MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

HIMA

F8621A

H41Q/H51Q COPROCESSOR MODULE

Used with the applicable HIMA H41q and H51q configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: HIMA The H41q and H51q System Families, HI 800 263 DEA

3 The H41q System Family

The H41q system family comprises compact designed PES in single channel and redundant models, also with TÜV safety certificate.

All input/output modules can be used with both redundant and single channel models of the central modules.

All modules of the H41q system family meet the requirements for electromagnetic compatibility and immunity according to article 10 of the EG guideline 89/336/EWG for the electromagnetic conformity. This is demonstrated with the CE sign within the data sheets of the modules. Also the systems and modules are wearing a label with this sign.

All models of the H41q system family have all the components required for control tasks in one 19 inches subrack, 5 units high, with an integrated cable tray (see also data sheets of H41q systems or assembly kits).

3.1 Overview Assembly Kits H41q

The components required for a working system are included in assembly kits:

System	H41q-M	H41q-H	H41q-HR	H41q-MS	H41q-HS	H41q-HRS
Safety	–	–	–	SIL 3	SIL 3	SIL 3
Quantity/type CU	1 x F 8653X	2 x F 8653X	2 x F 8653X	1 x F 8652X	2 x F 8652X	2 x F 8652X
Quantity/type CM *	1 x F 8621A	(2 x) 1 x F 8621A	(2 x) 1 x F 8621A	1 x F 8621A	(2 x) 1 x F 8621A	(2 x) 1 x F 8621A
Quantity/type CoM (Fast Ethernet) *	1 x F 8627/ F 8627X	(2 x) 1 x F 8627/ F 8627X	(2 x) 1 x F 8627/ F 8627X	1 x F 8627/ F 8627X	(2 x) 1 x F 8627/ F 8627X	(2 x) 1 x F 8627/ F 8627X
Quantity/type CoM (Profibus-DP) *	1 x F 8628/ F 8628X	(2 x) 1 x F 8628/ F 8628X	(2 x) 1 x F 8628/ F 8628X	1 x F 8628/ F 8628X	(2 x) 1 x F 8628/ F 8628X	(2 x) 1 x F 8628/ F 8628X
Quantity/type power supply	1 x F 7130A	2 x F 7130A	2 x F 7130A	2 x F 7130A	2 x F 7130A	2 x F 7130A
Quantity I/O buses	1	1	2	1	1	2
max. quantity I/O modules	13	13	7 + 6	13	13	7 + 6
Assembly kit number	B 4234	B 4236-1	B 4236-2	B 4235	B 4237-1	B 4237-2

Table 2: Overview Assembly Kits H41q

* Options

Abbreviations:

CM	Coprocessor Module
CoM	Communication Module
CU	Central Module
I/O	Input/Output

4 The H51q System Family

The H51q system family comprises modular designed PES in single channel and redundant models, also with TÜV safety certificate.

All input/output modules can be used with both redundant and single channel models of the central devices.

All modules of the H51q system family meet the requirements for electromagnetic compatibility and immunity according to article 10 of the EU guideline 89/336/EWG for the electromagnetic conformity. This is marked with the CE sign within the data sheets of the modules. Also the systems and modules are wearing a label with this sign.
The H51q system family consists of one 19 inches central rack, 5 units high, and up to 16 input/output racks in the 19 inches size, 4 units high (see also data sheets for H51q systems or assembly kits).

4.1 Overview Assembly Kits H51q

The components required for a working system are included in assembly kits:

System	H51q-M	H51q-H	H51q-HR	H51q-MS	H51q-HS	H51q-HRS
Safety	–	–	–	SIL 3	SIL 3	SIL 3
Quantity/type CU	1 x F 8651X	2 x F 8651X	2 x F 8651X	1 x F 8650X	2 x F 8650X	2 x F 8650X
Quantity/type CM *	3 x F 8621A	2 x 3 F 8621A	2 x 3 F 8621A	3 x F 8621A	2 x 3 F 8621A	2 x 3 F 8621A
Quantity/type CoM (Fast Ethernet) *	5 x F 8627/ F 8627X	2 x 5 F 8627/ F 8627X	2 x 5 F 8627/ F 8627X	5 x F 8627/ F 8627X	2 x 5 F 8627/ F 8627X	2 x 5 F 8627/ F 8627X
Quantity/type CoM (Profibus-DP) *	5 x F 8628/ F 8628X	2 x 5 F 8628/ F 8628X	2 x 5 F 8628/ F 8628X	5 x F 8628/ F 8628X	2 x 5 F 8628/ F 8628X	2 x 5 F 8628/ F 8628X
Quantity/type power supplies	2 (+1*) x F 7126A	3 x F 7126A	3 x F 7126A	2 (+1*) x F 7126A	3 x F 7126A	3 x F 7126A
5 V monitoring	F 7131	F 7131	F 7131	F 7131	F 7131	F 7131
Battery buffering	F 7131 + F 8651X	F 7131 + F 8651X	F 7131 + F 8651X	F 7131 + F 8650X	F 7131 + F 8650X	F 7131 + F 8650X
Quantity I/O buses	1	1	2	1	1	2
max. quantity I/O modules	256 in 16 I/O subracks	256 in 16 I/O subracks	2 x 128 in 2 x 8 I/O subracks	256 in 16 I/O subracks	256 in 16 I/O subracks	2 x 128 in 2 x 8 I/O subracks
Assembly kit number	B 5230	B 5232-1	B 5232-2	B 5231	B 5233-1	B 5233-2

