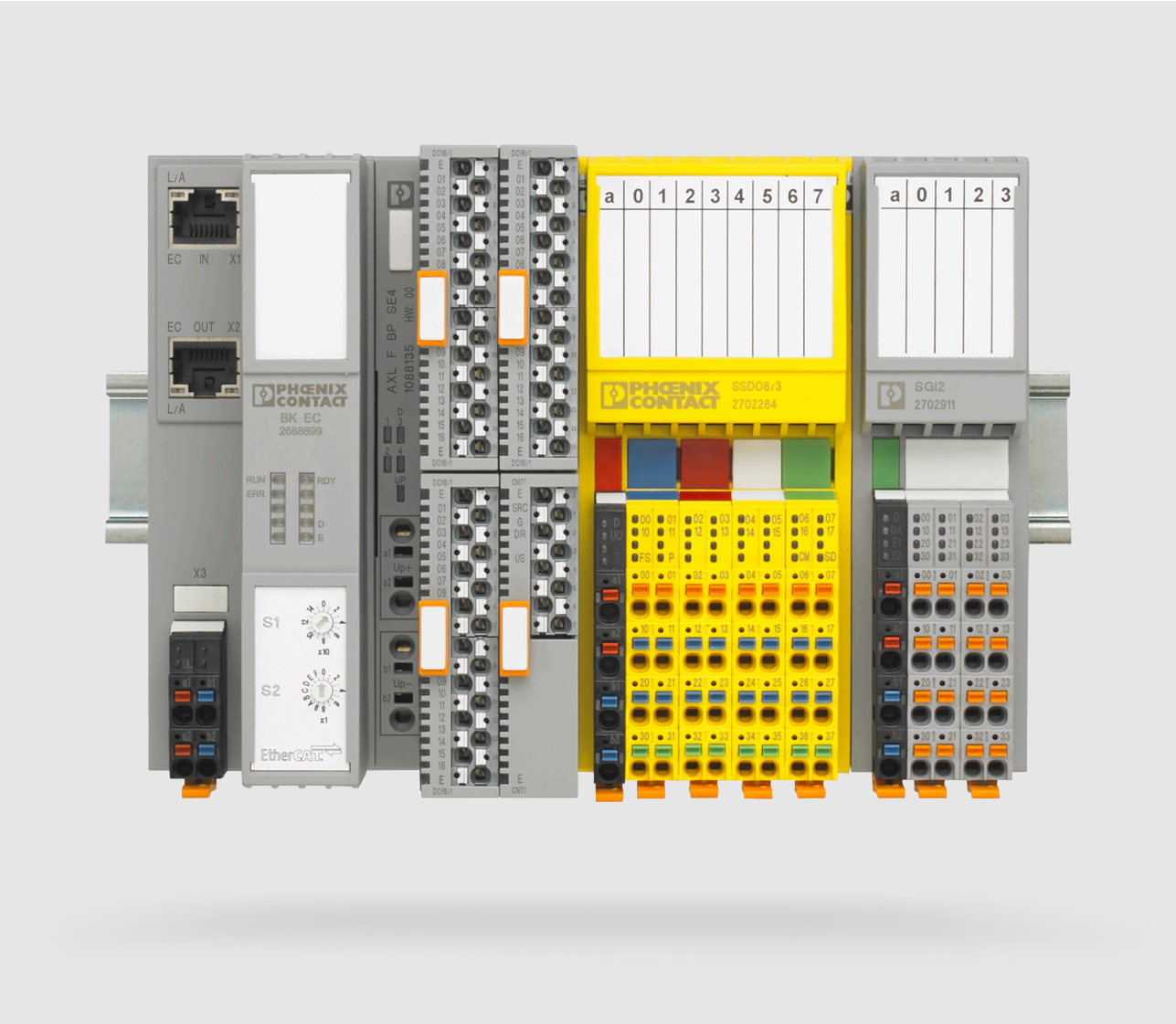

Axioline F: Diagnostic registers and error messages

User manual

User manual

Axioline F: Diagnostic registers and error messages

UM EN AXL F SYS DIAG, Revision 08 2024-11-25

This user manual is valid for:

Modules from the Axioline F and Axioline Smart Elements product groups

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1 For your safety

Read this user manual carefully and keep it for future reference.

1.1 Labeling of warning notes

This symbol indicates hazards that could lead to personal injury.

There are three signal words indicating the severity of a potential injury.

DANGER
Indicates a hazard with a high risk level. If this hazardous situation is not avoided, it will result in death or serious injury.

WARNING
Indicates a hazard with a medium risk level. If this hazardous situation is not avoided, it could result in death or serious injury.

CAUTION
Indicates a hazard with a low risk level. If this hazardous situation is not avoided, it could result in minor or moderate injury.

This symbol together with the **NOTE** signal word warns the reader of actions that might cause property damage or a malfunction.

Here you will find additional information or detailed sources of information.

1.2 Qualification of users

The use of products described in this manual is oriented exclusively to qualified application programmers and software engineers. The users must be familiar with the relevant safety concepts of automation technology as well as applicable standards and other regulations.

2 Diagnostics in the Axioline F system

Axioline Smart Elements are integrated into an Axioline F station using Axioline F backplanes. Although the Axioline Smart Elements are not explicitly mentioned in each instance, the explanations in this document also apply to the Axioline Smart Elements in connection with the Axioline F backplanes.

Terms used in the document:

Local bus	Axioline F local bus
Head of an Axioline F station	E.g., Axioline F bus coupler, Axioline F controller
Local bus master	Part of the head of the Axioline station that is responsible for controlling the Axioline F local bus
Axioline F module	Any module of an Axioline F station, i.e., head of the Axioline F station or I/O module

The Axioline F modules indicate the errors that occur in various ways:

– Via the local diagnostic indicators
– Via diagnostic object 0018_{hex} (DiagState)
– Via the diagnostic registers of the AXC ... controllers
– Via the diagnostic registers of the AXL F BK ... bus couplers

2.1 Local diagnostic and status indicators

All Axioline F modules are provided with diagnostic and status indicators for quick local error diagnostics. They enable the clear localization of system errors (bus errors) or I/O errors.

Diagnostics

The diagnostic indicators (red, yellow or green) provide information about the state of the module and, in the event of an error, provide information about the type and location of the error. The module is working correctly when all of its green LEDs are on.

