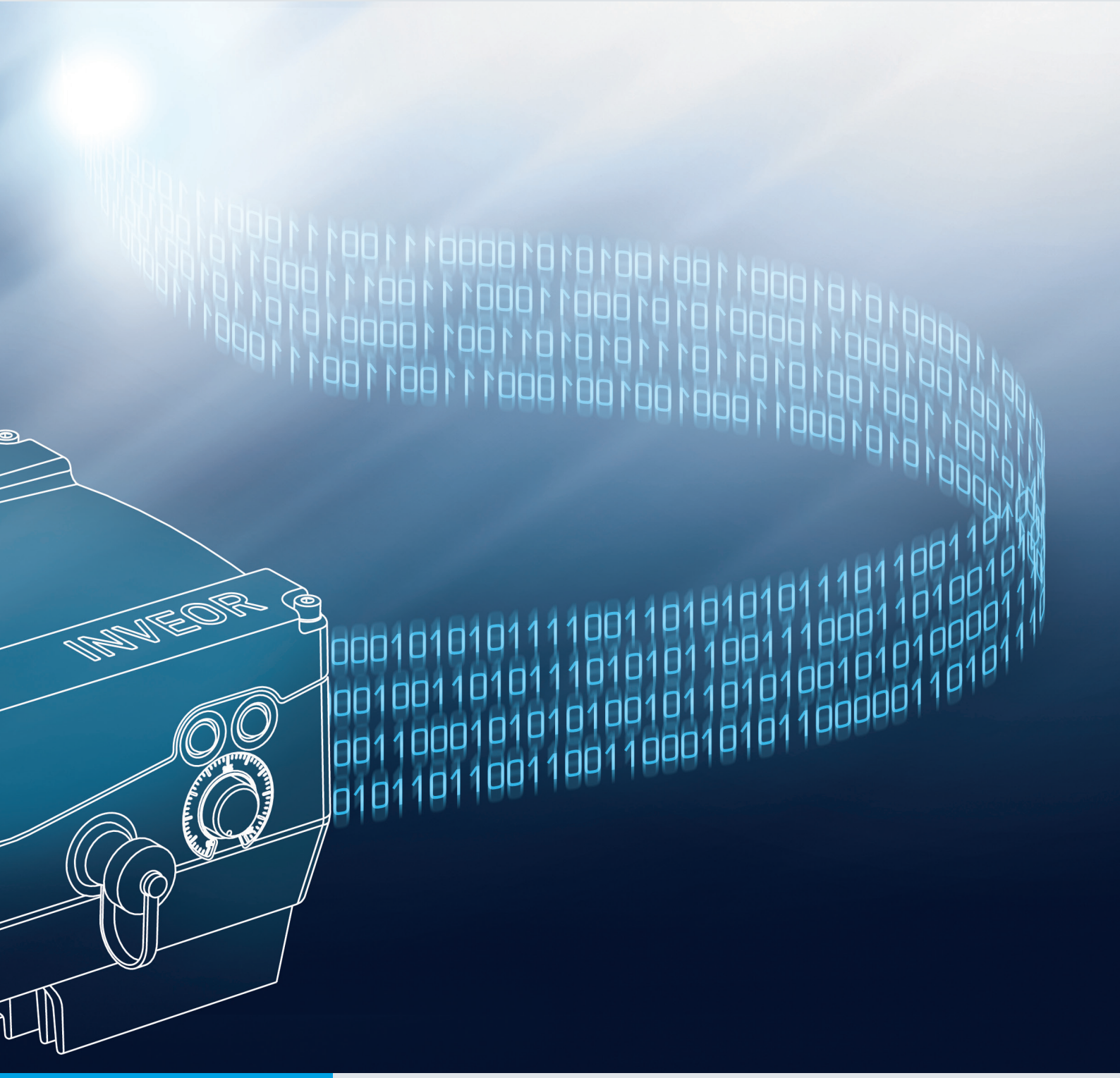
KOSTAL



Smart connections.

Operating manual

Sercos fieldbus

Legal notice

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Exclusion of liability

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The illustrations and texts have been compiled with great care. However, the possibility of errors cannot be ruled out. The compilation is made without any guarantee.

General note on gender equality

KOSTAL is aware of how language impacts on gender equality and always makes an effort to reflect this in documentation. Nevertheless, for the sake of readability we are unable to use non-gender-specific terms throughout and use the masculine form instead.

Contents

1. General information

Thank you for choosing an INVEOR drive controller with Sercos from KOSTAL Industrie Elektrik GmbH & Co KG! Our INVEOR line of drive controllers is designed to be universally usable with all common motor types and bus systems.

If you have any technical questions, please call our central service hotline:

Tel.: +49 (0)2331 80 40-848

Monday to Friday: 7 am to 5 pm (UTC/GMT +1)

Fax: +49 (0)2331 80 40-602

E-mail: INVEOR-service@kostal.com

Website address

www.kostal-industrie-elektrik.com

1.1 Information about documentation

This documentation is a supplementary operating manual for the INVEOR drive controller with Sercos bus system. It contains all the important information you need to install and operate the bus system.
Please read the operating manuals for the drive controller and bus system through carefully.
They contain important information for operating the INVEOR with fieldbus.
We assume no liability for any damage resulting from non-observance of this manual.
This manual is an integral part of the product and applies exclusively to the INVEOR with Sercos from KOSTAL Industrie Elektrik GmbH & Co KG.
Provide the operator of the system with this manual so it is available when needed.

1.1.1 Other applicable documents

This refers to all manuals that describe how to operate the drive controller system and any other manuals for the equipment used. Download the 3D files (.stp) for INVEOR and adapter plates from www.kostal-industrie-elektrik.com.

A description of parameters is available for download (www.kostal-industrie-elektrik.com) for parametrising the drive controller system. In the download, you will find all the information required for correct parameterisation.

1.1.2 Storing the documentation

Store this operating manual and all other applicable documents carefully so they are available when needed.

1.2 Notes in this manual

1.2.1 Warnings

The warnings refer to life-threatening dangers. Serious injuries possibly resulting in death may occur.

Each warning consists of the following elements:

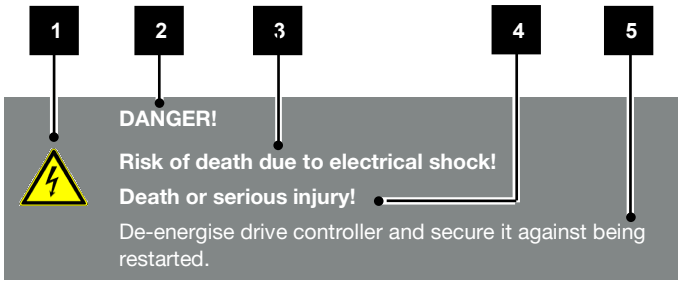


Fig.: 1 Structure of the warnings

1 Warning symbol

2 Signal word

3 Type of danger and its source

4 Possible consequence(s) of failure to comply

5 Corrective actions

1.2.2 Warning symbols used

Symbols	Explanation
	Danger
	Danger due to electrical shock and discharge
	Danger due to burns
	Danger due to electromagnetic fields

1.2.3 Signal words

Signal words are used to identify the severity of the danger.

DANGER

Indicates a direct hazard with a high level of risk, which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazard with a moderate level of risk, which, if not avoided, will result in death or serious injury.

CAUTION

Indicates a hazard with a low level of risk, which, if not avoided, may result in minor or slight injury or property damage.

1.2.4 Information notes

Information notes contain important instructions for the installation and problem-free operation of the drive controller. These must be followed at all times. The information notes also point out that failure to observe can result in damage to property or financial damages.

IMPORTANT INFORMATION

The drive controller may only be assembled, operated, maintained and installed by trained and qualified staff.

Fig.: 2 Example of an information note

Symbols within the information notes

Symbols	Explanation
	Important information
	Damage to property possible

Other notes

Symbols	Explanation
	INFORMATION
	Enlarged view

1.3 Symbols used in this manual

Symbol	Meaning
1., 1., 3. …	Consecutive steps in a handling instruction
➔	Effect of a handling instruction
✓	Final result of a handling instruction
■	List

Fig.: 3 Symbols and icons used

Abbreviations used

Abbreviation	Explanation
Tab.	Table
Fig.	Figure
It.	Item
Ch.	Chapter

1.4 Qualified staff

INFORMATION

You will find the “Qualified staff” chapter in the operating manual for the INVEOR.

