SIEMENS

SIMATIC

BRAUMAT/SISTAR Classic Blocks S5

Commissioning Manual

BRAUMAT/SISTAR Classic V6.0 SP2

1/2012
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Preface

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Purpose of the manual

This manual describes the blocks for the configuration of a SIMATIC S7 with BRAUMAT/ SISTAR Classic V6.0 and gives you an overview of the following topics:

- General info on system configuration
- List of all parameter sets
- Block parameter description

This manual is intended for those responsible for configuring, commissioning and servicing automation systems.

Where is this manual valid?

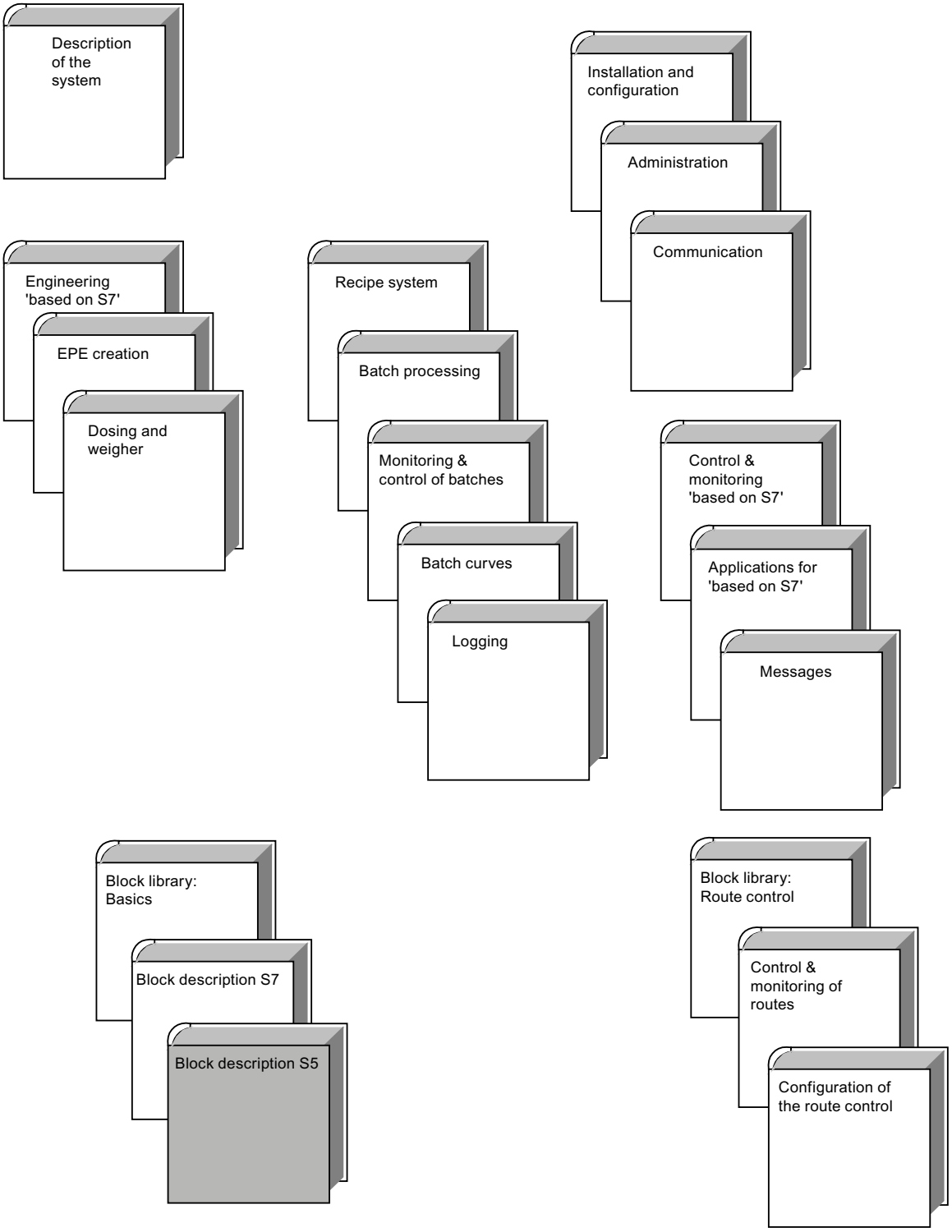
This manual is valid for the software package BRAUMAT/SISTAR *Classic* from Version V6.0.

The offered electronic manual is most largely identical with the contents of the on-line help. Due to a technically necessary editorial deadline for the generation of electronic manuals occasionally smaller deviations can give up opposite the on-line helps. The statements in the on-line helps are primary to those of the manual.

Place of this documentation in the information environment

This manual forms part of the BRAUMAT/SISTAR *Classic V6.0* documentation package. The following schematic of the document architecture shows the individual manuals as well as their thematic grouping within the entire program package.

Document structure



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If you have any technical questions, please get in touch with your Siemens representative or agent responsible.

You will find your contact person at:

- http://www.siemens.com/automation/partner (http://www.siemens.com/automation/partner)

You will find a guide to the technical documentation offered for the individual SIMATIC products and systems here at:

- http://www.siemens.com/simatic-tech-doku-portal (http://www.siemens.com/simatic-tech-doku-portal)

The online catalog and order system are found under:

- http://mall.automation.siemens.com/ (http://mall.automation.siemens.com/)

Training centers

Siemens offers a number of training courses to familiarize you with the SIMATIC S7 automation system. Please contact your regional training center or our central training center in D 90026 Nuremberg, Germany for details:

Internet: http://www.sitrain.com (http://www.sitrain.com)

Technical Support

You can reach the Technical Support for all Industry Automation and Drive Technology products

- Via the Web formula for the support request http://www.siemens.com.automation/support-request (http://www.siemens.com.automation/support-request)

Additional information about our Technical Support can be found on the Internet pages http://www.siemens.com/automation/service (http://www.siemens.com/automation/service)

Service & Support on the Internet

In addition to our documentation, we offer our know-how online on the internet at:

http://www.siemens.com/automation/service&support (http://www.siemens.com/automation/service&support)

where you will find the following:

- The newsletter, which constantly provides you with up-to-date information on your products
- The right documents via our search function in Product Support.
- A forum, where users and experts from all over the world exchange their experiences.
- Your local representative for Industry Automation and Drive Technology.
- Information on repairs, spare parts and consulting.

General 2

2.1 General info on system configuration

The selection for parameterization (=configuration) of the technological blocks as well as the text blocks is done in the main menu This function is used for parameterization of the technological data sets both directly in the PCU (online), as well as on the hard disk (offline). In addition, PCU related texts and data, global IOS texts and data as well as controller overview diagrams for PID and 3-PU controllers can be parameterized. Switching online/offline can be done in the block overview.

The individual technological data set parameters are stored in the corresponding PCU data set blocks. The names and other global data, on the other hand, are not stored in the PCU data blocks, but in text files on the hard disk.

In the case of offline parameterization, the parameterized blocks are subsequently transferred to the PCU ("block transfer" function).

Note

Several parameters are needed both in the PCU data set (data block) as well as in an IOS file and must, therefore, be parameterized in two places. Please make sure that no discrepancies occur (parameter values and block lengths for IOS and PCU must be the same). This is the responsibility of the user.

The following restriction applies to PCU type Simatic S5-155U:

All parameters of type Quell (source, data connection) are of type INT (I16) and can hold just 16 bits. It is strongly recommended to parameterize INT value sources only on those parameters.

2.1.1 Text parameterization IOS data and texts

Section selection

Section	Description
Global texts	Parameterization of general IOS data and texts
PCUxxx	Parameterization of PCU related data and texts

2.1.2 Memory allocation, RAM technological functions

All blocks are set up in length for the maximum quantity in the shipped state.

The demand of memory is thus defined. In order to space reduction the user can shorten the block at his own risk due to the actual number of data sets. This should be taken into account before each generation.

It is possible to calculate the actual memory allocation for each block using the following memory allocation table.

(n = number per PCU)

Block name	PCU	Block name	PCU
FIXV	n * 4 + 7	KURVSW	n * 24 + 7
AOUT	n * 8 + 7	MAINT_ICM	n * 7 + 12
SEQS	n * 8 + 7	MVC	n * 7 + 7
CAS	n * 11 + 7	MELD	n * 1 + 7
THRESTEP	n * 14 + 7	AIN	n * 10 + 7
ERSA	n * 8 + 15	MULT	n * 7 + 7
ICM1	n * 6 + 7	PID	n * 28 + 7
ICM2	n * 6 + 7	POLY	n * 17 + 7
ICM1_EA	n * 5 + 15	QUERJOB	n * 8 + 15
ICM2_EA	n * 5 + 15	SEQU	n * 30 + 12
GRUP_TA	n * 5 + 7	WELIn (n=1..6)	n * 16 + 21
INCO	n * 7 + 7		

The numbers have a direct influence on the cycle time of the automation device.

For the aforementioned reasons the system should be configured for a practical framework for the system concerned during the planning phase. To this end, the program run times of the system can be adapted to the real system variables.

2.1.3 Allocation block: FB200 / FB201

This block allows for free assignment of the input/output/flag user interfaces to the technological blocks.

In the as-delivered state, the FB 200 / FB 201 allocation blocks are responsible for default system allocation. If this standard allocation is not suitable, the user has to adapt allocation blocks FB 200 / FB 201. Thus it is possible to adapt every plant specific peripheral configuration to the standard technological blocks

All of the input/output/flag specifications in this manual refer to the default allocations.

Allocation is performed for the following blocks:

Name	Function	Assigned DB
SEQS	Sequence chain start block	DB114
AOUT	Analog-value output	DB107
THRESTEP	Three-point controller	DB117
ICM	Individual control module (except RA)	DB101, DB102, DB103, DB104, DB105
MANUAL	Manual release block	DB201
MVC	Measured value control	DB108, DB109
MELD	Message block	DB115
AIN	Measured value recording	DB106
MULT	Multi-functional block	DB111
PID	Controller	DB110
SE_TIMER	ON delay	DB118
SEQU	Plant sections	DB112, DB113

Exception

ICM-RA: Here the user must select an input allocation, if required.

2.1.4 Program interfaces

The plant section program is processed directly in the plant section prior to calling up the current basic operation.

Thus, an entry flag interface from the user to the basic operation is possible.

Following the basic operation, plant section program 2 is processed, thus providing an output interface from the user to the basic operation.

To distinguish if the actual call of the plant section program happens before or after running the basic operation, the user can query flag F101.4 (FXGO).

FX before plant section	F101.4 = 0
FX after plant section	F101.4 = 1

The evaluation of the system flag "FXGO“ is only valid if checked together with the system flag "ATL=1“ (sequence is running).

List of program interfaces

FX no.	Function
1	Plant section program ½ plant section 1
	...
48	Plant section program ½ plant section 48
49 ... 128	Reserve
150 ... 199	Interlock route

FX no.	Function
200	User interface OB20
201	User interface OB21
202	User interface OB22
205	Job control
209	Job control
210	Job control
220	User interface start OB1
221	User interface end OB1
222	User interface start OB10 (100 ms)
223	User interface end OB10 (100 ms)
224	User program 100 ms
225	User program 1 sec
226	User interface BV ICM 1 ... 128
227	User interface BV ICM 129 ... 255
228	User interface BV ICM 256 ... 383
229	User interface BV ICM 384 ... 510

2.1.5 Time slice distributor at PCU S5-155U

The time slice distributor works in OB10 and controls the call of technological system programs in 10 time slices (please refer to User interfaces as well).

The pre-occupation of the time slice word is done in FB191/OB20/22 (Restart/Power failure).

The clock signals from OB1 (MB 108) are synchronized in the OB10 cycle.

Interface description:

- Mode 0:Normal call
- Mode 1:Automatic call Status 2 -- Check DS no.

The processing order of the technological blocks is determined in the processing list (DB220). The numbers of the time slices must increase slightly monotonously. The time slice number in a subsequent data set must be identical or max. 1 larger than the previous data set. The parameter can be evaluated in the active FB's (DB221 DW15). If the data set number is larger than 1, at least 2 different time slices must be used.

Time slice distributor DB220

Time slice distributor DB220		
DW0	---	
DW1	Data set length = 4	Number
DW2	Type	DB no.
DW3	Type	FB no.
DW4	Mode	Time slice

Time slice distributor DB220		
DW5	Parameter	

Type = 0 DB/FB

Type = 1 DX/FX

Mode = 0DS in MB200 ff.

Mode = 1DS in DB100

Note

The configuration of the time slice distributor list in DB 220 can occur also for PCUs of type SIMATIC S5 with the parameterization application. The prerequisite for this is, however, that the object class ‘Schedule’ must have been defined for that DB in the system - which is not true in the system delivery state. In order to achieve this, the following files have to be copied into the respective PCU-specific subdirectories of the SIMATIC S5 PCUs:

- …\windcs\param.pcu\optionen\S5_Schedule.pcu --> …\windcs\pcu.nnn \S5_Schedule.pcu
- …\windcs\pcu.xxx\texte\S5_Schedule.txt --> …\windcs\pcu.nnn\texte**Schedule**.txt

With a restart of the system the header file is loaded by the object manager and the object class ‘Schedule’ is available now in the parameterization application.

2.1.6 Data block DB221

The time slice distributor block ZVST-DAT contains the current data for processing the technological blocks.

Time slice DB221		
DW 0	---	
DW 2	DB/DX	DB no.
DW 3	FB no.	
DW 4	Actual DS no.	
DW 9	DS length	DS count
DW10	Time slice actual	
DW 15	Parameter	

2.2 List of all parameter sets

PCU	IOS	Block/Function
FIXV	FIXV	Fixed analog values
AOUT	AOUT	Analog output
AOUT_PW	AOUT_PW	Value for analog output unit
SEQS	SEQS	Sequence chain start block
CAS	CAS	Batch-order start
DFM	DFM	Digital function block
THRESTEP	THRESTEP	Three-point controller
ICM	ICM	Individual control module
ICM_EA	ICM_EA	Individual control elements run/stop-delay
FIFO	FIFO	General PCU system data
WEIGHER_GF	WEIGHER_GF	Weigher basic function à Man 08_Dosing and Weighers
GRUP_TA	GRUP_TA	Groupwise plant section attachment
INCO	INCO	Incremental transformer
KURVSW	KURVSW	Curve target values
MAINT_ICM	MAINT_ICM	Maintenance data ICM
MAINT_USR	MAINT_USR	Maintenance data user
MVC	MVC	Measured value control
MELD	MELD	Message block
AIN	AIN	Measured value recording
AIN_PW	AIN_PW	New/old value from input block
MULT	MULT	Multi-functional block
PARACP	PARACP	Parameter for the IOS links
PCU_ALG	PCU_ALG	General PCU system data
PID	PID	PID controller
POLY	POLY	Polygon adaptation
CrossJobs	CrossJobs	Cross-coupling jobs – Layer 7
CrossJobsErs	CrossJobsErs	Cross-coupling - Layer 7
CrossPCU	CrossPCU	Cross-coupling jobs to partner PCU – Layer 7
CrossSteu	CrossSteu	Cross coupling control data – Layer 7
SE_TIMER	SE_TIMER	ON delay
SENDPU	SENDPU	Send buffer
Sondwert	Sondwert	Special values for operation and display à Man 16_Application based on S7
BLOCK	BLOCK	Block PCU messages
SEQU	SEQU	Plant sections
XC_PCU_SR	XC_PCU	Cross coupling to partner PCU – Layer 4 à Man 04_Communication
XC_JOB_SR	XC_JOB	Cross coupling jobs – Layer 4 à Man 04_Communication

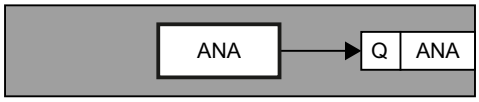
PCU	IOS	Block/Function
XC_SJOB_SR	XC_JOB_32	Cross coupling system jobs - Layer 4 à Man 04_Communication
WELIn	WELIn	Routing lists
ZTG	ZTG	Central clock generation
ZYKLMESS		Cycle time measurement

Block descriptions

3

3.1 FIXV - Fixed analog values

This block makes up to 255 parameterizable fixed analog values available as a source for other blocks.



Parameter sets for block FIXV: Parameterization PCU

FIXV PCU	DB 234		Sets: max. 255 per PCU	
No.	NAME	TYPE Info	Default	Comment
1	FIXV	I16 P S	0	Fixed analog value

Apart from analog values, other numerical values in a range from -32767 to +32767 can be entered.

Parameter set: Text parameterization IOS

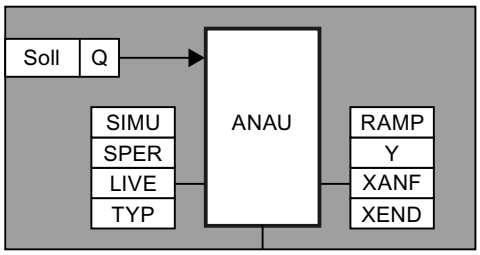
FIXV IOS		Sets: max. 255 per PCU	
No.	Type Info	Default	Comment
1	Z16 P IOS	FIXV xxx	Block name

3.2 AOUT - Analog output

This block allows up to 192 setpoints (PCU 155U) to be output via the analog output block 6ES5470-4UA12 (± 10 V, 0-20 mA, 4-20 mA).

The setpoint is specified as a physical variable of other blocks (PID controller , plant sections etc.) via sourcing.

The setpoint is converted into electrical units linearly within the specified scale (XANF, XEND) with consideration given to Live Zero/Dead Zero.



To avoid jumps, the maximum setpoint change per second can be specified via a ramp (RAMP).

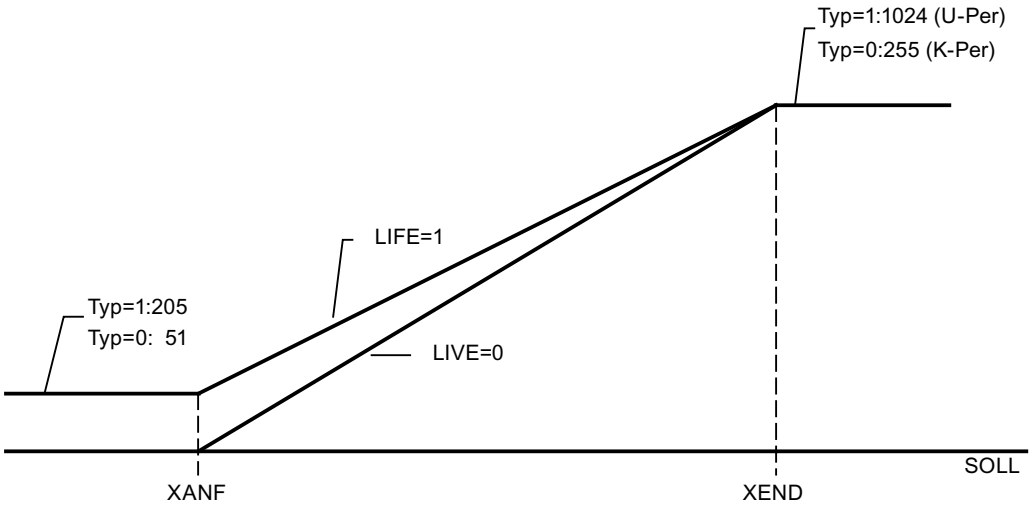
For program start without analog peripherals, per setpoint a block bit (SPER) can be used to suppress the output of the value. A value (Y) can be specified per setpoint per operation for simulation (SIMU). The switching is then inactive.

Parameterization:	ANAU PCU Text parameterization ANAU IOS
Process interface:	DB107 ANAU output
User interface:	• PW 128 - PW 254 (ANAU 1 - 64) • QW 0 - QW 126 (ANAU 65 - 192)
Meaning:	Parameter SIMU and SPER

Parameter sets for block ANAU: Parameterization PCU

ANAU PCU	DB 231		Sets: max. 192 per PCU	
No.	NAME	TYPE Info	Preset	Comment
1	TARGET	Quell P S		Setpoint source
2	XANF	I16 P S	0	Setpoint start
3	XEND	I16 P S	1000	Setpoint end
4	RAMP	I8 P S	0	Max. change in Y per sec. 1 is equal to 4 units for Y at a resolution of 1024
5	SIMU	B1 P S	0	Simulation: 0/1 = No/Yes
6	SPER	B1 P S	0	Output inhibit: 0/1 = No/Yes
7	Y	I16 P S	0	"Electr." output value (0...1024) (0 ... 255 only with K-peripherals)
8	LIVE	B1 P S	0	Live Zero: 0/1 = No/Yes
9	TYPE	B1 P S	1	Block type 0/1 = 476/470

Relations:



Parameter set: Text parameterization IOS

ANAU IOS			Sets: max. 192 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	ANAU xxx	Block name

Significance of parameters SIMU and SPER for block ANAU

SIMU	SPER	Functional properties
0	0	Output to peripherals. Adaptation of value Y to value SOLL. (normal operation)
1	0	Output to peripherals. No adaptation of value Y to value SOLL.
0	1	No output to peripherals. Continued adaptation of value Y to value SOLL.
1	1	No output to peripherals. No adaptation of value Y to value SOLL.

3.3 AOUT_PW

The electrical output value for the analog output assembly is stored in data block DB107.

Process interface: AOUT output value block AOUT

AOUT output value block	
DW0	
DW1	
DW2	DS length

AOUT output value block	
DW3	Max. number AOUT
DW4	Actual number AOUT
DW5	Initial address P area
DW6	Initial address Q area
DW7	
DW8	
DW9	
DW10	AOUT-1
DW11	AOUT-2
.....	

Data in PCU (per parameterization PCU)

AOUT_PW PCU		DB 107		Sets: max. 192 per PCU
No.	NAME	TYPE Info	Default	Comment
1	Value	Hexa P S	0	Value for output assembly

Parameter set: Text parameterization IOS

AOUT_PW IOS			Sets: max. 192 per PCU
No.	Type Info	Default	Comment
1	Z16 P IOS	AOUT_PW	Block name

3.4 SEQS - Plant section start block

This block allows plant sections to be started with simultaneous specification of the recipe type, the recipe number, the job number, and the batch number. The job number is only used for reports.

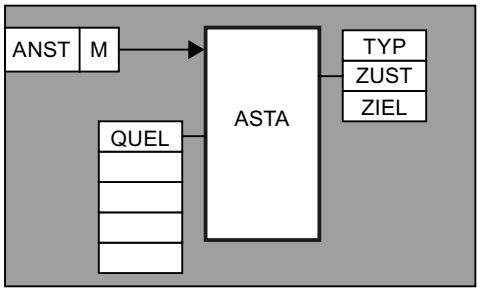
Plant sections can be started using the weekly program, other plant sections or any other user applications. It is also possible to start a plant section via a coupling from a partner PCU. In this case an SEQS must only be parameterized in the source PCU, however, not in the target PCU. The plant section is then started via a coupling bit.

For each start, one of 96 possible SEQS blocks is required in which corresponding source and target data can be specified.

When starting plant sections, the following occurs in the plant section or target plant section data set:

- The ATS bit, e.g. DB 225, DW 5.1 (Plant section 1) is set,
- A ‘1’ is entered in cell SNEU, e.g. DB 225, DW 7 (Plant section 1),
- Recipe type, recipe number, order number and batch number are entered in accordance with the parameterization in the data set.

Each SEQS parameter set has an assigned initiator flag (S 672.0 - S 683.7), which is set or deleted by the user application. The control (set / delete) of the initiator flag is done by the user in the respective FX SEQU or in the basic operations.



The SEQS block checks the start conditions of the target plant section. If the start conditions "Target plant section released"", "Not started", "No manual mode", "Permanent conditions present", "WOP release with

Type 3" are not found, the "Start Error" message will be given

If the start conditions are fulfilled, the target plant section is started with step 1.

Recommendation:
To achieve a meaningful run report and archiving, the batch numbers of all plant sections should be incremented at each plant section start. Batch numbers can be assigned from 1...32767 per sort block.

Parameter set:	Parameterization PCU, text parameterization IOS
Process interface:	DB114: Initiator bit
User interface:	Flag bit assignment
Meaning:	Parameter TYPE

Parameter set: Text parameterization IOS

SEQS PCU		**DB 242**		**Sets: max. 96 per PCU**
No.	**NAME**	**TYPE Info**	**Default**	**Comment**
1	SEQU	I8 P S	0	Assigned plant section
2	Type	I8 P S	0	SEQS type
3	QUEL_	I8 P S	0	Source plant section or sort number
4	ZIEL	I8 P S	0	Number of target plant section
5	EMPF	I8 P S	0	Target PCU number
6	Year	I8 P S	0	Year for RTyp, Job.Nr., batch
7	RTyp	I16 P S	0	Recipe type
8	RezeptNr	I16 P S	0	Recipe number (sort number)
9	AuftrNr	I16 P S	0	Job number
10	Charge	I16 P S	0	Batch number
11	ZUST	B1 S	0	Condition bit

Parameter set: Text parameterization IOS

SEQS IOS		Sets: max. 96 per PCU	
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	SEQS xxx	Block name

Process interface:

DB 114: Initiator bit

DB114 plant section permanent condition

DB114		
DW0		
DW1	1	Number words
DW2	SEQS 16 ... 1	
DW3	SEQS 32 ... 17	
DW4	SEQS 48 ... 33	
DW5	SEQS 64 ... 49	
DW6	SEQS 80 ... 65	
DW7	SEQS 96 ... 81	

User interface for block SEQS

No.	Flag	No.	Flag	No.	Flag	No.	Flag
1	S 672.0	25	S 675.0	49	S 678.0	73	S 681.0
2	S 672.1	26	S 675.1	50	S 678.1	74	S 681.1
3	S 672.2	27	S 675.2	51	S 678.2	75	S 681.2
4	S 672.3	28	S 675.3	52	S 678.3	76	S 681.3
5	S 672.4	29	S 675.4	53	S 678.4	77	S 681.4
6	S 672.5	30	S 675.5	54	S 678.5	78	S 681.5
7	S 672.6	31	S 675.6	55	S 678.6	79	S 681.6
8	S 672.7	32	S 675.7	56	S 678.7	80	S 681.7
9	S 673.0	33	S 676.0	57	S 679.0	81	S 682.0
10	S 673.1	34	S 676.1	58	S 679.1	82	S 682.1
11	S 673.2	35	S 676.2	59	S 679.2	83	S 682.2
12	S 673.3	36	S 676.3	60	S 679.3	84	S 682.3
13	S 673.4	37	S 676.4	61	S 679.4	85	S 682.4
14	S 673.5	38	S 676.5	62	S 679.5	86	S 682.5
15	S 673.6	39	S 676.6	63	S 679.6	87	S 682.6
16	S 673.7	40	S 676.7	64	S 679.7	88	S 682.7
17	S 674.0	41	S 677.0	65	S 680.0	89	S 683.0
18	S 674.1	42	S 677.1	66	S 680.1	90	S 683.1

No.	Flag	No.	Flag	No.	Flag	No.	Flag
19	S 674.2	43	S 677.2	67	S 680.2	91	S 683.2
20	S 674.3	44	S 677.3	68	S 680.3	92	S 683.3
21	S 674.4	45	S 677.4	69	S 680.4	93	S 683.4
22	S 674.5	46	S 677.5	70	S 680.5	94	S 683.5
23	S 674.6	47	S 677.6	71	S 680.6	95	S 683.6
24	S 674.7	48	S 677.7	72	S 680.7	96	S 683.7

Significance of TYPE parameter in block SEQS

TYPE	Function	Source	Target	Miscellaneous
0	Element undefined	-	-	
1	Start via plant section	Plant section	Plant section	Recipe type, recipe number, job number and batch number from the source plant section
2	Start of a CIP plant section	-	Plant section	Recipe type, recipe number, job number and batch number taken from the SEQS data set
3	Start via WOP	-	Plant section	Recipe number and batch number taken from the weekly program Recipe type taken from the SEQS data set Job number corresponds to current calendar week
4	Start of a CIP plant section	-	Plant section	Recipe type and recipe number taken from SEQS data set Job number and batch number not changed in target plant section
9	Start if a plant section in another PCU	Plant section	Plant section	Like type 1, however, target plant section is in another PCU
10	Start if a CIP plant section in another PCU	-	Plant section	Like type 2, however, target plant section is in another PCU
11	Start via a WOP in another plant section	-	Plant section	Like type 3, however, target plant section is in another PCU
12	Start if a CIP plant section in another PCU	-	Plant section	Like type 4, however, target plant section is in another PCU

3.5 CAS - batch job start in the PCU

The orders for the individual units are written into the CAS from the IOS order and recipe system. A CAS is available for each unit.

