída analógica AO401EX

Outros documentos

Além deste documento, o seguinte material pode ser encontrado na Internet em www.turck.com:

- Folha de dados
- Manual do excom – Terminais de E/S remotos para circuitos intrinsecamente seguros
- Homologações
- Declarações de conformidade (versão atual)

Para sua segurança

Finalidade de uso

O dispositivo é um equipamento da categoria de proteção contra explosões "Segurança intrínseca" (IEC/EN 60079-11) e deve ser usado apenas como parte do sistema de E/S excom para circuitos intrinsecamente seguros com os racks de módulo aprovados MT...-...G (PTB 00 ATEX 2194 U ou IECEx PTB 13.0040 U). O módulo de saída analógica AO401EX de quatro canais é projetado para a conexão de atuadores analógicos intrinsecamente seguros, como válvulas de controle ou indicadores de processo. As saídas são galvanicamente isoladas umas das outras. O dispositivo também é adequado para uso na Zona 1. O tipo de proteção contra ignição das entradas é Ex ia IIC. Atuadores analógicos, como válvulas de controle ou indicadores de processo, podem ser conectados ao dispositivo. Qualquer outro uso está fora de concordância com o uso pretendido. A Turck se exime de qualquer responsabilidade por danos resultantes.

Instruções gerais de segurança

- O dispositivo só pode ser montado, instalado, operado, configurado e mantido por pessoal profissionalmente treinado.
- O dispositivo atende aos requisitos de EMC para a área industrial. Para uso residencial, tome medidas para evitar interferência de rádio.
- Somente combine dispositivos nos quais os dados técnicos são adequados para uso conjunto.

Notas de proteção contra explosão

- Ao usar o dispositivo em circuitos Ex, o usuário deverá ter conhecimento prático sobre proteção contra explosões (IEC/EN 60079-14, etc.).
 - Observe os regulamentos nacionais e internacionais para proteção contra explosão.
 - Use o dispositivo somente em condições ambientais e de operação permitidas (consulte os dados técnicos e os requisitos de homologação Ex).
- Quando usado em áreas seguras:
- Monte os dispositivos em um gabinete separado aprovado de acordo com a IEC/EN 60079-0, com um grau de proteção de, pelo menos, IP54 de acordo com a IEC/EN 60529.
 - Se o grau de poluição 2 não estiver em conformidade com: Instale o dispositivo em um gabinete com um tipo de proteção de pelo menos IP54.

Descrição do produto

Visão geral do produto

Veja a fig. 1: Visão do dispositivo, fig. 2: Dimensões

Funções e modos de operação

O módulo converte um valor digital de 0...21.000 dígitos em um sinal de saída analógica de 0...21 mA. Isto corresponde à resolução de 1 µA por dígito. Transdutores compatíveis com HART podem ser conectados ao módulo. O usuário pode parametrizar o dispositivo de campo correspondente diretamente através dos terminais no rack do módulo usando um modem HART. Não é necessária impedância adicional, pois a carga correspondente para a transmissão de dados já está integrada ao módulo.

Instalação

Vários dispositivos podem ser inseridos diretamente um ao lado do outro em um rack de módulo. Também é possível alterar os dispositivos durante a operação.

- ▶ Proteja o local de montagem contra irradiação de calor, alterações de temperatura repentinas, poeira, sujeira, umidade e outras influências ambientais.
- ▶ Insira o dispositivo na posição designada no rack, e encaixe-o totalmente na posição.

Conexão

Quando conectado ao rack de módulo, o dispositivo é conectado à alimentação e aos dados internos do rack de módulo. É possível usar blocos terminais de conexão a parafusos ou a mola para conectar os dispositivos de campo.

- ▶ Conecte os dispositivos de campo de acordo com o "Wiring diagram".

Comissionamento

O dispositivo fica automaticamente operacional assim que os cabos são conectados e a fonte de alimentação ligada.