1.5 Proper use

INFORMATION

You will find the “Proper use” chapter in the operating manual for the INVEOR.

1.6 Responsibility

INFORMATION

You will find the “Responsibility” chapter in the operating manual for the INVEOR.

1.7 Contacts for information

More information is available from:

Central service hotline

Tel.: +49 2331 8040-848
Monday to Friday: 7 am to 5 pm (UTC/GMT +1)
Fax: +49 2331 8040-602
E-mail: INVEOR-service@kostal.com

Website address

Customers can find technical and general information on the following website:
www.kostal-industrie-elektrik.com

1.8 Safety instructions

INFORMATION

You will find the “Safety instructions” chapter in the operating manual for the INVEOR.

2. Device and system description

This chapter contains information on the scope of delivery for the drive controller and the function description.

2.1 Sercos

The Sercos bus system is part of the fieldbus family. The network is generally linear in structure. The maximum data transfer rate to a Sercos bus may be up to 100 Mbit/s. The fieldbus cable is only connected via the two M12 connector sockets on the front of the device. Ensure that the incoming bus cable is connected to the "In" socket and the outgoing one to the "Out" socket.
If connecting the last participant, the "Out" socket should be left free – there is no need for a terminal resistor.

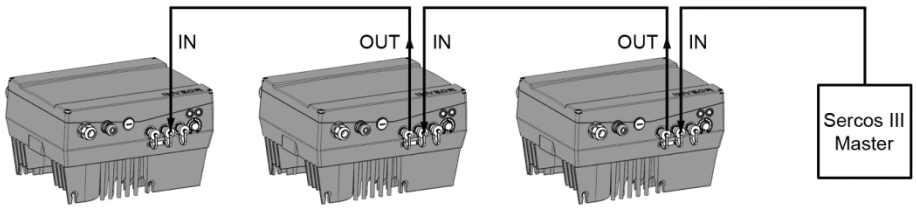


Fig.: 4 Wiring and bus connection (Example connection INVEOR M size C)

2.1.1 Master / slave operation

The INVEOR should only be operated as a Sercos slave.

2.2 Scope of delivery

The scope of delivery is described in the INVEOR basic documentation.

The Sercos interface forms part of the INVEOR.

2.3 Item description for INVEOR

2.3.1 Type code for Sercos

Typ Code Sercos: For information see operating manual

2.3.2 Feature code

AP17 - Standard + Sercos
AP47 - Standard + Sercos +

IO23 - Standard + Sercos
IO24 - Standard + Sercos +

AP26 - Functional safety + Sercos
AP56 - Functional safety + Sercos +

IO33 - Functional safety + Sercos
IO34 - Functional safety + Sercos +

2.4 Hardware components

INFORMATION

The INVEOR is fitted in the factory with the appropriate communication card.

The INVEOR cannot be retrofitted or converted at a later date.

2.4.1 Connecting the fieldbus cable (INVEOR M)

Size A

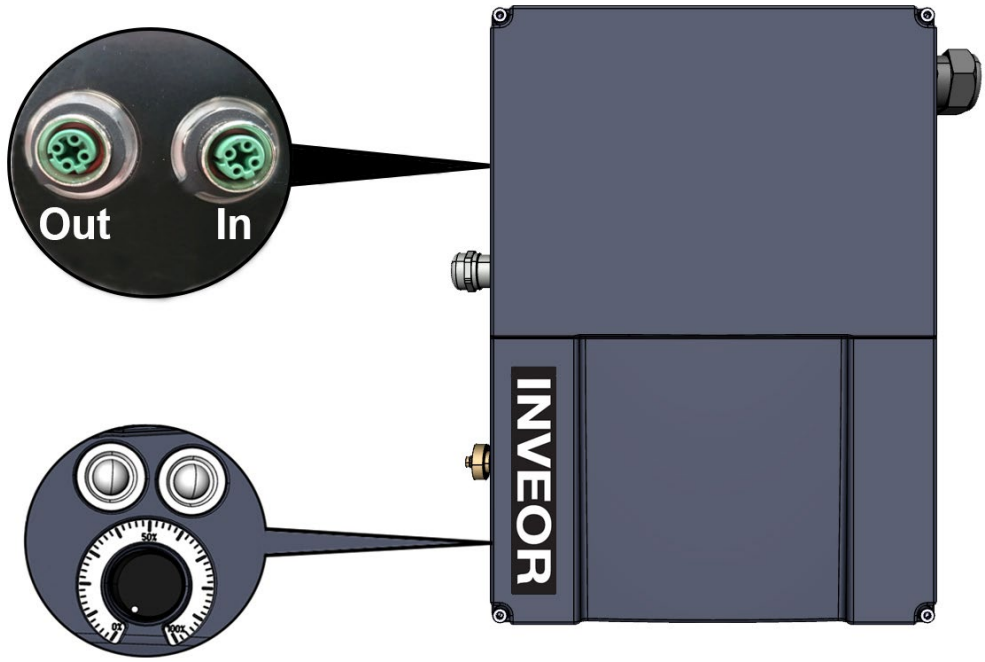


Fig.: 5 Fieldbus cable connection Size A

2.4.2 Connecting the fieldbus cable (INVEOR M size B/C/D) / (INVEOR MP size A/B/C/D)

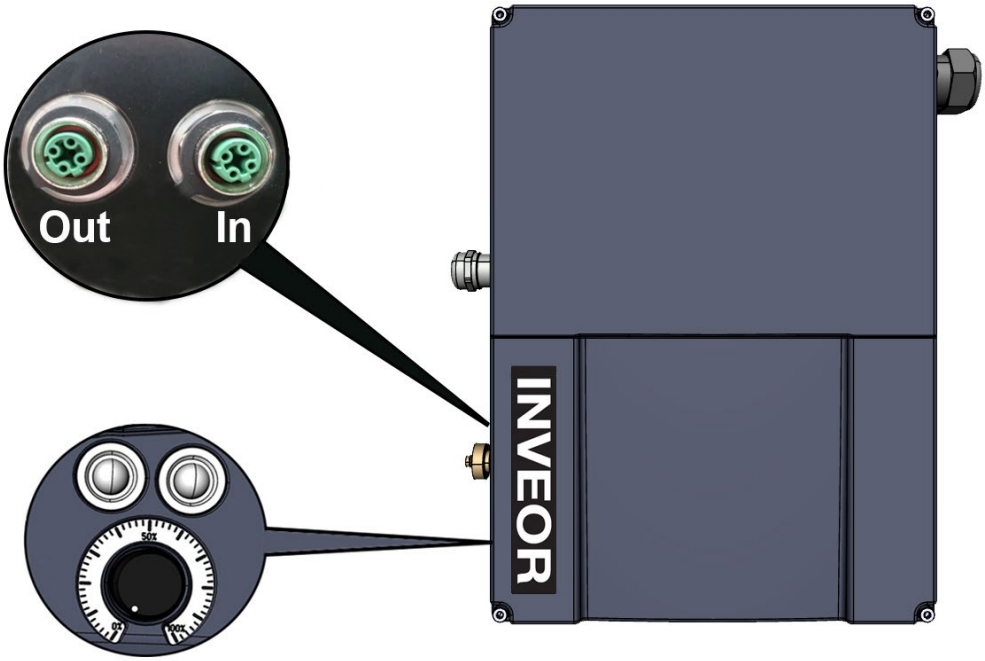


Fig.: 6 Fieldbus cable connection (INVEOR M size B/C/D) / (INVEOR MP size A/B/C/D)

1	2	3	4	5

2.4.3 Pin assignment for interfaces

Pin assignment on device side of M12 socket for Sercos:

Pin no.	Signal	Socket
1	Tx+	
2	Rx+	
3	Tx-	
4	Rx-	
Housing	Shielding	

Fig. 1: Round plug connector, 4-pin, M12, D-coded for Sercos fieldbus

2.4.4 Cable

The following points should be observed when wiring:

- Lay bus and power cables as far apart as possible (min. 30 cm),
- If cables do cross, an angle of 90° should be observed if possible.

2.5 Software components

The INVEOR drive controller can be parameterised using the INVEORpc tool and MMI (see operating manual) as well as the Sercos master.