The assignment is one to one, which means, for example, that CAS 29 corresponds to the 29th unit.

CAS PCU		DB 218		Sets: max. 64 per PCU
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	Year	I8 P S	0	Year for RTyp, order no., batch
2	RTyp	I8 P S	0	Recipe type
3	Rec.ID	I16 P S	0	Recipe number
4	OrderNo	I16 P S	0	Order number
5	BatchNo	I16 P S	0	Batch number
6	TANr	I16 P S	0	Unit number
7	ModSt	I16 P S	0	Start mode
8	Time_hi	I16 P S	0	Start time since 1.1.70
9	Time_lo	I16 P S	0	Start time since 1.1.70
10	Message	I8 P S	0	Message CAS state
11	UserSt	B1 P S	0	Start by user
12	StSper	B1 P S	0	Start lock by user
13	CADiO	B1 S	0	Batch data OK
14	CADniO	B1 S	0	Batch data faulty
15	WartHa	B1 P S	0	Wait manual by user
16	CASLoe	B1 P S	0	CAS entry delete by user
17	StaImp	B1 P S	0	Start pulse
18	CADAnf	B1 P S	0	Batch data request by user

Parameter set: Text parameterization IOS

UNIT IOS			
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	Unit xxx	Block name

Data structure for DB218 batch order start in PCU:

DB218 data structure		
DW 0	Bit0=General check	
DW 1	11 DW per data set	Number of data sets
DW 2	Year for RTyp, order no., batch (*)	Recipe type (*)
DW 3	Recipe number (*)	
DW 4	Order number (*)	
DW 5	Batch number (*)	
DW 6	Unit number (*)	
DW 7	Start mode (*)	

DB218 data structure	
DW 8 DW 9	Time slice for timed orders (*) Absolute time since 01/01/1970
DW 10	Control bits (*)
DW 11	Help cell
DW 12	Help cell
From DW13	Data for data set 2

(*) These words are set by the IOS with control bit 10.12 = 1 and all other control bits = 0. The maximum number of data sets is 64.

Control bits

Bit	Identifier	Set	Delete
.0	Start condition met	System	System
.1	Start (if start mode=4)	User	System
.2	Release plant section	System	System
.3	Lock unit start	User	User
.4	Data OK	System	System/User
.5	Data not OK	System	System/User
.6	Wait manual	User	System/User
.7	Erase batch order	User	System
.8	Start pulse start condition reached	System	System
.9	Edge bit start	System	System
.10	Batch data request by user	User	User
.11	Free user bit	User	User
.12	Start of order control	System	System
.13		System	System
.14	Status request running	System	System
.15	0 for first time cycle, else 1	System	System

Start mode

Mode	Description
0	Order data set free
1	Start immediate processing, if SEQ not free, send error message to IOS
2	Start as soon as possible, if SEQ not free, no error message
3	Timed order, if SEQ (after timeout) not free, send error message
4	Event dependent start by user program, if SEQ not free, send error message

Data set processing is carried out via FB205.

While FB205 is being processed, the data set is loaded in FW200, ...,

FW222. FB 205 calls the user FX205. The control bits are thus located in FW216 and can be interrogated.

If a new CAS data set has arrived in the PCU and the unit is ready-to-run, the user can request additional order parameters.

For this purpose, the blocking flag F217.3 is set in start mode 1-3, which blocks the start of the unit. Once the order parameters have been received and are OK, the block is canceled and the unit initiated.

The request of additional order parameters can be realized in one of two ways:

- **Pseudo PS**
  - A free unit is used as a 'pseudo PS' to request additional parameters.
  - This unit is started and the recipe is requested. 13 setpoints per basic operation are transferred. Thus by selecting additional basic operations the desired number of additional order parameters can be transferred.
- **Message type 14**
  - The additional order parameters are loaded from the IOS into the PCU by using type 14 message (request free protocol);
  - in this way any data from a dbf-file at the IOS can be transferred to a DB at the PCU
  - (see chapter "coupling/type 14 message").
  - If the blockade is not canceled, the PCU sends a "Start delayed" message to the IOS.
  - Alternatively, if none of the units is to be started, the CAS entry can be deleted (F217.7). A delete request is sent to the IOS.
  - In start mode 4, the unit is started once a positive signal is received from start flag F217.1.
  - If the unit is started, a telegram with start mode 0 is sent to the IOS. This enables the CAS again.

3.6 DFM - Digital Function Modules

3.6.1 Overview DFM

The specification of digital target values is necessary for controlling the process. For this purpose, there are a maximum of 13 **D**igital **F**unction **M**odules (DFM) available for the plant section plus the run time monitor TUET, to which various functions can be assigned depending on the plant section.

The type of function of the individual modules is parameterized, whereby the same type of function can be assigned to several modules or used in several plant sections.

It is also possible to use a type of function more than once in a basic operation.

The number and types of function in the DFM are defined separately for each basic operation (see Parameterization of basic operation)

The DFMs are divided into four groups:

DFM0	For 255 counters
DFM1	For 255 decoders, time steps, target value and limit value steps
DFM2	For 255 decoders, time steps, target value and limit value steps
DFM3	255 reserve DFMs for users

Possible function types for the digital function module:

- Forward counter non-totalizing
- Forward counter totalizing
- Backward counter non-totalizing
- Backward counter totalizing
- Time step forward
- Time step forward totalizing
- Time step backward
- Limit value step
- Target value step
- Mask 32 of 32
- Decoder 1 of 64
- Allocation block

The results (e.g. time expired, counter value reached, limit value exceeded) are available as binary signals (DFM flag) for logical operations or as switching condition in the basic operations.

The target values of the function modules are stored in the recipe lists directly after the number of the basic operation for each step and are loaded from the plant section control into the function module when processing the step.

Only 16-bit numbers ranging from -32767 to +32767 are possible for target value entry. 32-bit numbers can be assigned by the recipe list.

The following is valid for all function types:

- If "NONE" (blank) is entered as a target value in the recipe list, the target value of the function module is not overwritten when starting the basic operation. The target value specified in the previous steps is retained.
- The control program for binary signals of the function module (time release, counter cycle, target value block) are entered into the respective plant section function block.
- If no PSPR block report entry has been programmed, a run report is automatically written when processing the plant section (batch, brew report) in which the basic operation, the starting time of the basic operation as well as the target and actual values of all function modules are entered.

- The starting time of the basic operation (date HH.MM) is found in the first column of the run report, whereas the second column contains the values for the digital function modules.
- The run report can be printed out automatically once the last basic operation of the last subprocess has been processed. This can also be initiated by the operator.
- To achieve a meaningful run report and archiving, the batch numbers of all plant sections should be incremented at each plant section start. Batch numbers can be assigned from 1...32767 per sort block.

3.6.2 DFM parameterization

3.6.2.1 DFM0 - Counter

255 counters can be parameterized per PCU. The determination of when which counter is to be used is specified in the parameterization for the basic operation.

Only DFMs no. -1...204 can be switched to additional technological blocks (AOUT, PID, MULT, etc.).

Parameter sets for block DFM0: Parameterization PCU

DFM0 PCU		DB 236		Sets: max. 255 per PCU
No.	NAME	TYPE Info	Default	Comment
1	SOLL	I16 P S	0	Target value low word
2	IST	I16 P S	0	Actual value low word
3	Limit	I16 P S	0	Switching limit low word
4	Route	B1 P S	0	0 = forward counter, 1 = backward counter
5	Summation	B1 P S	0	0 = non-totalizing, 1 = totalizing
6	Type	B1 P S	0	0 = PSK is increment, 1 = PSK is reduction
7	PSK	I16 P S	0	Increment / reduction

Parameter set: Text parameterization IOS

DFM0 IOS			Sets: max. 255 per PCU
No.	Type Info	Default	Comment
1	Z16 P IOS	DFM0 xxx	Block name

General info on counters

To register counter pulses it is necessary to assign the counter inputs to flags. One flag (S 984.0... S 1015.6) per counter is specified for this purpose. The assignment is performed

depending on the counter frequency in the program of the plant section or, for fast pulse sequences, in user program FX224.

The maximum counter frequency is 2.5 Hz (sample time = 100 ms). However, it is possible to run the pulse inputs with a higher sampling rate of 200 ms, which provides a max. counter frequency of 1.25 Hz. Thereby the AS cycle time decreases.

Mode	Description
DB 236 D0.1=0	Shipping state 100 ms operation
DB 236 D0.1 = 1	200 ms operation

It is necessary to call FB 236 with the counter number (1...255) as a parameter in the sequencer **'before GOP'** or in the basic operation to update the counter status and form the DFM result flag.

The **direction** parameter specifies whether it is a forward or a backward counter.

If parameter type = "0" is specified, the counter is increased or decreased at each pulse by the value of parameter PSK.

If parameter type = "1" is specified, the counter will be incremented or decremented by one after each x-th pulse (x = value in PSK).

If the DFM result flag is not set for a backward counter after the switching limit has been reached (Limit_L), this may be due to a non-defined value for the switching limit (Limit_H). These parameters are of attribute type **'hidden'** and must be overwritten with zero.

Up counter

When processing the counter with a simultaneous start basic operation, the parameterized switching limit is loaded into the actual value cell of the counter. The DFM result flag is set upon reaching or exceeding the target value specified in the recipe list.

Example

Forward counter for liquid influx: At each pulse the counter is to be increased by 1 hl. The display occurs in plant section 2. The counter is to be parameterized as DFM no. 5.

Parameter assignment

Parameter	Value	Description
SOLL	0	Target value low word
IST	0	Actual value low word
Limit	0	Switching limit low word
Route	0	0 = forward counter,
Summation	0	0 = non-totalizing,
Type	0	0 = PSK is increment
PSK	1	Increment

Assignment of counter input in FX 2

U	I 3.1	Pulse counter input IDM
U	I 65.2	ICM-11 RE
=	S 984.4	Counter input DFM0 no. 5

Call DFM block in FX 2

	U	F 5.3	Release flag
	AN	F 101.4	FXGO
	SPB	FB 236	Processing group DFM0
NAME	DFM0		
DFM?		KF 5	DFM number = 5

Line in file SW.INI

Line	Content
Line 5:	quantity of water hl 0 0 250 SW

Forward counter totalizing (through several steps)

When starting the plant section the parameterized switching limit is loaded into the actual value cell. As opposed to the non-totalizing forward counter, the actual value is not overwritten by the switching limit parameterized in the PCU at every step. The DFM result flag is set upon reaching or exceeding the target value specified in the recipe list.

Example

Forward counter totalizing for solid substance taking: The counter is to be increased by 50 kg at each pulse. The display occurs in plant section 1. The counter is to be parameterized as DFM no. 6.

Parameter assignment

Parameter	Value	Description
SOLL	0	Target value low word
IST	0	Actual value low word
Limit	0	Switching limit low word
Route	0	0 = forward counter,
Summation	1	1 = totalizing,
Type	0	0 = PSK is increment
PSK	50	Increment

Assignment of counter input in FX 1:

U	I 2.5	Pulse counter input IDM
=	S 984.5	Counter input DFM0 no. 6

Call DFM block in FX 1

	U	S 656.0	Plant section 1 running
	AN	F 101.4	FXGO
	SPB	FB 236	Processing group DFM0
Name	DFM0		
DFM?		KF 6	DFM number = 6

Line in file SW.INI

Line	Content
Line 6:	Product quantity kg 0 0 15000 SW

Down counter

When processing the counter and a simultaneous start basic operation, the target value is loaded into the actual value cell. Upon reaching or dropping below the parameterized switching limit (Grenze_L) the DFM result flag is set.

Example:

Backward counter for solid product dosing. At every fifth pulse the counter value is to be reduced by 1 m3. The display occurs in plant section 4. The counter is to be parameterized as DFM no. 7.

Parameter assignment

Parameter	Value	Description
SOLL	0	Target value low word
IST	0	Actual value low word
Limit	0	Switching limit low word
Route	1	1 = backward counter,
Summation	0	0 = non-totalizing,
Type	1	1 = PSK is reduction
PSK	5	Reduction

Assignment of counter input in FX 4:

U	I 13.7	Pulse counter input IDM
=	S 984.6	Counter input DFM0 no. 7

Line in file SW.INI

	AN	F 101.4	FXGO
	SPB	FB 236	Processing group DFM0
Name	DFM0		
DFM?		KF 7	DFM number = 7

Line in file SW.INI

Line	Content
Line 7:	Quantity of water m3 0 0 20 SW

Backward counter totalizing (through several steps)

When first processing the counter the switching limit is loaded into the actual value cell of the counter. As opposed to the non-totalizing backward counter, the switching limit parameterized in the PCU is not loaded into the actual value cell at every step. Upon reaching or dropping below the parameterized switching limit (Grenze_L) the DFM result flag is set.

Example

Backward counter totalizing for liquid addition. At every pulse the counter is to be reduced by 10 l. The display occurs in plant section 8. The counter is to be parameterized as DFM no. 8.

Parameter assignment

Parameter	Value	Description
SOLL	0	Target value low word
IST	0	Actual value low word
Limit_L	0	Switching limit low word
Route	1	1 = backward counter,
Summation	1	1 = totalizing
Type	0	0 = PSK is increment
PSK	10	Increment

Assignment of counter input in FX 8:

	U	I 22.3	Pulse counter input IDM
	U	I 67.3	ICM-26 RE
	=	S 984.7	Counter input DFM0 no. 8

Call DFM block in FX 8

	AN	**F 101.4**	**FXGO**
	SPB	**FB 236**	**Processing group DFM0**
Name	DFM0		
DFM?		KF 8	DFM number = 8

Line in file SW.INI

Line	**Content**
Line 8:	Liquid quantity liters 0 0 300 SW

Assignment of counter inputs and DFM result flags of counters

									Counter inputs	**DFM result flag**
	Bit address								**Byte address**	**Byte address**
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**S flag**	**S flag**
	1	2	3	4	5	6	7	8	984	728
	9	10	11	12	13	14	15	16	985	729
	17	18	19	20	21	22	23	24	986	730
	25	26	27	28	29	30	31	32	987	731
	33	34	35	36	37	38	39	40	988	732
	41	42	43	44	45	46	47	48	989	733
	49	50	51	52	53	54	55	56	990	734
	57	58	59	60	61	62	63	64	991	735
C	65	66	67	68	69	70	71	72	992	736
O	73	74	75	76	77	78	79	80	993	737
U	81	82	83	84	85	86	87	88	994	738
N	89	90	91	92	93	94	95	96	995	739
T	97	98	99	100	101	102	103	104	996	740
ER	105	106	107	108	109	110	111	112	997	741
	113	114	115	116	117	118	119	120	998	742
N	121	122	123	124	125	126	127	128	999	743
U	129	130	131	132	133	134	135	136	1000	744
M	137	138	139	140	141	142	143	144	1001	745

									Counter inputs	DFM result flag
	Bit address								Byte address	Byte address
	0	1	2	3	4	5	6	7	S flag	S flag
B	145	146	147	148	149	150	151	152	1002	746
E	153	154	155	156	157	158	159	160	1003	747
R	161	162	163	164	165	166	167	168	1004	748
	169	170	171	172	173	174	175	176	1005	749
	177	178	179	180	181	182	183	184	1006	750
	185	186	187	188	189	190	191	192	1007	751
	193	194	195	196	197	198	199	200	1008	752
	201	202	203	204	205	206	207	208	1009	753
	209	210	211	212	213	214	215	216	1010	754
	217	218	219	220	221	222	223	224	1011	755
	225	226	227	228	229	230	231	232	1012	756
	233	234	235	236	237	238	239	240	1013	757
	241	242	243	244	245	246	247	248	1014	758
	249	250	251	252	253	254	255		1015	759

Example:

DFM 0.44 counter input: = S 989.3

DFM result flag S 733.3

3.6.2.2 DFM1 and DFM2 - Times, limit value steps, target value steps, decoder and allocation block

255 digital function modules DFM in DFM 1 and DFM 2 can be parameterized per PCU. The possible types of DFMs are described as follows.

The specification as to which DFMs can be used is indicated in the parameterization of the basic operation.

Only DFMs no. -1...204 can be switched to additional technological blocks (ANAU, PID, MULT, etc.).

Parameter sets for block DFM1/DFM2: Parameterization PCU

DFM1/DFM2 PCU		DB 237/DB 238		Sets: max. 255 per PCU
No.	NAME	TYPE Info	Preset	Comment
1	TARGET	I16 P S	0	Setpoint
2	ACTUAL	I16 P S	0	Actual value
3	Type	I16 P S	0	DFM type 1-8 (see below)
4	PSK	I16 P S	0	Meaning corresponding to type (see below)
5	Help	I16 P S	0	Help cell

DFM1/DFM2 PCU		DB 237/DB 238		Sets: max. 255 per PCU
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
6	QBit	Step P S	0	Type 1-3: Release/ Type 5: Lock/ Type 8: 0=DB, 1=DX
7	QDat	Quell	0	Type 4: Actual source of type **INT (I16)**

For updating the DFMs and forming the DFM result flags it is necessary to call FB 237 for DFM1 or FB238 for DFM2 with DFM number (1...255) in the plant section or basic operation.

Note

For the QBit parameter no S flags may be entered as a STEP5 command.

In order to cancel a STEP-5 call up instruction in the parameter QBit, the symbol "-" must be entered.

All parameters of type Quell (source, data connection) are of type INT (I16) and can hold just 16 bits. **It is strongly recommended to parameterize INT value sources only on those parameters.**

Parameter set: Text parameterization IOS

DFM0 IOS			Sets: max. 255 per PCU
No.	Type Info	Default	Comment
1	Z16 P IOS	DFMx xxx	Block name

Possible function types for DFM1 and DFM2

Function	TYPE	QBI	PSK	Help cell	QDat	DFM = 1 at
Time step forward	1	Release	Reduction	-	-	ACTUAL ≥ Target
Time step forward totalizing	2	Release	Reduction	-	-	ACTUAL ≥ Target
Time step backward	3	Release	Reduction	-	-	ACTUAL ≤ 0
Limit value step	4	-	Hysteresis	-	Actual source	ACTUAL ≥ Target
Setpoint step	5	Block	Substitute value	-	-	-
Mask 32 of 32	6	-	Rel. decoder no.	-	-	Target ≤ 0
Decoder 1 of 64	7	-	Rel. decoder no.	-	-	Target ≤ 0
Allocation block	8	0=DB / 1=DX	Target DB	Target DW	-	-

TYPE = 1: Time forward

When processing the DFM as time forward and simultaneously starting the basic operation a value of zero is loaded into the actual value cell. The DFM result flag is set upon reaching or exceeding the setpoint specified in the recipe list.

For setting the time base, a reduction factor is specified in the PSK control constants related to the time base cycle 1 second (e.g. PSK = 1 -> time base = 1 second, PSK = 6 -> time base = 1/10 minute), i.e. at PSK = 6 the actual value is increased by one after six seconds.

The "running" of the time step is only released when a query result of "1" is specified in the QBit parameter. At a query result of "0" the time step is "stopped."

Example

The counter value of a forward time step is to be increased by one every six seconds and displayed with one decimal place. The time step is only required in basic operation 68 and it should be parameterized as DFM no. 12 in group DFM1.

Parameter assignment

Parameter	Value	Description
TARGET	0	Setpoint
IST	0	Process value
Type	1	Type 1 = Time step forward
PSK	6	Reduction (increment in seconds)
Hilf	0	Help cell
QBit	U M 3.1	Release flag
QDat	0	-

Enable time stage in SB 68

	AN	F 102.3	Pulse step end
	AN	S 761.3	Result flag DFM1 no. 12
	=	F 3.1	Release flag

Call DFM block in SB 68

	JU	FB 237	Processing group DFM1
Name	DFM1		
DFM?		KF 12	DFM number = 12

Line in file SW.INI

Line	Content
Line 268:	Time min 1 0 32767 SW

TYPE = 2: Time forward totalizing (through several steps)

When processing the DFM as time forward totalizing and simultaneously starting the basic operation a value of zero is loaded into the actual value cell. As opposed to the non-totalizing time step the actual value is not set to zero at each step. The DFM result flag is set upon reaching or exceeding the setpoint specified in the recipe list.

For setting the time base, a reduction factor is specified in the PSK control constants related to the time base cycle 1 second (e.g. PSK = 1 -> time base = 1 second, PSK = 6 -> time base = 1/10 minute), i.e. at PSK = 6 the actual value is increased by one after six seconds.

The "running" of the time step is only released when a query result of "1" is specified in the QBit parameter. At a query result of "0" the time step is "stopped."

Example

The counter value of a forward time step totalizing is to be increased by once a minute and displayed without a decimal place. The display occurs in plant section 3. The time step should be parameterized as DFM no. 13 in group DFM1.

Parameter assignment

Parameter	Value	Description
TARGET	0	Setpoint
IST	0	Process value
Type	2	Type 2 = Time step forward totalizing
PSK	60	Reduction (increment in seconds)
Hilf	0	Help cell
QBit	U M 5.1	Release flag
QDat	0	-

Enable time stage in FX 3

	AN	F 101.4	FXGO
	U	S 656.2	Plant section 3 running
	AN	S 761.4	Result flag DFM1 no. 13
	=	F 5.1	Release flag

Call DFM block in FX 3

	SPB	FB 237	Processing group DFM1
Name	DFM1		
DFM?		KF 13	DFM number = 13

Line in file SW.INI

Line	Content
Line 269:	Time min 0 0 32767 SW

TYPE = 3: Time backward

When processing the DFM as time backward and simultaneously starting the basic operation a value of zero is loaded into the actual value cell. The DFM result flag is set upon reaching or dropping below the setpoint specified in the recipe list.

For setting the time base, a reduction factor is specified in the PSK control constants related to the time base cycle 1 second (e.g. PSK = 1 -> time base = 1 second, PSK = 6 -> time base = 1/10 minute), i.e. at PSK = 6 the actual value is increased by one after six seconds.

The "running" of the time step is only released when a query result of "1" is specified in the QBit parameter. At a query result of "0" the time step is "stopped."

Example

The counter value of a time step backward is to be reduced by one every second. The display occurs in plant section 42. The time step should be parameterized as DFM no. 35 in group DFM2.

Parameter assignment

Parameter	Value	Description
TARGET	0	Setpoint
IST	0	Process value
Type	3	Type 3= Time step backward
PSK	1	Reduction (increment in seconds)
Hilf	0	Help cell
QBit	A F 23.4	Release flag
QDat	0	-

Enable time stage in FX 42

	AN	F 101.4	FXGO
	U	S 661.1	Plant section 42 running
	AN	S 796.2	Result flag DFM2 no. 35
	=	F 23.4	Release flag

Call DFM block in FX 42

	SPB	FB 238	Processing group DFM2
Name	DFM2		
DFM?		KF 35	DFM number = 35

Line in file SW.INI

Line	Content
Line 547:	Time sec 0 0 32767 SW

TYPE = 4: Limit value step

Upon starting basic operation the setpoint is loaded into the setpoint cell.

The source of the actual value is parameterized in the QDat parameter

(e.g. AIN,5 XIST).

A hysteresis value is specified in the PSK control constants. If the actual value specified in the data source reaches or drops below the setpoint, the DFM flag is set.

Example

The temperature of a reactor (MELD-8) should be displayed with one decimal place in plant section 4. The limit value step should be parameterized in DFM no. 58 of group DFM1.

Parameter assignment

Parameter	Value	Description
TARGET	0	Setpoint
IST	0	Process value
Type	4	Type 4 = Limit value step
PSK	0	Hysteresis
Hilf	0	Help cell
QBit	-	-
QDat	AIN,8,XACTUAL	Actual source

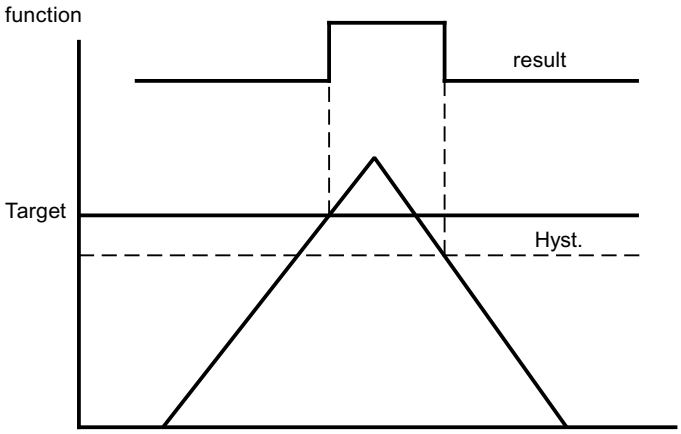
Call DFM block in FX 4

	JU	FB 237	Processing group DFM1
Name	DFM1		
DFM?		KF 58	DFM number = 58

Line in file SW.INI

Line	Content
Line 314:	Temperature °C 1 0 1000 SW

Function



TYPE = 5: Digital setpoint step

The digital setpoint step is used for specifying setpoints (for analog output from the actual recipe).

