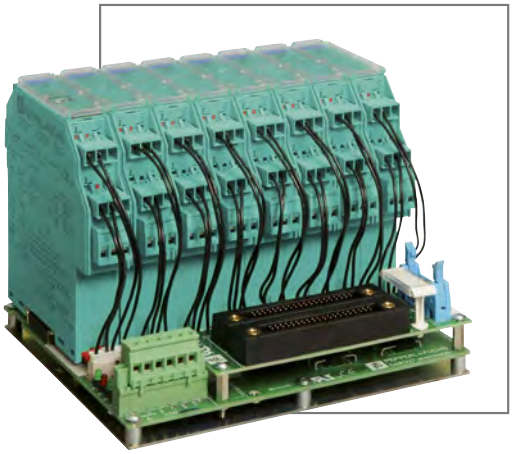
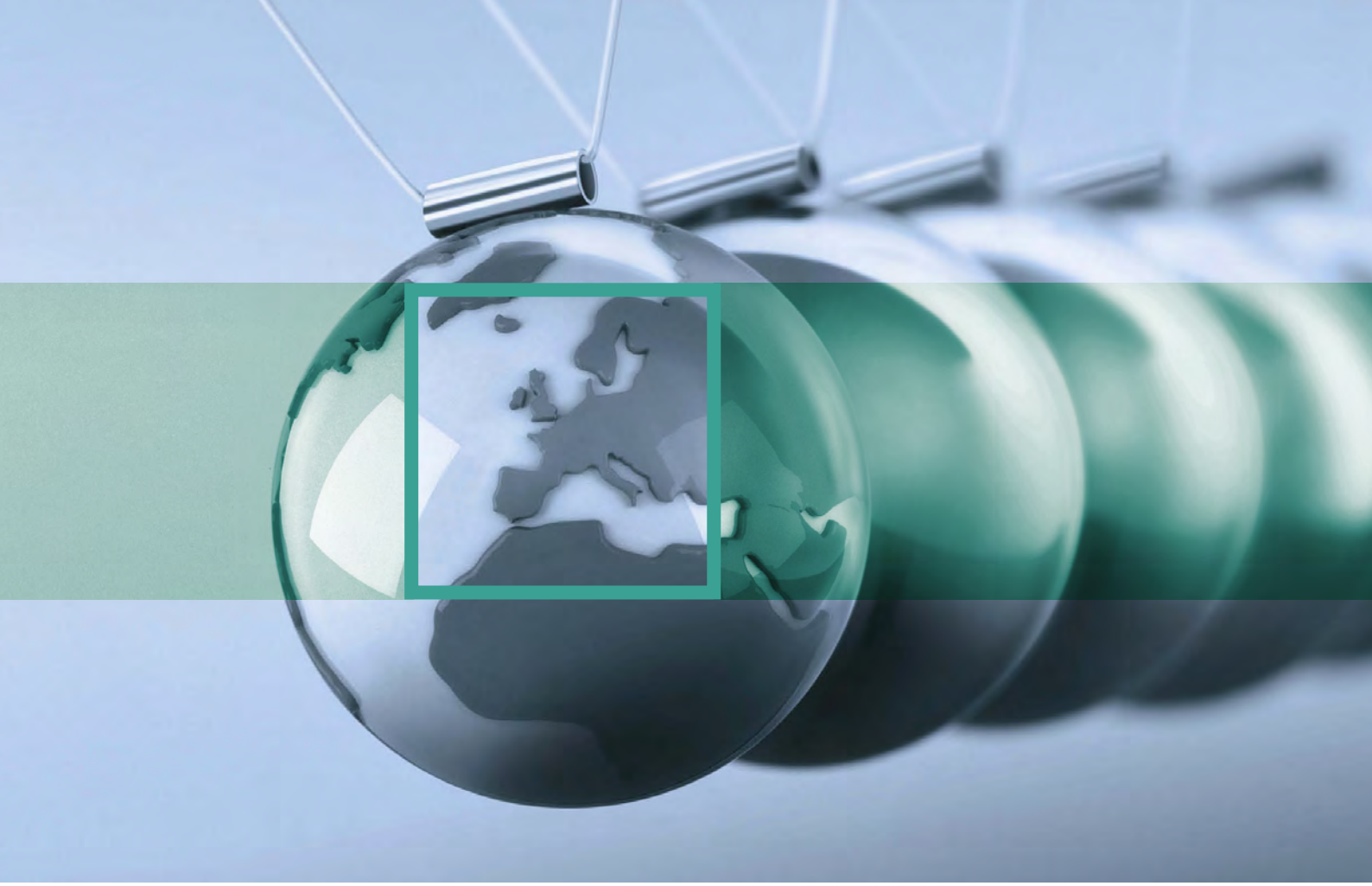
INTERFACE TECHNOLOGY

TERMINATION BOARD SOLUTIONS

K-SYSTEM FOR YOKOGAWA
CENTUM C3
PROSAFE RS



PEPPERL+FUCHS
PROTECTING YOUR PROCESS



About Pepperl+Fuchs

Pepperl+Fuchs is a leading developer and manufacturer of electronic sensors and components for the global automation market. Since more than 60 years, our continuous innovation, high quality products, and steady growth guarantee continued success.

One Company – Two Divisions

PEPPERL+FUCHS – PROTECTING YOUR PROCESS

The **Process Automation Division** is a market leader in intrinsically safe explosion protection. We offer comprehensive, application-oriented system solutions, including customer-specific control cabinet solutions for the process industry. A large portfolio of components is available from our various product lines: isolated barriers, fieldbus infrastructure solutions, remote I/O systems, HART interface solutions, level measurement devices, purge and pressurization systems, industrial monitors and HMI solutions, power supplies, separator alarm systems for oil and petrol separators, hazardous area enclosures and equipment.

PEPPERL+FUCHS – SENSING YOUR NEEDS

The main target markets of the **Factory Automation Division** are machine and plant construction, the automotive industry, storage and material handling, printing and paper industry, packaging technology, process equipment, door, gate and elevator construction, mobile equipment, renewable energies.
With the invention of the inductive proximity sensor in 1958, the company set an important milestone in the development of automation technology. Under the motto “Sensing your needs”, customers benefit from tailor-made sensor solutions for factory automation. The division offers a wide product range of industrial sensors whether it’s inductive, photoelectric or ultrasonic sensors, rotary encoders, identification systems, barcode readers for 1D, 2D and data matrix codes, and vision sensors.

PEPPERL+FUCHS

Pepperl+Fuchs worldwide

We're There When You Need Us

A global presence enables Pepperl+Fuchs to offer the best of both worlds: extremely high engineering standards combined with efficient, low-cost manufacturing facilities.

A worldwide presence means we have exactly what you need to make your process efficient and reliable. It means the most advanced technical expertise in the business is standard with every Pepperl+Fuchs product.

It means we have the largest and most ingenious staff of seasoned and skilled engineers and field representatives in the industry. It means we're there when you need us – anywhere in the world.

Pepperl+Fuchs offers proven industry expertise through market-based, customer-focused products that provide answers to the toughest application problems. Our target industries are involved with chemicals, pharmaceuticals, oil & gas, petrochemicals, and other areas including wastewater treatment and power technology. In all industrial areas, Pepperl+Fuchs is both a supplier and partner for end users, control systems manufacturers, system integrators and engineering contractors. We set the standard by offering the best product, service and support in the world. From our expert application analysis and global key account management, to our on-site engineering of new systems and technical support after the sale, we stand solidly behind every product we build.

North and Central America
Twinsburg, Ohio, USA

Asia Pacific
Singapore

Western Europe
Antwerp, Belgium

Middle East and India
Dubai

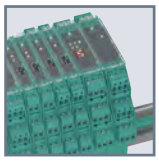
Northern Europe
Oldham, UK

Southern and Eastern Europe
Milan, Italy

South America
São Paulo, Brazil

Germany
Committed to engineering excellence, our worldwide headquarters is located in Mannheim, Germany. More than 600 specialists are dedicated to continuing our heritage of high quality and innovation.

Interface Technology



Interface technology guarantees a safe, reliable, and efficient signal transmission between your field device and the control system. We offer intrinsic safety isolated barriers, HART Interface Solutions, and Zener Barriers in DIN rail styles or Termination Board solutions; signal conditioners for general-purpose areas; and a wide variety of power supplies and accessories.

Fieldbus Infrastructure

FieldConnex® is a comprehensive fieldbus infrastructure that provides solutions for connecting your instruments to a controller. A wide range of products are designed for fast installation and commissioning. A unique High-Power Trunk concept uses Segment Protectors and FieldBarriers to provide power to each device. The Advanced Diagnostic Module lets you monitor the physical layer remotely, in real time.

Remote I/O

Remote I/O systems provide a way to communicate effectively with a modern DCS and proven legacy field devices. RPI and LB/FB Remote I/O connect a wide range of digital and analog sensors and actuators to process control systems over a fieldbus. A variety of gateways are available to make use of different bus protocols.

Purge and Pressurization

Purge/pressurization products offer a safe and economical approach to installing electrical equipment in hazardous locations. By creating a safe area inside an enclosure, general-purpose equipment can be used in hazardous areas. Pepperl+Fuchs offers a full range of Type X, Y, Z, Ex nP, and Ex px purge and pressurization equipment for use in Zones/Divisions 1 and 2.

Level Measurement and Corrosion Monitoring

Our measurement devices are available in 4 mA ... 20 mA, FOUNDATION Fieldbus and PROFIBUS PA interfaces. They are designed for point and continuous applications and are suitable for a wide range of materials and industries. CorrTran MV is a 2-wire, multivariable HART transmitter that evaluates general and localized (pitting) corrosion on line and in real time.

Visualization and HMI

HMI systems enable optimum control, operation, and monitoring of production processes. Our product line provides industrial PC components and visualization equipment used in hazardous areas focusing on equipment used for the human interface to automation systems. These include intrinsically safe electronic display and control device systems, Ex PC systems, intrinsically safe weighing and dosing terminals, and intrinsically safe data collection systems.

Cabinet Solutions

Our cabinet solutions unit offers expert development, manufacture and commissioning of a wide range of solutions including marshalling cabinets, displays and annunciators, distribution panels, control room cabinets, fieldbus panels, custom operator interface solutions, standard and customer fieldbus junction boxes and fieldbus power cabinets.

Table of Contents

Termination Board Solutions

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Model Number Description

	–		–	2			V	–		–	

partnumber

type of system cable

AKB system cable YUC50 or AKB331
KS system cable YUC40 or KS1
SCSIXX system cable SCSI

voltage type

V voltage

number of channels

type of signal

DI Digital Input
DO Digital Output
AI Analog Input
AO Analog Output

identification twinboard

system

C3 type DCS Centum 3000 R3
RS type PLC ProSafe RS

type of board

MB IS-board
TB NON-IS-board

General Description IS-Board

System description Termination Board (16 modules)

System description Termination Board (8 modules)

Installation instructions

Power supply block diagram

Technical Data for Termination Boards

Structure of the HART Multiplexer-System

Introduction

The standard Termination Boards are designed for 4, 8, 16 or 32 KF modules. Power feed and system connector to I/O modules are integrated in the Termination Board, which results in noticeable space savings in the interface cabinet. The power source has a redundant design, increasing the availability of the system. The operating status of the power supply is monitored and reported via LED and relay output.

The KF modules are interfaced to the Termination Board by using 2- to 6- pin coded cable connectors (FSY...). The Termination Board configuration is mounted on a stable metal plate. There are two brackets, on the back for mounting.

the board quickly and easily to a standard DIN Rail in accordance with DIN EN 50022 or similar.

Model with 16 Modules

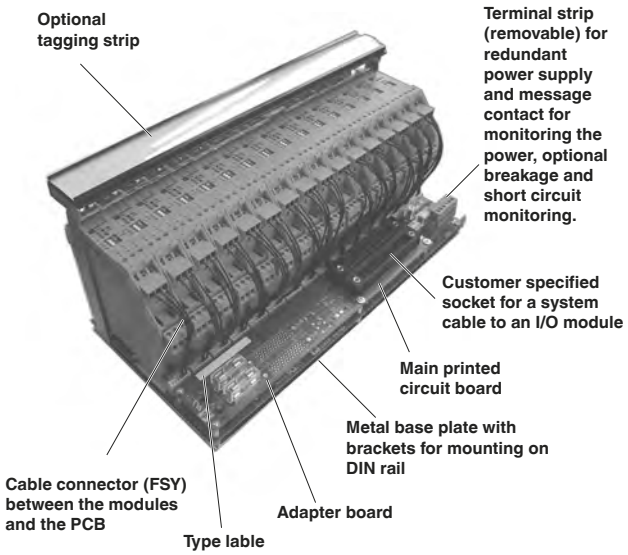

Figure 1 Termination Board for 16 modules

Model with 8 Modules

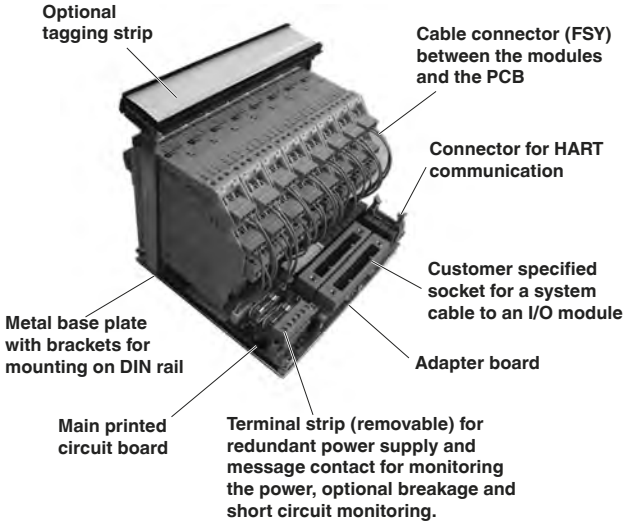

Figure 2 Termination Board for 8 modules

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Installations Instructions

1. Take away first and last module.Operate the screw behind them to fix the board on to the DIN rail.

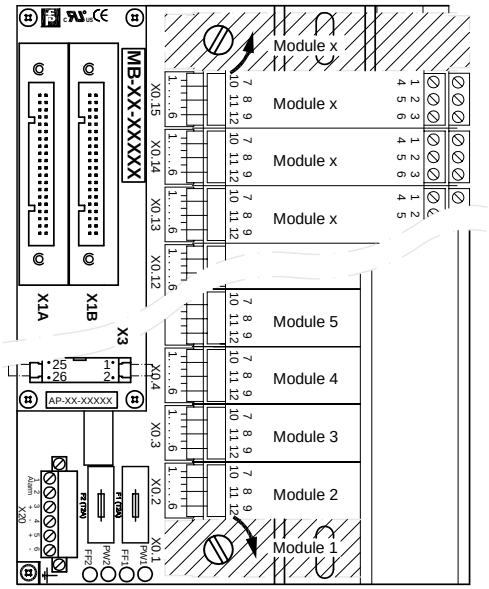

Figure 3 Mounting instructions for Termination Boards, Step 1

2. Turn these parts as shown the stopper until the stopper shown below.

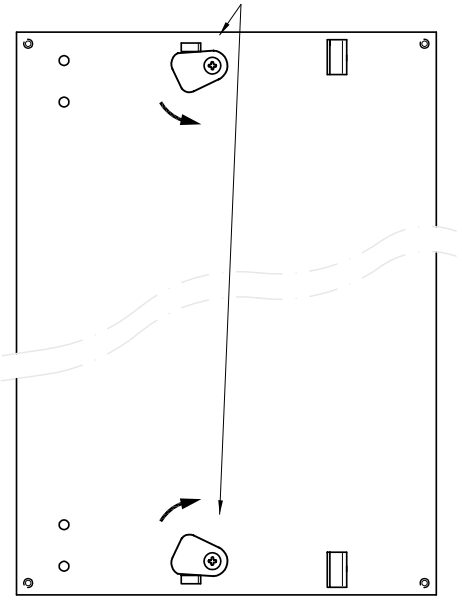

Figure 4 Mounting instructions for Termination Boards, Step 2

3. Set the board on the DIN rail.

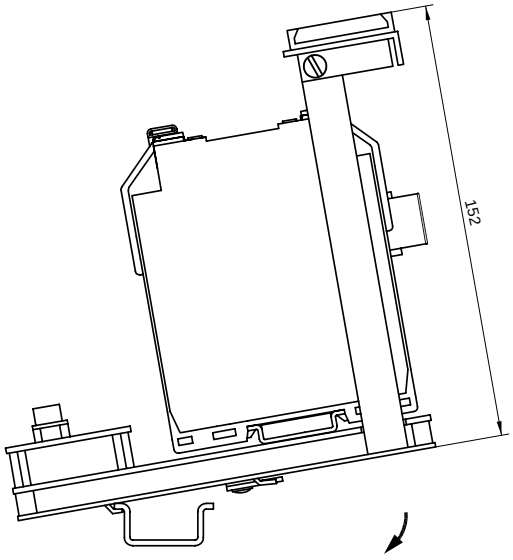

Figure 5 Mounting instructions for Termination Boards, Step 3

4. Turn the screw as shown till the board is fixed.(Arrows are showing direction how to turn for fixing the board).

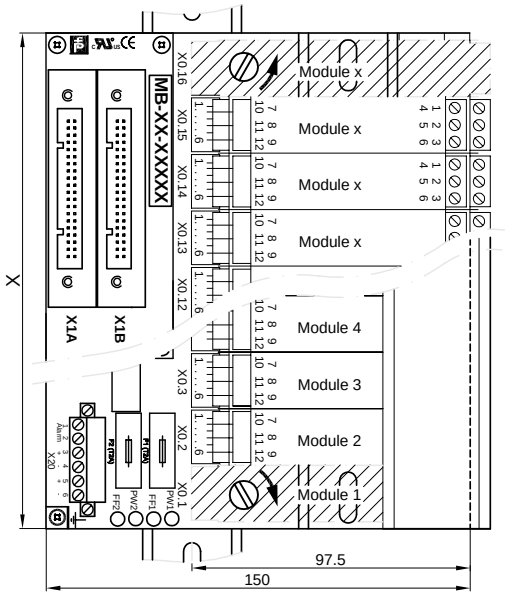

Figure 6 Mounting instructions for Termination Boards, Step 4

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Block Diagram Power Supply and Error Message

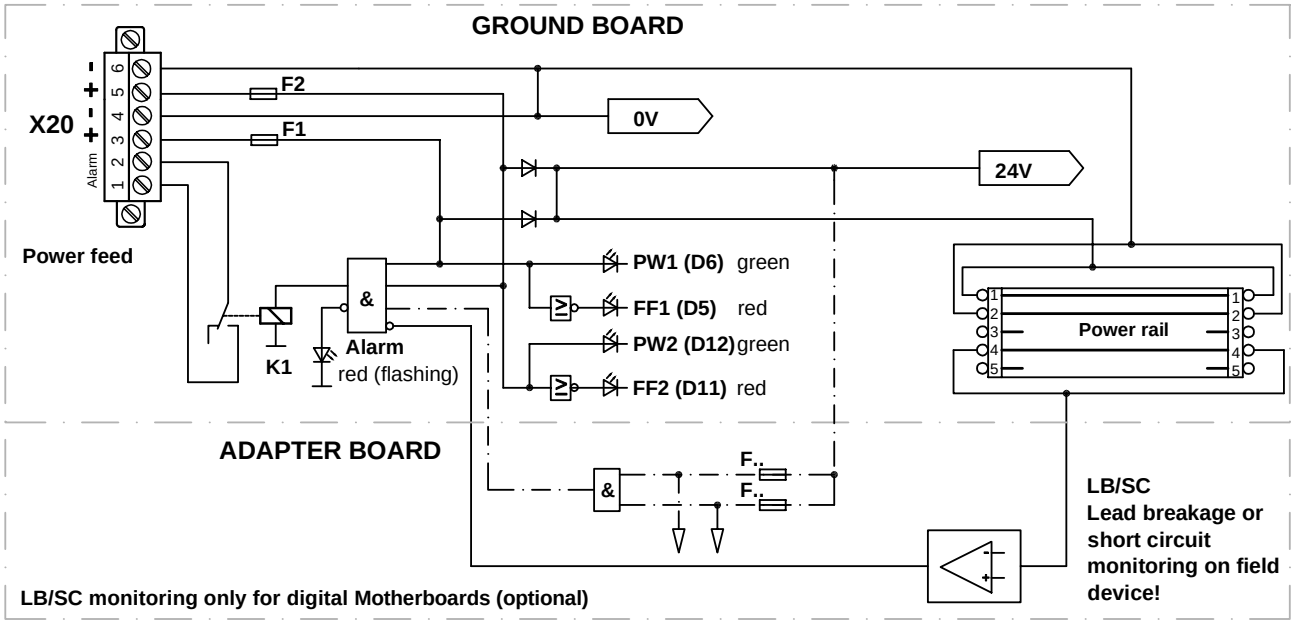

Figure 7 Block diagram power supply and error message

Connection Power Supply and Error Message

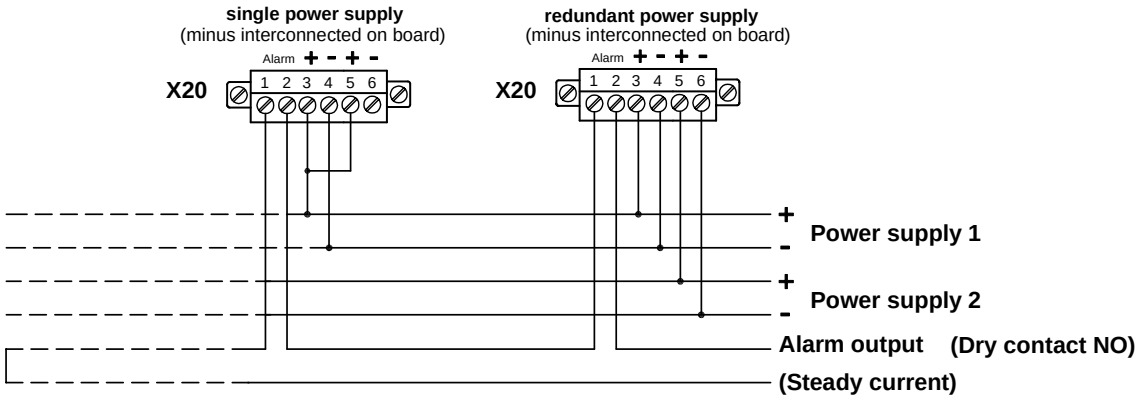

Figure 8 Connection power supply and error message

Error Message and Alarm

Power supply 1	Power supply 2	LED red		LED green		X20.1, 2 Alarm contact
PS ON and Fuse 1 OK	PS ON and Fuse 2 OK	D5 D11	OFF OFF	D6 D12	ON ON	contact closed
PS ON and Fuse 1 OK	PS OFF	D5 D11	OFF ON	D6 D12	ON OFF	contact open
PS OFF	PS ON and Fuse 2 OK	D5 D11	ON OFF	D6 D12	OFF ON	contact open
PS ON and Fuse 1 OK	PS ON and Fuse 2 broken	D5 D11	OFF ON	D6 D12	ON OFF	contact open
PS ON and Fuse 1 broken	PS ON and Fuse 2 OK	D5 D11	ON OFF	D6 D12	OFF ON	contact open
PS ON and Fuse 1 broken	PS ON and Fuse 2 broken	D5 D11	ON ON	D6 D12	OFF OFF	contact open
PS OFF	PS OFF	D5 D11	OFF OFF	D6 D12	OFF OFF	contact open
In case of LB/SC						contact open

Table 1 Error message and Alarm

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Technical Data for Termination Boards

Supply	Terminal X20 3+, 4-/5+, 6- (Fuse T2A)
Rated voltage	21 … 30 V DC
Ripple	< 10 %
Rated current	4/6/8/16x max. 50 mA each module depending on module type
Alarm	Terminal X20.1, 2 (Dry contact ≥ 50 V/2 A)
Supply termination	Removable termination block with screw type terminals for 0.2 … 2.5 mm²
Ambient conditions *	
Ambient temperature	working: -25 … 70 °C (243 … 353 K) storage: -40 … 85 °C (213 … 393 K)
Protection degree	IP 20
Humidity	max. 95 % rel. humidity non condensing
Vibration	< 15 Hz, amplitude ± 2.5 mm/15 Hz as per IEC 68-2-6
Schock	1.0 g, 16 ms all space directions as per IEC 68-2-27
Supplementary information	
EC-type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. For information see www.pepperl-fuchs.com. If a voltage exceeding the 50 V rating of the K-system modules fitted to Termination Boards, is applied, then the rated values are invalidated and are thereby reduced to 50 V. All rated values which do not exceed 50 V retain their validity. The galvanic isolation of all circuits on a Termination Board conform to the functional isolation level in accordance with EN 50178 with a rated isolation voltage of 50 V eff. **This is only a small selection of the most frequently needed Termination Boards! A range of Termination Boards for other Yokogawa I/O modules are also available. Please contact Pepperl+Fuchs!**	

Table 2 Technical Data for Termination Boards

*) For KF-modules see individual data sheet

Structure HART Multiplexer System

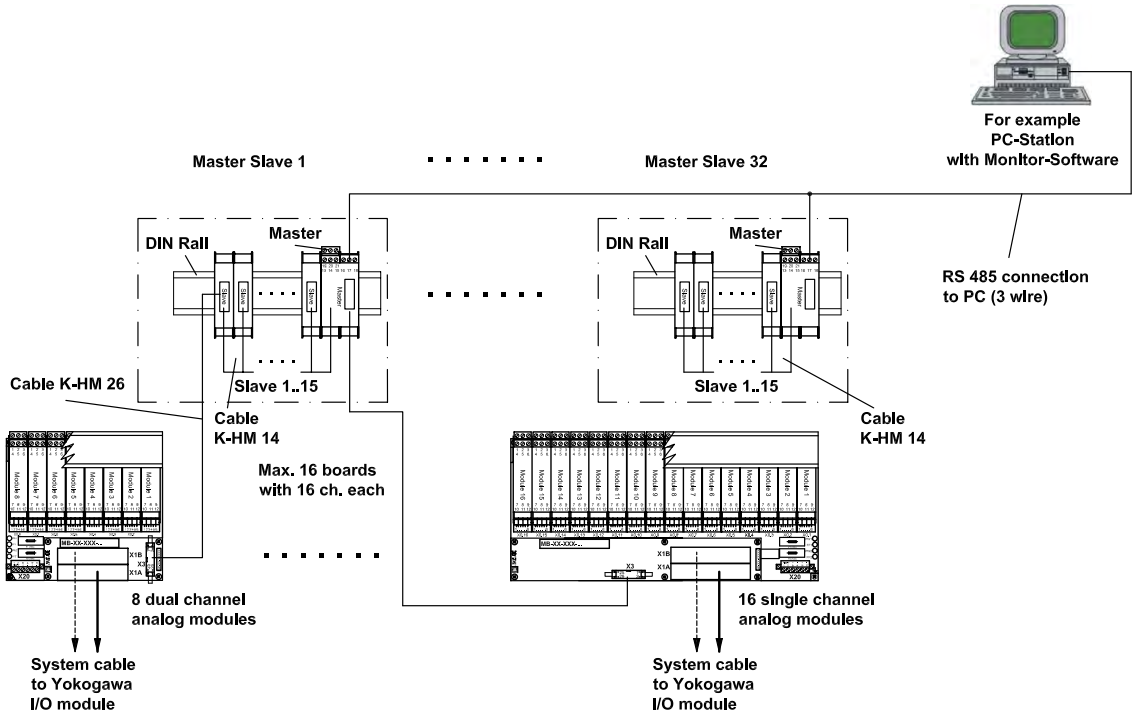

Figure 9 Structure HART Multiplexer System

System requirements	
HART Multiplexer Master (40 mm)	KFD2-HMM-16
HART Multiplexer Slave (20 mm)	KFD0-HMS-16
Cable Termination Board - Master/Slave	K-HM 26
Cable Master - Slave	K-HM 14
PC-Maintenance-Station with HART Management software	

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General Description NON-IS-Board

System Description Termination Board

Installation instructions

Power supply block diagram

Technical Data for Termination Boards

Introduction

The Termination Boards are designed to interface Yokogawa CS3000 R3 / ProSafe RS I/O cards. Power feed-if required- and system connector to I/O cards is integrated in the TB which results in noticeable space savings in the interface cabinet. The power supply should have a redundante design for increasing the availability of the system. The operating status of the power supply is monitored and reported via red flashing LED and relay output. There are two retainers on the back for mounting the TB quickly and easily on to a standard DIN Rail in accordance with DIN 50022 or integrated similar. Disconnecting is easy with aid of a screw driver to lever the two retainers.

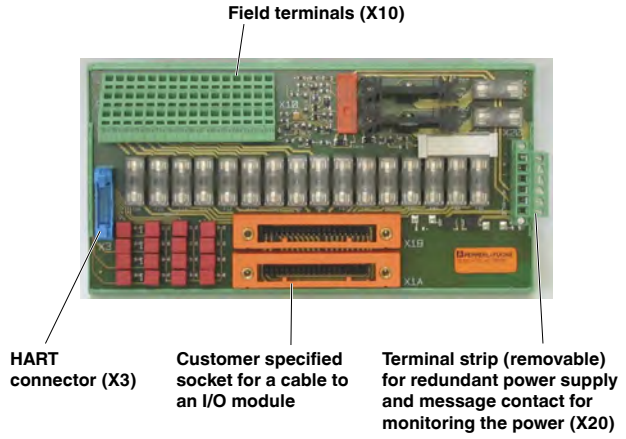

Figure 10 Termination Board

Installations Instructions

1. The TB is for mounting on 35 mm standard DIN Rail. It is designed for vertical installation.
   Advantage is, wiring of external connections can be made easily from cable ducts right and left hand side of the modules. So, the total lengths of the cabinet can be used for mountig the modules in one column.

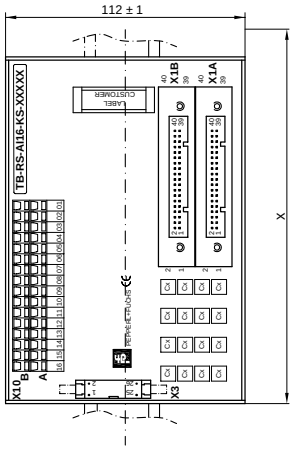

Figure 11 Installations instructions Termination Boards TB-XXX-..., Step 1

2. Mounting

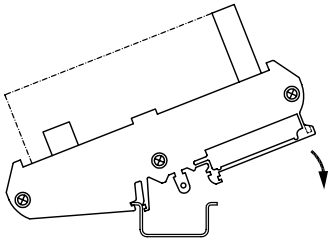

Figure 12 Installations instructions Termination Boards TB-XXX-..., Step 2

3. Removal

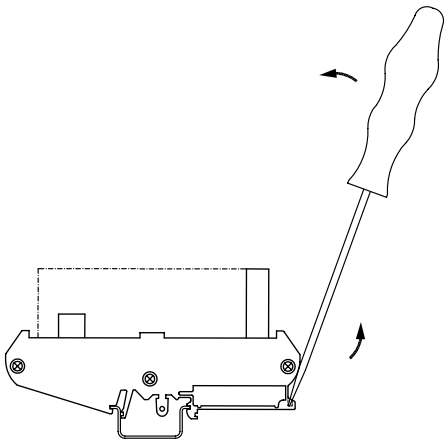

Figure 13 Installations instructions Termination Boards TB-XXX-..., Step 3

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Block Diagram Power Supply and Error Message

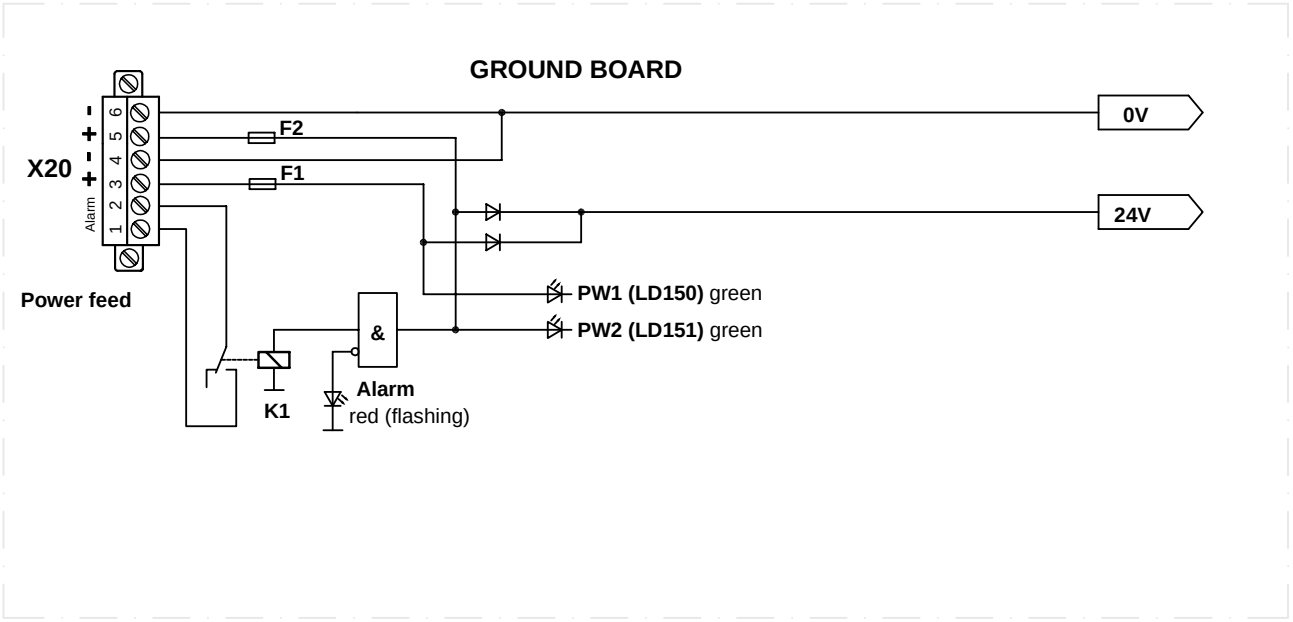

Figure 14 Block diagram power supply and error message

Connection Power Supply and Error Message

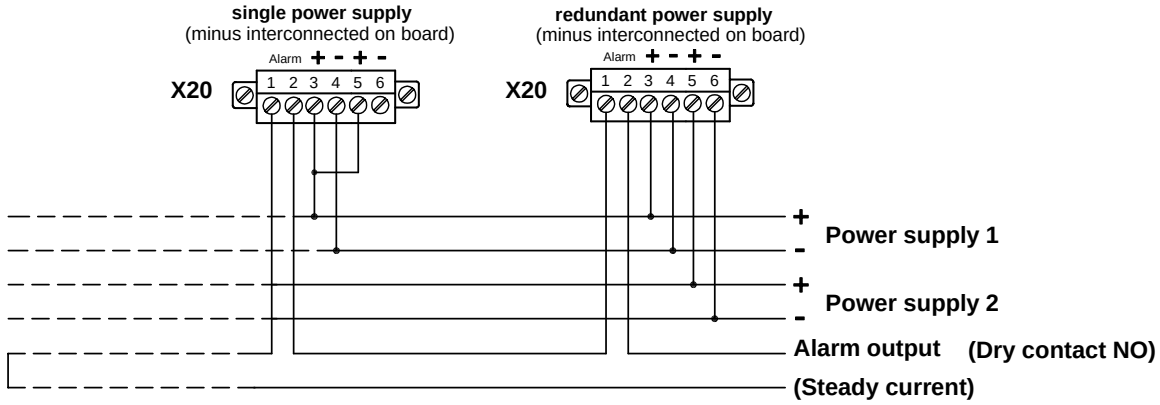

Figure 15 Connection power supply and error message

Error Message and Alarm

Power supply 1	Power supply 2	LED green		LED red (Flashing)		X20.1, 2 Alarm contact
PS ON and Fuse 1 OK	PS ON and Fuse 2 OK	LD150 LD151	OFF OFF	LD135	OFF	contact closed
PS ON and Fuse 1 OK	PS OFF	LD150 LD151	OFF ON	LD135	ON	contact open
PS OFF	PS ON and Fuse 2 OK	LD150 LD151	ON OFF	LD135	ON	contact open
PS ON and Fuse 1 OK	PS ON and Fuse 2 broken	LD150 LD151	OFF ON	LD135	ON	contact open
PS ON and Fuse 1 broken	PS ON and Fuse 2 OK	LD150 LD151	ON OFF	LD135	ON	contact open
PS ON and Fuse 1 broken	PS ON and Fuse 2 broken	LD150 LD151	ON ON	LD135	ON	contact open
PS OFF	PS OFF	LD150 LD151	OFF OFF	LD135	OFF	contact open

Table 3 Error message and Alarm

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Technical Data for Termination Boards

Supply	Terminal X20 3+, 4-/5+, 6- (Fuse T2A)
Rated voltage	21 … 30 V DC
Ripple	< 10 %
Rated current	see data sheet
Alarm	Terminal X20.1, 2 (Dry contact ≥ 50 V/2 A)
Supply termination	Removable termination block with screw type terminals for 0.2 … 2.5 mm²
Field termination	Tension clamp type terminals 0.2 … 1.5 mm²
Ambient conditions	
Ambient temperature	working: -25 … 70 °C (243 … 353 K) storage: -40 … 85 °C (213 … 393 K)
Protection degree	IP 20
Humidity	max. 95 % rel. humidity non condensing
Vibration	< 15 Hz, amplitude ± 2.5 mm/15 Hz as per IEC 68-2-6
Schock	10 g, 16 ms all space directions as per IEC 68-2-27
Supplementary information	

EC-type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. For information see www.pepperl-fuchs.com.
The galvanic isolation of all circuits on a Termination Board conform to the functional isolation level in accordance with EN 50178 with a rated isolation voltage of 50 V eff.
This is only a small selection of the most frequently needed Termination Boards!
A range of Termination Boards for other Yokogawa I/O modules are also available.
Please contact Pepperl+Fuchs!

Table 4 Technical Data for Termination Boards

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Termination Boards Centum C3

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Digital Inputs

Digital Outputs

Analog Inputs

Analog Outputs

Analog Inputs and Outputs

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pa-info@sg.pepperl-fuchs.com

Digital Inputs

YOKOGAWA		Pepperl+Fuchs Board				Page	Pepperl+Fuchs Module		Page
I/O CARD CS3000-FIO	Channel	Class	Channel	Positions on Board	Type		Channel	Type	
ADV151	32	IS	32	16	MB-C3-DI32-AKB	22	2	KFD2-SR2-EX2.2S alternative KFD2-SOT2-EX2	97 98
ADV161 (2 boards required)	64	IS	32	16	MB-C3-DI32-AKB	22	2	KFD2-SR2-EX2.2S alternative KFD2-SOT2-EX2	97 98
ADV151	32	NIS	32	–	TB-C3-DI32-AKB	26	–	–	–
ADV161 (2 boards required)	64	NIS	32	–	TB-C3-DI32-AKB	26	–	–	–
AKB to screw term.	–	NIS	–	–	TB-UNI-AKB	30	–	–	–

Digital Outputs

YOKOGAWA		Pepperl+Fuchs Board				Page	Pepperl+Fuchs Module		Page
I/O CARD CS3000-FIO	Channel	Class	Channel	Positions on Board	Type		Channel	Type	
ADV551	32	NIS	32	16	MB-C3-DO32-AKB	32	2	KFD2-SL2-EX2 alternative KFD2-SL2-EX2.B	101 102
ADV561 (2 boards required)	64	NIS	32	16	MB-C3-DO32-AKB	32	2	KFD2-SL2-EX2 alternative KFD2-SL2-EX2.B	101 102
AKB to screw term.	–	NIS	–	–	TB-UNI-AKB	36	–	–	–

Analog Inputs

YOKOGAWA		Pepperl+Fuchs Board				Page	Pepperl+Fuchs Module		Page
I/O CARD CS3000-FIO	Channel	Class	Channel	Positions on Board	Type		Channel	Type	
AAI141 / AAI143	16	IS	16	8	MB-C3-AI16-KS	38	2	KFD2-STC4-EX2	103
AAV141	16	IS	16	8	MB-C3-AI16V-KS	40	2	KFD2-STC4-EX2 alternative KFD2-UT2-EX2	103 104
AAI135	8	NIS	8	–	TB-C3-AI8-KS	42	–	–	–
AAI141 / AAI143	8 + 8	NIS	8 + 8	–	TB-C3-AIO16-KS	44	–	–	–

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Analog Outputs

YOKOGAWA		Pepperl+Fuchs Board				Page	Pepperl+Fuchs Module		Page
I/O CARD CS3000-FIO	Channel	Class	Channel	Positions on Board	Type		Channel	Type	
AAI543	16	IS	16	8	MB-C3-AO16-KS	46	2	KFD2-SCD2-EX2.LK	106
AAI543 AAV141 / AAV143 AAB841	16	NIS	16	–	TB-C3-AIO16-KS	48	–	–	–

Analog Inputs and Outputs

YOKOGAWA		Pepperl+Fuchs Board				Page	Pepperl+Fuchs Module		Page
I/O CARD CS3000-FIO	Channel	Class	Channel	Positions on Board	Type		Channel	Type	
AAI841	16	IS	16	8	MB-C3-AIO16-KS	50	2	KFD2-STC4-EX2 and KFD2-SCD2-EX2.LK	103 106
AAI835	8	NIS	4 + 4	–	TB-C3-AIO8-KS	52	–	–	–
AAI841	16	NIS	8 + 8	–	TB-C3-AIO16-KS	54	–	–	–

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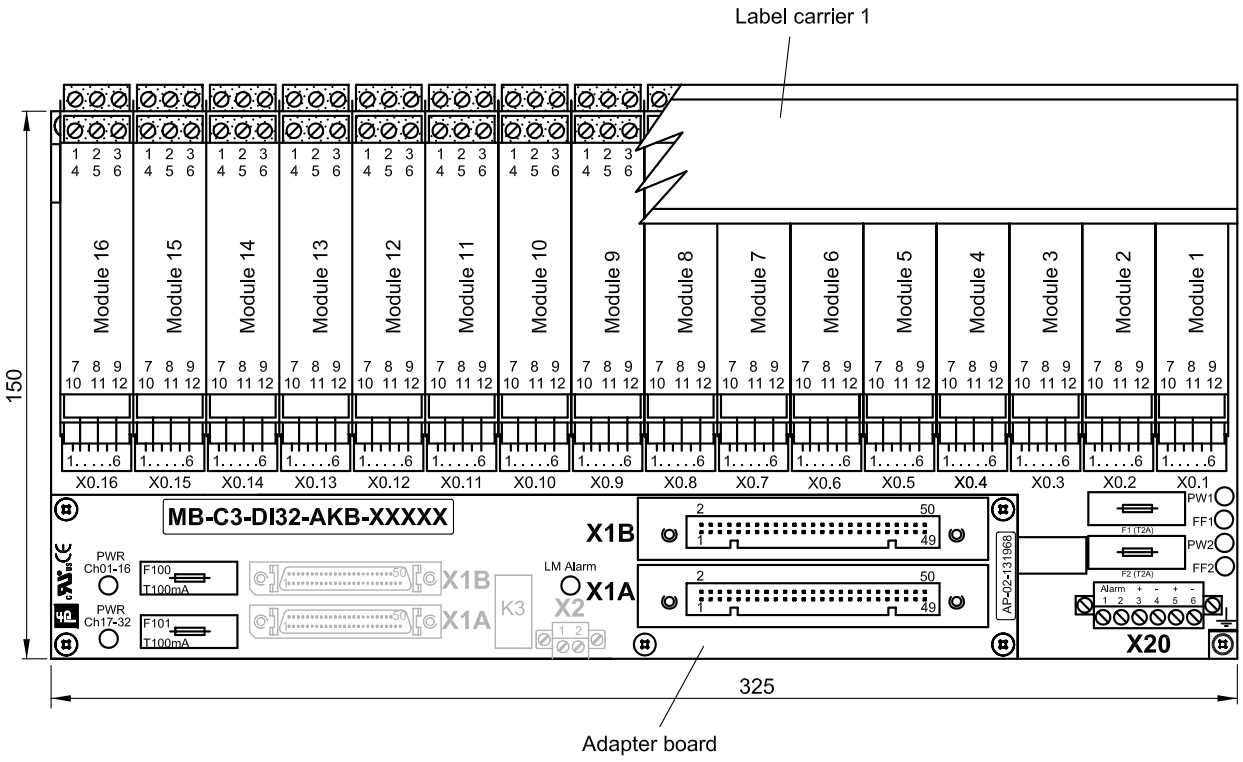

Name	Note	Part.No.:
X1A, X1B	50 pin male system connector YO50 (for AKB system cable)	----
KFD0-LC1-16M	Label carrier 1 (option, to order separate)	99144
X0.1 ... 16	6 pin male terminals for cable tree FSY....	----
X20.1 ... 6	Screw terminals (0.2 mm² ... 2.5 mm²)	----
X20.1; X20.2	Power/LM Alarm (Relay contact max. 30V AC, 40 V DC, 2 A)	----
X20.3 ... 6	Redundant power feed 24 V DC (21 V .. 30 V) (3/4 = PW1/L+/L-) (5/6 = PW2/L+/L-)	----
F1, F2	Fuse (5 mm x 20 mm/T2 A)	----
F100, F101	Fuse (5 mm x 20 mm/T100mA)	----
PW1, PW2, FF1, FF2	LEDs for power and power failure	----
PWR	LEDs Power for Ch.01 ... 16; Ch.17 ... 32	----

Motherboards name and part numbers according installed KF- module type					
KF-Module type (function)		Motherboard without KF-Module	KF-Module type (function)		Motherboard without KF-Module
Type	F.	Name	Type	F.	Name
KFD2-SR2-Ex2.2S	DI	MB-C3-DI32-AKB-131969	----	--	----
KFD2-SOT2-Ex2*	DI		----	--	----

Yokogawa CS3000 R3 Discrete Input Type ADV151 (1 board/32 channels, cable type AKB331)
Type ADV161 (2 boards/64 channels, cable type AKB337)

LM Alarm = Line monitoring

The equivalent non I.S. barrier devices may also be used.

