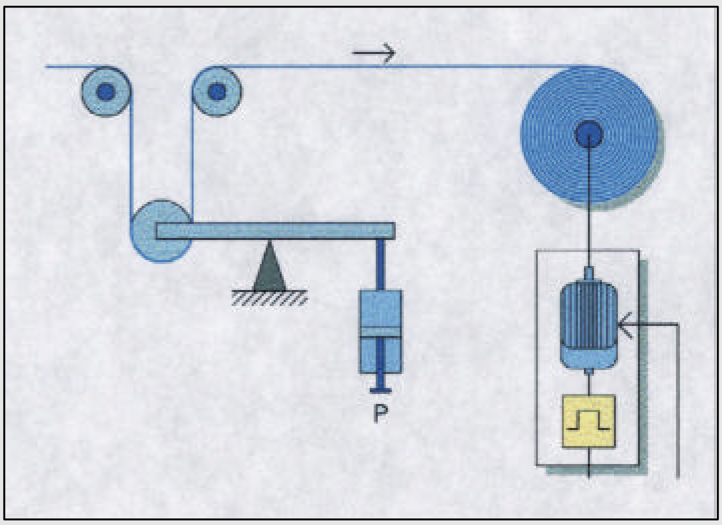
Standard Software Package

Axial Winder SPW420
for the
T400 Technology Board

Software Version 2.0



Abbreviations

AG	Automation unit (PLC)
CB	Communications board such as CBP/CB1
CU	Base drive converter or converter
CUVC	New SIMOVERT MASTERDRIVES
CUMC	SIMOVERT MASTERDRIVES Motion Control
CUD1	SIMOREG DC MASTER
dxxx	Technology parameters, number xxx, cannot be changed
FB	Function block
Hxxx	Technology parameters, number xxx, can be changed
M	Torque
n	Speed
n_act	Speed actual value
n_set	Speed setpoint
PG	Programmer (e.g. PG685, PG730, PG750)
PTP (PtP)	Peer-to-peer communications
T400	T400 technology module
TA	Sampling time
b.d. n	Block diagram, Page n
v	Web velocity
USS	USS communications

Contents

0 Warning information

WARNING

Electrical equipment has components which are at dangerous voltage levels.

If these instructions are not strictly adhered to, this can result in severe bodily injury and material damage.

Only appropriately qualified personnel may work on/commission this equipment.

This personnel must be completely knowledgable about all the warnings and service measures according to this User Manual.

It is especially important that the warning information in the relevant Operating Instructions (MASTERDRIVES or DC MASTER) is strictly observed.

Definitions

- **Qualified personnel** for the purpose of this User Manual and product labels

are personnel who are familiar with the installation, mounting, start-up and operation of the equipment and the hazards involved. He or she must have the following qualifications:

1. Trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety procedures.

2. Trained in the proper care and use of protective equipment in accordance with established safety procedures.

3. Trained in rendering first aid.

DANGER

For the purpose of this User Manual and product labels, „Danger“ indicates death, severe personal injury and/or substantial property damage will result if proper precautions are not taken.

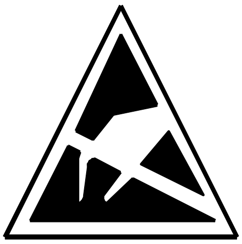
WARNING

For the purpose of this User Manual and product labels, „Warning“ indicates death, severe personal injury or property damage can result if proper precautions are not taken

CAUTION

For the purpose of this User Manual and product labels, „Caution“ indicates that minor personal injury or material damage can result if proper precautions are not taken.

NOTE For the purpose of this User Manual, „Note“ indicates information about the product or the respective part of the User Manual which is essential to highlight.



CAUTION

This board contains components which can be destroyed by electrostatic discharge. Prior to touching any electronics board, your body must be electrically discharged. This can be simply done by touching a conductive, grounded object immediately beforehand (e.g. bare metal cabinet components, socket protective conductor contact).

1 Overview

1.1 Validity

SPW420

This User Manual is valid for the *standard "**Axial winder**" **SPW420 software package,*** **Version 2.0**. The configured software, based on T300 MS320 (version 1.3) has been expanded, and has been implemented on the T400 technology module (32 bit). Differences to the previous versions will be shown in Chapter 10 " Version changes" . This SPW420 software can only run on the T400 technology module, both in the drive converter as well as in the SRT400 subrack.

Note

The control core (all of the functions) of the standard SPW420 software package are essentially also available to other SIMADYN D modules (PM4 - PM6 and FM 458).

Base- and interface modules

This standard software package has been released for the SIMOVERT MASTERDRIVES drive converters and the SIMOREG DC-MASTER drive converters with the following base- and interface modules:

Base modules (CU):

- CUVC or CUMC, installed in the SIMOVERT MASTERDRIVES VC or MC converters as well as the earlier CU2 or CU3 modules, installed in SIMOVERT MASTERDRIVES VC or SC.
- SIMOREG DC-MASTER

Interface modules (CB):

Only the subsequently described slots and combinations have been released:

- PROFIBUS interface module CBP on the ADB carrier module (lower slot of the ADB), installed in slot 3 of the Electronics box, if a CUVC or CUMC are used.
- PROFIBUS interface module CB1 at slot 3, if either CU2 or CU3 is used.
- Peer-to-peer / USS interface module SCB1 or SCB2 at slot 3.

1.2 General overview

The digital SIMOVERT MASTERDRIVES and SIMOREG DC-MASTER converters can be expanded by the T400 technology module and various interface modules. Standard software packages are available for applications which are frequently used, e.g. angular synchronism, sheet-cutters or axial winder controls (closed-loop). If the technological functions of the standard software packages have to be expanded to fulfill specific customer requirements, then the software packages can be purchased on CD-ROM, and then modified with the graphics CFC configuring tool (from version 4.0).

The standard software packages can run with and without interface module (e.g. CBP/CB1).

Note Getting to know the software and commissioning:

1. Configuring examples , refer to Chapters 4.7 to 4.13.
2. Block diagrams (b.d.), refer to Appendix (Chapter 10. 4)
3. Controlling the configured winder software package via CBP/ CB1, peer-to-peer and terminals, refer to the block diagram, Sheets 1 3a - 19, 22 - 22b.

1.2.1 T400 technology module

The T400 technology module is a processor module, which can be freely configured using CFC. It is compatible to SIMADYN D, and has been especially designed for use with the SIMOVERT MASTERDRIVES, SIMOREG DC-MASTER drive converters and SRT400 subracks. The graphical CFC configuring tool is used to define the function of the various modules. The generated software is downloaded into a program memory of the T400. Table 1-1 shows an overview of the characteristics of the T400[1]. The communications with the base drive is realized via a parallel interface, which is also implemented as **dual port RAM** (DPR). In addition, the T400 can communicate via PROFIBUS DP, the USS bus and peer-to-peer links. Refer to Chapter 2 for details.

Processor / clock frequency	**RISC R3081/ 32 MHz**
RAM memory	4 Mbyte
Communications with CU	Parallel bus, dual port RAM, 16 words (each 16 bit)
Program memory	2 Mbyte EPROM and 32 kbyte EEPROM, 128 byte NOVRAM
Digital inputs	12 of which 4 bidirectional inputs or outputs 24 V
Digital outputs	6 of which 4 bidirectional inputs or outputs 24 V, 50 mA
Analog inputs	5 12-bit resolution ± 10 V (2 differential inputs)
Analog outputs	2 12-bit resolution ± 10 V, 10 mA
Serial interfaces	2 1* RS232 or RS485 (2-wire) 1* RS485 (2- or 4-wire)
Pulse encoder inputs	2 1* track A, B, zero, HTL (15V) or TTL/RS422 (5V) 1* track A, B, zero and coarse HTL pulse

Table 1-1 Overview of the T400 technology module

Prerequisite

The following components are required to operate the SPW420 axial winder:

Product description	Order No.
Software package, SPW420 axial winder with T400	6DD1842-0AA0
Operating Instructions T400, German	6DD1902-0EB0
Manual, axial winder SPW420	
German	6DD1903-0AA0
English	6DD1903-0AB0
French	6DD1903-0AC0

Table 1-2 SPW420 components required

Adaptation possibility

The source code of the standard SPW420 axial winder software package is available on CD-ROM. Using the graphic configuring platform of SIMADYN D, i.e. CFC, when required, the functionality of the closed-loop winder control can be adapted to specific customer requirements. The individual components in Table 1-3 are also available:

Product description	Order No.
Axial winder software (CD-ROM) including User Manual	6DD1843-0AA0
T400 technology module	6DD1606-0AD0
D7-ES V5.0 (complete software package: STEP7, CFC, D7-SYS)	6DD1801-4DA2
Or Service-IBS V5.0 (German/English)	6DD1803-1BA1

Table 1-3 Components to adapt the software package using CFC

1.2.2 Interface module (CB)

For applications which require the SIMOVERT MASTERDRIVES or SIMOREG DC-MASTER drive converters to be coupled with a higher-level automation system, interface modules are used, depending on the protocol used. Thus, it is possible for automation systems to read and change setpoints, actual values, technology parameters as well as base drive converter parameters.

PROFIBUS DP is the preferred communications type. In this case, the interface modules CBP with ADP or CB1 are required; also refer to Chapter 1.1.

1.3 Overview of the closed-loop winder control

Applications

The standard " Axial winder" software package allows, in conjunction with the appropriate devices, winders and unwinders to be implemented for the widest range of applications. This include for example, foil machines, all types of printing machines, coating systems, paper finishing machines, coilers for wire-drawing machines, textile machines and coilers for sheet steel.

1.3.1 Hardware/software prerequisites

Hardware

The drive converter must be designed for 4 Q operation, as braking must be possible.

Software

The minimum software releases are required as follows:

Base drive converter modules:

- CU2: Software release ≥ 1.2
- CU3: Software release ≥ 1.1
- CUVC: Software release ≥ 3.0
- CUMC: Software release ≥ 1.1
- CUD1: Software release ≥ 1.3.

Interface modules:

- CBP: Software release ≥ 1.0
- CB1: Software release ≥ 1.3

Configuring tool (if the software is not only to be just parameterized):

- STEP7, CFC, D7-SYS: Software release ≥ 4.0

1.3.2 Main features of the closed-loop winder control

Function

– various winding techniques, e.g. direct closed-loop tension control, indirect closed-loop tension control or closed-loop constant v control are possible;

– override speed controller (the tension controller acts directly on the motor torque) or the speed correction technique (the tension controller acts on the speed setpoint), switchable ;

– tension controller- and speed controller gain adaptation as a function of the diameter ;

– winding hardness control using a polygon characteristic with 5 points, diameter-dependent, can be parameterized ;

- speed-dependent friction compensation using a polygon characteristic with 6 points, can be parameterized ;
- acceleration pre-control as a function of the diameter as well as the web width, gearbox stage and material thickness. The thickness can be automatically learned ;
- tension pre-control as a function of the diameter and tension setpoint ;
- two techniques to calculate the diameter, i.e. with/without v_{set} signals;
- diameter calculation with a control function for 'Set diameter' and 'Hold diameter';
- web length calculation ;
- it is possible to changeover between several gearbox stages ;
- free function blocks for additional user-specific requirements ;
- freely-assignable display parameters to visualize the actual value of the connector/binector .

Communications

- data transfer to the base drive converter and via PROFIBUS DP, peer-to-peer, USS and digital or analog I/O possible ;
- versatile as it is possible, within the standard axial winder software, to freely-interconnect analog and digital inputs, analog and digital outputs as well as parts of the dual port RAM to the interface module and to the base drive using BICO technology (start-up program).

Monitoring

- optional web break detection and the appropriate measures ;
- automatic standstill identification and switching to standstill tension ;
- monitoring of all communication interfaces ;
- winder-related open-loop control with alarm- and fault evaluation ;
- automatic protection against web sag .

Operating mode

- suitable for winders and unwinders with and without flying reel change for changeover mechanical system.
- inching-, positioning- and crawl operation.
- two motorized potentiometers which can be freely used.
- shutdown without overshoot, with braking characteristic for fast stop.

Measured value sensing

- tension transducer or dancer roll can be connected ;
- two pulse encoders can be connected to measure the motor speed and web velocity ;
- surface tachometer can be connected to sense the diameter actual value.

2 T400 technology module

2.1 Communication interfaces

All of the T400 interfaces, included in the standard software package, are shown in Fig. 2-1:

- Communications interface: PROFIBUS, peer-to-peer, USS-BUS and PC/start-up interface
- Base drive or converter
- I/O interface: Analog and digital inputs/outputs
- Actual value sensing: Two incremental encoders

The closed-loop control core of the axial winder and the actual value sensing is executed on the T400. Its functions are explained in detail in Chapter 3. All of the interfaces, shown in Fig. 2-1, which are used to transfer process- and parameter data with the T400, are described in the following Chapters.

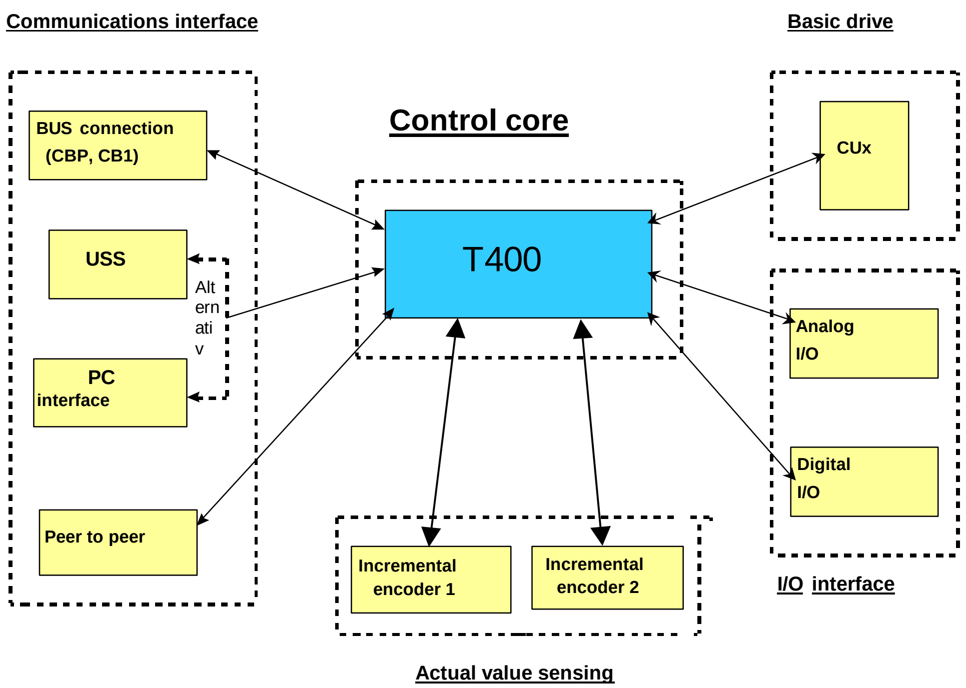


Fig. 2-1 Communications interface for T400

2.1.1 Interface to the base drive converter (b.d. 15a)

Communications with CU

Fast process data and parameter transfer as well as faults/alarms between the T400 technology module and the base drive is realized using the backplane bus via a parallel dual port RAM interface.

The **process data**, i.e. the setpoints and actual values are **cyclically** written and read by the technology module and base drive. **Parameters** are read and changed, **task-controlled**.

Base drive setting

The base drive must be commissioned. In order to operate the standard SPW420 software package, the following parameters must be set on the base drive for the setpoint/actual value channels and control / status words, refer to Table 2-1, Table 2-2 and Chapter 6.

NOTE

In Table 2-1 and Table 2-2

Pxxx: Base drive parameters

Hxxx: T400 parameter

Setpoint channels

T400 --> CU

The technology module transfers 10 words to the base drive. 8 of these words are defined as in Table 2-1. The other 2 words can be freely connected. The control word transferred is generated by the automation (higher-level open-loop control, data transfer via the interface module) or from the T400 terminals and fixed values.

CUVC param.	CUMC param.	CUD1 param.	Value	Explanation	Word . bit	Sampl. time	Par. T400
		P648	9	Source for control word 1			
		P649	9	Source for control word 2			
P554	P554	P654	3100	On command (main contactor)	Word 1.0	16 ms	
P555	P555	P655	3101	Off2	Word 1.1	16 ms	
P558	P558	P658	3102	Off3	Word 1.2	16 ms	
P561	P561	P661	3103	Pulse enable	Word 1.3	16 ms	
P565	P565	P665	3107	Acknowledge fault	Word 1.7	16 ms	
P575	P575	P675	3115	External fault	Word 1.15	16 ms	
P443	P443	P625	3002	Speed setpoint	Word 2	2 ms	H500
P585	P585	P685	3409	Speed controller enable	Word 4.9	16 ms	H519
P506	P262	P501	3005	Supplement. torque setpoint	Word 5	2 ms	H501
P493	P265	P605	3006	Positive torque limit	Word 6	2 ms	H502
P499	P266	P606	3007	Negative torque limit	Word 7	2 ms	H503
P232	P232	P553	3008	Variable moment of inertia	Word 8	2 ms	H504
			3009	free	Word 9	2 ms	H505
			3010	free	Word 10	2 ms	H506

Table 2-1 Control word- and setpoint channel from the T400 to the base drive

Act. value channels

CU --> T400

The technology module receives 8 words from the base drive; the sequence and the contents are defined with appropriate parameters, e.g. P734 for CUVC. Status word 1 which is transferred is logically combined with the status messages of the T400, and transferred to the automation. Various status bits are evaluated in the configured software.

Additional status words and actual values can be sent from the base drive to the T400 via the backplane bus for monitoring, setpoint from the CU or for output.

CUVC/ CUMC		CU D1		Explanation	Word	Sampl. time	Par. T400
Param.	Value	Param.	Value				
P734.01	32	U734.01	32	Status word 1 (block diag. 22)	Word 1	16 ms	
P734.02	148/91	U734.02	167	Receive word 2 (free)	Word 2	2 ms	d550
P734.03	0	U734.03	0	Receive word 3 (free)	Word 3	2 ms	d551
P734.04		U734.04		Status word 2 (not used)	Word 4		
P734.05	165	U734.05	141	Torque setpoint	Word 5	2 ms	d552
P734.06	24/241	U734.06	142	Torque actual value	Word 6	2 ms	d553
P734.07	0	U734.07	0	Receive word 7 (free)	Word 7	2 ms	d554
P734.08	0	U734.08	0	Receive word 8 (free)	Word 8	2 ms	d555

Table 2-2 Status word- and actual value channel from the base drive to T400

2.1.2 Interface to COMBOARD (b.d. 15)

Communications via PROFIBUS DP

Permanently set and freely selectable setpoints/actual values can be transferred via the COMBOARD communications module (in this case, only CB1 or CBP/ADB). The T400 with the COMBOARD only has a PROFIBUS slave function.

The COMBOARD is parameterized on the base drive, such as e. g. PPO type, baud rate, telegram length etc., refer to Lit. [2-4]). The standard software package defines which data should be transferred. It occupies 10 process data. Some of them can be freely selected.

NOTE

Various protocol versions are available for the PROFIBUS. PPO type 5 is used in this software package. This type includes 10 process data (each 16-bit words) and parameters.

Cycle time

Data is transferred between the communication modules and the technology module via dual port RAM. The process data (setpoints and actual values) are read or written from the T400 in the fastest cycle time (2 ms).

T400 in the SRT400

Parameterization from the T400 is only realized when the T400 is operated in the standalone mode in the SRT400 with COMBOARD at slot 2. Parameters H602-H604 are provided for this special case.

Enable H288

The configured software can be operated with and without a communications module. If the communications module is not used, PROFIBUS communications for the configured software can be deactivated using parameter H288. This then relieves the CPU, and disables the monitoring function. In addition, parameters H011 and H012 (alarm / fault suppression mask) must be appropriately set (refer to Chapter 5).

Receive data

COMBD --> T400

SPW420 expects a maximum of 10 words of process data from a higher-level automation system (8 setpoints and 2 control words). The setpoints which are transferred, can be freely connected within the software using BICO technology so that they do not have a fixed assignment (refer to block diagrams 2 , 15 and 22a). The telegram structure for PROFIBUS DP is shown in Table 2-3 (with PPO type 5).

Telegram word	Receive data	Parameter (T400)
1	Control word 1 (control word 1 T400)	Refer to block diagram 15/22a
2	Setpoint W2 (free)	d450 refer to block diagram 15
3	Setpoint W3 (free)	d451 refer to block diagram 15
4	Control word 2 (control word 2 T400)	Refer to block diagram 22a
5	Setpoint W5 (free)	d452 refer to block diagram 15
6	Setpoint W6 (free)	d453 refer to block diagram 15
7	Setpoint W7 (free)	d454 refer to block diagram 15
8	Setpoint W8 (free)	d455 refer to block diagram 15
9	Setpoint W9 (free)	d456 refer to block diagram 15
10	Setpoint W10 (free)	d457 refer to block diagram 15

Table 2-3 Receive channels from PROFIBUS (2 ms sampling time)

Send data

T400 --> COMBD

The send data (actual value/status word) selection can also be parameterized.

Telegram word	Send data (pre-assignment)	Parameter (T400)
1	Status word 1 (status word 1 T400)	H444(4335) r.t.b.d. 15/22
2	Actual value W2 (actual diameter)	H440(310) r.t.b.d. 15
3	Actual value W3 (free)	H441(0) r.t.b.d. 15
4	Status word (status word 2 T400)	H445(4336) r.t.b.d. 15/22
5	Actual value W5 (free)	H442(0) r.t.b.d. 15
6	Actual value W6 (free)	H443(0) r.t.b.d. 15
7	Actual value W7 (free)	H446(0) r.t.b.d. 15
8	Actual value W8 (free)	H447(0) r.t.b.d. 15
9	Actual value W9 (free)	H448(0) r.t.b.d. 15
10	Actual value W10 (free)	H449(0) r.t.b.d. 15

Table 2-4 Send channels (sampling time 2 ms)

Monitoring the telegram receive

The telegram data transfer can be monitored during communications. The time limits after power-on and during operation can be set separately (H495-496). The fault- and alarm messages are transferred to the CU, where they are displayed, if a data suppression mask (H011,H012) has not been activated (refer to Chapter 8.2).

2.1.3 Interface to the peer-to-peer (b.d. 14)

Communications via peer-to-peer

The serial interface X02 is assigned to the peer-to-peer protocol through configuring. This protocol allows data to be extremely quickly transferred, without any delay, to
- additional T400
- other drive converters with SCB 2
- SIMOREG 6RA24 and 6RA70

refer to Table 2-5 and Table 2-6.

Pre-assignment

This interface has the following pre-assignment:
- baud rate (H245): 19200 baud
- monitoring time limit (H246-H247): 10000 - 9920ms
- telegram length: 5 words (1 control word and 4 setpoints)

NOTE The telegram may include a maximum of 5 words (each 16 bit). The maximum baud rate is 38400 baud.

Caution The terminating resistors of the interface used must be switched-in to avoid data transfer disturbances (switch S1/ 3 to S1/6; refer to [1,5]).

Enable

The peer-to-peer communications can be inhibited using parameter H289. Thus, all of the peer-to-peer relevant function blocks are deactivated.

Telegram word	**Receive data**	**Parameter (T400)**
1	Control word 1	refer to block diagram 22a
2	Setpoint W2	d018 refer to b.d. 14
3	Setpoint W3	d019 refer to b.d. 14
4	Setpoint W4	d066 refer to b.d. 14
5	Setpoint W5	d067 refer to b.d. 14

Table 2-5 Receive data from peer-to-peer (2 ms sampling time)

Telegram word	**Send data**	**Parameter (T400)**
1	Status word 1(status word 1 from T400)	H015 (4335) r.t.b.d. 22b
2	Actual value W2 (actual diameter)	H016(310) r.t.b.d. 14
3	Actual value W3 (velocity setpoint)	H017(340) r.t.b.d. 14
4	Actual value W4	H064(0) r.t.b.d. 14
5	Actual value W5	H065(0) r.t.b.d. 14

Table 2-6 Send data from peer-to-peer (2 ms sampling time)

Monitoring telegram receive

The telegram data transfer can be monitored during communications. The time limits after power-on and during operation can be set separately (H246-H247). The fault- and alarm messages are transferred to the CU and displayed on the PMU, if a data suppression mask (H011-H012) has not been activated (refer to Chapter 8.2).

2.1.4 USS slave interface (b.d. 14a)

Communications via USS

The serial interface X01 (RS232 / RS485) can be alternatively used for parameterization. This is provided for the special case where the T400 is used in the SRT400. In this case, the following settings are required:

Involves	Significance	Act. value
H600	Enable USS slave ⇒ 1	1
H601	USS data transfer cable 0: RS485 (OP1S) 1: RS232 (SIMOVIS)	0
S1/8 on T400	Changeover from online operation (CFC, simple start-up) to USS. ON: USS, OFF: Online operation	OFF

Table 2-7 Settings for USS slave operation

Caution

It is *not* possible to simultaneously use USS and be in online mode! USS operation is not possible if the parameterization is incorrect. This means, the error can only be removed, if you re-select online operation, and, for example, rectify the error using the Service-IBS tool. Operation with OP1S is only possible from version 2.2.

2.1.5 Interface to the monitor

An operator control program, based on the SIMADYN D monitor (CFC online and Service-IBS) can be connected at the serial interface X01 (RS232). This then allows all connectors to be viewed and changed. Further, connection changes are possible (not using SIMOVIS).

The baud rate is, as standard **19200 baud**.

Terminal designation	Function
67	RxD
68	TxD
69	Ground

Table 2-8 Terminals of interface X01 on T400

2.2 Terminal assignment

Control signals and setpoints can be read-in and status signals and actual values output via digital and analog channels. For T400, the plant signals are connected directly at appropriate terminals, which are accessible from the front. An overview of the T400 connections is shown in Fig. 2-2. The subsequent description of the terminal assignment refers to this Fig. For additional information regarding T400, refer to Lit. [1, 5].

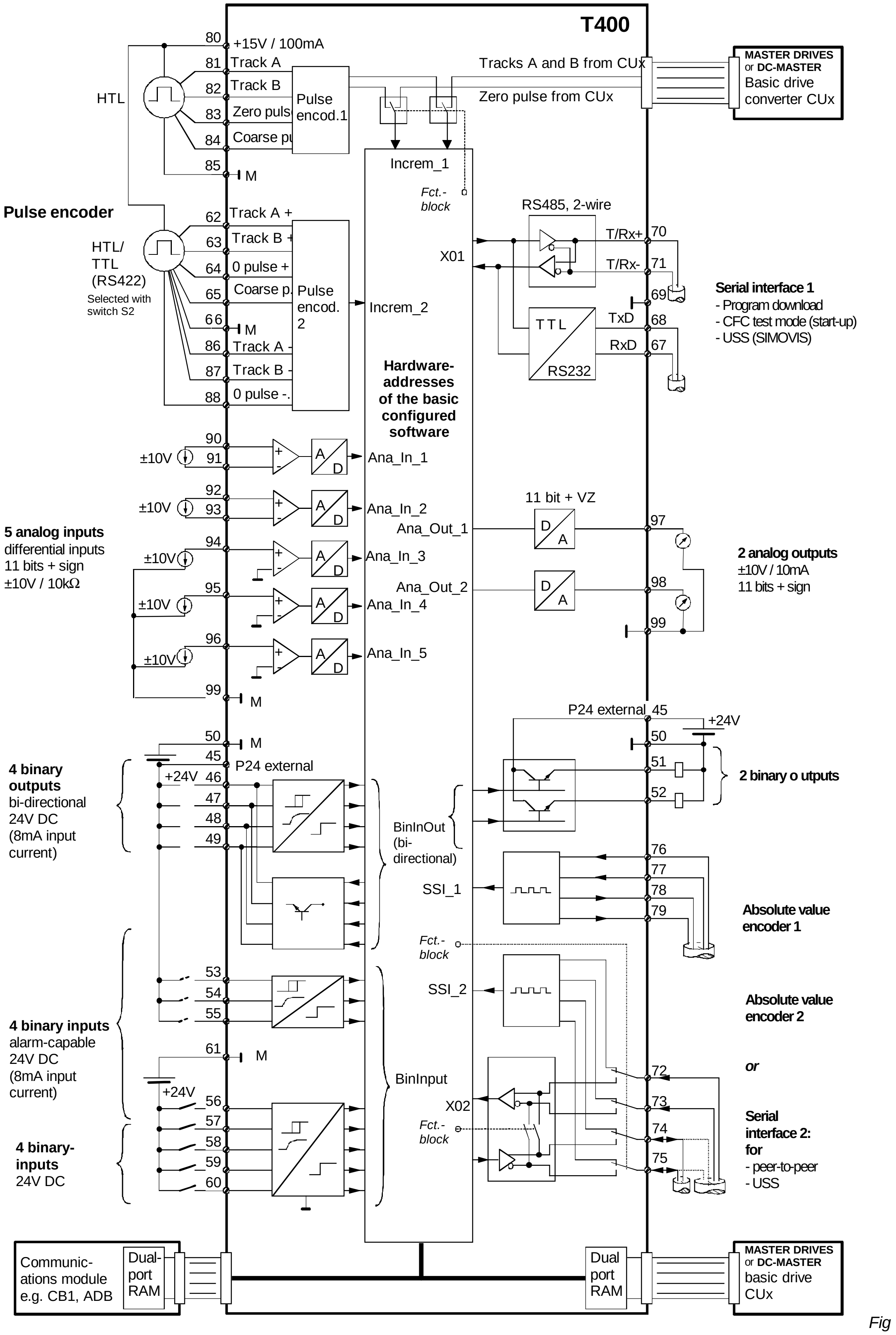


Fig. 2-2 Layout of the terminals of T400 technology module

2.2.1 Digital inputs and outputs

Power supply voltage

The digital inputs and outputs of the T400 technology module require or supply 24 volt signals. In this case, the **24 V** supply voltage for the digital outputs must be **externally supplied**.

Digital control inputs

The SPW420 closed-loop control core uses all of the 8 digital inputs on the T400 (Table 2-9). When required, the default values (pre-assigned values) can be changed.

Bit inversion H295

When required, it is possible to invert each bit of the digital inputs by using the appropriate parameterization. To realize this, the appropriate bit of parameter H295 must be set to 1; refer to Chapter 5.

Term.	Connector	Assignment	Explanation
53	B2003	System start (H021)	1 = operation enable for system operation
54	B2004	Tension control on (H022)	1 = on, switch-in the closed-loop tension control
55	B2005	Inhib. tension contr. (H023)	1 = inhibit, tension controller output = 0
56	B2006	Set diameter (H024)	1 = set, transfer setting diameter
57	B2007	Enter suppl.. Vset (H025)	1 = yes, addition, supplementary velocity setpoint
58	B2008	Local positioning (H026)	1 = yes, local operation with positioning ref. value
59	B2009	Local operator control (H027)	1 = local, local/system operation changeover
60	B2010	Local stop (H028)	1 = stop for local operation

Table 2-9 Terminal assignment, digital inputs, T400 module (16ms cycle time)

Digital outputs

The digital outputs are used for status signals as well as during start-up and during winding, refer to Table 2-10.

Characteristics

When the drive is first powered-up, all of the outputs are first inhibited (high-ohmic state). In the initialization phase, they are controlled with the values which are present at that time. When the drive is shutdown, or under a fault condition, all of the outputs are connected to ground.

NOTE

Logical " 0" : Output is open or connected to ground
Logical " 1" : Output is closed, i.e. the power supply voltage connected at the terminal (24V) is present.

Freely inter-connectable

The following table shows the pre-assigned digital outputs of the T400 technology module. The digital outputs can be freely inter-connected using BICO-technology or Service-IBS program.

Terminal	Assignment (binector)	Explanation
46 (H521)	Web break (B2501)	Web break detected
47 (H522)	Standstill (V_{act} = 0) (B2502)	Speed actual value < H157
48 (H523)	Tension controller on (B2503)	Tension/pos. controller on, speed contr. enabled
49(H524)	Base drive on (B2504)	Operating signal from the base drive

52(H525)	Speed setpoint =0 (B2505)	Speed controller setpoint < 0.1%
51(H526)	Limit value monitor 1 (B2114)	Output can be parameterized, H114

Table 2-10 Terminal assignment, digital outputs, T400 module (16ms cycle time)

2.2.2 Analog inputs and outputs

Scaling

An output- and input voltage of **10 V** corresponds to an internal value of **1.0**. The *gain* in the following table offers additional normalization possibilities.

Analog inputs

Analog value = terminal voltage · scaling factor - offset

The following tables indicate the relevant T400 analog inputs for commissioning the closed-loop control core.

Para. in T400	Term.	Significance (pre-assignment)	Gain	Offset
d320	90/91	Analog input 1	H054	H055
d321	92/93	Analog input 2	H056	H057
d322	94/99	Analog input 3, smoothed (tension actual value from the tension transducer)	H058	H059
d323	95/99	Analog input 4, smoothed	H060	H061
d324	96/99	Analog input 5 (pressure actual value from dancer roll)	H062	H063

Table 2-11 Terminal assignment, analog inputs, T400 module (2ms cycle time)

Analog outputs

Terminal voltage = (value + offset) · scaling factor

The SPW420 closed-loop control used two analog outputs.

Characteristics

0 V is output in the initialization phase.

Representation: 10V = 1.0 (e.g. 100% speed)

Freely interconnectable

Both analog outputs are pre-assigned. They can be freely interconnected using BICO technology.

Para. in T400	Term.	Significance (pre-assignment)	Gain	offset
H103	97/99	Analog output 1 (torque setpoint)	H102	H101
H098	98/99	Analog output 2 (diameter actual value)	H100	H099

Table 2-12 Terminal assignment, analog outputs T400 module (2ms cycle time)

2.2.3 Pulse encoders

Pulse encoder type

Pulse encoders with **two tracks shifted through 90 degrees** must be connected.

Encoder power supply

15 V (max. 100 mA) must be available from the T400 module as encoder power supply.

Screening

Encoders with a 15 - 24 V supply voltage, especially: **1XP8001-1** SIEMENS pulse encoders (for 1LA5 motors, frame sizes 100K to 200L).

The pulse encoder cable must be screened. The cable screen should be connected to ground through the lowest impedance, if possible using cable clamps. This must be especially observed, if these signal cables are routed close to proximity switches or switches with moving contacts.

15 V power supply units

If the 100 mA of the internal 15 V power supply is not sufficient, then the following 15V power supply units are recommended:

- Type CM62-PS-220 AC/ 15 DC/ 1
  220 V AC to 15V DC, 1 A load capability
  Manufacturer, Phoenix

- Type FMP 15S 500 " fast mounting"
  110/220 V AC to 15V DC, 0.5 A load capability
  Manufacturer, Block

Encoder pulse numbers

When selecting the encoder pulse number, the maximum pulse frequency is 1.5 MHz.

Pulse encoders 1/2 from the axle/web tachometer, are connected directly to the CU/T400. The T400 can use the shaft tachometer signals from the base drive (CU) via the backplane bus.

The mode can be parameterized using parameters H217 and H218. The following should be set:

- Encoder type
- Filter parameterization and filter time constant of the digital filter for the signals from the two pulse tracks / zero pulse track
- Source of the encoder tracks

The recommended values for H217 and H218 are specified in the parameter table in Chapter 5. For more detailed information refer to Lit.[6], block NAVS, connector MOD.

	Encoder 1	Encoder 2			
	HTL	RS422	HTL	TTL	HTL ±3V
Track A+ or track A	81	62	62	62	62
Track A-	-	86	-	-	-
Track B+ or track B	82	63	63	63	63
Track B-	-	87	-	-	-
P15 – output to the 15 V encoder supply	80	80	80	80	80
Ground	85	66	66	66	66
Switch S1.1		ON	OFF	ON	OFF
Switch S2.2		ON	OFF	ON	OFF
Switch S2.3		ON	OFF	OFF	ON
Switch S2.4		ON	OFF	ON	OFF
Switch S2.5		ON	OFF	OFF	ON

Table 2-13 Incremental encoder inputs of the T400: Terminal assignment and switch settings for various encoder types

3 Function description

Overview

The standard axial winder software package was developed with the goal of being able to cover many of the known winder applications using one single software package. Using the freely configurable T400 technology module, and the CFC configuring language, universal function units were created, which can be easily adapted to the particular system configuration by parameterization. Flexible interconnection of the control signals and setpoints allows control from higher-level system as well as operator control via the technology module terminals. " Mixed operation" is also possible.

Software structure

The rough structure of the standard SP W420 software package is illustrated in Fig. 3-1:

1. Reading-in setpoints, sensing actual values and open-loop controls
2. Closed-loop control and computation
3. Monitoring

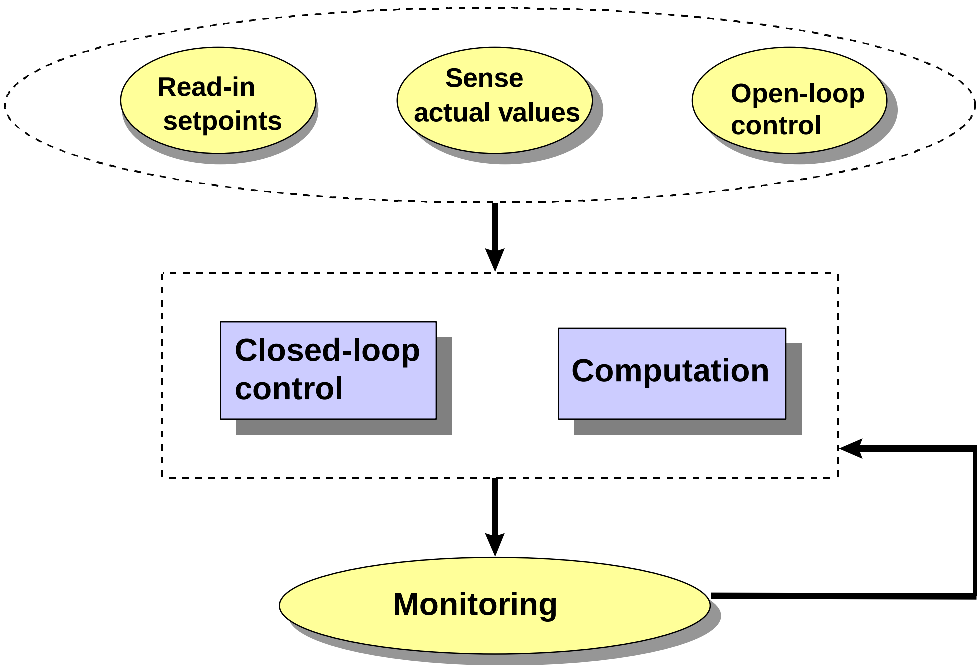


Fig. 3-1 Rough structure of the standard axial winder software package

Description

The description of all of the functions follows the rough structure in Fig. 3-1.

3.1 Reading-in setpoints

3.1.1 General information (block diagrams 11-13)

Source for selection

The selection and interconnection of the setpoints to be processed is realized using BICO technology. Each setpoint can be freely selected from a max. of 6 sources. The following input signals are available:

- 5 analog inputs of the T400 module
- 10 setpoints from PROFIBUS DP
- 5 setpoints from the peer to peer link
- 3 setpoints from the CU
- 2 motorized potentiometers
- 1 fixed setpoint as parameter

In the factory setting, the setpoints are connected with a fixed setpoint, which is generally pre-assigned (default value) 0.0.

3.1.2 Speed setpoint (block diagram 5)

3.1.2.1 Main setpoint

The main setpoint of the web speed for the winder drive is selected using parameter H069 (block diagram 11). The incoming web speed setpoint is normalized using parameter H139, so that the required speed ratio is obtained for the winder. The effective web speed setpoint is available as visualization parameter d301.

Parameter	Parameter name	Explanation
H069	Source, speed setpoint	Freely connectable from the source, refer to Chapter 5
H127	Fixed value, ratio gearbox stage 2	Ratio between gearbox stages 1 and 2 in %, refer to Chapter 5
H138	Source ratio, gearbox stage 2	Refer to Chapter 5
H139	Normalization, web speed	Refer to Chapter 5
d301	Effective web speed setpoint	After normalization and taking into account a gearbox stage changeover

Table 3-1 Parameters to set the speed setpoint

3.1.2.2 Stretch compensation for a speed setpoint

The main web speed setpoint can be influenced to provide "stretch compensation", if the material thickness is to be reduced before winding, e.g. by stretching or expansion. To realize this, a compensation setpoint should be selected using parameter H071. A fixed value is selected via H070, presetting 0.0 with the standard H071 connection. The web speed compensation can be normalized using parameter H137.

Note

The web speed compensation should only be set, if a deviation has been identified between the web speed setpoint and actual value. This difference influences, among other things, the accuracy of the diameter computation and the speed of the winding shaft at the flying roll change.

Parameter	Parameter name	Explanation
H070	Fixed value, web speed compensation	
H071	Source, web speed compensation	Freely-connectable from the source, refer to Chapter 5
H137	Normalized speed compensation	
d340	Compensated web speed	

Table 3-2 Parameters to enter the web speed setpoint compensation

3.1.2.3 Speed setpoint for winder operation

Prerequisite

The following operator controls are required for winder operation (‘ system operation’):

- Command ” Off1/On” = 1 active, the base drive is powered-on (main contactor closed)
- The ” Local operator control” control signal must be 0.
- The software package and base drive wait for an operation enable signal from ” System start” .
- The winder accelerates up to the specified setpoint.

Central ramp-function generator

For this ‘ system operation‘ , a central ramp-function generator is effective for the speed setpoint.

The ramp-up / ramp-down times and the ramp-up / ramp-down rounding-off functions are set using parameters H133, H134, H135 and H136. The upper and lower limits can be specified using parameters H131 and H132. The value from H130 can be entered as new setpoint using the “ Accept setpoint B” command via H037. The ” Accept setpoint A” command H036 switches a new selectable setpoint (block diagram 13) with H096. The ramp-function generator is held with the ” Ramp-function generator hold” command H049 or ” Set speed setpoint to stop” H034.

The speed setpoint is transferred directly to the closed-loop control without being influenced by the ramp-function generator, using H154 = 1. In this case, it is possible to use smoothing, which can be set using H155. This operating mode is practical, if the setpoint provided is already available at the ramp-function generator output (e.g. winder as slave drive, setpoint from the central machine control or from another drive).

Note

The ramp-function generator can also be used as smoothing element, e.g. for entering a setpoint from a web velocity tachometer. The ramp-up and ramp-down times should be set somewhat lower than the web velocity changes which occur.

Using the ” Input supplementary setpoint” command H025, a setpoint source, which can be selected with H073, is added directly in front of the speed controller (block diagram 5).

Parameter	Parameter name	Explanation
H021	Source, system start	Command, system start, refer to Chapter 5
H025	Source, input supplementary setpoint	Command, input supplementary setpoint
H034	Source, velocity setpoint, set to stop	Command, velocity setpoint, set to stop
H036	Source, accept setpoint A	Command, accept setpoint A
H037	Source, accept setpoint B	Command, accept setpoint B
H045	Source, Off1/On	Command, Off1/On (main contactor)
H049	Source, ramp-function generator stop	Command, ramp-function generator stop
H073	Source, suppl. velocity setpoint	Refer to Chapter 5
H096	Source, setpoint A	Selects the source for setpoint A, refer to Chapter 5
H130	Setpoint B	Fixed value as velocity setpoint, is entered with the 'Accept setpoint B' control signal (H037) in front of the ramp-function generator.
H131	Upper limit of the RFG	Limiting, maximum value
H132	Lower limit of the RFG	Limiting, minimum value
H133	Ramp-up time	
H134	Ramp-down time	
H135	Rounding-off at ramp-up	
H136	Rounding-off at ramp-down	
H138	Source ratio, gearbox stage 2	Ratio of the gearbox stages, between stage 1 and stage 2 as a %
H139	Normalization, web velocity	Refer to Table 3-1
H154	Slave drive	Disables the central ramp-function generator for the velocity setpoint, if the winder operates as a slave drive
H155	Smoothing, web velocity setpoint	Setpoint smoothing, if the ramp-function generator is switched-through with H154=1.
d301	Effective web velocity setpoint	Display parameter
d340	Compensated web velocity	Display parameter
d344	Velocity setpoint	Display parameter

Table 3-3 Parameters for the velocity setpoint for winder operation

3.1.2.4 Velocity setpoint for local operation

The standard axial winder software package has, in the local operating mode, its own setpoints system with a separate (override) ramp-function generator. Depending on the selected local operating mode, the corresponding setpoint is switched-through. The override ramp-function generator is in this case always effective after an operating mode change (block diagram 18). The ramp-up and ramp-down times are set together using H161. The presently active setpoint can be monitored using d344. It is possible to toggle between closed-loop speed / velocity control and local operation using H146 = 0/1.

Local operating modes

(block diagr. 16/17)

The following operating modes are available:

- " Local run" (H052) Setpoint selection via H075 (b.d. 11)
- " Local crawl" (H039) Crawl setpoint = H142
- " Local positioning" (H026) Setpoint is selected via H091 (b.d. 12), X^2/X^3 characteristic, selected using H163
- " Local inching, forwards" (H038), inching setpoint = H143
- " Local inching, backwards" (H040), inching setpoint = H144

Control signals

Local operation must be enabled via the " Local operator control" control signal H027. A dedicated control signal is available for each local operating mode. The commands are " latching" , i.e. they are internally saved. The commands are mutually interlocked, so that only one is effective at any one time. In order to exit the run, crawl and positioning modes, the " Local stop" command H028 or the " Local operator control" signal must be withdrawn; refer to Chapter 3.3.4.

Note

When setting-up a local operating mode, the base drive is powered-up (main contactor) and operation is automatically enabled after the drive ready status has been signaled back.

Caution

The "local operator control" control signal H027 must remain active until the basic drive shuts down. Otherwise the motor will coast down.

Inching

When inching, the pulse enable in the base drive is extended by a time which can be parameterized using H014. Before this time expires, the inching setpoints can be changed as often as required, by activating the inching commands. It is also possible to change into another local mode during this time.

Mixed operation

For system operation, it is possible to input the local setpoints using H166 = 1. In this case, only the appropriate setpoint is switched-through with the local control signals, and added to the velocity setpoints; refer to Chapter 3.3.4.

Parameter	Parameter name	Explanation
H014	Inching time	Refer to Chapter 5
H026	Source, local positioning	Command, local positioning (H091, H163)
H027	Source, local operator control	Command, local operator control, refer to Chapter 5
H028	Source, local stop	Command, local stop
H038	Source, local inching forwards	Command, local inching forwards (H143)
H039	Source, local crawl	Command, local crawl (H142)
H040	Source, local inching backwards	Command, local inching backwards (H144)
H052	Source, local run	To power-up with the local setpoint (H075)
H075	Source, setpoint local operation	Refer to Chapter 5 (H052)
H091	Source, positioning ref. value	Refer to Chapter 5 (H026, H163)
H142	Setpoint, local crawl	Setpoint for the *local crawl* operating mode (H039)
H143	Setpoint, local inching forwards	Setpoint for the local inching forwards mode (H038)
H144	Setpoint, local inching backwards	Setpoint for the local inching backwards mode (040)
H146	Closed-loop speed control for local	Changeover between closed-loop speed or velocity

	operation	control, refer to Chapter 5
H161	Ramp-up/ramp-down time	Ramp times for the override local ramp-fct. generator
H163	Select positioning reference value	Refer to Chapter 5 (H026, H091)
H166	Enable addition of local setpoints	Refer to Chapter 5
d344	Velocity setpoint	This is used to calculate the speed setpoint

Table 3-4 Parameters to the setpoint for the local operating modes

3.1.2.5 Limiting the velocity setpoint

Effective,

only for H203 < 2

The velocity setpoint is limited for the direct and indirect tension control (closed-loop) via the torque limits. Therefore, the following is possible:

a Velocity setpoints which are not required can be suppressed (e.g. for a rewinder);

b Automatic web sag protection using overcontrol.

3.1.2.6 Winder overcontrol

In order to prevent that a full roll accelerates up to an inadmissible speed when the web breaks, the setpoint of the web velocity is divided by the diameter calculated when winding. This means that the speed controller is supplied the correct speed setpoint, which in turn results in the fact that the circumferential velocity of the roll coincides with the web velocity. In order to be able to develop a motor torque for operation with the closed-loop torque limiting control, parameter H145 is added to the actual setpoint as saturation setpoint. Thus, it is ensured that the drive remains torque controlled, when the material web is intact (the speed controller is overcontrolled with the correct sign) . When the material web breaks, the motor only accelerates by the supplementary value of the basic speed setpoint (saturation setpoint). For most of the applications, H145 is set between 0.05 and 0.10 .

Parameter	Parameter name	Explanation
H044	Source, polarity saturation setpoint	To changeover the polarity of the saturation setpoint.
H145	Saturation setpoint	Supplementary setpoint for the velocity setpoint for the closed-loop torque limiting control
H164	Smoothing, saturation setpoint	Smoothing time for the saturation setpoint
d341	Actual saturation setpoint	Display parameter

Table 3-5 Overcontrol parameter

3.1.3 Setpoint for the closed-loop tension / position controller (block diagram 7/8)

Main tension setpoint

The setpoint source is selected using H081. For closed-loop position controls using a dancer roll, a fixed position reference value can be entered with the standard connection via parameter H080.

Ramp-function generator

The main tension setpoint can be fed through a ramp-function generator with ramp-up and ramp-down times which can be parameterized, H175 and H176. For applications using a dancer roll (H203= 2 or 3), we recommend that a ramp-function generator should be used, i.e. H284=0. Otherwise, the ramp-function generator can be disabled, i.e. H284=1.

Winding hardness characteristic

H206 is used to select whether the subsequent winding hardness characteristic is applied. The supplementary tension setpoint is added after the characteristic; the source is selected via H083.

The resulting total setpoint can be smoothed again using H192, and is available at d304 as display parameter.

Parameter	Parameter name	Explanation
H080	Fixed value, tension setpoint	Enters the fixed value via a standard connection
H081	Source, tension setpoint	Refer to Chapter 5
H082	Fixed value, suppl. tension setp.	Enters the fixed value via a standard connection
H083	Source, suppl. tension setpoint	Refer to Chapter 5
H175	Ramp-up time, tension setpoint	Refer to Chapter 5
H176	Ramp-down time, tension setp.	Refer to Chapter 5
H192	Smoothing, tension setpoint	Smoothing time constant for the total setpoint
H206	Select winding hardness charact.	Refer to Chapter 5
H284	De-activate ramp-function gen.	Refer to Chapter 5
d304	Sum, tension setpoint/position reference value	Display parameter

Table 3-6 Parameters for the setpoint tension/position control

3.1.3.1 Winding hardness control (block diagram 7)

Purpose

The winding hardness control reduces the tension as the diameter increases. Generally, it is only used for winders to ensure that the inner layers are more tightly wound.

Dancer roll

For closed-loop dancer controls, the position reference value is entered as supplementary tension setpoint. The output of the characteristic, available as d328, can be output at one of the analog outputs as setpoint for the dancer roll support (H177=1), when required.

Generating the characteristic

The winding hardness characteristic is realized as a parameterizable polygon characteristic with 5 points. The actual diameter and the main tension setpoint after the ramp-function generator are the input signals. The source for the maximum tension reduction, referred to the setpoint, can be freely selected using H087. The tension setpoint starts to decrease, if the diameter reaches the value set at H183. It follows the parameterized characteristic, which is set using the parameters shown in the block diagram (block diagram 7). The diameter values D and D1 - D4 for parameters H183 to H187 must be set in an increasing sequence. The tension reductions for diameters D1, D2 and D3 are specified using H180, H181 and H182; and, more precisely, as a % value of the maximum tension reduction.

Example 1 Tension setpoint for D1 = main setpoint - (maximum tension reduction * main setpoint * H180)

Example 2 With the standard link from H087 and H086=0.60, H086 is parameterized as fixed value for the maximum tension reduction. The main tension setpoint is 0.50. The winding hardness characteristic then has the following characteristics:

a) If the diameter is less than or equal to the initial diameter for the start of tension reduction, set in H183, then the output of the winding hardness characteristic is 0.5.

b) If the diameter is greater than or equal to the final diameter H187, then the output of the winding hardness characteristic is 0.20.

c) If the diameter lies between the initial diameter H183 and the final diameter H187, then the output follows the programmed winding hardness characteristic, and has values between 0.50 and 0.20.

Note If a decreasing winding hardness is not required, e.g. for unwinder, then parameter H206 must be set to 1.

Parameter	Parameter name	Explanation
H086	Fixed value, maximum tension reduction	Fixed value is entered
H087	Source, maximum tension reduction	Refer to Chapter 5
H177	Inhibit tension setpoint	Only for dancer rolls, refer to Chapter 5
H180	Tension reduction 1 at D1	Refer to Chapter 5
H181	Tension reduction 2 at D2	Refer to Chapter 5
H182	Tension reduction 3 at D3	Refer to Chapter 5
H183	Diameter at the start of tension reduction	Refer to Chapter 5
H184	Diameter, D1	Refer to Chapter 5
H185	Diameter, D2	Refer to Chapter 5
H186	Diameter, D3	Refer to Chapter 5
H187	Diameter, D4 at the end of tension reduction	Refer to Chapter 5
H192	Smoothing, tension setpoint	Smoothing time for the tension setpoint
H206	Select, winding hardness characteristic	Refer to Chapter 5
d328	Tension setpoint after the winding hardness ch.	

Table 3-7 Parameters for the setpoint, tension/position controller

3.1.3.2 Standstill tension (block diagram 7)

Standstill identification (block diagram 6) When the winder is at a standstill, it is possible to changeover from the standard operating tension to the standstill tension using the command " Standstill tension On" with H188. The prerequisite is that the standstill limit H157 has been fallen below and that a delay time, H159, has expired.

Standstill setpoint

The standstill setpoint can be selected from the following:

H188 = 1 & H191 = 0 The standstill setpoint is a fixed value, which can be set with H189

H188 = 0 & H191 = 0 The standstill setpoint is a percentage value of the operating tension setpoint, and is set using H189.

H188 = 1 & H191 = 1 The standstill setpoint is an operating t ension setpoint, or is the fixed standstill tension setpoint, set at H189, depending on which of the two values is the lower.

H188 = 0 & H191 = 1 Illegal operating status.

Parameter	Parameter name	Explanation
H157	Limit value for the standstill identification	Refer to Chapter 5
H159	Delay, standstill identification	Delay time before the standstill signal is issued
H188	Source, standstill tension	Operating status, refer above
H189	Standstill tension	Enter the fixed value
H191	Minimum selection	Refer to Chapter 5

Table 3-8 Parameters for the setpoint, tension/position controller

3.2 Sensing actual values

3.2.1 Selecting the speed actual value (block diagram 13)

Source

The axial winder requires the speed actual value to calculate the diameter. There are five possibilities to transfer the speed actual value to the T400:

- Directly via the T400 interface (pulse encoder 1)
- Via the CU backplane bus
- Actual value W2 received from the CU
- Analog inputs of T400
- Via the T400 interface (pulse encoder 2)

The actual speed can be monitored at display parameter d307 as a percentage of the maximum motor speed.

Parameterization

Table 3-9 summarizes all of the parameters which have to be set for the speed actual value acquisition:

Parameter	Parameter name	Explanation
H092	Source, speed actual value	Freely connectable from the source

H165	Smoothing, speed act. value	Smoothing time, speed actual value
H212	Encoder pulse number, axle-mounted tachometer	Number of pulses per revolution
H214	Rated speed, winder drive	100% maximum speed at the minimum diameter and maximum web velocity, refer to Chapter 5.
H217	Operating mode sensing	16#7FC2 encoder signals from the CU via the backplane bus (refer to Chapter 5) 16#7F02 encoder signals from terminal 72-75 of the T400
P151(CUVC)	Pulse number, shaft tachometer	same as for H212, refer to Table 6-1
P353(CUVC)	Rated speed, shaft tachometer	same as for H214, refer to Table 6-1
d307	Speed actual value	Display parameter

Table 3-9 Parameters for the speed actual value sensing

Example Pulse encoder at the base drive with 1024 pulses/ revolution, speed at V_{max} and core diameter: 2347RPM: H212= P151=1024, H214=P353=2347, H217=7FC2

Caution Any changes made at H212, H214 and H217 will only become effective after the system has first been powered-down and then powered-up again.

Note We recommend that the speed actual value is taken directly from the CU (H092=550), as in this case, only the parameters in the CU have to be set. Otherwise, the parameters from T400 (H212, H214 and H217) **and** from the CU (P151 and P353 for CUVC), must be set, as long as the speed controller in CU is used, refer to Table 6-1.

3.2.2 Speed actual value calibration

The speed actual value calibration for the winder must always be executed with the standard gearbox ratio:

When a velocity setpoint is entered (preferably 1.0), without web velocity compensation and without saturation setpoint (closed-loop tension control disabled!), the actual value measured at the winder shaft, must correspond with the entered setpoint. The actual diameter available in the closed-loop control (d310) must be identical with the mechanically measured diameter of the winder shaft. It is practical if the **core diameter** is adjusted with an empty mandrel.

Procedure Depending on the source (CU or T400, refer to block diagram 13), of the speed actual value sensing, the appropriate parameters are set in the basic drive (Pxxx) **or** T400 (Hxxx). **For each of the following points, check the speed actual value:**

- Enter the core diameter H222
- Select the core diameter as the diameter setting value, H89 = KR0222

- Issue the "Set diameter" command (activate H024=B2001 minimum pulse duration 100 ms)

1) *Using a digital tachometer*

- Enter the number of pulses per revolution at H212 and/or the appropriate parameters in the basic drive.
- Specify the rated motor speed (min. diameter, max. velocity and normal gearbox ratio: V_{max} * 1000 * i / (D_{core} * Π)) at H214 and/or Pxxx.
- Select the encoder mode with H217, if H092=219.

2) *Using an analog tachometer*

- Speed actual value from base drive converter (e.g. for CUVC P734.02=148, H092=550)
- Calibrate the speed actual value at the basic drive converter with P138 (in CUVC); in case of the limited voltage (± 10V) at analog inputs of base drive, an ATI board is required.
- When an analog tachometer is used (in CUVC, P130=13/14), the related parameters must be set according to the Instruction Manual.
- Check, if v_{act} (measured value from a handheld tachometer) = v^*

If the gearbox ratio is not precisely known, the parameter H214 /Pxxx should be so calibrated, until v_{act} equals v^* (at $D=D_{core}$). The correspondence should be checked at various web velocity setpoints up to 1.0.

Note

If parameters H212, H214 and H217 on the T400 are changed, they only become effective after the electronics power supply of the converter has been switched-off and -on again, refer to Chapter 3.2.1.

Parameter	Parameter name	Explanation
H022	Source, tension controller on	Refer to Chapter 5
H088	Diameter setting value	Fixed value, diameter setting value
H089	Source, diameter setting val.	Refer to Chapter 5
H222	Core diameter	D_{core}/D_{max}.
d310	Actual diameter	Display parameter

Table 3-10 Parameters to celebrate the speed actual value

3.3 Control

3.3.1 Control signals (block diagrams 16/17/22b)

Control bits

The source for the control commands required for the particular application can be freely selected. The individual commands can be entered from the COMBOARD, the base drive, via a peer-to-peer coupling or via the digital inputs of the T400. The individual control word bits are assigned to fixed control commands; the same is true for T400 terminals 53 to 60 (block diagram 17). For these 8 fixed control signals (refer to Table 2-8), it is possible to toggle between control via T400 terminals and input via a control word (from the COMBOARD or the peer-to-peer link).

Parameterization

The control commands are selected via appropriate parameterization and BICO-technology or Service-IBS program. The digital inputs (terminals 53 to 60), the appropriate bit of the possible control words and fixed values 0 and 1 are available as sources. Control bits, which are not included in the control words, can be addressed as dedicated parameters.

Monitoring

All of the possible control commands for winders are combined, for diagnostic purposes, in 3 display parameters (d332, d333 and d334). These parameters indicate the status of the control signals directly before internal processing.

3.3.2 Winding direction

Winding from “above” or “below”

To change the direction of the motor rotation, the ” Winding from below” command can be activated (block diagram 5/6/9b). This reverses the polarity (sign) of the speed setpoint signal for all operating modes (including reverse winding after the splice) (refer to Fig. 3-2). This change also activates the override ramp-function generator.

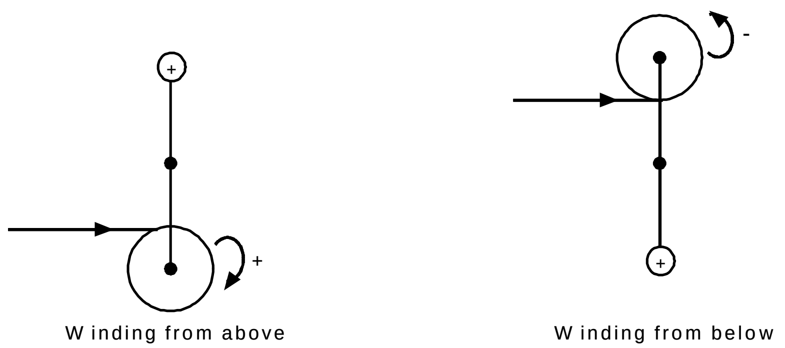


Fig. 3-2 Sketch of the winding direction

Note

The ” Winding from below” command should only be activated, if both modes are really operationally required. Otherwise, “ Winding from above should always be selected, independent of the web path.

3.3.3 Gearbox stage changeover (block diagram 5)

Several gearbox stages

The configured software allows you to changeover to a second gearbox stage which has been expanded using BICO technology . This is normally used in order to achieve a higher web tension with the same motor output, but at a lower web velocity. For instance, this is required for thicker materials. H042 is used to select the changeover signal, and the ratio between the standard gearbox stage and gearbox stage 2 must be entered by selecting H138 or the fixed value of H127 .

Operation with gearbox stage 2, for the same motor speed, means that the winder shaft rotates at a lower speed. The influence of gearbox stage 2 on the velocity setpoint, moment of inertia, diameter computer and the inertia compensation as well as reverse winding after a splice, is automatically taken into account by the winder software. The friction torque characteristic can be adapted using parameter H229 (source) or H128 (fixed value) .

The influence of gearbox stage 2 on the velocity setpoint, is effective in system operation, local operation and reverse winding after a splice.

Formula for H127

$$H127 = \frac{\text{Standard gearbox ratio}}{\text{Gearbox ratio 2}} * 100\ \%$$

Example

Speed $_{\text{winding motor}}$ / speed $_{\text{winder shaft}}$ = 5 / 1 for the standard gearbox stage
Speed $_{\text{winding motor}}$ / speed $_{\text{winder shaft}}$ = 7 / 1 for gearbox stage 2

H138=KR0127; H127 = 5 / 7 * 100 % = 71.4% = 0.714

3.3.4 Two operating modes (block diagram 18)

General

There are two operating modes for the winder: *System operation* and *local operation*. **It is not possible to toggle between the modes without shutting down.** The changeover between these two modes is realized using the " Local operator control" command, either via fixed value binector (B2000/B2001) or terminal 59 or via control word 2 bit 5 from the COMBOARD; the source is selected using H027. The operating modes are mutually interlocked, i.e. if the " Local operator control" signal level changes during operation, then the system is always shutdown.

System operation

This mode is selected using the Off1/On = 1 (H045) control signal. The power-on command is transferred to the base drive, the main contactor is closed, and the DC link is charged. When the base drive sends a checkback signal indicating that the drive is ready, the winder waits for the operating enable (block diagram 18) from the " System start" H021, and, after being enabled, accelerates to the setpoint; refer to Chapter 3.1.2.

The " Off1/On" = 0 control signal must be set to 0 to power-down the system. When the winder comes to a standstill (zero speed), the base drive is powered-down; if the winder is still running, the velocity setpoint is set to 0. The system is shutdown when the standstill limit has been fallen below. Only then is the "System start" control signal switched-out.

Caution

The winder can only be operated in the closed-loop tension controlled mode in system operation.

The "system start" control signal H0121 must remain active until the basic drive is powered-down, otherwise the motor coasts down.

Local operation

In order to select a local operating mode, the " Local operator control" control signal H027 must be 1. The run, crawl and positioning operating modes are activated with a positive edge of the appropriate control signal, and are internally stored. For inching, the operating mode only remains active as long as the appropriate control command is present. The operating modes are mutually interlocked, i.e. only one can be active at any one time.

When an operating mode is switched-in/out, the associated setpoint is transferred to the closed-loop control via the override ramp-function generator. At each operating mode change the ramp-function generator will first be set to the actual value. This is realized both when switching-in as well as when switching-out. For the base drive, a power-on command is generated to close the main contactor. Operation is automatically enabled when the drive signals back a ready signal. This also sets the override ramp-function generator.

In the inching mode, the winder operates with the appropriate setpoint only as long as the inching command is active. After this, the drive remains powered-up for a time which can be set using H014. The drive automatically shuts down when the delay time expires.

It is possible to disable all of the local operating modes with " Local stop" H028, or by withdrawing the " Local operator control" H027. The winder decelerates to a web velocity of 0.0, and after the standstill limit is fallen below, it shuts down.

The local setpoints refer, as standard, to the web velocity. It is possible to changeover to the closed-loop speed control mode with H146 = 1; refer to Chapter 3.1.2.4.

- "**Local run**"

  Select the source for the control command using H052.
  Select the source for the setpoint using H075; pre-setting H075 =KR0074= 0.0.

- "**Local crawl**"

  Select the source for the control command using H039.
  The crawl setpoint is entered with H142, pre-setting 0.1.

- "**Local inching, forwards/backwards**"

  The source of the inching forwards/backwards command is selected using H038 or H040.
  The setpoints are set using parameters H143 and H144, and, as standard +0.05 and –0.05.
  In the inching modes, the drive only moves with the selected setpoint for the time that the control command is present.

Note It is possible to changeover from the inching mode into any other local operating mode, without powering-down the drive.

- "**Local positioning**"

  The source of the positioning command is selected using H026.
  The source of the positioning setpoint is selected using H091. The

setpoint is used internally as X^2 or X^3 characteristic, changeover using H163.

