MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

HIMA

HIMatrix F35 014

COMPACT SAFETY RELATED CONTROLLER

Used with the applicable HIMatrix F35 configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: HIMA HIMatrix Product Catalog, version 2, 96 9000345 1011; F35 and F35 014 sections

HIMatrix

Overview

2.2.0

The programmable electronic systems (PES) in the HIMatrix series are available in two different performance classes. The choice of engineering software directly determines the performance level. The other technical data for the respective HIMatrix controllers remain unchanged, irrespective of their performance level or engineering software.

The following PES can be supplied with two different operating systems and can be programmed with either ELOP II Factory or SILworX:

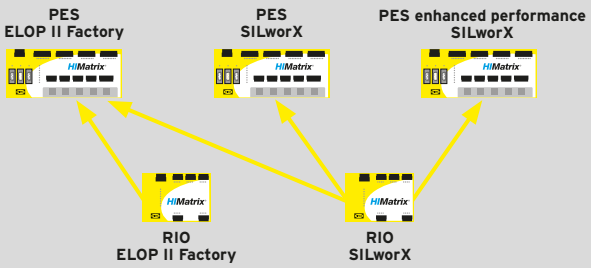
ELOP II Factory	SILworX®
▪ F20 01	▪ F20 01 SILworX
▪ F30 01	▪ F30 01 SILworX
▪ F31 02	▪ F31 02 SILworX
▪ F35	▪ F35 SILworX
▪ F60 CPU 01	▪ F60 CPU 01 SILworX

The following PES with a new, more-powerful processor unit providing enhanced performance can only be programmed with SILworX:

SILworX®
▪ F10 PCI
▪ F30 03 SILworX
▪ F31 03 SILworX
▪ F35 03 SILworX
▪ F60 CPU 03 SILworX

Networking different HIMatrix releases:

All remote I/O systems with SILworX programming can be connected to all HIMatrix controllers.
In contrast, remote I/O systems with ELOP II Factory programming can only be used with ELOP II Factory programmable systems.



HIMatrix-PES: nomenclature and programming

FXX 01	Programmable with ELOP II Factory, 500 kB memory each for the program and data
FXX 01 SILworX	Programmable with SILworX, 1,023 kB memory each for the program and data
FXX 03 SILworX	Enhanced performance, programmable with SILworX, 5 MB shared memory for the program and data

Version 2, Subject to change and errors, 96 9000345 1011

SAFETY
NONSTOP

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HIMatrix

HIMatrix for extreme operating conditions

2.3.0

Subsea

The following HIMatrix model versions have been especially developed for subsea use at depths of up to 4,000 metres. The housing is made of V2A stainless steel. The electronic components are coated with a protective lacquer.



F35 012

Products
F35 012 **F3 AIO 8/4 012**

Description	
Housing material	V2A stainless steel
Operating temperature	-20 °C ... 60 °C
ISO 13628-6:2006	Fulfils vibration and shock test according to levels Q1 and Q2. Fulfils stochastic vibration test, ESS (environmental stress screening).

Rail

These safety controllers feature an extended temperature range of -25 °C to 70 °C and were developed especially for the rail sector.



F3 DIO 20/8 02

Product	Description
F3 DIO 20/8 023	Salt-spray-resistant for railway and signal boxes
F30 014 **F3 DIO 8/8 014** **F35 014** **F3 DIO 20/8 024** **F3 AIO 8/4 014** **F2 DO 16 014**	Tested for railway vehicle operating equipment. These devices are vibration- and shock-resistant in accordance with IEC 61373 Class 1B.

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Observe the instructions specified in the certificates,
the safety manual, the system manual and the corresponding data sheet.

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General specifications

2.6.0

Cable connection
- Power supply: 2.5 mm²
- Clamp terminals: 1.5 mm²
- Screw terminal connector blocks included within the scope of delivery

Operating principles
- Operating principles
- De-energize-to-trip principle
- Energize-to-trip principle for F35, F60 and F3 AIO 8/4 01

Behaviour in the event of short-circuit or overload on outputs
- If the total current is exceeded: all outputs are switched off
- If channel current is exceeded: the affected output is switched off
- Each output is switched on again cyclically

Integrated ethernet switch
- Auto crossover
- Configurable (speed, flow control, broadcast limiter)

Communication
HIMatrix is a system that is designed for high-performance open communication. It supports both safe communication up to SIL 3/PL e (safe**ethernet**) as well as the most common non-secure industrial protocols for connecting to external systems (see HIMatrix communication).

