HAEHNE

Measuring Amplifier CA-IO

Operating Manual for IO-Link Amplifiers

HAEHNE Elektronische Messgeräte GmbH · Heinrich-Hertz-Str. 29 · D-40699 Erkrath Germany · Telefon 0211/9 2591-0 · Fax 0211/9 2591-20
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Content

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Symbols of this manual

Note

Text sections with this note must be followed

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1 General

1.1 About this guide

The setting instructions describe the structure, the functions and the use of *HAEHNE* IO-Link amplifiers and help to commission them.

This manual should be read carefully before using the system. This avoids possible damage to persons, property and equipment.

Technical modifications are reserved.

2 Overview IO-Link

The following components are required to install the *HAEHNE* IO-Link amplifier:

• IO-Link master

• *HAEHNE* IO-Link amplifier

• unshielded IO-Link standard cables

• Engineeringtool for configuring and parameterizing IO-Link

The IO-Link master establishes the connection between the *HAEHNE* IO-Link amplifier and the automation system. As part of a peripheral system, the IO-Link master is installed either in the control cabinet or as remote I / O directly in the field. The IO-Link master can communicate via different fieldbuses.

The configuration of an IO-Link system takes place in several steps. In the first step, the IO-Link master is integrated into the automation system and configured. In the second step, the IO-Link devices are connected to the master and parameterized.

3 Quick Start

3.1 Setting instructions

Basically, the measuring chain does not need to be adjusted. The IO-Link amplifier is adjusted by *HAEHNE* to match the *HAEHNE* sensors adjusted to a certain sensitivity.

1. Wire the IO-Link amplifier to the master (4.2).
2. Switch on the device and wait until the operating temperature is reached.
3. Integrate O-Link amplifiers into the automation system of the master (4.3).
4. Integrate the IODD of the amplifier into the configuration tool of the master (5.1).
5. Set the amplifier parameters as a function of the force measurement (3.2).

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3.2 Setting examples for force measurements

3.2.1 Force measurements

Relieve the pressure on the sensor, but leave the pre-load effective as during normal measuring operation.

The desired nominal force is entered in the adjustable parameter "strip tension 100%".

This adjustable parameter is used to adapt the signal to the higher-level automation system.
The entered force value then corresponds to the digital value of 20480 (6.3.3).

Then use the system command **<Set zero point>** to adjust the zero point of the connected sensor (6.3.3).

If the process output value fluctuates too much, the signal can be filtered using the "Filter" parameter (6.3.3).

Examples of connected sensors:

- Ring force sensors of the RKS and CTS series
- Force measuring bolts KMB
- Compression force sensors of the DK series

3.2.2 Strip tension measurements with bearing on both sides

Relieve the sensors, but allow the preload existing in normal measuring operation to act.
If the strip tension sensors are connected, this is the built-in measuring chain with a roller without a web like e.g. foil, paper etc.
Enter the corresponding values of the force sensor to be connected in the parameters **"nominal force"** and **"nominal value"**. These characteristic values can be found in the documentation of the sensor:

Enter the desired nominal force or the maximum strip tension in the adjustable parameter **"strip tension 100%"**. Since only half of the total tape tension acts on a sensor with double-sided storage, only half of the effective tape tension is entered here.

Example: Total strip tension = 150 N

F_{Ges} = 150 N / 2 = 75 N

With a total web tension of 150 N, 75 N is entered for **"tape tension 100%"**.

In the **"Write protection"** submenu, use the system command **<Remove write protection>** to release the write lock for the adjustable parameters (6.3.4).

In the next step, the entry angle and runout angles specified by the machine design are entered in the corresponding entries in the menu (6.3.4).

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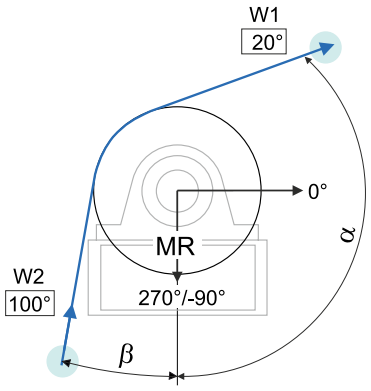

Strip tension F	100N
Measuring direction MR	vertical
Entry angle W1	20°
Runout angle W2	-100°

Angle related to MR	
Entry angle α	110°
Runout angle β	-10°

Note

The angles in the *HAEHNE* software "measuring force calculation" always refer to the horizontal, roller weight 0 kg.
The inlet and outlet angles for the parameters of the CA-IO must be related to the f**orce direction of the sensor**.