For all of the local operating modes, the setpoint is changed using the internal override ramp-function generator. The ramp-up and ramp-down time is entered using H161, and refers to a 1.0 setpoint.

Parameters

Refer to Table 3-3 and Table 3-4.

Mixed operation

Using H166 = 1, it is possible, in system operation, to add the local setpoints with the tension control enabled, to the velocity setpoint. For a velocity setpoint of 0.0, for example, the appropriate inching setpoint can be entered via the override ramp-function generator, using the "Inching forwards" command. It is possible to add each individual local setpoint with the appropriate command. The same interlocking conditions apply as for the local operating modes. A change, for example, from closed-loop tension controlled inching into winding operation, can be easily realized via the "Enable setpoint" control input of the central ramp-function generator.

3.3.5 Motorized potentiometer functions (block diagram 19)

Two motorized potentiometers

The winder software package has two separate motorized potentiometer functions. Their outputs can be used everywhere as setpoints.

Motorized potentiometer 1 as additional ramp-function generator

H267=1

Motorized potentiometer 1 can be additionally parameterized as ramp-function generator to generate defined ramps during start-up, e.g. for inertia compensation. The ramp-function generator mode is enabled with H267 = 1, the setpoint is parameterized with H268, and the ramp-up/ramp-down time with H269. The ramp-function generator ramps-up to the entered setpoint with the "Raise motorized potentiometer 1" command H030; with "Lower motorized potentiometer 1" H032, it is ramped-down towards 0.0.

Motorized potentiometer function

For the motorized potentiometer function, the appropriate output can be changed with the raise or lower control inputs. It the commands are briefly activated (< 300ms), the output is changed bitwise. When it is actuated for a longer period of time, it changes with the ramp-up/ramp-down times, parameterized with H265 for motorized potentiometer 1, and with H263 for motorized potentiometer 2. If the control commands are present for longer than 4 s, the ramp-up/ramp-down ramps are changed over to H266 (Mop 1) and H264 (Mop 2). The outputs of the motorized potentiometers are available as monitoring/visualization parameters d305 and d306.

Param.	Parameter name	Explanation
H029	Source, raise motorized potentiometer 2	Command, raise motorized potentiometer 2
H030	Source, raise motorized potentiometer 1	Command, raise motorized potentiometer 1
H031	Source, lower motorized potentiometer 2	Command, lower motorized potentiometer 2
H032	Source, lower motorized potentiometer 1	Command, lower motorized potentiometer 1
H263	Motorized potentiometer 2, fast change	The fast change starts, if the raise or lower control commands are present for longer than 4s.
H264	Motorized pot. 2, standard change	Ramp-up- and ramp-down times

H265	Motorized pot. 1, fast change	As for H263
H266	Motorized pot. 1, standard change	As for H264
H267	Select mode, motorized potentiometer 1	0: mot. potentiometer; 1: ramp-function generator
H268	Setpoint, ramp-funct. gen. operation	Refer to Chapter 5
H269	Ramp time, ramp-funct. gen. operat.	Refer to Chapter 5
d305	Output, motorized potentiometer 1	Display parameter
d306	Output, motorized potentiometer 2	Display parameter

Table 3-11 Parameters for the motorized potentiometer functions

3.3.6 Splice control (block diagram 21)

Purpose

The splice logic allows the drive functions to be controlled for a flying roll change. The closed-loop tension control, fast stop, reverse winding after a splice and synchronization are implemented on the T400. The sequence control for the automatic splice functions (mechanical rotation, power-up commands for synchronizing and splicing, controlling the glue roll and knife) must be realized in a PLC control.

Sequence

The splice control is activated via H148 (reverse winding time) as soon as a value not equal to zero is entered there. Further, the ‘ Tension controller on’ command (H022) must be set to one of the other two connections (B2011/B2012 refer to block diagram 17), dependent on whether the command to switch-in the tension controller is received from the terminal or via a control bit. When splicing, **only** the 'splice enable ' signal is used to activate the tension controller and the 'tension controller on' command must be **inactive**. For the very first roll, the "tension controller on" signal is used to activate the tension controller The setpoint for the reverse winding function is entered at H149 (the value must be negative!); refer to Fig. 3-3.

To sense a new diameter, a diameter must first be set (e.g. the average value from the highest- and lowest possible diameter for a splice). The new reel is then powered-up with a local operating mode and runs at a low speed. The tachometer is then applied and this is signaled using a digital signal. The diameter computer is enabled and calculates the actual diameter of the new roll. The drive is then shutdown again (powered-down).

The swiveling mechanism is rotated into the changeover position for splicing, refer to Fig. 3-4. The drive with the new roll is powered-up again. If it is running in system operation, it synchronizes to the web velocity. The ’ Tension controller on’ signal (from the terminal or via the control bit) must be inactive. However the drive still remains in the closed-loop speed control mode until the ’ Knife in the cutting position’ signal becomes active. It then switches-over to closed-loop tension controller. The partner drive, which was previously in the closed-loop tension control mode, goes into a fast stop. Depending on the parameterization of H148/149, it rotates backwards for some time before it shuts down.

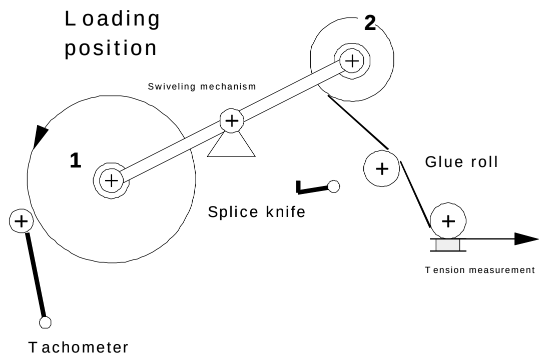


Fig. 3-3 Loading position when splicing

A connection must be established from the ’ Tension controller on’ output to the ’ Partner drive is in the tension controlled mode’ input of the partner so that the drives can be mutually interlocked. The pre-assignments of these signals refer to block diagram 17.

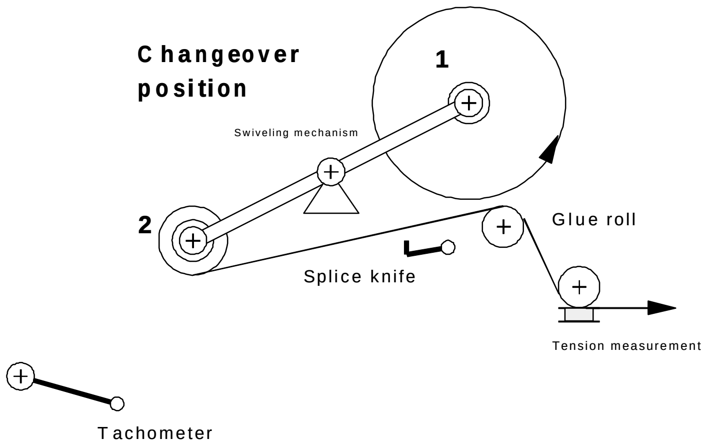


Fig. 3-4 Change position when splicing

Note The splice functions are only provided for relatively simple requirements. The actual functions to be implemented must be precisely clarified with the manufacturers of the mechanical design of the splice mechanism. If you have any doubt, please contact your local SIEMENS office.

Parameter	Parameter name	Explanation
H022	Source, tension controller on	Refer to Chapter 5
H148	Time for reverse winding after a splice	Refer to Chapter 5
H149	Speed setpoint, reverse winding after a splice	Refer to Chapter 5
H169	Knife in the cutting position	Refer to Chapter 5
H170	Partner drive is in the closed-loop tension control mode	Refer to Chapter 5

Table 3-12 Parameters for the splice control

3.4 Closed-loop control

3.4.1 Closed-loop control structure (block diagram 4)

Control technique

An overview of the complete closed-loop control structure is provided in Sheet 4 of the block diagram. The closed-loop tension control, characteristic for the winder, influences the speed controller in the converter in three different ways. A specific winding technique is defined using parameter H203.

Closed-loop torque limiting control

For the closed-loop torque limiting control, the higher-level tension controller acts on the speed controller limits, and thus maintains the required web tension. Compensating torques for friction and inertia compensation are generated as pre-control values which are added in front of the torque limiting, with the correct sign. With this control method, the speed controller is kept at the torque limits, by entering a saturation setpoint. Further, the velocity setpoint is limited. This means that the winder automatically goes to the saturation setpoint if the web breaks or the web sags.

Closed-loop speed correction control

When the closed-loop speed correction control is selected, a cascade-type structure is obtained. The tension controller influences the speed controller setpoint. The compensation torques are added as supplementary torque setpoint after the speed controller in the base drive (CU).

Closed-loop constant v control

For the closed-loop constant v control, the tension controller is disabled (output limiting = 0.0 using parameter H195) and the winder operates with the specified web velocity setpoint, e.g. as the master drive of a rewinder.

3.4.2 Closed-loop speed control (block diagram 6/6a)

External or internal

H282

The universal applicability of the T400 allows closed-loop speed control to be implemented in two ways. The **closed-loop speed control** is either **externally** implemented in the connected drive converter, or is **internally** executed on the T400 processor module for stand alone operation in the SRT 400. One of these alternatives is selected using the " Speed controller changeover to CU or T400" option, which can be set using parameter H282.

Note

Parameter H282 is preset to 0, i.e. the speed control is executed in the drive converter. The standard axial winder software package specifies the speed setpoint, influences the torque limits and outputs a supplementary torque setpoint for the necessary compensation functions.

3.4.2.1 Influence of the speed controller (block diagram 6)

For closed-loop tension controlled operation, either the speed controller limits (torque limiting control) are influenced, or the speed setpoint (speed correction control). It is possible to adapt the gain to the variable moment of inertia. The controller is set at start-up using automatic optimization routines.

3.4.2.2 Kp adaptation (block diagram 6a)

Mode of operation

The controller gain is adapted to the variable moment of inertia on the T400 or in the drive converter using a polygon curve which can be parameterized. The quantity is the calculated variable moment of inertia; the output acts on the proportional gain of the controller on the T400 or in the drive converter, depending on the setting of parameter H282. The starting- and end points of the adaptation should be set together with the associated controller gains. The characteristic is linearly interpolated between these two points.

Parameterization

The Kp values for a full and an empty reel are required for the correct setting. These are determined at start-up (when the drive is being commissioned).

Setting parameters:

$K_{p\,min}$	H151	Controller gain for an empty roll
$K_{p\,max}$	H153	Controller gain for a full roll
$J_{v\,start}$	H150	Starting point of adaptation, generally at 0.0
$J_{v\,end}$	H152	End point of adaptation, generally at 1.0

On the T400

H282=1

When determining the controller gain with, as far as possible, a full reel, the associated variable moment of inertia can be read as visualization parameter d308, or can be calculated using the known diameter. The following is valid for gearbox stage 1, material density and width: J_v [%] ≈ D^4 [%] – D_{core}^4 [%]. The value, entered as H153, must be referred to 100% J_v, i.e.

$K_{p\,max}$ = determined K_p * 100% / determined J_v [%].

For the basic winder setting, with H151=H153, adaptation is disabled. The actual adaptation value is displayed using d345.

In the converter

H282=0

For H282=0, the values must be set in the base drive as shown in Table 3-13. The speed controller optimization run of the basic drive can be used.

Parameter		**Value**	**Explanation**
CUVC/CUMC	**CUD1**	**T400**	
P233 (0%)	P556 (0%)	H150 (0.0)	Start of adaptation $J_{v\,start}$
P234 (100%)	P559(100%)	H152 (1.0)	End of adaptation $J_{v\,end}$
P235	P550	H151	Kp adaptation min.
P236	P225	H153	Kp adaptation max.

Table 3-13 Parameters for the Kp adaptation in the drive converter

Note

We recommend that the kp adaptation is commissioned for winding ratios >3, otherwise the basic setting should be used, H151=H153=1 and P235=P236 =100% for CUVC.

Param.	**Parameter name**	**Explanation**
H150	Start of adaptation $J_{v\,start}$	First point of intervention of the Kp adapt., generally 0.0
H151	Kp adaptation min.	Kp for an empty reel, generally 1 .0

H152	End of adaptation $J_{v\,end}$	Last point of intervention of the Kp adaptation, generally 1.0
H153	Kp adaptation max.	Kp for a full roll
H162	Smoothing, speed controller output	Smoothing for the visualization parameter d331
H282	Changeover to the speed controller on CU or T400	H282 = 0 speed controller on CU H282 = 1 speed controller on T400
H290	Upper speed setpoint limiting	If H282=1
H291	Lower speed setpoint limiting	If H282=1
H292	Ramp-up time, speed setpoint	If H282=1
H293	Ramp-down time, speed setpoint	If H282=1
H294	Integral action time, speed controller (H282=1)	For the speed controller on T400
d308	Variable moment of inertia	Display parameter
d329	Torque setpoint calculated from T400	Display parameter, if H282=1
d331	Smoothed torque setpoint calculated from T400	Display parameter, if H282=1
d345	Actual Kp adaptation from T400	Display parameter

Table 3-14 Parameters for the speed controller on T400

3.4.3 Closed-loop tension / dancer roll – position control (block diagram 7/8)

Control methods

In order to control the material tension, for the standard axial winder software package, five different control techniques are implemented. H203 is used to select one of the following possibilities:

H203 = 0

Indirect closed-loop tension control with direct open-loop torque control via the torque limit values.

This is the preferred solution for indirect closed-loop tension control.

H203 = 1

Direct closed-loop tension control using a tension transducer, whereby the tension controller regulates the torque via the torque limit values.

This is the preferred solution if a tension transducer is used.

H203 = 2

Direct closed-loop tension control using a dancer roll potentiometer as tension actual value generator. The dancer roll closed-loop position controller regulates (open-loop) the torque via the torque limit values.

This control technique is seldomly used; it may, under certain circumstances, be practical for extremely sensitive brittle or hard materials which are not very flexible, e.g. cables, textiles, paper etc.

H203 = 3

Direct closed-loop tension control using a tension transducer or a dancer roll potentiometer as tension actual value generator, whereby the tension controller acts on the speed controller via a speed correction setpoint.

This control technique should be used if a dancer roll is used. If there is a tension transducer, then this control technique is occasionally used for elastic, extremely expandable materials, e.g. thin plastic foils.

H203 = 4 Presently not used; free for making expansions.

H203 = 5 As for H203=3, however the tension controller output can be multiplied by the web velocity signal. With parameter H201, the " lower limit value" is defined for the multiplying effect of the web velocity on the tension controller output. It can be normalized using parameter H202.

Tension/position controller

The tension controller is a proportional-integral differential controller (PID), whose integral action time and differentiating time constant can be set using parameters H199 and H173. With H196 = 1 and H283=0, the controller acts as a pure proportional controller or proportional-differential controller, depending on the setting H174 (inhibits the D controller). If a dancer roll is used, then the tension controller operates as dancer roll position controller.

Note For applications with tension transducer or dancer roll in the " speed correction" mode (H203 = 3 or 5), the tension controller is operated as usual as proportional-differential controller (PD). I.e. H174=0, H196=1 and H283=0. For applications with the tension transducer via the torque limits (H203=1) the tension controller is normally used as proportional-integral controller (PI).

Limiting the tension controller

The output signal of the tension controller is limited depending on the setting of parameters H194 and H195:

H194 = 1 The output signal is limited to a positive value, which is set at H195. Negative values are limited to zero. This setting is only practical when using a 1Q drive for H203 = 0, 1 and 2.

H194 = 2 The output signal is limited to values between ±H195.

H194 = 3 The upper limit corresponds to the absolute speed actual value or a minimum value which can be set with H193. The negative limit value is zero.

H194 = 4 The upper limit value corresponds to the absolute speed actual value or a minimum value which can be set with H193; the lower limit value, corresponds to the inverted signal.

3.4.3.1 Kp adaptation

Analog to the speed controller, also here, the controller proportional gain is adapted to the variable moment of inertia, which means that the influence of the diameter, material width and density as well as a possible gearbox changeover can be automatically taken into account.

Parameterization

Setting parameters:

$K_{p\ min}$	H197	Controller gain for an empty roll
$K_{p\ max}$	H198	Controller gain at 1.0 J_v
$J_{v\ start}$	H207	Start of adaptation, generally at 0.0
$J_{v\ end}$	H208	End of adaptation, generally at 1.0

When determining the controller gain with, if possible a full roll, the associated variable moment of inertia can be read as display parameter d308, or can calculated using the known diameter. The following is valid for gearbox stage 1, constant material thickness and width: J_v [%] ≈ D^4 [%] – D_{core}^4 [%]. The factor, which is entered as $K_{p\,max}$, must be referred to 100% J_v, i.e.

$K_{p\,max}$ = determined K_p * 100% / determined J_v [%].

For the basic winder setting, with $K_{p\,min} = K_{p\,max}$, adaptation is not effective and the actual value of K_p is displayed using d346.

Note We recommend that the kp adaptation is commissioned for winding ratios >3.

3.4.3.2 D component of the tension controller (block diagram 7)

The differential component of the tension controller is used to compensate the phase rotation, which is caused by an integral loop element (dancer roll). If the tension is measured using a transducer, the differential component must be disabled (H174=1), since the control loop has PT1 characteristics.

For closed-loop dancer controls (H174=0, H196=1 and H283=0), without or with a low derivative action time, the controller may oscillate. These can be effectively suppressed by increasing H173.

Note The duration of an actual value oscillation period without D-component is a good approximation of the time constant of the differentiating (H173). This value should not be exceeded. Instability can result if the time constants are too high!

Parameter	Parameter name	Explanation
H173	Differentiating time constant	Refer to Chapter 5
H174	Inhibit D controller	1: no D control
H193	Min. value speed dependent tension controller limits	Refer to Chapter 5
H194	Select tension controller limits	Refer above
H195	Adapt tension controller limits	Refer to Chapter 5
H196	Inhibit I-component, tension controller	1: PI controller --> P controller
H197	Min. Kp tension controller $K_{p\,min}$ at H207	Controller gain for an empty roll
H198	Max. Kp tension controller $K_{p\,max}$ at H208	Controller gain at 1.0 J_v
H199	Integral action time, tension controller	For the tension controller I component
H200	Adaptation, setpoint pre-control	Refer to Chapter 5
H203	Selecting the tension control technique	Refer above
H207	Start of adaptation, tension controller $J_{v\,start}$	Start of adaptation, generally 0.0
H208	End of adaptation, tension controller $J_{v\,end}$	End of adaptation, generally 1.0
H209	Droop, tension controller	Refer to Chapter 5
H283	I controller enable	1: PI controller -> I controller
H284	Deactivate ramp-function generator	0: for a dancer roll
d308	Variable moment of inertia	Display parameter
d317	Sum, tension controller output	Sum of the PI component on the D component
d318	Tension controller, D component	Display parameter

d319	Tension controller output from the PI comp.	Display parameter
d346	Actual Kp adaptation	Display parameter

Table 3-15 Parameters for the tension controller

3.4.4 Generating the supplementary torque setpoint (block diagram 6/ 9b)

Compensation In order to compensate for the friction losses and the torques when accelerating/braking, the appropriate compensation factors are calculated and are added to the torque setpoint with the correct polarity. The winding direction, web routing, closed-loop control type, material thickness and width as well as the gearbox stage changeover are automatically taken into account.

This compensation influences the winder control in two different ways:

Pre-control torque For closed-loop speed correction control, the pre-control torque is injected as supplementary torque setpoint. The speed setpoint is entered from T400, if H282= 0.

Torque limit For the closed-loop torque limiting control, the compensation additionally acts, in addition to the torque controller output, on the speed controller limits. The drive converter parameterization required to realize this, is specified in Chapter 6 (block diagram 3).

3.4.4.1 Compensation calculation (block diagram 9b)

Friction effect The friction losses are compensated using a parameterizable polygon characteristic with 6 points. This setting is made at start-up using parameters H230 to H235 in 0.20 steps; refer to Chapter 7.2.2. The outputs of the characteristic can be monitored using d314. For gearbox stage 2, the characteristic output should be adapted by selecting H229 or the fixed value of H128 .

Accelerating torque In order to compensate the accelerating torque, the variable moment of inertia is calculated. In this case, diameter, material thickness (H224), width (selected using H079) and a possible gearbox changeover (selected using H138) are included. Together with the fixed moment of inertia, after the actual diameter and the internal or external (H226) acceleration signal have been taken into account, the pre-control torque for inertia compensation is obtained, which is available at d316.

Note The precise setting of the compensation factors is especially important for indirect closed-loop tension control, so that the torque-generating current results in, as precisely as possible, the material tension; refer to Chapter 7.2.3.

The compensation factors for friction and acceleration are also effective in the closed-loop speed controlled mode (e.g. for acceleration and braking at roll change).

Param.	Parameter name	Explanation
H077	Source, external dv/dt	Refer to Chapter 5
H079	Source, web width	Refer to Chapter 5
H128	Fixed value, adapt friction torque, gearbox stage 2	Refer to Chapter 5
H138	Source ratio, gearbox stage 2	Refer to Chapter 5
H224	Material density	The density of the material to be wound is specified as a % of the maximum density.
H225	Fine adjustment, dv/dt	Refer to Chapter 5
H226	Source, dv/dt	Changeover between the internal or external value
H227	Adjustment, variable moment of inertia	Adjustment factor
H228	Constant moment of inertia	Refer to Chapter 5
H229	Source adaptation , gearbox stage 2	Refer to Chapter 5
H230	Friction torque at 0% speed	Absolute torque setpoint (d331) at n= 0%.
H231	Friction torque at 20 % speed	Absolute torque setpoint at n = 20%.
H232	Friction torque at 40% speed	Absolute torque setpoint at n = 40%.
H233	Friction torque at 60% speed	Absolute torque setpoint at n = 60%.
H234	Friction torque at 80% speed	Absolute torque setpoint at n = 80%.
H235	Friction torque at 100% speed	Absolute torque setpoint at n = 100%.
H237	Pre-control with n^2	Refer to Chapter 5
d302	Actual dv/dt	Display parameter
d308	Variable moment of inertia	Display parameter
d312	Pre-control torque	Sum of the friction- and acceleration effects
d314	Pre-control torque, friction compensation	Display parameter
d316	Pre-control torque, inertia compensation	Display parameter

Table 3-16 Parameters for compensation

3.5 Calculation

3.5.1 Diameter computer (block diagram 9a)

Principle

The diameter is computed from the velocity setpoint and the actual motor speed. An integrating computation technique is used to generate the smoothest output signal possible. The time for a computation interval (time for one revolution at Dmin and Vmax) is specified using H216.

Alternative technique

If the velocity setpoint signal is not available, the computation function via H277 changes over to an alternative technique, which continues to calculate the diameter, taking into account the revolutions and material thickness. In this case, the thickness-diameter ratio (H286), the initial diameter (H276) and the setting pulse duration (H278) are required. For H277=1, the other technique runs in parallel in the background. The actual diameter (in front of the ramp-function generator) can be taken via connector KR0359.

External V_{act}

When an external web velocity actual value is used for the calculation, this is selected using H094 (block diagram 13) and H211 must be set to 1. Gearbox changeover is automatically taken into account.

Web tachometer

When a digital web tachometer is used, parameters H213, pulse number, H215, rated speed and H218 operating mode must be set for pulse sensing on the T400; refer to Fig. 2-2 for the connection configuration. When an analog web tachometer is used, an analog input is used to sense the tachometer voltage.

Surface tachometer

The diameter computer can also be enabled without an active tension controller, using a digital signal which can be selected with H013 (surface tachometer function b.d. 9a). The web velocity actual value which is used for the computation, can be selected using H093. This can be an external analog tachometer as well as a pulse encoder, which is connected instead of the web tachometer.

Ramp-function generator

In order to increase the stability of the closed-loop control, the diameter change can be limited per unit time using H238. H238 should be selected so that the maximum change is still possible (this occurs at V_{max} and D_{min}). The selected rate of change is automatically adapted to the actual diameter.

Example

Core diameter D_{core} = 140 mm,

Maximum diameter D_{max} = 1000 mm

Maximum web velocity V_{max} = 200 m/min = 3333 mm/s

Material thickness d=1 mm, i.e. 2 mm diameter increase / revolution

Minimum time for one revolution: t = H216 = $D_{core} * \Pi / V_{max}$ = 132 ms

This results in a maximum diameter change = 2*d / t = 15.15 mm/s.

This value is converted over the complete change ($D_{max} - D_{core}$) and entered at H238.

H238 = $(D_{max} - D_{core}) * t / (2 * d)$

55 s is entered at H238 = 860 mm / 15.15 mm/s = 56.76 s, with a safety factor of 5%.

Additional interlocking

An additional interlocking can be enabled using H236. For H236=1, the diameter of a winder can only increase, and for an unwinder, only decrease. This interlocking function is canceled when the diameter is set with " Set diameter" H024.

External diameter

It is possible to de-couple the winder diameter computer, and to feed in an externally calculated diameter actual value. In this case, the " Set diameter" control signal (H024) must be permanently available, and the external value entered as diameter setting value; this is selected via H089.

Example a:

Diameter actual value from the analog input, terminals 92/93 ⇒ H089 = KR0321, set diameter from the digital input, terminal 56 ⇒ H024 =B2006.

24 V must be connected to terminal 45.

Example b: Diameter actual value from PROFIBUS, received word 3
⇒ H089 = KR0451

‘ Set diameter’ from PROFIBUS, control word 1.15
⇒ H024 = B2615

The above connections are realized via BICO technology.

For dancer rolls For applications with a dancer roll in "speed correction" operation (H203 = 3 or 5), the constant deviation of the dancer roll position can be taken into account in the diameter computer using parameters H254 and H255. This increases the accuracy of the diameter calculation, especially when accelerating or decelerating or if there is a constant deviation between the position setpoint and actual value .

Parameter	Parameter name	Explanation
H013	Source, surface tachometer on	Command, compute diameter with surface tachometer
H024	Source, set diameter	Command, set diameter using terminal 56
H089	Source, diameter setting value	Refer to Chapter 5
H093	Source, velocity actual value, surface tachometer	Refer to Chapter 5
H094	Source, external web velocity (actual value)	Refer above , only for H211=1
H210	Adjustment, web velocity	Refer to Chapter 5
H211	Select web tachometer	Command with/without web tachometer
H213	Pulse number, web tachometer	Pulse number, each revolution
H215	Rated speed, measuring roll, web tachometer	Rated speed for normalization
H216	Computation internal, diameter computer	Time for one revolution of the winder at D_{min} and V_{max}
H218	Select mode, web tachometer 2	Refer to Chapter 5
H221	Minimum speed, diameter computer	When H221 is fallen below, the diameter computation is inhibited.
H222	Core diameter	Diameter of the mandrel as a % of D_{max}
H236	Diameter change, monotone	Refer to Chapter 5
H238	Minimum change time, diameter	Refer to Chapter 5 or above
H254	Smoothing time for Δv	only for dancer rolls, refer to Chapter 5
H255	Adaptation factor Δv	only for dancer rolls, refer to Chapter 5
H276	Initial diameter	Refer to Chapter 5
H277	Enable diameter calculation without V signal	Refer to Chapter 5
H278	Setting pulse duration	Refer to Chapter 5
H286	Thickness-diameter ratio	$= d / D_{max}$
d310	Actual diameter	Display parameter

Table 3-17 Parameters to compute the diameter

3.5.2 Length measurement and length stop (block diagram 13)

Principle

The length measurement function is based on the availability of a digital pulse encoder at the web tachometer input (refer to Fig. 2-2, Increm_2). This can either be an actual web tachometer, or the signal of a pulse tachometer of the master machine drive. A position actual value is available after H218 (operating mode) and H213 (pulse number) and H215 (rated speed) have been entered. However, this must be adapted at the specified normalization H239-H240.

In this case, the nominal length Ln (length, where a position measurement of 100% is determined) of the particular arrangement, is calculated according to the following equation:

$$Ln = \frac{\Pi D_w}{i} \cdot \frac{32.767 \cdot 65.536}{4 \cdot r} = 1685.58 \cdot \frac{D_w}{i \cdot r}$$

D_w.....roll diameter in [mm]
i.........gearbox factor n_{mot}/n_{roll}
r........pulse number, pulse encoder

The normalization length 75[km] is now divided by the rated length. If the result is in the range of up to approx. 190%, this value is entered into parameter H239. If the ratio lies above, then H239 is left at 100%, and the inverse value is generated: L_n/75[km]. This then lies below 50% and is entered into H240.

$$H239 = \frac{75[km]}{L_n} \cdot 100\%, \quad H240 = 100\% \quad \text{if } H239 < 190\%;$$

$$\text{otherwise} \quad H240 = \frac{L_n}{75[km]} \cdot 100\% \quad H239 = 100\%,$$

The length actual value is an absolute value with units [m] and can be monitored at parameter d309.

Calculating the braking distance

The braking distance still has to be calculated for the length stop. This is the material length, which still runs through the machine for a standard stop, until the machine comes to a standstill. This is determined from the machine ramp-function generator data. The maximum velocity (H244), as well as the ramp-down time from the maximum velocity Tr (H241) and the rounding-off time at ramp-down Tvr (H242) must be entered. The calculation is based on constant-velocity operation and a linear deceleration ramp for a standard stop. The braking distance can be precisely calculated; refer to Fig. 3-5.

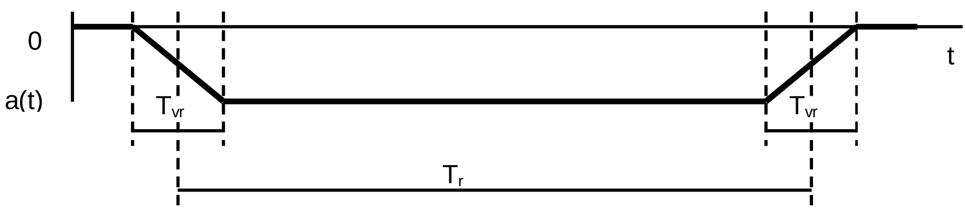


Fig. 3-5 Principle of the braking distance calculation

The braking distance can be monitored at d350. It is added to the already traveled length actual value, and is compared with the length setpoint (reference value) selected using H262. If the value is exceeded, the 'length stop' signal (binector B2411) becomes active, which can be connected to the limit value monitors. The standard stop can be directly initiated via a digital output, or signaled to the automation, via the status word. The 'length stop' signal is canceled, if the machine is moving at less than 4% of the rated velocity, or the drive is powered-down.

Notes

- The braking distance is continuously computed and displayed. However, it is only precise, if the drive is operated with v=const. When accelerating, the value is too low, when decelerating, too high. The error depends on the ratio T_{vr}/T_r.
- The length actual value can be up to 150[km] ; in this case, the resolution is 0.000024% of 75[km] or approx. 0.018[m]. The same scaling is also true for the braking distance.

Parameter	Parameter name	Explanation
H213	Pulse number, web tachometer	Pulse number per revolution from the web tachometer
H215	Rated speed, web tachometer	Maximum speed of the measuring roll, 100% at the maximum web velocity.
H218	Operating mode, web tachometer (encoder 2)	Operating mode, web tachometer
H239	Adaptation divisor, length computer	Normalization, web length computer, refer above
H240	Adaptation factor, length computer	Normalization, web length computer, refer above
H241	Ramp-down time for the braking distance computer	T_r in Fig. 3-5
H242	Ramp-down rounding-off time	T_{VT} in Fig. 3-5
H244	Rated velocity	For the braking distance computer
H262	Source, length setpoint	Refer to Chapter 5
d309	Actual web length	1.0=75 [km]
d350	Braking distance	1.0=75[km]

Table 3-18 Parameters to calculate the length and braking distance

3.6 Monitoring and signaling

3.6.1 Web break detection (block diagram 7)

Concept

The following prerequisites must be fulfilled for the identification to respond:

– The web break detection must be enabled, H285=1

– Closed-loop tension control must be enabled
For the closed-loop torque limiting control (H203=0,1,2) the difference, referred to the tension controller output, from the torque

actual value minus the tension controller output must be less than the value in H275.

– The limit for the torque/tension actual value, set using H204, must be fallen below, and the setpoint must be above this limit. For indirect closed-loop tension control (H203=0), this limit value refers to the torque actual value; for all other control types, to the tension actual value.

– The time delay, set using H205 must have expired; it is essentially used to suppress incorrect signals if the actual values are not steady.

– An external web break signal can be connected using parameter H253 via a digital input.

The web break signal is available at terminal 46. It can be used to control a 24 V relay or contactor.

Internal response

H178 is used to activate the internal response of the winder software to the web break signal. For H178=1, the web break signal is saved, the diameter computer is inhibited in order to prevent incorrect values being computed. Furthermore, the tension control is disabled, and the winder continues to run with a specified web velocity. The storage must be acknowledged by withdrawing the control command "Tension controller on" H022.

For H178=0, the web break is just signaled.

Notes

If only low tension values are used (e.g. for thin foils), then the web break detection using the torque- and tension actual value signal is problematical, and it may be more practical to use an external web break detection, e.g. using optical barriers or dancer roll limit switches.

Caution

The web break detection is **not** effective for the closed-loop v-constant control.

Param.	**Parameter name**	**Explanation**
H022	Source, tension controller on	Standard connection with digital input, terminal 54
H178	Response at web break	0/1: without/with response
H203	Selecting the tension control technique	Selects the control technique, refer to Chapter 5
H204	Lower limit, web break detection	Refer to Chapter 5
H205	Delay, web break signal	Refer to Chapter 5
H253(B2253)	Input, web break signal	Refer to Chapter 5
H275	Response threshold, web break monitoring, indirect tension control	Refer to Chapter 5
H285	Enable web break detection	0: no web break detection
H521(501)	Digital output of the T400	Web break signal using terminal 46

Table 3-19 Parameters for web break detection

3.6.2 Freely-connectable limit value monitors (block diagram 10)

2 Limit value monitors

Two freely-connectable limit value monitors are available. They have identical functions and the only difference is in the number of the parameters for setting.

Input signal

One of the display parameters can be selected as input signal using BICO technology. For the input signal, the absolute value generation, inversion and smoothing can be parameterized.

Comparison signal

One of the display parameters or one of the fixed values, available as parameter, can be selected as comparison signal. Inversion or absolute value generation are possible for adaptation purposes.

Output signal

For the actual limit value monitors, the interval limit (H112 H120), hysteresis (H113, H121) and the output signal to be displayed, can be selected. The outputs of the limit value monitors can be freely connected. Presently, the output of limit value monitor 1 (B 2506) is pre-assigned to terminal 51, digital output 6 (H526).

Parameter GWM 1	**Parameter GWM 2**	**Parameter name**	**Explanation**
H107	H115	Input value for the limit value monitor	Source: d301-d350
H108	H116	Source, comparison value	Source: d301-d350
H109	H117	Adaptation, input value	Refer to Chapter 5
H110	H118	Smoothing, input value	Smoothing time
H111	H119	Adaptation, comparison value	Refer to Chapter 5
H112	H120	Interval limit	Refer to Chapter 5
H113	H121	Hysteresis	Refer to Chapter 5
H114	H122	Select, output signal	Freely connectable, e.g. terminal 51
d403	d407	Output 1	Input value > comparison value
d404	d408	Output 2	Input value < comparison value
d405	d409	Output 3	Input value = comparison value
d406	d410	Output 4	Input value ≠ comparison value
d411		Length setpoint reached (output 5)	

Table 3-20 Parameters for the limit value monitors

3.6.3 Analog outputs (block diagram 10)

Freely-connectable

The T400 has 2 analog outputs. These are pre-assigned but can be freely connected for display parameters and several other values using BICO technology.

Pre-assignment

The torque setpoint (speed controller output) is output at terminals 97/99 (H098). An offset is added using H101, and a multiplication factor applied using H10 2.

The actual diameter is output at terminals 98/99 (H103). An offset is added using H099, and a multiplication factor applied using H10 0.

Note All of the analog outputs are normalized as standard, so that an internal value of ±1.0 represents a voltage of ±10 V. Additional normalization functions are realized using parameters H099 to H102.

Parameter	Parameter name	Explanation
H098	Analog output 2, terminal 98/99 (diameter actual value)	Refer to Chapter 5
H099	Analog output 2, offset	Refer to Chapter 5
H100	Analog output 2, normalization	1.0 = 10 V
H101	Analog output 1, offset	Refer to Chapter 5
H102	Analog output 1, normalization	1.0 = 10 V
H103	Analog output 1, terminal 97/99 (torque setpoint)	Refer to Chapter 5

Table 3-21 Parameters for the analog outputs

3.6.4 Overspeed (block diagram 20)

Undesirable operating statuses of the drive are prevented by identifying an overspeed condition. If an overspeed condition is identified, i.e. the determined speed actual value is greater than the positive limit value or less than the negative limit value, if required, the drive is shutdown with a fault message; **fault number 116 or 117**.

Note An overspeed condition is only identified if the speed actual value sensing works correctly.

Parameter	Parameter name	Explanation
H125	Overspeed, positive	Limit value referred to the rated speed
H126	Overspeed, negative	Limit value referred to the rated speed

Table 3-22 Parameters for overspeed identification

3.6.5 Excessive torque

When an excessive torque is identified, i.e. the torque actual value from the base drive is greater than the positive limit value or less than the negative limit value. If required, the drive is shutdown with a fault signal; **fault number 118 or 119**.

Parameter	Parameter name	Explanation
H003	Excessive torque, positive	Limit value referred to the rated torque
H004	Excessive torque, negative	Limit value referred to the rated torque

Table 3-23 Parameters for excessive torque identification

3.6.6 Stall protection

This function has the task of identifying if the drive has stalled (for instance, can no longer mechanically move). The drive can be shutdown with a fault signal output. The stall signal is derived from the actual values of speed, torque and control deviation, if the following conditions are fulfilled (logical AND):

- **speed actual value** is less than the speed actual value threshold **&**
- **torque actual value** is greater than the torque actual value threshold **&**
- **control deviation** is greater than the control deviation threshold

If these three conditions exist simultaneously over the response time which can be parameterized, the stall protection signal is generated and, if required, can cause the drive to be shutdown; **fault number 120**.

Parameter	**Parameter name**	**Explanation**
H007	Speed actual value threshold	Less than the rated speed (% value)
H008	Torque actual value threshold	Greater than the rated motor torque (% value)
H009	Threshold, control deviation	Greater than the rated speed (% value)
H010	Response time	exceeded in ms

Table 3-24 Parameters for stall protection identification

3.6.7 Receiving telegrams from CU, CB and PTP (block diagram 20)

CU

If a telegram is not received after power-on and after the time, set using H005, has expired, the fault message is generated and causes the drive to be shutdown; **fault number 121**.

COMBOARD

Not only is the first telegram monitored, but the interval between telegram failures during communication are also monitored (refer to Chapter 2.1.2). **Fault number 122**.

Peer-to-peer

The coupling is monitored in a similar way to the COMBOARD (refer to Chapter 2.1.3). **Fault number 123**.

3.7 Others

3.7.1 Free function blocks (block diagram 23a/23b)

Goal

In order to permit additional customer-specific requirements, the SPW420 has some frequently used free function blocks. These free function blocks can be interconnected using simple parameterization via BICO technology. An example with free blocks is shown in Chapter 4.14.

Free blocks which are available (No.)

- Arithmetic blocks
  - Multipliers (2)
  - Adders (1)
  - Subtractors (1)
  - Polygon characteristic with two transition points (2)
- Logic blocks
  - Numerical changeover switch (3)
  - Switch-on delay (1)
  - Switch-off delay (1)
  - Pulse shortener (1)
  - Pulse generator (1)
  - Inverter (1)
  - Logical AND (1)
  - Logical OR (1)
  - Numerical comparator (1)
- Closed-loop control blocks
  - Integrator (1)
  - Limiter (1)
  - PT1 element (1)
- Constant blocks
  - Fixed setpoint (3)

Note

Details on start-up, refer to Chapter 7.6. Details on the functions blocks, refer to Lit.[6]

3.7.2 Free display parameters (block diagram 25)

Destination

The standard software package provides freely-assignable display parameters for every data type to monitor available binectors/connectors. Using BICO technology, every binector/connector can be connected to the input of a display parameter. The value of the binector/connector can then be monitored using an operator control device, e.g. OP1S or PMU.

Display parameters available

Data type	No.
R type (for KRxxxx)	4
B type (for Bxxxx)	2
I type (for Kxxxx)	1

4 Configuring instructions and examples

4.1 Some formulas for a winder drive

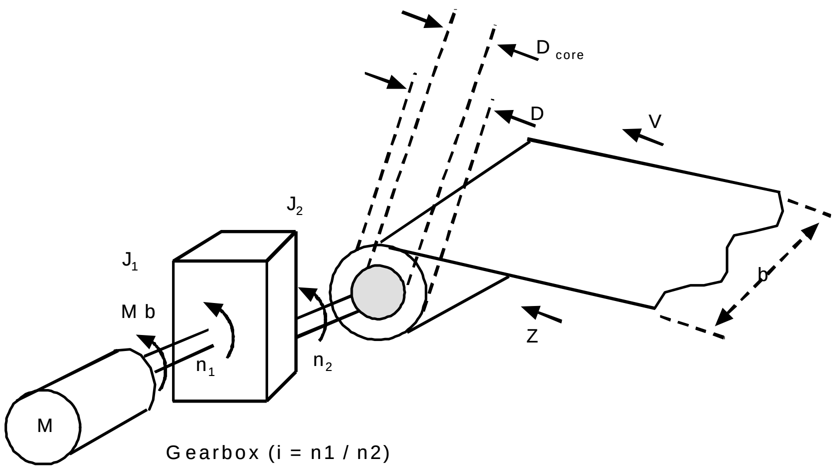


Fig. 4-1 Structure of an axial winder

(1) Winding ratio:

$$q = \frac{Dmax}{Dcore} \qquad \frac{[mm]}{[mm]}$$

(2) Speed [RPM]:

$$n = \frac{1000 * V}{D * P} \qquad \frac{[m/min]}{[mm]}$$

(3) Winding torque referred to the motor shaft [Nm]:

$$M_W = \frac{Z * D}{2000 * i} \qquad \frac{[N\ mm]}{1}$$

(4) Winding power [kW]:

$$P_W = \frac{Z * V}{60 * 103} \qquad \frac{[Nm/min]}{1}$$

(5) Gearbox ratio, max. motor speed / max. winder speed:

$$i = \frac{n_1}{n_2} = \frac{P * D_{core} * n_{max}}{1000 * v_{max}} \qquad \frac{[mm/min]}{[m/min]}$$

(6) Moment of inertia, solid cylinder [kg m ^{2}]:

$$J = \frac{m}{8 * 10^6} * D^2 = \frac{P}{32 * 10^{12}} * b * r * D^4 \qquad \frac{[mm\ kg\ mm^4}{[dm^3]}$$

(7) Moment of inertia, hollow cylinder [kg m ^{2}]:

$$J = \frac{m}{8 * 10^6} * (D^4 - D^4_{core}) = \frac{P}{32 * 10^{12}} * b * r * (D^4 - D^4_{core}$$

(8) Reduction of the moment of inertia through a gearbox:

$$J_1 = \frac{J_2}{i^2}$$

(9) Fixed moment of inertia [kg m ^{2}]
as a result of the winder components whose parameters do not change (motor, gearbox and winder core) referred to the motor shaft

$$J_F = J_{motor} + J_{gear} + \frac{J_{core}}{i^2}$$

(10) Variable moment of inertia [kg m ^{2}]

$$J_V = \frac{\Pi * b * \rho}{32 * 10^{12} * i^2} * (D^4 - D^4_{core}) \qquad \frac{[mm\ kg\ mm^4]}{[dm^3]}$$

(11) Accelerating torque referred to the motor shaft [Nm] for the accelerating time t_b

$$M_b = \frac{100 * i}{3 * D} * \frac{DV}{t_b} (J_F + J_V)$$

(12) Accelerating power [kW]

$$P_b = \frac{i * V}{30 * D} * M_b = \frac{10 * i^2 * V}{9 * D^2} * \frac{DV}{t_b} (J_F + J_V)$$

(13) Rated motor torque [Nm]

$$M_N = \frac{9549 * P_N}{n_N}$$

(14) Length of material wound for flat materials [m]:

$$l = \frac{\Pi}{4000 * d} * (D^2_{max} - D^2_{core})$$

(15) Length material which can be wound, round materials [m]:

$$l = \frac{\Pi * b}{2000 * \sqrt{3} * D^2_R} * (D^2_{max} - D^2_{core})$$

(16) Relative amount of material which can wound, as a function of the winding ratio:

q	2	3	4	5	6	7	8	9	10
$\frac{l}{l_{max}} = 1 - \frac{1}{q^2}$	75 %	88.9%	93.8%	96%	97.2%	98%	98.4%	98.8%	99%

(17) Winding time [s]:

$$t = 60 * \frac{l}{V}$$

Formula characters and dimensions used

b	=	material width [mm]
b_{max}	=	maximum material width of the roll [mm],
d	=	material thickness [mm]
D	=	actual diameter [mm]
D_{core}	=	core- or winder core diameter [mm]
D_{max}	=	maximum diameter [mm]
D_R	=	material diameter for round materials [mm]
i	=	gearbox ratio (refer to equation5)
J	=	moment of inertia [kgm^2]
J_F	=	fixed moment of inertia as a result of the winder components (motor, gearbox + winder core) referred to the motor shaft [kgm^2]
l	=	material length [m]
l_{max}	=	maximum material length [m] (for a core diameter mm)
J_{gear}	=	moment of inertia of the gearbox referred to the motor shaft [kgm^2]
J_{core}	=	moment of inertia of the winder core [kgm^2]
J_{motor}	=	motor moment of inertia [kgm^2]
J_V	=	variable moment of inertia as a result of the wound material referred to the motor shaft [kgm^2] (refer to equation 10)
m	=	weight [kg]
M_w	=	winding torque referred to the motor shaft [Nm]
M_b	=	accelerating torque referred to the motor shaft [Nm]
M_{bF}%	=	percentage accelerating torque as a result of the fixed moment of inertia J_F at the minimum diameter [% of M_N] (refer to formula (1.2))
M_{bV}%	=	percentage accelerating torque as a result of the variable moment of inertia J_V at the maximum diameter and maximum width [% of M_N] (refer to formula (1.5))
M_N	=	rated motor torque [Nm] (refer to equation13)
n	=	speed [RPM]
n_{max}	=	maximum motor speed [RPM] (no-load speed at maximum field weakening)
n_N	=	rated motor speed at rated voltage and rated motor field current [RPM]
P_b	=	power required for acceleration [kW]
P_M	=	required motor power [kW]
P_N	=	rated motor output [kW]
P_w	=	winding power [kW]
q	=	winding ratio (refer to (1))
r	=	specific weight [kg/dm^3]
p	=	material density [kg/m^3]
t	=	winding time [s]
t_b	=	accelerating time [s]
t_h	=	time to accelerate up to the web velocit y, f. 0 to V_{max} [s]
V	=	web velocity [m/min]
V_{max}	=	max. web velocity [m/min]
Z	=	tension [N]
ΔV	=	velocity difference [m/min]

4.2 Calculating the inertia compensation

Principle

When accelerating and braking, the standard axial winder software package computes the required accelerating torque

$$M_b = \frac{p}{30} * J * \frac{\Delta n}{t_b} \qquad (1.1)$$

and controls it to the required torque (block diagram 9 b), so that the tension torque is kept as constant as possible.

The winder software can compute the acceleration dv/dt, or this can also be entered externally. The moment of inertia J is not constant due to the changing roll diameter as the material is wound, and it therefore consists of two components:

a) Fixed moment of inertia J_F (parameter H228) as a result of the winder components (components which do not change).

b) Variable moment of inertia J_V (adapted using parameter H227) as a result of the wound material.

This Chapter includes instructions as to how parameters H228 for the fixed moment of inertia, and H227 for the variable moment of inertia can be calculated from the system data. The equations involve normalized value quantities. The formula characters in the equations and dimensions are listed in Chapter 4.1.

4.2.1 Determining parameter H228 for the fixed moment of inertia

Fixed moment of inertia

The fixed moment of inertia comprises the sum of the following moments of inertia, refer to Fig. 4-2:

- Moment of inertia of the motor
- Moment of inertia of the gearbox referred to the motor shaft
- Moment of inertia of the winder core, also referred to the motor shaft
- Remaining moments of inertia as a result of couplings, tachometers etc.

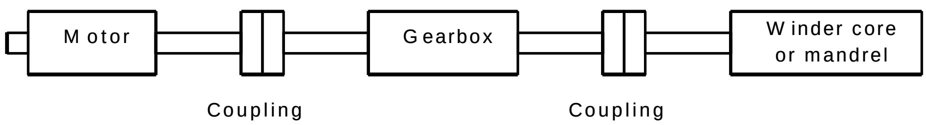


Fig. 4-2 Coupling between the motor and winder core

The following formula is valid for the fixed moment of inertia (refer to Equation (9)):

$$J_F = J_{Motor} + J_{Getr} + \frac{J_{Kern}}{i^2}$$

The moments of inertia of the motor and gearbox can generally be taken from the rating plates or data sheets. The moment of inertia of the winder core must be calculated. If cardboard cores are used, their moments of inertia can be neglected.

The higher the gearbox ratio *i*, the lower is the influence of the winder core and the variable moment of inertia on the total moment of inertia.

The " remaining moments of inertia" are generally low with respect to the other moments of inertia and can be neglected.

Determining H228

We recommend that you determine the value of H228 in two steps:

1) Calculate the percentage accelerating torque $M_{bF\%}$ as a result of the fixed moment of inertia J_F and the accelerating time t_b:

Prerequisite: $D = D_{core}$ and $t_b = t_h$

$$M_{bF\%} = \frac{J_F * n_N * i}{2.865 * D_{core} * P_N} * \frac{DV}{t_b} \quad (1.2)$$

Formula characters and dimension:
Refer to Sect. 4.1

This equation is obtained by dividing formulas (11) and (13), it calculates the accelerating torque referred to the rated torque as a %.

2) Determining the setting value for parameter H228

$$H228 = \frac{M_{bF\%} * t_b}{H220} * D_{core} / D_{max} \quad (1.3)$$

Formula characters and dimensions:
Refer to Sect.

The value of H220, should be the shortest ramp available, e.g. if inertia compensation is required for a fast stop. The equation is valid for an internal dv/dt calculation (H226=0) and H225=1 .0.

Example

Drive system data:

- fixed moment of inertia: $J_F = 38.77$ kg m^2
- rated motor spee d: $n_N = 400$ RPM
- gearbox ratio $n_{mot}/n_{winder\ shaft}$ i = 5.8

- core diameter — D_{core} = 508 mm
- rated motor output: — P_N = 186 kW
- max. web velocity: — V_{max} = 339 m/min
- time to accelerate from 0 to V_{max}: — t_h = 20 sec
- deceleration time for a fast stop — H220 = 5 sec
- max. diameter — D_{max} = 1500 mm

The following is obtained from equation (1.2):

$$M_{bF\%} = \frac{38.77 * 400 * 5.8}{2.865 * 508 * 186} * \frac{339}{20} = 5.63\%$$

(1.4) Formula characters and dimensions:
Refer to Section 4.1

The following is obtained equation (1.3):

$$H228 = 5.63\% * 4 * 0.339 = 7.63\%$$

(1.5) Formula characters and dimension:
Refer to Sect. 4.1

For H228 = 7.63% and an acceleration using a 20 sec ramp at the minimum diameter, the inertia compensation generates a torque of 5.63 %.

4.2.2 Determining parameter H227 for the variable moment of inertia

Variable moment of inertia

The maximum variable moment of inertia is obtained at the maximum diameter and maximum width from equation (10) as follows:

$$J_{Vmax} = \frac{p * b_{max} * r}{32 * 10^{12} * i^2} (D_{max}^4 - D_{min}^4) \qquad (1.6)$$

Determining H227

We recommend that the correct value of H227 is determined in two steps:

1) Calculate the percentage accelerating torque M_{bV}% for a full roll as a result of the maximum variable moment of inertia J_{Vmax}:

Prerequisite : $D = D_{max}$, $t_b = t_h$ and $J_F = 0$

$$M_{bV\%} = \frac{b_{max} * r * (D^4_{Max} - D^4_{Kern}) * n_N}{29.18 * 1012 * i * D_{Max} * P_N} * \frac{DV}{t_b}$$

Formula characters and dimensions:
Refer to Sect. 4.1

(1.7)

This equation is obtained, if equation (1.6) is inserted in equation (11), and the result is divided by equation (13); it calculates the accelerating torque referred to the rated torque as a %.

2) Determining the setting value for parameter H227:

$$H227 = \frac{M_{bV\%} * t_h}{H220} * 100\%$$

Formula characters and dimension:
Refer to Sect.

(1.8)

The equation is valid for the internal dv/dt calculation (H226=0) and H225=1.0.

Example Drive system data:

- specific weight of the wind ing material r = 7.85 (steel)
- rated motor speed: n_N = 400 RPM
- gearbox ratio $n_{mot}/n_{winder\ shaft}$ i = 5.8
- maximum diameter D_{max} = 1500 mm
- core diameter D_{core} = 508 mm
- rated motor output: P_N = 187 kW
- maximum material width b_{max} = 420 mm
- max. web velocity V_{max} = 340 m/min
- accelerating time from 0 to V_{max} t_h = 20 sec
- decelerating time for a fast stop H220 = 5 sec

The following is obtained from equation (1.7):

$$M_{bV\%} = \frac{420 * 7.85 * (1500^4 - 508^4) * 400}{29.18\ 1012 * 5.8 * 1500 * 187} * \frac{340}{20} = 2.36\%$$

Formula characters and dimensions:
Refer to Sect.

(1.9)

The following is obtained from equation (1.8):

*H227 = 2.36% * 4 = 9.44%*
Formula characters and dimension: Refer to Sect. 4.1

(1.10)

For H227 = 9.44 % and an acceleration along a 20 sec ramp at the maximum diameter and maximum web width, the inertia compensation generates a torque of 2.36%.

4.3 Selecting the winding ratio (winding range)

Winding operation is discussed in the following. The same is essentially true for unwinding.

The winding ratio is the following quotient:

$$\frac{\textit{Max. Wickeldurchmesser } (D_{max})}{\textit{Durchmesser des Wickelkerns } (D_{Kern})}$$

((max. winding diameter, diameter of the winder core, Dkern = Dcore))

The useful wound quantity as a % is given by equation (14) :

$$(D^2_{max} - D^2_{core}) \frac{p}{4}$$

For a winding ratio of 6:1, the useful winding length is ≃ 97 %.

4.4 Power and torque

The power required for winding is constant over the complete winding range, if, at the selected web velocity, the set winding tension is to be kept constant (also refer to equation (4)). Winding power P_w:

$$P_W = \frac{Z_s \cdot b \cdot d \cdot V}{60 \cdot 10^3} \text{ kW}$$

b = working width in mm
d = working thickness in mm
V = web velocity in m/min
Z_s = specific material tension in [N/(mm^2 material cross section)]

The required torque increases linearly with the diameter of the winder roll.

4.5 Defining the sign

These definitions are valid, independent of the mode as either winder or unwinder

The values for the tension setpoint and the tension actual value must have a positive polarity (sign). The remaining polarities (signs) are then obtained according to Table 4-1 and Table 4-2 (for the velocity setpoint, if a forwards- and backwards direction is required, a negative value can be assigned for the backwards operation).

Note The specified polarities apply to both the T400 module and the base drive.

Caution

- For an indirect tension control and tension control with tension transducer, the tension setpoint is always positive, display parameter d304.
- For position control (e.g. dancer roll) the position reference value is 0.0 or positive, display parameter d304.

Operating modes The following winding types are possible. The **definitions** for the polarity of speed, torque and velocity for various operating modes are indicated in Table 4-1. The definition of the signs for each winding type are listed in Table 4-2.

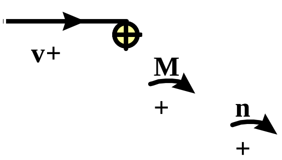
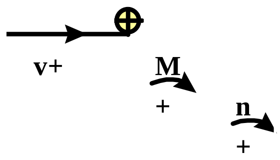
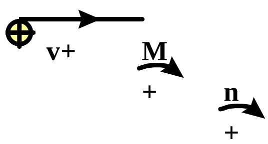
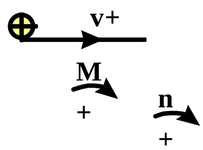
Winding type A	Winding type B	Winding type C	Winding type D
Winder, winding from above	Winder, winding from below	Unwinder, winding from above	Unwinder, winding from below
			
Control signal level: winder=1 winding from below=0	Control signal level: winder=1 winding from below=1	Control signal level: winder=0 winding from below =0	Control signal level: winder=0 winding from below =1

Table 4-1 Defining the winding types and the appropriate control signals for winders (selected using H043) and winding from below (selected with H035).

Winder type	Speed actual value d307, r219 for CUVC	Saturation setpoint/actual value H145 / d341 [1])	Torque setpoint d329 r269 for CUVC	Direct tension control with tension transducer Tension setpoint/actual value d304 / d317		indirect tension control Tension setpoint d304	Position control using a dancer roll Position reference value/actual value d304 / d317	
A	positive	positive/ positive	positive	positive	positive	positive	≥ 0.0	[5])
B	negative	positive/negative	negative	positive	positive	positive	≥ 0.0	[5])
C	positive	negative/ negative	negative [2])[3])	positive	positive	positive	≥ 0.0	[5])
D	negative	negative/ positive	positive [2])[4])	positive	positive	positive	≥ 0.0	[5])

Table 4-2 Defining the polarities (signs)

Explanation

1. Only set the saturation setpoint for closed-loop torque limiting controls (H203 = 0,1,2), otherwise enter 0.0.
2. The unwinder can also changeover from braking to motoring, e.g. at low diameters or at low tension
3. When inching forwards (without material), positive polarity
4. When inching backwards (without material), negative polarity
5. The tension actual value depends on the dancer roll setting
   Winders:

   Dancer roll at the top : Winder is running too fast,
   tension actual value > tension setpoint

   Dancer roll at the bottom : Winder is running too slowly,
   tension actual value < tension setpoint

   Dancer roll at the center : Winder is running with V_{set},
   tension setpoint = tension actual value

   Unwinder:

   Dancer roll at the top : Unwinder is running too slowly,
   tension actual value > tension setpoint

   Dancer roll at the bottom : Unwinder is running too fast,
   tension actual value < tension setpoint

   Dancer roll at the center : Unwinder is running with V_{set},
   tension setpoint = tension actual value

4.6 Selecting the closed-loop control concept

Closed-loop control concept

H203

The standard SPW420 axial winder software package allows the following closed-loop control concepts to be implemented:

- Indirect closed-loop tension control (without tension transducer)
- Direct closed-loop tension control with dancer roll or tension transducer
- Closed-loop constant v control (if there is no ” nip” position)

These control concepts will now be explained. Chapters 4.7 to 4.13 will describe individual examples of concepts which are used. Parameter H203 is used to changeover between the various control concepts.

4.6.1 Indirect closed-loop tension control (”Open-loop tension control”)

Concept

H203=0

This technique does not require a tension transducer or tension measuring device. The tension controller is not used, but instead, the tension setpoint is multiplied by the diameter, and the result is directly pre-controlled as torque setpoint, so that the motor current linearly increases with increasing diameter and the tension is kept constant. For this control type, the speed controller is kept at its limit by entering an saturation setpoint (refer to the configuring examples, Chapters 4.7 and 4.8).

Note It is important that the friction- and accelerating torques are precisely compensated so that the pre-controlled torque setpoint results in a material web tension which is as close as possible to that required.

Caution For this control type, it must be ensured that the mechanical losses are kept as low as possible, i.e. no worm gears, no open intermediate ratios, for herring bone teeth, direction of rotation in the direction of the arrow, the lowest possible loss differences between warm and cold gears.

4.6.2 Direct closed-loop tension control with dancer roll

Tension measurement

The material web is routed over a dancer roll. The dancer roll tries to move the material web with a defined force. This deflection of the dancer roll is sensed using a potentiometer (e.g. field plate potentiometer), and is used as a measure for the material tension.

The material tension depends on the return force of the dancer roll suspension. Often, due to the geometry of the arrangement (distance to possibly existing guide rolls) and the weight of the dancer roll, additional effect on the tension actual value. Using a good mechanical design, the effects can be eliminated or adequately minimized.

Concept

H203=3 or 5

The higher-level controller to the speed controller (designated as "tension controller") is used as the closed-loop dancer roll position controller and corrects the position actual value of the dancer roll to track the position reference value (e.g. dancer roll center position). Generally, the position controller outputs a velocity correction setpoint to the speed controller.

Generally, the position reference value is not externally entered, but is parameterized as a fixed value, i.e. standard connection of H081, position reference value entered via H080.

For dancer rolls using pneumatic or hydraulically controllable support force, it is possible to implement a decreasing winding hardness via the winding hardness characteristic of the T400 module. To realize this, the output signal d328 of the characteristic block is output at an analog output and is used as setpoint for the dancer roll support (refer to the configuring examples, Chapters 4.9 and 4.10).

Note H203=2 is a non-typical behavior for the direct tension control using a dancer roll and the torque limits.

Advantage

When the dancer roll is used as actual value transmitter, this has the advantage that the dancer roll can simultaneously act as material storage device (when the selected stroke has been selected high enough). This means that in this case it is already a ’ tension controller’ . Although dancer-roll controls are complex, they offer unsurpassed control behavior and characteristics

Note The material storage function also has a damping effect on

– off-center material reels
– layer jumps, e.g. when winding cables
– roll changes

4.6.3 Direct closed-loop tension control with a tension transducer

Tension measurement

A tension transducer directly measures the material tension (e.g. a tension transducer from FAG Kugelfischer or Philips). The output signal of the tension transducer is proportional to the tension, and is fed to the tension controller as actual value signal.

Concept

H203 = 1

When appropriately controlling the torque limits, the tension controller specifies the torque setpoint. For normal winding operation, the secondary speed controller is not effective as a result of the overcontrol. If the web breaks or the material sags, the winder speed is controlled by the speed controller. (Closed-loop torque limiting control, refer to the configuring examples, Chapters 4.11 and 4.12).

The tension setpoint can either be entered internally or externally.

4.6.4 Closed-loop constant v control

Secondary condition

The closed-loop control techniques which have been discussed up until now, using either indirect or direct tension control assume that the web velocity is kept constant at a " nip position" outside the winder. For instance, this can be using two rolls which are pressed together and driven at an appropriate speed through which the web material is fed.

If there is no nip position, then a tension control cannot be realized, and the winder is normally just controlled to keep the circumferential velocity constant.

Concept

H203=3 & H195=0

With this control concept, the material web velocity must be detected using a web tachometer so that the diameter can be computed. The speed controller regulates the current controller in the drive. The pre-control torque is added as a supplementary torque setpoint after the speed controller.

The closed-loop constant v control is explained in more detail in Chapter 4.13 using a configuring example.

Caution

The web break detection is **not** effective for the closed-loop v-constant control.

4.6.5 Selecting a suitable control concept

The most important criteria to select a suitable control concept are summarized in Table 4-3:

Control concept	Indirect tension control	Direct tension control with dancer roll	Direct tension control with tension transducer	Constant v control
Information on the tension actual value sensing	Tension actual value sensing not required	Intervenes in the web routing, material storage capability	Sensitive to overload, generally does not intervene in the web routing	-

Winding ratio D_{max} / D_{core}	Up to approx. 10:1, good dv/dt and friction compensation required	From experience, up to approx. 15:1	From experience, up to approx. 15:1, precise dv/dt compensation required	Up to approx. 15:1
Tension range Z_{max}/Z_{min}	Up to approx. 6:1 for good compensation of friction and dv/dt	Can only be changed for adjustable dancer roll support	Up to approx. 20:1 for precise dv/dt compensation	-
Winding ratio x tension range $\frac{D_{max}}{D_{core}} \times \frac{Z_{max}}{Z_{min}}$	Generally up to 40:1	Depends heavily on the dancer roll support design, up to approx. 40:1	Up to 100:1, depends essentially on the tension actual value signal	-
Friction force/ tension force which cannot be compensated	From experience, over the compl. tension range < 1	-	-	-
Web velocity	Up to 600 m/min for good compensation	Up to above 1000 m/min	Up to 2000 m/min for a precise dv/dt compensation	-
Control concept preferably used for	Sheet steel, textile, paper	Rubber, cable, wire, textiles, foils, paper	Paper, thin foils	Sorting winder
Nip position required	Yes	Yes	Yes	-
Web tachometer required	-	-	-	Yes

Table 4-3 Comparing various control concepts

4.7 Configuring example: Winder with indirect tension control

Note Fig. 4-4 show, shows as an example how a winder can be configured with indirect tension control.

<1> **Tension setpoint and web velocity setpoint**

(" Machine velocity") is entered as analog signal, from the automation or as parameter.

<2> A pulse encoder as shaft tachometer is used to **sense the speed actual value**.

<3> The **diameter computer** continually computes the diameter corresponding to the formula:

$$\text{diameter} \approx \frac{\text{web velocity}}{\text{speed}}$$

<4> The **speed controller** receives a speed setpoint, which corresponds to the actual web velocity plus the **saturation setpoint** H145 <6> (set H145 to approx. 0.05 ... 0.1). Overcontrol means that the speed controller is overcontrolled when the material web is present <7>, i.e. it goes to its positive output limit. When an attempt is made to increase the shaft speed by the saturation setpoint, the speed controller output reaches the specified torque limit B+ <8> due to the selected tension setpoint.

<8> Thus, the **tension setpoint** specifies the torque setpoint for the current controller by appropriately controlling torque limit B+.

<9> The core function of the **indirect tension control** is that the tension setpoint multiplied with the normalized diameter D is entered as torque (max. diameter and max. tension setpoint results in the max. torque).

<10> In order that the entered torque results in, as far as possible, the required material tension, it is necessary to precisely **compensate** the friction- and accelerating torques, which must be additionally overcome. The friction torque always acts in the direction of rotation and the inertia compensation has a braking effective when decelerating and an accelerating effect when accelerating.