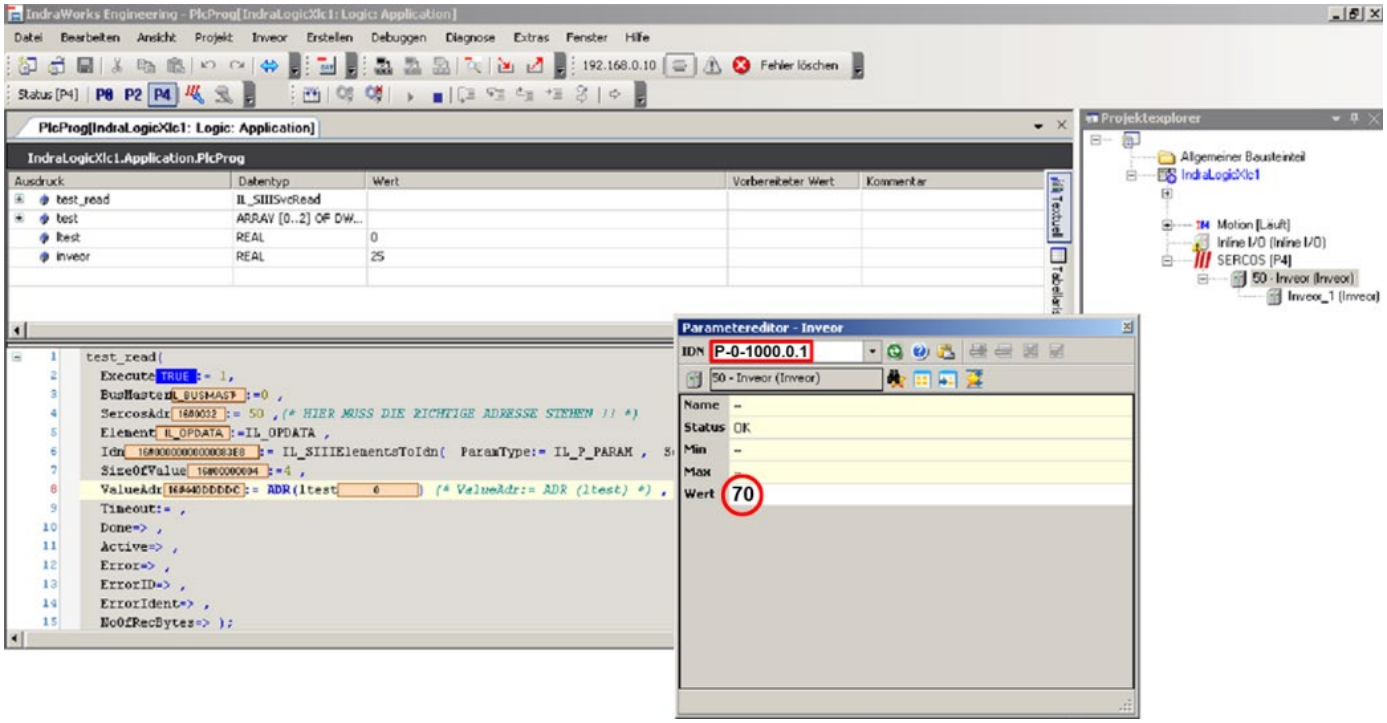


Fig.: 7 Bosch Rexroth master

The figure above shows implementation of parameter 1(1.021, maximum frequency) [IDN: P-0-1000.0.1] with the value 70 Hz.

3. Installation

3.1 Configuring drive controller for Sercos

For the drive controller to be controlled by the fieldbus, the following basic parameters must be set using the INVEORpc tool, MMI or Sercos master:

- Set parameter 1.130 (target value source) to fieldbus "9"
- Set parameter 1.131 (target value approval) to fieldbus "6"

The user must choose the set of parameters appropriate to him.

Parameters 6.067 (IP number), 6.068 (netmask) and 6.069 (gateway) must be set to suit the network environment.

If parameters are not set, the following default values apply:	IP:	192.168.0.31
	Netmask:	255.255.255.0
	Gateway:	0.0.0.0

3.2 INVEOR bus address

DANGER!

Risk of death due to electrical shock!

Death or serious injury!

De-energise the drive controller, determine that it is voltage-free and secure it against being restarted

Device IDs between 1 – 255 can be set using the rotary switches* or parameter 6.060 Fieldbus address. If both are set to "0", the default address is 50.

For IDs > 255, the rotary switches must be in the "0" position. Settings should only be made via the parameter.

Continues on next page

* not for STO variants

Continuation

Address		Settings	
DECIMAL	HEX	DS1	DS2
0	0	**0**	**0**
1	1	**1**	**0**
2	2	**2**	**0**
3	3	**3**	**0**
4	4	**4**	**0**
5	5	**5**	**0**
6	6	**6**	**0**
7	7	**7**	**0**
8	8	**8**	**0**
9	9	**9**	**0**
10	a	**a**	**0**
11	b	**b**	**0**
12	c	**c**	**0**

Address		Settings	
DECIMAL	HEX	DS1	DS2
13	d	**d**	**0**
14	e	**e**	**0**
15	f	**f**	**0**
16	10	**0**	**1**
17	11	**1**	**1**
18	12	**2**	**1**
19	13	**3**	**1**
20	14	**4**	**1**
21	15	**5**	**1**
•			
•			
•			
255	ff	**f**	**f**

3.3 Installing the INVEOR XML file

A "device-specific information file" in XML format is required to use the INVEOR drive controller with Sercos.

Download the "Sercos fieldbus for INVEOR" ZIP file from the download area on our website:

www.kostal-industrie-elektrik.com

Embed the XML file as required by the Sercos master you are using.

4. Accessing data via Sercos

Data can be accessed via Sercos both cyclically and non-cyclically (see chapter 4.3).

Cyclic data is known as a process image. It is made up of data sent by the Sercos master to the drive controller and from the drive controller to the Sercos master.

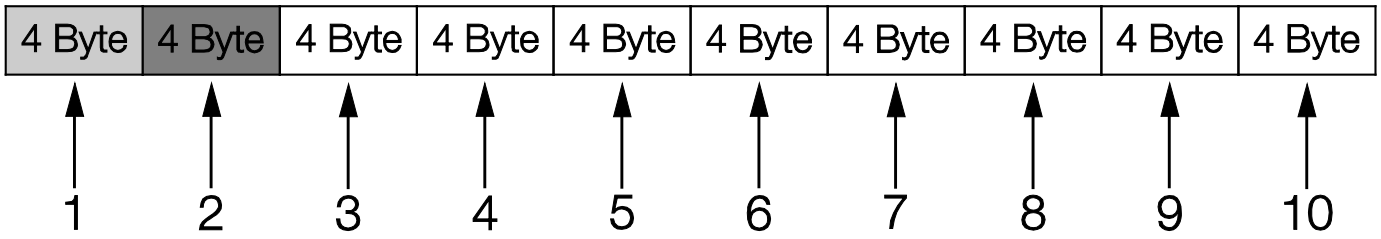
The cyclic data sent from the Sercos master to the drive controller is known as "Process data In".

The cyclic data sent from the drive controller to the Sercos master is known as "Process data Out".

4.1 Cyclic data access – Process data Out

4.1.1 Structure of Process data Out

The process data stated below is sent from the drive controller to the Sercos master.
The data is made up of 10 process variables.



The first two process variables (status word and actual frequency) cannot be parameterised and are always sent. The remaining 8 process variables can be configured using parameters 6.080 to 6.087.
The "Process data Out" available can be found in chapter 4.1.4 "Process data Out".
Use "INVEORpc", "MMI" or Sercos master for parameterisation.

The structure of the "Process data Out" set in the factory is shown in the following table.
The structure is part of the standard XML file.

IMPORTANT INFORMATION

Changes to the "device-specific information file (XML file)" may cause communication problems.