Resulting force per sensor:

$$F_M = \frac{F}{2} * (\cos(\alpha) + \cos(\beta))$$

$$F_M = \frac{100}{2} * (\cos(110) + \cos(-10)) = \underline{32{,}14\ N}$$

The resulting force component per sensor calculated in this example is output in the **"Strip tension component"** parameter. The **"Wrapgain"** parameter then outputs the scaling factor calculated from the angles entered. Alternatively, the **"Wrapgain"** factor can also be entered directly if this is known (6.3.4).

Wrapgain

The value displayed in this parameter is a scaling factor that corresponds to the ratio between the tape tension F and the force component FM from the tape tension that acts in the measuring direction of the force sensor. This results in the following calculation based on the previous example:

$$\text{Strip tension } F = \text{Wrapgain} * F_M$$

$$\text{Wrapgain} = \frac{F}{F_M} = \frac{F}{F(\cos\alpha + \cos\beta)} = \frac{50\ N}{50\ N\ (-0{,}34202 + 0{,}98481)} = 1{,}5557$$

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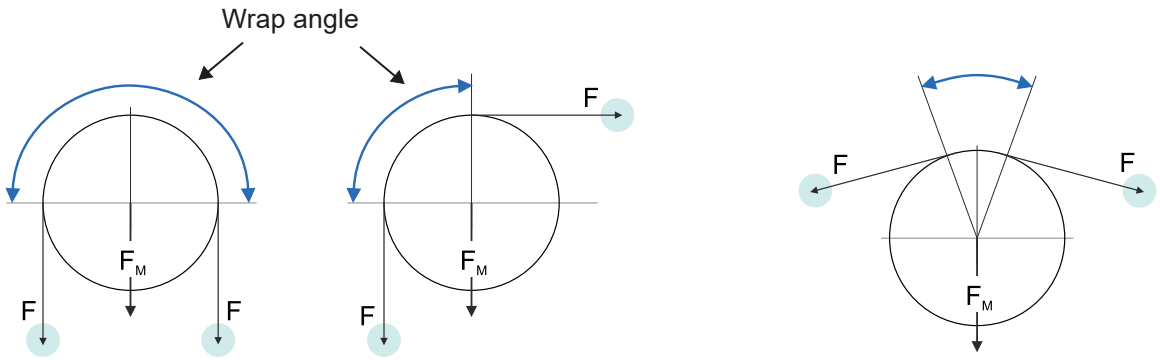
Further calculation examples showing the angles



$F_M = 2F$

Wrapgain = $\frac{F}{F_M} = \frac{F}{2F} = 0,5$

$F_M = F$ (Standard setting of the CA-IO)

Wrapgain = $\frac{F}{F_M} = \frac{F}{F} = 1$

$F_M = < F$

Wrapgain = $\frac{F}{F_M} = >1,0$

Then use the system command **<Set zero point>** to adjust the zero point of the connected sensor (6.3.3).

If the process input value fluctuates too much, the signal is filtered using the **"Filter"** parameter (6.3.3).

3.2.3 Strip tension measurements on one side

Relieve the sensor, but allow the existing preload in normal measuring operation to act.

If the strip tension sensors are connected, this is the built-in measuring chain with a roller without a web such as foil, paper, etc.

In the **"Write protection"** submenu, use the system command **<Remove write protection>** to release the write lock for the adjustable parameters (6.3.4).

In the next step, the strip entry and runout angles specified by the machine design are entered in the corresponding entries in the menu (6.3.4).

Note

The angles relate to the direction of measurement.
See 3.2.2 strip tension measurement with bearings on both sides

The **"Wrapgain"** parameter then outputs the scaling factor calculated from the angles entered.

Alternatively, the "Wrapgain" factor can also be entered directly if this is known (6.3.4).

Enter the desired nominal force in the adjustable parameter **"Strip tension 100%"**.