<11> When the **material web breaks** or the web sags, the speed controller intervenes and prevents the winder drive from accelerating up to an inadmissible speed, by controlling the circumferential velocity to the sum of the web velocity + saturation setpoint (overspeed protection). Refer to Chapter 3.6.1 for web break.

The drive can also be shutdown by appropriately parameterizing the web break detection and evaluating the web break signal; refer to Chapter 3.6.1.

Threading the material web

There is an automatic changeover from closed-loop speed- to tension control when the material web is threaded in system operation. In this case, the tension setpoint should be run-up and the tension controller enabled, whereby the torque limit is set corresponding to the required tension <9>.

When the tension is established, the torque limit automatically takes-over the drive control.

Torque characteristic

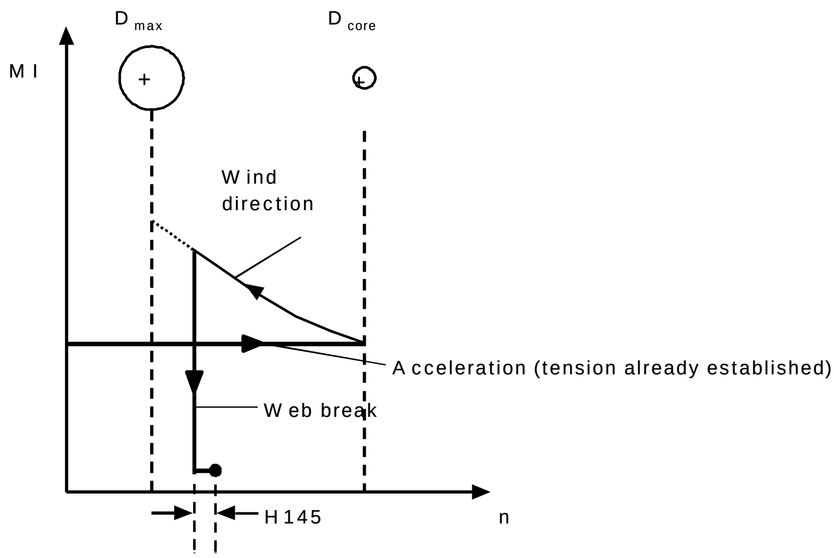


Fig. 4-3 Torque/speed characteristic

Caution The tension setpoint becomes effective when the tension controller is enabled.

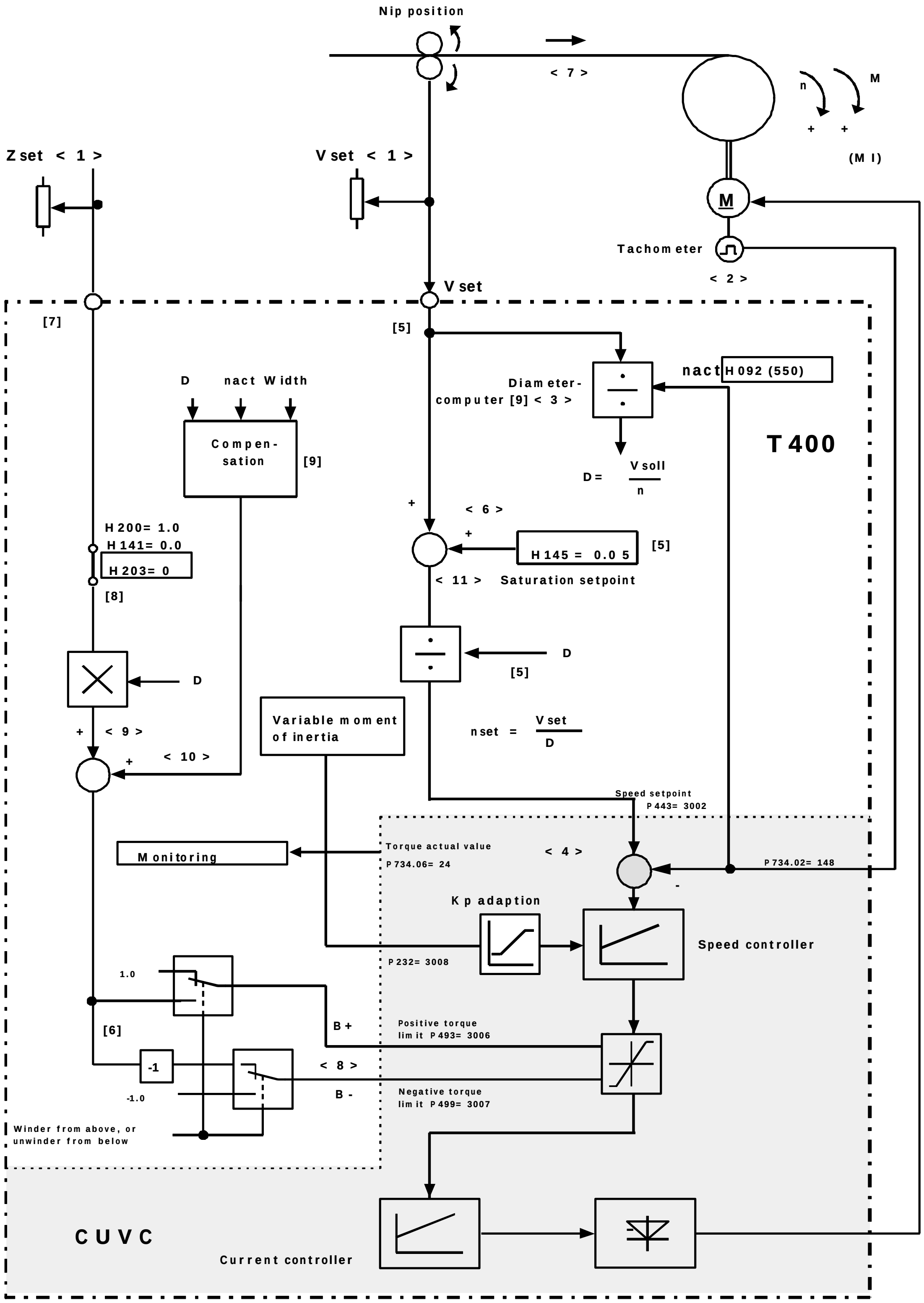


Fig. 4-4 Example for a winder with indirect tension control

[3] = refer to 3 in the block diagram

<2> = Information in the text

4.8 Configuring example: Unwinder with indirect tension control

Note An example is shown in Fig. 4-6, as to how an unwinder with indirect tension control can be configured

<1> **Tension setpoint and web velocity setpoint**

(" Machine velocity") are entered as analog signals, from the automation or as parameter.

<2> A pulse encoder as shaft tachometer is used for the **speed actual value sensing**.

<3> The **diameter computer** continually computes the diameter corresponding to the above formula

$$\text{diameter} \approx \frac{\text{web velocity}}{\text{speed}}$$

<4> While unwinding, the **speed controller** is overcontrolled, by entering into it a low, negative saturation setpoint H145 (H145=0...- 0.05). This causes the speed controller, when material is present, to go to its negative output limit. If an attempt is made to re-wind the material which has just been unwound, the speed controller goes to the entered torque limit B – due to the selected tension setpoint.

<8> The **tension setpoint** therefore specifies the torque setpoint by appropriately controlling torque limit B- (braking in the clockwise direction of rotation).

<9> The core function of the **indirect tension control** is that the torque is entered as tension setpoint multiplied by diameter D (max. diameter and max. tension setpoint result in max. torque).

<10> In order that the entered torque results in the best approximation to the required material tension, it is necessary to precisely **compensate** the friction- and accelerating torque.

<12> When the **web breaks** or the material web sags, if the unwinder was to continue to rotate or even accelerate, this could result in an uncontrolled " material rejection" . This is prevented by the fact that the speed controller intervenes and approaches the saturation setpoint set using H145. The drive then rotates at a low speed in the wind direction, and winds-up residual material web which may be in the machine; refer to Chapter 3.6.1.

Threading the material web The material web is **threaded** in the standard system operation. The velocity setpoint limiting function automatically ensures this, refer to Chapter 3.1.2.5. The tension in the material web can establish itself after the tension control has been switched-in.

Note An unwinder might have to go into the motoring mode, if the accelerating torque when braking is greater than the tension torque.

Torque characteristic

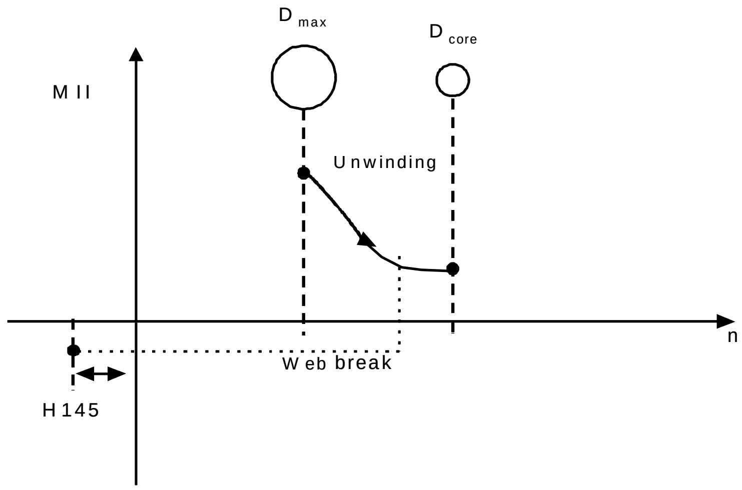


Fig. 4-5 Torque / speed characteristic

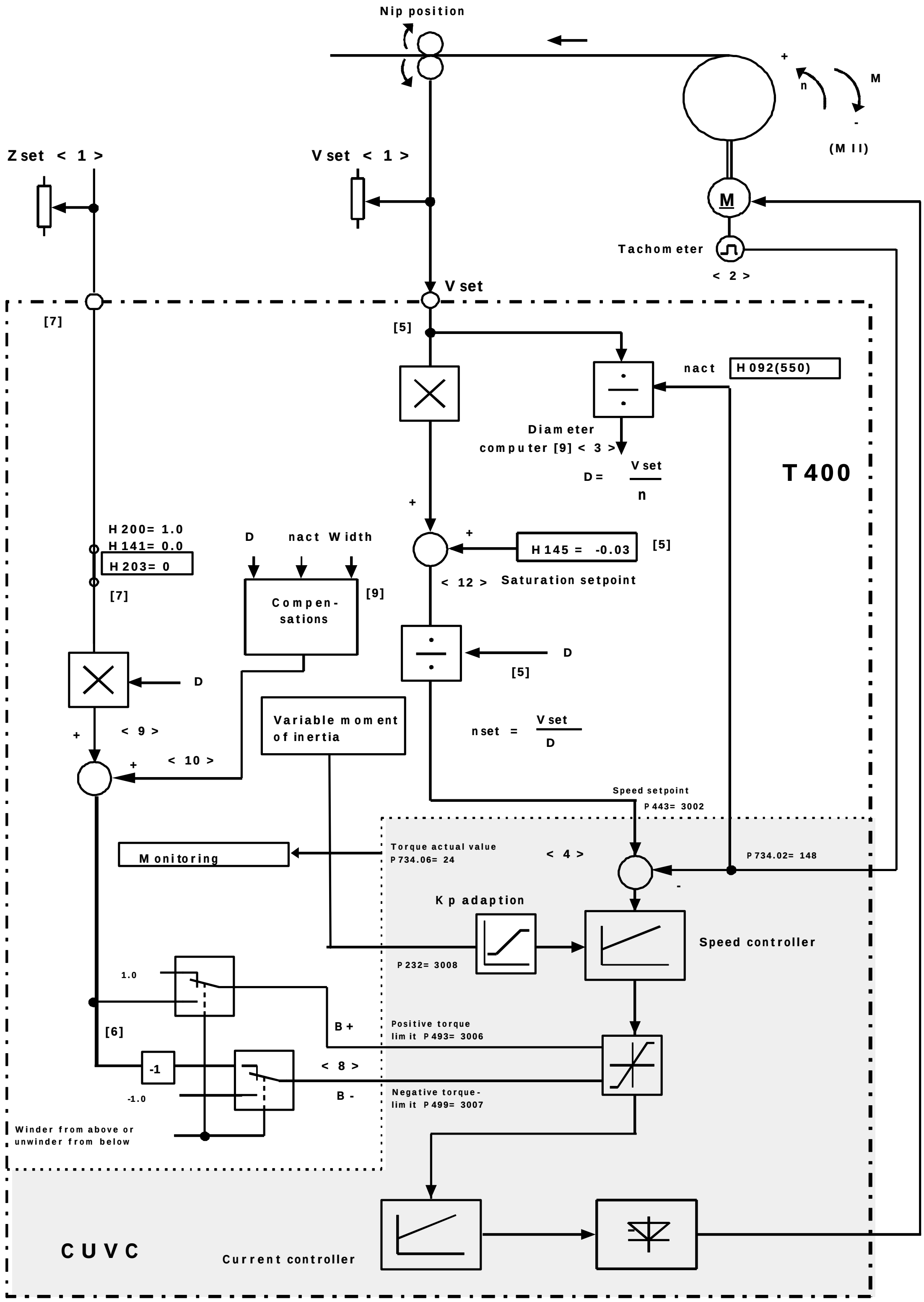


Fig. 4-6 Example for an unwind stand with indirect tension control

[3] = Page 3 in the block diagram

<2> = Information in the text

4.9 Configuring example: Winder with dancer roll, speed correction

Note An example of a winder with dancer roll is shown in Fig. 4-8.

<1> The **web velocity setpoint** is entered here at terminals 90/91 as analog signal.

<2> An analog tachometer is used for the **speed actual value sensing.** The signal is connected at the base drive and the actual value is transferred to T400 via the dual port RAM.

<3> The **diameter computer** continually computes the diameter corresponding to the following formula

$$\text{diameter} \approx \frac{\text{web velocity}}{\text{speed}}$$

<4> The analog **dancer roll position actual value** is connected at terminals 96/99.

<6> The **dancer roll position setpoint** is permanently entered via parameter H082 with the standard connection of H083; normally, the voltage is set at the dancer roll center position. The tension setpoint channel is interrupted with H177 = 1 and the winding hardness characteristic can then be used to control the dancer roll support.

<7> The "tension controller" operates as **dancer roll position controller**, and normally generates a supplementary velocity setpoint, which is input into the speed controller with a positive polarity (sign) which means that the dancer roll actual value tracks the entered position reference value. The D controller is used to dampen the dancer roll and prevents oscillation between the dancer roll and winder; the following parameters should be set: H174=0, H196=1 and H283=0.

<8> The **speed setpoint** is obtained from the total velocity setpoint divided by the diameter.

<9> Generally, the position controller output has a relatively low effect of approx. 0.02...0.1 on the speed controller. The tension controller output can be limited using H195; the influence on the velocity setpoint can be normalized using H141.

When the **web breaks**, the dancer roll falls to its lower end stop, and the position controller goes to its output limit, as it can no longer maintain the reference position. This means that the speed increases by the value set at H195; refer to Chapter 3.6.1.

<10> The **compensation torques** for friction and acceleration are added as supplementary torque setpoints after the speed controller. Generally, for the dancer roll position control, friction compensation is not required and normally, inertia compensation is not required.

<13> For a winder with dancer roll, there is normally no **external tension setpoint**.

For a dancer roll with a selectable support force, as shown in Fig. 4-8, a tension setpoint can be entered at the T400 technology module, in order to be able to use its winding hardness control (open-loop) (H206=0). The tension setpoint can be still controlled using a ramp-function generator with H284=0. The output of the winding hardness characteristic can then be output, for example, at terminals 97/99, and they can then serve as setpoint for the pneumatic adjustable dancer roll support.

Threading the web

The normal web velocity setpoint input (in this case, terminals 90/91) can be used to **thread the material web**. After the web has been thread, the parameterized tension is established by switching-in the tension control.

Torque characteristic

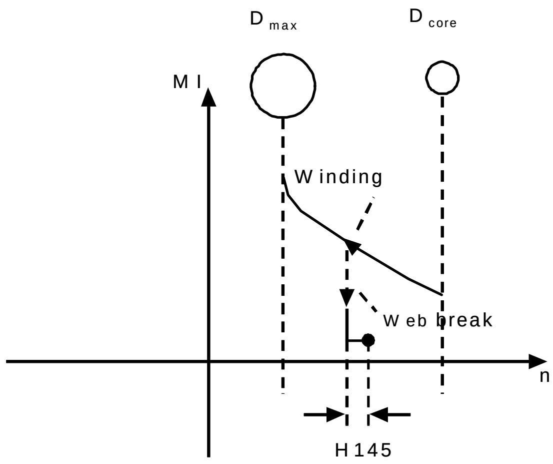


Fig. 4-7 Speed/torque characteristic with web break

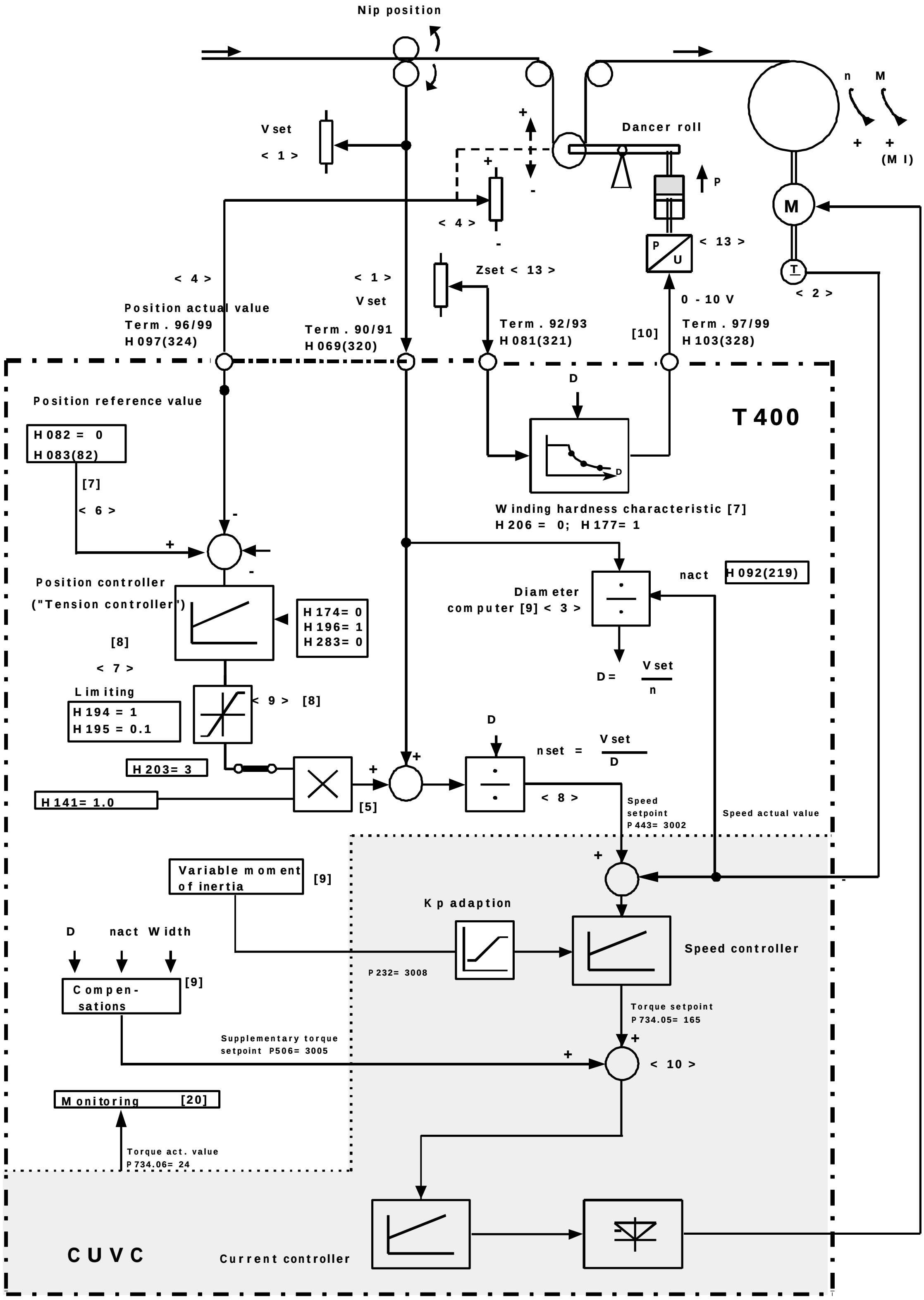


Fig. 4-8 Winder with dancer roll, closed-loop speed correction control

[3] = Page 3 in the block diagram
<2> = Information in the text

4.10 Configuring example: Unwinder with dancer roll, speed correction

Note An example is shown in Fig. 4-10 as to how an unwinder with dancer roll can be configured.

<1> In this case, the **web velocity setpoint** is entered at terminals 90/91 as analog signal.

<2> An analog tachometer is used for **speed actual value sensing**. The connection is made at the base drive and the actual value is transferred to the T400 via the dual port RAM.

<3> The **diameter computer** continuously computes the diameter corresponding to the formula

$$\text{diameter} \approx \frac{\text{web velocity}}{\text{speed}}$$

<4> The analog **dancer roll position actual value** is connected at terminals 96/99.

<6> The **dancer roll position reference value** is entered as fixed value via parameter H082 with the standard connection from H083; generally, the voltage is set at the dancer roll center position. For H177 = 1, the tension setpoint channel is interrupted and the winding hardness characteristic can then be used to control (open-loop) the dancer roll support.

<7> The "tension controller" operates as **dancer roll position controller**, and normally generates a supplementary velocity setpoint, which is input into the speed controller with a negative polarity. This means that the dancer roll actual value tracks the entered position reference value. The D controller is used to dampen the dancer roll and this prevents oscillation between the dancer roll and winder; the following parameters should be set: H174=0, H196= 1 and H283=0.

<8> The **speed setpoint** is obtained from the total velocity setpoint divided by the diameter.

<9> Generally, the position controller output has a relatively low effect of approx. 0.02...0.1 on the speed controller. The tension controller output can be limited using H195; the influence on the velocity setpoint can be normalized using H141.

When the **web breaks**, the dancer roll falls to its lower end stop, and the position controller goes to its output limit, as it can no longer maintain the reference position. This means that the speed increases by the value set at H195. The drive can be shutdown by appropriately parameterizing the web break detection and evaluating the web break signal; refer to Chapter 3.6.1.

<10> The **compensation torques** for friction and acceleration are added as supplementary torque setpoints after the speed controller. Generally, for the dancer roll position control, friction compensation is not required and normally, inertia compensation is not required.

<13> For a winder with dancer roll, there is normally no **external tension setpoint**. For a dancer roll with selectable support force, as shown in Fig. 4-10 a tension setpoint can be entered at the T400 technology module, in order to be able to use its winding hardness control (open-loop) (H206=0). The tension setpoint can be still controlled using a ramp-function generator with H284=0. The output of the winding hardness characteristic can then be output, for example, at terminals 97/99, and they can then serve as setpoint for the pneumatic adjustable dancer roll support.

Threading the web

The normal web velocity setpoint input (in this case, terminals 90/91) can be used to **thread the material web**. After the web has been thread, the parameterized tension is established by switching-in the tension control.

Torque characteristic

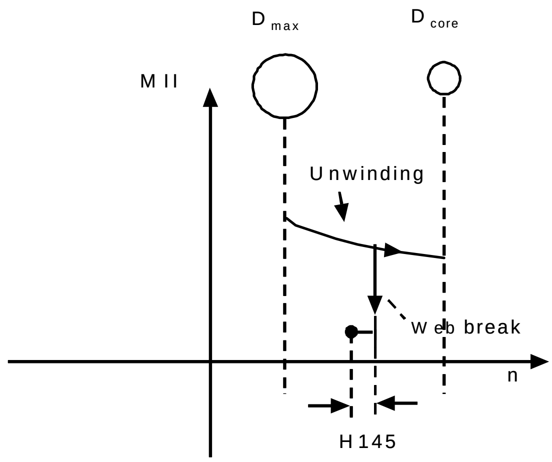


Fig. 4-9 Speed/torque characteristic with web break

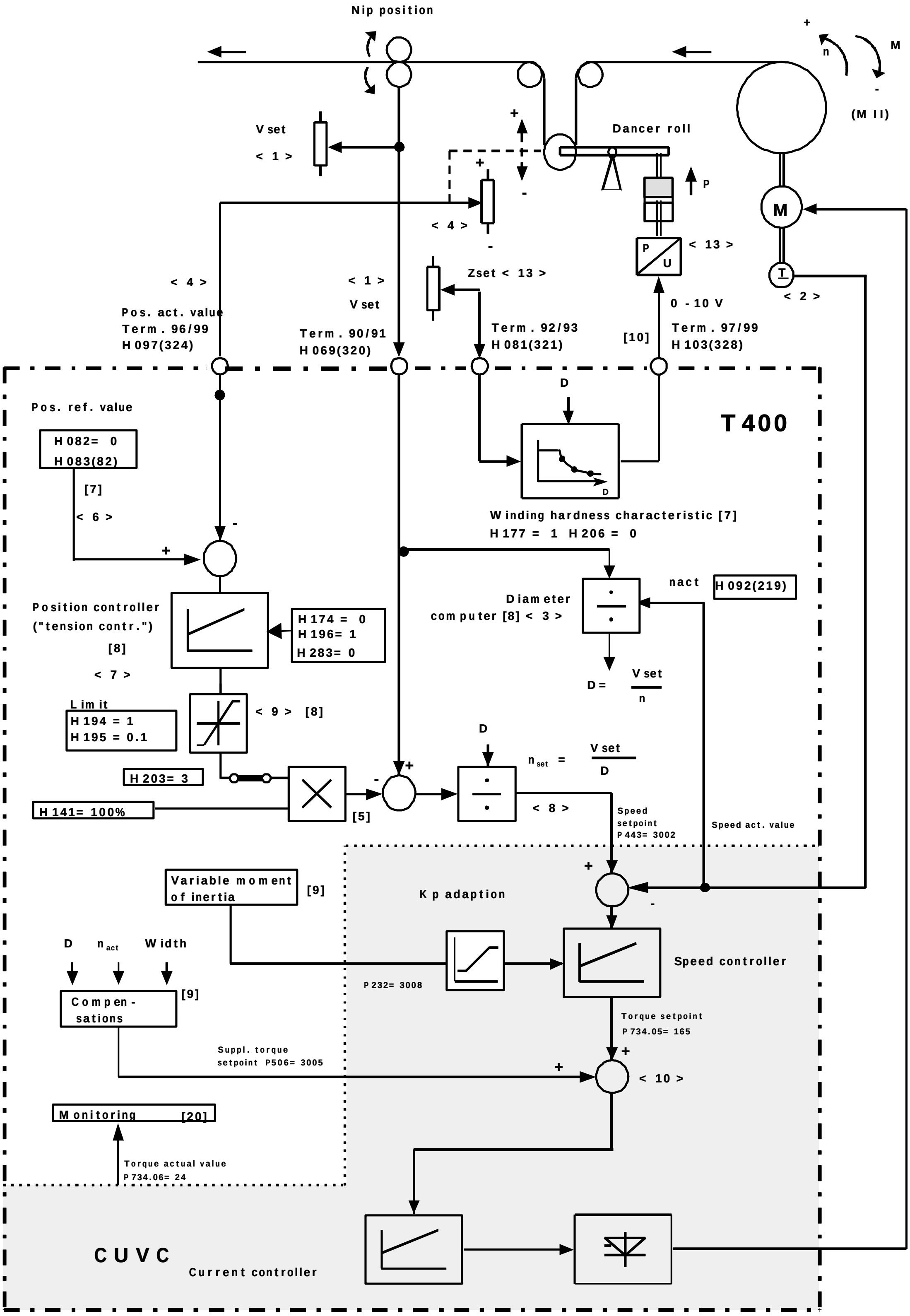


Fig. 4-10 Unwinder with dancer roll, speed correction control

[3] = Page 3 in the block diagram
<2> = Information in the text

4.11 Configuring example: Winder with tension transducer

Note An example for a winder with tension transducer and closed-loop torque limiting control is shown in Fig. 4-12.

<1> **Tension setpoint and web velocity setpoint**

(" Machine velocity") are entered at terminals 90/91 and 92/93 as analog signals.

<2> A pulse encoder as shaft tachometer is used for **speed actual value sensing**; this is connected at the basic drive.

<3> The **diameter computer** continuously computes the diameter according to the following formula

$$\text{diameter} \approx \frac{\text{web velocity}}{\text{speed}}$$

<4> A speed setpoint is entered into the **speed controller**, which corresponds to the actual web velocity plus the **saturation setpoint** H145 (set H145 to approx. 0.05...0.1).

The saturation setpoint means that the speed controller, when web material is present, goes into saturation, i.e. up to its positive output limit. When an attempt is made to increase the speed by the saturation setpoint, the speed controller output goes to the entered torque limit that results from the tension setpoint.

<5> The **tension actual value** is available as analog signal at terminals 94/99. In this case, under certain circumstances, external smoothing may be required; refer to Fig. 4-12.

<6> If the **web breaks** or the web sags, the speed controller intervenes, and the prevents the winder drive from further accelerating, by controlling the circumferential velocity to the sum of the web velocity and the saturation setpoint (overspeed protection).

The drive can also be shutdown by appropriately parameterizing the web break detection and evaluating the web break signal; refer to Chapter 3.6.1.

<9> The tension setpoint is controlled via the **winding hardness characteristic** (H206=0). This allows a reduced tension to be set for an increasing diameter.

The characteristic output is the setpoint input for the tension controller and the tension pre-control. The tension- and torque setpoints can be adjusted for pre-control using H200.

<11> The **tension controller** compares the **tension actual value** (under certain circumstances, smoothed using a filter) with the tension setpoint and outputs an appropriate correction signal.

<14> The tension controller output signal and the parameterized pre-control value are added, and after been **multiplied by the actual diameter**, is used to limit the speed controller output. (max. diameter and max. tension setpoint results in the max. torque).

<15> The **tension controller output** is limited via H195 (typical value: 0.1).

<16> The **compensation torque** comprises the friction torque and accelerating torque, and must be additionally overcome. Therefore, it is input and added to the tension torque.

Threading the material web

When the material web is threaded, it is possible that the drive automatically changes over from closed-loop speed- to closed-loop tension control. In this case, when accelerating, the threading setpoints should be entered at the standard web velocity setpoint input. The torque limit is enabled when a tension setpoint is entered. When the tension is established, the torque limit automatically takes over the drive control.

Torque characteristic

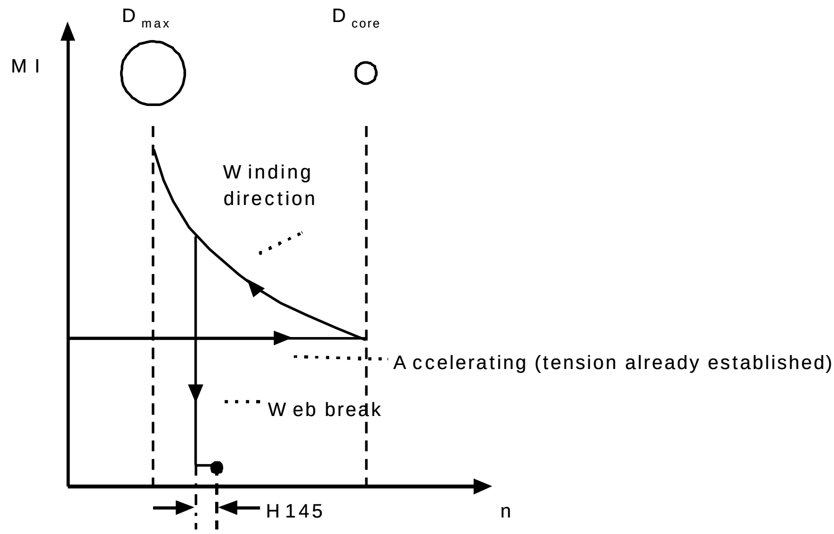


Fig. 4-11 Speed/torque characteristic with web break

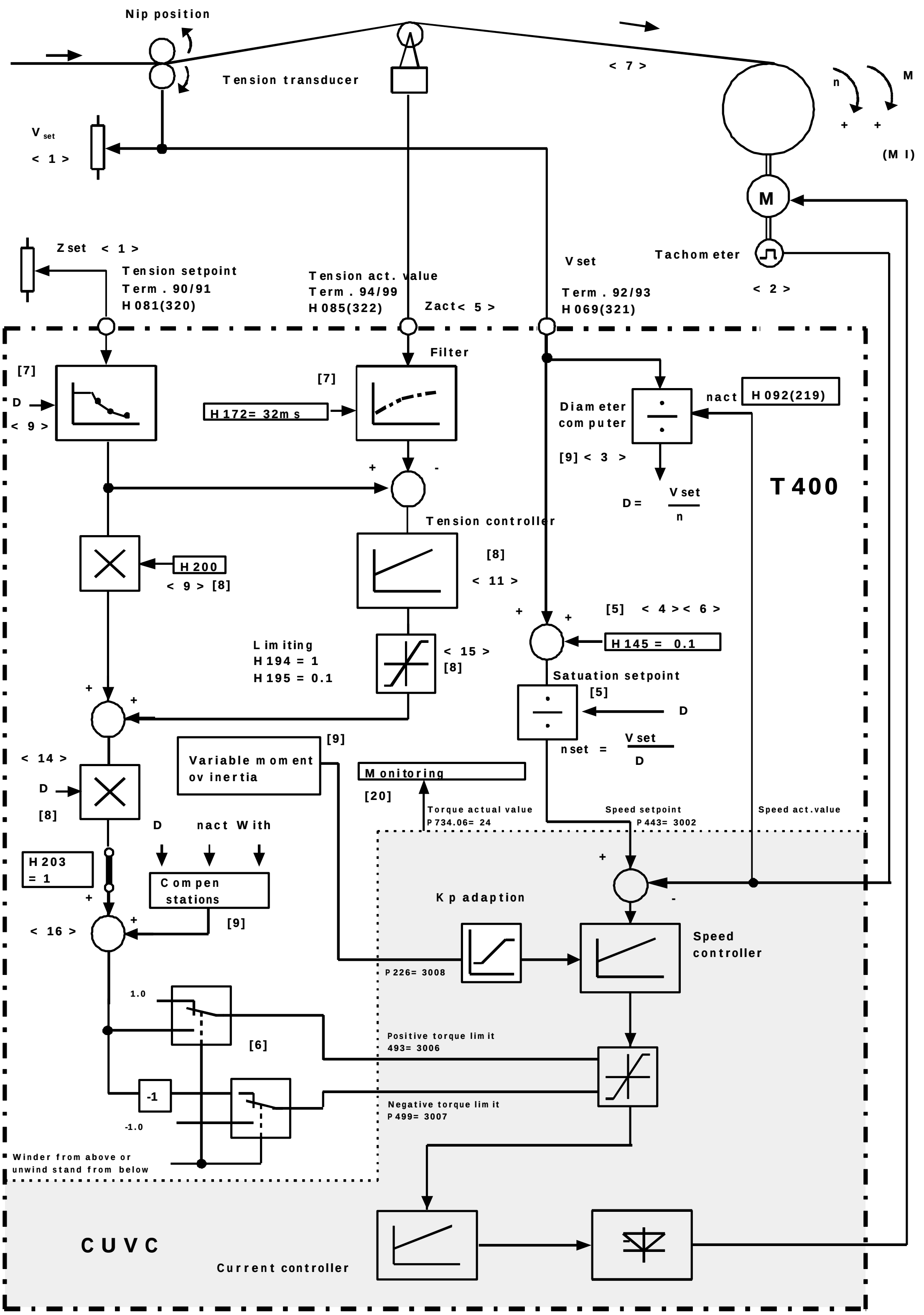


Fig. 4-12 Winder with tension transducer, torque limiting control

[3] = Page 3 in the block diagram

<2> = Information in the text

4.12 Configuring example: Unwinder with tension transducer

Note An example for an unwinder with tension transducer and closed-loop torque limiting control is shown in Fig. 4-14.

<1> **Tension setpoint and web velocity setpoint**

(" Machine velocity") are entered at terminals 90/91 and 92/93 as analog signals.

<2> A pulse encoder as shaft tachometer is used for **actual speed sensing**; this is connected at the base drive.

<3> The **diameter computer** continuously computes the diameter according to the following formula

$$\text{diameter} \approx \frac{\text{web velocity}}{\text{speed}}$$

<4> A speed setpoint is input into the **speed controller**, which corresponds to the actual web velocity plus the **saturation setpoint** H145 (set H145 to approx. 0.05...-0.1). The velocity setpoint limiting and the saturation provide automatic protection against web sag.

The saturation setpoint means that the speed controller goes into saturation when the material web is present, i.e. it goes to its negative output limit. When an attempt is made to increase the speed by the saturation setpoint, the speed controller output goes to the entered torque limit due to the selected tension setpoint.

<5> The **tension actual value** is entered as an analog signal at terminals 94/99. Under certain circumstances, it may be necessary to provide external smoothing; refer to Fig. 4-14.

<6> When the **web breaks** or the material web sags, the speed controller automatically takes over drive control, and moves away from the negative torque limit. The winder is braked, and rotates with the velocity, parameterized at H145, in the opposite direction to the winding direction.

The drive can also be shutdown and the diameter computer inhibited by appropriately parameterizing the web break detection and evaluating the web break signal; also refer to Chapter 3.6.1.

<9> The **tension setpoint** is connected to the setpoint input of the tension controller and simultaneously controls the torque setpoint (pre-control). The tension- and torque setpoints can be adjusted for the pre-control using H200. Normally, decreasing winding hardness for unwinder is not required and the characteristic can be disabled with H206=1.

<11> The **tension controller** compares the **tension actual value** (under certain circumstances, smoothed through a filter) with the tension setpoint and outputs an appropriate correction signal.

<14> The tension controller output signal and the parameterized pre-controlled value are added, and after **multiplication with the actual diameter**, used to limit the speed controller output. (max. diameter and max. tension setpoint result in max. torque).

<15> The **tension controller output** is limited via H195 (typical value: 0.1).

<16> The **compensation torque** comprises friction- and accelerating torque and is subtracted from the tension torque; it helps to brake the unwinder.

Threading the material web

When the material web is **threaded**, the standard system operation is used. The velocity setpoint limiting function executes this automatically, refer to Chapter 3.1.2.5. After the material web has been threaded, the tension control can establish the material tension.

Torque characteristic

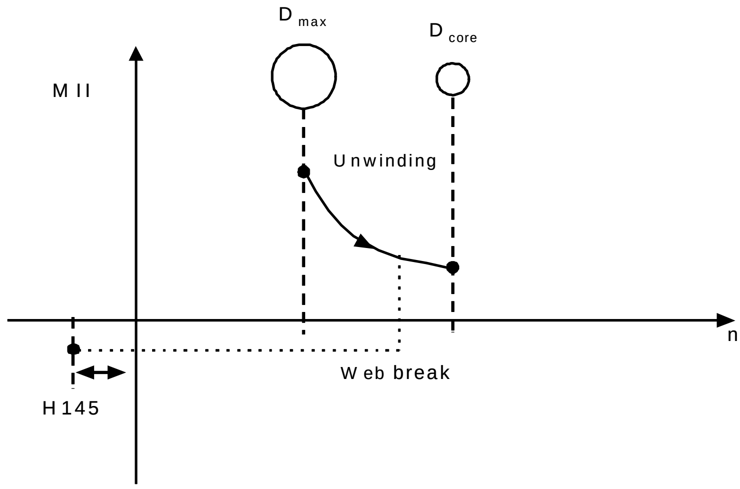


Fig. 4-13 Speed/torque characteristic with web break

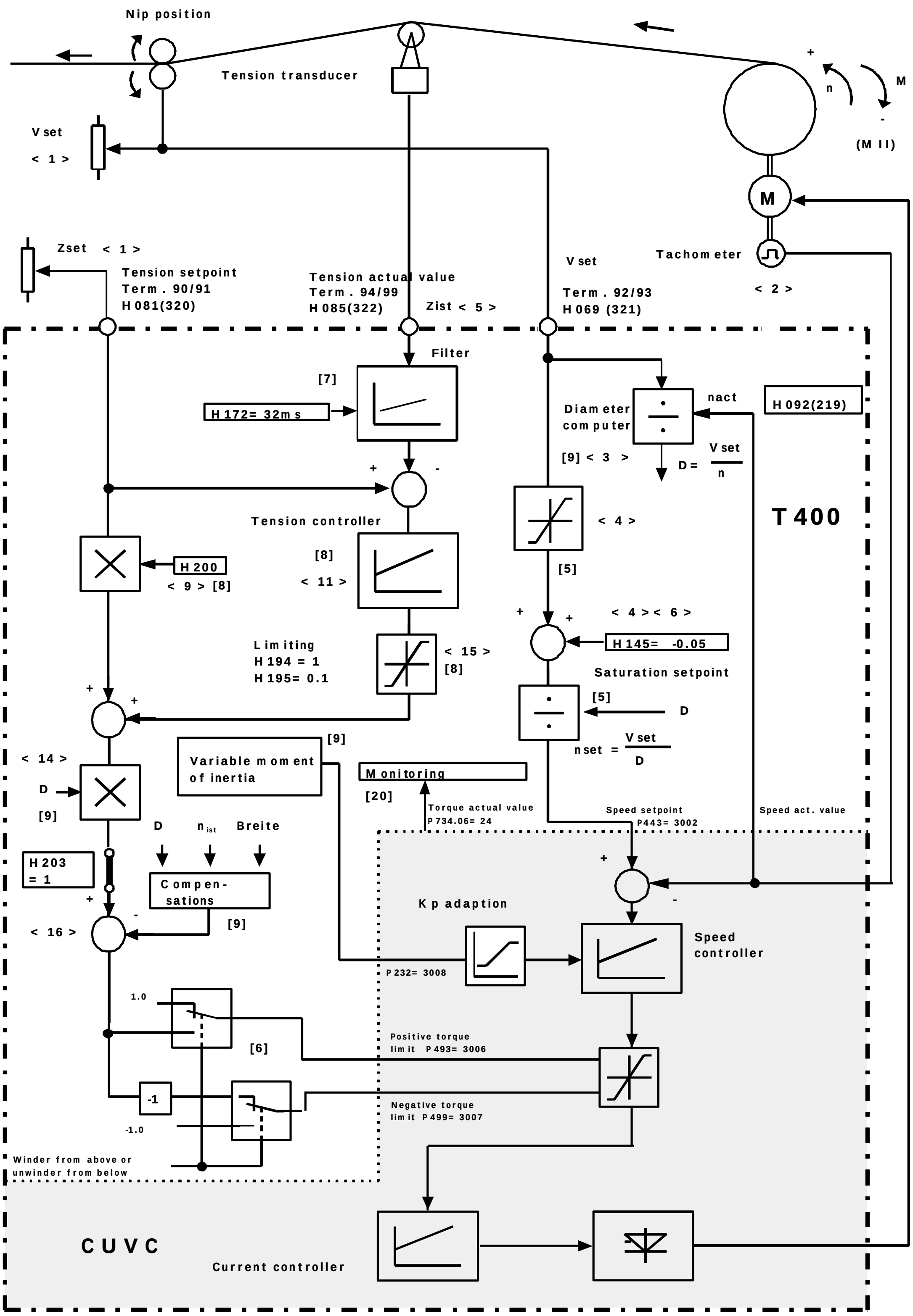


Fig. 4-16 Unwinder with tension transducer, closed-loop torque limiting control

[3] = Page 3 in the block diagram
<2> = Information in the text

4.13 Configuring example: Winder with closed-loop constant v control

Applications

If there is no " nip position" between an unwinder and a winder, which then keeps the web velocity constant (e.g. for an " inspection machine"), then the winder must be operated in the pure closed-loop velocity controlled mode.

For closed-loop velocity controlled winders, a web tachometer is always required for the diameter computation.

Note An example for a winder with closed-loop constant v control is shown in Fig. 4-17.

<1> The tension controller has no effect and its input is disabled with H195=0.0. For H203 = 3, the closed-loop speed correction control is selected as control type and the correction setpoint is now 0.0.

<2> For the diameter computer, instead of the velocity setpoint, the web velocity actual value from the web tachometer is used. The closed-loop tension control must be enabled in order to enable the diameter computer.

<3> The diameter is calculated from the measured web velocity actual value and the speed actual value of the shaft tachometer. The quotient of the velocity setpoint and the actual diameter then provides the speed setpoint for the winder.

<5> The friction- and acceleration compensation are entered as supplementary torque setpoint after the speed controller.

<6> A pulse encoder should always be used as web tachometer.

<7> When the **web breaks**, the web tachometer signal goes to zero. In accordance with the ramp-up/ramp-down time, parameterized using H238, the diameter goes toward Dmin, and the winder speed increases.

For H236=1, the diameter for winders only increases, i.e. when the web breaks, the winder would continue to run at the same speed.

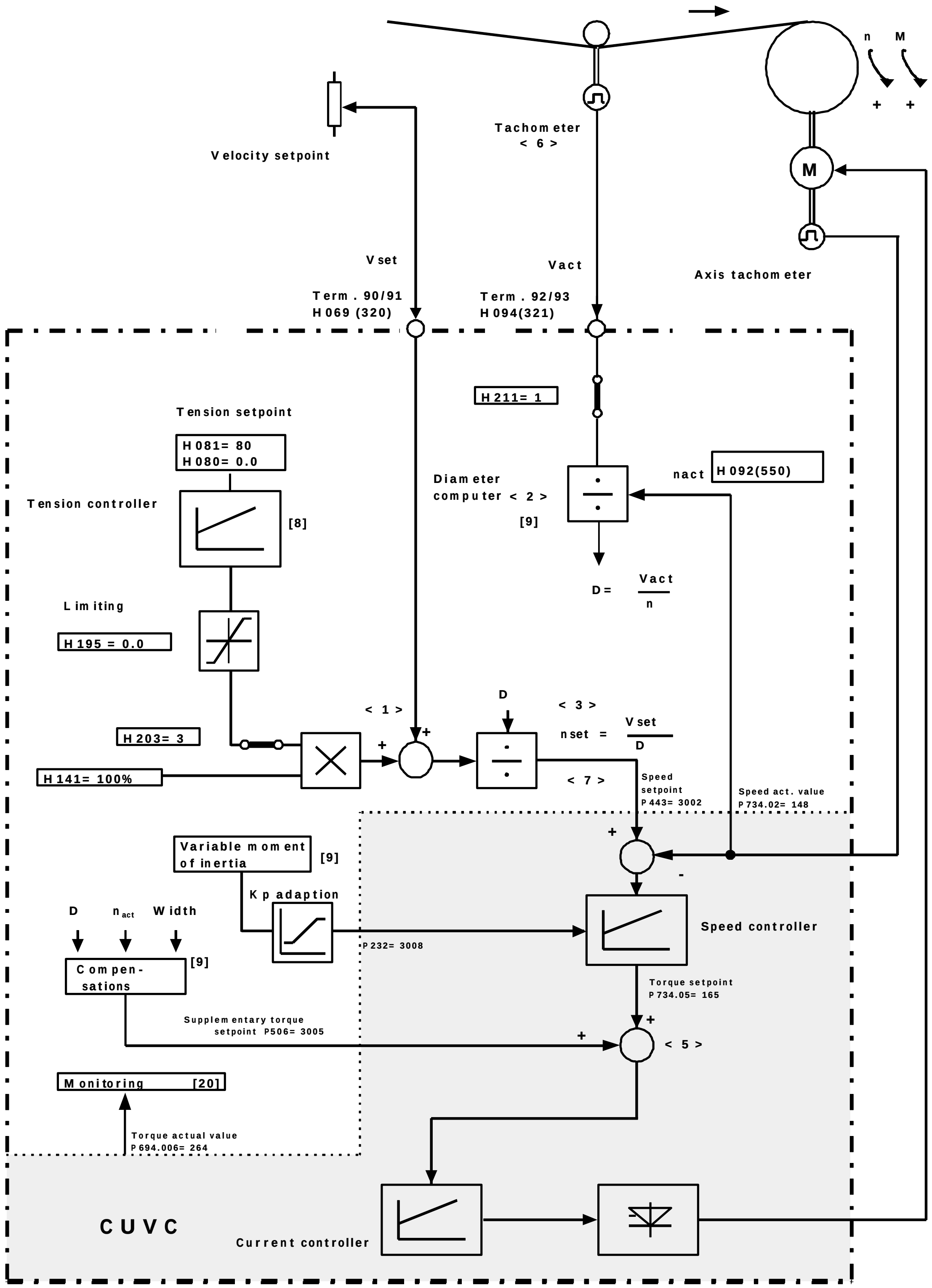


Fig. 4-17 Winder with closed-loop constant v control

[3] = Page 3 in the block diagram

<2> = Information in the text

4.14 Configuring example: Cut tension with freely-assignable blocks

Freely-assignable blocks

Frequently used freely-assignable function blocks are shown in block diagram 23a/23b. These are used to implement customized requirements; also refer to Chapter 7.6.

Application profile

A winder with tension transducer is controlled using closed-loop torque limiting control (refer to Chapter 4.12). The autonomous splice control is realized using a higher-level PLC system, and allows a flying roll change. Shortly before the roll change, the tension transducer should be changed over from roll 1 to roll 2, although roll 1 should move with the last torque. As soon as the knife has been positioned at the cutting location, roll 1 should be tensioned to a very high value for cutting. This tension depends on the material weight per square meter (g/m ^{2}).

Solution

The following solution is implemented using the freely-assignable blocks in SPW420; refer to Fig. 4-18 and block diagram 24.

- The last torque of roll 1 before the tension transducer change - over is stored, and is still used as long as the knife has still not reached the cutting position. The ‘ tension transducer change’ signal activates the changeover from direct tension control to indirect one. The winder operates with the saved torque.

- A characteristic, dependent on the weight per square meter (g/m ^{2}) is introduced, in order to calculate the tension for cutting. The changeover is made using the ‘ knife in cutting position’ command.

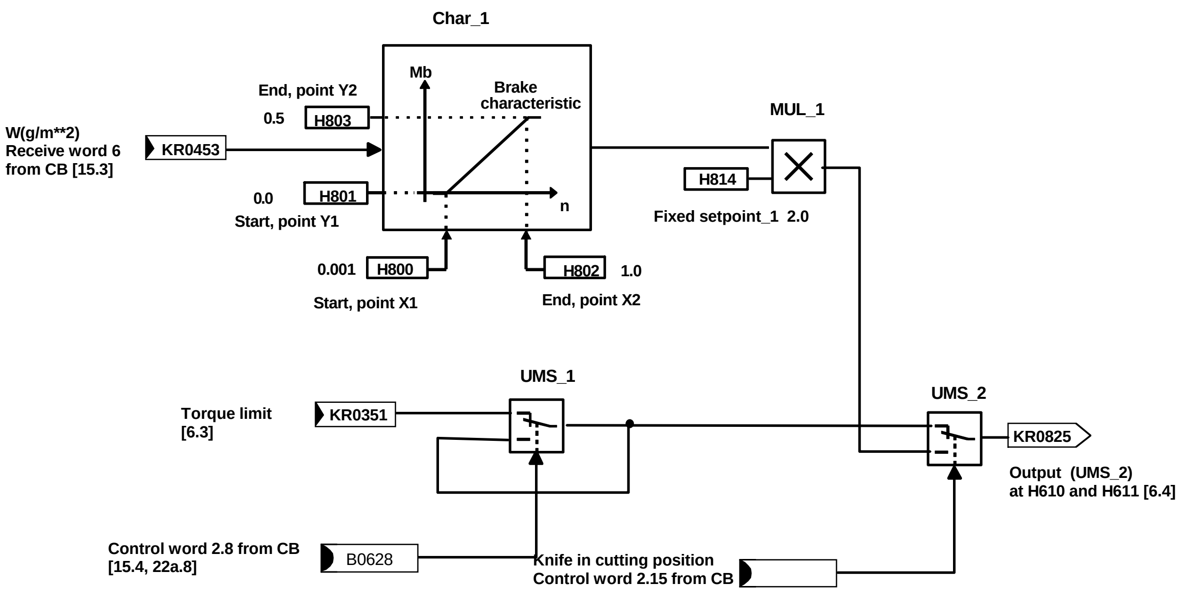


Fig. 4-18 Block diagram to implement the cut tension function

Caution Observe the sequence in which the freely-assignable blocks are executed.

5 Parameters

5.1 Parameter handling

Parameter designation

All of the parameters which are implemented on the technology module, are called *technology parameters.* In the software configured with CFC, these parameters are always designated with **TP_xxx** (xxx stands for the parameter number). Quantities which can be changed are displayed as **Hxxx**, and others which cannot be changed (display quantities) as **dxxx** at the drive converter operator panel and SIMOVIS. The technology parameters can be read and changed from several locations:

- device operator panel (PMU or OP1)
- SST1 serial interface (RS232) or SST2 (RS485) from the base drive
- CBP/CB1 interface module (if available)
- SIMADYN D monitor, which can be addressed with CFC, IBS (start-up)- or SIMOVIS program via the serial interface X01 of the technology module.

Parameterization

The parameterization of the axial winder is realized, as **standard** using SIMOVIS or via the drive operator panel (PMU or OP1 S). The parameter changes are automatically saved in the EEPROM in a non-volatile fashion. Refer to Chapter 7.1 for the various parameterization resources

5.2

Value range

The parameters can only be changed within a specific value range. The value range normally depends on the data type of the parameter, and, in

range (MIN/MAX limits). If no information is provided in the value range column in the parameter lists, then the value range is specified by its

Parameter list

All of the parameters used in the standard *SPW420 axial winder* package are listed on the following pages. The list is realized in the general form:

	Description	Data
	Parameter name	Value:
		Max:
		Unit:
b.d. n	CFC chart.block.connection	
dxxx		
	Explanation and, if required information on the parameter	Min:
		Max:
b.d. n	CFC chart.block.connection	Type:

Table -1

Hxxx Parameter number xxx which can be changed

dxxx Parameter number xxx which can be displayed

Value Factory setting of the parameter or connection default

Min. /max. Value range for the setting

Type Data type, refer to Table 5 2

Data type		Value range	Resolution
	Boolean quantity	Logical 0 or 1	
I		-32768 .. 0 .. 32767	1
DI	Double Integer		1
	Floating-point number (real)	-1.7E38 .. 0 .. 1.7 E38	
W	Status word		1

Table -2

Parameter	Description	Data
H000	**Language selection** Selecting the text on the HMI display 0: German 1: English *Caution: It is necessary to initialize after the change!*	Value: 0 Type: I
b.d. 4	IF_CU.@DRIVE.PLA	
d001	**ID standard software package** The value is 420 for the standard software package on T400 for axial winder SPW420.	Value: 420 Type: I
b.d. 4	PARAMZ_01.MODTYP.Y	
d002	**Software version, axial winder**	Value: 2,0 Type: R
b.d. 4	PARAMZ_01.VER.Y	
H003	**Overtorque limit, positive** Upper torque actual value limit as a % of the rated torque, fault signal and shutdown at I_{act} > H003 Prerequisite: The fault is not suppressed.	Value: 1.2 Min: 0.0 Max: 2.0 Type: R
b.d. 20	CONTZ_01.SU040.LU	
H004	**Overtorque limit, negative** Lower torque actual value limit as a % of the rated torque, fault signal and shutdown at I_{act} < H004 Prerequisite: The fault is not suppressed.	Value: -1.2 Min: -2.0 Max: 0.0 Type: R
b.d. 20	CONTZ_01.SU040.LL	
H005	**Initialization time for CU couplings** Delay, after the T400 has been powered-up (voltage on or reset) and before the coupling monitoring functions to the CU interface are activated.	Value: 20000 Min: 0 Unit: ms Type: R
b.d. 20	CONTZ_01.SU130.T	
H007	**Stall protection, threshold n_{act}** Absolute speed actual value, which must be exceeded for the " stall protection" fault message. Condition 1 for the stall protection message: $\|n_{act}\|$ < H007 Prerequisite: The fault is not suppressed.	Value: 0.02 Min: 0 Max: 2.0 Type: R
b.d. 20	CONTZ_01.SU080.L	
H008	**Stall protection, threshold I_{act}** Absolute torque actual value which must be exceeded for the " stall protection" fault message. Condition 2 for the stall protection message: $\|M_{act}\|$ > H008 Prerequisite: The fault is not suppressed.	Value: 0.10 Min: 0 Max: 2.0 Type: R
b.d. 20	CONTZ_01.SU090.L	

H009	**Stall protection threshold, control deviation** Absolute control error YE of the speed controller, which must be exceeded for the fault message " stall protection" . Condition 3 for the stall protection message: |YE| > H009 Prerequisite: The fault is not suppressed.	Value: 0.50 Min: 0 Max: 2.0 Type: R
b.d. 20	CONTZ_01.SU100.L	

H010	**Stall protection, response time** Time during which conditions 1-3 must simultaneously be present for the " stall protection" fault message = condition 4 for the stall protection message. Prerequisite: The fault is not suppressed.	Value: 500 Min: 0 Unit: ms Type: R
b.d. 20	CONTZ_01.SU120.T	

H011	**Alarm mask** Bitwise coding of the faults/errors which should result in an alarm, (a bit which is set, enables the appropriate alarm; also refer to Chapter 8.2):	Value: 0 Min: 0 Max: FF Type: W

Bit	alarm	significance
0	A097	overspeed, positive
1	A098	overspeed, negative
2	A099	overtorque, positive
3	A100	overtorque, negative
4	A101	stall protection
5	A102	data receive from C U faulted
6	A103	data receive from CB faulted
7	A104	data receive from PTP faulted

b.d. 20 IF_CU.SE030.I2

H012	**Fault mask** Bitwise coding of the faults/errors which should result in a fault message, (a bit which is set, enables the appropriate fault; also refer to Chapter 8.2):	Value: 0 Min: 0 Max: FF Type: W

Bit	fault	significance
0	F116	overspeed, positive
1	F117	overspeed, negative
2	F118	overtorque, positive
3	F119	overtorque, negative
4	F120	stall protection
5	F121	data receive from CU faulted
6	F122	data receive from CB faulted
7	F123	data receive from PTP faulted

b.d. 20 IF_CU.SE040.I2

H013	**Input, connection tachometer on** Input for the compute diameter command with tachometer must be connected with the application-specific source. Default: B2634 (control word 2.14 from CB)	Value: B2634 Type: B
b.d. 17	IQ1Z_07.B207A.I	

H014	**Inching time** Delay, after an inching command is inactive and before the base drive is shutdown.	Value: 10000 Min: 0 Unit: ms
b.d. 18	CONTZ_07.C2736.X	Type: R

H015 **Status word 1 PtP** Value: K4335

Input for status word 1 from the peer-to-peer interface must be connected with the application-specific source. Type: I

Default: K4335 (status word 1 from T400)

b.d. 2/14 IF_PEER.Zustandswort..X

H016 **Actual word W2 PtP** Value: KR0310

Send word 2 from the peer-to-peer protocol must be connected with the application-specific source. Type: R

Default: KR0310 (actual diameter)

b.d. 2/14

IF_PEER.Istwert_W2 .X

H017 **Actual word W3 PtP** Value: KR0344

Send word 3 from the peer-to-peer protocol must be connected with the application-specific source. Type: R

Default: KR0344 (sum of the velocity setpoint)

b.d. 2/14

IF_PEER.Istwert_W3 .X

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d018 **Setpoint W2 (PtP)** Type: R

Receive word 2 from the peer-to-peer protocol (KR0018) can be connected with an application-specific destination.

b.d. 2/14

IF_PEER.Sollwert_W2 .Y

---

d019 **Setpoint W3 (PtP)** Type: R

Receive word 3 from the peer-to-peer protocol (KR0019) can be connected with an application-specific destination.

b.d. 2/14

IF_PEER.Sollwert_W3 .Y

H021 **Input, system start** Value: B2003

The "system start" control command is used to enable operation (b.d. 18) for standard "system operation". This signal must remain active until the basic drive is shut down. Otherwise the motor would coast down. Type: B

The input for the system start command must be connected to the application-specific source.