The setpoint is loaded into the setpoint cell upon basic operation start.

In parameter QBit the STEP 5 query command for the output block of the setpoint is parameterized.

If the query result is "1" (setpoint block) the parameterized replacement value PSK is loaded into the actual value cell.

If the query result is "0" (setpoint release) the setpoint specified in the actual recipe is loaded into the actual value cell.

The DFM result flag is irrelevant.

Example

The setpoint flow for the target run off is specified as a setpoint step. If the run off pump

is not running (RE = E 72.4), a setpoint of 0 hl/h should be specified. The display occurs in plant section 15. The setpoint step is to be parameterized in DFM no. 31 of group DFM1.

Parameter assignment

Parameter	Value	Description
TARGET	0	Setpoint
IST	0	Process value

Parameter	Value	Description
Type	5	Type 5 = Setpoint step
PSK	0	Substitute value
Hilf	0	Help cell
QBit	AN I 72.4	Setpoint block
QDat	-	-

Call DFM block in FX 15

	AN	F 101.4	FXGO
	U	S 657.6	Plant section 15 running
	SPB	FB 237	Processing group DFM1
Name	DFM1		
DFM?		KF 31	DFM number = 31

Line in file SW.INI

Line	Content
Line 287:	Flow hl/h 1 0 5500 SW

TYPE = 6: Mask 32 of 32

Mask 32 of 32 supports recipe-controlled selection functions or route switches. Upon starting basic operation the setpoint is loaded into the setpoint cell. The setpoint is depicted in the actual value cell. The result flag is not set.

Depending on the rel. decoder number (0...2) in parameter PSK the setpoint is transferred in the 32 bits of the flag range by the specified decoder and can be evaluated in the basic operation.

The corresponding flag bytes are occupied from high byte to low byte.

S flag range for rel. decoder numbers 0...2:

- Rel. decoder no. = 0:SY 688 ... 691
- Rel. decoder no. = 1:SY 696 ... 699
- Rel. decoder no. = 2:SY 704 ... 707

Example

16 bits from mask 32 of 32 are to be used for a route switch, whereby the setpoint is to be depicted in decoder no. 1. The call is only made in basic operation 312. Mask 32 of 32 is to be parameterized in DFM no. 73 or group DFM1.

Parameter assignment

Parameter	Value	Description
TARGET	0	Setpoint
IST	0	Process value
Type	6	Type 6 = Mask 32 of 32
PSK	1	Decoder no. = 1
Hilf	0	Help cell
QBit	-	-
QDat	-	-

Call DFM block in FX 58

	AN	F 102.3	Pulse step end
	SPB	FB 237	Processing group DFM1
Name	DFM1		
DFM?		KF 73	DFM number = 73

Line in file SW.INI

Line	Content
Line 329:	Route selection bits 0 0 0 16-bit

Decoder 1, i.e. SY 696, SY 697, SY 698, SY 699

e.g. setpoint = 5 --> SY 699 = 00000101

TYPE = 7: Decoder 1 of 64

This decoder supports recipe-controlled selection functions or route switches and operating modes.

The setpoint is loaded into the setpoint cell upon basic operation start.

The setpoint is depicted in the actual value cell.

At a setpoint ≤ 0 the DFM result flag is set.

Depending on the rel. decoder number (0...2) in parameter PSK, the relevant flag is set in the specified decoder by setting a setpoint of 1 ... 64. This flag can be evaluated in the basic operation.

The corresponding flag bytes are occupied from high byte to low byte.

S flag range for rel. decoder numbers 0...2:

- Rel. decoder no. = 0: --> SY 688 ... 695
- Rel. decoder no. = 1: --> SY 696 ... 703
- Rel. decoder no. = 2: --> SY 704 ... 711

Example 1

For the silo selection (silo 0...23), decoder 1 of 64 is to be used. Depending on the setpoint a flag is set in decoder no. 0. The call is only performed in basic operation 11. The decoder target is to be parameterized in DFM no. 74 of Group DFM1.

Parameter assignment

Parameter	Value	Description
TARGET	0	Setpoint
IST	0	Process value
Type	7	Type 7 = Decoder 1 of 64
PSK	0	Decoder no. = 0
Hilf	0	Help cell
QBit	-	-
QDat	-	-

Call DFM block in SB 11

	AN	F 102.3	Pulse step end
	SPB	FB 237	Processing group DFM1
Name	DFM1		
DFM?		KF 74	DFM number = 74

Line in file SW.INI

Line	Content
Line 287:	Silo no. 0 0 23 SW

Decoder 1, i.e. SY 696, SY 697, SY 698, SY 699

e.g. setpoint = 5 → SY 699 = 00000101

Example 2

A text list should be used to select which steam valves are to be opened when heating up. Dependent on the text number in the text list a flag is set in decoder no. 2 by decoder 1 of 64. The call is only performed in basic operation 36. The decoder target is to be parameterized in DFM no. 75 of Group DFM1.

Parameter assignment

Parameter	Value	Description
TARGET	0	Setpoint
IST	0	Process value

Parameter	Value	Description
Type	7	Type 7 = Decoder 1 of 64
PSK	2	Decoder no. = 2
Hilf	0	Help cell
QBit	-	-
QDat	-	-

Call DFM block in SB 36

	AN	F 102.3	Pulse step end
	SPB	FB 237	Processing group DFM1
Name	DFM1		
DFM?		KF 75	DFM number = 75

Line in file SW.INI

Line	Content
Line 287:	Text, -, 0, 3, STEAM

Text list 'windcs\PCUxxx\TEXTE\DAMPF.TXT'

Line	Content	Description
Line 0:		Blank line
Line 1:	Steam valve D101	Upon selection: SW = 1 → S 704.0 = 1
Line 2:	Steam valve D102	Upon selection: SW = 2 → S 704.1 = 1
Line 3	Steam D101+D102	Upon selection: SW = 3 → S 704.2 = 1

TYPE = 8: Allocation block

When processing the DFM as an allocation block, a data block (QBit = 0) or DX block (QBit = 1) is opened depending on the QBit parameter.

The number of the data block (DB / DX) is specified in parameter PSK.

The setpoint is transferred from the recipe list into this open data block as a double word.

The data word address of the target data block is stored in the **Help** parameter.

In addition, the **Help** parameter is increased by two and the so addressed double word is loaded into the actual value cell from the data block as an actual value.

The DFM result flag is irrelevant.

Example:

The allocation block is used for transferring the setpoint of a temperature in DX 62, DW 8. The call is only performed in basic operation 25. The decoder target should be parameterized in DFM no. 126 of group DFM2.

Parameter assignment

Parameter	Value	Description
TARGET	0	Setpoint
IST	0	Process value
Type	8	Type 8 = allocation block
PSK	62	Target DX number
Hilf	8	Target DW (double word)
QBit	1	1 = DX block
QDat	-	-

Call DFM block in SB 36

	AN	F 102.3	Pulse step end
	U	F 54.7	Flank flag
	SPB	FB 238	Processing group DFM2
Name	DFM2		
DFM?		KF 126	DFM number = 126

Line in file SW.INI

Line	Content
Line 688:	Temperature °C 1 200 1200 SW

3.6.2.3 DFM3 - User

255 digital function modules DFM can be parameterized for each PCU in DFM3. The possible DFM types and functions can be freely selected by the user. However, if the same functions are possible under both DFM1 and DFM2, FB 239 must be programmed in accordance with FB 237 or FB 238.

The specification as to which DFMs can be used is indicated in the parameterization of the basic operation. Only DFMs no. 1...204 can be switched to additional technological blocks (AOUT, PID, MULT, etc.).

Parameter sets for block DFM3: Parameterization PCU

DFM3 PCU		DB 239		Sets: max. 255 per PCU
No.	**NAME**	**TYPE Info**	**Default**	**Comment**
1	SOLL	I16 P S	0	Setpoint
2	IST	I16 P S	0	Process value
3	P1	I16 P S	0	User parameter 1
4	P2	I16 P S	0	User parameter 2
5	P3	I16 P S	0	User parameter 3
6	P4	I16 P S	0	User parameter 4
7	P5	I16 P S	0	User parameter 5

It is necessary to call FB 239 in a plant section or in a basic operation with the DFM number (1 ... 255) as a parameter for updating the DFMs and forming the DFM result flag.

Parameter set: Text parameterization IOS

DFM3 IOS			Sets: max. 255 per PCU
No.	**TYPE Info**	**Default**	**Comment**
1	Z16 P IOS	DFM3 xxx	Block name

3.6.2.4 Result flag of DFM blocks DFM1, DFM2 and DFM3

									DFM1	DFM2	DFM3
	Bit address								**Result flag**		
									Byte address		
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**S flag**		
	1	2	3	4	5	6	7	8	760	792	824
	9	10	11	12	13	14	15	16	761	793	825
	17	18	19	20	21	22	23	24	762	794	826
	25	26	27	28	29	30	31	32	763	795	827
	33	34	35	36	37	38	39	40	764	796	828
	41	42	43	44	45	46	47	48	765	797	829
	49	50	51	52	53	54	55	56	766	798	830
	57	58	59	60	61	62	63	64	767	799	831
	65	66	67	68	69	70	71	72	768	800	832
D	73	74	75	76	77	78	79	80	769	801	833
F	81	82	83	84	85	86	87	88	770	802	834
M	89	90	91	92	93	94	95	96	771	803	835
	97	98	99	100	101	102	103	104	772	804	836
N	105	106	107	108	109	110	111	112	773	805	837
U	113	114	115	116	117	118	119	120	774	806	838
M	121	122	123	124	125	126	127	128	775	807	839

									DFM1	DFM2	DFM3
	Bit address								Result flag		
									Byte address		
	0	1	2	3	4	5	6	7	S flag		
B	129	130	131	132	133	134	135	136	776	808	840
E	137	138	139	140	141	142	143	144	777	809	841
R	145	146	147	148	149	150	151	152	778	810	842
	153	154	155	156	157	158	159	160	779	811	843
	161	162	163	164	165	166	167	168	780	812	844
	169	170	171	172	173	174	175	176	781	813	845
	177	178	179	180	181	182	183	184	782	814	846
	185	186	187	188	189	190	191	192	783	815	847
	193	194	195	196	197	198	199	200	784	816	848
	201	202	203	204	205	206	207	208	785	817	849
	209	210	211	212	213	214	215	216	786	818	850
	217	218	219	220	221	222	223	224	787	819	851
	225	226	227	228	229	230	231	232	788	820	852
	233	234	235	236	237	238	239	240	789	821	853
	241	242	243	244	245	246	247	248	790	822	854
	249	250	251	252	253	254	255		791	823	855

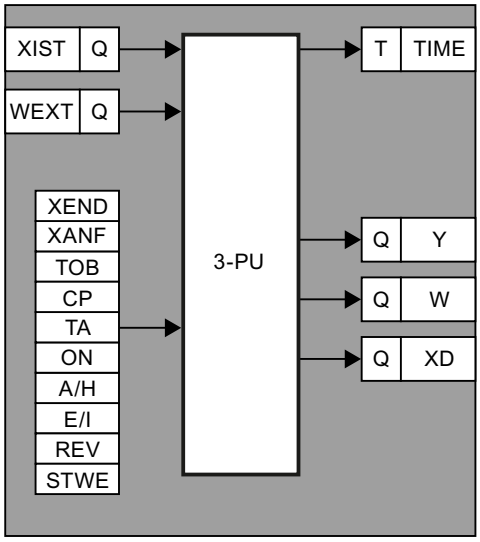
Example:

DFM 1.44 result flag S 765.3

DFM 2.85 result flag S 802.4

3.7 THRESTEP - Three-point controller

The block contains the necessary functions for maximum 96 controllers per PCU. The controller is suitable for fixed value controls in temperature and pressure circuits.



From one XIST actual value available as a source parameter and one WEXT external setpoint available as a source parameter or an internal setpoint W, XD is formed as a control difference.

Parameter sets

- Parametrization PID PCU
- Text parameterization PID IOS
- Controller parameterization PID IOS

Assignment:	Controller for controller groups (pre-entered)
Description:	Automatic mode, manual operation, user program
Operating modes:	ON/OFF, MANUAL/AUTO, EXTERNAL/ INTERNAL
Assignment:	Time steps DREIP direction bit "ANST" (OPEN/ CLOSED bit) in DB244 for actuator open and close DREIP
Example:	
Ranging program time step on outputs	
Parameter:	Scanning parameter SEQ

Parameter sets for block DREIP - Parameterization PCU

DREIP PCU		**DB244**		**Sets: max. 96 per PCU**
No.	NAME	TYPE Info	Preset	Comment
1	SEQU	I8 P S	0	Assigned sequence 1..48 or group 101..255

DREIP PCU		DB244		Sets: max. 96 per PCU
2	XIST	Quell P S		Actual value
3	WEXT	Quell P S		External setpoint
4	W	I16 P S	0	Effective setpoint
5	XEND	I16 P S	1000	End limit for XIST, WEXT, W
6	XANF	I16 P S	0	Start limit for XIST, WEXT, W
7	XD	I16 S	0	System deviation
8	TOB	I8 P S	5	Dead range
9	CP	I8 P S	255	Adjustment time reinforcement factor
10	Y	I16 S	0	Manipulated variable in 100 msec.
11	TA	I8 P S	2	Scanning parameters
12	ON	B1 P S	0	Controller on/off = 1/0
13	A/H	B1 P S	0	Operating mode: 0/1 = Auto/Manual
14	E/I	B1 P S	0	Setpoint: 0/1 = External/Internal
15	REV	B1 P S	0	Reversing operation: 0/1 = No/Yes
16	AIN	B1 S	0	Measured value monitoring
17	ANST	B1 S	1	Adjustment start open/close = 0/1
18	STWE	I8 P S	255	Adjustment value in manual operation in 100 msec.
19	OPEN	B1 S	0	Adjustment start OPEN = 1
20	CLOSED	B1 S	0	Adjustment start CLOSED = 1

Parameter set: Text parameterization IOS

DREIP IOS			Sets: max. 96 per PCU
No.	Type info	Preset	Comment
1	Z16 P IOS	3PU xxx	Block name

Controller parameterization IOS

4 controllers can be shown and operated on one screen page. A screen patch corresponds to a three-point controller group. The assignment of which controller is shown in which group and which screen page is made in the file "\PCUxxx\REGLER\BLD3PKT.INI".

Name	Description
[GROUPxxx]	Group number = screen page
Name=	Group name
Controller=	Numbers of the PID controllers that should be displayed
DIM=	Dimensions
DEP=	Number of decimal places

Example

In controller image 1 the controllers 1, 3, 8, 14 should be shown:

- Controller numbers 1 and 3 have the dimension °C and one decimal place.
- Controller numbers 8 and 14 have the dimension mbar and two decimal places.

Name	Description
[GROUP001]	Screen page-1
Name=Tank-1+2	Group name
Controller=1,3,8,14	Numbers of the three point controllers that should be displayed
DIM=°C,°C,mbar,mbar	Dimensions of the individual controllers
DEP=1,1,2,2	Number of decimal places

Operation three point controller

Automatic mode

The control difference (XD) is compared with a dead range (TOB). If the absolute amount of XD is smaller than TOB no adjustment commands are generated. Otherwise a time step is started with a value that is calculated by the formula:

- T = (adjustment time in 100 msec) * 10 * | XD / (XEND - XANF) | (in 100 msec)

The adjustment time corresponds to the reinforcement factor KP. No adjustment feedback is given.

The direction bit ("ANST") is formed from the sign of the control variance. For reverse operation (REV = 1) the direction bit is inverted.

Manual mode

In order to provide manual operation for operating the controller, an adjustable time value "STWE" (adjustment value/manual operation) is issued if required via the time step. The output is released by setting the bit to "Z" (closed) or "A" (open): If Z(A) accepts the value 1 the bit is set to "MESS" and the direction bit ("ANST") takes on the value 0 (1).

If in "MANUAL" operation the time step does not run y = 0 and "MESS" bit = 0.

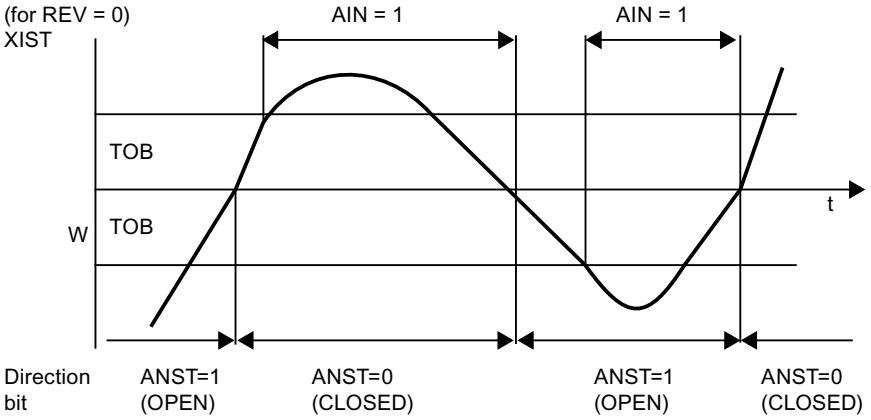
User program

The time step is to be queried from a user program and by linking with the direction bit the outputs for "more" and "less" are to be controlled.

The user program must run in 100 ms speed.

The bit for monitoring the measured value (MESS) records whether the actual value has left the dead range to the top or bottom (MESS = 1). The bit is zero if the actual value reaches the setpoint (MESS = 0).

If TOB = 0 MESS = 1, as soon as XIST >< W (see image)



Operating modes three point controller

Operating mode	Function
ON/OFF	For "OFF" the time step is set to the value 0. The MESS bit (refer to parameter set 3PU PCU) is set to "0". XD is calculated. For "IN" normal operation takes place if "AUTO" also exists.
MANUAL/AUTO	For "MANUAL" the time step is only controlled if an OPEN or CLOSED operation takes place. The actuating time in manual operation "STWE" is taken as the time value. The adjustment organs can then be controlled in the user program. For "AUTO" normal operation takes place.
EXTERNAL/ INTERNAL	For "EXTERNAL" "WEST" is used as the setpoint, for "INTERNAL" the "W" setpoint is used and this can be stipulated e.g. using operation.

Assignment time steps block DREIP

No.	Time step	No.	Time step	No.	Flag	No.	Time step
1	T 128	25	T 152	49	T 176	73	T 200
2	T 129	26	T 153	50	T 177	74	T 201
3	T 130	27	T 154	51	T 178	75	T 202
4	T 131	28	T 155	52	T 179	76	T 203
5	T 132	29	T 156	53	T 180	77	T 204
6	T 133	30	T 157	54	T 181	78	T 205
7	T 134	31	T 158	55	T 182	79	T 206
8	T 135	32	T 159	56	T 183	80	T 207
9	T 136	33	T 160	57	T 184	81	T 208
10	T 137	34	T 161	58	T 185	82	T 209
11	T 138	35	T 162	59	T 186	83	T 210
12	T 139	36	T 163	60	T 187	84	T 211
13	T 140	37	T 164	61	T 188	85	T 212
14	T 141	38	T 165	62	T 189	86	T 213

No.	Time step	No.	Time step	No.	Flag	No.	Time step
15	T 142	39	T 166	63	T 190	87	T 214
16	T 143	40	T 167	64	T 191	88	T 215
17	T 144	41	T 168	65	T 192	89	T 216
18	T 145	42	T 169	66	T 193	90	T 217
19	T 146	43	T 170	67	T 194	91	T 218
20	T 147	44	T 171	68	T 195	92	T 219
21	T 148	45	T 172	69	T 196	93	T 220
22	T 149	46	T 173	70	T 197	94	T 221
23	T 150	47	T 174	71	T 198	95	T 222
24	T 151	48	T 175	72	T 199	96	T 223

Assignment direction bit "ANST" block DREIP

OPEN/CLOSE flag for actuator open or close DREIP

No.	S flag	No.	S flag	No.	S flag	No.	S flag
1	S 1208.0	25	S 1211.0	49	S 1214.0	73	S 1217.0
2	S 1208.1	26	S 1211.1	50	S 1214.1	74	S 1217.1
3	S 1208.2	27	S 1211.2	51	S 1214.2	75	S 1217.2
4	S 1208.3	28	S 1211.3	52	S 1214.3	76	S 1217.3
5	S 1208.4	29	S 1211.4	53	S 1214.4	77	S 1217.4
6	S 1208.5	30	S 1211.5	54	S 1214.5	78	S 1217.5
7	S 1208.6	31	S 1211.6	55	S 1214.6	79	S 1217.6
8	S 1208.7	32	S 1211.7	56	S 1214.7	80	S 1217.7
9	S 1209.0	33	S 1212.0	57	S 1215.0	81	S 1218.0
10	S 1209.1	34	S 1212.1	58	S 1215.1	82	S 1218.1
11	S 1209.2	35	S 1212.2	59	S 1215.2	83	S 1218.2
12	S 1209.3	36	S 1212.3	60	S 1215.3	84	S 1218.3
13	S 1209.4	37	S 1212.4	61	S 1215.4	85	S 1218.4
14	S 1209.5	38	S 1212.5	62	S 1215.5	86	S 1218.5
15	S 1209.6	39	S 1212.6	63	S 1215.6	87	S 1218.6
16	S 1209.7	40	S 1212.7	64	S 1215.7	88	S 1218.7
17	S 1210.0	41	S 1213.0	65	S 1216.0	89	S 1219.0
18	S 1210.1	42	S 1213.1	66	S 1216.1	90	S 1219.1
19	S 1210.2	43	S 1213.2	67	S 1216.2	91	S 1219.2
20	S 1210.3	44	S 1213.3	68	S 1216.3	92	S 1219.3
21	S 1210.4	45	S 1213.4	69	S 1216.4	93	S 1219.4
22	S 1210.5	46	S 1213.5	70	S 1216.5	94	S 1219.5
23	S 1210.6	47	S 1213.6	71	S 1216.6	95	S 1219.6
24	S 1210.7	48	S 1213.7	72	S 1216.7	96	S 1219.7

Ranging program time step on outputs

Example:			
U	T 128		Time step three point 1
U	S 1208.0		Trigger bit "OPEN" = 1
=	Q x.x		Output for actuator open
U	T 128		
AN	S 1208.0		Adjustment trigger bit for "CLOSED" = 0
=	Q x.y		Output for actuator close

Scanning parameters three point controller

As a part of the control circuits permit processing in a larger time frame, a scanning time is assigned individually to each controller. There is still the option of minimizing the processor load by appropriately modifying the controller processing. If at a later time other controllers are operated these synchronize **automatically** in the stated processing order.

An individual scanning parameter TA can be stated for each controller. With the scanning parameter the processing cycle and the basic cycle delay are set.

The following relationship is used:

- Scanning parameter = processing cycle + basic cycle delay
- TA = BZ + GV

The processing cycle is one of the numbers 1,2,4,8,16,32,64,128.

The following applies to the basic cycle delay:

- 0 = < basic cycle delay < processing cycle

The processing cycle states the time intervals in which the controllers operate (in seconds). The basic cycle delay is used for the even distribution of processes for several cycles.

Example:

- 16 controllers in a 2 second grid
- 32 controllers in a 4 second grid

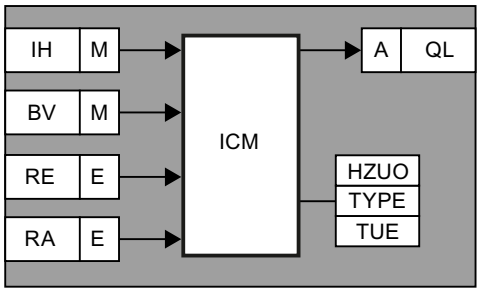
Controller no.	Scanning parameter	Cycle number												
		0	1	2	3	4	5	6	7	8	9	10	11	12
1 - 16	TA = 2	X		x		x		x		x		x		x
17 - 32	TA = 4 + 1 = 5		x				x				x			
33 - 48	TA = 4 + 3 = 7				x				x				x	

TA = 0 is a special case. In this case, the controller is not processed.

3.8 ICM - Individual Control Modules (ICM1 and ICM2)

The individual actuator (ICM) block takes on locking, controlling and monitoring up to 510 actuators (per PCU) such as valves, motors etc.

Each individual actuator is assigned a parameter set in which the actuator type, supervising time etc. is stored.



Stipulated flags form the interface to the automatic programs (e.g. basic operations) and to an interlocking program that exists for each ICM.

Parameter set:	Parameterization PCU, text parameterization IOS
Assignment:	Actuator type - Type
Process interface:	DB101 ... 105
User interface:	FX226 ... 229 BV assignment ICM group 1/2
ICM user interface:	BV, BA, RE, RA, QL, HUP, HUPS
ICM status bits:	BSP, QSP, HD
Example:	Actuator control
User interface:	Signal occupancy for the actuators group 1 and 2

Parameter sets for block ICM - Parameterization PCU

ICM1 or ICM2 PCU		**DB 226 DB 243**		**Sets: max. 255 per PCU for ICM-Gr. 1 max. 255 per PCU for ICM-Gr. 2**
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	SEQU	I8 P S	0	Assigned sequence 1..48 or group 101..255
2	HZUO	I8 P S	1	Manual group assignment 1..64
3	TYPE	I8 P S	49	Actuator type
4	TUE	I8 P S	10	Supervising time in seconds

Parameter set: Text parameterization IOS

ICM1 or ICM2 IOS				**Sets: max. 255 per PCU for ICM-Gr. 1 max. 255 per PCU for ICM-Gr. 2**
No.	**Type**	**Info**	**Preset**	**Comment**
1	Z16	P IOS	ICMx xxx	Block name

Assignment actuator type - type for block ICM

TYPE	Actuator	RE feedback	RA feedback	Manual level
				Hardware level below (impact freedom for manual → auto)
8	Valve	0 = Open		external, with overwrite
9	Valve	1 = Open		external, with overwrite
11	Valve	1 = Open	1 = Closed	external, with overwrite
12	Motor	0 = on		external, with overwrite
13	Motor	1 = on		external, with overwrite
				Manual level in the PCU (Impact freedom for manual → auto)
16	Valve	0 = Open		internal, with overwrite
17	Valve	1 = Open		internal, with overwrite
19	Valve	1 = Open	1 = Closed	internal, with overwrite
20	Motor	0 = on		internal, with overwrite
21	Motor	1 = on		internal, with overwrite
				Hardware level below (no impact freedom for manual → auto)
32	Valve	0 = Open		external, without overwrite
33	Valve	1 = Open		external, without overwrite
35	Valve	1 = Open	1 = Closed	external, without overwrite
36	Motor	0 = on		external, without overwrite
37	Motor	1 = on		external, without overwrite
				Manual level in the PCU (no impact freedom for manual → auto)
48	Valve	0 = Open		internal, without overwrite
49	Valve	1 = Open		internal, without overwrite
51	Valve	1 = Open	1 = Closed	internal, without overwrite
52	Motor	0 = on		internal, without overwrite
53	Motor	1 = on		internal, without overwrite
128-255	ICM blocked			ICM is not edited

For the actuator type **valve** the load output QL remains controlled in case of error, it is uncontrolled for the **motor** type.