***KFD2-SOT2-Ex2:** Prefered type

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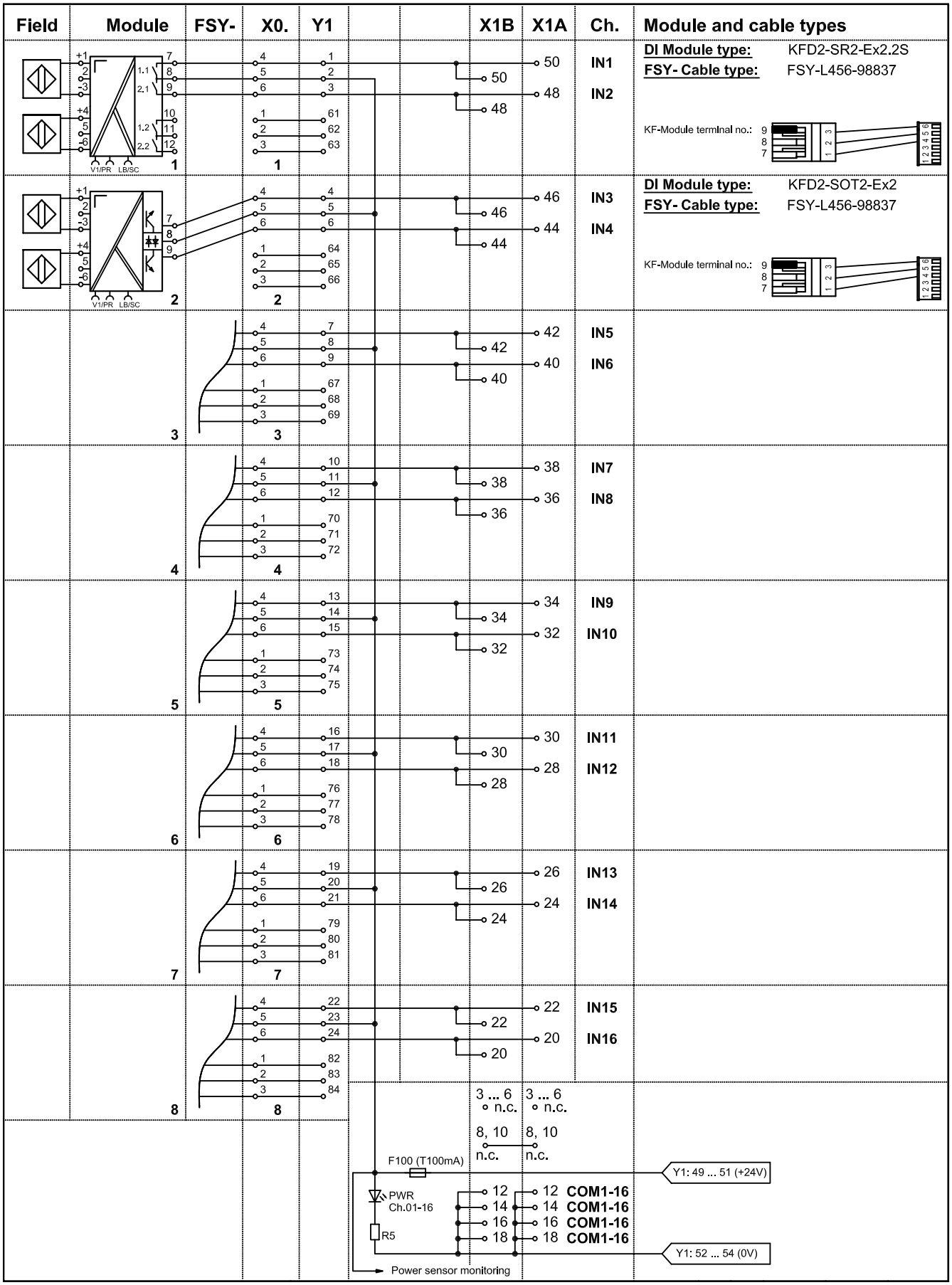

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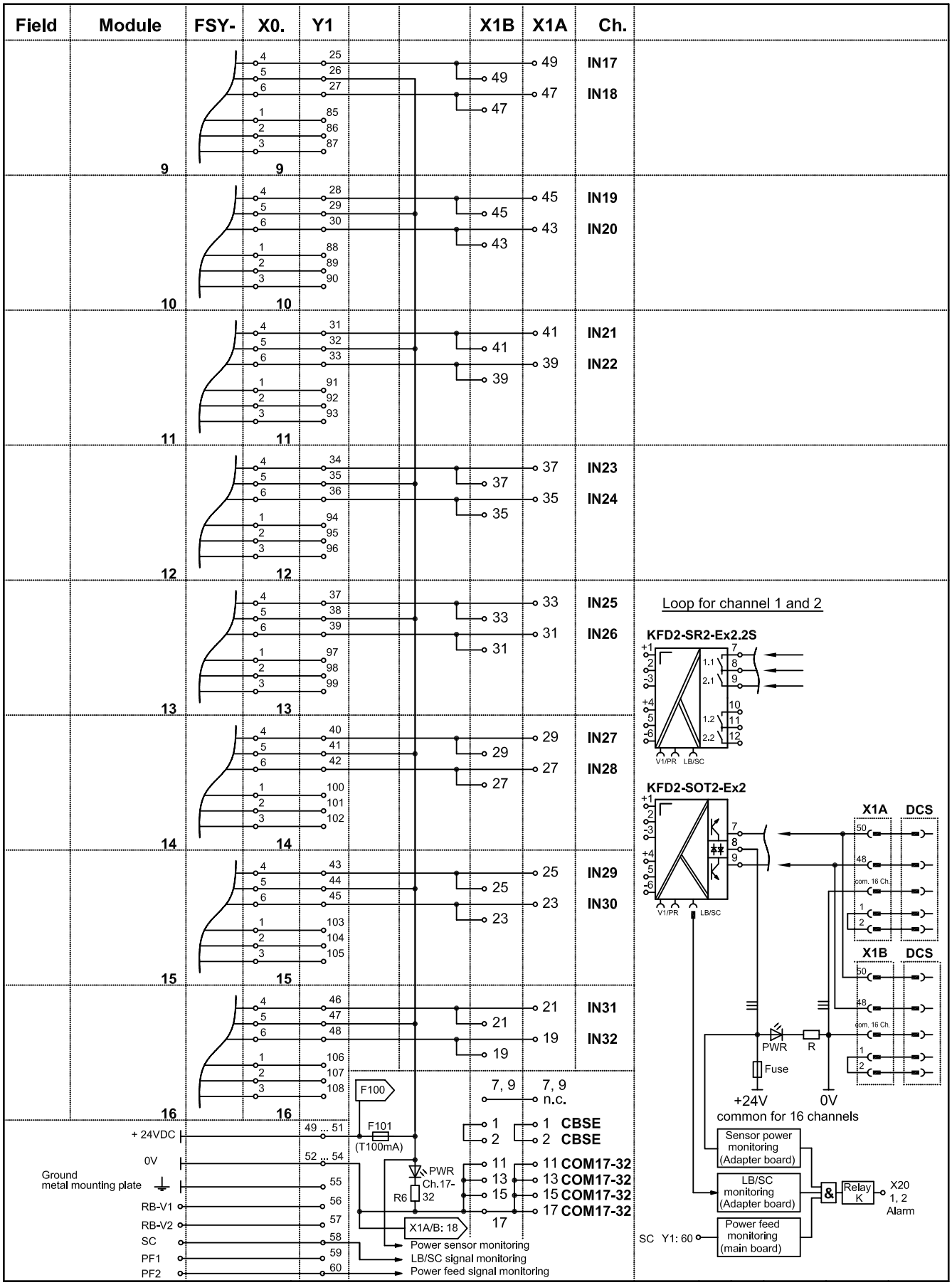

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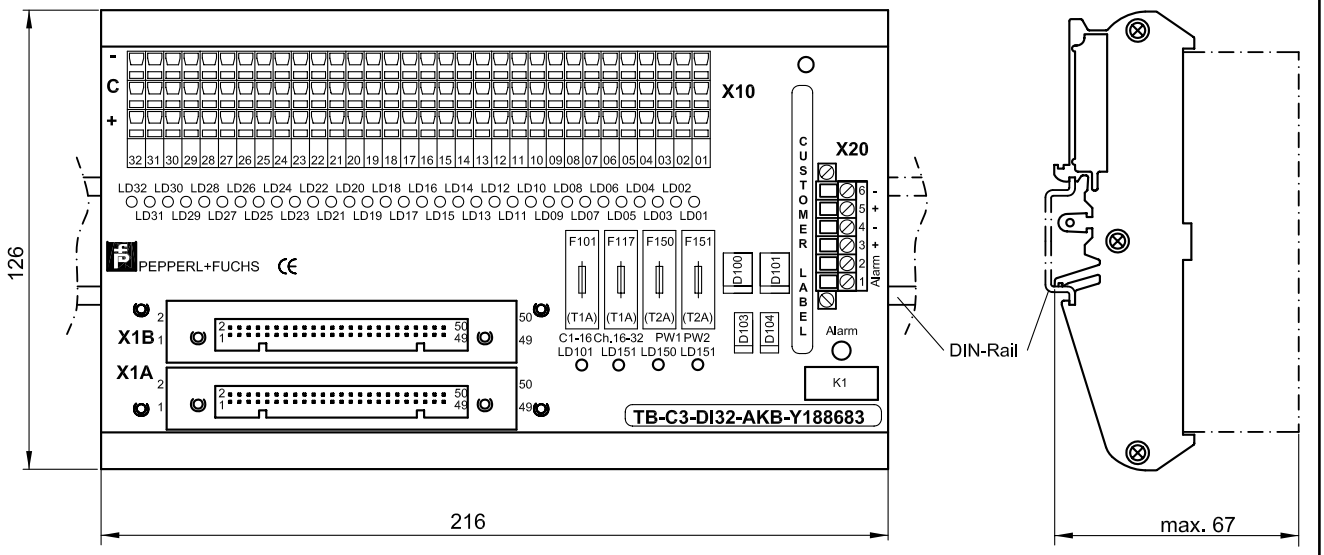
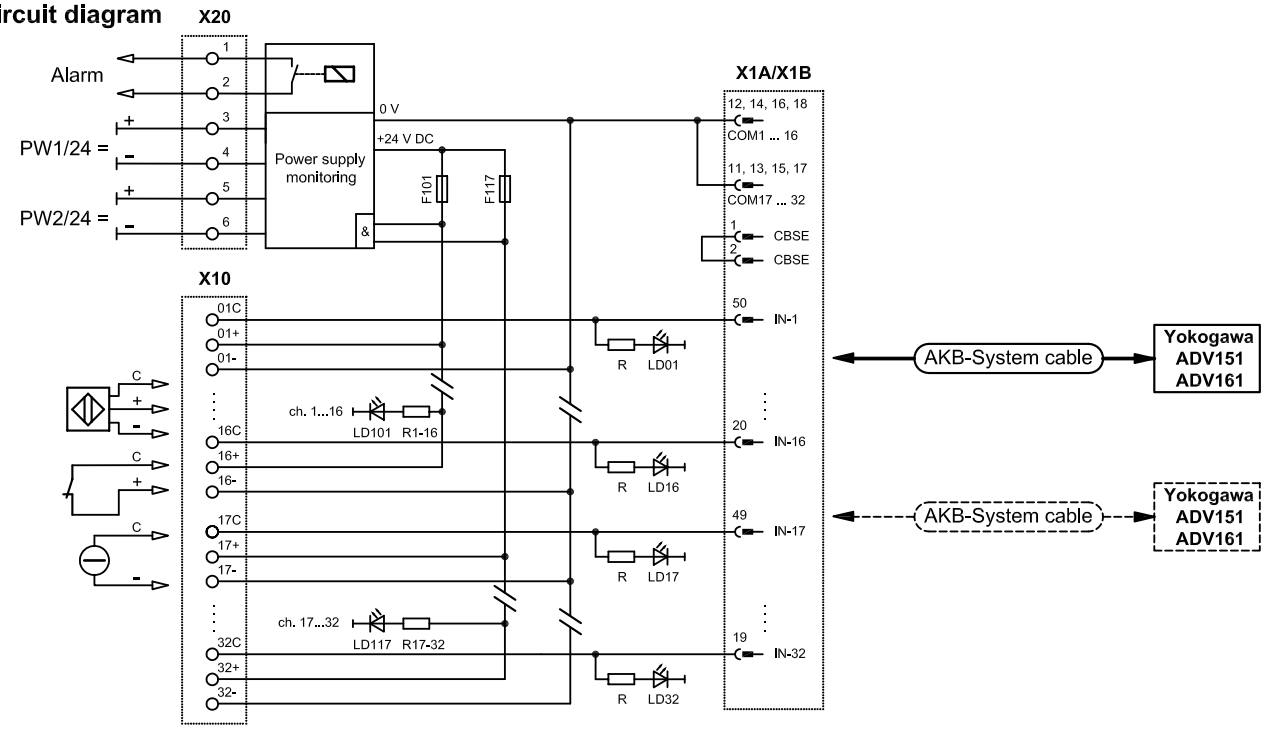


Technical Description

Field termination: X10	Pressure clamp terminal	24 V DC / 6 mA , max. 100 mA per channel
System connector: X1A, X1B	50 pin YO50 (AKB331)	DI
Power feed: X20.3 ... 6	Redundant Power feed	24 V DC / 2 A, max. 3,15 A
Alarm: X20.1, X20.2	Power Alarm	Relay contact max. 30 V AC, 40 V DC, 2 A
F101; 117	Fuse channels 1...16 and 17...32	1 A, max. 1,5 A
F150; 151	Power feed fuse	2 A, max. 3,15 A
X20	6 pin screw terminal (removable)	Power feed terminal

Function: Termination-Board to connect to the Yokogawa CS 3000 R3 I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. Two system connectors in parallel allow for redundant applications. The connections X10 to/from the field are clamp terminals. The unit has a 24 V DC redundant power supply feed, monitored by a potential free relay contact. (X20. 1, 2) LED PW1, PW2 and Alarm indicate the actual power status. Loops are powered directly from the board: 3-wire sensor, potential free contact, active voltage surce (see circuit diagram). Two groups (Ch. 1 ... 16 and Ch. 17 ... 32) are separatly fused (F101, F117). Fuses are supervised and monitored by the Alarm relay. The board is designed to be mounted on DIN-Rail (DIN EN5022).

Circuit diagram



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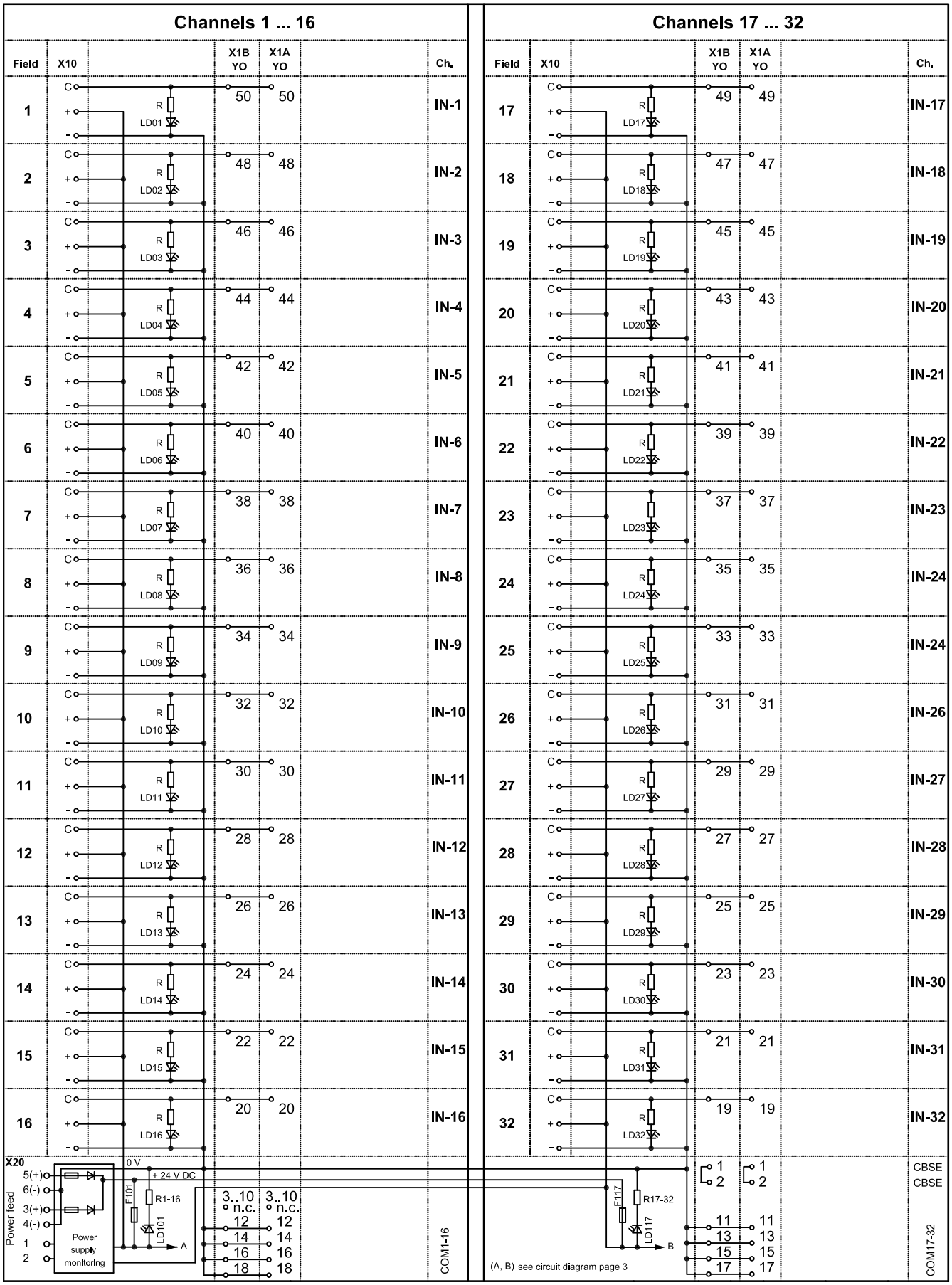

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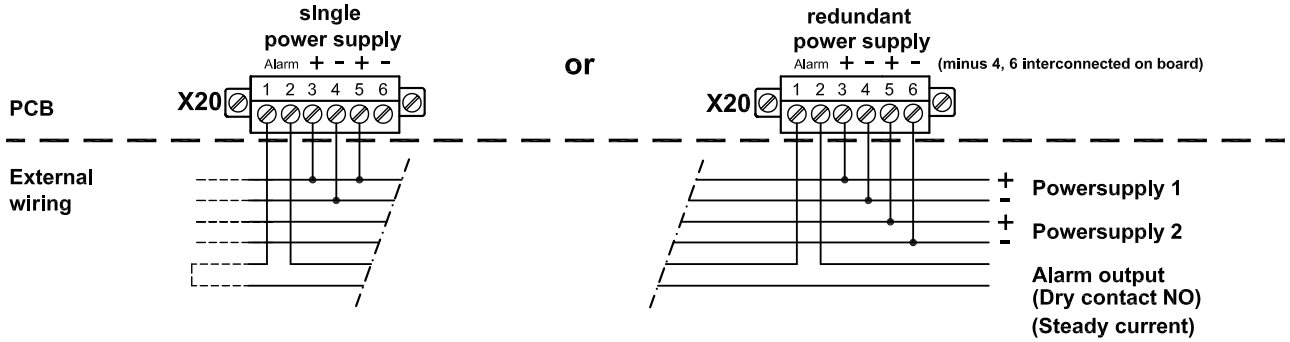
Connection power supply and error message (Alarm)



Alarm LD Indication and contact status

Power supply 1	Power supply 2	LD green	X20.1, X20.2 Alarm contact	LD red (Flashing)
PS **ON** and Fuse 150 **OK**	PS **ON** and Fuse 151 **OK**	LD150 **ON** LD151 **ON**	contact **closed**	LD135 **OFF**
PS **ON** and Fuse 150 **OK**	PS **OFF**	LD150 **ON** LD151 **OFF**	contact **open**	LD135 **ON**
PS **OFF**	PS **ON** and Fuse 151 **OK**	LD150 **OFF** LD151 **ON**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **OK**	PS **ON** and Fuse 151 **broken**	LD150 **ON** LD151 **OFF**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **broken**	PS **ON** and Fuse 151 **OK**	LD150 **OFF** LD151 **ON**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **broken**	PS **ON** and Fuse 151 **broken**	LD150 **OFF** LD151 **OFF**	contact **open**	LD135 **OFF**
PS **OFF**	PS **OFF**	LD150 **OFF** LD151 **OFF**	contact **open**	LD135 **OFF**
F101 or 117 broken		LD101 **OFF** LD117 **OFF**	contact **open**	LD135 **ON**

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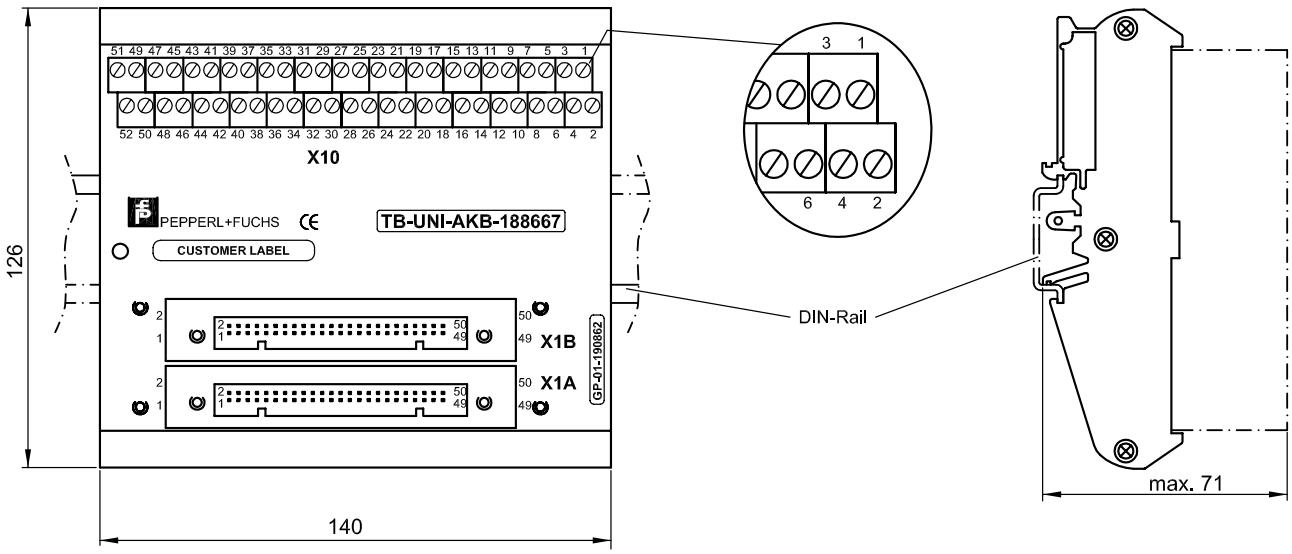
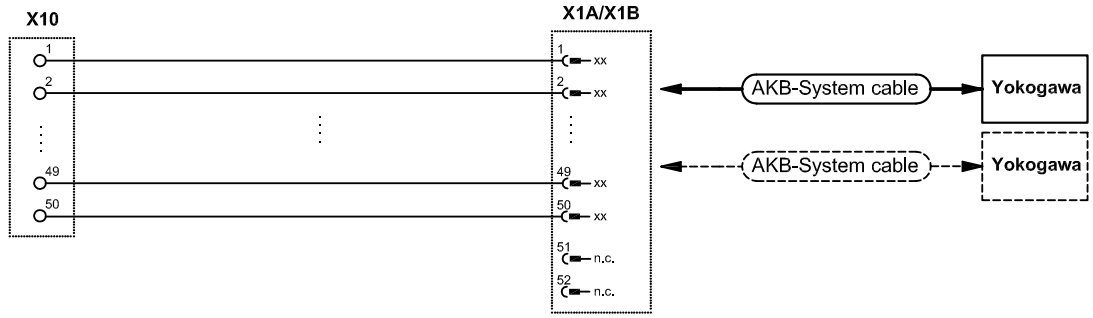


Technical Description	Connector	Signal
Field termination: X10	Screw terminal (max.1.5 mm²)	universal
System connector: X1A, X1B	50 pin male YO50	universal

Function:
Termination-**B**oard to connect to the Yokogawa CS 3000 R3 I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. The connections to/from the field (X10.xx) are screw terminals. The board is designed to be mounted on DIN-Rail (DIN EN5022).

Circuit diagram



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Pinning

X10	X1A/B YO	Note
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
7	7	
8	8	
9	9	
10	10	
11	11	
12	12	
13	13	
14	14	
15	15	
16	16	
17	17	
18	18	
19	19	
20	20	
21	21	
22	22	
23	23	
24	24	
25	25	

Pinning

X10	X1A/B YO	Note
26	26	
27	27	
28	28	
29	29	
30	30	
31	31	
32	32	
33	33	
34	34	
35	35	
36	36	
37	37	
38	38	
39	39	
40	40	
41	41	
42	42	
43	43	
44	44	
45	45	
46	46	
47	47	
48	48	
49	49	
50	50	
51		
52		

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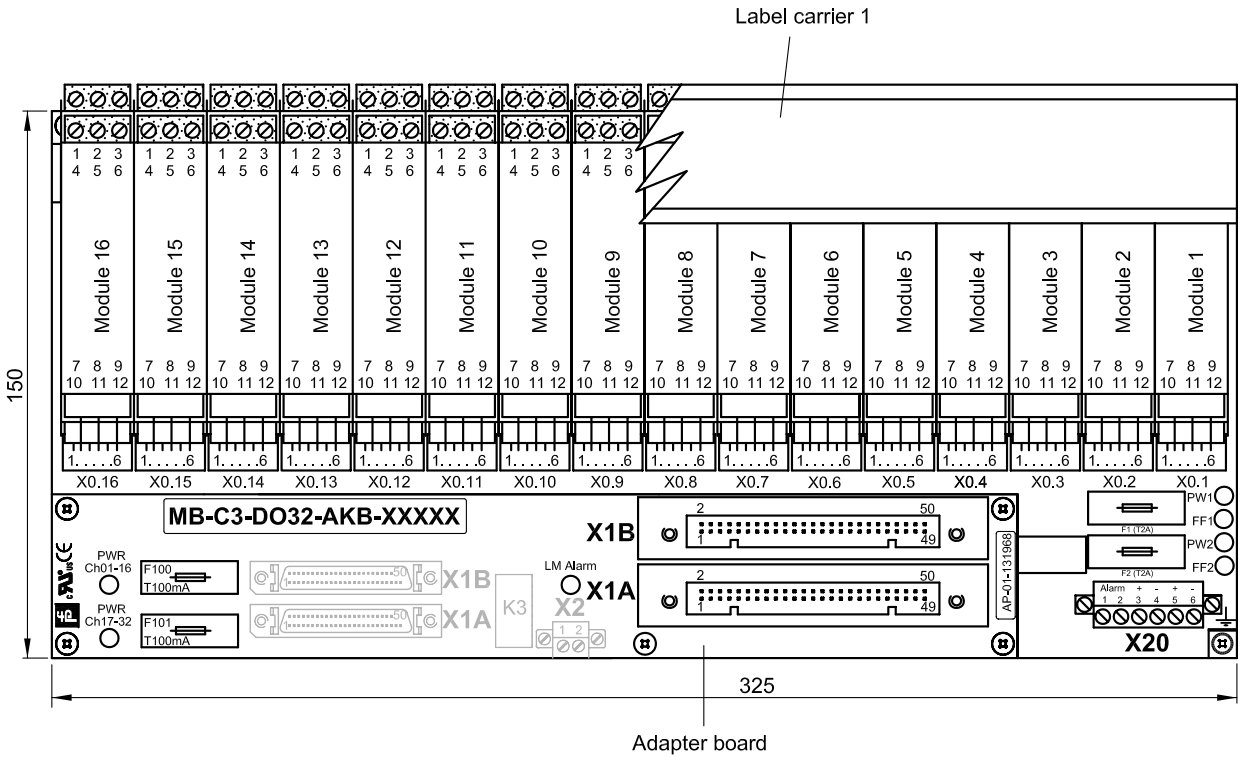

Name	Note	Part.No.:
X1A, X1B	50 pin male system connector YO50 (for AKB system cable)	----
KFD0-LC1-16M	Label carrier 1 (option, to order separate)	99144
X0.1 ... 16	6 pin male terminals for cable tree FSY	----
X20.1 ... 6	Screw terminals (0.2 mm² ... 2.5 mm²)	----
X20.1; X20.2	Alarm (Relay contact max. 30V AC, 40 V DC, 2 A)	----
X20.3 ... 6	Redundant power feed 24 V DC (21 V .. 30 V) (3/4 = PW1/L+/L-) (5/6 = PW2/L+/L-)	----
F1, F2	Fuse (5 mm x 20 mm/T2 A)	----
F100, F101	Fuse (5 mm x 20 mm/T100mA)	----
PW1, PW2, FF1, FF2	LEDs for power and power failure	----

Motherboards name and part numbers according installed KF- module type					
KF-Module type (function)		Motherboard without KF-Module	KF-Module type (function)		Motherboard without KF-Module
Type	F.	Name	Type	F.	Name
KFD2-SL2-Ex2	DO	MB-C3-DO32-AKB-131972	----	--	----
KFD2-SL2-Ex2.B *)	DO		----	--	----

Yokogawa CS3000 R3 Discrete Output Type ADV551 (1 board/32 channels, cable type AKB331)
Type ADV561 (2 boards/64 channels, cable type AKB337)

LM Alarm = Line monitoring

*) No LM on this module

The equivalent non I.S. barrier devices may also be used

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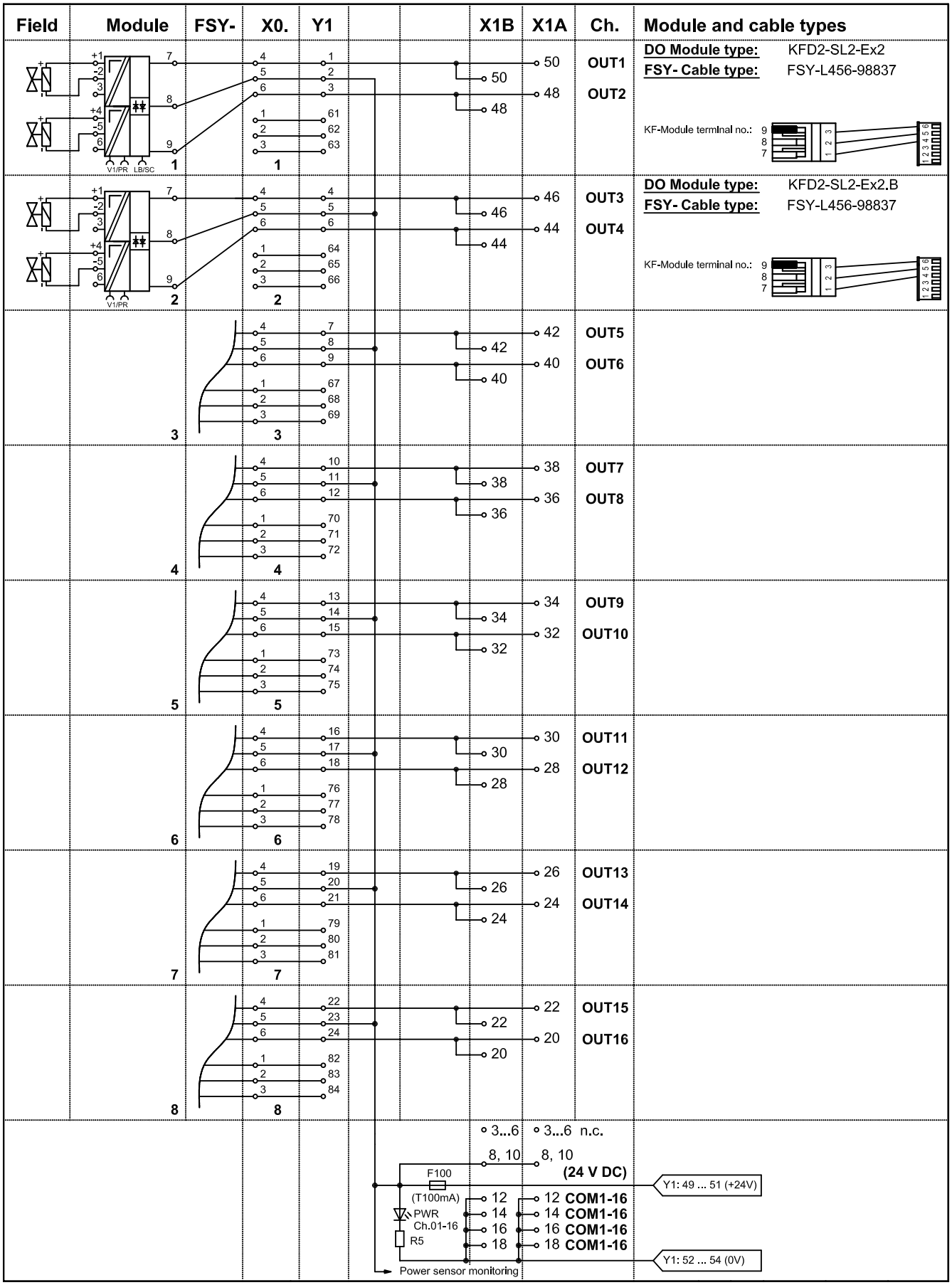

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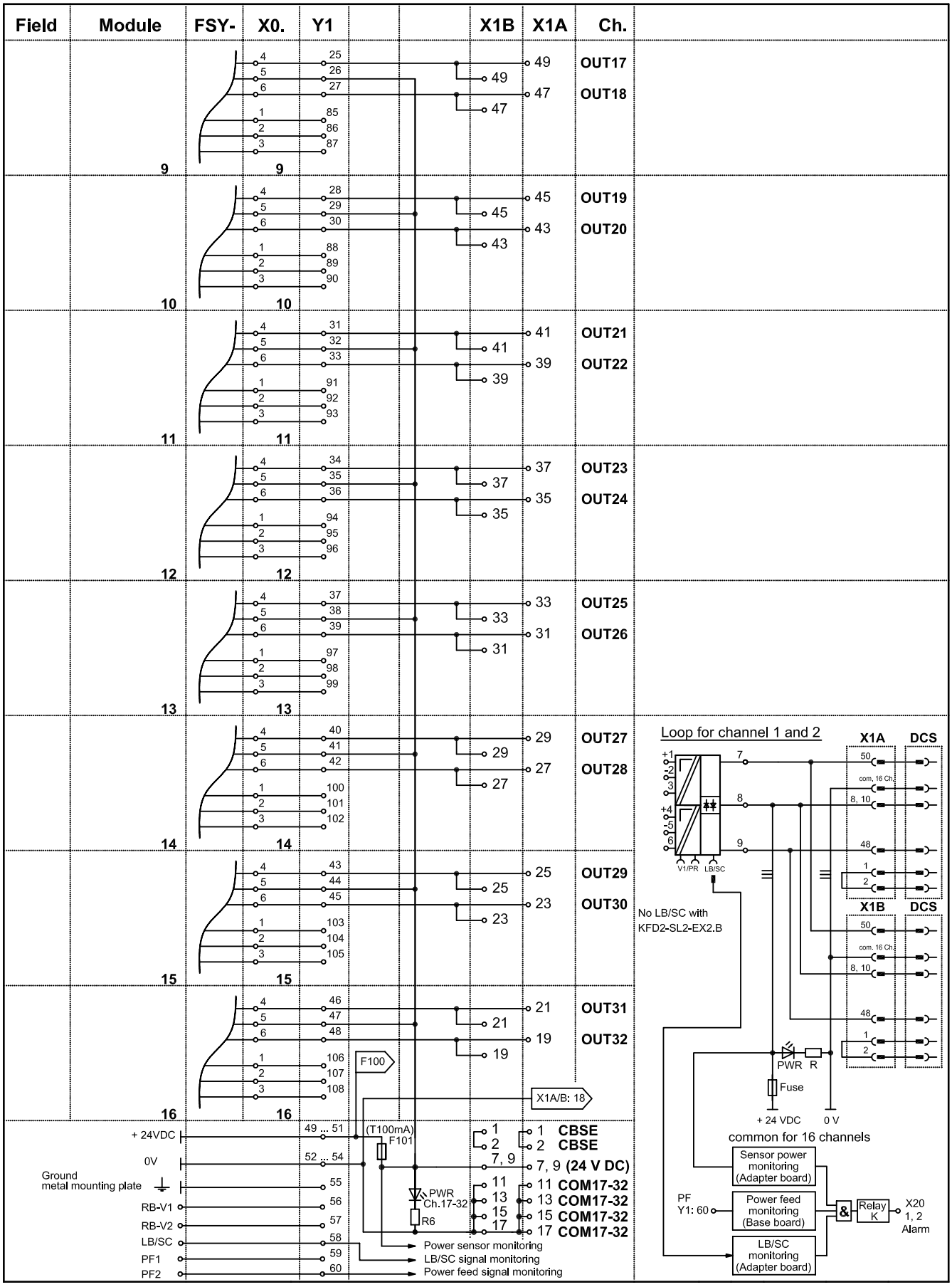

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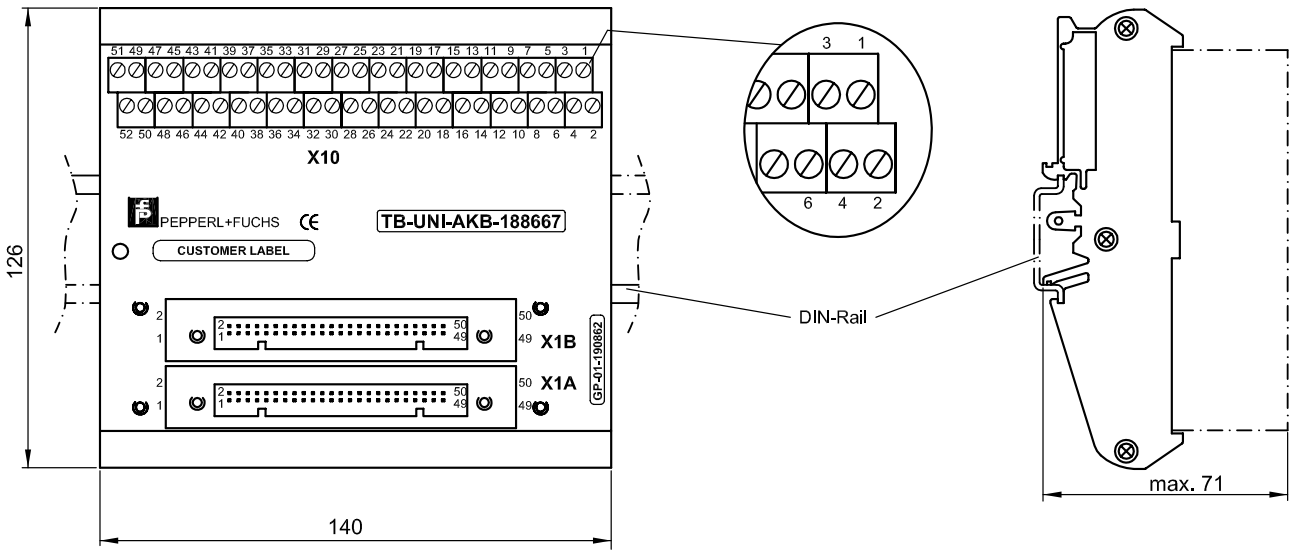
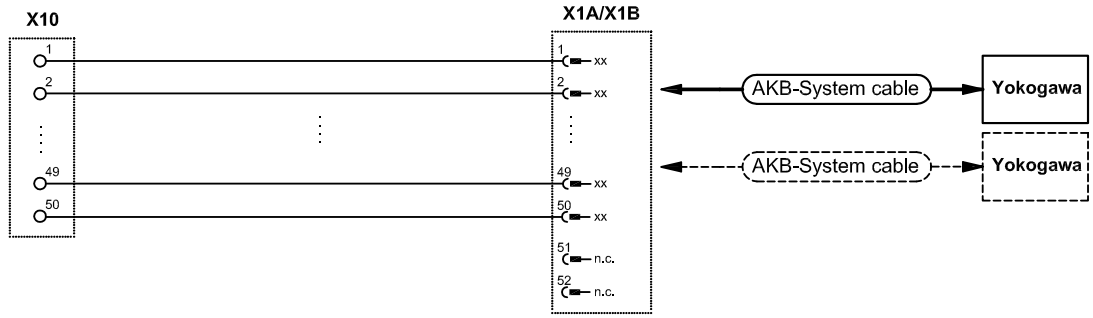


Technical Description	Connector	Signal
Field termination: X10	Screw terminal (max.1.5 mm²)	universal
System connector: X1A, X1B	50 pin male YO50	universal

Function:
Termination-**B**oard to connect to the Yokogawa CS 3000 R3 I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. The connections to/from the field (X10.xx) are screw terminals. The board is designed to be mounted on DIN-Rail (DIN EN5022).