Frame no.	Address	Data type	Designation	Unit	Description
1	0x0000	WORD*	Status word (see 4.1.2)	-	cannot be parameterised
2	0x0004	REAL***	Actual frequency	Hz	cannot be parameterised
3	0x0008	REAL	Process data Out 3 (Motor voltage)	V	can be parameterised using INVEORpc tool (parameter 6.080)
4	0x000C	REAL	Process data Out 4 (Motor current)	A	can be parameterised using INVEORpc tool (parameter 6.081)
5	0x0010	REAL	Process data Out 5 (Grid voltage)	V	can be parameterised using INVEORpc tool (parameter 6.082)
6	0x0014	REAL	Process data Out 6 (Target frequency value)	Hz	can be parameterised using INVEORpc tool (parameter 6.083)
7	0x0018	DWORD**	Process data Out 7 (Digital inputs with bit coding)	-	can be parameterised using INVEORpc tool (parameter 6.084)
8	0x001C	REAL	Process data Out 8 (Analogue input 1)	V	can be parameterised using INVEORpc tool (parameter 6.085)
9	0x0020	DWORD**	Process data Out 9 (Error word 1)	-	can be parameterised using INVEORpc tool (parameter 6.086)
10	0x0024	DWORD**	Process data Out 10 (Error word 2)	-	can be parameterised using INVEORpc tool (parameter 6.087)

* **WORD data type corresponds to UINT16 = 2 bytes**
** **DWORD data type corresponds to UINT32 = 4 bytes**
*** **REAL data type corresponds to = 4 bytes**

INFORMATION

The 32-bit data (error status, DigOuts, DigIns) has been broken down into 16-bit data because the data width of the fieldbuses is limited to 16-bit in some places.

If 32-bit data access is possible, the 32-bit word is used, regardless of whether the low- or high-Word is accessed!

Continues on next page

Continuation

The structure of the "Process data Out" set in the factory is shown in the following table.
The structure is part of the standard XML file.

IMPORTANT INFORMATION

Changes to the "device-specific information file (XML file)" may cause communication problems.

Frame no.	Address	Data type	Designation	Unit	Description
1	0x0000	WORD*	Status word (see 4.1.2)	-	cannot be parameterised
2	0x0004	REAL***	Actual frequency	Hz	cannot be parameterised
3	0x0008	REAL	Process data Out 3 (Motor voltage)	V	can be parameterised using INVEORpc tool (parameter 6.080)
4	0x000C	REAL	Process data Out 4 (Motor current)	A	can be parameterised using INVEORpc tool (parameter 6.081)
5	0x0010	REAL	Process data Out 5 (Grid voltage)	V	can be parameterised using INVEORpc tool (parameter 6.082)
6	0x0014	REAL	Process data Out 6 (Target frequency value)	Hz	can be parameterised using INVEORpc tool (parameter 6.083)
7	0x0018	DWORD**	Process data Out 7 (Digital inputs with bit coding)	-	can be parameterised using INVEORpc tool (parameter 6.084)
8	0x001C	REAL	Process data Out 8 (Analogue input 1)	V	can be parameterised using INVEORpc tool (parameter 6.085)
9	0x0020	DWORD**	Process data Out 9 (Error word 1)	-	can be parameterised using INVEORpc tool (parameter 6.086)
10	0x0024	DWORD**	Process data Out 10 (Error word 2)	-	can be parameterised using INVEORpc tool (parameter 6.087)

* **WORD data type corresponds to UINT16 = 2 bytes**
** **DWORD data type corresponds to UINT32 = 4 bytes**
*** **REAL data type corresponds to = 4 bytes**

INFORMATION

The 32-bit data (error status, DigOuts, DigIns) has been broken down into 16-bit data because the data width of the fieldbuses is limited to 16-bit in some places.

If 32-bit data access is possible, the 32-bit word is used, regardless of whether the low- or high-Word is accessed!

Continues on next page

1	2	3	4	5

Continuation

IMPORTANT INFORMATION

The REAL depiction corresponds to the IEEE format standard

(Help: 50 % target value = 0x42480000)

The endianness of the fieldbus should be observed for all data types.

4.1.2 Structure of INVEOR status word

The meanings of the individual bits of the INVEOR status word are described in the following table.

Bit	Value	Meaning	Description
0	**1**	Ready for engagement	Grid voltage present, no fault
	0	Not ready for engagement	
1	1	Ready for operation	No fault / HW enable set
	0	Not ready for operation	
2	1	Operation	Motor is energised
	0	Operation blocked	
3	1	Error active	A fault is present
	0	Free from faults	
4	1	No OFF 2	On 2 off / STW bit 1 set [3](logic can be inverted with parameter 6.066.)
	0	Electr. stop active (OFF 2)	
5	1	No OFF 3	On 3 off / STW bit 2 set [3](logic can be inverted with parameter 6.066)
	0	Rapid stop active (OFF 3)	
6	1	Engagement inhibit active	[1] PWM blocked
	0	No engagement inhibit	[1] PWM enabled
7	1	Warning active	[2] A warning is present
	0	No warning	
8	1	Nominal/actual value deviation in tolerance range	Actual value within a tolerance band Parameter 6.070 / 6.071
	0	Nominal/actual value deviation outside tolerance range	
9	1	Control from AG	INVEOR is parameterised for activation via fieldbus
	0	No control from AG	
10	1	Target frequency reached	Actual frequency > = reference value (Parameter 6.072)
	0	Target frequency fallen below	Actual frequency < reference value
11	1	Device-specific	Meaning not specified
	0	-	

Continues on next page

1	2	3	4	5

Continuation

Bit	Value	Meaning	Description
12	1	Device-specific	Meaning not specified
	0	-	
13	1	Device-specific	Meaning not specified
	0	-	
14	1	Device-specific	Meaning not specified
	0	-	
15	1	Motor current limit	Motor current is limited
	0		

AG: Automation device
1 Deviation from standard
2 As of software version 03.61
3 As of software version 03.74

4.1.3 Process data Out which can be parameterised

The remaining 8 process variables can be selected using the INVEORpc tool, MMI or Sercos master by configuring parameters 6.080 to 6.087.

The process data available can be found in the following table.

Serial no.	Data type	Available in SW version	Designation	Unit	Description
0	REAL		Actual frequency	Hz	
1	REAL		Output voltage	V	Motor voltage
2	REAL		Motor current	A	
3	REAL		IGBT temperature	°C	
4	REAL		Intermediate circuit voltage	V	
5	REAL		Target frequency value	Hz	
6	REAL		Grid voltage	V	Input voltage
7	REAL		Intermediate circuit current	A	
8	REAL		Inner temperature	°C	FC inner temperature
9	REAL		Incremental encoder speed	Hz	only with encoder option
10	t.b.d.		Incremental encoder position		only with encoder option
11	DWORD*		Application error	1	Bit-coded
13	DWORD*		Power error	1	Bit-coded
15	DWORD*		Digital inputs (1..4+release for output stages)	1	Bit-coded
16	REAL		Analogue In 1	V	Analogue input 1 application
17	REAL		Analogue In 2	V	Analogue input 2 application
18	REAL		F_target ramp	Hz	Frequency target value behind ramp

Continues on next page

1	2	3	4	5

Continuation

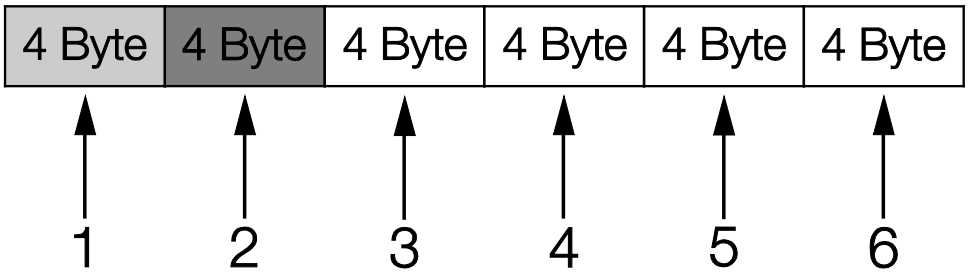
Serial no.	Data type	Available in SW version	Designation	Unit	Description
19	REAL		F_target	Hz	Frequency target value of target value source
20	REAL		PID actual value	%	Actual value of PID process controller
21	REAL		PID target value	%	Target value of PID process controller
22	REAL		Analogue Out 1	V	Analogue Out 1
23	REAL		Intermediate circuit power	W	Intermediate circuit power
24	REAL		Reserved	-	Reserved
25	REAL		Reserved	-	Reserved
26	REAL		Reserved	-	Reserved
27	REAL		Reserved	-	Reserved
28	REAL		Reserved	-	Reserved
29	DWORD*		Status word BUS/Soft PLC	1	Status word BUS/Soft PLC
30	REAL	03.02	Rotation speed	rpm	Motor shaft speed
31	REAL	03.02	Torque	Nm	Torque
32	REAL	03.02	Shaft power	W	Mechanical shaft power
33	DWORD*	03.04	Customised output variable 1	1	Customised output variable Soft PLC
35	REAL	03.04	Customised output variable 2	1	Customised output variable Soft PLC
36	REAL	03.04	Customised output variable 3	1	Customised output variable Soft PLC
37	REAL	03.04	Customised output variable 4	1	Customised output variable Soft PLC
38	DWORD*	03.05	Operating time in seconds	1	Operating time in seconds
39	DWORD*	03.05	Power On cycles	1	Power On cycles
40	REAL	03.05	Electric energy	Wh	Total electric energy
41	DWORD*	03.05	Status of outputs (DigOut1+2, relays 1+2)		Status of outputs

*** DWORD data type corresponds to UINT32= 4 bytes**

1	2	3	4	5

4.2 Cyclic data access – Process data In

The process data listed below is sent from the Sercos master to the drive controller.
The data is made up of 6 process variables.