Type 8 ... 13	with lower manual level (e.g. emergency control or C1 level) and impact-free switching from manual → auto. In manual operation the QL is switched off and the BSP is added to the RE. After the system switches (auto) the switching status of the control unit controlled from the lower level is retained. In automatic mode it is possible to operate the ICM via the monitor.
Type-16 ... 21	Manual level in the system and impact-free switching from manual → auto. For manual operation in the manual and automatic automatic modes the QL is added to the BSP (with overwrite in automatic mode). During manual operation the BA has no influence. The manual operation takes place via the monitor or using a separate FB which controls the BSP depending on the buttons of the manual inputs. After switching the operating mode from manual to automatic the switching status of the control unit is retained.
Type-32 ... 37	with lower manual level (e.g. emergency control or C1 level) and no impact-free conversion from manual → auto. In manual operation the QL is switched off and the RE is added to the BSP. After switching the system (auto) the status of the BA is transferred to the BSP.
Type-48 ... 53	Manual level in the system and no impact-free switching from manual → auto. For manual operation the QL is added to the BSP. During manual operation the BA has no influence. The manual operation takes place via the monitor or using a separate FB which controls the BSP depending on the buttons of the manual inputs. After switching the system from manual → auto the status of the BA is transferred to the BSP. No overwrite is possible in automatic mode.

Process interface for the block ICM

All system technology FBs no longer directly access inputs, outputs and S flags. Instead, the following DBs are available as interfaces to the system FBs:

The **allocating blocks FB 200 / 201** ensure the allocation to the E/A/S interface in the standard delivery status. These function blocks are open so that the user can modify the E/A occupancy (e.g. for an electric terminal bar).

DB no.	Function
101	ICM-BA
102	ICM-BV
103	ICM-RE
104	ICM-RA
105	ICM-QL

The structure is the same for all data blocks

BIT DW	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
0																		
1	1								Number of words									
2	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
3	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17		
4	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33		
5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49		
6	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65		
7	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81		ICM-
8	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	S	Group
9	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	T	1
10	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	E	
11	160	159	158	157	156	155	154	153	152	151	150	149	148	147	146	145	L	
12	176	175	174	173	172	171	170	169	168	167	166	165	164	163	162	161	L	
13	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	G	
14	208	207	206	205	204	203	202	201	200	199	198	197	196	195	194	193	L	
15	224	223	222	221	220	219	218	217	216	215	214	213	212	211	210	209	I	
16	240	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225	E	
17		255	254	253	252	251	250	249	248	247	246	245	244	243	242	241	D	
--	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	----------
18	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	N	
19	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	U	
20	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	M	
21	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	M	
22	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	E	
23	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	R	ICM-
24	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97		Group
25	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113		2
26	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129		
27	160	159	158	157	156	155	154	153	152	151	150	149	148	147	146	145		
28	176	175	174	173	172	171	170	169	168	167	166	165	164	163	162	161		
29	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177		
30	208	207	206	205	204	203	202	201	200	199	198	197	196	195	194	193		
31	224	223	222	221	220	219	218	217	216	215	214	213	212	211	210	209		
32	240	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225		
33		255	254	253	252	251	250	249	248	247	246	245	244	243	242	241		

User interface for the block ICM

Each ICM has a segment in the ICM interlock program (FX 226... 229). Each lock program segment must end with the BV flag assignment:

Example: ICM001

U	I 65.3	Binary input lock
=	S 256.0	BV flag assignment ICM 1

The interlock BV-1 ... 255 is programmed in FX226 and in FX227, BV-256 ... 510 is programmed in FX228 and in FX229 (FX ACTUATORS).

The status of the interlock is allocated to flag S 256.0 ... S 319.6.

FX 226 BV assignment ICM group 1

SY	.0	.1	.2	.3	.4	.5	.6	.7	
256	1	2	3	4	5	6	7	8	
257	9	10	11	12	13	14	15	16	
258	17	18	19	20	21	22	23	24	
259	25	26	27	28	29	30	31	32	**E**
260	33	34	35	36	37	38	39	40	**S**
261	41	42	43	44	45	46	47	48	**G**
262	49	50	51	52	53	54	55	56	**-**
263	57	58	59	60	61	62	63	64	**N**
264	65	66	67	68	69	70	71	72	**U**
265	73	74	75	76	77	78	79	80	**M**
266	81	82	83	84	85	86	87	88	**M**
267	89	90	91	92	93	94	95	96	**E**
268	97	98	99	100	101	102	103	104	**R**
269	105	106	107	108	109	110	111	112	
270	113	114	115	116	117	118	119	120	
271	121	122	123	124	125	126	127	128	

FX 227 BV assignment ICM group 1

SY	.0	.1	.2	.3	.4	.5	.6	.7	
272	129	130	131	132	133	134	135	136	
273	137	138	139	140	141	142	143	144	
274	145	146	147	148	149	150	151	152	
275	153	154	155	156	157	158	159	160	**E**
276	161	162	163	164	165	166	167	168	**S**
277	169	170	171	172	173	174	175	176	**G**
278	177	178	179	180	181	182	183	184	**-**
279	185	186	187	188	189	190	191	192	**N**
280	193	194	195	196	197	198	199	200	**U**
281	201	202	203	204	205	206	207	208	**M**
282	209	210	211	212	213	214	215	216	**M**

SY	.0	.1	.2	.3	.4	.5	.6	.7	
283	217	218	219	220	221	222	223	224	**E**
284	225	226	227	228	229	230	231	232	**R**
285	233	234	235	236	237	238	239	240	
286	241	242	243	244	245	246	247	248	
287	249	250	251	252	253	254	255		

FX 228 BV assignment ICM group 2

SY	.0	.1	.2	.3	.4	.5	.6	.7	
288	1	2	3	4	5	6	7	8	
289	9	10	11	12	13	14	15	16	
290	17	18	19	20	21	22	23	24	
291	25	26	27	28	29	30	31	32	**E**
292	33	34	35	36	37	38	39	40	**S**
293	41	42	43	44	45	46	47	48	**G**
294	49	50	51	52	53	54	55	56	**-**
295	57	58	59	60	61	62	63	64	**N**
296	65	66	67	68	69	70	71	72	**U**
297	73	74	75	76	77	78	79	80	**M**
298	81	82	83	84	85	86	87	88	**M**
299	89	90	91	92	93	94	95	96	**E**
300	97	98	99	100	101	102	103	104	**R**
301	105	106	107	108	109	110	111	112	
302	113	114	115	116	117	118	119	120	
303	121	122	123	124	125	126	127	128	

FX229 BV assignment ICM group 2

SY	.0	.1	.2	.3	.4	.5	.6	.7	
304	129	130	131	132	133	134	135	136	
305	137	138	139	140	141	142	143	144	
306	145	146	147	148	149	150	151	152	
307	153	154	155	156	157	158	159	160	**E**
308	161	162	163	164	165	166	167	168	**S**
309	169	170	171	172	173	174	175	176	**G**
310	177	178	179	180	181	182	183	184	**-**
311	185	186	187	188	189	190	191	192	**N**
312	193	194	195	196	197	198	199	200	**U**
313	201	202	203	204	205	206	207	208	**M**
314	209	210	211	212	213	214	215	216	**M**
315	217	218	219	220	221	222	223	224	**E**

SY	.0	.1	.2	.3	.4	.5	.6	.7	
316	225	226	227	228	229	230	231	232	**R**
317	233	234	235	236	237	238	239	240	
318	241	242	243	244	245	246	247	248	
319	249	250	251	252	253	254	255		

User interface for the block ICM

The connection of the individual control devices with the system, the user programs and procedures takes place via the following signals:

		ICM 1	ICM 2
BV	**I**nter**l**ock to lock the actuator control 0/1 = Block/release	S 256.0 - S 287.6	S 288.0 - S 319.6
IH	**C**ommand **a**utomatic to control the actuators from basic operations or user programs	S 128.0 - S 159.6	S 160.0 - S 191.6
RE	**F**eedback **O**n Control unit feedback for the state**On** or **Open**. (For details refer to table "Assignment actuator type - type")	E 64.0 - E 95.6	E96.0 - E 127.6
RA *(2)	Feedback OFF Control unit feedback for the state Off or Closed. (For details refer to table "Assignment actuator type - type")	none Standard allocation	no Standard allocation
QL	**L**oad output to control the actuator	A 64.0 - A 95.6	A96.0 - A 127.6
HUP	**HUP**trigger is set in the event of an ICM error; processing and resetting by user	M 99.5	M 99.5
HUPS	**HUP**trigger **C**ollective flag is activated in the event of an ICM, AIN, and sequence error, processing and resetting by user	M 107.1	M 107.1
*(2): For the RA allocation the user himself must select a peripheral assignment and organize the transfer from/to the DB104			

Status bits ICM block

The ICM block has the following internal bits:

ICM	
BSP	**C**ommand **M**emory Displays the target switching status of the actuator. In automatic mode (HD = 0): • The BSP is changed for a signal change of the BA or by operation on the screen. Both control types have equal priority. By changing the BSP the supervising time is triggered. In manual operation: • The feedback on (RE) is added to the BSP. If for an outstanding BA the actuator is switched off via the BV interlock and subsequently released again, the BA command is transferred again, i.e. the control unit is controlled again.
QSP	Error **m**emory is set when addressing the run time monitoring or for double feedback and if the BSP and feedback match can be reset using the "QUIT" button. Automatic logging in the message archive and trigger hooter flag (M99.5) if the error type ICM is released.
HD	**M**anual **O**peration indicates whether manual (HD = 1) or automatic mode (HD = 0) will take place. The bit is manipulated by the system component "manual signal distributor".

Example: Actuator control

The control of the individual actuators from the PROGRAM USER block or basic operations takes place via the standardized communication interface.

BA:	Command automatic	ICM1: S 128.0 S 159.6 ICM2: S 160.0 -S 191.6

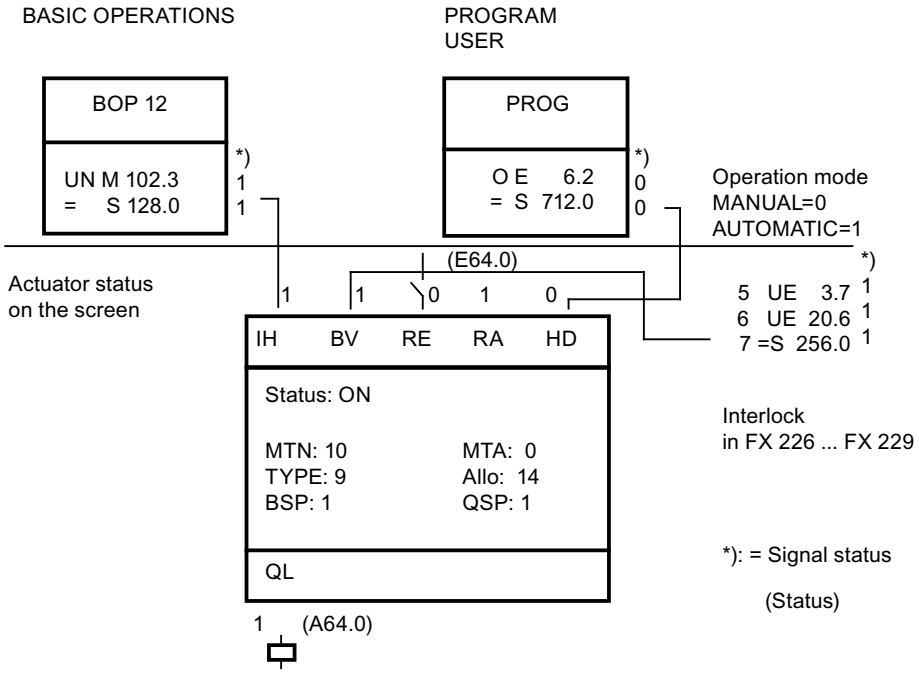
The BA flag is used to control the actuators from the basic operations (switching on/off) or the PROGRAMS USER block

Signal occupancy BA for the actuators 1 ... 255: see Table signal occupancy.

Example

Assignment group 1:	
ICM-1	= S 128.0
ICM-2	= S 128.1
ICM-9	= S 129.0
ICM-255	= S 159.6

Example ICM 1:



User interface for the block ICM

Signal occupancy for the actuators group 1 and 2

									ICM Group 1 (1 ... 255)				ICM Group 2 (1 ... 255)			
	Bit address															
									BV	IH	RE	QL	BV	IH	RE	QL
	0	1	2	3	4	5	6	7	(S)	(S)	(E)	(A)	(S)	(S)	(E)	(A)
	1	2	3	4	5	6	7	8	256	128	64	64	288	160	96	96
	9	10	11	12	13	14	15	16	257	129	65	65	289	161	97	97
	17	18	19	20	21	22	23	24	258	130	66	66	290	162	98	98
	25	26	27	28	29	30	31	32	259	131	67	67	291	163	99	99
	33	34	35	36	37	38	39	40	260	132	68	68	292	164	100	100
	41	42	43	44	45	46	47	48	261	133	69	69	293	165	101	101
	49	50	51	52	53	54	55	56	262	134	70	70	294	166	102	102
	57	58	59	60	61	62	63	64	263	135	71	71	295	167	103	103
	65	66	67	68	69	70	71	72	264	136	72	72	296	168	104	104
E	73	74	75	76	77	78	79	80	265	137	73	73	297	169	105	105
S	81	82	83	84	85	86	87	88	266	138	74	74	298	170	106	106
G	89	90	91	92	93	94	95	96	267	139	75	75	299	171	107	107
	97	98	99	100	101	102	103	104	268	140	76	76	300	172	108	108

									ICM Group 1 (1 ... 255)				ICM Group 2 (1 ... 255)			
N	105	106	107	108	109	110	111	112	269	141	77	77	301	173	109	109
U	113	114	115	116	117	118	119	120	270	142	78	78	302	174	110	110
M	121	122	123	124	125	126	127	128	271	143	79	79	303	175	111	111
M	129	130	131	132	133	134	135	136	272	144	80	80	304	176	112	112
E	137	138	139	140	141	142	143	144	273	145	81	81	305	177	113	113
R	145	146	147	148	149	150	151	152	274	146	82	82	306	178	114	114
	153	154	155	156	157	158	159	160	275	147	83	83	307	179	115	115
	161	162	163	164	165	166	167	168	276	148	84	84	308	180	116	116
	169	170	171	172	173	174	175	176	277	149	85	85	309	181	117	117
	177	178	179	180	181	182	183	184	278	150	86	86	310	182	118	118
	185	186	187	188	189	190	191	192	279	151	87	87	311	183	119	119
	193	194	195	196	197	198	199	200	280	152	88	88	312	184	120	120
	201	202	203	204	205	206	207	208	281	153	89	89	313	185	121	121
	209	210	211	212	213	214	215	216	282	154	90	90	314	186	122	122
	217	218	219	220	221	222	223	224	283	155	91	91	315	187	123	123
	225	226	227	228	229	230	231	232	284	156	92	92	316	188	124	124
	233	234	235	236	237	238	239	240	285	157	93	93	317	189	125	125
	241	242	243	244	245	246	247	248	286	158	94	94	318	190	126	126
	249	250	251	252	253	254	255		287	159	95	95	319	191	127	127

Setting the signals e.g. for control unit 172 (group 1):

- Search for control unit no. 172 in the left table field in the same line in the right table field are the byte addresses for BV, RE, RA, QL, the column heading belonging to the control unit module states the bit address

Example

For actuator no. 172 the following applies:	
BV S	277.3
BA S	149.3
RE E	85.3
RA E	User occupancy
QL A	85.3

3.9 ICM_IO - ON/OFF delay (ICM1/ICM2)

With the block ICM1_EA(ICM1-255) and ICM2_EA(ICM256-510) the individual control units with delay time switch on / off can be added. A parameter set is assigned to each ICM; this stores the values for the delay time switch on or off. The delay values are stipulated in the ICM1_EA or ICM2_EA parameterization. The maximum delay time switch on or off is 255 seconds. The delay time switch on or off is only active if the ICM is in automatic mode.

Parameter sets for block ICM1/2_EA: Parameterization PCU:

ICM1_EA or ICM2_EA PCU		DB126 DB143			Sets: max 255 per PCU for ICM1_EA max 255 per PCU for ICM2_EA
No.	Name	Type	Info	Preset	Comment
1	EVZ_SOLL	I8	P S	0	Target value switch on delay (0...255)
2	EVZ_IST	I8	P S	0	Actual value switch on delay
3	AVZ_SOLL	I8	P S	0	Target value delay time switch off (0...255)
4	AVZ_IST	I8	P S	0	Actual value delay time switch off

Parameter set: Text parameterization IOS:

ICM1_EA or ICM2_EA IOS			Sets: max. 255 per PCU
No.	Type Info	Preset	Comment
1	Z16 P IOS	ICMx_EA xxx	Block name

3.10 FIFO1 to FIFO8 - PCU system data - General

The block enables you to determine for each of the maximum 8 connectible IOSs which telegram types should be sent from the PCU to which IOS.

FIFOs are assigned to the IOSs by configuring the channels. Each channel is assigned to precisely one IOS. With regard to the A/R system this must be entered in the file area.ini in the windcs\sys catalog.

Parameter sets for block FIFOx - Parameterization PCU

FIFOx PCU		DB 170 ... DB 177	Data set: 0	
No.	NAME	TYPE Info	Preset	Comment
1	TYPE0	I8 P S	7	Telegram type which FIFO accepts
2	TYPE1	I8 P S	3	Telegram type which FIFO accepts
3	TYPE2	I8 P S	0	Telegram type which FIFO accepts
4	TYPE3	I8 P S	0	Telegram type which FIFO accepts
5	TYPE4	I8 P S	0	Telegram type which FIFO accepts
6	TYPE5	I8 P S	0	Telegram type which FIFO accepts
7	TYPE6	I8 P S	0	Telegram type which FIFO accepts
8	TYPE7	I8 P S	0	Telegram type which FIFO accepts
9	TYPE8	I8 P S	0	Telegram type which FIFO accepts
10	TYPE9	I8 P S	0	Telegram type which FIFO accepts
11	SYNCLCK	I16 P S	60	Time interval date/time synchronization
12	SYNCCNT	I16 P S	0	Clock meter date/time synchronization

Telegram types:

Type	Description
Typ-0	Locked
Typ-1	Batch data
Typ-2	Process protocol entry for 6 DFMs
Typ-3	Messages
Typ-4	Recipe order V2
Typ-5	Step report entry time + 13 DFMs
Typ-6	Free protocol: Received data
Typ-7	Date/time synchronization
Typ-8	Recipe order V3
Typ-9	Batch order data: Batch start
Typ-10	Reserved for system extensions
Typ-11	Reserved for system extensions
Typ-12	Route Control
Typ-13	TA status
Typ-14	Free protocol order
Typ-15	Batch status
Typ-109	Movement message
Typ-16 127	Reserved for system extensions
Typ-128 ... 255	Free for user allocation

3.11 GOP.INI - Definition of the basic operation (GOP)

A maximum of 508 basic operations are possible per PCU.

The data set in the file GOP.INI has the following structure:

Name	Description		
[BOP-NO]	= Number of the basic operation (1 ... 508)		
KZuo	Assignment to sequence (1 ... 48), 0 = Assignment to all sequences		
SW	Target values → Numbers of the DFMs used in the basic operation		
		sequential number → group no. DFM.* 256 + DFM-No	
			Group no. DFM = 0 ... 3
			DFM no. = 1 ... 255
		Group no. DFM and DFM no. (0.1 ... 3,255)	

Example

BOP.INI	Description
[BOP001]	Basic operation-1
KZuo=2	Assignment to sequence 2
SW=1.12,1.14,0.23,0.24,1.9,1.113,2.45	DFM numbers of the target values
	Indication of the group no. and DFM no.
Or:	
SW=268,270,23,24,265,369,557	DFM numbers of the target values
	Indication of the absolute DFM no.
[BOP002]	Basic operation 2
KZuo=2,4,32	Assignment to sequence 2, 4 and 32
SW=1.13,1.14,2.25,2.9,0.123,0.45	DFM numbers of the target values

etc.

BOP - name of basic operation

The names of the 508 basic operations can be stored in the BOP parameter set.

Parameter set

Text parameterization IOS

BOP IOS			Sets: max. 508 per PCU
No.	Type Info	Preset	Comment
1	Z16 P IOS	BOP xxx	Name of basic operation

3.12 GRUP_TA - Group block

The group block is required to assign ICM, MSG, AIN, controller (PID/DREIP) to a group.

The user stores the current recipe, job and batch data that are issued for a notification of the assigned ICM, MSG, AIN, controller (PID/DREIP) in this block.

The group number at the data point goes from 101.255.

The associated data set number in DB224 is group number - 100.

Structure of the data block DB 224:		
DW 0	0	
DW 1	5 DW per data set	Number of data sets
From DW 2	1st data set	
DL 2	Year for RType, JobNo, BatchNo	

Structure of the data block DB 224:	
DR 2	Recipe type
DW 3	Recipe number
DW 4	Job number
DW 5	Batch number
DW 6	Help cell
From DW 7	2nd data set

Parameter sets for block GRUP_TA - Parameterization PCU

GRUP_TA		DB 224		Sets: max. 155 per PCU
No.	NAME	Type Info	Preset	Comment
1	Year	I8 P S	0	Year for RType, JobNo, BatchNo
2	RType	I8 P S	0	Recipe type
3	RecNo	I16 P S	0	Recipe number
4	AuftrNr	I16 P S	0	Job number
5	ChargeNr	I16 P S	0	Batch number
6	Helpc	I16 P S	0	Help cell

Parameter set: Text parameterization IOS

GRUP_TA			Sets: max. 155 per PCU
No.	Type Info	Preset	Comment
1	Z16 P IOS	GRUP_TA xxx	Block name

3.13 HAND - Manual enable block

The actuators and sequence controls for a system can be classified into up to 64 manual groups per PCU. The classification is of any kind but will generally comply with the technological requirements.

The association of an actuator is set by the parameter HZUO on the ICM block; that of a sequence by the parameter HZUO from the sequence block.

The manual releases must be set to defined flags in the program PROG. (Flag = "1" means "manual"). The system completes the distribution to ICM and sequence blocks.

Process interface

Manual group assignment to data bit DB201

Excerpt from the data structure **SYS-ALG** "General system data":

Bit DW	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
12	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	**Manual groups**
13	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	**Number**
14	48	47	56	45	44	43	43	41	40	39	38	37	36	35	34	33	
15	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	

HZUO	Significance for ICM 1/2, SEQUENCE
0	No assignment of manual signals in the data set, i.e. the MANUAL bit must e.g. be switchable via process image operation
1..64	MANUAL bit comes after the status of the relevant manual group
>64	MANUAL bit is always = 1 !

User interface

Assignment of manual group to S-flag

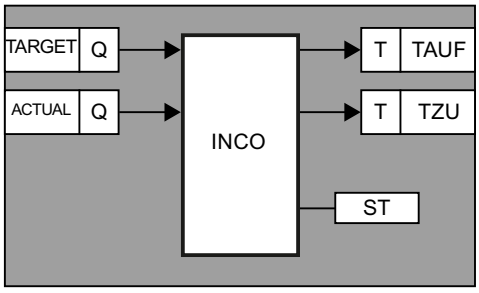
No. = Manual group no.

No.	S flag	No.	S flag	No.	S flag	No.	S flag
1	S 712.0	17	S 714.0	33	S 716.0	49	S 718.0
2	S 712.1	18	S 714.1	34	S 716.1	50	S 718.1
3	S 712.2	19	S 714.2	35	S 716.2	51	S 718.2
4	S 712.3	20	S 714.3	36	S 716.3	52	S 718.3
5	S 712.4	21	S 714.4	37	S 716.4	53	S 718.4
6	S 712.5	22	S 714.5	38	S 716.5	54	S 718.5
7	S 712.6	23	S 714.6	39	S 716.6	55	S 718.6
8	S 712.7	24	S 714.7	40	S 716.7	56	S 718.7
9	S 713.0	25	S 715.0	41	S 717.0	57	S 719.0
10	S 713.1	26	S 715.1	42	S 717.1	58	S 719.1
11	S 713.2	27	S 715.2	43	S 717.2	59	S 719.2
12	S 713.3	28	S 715.3	44	S 717.3	60	S 719.3
13	S 713.4	29	S 715.4	45	S 717.4	61	S 719.4
14	S 713.5	30	S 715.5	46	S 717.5	62	S 719.5
15	S 713.6	31	S 715.6	47	S 717.6	63	S 719.6
16	S 713.7	32	S 715.7	48	S 717.7	64	S 719.7

3.14 INCO - Increment transformer

The functional block is used to calculate and implement adjustment increments in appropriately long opening and closing impulses for up to 16 motorized actuators.

Opening and closing impulses each affect one time level and are to be guided by the user in the program PROG to digital outputs.



The block is switched with the manipulated variable (TARGET) and the actuator feedback (ACTUAL).

The setting time (ST) of the drive is set in seconds in the parameter set. Using the TARGET, ACTUAL and ST, INKO calculates the necessary setpoints for each second for the time stages.

