Product data sheet

FX3-MOC100000

Safe EFI-pro System

SAFETY SYSTEMS FOR AGVS AND AMRS

SICK
Sensor Intelligence.

Ordering information

Description	Type	Part no.
Safe speed monitoring and safe position monitoring	FX3-MOC100000	1057833

Other models and accessories ➜ www.sick.com/Safe_EFI-pro_System

Detailed technical data

Features

Module	Motion Control module
Configuration method	Via software (Flexi Soft Designer, Safe EFI-pro System: Safety Designer)

Safety-related parameters

For axes with two encoders (any combination of sine-cosine, TTL, HTL 24 V, MTL 12 V, RS-422, SSI)	
Safety integrity level	SIL 3 (IEC 61508)
Category	Category 4 (EN ISO 13849)
Performance level	PL e (EN ISO 13849)
PFH_D (mean probability of a dangerous failure per hour)	$5.0 * 10^{-9}$
Minimum movement for error detection	≥ Selected tolerance limit of the function block used for cross check, e.g., position cross check, At least 1 x within 24 h
T_M (mission time)	20 years (EN ISO 13849)
For axes with one sine-cosine encoder and sin/cos analog voltage monitoring activated	
Safety integrity level	SIL 2 (IEC 61508)
Category	Category 3 (EN ISO 13849)
Performance level	PL d (EN ISO 13849)
PFH_D (mean probability of a dangerous failure per hour)	$6.0 * 10^{-9}$
Minimum movement for error detection	≥ 1 Sin/Cos period, At least 1 x within 24 h
T_M (mission time)	20 years (EN ISO 13849)

Functions

Drive safety functions	Safe stop 1 (SS1) Safe stop 2 (SS2) Safe operating stop (SOS)

	Safe speed monitoring (SSM) Safely-limited speed (SLS) Safe direction (SDI) Safe brake control (SBC) Safe cam (SCA) Safely-limited position (SLP)

Interfaces

Encoder interface	A/B incremental encoder, TTL A/B incremental encoder, HTL 12 V or 24 V A/B incremental encoder, RS-422 Sin/cos encoder SSI encoder (master / listener) HIPERFACE®
Connection type	Male connector, Micro D-Sub, 15-pin
Data interface	Internal bus (FLEXBUS+)

Electrical data

Protection class	III (EN 61140)
Voltage supply	Via FLEXBUS+
Internal power consumption	≤ 2.5 W [1]
A/B incremental encoder, TTL, 2 outputs	
Differential input voltage HIGH	5 V (2 V ... 5.3 V) [2]
Differential input voltage LOW	0 V (–0.3 V ... 0.8 V) [2]
Input voltage	–5 V ... 10 V [3]
Input frequency	≤ 300 kHz
Input resistance	≥ 35 kΩ
A/B incremental encoder, TTL, 2 pairs of outputs	
Differential input voltage HIGH	5 V (1.2 V ... 5.6 V) [2]
Differential input voltage LOW	–5 V (–5.6 V ... –1.2 V) [2]
Input voltage	–5 V ... 10 V [3]
Input frequency	≤ 300 kHz
Input resistance	≥ 35 kΩ
A/B incremental encoder, HTL 12 V, 2 outputs	
Differential input voltage HIGH	12 V (6.5 V ... 15 V) [2]
Differential input voltage LOW	0 V (–1 V ... 2.5 V) [2]
Input voltage	–5 V ... 20 V [3]
Input frequency	≤ 300 kHz
Input resistance	≥ 35 kΩ
A/B incremental encoder, HTL 12 V, 2 pairs of outputs	
Differential input voltage HIGH	12 V (4 V ... 15 V) [2]

[1] Via FLEXBUS+, without streams at analog inputs.
[2] Voltage between ENCx_y+ and ENCx_y–.
[3] Voltage between ENCx_y+ and ENC_0V and between ENCx_y– and ENC_0V.
[4] Peak to peak voltage between ENCx_y+ and ENCx_y–.

Differential input voltage LOW	–12 V (–15 V ... –4 V) [2]
Input voltage	–5 V ... 20 V [3]
Input frequency	≤ 300 kHz
Input resistance	≥ 35 kΩ
A/B incremental encoder, HTL 24 V, 2 outputs	
Differential input voltage HIGH	24 V (13 V ... 30 V) [2]
Differential input voltage LOW	0 V (–3 V ... 5 V) [2]
Input voltage	–10 V ... 40 V [3]
Input frequency	≤ 300 kHz
Input resistance	≥ 35 kΩ
A/B incremental encoder, HTL 24 V, 2 pairs of outputs	
Differential input voltage HIGH	24 V (8 V ... 30 V) [2]
Differential input voltage LOW	–24 V (–30 V ... –8 V) [2]
Input voltage	–10 V ... 40 V [3]
Input frequency	≤ 300 kHz
Input resistance	≥ 35 kΩ
A/B incremental encoder, RS-422	
Differential input voltage HIGH	0.2 V ... 5 V [2]
Differential input voltage LOW	–5 V ... –0.2 V [2]
Input voltage	–7 V ... 7 V [3]
Input frequency	≤ 1,000 kHz
Input resistance	≥ 35 kΩ
Differential resistance	120 Ω (100 Ω ... 150 Ω)
Sin/cos encoder	
Differential input voltage	1 V (0.8 V ... 1.2 V) [4]
Input voltage	0 V ... 5 V [3]
Input frequency	≤ 120 kHz
Input resistance	1 kΩ (0.9 kΩ ... 1.1 kΩ)
Voltage monitoring, lower limit for vector length monitoring	0.5 V
Voltage monitoring, upper limit for vector length monitoring	1.5 V
SSI encoder (master / listener)	
Differential resistance	120 Ω (100 Ω ... 150 Ω)
Clock frequency	100 kHz ... 1,000 kHz
Cycle gaps between the data packages (monoflop time)	≥ 100 µs

[1] Via FLEXBUS+, without streams at analog inputs.
[2] Voltage between ENCx_y+ and ENCx_y–.
[3] Voltage between ENCx_y+ and ENC_0V and between ENCx_y– and ENC_0V.
[4] Peak to peak voltage between ENCx_y+ and ENCx_y–.

