

# sercos<sup>®</sup> II

Fieldbus Interface for S300 / S700



**sercos**  
the automation bus

Edition 07/2014  
Translation of the original manual

Keep the manual as a product component during the life span of the product.  
Pass the manual to future users / owners of the product.

**KOLLMORGEN**

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**Technical changes which improve the performance of the equipment may be made without prior notice !**

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# 1 General Information

## 1.1 About this manual

This manual describes the installation, setup, range of functions and software protocol of the sercos<sup>®</sup> interface for SERVOSTAR 300 (short: S300) and S700 servo amplifiers and a reference for all IDN which are used by these servo amplifiers.

The expansion card -SERCOS- offers sercos<sup>®</sup> II compatible Fiber Optic Cable (FOC) connectivity to these servo amplifiers.

This manual forms part of the complete documentation for the S300 and S700 families of servo amplifiers.

The installation and setup of the servo amplifiers, as well as all standard functions, are described in the corresponding instructions manuals.

### Other parts of the complete documentation for the digital servo amplifier series:

<u>Title</u>	<u>Publisher</u>
Instructions manual for the servo amplifier	Kollmorgen
Online Help in the setup software with ASCII Object Reference	Kollmorgen

## 1.2 Target group

Only properly qualified personnel are permitted to perform such tasks as transport, assembly, setup and maintenance. Qualified specialist staff are persons who are familiar with the transport, installation, assembly, commissioning and operation of drives and who bring their relevant minimum qualifications to bear on their duties:

Transport : only by personnel with knowledge of handling electrostatically sensitive components.

Unpacking: only by electrically qualified personnel.

Installation : only by electrically qualified personnel.

Setup : only by qualified personnel with extensive knowledge of electrical engineering and drive technology

Programming: Software engineers, sercos<sup>®</sup> projecting engineers

The qualified personnel must know and observe IEC 60364 / IEC 60664 and national accident prevention regulations.



### WARNING

During operation there are deadly hazards, with the possibility of death, severe injury or material damage. The operator must ensure that the safety instructions in this manual are followed. The operator must ensure that all personnel responsible for working with the servo amplifier have read and understood the instructions manual.

## 1.3 Hints for the online edition (PDF format)

### Bookmarks:

Table of contents and index are active bookmarks.

### Table of contents and index in the text:

The lines are active cross references. Click on the desired line and the appropriate page is accessed.

### Page/chapter numbers in the text:

Page/chapter numbers with cross references are active. Click at the page/chapter number to reach the indicated target.

## 1.4 Use as directed






Please observe the chapter "Use as directed" in the instructions manual for the servo amplifier. The sercos<sup>®</sup> interface serves only for the connection of the servo amplifier to a master with sercos<sup>®</sup> Fiber Optic Cable (FOC) connectivity.

The servo amplifiers are components that are built into electrical apparatus or machinery, and can only be setup and operated as integral components of such apparatus or machinery.

We can only guarantee the conformity of the servo amplifier with the following standards for industrial areas when the components that we specify are used, and the installation regulations are followed:

EC EMC Directive	2004/108/EEC
EC Low-Voltage Directive	2006/95/EEC

## 1.5 Symbols used

Symbol	Indication
 <b>DANGER</b>	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 <b>NOTICE</b>	This is not a safety symbol. Indicates situations which, if not avoided, could result in property damage.
 <b>NOTE</b>	This is not a safety symbol. This symbol indicates important notes.

## 1.6 Abbreviations used

Abbreviation	Meaning
AqB	Incremental encoder signaling scheme. The A and B signals are shifted by 90°.
AT	Amplifier telegram.
C1D	Class 1 diagnostic (fault)
C2D	Class 2 diagnostic (warning)
C3D	Class 3 diagnostic (status)
CCT	Communication cycle time (IDN2)
CCW	Counter clockwise. Viewed to the shaft
CUCT	Control unit cycle time (IDN1)
CUSB	Control unit synchronization bit (MDT control word bit 10)
CW	Clockwise. Viewed to the shaft
CPx	Communication phase
FOC	Fiber Optic Cable
F-SMA	FOC connector according to IEC 60874-2
IC	Continuous current
IDN	Identification number
IDNP	Product specific IDN
IP	Peak current
LSB	Least significant bit
MDT	Master data telegram
MSB	Most significant bit
MST	Master synchronization telegram
PFB	Position feedback
ROD	Refer to AqB
RTC	Real time control bit
RTS	Real time status bit
S300	SERVOSTAR 300
μl	Micro-Interpolator

## 2 Installation / Setup

### 2.1 Assembly / Installation



#### WARNING

The equipment produces potentially lethal voltages up to 900 V. Risk of electric shock. Only professional personnel with extensive knowledge in the fields of electrical engineering and drive technology are allowed to setup the servo amplifier.

Check that all connection components that are live in operation are safely protected against bodily contact.

Residual charges in the capacitors can still have dangerous levels several minutes after switching off the supply voltage. Measure the voltage in the intermediate (DC bus link) circuit and wait until it has fallen below 60V.

Power and control connections can still be live, even though the motor is not rotating.



#### CAUTION

Electronic equipment is basically not failure-proof. The user is responsible for ensuring that, in the event of a failure of the servo amplifier, the drive is set to a state that is safe for both machinery and personnel, for instance with the aid of a mechanical brake.

#### NOTICE

Install the servo amplifier as described in the instructions manual. The wiring for the analog setpoint input and the positioning interface, as shown in the wiring diagram in the instructions manual, is not required.

Never break any of the electrical connections to the servo amplifier while it is live. This could result in destruction of the electronics.

#### NOTE

Because of the internal representation of the position-control parameters, the position controller can only be operated if the final limit speed of the drive at sinusoidal<sup>2</sup> commutation is not more than 7500 rpm. At trapezoidal commutation, the permitted maximum speed is 12000 rpm. All the data on resolution, step size, positioning accuracy etc. refer to calculatory values. Non-linearities in the mechanism (backlash, flexing, etc.) are not taken into account.

#### NOTE

If the final limit speed of the motor has to be altered, then all the parameters that were previously entered for position control and motion blocks must be adapted.

### 2.1.1 Installing the expansion card

**NOTE**

To fit the sercos® II expansion card, proceed as follows:

1. Remove the cover of the option slot (see instructions manual of the servo amplifier.)
2. Take care that no small items (such as screws) fall into the open option slot.
3. Push the expansion card carefully into the guide rails that are provided, without twisting it.
4. Press the expansion card firmly into the slot, until the front cover touches the fixing lugs. This ensures that the connectors make good contact.
5. Screw the screws on the front cover into the threads in the fixing lugs.

### 2.1.2 Front view



### 2.1.3 LEDs

<b>RT</b>	Indicates whether sercos® telegrams are being correctly received. In the final Communication Phase 4 this LED should flicker, since cyclical telegrams are being received.
<b>TT</b>	Indicates that sercos® telegrams are being transmitted. In the final Communication Phase 4 this LED should flicker, since cyclical telegrams are being transmitted. Check the stations addresses for the controls and the servo amplifier if: - the LED never lights up in sercos® Phase 1 or - the axis cannot be operated, although the RT LED is lighting up cyclically.
<b>Err</b>	Indicates that sercos® communication is faulty or suffering from interference. If this LED is very bright, then communication is suffering strong interference, or is non-existent. Check the sercos® transmission speed for the controls and the servo amplifier (BAUDRATE) and the fibre-optic connection. If this LED flickers, this indicates a low level of interference for sercos® communication, or the optical transmitting power is not correctly adjusted to suit the length of cable. Check the transmitting power of the (physically) previous sercos® station. The transmitting power of the servo amplifier can be adjusted in the setup software on the SERCOS screen page, by altering the parameter for the cable length.

### 2.1.4 Connection technology

For the fiber optic cable (FOC) connection, only use sercos® components to the sercos® Standard IEC 61491.

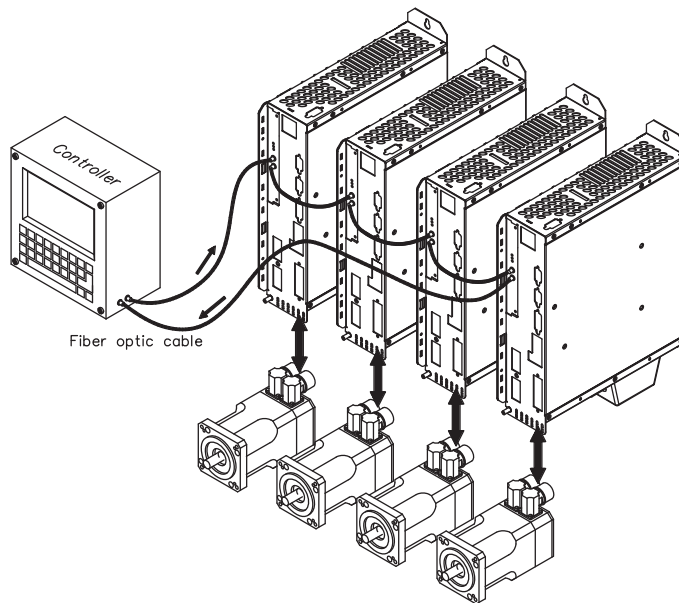
**Receive data:** The fiber optic cable carrying receive data for the amplifier in the ring structure is connected to **X13** with a F-SMA connector.

**Transmit data:** Connect the fiber optic cable for the data output to **X14** with a F-SMA connector.

Tightening torque for connectors max. 0.8 Nm.

### 2.1.5 Connection diagram

Layout of the sercos<sup>®</sup> bus system in ring topology, with optical fibre cables (schematic with S700).



### 2.1.6 Modifying the station address

The amplifier address can be set to a value between 0 and 63. With address 0, the amplifier is assigned only as a repeater in the sercos<sup>®</sup> ring.

There are various ways to set the station address:

#### Setup software

The sercos<sup>®</sup> address can be modified in the setup software. For additional information, please refer to the online help in the Setup Software.

Alternatively, enter the command **ADDR #** in the "Terminal" screen, where # is the new address of the amplifier. An amplifier SAVE and COLDSTART is required for the new address to take affect.

#### Keys on the front of the servo amplifier

The sercos<sup>®</sup> address can also be modified using the keys on the front of the servo amplifier. (For additional information, please refer to the instructions manuals).

### 2.1.7 Modifying the baud rate and optical power

If the baud rate is not set correctly, communication is not possible. The **SBAUD #** parameter can be used to set the baud rate, where # is the baud rate.

<b>SBAUD</b>	
2	2 MBAUD
4	4 MBAUD
8	8 MBAUD
16	16 MBAUD

If the optical power is not set correctly, errors occur in telegram transmission and the red LED on the amplifier lights up. During normal communication, the green send and receive LEDs flash, giving the impression that the relevant LED is on. The **SLEN #** parameter can be used to specify the optical range for a standard 1 mm<sup>2</sup> glass fibre cable, where # is the length of the cable in meters.

<b>SLEN</b>	
0	Very short connection
1...< 15	Length of the connection with a 1 mm <sup>2</sup> plastic cable
15...< 30	Length of the connection with a 1 mm <sup>2</sup> plastic cable
≥ 30	Length of the connection with a 1 mm <sup>2</sup> plastic cable

#### Setup software

The parameters can be modified in the setup software, "SERCOS" screen (⇒ p.17 / p.119)

Alternatively, the commands **SBAUD #** and **SLEN #** can be entered in the "Terminal" screen.

## 2.2 Setup

### 2.2.1 Guide to setup

#### NOTICE

Only professional personnel with extensive knowledge of control and amplifier technology are allowed to setup the servo amplifier.

Before setting up, the manufacturer of the machine must generate a risk assessment for the machine, and take appropriate measures to ensure that unforeseen movements cannot cause injury or damage to any person or property.



#### CAUTION

Drives with servo amplifiers and sercos<sup>®</sup> expansion cards are remote-controlled machines. They can start to move at any time without previous warning. Take appropriate measures to ensure that the operating and service personnel is aware of this danger. Implement appropriate protective measures to ensure that any unintended start-up of the machines cannot result in dangerous situations for personnel or machinery. Software limit-switches are not a substitute for the hardware limit-switches in the machine.

#### Check assembly / installation

Check that all the safety instructions in the instructions manual for the servo amplifier and this manual have been observed and implemented. Check the setting for the station address and baud rate.

#### Connect PC, start setup software

Use the setup software to set the parameters for the servo amplifier.

#### Setup basic functions

Start up the basic functions of the servo amplifier and optimize the current, speed and position controllers. This section of the setup is described in the in the online help of the setup software.

#### Save Parameters

When the parameters have been optimized, save them in the servo amplifier.

#### Start up bus communication

Using the SERCOS screen in the DriveGUI setup software, configure the address, baud rate and optical power on the servo amplifier to operate properly with the sercos<sup>®</sup> master. These values can also be adjusted via a terminal emulator program such as the terminal in the servo amplifier's setup software or the Microsoft Windows<sup>®</sup> HYPERTERMINAL (see p.14).

When set successfully, save the parameters in the servo amplifier.

The altered parameters will only become effective after a software-reset. To do this, click the Reset button in the tool bar of the setup software or from a terminal type "SAVE" followed by "COLDSTART".



## 2.2.2

## Setup Software

Fiber Optic Cable Length <input type="text" value="5"/> m Baud Rate <input type="text" value="4"/> MBaud Address <input type="text" value="2"/>	Phase <input type="text" value="0"/> Cycle Time <input type="text" value="2000"/> $\mu$ s	Monitor IDN No. <input type="text" value="0"/> Value <input type="text" value="0000"/> Hex <input type="text" value="0"/> Dec	Bus Parameters Telegram Type Parameter <input type="text" value="7"/> Primary Operation Mode <input type="text" value="Position Control"/>
Product SERCOS Settings <input type="checkbox"/> Error if HW/ Limit Switch is signaled <input type="checkbox"/> Faults which require a Coldstart will not clear <input type="checkbox"/> Allow SW/ Enable before HW/ Enable <input type="checkbox"/> Enable Acceleration Feedforward	Standard SERCOS Settings <input type="checkbox"/> Enable Spline Interpolation Scaling Method <input type="text" value="Rotary"/> Standard Scaling Type <input type="text" value="Parameter"/> Scaling Units <input type="text" value="Degrees"/> Data Reference <input type="text" value="Motor Shaft"/> Processing Format <input type="text" value="Modulo"/>	Position Control Parameters <input checked="" type="checkbox"/> Motor Feedback <input type="checkbox"/> External Feedback <input checked="" type="checkbox"/> Following Error Monitoring Input revolutions of load gear <input type="text" value="1"/> Output revolutions of load gear <input type="text" value="0"/> Feed Constant <input type="text" value="0"/> Rotational Position Resolution <input type="text" value="1048576"/> Resolution of Rotational Feedback 2 <input type="text" value="0"/>	
Standard SERCOS Settings <input type="checkbox"/> Invert Position Command Value <input type="checkbox"/> Reserved <input type="checkbox"/> Invert Position Feedback Value 1 <input type="checkbox"/> Invert Position Feedback Value 2 <input type="checkbox"/> Enable Position Limit Values <input type="checkbox"/> Invert Velocity Command Value <input type="checkbox"/> Reserved <input type="checkbox"/> Invert Velocity Feedback Value			

**Fiber Optic Cable Length**

If the optical power is not adjusted properly, there will be errors in the telegram transmission. You can define the cable length (in meter) for a standard 1 mm<sup>2</sup> fiber optic cable.

0 m	Very short connection
1 m...< 15 m	Length of the connection with a 1 mm <sup>2</sup> plastic cable
15 m...<30 m	Length of the connection with a 1 mm <sup>2</sup> plastic cable
≥ 30 m	Length of the connection with a 1 mm <sup>2</sup> plastic cable

**Baud Rate**

If the baud rate is not adjusted correctly, communication will not work. Adjust the baud rate in Mbaude here.

**Address**

The actual amplifier address is indicated (setting see p.14).

**Phase**

The actual phase of the sercos<sup>®</sup> transmission is indicated.

**Cycle time**

Actual cycle time is indicated.

**Monitor IDN****No.**

Enter an IDN here, which is then cyclically updated (example: to watch IDNP 3036 the number has to be 3036). This is used as the internal "service channel".

**Value**

The value of the monitored IDN. For IDNs that contain lists, only the list length is displayed.

**Product sercos<sup>®</sup> settings****Error if HW Limit Switch is signaled (IDNP 3015)**

This function is used to set the behavior on reaching the hardware limit switch.

**Faults which require a Coldstart will not clear (IDNP 3016)**

This function can be used to prevent faults from being cleared when a reset command is given. This applies to faults that normally require a coldstart to clear.

**Allow SW Enable before HW Enable (IDNP 3028)**

Allows enable via sercos<sup>®</sup> to be set before the hardware enable. Otherwise an F29 is generated.

**Enable Acceleration Feedforward (IDNP 3052)**

The feed forward gain calculated by the amplifier can be modified via the ASCII parameter GPFFT or IDN 348.

**Standard sercos<sup>®</sup> settings****Invert Position setpoint (IDN 55)**

The position polarity parameter is used to switch the polarities of position data. The motor shaft turns clockwise when there is a positive position setpoint difference and no inversion. sercos<sup>®</sup> bus data are inverted, servo amplifier data and limit switch data are not changed.

**Invert Position Feedback Value 1 (IDN 51)**

This function can be used to invert the polarity of the internal actual-position value.

**Invert Position Feedback Value 2 (IDN 53)**

This function can be used to invert the polarity of the external actual-position value.

**Enable Position Limit Values (IDN 55)**

Activates the software limit switches. Always active for linear position scaling.

**Invert Velocity setpoint (IDN 44)**

This function can be used to invert the polarity of the speed setpoint. The motor axis turns clockwise if a positive speed setpoint is present without invert enabled.

**Invert Velocity Feedback Value (IDN 43)**

This function can be used to invert the polarity of the actual-speed value.

**Enable Spline Interpolation (IDNP 3040)**

Only when a cycle time of 500  $\mu$ s is selected can spline interpolation be selected instead of linear interpolation. Modulo must not be active.

**Scaling Method**

Rotary or linear (see IDN 76).

**Standard Scaling Type**

Default or parameter scaling (see IDN 76).

**Scaling Units**

Units for selected scaling (see IDN 76).

**Data Reference**

The data reference can be to the motor shaft (internal feedback) or to the load (external feedback), (see IDN 76).

**Processing Format**

Modulo format (see IDN 76).

**Bus Parameters****Telegram Type Parameter**

Selected telegram type (see IDN 15).

**Primary Operation Mode**

Position, speed or current control (see IDN 32).

**Position Control Parameters****Motor Feedback**

Feedback to be used (see IDN 32).

**External Feedback**

Feedback to be used (see IDN 32).

**Following Error Monitoring**

Select operational mode with (default) or no internal velocity feed forward (see IDN 32).

**Input revolutions of load gear**

Gear ratio IDN 121.

**Output revolutions of load gear**

Gear ratio IDN 122.

**Feed constant**

Feed with linear scaling (see IDN 123).

**Rotational Position Resolution**

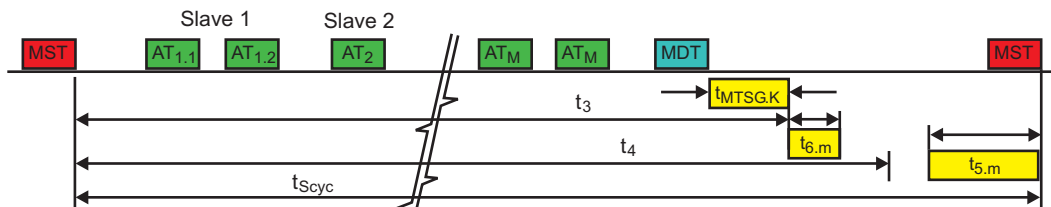
Increments per revolution.

**Resolution of Rotational Feedback 1**

Resolution of external feedback.

### 3 sercos® IDN Set

**NOTE** The data used on the amplifier may differ from the data used for the sercos® bus. For example, a speed setpoint can be specified for the amplifier in revolutions per minute, however increments per 250 μs can be used for sercos®.



#### 3.1 MDT Control Word, Bits 13 - 15

The following table gives a detailed description of the operation of the amplifier with regard to bits 13, 14 and 15 of the MDT Control Word sent by the master controller. Every amplifier receives it's own control word. Please note that the three bits are ordered in the table according to priority.

Enable Amplifier 14	Amplifier On/Off 15	Halt/Restart 13	Description
0	x	x	When the "Enable Amplifier" bit changes from 1 to 0, the power stage is disabled and the motor coasts to a stop.
1	0	x	When the "Amplifier On/Off" bit changes from 1 to 0, the amplifier decelerates at the quick deceleration rate (IDNP3022). The power stage is disabled when the internal velocity setpoint is zero and the velocity feedback is below 5 RPM.
1	1	0	When the bits "Enable Amplifier" and "Amplifier On/Off" are set, the power stage is enabled. When the "Halt/Restart" bit changes from 1 to 0, the amplifier decelerates at the acceleration limit value defined by IDN137 or IDN42.
1	1	1	When the "Halt/Restart" bit changes from 0 to 1, the amplifier follows the master's setpoint values. In velocity and position mode, accelerations are limited by IDN136 or IDN137, and the velocity setpoint is limited by IDN38, IDN39 or IDN91. In position mode, the amplifier monitors the position setpoint and sets a fault if successive position setpoints exceed the velocity limit (IDN38, IDN39 or IDN91).

## 3.2 IDN Format

The IDN set supported by the servo amplifier is listed in numerical order with a short description for each IDN.

The descriptions use the following format.

**IDNx**      **Name**

Description:

Data Length:		Non-Volatile:	
Data Type:		Write Access:	
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param:	
Units:		Version:	

Not all IDN descriptions require all of the fields listed above. Only the applicable fields are filled within an IDN description. The field definitions are as follows:

### **IDNx:**

The identification number. An IDN combined with 'P' (IDNP) is a product specific IDN (manufacturer IDN) in a short hand notation. The actual IDN may be obtained by adding 32768 to the shorthand numeric value. For convenience, the actual IDN is given in parentheses following the shorthand notation.

Example:

IDNP = 3005 is a manufacturer-specific IDN

IDN = 3005 + 32768 = 35773.

### **Name:**

A descriptive title of the IDN.

### **Description:**

A short description of the purpose of the IDN.

### **Data Length:**

The length of an IDN (defined by element 7 of each IDN), in bytes.

Possible entries for this field:

2 bytes      - Length of the operating data: 2 bytes.

4 bytes      - Length of the operating data: 4 bytes.

1 byte var. - Length of the operating data: variable. Length of one data element: 1byte.

2 bytes var. - Length of the operating data: variable. Length of one data element: 2bytes.

4 bytes var. - Length of the operating data: variable. Length of one data element: 4bytes.

### **Data Format:**

The format for interpreting and displaying the operating data. Possible entries for this field are binary, unsigned decimal, signed decimal, hexadecimal, text and IDN.

### **Minimum / Maximum:**

The allowable range of IDN element 7 data. IDN element 7 is checked for range compliance in the service channel. In general, if the range is blank in the IDN description, this means that IDN elements 5 and 6 are not supported. The ranges of some IDNs are dependent upon the value of other IDNs, amplifier parameters or motor parameters.

**Default:**

The default value for IDN element 7 data. An IDN will revert to its default value after a firmware upgrade. The default may be a fixed value, or it may be stored in non-volatile memory. A blank "Default" field indicates that the IDN does not have a default value.

**Units:**

The units of IDN element 7 data and of the minimum, maximum, and default fields. The units of some IDNs are obtained from the operating data of other IDNs. IDNs of data type "binary", "text", or "IDN" do not have units and the "Units" field is left blank in the IDN description.

**Non-Volatile:**

Indicates whether the IDN operation data can be saved in non-volatile memory. Possible entries for this field are as follows:

- No - operating data is stored in volatile memory and is lost when logic power is removed.
- Yes - operating data may be stored in non-volatile memory and will be retained after power down.
- Fix - value can't be changed

**Write Access:**

The communication phases (CPx) during which an IDN may be written. In general an IDN may be read through the service channel during communication phases CP2 and above. However writing to an IDN may be restricted during some communication phases or while the amplifier is enabled. An entry of "Read-only" indicates that the IDN cannot be written during any communication phase.

**Run-Up Check:**

The communication phases (CPx) during which the validity of the operating data is checked. Possible entries for this field are as follows:

- (blank) - The validity of the operating data is not checked.
- CP2 - The validity of the operating data will be checked in the procedure "... Communication phase 3 transition check."
- CP3 - The validity of the operating data will be checked in the procedure "... Communication phase 4 transition check."

**Cyclic Transfer:**

Indicates whether cyclic transfer is possible for IDN element 7. Possible entries for this field are as follows:

- (blank) - The operating data is not cyclic.
- MDT - The IDN may be transferred within the MDT as cyclic data.
- AT - The IDN may be transferred within the AT as cyclic data.
- RTS - The IDN may be transferred within the AT as a realtime status bit.
- RTC - The IDN may be transferred within the MDT as a realtime control bit.

**ASCII Parameter (abbreviation "ASCII Param.):**

An equation of equivalent protocol commands that may be issued through the RS-232/485 serial port to obtain the IDN data. The contents of the IDN can be obtained by evaluating the equation.

If no equivalent ASCII parameters are available, then the field is blank in the IDN description.

