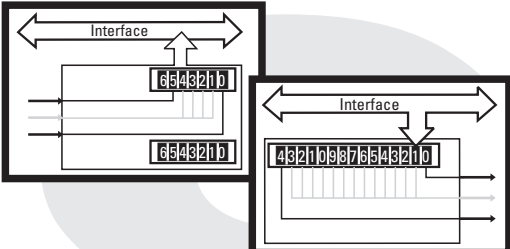



Multi-function unit KS 98-1



KS 98-1


PROFIBUS-DP



Interface description
PROFIBUS protocol
9499 040 82811
Valid from: 8445

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1 General

The KS98 multi-function unit versions (9407-9xx-3xxx1) are equipped with a PROFIBUS-DP interface, which permits transmission of process, parameter and configuration data. Connection is on the instrument rear. The serial communication interface permits connections to supervisory PLCs, visualization tools, etc.

Another standard interface is the non-bussable front-panel PC interface, which is used for connecting an engineering tool running on a PC.

Communication is according to the master/slave principle. KS98/DP is always slave.

Characteristic data of the cable medium as well as the physical and electrical interface properties are:

- Network topology
Linear bus with active bus termination (→ p. 7) at both ends. Stub lines are possible (dependent of cable type, a maximum overall stub line length of 6,6m with 1,5bit/s and of 1,6m with 3 .. 12 Mbit/s is possible).
- Transmission medium
screened, twisted 2-wire cable (→ EN 50170 vol.2).
- Baudrates and cable lengths (without repeater)
The maximum cable length is dependent of the transmission rate.
The Baudrate is determined by the master configuration.

Automatic Baudrate detection	Baudrate	Maximum cable length
	9,6 / 19,2 / 93,75 kbit/s	1200 m
	187,5 kbit/s	1000 m
	500 kbit/s	400 m
	1,5 Mbit/s	200 m
	3 ... 12 Mbit/s	100 m

- Interface
RS485 with AMP flat-pin connector; can be installed at the site.
- Addressing: 0 ... 126 (factory setting: 126)
Remote addressing is possible
- 32 units in one segment. Can be extended to 127 with repeater.

KS98 with PROFIBUS-DP interface offers many advantages referred to handling and integration into a PROFIBUS network.

- Diagnosis and monitoring
Display of bus errors
 - (→ "PROFIBUS status" p. 7)
 - Bus error signalling via
 - function block **STATUS; dp-err** (common error message → p. 5)
 - Function block **DPREAD / DPWRITE** (individual error messages → p. 7)
 - Freeze and Synch commands possible
- Particularities
Configurable process data modules
Direct input and output reading and writing
Input and output forcing
Easy connection even to small PLCs

1.1 Scope of delivery

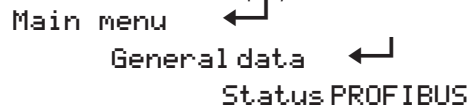
The engineering set comprises:

- Disk
 - 3,5-Diskette (A:)
 - Ks98dp
 - Et98
 - Example Profibus.edg Engineering example for ET/KS98
 - Gsd Pma_9801.gsd GSD file
 - Pma9801x.dib GSD-Logos
 - Pma9801x.bmp GSD-Logos
 - S5_fb Pmadv1st.s5d function module for STEP® 5
 - Example.fix Pmadm1*.* project example in STEP® 5 for FixPoint
 - Example.ftt Pmadm2*.* project example in STEP® 5 for Float
 - S7_fb Pma_sup.arj function module for STEP® 7 as S7 library
 - Example Ks98demo.arj project example in STEP® 7 for S7-300
 - Type Ks98_01x.200 type file general
 - Example 2.1/3.1 Demo308i.et2 configuration example COM PROFIBUS
 - Demo308r.et2
 - Demo95ui.et2
 - Demo95ur.et2
 - Ks98demo.et2
- Interface description for PROFIBUS-DP

2 Hints on operation

2.1 PROFIBUS status display

The PROFIBUS status can be displayed via



Status PROFIBUS	
Buszugriff	= O.K.
Parameter	= O.K.
Konfigurat.	= O.K.
Nutzdaten	= O.K.
Ende	

Message signification:

	= O.K.	= error
Bus access	Bus access successful	Bus access not successful
Parameter	Parameter setting successful	Parameter setting faulty
Konfigurat.	Configuration successful	Configuration faulty
Exchnæ	Useful data exchange O.K.	No useful data exchange

2.2 Remote/local

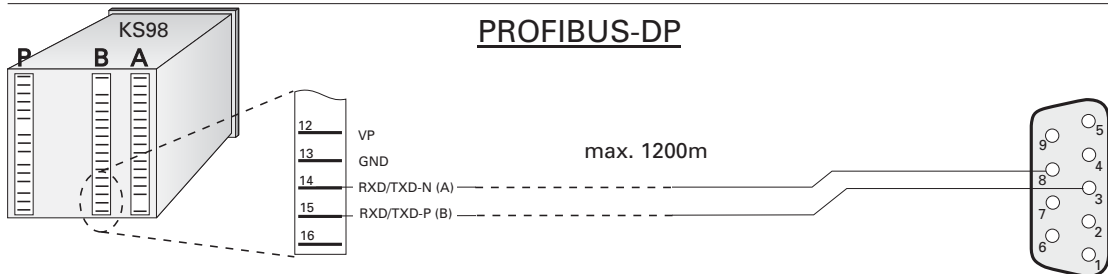
The write and read access authorities for KS98-DP are defined as follows:

- PC interface:
 - Write / read accesses are always permitted
- PROFIBUS interface:
 - Read accesses always permitted
 - Write accesses are permissible only with **WriteOK = 0** (→ page)

2.3 Interface connection

Connection of the PROFIBUS is to connector B.
Rear-panel serial interface, RS485-based physical signals.

Fig.: 1 connection PROFIBUS-DP



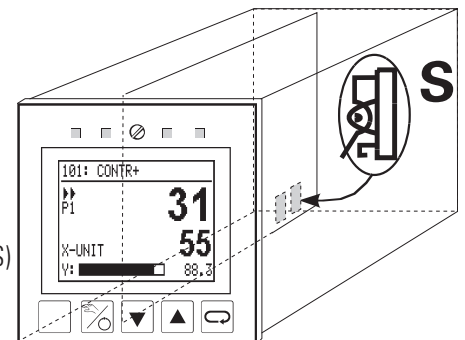
Installation of suitable cables must be done by the user, whereby the general cable specifications to EN 50170 vol. 2 must be followed.

2.3.1 Installation of cables

When installing the cables, the general hints for cable installation provided by the supplier of the master module must be followed:

- Cable run inside buildings (inside and outside cabinets)
- Cable run outside buildings
- Potential compensation
- Cable screening
- Measures against interference voltage
- Stub line length
- The bus termination resistor can be activated by 2 S.I.L. switches (S)

in KS98. Both S.I.L. switches must always be open or closed (terminating resistor active).



Bus cable termination at the two segments end by means of terminating resistors ensures

- adjustment of a defined rest potential on the line,
- minimization of line reflections, and
- adjustment of a nearly constant bus load behaviour.

Two bus line version are specified in standard EN 50 170. With type A cable, all transmission rates up to 12 Mbaud can be used. In addition to the standard cable version, versions for underground installation, overhead suspension and trailing cables are available.

The cable parameters are:

Parameter	Type A cable
Wave resistance in W	135 ... 165 at 3 ... 20 MHz
Operating capacitance (pF/m)	< 30
Loop resistance (W/km)	< 110
Conductor diameter (mm)	> 0,64
Conductor cross section (mm ²)	> 0,34

i Special hints for installation of PROFIBUS cables are given in the PNO Technical guideline "Installation guidelines for PROFIBUS-DP/FMS" (order no. 2.111 [dt]; 2.112 [engl.]).

2.3.2 Bus connector

- Screw-on adaptor:
For connecting the bus cable to the bus connector (order no. 9407 998 00021), remove the cable insulation as shown in Fig.: 2. Subsequently, mount the bus cable by connecting similar wires to similar connections A or B (e.g. a green wire for connection A and a red wire for connection B should always be used). Note that the cable screening is bare under the strain relief.

Fig.: 2 Length of stripped cable insulation for screw-on adaptor

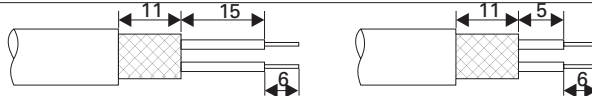


Fig.: 4 Screw-on adaptor

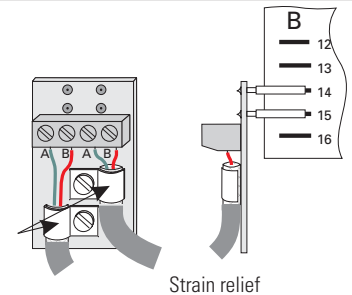
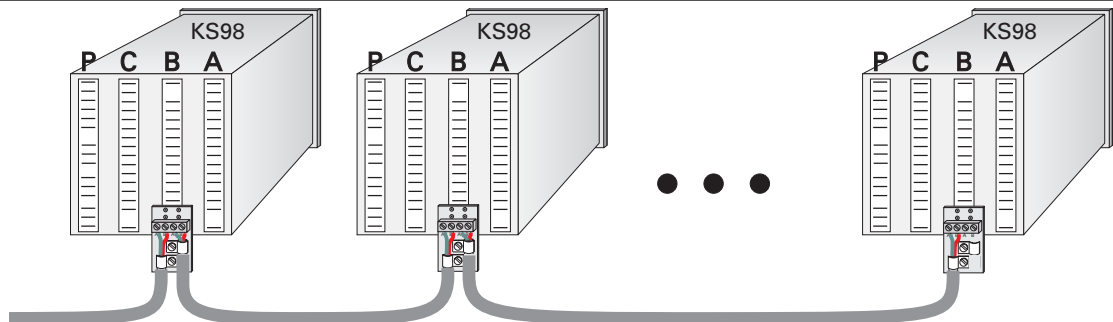


Fig.: 3 Wiring example with screw-on adaptor



- Sub-D bus adaptor:
For using standard PROFIBUS connectors (9-pole sub-D) in an installation, the sub-D bus adaptor must be used (order no. 9407 998 00031).

Fig.4: Sub-D-dp



When using bus connectors with terminating resistors, the KS98 terminating resistors must be switched off (open S.I.L. Switches).

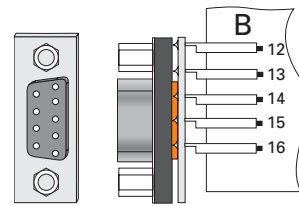
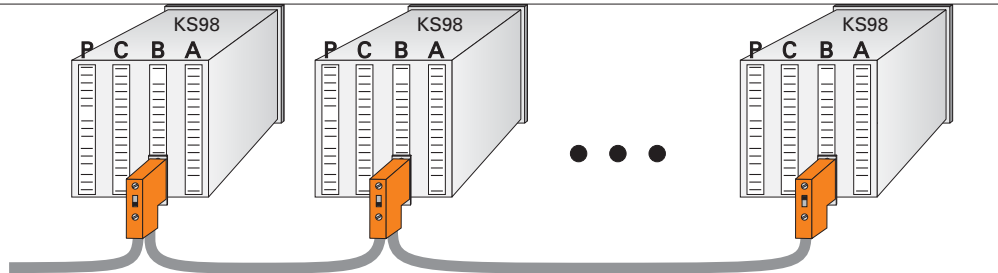


Fig.: 5 Wiring example with Sub-D bus adaptor and bus connector

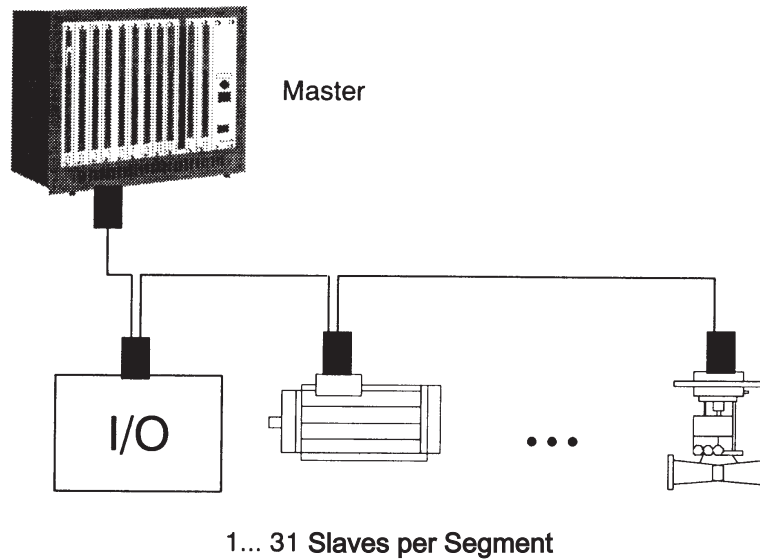


2.4 Systemstructure

2.4.1 Minimum PROFIBUS system equipment

A min. PROFIBUS system comprises the following components:

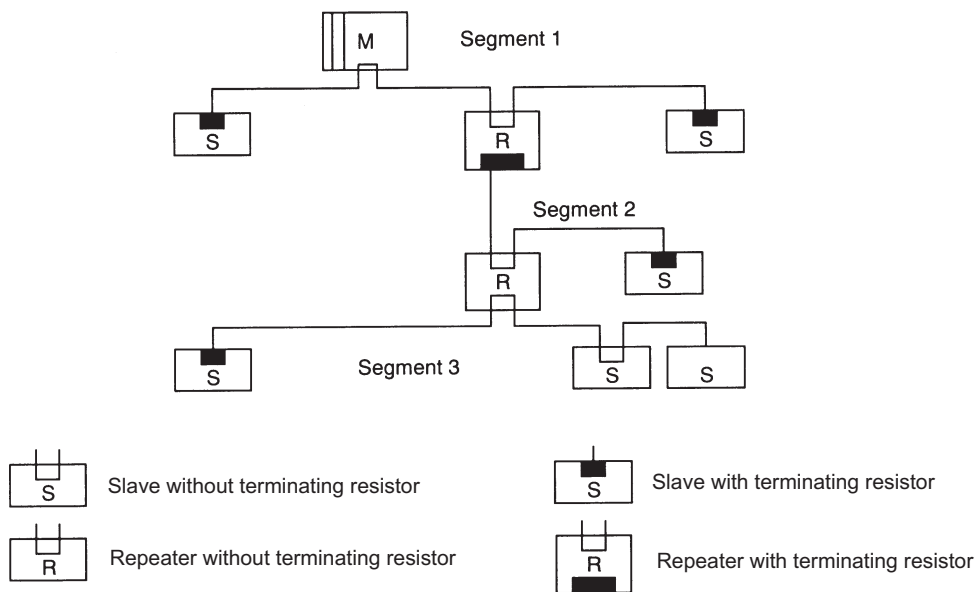
- a bus master for data communication control,
- one or several slaves which provide data on request by the master,
- the transmission medium, consisting of bus cable and bus connector for connecting the various units, one or several bus segments connected by means of repeaters.



2.4.2 Maximum PROFIBUS system equipment

A bus segment comprises max. 32 (active and passive) field units. The maximum possible number of slaves which can be operated over several segments at a PROFIBUS master is determined by the internal master memory structure. Therefore, we recommend getting information on the master capacity when planning a system. Opening the bus cable for including a new unit by adding a bus connector is possible at any point of the bus cable. At the end of a segment, the bus cable can be extended up to the predefined segment length and further extending units can be connected. The bus segment length is dependent of adjusted transfer rate. The transfer rate is determined mainly by system construction (segment length, distributed inputs/outputs) and required polling cycles of the units. The transfer rate predefined by the master is applicable to all bus units.

To ensure a physically clean signal level, terminating resistors must be connected at each segment start and end. These resistors are integrated in most connectors and must be included only by means of switch.



PROFIBUS units must be connected in line structure.

A PROFIBUS system can be extended by connecting repeaters,

- for connecting more than 32 units,
- for connecting over larger distances than those defined according to transfer rate.

With max. PROFIBUS system extension, the max. number of stations is 126 with addresses 0 ... 125. Each repeater reduces the max. number of stations within a segment. As a passive unit, no PROFIBUS address is assigned to a repeater. However, the repeater input circuitry adds an additional load due to the bus driver power consumption to the segment. However, a repeater is without effect on the overall number of connected bus stations.

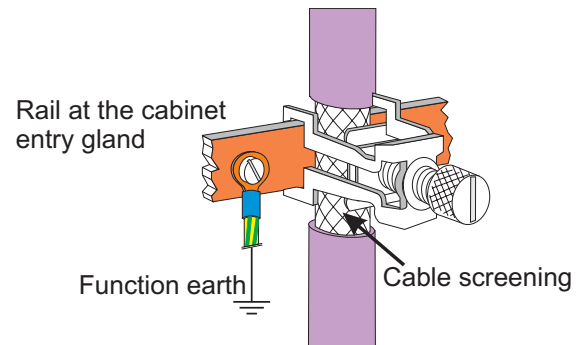
The max. number of repeaters which may be connected in series can differ dependent of manufacturer. Therefore, manufacturer information on any limitations should be provided when projecting a system.

2.4.3 Cable installation in buildings

The following installation hints are applicable to a twisted and screened cable. The cable screening is used for improvement of the electromagnetic compatibility. A type A PROFIBUS cable includes meshed screening and screening film. The following versions always contains both screening versions (meshed screening and screening film). Using only screening film must be avoided, because the film is very thin and implies a break risks, which can lead to interruption of the potential compensating system.

Both ends of the cable screening must be connected to reference earth by a large-surface contact of conducting material. When installing a repeater or a field unit in a cabinet, the cable screening should be connected with a screening rail via cable collars, etc. as close as possible to the cable gland.

The screening must be taken to the field unit, where it must be connected to the conducting housing and/or the metal connector. Ensure that the earth potential of the housing and of the cabinet in which the field unit is installed is equal by means of a large-surface metal contact. Mounting a screening rail on a painted surface is without effect. This measure ensures grounding of high-frequency interference via meshed screening. With external interference induced into the data lines, the voltage potential is increased equally on the two data lines so that the voltage difference is normally not affected. Normally, safe data transmission is still ensured with a change of some Volts in the earth potential. With higher changes (DGND potential at Pin 5 against reference earth), a potential compensating lead with a min. cross section of 10 mm² in parallel to the bus cable should be installed and connected to the reference earth of each field unit. Normally, the field units are provided with an earthing screw. With extreme interference, the bus cable can be installed in a steel tube or a tight sheet-metal duct. In this case, the tube or duct must be connected to earth correctly.



The bus cable must be installed at a min. distance of 20 cm from other cables for transmitting voltage above 60 V. Moreover, the bus cable must be kept separate from telephone lines and cables leading into explosion-hazarded areas. In these cases, we recommend installing the bus cable in a separate cable duct.

With a cable duct, only conducting materials correctly connected to reference earth should be used. The bus cables must not be exposed to mechanical strain or obvious damage. If this cannot be precluded, special protective measures, e.g. installation in tubes, etc. must be taken.