Operação

O dispositivo é um equipamento que é puro e intrinsecamente seguro e, logo, pode ser conectado ou desconectado do rack de módulo aprovado durante a operação.

LEDs

LED	Indicação	Significado
Status	Desligado	Sem alimentação de energia
	Piscando em vermelho	Módulo não configurado para a porta atual
	Verde	Fonte de alimentação e comunicação livres de erros
	Verde intermitente (lento: 0,5 Hz)	Módulo ainda não configurado pelo gateway, aguardando dados de configuração
	Verde piscando (1,0 Hz assim.)	Módulo em modo de segurança à prova de falhas
	Verde piscando (rápido: 2,0 Hz)	Módulo configurado, não há ainda a troca de dados entre o módulo e o mestre
Canais 1...4	Desligado	Sem erro de canal
	Vermelho	Erro de canal (rompimento de fio, curto-circuito): Diagnóstico de canal disponível

Configuração

O comportamento das saídas é parametrizado por meio de uma ferramenta de configuração associada, FDT frame ou servidor web, dependendo do sistema fieldbus de nível superior. Os seguintes parâmetros podem ser definidos para cada canal:

- Monitoramento de curto-circuito
- Monitoramento de ruptura de fio
- Estratégia de valor substituído
- Intervalo de medição

①

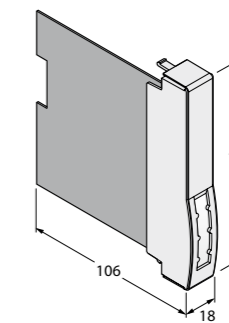


AO401EX
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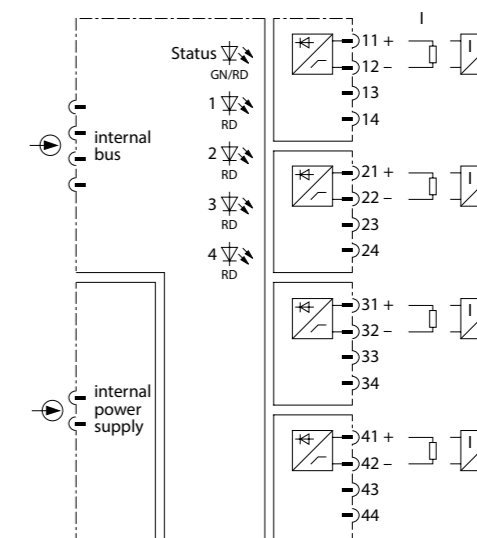
Additional information see



②



Wiring diagram



FR Guide d'utilisation rapide

Réparation

L'appareil ne peut pas être réparé. Si l'appareil est défectueux, mettez-le hors service et renvoyez-le à Turck pour un diagnostic des défauts. En cas de retour à Turck, veuillez respecter les conditions de reprise.

Mise au rebut

Les appareils doivent être mis au rebut de manière appropriée et ne doivent pas être éliminés avec les ordures ménagères.

PT Guia de Inicialização Rápida

Reparo

O dispositivo não é destinado para reparos. Deixe os dispositivos avariados fora de operação e envie-os para a Turck para análise de falhas. Observe nossas condições para aceitação de devolução ao devolver o dispositivo à Turck.

Descarte

Os dispositivos devem ser descartados corretamente e não em um lixo doméstico normal.