This parameter is used to adapt the signal to the higher-level automation system. The force value entered then corresponds to the digital value of 20480 (6.3.3). The resulting portion of the effective force on the sensor is displayed in the **"Strip tension portion"** parameter (6.3.3).

Then use the system command **<Set zero point**> to adjust the zero point of the connected sensor (6.3.3).
If the process input value fluctuates too much, the signal is filtered using the **"Filter"** parameter (6.3.3).

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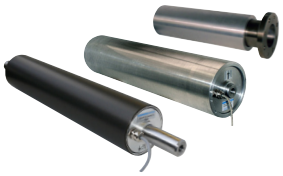
Examples of connected sensors:

- Force measuring bearings of the series BZA and BZN
- Pillow blocks of the series BZV and BZH
- Measuring rolls



4 Installation of *HAEHNE* IO-Link amplifiers

4.1 Device data of CA-IO

The physical layer describes the basic IO-Link device data. The device data is automatically communicated to the IO-Link master. It must be ensured that the IO-Link master used supports this performance data.

SIO- Mode	no
Min. CycleTime	3 ms
Baud rate	COM 2 (38,4kBit/s)
Process Data Length PD In	2 Byte
IODD version	V1.0.1
Supported IO-Link version	IO-Link V1.1

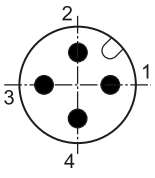
4.2 Connection of CA-IO

The *HAEHNE* IO-Link amplifier has a 4-pin M12 device plug for connecting force sensors with strain gage full bridges. The *HAEHNE* CA-IO amplifier is connected to a master via an IO-Link standard cable with a cross section of> = 0.34 mm^2. The maximum cable length here is 20 m.
The power supply of the IO-linkable *HAEHNE* amplifier is via the IO-Link standard cable and is provided by the master.

Pin assignment

CA-IO Amplifier

Pin 1:	24 V
Pin 2:	NC
Pin 3:	0 V
Pin 4:	Switching and communication line (C/Q)



In accordance with the IO-Link specification, the *HAEHNE* CA-IO with this connection variant is compatible with "Port Class A". The maximum current consumption of these devices is specified here to ≤ 200 mA.

The *HAEHNE* CA-IO supports a transmission rate of 38.4 kbit / s, which corresponds to the SDCI communication mode "COM2"

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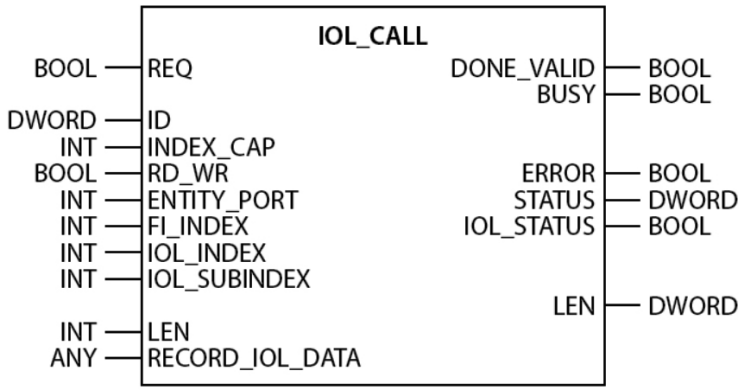
4.3 Integration into an automation system

In the configuration of the automation system or the fieldbus, the IO-Link system is represented by the IO-Link master. This must be integrated by the corresponding device description (eg GSD file with PROFINET).

The *HAEHNE* CA-IO data are displayed as a two's complement in the 16-bit register. In the configuration software this is in the hardware catalog of the IO-Link master the "IOL_I_2 Byte" entry under "IO-Link inputs"

The configuration of a *HAEHNE* IO-Link amplifier is possible with every IO-Link configuration tool. The IO-Link amplifier can also be set and configured via a higher-level control.