Proof test interval in accordance with IEC 61511
- 10 years (the next interval begins when the components are restarted)
- 3 years for relay modules

Service life according to EN ISO (PL e) 13849
- 20 years
- 3 years for relay modules

Programming
- Function Block Diagram (FBD)
- Sequential Function Chart (SFC)

Program update possible for:
- Controllers in STOP state
- Controllers with enhanced performance in RUN state

Calculation values for safety
Available upon request

Program update
Possible for controllers in the STOP state

Forcing
Possible at any time, if permitted in the user program

Online test
Possible at any time

Diagnosis
- State variables
- Evaluation of other diagnosis data in ELOP II Factory or SILworX

Standards met
- EN ISO 13849 (PL e)
- EN 954-1:1969 (Cat. 4)
- EN 62061 (SIL 3)
- IEC 61511:2004 (SIL 3)
- IEC 61508 Parts 1-7:2000 (SIL 3)
- EN 12067-2:2004, EN 198:203, EN 230:1990
- NFPA 85:2001
- DIN VDE 0116:1989, EN 50156-1:2004
- EMC Directive 89/336/EEC
- Ex-Directive 94/9/EG, EN 1127-1
- EN 54-2:1997, NFPA 72:2002: F35, F60, F3 AIO 8/4 01
- Lloyd's Register, UL, FM Approvals: see manual
- SIL 4 according to CENELEC

Operating requirements
- EN 61131-2 (2003) PLC standard (Zone B)
- EN 61000-6-2:2001 EMC immunity, for industrial environments
- EN 61000-6-4:2001 EMC emission, for industrial environments

Rail standards
- EN 50126 (SIL 4)
- EN 50128 (SIL 4)
- EN 50129 (SIL 4)
- EN 50159-1
- EN 61373 Category 1 Class B

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24DI 8AI 2CNT 8DO 3FB 4TX

HIMatrix® F35

3.1.0

HIMatrix F35, 24 digital and 8 analog inputs, 2 counter inputs, 8 digital outputs, add. 4 port-switch 100 Base-Tx with safe**ethernet**, SIL 3/Cat. 4/PL e

Specifications, Dimensions and Weight	
Dimensions	257 mm x 114 mm x 97 mm (WxHxD)
Weight approx.	1200 g
Mounting	Horizontal on 35 mm DIN rail
Minimum distances	20 mm horizontally, 100 mm vertically (keep the ventilation slots free)
Power supply	24 VDC, -15% ... +20%, power supply unit with safe isolation in accordance with IEC 61131-2 (SELV, PELV)
Power consumption	12 W idle; 216 W max.
External fuse	10 A time-lag
Digital inputs	24 (no electrical isolation)
Input level	Configurable
Sensor supply LS+	3 x 20 V / 100 mA – short-circuit-proof
Analog inputs	8 (unipolar, no electrical isolation)
Accuracy intrinsic errors Accuracy operating errors Safety-related accuracy	±0.1% (25 °C) ±0.5% (60 °C) 2%
Nominal value/operating value	Related to L- 0 ... 10 VDC / -0.1 ... 11.5 VDC 0 ... 20 mA / -0.4 ... 23 mA (at 500 Ω)
Resolution A/D converter / eff	12 bit / 9 bit
Transmitter supply	8 x 24 V ≤ 46 mA – short-circuit-proof
Digital outputs	8 (no electrical isolation)
Output current	0.5 A (channels 4 and 8: 1 A at 60 °C, 2 A at 50 °C)
Counters	2 (no electrical isolation)
Inputs	3 (A, B, C), 5 V or 24 V each
Frequency	0 ... 100 kHz

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Specifications, Dimensions and Weight (continued from F35)	
Number of switch ports	4 (RJ-45, 10/100 Mbit/s)
Number of fieldbus interfaces	3 (see the description of protocols)
RS485 for Modbus	Fixed on FB3
Type of protection	IP20
Operating temperature	0 ... 60 °C
Storage temperature	-40 °C ... +85 °C
Use in Ex-Zone	Ex II 3 G EEx nA II T4 X
Use above sea level ≤ 2000 m a.s.l. > 2000 ≤ 4000 m a.s.l. at max. 50 °C	 Without restrictions Digital outputs max. 0.5 A

Accessories to F35

Product	Part number	Description
Z 7301	**98 2220059**	External shunt adapter for current measurement
		250 Ω for 2 analog inputs
Z 7302	**98 2220067**	External shunt adapter for current measurement
		500 Ω for 2 analog inputs
Z 7306	**98 2220115**	External shunt adapter for current measurement
		250 Ω for 2 analog inputs with HART rejection and short-circuit protection
Z 7308	**98 2220137**	External shunt adapter for current measurement
		Voltage divider, over voltage protection

Product	ELOP II Factory	SILworX	Description
F35 01	**98 2200416**	**98 2200473**	-
F35 03	**-**	**98 2200497**	Enhanced performance
F35 011	**98 2200453**	**98 2200476**	Operation temperature -20 °C ... 60 °C
F35 012	**98 2200454**	**98 2200477**	Operation temperature -20 °C ... 60 °C, cabinet material stainless steel V2A, vibration and shock test: ISO 13628-6:2006 Level Q1 and Q2, random vibration test, ESS (environmental stress screening), dimensions of mounting plate 200 mm x 136 mm x 6 mm (WxHxD), weight approx. 1700g
F35 014	**98 2200511**	**98 2200510**	Operation temperature -25 °C ... 70 °C, shock resistance due to IEC 61373 Class 1B for transportation and mobile applications

Observe the instructions specified in the certificates, the safety manual, the system manual and the corresponding data sheet.