T = ST * (TARGET - ACTUAL) / 10 (time setpoint in 0.1 s)

With the calculated T, depending on the activation direction, one of two time steps are started and the other time step is deleted.

Parameter set:	Parameterization PCU, text parameterization IOS
Assignment:	Time step - INKO and sample ranging program

Parameter sets for block INKO - Parameterization PCU

INKO PCU		**DB 229**		**Sets: max. 16 per PCU**
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	TARGET	Quell P S		Position setpoint
2	IST	Quell P S		Actual position value
3	ST	I8 P S	0	Setting time in seconds

Parameter set: Text parameterization IOS

INKO IOS			**Sets: max. 16 per PCU**
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	INKO xxx	Block name

Time step assignment - INKO block

No.	**'open'**	**"closed"**	**No.**	**'open'**	**"closed"**
1	T96	T97	9	T112	T113
2	T98	T98	10	T114	T115

No.	'open'	"closed"	No.	'open'	"closed"
3	T100	T101	11	T116	T117
4	T102	T103	12	T118	T119
5	T104	T105	13	T120	T121
6	T106	T107	14	T122	T123
7	T108	T109	15	T124	T125
8	T110	T111	16	T126	T127

Example

Ranging program time step on outputs

U	T 96	Time step for INKO 01 "open"
=	Q xx.x	Output for INKO 01 "open"
U	T 97	Time step for INKO 01 "closed"
=	Q yy.y	Output for INKO01 "closed"

3.15 KETTBLD Plant-section-related process images

An appropriate process image should be set for each of a maximum of 48 sequences. For the sequence operation these process images may be dependent from the sequence just selected via the function key **Image** in which the 2nd function key occupancy is displayed.

Parameter set: Text parameterization IOS

KETTBLD				Sets: 48
No.	**Type**	**Info**	**Preset**	**Comment**
1	Z16	P IOS	KETTBLD.bik	Process image name

The KETTBLD name with the sequence number is pre-entered for all sequences. Any process images that were created with the function **image construction** can be entered here.

If the process image set is not available a "image does not exist" notification window is displayed.

3.16 KPOS - Plant section position

For each sequence there are 48 positions that can be displayed in the system overview for the maximum 48 sequences available for each PCU.

The names of the maximum 16 sequences are stored in the file \TEXTE.0\BEREICH.TXT.

The individual items in the sequences for the area are set in the file windcs\etc\kposxxx.ini.

The entry of PCU no = 0 and sequence no = 0 in the file results in an empty line on the screen. The same sequence number can be entered several times.

The line number in the kposxxx.ini files corresponds to the position in the system overview area.

TEILPOS assignments

TEILPOS	SECTION
\etc\kpos001.ini	1
\etc\kpos002.ini	2
\etc\kpos003.ini	3
"	"
"	"
\etc\kpos016.ini	16

Structure of the file KPOSxxx.ini

KPOSxxx.ini IOS			
Line no.	PCU no.	Sequence no.	Comment
1	1	1	Line 1
2	1	2	Line 2
3	1	3	Line 3
4	1	4	Line 4
5	1	5	Line 5
6	1	6	Line 6
7	1	7	Line 7
8	1	8	Line 8
9	1	9	Line 9
10	1	10	Line 10
11	1	11	Line 11
12	1	12	Line 12
13	1	13	Line 13
14	1	14	Line 14
15	1	15	Line 15
16	1	16	Line 16
17	1	17	Line 17
18	1	18	Line 18
19	1	19	Line 19
20	1	20	Line 20
21	1	21	Line 21
22	1	22	Line 22
23	1	23	Line 23
24	1	24	Line 24
25	1	25	Line 25

26	1	26	Line 26
27	1	27	Line 27
28	1	28	Line 28
29	1	29	Line 29
30	1	30	Line 30
31	1	31	Line 31
32	1	32	Line 32
33	1	33	Line 33
34	1	34	Line 34
35	1	35	Line 35
36	1	36	Line 36
37	1	37	Line 37
38	1	38	Line 38
39	1	39	Line 39
40	1	40	Line 40
41	1	41	Line 41
42	1	42	Line 42
43	1	43	Line 43
44	1	44	Line 44
45	1	45	Line 45
46	1	46	Line 46
47	1	47	Line 47
48	1	48	Line 48

3.17 CURVSCAN - Curve target values

In the system it is possible to show any setpoint series as a graph. The interpolation points on this curve are stored in a data block (DB or DX). A maximum of 16 curves can run in one PCU at the same time.

This block always calculates the current setpoint depending on the time basis. This setpoint Yakt can be switched on for further processing, e.g. to a PID controller.

A QBI release bit can be set in the data set of the curve. If the query comes from QBI = 1 scanning the curve is stopped (e.g. if there is an error in the sequence).

There are two options for starting to scan a curve:

Start type	Description
Internally:	Starting the curve internally means that the curve is started manually. For this the curve's data set must stated the curve group number and the relative curve number in the group. The curve then starts via the start bit external EXT = 1 in the data set. This start bit is automatically reset after the curve has ended.
Externally:	Starting the curve externally means that the curve is started via a sequence. For this the curve number is stated as a decimal number with two digits after the decimal point in a block that can be sourced, e.g. the setpoint in the DFM block. This is set as the source in the curve's data set. Digit before the decimal point: • Curve group number Digital after the decimal point: • Relative curve number in the group
	After starting the curve SW = 0 must be stated as the setpoint in the recipe list as otherwise the curve is restarted after it ends. As long as a curve number is stipulated, the curve is restarted and time again. Only the DFMs 1 to 204 can be used.

Parameter sets for block CURVSCAN - Parameterization PCU

CURVSCAN PCU		DB 247		Record: 0
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	TYPE	I8 P S	0	Block type: 0 = DB / 1 = DX
2	NR	I8 P S	50	Block number for first curve group
3	KURVANZ	I8 P S	0	Number of curves
4	DS_LEN	I8 S	24	Dataset length

CURVSCAN PCU		DB 247		Sets: max. 16 per PCU
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	KvGnr	I8 P S	0	Current curve group number
2	KvRnr	I8 P S	0	Current relative curve number in the group
3	KVQ	Quell P S	0	Source for curve number for external
4	Yakt	I16.P.S	0	Current setpoint
5	QBI	Step P S	-	STEP 5 Query command for releasing the curve processing (VKE = "0" → Release)

Note

For the QBI parameter no S-flag may be entered as the STEP 5 query command.

In order to be able to delete a STEP 5 query command in the QBit parameter again the "-" character must be entered.

Parameter set

Text parameterization IOS

CURVSCAN IOS			Sets: max. 16 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	CURVSCANxx	Block name

Curve group parameterization IOS

In order to be able to stipulate setpoint curves to the IOS, the data blocks in which the curve's interpolation points are to be saved must first be stated in the \SYS\KURVEIN.INI file under [DB_List].

If more than one data block is required, starting from the first data block the next curve stipulated must always be used. It may also only ever be the data block type DB or DX.

The number of the first data block for the curve's interpolation points must also still be stated in the data set by the CURVSCAN block.

KURVEIN.INI	Description
[DB_List]	Data block list
Groupx=PCU,DB,Type	Group no.= PCU no., DB no., data type*
Groupx=PCU,DB,Type	Group no.= PCU no., DB no., data type*
etc.	
	* Data type: short = 16 bit number, long = 32 bit number

Note

The data type long is not implemented in the standard system!

Example

The interpolation points on the setpoint curves from PCU-1 should be stored in DB 50 for group 1 and in DB 51 for group 2 as 16 bit digits.

KURVEIN.INI	Description
[DB_List]	
Group1=1,DB50,short	Group no. 1= PCU no. 1, DB no. 50, data type short=16 BIT number
Group2=1,DB51,short	Group no. 2= PCU no. 1, DB no. 51, data type short=16 BIT number

After setting the data blocks the curves can be created with the curve entry application.

Creating the curves is described in the curve entry chapter in the operator manual.

Synchronization points

If a next step condition in a basic operation is made dependent on a synchronization value that can be stated in the setpoint curve, to do so the FX247 block must be called up. The curve numbers, the querying synchronization value and the recipe system must be notified to this block as formal operators.

With the aid of stating the recipe system a comparison is made on whether the basic operation that opens the FX 247 is assigned to the same DFM as in the CURVSCAN. This enables the right curve to be set for querying the synchronization points as it is possible that a setpoint curve was started in various CURVSCAN. Only in this case, stating the curve group number / curve number would not be unique in this case.

The DFM of the CURVSCAN must be used in the BOP as it is used to assign the BOP to the setpoint curve. Otherwise no synchronization values are queried.

If the synchronization value is reached the FX247 with VKE = "1" is quitted and can be set for example to a flag.

The value range for the synchronization points amounts to Zsyn = 2 to 32767

The synchronization points 0 and 1 are filled by the system and can be queried accordingly by the user:

- Zsyn = 0 → Curve does not run
- Zsyn = 1 → Curve runs and first synchronization point has not yet been reached.

Example

Callup the FX247 in a basic operation BOP 24 (SB24), whereby the curve 2.5 should be queried on the synchronization value Zsyn = 13. The VKE of FS247 is assigned to the flag M 23.4 and can for example be used in the next step condition.

SB24			
	SPA	FX 247	Processing synchronization points
NAME	SYN-PKT.		
KURV		KF 205	Curve group number
ZSYN		KF 13	Synchronization value
REC		KF 1	0 = old recipe system, 1 = new recipe system
	=	M 23.4	VKE from M 23.4 = 1 when synchronization value has been reached

Canceling a running curve

With the parameter QBI on the CURVSCAN it is possible to stop and start the setpoint curve. But it is not possible to reset a curve in order to start it again. The setpoint curve must first be complete for it to be restarted.

But after canceling a sequence it is often not possible to wait for the setpoint curve to end before restarting you have to cancel this setpoint curve.

For this you have to set the data bit x.9 in the CURVSCAN data block DB 247 whereby x can be calculated by the following formula:

- x = 24 * (curve no. -1) + 5

Example

The data bits D 5.9, D 29.9, D 53.9,.... are to be set for CURVSCAN 1,2,3...

The system resets this bit.

If the cancel bit is set and the curve is not active the next curve start is canceled.

3.18 MAINT_ICM - Maintenance data

Switch alterations and operating hours are seized for every ICM

with a maximum of 5 target values each. Overwriting these values is output as messages which have to be acknowledged after maintenance has happened.

Maint_ICM manages the actual values of the switch alternations and operating hours counters as well as acknowledgments when overwriting the parameterized target values.

Table 3-1 Parameter sets for block MAINT_ICM: Parameterization PCU

MAINT_ICM PCU		DB 182		Sets: max. 510 per PCU
No.	NAME	Type Info	Preset	Comment
1	SSp_SW1_OK	B1 P S	0	Switch cycle - maintenance job target value 1 done
2	SSp_SW2_OK	B1 P S	0	Switch cycle - maintenance job target value 2 done
3	SSp_SW3_OK	B1 P S	0	Switch cycle - maintenance job target value 3 done
4	SSp_SW4_OK	B1 P S	0	Switch cycle - maintenance job target value 4 done
5	SSp_SW5_OK	B1 P S	0	Switch cycle - maintenance job target value 5 done
6	Std_SW1_OK	B1 P S	0	Hours - maintenance job target value 1 done
7	Std_SW2_OK	B1 P S	0	Hours - maintenance job target value 2 done
8	Std_SW3_OK	B1 P S	0	Hours - maintenance job target value 3 done
9	Std_SW4_OK	B1 P S	0	Hours - maintenance job target value 4 done
10	Std_SW5_OK	B1 P S	0	Hours - maintenance job target value 5 done
11	SSp_WERT_H	I16 P S	0	Switch value high
12	SSp_WERT_L	I16 P S	0	Switch value low
13	Std_WERT_H	I16 P S	0	Hours value high
14	Std_WERT_L	I16 P S	0	Hours value low

Table 3-2 Parameter set: Text parameterization IOS

MAINTICM IOS			Sets: max. 510 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	MaintICM xxx	Block name

3.19 MAINT_USR - Maintenance data User

Switch alternations and operating hours are seized for a maximum of 510 user aggregates

with a maximum of 5 target values each. Overwriting these values is output as messages which have to be acknowledged after maintenance has happened.

Maint_USR manages the actual values of the switch alternations and operating hours counters as well as acknowledgments when overwriting the parameterized target values.

Table 3-3 Parameter sets for block MAINT_USR: Parameterization PCU

MAINT_USR PCU		DB 184		Sets: max. 512 per PCU
No.	**NAME**	**Type Info**	**Preset**	**Comment**
1	SSp_SW1_OK	B1 P S	0	Switch cycle - maintenance job target value 1 done
2	SSp_SW2_OK	B1 P S	0	Switch cycle - maintenance job target value 2 done
3	SSp_SW3_OK	B1 P S	0	Switch cycle - maintenance job target value 3 done
4	SSp_SW4_OK	B1 P S	0	Switch cycle - maintenance job target value 4 done
5	SSp_SW5_OK	B1 P S	0	Switch cycle - maintenance job target value 5 done
6	Std_SW1_OK	B1 P S	0	Hours - maintenance job target value 1 done
7	Std_SW2_OK	B1 P S	0	Hours - maintenance job target value 2 done
8	Std_SW3_OK	B1 P S	0	Hours - maintenance job target value 3 done
9	Std_SW4_OK	B1 P S	0	Hours - maintenance job target value 4 done
10	Std_SW5_OK	B1 P S	0	Hours - maintenance job target value 5 done
11	SSp_WERT_H	I16 P S	0	Switch value high
12	SSp_WERT_L	I16 P S	0	Switch value low
13	Std_WERT_H	I16 P S	0	Hours value high
14	Std_WERT_L	I16 P S	0	Hours value low

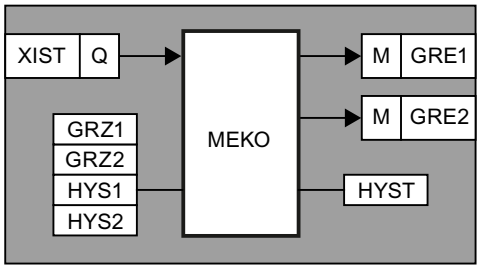
Table 3-4 Text parameterization IOS

MAINTUSR IOS			Sets: max. 512 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	MaintUSR xxx	Block name

3.20 MVC - Measured value control

The functional block MVC checks up to 64 analog values for limit value infringements.

The measured value to be checked (XIST) is taken from another block (AIN, MULT, PID, POLY, TeilAnl) using interconnection.



For each measured value 2 limits (GRZ1, GRZ2) are monitored whilst considering a hysteresis range (HYST) for both limits. The hysteresis limit can either be above or below the relevant limit.

MVC sets or deletes the associated result bit (GRE1, GRE2) for the corresponding analogue value.

Each of the measured values to be checked is assigned to each measured value.

Parameter set

Parameterization MVC PCU

Table 3-5 Text parameterization MVC IOS

Process interface:	Assignment event bit - MVC, DB108, DB109
User interface:	Assignment event bit - MVC
Graphics:	Hysteresis range upper and lower

Table 3-6 Parameter sets for block MVC - Parameterization PCU

MVC PCU		DB 228		Sets: max. 64 per PCU
No-	NAME	TYPE Info	Preset	Comment
1	GRZ1	I16 P S	0	Limit value 1
2	HYS1	B1 P S	0	Hysteresis range 1: 0/1 = lower/upper
3	GRZ2	I16 P S	0	Limit value 2
4	HYS2	B1 P S	0	Hysteresis range 2: 0/1 = lower/upper
5	HYST	I8 P S	0	Hysteresis for both limit values
6	XIST	Quell P S		Actual value address
7	GRE1	B1 S		Infringement limit 1: 0/1 = No/Yes
8	GRE2	B1 S		Infringement limit 2: 0/1 = No/Yes

Table 3-7 Text parameterization IOS

MVC IOS			Sets: max. 64 per PCU
No.	Type Info	Preset	Comment
1	Z16 P IOS	MVC xxx	Block name

Process interface for MVC block

- DB108 = limit value bit 1
- DB109 = limit value bit 2

Table 3-8 Assignment event bit - MVC

MVC		
DW0		
DW1	1	Number of words
DW2	MVC 16 ... 1	
DW3	MVC 32 ... 17	
DW4	MVC 48 ... 33	
DW5	MVC 64 ... 49	

Table 3-9 Bit occupancy for MVC

Bit DW	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
2	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	**MVC**
3	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	**Number**
4	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	
5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	

User interface for MVC block

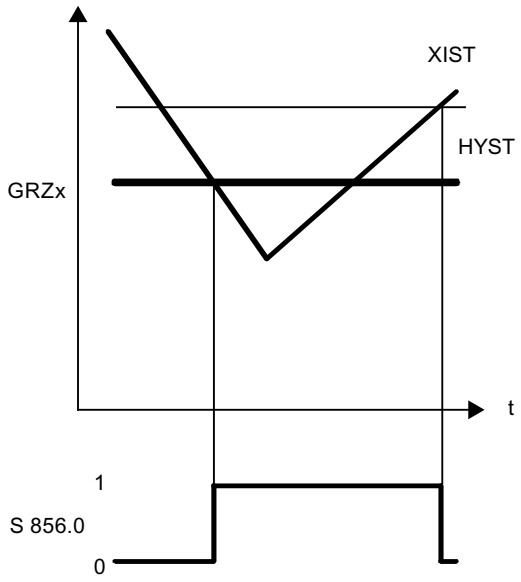
Table 3-10 Assignment event bit - MVC

No.	**GRE1**	**GRE2**		**No.**	**GRE1**	**GRE2**
1	S 856.0	S 872.0		33	S 860.0	S 876.0
2	S 856.1	S 872.1		34	S 860.1	S 876.1
3	S 856.2	S 872.2		35	S 860.2	S 876.2
4	S 856.3	S 872.3		36	S 860.3	S 876.3
5	S 856.4	S 872.4		37	S 860.4	S 876.4
6	S 856.5	S 872.5		38	S 860.5	S 876.5
7	S 856.6	S 872.6		39	S 860.6	S 876.6
8	S 856.7	S 872.7		40	S 860.7	S 876.7
9	S 857.0	S 873.0		41	S 861.0	S 877.0
10	S 857.1	S 873.1		42	S 861.1	S 877.1
11	S 857.2	S 873.2		43	S 861.2	S 877.2
12	S 857.3	S 873.3		44	S 861.3	S 877.3
13	S 857.4	S 873.4		45	S 861.4	S 877.4
14	S 857.5	S 873.5		46	S 861.5	S 877.5
15	S 857.6	S 873.6		47	S 861.6	S 877.6
16	S 857.7	S 873.7		48	S 861.7	S 877.7

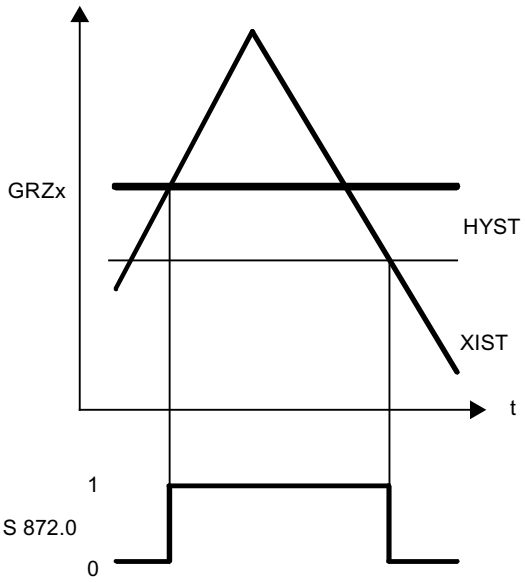
17	S 858.0	S 874.0		49	S 862.0	S 878.0
18	S 858.1	S 874.1		50	S 862.1	S 878.1
19	S 858.2	S 874.2		51	S 862.2	S 878.2
20	S 858.3	S 874.3		52	S 862.3	S 878.3
21	S 858.4	S 874.4		53	S 862.4	S 878.4
22	S 858.5	S 874.5		54	S 862.5	S 878.5
23	S 858.6	S 874.6		55	S 862.6	S 878.6
24	S 858.7	S 874.7		56	S 862.7	S 878.7
25	S 859.0	S 875.0		57	S 863.0	S 879.0
26	S 859.1	S 875.1		58	S 863.1	S 879.1
27	S 859.2	S 875.2		59	S 863.2	S 879.2
28	S 859.3	S 875.3		60	S 863.3	S 879.3
29	S 859.4	S 875.4		61	S 863.4	S 879.4
30	S 859.5	S 875.5		62	S 863.5	S 879.5
31	S 859.6	S 875.6		63	S 863.6	S 879.6
32	S 859.7	S 875.7		64	S 863.7	S 879.7

Hysteresis ranges

Hysteresis range upper



Hysteresis range lower



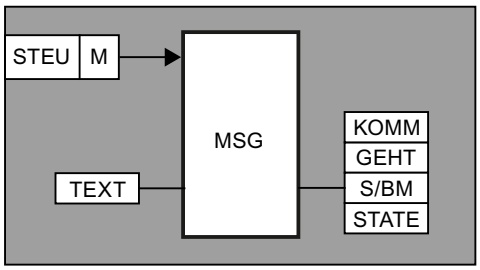
3.21 MELD - Message block (MELD1 and MELD2)

The MSG block manages up to 510 system-specific messages.

These messages are sent, when approved, to the IOS released for messages (refer to parameterization component FIFO telegram type 3). They are displayed there in the DCU server and entered into the message archive.

If the message is set as an error message (S/BM=1) the collective flag HUPE-MSG (M 99.7) is set.

The message output is initiated by a signal change to the trigger flag (ANST = S 888.0 - S 951.6).



message structure:	HH.MM.SS X Product 1234 001 MSG 012 aaa ... aaa
Parameter set:	Parameterization MSG PCU

Text parameterization MSG IOS

Process interface:	Assignment notification block to data bit
User interface:	Assignment notification block to flag bits for message 1 to 510
Interface:	Interface to MSG

Parameter sets for block MSG - Parameterization PCU

MSG1 or MSG2 PCU		DB 233 DB 223		Sets: max. 255 per PCU
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	SEQU	I8 P S	0	assigned sequence
2	KOMM	B1 P S	0	Release incoming message: 0/1 = No/Yes
3	GEHT	B1 P S	0	Release outgoing message: 0/1 = No/Yes
4	S/BM	B1 P S	0	0/1 = operation/error notification
5	STATE	B1 S	0	Alarm status

The messages are assigned in the program **PROG** to the trigger flags.

Example: Switching from input E3.7 to message 1 (= S 888.0)

U	I 3.7	Notification signal for message
=	S 888.0	Trigger memory bit

Parameter set: Text parameterization IOS

MSGKOM IOS			Sets: max. 510 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z48 P IOS	MESSAGE 01 INCOMING	Notification text for incoming message

MSGGEH IOS			Sets: max. 510 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z48 P IOS	MESSAGE 01 OUTGOING	Notification text for outgoing message

For each message 48 characters of text that can be parameterized for incoming and outgoing messages are output. The notification texts are parameterized in the PCU-related text lexica **MSGGEH** and **MSGKOM** via the text parameterization.

Each message can be parameterized with the parameter bit S/BM as an error or operating message.

Issuing incoming and outgoing messages: Each notification direction can be released (= 1) or blocked (= 0) with the assigned parameter bit **INCOMING** and **OUTGOING**.

Process interface for the block MSG

Assignment notification block to data bit

DB115 MSG-M

DB115		
DW0		
DW1	1	Number of words
DW2	Bit 16 ... 1	
DW3	Bit 32 ... 17	
.....	.....	