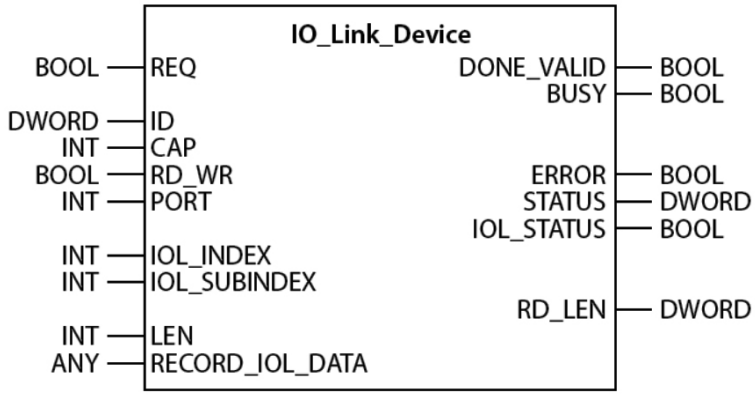
An IO-Link function block is required for this. The function module is provided by the controller manufacturer. The IO-Link function block IOL_CALL is defined in the IO-Link specification "IO-Link Integration Part 1 - Technical Specification for PROFIBUS and PROFINET".



Depending on the controller manufacturer, the function blocks may differ from the specification, eg in the representation and use of the variables.

(Example screen: Siemens function block IO_Link_Device for TIA Portal)

Further information can be found in the manual of the respective control manufacturer.



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4.4 Start up on the IO-Link Master

If the *HAEHNE* measuring system is connected to an IO-Link master and the operating mode on the selected port is set to IO-Link, the IO-Link master tries to communicate with it.For this purpose, the IO-Link master sends a *wake-up request* and waits for the response of the IO-Link amplifier.

After receiving the response, the data transfer rate (COM2) is set by the IO-Link master and the communication is started

Thereafter, the necessary communication and identification parameters are read via the page communication channel. Subsequently, the cyclic data exchange of the process data is started.

Note

For a precise parameterization of the measuring system, a warm-up time of the IO-Link amplifier of at least 15 minutes must be maintained.

The ready-mounted sensors must be in the "no-load" condition, but with the pre-load effective during normal measuring operation.

5 Commissioning of the *HAEHNE* IO-Link amplifier

5.1 Integration of the device description file IODD

To configure the IO-Link amplifier, the configuration tool of the master is required. This is able to read in IODD files (IO Device Description).

For the CA-IO amplifier the electronic device description IODD is included. Furthermore, the device description file is also available for download on the *HAEHNE* homepage and the IO Link - IODD finder:

https://haehne.de/en/service/download-device-software/

https://ioddfinder.io-link.com/#/

The IODD must be added to the software in the Settings tab with "Import IODD". As a result, the IO-Link amplifier with the entry *HAEHNE_CA*-IO (IOL 1.1) appears in the device catalog of the configuration tool under "*HAEHNE* Elektronische Messgeräte GmbH".

After selecting an IO-Link master, the *HAHNE* CA-IO can be assigned to an IO-Link port. For this, the IODD of the CA-IO amplifier is selected from the device catalog and dragged to the desired IO-Link master port.

5.2 Selection in configuration and engineering tools

All possible device parameters and information are contained in the IODD of the CA-IO. After selecting *HAEHNE* CA-IO in the project tree, these can be set in the corresponding tabs.

When the measuring system is delivered, the IO-Link amplifier and sensor are matched to each other.

After initial power up, the *HAEHNE* CA-IO default settings are loaded into the data storage of the master by an "upload from device" and displayed in the corresponding device parameters (see chapter 5.4 Data management of the IO-Link master).

According to the IO-Link specification V1.1, the *HAEHNE* IO-Link amplifier supports the backup of the device settings in the IO-Link master.

Changed parameters in the configuration software are therefore automatically saved depending on the setting of the IO-Link master (see chapter 5.4 Data management of the IO-Link master).

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5.3 User roles in configuration tools

Certain commands and some access rights of the IO-Link amplifier are dependent on the selected user role..

	ObserverRoleMenu	MaintenanceRoleMenu	SpecialistRoleMenu
User Role	Operator	Maintenance	Specialist
	Operate and Observe	Wait	Commissioning

In order to be able to parameterize, the role "Specialist" must be selected.
the access rights to parameters are restricted or not available in the user roles "Operator" or "Maintenance"

From Chap. 6, the setting options are described as "Specialist".