The first two process variables (control word and target value) cannot be parameterised and are always expected. The remaining 4 process variables can be configured using parameters 6.110 to 6.113.

The "Process data In" available can be found in chapter 4.2.2 "Process data In".
Use INVEORpc, MMI or Sercos master for parameterisation.

The structure of the "Process data In" set in the factory is shown in the following table.
The structure is part of the standard XML file.

Frame no.	Address	Data type	Designation	Unit	Description
1	0x0000	WORD*	Control word (see 4.2.1)		cannot be parameterised
2	0x0004	REAL***	Target value	%	cannot be parameterised
3	0x0008	DWORD**	Process data In 3 (Digital output 1 – relay)		can be parameterised using INVEORpc tool (parameter 6.110)
4	0x000C	REAL	Process data In 4 (Analogue output 1)	V	can be parameterised using INVEORpc tool (parameter 6.111)
5	0x0010		Process data In 5 (Reserved)		can be parameterised using INVEORpc tool (parameter 6.112)
6	0x0014		Process data In 6 (Reserved)		can be parameterised using INVEORpc tool (parameter 6.113)

*** WORD data type corresponds to UINT16 = 2 bytes**

**** DWORD data type corresponds to UINT32= 4 bytes**

***** REAL data type corresponds to = 4 bytes**

1	2	3	4	5

4.2.1 Structure of INVEOR control word

The meanings of the individual bits of the INVEOR control word are described in the following table.

IMPORTANT INFORMATION

- The control word is only accepted if bit 10 (control from AG) is set, otherwise the control word is rejected.
- The target value is only accepted if bit 6 (target value enabled) is set. Otherwise the target value is rejected.

Bit	Value	Meaning	Description
0	1*	ON 1	Engagement condition 1
	0	OFF 1	Shut down via ramp
1	1*	ON 2	Engagement condition 2
	0	Electr. stop (OFF 2)	Switch off PWM, free shutdown
2	1*	ON 3	Engagement condition 3
	0	Rapid stop (OFF 3)	Shut down via fastest possible ramp
3	1*	Operating condition 1	Operating condition 1
	0		Switch off PWM, free shutdown
4	1*	Operating condition 2	Operating condition 2
	0		Shut down via fastest possible ramp
5	1	Block HLG	[1] Not implemented
	0	Stop HLG	[1] Not implemented
6	1*	Enable target value	Adopt target value
	0	Block target value	Reject target value
7	1	Error acknowledgement (0-> 1)	Collective acknowledgement on pos. flank
	0*	---	---
8	1	JOG (right)	[1] Not implemented
	0		[1] Not implemented
9	1	JOG (left)	[1] Not implemented
	0		[1] Not implemented
10	1*	Control from AG	Management via interface, control word valid
	0		Control word is rejected
11	1	Device-specific	-
	0		
12	1	Device-specific	-
	0		
13	1	Device-specific	-
	0		
14	1	Device-specific	-
	0		
15	1	Device-specific	-
	0		

HLG: Ramp function generator
*** Operating condition**
[1] Deviation from standard

IMPORTANT INFORMATION

An example of a control word with which the start-up works is 0x45F.

The endianness of the fieldbus should be observed for all data types.

1	2	3	4	5

4.2.2 Process data in which can be parameterised

The remaining 4 process variables (2 – 6) can be parameterised with the help of the INVEORpc tool using parameters 6.110 to 6.113.
The available process variables of the parameter settings can be found in the following table.

Serial no.	Data type	SW vers.	Designation	Unit	Description
0	DWORD*	03.02	Digital – relay – outputs	1	**Control of the outputs** Bit 0 = Dig Out 1 (parameter 4.150 = 25) Bit 1 = Dig Out 2 (parameter 4.170 = 25) Bit 2 = Relay1 (parameter 4.190 = 25) Bit 3 = Relay 2 (parameter 4.210 = 25) Bit 4 = Virt Out 1 (parameter 4.230 = 25)
1	REAL	03.02	Analogue Out 1	V	Control of analogue output
2	DWORD*	03.04	Customised input variable 1	1	Customised input variable Soft PLC (32 bit)
4	REAL	03.04	Customised input variable 2	-	Customised input variable Soft PLC
5	REAL	03.04	Customised input variable 3	-	Customised input variable Soft PLC
6	REAL	03.04	Customised input variable 4	-	Customised input variable Soft PLC

*** DWORD data type corresponds to UINT32= 4 bytes**

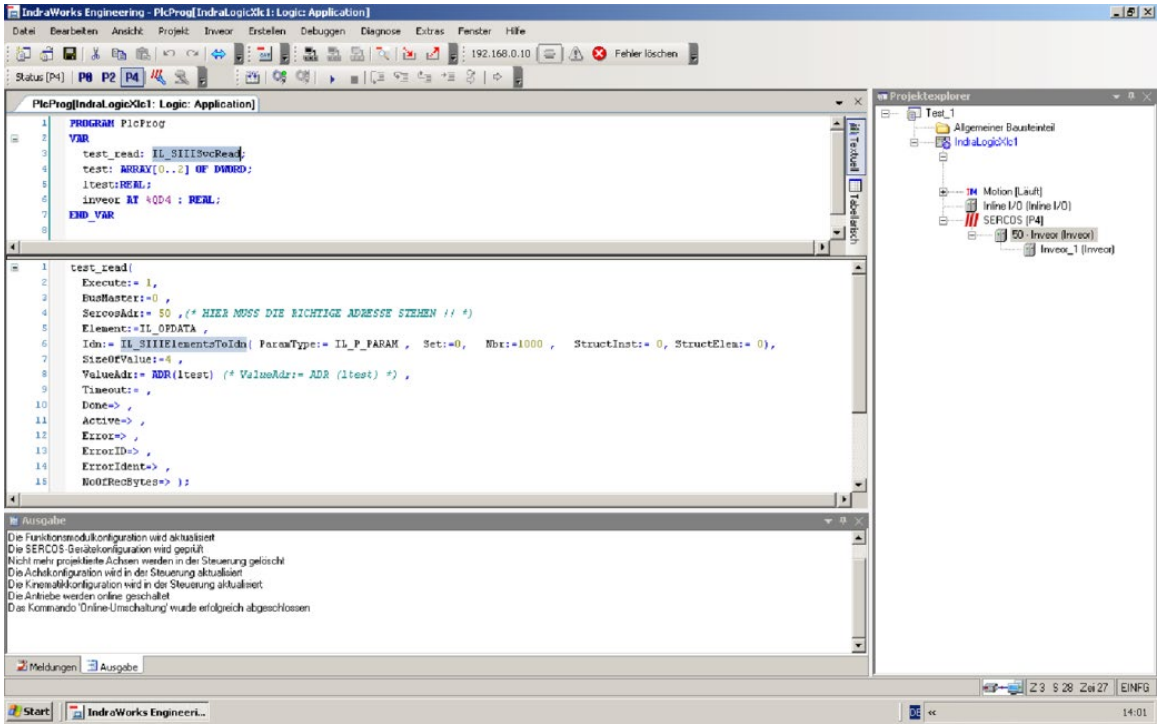
4.3 Non-cyclic data access / parameters

Non-cyclic communication is used to access the INVEOR parameters. IDNs P-0-1000.0.0-255 and P-0-1001.0.0-255 are used for this purpose.
Only the value and/or Opdata may be accessed.
The parameter indices of the INVEOR are depicted as follows:

Parameter index:	IDN:
0	P-0-1000.0.0
1	P-0-1000.0.1
2	P-0-1000.0.2
.	.
.	.
255	P-0-1000.0.255
256	P-0-1001.0.0
257	P-0-1001.0.1
.	.
.	.
510	P-0-1001.0.255

IMPORTANT INFORMATION

- Only parameters with an access level of 2 or less can be accessed.
  Access for both reading and writing is possible.
- You will find detailed information about the parameters in the "Parameters" chapter of the "INVEOR drive controller" operating manual.