Earth-free construction :

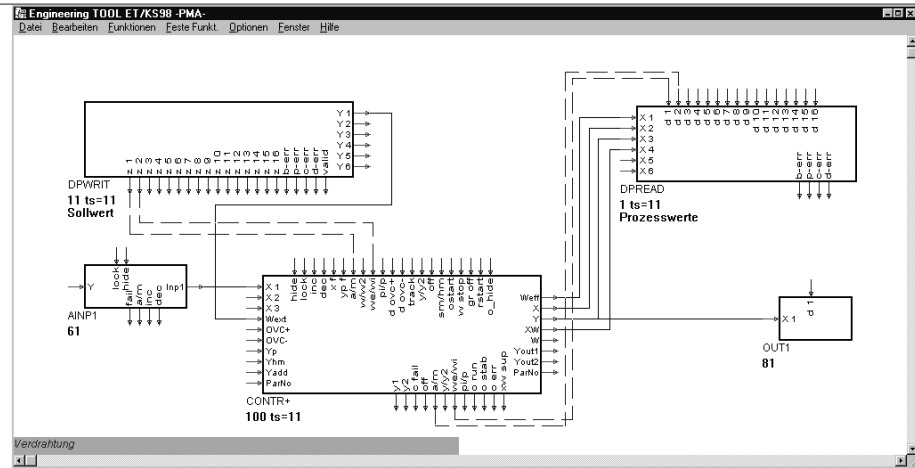
If earth-free construction is required for defined reasons, the connection of instrument ground and reference earth must be of very high impedance (using an RC snapper). In this case, the system selects its own potential. When installing repeaters for connecting bus segments, the earth-free construction should always be preferred, in order to prevent transmission of potential differences between bus segments.

3 Process data

3.1 General

Function blocks DPREAD and DPWRIT are provided for realization of a simple data transmission controller ↔ PLC or visualization. The process data of these function blocks are transmitted cyclically (→). During creation of the engineering, take care that all data which shall be transmitted via the PROFIBUS interface are connected (soft-wired) to these communication blocks. A simple example is shown in Fig.: 6.

Fig.: 6 Engineering example 'PROFIBUS-communication'



3.2 Process data modules

During data transmission, distinction of process data which are transmitted cyclically and parameter/configuration data which are transmitted acyclically is made. The structure of the I/O data field is modular for matching it to the requirements of the control task.

Selection of process data module and data format (FIX point format for small PLCs; floating point or REAL format for full resolution) is via configuration tools of the master circuitry (e.g. via COM PROFIBUS with Siemens S5).

The following process data modules can be configured:

Process data module	read (18/26 bytes) ¹⁾	write (18/26 byte)*	without parameter channel
a	16 digital inputs and 6 analog inputs of a DPREAD function block	16 digital outputs and 6 analog outputs of a DPWRITE function block	
b	16 digital inputs and 6 analog inputs of a DPREAD function block	16 digital outputs and 6 analog outputs of a DPWRITE function block	with parameter channel
c	32 digital inputs and 12 analog inputs of two DPREAD function blocks	32 digital outputs and 12 analog outputs of two DPWRITE function blocks	with parameter channel
d	48 digital inputs and 18 analog inputs of three DPREAD function blocks	48 digital outputs and 18 analog outputs of three DPWRITE function blocks	with parameter channel
e	64 digital inputs and 24 analog inputs of four DPREAD function blocks	64 digital outputs and 24 analog outputs of four DPWRITE function blocks	with parameter channel

The parameter channel is used for sequential transmission of parameter and configuration data. Transmission of analog values is in REAL format (range: -29999 .. 200000) or in 16-bit fixed point format (FIX) dependent of configuration. In the FIX format, all values are interpreted with one digit behind the decimal point (range -3000,0 to 3200,0).

The values to be adjusted and data significations are given in the following table.

1) number of bytes required in the I/O field (FIX point format/REAL format)

- Module a (1 channel)

No.	Descr.	R/W	REAL format			FIX point format			
			Type	Value		Type	Value		Rem.
				Hex	COM PROFIBUS		Hex	COM PROFIBUS	
DPREAD FB no. 01	0	R	Status	10	8DE	Status	10	8DE	A
	1	R	Status	10	8DE	Status	10	8DE	B
	2	R	Float	D1	209	Int16	50	1AE	
	3	R	Float	D1	209	Int16	50	1AE	
	4	R	Float	D1	209	Int16	50	1AE	
	5	R	Float	D1	209	Int16	50	1AE	
	6	R	Float	D1	209	Int16	50	1AE	
DPWRITE FB no. 11	8	W	Status	20	8DA	Status	20	8DA	C
	9	W	Status	20	8DA	Status	20	8DA	D
	10	W	Float	E1	225	Int16	60	1AA	
	11	W	Float	E1	225	Int16	60	1AA	
	12	W	Float	E1	225	Int16	60	1AA	
	13	W	Float	E1	225	Int16	60	1AA	
	14	W	Float	E1	225	Int16	60	1AA	
15	W	Float	E1	225	Int16	60	1AA		

- Module b (1 channel + parameters)

No.	Descr.	R/W	REAL format			FIX point format			
			Type	Value		Type	Value		Rem.
				Hex	COM PROFIBUS		Hex	COM PROFIBUS	
DPREAD FB no. 01	0	R	Status	10	8DE	Status	10	8DE	A
	1	R	Status	10	8DE	Status	10	8DE	B
	2	R	Float	D1	209	Int16	50	1AE	
	3	R	Float	D1	209	Int16	50	1AE	
	4	R	Float	D1	209	Int16	50	1AE	
	5	R	Float	D1	209	Int16	50	1AE	
	6	R	Float	D1	209	Int16	50	1AE	
DPWRITE FB no. 11	8	W	Status	20	8DA	Status	20	8DA	C
	9	W	Status	20	8DA	Status	20	8DA	D
	10	W	Float	E1	225	Int16	60	1AA	
	11	W	Float	E1	225	Int16	60	1AA	
	12	W	Float	E1	225	Int16	60	1AA	
	13	W	Float	E1	225	Int16	60	1AA	
	14	W	Float	E1	225	Int16	60	1AA	
15	W	Float	E1	225	Int16	60	1AA		
16	Parameter channel	R/W	8Byte	F3	4AX	Byte8	F3	4AX	

- Module c (2 channels + parameters)

	No.	Descr.	R/W	REAL format			FIX point format				
				Type	Value		Type	Value			Rem.
					Hex	COM PROFIBUS		Hex	COM PROFIBUS		
DPREAD FB no. 01	0	State1_1	R	Status	10	8DE	Status	10	8DE	A	
	1	State2_1	R	Status	10	8DE	Status	10	8DE	B	
	2	Input 1_1	R	Float	D1	209	Int16	50	1AE		
	3	Input 2_1	R	Float	D1	209	Int16	50	1AE		
	4	Input 3_1	R	Float	D1	209	Int16	50	1AE		
	5	Input 4_1	R	Float	D1	209	Int16	50	1AE		
	6	Input 5_1	R	Float	D1	209	Int16	50	1AE		
DPREAD FB no. 02	7	Input 6_1	R	Float	D1	209	Int16	50	1AE		
	8	State1_2	R	Status	10	8DE	Status	10	8DE	A	
	9	State2_2	R	Status	10	8DE	Status	10	8DE	B	
	10	Input 1_2	R	Float	D1	209	Int16	50	1AE		
	11	Input 2_2	R	Float	D1	209	Int16	50	1AE		
	12	Input 3_2	R	Float	D1	209	Int16	50	1AE		
	13	Input 4_2	R	Float	D1	209	Int16	50	1AE		
DPWRITE FB no. 11	14	Input 5_2	R	Float	D1	209	Int16	50	1AE		
	15	Input 6_2	R	Float	D1	209	Int16	50	1AE		
	16	Cntrl1_1	W	Status	20	8DA	Status	20	8DA	C	
	17	Cntrl2_1	W	Status	20	8DA	Status	20	8DA	D	
	18	Output 1_1	W	Float	E1	225	Int16	60	1AA		
	19	Output 2_1	W	Float	E1	225	Int16	60	1AA		
	20	Output 3_1	W	Float	E1	225	Int16	60	1AA		
DPWRITE FB no. 12	21	Output 4_1	W	Float	E1	225	Int16	60	1AA		
	22	Output 5_1	W	Float	E1	225	Int16	60	1AA		
	23	Output 6_1	W	Float	E1	225	Int16	60	1AA		
	24	Cntrl1_2	W	Status	20	8DA	Status	20	8DA	C	
	25	Cntrl2_2	W	Status	20	8DA	Status	20	8DA	D	
	26	Output 1_2	W	Float	E1	225	Int16	60	1AA		
	27	Output 2_2	W	Float	E1	225	Int16	60	1AA		
	28	Output 3_2	W	Float	E1	225	Int16	60	1AA		
	29	Output 4_2	W	Float	E1	225	Int16	60	1AA		
	30	Output 5_2	W	Float	E1	225	Int16	60	1AA		
	31	Output 6_2	W	Float	E1	225	Int16	60	1AA		
	32	Parameter channel	R/W	8Byte	F3	4AX	Byte8	F3	4AX		

- Module d (3 channels + parameters)

	No.	Descr.	R/W	REAL format			FIX point format				
				Type	Value		Type	Value			Rem.
					Hex	COM PROFIBUS		Hex	COM PROFIBUS		
DPREAD FB no. 01 ... FB no. 03	0	State1_1	R	Status	10	8DE	Status	10	8DE	A	
	1	State2_1	R	Status	10	8DE	Status	10	8DE	B	
	2	Input 1_1	R	Float	D1	209	Int16	50	1AE		
	3	Input 2_1	R	Float	D1	209	Int16	50	1AE		
	21	Input 4_3	R	Float	D1	209	Int16	50	1AE		
	22	Input 5_3	R	Float	D1	209	Int16	50	1AE		
DPWRITE FB no. 11 ... FB no. 13	23	Input 6_3	R	Float	D1	209	Int16	50	1AE		
	24	Cntrl1_1	W	Status	20	8DA	Status	20	8DA	C	
	25	Cntrl2_1	W	Status	20	8DA	Status	20	8DA	D	
	26	Output 1_1	W	Float	E1	225	Int16	60	1AA		
	27	Output 3_1	W	Float	E1	225	Int16	60	1AA		
	45	Output 4_3	W	Float	E1	225	Int16	60	1AA		
	46	Output 5_3	W	Float	E1	225	Int16	60	1AA		
	47	Output 6_3	W	Float	E1	225	Int16	60	1AA		
48	Parameter channel	R/W	8Byte	F3	4AX	Byte8	F3	4AX			

- Module e (4 channels + parameters)

	No.	Descr.	R/W	REAL format			FIX point format			Rem.	
				Type	Value		Type	Value			
					Hex	COM PROFIBUS		Hex	COM PROFIBUS		
DPREAD FB no. 01 ... FB-Nr. 04	0	State1_1	R	Status	10	8DE	Status	10	8DE	A	
	1	State2_1	R	Status	10	8DE	Status	10	8DE	B	
	2	Input 1_1	R	Float	D1	209	Int16	50	1AE		
	3	Input 2_1	R	Float	D1	209	Int16	50	1AE		

	29	Input 4_4	R	Float	D1	209	Int16	50	1AE		
DPWRITE FB no. 11 ... FB no. 14	30	Input 5_4	R	Float	D1	209	Int16	50	1AE		
	31	Input 6_4	R	Float	D1	209	Int16	50	1AE		
	32	Cntrl1_1	W	Status	20	8DA	Status	20	8DA	C	
	33	Cntrl2_1	W	Status	20	8DA	Status	20	8DA	D	
	34	Output 1_1	W	Float	E1	225	Int16	60	1AA		
	35	Output 3_1	W	Float	E1	225	Int16	60	1AA		

	61	Output 4_4	W	Float	E1	225	Int16	60	1AA		
62	Output 5_4	W	Float	E1	225	Int16	60	1AA			
63	Output 6_4	W	Float	E1	225	Int16	60	1AA			
64	Parameter channel	R/W	8Byte	F3	4AX	Byte8	F3	4AX			

- Modul f (3 channels + parameters in compact format)

	No.	Descr.	R/W	Typ	FIX point format		Rem.
					Value		
					Hex	COM PROFIBUS	
DPREAD FB-Nr. 01 ... FB-Nr. 03	0	State1_1, State2_1	R	Status	11	16DE	A, B
	1	Input 1_1 ... Input 6_1	R	Int16	55	6AE	
	2	State1_2, State2_2	R	Status	11	16DE	A, B
	3	Input 1_2 ... Input 6_2	R	Int16	55	6AE	
	4	State1_3, State2_3	R	Status	11	16DE	A, B
DPWRITE FB-Nr. 11 ... FB-Nr. 13	5	Input 1_3 ... Input 6_3	R	Int16	55	6AE	
	6	Cntrl1_1, Cntrl2_1	W	Status	21	16DA	C, D
	7	Output 1_1 ... Output 6_1	W	Int16	65	6AA	
	8	Cntrl1_2, Cntrl2_2	W	Status	21	16DA	C, D
	9	Output 1_2 ... Output 6_2	W	Int16	65	6AA	
	10	Cntrl1_3, Cntrl2_3	W	Status	21	16DA	C, D
	11	Output 1_3 ... Output 6_3	W	Int16	65	6AA	
	12	Parameterchannel	R/W	Byte8	F3	4AX	

- Modul g (4 channels + parameters in compact format)

	No.	Descr.	R/W	Typ	FIX point format		Rem.
					Value		
					Hex	COM PROFIBUS	
DPREAD FB-Nr. 01 ... FB-Nr. 04	0	State1_1, State2_1	R	Status	11	16DE	A, B
	1	Input 1_1 ... Input 6_1	R	Int16	55	6AE	
	2	State1_2, State2_2	R	Status	11	16DE	A, B
	3	Input 1_2 ... Input 6_2	R	Int16	55	6AE	
	4	State1_3, State2_3	R	Status	11	16DE	A, B
	5	Input 1_3 ... Input 6_3	R	Int16	55	6AE	
	6	State1_4, State2_4	R	Status	11	16DE	A, B
DPWRITE FB-Nr. 11 ... FB-Nr. 14	7	Input 1_4 ... Input 6_4	R	Int16	55	6AE	
	8	Cntrl1_1, Cntrl2_1	W	Status	21	16DA	C, D
	9	Output 1_1 ... Output 6_1	W	Int16	65	6AA	
	10	Cntrl1_2, Cntrl2_2	W	Status	21	16DA	C, D
	11	Output 1_2 ... Output 6_2	W	Int16	65	6AA	
	12	Cntrl1_3, Cntrl2_3	W	Status	21	16DA	C, D
	13	Output 1_3 ... Output 6_3	W	Int16	65	6AA	
	14	Cntrl1_4, Cntrl2_4	W	Status	21	16DA	C, D
	15	Output 1_4 ... Output 6_4	W	Int16	65	6AA	
	16	Parameterchannel	R/W	Byte8	F3	4AX	

State1_x

D7	D6	D5	D4	D3	D2	D1	D0	Bit
d8	d7	d6	d5	d4	d3	d2	d1	Digital input from DPREAD

State2_x

D7	D6	D5	D4	D3	D2	D1	D0	Bit
d16	d15	d14	d13	d12	d11	d10	d9	Digital input from DPREAD

Cntrl1_x

D7	D6	D5	D4	D3	D2	D1	D0	Bit
z8	z7	z6	z5	z4	z3	z2	z1	Digital output from DPWRIT

Cntrl2_x

D7	D6	D5	D4	D3	D2	D1	D0	Bit
z16	z15	z14	z13	z12	z11	z10	z9	Digital output from DPWRIT

3.2.1 Transmission times

The following table gives the minimum time after which an updated value of these function blocks is available at the PROFIBUS.

	FB no. 01	FB no. 02	FB no. 03	FB no. 04	FB no. 11	FB no. 12	FB no. 13	FB no. 14
Module a	100 ms				100 ms			
Module b	100 ms				100 ms			
Module c	100 ms	100 ms			100 ms	100 ms		
Module d	100 ms	200 ms	200 ms		100 ms	200 ms	200 ms	
Module e	100 ms	400 ms	400 ms	400 ms	100 ms	400 ms	400 ms	400 ms



In addition to the transmission time, the time slot allocation of the connected function blocks must be taken into account.

3.3 PROFIBUS-DP diagnosis information

PROFIBUS-DP offers convenient, complex functionality for handling diagnosis messages due to error statuses. The KS98 diagnosis information comprises standard (6 bytes) and instrument-specific diagnosis information.

3.3.1 Standard diagnosis message

A standard diagnosis message consists of 6 bytes.

	Bit	Description	Signification
1. Byte	0	Diag.station	does not exist (sets master)
	1	Diag.station_not_ready	Slave is not ready for data exchange
	2	Diag.cfg_Fault	Configuration data do not correspond
	3	Diag.ext_diag	Slave has external diagnosis data
	4	Diag.not_supported	Requested function is not supported in slave
	5	Diag.invalid_slave_response	Fixes slave to 0
	6	Diag.prm_fault	Faulty parameter setting (identification number, etc.)
	7	Diag.master_lock (setzt Master)	Slave parameters were set by other master

	Bit	Description	Signification
2. Byte	0	Diag.Prm_req	New slave parameter setting required The application has detected a status which requires a restart with corresponding parameter setting and configuration. Following this diagnosis, a master start-up with defined parameter setting and configuration is made. This bit is set when switching on PROFIBUS-DP coupler RM202.
	1	Diag.Stat_diag	Static diagnosis (byte diag bits) Due to an application status, the slave cannot provide valid data. Consequently, the master requests only diagnosis information, until the slave resets this bit. However, the PROFIBUS-DP status is data exchange, i.e. data exchange can be continued immediately after static diagnosis reset. This bit is set by PROFIBUS-DP coupler RM 202 in case of I/O module failure.
	2	fixed 1	
	3	Diag.WD_on	Response monitoring active
	4	Diag.freeze_mode	Freeze command received
	5	Sync_Mode	Sync command received
	6	reserved	
	7	Diag.deactivated (set by master)	

	Bit	Descr.	Signification
3. Byte	0..6	reserved	
	7	Diag.ext_overflow	This bit is set by the slave, if the diagnosis data volume exceeds the capacity of the available diagnosis data area.

	Bit	Descr.	Signification
4. Byte	0..7	Diag.master_add	Master address according to parameter setting (0xFF without parameter setting)

	Bit	Descr.	Signification
5. Byte	0..7		Ident number (high byte); RM 202: 0x05

	Bit	Descr.	Signification
6. Byte	0..7		Ident number (low byte); RM 202: 0x2C

Additionally, the extended diagnosis includes:

	Bit	Descr..	Signification
7. Byte	0..7		External diagnosis: header length
			Bit 5 ... 0 = Block length in bytes including header Bit 7, 6 = 0, 0

	Bit	Descr.	Signification
from 8th byte	0..7		External diagnosis

3.3.2 Instrument-specific external diagnosis

For KS98 instrument status signalling, the external (user-specific) diagnosis must be used. The format corresponds to the instrument-related diagnosis (EN50170 volume 2 PROFIBUS).