Circuit diagram



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Pinning

X10	X1A/B YO	Note
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
7	7	
8	8	
9	9	
10	10	
11	11	
12	12	
13	13	
14	14	
15	15	
16	16	
17	17	
18	18	
19	19	
20	20	
21	21	
22	22	
23	23	
24	24	
25	25	

Pinning

X10	X1A/B YO	Note
26	26	
27	27	
28	28	
29	29	
30	30	
31	31	
32	32	
33	33	
34	34	
35	35	
36	36	
37	37	
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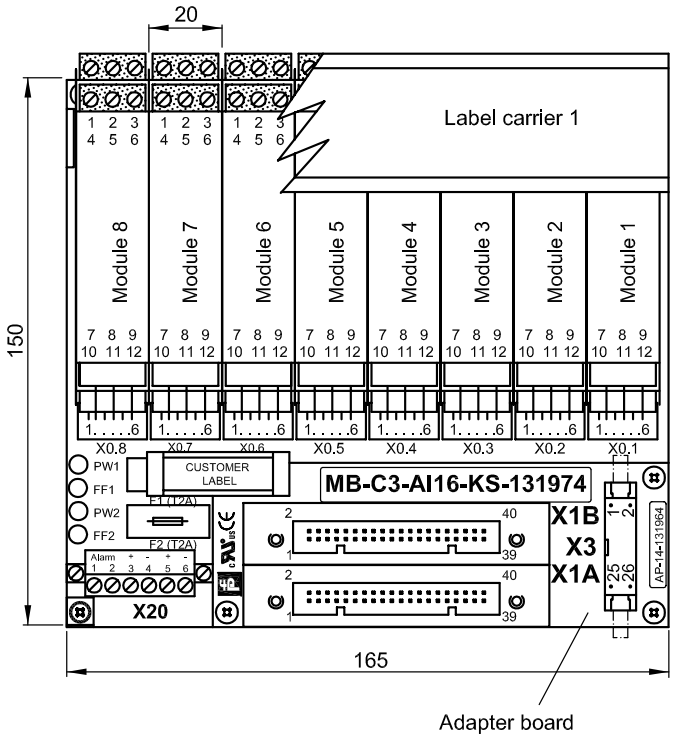

Name	Note	Part.No.:
X1A, X1B	40 pin male system connector YO40 (for KS system cable)	----
X3	26 pin HART connector male	----
KFD0-LC1-8M	Label carrier 1 (option, to order separate)	99143
X0.1 ... 8	6 pin male terminals for cable tree FSY	----
X20.1 ... 6	Screw terminals (0.2 mm² ... 2.5 mm²)	----
X20.1; X20.2	Alarm (Relay contact max. 30V AC, 40 V DC, 2 A)	----
X20.3 ... 6	Redundant power feed 24 V DC (21 V .. 30 V) (3/4 = PW1/L+/L-) (5/6 = PW2/L+/L-)	----
F1, F2	Fuse (5 mm x 20 mm/T2 A)	----
PW1, PW2, FF1, FF2	LEDs for power and power failure	----

Motherboards name and part numbers according installed KF- module type					
KF-Module type (function)		Motherboard without KF-Module	KF-Module type (function)		Motherboard without KF-Module
Type	F.	Name	Type	F.	Name
KFD2-STC4-Ex2	AI	MB-C3-AI16-KS-131974	----	-	----

Yokogawa Centum CS3000 R3 Analog Input Type AAI141 / AAI143
Yokogawa I/O module must be set in 4-wire mode

The equivalent non I.S. barrier devices may also be used

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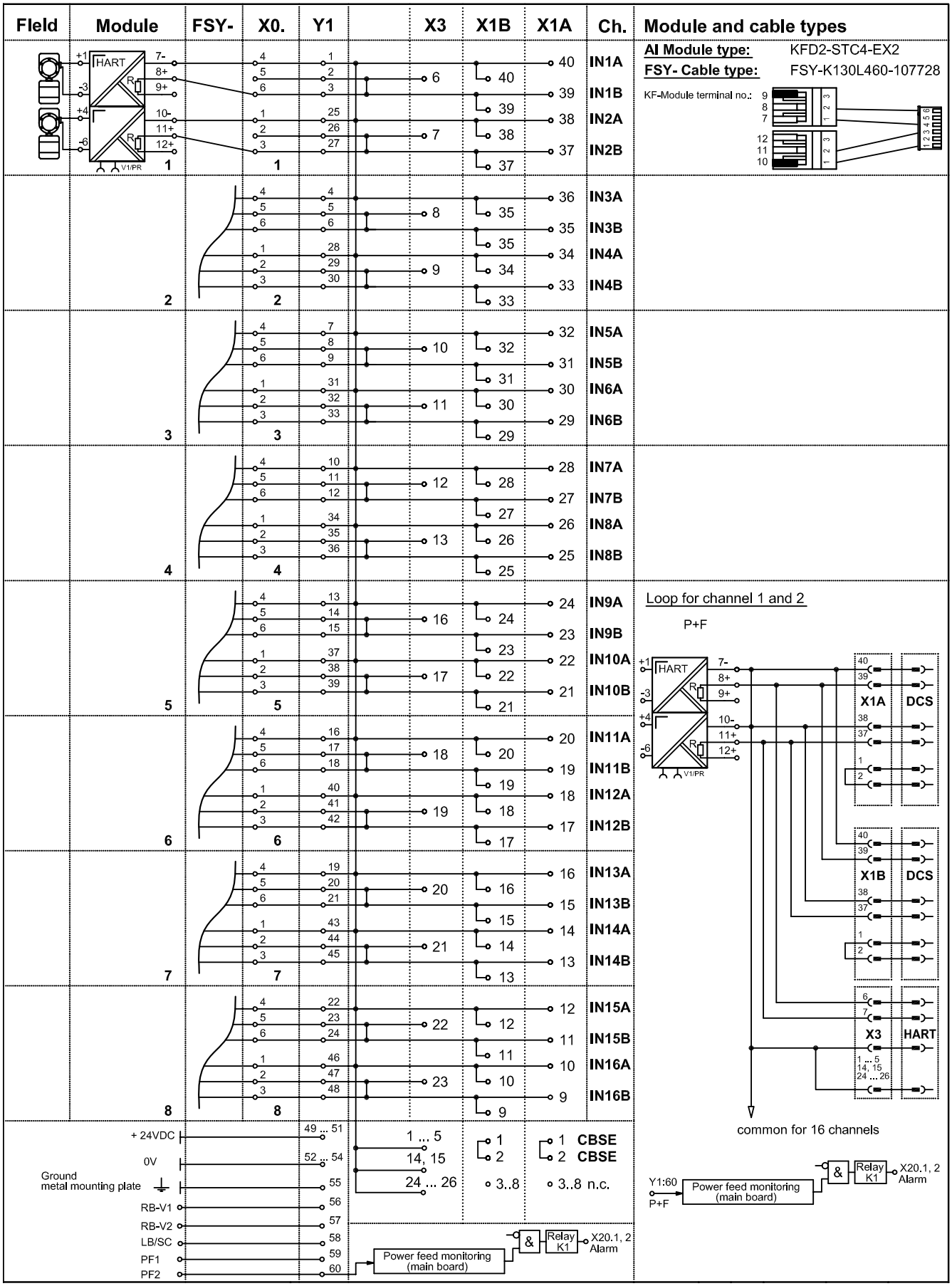

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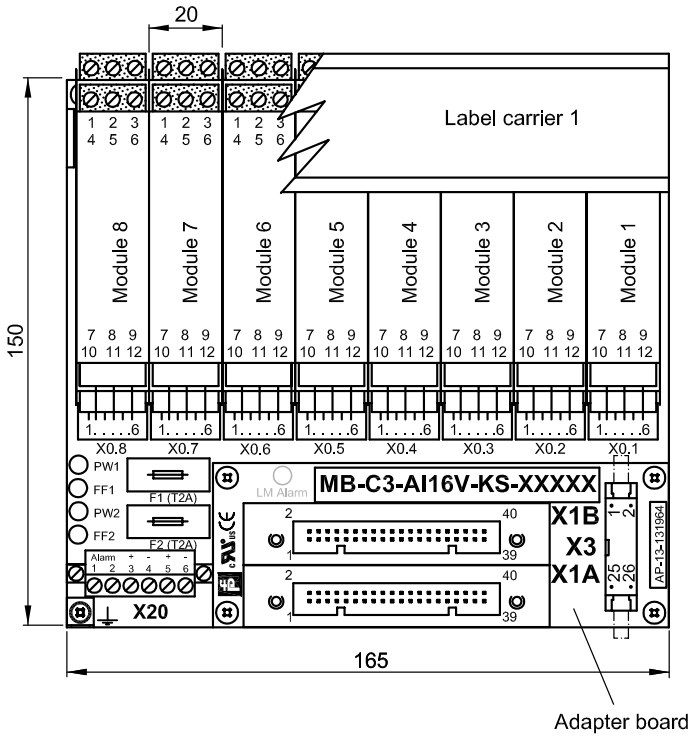

Name	Note	Part.No.:
X1A, X1B	40 pin male system connector YO40 (for KS system cable)	----
X3	26 pin HART connector male	----
KFD0-LC1-8M	Label carrier 1 (option, to order separate)	99143
X0.1 ... 8	6 pin male terminals for cable tree FSY	----
X20.1 ... 6	Screw terminals (0.2 mm² ... 2.5 mm²)	----
X20.1; X20.2	Alarm (Relay contact max. 30V AC, 40 V DC, 2 A)	----
X20.3 ... 6	Redundant power feed 24 V DC (21 V .. 30 V) (3/4 = PW1/L+/L-) (5/6 = PW2/L+/L-)	----
F1, F2	Fuse (5 mm x 20 mm/T2 A)	----
PW1, PW2, FF1, FF2	LEDs for power and power failure	----

Motherboards name and part numbers according installed KF- module type					
KF-Module type (function)		Motherboard without KF-Module	KF-Module type (function)		Motherboard without KF-Module
Type	F.	Name	Type	F.	Name
KFD2-STC4-Ex2	AI	MB-C3-AI16V-KS-131963	----	-	----
KFD2-UT2-Ex2 *)	AI		----	--	----

Yokogawa Centum CS1 Analog Input Type AMM12C
Yokogawa Centum CS3000 R3 Analog Input Type AAV141

*) No HART communication

The equivalent non I.S. barrier devices may also be used

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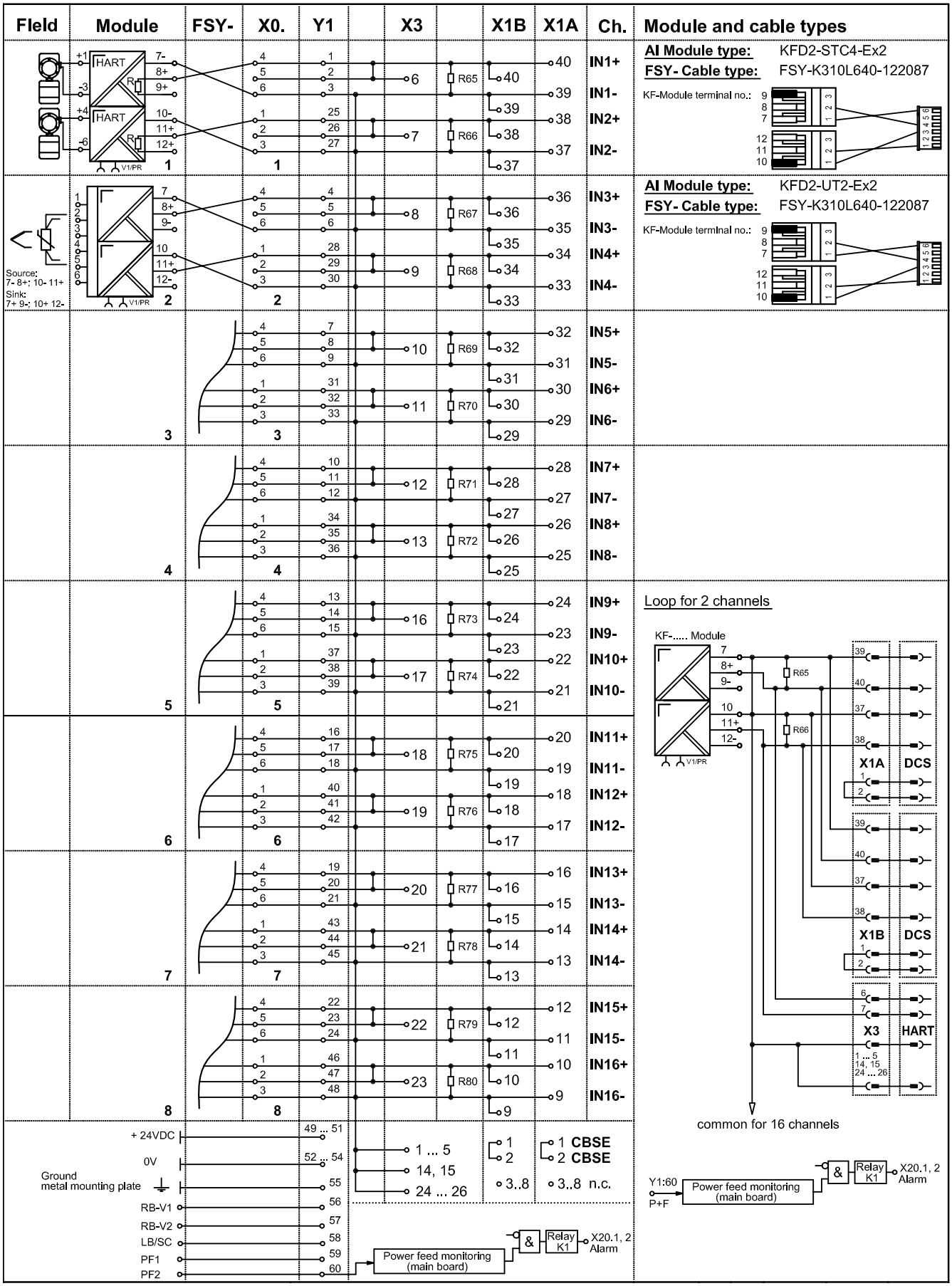

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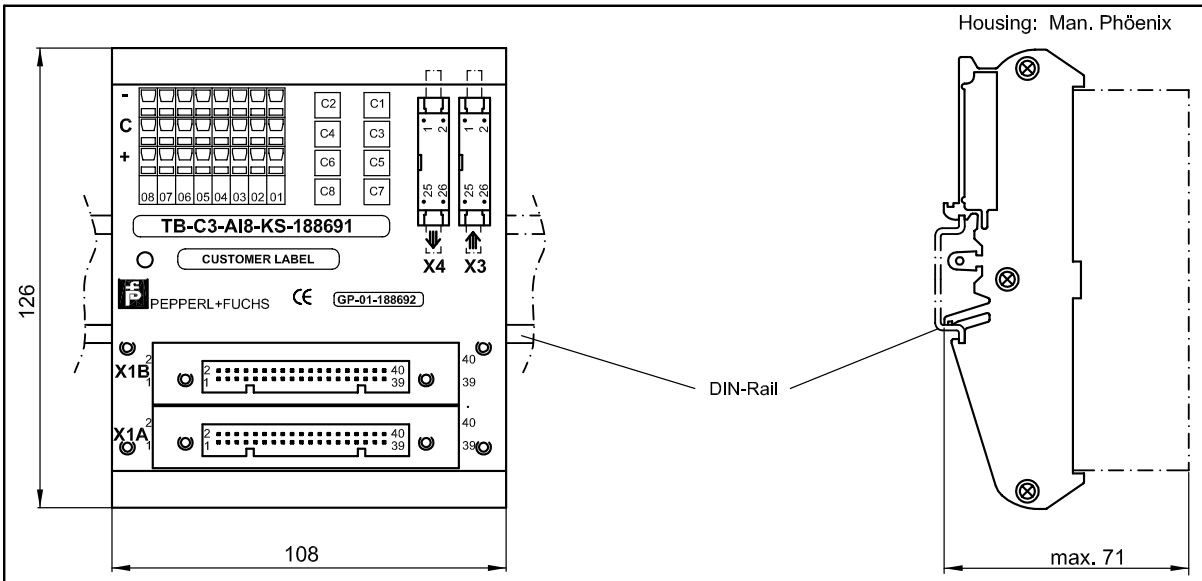
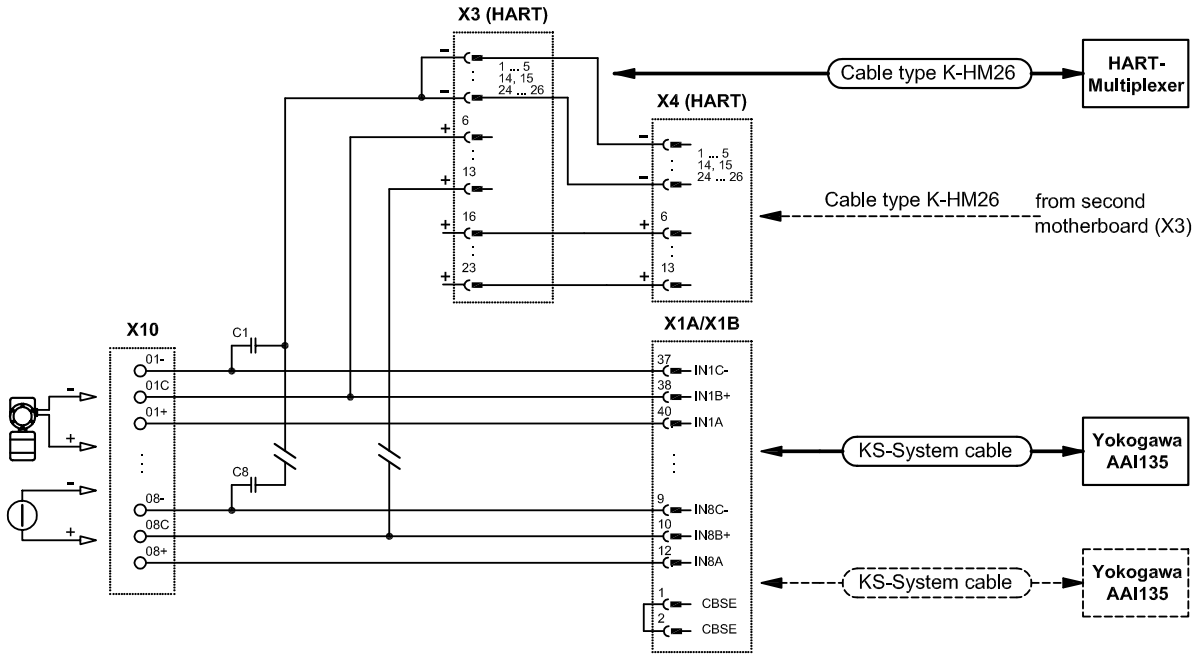


Technical Description		
Field termination: X10	Pressure clamp	AI (4 ... 20 mA)
System connector: X1A, X1B	40 pin male YO40	AI (4 ... 20 mA)
Connector HART-Mux: X3, X4	26 pin HART connector	HART-communication

Function: Termination-Board to connect to the Yokogawa CS 3000 R3 I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. Two system connectors in parallel allow for redundant applications. The connections to/from the field are screw terminals X10. A HART connector X3 (8 channels intern) and X4 (8 channels extern), in parallel with the system connector, links to the Pepperl+Fuchs HART multiplexer via a ribbon cable type K-HM26. The board is designed to be mounted vertically on DIN-Rail (DIN EN 5022).

Circuit diagram



Note: For pulse input module AAP135 also

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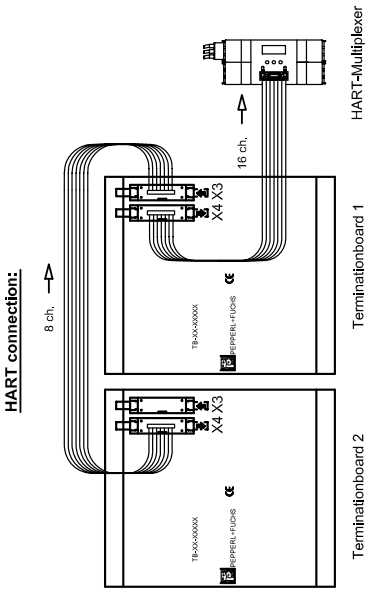
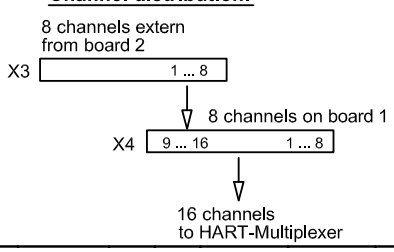
Channels 1 ... 8

Field	X10	X3	X4	X1A/B YO	Ch.
1	-, C, +	C1	6	37, 38, 40	IN1C-, IN1B+, IN1A
2	-, C, +	C2	7	33, 34, 36	IN2C-, IN2B+, IN2A
3	-, C, +	C3	8	29, 30, 32	IN3C-, IN3B+, IN3A
4	-, C, +	C4	9	25, 26, 28	IN4C-, IN4B+, IN4A
5	-, C, +	C5	10	21, 22, 24	IN5C-, IN5B+, IN5A
6	-, C, +	C6	11	17, 18, 20	IN6C-, IN6B+, IN6A
7	-, C, +	C7	12	13, 14, 16	IN7C-, IN7B+, IN7A
8	-, C, +	C8	13	9, 10, 12	IN8C-, IN8B+, IN8A
		1 ... 5	1 ... 5	1	CBSE
		14, 15	14, 15	2	CBSE
		24 ... 26	24 ... 26		
		16	6		
		17	7		
		18	8		
		19	9		
		20	10		
		21	11		
		22	12		
		23	13		



Channel distribution:



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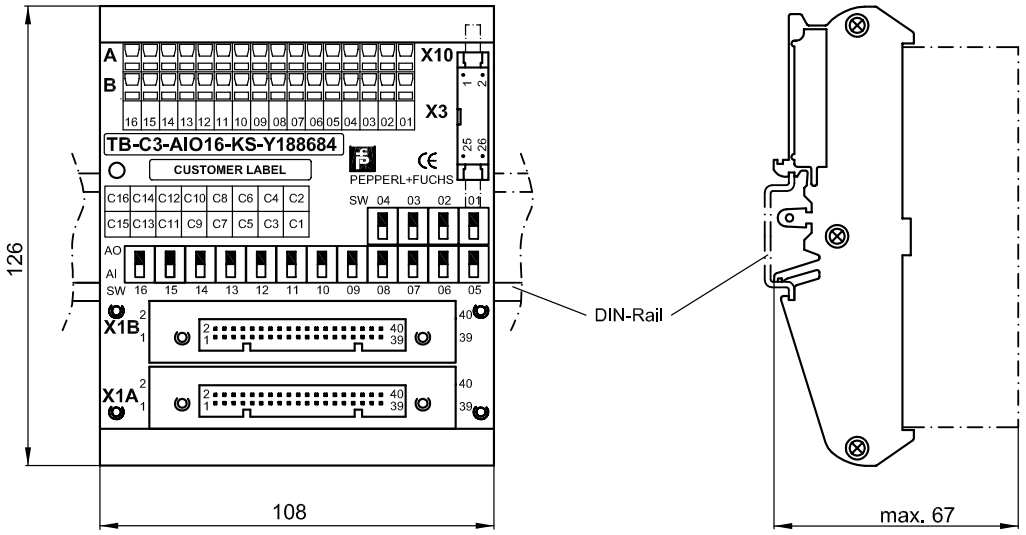
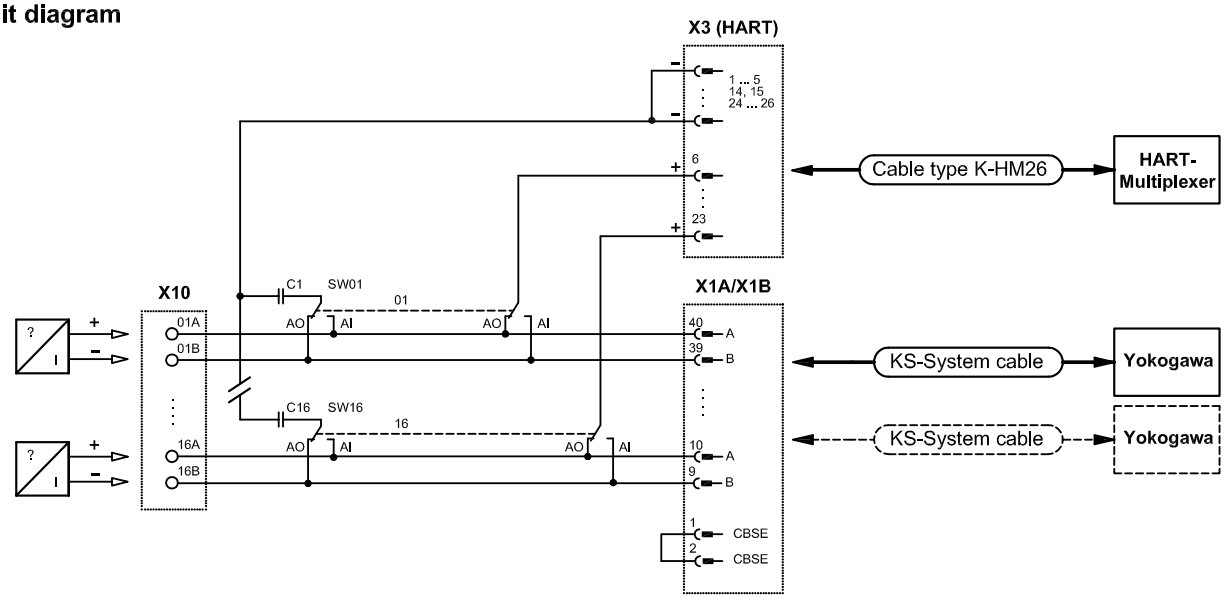


For card AAI543 set switch 01 ... 16: Pos. AO (delivery position)
For card AAV141/143 set switch 01 ... 16: Pos. AO (HART connector will be not used!)
For card AAI141 / AAI143 set switch 01 ... 16: Pos. AI
For card AAI841 set switch 01 ... 08: Pos. AI and switch 09 ... 16: Pos. AO
For card AAB841 set switch 01 ... 16: Pos. AO

Technical Description	Connector	Signal
Field termination: X10	Pressure clamp terminal	AIO
System connector: X1A, X1B	40 pin male YO40	AIO
Connector HART-Mux: X3	26 pin HART connector	HART-communication
Switch: SW01...SW16	max. switch current: 30mA; max. constant current: 2A	

Function: Termination-Board to connect to the Yokogawa CS 3000 R3 I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. Two system connectors in parallel allow for redundant applications. The connections X10 to/from the field are clamp terminals. A HART connector X3, in parallel with the system connector, links to the Pepperl+Fuchs HART multiplexer via a ribbon cable type K-HM26. The board is designed to be mounted on DIN-Rail (DIN EN 5022).

Circuit diagram



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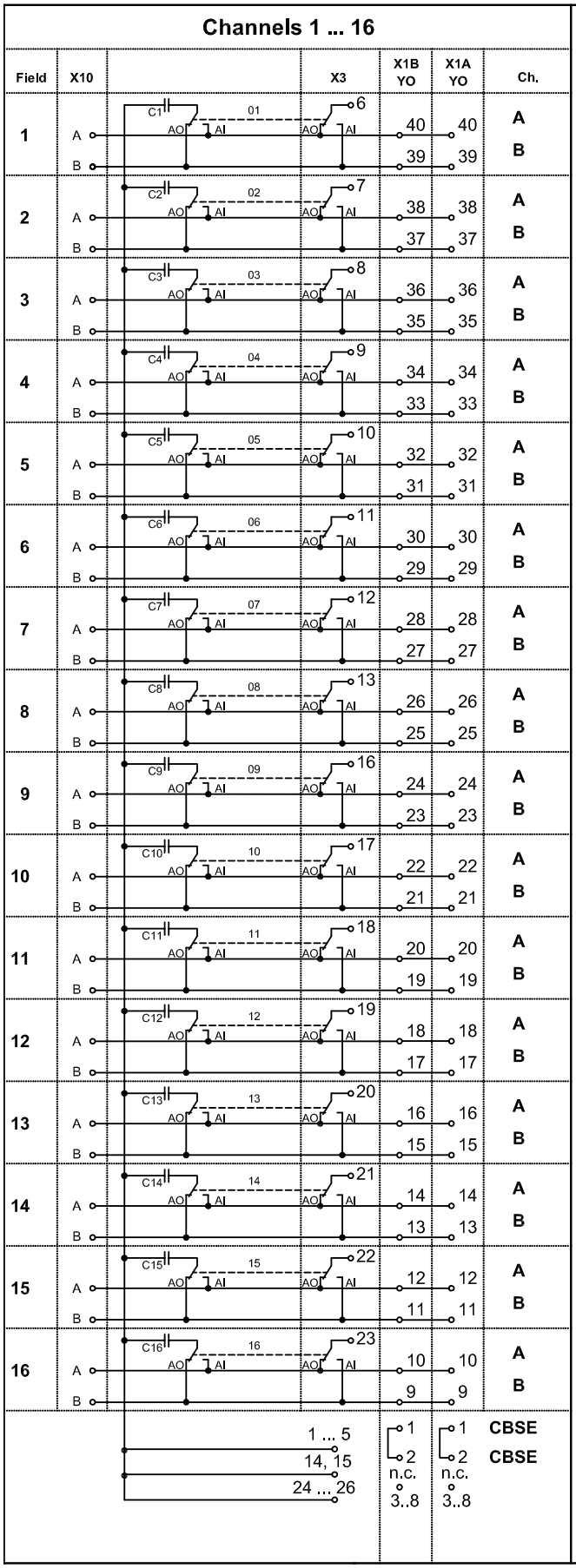
Channels 1 ... 16



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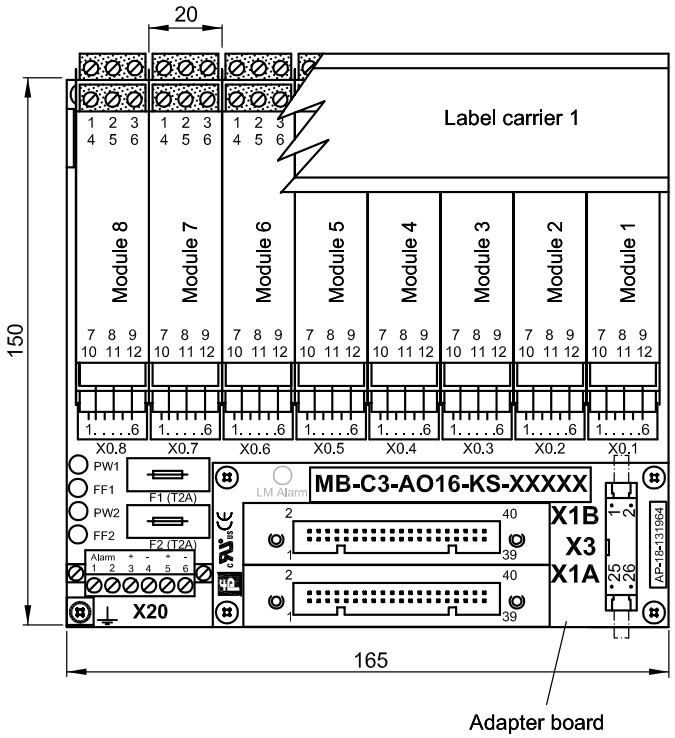

Name	Note	Part.No.:
X1A, X1B	40 pin male system connector YO40 (for KS system cable)	----
X3	26 pin HART connector male	----
KFD0-LC1-8M	Label carrier 1 (option, to order separate)	99143
X0.1 ... 8	6 pin male terminals for cable tree FSY	----
X20.1 ... 6	Screw terminals (0.2 mm² ... 2.5 mm²)	----
X20.1; X20.2	Power/LM Alarm (Relay contact max. 30V AC, 40 V DC, 2 A)	----
X20.3 ... 6	Redundant power feed 24 V DC (21 V .. 30 V) (3/4 = PW1/L+/L-) (5/6 = PW2/L+/L-)	----
F1, F2	Fuse (5 mm x 20 mm/T2 A)	----
PW1, PW2, FF1, FF2	LEDs for power and power failure	----

Motherboards name and part numbers accordIng Installed KF- module type					
KF-Module type (function)		Motherboard without KF-Module	KF-Module type (function)		Motherboard without KF-Module
Type	F.	Name	Type	F.	Name
KFD2-SCD2-Ex2.LK	AO	MB-C3-AO16-KS-185976			

Yokogawa Centum CS3000 R3 Analog Output Type AAI543

The equivalent non I.S. barrier devices may also be used

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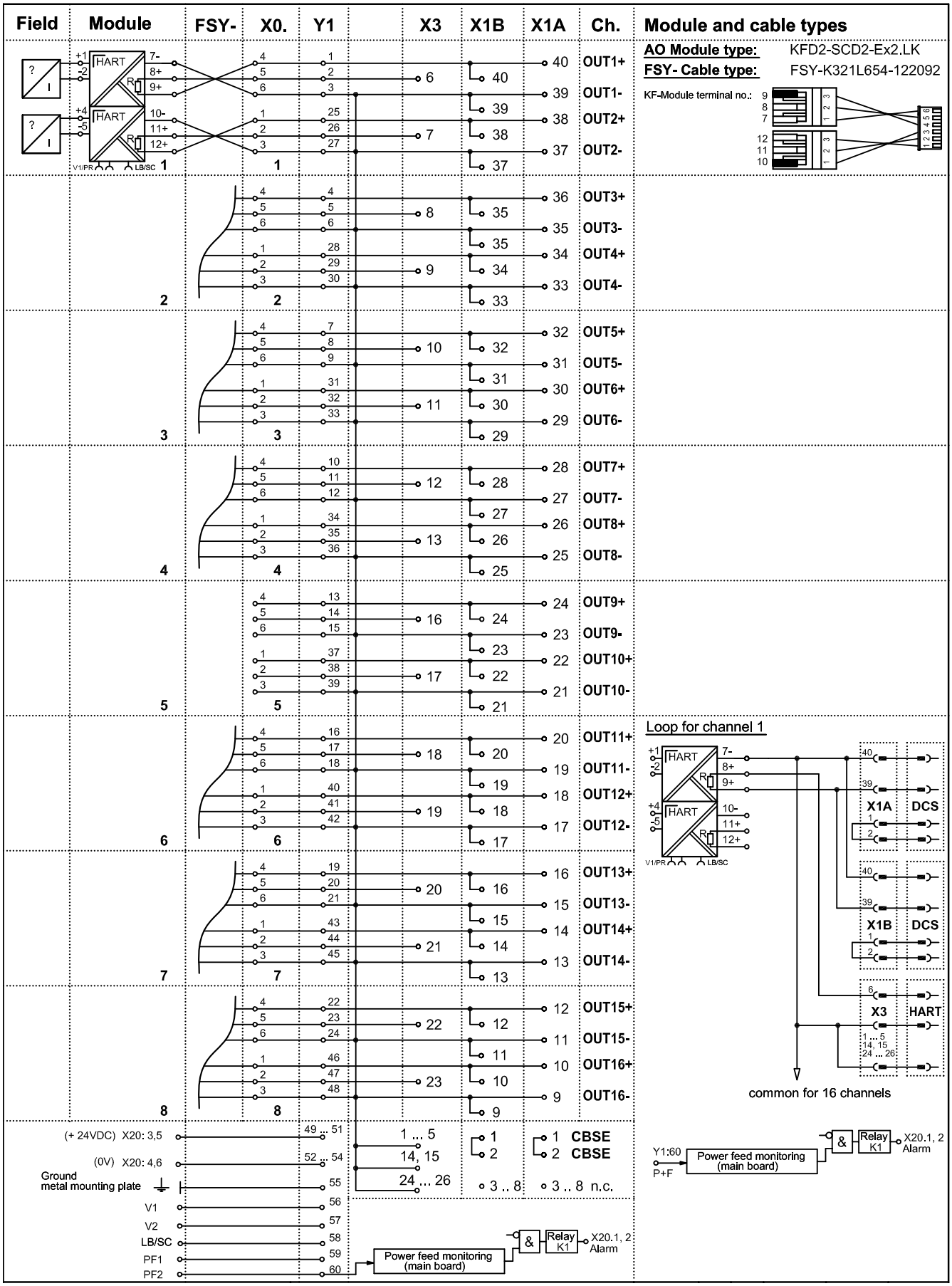

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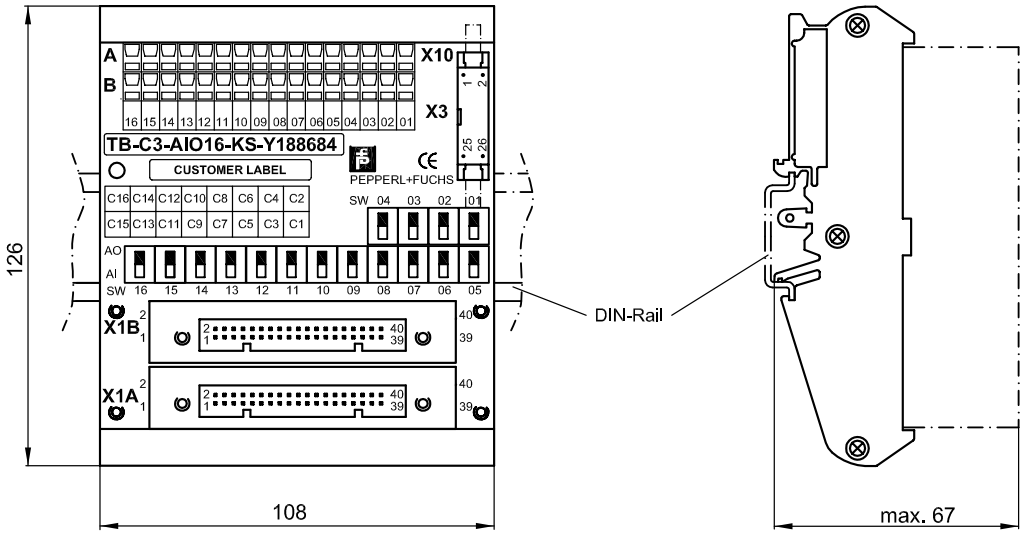
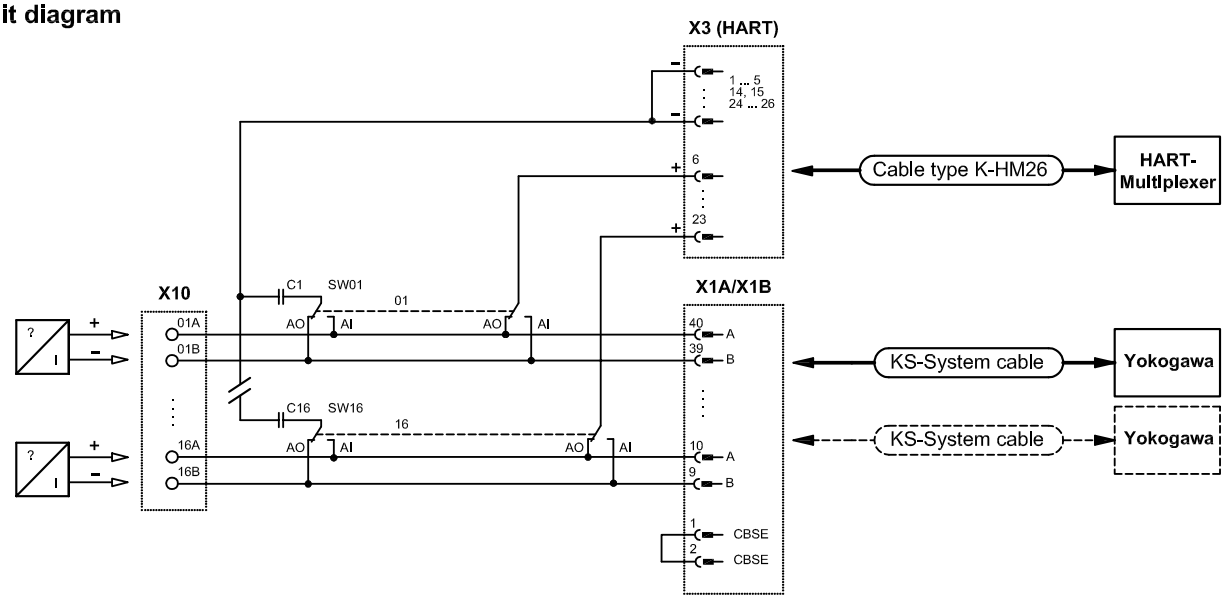


For card AAI543 set switch 01 ... 16: Pos. AO (delivery position)
For card AAV141/143 set switch 01 ... 16: Pos. AO (HART connector will be not used!)
For card AAI141 / AAI143 set switch 01 ... 16: Pos. AI
For card AAI841 set switch 01 ... 08: Pos. AI and switch 09 ... 16: Pos. AO
For card AAB841 set switch 01 ... 16: Pos. AO

Technical Description	Connector	Signal
Field termination: X10	Pressure clamp terminal	AIO
System connector: X1A, X1B	40 pin male YO40	AIO
Connector HART-Mux: X3	26 pin HART connector	HART-communication
Switch: SW01...SW16	max. switch current: 30mA; max. constant current: 2A	

Function: Termination-Board to connect to the Yokogawa CS 3000 R3 I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. Two system connectors in parallel allow for redundant applications. The connections X10 to/from the field are clamp terminals. A HART connector X3, in parallel with the system connector, links to the Pepperl+Fuchs HART multiplexer via a ribbon cable type K-HM26. The board is designed to be mounted on DIN-Rail (DIN EN 5022).