5.4 Data management of the IO-Link master

With the introduction of the current IO-Link standard V1.1, the functional spectrum of IO-Link has been extended to include automatic data management. The data management makes it possible to exchange a defective *HAEHNE* IO-Link amplifier for a corresponding replacement device without having to reconfigure it manually.

When data storage is activated, the IO-Link 1.1 master always saves the last valid setting parameters of the connected *HAEHNE* IO-Link amplifiers in its local memory. If one of the connected IO-Link amplifiers is replaced by a functionally compatible replacement device, the IO-Link master automatically transfers the last valid parameter set of the predecessor device to the new amplifier.

The following data management options, which can be set in the configuration tool of the IO-Link master, are available for the master ports:

NONE:
There is no data backup of the device parameters in the IO-Link master.

BACKUP / RESTORE:
After each change of the device parameters a backup of this data in the master is automatically done.
With this setting, the new device assumes the same behavior of the replaced device during restore.

RESTORE:
There is no automatic data backup of the device parameters in the IO-Link master.
With this setting, the new device will assume the behavior according to the parameters stored in the master at the time of the last backup during the restore.
Since possible previous parameter changes were not saved in the master, a different behavior to that before the exchange may prevail.

Note

After a device replacement, zero calibration must be performed regardless of the data protection setting of the IO-Link master.

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6 Parameter of *HAEHNE* IO-Link amplifiers

6.1 Register Identification

This register contains all informations of the *HAEHNE* IO-Link amplifier.

The identification parameters contain device data which the used IO-Link master uses to identify the connected device more precisely. This device data can be read from the device or written to the device via its index and the subindex.

6.1.1 Overview

	Menu	Chapter
Register Identification	**Device Informationen** Vendor Name Vendor Text Product Name Product ID Product Text Serial Number	**6.1.2**
	Revision Informationen Hardware Version Software Version	**6.1.3**
	User-specific Informationen Application Specific Tag Function Tag Location Tag	**6.1.4**

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6.1.2 Menu Device information

	Index	Sub-Index	Parameter	Access	Default
Device Information	0x0010	0	Vendor Name	Read only	*HAEHNE* Elektronische Messgeraete GmbH
	0x0011	0	Vendor Text	Read only	www.haehne.de
	0x0012	0	Product Name	Read only	*HAEHNE* CA-IO
	0x0013	0	Product ID	Read only	Cable Amplifier with IO-Link interface and connected sensor
	0x0014	0	Product Text	Read only	CA-IO
	0x0015	0	Serial Number	Read only	Serial number

6.1.3 Menu Revision informationen

	Index	Sub-index	Parameter	Access	Default
Revisions Information	0x0016	0	Hardware version	Read only	
	0x0017	0	Software version	Read only	

6.1.4 Menu User-specific information

	Index	Sub-index	Parameter	Access	Type	Default
User-specific Information	0x0018	0	Application Specific Tag	Read/ Write	StringT32	***
	0x0019	0	Function Tag	Read/ Write	StringT32	***
	0x001A	0	Location Tag	Read/ Write	StringT32	***

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Parameter Application Specific Tag

This parameter defines an arbitrarily usable range (32 bytes) in the IO-Link master

established. This is used exclusively for application-specific information of the measuring chain / amplifier and created in the parameter manager.

Parameter Function Tag

In the parameter Location Tag any text (32 Byte) can be written. This text describes the task of the sensor in the whole machine. The function tag is saved via data management.

Parameter Location Tag

In the parameter Location Tag any text (32 Byte) can be written. This is useful to describe the exact position of the sensor in the overall machine. The location tag is also saved via the data management.

6.2. Register Process data

This register contains the current process data of the *HAEHNE* IO-Link amplifier.

6.2.1 Menü Process input data

The current sensor values are output via the process input data.

The process input data is transmitted cyclically. There is no confirmation of receipt.

The cycle time is determined by the IO-Link master, but the minimum cycle time (3 ms) of the CA-IO can not be undershot.

	Index	Subindex	Parameter	Access	Type	Length
Process-input data	0x0028	0	Sensor value	Read only	IntegerT	16Bit

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6.2.2 Construction and data transmission

The analog processed and digitally converted force values are transferred to the IO-Link system.
The measuring range is ± 160 % of nominal force of the sensor. If the sensor measuring direction has a vertical component, force values are transmitted by the roller weight, even in operation without a belt.