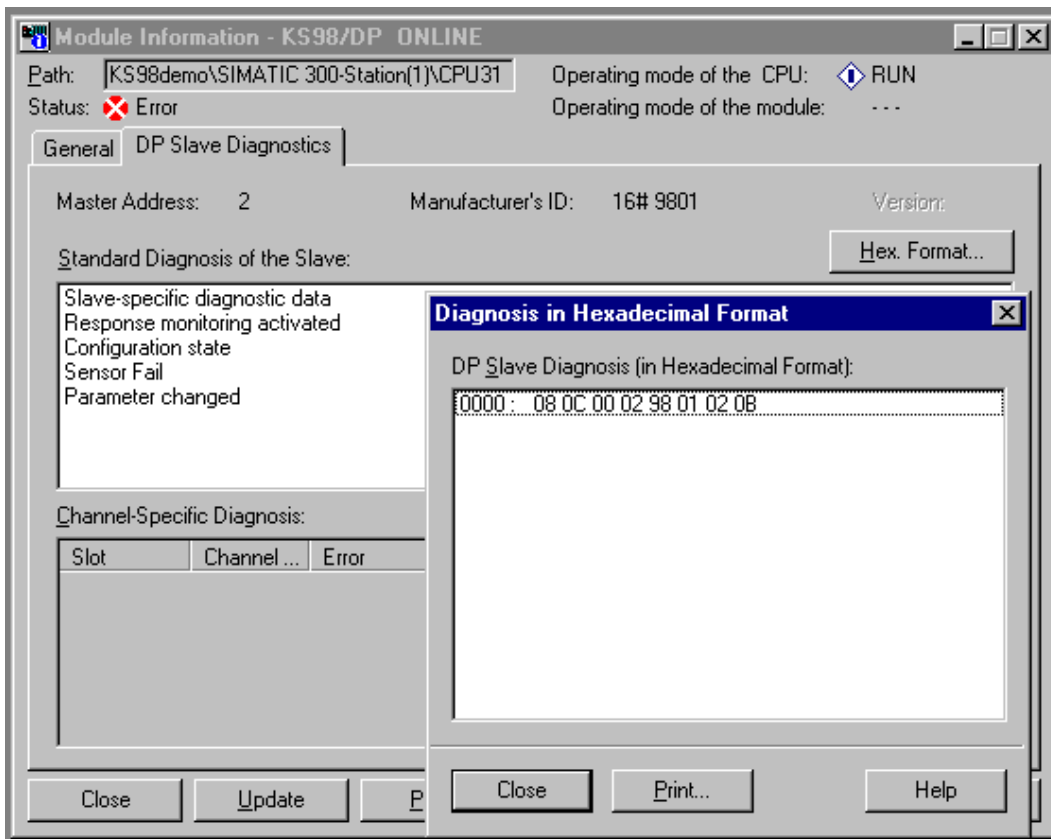
Instrument-specific diagnosis byte 1

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0

Bit no.	Name	Allocation	Status '0'	Status '1'	Type
D0	Online/Conf	Online / configuration	Online	Configuration	Status
D1	SFail	Sensor error INP1 ... INP6	no	yes	Diagnosis
D2	NAK	Error writing process values	no	yes	Diagnosis
D3	UPD	Parameter changed	no	yes	Status
D4 .. D7		Not used, always '0'			

3.3.3 Slave diagnosis display in STEP® 7

The KS98 module status and the diagnosis information in hexadecimal format are displayed on the following screen.



3.4 Process data transmission

Process data are read cyclically by the multi-function unit, whereby a minimum poll time of 100 ms for the first channel is ensured, unless an access via the parameter channel is made simultaneously.

Output data sent to KS98 are compared to the values sent previously and activated in case of deviation. If a value is faulty, bit 'NAK' in the external diagnosis is set, until no more faulty accesses are pending.

If there should be no more internal process data exchange with the multi-function unit, bit 2 (static diagnosis) in station status 2 in the PROFIBUS slave diagnosis is set.

- i** Bei einer Clear-Data Nachricht werden die nachfolgenden Daten (diese sind alle 0) nicht übernommen. Der KS 98 arbeitet autark mit den letzten gültigen Daten weiter. Wird Clear-Data zurückgesetzt, so werden die in dieser Nachricht enthaltenen Daten nicht übernommen.

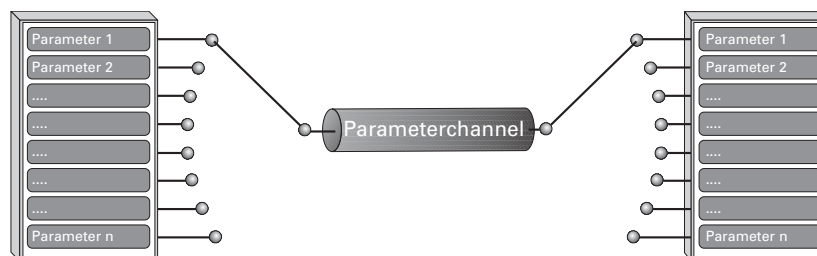
3.5 Parameter transmission

For parameter transmission, the 'parameter channel' is available. Via this channel, transparent data exchange via the function block protocol independent of multifunction unit is possible, whereby all possible protocol access modes are supported (individual access, tens block and overall block). Communication to the controller is transparent, i.e. the user himself is responsible for monitoring ranges, operating modes (remote/local) etc.

The parameter channel was designed for large data volumes with low requirements on the transfer rate. The parameter channel transfer rate can be increased (up to factor 3, dependent of number of message data to be transmitted, bus cycle time and master cycle time). For activating or de-activating this function, a special message must be sent to KS 98 (code = 31; FB no. = 0; Fct. no. = 98; tType = 0). Switching over with value 1 means that parameter channel handling has priority over fast process data transmission. Switching off is done by transmission of value 0 or after supply voltage switch-on.

From KS 98 operating version 5, allocating function blocks up to block number 450 is possible. The most significant bit in the fct. no signals a block number > 250.

Example: Access to the set-point (Wvol) of controller block 300
Code = 32; FB no.. = 50; fct.. no. = 129



3.5.1 Message elements

A number of terms which are used in the following descriptions are explained below:

Element	Description	Rem.
ID	Telegram type identification	A
ID1	Format of the data to be transmitted or received	B
Code	Addressing code of a datum	C
FB no.	Function block number	D
Fct. no.	Function number	E
Type	Function type	F

ID

This element identifies the telegram mode:

ID = 0x10 \triangleq start telegram
 ID = 0x68 \triangleq data telegram
 ID = 0x16 \triangleq end telegram

ID1

This element identifies the file format:
 (permissibility dependent of access type)

ID1 = 0 \triangleq integer
 ID1 = 1 \triangleq Real
 ID1 = 2 \triangleq Char ¹⁾
 ID1 = 3*
 ID1 = 4 \triangleq Char (kompakte Übertragung) ²⁾

* ID1 = 3: (Special format)

- With individual access, all data are transmitted in float format (4 bytes IEEE 784 format).
- With block access (tens block), value 0 is transmitted for unused block data. 9 values are always transmitted!
- With block access (overall block), real data in float format are transmitted (4 bytes IEEE 784 format), however, integer data are transmitted as integer values. In a read reply, the function block type is entered additionally in byte 5.
- Statuses (codes 01, 02, 11,12 or value > 3F) are transmitted without conversion in the last one of the 4 bytes.

Code

The code identification is decimal and the range includes '00'...'99' and '177' \triangleq B1, '178' \triangleq B2 and '179' \triangleq B3.

FB no. (function block number)

A function block is addressed with a function block number. The number is within '0' and '250'.

Function block number ranges:

- 0 General data for the overall instrument
- 1 - 99 firmly set function blocks
- 100 - 250 freely definable function blocks

Fct. no. (function number)

A function as a partial function block address is also addressed with a function number. The number is within '0' and '99'.

Function number ranges:

- 0 function general
- 1 - 99 other functions

Type (function type)

A function type number is also allocated to each function block. The number is within '0' and '126'.

Function types:

- 0 function type general
- 1 - 126 other function types

1) The data stream is sent after character '=' as part of the FB telegram, commas are replaced by SUB (26.).

2) All 4 available bytes are used for character transmission.

3.5.2 General transmission structure

For transmission of the parameters required for the function block protocol via an 8-byte data window, the access is composed of three parts:

- Command header with specification of code, FB no., fct. no., type and following real and integer values.

Start telegram structure:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
ID	ID1	Code	FB no.	Fct._no.	Type	Number of real values	Number of integer values

- n data blocks with the useful data to be transmitted

Data telegram structure:

a) Transmission of REAL values

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
ID	Count					Float	

b) Transmission of fixed point integer values

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
ID	Count					Integer	

c) Char value transmission

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
ID	Count				Char		

- an end block, provides the operation result

End telegram structure:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
ID		Result					

Signification of result	
0	OK
1	Timeout occurred
2	Parity error
3	Faulty BCC
4	NAK

internal interface

Reading or writing is always started by the master. If the number of real and integer values is $\neq 0$, a Write service, otherwise a Read service is started.

The code determines the access type:

Code < 100, no multiple of 10	→	individual access
Code < 100, multiple of 10	→	tens block access
Code > 100	→	Block access overall block

3.5.3 Data write sequence

Start telegram:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x10	ID1	Code	FB no.	Fkt._no.	Type	Number of real value	Number of integer values

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x10							

Data telegrams:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
0x68	count			Value	0x68	count			

Thereby, the first value is sent with Count = 1, for flow control, Count is reflected by KS98 (\geq once). The values are transmitted in the order Real Integer.

End telegram:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Byte 0	Byte 1	Byte 2-3	Byte 4 - 7
0x16					0x16		Result	

3.5.4 Data read sequence

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	ID1	Code	FB no.	Fct._no.	Type	0	0
Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10						Number of real values	Number of integer values

Data telegrams:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
Master sends:	0x68	count				0x68	count			Value
Controller replies:										

Thereby, the first value is sent with Count = 1, for flow control, Count is reflected by the master (\geq once). The values are transmitted in the order Real Integer.

End telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Byte 0	Byte 1	Byte 2-3	Byte 4 - 7
Master sends:	0x16					0x16		Result	
Controller replies:									

3.6 Examples

3.6.1 Principles of the function block protocol

A function block has input and output data (process data) as well as parameter and configuration data. It is addressable via a block number. An allocated block type defines the relevant function.

The access mechanisms are:

3.6.2 Individual access

With this access (code xx), an individual process value of a function can be read or written.

Valid values for ID1:

a) Configuration as FixPoint:	0 = integer 1 = real	float values are transmitted as integers (without digits behind the decimal point) float values are transmitted as FixPoint (1 digit behind the decimal point)
b) Configuration as float:	0, 1	transmission as a 4-byte float value.

Example 1: (Message structure with data sending)

Transmission of the non-volatile set-point (Wnvol) to the controller

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	1	31	100	0	90	0	1
Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10							

Data telegrams:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
Master sends:	0x68	1			250	0x68	1			
Controller replies:										

End telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
Master sends:	0x16					0x16		0	
Controller replies:									

Example 2: (Message structure with data request)

Reading the error code of the controller self-tuning heating (MSG1)

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	0	35	100	2	90	0	0
Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10						0	1

Data telegrams:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
Master sends:	0x68	1				Controller replies:	0x68	1			2 (ok)

End telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
Master sends:	0x16					Controller replies:	0x16		0	

3.6.3 Block access (tens block)

Maximum nine process values (always as REAL values) of a function can be read with this access (code x0).

Valid values for ID1:

a) Configuration as fix point:	0, 1	transmission as a FixPoint value
b) Configuration as float:	0, 1	transmission as a 4-byte float value

Example: (Message structure with data request)

Reading the controller set-points (W_{nvol} , W_{vol}) and output values (dY_{man} , Y_{man}).

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	0	20	50	0	90	0	0
Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10						0	3

Data telegrams:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
Master sends:	0x68	1				Controller replies:	0x68	1			150
Master sends:	0x68	2				Controller replies:	0x68	2			250
Master sends:	0x68	3				Controller replies:	0x68	3			0
Master sends:	0x68	4				Controller replies:	0x68	4			20

End telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
Master sends:	0x16					Controller replies:	0x16		0	

3.6.4 Block access (overall block)

All I/O (code 177), parameter (code 178) and configuration data (code 179) of a function can be read or written with this access. The following conditions are valid for this access:

- For writing data with 'code B3', the instrument must be switched to configuration mode (→ see page 'OpMod'). After entry, all new configuration data and parameters are only effective with the instrument switched back to on-line.
- All data of a message must be defined, omissions are not permissible.
- The complete message must be transmitted also, if parts of a message in the instrument are not used (HW and SW options). Checking the data which are not provided is omitted.
- With faulty block write accesses, the following information is valid: a message is replied with NAK, if at least one datum is faulty. Already valid values are taken over.

The message structure with block accesses with code B2/B3 is shown below using two examples. The order of data to be transmitted is given in the relevant code table.

Valid values for ID1:		
a) Configuration as FixPoint:	0, 1	transmission as a FixPoint value
	2	transparent transmission as a character string (for structure)
b) Configuration as float:	0, 1	transmission as a 4-byte float value
	2	transparent transmission as a character string (for structure)

3.6.5 Example for overall block accesses

I/O data (code B1)

I/O data of a function block can be read out or written ¹⁾ via the B1 access .

Example: (message structure with data request)

Reading the AINP1 input values.

Start telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10	0	B1	61	0	110	0	0
Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10						1	2

Data telegrams:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	1					0x68	1			87
Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	2					0x68	2			0
Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	3					0x68	3			1

End telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
	0x16						0x16		0	

Example: (message structure with data sending)

Writing the AINP1 output values. The written values are effective with 1 specified in **Debus** (→ see page 36).

Start telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10	0	B1	61	1	110	1	4
Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10						0	0

Data telegrams:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	1			123.45		0x68	1			
Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	2			0		0x68	2			
Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	3			0		0x68	3			
Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	1			0		0x68	1			
Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	2			0		0x68	2			

End telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
	0x16						0x16		0	

1) Only function block INP1 ... INP6 output data can be written.

Trend data of VTREND (code B1)

The 100 only readable trend data of function VTREND can be read in four B1 accesses with fct. no. 80 ... 83 (→ see also page 62).

Example: (message structure with data sending)

Trend data reading 75 .. 100.

Start telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10	0	B1	110	83	99	0	0
Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10						25	1

Data telegrams:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	1					0x68	1			8.001

•
•
•
•
•

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	25					0x68	25			58.002

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	26					0x68	26			32

End telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
	0x16						0x16		0	

Parameter data (code B2)

The access via code B2 permits groupwise parameter data reading and writing.

Example: (message structure with data request)

Reading the TIME1 parameters.

Start telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10	0	B2	101	0	69	0	0
Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10						2	0

Data telegrams:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	25					0x68	25			0

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	26					0x68	26			0

End telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
	0x16						0x16		0	

Example: (message structure with data sending)
Writing the TIME1 parameters

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	0	B2	101	0	69	2	0
Controller replies:	0x10						0	0

Data telegrams:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	25			0		0x68	25			
Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	26			0		0x68	26			

End telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
	0x16						0x16		0	

Display texts (code B2)

This access permits groupwise reading and writing of display texts. A text always comprises 16 characters and is of type CHAR(16). Writing is possible only during off-line mode (configuration mode).

Example: (message structure with data request)
Reading the display texts of VTREND

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	2	B2	110	80	99	0	0
Controller replies:	0x10						0	2

Data telegrams:

Master sends:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7
	0x68	1					0x68	1		'A'	
•											
•											
Master sends:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7
	0x68	16					0x68	16		'P'	
Master sends:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7
	0x68	17					0x68	17		'A'	
•											
•											
Master sends:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7
	0x68	32					0x68	32		'P'	

End telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
	0x16						0x16		0	

Example: (message structure with data sending)

Writing the display texts of VTREND.

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	2	B2	110	80	99	0	0
Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x10						0	2

Data telegram:

Master sends:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7
	0x68	1		'A'			0x68	1			

•

Master sends:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7
	0x68	16		'P'			0x68	16			

Master sends:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7
	0x68	17		'A'			0x68	17			

•

Master sends:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7
	0x68	32		'P'			0x68	32			

End telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
	0x16						0x16		0	

Password (code B2)

Example: (message structure with data sending)

Set / modify / delete password. This access is permitted, unless there is already a password, or in logged-in condition.

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	0	B2	0	80	0	0	1
Controller replies:	0x10						0	0

Data telegrams:

Master sends:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7
	0x68	1		'A'			0x68	1			

-
-

Master sends:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 4	Byte 5	Byte 6 - 7
	0x68	16		'P'			0x68	16			

End telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
	0x16						0x16		0	

Example: (message structure with data sending)

Logging out (activating the password). This access is permitted, if a password exists (password status = 1 or 2).

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	0	23	0	4	0		1
Controller replies:	0x10						0	0

Data telegrams:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
	0x68	1			2		0x68	1			

End telegram:

Master sends:	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7	Controller replies:	Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
	0x16						0x16		0	

Configuration data (code B3)

The access via code B3 permits groupwise configuration data reading and writing. For writing configuration data, the instrument must have been switched to the configuration mode previously. After entry, all new configurations are only valid, when the instrument is switched to on-line again.

Example: (message structure with data sending)

TIME1 configuration reading.

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	0	B3	101	0	69	0	0
Controller replies:	0x10						0	1

Data telegrams:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
Master sends:	0x68	1				Controller replies:	0x68	1			0
End telegram:											

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
Master sends:	0x16					Controller replies:	0x16		0	

Example: (message structure with data sending)
TIME1 parameter writing

- Switch KS98 to off-line

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	0	21	0	0	0		1
Controller replies:	0x10						0	0

Data telegrams:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
Master sends:	0x68	1			1	Controller replies:	0x68	1			

End telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
Master sends:	0x16					Controller replies:	0x16		0	

- Computer transmits data to KS98:

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	0	B3	101	0	69		1
Controller replies:	0x10						0	0

Data telegrams:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
Master sends:	0x68	1			1	Controller replies:	0x68	1			

End telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
Master sends:	0x16					Controller replies:	0x16		0	

- Switch KS98 to on-line

Start telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Master sends:	0x10	0	21	0	0	0		1
Controller replies:	0x10						0	0

Data telegrams:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7
Master sends:	0x68	1			0	Controller replies:	0x68	1			

End telegram:

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - 7		Byte 0	Byte 1	Byte 2 - 3	Byte 4 - 7
Master sends:	0x16					Controller replies:	0x16		0	

3.7 Quick entrance

The disk enclosed in the engineering set contains the GSD file, project examples for a SIMATIC® S5/S7, the type file and configuration examples for COM PROFIBUS. Communication with a KS98/DP can be built up easily by means of configuration and project.

