Kuhnke FIO — Control Technology

Description	Order number	Function
Controller (CODESYS PLC)	694 300 16 000 Kuhnke FIO Controller 116 694 500 16 000 Kuhnke FIO Controller 116 SM 694 600 16 000 Kuhnke FIO Controller 116 CNC	PLC with RS232, CANopen®, EtherCAT® like 116 but with CODESYS-Softmotion like 116 but with CODESYS-CNC & Rob.
	further versions e.g. with WebVisu and OPC UA on demand	
	With extension (2 x RJ45) left side, OPC UA and WebVisu:	
	694 321 16 001 Kuhnke FIO Controller 116 LAN 694 322 16 001 Kuhnke FIO Controller 116 IRT 694 323 16 001 Kuhnke FIO Controller 116 EC	like 116 but with Ethernet extension like 116 but with PROFINET® Device ext. like 116 but with EtherCAT® Slave ext.
EtherCAT® bus coupler	694 400 00 Kuhnke FIO Coupler, 3A 694 400 10 Kuhnke FIO Coupler DI16/DO16	EtherCAT® RJ45 In / Out 2A, EtherCAT® RJ45 In / Out, 16 Inputs 3ms, 16 Outputs 0.5A
Extension modules **Communication**	694 400 02 Kuhnke FIO Extender 694 455 02 Kuhnke FIO RS485 1 Port 694 455 04 Kuhnke FIO RS232 2 Port 694 455 06 Kuhnke FIO CAN Master/Slave	2 x EtherCAT RJ45 Out 1 x RS485 2 x RS232 1 x CAN
Extension modules **Digital input / output**	694 450 02 Kuhnke FIO DI16/DO8 1A 694 450 03 Kuhnke FIO DI16/DO16 694 450 04/ 05 Kuhnke FIO DI8/DO8 694 451 02/ 04 Kuhnke FIO DI32 694 451 03 Kuhnke FIO DI16 694 452 01 Kuhnke FIO DO16 694 452 02 Kuhnke FIO DO8 1A 694 452 06 Kuhnke FIO DO8 2A 694 452 03 Kuhnke FIO DO8 Relay NO 24V 694 452 04 Kuhnke FIO DO8 Relay NO 230 VAC	16 Inputs 1ms, 8 Outputs 1A 16 Inputs 1ms, 16 Outputs 0.5A 8 Inputs 5ms/ 1ms, 8 Outputs 0.5A 32 Inputs 1ms/ 5ms 16 Inputs 1ms 16 Outputs 0.5A 8 Outputs 1A 8 Outputs 2A 8 Relay-Outputs, NO, 24V 2A 8 Relay-Outputs, NO, 230VAC 2A
Extension modules **Analogue input / output (each channel configurable via CoE)**	694 441 51 Kuhnke FIO AI4-I 12Bit 694 441 52 Kuhnke FIO AI4/8-U 13Bit 694 441 53 Kuhnke FIO AI8/16-U 13Bit 694 441 54 Kuhnke FIO AI8-I 12Bit 694 442 52 Kuhnke FIO AO4-U/I 16Bit 694 444.65 Kuhnke FIO AI4 12 Bit/AO4 16 Bit	4 Inputs 0(4)..20mA 4 diff. / 8 s.e. Inputs 0..10V / -10..+10V 8 diff. / 16 s.e. Inputs 0..10V / -10..+10V 8 Inputs 0(4)..20mA 4 Outp. 0(4)..20(24)mA / 0..10V, -10..+10V 4 Inputs 0..10V/0(4)..20mA, 4 Outputs 0(4)..20mA / 0..10V, -10..+10V
Extension modules **Temperature input (each channel configurable via CoE)**	694 443 57 Kuhnke FIO AI4-PT/Ni100 16 Bit 694 443 58 Kuhnke FIO AI8-PT/Ni1000 16 Bit	4 Inputs bzw. 8 Inputs PT100 / Ni100 oder PT1000 / Ni1000 oder Thermo Typ J, K oder mV