To determine the actual force value, the tare value (preload) must be subtracted and a factor must be taken into account in accordance with the direction of force action.

The different procedures for parameterization for specific force measurements with the IO-Link amplifier are described in chap. 3 described.

Measurement data transmission

Presentation in 16 bit register as complement of two

Measurement value based on F_{nom}	* Measurement signal voltage V_1 [mV/V] 1,5	1	0,75	0,5	hex	dez (unsigned)	dez (signed)	MSB 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	LSB 0
+ 150 %	5,625	3,75	2,8125	1,875	7800	30720	30720	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
+ 100 %	3,75	2,5	1,875	1,25	5000	20480	20480	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
+ 50 %	1,875	1,25	0,9375	0,625	2800	10240	10240	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
0 %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- 50 %	-1,875	-1,25	-0,9375	-0,625	D800	55296	-10240	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
- 100 %	-3,75	-2,5	-1,875	-1,25	B000	45056	-20480	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
- 150 %	-5,625	-3,75	-2,8125	-1,875	8800	34816	-30720	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

* The measured value signal voltage depends on the set nominal value.

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6.3. Register Parameter

This register contains specific device information as well as the adjustable parameters of the device *HAEHNE* IO-Link amplifier.

The settings of some parameters depend on the application-specific measuring task (see chapter 3.2 Setting examples for force measurements)

6.3.1 Overview

	Menu	Chapter
Register parameter	**Unit selection**	
	Newton-Kilonewton-Meganewton	**6.3.2**
	Specific device parameters[ ]	
	Nominal force	**6.3.3**
	Nominal rating	
	Write protection	
	System command <Remove write protection>	**6.3.4**
	Entry angle	
	Runout angle	
	Wrapgain	
	Strip tension 100%	
	Strip tension portion	
	Gain	
	Filter	**6.3.3**
	System command <Zero point setting>	
	Change zero point	
	Geräteparameter Reset	
	System command <Restore Factory Settings>	**6.3.5**

6.3.2 Menu Unit selection

	Index	Subindex	Parameter	Access	Default
Unit selection	0x00C8	0	Newton-Kilonewton-Meganewton	Read/Write	Newton

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Parameter Newton-Kilonewton-Meganewton

The parameter "Newton-Kilonewton-Meganewton" defines with which unit the parameters are displayed with force data.

	Value	Assignment	Description
Newton-Kilonewton-Meganewton	1	Newton	Display of the parameters in N
	2	Kilonewton	Display of the parameters in kN
	3	Meganewton	Display of the parameters in MN

6.3.3 Menu Specific device parameters [ ]

	Index	Sub-index	Parameter	Description	Access	Default
Specific device parameters [ ]	0x0043	0	Nominal Force	Display of the nominal force of the connected sensor	Read only	10 000 000
	0x0042	0	Nominal rating	Display of the nominal rating of the connected sensor	Read only	1,5000
	0x0048	0	Strip tension 100%	Setting the desired nominal force or strip tension	Read/ Write	10 000 000
	0x0049	0	Strip tension portion	Resulting proportion of effective force at changed angles or wrapgain	Read only	10 000 000
	0x004A	0	Gain	Amplification of CA-IO	Read only	1,0000
	0x005C	0	Filter	Setting the filter time	Read/ Write	20
	0x004C	0	Zero change	Deviation of the zero point after taring of the connected sensor	Read only	0,00

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Parameter strip tension 100%

This parameter is used to set the desired nominal force or strip tension. This value then corresponds to the digital value of 20480 (6.2.2 Table Measurement data transmission and 3.2 Setting examples for force measurements).

If the maximum utilized sensor force does not correspond to the nominal force of the connected sensor, the gain factor "Gain" of the IO-Link amplifier changes by the corresponding input in this parameter.

Strip tension 100%	Lower limit	10	N
	Upper limit	500 000 000	

Parameter Filter

With this parameter it is possible to change the filter time of the IO-Link amplifier.

Filter	Lower limit	1	ms
	Upper limit	2000	

System command <Zero point setting>

The <set zero point> function is used to adjust the connected sensor after it has been assembled.