Status

The status indicators (yellow) indicate the status of the associated input or output and of the connected I/O device.

Extended diagnostics

Some modules have extended diagnostics. For example, this enables a short circuit or overload of the sensor supply to be detected and reported. If a short circuit occurs at an output, some output modules can diagnose each channel individually. Information about the supply voltage is also reported. The module sends information about I/O errors to the controller with precise details of the error type. In addition, the status indicators signal the error.

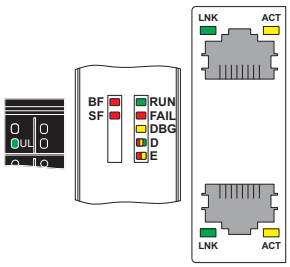
Only the D (diagnostics for local bus communication) and E (error) LEDs are described below.

For an overview of all the main diagnostic and status indicators in the Axioline F system and their meaning, please refer to the UM EN AXL F SYS INST user manual.

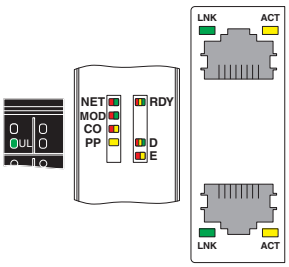
For information regarding the diagnostic and status indicators on a particular module and their meaning, please refer to the module-specific documentation.

2.1.1 D and E indicators on controllers and bus couplers

Figure 2-1 Indicators on controllers and bus couplers



Example: AXC 1050



Example: AXL F BK EIP

Table 2-1 D and E indicators on controllers and bus couplers

Designation	Color	Meaning	State	Description
D	Red/ yellow/ green	Diagnostics for local bus communication		
		Run	Green on	The station is ready to operate. The communication within the station is OK. The controller is providing **valid data**. An error has not occurred
		Active	Flashing green	The station is ready to operate. The communication within the station is OK. The controller is **not providing valid data**. There is no malfunction on the module.
			Flashing green/red	A residual system is operated, at least one device in the configuration is not reachable.
		Ready	Yellow on	The station is ready to operate. No data is being exchanged.
		Active + Force	Flashing yellow	Access from Startup+ in I/O check mode
			Flashing yellow/red	Local bus error during active I/O check (with connected Startup+)
		Ready + Bus error	Flashing red	Local bus error during startup
				Possible causes: – Configuration cannot be generated, information is missing from a device – Chip version of a device is <V1.1 – The desired and actual configuration are different – No local bus device connected – Maximum number of local bus devices exceeded

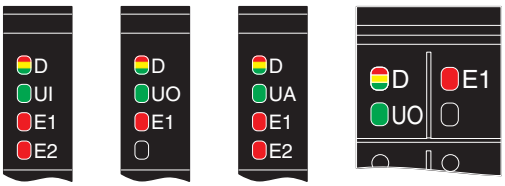
Table 2-1 D and E indicators on controllers and bus couplers [...]

Designation	Color	Meaning	State	Description
D	Red/ yellow/ green	Active + Bus error	Red on	The station is ready to operate, but has lost connection to at least one device.
				Possible causes: – Communication error – Local bus device has been removed or a configured device is missing – Reset at a local bus device – Serious device error at a local bus device (local bus device can no longer be reached)
		Power down	Off	The station is in (power) reset or in energy-saving mode.
E	Yellow/ red	Error	Yellow on	I/O warning at a local bus device
			Red on	I/O error at a local bus device
			Off	No I/O messages present.

2.1.2 Indicators on I/O modules and backplanes

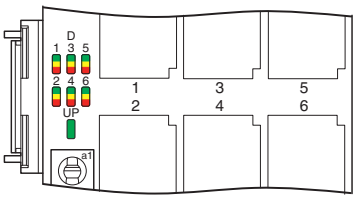
2.1.2.1 D and E indicators on I/O modules

Figure 2-2 D and E LEDs on the power connectors of the I/O modules (examples)



2.1.2.2 D indicator on Axioline F backplanes

Figure 2-3 D LEDs on an Axioline F backplane



One D LED (red, yellow, green) is assigned to each slot for a Smart Element.

Each D LED signals the state of the local bus of the assigned slot.

The firmware of the bus head determines whether a bus head (bus coupler or controller) supports operation with passive Smart Elements. The blink codes of the bus head likewise depend on the firmware.

The following controllers and bus couplers support the Smart Elements AXL SE SC and AXL SE PD ... from the specified firmware version:

Table 2-2 Support of AXL SE SC and AXL SE PD ...

Order No.	Type	Firmware version
Controllers		
2700988	AXC 1050	≥ 5.0
2700989	AXC 3050	≥ 6.3
1151412	AXC F 1152	≥ 2020.0
2404267	AXC F 2152	≥ 2020.0
1069208	AXC F 3152	≥ 2020.3
Bus couplers		
2688459	AXL F BK ETH	≥ 1.30
2701949	AXL F BK ETH XC	≥ 1.30
2688394	AXL F BK EIP	≥ 1.30
2702782	AXL F BK EIP EF	≥ 1.30
2403869	AXL F BK PN TPS	≥ 1.30
1068857	AXL F BK PN TPS XC	≥ 1.30
2688899	AXL F BK EC	≥ 1.30
2701686	AXL F BK S3	≥ 1.35
2688530	AXL F BK PB	≥ 2.20
2702463	AXL F BK PB XC	≥ 2.20

Controllers and bus couplers not listed in the table do not support the AXL SE SC and AXL SE PD ....

2.1.2.3 LED states on I/O modules and backplanes

Meaning in Table 2-3:

1) Firmware of the bus head does not support passive Smart Elements

2) Firmware of the bus head supports passive Smart Elements

Table 2-3 D and E LEDs on the power connectors of the I/O modules and on Axioline F backplanes

Designation	Color	Meaning	State	Description
D	Red/ yellow/ green	Diagnostics for local bus communication		
		Run	Green on	The device is ready to operate. The communication within the station is OK. The controller is providing **valid process data**. There is **no malfunction**.
		Active	Flashing green	The device is ready to operate. The communication within the station is OK. The controller is **not** providing **valid data**. **No malfunction** has occurred on the module. – Backplane: The backplane slot is configured for a passive Smart Element.[2)]
		Device application not active	Flashing green/ yellow	The device is ready to operate. The communication within the station is OK. The controller is providing **valid process data**. There is a **malfunction on the I/O side** of the module. The process output data **cannot** be output and/or the process input data **cannot** be read in. Backplane: There is a **malfunction on the I/O side** of the Smart Element. The process output data cannot be output and/or the process input data cannot be read.
		Ready	Yellow on	The device is ready to operate, but has still not detected a valid cycle after power up.