Table 4: Overview Assembly Kits H51q

* Options (max. 5 communication slots per central module)

Abbreviations:

CM	Coprocessor Module
CoM	Communication Module
CU	Central Module
I/O	Input/Output

5 Technical Data

5.1 Mechanical Design

Structure of the compact devices H41q
1 subrack 482.6 mm (19-inches technology), 5 HU for central modules and I/O modules

Modules in the I/O area: 4 or 8 SU, 3 HU,
max. 13 I/O modules with width 4 SU

Structure of the modular devices H51q
subracks 482.6 mm (19-inches technology), 1 central subrack 5 HU,
max. 16 I/O subracks 4 HU

Modules in the central area: width 4 and 8 SU, 3 HU,
Modules in the I/O area: width 4 or 8 SU, 3 HU,
max. 256 I/O modules with width 4 SU

Explanation:1 SU (spacing unit) = 5.08 mm (= 1 TE)
1 HU (height unit) = 44.45 mm (= 1 HE)

The connection of the external signal cables is made at the front plate of the I/O modules via cable plugs with LED displays (no LEDs for analog modules).
For the wiring fire-retardant wires and cables are used.

5.2 System Data

Operating voltages	24 VDC (peripherals) 5 VDC (microprocessor system)
Supply voltage	24 VDC / -15 %...+20 %, $r_{pp} \leq 15$ %
Ambient conditions	0...+60 °C, according to IEC 61131-2 pollution degree II according to DIN VDE 0160
Storage temperature	-40...+85 °C (without batteries) -40...+75 °C (central module and central subrack with battery)

5.3 Data of the Central Module (CU)

Type of processor	INTEL 386 EX
Clock frequency	25 MHz
Program memory	Flash-EPROM for operating system and function blocks Flash-EPROM for user program CMOS-RAM for variables
Battery backup for CMOS-RAM	Lithium battery on the central module
Battery monitoring	Measuring circuit in the central module
Diagnostic system	in the central module with 4 digit alphanumeric display and 2 LEDs
Diagnoses/displays	information of the user program Errors in the central device, I/O bus, in safety-related I/O modules, interfaces
Memory capacity for user	320 kbyte (logic, parameters, variables)
Basic cycle time	5 ms for single channel systems, 27 ms for redundant systems

5.4 Interfaces

5.4.1 RS 485 Interfaces

Interface type	Two-wire bus interface with passive coupling (RS 485)
Central module	2 interfaces
Quantity H41q	max. 4 interfaces on 2 coprocessor modules
Interface extensions	
Quantity H51q	max. 12 interfaces on 6 coprocessor modules
Interface extensions	
Baud rate	300 bps up to 57600 bps (except 38400 bps)
Connection to programming device	by RS 485 / RS 232C converter, type H 7505 or cable BV 7043

5.4.2 Ethernet Interfaces

Interface type	Ethernet according to IEEE 802.3 with 100BaseT connection via RJ 45
Quantity H41q	max. 2 interfaces on 2 communication modules
Interface extensions	(with redundant CUs up to 4 interfaces)
Quantity H51q	max. 5 interfaces on 5 communication modules
Interface extensions	(with redundant CUs up to 10 interfaces)
Baud rate	max. 100 Mbit/s

5.4.3 Profibus-DP interfaces

Interface type	Profibus-DP Slave coupling with RS 485
Quantity H41q	max. 2 interfaces on 2 communication modules
Interface extensions	(with redundant CUs up to 4 interfaces)
Quantity H51q	max. 5 interfaces on 5 communication modules
Interface extensions	(with redundant CUs up to 10 interfaces)
Baud rate	up to 12 MBit/s

5.5 Definition of Signals

The signal definitions of the H41q and H51q systems are according to IEC/EN 61131-2:

Input signals	
L-signal (0-signal)	-3...+5 V or open input
H-signal (1-signal)	+13...+33 V typ. switching point: approx. 9 V
Output signals	
L-signal (0-signal)	0...+2 V
H-signal (1-signal)	+16...+30 V

7.4 Update from F 865. to F 865.X

When F 865. central modules are updated to F 865.X, also the fan conception must be modified:

Former fan concept:
Z 6012: one integrated fan with fan run monitoring and fuse monitoring

New fan concept:
Z 6018: fan run monitoring for 4 fans and fuse monitoring
K 9212: fan unit (4 fan units for H41, 3 fan units for H51).