The zero point is tared if the system command is executed with the index and the command code = 0xA1. After a taring, the change from the factory setting is calculated and displayed in the parameter "Zero point change".

Index	Subindex	Parameter	Access	Type	Length
0x0002	0	System Command *Set zero point*	Write only	UIntegerT	8 Bit

6.3.4 Submenu Write protection

Settings in this submenu are only necessary if they are strip tension measurements (see chapter 3.2 Setting examples for force measurements).

The parameters "Run-in and run-out angle" and "Wrapgain" assigned to the menu can only be changed if system protection <Remove write protection> has previously been deactivated.

After changing the angle, the corresponding value of the scaling factor Wrapgain is automatically calculated and output and the write protection is reactivated.

The entry of a possibly given wrapgain is only possible after the repeated removal of the write protection.

A simultaneous change of the parameters "Entry and runout angle" and "Wrapgain" is thus excluded.

After a restart of the device the write protection is active.

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	Index	Sub-index	Parameter	Access	Default
Write protection	0x0002	0	<Remove write protection>	Write only	
	0x0044	0	Entry angle	Read/ Write	0,0000
	0x0045	0	Runout angle	Read/ Write	0,0000
	0X0046	0	Wrapgain	Read/ Write	1,0000

System command <Remove write protection>

The function <Remove write protection> is used to set the write lock for the parameters

"Entry and runout angle" and "Wrapgain" cancel.

The write protection is deactivated if the system command with its index and the command code = 0xA0 is executed.

Index	Subindex	Parameter	Access	Type	Length
0x0002	0	System Command *Remaove write protection*	Write only	UIntegerT	8 Bit

Parameter Entry angle

The input of the strip entry angle is possible with this parameter. This is only necessary if the force measurement is a strip tension measurement.

Entry angle	Lower limit	0	°
	Upper limit	360	

Parameter Runout angle

With this parameter the input of the strip runout angle is possible. This is only necessary if the force measurement is a strip tension measurement.

Runout angle	Lower limit	-360	°
	Upper limit	0	

Parameter Wrapgain

"Wrapgain" is a scaling factor that corresponds to the relationship between the strip tension and the force component of the strip tension acting in the direction of measurement of the force sensor.

This parameter thus describes the resulting gain from changed strip entry and runout angles. If the scaling factor is known, it can also be entered directly via this parameter.

Wrapgain	Lower limit	0,01	
	Upper limit	2,0000	

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6.3.5 Menu Device parameter reset

System command <Restore factory settings>

The function <Restore factory settings> is used to reset the device parameters to the default settings. The restore is executed when the system command is executed with the index and the command code = 0x82.

The adjustable parameters "Strip tension 100%", "Filter", "Entry and runout angle", "Wrapgain" as well as the "Zero point"of the sensor are reset.

When the command is executed, the parameters "Error Count", "Device Status" and "Detailed

Device Status " reset.

Index	Subindex	Parameter	Access	Type	Length
0x0002	0	System Command *Restore factory settings*	Write only	UIntegerT	8 Bit

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7 Diagnosis options of *HAEHNE* IO-Link amplifiers

7.1 Register Diagnosis and limit value

This register includes all device diagnosis as well as the minimum and maximum value display of the amplifier. It is also possible to define limit values.

7.1.1 Overview

	Menu		Chapter
Register Diagnostic	**Diagnosis**		**7.1.2**
		Device Status	
		Error Count	
	Detailed Device Status		**7.1.3**
		[1]	
		[2]	
		[3]	
		[4]	
		Sensor value	**7.1.2**
	Maximal and minimal value		**7.1.4**
		Maximum value	
		Minimum value	
		<Reset maximal and minimum value>	
	Limit value [ ]		**7.1.5**
		Maximum limit value	
		Minimum limit value	

7.1.2 Menu Diagnosis

	Index	Sub-index	Parameter	Description	Access	Default
Diagnostic	0x0024	0	Device Status	Display of device status	Read only	
	0x0020	0	Error Count	Display of error count	Read only	
	0x0028		Sensor Value	Process input data (acyclic output)	Read only	

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Parameter Device Status

The parameter "Device Status" contains the current device status and can be displayed via the PLC program or via a corresponding IO-Link configuration tool.