3.7.1 Quick entrance with S5


Test environment

The following components are required for the test set-up:

- Programming unit (PG740 recommended)
- Automation unit
 - S5-115U, S5-135U or S5-155U with IM 308-C
- KS98/DP
- Engineering set (order no. 9407 999 100x1)
- Cable
 - PROFIBUS cable automation unit / IM 308-C ↔ KS98/DP
 - programming unit ↔ automation unit
- PC adaptor (order no. 9407 998 00001)
- Engineering tool (order no. 9407 999 063x1)

Example of a test environment:

A KS98/DP with address 5 shall be connected to an IM 308-C via PROFIBUS-DP. Process data module B is selected (1 channel + parameters). Data shall be transmitted in Fix Point format. The I/O addresses in the S5 start at 64 in the P area.

 Before taking the test environment into operation, you should ensure that the automation units do not contain any user software ("initial delete"). The same also applies to the IM 308-C memory card.

Procedure:

- Install engineering tool ET/KS98.
- Load example file '*PROFIBUS.EDG*'
- Transmit the project to the instrument.
- Make the connections (PROFIBUS)
- Configure the instruments
 - Connect KS98/DP to the network and adjust address 5 (via front panel).
 - Activate the bus terminating resistors at the controller and at the (S5) PLC connector.
- PROFIBUS network configuration
 - Insert the disk (engineering set) into the programming unit.
 - Call up 'COM PROFIBUS' and load example (A:\ks98dp\typ\example\demo308i.et2)
 - Select the correct CPU type with IM308C.
 - If necessary, adapt addresses and DP network and transmit them to the DP master (→ Fig.: 7).
- Load S5 program
 - Insert the disk (engineering set) into the programming unit.
 - Call up STEP® 5.
 - Load program example, e.g. (A:\ks98dp\s5-fb\example.fix)
 - If necessary, adapt the addresses for send/receive window (A-A/E-A in FB) and transmit them to the automation unit.
 - Switch the automation unit to run.

Fig.: 7 Module b configuration example (with COM PROFIBUS for SIMATIC S5 with IM308C)

ID	Remarks	I Addr.	O Addr.
0	8DI State1_1	P064	
1	8DI State2_1	P065	
2	1AI Input1_1	P066	
3	1AI Input2_1	P068	
4	1AI Input3_1	P070	
5	1AI Input4_1	P072	
6	1AI Input5_1	P074	
7	1AI Input6_1	P076	
8	8DO Cntrl1_1		P064
9	8DO Cntrl2_1		P065
10	1AO Output1_1		P066
11	1AO Output2_1		P068
12	1AO Output3_1		P070
13	1AO Output4_1		P072

After taking the test set-up into operation, testing the I/O areas and calling up the parameter channel are possible by means of the graphic modules enclosed in the project.

Graphic module 1:
The input process data of data module b are shown (Fix-Point).

Operanden:	Signalzustände:
-State1_1	EB 64 KM=10101010
-State2_1	EB 65 KM=10101010
-Input1_1	EW 66 KF=+3966
-Input2_1	EW 68 KF=+2382
-Input3_1	EW 70 KF=+3618
-Input4_1	EW 72 KF=+1234
-Input5_1	EW 74 KF=+0
-Input6_1	EW 76 KF=+0

Graphic module 2:
All output process data of data module b are shown (Fix-Point).

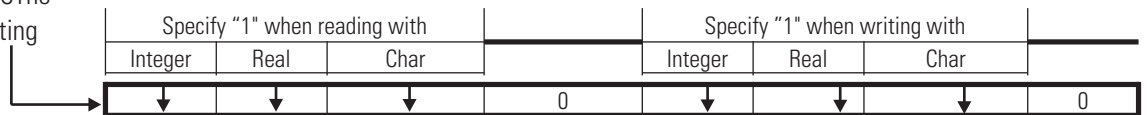
Operanden:	Signalzustände:
-Cntrl1_1	AB 64 KM=10101010
-Cntrl2_1	AB 65 KM=00000000
-Output1_1	AW 66 KF=+1234
-Output2_1	AW 68 KF=+15000
-Output3_1	AW 70 KF=+0
-Output4_1	AW 72 KF=+0
-Output5_1	AW 74 KF=+0
-Output6_1	AW 76 KF=+0

Graphic module 3:
This graphic module can be used for access to the parameters of the function module for parameter channel mapping.

Operanden:	Signalzustände:
-DWLR	MW 52 KF=+1
-DWLI	MW 54 KF=+0
-DWLC	MW 56 KF=+0
-Read/Wr	MW 58 KH=0001
-Code	MW 60 KF=+6
-FBno.	MW 62 KF=+101
-FCTno.	MW 64 KF=+0
-Type	MW 66 KF=+24
-ANZW	MW 68 KM=00000000 00000010
-Setting	MB 0 KM=00000000
.....	DB 12
-DBval1	DW 11 KF=+9000

Specify e.g. when reading values:

- Code
- FBno
- FCTno
- Setting



- ANZW indicates status and result after completing the FB handling.
- DWLR, DWLI, DWLC indicate the number of read values.

Graphic module 4:
This graphic module indicates the first data of the data module into which parameter channel data are written, or from which values are read out.

Operanden:	Signalzustände:
.....	DB 12
-DBval1	DW 11 KF=+600
-DBval2	DW 12 KF=+1000
-DBval3	DW 13 KF=+600
-DBval4	DW 14 KF=+2000
-DBval5	DW 15 KF=+600
-DBval6	DW 16 KF=+3000
-DBval7	DW 17 KF=+600
-DBval8	DW 18 KF=+4000
-DBval9	DW 19 KF=+600
-DBval10	DW 20 KF=+5000
-DBval11	DW 21 KF=+600
-DBval12	DW 22 KF=+6000
-DBval13	DW 23 KF=+600
-DBval14	DW 24 KF=+7000
.....	DW 25 KF=+600
.....	DW 26 KF=+8000
.....	DW 27 KF=+600
.....	DW 28 KF=+9000
.....	DW 29 KF=+600

3.7.2 Quick entrance with S7

Test environment

The following components are required for the test set-up:

- Programming unit (PG740 recommended)
- Automation unit
 - CPU315-2 DP
- KS98/DP
- Engineering set (order no. 9407 999 100x1)
- Cable
 - PROFIBUS cable automation unit ↔ KS98/DP
 - programming unit ↔ automation unit
- PC adaptor (order no. 9407 998 00001)
- Engineering tool (order no. 9407 999 063x1)

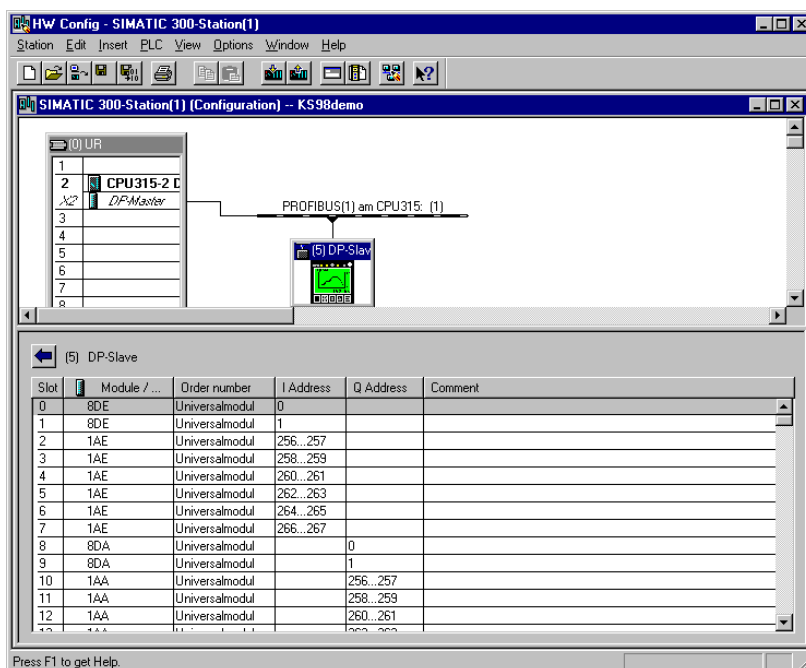
Example of a test environment:

A KS98/DP with address 5 shall be connected to a CPU315-2 DP via PROFIBUS-DP. Process data module B is selected (1 channel + parameters). Data shall be transmitted in Fix Point format.

- i** Before taking the test environment into operation, ensure that the automation units do not contain any user software ("initial clear").

Procedure:

- Install engineering tool ET/KS98
- Load example file 'PROFIBUS.EDG'
- Transmit the project to the unit.
- Make the connections (PROFIBUS)
- Configure the instruments
 - Adjust address 5 at KS98/DP (via front panel) and connect it to the network.
 - Activate the bus terminating resistors at the controller and at the (S7) PLC connector.
- Configure the PROFIBUS network.
 - Insert the disk (engineering set) into the programming unit.
 - De-archive project example. (A:\KS98DP\S7_FB\EXAMPLE\KS98demo.arj)
 - Open projekt KS98demo.
 - If necessary, match addressings and CPU hardware configuration and transmit them to the DP master (CPU315-2 DP).
 - Switch the automation unit to run.



After taking the test set-up into operation, testing the I/O area and calling up the parameter channel are possible by means of the variable tables (VAT x) enclosed in the project.

VAT 1:

The process data of a DPREAD and a DPWRITE function block are shown (Fix-Point).

Address	Symbol	Monitor Value	Modify Value
//KS98/DP Adr. 5 - Demonstration Process Data - 1 channel			
PIB 0	"State1_1"	2#0000_0001	
PIB 1	"State2_1"	2#0000_0001	
PIW 256	"Input1_1"	5913	
PIW 258	"Input2_1"	3548	
PIW 260	"Input3_1"	2452	
PIW 262	"Input4_1"	0	
PIW 264	"Input5_1"	0	
PIW 266	"Input6_1"	300	
PQB 0	"Cntrl1_1"	No monitor value.	2#0000_0001
PQB 1	"Cntrl2_1"	No monitor value.	2#0000_0001
PQW 256	"Output1_1"	No monitor value.	
PQW 258	"Output2_1"	No monitor value.	
PQW 260	"Output3_1"	No monitor value.	300
PQW 262	"Output4_1"	No monitor value.	
PQW 264	"Output5_1"	No monitor value.	
PQW 266	"Output6_1"	No monitor value.	

VAT 2:

This variable table permits access to the parameters of the function module for parameter channel mapping. The lower part of the picture shows the data of a data module into which data of the parameter channel are written, or from which values are read out.

Address	Symbol	Monitor Value	Modify Value
//KS98/DP Adr. 5 - Demonstration parameter channel			
MW 100	"Service"	W#16#0000	W#16#0000
MW 102	"Code"	178	178
MW 104	"FBnr"	100	100
MW 106	"FKTr"	0	0
MW 108	"Type"	25	25
MW 110	"DWLR"	20	
MW 112	"DWLI"	0	//1
MW 114	"DWLC"	0	
MW 120	"ANZW_FixP"	2#0000_0000_0000_0010	
M 0.0	"Start_FixP"	2#0	2#1
M 121.4	"Reset_FixP"	2#0	//2#1
M 0.1	"Start_Float"	2#0	//2#1
MW 130	"ANZW_Float"	2#0000_0000_0000_0000	
M 131.4	"Reset_float"	2#0	
DB37.DBW 0	---	600	//300
DB37.DBW 2	---	1000	
DB37.DBW 4	---	600	
DB37.DBW 6	---	2000	
DB37.DBW 8	---	600	
DB37.DBW 10	---	3000	

Specify e.g. when reading Fixpoint values:

- CodeNo, FBNo, FKTr, Type = 0
- Service = 0x 0001
- Start_FixP = 1
- ANZW_FixP indicates status and result after completing the FB handling.
- DWLR, DWLI, indicate the number of read values.

3.8 Data types

Data values are divided into data types for transmission.

- FP
Floating point number
Range: -29999 ... -0.001, 0, 0.001 ... 200000
- INT
Positive integer number
Range: 0 ... 32767
Exception: switch-off value '-32000'
- ST1
Status, bit-oriented, 1 byte long
Range: 00H ... 3FH, transmitted: 40H...7FH
Only 6 bits can be used for information transfer, i.e. bit 0...5 (LSB = bit 0). Bit 6 must always be set to '1', to avoid confusion with the control characters. Bit 7 contains the parity bit.
- CHAR5/16
Text string comprising n characters, presently defined n=1, n=5, n=16
permissible characters: 20H...7FH
- ICMP (Integer Compact)
Bit information as integer transmission, max. 15 bits
Range: 0...32767; integer transmission is in ASCII format.

	fixed to '0'	Bit signification														
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Value	-	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1

Example:

Bit 13 = 1 and bit 1 = 1, all remaining bits are '0'

internal hex value: 0x2002, as integer value: 8194, transmitted ASCII value: '8194'

4

Code tables

4.1 Scheme of addressing data

The addressing of the data follows the principle described below:

Code**datarangecodenumber-range**

Level 1-data		
	-Read-only , ("Block 00")	0x, (1x)
	-Read/Write integer values	2x
	-Read/Write real values	3x
Parameter		4x, 5x, 6x
Config-data		7x, 8x, 9x

Function-no.**datarangefunction number-range**

Level 1-data		0 ... 19
Parameter		
	- Real parameter	20 ... 24
	- Integer parameter	25 ... 29
Config-data		
	- Real configurations	30 ... 34
	- Integer configurations	35 ... 39
Special fct. display texts		80 ... 84
Special fct. special data		85 ... 89

For Level 1 - data with code-ranges 0x and 1x effective:

- Values 01, 02 and. 11, 12 are reserved for statuswords type ST1.
- Max. 7 further values type BCD

Blockreading (10-block) access is possible, if defined, writing only as single access.

4.2

Header structure

The signification of the header inscription is:

Des.	Description	Range	R/W	Def.	Type	Rem.	Code	Fct.no.
Short name	Short description of value	Range	R = read W= write R/W = read and write	default value (with param. and config. data)	data type (→ S.34)	Remark	Access code	Function number

The column R/W is dropped if within a table reading and writing is allowed (see e.g. configuration- or parameterdata).

4.3

Instrument function

INSTRUMENT (instrument function - no. 0) Fixed block number 0

Process data

Des.	Description	Range	R/W	Type	Rem.	Code	Fct.no.
Block	Block access	01, 02	R	block		00	0
Status 1	Instrument status 1		R	ST1	A	01	0
Status 2	Instrument status 2		R	ST1	B	02	0
Block	Block access		R	block		20	0
OpMode	Instrument mode: Online Offline (configuration) Cancel configuration	0 1 2	R/W R	INT		21	0
Save	Safety status: not active active	0 1	R/W	INT		22	0
ResUpd	Reset of local data not changed change changed	0 1	R/W R	INT	C	23	0
ClearE	Delete engineering not deleted deleted / delete	0 1	R R/W	INT		24	0
Wire	Finish wiring not finished finished / finish	0 1	R R/W	INT		25	0
Debug	Debug mode	0..127	R/W	INT	D	26	0
PwFChk	Activate power fail not active check active / activate	0 1	R R/W	INT		27	0
WriteOK	Write permission read and write permission for field interface only read permission	0 1	R/W	INT		28	0
Block	Block access	01	R	block		00	1
Status 3	Instrument status 3		R	ST1	E	01	1
Block	Block access	21 .. 27	R	block		20	1
Hwbas	Basic HW option: module A, B	2101..2999	R	INT	F	21	1
Hwext	Ext. HW option: module B, C	0000..9999	R	INT	G	22	1
SWopt	SW option	0000..9999	R	INT	H	23	1
SWcode	SW code number (7th to 10th digit)	7254	R	INT	I	24	1
SWvers	SW version (SW code number 11th - 12th digit)	0000..0099	R	INT	J	25	1
OPvers	Operating version	0000..0099	R	INT		26	1
EEPvers	EEPROM version	0000..0099	R	INT		27	1
Block	Block access	21 .. 23	R	block		20	2
WrErr	Error during last write access	0, 100..127	R	INT		21	2
WrErPos	Position of last write access	0..99	R	INT		22	2
ReErr	Error during last read access	0, 100..127	R	INT		23	2
Block	Block access	21, 22	R	block		20	3
Addr	Interface address: ISO 1745 PROFIBUS	0 .. 99 0 .. 126	R/W	INT	K	21	3
AdrFl	Flag for address changing disabled	0 / 1	R/W	INT		22	3
Block	Block access	21 .. 23	R	block		20	4
PasMod	Password mode	0 .. 3	R/W	INT	R	21	4
PasVer	Password attempts	0 .. 99	R/W	INT	M	22	4
PasSt	Password status No password existing Password existing (in logged-in condition) Password existing (in logged-out condition)	0 1 2	R/(W)	INT		23	4
Refresh	activate/deactivate fast parameterchannel transmission	0..1	S	INT		31	98

Instrument 'status 1'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0

Bit no.	Name	Allocation	Status '0'	Status '1'
D0	XFail	Sensor failure (common message)	no	yes
D1	CNF	Instrument status	online	configuration
D2		Safety status	not active	active
D3		EEPROM error	no	yes
D4		Power-fail check	not active	active
D5	UPD	Parameter update	no	yes
D6	'1'	Always '1'		
D7		Parity		

Instrument 'status 2'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0		Engineering existing	no	yes			
D1		Wiring finished	no	yes			
D2		Parameter display by operation	possible	blocked			
D3		Configuration display by operation	possible	blocked			
D4		Main menu display by operation	possible	blocked			
D5		Field interface	read/write	read			
D6	'1'	always '1'					
D7		Parity					

Parameter update bit 'ResUpd'

Changing of a parameter value or of a configuration value via the local front panel or the PC interface is displayed in the status1 UPD flag. After power recovery, this bit is also set. The flag can be reset with code 23 = 0.

Debug

Used for storage of the I/O data written with AINPx and DINPUT.

2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
DINPUT	AINP6	AINP5	AINP4	AINP3	—	AINP1

Example: The outputs of AINP1 and AINP5 shall be specified via the interface. In this case, 9 must be specified in 'Debug'.

Instrument 'Status 3'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0		Bus access not successful	no	yes			
D1		Parameter setting faulty	no	yes			
D2		Configuration faulty	no	yes			
D3		No traffic of useful data	no	yes			
D4		Data status channel 1 .. 4	ok	faulty			
D5		Address changing disabled	no	yes			
D6	'1'	Always '1'					
D7		Parity					

HWbas (basic HW option: module A, B)

	Instrument type (Modul A)		Output-HW (Modul P)		
	T	H	Z	E	
KS 98-1	2	1	0	1	relay: Out1, 2, 3, 4
			2	1	Current: Out 1, 2 relay: Out 4, 5

Example: Value 'HWbas = 2121' means that the addressed unit is a KS 98-1 with 2 relays and 2 current outputs. (12NC e.g. 9407 956 xx0x1)

HWext (ext. HW option: module B, C)

	Module B		Module C		
	T	H	Z	E	
Not existing	0	0	0	0	Not existing
TTL-interface ISO 1745, without real-time clock	0	1	0	1	version a: 1 analog output (OUT3, continuous)
RS485/422-interface ISO 1745, with real-time clock	0	2	0	2	version b: 2 analog inputs (INP3, INP4)
PROFIBUS	1	0	0	4	version c: 5 digital inputs (di8 .. di12) and 2 digital outputs (do5, do6)
			0	5	version a+c
			0	6	version b+c
			0	7	version a+b+c

Example: Value 'HWexts = 0104' means that the addressed unit is equipped with a module B as TTL interface without real-time clock and a version C module c.
(12NC e.g. 9407 96x 11x01)

SWopt change 12NC 10th digit

T				H				Z				E			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Presently no definition

SWCod (SW code number 7th - 10th digit)

T	H	Z	E
7th digit	8th digit	9th digit	10th digit

Example: Value 'SWCod = 7254' means that the addressed unit contains the software with code number 4012 157 254xx.