User interface to the block MSG

Assignment notification block to flag bit for message 1 to 510

Table 3-11 Flag occupancy MSG1:

No.	S flag	No.	S flag	No.	S flag	No.	S flag
1	S 888.0	65	S 896.0	129	S 904.0	193	S 912.0
2	S 888.1	66	S 896.1	130	S 904.1	194	S 912.1
3	S 888.2	67	S 896.2	131	S 904.2	195	S 912.2
4	S 888.3	68	S 896.3	132	S 904.3	196	S 912.3
5	S 888.4	69	S 896.4	133	S 904.4	197	S 912.4
6	S 888.5	70	S 896.5	134	S 904.5	198	S 912.5
7	S 888.6	71	S 896.6	135	S 904.6	199	S 912.6
8	S 888.7	72	S 896.7	136	S 904.7	200	S 912.7
9	S 889.0	73	S 897.0	137	S 905.0	210	S 913.0

No.	S flag	No.	S flag	No.	S flag	No.	S flag
10	S 889.1	74	S 897.1	138	S 905.1	202	S 913.1
11	S 889.2	75	S 897.2	139	S 905.2	203	S 913.2
12	S 889.3	76	S 897.3	140	S 905.3	204	S 913.3
13	S 889.4	77	S 897.4	141	S 905.4	205	S 913.4
14	S 889.5	78	S 897.5	142	S 905.5	206	S 913.5
15	S 889.6	79	S 897.6	143	S 905.6	207	S 913.6
16	S 889.7	80	S 897.7	144	S 905.7	208	S 913.7
17	S 890.0	81	S 898.0	145	S 906.0	209	S 914.0
18	S 890.1	82	S 898.1	146	S 906.1	210	S 914.1
19	S 890.2	83	S 898.2	147	S 906.2	211	S 914.2
20	S 890.3	84	S 898.3	148	S 906.3	212	S 914.3
21	S 890.4	85	S 898.4	149	S 906.4	213	S 914.4
22	S 890.5	86	S 898.5	150	S 906.5	214	S 914.5
23	S 890.6	87	S 898.6	151	S 906.6	215	S 914.6
24	S 890.7	88	S 898.7	152	S 906.7	216	S 914.7
25	S 891.0	89	S 899.0	153	S 907.0	217	S 915.0
26	S 891.1	90	S 899.1	154	S 907.1	218	S 915.1
27	S 891.2	91	S 899.2	155	S 907.2	219	S 915.2
28	S 891.3	92	S 899.3	156	S 907.3	220	S 915.3
29	S 891.4	93	S 899.4	157	S 907.4	221	S 915.4
30	S 891.5	94	S 899.5	158	S 907.5	222	S 915.5
31	S 891.6	95	S 899.6	149	S 907.6	223	S 915.6
32	S 891.7	96	S 899.7	160	S 907.7	224	S 915.7
33	S 892.0	97	S 900.0	161	S 908.0	225	S 916.0
34	S 892.1	98	S 900.1	162	S 908.1	226	S 916.1
35	S 892.2	99	S 900.2	163	S 908.2	227	S 916.2
36	S 892.3	100	S 900.3	164	S 908.3	228	S 916.3
37	S 892.4	101	S 900.4	165	S 908.4	229	S 916.4
38	S 892.5	102	S 900.5	166	S 908.5	230	S 916.5
39	S 892.6	103	S 900.6	167	S 908.6	231	S 916.6
40	S 892.7	104	S 900.7	168	S 908.7	232	S 916.7
41	S 893.0	105	S 901.0	169	S 909.0	233	S 917.0
42	S 893.1	106	S 901.1	170	S 909.1	234	S 917.1
43	S 893.2	107	S 901.2	171	S 909.2	235	S 917.2
44	S 893.3	108	S 901.3	172	S 909.3	236	S 917.3
45	S 893.4	109	S 901.4	173	S 909.4	237	S 917.4
46	S 893.5	110	S 901.5	174	S 909.5	238	S 917.5
47	S 893.6	111	S 901.6	175	S 909.6	239	S 917.6
48	S 893.7	112	S 901.7	176	S 909.7	240	S 917.7
49	S 894.0	113	S 902.0	177	S 910.0	241	S 918.0
50	S 894.1	114	S 902.1	178	S 910.1	242	S 918.1
51	S 894.2	115	S 902.2	179	S 910.2	243	S 918.2
52	S 894.3	116	S 902.3	180	S 910.3	244	S 918.3

No.	S flag	No.	S flag	No.	S flag	No.	S flag
53	S 894.4	117	S 902.4	181	S 910.4	245	S 918.4
54	S 894.5	118	S 902.5	182	S 910.5	246	S 918.5
55	S 894.6	119	S 902.6	183	S 910.6	247	S 918.6
56	S 894.7	120	S 902.7	184	S 910.7	248	S 918.7
57	S 895.0	121	S 903.0	185	S 911.0	249	S 919.0
58	S 895.1	122	S 903.1	186	S 911.1	250	S 919.1
59	S 895.2	123	S 903.2	187	S 911.2	251	S 919.2
60	S 895.3	124	S 903.3	188	S 911.3	252	S 919.3
61	S 895.4	125	S 903.4	189	S 911.4	253	S 919.4
62	S 895.5	126	S 903.5	190	S 911.5	254	S 919.5
63	S 895.6	127	S 903.6	191	S 911.6	255	S 919.6
64	S 895.7	128	S 903.7	192	S 911.7		

Flag occupancy MSG2:

No.	S flag	No.	S flag	No.	S flag	No.	S flag
256	S 920.0	320	S 928.0	384	S 936.0	448	S 944.0
257	S 920.1	321	S 928.1	385	S 936.1	449	S 944.1
258	S 920.2	322	S 928.2	386	S 936.2	450	S 944.2
259	S 920.3	323	S 928.3	387	S 936.3	451	S 944.3
260	S 920.4	324	S 928.4	388	S 936.4	452	S 944.4
261	S 920.5	325	S 928.5	389	S 936.5	453	S 944.5
262	S 920.6	326	S 928.6	390	S 936.6	454	S 944.6
263	S 920.7	327	S 928.7	391	S 936.7	455	S 944.7
264	S 921.0	328	S 929.0	392	S 937.0	456	S 945.0
265	S 921.1	329	S 929.1	393	S 937.1	457	S 945.1
266	S 921.2	330	S 929.2	394	S 937.2	458	S 945.2
267	S 921.3	331	S 929.3	395	S 937.3	459	S 945.3
268	S 921.4	332	S 929.4	396	S 937.4	460	S 945.4
269	S 921.5	333	S 929.5	397	S 937.5	461	S 945.5
270	S 921.6	334	S 929.6	398	S 937.6	462	S 945.6
271	S 921.7	335	S 929.7	399	S 937.7	463	S 945.7
272	S 922.0	336	S 930.0	400	S 938.0	464	S 946.0
273	S 922.1	337	S 930.1	401	S 938.1	465	S 946.1
274	S 922.2	338	S 930.2	402	S 938.2	466	S 946.2
275	S 922.3	339	S 930.3	403	S 938.3	467	S 946.3
276	S 922.4	340	S 930.4	404	S 938.4	468	S 946.4
277	S 922.5	341	S 930.5	405	S 938.5	469	S 946.5
278	S 922.6	342	S 930.6	406	S 938.6	470	S 946.6
279	S 922.7	343	S 930.7	407	S 938.7	471	S 946.7
280	S 923.0	344	S 931.0	408	S 939.0	472	S 947.0
281	S 923.1	345	S 931.1	409	S 939.1	473	S 947.1

No.	S flag	No.	S flag	No.	S flag	No.	S flag
282	S 923.2	346	S 931.2	410	S 939.2	474	S 947.2
283	S 923.3	347	S 931.3	411	S 939.3	475	S 947.3
284	S 923.4	348	S 931.4	412	S 939.4	476	S 947.4
285	S 923.5	349	S 931.5	413	S 939.5	477	S 947.5
286	S 923.6	350	S 931.6	414	S 939.6	478	S 947.6
287	S 923.7	351	S 931.7	415	S 939.7	479	S 947.7
288	S 924.0	352	S 932.0	416	S 940.0	480	S 948.0
289	S 924.1	353	S 932.1	417	S 940.1	481	S 948.1
290	S 924.2	354	S 932.2	418	S 940.2	482	S 948.2
291	S 924.3	355	S 932.3	419	S 940.3	483	S 948.3
292	S 924.4	356	S 932.4	420	S 940.4	484	S 948.4
293	S 924.5	357	S 932.5	421	S 940.5	485	S 948.5
294	S 924.6	358	S 932.6	422	S 940.6	486	S 948.6
295	S 924.7	359	S 932.7	423	S 940.7	487	S 948.7
296	S 925.0	360	S 933.0	424	S 941.0	488	S 949.0
297	S 925.1	361	S 933.1	425	S 941.1	489	S 949.1
298	S 925.2	362	S 933.2	426	S 941.2	490	S 949.2
299	S 925.3	363	S 933.3	427	S 941.3	491	S 949.3
300	S 925.4	364	S 933.4	428	S 941.4	492	S 949.4
301	S 925.5	365	S 933.5	429	S 941.5	493	S 949.5
302	S 925.6	366	S 933.6	430	S 941.6	494	S 949.6
303	S 925.7	367	S 933.7	431	S 941.7	495	S 949.7
304	S 926.0	368	S 934.0	432	S 942.0	496	S 950.0
305	S 926.1	369	S 934.1	433	S 942.1	497	S 950.1
306	S 926.2	370	S 934.2	434	S 942.2	498	S 950.2
307	S 926.3	371	S 934.3	435	S 942.3	499	S 950.3
308	S 926.4	372	S 934.4	436	S 942.4	500	S 950.4
309	S 926.5	373	S 934.5	437	S 942.5	501	S 950.5
310	S 926.6	374	S 934.6	438	S 942.6	502	S 950.6
311	S 926.7	375	S 934.7	439	S 942.7	503	S 950.7
312	S 927.0	376	S 935.0	440	S 943.0	504	S 951.0
313	S 927.1	377	S 935.1	441	S 943.1	505	S 951.1
314	S 927.2	378	S 935.2	442	S 943.2	506	S 951.2
315	S 927.3	379	S 935.3	443	S 943.3	507	S 951.3
316	S 927.4	380	S 935.4	444	S 943.4	508	S 951.4
317	S 927.5	381	S 935.5	445	S 943.5	509	S 951.5
318	S 927.6	382	S 935.6	446	S 943.6	510	S 951.6
319	S 927.7	383	S 935.7	447	S 943.7		

Interface to MSG

Interface MSG		
HUP	Hooter message	M 99.7
HUPS	Collective flag hooter (ICM, SEQU, AIN, MSG)	M 107.1

The hooter flag is to be processed and reset by the user.

3.22 AIN - Measured value recording

3.22.1 AIN - Measured value recording

The block AIN records and processes up to 192 analog values (per PCU) via analog entry components of the type 6ES5465-4UA12 or 6ES5460-4UA12.

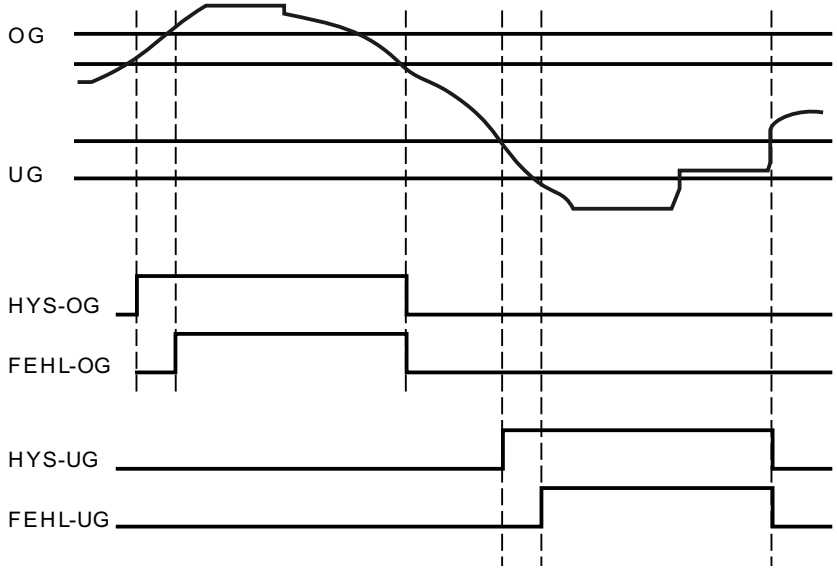
Each analog value is checked for measuring range overrun and wire breakage (for live zero = 4 - 20 mA). The wire breakage monitoring can be blocked for live zero. Negative flows are also processed.

In case of an error, this analog value is marked as faulty (STOE), a projected substitute value is entered (STWE) and an appropriate error message is printed to the message file if it is enabled. The hooter collective flag (M 99.6) is also set.

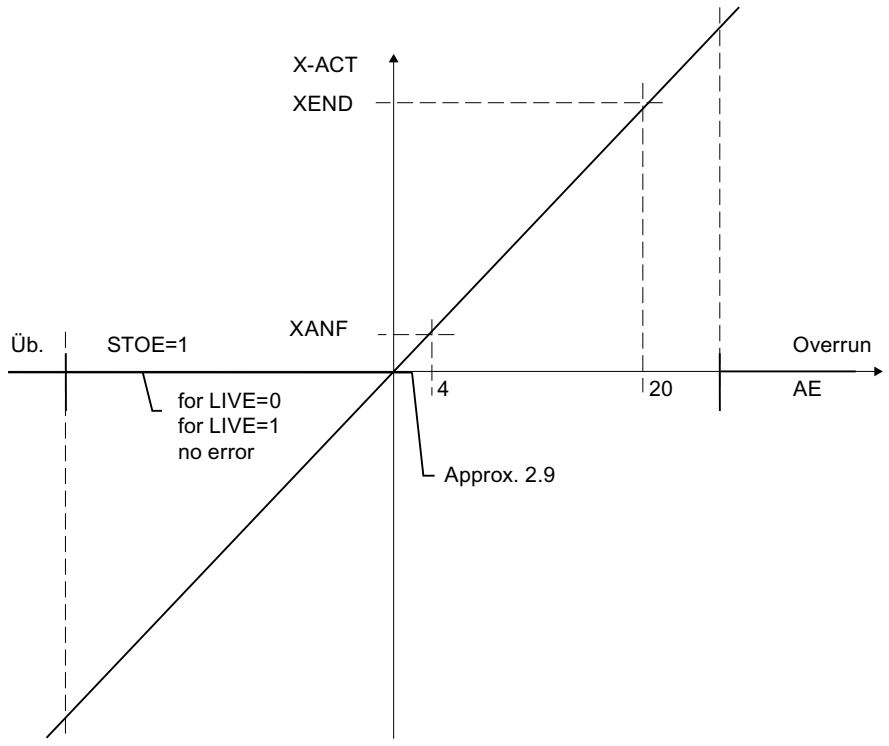
The recorded analog value is modified linearly in the XANF - XEND range (XIST). Negative values can also be processed.

Additionally, it is possible to define a lower (UNTGR), upper limit value (OBERGR) and a joint hysteresis (HYST). The limit value infringement is displayed in the S flag.
For the upper limit the hysteresis range is below, for the lower limit above the threshold value.
A message for parameterizing a message for limit value infringement (UO, OG) can be enabled.

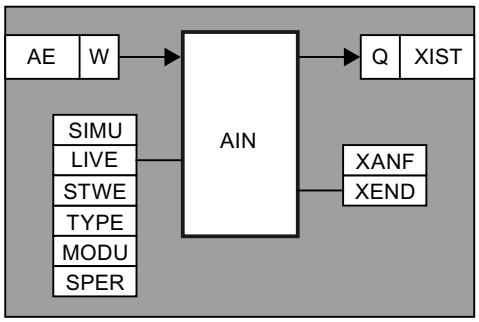
Function of limit value bits



Function of the STOER bit



If the simulation bit (SIMU) is set, there is no adaption and no access to the module.



A parameter set is assigned to each analog value.

Process interface	Measurement input value DB106	
User interface	PW 128 - 254, QW 0 - 254	
Interface	to AIN:	HUPM, HUPS
	Assignment of limit value bits	
Parameter set	Parameterization AIN	
Bridge setting	6ES5465-4UA12 at 0..20 mA or 4..20 mA	

Interface to AIN

AIN interface		
HUPM	Hooter flag	M 99.6
HUPs	Collective flag hooter (ICM, SEQU, AIN, MSG)	M 107.1

The hooter flag is to be processed and reset by the user.

Assignment limit value bit - AIN

AIN NO.	**LOWER LIMIT**	**UPPER LIMIT**		**AIN No.**	**LOWER LIMIT**	**UPPER LIMIT**
1	S 1144.0	S 1176.0		33	S 1148.0	S 1180.0
2	S 1144.1	S 1176.1		34	S 1148.1	S 1180.1
3	S 1144.2	S 1176.2		35	S 1148.2	S 1180.2
4	S 1144.3	S 1176.3		36	S 1148.3	S 1180.3
5	S 1144.4	S 1176.4		37	S 1148.4	S 1180.4
6	S 1144.5	S 1176.5		38	S 1148.5	S 1180.5
7	S 1144.6	S 1176.6		39	S 1148.6	S 1180.6
8	S 1144.7	S 1176.7		40	S 1148.7	S 1180.7
9	S 1145.0	S 1177.0		41	S 1149.0	S 1181.0
10	S 1145.1	S 1177.1		42	S 1149.1	S 1181.1
11	S 1145.2	S 1177.2		43	S 1149.2	S 1181.2

AIN NO.	LOWER LIMIT	UPPER LIMIT		AIN No.	LOWER LIMIT	UPPER LIMIT
12	S 1145.3	S 1177.3		44	S 1149.3	S 1181.3
13	S 1145.4	S 1177.4		45	S 1149.4	S 1181.4
14	S 1145.5	S 1177.5		46	S 1149.5	S 1181.5
15	S 1145.6	S 1177.6		47	S 1149.6	S 1181.6
16	S 1145.7	S 1177.7		48	S 1150.7	S 1181.7
17	S 1146.0	S 1178.0		49	S 1150.0	S 1182.0
18	S 1146.1	S 1178.1		50	S 1150.1	S 1182.1
19	S 1146.2	S 1178.2		51	S 1150.2	S 1182.2
20	S 1146.3	S 1178.3		52	S 1150.3	S 1182.3
21	S 1146.4	S 1178.4		53	S 1150.4	S 1182.4
22	S 1146.5	S 1178.5		54	S 1150.5	S 1182.5
23	S 1146.6	S 1178.6		55	S 1150.6	S 1182.6
24	S 1146.7	S 1178.7		56	S 1150.7	S 1182.7
25	S 1147.0	S 1179.0		57	S 1151.0	S 1183.0
26	S 1147.1	S 1179.1		58	S 1151.1	S 1183.1
27	S 1147.2	S 1179.2		59	S 1151.2	S 1183.2
28	S 1147.3	S 1179.3		60	S 1151.3	S 1183.3
29	S 1147.4	S 1179.4		61	S 1151.4	S 1183.4
30	S 1147.5	S 1179.5		62	S 1151.5	S 1183.5
31	S 1147.6	S 1179.6		63	S 1151.6	S 1183.6
32	S 1147.7	S 1179.7		64	S 1151.7	S 1183.7

Assignment limit value bit - AIN

AIN NO.	LOWER LIMIT	UPPER LIMIT		AIN No.	LOWER LIMIT	UPPER LIMIT
65	S 1152.0	S 1184.0		97	S 1156.0	S 1188.0
66	S 1152.1	S 1184.1		98	S 1156.1	S 1188.1
67	S 1152.2	S 1184.2		99	S 1156.2	S 1188.2
68	S 1152.3	S 1184.3		100	S 1156.3	S 1188.3
69	S 1152.4	S 1184.4		101	S 1156.4	S 1188.4
70	S 1152.5	S 1184.5		102	S 1156.5	S 1188.5
71	S 1152.6	S 1184.6		103	S 1156.6	S 1188.6
72	S 1152.7	S 1184.7		104	S 1156.7	S 1188.7
73	S 1153.0	S 1185.0		105	S 1157.0	S 1189.0
74	S 1153.1	S 1185.1		106	S 1157.1	S 1189.1
75	S 1153.2	S 1185.2		107	S 1157.2	S 1189.2
76	S 1153.3	S 1185.3		108	S 1157.3	S 1189.3
77	S 1153.4	S 1185.4		109	S 1157.4	S 1189.4
78	S 1153.5	S 1185.5		110	S 1157.5	S 1189.5
79	S 1153.6	S 1185.6		111	S 1157.6	S 1189.6

AIN NO.	LOWER LIMIT	UPPER LIMIT		AIN No.	LOWER LIMIT	UPPER LIMIT
80	S 1153.7	S 1185.7		112	S 1157.7	S 1189.7
81	S 1154.0	S 1186.0		113	S 1158.0	S 1190.0
82	S 1154.1	S 1186.1		114	S 1158.1	S 1190.1
83	S 1154.2	S 1186.2		115	S 1158.2	S 1190.2
84	S 1154.3	S 1186.3		116	S 1158.3	S 1190.3
85	S 1154.4	S 1186.4		117	S 1158.4	S 1190.4
86	S 1154.5	S 1186.5		118	S 1158.5	S 1190.5
87	S 1154.6	S 1186.6		119	S 1158.6	S 1190.6
88	S 1154.7	S 1186.7		120	S 1158.7	S 1190.7
89	S 1155.0	S 1187.0		121	S 1159.0	S 1191.0
90	S 1155.1	S 1187.1		122	S 1159.1	S 1191.1
91	S 1155.2	S 1187.2		123	S 1159.2	S 1191.2
92	S 1155.3	S 1187.3		124	S 1159.3	S 1191.3
93	S 1155.4	S 1187.4		125	S 1159.4	S 1191.4
94	S 1155.5	S 1187.5		126	S 1159.5	S 1191.5
95	S 1155.6	S 1187.6		127	S 1159.6	S 1191.6
96	S 1155.7	S 1187.7		128	S 1159.7	S 1191.7

Assignment limit value bit - AIN

AIN NO.	LOWER LIMIT	UPPER LIMIT		AIN No.	LOWER LIMIT	UPPER LIMIT
129	S 1160.0	S 1192.0		161	S 1164.0	S 1196.0
130	S 1160.1	S 1192.1		162	S 1164.1	S 1196.1
131	S 1160.2	S 1192.2		163	S 1164.2	S 1196.2
132	S 1160.3	S 1192.3		164	S 1164.3	S 1196.3
133	S 1160.4	S 1192.4		165	S 1164.4	S 1196.4
134	S 1160.5	S 1192.5		166	S 1164.5	S 1196.5
135	S 1160.6	S 1192.6		167	S 1164.6	S 1196.6
136	S 1160.7	S 1192.7		168	S 1164.7	S 1196.7
137	S 1161.0	S 1193.0		169	S 1165.0	S 1197.0
138	S 1161.1	S 1193.1		170	S 1165.1	S 1197.1
139	S 1161.2	S 1193.2		171	S 1165.2	S 1197.2
140	S 1161.3	S 1193.3		172	S 1165.3	S 1197.3
141	S 1161.4	S 1193.4		173	S 1165.4	S 1197.4
142	S 1161.5	S 1193.5		174	S 1165.5	S 1197.5
143	S 1161.6	S 1193.6		175	S 1165.6	S 1197.6
144	S 1161.7	S 1193.7		176	S 1165.7	S 1197.7
145	S 1162.0	S 1194.0		177	S 1166.0	S 1198.0
146	S 1162.1	S 1194.1		178	S 1166.1	S 1198.1
147	S 1162.2	S 1194.2		179	S 1166.2	S 1198.2

AIN NO.	LOWER LIMIT	UPPER LIMIT		AIN No.	LOWER LIMIT	UPPER LIMIT
148	S 1162.3	S 1194.3		180	S 1166.3	S 1198.3
149	S 1162.4	S 1194.4		181	S 1166.4	S 1198.4
150	S 1162.5	S 1194.5		182	S 1166.5	S 1198.5
151	S 1162.6	S 1194.6		183	S 1166.6	S 1198.6
152	S 1162.7	S 1194.7		184	S 1166.7	S 1198.7
153	S 1163.0	S 1195.0		185	S 1167.0	S 1199.0
154	S 1163.1	S 1195.1		186	S 1167.1	S 1199.1
155	S 1163.2	S 1195.2		187	S 1167.2	S 1199.2
156	S 1163.3	S 1195.3		188	S 1167.3	S 1199.3
157	S 1163.4	S 1195.4		189	S 1167.4	S 1199.4
158	S 1163.5	S 1195.5		190	S 1167.5	S 1199.5
159	S 1163.6	S 1195.6		191	S 1167.6	S 1199.6
160	S 1163.7	S 1195.7		192	S 1167.7	S 1199.7

Parameter sets for block AIN: Parameterization PCU

AIN PCU		DB 227		Sets: max. 192 per PCU
	NAME	TYPE Info	Preset	Comment
1	XIST	I16 P S	0	Actual value
2	XANF	I16 P S	0	Start value
3	XEND	I16 P S	1000	End value
4	UNTGR	I16 P S	0	Lower limit
5	OBERGR	I16 P S	0	Upper limit
6	SEQU	I8 P S	0	assigned sequence 1..48 or group 101..255
7	STWE	B1 P S	0	XIST on error: 0/1 = XANF/ END
8	SIMU	B1 P S	0	Simulation: 0/1 = off/on
9	STOE	B1 S	0	Error actual value: 0/1 = No/Yes
10	FEHL_UG	B1 P S	1	Error UG
11	FEHL_OG	B1 P S	1	Error OG
12	LIVE	B1 P S	1	Live Zero: 0/1 = No/Yes
13	KOMPL_2	B1 P S	0	Set of 2: 0/1 = No/Yes
14	HYST	I8 P S	0	Hysteresis
15	HYS_UG	B1 P S	1	Hysteresis UG
16	HYS_OG	B1 P S	1	Hysteresis OG
15	FEHL_UG	B1 P S	1	Error UG
16	FEHL_OG	B1 P S	1	Error OG
17	FREI_FUG	B1 P S	1	Enable error output lower limit
18	FREI_FOG	B1 P S	1	Enable error output upper limit
19	TYPE	B1 P S	1	0=K peripheral/ 1=U peripheral
20	MODU	B1 P S	0	Measuring range module
21	SPERR	B1 P S	0	Wire break notification block: 0/1 = No/Yes

AIN PCU		DB 227		Sets: max. 192 per PCU
22	Notification block	B1 P S	0	Notification block on overflow
23	OldNew	B1 P S	1	0 = cyclical processing 1 = old/new processing

If the **OldNew** bit = 0, the current actual value is transferred cyclically to the AIN.

If the **OldNew** bit = 1 the actual value is only transferred to the actual value line if the old-new value comparison is different.

Parameter set: Text parameterization IOS

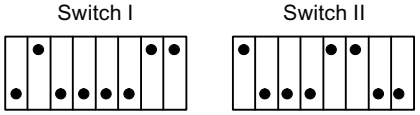
AIN IOS			Sets: max. 192 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	AIN xxx	Block name

Parameterization of the analog input modules

TYPE	MODU	LIVE	Range	Module	
0	0	0	0..20 mA	6ES5465-3AA 13	
0	0	1	4..20 mA	6ES5465-3AA 13	
1	0	0	0..20 mA	6ES5465-4UA 12 +	6ES5498-1AA 41 (*)
1	0	1	4..20 mA	6ES5465-4UA 12 +	6ES5498-1AA 41 (*)
1	1	0	0..20 mA	6ES5465-4UA 12 +	6ES5498-1AA 71 / 6ES5498-1AA 51
1	1	1	4..20 mA	6ES5465-4UA 12 +	6ES5498-1AA 71 / 6ES5498-1AA 51
(*) the measurement reformers 6ES5498-1AA11, -1AA21, -1AA31, -1AA61 can be used; but the error bit of the analog block is not analyzed (± 20 mA is also possible).					

Connection of PT100 is possible. But AIN does not correct PT100. Modification can take place via POLY which comes after the AIN component.

Bridge setting 6ES5465-4UA12 at 0..20 mA or 4..20 mA



(set additional address for block)

Significance of switch I	
DIL-1	Scanning cyclical
DIL-2	Mains frequency 50 Hz
DIL-3	16 channels
DIL-4	Amount and sign
DIL-5	Channel 0 ... 7 without wire break notification
DIL-6	Channel 8 ... 15 without wire break notification
DIL-7	mV / mA
DIL-8	Switch unassigned

Significance of switch II	
DIL-1	without comparison compensation
DIL-2	Measuring range 500 mV
DIL-3	Measuring range 500 mV
DIL-4	Measuring range 500 mV
DIL-5	Electricity or voltage measurement 16 channels
DIL-6	Electricity or voltage measurement 16 channels
DIL-7	Electricity or voltage measurement 16 channels
DIL-8	Electricity or voltage measurement 16 channels

Bridge setting 6ES5460-4UA12

The bridge settings are identical to those for 6ES5465-4UA12.

3.22.2 AIN_PW

In the DB106 data block the electrical old and new values are stored by the analog input block. These values are converted later to physical values by the AIN block.