**Version:**

The version in which the IDN was implemented.

### 3.3 IDN1 Control Unit Cycle Time ( $t_{Ncyc}$ )

The control unit cycle time specifies the intervals at which new setpoints can be sent by the control unit. This parameter is transmitted in communication phase 2 and activated in communication phase 3.

However, the following condition applies for the control unit cycle time:

$$IDN1 = IDN2$$

### 3.4 IDN2 Communication Cycle Time ( $t_{Scyc}$ )

The communication cycle time specifies the intervals at which cyclic data is transmitted. Valid times: 500, 1000, 2000, ... 8000  $\mu$ s

Up to a maximum cycle time of 4 ms, the setpoints are interpolated linearly to 250  $\mu$ s. Interpolation is not performed for higher cycle times, resulting in poor regulation properties.

In addition, spline interpolation is available at a cycle time of 500  $\mu$ s (see also IDN 3040). In CP1+2, a 2 ms cycle time is always used (according to the sercos<sup>®</sup> standard) and the desired cycle time can only be enabled in CP3 and onwards.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2
Minimum:	250	Run-Up Check:	CP2
Maximum:	8000	Cyclic Transfer:	
Default:	2000	ASCII Param:	
Units:	$\mu$ s	Version:	

### 3.5 IDN3 Shortest AT Transmission Starting Time ( $t_{1min}$ )

The time required by the amplifier between end of MST and beginning of the amplifier's AT.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	2...4MBaud: 12 8...16MBaud: 4	ASCII Param.:	
Units:	$\mu$ s	Version:	

### 3.6 IDN4 Transmit/Receive Transition Time ( $t_{ATMT}$ )

The time required by the amplifier between the end of the AT and the beginning of the next MDT.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	12	ASCII Param.:	
Units:	$\mu$ s	Version:	

### 3.7 IDN5 Minimum Feedback Processing Time (t<sub>5</sub>)

The time required by the amplifier for receiving and processing cyclic feedback. This time period is measured from the beginning of the feedback acquisition to the end of the next MST.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	200	ASCII Param.:	
Units:	µs	Version:	

### 3.8 IDN6 AT Transmission Starting Time (t<sub>1</sub>)

The time at which the amplifier should transmit its Amplifier Telegram (AT) during CP3 and CP4, measured from the end of the MST, otherwise changeover to CP3 is blocked.

$$\begin{array}{ccccccc} \text{IDN3} & < & \text{IDN6} & < & \text{IDN89} & - & \text{IDN4} \\ \text{Min.AT.Transm.Start.time} & < & \text{AT Transm.Start. time} & < & \text{MDT Trans.Start.time} & - & \text{Transm/Rec.trans.time} \\ t_{1\text{min}} & < & T1 & < & T2 & - & t_{\text{ATMT}} \end{array}$$

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2
Minimum:		Run-Up Check:	CP2
Maximum:		Cyclic Transfer:	
Default:	None	ASCII Param.:	
Units:	µs	Version:	

### 3.9 IDN7 Feedback Acquisition Capture Point (t<sub>4</sub>)

The time at which the amplifier should latch the feedback values after the end of the MST. The "Feedback Acquisition Capture Point" is limited by the CCT (IDN2) and the "Minimum Feedback Processing Time" (IDN5) according to the following equation.

$$\text{IDN7} \leq \text{IDN2} - \text{IDN5}$$

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2
Minimum:		Run-Up Check:	CP2
Maximum:		Cyclic Transfer:	
Default:	IDN2 - IDN5	ASCII Param.:	
Units:	µs	Version:	



### 3.10 IDN8 Command Value Valid Time (t<sub>3</sub>)

The time at which the amplifier is allowed to access the new command values after the MST.

In all cycle times above 500 µs this is the time at which the amplifier synchronizes itself. At 500 µs it is synchronized to 450 µs by default, for all other values please refer to the ASCII documentation for "BUSP1".

The "Command Value Valid Time" is limited by the "MDT Transmission Starting Time" (IDN89), the "Command Value Processing Time" (IDN90) and the CCT (IDN2) according to this equation.

$$\text{IDN89} + \text{MDT Transmission Time} + \text{IDN90} < \text{IDN8} \leq \text{IDN2}$$

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2
Minimum:		Run-Up Check:	CP2
Maximum:		Cyclic Transfer:	
Default:	IDN2	ASCII Param.:	
Units:	µs	Version:	

### 3.11 IDN9 Position of Data Record in MDT

The offset of the amplifier's data record within the MDT. The offset is measured in bytes from the MDT's address field. The data record position within the MDT must be downloaded from the master during CP2 and becomes active during CP3. The value must be greater than zero and must be an odd number not exceeding 65531.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2
Minimum:		Run-Up Check:	CP2
Maximum:		Cyclic Transfer:	
Default:	None	ASCII Param.:	
Units:	Bytes	Version:	

### 3.12 IDN10 Length of MDT

The length of the MDT's data field, expressed in bytes. This length does not include the MDT delimiters, address field, or cyclic redundancy check (CRC). The MDT length must be downloaded from the master during CP2 and becomes active during CP3. The MDT length must be an even number, and it must be greater than or equal to 4, but not exceeding 65534.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2
Minimum:		Run-Up Check:	CP2
Maximum:		Cyclic Transfer:	
Default:	4	ASCII Param.:	
Units:	Bytes	Version:	

### 3.13 IDN11 Class 1 Diagnostic (C1D)

The present fault status of the amplifier. When a fault occurs, the amplifier decelerates to a stop and is disabled. The C1D status bit (AT bit 13) is set, and the corresponding fault bits are set within IDN11. All faults are latched within IDN11 and are reset through the "Procedure: Reset Class 1 Diagnostic" (IDN99). IDN99 performs a coldstart automatically when required. A coldstart automatically results in the loss of communication. Those faults which require a coldstart are noted in the table below. The error messages which are displayed with LEDs on the front panel of the servo amplifier are also shown below.

Bit	Description	Coldstart	Error
LSB 0	Overload fault (IDN114).	no	F15
1	Amplifier over temperature fault (IDN203).	no	F01
2	Motor over temperature fault.	yes	F06
3	Cooling system fault (IDN205).	no	F13
4	Control voltage fault ( $\pm 15V$ ).	yes	F07
5	Feedback loss fault.	yes	F04
6	Commutation fault. Set to 0.	yes	F25
7	Overcurrent fault.	yes	F14
8	Overvoltage fault.	no	F02
9	Undervoltage fault.	no	F05
10	Power supply phase fault.	yes	F12, F19
11	Excessive position deviation (IDN159).	no	F03
12	Communication interface fault (IDN14).	no	F29
13	Software limit switch fault (IDN49 and 50).	no	F24
14	Reserved. Set to 0.		
MSB 15	Manufacturer-defined fault (IDN129).	IDN129	

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	AT
Default:	0	ASCII Param.:	ERRCODE

### 3.14 IDN12 Class 2 Diagnostic (C2D)

Warning flags that may indicate an impending shutdown. When an unmasked warning condition changes state, the corresponding warning bits are changed within IDN12, and the C2D change bit (AT status word, bit 12) is set. The warning bits within IDN12 are not latched and will automatically reset when the warning condition is no longer valid. The C2D change bit is reset when IDN12 is read through the service channel. IDN97 may be used to mask warnings and their affect on the C2D change bit.

Bit	Description
LSB 0	Overload warning (IDN114)
1	Amplifier over temperature warning (IDN311)
2	Motor over temperature warning (IDN312)
3...12	
13	Target position outside of travel range (IDN323).
14	
MSB 15	Manufacturer-defined warning flags (IDN181).

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.15 IDN13 Class 3 Diagnostic (C3D)

Status flags for the amplifier. When an unmasked status condition changes state, the corresponding status bit changes within IDN13, and the C3D change bit (AT status word, bit 11) is set. The status bits within IDN13 are not latched and will automatically reset when the status condition is no longer valid. The C3D change bit is reset when IDN13 is read through the service channel. IDN98 may be used to mask particular status conditions and their affect on the C3D change bit.

Bit	Description
LSB 0	
1...3	
4	$ \text{Torque}  \geq  \text{Torque limit} $ (IDN334)
5	$ \text{Ncmd}  >  \text{N limit} $ (IDN335)
6	In Position (IDN57 and IDN336)
7...14	IDN333
MSB 15	Manufacturer-defined status flags (IDN182).

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.16 IDN14 Interface Status

The communication phase (CPx) and communication fault flags. In the event of a communication fault the amplifier stops and is disabled, and the amplifier's communication phase returns to 0. The communication interface fault summary bit (IDN11, bit 12) is set. The cause of the communication fault is latched within IDN14 along with the communication phase in which the fault occurred. The master may retrieve this information from the amplifier by reading IDN14 before issuing a "Reset Class 1 Diagnostic" procedure (IDN99).

If both bit 3 and bit 4 (MST and MDT failures) are set, this could indicate a signal loss (e.g. a broken optical fiber cable). In this case, the MST and MDT error counters (IDN28 and IDN29) will not be incremented.

Bit	Description
2 - 0	Communication Phase (CPx).
3	MST failure.
4	MDT failure.
5	Invalid phase (CP > 4)
6	Error during phase advance.
7	Error during phase regression.
8	Phase switch without proper acknowledgment.
9	Switching to an uninitialized operation mode.
10 - 15	

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.17 IDN15 Telegram Type Parameter

The master uses IDN15 to select the contents of the AT and MDT cyclic data fields. Selecting a pre-defined or standard telegram type completely defines the contents and order of cyclic data within the AT and MDT. Within IDN15, the servo amplifier supports values 1 through 7. Telegram type 7, or the application type telegram, allows the master to define the contents and order of the AT and MDT cyclic data. The IDNs that may be transferred as cyclic data within the AT and MDT are listed in IDN187 and IDN188 respectively. The maximum amount of AT and MDT cyclic data that the amplifier can transfer is specified in IDN185 and IDN186 respectively. When the application telegram is selected, the master writes the desired cyclic data IDNs for the AT into IDN16 and for the MDT into IDN24.

The telegram type is saved in the lower byte of the bus parameter BUSP2. BUSP2 is an Integer32 variable and contains other parameters (see ASCII documentation).

IDN15 Value	Telegram Type	Telegram Cyclic Data	
		MDT (Commands)	AT (Feedback)
0			
1			
2	Standard telegram 2	Velocity (IDN36)	Velocity (IDN40)
3	Standard telegram 3	Velocity (IDN36)	Motor Position (IDN51)
11			External Position (IDN53)
4	Standard telegram 4	Position (IDN47)	Motor Position (IDN51)
12			External Position (IDN53)
5	Standard telegram 5	Pos/Vel (IDN47/36)	Motor Pos/Vel (IDN51/40)
13			External Pos/Vel (IDN53/40)
6			
7	Application telegram	Contents defined in IDN24	Contents defined in IDN16

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2
Minimum:		Run-Up Check:	CP2
Maximum:		Cyclic Transfer:	
Default:	4	ASCII Param.:	BUSP2

### 3.18 IDN16 Configuration List of AT Cyclic Data

An IDN list of the AT's cyclic data. The master fills this list with IDNs in CP2 selected from a list of configurable AT data (IDN187) when an application telegram has been selected through IDN15.

Data Length:	2 bytes elements, variable length array	Non-Volatile:	No
Data Type:	IDN	Write Access:	CP2
Minimum:		Run-Up Check:	CP2
Maximum:		Cyclic Transfer:	
Default:	Empty list	ASCII Param.:	

### 3.19 IDN17 IDN List of All Operation Data

An IDN list of all data IDNs that are supported by the amplifier.

Data Length:	2 byte elements, variable length array	Non-Volatile:	Fix
Data Type:	IDN	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.20 IDN18 IDN List of Operation Data for CP2.

A list of all IDNs that must be written by the master during CP2. That are IDN 6, 9,10,16, 24 and 89. The amplifier's CP2 to CP3 transition procedure (IDN127) will fail if this data is not supplied by the master. IDN16 and IDN24 are not included in this list, but they need to be written by the master in CP2 if the application telegram (type 7) is selected. If IDN16 and IDN24 are not written during CP2, then the application telegram will be empty.

Data Length:	2 byte elements, variable length array	Non-Volatile:	Fix
Data Type:	IDN	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	6	ASCII Param.:	

### 3.21 IDN19 IDN List of Operation Data for CP3

A list of all IDNs that must be written by the master during CP3. The amplifier's CP3 to CP4 transition procedure (IDN128) will fail if this data is not supplied by the master.

Data Length:	2 byte elements, variable length array	Non-Volatile:	Fix
Data Type:	IDN	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.22 IDN21 IDN List of Invalid Operation Data for CP2

A list of all IDNs which are considered invalid by the CP2 to CP3 transition procedure (IDN127).

Data Length:	2 byte elements, variable length array	Non-Volatile:	No
Data Type:	IDN	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	Empty list.	ASCII Param.:	

### 3.23 IDN22 IDN List of Invalid Operation Data for CP3

A list of all IDNs which are considered invalid by the CP3 to CP4 transition procedure (IDN128).

Data Length:	2 byte elements, variable length array	Non-Volatile:	No
Data Type:	IDN	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	Empty list.	ASCII Param.:	

### 3.24 IDN24 Configuration List of MDT Cyclic Data

A list of IDNs in the MDT's cyclic data. The master fills this list with IDNs selected from a list of configurable MDT data (IDN188) when an application telegram has been selected through IDN15.

Data Length:	2 byte elements, variable length array	Non-Volatile:	No
Data Type:	IDN	Write Access:	CP2
Minimum:	0	Run-Up Check:	CP2
Maximum:	6	Cyclic Transfer:	
Default:	Empty list.	ASCII Param.:	

### 3.25 IDN25 IDN List of All Procedure Commands

An list of all command IDNs that are supported by the amplifier.

IDN	Description
99	Reset Class 1 Diagnostic, ASCII "CLRFAULT"
127	Check routine before switching from CP2 to CP3
128	Check routine before switching from CP3 to CP4
139	Command "Parking axis" enables CP4 despite any errors that are present. Enabling is not possible when this command is activated.
146	Command" NC controlled homing"
148	Homing command
170	Command probe
191	Clear "Reference point set" command
197	Command "Set coordinate system"
262	Command "Load default values"; ASCII "RSTVAR"
264	Command "Save parameters"; ASCII "SAVE"
447	Command "Set absolute position"

Data Length:	2 byte elements, variable length array	Non-Volatile:	Yes
Data Type:	IDN	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	Empty list	ASCII Param.:	

### 3.26 IDN28 MST Error Counter

A count of all invalid MSTs in CP3 and CP4. In the case where more than two consecutive MST's are invalid, only two are counted, and the amplifier returns to CP0. The MST error counter counts to a maximum of 65535 and does not roll over to 0. If a value of 65535 is in the counter, there may have been a noisy transmission over a long period of time. The MST error counter is cleared on the transition from CP2 to CP3.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.27 IDN29 MDT Error Counter

A count of all invalid MDTs in CP4. In the case where more than two consecutive MDTs are invalid, only two are counted, and the amplifier returns to CP0. The MDT error counter counts to a maximum of 65535 and does not roll over to 0. If a value of 65535 is in the counter, there may have been a noisy transmission over a long period of time. The MDT error counter is cleared on the transition from CP2 to CP3.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	



### 3.28 IDN30 Manufacturer Version

A string of the sercos® firmware version that is installed in the servo amplifier.

Data Length:	1 byte elements, variable length array	Non-Volatile:	Fix
Data Type:	Text	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	VER *
Units:		Version:	

### 3.29 IDN32 Primary Operation Mode

Defines the amplifier's operational mode when the AT status word bits 8 and 9 are both 0. The master requests a particular operation mode through the MDT control word (bits 8 and 9). The master can switch between the operation modes defined within this IDN and the mode defined within the secondary operation mode 1 (IDN33) with this bits in realtime. Switch into position control during fast moving, could result in a jerk. The following table may be used to define the primary operation mode. All reserved bits are not supported and must be zero. The gain for bit 3 is defined by IDN296, Velocity Feed Forward Gain. It is not possible to select position control with motor feedback in IDN32 and position control using external feedback in IDN33, also the reverse setting of this IDNs is not possible and will be checked by the amplifier (refer to IDN117). For position control with external feedback 2, all position data, e.g. also IDN51, are used for the external feedback. IDN 32, for example, is also saved in BUSP2 (see ASCII documentation).

Bit	Value	Description
3 - 0	0000	Reserved: no operation mode
	0001	Torque control
	0010	Velocity control
	x011	Position control using motor feedback.
	x100	Position control using external feedback.
3	x101	Reserved: position control with motor feedback and external feedback
	0	Position control with following error.
4 - 15	1	Position control without following error (IDN296).
	0	.

Data Length:	2 bytes	Non-Volatile:	yes
Data Type:	Binary	Write Access:	CP2, CP3
Minimum:		Run-Up Check:	CP3
Maximum:		Cyclic Transfer:	
Default:	3	ASCII Param.:	BUSP2

### 3.30 IDN33 Secondary Operation Mode 1

Defines the amplifier's operational mode when the AT status word bit 9 is clear and bit 8 is set. The master requests a particular operation mode through the MDT control word (bits 8 and 9). The master can switch between the operation modes defined within this IDN and the mode defined within the primary operation mode (IDN32) with this bits in realtime. Switch into position control during fast moving, could result in a jerk. The following table may be used to define the secondary operation mode 1. All reserved bits are not supported and must be zero. The gain for bit 3 is defined by IDN296, Velocity Feed Forward Gain. It is not possible to select position control with motor feedback in IDN32 and position control using external feedback in IDN33, also the reverse setting of this IDNs is not possible and will be checked by the amplifier (refer to IDN117). For position control with external feedback 2, all position data, e.g. also IDN51, are used for the external feedback.

Bit	Value	Description
3 - 0	0000	No mode of operation.
	0001	Torque control
	0010	Velocity control
	x011	Position control using motor feedback.
	x100	Position control using external feedback.
	x101	Reserved: Position control using motor and external feedback.
3	0	Position control with following error.
	1	Position control without following error (IDN296).
4 - 15	0	not used

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3
Minimum:		Run-Up Check:	CP3
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.31 IDN36 Velocity Setpoint Value

The master issues the velocity setpoint to the amplifier through IDN36. The velocity scaling type is defined with IDN44, and the scaling parameters are adjustable (IDN45 and 46). The data mapped to cyclic data cannot be influenced via the service channel.

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	MDT
Default:		ASCII Param.:	J
Units:	IDN44=1, 45, 46 : default: m/min / 1000000 IDN44>1, 45, 46 : default: U/min / 10000*)	Version:	

\*: 10000~60rpm

### 3.32 IDN38 Positive Velocity Limit Value

Establishes the maximum acceptable velocity setpoint in the positive direction. In velocity mode and during homing, velocity setpoints that exceed the positive velocity limit are clamped to the positive velocity limit. In position mode, the velocity is monitored, and if the positive velocity exceeds the positive velocity limit, a fault is generated (IDN129, bit 10).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed Decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	IDN113, IDN91	Cyclic Transfer:	
Default:	3000 RPM	ASCII Param.:	VLIMP
Units:	IDN44, 45, 46 (Default: RPM / 10000*)	Version:	

\*: 10000~60rpm

### 3.33 IDN39 Negative Velocity Limit Value

Establishes the maximum acceptable velocity setpoint in the negative direction. In velocity mode and during homing, velocity setpoints that exceed the negative velocity limit are clamped to the negative velocity limit. In position mode, the velocity is monitored, and if the negative velocity exceeds the negative velocity limit, a fault is generated (IDN129, bit 9).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed Decimal	Write Access:	CP2, CP3, CP4
Minimum:	- IDN113, -IDN91	Run-Up Check:	
Maximum:	0	Cyclic Transfer:	
Default:	- 3000 RPM	ASCII Param.:	VLIMN
Units:	IDN44, 45, 46 (Default: RPM / 10000*)	Version:	

\*: 10000~60rpm

### 3.34 IDN40 Velocity Feedback Value

The master retrieves the velocity feedback from the amplifier through IDN40. The velocity scaling type is defined with IDN44, and the scaling parameters are adjustable (IDN45 and 46).

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	AT
Default:		ASCII Param.:	V
Units:	IDN44=1, 45, 46 : default: m/min / 1000000 IDN44>1, 45, 46 : default: U/min / 10000*)	Version:	

### 3.35 IDN41 Homing Velocity

The amplifier's velocity during the "Amplifier-Controlled Homing" procedure command (IDN148). The actual homing velocity may be limited by the Bipolar, Positive, or Negative Velocity Limit Values (IDN91, 38, 39 respectively). The velocity scaling type is defined with IDN44, and the scaling parameters are adjustable (IDN45 and 46). The unit differs because linear scaling (IDN 44 = 0x01) is also supported.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	$2^{31} - 1$	Cyclic Transfer:	
Default:	23 RPM	ASCII Param.:	VREF
Units:	IDN44=1, 45, 46 : default: m/min / 1000000 IDN44>1, 45, 46 : default: U/min / 10000*)	Version:	

### 3.36 IDN42 Homing Acceleration

The amplifier's maximum acceleration and deceleration during the "Amplifier-Controlled Homing" procedure (IDN148).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	3000	Run-Up Check:	
Maximum:	600000	Cyclic Transfer:	
Default:	1260000000	ASCII Param.:	ACCR, DECR
Units:	IDN160, 161, 162	Version:	

### 3.37 IDN43 Velocity Polarity Parameter

The velocity polarity parameter is used to switch the polarities of velocity data. Polarities are not switched internally but externally, this means on the in- and output of a closed loop system.

**( sercos® bus data are inverted, the servo amplifier data and the limit switch data are not changed).**

The motor shaft turns clockwise when there is a positive velocity setpoint and no inversion.

Bit		Description
0	Velocity setpoint value	0 = non-inverted 1 = inverted
1		
2	Velocity feedback value	0 = non-inverted 1 = inverted
15-3		

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2
Minimum:	0	Run-Up Check:	
Maximum:	0005h	Cyclic Transfer:	
Default:	0	ASCII Param.:	SERCSET (bits 12-15)

### 3.38 IDN44 Velocity Data Scaling Type

Defines the scaling options for all velocity data.

The scaling types which are supported are:

0x1h, 0x2h, 0x9h, 0xAh, 0x41h, 0x42h, 0x49h, 0x4Ah

If preferred rotational scaling is selected, the velocity scaling factor (IDN45) will set to 1 and the velocity data scaling exponent (IDN46) will set to -4 (refer to IDN45 and 46).

Bit		Description
2 - 0	Scaling Method	001 = Linear Scaling 010 = Rotational Scaling
3	Standard Scaling Type	0 = Preferred Scaling 1 = Parameter Scaling
4	Units for Linear Scaling	0 = Meters (m)
4	Units for Rotational Scaling	0 = Revolutions (R)
5	Time Units	0 = Minutes (min)
6	Data Reference	0 = At the Motor Shaft 1 = At the Load
15-7	Reserved	

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3
Minimum:	0x0002h	Run-Up Check:	
Maximum:	0x0004Ah	Cyclic Transfer:	
Default:	0x000Ah	ASCII Param.:	

### 3.39 IDN45 Velocity Data Scaling Factor

The scaling factor for all velocity data in the amplifier. The exponent is defined with IDN46, so that the LSB weight of all rotational velocity data is derived from the following equation:

$$LSB\ Weight = factor(IDN45) \cdot 10^{\text{exponent}(IDN46)} \left\{ \frac{unit(revolutions)}{time\ unit(minutes)} \right\}$$

The scaling may be defined within the following range:  $1 \times 10^{-5}$  to  $1 \times 100$ . IDN45 and IDN46 must be integers. If the preferred rotational scaling is selected in IDN44, the velocity scaling factor (IDN45) and the velocity data scaling exponent (IDN46) will be fixed at their default values (refer to IDN44). With velocity scaling it is possible to get a rounding error in the LSBits.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:	1	Run-Up Check:	
Maximum:	$10^{-(IDN46)}$	Cyclic Transfer:	
Default:	1	ASCII Param.:	

### 3.40 IDN46 Velocity Data Scaling Exponent

The scaling exponent for all velocity data in the amplifier. Refer to IDN45.

**IDN46 = -6 reduces the max. permitted speed to approx. +/-2300rpm (counter overflow).**

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3
Minimum:	-6	Run-Up Check:	
Maximum:	0	Cyclic Transfer:	
Default:	-4	ASCII Param.:	

### 3.41 IDN47 Position Setpoint Value

The master issues position setpoints to the amplifier as cyclic data through IDN47. Position setpoints written via the service channel do not have any affect. The "Position Setpoint Value" has a defined scaling type (IDN76) and a defined resolution (IDN76, 77, 78, 79, 123).

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	MDT
Default:		ASCII Param.:	
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.42 IDN49 Positive Position Limit

This IDN defines the maximum permissible position in the positive direction. The position limit switch is active when IDN55 bit 4 or IDNP3004 is set. If linear scaling is selected in IDN76, the limit switch is automatically calculated with the feed constant IDN123 and enabled with the enable bit in IDN55. When the position setpoint reaches the limit switch, the drive decelerates to a stop and error "F24" and warning "n07" flash in the LED. In addition, fault bit 13 is set in IDN11 and the warning bit is set in IDN323 and IDN12 bit 13. With linear position scaling the maximum value is 1024 x feed constant (IDN123).