The figure above shows non-cyclic data access to a Bosch Rexroth master.
The "IL_SIIISvcRead" function provides read-only access to the minimum frequency via "IDN P-0-1000.0.0". Afterwards the value can be found in the "ltest" variables. "IL_SIIISvcWrite" would be used for access for writing.

Continuation

4.3.1 Non-cyclic data

The following parameters can be accessed non-cyclically for reading and writing.

IMPORTANT INFORMATION

- Changing a parameter value via the fieldbus includes direct EEPROM write access.
- The data below is listed sorted in ascending order by "Number*".

Sercos	INVEOR parameter						
Sercos IDN	Index	Number*	Accepted	Name in German	Minimum	Maximum	Unit
P-0-1000.0.000	0	1.020	2: Always	Minimum frequency	0	400	Hz
P-0-1000.0.001	1	1.021	2: Always	Maximum frequency	5	400	Hz
P-0-1000.0.003	3	1.050	2: Always	Deceleration time 1	0.1	1000	s
P-0-1000.0.004	4	1.051	2: Always	Run up time 1	0.1	1000	s
P-0-1000.0.048	48	1.052	2: Always	Deceleration time 2	0.1	1000	s
P-0-1000.0.049	49	1.053	2: Always	Run up time 2	0.1	1000	s
P-0-1000.0.050	50	1.054	2: Always	Ramp selection	0	9	
P-0-1000.0.172	172	1.088	2: Always	Deceleration time 3	0.1	1000	s
P-0-1000.0.008	8	1.100	2: Always	Operating mode	0	3	
P-0-1000.0.005	5	1.130	2: Always	Target value source	0	10	
P-0-1000.0.007	7	1.131	2: Always	Target value approval	0	16	
P-0-1000.0.081	81	1.132	2: Always	Start protection	0	8	
P-0-1000.0.041	41	1.150	2: Always	Rotation direction	0	16	
P-0-1000.0.053	53	1.180	2: Always	Acknowledge function	0	7	
P-0-1000.0.054	54	1.181	2: Always	Auto acknowledgement	0	1000	s
P-0-1000.0.109	109	1.182	2: Always	Auto ackn. no.	0	500	
P-0-1000.0.055	55	2.050	2: Always	Fixed frequency mode	0	4	
P-0-1000.0.009	9	2.051	2: Always	Fixed frequency 1	-400	400	Hz
P-0-1000.0.010	10	2.052	2: Always	Fixed frequency 2	-400	400	Hz
P-0-1000.0.011	11	2.053	2: Always	Fixed frequency 3	-400	400	Hz
P-0-1000.0.012	12	2.054	2: Always	Fixed frequency 4	-400	400	Hz
P-0-1000.0.013	13	2.055	2: Always	Fixed frequency 5	-400	400	Hz
P-0-1000.0.014	14	2.056	2: Always	Fixed frequency 6	-400	400	Hz
P-0-1000.0.015	15	2.057	2: Always	Fixed frequency 7	-400	400	Hz
P-0-1000.0.139	139	2.150	2: Always	MOP digit. input	0	8	
P-0-1000.0.051	51	2.151	2: Always	MOP step range	0	100	%
P-0-1000.0.141	141	2.152	2: Always	MOP step time	0.02	1000	s
P-0-1000.0.140	140	2.153	2: Always	MOP react. Time	0.02	1000	s

Continues on next page

1	2	3	4	5

Continuation

Sercos	INVEOR parameter						
Sercos IDN	Index	Number*	Accepted	Name in German	Minimum	Maximum	Unit
P-0-1000.0.142	142	2.154	2: Always	MOP reference memory	0	1	
P-0-1000.0.037	37	3.050	2: Always	PID-P amplific.	0	100	
P-0-1000.0.038	38	3.051	2: Always	PID-I amplific.	0	100	1/s
P-0-1000.0.039	39	3.052	2: Always	PID-D amplific.	0	100	s
P-0-1000.0.006	6	3.060	2: Always	PID actual value	0	3	
P-0-1000.0.082	82	3.061	2: Always	PID inverted	0	1	
P-0-1000.0.083	83	3.062	2: Always	PID fixed nominal value 1	0	100	%
P-0-1000.0.127	127	3.063	2: Always	PID fixed nominal value 2	0	100	%
P-0-1000.0.128	128	3.064	2: Always	PID fixed nominal value 3	0	100	%
P-0-1000.0.129	129	3.065	2: Always	PID fixed nominal value 4	0	100	%
P-0-1000.0.130	130	3.066	2: Always	PID fixed nominal value 5	0	100	%
P-0-1000.0.131	131	3.067	2: Always	PID fixed nominal value 6	0	100	%
P-0-1000.0.132	132	3.068	2: Always	PID fixed nominal value 7	0	100	%
P-0-1000.0.133	133	3.069	2: Always	PID fixed nominal mod.	0	2	
P-0-1000.0.084	84	3.070	2: Always	PID standby time	0	1000	s
P-0-1000.0.085	85	3.071	2: Always	PID standby hyst.	0	50	%
P-0-1000.0.166	166	3.072	2: Always	PID dry. Time	0	32767	s
P-0-1000.0.169	169	3.073	2: Always	PID target value min.	0	100	%
P-0-1000.0.170	170	3.074	2: Always	PID target value max.	0	100	%
P-0-1000.0.025	25	4.020	2: Always	AI1 input type	1	2	
P-0-1000.0.026	26	4.021	2: Always	AI1 standard. Low	0	100	%
P-0-1000.0.027	27	4.022	2: Always	AI1 standard. High	0	100	%
P-0-1000.0.023	23	4.023	2: Always	AI1 dead time	0	100	%
P-0-1000.0.022	22	4.024	2: Always	AI1 filter time	0.02	1	s
P-0-1000.0.019	19	4.030	2: Always	AI1 function	0	1	
P-0-1000.0.103	103	4.033	2: Always	AI1-phys unit	0	10	
P-0-1000.0.104	104	4.034	2: Always	AI1-phys min.	-10000	10000	%
P-0-1000.0.105	105	4.035	2: Always	AI1-phys max.	-10000	10000	%
P-0-1000.0.167	167	4.036	2: Always	AI1 wire break time	0	32767	s
P-0-1000.0.034	34	4.050	2: Always	AI2 input type	1	2	
P-0-1000.0.035	35	4.051	2: Always	AI2 standard Low	0	100	%
P-0-1000.0.036	36	4.052	2: Always	AI2 standard High	0	100	%
P-0-1000.0.032	32	4.053	2: Always	AI2 dead time	0	100	%
P-0-1000.0.031	31	4.054	2: Always	AI2 filter time	0.02	1	s
P-0-1000.0.028	28	4.060	2: Always	AI2 function	0	1	
P-0-1000.0.106	106	4.063	2: Always	AI2-phys unit	0	10	
P-0-1000.0.107	107	4.064	2: Always	AI2-phys min.	-10000	10000	%
P-0-1000.0.108	108	4.065	2: Always	AI2-phys max.	-10000	10000	%
P-0-1000.0.168	168	4.066	2: Always	AI2 wire break time	0	32767	s
P-0-1000.0.042	42	4.100	2: Always	AO1 function	0	40	
P-0-1000.0.043	43	4.101	2: Always	AO1 standard Low	-32767	32767	
P-0-1000.0.080	80	4.102	2: Always	AO1 standard high	-32767	32767	
P-0-1000.0.120	120	4.110	2: Always	DI1 inverted	0	1	