Default: B2003 (digital input 1, terminal 53)

b.d. 17 IQ1Z_01.B10.I

H022 **Input, tension controller on** Value: B2004

The input for the tension controller on command must be connected with the application-specific source. Type: B

Default: B2004 (digital input 2, terminal 54)

Alternatively:

- B2011 for digital input or splice (B2004 & splice enable)
- B2012 for PROFIBUS or splice (splice enable & B 2611)

b.d. 17

IQ1Z_01.B11.I

H023	**Input, inhibit tension controller** The input for the inhibit tension controller command must be connected with the application-specific source. Default: B2005 (digital input 3, terminal 55) Alternatively: • B2612 for PROFIBUS (control word 1.12 from CB) • B2652 for peer-to-peer (control word 1.12 from PTP)	Value: B2005 Type: B
b.d. 17	IQ1Z_01.B12.I	
H024	**Input, set diameter** The input for the set diameter command must be connected to the application-specific source. Default: B2006 (digital input 4, terminal 56) Alternatively: • B2614 for PROFIBUS (control word 1.14 from CB) • B2654 for peer-to-peer (control word 1.14 from CB)	Value: B2006 Type: B
b.d. 17	IQ1Z_01.B13.I	
H025	**Input, enter supplementary setpoint** The input for the enter supplementary setpoint command must be connected to the application-specific source. Default: B2007 (digital input 5, terminal 57) Alternatively: • B2620 for PROFIBUS (control word 2.0 from CB)	Value: B2007 Type: B
b.d. 17	IQ1Z_01.B14.I	
H026	**Input, local positioning** The input for the local positioning command must be connected to the application-specific source. Default: B2008 (digital input 6, terminal 58) Alternatively: • B2621 for PROFIBUS (control word 2, bit 1)	Value: B2008 Type: B
b.d. 17	IQ1Z_01.B15.I	
H027 b.d. 17	**Input, local operator control** The "local operator control" control signal is the prerequisite for local operation. In every local mode, this signal must remain active until the basic drive is shut down. Otherwise the motor would coast down. The input for the local operator control command must be connected to the application-specific source. Default: B2009 (digital input 7, terminal 59) Alternatively: • B2624 for PROFIBUS (control word 2, bit 4) IQ1Z_01.B16.I	Value: B2009 Type: B

H028	**Input, local stop** The input for the local stop command must be connected to the application-specific source. Default: B2010 (digital input 8, terminal 60) Alternatively: • B2625 for PROFIBUS (control word 2.5)	Value: B2010 Type: B
b.d. 17	IQ1Z_01.B17.I	
H029	**Input, raise motorized potentiometer 2** The input for the raise motorized potentiometer 2 command must be connected with the application-specific source. Default: B2622 (control word 2.2 from CB)	Value: B2622 Type: B
b.d. 16	IQ1Z_01.B20.I	
H030	**Input, raise motorized potentiometer 1** The input for the raise motorized potentiometer 1 command must be connected with the application-specific source. Default: B2630 (control word 2.10 from CB)	Value: B2630 Type: B
b.d. 16	IQ1Z_01.B40.I	
H031	**Input, lower motorized potentiometer 2** The input for the lower motorized potentiometer 2 command must be connected with the application-specific source. Default: B2623 (control word 2.3 from CB)	Value: B2623 Type: B
b.d. 16	IQ1Z_01.B30.I	
H032	**Input, lower motorized potentiometer 1** The input for the lower motorized potentiometer 1 command must be connected with the application-specific source. Default: B2631 (control word 2.11 from CB)	Value: B2631 Type: B
b.d. 16	IQ1Z_01.B50.I	
H033	**Input, hold diameter** The input for the hold diameter command must be connected with the application-specific source. Default: B2615 (control word 2.2 from CB) Alternatively: B2655 for peer-to-peer (control word 1.15 from PTP)	Value: B2615 Type: B
b.d. 16	IQ1Z_07.B60.I	
H034	**Input, set velocity setpoint to stop** The input for the set velocity setpoint command must be connected with the application-specific source. Default: B2629 (control word 2.9 from CB)	Value: B2629 Type: B
b.d. 16	IQ1Z_07.B80.I	

H035	**Input, winding from below**	Value:	B2633
	The input for the winding from below command must be connected with the application-specific source.	Type:	B
	Default: B2633 (control word 2.2 from CB)		
b.d. 16	IQ1Z_07.B70.I		
H036	**Input, accept setpoint A**	Value:	B2000
	The input for the accept setpoint A command must be connected with the application-specific source.	Type:	B
	Default: B2000 (constant digital output =0)		
b.d. 16	IQ1Z_07.B90.I		
H037	**Input, accept setpoint B**	Value:	B2000
	The input for the accept setpoint B command must be connected with the application-specific source.	Type:	B
	Default: B2000 (constant digital output =0)		
b.d. 16	IQ1Z_07.B100.I		
H038	**Input, local inching forwards**	Value:	B2608
	The input for the local inching forwards command must be connected with the application-specific source.	Type:	B
	Default: B2608 (control word 1.8 from CB) Alternatively: • B2648 from peer-to-peer (control word 1.8 from PTP)		
b.d. 16	IQ1Z_07.B120.I		
H039	**Input, local crawl**	Value:	B2627
	The input for the local crawl command must be connected with the application-specific source.	Type:	B
	Default: B2627 (control word 2.7 from CB)		
b.d. 16	IQ1Z_07.B110.I		
H040	**Input, local inching backwards**	Value:	B2609
	The input for the local inching backwards command must be connected with the application-specific source.	Type:	B
	Default: B2609 (control word 1.9 from CB) Alternatively: • B2649 for peer-to-peer (control word 1.9 from PTP)		
b.d. 16	IQ1Z_07.B130.I		
H042	**Input, gearbox stage 2**	Value:	B2000
	The input for the changeover to gearbox stage 2 must be connected with the application-specific source.	Type:	B
	Default: B2000 (constant digital output = 0)		
b.d. 16	IQ1Z_07.B160.I		

H043	**Input, winder** The input for the winder command (=1) must be connected with the application-specific source. Default: B2000 (constant digital output = 0)	Value: B2000 Type: B
b.d. 16	IQ1Z_07.B150.I	
H044	**Input, saturation setpoint polarity** The input to changeover the polarity of the saturation setpoint must be connected with the application-specific source. Default: B2000 (constant digital output = 0)	Value: B2000 Type: B
b.d. 16	IQ1Z_07.B170.I	
H045	**Input, Off1/On** The input for the power-on command for system operation must be connected with the application-specific source. Default: B2600 (control word 1.0 from CB) Alternatively: • B2640 for peer-to-peer (control word 1.0 from PTP)	Value: B2600 Type: B
b.d. 16	IQ1Z_07.B180.I	
H046	**Input, inhibit ramp-function generator** The input for the inhibit ramp-function generator command must be connected with the application-specific source. Default: B2604 (control word 1.4 from CB) Alternatively: • B2644 for peer-to-peer (control word 1.4 from PTP)	Value: B2604 Type: B
b.d. 17	IQ1Z_07.B201.I	
H047	**Input, Off2** The input for the Off2 command must be connected with the application-specific source. This command is also effective from every other source; it is low active. Default: B2001 (constant digital output)	Value: B2001 Type: B
b.d. 17	IQ1Z_07.B190.I	
H048	**Input, Off3** The input for the Off3 (fast stop) command must be connected with the application-specific source. This command is also effective from every other source; it is low active. Default: B2001 (constant digital output)	Value: B2001 Type: B
b.d. 17	IQ1Z_07.B200.I	
H049	**Input, ramp-function generator stop** The input for the ramp-function generator stop must be connected with the application-specific source. Default: B2605 (control word 1.5 from CB) Alternatively: • B2645 for peer-to-peer (control word 1.5 from PTP)	Value: B2605 Type: B
b.d. 17	IQ1Z_07.B202.I	

H050	**Input, enable setpoint** The input for the enable web velocity setpoint must be connected with the application-specific source. Default: B2606 (control word 1.6 from CB) Alternatively: • B2646 for peer-to-peer (control word 1.6 from PTP)	Value: B2606 Type: B
b.d. 17	IQ1Z_07.B203.I	
H051	**Input, standstill tension on** The input to switch-in the standstill tension must be connected with the application-specific source. Default: B2613 (control word 1.13 from CB) Alternatively: • B2653 for peer-to-peer (control word 1.13 from PTP)	Value: B2613 Type: B
b.d. 17	IQ1Z_07.B204.I	
H052	**Input, local run** The input to power-up with a local setpoint must be connected with the application-specific source. Default: B2626 (control word 2.6 from CB)	Value: B2626 Type: B
b.d. 17	IQ1Z_07.B205.I	
H053	**Input, reset length computer** Input to reset the web length computer must be connected with the application-specific source. Default: B2632 (control word 2.12 from CB)	Value: B2632 Type: B
b.d. 17	IQ1Z_07.B206.I	
H054	**Adaptation, analog input 1** Adaptation factor for analog input 1, terminals 90/91, input range ±10V, corresponds to ± 1.0.	Value: 1.0 Min: -2.0 Max: 2.0
b.d. 10	IF_CU.AI10A.X1	Type: R
H055	**Offset, analog input 1** Offset for analog input 1, terminals 90/91, the offset is added after the adaptation.	Value: 0.0 Min: -2.0 Max: 2.0
b.d. 10	IF_CU.AI10.OFF	Type: R
H056	**Adaptation, analog input 2** Adaptation factor for analog input 2, terminals 92/93, input range ±10V, corresponds to ± 1.0.	Value: 1.0 Min: -2.0 Max: 2.0
b.d. 10	IF_CU.AI25A.X1	Type: R
H057	**Offset, analog input 2** Offset for analog input 2, terminals 92/93, the offset is added after adaptation.	Value: 0.0 Min: -2.0 Max: 2.0
b.d. 10	IF_CU.AI25.OFF	Type: R
H058	**Adaptation, analog input 3** Adaptation factor for analog input 3, terminals 94/99 input range ±10V, corresponds to ± 1.0.	Value: 1.0 Min: -2.0 Max: 2.0
b.d. 10	IF_CU.AI40A.X1	Type: R

H059 b.d. 10	**Offset, analog input 3** Offset for analog input 3, terminals 94/99, the offset is added after adaptation. IF_CU.AI40.OFF	Value: Min: Max: Type:	0.0 -2.0 2.0 R
H060 b.d. 10	**Adaptation, analog input 4** Adaptation factor for analog input 4, terminals 95/99, input range ±10V, corresponds to ±1.0. IF_CU.AI55A.X1	Value: Min: Max: Type:	1.0 -2.0 2.0 R
H061 b.d. 10	**Offset, analog input 4** Offset for analog input 4, terminals 95/99, the offset is added after adaptation. IF_CU.AI55.OFF	Value: Min: Max: Type:	0.0 -2.0 2.0 R
H062 b.d. 10	**Adaptation, analog input 5** Adaptation factor for analog input 5, terminals 96/99, input range ±10V, corresponds to ±1.0. IF_CU.AI70A.X1	Value: Min: Max: Type:	1.0 -2.0 2.0 R
H063 b.d. 10	**Offset, analog input 5** Offset for analog input 5, terminals 96/99, the offset is added after adaptation. IF_CU.AI70.OFF	Value: Min: Max: Type:	0.0 -2.0 2.0 R
H064 b.d. 2/14	**Actual word W4, PtP** Send word 4 from the peer-to-peer protocol must be connected with the application-specific source. Default: KR0000 (constant output Y=0.0) IF_PEER.Istwert_W4 .X	Value: Type:	KR0000 R
H065 b.d. 2/14	**Actual word W5, PtP** Send word 5 from the peer-to-peer protocol must be connected with the application-specific source. Default: KR0000 (constant output Y=0.0) IF_PEER.Istwert_W5 .X	Value: Type:	KR0000 R
d066 b.d. 2/14	**Setpoint W4 (PtP)** Receive word 4 from the peer-to-peer protocol (KR0066) can be connected with the application-specific destination. IF_PEER.Sollwert_W4 .Y	Type:	R
d067 b.d. 2	**Setpoint W5 (PtP)** Receive word 5 from peer-to-peer protocol (KR0067) can be connected with the application-specific destination. IF_PEER.Sollwert_W5 .Y	Type:	R
H068 b.d. 11	**Fixed value, velocity setpoint** Enters a fixed value as technology parameter. IQ1Z_01.AI200A.X	Value: Min: Max: Type:	0.0 -2.0 2.0 R

H069	**Input, velocity setpoint**	Value:	KR0068
	The input for the velocity setpoint must be connected with the application-specific source.	Type:	R
	Default: KR0068 (output from H068, fixed value)		
b.d. 11	IQ1Z_01.AI200.X		
H070	**Fixed value, web velocity compensation**	Value:	0.0
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 11	IQ1Z_01.AI210A.X	Type:	R
H071	**Input, web velocity compensation**	Value:	KR0070
	The input for the compensation setpoint must be connected with the application-specific source.	Type:	R
	Default: KR0068 (output from H070, fixed value)		
b.d. 11	IQ1Z_01.AI210.X		
H072	**Fixed value supplementary velocity setpoint**	Value:	0.0
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 11	IQ1Z_01.AI220A.X	Type:	R
H073	**Input, supplementary velocity setpoint**	Value:	KR0072
	The input for the supplementary velocity setpoint must be connected with the application-specific source.	Type:	R
	Default: KR0072 (output from H072, fixed value)		
b.d. 11	IQ1Z_01.AI220.X		
H074	**Fixed value setpoint, local operation**	Value:	0.0
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 11	IQ1Z_01.AI230A.X	Type:	R
H075	**Input, setpoint local operation**	Value:	KR0074
	The input for the setpoint in local operation must be connected with the application-specific source.	Type:	R
	Default: KR0074 (output from H074, fixed value)		
b.d. 11	IQ1Z_01.AI230.X		
H076	**Fixed value, external dv/dt**	Value:	0.0
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 11	IQ1Z_01.AI240A.X	Type:	R
H077	**Input, external dv/dt**	Value:	KR0076
	Input for the external acceleration value must be connected with the application-specific source.	Type:	R
	Default: KR0076 (output from H076, fixed value)		
b.d. 11	IQ1Z_01.AI240.X		
H078	**Fixed value web width**	Value:	1.0
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 11	IQ1Z_01.AI250A.X	Type:	R

H079	**Input, web width**	Value:	KR0078
	The input for the web width must be connected with the application-specific source.	Type:	R
	Default: KR0078 (output from H078, fixed value)		
b.d. 11	IQ1Z_01.AI250.X		
H080	**Fixed value tension setpoint**	Value:	0.0
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 12	IQ1Z_01.AI260A.X	Type:	R
H081	**Input, tension setpoint**	Value:	KR0080
	The input for the tension/position reference value must be connected with the application-specific source.	Type:	R
	Default: KR0080 (output from H080, fixed value)		
b.d. 12	IQ1Z_01.AI260.X		
H082	**Fixed value supplementary tension setpoint**	Value:	0.0
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 12	IQ1Z_01.AI270A.X	Type:	R
H083	**Input, supplementary tension setpoint**	Value:	KR0082
	The input for the tension/supplementary position reference value must be connected with the application-specific source.	Type:	R
	Default: KR0082 (output from H082, fixed value)		
b.d. 12	IQ1Z_01.AI270.X		
H084	**Fixed value tension actual value**	Value:	0.0
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 12	IQ1Z_01.AI280A.X	Type:	R
H085	**Input, tension actual value**	Value:	KR0322
	The input for the tension/position actual value must be connected with the application-specific source.	Type:	R
	Default: KR0322 (analog input 3, smoothed, terminals 94/99)		
	Alternative: KR0084 (fixed value, tension actual value)		
b.d. 12	IQ1Z_01.AI280.X		
H086	**Fixed value maximum tension reduction**	Value:	0.0
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 12	IQ1Z_01.AI290A.X	Type:	R
H087	**Input, maximum tension reduction**	Value:	KR0086
	The input for the tension/supplementary position reference value must be connected with the application-specific source.	Type:	R
	Default: KR0086 (output from H086, fixed value)		
b.d. 12	IQ1Z_01.AI290.X		
H088	**Fixed value diameter setting value**	Value:	0.1
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 12	IQ1Z_01.AI300A.X	Type:	R

H089	**Input, diameter setting value**	Value:	KR0088
	The input for the diameter setting value must be connected with the application-specific source.	Type:	R
	Default: KR0088 (output from H088, fixed value)		
	Alternatively:		
	• KR0222 (output from H222, core diameter)		
b.d. 12	IQ1Z_01.AI300.X		
H090	**Fixed value positioning setpoint**	Value:	0.0
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 12	IQ1Z_01.AI310A.X	Type:	R
H091	**Input, positioning setpoint**	Value:	KR0090
	The input for the setpoint for the local positioning mode must be connected with the application-specific source.	Type:	R
	Default: KR0090 (output from H090, fixed value)		
b.d. 12	IQ1Z_01.AI310.X		
H092	**Input, speed actual value**	Value:	KR0550
	The input for the speed actual value must be connected with the application-specific source.	Type:	R
	Default: KR0550 (n_act from CU)		
b.d. 13	IQ1Z_01.AI320.X		
H093	**Input, velocity actual value connection tachometer**	Value:	KR0401
	The input for a connection tachometer velocity actual value must be connected with the application-specific source. This input can be active with the bit selected using H013 and can be effective for the diameter computation instead of the value selected from H094.	Type:	R
	Default: KR0401 (output from H401, fixed value)		
b.d. 13	IQ1Z_01.AI329.X		
H094	**Input, external web velocity actual value**	Value:	KR0402
	The input for an external web velocity actual value must be activated with H211=1. The input must be connected with the application-specific source.	Type:	R
	Default: KR0402 (output from H402, fixed value)		
b.d. 13	IQ1Z_01.AI330.X		
H095	**Fixed value setpoint A**	Value:	0.0
	Enters a fixed value as technology parameter.	Min:	-2.0
		Max:	2.0
b.d. 13	IQ1Z_01.AI340A.X	Type:	R
H096	**Input, setpoint A**	Value:	KR0095
	The input for setpoint A must be connected with the application-specific source.	Type:	R
	Default: KR0095 (output from H095, fixed value)		
b.d. 13	IQ1Z_01.AI340.X		

H097 b.d. 13	**Input, pressure actual value, dancer roll** The input for the measured value from the dancer roll can be connected with the application-specific source. Default: KR0324 (analog input 5) TENSZ_07.T1937.X2	Value: KR0324 Type: R
H098 b.d. 10	**Analog output 2 (diameter actual value), terminals 98/99** Analog output 2 can be connected with the application-specific source. Default: KR0310 (actual diameter) IF_CU.AQ80.X	Value: KR0310 Type: R
H099 b.d. 10	**Analog output 2, offset** Offset analog output 2, terminals 97/99 = diameter actual value. The parameter value is subtracted. IF_CU.AQ80.OFF	Value: 0.0 Min: -2.0 Max: 2.0 Type: R
H100 b.d. 10	**Analog output 2, normalization** Gain after subtracting the offset, ±1.0 corresponds to ±10V IF_CU.AQ80A.X1	Value: 1.0 Min: 0.0 Max: 1.0 Type: R
H101 b.d. 10	**Analog output 1, offset** Offset analog output 3, terminals 98/99. The parameter value is subtracted. IF_CU.AQ110.OFF	Value: 0.0 Min: -2.0 Max: 2.0 Type: R
H102 b.d. 10	**Analog output 1, normalization** Gain after subtracting the offset, ±1.0 corresponds to ±10V . IF_CU.AQ110A.X1	Value: 1.0 Min: 0 Max: 1.0 Type: R
H103 b.d. 10	**Analog output 1 (torque setpoint), terminals 97/99** Analog output 1 can be connected with the application-specific source. Default: KR0329 (torque setpoint) IF_CU.AQ110.X	Value: KR0329 Type: R
H107 b.d. 10	**Input value for limit value monitor 1 (GWM 1)** The input of the input signal for limit value monitor 1 can be connected with the application-specific source. Default: KR0307 (speed actual value) IQ2Z_01.G10.X	Value: KR0307 Type: R
H108 b.d. 10	**Input, comparison value GWM 1** The input of the comparison value for limit value monitor 1 can be connected with the application-specific source. Default: KR0303 (speed setpoint) IQ2Z_01.G70.X	Value: KR0303 Type: R
H109 b.d. 10	**Adaptation, input value GWM 1** Adapts the input signal for limit value monitor 1. 1 = no adaptation 2 = absolute value generation 3 = sign reversal IQ2Z_01.G40.XCS	Value: 1 Min: 1 Max: 3 Type: I

H110 b.d. 10	**Smoothing, input value GWM 1** Smoothes the input signal for limit value monitor 1. IQ2Z_01.G60.T	Value: 500 Min: 0 Unit: ms Type: R
H111 b.d. 10	**Adaptation, comparison value GWM 1** Adapts the comparison value for limit value monitor 1: 1 = no adaptation 2 = absolute value generation 3 = sign reversal IQ2Z_01.G100.XCS	Value: 1 Min: 1 Max: 3 Type: I
H112 b.d. 10	**Interval limit GWM 1** Enters the interval limits for the limit value monitor 1. IQ2Z_01.G110.L	Value: 0.0 Min: 0.0 Max: 1.0 Type: R
H113 b.d. 10	**Hysteresis, GWM 1** Enters the hysteresis for limit value monitor 1. IQ2Z_01.G110.HY	Value: 0.0 Min: 0 Max: 1.0 Type: R
H114 b.d. 10	**Output signal from GWM 1 (terminal 52)** The output signal for limit value monitor 1 can be connected with: • KR0403 = input value > comparison value • KR0404 = input value < comparison value • KR0405 = input value = comparison value • KR0406 = input value ≠ comparison value • KR0411 = length setpoint reached Default: KR0403 (input signal> comparison value) IQ2Z_01.G130.I	Value: B2403 Type: B
H115 b.d. 10	**Input, input value for limit value monitor 2 (GWM 2)** The selection of the input signal for limit value monitor 2 can be connected with the application-specific source. Default: KR0311 (tension actual value smoothed) IQ2Z_01.G200.X	Value: KR0311 Type: R
H116 b.d. 10	**Input, comparison value GWM 2** The selection of the comparison value for limit value monitor 2 can be connected with the application-specific source. Default: KR0304 (sum, tension/position reference value) IQ2Z_01.G270.X	Value: KR0304 Type: R
H117 b.d. 10	**Adaptation, input value GWM 2** Adapts the input signal for limit value monitor 2: 1 = no adaptation 2 = absolute value generation 3 = sign reversal IQ2Z_01.G240.XCS	Value: 1 Min: 1 Max: 3 Type: I
H118 b.d. 10	**Smoothing, input value GWM 2** Smoothes the input signal for limit value monitor 2. IQ2Z_01.G260.T	Value: 500 Min: 0 Unit: ms Type: R

H119	**Adaptation, comparison value GWM 2** Adapts the comparison value for limit value monitor 2: 1 = no adaptation 2 = absolute value generation 3 = sign reversal	Value: 1 Min: 1 Max: 3 Type: I
b.d. 10	IQ2Z_01.G300.XCS	
H120	**Interval limit, GWM 2** Enters the interval limits for the limit value monitor 2.	Value: 0.0 Min: 0.0 Max: 1.0
b.d. 10	IQ2Z_01.G310.L	Type: R
H121	**Hysteresis** Enters the hysteresis for limit value monitor 2.	Value: 0.0 Min: 0 Max: 1.0
b.d. 10	IQ2Z_01.G310.HY	Type: R
H122	**Select output signal from limit value monitor 2** The output signal for limit value monitor 2 can be connected with the application-specific source: • KR0407 = input value > comparison value • KR0408 = input value < comparison value • KR0409 = input value = comparison value • KR0410 = input value ≠ comparison value • KR0411 = length setpoint reached Default: KR0407 (input signal > comparison value)	Value: B2407 Type: B
b.d. 10	IQ2Z_01.G330.I	
H125	**Overspeed, positive limit** Upper limit, speed actual value as a % of the rated speed fault signal and -trip at n_{act} > H125 Prerequisite: The fault is not suppressed .	Value: 1.20 Min: 0 Max: 2.0 Type: R
b.d. 20	CONTZ_01.SU010.LU	
H126	**Overspeed,-negative limit** Lower limit speed actual value as a % of the rated speed fault signal and -trip at n_{act} < H126 Prerequisite: The fault is not suppressed .	Value: -1.20 Min: -2.0 Max: 0.0 Type: R
b.d. 20	CONTZ_01.SU010.LL	
H127	**Fixed value ratio, gearbox stage 2** Ratio between gearbox stages 1 and 2 as a % e.g. gearbox stage 1 = 5:1; gearbox stage 2 = 7:1 H127 = Stage1 / stage2 = 5 / 7 = 71.428% = 0.714	Value: 1.0 Type: R
b.d. 11	IQ1Z_01.A350.X	
H128	**Fixed value, friction torque adaptation factor on gearbox 2** Adaptation factor for the friction torque characteristic, gearbox stage 2 should be adapted for the friction characteristic measurement, for the same points in gearbox stage 1 (if available) .	Value: 1.0 Type: R
b.d. 11	IQ1Z_01.A360.X	

H129	**Input, alternative On command** The command selection to power-on the equipment can be connected with the application-specific source. Generally, this is the availability of a specific operating mode. However, one of the digital select inputs can be used. Default: B2000 (constant digital output Y=0)	Value: B2000 Type: B
b.d. 18	IQ1Z_01.SELMX.I	
H130	**Setpoint B** The fixed value as velocity setpoint is entered with the control signal, accept setpoint B in front of the ramp-function generator.	Value: 0.0 Min: -2.0 Max: 2.0
b.d. 5	SREFZ_01.S25.X2	Type: R
H131	**Upper limit** Maximum limit for the central ramp-function generator	Value: 1.10 Min: 0.0 Max: 2.0
b.d. 5	SREFZ_01.S50.LU	Type: R
H132	**Lower limit** Minimum limit for the central ramp-function generator	Value: -1.1 Min: -2.0 Max: 1.0
b.d. 5	SREFZ_01.S50.LL	Type: R
H133	**Ramp-up time** For the central velocity ramp-function generator.	Value: 30000 Unit: ms Type: R
b.d. 5	SREFZ_01.S50.TU	
H134	**Ramp-down time** For the central velocity ramp-function generator.	Value: 30000 Unit: ms Type: R
b.d. 5	SREFZ_01.S50.TD	
H135	**Rounding-off at acceleration** For the central velocity ramp-function generator.	Value: 3000 Unit: ms Type: R
b.d. 5	SREFZ_01.S50.TRU	
H136	**Rounding-off at deceleration** For the central velocity ramp-function generator.	Value: 3000 Unit: ms Type: R
b.d. 5	SREFZ_01.S50.TRD	
H137	**Normalization, web velocity compensation** Normalization factor for the influence of the compensation signal.	Value: 1.0 Min: -2.0 Max: 2.0
b.d. 5	SREFZ_01.S120.X2	Type: R
H138	**Input, ratio, gearbox stage 2** The input for the ratio, gearbox stage 2 can be connected with an application-specific source. Default: KR0127 (output of H127, fixed value)	Value: KR0127 Min: -2.0 Max: 2.0 Type: R
b.d. 11	SREFZ_01.S140.X2	
H139	**Normalization, web velocity** Normalization factor for the web velocity setpoint.	Value: 1.0 Min: -2.0 Max: 2.0
b.d. 5	SREFZ_01.S150.X1	Type: R

H140	**Normalization, acceleration** Normalization factor for acceleration (dv/dt) calculated by the central ramp-function generator (b.d. 5) . A value should be set at H140 which, for the actual dv/dt (d302) for the set ramp-up time (H133), should then supply 1.0 . This means, H140 * b = 1.0 if external dv/dt selected: H226=1 and H077 = KR0140	Value: 1.0 Type: R
b.d. 11	SREFZ_01.S51.X2	
H141	**Influence, tension control** Normalization factor for the influence of the web velocity setpoint by the tension control for closed-loop speed correction control. (H203 = 3.5)	Value: 1.0 Min: -2.0 Max: 2.0
b.d. 5	SREFZ_01.S200.X2	Type: R
H142	**Setpoint, local crawl** Setpoint for the local crawl operating mode. SREFZ_01.S300.X2	Value: 0.1 Min: -2.0 Max: 2.0
b.d. 5		Type: R
H143	**Setpoint, local inching forwards** Setpoint for the local inching backwards operating mode. SREFZ_01.S310.X2	Value: 0.05 Min: -2.0 Max: 2.0
b.d. 5		Type: R
H144	**Setpoint, local inching backwards** Setpoint for the local inching backwards operating mode. SREFZ_01.S320.X2	Value: -0.05 Min: -2.0 Max: 2.0
b.d. 5		Type: R
H145	**Saturation setpoint** Supplementary setpoint for the velocity setpoint for the closed-loop torque limiting control to take the speed controller to its limit (saturation). Only set H145 for the closed-loop torque limiting control (H203=0,1,2)	Value: 0.10 Min: -2.0 Max: 2.0 Type: R
b.d. 5	SREFZ_01.S360.X	
H146	**Closed-loop speed control for local operation** 0 = velocity controlled local operation 1 = speed controlled local operation	Value: 0 Type: B
b.d. 5	SREFZ_01.NC112.I2	
H147	**Torque limit for closed-loop speed control** Enters the limits for the speed controller in local operation and for closed-loop speed correction control.	Value: 0.20 Min: -2.0 Max: 2.0
b.d. 6	SREFZ_07.C56.X	Type: R
H148	**Time for reverse winding after a splice** This is the time which the drive should wind in reverse after the splice to take-up material web.	Value: 10000 Unit: ms Type: R
b.d. 21	CONTZ_07.SL70.T	
H149	**Speed setpoint, reverse winding after the splice** The setpoint to establish the web after the splice with negative polarity (sign)	Value: 0.0 Min: -2.0 Max: 2.0
b.d. 6	SREFZ_07.RW100.X	Type: R

H150 b.d. 6a	**Start of adaptation** The speed controller gain is adapted to the variable moment of inertia; the intervention of Kp adaptation is defined using H150. Note: Parameterization only if the speed controller is operational on the T400, i.e. H282 = 1. SREFZ_07.NC035.A1	Value: 0.0 Min. 0.0 Max: 1.0 Type: R
H151 b.d. 6a	**Kp adaptation min.** Gain for the speed controller on the T400 at the start of adaptation. Note: Parameterization only if the speed controller is operational on the T400, i.e. H282 = 1. SREFZ_07.NC035.B1	Value: 0.1 Type: R
H152 b.d. 6a	**End of adaptation** End point of Kp adaptation for the speed controller. Note: Parameterization only if the speed controller is operational on the T400, i.e. H282 = 1. SREFZ_07.NC035.A2	Value: 1.0 Min: 0.0 Max: 1.0 Type: R
H153 b.d. 6a	**Kp adaptation max.** Gain of the speed controller on the T400 at the end of adaptation, i.e. when the maximum moment of inertia occurs. This setting must be determined at start-up using speed controller optimization runs with the roll as full as possible. . Note: Parameterization only if the speed controller is operational on the T400, i.e. H282 = 1. SREFZ_07.NC035.B2	Value: 0.1 Type: R
H154 b.d. 5	**Slave drive** Disables the central ramp-function generator for the velocity setpoint if the winder operates as a slave drive, and the setpoint is already available as ramp-function generator output. 0 = ramp-function generator effective 1 = ramp-function generator not effective SREFZ_01.S47.I	Value: 0 Type: B
H155 b.d. 5	**Smoothing, web velocity setpoint** Smoothes the setpoint if the ramp-function generator is switched-through with H154=1. SREFZ_01.S10.T	Value: 8 Unit: ms Type: R
H157 b.d. 6	**Limit value for standstill identification** Threshold for the standstill identification; 25% of the threshold is used as hysteresis. The speed- or velocity actual value are used for the signal, depending on H146. SREFZ_07.S810.X	Value: 0.01 Min: -2.0 Max: 2.0 Type: R
H159 b.d. 6	**Delay, standstill identification** Delay time for the standstill signal. SREFZ_07.S840.T	Value: 0 Unit: ms Type: R

H160	**Erase EEROM**	Value:	0
	A positive edge at H160 deletes the EEPROM, and therefore re-establishes the initialization status for all of the parameters. The key parameter H250 must be set to 165. *Note, observe 7.1.2!*	Type:	B
b.d. 4	CONTZ_01.URLAD.ERA		
H161	**Ramp-up/ramp-down time, override ramp-function generator**	Value:	20000
	Ramp times for the local ramp-function generator; it is set to the corresponding actual value at each operating mode change, when operation is enabled and when the winding direction changes.	Unit:	ms
		Type:	R
b.d. 5	SREFZ_07.S457.X		
H162	**Smoothing, speed controller output**	Value:	500
	Smoothing for display parameter d331, smoothed torque setpoint .	Unit:	ms
b.d. 6a	SREFZ_07.NT130.T	Type:	R
H163	**Select, positioning setpoint**	Value:	0
	Selects from either x^2 or x^3 characteristic for the positioning reference value. 0 = x^2 characteristic 1 = x^3 characteristic	Type:	B
b.d. 12	SREFZ_01.S328.I		
H164	**Smoothing, saturation setpoint**	Value:	8
	Smoothing time for the saturation setpoint.	Unit:	ms
b.d. 5	SREFZ_01.S395.T	Type:	R
H165	**Smoothing, speed actual value**	Value:	20
	Smoothing time, speed actual value for the diameter computer, compensation torques and monitoring functions	Unit:	ms
		Type:	R
b.d. 13	IQIZ_01.AI325.T		
H166	**Enable, addition of local setpoints**	Value:	0
	H166 =1 allows a local setpoint to be added in system operation. When a local operated mode is selected, then only the appropriate local setpoint is switched-through. This is added to the velocity setpoint; the override ramp-function generator is in this case effective. 0 = addition inhibited 1 = addition released	Type:	B
b.d. 5	CONTZ_01.C22.I3		
H167	**Density correction limiting**	Value:	0.0
	This is the value by which the density correction factor can deviate from a maximum of 1.0.	Min:	0.0
		Max:	0.70
b.d. 9b		Type:	R
	DIAMZ_07.DC1000.X		
H168	**Integrating time, density correction**	Value:	200000
	The time where the correction factor for the material density changes by 1.0, if the tension controller output and acceleration actual value are 1.0. This should be a minimum of 10x greater than the tension controller integral action time.	Unit:	ms
		Type:	R
b.d. 9b	DIAMZ_07.DC70.TI		

H169	**Knife in the cutting position**	Value:	B2000
	The input for the knife in cutting position command must be connected with the application-specific source. Default: B2000 (constant digital output 0)	Type:	B
b.d. 17	IQ1Z_01.B52.I		
H170	**Partner drive is in tension control**	Value:	B2000
	Input for the ' Partner drive is in tension control' command must be connected with the application-specific source. Default: B2000 (constant digital output 0)	Type:	B
b.d. 17	IQ1Z_01.B53.I		
H172	**Smoothing, tension actual value**	Value:	150
	Time constant for the actual value smoothing.	Unit:	ms
b.d. 7	TENSZ_01.T641.T	Type:	R
H173	**Differentiating time constant**	Value:	800
	Sets the D component of the tension controller, if H174 = 0, refer to Chapter 3.4.3.2.	Unit:	ms
b.d. 8	Note: Only used for closed-loop dancer roll position controls. TENSZ_01.T1796.TD	Type:	R
H174	**Inhibit D controller**	Value:	1
	Generally, the addition of the D component for tension control is only used for closed-loop dancer roll position controls, otherwise the D component remains inhibited. 0 = D controller enabled for dancer rolls 1 = D controller inhibited	Type:	B
b.d. 8	TENSZ_01.T643.I		
H175	**Ramp-up time, tension setpoint**	Value:	10000
	Ramp-up time for the main tension/position reference value.	Unit:	ms
b.d. 7	TENSZ_01.T1350.TU	Type:	R
H176	**Ramp-down time, tension setpoint**	Value:	10000
	Ramp-down time for the main tension/position reference value.	Unit:	ms
b.d. 7	TENSZ_01.T1350.TD	Type:	R
H177	**Inhibit tension setpoint**	Value:	0
	When the winding hardness characteristic is used for dancer roll support, the tension setpoint must be disconnected. In this case, the position reference value is entered via the supplementary tension setpoint. 0 = normal operation 1 = tension setpoint inhibited	Type:	B
b.d. 8	TENSZ_01.T1485.I		
H178	**Response at web break**	Value:	1
	0 = none, only the message/signal is displayed 1 = closed-loop tension control is switched-out, and the diameter computer is inhibited	Type:	B
b.d. 7	TENSZ_07.T2110.I2		

H179	**Enable tension offset compensation**	Value:	0
	The hold diameter control signal can be used, when the tension control is switched-out, to automatically adjust an offset of the tension actual value sensing. 0 = adjustment inhibited 1 = adjustment enabled	Type:	B
b.d. 7	TENSZ_01.T603.I4		
H180	**Tension reduction 1**	Value:	1.0
	Tension reduction 1 for diameter D1 as a % of the maximum tension reduction.	Min:	0.0
		Max:	1.0
b.d. 7	TENSZ_01.T1435.X2	Type:	R
H181	**Tension reduction 2**	Value:	1.0
	Tension reduction 2 for diameter D2 as a % of the maximum tension reduction.	Min:	0.0
		Max:	1.0
b.d. 7	TENSZ_01.T1445.X2	Type:	R
H182	**Tension reduction 3**	Value:	1.0
	Tension reduction 3 for diameter D3 as a % of the maximum tension reduction.	Min:	0.0
		Max:	1.0
b.d. 7	TENSZ_01.T1455.X2	Type:	R
H183	**Diameter, start of tension reduction**	Value:	1.0
	Diameter for the start of tension reduction.	Min:	0.0
		Max:	1.0
b.d. 7	TENSZ_01.T1470.A1	Type:	R
H184	**Diameter D1**	Value:	1.0
	Diameter D1 for tension reduction 1.	Min:	0.0
		Max:	1.0
b.d. 7	TENSZ_01.T1470.A2	Type:	R
H185	**Diameter D2**	Value:	1.0
	Diameter D2 for tension reduction 2.	Min:	0.0
		Max:	1.0
b.d. 7	TENSZ_01.T1470.A3	Type:	R
H186	**Diameter D3**	Value:	1.0
	Diameter D2 for tension reduction 3.	Min:	0.0
		Max:	1.0
b.d. 7	TENSZ_01.T1470.A4	Type:	R
H187	**Diameter D4, end of tension reduction**	Value:	1.0
	Diameter D4 for the end of tension reduction.	Min:	0.0
		Max:	1.0
b.d. 7	TENSZ_01.T1466.X	Type:	R
H188	**Input, standstill tension**	Value:	0
	The standstill tension is either entered as parameter value or is parameterized as part of the tension setpoint. 0 = standstill tension is obtained from H189 * tension setpoint 1 = standstill tension is entered using H189	Type:	B
b.d. 7	TENSZ_01.T1500.I		
H189	**Standstill tension**	Value:	1.0
	Enters a fixed value or a multiplication factor for the tension setpoint .	Min:	-2.0
		Max:	2.0
b.d. 7	TENSZ_01.T1505.X2	Type:	R

Parameter	Description	Values
H190 b.d. 8	**Tension pre-control, dancer roll** Factor for the tension pre-control for closed-loop dancer roll control (H203=2). 0.0...2.0: The main tension setpoint before inhibit is multiplied by this and is added as supplementary torque to the controller output. 0.0...-2.0: Analog input 5 (pressure actual value of the dancer roll) is multiplied by the **absolute value** of the factor, and is added as supplementary torque to the controller output. TENSZ_07.T1936.X	Value: 0.0 Min: -2.0 Max: 2.0 Type: R
H191 b.d. 7	**Minimum selection** Using H191=1, a minimum selection between the operating tension and standstill tension is activated, and the lower of the values is used as standstill setpoint. 0 = no minimum evaluation 1 = minimum evaluation activated TENSZ_01.T1515.I	Value: 0 Type: B
H192 b.d. 8	**Smoothing, tension setpoint** Smoothing time constant for the total setpoint after the additional setpoint is added. TENSZ_01.T1525.T	Value: 300 Unit: ms Type: R
H193 b.d. 8	**Minimum value, speed-dependent tension controller limits** Lower limit value for a speed-dependent input of the output limiting of the tension controller. TENSZ_01.T1710.X2	Value: 0.0 Min: -2.0 Max: 2.0 Type: R
H194 b.d. 8	**Select tension controller limits** Setting for the operating mode for the tension controller output limiting: 1 = the tension controller output is limited to (0, H195) 2 = the tension controller output is limited to ±H195 3 = limiting to (0, H195 * absolute speed actual value) 4 = limiting to ±H195 * absolute speed actual value TENSZ_01.T1715.X	Value: 2 Min: 0 Max: 4 Type: I
H195 b.d. 8	**Adaptation, tension controller limits** The maximum influence of the tension controller is defined using H195; it acts as multiplying factor for the limits selected using H194. TENSZ_01.T1745.X	Value: 1.0 Min: 0.0 Max: 2.0 Type: R
H196 b.d. 8	**Inhibit I component, tension controller** For closed-loop dancer roll position controls, the tension controller must be used as a pure P controller, the changeover is realized using H196. 0 = PI controller 1 = P controller Caution: The tension controller must be inhibited when changing-over this parameter! TENSZ_01.T1790.HI	Value: 0 Type: B
H197 b.d. 8	**Minimum Kp, tension controller** Gain at the start of adaptation to the variable moment of inertia, generally for Jv=0.0. TENSZ_01.T1770.B1	Value: 0.3 Min: 0 Max: 128 Type: R
H198 b.d. 8	**Maximum Kp, tension controller** Gain at the end of adaptation, normally at Jv=1.0. TENSZ_01.T1770.B2	Value: 0.3 Min: 0 Max: 128 Type: R

H199 b.d. 8	**Integral action time, tension controller** Parameter which influences the I controller (current controller). TENSZ_01.T1790.TN	Value: Unit: Type:	1000 ms R
H200 b.d. 8	**Adaptation, setpoint pre-control** Multiplication factor for the pre-control of the tension control using the tension setpoint. TENSZ_07.T1800.X1	Value: Min: Max: Type:	0.0 -2.0 2.0 R
H201 b.d. 8	**Lower limit, web velocity** Lower limit for the multiplicative influence of the web velocity for control type H203=5. TENSZ_07.T1900.X2	Value: Min: Max: Type:	1.0 -2.0 2.0 R
H202 b.d. 8	**Influence, web velocity** Factor with which the web velocity is multiplied for control type H203=5. TENSZ_07.T1920.X2	Value: Min: Max: Type:	1.0 -2.0 2.0 R
H203 b.d. 8	**Selecting the tension control technique** Selecting the control technique 0 = indirect tension control via the torque limits 1 = direct tension control with tension transducer via the torque limits 2 = direct tension control with dancer roll via the torque limits 3 = direct tension control with dancer roll/tension transducer via the speed correction control (closed-loop) 4 = reserved for expanded functionality 5 = as for 3, tension controller output multiplied by V_{set} TENSZ_07.T1945.X	Value: Min: Max: Type:	0 0 5 R
H204 b.d. 7	**Lower limit, web break detection** Limit value for the web break detection. For indirect tension control, the torque actual value and for direct tension control, the tension actual value, is compared with this limit; the web break signal is activated when this limit is fallen below. TENSZ_07.T2015.X2	Value: Min: Max: Type:	0.05 -2.0 2.0 R
H205 b.d. 7	**Delay, web break signal** Delay time before the web break signal is activated; this is mainly used to suppress erroneous signals. TENSZ_07.T2100.T	Value: Unit: Type:	3000 ms R
H206 b.d. 7	**Select winding hardness characteristic** 0 = winding hardness characteristic active 1 = winding hardness characteristic inactive TENSZ_01.T1475.I	Value: Type:	0 B
H207 b.d. 8	**Start of adaptation, tension controller** Start of Kp adaptation for the tension controller TENSZ_01.T1770.A1	Value: Min: Max: Type:	0.0 0.0 2.0 R
H208 b.d. 8	**End of adaptation, tension controller** End of Kp adaptation for the tension controller TENSZ_01.T1770.A2	Value: Min: Max: Type:	1.0 0.0 2.0 R

H209 b.d. 8	**Droop, tension controller** Multiplication factor to parameterize droop with the I component of the tension controller output, if a steady-state deviation is required between Z_{set} and Z_{act}. TENSZ_01.T1795.X1	Value: 0.0 Min: -2.0 Max: 2.0 Type: R
H210 b.d. 9a	**Adjustment, web velocity** Normalization factor to finely adjust the web velocity actual value. DIAMZ_01.D910.X2	Value: 1.0 Min: -2.0 Max: 2.0 Type: R
H211 b.d. 9a	**Select, web tachometer** When the web velocity is sensed using a web tachometer, the actual value must be parameterized as source for the diameter computer. 0 = web tachometer not used 1 = web tachom eter used DIAMZ_01.D1105.I	Value: 0 Type: B
H212 b.d. 13	**Pulse number, shaft tachometer** Specifies the pulses per revolution when using the digital speed actual value sensing on the T400. *Caution: Initialization required* IF_CU.D900.PR	Value: 1024 Unit: Pulse Type: I
H213 b.d. 13	**Pulse number, web tachometer** Specifies the number of pulses per revolution when using a web tachometer. IF_CU.D901.PR	Value: 600 Unit: Pulse Type: I
H214 b.d. 13	**Rated speed, shaft tachometer** Maximum speed 1.0 at the minimum diameter and maximum web velocity. This means H214 = Vmax * 1000 * i / (D_{core} * π) whereby V(m/min), D_k (mm) and $i=n_{motor}/n_{winder}$ *Caution: Initialization required* IF_CU.D900.RS	Value: 1500 Unit: RPM Type: R
H215 b.d. 13	**Rated speed measuring roll, web tachometer** Maximum speed of the measuring roll 1.0 at the maximum web velocity. *Caution: Initialization required* IF_CU.D901.RS	Value: 1000 Unit: RPM Type: R
H216 b.d. 9a	**Computation interval, diameter computer** Time for one revolution of the winder at minimum diameter and maximum web velocity, i.e. H216 = D_{core} * π * 60 / V_{max} (ms) where D(mm) and V(m/min) Note: The diameter computer operates in the sampling time of T3(16ms). the minimal value of H216 (32ms) will ensure a correct calculation of diameter. DIAMZ_01.D1140.X	Value: 320 Unit: ms Type: R

H217	**Selecting the shaft tachometer operating mode**	Value:	16#7FC2
	Using this parameter, the operating mode of the speed sensing block for the winder drive is selected, especially the digital filter, the encoder type and the coarse signal type selection as well as the source of the encoder pulses. Only the factory selected operating mode is described from all of the possible operating modes in the following text. For more detailed explanation, refer to Lit. [1], function block NAV, connection MOD. - - - X: last digit = 2: Digital filter with time constant/limiting frequency 500 ms / 2 MHz Encoder type : Pulse encoder with 2 tracks displaced through 90 degrees - - X -: last but one digit = C: Setting mode S=0 : Set YP to SV Zero- and incremental pulses from the base drive via backplane bus to the T400 XX - -: the two highest digits = 7F: Corrects the standstill limit by 127 pulses *Caution: Initialization required*	Type:	W
b.d. 13	IF_CU.D900.MOD		
H218	**Select operating mode, web tachometer**	Value:	16#7F02
	For this software package, the only difference between H217 and H218 is at the last but one digit (refer below). Using this parameter, the operating mode of the speed sensing block for the web tachometer is set, especially the digital filter, the encoder type and the coarse signal type selection as well as the source of the encoder pulses. Only the factory selected operating mode is described from all of the possible operating modes in the following text. For more detailed explanation, refer to Lit. [1], function block NAV, connection MOD. - - - X: last digit = 2: Digital filter with time constant/limiting frequency 500 ms / 2 MHz Encoder type : Pulse encoder with 2 tracks displacing through 90 degrees - - X -: last but one digit = 0: Zero- and incremental pulses from terminal, encoder 2 of the T400 Setting mode S=0 : Set YP to SV XX - -: the two highest digits = 7F: Corrects the standstill limit by 127 pulses *Caution: Initialization required*	Type:	W
b.d. 13	IF_CU.D901.MOD		
H220	**Scaling, dv/dt**	Value:	1000
	Normalization factor for the dv/dt signal.	Unit:	ms
	The shortest ramp time (e.g. ramp-down time for a fast stop) should be set at H220, where the result of the dv/dt calculation should be 1.0. This means, H220 = ramp time Other inaccuracies can be compensated using H225 (fine adjustment). For inertia compensation, generally a dv/dt signal, normalized to10.0, is sufficient and parameters H227 and H228 must then be increased by a factor of 10. In this case, the tenth part of the ramp time can be entered at H220 which significantly improves the resolution.	Type:	R
b.d. 9b	DIAMZ_01.P148.X2		
H221	**Minimum speed, diameter computer**	Value:	0.01
	When the limit value is fallen below, the diameter computation is inhibited.	Min:	-2.0
		Max:	2.0
b.d. 9a	DIAMZ_01.D1030.M	Type:	R

H222	**Core diameter** Diameter of the mandrel as a % of the maximum diameter.	Value:	0.2
		Min:	0.0
		Max:	1.0
b.d. 9a/12	DIAMZ_01.P100.X	Type:	R
H223	**Smoothing, setpoint for dv/dt computation** Smoothing for display parameter d331.	Value:	32
		Unit:	ms
b.d. 9b	DIAMZ_01.P142.T	Type:	R
H224	**Material density** Specifies the density of the winder material as a % of the maximum density.	Value:	1.0
		Min:	0.0
		Max:	1.0
b.d. 9b	DIAMZ_07.P295.X1	Type:	R
H225	**Fine adjustment, dv/dt** If the normalization factor H220 for the dv/dt signal is not be able to be precisely set as a result of longer ramp-up times, this inaccuracy is compensated with the fine adjustment. For example, with a 50s up-ramp, possible setting at H220 = 52.42s with H225=50s * 100% ÷ H220 = 95.38% the dv/dt output is 100% for a 50s ramp.	Value:	1.0
		Min:	0.0
		Max:	2.0
		Type:	R
b.d. 9b	DIAMZ_01.P500.X2		
H226	**Input, dv/dt** 0 = the internally computed value is used 1 =the external value is used	Value:	0
		Type:	B
b.d. 9b	DIAMZ_01.P160.I		
H227	**Variable moment of inertia** Adjustment factor to compensate the variable moment of inertia when accelerating.	Value:	0.0
		Min:	0.0
		Max:	2.0
b.d. 9b	DIAMZ_01.P332.X1	Type:	R
H228	**Constant moment of inertia** Enters the computed moment of inertia for the motor, gearbox and mandrel.	Value:	0.0
		Min:	0.0
		Max:	2.0
b.d. 9b	DIAMZ_01.P340.X1	Type:	R
H229	**Input, friction torque adaptation factor, gearbox stage 2** Input for the friction torque adaptation factor, gearbox 2 must be connected with the application-specific source. Default: KR0128 (fixed value adaptation factor)	Value:	KR0128
		Type:	R
b.d. 11	DIAMZ_07.P915.X2		
H230	**Friction torque at 0% speed** Absolute torque setpoint (d331) at 0% speed.	Value:	0.0
		Min:	0.0
		Max:	2.0
b.d. 9b	DIAMZ_07.P910.B1	Type:	R
H231	**Friction torque at 20% speed** Absolute torque setpoint (d331) at 20% speed.	Value:	0.0
		Min:	0.0
		Max:	2.0
b.d. 9b	DIAMZ_07.P910.B2	Type:	R

H232 b.d. 9b	**Friction torque at 40% speed** Absolute torque setpoint (d331) at 40% speed. DIAMZ_07.P910.B3	Value: 0.0 Min: 0.0 Max: 2.0 Type: R
H233 b.d. 9b	**Friction torque at 60% speed** Absolute torque setpoint (d331) at 60% speed. DIAMZ_07.P910.B4	Value: 0.0 Min: 0.0 Max: 2.0 Type: R
H234 b.d. 9b	**Friction torque at 80% speed** Absolute torque setpoint (d331) at 80% speed. DIAMZ_07.P910.B5	Value: 0.0 Min: 0.0 Max: 2.0 Type: R
H235 b.d. 9b	**Friction torque at 100% speed** Absolute torque setpoint (d331) at 100% speed. DIAMZ_07.P900.X	Value: 0.0 Min: 0.0 Max: 2.0 Type: R
H236 b.d. 9a	**Diameter change, monotone** For H236=1, only monotone diameter changes are permitted. The diameter for winders can only increase, for unwinders, only decrease. 0 = standard operation 1 = only monotone changes permitted DIAMZ_01.D1704.I	Value: 0 Type: B
H237 b.d. 9b	**Pre-control with n^2** Compensation with the square of the speed actual value; this is occasionally used for thick material webs, if the diameter quickly changes at high motor speeds. DIAMZ_07.P940.X2	Value: 0.0 Min: -1.0 Max: 1.0 Type: R
H238 b.d. 9a	**Minimum diameter change time** Time for winding/unwinding at maximum material increase/decrease, i.e. at D_{min} and V_{max}. *H238 = H216 * (D_{max} - D_{min}) / (2*d) (ms)* where D (mm), d(mm) and V(m/min.), refer to Chapter 4.1 *Example, refer to Chapter 3.5.1* DIAMZ_01.D1670.X2	Value: 50 Unit: s Type: R
H239 b.d. 13	**Adaptation devisor, length computer** Normalization, web length computer H239 = 75 (km) / L_n H240 = 1.0 if H239 < 1,9 where L_n the rated length for actual length = 1.0, refer to Chapter 3.5.2 DIAMZ_07.W10.X2	Value: 1.0 Min: 0.0 Max: 2.0 Type: R
H240 b.d. 13	**Adaptation factor, length computer** Normalization, web length computer H240 = L_n / 75 (km) H239 = 1.0 if H240 < 0.5 where L_n the rated length for actual length = 1.0, refer to Chapter 3.5.2 DIAMZ_07.W20.X2	Value: 1.0 Min: 0.0 Max: 1.0 Type: R
H241 b.d. 13	**Ramp-down time for braking distance computer** Scaling factor = 600 s ; i.e. the value used in the processor = H241/600 DIAMZ_07.W30.X1	Value: 60 Unit: s Type: R

H242	**Ramp-down rounding-off time for the braking distance computer** Scaling factor = 600 s ; i.e. the value used in the processor = H242/600	Value: 6 Unit: s Type: R
b.d. 13	DIAMZ_07.W40.X1	
H243	**Smoothing, web width** Smoothing time constant when the web width changes	Value: 1000 Unit: ms Type: R
b.d. 9b	DIAMZ_01.P150.T	
H244	**Rated velocity for the braking distance computer** Scaling factor = 7500 m/min ; i.e. the value used in the processor = H244/7500 .	Value: 1000 Min: 0 Max: 15000 Unit: m/min
b.d. 13	DIAMZ_07.W70.X1	Type: R
H245	**Baud rate PtP protocol** Sets the baud rate for the peer-to-peer protocol 9600, 19200, 38400, 93750, 187500 baud *Initialization is required after the change has been made!*	Value: 19200 Min: 9600 Max: 187500 Unit: Baud Type: DI
b.d. 14	IF_PEER.PtP_Zentr.BDR	
H246	**Upper limit (PtP monitoring)** Maximum tolerance (time) before starting telegram receive monitoring	Value: 10000 Min: 0 Unit: ms
b.d. 14	IF_PEER.Ueberwa.LU	Type: R
H247	**Setting value (PtP monitoring)** H247 = H246 - max. time (tolerance) for telegram failure (default 80ms)	Value: 9920 Min: 0 Unit: ms
b.d. 14	IF_PEER.Ueberwa.SV	Type: R
d248	**Status display (PTP receive)** Status display of receive block CRV as indication for the fault message ‘ F123’ or ‘ A104’ .	Value: 0 Type: W
b.d. 14	IF_PEER.Empf_PEER.YTS	
H249	**Input, length actual value** The input for the length actual value must be connected with the application-specific source. Default: KR0229 (web actual value from the web tachometer, pulse encoder 2)	Value: KR0229 Type: R
b.d. 13	DIAMZ_07.W5.X1	
H250	**EEPROM key** In order to establish the initialization status of all of the parameters with a rising edge, key parameter H250 must be set 165 at H160. *Observe the information/instructions in 7.1.2.!*	Value: 0 Type: I
b.d. 4	CONTZ_01.URLAD.KEY	
H251	**Rated pulses, shaft tachometer** For incremental encoders with two encoder tracks offset through 90 degrees. • H251 = 4 * H 212 → Position actual value = 1.0 /revolution • H251 = 1 → Position actual value = 4 * H212 pulses/rev.	Value: 4096 Type: DI
b.d. 13	IF_CU.D900.RP	

H252	**Rated pulses, web tachometer** For incremental encoders with two encoder tracks offset through 90 degrees • H252 = 4 * H 213 / circumference of the measuring wheel (mm) → Position actual value (KR0229) in (mm), → L_n = 1.0 for setting H239 and H240 • H252 = 1 → Position actual value (KR0229) in pulses, → Setting H239 and H240 refer to Chapter 3.5.2 and Chapter 5: H239-H240	Value: 1 Type: DI
b.d. 13	IF_CU.D901.RP	
H253	**Input, web break inputs** Input for the web break pulse must be connected with the application-specific source. Default: B2253 (internal web break signal)	Value: B2253 Type: B
b.d. 7	TENSZ_07.T2100.I	
H254	**Smoothing time for Δv** Smoothing time constant for speed correction Δv, which for a speed correction control H203 = 3, corresponds to the tension control output .	Value: 300 Min.: 0.0 Units: ms Type: R
b.d. 9a	DIAMZ_01.D940.T	
H255	**Adaptation factor Δv** This adaptation factor allows a higher accuracy for the diameter calculation when using dancer rolls, as the speed correction Δv from the closed-loop position control is taken into account into the diameter computer . for dancer roll: 0.0 - 1.0 for others: 0.0	Value: 0.0 Min: 0.0 Max: 1.0 Type: R
b.d. 9a	DIAMZ_01.D945.X2	
H256	**Braking characteristic, speed point 1** Speed below which the reduced braking torque acts. Scaling factor = 10.0 i.e. the value used in the processor = H256 / scaling factor	Value: 0.01 Min: 0.0 Max: 1.0 Type: R
b.d. 6	SREFZ_07.BD10.A1	
H257	**Reduced braking torque** Braking torque for a fast stop and at a low speed.	Value: 0.0 Min: 0.0 Max: 1.0
b.d. 6	SREFZ_07.BD10.B1	Type: R
H258	**Braking characteristic, speed point 2** Speed, above which the maximum braking torque acts. Scaling factor = 10.0; i.e. the value used in the processor = H258 / scaling factor	Value: 0.02 Min: 0.0 Max: 1.0 Type: R
b.d. 6	SREFZ_07.BD10.A2	
H259	**Maximum braking torque** Braking torque for a fast stop and at a high speed.	Value: 2.0 Min: 0.0 Max: 1.0
b.d. 6	SREFZ_07.BD10.B2	Type: R

H262	**Input, length setpoint** Input for the length setpoint with 1.0 = 75000[m], can be connected with the application-specific source. Default: KR0400 (output from H400, fixed value)	Value: KR0400 Type: R
b.d. 12	IQ!Z_01.AI328.X	
H263	**Motorized potentiometer 2, fast rate-of-change** Ramp-up and ramp-down times are parameterized together; the fast rate of change starts, if the raise or lower control commands are present for longer than 4s.	Value: 25000 Unit: ms Type: R
b.d. 19	IQ2Z_01.M590.X2	
H264	**Motorized potentiometer 2, standard rate-of-change** Ramp-up- and ramp-down times are parameterized together.	Value: 100000 Unit: ms Type: R
b.d. 19	IQ2Z_01.M590.X1	
H265	**Motorized potentiometer 1, fast rate-of-change** Ramp-up and ramp-down times are parameterized together; the fast rate-of-change starts, if the raise or lower control commands are present for longer than 4s.	Value: 25000 Unit: ms Type: R
b.d. 19	IQ2Z_01.M390.X2	
H266	**Motorized potentiometer 1, standard rate-of-change** Ramp-up- and ramp-down times are parameterized together.	Value: 100000 Unit: ms Type: R
b.d. 19	IQ2Z_01.M390.X1	
H267	**Select operating mode, motorized potentiometer 1** Motorized potentiometer 1 can be parameterized as a basic ramp-function generator. 0 = motorized potentiometer 1 = ramp-function generator	Value: 0 Type: B
b.d. 19	IQ2Z_01.M100.I1	
H268	**Setpoint, ramp-function generator operation** Setpoint for H267=1, i.e. motorized potentiometer 1 is used as ramp-function generator	Value: 1.0 Min: -2.0 Max: 2.0 Type: R
b.d. 19	IQ2Z_01.M120.X2	
H269	**Ramp time, ramp-function generator operation** For H267 = 1, ramp-up- and ramp-down times are parameterized together.	Value: 10000 Unit: ms Type: R
b.d. 19	IQ2Z_01.M130.X2	
H270	**Smoothing, analog input 3** Smoothing time constant, analog input 3	Value: 8 Unit: ms Type: R
b.d. 10	IF_CU.AI51.T	
H271	**Smoothing, analog input 4** Smoothing time constant, analog input 4	Value: 8 Unit: ms Type: R
b.d. 10	IF_CU.AI66.T	

H272 b.d. 9b	**Dead zone for dv/dt computation** Dead zone to calculate the dv/dt value. All acceleration signals, which are less than this limit, are suppressed. The slowest velocity ramp sometimes generates an unnecessary value as acceleration signal. The limit value should lie below this. Example: H220=100[s], slowest ramp = 500[s] ⇒ H272=0.2 * (100[s]/500[s])·1.0 = 4% = 0.04 DIAMZ_01.P147Z.TH	Value: 0.01 Min: -2.0 Max: 2.0 Type: R
H273 b.d. 3	**Normalization, torque setpoint from CU on T400** CUVC, CUMC and CUD1: H273 = 1.0: The values of the torque setpoint at r269 (CUVC, CUMC) and d330 (T400) are the same. CU2: H273=0.25 The values of the torque setpoint at r246 (CU2) and d329 (T400) are the same. CU3: A torque setpoint is not output. IQ1Z_01.AI21.X2	Value: 1.0 Min: 0.0 Max: 1.0 Type: R
H274 b.d. 3	**Normalization, torque actual value from CU on T400** CUMC, CUVC and CUD1: H274 = 1.0: The values of the torque actual value at K184, connected to a display parameter (CUMC) and d330 (T400) are the same. CU2, CU3: H274=25%: The values of the torque actual value at r007 (CU2, CU3) and d330 (T400) are the same. IQ1Z_01.AI21A.X2	Value: 1.0 Min: 0.0 Max: 1.0 Type: R
H275 b.d. 7	**Response threshold web break monitoring, indirect tension control** H275 = 1- {(tension controller output-torque actual value)/ tension controller output} TENSZ_07.T2060.M	Value: 0.25 Min: 0.0 Max: 1.0 Type: R
H276 b.d 9a	**Initial diameter** The initial diameter for winders/unwinders when calculating the diameter without web speed signal. DIAMZ_07.D_Anfang.X	Value: 0.4 Min: 0.0 Max: 1.0 Type: R
H277 b.d. 9a	**Enable diameter calculation without V signal** To change over to the diameter calculation technique without web speed signal : 0: with V signal; 1: without V signal If H277=1, both techniques run in parallel : - KR0358: output D_{act} (without V signal, in front of the ramp-function generator) - d310 indicates D_{act} after the ramp-function generator and check - KR0359: output D_{act} (with V signal, in front of the ramp-function generator). The value can be monitored using the freely-assignable connector display H560-H566. DIAMZ_07.DOV_Freigabe.I	Value: 0 Type: B
H278 b.d. 9a	**Setting pulse duration** The pulse duration to set the initial diameter : - at the first start of the diameter calculation, set H278 > the time for one revolution , to correctly set D_{act} to D_start (H276). - For an intermediate start , H278 < the time for one revolution, in order to reset the diameter not to D_start (H276), but to continue to calculate . DIAMZ_07.DOV2.T	Value:10000 Min: 0.0 Units: ms Type: R

H281	**Alternative On command**	Value:	0
	To activate the alternative Power-on n_command	Type:	B
b.d. 18	IQ1Z_01.SELACT.1		
H282	**Changing over the speed controller to CU or T400**	Value:	0
	The speed controller is switched-through (bypassed) if an external speed controller is to be used. 1 = yes, this means, that the controller on the T400 operates as speed controller and transfers the torque setpoint 0 = no, i.e. T400 transfers the speed setpoint to CU taking into account the limits. Further, the speed controller block processing is disabled, in order to minimize CPU utilization.	Type:	B
b.d. 6a	IQ1Z_07.B51.I		
H283	**I controller enable**	Value:	0
	0: With PI-component in the tension controller for the dancer roll and H196=1 1: Only I-component in the tension controller for other techniques and H196 =0	Type:	B
b.d. 8	TENSZ_01.T1790.IC		
H284	**Tension setpoint, inhibit ramp-function generator**	Value:	1
	0: For dancer roll 1: For others	Type:	B
b.d. 7	TENSZ_01.T1320.I2		
H285	**Enable web break detection**	Value:	1
	0: Without web break detection; the web break detection blocks are also disabled to minimize CPU utilization. 1: With web break detection	Type:	B
b.d. 7	TENSZ_07.Bahnrisserken.I		
H286	**Thickness-diameter ratio**	Value:	0.0
	The relative ratio between the material thickness and maximum diameter, i.e. H286 = material thickness/max. diameter.	Min:	0.0
		Max:	1.0
b.d. 9a	DIAMZ_07.OV6.X1	Type:	R
H288	**Enable PROFIBUS**	Value:	0
	Enables the PROFIBUS communications interface and its monitoring, in order to reduce CPU utilization if PROFIBUS is not available. 0: The complete PROFIBUS module is inhibited 1: PROFIBUS interface is enabled	Type:	B
b.d. 15, 22a	IQ1Z_01.B01.I		
H289	**Enable peer-to-peer**	Value:	0
	Enables the communications interface peer-to-peer and its monitoring, in order to reduce CPU utilization if peer-to-peer is not available. 0: The complete peer-to-peer module is inhibited 1: Peer-to-peer interface is enabled	Type:	B
b.d. 14/22a	IQ1Z_01.B02.I		

H290	**Upper speed setpoint limiting** Upper limit for the speed setpoint in the ramp-function generator, if H282 = 1.	Value: 1.0 Min: -2.0 Max: 2.0
b.d. 6a	SREFZ_07.S1000.LU	Type: R
H291	**Lower speed setpoint limiting** Lower limit for the speed setpoint in the ramp-function generator, if H282 = 1.	Value: -1.0 Min: -2.0 Max: 2.0
b.d. 6a	SREFZ_07.S1000.LL	Type: R
H292	**Ramp-up time, speed setpoint** For the speed setpoint in the ramp-function generator, if H282 = 1.	Value: 1000 Unit: ms Type: R
b.d. 6a	SREFZ_07.S1000.TU	
H293	**Ramp-down time, speed setpoint** For the speed setpoint in the ramp-function generator, if H282 = 1.	Value: 1000 Unit: ms Type: R
b.d. 6a	SREFZ_07.S1000.TD	
H294	**Integral action time, speed controller** Integral action time for the speed controller on T400, if 282 = 1	Value: 300 Unit: ms Type: R
b.d. 6a	SREFZ_07.S1100.TN	
H295	**Invert_mask** Digital inputs can be inverted using the appropriate bit in parameter H295. Example: to invert digital input 2 H295= 16#2 ⇒ digital input: 8 7 6 5 4 3 2 1 bit in H295: 0 0 0 0 0 0 1 0	Value: 0 Type: W
b.d. 13a	IF_CU.Bit_Invert .I2	
d301	**Effective web velocity setpoint**	Min: -2.0 Max: 2.0
b.d. 5	SREFZ_01.S160.Y	Type: R
d302	**Actual dv/dt**	Min: -2.0 Max: 2.0
b.d. 9b	DIAMZ_01.P500.Y	Type: R
d303	**Speed setpoint**	Min: -2.0 Max: 2.0
b.d. 6	SREFZ_07.NC122.Y	Type: R
d304	**Sum, tension/position reference value**	Min: -2.0 Max: 2.0
b.d. 8	TENSZ_01.T1525.Y	Type: R
d305	**Output, motorized potentiometer 1**	Min: -2.0 Max: 2.0
b.d. 19	IQ2Z_01.M450.Y	Type: R
d306	**Output, motorized potentiometer 2**	Min: -2.0 Max: 2.0
b.d. 19	IQ2Z_01.M650.Y	Type: R
d307	**Speed actual value**	Min: -2.0 Max: 2.0
b.d. 13	IQ1Z_01.AI325.Y	Type: R

d308 b.d. 9b	**Variable moment of inertia** DIAMZ_01.P320.Y	Min: -2.0 Max: 2.0 Type: R
d309 b.d. 13	**Actual web length** 1.0=75000m DIAMZ_01.W21.Y	Min: 0 Max: 150000 Unit: m Type: R
d310 b.d. 9a	**Actual diameter** DIAMZ_01.D1706.Y	Min: -2.0 Max: 2.0 Type: R
d311 b.d. 7	**Tension actual value smoothed** TENSZ_01.T641.Y	Min: -2.0 Max: 2.0 Type: R
d312 b.d. 9b	**Pre-control torque** Sum of the friction- and acceleration effects DIAMZ_07.P1060.Y	Min: -2.0 Max: 2.0 Type: R
d313 b.d. 8	**Output, closed-loop tension control** Sum of the tension controller output and pre-control, if H203 = 0, 1, 2; tension controller output, if H203 = 3, 5 TENSZ_07.T1960.Y	Min: -2.0 Max: 2.0 Type: R
d314 b.d. 9b	**Pre-control torque, friction compensation** DIAMZ_07.P920.Y	Min: -2.0 Max: 2.0 Type: R
d316 b.d. 9b	**Pre-control torque, inertia compensation** DIAMZ_01.P530.Y	Min: -2.0 Max: 2.0 Type: R
d317 b.d. 8	**Sum, tension controller output** Sum of the tension controller from the PI component and D component **(**PID controller). TENSZ_01.T1798.Y	Min: -2.0 Max: 2.0 Type: R
d318 b.d. 8	**Tension controller, D component** TENSZ_01.T1796.Y	Min: -2.0 Max: 2.0 Type: R
d319 b.d. 8	**Tension controller output from the PI component** TENSZ_01.T1790.Y	Min: -2.0 Max: 2.0 Type: R
d320 b.d. 10	**Analog input 1, terminals 90/91** IF_CU.AI10.Y	Min: -2.0 Max: 2.0 Type: R
d321 b.d. 10	**Analog input 2, terminals 92/93** IF_CU.AI25.Y	Min: -2.0 Max: 2.0 Type: R
d322 b.d. 10	**Analog input 3 (tension actual value), smoothed, terminals 94/99** IF_CU.AI51.Y	Min: -2.0 Max: 2.0 Type: R

d323	**Analog input 4, smoothed, terminals 95/99**	Min:	-2.0
		Max:	2.0
b.d. 10	IF_CU.AI66.Y	Type:	R
d324	**Analog input 5 (pressure actual value from the dancer roll), terminals 96/99**	Min:	-2.0
		Max:	2.0
b.d. 10	IF_CU.AI70.Y	Type:	R
d327	**External web velocity actual value**	Min:	-2.0
		Max:	2.0
b.d. 13	IQ1Z_01.AI330.Y	Type:	R
d328	**Tension setpoint after the winding hardness characteristic**	Min:	-2.0
		Max:	2.0
b.d. 7	TENSZ_01.T1470.Y	Type:	R
d329	**Torque setpoint**	Min:	-2.0
	Receive torque setpoint from CU or computed on T400.	Max:	2.0
b.d. 6a	SREFZ_07.NT119.Y	Type:	R
d330	**Torque actual value**	Min:	-2.0
		Max:	2.0
b.d. 20	IQ1Z_01.AI21A.Y	Type:	R
d331	**Smoothed torque setpoint**	Min:	-2.0
		Max:	2.0
b.d. 6a	SREFZ_07.NT130.Y	Type:	R
d332	**Control word 1**	Type:	W
b.d. 22b	IQ1Z_07.B210.QS		

d332 – Control word 1:

Bit 0:	On	1 = active
Bit 1:	/OFF2 (voltage-free)	0 = active
Bit 2:	/OFF3 (fast stop)	0 = active
Bit 3:	System start	1 = active
Bit 4:	Ramp-function generator inhibit	1 = active
Bit 5:	Ramp-function generator stop	1 = active
Bit 6:	Enable setpoint	1 = active
Bit 7:	Acknowledge fault	1 = active
Bit 8:	Inching, forwards	1 = active
Bit 9:	Inching, backwards	1 = active
Bit 10:	Control from CS	1 = active
Bit 11:	Tension controller on	1 = active
Bit 12:	Inhibit tension controller	1 = active
Bit 13:	Standstill tension on	1 = active
Bit 14:	Set diameter	1 = active
Bit 15:	Hold diameter	1 = active

d333	**Control word 2**	Type:	W
	Bit 0: Input supplementary setpoint 1 = active Bit 1: Local positioning 1= active Bit 2: Motorized potentiometer 2, raise 1 = active Bit 3: Motorized potentiometer 2, lower 1 = active Bit 4: Local operator control 1 = active Bit 5: Local stop 1 = active Bit 6: Local run 1 = active Bit 7: Local crawl 1 = active Bit 8: = 0 not used Bit 9: Set V_{set} to stop 1 = active Bit 10: Motorized potentiometer 1, raise 1 = active Bit 11: Motorized potentiometer 1, lower 1 = active Bit 12: Reset length computer 1 = active Bit 13: Winding from below 1 = active Bit 14: Connection tachometer 1 = active Bit 15 = 0 not used		
b.d. 22b	IQ1Z_07.B220.QS		
d334	**Control word 3**	Type:	W
	Bit 0: = 0 not used Bit 1: Polarity, saturation setpoint 1= active Bit 2: Winder 1 = active Bit 3: Gearbox stage 2 1 = active Bit 4: Accept setpoint A 1 = active Bit 5: Accept setpoint B 1 = active Bit 6 - 15 = 0 not used		
b.d. 22b	IQ1Z_07.B230.QS		
d335	**Status word 1**	Type:	W
	Bit 0: Ready to power-on 1 = active Bit 1: Ready 1 = active Bit 2: Operation enabled 1= active Bit 3: Fault 1 = active Bit 4: OFF2 0 = active Bit 5: OFF3 0 = active Bit 6: Power-on in hibit 1 = active Bit 7: Alarm 1 = active Bit 8: Setpoint/actual value difference within tolerance 1 = active Bit 9: Control requested 1 = active Bit 10: f/n limit reached 1 = active Bit 11: Device-specific, refer to Ref. (2-4), also b.d. 22 1 = active Bit 12: Speed controller at its limit 1 = active Bit 13: Tension controller at its limit 1 = active Bit 14: Device-specific 1 = active Bit 15: Device-specific 1 = active		
b.d. 22	• refer to block diagram 22 and Lit.[2-4] CONTZ_01.SE120.QS		

d336	**Status word 2**	Type: W
	Bit 0: System start — 1 = active	
	Bit 1: Local stop — 1 = active	
	Bit 2: OFF3 — 0 = active	
	Bit 3: Local run mode — 1 = active	
	Bit 4: Local crawl mod e — 1 = active	
	Bit 5: Local inching forwards mode. — 1 = active	
	Bit 6: Local inching backwards mode — 1 = active	
	Bit 7: Local positioning mode — 1 = active	
	Bit 8: Speed setpoint is zero — 1 = active	
	Bit 9: W eb break — 1 = active	
	Bit 10: Tension control on — 1 = active	
	Bit 11: System operation mode — 1 = active	
	Bit 12: Standstill — 1 = active	
	Bit 13: Limit value monitor 1 output — 1 = active	
	Bit 14: Limit value monitor 2 output — 1 = active	
	Bit 15: Local operator control — 1 = active	
b.d. 22	CONTZ_01.C245.QS	
d337	**Alarms from T400**	Type: W
	Bit 0: Overspeed, positive — 1 = active ⇒ A097	
	Bit 1: Overspeed, negative — 1 = active ⇒ A098	
	Bit 2: Overtorque, p ositive — 1= active ⇒ A099	
	Bit 3: Overtorque, negative — 1 = active ⇒ A100	
	Bit 4: Drive stalled — 1 = active ⇒ A101	
	Bit 5: Receive CU faulted — 1 = active ⇒ A102	
	Bit 6: Receive CB faulted — 1 = active ⇒ A103	
	Bit 7: Receive PTP faulted — 1 = active ⇒ A104	
	Bit 8 - 15 = 0	
b.d. 20	IF_CU.SU150.QS	
d338	**Faults from T400**	Type: W
	Bit 0: Overspeed, positive — 1 = active ⇒ F116	
	Bit 1: Overspeed, negative — 1 = active ⇒ F117	
	Bit 2: Overtorque, positive — 1 = active ⇒ F118	
	Bit 3: Overtorque, negative — 1 = active ⇒ F119	
	Bit 4: Drive stalled — 1 = active ⇒ F120	
	Bit 5: Receive CU faulted — 1 = active ⇒ F121	
	Bit 6: Receive CB faulted — 1 = active ⇒ F122	
	Bit 7: Receive PTP faulted — 1 = active ⇒ F123	
	Bit 8 - 15 = 0	
b.d. 20	IF_CU.SU170.QS	
d339	**Correction factor, material density**	Min: -1.0 Max: 1.0 Type: R
b.d. 9b	DIAMZ_07.P290.Y	
d340	**Compensated web velocity**	Min: -2.0 Max: 2.0 Type: R
b.d. 5	SREFZ_01.S170.Y	
d341	**Actual saturation setpoint**	Min: -1.0 Max: 1.0 Type: R
b.d. 5	SREFZ_01.S397.Y	
d342	**Positive torque limit**	Min: -2.0 Max: 2.0 Type: R
b.d. 6	SREFZ_07.NC005.Y	
d343	**Negative torque limit**	Min: -2.0 Max: 2.0 Type: R
b.d. 6	SREFZ_07.NC006.Y	

d344 b.d. 5	**Velocity setpoint** SREFZ_07.S490.Y	Min: -2.0 Max: 2.0 Type: R
d345 b.d. 6a	**Actual Kp speed controller from T400** SREFZ_07.NC035.Y	Min: 0 Type: R
d346 b.d. 8	**Actual Kp tension controller** TENSZ_01.T1770.Y	Min: 0 Type: R
d349 b.d. 13	**Velocity actual value connection tachometer** IQ1Z_01.AI329.Y	Min: 0 Max: 2.0 Type: R
d350 b.d. 13	**Braking distance** Output in (m) DIAMZ_07.W92.Y	Min: 0 Max: 150000 Unit: m Type: R
d352 to d356 b.d. 4	**CPU utilization T1 to T5** Processor utilization of the standard software, sub-divided according to time sectors. T1 is the fastest (highest priority), T5 the slowest time sector. It is important that no time sector is utilized more than 100% (corresponding to 1.0), as otherwise it will not be processed in the configured time intervals. d352 CPU utilization of T1 (2ms) d353 CPU utilization of T2 (8ms) d354 CPU utilization of T3 (16ms) d355 CPU utilization of T4 (32ms) d356 CPU utilization of T5 (128ms) IF_CU.CPU-Auslast.Y1, ... IF_CU.CPU-Auslast.Y5	Min. 0 Type R
H400 b.d. 12	**Fixed value, length setpoint** Enters the length setpoint. IQ1Z_01.AI328A.X	Value: 2.0 Min: 0 Max: 2.0 Type: R
H401 b.d. 13	**Velocity actual value, connection tachometer** Enters the velocity actual value, connection tachometer. IQ1Z_01.AI329A.X	Value: 0 Min: 0 Max: 2.0 Type: R
H402 b.d. 13	**Fixed value, external web velocity actual value** Enters the external web velocity actual value. IQ1Z_01.AI330A.X	Value: 0 Min: 0 Max: 2.0 Type: R
d403 b.d. 10	**Output 1 from limit value monitor 1** Input value > comparison value IQ2Z_01.G130A.Q1	Type: B
d404 b.d. 10	**Output 2 from limit value monitor 1** Input value < comparison value IQ2Z_01.G130A.Q2	Type: B

d405	**Output 3 from limit value monitor 1** Input value = comparison value	Type: B
b.d. 10	IQ2Z_01.G130A.Q3	
d406	**Output 4 from limit value monitor 1** Input value ≠ comparison value	Type: B
b.d. 10	IQ2Z_01.G130A.Q4	
d407	**Output 1 from limit value monitor 2** Input value > comparison value	Type: B
b.d. 10	IQ2Z_01.G330A.Q1	
d408	**Output 2 from limit value monitor 2** Input value < comparison value	Type: B
b.d. 10	IQ2Z_01.G330A.Q2	
d409	**Output 3 from limit value monitor 2** Input value = comparison value	Type: B
b.d. 10	IQ2Z_01.G330A.Q3	
d410	**Output 4 from limit value monitor 2** Input value ≠ comparison value	Type: B
b.d. 10	IQ2Z_01.G330A.Q4	
d411	**Length setpoint reached** Signal when the length setpoint has been reached.	Type: B
b.d. 10	IQ2Z_01.G130A.Q5	
H440	**Actual value W2 at CB** Send word 2 at the CB module can be connected with the application-specific source. Default: KR0310 (actual diameter)	Value: KR0310 Type: R
b.d. 15	IF_COM.Istwert_W2 .X	
H441	**Actual value W3 at CB** Send word 3 at the CB module can be connected with the application-specific source. Default: KR0000 (constant output, real type, Y=0.0)	Value: KR0000 Type: R
b.d. 15	IF_COM.Istwert_W3 .X	
H442	**Actual value W5 at CB** Send word 5 at the CB module must be connected with the application-specific source. Default: KR0000 (constant output, real type, Y=0.0)	Value: KR0000 Type: R
b.d. 15	IF_COM.Istwert_W5 .X	

H443	**Actual value W6 at CB** Send word 6 at the CB module must be connected with the application-specific source. Default: KR00100 (constant output, real type, Y=0.0)	Value: KR0000 Type: R
b.d. 15	IF_COM.Istwert_W6 .X	
H444	**Status word 1 at CB** Send word 1 at the CB module must be connected with the application-specific source. Default: K4335 (status word 1 from T400)	Value: K4335 Type: I
b.d. 15	IF_COM.send_ZW1.X	
H445	**Status word 2 at CB** Send word 4 at the CB module must be connected with the application-specific source. Default: K4336 (status word 2 from T400)	Value: K4336 Type: I
b.d. 15	IF_COM.send_ZW2.X	
H446	**Actual value W7 at CB** Send word 7 at the CB module must be connected with the application-specific source. Default: KR0000 (constant output, real type, Y=0.0)	Value: KR0000 Type: R
b.d. 15	IF_COM.Istwert_W7 .X	
H447	**Actual value W8 at CB** Send word 8 at the CB module must be connected with the application-specific source. Default: KR0000 (constant output, real type, Y=0.0)	Value: KR0000 Type: R
b.d. 15	IF_COM.Istwert_W8 .X	
H448	**Actual value W9 at CB** Send word 9 at the CB module must be connected with the application-specific source. Default: KR0000 (constant output, real type, Y=0.0)	Value: KR0000 Type: R
b.d. 15	IF_COM.Istwert_W9 .X	
H449	**Actual value W10 at CB** Send word 10 at the CB module must be connected with the application-specific source. Default: KR0000 (constant output, real type, Y=0.0)	Value: KR0000 Type: R
b.d. 15	IF_COM.Istwert_W10 .X	
d450	**Setpoint W2 from CB** Receive word 2 from the CB module can be connected with the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 2	IF_COM.Sollwert_W2 .Y	
d451	**Setpoint W3 from CB** Receive word 3 from the CB module can be connected with the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 2	IF_COM.Sollwert_W3 .Y	

d452	**Setpoint W5 from CB** Receive word 5 from the CB module can be connected with the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 2	IF_COM.Sollwert_W5 .Y	
d453	**Setpoint W6 from CB** Receive word 6 from the CB module can be connected with the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 2	IF_COM.Sollwert_W6 .Y	
d454	**Setpoint W7 from CB** Receive word 7 from the CB module can be connected with the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 2	IF_COM.Sollwert_W7 .Y	
d455	**Setpoint W8 from CB** Receive word 8 from the CB module can be connected with the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 2	IF_COM.Sollwert_W8 .Y	
d456	**Setpoint W9 from CB** Receive word 9 from the CB module can be connected with the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 2	IF_COM.Sollwert_W9 .Y	
d457	**Setpoint W10 from CB** Receive word 10 from the CB module can be connected with the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 2	IF_COM.Sollwert_W10 .Y	
H495	**Upper limit (monitoring CB)** Maximum tolerance time before the start of telegram receive monitoring	Value: 20000 Min: 0 Unit: ms
b.d. 20/22a	IF_COM.Ueberwa.LU	Type: R
H496	**Setting value (monitoring CB)** H496 = H246 - max. time (tolerance) for telegram failure (default 80ms)	Value: 19920 Min: 0 Unit: ms
b.d. 20/22a	IF_COM.Ueberwa.SV	Type: R
d497	**Status display (CB receive)** Status display of the CRV receive block as indication/information for the fault message ‘ F122’ or ‘ A103’ .	Type: W
b.d. 20	IF_COM.Empf_COM.YTS	
H499	**ext. status word** The external status word is used to generate status word 1 from T400. Chapter: • K 4549 (status word 1 from CU) ⇒ if T400 is inserted in the drive converter • K 4498 (fixed status word) ⇒ for SRT400 solution Default : K4549 (status word 1 from CU)	Value: K4549 Type: W
b.d. 12	CONTZ_01.SE110.I1	

H500	**Setpoint W2 at CU** Send word 2 at CU is connected to the fixed connector KR0303 (speed setpoint).	Value: KR0303 Type: R
b.d. 15a	IF_CU.Sollwert_W2 .X	
H501	**Setpoint W5 at CU** Send word 5 at CU is connected to the fixed connector KR0558 (torque supplementary setpoint).	Value: KR0558 Type: R
b.d. 15a	IF_CU.Sollwert_W5 .X	
H502	**Setpoint W6 at CU** Send word 6 at CU is connected to the fixed connector KR0556 (positive torque limit).	Value: KR0556 Type: R
b.d. 15a	IF_CU.Sollwert_W6 .X	
H503	**Setpoint W7 at CU** Send word 7 at CU is connected to the fixed connector KR0557 (negative torque limit).	Value: KR0557 Type: R
b.d. 15a	IF_CU.Sollwert_W7 .X	
H504	**Setpoint W8 at CU** Send word 8 at CU is connected to the fixed connector KR0308 (variable moment of inertia).	Value: KR0308 Type: R
b.d. 15a	IF_CU.Sollwert_W8 .X	
H505	**Setpoint W9 at CU** Send word 9 at CU can be freely connected. Default: KR0000 (constant output, Y= 0.0)	Value: KR0000 Type: R
b.d. 15a	IF_CU.Sollwert_W9 .X	
H506	**Setpoint W10 at CU** Send word 10 at CU can be freely connected. Default: KR0000 (constant output, Y= 0.0)	Value: KR0000 Type: R
b.d. 15a	IF_CU.Sollwert_W10 .X	
H510	**Control word 2.0 at CU** Control word 2.0 at CU can be connected with the application-specific source. Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I1	
H511	**Control word 2.1 at CU** Control word 2.1 at CU can be connected with the application-specific source. Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I2	
H512	**Control word 2.2 at CU** Control word 2.2 at CU can be connected with the application-specific source. Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I3	

H513	**Control word 2.3 at CU** Control word 2.3 at CU can be connected with the application-specific source. Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I4	
H514	**Control word 2.4 at CU** Control word 2.4 at CU can be connected with the application-specific source. Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I5	
H515	**Control word 2.5 at CU** Control word 2.5 at CU can be connected with the application-specific source. Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I6	
H516	**Control word 2.6 at CU** Control word 2.6 at CU can be connected with the application-specific source. Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I7	
H517	**Control word 2.7 at CU** Control word 2.7 at CU can be connected with the application-specific source. Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I8	
H518	**Control word 2.8 at CU** Control word 2.8 at CU can be connected with the application-specific source. Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I9	
H519	**Enable for speed controller in CU** Enable command for the speed controller in the CU, setting for control word 2.9 at CU. Default: B2508 (operating enable)	Value: B2508 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I10	
H520	**Control word 2.10 at CU** Control word 2.10 at CU can be connected with the application-specific source. Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I11	
H521	**Digital output 1, terminal 46 (web break)** The output can be connected with the application-specific source. Default: B2501 (web break signal)	Value: B2501 Type: B
b.d. 13a	IF_CU.BinOut .I1	

H522	**Digital output 2, terminal 47 (Vact=0 standstill)**	Value:	B2502
	Digital output 2 can be connected with the application-specific source.	Type:	B
	Default: B2502 (standstill signal)		
b.d. 13a	IF_CU.BinOut .I2		
H523	**Digital output 3, terminal 48 (tension controller on)**	Value:	B2503
	Digital output 3 can be connected with the application-specific source.	Type:	B
	Default: B2503 (tension controller on signal)		
b.d. 13a	IF_CU.BinOut .I3		
H524	**Digital output 4, terminal 49 (base drive operational)**	Value:	B2504
	Digital output 4 can be connected with the application-specific source.	Type:	B
	Default: B2504 (signal that operation has been enabled)		
b.d. 13a	IF_CU.BinOut .I4		
H525	**Digital output 5, terminal 52 (speed setpoint=0)**	Value:	B2505
	Digital output 5 can be connected with the application-specific source.	Type:	B
	Default: B2505 (signal for speed setpoint =0)		
b.d. 13a	IF_CU.BinOut .I5		
H526	**Digital output 6, terminal 51 (limit value monitor 1)**	Value:	B2114
	Digital output 6 can be connected with the application-specific source.	Type:	B
	Default: B2506 (signal for limit value monitor 1)		
b.d. 13a	IF_CU.BinOut .I6		
H531	**Control word 2.11 at CU**	Value:	B2000
	Control word 2.11 at CU can be connected with the application-specific source.	Type:	B
	Default: B2000 (constant digital output)		
b.d. 15a	IF_CU.Steuerwort_2 .I12		
H532	**Control word 2.12 at CU**	Value:	B2000
	Control word 2.12 at CU can be connected with the application-specific source.	Type:	B
	Default: B2000 (constant digital output)		
b.d. 15a	IF_CU.Steuerwort_2 .I13		
H533	**Control word 2.13 at CU**	Value:	B2000
	Control word 2.13 at CU can be connected with the application-specific source.	Type:	B
	Default: B2000 (constant digital output)		
b.d. 15a	IF_CU.Steuerwort_2 .I14		
H534	**Control word 2.14 at CU**	Value:	B2000
	Control word 2.14 at CU can be connected with the application-specific source.	Type:	B
	Default: B2000 (constant digital output)		
b.d. 15a	IF_CU.Steuerwort_2 .I15		

H535	**Control word 2.15 at CU** Control word 2.15 at CU can be connected with the application-specific source. Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 15a	IF_CU.Steuerwort_2 .I16	
H537	**Select digital input/output, B2527/H521** Mode for the bidirectional inputs/outputs 0: Digital input → B2527 1: Digital output → H521 (default)	Value: 1 Type: B
b.d. 13a	IF_CU.BinOut.DI1	
H538	**Select digital input/output, B2528/H522** Mode for the bidirectional inputs/outputs 0: Digital input → B2528 1: Digital output → H522 (default)	Value: 1 Type: B
b.d. 13a	IF_CU.BinOut.DI2	
H539	**Select digital input/output, B2529/H523** Mode for the bidirectional inputs/outputs 0: Digital input → B2529 1: Digital output → H523 (default)	Value: 1 Type: B
b.d. 13a	IF_CU.BinOut.DI3	
H540	**Select digital input/output, B2530/H524** Mode for the bidirectional inputs/outputs 0: Digital input → B2530 1: Digital output → H524 (default)	Value: 1 Type: B
b.d. 13a	IF_CU.BinOut.DI4	
d549	**Status word 1 from CU** Receive word 2 from CU can be connected with the application-specific destination .	Type: W
b.d. 15a	IF_CU.Verteilung.Y1	
d550	**Actual value W2 from CU** Receive word 2 from CU can be connected to the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 15a	IF_CU.Istwert_W2 .Y	
d551	**Actual value W3** Receive word 3 from CU can be connected to the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 15a	IF_CU.Istwert_W3 .Y	
d552	**Actual value W5 (torque setpoint)** Receive word 5 from the CU is connected to the fixed connector (torque setpoint) in the CU.	Min: -2.0 Max: 2.0 Type: R
b.d. 15a	IF_CU.Istwert_W5 .Y	

d553	**Actual value W6 (torque actual value)** Receive word 6 from the CU is connected to the fixed connector (torque actual value) in the CU.	Min: -2.0 Max: 2.0 Type: R
b.d. 15a	IF_CU.Istwert_W6 .Y	
d554	**Actual value W7** Receive word 7 from the CU can be connected with the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 15a	IF_CU.Istwert_W7 .Y	
d555	**Actual value W8** Receive word 8 from the CU can be connected with the application-specific destination.	Min: -2.0 Max: 2.0 Type: R
b.d. 15a	IF_CU.Istwert_W8 .Y	
H560	**Input (Anz_R1)** Input for the free KR connector display 1 can be connected with the application-specific source Default: KR0000 (constant R_output)	Value: KR0000 Type: R
b.d. 25	IQ2Z_01.Anz_R1.X	
d561	**Output (Anz_R1)** Display parameter from H560	Type: R
b.d. 25	IQ2Z_01.Anz_R1.Y	
H562	**Input (Anz_R2)** Input for the free KR connector display 2 can be connected with the application-specific source Default: KR0000 (constant R_output)	Value: KR0000 Type: R
b.d. 25	IQ2Z_01.Anz_R2.X	
d563	**Output (Anz_R2)** Display parameter from H562	Type: R
b.d. 25	IQ2Z_01.Anz_R2.Y	
H564	**Input (Anz_R3)** Input for the free KR connector display 3 can be connected with the application-specific source Default: KR0000 (constant R_output)	Value: KR0000 Type: R
b.d. 25	IQ2Z_01.Anz_R3.X	
d565	**Output (Anz_R3)** Display parameter from H564	Type: R
b.d. 25	IQ2Z_01.Anz_R3.Y	
H566	**Input (Anz_R4)** Input for the free KR connector display 4 can be connected with the application-specific source Default: KR0000 (constant R_output)	Value: KR0000 Type: R
b.d. 25	IQ2Z_01.Anz_R4.X	

d567	**Output (Anz_R4)** Display parameter from H566	Type: R
b.d. 25	IQ2Z_01.Anz_R4.Y	
H570	**Input (Anz_B1)** Input for the free binector display 1 can be connected with the application-specific source Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 25	IQ2Z_01.Anz_B1.I	
d571	**Output (Anz_B1)** Display parameter from H570	Type: B
b.d. 25	IQ2Z_01.Anz_B1.Q	
H572	**Input (Anz_B2)** Input for the free binector display 2 can be connected with the application-specific source Default: B2000 (constant digital output)	Value: B2000 Type: B
b.d. 25	IQ2Z_01.Anz_B2.I	
d573	**Output (Anz_B2)** Display parameter from H572	Type: B
b.d. 25	IQ2Z_01.Anz_B2.Q	
H580	**Input (Anz_I1)** Input for the free KR connector display 1 can be connected with the application-specific source Default: K4000 (constant I_output)	Value: K4000 Type: I
b.d. 25	IQ2Z_01.Anz_I1.X	
d581	**Output (Anz_I1)** Display parameter from H580	Type: I
b.d. 25	IQ2Z_01.Anz_I1.Y	
H600	**Enable USS BUS** Enable signal for the USS interface on serial interface X01. An OP1S MASTERDRIVES operator control device or SIMOVIS, e.g. SRT400 solution, can be connected to this USS interface. The USS station address was defined as `0‘ . The baud rate was set to 9600. Please observe the following - the hardware switches S1/1, S1/2 and S1/8 are in the ‘ ON‘ setting - the setting of H601	Value: 1 Type: B
b.d. 14a	IQ1Z_01.B03 .I	
H601	**USS data transfer line** Set the data transfer line at connector X01: 0: RS485/2-wire 1: RS232	Value: 0 Type: B
b.d. 14a	IF_USS.Slave_ZB .WI4	

H602	**Command to re-configure CB** For an SRT400 solution, T400 configures a COMBOARD. For each online configuration, a positive edge is required at H602 (0 →1).	Value: 1 Type: B
b.d. 15, 22a	IF_COM.CB_SRT400 .SET	
H603	**CB station address** Only enter the address if there is a communications board (CBx) in the subrack SRT400, e.g. for PROFIBUS DP: 3,..125.	Value: 3 Type: I
b.d. 15	IF_COM.CB_SRT400 .MAA	
H604	**PPO type (PROFIBUS)** Enters the telegram structure only for the SRT400 solution. This configuring permits the following telegram structure: - PPO type 5 (10 PZD + 4 PKW)	Value: 5 Type: I
b.d. 15	IF_COM.CB_SRT400 .P02	
H610	**Input, positive torque limit** Input, positive torque limit can be connected with the application-specific source. Default: KR0351 (torque limit)	Value: KR0351 Type: R
b.d. 6	SREFZ_07.NC005.X2	
H611	**Input, negative torque limit** Input, negative torque limit can be connected with the application-specific source. Default: KR0351 (torque limit)	Value: KR0351 Type: R
b.d. 6	SREFZ_07.NC004 .X	
H612	**Input, torque limit** Input, torque limit can be connected with the application-specific source. Default: KR0313 (output, tension control)	Value: KR0313 Type: R
b.d. 6	SREFZ_07.NC003.X2	
H650	**Enable, freely-assignable_blocks** Enable for all freely-assignable blocks, which are configured in two cycle groups (T1 = 2ms or T5 = 128ms).	Value: 0 Type: B
b.d. 23a/23b	IQ1Z_01.B04.I	
H800	**Start, point X1** Characteristic 1, abscissa value, point 1	Value: 0.0 Type: R
b.d. 23a	FREI_BST.Kenn_1.A1	
H801	**Start, point Y1** Characteristic 1, ordinate value, point 1	Value: 0.0 Type: R
b.d. 23a	FREI_BST.Kenn_1.B1	
H802	**End, point X2** Characteristic 1, abscissa value, point 2	Value: 1.0 Type: R
b.d. 23a	FREI_BST.Kenn_1.A2	

H803	**End, point Y2**	Value:	0.0
	Characteristic 1, ordinate value, point 2	Type:	R
b.d. 23a	FREI_BST.Kenn_1.B2		
H804	**Input quantity (char_1)**	Value:	KR0000
	Characteristic 1, input variable can be connected with the application-specific source.	Type:	R
	Default: KR0000 (constant R_output, Y=0.0)		
b.d. 23a	FREI_BST.Kenn_1.X		
H805	**Start, point X1**	Value:	0.0
	Characteristic 2, abscissa value, point 1	Type:	R
b.d. 23a	FREI_BST.Kenn_2.A1		
H806	**Start, point Y1**	Value:	0.0
	Characteristic 2, ordinate value, point 1	Type:	R
b.d. 23a	FREI_BST.Kenn_2.B1		
H807	**End, point X2**	Value:	1.0
	Characteristic 2, abscissa value, point 2	Type:	R
b.d. 23a	FREI_BST.Kenn_2 .A2		
H808	**End, point Y2**	Value:	0.0
	Characteristic 2, ordinate value, point 2	Type:	R
b.d. 23a	FREI_BST.Kenn_2.B2		
H809	**Input quantity (char_2)**	Value:	KR0000
	Characteristic 2, input variable can be connected with the application-specific source.	Type:	R
	Default: KR0000 (constant R_output, Y = 0.0)		
b.d. 23a	FREI_BST.Kenn_2.X		
H810	**Input 1 (MUL_1)**	Value:	KR0000
	Input 1 for multiplier 1 can be connected with the application-specific source.	Type:	R
	Default: KR0000 (constant R_output, Y = 0.0)		
b.d. 23a	FREI_BST.MUL_1.X1		
H811	**Input 2 (MUL_1)**	Value:	KR0000
	Input 2 for multiplier 1 can be connected with the application-specific source.	Type:	R
	Default: KR0000 (constant R_output, Y = 0.0)		
b.d. 23a	FREI_BST.MUL_1.X2		
H812	**Input 1 (MUL_2)**	Value:	KR0000
	Input 1 for multiplier 2 can be connected with the application-specific source.	Type:	R
	Default: KR0000 (constant R_output, Y = 0.0)		
b.d. 23a	FREI_BST.MUL_2.X1		

H813	**Input 2 (MUL_2)** Input 2 for multiplier 2 can be connected with the application-specific source. Default: KR0000 (constant R_output, Y = 0.0)	Value: Type:	KR0000 R
b.d. 23a	FREI_BST.MUL_2.X2		
H814	**Fixed setpoint_1** Freely-assignable block for application-specific fixed setpoint	Value: Type:	0.0 R
b.d. 23b	FREI_BST.Fest_SW_1.X		
H815	**Fixed setpoint_2** Freely-assignable block for application-specific fixed setpoint	Value: Type:	0.0 R
b.d. 23b	FREI_BST.Fest_SW_2.X		
H816	**Fixed setpoint_3** Freely-assignable block for application-specific fixed setpoint	Value: Type:	0.0 R
b.d. 23b	FREI_BST.Fest_SW_3 .X		
H820	**Input 1 (UMS_1)** Input 1 for numerical changeover switch 1 can be connected with the application-specific source. Default: KR0000 (constant R_output, Y = 0.0)	Value: Type:	KR0000 R
b.d. 23a	FREI_BST.UMS_1.X1		
H821	**Input 2 (UMS_1)** Input 2 for numerical changeover switch 1 can be connected with the application-specific source. Default: KR0000 (constant R_output, Y = 0.0)	Value: Type:	KR0000 R
b.d. 23a	FREI_BST.UMS_1.X2		
H822	**Switch signal (UMS_1)** The input switch signal for numerical changeover switch 1 can be connected with the application-specific source. Default: B2000 (constant B_output, Y = 0)	Value: Type:	B2000 B
b.d. 23a	FREI_BST.UMS_1.I		
H823	**Input 1 (UMS_2)** Input 1 for numerical changeover switch 2 can be connected with the application-specific source. Default: KR0000 (constant R_output, Y = 0.0)	Value: Type:	KR0000 R
b.d. 23a	FREI_BST.UMS_2.X1		
H824	**Input 2 (UMS_2)** Input 2 for numerical changeover switch 2 can be connected with the application-specific source. Default: KR0000 (constant R_output, Y = 0.0)	Value: Type:	KR0000 R
b.d. 23a	FREI_BST.UMS_2.X2		

H825	**Switch signal (UMS_2)**	Value: B2000
	The input switch signal for numerical changeover switch 2 can be connected with the application-specific source.	Type: B
	Default: B2000 (constant B_output, Y = 0)	
b.d. 23a	FREI_BST.UMS_2.I	
H826	**Input 1 (UMS_3)**	Value: KR0000
	Input 1 for numerical changeover switch 3 can be connected with the application-specific source.	Type: R
	Default: KR0000 (constant R_output, Y=0,0)	
b.d. 23a	FREI_BST.UMS_3.X1	
H827	**Input 2 (UMS_3)**	Value: KR0000
	Input 2 for numerical changeover switch 3 can be connected with the application-specific source.	Type: R
	Default: KR0000 (constant R_output, Y=0,0)	
b.d. 23a	FREI_BST.UMS_3.X2	
H828	**Switch signal (UMS_3)**	Value: B2000
	The input switch signal for numerical changeover switch 3 can be connected with the application-specific source.	Type: B
	Default: B2000 (constant B_output, Y=0)	
b.d. 23a	FREI_BST.UMS_3.I	
H840	**Input 1 (ADD_1)**	Value: KR0000
	Input 1 for adder 1 can be connected with the application-specific source.	Type: R
	Default: KR0000 (constant R_output, Y = 0.0)	
b.d. 23a	FREI_BST.ADD_1.X1	
H841	**Input 2 (ADD_1)**	Value: KR0000
	Input 2 for adder 1 can be connected with the application-specific source.	Type: R
	Default: KR0000 (constant R_output, Y = 0.0)	
b.d. 23a	FREI_BST.ADD_1.X2	
H845	**Input 1 (SUB_1)**	Value: KR0000
	Input 1 for subtractor 1 can be connected with the application-specific source.	Type: R
	Default: KR0000 (constant R_output, Y = 0.0)	
b.d. 23a	FREI_BST.SUB_1.X1	
H846	**Input 2 (SUB_1)**	Value: KR0000
	Input 2 for multiplier 1 can be connected with the application-specific source.	Type: R
	Default: KR0000 (constant R_output, Y = 0.0)	
b.d. 23a	FREI_BST.SUB_1.X2	
H850	**Input (INT)**	Value: 0.0
	Input quantity for the integrator can be an application-specific constant value	Type: R
b.d. 23b	FREI_BST.INT.X	

H851	**Upper limit value (INT)** Upper limit of the integrator	Value: 0.0 Type: R
b.d. 23b	FREI_BST.INT.LU	
H852	**Lower limit value (INT)** Lower limit of the integrator	Value: 0.0 Type: R
b.d. 23b	FREI_BST.INT.LL	
H853	**Integrating time (INT)** Integrating time constant of the integrator	Value: 0 Type: R Unit.: ms
b.d. 23b	FREI_BST.INT.TI	
H854	**Setting value (INT)** The setting value input for the integrator can be connected to the application-specific source. Default: KR0000 (constant R_output, Y=0,0)	Value: KR0000 Type: R
b.d. 23b	FREI_BST.INT.SV	
H855	**Set (INT)** The set input for the integrator can be connected to the application-specific source. Default: B2000 (constant B_output, Y=0,0)	Value: B2000 Type: B
b.d. 23a	FREI_BST.INT.S	
H856	**Input (LIM)** The input for the limiter can be connected to the application-specific source. Default: KR0000 (constant R_output, Y=0,0)	Value: KR0000 Type: R
b.d. 23b	FREI_BST.LIM.X	
H857	**Upper limit value (LIM)** The "upper limit value" for the limiter can be connected with the application-specific source. Default: KR0000 (constant R_output, Y=0,0)	Value: KR0000 Type: R
b.d. 23b	FREI_BST.LIM.LU	
H858	**Lower limit value (LIM)** The "lower limit value" for the limiter can be connected with the application-specific source. Default: KR0000 (constant R_output, Y=0,0)	Value: KR0000 Type: R
b.d. 23b	FREI_BST.LIM.LL	
H860	**Input (EinV)** The input for the switch-on delay stage can be connected with the application-specific source. Default: B2000 (constant B_output, Y=0)	Value: B2000 Type: B
b.d. 23b	FREI_BST.EinV.I	
H861	**Delay time (EinV)** Pulse delay time for the switch-on delay stage	Value: 0 Type: R Unit.: ms
b.d. 23b	FREI_BST.EinV.T	

H862	**Input (AusV)** The input for the switch-off delay stage can be connected with the application-specific source. Default: B2000 (constant B_output, Y=0)	Value: B2000 Type: B
b.d. 23b	FREI_BST.AusV.I	
H863	**Delay time (AusV)** Pulse delay time for the switch-off delay stage	Value: 0 Type: R Unit: ms
b.d. 23b	FREI_BST.AusV.T	
H864	**Input (ImpV)** The input for the pulse shortening stage can be connected with the application-specific source. Default: B2000 (constant B_output, Y=0)	Value: B2000 Type: B
b.d. 23b	FREI_BST.ImpV.I	
H865	**Delay time (ImpV)** Pulse delay time for the pulse shortener stage	Value: 0 Type: R Unit: ms
b.d. 23b	FREI_BST.ImpV.T	
H866	**Input (ImpB)** The input for the pulse generator can be connected to the application-specific source. Default: B2000 (constant B_output, Y=0)	Value: B2000 Type: B
b.d. 23b	FREI_BST.ImpB.I	
H867	**Pulse duration (ImpB)** Pulse duration for the pulse generator	Value: 0 Type: R Unit: ms
b.d. 23b	FREI_BST.ImpB.T	
H868	**Input (Inv)** The input for the pulse inverter can be connected to the application-specific source. Default: B2000 (constant B_output, Y=0)	Value: B2000 Type: B
b.d. 23b	FREI_BST.Invt.I	
H870	**Input 1 (AND_1)** Input 1 for the logical AND can be connected with the application-specific source . Default: B2001 (constant B_output)	Value: B2001 Type: B
b.d. 23b	FREI_BST.AND_1.I1	
H871	**Input 2 (AND_1)** Input 2 for the logical AND can be connected with the application-specific source . Default: B2001 (constant B_output)	Value: B2001 Type: B
b.d. 23b	FREI_BST.AND_1.I2	
H876	**Input 1 (OR_1)** Input 1 for the logical OR can be connected with the application-specific source Default: B2000 (constant B_output)	Value: B2000 Type: B
b.d. 23b	FREI_BST.OR_1.I1	

H877	**Input 2 (OR_1)**	Value: B2000
	Input 2 for the logical OR can be connected with the application-specific source .	Type: B
	Default: B2000 (constant B_output)	
b.d. 23b	FREI_BST.OR_1.I2	
H880	**Input 1 (comp.)**	Value: KR0000
	Input 1 (H880) is compared with input 2 (H881).	Type: R
	Input 1 for the numerical comparator can be connected with the application-specific source.	
b.d. 23b	Default: KR0000 (constant R_output)	
	FREI_BST.Vergl.X1	
H881	**Input 2 (comp.)**	Value: KR0000
	Input 2 for the numerical comparator can be connected with the application-specific source.	Type: R
	Default: KR0000 (constant R_output)	
b.d. 23b	FREI_BST.Vergl.X2	
H883	**Input (smooth)**	Value: KR0000
	Input for the PT1 element (smoothing block) can be connected with the application-specific source.	Type: R
	Default: KR0000 (constant R_output)	
b.d. 23b	FREI_BST.Glaet.X	
H884	**Smoothing time (smooth)**	Value: 0
	Time constant for the smoothing block (PT1 element)	Type: R
		Units. ms
b.d. 23b	FREI_BST.Glaet.T	
H885	**Setting value (smooth)**	Value: KR0000
	The setting value is output at the smoothing block if the setting (H886) is a logical 1, i.e. for H886=1, KR0883 = H885. The input for the setting value can be connected with the application-specific source .	Type: R
	Default: KR0000 (constant R_output)	
b.d. 23b	FREI_BST.Glaet.SV	
H886	**Setting (smooth)**	Value: B2000
	The input for setting can be connected with the applic ation-specific source.	Type: B
	Default: B2000 (constant B_output)	
b.d. 23b	FREI_BST.Glaet.S	
H997	**Drive number**	Value: 0
	Drive ID for documentation purposes	Type: I
b.d. 4	PARAMZ_01.DRNR.X	
d998	**SIMADYN D**	Value: 80
	Reserved for automatic identification of a SIMADYN D module	Type: I
b.d. 4	PARAMZ_01.Simadyn.Y	

6 Base drive parameters

Prerequisite H282 = 0

For parameter H282=0, the closed-loop speed- and torque control are computed on the base drive. The sum of the speed setpoints is entered directly in front of the speed controller; the ramp-function generator on the T400 technology module is used, and the torques are entered as supplementary signal or as limits.

Advantages

- The best configuration from the dynamic performance standpoint, lowest deadtimes;
- The speed controller optimization routine of the base drive can be used;
- Start-up can initially be made without the T400.

CU VC		CU MC		CU D1		Word. Bit	Explanation
Param.	Value	Param.	Value	Param.	Value		
P100	4						Selects the control type
		P290	0	P169/P170	0/1		Selects the torque/current control
				P648	9		Source for control word 1
				P649	9		Source for control word 2
P554	3100	P554	3100	P654	3100	Word 1.0	On command (main contactor)
P555	3101	P555	3101	P655	3101	Word 1.2	Off2
P558	3102	P558	3102	P658	3102	Word 1.2	Off3
P561 Note	3103	P561 Note	3103	P661	3103	Word 1.3	Pulse enable , refer to Note
P565	3107	P565	3107	P665	3107	Word 1.7	Acknowledge fault
P575	3115	P575	3115	P675	3115	Word 1.15	External fault
P443	3002	P443	3002	P625	3002	Word 2	Speed setpoint
P585	3409	P585	3409	P685	3409	Word 4.9	Speed controller enable
P506	3005	P262	3005	P501	3005	Word 5	Supplementary torque setpoint
P493	3006	P265	3006	P605	3006	Word 6	Positive torque limit
P499	3007	P266	3007	P606	3007	Word 7	Negative torque limit
P232	3008	P232	3008	P553	3008	Word 8	Variable moment of inertia
P734.01	32	P734.01	32	U734.01	32	Word 1	Status word 1 (b.d. 22)
P734.02	148	P734.02	91	U734.02	167	Word 2	Receive word 2 (free)
P734.03	0	P734.03	0	U734.03	0	Word 3	Receive word 3 (free)
P734.04		P734.04		U734.04		Word 4	Status word 2 (not used)
P734.05	165	P734.05	165	U734.05	141	Word 5	Torque setpoint
P734.06	24	P734.06	241	U734.06	142	Word 6	Torque actual value, smoothed
P233	H150	P233	H150	P556	H150		Start of adaptation $J_{v\ start}$
P234	H152	P234	H152	P559	H152		End point of adaptation $J_{v\ end}$
P235	H151	P235	H151	P550	H151		Kp adapt. min., speed controller
P236	H153	P236	H153	P225	H153		Kp adapt. max., speed controller

P151	H212	P151	H212	P141	H212		Pulse No. axial tach., speed act.val.
P353	H214	P353	H214	P143	H214		Rated speed, shaft tachom. for n_{act}

Table 6-1 Parameter setting

Note If the open-loop brake control function of CUVC/MC is used, the following parameter settings are required:

H510 = B2509 (no operating enable)

H519 = B2001 (constant digital output)

P561 = 278 (inverter enable from the brake)

P614 = 3400 (no operating enable)

7 Commissioning the winder

Information and instructions are provided in this Chapter, which should allow the axial winder to be started up as quickly as possible.

Warning

Only start to commission the system, if adequate and effective measures have been made to safely operate the system and the drive both electrically and mechanically.
Carefully check that all of the safety- and EMERGENCY OFF signals are connected and are effective, so that the drive can be shutdown at any time.

Procedure

- Commission the base drive and install the supplementary modules used according to the appropriate Instruction Manuals.
- The drive converters are always operated in the closed-loop speed controlled mode (e.g. for CUVC P100=4); the speed is sensed at the base drive. The pulse encoder is connected to the base drive and the pulse signals are transferred to the T400 via the backplane bus (H217=7FC2).
- For the axial winder, two optimization runs should be made for the speed controller (one only with the mandrel and the other, as far as possible, with a full roll), before the drive converter is re-parameterized for the standard software package (SPW420).
- Parameterize the drive converter, refer to Table 6-1.

Caution It is only possible to commission the winder, after the base drive has been correctly commissioned.

7.1 Information on commissioning

All of the settings to parameterize this standard software package, are made via the technology parameters " Hxxx" .

The standard software package monitors the communications to CUxy, CBx and to its own serial peer to peer interface.
Errors which occur, are always signaled as alarm and fault messages; they can be suppressed using H011 and H012.

7.1.1 Resources used for adaptation and commissioning

Tools

Various resources are available to adapt the standard software package to the particular application.

Name	Explanation
PMU	Input field for all MASTERDRIVES- and DC Master units (with 4-digit display)
OP1S	Operator control device with numerical keypad and 4-line text display; this can be directly connected to the PMU .
SIMOVIS	Commissioning and parameterizing software for the PC (Windows). It also offers an oscilloscope function for MASTERDRIVES MC/VC and DC-MASTER.
CFC	Graphic configuring/engineering tool which was used to generate the standard software package. This is connected to the service interface of the T400 . Prerequisite: STEP 7; D7-SYS
Service-IBS	Basic commissioning- and diagnostics tool for PC (DOS). It is also available as Telemaster for remote diagnostics .

Table 7-1 Adaptation- and commissioning tools

Comparison

The resources essentially differ by the intervention possibilities which are shown in the following table .

Intervention	CFC	PMU	OP1S	SIMOVIS	Service-IBS
View value	Any	Parameter	Parameter	Parameter	Any
Change value	Any	Parameter	Parameter	Parameter	Any
Change connection	Any	BICO (with restrictions)	BICO	BICO	Any
Insert block	Yes	No	No	No	No
Delete block	yes	No	No	No	No
Change execution sequence	Yes	No	No	No	No
Change cycle time for processing	Yes	No	No	No	No
Duplicate software	Yes	No	No	No	No
Duplicate complete parameter set	No	No	No	Yes	(Macro)
Documentation	Charts	No	No	Parameter lists	No

Table 7-2 Comparison of the adaptation- and commissioning tools

7.1.2 Specification of the parameter numbers

In addition to the technology parameters, for the drive converters used, there are so-called basic drive parameters. These should be taken from the associated function charts of the documentation of the drive converter used .

Note It should be observed that parameters are selected by entering the number (e.g. at the drive converter operator panel). When displayed, the most significant position is replaced by a letter, which indicates whether it involves a quantity which can be changed or not changed.

Example In order to select technology parameter "H956", "1956" is entered.

Value-range	Significance	Parameter display (example)	
		can be changed	cannot be changed
0 ... 999	Lower parameter range of the drive converter	P123	r123
1000 ... 1999	Lower parameter range of the T400	H123	d123
2000 ... 2999	Upper parameter range of the drive converter	U123	n123
3000 ... 3999	Upper parameter range of the T400	L123	c123

Table 7-3 Parameter number specification

7.1.3 BICO technology

BICO parameters This standard software package is extremely flexible when it comes to the freely connectable input- and output signals using BICO technology. Contrary to (value) parameters, BICO parameters define connections. This means that parameters specify a fixed value at an input, whereby BICO parameters select the signal source, which is connected with the input. This signal source must be defined in the (Fig. 7-1)

Caution The source and destination of a BICO connection must have the same data type. Thus, there are different symbols for connectors and BICO inputs in the function charts for each data type used.

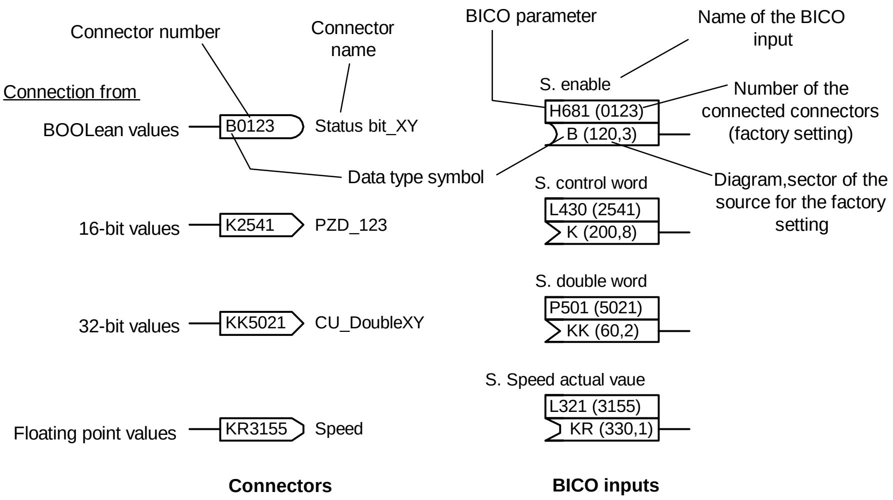


Fig. 7-1 Symbols for connectors and BICO inputs

7.1.4 Establishing the factory setting

Applications

” Establish factory setting” is not required for a ” standard” start-up, as the SPW420 is shipped on the T400 with the factory setting.

The factory setting can be re-established, if there is, for example, uncertainty about the parameterization, or it is not possible to change any more parameters. All of the parameters are reset to the factory setting. The T400 must be appropriately parameterized for the new plant/system or a parameter set must be read-in (e.g. using SIMOVIS) .

Parameterization

The factory setting is established as follows, whereby the memory type (RAM or EEPROM, this only involves SIMOVIS) is of no significance:

H250=165
set H160 from 0 to 1
power-down the drive converter

Note

The factory setting only becomes effective after the equipment has been powered-up again (with the exception of H160). We recommend that H160 is power-up again.

Measures for a full EEPROM (parameter changes are no longer possible):

1) A PC with SIMOVIS is required.
2) SIMOVIS: Changeover the SIMOVIS memory type from EEPROM to RAM by clicking on the RAM symbol in the main menu.
3) ” Establish factory setting” (as described above; after powering-up again, H160 is now 0).
4) Then changeover the SIMOVIS memory type back to EEPROM.

7.2 Commissioning the winder functions

7.2.1 Checking the speed actual value calibration

Principle

The maximum speed is obtained at the maximum web velocity and the minimum diameter (also refer to Chapter 3.2.2).

$n = n_{max}$, if web velocity = 1.0 and diameter = D_{core} = H222

Procedure

- closed-loop velocity controlled operation of the winder, e.g. by selecting local operation and local inching forwards. The required inching setpoint is entered with H143. Local, closed-loop velocity controlled operation is selected with H146=0.
- enter the actual diameter as setting value and select via H089, activate the setting command, check via d310. For winding, generally the core diameter H222 (empty mandrel) is used as reference and then H089 should be set to connector KR0222.
- ramp-up the web velocity setpoints to a defined low value, e.g. 0.10 (check at d344).
- check the circumferential velocity at the roll using the handheld tachometer.
- if required, correct the speed calibration (H214 on the T400 or Pxxx in the basic drive, refer to Table 6-1) (refer to Chapter 3.2.2)

Caution

After each significant change in the speed actual value calibration, the speed controller must be re-optimized with an empty roll.

- check the polarity of the speed actual value and if required change.
- check the torque direction. When the winder is rotating in the direction of the material web and "winding from above", the speed actual value and torque setpoint must be positive; refer to Chapter 4.5.

7.2.2 Compensation, friction torque (block diagram 9b)

Note

Generally, the friction component is dependent on the shaft speed of the winder. For most winder designs, the weight of the wound material only has a low influence.

Principle

The friction compensation can only compensate for friction values, which are speed-dependent, but which otherwise do not change. Frequently, especially for high gearbox ratios, the friction torque is strongly dependent on the gearbox temperature. This can mean that friction compensation is either difficult or is just not practical.

For some gearbox designs, high mandrel speeds cause the gearbox temperature to increase to some extent. This temperature rise results in a significantly different friction torque. We recommend that the measuring time when plotting the friction characteristic is kept as short as possible – later, when winding, high shaft speeds only occur briefly.

Under certain circumstances, after the first commissioning, it may be necessary to post-optimize the friction characteristic (from experience winders are " run-in" after between 2 and 30 operating hours).

When using gearbox stage 2, the friction characteristic output, based on gearbox stage 1, should be adapted using H229 or H128.

Applications

A friction compensation should be set, especially for indirect tension control techniques. The winder is operated without any material when plotting the friction characteristic.

When using the direct tension control with a tension transducer or dancer roll, frequently, it is not necessary to parameterize the friction characteristic. However, it makes it easier to set the inertia compensation and tension pre-control.

Caution

If the friction compensation has been set too high, the winder can start to run, and, when unwinding using indirect tension control, can result in slack in the material web.

7.2.2.1 Friction characteristic

Procedure

- closed-loop speed controlled operation of the winder, e.g. local operation and local inching forwards mode are selected. The required inching setpoint is entered using H143. Local, closed-loop speed controlled operation is selected with H146=1.
- check the setpoint entered at d307 (n_act).
- read the torque setpoint at d331; the measurement result should be evaluated only after 10-20 seconds. The torque setpoint is smoothed using H162, basic setting 0.5 s.
- the pre-control for inertia compensation is disabled with H227=0.0 and H228=0.0 (pre-settings).
- measurement and reading-out as in the following table

H143 speed d307	Input	Setting H230-235 read d331
0.0	H143=0.0	Select H230, so that the winder is just about to run, or comes to a standstill at a low speed. Then enter the value read at d331 into H230
0.2	H143=0.2	Enter the value read at d331 into H231
0.4	H143=0.4	Enter the value read at d331 into H232
0.6	H143=0.6	Enter the value read at d331 into H233
0.8	H143=0.8	Enter the value read at d331 into H234
1.0	H143=1.0	Enter the value read at d331 into H235

Table7-4 Generating the friction characteristic

– after the points for the friction characteristic have been entered, the calibration should be checked at various speeds. After the acceleration sequence has decayed, the torque setpoint, monitored at d331, should be $\leq$ 2%.

– if gearbox stage 2 is used, a minimum of the 2 above mentioned points should be used in order to define adaptation factor H229 or H128.

7.2.3 Compensating the accelerating torque (block diagram 9b)

Applications

The inertia compensation should be set for winders with indirect tension control, and for direct tension control, with tension transducer, if the accelerating torque cannot be neglected with respect to the other torque. For closed-loop dancer roll controls, generally it is not necessary to compensate the accelerating torque.

Prerequisite

If the compensation friction torque is required, the friction characteristic must be carefully commissioned, refer to Section 7.2.2.

Procedure

General procedure for inertia compensation:

– system operation of the winder, e.g. by connecting H069 to connector KR0068. The required velocity setpoint is entered using H068.

– enter the actual diameter as setting value and select via H089, activate the setting command, check using d310.

– enter a ramp-up/ramp-down time at H133/H134, which corresponds to the system acceleration time.

– select H220 so that it also corresponds to the system acceleration time

– when the on command ("OFF1" and "system start") is activated, an up ramp is started, the I component of the speed controller in the basic drive is monitored when accelerating, e.g. for CUVC via r033 (P032.01=155). The average value of R033 is generated in the interval between 0.1 and 0.9 of the specified speed setpoint.

– the winder is then operated without "material web" with respect to the remaining machine.

– gearbox stage 1 is always used.

7.2.3.1 Constant moment of inertia, H228

Principle

We recommend that the fixed moment of inertia is calculated according to Chapter 4.2.1.

Procedure

Determine H228 by accelerating along a defined ramp:

– disable the variable moment of inertia with H227=0.0.

– insert the mandrel with core, set the core diameter and check at d310.

- enter a setpoint with H068 and activate the "OFF1" and "System start" commands.
- read-out r033 (for CUVC, P032.01=155) in the range from 10-90% of the speed setpoint.
- enter the monitored average value of r33, multiplied by D_{core}/D_{max} in parameter H228. Or, parameter H228 is adjusted until the I component of the speed control r033 (for CUVC) goes to 0%.
- repeat the measurement; the value displayed at r033 must now be extremely low (≤ 2%).

Note Different values at d331 for ramp-up and ramp-down signify that the friction component has not been precisely compensated.

7.2.3.2 Variable moment of inertia, H227

Principle Also here, we recommend that parameter H227 is first calculated corresponding to Chapter 4.2.2. For gearboxes with a high ratio, frequently the component of the variable moment of inertia can be neglected.

Procedure Determine H227 by accelerating along a defined ramp:

- insert a roll which is as full as possible, set the diameter to the actual value and check at d310. Enter the web width (H079, possibly 1.0) and the material density (H224, possibly 1.0).
- enter a setpoint using H068, and activate the command "OFF1" and "System start".
- read-out r033 (for CUVC, P032.01 = 155) in the range 10-90% of the speed setpoint.
- enter the monitored average value (in the floating point format) at H227. *Or*, parameter H227 is adjusted until the I component of the speed controller r033 goes to 0 % (for CUVC).
- repeat the measurement, the value displayed at r033, must now be extremely low (≤ 2%).

Note A changeover to gearbox stage 2 is taken into account when computing the variable moment of inertia.

7.2.4 Setting the Kp adaptation for the speed control

Measure required The proportional gain of the speed controller should generally be adapted to the variable moment of inertia. For a ratio of D_{max}/D_{min} > 3 to 4, it is absolutely necessary to optimize the kp adaptation in order to achieve good winding characteristics and fast commissioning.

Procedure Using the "Set diameter" and the "Diameter setting value" commands, refer to Sheet 9 a of the block diagram, enter the diameter which corresponds to the diameter of the roll at the machine, and that value for which the speed controller should be optimized. Generally, this is the core diameter and the maximum diameter (the largest possible diameter). Always check the entered diameter using d310!

Adaptation is carried-out using a polygon characteristic with 2 points, which can be parameterized. The variable moment of inertia is the input variable of the characteristic. The starting and end points of the appropriate adaptation should be determined.

Selection: T400 or CU

H282 can be used to select whether the speed controller is used on the T400 or in the base drive. In this case, set the Kp adaptation on the appropriate module (T400 or CU), refer to Chapter 3.4.2.2.

7.2.4.1 Setting on the T400

H282 = 1

Characteristic parameters which should be set:

$K_{p\ min}$	H151	controller gain for an empty roll J_v=0.0
$K_{p\ max}$	H153	controller gain for a full roll
$J_{v\ start}$	H150	starting point of the adaptation, generally at 0.0
$J_{v\ end}$	H152	end point of the adaptation, generally at 1.0

Determining H153

Use a roll which is as full as possible, with the full width and maximum specific weight, set the diameter and check at d310. Carry-out the optimization routine for the speed controller.

H153 = determined K_p * 1.0 / d308

The value for the variable moment of inertia can then also be determined via the measured diameter. $J_v[\%] \approx D^4[\%] - D_{core}[\%]$.

7.2.4.2 Setting for CUVC or CUMC

Procedure

Refer to the block diagram of CUVC or CUMC, (Sheet 360 in Lit. [2-3] and Table 3-13 or Table 6-1 in this Manual:

- P233=0%; P234=100% (corresponding to H152 = 1.0)
- for an empty (smallest) mandrel, the speed controller kp is optimized as usual using parameter P235.
- optimize the speed controller again using P236 with the largest possible diameter, web width and specific weight.

The effective kp can be read at parameter r237 of the base drive.

7.2.5 Setting the tension or dancer roll controller (block diagram 7/8)

For tension transducer

When the tension is measured using a tension transducer:

- check the control sense corresponding to the recommended configuring. If the polarity (sign) is incorrect, either re-connect at the analog input, or invert the polarity using a multiplier function.

- a possible tension transducer offset can be compensated using H179=1. The instantaneous tension actual value is saved and can be subsequently subtracted as offset by activating the control signal " Hold diameter" when the tension controller is inactive.

- the maximum input voltage at the analog input for the tension actual value should not exceed 9 V. The input must be calibrated, using the appropriate multiplier, so that the maximum value of 1.0 corresponds, display parameter d311.

- select the tension setpoint using H081, calibrate to 1.0 for the maximum tension setpoint. A supplementary tension setpoint can be selected using H083 and this is added after the ramp-function generator for the main setpoint. Display parameter for the total setpoint d304.

- parameterize the ramp-function generator for the tension setpoint using H175 and H176.

Example

Tension actual value at terminals 94/99, maximum value 9 V

Calibration: 9V corresponds to 1.0 ⇒ H054 = 10V / 9V = 1.11

For dancer roll

For dancer roll control:

- enter a fixed position reference value at H080 with the standard connection from KR0081; the setpoint corresponds to the center dancer roll position. When the winding hardness characteristic is used as output signal for dancer roll support, the main setpoint is disconnected with H244=1, and the position reference value is entered via supplementary setpoint with H082 and H083.

- the range for the analog dancer roll position input voltage is normalized to 1.0 at maximum voltage.

Example

10V voltage range, 5V dancer roll center voltage, actual value at terminals 94/99 =0V when the dancer is at the bottom and 10V when the dancer roll is at the top.

A winder runs too quickly if the actual value > 5V and too slowly for actual values < 5V; for unwinder, this is the other way round. The position reference value H080 is set to 0.5, the normalization of the analog input with H058 to 1.0.

- the winding hardness characteristic should be disabled using H206=1.

- for the dancer roll control, H190 can be used to realize tension pre-control via the torque limits (H203=2). The main tension setpoint is multiplied by the diameter and H190, and added to the controller output.

- alternatively, pre-control can also be realized, if the web tension is not available, or is not known. In this case, it is necessary that a pressure actual value is received from the dancer roll which is read-in via analog input 5. In this case a negative adaptation factor H190 must be entered.

– the D controller for the position controller must enabled with H174=0; this is generally always required for dancer roll position controls, in order to prevent the dancer roll oscillating. When optimizing the D controller, starting from the pre-setting, it is preferable change H173; for the correct setting, the dancer roll must remain steady, with the exception of mechanical influences.

Checking the control sense

– system operation with low web velocity.

– set the correct diameter and enable the tension control.

– check the control sense according to the following table

Tension transducer	Dancer roll	Winder	Unwinder
Actual value > setpoint	-	Too fast	Too slow
Actual value < setpoint	-	Too slow	Too fast
-	Above, ref. to Fig. 7-2	Too fast	Too slow
-	Below, ref. to Fig. 7-2	Too slow	Too fast

Table 7-5 Checking the control sense

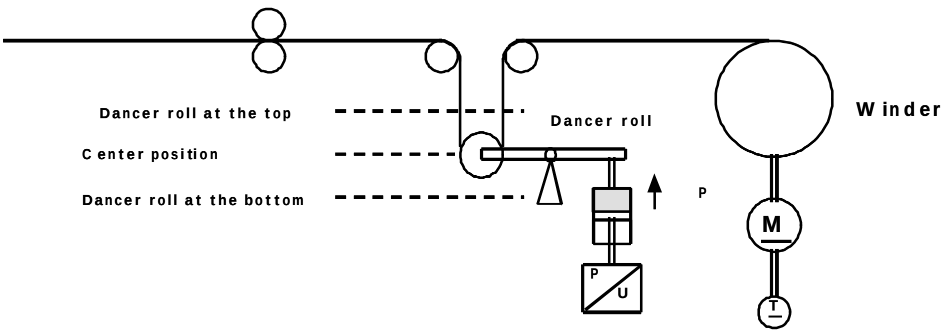


Fig. 7-2 Dancer roll position for dancer roll position controls

7.2.6 Setting the tension controller, Kp adaptation

Required for H203=1.2

Adaptation to the variable moment of inertia is required for torque limiting controls with direct tension measurement, operating modes H203=1.2.

The indirect tension control (H203=0) requires no adaptation and no tension controller setting.

For the speed correction control (H203=3.5) it is not permissible that the adaptation is set, in this case the Kp value from H197 is valid for the complete range.

Note When parameterizing the Kp-characteristic, essentially proceed as described in Chapter 7.2.4.

Optimizing the tension controller

Then tension controller is optimized using the usual technique, e.g. by entering a small supplementary tension setpoint and monitoring the speed actual value. A damped oscillation must always be observed. When entering a step function of a setpoint for other quantities, e.g. the speed setpoint, the same results must be obtained.

Optimization should be carried-out for various diameters.

Experience values for the controller setting:

Kp for the speed correction control:	0.1 – 0.3
Kp for torque limiting control and Dmin:	0.1 - 0.3
T_N for torque limiting control:	0.5 - 1 s

Note For speed correction control, the tension controller output (d313) in standard operation ≈ 0.0 (web stretch); for torque limiting control, the output moves between the torque setpoint and 0.0, dependent on the friction compensation.

7.2.7 Setting the saturation setpoint H145

Note

- for speed correction control, H145=0.0
- for torque limiting control H145=0.03 ... 0.10. The value should be selected so that the speed controller is always at its limit under normal operating conditions. The speed controller only leaves its limit when the web breaks, thus preventing the winder from accelerating to inadmissible high speeds.
- for unwinder, it is practical if a low overcontrol value is selected. This means that the tension controller can then always be directly switched-in, even if there is slack in the material web. The drive slowly rotates backwards, tensioning the material web.

7.2.8 Setting the braking characteristic H256-259

Braking characteristic

The braking characteristic is used to shutdown the drive, without any overshoot, for fast stop (OFF3). In this case, the braking torque is limited to a maximum value (H259). If the drive falls below a specific speed (H258), the braking torque is reduced, until it has reached a lower value (H257) at an additional speed (H256).

This measure means that a high braking torque can be achieved, and also a clean shutdown in the vicinity of zero speed.

Effectiveness

Variable moments of inertia for winder drives are handled by setting the fast stop ramp-down time (P466 in the base drive, CUVC), so that the drive still does not reach the torque limit, at approximately half the diameter and is cleanly shutdown using the closed-loop speed control. For higher diameters and moments of inertia, the braking characteristic becomes effective and the braking time is appropriately extended.

If this function is not required, then 2.0 can be entered in H257 and H259.

7.3 Operation with the communications module (CBP/CB1)

Factory setting

The factory setting assumes **no** communication module which is at slot 3 (center!), i.e. PROFIBUS communications is not enabled and alarm / fault messages are suppressed.

Enable

If there is a communications module, then this must be taken into account with the following parameters

- H288 =1: PROFIBUS enable,
- H011: Enable alarm suppression (bit6=1)
- H012: Enable fault suppression (bit6=1)
- H495-H496 telegram monitoring time

Suppression

Suppresses this alarm and fault (all others are effective):
- H011= BF
- H012= BF

Otherwise, a message will occur on PMU

- alarm A103
- fault F122

Note

Refer to Chapter 8.2

T400 in the SRT400

In addition to setting parameters H288, H495 and H496, other parameters H602-H604 are required to initialize the COMBOARD, also refer to Chapter 2.1.2.

7.4 Operation with peer-to-peer

Factory setting

The factory setting assumes that data is **not** received via peer-to-peer.