Table 2-3 D and E LEDs on the power connectors of the I/O modules and on Axioline F backplanes [...]

Designation	Color	Meaning	State	Description
D	Red/ yellow/ green	Connected	Flashing yellow 1 Hz	The device is not (yet) part of the active configuration. Backplane: During power up: The Smart Element configured for the backplane slot **before** the slot with the flashing yellow D LED is missing from this slot or it is passive.[1)]
			Flashing yellow 8 Hz[2)]	Backplane: Configuration difference Possible causes: – The Smart Element has lost the connection to the backplane or has been removed. – An unconfigured Smart Element has been plugged into the slot.
			Flashing yellow/red [1)]	Backplane: During operation: The Smart Element in the backplane slot **before** the slot with the flashing yellow/red D LED has lost the connection to the backplane.
		Not connected	Flashing red	The device is ready to operate, but there is no connection to the previous device.
		Reset	Red on	The device is ready to operate, but has lost the connection to the head of the station (bus coupler or controller). Backplane: – One LED: The local bus has been interrupted. The flashing red LED D indicates the location of the error in the station. – All LEDs, after power up: There is an unconfigured Axioline F module or Smart Element in the station.
		Power down	Off	Device is in (power) reset. – The supply voltage is not present. – Energy-saving mode is active. – Backplane: The slot is empty or the inserted Smart Element is passive.[1)]
E1	Red/ yellow	Device error or warning Indicates messages that apply to the entire device.		
			Red on	Error (priority 1)
			Yellow on	Warning (priority 2)
E2	Red/ yellow	I/O error, channel error or warning (group message) Indicates messages that only apply to a single channel.		
			Red on	Error (priority 1)
			Yellow on	Warning (priority 2)

2.2 Diagnostics via object 0018_{hex} (DiagState)

In addition, each I/O module features object 0018_{hex} (DiagState), which is used for the structured reporting of an error. The I/O module also provides its diagnostic state in this way.

The object is illustrated in the module-specific documentation of each I/O module.

Table 2-4 Diagnostic state (read) **according to basic profile V2.x**

Index [hex]	Object name	Data type	Length in bytes	Meaning		
0018	DiagState	Record		Diagnostic state	Complete diagnostic information	
.1	Consecutive no.	UINT16	2	Error number	0 … 65535_{dec}	Unique, consecutive error number since the last power up or reset of the diagnostic counter
.2	Priority	UINT8	1	Priority	Priority of the message. 1: Highest priority See Table 2-7 on page 13	
					00_{hex}	No malfunction
					01_{hex}	Error
					02_{hex}	Warning
					03_{hex}	Information
					81_{hex}	Error removed
					82_{hex}	Warning removed
					83_{hex}	Information removed
.3	Channel/ Group/ Module	UINT8	1	Channel/ group/ module	Channel, group or module where the malfunction occurred. Additional information available under “Additional information”.	
					00_{hex}	No malfunction
					xx_{hex}	Channel xx, group xx or module xx
					FF_{hex}	Entire device
.4	Code	Octet string	2	Error code		
.5	MoreFollows	Bit string 8	1	Additional information	Further information about the malfunction	
					00_{hex}	Subindex 3 = channel number
					04_{hex}	Subindex 3 = group number
					08_{hex}	Subindex 3 = module number
					Other	Not used at present.
.6	Text	Visible string	Max. 51	Text	Plain text message. Default: Status OK	

Table 2-5 Objects for diagnostics: Diagnostic state (read) **according to basic profile V3.x**

Index [hex]	Object name	Data type	Length in bytes	Meaning		
0018	DiagState		23 + max. 100	Diagnostic state	Current diagnostic state of the device in short form	
.01	Consecutive no.	UINT16	2	Consecutive number	0 ... 65535_{dec}	Unique, consecutive error number since the last power up or reset of the diagnostic counter
.02	Priority	UINT8	1	Priority	Priority of the malfunction. 1: Highest priority See Table 2-7 on page 13	
					00_{hex}	No malfunction
					01_{hex}	Error
					02_{hex}	Warning
					03_{hex}	Information
					81_{hex}	Error removed
					82_{hex}	Warning removed
					83_{hex}	Information removed
.03	Channel	UINT8	1	Channel	Channel on which the malfunction occurred.	
					00_{hex}	No malfunction
					xx_{hex}	Channel xx
					FF_{hex}	Entire device
.04	Code	Octet string	2	Error code		
.05	MoreFollows	Bit string 8	1	Additional information	Information for interpreting the following data (see Table 2-6)	
.06	Reserved	Octet string	2	Reserved	(= 0000_{hex})	
.07	SubModNo	UINT8	1	Submodule number	If the device is a modular device, the corresponding submodule is specified here. If the device is not a modular device, “0” is entered here.	
.08	Function-Group	Octet string	8	Function group	Short designation of the function of the group reporting diagnostics. For example: DI (0x44, 0x49, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00) RTD (0x52, 0x54, 0x44, 0x00, 0x00, 0x00, 0x00, 0x00) AI, AO, DO, IOL, CNT, INC, RS485, PSDI, PSDO, SC The manufacturer-specific designation (e.g., “Relay OUT”) is specified in the diagnostic text (0x0018.11).	

Table 2-5 Objects for diagnostics: Diagnostic state (read) **according to basic profile V3.x [...]**

Index [hex]	Object name	Data type	Length in bytes	Meaning	
.09	AddValue	Octet string	4	Additional information	"Additional value" for the current diagnostic state of the device.
.0A	TextLength	UINT8	1	Text length	Length of the following diagnostic text in bytes.
.0B	Text	Visible string	Max. 100	Diagnostic text	Device-specific explanation of the malfunction that occurred. Information includes: – Error type – Function group and channel – Terminal point – Option for action for the user Default: "Status OK" The string is terminated with 00_{hex}.