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Continuation

Sercos	INVEOR parameter						
Sercos IDN	Index	Number*	Accepted	Name in German	Minimum	Maximum	Unit
P-0-1000.0.121	121	4.111	2: Always	DI2 inverted	0	1	
P-0-1000.0.122	122	4.112	2: Always	DI3 inverted	0	1	
P-0-1000.0.123	123	4.113	2: Always	DI4 inverted	0	1	
P-0-1000.0.056	56	4.150	2: Always	DO1 function	0	60	
P-0-1000.0.057	57	4.151	2: Always	DO1 on	-32767	32767	
P-0-1000.0.058	58	4.152	2: Always	DO1 off	-32767	32767	
P-0-1000.0.059	59	4.170	2: Always	DO2 function	0	60	
P-0-1000.0.060	60	4.171	2: Always	DO2 on	-32767	32767	
P-0-1000.0.061	61	4.172	2: Always	DO2 off	-32767	32767	
P-0-1000.0.062	62	4.190	2: Always	Rel.1 function	0	60	
P-0-1000.0.063	63	4.191	2: Always	Relay 1 on	-32767	32767	
P-0-1000.0.064	64	4.192	2: Always	Relay 1 off	-32767	32767	
P-0-1000.0.094	94	4.193	2: Always	Relay 1 on delay	0	10000	s
P-0-1000.0.095	95	4.194	2: Always	Relay 1 off delay	0	10000	s
P-0-1000.0.065	65	4.210	2: Always	Relay 2 function	0	60	
P-0-1000.0.066	66	4.211	2: Always	Relay 2 on	-32767	32767	
P-0-1000.0.067	67	4.212	2: Always	Relay 2 off	-32767	32767	
P-0-1000.0.096	96	4.213	2: Always	Relay 2 on delay	0	10000	s
P-0-1000.0.097	97	4.214	2: Always	Relay 2 off delay	0	10000	s
P-0-1000.0.160	160	4.230	2: Always	VO function	0	60	
P-0-1000.0.161	161	4.231	2: Always	VO on	-10000	10000	
P-0-1000.0.162	162	4.232	2: Always	VO off	-10000	10000	
P-0-1000.0.163	163	4.233	2: Always	VO on delay	0	32767	s
P-0-1000.0.164	164	4.234	2: Always	VO off delay	0	32767	s
P-0-1000.0.124	124	5.010	2: Always	External fault 1	0	7	
P-0-1000.0.125	125	5.011	2: Always	External fault 2	0	7	
P-0-1000.0.086	86	5.070	2: Always	Motor current limit %	0	250	%
P-0-1000.0.087	87	5.071	2: Always	Motor current limit s	0	100	s
P-0-1000.0.156	156	5.075	2: Always	Gearbox factor	0	1000	
P-0-1000.0.111	111	5.080	2: Always	Stall detection	0	1	
P-0-1000.0.154	154	5.081	2: Always	Stall Time	1	50	s
P-0-1000.0.171	171	5.082	2: Always	Start-up error_current	0	1	
P-0-1000.0.138	138	5.090	2: Always	Par.set change	0	12	
P-0-1000.0.070	70	5.100	2: Always	Techn.param.1	-9999999	9999999	
P-0-1000.0.071	71	5.101	2: Always	Techn.param.2	-9999999	9999999	
P-0-1000.0.072	72	5.102	2: Always	Techn.param.3	-9999999	9999999	
P-0-1000.0.073	73	5.103	2: Always	Techn.param.4	-9999999	9999999	
P-0-1000.0.074	74	5.104	2: Always	Techn.param.5	-9999999	9999999	
P-0-1000.0.075	75	5.105	2: Always	Techn.param.6	-9999999	9999999	
P-0-1000.0.076	76	5.106	2: Always	Techn.param.7	-9999999	9999999	
P-0-1000.0.077	77	5.107	2: Always	Techn.param.8	-9999999	9999999	
P-0-1000.0.078	78	5.108	2: Always	Techn.param.9	-9999999	9999999	

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Continuation

Sercos	INVEOR parameter						
Sercos IDN	Index	Number*	Accepted	Name in German	Minimum	Maximum	Unit
P-0-1000.0.079	79	5.109	2: Always	Techn.param.10	-9999999	9999999	
P-0-1000.0.144	144	5.110	2: Always	Techn.param.11	-32768	32767	
P-0-1000.0.145	145	5.111	2: Always	Techn.param.12	-32768	32767	
P-0-1000.0.146	146	5.112	2: Always	Techn.param.13	-32768	32767	
P-0-1000.0.147	147	5.113	2: Always	Techn.param.14	-32768	32767	
P-0-1000.0.148	148	5.114	2: Always	Techn.param.15	-32768	32767	
P-0-1000.0.149	149	5.115	2: Always	Techn.param.16	-32768	32767	
P-0-1000.0.150	150	5.116	2: Always	Techn.param.17	-32768	32767	
P-0-1000.0.151	151	5.117	2: Always	Techn.param.18	-32768	32767	
P-0-1000.0.152	152	5.118	2: Always	Techn.param.19	-32768	32767	
P-0-1000.0.153	153	5.119	2: Always	Techn.param.20	-32768	32767	
P-0-1000.0.098	98	6.050	2: Always	SAS/ SPF adr	0	31	
P-0-1000.0.110	110	6.051	2: Always	SAS baud rate	0	3	
P-0-1000.0.099	99	6.060	0: Commissioning	Fieldbus address	0	127	
P-0-1000.0.100	100	6.061	0: Commissioning	Fieldbus baud rate	0	8	
P-0-1000.0.102	102	6.062	2: Always	Bus time-out	0	100	s
P-0-1000.0.176	176	6.066	2: Always	Status word Bits 4/5	0	1	
P-0-1000.0.157	157	6.070	2: Always	Target/actual value dev.	0	100	%
P-0-1000.0.158	158	6.071	2: Always	Tolerance range	0	32767	s
P-0-1000.0.159	159	6.072	2: Always	Target comp. value	0	400	Hz
P-0-1000.0.112	112	6.080	2: Always	Process data Out 3	0	49	
P-0-1000.0.113	113	6.081	2: Always	Process data Out 4	0	49	
P-0-1000.0.114	114	6.082	2: Always	Process data Out 5	0	49	
P-0-1000.0.115	115	6.083	2: Always	Process data Out 6	0	49	
P-0-1000.0.116	116	6.084	2: Always	Process data Out 7	0	49	
P-0-1000.0.117	117	6.085	2: Always	Process data Out 8	0	49	
P-0-1000.0.118	118	6.086	2: Always	Process data Out 9	0	49	
P-0-1000.0.119	119	6.087	2: Always	Process data Out 10	0	49	
P-0-1000.0.134	134	6.110	2: Always	Process data In 3	0	10	
P-0-1000.0.135	135	6.111	2: Always	Process data In 4	0	10	
P-0-1000.0.136	136	6.112	2: Always	Process data In 5	0	10	
P-0-1000.0.137	137	6.113	2: Always	Process data In 6	0	10	
P-0-1001.0.102	358	32.100	0: Commissioning	Output power PM	0	1100	W
P-0-1001.0.112	368	33.001	1: Ready	Type of motor	1	2	
P-0-1001.0.100	356	33.010	2: Always	I2T fact. motor	0	1000	%
P-0-1001.0.084	340	33.011	2: Always	I2T time	0	1200	s
P-0-1001.0.132	388	33.015	1: Ready	R optimisation	0	200	%
P-0-1001.0.147	403	33.016	1: Ready	Motor phase monitoring	0	1	
P-0-1001.0.070	326	33.031	1: Ready	Motor current	0	150	A
P-0-1001.0.071	327	33.032	1: Ready	Motor rating	50	55000	W
P-0-1001.0.073	329	33.034	1: Ready	Motor speed	0	80000	rpm