Data Length:	4 bytes	Non-Volatile:	YES
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	$-2^{31}+1$	Run-Up Check:	
Maximum:	$2^{31}-1$	Cyclic Transfer:	
Default:	0	ASCII Param.:	SWE2
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.43 IDN50 Negative Position Limit

This IDN defines the maximum permissible position in the negative direction. See IDN 49.

Data Length:	4 bytes	Non-Volatile:	YES
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	$-2^{31}+1$	Run-Up Check:	
Maximum:	$2^{31}-1$	Cyclic Transfer:	
Default:	0	ASCII Param.:	SWE1
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.44 IDN51 Position Feedback Value 1 (Motor Feedback)

The master retrieves the motor's position feedback from the amplifier through IDN51. The scaling type and the resolution will be defined within IDN76, 77, 78 and 79.

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	AT
Default:		ASCII Param.:	PFB
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.45 IDN52 Reference Distance 1 (Motor Feedback)

The distance from the machine zero point to the home position, referenced through the motor feedback.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	$-2^{31} + 1$	Run-Up Check:	
Maximum:	$+2^{31} - 1$	Cyclic Transfer:	
Default:	0	ASCII Param.:	ROFFS
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.46 IDN53 Position Feedback Value 2 (External Feedback)

The external position feedback of the amplifier from an external encoder, in rotational position resolution within IDN79. For linear position scaling this IDN is in counts, not in sercos® units (refer to IDN76 and 79).

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	AT
Default:		ASCII Param.:	PFB0
Units:	IDN76, 79	Version:	

### 3.47 IDN54 Reference Distance 2 (External Feedback)

The distance from the machine zero point to the home position for the secondary feedback. If homing is done, the position feedback value 2 (IDN53) contains the value of this IDN (refer to IDN 148).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	$-2^{31} + 1$	Run-Up Check:	
Maximum:	$2^{31} - 1$	Cyclic Transfer:	
Default:	0	ASCII Param.:	ROFFS0
Units:	IDN76, 79	Version:	

### 3.48 IDN55 Position Polarity Parameter

The position polarity parameter is used to switch the polarities of position data. Polarities are not switched internally but externally, this means on the input and output of a closed loop system (sercos® bus data are inverted, servo amplifier data and limit switch data are not changed). The motor shaft turns clockwise when there is a positive position setpoint difference and no inversion.

Bit		Description	
0	Position setpoint value*	0 = non-inverted	1 = inverted
1	Reserved: Additive position setpoint value	0 = non-inverted	1 = Reserved (inverted)
2	Position feedback value 1*	0 = non-inverted	1 = inverted
3	Position feedback value 2*	0 = non-inverted	1 = inverted
4	Position limit values (software limit switches)	0 = disabled	1 = enabled**
15-5			

\* Homing direction DREF is **not** changed!

\*\* If linear scaling of the position data is selected (see IDN76 – Position Data Scaling Type), these bits will be automatically set and it is not possible to disable the position limit switches (see IDN49 and 50 – Pos./Neg. Position Limit Switch).

If the position limit switches are set, the amplifier sets a software limit switch (Bit 13 in IDN11 - Class 1 –current fault status of the amplifier), if the drive reaches the disallowed area. A new value in bit 4 will not become active until this parameter is saved to the non-volatile memory and a coldstart or warmstart (IDN128) procedure is initiated.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2
Minimum:	0	Run-Up Check:	
Maximum:	0x001D h	Cyclic Transfer:	
Default:	0	ASCII Param.:	SERCSET (Bits 4 - 11)



### 3.49 IDN57 Position Window

Defines the maximum absolute distance between the position setpoint value and the position feedback value. When the following error is within the "Position Window," the amplifier sets the status flag "In Position" (IDN13, bit 6). This function is only active while the amplifier is in position control. The "In Position" flag may be selected as a RTS bit through IDN336 (refer to IDN159, 189, 336).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0x0h	ASCII Param.:	PEINPOS
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.50 IDN59 Position Switch Flag Parameter

The position switch flag parameter depends on

- the position feedback value
- the settings of the "Position Switch Polarity Parameter" (IDNP3043)
- the "Type of Position Switch Parameter" (IDNP3044).

The behavior of the position switch flag bits are described below (please refer also to the IDNs P3041 and P3044).

The corresponding bits of IDNP3043 and IDNP3044 are set to "0", which is the default. Then the associated flag bit is set to "0" if the position feedback value is smaller than the position switching point.

The associated flag is set to "1" if the position feedback value is greater than or equal to the position switching point.

The corresponding bits of IDNP3043 is set to "1" and of IDNP3044 is set to "0".

Then the associated flag bit is set to "1" if the position feedback value is smaller than the position switching point.

The associated flag is set to "0" if the position feedback value is greater than or equal to the position switching point.

If the corresponding bit of IDNP3044 is set to "1", then the associated flag is checked once according to the polarity setting of IDNP3043 and latched till the associated flag is enabled again.

Bit	Description
LSB 0	Position switch point 1 (IDN60)
1	Position switch point 2 (IDN61)
2	Position switch point 3 (IDN62)
3	Position switch point 4 (IDN63)
4	Position switch point 5 (IDN64)
5	Position switch point 6 (IDN65)
6	Position switch point 7 (IDN66)
7	Position switch point 8 (IDN67)
8 - 15	Reserved.

A positioning switch point can also be indicated via digital outputs (see P3005...8).

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:	0x0000h	Run-Up Check:	
Maximum:	0x00FFh	Cyclic Transfer:	AT
Default:		ASCII Param.:	M POSRSTAT

### 3.51 IDN60..67 Position Switch Point 1..8

Each position switch point IDN defines a feedback position that determines the state of a corresponding position status flag within IDN59 (refer to IDN59).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	MDT (60, 61, 62, 63, 64, 66)
Default:	0	ASCII Param.:	P1, P2, P3, P4, P5, P6, P7 and P8
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.52 IDN76 Position Data Scaling Type

Defines the scaling options for all position data. The supported scaling types are:

**Preferred Scaling:** Fixed velocity data scaling (IDN45 = 1, IDN46 = -4)  
Fixed position data scaling (IDN77 = 1, IDN78 = -7)

**Parameter Scaling:** Adjustable velocity data scaling (IDN44, 45, 46)  
Adjustable position data scaling (IDN77, 78)

IDN76	Scaling method	Scaling type	Data reference
0x0001h	linear scaling	Preferred Scaling	Motor Shaft
0x0009h	linear scaling	Parameter Scaling	Motor Shaft
0x0002h	rotational scaling	Preferred Scaling	Motor Shaft
0x000Ah	rotational scaling	Parameter Scaling	Motor Shaft
0x0041h	linear scaling	Preferred Scaling	Load
0x0049h	linear scaling	Parameter Scaling	Load
0x004Ah	rotational scaling	Parameter Scaling	Load

Linear scaling and Modulo exclude each other. With linear scaling, the software limit switches are automatically switched on (refer to IDN49, 50, 55 and P3004).

If rotational scaling is selected and the rotational position resolution (IDN79) is different from the internal scaling ( $2^X$  with  $X = \{16, \dots, 28\}$ ), the modulo format must be switched on, this will be done during run-up.

With set the operation mode within IDN32 or 33 to position control with external feedback, this IDN will set to 004A(Hex) as a fixed setting. The amplifier can only operate with a fixed rotational scaling for the position data in this case (refer to IDN79).

Bit		Value	Description
2 - 0	Scaling Method	000	
		001	Linear Scaling
		010	Rotational Scaling
3	Standard Scaling Type	0	Preferred Scaling
		1	Parameter Scaling
4	Reserved: Units for Linear Scaling	0	Meters (m)
		1	
4	Units for Rotational Scaling	0	Degrees
		1	
5	Reserved		
6	Data Reference	0	At the Motor Shaft
		1	At the Load (Only for rotational scaling)
7	Processing Format*	0	Absolute Format
		1	Modulo Format (See IDN103)
15-8	Reserved.		

\* A change of bit 7 will initiate a warmstart procedure (refer to IDN128) during run-up. The amplifier's display will show three flashing dots for up to 30s while startup configuration is updated.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2 (amplifier disabled)
Minimum:	0x0001h	Run-Up Check:	CP3
Maximum:	0x008Ah	Cyclic Transfer:	
Default:	0x000Ah	ASCII Param.:	SERCSET (Bits 24 - 31)

### 3.53 IDN77 Linear Position Data Scaling Factor

This parameter defines the scaling factor for all position data in the amplifier, when linear scaling is selected in IDN76.

$$LSB\ Weight = factor(IDN77) \cdot 10^{\text{exponent}(IDN78)} \{m\} = 1 \cdot 10^{-7} m$$

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP 2
Minimum:	1	Run-Up Check:	
Maximum:	100	Cyclic Transfer:	
Default:	1	ASCII Param.:	

### 3.54 IDN78 Linear Position Data Scaling Exponent

This parameter defines the scaling exponent for all position data in the amplifier, when linear scaling in IDN76 is selected. Refer to IDN77.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP 2
Minimum:	-9	Run-Up Check:	
Maximum:	-3	Cyclic Transfer:	
Default:	-7	ASCII Param.:	

### 3.55 IDN79 Rotational Position Resolution

This parameter defines the rotational position resolution for all position data in the amplifier. The LSB weight of rotational position data is determined by the following equation:

$$LSB\ Weight = \frac{360^\circ}{IDN79}$$

If the rotational position resolution is different from the internal resolution of the amplifier ( $2^{PRBASE}$ ), it is necessary that the modulo format is switched on in IDN76. Only the values  $2^x$  can be saved in the non-volatile memory with  $x = \{16, 20, 24, 28\}$ .

By using parameter 121 (Input revolutions of load gear) und 122 (Output revolutions of load gear) the minimum changes to

$$\text{min: } 100 * (IDN122/IDN121)$$

and the maximum to  $\text{max: } 2^{28} * (IDN122/IDN121)$

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2
Minimum:	100	Run-Up Check:	
Maximum:	268 435 456 ( $2^{28}$ )	Cyclic Transfer:	
Default:	1048576	ASCII Param.:	log(PRBASE)
Units:	Counts / Revolution	Version:	

### 3.56 IDN80 Torque Setpoint Value

The master issues torque setpoints to the amplifier as cyclic data through IDN80. Torque setpoints written via the service channel do not take affect.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	MDT, AT
Default:		ASCII Param.:	ICMD x (1000 / MICONT)
Units:	IDN86	Version:	

### 3.57 IDN81 Additive Torque Setpoint

The master issues additive torque commands to the amplifier as cyclic data via IDN81.

Values written via the service channel do not have any effect. This is an additional function, which is used to influence the torque in the drive in order to minimize following errors. This value is added to the torque command. This function can be used for position and speed control. It should not be set together with automatic acceleration feed forward P-IDN 3052, since both functions write the internal variable "IVORCMD" (see also IDN P3052).

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	$-2^{15}$	Run-Up Check:	
Maximum:	$2^{15} - 1$	Cyclic Transfer:	MDT
Default:		ASCII Param.:	M IVORCMD
Units:	IDN86	Version:	

### 3.58 IDN82 Positive Torque Limit

The master issues values to the amplifier as cyclic data via IDN82. Torque limits written via the service channel do not have any effect (see also IDN 92)

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP4
Minimum:		Run-Up Check:	
Maximum:	+IPEAK	Cyclic Transfer:	MDT
Default:		ASCII Param.:	IPEAKP x (1000 / MICONT)
Units:	IDN86	Version:	

### 3.59 IDN83 Negative Torque Limit

The master controller issues values to the amplifier as cyclic data via IDN83. Torque limits written via the service channel do not have any effect (see also IDN 92).

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP4
Minimum:		Run-Up Check:	
Maximum:	-IPEAK	Cyclic Transfer:	MDT
Default:		ASCII Param.:	IPEAKN x (1000 / MICONT)
Units:	IDN86	Version:	

### 3.60 IDN84 Torque Feedback Value

The master controller retrieves the motor's torque feedback from the amplifier through IDN84.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	AT
Default:		ASCII Param.:	I x (1000 / MICONT)
Units:	IDN86	Version:	

### 3.61 IDN86 Torque/Force Data Scaling Type

Defines the scaling options for all torque or force data. The weight of the LSB for percentage scaling is defined as 0.1% of the motor's continuous current (IDN111).

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Binary	Write Access:	Read-only
Minimum:	0	Run-Up Check:	
Maximum:	0	Cyclic Transfer:	
Default:	0 Percentage Scaling	ASCII Param.:	

### 3.62 IDN87 Transmit to Transmit AT Recovery Time

Applies only to multiaxes systems. This parameter is not used for single axis systems. The recovery time is read by the master during CP2 in order to correctly calculate the AT transmission starting time (IDN 6).

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	
Units:	µs	Version:	

### 3.63 IDN88 Receive to Receive Recovery Time

The time required by the amplifier between the end of the MDT and the beginning of the MST.

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	50	ASCII Param.:	
Units:	µs	Version:	

### 3.64 IDN89 MDT Transmission Starting Time

The time at which the master should transmit the MDT, after the end of the MST, during CP3 and CP4. The MDT Transmission Starting Time must be downloaded from the master during CP2. The "MDT Transmission Starting Time" is limited by the CCT (IDN2), the "Transmit/Receive Transmission Time" (IDN4) the "AT Transmission Starting Time" (IDN6) and the "Receive to Receive Recovery Time" (IDN88) according to the following restrictions.

$$\text{IDN89} \geq \text{IDN6} + \text{AT Transmission Time} + \text{AT Jitter} + \text{IDN4} + \text{MDT Jitter}$$

$$\text{IDN89} \leq \text{IDN2} - \text{max IDN88 from all amplifiers} - \text{MDT Transmission Time} - \text{MST Transmission Time} - \text{MDT Jitter} - \text{CCT Jitter}$$

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2
Minimum:		Run-Up Check:	CP2
Maximum:		Cyclic Transfer:	
Default:	None	ASCII Param.:	
Units:	µs	Version:	

### 3.65 IDN90 Setpoint Value Processing Time

The minimum time required by the amplifier from the end of the MDT to the point at which the received setpoint values may be used by the amplifier.

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	50	ASCII Param.:	
Units:	µs	Version:	

### 3.66 IDN91 Bipolar Velocity Limit

Establishes the maximum acceptable velocity setpoint in both the clockwise and counter-clockwise directions. In velocity mode and during homing, velocity setpoints that exceed the bipolar velocity limit are clamped to the velocity limit. In position mode, the velocity is monitored, and if the velocity exceeds the bipolar velocity limit, a fault is generated (IDN129, bit 9).

The “Bipolar Velocity Limit” (IDN91) is linked to the “Positive and Negative Velocity Limit Values” (IDN38 and IDN39). If the values in IDN38 and IDN39 are larger than IDN91, then IDN91 limits IDN38 and IDN39 to IDN91.

If the value in IDN91 is , the same value is also written to IDN38 and IDN39 (with the appropriate signs). IDN38 and IDN39 must have the same absolute value in order for IDN91 to be valid. If they do not have the same absolute value when IDN91 is read, then the amplifier will return error message 7008, “Invalid Data” for IDN91.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	IDN113	Cyclic Transfer:	
Default:	3000 RPM	ASCII Param.:	VLIM
Units:	IDN44,45,46 Default: RPM*10 000	Version:	

### 3.67 IDN92 Bipolar Torque Limit

Defines the maximum torque limit in both the clockwise and counter-clockwise directions.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	Minimum of IDN109 (Ipeak motor) and IDN110 (Ipeak amplifier)	Cyclic Transfer:	MDT
Default:	Minimum of IDN109 (Ipeak motor) and IDN110 (Ipeak amplifier)	ASCII Param.:	IPEAK, IPEAKN, IPEAKP
Units:	IDN86 Scaling type for torque/force	Version:	

### 3.68 IDN93 Scaling Factor Torque

Defines the scaling factor for all torque data in the amplifier. See IDN86.

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Unsigned decimal	Write Access:	read-only
Minimum:	1	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	1	ASCII Param.:	

### 3.69 IDN94 Scaling Exponent Torque

Defines the scaling exponent for all torque data in the amplifier. See IDN86.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	read-only
Minimum:	0	Run-Up Check:	
Maximum:	0	Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.70 IDN95 Diagnostic Message

The master can read a text message that describes the status of the amplifier.

Data Length:	1 byte elements, variable length array	Non-Volatile:	Fix
Data Type:	Text	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	SSTAT

### 3.71 IDN96 Slave Arrangement

The sercos® address of the amplifier is contained in both the upper and lower bytes of this IDN.

Example: ADDR = 3  
IDN96 = 0x0303h

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Hexadecimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	ADDR

### 3.72 IDN97 Class 2 Diagnostic Mask

**Warnings for masked bits are not indicated in C2D (AT status word, bit 12).**

A mask for the C2D (AT status word, bit 12), amplifier warning. When a warning condition within IDN12 changes state, the C2D change bit (AT status word, bit 12) is set.

The warning bits within IDN12 are not latched (i.e. they will automatically set or reset as warning conditions change). The C2D change bit is reset when IDN12 is read through the service channel.

IDN97 may be used to mask the effect of a particular warning condition on the C2D change bit in the AT status word. When a masked warning changes state, the C2D change bit in the AT status word will not be set. However, the warning bits in IDN12 will continue to change state according to the warning conditions. When a bit in IDN97 is clear, the corresponding bit in IDN12 is masked.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0b xxxx xxxx 1111 1111	ASCII Param.:	BUSP0 (lower 16 bits)



### 3.73 IDN98 Class 3 Diagnostic Mask

#### Warnings for masked bits are not indicated in C3D (AT status word, bit 11).

A mask for the C3D (IDN13). When a warning condition within IDN13 changes state, the C3D change bit (AT status word, bit 11) is set.

The warning bits within IDN13 are not latched (i.e. they will automatically set or reset as warning conditions change). The C3D change bit is reset when IDN13 is read through the service channel.

IDN98 may be used to mask the effect of a particular warning condition on the C3D change bit in the AT status word. When a masked warning changes state, the C3D change bit in the AT status word will not be set. However, the warning bits in IDN13 will continue to change state according to the warning conditions. When a bit in IDN98 is clear, the corresponding bit in IDN13 is masked.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0b1111 1111 xxxx xxxx	ASCII Param.:	BUSP0 (upper 16 bits)

### 3.74 IDN99 Command: Reset Class 1 Diagnostic (clear fault)

The latched faults contained in IDN11, IDN14 and IDN129 are cleared, if the causes for the faults have been repaired. If all the faults are cleared successfully, the C1D status bit (AT bit 13) is also cleared. The fault reset procedure will fail if faults have been latched and the master has not reset the amplifier enable control bits (MDT bits 13-15).

Some faults specified in IDN11 and IDN129 (e.g. faulty feedback, faulty commutation, for details see ASCII – Command ERRCODE) require a coldstart, which IDN99 performs automatically when required. The sercos<sup>®</sup> ring is thus automatically reset to phase 0. Other amplifiers respond to this according to the standard with error message F29 “SER-COS fault” (see also IDNP3016).

The IDN99 procedure will not reset faults if MDT controlword bits 14 and 15 are set during CP4.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.75 IDN100 Velocity Loop Proportional Gain

Proportional Gain for the proportional-integral velocity loop controller. If the gain is too low, then the amplifier may respond slowly or have poor damping. If the value is too high, then the amplifier may whistle or oscillate.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0.01	Run-Up Check:	
Maximum:	3692	Cyclic Transfer:	
Default:	0.46	ASCII Param.:	GV * 100

### 3.76 IDN101 Velocity Loop Integral Action Time

The integral action time for the proportional-integral velocity loop controller. With IDN101=0, the integrator is switched off. If the value is too low, then the amplifier may run roughly or may oscillate. If the value is too high, the amplifier response may be sluggish.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0 , IDN 100 / 625	Run-Up Check:	
Maximum:	1000.0	Cyclic Transfer:	
Default:	10	ASCII Param.:	GVTN * 10
Units:	0.1 ms	Version:	

### 3.77 IDN103 Modulo Value

If the modulo format is on (IDN76 bit 7 = 1), the modulo value determines at which numeric value the position data switch back to the start value. The following conditions for the modulo value will check during run-up:

1. If linear scaling and modulo format is selected within IDN76 and the feed constant IDN123 is smaller than  $2^{20}$ , IDN103 must be smaller than  $2^{10} * IDN123$ .
2. If rotational scaling and modulo format is selected within IDN76 and rotational position resolution IDN79 is smaller than  $2^{20}$ , IDN103 must be smaller than  $2^{10} * IDN79$ .
3. If rotational scaling and modulo format is selected within IDN76 and rotational position resolution IDN79 is greater than  $2^{20}$ , IDN103 must be smaller than  $2^{20} / IDN79$ .
4. The modulo value and the current position resolution must be dividable without remainder.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:	1	Run-Up Check:	CP3
Maximum:	$2^{31}-1$	Cyclic Transfer:	
Default:	$2^{31}-1$	ASCII Param.:	ERND / SRND
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.78 IDN104 Position Loop Proportional Gain

The proportional gain for the proportional position loop controller. If the gain is too low, then the drive may respond with a time lag or have poor damping. If the value is too high, then the drive may whistle or oscillate.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	65000	Cyclic Transfer:	
Default:	600	ASCII Param.:	GP * 6000
Units:	0.01 (m/min)/mm ≡ 0.01 (in/min)/mil ≡ 0.01 (kRPM)/rev	Version:	

**3.79 IDN106 Current Loop Proportional Gain 1**

The proportional gain for the torque producing current (D) within the proportional-integral current loop controller.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0.001	Run-Up Check:	
Maximum:	1.5	Cyclic Transfer:	
Default:	0.1	ASCII Param.:	MLGQ / 10

**3.80 IDN107 Current Loop Integral Action Time 1**

The integral time for the torque producing current within the proportional-integral current loop controller.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	200	Run-Up Check:	
Maximum:	10000	Cyclic Transfer:	
Default:	600	ASCII Param.:	KTN * 1000
Units:	µs	Version:	

**3.81 IDN108 Feedrate Override**

The feedrate override is activated only with amplifier-controlled procedure commands. The velocity setpoint is then calculated by the amplifier internally. IDN108 has a multiplying effect on the velocity setpoint value.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	10000	Cyclic Transfer:	
Default:	10000	ASCII Param.:	OVERRIDE *625 / 512
Units:	0.01%	Version:	

**3.82 IDN109 Motor Peak Current**

If the motor peak current is less than that of the amplifier, the amplifier is automatically limited to the level of the motor peak current.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:	0.1 * IDN110	Run-Up Check:	
Maximum:	2 * IDN110	Cyclic Transfer:	
Default:	IDN110	ASCII Param.:	MIPEAK * 1000
Units:	mA	Version:	

**3.83 IDN110 Amplifier Peak Current**

This value is defined by the hardware.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	Hardware defined	ASCII Param.:	DIPEAK * 1000
Units:	mA	Version:	

**3.84 IDN111 Motor Continuous Stall Current**

This parameter is used as a reference for all torque data and for determining motor-related current values from torque data.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:	0.1 * IDN112	Run-Up Check:	
Maximum:	2.0 * IDN112	Cyclic Transfer:	
Default:	IDN112	ASCII Param.:	MICONT * 1000
Units:	mA	Version:	

**3.85 IDN112 Amplifier Rated Current**

This hardware-defined variable is automatically determined by the amplifier.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	Hardware defined	ASCII Param.:	DICONT
Units:	mA	Version:	

**3.86 IDN113 Maximum Motor Speed**

The motor's maximum recommended speed, as listed in the motor specification sheet provided by the manufacturer.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:	0	Run-Up Check:	
Maximum:	12000 RPM	Cyclic Transfer:	
Default:	3000 RPM	ASCII Param.:	MSPEED
Units:	IDN44,45,46 (Default: RPM / 10000)	Version:	
IDN Type:	Motor compatibility		

**3.87 IDN114 System Load Limit**

The system's continuous load rating. The continuous load rating is defined as a percentage of the system's continuous current. When the load limit is exceeded, the amplifier sets the overload warning bit in the C2D (IDN12, bit 0).

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	100	Cyclic Transfer:	
Default:	80	ASCII Param.:	I2TLIM
Units:	% of min (IDN111, 112, or P3020)	Version:	

**3.88 IDN116 Resolution of Rotational Feedback 1 (Motor Feedback)**

The motor's rotary feedback resolution (refer to IDN79).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:	2	Run-Up Check:	
Maximum:	$2^{31}-1$	Cyclic Transfer:	
Default:	1048576	ASCII Param.:	BUSP6
Units:	Counts	Version:	

**3.89 IDN117 Resolution of Rotational Feedback 2 (External Feedback)**

The resolution of the external feedback 2 contains the cycles per revolution of an external feedback (IDN53). The resolution of the external position feedback depends on this parameter and the multiplication factor 2 (IDN257).

resolution = external feedback (IDN117) x 4 x multiplication factor 2 (IDN257)

The maximum resolution is set within IDN79 divide by 4, the amplifier checks during run-up, that the setting will not give a bigger value. In this case the amplifier automatically calculates a new multiplication factor 2 (IDN257).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2
Minimum:	12	Run-Up Check:	
Maximum:	262144 (16384)	Cyclic Transfer:	
Default:	0	ASCII Param.:	BUSP7
Units:	Lines per revolution	Version:	

**3.90 IDN119 Current Loop Proportional Gain 2**

The proportional gain for the field-producing current (D) within the proportional-integral current loop controller. The parameter specifies the relative gain in reference to MLGQ (see also IDN106). 60 indicates that the gain of the D current controller is 60% of MLGQ.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:	1	Run-Up Check:	
Maximum:	3 000	Cyclic Transfer:	
Default:	100	ASCII Param.:	MLGQ * 100
Units:		Version:	1.38

### 3.91 IDN120 Current Loop Integral Action Time 2

The integral time for the field-producing current within the proportional-integral current loop controller. See IDN 107.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:	200	Run-Up Check:	
Maximum:	10 000	Cyclic Transfer:	
Default:	600	ASCII Param.:	KTN * 1000
Units:	µs	Version:	

### 3.92 IDN121 Input Revolutions of Load Gear

Input revolution values must be entered as integers. The relation between IDN121 and 122 can be between 0.01 and 100.

$$\text{Gear ratio} = \frac{\text{Input revolution (IDN121)}}{\text{Output revolutions (IDN122)}}$$

#### Basic Example for Ratio 1

100 = 100 motor revolutions per revolution at the load.