Circuit diagram



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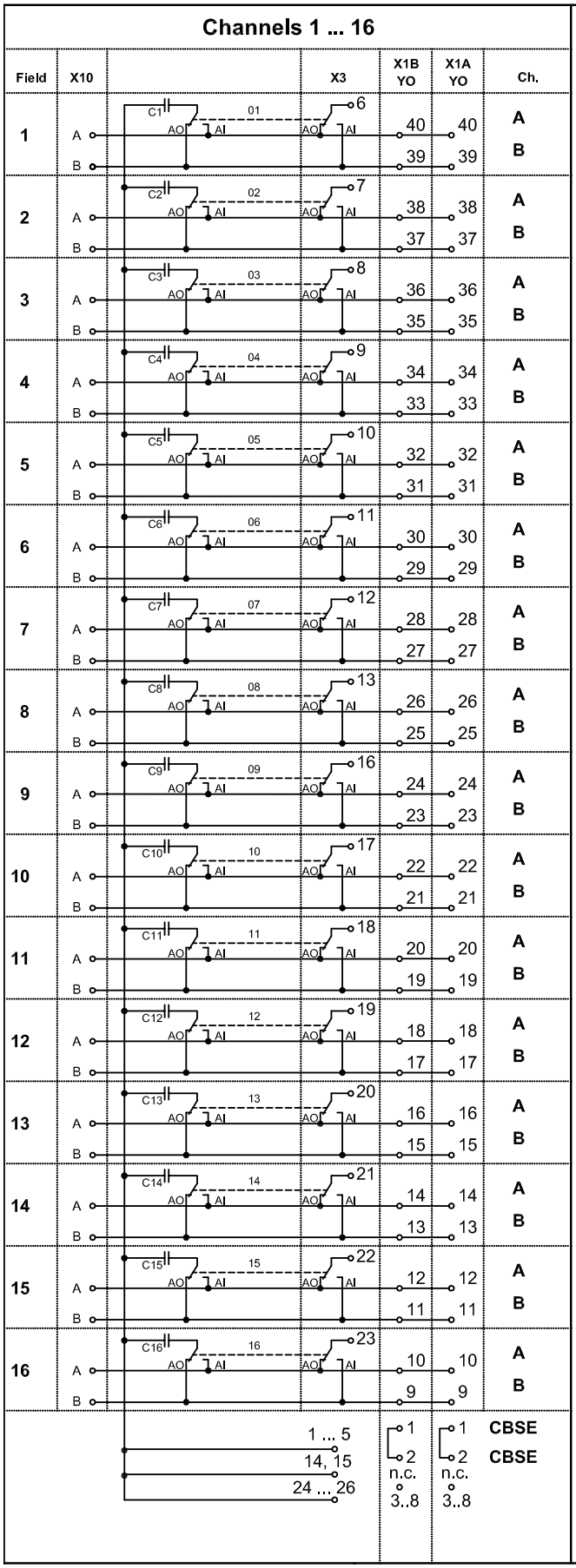
Channels 1 ... 16



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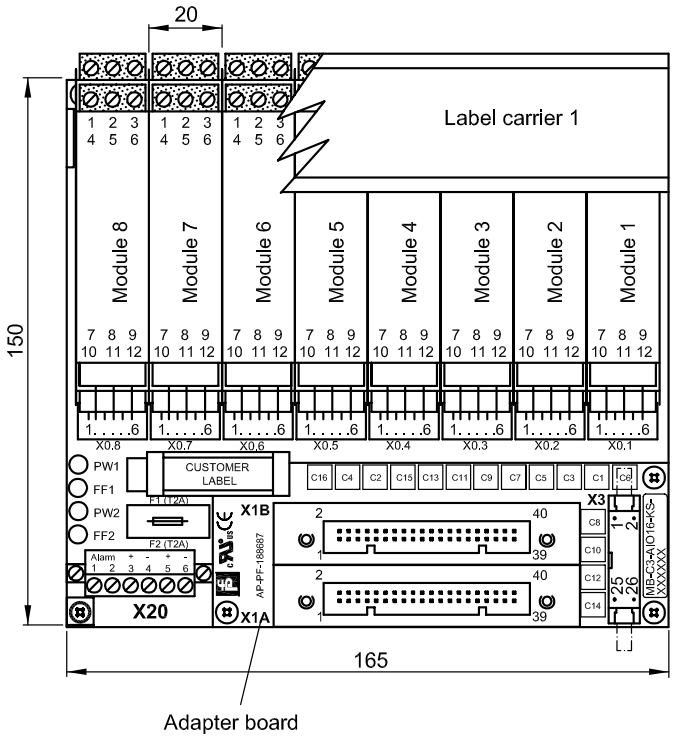

Name	Note	Part.No.:
X1A, X1B	40 pin male system connector YO40 (for KS system cable)	----
X3	26 pin HART connector male	----
KFD0-LC1-8M	Label carrier 1 (option, to order separate)	99143
X0.1 ... 8	6 pin male terminals for cable tree FSY	----
X20.1 ... 6	Screw terminals (0.2 mm² ... 2.5 mm²)	----
X20.1; X20.2	Alarm (Relay contact max. 30V AC, 40 V DC, 2 A)	----
X20.3 ... 6	Redundant power feed 24 V DC (21 V .. 30 V) (3/4 = PW1/L+/L-) (5/6 = PW2/L+/L-)	----
F1, F2	Fuse (5 mm x 20 mm/T2 A)	----
PW1, PW2, FF1, FF2	LEDs for power and power failure	----

Motherboards name and part numbers according installed KF- module type					
KF-Module type (function)		Motherboard without KF-Module	KF-Module type (function)		Motherboard without KF-Module
Type	F.	Name	Type	F.	Name
KFD2-STC4-Ex2	AI	MB-C3-AIO16-KS-188686			
KFD2-SCD2-Ex2.LK	AO				

Yokogawa Centum CS3000 R3 Analog In- Output Type AAI841

Module 1 ... 4: Analog Input
Module 5 ... 8: Analog Output

Note: Input channels of AAI841 must be setted in 4-wire mode

The equivalent non I.S. barrier devices may also be used

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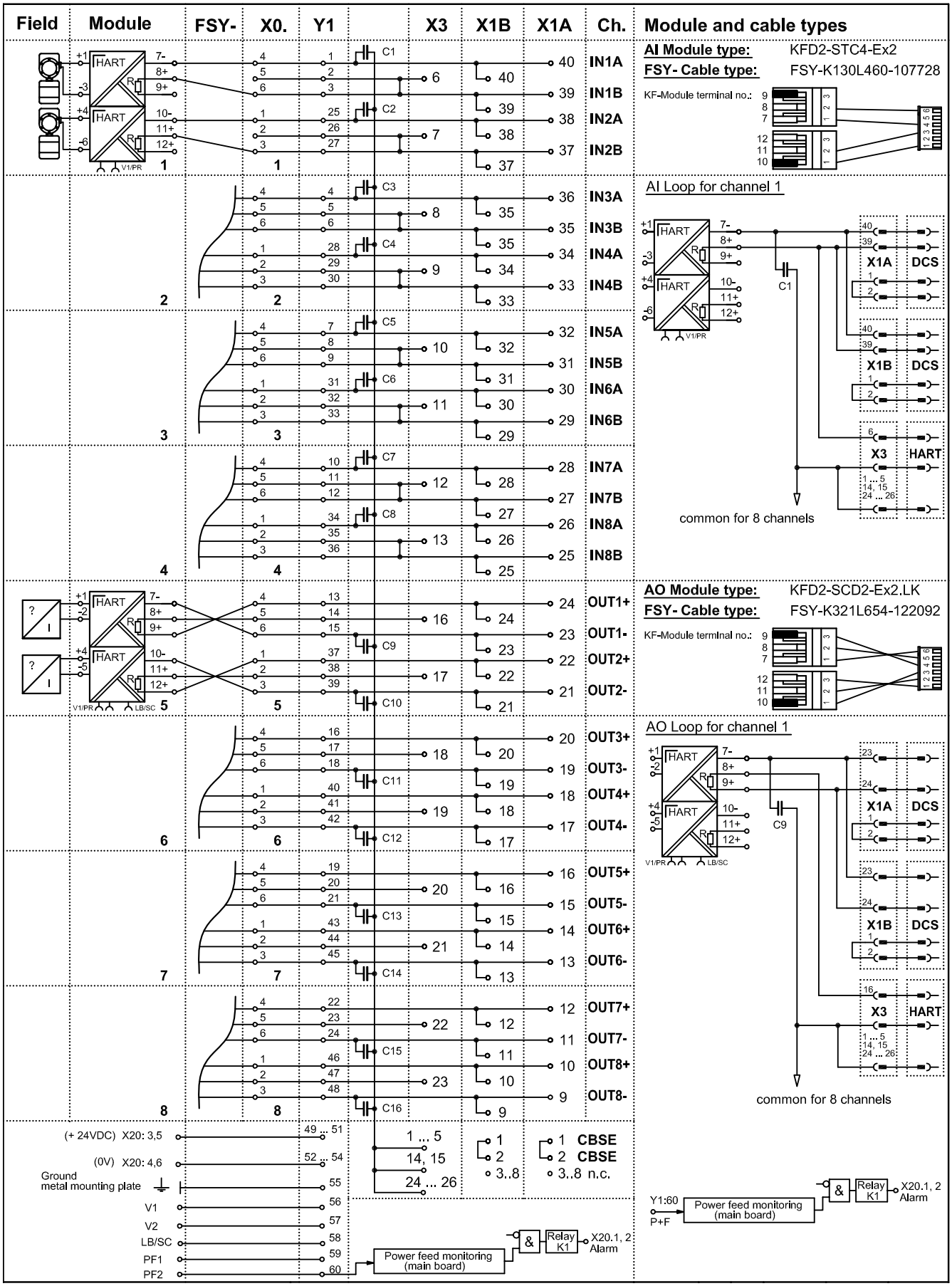

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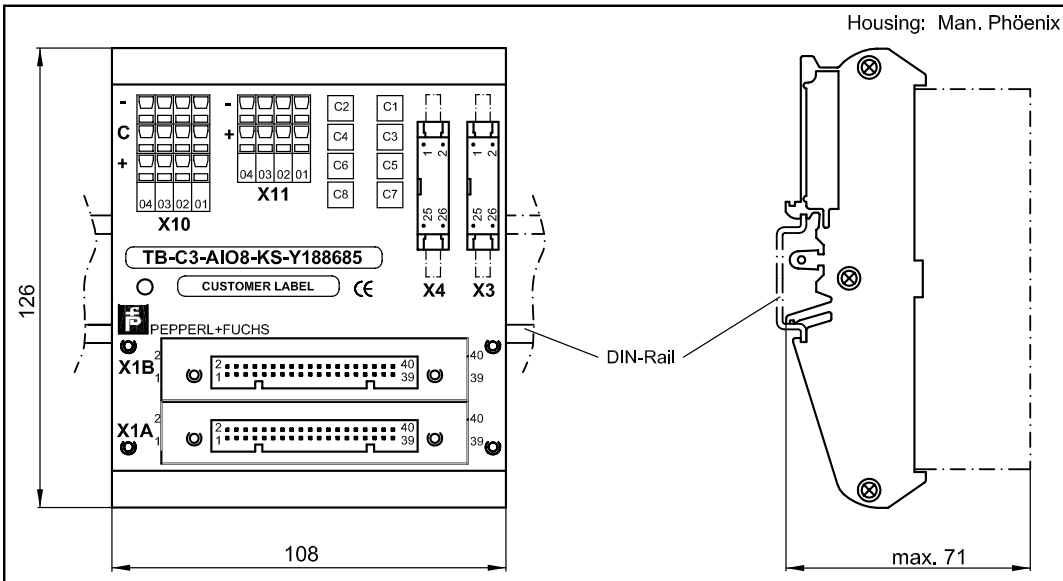
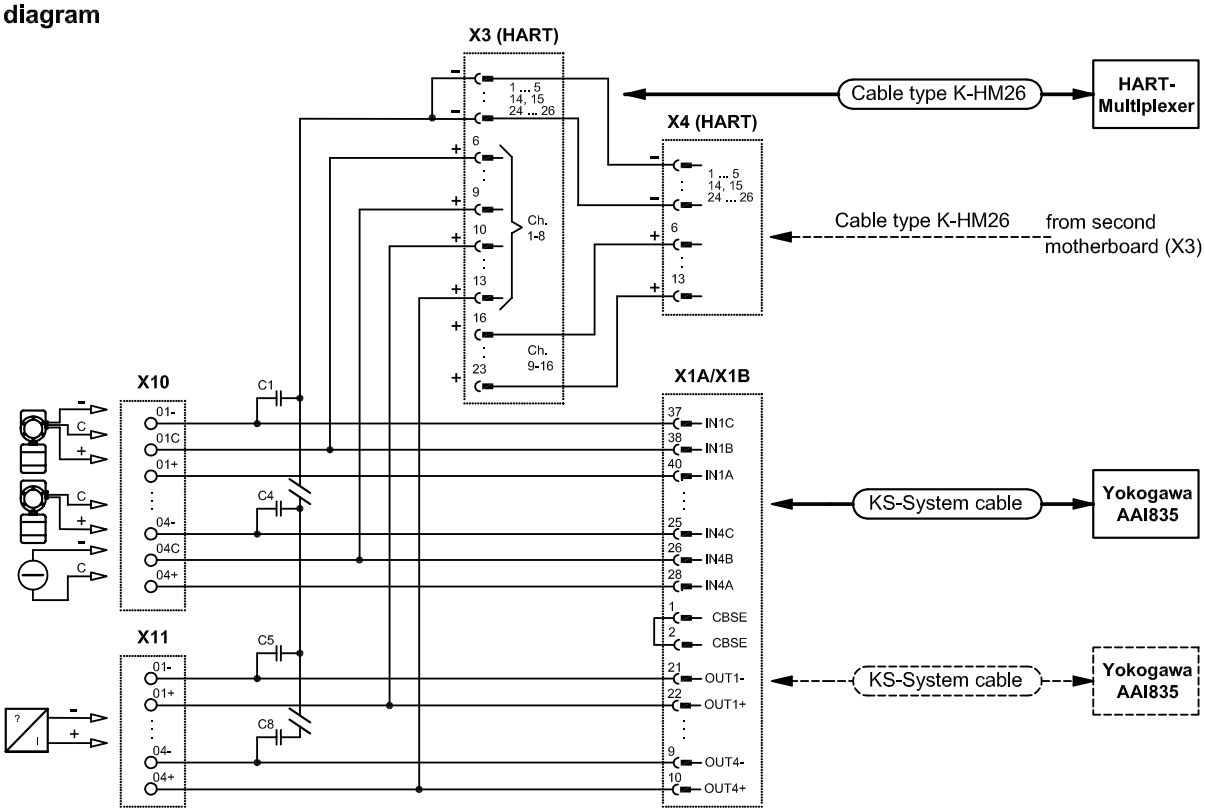


Technical Description		
Field termination: X10, X11	Pressure clamp	AI/AO
System connector: X1A, X1B	40 pin male YO40	AI/AO
Connector HART-Mux: X3, X4	26 pin HART connector	HART-communication
Max. current / channel		2A

Function: Termination-**B**oard to connect to the Yokogawa CS 3000 R3 I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. Two system connectors in parallel allow for redundant applications. The connections to/from the field are screw terminals X10, X11. A HART connector X3 (8 channels intern) and X4 (8 channels extern), in parallel with the system connector, links to the Pepperl+Fuchs HART multiplexer via a ribbon cable type K-HM26. The board is designed to be mounted vertically on DIN-Rail (DIN EN 5022).

Circuit diagram



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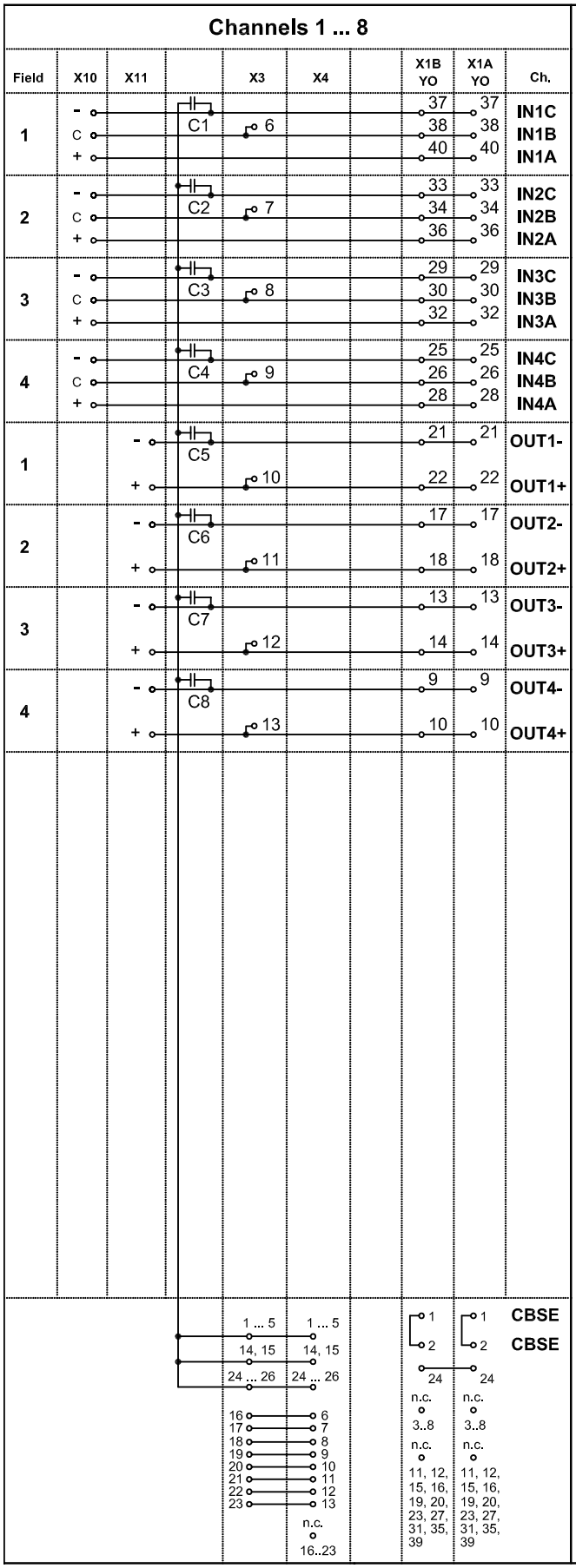

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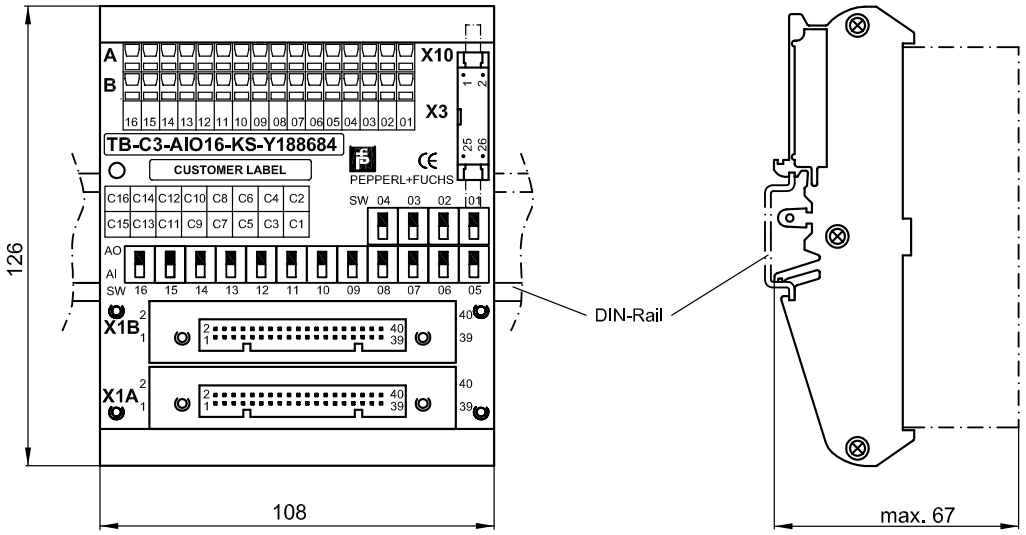
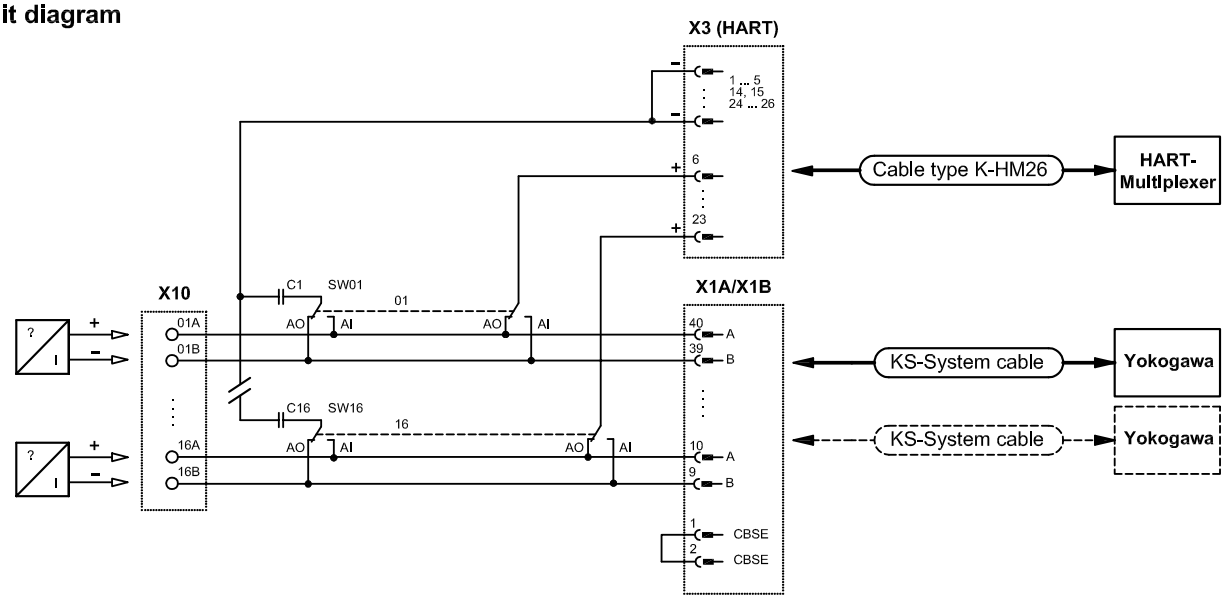


For card AAI543 set switch 01 ... 16: Pos. AO (delivery position)
For card AAV141/143 set switch 01 ... 16: Pos. AO (HART connector will be not used!)
For card AAI141 / AAI143 set switch 01 ... 16: Pos. AI
For card AAI841 set switch 01 ... 08: Pos. AI and switch 09 ... 16: Pos. AO
For card AAB841 set switch 01 ... 16: Pos. AO

Technical Description	Connector	Signal
Field termination: X10	Pressure clamp terminal	AIO
System connector: X1A, X1B	40 pin male YO40	AIO
Connector HART-Mux: X3	26 pin HART connector	HART-communication
Switch: SW01...SW16	max. switch current: 30mA; max. constant current: 2A	

Function: Termination-Board to connect to the Yokogawa CS 3000 R3 I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. Two system connectors in parallel allow for redundant applications. The connections X10 to/from the field are clamp terminals. A HART connector X3, in parallel with the system connector, links to the Pepperl+Fuchs HART multiplexer via a ribbon cable type K-HM26. The board is designed to be mounted on DIN-Rail (DIN EN 5022).

Circuit diagram



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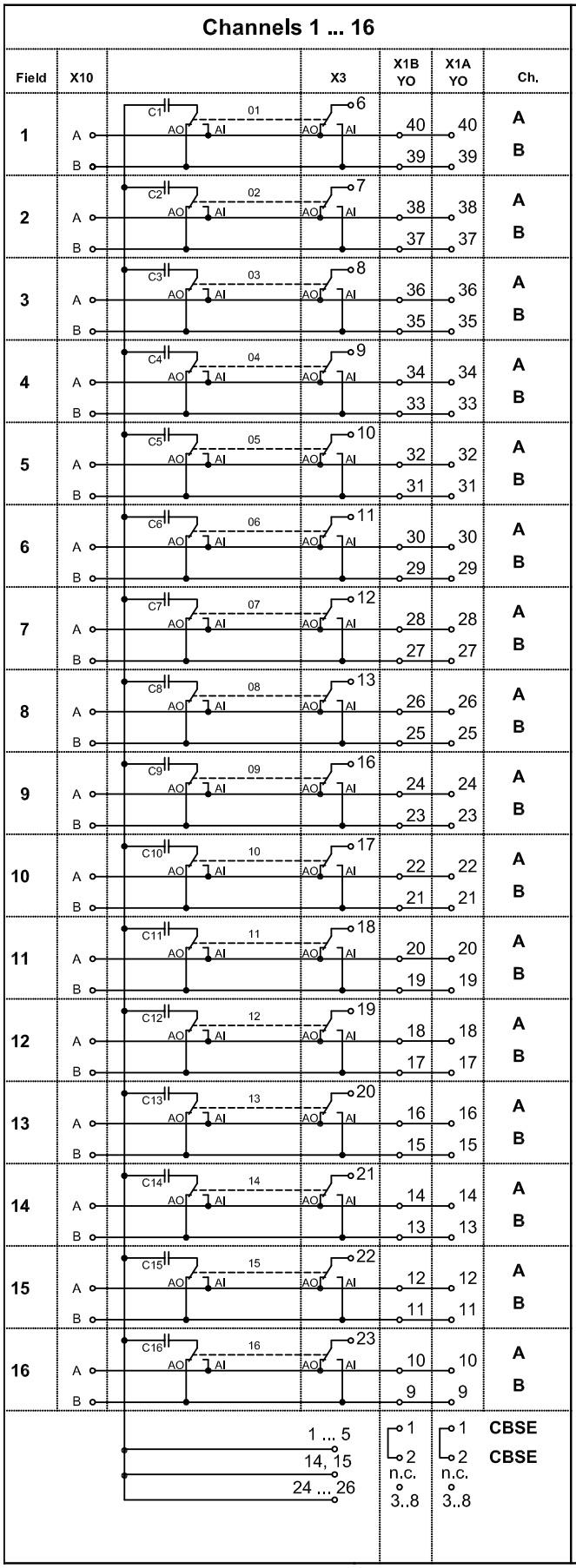
Channels 1 ... 16



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Termination Boards ProSafe RS

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Digital Inputs

Digital Outputs

Analog Inputs

Analog Outputs

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Digital Inputs

YOKOGAWA		Pepperl+Fuchs Board				Page	Pepperl+Fuchs Module		Page
I/O CARD CS3000-FIO	Channel	Class	Channel	Positions on Board	Type		Channel	Type	
SDV144	16	IS	16	8	MB-RS-DI16-AKB	60	2	KFD2-SR2-EX2.2S alternative KFD2-SOT2-EX2	97 98
SDV144	16	NIS	16	–	TB-RS-DI16-AKB	62	–	–	–

Digital Outputs

YOKOGAWA		Pepperl+Fuchs Board				Page	Pepperl+Fuchs Module		Page
I/O CARD CS3000-FIO	Channel	Class	Channel	Positions on Board	Type		Channel	Type	
SDV541	16	IS	16	16	MB-RS-S-DO16-AKB	66	1	KFD2-SD2-EX1.1045 alternative KFD2-SL2-EX1	99 100
SDV541	16	NIS	16	–	TB-RS-DO16-AKB	70	–	–	–
SDV531	8	NIS	8	–	TB-RS-DO8-AKB	74	–	–	–

Analog Inputs

YOKOGAWA		Pepperl+Fuchs Board				Page	Pepperl+Fuchs Module		Page
I/O CARD CS3000-FIO	Channel	Class	Channel	Positions on Board	Type		Channel	Type	
SAI143	16	IS	16	8	MB-RS-AI16-KS	78	2	KFD2-STC4-EX2	103
SAI143	16	NIS	16	–	TB-RS-AI16-KS	80	–	–	–
SAV144	16	IS	16	8	MB-RS-AI16V-KS	82	2	KFD2-STC4-EX2	103
SAV144	16	NIS	16	–	TB-RS-AI16V-KS	84	–	–	–

Analog Outputs

YOKOGAWA		Pepperl+Fuchs Board				Page	Pepperl+Fuchs Module		Page
I/O CARD CS3000-FIO	Channel	Class	Channel	Positions on Board	Type		Channel	Type	
SAI533	8	IS	8	8	MB-RS-S-AO8-KS	88	1	KFD2-SCD2-EX1.LK	105

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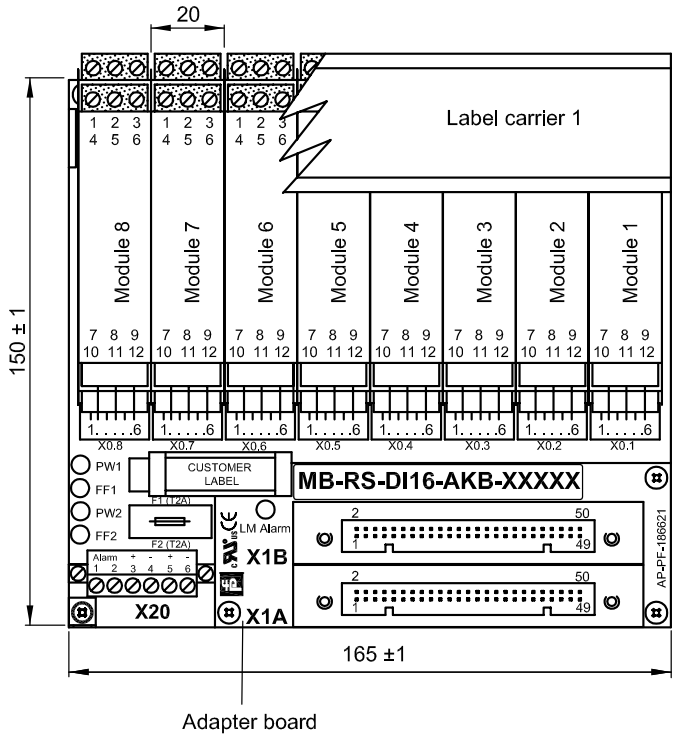

Name	Note	Part.No.:
X1A, X1B	50 pin male system connector YO50 (for AKB system cable)	----
KFD0-LC1-8M	Label carrier 1 (option, to order separate)	99143
X0.1 ... 8	6 pin male terminals for cable tree FSY	----
X20.1 ... 6	Screw terminals (0.2 mm² ... 2.5 mm²)	----
X20.1; X20.2	Alarm (Relay contact max. 30 V AC, 40 V DC, 2 A)	----
X20.3 ... 6	Redundant power feed 24 V DC (21 V .. 30 V) (3/4 = PW1/L+/L-) (5/6 = PW2/L+/L-)	----
F1, F2	Fuse (5 mm x 20 mm/T2 A)	----
PW1, PW2, FF1, FF2	LEDs for power and power failure	----
Power Rail	PR-03 (with 3 conductors)	----

Motherboards name and part numbers according installed KF- module type					
KF-Module type (function)		Motherboard without KF-Module	KF-Module type (function)		Motherboard without KF-Module
Type	F.	Name	Type	F.	Name
KFD2-SR2-Ex2.2S	DI	MB-RS-DI16-AKB-185842	----	-	----
KFD2-SOT2-Ex2 *)	DI		----	-	----

Yokogawa ProSafe-RS Digital Input Type SDV144

The equivalent non I.S. barrier devices may also be used

*) = Prefered module

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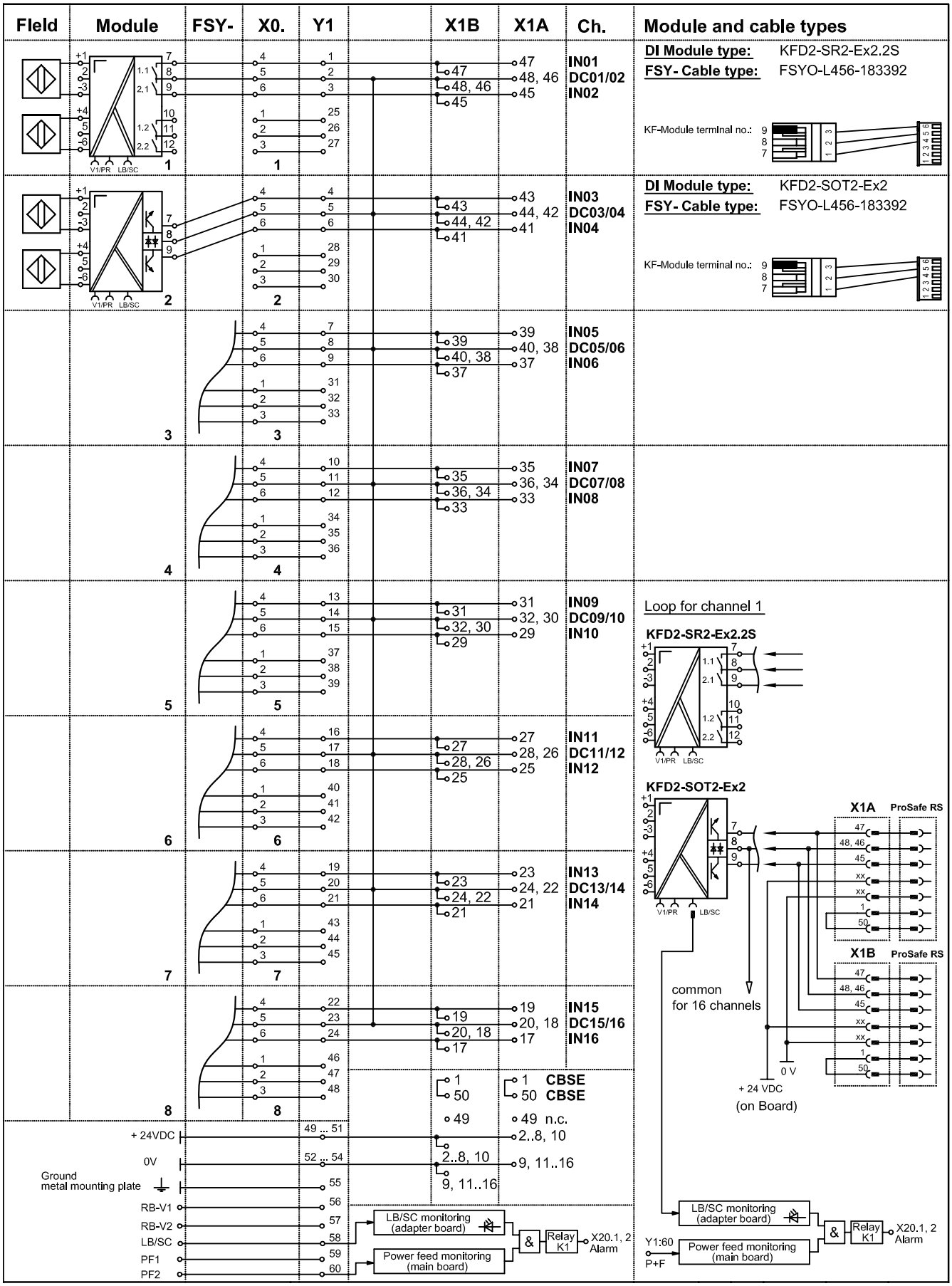

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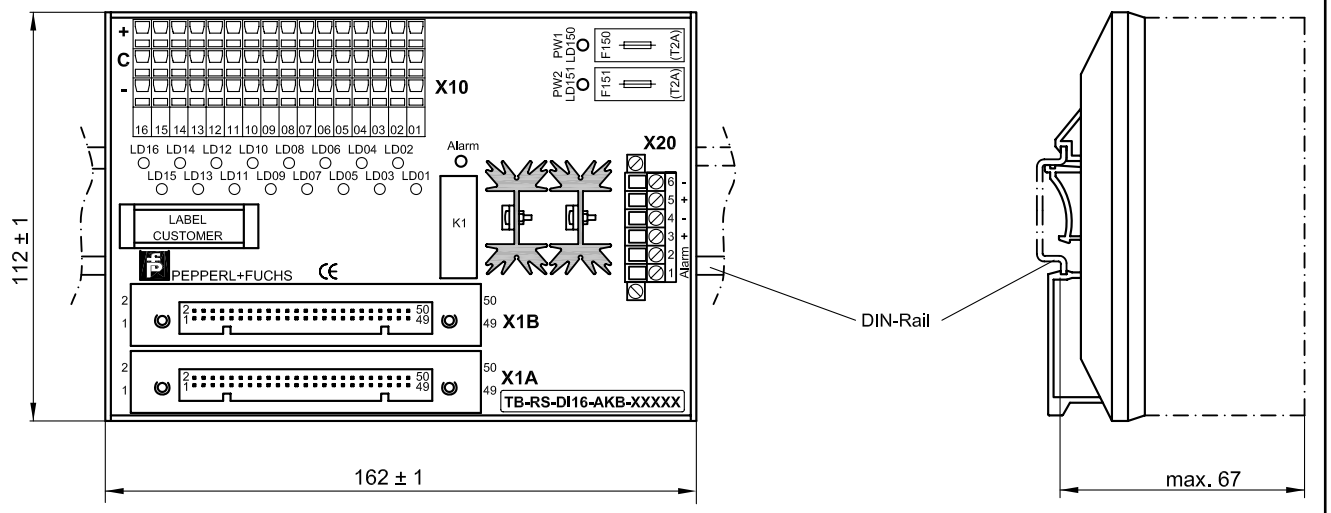


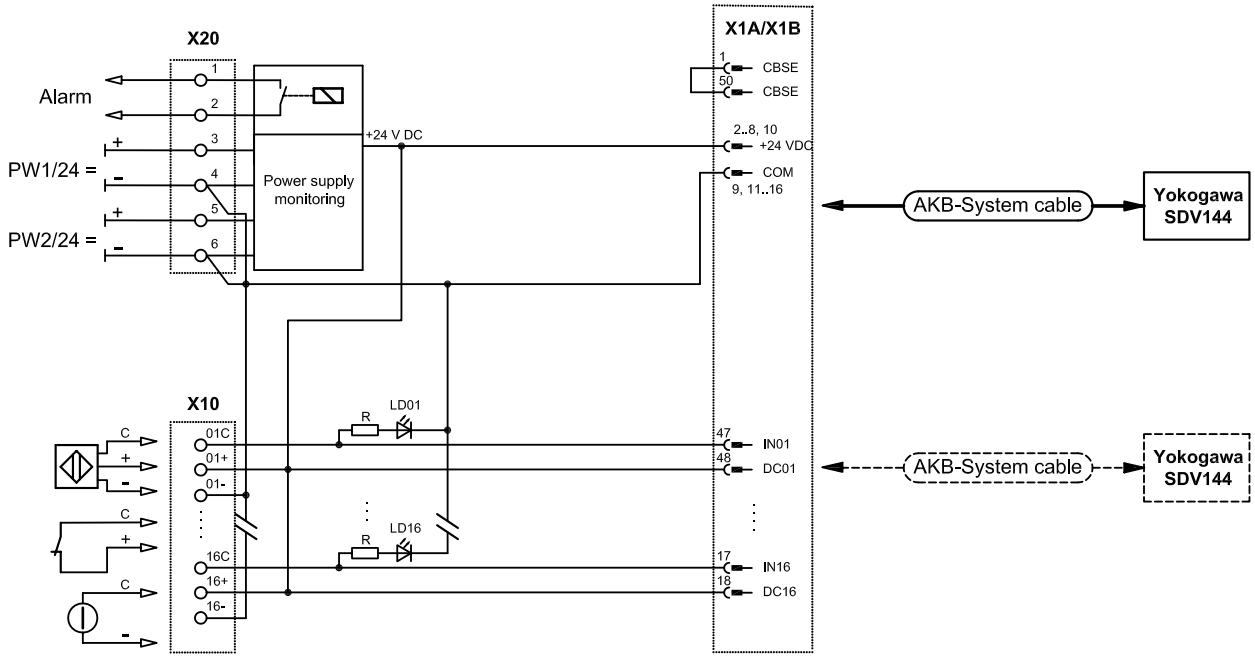
Technical Description

Field termination: X10	Pressure clamp terminal AWG 14...24	DI
System connector: X1A, X1B	50 pin YO50 AKB (331)	DI
Power feed: X20.3 ... 6	Redundant Power feed	24 V DC / max. 2 A
Alarm: X20.1, X20.2	Power Alarm	Relay contact max. 30 V AC, 40 V DC, 2 A
F150; 151	Power feed fuse	2 A
X20	6 pin screw terminal (removable)	Power feed terminal

Please note: If the SDV144 pulse diagnostic is on, the yellow LEDs with open input circuit are flashing.

Function: **T**ermination-**B**oard to connect to the Yokogawa ProSafe RS I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. Two system connectors in parallel allow for redundant applications. The connections to/from the field are pressure clamp terminals X10. The unit has a 24 V DC redundant power supply feed, monitored by a potential free relay contact. (X20. 1, 2) LED PW1, PW2 and Alarm indicate the actual power status. Following field devices are supported: 3-wire sensor, potential free contact, active voltage surce (see circuit diagram). Fuses are supervised and monitored by the Alarm relay. The board is designed to be mounted on DIN-Rail (DIN EN5022).