Enable

If **a** peer-to-peer link is required, the following parameters must be adapted:

- H289 =1: Peer-to-peer enable,
- H011: Enable alarm suppression (bit7=1)
- H012: Enable fault suppression (bit8=1)
- H246-H247 telegram monitoring time

Suppression

Suppresses this alarm and fault (or others are effective) with bit7=0 in H011 and H012:

- H011= 7F
- H012= 7F

Otherwise, the following message is displayed on the PMU in the drive converter:
- alarm A104 and
- fault F123

Note

Refer to Chapter 8.2

7.5 Operation with USS slave

T400 in the SRT400

The factory setting assumes **one** USS slave connection. This interface is only used for parameterization in special cases where the T400 is used in the SRT400 subrack. In this case, the following setting is required (refer to Table 2-7 in Chapter 2.1.4):

- H600 =1: USS slave enable
- H 601=0: RS485/2 wire
- S1/8 on T400 into the ' ON' position

Fixed setting in the software package:

- baud rate: 9600
- station address: 0

7.6 Operation with free function blocks

Factory setting

The factory setting assumes that **non** of the free blocks **are being used**.

Enable

The following points must be observed if a customer-specific function is also to be implemented using free function blocks:

- H650 =1: Enable free function blocks
- all of the free blocks are shown in block diagram 23a/b . This is sub-divided into two cycle times (T1=2ms and T5=128ms). All of the parameter- and binector/connector numbers are listed in Chapter 5 and summarized in Table 10-2 and Table 10-3.
- when parameterizing, please observe the run sequence (e.g. T1(3) in block diagram 23a/b of the free blocks.

8 Diagnostic LEDs, alarms, faults

8.1 Diagnostic LEDs on the T400

LED on the T400

The T400 has 3 LEDs: red, yellow and green.

Red LED

The red LED flashes if the T400 software is being processed. This LED must always flash, even if the T400 has not logged-on with the CU in the drive.

T400 status	Flash type	Flash frequency (Hz)
RUN	Slow	1.25
Fault/error ▪ User stop ▪ Communications error ▪ Computation time overflow ▪ Hardware monitoring error	Medium	2.5
Initialization error	Fast	5
System error	Steady	

Table 8-1 Diagnostics using the red LED

Yellow LED

The yellow LED flashes if the T400 communicates with the base drive (CU). Error, if only the red LED flashes, but not the yellow LED.

Slot	Explanation	Flash frequency (Hz)
In the CU	- flashes - data transfer to the base drive O.K. - controlled using function block @DRIVE	Corresponds to the sampling time
In the SRT400 At the left slot	- always off - controlled using function block @DRIVE	
In the SRT400 At the right slot	- flashes - data transfer to T400 at the lefthand slot O.K. - controlled using function block @DRIVE	Corresponds to the sampling time

Table 8-2 Diagnostics using the yellow LED

Green LED

This flashes if the T400 is communicating with the communications module (CBP/CB1, SCB1/SCB2).

The green LED does not flash, if in order to operate the axial winder, a communications module is either not required or is not available.

Slot	Explanation	Flash frequency (Hz)
In the CU	- flashes - data transfer to COMBOARD O.K. - controlled using function block @DRIVE	Corresponds to the sampling time
In the SRT400 At the left slot	- data transfer to T400 at the righthand slot O.K. - controlled using function block @DRIVE	Corresponds to the sampling time
In the SRT400 At the right slot	- constant off - controlled using function block @DRIVE	

Table 8-3 Diagnostics using the green LED

8.2 Alarms and faults of the axial winder

Messages on CUx

The alarms (A097 - A104) and faults (F116 - F123) generated by the SPW420 are described in the following Table 8-4.

Alarm No.	Fault No.	Significance	Suppression bit H011 and H012
A097	F116	Overspeed, positive	0
A098	F117	Overspeed, negative	1
A099	F118	Overtorque, positive	2
A100	F119	Overtorque, negative	3
A101	F120	Stall protection	4
A102	F121	Data receive from CU faulted	5
A103	F122	Data receive from PROFIBUS faulted	6
A104	F123	Data receive from peer-to-peer faulted	7

Table 8-4 Alarms and faults from SPW420

Suppression

The alarms and faults are, as described in H011 and H012, coded bitwise. By setting the associated bit (=1), the associated alarm or fault is enabled and by deleting (=0) inhibited.

Example

Operation without communications module and peer-to-peer link: In H011, H012 bits 6 and 7 must be set to 0:

Bit: 7 6 5 4 3 2 1 0
Value: 0 0 1 1 1 1 1 1

thus, for H011=H012= 3F

9 Literature

1. SIMADYN D T400 technology module, Brief Description, 1998.
2. SIMOVERT MASTERDRIVES Guidelines for changing over from control module CU2 to CUVC, Order No. E20125-J0006-V021-A1, 1998.
3. SIMOVERT MASTERDRIVES Motion Control Compendium, Order No. 6SE7080-0QX50, 1998.
4. 6RA70 SIMOREG DC MASTER, Description, Order No. C98130-A1256-A1-02-7447, 1998.
5. Hardware - SIMADYN D Manual, Order No. 6DD1987-1BA1, 1997.
6. SIMADYN D, Function Block Library, Reference Manual, Order No. 6DD1987-1CA1, Oct. 1997.

10 Appendix

10.1 Version changes

Version 2.0

First edition, 30.09.98:

The standard SPW420 software package functions correspond to those of the standard MS320 software package, Version 1.3 for 6SE70/71.

Adaptation

The following adaptations have been made:

- conversion to CFC V4.0
– use of the T400 module

Expansion

New or improved functions:

- introduction of the BICO technology
- automatic protection against material sagging for the torque limiting control
- D controller for the dancer control
- diameter calculation without V_{set} signal
- acceleration calculation
- enable for web break detection
- enable for communications (PROFIBUS, peer-to-peer and USS)
- monitoring receive telegrams in the communications
- adapting friction torques for gearbox stage 2
- parameterizing possibility via USS interface for T400 in the SRT400 (standalone solution)
- communication possibilities via PROFIBUS for standalone solutions in the SRT400
- free function blocks for additional customer-specific requirements.
- free display parameters for the binectors/connectors
- expansion of gearbox stage 2

10.2 Definition of the 5 cycle times

Cycle	T1	T2	T3	T4	T5
Sampling time	2 ms	8 ms	16 ms	32 ms	128 ms

Table 10-1 Definition of the cycle times

10.3 List of block I/O (connectors and parameters)

10.3.1 List of parameters and connections which can be changed

Parameter No.	Significance	Chart.block.connection(I/O)	Pre assignment	Type
Hxxx	Parameter which can be changed	xxxx.yyyy.zz	Value / connector	B/I/R/W

Para.	Significance	Chart.block.connection(I/O)	Pre-assignment	Type
H000	Language selection	IF_CU.@DRIVE.PLA	0	I
H003	Overtorque limit, positive	CONTZ_01.SU040.LU	1.20	R
H004	Overtorque limit, negative	CONTZ_01.SU040.LL	-1.20	R
H005	Initialization time for CU couplings	CONTZ_01.SU130.T	20000 ms	R
H007	Stall protection, threshold n_{act}	CONTZ_01.SU080.L	0.02	R
H008	Stall protection, threshold I_{act}	CONTZ_01.SU090.L	0.1	R
H009	Stall protection, threshold control deviation	CONTZ_01.SU100.L	0.5	R
H010	Stall protection, response time	CONTZ_01.SU120.T	500 ms	R
H011	Alarm mask	IF_CU.SE030.I2	16#0	W
H012	Fault mask	IF_CU.SE040.I2	16#0	W
H013	Input, connection tachometer on	IQ1Z_07.B207A.I	B2634	B
H014	Inching time	CONTZ_07.C2736.X	10000 ms	R
H015	Status word 1 PtP	IF_PEER.Zustandswort.X	K4335	I
H016	Actual word W2 PtP	IF_PEER.Istwert_W2.X	KR0310	R
H017	Actual word W3 PtP	IF_PEER.Istwert_W3.X	KR0344	R
H021	Input, system start	IQ1Z_01.B10.I	B2003	B
H022	Input, tension controller on	IQ1Z_01.B11.I	B2004	B
H023	Input, inhibit tension controller	IQ1Z_01.B12.I	B2005	B
H024	Input, set diameter	IQ1Z_01.B13.I	B2006	B
H025	Input, enter supplementary setpoint	IQ1Z_01.B14.I	B2007	B
H026	Input, local positioning	IQ1Z_01.B15.I	B2008	B
H027	Input, local operator control	IQ1Z_01.B16.I	B2009	B
H028	Input, local stop	IQ1Z_01.B17.I	B2010	B
H029	Input, motorized potentiometer 2 raise	IQ1Z_01.B20.I	B2622	B
H030	Input, motorized potentiometer 1 raise	IQ1Z_01.B40.I	B2630	B
H031	Input, motorized potentiometer 2 lower	IQ1Z_01.B30.I	B2623	B
H032	Input, motorized potentiometer 1 lower	IQ1Z_01.B50.I	B2631	B
H033	Input, hold diameter	IQ1Z_07.B60.I	B2615	B
H034	Input, set V_set to stop	IQ1Z_07.B80.I	B2629	B
H035	Input, winding from below	IQ1Z_07.B70.I	B2633	B
H036	Input, accept setpoint A	IQ1Z_07.B90.I	B2000	B
H037	Input, accept setpoint B	IQ1Z_07.B100.I	B2000	B
H038	Input, local inching forwards	IQ1Z_07.B120.I	B2608	B
H039	Input, local crawl	IQ1Z_07.B110.I	B2627	B
H040	Input, local inching backwards	IQ1Z_07.B130.I	B2609	B
H042	Input, gearbox stage 2	IQ1Z_07.B160.I	B2000	B
H043	Input, winder	IQ1Z_07.B150.I	B2000	B
H044	Input, polarity saturation setpoint	IQ1Z_07.B170.I	B2000	B
H045	Input, Off1/on	IQ1Z_07.B180.I	B2600	B

H046	Input, inhibit ramp-function generator	IQ1Z_07.B201.I	B2604	B
H047	Input, Off2	IQ1Z_07.B190.I	B2001	B
H048	Input, Off3	IQ1Z_07.B200.I	B2001	B
H049	Input, ramp-function generator stop	IQ1Z_07.B202.I	B2605	B
H050	Input, enable setpoint	IQ1Z_07.B203.I	B2606	B
H051	Input, standstill tension on	IQ1Z_07.B204.I	B2613	B
H052	Input, local run	IQ1Z_07.B205.I	B2626	B
H053	Input, reset length computer	IQ1Z_07.B206.I	B2632	B
H054	Adaptation, analog input 1	IF_CU.AI10A.X1	1.0	R
H055	Offset, analog input 1	IF_CU.AI10.OFF	0.0	R
H056	Adaptation, analog input 2	IF_CU.AI25A.X1	1.0	R
H057	Offset, analog input 2	IF_CU.AI25.OFF	0.0	R
H058	Adaptation, analog input 3	IF_CU.AI40A.X1	1.0	R
H059	Offset, analog input 3	IF_CU.AI40.OFF	0.0	R
H060	Adaptation, analog input 4	IF_CU.AI55A.X1	1.0	R
H061	Offset, analog input 4	IF_CU.AI55.OFF	0.0	R
H062	Adaptation, analog input 5	IF_CU.AI70A.X1	1.0	R
H063	Offset, analog input 5	IF_CU.AI70.OFF	0.0	R
H064	Actual value 4 P tP	IF_PEER.Istwert_W4.X	KR0000	R
H065	Actual value 5 PtP	IF_PEER.Istwert_W5.X	KR0000	R
H068	Fixed value, velocity setpoint	IQ1Z_01.AI200A.X	0.0	R
H069	Input, velocity setpoint	IQ1Z_01.AI200.X	KR0068	R
H070	Fixed value, web velocity compensation	IQ1Z_01.AI210A.X	0.0	R
H071	Input, web velocity compensation	IQ1Z_01.AI210.X	KR0070	R
H072	Fixed value, s uppl. velocity setpoint	IQ1Z_01.AI220A.X	0.0	R
H073	Input, supplementary velocity setpoint	IQ1Z_01.AI220.X	KR0072	R
H074	Fixed value, s etpoint, local operation	IQ1Z_01.AI230A.X	0.0	R
H075	Input, setpoint local operation	IQ1Z_01.AI230.X	KR0074	R
H076	Fixed value, e xternal dv/dt	IQ1Z_01.AI240A.X	0.0	R
H077	Input, external dv/dt	IQ1Z_01.AI240.X	KR0076	R
H078	Fixed value, w eb width	IQ1Z_01.AI250A.X	1.0	R
H079	Input, web width	IQ1Z_01.AI250.X	KR0078	R
H080	Tension setpoint	IQ1Z_01.AI260A.X	0.0	R
H081	Input, tension setpoint	IQ1Z_01.AI260.X	KR0080	R
H082	Fixed value, s upplementary tension setpoint	IQ1Z_01.AI270A.X	0.0	R
H083	Input, supplementary tension setpoint	IQ1Z_01.AI270.X	KR0082	R
H084	Tension actual value	IQ1Z_01.AI280A.X	0.0	R
H085	Input, tension actual value	IQ1Z_01.AI280.X	KR0322	R
H086	Maximum tension reduction	IQ1Z_01.AI290A.X	0.0	R
H087	Input, maximum tension reduction	IQ1Z_01.AI290.X	KR0086	R
H088	Diameter setting value	IQ1Z_01.AI300A.X	0.1	R
H089	Input, diameter setting value	IQ1Z_01.AI300.X	KR0088	R
H090	Fixed value, s etpoint, positioning	IQ1Z_01.AI310A.X	0.0	R
H091	Input, setpoint positioning	IQ1Z_01.AI310.X	KR0090	R
H092	Input, speed actual value	IQ1Z_01.AI320.X	KR0550	R
H093	Input, V_act connection tachometer	IQ1Z_01.AI329.X	KR0401	R
H094	Input, ext. web velocity actual value	IQ1Z_01.AI330.X	KR0402	R
H095	Fixed value s etpoint A	IQ1Z_01.AI340A.X	0.0	R
H096	Input, setpoint A	IQ1Z_01.AI340.X	KR0095	R
H097	Input, pressure actual value, dancer roll	TENSZ_07.T1937.X2	KR0324	R

H098	Analog output 2 (diameter act.val.) term. 98/99	IF_CU.AQ80.X	KR0310	R
H099	Analog output 2, offset	IF_CU.AQ80.OFF	0.0	R
H100	Analog output 2, normalization	IF_CU.AQ80A.X1	1.0	R
H101	Analog output 1, offset	IF_CU.AQ110.OFF	0.0	R
H102	Analog output 1, normalization	IF_CU.AQ110A.X1	1.0	R
H103	Analog output 1 (torque setpoint) term.97/99	IF_CU.AQ110.X	KR0329	R
H107	Input, input value for limit value monitor 1	IQ2Z_01.G10.X	KR0307	R
H108	Input, comparison value	IQ2Z_01.G70.X	KR0303	R
H109	Adaptation, input value	IQ2Z_01.G40. XCS	1	I
H110	Smoothing, input value	IQ2Z_01.G60.T	500 ms	R
H111	Adaptation, comparison value	IQ2Z_01.G100.XCS	1	I
H112	Interval limit	IQ2Z_01.G110.L	0.0	R
H113	Hysteresis	IQ2Z_01.G110.HY	0.0	R
H114	Select output signal (terminal 52)	IQ2Z_01.G130.I	B2403	B
H115	Input, input value for limit value monitor 2	IQ2Z_01.G200.X	KR0311	R
H116	Input, comparison value GWM 2	IQ2Z_01.G270.X	KR0304	R
H117	Adaptation, input value	IQ2Z_01.G240.XCS	1	I
H118	Smoothing, input value	IQ2Z_01.G260.T	500 ms	R
H119	Adaptation, comparison value	IQ2Z_01.G300.XCS	1	I
H120	Interval limit	IQ2Z_01.G310.L	0.0	R
H121	Hysteresis	IQ2Z_01.G310.HY	0.0	R
H122	Select, output signal	IQ2Z_01.G330.I	B2407	B
H125	Overspeed limit, positive	CONTZ_01.SU010.LU	1.20	R
H126	Overspeed limit, negative	CONTZ_01.SU010.LL	-1.20	R
H127	Fixed value ratio, gearbox stage 2	IQ1Z_01.A350.X	1.0	R
H128	Fixed value adapt.friction torque gearbox stage 2	IQ1Z_01.A360.X	1.0	R
H129	Input, alternative on command	IQ1Z_01.SELMX.I	B2000	B
H130	Setpoint B	SREFZ_01.S25.X2	0.0	R
H131	Upper limit	SREFZ_01.S50.LU	1.1	R
H132	Lower limit	SREFZ_01.S50.LL	-1.1	R
H133	Ramp-up time	SREFZ_01.S50.TU	30000 ms	R
H134	Ramp-down time	SREFZ_01.S50.TD	30000 ms	R
H135	Rounding-off at ramp-up	SREFZ_01.S50.TRU	3000 ms	R
H136	Rounding-off at ramp-down	SREFZ_01.S50.TRD	3000 ms	R
H137	Normalized web velocity compensation	SREFZ_01.S120.X2	1.0	R
H138	Input ratio, gearbox stage 2	SREFZ_01.S140.X2	KR0127	R
H139	Normalization, web velocity	SREFZ_01.S150.X1	1.0	R
H140	Normaliz ation, acceleration	SREFZ_01.S51.X2	1.0	R
H141	Influence, closed-loop tension control	SREFZ_01.S200.X2	1.0	R
H142	Setpoint, local crawl	SREFZ_01.S300.X2	0.1	R
H143	Setpoint, local inching forwards	SREFZ_01.S310.X2	0.05	R
H144	Setpoint, local inching backwards	SREFZ_01.S320.X2	-0.05	R
H145	Saturation setpoint	SREFZ_01.S360.X	0.1	R
H146	Speed control for local operation	SREFZ_01.NC112.I2	0	B
H147	Torque limit for speed control	SREFZ_07.C56.X	0.2	R
H148	Time for reverse winding after splice	CONTZ_07.SL70.T	10000 ms	R
H149	n_set reverse winding after splice	SREFZ_07.RW100.X	0.0	R
H150	Start of adaptation	SREFZ_07.NC035.A1	0.0	R
H151	Kp adaptation min.	SREFZ_07.NC035.B1	0.1	R
H152	End of adaptation	SREFZ_07.NC035.A2	1.0	R

H153	Kp adaptation max.	SREFZ_07.NC035.B2	0.1	R
H154	Slave drive	SREFZ_01.S47.I	0	B
H155	Smoothing, web velocity setpoint	SREFZ_01.S10.T	8 ms	R
H157	Limit value for standstill identification	SREFZ_07.S810.X	0.01	R
H159	Delay, standstill identification	SREFZ_07.S840.T	0 ms	R
H160	Erase EEPROM	CONTZ_01.URLAD.ERA	0	B
H161	Ramp-up/ramp-down time, replacing ramp-f.g.	SREFZ_07.S457.X	20000 ms	R
H162	Smoothing, speed controller output	SREFZ_07.NT130.T	500 ms	R
H163	Selection, positioning setpoint	SREFZ_01.S328.I	0	B
H164	Smoothing, saturation setpoint	SREFZ_01.S395.T	8 ms	R
H165	Smoothing, speed actual value	IQIZ_01.AI325.T	20 ms	R
H166	Enable addition, local setpoints	CONTZ_01.C22.I3	0	B
H167	Limiting, density correction	DIAMZ_07.DC1000.X	0.0	R
H168	Integrating time, density correction	DIAMZ_07.DC70.TI	200000 ms	R
H169	Knife in the cutting position	IQIZ_01.B52.I	B2000	B
H170	Partner drive is closed-loop tension controlled	IQIZ_01.B53.I	B2000	B
H172	Smoothing, tension actual value	TENSZ_01.T641.T	150 ms	R
H173	Differentiating time constant	TENSZ_01.T1796.TD	800 ms	R
H174	Inhibit D controller	TENSZ_01.T643.I	1	B
H175	Ramp-up time, tension setpoint	TENSZ_01.T1350.TU	10000 ms	R
H176	Ramp-down time, tension setpoint	TENSZ_01.T1350.TD	10000 ms	R
H177	Inhibit tension setpoint	TENSZ_01.T1485.I	0	B
H178	Response for web break	TENSZ_07.T2110.I2	1	B
H179	Enable tension offset compensation	TENSZ_01.T603.I4	0	B
H180	Tension reduction 1	TENSZ_01.T1435.X2	1.0	R
H181	Tension reduction 2	TENSZ_01.T1445.X2	1.0	R
H182	Tension reduction 3	TENSZ_01.T1455.X2	1.0	R
H183	Diameter at the start of tension reduction	TENSZ_01.T1470.A1	1.0	R
H184	Diameter D1	TENSZ_01.T1470.A2	1.0	R
H185	Diameter D2	TENSZ_01.T1470.A3	1.0	R
H186	Diameter D3	TENSZ_01.T1470.A4	1.0	R
H187	Diameter D4 end of tension reduction	TENSZ_01.T1466.X	1.0	R
H188	Input, standstill tension	TENSZ_01.T1500.I	0	B
H189	Standstill tension	TENSZ_01.T1505.X2	1.0	R
H190	Tension pre-control, dancer roll	TENSZ_07.T1936.X	0.0	R
H191	Minimum selection	TENSZ_01.T1515.I	0	B
H192	Smoothing, tension setpoint	TENSZ_01.T1525.T	300 ms	R
H193	Minimum value, speed-dependent tension controller limits	TENSZ_01.T1710.X2	0.0	R
H194	Select tension controller limits	TENSZ_01.T1715.X	2	I
H195	Adapt tension controller limits	TENSZ_01.T1745.X	1.0	R
H196	Inhibit I component tension controller	TENSZ_01.T1790.HI	0	B
H197	Minimum Kp tension controller	TENSZ_01.T1770.B1	0.3	R
H198	Maximum Kp tension controller	TENSZ_01.T1770.B2	0.3	R
H199	Integral action time, tension controller	TENSZ_01.T1790.TN	1000 ms	R
H200	Adapt setpoint pre-control	TENSZ_07.T1800.X1	0.0	R
H201	Lower limit, web velocity	TENSZ_07.T1900.X2	1.0	R
H202	Influence, web velocity	TENSZ_07.T1920.X2	1.0	R
H203	Select the tension control technique	TENSZ_07.T1945.X	0	R
H204	Lower limit, web break detection	TENSZ_07.T2015.X2	0.05	R
H205	Delay, web break signal	TENSZ_07.T2100.T	3000 ms	R

H206	Select winding hardness characteristic	TENSZ_01.T1475.I	0	B
H207	Start of adaptation, tension controller	TENSZ_01.T1770.A1	0.0	R
H208	End of adaptation, tension controller	TENSZ_01.T1770.A2	1.0	R
H209	Droop, tension controller	TENSZ_01.T1795.X1	0.0	R
H210	Calibration, web velocity	DIAMZ_01.D910.X2	1.0	R
H211	Select, web tachometer	DIAMZ_01.D1105.I	0	B
H212	Pulse number, shaft tachometer	IF_CU.D900.PR	1024 pulse	I
H213	Pulse number, web tachometer	IF_CU.D901.PR	600 pulse	I
H214	Rated speed, shaft tachometer	IF_CU.D900.RS	1500 RPM	R
H215	Rated speed, measuring roll web tachometer	IF_CU.D901.RS	1000 RPM	R
H216	Calculation interval, diameter computer	DIAMZ_01.D1140.X	320 ms	R
H217	Select, operating mode shaft tachometer	IF_CU.D900.MOD	16#7FC2	W
H218	Select, operating mode web tachometer	IF_CU.D901.MOD	16#7F02	W
H220	Scaling, dv/dt	DIAMZ_01.P148.X2	1000 ms	R
H221	Minimum speed, diameter computer	DIAMZ_01.D1030.M	0.01	R
H222	Core diameter	DIAMZ_01.P100.X	0.2	R
H223	Smoothing, setpoint for dv/dt computation	DIAMZ_01.P142.T	32 ms	R
H224	Material thickness	DIAMZ_07.P295.X1	1.0	R
H225	Fine calibration, dv/dt	DIAMZ_01.P500.X2	1.0	R
H226	Input dv/dt	DIAMZ_01.P160.I	0	B
H227	Variable moment of inertia	DIAMZ_01.P332.X1	0.0	R
H228	Constant moment of inertia	DIAMZ_01.P340.X1	0.0	R
H229	Input adaptation factor, friction torque gearbox stage 2	DIAMZ_07.P915.X2	KR0128	R
H230	Friction torque, speed 0%	DIAMZ_07.P910.B1	0.0	R
H231	Friction torque, speed 20%	DIAMZ_07.P910.B2	0.0	R
H232	Friction torque, speed 40%	DIAMZ_07.P910.B3	0.0	R
H233	Friction torque, speed 60%	DIAMZ_07.P910.B4	0.0	R
H234	Friction torque, speed 80%	DIAMZ_07.P910.B5	0.0	R
H235	Friction torque, speed 100%	DIAMZ_07.P900.X	0.0	R
H236	Diameter change, monotone	DIAMZ_01.D1704.I	0	B
H237	Pre-control with n^2	DIAMZ_07.P940.X2	0.0	R
H238	Minimum change time, diameter	DIAMZ_01.D1670.X2	50 s	R
H239	Adaptation divisor, length computer	DIAMZ_07.W10.X2	1.0	R
H240	Adaptation factor, length computer	DIAMZ_07.W20.X2	1.0	R
H241	Ramp-down time for braking distance computer	DIAMZ_07.W30.X1	60 s	R
H242	Ramp-down rounding-off time for braking distance computer	DIAMZ_07.W40.X1	6 s	R
H243	Smoothing, web width	DIAMZ_01.P150.T	1000 ms	R
H244	Rated velocity for the braking distance computer	DIAMZ_07.W70.X1	1000 m/min	R
H245	Baud rate PtP protocol	IF_PEER.PtP_Zentr.BDR	19200 baud	DI
H246	Upper limit (monitoring PtP)	IF_PEER.Ueberwa.LU	10000 ms	R
H247	Setting value (monitoring PtP)	IF_PEER.Ueberwa.SV	9920 ms	R
H249	Input, length actual value	DIAMZ_07.W5.X1	KR0229	R
H250	EEPROM key	CONTZ_01.URLAD.KEY	0	I
H251	Rated pulses, shaft tachometer	IF_CU.D900.RP	4096	DI
H252	Rated pulses, web tachometer	IF_CU.D901.RP	1	DI
H253	Input web break pulse	TENSZ_07.T2100.I	B2253	B
H254	Smoothing time for Δv	DIAMZ_01.D940.T	300ms	R
H255	Adaptation factor Δv	DIAMZ_01.D945.X2	0.0	R
H256	Braking characteristic, speed, point 1	SREFZ_07.BD10.A1	0.01	R

H257	Reduced braking torque	SREFZ_07.BD10.B1	0.0	R
H258	Braking characteristic, speed, point 2	SREFZ_07.BD10.A2	0.2	R
H259	Maximum braking torque	SREFZ_07.BD10.B2	2.0	R
H262	Input, length setpoint	IQ!Z_01.AI328.X	KR0400	R
H263	Motorized potentiometer 2, fast rate of change	IQ2Z_01.M590.X2	25000 ms	R
H264	Motorized potentiometer 2, standard rate of c.	IQ2Z_01.M590.X1	100000 ms	R
H265	Motorized potentiometer 1, fast rate of change	IQ2Z_01.M390.X2	25000 ms	R
H266	Motorized potentiometer 1, standard rate of c.	IQ2Z_01.M390.X1	100000 ms	R
H267	Select, operating mode, mot. potentiometer 1	IQ2Z_01.M100.I1	0	B
H268	Setpoint, ramp-function generator operation	IQ2Z_01.M120.X2	1.0	R
H269	Ramp time, ramp-function generator operation	IQ2Z_01.M130.X2	10000 ms	R
H270	Smoothing, analog input 3	IF_CU.AI51.T	8 ms	R
H271	Smoothing, analog input 4	IF_CU.AI66.T	8 ms	R
H272	Dead zone for dv/dt computation	DIAMZ_01.P147Z.TH	0.01	R
H273	Normalization, torque setpoint on T400	IQ1Z_01.AI21.X2	1.0	R
H274	Normalization, torque actual value on T400	IQ1Z_01.AI21A.X2	1.0	R
H275	Response threshold, web break monitoring	TENSZ_07.T2060.M	0.25	R
H276	Initial diameter	DIAMZ_07.D_Anfang.X	0.4	R
H277	Enable D calculation without V* signal	DIAMZ_07.DOV_Freigabe.I	0	B
H278	Setting pulse duration	DIAMZ_07.DOV2.T	10000ms	R
H281	Alternative On command	IQ1Z_01.SELACT.I	0	B
H282	Changeover, speed controller to CU or T400	IQ1Z_07.B51.I	0	B
H283	I controller enable	TENSZ_01.T1790.IC	0	B
H284	Tension setpoint, inhibit ramp-fct. generator	TENSZ_01.T1320.I2	1	B
H285	Enable web break detection	TENSZ_07. Bahnrisserken.I	1	B
H286	Thickness-diameter ratio	DIAMZ_07.OV6.X1	0.0	R
H288	Enable PROFIBUS	IQ1Z_01.B01.I	0	B
H289	Enable peer-to-peer	IQ1Z_01.B02.I	0	B
H290	Upper speed setpoint limiting	SREFZ_07.S1000.LU	1.0	R
H291	Lower speed setpoint limiting	SREFZ_07.S1000.LL	-1.0	R
H292	Ramp-up time, speed setpoint	SREFZ_07.S1000.TU	1000 ms	R
H293	Ramp-down time, speed setpoint	SREFZ_07.S1000.TD	1000 ms	R
H294	Integral action time, speed controller	SREFZ_07.S1100.TN	300 ms	R
H295	Invert_mask	IF_CU.Bit_Invert.I2	16#0	W
H400	Fixed value, length setpoint	IQ1Z_01.AI328A.X	2.0	R
H401	Velocity actual value, connection tachometer	IQ1Z_01.AI329A.X	0.0	R
H402	Fixed value, ext. web velocity actual value	IQ1Z_01.AI330A.X	0.0	R
H440	Actual value W2 at CB	IF_COM.Istwert_W2.X	KR0310	R
H441	Actual value W3 at CB	IF_COM.Istwert_W3.X	KR0000	R
H442	Actual value W5 at CB	IF_COM.Istwert_W5.X	KR0000	R
H443	Actual value W6 at CB	IF_COM.Istwert_W6.X	KR0000	R
H444	Status word 1 at CB	IF_COM.Send_ZW1.X	K4335	I
H445	Status word 2 at CB	IF_COM.Send_ZW2.X	K0336	I
H446	Actual value W7 at CB	IF_COM.Istwert_W7.X	KR0000	R
H447	Actual value W8 at CB	IF_COM.Istwert_W8.X	KR0000	R
H448	Actual value W9 at CB	IF_COM.Istwert_W9.X	KR0000	R
H449	Actual value W10 at CB	IF_COM.Istwert_W10.X	KR0000	R
H495	Upper limit (monitoring CB)	IF_COM.Ueberwa.LU	20000 ms	R
H496	Setting value (monitoring CB)	IF_COM.Ueberwa.SV	19920 ms	R
H499	Ext. status word	CONTZ_01.SE110.I1	K4549	W

H500	Setpoint W2 at CU	IF_CU.Sollwert_W2.X	KR0303	R
H501	Setpoint W5 at CU	IF_CU.Sollwert_W5.X	KR0558	R
H502	Setpoint W6 at CU	IF_CU.Sollwert_W6.X	KR0556	R
H503	Setpoint W7 at CU	IF_CU.Sollwert_W7.X	KR0557	R
H504	Setpoint W8 at CU	IF_CU.Sollwert_W8.X	KR0308	R
H505	Setpoint W9 at CU	IF_CU.Sollwert_W9.X	KR0000	R
H506	Setpoint W10 at CU	IF_CU.Sollwert_W10.X	KR0000	R
H510	Control word 2.0 at CU	IF_CU.Steuerwort_2.I1	B2000	B
H511	Control word 2.1 at CU	IF_CU.Steuerwort_2.I2	B2000	B
H512	Control word 2.2 at CU	IF_CU.Steuerwort_2.I3	B2000	B
H513	Control word 2.3 at CU	IF_CU.Steuerwort_2.I4	B2000	B
H514	Control word 2.4 at CU	IF_CU.Steuerwort_2.I5	B2000	B
H515	Control word 2.5 at CU	IF_CU.Steuerwort_2.I6	B2000	B
H516	Control word 2.6 at CU	IF_CU.Steuerwort_2.I7	B2000	B
H517	Control word 2.7 at CU	IF_CU.Steuerwort_2.I8	B2000	B
H518	Control word 2.8 at CU	IF_CU.Steuerwort_2.I9	B2000	B
H519	Enable for speed controller in CU	IF_CU.Steuerwort_2.I10	B2508	B
H520	Control word 2.10 at CU	IF_CU.Steuerwort_2.I11	B2000	B
H521	Digital output 1 (web break), terminal 46	IF_CU.BinOut.I1	B2501	B
H522	Digital output 2 (standstill), terminal 47	IF_CU.BinOut.I2	B2502	B
H523	Digital output 3 (tension controller on), term. 48	IF_CU.BinOut.I3	B2503	B
H524	Digital output 4 (CU operational), terminal 49	IF_CU.BinOut.I4	B2504	B
H525	Digital output 5 (n*=0), terminal 52	IF_CU.BinOut.I5	B2505	B
H526	Digital output 6 (limit value monitor 1) term. 51	IF_CU.BinOut.I6	B2114	B
H531	Control word 2.11 at CU	IF_CU.Steuerwort_2.I12	B2000	B
H532	Control word 2.12 at CU	IF_CU.Steuerwort_2.I13	B2000	B
H533	Control word 2.13 at CU	IF_CU.Steuerwort_2.I14	B2000	B
H534	Control word 2.14 at CU	IF_CU.Steuerwort_2.I15	B2000	B
H535	Control word 2.15 at CU	IF_CU.Steuerwort_2.I16	B0000	B
H537	Select digital input/output , B2527/H521	IF_CU.BinOut.DI1	1	B
H538	Select digital input/output , B2528/H522	IF_CU.BinOut.DI2	1	B
H539	Select digital input/output , B2529/H523	IF_CU.BinOut.DI3	1	B
H540	Select H digital input/output , B2530/H524	IF_CU.BinOut.DI4	1	B
H560	Input (Anz_R1)	IQ2Z_01.Anz_R1.X	KR0000	R
H562	Input (Anz_R2)	IQ2Z_01.Anz_R2.X	KR0000	R
H564	Input (Anz_R3)	IQ2Z_01.Anz_R3.X	KR0000	R
H566	Input (Anz_R4)	IQ2Z_01.Anz_R4.X	KR0000	R
H570	Input (Anz_B1)	IQ2Z_01.Anz_B1.I	B2000	B
H572	Input (Anz_B2)	IQ2Z_01.Anz_B2.I	B2000	B
H580	Input (Anz_I1)	IQ2Z_01.Anz_I1.X	K4000	I
H600	Enable USS protocol	IQ1Z_01.B03.I	1	B
H601	USS data transfer line	IF_USS.Slave_ZB.WI4	0	B
H602	Command to new CB configuration	IF_COM.CB_SRT400.SET	1	B
H603	CB station address	IF_COM. CB_SRT400.MAA	3	I
H604	PPO type (PROFIBUS)	IF_COM. CB_SRT400.P02	5	I
H610	Input, pos. torque limit	SREFZ_07.NC005.X2	KR0351	R
H611	Input, neg. torque limit	SREFZ_07.NC004.X	KR0351	R
H612	Input, torque limit	SREFZ_07.NC003.X2	KR0313	R
H650	Enable, free_blocks	IQ1Z_01.B04.I	0	B
H800	Start, point X1	FREI_BST.Kenn_1.A1	0.0	R

H801	Start, point Y1	FREI_BST.Kenn_1.B1	0.0	R
H802	End, point X2	FREI_BST.Kenn_1.A2	1.0	R
H803	End, point Y2	FREI_BST.Kenn_1.B2	0.0	R
H804	Input quantity (char_1)	FREI_BST.Kenn_1.X	KR0000	R
H805	Start, point X1	FREI_BST.Kenn_2.A1	0.0	R
H806	Start, point Y1	FREI_BST.Kenn_2.B1	0.0	R
H807	End, point X2	FREI_BST.Kenn_2.A2	1.0	R
H808	End, point Y2	FREI_BST.Kenn_2.B2	0.0	R
H809	Input quantity (char_2)	FREI_BST.Kenn_2.X	KR0000	R
H810	Input 1 (MUL_1)	FREI_BST.MUL_1.X1	KR0000	R
H811	Input 2 (MUL_1)	FREI_BST.MUL_1.X2	KR0000	R
H812	Input 1 (MUL_2)	FREI_BST.MUL_2.X1	KR0000	R
H813	Input 2 (MUL_2)	FREI_BST.MUL_2.X2	KR0000	R
H814	Fixed setpoint_1	FREI_BST.Fest_SW_1.X	0.0	R
H815	Fixed setpoint_2	FREI_BST.Fest_SW_2.X	0.0	R
H816	Fixed setpoint_3	FREI_BST.Fest_SW_3.X	0.0	R
H820	Input 1 (UMS_1)	FREI_BST.UMS_1.X1	KR0000	R
H821	Input 2 (UMS_1)	FREI_BST.UMS_1.X2	KR0000	R
H822	Switch signal (UMS_1)	FREI_BST.UMS_1.I	B2000	B
H823	Input 1 (UMS_2)	FREI_BST.UMS_2.X1	KR0000	R
H824	Input 2 (UMS_2)	FREI_BST.UMS_2.X2	KR0000	R
H825	Switch signal (UMS_2)	FREI_BST.UMS_2.I	B2000	B
H826	Input 1 (UMS_3)	FREI_BST.UMS_3.X1	KR0000	R
H827	Input 2 (UMS_3)	FREI_BST.UMS_3.X2	KR0000	R
H828	Switch signal (UMS_3)	FREI_BST.UMS_3.I	B2000	B
H840	Input 1 (ADD_1)	FREI_BST.ADD_1.X1	KR0000	R
H841	Input 2 (ADD_1)	FREI_BST.ADD_1.X2	KR0000	R
H845	Minuend (SUB_1)	FREI_BST.SUB_1.X1	KR0000	R
H846	Subtrahend (SUB_1)	FREI_BST.SUB_1.X2	KR0000	R
H850	Input (INT)	FREI_BST.INT.X	0.0	R
H851	Upper limit value (INT)	FREI_BST.INT.LU	0.0	R
H852	Lower limit value (INT)	FREI_BST.INT.LL	0.0	R
H853	Integration time (INT)	FREI_BST.INT.TI	0ms	R
H854	Setting value (INT)	FREI_BST.INT.SV	KR0000	R
H855	Set (INT)	FREI_BST.INT.S	B2000	B
H856	Input (LIM)	FREI_BST.LIM.X	KR0000	R
H857	Upper limit value (LIM)	FREI_BST.LIM.LU	KR0000	R
H858	Lower limit value (LIM)	FREI_BST.LIM.LL	KR0000	R
H860	Input (EinV)	FREI_BST.EinV.I	B2000	B
H861	Delay time (EinV)	FREI_BST.EinV.T	0ms	B
H862	Input (AusV)	FREI_BST.AusV.I	B2000	B
H863	Delay time (AusV)	FREI_BST.AusV.T	0ms	B
H864	Input (ImpV)	FREI_BST.ImpV.I	B2000	B
H865	Pulse duration (ImpV)	FREI_BST.ImpV.T	0ms	B
H866	Input (ImpB)	FREI_BST.ImpB.I	B2000	B
H867	Pulse duration (ImpB)	FREI_BST.ImpB.T	0ms	B
H868	Input (Inv)	FREI_BST.Invt.I	B2000	B
H870	Input 1 (AND_1)	FREI_BST.AND_1.I1	B2001	B
H871	Input 2 (AND_1)	FREI_BST.AND_1.I2	B2001	B
H876	Input 1 (OR_1)	FREI_BST.OR_1.I1	B2000	B

H877	Input 2 (OR_1)	FREI_BST.OR_1.I2	B2000	B
H880	Input 1 (comp.)	FREI_BST.Vergl.X1	KR0000	R
H881	Input 2 (comp.)	FREI_BST.Vergl.X2	KR0000	R
H883	Input (smooth)	FREI_BST.Glaet.X	KR0000	R
H884	Smoothing time (smooth)	FREI_BST.Glaet.T	0ms	R
H885	Setting value (smooth)	FREI_BST.Glaet.SV	KR0000	R
H886	Set (smooth)	FREI_BST.Glaet.S	B2000	B
H997	Drive number	PARAMZ_01.DRNR.X	0	I

Table 10-2 List of parameters and connections which can be changed

10.3.2 List of block I/O (connectors and binectors)

Connector No.	Display para.	Significance	Chart.block. connection	Pre-assignment / value
KRxxxx	dxxx	Connector, real type	xxxx.yyyy.zz	Hxxx if available
Bxxxx	dxxx	Connector, Boolean type	xxxx.yyyy.zz	Hxxx if available
Kxxxx	dxxx	Connector, I- or W type	xxxx.yyyy.zz	Hxxx if available

Connector No.	Displ. para.	Significance	Chart.block. connection	Pre-assignment
KR0000		Constant output, real type Y=0 .0	IQ1Z_01.0_R_Ausgang.Y	H441,...
	d001	ID, standard software package	PARAMZ_01.MODTYP.Y	420
	d002	Software version, axial winder	PARAMZ_01.VER.Y	2.0
KR0018	d018	Setpoint W2 (PtP)	IF_PEER.Sollwert_W2.Y	
KR0019	d019	Setpoint W3 (PtP)	IF_PEER.Sollwert_W3.Y	
KR0066	d066	Setpoint W4 (PtP)	IF_PEER.Sollwert_W4.Y	
KR0067	d067	Setpoint W5 (PtP)	IF_PEER.Sollwert_W5.Y	
KR0068		Output from H068, fixed value V_set	IQ1Z_01.AI200A.Y	H069
KR0070		Output from H070, fixed value V_compensation	IQ1Z_01.AI210A.Y	H070
KR0072		Output from H072, fixed value V_suppl._set	IQ1Z_01.AI220A.Y	H073
KR0074		Output from H074, fixed value V_set, local op.	IQ1Z_01.AI230A.Y	H075
KR0076		Output from H076, fixed value external dv/dt	IQ1Z_01.AI240A.Y	H077
KR0078		Output from H078, fixed value web width	IQ1Z_01.AI250A.Y	H079
KR0080		Output from H080, fixed value Z_set	IQ1Z_01.AI260A.Y	H081
KR0082		Output from H082, fixed value Z_suppl._set	IQ1Z_01.AI270A.Y	H083
KR0084		Output from H084, fixed value Z_act	IQ1Z_01.AI280A.Y	
KR0086		Output from H086, fixed value max. Z_deviation	IQ1Z_01.AI290A.Y	H087
KR0088		Output from H088, fixed value D_set	IQ1Z_01.AI300A.Y	H089
KR0090		Output from H090, fixed value positioning ref. value	IQ1Z_01.AI310A.Y	H091
KR0095		Output from H095, fixed value setpoint A	IQ1Z_01.AI340A.Y	H096
KR0127		Output from H127, fixed val. gearbox stage 1/2	IQ1Z_01.A350.Y	H138
KR0128		Output from H128 fixed value adapt. friction torque gearbox stage 2	IQ1Z_01.A360.Y	H229
KR0140		dv/dt from the central ramp-function generator	SREFZ_01.S51.Y	
KR0219		n_{act} from shaft tachometer or CU backplane bus (encoder 1)	IF_CU.D900.Y	
KR0222		Output from H222, core diameter	DIAMZ_01.P100.Y	
KR0228		Web velocity actual value, web tacho (encoder 2)	IF_CU.D901.Y	

KR0229		W eb actual value from the web tachometer (encoder 2)	IF_CU.D901.YP	
KR0301	d301	Effective web velocity setpoint	SREFZ_01.S160.Y	
KR0302	d302	Actual dv/dt	DIAMZ_01.P500.Y	
KR0303	d303	Speed setpoint	SREFZ_07.NC122.Y	H108,H500
KR0304	d304	Sum, tension/position reference value	TENSZ_01.T1525.Y	H116
KR0305	d305	Output, motorized potentiometer 1	IQ2Z_01.M450.Y	
KR0306	d306	Output, motorized potentiometer 2	IQ2Z_01.M650.Y	
KR0307	d307	Speed actual value	IQ1Z_01.AI325.Y	H107
KR0308	d308	Variable moment of inertia	DIAMZ_01.P320.Y	H504
KR0309	d309	Actual web length	DIAMZ_07.W21.Y	
KR0310	d310	Actual diameter	DIAMZ_01.D1706.Y	H016,H098,H440
KR0311	d311	Tension actual value, smoothed	TENSZ_01.T641.Y	H115
KR0312	d312	Pre-control torque	DIAMZ_07.P1060.Y	
KR0313	d313	Output, closed-loop tension control	TENSZ_07.T1960.Y	H612
KR0314	d314	Pre-control torque, friction compensation	DIAMZ_07.P920.Y	
KR0316	d316	Pre-control torque, inertia compensation	DIAMZ_01.P530.Y	
KR0317	d317	Sum, tension controller output	TENSZ_01.T1798.Y	
KR0318	d318	Tension controller, D component	TENSZ_01.T1796.Y	
KR0319	d319	Tension controller output from PI component	TENSZ_01.T1790.Y	
KR0320	d320	Analog input 1, terminals 90/91	IF_CU.AI10.Y	
KR0321	d321	Analog input 2, terminals 92/93	IF_CU.AI25.Y	
KR0322	d322	Analog input 3,smoothed, terminals 94/99	IF_CU.AI51.Y	H085
KR0323	d323	Analog input 4, smoothed, terminals 95/99	IF_CU.AI66.Y	
KR0324	d324	Analog input 5, terminals 96/99	IF_CU.AI70.Y	H097
KR0327	d327	External web velocity actual value	IQ1Z_01.AI330.Y	
KR0328	d328	Tension setpoint after the winding hardness ch.	TENSZ_01.T1470.Y	
KR0329	d329	Torque setpoint	SREFZ_07.NT119.Y	
KR0330	d330	M_actual value	IQ1Z_01.AI21A.Y	
KR0331	d331	Smoothed torque setpoint	SREFZ_07.NT130.Y	
KR0339	d339	Correction factor, material thickness	DIAMZ_07.P290.Y	
KR0340	d340	Compensated web velocity	SREFZ_01.S170.Y	
KR0341	d341	Actual saturation setpoint	SREFZ_01.S397.Y	
KR0342	d342	Positive torque limit	SREFZ_07.NC005.Y	
KR0343	d343	Negative torque limit	SREFZ_07.NC006.Y	
KR0344	d344	Velocity setpoint	SREFZ_07.S490.Y	H017
KR0345	d345	Actual Kp speed controller from T400	SREFZ_07.NC035.Y	
KR0346	d346	Actual Kp tension controller	TENSZ_01.T1770.Y	
KR0349	d349	Velocity actual value, connection tachometer	IQ1Z_01.AI329.Y	
KR0350	d350	Braking distance	DIAMZ_07.W92.Y	
KR0351		Torque limit	SREFZ_07.NC003.Y	H610, H611
KR0352	d352	CPU utilization T1	IF_CU.CPU-Auslast.Y1	
KR0353	d353	CPU utilization T2	IF_CU.CPU-Auslast.Y2	
KR0354	d354	CPU utilization T3	IF_CU.CPU-Auslast.Y3	
KR0355	d355	CPU utilization T4	IF_CU.CPU-Auslast.Y4	
KR0356	d356	CPU utilization T5	IF_CU.CPU-Auslast.Y5	
KR0358		Actual diameter OV (in front of the RFG)	DIAMZ_07.OV9.Y	
KR0359		Actual diameter MV (in front of the RFG)	DIAMZ_01.D1535.Y	
KR0400		Output from H400 fixed value, length setpoint	IQ1Z_01.AI328A.Y	H262
KR0401		Output from H401, fixed value V_connection tachometer	IQ1Z_01.AI329A.Y	H093

KR0402		Output from H402 fixed value V_web_act	IQ1Z_01.AI330A.Y	H094
KR0450	d450	Setpoint W2 from CB	IF_COM.Sollwert_W2.Y	
KR0451	d451	Setpoint W3 from CB	IF_COM.Sollwert_W3.Y	
KR0452	d452	Setpoint W5 from CB	IF_COM.Sollwert_W5.Y	
KR0453	d453	Setpoint W6 from CB	IF_COM.Sollwert_W6.Y	
KR0454	d454	Setpoint W7 from CB	IF_COM.Sollwert_W7.Y	
KR0455	d455	Setpoint W8 from CB	IF_COM.Sollwert_W8.Y	
KR0456	d456	Setpoint W9 from CB	IF_COM.Sollwert_W9.Y	
KR0457	d457	Setpoint W10 from CB	IF_COM.Sollwert_W10.Y	
KR0550	d550	Actual value W2 from CU	IF_CU.Istwert_W2.Y	H092
KR0551	d551	Actual value W3 from CU	IF_CU.Istwert_W3.Y	
KR0552	d552	Actual value W5 from CU	IF_CU.Istwert_W5.Y	M_set from CU
KR0553	d553	Actual value W6 from CU	IF_CU.Istwert_W6.Y	M_act from CU
KR0554	d554	Actual value W7 from CU	IF_CU.Istwert_W7.Y	
KR0555	d555	Actual value W8 from CU	IF_CU.Istwert_W8.Y	
KR0556		Output from the positive torque limit	SREFZ_07.MGPOS.Y	H502
KR0557		Output from the negative torque limit	SREFZ_07.MGNEG.Y	H503
KR0558		Supplementary torque setpoint	SREFZ_07.NT065.Y	H501
	d561	Output (Anz_R1)	IQ2Z_01.Anz_R1.Y	
	d563	Output (Anz_R2)	IQ2Z_01.Anz_R2.Y	
	d565	Output (Anz_R3)	IQ2Z_01.Anz_R3.Y	
	d567	Output (Anz_R4)	IQ2Z_01.Anz_R4.Y	
KR0804		Output (char_1)	FREI_BST.Kenn_1.Y	
KR0809		Output (char_2)	FREI_BST.Kenn_2.Y	
KR0810		Output (MUL_1)	FREI_BST.MUL_1.Y	
KR0812		Output (MUL_2)	FREI_BST.MUL_2.Y	
KR0814		Output from H814	FREI_BST.Fest_SW_1.Y	
KR0815		Output from H815	FREI_BST.Fest_SW_2.Y	
KR0816		Output from H816	FREI_BST.Fest_SW_3.Y	
KR0822		Output (UMS_1)	FREI_BST.UMS_1.Y	
KR0825		Output (UMS_2)	FREI_BST.UMS_2.Y	
KR0828		Output (UMS_3)	FREI_BST.UMS_3.Y	
KR0840		Output (ADD_1)	FREI_BST.ADD_1.Y	
KR0845		Output (SUB_1)	FREI_BST.SUB_1.Y	
KR0850		Output (INT)	FREI_BST.INT.Y	
KR0856		Output (LIM)	FREI_BST.LIM.Y	
KR0883		Output (smooth)	FREI_BST.Glaet.Y	
B2000		Constant digital output = 0	IQ1Z_01.0_B_Ausgang.Q	H036…
B2001		Constant digital output = 1	IQ1Z_01.1_B_Ausgang.Q	H047…
B2003		Digital input 1, terminal 53	IF_CU.X6A01.Q1	H021
B2004		Digital input 2, terminal 54	IF_CU.X6A01.Q2	H022
B2005		Digital input 3, terminal 55	IF_CU.X6A01.Q3	H023
B2006		Digital input 4, terminal 56	IF_CU.X6A01.Q4	H024
B2007		Digital input 5, terminal 57	IF_CU.X6A01.Q5	H025
B2008		Digital input 6, terminal 58	IF_CU.X6A01.Q6	H026
B2009		Digital input 7, terminal 59	IF_CU.X6A01.Q7	H027
B2010		Digital input 8, terminal 60	IF_CU.X6A01.Q8	H028
B2011		Alternative 1 tension controller on	1Q1Z_01.B98.Q	
B2012		Alternative 2 tension controller on	1Q1Z_01.B99.Q	
B2013		Digital input 13 terminal 84	IF_CU.BinOut.Q7	

B2014		Digital input 14 terminal 65	IF_CU.BinOut.Q8	
B2114		Output, limit value monitor 1	IQ2Z_01.G130.Q	H526
B2122		Output, limit value monitor 2	IQ2Z_01.G330.Q	
B2253		Int. web break signal	TENSZ_07.T2090.Q	H253
B2403	d403	Output 1, from limit value monitor 1	IQ2Z_01.G130A.Q1	H114
B2404	d404	Output 2, from limit value monitor 1	IQ2Z_01.G130A.Q2	
B2405	d405	Output 3, from limit value monitor 1	IQ2Z_01.G130A.Q3	
B2406	d406	Output 4, from limit value monitor 1	IQ2Z_01.G130A.Q4	
B2407	d407	Output 1 from limit value monitor 2	IQ2Z_01.G330A.Q1	H122
B2408	d408	Output 2, from limit value monitor 2	IQ2Z_01.G330A.Q2	
B2409	d409	Output 3, from limit value monitor 2	IQ2Z_01.G330A.Q3	
B2410	d410	Output 4, from limit value monitor 2	IQ2Z_01.G330A.Q4	
B2411	d411	Length setpoint reached	IQ2Z_01.G130A.Q5	
B2501		W eb break signal	TENSZ_07.T2130.Q	H521
B2502		Standstill signal v_act = 0	SREFZ_07.S840.Q	H522
B2503		Tension control on	TENSZ_01.T1000.Q	H523
B2504		CU operational	IF_CU.Zustandswort1.Q3	H524
B2505		Speed setpoint = 0	IQ2Z_01.G400.QM	H525
B2508		Operating enable	CONTZ_07.S120.Q	H519
B2509		No operating enable	CONTZ_07.C2735.Q	
B2527		Digital input 9 terminal 46 (H537=0)	IF_CU.BinOut.Q1	
B2528		Digital input 10 terminal 47 (H538=0)	IF_CU.BinOut.Q2	
B2529		Digital input 11 terminal 48 (H539=0)	IF_CU.BinOut.Q3	
B2530		Digital input 12 terminal 49 (H540=0)	IF_CU.BinOut.Q4	
	d571	Output (Anz_B1)	IQ2Z_01.Anz_B1.Q	
	d573	Output (Anz_B2)	IQ2Z_01.Anz_B2.Q	
B2600		Control word 1.0 from CB	IF_COM.B07.Q1	H045
B2601		Control word 1.1 from CB	IF_COM.B07.Q2	H047
B2602		Control word 1.2 from CB	IF_COM.B07.Q3	H048
B2603		Control word 1.3 from CB	IF_COM.B07.Q4	Inverter enable
B2604		Control word 1.4 from CB	IF_COM.B07.Q5	H046
B2605		Control word 1.5 from CB	IF_COM.B07.Q6	H049
B2606		Control word 1.6 from CB	IF_COM.B07.Q7	H050
B2607		Control word 1.7 from CB	IF_COM.B07.Q8	Acknowledge fault
B2608		Control word 1.8 from CB	IF_COM.B07.Q9	H038
B2609		Control word 1.9 from CB	IF_COM.B07.Q10	H040
B2610		Control word 1.10 from CB	IF_COM.B07.Q11	Control from PLC
B2611		Control word 1.11 from CB	IF_COM.B07.Q12	Tension controller on
B2612		Control word 1.12 from CB	IF_COM.B07.Q13	Tens. control. inhibit
B2613		Control word 1.13 from CB	IF_COM.B07.Q14	H051
B2614		Control word 1.14 from CB	IF_COM.B07.Q15	Set diameter
B2615		Control word 1.15 from CB	IF_COM.B07.Q16	H033
B2620		Control word 2.0 from CB	IF_COM.B09.Q1	Enter v_suppl._set
B2621		Control word 2.1 from CB	IF_COM.B09.Q2	Local positioning
B2622		Control word 2.2 from CB	IF_COM.B09.Q3	H029
B2623		Control word 2.3 from CB	IF_COM.B09.Q4	H031
B2624		Control word 2.4 from CB	IF_COM.B09.Q5	Local op. control
B2625		Control word 2.5 from CB	IF_COM.B09.Q6	Local stop
B2626		Control word 2.6 from CB	IF_COM.B09.Q7	H052
B2627		Control word 2.7 from CB	IF_COM.B09.Q8	H039

B2628		Control word 2.8 from CB	IF_COM.B09.Q9	
B2629		Control word 2.9 from CB	IF_COM.B09.Q10	H034
B2630		Control word 2.10 from CB	IF_COM.B09.Q11	H030
B2631		Control word 2.11 from CB	IF_COM.B09.Q12	H032
B2632		Control word 2.12 from CB	IF_COM.B09.Q13	H053
B2633		Control word 2.13 from CB	IF_COM.B09.Q14	H035
B2634		Control word 2.14 from CB	IF_COM.B09.Q15	Connection tachom.
B2635		Control word 2.15 from CB	IF_COM.B09.Q16	
B2640		Control word 1.0 from peer-to-peer	IF_PEER.B04.Q1	Main contactor in
B2641		Control word 1.1 from peer-to-peer	IF_PEER.B04.Q2	No Off 2
B2642		Control word 1.2 from peer-to-peer	IF_PEER.B04.Q3	No Off 3
B2643		Control word 1.3 from peer-to-peer	IF_PEER.B04.Q4	Inverter enable
B2644		Control word 1.4 from peer-to-peer	IF_PEER.B04.Q5	RFG enable
B2645		Control word 1.5 from peer-to-peer	IF_PEER.B04.Q6	RFG start
B2646		Control word 1.6 from peer-to-peer	IF_PEER.B04.Q7	RFG setpoint enable
B2647		Control word 1.7 from peer-to-peer	IF_PEER.B04.Q8	Acknowledge fault
B2649		Control word 1.9 from peer-to-peer	IF_PEER.B04.Q10	Local inching backw.
B2651		Control word 1.11 from peer-to-peer	IF_PEER.B04.Q12	Tension controller on
B2652		Control word 1.12 from peer-to-peer	IF_PEER.B04.Q13	Tens. control. inhibit
B2653		Control word 1.13 from peer-to-peer	IF_PEER.B04.Q14	Standstill tension on
B2654		Control word 1.14 from peer-to-peer	IF_PEER.B04.Q15	Set diameter
B2655		Control word 1.15 from peer-to-peer	IF_PEER.B04.Q16	Hold diameter
B2660		Status word 2.0 from CU	IF_CU.Zustandswort2.Q1	
B2661		Status word 2.1 from CU	IF_CU.Zustandswort2.Q2	
B2662		Status word 2.3 from CU	IF_CU.Zustandswort2.Q3	
B2663		Status word 2.4 from CU	IF_CU.Zustandswort2.Q4	
B2664		Status word 2.5 from CU	IF_CU.Zustandswort2.Q5	
B2665		Status word 2.6 from CU	IF_CU.Zustandswort2.Q6	
B2666		Status word 2.7 from CU	IF_CU.Zustandswort2.Q7	
B2667		Status word 2.8 from CU	IF_CU.Zustandswort2.Q8	
B2668		Status word 2.9 from CU	IF_CU.Zustandswort2.Q9	
B2669		Status word 2.10 from CU	IF_CU.Zustandswort2.Q10	
B2670		Status word 2.11 from CU	IF_CU.Zustandswort2.Q11	
B2671		Status word 2.12 from CU	IF_CU.Zustandswort2.Q12	
B2672		Status word 2.13 from CU	IF_CU.Zustandswort2.Q13	
B2673		Status word 2.14 from CU	IF_CU.Zustandswort2.Q14	
B2674		Status word 2.15 from CU	IF_CU.Zustandswort2.Q15	
B2675		Status word 2.16 from CU	IF_CU.Zustandswort2.Q16	
B2860		Output (EinV)	FREI_BST.EinV.Q	
B2862		Output (AusV)	FREI_BST.AusV.Q	
B2864		Output (ImpV)	FREI_BST.ImpV.Q	
B2866		Output (ImpB)	FREI_BST.ImpB.Q	
B2868		Output (Inv)	FREI_BST.Invt.Q	
B2870		Output (AND_1)	FREI_BST.AND_1.Q	
B2876		Output (OR_1)	FREI_BST.OR_1.Q	
B2880		Output 1 (comp.)	FREI_BST.Vergl.QU	
B2881		Output 2 (comp.)	FREI_BST.Vergl.QE	
B2882		Output 3 (comp.)	FREI_BST.Vergl.QL	
K4000		Constant output in I type Y=0	IQ1Z_01.0_I_Ausgang.Y	
K4248	d248	Status display (PTP receive)	IF_PEER.Empf_PEER.YTS	

K4332	d332	Control word 1 from T400	IQ1Z_07.B210.QS	
K4333	d333	Control word 2 from T400	IQ1Z_07.B220.QS	
K4334	d334	Control word 3 from T400	IQ1Z_07.B230.QS	
K4335	d335	Status word 1 from T400	CONTZ_01.SE120.QS	H015, H444
K4336	d336	Status word 2 from T400	CONTZ_01.C245.QS	H445
K4337	d337	Alarm message from T400	IF_CU.SU150.QS	
K4338	d338	Faults from T400	IF_CU.SU170.QS	
K4497	d497	Status display (CB receive)	IF_COM.Empf_COM.YTS	
K4498		Fixed status word	CONTZ_01.R140.QS	
K4549	d549	Status word 1 from CU	IF_CU.Verteilung.Y1	H499
	d581	Output (Anz_I1)	IQ2Z_01.Anz_I1.Y	
	d998	SIMADYN D	PARAMZ_01.Simdyn.Y	80

Table 10-3 List of block I/O (connectors and binectors)

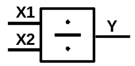
10.4 Block diagram

List of contents, block diagram "Standard SPW420 axial winder software package" for SIMOVERT/SIMOREG

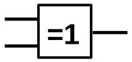
Explanation of the abbreviations and symbols in the block diagram

CF	=	"Output = setpoint input" command
EN	=	Controller enable
HY	=	Hysteresis
KP	=	Proportional gain
LL	=	Lower limit
LU	=	Upper limit
M	=	Threshold
MUX	=	Multiplexer, changeover switch
PTP	=	Peer-to-peer protocol
QL	=	"At the lower limit" signal
QU	=	"At the upper limit" signal
S	=	"Set" command
SV	=	Setting value
Ta	=	Sampling time
TD	=	Ramp-down time or differentiating time constant
TI	=	Integrating time constant
TN	=	Integral action time
TRU	=	Ramp-up, rounding-off time
TRD	=	Ramp-down, rounding-off time
TU	=	Ramp-up time
X	=	Main input quantity, actual value
Y	=	Main output quantity, actuating quantity
YA	=	Acceleration, dv/dt
YE	=	Control error
YI	=	I component
HI	=	Inhibit I component
IC	=	Inhibit P component
D	=	Diameter
n	=	Speed

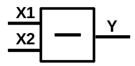
= Ramp-function generator



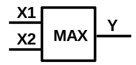
= Divider (Y=X1/X2)



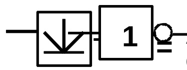
= Exclusive or



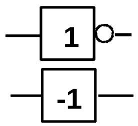
= Subtractor (Y=X1-X2)



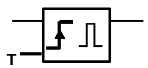
= Maximum value generator (Y=maximum of X1 and X2)



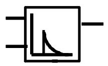
= Absolute value generator

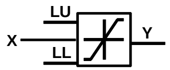


= Sign reversal

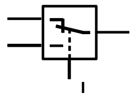


= Monoflop

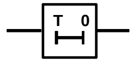

= Differentiating element



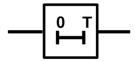
= Limiter (LL<=Y<=LU)



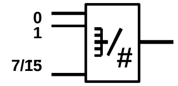
= Changeover switch (quiescent position (I=O) shown)



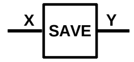
= Switch-on delay, retriggerable



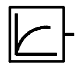
= Switch-off delay, retriggerable

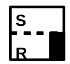


= Conversion, binary quantity into bytes/word quantity

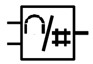


= Block to save X at power failure


= PT1 element



= Flip-Flop


= A/D converter

Standard SPW420 axial winder software, version 2.0

Explanation of abbreviations and symbols

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Explanation of the parameter, bin-/connector and signal in the block diagram