Declarations of conformity

EU-Konformitätserklärung Nr.
UK Declaration of Conformity No. 5003-3M
EU Declaration of Conformity No.:

TURCK

Wir / We Hans Turck GmbH & Co. KG
Witzlebenstr. 7, 45472 Mülheim an der Ruhr, Germany

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product

Analoges Ausgangsmodul / Analog Output Module
für das / for the: Remote – I/O – System excom®

Typ / Type: **AO401EX**
ID: **6884205**

Ex-Kennzeichnung / Ex-marking:
Gas / gas Ⓜ II 2 (1) G Ex ib [ia Ga] IIC T4 Gb
Staub / dust Ⓜ II (1) D [Ex ia Da] IIIC

auf die in der von uns in Verkehr gebrachten Ausführung sich diese Erklärung bezieht, den Anforderungen der folgenden EU-Richtlinien und den Anforderungen der folgenden UK-Statutory Instruments durch Einhaltung der folgenden harmonisierten / designierten Normen genügen:

to which this declaration relates in the configuration placed on the market by us, are in conformity with the requirements of the following EU-directives and the requirements of the following UK Statutory Instruments by compliance with the following harmonized / designated standards:

Richtlinie / Directive EMC **2014 / 30 / EU** **26. Feb. 2014**
EMC SI* and part. sign. changes** **SI 2016/1091**
EN 61326-1:2013

Richtlinie / Directive ATEX **2014 / 34 / EU** **26. Feb. 2014**
ATEX SI* and part. sign. changes** **SI 2016/1107**
EN IEC 60079-0:2018 EN 60079-11:2012

Richtlinie / Directive RoHS **2011 / 65 / EU** **08. Jun. 2011**
RoHS SI* and part. sign. changes **SI 2012/3032** **and SI 2019/188**
EN IEC 63000:2018

*: SI = Statutory Instrument **: SI 2019/696, SI 2020/1460

Weitere Normen, Bemerkungen / additional standards, remarks:

Die aufgeführten benannten Stellen haben die Konformitätsbewertung durchgeführt und Zertifikate ausgestellt:
The listed notified bodies have carried out conformity assessment and issued certificates:

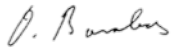
EU-Baumusterprüfbescheinigung (Modul B) / EU-type examination certificate (module B): PTB 00 ATEX 2179
ausgestellt von / issued by: Physikalisch Technische Bundesanstalt, Kenn-Nr. / ID no.: 0102
Bundesallee 100, 38116 Braunschweig, Germany

Zertifizierung des QS-Systems (Modul D) / Certification of the QS-system (module D):
ausgestellt von / issued by: Physikalisch Technische Bundesanstalt, Kenn-Nr. / ID no.: 0102
Bundesallee 100, 38116 Braunschweig, Germany

UK-Baumusterprüfbescheinigung / UK-type examination certificate : TÜV 21 UKEX 7055
ausgestellt von / issued by: TÜV Rheinland Industrie Service GmbH, Kenn-Nr. / ID no.: 0035
Alfredstraße 81, 45130 Essen, Germany

UK Erklärung zur Qualitätssicherung / UKCA Quality Assurance Notification:
ausgestellt von / issued by: Eurofins E&E CML Limited, Kenn-Nr. / ID no.: 2503,
New Port Road, Ellesmere Port CH65 4LZ, United Kingdom

Mülheim, den 02.05.2022



I.V. O. Barabas, Zulassungsbeauftragter /
Certification Representative
Name, Funktion und Unterschrift des Befugten /
Name, function and signature of authorized person



Ort und Datum der Ausstellung /
Place and date of issue

FM 7.3-12

09.11.21

Certification data | Technical data

Approvals and markings

Approvals	Marking parts in acc. with	
	ATEX directive	IEC/EN 60079-0/ -11
	UK Statutory Instruments (SI)	
ATEX Certificate number: PTB 00 ATEX 2179	Ⓜ II 2 (1) G	Ex ib [ia Ga] IIC T4 Gb
UKEX Certificate number: TÜV 21 UKEX 7055	Ⓜ II (1) D	[Ex ia Da] IIIC
 		