SWVers (SW code number 11th and 12th digit)

T	H	Z	E
		11th digit	12th digit

Example: Value 'SWCod = 0011' means that the addressed unit contains the software with code number 4012 15x xxx11.

Interface address

A single write access to the address (code 21, fct.no. 3) disables further write accesses. A new write access is possible only, if a write access with code 73, fct. no. 35 was made, if the address was changed via the instrument front panel, or if disabling was removed by deleting flag **Adr-F1** with code 22, fct.no. 3.

Password mode

The password mode determines the access possibilities (→ see following table) to the KS 98-1 data via the interface.

	PasMod = 0	PasMod = 1	PasMod = 2	PasMod = 3
Password writing (logging in)	enabled	enabled	enabled	enabled
Process data reading and writing	enabled	enabled	enabled	disabled
I/O data and trend data reading and writing (code B1)	enabled	enabled	enabled	disabled
Parameter and display text reading and writing (code B2)	enabled	enabled	disabled	disabled
Configuration reading and writing (code B3)	enabled	disabled	disabled	disabled

PROFIBUS data can always be read / written!

Password attempts

Determines the number of permitted unsuccessful attempts during password transmission (log-in). When exceeding the number of permitted attempts, KS 98-1 is switched to the OFFLINE mode and the password as well as the existing engineering are deleted.

Parameter data

Des.	Description	Range	Default	Type	Rem.	Single access		Block access	
						Code	Fct. no.	Code	Fct. no.
Block	Block access	41 .. 48		block		40	25	B2	0
Year	Time year ^{1, 2)}	0 .. 99	0	INT		41	25		
Month	Time month ¹⁾	1 .. 12	1	INT		42	25		
Day	Time day ¹⁾	1 .. 31	1	INT		43	25		
Hour	Time hours ¹⁾	0 .. 23	0	INT		44	25		
Minute	Time minutes ¹⁾	0 .. 59	0	INT		45	25		
P-hide	Parameter display by operation	0 (possible) 1 (blocked)	0	INT	A	46	25		
c-hide	Configuration display by operation	0 (possible) 1 (blocked)	0	INT		47	25		
m-hide	Main menu display by operation	0 (possible) 1 (blocked)	0	INT		48	25		

These parameters are effective only if the real-time clock (HW option B with RS485) is fitted.

Calculation of the current year: range 70 ... 99 corresponding to 1970 ... 1999; range 00 ... 69 c corresponding to 2000 ... 2069; examples: value 98 corresponds to year 1998, value 02 corresponds to year 2002.

Blocking by operation

Parameters **ParOP**, **ConOP** and **MenOP** affect the possibility to change existing settings via the operation. Their status is connected via an OR function with the relevant digital inputs of function STATUS (→ see page 5), if it is used. The parameters are stored in EEPROM, i.e. they are available also after power-on. The priority of the OR function results is different.

MenOP	ParOP	ConOP	Main menu	Parameter	Configuration
1	d.c.	d.c.	blocked	blocked	blocked
0	1	d.c.	operable	blocked	blocked
0	0	1	operable	operable	blocked

Configuration display blocking means that the instrument cannot leave the online mode by operator entry, but only by interface message and that the configuration display via operation is not possible.

Parameter display blocking means that the parameters cannot be displayed. This does not affect the change of level-1 data on the operating pages.

Password

	Description	Type	Fct. no.	Code
SetPas	Set / change / delete password	CHAR(16)	80	B2
LogPas	Logging in (password)	CHAR(16)	81	

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Block	Block access	41 .. 48		Block	70	35	B3	0
Prot	Protocol mode	0	0	INT	71	35		
Baud	Baudrate	0 (not adjustable)	1	INT	72	35		
		1 (2400 Baud)						
		2 (4800 Baud)						
		3 (9600 Baud)						
	4 (19200 Baud)							
Adr	Instrument adress	0 .. 99 (ISO1745) 0 .. 126 (PROFIBUS)	0 126	INT	73	35		
Freq	Mains frequency	0 (50 Hz) 1 (60 Hz)	0	INT	74	35		
Lang	language	0 (german) 1 (english)	0	INT	75	35		

4.4 Scaling and calculation functions

ABSV (Absolute value - no. 01)

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
a	Multiplication factor	-29999 .. 999999	1,000	FP	41	20	B2	0
a0	Offset	-29999 .. 999999	0,000	FP	42	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: ABSV	80	B2

ADSU (Addition / subtraction - no. 03)

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
a	Multiplication factor for x1	-29999 .. 999999	1,000	FP	41	20	B2	0
b	Multiplication factor for x2	-29999 .. 999999	1,000	FP	42	20		
c	Multiplication factor for x3	-29999 .. 999999	1,000	FP	43	20		
d	Multiplication factor for x4	-29999 .. 999999	1,000	FP	44	20		
a0	Offset	-29999 .. 999999	0,000	FP	45	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 x2 x3 x4	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: ADSU	80	B2

MUDI (Multiplication / division - no. 05)

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
a	Multiplication factor for x1	-29999 .. 999999	1,000	FP	41	20	B2	0
b	Multiplication factor for x2	-29999 .. 999999	1,000	FP	42	20		
c	Multiplication factor for x3	-29999 .. 999999	1,000	FP	43	20		
a0	Offset for x1	-29999 .. 999999	0,000	FP	44	20		
b0	Offset for x2	-29999 .. 999999	0,000	FP	45	20		
c0	Offset for x3	-29999 .. 999999	0,000	FP	46	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 x2 x3	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: MUDI	80	B2

SQRT (Square root function - no. 08)

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
a	Multiplication factor	-29999 .. 999999	1,000	FP	41	20	B2	0
a0	Input offset	-29999 .. 999999	0,000	FP	42	20		
y0	Output offset	-29999 .. 999999	0,000	FP	43	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: S \sqrt{R} T	80	B2

SCAL

(Scaling - no. 09)

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
α	Multiplication factor	-29999 .. 999999	1,000	FP	41	20	B2	0
$\alpha 0$	Offset	-29999 .. 999999	0,000	FP	42	20		
EXP	Exponent	-7 .. 7	1,000	FP	43	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: SCAL	80	B2

10EXP

(Power of 10 - no. 10)

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: 10EXP	80	B2

EEXP

(e function - no. 11)

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: EEXP	80	B2

LN

(Natural logarithm - no.12)

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: LN	80	B2

LG10

(Decimal logarithm - no. 13)

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: LG10	80	B2

4.5 Non-linear functions

LINEAR (Linearization function no.. 07)

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x(1)	Input value for point 1	-29999 .. 999999	0,000	FP	41	20	B2	0
y(1)	Output value for point 1	-29999 .. 999999	0,000	FP	42	20		
x(2)	Input value for point 2	-29999 .. 999999	1,000	FP	43	20		
y(2)	Output value for point 2	-29999 .. 999999	1,000	FP	44	20		
x(3)	Input value for point 3	-29999 .. 999999	2,000	FP	45	20		
y(3)	Output value for point 3	-29999 .. 999999	2,000	FP	46	20		
x(4)	Input value for point 4	-29999 .. 999999	3,000	FP	47	20		
y(4)	Output value for point 4	-29999 .. 999999	3,000	FP	48	20		
x(5)	Input value for point 5	-29999 .. 999999	4,000	FP	49	20		
y(5)	Output value for point 5	-29999 .. 999999	4,000	FP	50	20		
x(6)	Input value for point 6	-29999 .. 999999	5,000	FP	51	20		
y(6)	Output value for point 6	-29999 .. 999999	5,000	FP	52	20		
x(7)	Input value for point 7	-29999 .. 999999	6,000	FP	53	20		
y(7)	Output value for point 7	-29999 .. 999999	6,000	FP	54	20		
x(8)	Input value for point 8	-29999 .. 999999	7,000	FP	55	20		
y(8)	Output value for point 8	-29999 .. 999999	7,000	FP	56	20		
x(9)	Input value for point 9	-29999 .. 999999	8,000	FP	57	20		
y(9)	Output value for point 9	-29999 .. 999999	8,000	FP	58	20		
x(10)	Input value for point 10	-29999 .. 999999	9,000	FP	59	20		
y(10)	Output value for point 10	-29999 .. 999999	9,000	FP	60	20		
x(11)	Input value for point 11	-29999 .. 999999	10,000	FP	61	20		
y(11)	Output value for point 11	-29999 .. 999999	10,000	FP	62	20		

I/O data		Description	Fct. no.	Code
Analog input:	x1		0	B1
	Casc			
Analog output:	y1		1	

Display texts

Default display		Fkt. Nr.	Code
Text 1:	LINEAR	80	B2

GAP (Dead band - no. 20)

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Low	Lower limit values	-29999 .. 0,000	0,000	FP	41	20	B2	0
High	Upper limit value	0,000 .. 999999	0,000	FP	42	20		

I/O data		Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display		Fct. no.	Code
Text 1:	GAP	80	B2

CHAR (Function generator - no. 21)

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x(1)	Input value for point 1	-29999 .. 999999	0,000	FP	71	30	B2	0
y(1)	Output value for point 1	-29999 .. 999999	0,000	FP	72	30		
x(2)	Input value for point 2	-29999 .. 999999	1,000	FP	73	30		
y(2)	Output value for point 2	-29999 .. 999999	1,000	FP	74	30		
x(3)	Input value for point 3	-29999 .. 999999	2,000	FP	75	30		
y(3)	Output value for point 3	-29999 .. 999999	2,000	FP	76	30		
x(4)	Input value for point 4	-29999 .. 999999	3,000	FP	77	30		
y(4)	Output value for point 4	-29999 .. 999999	3,000	FP	78	30		
x(5)	Input value for point 5	-29999 .. 999999	4,000	FP	79	30		
y(5)	Output value for point 5	-29999 .. 999999	4,000	FP	81	30		
x(6)	Input value for point 6	-29999 .. 999999	5,000	FP	82	30		
y(6)	Output value for point 6	-29999 .. 999999	5,000	FP	83	30		
x(7)	Input value for point 7	-29999 .. 999999	6,000	FP	84	30		
y(7)	Output value for point 7	-29999 .. 999999	6,000	FP	85	30		
x(8)	Input value for point 8	-29999 .. 999999	7,000	FP	86	30		
y(8)	Output value for point 8	-29999 .. 999999	7,000	FP	87	30		
x(9)	Input value for point 9	-29999 .. 999999	8,000	FP	88	30		
y(9)	Output value for point 9	-29999 .. 999999	8,000	FP	89	30		
x(10)	Input value for point 10	-29999 .. 999999	9,000	FP	91	30		
y(10)	Output value for point 10	-29999 .. 999999	9,000	FP	92	30		
x(11)	Input value for point 11	-29999 .. 999999	10,000	FP	93	30		
y(11)	Output value for point 11	-29999 .. 999999	10,000	FP	94	30		
See	Number of segments	0 .. 10	2	INT	71	35		

I/O data	Description	Fct. no.	Code
Analog input:	x1	0	B1
Analog output:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: CHAR	80	B2

4.6 Trigonometric functions

SIN (Sine function - no. 80)

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
Select	Unit: Angular degree Unit: radian measure	0 1	0	INT	41	25	B2	0

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: SIN	80	B2

COS (Cosine function - no. 81)

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
Select	unit: angular degree Unit: radian	0 1	0	INT	41	25	B2	0

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: COS	80	B2

TAN (Tangent function - no. 82)

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
Select	unit: angular degree Unit: radian measure	0 1	0	INT	41	25	B2	0

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: TAN	80	B2

COT (Cotangent function - no. 83)

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
Select	Unit: angular degree Unit: radian measure	0 1	0	INT	41	25	B2	0

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: COT	80	B2

ARCSIN (Arc- sine function - no. 84)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Select	Unit: Angular degree	0	0	INT	41	25	B2	0
	Unit: Radian measure	1						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: ARCSIN	80	B2

ARCCOS (Arc-cosine function - no. 85)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Select	Unit: Degree of angle	0	0	INT	41	25	B2	0
	Unit: Arc measure	1						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: ARCCOS	80	B2

ARCTAN (Arc-tangent function - no. 86)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Select	Unit: Angular degree	0	0	INT	41	25	B2	0
	Unit: Radian measure	1						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: ARCTAN	80	B2

ARCCOT (Arc-cotangent function - no. 87)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Select	Unit: Angular degree	0	0	INT	41	25	B2	0
	Unit: Radian measure	1						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: ARCCOT	80	B2

4.7 Logic functions

AND (AND gate - no. 60)

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1 d2 d3 d4	0	B1
Digital outputs:	z1 z2	1	

Display texts

Default display	Fct. no.	Code
Text 1: AND	80	B2

NOT (Inverter - no. 61)

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1	0	B1
Digital outputs:	z1	1	

Display texts

Default display	Fct. no.	Code
Text 1: NOT	80	B2

OR (OR gate - no. 62)

I/O data

I/O data	Description	Fct. no.	Code
Digital inputs:	d1 d2 d3 d4	0	B1
Digital outputs:	z1 z2	1	

Display texts

Default display	Fct. no.	Code
Text 1: OR	80	B2

BOUNCE (De-bouncer - no. 63)

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1	0	B1
Digital outputs:	z1	1	

Display texts

Default display	Fct. no.	Code
Text 1: BOUNCE	80	B2

EXOR (Exclusive OR gate - no. 64)

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1 d2	0	B1
Digital outputs:	z1 z2	1	

Display texts

Default display	Fct. no.	Code
Text 1: EXOR	80	B2

FLIP (D-type flip-flop - no. 65)

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1 (signal) d2 (clock) d3 (reset)	0	B1
Digital outputs:	z1 z2	1	

Display texts

Default display	Fct. no.	Code
Text 1: FLIP	80	B2

MONO (Monoflop - no. 66)

Parameter setting data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Ti1	Pulse duration in s (d1, Mode1 = 0)	0,0 .. 999999	1,0	FP	41	20	B2	0
Ti2	Pulse duration in s (d2, Mode2 = 0)	0,0 .. 999999	1,0	FP	42	20		
Mode1	Source of pulse duration T1 = Ti1 Source of pulse duration T1 = x1	0 1	0	INT	41	25		
Mode2	Source of pulse duration T1 = Ti2 Source of pulse duration T1 = x2	0 1	0	INT	42	25		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 (Ti1) x2 (Ti2)	0	B1
Digital inputs:	d1 d2		
Digital outputs:	z1 z2 z3 z4	1	

Display texts

Default display	Fct. no.	Code
Text 1: MONO	80	B2

STEP (Step function for sequencing - no. 68)

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 (Casc)	0	B1
Digital inputs:	d1 d2 d3 d4 d5 d6 d7 d8 d9 d10 d11 (reset) d12 (stop) d13 (skip)		
Analog outputs:	y1 (step)	1	
Digital outputs:	z1 (activ)		

Display texts

Default display	Fct. no.	Code
Text 1: STEP	80	B2

TIME1 (Timer - no. 69)

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
T1	Delay time in s (d1 = 0→1)	0,0 .. 999999	0,0	FP	41	20	B2	0
T2	Delay time in s (d1 = 1→0)	0,0 .. 999999	0,0	FP	42	20		

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Select	Delay times = T1 / T2 Delay times = x1 / x2	0 1	0	INT	71	35	B3	0

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 (t1) x2 (t2)	0	B1
Digital inputs:	d1		
Digital outputs:	z1 z2	1	

Display texts

Default display	Fct. no.	Code
Text 1: TIME1	80	B2

4.8 Signal converters

ABIN (Analog ↔ binary conversion - no. 71)

Configuration data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
Select	analog → binary and vice versa	0	0	INT	71	35	B2	0
	analog → FP and vice versa	1						
	analog → 1 out of 8 and vice versa	2						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1 d2 d3 d4 d5 d6 d7 d8		
Analog outputs:	y1	1	
Digital outputs:	z1 z2 z3 z4 z5 z6 z7 z8		

Display texts

Default display	Fct. no.	Code
Text 1: ABIN	80	B2

TRUNC (Integer portion - no. 72)

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: TRUNC	80	B2

PULS (Analog-pulse conversion - no. 73)

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
x0	Span start	-29999 .. 999999	0,000	FP	41	20	B2	0
x100	End of span	-29999 .. 999999	1,000	FP	42	20		
Pulses/h	Pulses/h for x1 = x100	0 .. 18000	0	FP	43	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: PULS	80	B2

COUN (Up / down counter - no. 74)

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
p0	Preset value	0,000 .. 9999,0	0,000	FP	41	20	B2	0
Max	Max. limit	-29999 .. 999999	9999,0	FP	42	20		
Min	Min. limit	-29999 .. 999999	0,000	FP	43	20		
Mode	Source of preset value = p0 Source of preset = x1	0 1	0	INT	41	25		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 (Preset)	0	B1
Digital inputs:	d1 (up) d2 (down) d3 (preset) d4 (reset)		
Analog outputs:	y1 (Count)	1	
Digital outputs:	z1 (carry) z2 (borrow)		

Display texts

Default display		Fct. no.	Code
Text 1:	COUN	80	B2

MEAN

(Mean value generation - no. 75)

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Sample	Sample time	0,100 .. 999999	100	FP	71	30	B3	0
ValNo	Number of values to be sampled	1 .. 100	100	INT	71	35		
Unit	Time unit for Sample: s	0 ..	0	INT	72	35		
	Time unit for Sample: min	1 ..						
	Time unit for Sample: h	2						

I/O data

Description		Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1 (disabl) d2 (reset) d3 (sample)		
Analog outputs:	y1 (Mean)	1	
Digital outputs:	z1 (ready)		

Display texts

Default display		Fct.no.	Code
Text 1:	MEAN	80	B2

AOCTET

(Data type converter - no. 02)

Configuration data

	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Ioct	Data type of Inputs _Uint8	0 ..	0	INT	41	25	B3	0
	Data type of Inputs _Int8	1 ..						
	Data type of Inputs _Uint16	2 ..						
	Data type of Inputs _Int16	3 ..						
	Data type of Inputs _Uint32	4 ..						
	Data type of Inputs _Int32	5 ..						
Ooct	Data type of Outputs _Uint8	0 ..	0	INT	42	25		
	Data type of Outputs _Int8	1 ..						
	Data type of Outputs _Uint16	2 ..						
	Data type of Outputs _Int16	3 ..						
	Data type of Outputs _Uint32	4 ..						
	Data type of Outputs _Int32	5 ..						
	Data type of Outputs Float	6						