Circuit diagram



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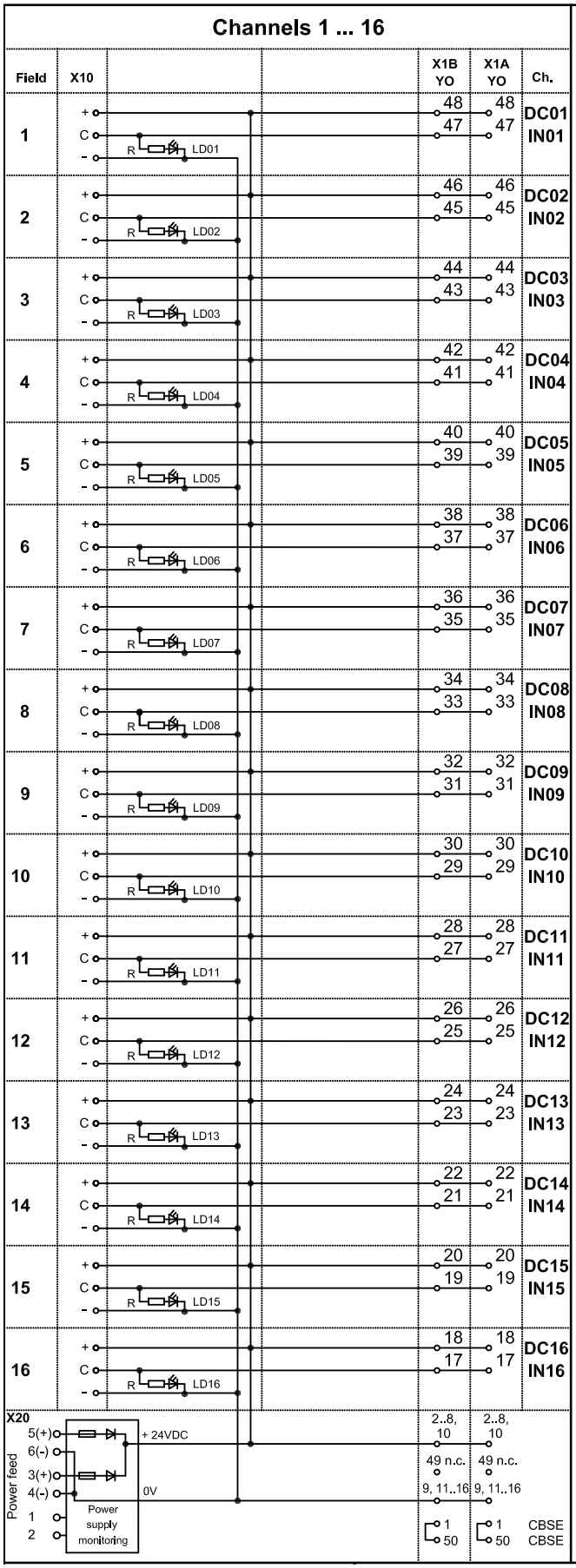

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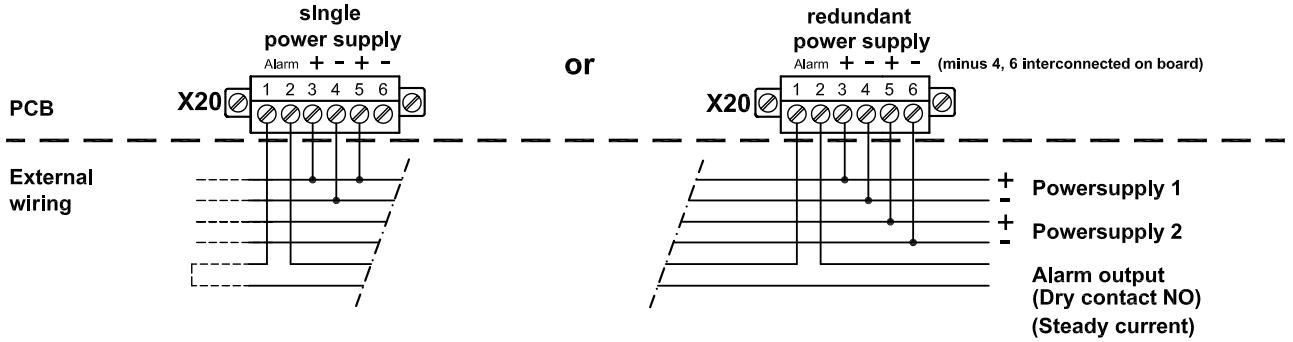
Connection power supply and error message (Alarm)



Alarm LD Indication and contact status

Power supply 1	Power supply 2	LD green	X20.1, X20.2 Alarm contact	LD red (Flashing)
PS **ON** and Fuse 150 **OK**	PS **ON** and Fuse 151 **OK**	LD150 **ON** LD151 **ON**	contact **closed**	LD135 **OFF**
PS **ON** and Fuse 150 **OK**	PS **OFF**	LD150 **ON** LD151 **OFF**	contact **open**	LD135 **ON**
PS **OFF**	PS **ON** and Fuse 151 **OK**	LD150 **OFF** LD151 **ON**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **OK**	PS **ON** and Fuse 151 **broken**	LD150 **ON** LD151 **OFF**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **broken**	PS **ON** and Fuse 151 **OK**	LD150 **OFF** LD151 **ON**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **broken**	PS **ON** and Fuse 151 **broken**	LD150 **OFF** LD151 **OFF**	contact **open**	LD135 **OFF**
PS **OFF**	PS **OFF**	LD150 **OFF** LD151 **OFF**	contact **open**	LD135 **OFF**

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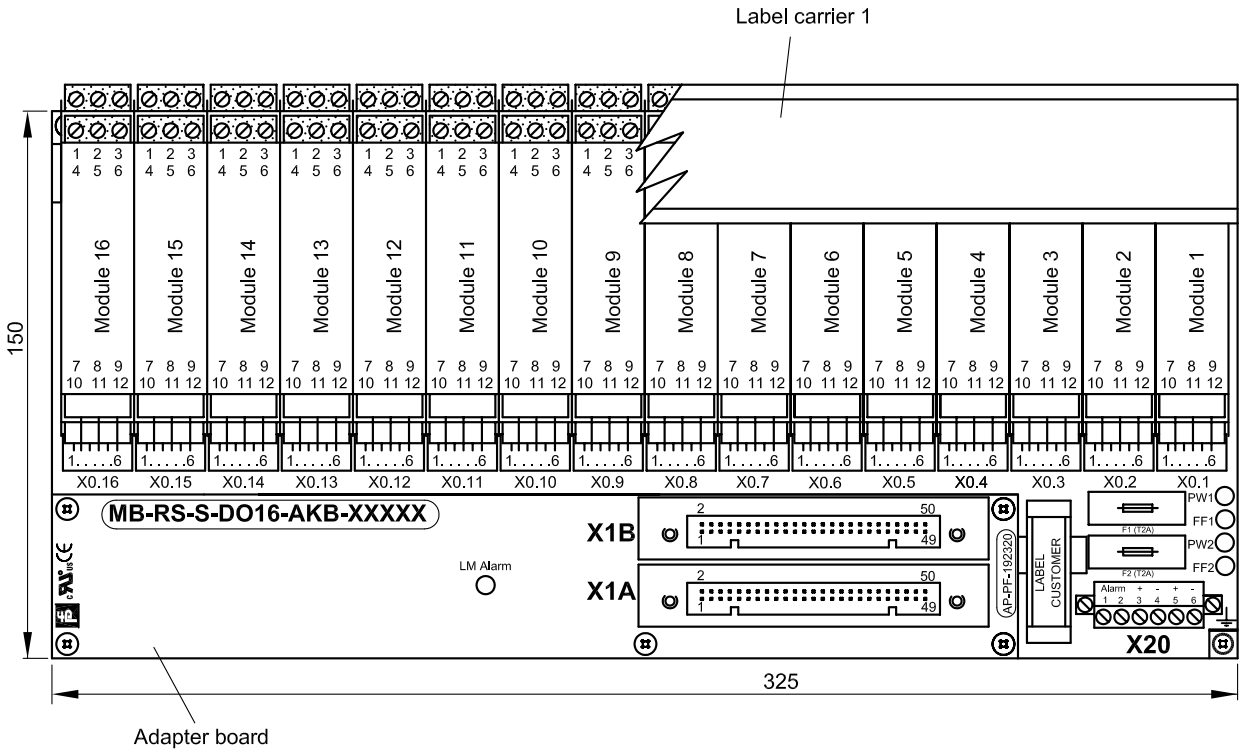

Name	Note	Part.No.:
X1A, X1B	50 pin male system connector YO50 (for KS system cable)	----
KFD0-LC1-16M	Label carrier 1 (optional to order separate)	99144
X0.1 ... 16	6 pin male terminals for cable tree FSY	----
X20.1 ... 6	Screw terminals (0.2 mm² ... 2.5 mm²)	----
X20.1; X20.2	Alarm (Relay contact max. 30 V AC, 40 V DC, 2 A)	----
X20.3 ... 6	Redundant power feed 24 V DC (21 V .. 30 V) (3/4 = PW1/L+/L-) (5/6 = PW2/L+/L-)	----
F1, F2	Fuse (5 mm x 20 mm/T2 A)	----
PW1, PW2, FF1, FF2	LEDs for power and power failure	----
Power Rail	Without Power Rail	----

Motherboards name and part numbers according installed KF- module type					
KF-Module type (function)		Motherboard without KF-Module	KF-Module type (function)		Motherboard without KF-Module
Type	F.	Name	Type	F.	Name
KFD0-SD2-Ex1.1045 (*)	DO	MB-RS-S-DO16-AKB-192321			
KFD2-SL2-Ex1	DO				
KFD2-SD-Ex1.48....(*)(**)					

Yokogawa ProSafe DIgItal Output - Type SDV541

(*) Line monitoring nor available on this module
(**) no more abailable, replaced with KFD0-SD2-Ex1.1045

The equivalent non I.S. barrier devices may also be used

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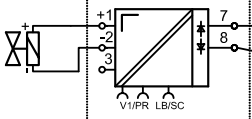
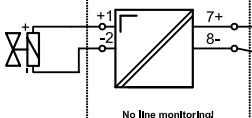
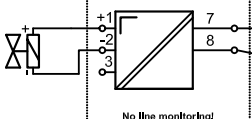
Field	Module	FSY-	X0.	Y1	X1B	X1A	Ch.	Module and cable types
1		1	1	1	48	48	OUT1	DO Module type: KFD2-SL2-Ex1 FSY- Cable type: FSYO-L460-192303 KF-Module terminal no.: 9 8 7 1 2 3 1 2 3 4 5 6
					47	47	COM1	
2		2	2	2	46	46	OUT2	DO Module type: KFD2-SD-Ex1..... FSY- Cable type: FSYO-L460-192303 KF-Module terminal no.: 9 8 7 1 2 3 1 2 3 4 5 6
					45	45	COM2	
3		3	3	3	44	44	OUT3	DO Module type: KFD0-SD2-Ex1.1045 FSY- Cable type: FSYO-L460-192303 KF-Module terminal no.: 9 8 7 1 2 3 1 2 3 4 5 6
					43	43	COM3	
4		4	4	4	42	42	OUT4	
					41	41	COM4	
5		5	5	5	40	40	OUT5	
					39	39	COM5	
6		6	6	6	38	38	OUT6	356.6730
					37	37	COM6	
7		7	7	7	36	36	OUT7	
					35	35	COM7	
8		8	8	8	34	34	OUT8	
					33	33	COM8	

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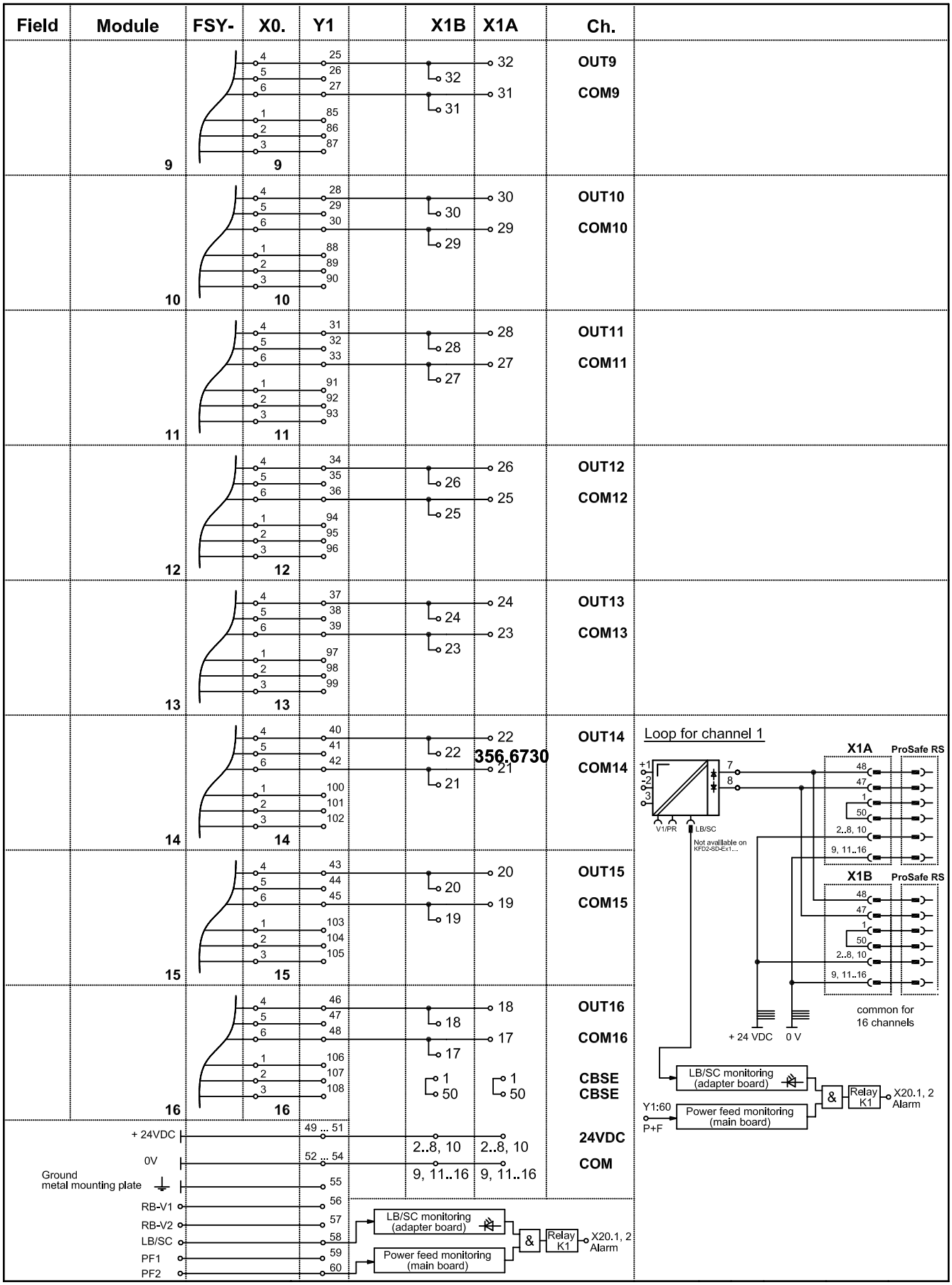

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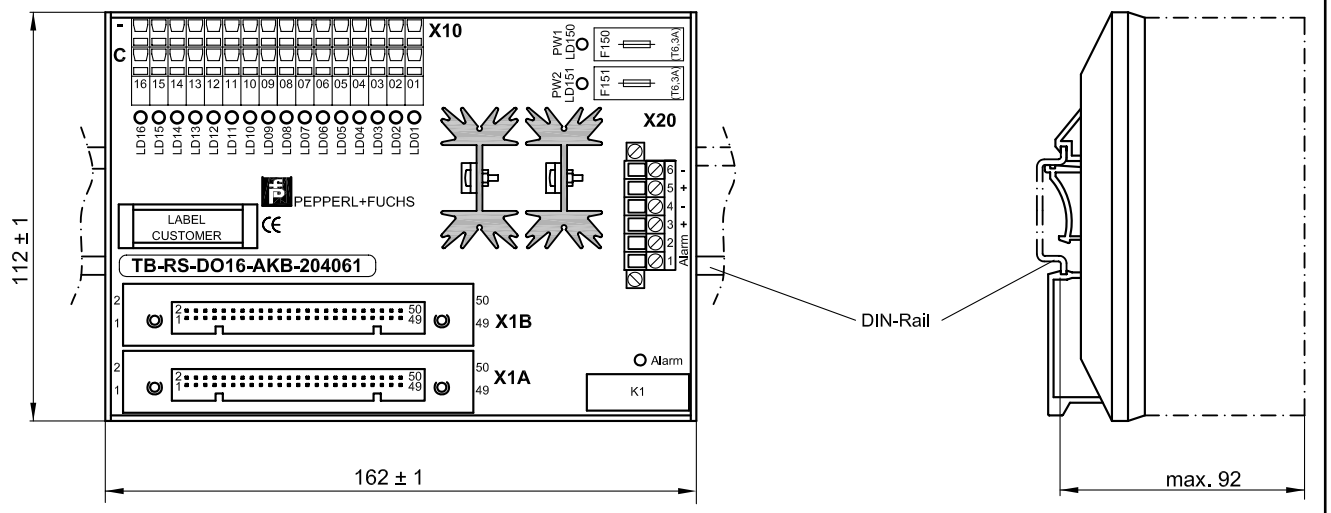
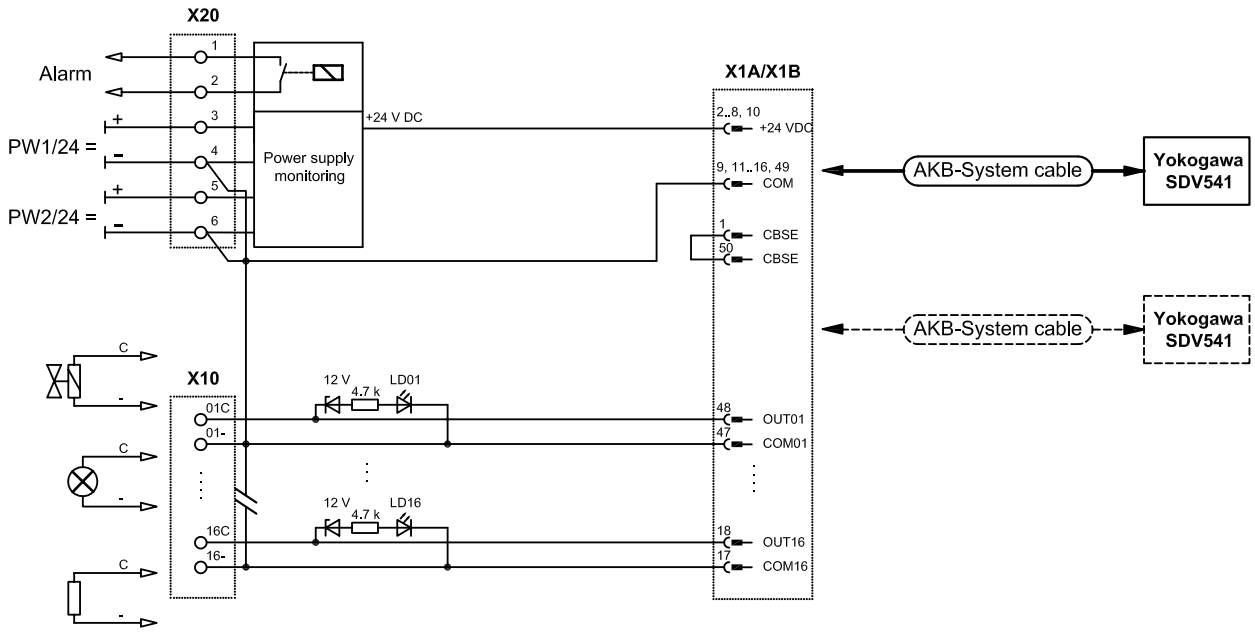


Technical Description

Field termination: X10	Pressure clamp terminal AWG14...24	DO 24 V DC / 0,6 A per channel / total 3,6 A max.
System connector: X1A, X1B	50 pin male YO50	DO
Power feed: X20.3 ... 6	Redundant Power feed	24 V DC / 5 A, max. 6,3 A
Alarm: X20.1, X20.2	Power Alarm	Relay contact max. 30 V AC, 40 V DC, 2 A
F150; 151	Power feed fuse	6,3 A
X20	6 pin screw terminal (removable)	Power feed terminal

Function: Termination-Board to connect to the Yokogawa ProSafe RS I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. Two system connectors in parallel allow for redundant applications. The connections to/from the field are pressure clamp terminals X10. The unit has a 24 V DC redundant power supply feed, monitored by a potential free relay contact. (X20. 1, 2) LED PW1, PW2 and Alarm indicate the actual power status. The board is designed to be mounted vertically on DIN-Rail (DIN EN 5022).

Circuit diagram



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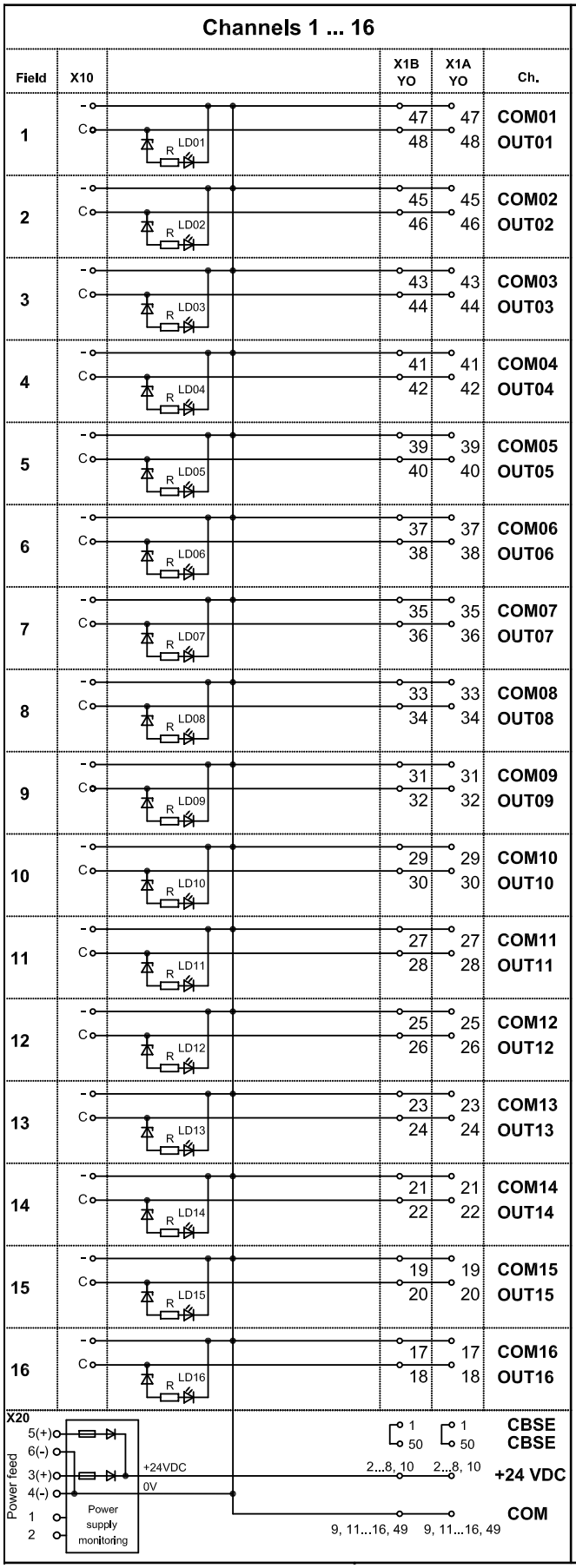

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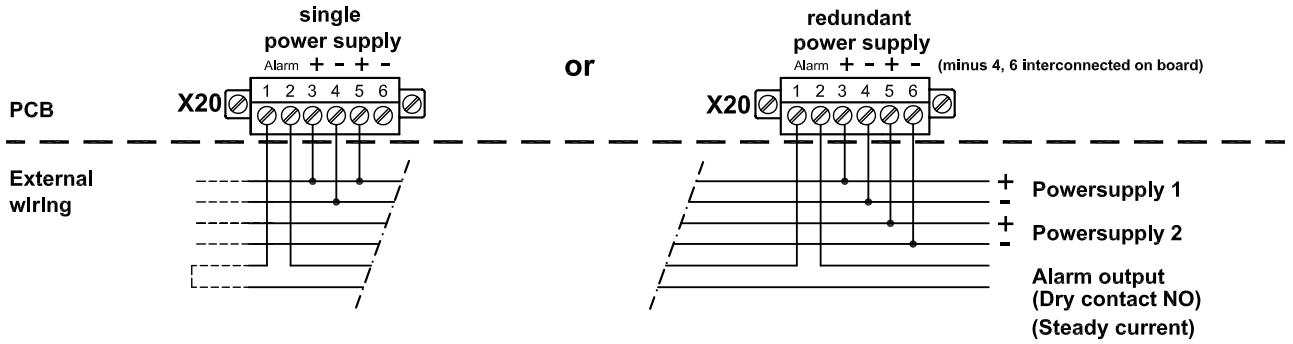
Connection power supply and error message (Alarm)



Alarm LD indication and contact status

Power supply 1	Power supply 2	LD green	X20.1, X20.2 Alarm contact	LD red (Flashing)
PS **ON** and Fuse 150 **OK**	PS **ON** and Fuse 151 **OK**	LD150 **ON** LD151 **ON**	contact **closed**	LD135 **OFF**
PS **ON** and Fuse 150 **OK**	PS **OFF**	LD150 **ON** LD151 **OFF**	contact **open**	LD135 **ON**
PS **OFF**	PS **ON** and Fuse 151 **OK**	LD150 **OFF** LD151 **ON**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **OK**	PS **ON** and Fuse 151 **broken**	LD150 **ON** LD151 **OFF**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **broken**	PS **ON** and Fuse 151 **OK**	LD150 **OFF** LD151 **ON**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **broken**	PS **ON** and Fuse 151 **broken**	LD150 **OFF** LD151 **OFF**	contact **open**	LD135 **OFF**
PS **OFF**	PS **OFF**	LD150 **OFF** LD151 **OFF**	contact **open**	LD135 **OFF**

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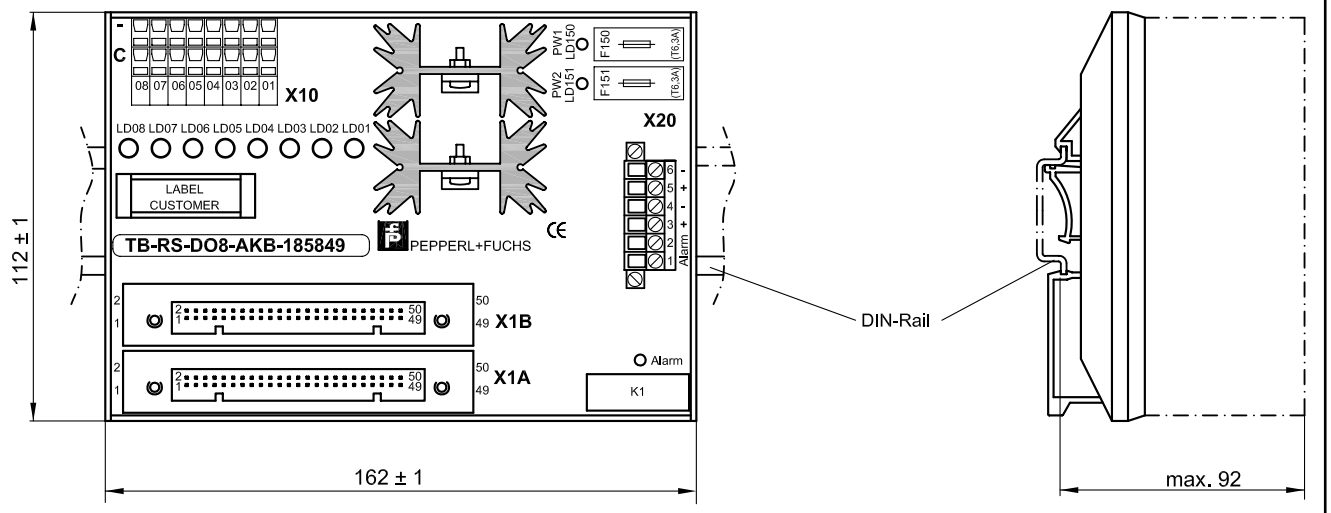
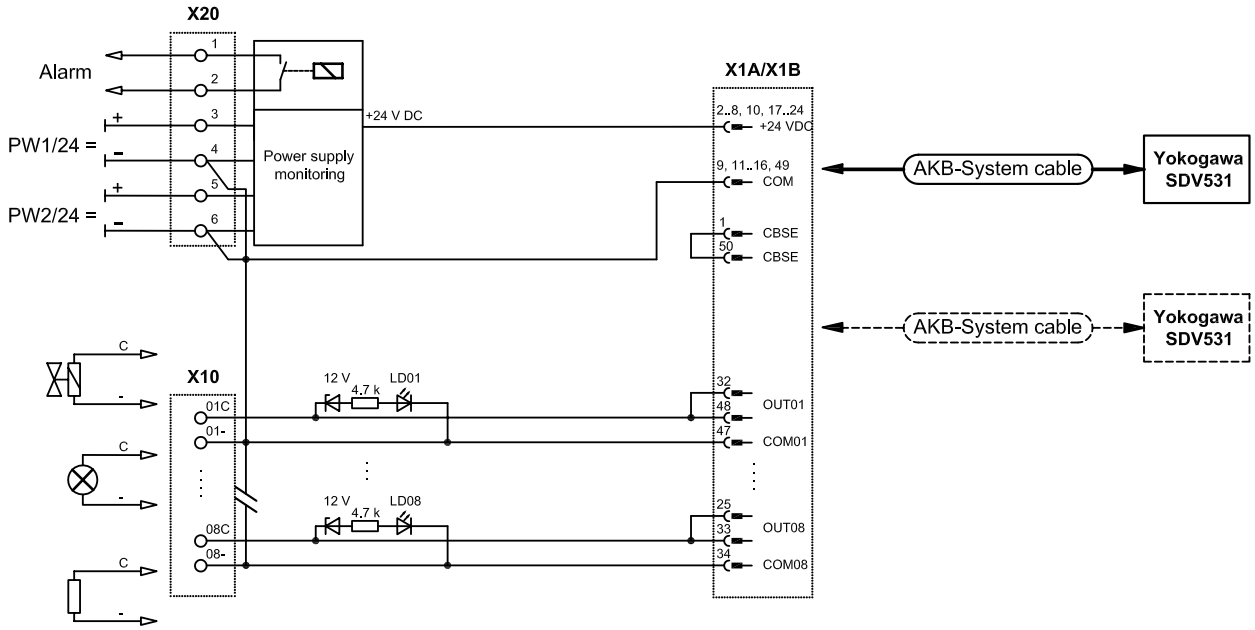


Technical Description

Field termination: X10	Pressure clamp terminal AWG14...24	DO 24 V DC / 0,6 A max.
System connector: X1A, X1B	50 pin male YO50	DO
Power feed: X20.3 ... 6	Redundant Power feed	24 V DC / 5 A, max. 6,3 A
Alarm: X20.1, X20.2	Power Alarm	Relay contact max. 30 V AC, 40 V DC, 2 A
F150; 151	Power feed fuse	6,3 A
X20	6 pin screw terminal (removable)	Power feed terminal

Function: Termination-Board to connect to the Yokogawa ProSafe RS I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. Two system connectors in parallel allow for redundant applications. The connections to/from the field are pressure clamp terminals X10. The unit has a 24 V DC redundant power supply feed, monitored by a potential free relay contact. (X20. 1, 2) LED PW1, PW2 and Alarm indicate the actual power status. Each loop is fused to protect the Yokogawa I/O card. The board is designed to be mounted vertically on DIN-Rail (DIN EN 5022).

Circuit diagram



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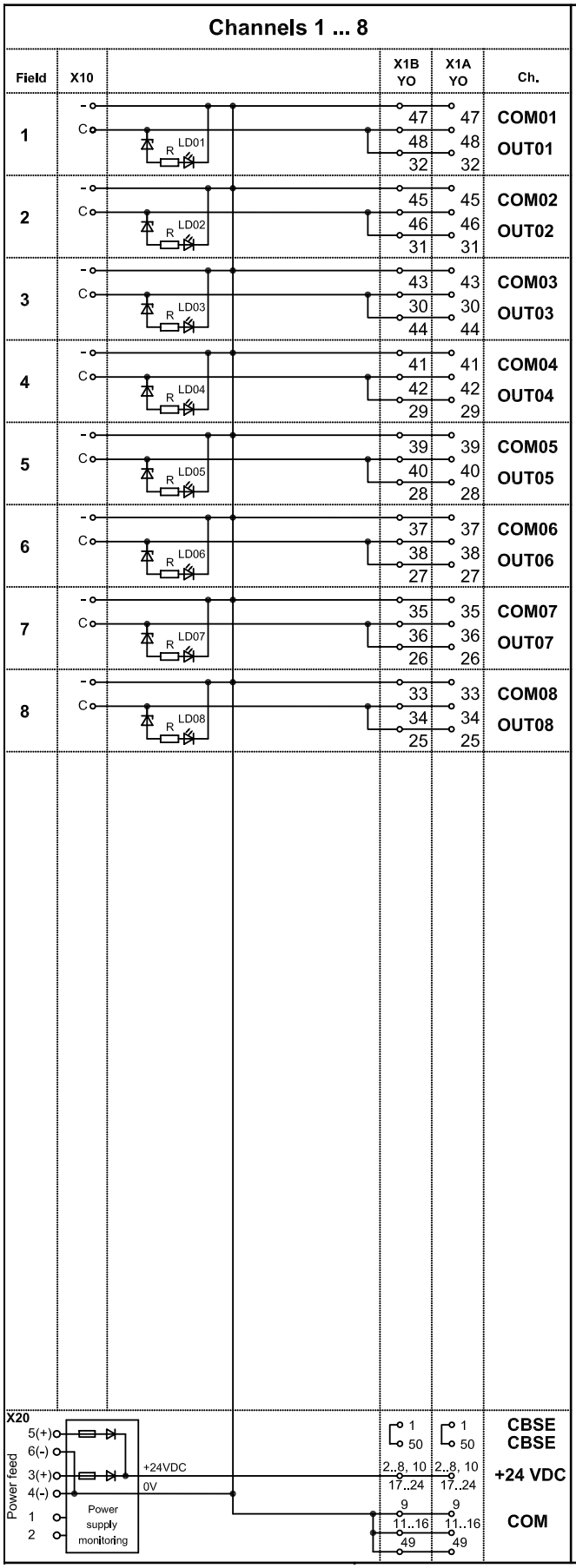

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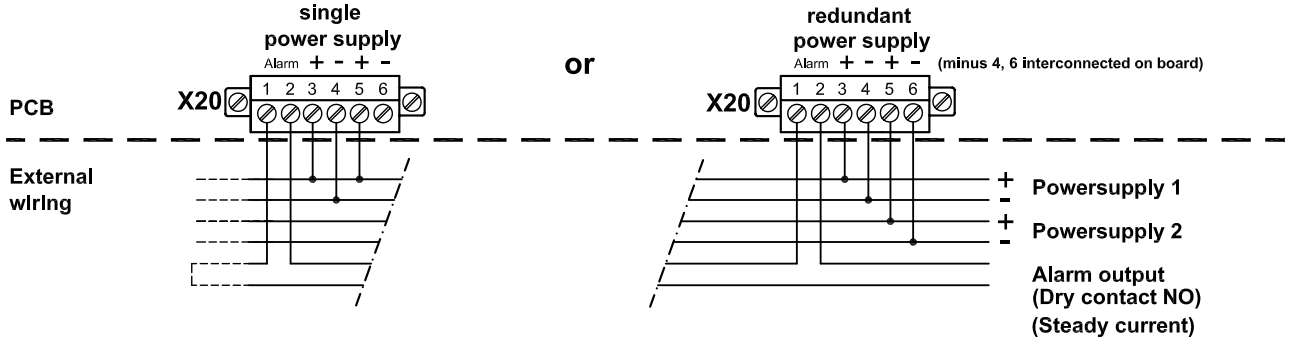
Connection power supply and error message (Alarm)



Alarm LD indication and contact status

Power supply 1	Power supply 2	LD green	X20.1, X20.2 Alarm contact	LD red (Flashing)
PS **ON** and Fuse 150 **OK**	PS **ON** and Fuse 151 **OK**	LD150 **ON** LD151 **ON**	contact **closed**	LD135 **OFF**
PS **ON** and Fuse 150 **OK**	PS **OFF**	LD150 **ON** LD151 **OFF**	contact **open**	LD135 **ON**
PS **OFF**	PS **ON** and Fuse 151 **OK**	LD150 **OFF** LD151 **ON**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **OK**	PS **ON** and Fuse 151 **broken**	LD150 **ON** LD151 **OFF**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **broken**	PS **ON** and Fuse 151 **OK**	LD150 **OFF** LD151 **ON**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **broken**	PS **ON** and Fuse 151 **broken**	LD150 **OFF** LD151 **OFF**	contact **open**	LD135 **OFF**
PS **OFF**	PS **OFF**	LD150 **OFF** LD151 **OFF**	contact **open**	LD135 **OFF**

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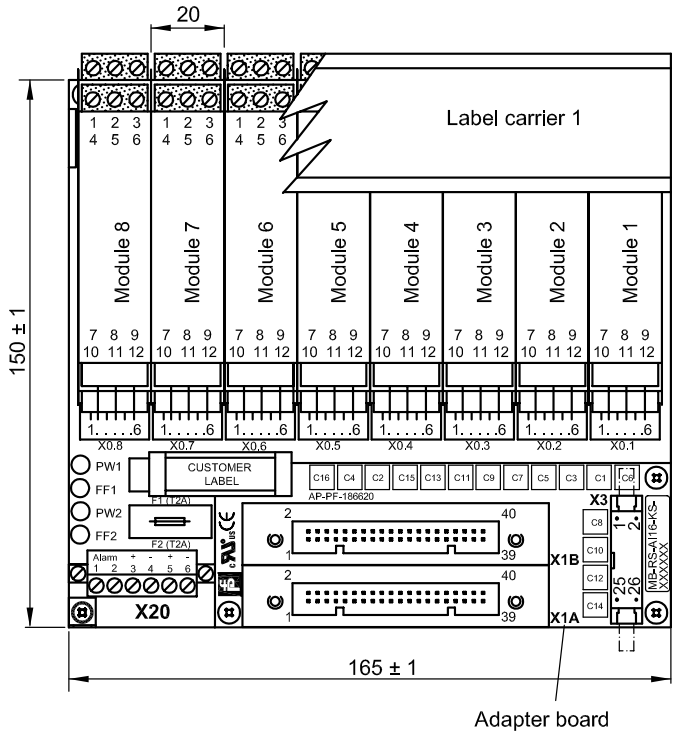

Name	Note	Part.No.:
X1A, X1B	40 pin male system connector YO40 (for KS system cable)	----
X3	26 pin HART connector male	----
KFD0-LC1-8M	Label carrier 1 (option, to order separate)	99143
X0.1 ... 8	6 pin male terminals for cable tree FSY	----
X20.1 ... 6	Screw terminals (0.2 mm² ... 2.5 mm²)	----
X20.1; X20.2	Alarm (Relay contact max. 30 V AC, 40 V DC, 2 A)	----
X20.3 ... 6	Redundant power feed 24 V DC (21 V .. 30 V) (3/4 = PW1/L+/L-) (5/6 = PW2/L+/L-)	----
F1, F2	Fuse (5 mm x 20 mm/T2 A)	----
PW1, PW2, FF1, FF2	LEDs for power and power failure	----

Motherboards name and part numbers accordIng Installed KF- module type					
KF-Module type (function)		Motherboard without KF-Module	KF-Module type (function)		Motherboard without KF-Module
Type	F.	Name	Type	F.	Name
KFD2-STC4-Ex2	AI	MB-RS-AI16-KS-185838	----	-	----

Yokogawa ProSafe-RS Analog Input Type SAI143

The module SAI143 must set in 4-wire mode! (Termination A to internal GND)

The equivalent non I.S. barrier devices may also be used

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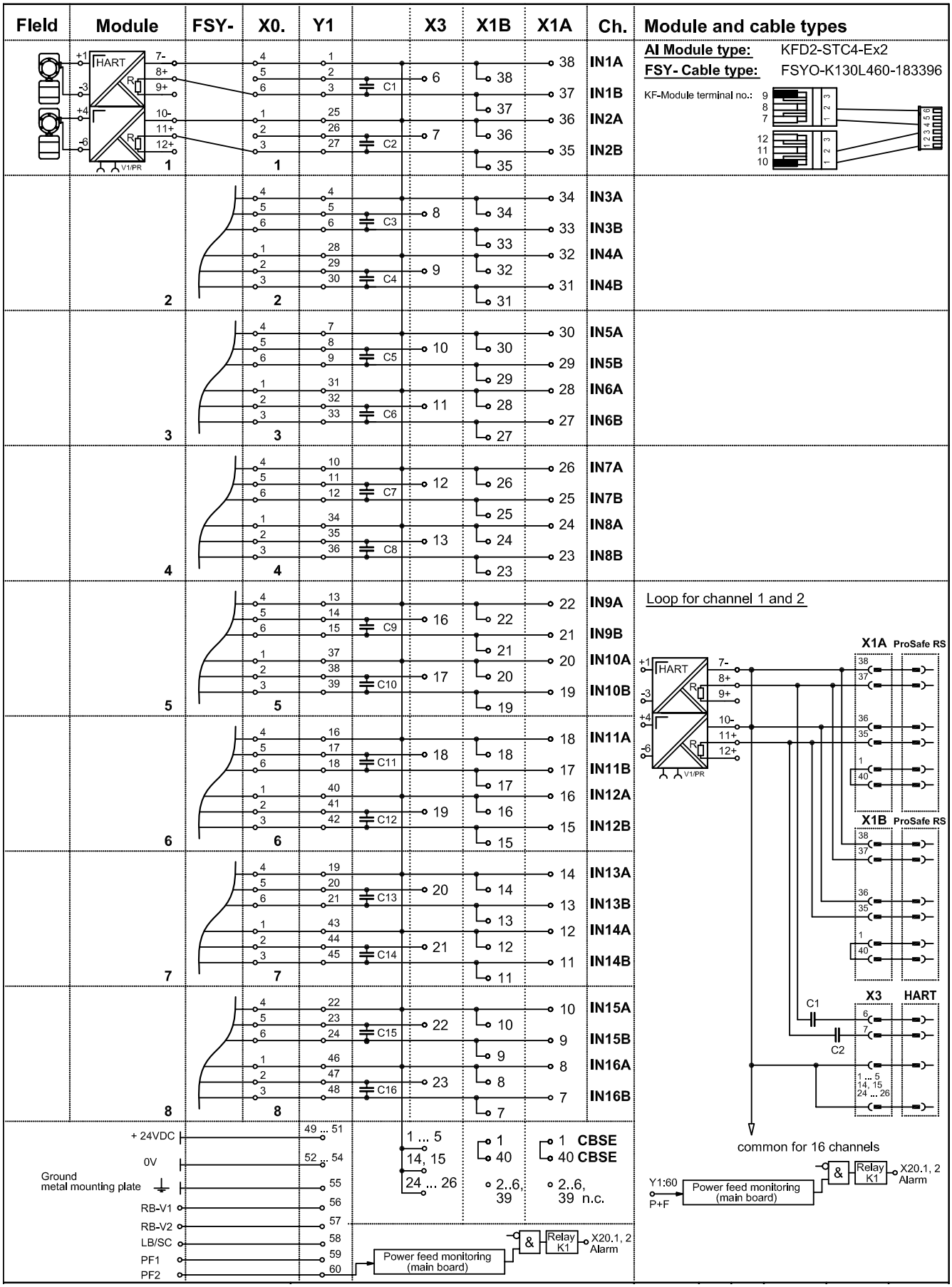

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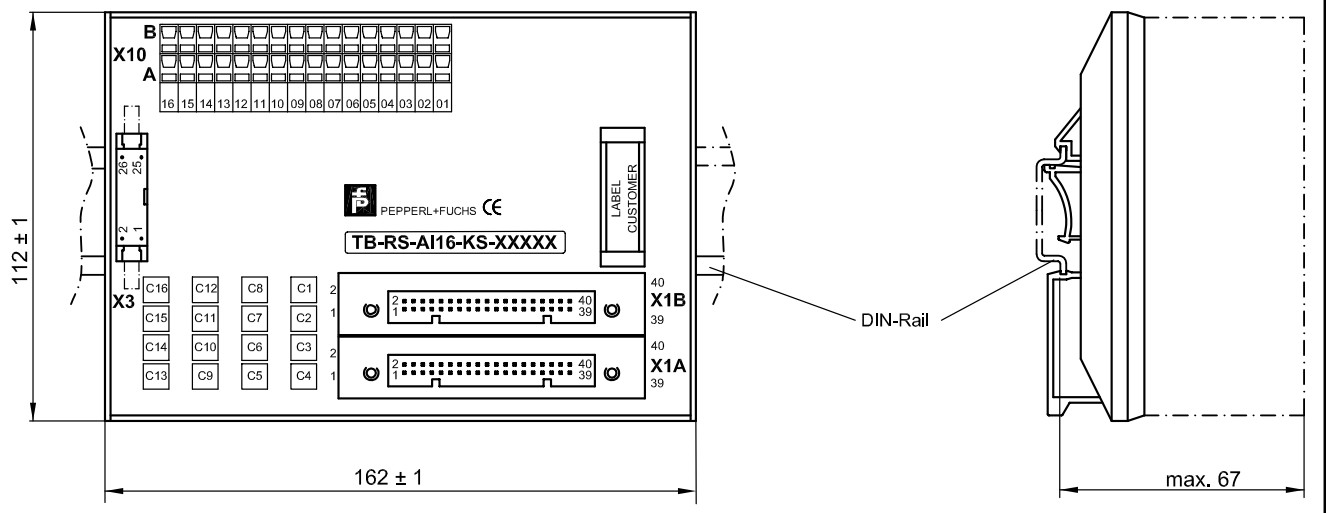
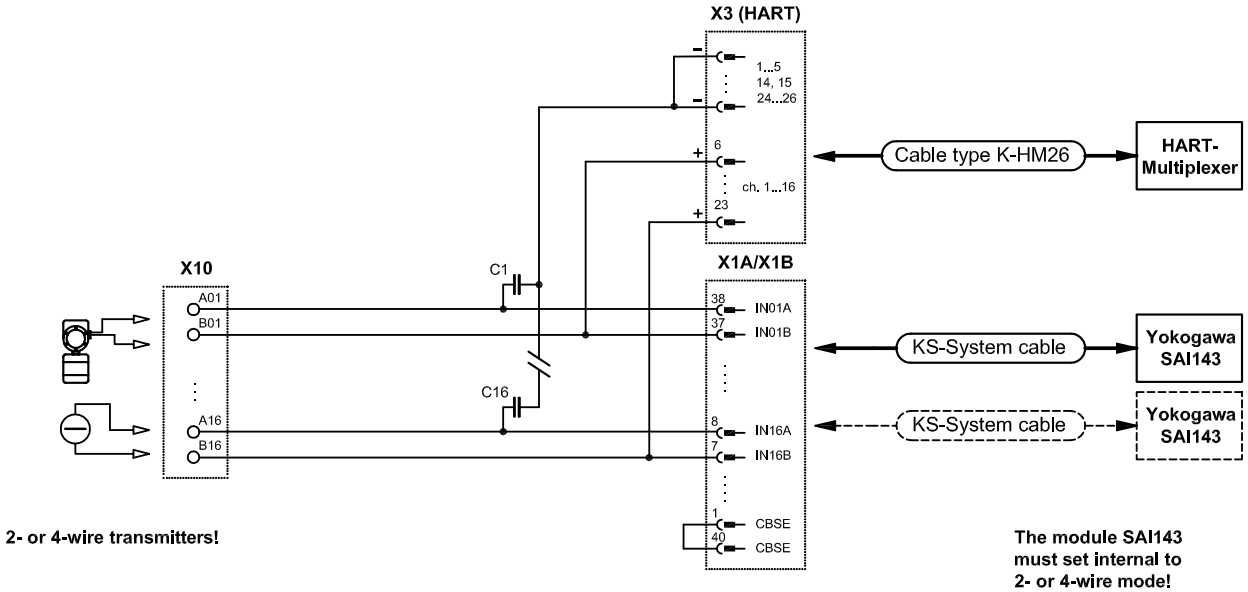


Technical Description		
Field termination: X10	Pressure clamp terminal AWG 14...24	AI (4 ... 20 mA)
System connector: X1A, X1B	40 pin male YO40	AI (4 ... 20 mA)
Connector HART-Mux: X3	26 pin HART connector	HART-communication

Function: Termination-**B**oard to connect to the Yokogawa ProSafe RS I/O module. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. Two system connectors in parallel allow for redundant applications. The connections to/from the field are pressure clamp terminals X10. A HART connector X3, in parallel with the system connector, links to the Pepperl+Fuchs HART multiplexer via a ribbon cable type K-HM26. The board is designed to be mounted vertically on DIN-Rail (DIN EN 5022).