#### Basic Example for Ratio 2

0.01 = 1 motor revolution per 100 revolutions at the load.

For example:

Motor: 770 rpm, load 17.5 rpm => gear ratio = 42.5 and is therefore within the permissible range.

The IDNs would have the following settings, for example: IDN 121 = 85, IDN 122 = 2.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP 3
Minimum:	IDN122 / 100	Run-Up Check:	
Maximum:	IDN122 * 100	Cyclic Transfer:	
Default:	1	ASCII Param.:	BUSP3

### 3.93 IDN122 Output Revolutions of Load Gear

Output revolution values must be entered as integers.

The relation between IDN121 and 122 can be between 0.01 and 100 (⇒ IDN 121).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP 3
Minimum:	IDN121 / 100	Run-Up Check:	
Maximum:	IDN121 * 100	Cyclic Transfer:	
Default:	1	ASCII Param.:	BUSP4

### 3.94 IDN123 Feed Constant

The feed constant describes the machine element which converts a rotational motion into a linear motion. IDN123 indicates the linear distance during one revolution of the feed spindle. This IDN is only active when linear scaling in IDN76 is selected. This IDN also describes the feed at linear rotational speed scaling.

By using parameter 121 and 122 the minimum changes to min:  $100 \times (\text{IDN122}/\text{IDN121})$  and the maximum to max:  $100,000,000 \times (\text{IDN122}/\text{IDN121})$

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2
Minimum:	100	Run-Up Check:	
Maximum:	10,000,000	Cyclic Transfer:	
Default:	100,000	ASCII Param.:	BUSP5
Units:	IDN76, 77, 78	Version:	

### 3.95 IDN126 Torque threshold Tx

Threshold for IDN333.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	
Units:	IDN86	Version:	

### 3.96 IDN127 Command: Communication Phase 3 Transition Check

Ensures that the amplifier is ready to switch from CP2 to CP3. The master must successfully execute this procedure prior to switching from CP2 to CP3. If the procedure fails, IDN21 will contain a list of IDNs that the amplifier considers invalid.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.97 IDN128 Command: Communication Phase 4 Transition Check

Ensures that the amplifier is ready to switch from CP3 to CP4. The master must successfully execute this procedure prior to switching from CP3 to CP4. If the procedure fails, IDN22 will contain a list of IDNs that the amplifier considers invalid.

If any of the macros have been changed in CP2 or CP3, the amplifier will re-compile the macro program and perform a warmstart, which may take up to 3 minutes. During the warmstart, the LED on the front panel of the amplifier add with the three dots will flashing. During the warmstart IDN182 Bit 1 is set, it will cleared after the warmstart.

Alternatively, the serial interface may be used to save all values and reset the amplifier before the CP4 transition check procedure is executed.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP3
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.98 IDN129 Manufacturer Class 1 Diagnostic (MC1D)

Lists the status of the latched manufacturer-defined amplifier faults. In this fault situation the amplifier decelerates to a stop and disables. The C1D status bit (AT status bit 13) is set, IDN11 bit 15 (manufacturer status class C1D / manufacturer specific fault) is set, and the corresponding manufacturer-defined fault bit is set within IDN129. Refer to IDN11 and IDN99.

Bit	Description	Coldstart	Error
LSB 0	AS (restart lock)	yes	F27
1	Non-volatile memory checksum fault	yes	F09, F10
2	Warning-Fault (actual warning is mask to a fault)	no	F24
3	Motor holding brake fault	yes	F11
4	Supply voltage not present	no	F16
5	A/D converter fault	yes	F17
6	Regen fault	yes	F18
7	System fault	yes	F32
8	Macro fault	no	F31
9	Motor overspeed fault	no	F08
10	Excessive position setpoint difference	No	F28
11	Impermissible software-enable (no hardware-enable), refer to IDNP3028	No	F29
12 - 15			

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	ERRCODE

### 3.99 IDN130 Probe 1 Positive Edge Value

The “Probing” procedure (IDN170) is used to capture a position when a digital input changes. IDN130 will contain the captured position when the “Probe Control Parameter” (IDN169, bit 0) is configured for probe 1 to capture the position on the rising edge of the digital input. Selection of the source of the position information ⇒ IDNP 3018.

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	AT
Default:		ASCII Param.:	LATCH1P32
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.100 IDN131 Probe 1 Negative Edge Value

The “Probing” procedure (IDN170) is used to capture a position when a digital input changes. IDN131 will contains the captured position when the “Probe Control Parameter” (IDN169, bit 1) is configured for probe 1 to capture the position on the falling edge of the digital input. Selection of the source of the position information ⇒ IDNP 3018.

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	AT
Default:		ASCII Param.:	LATCH1N32
Units:	IDN76, 77, 78, 79, 123	Version:	



### 3.101 IDN132 Probe 2 Positive Edge Value

The “Probing” procedure (IDN170) is used to capture a position when a digital input changes. IDN132 will contains the captured position when the “Probe Control Parameter” (IDN169, bit 2) is configured for probe 2 to capture the position on the rising edge of the digital input. Selection of the source of the position information ⇒ IDNP 3018.

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	AT
Default:		ASCII Param.:	LATCH2P32
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.102 IDN133 Probe 2 Negative Edge Value

The “Probing” procedure (IDN170) is used to capture a position when a digital input changes. IDN133 will contains the captured position when the “Probe Control Parameter” (IDN169, bit 3) is configured for probe 2 to capture the position on the falling edge of the digital input. Selection of the source of the position information ⇒ IDNP 3018.

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	AT
Default:		ASCII Param.:	LATCH2N32
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.103 IDN134 Master Control Word

The amplifier's control word within the MDT is stored within IDN134 as a diagnostic aid. More detailed information can be found in the sercos® standards (see MDT Control Bit 13-15 ⇒ p. 20).

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	

**Control word, length: two bytes**

Bit No.	Control word description
<b>Bits 15-13</b>	
<b>1 1 1</b>	Amplifier should follow the setpoints
<b>Bit 15 (MSB)</b>	Amplifier ON/OFF
<b>0</b>	Amplifier OFF
<b>1</b>	Amplifier ON: when changing from 0 -> 1: drive follows the master's setpoints
<b>Bit 14</b>	Enable amplifier
<b>0</b>	Not enabled: when changing from 1 -> 0, torque is immediately disabled and the power stage pulses are blocked (independent of bits 15 and 13).
<b>1</b>	Enable Amplifier : when changing from 0 -> 1, the enable is delayed in the amplifier by the amplifier enable delay time.
<b>Bit 13</b>	Halt/Restart Amplifier
<b>0</b>	Halt Amplifier : when changing from 1 -> 0, amplifier is halted according to the „amplifier acceleration bipolar“ parameter and the control loop remains closed (only possible when bits 15 and 14 are set to 1).
<b>1</b>	Restart Amplifier : when changing from 0 -> 1, original function is continued. Only in velocity control the amplifier has to use the „amplifier acceleration bipolar“. In position control the control unit has to set position setpoints to the position feedback value before bit 13 is set.
<b>Bit 12</b>	Reserved
<b>Bit 10</b>	IPOSYNC: Control unit synchronization bit , not supported
<b>Bits 11,9, 8</b>	Operation mode
<b>0 0 0</b>	Primary operation mode (defined by operation data IDN32).
<b>0 0 1</b>	Secondary operation mode 1 (defined by operation data IDN33)
<b>0 1 0 ... 1 1 1</b>	not supported
<b>Bit 7</b>	Real-time control bit 2
<b>Bit 6</b>	Real-time control bit 1
<b>Bits 5, 4, 3</b>	Data block element
<b>0 0 0</b>	Service channel not active, close service channel or break active transmission
<b>0 0 1</b>	IDN of the operation data. Service channel is closed for the previous IDN and opened for a new IDN
<b>0 1 0</b>	Name of operation data
<b>0 1 1</b>	Attribute of operation data
<b>1 0 0</b>	Unit of the operation data
<b>1 0 1</b>	Minimum input value
<b>1 1 0</b>	Maximum input value
<b>1 1 1</b>	Operation data
<b>Bit 2</b>	
<b>0</b>	Transmission in progress
<b>1</b>	Last transmission
<b>Bit 1</b>	R/W (read/write)
<b>0</b>	Read service INFO
<b>1</b>	Write service INFO
<b>Bit 0</b>	MHS
<b>0/1</b>	Service transport handshake of the master

### 3.104 IDN135 Amplifier Status Word

The AT telegram status word is stored within IDN135 as a diagnostic aid.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

#### Status word, length: two bytes

Bit No.	Status word description
<b>Bits 15-14</b>	Ready to operate
0 0	Amplifier not ready, internal checks not yet concluded successfully
0 1	Amplifier logic ready for main power on (power stage section)
1 0	Amplifier ready and main power applied, drive is free of torque, power stage pulses are blocked
1 1	Amplifier ready to operate, 'enable amplifier' is set and active. Power stage is active
<b>Bit 13</b>	Amplifier shut-down error in C1D (IDN11)
0	No shut-down
1	Amplifier is shut-down due to error
<b>Bit 12</b>	Change bit for C2D (IDN12)
0	No change
1	Change
<b>Bit 11</b>	Change bit for C3D (IDN13)
0	No change
1	Change
<b>Bits 10, 9, 8</b>	Actual operation mode
0 0 0	Primary operation mode (defined by IDN32)
0 0 1	Secondary operation mode 1 (defined by IDN33)
0 1 0 ... 1 1 1	not supported
<b>Bit 7</b>	Real-time status bit 2 (IDN306)
<b>Bit 6</b>	Real-time status bit 1 (IDN304)
<b>Bit 5</b>	Procedure command change bit
0	No change in procedure command acknowledgement
1	Changing procedure command acknowledgment
<b>Bit 4</b>	(Reserved)
<b>Bit 3</b>	not supported
<b>Bit 2</b>	Error in service channel
0	No error
1	Error in service channel, error message in amplifier service INFO
<b>Bit 1</b>	Busy
0	Step finished, ready for new step
1	Step in progress, new step not allowed
<b>Bit 0</b>	AHS
0/1	Service transport handshake of the amplifier

**3.105 IDN136 Positive Acceleration Limit Value**

Defines the amplifier's maximum positive acceleration when the amplifier is in velocity mode or position mode.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	1	Run-Up Check:	
Maximum:	IDN138	Cyclic Transfer:	
Default:	10	ASCII Param.:	ACC
Units:	IDN160, 161, 162	Version:	

**3.106 IDN137 Negative Acceleration Limit Value**

Defines the amplifier's maximum deceleration (negative acceleration) when the amplifier is in velocity mode or position mode.

The amplifier alternatively uses the quick deceleration limit (IDNP3022) under the following conditions: position limits are encountered, a fault has occurred, or the master has requested an active disable (MDT control word, bit 15). The quick deceleration limit (IDNP3022) is always used by the amplifier when these conditions occur.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	-IDN138	Run-Up Check:	
Maximum:	-1	Cyclic Transfer:	
Default:	-10	ASCII Param.:	DEC
Units:	IDN160, 161, 162	Version:	

**3.107 IDN138 Bipolar Acceleration Limit Value**

This parameter limits the acceleration symmetrically to the programmed value in both directions (from firmware 2.26).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	$2^{15} - 1$	Cyclic Transfer:	
Default:	31400	ASCII Param.:	Busp8
Units:	IDN160, 161, 162	Version:	

**3.108 IDN140 Controller Type**

The operation data of the controller type contains the name of the company and the manufacturer's controller type. If necessary, the master can use this IDN to read the text description for the controller type. For example, with a SERVOSTAR 303, if IDN140 is read via the service channel, "SR 303" is returned.

Data Length:	1 byte elements, variable length array	Non-Volatile:	Yes
Data Type:	Text	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	HVER

### 3.109 IDN141 Motor Type

The master may use this IDN to read or write the motor type text describing. With IDNP 3046 the master can select the motor that is used from the motor database of the amplifier.

Data Length:	1 byte elements, variable length array	Non-Volatile:	Yes
Data Type:	Text	Write Access:	CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	"NN"	ASCII Param.:	MNAME

### 3.110 IDN142 Application Type

The master may use this IDN to store text describing the amplifier's application.

Data Length:	1 byte elements, variable length array	Non-Volatile:	Yes
Data Type:	Text	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	"DRIVE0"	ASCII Param.:	ALIAS

### 3.111 IDN143 System Interface Version

Contains the version number of the sercos<sup>®</sup> specification. The amplifier conforms this version of the specification.

Data Length:	1 byte elements, variable length array	Non-Volatile:	Yes
Data Type:	Text	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	"V01.10"	ASCII Param.:	

### 3.112 IDN146 Command: NC-Controlled Homing

When the master sets and enables the control unit controlled homing procedure command, the servo amplifier reacts on the programmed or assigned signals (home switch IDN400, reference marker pulse of the feedback system). For more information see sercos<sup>®</sup> specification.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.113 IDN147 Homing Parameter

**NOTE**

Using IDN147 and its configuration IDNs (41, 42) is sercos® standard. The servo amplifier interprets these IDNs to set the ASCII parameter NREF (see IDNP3027). It's much easier to use IDNP3027 instead of setting IDN147 (and IDN41 and 42).

The "Amplifier-Controlled Homing" procedure (IDN148) is configured through IDN41, IDN42 and IDN147.

If command IDN148 is active, then IDN147 is write protected (from firmware 2.26).

If the home switch is evaluated by the amplifier (bit 1=0 and bit 2=1), only the bits 0, 5 and 6 are supported.

All other reserved bits must be set as indicated within the following table. For the different homing types refer also to IDNP3027.

If the position control is set on the external feedback, bit 3 must be set to 1.

Bit	Description	Setting 0	Setting 1
LSB 0	Homing direction*	CW	CCW
1	Not supported	Set to 0	
2	Home switch location	Master	Amplifier
3	Feedback source	Motor	External
4	Home enable evaluation	Home switch+IDN407	IDN 407 only
5	Home switch evaluation	Evaluate	Not evaluated
6	Marker pulse evaluation	Evaluate	Not evaluated
7	Reserved: Stop condition	After position capture	On home position (IDN52,54)
8	Not supported	Set to 0	
9	To limit switch	Evaluate	Not evaluated
10	To mechanical stop with torque	Evaluate	Not evaluated
11 - 15	Reserved.	Set to 0	

\* Direction as defined by IDNP3025. IDN55 defines direction from the sercos® master's view.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0085h	ASCII Param.:	

### 3.114 IDN148 Command: Amplifier-Controlled Homing

The amplifier automatically enters an internal position mode and homes the amplifier. Homing is configured through the “Homing Velocity” (IDN41), “Homing Acceleration” (IDN42) and the “Homing Parameter” (IDN147/147 or IDNP3027).

Homing will fail under the following conditions:

- 1) The amplifier is disabled (Enable=0V), or the master clears any of the enable bits (MDT bits 13-15) during amplifier-controlled homing. With disabled amplifier you can start NREF 0, if the master has set MDT bit 13.
- 2) The “Probing” procedure (IDN170) is active.
- 3) The home switch is located on the amplifier (IDN147, bit 2 is set) and will be evaluated during homing (IDN147, bit 5 is clear) and a configurable input has not been configured as a home switch input.
- 4) A fault occurs during amplifier-controlled homing.

The master should not cancel the amplifier-controlled homing procedure until it has aligned its position setpoint with the amplifier’s present position setpoint. The master controller may abort amplifier-controlled homing by first stopping the amplifier through the start/stop bit (MDT control bit 13), aligning its position setpoint with the amplifier and then canceling the procedure.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.115 IDN159 Monitoring Window

The monitoring window defines the maximum position error. When the absolute distance between the active position setpoint and active position feedback exceeds the monitoring window, an “excessive position deviation” fault F03 is generated (IDN11, bit 11).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	$2^{31} - 1$	Cyclic Transfer:	
Default:	262144	ASCII Param.:	PEMAX
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.116 IDN160 Acceleration Data Scaling Type

Defines the scaling options for all acceleration data. For the no scaling option, all acceleration data are scaled in ms, to reach the bipolar velocity limit. A new value will not become active until the parameter is saved to non-volatile memory and a coldstart or warmstart (IDN128) procedure is initiated

Bit		Description
2 - 0	Scaling Method	000 = No Scaling 001 = Reserved: Linear Scaling 010 = Rotational Scaling
3	Standard Scaling Type	0 = Preferred Scaling 1 = Parameter Scaling
4	Units for Linear Scaling	0 = Meters (m)
4	Units for Rotational	0 = Radian (rad)
5	Time Units	0 = Seconds (s)
6	Data Reference	0 = At the Motor Shaft
15-7	Reserved.	

\* The rotational parameter scaling setting (IDN160 = 000Ah), can not be saved in the EEPROM (refer to IDN161, 162).

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2, CP3
Minimum:	0	Run-Up Check:	
Maximum:	000Ah	Cyclic Transfer:	
Default:	1	ASCII Param.:	ACCUNIT

### 3.117 IDN161 Acceleration Data Scaling Factor

Only for rotational parameter scaling (refer to IDN 160).

This parameter defines the scaling factor for all acceleration data in the amplifier.

$$LSB\ Weight = factor(IDN161) \cdot 10^{\text{exponent}(IDN\ 162)} \left\{ \frac{rad}{s^2} \right\}$$

$$Preferred\ scaling(default) = 1 \cdot 10^{-3} \left\{ \frac{rad}{s^2} \right\}$$

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	1	ASCII Param.:	



### 3.118 IDN162 Acceleration Data Scaling Exponent

Only for rotational parameter scaling (refer to IDN 160).

This parameter defines the scaling exponent for all acceleration data in the amplifier.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3
Minimum:	-3	Run-Up Check:	
Maximum:	0	Cyclic Transfer:	
Default:	-3	ASCII Param.:	

### 3.119 IDN169 Probe Control Parameter

The probe control parameter defines the input signal edge that will result in a position capture during the "Probing" procedure (IDN170). Each probe may be used to capture positions on both probe signal edges, but the probe edges must be separated by at least 0.5 milliseconds.

The table below describe the fixed settings if only digital input 2 is used for the latched function. For the other settings please refer also to IDNP3018.

Bit	Description	Setting
LSB 0	Probe 1 - Capture motor position on positive edge	0 = Inactive. 1 = Active.
1	Probe 1 - Capture motor position on negative edge	0 = Inactive. 1 = Active.
2	Probe 2 - Capture external position on positive edge	0 = Inactive. 1 = Active.
3	Probe 2 - Capture external position on negative edge	0 = Inactive. 1 = Active.
4 - 15	Reserved.	Set to 0.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	15	Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.120 IDN170 Command: Probing

Probing is used to capture position data when a digital input changes. Each probe may trigger a position capture using both edges (rising and/or falling) of the digital input signal, as long as the edges are separated by at least 0.5 milliseconds. The “Probe Control Parameter” (IDN169) is used to configure the digital input edges that will trigger a position capture. Once the probe procedure is started by the master (set IDN170 to 3), it will continue indefinitely until either the master cancels the probing procedure or a probing error occurs.

The probing procedure will fail under the following conditions:

- 1) The “Homing” procedure (IDN148) is active.
- 2) A digital input has not been configured as a position capture input (IDNP3001).

During the activation of the probing procedure, the master arms the probe trigger by setting a “Probe Enable” signal (IDN405 or IDN406). After the probe trigger has been armed, the next rising and/or falling edge(s) (as specified in IDN169) on the probe inputs (IDN401 or IDN402) will latch the motor position and cause the corresponding “Probe Position Latch Status” (IDN179) bits to set.

Any further changes in the probe input are ignored until the master re-arms the probe trigger by clearing and setting the probe enable signal. The master may read captured positions through the “Probe 1+2 Positive Edge Value” (IDN130 and IDN132) and the “Probe 1+2 Negative Edge Value” (IDN131 and IDN133).

The amplifier supports two physical probe input that must be pre-configured through IDNP3001 and IDNP3000 or the amplifier setup software before starting the probe procedure.

Configuration will be selected with IDNP3018: Probe 1 = Input 1, Probe 2 = Input 2

It is possible to use only one physical probe input (digital input 2) with the two logical probes that are operated independently. Logical probe 1 then supports capturing the motor feedback while logical probe 2 supports capturing the external feedback. Accuracy see ASCII reference

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.121 IDN179 Probe Position Latch Status

The probe status parameter indicates whether a position has been captured and latched within one of the "Probe Edge Value" IDNs (IDNs 130 through 133). IDN179 duplicates the information found in IDNs 409 through 412.

Bit	Description	Setting
LSB 0	Probe 1 - Position latched on positive edge (IDN130)	0 = No. 1 = Latched.
1	Probe 1 - Position latched on negative edge (IDN131)	0 = No. 1 = Latched.
2	Probe 2 - Position latched on positive edge (IDN132)	0 = No. 1 = Latched.
3	Probe 2 - Position latched on negative edge (IDN133)	0 = No. 1 = Latched.
4 - 15	Reserved.	Set to 0.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.122 IDN181 Manufacturer Class 2 Diagnostic (MC2D)

Lists the manufacturer-defined warnings for the amplifier. If a warning condition is set or reset within IDN181, the manufacturer class 3 diagnostic bit (IDN12 bit 15) is set as well. When IDN181 is read via the service channel, the bit 15 of IDN12 will reset to 0.

Bit	Description	Setting
LSB 0	Voltage monitoring of SinCos feedback	0 = no warning 1 = warning
1-15	Reserved	

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.123 IDN182 Manufacturer Class 3 Diagnostic (MC3D)

Lists the manufacturer-defined status flags for the amplifier. If a status condition is set or reset within IDN182, the manufacturer class 3 diagnostic bit (IDN13 bit 15) is set as well. When IDN182 is read via the service channel, the bit 15 of IDN13 will reset to 0.

Bit	Description	Setting
LSB 0	Hardware enable	0 = not exist 1 = exist
1	warm boot (IDN128)	0 = not running 1 = still running
2	wake&shake not finished	
2 - 15	Reserved	

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.124 IDN185 Maximum Length of AT Configurable Data

Defines the maximum length, in bytes, of the AT's cyclic data field. The master may use this IDN to determine how many IDNs may be placed within the application telegram (refer to IDN15).

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	24	ASCII Param.:	
Units:	Bytes	Version:	

### 3.125 IDN186 Maximum Length of MDT Configurable Data

Defines the maximum length, in bytes, of the MDT's cyclic data field. The master may use this IDN to determine how many IDNs may be placed within an application telegram (refer to IDN15).

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	12	ASCII Param.:	
Units:	Bytes	Version:	

### 3.126 IDN187 List of AT Configurable Data IDNs

Lists all the IDNs that may be transferred as AT cyclic data. The master may use this IDN to determine the IDNs that may be placed within an amplifier telegram (refer to IDN15). The following IDNs may be assigned as AT cyclic data:

IDN	Description	IDN	Description
11	Class 1	P3012	Difference Probe Edge Value 1
40	Velocity Feedback Value	P3013	Difference Probe Edge Value 2
51	Position Feedback Value 1 (motor)	P3030	Digital Input 1 Status
53	Position Feedback Value 2 (external)	P3031	Digital Input 2 Status
59	Position Switch Flag Parameter	P3032	Digital Input 3 Status
80	Torque Setpoint Feedback	P3033	Digital Input 4 Status
84	Torque Feedback Value	P3034	Analog Input 1 Value
129	Manufacturer-Class 1	P3035	Analog Input 2 Value
130	Probe 1 Positive Edge Value	P3050	Analog Output 1 Value
131	Probe 1 Negative Edge Value	P3051	Analog Output 2 Value
132	Probe 2 Positive Edge Value	P3054	DPRVAR 1
133	Probe 2 Negative Edge Value		
189	Following Distance		
347	Velocity Control Deviation		

Data Length:	2 byte elements, variable length array	Non-Volatile:	Fix
Data Type:	IDN	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.127 IDN188 List of MDT Configurable Data IDNs

Lists all the IDNs that may be transferred as MDT cyclic data. The master may use this IDN to determine the IDNs that may be placed within an application telegram (refer to IDN15).