Table 2-6 Index 5: Additional information

Byte/bit	Value	Meaning
Byte	00_{hex}	No further information
Bit 0	1	There is further information about this error. You can read it via object $E800_{hex}$ "DiagStateLong" (if implemented).
Bits 1 ... 3	0	Reserved
Bit 4	1	There are additional simultaneously occurring diagnostic events. You can read them via object E806hex "ComplDiag-State" (if implemented).
Bits 5 ... 6	0	Reserved
Bit 7	1	Indication that this is an extended version of object 0018_{hex} (compared to version V2.x).

Table 2-7 Classification of the error messages

Priority		Message type	Example	Note
01_{hex}	High	Error (malfunction, alarm)	Supply voltage faulty Parameter table invalid	A malfunction has occurred that requires a response. For example, a malfunction requires action in the drive, but does not necessarily require the system to be stopped with immediate effect.
02_{hex}	Medium	Warning	Limit value undershot or exceeded	Risk of an error. A warning does not require action to be taken in the device.
03_{hex}	Low	Information (message, notification)	General operating message: 10,000 operating hours have elapsed.	General operating message: 10,000 operating hours have elapsed.

Diagnostic object 0018_{hex} is implemented with a storage depth of 1.
This means that:
- A higher priority message overwrites a lower priority message.
- If a higher priority message is already present, lower priority messages will not be reported.

2.3 Diagnostic registers of the local bus master

The errors reported to the local bus master by the I/O modules are mapped to the diagnostic registers of the local bus master.

A local bus master has three diagnostic registers:

– Diagnostic status register:
  Operating and error states of the Axioline F local bus
– Diagnostic parameter register 1:
  Returns the associated error code in the event of an error
– Diagnostic parameter register 2:
  Returns the error location for localized bus or I/O errors (device number)

2.3.1 Diagnostic status register

Information on the operating and error states of the Axioline F local bus is stored in the diagnostic status register. An Axioline F local bus state is assigned to each bit in the diagnostic status register.

The states in the error bits (F_PW_BIT, F_PF_BIT, F_BUS_BIT, F_CTRL_BIT) are described in greater detail using the two diagnostic parameter registers.

Table 2-8 Diagnostic status register

Bit	Designation	Meaning	
00	F_PW_BIT	I/O warning	At least one device is indicating an I/O warning.
01	F_PF_BIT	I/O error	At least one device is indicating an I/O error.
02	F_BUS_BIT	Bus error	A bus error has occurred.
03	F_CTRL_BIT	Controller error	The driver has detected an internal error.
04	-		Reserved
05	F_RUN_BIT	Run	Data cycles are being exchanged, output data is enabled.
06	F_ACTIVE_BIT	Active	Configuration is active, PDI to the devices is possible, data exchange with invalid/non-enabled process data.
07	F_READY_BIT	Ready	Local bus master is ready to operate, no data exchange via the bus.
08	F_BD_BIT	Bus different	A device which does not belong to the active configuration has been detected at the last interface or a Smart Element has been plugged into an empty slot.
09	F_BASP_BIT	SYS_FAIL	The controller is in the STOP state or no application program has been loaded. The output data is blocked (substitute value behavior is active)
10	F_FORCE_BIT	Force mode	Force mode (startup tool or I/O check) is active.
11	F_SYNC_BIT	Synchronization	Synchronization between higher-level system and local bus master failed.
12	F_PARA_REQ	Module parameter	At least one device is requesting parameters.
13 ...15	-		Reserved

Status displays

The Ready, Active, and Run status displays indicate the current state of the system. The diagnostic parameter registers are not used.

Following initialization, the driver is ready to operate. The Ready indicator bit is set (F_READY_BIT = 1).

If the driver has been configured and a configuration frame has been activated without errors, the system indicates that it is active. The Ready and Active indicator bits are set (F_READY_BIT = 1, F_ACTIVE_BIT = 1).

In addition, the Run indicator bit is set (F_READY_BIT = 1, F_ACTIVE_BIT = 1, and F_RUN_BIT = 1) when data exchange is started.

Error indicators

The PF, BUS, CTRL, and SYNC error indicators report an error, while PW reports a warning.

Errors which are indicated with BUS or CTRL will cause the bus to be disconnected. The Run indicator bit is reset (F_RUN_BIT = 0).

Further information on the error cause is provided by the two diagnostic parameter registers.

If several error bits are 1 at the same time, the values in the parameter registers represent the error with the highest priority.

Table 2-9 Priorities of the error messages

Message	Priority
CTRL	1 (highest priority)
BUS	2
SYNC	3
PF	4
PW	5 (lowest priority)

If there are I/O errors (PF= peripheral fault) at several devices, the parameter registers show the message that occurred first. When you remove this message, the next pending massage with the lowest device number is shown.

If there are I/O warnings (PW = peripheral warning) from several devices, the warnings are shown in the same way as the I/O errors.

After an error has been removed or disappears (e.g., elimination of an interruption), the bus is started again automatically and the output data is enabled again. The Run indicator bit is set again (F_RUN_BIT = 1).

2.3.2 Diagnostic parameter registers

The diagnostic parameter registers are always written to when a malfunction occurs and whenever one of the error bits (F_PW_BIT, F_PF_BIT, F_BUS_BIT, F_CTRL_BIT) is set. Otherwise, the diagnostic parameter registers have the value 0000_{hex}.

When the aforementioned error bits are set, the diagnostic parameter registers provide additional information on the status indicated in the diagnostic status register.

Diagnostic parameter register 1 contains the error code.
For an overview of the error codes, please refer to Section 3, “Error codes”.

Diagnostic parameter register 2 contains additional information. For localized bus or I/O errors, this is the error location or the device number. The error location is stored as a slot number. This starts at 1 and corresponds to the sequential number of the Axioline F modules that are installed one after another.

2.4 Diagnostic registers of the AXC ... controllers

You can use system variables to access the diagnostic registers of an AXC ... controller and read the information.