Extension modules **Counter / CAM Control / Drive Control**	694 444 01 Kuhnke FIO Counter 2 694 454 01 Kuhnke FIO Counter/ Posi 2 694 454 53 Kuhnke Counter/ Encoder 654 444 11 Kuhnke FIO CAM Control 694 454 16 Kuhnke FIO Drive Control	2 Counter 400kHz 2 Counter 400kHz, 2 AO* 0V..10V 2 Counter or 2 Encoder SSI, EnDAT 2.1 24 CAM-Outputs 0.5A, 1 DI* 1ms, 4 AI* 24V od. 0..10V) Stepper- or brushless motor, 5A
Extension modules **Mixed I/O**	694 444 62 Kuhnke FIO MIX 02 694 444 64 Kuhnke FIO MIX 04	4 DI*, 24 DO*, 4 AI*,ABRef, configurable 4 AI 12Bit, 4AO 16Bit, 2 Counter/ Encoder configurable via CoE
Extension modules **Safety**	694 330 00 Kuhnke FIO Safety PLC 694 430 00 Kuhnke FIO Safety SDI4/SDO2 694 430 10 Kuhnke FIO Safety SDI8/SDO2 694 430 20 Kuhnke FIO Safety SDI16/SDO4 694 431 00 Kuhnke FIO Safety SDI16	FSoE Master, CODESYS Safety FSoE Slave, 4 safe DI*, 2 safe DO* FSoE Slave, 8 safe DI*, 2 safe DO* FSoE Slave, 16 safe DI*, 4 safe DO* FSoE Slave, 16 safe DI*

*DI=digital Inputs, DO=Digital Outputs, AI=Analogue Inputs, AO=Analogue Outputs

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Kuhnke FIO digital I/Os

Control Technology

Technical Data

Type / order no.	Input module 694 451…		Output module 694 452…				In- / Output module 694 450…			
Order number	**… 03**	**… 04**	**… 01**	**… 02**	**… 03**	**… 04**	**… 03**	**… 13**	**… 02**	**… 05**
Number of digital inputs	16	32	0	0	0	0	16	16 LS	16	8
Characteristics of inputs	24 V, 1ms	24 V, 1 ms	-	-	-	-	24 V, 1 ms	24 V, 1 ms	24 V, 1 ms	24 V, 1 ms
Number of digital outputs	0	0	16	8	8	8	16	16 LS	8	8
Characteristics of outputs	-	-	24 V 0,5 A	24V 1A	Relais NO 24V 2A	Relais NO 230V 2A	24 V 0,5 A	0 V 0,5 A	24 V 1 A	24 V 0,5 A
Fieldbus	EtherCAT® 100 Mbit/s LVDS: E-Bus									
Mounting	35 mm DIN-Rail									
Indication	LED, assigned to the clamping point locally									
Vibration- and shock-resistance	Acc. EN 60068-2-6/ EN 60068-2-27									
Transient emissions	Acc. EN 61000-6-2/ EN 61000-6-4									
Protection class	IP 20									
Shield connection	Directly at module									
I/O connection	Spring- loaded plug with mechanical ejection									
Ambience conditions	0 °C…+55 °C, IP 20, Interference immunity Zone B acc. EN 61131-2									
Housing (W x H x D)	Aluminium, plastic, 25 x 120 x 90 mm									
Certifications	CE, cULus									
Order number	EtherCAT® 100 Mbit/s LVDS: E-Bus									

JP2519

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Kuhnke FIO analogue I/Os - CoE

Control Technology

Technical Data

Type	Input modules				Output modules	In-/ Output modules
Order no.	694 441 51	694 441 52	694 441 53	694 441 54	694 442 52	694 444 65
Channel/Type	4 / current	4(8) / voltage	8(16) / voltage	8 / current	4 / current + voltage	4 + 4 / current + voltage
Resolution	12 Bit	13 Bit	13 Bit	12 Bit	16 Bit	12 Bit / 16 Bit
Input signal range Unipolar / Bipolar (configurable per channel)	0(4)...20 mA	0...10 V / -10...+10 V	0...10 V / -10…+10 V	0(4)...20 mA		0(4)...20 mA 0...10 V
Output signal range Unipolar / Bipolar (configurable per channel)					0(4)…20 mA 0...24 mA 0...10 V / -10...+10 V	0(4)...20 mA 0...10 V / -10...+10 V

Type	Temperature input modules	
Order no.	694 443 57	694 443 58
Channel/Type (configurable per channel)	4 / PT100 / Ni100 orPT1000 / Ni1000 or Thermo /Type J, K or mV	8 / PT100 / Ni100 or PT1000 / Ni1000 or Thermo /Type J, K or mV
Resolution	16 Bit	16 Bit
Fieldbus	EtherCAT® 100 Mbit/s LVDS: E-Bus	
Mounting	35 mm DIN-Rail	
Indication	LED, assigned to the clamping point locally	
Transient emissions	Acc. EN 61000-6-2/ EN 61000-6-4	
Shield connection	Directly at module	
I/O connection	Spring-loaded plug with mechanical ejection	
Ambience conditions	0 °C…+55 °C, IP 20, Interference immunity Zone B acc. EN 61131-2	
Housing (W x H x D)	Aluminium, plastic, 25 x 120 x 90 mm	
Certifications	CE, cULus	