AIN	
DW0	
DW1	DS length
DW2	Max. number AIN
DW3	Current number AIN
DW4	Initial address P range
DW5	Initial address Q range
DW6	
DW7	
DW8	
DW9	1. AIN - new value
DW10	1. AIN - old value

DW11	2. AIN - new value
DW12	2. AIN - old value
DW13	

Process interface: Measurement input value AIN block

Parameter sets for block AIN_PW - Parameterization PCU

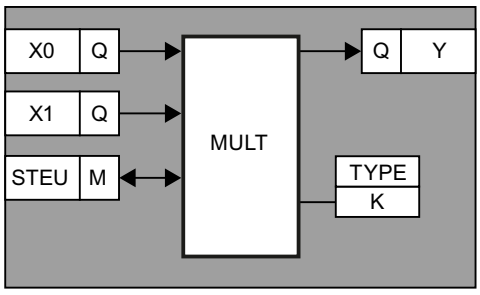
AIN_PW PCU				Sets: max. 192 per PCU
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	NEW	Hexa P S	0	New value
2	ALT	Hexa P S	0	Old value

Parameter set: Text parameterization IOS

AIN_PW IOS			Sets: max. 192 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	AVA_PW	Block name

3.23 MULT - Multifunction block

The multi-functional block has 2 inputs and one output and is able to work up to 64 times in various functions. The block occupies one flag bit each which has a different significance depending on the function.



Parameter set:	Parameterization PCU, text parameterization IOS
Description:	Functions that can be realized
Process interface:	Assignment MULT to data bit
User interface:	Assignment MULT to flag bit

Parameter sets for block MULT- Parameterization PCU

MULT PCU		DB 232		Sets: max. 64 per PCU
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	Y	I16 P S	0	Output value
2	X0	Quell P S		1. Input value
3	X1	Quell P S		2. Input value
4	TYPE	I8 P S	0	Function type (0 to 11)
5	K	I8 P S	0	Hysteresis

All arithmetic functions work in the range of ±32767. With division, the residual is cut off. Division by "0" results in "nothing". Taking a root produces a result with no remainder.

Parameter set: Text parameterization IOS

MULT IOS			Sets: max. 64 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	MULT xxx	Block name

Description of the individual functions of the MULT block

TYPE	Name	Flag bit	Description of the logic	
0	ASL	Control input	M = 0	then Y := X0 otherwise Y := X1
1	MIN	Result	X0 <= X1	then Y := X0, M := 0 otherwise Y := X1, M := 1
2	MAX	Result	X0 >= X1	then Y := X0, M := 0 otherwise Y := X1, M := 1
3	ADD	Irrelevant	Y := X0 + X1	
4	SUB	Irrelevant	Y := X0 - X1	
5	MUL	Irrelevant	Y := X0 * X1	
6	DIV	Irrelevant	Y := X0 / X1	
7	LI+	Result	Y := 0, M = 1 and X0 > (X1 + K) M = 0 and X0 <= X1	then M := 0 then M := 1
8	LI-	Result	Y := 0, M = 1 and X0 < (X1 - K) M = 0 and X0 >= X1	then M := 0 then M := 1
9	ABS	Irrelevant	Y := | X0 |	
10	AVG	Irrelevant	Y := (X0 + X1) / 2	
11	RAD	Irrelevant	Y := X1 * √|X0|	

Process interface

Assignment MULT to data bit

Table 3-12 DB111 control/result bit

DB111		
DW0		
DW1	1	Number of words
DW2	MULT 16 ... 1	
DW3	MULT 32 ... 17	
DW4	MULT 48 ... 33	
DW5	MULT 64 ... 49	

Bit DW	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
2	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
3	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	**MULT-**
4	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	**Number**
5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	

User interface: Assignment MULT to flag bit

No.	**S flag**	**No.**	**S flag**	**No.**	**S flag**	**No.**	**S flag**
1	S 952.0	17	S 954.0	33	S 956.0	49	S 958.0
2	S 952.1	18	S 954.1	34	S 956.1	50	S 958.1
3	S 952.2	19	S 954.2	35	S 956.2	51	S 958.2
4	S 952.3	20	S 954.3	36	S 956.3	52	S 958.3
5	S 952.4	21	S 954.4	37	S 956.4	53	S 958.4
6	S 952.5	22	S 954.5	38	S 956.5	54	S 958.5
7	S 952.6	23	S 954.6	39	S 956.6	55	S 958.6
8	S 952.7	24	S 954.7	40	S 956.7	56	S 958.7
9	S 953.0	25	S 955.0	41	S 957.0	57	S 959.0
10	S 953.1	26	S 955.1	42	S 957.1	58	S 959.1
11	S 953.2	27	S 955.2	43	S 957.2	59	S 959.2
12	S 953.3	28	S 955.3	44	S 957.3	60	S 959.3
13	S 953.4	29	S 955.4	45	S 957.4	61	S 959.4
14	S 953.5	30	S 955.5	46	S 957.5	62	S 959.5
15	S 953.6	31	S 955.6	47	S 957.6	63	S 959.6
16	S 953.7	32	S 955.7	48	S 957.7	64	S 959.7

3.24 PARACP - Parameter for the IOS links

The block enables the parameterization of coupling information for the CP525/CP524 and CP143 block. The following can be stipulated:

In data set 0	the number of IOSs to be connected to a PCU
In data set 1-8	the parameters of each connected IOS
Parameter set:	Text parameterization IOS

PARACP IOS			**Sets: max. 8 per PCU**
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	PARACP	Block name

Parameter sets for block PARACP - Parameterization PCU

PARACP PCU		**DB 202**		**Sets: Record: 0**
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	PCanz	I16 P S	1	Number of active PCs
2	DS_Len	I8.....S	20	Dataset length

Parameter sets for block PARACP - Parameterization PCU

PARACP PCU		**DB 202**		**Sets: max. 8 per PCU**
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	SST	I8 P S	0	CP interface number for IOS
2	ANR	I8 P S	0	A-NR for IOS
3	BTY_RFIFO	I8 P S	0	Block type reserve-FIFO 0 = DB / 1 = DX
4	BNR_RFIFO	I8 P S	0	Block number reserve-FIFO
5	BTY_FIFO	I8 P S	0	Block type FIFO 0 = DB / 1 = DX
6	BNR_FIFO	I8 P S	0	Block number FIFO
7	BTY_SEPU	I8 P S	0	Block type transmission buffer 0 = DB / 1 = DX
8	BNR_SEPU	I8 P S	0	Block number transmission buffer
9	BTY_PAQU	I8 P S	0	Block type PA sources 0 = DB / 1 = DX
10	BNR_PAQU	I8 P S	0	Block number PA sources
11	BTY_PADA	I8 P S	0	Block type PA data 0 = DB / 1 = DX
12	BNR_PADA	I8 P S	0	Module number PA data
13	BTY_PIQU	I8 P S	0	Block type PI sources 0 = DB / 1 = DX
14	BNR_PIQU	I8 P S	0	Block number PI sources
15	BTY_PIDA	I8 P S	0	Block type PI data 0 = DB / 1 = DX
16	BNR_PIDA	I8 P S	0	Block number PI data
17	BTY_SFKT	I8 P S	0	Block type block transfer 0 = DB / 1 = DX
18	BNR_SFKT	I8 P S	0	Block number block transfer
19	BTY_ZPUFF	I8 P S	0	Block type block transfer intermediate buffer

20	BNR_ZPUFF	I8 P S	0	Block no. Block transfer intermediate buffer
21	E4_E7	B1 P S	0	0=E4 (CP525,SYSTEM PA/PI), 1=E7 (STF)
22	BED_SPERR	B1 P S	0	1=Reject operations

3.25 PCU_GEN - PCU System data in general

The PCU number must be entered in this block. The default entry is 1 and this also applies to the version with one PCU.

Parameter set: Text parameterization IOS

PCU_GEN IOS			
No.	Type Info	Preset	Comment
1	Z16 P IOS	PCI_ALG	Block name

Parameter sets for block PCU_GEN- Parameterization PCU

PCU_GEN PCU				
No.	NAME	TYPE Info	Preset	Comment
1	PCU_Nr	I8 P S	1	PCU number

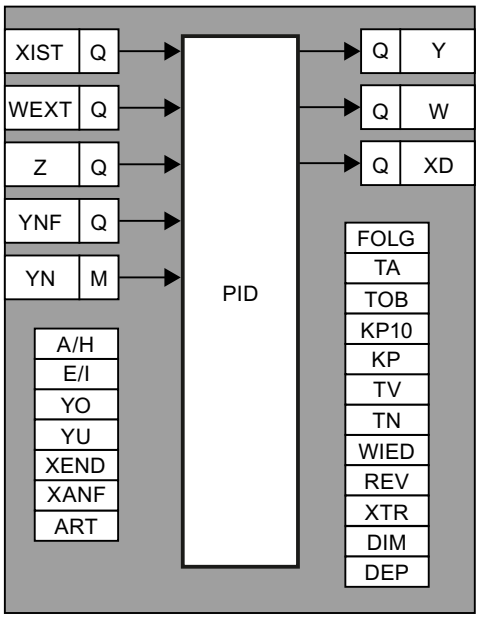
3.26 PID controller

The block contains the necessary functions for maximum 64 controllers per PCU.

The controller is suitable for:

- Fixed value controls
- Cascade controls

- Relationship controls
- Controls with hardware backup



The PID controller works using the setting algorithm, i.e. Y is calculated for each manipulated variable. By switching Y with the ANAU block this creates a continuous controller, with block INKO a step controller.

Parameter sets:	Parameterization PID PCU
	Text, controller parameterization PID IOS
Assignment:	Controller for controller groups (pre-entered)
Process interface:	Later bits YN
User interface:	Later flags YN
Block diagram:	PID control module
Operation modes:	Auto/manual, external/internal, X-tracking
	(cascade control, hardware backup, logging)
Controller types:	ART1, ART2
Optimization:	PI and PID controller

Parameter sets for block PID - Parameterization PCU

PID PCU		DB 23		Sets: max. 64 per PCU
No.	NAME	TYPE Info	Preset	Comment
1	Y	I16 P S	0	Manipulated value
2	CP	I8 P S	0	P reinforcement 0..255 corresponds to 0.00..2.55
3	TN	I16 P S	0	Subsequent control factor = TA/TN
4	TV	I16 P S	0	Storage factor = TV/TA
5	A/H	B1 P S	0	Operation mode: 0/1 = Auto/Manual

6	E/I	B1 P S	0	setpoint: 0/1 = External/Internal
7	W	I16 P S	0	Effective setpoint
8	XIST	Quell P S		Actual value
9	WEXT	Quell P S		external setpoint
10	Z	Quell P S		Disturbance variable
11	YNF	Quell P S		Later value
12	XD	I16 S	0	System deviation
13	XANF	I16 P S	0	Initial limit for XIST,WEXT,W
14	XEND	I16 P S	1000	End limit for XIST,WEXT,W
15	YU	I16 P S	0	Lower limit for manipulated variable Y
16	YO	I16 P S	1000	Upper limit for manipulated variable Y
17	SEQU	I8 P S	0	assigned sequence 1..48 or group 101..255
18	TYPE	I8 P S	0	See Table ART1/ART2
19	FOLG	I8 P S	0	Number of subsequent controller
20	TA	I8 P S	1	Scanning time in seconds
21	TOB	I8 P S	0	Dead band
22	KP10	B1 P S	0	KP reinforcement * 10
23	WIED	B1 P S	0	Hot restart: 0/1 = Auto/Manual
24	REV	B1 P S	0	Reversing operation: 0/1 = No/Yes
25	XTR	B1 P S	0	X-Tracking: 0/1 = No/Yes

Parameter set: Text parameterization IOS

PID IOS			Sets: max. 64 per PCU
No.	Type Info	Preset	Comment
1	Z16 P IOS	PID xxx	Block name

Controller groups parameterization IOS (bldpid.ini)

4 controllers can be shown and operated on one screen page. A screen page corresponds to a PID group. The assignment of which controller is shown in which group and which screen page is made in the file "\PCUxxx\REGLER\BLDPID.INI".

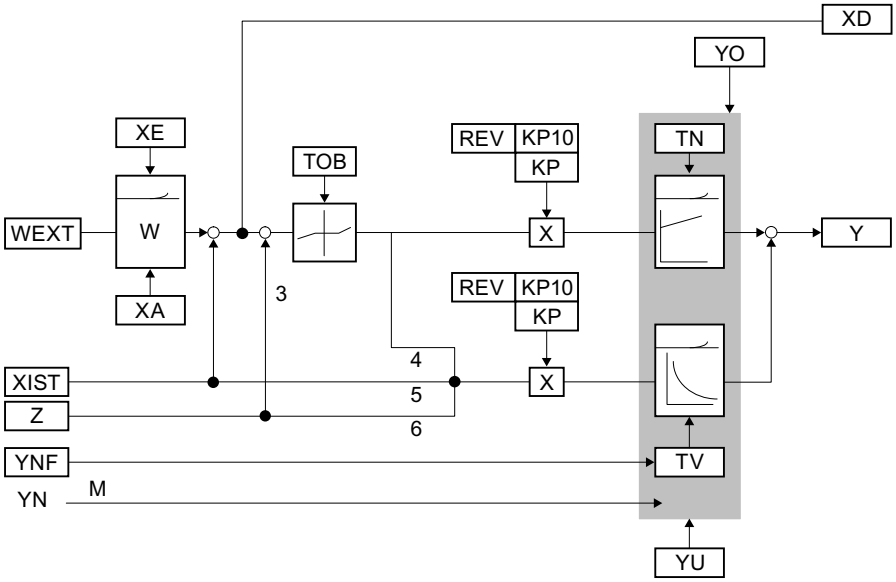
ProfileString	Description
[GROUPxxx]	Group number = screen page
Name=	Group name
Controller=	Numbers of the PID controllers that should be displayed
DIM=	Dimensions
DEP=	Number of decimal places

Example:

In controller image 1 the controllers 1, 3, 8, 14 should be shown.

ProfileString	Description
[GROUP001]	Screen page-1
Name="MG Aufheizen"	Group name
Controller=1,3,8,14	Numbers of the PID controllers that should be displayed
DIM="°C,°C,%,m3/h	Dimensions of the individual controllers
DEP=1,1,2,0	Number of decimal places

Block circuit drawing PID controller:



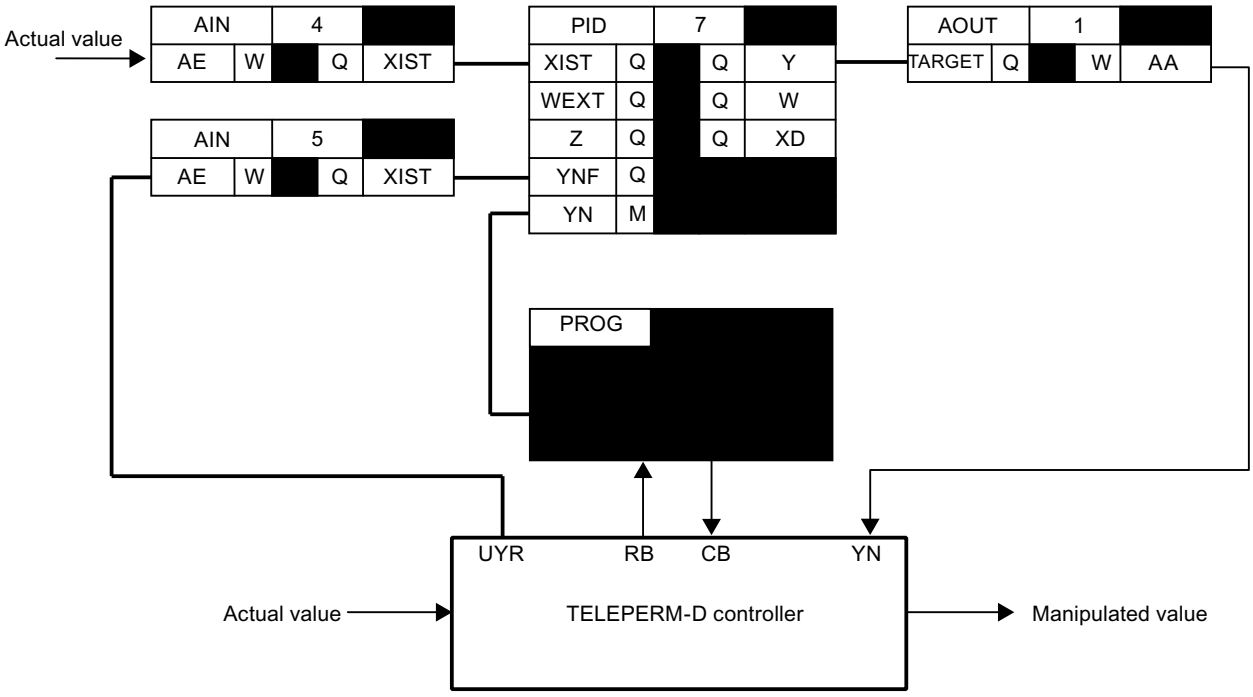
Assignment controller type/bridges 3-6:

Controller type	Description
Type1	3456 ("1"= bridge closed)
0	1100
1	1010
2	1001
3	0001

Operation modes PID block

- **Cascade control:**
  The manipulated variable Y of the management controller is added to the subsequent controller as the setpoint WEXT. If the subsequent controller is switched from the INTERNAL operating mode to EXTERNAL the switching is impact-free, i.e. the Y of the guide controller is modified to the current value of the subsequent controller.
- **Controller with hardware back up:**
  Here the software controller is located below a discrete controller (e.g. TELEPERM D). Via the flag YN (adjust manipulated variable) the controller program is informed that the HW controller is switched to DDC operation. For the positive flank of the flag YN Y is adjusted to the value located at the entrance YNF of the controller; the software controller is in manual mode! Refer also to the example **"Controller with back up".**
- **Auto-manual operating mode:**
  From switching from automatic to manual operation the controller does not calculate any more manipulated variables. The Y to be output can be changed by operator input. For each processing cycle the controller compares the current Y with the YO and YU limits and corrects this accordingly. So the permitted Y is also corrected when manually stating an impermissible value of the YU and YO limits. When switching from manual to automatic a comparison similar to the cascade controller takes place, only the own Y position is used as a comparison value. The operating mode change is entered automatically in the message archive.
- **operating mode external/internal (E/I):**
  For the internal operating mode the setpoint W can be stipulated by the operator. For modifying the W to the XA and XE limits the same applies as to the manipulated variable Y for manual mode. The operating mode change is expressed automatically via the operating type printer.

- **X-Tracking:**
  For the X-Tracking operating mode (XTR = "1") the internal setpoint is modified to the actual value XIST. This enables impact-free switching from "external" to "internal".
- **Reporting:**
  Each change A/M and E/I is logged when the messages are released.
  Example "Controller with backup".



Controller types PID block

Type		Description
TYPE1	0	PID component: is derived from XD + Z
	1	D component: is derived from XIST; PI from XD + Z
	2	D component: is derived from Z; PI from XD + Z
	3	D component: is derived from any variable on input Z; PI component of XD
TYPE2	0	Type: Fixed-setpoint controller
	4	Type: Master controller
	8	Type: Controller with HW backup; A/M = "1"

The indicators for TYPE1 and TYPE2 are to be added and stored in the TYPE parameter.

Process interface PID block

DB110 later bits YN

DB110		
DW0		
DW1	1	Number of words
DW2	PID-YN 16 ... 1	
DW3	PID-YN 32 ... 17	
DW4	PID-YN 48 ... 33	
DW5	PID-YN 64 ... 49	

In automatic mode the manipulated variable Y is overwritten with the YNF value as long as the YN flag is set.

User interface: Later flags YN

No.	S flag	No.	S flag	No.	S flag	No.	S flag
1	S 968.0	17	S 970.0	33	S 972.0	49	S 974.0
2	S 968.1	18	S 970.1	34	S 972.1	50	S 974.1
3	S 968.2	19	S 970.2	35	S 972.2	51	S 974.2
4	S 968.3	20	S 970.3	36	S 972.3	52	S 974.3
5	S 968.4	21	S 970.4	37	S 972.4	53	S 974.4
6	S 968.5	22	S 970.5	38	S 972.5	54	S 974.5
7	S 968.6	23	S 970.6	39	S 972.6	55	S 974.6
8	S 968.7	24	S 970.7	40	S 972.7	56	S 974.7
9	S 969.0	25	S 971.0	41	S 973.0	57	S 975.0
10	S 969.1	26	S 971.1	42	S 973.1	58	S 975.1
11	S 969.2	27	S 971.2	43	S 973.2	59	S 975.2
12	S 969.3	28	S 971.3	44	S 973.3	60	S 975.3
13	S 969.4	29	S 971.4	45	S 973.4	61	S 975.4
14	S 969.5	30	S 971.5	46	S 973.5	62	S 975.5
15	S 969.6	31	S 971.6	47	S 973.6	63	S 975.6
16	S 969.7	32	S 971.7	48	S 973.7	64	S 975.7

Optimizing the PID controller

Setting the control parameters without knowledge of the system behavior

The controller parameters for optimal control of the system are in this case not yet known. The following settings must be made in order to still obtain stable control:

Proportional gain:	CP	1	(Lowest value)
Sampling time:	TA	1	

Reset time:	TN	+32767 s	(largest value; 0=> Tn = infinite!)
Derivative action time:	TV	0 s	

Controller type		Description
PI controller	-	Set desired setpoint and in manual mode make normal variation zero
	-	Switch to automatic mode
	-	Enlarge KP slowly until the control circuit starts to vibrate due to small setpoint changes
	-	Reduce KP slightly until the vibrations are resolved
	-	Reduce TN until the control circuit starts to vibrate again
	-	Increase TN slightly until the vibrations are resolved

Controller type		Description
PID control module	-	Set desired setpoint and in manual mode make normal variation zero
	-	Switch to automatic mode
	-	Enlarge KP slowly until the control circuit starts to vibrate due to small setpoint changes
	-	Switch TV from 0 to 1 s
	-	Increase TV until the vibrations are resolved
	-	Enlarge KP again slowly until the vibrations start again
	-	Repeat the setting according to the two previous steps until it is not possible to remove the vibrations again
	-	Reduce TV and KP slightly until the vibrations stop
	-	Reduce TN until the control circuit starts to vibrate again
	-	Increase TN slightly until the vibration tendency is resolved

3.27 POLY - Polygon adjustment

The block provides for the adjustment of up to 16 values by means of 6 pairs of interpolation points each. The interpolation between the interpolation points is to be linear.

If the input value X lies outside of the interpolation point range (X<X1 or X>X6), the default value Y is set on Y1 or Y6 respectively.

- X is linked to the block by means of interconnection.
- Y serves as a source for other blocks.

Parameter sets for block POLY: Parameterization PCU

POLY PCU		DB 235		Sets: max. 16 per PCU
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	Y	I16 S		Output value
2	X	Quell P S		Data source
3	X1	I16 P S	0	Interpolation point1: X value
4	Y1	I16 P S	0	Interpolation point1: Y value
5	X2	I16 P S	0	Interpolation point2: X value
6	Y2	I16 P S	0	Interpolation point2: Y value
7	X3	I16 P S	0	Interpolation point3: X value
8	Y3	I16 P S	0	Interpolation point3: Y value
9	X4	I16 P S	0	Interpolation point4: X value
10	Y4	I16 P S	0	Interpolation point4: Y value
11	X5	I16 P S	0	Interpolation point5: X value
12	Y5	I16 P S	0	Interpolation point5: Y value
13	X6	I16 P S	0	Interpolation point6: X value
14	Y6	I16 P S	0	Interpolation point6: Y value

Parameter set: Text parameterization IOS

POLY IOS			Sets: max. 16 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	POLY xxx	Block name

3.28 TYP - Recipe types

In the RTYP parameter set the recipe names can be stored for up to 99 recipe types (e.g. product, cleaning, etc.). These recipe types are inserted into the process log.

Parameter set: Text parameterization IOS

RTYP IOS			Sets: 99
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	Recipe type xxx	Recipe type name

3.29 SE_TIMER – TIME DELAY

255 additional switch on delays are available in this block.

Setting the stat input starts the switch on delay, the output is assigned the status of switch on delay.

Parameter set for block SE_TIMER: Parameterization PCU

SE_TIMER PCU		DB 248		Sets: max. 255 per PCU
No.	**NAME**	**Type Info**	**Preset**	**Comment**
1	SOLL_ZEIT	I16 P S	0	Time target value
2	REST_ZEIT	I16 P S	0	Remaining runtime
3	START	BIT P S	0	Start input
4	AUSG	BIT S	0	Time expired

Parameter set: Text parameterization IOS

SE_TIMER IOS			Sets: max. 255 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	SE_TIMER xxx	ON delay

Process interface for the block SE_TIMER

The DB 118 data block is available as an interface for the block SE_TIMER.

The **allocating blocks FB 200 / 201** ensure the allocation to the S flag interface in the standard delivery status. These function blocks are published so that the users can modify the S flag occupancy.