Table 2-10 System variables of the diagnostic status register

System variable	Type	Meaning
AXIO_DIAG_STATUS_REG_HI	BYTE	Diagnostic status register (high byte)
AXIO_DIAG_STATUS_REG_LOW	BYTE	Diagnostic status register (low byte)
AXIO_DIAG_STATUS_REG_PF	BOOL	I/O error
AXIO_DIAG_STATUS_REG_PW	BOOL	I/O warning
AXIO_DIAG_STATUS_REG_BUS	BOOL	Bus error
AXIO_DIAG_STATUS_REG_RUN	BOOL	Data transmission is active
AXIO_DIAG_STATUS_REG_ACT	BOOL	Selected configuration is ready to operate
AXIO_DIAG_STATUS_REG_RDY	BOOL	Axioline F local bus is ready to operate
AXIO_DIAG_STATUS_REG_SYSFAIL	BOOL	When the controller is in the STOP state or there is no program present on it, the Axioline F local bus switches to the SYSFAIL state.

Table 2-11 System variables of the diagnostic parameter register

System variable	Type	Meaning
AXIO_DIAG_PARAM_REG_HI	BYTE	Diagnostic parameter register 1 (high byte)
AXIO_DIAG_PARAM_REG_LOW	BYTE	Diagnostic parameter register 1 (low byte)
AXIO_DIAG_PARAM_2_REG_HI	BYTE	Diagnostic parameter register 2 (high byte)
AXIO_DIAG_PARAM_2_REG_LOW	BYTE	Diagnostic parameter register 2 (low byte)

2.5 Diagnostic registers of the AXL F BK ... bus couplers

The diagnostic registers of the local bus master can be read via the diagnostic mechanisms of the higher-level system (see Table 2-12).

Table 2-12 Diagnostic mechanisms of higher-level systems

Bus coupler	Higher-level system	Diagnostic mechanism	See	Web-based management
AXL F BK PB	PROFIBUS	Diagnostics in common format, block 6, bytes 9 ... 12	UM EN AXL F BK PB	No
AXL F BK EC	EtherCAT®	CoE object $F100_{hex}$: Axioline Bus Coupler Diag Info	DB EN AXL F BK EC	No
AXL F BK PN ...	PROFINET	Diagnostic alarms	DB EN AXL F BK PN ... UM EN PROFINET SYS	Yes
AXL F BK ETH ...	Ethernet	Modbus registers: Local bus diagnostics: 7997 diagnostic status register 7998 diagnostic status register 1 7999 diagnostic status register 2 I/O diagnostics: 1801 ... 1989 I/O diagnostics of the local bus devices	DB EN AXL F BK ETH ...	Yes
AXL F BK EIP ...	EtherNet/IP™	Axioline F diagnostic object (class code 67_{hex})	UM EN AXL F BK EIP - OBJECTS	Yes
AXL F BK S3	Sercos	IDN S-0-1500.0.134	DB EN AXL F BK S3	No
AXL F BK SAS	IEC 61850			Yes

Further options for diagnostics:

For devices with web-based management:

- Open the “Diagnostics” menu item.
  You can call the diagnostics for the bus coupler and local bus here.

When using the Startup+ software:

- Right-click on the bus coupler to open the context menu and select the “Diagnostics” menu item.
  You can call the diagnostics for the station and the individual devices here.

3 Error codes

Problems when invoking the firmware services or problems during operation are reported with error codes to determine the exact cause of the error. The following sections explain the meaning of the individual codes.

The code listed in the tables consists of the error class and error code. The Additional Code parameter contains a more detailed description of the error cause.

3.1 Error codes for user errors

Table 3-1 Error codes for user errors

Code (hex)	Additional code	Meaning	Remedy
0903		Memory problem (e.g., buffer too small)	Reduce the amount of data.
0904		Inconsistent parameters.	Check the parameters.
0905		Invalid parameters.	Check the parameters.
0908	Code of failed service	Maximum number of permitted parallel services exceeded. (Processing conflict)	Wait for the previously invoked service to be completed and try again.
090A	Value transmitted in Parameter_Count	The number of parameters is inconsistent with the service. The Parameter_Count parameter does not match the number of subsequent words.	Adjust the number of parameters.
0913	Code of failed service	The invoked service is not supported.	Use a service that is supported.
0917	Code of failed service	Service decoding failed.	Restart the device. If the problem persists, please contact Phoenix Contact.
0918	Code of the unknown service	Invocation of an unknown service code.	Check the invocation.
0928		An exclusive service was to be executed without the appropriate rights.	Wait for the exclusive rights to be enabled.
0932		Attempt to pass on the exclusive rights without having these rights.	
0933		Another node currently has the exclusive rights.	Wait for the exclusive rights to be enabled.
0934		Node already has the exclusive rights.	
0937	Invalid Variable_ID	Unknown variable ID component.	Check the invocation.
0938	Reserved Variable_ID	An internal variable ID was used.	Check the invocation.

Table 3-1 Error codes for user errors [...]

Code (hex)	Additional code	Meaning	Remedy
0939	Variable_ID not enabled	The variable ID is not enabled. (Password protection)	Check the invocation.
093A	Incorrect Variable_ID	Length specification in the variable ID is 0 or incorrect.	Check the invocation.
093B	Incorrect Variable_Count	The number of variables has been calculated incorrectly.	Check the invocation.
0A01		A hardware fault or firmware error has occurred.	Restart the device. If the problem persists, please contact Phoenix Contact.
0A02	Current state of the local bus master	A service was invoked that is not permitted in the current status of the local bus master. Possible states: 0001 Ready (After restart or reset) 0002 Load config (Configuration cannot be loaded) 0004 Config ready (Configuration loaded successfully) 0008 Active (Configuration frame connected) 0010 Param ready (Parameterization of modules completed) 0020 Run (Process data traffic running) 0080 Force mode (Startup tool specifies outputs) 0100 Ready fail (Communication breakdown in Ready) 0800 Active fail (Communication breakdown in Active) 1000 Param ready fail (Communication breakdown in Param Ready) 2000 Run fail (Process data traffic with subsystem) 4000 Force fail (Application timeout for all devices) 8000 Force Mode Fail (Communication breakdown in force mode)	Set the local bus master to the required state.
0A03		Memory problem (e.g., buffer too small)	Restart the device. If the problem persists, please contact Phoenix Contact.
0A04		Inconsistent parameters.	Check the invocation.
0A05		Invalid parameters.	Check the invocation.
0A06		Access not supported.	Check the invocation.

Table 3-1 Error codes for user errors [...]