I/O-data

Description		Fct.no.	Code
Analog inputs:	x1 (Ioct1) x2 (Ioct2) x3 (Ioct3) x4 (Ioct4)	0	B1
	x5 (X 1)		
Analog Outputs:	y1 (Y 1) y2 (Ooct1) y3 (Ooct2) y4 (Ooct3)	1	
	y5 (Ooct4)		

Display texts

Default display		Fct.no.	Code
Text 1:	AOCTET	80	B2

4.9 Time functions

LEAD (Differentiator - no. 50)

Parameter data

	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
a	Gain factor	-29999 .. 999999	1,000	FP	41	20	B2	0
u0	Output offset	-29999 .. 999999	0,000	FP	42	20		
T	Time constant in s	0,0 .. 199999	1,0	FP	43	20		

Configuration data

	Description	Range	Def.	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Mode	Differentiate all changes	0	0	INT	71	35	B3	0
	Differentiate only positive changes	1						
	Differentiate only negative changes	2						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Analog outputs:	y1	1	

Display texts

Default display		Fct. no.	Code
Text 1:	LEAD	80	B2

INTE (Integrator - no. 51)

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
T	Time constant in s	0,1 .. 999999	60,0	FP	41	20	B2	0
x0	Constant	-29999 .. 999999	0,000	FP	42	20		
u0	Preset value	-29999 .. 999999	0,000	FP	43	20		
Max	Max. limit	0,000 .. 999999	1,000	FP	44	20		
Min	Min. limit	-29999 .. 1,000	0,000	FP	45	20		
Mode	Source of preset value = u0	0	0	INT	41	25		
	Source of Preset = x2	1						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 ; X2 (preset)	0	B1
Digital inputs:	d1 (stop) ; d2 (reset) ; d3 (preset)		
Analog outputs:	y1	1	
Digital outputs:	z1 (max) ; z2 (min)		

Display texts

Default display		Fct. no.	Code
Text 1:	INTE	80	B2

LAG (Filter - no. 52)

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Fct. no.	Code	Code	Fct. no.
T	Time constant in s	0,0 .. 199999	1,0	FP	20	41	B2	0

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1 (reset)		
Analog outputs:	y1	1	

Display texts

Default display		Fct. no.	Code
Text 1:	LAG	80	B2

DELA1 (Delay time 1 - no. 53)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Fct. no.	Code	Code	Fct. no.
r	DelayVerzögerungszahl	0 .. 255	0	INT	25	41	B2	0

I/O data

I/O data	Description	Fct. no.	Code
Analog inputs:	x1 X2 (preset)	0	B1
Digital inputs:	d1 (reset) d2 (pereset) d3 (clock)		
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: DELA1	80	B2

DELA2 (Delay time 2 - no. 54)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Fct. no.	Code	Code	Fct. no.
Td	Delay in s	0,0 .. 999999	0,0	FP	20	41	B2	0

I/O data

I/O data	Description	Fct. no.	Code
Analog inputs:	x1 X2 (preset)	0	B1
Digital inputs:	d1 (reset) d2 (pereset)		
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: DELA2	80	B2

FILT (Filter with tolerance band - no. 55)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Fct. no.	Code	Code	Fct. no.
T	Time constant in s	0,0 .. 199999	1,0	FP	20	41	B2	0
Diff	Tolerance band	0,000 .. 999999	1,000	FP	20	41		

I/O data

I/O data	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1 (reset)		
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: FILT	80	B2

TIMER (Timer 1 - no. 67)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
TS.Mo	Switch-on delay, months	0 .. 12	0	INT	41	25	B2	0
TS.D	Switch-on delay, days	0 .. 31	0	INT	42	25		
TS.H	Switch-on delay, hours	0 .. 23	0	INT	43	25		
TS.Mi	Switch-on time, minutes	0 .. 59	0	INT	44	25		
TE.D	Switch-on duration, days	0 .. 255	0	INT	45	25		
TE.H	Switch-on duration, hours	0 .. 23	0	INT	46	25		
TE.Mi	Switch-on duration, minutes	0 .. 59	0	INT	47	25		

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Func1	Function runs cyclically	0 .. 1	0	INT	71	35	B3	0
	Function runs once	1						
Func2	Function runs daily	0 .. 1	0	INT	72	35	B3	0
	Function runs from Mon...Fri	1						
	Function runs from Mon...Sat	2						
	Function runs weekly	3						

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1 (disabl)	0	B1
Analog outputs:	y1 (Week-D)	1	
Digital outputs:	z1		

Display texts

Default display	Fct. no.	Code
Text 1: TIMER	80	B2

TIME2

(Timer 2 - no. 70)

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
TS.D	Switch-on delay, days	0 .. 31	0	INT	41	25	B2	0
TS.H	Switch-on delay, hours	0 .. 23	0	INT	42	25		
TS.Mi	Switch-on delay, minutes	0 .. 59	0	INT	43	25		
TE.D	Switch-on duration, days	0 .. 255	0	INT	44	25		
TE.H	Switch-on duration, hours	0 .. 23	0	INT	45	25		
TE.Mi	Switch-on duration, minutes	0 .. 59	0	INT	46	25		

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1 (disabl) ; d2 (reset) ; d3 (start)	0	B1
Analog outputs:	y1 (Week-D)	1	
Digital outputs:	z1 ; z2 (end)		

Display texts

Default display	Fct. no.	Code
Text 1: TIME2	80	B2

4.10 Selection and storage

EXTR (Extreme value selection - no. 30)

I/O data

	Description	Fct.no.	Code
Analog inputs:	x1 x2 x3	0	B1
Analog outputs:	y1 (Max) y2 (Mid) y3 (Min) y4 (MaxNo) y5 (MidNo) y6 (MinNo)	1	

Display texts

Default display	Fct. no.	Code
Text 1: EXTR	80	B2

PEAK (Peak value memory - no. 31)

I/O data

	Description	Fct. no.,	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1 (stop) d2 (reset)		
Analog outputs:	y1 (Max) y2 (Min)	1	

Display texts

Default display	Fct. no.	Code
Text 1: PEAK	80	B2

TRST (Hold amplifier - no. 32)

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1 (hold)		
Analog outputs:	y1 y2	1	

Display texts

Default display	Fct. no.	Code
Text 1: TRST	80	B2

SELC (Constants selection - no. 33)

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
C1.1	Constant 1, group 1	-29999 .. 999999	0.000	FP	41	20	B2	0
C1.2	Constant 2, group 1	-29999 .. 999999	0.000	FP	42	20		
C1.3	Constant 3, group 1	-29999 .. 999999	0.000	FP	43	20		
C1.4	Constant 4, group 1	-29999 .. 999999	0.000	FP	44	20		
C2.1	Constant 1, group 2	-29999 .. 999999	0.000	FP	45	20		
C2.2	Constant 2, group 2	-29999 .. 999999	0.000	FP	46	20		
C2.3	Constant 3, group 2	-29999 .. 999999	0.000	FP	47	20		
C2.4	Constant 4, group 2	-29999 .. 999999	0.000	FP	48	20		

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1	0	B1
Analog outputs:	y1 y2 y3 y4	1	

Display texts

Default display	Fct. no.	Code
Text 1: SELC	80	B2

SELD (Konstantenauswahl - Typ-Nr. 33)

I/O-Daten

	Beschreibung	Fkt Nr.	Code
Analoge Eingänge:	x1 (select)	0	B1
Digitale Eingänge:	d1 d2 d3 d4 d5 (seld1) d6 (seld2)		
Analoge Ausgänge:	Casc	1	
Digitale Ausgänge:	z1		

SELP (Parameter selection - no. 34)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
C1	Constant 1	-29999 .. 999999	0.000	FP	41	20	B2	0
C2	Constant 2	-29999 .. 999999	0.000	FP	42	20		
C3	Constant 3	-29999 .. 999999	0.000	FP	43	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1 d2		
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: SELP	80	B2

SELV1 (Selection of variables - no. 35)**I/O data**

	Description	Fct. no.	Code
Analog inputs:	x1 x2 x3 x4	0	B1
Digital inputs:	d1 d2		
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: SELV1	80	B2

SOUT (Selection of output - no. 36)**I/O data**

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1 d2		
Analog outputs:	y1 y2 y3 y4	1	

Display texts

Default display	Fct. no.	Code
Text 1: SOUT	80	B2

REZEPT (Recipe management - no. 37)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Set1.1	Parameter 1 for recipe 1	-29999 .. 999999	0,000	FP	41	20	B2	0
Set1.2	Parameter 2 for recipe 1	-29999 .. 999999	0,000	FP	42	20		
Set1.3	Parameter 3 for recipe 1	-29999 .. 999999	0,000	FP	43	20		
Set1.4	Parameter 4 for recipe 1	-29999 .. 999999	0,000	FP	44	20		
Set2.1	Parameter 1 for recipe 2	-29999 .. 999999	0,000	FP	45	20		
Set2.2	Parameter 2 for recipe 2	-29999 .. 999999	0,000	FP	46	20		
Set2.3	Parameter 3 for recipe 2	-29999 .. 999999	0,000	FP	47	20		
Set2.4	Parameter 4 for recipe 2	-29999 .. 999999	0,000	FP	48	20		
Set3.1	Parameter 1 for recipe 3	-29999 .. 999999	0,000	FP	49	20		
Set3.2	Parameter 2 for recipe 3	-29999 .. 999999	0,000	FP	51	20		
Set3.3	Parameter 3 for recipe 3	-29999 .. 999999	0,000	FP	52	20		
Set3.4	Parameter 4 for recipe 3	-29999 .. 999999	0,000	FP	53	20		
Set4.1	Parameter 1 for recipe 4	-29999 .. 999999	0,000	FP	54	20		
Set4.2	Parameter 2 for recipe 4	-29999 .. 999999	0,000	FP	55	20		
Set4.3	Parameter 3 for recipe 4	-29999 .. 999999	0,000	FP	56	20		
Set4.4	Parameter 4 for recipe 4	-29999 .. 999999	0,000	FP	57	20		
Set5.1	Parameter 1 for recipe 5	-29999 .. 999999	0,000	FP	58	20		
Set5.2	Parameter 2 for recipe 5	-29999 .. 999999	0,000	FP	59	20		
Set5.3	Parameter 3 for recipe 5	-29999 .. 999999	0,000	FP	61	20		
Set5.4	Parameter 4 for recipe 5	-29999 .. 999999	0,000	FP	62	20		

I/O data

	Description				Fct. no.	Code
Analog inputs:	x1	x2	x3	x4	0	B1
	x5 (SetNo)					
Digital inputs:	d1 (store)	d2 (manual)				
Analog outputs:	y1	y2	y3	y4	1	
	y5 (Casc)					

Display texts

Default display		Fct. no.	Code
Text 1:	REZEPT	80	B2

20F3

(2-out-of-3 selection with mean value formation - no. 38)

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
Diff	Difference limit value	0.000 .. 999999	1.000	FP	41	20	B2	0

I/O data

	Description				Fct. no.	Code
Analog inputs:	x1	x2 (X1mult)	x3 (X2)	x4 (X2mult)	0	B1
	x5 (X3)	x6 (X3mult)				
Digital inputs:	d1 (fail1)	d2 (fail2)	d3 (fail3)	d4 (off)		
Analog outputs:	y1	y2 (Casc)			1	
Digital outputs:	z1 (err1)	z2 (err2)				

Display texts

Default display		Fct. no.	Code
Text 1:	20F3	80	B2

SELV2

(Cascadable selection of variables - no. 39)

I/O data

	Description				Fct. no.	Code
Analog inputs:	x1	x2	x3	x4	0	B1
	x5 (Select)					
Analog outputs:	y1	y2 (Casc)			1	

Display texts

Default display		Fct. no.	Code
Text 1:	SELV2	80	B2

4.11 Alarm and limiting

ALLP (Alarm and limiting with fixed limits - no. 40)

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Select	Value x1 for monitoring	0	0	INT	71	35	B2	0
	Value dx1/dt for monitoring	1						
	Value x1 for monitoring - $\times 0$	2						

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
H1	High alarm 1 and high limit	-29999 .. 999999	9999,0	FP	41	20	B2	0
H2	High alarm 2	-29999 .. 999999	9999,0	FP	42	20		
L1	Low alarm 1 or low limit	-29999 .. 999999	-9999,0	FP	43	20		
L2	Low alarm 2	-29999 .. 999999	-9999,0	FP	44	20		
$\times 0$	Offset	-29999 .. 999999	0,000	FP	45	20		
$\times sd$	Switching hysteresis	0,000 .. 999999	1,000	FP	46	20		

I/O data

		Description	Fct. no.	Code
Analog inputs:	x1		0	B1
Analog outputs:	y1		1	
Digital outputs:	z1 (h1)	z2 (h2)	z3 (l2)	

Display texts

Default display		Fct. no.	Code
Text 1:	ALLP	80	B2

ALLV (Alarm and limiting with variable limits - no. 41)

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Select	Value x1 for monitoring	0	0	INT	71	35	B2	0
	Value dx1/dt for monitoring	1						
	Value x1 for monitoring - $\times 0$	2						

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
H2	High alarm 2	-29999 .. 999999	9999,0	FP	42	20	B2	0
L2	Low alarm 2	-29999 .. 999999	-9999,0	FP	44	20		
$\times 0$	Offset	-29999 .. 999999	0,000	FP	45	20		
$\times sd$	Switching hysteresis	0,000 .. 999999	1,000	FP	46	20		

I/O data

		Description	Fct. no.	Code	
Analog inputs:	x1	x2 (H1)	x3 (L1)	0	B1
Analog outputs:	y1			1	
Digital outputs:	z1 (h1)	z2 (h2)	z3 (l1)	z4 (l2)	

Display texts

Default display		Fct. no.	Code
Text 1:	ALLV	80	B2

EQUAL (Comparison - no. 42)

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Diff	Tolerance limit	0,000 .. 999999	0,000	FP	41	20	B2	0
Mode	Source of tolerance limit: Diff	0	0	INT	41	25		
	Source of tolerance limit: $\times 3$	1						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 x2 x3 (Diff)	0	B1
Digital outputs:	z1 (X1 > X2) z2 (X1 = X2) z3 (X1 < X2) z4 (X1 ≤ X2) z5 (X1 ≠ X2) x6 (X1 ≥ X2)	1	

Display texts

Default display	Fct. no.	Code
Text 1: EQUAL	80	B2

VELO

(Rate of change limiting - no. 43)

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
Grx+	Positive gradient	0,000 .. 999999	0,000	FP	41	20	B2	0
Grx-	Negative gradient	-29999 .. 0,000	0,000	FP	42	20		
Mode+	Source of positive gradient: Grx+ Source of positive gradient: x2	0 .. 1	0	INT	41	25		
Mode-	Source of negative gradient: Grx- Source of negative gradient: x3	0 .. 1	0	INT	42	25		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 x2 (GrX+) x3 (GrX-)	0	B1
Digital inputs:	d1 d2		
Analog outputs:	y1	1	

Display texts

Default display	Fct. no.	Code
Text 1: VELO	80	B2

LIMIT

(Multiple alarm - no. 44)

Configuration data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
Mode1	Mode: Max. alarm	0 .. 1	0	INT	71	35	B3	0
	Mode: Min. alarm	1						
Mode2	Operating mode: max. alarm	0 .. 1	0	INT				
	Operating mode: min. alarm	1						
Mode3	Operating mode: max. alarm	0 .. 1	0	INT				
	Operating mode: min. alarm	1						
Mode4	Operating mode: max. alarm	0 .. 1	0	INT				
	Operating mode: min. alarm	1						
Mode5	Operating mode: max. alarm	0 .. 1	0	INT				
	Operating mode: min. alarm	1						
Mode6	Operating mode: max. alarm	0 .. 1	0	INT				
	Operating mode: min. alarm	1						
Mode7	Operating mode: max. alarm	0 .. 1	0	INT				
	Operating mode: min. alarm	1						
Mode8	Operating mode: max. alarm	0 .. 1	0	INT				
	Operating mode: min. alarm	1						

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
L1	Alarm value 1	-29999 .. 999999	0,000	FP	41	20	B2	0
L2	Alarm value 2	-29999 .. 999999	0,000	FP				
L3	Alarm value 3	-29999 .. 999999	0,000	FP				
L4	Alarm value 4	-29999 .. 999999	0,000	FP				
L5	Alarm value 5	-29999 .. 999999	0,000	FP				
L6	Alarm value 6	-29999 .. 999999	0,000	FP				
L7	Alarm value 7	-29999 .. 999999	0,000	FP				
L8	Alarm value 8	-29999 .. 999999	0,000	FP				

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital outputs:	z1 (I1) z2 (I2) z3 (I3) z4 (I4) z5 (I5) z6 (I6) z7 (I7) z8 (I8)	1	

Display texts

Default display	Fct. no.	Code
Text 1: LIMIT	80	B2

ALARM**(Alarm processing - no. 45)**

Configuration data

Des.	Description	Range	Default	Type	Code	Fct. no.	Block access Code	Fct. no.
Fnc	Alarm function: meas. value	0	0	INT	71	35	B3	0
	Alarm function: meas. value + d1	1						
	Alarm function: d1	2						

Parameter data

Des.	Description	Range	Default	Type	Code	Fct. no.	Block access Code	Fct. no.
LimL	Lower alarm value	-29999 .. 999999	-10,00	FP	41	20	B2	0
LimH	Upper alarm value	-29999 .. 999999	10,000	FP	42	20		
Lxsd	Switching difference	0,000 .. 999999	0,000	FP	43	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1 (fail) d2 (stop)		
Digital outputs:	z1 (alarm)	1	

Display texts

Default display	Fct. no.	Code
Text 1: ALARM	80	B2

4.12 Visualization

TEXT (Textcontainer with language-dependent selection - no. 79)

I/O-Data

	Description	Fct. no.	Code
Analog inputs:	x1 (Index) ; x2 (Case) ; x3 (UsrLan)	0	B1
Analoge outputs:	y1 (Index)	1	

Display texts

	Default display	Fct. no.	Code
Text 1:	TEXT	80	B2
Text 2:	TEXT_1		
Text 3:	TEXT_2		
Text 4:	TEXT_3		
Text 5:	TEXT_4		

VWERT (Display / preset of process values - no. 96)