Ambient temperature: T_{amb}: -20...+70 °C

Electrical data

Max. output voltage U _o	18.9 V		
Max. output current I _o	80 mA		
Max output power P _o	510 mW		
Characteristic	Trapezoidal		
Internal inductance L _i	Negligibly low		
Internal capacitance C _i			
External inductance L _o /capacitance C _o		IIC	IIB
	L _o	C _o	C _o
	2 mH	-	1 µF
	1 mH	-	1 µF
	0.5 mH	0,13 µF	1 µF
	0.2 mH	0,17 µF	1.2 µF
	0.1 mH	0,21 µF	1.3 µF

Technical data

Type designation	AO401EX
ID	6884205
Supply voltage	Via module rack, central power supply
Power consumption	≤ 2.5 W
Galvanic isolation	Complete galvanic isolation acc. to IEC/EN 60079-11
Number of channels	4-channel
Output circuits	Intrinsically safe acc. to IEC/EN 60079-11 0/4...20 mA
No-load voltage	≥ 16 VDC
External load	≤ 640 Ω
Switching frequency	≤ 50 Hz
Short circuit	≥ 50 Ω (only in live zero mode)
Wire break	< 2 mA (only in live zero mode)
Max. output current	22 mA

Resolution	2 µA
Reference temperature	25 °C
Full range	0...20 mA
Rel. actuating inaccuracy (including linearity, hysteresis and repeatability)	≤ 0.06 % of full range at 25 °C
Abs. actuating inaccuracy (including linearity, hysteresis and repeatability)	≤ ± 12 µA at 25 °C
Linearity deviation	≤ 0.05 % of full range at 25 °C
Temperature drift	≤ 0.005 % of full range/K
Rise time/fall time	≤ 50 ms (10...90 %)
Max. actuating inaccuracy under EMC influence	≤ 0.1 % of full range at 25 °C
Connection mode	Module, plugged on rack
Protection class	IP20
Relative humidity	≤ 93 % at 40 °C acc. to EN 60068-2-78
EMC	Acc. EN 61326-1 Acc. to Namur NE21

ZH 快速入门指南

模拟量输出模块AO401EX

其他文档

除了本文档之外,还可在www.turck.com网站上查看以下资料:

- 数据表
- excom手册 — 本安电路的远程I/O系统
- 认证
- 合规声明(最新版本)

安全须知

预期用途

该装置是一款防燃型“本安”(IEC/EN 60079-11)装置,仅作为excom I/O系统的一部分与经认证的模块机架MT...-...G(PTB 00 ATEX 2194 U或IECEx PTB 13.0040 U)一起用于本安电路。AO401EX 4通道模拟量输出模块设计用于连接控制阀或过程显示器等本安型模拟量现场设备。输出回路之间完全电隔离。该装置适合在危险1区中运行。输出端的防燃类型为Ex ia IIC。控制阀等模拟执行器或过程指示器可连接至该装置。任何其他用途都不属于预期用途。图尔克公司不会对此导致的任何损坏承担责任。

一般安全须知

- 该装置的组装、安装、操作、配置和维护只能由经过专业培训的人员执行。
- 该装置符合工业领域的EMC要求。在住宅区使用时,请采取相应的措施以防止无线电干扰。
- 仅当技术数据支持装置联用时,才能组合使用装置。

防爆说明

- 将本装置应用到防爆电路时,用户还必须具有防爆知识(IEC/EN 60079-14等)。
 - 请遵守国内和国际防爆法规。
 - 仅在允许的工作条件 and 环境条件下使用本装置(参见技术数据和防爆认证规格)。
- 在危险1区和2区中使用该装置:
- 根据IEC/EN 60079-0标准,将本装置安装在防护等级至少为IP54(依据IEC/EN 60529标准)且经过单独认证的外壳中。
- 在安全区域中使用时:
- 如果不符合污染等级2:应将本装置安装在防护等级至少为IP54的保护外壳内。

产品描述

装置概览

见图1:装置视图,图2:尺寸

功能和工作模式

该模块可将0...21000位数字值转换为0...21 mA的模拟量输出信号。这对应于每个数1 μA的分辨率。HART兼容的现场装置可连接至该模块。用户可以使用HART调制解调器直接通过模块机架上的端子对相应的现场装置进行参数设定。由于数据传输的相应负载已集成到模块中,因此无需额外的阻抗。