Code (hex)	Additional code	Meaning	Remedy
0A07		Object does not exist.	Check the invocation.
0A08	Code of failed service	Maximum number of permitted parallel SM services exceeded. (Processing conflict)	Wait for the previously invoked service to be completed and try again.
0A0C	Unknown Variable_ID	Invocation of Set_Value or Read_Value with a Variable_ID that contains an unknown code.	Check the invocation.
0A0D		A firmware error occurred.	Restart the device. If the problem persists, please contact Phoenix Contact.
0A0E	Current state of the local bus master	Energy-saving mode cannot be activated in the current state of the local bus master.	Set the local bus master to the required state.
0A18	Invalid Used_Attributes parameter	A reserved bit is set in Used_Attributes.	Check the parameters.
0A19	Number of bus devices	The end of the frame was exceeded when accessing the configuration or line 0 was accessed.	Check access.
0A1A	Invalid Frame_Reference (if specified)	The frame reference specified for the service does not exist.	Check the parameters.
0A1C	Number of connected devices	Maximum number of devices exceeded.	Reduce the bus configuration.
0A2F		Number of devices is zero.	Connect the device and check the connection.
0A51		Only a frame reference from 1 to 254 is permitted.	Only the value 1 is permitted at present.
0A54		The maximum number of permissible I/O points was exceeded.	Reduce the number of I/O points to the maximum number. For the exact number, please refer to the documentation for your controller.
0A60		A configuration frame could not be assigned.	Create the configuration frame.
0A70		A reserved bit is set in the Diag Info attribute.	Check the parameters.
0A73	Device number	Device with an unsupported chip version present in the local bus.	Replace the device.
0A74	Device number	Device from an unsupported manufacturer present in the local bus.	Replace the device.

Table 3-1 Error codes for user errors [...]

Code (hex)	Additional code	Meaning	Remedy
0A75	Device number	Device is reporting a serious error (e.g., faulty EEPROM).	Restart the device. If the problem persists, please contact Phoenix Contact.
0A76	Device number	The master does not support the topology used by the device.	Replace the device.
0A77	Device number	Error at the interface.	Check the connection between the electronics module and bus base module.
0A79	Device number	The device requires parameters for correct operation.	Parameterize the device or restart it.
0A7A		Invalid Dev_Type specified during loading.	Check the parameters.
0A7B		Invalid Dev_ID specified during loading.	Check the parameters.
0A7C		Invalid Dev_Length specified during loading.	Check the parameters.
0A81	Object index	Service (e.g., Create_Configuration) could not be executed due to PDI communication malfunctions (timeout).	Restart the device. If the problem persists, please contact Phoenix Contact.
0A82	Object index	Service (e.g., Create_Configuration) could not be executed due to PDI communication malfunctions (number).	Restart the device. If the problem persists, please contact Phoenix Contact.
0A83	Object index	Service (e.g., Create_Configuration) could not be executed due to PDI communication malfunctions (error).	Restart the device. If the problem persists, please contact Phoenix Contact.
0A90	Device number	Device was selected for synchronization, but does not support this.	Select a device that supports synchronization or change the selection.
0A91	Device number	Device was selected for synchronization, but does not support the specified cycle time.	Select a different cycle time or a different device.
0A92	Device number	Device was selected for synchronization, but does not support the specified value for Input_Delay.	Select a different value for Input_Delay or a different device.
0A93	Device number	Device was selected for synchronization, but does not support the specified value for Output_Delay.	Select a different value for Output_Delay or a different device.

Table 3-1 Error codes for user errors [...]

Code (hex)	Additional code	Meaning	Remedy
0A94	Device number	Device was selected for synchronization, but does not support the specified values for Input_Delay and Output_Delay.	Select different values for Input_Delay and Output_Delay or a different device.
0AFF		Invocation of Reset_Driver during PDI communication.	Restart the device. If the problem persists, please contact Phoenix Contact.
0B01		A hardware fault or firmware error has occurred.	Restart the device. If the problem persists, please contact Phoenix Contact.
0B02		A hardware fault or firmware error has occurred.	
0B03		A hardware fault or firmware error has occurred.	
0B04		A hardware fault or firmware error has occurred.	
0B05		Invalid parameters.	Check the parameters.
0B06		Access not supported. (E.g., write protection)	Restart the device. If the problem persists, please contact Phoenix Contact.
0B07		Object does not exist.	
0B0C		A hardware fault or firmware error has occurred.	
0BC1		Supply voltage for the local bus not present. Too many devices connected or the higher-level power supply unit is too weak.	Use a suitable power supply unit. Check the current consumption of the devices. If necessary, use a power module or set up another Axioline F station.
0BC2		The local bus is in energy-saving mode. The supply voltage has been switched off.	Deactivate energy-saving mode.
0BDE		Synchronization failed. Trigger signal does not correspond to the specification.	Check the synchronization signal of the higher-level system. Make sure that you have selected the cycle time specification correctly.

3.2 Error codes for bus diagnostics

Table 3-2 Error codes for bus diagnostics

Code (hex)	Additional code	Meaning	Remedy
0BD1		The bus could not be activated successfully due to malfunctions on the bus.	Check the bus configuration.
0BF1			
0BF2			
0BF3			
0C01	Device number	The configured module cannot be reached. A device present in the configuration frame has been removed from the physical bus structure after the configuration frame was connected.	Check the configuration. Adapt the configuration frame if the change was made on purpose.
0C02		An unconfigured module has been detected. An additional device was added at the end of the physical bus structure after the configuration frame was connected.	
0C11		The module is not located in the configured slot. An active device was placed elsewhere in the physical bus structure after the configuration frame was connected.	
0C12		The module can be reached, but was not started up due to missing parameters. An active device was replaced by an unknown device in the physical bus structure after the configuration frame was connected (wrong instance ID).	
0C13		The process data length does not correspond to the configured value. The process data width of an active device was changed after the configuration frame was connected.	
0C14		The module type does not correspond to the configured value.	
0C15			
0C16		An address conflict has occurred.	Restart the station.

Table 3-2 Error codes for bus diagnostics [...]