Bit occupancy for SE_TIMER (DB 118):

BIT DW	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
0																		
1	16								2									
2	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
3	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17		
4	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33		
5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49		
6	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65		
7	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81		
8	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97		
9	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113		**Start bit**
10	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	**S**	
11	160	159	158	157	156	155	154	153	152	151	150	149	148	147	146	145	**E**	
12	176	175	174	173	172	171	170	169	168	167	166	165	164	163	162	161	_	

13	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	**T**	
14	208	207	206	205	204	203	202	201	200	199	198	197	196	195	194	193	**I**	
15	224	223	222	221	220	219	218	217	216	215	214	213	212	211	210	209	**M**	
16	240	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225	**E**	
17		255	254	253	252	251	250	249	248	247	246	245	244	243	242	241	**R**	
--	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	**---**	----------
18	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	**N**	
19	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	**U**	
20	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	**M**	
21	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	**M**	
22	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	**E**	
23	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	**R**	
24	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97		
25	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113		**Output**
26	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129		
27	160	159	158	157	156	155	154	153	152	151	150	149	148	147	146	145		
28	176	175	174	173	172	171	170	169	168	167	166	165	164	163	162	161		
29	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177		
30	208	207	206	205	204	203	202	201	200	199	198	197	196	195	194	193		
31	224	223	222	221	220	219	218	217	216	215	214	213	212	211	210	209		
32	240	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225		
33		255	254	253	252	251	250	249	248	247	246	245	244	243	242	241		

User interface for the block SE_TIMER

Bit address								Start bit	Output
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**(SY)**	**(SY)**
	1	2	3	4	5	6	7	8	2048	2080
	9	10	11	12	13	14	15	16	2049	2081
	17	18	19	20	21	22	23	24	2050	2082

	25	26	27	28	29	30	31	32	2051	2083
	33	34	35	36	37	38	39	40	2052	2084
	41	42	43	44	45	46	47	48	2053	2085
	49	50	51	52	53	54	55	56	2054	2086
	57	58	59	60	61	62	63	64	2055	2087
	65	66	67	68	69	70	71	72	2056	2088
S	73	74	75	76	77	78	79	80	2057	2089
E	81	82	83	84	85	86	87	88	2058	2090
_	89	90	91	92	93	94	95	96	2059	2091
T	97	98	99	100	101	102	103	104	2060	2092
I	105	106	107	108	109	110	111	112	2061	2093
M	113	114	115	116	117	118	119	120	2062	2094
E	121	122	123	124	125	126	127	128	2063	2095
R	129	130	131	132	133	134	135	136	2064	2096
	137	138	139	140	141	142	143	144	2065	2097
N	145	146	147	148	149	150	151	152	2066	2098
U	153	154	155	156	157	158	159	160	2067	2099
M	161	162	163	164	165	166	167	168	2068	2100
M	169	170	171	172	173	174	175	176	2069	2101
E	177	178	179	180	181	182	183	184	2070	2102
R	185	186	187	188	189	190	191	192	2071	2103
	193	194	195	196	197	198	199	200	2072	2104
	201	202	203	204	205	206	207	208	2073	2105
	209	210	211	212	213	214	215	216	2074	2106
	217	218	219	220	221	222	223	224	2075	2107
	225	226	227	228	229	230	231	232	2076	2108
	233	234	235	236	237	238	239	240	2077	2109
	241	242	243	244	245	246	247	248	2078	2110
	249	250	251	252	253	254	255		2079	2111

Definition of the signals:

- Search for SE_Timer in the left-hand table field
- The byte addresses for the S flags are in the same line in the right-hand table field.
- The column heading belonging to the SE_Timer states the bit address.

3.30 SENDPU - Send buffer

Via the blocks the supervising time for the message/log buffer and the status of the supplying PCU function block can be checked.

Parameter set for block SENDPUx : Parameterization PCU

SENDPUx PCU		DX 208...215		Sets: max. 8 per PCU
No.	**NAME**	**Type Info**	**Preset**	**Comment**
1	QUITT_PC	Hexa P S	0	Quitting IOS
2	ZUST	I16 S	0	Status couple block FB 192
3	TUES	I8 P S	0	Supervising time target value in seconds
4	TUEI	I8 P S	0	Supervising time actual value
5	ANZ	I8 P S	0	Number of data recorded in the transmission buffer
6	TELE_NR	Hexa P S	0	Sequential message number
7	KENN	I8 P S	0	Code 1st data set
8	PCU	I8 P S	0	PCU number 1st data set

ZUST:	1	Data from FIFO to transmission buffer
	2	Send
	3	Wait for send ready
	4	Wait for confirmation from the IOS

3.31 SORT - Sort name

In the SORT parameter set requirements for a recipe type (e.g. product) can be set.

Each recipe type can consist of up to 255 types.

Parameter set: Text parameterization IOS

SORT IOS		Sets: max. 255	
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	SORT1 1	Sort name

3.32 DIS_MSG - Disable PCU message block

The block enables each message initiated by the PCU to be blocked in a targeted manner. The relevant message telegrams are not even entered first in the notification buffer for the IOS.

Parameter sets for block SPERREN: Parameterization PCU

LOCK PCU				Sets: 1 per PCU
No.	**NAME**	**Type Info**	**Preset**	**Comment**

1	SPERR0	B1 P S	0	Notification block user error incoming
2	SPERR1	B1 P S	0	Notification block user error outgoing
3	SPERR2	B1 P S	0	Notification block user message incoming
4	SPERR3	B1 P S	0	Notification block user message outgoing
5	SPERR4	B1 P S	0	Notification block ICM-1 error
6	SPERR5	B1 P S	0	Notification block ICM-1 error incoming
7	SPERR6	B1 P S	0	Notification block user message outgoing
8	SPERR7	B1 P S	0	Notification block MESS error outgoing
9	SPERR8	B1 P S	0	Notification block sequence TUE error
10	SPERR9	B1 P S	0	Notification block notification block SEQS start
11	SPERR10	B1 P S	0	Notification block notification block SEQS parameter error
12	SPERR11	B1 P S	0	Notification block PID controller
13	SPERR12	B1 P S	0	Notification block sequence operating faults
14	SPERR13	B1 P S	0	Notification block WOP
15	SPERR14	B1 P S	0	Notification block ICM-2 error
16	SPERR15	B1 P S	0	Notification block ICM-2 error outgoing
17	SPERR16	B1 P S	0	Notification block process log complete
18	SPERR17	B1 P S	0	Notification block three point controller
19	SPERR18	B1 P S	0	Notification block process log error

whereby parameter: 0/1 = Release/block

3.33 SW.INI - Parameterization of the SW.INI

A maximum of 1020 TARGET VALUES are possible per PCU. These result from the four DFM modules from which 255 target values each can be parameterized.

The target value type, dimension, decimal point and the upper/lower limit is stored for each line in the file SW.INI whereby the line number matches the absolute DFM number.

This shows that no target values can be defined in the lines 0, 257, 513, and 769 which are therefore empty in the file.

The data set in the file SW.INI has the following structure

Name	Description
Target value type	Type: **SW** (target value type)
	This is a fixed number of points within the stipulated
	limits. No further entries are required.
	Type: **TEXT** (selection type)
	The target value is not displayed as a number but rather as text.
	The text file is in the sub-directory "\PCUXXX\TEXTE"
	of the relevant PCU and must have the ".txt" extension.

Name	Description
	A file name must be stated for this type.
	Type: **16 bit**
	Entry option for the target value in the form of 16 individual bits.
	The limit values and the decimal point are not analyzed.
	Type: **32 bit**
	Entry option for the target value in the form of a double word in
	8-digit hexadecimal form.
	The limit values and the decimal point are not analyzed.
	If no type is stated it is the type: SW (target value)
Dimension	Dimensions, max. 16 characters
Decimal point	Number of decimal places
Lower limit	Minimum entry value (without decimal point)
Upper limit	Maximum entry value (without decimal point)
Comment	A comment may be entered but is not displayed or analyzed.

Examples:

Line	Content	
Line 0:		
Line 1:	SW, hl, 0, 0, 500;	Water meter
Line 2:	SW, kg, 0, 0, 10000;	
Line 3:	SW, L, 1, 0, 300;	Sugar in WPF
.		
.		
.		
Line 257:		
Line 258:	SW, min, 1, 0, 32767;	
Line 259:	SW, °C,2, 0, 10000;	Temperature 80°C tank
Line 260:	Text, -, 2, 6, steam;	
Line 261:	SW, Nr., 0, 0, 23;	Silo selection
Line 262:	16bit, route;	

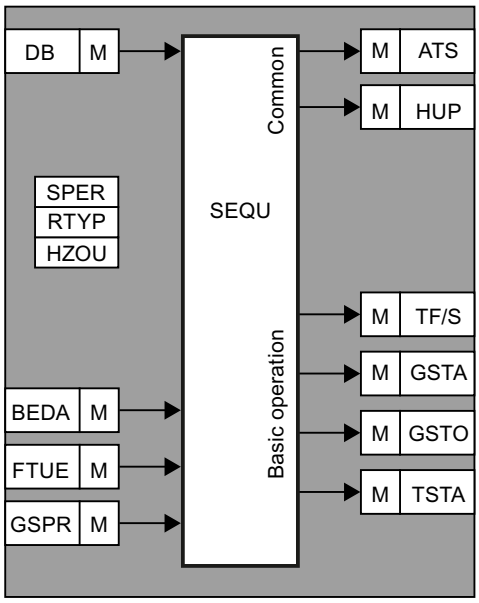
Explanations:

Line	Description
to line 0:	Empty as this target value does not exist
to line 1:	DFM group-0, i.e. parameterized as meter, type target value without decimal point and
	entry limits of 0 ... 500 hl
to line 2:	DFM group-0, i.e. parameterized as meter, type target value without decimal point and
	entry limits of 0 ... 10000 kg
to line 3:	DFM group-0, i.e. parameterized as meter, type target value with a decimal point
	and entry limits of 0.0 ... 30,0 l
to line 257:	Empty as this target value does not exist
to line 258:	DFM group-1, i.e. parameterized as time step, type target value with a decimal point
	and entry limits of 0.0 ... 32767 min
to line 259:	DFM group-1, i.e. parameterized as limit value step, type target value with two decimal points
	and entry limits of 0.00 ... 100.00 °C
to line 260:	DFM group-1, i.e. parameterized as decoder, type selection, from file
	'\PCUxxx\texte\dampf.txt' lines 2 ... 6 are displayed
to line 261:	DFM group-1, i.e. parameterized as decoder, type target value without decimal point and
	entry limits from no. 0 ... 23
to line 262:	DFM group-1, i.e. parameterized as mask 32 out of 32, type 16 bit

3.34 SEQU - Plant section

With this block it is possible to operate up to 48 sequences (per PCU) simultaneously. In such a case, the instructions and the step enabling conditions, which are stored in basic operations, are processed under the control of the recipes.

The elements of the sequence block are up to 13 Digital Function Modules (DFMs) plus run time monitoring, which can be configured as time step, forward and backward counter, limit value stage, target value stage, allocators, decoders or mask. The respective target or limit values are stored in the recipe lists.



To each sequence one function block is allocated in which the permanent conditions, interlockings, start instructions, etc. are programmed by the user.

The function block is called before or after processing the basic operation. Where a flag may be queried to determine whether the block was called before or after.

Note

Inserting or deleting recipe parts is only possible if the relevant recipe is not currently being processed by the sequence. It is however possible to modify the parameters.

The file SEQUENCE.INI

So that, even if the sequence is not running, the DFMs are displayed in the **system overview** in the file c:\windcs\PCUxxx\Rezept**TEILANL.INI** the numbers must be entered in the corresponding DFMs.
The data record in the file **TEILANL.INI** has the following structure:

Name	Description
[PARTxx]	= Number of the sequence (1 ... 48)
RecType	Recipe type (0 ... 99), 0 = Assignment to all recipe types
Target value	Numbers of the DFM which are to be updated while sequence is not working
	Notation: - Absolute Number --> Group-No-DFM * 256 + DFM-No.
	Group no. DFM = 0 ... 3
	DFM no. = 1 ... 255
	- Group no. DFM and DFM no. (0.1 ... 3,255)

Examples:

Name	Description
[PART01]	Sequence 1
RecType=1	Recipe type = 1 (e.g. product)
Target value=1.12, 1.14, 0.23, 1.113, 2.45	DFMs that are to be updated while sequence is not working
	Indication of the group no. DFM and DFM no.
or	
Target value=268,270,23,369,557	DFMs that are to be updated while sequence is not working
	Indication of the absolute DFM no.
[PART02]	Sequence 2
RECType=1,4	Recipe type = 1 and 44 (e.g. product and CIP)
Target value=1.13, 2.25, 0.123	DFMs that are to be updated while sequence is not working

It must be defined in file **SEQUENCE.INI** which DFMs (up to 30) per sequence are to be displayed in the application **DFM overview**.

The 5 x 6 positions can be assigned free, which means gaps may be inserted.

One entry "DFMLIST“ per sequence has to be completed in SEQUENCE.INI by means of an ASCII editor.

Example

To display DFM 0.1, gap, DFM 2.1.

The following entry is necessary:

- DFMLIST=0.1,0.0,2.1

Parameter set:	Parameterization PCU sequence
	Text parameterization IOS
Interfaces:	Sequences (DB, ATS, HUP, HUPS)

Basic operations (DFM, BEDA, FTUE, WF/H, AUS, GSTA, GSTO, TSTA, TVERZ, DB, HAND, DB)

- DFM0 Result flag and counter inputs
- DFM1, DFM2, and DFM3 result flags

Process interface:	Sequences and basic operations: DB 112, DB113
User interface:	Flag assignment table
Parameter:	DFM0: ART, PSK
	DFM1 and DFM2: ART, PSK, QBit, QDat
	DFM3 users

Sequences - target value parameters

Parameter sets for block sequence: Parameterization PCU

SEQU PCU		DB 225		Sets: max. 48 per PCU
No.	**NAME**	**TYPE Info**	**Preset**	**Comment**
1	SPER	B1 P S	0	Working disruption
2	ICMS	B1 S	0	Group error ICM
3	AIN	B1 S	0	Group error AIN
4	ZGEA	B1 P S	0	Additional unit on/off
5	HZUO	I8 P S	1	Manual group assignment
6	RTYP	I16 P S	1	Recipe type
7	GTueS	I16 P S	0	BOP-time target value (sec.)
8	GTueI	I16 P S	0	BOP-time actual value (sec.)
9	WTueS	I16 P S	0	Waiting time target value (sec.)
10	WTueI	I16 P S	10	Waiting time actual value (sec.)
11	QBI	STEP P S	0	STEP 5 - query command release TUE

Parameter set: Text parameterization IOS

Sequence IOS			Sets: max. 48 per PCU
No.	**Type Info**	**Preset**	**Comment**
1	Z16 P IOS	Sequence xx	Block name

Interface block sequence to the sequence programs

kng	Function	Range	System		User	
			S	U	S	U
DB	Continuous condition for locking the processing of the sequence by the sequence program 0/1 = Block/release the sequence	S 640.0 - S 645.7		X	X	
ATS	Process sequence start to display the status of the sequence 0/1 = sequence is in Step 0/sequence is in operation	S 656.0 - S 661.7	X			X
HUP	Hooter operation is activated at the end of the supervising time (GTues). Processing and resetting by user	M 99.4	X		R	X
HUPS	Hooter operation group flag is activated in the event of an ICM, AIN, MSG and SEQU(GTuesS) error, processing and resetting by user	M 107.1	X		R	X

TUET	Supervising time (GTueS) sequence Result bit of supervising time of sequence. 0/1 = time not elapsed/time elapsed	M 101.0	X			X
TVERZ	Delay/waiting time (WTueS) sequence Result bit of delay/waiting time of sequence. 0/1 = time not elapsed/time elapsed	M 101.1	X			X
SRDR	Triggers automatic printing of the step protocols.	M 101.2		X	X	
CHEN	Batch end Shows the job control that the batch has ended.	M 101.3		X	X	
FXGO	FX before/after BOP FX sequence is processed before (=0) or after (=1) the BOP.	M 101.4				
ZGEA	Add-on unit on/off Two function keys (Shift-F2 or Shift-F3 (off/on)) in the plant overview control flag M 101.5. In turn, this can be used to control an add-on unit in the basic operation or in the sequence.	M 101.5	X	X	X	X
BEDA	OPEration Order to display the operating requirement on the data viewing device. Reset for operation on the data viewing device or deleting the M 101.6	M 101.6		X	X	X
FTUE	Release monitoring run-time supervising time (GTueS) Flag to release the run-time monitoring of the supervising time sequence TUET 0 / 1 = Lock TUET / Release TUET	M 101.7		X	X	

Interface basic operations to block SEQU:

kng	Function	Range	System		User	
TF/S	Sequence release/stop By changing the control of the release/stop control bit in the stop status the step further switching is prevented when the further switching is fulfilled.	M 102.0		X	X	
ATS	Operation sequence working	M 102.1		X	X	
GSTA	Basic operation STArt indicates whether the actual basic operation is processed for the first time 0/1 = no/yes	M 102.2	X			X
GSTO	Basic operation STOp indicates whether the actual basic operation is processed for the last time 0/1 = no/yes	M 102.3	X			X
TSTA	Sequence STArt 1-Impulse at time of first processing of the sequence	M 102.4	X			X
PSPR	Report Entry Interlock prevents protocol entries for the current basic operation 0 / 1 = No / Yes	M 102.5		X	X	

DB	Permanent Conditions Display Always RLO = 1 when sequence is working	M 102.6	X			X
HAND	Manual mode Flag is activated when sequence is in operation mode MANUAL.	M 102.7	X			X

User interface flag assignment table block sequence

No. Sequence	DB Permanent condition	ATS Operation sequence start	No. Sequence	DB Permanent condition	ATS Operation sequence start
1	S 640.0	S 656.0	25	S 643.0	S 659.0
2	S 640.1	S 656.1	26	S 643.1	S 659.1
3	S 640.2	S 656.2	27	S 643.2	S 659.2
4	S 640.3	S 656.3	28	S 643.3	S 659.3
5	S 640.4	S 656.4	29	S 643.4	S 656.4
6	S 640.5	S 656.5	30	S 643.5	S 659.5
7	S 640.6	S 656.6	31	S 643.6	S 659.6
8	S 640.7	S 656.7	32	S 643.7	S 659.7
9	S 641.0	S 657.0	33	S 644.0	S 660.0
10	S 641.1	S 657.1	34	S 644.1	S 660.1
11	S 641.2	S 657.2	35	S 644.2	S 660.2
12	S 641.3	S 657.3	36	S 644.3	S 660.3
13	S 641.4	S 657.4	37	S 644.4	S 660.4
14	S 641.5	S 657.5	38	S 644.5	S 660.5
15	S 641.6	S 657.6	39	S 644.6	S 660.6
16	S 641.7	S 657.7	40	S 644.7	S 660.7
17	S 642.0	S 658.0	41	S 645.0	S 661.0
18	S 642.1	S 658.1	42	S 645.1	S 661.1
19	S 642.2	S 658.2	43	S 645.2	S 661.2
20	S 642.3	S 658.3	44	S 645.3	S 661.3
21	S 642.4	S 658.4	45	S 645.4	S 661.4
22	S 642.5	S 658.5	46	S 645.5	S 661.5
23	S 642.6	S 658.6	47	S 645.6	S 661.6
24	S 642.7	S 658.7	48	S 645.7	S 661.7

Process interface block sequence to SEQU program and basic operations

DB112	Sequence permanent condition
DB113	Sequence start (ATS)

DB112/DB113		
DW0		
DW1	1	Number of words
DW2	Sequence 16 ... 1	
DW3	Sequence 32 ... 17	
DW4	Sequence 48 ... 33	

Sequence - Function description

- **Start of a sequence**
  A sequence can be started via the IOS (if the permanent condition is fulfilled) or via **PROGRAMS USERS** or basic operations via the process sequences starting block SEQS. When starting via the IOS the type and batch numbers must be stated before the start (always possible at Step 0).
- **Step operation:**
  From the IOS display, every step of a sequence can be activated independently of the step. Step 1 is entered to start the sequence.
- **Manual mode:**
  - (BTR indication H/A on IOS display):
    The signal Manual mode indicates switching to the manual control level.
    In Manual mode, the step enabling of the sequence is locked.
    The signal **Manual mode** is given directly from the block **MANUAL** "Manual signal distributor“. Therefore, each sequence is assigned to a manual group via the parameter **HZU0**.
- **Release/Stop - Control:**
  (BTR indication "+/-" on IOS display): By switching the rel./stop control bit to the stop state (BTR indication on the IOS display "-") the step enabling of a sequence can be blocked even if the step enabling conditions are fulfilled.
- **Abort of a sequence:**

The processing of a sequence is aborted when the permanent condition is not given (DB = "0") or when step 0 is given.

- **Supervising time sequence TUET:**
  - (ANZ indicator S, flashing on data backup device when addressing the monitoring):
    The individual sequence steps are monitored over time.
    At the end of the runtime of the step GTueS (M101.0) given via the recipe list with released runtime monitoring (flag M 101.7) the error indication (S) is displayed flashing on the data display; hooter operation is activated (M 99.4) and the message "ERROR supervising time START" is printed if sequence messages are enabled.
    The control bit FTUE (M107.7) to release the run time monitoring must be set in the relevant basic operation. If the FTUE control bit is not set the run-time monitoring is blocked.
- **Delay/waiting time TVERZ:**
  By setting a time value WtueS in the sequence data set **block sequence** an additional time limit value (M101.1) can be queried in processing the sequence.
  Here the limit value is compared with the actual value of TUET. If the time TUET is parameterized as forward time and TUET >= TUEG, M 101.1 VKE ="1".
  The time value that is parameterized in the sequence's data record applies to all basic operations of the sequence.
  - **Operating requirement BEDA** for a sequence indication B (flashing) on the IOS:
    By setting the control bit BEDA (M 101.6) in the basic operation, a user order can be signaled via the IOS display (e.g. test sampling). The operator can acknowledge the order in the plant overview by means of the function key **B-QUIT**, thus resetting the BEDA control bit.
- **Report interlocking PSPR:**
  By setting the control bit PSPR (M 102.5) in the basic operation the entry of the processed basic operation in the report can be blocked.
- **Add-on unit on/off ZGEA:**
  By combining the flag M 101.5 in the basic operation or in the program sequence with an ICM, a higher level output or something similar, an add-on unit can be switched on or off in the plant overview via two function keys (ON/OFF).
- **Processing operation:**
  After starting the sequence, the data for processing the actual step is read from the recipe list indicated in the sort number and the indicated basic operation is loaded. At the start of a step (start basic operation), the target values for the DFMs are given (processing of the basic operations: see Programming basic operations).
  With fulfilled step enabling conditions (RLO = "1"), when returning from processing the basic operation, Automatic mode (A+) and operation enabled (+) the next step from the recipe list is processed. After processing all steps from the recipe list the system returns automatically to step 0 and the processing of the sequence is finished.
  In the actual recipe all parameters can be changed during processing. The insertion and deletion of complete parts of recipes stays blocked, however, and is only released when the sequence has returned to step 0.

Recipes:	DX 11	Sequence-1
	...	...
	DX 59	Sequence-48

Sequence programs:	FX 1	Sequence-1
	...	...
	FX 48	Sequence-48

Before and after the processing of a sequence, an FB <1000+n> (n = sequence number) is called (**program sequence**).

On processing the FX before BOP, the flag M101.4 is set to "0" and after BOP, flag M101.4 is set to "1".

Example:	
FXn before BOP:	Locks (Sequence processing/DFM processing/flag interface)
FXn after BOP:	Analysis of the DFM results flag

Step 0 only operates DFM blocks that are programmed outside the basic operations.

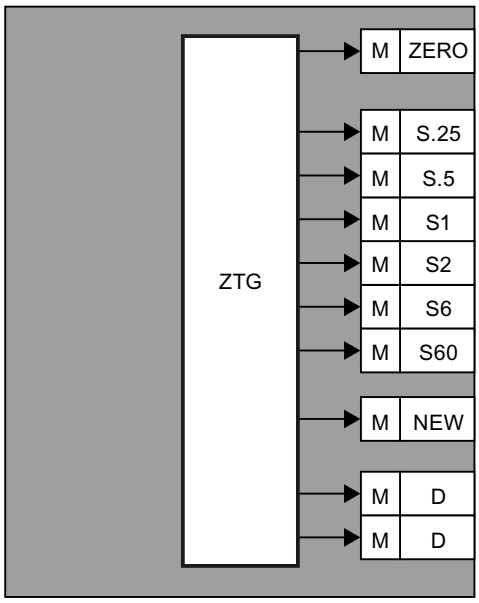
Manual mode:	Target values can be stated via the screen or
user programs or	
old values are retained.	
Basic operations:	508 per PCU.
Batch end:	

In order to display to the order control, e.g. for chained sequences, that the batch has ended, the M101.3 must be set with the end of the last BOP (GSTO).

3.35 ZTG - Central clock

The central clock generation provides static and dynamic timing signals and a defined "0" signal and forms a new start impulse when the system starts.

The timing ratio for the static time clock is 1:1. The time details permanently refer to "1" signals. The dynamic timings stand for one cycle. The component works in OB1.



Process interface

ZERO	Link result "ZERO"	M 97.0	LOG 0	Def. RLO = "0"		M 98.0 (*)
S.25	**S**tatic 00.**25** second interval	M 97.1	**D25**	**D**yn. 0.**25**SEC	IMPULSE / 4 Hz	M 98.1 (*)
S.5	**S**tatic 00.**50** second interval	M 97.2	**D5**	**D**yn. 0.**5** SEC	IMPULSE / 2 Hz	M 98.2 (*)
S1	**S**tatic 0**1**.00 second interval	M 97.3	**D1**	**D**yn. **1** SEC	IMPULSE / 1 Hz	M 98.3 (*)
S2	**S**tatic 0**2**.00 second interval	M 97.4	**D2**	**D**yn. **2** SEC	IMPULSE / 0.5 Hz	M 98.4 (*)
S6	**S**tatic 0**6**.00 second interval	M 97.5	**D6**	**D**yn. **6** SEC	IMPULSE	M 98.5 (*)
S60	**S**tatic **60**.00 second interval	M 97.6	**D60**	**D**yn. **60** SEC	IMPULSE	M 98.6 (*)
NEW	**NEW**Start impulse	M 97.7	**D15**	**D**yn. **15** SEC	IMPULSE	M 98.7 (*)
D6	**D**ynamic 0**6**.00 second interval	M 107.5				
D60	**D**ynamic **60**.00 second interval	M 107.6				
(*) Flags only apply to query in OB 1						

3.36 ZYKLMESS - Measuring of cycle time

The time values for the OB1 cycle and for the individual time slices of the time slice distributor are entered in this component in OB10.

When the component is released the measurement is made until the component is locked again.

Parameter sets for block ZyklMESS - Parameterization PCU

ZyklMESS PCU		DB 221		Record: 1
No.	**NAME**	**Type Info**	**Preset**	**Comment**
1	Freig	Bit P S	0	Measuring: 1=Release; 0=Block
2	OB1ZykA	I16 S	0	OB1 current cycle time
3	OB10Zs1A	I16 S	0	OB10 time slice 1 current cycle time
4	OB10Zs2A	I16 S	0	OB10 time slice 2 current cycle time
5	OB10Zs3A	I16 S	0	OB10 time slice 3 current cycle time
6	OB10Zs4A	I16 S	0	OB10 time slice 4 current cycle time
7	OB10Zs5A	I16 S	0	OB10 time slice 5 current cycle time
8	OB10Zs6A	I16 S	0	OB10 time slice 6 current cycle time
9	OB10Zs7A	I16 S	0	OB10 time slice 7 current cycle time
10	OB10Zs8A	I16 S	0	OB10 time slice 8 current cycle time
11	OB10Zs9A	I16 S	0	OB10 time slice 9 current cycle time
12	OB10Zs10A	I16 S	0	OB10 time slice 10 current cycle time