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Disp 1	Display line, value variable	.0	0	INT	71	35	B3	0
	Only display line	.1						
	Line is empty	2						
Disp 2	Display line, value variable	.0	0	INT	72	35		
	Only display line	.1						
	Line is empty	2						
Disp 3	Display line, value variable	.0	0	INT	73	35		
	Only display line	.1						
	Line is empty	2						
Disp 4	Display line, value variable	.0	0	INT	74	35		
	Only display line	.1						
	Line is empty	2						
Disp 5	Display line, value variable	.0	0	INT	75	35		
	Only display line	.1						
	Line is empty	2						
Disp 6	Display line, value variable	.0	0	INT	76	35		
	Only display line	.1						
	Line is empty	2						
Mode 1	Display line analog	.0	0	INT	77	35		
	Display line digital	.1						
	Display line time	2						
	Display line radio	.3						
	Display line switch	.4						
	Display line push-button	.5						
	Display line text	.6						
Display line menu	7							
Mode 2	Display line analog	.0	0	INT	78	35		
	Display line digital	1						
	Display line time	2						
	Display line radio	3						
	Display line switch	4						
	Display line push-button	5						
	Display line text	6						
Display line menu	7							
Mode 3	Display line analog	.0	0	INT	79	35		
	Display line digital	1						
	Display line time	2						
	Display line radio	3						
	Display line switch	4						
	Display line push-button	5						
	Display line text	6						
Display line menu	7							

Mode 4	Display line analog	0	0	INT	81	35		
	Display line digital	1						
	Display line time	2						
	Display line radio	3						
	Display line switch	4						
	Display line push-button	5						
	Display line text	6						
Mode 5	Display line analog	0	0	INT	82	35		
	Display line digital	1						
	Display line time	2						
	Display line radio	3						
	Display line switch	4						
	Display line push-button	5						
	Display line text	6						
Mode 6	Display line analog	0	0	INT	83	35		
	Display line digital	1						
	Display line time	2						
	Display line radio	3						
	Display line switch	4						
	Display line push-button	5						
	Display line text	6						
Display line menu	7							
DP1	Digits behind decimal point in analog line 1	0..3	0	INT	84	35		
DP2	Digits behind decimal point in analog line 2	0..3	0	INT	85	35		
DP3	Digits behind decimal point in analog line 3	0..3	0	INT	86	35		
DP4	Digits behind decimal point in analog line 4	0..3	0	INT	87	35		
DP5	Digits behind decimal point in analog line 5	0..3	0	INT	88	35		
DP6	Digits behind decimal point in analog line 6	0..3	0	INT	89	35		

Parameters

Des.	Description	Range	Default	Type	Single access Code	Block access Fct. no.	Block access Code	Block access Fct. no.
Y1	Starting value of analog output 1	-29999 .. 999999	0	FP	41	20	B2	0
Y2	Starting value of digital output 2	-29999 .. 999999	0	FP	42	20		
Y3	Starting value of analog output 3	-29999 .. 999999	0	FP	43	20		
Y4	Starting value of analog output 4	-29999 .. 999999	0	FP	44	20		
Y5	Starting value of analog output 5	-29999 .. 999999	0	FP	45	20		
Y6	Starting value of analog output 6	-29999 .. 999999	0	FP	46	20		
z1	Starting value of digital output 1	0 / 1	0	INT	41	25		
z2	Starting value of digital output 1	0 / 1	0	INT	42	25		
z3	Starting value of digital output 1	0 / 1	0	INT	43	25		
z4	Starting value of digital output 1	0 / 1	0	INT	44	25		
z5	Starting value of digital output 1	0 / 1	0	INT	45	25		
z6	Starting value of digital output 1	0 / 1	0	INT	46	25		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 x2 x3 x4 x5 x6 x7 (Casc)	0	B1
Digital inputs:	d1 (hide) d2 (lock) d3 d4 d5 d6 d7 d8 d9 (store)		
Analog outputs:	y1 y2 y3 y4 y5 y6 y7 (BI-no) y8 (Line)	1	
Digital outputs:	z1 z2 z3 z4 z5 z6		

Display texts

Default display	Fct. no.	Code
Text 1: UWERT	80	B2
Text 2: Name_1 Off		
Text 3: Name_1 On		
...		
Text 12: Name_6 Off		
Text 13: Name_6 On		

VBAR (Bargraph display - no. 97)

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x3 0	Scaling of bargraph 1 (0%)	-29999 .. 999999	0,000	FP	71	30	B3	0
x3 100	Scaling of bargraph 1 (100%)	-29999 .. 999999	100,00	FP	72	30		
x3 mid	Scaling of bargraph 1 (start value)	-29999 .. 999999	0,000	FP	73	30		
x4 0	Scaling of bargraph 2 (0%)	-29999 .. 999999	0,000	FP	74	30		
x4 100	Scaling of bargraph 2 (100%)	-29999 .. 999999	100,00	FP	75	30		
x4 mid	Scaling of bargraph 2 (start value)	-29999 .. 999999	0,000	FP	76	30		
Disp1	Display x1/x2, value variable	0	0	INT	71	35		
	Only display x1/x2	1						
	No display x1/x2	2						
Disp2	Display x1/x2, value variable	0	0	INT	72	35		
	Only display x1/x2	1						
	No display x1/x2	2						
DP1	Digit behind the decimal point in value display 1	0 .. 3	0	INT	73	35		
DP2	Digit behind the decimal point in value display 2	0 .. 3	0	INT	74	35		
Type	Both bargraphs horizontal	0	0	INT	75	35		
	Both bargraphs vertical	1						

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Y1	Starting value for analog output 1	-29999 .. 999999	0,000	FP	41	20	B2	0
Y2	Starting value for analog output 2	-29999 .. 999999	0,000	FP	42	20		

I/O data

		Description				Fct. no.	Code
Analog inputs:	x1	x2	x3 (Bar 1)	x4 (Bar 2)	0	B1	
	x5 (Mark11)	x6 (Mark 12)	x7 (Mark 21)	x8 (Mark 22)			
Digital inputs:	d1 (hide)	d2 (lock)					
Analog outputs:	y1	y2	y3 (BI-no)		1		

Display texts

Default display		Fct. no.	Code
Text 1:	VBar	80	B2
Text 2:	Name_1		
Text 3:	UNIT_1		
Text 12:	NAME_2		
Text 13:	UNIT_2		

VPARA (Parameter display no. 98)**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
P 1-B1	Block number parameter 1	0 .. 250	0	INT	71	35	B3	0
P 1-No	Number parameter 1	1 .. 99	1	INT	72	35		
P 2-B1	Block number parameter 2	0 .. 250	0	INT	73	35		
P 2-No	Number parameter 2	1 .. 99	1	INT	74	35		
P 3-B1	Block number parameter 3	0 .. 250	0	INT	75	35		
P 3-No	Number parameter 3	1 .. 99	1	INT	76	35		
P 4-B1	Block number parameter 4	0 .. 250	0	INT	77	35		
P 4-No	Number parameter 4	1 .. 99	1	INT	78	35		
P 5-B1	Block number parameter 5	0 .. 250	0	INT	79	35		
P 5-No	Number parameter 5	1 .. 99	1	INT	81	35		
P 6-B1	Block number parameter 6	0 .. 250	0	INT	82	35		
P 6-No	Number parameter 6	1 .. 99	1	INT	83	35		

I/O data

Description		Fct. no.	Code
Analog inputs:	x1 (P 1) x2 (P 2) x3 (P 3) x4 (P 4) x5 (P 5) x6 (P 6)	0	B1
Digital inputs:	d1 (hide) d2 (lock) d3 (store)		
Analog outputs:	y1 (P 1) y2 (P 2) y3 (P 3) y4 (P 4) y5 (P 5) y6 (P 6)	1	
Digital outputs:	z1 (P 1) z2 (P 2) z3 (P 3) z4 (P 4) z5 (P 5) z6 (P 6)		

Display texts

Default display		Fct. no.	Code
Text 1:	VPARA	80	B2
Text 2:	Para 1		
Text 3:	Unit 1		
...			
Text 12:	Para 6		
Text 13:	Unit 6		

VTREND (Trend display - no. 99)**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Sample	Time unit of sampling interval	0.200 .. 999999	1.000	INT	71	30	B3	0
X 0	Display scaling 0 %	-29999 .. 999999	0.000	INT	72	30		
X 100	Display scaling 100 %	-29999 .. 999999	100.00	INT	73	30		
Unit	Block number parameter 1	0 .. 250	0	INT	71	35		
	Number parameter 1	1 .. 99						
DP	Block number parameter 2	0 .. 250						
	Number parameter 2	1 .. 99	1	INT	72	35		

I/O data

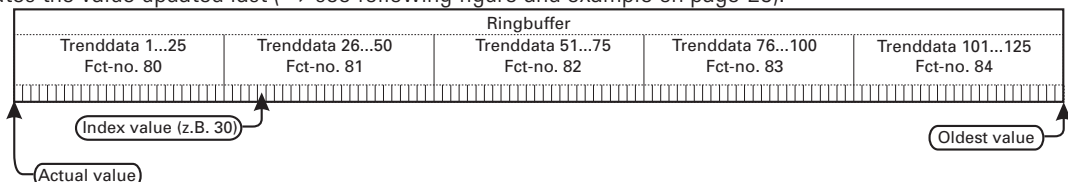
Description		Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1 (hide) d2 (disabl) d3 (reset) d4 (sample)		
Analog outputs:	y1 (X-100) y2 (BI-no)	1	
Digital outputs:	z1 (ready)		

Display texts

Default display		Fct. no.	Code
Text 1:	VTREND	80	B2
Text 2:	_UNIT_		

Trend data

The 100 only readable trend data can be read via four B1 accesses. The index which is transmitted with each read access indicates the value updated last (→ see following figure and example on page 25).



4.13 Communication

L1READ (Read level 1 data - no. 100)

Process data

Des.	Description	R/W	Type	Range	Rem.	Code	Fct. no.
Block	Block access	R	Block	01 .. 09		00	0
Status 1	L1READ status 1	R	ST1		A	01	0
Status 2	L1READ status 2	R	ST1		B	03	0
X1	Analog input X1	R	FP	-29999 .. 999999		04	0
X2	Analog input X2	R	FP	-29999 .. 999999		05	0
X3	Analog input X3	R	FP	-29999 .. 999999		06	0
X4	Analog input X4	R	FP	-29999 .. 999999		07	0
X5	Analog input X5	R	FP	-29999 .. 999999		08	0
X6	Analog input X6	R	FP	-29999 .. 999999		09	0

'Status 1'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0	d1	Status d1	off	on			
D1	d2	Status d2	off	on			
D2	d3	Status d3	off	on			
D3	d4	Status d4	off	on			
D4	d5	Status d5	off	on			
D5	d6	Status d6	off	on			
D6	'1'	always '1'					
D7		Parity					

'Status 2'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0	d7	Status d7	off	on			
D1	d8	Status d8	off	on			
D2	d9	Status d9	off	on			
D3	d10	Status d10	off	on			
D4	d11	Status d11	off	on			
D5	d12	Status d12	off	on			
D6	'1'	always '1'					
D7		Parity					

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 ----- x2 ----- x3 ----- x4 ----- x5 ----- x6 ----- x7 -----	0	B1
Digital inputs:	d1 ----- d2 ----- d3 ----- d4 ----- d5 ----- d6 ----- d7 ----- d8 ----- d9 ----- d10 ----- d11 ----- d12 -----		

Display texts

Default display	Fct. no.	Code
Text 1: L1READ	80	B2

L1WRITE (Write Level 1 data - no. 101)

Process data

Des.	Description	R/W	Type	Range	Rem.	Code	Fct. no.
Block	Block access	R	Block	31 .. 39		30	0
	Digital outputs z1 .. z15	R/W	ICMP	0 .. 32767	A	31	0
Y1	Analog output Y1	R/W	FP	-29999 .. 999999		33	0
Y2	Analog output Y2	R/W	FP	-29999 .. 999999		34	0
Y3	Analog output Y3	R/W	FP	-29999 .. 999999		35	0
Y4	Analog output Y4	R/W	FP	-29999 .. 999999		36	0
Y5	Analog output Y5	R/W	FP	-29999 .. 999999		37	0
Y6	Analog output Y6	R/W	FP	-29999 .. 999999		38	0
Y7	Analog output Y7	R/W	FP	-29999 .. 999999		39	0

Data structure

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Signification	0	z15	z14	z13	z12	z11	z10	z9	z8	z7	z6	z5	z4	z3	z2	z1

I/O data

	Description	Fct. no.	Code
Analog outputs:	y1 ----- y2 ----- y3 ----- y4 ----- y5 ----- y6 ----- y7 ----- y8 -----	1	B1
Digital outputs:	z1 ----- z2 ----- z3 ----- z4 ----- z5 ----- z6 ----- z7 ----- z8 ----- z9 ----- z10 ----- z11 ----- z12 ----- z13 ----- z14 ----- z15 -----		

Display texts

Default display	Fct. no.	Code
Text 1: L1WRITE	80	B2

DPREAD**(Read Level 1 data via PROFIBUS - no. 102)****I/O data**

	Description	Fct. no.	Code
Analog inputs:	x1 ----- x2 ----- x3 ----- x4 ----- x5 ----- x6 -----	0	B1
Digital inputs:	d1 ----- d2 ----- d3 ----- d4 ----- d5 ----- d6 ----- d7 ----- d8 ----- d9 ----- d10 ----- d11 ----- d12 ----- d13 ----- d14 ----- d15 ----- d16 -----		
Digital outputs:	z1 (b-err) z2 (p-err) z3 (c-err) z4 (d-err)	1	

Display texts

Default display	Fct. no.	Code
Text 1: DPREAD	80	B2

DPWRITE**(Write Level 1 data via PROFIBUS - no. 103)****I/O data**

	Description	Fct. no.	Code
Analog outputs:	y1 ----- y2 ----- y3 ----- y4 ----- y5 ----- y6 -----	1	B1
Digital outputs:	z1 ----- z2 ----- z3 ----- z4 ----- z5 ----- z6 ----- z7 ----- z8 ----- z9 ----- z10 ----- z11 ----- z12 ----- z13 ----- z14 ----- z15 ----- z16 ----- z17 (b-err) z18 (p-err) z19 (c-err) z20 (d-err) z21 (valid)		

Display texts

Default display	Fct. no.	Code
Text 1: DPWRITE	80	B2

4.14 KS98-CAN-extension

C RM2x (CANopen field bud coupler RM 201 - Type-Nr. 14) block numbers 21-25

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
NodeId	Node adresse of RM2x	-29999 .. 999999	0,000	FP	41	20	B2	0

I/O-data

	Description	Fct. no.	Code
Digital outputs:	z1 (et_err) z2 (id_err) z3 (valid)	1	B1

Display texts

Default display	Fct. no.	Code
Text 1: C_RM2x	80	B2

RM DI (RM 200 - digital input module - Typ-Nr. 15)

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
MTYP	Module type RM 241 = 4 x 24_VDC	0	0	INT	71	35	B3	0
	Module type RM 242 = 8 x 24_VDC	1						
	Module type RM 243 = 4 x 230VAC	2						
Inv 1	direct input of signal1	0	0	INT	72	35		
	invers input of signal1	1						
Inv 2	direct input of signal2	0	0	INT	73	35		
	invers input of signal 2	1						
Inv 3	direct input of signal 3	0	0	INT	74	35		
	invers input of signal 3	1						
Inv 4	direct input of signal 4	0	0	INT	75	35		
	invers input of signal 4	1						
Inv 5	direct input of signal 5	0	0	INT	76	35		
	invers input of signal 5	1						
Inv 6	direct input of signal 6	0	0	INT	77	35		
	invers input of signal 6	1						
Inv 7	direct input of signal 7	0	0	INT	78	35		
	invers input of signal 7	1						
Inv 8	direct input of signal 8	0	0	INT	79	35		
	invers input of signal 8	1						

I/O-data

	Description	Fct. no.	Code
Digital outputs:	z1 (et_err) z2 (lotid) z3 (valid) z4 (di 1)	1	B1
	z5 (di 1) z6 (di 1) z7 (di 1) z8 (di 1)		
	z9 (di 1) z10 (di 1) z11 (di 1) z12 (di 1)		

Display texts

Default display	Fct. no.	Code
Text 1: RM_DI	80	B2

RM DO (RM 200 - digital output module - Typ-Nr. 16)**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
MTYP	Module type RM 251 = 8 x 24 VDC, 0,5A Module type RM 252 = 4 x Relais (230 VDC) 2A	0 .. 1	0	INT	71	35	B3	0
Inv 1	direct output of signal 1 invers output of signal 1	0 .. 1	0	INT	72	35		
Inv 2	direct output of signal 2 invers output of signal 2	0 .. 1	0	INT	73	35		
Inv 3	direct output of signal 3 invers output of signal 3	0 .. 1	0	INT	74	35		
Inv 4	direct output of signal 4 invers output of signal 4	0 .. 1	0	INT	75	35		
Inv 5	direct output of signal 5 invers output of signal 5	0 .. 1	0	INT	76	35		
Inv 6	direct output of signal 6 invers output of signal 6	0 .. 1	0	INT	77	35		
Inv 7	direct output of signal 7 invers output of signal 7	0 .. 1	0	INT	78	35		
Inv 8	direct output of signal 8 invers output of signal 8	0 .. 1	0	INT	79	35		

I/O-data

					Fct. no.	Code
Digital inputs:	d1 (do 1)	d2 (do 2)	d3 (do 3)	d4 (do 4)	0	B1
	d5 (do 5)	d6 (do 6)	d7 (do 7)	d8 (do 8)		
Digital outputs:	z1 (et_err)	z1 (slotid)	z1 (valid)	z1 (di 1)	1	B1
	z1 (di 2)	z1 (di 3)	z1 (di 4)	z1 (di 5)		
	z1 (di 6)	z1 (di 7)	z1 (di 8)			

Display texts

Default display	Fct. no.	Code
Text 1: RM_DO	80	B2

RM AI (RM 200 - analog input module - Typ-Nr. 17)**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Tf 1	Filter time constant [s] A1	0 .. 999999	0.5	FP	71	30	B3	0
X0 1	Scaling start value (0%) A1	-29999 .. 999999	0.000	FP	72	30		
X100 1	Scaling end value (100%) A1	-29999 .. 999999	100.00	FP	73	30		
Tf 2	Filter time constant [s] A2	0 .. 999999	0.5	FP	74	30		
X0 2	Scaling start value (0%) A2	-29999 .. 999999	0.000	FP	75	30		
X100 2	Scaling end value (100%) A2	-29999 .. 999999	100.00	FP	76	30		
Tf 3	Filter time constant [s] A3	0 .. 999999	0.5	FP	77	30		
X0 3	Scaling start value (0%) A3	-29999 .. 999999	0.000	FP	78	30		
X100 3	Scaling end value (100%) A3	-29999 .. 999999	100.00	FP	79	30		
Tf 4	Filter time constant [s] A4	0 .. 999999	0.5	FP	80	30		
X0 4	Scaling start value (0%) A4	-29999 .. 999999	0.000	FP	81	30		
X100 4	Scaling end value (100%) A4	-29999 .. 999999	100.00	FP	82	30		
MTYP	Module type RM 221-0 = 4x 0/4...20 mA	0	0	INT	71	35		
	Module type RM 221-1 = 4x -10/0...10 V	1						
	Module type RM 221-2 = 2x 0/4...20 mA + 2x -10/0...10 V	2						
	Modul type RM 222-0 = 4x 0/4...20 mA, TPS	3						
	Module type RM 222-1 = 4x -10/0...10 V, Poti, TPS	4						
	Module type 222-2 = 2x 0/4...20 mA + 2x -10/0...10 V, Poti, TPS	5						
	Module type 224-1 = 4x thermocouple/ Pt100, 16Bit	6						
Module type RM 224-1 = 2x thermocouple, 16Bit	7							