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Continuation

Sercos	INVEOR parameter						
Sercos IDN	Index	Number*	Accepted	Name in German	Minimum	Maximum	Unit
P-0-1001.0.074	330	33.035	1: Ready	Motor frequency	10	400	Hz
P-0-1001.0.115	371	33.050	1: Ready	Stator resistance	0	100	Ohm
P-0-1001.0.117	373	33.105	1: Ready	Scatter inductivity	0	1	H
P-0-1001.0.068	324	33.110	1: Ready	Motor voltage	0	1500	V
P-0-1001.0.072	328	33.111	1: Ready	Motor cos phi	0.5	1	
P-0-1001.0.125	381	33.138	2: Always	Holding current time	0	3600	s
P-0-1001.0.116	372	33.200	1: Ready	Stator induc.	0	1	H
P-0-1001.0.129	385	33.201	1: Ready	Nominal flux	0	10000	mVs
P-0-1001.0.111	367	34.010	1: Ready	Control method	100	299	
P-0-1001.0.085	341	34.011	1: Ready	Type of encoder	0	2	1
P-0-1001.0.086	342	34.012	1: Ready	Encoder line count	0	10000	1
P-0-1001.0.087	343	34.013	2: Always	Encoder offset	-360	360	°
P-0-1001.0.131	387	34.020	2: Always	Flying restart	0	1	
P-0-1001.0.130	386	34.021	2: Always	Catch time	0	10000	ms
P-0-1001.0.008	264	34.030	2: Always	Switching frequency	1	4	
P-0-1001.0.121	377	34.090	2: Always	Speed controller Kp	1	10000	mA/rad/s
P-0-1001.0.122	378	34.091	2: Always	Speed controller Tn	0	10	s
P-0-1001.0.113	369	34.110	2: Always	Slip trimmer	0	1.5	
P-0-1001.0.138	394	34.120	2: Always	Quadr. characteristic curve	0	1	
P-0-1001.0.139	395	34.121	2: Always	Flux adjustment	10	100	%
P-0-1001.0.114	370	34.130	2: Always	Control reserve voltage	0	3	
P-0-1001.0.137	393	34.225	1: Ready	Field weaken.PMSM	0	1	
P-0-1001.0.136	392	34.226	2: Always	PMSM start-up current	5	1000	%
P-0-1001.0.143	399	34.227	1: Ready	PMSM init. time	0	100	s
P-0-1001.0.140	396	34.228	1: Ready	PMSM start-up procedure	0	1	
P-0-1001.0.141	397	34.229	1: Ready	PMSM start-up ramp	0.1	1000	s
P-0-1001.0.142	398	34.230	1: Ready	Start-up frequency P	5	400	Hz
P-0-1001.0.120	376	35.080	2: Always	Brake chopper	0	1	

5. Error detection and troubleshooting

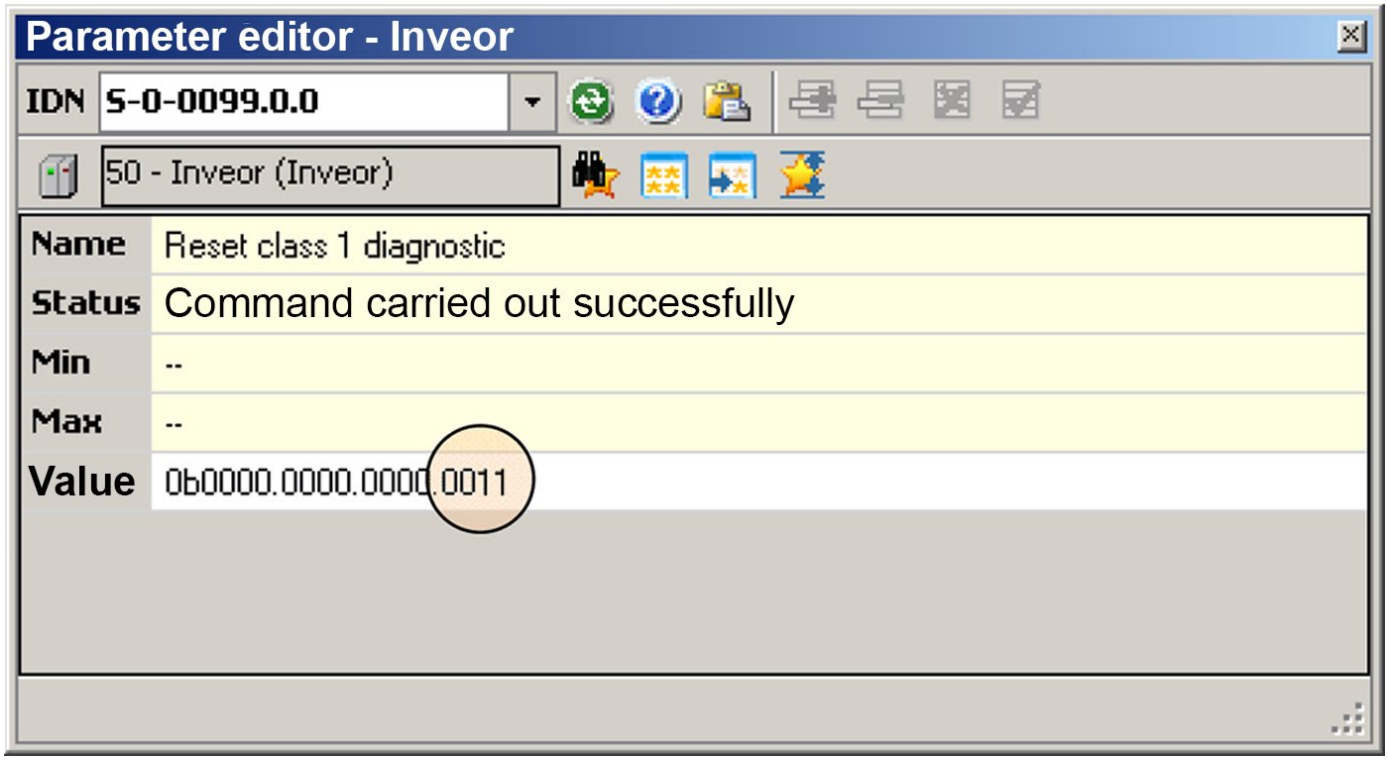
The INVEOR reports an error to the Sercos master as Sercos Class 1 Diagnostic.

Function	Call-up via IDN
Last error which occurred	S-0-0390.0.0
Call up all errors entered*	S-0-1303.0.10
Delete all errors**	S-0-0099.0.0

* The relevant error is coded (see Error codes table)

IMPORTANT INFORMATION

**Errors can only be deleted if both LSBs are set to "1" as shown in the following illustration for the parameter editor of the Bosch Rexroth master.



5.1 Error codes

The INVEOR error codes are imported as 32-bit values.
The upper 16 bits are set to value = 0x000F for all errors.
Only the bottom 16 bits define the meaning of the error. In the value 0x000F0FA1, only the value "0xFA1" is of any interest.

Please refer to the tables below for the meaning of the error codes.

5.1.1 Application page errors

Error code	Meaning
0x0FA1	Undervoltage 24 V application
0x0FA2	Overvoltage 24 V application
0x0FA3	System error 3
0x0FA4	System error 4
0x0FA5	System error 5
0x 0FA6	Customer PLC version error
0x0FA7	System error 7
0x0FA8	Communication Application<>power
0x0FA9	System error 9
0x0FAA	Parameter distributor
0x0FAB	Time-out power
0x0FAC	System error 12
0x0FAD	Cable break Analogue In 1 (4..20 mA / 2 – 10 V)
0x0FAE	Cable break Analogue In 2 (4..40 mA / 2 – 10 V)
0x0FAF	Stall detection
0x0FB0	System error 16
0x0FB1	System error 17
0x0FB3	System error 19
0x0FB4	System error 20
0x0FB2	Overtemperature Fi application
0x0FB5	Bus Time-Out
0x0FB6	Acknowledgement error
0x0FB7	External error 1
0x0FB8	External error 2
0x0FB9	Motor detection
0x0FB2	Excess temperature for frequency converter application

5.1.2 Power page errors

Error code	Meaning
0x1389	Trip IGBT
0x138A	Overvoltage of intermediate circuit
0x138B	Undervoltage of intermediate circuit
0x138C	Excess motor temperature
0x138D	Power failure
0x138E	System error 37
0x138F	Excess IGBT module temperature
0x1390	Overcurrent
0x1391	Excess frequency converter temperature
0x1392	System error 41
0x1393	I^2t motor protection shut-off
0x1394	Ground leak
0x1395	System error 44
0x1396	Motor connection disrupted
0x1397	Motor parameters
0x1398	Drive controller parameters
0x1399	Type plate data
0x139A	Power class limitation
0x139B	System error 50
0x139C	System error 51
0x139D	System error 52
0x139E	The motor's field orientation is lost

Notes

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