The following IDNs may be assigned as MDT cyclic data:

IDN	Description	IDN	Description
36	Velocity setpoint	P3036	Digital Output 1 Control/Status
47	Position setpoint	P3037	Digital Output 2 Control/Status
60	Position Switch Point 1	P3045	Integral Preload Current
62	Position Switch Point 3	P3050	Only /: Analog Output 1 Value
64	Position Switch Point 5	P3051	Only /: Analog Output 2 Value
66	Position Switch Point 7	P3053	DPRVAR 9
80	Torque setpoint	P3055	Only : External Velocity Feed Forward
81	Additive Torque setpoint	P3056	Only : External Acceleration Feed Forward
92	Bipolar Torque Limit		

Data Length:	2 byte elements, variable length array	Non-Volatile:	Fix
Data Type:	IDN	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.128 IDN189 Following Distance

The distance between the position setpoint value and the appropriate position feedback value (1 or 2). The amplifier calculates this value by subtracting the position feedback value (1 or 2) from the position setpoint value.

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	AT
Default:		ASCII Param.:	PE
Units:	IDN76, 77, 78, 79, 123	Version:	

### 3.129 IDN192 IDN List of Back-up Operation Data

A list of all IDNs which are essential for amplifier operation. The master may use this list to back-up the amplifier parameters. If the amplifier is replaced, the IDNs within this list may be reloaded into the replacement amplifier using the order defined within IDN288 and IDN289 or direct the order of the list within this IDN.

Data Length:	2 byte elements, variable length array	Non-Volatile:	Fix
Data Type:	IDN	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.130 IDN196 Motor Rated Current

The motor's rated current. If the motor rated current is less than that of the amplifier, the amplifier is automatically limited to the level of the motor rated current.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:	0.1 * IDN112	Run-Up Check:	
Maximum:	2 * IDN112	Cyclic Transfer:	
Default:	IDN112	ASCII Param.:	MICONT*1000
Units:	mA	Version:	

### 3.131 IDN197 Command; Set coordinate system

After activation of the command "Set coordinate system", the servo amplifier ignores the position setpoint and instead transfers the programmed "Initial coordinate value" into the amplifier-internal position command. For more information see sercos<sup>®</sup> specification.

### 3.132 IDN200 Amplifier Temperature Warning Threshold

If the amplifier temperature exceeds the threshold, the amplifier sets the corresponding warning bit in IDN12 (IDN12 C2D bit 2).

Data Length:	2 bytes	Non-Volatile:	no
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	600	ASCII Param.:	
Units:	IDN208	Version:	

**3.133 IDN201 Motor Temperature Warning Threshold**

If the motor temperature exceeds the threshold, the amplifier sets the corresponding warning bit in IDN12 (IDN12 C2D bit 3).

Data Length:	2 bytes	Non-Volatile:	no
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	2500	ASCII Param.:	
Units:	Ohm	Version:	

**3.134 IDN203 Amplifier Shutdown Temperature**

When the amplifier temperature (heat sink temperature) exceed the value of the amplifier shutdown temperature, the amplifier sets the fault bit for amplifier over temperature fault in C1D (IDN11 bit 1).

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	200	Run-Up Check:	
Maximum:	850	Cyclic Transfer:	
Default:	800	ASCII Param.:	MAXTEMPH * 10
Units:	IDN208	Version:	

**3.135 IDN205 Cooling Error Shutdown Temperature**

When the temperature inside the amplifier housing exceed the value of the cooling error shutdown temperature, the amplifier sets the fault bit for cooling system fault in C1D (IDN11 bit 3).

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	100	Run-Up Check:	
Maximum:	800	Cyclic Transfer:	
Default:	700	ASCII Param.:	MAXTEMPE * 10
Units:	IDN208	Version:	

**3.136 IDN208 Temperature Data Scaling Type**

Defines the scaling options for all temperature data.

Bit		Description
0	Scaling Method	0 = 0.1°C
15-1		

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0000h	ASCII Param.:	

**3.137 IDN256 Multiplication Factor 1**

The multiplication factor 1 defines the amplifier internal multiplication of an rotary encoder for the position feedback value 1 (IDN51).

Data Length:	4 Byte	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	256	ASCII Param.:	

### 3.138 IDN257 Multiplication Factor 2

The multiplication factor 2 defines the amplifier internal multiplication of an rotary encoder as an external feedback for the position feedback value 2 (IDN53). If the resolution of feedback 2 (IDN117) is not a result of 2x, the amplifier may use an additional scaling for IDN53.

If the master write IDN117 the amplifier calculate automatic the "Multiplication factor 2" (IDN257), for the external feedback, and an additional scaling factor if necessary, to scale the external feedback to the rotational position resolution set within IDN79 (refer to IDN53, 79 and 117). The amplifier also does the automatic calculation for position control with external feedback.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	256	ASCII Param.:	

### 3.139 IDN262 Command: Load Default Values

Loads the manufacturer's default parameters into volatile memory. The parameters stored in non-volatile memory remain unchanged. The default parameters allow the amplifier to operate without problems, but the operation is not necessarily optimized.

This procedure will normally modify the amplifiers startup program, and the amplifier will re-compile the start-up program and perform a warmstart in the CP4 transition check, which may take up to 3 minutes. During the warmstart, the LED on the front panel of the amplifier will flash 3 dots. During the warmstart IDN182 Bit 1 is set, it will be cleared after the warmstart. Alternatively, the serial interface (setup software or terminal program) may be used to save all values and reset the amplifier before the CP4 transition check procedure is executed.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	RSTVAR

### 3.140 IDN264 Command: Back-up Working Memory

This command saves all data essential for amplifier operation from the active memory to the non-volatile memory. IDN192 defines which data is essential for amplifier operation. Previously saved data is overwritten.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	SAVE

### 3.141 IDN265 Language Selection

Defines the language of all text messages.

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Unsigned decimal	Write Access:	read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	1 = English	ASCII Param.:	



**3.142 IDN278 Maximum Traverse**

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0 or Module value, if active	Run-Up Check:	
Maximum:	$2^{31} - 1$	Cyclic Transfer:	
Default:	0	ASCII Param.:	SWE2

**3.143 IDN288 IDN List of Data Programmable in CP2**

A list of all IDNs that may be written by the master in CP2. The IDNs are listed in the order in which the master should write them to avoid data dependency problems. Data dependency problems may arise, for example, when the range of one IDN depends upon an IDN that has not yet been written.

Data Length:	2 byte elements, variable length array	Non-Volatile:	Fix
Data Type:	IDN	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

**3.144 IDN289 IDN List of Data Programmable in CP3**

A list of all IDNs that may be written by the master in CP3. The IDNs are listed in the order in which the master should write them to avoid data dependency problems. Data dependency problems may arise, for example, when the range of one IDN depends upon an IDN that has not yet been written.

Data Length:	2 byte elements, variable length array	Non-Volatile:	Fix
Data Type:	IDN	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

**3.145 IDN290 Device Type**

Necessary information for some master controls.

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Unsigned decimal	Write Access:	read-only
Minimum:	0	Run-Up Check:	
Maximum:	0	Cyclic Transfer:	
Default:	0	ASCII Param.:	

**3.146 IDN296 Velocity Feed-Forward Gain**

Defines a multiplier for the velocity feedforward value that is generated from the position profile. Velocity feed-forward helps to reduce the velocity-dependent following error. Velocity feed-forward is added to the velocity setpoint when the active operational mode defined by IDN32 and/or IDN33 has bit 3 set and is in position control mode.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	2000	Cyclic Transfer:	
Default:	1000	ASCII Param.:	GPFFV
Units:	0.1%	Version:	

**3.147 IDN298 Home Switch Distance**

The distance of the home switch from the “optimal” location after homing. The “optimal” location is defined as half the distance between successive marker pulses (encoder) or null points (resolvers). The home switch distance may be used to ensure that the home switch is located correctly to avoid inconsistent homing. The home switch distance is not valid until homing has completed successfully (IDN403 is set).

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	
Units:	IDN76, 77, 78, 79, 123	Version:	

**3.148 IDN300 Real-time Control Bit 1**

Assigns a control signal IDN to the real-time control bit 1 (RTC bit 1, MDT control word bit 6). Two RTC bits are defined within the MDT control word (bits 6 and 7) and may be updated every communication cycle by the master.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	IDN	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	
Units:		Version:	

### 3.149 IDN301 Allocation of Real-time Control Bit 1

Assigns a control signal IDN to the real-time control bit 1 (RTC bit 1, MDT control word bit 6). Two RTC bits are defined within the MDT control word (bits 6 and 7) and may be updated every communication cycle by the master.

The following rules govern the assignment and use of RTC bit 1:

Only certain control signal IDNs of type binary may be assigned to the real time control allocation IDNs. The exception is IDN0, which indicates that the real time control bit is undefined.

The following IDNs may be assigned as RTC signals:

IDN	Description	IDN	Description
0	empty IDN	P3036	Digital Out 1
99	Command Clear Fault	P3037	Digital Out 2
405	Enable Latch 1 (IDNP3039=0)	P3038	Enable Latch 1+2 (IDNP3039=1)
406	Enable Latch 2 (IDNP3039=0)	P3057	Disable CAM 1+2
		P3058	Disable CAM 3+4

A new RTC bit assignment must be valid within the amplifier, before the service channel busy bit is reset. After the service channel busy bit from the amplifier is reset, the master can operate with the RTC bit 1 in the master control word.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	IDN	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.150 IDN302 Real-time Control Bit 2

Assigns a control signal IDN to the real-time control bit 2 (RTC bit 2, MDT control word bit 7). Two RTC bits are defined within the MDT control word (bits 6 and 7) and may be updated every communication cycle by the master.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	IDN	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.151 IDN303 Allocation of Real-time Control Bit 2

Assigns a control signal IDN to the real-time control bit 2 (RTC bit 2, MDT control word bit 7). Two RTC bits are defined within the MDT control word (bits 6 and 7) and may be updated every communication cycle by the master. For further information refer to IDN301.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	IDN	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.152 IDN304 Real-Time Status Bit 1

The value of the IDN assigned to RTS bit 1 (see IDN 305).

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.153 IDN305 Allocation of Real-time Status Bit 1

The IDN of a real-time status signal that appears in real-time status bit 1 (AT status word, bit 6). Two real time status bits are defined within the AT status word (bits 6 and 7) and are continuously updated by the amplifier during CP4.

Rules for the assignment and use of a real time status bit (i.e. writing IDN305/307):

Only status signal IDNs of type binary may be assigned to the real time status allocation IDNs. The exception is IDN0, which indicates that the real time status bit is undefined.

The following IDNs may be assigned as RTS signals:

IDN	Description	IDN	Description
0	Reserved	403	Position Feedback Status
334	Message "Torque Limit Value Exceeded"	409	Message "Latch 1 Positive Edge Latched Status"
335	Message "Velocity Limit Value Exceeded"	410	Message "Latch 1 Negative Edge Latched Status"
336	Message "In Position"	411	Message "Latch 2 Positive Edge Latched Status"
400	Home Switch	412	Message "Latch 2 Negative Edge Latched Status"

The master should no longer evaluate a previous real-time status assignment after transmitting a write request for element 7 of a real-time status bit allocation IDN. The previously assigned real-time status bit will remain valid until the service channel busy bit is set.

The master should not start evaluating a new real-time status bit assignment until the service channel busy bit is reset by the amplifier.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	IDN	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.154 IDN306 Real-Time Status Bit 2

The value of the IDN assigned to RTS bit 2 (see IDN 307).

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.155 IDN307 Allocation of Real-time Status Bit 2

The IDN of a real-time status signal that appears in real-time status bit 2 (AT status word, bit 7). Two real-time status bits are defined within the AT status word (bits 6 and 7) and are continuously updated by the amplifier during CP4.

For further information, refer to IDN305.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	IDN	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.156 IDN311 Temperature Warning Amplifier Status

This warning signal IDN is set (bit 0 = 1) when the amplifier temperature exceeds the threshold set in IDN200.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.157 IDN312 Temperature Warning Motor Status

This warning signal IDN is set (bit 0 = 1) when the motor temperature exceeds the threshold set in IDN201.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.158 IDN323 Status “Target position outside of travel range”

A warning signal IDN that is set (Bit 0 = 1) when the target position is outside of the travel range. This IDN will set if the HW- or SW-Limit Switch is active. The amplifier show this by flashing the warning “n10” or “n07” for outside of positive range or “n11” or “n06” outside of negative range. IDN323 duplicates the C2D “Target position outside of travel range” warning bit (IDN12, bit 13).

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	see DRVSTAT

**3.159 IDN333 Status "Torque overrides Tx"**

This status signal IDN is set when the torque feedback value (IDN84) is greater than the torque threshold value Tx (IDN126).

Structure of Bit 0 = 0:  $|T| < |Tx|$  1:  $|T| \geq |Tx|$  )

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	RTS
Default:		ASCII Param.:	

**3.160 IDN334 Status "Torque limit override"**

This status signal IDN is set when the torque setpoint exceeds the torque limit in IDN92. IDN334 duplicates the status bit for C3D (IDN13, bit 4) and may be assigned to an RTS bit (AT status word bit 6 or 7) via IDN305 or IDN307.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	RTS
Default:		ASCII Param.:	

**3.161 IDN335 Status "Velocity limit override"**

This status signal IDN is set when the velocity setpoint exceeds the velocity limit in IDN91. IDN334 duplicates the status bit for C3D (IDN13, bit 5) and may be assigned to an RTS bit (AT status word bit 6 or 7) via IDN305 or IDN307.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	RTS
Default:		ASCII Param.:	

**3.162 IDN336 Status "In Position"**

A status signal IDN that is set when the difference between the position setpoint value and the position feedback value falls within the range defined by the "Position Window" (IDN57). IDN336 duplicates the C3D "In Position" status bit (IDN13, bit 6) and may be assigned to a RTS bit (AT status word bit 6 or 7) through IDN305 or IDN307.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	RTS
Default:		ASCII Param.:	see INPOS, DRVSTAT

**3.163 IDN347 Velocity Control Deviation**

The master retrieves the amplifier's current velocity control deviation via this IDN.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	
Units:	IDN 44, 45, 46	Version:	

**3.164 IDN348 Gain for Acceleration Feed Forward**

If the acceleration feed forward is activated via P-IDN 3052, influences the feed forward gain.

Data Length:	2 Byte	Non-Volatile:	Yes
Data Type:	2 bytes	Write Access:	CP2, CP3, CP4
Minimum:	Unsigned decimal	Run-Up Check:	
Maximum:	1000	Cyclic Transfer:	
Default:	1	ASCII Param.:	GPFFT

**3.165 IDN376 Supported Baud Rate**

Bit	Description	Bit	Description
0	2 Mbit/s	2	8 Mbit/s
1	4 Mbit/s	3	16 Mbit/s

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	1	ASCII Param.:	

**3.166 IDN380 DC Bus Link Voltage**

The master retrieves the amplifier's DC bus link voltage through this IDN.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:	0	Run-Up Check:	
Maximum:	900	Cyclic Transfer:	
Default:		ASCII Param.:	VBUS
Units:	Volt	Version:	

**3.167 IDN383 Motor Temperature**

The master retrieves the motor temperature from the amplifier through this IDN.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	TEMPM * 10
Units:	Ohm	Version:	

**3.168 IDN384 Amplifier Temperature**

The master retrieves the amplifier temperature (heat sink temperature) from the amplifier through this IDN.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	TEMPH * 10
Units:	IDN208	Version:	

**3.169 IDN386 Active Feedback System for Position Control**

See IDNP 3017

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	EXTPOS

**3.170 IDN390 Diagnostic Number**

Messages from IDN95 are displayed in hexadecimal form.

0x0000 0001	amplifier not in phase 4	0x0000 0008	F28
0x0000 0003	amplifier ready for connection to power supply	0x0000 0009	F29 HW enable
0x0000 0004	amplifier disabled	0x0000 000A	IDN11 + IDN29
0x0000 0005	amplifier enabled	0x0000 000B	Software limit switch
0x0000 0006	F29 + IDN14	0x0000 000C	Command "Parking axis" active
0x0000 0007	F05 + F16		

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Hexadecimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	



**3.171 IDN400 Home Switch Status**

Contains the state of the home switch. The digital input used as home switch input is assigned through the use of digital input mode IDNs (IDNP3000, IDNP3001, IDNP3002 or IDNP3003). IDN400 is useful for assigning the home switch signal to a RTS bit.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	RTS
Default:		ASCII Param.:	IN1, IN2, IN3, IN4

**3.172 IDN401 Probe 1 Status**

Contains the state of the probe 1 input. The digital input used as a probe is assigned through the use of IDNP3001. The amplifier updates the probe 1 IDN only when the probing procedure (IDN170) is active and the probe 1 enable (IDN405) is set.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	IN1

**3.173 IDN402 Probe 2 Status**

Contains the state of the probe 2 input. The digital input used as a probe is assigned through the use of IDNP3001. The amplifier updates the probe 2 IDN only when the probing procedure (IDN170) is active and the probe 2 enable (IDN406) is set.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	IN2

**3.174 IDN403 Position Feedback Value Status**

The position feedback value status flag is set by the amplifier during homing when the position feedback is referenced to the machine zero point. The status flag is reset after power-up, and when the "Amplifier-Controlled Homing" procedure (IDN148) is started. IDN403 may be assigned to a RTS bit (AT status word bit 6 or 7) through IDN305 or IDN307.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	

**3.175 IDN405 Probe 1 Enable**

Used to arm the position capture mechanism so that the next valid probing signal edge captures the current position into IDN130 or 131. IDN405 may be assigned to a RTC bit (MDT control word bit 6 or 7) through IDN301 or IDN303. This IDN is write-protected while it is assigned to a RTC bit and could only reset to 0 via the System Communications. Refer to IDN170 and IDNP3038 for more information.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:		ASCII Param.:	

**3.176 IDN406 Probe 2 Enable**

Used to arm the position capture mechanism so that the next valid probing signal edge captures the current position into IDN132 or 133. IDN406 may be assigned to a RTC bit (MDT control word bit 6 or 7) through IDN301 or IDN303. This IDN is write-protected while it is assigned to a RTC bit and could only reset to 0 via the System Communications. Refer to IDN170 and IDNP3038 for more information.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:		ASCII Param.:	

**3.177 IDN409 Probe 1 Positive Edge Latched Status**

Indicates whether captured position data has been latched within IDN130 after the rising edge of the probe 1 input signal (IDN401). Position data can only be latched on the positive edge of probe 1 if the “Probing” procedure (IDN170) is active and the “Probe Control Parameter” (IDN169) has been configured to use the positive edge of probe 1.

Additionally, probe 1 must be armed by setting the “Probe 1 Enable” (IDN405). After arming probe 1, the next probe 1 rising edge will capture the current position and the “probe 1 positive edge latched status” will set when the captured data is available in IDN130. Once the latched status has been set, no more position captures will occur on the rising edges of the probe 1 input until the master re-arms probe 1 by clearing and setting the probe 1 enable. Clearing the probe 1 enable signal will reset the latch status.

IDN409 duplicates information found in the probe status (IDN179, bit 0). IDN409 may be assigned to a RTS bit (AT status word bit 6 or 7) through IDN305 or IDN307.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.178 IDN410 Probe 1 Negative Edge Latched Status

Indicates whether captured position data has been latched within IDN131 after the falling edge of the probe 1 input signal (IDN401). Position data can only be latched on the negative edge of probe 1 if the probing procedure (IDN170) is active and the “Probe Control Parameter” (IDN169) has been configured to use the negative edge of probe 1. Additionally, probe 1 must be armed by setting the “Probe 1 Enable” (IDN405). After arming probe 1, the next probe 1 falling edge will capture the current position and the “probe 1 negative edge latched status” will set when the captured data is available in IDN131. Once the latched status has been set, no more position captures will occur on the falling edges of the probe 1 input until the master re-arms probe 1 by clearing and setting the probe 1 enable. Clearing the probe 1 enable signal will reset the latch status. IDN410 duplicates information found in the probe status (IDN179, bit 1). IDN410 may be assigned to a RTS bit (AT status word bit 6 or 7) through IDN305 or IDN307.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.179 IDN411 Probe 2 Positive Edge Latched Status

Indicates whether captured position data has been latched within IDN132 after the rising edge of the probe 2 input signal (IDN402). Position data can only be latched on the positive edge of probe 2 if the “Probing” procedure (IDN170) is active and the “Probe Control Parameter” (IDN169) has been configured to use the positive edge of probe 2. Additionally, probe 2 must be armed by setting the “Probe 2 Enable” (IDN406). After arming probe 2, the next probe 2 rising edge will capture the current position and the “probe 2 positive edge latched status” will set when the captured data is available in IDN132. Once the latched status has been set, no more position captures will occur on the rising edges of the probe 2 input until the master re-arms probe 2 by clearing and setting the probe 2 enable. Clearing the probe 2 enable signal will reset the latch status. IDN411 duplicates information found in the probe status (IDN179, bit 2). IDN411 may be assigned to a RTS bit (AT status word bit 6 or 7) through IDN305 or IDN307.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.180 IDN412 Probe 2 Negative Edge Latched Status

Indicates whether captured position data has been latched within IDN133 after the falling edge of the probe 2 input signal (IDN402). Position data can only be latched on the negative edge of probe 2 if the probing procedure (IDN170) is active and the “Probe Control Parameter” (IDN169) has been configured to use the negative edge of probe 2. Additionally, probe 2 must be armed by setting the “Probe 2 Enable” (IDN406). After arming probe 2, the next probe 2 falling edge will capture the current position and the “probe 2 negative edge latched status” will set when the captured data is available in IDN133. Once the latched status has been set, no more position captures will occur on the falling edges of the probe 2 input until the master re-arms probe 2 by clearing and setting the probe 2 enable. Clearing the probe 2 enable signal will reset the latch status. IDN412 duplicates information found in the probe status (IDN179, bit 3). IDN412 may be assigned to a RTS bit (AT status word bit 6 or 7) through IDN305 or IDN307.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.181 IDN447 Command: Set absolute position

After activation of the “Set absolute position procedure command” the servo amplifier ignores the position setpoint. The difference between the position feedback and the Reference Distance is calculated and stored. Refer to the sercos® specification for more information.

### 3.182 IDNP3000..3003 (35 768..35 771) Digital Input 1..4 Configuration

Sets the functionality of digital inputs 1 through 4. The digital inputs may be read directly through IDNs P3030 ... P3033.

The configurable functions depend on the used amplifier and are described in the ASCII Object Reference.

A new input mode will not be active until the parameter set is saved to non-volatile memory and a coldstart or warmstart (IDN128) procedure is initiated.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	InxMODE (x = 1, 2, 3, 4).

### 3.183 IDNP3004 (35 772) Position Switch Configuration

Extends the functionality of the “Position Switch Points” (IDNs 60 through 63). A new position switch configuration will not be active until the parameter set is saved to non-volatile memory and a coldstart or warmstart (IDN128) procedure is initiated.

The software limit switches are active when linear scaling without modulo is selected for IDN76.

Bit	Description	Setting
LSB 0	Software Limit Switch 1 active (smaller position value)	0 = Limit switched off 1 = Limit switched active
1	Software Limit Switch 2 active (larger position value).	0 = Limit switched off 1 = Limit switched active

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2, CP3
Minimum:	0	Run-Up Check:	
Maximum:	65535	Cyclic Transfer:	
Default:	0	ASCII Param.:	SWCNFG

### 3.184 IDNP3005/3006 (35 773 / 35 774) Digital Output 1..2 Configuration

Sets the functionality of the digital outputs. The digital outputs may be read through IDNP3036 and IDNP3037. The configurable functions depend on the used amplifier and are described in the ASCII Object Reference.

A new digital output mode will not be active until the parameter set is saved to non-volatile memory and a coldstart or warmstart (IDN128) procedure is initiated.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	O1MODE, O2MODE

### 3.185 IDNP3007/3008 (35 775 / 35 776) Digital Output Trigger

Sets a help or trigger value to the functionality of the digital outputs (refer to IDNP3005 and P3006).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:	0	ASCII Param.:	OxTRIG

### 3.186 IDNP3009 (35 777) Release Motor Brake

If the drive is not enabled and EXTBRAKE is set to 1, the brake can be released. If the brake is released by the powerstage it is not possible to disable the brake by this IDN.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.187 IDNP3010 (35 778) Feedback Type

Sets the motor feedback type. A new feedback type will not be active until the parameter set is saved to non-volatile memory and a coldstart or warmstart (IDN128) procedure is initiated.

Mode	Function
0	Resolver
1	SinCos 5V (MPHASE out of EEPROM)
2	HIPERFACE® with Zero Pulse
3	Sine-/Cosine-Encoder 12V (MPHASE out of EEPROM)
4	EnDat (Heidenhain)
5	Sine-/Cosine-Encoder + Hall 5V
6	Sine-/Cosine-Encoder + Hall 12V
7	Sine-/Cosine-Encoder + W&S 5V
8	Sine-/Cosine-Encoder + W&S 12V
9	SSI
10	Without Feedback Device (sensorless)
11	Hall only, 5V
12	RS422 feedback device with hall's
13	ROD (MPHASE out of EEPROM)
14	ROD with Hall 24V
15	ROD with Hall 5V
16	ROD W&S 24V
17	ROD W&S 5V
18	ROD with Hall 5V
19	ROD W&S 5V

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	FBTYPE

### 3.188 IDNP3011 (35 779) Encoder Emulation Configuration

Sets the signaling format for the encoder emulation on connector X5. A new emulation mode will not become active until the parameter set is saved to non-volatile memory and a coldstart or warmstart (IDN128) procedure is initiated.