安装

可将多台装置直接毗邻安装在一个模块机架中。也可在运行过程中更换装置。

- ▶ 应使安装位置免受辐射热、温度骤变、灰尘、污垢、潮湿和其他的环境影响。
- ▶ 将该装置安装在机架上的预期位置,然后将其完全卡入到位。

连接

插入模块机架中时,本装置将连接至模块机架的内部电源和数据通信部分。螺钉连接或弹簧式接线板可用于连接现场装置。

- ▶ 按照“Wiring diagram”连接现场装置。

调试

一旦连接线缆并接通电源,该装置将自动运行。

运行

该装置是一款纯本安设备,支持在设备运行期间在经认证的模块机架上进行热插拔。

LED

LED	指示	含义
Status	熄灭	无电源
	红灯闪烁	未针对当前插槽配置模块
	绿灯	电源和通信正常运行
	呈绿色闪烁(缓慢:0.5 Hz)	尚未通过网关配置模块,正在等待配置数据
	呈绿色闪烁(1.0 Hz非对称)	模块处于故障安全模式
	呈绿色闪烁(快速:2.0 Hz)	模块已配置;模块和主设备之间尚未进行数据交换
通道 1...4	熄灭	无通道错误
	红灯	通道故障(断线、短路):通道诊断可用

设置


根据不同的高级别现场总线系统,通过相关的配置工具、FDT帧或Web服务器对输出行为进行参数设定。可为每条通道设置以下参数:

- 短路监测
- 断线监测
- 替代值策略
- 测量范围

维修

本装置不可维修。请停止使用有故障的装置,并将其寄回给图尔克进行故障分析。如果要将该装置送还给图尔克公司维修,请遵从我们的返修验收条件。

废弃处理

 必须正确地弃置本装置,不得将它混入普通的生活垃圾中。

KO 빠른 시작 가이드

아날로그 출력 모듈 AO401EX

추가 문서

이 문서 외에도 다음과 같은 자료를 인터넷(www.turck.com)에서 확인할 수 있습니다.

- 데이터 시트
- excom 매뉴얼 — 본질 안전 회로용 원격 I/O
- 인증
- 적합성 선언(현재 버전)

사용자 안전 정보

사용 목적

이 장치는 점화 보호 타입 “본질 안전”(IEC/EN 60079-11) 장치이며 승인된 모듈 랙 MT...-...G(PTB 00 ATEX 2194 U 또는 IECEx PTB 13.0040 U)와 함께 본질 안전 회로용 excom I/O 시스템의 일부로만 사용할 수 있습니다. AO401EX 4-채널 아날로그 출력 모듈은 제어 밸브 또는 프로세스 표시기와 같은 본질 안전 아날로그 필드 장치 연결용으로 설계되었습니다. 출력은 상호 간에 갈바닉 절연 처리됩니다. 이 장치는 1종 위험 지역에서 작동하기에 적합합니다. 출력의 점화 보호 타입은 Ex ia IIC입니다. 제어 밸브 또는 프로세스 표시기와 같은 아날로그 액츄에이터를 장치에 연결할 수 있습니다. 기타 다른 방식으로 사용하는 것은 사용 목적을 따르지 않는 것입니다. 터크는 그로 인한 손상에 대해 어떠한 책임도 지지 않습니다.

일반 안전 지침

- 전문적인 훈련을 받은 숙련된 인력만이 이 장치의 설치, 장착, 작동, 구성 및 유지보수를 수행해야 합니다.
- 이 장치는 산업 분야의 EMC 요구 사항을 충족합니다. 주거 지역에서 사용하는 경우 무선 간섭을 방지하기 위한 조치를 취하십시오.
- 기술 데이터가 공동 사용에 적합한 장치만 조합하십시오.