Circuit diagram



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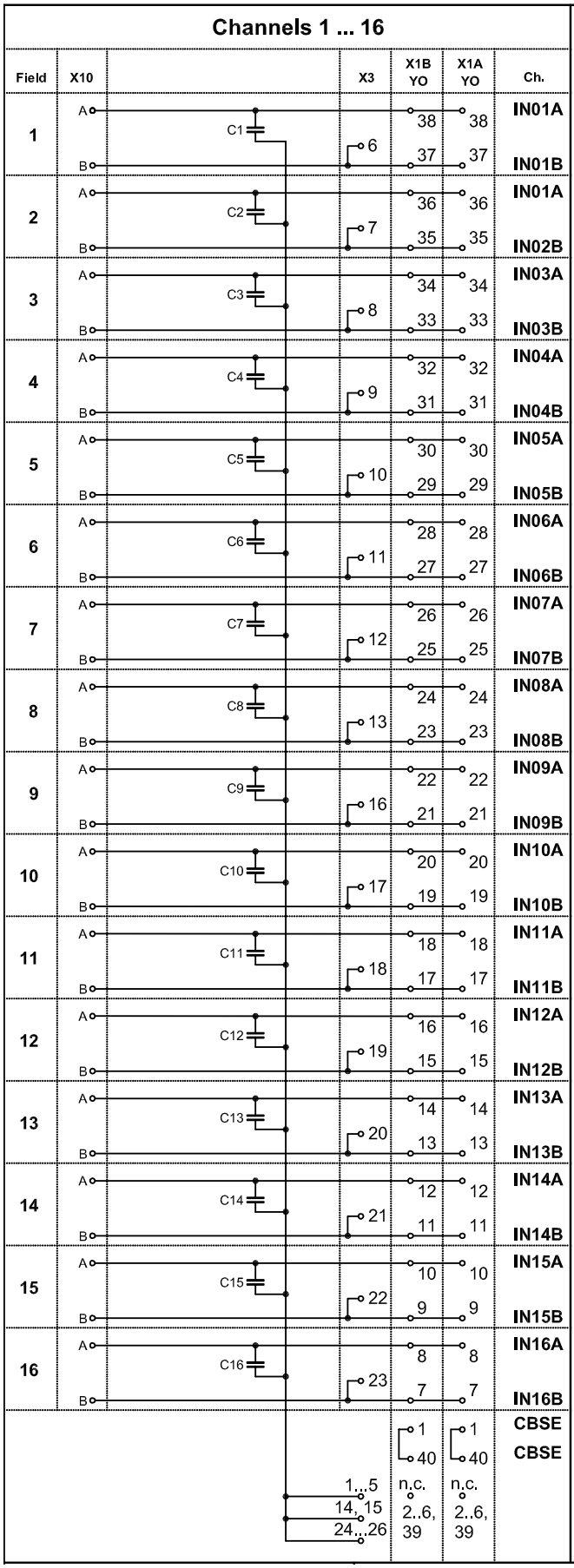

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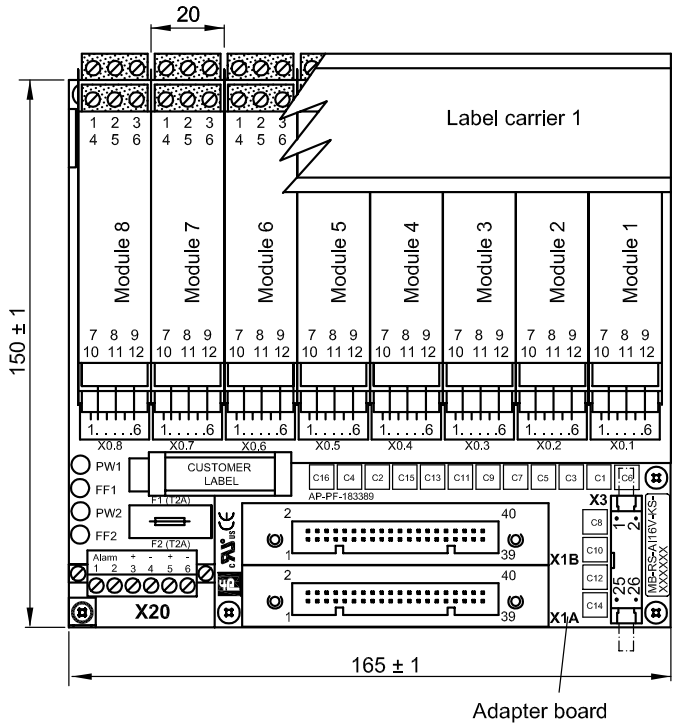

Name	Note	Part.No.:
X1A, X1B	40 pin male system connector YO40 (for KS system cable)	----
X3	26 pin HART connector male	----
KFD0-LC1-8M	Label carrier 1 (option, to order separate)	99143
X0.1 ... 8	6 pin male terminals for cable tree FSY	----
X20.1 ... 6	Screw terminals (0.2 mm² ... 2.5 mm²)	----
X20.1; X20.2	Alarm (Relay contact max. 30 V AC, 40 V DC, 2 A)	----
X20.3 ... 6	Redundant power feed 24 V DC (21 V .. 30 V) (3/4 = PW1/L+/L-) (5/6 = PW2/L+/L-)	----
F1, F2	Fuse (5 mm x 20 mm/T2 A)	----
PW1, PW2, FF1, FF2	LEDs for power and power failure	----

Motherboards name and part numbers according installed KF- module type					
KF-Module type (function)		Motherboard without KF-Module	KF-Module type (function)		Motherboard without KF-Module
Type	F.	Name	Type	F.	Name
KFD2-STC4-Ex2	AI	MB-RS-AI16V-KS-185840	----	-	----

Yokogawa ProSafe-RS Analog Input Type SAV144

Accuracy current to voltage conversion: 0,15% by 20°C ambient temperature +0,025%/10°C

The equivalent non I.S. barrier devices may also be used

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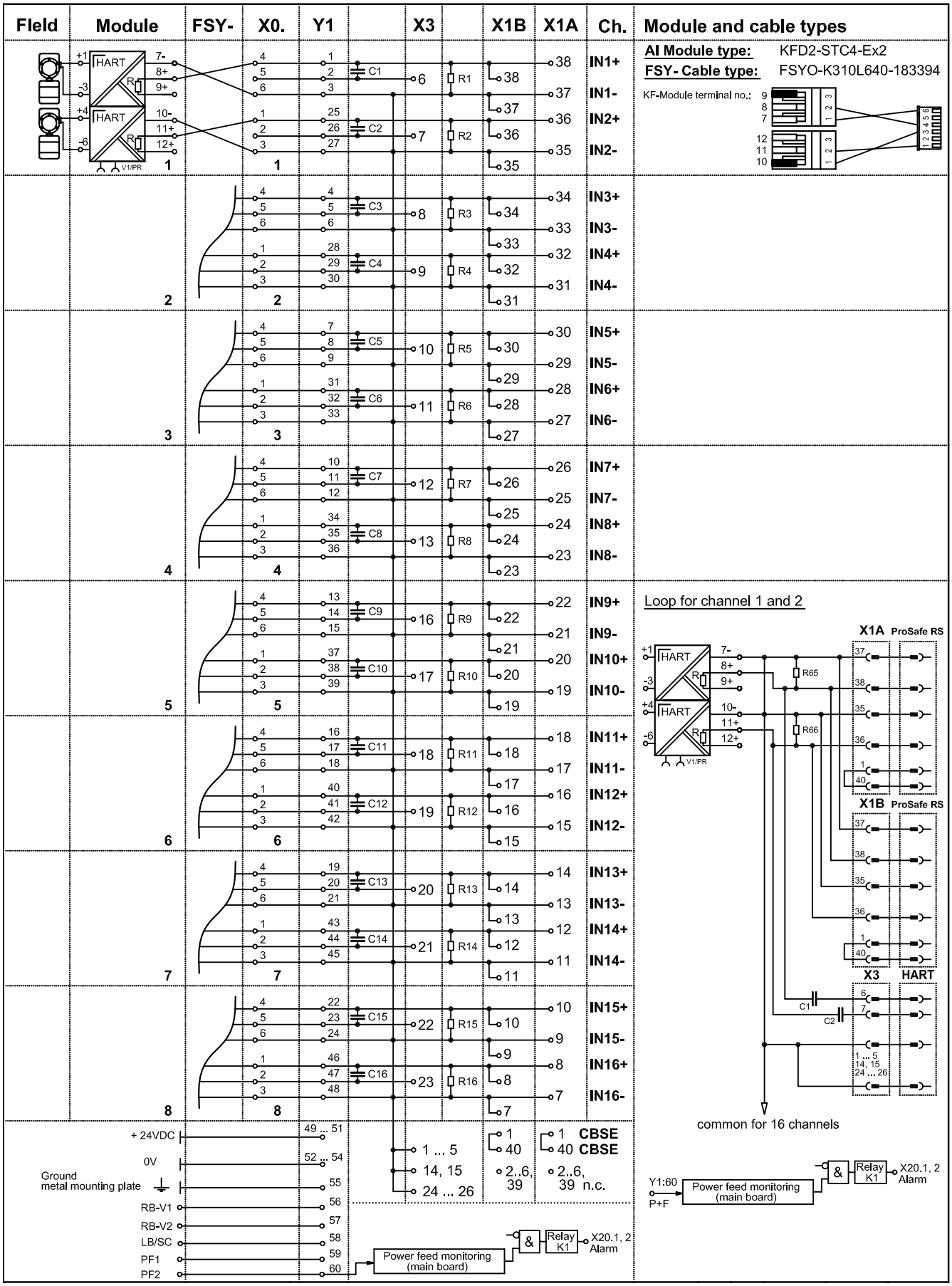

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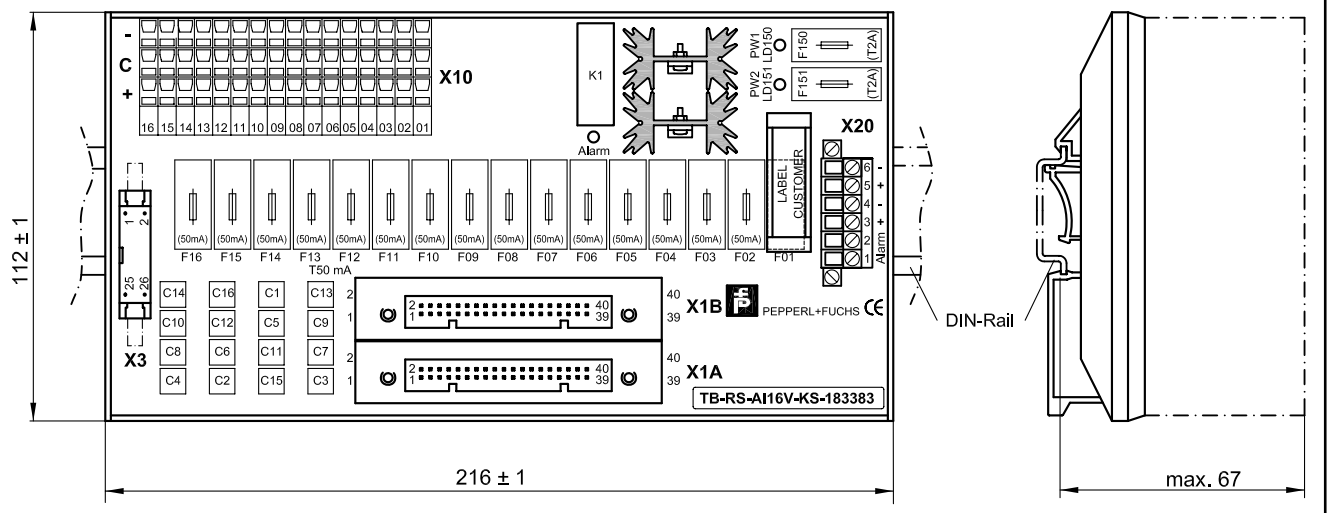
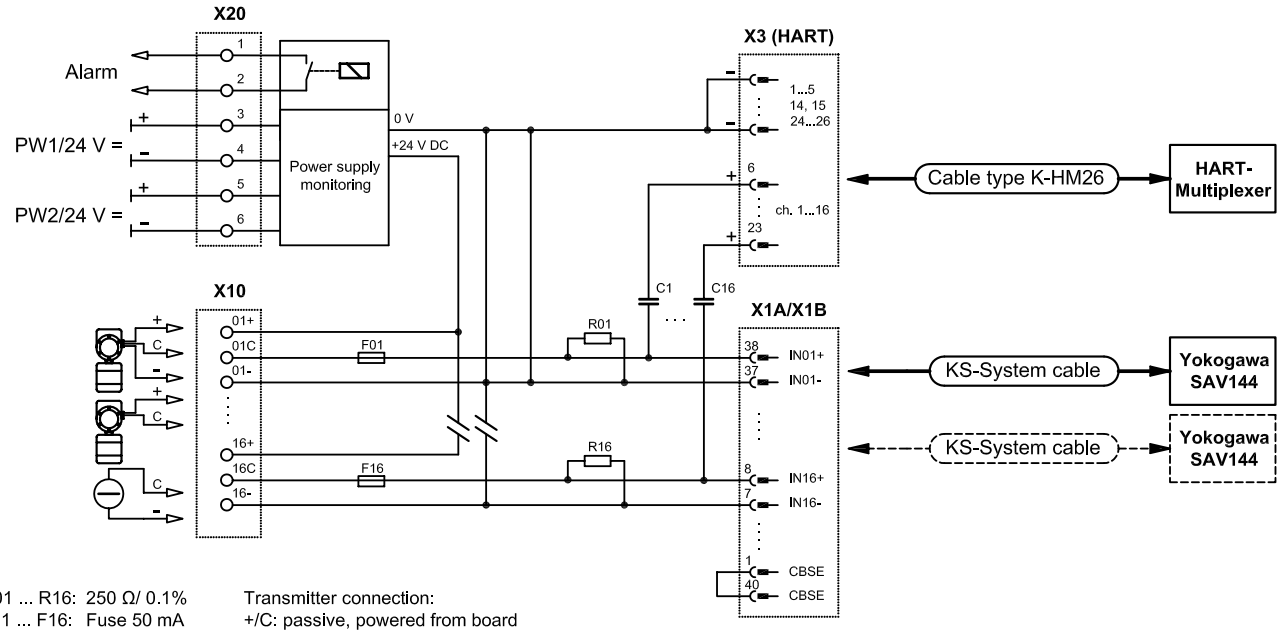


Technical Description		
Field termination: X10	Pressure clamp terminal AWG 14...24	AI (4 ... 20 mA)
System connector: X1A, X1B	40 pin male YO40	AI (4 ... 20 mA)
Connector HART-Mux: X3	26 pin HART connector	HART-communication
Power feed: X20.3 ... 6	Redundant Power feed	24 V DC / max. 2 A
Alarm: X20.1, X20.2	Power Alarm	Relay contact max. 30 V AC, 40 V DC, 2 A
F150; 151	Power feed fuse	2 A
X20	6 pin screw terminal (removable)	Power feed terminal

Accuracy current to voltage conversion: 0,1% by 20°C ambient temperature +0,025%/10°C

Function: **T**ermination-**B**oard to connect to the Yokogawa ProSafe RS I/O card. The TB System connector X1A/X1B links to the Yokogawa I/O card via a standard cable supplied by Yokogawa. Two system connectors in parallel allow for redundant applications. The connections to/from the field are pressure clamp terminals X10. A HART connector X3, in parallel with the system connector, links to the Pepperl+Fuchs HART multiplexer via a ribbon cable type K-HM26. The unit has a 24 V DC redundant power supply feed, monitored by a potential free relay contact. (X20. 1, 2) LED PW1, PW2 and Alarm indicate the actual power status. Each loop is fused to protect the Yokogawa I/O card. The board is designed to be mounted vertically on DIN-Rail (DIN EN 5022).

Circuit diagram



R01 ... R16: 250 Ω/ 0.1%
F01 ... F16: Fuse 50 mA
C01 ... C16: 4.7 µF/50 V

Transmitter connection:
+/C: passive, powered from board
-/C: active, self powered

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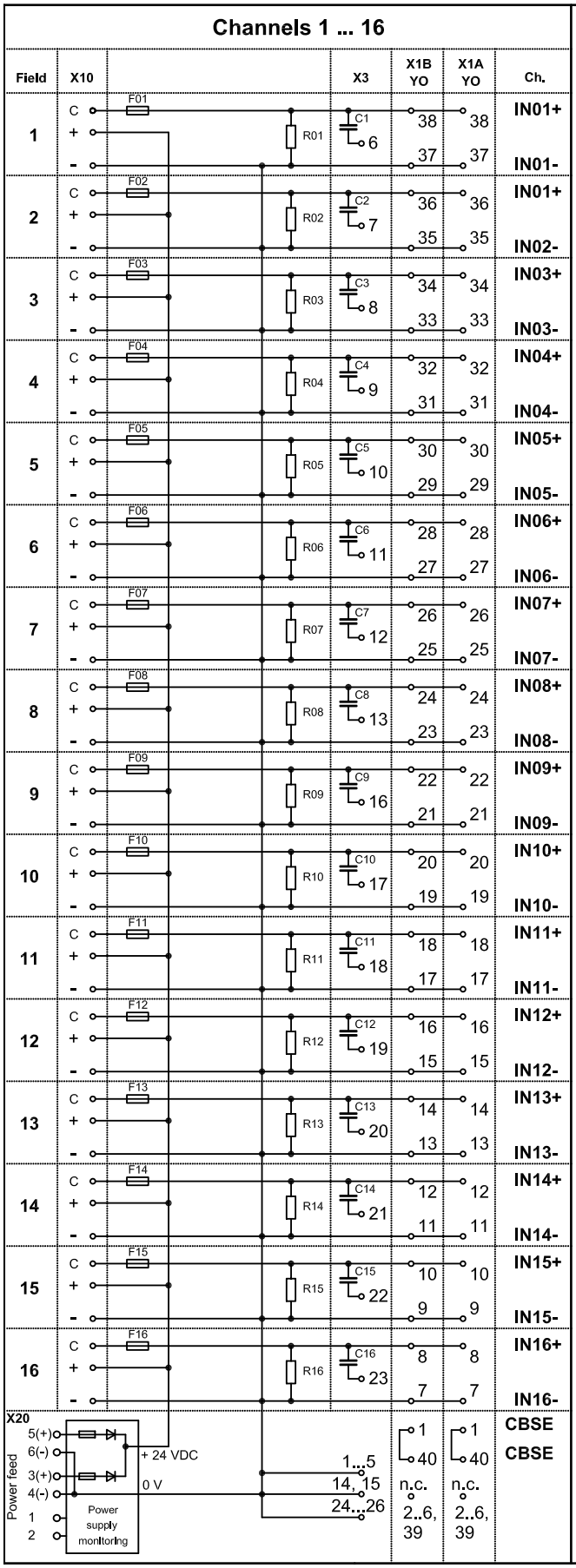

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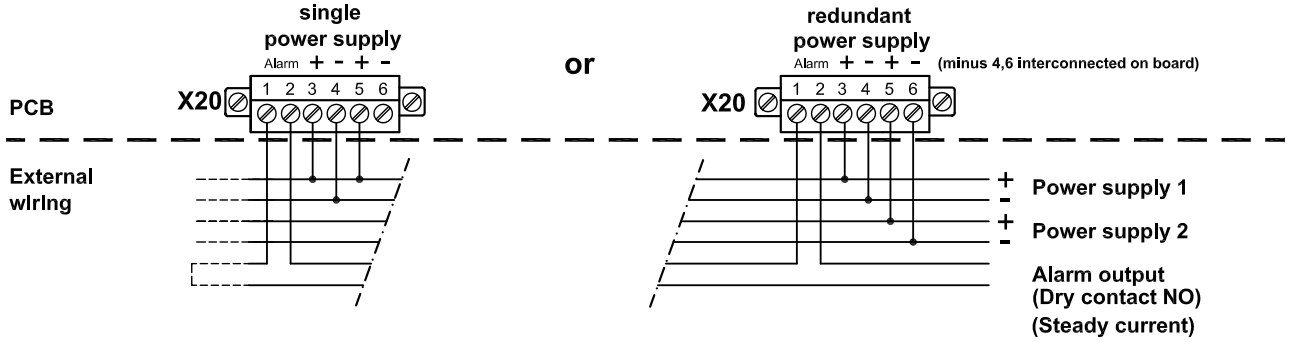
Connection power supply and error message (Alarm)



Alarm LED indication and contact status

Power supply 1	Power supply 2	LED green	X20.1, X20.2 Alarm contact	LED red (Flashing)
PS **ON** and Fuse 150 **OK**	PS **ON** and Fuse 151 **OK**	LED150 **ON** LED151 **ON**	contact **closed**	LD135 **OFF**
PS **ON** and Fuse 150 **OK**	PS **OFF**	LED150 **ON** LED151 **OFF**	contact **open**	LD135 **ON**
PS **OFF**	PS **ON** and Fuse 151 **OK**	LED150 **OFF** LED151 **ON**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **OK**	PS **ON** and Fuse 151 **broken**	LED150 **ON** LED151 **OFF**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **broken**	PS **ON** and Fuse 151 **OK**	LED150 **OFF** LED151 **ON**	contact **open**	LD135 **ON**
PS **ON** and Fuse 150 **broken**	PS **ON** and Fuse 151 **broken**	LED150 **OFF** LED151 **OFF**	contact **open**	LD135 **OFF**
PS **OFF**	PS **OFF**	LED150 **OFF** LED151 **OFF**	contact **open**	LD135 **OFF**

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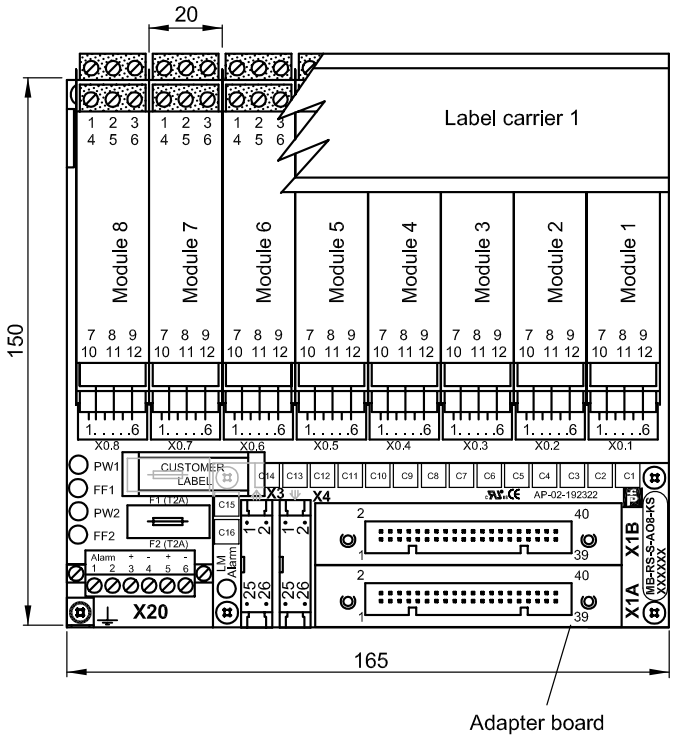

Name	Note	Part.No.:
X1A, X1B	40 pin male system connector YO40 (for KS system cable)	----
X3, X4	26 pin HART connector male (IDC-NFP-26A)	----
KFD0-LC1-8M	Label carrier 1 (option, to order separate)	99143
X0.1 ... 8	6 pin male terminals for cable tree FSY	----
X20.1 ... 6	Screw terminals (0.2 mm² ... 2.5 mm²)	----
X20.1; X20.2	Power/LM Alarm (Relay contact max. 30V AC, 40 V DC, 2 A)	----
X20.3 ... 6	Redundant power feed 24 V DC (21 V .. 30 V) (3/4 = PW1/L+/L-) (5/6 = PW2/L+/L-)	----
F1, F2	Fuse (5 mm x 20 mm/T2 A)	----
PW1, PW2, FF1, FF2	LEDs for power and power failure	----

Motherboards name and part numbers according installed KF- module type					
KF-Module type (function)		Motherboard without KF-Module	KF-Module type (function)		Motherboard without KF-Module
Type	F.	Name	Type	F.	Name
KFD2-SCD2-Ex1.LK	AO	MB-RS-S-AO8-KS-192323			

Yokogawa ProSafe-RS Analog Output Type SAI533

LM Alarm = Line monitoring

The equivalent non I.S. barrier devices may also be used

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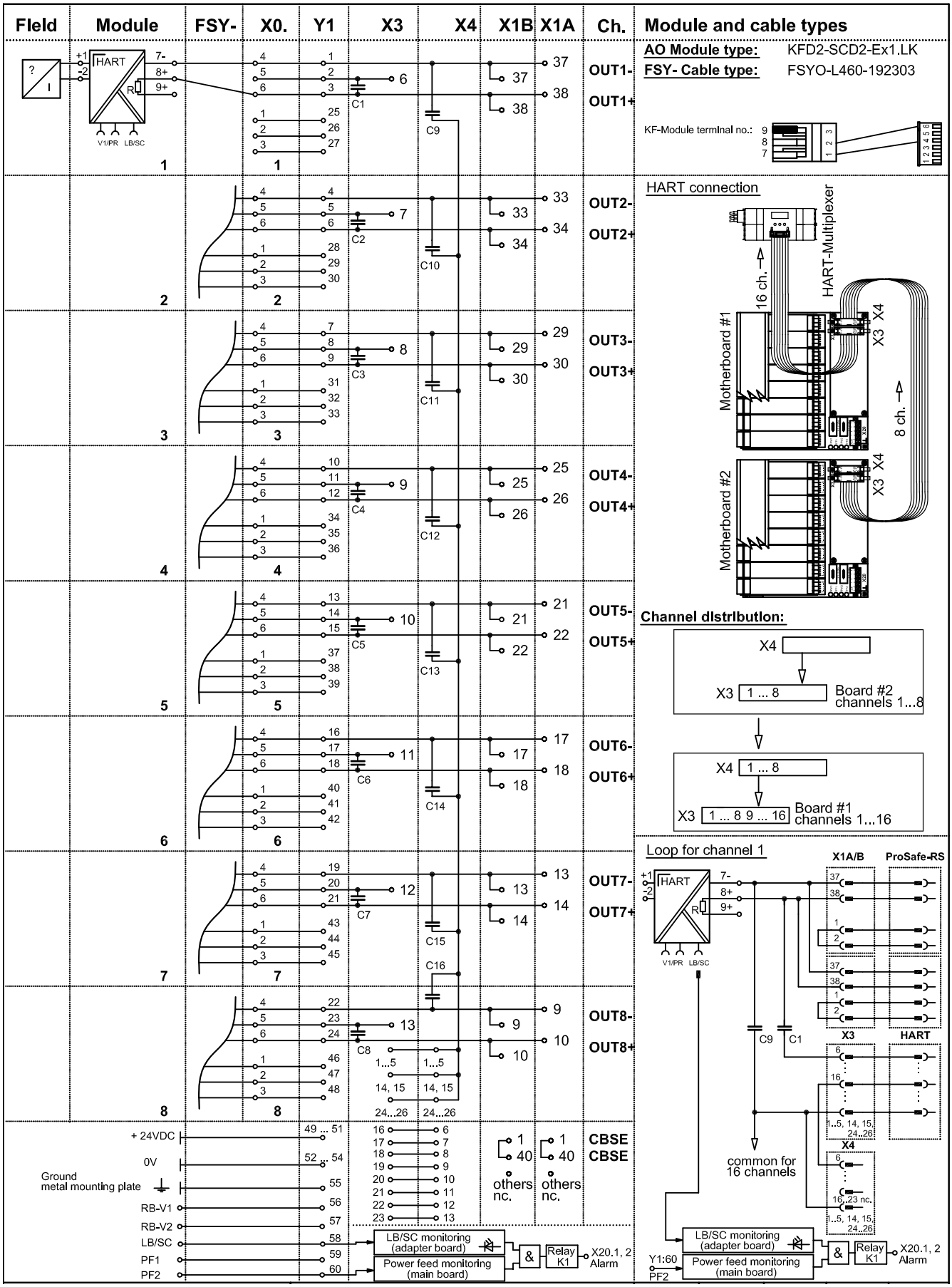

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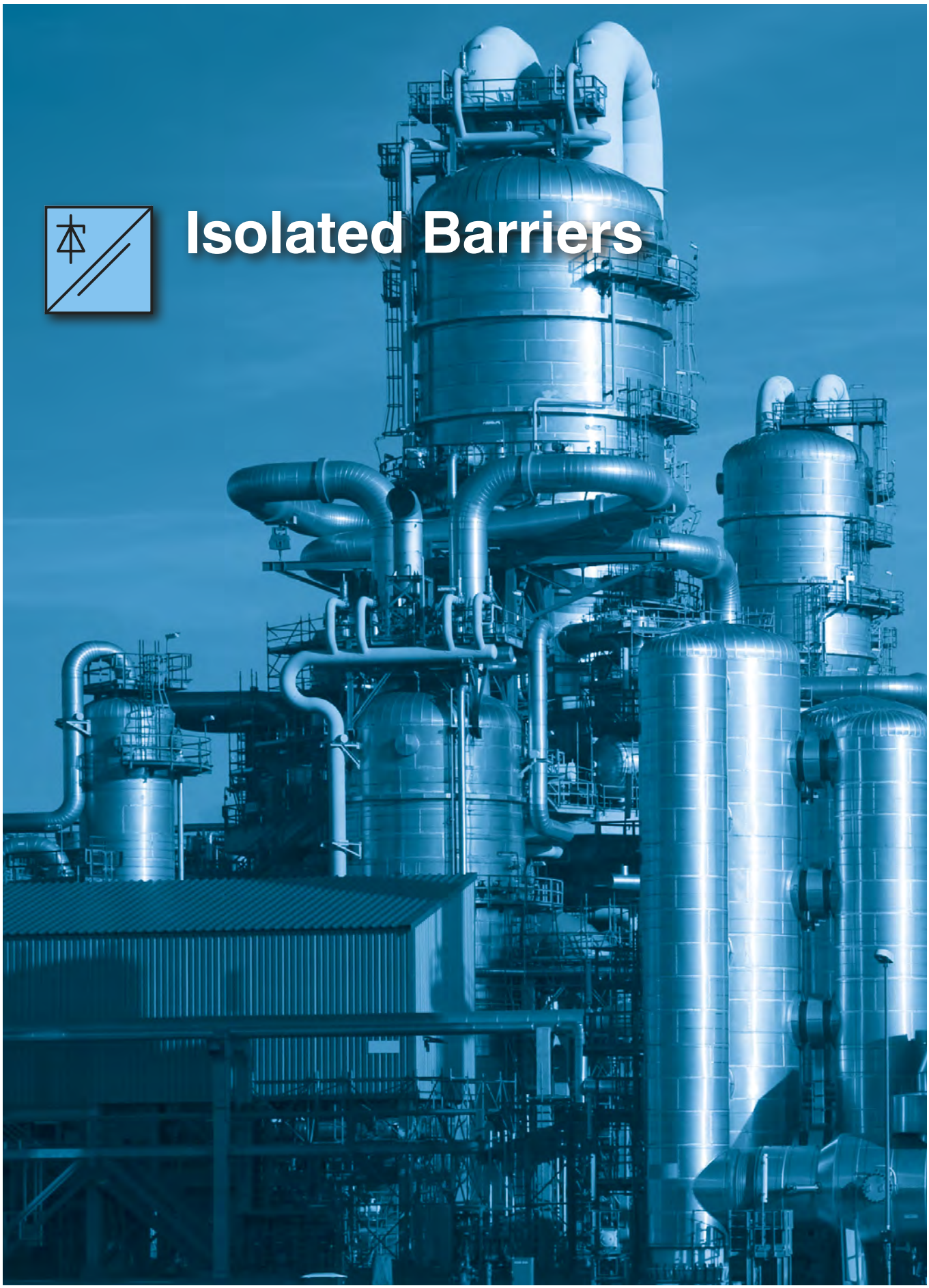

Isolated Barriers

Edition 219358 09/2011

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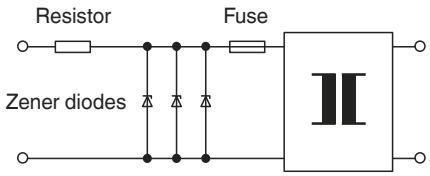
PEPPERL+FUCHS
PROTECTING YOUR PROCESS

Isolated barriers for intrinsic safety applications are used in factory and process control for the galvanic isolation of control and instrumentation signals, such as NAMUR sensors, 4 mA to 20 mA and 0 V to 10 V signals. These devices are also used to convert specialized measurement signals into standard control signals. Isolated barriers have intrinsically safe control circuits in order to operate and communicate with field devices in hazardous areas. In all cases, the respective statutory regulations and directives governing the application or intended use shall be observed.

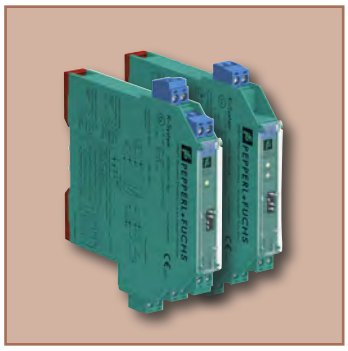
Operating principle

Isolated barriers are a combination of an intrinsic safety zener barrier and a galvanic isolation network. The energy limitation delivered to the field (voltage and current) is achieved through the zener barrier. In simple terms, a zener barrier contains a zener diode for voltage limitation and a resistor for current limitation. These components are protected with a fuse.



The galvanic isolation contained within the isolated barriers prevents noise, potential effects and transients from affecting the measurement signals. Although necessary for stand-alone, zener barriers, an isolated barrier does not require a connection to earth (ground).