Code (hex)	Additional code	Meaning	Remedy
0D01	Device number	The configured Axioline Smart Element cannot be reached.	Check the configuration. Adapt the configuration frame if the change was made on purpose.
0D02		An unconfigured Axioline Smart Element has been detected. An additional device was added to the physical bus structure after the configuration frame was connected: An Axioline Smart Element was plugged into an empty slot.	
0D13		The Axioline Smart Element process data length does not correspond to the configured value. The Axioline Smart Element has been replaced with an unsuitable Axioline Smart Element. The process data width of an active device was changed after the configuration frame was connected.	
0D14		The Axioline Smart Element module type does not correspond to the configured value.	
0D15		An Axioline Smart Element has been replaced with an Axioline Smart Element whose module type (device type) does not correspond to the configuration.	

The error codes $0Dxx_{hex}$ only occur if changes are made to Axioline Smart Elements during operation.

3.3 Error codes when invoking the PDI services

In Table 3-3, the additional code is only specified if it contains a special value. The standard values for the additional code are listed in Table 3-4.

The code consists of the error code and error class.

Example:

Code = 0501_{hex}: Error class = 05_{hex}, Error code = 01_{hex}

Table 3-3 Error codes when invoking the PDI services

Code (hex)	Additional code	Meaning	Remedy
02xx		**Error in the communication relationship**	Check the invocation.
0200		Miscellaneous error	
0201		Unable to access the object. Possible causes: – Module not present – Incorrect module number	
05xx		**Invalid service**	Check the invocation.
0500		Miscellaneous error	
0501		The current object state is preventing the service from being executed.	
0502		Problem with the PDU size	
		Permissible length exceeded. Object cannot be read in full.	
0503		The service cannot be executed at present.	
0504		The service contains inconsistent parameters.	
0505		A parameter has an impermissible value.	

Table 3-3 Error codes when invoking the PDI services [...]

Code (hex)	Additional code	Meaning	Remedy
06xx		**Invalid access**	Check the invocation.
0600		Miscellaneous error	
0601		Invalid object	
0602		Hardware fault	Eliminate the hardware fault (e.g., I/O voltage not present). Restart the device. If the problem persists, please contact Phoenix Contact.
0603		Access to object denied, insufficient access rights	Check the invocation.
0604		Access to an invalid internal address	
0605		Inconsistent object attributes	
0606		The service used cannot be applied to this object.	
0607		Object does not exist	
0608		The data does not correspond to the data type of the object.	
060A		The object data cannot be accessed at present (e.g., during reparameterization).	
08xx		**Error in the application**	
0800		The service was not executed. The reason is specific to the application or manufacturer and only affects the actual data item. Refer to the additional code for the precise reason. Example: A certain object value is not permitted in this special application.	
	xx30	A reserved bit or reserved code was used during parameterization. xx: Number of the affected element 30: Value is out of range	Check the parameterization.
0801		The service was not executed. The reason is specific to the device. Refer to the additional code for the precise reason.	
080B		The service cannot be completed by the device in the expected time. The estimated time still required for the data to become available is given in ms in the additional code. “0xFFFF” means that the estimated time for completion is unknown.	

Table 3-3 Error codes when invoking the PDI services [...]

Code (hex)	Additional code	Meaning	Remedy
0F01		Hardware fault or firmware error	Restart the device. If the problem persists, please contact Phoenix Contact.
0F02			
0F03			
0F04		Inconsistent parameters.	Check the parameters.
0F05	PDI object index	Invalid parameters.	Check the parameters.
0F06	PDI object index	Access not supported.	Check the invocation.
0F08	PDI object index	Maximum number of permitted parallel PDI services exceeded.	Wait until the services have been processed.
0F0C	Unknown Variable_ID	Incorrect variable ID for Set_Value or Read_Value.	Check the invocation.
0F0D		Internal error	Restart the device. If the problem persists, please contact Phoenix Contact.
0F11		Internal error	
0F12		Device cannot be reached (timeout).	Check the device.
0F13		Device cannot be reached because it was removed.	Check the bus configuration.
0F21	Invalid device number	Invalid slot number. (Value is 0 or greater than the maximum number of devices)	Check the invocation.
0F22	Invalid device number	Slot is not active.	Check the invocation.
0F23	Invalid data length	Invalid data length.	Check the invocation.
0F24	Invalid number of parameters	Invalid number of parameters.	Check the invocation.
0F31		Internal error	Restart the device. If the problem persists, please contact Phoenix Contact.
0F32			
0F33			

Table 3-4 Additional codes

Additional code (hex)	Meaning
0000	No detailed information on the cause of the error.
0010	Service parameter with impermissible value.
0011	Subindex is not present.
0012	Object access is not a request.
0013	Service code is not supported.
0014	Subslot is not supported.
0015	Object access type is not supported on this object.
0016	Object access request index for this AccessType must equal 000_{hex}.
0017	Object access request length for this AccessType must equal 0.
0018	Object length is not suitable for this object.
0019	Object is ReadOnly and cannot be overwritten.
001A	Object is WriteOnly and cannot be read.
001B	Write/read access to the object is not supported.
001C	Due to the object length, Upload Read or Download Write is required for access to the object.
001D	Object length is not suitable for this object (0018). Too much data was transmitted.
001E	Object length is not suitable for this object (0018). Too little data was transmitted.
0020	Service cannot be executed at present.
0021	Service cannot be executed at present, as the device is currently being controlled locally.
0022	Service cannot be executed in current device state (device control).
0023	Service cannot be executed at present, as no object dictionary is available.
0024	Index is not available.
0030	Parameter value is out of range.
0031	Parameter value is too large.
0032	Parameter value is too small.
0040	Collision with other values, dependency was not taken into consideration.
0041	Communication object cannot be mapped to the process data.
0042	Process data length exceeded.
0050	Firmware update: General. – Firmware is incorrect for the device – Device unable to process firmware
0051	Firmware update: – Due to the object length, Upload Read or Download Write is required for access to the object. – Incorrect firmware header or update version.
0052	Firmware update: Firmware version is incorrect for the device. – Below minimum firmware version (e.g., hardware is too old)

Table 3-4 Additional codes [...]