폭발 방지 참고 사항

- 폭발 위험 회로에서 이 장치를 사용할 경우 사용자는 폭발 방지(KS C IEC 60079-14 등)에 대한 지식이 있어야 합니다.
- 폭발 방지에 관한 국내 및 국제 규정을 준수하십시오.
- 허용되는 작동 및 주변 조건 내에서만 장치를 사용하십시오(기술 데이터 및 방폭 인증서 사양 참조).

1종 및 2종 위험 지역 내 장치 사용:

- IEC/EN 60529에 따라 보호 등급이 IP54 이상인 IEC/EN 60079-0 규격의 별도 승인 외함에 장치를 설치하십시오.

안전 지역에서 사용할 경우:

- 오염도 2를 준수하지 않을 경우: IP54 이상의 보호 등급이 있는 보호 하우징에 장치를 설치하십시오.

제품 설명

장치 개요

그림 1: 장치 도면, 그림 2: 치수 참조

기능 및 작동 모드

이 모듈은 0...21,000 자리의 디지털 값을 0...21 mA의 아날로그 출력 신호로 변환합니다. 이는 1자리당 1 μA의 해상도에 해당합니다.

HART 호환 필드 장치를 모듈에 연결할 수 있습니다. 사용자는 HART 모뎀을 사용하여 모듈 랙의 터미널을 통해 해당 필드 장치를 직접 매개 변수화할 수 있습니다. 데이터 전송을 위한 해당 부하가 이미 모듈에 통합되어 있으므로 추가적인 임피던스는 필요하지 않습니다.

설치

여러 장치를 서로 맞게 모듈 랙에 삽입할 수 있습니다. 또한 작동 중에 장치를 변경할 수 있습니다.

- ▶ 장착 장소를 복사열과 갑작스러운 온도 변화, 먼지, 흙, 습도, 기타 주변 영향 요소로부터 보호하십시오.
- ▶ 장치를 랙의 의도한 위치에 장착하고 제자리에 완전히 끼우십시오.

연결

모듈 랙에 연결하면 장치가 모듈 랙의 내부 파워 서플라이 및 데이터 통신에 연결됩니다. 나사 연결 또는 스프링 터미널 블록을 사용하여 필드 장치를 연결할 수 있습니다.

- ▶ “Wiring diagram”에 따라 필드 장치를 연결하십시오.

시운전

케이블이 연결되고 파워 서플라이가 켜지면 장치가 자동으로 작동 가능해집니다.

작동

이 장치는 순수한 본질 안전 장비이므로 작동 중에 승인된 모듈 랙에 연결하거나 분리할 수 있습니다.

LED

LED	표시	의미
Status	꺼짐	파워 서플라이 없음
	적색 점멸	모듈이 현재 슬롯에 대해 구성되지 않음
	녹색	파워 서플라이 및 통신 올바르게 작동 중
	녹색 점멸	모듈이 아직 게이트웨이에 의해 구성되지 않음, 구성 데이터 대기 중
	녹색 점멸	페일 세이프 모드의 모듈(1.0 Hz 비대칭)
	녹색 점멸	모듈이 구성됨, 모듈과 마스터 사이에 아직 데이터 교환 없음(고속: 2.0 Hz)
채널 1...4	꺼짐	채널 오류 없음
	적색	채널 오류(단선, 단락): 채널 진단 있음

설정


출력 동작은 상위 레벨의 필드버스 시스템에 따라 관련 구성 도구, FDT 프레임 또는 웹 서버를 통해 매개 변수화됩니다. 다음 매개 변수는 채널별로 설정될 수 있습니다.

- 단락 모니터링
- 단선 모니터링
- 대체값 전략
- 측정 범위

수리

이 장치는 수리 대상이 아닙니다. 결함이 있는 장치는 작동을 중지하고 고장 분석을 위해 터크로 보내십시오. 장치를 터크에 반품할 경우, 반품 승인 조건을 준수해 주십시오.