Technology-parameter

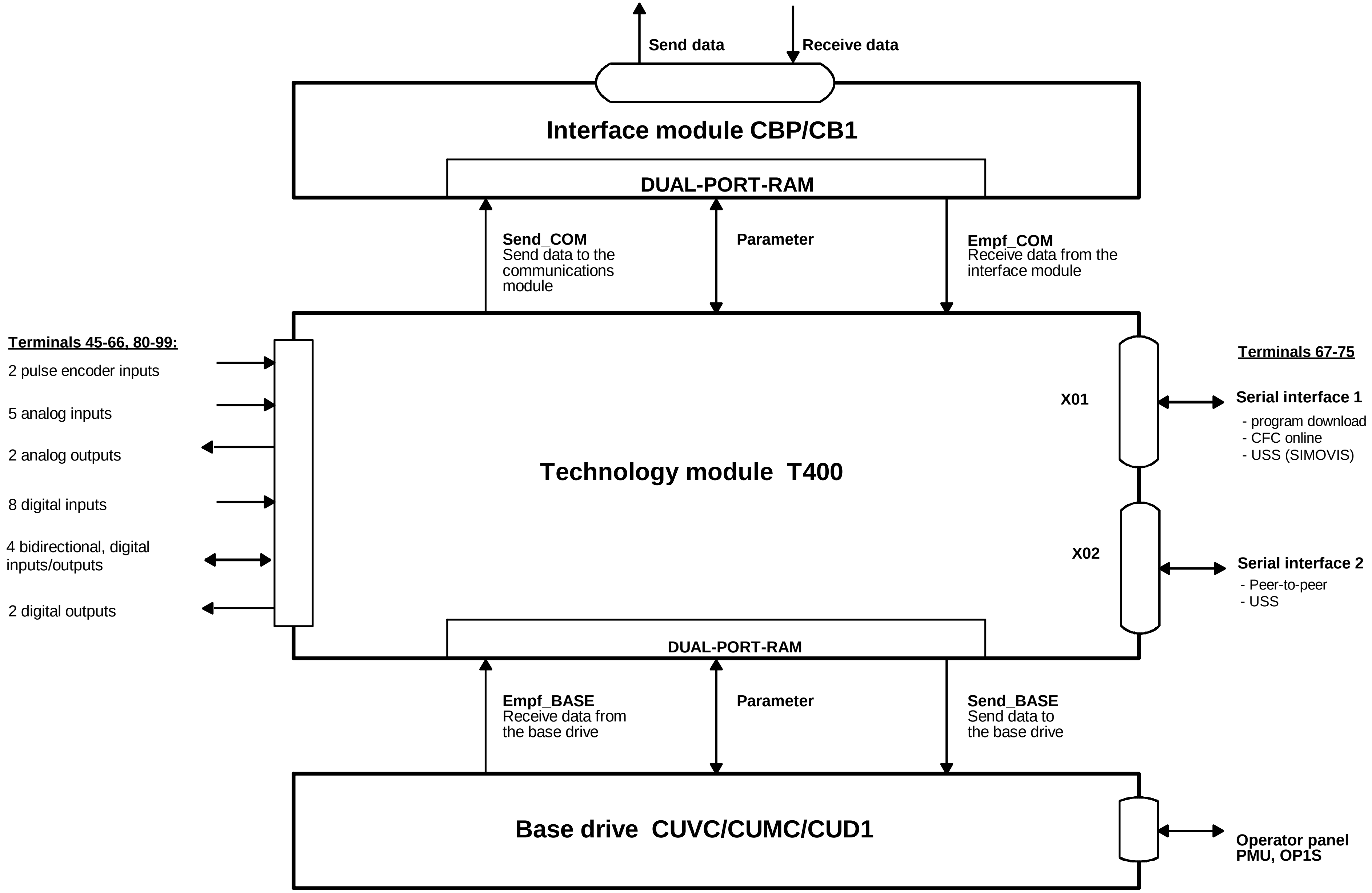
Name Value H295 →	Changeable parameter
Name → d330	Display parameter
Name / H123 (def) / KR	Connectable parameter in R-type
Name / H125 (def) / K	Connectable parameter in I-type
Name / H123 (def) / B	Connectable parameter in B-type

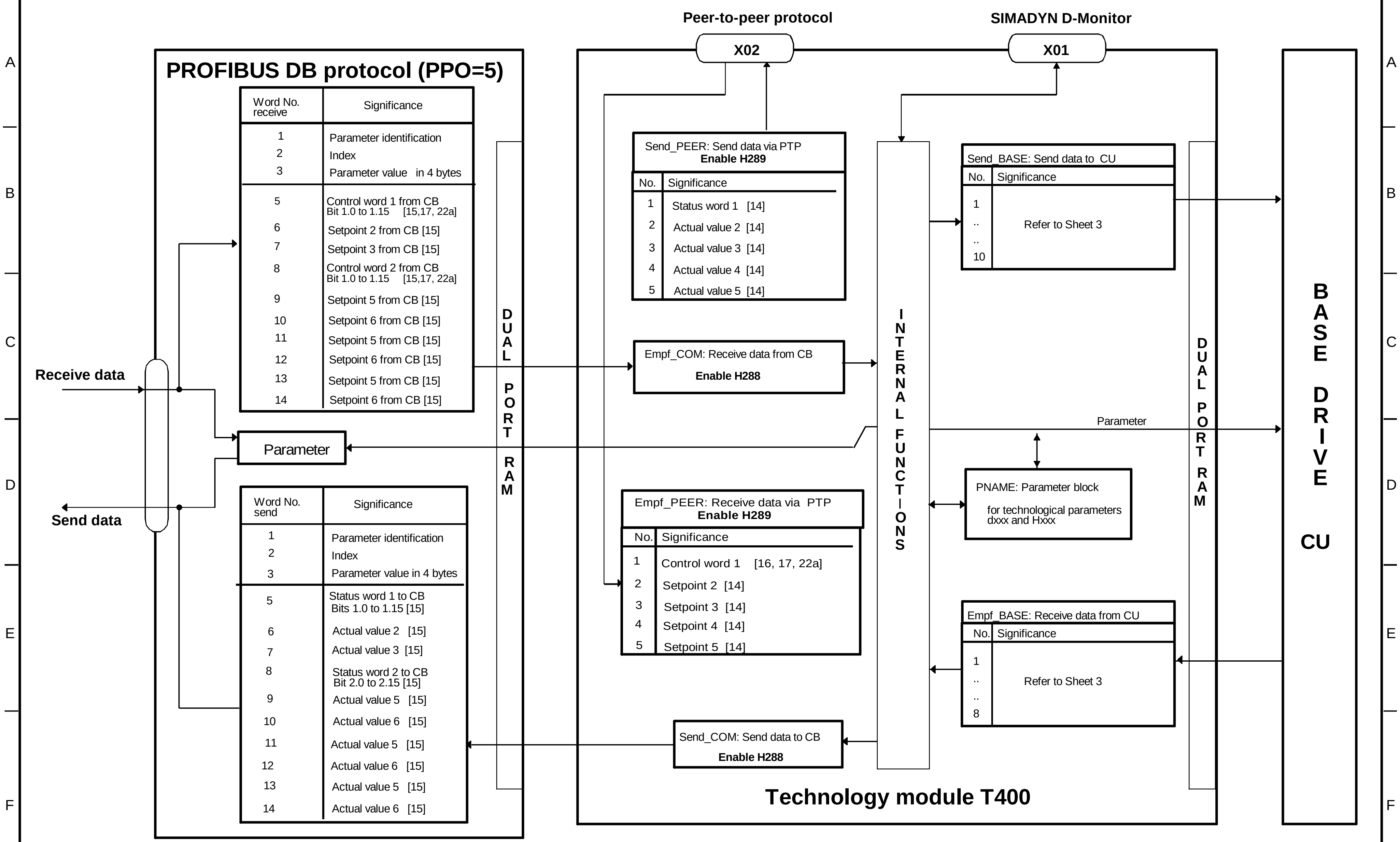
Binnector and connector

KR0800 Name	Connectable connector in R-type
K4248 Name	Connectable connector in I-type
B2001 Name	Connectable binnector in B-type
Name KR0850	Connected connector in R-type
Name K4248	Connected connector in I-type
Name B2528	Connected binnector in B-type

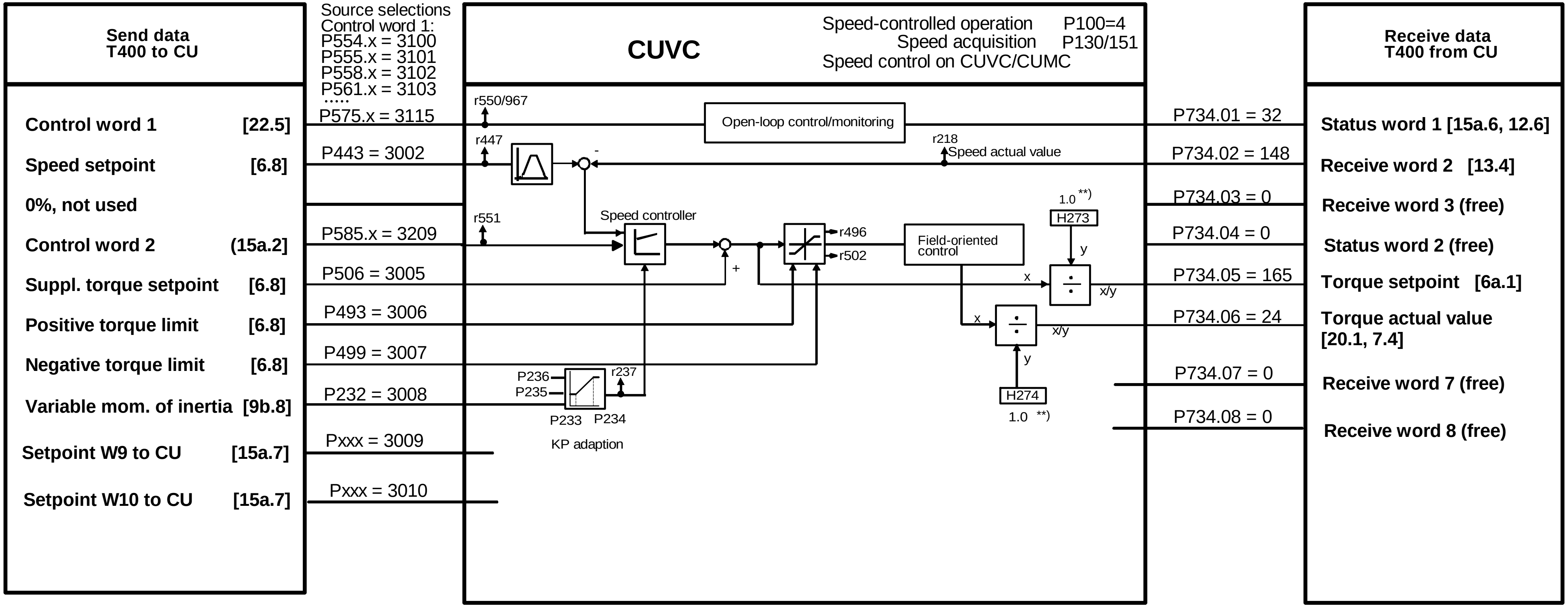
Signal

→	Signal to (Sheet.column)
←	Signal from (Sheet.column)


Send data
Receive data
Interface module CBP/CB1
DUAL-PORT-RAM
Send_COM
Send data to the communications module
Parameter
Empf_COM
Receive data from the interface module
Terminals 45-66, 80-99:
2 pulse encoder inputs
5 analog inputs
2 analog outputs
8 digital inputs
4 bidirectional, digital inputs/outputs
2 digital outputs
Technology module T400
X01
X02
Terminals 67-75
Serial interface 1
- program download
- CFC online
- USS (SIMOVIS)
Serial interface 2
- Peer-to-peer
- USS
DUAL-PORT-RAM
Empf_BASE
Receive data from the base drive
Parameter
Send_BASE
Send data to the base drive
Base drive CUVC/CUMC/CUD1
Operator panel PMU, OP1S

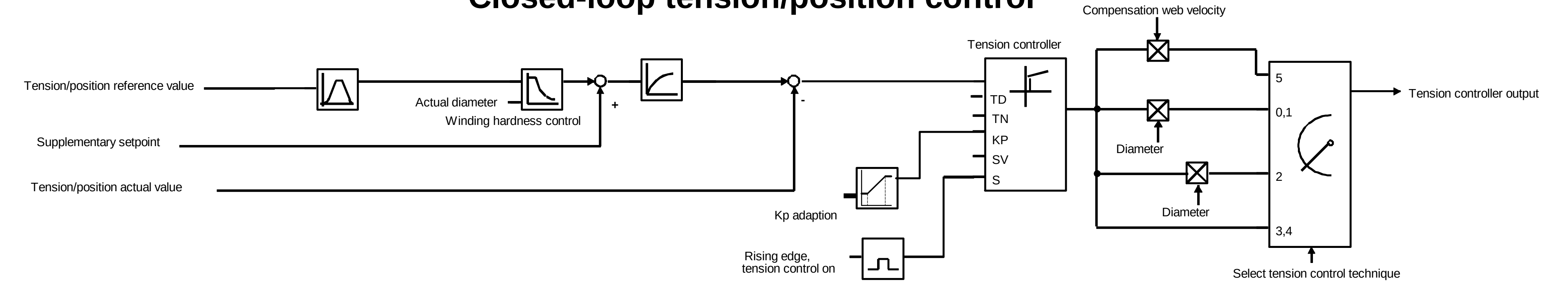


Peer-to-peer protocol
SIMADYN D-Monitor
X02
X01
PROFIBUS DB protocol (PPO=5)
Word No. receive
Significance
1 Parameter identification
2 Index
3 Parameter value in 4 bytes
5 Control word 1 from CB Bit 1.0 to 1.15 [15,17, 22a]
6 Setpoint 2 from CB [15]
7 Setpoint 3 from CB [15]
8 Control word 2 from CB Bit 1.0 to 1.15 [15,17, 22a]
9 Setpoint 5 from CB [15]
10 Setpoint 6 from CB [15]
11 Setpoint 5 from CB [15]
12 Setpoint 6 from CB [15]
13 Setpoint 5 from CB [15]
14 Setpoint 6 from CB [15]
Receive data
Parameter
Send data
Word No. send
Significance
1 Parameter identification
2 Index
3 Parameter value in 4 bytes
5 Status word 1 to CB Bits 1.0 to 1.15 [15]
6 Actual value 2 [15]
7 Actual value 3 [15]
8 Status word 2 to CB Bit 2.0 to 2.15 [15]
9 Actual value 5 [15]
10 Actual value 6 [15]
11 Actual value 5 [15]
12 Actual value 6 [15]
13 Actual value 5 [15]
14 Actual value 6 [15]
DUAL PORT RAM
Send_PEER: Send data via PTP
Enable H289
No. Significance
1 Status word 1 [14]
2 Actual value 2 [14]
3 Actual value 3 [14]
4 Actual value 4 [14]
5 Actual value 5 [14]
Empf_COM: Receive data from CB
Enable H288
Empf_PEER: Receive data via PTP
Enable H289
No. Significance
1 Control word 1 [16, 17, 22a]
2 Setpoint 2 [14]
3 Setpoint 3 [14]
4 Setpoint 4 [14]
5 Setpoint 5 [14]
Send_COM: Send data to CB
Enable H288
INTERNAL FUNCTIONS
Send_BASE: Send data to CU
No. Significance
1 .. .. 10 Refer to Sheet 3
Parameter
PNAME: Parameter block
for technological parameters dxxx and Hxxx
Empf_BASE: Receive data from CU
No. Significance
1 .. .. 8 Refer to Sheet 3
DUAL PORT RAM
BASE DRIVE
CU
Technology module T400



**) Technology-parameter on T400

Closed-loop tension/position control



Closed-loop speed control

Language selection 0 H000

Identification, standard software package 420 d001

Software release, standard software package 2.0 d002

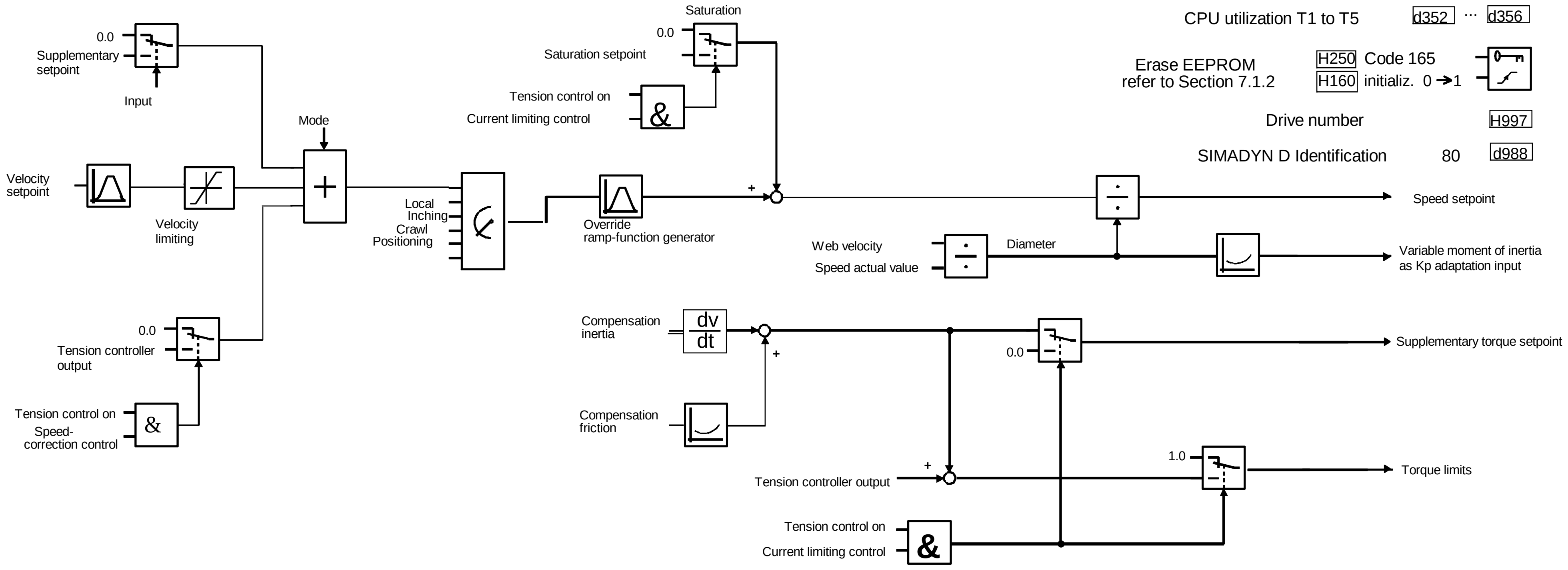
CPU utilization T1 to T5 d352 ··· d356

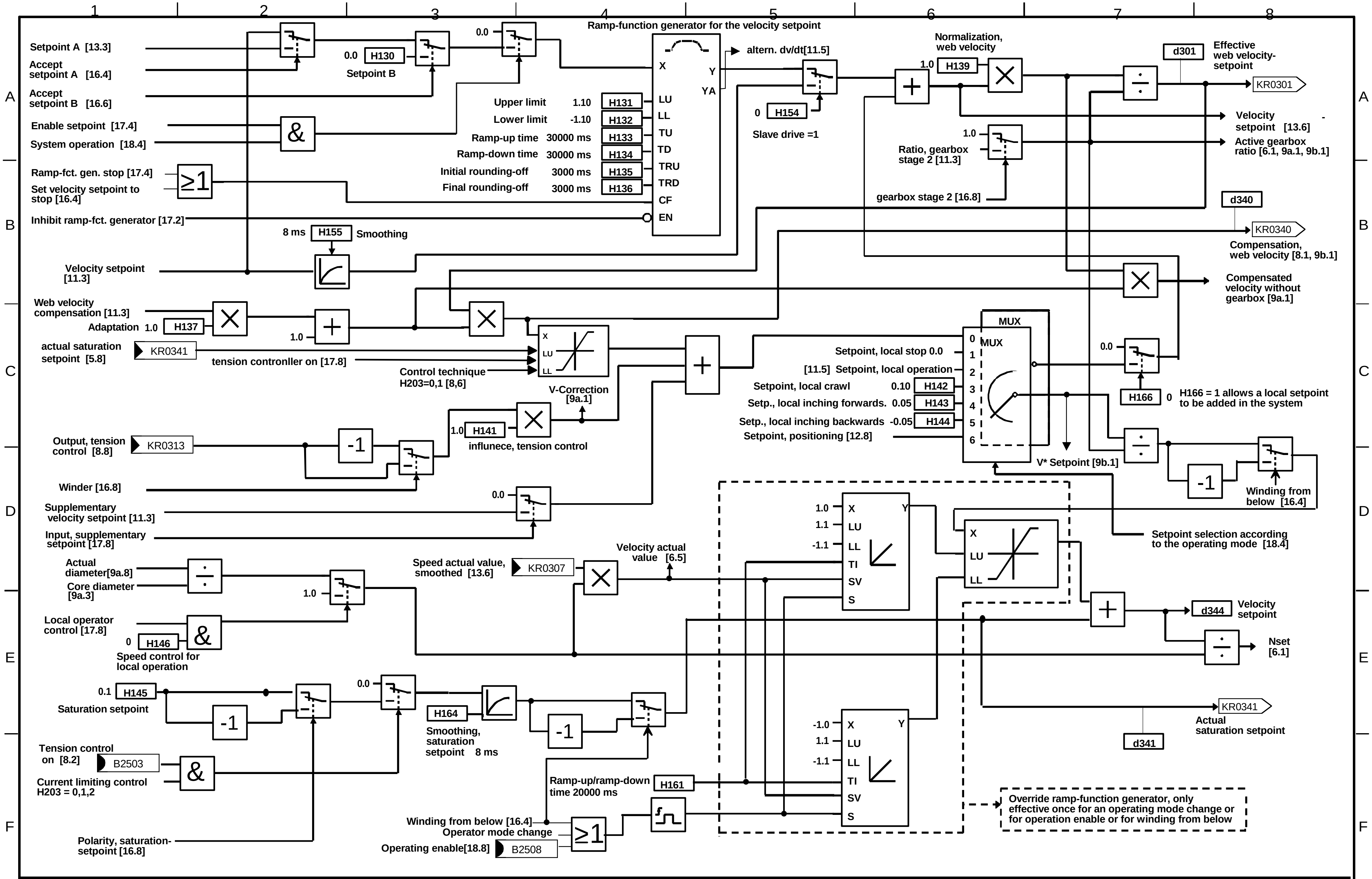
Erase EEPROM refer to Section 7.1.2 H250 Code 165

H160 initializ. 0 → 1

Drive number H997

SIMADYN D Identification 80 d988





Standard SPW420 axial winder software, version 2.0

Speed setpoint conditioning

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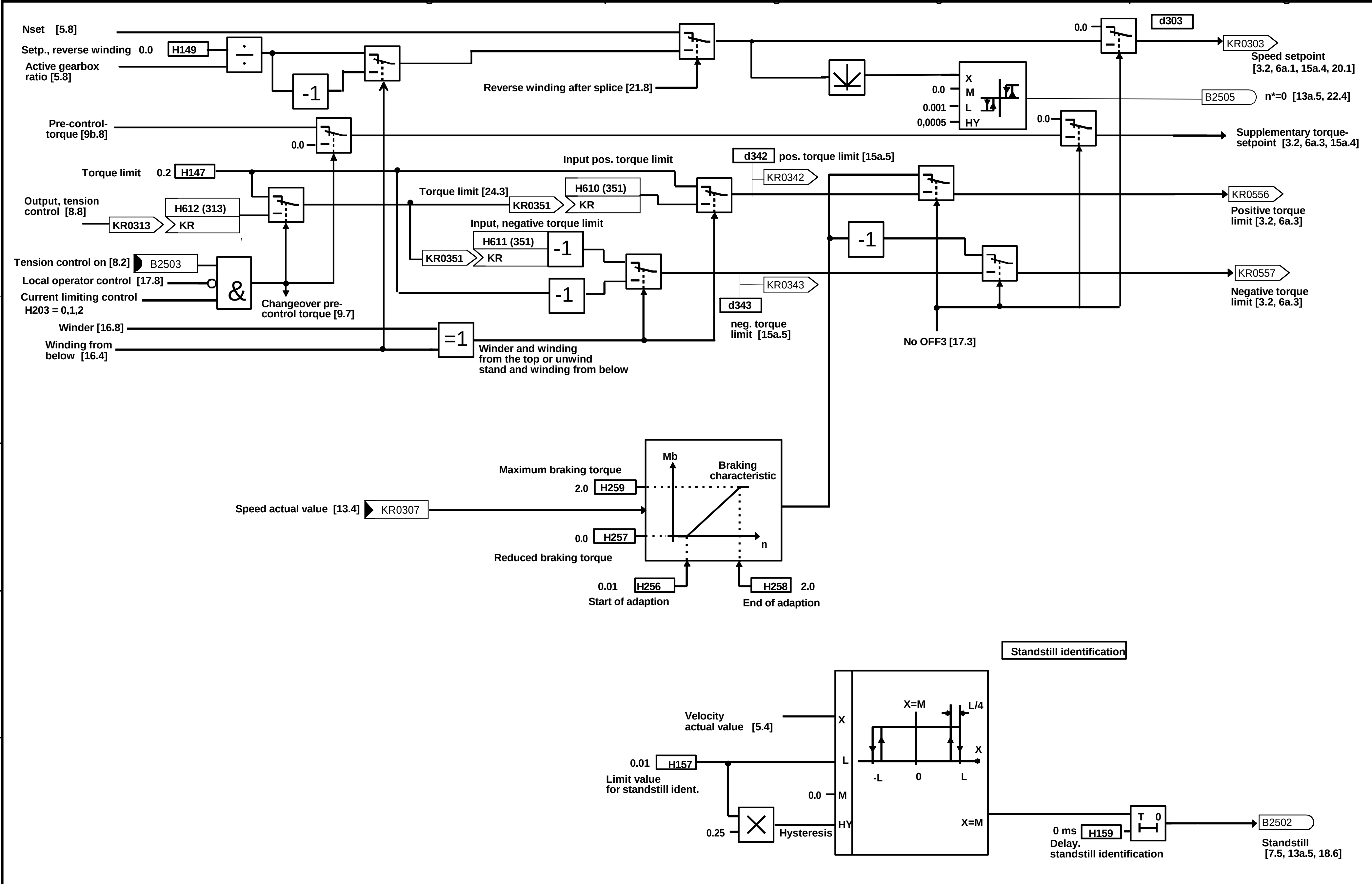
Sheet 5



Standard SPW420 axial winder software, version 2.0

Torque limiting, supplementary torque setpoint, standstill identification

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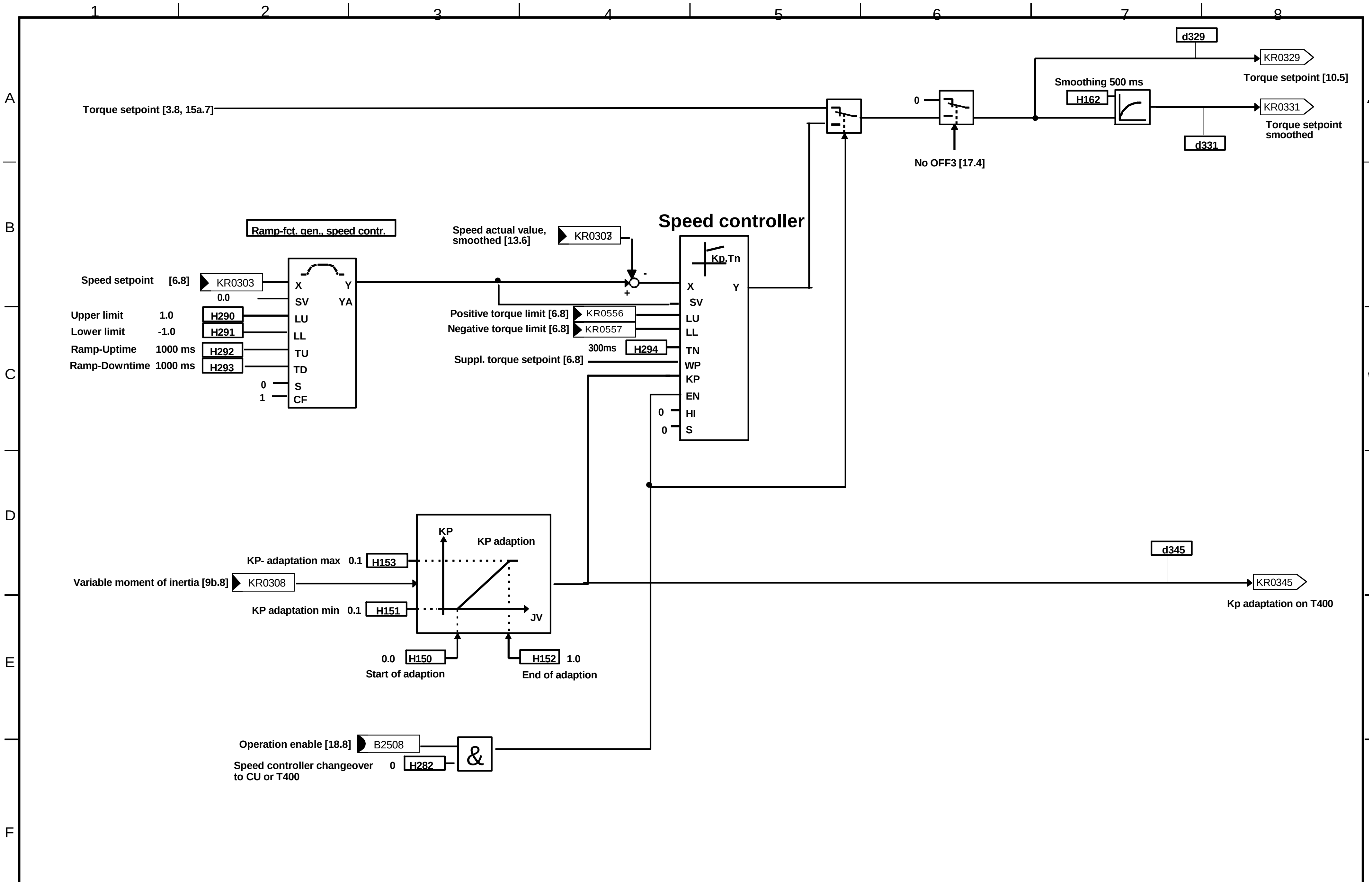
Sheet 6



Standard SPW420 axial winder software, version 2.0

Speed controller on the T400

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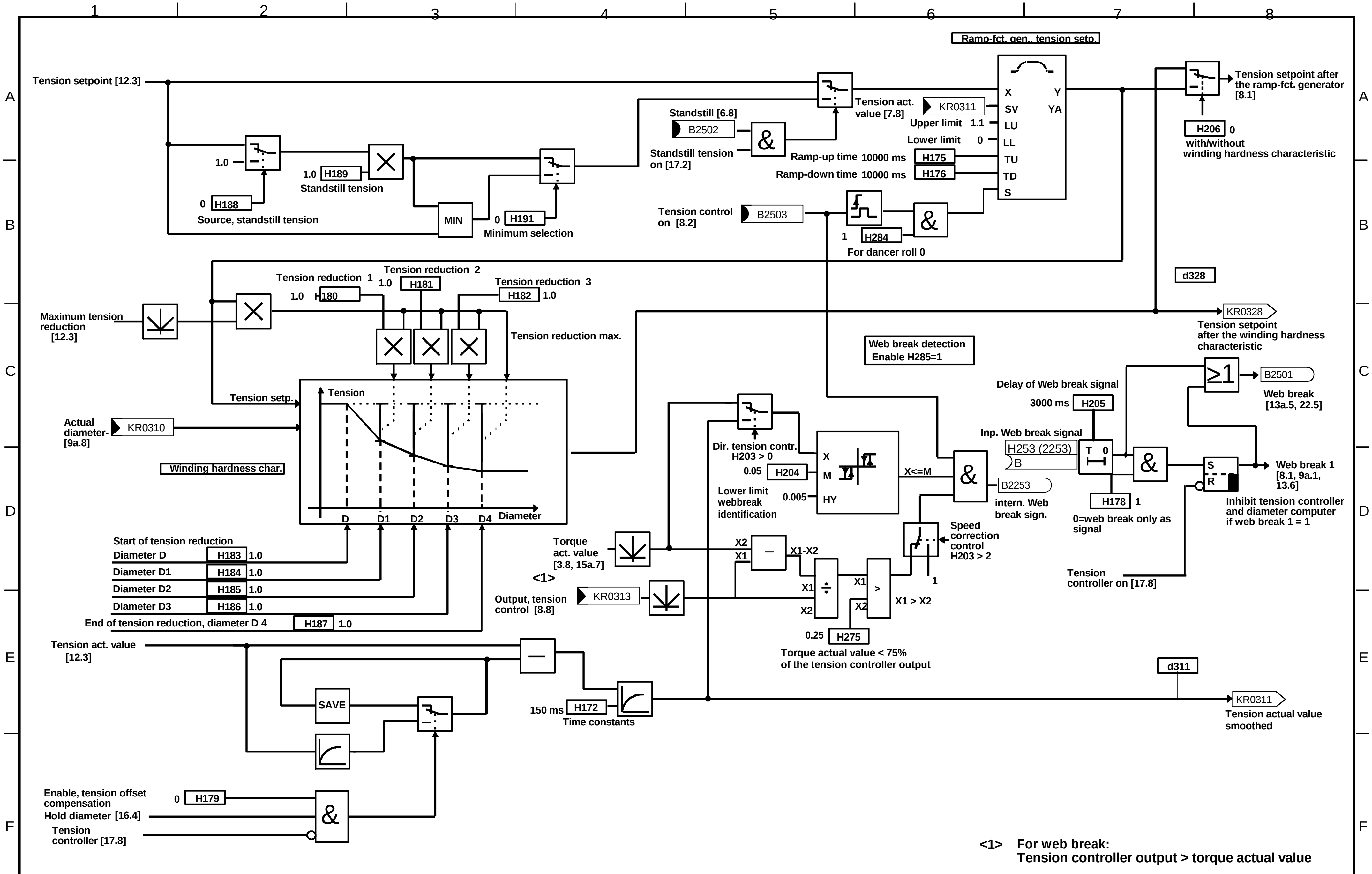
Sheet 6a



Standard SPW420 axial winder software, version 2.0

Tension setpoint/tension actual value conditioning, winding hardness control, web break detection

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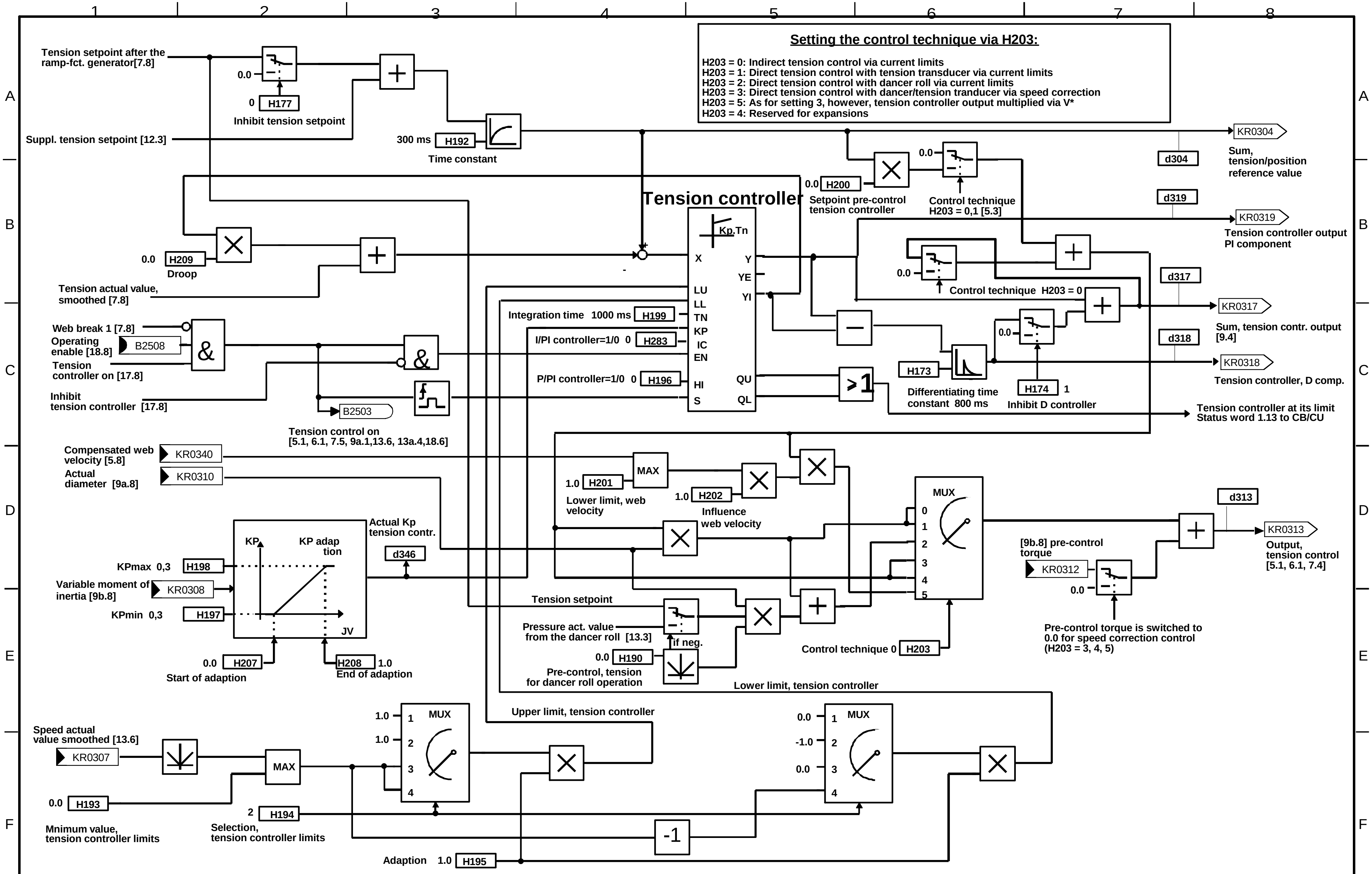
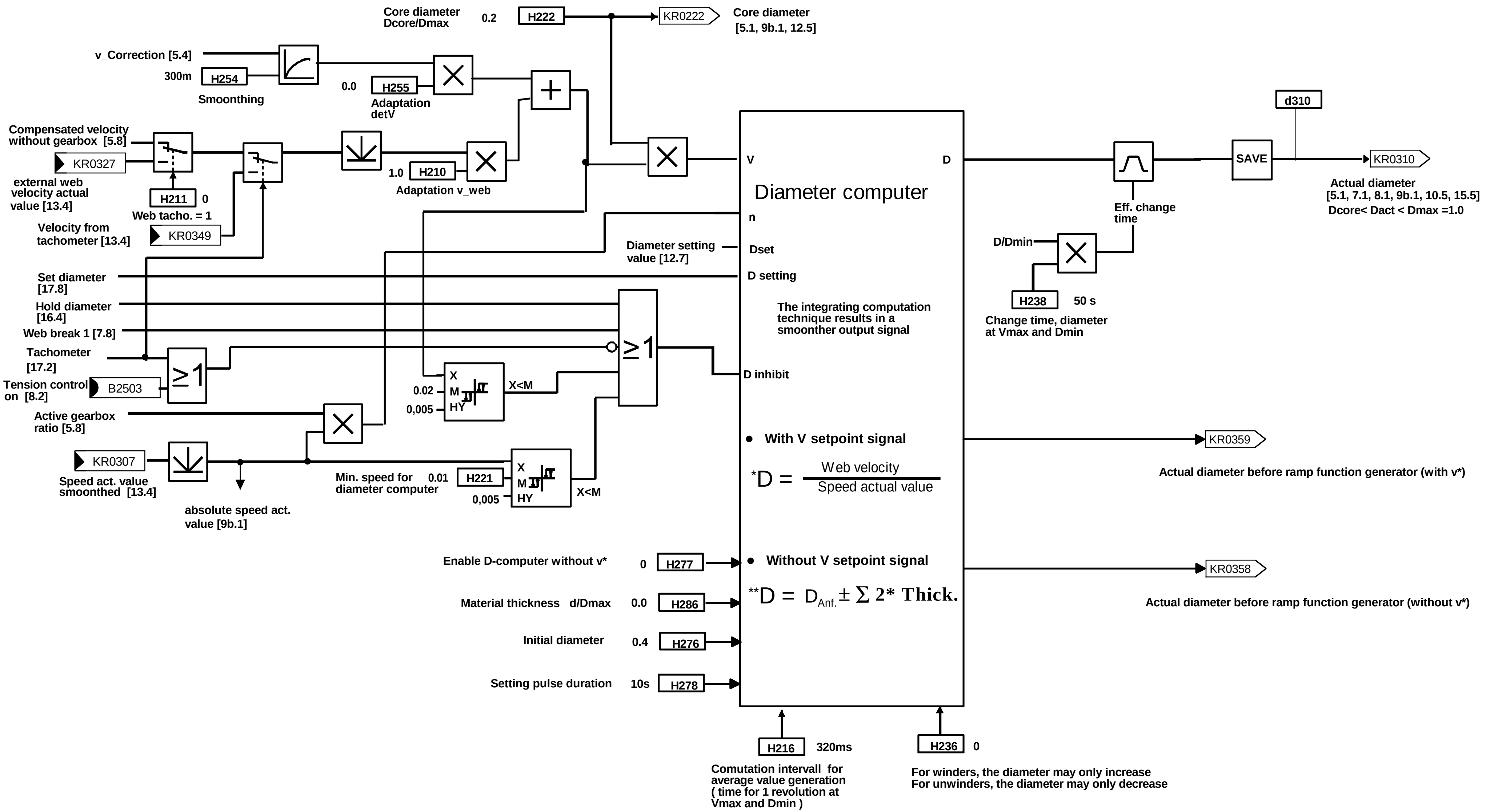
Sheet 7



Standard SPW420 axial winder software, version 2.0
Tension controller

SIEMENS AG A&D LD R
Sheet 8



Standard SPW420 axial winder software, version 2.0

Diameter computer

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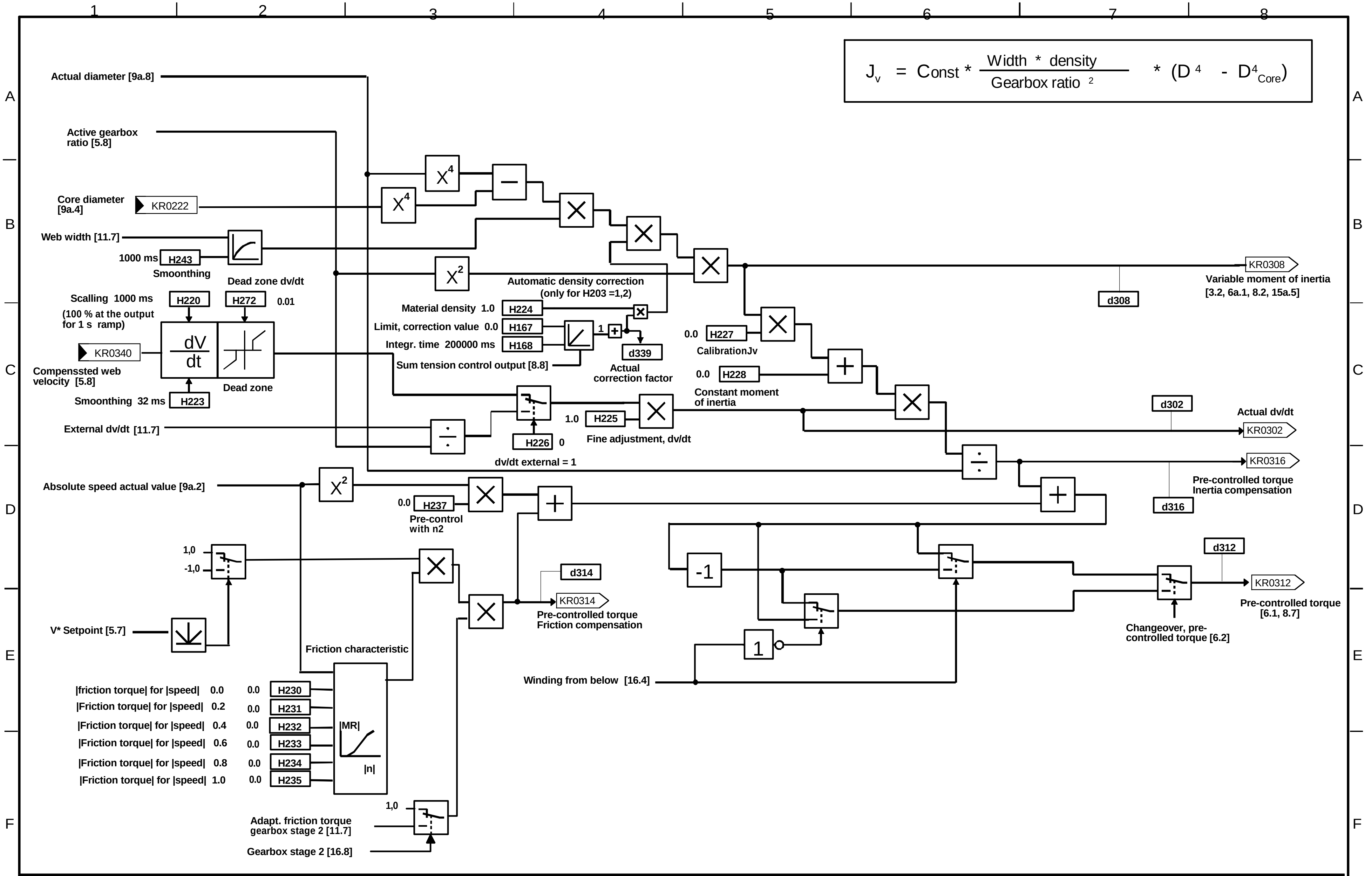

Standard SPW420 axial winder software, version 2.0

Pre-control

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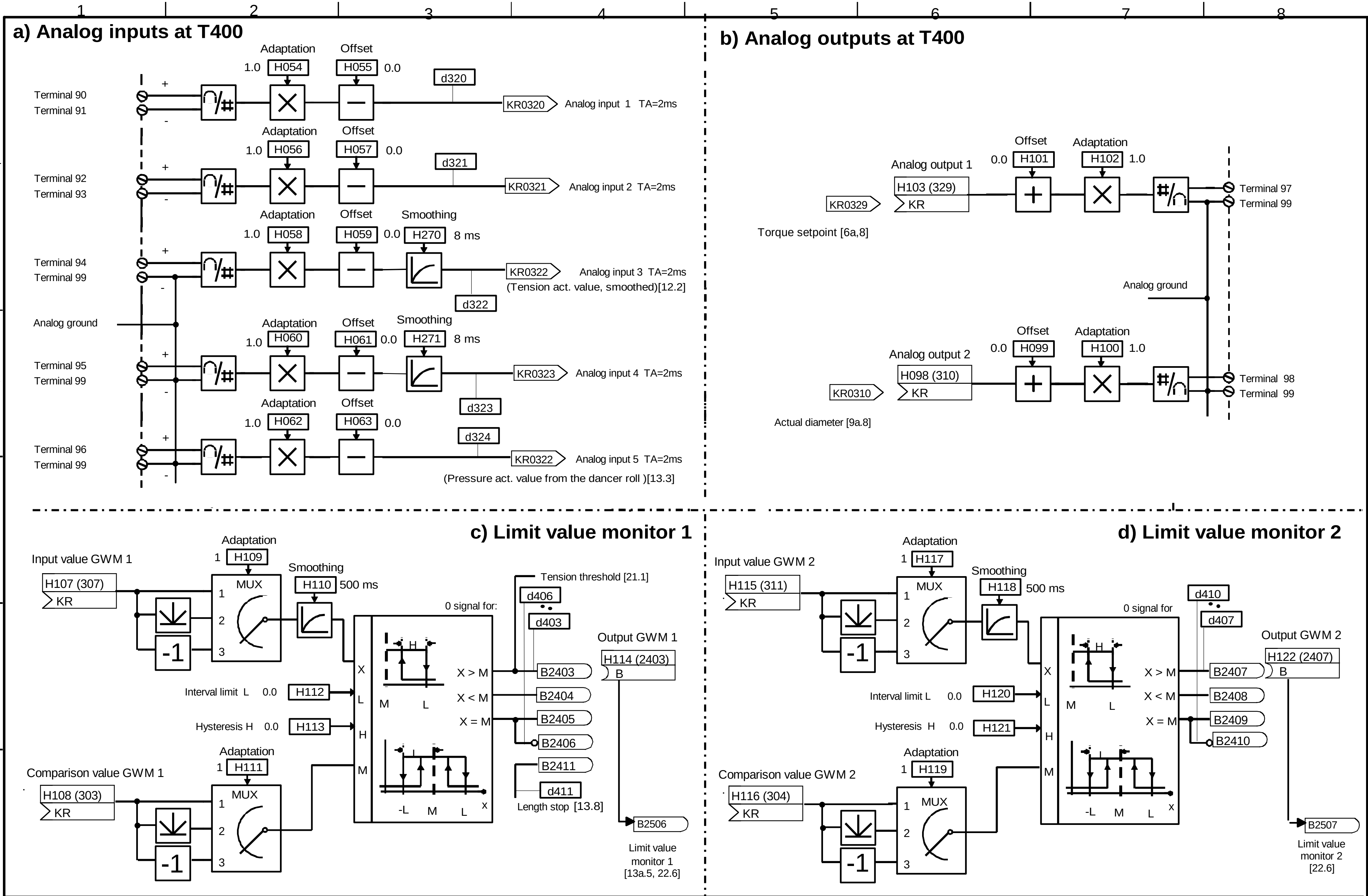
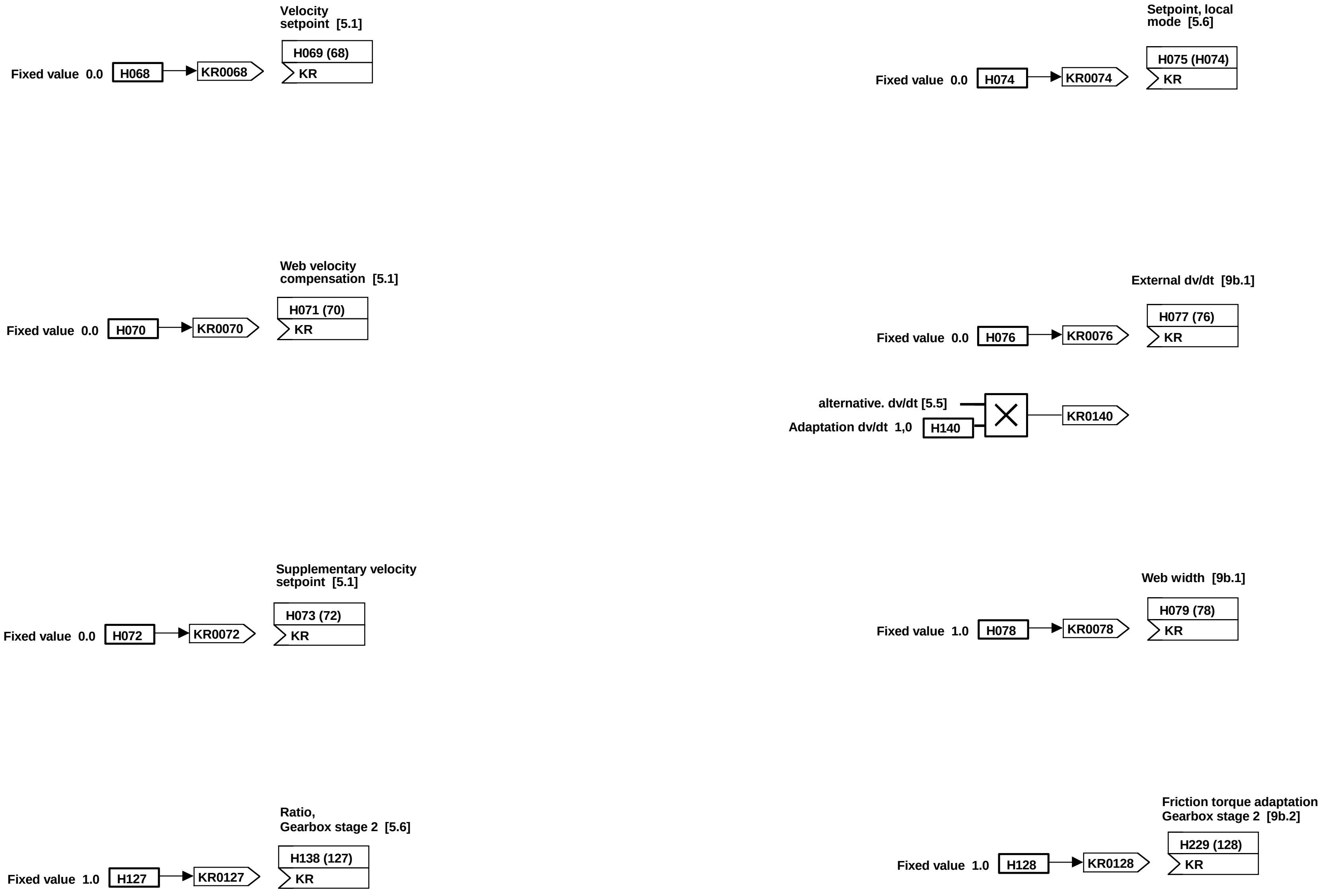
Sheet 9b


a) Analog inputs at T400
Terminal 90
Terminal 91
Adaptation
1.0 H054
Offset
H055 0.0
d320
KR0320
Analog input 1 TA=2ms
Terminal 92
Terminal 93
1.0 H056
H057 0.0
d321
KR0321
Analog input 2 TA=2ms
Terminal 94
Terminal 99
1.0 H058
H059 0.0
Smoothing
H270 8 ms
KR0322
Analog input 3 TA=2ms
(Tension act. value, smoothed)[12.2]
d322
Analog ground
Terminal 95
Terminal 99
1.0 H060
H061 0.0
H271 8 ms
KR0323
Analog input 4 TA=2ms
d323
Terminal 96
Terminal 99
1.0 H062
H063 0.0
d324
KR0322
Analog input 5 TA=2ms
(Pressure act. value from the dancer roll)[13.3]
b) Analog outputs at T400
Analog output 1
H103 (329)
KR
KR0329
Torque setpoint [6a,8]
Offset
0.0 H101
Adaptation
H102 1.0
Terminal 97
Terminal 99
Analog ground
Analog output 2
H098 (310)
KR
KR0310
Actual diameter [9a.8]
0.0 H099
H100 1.0
Terminal 98
Terminal 99
c) Limit value monitor 1
Input value GWM 1
H107 (307)
KR
Adaptation
1 H109
MUX
Smoothing
H110 500 ms
0 signal for:
Tension threshold [21.1]
d406
d403
X
L
H
M
X > M
X < M
X = M
B2403
B2404
B2405
B2406
B2411
d411
Length stop [13.8]
Interval limit L 0.0 H112
Hysteresis H 0.0 H113
Comparison value GWM 1
H108 (303)
KR
1 H111
Output GWM 1
H114 (2403)
B
B2506
Limit value monitor 1 [13a.5, 22.6]
d) Limit value monitor 2
Input value GWM 2
H115 (311)
KR
1 H117
H118 500 ms
0 signal for
d410
d407
Output GWM 2
H122 (2407)
B
B2407
B2408
B2409
B2410
Interval limit L 0.0 H120
Hysteresis H 0.0 H121
Comparison value GWM 2
H116 (304)
KR
1 H119
B2507
Limit value monitor 2 [22.6]



Standard SPW420 axial winder software, version 2.0

Inputs for setpoints

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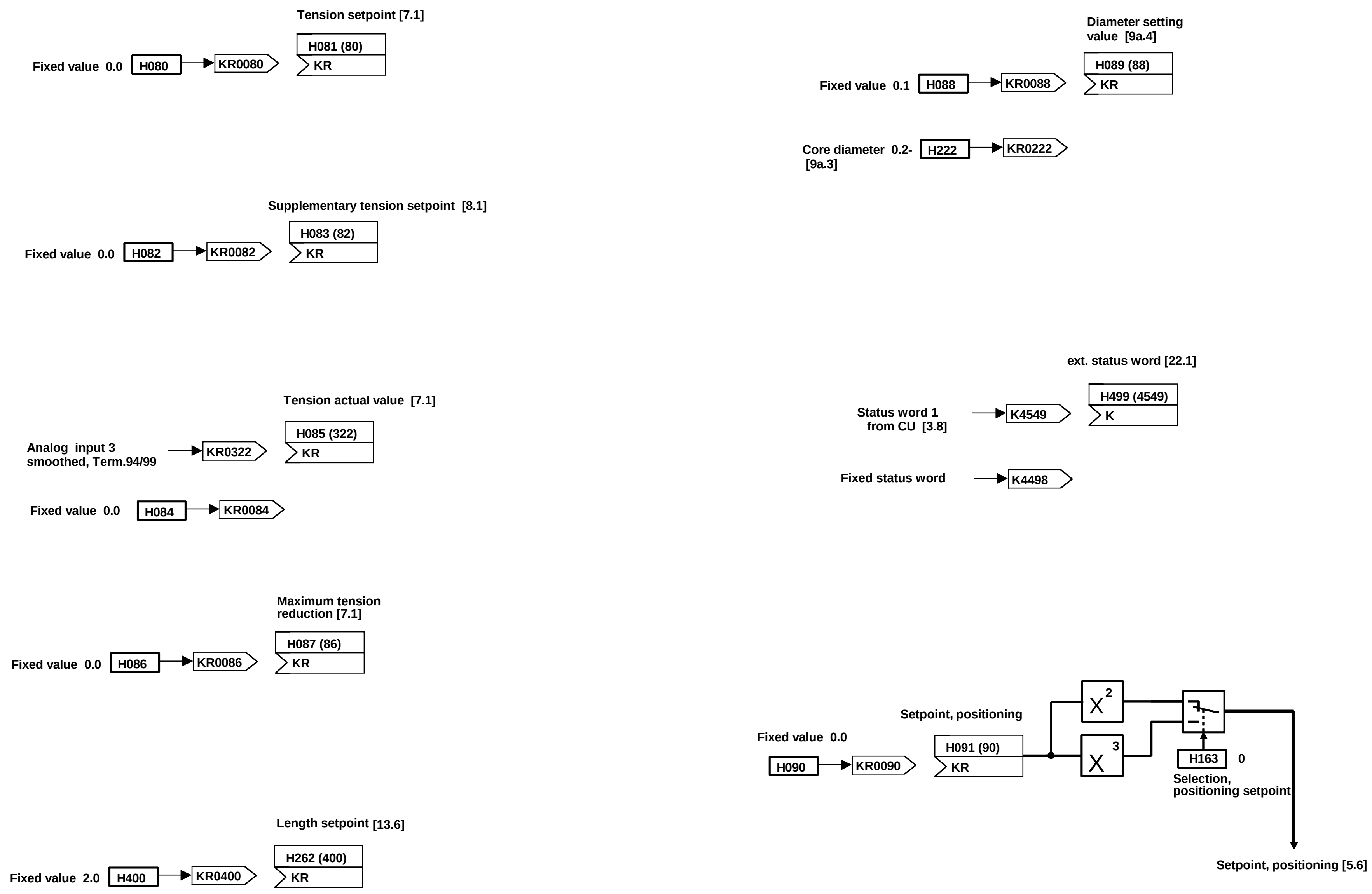
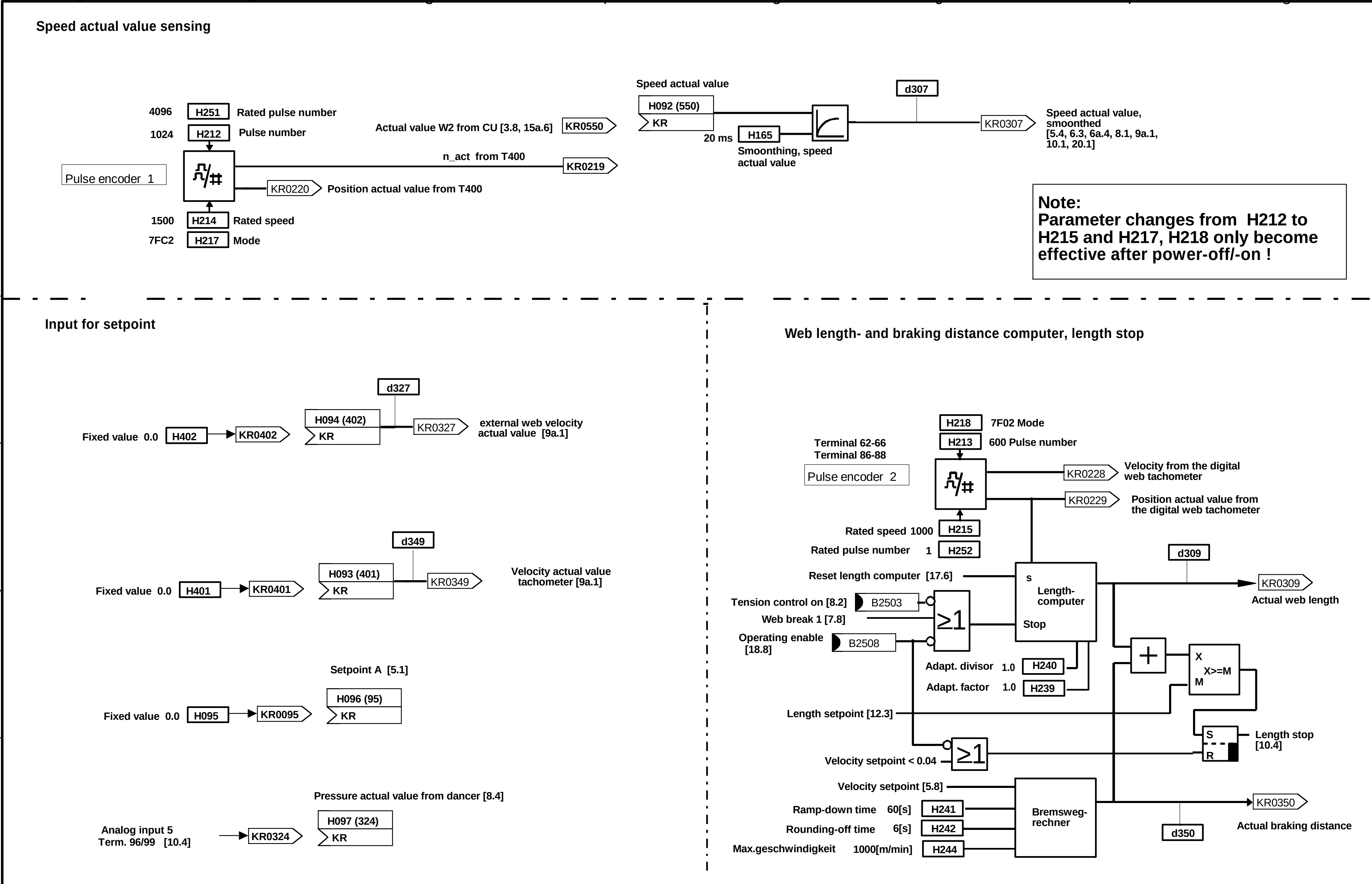
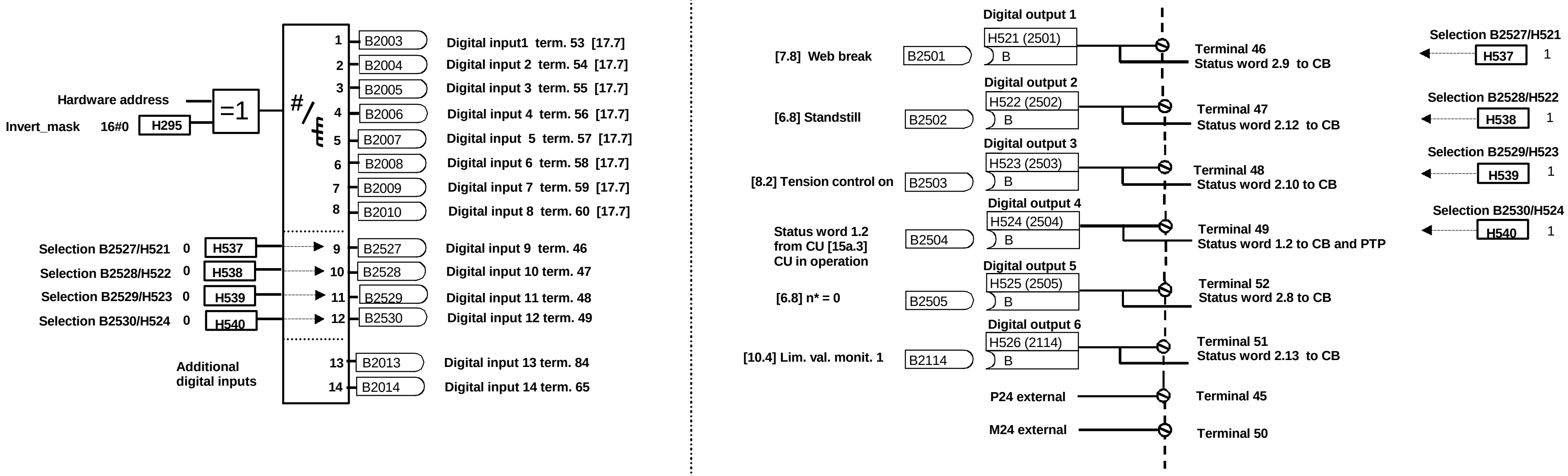


Tension setpoint [7.1]
Fixed value 0.0
H080
KR0080
H081 (80)
KR
Supplementary tension setpoint [8.1]
Fixed value 0.0
H082
KR0082
H083 (82)
KR
Tension actual value [7.1]
Analog input 3 smoothed, Term.94/99
KR0322
H085 (322)
KR
Fixed value 0.0
H084
KR0084
Maximum tension reduction [7.1]
Fixed value 0.0
H086
KR0086
H087 (86)
KR
Length setpoint [13.6]
Fixed value 2.0
H400
KR0400
H262 (400)
KR
Diameter setting value [9a.4]
Fixed value 0.1
H088
KR0088
H089 (88)
KR
Core diameter 0.2- [9a.3]
H222
KR0222
ext. status word [22.1]
Status word 1 from CU [3.8]
K4549
H499 (4549)
K
Fixed status word
K4498
Setpoint, positioning
Fixed value 0.0
H090
KR0090
H091 (90)
KR
X2
X3
H163
0
Selection, positioning setpoint
Setpoint, positioning [5.6]

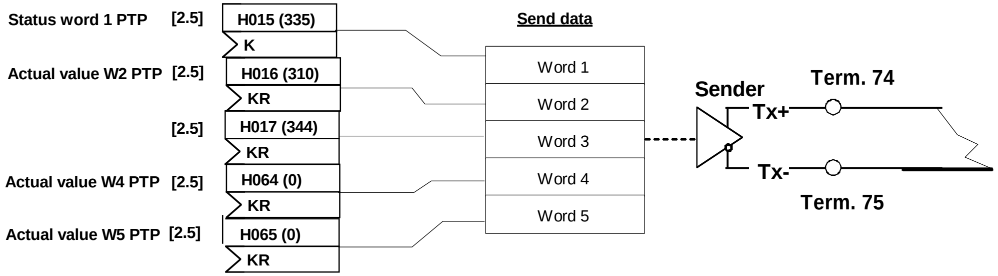

Speed actual value sensing
4096 H251 Rated pulse number
1024 H212 Pulse number
Pulse encoder 1
1500 H214 Rated speed
7FC2 H217 Mode
n_act from T400
KR0219
KR0220 Position actual value from T400
Actual value W2 from CU [3.8, 15a.6] KR0550
Speed actual value
H092 (550)
KR
20 ms H165
Smoonthing, speed actual value
d307
KR0307
Speed actual value, smoonthed [5.4, 6.3, 6a.4, 8.1, 9a.1, 10.1, 20.1]
Note:
Parameter changes from H212 to H215 and H217, H218 only become effective after power-off/-on !
Input for setpoint
d327
Fixed value 0.0 H402 KR0402
H094 (402)
KR
KR0327 external web velocity actual value [9a.1]
d349
Fixed value 0.0 H401 KR0401
H093 (401)
KR
KR0349 Velocity actual value tachometer [9a.1]
Setpoint A [5.1]
Fixed value 0.0 H095 KR0095
H096 (95)
KR
Pressure actual value from dancer [8.4]
Analog input 5 Term. 96/99 [10.4] KR0324
H097 (324)
KR
Web length- and braking distance computer, length stop
H218 7F02 Mode
H213 600 Pulse number
Terminal 62-66
Terminal 86-88
Pulse encoder 2
KR0228 Velocity from the digital web tachometer
KR0229 Position actual value from the digital web tachometer
Rated speed 1000 H215
Rated pulse number 1 H252
d309
Reset length computer [17.6]
s
Length-computer
Stop
KR0309
Actual web length
Tension control on [8.2] B2503
Web break 1 [7.8]
Operating enable [18.8] B2508
≥1
Adapt. divisor 1.0 H240
Adapt. factor 1.0 H239
X
X>=M
M
Length setpoint [12.3]
S
R
Length stop [10.4]
Velocity setpoint < 0.04
≥1
Velocity setpoint [5.8]
Ramp-down time 60[s] H241
Rounding-off time 6[s] H242
Max.geschwindigkeit 1000[m/min] H244
Bremsweg-rechner
KR0350
d350
Actual braking distance

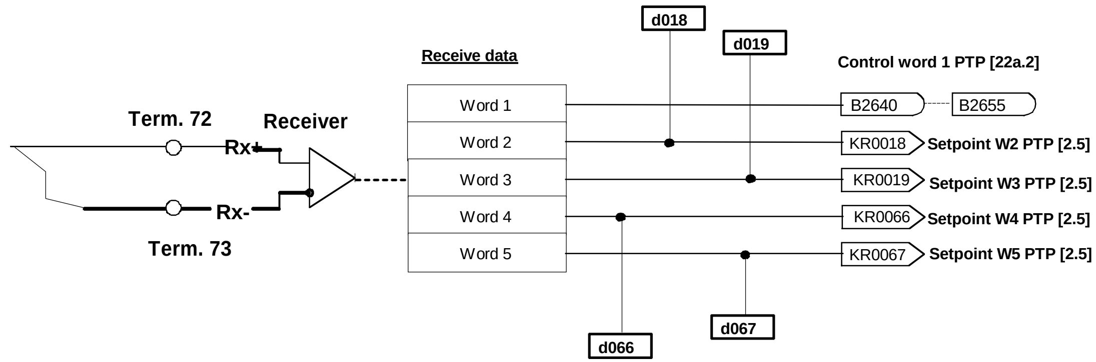
Digital inputs on the T400

Digital outputs on the T400



Serial interface 2 for the peer-to-peer protocol (terminal 72-75)





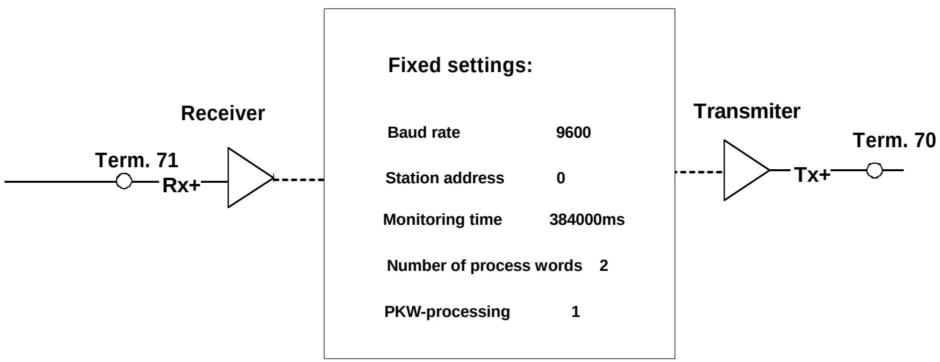
Settings for the peer-to-peer protocol

H289	0	Enable peer-to-peer communications
H245	19200	Baud rate
H247	9.92 s	Setting value
d248		Status display

Note: Changes to H245, H289
only become effective after power-down/-up!