K-System 92



- DIN rail/Power Rail solutions
- 1-, 2- and 4-channel designs reduce DIN rail space
- SIL rated for safety instrumented systems
- Horizontal/vertical installation with no temperature degradation
- Removable terminals reduce the maintenance over the life cycle of the plant
- Integrated HART solutions for plant asset management
- 3-port galvanically isolated intrinsic safety barriers
- Line fault detection and local indication
- World-wide approvals

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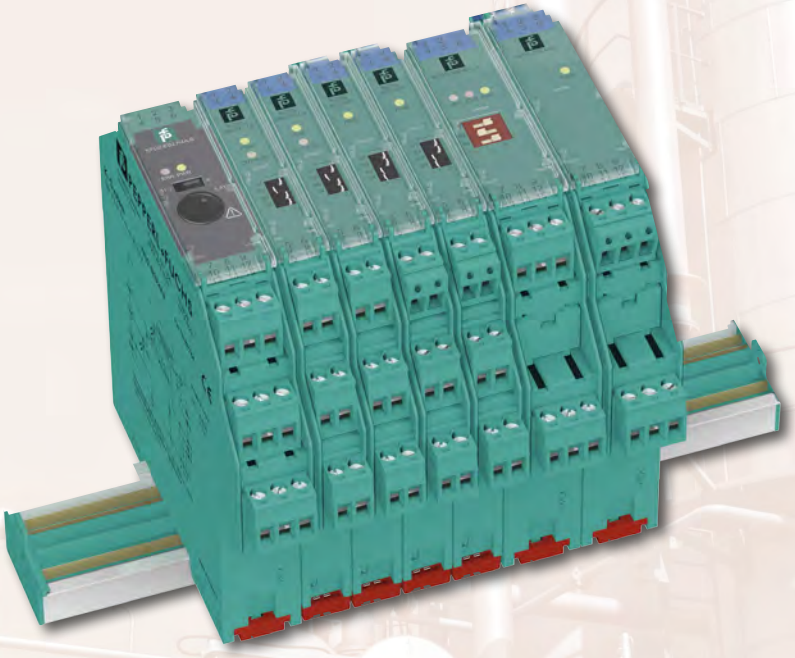
K-System



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Digital Inputs

Digital Outputs

Analog Inputs

Analog Outputs

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Digital Inputs

Model Number	Channels	Input (Field)		Output (Control System)		Supply 24 V DC	SIL	Zone 2/Division 2 Mounting	Page
		NAMUR Sensor/ Dry Contact	Line Fault Detection	Relay	Transistor (Active/Passive)				
Switch Amplifiers									
KFD2-SR2-Ex2.2S	2	■	■	2 x 2		■	2	■	97
KFD2-SOT2-Ex2	2	■	■		2	■	2	■	98

Digital Outputs

Model Number	Channels	Input (Control System)		Output (Field)		Supply		SIL	Zone 2/Division 2 Mounting	Page
		Loop Powered	Logic Input	Voltage (V)	Max. Current (mA)	24 V DC	Loop Powered			
Solenoid Drivers										
KFD02-SD2-Ex1.1045	1	■		10	45		■	3		99
KFD2-SL2-Ex1	1		■	11.7	45	■		2	■	100
KFD2-SL2-Ex2	2		■	11.7	45	■		2	■	101
KFD2-SL2-Ex2.B	2		■	11.7	45	■		2	■	102

Analog Inputs

Model Number	Channels	Input (Field)					Output (Control System)		SMART	Supply 24 V DC	SIL	Zone 2/Division 2 Mounting	Page
		RTD	TC	Potentiometer	V	2-wire Transmitter	0/4 mA ... 20 mA (Source)	4 mA ... 20 mA					
Transmitter Power Supplies													
KFD2-STC4-Ex2	2					■		■	■	■	2		103
Temperature Converters													
KFD2-UT2-Ex2	2	■	■	■	■		2			■	2	■	104

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Analog Outputs

Model Number	Channels	Input (Control System)	Output (Field)		Specials SMART	Supply 24 V DC	SIL	Page
		4 mA ... 20 mA	mA	Line Fault Detection				
Current Drivers								
KFD2-SCD2-Ex1.LK	1	■	■	■	■	■	2	105
KFD2-SCD2-Ex2.LK	2	■	■	■	■	■	2	106

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Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power loss	1 W
Power consumption	< 1.3 W
Input	
Rated values	acc. to EN 60947-5-6 (NAMUR)
Open circuit voltage/short-circuit current	approx. 8 V DC/approx. 8 mA
Switching point/switching hysteresis	1.2 ... 2.1 mA/approx. 0.2 mA
Line fault detection	breakage I ≤0.1 mA , short-circuit I > 6 mA
Pulse/Pause ratio	≥ 20 ms / ≥ 20 ms
Output	
Collective error message	Power Rail
Output I, II, III, IV	channel 1, 2; relay
Contact loading	50 V AC/1 A/cos Φ> 0.7; 40 V DC/1 A resistive load
Minimum switch current	1 mA/24 V DC
Energized/De-energized delay	approx. 20 ms/approx. 20 ms
Mechanical life	10^8 switching cycles
Transfer characteristics	
Switching frequency	≤10 Hz
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2
Data for application in connection with Ex-areas	see page 107 for entity parameters
EC-Type Examination Certificate	PTB 00 ATEX 2083
Group, category, type of protection	⟨Ex⟩ II (1)GD [EEx ia] IIC [circuit(s) in zone 0/1/2]
Statement of conformity	TÜV 99 ATEX 1493 X
Group, category, type of protection, temperature classification	⟨Ex⟩ II 3G Ex nA nC IIC T4
FM approval	
Control drawing	116-0035
CSA approval	
Control drawing	116-0047

Features

- **2-channel isolated barrier**
- **24 V DC supply (Power Rail)**
- **Dry contact or NAMUR inputs**
- **2 x 2 relay contact outputs with AND logic**
- **Line fault detection (LFD)**
- **Reversible mode of operation**
- **Up to SIL2 acc. to IEC 61508**

Function

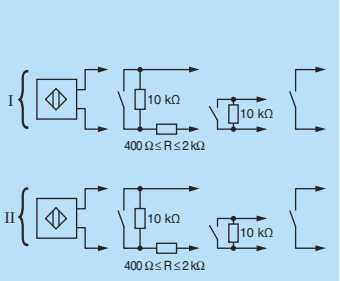
This isolated barrier is used for intrinsic safety applications. It transfers digital signals (NAMUR sensors/mechanical contacts) from a hazardous area to a safe area.

Each sensor or switch controls two form A normally open relay contacts for the safe area load. The normal output state can be reversed using switches S1 and S2. Switch S3 is used to enable or disable line fault detection of the field circuit.

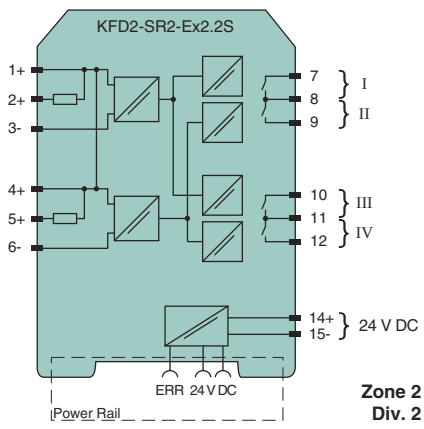
During an error condition, the relays revert to their de-energized state and the LEDs indicate the fault according to NAMUR NE44.

A unique collective error messaging feature is available when used with the Power Rail system.

Diagrams

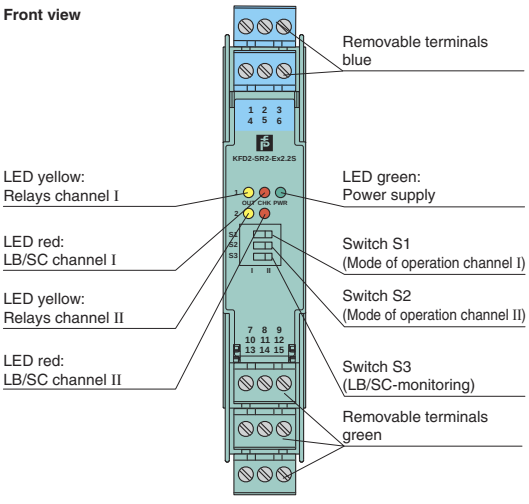


⟨Ex⟩ **Zone 0, 1, 2**
Div. 1, 2



Zone 2
Div. 2

Front view



Edition 219358 09/2011

Features

- **2-channel isolated barrier**
- **24 V DC supply (Power Rail)**
- **Dry contact or NAMUR inputs**
- **Passive transistor output, non-polarized**
- **Line fault detection (LFD)**
- **Reversible mode of operation**
- **Up to SIL2 acc. to IEC 61508**

Function

This isolated barrier is used for intrinsic safety applications. It transfers digital signals (NAMUR sensors/mechanical contacts) from a hazardous area to a safe area.

Each proximity sensor or switch controls a passive transistor output for the safe area load. The normal output state can be reversed using switch S1 for channel I and switch S2 for channel II. Switch S3 enables or disables line fault detection of the field circuit.

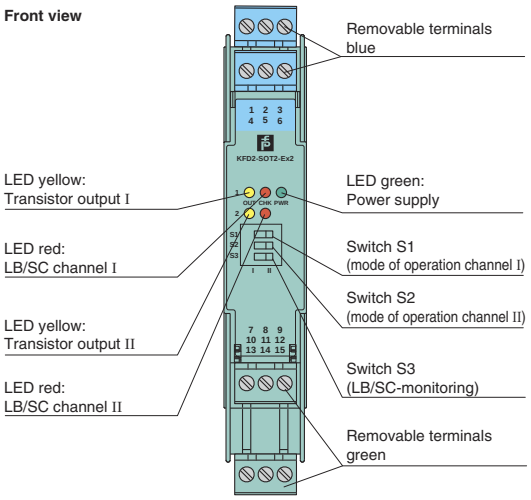
During an error condition, the transistors revert to their de-energized state and LEDs indicate the fault according to NAMUR NE44.

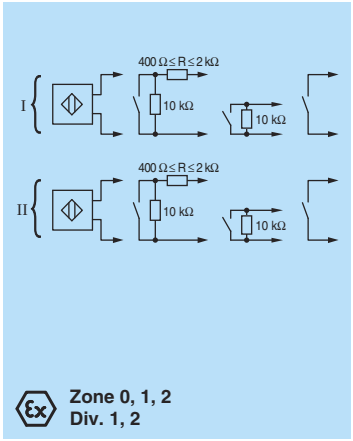
A unique collective error messaging feature is available when used with the Power Rail system.

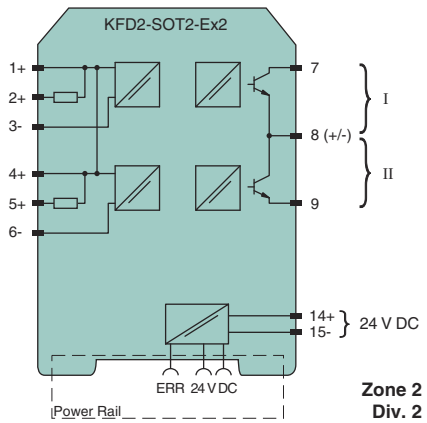
Technical data

Supply	
Rated voltage	20 ... 30 V DC
Input	
Rated values	acc. to EN 60947-5-6 (NAMUR)
Open circuit voltage/short-circuit current	approx. 8 V DC/approx. 8 mA
Switching point/switching hysteresis	1.2 ... 2.1 mA/approx. 0.2 mA
Lead monitoring	breakage I ≤0.1 mA, short-circuit I > 6 mA
Output	
Switching voltage	≤40 V
Switching current	≤100 mA, short-circuit protected
Collective error message	Power Rail
Signal level	1-signal: switching voltage - 2.5 V max. at 10 mA switching current or 3 V max. at 100 mA switching current 0-signal: switched off (off-state current ≤10 µA)
Output I, II	signal; electronic output, passive
Transfer characteristics	
Switching frequency	≤5 kHz
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2
Data for application in connection with Ex-areas	see page 107 for entity parameters
EC-Type Examination Certificate	PTB 00 ATEX 2035
Group, category, type of protection	Ⓔx II (1)GD [EEx ia] IIC [circuit(s) in zone 0/1/2]
EC-Type Examination Certificate	DMT 01 ATEX E 133
Group, category, type of protection	Ⓔx I (M1) [Ex ia] I
Statement of conformity	TÜV 99 ATEX 1499 X
Group, category, type of protection, temperature classification	Ⓔx II 3G Ex nA II T4
FM approval	
Control drawing	116-0035
CSA approval	
Control drawing	116-0047

Diagrams







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Technical data

Supply		
Rated voltage		loop powered
Power loss		< 1.05 W (≤30 V)
Input		
Rated voltage U_i		20 ... 35 V DC
Current		72 mA at 20 V input voltage, load = 220 Ω 50 mA at 35 V input voltage, load = 220 Ω
Output		
Internal resistor	R_i	≤282 Ω
Current	I_e	≤45 mA
Voltage	U_e	≥ 10 V
Open loop voltage	U_s	≥ 22.7 V
Output rated operating current		45 mA
Output signal		These values are valid for the rated operational voltage 20 ... 35 V DC.
Energized/De-energized delay		single operation: 300 µs/50 µs; periodical: 5 µs/50 µs
Ambient conditions		
Ambient temperature		-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications		
Protection degree		IP20
Mass		approx. 100 g
Dimensions		20 x 107 x 115 mm (0.8 x 4.2 x 4.5 in), housing type B1
Data for application in connection with Ex-areas		see page 107 for entity parameters
EC-Type Examination Certificate		BASEEFA 06 ATEX 0252
Group, category, type of protection		Ⓔx II (1)GD [Ex ia] IIC; [Ex iaD] [circuit(s) in zone 0/1/2/20/21/22] Ⓔx I (M1) [Ex ia] I
Statement of conformity		TÜV 99 ATEX 1499 X
Group, category, type of protection, temperature classification		Ⓔx II 3G Ex nA II T4
FM approval		
Control drawing		266-031FM-12 (cFMus)
UL approval		
Control drawing		116-0316 (cULus)
IECEx approval		IECEx BAS 06.0058

Features

- **1-channel isolated barrier**
- **24 V DC supply (loop powered)**
- **Current limit 45 mA at 10 V DC**
- **Up to SIL3 acc. to IEC 61508**

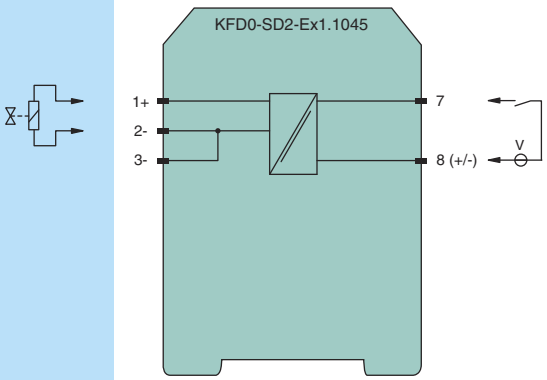
Function

This isolated barrier is used for intrinsic safety applications. It supplies power to solenoids, LEDs, and audible alarms located in a hazardous area.

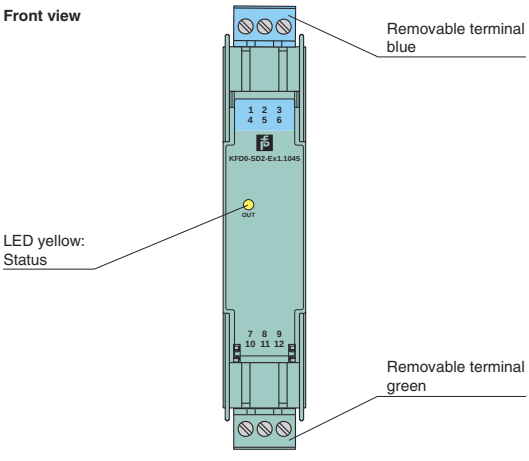
It is loop powered, so the available energy at the output is received from the input signal. The output signal has a resistive characteristic. As a result the output voltage and current are dependent on the load and the input voltage.

At full load, 10 V at 45 mA is available for the hazardous area application.

Diagrams



Ⓔx **Zone 0, 1, 2**
Div. 1, 2



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Features

- **1-channel isolated barrier**
- **24 V DC supply (Power Rail)**
- **Output 45 mA at 11.7 V DC**
- **Logic input, non-polarized**
- **Lead monitoring**
- **Up to SIL2 acc. to IEC 61508**

Function

This isolated barrier is used for intrinsic safety applications.

It supplies power to solenoids, LEDs, and audible alarms, located in a hazardous area.

It is controlled via a logic signal. The input has two defined states:
1-Signal = 16 V DC ... 30 V DC,
0-Signal = 0 V DC ... 5 V DC. The current consumption of the input is about 3 mA.

At full load, 11.7 V at 45 mA is available for the hazardous area application.

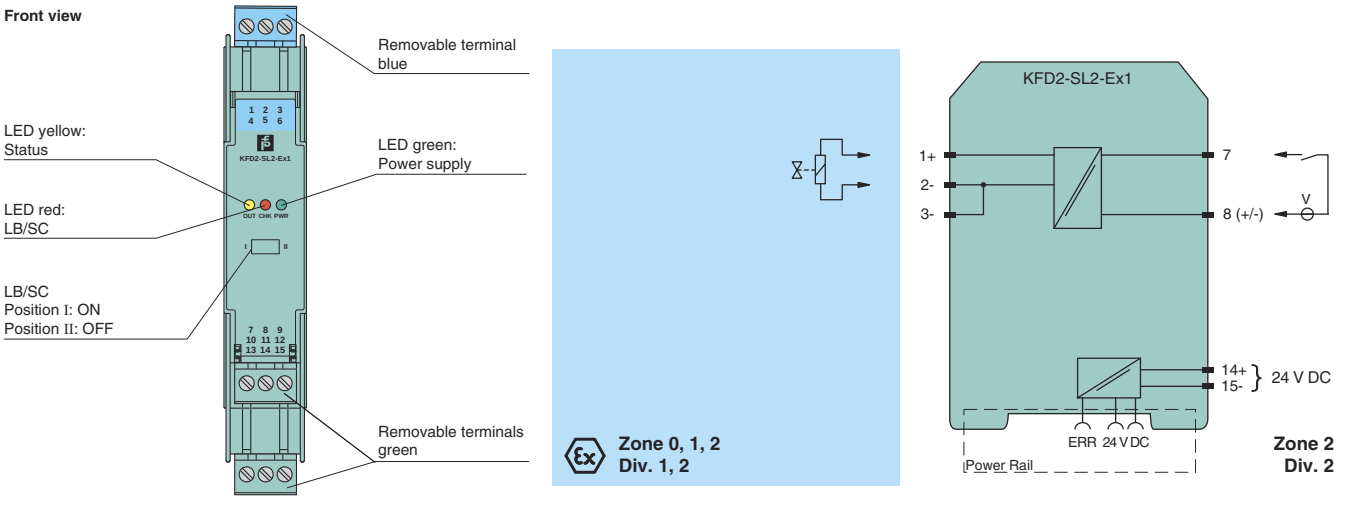
If the field impedance is > 10 kΩ for lead breakage or < 50 Ω for short circuits a line fault is detected.

A fault is signalized by LEDs acc. to NAMUR NE44 and a separate collective error message output.

Technical data

Supply		
Rated voltage		20 ... 30 V DC
Power consumption		≤1.7 W at 45 mA output current
Input		
Input current		approx. 3 mA at 24 V DC
Signal level		1-signal: 16 ... 30 V DC 0-signal: 0 ... 5 V DC
Output		
Internal resistor	R_i	272 Ω
Current	I_e	≤45 mA
Voltage	U_e	≥ 11.7 V
Open loop voltage	U_s	≥ 24 V
Output signal		These values are valid for the rated operational voltages from 20 ... 30 V DC.
Energized/De-energized delay		≤20 ms/≤20 ms
Line fault detection		signal at short-circuit R_B < 50 Ω, lead breakage R_B > 10 kΩ, test current < 650 µA
Ambient conditions		
Ambient temperature		-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications		
Protection degree		IP20
Mass		approx. 150 g
Dimensions		20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2
Data for application in connection with Ex-areas		see page 107 for entity parameters
EC-Type Examination Certificate		ZELM 00 ATEX 0024
Group, category, type of protection		⟨Ex⟩ II (1)GD [Ex ia] IIC; [Ex iaD] [circuit(s) in zone 0/1/2/20/21/22]
Statement of conformity		TÜV 02 ATEX 1820 X
Group, category, type of protection, temperature classification		⟨Ex⟩ II 3G Ex nA II T4
FM approval		
Control drawing		16-548FM-12
IECEx approval		IECEx TUN 04.0001
Approved for		[Ex ia] IIC , [Ex iaD]

Diagrams



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Technical data

Supply		
Rated voltage		20 ... 30 V DC
Power consumption		≤3.3 W at 45 mA output current
Input		
Input current		approx. 3 mA at 24 V DC
Signal level		1-signal: 16 ... 30 V DC 0-signal: 0 ... 5 V DC
Output		
Internal resistor	R_i	272 Ω
Current	I_e	≤45 mA
Voltage	U_e	≥ 11.7 V
Open loop voltage	U_s	≥ 24 V
Output signal		These values are valid for the rated operational voltages from 20 ... 30 V DC.
Energized/De-energized delay		≤20 ms/≤20 ms
Line fault detection		signal at short-circuit R_B < 50 Ω, lead breakage R_B > 10 kΩ, test current < 650 µA
Ambient conditions		
Ambient temperature		-20 ... 50 °C (-4 ... 122 °F)
Mechanical specifications		
Protection degree		IP20
Mass		approx. 150 g
Dimensions		20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in) , housing type B2
Data for application in connection with Ex-areas		see page 107 for entity parameters
EC-Type Examination Certificate		ZELM 00 ATEX 0024
Group, category, type of protection		⟨Ex⟩ II (1)GD [Ex ia] IIC; [Ex iaD] [circuit(s) in zone 0/1/2/20/21/22]
Statement of conformity		TÜV 02 ATEX 1820 X
Group, category, type of protection, temperature classification		⟨Ex⟩ II 3G Ex nA II T4
FM approval		
Control drawing		16-548FM-12
IECEx approval		IECEx TUN 04.0001
Approved for		[Ex ia] IIC , [Ex iaD]

Features

- **2-channel isolated barrier**
- **24 V DC supply (Power Rail)**
- **Output 45 mA at 11.7 V DC**
- **Logic input, non-polarized**
- **Lead monitoring**
- **Up to SIL2 acc. to IEC 61508**

Function

This isolated barrier is used for intrinsic safety applications.

It supplies power to solenoids, LEDs, and audible alarms, located in a hazardous area.

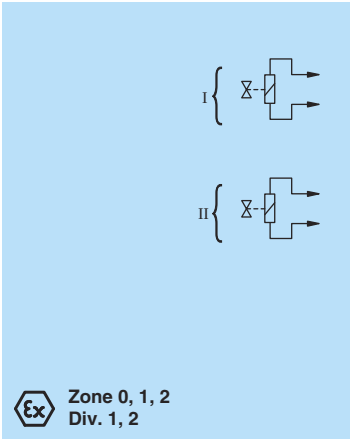
It is controlled via a logic signal. The input has two defined states:
1-Signal = 16 V DC ... 30 V DC,
0-Signal = 0 V DC ... 5 V DC. The current consumption of the input is about 3 mA.

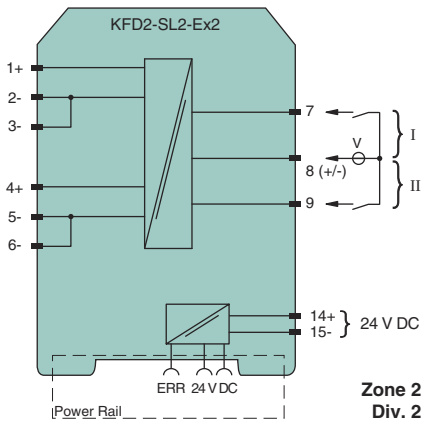
At full load, 11.7 V at 45 mA is available for the hazardous area application.

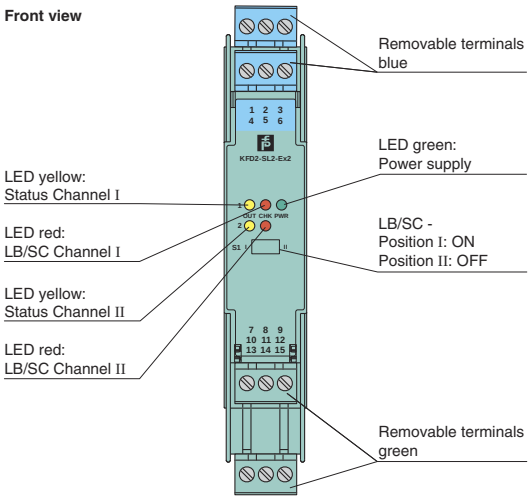
If the field impedance is > 10 kΩ for lead breakage or < 50 Ω for short circuits a line fault is detected.

A fault is signalized by LEDs acc. to NAMUR NE44 and a separate collective error message output.

Diagrams







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Features

- **2-channel isolated barrier**
- **24 V DC supply (Power Rail)**
- **Output 45 mA at 11.7 V DC**
- **Logic input, non-polarized**
- **Up to SIL2 acc. to IEC 61508**

Function

This isolated barrier is used for intrinsic safety applications. It supplies power to solenoids, LEDs, and audible alarms.

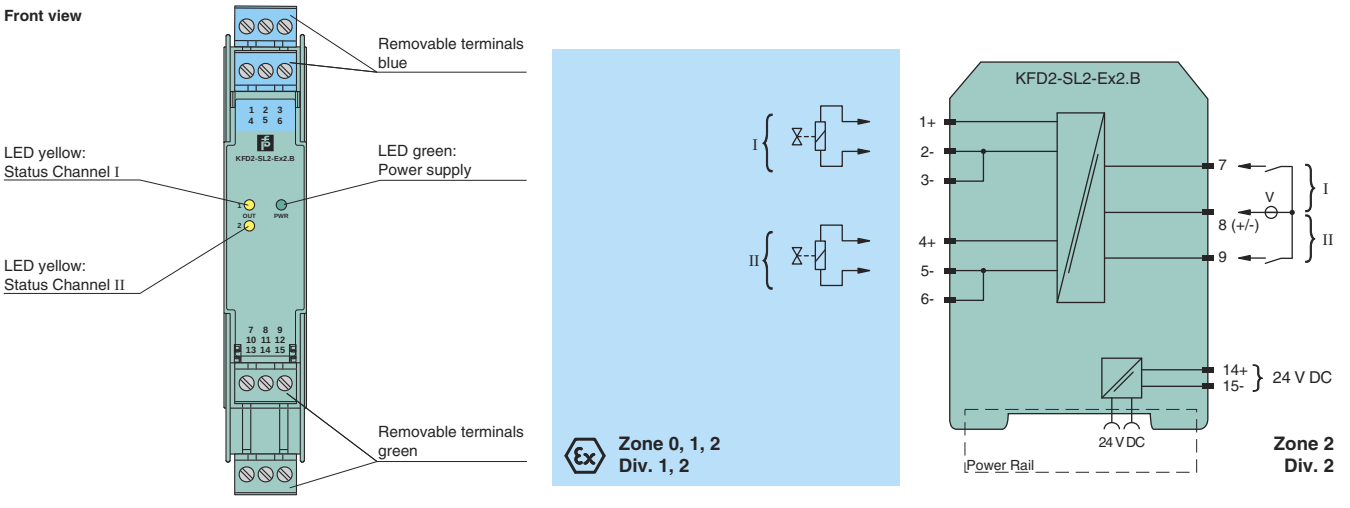
It is controlled by means of a logic circuit. Voltage signals in a range of 16 V DC ... 30 V DC are accepted as 1-signal. The 0-signal must be within a range of 0 V DC ... 5 V DC. The current consumption of the logic inputs is about 3 mA each.

At full load, 11.7 V at 45 mA is available for the hazardous area load.

Technical data

Supply		
Rated voltage		20 ... 30 V DC
Power consumption		≤3.3 W at 45 mA output current
Input		
Input current		approx. 3 mA at 24 V DC
Signal level		1-signal: 16 ... 30 V DC 0-signal: 0 ... 5 V DC
Output		
Internal resistor	R_i	272 Ω
Current	I_e	≤45 mA
Voltage	U_e	≥ 11.7 V
Open loop voltage	U_s	≥ 24 V
Output rated operating current		45 mA
Output signal		These values are valid for the rated operational voltages from 20 ... 30 V DC.
Energized/De-energized delay		≤20 ms/≤20 ms
Ambient conditions		
Ambient temperature		-20 ... 50 °C (-4 ... 122 °F)
Mechanical specifications		
Protection degree		IP20
Mass		approx. 150 g
Dimensions		20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2
Data for application in connection with Ex-areas		see page 107 for entity parameters
EC-Type Examination Certificate		ZELM 00 ATEX 0024
Group, category, type of protection		Ⓔx II (1)GD [Ex ia] IIC; [Ex iaD] [circuit(s) in zone 0/1/2/20/21/22]
Statement of conformity		TÜV 02 ATEX 1820 X
Group, category, type of protection, temperature classification		Ⓔx II 3G Ex nA II T4
FM approval		
Control drawing		16-548FM-12
IECEx approval		IECEx TUN 04.0001
Approved for		[Ex ia] IIC , [Ex iaD]

Diagrams



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Technical data

Supply	
Rated voltage	20 ... 35 V DC
Power loss	1.9 W
Power consumption	≤2.8 W
Input	
Input signal	0/4 ... 20 mA
Available voltage	≥ 16 V at 20 mA, terminals 1+, 3
Output	
Load	0 ... 550 Ω
Output signal	0/4 ... 20 mA (overload > 25 mA)
Ripple	≤50 μA_{rms}
Transfer characteristics	
Deviation	at 20 °C (68 °F), 0/4 ... 20 mA ≤10 µA incl. calibration, linearity, hysteresis, loads and fluctuations of supply voltage
Influence of ambient temperature	0.25 µA/K
Frequency range	field side into the control side: band width with 1 V_{pp} signal 0 ... 7.5 kHz (-3 dB) safe area to hazardous area: band width with 1 V_{pp} signal 0.3 ... 7.5 kHz (-3 dB)
Rise time	20 µs
Start-up time	200 µs
De-energized delay	20 µs
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2
Data for application in connection with Ex-areas	see page 107 for entity parameters
EC-Type Examination Certificate	BAS 99 ATEX 7025
Group, category, type of protection	⟨Ex⟩ II (1)GD, I (M1), [Ex ia] IIC, [Ex iaD], [Ex ia] I (-20 °C ≤T_{amb} ≤60 °C) [circuit(s) in zone 0/1/2]
Statement of conformity	TÜV 99 ATEX 1499 X
Group, category, type of protection, temperature classification	⟨Ex⟩ II 3G Ex nA II T4 [device in zone 2]
UL approval	
Control drawing	116-0173 (cULus)
IECEx approval	IECEx BAS 04.0015
Approved for	[zone 0] [Ex ia] IIC, [Ex iaD], [Ex ia] I

Features

- **2-channel isolated barrier**
- **24 V DC supply (Power Rail)**
- **Input 2-wire SMART transmitters**
- **Output 0/4 mA ... 20 mA**
- **Terminals with test points**
- **Up to SIL2 acc. to IEC 61508**

Function

This isolated barrier is used for intrinsic safety applications.

The device supplies 2-wire SMART transmitters in a hazardous area.

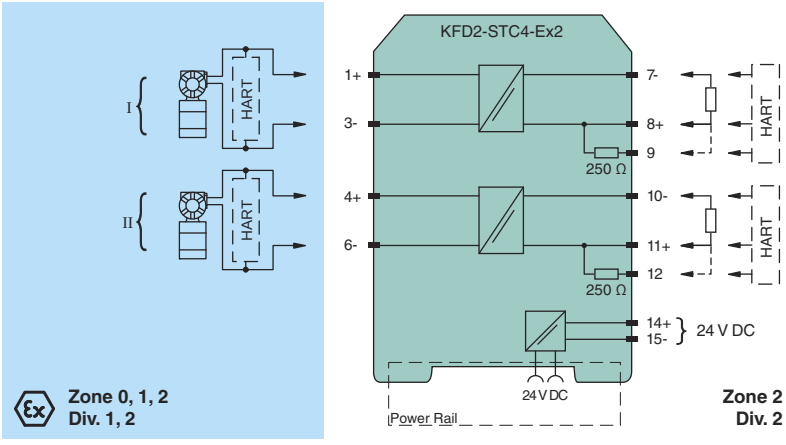
It transfers the analog input signal to the safe area as an isolated current value.

Digital signals may be superimposed on the input signal in the hazardous or safe area and are transferred bi-directionally.

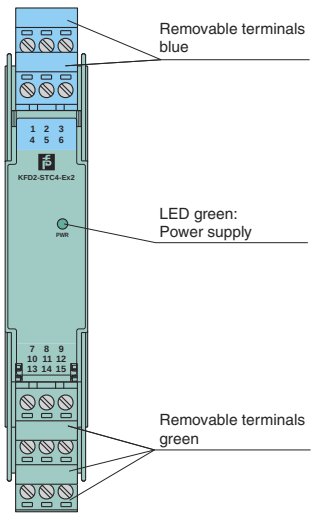
If the HART communication resistance in the loop is too low, the internal resistance of 250 Ω between terminals 8, 9 and 11, 12 can be used.

Test sockets for the connection of HART communicators are integrated into the terminals of the device.

Diagrams



Front view



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KFD2-UT2-Ex2

Universal Temperature Converter

Features

- **2-channel isolated barrier**
- **24 V DC supply (Power Rail)**
- **TC, RTD, potentiometer or voltage input**
- **Current output 0/4 mA ... 20 mA**
- **Sink or source mode**
- **Configurable by PACT*ware*™**
- **Line fault (LFD) and sensor burnout detection**
- **Up to SIL2 acc. to IEC 61508**

Function

This isolated barrier is used for intrinsic safety applications. It is designed to connect RTDs, thermocouples, or potentiometers in the hazardous area, and provide a proportional 0/4 mA ... 20 mA signal to the safe area.

The barrier offers 3-port isolation between input, output, and power supply.

A removable terminal block K-CJC-** is available for thermocouples when internal cold junction compensation is desired.

A fault is indicated by a red flashing LED per NAMUR NE44 and user-configured fault outputs.

The unit is easily programmed with the **PACT*ware*™** configuration software.

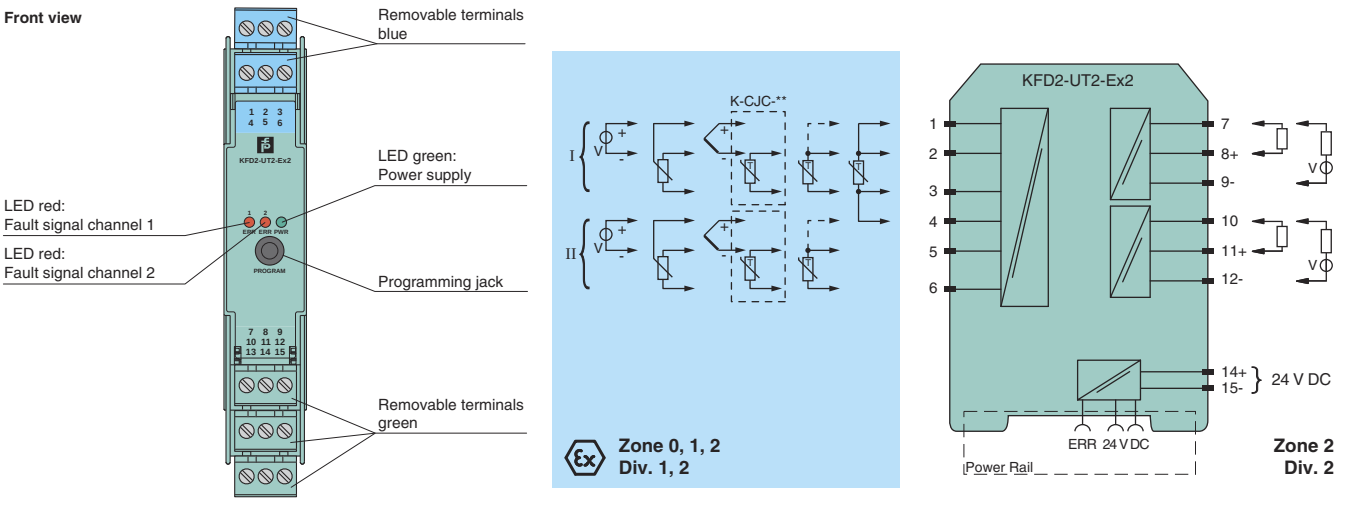
A collective error messaging feature is available when used with the Power Rail system.

For additional information, refer to the manual and www.pepperl-fuchs.com.

Technical data

Supply	
Rated voltage	20 ... 30 V DC
Power loss/power consumption	≤1.5 W/1.5 W
Input	
RTD	type Pt10, Pt50, Pt100, Pt500, Pt1000 (EN 60751: 1995) type Pt10GOST, Pt50GOST, Pt100GOST, Pt500GOST, Pt1000GOST (6651-94) type Cu10, Cu50, Cu100 (P50353-92) type Ni100 (DIN 43760)
Measuring current	approx. 200 µA with RTD
Types of measuring	2-, 3-wire connection
Lead resistance	≤50 Ω per lead
Thermocouples	type B, E, J, K, N, R, S, T (IEC 584-1: 1995) type L (DIN 43710: 1985) type TXK, TXKH, TXA (P8.585-2001)
Cold junction compensation	external and internal
Voltage	selectable within the range -100 ... 100 mV
Output	
Output I, II	analog current output
Current range	0 ... 20 mA or 4 ... 20 mA
Fault signal	downscale 0 or 2 mA, upscale 21.5 mA (acc. NAMUR NE43)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 130 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in), housing type B2
Data for application in connection with Ex-areas	see page 107 for entity parameters
EC-Type Examination Certificate	CESI 04 ATEX 143
Group, category, type of protection	⟨Ex⟩ II (1)GD, I (M1), [Ex ia] IIC, [Ex iaD], [Ex ia] I (-20 °C ≤T_{amb} ≤60 °C) [circuit(s) in zone 0/1/2]
Statement of conformity	TÜV 02 ATEX 1797 X
Group, category, type of protection, temperature classification	⟨Ex⟩ II 3G Ex nA II T4 [device in zone 2]
UL approval	
Control drawing	116-0316
CSA approval	
Control drawing	366-024CS-12 (cCSAus)
IECEx approval	IECEx TUN 07.0003
Approved for	[zone 0] [Ex ia] IIC, [Ex iaD], [Ex ia] I

Diagrams



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Technical data

Supply	
Rated voltage	10 ... 35 V DC
Power loss	0.8 W
Power consumption	1 W at 20 mA
Input	
Voltage drop U_d	approx. 4 V or internal resistance 200 Ω at 20 mA
Input resistance	> 100 kΩ, when wiring resistance in the field > 16 V (equivalent to 800 Ω at 20 mA)
Current	4 ... 20 mA limited to approx. 25 mA
Output	
Current	4 ... 20 mA
Load	100 ... 700 Ω
Voltage	≥ 14 V at 20 mA
Transfer characteristics	
Deviation	
After calibration	at 20 °C (68 °F): 10 µA incl. non-linearity, calibration, hysteresis, supply and load changes
Influence of ambient temperature	1 µA/K
Rise time	< 100 µs (bounce from 10 ... 90 %)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2
Data for application in connection with Ex-areas	see page 107 for entity parameters
EC-Type Examination Certificate	BAS 00 ATEX 7240
Group, category, type of protection	⟨Ex⟩ II (1)GD, I (M1), [Ex ia] IIC, [Ex iaD], [Ex ia] I (-20 °C ≤T_{amb} ≤60 °C) [circuit(s) in zone 0/1/2]
Statement of conformity	TÜV 99 ATEX 1499 X
Group, category, type of protection, temperature classification	⟨Ex⟩ II 3G Ex nA II T4 [device in zone 2]
UL approval	
Control drawing	116-0173 (cULus)
IECEx approval	IECEx BAS 04.0014
Approved for	[zone 0] [Ex ia] IIC, [Ex iaD], [Ex ia] I

Features

- **1-channel isolated barrier**
- **24 V DC supply (Power Rail)**
- **Current output up to 700 Ω load**
- **HART I/P and valve positioner**
- **Line fault detection (LFD)**
- **Accuracy 0.05 %**
- **Terminals with test points**
- **Up to SIL2 acc. to IEC 61508**

Function

This isolated barrier is used for intrinsic safety applications. It drives SMART I/P converters, electrical valves, and positioners in hazardous areas.

Digital signals are superimposed on the analog values at the field or control side and are transferred bi-directionally.

Current transferred across the DC/DC converter is repeated at terminals 1 and 2.

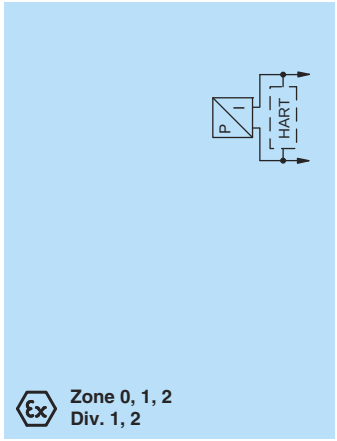
An open and shorted field circuit presents a high input impedance to the control side to allow line fault detection by control system.

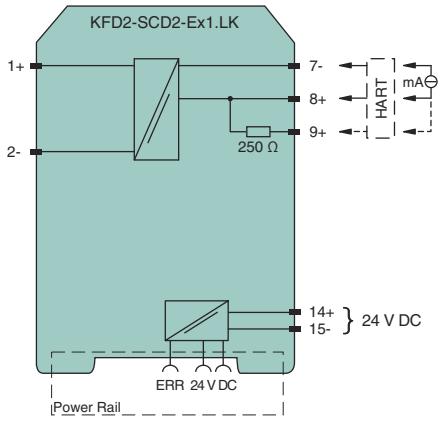
If the loop resistance for the digital communication is too low, an internal resistor of 250 Ω between terminals 8 and 9 is available, which may be used as the HART communication resistor.

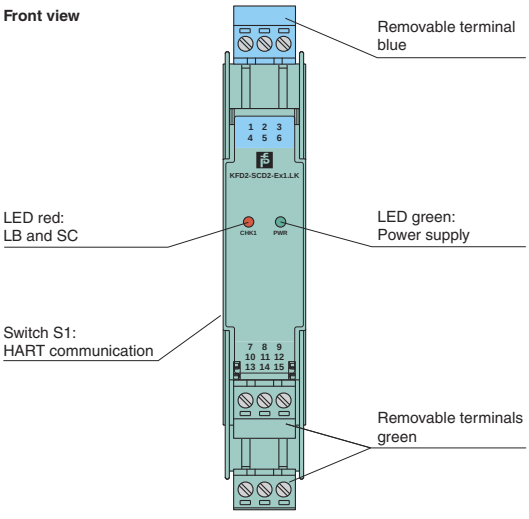
Sockets for the connection of a HART communicator are integrated into the terminals of the device.

A unique collective error messaging feature is available when used with the Power Rail system.

Diagrams







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Features

- **2-channel isolated barrier**
- **24 V DC supply (Power Rail)**
- **Current output up to 700 Ω load**
- **HART I/P and valve positioner**
- **Line fault detection (LFD)**
- **Accuracy 0.05 %**
- **Terminals with test points**
- **Up to SIL2 acc. to IEC 61508**

Function

This isolated barrier is used for intrinsic safety applications. It drives SMART I/P converters, electrical valves, and positioners in hazardous areas.

Digital signals are superimposed on the analog values at the field or control side and are transferred bi-directionally.

Current transferred across the DC/DC converter is repeated at terminals 1, 2 and 4, 5.

An open and shorted field circuit presents a high input impedance to the control side to allow line fault detection by control system.

If the loop resistance for the digital communication is too low, an internal resistor of 250 W between terminals 8, 9 and 11, 12 is available, which may be used as the HART communication resistor.

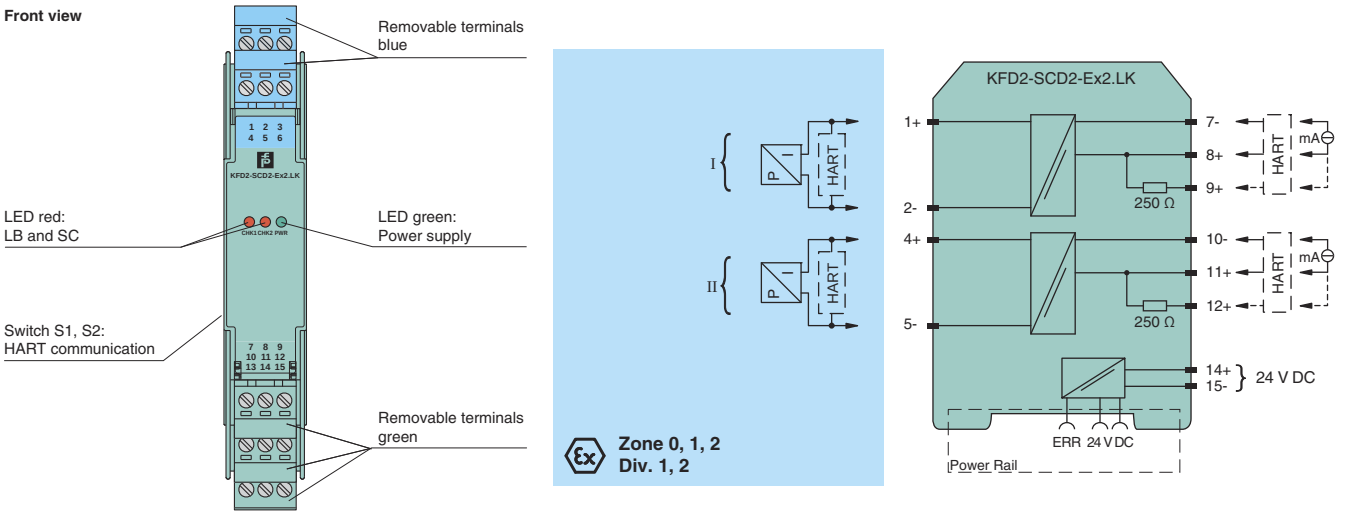
Sockets for the connection of a HART communicator are integrated into the terminals of the device.