폐기

 이 장치는 올바른 방법으로 폐기해야 하며 일반적인 가정 폐기물과 함께 배출해서는 안 됩니다.

①

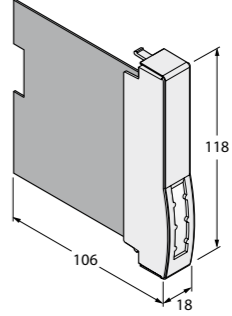


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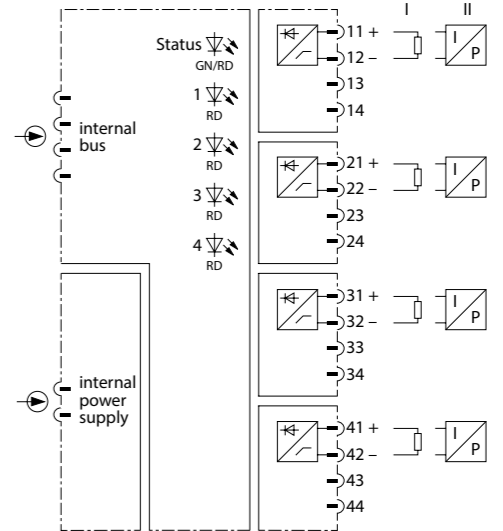
Additional information see



②



Wiring diagram



Declarations of conformity

EU-Konformitätserklärung Nr.
UK Declaration of Conformity No. 5003-3M
 EU Declaration of Conformity No.:

Wir / We Hans Turck GmbH & Co. KG
 Witzlebenstr. 7, 45472 Mülheim an der Ruhr, Germany

erklären in alleiniger Verantwortung, dass das Produkt
 declare under our sole responsibility that the product

Analoges Ausgangsmodul / Analog Output Module
 für das / for the: Remote – I/O – System excom®

Typ / Type: **AO401EX**
 ID: **6884205**

Ex-Kennzeichnung / Ex-marking:
 Gas / gas Ⓜ II 2 (1) G Ex ib [ia Ga] IIC T4 Gb
 Staub / dust Ⓜ II (1) D [Ex ia Da] IIIC

auf die in der von uns in Verkehr gebrachten Ausführung sich diese Erklärung bezieht, den Anforderungen der
 folgenden EU-Richtlinien und den Anforderungen der folgenden UK-Statutory Instruments durch Einhaltung der
 folgenden harmonisierten / designierten Normen genügen:

to which this declaration relates in the configuration placed on the market by us, are in conformity with the requirements of
 the following EU-directives and the requirements of the following UK Statutory Instruments by compliance with the following
 harmonized / designated standards:

Richtlinie / Directive EMC	2014 / 30 / EU	26. Feb. 2014
EMC SI* and part. sign. changes**	SI 2016/1091	
EN 61326-1:2013		

Richtlinie / Directive ATEX	2014 / 34 / EU	26. Feb. 2014
ATEX SI* and part. sign. changes**	SI 2016/1107	
EN IEC 60079-0:2018 EN 60079-11:2012		

Richtlinie / Directive RoHS	2011 / 65 / EU	08. Jun. 2011
RoHS SI* and part. sign. changes	SI 2012/3032	and SI 2019/188
EN IEC 63000:2018		

*: SI = Statutory Instrument **: SI 2019/696, SI 2020/1460

Weitere Normen, Bemerkungen / additional standards, remarks:

Die aufgeführten benannten Stellen haben die Konformitätsbewertung durchgeführt und Zertifikate ausgestellt:
 The listed notified bodies have carried out conformity assessment and issued certificates:

EU-Baumusterprüfbescheinigung (Modul B) / EU-type examination certificate (module B): PTB 00 ATEX 2179
 ausgestellt von / issued by: Physikalisch Technische Bundesanstalt, Kenn-Nr. / ID no.: 0102
 Bundesallee 100, 38116 Braunschweig, Germany

Zertifizierung des QS-Systems (Modul D) / Certification of the QS-system (module D):
 ausgestellt von / issued by: Physikalisch Technische Bundesanstalt, Kenn-Nr. / ID no.: 0102
 Bundesallee 100, 38116 Braunschweig, Germany

UK-Baumusterprüfbescheinigung / UK-type examination certificate : TÜV 21 UKEX 7055
 ausgestellt von / issued by: TÜV Rheinland Industrie Service GmbH, Kenn-Nr. / ID no.: 0035
 Alfredstraße 81, 45130 Essen, Germany

UK Erklärung zur Qualitätssicherung / UKCA Quality Assurance Notification:
 ausgestellt von / issued by: Eurofins E&E CML Limited, Kenn-Nr. / ID no.: 2503,
 New Port Road, Ellesmere Port CH65 4LZ, United Kingdom

Mülheim, den 02.05.2022

i.V. O. Barabas, Zulassungsbeauftragter /
 Certification Representative

Ort und Datum der Ausstellung /
 Place and date of issue

Name, Funktion und Unterschrift des Befugten /
 Name, function and signature of authorized person

FM 7.3-12

09.11.21

Certification data | Technical data

Approvals and markings

Approvals	Marking parts in acc. with	
	ATEX directive	IEC/EN 60079-0/ -11
	UK Statutory Instruments (SI)	
ATEX Certificate number: PTB 00 ATEX 2179	Ⓜ II 2 (1) G	Ex ib [ia Ga] IIC T4 Gb
UKEX Certificate number: TÜV 21 UKEX 7055	Ⓜ II (1) D	[Ex ia Da] IIIC

Ambient temperature: T_{amb}: -20...+70 °C

Electrical data

Max. output voltage U _o	18.9 V		
Max. output current I _o	80 mA		
Max output power P _o	510 mW		
Characteristic	Trapezoidal		
Internal inductance L _i	Negligibly low		
Internal capacitance C _i			
External inductance L _o / capacitance C _o		IIC	IIB
	L _o	C _o	C _o
	2 mH	-	1 µF
	1 mH	-	1 µF
	0.5 mH	0,13 µF	1 µF
0.2 mH	0,17 µF	1.2 µF	
0.1 mH	0,21 µF	1.3 µF	

Technical data

Type designation	AO401EX
ID	6884205
Supply voltage	Via module rack, central power supply
Power consumption	≤ 2.5 W
Galvanic isolation	Complete galvanic isolation acc. to IEC/EN 60079-11
Number of channels	4-channel
Output circuits	Intrinsically safe acc. to IEC/EN 60079-11 0/4...20 mA
No-load voltage	≥ 16 VDC
External load	≤ 640 Ω
Switching frequency	≤ 50 Hz
Short circuit	≥ 50 Ω (only in live zero mode)
Wire break	< 2 mA (only in live zero mode)
Max. output current	22 mA

Resolution	2 µA
Reference temperature	25 °C
Full range	0...20 mA
Rel. actuating inaccuracy (including linearity, hysteresis and repeatability)	≤ 0.06 % of full range at 25 °C
Abs. actuating inaccuracy (including linearity, hysteresis and repeatability)	≤ ± 12 µA at 25 °C
Linearity deviation	≤ 0.05 % of full range at 25 °C
Temperature drift	≤ 0.005 % of full range/K
Rise time/fall time	≤ 50 ms (10...90 %)
Max. actuating inaccuracy under EMC influence	≤ 0.1 % of full range at 25 °C
Connection mode	Module, plugged on rack
Protection class	IP20
Relative humidity	≤ 93 % at 40 °C acc. to EN 60068-2-78
EMC	Acc. EN 61326-1 Acc. to Namur NE21