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Kuhnke FIO Communication — Control Technology

Technical Data

Type	EtherCAT Coupler	EtherCAT Extender
Order no.	694 400 00	694 400 02
Bus Interface RJ45	2 (In / Out)	2 (Out / Out)
Bus Interface E-Bus	1 (Out)	2 (In / Out)
Power supply	24 V DC	-
Power supply E-Bus	3 A	-

Type	EtherCAT RS485 1 Port	EtherCAT RS232 2 Port	EtherCAT CAN Master/Slave
Order no.	694 455 02	694 455 04	694 455 06
Interface	RS485 2400…115200 bit/s	RS232 2400…115200 bit/s	RS485 100…1000 kbit/s
Connection	Spring- loaded plug with mechanical ejection		
Fieldbus	EtherCAT® 100 Mbit/s LVDS: E-Bus		
Mounting	35 mm DIN-Rail		
Indication	LED, assigned to the clamping point locally		
Shield connection	Directly at module		
I/O connection	Spring-loaded plug with mechanical ejection		
Ambience conditions	0° C…+55 °C, IP 20, Interference immunity Zone B per EN 61131-2		
Housing (W x H x D)	Aluminium, plastic 25 x 120 x 90 mm		
Certifications	CE, cULus		

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Kuhnke FIO Safety — Control Technology

Kuhnke FIO Safety PLC

Safety PLC

Kuhnke FIO Safety PLC is a module intended to be integrated in EtherCAT® networks. Acting as the FSoE master, it is able to address any FSoE slave including safety I/Os, motion controllers, valve islands and other FSoE equipment. The Safety PLC meets the requirements of IEC 61508 SIL3 and DIN EN ISO 13849 PLe. CODESYS version 3.5 SP8 or higher is used for programming. The CODESYS safety function modules have been certified previously, thus considerably reducing the efforts of developing, verifying and approving a safety application. The main controller's CODESYS environment and the EtherCAT link are used for programming.

Features

- The Safety PLC meets the requirements of IEC 61508 SIL3 and DIN EN ISO 13849 PLe.
- CODESYS version 3.5 SP8 or higher is used for programming.
- The CODESYS safety function modules have been certified previously, thus considerably reducing the efforts of developing, verifying and approving a safety application.
- The main controller's CODESYS environment and the EtherCAT link are used for programming the Safety PLC as well.

Runtime

Safety

Technical Data	Kuhnke FIO Safety PLC
Safety protocol	FSoE
Safety standard	IEC 61508 SIL3 and DIN EN ISO 13849-1 PLe
Runtime system	CODESYS RT Safety
Programming tool	CODESYS V3.5 SP5 or higher with integrated safety function modules
E-bus power consumption	200 - 300 mA
Power supply voltage	From bus coupler through E-bus connector
Electrical interference	EN 61000-6-2/ EN 61000-6-4
Resistance to vibration	EN 60068-2-6
Resistance to shock	EN 60068-2-27
Fieldbus port	EtherCAT® 100 Mbps LVDS: E-bus
Installation / mounting pos.	35 mm DIN rail / horizontal
Signal indication	Status LEDs (EtherCAT, Safety, Power)
Shield	Provided directly by the module
Terminals	-
Ambient conditions	0 °C …+55 °C, IP 20
Housing	Plastic shroud over aluminium frame, 25 x 120 x 90 mm
Certifications	CE, cULus, TÜV Rheinland

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Kuhnke FIO Safety — Control Technology

Kuhnke FIO IO Line

CODESYS Safety PLC and Safety I/Os

- Modular safety control system
- Safety FD editor integrated in CODESYS
- PLCopen safety components
- Cross-communication between PLC and safety PLC
- Online monitoring of safe and unsafe data
- Fail-safe over EtherCAT® (FSoE)
- SIL 3 to IEC 61508
- PL e to DIN EN ISO 13849

Runtime

Safety

Programming:

- CODESYS V3.5 or higher with safety extension
- PLCopen safety components
- Integrated safety FBD editor
- Safety application integrated in project tree

CODESYS V3 safety FBD editor

CODESYS V3 devices explorer with integrated safety

System configuration example:

- Standard CODESYS V3 PLC
- Kuhnke FIO bus coupler
- Kuhnke FIO Safety PLC
- Kuhnke FIO Safety I/O
- Expandable by any FIO module