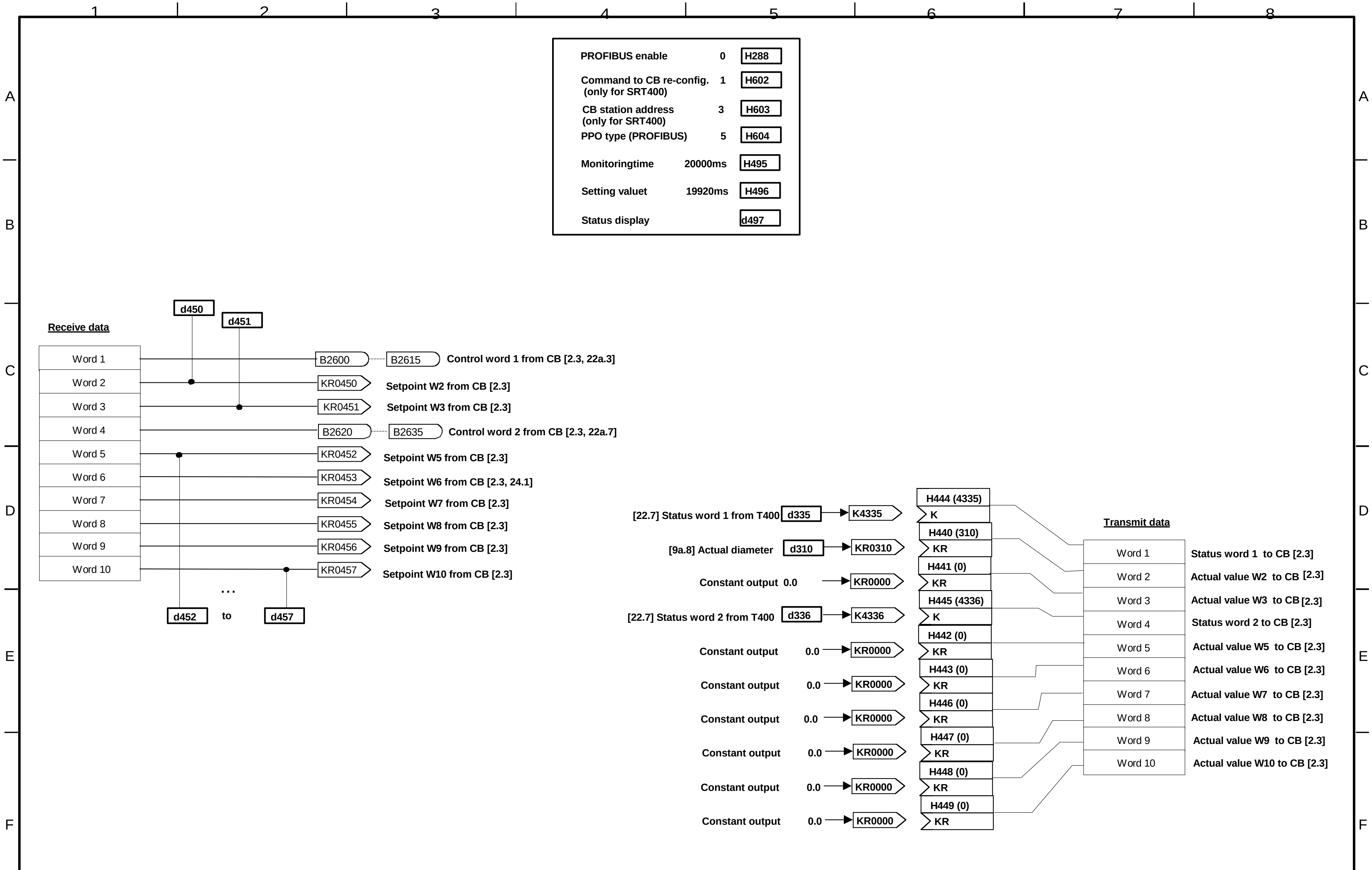
Serial interface 1 for USS_Slave Protocol (Terminal 70-71)

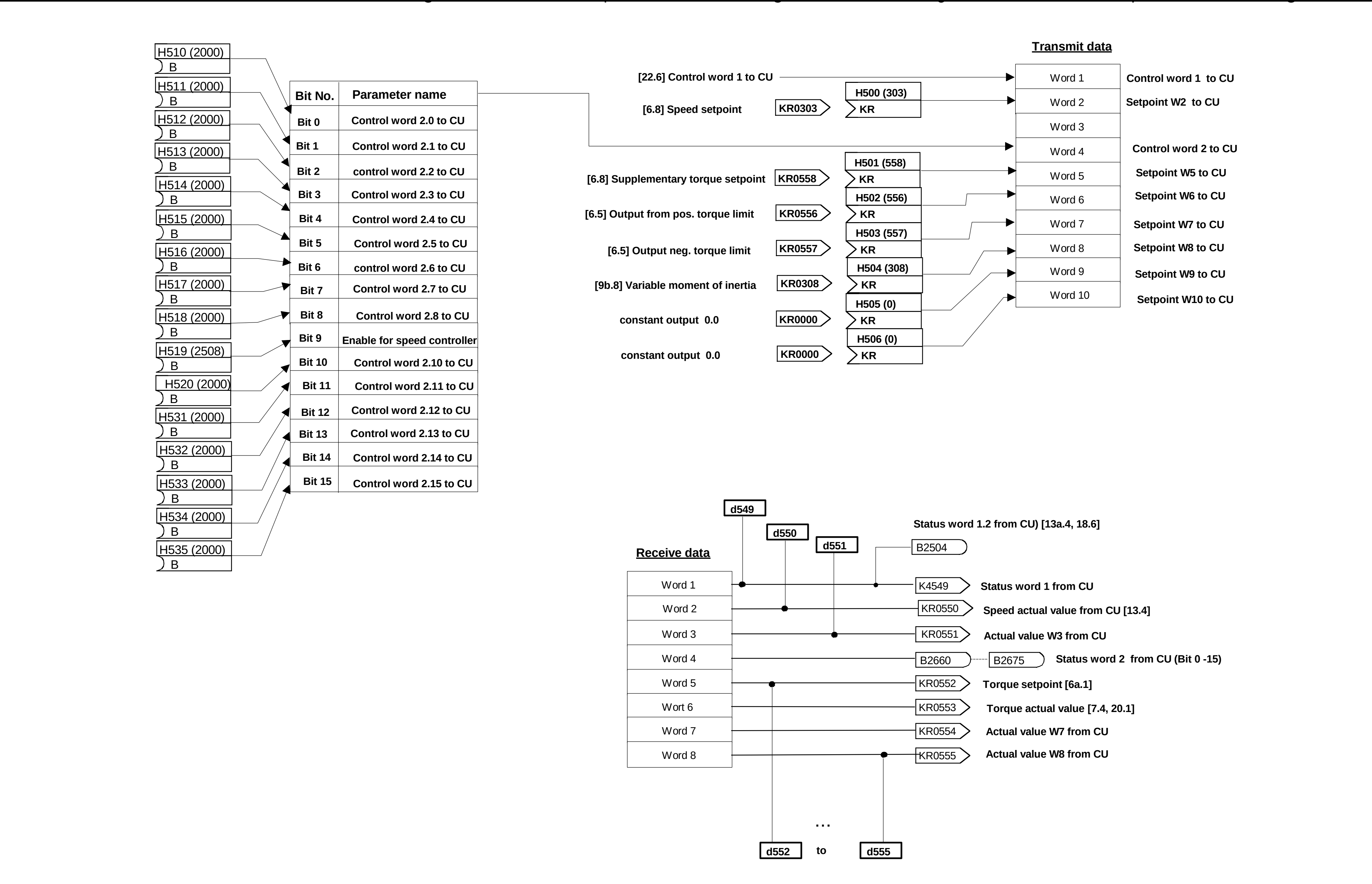
USS_Slave



Settings for USS_Slave Protocol:

H600	1	Enable USS_Slave communication
H601	0	USS data transfer line
S1/8 on T400	OFF	


PROFIBUS enable 0 H288
Command to CB re-config. (only for SRT400) 1 H602
CB station address (only for SRT400) 3 H603
PPO type (PROFIBUS) 5 H604
Monitoringtime 20000ms H495
Setting valuet 19920ms H496
Status display d497
Receive data
d450
d451
Word 1
Word 2
Word 3
Word 4
Word 5
Word 6
Word 7
Word 8
Word 9
Word 10
B2600
B2615
Control word 1 from CB [2.3, 22a.3]
KR0450
Setpoint W2 from CB [2.3]
KR0451
Setpoint W3 from CB [2.3]
B2620
B2635
Control word 2 from CB [2.3, 22a.7]
KR0452
Setpoint W5 from CB [2.3]
KR0453
Setpoint W6 from CB [2.3, 24.1]
KR0454
Setpoint W7 from CB [2.3]
KR0455
Setpoint W8 from CB [2.3]
KR0456
Setpoint W9 from CB [2.3]
KR0457
Setpoint W10 from CB [2.3]
...
d452 to d457
[22.7] Status word 1 from T400 d335 K4335
H444 (4335) K
[9a.8] Actual diameter d310 KR0310
H440 (310) KR
Constant output 0.0 KR0000
H441 (0) KR
[22.7] Status word 2 from T400 d336 K4336
H445 (4336) K
Constant output 0.0 KR0000
H442 (0) KR
Constant output 0.0 KR0000
H443 (0) KR
Constant output 0.0 KR0000
H446 (0) KR
Constant output 0.0 KR0000
H447 (0) KR
Constant output 0.0 KR0000
H448 (0) KR
Constant output 0.0 KR0000
H449 (0) KR
Transmit data
Word 1 Status word 1 to CB [2.3]
Word 2 Actual value W2 to CB [2.3]
Word 3 Actual value W3 to CB [2.3]
Word 4 Status word 2 to CB [2.3]
Word 5 Actual value W5 to CB [2.3]
Word 6 Actual value W6 to CB [2.3]
Word 7 Actual value W7 to CB [2.3]
Word 8 Actual value W8 to CB [2.3]
Word 9 Actual value W9 to CB [2.3]
Word 10 Actual value W10 to CB [2.3]



Standard SPW420 axial winder software, version 2.0

CU - Interface

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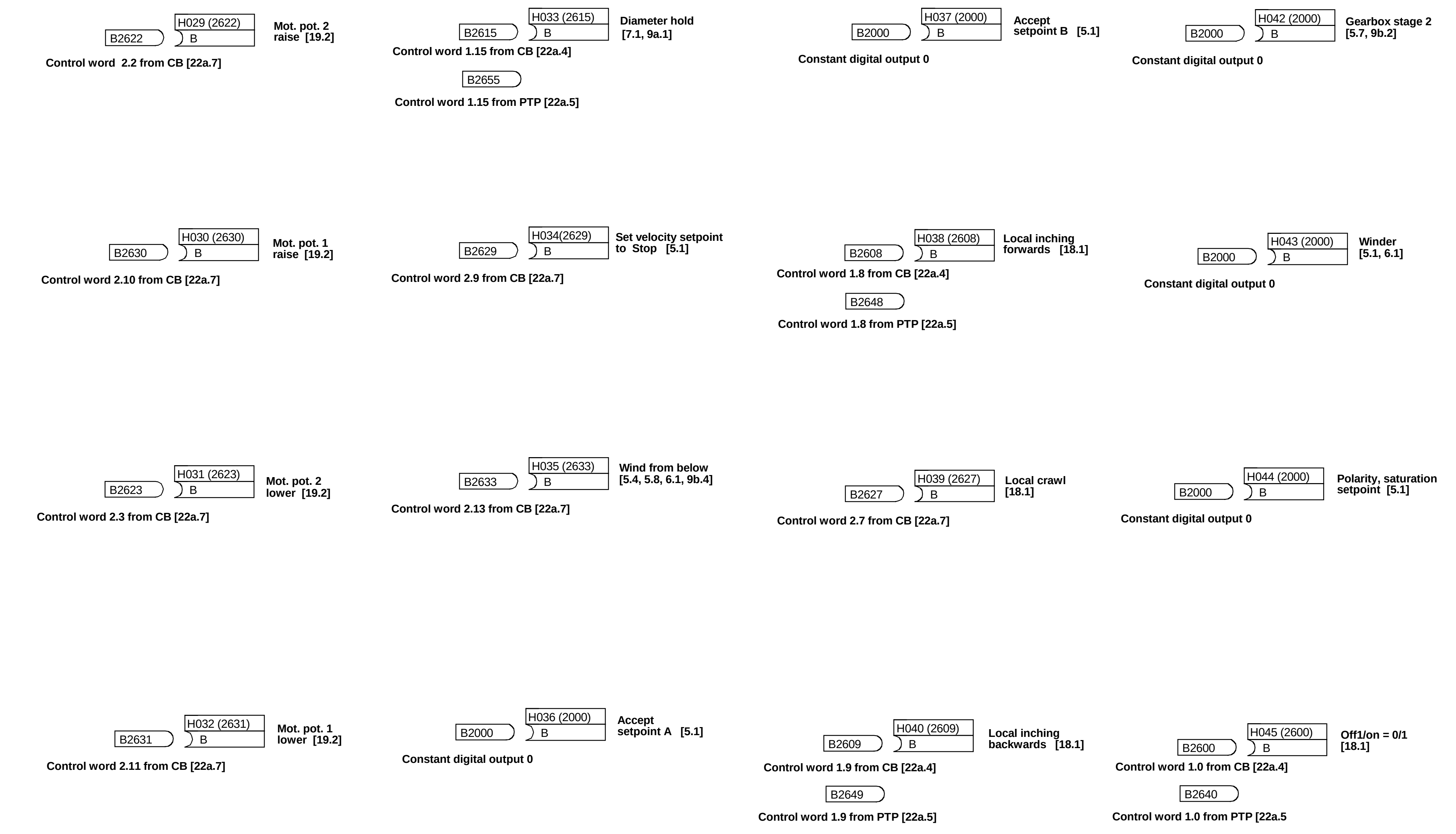

Standard SPW420 axial winder software, version 2.0

Inputs for control commands

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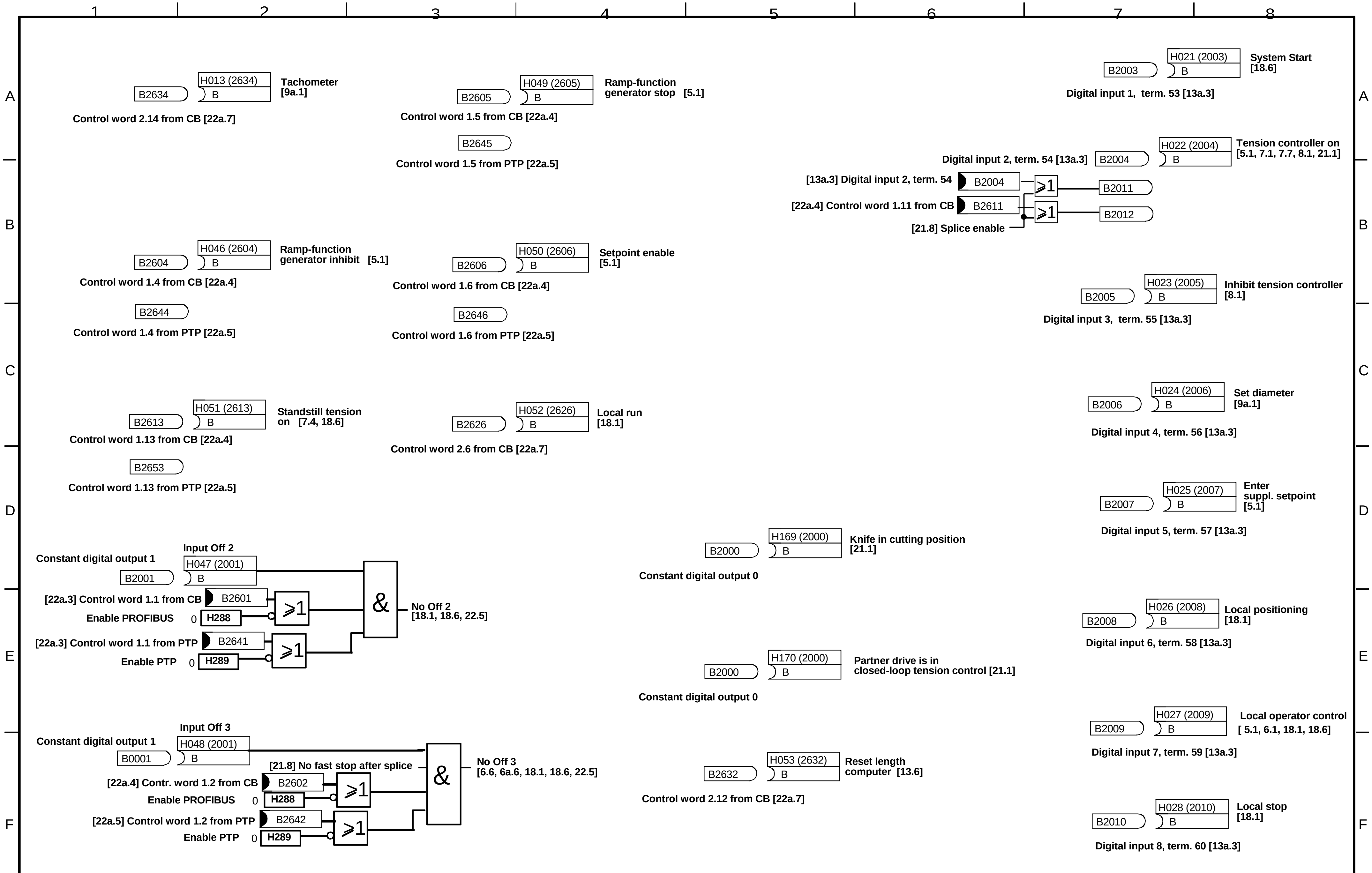

Standardprojektierung Achswickler SPW420 Version 2.0

Inputs for control commands, pre-assigned digital inputs, terminals 53-60

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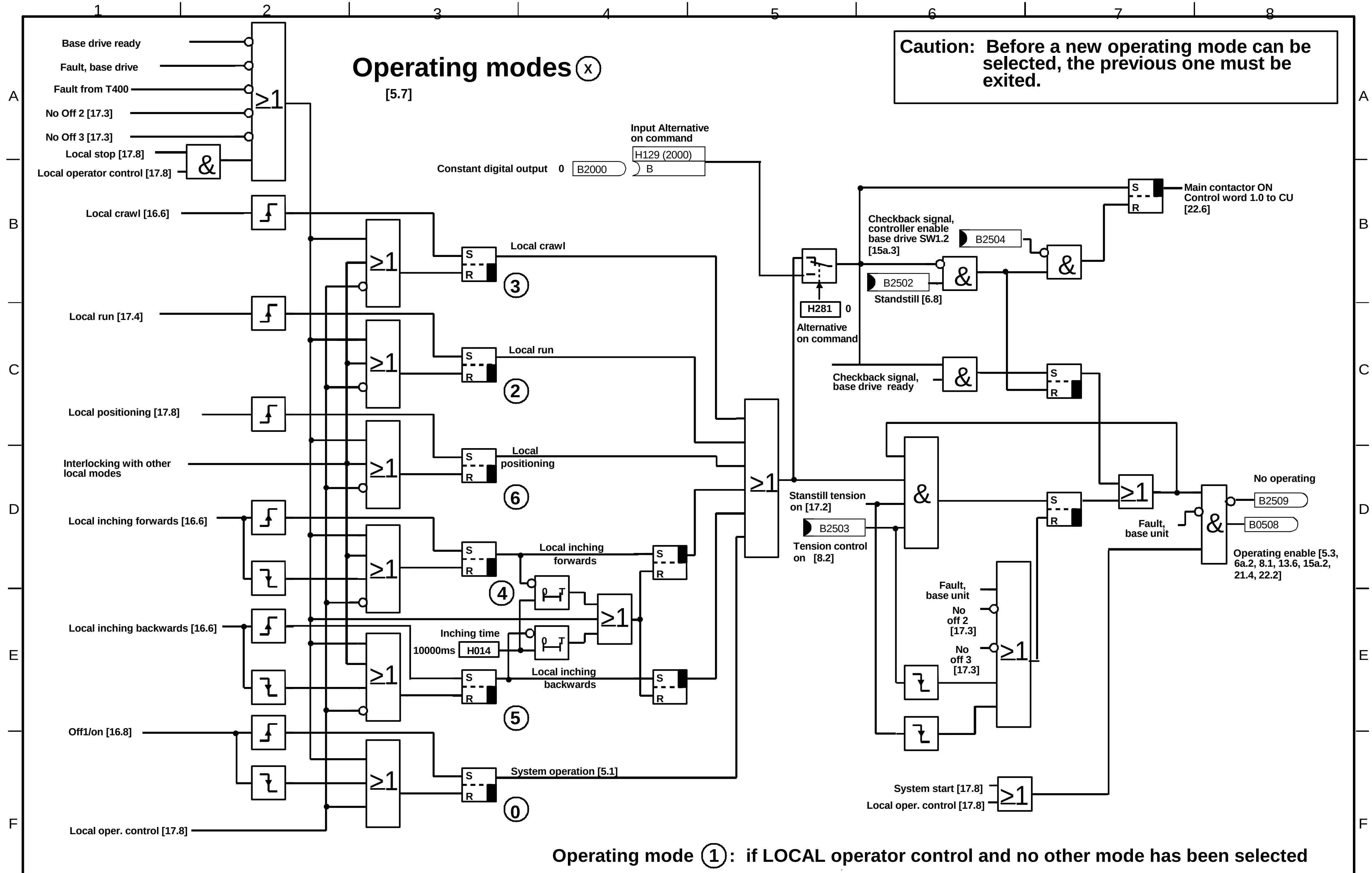
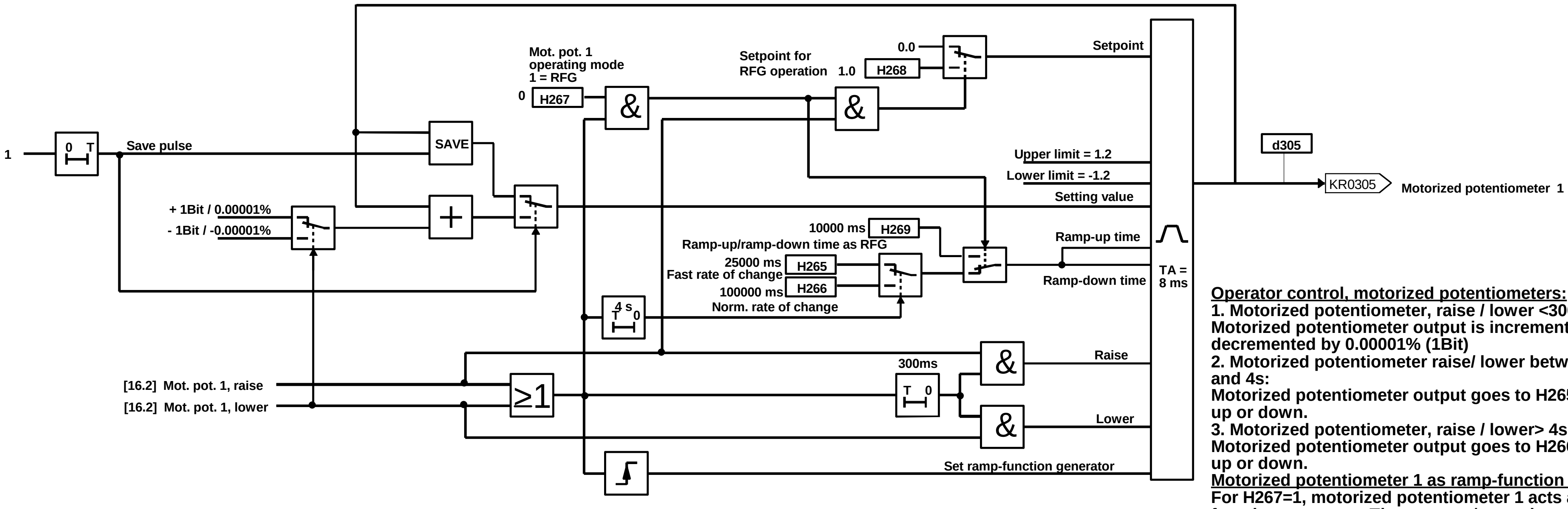
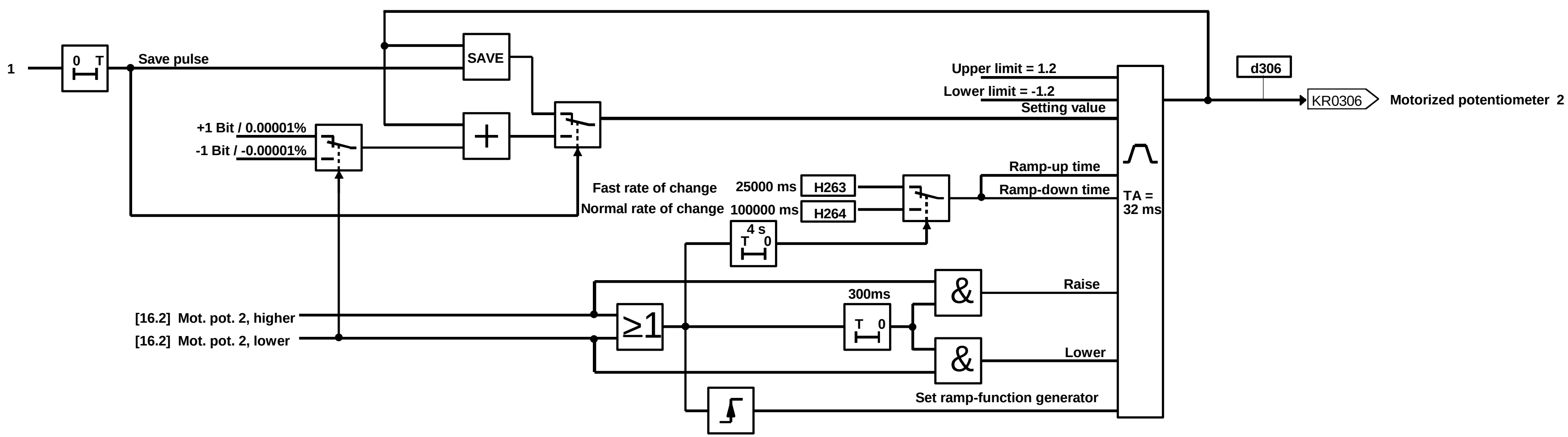
Sheet 17

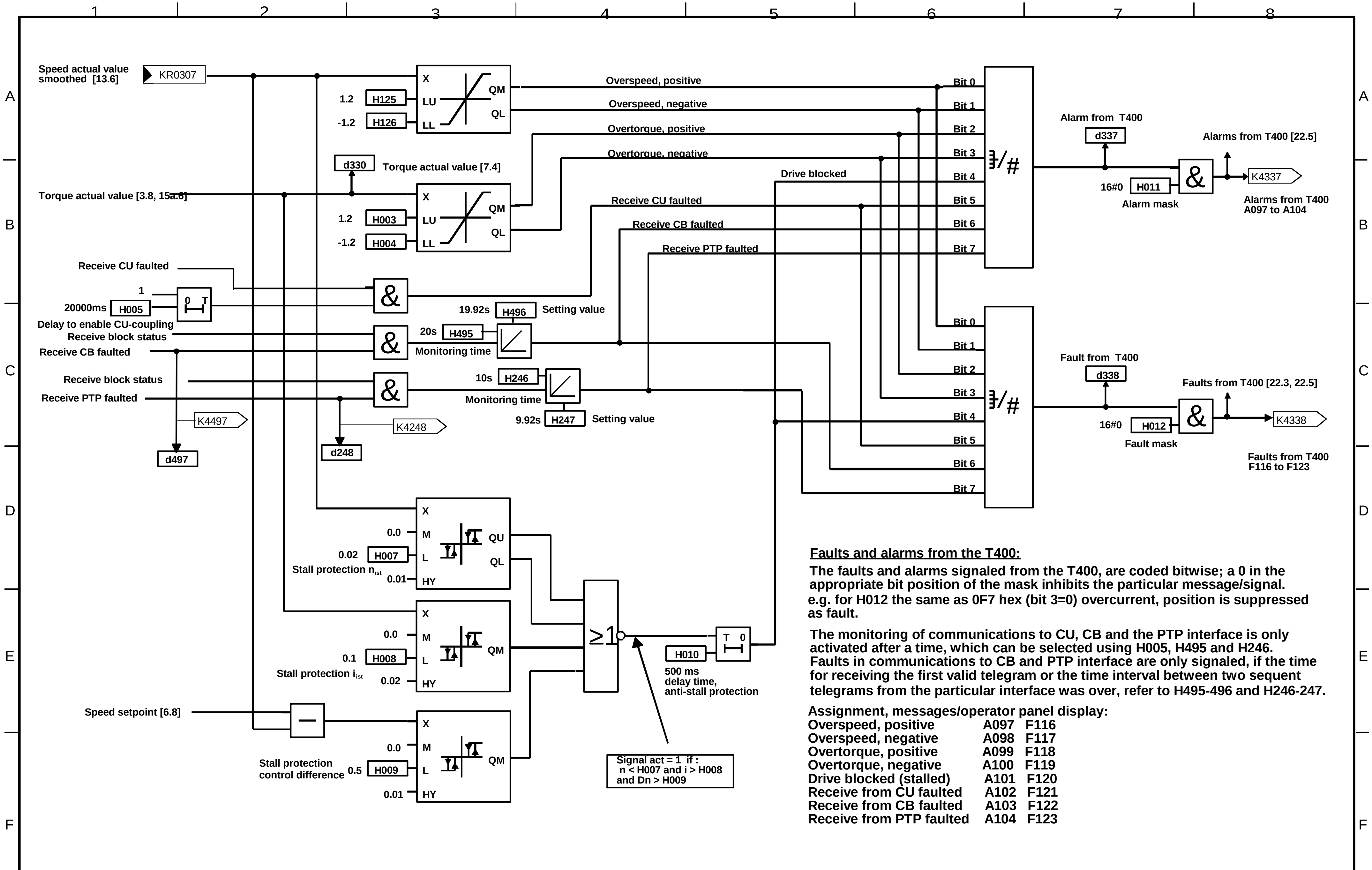

Operating modes (x)
[5.7]
Caution: Before a new operating mode can be selected, the previous one must be exited.
Base drive ready
Fault, base drive
Fault from T400
No Off 2 [17.3]
No Off 3 [17.3]
Local stop [17.8]
Local operator control [17.8]
Local crawl [16.6]
Local run [17.4]
Local positioning [17.8]
Interlocking with other local modes
Local inching forwards [16.6]
Local inching backwards [16.6]
Off1/on [16.8]
Local oper. control [17.8]
Constant digital output 0 B2000
Input Alternative on command
H129 (2000)
B
Local crawl
3
Local run
2
Local positioning
6
Local inching forwards
4
Inching time
10000ms H014
Local inching backwards
5
System operation [5.1]
0
H281 0
Alternative on command
Checkback signal, controller enable base drive SW1.2 [15a.3]
B2504
B2502
Standstill [6.8]
Main contactor ON Control word 1.0 to CU [22.6]
Checkback signal, base drive ready
Stanstill tension on [17.2]
B2503
Tension control on [8.2]
Fault, base unit
No off 2 [17.3]
No off 3 [17.3]
No operating
B2509
B0508
Fault, base unit
Operating enable [5.3, 6a.2, 8.1, 13.6, 15a.2, 21.4, 22.2]
System start [17.8]
Local oper. control [17.8]
Operating mode (1): if LOCAL operator control and no other mode has been selected



Operator control, motorized potentiometers:
1. Motorized potentiometer, raise / lower <300ms:
Motorized potentiometer output is incremented or decremented by 0.00001% (1Bit)
2. Motorized potentiometer raise/ lower between 300ms and 4s:
Motorized potentiometer output goes to H265 or H263, up or down.
3. Motorized potentiometer, raise / lower> 4s:
Motorized potentiometer output goes to H266 or H264, up or down.

Motorized potentiometer 1 as ramp-function generator:
For H267=1, motorized potentiometer 1 acts as ramp-function generator. The ramp-up/ramp-down time is set at H269. The setpoint is entered at H268.





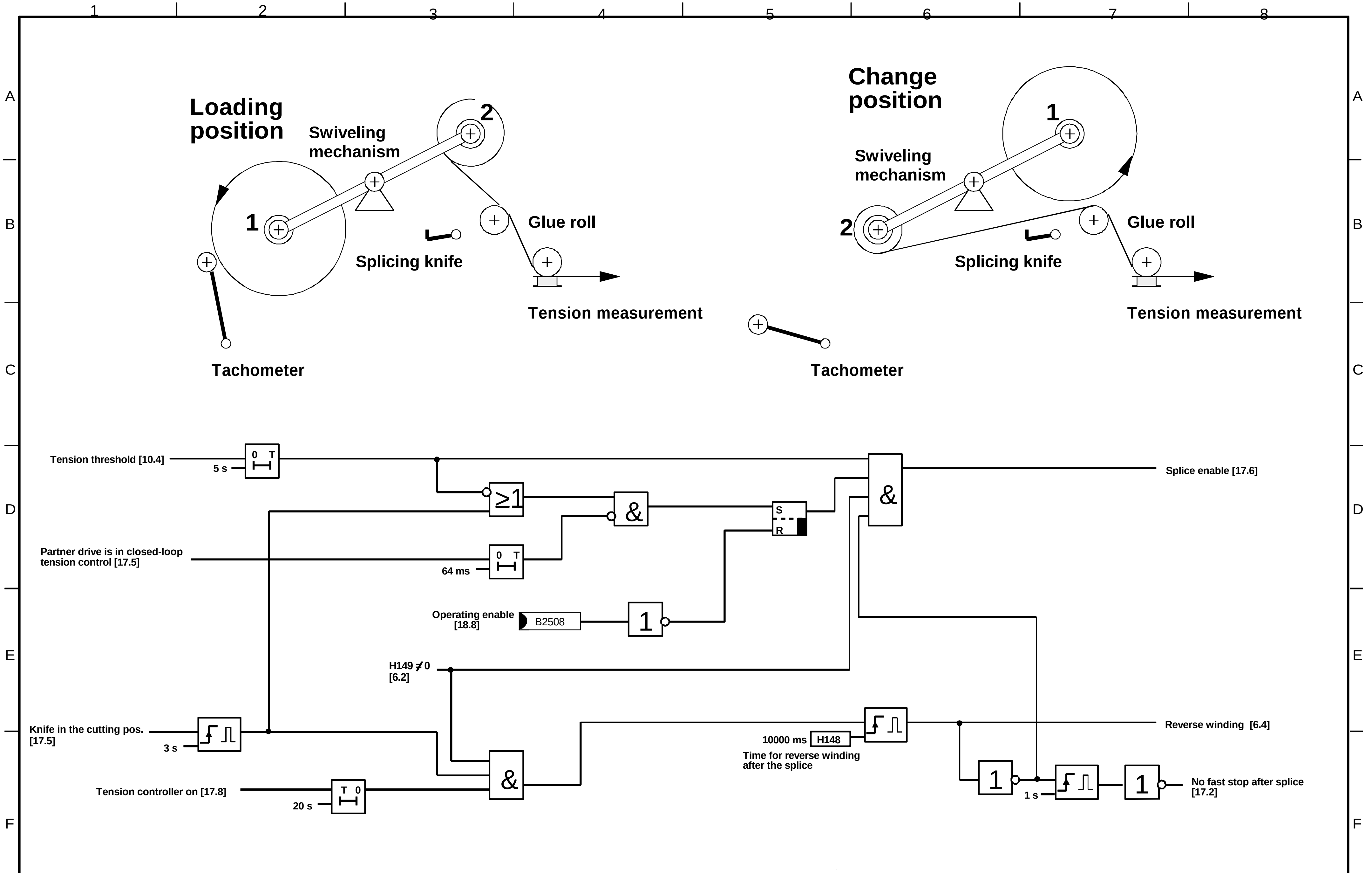
Faults and alarms from the T400:

The faults and alarms signaled from the T400, are coded bitwise; a 0 in the appropriate bit position of the mask inhibits the particular message/signal.
e.g. for H012 the same as 0F7 hex (bit 3=0) overcurrent, position is suppressed as fault.

The monitoring of communications to CU, CB and the PTP interface is only activated after a time, which can be selected using H005, H495 and H246.
Faults in communications to CB and PTP interface are only signaled, if the time for receiving the first valid telegram or the time interval between two sequent telegrams from the particular interface was over, refer to H495-496 and H246-247.

Assignment, messages/operator panel display:

Overspeed, positive	A097	F116
Overspeed, negative	A098	F117
Overtorque, positive	A099	F118
Overtorque, negative	A100	F119
Drive blocked (stalled)	A101	F120
Receive from CU faulted	A102	F121
Receive from CB faulted	A103	F122
Receive from PTP faulted	A104	F123



Standard SPW420 axial winder software, version 2.0

Splice control (open-loop)

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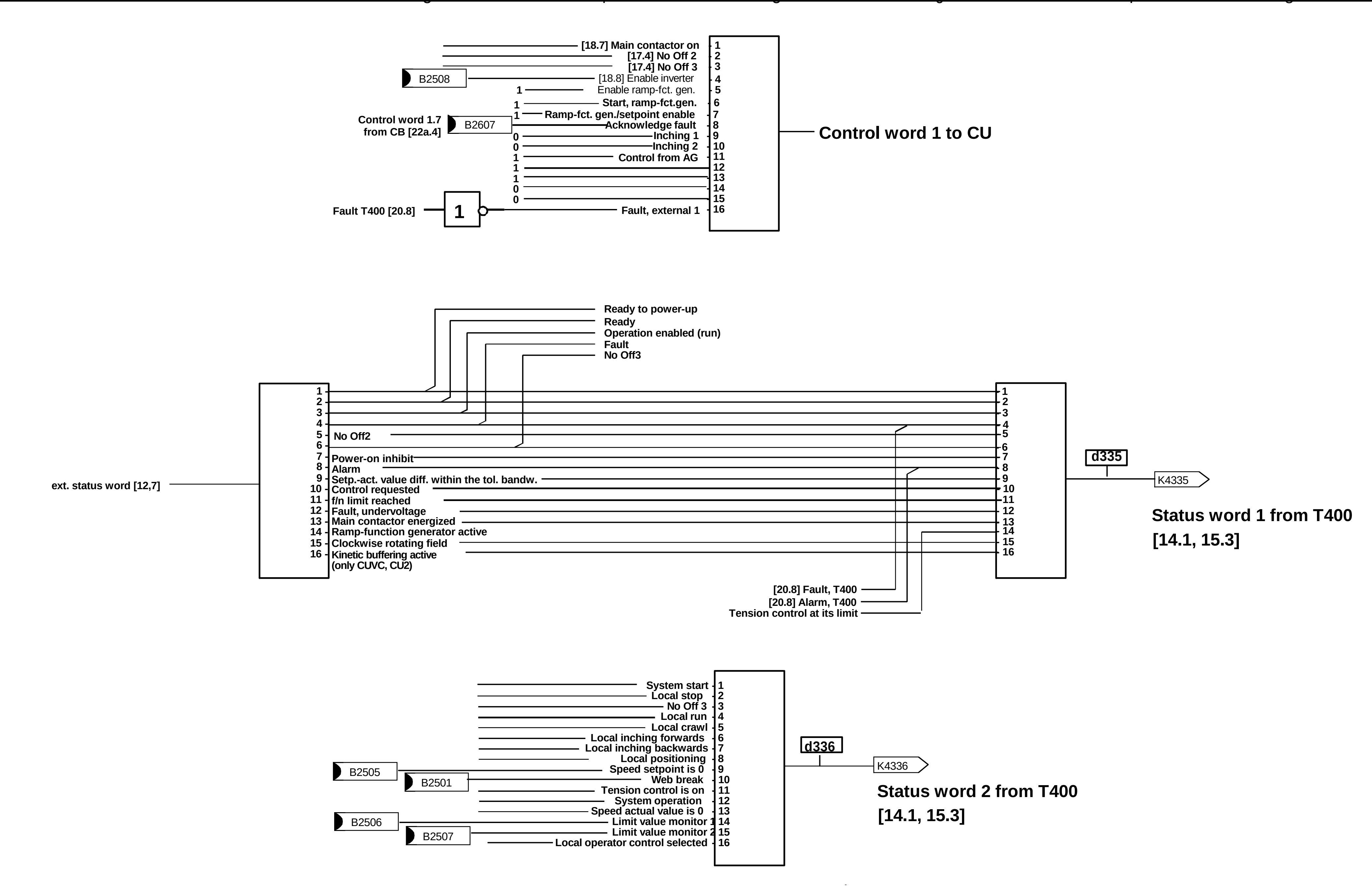

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Control- and status words to/from CU, status words from T400

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PROFIBUS enable	0	H288
Peer-to-peer enable	0	H289
Command to re-config. CB (only for SRT400)	1	H602
CB-station address (only for SRT400)	3	H603
Monitoring time (telegram failure)	20000ms	H495
Setting value	19920 ms	H496

<1> refer to Sheet 2 and 15

<2> refer to Sheet 2 and 15

Control word 1 from CB <1>

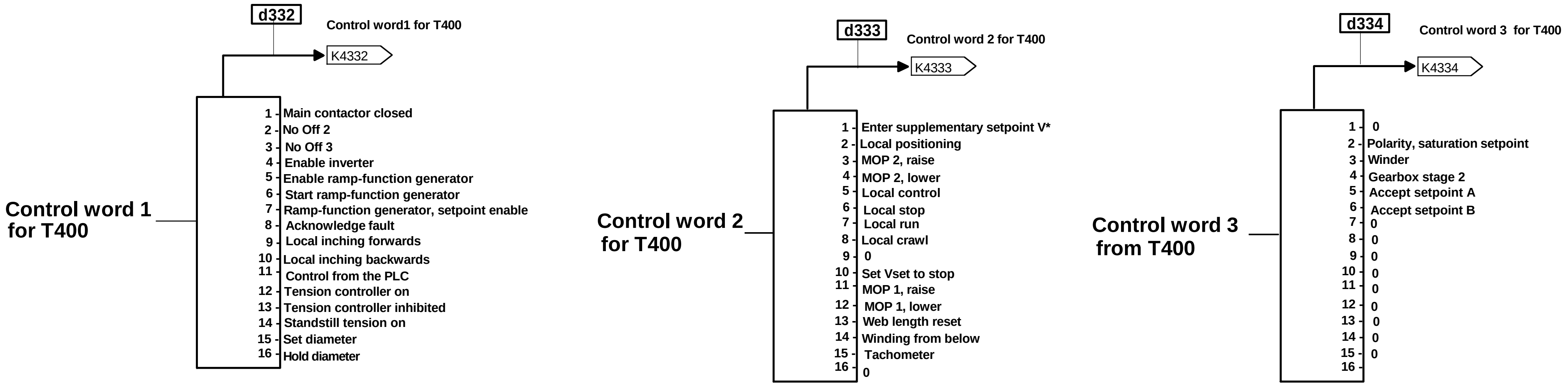
Bit	Function	Connector	Description
1	Main contactor on	B2600	Control word 1.0 from CB
2	No Off 2	B2601	Control word 1.1 from CB
3	No Off 3	B2602	Control word 1.2 from CB
4	Inverter enable	B2603	Control word 1.3 from CB
5	Ramp-function generator inhibit	B2604	Control word 1.4 from CB
6	Ramp-function generator stop	B2605	Control word 1.5 from CB
7	Ramp-function generator setpoint enable	B2606	Control word 1.6 from CB
8	Acknowledge fault	B2607	Control word 1.7 from CB
9	Local inching forwards	B2608	Control word 1.8 from CB
10	Local inching backwards	B2609	Control word 1.9 from CB
11	Control from PLC	B2610	Control word 1.10 from CB
12	Tension controller on	B2611	Control word 1.11 from CB
13	Tension controller inhibit	B2612	Control word 1.12 from CB
14	Standstill tension on	B2613	Control word 1.13 from CB
15	Set diameter	B2614	Control word 1.14 from CB
16	Hold diameter	B2615	Control word 1.5 from CB

Control word 2 from CB <1>

Bit	Function	Connector	Description
1	Enter supplementary setpoint V*	B2620	Control word 2.0 from CB
2	Local positioning	B2621	Control word 2.1 from CB
3	MOP 2, raise	B2622	Control word 2.2 from CB
4	MOP 2, lower	B2623	Control word 2.3 from CB
5	Local control	B2624	Control word 2.4 from CB
6	Local stop	B2625	Control word 2.5 from CB
7	Local run	B2626	Control word 2.6 from CB
8	Local crawl	B2627	Control word 2.7 from CB
9	0	B2628	Control word 2.8 from CB
10	Set Vset to stop	B2629	Control word 2.9 from CB
11	MOP 1, raise	B2630	Control word 2.10 from CB
12	MOP 1, lower	B2631	Control word 2.11 from CB
13	Web length reset	B2632	Controlword 2.12 from CB
14	Winding from below	B2633	Control word 2.13 from CB
15	Tachometer	B2634	Control word 2.14 from CB
16	0	B2635	Control word 2.15 from CB

Control word 1 from peer-to-peer <2>

Bit	Function	Connector	Description
1	Main contactor on	B2640	Control word 1.0 from Peer-to-Peer
2	No Off 2	B2641	Control word 1.1 from Peer-to-Peer
3	No Off 3	B2642	Control word 1.2 from Peer-to-Peer
4	Inverter enable	B2643	Control word 1.3 from Peer-to-Peer
5	Ramp-function generator inhibit	B2644	Control word 1.4 from Peer-to-Peer
6	Ramp-function generator stop	B2645	Control word 1.5 from Peer-to-Peer
7	Ramp-function generator setpoint enable	B2646	Control word 1.6 from Peer-to-Peer
8	Acknowledge fault	B2647	Control word 1.7 from Peer-to-Peer
9	Local inching forwards	B2648	Control word 1.8 from Peer-to-Peer
10	Local inching backwards	B2649	Control word 1.9 from Peer-to-Peer
11	Control from PLC	B2650	Control word 2.0 from Peer-to-Peer
12	Tension controller on	B2651	Control word 2.1 from Peer-to-Peer
13	Tension controller inhibit	B2652	Control word 2.2 from Peer-to-Peer
14	Standstill tension on	B2653	Control word 2.3 from Peer-to-Peer
15	Set diameter	B2654	Control word 2.4 from Peer-to-Peer
16	Hold diameter	B2655	Control word 2.5 from Peer-to-Peer



Standard SPW420 axial winder software, version 2.0

Control words from T400

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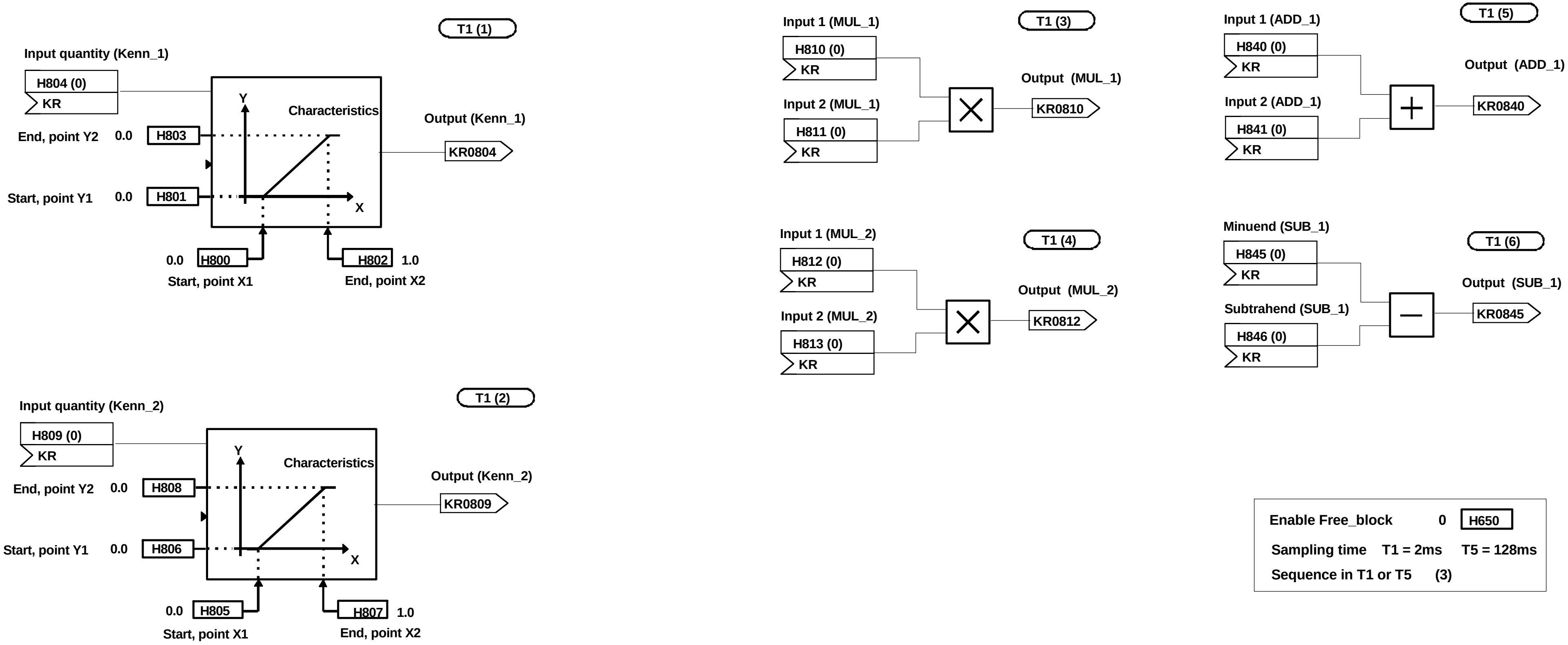
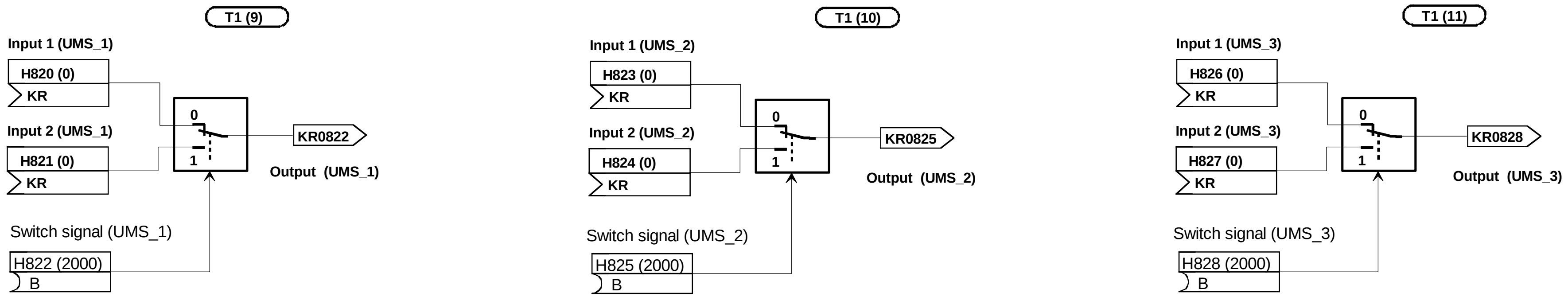
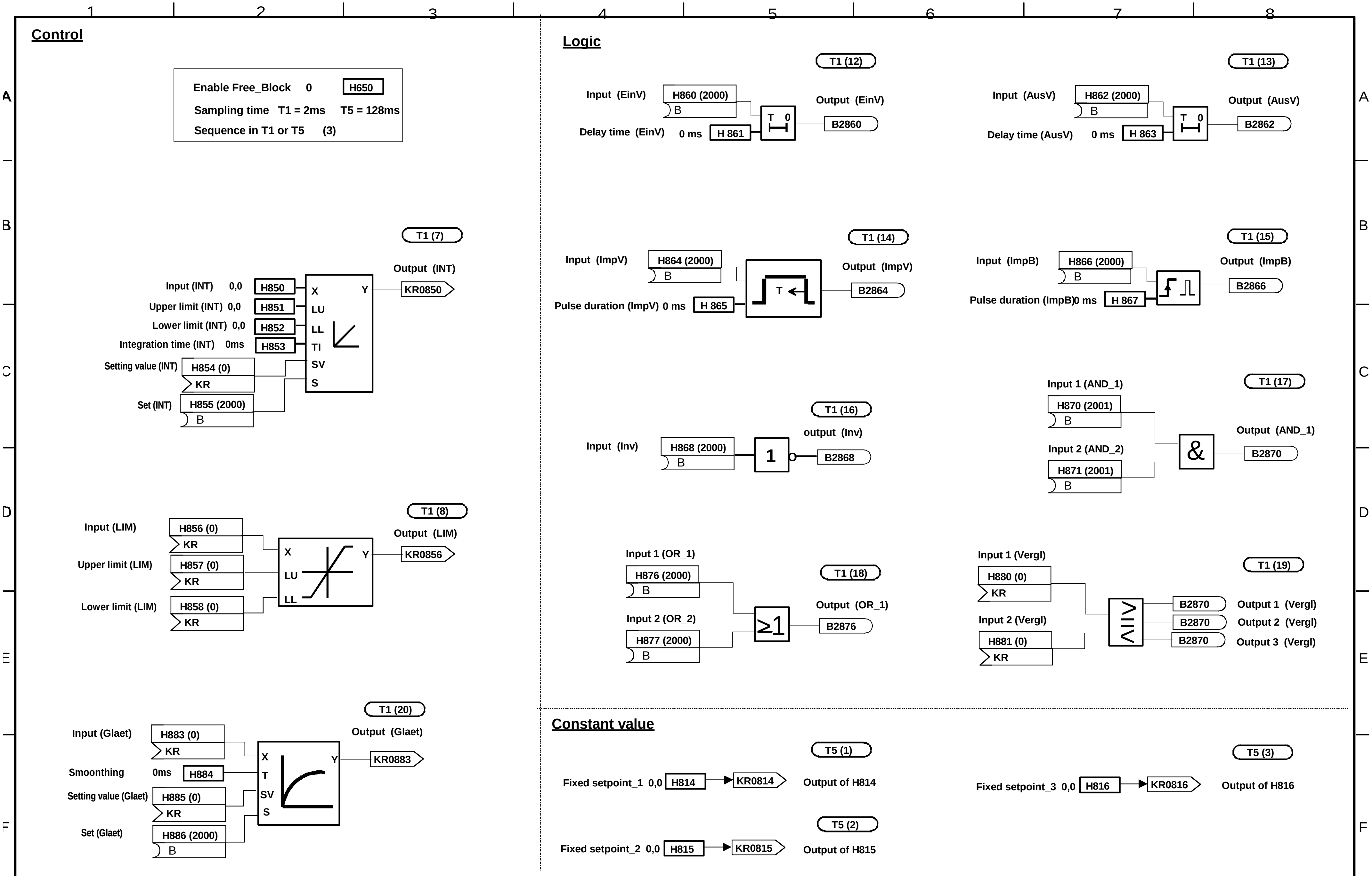
Arithmetic



Changeover





Standard SPW420 axial winder software, version 2.0

Control, Logic and constant value

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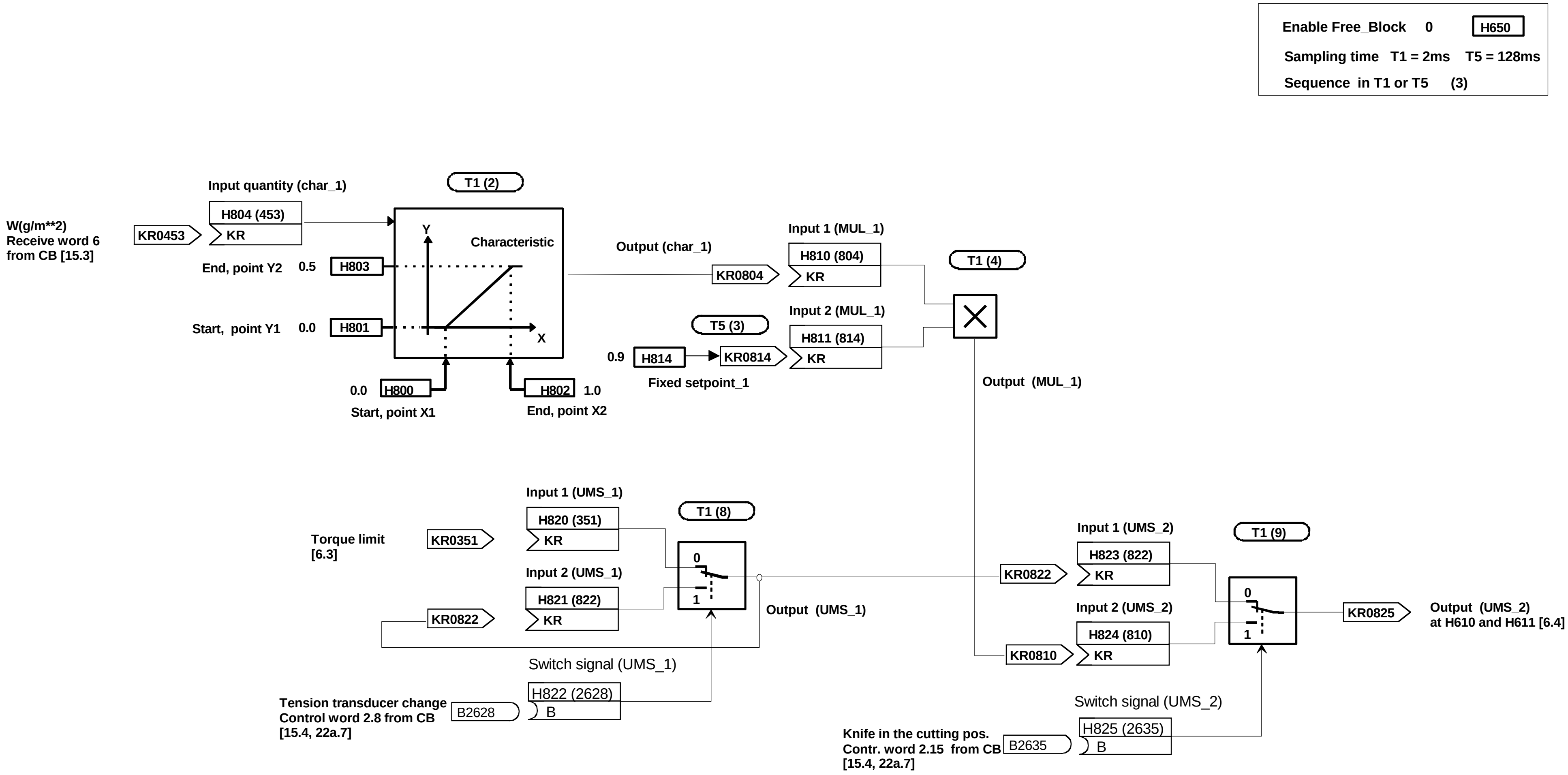

Standard SPW420 axial winder software, version 2.0

Example with free blocks: Cut tension for splice

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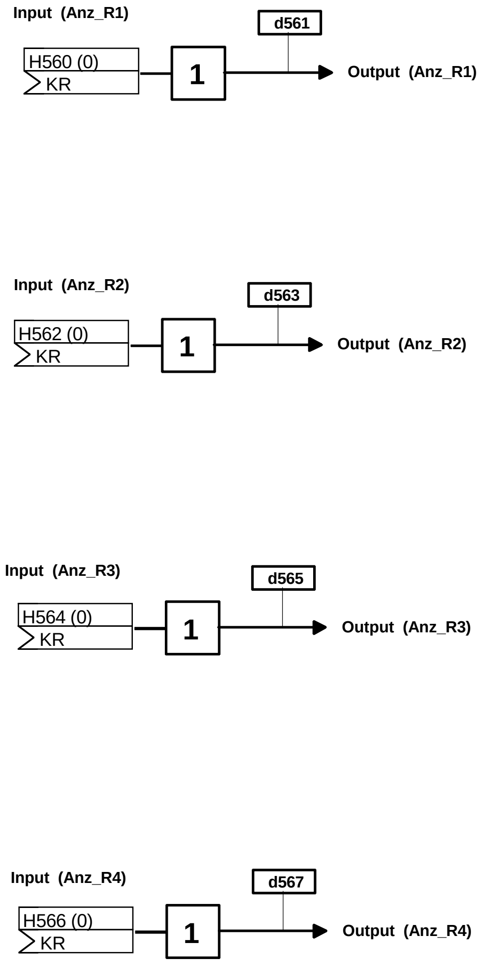
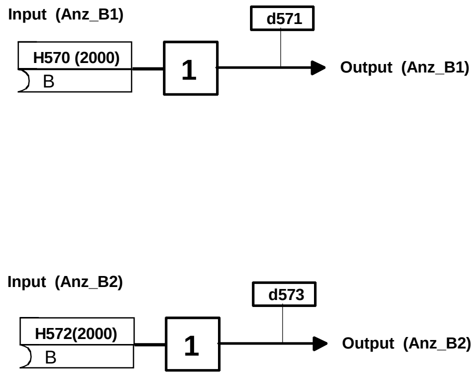
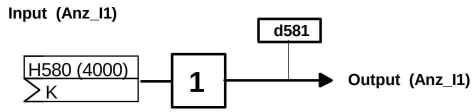
Connctor display (R-type)



Binnector display (B-type)



Connector display (I-type)



10.5 CFC charts