Additional code (hex)	Meaning
0053	Firmware update: Indicates the option to bypass the download of a FW update block to the device.
0080	Hardware fault
0081	Application has failed.
0082	Hardware is temporarily faulty.
00A0	Invalid segment number, e.g., upload without initiation with subindex ==FF_{hex}.
00A1	Resource not available. No more resources (memory) available for download.
00A2	Incorrect CRC (checksum)
00A3	Error opening the file (if file system is available).
00A4	Error writing the file (if file system is available).
00A5	Error closing the file (if file system is available).
00A6	Segment missing: Fewer data blocks were received than specified in the last segment.
00A7	Extra segment: More data blocks were received than specified in the last segment.
00A8	Error reading the file (if file system is available).
00A9	Invalid segment number (segment duplicated, segment ignored).
00B1	The password cannot be replaced (deleted).
00B2	The password cannot be added (too many passwords).
00B3	The password cannot be assigned for the desired type of access.

3.4 Error codes of the I/O modules

If an error occurs on an I/O module, the module reports this error to the local bus master.

Please refer to the module-specific data sheets for the error types that a module reports.

Table 3-5 Error codes of the I/O modules

Code (hex)	Meaning	Remedy
0000	**No malfunction**	
1000	**General malfunction**	
2000	**Current**	
2130	Short circuit	Check the wiring.
	Overload of the analog output or short circuit	
2211	Input overload	
	Overload of the sensor supply for the inputs	
2340	Overload or short circuit of the sensor supply	
	Overload or short circuit of the actuator supply	
	Overload or short circuit (L+)	
2344	Output overload	
	Short circuit or overload of an output	
	Overload or short circuit (C/Q cable)	
	Short circuit in IEPE/ICP channel	
2345	Sensor supply overload	

Table 3-5 Error codes of the I/O modules [...]

Code (hex)	Meaning	Remedy
3000	**Voltage**	
3130	I/O supply voltage is not present or faulty	Check the supply.
3184	Overvoltage at a signal input of the incremental encoder	Check the wiring.
3186	Undervoltage at a signal input of the incremental encoder	Check the wiring.
3300	Output voltage	Check the wiring.
	Short circuit or overload at the output	
3400	I/O supply voltage failure	Check the supply.
3401	Overvoltage at port x	
3403	Undervoltage at port x	
3412	Sensor supply not present	
	I/O supply voltage failure	
3422	Actuator supply not present	
4000	**Temperature**	
4210	Overtemperature	Reduce the temperature, for example: – Reduce the ambient temperature – Ensure sufficient ventilation – Reduce the load – Check the mounting position
5000	**Device hardware**	
5112	Faulty 24 V supply	Check the supply.
	Short circuit or overload at the 24 V supply	
	24 V encoder supply for channel x faulty	
5113	Short circuit or overload at the 5 V supply	
5120	Cold junction invalid	Check the cold junction.
5160	Supply voltage faulty	Check the supply.
	I/O supply overload	
5230	Communication faulty (device-internal)	Restart the device. Replace the device if the error persists.

Table 3-5 Error codes of the I/O modules [...]

Code (hex)	Meaning	Remedy
6000	**Device software**	
6100	Error in the Smart Element firmware	Replace the Smart Element.
6130	Problem communicating with the Smart Element	Check whether the Smart Element has been plugged in correctly. If the error is still present, replace the Smart Element.
6300	Parameter record incorrect	Check the parameterization of the specified device.
6301	Device error	Restart the device. Replace the device if the error persists.
	Flash checksum error	
6302	Device error	
	Fault in the Smart Element firmware	
6310	Device error: Lost parameters	Parameterize the specified device. Restart the device. Replace the device if the error persists.
6320	Parameter table invalid	Check the parameterization of the specified device.
	Error in the parameter memory	
7000	**Additional modules**	
7300	Encoder error	Check the encoder.
7305	Encoder error	
7330	Electrical encoder error	
7340	Logical encoder error	
7610	Receive buffer full	Read the receive buffer.
7611	Transmit buffer full	Check the handshake.
7620	EPROM (device error)	Restart the device. Replace the device if the error persists.
7710	Wire break on cable to sensor	Remove the wire break.
	Wire break	
	Wire break on signal line	
	Wire break in IEPE/ICP channel	

Table 3-5 Error codes of the I/O modules [...]

Code (hex)	Meaning	Remedy
8000	**Monitoring**	
8152	Transmit buffer full	Check the handshake.
815A	Receive buffer full	Read the receive buffer.
8600	Incremental encoder input error	– Check the input signal. – Remove the short circuit. – Connect the encoder.
8910	Measuring range violated (overrange)	– Adjust the range. – Check the wiring.
8911	Upper limit value reached (only applies to single counting)	
8920	Measuring range violated (underrange)	
8921	Lower limit value reached (only applies to single counting)	

Table 3-5 Error codes of the I/O modules [...]

Code (hex)	Meaning	Remedy
A000	**Modular devices, lower-level bus (sub-bus)**	
A001	Lower-level bus: No module present	Check the connected lower-level bus and its power supply.
	No module found at a port configured as IO-Link (after 5 seconds following port configuration)	– Check whether the IO-Link device is connected correctly. – Check the cabling. – Replace the IO-Link device.
A002	Lower-level bus: Incorrect module present	– Check the specified device and its power supply. – Check the desired and actual configuration.
	Connected IO-Link device does not match IO-Link port configuration.	
A003	Lower-level bus: Module replaced with compatible one	
A004	Lower-level bus: More modules than expected	
A005	Lower-level bus: Residual system operated	
A010	Lower-level bus: Module error	
	Device at the port reporting an event	
A012	Lower-level bus: Application on the module not ready	
A013	Lower-level bus: Device reset	
A014	Lower-level bus: Parameterization error on the device	Check the parameterization.
	Parameterization error on the device at the relevant port. Data storage problem.	
A020	Lower-level bus: Communication error with device	Check the specified device in the lower-level bus or in the system section for the following aspects: – Missing or incorrect shielding of the bus line (connector) – Missing or incorrect grounding, missing or incorrect equipotential bonding – Faulty connections in the connector – Voltage dips on the power supply
	Communication error at the relevant port with the connected device.	
A021	Lower-level bus: Timeout	
A022	Lower-level bus: Multiple transmission errors	
A023	Lower-level bus: I/O data communication error	
A024	Lower-level bus: Management data communication error	Check the specified device and its power supply.
A030	Lower-level bus: Configuration error	Check the parameterization of the specified device.
A041	Lower-level bus: Hardware fault	Restart the device. Replace the device if the error persists.
A042	Lower-level bus: Firmware error	Check the parameterization of the specified device.
A043	Lower-level bus is asynchronous to the higher-level system	

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