See also data sheets of the assembly kits.

7.5 Replacement of F 865.A by F 865.X

F 865.A central modules can be replaced by F 865.X modules after changing to the new fan concept and using the unaltered user program, but with the new operating system (BS41q/51q V7.0-8).

7.6 Use of Coprocessor and Communication Modules

System H41q
To the right of each central module one coprocessor module (F 8621A) or one communication module (Ethernet: F 8627/F 8627X, Profibus-DP: F 8628/F 8628X) can be installed. If they are operated in redundant mode, the same type has to be used.

System H51q
To the right of each central module up to three coprocessor modules or up to five communication modules can be installed additionally.

Restrictions
Coprocessor modules:
Max. 3 for each central module, only the slots reserved for the coprocessor modules can be used (slots 10, 11, 12 or 17, 18, 19).

Ethernet or Profibus-DP communication modules:
Max. 5 for each central module, each of the five slots right of the central modules can be used (slots 10, 11, 12, 13, 14 or 17, 18, 19, 20, 21). The different types can be mixed.

If they are operated in redundant mode, the redundant coprocessor or communication modules must be installed in the according slots.

8.2.5 Communication and Coprocessor Modules

Remove:

1. Disconnect the communication cable.
2. Important: **At first** remove the appertaining central module after removing the fixing screws,
3. remove communication module (Ethernet module **with** HSR cable connected, if existing) after removing the fixing screws,
4. Ethernet module: Remove HSR cable.

Insert:

1. Check settings of the switches according to the data sheet,
2. insert module without cable and fix it,
3. Ethernet module: Connect HSR cable (only at HIPRO-S, but not at HIPRO-S-DIRECT),
4. connect communication cable,
5. insert appertaining central module and fix it by screws.

8.3 Earthing of the 24 VDC System Voltage

Please regard the requirement of the SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage). To improve the electromagnetic compatibility an instrument earth is provided. The instrument earth is designed within the cabinet in such a way that it fulfills the requirements of a protection earth.

All H41q/H51q systems can be operated with earthed L- or not earthed.

8.3.1 Floating Supply

With several undetected earth faults faulty control signals may be triggered. To prevent this, with floating operation in any case an earth fault monitoring system must be provided (ref. also to e.g. VDE 0116). The earth fault monitoring must be installed outside the control cabinet.

An earth fault can only be located by switching off a partial function (separation of lines). An earth fault can be detected if both poles are feed to supply an output circuit.

8.3.2 Earthed Operation

It is premised that the earthing conditions are excellent and there is a separate earth connection (if possible) through which no external currents flow. Only the earthing of the negative pole (L-) is permitted. Earthing of the L+ positive pole is not admissible, as any earth fault on a sensor line would result in an overriding of the sensor concerned.

L- may only be earthed at one point within the system. Generally L- is earthed directly behind the power supply (e.g. on the bus bar). The earthing should be easy to access and disconnect. The earthing resistance must be $\leq 2\ \Omega$.

8.4 Measures to Install a Cabinet According to the CE Requirements

According to the guidline 89/336/EWG of the European Council (also law for EMC in the Federal Republic of Germany), since January 1st, 1996 all electrical equipments have to be provide with the CE symbol for Electromagnetic Compatibility (EMC) within the European Union.

All modules of the HIMA system families H41q/H51q are supplied with the CE symbol.

To prevent also EMC problems with the installation of controls (PLCs) in cabinets and frames, the following measures are required:

– Installation of the **H 7013** HIMA module as power supply filter directly at the 24 VDC feed-

Note In this state the system is set up for testing if individual lines or a group of lines are insulated against earth, but not if two lines are insulated against each other. Otherwise there is a risk of damage.
The guideline for test voltages and insulating resistance is IEC/EN 61131-2 or DIN VDE 0160/EN 50178.

9.5 Switching on Power Supply

The input/output modules and their appertaining cable connectors are fixed with screws. The 24 VDC operation voltage has to be checked for correct polarity, level and ripple before it is connected.
In case of reverse polarity a fuse protects the I/O module of damages.