A unique collective error messaging feature is available when used with the Power Rail system.

Technical data

Supply	
Rated voltage	10 ... 35 V DC
Power loss	1.4 W
Power consumption	1.8 W at 20 mA
Input	
Voltage drop U_d	approx. 4 V or internal resistance 200 Ω at 20 mA
Input resistance	> 100 kΩ, when wiring resistance in the field > 16 V (equivalent to 800 Ω at 20 mA)
Current	4 ... 20 mA limited to approx. 25 mA
Output	
Current	4 ... 20 mA
Load	100 ... 700 Ω
Voltage	≥ 14 V at 20 mA
Transfer characteristics	
Deviation	
After calibration	at 20 °C (68 °F): 10 µA incl. non-linearity, calibration, hysteresis, supply and load changes
Influence of ambient temperature	1 µA/K
Rise time	< 100 µs (bounce from 10 ... 90 %)
Ambient conditions	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 124 x 115 mm (0.8 x 4.9 x 4.5 in), housing type B2
Data for application in connection with Ex-areas	see page 107 for entity parameters
EC-Type Examination Certificate	BAS 00 ATEX 7240
Group, category, type of protection	Ⓔx II (1)GD, I (M1), [Ex ia] IIC, [Ex iaD], [Ex ia] I (-20 °C ≤T_{amb} ≤60 °C) [circuit(s) in zone 0/1/2]
Statement of conformity	TÜV 99 ATEX 1499 X
Group, category, type of protection, temperature classification	Ⓔx II 3G Ex nA II T4 [device in zone 2]
UL approval	
Control drawing	116-0173 (cULus)
IECEx approval	IECEx BAS 04.0014
Approved for	[zone 0] [Ex ia] IIC, [Ex iaD], [Ex ia] I

Diagrams



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ATEX Entity Parameters

Model Number	Terminals	U_o (V)	I_o (mA)	P_o (mW)
KFD0-SD2-Ex1.1045	1, 2	25.2	93	590
KFD2-SCD2-Ex1.LK	1, 2	25.2	93	585
KFD2-SCD2-Ex2.LK	1, 2; 4, 5	25.2	93	585
KFD2-SL2-Ex1	1, 2, 3	28	110	770
KFD2-SL2-Ex2	1, 2, 3; 4, 5, 6	28	110	770
KFD2-SL2-Ex2.B	1, 2, 3; 4, 5, 6	28	110	770
KFD2-SOT2-Ex2	1, 2, 3; 4, 5, 6	10.5	13	34
KFD2-SR2-Ex2.2S	1, 2, 3; 4, 5, 6	10.5	13	34
KFD2-STC4-Ex2	1, 3; 4, 6	25.2	93	586
KFD2-UT2-Ex2	1, 2, 3, 4, 5, 6	9	22	50

CSA Entity Parameters

Model Number	Terminals	V_{oc} (V)	I_{sc} (mA)
KFD2-SOT2-Ex2	1, 3, 2, 3; 4, 6, 5, 6	10.5	13.0
KFD2-SR2-Ex2.2S	1, 3, 2, 3; 4, 6, 5, 6	12.9	19.8
KFD2-UT2-Ex2	1, 2, 3, 4, 5, 6	9	22

FM Entity Parameters

Model Number	Terminals	V_{oc} (V)	I_{sc} (mA)	V_t (V)	I_t (mA)
KFD0-SD2-Ex1.1045	1, 2	25.2	93	–	–
KFD2-SL2-Ex1	1, 2, 3	28	110	–	–
KFD2-SL2-Ex2	1, 2, 3; 4, 5, 6	28	110	–	–
KFD2-SL2-Ex2.B	1, 2, 3; 4, 5, 6	28	110	–	–
KFD2-SOT2-Ex2	1, 3; 2, 3; 4, 6; 5, 6	12.9	19.8	–	–
KFD2-SR2-Ex2.2S	1, 3; 2, 3; 4, 6; 5, 6	12.9	19.8	–	–

UL Entity Parameters

Model Number	Terminals	V_{oc} (V)	I_{sc} (mA)	V_t (V)	I_t (mA)
KFD0-SD2-Ex1.1045	1, 2, 3	25.2	93	–	–
KFD2-SCD2-Ex1.LK	1, 2	25.2	93	–	–
KFD2-SCD2-Ex2.LK	1, 2; 4, 5	25.2	93	–	–
KFD2-STC4-Ex2	1, 3; 4, 6	25.2	93	–	–
KFD2-UT2-Ex2	1, 2, 3; 4, 5, 6	9	22	–	–

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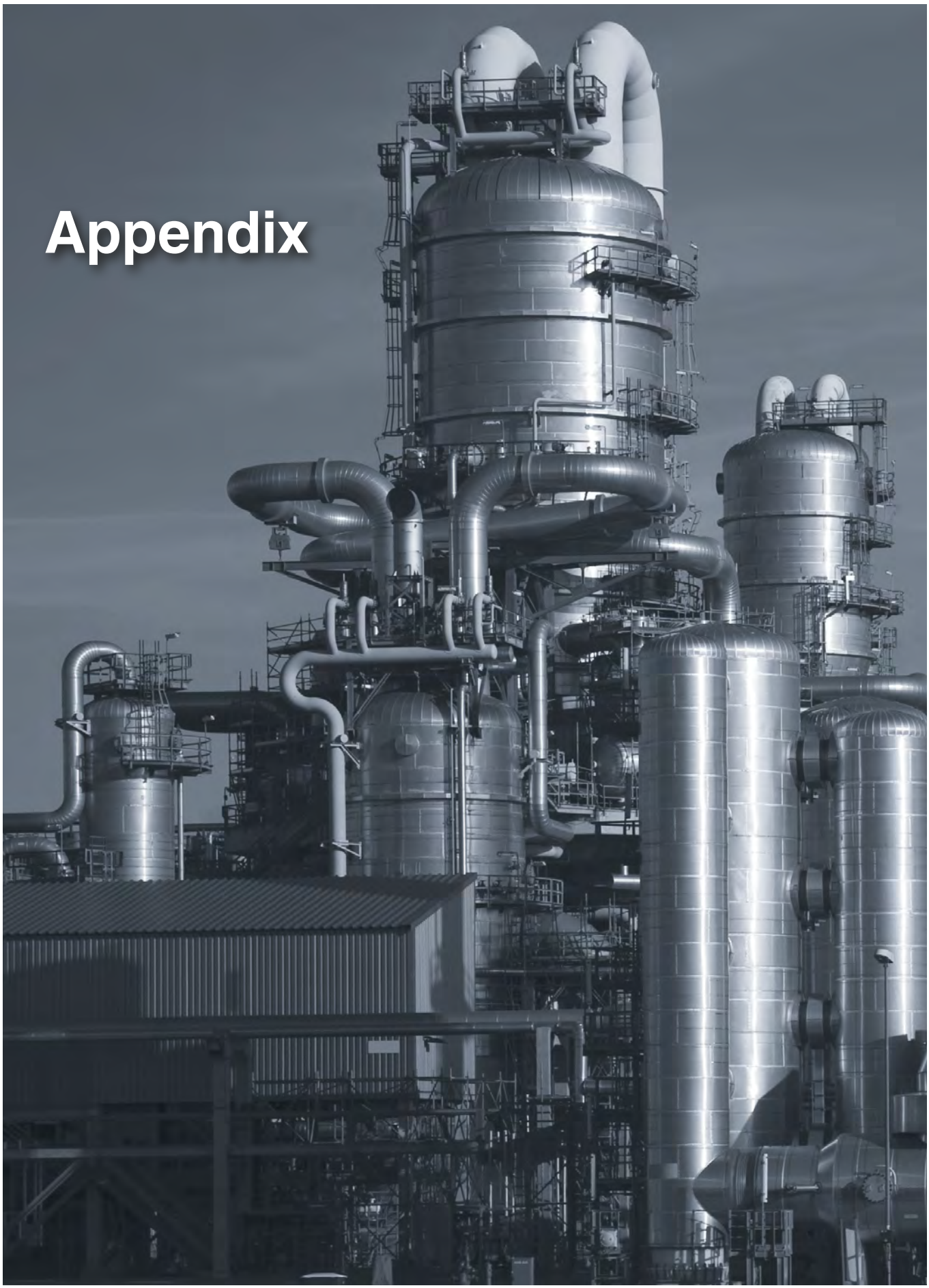
Appendix



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A

Active Transistor Output

A transistor that has either the emitter or the collector connected to an internal power source.

Active Zener Barrier

A Zener Barrier with additional active components

(i. e., transistors, integrated circuits, etc.) that provides special functions or features.

AIT

Abbreviation for autogenous ignition temperature.

Amplifier

A device that enables an input signal to control power from a source independent of the signal and thus be capable of delivering an output that bears some relationship to, and is generally greater than, the input signal.

Analog Device

An automatic computing device that operates in terms of continuous variation of some physical quantities, such as electrical voltages and currents, mechanical shaft rotations or displacements, and which is used primarily to solve differential equations.

Analog Input

Analog type signal from a hazardous area instrument

(i. e., transmitter) to the safe area controller.

Analog Output

Analog type signal from the safe area controller to the hazardous area instrument (i. e., I/P positioner).

ANSI

Acronym for American National Standards Institute.

API

Acronym for American Petroleum Institute.

Approved

Acceptable to the authority having jurisdiction.

Arcing Device

A device, such as make/ break component, that under normal conditions produces an arc with energy sufficient to cause ignition of an ignitable mixture. See also "non-incendive circuit."

Associated Apparatus

Apparatus in which the circuits are not necessarily intrinsically safe themselves, but which affect the energy in the intrinsically safe circuits and are relied upon to maintain intrinsic safety. Associated electrical apparatus may be either

1. electrical apparatus that have an alternative type of protection, for use in the appropriate hazardous (classified) location; or
2. electrical apparatus that are not protected and therefore cannot be used within a hazardous (classified) location.

Associated Non-incendive Field Wiring Apparatus

Apparatus in which the circuits are not necessarily non-incendive themselves but that affect the energy in non-incendive field wiring circuits and are relied upon to maintain non-incendive energy levels.

Associated Safe-Location Equipment

Equipment designed to form part of an intrinsically safe system, in which not all the circuits are of an intrinsically safe system, in which not all the circuits are intrinsically safe, but which affects the safety of the intrinsically safe system of which it forms a part. Such equipment may not be installed in a hazardous location unless provided with appropriate protection, such as the installation of an explosion-proof enclosure in a Class I hazardous location. Examples of associated safe-location equipment are

1. a line-connected power unit supplying power to intrinsically safe equipment in a hazardous location and
2. a recorder in a safe location actuated by a transducer situated in a hazardous location.

Authority Having Jurisdiction

The organization, office, or individual that has the responsibility and authority for approving equipment, installations, or procedures.

Autogenous Ignition Temperature

The temperature at which a mixture of a specified gas or vapor in air will spontaneously ignite under specified test conditions, without any source of ignition.

Automation System

The system that provides overall control and monitoring functions of a specific process or application. Generally consists of a network of computers, controllers, and I/O modules.

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B

Barrier Specification

The typical way of describing a barrier, for example 28 V, 300 Ω, 93 mA. This is a reference to the maximum voltage of the terminating zener diode during the period of time it takes for the fuse to break, the minimum value of the terminating resistor and the resulting maximum short circuit current. The description does not refer to the working voltage or the end-to-end resistance, but is purely an indication of the potential fault energy that could be generated in the hazardous area.

BASEEFA

Acronym for British Approvals Service for Electrical Equipment in Flammable Atmospheres. A governmental body in the United Kingdom that has the authority to accept or reject the design of an electrical apparatus based on recognized safety standards.

BSI

Acronym for British Standards Institute.

C

Capacitance

The property of a system of conductors and dielectrics that permits the storage of electrically separated charges when potential differences exist between the conductors. The greater the capacitance, the greater the charge that can be stored. The practical difference between capacitance and inductance in an intrinsically safe circuit is minimal. Both store energy but a capacitor will release energy when a circuit is made and an inductor will release energy when the circuit is broken.

CENELEC

Acronym for European Electrotechnical Committee for Standardization. The standard for the European Economic Community (EEC) nations and the European Free Trade Association. Legally, certification to the CENELEC standard is sufficient to permit sale in any European country. If IEC standards are available, CENELEC tries to utilize them because these standards are already adopted by the European community.

Certified Equipment

Equipment that has been evaluated by a recognized testing agency and confirmed to be in compliance with the applicable standard(s).

CESI

Acronym for Centro Elettronico Sperimentale Italiano. A governmental body in Italy that has the authority to accept or reject the design of an electrical apparatus based on recognized safety standards.

Class I Location

A location in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

Class I, Division 1 Location

A location (1) in which ignitable concentrations of flammable gases or vapors can exist under normal operating conditions; (2) in which ignitable concentrations of such gases or vapors may exist frequently because of repair or maintenance operations or because of leakage; or (3) in which breakdown or faulty operation of equipment or processes might release ignitable concentrations of flammable gases or vapors and might also cause simultaneous failure of electrical equipment that could act as a source of ignition.

Class I, Division 2 Location

A location (1) in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment; (2) in which ignitable concentrations of gases or vapors are normally prevented by positive mechanical ventilation and might become hazardous through failure or abnormal operation of the ventilating equipment; or (3) that is adjacent to a Class I, Division 1 location and to which ignitable concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided. Electrical conduits and their associated enclosures separated from process fluids by a single seal or barrier are classified as a Class I, Division 2 location if the outside of the conduit and enclosures is a non-hazardous (unclassified) location.

Class II Location

A location that is hazardous because of the presence of combustible dust.

Class II, Division 1 Location

A location (1) in which combustible dust is in the air under normal operating conditions in quantities sufficient to produce explosive or ignitable mixtures; (2) in which mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced and might also provide a source of ignition through simultaneous (the word "simultaneous" is not included in the Canadian definition) failure of electric equipment, operation of protection devices, or from other causes; or (3) in which combustible dusts of an electrically conductive nature may be present in hazardous quantities.

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Class II, Division 2 Location

A location in which combustible dust is not normally in the air in quantities sufficient to produce explosive or ignitable mixtures and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus, but combustible dust may be in suspension in the air as a result of infrequent malfunctioning of handling or processing equipment and where combustible dust accumulations on, in, or in the vicinity of the electrical or may be ignitable by abnormal operation or failure of electrical equipment.

Class III Location

A location that is hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

Class III, Division 1 Location

A location in which easily ignitable fibers or materials producing flyings are handled, manufactured, or used.

Class III, Division 2 Location

A location in which easily ignitable fibers are stored or handled (except in the process of manufacture).

Clearance Distance

The shortest distance measured in air between conductive parts.

Code of Practice

An international term referring to a document that describes basic safety features and methods of protection and recommends the selection, installation, and maintenance procedures that should be followed to ensure the safe use of electrical apparatus.

Converter

A type of isolated barrier that receives a signal from the hazardous area instrument (i. e. transmitter, thermocouples, etc.) and converts it into an equivalent signal (i. e. 4 mA ... 20 mA, 1 V ... 5 V, etc.).

Control Drawing

A drawing or other document provided by the manufacturer of the intrinsically safe or associated apparatus that details the allowed interconnections between the intrinsically safe and associated apparatus.

CSA

Acronym for Canadian Standards Association. A third party certification agency headquartered in Canada and recognized by OSHA as a Nationally Recognized Test Laboratory in the United States. The presence of CSA, UL, or FM certification marks on equipment is normally sufficient to the local inspector that the product is designed to recognized safety standards.

D

Definition of Contamination Level 2 per EN 50178

Under normal circumstances, only non-conductive contamination occurs. Occasionally however, short-term conductance may be expected through condensation when the device is not being operated. This applies to the immediate surrounding conditions of the electronic device.

Digital Input

Signal from a hazardous area instrument that is an on/off type electrical input to the safe area (i. e., contact closure, proximity sensor).

Digital Output

On/Off type signal from the safe area to the hazardous area (i. e., signal to a solenoid or LED cluster).

Distance Through Casting Compound

The shortest distance between two conductive parts separated by a casting compound.

Distance Through Solid Insulation

The shortest distance between two conductive parts separated by solid insulation.

Driver

A type of active or transformer isolated barrier that receives a signal from a safe area source (i. e., DCS, process controller, etc.) and drives that signal to the hazardous area instrument (i. e., I/P positioner).

Dust, Combustible

Dust that (when mixed with air in certain proportions) can be ignited and will propagate a flame. The combustible properties of dust are dependent upon test conditions and dust particle size, chemical structure, and other particle characteristics.

Dust-Ignition Proof

A term used in the United States to describe an enclosure that will exclude ignitable amounts of dusts that might affect performance or rating and that, when installed and protected in accordance with the original design intent, will not permit arcs, sparks, or heat otherwise generated or liberated inside the enclosure to cause ignition of exterior accumulations or atmospheric suspensions of a specified dust.

Dust-Protected Enclosure

An international term describing an enclosure in which the ingress of dust is not totally prevented, but dust does not enter in sufficient quantity to interfere with the safe operation of the equipment or accumulate in a position within the enclosure where it is possible to cause an ignition hazard.

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Dust-Tight

An enclosure so constructed that dust will not enter the enclosing case under specified test conditions.

E

EC-Type Examination Certificate

The manufacturer certifies that the product meets the fundamental safety requirements under EC regulations by the application of a registration number to this product.

The following apply to Pepperl+Fuchs products:

Regulations:

73/23/EWG	Low Voltage Directive
89/336/EWG	EMC Directive
89/392/EWG	Machine Directive
94/9/EG	Devices and Safety Systems for Hazardous Areas

Encapsulation

An international term describing a type of protection in which the parts that could ignite an explosive atmosphere by either sparking or heating are enclosed in an encapsulant in such a way that this explosive atmosphere cannot be ignited. This type of protection is referred to by CENELEC as Ex m in Standard EN 60079-18.

End-to-End Resistance

The resistance between both ends of a barrier channel. It is the sum of the resistor itself and the resistance of the fuse at an ambient temperature of 20 °C.

Entity Concept

The entity concept provides more flexibility in selecting equipment to form an intrinsically safe system. The entity concept allows the user to identify acceptable combinations of intrinsically safe apparatus and associated apparatus that have not been examined as a system.

Entity Parameters

The four categories that are set by the certification agency in order to properly match the intrinsic safety barrier to the hazardous area instrument. These four parameters are voltage, current, capacitance and inductance.

Ex d

Designation for the flame-proof (explosion containment) method of protection.

Ex e

Designation for the increased safety (prevention) method of protection.

Ex i

Designation for the intrinsic safety (prevention) method of protection. This method consists of two categories – ia and ib.

Ex ia

This intrinsic safety category is limited to low power circuits and is suitable for process instrumentation. Up to two faults are allowed and can be used in Zones 0, 1, and 2.

Ex ib

This intrinsic safety category is similar to the Ex ia method, except that category ib allows only one fault and can only be used in Zones 1 and 2.

Ex m

Designation for the encapsulation (segregation) method of protection.

Ex n

Designation for the simplified (prevention) method of protection.

Ex o

Designation for the oil-immersion (segregation) method of protection.

Ex p

Designation for the pressurization (segregation) method of protection.

Ex q

Designation for the powder-filling (segregation) method of protection.

Ex s

Designation for the special (special protection) method of protection. This method is standardized only in Great Britain and Germany.

Explosion-Proof Enclosure

An enclosure that is capable of withstanding an explosion of a gas or vapor within it and of preventing the ignition of an explosive gas or vapor that may surround it and that operates at such an external temperature that a surrounding explosive gas or vapor will not be ignited. This type of enclosure is similar to a flame-proof enclosure.

Explosion-Proof Equipment (apparatus)

Equipment or apparatus enclosed in an explosion-proof enclosure.

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F

Fault

A defect or electrical breakdown of any component, spacing or insulation that alone or in combination with other faults may adversely affect the electrical or thermal characteristics of the intrinsically safe circuit. If a defect or breakdown leads to defects or breakdowns in other components, the primary and subsequent defects and breakdowns are considered to be a single fault.

Countable Fault

A fault that is applied to a part of the electrical apparatus that meets the constructional requirements of this standard.

Uncountable Fault

A fault that is applied to areas of the electrical apparatus that do not meet the constructional requirements of this standard. If application of a countable fault leads to subsequent defects and breakdowns, they are considered to be uncountable faults.

Fibers And Flyings, Easily Ignitable

Fibers and flyings that are easily ignitable including rayon, cotton (including cotton linters and cotton waste), sisal or henequen, jute, hemp, tow, cocoa fiber, oakum, baled waste kapok, spanish moss, excelsior, and other materials of similar nature.

Flame-Proof Enclosure

An International term describing an enclosure that can withstand the pressure developed during an internal explosion of an explosive mixture and that prevents the transmission of the explosion to the explosive atmosphere surrounding the enclosure and that operates at such an external temperature that a surrounding explosive gas or vapor will not be ignited. This enclosure is similar to an explosion-proof enclosure. This type of protection is referred to by IEC as Ex d.

FM

Acronym for Factory Mutual Approvals, a third party certification agency that is recognized by OSHA as a Nationally Recognized Testing Laboratory in the United States. It is a division of Factory Mutual Global, which specializes in property insurance. For marketing in the U.S., FM, CSA, and UL provide testing, listing and labeling services for industrial and safety products. Generally, certifications by FM, CSA, and UL are recognized in most jurisdictions; however, there are exceptions.

Fuse Rating

This is the maximum current that can flow continuously through the fuse (approx. 1,000 hours at 35 °C (95 °F)). The rated current may be exceeded for short periods at temperatures up to approximately 55 °C (131 °F).

Fuse-Protected Shunt Diode Barrier Assembly (Zener Barrier)

A network consisting of a fuse, voltage-limiting shunt diodes, and a current-limiting resistor or other current-limiting components designed to limit current and voltage. The fuse protects the diodes from open circuiting when high fault current flows.

G

Galvanic Isolation

A form of isolation that meets stringent standards for intrinsically safe circuits.

Grounding Device

An impedance device used to connect conductors of an electric system to ground for the purpose of controlling the ground current or voltages to ground, or a non-impedance device used to temporarily ground conductors for the purpose of the safety of workmen. The grounding device may consist of a grounding transformer or a neutral grounding device, or a combination of these. Protective devices, such as surge arresters, may also be included as an integral part of the device.

Group

A classification of flammable materials of similar hazard. Consists of Groups A, B, C, D, E, F, and G to NEC and CEC standards and Groups I, IIA, IIB, and IIC to IEC standards.

H

Hazardous (Classified) Location

A location where fire or explosion hazards may exist due to the presence of flammable gases or vapors, flammable liquids, combustible dust, or easily ignitable fibers or flyings.

Hazardous Materials

Gases, vapors, combustible dusts, fibers, or flyings that are explosive under certain conditions.

Hermetically Sealed Device

A device that is sealed against the entrance of an external atmosphere and in which the seal is made by fusion. Continuous soldering, brazing, welding, and the fusion of glass to metal are examples of recognized methods.

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I/O Module

A module that provides basic input and output functions between the automation system and the field devices. Disregarding specialty modules, there are four basic types available from various vendors - analog input, analog output, discrete input, and discrete output.

IEC

Acronym for International Electrotechnical Commission. An international commission of which most nations are members. IEC standards directly affect equipment for sale internationally. The benefit of participation in the IEC is that costly differences in plant or equipment design can be avoided by designing equipment consistent with IEC documents where feasible.

Ignitable Gas Mixture

A gas -air mixture that is capable of being ignited by an open flame, arc or spark or high temperature.

Ignition (Autoignition) Temperature

The minimum uniform temperature required to initiate or cause self-sustained combustion of a solid, liquid, or gaseous substance (independent of any other ignition source).

Increased Safety

An international term that describes a type of protection in which various measures are applied so as to reduce the probability of excessive temperatures and the occurrence of arcs or sparks in the interior and on the external parts of electrical apparatus that do not produce them in normal service. This type of protection is referred to by IEC as Ex e.

Inductance

The property of an electric circuit by virtue of which a varying current induces an electromotive force in that circuit or in a neighboring circuit. The practical difference between capacitance and inductance in an intrinsically safe circuit is minimal. Both store energy, but an inductor will release energy when a circuit is broken, and a capacitor will release energy when the circuit is made.

Insulation coordination

The assignment of the insulation characteristics of an apparatus in accordance with:

1. The expected overvoltages,
2. The characteristic values of the overvoltage precautions,
3. The expected surrounding conditions,
4. The protective measures against contamination.

Insulator

A material that conducts electrons slowly. The importance to intrinsic safety is that air (a spatial distance) is often an insulator.

Internal Wiring

Wiring and electrical connections that are made within the apparatus by the manufacturer. Within racks or panels, interconnections between separate pieces of apparatus made in accordance with detailed instructions from the apparatus manufacturer are considered to be internal wiring.

Intrinsic Safety Barrier

A component containing a network designed to limit the energy (voltage and current) available to the protected circuit in the hazardous (classified) location under specified fault conditions.

Intrinsic Safety Ground Bus

A grounding system that has a dedicated conductor separate from the power system so that ground currents will not normally flow and that is reliably connected to a ground electrode (e. g., in accordance with Article 250 of NEC, ANSI/NFPA 70, or Section 10 of CEC Part I, CSA C22.1).

Intrinsic Safety

A type of protection in which a portion of the electrical system contains only intrinsically safe equipment (apparatus, circuits, and wiring) that is incapable of causing ignition in the surrounding atmosphere. No single device or wiring is intrinsically safe by itself (except for battery-operated self-contained apparatus such as portable pagers, transceivers, gas detectors, etc., which are specifically designed as intrinsically safe self-contained devices) but is intrinsically safe only when employed in a properly designed intrinsically safe system. This type of protection is referred to by IEC as Ex i.

Intrinsically Safe Apparatus

Apparatus in which all the circuits are intrinsically safe.

Intrinsically Safe Circuit

A circuit in which any spark or thermal effect, produced either normally or in specified fault conditions, is incapable, under the prescribed test conditions, of causing ignition of a mixture of flammable or combustible material in air in the mixture's most easily ignited concentration.

Intrinsically Safe Equipment

Equipment that may be installed in a hazardous location, in which all the circuits are intrinsically safe, or that is designed to form part of an intrinsically safe system.

Intrinsically Safe Ground

A clearly identified conductor of not less than 4 mm^2 (12 AWG) cross-sectional area with a total impedance from barrier ground bus bar to main power system earth of not more than 1 Ω.

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Intrinsically Safe System

An assembly of interconnected intrinsically safe apparatus, associated apparatus, and interconnecting cables in which those parts of the system that may be used in hazardous (classified) locations are intrinsically safe circuits.

I.S. Ground

A dedicated ground system to which Zener Barriers are connected. The resistance to ground path must be less than or equal to 1 W from any Zener Barrier to designated ground electrode.

I.S.

Abbreviation for intrinsic safety.

ISA

Acronym for the Instrumentation, Systems and Automation Society. ISA Committee SP12, established in 1949, has been influential in establishing the recognition of intrinsic safety and non-incendive circuits in the NEC.

Isolated Barriers

A type of barrier with additional active components and galvanic isolation to separate the hazardous area instrument from the safe area controller providing advantages over the traditional Zener Barrier.

K

Knock-Out

A portion of the wall of an enclosure so fashioned that it may be removed readily by a hammer, screwdriver, and pliers at the time of installation in order to provide a hole for the attachment of an auxiliary device or raceway, cable, or fitting.

L

Labeled Equipment

Equipment or materials, to which has been attached a label, symbol, or other identifying mark of an organization concerned with product evaluation, that may maintain periodic inspection of the production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

LEL

Abbreviation for lower explosive limit (lower flammable limit).

Listed

Equipment or materials, included in a list published by an organization concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or materials meets appropriate standards or has been tested and found suitable for use in the specified manner.

M

Maintenance, Corrective

Any maintenance activity that is not normal in the operation of the equipment and requires access to the equipment's interior. Such activities are expected to be performed by qualified personnel who are aware of the hazards involved. Such activities typically include locating causes of faulty performance, replacement of defective components, adjustment of internal controls, and the like.

Maintenance, Operational

Any maintenance activity, excluding corrective maintenance, intended to be performed by the operator and required in order for the equipment to serve its intended purpose. Such activities typically include the correcting of "zero" on a panel instrument, changing charts, record keeping, adding ink, and the like.

Make/Break Components

Components having contacts that can interrupt a circuit (even if the interruption is transient in nature). Examples of make/break components are relays, circuit breakers, servopotentiometers, adjustable resistors, switches, connectors, and motor brushes.

Maximum External Capacitance (C_o, C_a)

Maximum capacitance in an intrinsically safe circuit that can be connected to the connection facilities of the apparatus without invalidating intrinsic safety.

Maximum External Inductance (L_o, L_a)

Maximum value of inductance in an intrinsically safe circuit that can be connected to the connection facilities of the apparatus without invalidating intrinsic safety.

Maximum External Inductance to Resistance Ratio (L_o/R_o)

Ratio of inductance (L_o) to resistance (R_o) of any external circuit that can be connected to the connection facilities of the electrical apparatus without invalidating intrinsic safety.

Maximum Inductance to Resistance Ratio (L/R)

As an alternative value to La, the ratio of inductance (L) to resistance (R) of any external circuit that can be connected to the terminals of intrinsically safe apparatus without invalidating the intrinsic safety of the apparatus.

Maximum Input Current (I_i, I_{max})

Maximum current (peak AC or DC) that can be applied to the connection facilities for intrinsically safe circuits without invalidating intrinsic safety.

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Maximum Input Power (P_i)

The maximum power that can be applied to the terminals of an intrinsically safe device without invalidating the intrinsic safety of the device.

Maximum Input Voltage (U_i, V_{max})

Maximum voltage (peak AC or DC) that can be applied to the connection facilities for intrinsically safe circuits without invalidating intrinsic safety.

Maximum Internal Capacitance (C_i)

The total unprotected internal capacitance of the intrinsically safe apparatus that must be considered as appearing across the terminals of the intrinsically safe apparatus.

Maximum Internal Inductance (L_i)

The total unprotected internal inductance of the intrinsically safe apparatus that must be considered as appearing across the terminals of the intrinsically safe apparatus.

Maximum Internal Inductance to Resistance Ratio (L_i/R_i)

Ratio of inductance (L_i) to resistance (R_i) which is considered as appearing at the external connection facilities of the electrical apparatus.

Maximum Output Current (I_o, I_{sc})

Maximum current (peak AC or DC) in an intrinsically safe circuit that can be taken from the connection facilities of the apparatus.

Maximum Output Power (P_o)

Maximum electrical power in an intrinsically safe circuit that can be taken from the apparatus.

Maximum Output Voltage (U_o, V_{oc})

Maximum output voltage (peak AC or DC) in an intrinsically safe circuit that can appear under open circuit conditions at the connection facilities of the apparatus at any applied voltage up to the maximum voltage, including U_m and U_i.

Maximum r.m.s. AC or DC Voltage (U_m)

Maximum voltage that can be applied to the non-intrinsically safe connection facilities of associated apparatus without invalidating intrinsic safety. The value of U_m may be different at different sets of connection facilities.

Maximum Surface Temperature

The highest temperature attained by a surface accessible to flammable gases, vapors, or combustible dusts under conditions of operation within the ratings of the apparatus (including recognized overloads and defined fault conditions.

MEIC

Abbreviation for most easily ignited concentration.

MESG

Abbreviation for maximum experimental safe gap.

MIC

Abbreviation for minimum ignition current.

MIE

Abbreviation for minimum ignition energy.

Minimum Igniting Voltage

Minimum voltage of capacitive circuits that causes the ignition of the explosive test mixture in the spark-test apparatus.

N

NEMA

Acronym for National Electrical Manufacturers Association. Provides a rating system to identify an enclosure's ability to repel the outside environment. Unlike organizations such as UL, FM, and CSA, NEMA does not require independent testing and leaves compliance to its rating system completely up to the manufacturer.

NFPA

Acronym for National Fire Protection Association. The NFPA has acted as a sponsor and publisher of the National Electrical Code since 1911. Most of the NFPA standards tend to emphasize recommendations for the safe use of electrical apparatus, area classification, fire protection, and hazards of materials.

Non-Hazardous Location

A location utilizing drying, curing, or fusion apparatus and provided with positive mechanical ventilation adequate to prevent accumulation of flammable concentrations of vapors, and provided with effective interlocks to deenergize all electric equipment (other than equipment approved for Class I locations) in case the ventilating equipment is inoperative, shall be permitted to be classified as non-hazardous where the authority having jurisdiction so judges.

Non-Incendive Circuit

A circuit in which any arc or thermal effect produced in normal operating conditions of the equipment is not capable, under prescribed conditions, of igniting the specified flammable gas, vapor-in-air mixture, combustible dusts, or ignitable fibers or flyings.

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Non-Incendive Component

A component having contacts for making or breaking a specified incendive circuit in which the contacting mechanism is constructed so that the component is not capable of ignition of the specified flammable gas or vapor-in-air mixture when tested as specified by appropriate test procedure. The housing of a non-incendive component is not intended to exclude the flammable atmosphere or contain an explosion.

Non-Incendive Equipment

Equipment having electrical/electronic circuitry and components that are incapable under normal conditions, of causing ignition of a specified flammable gas or vapor-in-air mixture due to arcing or thermal effect.

Non-Incendive Field Wiring

Wiring that enters or leaves an equipment enclosure and, under normal operating conditions of the equipment, is not capable, due to arcing or thermal effects, of igniting a specified flammable gas or vapor-in-air mixture or combustible dust-in-air mixture. Normal operation includes opening, shorting, or grounding the field wiring.

Non-Incendive Field Wiring Apparatus

Apparatus intended to be connected to non-incendive field wiring.

Normal Operational Conditions

Conditions that conform electrically and mechanically with its design specifications and is used within the limits specified by the manufacturer.

NRTL

Acronym for Nationally Recognized Testing Laboratory. This recognition indicates that the Occupational Safety & Health Administration has accredited certain organizations to evaluate products according to consensus based safety standards.

O

Operational Maintenance

Any maintenance activity, other than corrective maintenance, intended to be performed by the operators and which is required in order for the equipment to serve its intended purpose. Such activities typically include the correcting of "zero" on a panel instrument, changing charts, making records, adding ink, etc.

OSHA

Acronym for Occupational Safety and Health Administration. The OSHA Act was passed by the U.S. Congress in 1971. Part 1910 of the OSHA regulations adopted the 1968 NEC and defined "approved" to mean "listed by UL or FM." "Approved" was redefined in 1972, providing exceptions to FM or UL listing; however, in practice the emphasis on listing remained unchanged. Listing requirements increased interest in developing standards for certain categories of apparatus, such as process control instrumentation. Third-party approval agencies (e. g., UL, FM, CSA) for electrical equipment must be accredited by OSHA.

Overvoltage Category

The assignment of an electrical apparatus in accordance with the expected overvoltage.

Rated operating voltage (V) for alternating voltage systems in accordance with DIN IEC 38	Rated surge voltages (V) for overvoltage category			
	I	II	III	IV
230/400/277/480[1)]	1500	2500	4000	6000
400/690	2500	4000	6000	8000
1000	4000	6000	8000	12000

[1)] Rated operating voltage of 500 V is set.

Table 1 The assignment of rated operating voltages to the rated surge voltages

P

Passive Transistor Output

A transistor in which the emitter and collector are not connected to an internal power source. Only the base is connected so that it may be switched on and off. The emitter and collector may be connected to the customer's power source.

Polarity

Zener barriers are available in polarized (DC) and non-polarized (AC) versions. Positive polarity types have the negative side of the circuit grounded, while negative polarity types have the positive side of the circuit grounded. Non-polarized barriers have zener diodes connected in inverse series pairs and can be used in both AC and DC circuits.

Protective (Infallible) Component or Assembly

A component or assembly which is so unlikely to become defective in a manner that will lower the intrinsic safety of the circuit it may be considered not subject to fault when analysis or tests for intrinsic safety are made. Examples of this type of component or assembly are:

PTB

Acronym for Physikalisch-Technische Bundesanstalt. An approval agency in Germany that has the authority to accept or reject the design of an electrical apparatus based on recognized safety standards.

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R

Repeater

A type of active or transformer isolated barrier that receives a signal from the hazardous area instrument (i. e., transmitter, thermocouple, etc.) and repeats that signal into the safe area while providing Intrinsic Safety.

Resistance Temperature Detector (RTD)

A resistor made of some material for which the electrical resistivity is a known function of the temperature and that is intended for use with a resistance thermometer. It is usually in such a form that it can be placed in the region where the temperature is to be determined.

Resistance

That physical property of an element, device, branch, network or system that is the factor by which the mean-square conduction current must be multiplied to give the corresponding power lost by dissipation as heat or as other permanent radiation or loss of electromagnetic energy from the circuit.

RS 232

An EIA standard that specifies the electrical, mechanical, and functional characteristics for serial communications. Used in point-to-point applications.

RS 485

An EIA standard that specifies the electrical characteristics of a balanced-voltage digital interface. Used in multi-point applications.

S

Safe Area

A non-hazardous location.

Seal, Cable, Explosionproof

A cable terminator filled with compound and designed to contain an explosion in the enclosure to which it is attached or to minimize passage of flammable gases or vapors from one location to another. A conduit seal may also be used as a cable seal. This method differs from the international practice, which requires cable glands.

Seal, Conduit, Explosionproof

A sealed fitting, poured with a cement-like potting compound, designed to contain an explosion in the enclosure to which it is attached and to minimize passage of flammable gases or vapors from one location to another.

Serial Interface

A method of digitally transmitting data between devices over a pair of conductors. See RS 232 and RS 485.

Short Circuit Proof

The ability of an intrinsic safety barrier or isolator to withstand the shorting of its' intrinsically safe connections to ground. Determined by dividing the rated voltage by its' internal resistance. If the resulting value is less than the fuse rating, the barrier is said to be short-circuit proof.

Short Circuit Protection

The ability of the solid-state output to withstand a direct short without damage to itself.

Shunt Diode Barrier Assembly

A fuse- or resistor- protected diode barrier.

Simple Apparatus

An electrical component or combination of com-ponents of simple construction with well-defined electrical parameters that is compatible with the intrinsic safety of the circuit in which it is used. A device that will neither generate nor store more than 1.5 V, 0.1 A and 25 mW. Examples are switches, thermocouples (TCs), light-emitting diodes (LEDs), and resistance temperature devices (RTDs).

SIT

Abbreviation for spontaneous ignition temperature.

Switch Isolator

Term used for the type of transformer isolated barrier that is used to repeat signals from discrete inputs (i. e., contact closures, proximity sensors.)

T

Temperature Code (Temperature Classification)

A system of classification by which one of 14 temperature identification numbers (internationally, six temperature classes) is allocated to an electrical apparatus. The temperature code represents the maximum surface temperature of any component that may come in contact with the flammable gas or vapor mixture.

Termination Panel

A mechanical assembly that resides in front of the I/O system and performs signal conditioning, electrical isolation, and other functions.

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Thermistor

An electron device that makes use of the change of resistivity of a semiconductor with change in temperature.

Thermocouple (TC)

A pair of dissimilar conductors so joined at two points that an electromotive force is developed by the thermoelectric effects when the junctions are at different temperatures.

TIB

Acronym for Transformer Isolated Barrier. A term used to describe an isolated intrinsic safety barrier used for hazardous area applications. Although a typical TIB will employ multiple means of isolation, the term TIB is used to generically describe this type of barrier.

Transmitter (Tx)

A device for transmitting a coded signal when operated by any one of a group of actuating devices.

U

UEL

Abbreviation for upper explosive limit (upper flammable limit).

UL

Acronym for Underwriters Laboratories, Inc, a third party certification agency that is an independent, self-supporting, non-profit testing laboratory and standards developer. It is recognized by OSHA as a Nationally Recognized Testing Laboratory in the United States. The presence of UL, CSA, or FM certification labels on equipment is normally sufficient evidence to the local inspector that the product is designed to meet recognized safety standards.

Z

Zener Barrier

A combination of components that limits energy to the hazardous area to a level below that which would ignite a specific gas/air mixture.

Zener Diode

A class of silicon diodes that exhibit in the avalanche breakdown region a large change in reverse current over a very narrow range of reverse voltage. This characteristic permits a highly stable reference voltage to be maintained across the diode despite a relatively wide range of current through the diode.

Zone

The international method of specifying the probability that a location is made hazardous by the presence, or potential presence, of flammable concentrations of gases and vapors. The term Division is used in the United States and Canada.

Zone 0

An area in which an explosive gas-air mixture is continuously present or present for long periods. Equal to a Class I, Division 1 hazardous location.

Zone 1

An area in which an explosive gas-air mixture is likely to occur in normal operation. Equal to a Class I, Division 1 hazardous location.

Zone 2

An area in which an explosive gas-air mixture is not likely to occur and if it does occur, will only exist for a short time. Equal to a Class I, Division 2 hazardous location.

Zone 20

An area in which a combustible dust cloud is part of the air permanently, over long periods of time or frequently. Equal to a Class II, Division 1 hazardous location.

Zone 21

An area in which a combustible dust cloud in air is likely to occur in normal operation. Equal to a Class II, Division 1 hazardous location.

Zone 22

An area in which a combustible dust cloud in air may occur briefly or during abnormal operation. Equal to a Class II, Division 2 hazardous location.

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PROCESS AUTOMATION – PROTECTING YOUR PROCESS

For over a half century, Pepperl+Fuchs has been continually providing new concepts for the world of process automation. Our company sets standards in quality and innovative technology. We develop, produce and distribute electronic interface modules, Human-Machine Interfaces and hazardous location protection equipment on a global scale, meeting the most demanding needs of industry. Resulting from our world-wide presence and our high flexibility in production and customer service, we are able to individually offer complete solutions – wherever and whenever you need us. We are the recognized experts in our technologies – Pepperl+Fuchs has earned a strong reputation by supplying the world's largest process industry companies with the broadest line of proven components for a diverse range of applications.

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