If an error occurs, the parameter "Detailed Device Status" indicates the exact cause of the error.

Index	Subindex	Parameter	Access	Type	Length
0x0024	0	Device Status	Read only	UIntegerT	8 Bit

Parameter value	Description
0x00	Device is working properly, no error
0x04	Device error

Parameter Error Count

This parameter is needed for the display of the occurred errors (event type). The displayed number always refers to the period after the last power on.

Index	Subindex	Parameter	Access	Type	Length
0x0020	0	Error Count	Read only	UIntegerT	16 Bit

7.1.3 Submenu Detailed Device Status

Parameter Detailed Device Status [1]…[4]

The parameter "Detailed Device Status" contains the currently pending events in the device and is also displayed via the PLC program or via a corresponding IO-Link configuration tool.

Each occurring event of the type "Error" or "Warning" with the mode = Event appears is entered in the list with a so-called EventQualifier and an EventCode.

If an event no longer exists, this is indicated by the mode = Event disappears.

In this case, the display of the corresponding list entry of the parameter Detailed Device Status is set to the values 0x00, 0x00, 0x00 (EventQualifier = 0x00 and EventCode = 0x0000).

In this way, this parameter always indicates the current diagnostic status of the device.

Index	Subindex	Name	Acess	Type	Length
0x0025	0	Detailed Device Status	Read only	ArrayT	9 Byte

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	Assignment	Length	Description		
			Byte 3	Byte 2	Byte 1
Detailed Device Status	Error / Warning [1]	3 Byte	Event-Qualifier	Event- Code	
	Error / Warning [2]	3 Byte			
	Error / Warning [3]	3 Byte			
	Error / Warning [4]	3 Byte			
	Example display: application error, IO-Link device, Warning, Event occurred, Upper limit exceeded		228dez	140dez	162dez

Structure of Event-Qualifier

	Modus		Typ		Source	Instanz		
	Bit 7	Bit6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Descrip-tion	Event disappears 0x02		Report 0x01 Warning 0x02 Error 0x03		IO-Link Device 0x00	Unknown 0x00 Application error 0x04		
	Event appears 0x03				IO- Link Master 0x01			

Supprted Event-Codes

	Display		Description	Type
	Hex.	Dez.		
Event Code	0x8C A2	140 162	Upper limit exceeded	Warning
	0x8C A1	140 161	Lower limit fell below	

7.1.4 Menu Maximum and minimum value

These parameters are used to display the maximum force measured by the IO-Link amplifier and the minimum force of the connected sensor.

With the system command **<Reset maximum and minimum values>**, these values are set to the currently measured process input value.

	Index	Sub-index	Parameter	Description	Access	Default
Minimum and Maximum value	0x004E	0	Maximaum value	Displax of maxi-mum forcet	Read only	0
	0x004F	0	Minimalum value	Display of minimum force	Read only	0
	0x0002	0	<Reset maximum and minimum value>	Reset function	Write only	

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System command <Reset maximum and minimum value>

With this parameter it is possible to reset the measured force values. The values are not set to their default value but to the currently measured process input value.

The <Reset maximum and minimum value> function is executed when the system command is executed with the index and the command code = 0xA2.

Index	Subindex	Name	Access	Type	Length
0x0002	0	System Command *Reset maximum and minimum value*	Write only	UIntegerT	8 Bit

7.1.5 Menu Limit values [ ]

Limits for the application-specific measuring task can be set with these parameters.

By selecting the default value of the parameter, the corresponding limit value is deactivated.

	Index	Sub-index	Parameter	Access	Default
Limit values [ ]	0x0054	0	Maximum limit value	Read/Write	No upper limit value
	0x0055	0	Minimum limit value	Read/Write	No lower limit value

	Value	Assignment	Description
Minimum and maximum limit values	2147483648	No upper limit	Deactivated the setting of limit value
	-2147483648	No lower limit	Deactivated the setting of limit value

Maximum limit value	Lower limit	0	Unit dependent on the parameter Newton-Kilonewton-Meganewton
	Upper limit	500 000 000	
Minimaler limit value	Lower limit	-500 000 000	Unit dependent on the parameter Newton-Kilonewton-Meganewton
	Upper limit	500 000 000	

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