Position data bits per frame	16 ... 62

[1] Via FLEXBUS+, without streams at analog inputs.
[2] Voltage between ENCx_y+ and ENCx_y–.
[3] Voltage between ENCx_y+ and ENC_0V and between ENCx_y– and ENC_0V.
[4] Peak to peak voltage between ENCx_y+ and ENCx_y–.

Mechanical data

Dimensions (W x H x D)	22.5 mm x 96.5 mm x 126 mm
Weight	120 g

Ambient data

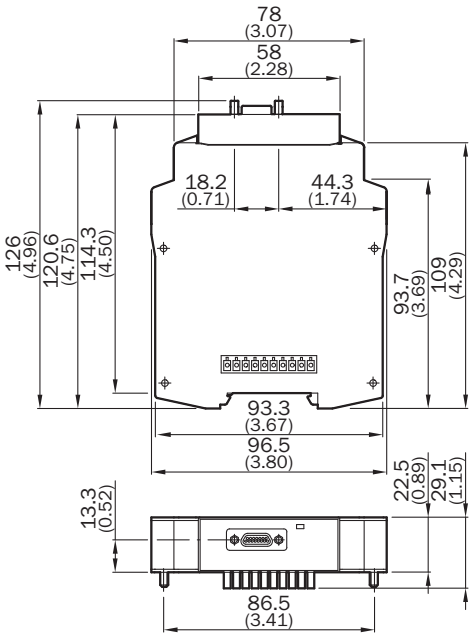
Enclosure rating	IP20 (EN 60529)
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +70 °C
Air humidity	≤ 95 %, Non-condensing

Classifications

ECLASS 5.0	27243001
ECLASS 5.1.4	27243101
ECLASS 6.0	27243101
ECLASS 6.2	27243101
ECLASS 7.0	27243101
ECLASS 8.0	27243101
ECLASS 8.1	27243101
ECLASS 9.0	27243101
ECLASS 10.0	27243101
ECLASS 11.0	27243101
ECLASS 12.0	27243101
ETIM 5.0	EC001449
ETIM 6.0	EC001449
ETIM 7.0	EC001449
ETIM 8.0	EC001449
UNSPSC 16.0901	32151705

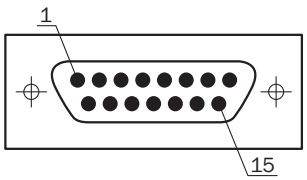
Dimensional drawing (Dimensions in mm (inch))

FX3-MOC0, FX3-MOC1



PIN assignment

FX3-MOC0, FX3-MOC1



Pin	Signal	Color-coded connecting cable
1	ENC1_A+	White
2	ENC1_B+	Green
3	ENC1_C+	Gray
4	ENC1_24V	Blue
5	ENC2_24V	Red
6	ENC2_C+	White-green
7	ENC2_B+	Gray-pink
8	ENC2_A+	Black
9	ENC1_A–	Brown
10	ENC1_B–	Yellow
11	ENC1_C–	Pink
12	ENC_0V	White-yellow
13	ENC2_C–	Brown-green

Pin	Signal	Color-coded connecting cable
14	ENC2_B–	Red-blue
15	ENC2_A–	Violet

Recommended accessories

Other models and accessories ➜ www.sick.com/Safe_EFI-pro_System

	Brief description	Type	Part no.
Others			
	• **Sub product family:** SIM1000 FX • **Product category:** Programmable devices • **Supported products:** 2D and 3D LiDAR sensors, pico- und midiCam series, incremental and absolute encoders, Image-based code readers, Fixed mount barcode scanners, RFID read/write device, displacement measurement sensors, Photoelectric sensors, Flexi Soft main module • **Processor:** Dual-core ARM Cortex-A9 CPU with NEON accelerator • **Toolkit:** SICK algorithm API • **Further functions:** FPGA for I/O handling • **Connections:** Terminal block 1-4, Ethernet, FLEXBUS+ • **Enclosure rating:** IP20	SIM1000-0P0B110	1097817
Safety switching amplifier			
	• **Applications:** Output expansion module for OSSDs • **Compatible sensor types:** Safety sensors with OSSDs • **Connection type:** Front connector with spring terminals • **Restart interlock:** no • **External device monitoring (EDM):** Via path • **Outputs:** 2 enabling current paths (safe), 1 feedback current path (for use as external device monitoring, not safe) • **Housing width:** 18 mm	RLY3-0SSD100	1085343
	• **Applications:** Output expansion module for OSSDs • **Compatible sensor types:** Safety sensors with OSSDs • **Connection type:** Front connector with spring terminals • **Restart interlock:** no • **External device monitoring (EDM):** Via path • **Outputs:** 4 enabling current paths (safe), 1 feedback current path (for use as external device monitoring, not safe), 1 signaling current path (not safe) • **Housing width:** 28 mm	RLY3-0SSD400	1099971

SICK AT A GLANCE

SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

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