Mode	Function	Comments
0	Input	The interface is used as an input.
1	AqB (ROD)	Incremental encoder emulation. Incremental encoder compatible pulses (max. 250 kHz) are transmitted as two signals (A and B) with a 90° electrical phase difference (quadrature). A zero marker pulse is also transmitted. If an encoder with a commutation track is used, then the output of the zero marker pulse is inhibited until the zero pulse from the encoder has been evaluated.
2	SSI	Synchron serial interface (SSI) for absolute encoder emulation. The standard SSI absolute encoder format transmits 24 bits. The upper 12 bits are fixed to zero and the lower 12 bits contain position information. For 'N' pole resolver feedback systems, the transmitted position refers to the position within 2/N turns of the motor. If an encoder with a commutation track is used as feedback, then the upper 12 bits are set to 1 (invalid data) until homing is performed.
3	ROD-Emulation	Incremental encoder emulation (AqB) with interpolation

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:	0	Run-Up Check:	
Maximum:	3	Cyclic Transfer:	
Default:	1	ASCII Param.:	ENCMODE

### 3.189 IDNP3015 (35 783) Hardware Limit Switch Consequence

This parameter define the consequence of the Hardware Limit Switch, if the corresponding digital inputs (IDNP3002 and/or P3003) are set to the function "hardware limit switches".

If the IDNP3015 is set to 0, a warning occurs.

If the IDNP3015 is set to 1, a fault occurs, the amplifier ramps down and sets fault bit 15 in IDN11 and in IDN129 the bit 2.

After the reset class 1 diagnostic command (IDN99) the amplifier can enable again and move back into the valid range. During the procedure amplifier-controlled homing (IDN148), the hardware limit switch can be used in the normal way (refer to IDNP3027).

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	SERCSET (Bit 0)

**3.190 IDNP3016 (35 784) Reset Command Consequence: prevent cold start**

This parameter defines the consequence of the reset class 1 diagnostic command (IDN99), for faults which require a coldstart. If this IDN is set, faults which require a coldstart will not clear. The reset command will abort with the service channel message "Command execution not possible" (refer to IDN11, 99 and 129).

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	SERCSET (Bit 1)

**3.191 IDNP3017 (35 785) Position Feedback Type**

The parameter EXTPOS specifies the feedback source for the internal position controller. For the majority of applications, position information for commutation and position control can be used from a single source. This source is specified with parameter FBTYPE and can be a resolver, EnDat/Hiperface feedback or other feedback. In certain applications it may be useful to use position information for commutation and position control from a different feedback source. In these applications, parameter FBTYPE defines the source for commutation.

The source for external position control is defined with EXTPOS. With EXTPOS=0 the feedback system built-into the motor and defined by FBTYPE is used. With EXTPOS>0 an external feedback is used for position control.

For detailed information, please refer to the ASCII reference document (EXTPOS).

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:	-9	Run-Up Check:	
Maximum:	+9	Cyclic Transfer:	
Default:	0	ASCII Param.:	EXTPOS



### 3.192 IDNP3018 (35 786) Configuration of the Position latch

Configuration variable EXTLATCH defines the source of the position information when using the latch functions.

When setting IN1MODE = 26 or IN2MODE=26, digital input 1 or 2 can be used as a latch input. A rising/falling edge at this input saves the internal position in a latch register.

The source of the position information depends on the settings for variables IN1MODE, IN2MODE and EXTLATCH.

If both inputs (input 1 and input 2) have been configured for the latch function, variable EXTLATCH can be used to define the position sources for the individual latch inputs: EXTLATCH=1 -> INPUT2 is used as latch input, EXTLATCH=2 both inputs are used.

If only digital input 2 has been configured for the latch function (IN2MODE = 26), variable EXTLATCH has no function. In the event of an edge at digital input 2, both the position of the motor feedback (resolver/EnDat/Hiperface) (Probe 1) and the external feedback (Probe 2) are saved.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3
Minimum:	0	Run-Up Check:	
Maximum:	2	Cyclic Transfer:	
Default:	0	ASCII Param.:	EXTLATCH

### 3.193 IDNP3021 (35 789) Over Speed

The maximum motor speed threshold. If the maximum motor speed is exceeded, then an overspeed fault (IDN129, bit 9) occurs.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1.2 * IDN113	Cyclic Transfer:	
Default:	36 000 000	ASCII Param.:	similar to VOSPD
Units:	0.0001 RPM	Version:	

### 3.194 IDNP3022 (35 790) Emergency Stop Rate

The amplifier uses the emergency stop rate during an active disable (MDT control bit 15, a fault or a limit value excess).

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	1	Run-Up Check:	
Maximum:	32767	Cyclic Transfer:	
Default:	10	ASCII Param.:	DECSTOP
Units:	IDN160, 161, 162	Version:	

**3.195 IDNP3023 (35 791) 2nd Filter Time Constant Velocity Control**

With ARLP2 a second filter can be adjusted in the velocity control loop. This filter is a simple low-pass filter of first order. With ARLP2 the frequency of the low-pass filter is defined. With default setting of ARLP2 = 0 this second filter is switched off.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1500	Cyclic Transfer:	
Default:	0	ASCII Param.:	ARLP2

**3.196 IDNP3025 (35 793) Command DIR**

DIR is a 16-bit variable in which the individual bits specify the counting direction for different feedback devices.

Value	Description
0	Counting direction for FBTYPE (1=positive)
1	
2	Counting direction for EXTPOS (=1 positive)
3	
4	Counting direction for GEARMODE (=1 positive)
5	
6	inverted commutation

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	read-only
Minimum:	0	Run-Up Check:	
Maximum:	64	Cyclic Transfer:	
Default:	21	ASCII Param.:	

**3.197 IDNP3026 (35 794) Non-Volatile Memory Data Checksum**

A checksum of the data stored within non-volatile memory. The checksum is updated after a "Back-up Working Memory" procedure (IDN264) has been executed successfully. The checksum is calculated with a CRC algorithm.

Data Length:	2 bytes	Non-Volatile:	Fix
Data Type:	Unsigned decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	
Default:		ASCII Param.:	

### 3.198 IDNP3027 (35 795) Manufacturer Homing Modes

Selection of manufacturer-defined homing modes.

If command IDN148 is active, then IDN147 is write protected (from firmware 2.26).

This IDN contains the saved serial command NREF after reset. Write this P IDN or write IDN147 through the service channel to change the homing mode used for the amplifier-controlled homing (IDN148). After or while homing with sercos® the parameter NREF contains the value of this IDN. A following SAVE command can save this value permanently.

IDNP 3027 is set using ASCII command NREF.

Mode	Function
0	Set reference point to the actual position
1	Traverse to the reference switch with zero-mark recognition
2	Move to hardware limit-switch, with zero-mark recognition
3	Move to reference switch, without zero-mark recognition
4	Move to hardware limit-switch, without zero-mark recognition
5	Move to the next zero-mark of the feedback unit
6	Set reference at actual position, without losing target position
7	Move to mechanical stop with zero-mark recognition
8	Move to absolute SSI-position
9	Move to mechanical stop without zero-mark recognition

#### NOTE

Hardware limit switches must be present and connected. The appropriate limit switch functions must be switched on, i.e. digital input 3 must be PSTOP (IDNP3002, mode2) and/or digital input 4 must be NSTOP (IDNP3003, mode 3).

#### Mechanical Stop Homing (mode 7) without hardware limit switch

This homing mode uses the mechanical stop instead of a separate homing switch or a hardware limit switch. Set the maximum current (torque) limit through IDN92, to limit the torque applied against the mechanical stop. When motion toward the stop is no longer possible, the following error increases up to 150% of the defined following error and then triggers a movement back to the first zero mark.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	9	Cyclic Transfer:	
Default:	1	ASCII Param.:	NREF

Additional IDNs, which are used for homing, are:

IDN 41 Homing Velocity, IDN 42 Homing Acceleration

IDN147 Homing Direction

### 3.199 IDNP3028 (35 796) Output stage enable order

With this IDN you can select the order of SW- and HW-Enable. The default is that the HW-Enable for sercos® has to be set before SW enable will set (HW-Enable order =0) otherwise an F29 error (bit 11 in IDN129) will be set.

To allow SW- before HW-Enable, set this IDN to 1 (HW-Enable order =1).

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	SERCSET Bit 2

**3.200 IDNP3030..3033 (35 798..35 801) Digital Input 1...4**

Reflects the state of a digital input (connector X3) in the least significant bit of the IDN.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	Read-only
Minimum:	-10 000	Run-Up Check:	
Maximum:	10 000	Cyclic Transfer:	AT
Default:		ASCII Param.:	IN1, IN2, IN3, IN4

**3.201 IDNP3034/3035 (35 802/35 803) Analog Input Value 1...2**

Returns the differential voltage at an analog input, which may vary from +10V to -10V. Analog input 1 is located on connector X3 (pins 4 and 5). Analog input 2 is located on connector X3 (pins 6 + 7).

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:		Run-Up Check:	
Maximum:		Cyclic Transfer:	AT
Default:		ASCII Param.:	ANIN1, ANIN2
Units:	mV	Version:	

**3.202 IDNP3036/3037 (35 804/35 805) Digital Output 1...2**

The master may set and read the state of a digital output in the least significant bit of the corresponding digital output control/status IDN.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	MDT
Default:	0	ASCII Param.:	O1, O2

**3.203 IDNP3038 (35 806) Probe 1 and 2 Enable**

Used to arm the position capture mechanism for probe 1 and 2 so that the next valid probing signal edge captures the current position into IDN130/132 or 131/133. IDNP3038 can only be used if the IDNP3039 is set to 1 by the master. IDNP3038 may be assigned to a RTC bit (MDT control word bit 6 or 7) through IDN301 or IDN303. This IDN is write-protected while it is assigned to a RTC bit.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.204 IDNP3039 (35 807) Probe 1 and 2 Control Parameter

The master may use this IDN to configure the probe enable IDNs.

IDNP3039=0, the master can enable the probes with IDN405 and 406

IDNP3039=1, the master can enable both probes with IDNP3038 at the same time.

<b>This IDN can not be set to 0</b>		<b>This IDN can not be set to 1</b>	
if the IDNP3038 is actually assigned to a real time control bit via IDN301 or 303		if the IDN405 or 406 is actually assigned to a real time control bit via IDN301 or 303	
if the IDNP3038 is actually set to 1.		if the IDN405 or 406 is actually set to 1.	
Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.205 IDNP3040 (35 808) Spline Interpolation Method

Only works in a 500 us cycle for sercos® position control and when modulo scaling is not set.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	SERCSET Bit 20

### 3.206 IDNP3041 (35 809) Position Switch On/Off Parameter

This IDN must set to "1", to use the whole function for the position switch flag parameter (IDN59) and may, if it is selected, the duplication of IDN59 to a digital output.

The value "0" switches off the entire position switch function (refer to IDN59, P3042, 3043 and P3044). A new value will not become active until the parameter is saved to non-volatile memory and a coldstart or warmstart (IDN128) procedure is initiated (refer to IDN59, P3042, 3043, P3044).

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2, CP3
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	WPOS

### 3.207 IDNP3042 (35 810) Position Switch Enable/Disable Parameter

This IDN can be used to enable or disable the check of each position switch point for the position switch flag parameter (IDN59) (refer to IDN59, P3041, 3043 and P3044).

Bit	Description	Setting
LSB 0	Position switch point 1 (IDN60)	0 = Disable 1 = Enable Position Switch Flag
1	Position switch point 2 (IDN61)	
2	Position switch point 3 (IDN62)	
3	Position switch point 4 (IDN63)	
4	Position switch point 5 (IDN64)	
5	Position switch point 6 (IDN65)	
6	Position switch point 7 (IDN66)	
7	Position switch point 8 (IDN67)	
8 - 15		Reserved.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0x0000h	Run-Up Check:	
Maximum:	0x00FFh	Cyclic Transfer:	
Default:	0	ASCII Param.:	WPOSE

3.208

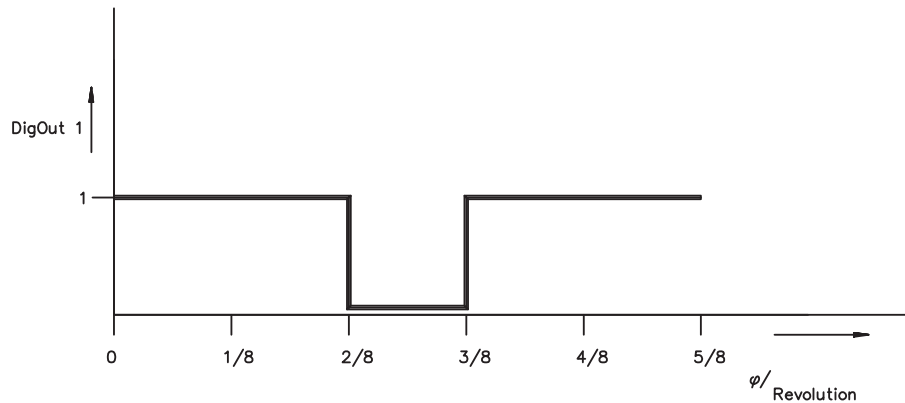
**IDNP3043 (35 811) Position Switch Polarity Parameter**

With this IDN it is possible to select the polarity for each position switch flag to the corresponding flag bit (IDN59) or the digital output (refer to IDN59, P3041, 3042 and P3044).

Bit	Description	Setting
LSB 0	Position switch point 1 (IDN60)	0 = The flag will set to "1" if the position feedback is greater than or equal to the position switch point. 1 = The flag will set to "0" if the position feedback value is smaller than the position switching point.
1	Position switch point 2 (IDN61)	
2	Position switch point 3 (IDN62)	
3	Position switch point 4 (IDN63)	
4	Position switch point 5 (IDN64)	
5	Position switch point 6 (IDN65)	
6	Position switch point 7 (IDN66)	
7	Position switch point 8 (IDN67)	
8 - 15		Reserved.

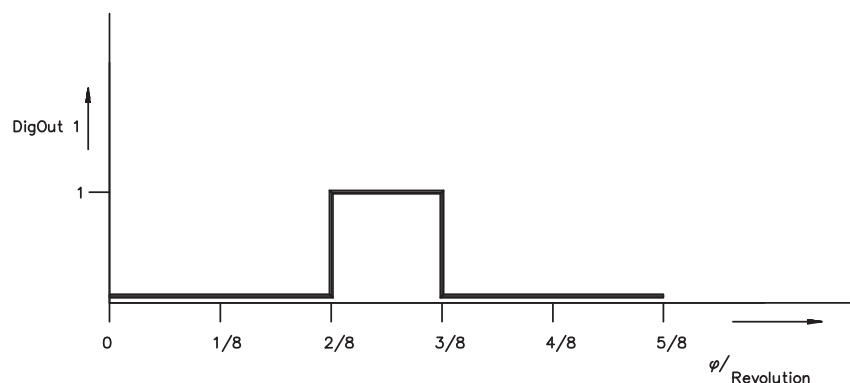
With this functionality it is possible to implement a cam function with a positive or negative polarity.

**Application Example : Negative Cam Function**



IDN60 = 2/8 Revolution      IDNP3041= 0001Hex      IDNP3042 = 0003Hex  
 IDN61 = 3/8 Revolution      IDNP3043 = 0002Hex      IDNP3044 = 0  
 IDNP3005 = 41      IDNP3007 = 0003Hex

**Application Example : Positive Cam Function**



IDN60 = 2/8 Revolution      IDNP3041= 0001Hex      IDNP3042 = 0003Hex  
 IDN61 = 3/8 Revolution      IDNP3043 = 0001Hex      IDNP3044 = 0  
 IDNP3005 = 40      IDNP3007 = 0003Hex

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0x0000h	Run-Up Check:	
Maximum:	0x00FFh	Cyclic Transfer:	
Default:	0	ASCII Param.:	WPOSP

### 3.209 IDNP3044 (35 812) Type of Position Switch Parameter

With this IDN it is possible to select the type of the position check for each position switch flag to the corresponding flag bit (IDN59) or the digital output (refer to IDN59, P3041, 3042 and P3043).

Bit	Description	Setting	
LSB 0	Position switch point 1 (IDN60)	0 = The position check is operating the hole time. 1 = The position flag is checked once. The corresponding bit in IDN59 will be set and latched and the corresponding enable bit in P3042 will be reset.	
1	Position switch point 2 (IDN61)		
2	Position switch point 3 (IDN62)		
3	Position switch point 4 (IDN63)		
4	Position switch point 5 (IDN64)		
5	Position switch point 6 (IDN65)		
6	Position switch point 7 (IDN66)		
7	Position switch point 8 (IDN67)		
8 - 15		Reserved.	
Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0x0000h	Run-Up Check:	
Maximum:	0x00FFh	Cyclic Transfer:	
Default:	0	ASCII Param.:	WPOSX

### 3.210 IDNP3045 (35813) Integral Current Component

This parameter is used to load the integral component of the current controller. This may be required when switching into the torque control operation mode under load, to ensure a transition without jerking.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	-1640	Run-Up Check:	
Maximum:	1640	Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.211 IDNP3046 (35814) Motor Number

The command "MNUMBER nr" is used to load a motor data set with the number "nr" from the motor database. If MNUMBER 0 is entered, then no data set will be loaded, but the variable MNUMBER will simply be set to 0. This setting indicates a customer-specific motor data set.

Data Length:	2 bytes	Non-Volatile:	Yes
Data Type:	Signed decimal	Write Access:	CP2, CP3
Minimum:	0	Run-Up Check:	
Maximum:	$2^{15} - 1$	Cyclic Transfer:	
Default:	0	ASCII Param.:	MNUMBER



### 3.212 IDNP3047 (35 815) Configuration of Digital Cams

This IDN activates digital camming with velocity-dependent correction.

Variables P1...P16 contain position values for position thresholds 1...16.

The standardization of the position depends on settings PGEARI, PGEARO and PRBASE (see also IDN60 + 61).

P1 is specified in IDN60 and the length is specified in IDN 61.

P2 = IDN 60+ IDN 61

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.213 IDNP3048/3049 (35 816/35 817) Correction Values for Digital Cams 1..2 and 3..4

Correction factors in ms for the digital cam. Path correction is calculated according to the current velocity. See also IDN P3047.

Correction = current velocity \* time

P1 = IDN60 - correction

P2 = IDN60 + IDN61 - correction

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	$2^{15} - 1$	Cyclic Transfer:	
Default:	0	ASCII Param.:	

### 3.214 IDNP3050/3051 (35 818/35 819) Analog Output 1..2 Value

The analog outputs of the amplifier can be read with these IDNs. The configuration of the analog outputs can be set with the Setup Software.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	Read-only
Minimum:	-10 000	Run-Up Check:	
Maximum:	10 000	Cyclic Transfer:	AT
Default:		ASCII Param.:	MONITOR1, MONITOR2
Units:	mV	Version:	

### 3.215 IDNP3052 (35 820) Switch for Acceleration Feed Forward

If the value 1 is set, IDN 348 (ASCII = GPFFT) is also used. The amplifier calculates the velocity feed forward automatically from the position setpoint.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	

**3.216 IDNP3053 (35 821) Cyclic Setpoint**

A free variable that can be used for various communication purposes, e.g. with the internal PLC.

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	$2^{31} - 1$	Cyclic Transfer:	MDT
Default:	0	ASCII Param.:	DPRVAR9

**3.217 IDNP3054 (35 822) Cyclic Actual Value**

A free variable that can be used for various communication purposes, e.g. with the internal PLC.

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	$2^{31} - 1$	Cyclic Transfer:	AT
Default:	0	ASCII Param.:	DPRVAR1

**3.218 IDNP3055 (35 823) Cyclic Value for External Velocity Feed Forward**

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	$2^{31} - 1$	Cyclic Transfer:	MDT
Default:	0	ASCII Param.:	

**3.219 IDNP3056 (35 824) Cyclic Value for External Acceleration Feed Forward**

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	$2^{31} - 1$	Cyclic Transfer:	MDT
Default:	0	ASCII Param.:	

**3.220 IDNP3057 (35 825) Off Switch for Digital Cams 1..2**

The cams are active when the value is 0 and not active when the value is 1 (refer to IDNP 3047 and IDNP 3048/3049).

Data Length:	2	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	

**3.221 IDNP3058 (35 826) Off Switch for Digital Cams 3..4**

The cams are active when the value is 0 and not active when the value is 1 (refer to IDNP 3047 and IDNP 3048/3049).

Data Length:	2	Non-Volatile:	No
Data Type:	Binary	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	
Default:	0	ASCII Param.:	

**3.222 IDNP3059 (35 827) Switches for External Feed Forward**

Possible settings:

0 = internal values (if activated)

1 = cyclic external values (linearly interpolated to 250 µs)

The cycle time must be set to 500 µs.

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	$2^{15} - 1$	Cyclic Transfer:	
Default:	0	ASCII Param.:	

**3.223 IDNP3060 (35 828) Counter for RDIST - Receive Noise**

The counter is incremented by sercos® ASIC interrupts.

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Unsigned decimal	Write Access:	read-only
Minimum:	0	Run-Up Check:	
Maximum:	$2^{32}$	Cyclic Transfer:	
Default:	0	ASCII Param.:	

**3.224 IDNP3061 (35 829) Unscaled Internal Position**

Data Length:	4 bytes	Non-Volatile:	No
Data Type:	Signed decimal	Write Access:	read-only
Minimum:	0	Run-Up Check:	
Maximum:	$2^{32} - 1$	Cyclic Transfer:	
Default:	0	ASCII Param.:	

**3.225 IDNP3070 (35 838) High-pass damping of the velocity-loop filter**

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	10	Cyclic Transfer:	
Default:	0	ASCII Param.:	ARHPD

**3.226 IDNP3071 (35 839) High-pass frequency of the velocity-loop filter**

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	80	Run-Up Check:	
Maximum:	4000	Cyclic Transfer:	
Default:	1000	ASCII Param.:	ARHPF

**3.227 IDNP3072 (35 840) Low-pass damping of the velocity-loop filter**

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	10	Cyclic Transfer:	
Default:	0	ASCII Param.:	ARLPD

**3.228 IDNP3073 (35 841) Low-pass frequency of the velocity-loop filter**

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	Unsigned decimal	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	4000	Cyclic Transfer:	
Default:	160	ASCII Param.:	ARLPF

**3.229 IDNP3074 (35 842) Virtual Inputs**

Equivalent to the digital inputs, which are not used by hardware like I/O-expansion card.

Data Length:	4 bytes	Non-Volatile:	Yes
Data Type:	binary	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	0x0000FFFF	Cyclic Transfer:	
Default:		ASCII Param.:	INx

**3.230 IDNP3075 (35 843) I/O Summary variable**

Bit	Description	Bit	Description
0	Digital Input 1 (IDNP 3030)	6	Enable
1	Digital Input 2 (IDNP 3031)	7	AS-Enable
2	Digital Input 3 (IDNP 3032)	8	Probe 1 positive status (IDN 179)
3	Digital Input 4 (IDNP 3033)	9	Probe 1 negative status (IDN 179)
4	Digitaler Output 1 (IDNP 3036)	10	Probe 2 positive status (IDN 179)
5	Digitaler Output 2 (IDNP 3037)	11	Probe 2 negative status (IDN 179)

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	binary	Write Access:	read-only
Minimum:	0	Run-Up Check:	
Maximum:	0x0FFF	Cyclic Transfer:	
Default:		ASCII Param.:	

**3.231 IDNP3076 (35 844) Reactivate Latch**

Toggling reactivates the Latch (IDN 170).