9.6 Functional Testing

9.6.1 Preparing Functional Testing

For functional testing check the equipment of the control cabinet completely with help of the label and/or documentation printout "I/O subrack". All free connectors of the input/output modules have to be connected to the allocated input/output racks, and the voltage connections of the cable connectors to the allocated voltage distributors. All control elements (control devices) must be released by the factory management or be driven without auxiliary power.

9.6.2 Testing in the Central Devices

The essential tests in the central devices of the H41q/H51q system are:

Central modules	switch positions for bus station no. and transfer rate, version of the operation system via display
Coprocessor module F 8621A	operating system EPROM switch positions for RS 485 interface
Communication modules	switch positions for different operating modes for modules F8627/F8627X and F8628/F8628X, see corresponding data sheet
I/O bus connection	refer to the data sheet of the appertaining assembly kit

We recommend marking all required switch positions etc. in copies of the data sheets of the respective control cabinet and keeping the copies in the pocket of the cabinet door. Should modules have to be exchanged, the necessary information will thus be immediately available.

9.7.1 Exchange of the Buffering Batteries

For buffering lithium batteries are used.

Lifetime of the buffer batteries (CPU not in operation, modules *without* voltage feeding):
1000 days at T_A = 25 °C,
200 days at T_A = 60 °C
It is recommended to change the buffer batteries (CPU in operation, modules *with* voltage feeding) at the latest after 6 years.

Changing of external batteries of the systems H41q/H51q:

1. Battery without soldering lug:
   CR-1/2 AA-CD, HIMA part no. 440000019.
   Remove battery cap, loose battery out of the holder and plug in new battery. Check the polarity!
2. Battery with soldering lug: CR-1/2 AA-CD, HIMA part no. 440000016
   Solder battery out of holder (first + pole then - pole). At solder in check the correct polarity and first solder the - pole then the + pole.

External batteries of the systems H41q: Backplane of the bus plate
Dependent on the battery type changing as described above.

External batteries of the systems H51q: Power supply monitoring module F 7131
The module can be pulled out in the energized state. Then change the battery as described above. Check the polarity!

Central modules: F 8650E / F 8650X, F 8651E / F 8651X, F 8652E / F 8652X, F 8653E / F 8653X
Battery: CR 2477N, HIMA part no. 44 0000018
It is recommended to change the buffer battery (CPU in operation, modules *with* voltage feeding) at the latest after 6 years, or with display BATI within three months.



For battery change the central module has to be pulled out of the subrack!

Further informations you will find in chapter “How to Insert and to Remove Modules“. For single channel systems this results of course in a shutdown of the plant, in redundant systems the system reaction depends on the configuration.

Coprocessor module F 8621A
This module may be installed as an option within the central rack of the H41q/H51q system family. At H41q system the coprocessor module is buffered via the batteries on the backplane, at H51q system this is done by batteries on the F 7131 power supply monitoring module. A coprocessor module is needed to hold the master program for controlling the communication between PES systems (slaves).

The additional devices listed below are now described in the catalog "Cabinets and Power Supplies".

K 7212	Feeding and current distribution (with mains filter)
K 7213	Feeding and current distribution, up to 35 A
K 7214	Feeding and current distribution, up to 150 A
K 7215	Feeding and current distribution, up to 150 A, graphical display
K 7216	Feeding and current distribution, up to 63 A, for SELV and PELV
K 7901	Feeding and current distribution, up to 63 A, with two mains filters Z 6015
K 7915	Fuse distributor for lead fuse with certificate of Factory Mutual Research Corporation

10.7 Modules for I/O Bus Coupling

F 7553	Coupling module for H51q

10.8 Communication Modules

F 8621A	H41q/51q coprocessor module
F 8627 / F 8627X	Fast Ethernet communication
F 8628 / F 8628X	Profibus-DP communication

10.9 Relays in Terminal Block Housing

H 4116	Relay in terminal block housing, safety-related, 4 A, SIL 2
H 4135	Relay in terminal block housing, safety-related, SIL 3
H 4136	Relay in terminal block housing, safety-related, operating voltage 48 VDC, SIL 3

10.10 Bus Connection Modules for HIBUS

H 7505	data signal converter V.24 / 20 mA, 2-wire / 4-wire (HIBUS)
H 7506	Bus terminal module for 2-wire buses

10.11 Accessories

H 7014	Electronic fuses
H 7015A	Terminal module
H 7016	Terminal module
H 7017	Shunt with low-pass filter
H 7018	Terminal module
H 7020	Terminal module
RS485 PCI	Interface card