Kuhnke FIO controller with safety PLC

Kuhnke FIO assembly with safety I/Os

Kuhnke FIO Safety — Control Technology

Technical data	
Safety control unit	**Kuhnke FIO Safety PLC**
Part number	694 330 00
Runtime system	CODESYS RT Safety
Processor	Cortex M4
Programming tool	CODESYS v3.5 SP5 or higher with integrated safety function modules
E-bus power consumption	max. 240 mA
Safety standards	DIN EN 61508 SIL 3, DIN EN ISO 13849-1 PL e, Cat. 4
Power supply voltage	From bus coupler through E-bus connector
Signal indication	Status LEDs: EtherCAT®, Safety, Power

Safe in-/output terminal	Kuhnke FIO Safety SDI4 / SDO2	Kuhnke FIO Safety SDI8 / SDO2	Kuhnke FIO Safety SDI16 / SDO4	Kuhnke FIO Safety SDI16
Part number	694 430 00	694 430 10	694 430 20	694 431 00
Processor	Cortex M3	Cortex M4	Cortex M4	Cortex M4
Number of inputs	4 safe inputs (configurable)	8 safe inputs (configurable)	16 safe inputs (configurable)	16 safe inputs (configurable)
Number of outputs	2 safe outputs (I_{max} = 2.0 A)	2 safe outputs (I_{max} = 0.5 A)	4 safe outputs (I_{max} = 0.5 A)	-
Clock pulse outputs (OSSD)	4	4	8	8
E-bus power consumption	max. 275 mA	max. 200 mA	max. 200 mA	max. 200 mA
Safety standards	DIN EN 61508 SIL 3, DIN EN ISO 13849-1 PL e, Cat. 3	DIN EN 61508 SIL 3, DIN EN ISO 13849-1 PL e, Cat. 4	DIN EN 61508 SIL 3, DIN EN ISO 13849-1 PL e, Cat. 4	DIN EN 61508 SIL 3, DIN EN ISO 13849-1 PL e, Cat. 4
Terminals	18-pin spring-type connector		36-pin spring-type connector	
Safe response time	< 5 ms (read input, write to E-bus)			
Error response time	≤ watchdog time (configurable)			
Extended diagnostics	via CoE			
Signal indication	LEDs allocated to the point of termination, status LEDs (EtherCAT, Safety, Power)			

General data	
Fieldbus port	EtherCAT® 100 Mbps LVDS: E-bus
Power supply voltage	24 V DC (-15% / +20%)
Installation / mounting pos.	35 mm DIN rail / horizontal
Ambient conditions	0 °C …+55 °C, IP 20
Housing (W x H x D)	Plastic shroud over aluminium frame, 25 x 120 x 90 mm
Certifications	CE, cULus, TÜV Rheinland

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Kuhnke FIO Safety SDI4/SDO2

Safety I/O terminal

Kuhnke FIO Safety SDI4/SDO2 is a safety I/O terminal featuring four safe digital input channels and two safe digital output channels. This module from Kuhnke FIO range can easily be integrated in any EtherCAT® network. Four inputs pick up sensor readings via floating 24 V DC contacts while two outputs send up to 2 A of current per channel to 24 V DC actuators. In case the EtherCAT terminal detects a fault, it changes to a safe state (fail safe). The module meets the requirements of IEC 61508 SIL3 and DIN EN ISO 13849 PLe.

Supported safety functions

- 4 x emergency stop, or
- 4 x contact sensor, or
- 2 x light grid, or
- 1 x two-handed operation
- and 2 autonomous output functions

Technical data	Kuhnke FIO Safety IO SDI4/SDO2
Safety protocol	FSoE
Safety standard	IEC 61508 SIL3 and DIN EN ISO 13849-1 PLe
Number of inputs	4 safe inputs (configurable properties)
Number of outputs	2 safe outputs (I_{max} = 2.0 A)
Clock pulse outputs (OSSD)	4
Response time	< 1 ms (read input, write to E-bus)
Error response time	≤ watchdog time (configurable)
Extended diagnostic information	via CoE
E-bus power consumption	275 mA
Power supply voltage	24 V DC (-15% / +20%)
Electrical interference	EN 61000-6-2/ EN 61000-6-4
Resistance to vibration	EN 60068-2-6
Resistance to shock	EN 60068-2-27
Fieldbus port	EtherCAT® 100 Mbps LVDS: E-bus
Installation / mounting pos.	35 mm DIN rail / horizontal
Signal indication	LEDs allocated to the point of termination, status LEDs (EtherCAT, Safety, Power)
Shield	Provided directly by the module
Terminals	18-pin spring-assisted connector with mechanical ejector
Ambient conditions	0 °C …+55 °C, IP 20
Housing (W x H x D)	Plastic shroud over aluminium frame, 25 x 120 x 90 mm
Certifications	CE, cULus, TÜV Rheinland

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