Data Length:	2 bytes	Non-Volatile:	No
Data Type:	binary	Write Access:	CP2, CP3, CP4
Minimum:	0	Run-Up Check:	
Maximum:	1	Cyclic Transfer:	MDT
Default:		ASCII Param.:	

## 4 Appendix

### 4.1 ASCII Reference List

ASCII	IDN	Description
ACC	IDN 136	Positive Acceleration Limit Value
ACCR	IDN 42	Homing Acceleration
ACCUNIT	IDN 160	Scaling Type for Acceleration Data
ACCUNIT	IDN 161	Scaling Factor for Acceleration Data
ACCUNIT	IDN 162	Scaling Exponent for Acceleration Data
ADDR	IDN 96	Slave Arrangement
ALIAS	IDN 142	Application Type
ANIN1 / 2	IDNP 3034 ...3035	(35 802/803) Analog Input 1..2 Value
DEC	IDN 137	Negative Acceleration Limit Value
DECR	IDN 42	Homing Brake Acceleration
DECSTOP	IDNP 3022	(35 790) Emergency Stop Ramp
DICONT	IDN 112	Nominal Current Amplifier
DIPEAK	IDN 110	Peak Current Amplifier
ENCMODE	IDNP 3011	(35 779) Encoder Emulation Mode
ERND	IDN 103	Modulo Value
ERRCODE	IDN 129	Manufacturer Class 1 Diagnostic (MC1D)
EXTLATCH	IDNP 3018	(35 786) Configuration of Probe Position Latch
EXTMUL	IDN 257	Multiplication Factor 2
FBTYPE	IDNP 3010	(35 778) Feedback Type
GP	IDN 104	Position Loop Proportional Gain
GPFFV	IDN 296	Velocity Feed Forward Gain
GV	IDN 100	Velocity Loop Proportional Gain
GVTN	IDN 101	Velocity Loop Integral Action Time
I	IDN 84	Torque Feedback Value
I2TLIM	IDN 114	System Load Limit
IN1 ...4	IDN 400	Home Switch
IN1 ...4	IDNP 3030 ...3033	(35 798..801) Digital Input 1..4 Status
IN2	IDN 401	Probe 1
IN2	IDN 402	Probe 2
INXMODE	IDNP 3000 ... 3003	(35 768..771) Digital Input 1..4 Mode
IPEAK	IDN 92	Bipolar Torque Limit
J	IDN 36	Velocity setpoint
KTN	IDN 107	Current Loop Integral Action Time 1
KTN	IDN 120	Current Loop Integral Action Time 2
LATCH1P32	IDN 130	Probe 1 Positive Edge Value
LATCH2P32	IDN 132	Probe 2 Positive Edge Value
LATCH1N32	IDN 131	Probe 1 Negative Edge Value
LATCH2N32	IDN 133	Probe 2 Negative Edge Value
MAXTEMPE	IDN 205	Cooling Error Shutdown Temperature
MAXTEMPH	IDN 203	Amplifier Shutdown Temperature
MICONT	IDN 111	Motor Continuous Stall Current
MICONT	IDN 196	Motor Rated Current
MIPEAK	IDN 109	Peak Motor Current
MLGD	IDN 119	Current Loop Proportional Gain 2
MLGQ	IDN 106	Current Loop Proportional Gain 1
MNAME	IDN 141	Motor Type
MNUMBER	IDNP 3046	Motor Number
MSPEED	IDN 113	Maximum Motor Speed
NREF	IDNP 3027	(35 795) Manufacturer Homing Types
O1, O2	IDNP 3036 ...37	(35 804/805) Digital Output 1..2 Control/Status
OPMODE	IDN 32	Primary Operation Mode

ASCII	IDN	Description
OPMODE	IDN 33	Secondary Operation Mode 1
OVERRIDE	IDN 108	Feedrate Override
OxMODE	IDNP 3005, 3006	(35 773/774) Digital Output 1..2 Mode
OxTRIG	IDNP 3007, 3008	(35 775/777) Digital Output 1..2 Trigger
PE	IDN 189	Following Distance
PEMAX	IDN 159	Monitoring Window
PFB	IDN 51	Position Feedback Value 1 (Motor)
PFBO	IDN 53	Position Feedback Value 2 (External)
PRBASE	IDN 116	Resolution of Rotational Feedback 1 (Motor Feedback)
PRBASE	IDN 79	Rotation Position Resolution
ROFFS	IDN 52	Reference Distance 1
RSTVAR	IDN 262	Command: Load Default Values
SAVE	IDN 264	Command: Back-up Working Memory
SERCSET	IDN 43	Velocity Polarity Parameter
SERCSET	IDNP 3028	(35 796) HW Enable Order
SSTAT	IDN 95	Diagnostics
SWCNFG	IDNP 3004	(35 772) Position Switch Configuration
SWE1	IDN 50	Negative Position Limit Switch
SWE2	IDN 49	Positive Position Limit Switch
TEMPH	IDN 384	Amplifier Temperature
V	IDN 40	Velocity Feedback Value
VBUS	IDN 380	DC Bus Voltage
VLIMN	IDN 39	Negative Velocity Limit Value
VLIM	IDN 91	Bipolar Velocity Limit
VLIMP	IDN 38	Positive Velocity Limit Value
VOSPD	IDNP 3021	(35 789) Overspeed
VREF	IDN 41	Homing Velocity
WPOS	IDNP 3041	(35 809) Position Switch On/Off Parameter
WPOSE	IDNP 3042	(35 810) Position Switch Enable/Disable Parameter
WPOSP	IDNP 3043	(35 811) Position Switch Polarity Parameter
WPOSX	IDNP 3044	(35 812) Type of Position Switch Parameter

## 4.2 Special parameters: SERCSET and BUSPx

### SERCSET

Bit	Meaning	Value
24-31	IDN 76	0xFF00 0000
23	AT Status Bit 2 "Drive follows setpoints"	0x0080 0000
22	free	0x0040 0000
21	free	0x0020 0000
20	IDNP 3040 quadratic interpolation	0x0010 0000
19	IDNP 3059 external feed forward torque and velocity	0x0008 0000
18	IDNP 3059 external feed forward torque	0x0004 0000
17	Unassigned	0x0002 0000
16	SLEN binary	0x0001 0000
12-15	IDN 43 V-polarities	0x0000 F000
4-11	IDN 55 P-polarity, bit 8 is software limit switch	0x0000 0FF0
3	IDNP 3052 acceleration pilot control	0x0000 0008
2	IDNP 3028 output stage enable sequence	0x0000 0004
1	IDNP 3016 prevent coldstart (on/off)	0x0000 0002
0	IDNP 3015 consequence of the hardware limit switch	0x0000 0001

### BUSPx

Parameter	Meaning
BUSP0	IDN 97 = 0x0000FFFF IDN 98 = 0xFFFF0000
BUSP 1	Delay of external feed forward and move of time t3
BUSP 2	IDN 15 = 0x000000FF IDN 32 = 0x00FF0000
BUSP 3	IDN 121 - input revolutions of load gear
BUSP 4	IDN 122 - output revolutions of load gear
BUSP 5	IDN 123 - feed constant
BUSP 6	IDN 79 - rotational position resolution
BUSP 7	IDN 117 - resolution of rotational feedback 2 (External Feedback)
BUSP 8	IDN 138 - nipolaracceleration limit value

### BUSP1

Bit	HEX	DEZ	Meaning
0	0x0000 0001	1	Torque feed forward 1 cycle longer
1	0x0000 0002	2	Torque feed forward 1 cycle shorter
2	0x0000 0004	4	Velocity feed forward 1 cycle longer
3	0x0000 0008	8	Velocity feed forward 1 cycle shorter
4	0x0000 0010	16	1 further cycle of deceleration, if using non-quadratic interpolation
5	0x0000 0020	32	Target position value + 4 cycles of deceleration for pilot controls
6	0x0000 0040	64	Target position value + 5 cycles of deceleration for pilot controls
7	0x0000 0080	128	Target position value + 6 cycles of deceleration for pilot controls
8	0x0000 0100	256	T3 = T2 (MDT timing) + 50µs only at 500µs cycle time
9	0x0000 0200	512	T3 = 100µs only at 500µs cycle time
10	0x0000 0400	1024	T3 = 200µs only at 500µs cycle time
11	0x0000 0800	2048	T3 = 300µs only at 500µs cycle time
12	0x0000 1000	4096	T3 = 510µs only at 500µs cycle time
13	0x0000 2000	8192	Actual position value deceleration by 1 sercos® cycle
14	0x0000 4000	16384	Actual position value deceleration by 2 sercos® cycles
15	0x0000 8000	32768	reserved
16-27	0x0FFF 0000		T3 timing from and to IDNP 3062.
28-31	0xF000 0000		reserved



## 4.3 Cyclically addressable data – IDN 187 (AT) + IDN 188 (MDT)

AT	Meaning	MDT	Bedeutung
11	State class 1	36	Target speed value
40	Actual speed value	47	Target position value
51	Actual position of motor encoder	60	Position switching point 1
53	Actual position of external encoder	61	
59	Position switching point parameter	62	
84	Actual torque value	63	
129	Manufacturer state class 1	64	
130	Probe 1 value positive	66	
131	Probe 1 value negative	80	Torque setpoint
132	Probe 2 value positive	81	Additive torque setpoint
133	Probe 2 value negative	92	Bipolar torque limit
144	Status word signal	145	Control word signal
189	Following error	3036	Status Digital Output 1
347	Speed control deviation	3037	Status Digital Output 2
3012	Differential value probe 1	3053	Cyclical setpoint
3013	Differential value probe 2	3055	Cyclical value of the external speed feed forward
3030	Status Digital Input 1	3056	Cyclical value of the external acceleration feed forward
3031	Status Digital Input 2		
3032	Status Digital Input 3		
3033	Status Digital Input 4		
3034	Value Analogue Input 1		
3035	Value Analogue Input 2		
3036	Status Digital Output 1		
3037	Status Digital Output 2		
3054	Cyclical actual value		

## 4.4 Limit Switch Hardware and Software

The limit switches are activated via SERCSET bit 0 (even / uneven) or IDNP 3015. If bit 0 is set in SERCSET, the drive configures WMASK independently.

**NOTE**

The INxMODEs must be set correctly, i.e. IN3MODE to 2 and IN4MODE to 3.

If the servo amplifier in the limit switch is switched on from standstill, an IDN 99 (CLRFAULT) is issued by the control system in phase 2 during the phase run-up (generally without any user input). This causes the error to be deleted and then not issued again as long as the motor in the limit switch is at standstill, since the bit for the corresponding limit switch is reset internally in WMASK. When the motor is moved out of the limit switch, either manually or via sercos<sup>®</sup>, WMASK is automatically set back to the correct value, meaning that errors are again issued the next time the limit switch is actuated. Even if this setting from WMASK were to be saved, it is only the parameter SERCSET that is important!

This handling should ensure that the motor can be moved out of the limit switch, instead of having to be moved by hand. Since one direction of rotation is locked, it is only possible to move out of the limit switch and not further into it.

- Positive position limit IDN 49
- Negative position limit IDN 50
- The software limit switches are activated with IDN 55 (position polarities) bit 4 =  $0 \times 10 = 16$ .

IDN 55 is also mapped in SERCSET, meaning that setting bit 8 performs the same function.

Should limit switches be absolutely necessary due to the parameterization in the drive, these are automatically set to the largest possible range. However, this range can be limited.

**NOTE**

The software limit switches (SWEs) are not active until a reference run has been performed or reference point defined.

## 4.5 Scalings

The following units are supported by the servo amplifier:

IDN 76: Seconds, minutes, inches, meters

The unit for each respective parameter can be freely selected by the user.

### 4.5.1 Position

#### IDNs responsible for scaling:

IDN 76	Type of scaling
IDN 77	Scaling factor
IDN 78	Scaling exponent
IDN 79	Rotation position resolution, should correspond to $2^{\text{PRBASE}}$ for simplification

#### Dependent IDNs and values:

IDN 98	Tracking error
IDN 159	Tracking error window
IDN 336+ C3D bit 6	"In position" message
IDN 57	"In position" window

#### Types of scaling supported:

Rotational  
Linear

#### Sample configuration for a linear axis with parameter scaling:

S-0-0032	Main operating mode	UINT16	11 (0x000B)
S-0-0076	Type of scaling for position data	UINT16	9 (0x0009)
S-0-0077	Scaling factor for transl. position data	UINT16	1 (0x0001)
S-0-0078	Scaling exponent for transl. position data	INT16	-8
S-0-0123	Feed constant	UINT32	1000000

- PRBASE = IDN79 no longer has any influence. The resolution in increments is now only dependent on the feed constant.
- 10nm has been selected as the unit per increment via IDN 77+78.
- One revolution corresponds to 1,000,000 increments = 1,000,000 x 10nm = 10mm.
- For linear axes, the software limit switches are always activated. However, these do not have an effect until the reference point has been set.

### 4.5.2 Speed

#### IDNs responsible for scaling:

IDN 44	Type of scaling
IDN 45	Factor
IDN 46	Exponent

#### Dependent IDNs and values:

IDN 41	VREF (Reference travel speed)
IDN 91	VLIM (Maximum speed)
IDN 347	Speed control deviation

#### Standard scaling:

Rotational:  $10^{-4}$  rpm, although seconds can alternatively be selected via IDN 44.  
Linear:  $10^{-6}$  m/min

### 4.5.3 Power / Torque

IDN 86: only scaling is available here: 0.1% of continuous motor current (MICON T)

Example: MICON T = 6A => LSB = 6mA

### 4.5.4 Unit conversion, example

Specifications:

IDN 123 = 10.000

IDN 79 = 1.000.000

IDN 76 = 0x02 rotative (default)

PRBASE = 20bit = 1048576 Inkr/U

VREF = 262 Inkr / 250µs = 262\*4000 Inkr/s = 1048576 Inkr/s = 60 U/min

IDN 41 Setpoint = 600.000

#### Conversion sercos<sup>®</sup> -> ASCII

$$\frac{\text{Setpoint}(\text{IDN41}) * \text{Feedconst}(\text{IDN123}) * (2^{\text{PRBASE}})}{24.000.000 * \text{IDN79}} = \frac{600.000 * 10.000 * 1048.576}{24.000.000 * 1000.000} = 262$$

#### Conversion ASCII -> sercos<sup>®</sup>

$$\frac{\text{Value}(\text{VREF}) * 24.000.000 * \text{IDN79}}{\text{Feedconst}(\text{IDN123}) * (2^{\text{PRBASE}})} = \frac{262 * 24.000.000 * 1000.000}{10.000 * 1048.576} = 600.000$$

## 4.6 Simple basic configuration, example

### 4.6.1 Position control

Phase 2

IDN	Value	Remarks
IDN 1	1000	NC cycle time
IDN 2	1000	Communication cycle time
IDN 6	St*	AT transmission reaction time
IDN 8	St	Setpoint validity time (t3)
IDN 9	St	Starting address in the AT
IDN 10	St	MDT length
IDN 15	7	Telegram type: User-defined telegram
IDN 16	51	AT configuration list: Actual position value
IDN 24	47	MDT configuration list: Setpoint position
IDN 32	11	Main operating mode: Position without following error
IDN 76	10	Scaling type of position data: Rotational, default
IDN 79	1048576	Rotation position resolution
IDN 89	St	MDT transmission timing

\*St = This parameter should be calculated automatically by the control system.

This configuration provides 1048576 increments per revolution. This then has to be correctly interpreted on the control system side.

As a general rule, conversions should be performed on the control system side and not in the servo amplifier, since the computing time in the servo amplifier is needed for other more critical calculations.

All resolutions in 2<sup>x</sup> format are easier for our servo amplifiers to handle.

## 4.6.2 Speed control

Phase 2

IDN	Value	Remarks
IDN 1	1000	NC cycle time
IDN 2	1000	Communication cycle time
IDN 6	St*	AT transmission reaction time
IDN 8	St	Setpoint validity time (t3)
IDN 9	St	Starting address in the AT
IDN 10	St	MDT length
IDN 15	7	Telegram type: User-defined telegram
IDN 16	40, 51	AT configuration list: Actual speed value + actual position value
IDN 24	36	MDT configuration list: Setpoint speed
IDN 32	2	Main operating mode: Position without following error
IDN 44	2	Scaling type of speed data: Rotational, default
IDN 76	10	Scaling type of position data: Rotational, default
IDN 79	1048576	Rotation position resolution
IDN 89	St	MDT transmission timing

\*St = This parameter should be calculated automatically by the control system.

The position is now returned to 1048576 increments and the current speed value to 10000 increments per revolution per minute. This means that 10,000,000 corresponds to a speed of 1000 rpm.

The target value specification is scaled accordingly.

## 4.6.3 Torque control

Phase 2

IDN	Value	Remarks
IDN 1	1000	NC cycle time
IDN 2	1000	Communication cycle time
IDN 6	St*	AT transmission reaction time
IDN 8	St	Setpoint validity time (t3)
IDN 9	St	Starting address in the AT
IDN 10	St	MDT length
IDN 15	7	Telegram type: User-defined telegram
IDN 16	84, 51	AT configuration list: Actual torque value + actual position value
IDN 24	80	MDT configuration list: Setpoint torque
IDN 32	1	Main operating mode: Position without following error
IDN 76	10	Scaling type of position data: Rotational, default
IDN 79	1048576	Rotation position resolution
IDN 89	St	MDT transmission timing

\*St = This parameter should be calculated automatically by the control system.

The scaling of the target and actual values is fixed at 0.1% of maximum power. This maximum power depends on the motor being used (MICONTE).

## 4.7

**Real-time bits****IDNs responsible for the real-time bits:**

IDN300	Real-time control bit 1
IDN301	Assignment of real-time control bit 1
IDN302	Real-time control bit 2
IDN303	Assignment of real-time control bit 2
IDN304	Real-time status bit 1
IDN305	Assignment of real-time status bit 1
IDN306	Real-time status bit 2
IDN307	Assignment of real-time status bit 2

**Configurable IDNs**

Control bits		Status bits	
IDN 99	Command: Reset Class 1 Diagnostic (clear fault)	IDN 334	Status Torque limit override
IDN 404	Status of position setpoint	IDN 335	Status Velocity limit override
IDN 405	Probe 1 enable	IDN 336	Status In position
IDN 406	Probe 2 enable	IDN 400	Status Home Switch
IDN 407	Homing enable	IDN 403	Status Position Feedback Value
IDNP 3036	Status digital output 1	IDN 408	Reference mark recorded
IDNP 3037	Status digital output 2	IDN 409	Measured value 1 recorded positive
IDNP 3038	Probe 1 and 2 enable	IDN 410	Measured value 1 recorded negative
IDNP 3057	Off Switch for Digital Cams 1+2	IDN 411	Measured value 2 recorded positive
IDNP 3058	Off Switch for Digital Cams 3+4	IDN 412	Measured value 2 recorded negative

The real-time assignments can be altered at any time to ensure that the information currently needed is always available. The real-time bits are in particular used for the reference run initiated by the control system as a kind of handshake.

**NOTE**

The update rate of the real-time bits is one millisecond.

## 4.8 Homing

### 4.8.1 Drive-controlled

If all ASCII parameters are set in such a way that the reference run (homing) works perfectly without sercos<sup>®</sup>, for example via the startup software (note incremental scaling via sercos<sup>®</sup>), the drive-controlled reference run can be started using the command IDN148.

IDN used	Meaning	ASCII Parameter
IDN 41	Homing speed	VREF
IDN 42	Homing acceleration	ACCR, DECR
IDN 47	Position setpoint	
IDN 52	Reference distance 1 (motor feedback)	ROFFS
IDN 54	Reference distance 2 (external feedback)	ROFFS
IDN 147	Homing parameter	NREF
IDN 148	Command: Amplifier-Controlled Homing	MH
IDN 300 (x=0...3)	Configuration DIGITAL-In 1...4	INxMODE
IDN 403	Position Feedback Value Status	
IDNP 3004	Position Switch Configuration	SWCNFG
IDNP 3027	Homing mode according to ASCII object reference	NREF
IDNP 3067		REFMODE
IDNP 3068		DREF

### Drive-controlled referencing

Sequence	IDN	Meaning
Master sets and releases	IDN 148	Drive-controlled referencing
The cyclical target values are ignored as long as IDN 148 is active.		
Drive deletes the "Position Feedback Value Status" bit	IDN 403	Position Feedback Value Status
The drive switches to internal position control		
The drive accelerates	IDN 42	Homing acceleration
To final speed for Homing	IDN 41	Homing speed
Further settings for Homing	(IDN 147)	Homing Parameters
Homing mode (see ASCII object reference)	IDNP 3027	
REFMODE	IDNP 3067	Source of the zero impulse
The drive brakes behind the position encoder ref. mark and stops at the ref. point	IDN 42	Reference run acceleration
The target position values are based on the ref. mark.	IDN 47	Position setpoint
If the drive is at standstill and the actual position values are based on the ref point.	IDN 403	Position Feedback Value Status
Homing is completed (bit = 0)	IDN 148	Drive-controlled referencing
ROFFS	(IDN 52)	Reference distance 1 (motor feedback)
ROFFS	(IDN 54)	Reference distance 2 (external feedback)

Once homing has been successfully completed, the drive follows the target values. Should homing be interrupted, the actual position values are not based on the ref mark, and the bit for the status of actual position values remains at a low level.

**Example (speed setpoint for homing):**

With sercos<sup>®</sup>, the units are switched over to “incremental” in the servo amplifier. For the VREF homing speed, this means:

VREF = Increments per 250µs based on PRBASE

PRBASE = 20bit = 1048576

VREF = 262 =>

$(262 \cdot 4000) / 1048576$  per sec. =>  $1048000 / 1048576 =$  approx. 1 rev/s = 60 rpm

The default scaling on sercos<sup>®</sup> (Master) is 10,000 rpm

A target value of 600,000 for IDN 41 then corresponds to

$600,000 / 10,000 = 60$  rpm => VREF 262

NREF	=	IDNP 3027
VREF	=	IDN 41
DREF	=	IDN 147 Bit 0 (but only DREF 0 or 1 available) IDNP 3068 also provides 2.
MH	=	IDN 148
REFMODE	=	IDNP 3067
INxMODE	=	IDNP 300x (x = 0...4)
ROFFS	=	IDN 52 motor encoder
ROFFS	=	IDN 54 external encoder, if configured via EXTPOS

**IDN 147 settings**

Bit	Hex	Active at	Supported	Meaning
0	0x0001		Yes	0 = positive direction; 1 = negative direction
1	0x0002	0	No	Edge evaluation of the reference switch
2	0x0004		Yes	Reference switch connection to 0 = control system; 1 = drive
3	0x0008		Yes	Encoder 0 = motor encoder 1 = external encoder
4	0x0010		Yes	Release NC homing 0 = (reference switch+ IDN 407); 1 = only IDN 407
5	0x0020	0	Yes	Evaluate reference switch
6	0x0040	0	Yes	Evaluate zero impulse
7	0x0080		Yes	Position after reference run 0 = any (IDNP 3029); 1 = IDN 52/54
8	0x0100	0	No	Reference run over distance in IDN 297
9	0x0200	1	Yes	Reference run to limit switch
10	0x0400	1	Yes	Reference run to stop with clamping torque
11-15		0	No	Not used

Bits that are not supported (highlighted grey) must be set to 0.

**Combinations that lead to error messages:**

Bit 1 = 1	Negative edge is not supported
Bit 7 = 0	Drive is always in position in IDN 52/54
Bit 8 = 1	Path is not supported
Bit 5 = 0 + Bit 2 = 0	Drive cannot evaluate the reference switch, since it is connected to
Bit 4 = 0 + Bit 2 = 0	the control system.
Bits 5,9,10	Only ever one of these bits can be active at any time.
Bit 3 = 1	However, EXTPOS is $\leq 0$ , i.e. no external encoder is active



**DREF, NREFs and set bits in IDN 147**

<b>NREF</b>	<b>Bits in 147</b>	<b>Type of reference run</b>
<b>0</b>	0x00E5	Set the reference point to the current position.
<b>1</b>	0x0085	Homing to reference switch with zero mark
<b>2</b>	0x0215	Homing to limit switch with zero mark
<b>3</b>	0x00C5	Homing to reference switch without zero mark
<b>4</b>	0x02E5	Homing to limit switch without zero mark
<b>5</b>	0x0015	within one turn
<b>6</b>	0x00E5	Not adjustable, as no means of differentiation. Always set 0.
<b>7</b>	0x0415	Homing to mechanical stop with zero mark
<b>8</b>	Read error.	Not supported by SECOS standard. Adjustable with IDNP 3027
<b>9</b>	0x04E5	Homing to mechanical stop without zero mark

IDNP 3068 was set to 0 (negative homing direction). With positive direction IDN 147 / Bit 0 will change accordingly.

**4.8.2****Control system-controlled**

The control system has several ways of referencing the servo amplifier. If the internal drive options are not enough, or if the control system does not support drive-controlled referencing, the control system can perform the referencing itself.

The servo amplifier provides the following signals for this purpose:

IDN 400 – Reference switch (available as real-time status bit)

IDN 407 – Release NC homing; the command must first be started

IDN 408 – Zero impulse status detected (available as real-time status bit)

IDN 173 – Distance to zero impulse

Since it does not issue a zero impulse for resolvers, IDN 408 is immediately set to 1 as soon as the release is issued. Also, IDN173 is set to ASCII "PRD".

If the reference switch in the servo amplifier is to be evaluated, there must be a valid source for a zero impulse. REFMODE must not equal 0 or one of the INxMODEs must be assigned function 12, as otherwise an error message will be issued when starting the command.

**Referencing by the control system**

With NC-controlled referencing, two commands are available:

IDN 146 – NC-controlled referencing

IDN 172 – Movement into the reference system

These commands can also be used if, for example, the control system calculates the movement and then writes this to the drive.

**Command IDN146 "NC-controlled referencing"**

For correct processing of the command (IDN 146), the following assignments to the real-time control or status bits must be made **before the start of the command**:

- Real-time control bit (1 or 2): Reference release (IDN 407)

- Real-time status bit (1 or 2): Reference mark recorded (IDN 408).

Once the reference switch is connected to the servo amplifier, the following assignment is still necessary:

- Real-time status bit (1 or 2): Reference switch (IDN 400).

With NC-controlled referencing, we distinguish between two cases:

- The reference switch is connected to the control system, but the servo amplifier only evaluates the “reference release” signal.
- The reference switch is connected to the control system. The servo amplifier registers the IDN 400 reference switch with the control system via the real-time status bit 2. The control system sets the IDN 407 reference release via the real-time control bit. There are two options here:
  - The servo amplifier evaluates the IDN 407 reference release.
  - The servo amplifier evaluates the IDN 407 reference release **and** the IDN 400 reference switch.

## 4.9 Latch and Extended Measurement Functions

IDNs used and their meaning:

- IDN 130 = Latch position 1, positive edge from digital input 1
- IDN 131 = Latch position 1, negative edge from digital input 1
- IDN 132 = Latch position 2, positive edge from digital input 2
- IDN 133 = Latch position 2, negative edge from digital input 2
- IDN 169 = Configuration parameter (edge selection, continuous measurement)
- IDN 170 = Command; must be activated (= 3) to perform measurements
- IDN 179 = Overall status of edges already recorded
- IDN 401 = Current status of digital input 1
- IDN 402 = Current status of digital input 2
- IDN 405 = Latch 1 release must be present, if used
- IDN 406 = Latch 2 release must be present, if used
- IDN 409 = Single status latch 1 positive edge or counter for continuous measurement
- IDN 410 = Single status latch 1 negative edge or counter for continuous measurement
- IDN 411 = Single status latch 2 positive edge or counter for continuous measurement
- IDN 412 = Single status latch 2 negative edge or counter for continuous measurement
- IDN 426 = Data selection measurement sensor 1 (internal/external encoder)
- IDN 427 = Data selection measurement sensor 2 (internal/external encoder)
- IDN 428 = Available data for measurement sensor (edge, internal/external encoder)
- IDN 509 = Extended configuration parameter (differences, missing marks, window)
- IDN 510 = Value of difference measurement 1
- IDN 511 = Value of difference measurement 2
- IDN 512 = Start position measurement sensor 1
- IDN 513 = End position measurement sensor 1
- IDN 514 = Start position measurement sensor 2
- IDN 515 = End position measurement sensor 2
- IDN 516 = Missing marks 1
- IDN 517 = Missing marks 2
- IDN 518 = Maximum number of missing marks 1
- IDN 519 = Maximum number of missing marks 2
- P-IDN 3000 = 26 (IN1MODE, if changed, SAVE and COLDSTART must be performed.)
- P-IDN 3001 = 26 (IN2MODE, if changed, SAVE and COLDSTART must be performed.)
- P-IDN 3018 = EXTLATCH, i.e. which inputs should reference the position of external encoders. This does not change the IDNs that display the recorded positions!
  - 0 = Only latch motor encoder
  - 1 = INPUT1 records external encoder
  - 2 = Both inputs latch the external encoder.Is now set using data selection IDN 426/427!
- P-IDN 3038 = Simultaneous release for both measurement sensors, must be configured in 3039.
- P-IDN 3039 = Configuration of measurement sensor release 1+2

IDN 169 Edge selection		IDN 509 Extended edge selection	
Bit	Meaning	Bit	Meaning
0	Latch 1 positive edge	0-4	Unused
1	Latch 1 negative edge	5	Continuous measurement Latch 1
2	Latch 2 positive edge	6	Continuous measurement Latch 2
3	Latch 2 negative edge	7	Unused
4-7	Unused	8	Latch 1 extended difference Enable
8	Auto-activation bit is not supported	9/10	00 - negative -> negative 01 - negative -> positive 10 - positive -> negative 11 - positive -> positive
9-15	Unused	11	Latch 2 extended difference Enable
		12/13	00 - negativ -> negativ 01 - negativ -> positiv 10 - positiv -> negativ 11 - positiv -> positiv
		14/15	Unused

- In continuous measurement, it is possible for multiple latch events to occur within one sercos<sup>®</sup> cycle. In this case, the counter (status IDN 409-411) is incremented and only the last event is stored as a value in IDN 130-134!
- If a measuring window is required, this must be defined **before** it is configured in IDN 509, otherwise an error message is issued.
- There are some differences in the inputs between S300 and S400/S600  
S300: digital 1 -> IDN 130,131; digital 2 -> IDN 132,133  
S400/S600: digital 2 -> IDN 130,131; digital 1 -> IDN 132,133
- The measurement sensor release (IDN 405 & 406 or P-IDN 3038) must take place after the start of the command (IDN 170)!
- When the command 170 is active, IDN 169+509 cannot be changed.

#### Examples:

a) Input 1 only, but both edges

```
Phase 2: P-IDN 3000 26      Digital input 1 as latch
Phase 2/3/4: IDN 179 0x03  both edges active
Phase 4:  IDN 170  3       Start command
          IDN 405  1       Probe release
```

The entered values are in IDN 130 + 131.

b) Both inputs, all edges, 2 input extended difference positive to negative

```
Phase 2: P-IDN 3000 26      Digital input 1 as latch
          P-IDN 3001 26      Digital input 2 as latch
Phase 2/3/4: IDN 179 0x0F    all edges active
          IDN 509 0x1800    measurement difference positive -> negative Input
2
Phase 4:  IDN 170  3       Start command
          IDN 405  1       Probe 1 release
          IDN 406  1       Probe 2 release
```

Information whether one or more events have already been recorded is found in:

- IDN 179 Bits 0+1 for input 1 and Bit 7 (0x0080) for the extended difference.  
The individual statuses are, of course, also available.

The recorded values are in:

- IDN 130 + 131 for input 1 and in IDN 523 for the extended difference

**Startup parameters without timings**

Latching does not require many preparatory steps. If the digital inputs are already configured in the firmware, it is not necessary to include the P-IDNs 3001+3002 in startup.

IDN	Name	Typ	Wert
S-0-0032	Hauptbetriebsart	UINT 16	11 (0x000B)
S-0-0076	Wichtungsart für Lagedaten	UINT 16	10 (0x000A)
S-0-0079	Rotations-Lageauflösung	UINT 32	1048576
S-0-0169	Messtaster-Steuerparameter	UINT 16	15 (0x000F)
P-0-3000	IN1MODE	UINT 16	26 (0x001A)
P-0-3001	IN2MODE	UINT 16	26 (0x001A)

**Service channel view**

IDN	Name	Einheit	Wert
S-0-0130	Probe 1 Value +	--	-699580267
S-0-0131	Probe 1 Value -	--	-572556943
S-0-0132	Probe 2 Value +	--	-511422610
S-0-0133	Probe 2 Value -	--	-457379571
S-0-0169	Probe Control Parameter	--	00000000 00001111
S-0-0170	Probe Command	--	00000000 00000011
S-0-0179	Probe Status	--	00000000 00001111
S-0-0405	Probe 1 Enable	--	00000000 00000001
S-0-0406	Probe 2 Enable	--	00000000 00000001
S-0-0409	Probe 1 pos latched	--	00000000 00000001
S-0-0410	Probe 1 neg latched	--	00000000 00000001
S-0-0411	Probe 2 pos latched	--	00000000 00000001
S-0-0412	Probe 2 neg latched	--	00000000 00000001

**Startup for extended measurement function**

IDN	Name	Typ	Wert
S-0-0032	Hauptbetriebsart	UINT 16	11 (0x000B)
S-0-0055	Lage-Polaritäten	UINT 16	0 (0x0000)
S-0-0076	Wichtungsart für Lagedaten	UINT 16	10 (0x000A)
S-0-0079	Rotations-Lageauflösung	UINT 32	1048576
S-0-0169	Messtaster-Steuerparameter	UINT 16	271 (0x010F)
P-0-3000	IN1MODE	UINT 16	26 (0x001A)
P-0-3001	IN2MODE	UINT 16	26 (0x001A)

**Service channel view**

IDN	Name	Einheit	Wert
S-0-0055	Position Polarity	--	00000000 00000000
S-0-0130	Probe 1 Value +	--	10493072
S-0-0131	Probe 1 Value -	--	6995390
S-0-0132	Probe 2 Value +	--	10493094
S-0-0133	Probe 2 Value -	--	6995378
S-0-0169	Probe Control Parameter	--	00000101 00001111
S-0-0170	Probe Command	--	00000000 00000000
S-0-0179	Probe Status	--	00000000 00000000
S-0-0405	Probe 1 Enable	--	00000000 00000000
S-0-0406	Probe 2 Enable	--	00000000 00000000
S-0-0510	Probe Difference 1	--	3497682
S-0-0511	Probe Difference 2	--	0

In the example, the value of the negative edge has been subtracted from the value of the positive edge.

## 4.10 Cam-Switch

This function generates up to 4 virtual cams, which can be altered cyclically (online). A cam consists of the starting point and the length. The starting point is issued cyclically by the control system and the length can be altered via the service channel.

### NOTE

Limitations: Only 16/20bit resolution can be used, even with modulo.

The following ASCII parameters must be set in the drive:

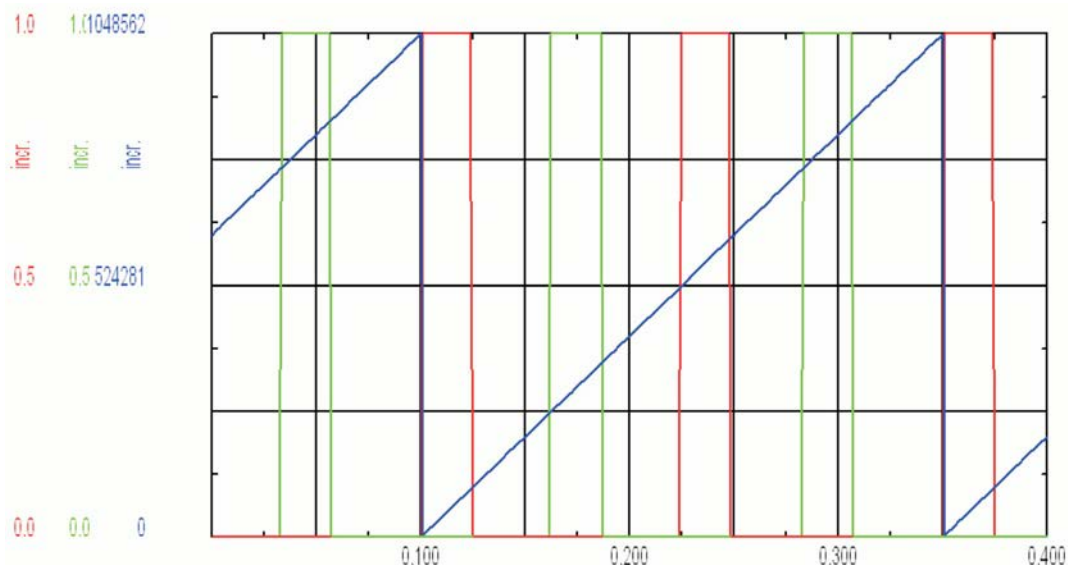
ASCII	Value	IDN
WPOSP	34	IDNP 3043
WPOS	1	IDNP 3041
WPOSE	255	IDNP 3042
O1MODE	41	IDNP 3005
O2MODE	41	IDNP 3006
O2TRIG	48 (= 0x30h)	IDNP 3007
O1TRIG	3 (= 0x03h)	IDNP 3008

IDN 60	P1 position switching point 1	Must be configured cyclically (MDT)
IDN 61	P2 position switching point 2	Must be written via the SC
IDN 62	P3 position switching point 3	Must be configured cyclically (MDT)
IDN 63	P4 position switching point 4	Must be written via the SC
IDN 64	P5 position switching point 5	Must be configured cyclically (MDT)
IDN 65	P6 position switching point 6	Must be written via the SC
IDN 66	P7 position switching point 7	Must be configured cyclically (MDT)
IDN 67	P8 position switching point 8	Must be written via the SC
IDNP 3047	CAM configuration	
IDNP 3048	CAM configuration	
IDNP 3049	CAM configuration	
IDNP 3057	Disable CAM 1+2, both can only be switched on/off at the same time	
IDNP 3058	Disable CAM 3+4, both can only be switched on/off at the same time	

### Example

	Start	End
CAM 1	0	100.000
CAM 2	524.000	624.000
CAM 3	262.000	362.000
CAM 4	768.000	868.000

blue: PFB  
red: CAM 1+2  
green: CAM 3+4



## 4.11 Linearaxes

IDN used	Meaning
IDN 76	0x01 linear with std. scaling $10^{-7}$ m/incr
	0x09 linear with parameter scaling
	0x81 linear with std. scaling $10^{-7}$ m/incr + modulo
	0x89 linear with parameter scaling + modulo
	0xC1 linear with std. scaling $10^{-7}$ m/incr + modulo + scaling at load
	0xC9 linear with parameter scaling + modulo + scaling at load
IDN 77	Linear Position Data Scaling Factor
IDN 78	Linear Position Data Scaling Exponent
IDN 79	Rotational position resolution
IDN 103	Modulo value
IDN 121	Input Revolutions of Load Gear
IDN 122	Output Revolutions of Load Gear
IDN 123	Linear feed constant in selected units, i.e. travel per revolution

Since with linear axes the absolute travel is limited, the servo amplifier ensures that there is no overrun in the actual position by setting the software limit switches. Due to scaling, the internal drive values in SWE1 and SWE2 differ from the values determined via sercos<sup>®</sup>.

## 4.12 Directions of rotation

### ASCII "DIR"

With this command, the polarities can be rotated directly in the servo amplifier. This has an effect on the display in the GUI! It is then no longer necessary to rotate using sercos<sup>®</sup>.

### IDN 43 – Speed polarities

Bit		Meaning	
Bit 0	Velocity setpoint	0	Not inverted
		1	Inverted
Bit 1	Additive velocity setpoint	0	Not inverted
		1	Inverted
Bit 2	Velocity actual value 1	0	Not inverted
		1	Inverted
Bit 3	Velocity actual value 2	0	Not inverted
		1	Inverted
Bit 4-15	reserved		

**IDN 55 – Position polarities****NOTE**

Rotations via IDN 55 and IDN 43 only affect sercos<sup>®</sup> and do not have an effect in the servo amplifier itself. The display in the startup software then no longer matches the display via sercos<sup>®</sup>.

IDN 55 is saved in SERCSET bits 4-11, meaning that settings have an effect here, even if these are later no longer desired. IDN 55 then has to be explicitly altered in phase 2 and the SAVE command executed.

Bit		Meaning	
Bit 0	Position setpoint	0	Not inverted
		1	Inverted
Bit 1	Reserved: Additive position setpoint	0	Not inverted
		1	Inverted
Bit 2	Position actual value 1	0	Not inverted
		1	Inverted
Bit 3	Position actual value 2	0	Not inverted
		1	Inverted
Bit 4	Position limit values (software limit switches)	0	deactivated
		1	activated*
Bit 4-15	reserved		



## 4.13 External position control

IDN used	Meaning
IDN 32	Primary Operation Mode
IDN 53	Position Feedback Value 2 (External Feedback)
IDN 76	Position Data Scaling Type
IDN 79	Rotational Position Resolution
IDN 117	Resolution of Rotational Feedback 2 (External Feedback)
IDN 257	Multiplication Factor 2
IDN 121	Input Revolutions of Load Gear
IDN 122	Output Revolutions of Load Gear
IDN 123	Feed Constant
IDNP 3017	Position Feedback Type (ASCII: EXTPOS)

The resolution of the external encoder is the number of lines per revolution it can supply. In standard configuration, the multiplication factor can remain 1. The resolution used via sercos<sup>®</sup> is still set via IDN 79 for rotational and IDN 123 for linear scaling. The encoder lines are then scaled to this resolution.

### Example:

Motor encoder: Resolver FBTYPE 0

External encoder: 5 V ROD encoder on plug X5 => EXTPOS 3

Position resolution: 20bit via sercos<sup>®</sup>

### NOTE

EXTPOS uses positive values for active control and negative values when the external encoder is only to be read in.

If the external encoder is being used for active control, PFB0 is copied to PFB and the motor encoder then only supplies position data via PRD. This is limited to one revolution (like modulo), as it only contributes to the commutation.

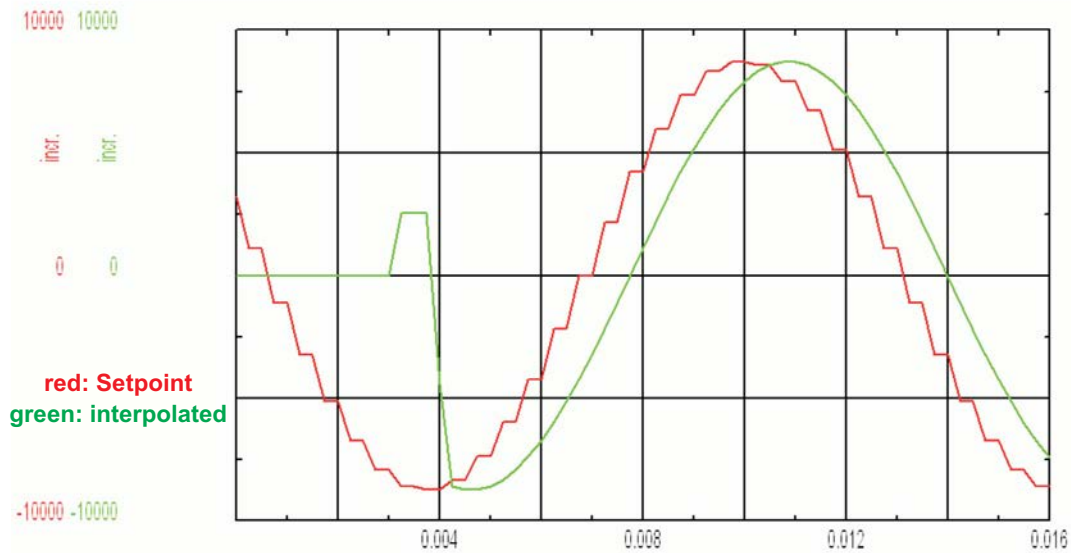
### Startup parameters

IDN	Name	Type	Value
S-0-0032	Main operating mode	UINT16	12 (0x000C)
S-0-0055	Position polarities	UINT16	0 (0x0000)
S-0-0076	Type of scaling for position data	UINT16	74 (0x004A)
S-0-0117	Resolution of Rotational Feedback 2	UINT32	500
S-0-0079	Rotational position resolution	UINT32	1048576
P-0-3017	Position Feedback Type	INT16	3

### 4.14 Quadratic interpolation

Quadratic interpolation is used for “softer” evening out of target value jumps. The sercos® cycle time must be 500 µs and the position control must be used. The interpolation method is then activated with IDNP 3040 = 1. With modulo it **cannot** be used.

An internal table with sinus-shaped trajectory is used as reference. Since the cycle time is 500µs and the cycle time of the internal position controller is 250µs, the target value is only updated every second time.



Setpoint	S_SETH
	-8720
-7378	-8721
-7378	-8581
-5982	-8310
-5982	-7902
-4210	-7378
-4210	-6727
-2173	-5982
-2173	-5129
0	-4210
0	-3209
2173	-2173
2173	-1087

4210	0
4210	1103
5982	2173
5982	3224
7378	4210
7378	5143
8310	5982
8310	6738
8721	7378
8721	7910
8583	8310
8583	8584
7906	8721
7906	8720
6733	8583

6733	8306
5136	7906
5136	7372
3217	6733
3217	5975
1095	5136
1095	4202
-1095	3217
-1095	2165
-3217	1095
-3217	-8
-5136	-1095
-5136	-2181
-6733	-3217
-6733	-4217

## 4.15 Gearing and transmission ratios for linear and rotational axes

IDN used	Meaning
IDN 76	scaling of the position data
IDN 121	Gearing input revolutions
IDN 122	Gearing output revolutions

With IDN 121 and 122 a gearing factor for simulating an electron gearing. IDN 76 Bit 6 then defines whether the setpoint relates to the motor or the load. The gearing manipulates the setpoint according to the gearing factor.

### NOTE

Does not work with modulo.

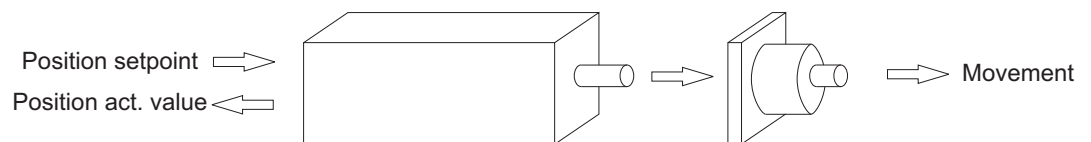
The travel is limited via software limit switches, since overrun can occur.

### Example:

IDN 121 = 1

IDN 122 = 2

Transmission ratio 2:1 (IDN122 / IDN121)

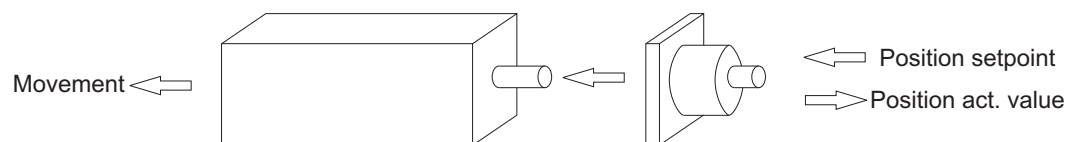


### IDN 76 Bit 6 = 0

### NOTE

Gearing factor 1:2 with interpretation of the setpoint from the motor to the load. With a setpoint of 1 revolution, the motor shaft turns 2 revolutions. The sercos<sup>®</sup> actual position value sent back is for just 1 revolution of the motor.

### IDN 76 Bit 6 = 1



### NOTE

Gearing factor 1:2 with interpretation of the setpoint from the load to the motor. With a setpoint of 2 revolutions, the motor shaft turns 1 revolution. The sercos<sup>®</sup> actual position value sent back is for 2 revolutions of the load.

## 4.16 Macro variables for debugging

SERC_SYNCVAL	Synchronization time T3 in $\mu\text{s}$
SERC_NOSYNC	Synchronization deviation in $\mu\text{s}$
SERC_SYNCHUB	Stroke used for the PWM
SERC_VVOR	Pilot speed control value IDNP 3055
SERC_IVOR	Pilot speed control value IDNP 3056
SERC_SOLLFREI	Internal release of the target values from the interpolator. Determined by functions such as homing or "wake & shake" and of course also by the control bits.
SERC_SOLLWERT	Target value of the control system via sercos <sup>®</sup> (formerly DPRNEW30)
S_SETH	Target value of the linear interpolation. However, this value is only applied when OPMODE is 6 and SERC_SOLLFREI is 1.
S_SETL	Target value of the position controller
HARDENA	Hardware enable
SOFTENABLE	Software enable
EN_P_I	Global enable of the output stage, consisting of software and hardware enable.
OPMODE	Operating mode 6 = sercos position control
PFB	Actual position value of motor encoder
PFB0	Actual position value of external encoder
PRD	Commutation angle
S_FEHL	Internal tracking error
TRJSTAT	Collective bit variable for the trajectory status
SERC_ATSTAT	AT status word
SERC_MDTCNTL	MDT control word
STATCODE	Warnings
ERRCODE	Error messages
FFVAKTIV	Pilot controls status via the sercos <sup>®</sup> bus
TICK0	Counter 62.5 $\mu\text{s}$
TICK	Millisecond counter
TICK250	Counter in 250 $\mu\text{s}$
INPUTx	Status of the digital input x
PSPEED	Target speed value
DPRNEWx	Test variables (x = 1...40)

## 4.17 Troubleshooting

### 4.17.1 When does F29 occur?

- Every time the phases are switched back, i.e. also every time the control system is intentionally switched off!
- If two consecutive (back-to-back) MSTs or MDTs fail
- If the software enable is issued before the hardware enable without it having been configured with IDNP 3016
- If the sercos<sup>®</sup> ASIC has an unexpected version number (unlikely).
- If the hardware enable switches to 0V with servo amplifiers released via sercos<sup>®</sup>.
- In the event of cable break.
- Control system wants to switch to a phase greater than 4.
- The next phase requested by the control system would skip one or more phases.
- Switching is to be performed to phase 3 without the command IDN127 having first been successfully executed.
- Switching is to be performed to phase 4 without the command IDN128 having first been successfully executed.

### 4.17.2 Phase 0 or phase 1 is not possible

- Do all servo amplifiers have the same baud rate (SBAUD)?
- Do all servo amplifiers have a unique address (ADDR)?
- The light output (SLEN) might not be set optimally. The light output can effectively only be set in the following steps:  
0      1-14      15- 30      31-44      45...
- With 16 Mbaud, 30 is the maximum light output and the only steps available are 0-10 and 11-30.

### 4.17.3 It is not possible to switch up from phase 2 to phase 3

IDN 21 contains all parameters that prevent phase runup. These are predominantly timings, which come from the control system and are checked in the drive. However, the configuration of the AT and MDT is also checked here with regard to the operating mode. Speed control stipulates that the MDT also contains the target speed value.

The following parameters MUST be written by the control system:

IDN 1	NC cycle time	Must be the same; larger than 250µs; above 1ms only whole digits, no decimals
IDN 2	sercos <sup>®</sup> cycle time	
IDN 6	AT timing	Are all required values on the operating mode and telegram type programmed? And do these match the length?
IDN 9	Start address in the MDT	
IDN 10	Length of the MDT	
IDN 15	Telegram type	
IDN 16	AT configuration	
IDN 24	MDT configuration	
IDN 32	Main operating mode	
IDN 89	MDT timing	

#### 4.17.4 It is not possible to switch up from phase 3 to phase 4

IDN 22 lists the IDNs which prevent switching up. In this phase these are scaling values and general settings that contradict one another.

For example:

IDN 44,45,46	scaling values for speed control
IDN 76,79,103,123	scaling values for position control
IDN 121,122	Gearing factors

**4.18 IDN type-sorted****4.18.1 General**

IDN0030 Manufacturer Version . . . . .	33
IDN0140 Controller Type . . . . .	60
IDN0141 Motor Type . . . . .	61
IDN0142 Application Type . . . . .	61
IDN0192 IDN List of Back-up Operation Data . . . . .	70
IDN0262 Load Default Values . . . . .	72
IDN0264 Back-up Working Memory . . . . .	72
IDN0265 Language Selection . . . . .	72
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IDN0289 IDN List of Data Programmable in CP3 . . . . .	73
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