STyp 1	Sensor type of A1:	1	1	INT	72	35		
	Type J = -120...1200°C	2						
	Type K = -130...1370°C	3						
	Type L = -120... 900°C	4						
	Type E = -130...1000°C	5						
	Type I = -130... 400°C	6						
	Type S = 12...1760°C	7						
	Type R = 13...1760°C	8						
	Type B = 50...1820°C	9						
	Type N = -109...1300°C	10						
	Type W = 50...2300°C	30						
	Pt100 = -200 ...850°C	40						
	Standard signal= 0...10V	41						
	Standard signal= -10...10V	50						
Standard signal= 4...20mA	51							
Standard signal= 0...20mA								
Unit 1	Unit of A1= °C	0	0	INT	73	35		
	Unit of A1= °F	1						
	Unit of A1= K	2						
STyp 2	Sensor type of A2:	1	1	INT	74	35		
	Type J = -120...1200°C	2						
	Type K = -130...1370°C	3						
	Type L = -120... 900°C	4						
	Type E = -130...1000°C	5						
	Type I = -130... 400°C	6						
	Type S = 12...1760°C	7						
	Type R = 13...1760°C	8						
	Type B = 50...1820°C	9						
	Type N = -109...1300°C	10						
	Type W = 50...2300°C	30						
	Pt100 = -200 ...850°C	40						
	Standard signal= 0...10V	41						
	Standard signal= -10...10V	50						
Standard signal= 4...20mA	51							
Standard signal= 0...20mA								
Unit 2	Unit of A2= °C	0	0	INT	75	35		B3
	Unit of A2= °F	1						
	Unit of A2= K	2						
STyp 3	Sensor type of A3: Type J =	1	1	INT	76	35		
	-120...1200°C	2						
	Type K = -130...1370°C	3						
	Type L = -120... 900°C	4						
	Type E = -130...1000°C	5						
	Type I = -130... 400°C	6						
	Type S = 12...1760°C	7						
	Type R = 13...1760°C	8						
	Type B = 50...1820°C	9						
	Type N = -109...1300°C	10						
	Type W = 50...2300°C	30						
	Pt100 = -200 ...850°C	40						
	Standard signal= 0...10V	41						
	Standard signal= -10...10V	50						
Standard signal= 4...20mA	51							
Standard signal= 0...20mA								
Unit 3	Unit of A3= °C	0	0	INT	77	35		
	Unit of A3= °F	1						
	Unit of A3= K	2						
STyp 4	Sensor type of A4: Typ J =	1	1	INT	78	35		
	-120...1200°C	2						
	Typ K = -130...1370°C	3						
	Typ L = -120... 900°C	4						
	Typ E = -130...1000°C	5						
	Typ T = -130... 400°C	6						
	Typ S = 12...1760°C	7						
	Typ R = 13...1760°C	8						
	Typ B = 50...1820°C	9						
	Typ N = -109...1300°C	10						
	Typ W = 50...2300°C	30						
Pt100 = -200 ...850°C	40							
Standard signal= 0...10V								

	Standard signal= -10...10V	41							
	Standard signal= 4...20mA	50	1	INT	78	35			
	Standard signal= 0...20mA	51							
Unit 4	Unit of A4= °C	0							
	Unit of A4= °F	1	0	INT	79	35			
	Unit of A4= K	2							
Fail 1	Upscale: z3=1, y1 = x100	0							
	Downscale: z3 = 1, y1 = x0	1	0	INT	80	35	B3	0	
Fail 2	Upscale: z4=1, y1 = x100	0							
	Downscale: z4 = 1, y1 = x0	1	0	INT	81	35			
Fail 3	Upscale: z5 = 1, y1 = x100	0							
	Downscale: z5 = 1, y1 = x0	1	0	INT	82	35			
Fail 4	Upscale: z6 = 1, y1 = x100	0							
	Downscale: z6 = 1, y1 = x0	1	0	INT	83	35			

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x1in 1	Meas.value correction P1, input 1	-29999 .. 999999	0,000	FP	41	20	B2	0
x1out 1	Meas.value correction P1, output 1	-29999 .. 999999	0,000	FP	42	20		
x2in 1	Meas.value correction P21, input 1	-29999 .. 999999	100,00	FP	43	20		
x2out 1	Meas.value correction P2, output 1	-29999 .. 999999	100,00	FP	44	20		
x1in 2	Meas.value correction P1, input 2	-29999 .. 999999	0,000	FP	45	20		
x1out 2	Meas.value correction P1, output 2	-29999 .. 999999	0,000	FP	46	20		
x2in 2	Meas.value correction P2, input 2	-29999 .. 999999	100,00	FP	47	20		
x2out 2	Meas.value correction P2, output 2	-29999 .. 999999	100,00	FP	48	20		
x1in 3	Meas.value correction P1, input 3	-29999 .. 999999	0,000	FP	49	20		
x1out 3	Meas.value correction P1, output 3	-29999 .. 999999	0,000	FP	50	20		
x2in 3	Meas.value correction P2, input 3	-29999 .. 999999	100,00	FP	51	20		
x2out 3	Meas.value correction P2, output 3	-29999 .. 999999	100,00	FP	52	20		
x1in 4	Meas.value correction P1, input 4	-29999 .. 999999	0,000	FP	53	20		
x1out 4	Meas.value correction P1, output 4	-29999 .. 999999	0,000	FP	54	20		
x2in 4	Meas.value correction P2, input 4	-29999 .. 999999	100,00	FP	55	20		
x2out 4	Meas.value correction P2, output 4	-29999 .. 999999	100,00	FP	56	20		

I/O-data

					Fct. no.	Code
Analog inputs:	x1 (Slot x)				0	B1
Digital inputs:	d1 (lock)	d2 (hide)				
Analog outputs:	y1 (AI 1)	y1 (AI 1)	y1 (AI 1)	y1 (AI 1)	1	
Digital outputs:	z1 (et-err)	z1 (slotid)	z1 (valid)	z1 (fail 1)		
	z1 (fail 2)	z1 (fail 3)	z1 (fail 4)	z1 (tcfail)		

Display texts

Default display				Fct. no.	Code
Text 1:	RM_AI			80	B2

Attention!

This functionblock had no parameter data for online calibration until operating version 6. To differentiate between both, the new functionblock has the typenumber 19, the old one, without parameter data is number 17.

RM_AO (RM 200 - analog output module - Typ-Nr. 18)**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
X0 1	Value of AO 1 at 0%	-29999 .. 999999	0,000	FP	71	30	B3	0
X100 1	Value of AO 1 at 100%	-29999 .. 999999	100,00	FP	72	30		
X0 2	Value of AO 2 at 0%	-29999 .. 999999	0,000	FP	73	30		
X100 2	Value of AO 2 at 100%	-29999 .. 999999	100,00	FP	74	30		
X0 3	Value of AO 3 at 0%	-29999 .. 999999	0,000	FP	75	30		
X100 3	Value of AO 3 at 100%	-29999 .. 999999	100,00	FP	76	30		
X0 4	Value of AO 4 at 0%	-29999 .. 999999	0,000	FP	77	30		
X100 4	Value of AO 4 at 100%	-29999 .. 999999	100,00	FP	78	30		
MTyp	Module type RM 231-0 = 4x 0/4...20 mA / 4x 0...10 V	0	0	INT	71	35		
	Module type RM 231-1 = 4x 0/4...20 mA / 2x 0...10V / 2x-10...10V	1						
	Modultyp RM 231-2 = 4x 0/4...20 mA / 4x-10...10 V	2						
Otyp 1	Output-signal 1 -10...10V	10	0	INT	72	35		
	Output-signal 1 0...10V	11						
	Output-signal 1 0...20mA	20						
	Output-signal 1 4...20mA	21						
Otyp 2	Output-signal 2 -10...10V	10	0	INT	73	35		
	Output-signal 2 0...10V	11						
	Output-signal 2 0...20mA	20						
	Output-signal 2 4...20mA	21						
Otyp 3	Output-signal 3 -10...10V	10	0	INT	74	35		
	Output-signal 3 0...10V	11						
	Output-signal 3 0...20mA	20						
	Output-signal 3 4...20mA	21						
Otyp 4	Output-signal 4 -10...10V	10	0	INT	75	35		
	Output-signal 4 0...10V	11						
	Output-signal 4 0...20mA	20						
	Output-signal 4 4...20mA	21						
Fail 1	Fail_function off_output 1	0	0	INT	76	35		
	Keep value on fail on output 1	1						
Fail 2	Fail_function off_output 2	0	0	INT	77	35		
	Keep value on fail on output 2	1						
Fail 3	Fail_function off_output 3	0	0	INT	78	35		
	Keep value on fail on output 3	1						
Fail 4	Fail_function off_output 4	0	0	INT	79	35		
	Keep value on fail on output 4	1						

I/O-data

	Description	Fct. no.	Code
Analog inputs:	x1 (Slot x) x2 (AO 1) x3 (AO 2) x4 (AO 3)	0	B1
	x5 (AO 4)		
Digital outputs:	z1 (et-err) z2 (slotid) z3 (valid) z4 (fail 1)	1	
	z5 (fail 2) z6 (fail 3) z7 (fail 4)		

Display texts

Default display	Fct. no.	Code
Text 1: RM_AO	80	B2

RM DMS (RM 225 - DMS-module - Typ-Nr. 22)**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Tfm 1	Filter time constant A1 1 [s]	0 .. 999999	0,000	FP	71	30	B3	0
X0 1	Value of A1 1 at 0%	-29999 .. 999999	0,00	FP	72	30		
X100 1	Value of A1 1 at 100%	-29999 .. 999999	100,00	FP	73	30		
Cn 1	Sensitivity at nominal load [mV/V]	-29999 .. 999999	100,00	FP	74	30		
Tfm 2	Filter time constant A1 2 [s]	0 .. 999999	0,000	FP	75	30		
X0 2	Value of A1 2 at 0%	-29999 .. 999999	0,00	FP	76	30		
X100 2	Value of A1 2 at 100%	-29999 .. 999999	100,00	FP	77	30		
Cn 2	Sensitivity at nominal load [mV/V]	-29999 .. 999999	100,00	FP	78	30		
MTyp	Module type RM 225= DMS-Modul	0	0	INT	71	35		
Styp 1	input signal 1 -4 +4mV/V	0	0	INT	72	35		
Unit 1	Unit input 1 mV/V	71	71	INT	73	35		
Styp 2	Unit input 2 -4 +4mV/V	0	0	INT	74	35		
Unit 2	Einheit input 2 mV/V	71	71	INT	75	35		
Fail 1	Error handling z3=1,y1=x100 Error handling z3=1,y1=x0	0 1	0	INT	76	35		
Fail 2	Error handling z4=1,y1=x100 Error handling z4=1,y1=x0	0 1	0	INT	77	35		

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x1in 1	Meas.value correction P1 in of AI 1	-29999 .. 999999	0,000	FP	41	20	B2	0
x1out 1	Meas.value correction P1 out of AI 1	-29999 .. 999999	0,000	FP	42	20		
x2in 1	Meas.value correction P2 in of AI 1	-29999 .. 999999	100,00	FP	43	20		
x2out 1	Meas.value correction P2 out of AI 1	-29999 .. 999999	100,00	FP	44	20		
x1in 2	Meas.value correction P1 in of AI 2	-29999 .. 999999	0,000	FP	45	20		
x1out 2	Meas.value correction P1 out of AI 2	-29999 .. 999999	0,000	FP	46	20		
x2in 2	Meas.value correction P2 in of AI 2	-29999 .. 999999	100,00	FP	47	20		
x2out 2	Meas.value correction P2 out of AI 2	-29999 .. 999999	100,00	FP	48	20		

I/O-data

	Description	Fct. no.	Code
Analog inputs:	x1 (Slot x)	0	B1
Digital inputs:	d1 (set t1) d2 (res t1) d3 (zero 1) d4 (set t2) d5 (res t2) d6 (zero 2)		
Analog outputs:	x1 (AI 1) x2 (AI 1)	1	
Digital outputs:	z1 (et-err) z2 (slotid) z3 (valid) z4 (fail 1) z5 (fail 2) z6 (ready)		

Display texts

Default display	Fct. no.	Code
Text 1: RM_DMS	80	B2

CRCV (receive block s 22, 24, 26, 28 - Typ-Nr. 56)**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Nodeid	Node address of sending KS98	1 .. 42	1	INT	71	35	B3	0

I/O-data

	Description	Fct. no.	Code
Analog outputs:	y1 y2 y3 y4 y5 y6 y7 y8 y9	1	B1
Digital outputs:	z1 (id-err) z2 (valid) z3 (do 1) z4 (do 2) z5 (do 3) z6 (do 4) z7 (do 5) z7 (do 6) z5 (do 7) z5 (do 8) z5 (do 9) z5 (do 10) z5 (do 11) z5 (do 12) z5 (do 13) z5 (do 14) z7 (do 15) z7 (do 16)		

Display texts

Default display	Fct. no.	Code
Text 1: CRCV	80	B2

CSEND (send bock s 21, 23, 25, 27 - Typ-Nr. 57)**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
delta	change, causing a new transmission	-29999 .. 999999	0.100	FP	71	30	B3	0

I/O-data

		Description	Fct. no.	Code		
Analog inputs:	x1	x2	x3	x4	0	B1
	x5	x6	x7	x8		
	x9					
Digital inputs:	d1 (di 1)	d2 (di 2)	d3 (di 3)	d4 (di 4)	1	B1
	d5 (di 5)	d6 (di 6)	d7 (di 7)	d7 (di 8)		
	d5 (di 9)	d5 (di 10)	d5 (di 11)	d5 (di 12)		
	d5 (di 13)	d5 (di 14)	d5 (di 15)	d5 (di 16)		
Digital outputs:	z1 (valid)				1	

Display texts

Default display		Fct. no.	Code
Text 1:	CSEND	80	B2

C KS8x (KS 800 and KS 816 node function - Typ-Nr. 58)**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Nodeid	Node address of KS800/KS816	2 .. 42	2	INT	71	35	B3	0

I/O-data

		Description	Fct. no.	Code		
Analog outputs:	y1 (C 1)	y2 (C 2)	y3 (C 3)	y4 (C 4)	1	B1
	y5 (C 5)	y6 (C 6)	y7 (C 7)	y8 (C 8)		
	y9 (C 9)	y10 (C 10)	y11 (C 11)	y12 (C 12)		
	y13 (C 13)	y14 (C 14)	y15 (C 15)	y16 (C 16)		
Digital outputs:	z1 (et-err)	z2 (id-err)	z3 (valid)	z4 (online)	1	B1
	z5 (fail 1)	z6 (fail 2)	z7 (fail 3)	z7 (di 1)		
	z5 (di 2)	z5 (di 3)	z5 (d1 4)			

Display texts

Default display		Fct. no.	Code
Text 1:	C_KS8x	80	B2

KS8x (KS 800 and KS 816 controller function - Typ Nr. 59)**I/O-data**

		Description	Fct. no.	Code		
Analog inputs:	x1 (Cx)	x2 (W)	x3 (Yman)		0	B1
	Digital inputs:	d1 (a/m)	d2 (C off)	d3 (w/w2)		
		d5 (ostart)				
Analog outputs:	y1 (X)	y2 (Y)	y3 (St1)	y4 (St2)	1	B1
Digital outputs:	z1 (et-err)	z2 (valid)	z3 (xfail)			

Display texts

Default display		Fct. no.	Code
Text 1:	KS8x	80	B2

CPREAD (CAN-PDO-read function - no 88)**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Nodeid	Nodeaddress of producer	0	0	INT	71	35	B3	0
Guard	deactivate node guarding	0	0	INT	72	35		
	activate node guarding	1						
COBId1	COB-adresse of 1. receive PDO	385 .. 1320	-32000	INT	73	35		
COBId2	COB-adresse of 2. receive PDO	385 .. 1320	-32000	INT	74	35		

I/O-data

	Description	Fct. no.	Code
Digital inputs:	d1 (start)	0	B1
Analog outputs:	y1 (R1 1) y2 (R121) y3 (R1 3) y4 (R14)	1	
	y5 (R1 5) y6 (R1 6) y7 (R1 7) y8 (R1 8)		
	y8 (R2 1) y8 (R2 2) y8 (R2 3) y8 (R2 4)		
	y8 (R2 5) y8 (R2 6) y8 (R2 7) y8 (R2 8)		
Digital outputs:	z1 (id-err) z2 (et-err) z3 (valid)		

Display texts

Default display		Fct. no.	Code
Text 1:	CPREAD	80	B2

CPWRIT

(CAN-PDO-write function - no 89)

Configuration data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
Nodeid	Nodeaddress of producer	0	0	INT	71	35	B3	0
Guard	deactivate node guarding activate node guarding	0 1	0	INT	72	35		
COBId1	COB-adresse of 1. send PDO	385 .. 1320	-32000	INT	73	35		
COBId2	COB-adresse of 2. send PDO	385 .. 1320	-32000	INT	74	35		

I/O-data

	Description	Fct. no.	Code
Digital inputs:	d1 (start)	0	B1
Analog inputs:	x1 (T1 1) x2 (T121) x3 (T1 3) x4 (T14)		
	x5 (T1 5) x6 (T1 6) x7 (T1 7) x8 (T1 8)		
	x8 (T2 1) x8 (T2 2) x8 (T2 3) x8 (T2 4)		
	x8 (T2 5) x8 (T2 6) x8 (T2 7) x8 (T2 8)		
Digital outputs:	z1 (id-err) z2 (et-err) z3 (valid)	1	

Display texts

Default display		Fct. no.	Code
Text 1:	CPWRIT	80	B2

CSDO

(CAN-SDO-function - no. 92)

Parameter data

Des.	Description	Range	Default	Type	Single access Code	Fct. no.	Block access Code	Fct. no.
Value	Set value	-29999 .. 999999	0,000	FP	41	20	B2	0
Access	Type of object access read Type of object access write	0 1	0	INT	41	25		
Nodeid	Node address of target	2	2	INT	42	25		
D-Type	Data type of object _Uint8	0	0	INT	43	25		
	Data type of object _Int8	1						
	Data type of object _Uint16	2						
	Data type of object _Int16	3						
	Data type of object _Uint32	4						
	Data type of object _Int32	5						
	Data type of object Float	6						
Subind	Object dictionary subindex	0	255	INT	44	25		
Index	Object dictionary index	1	65535	INT	45	25		

I/O-data

	Description	Fct. no.	Code
Analog inputs:	x1 (Nodeid) x2 (D-Type) x3 (Subind) x4 (Index)	0	B1
	x5 (Wert)		
Digital inputs:	d1 (r/w) d2 (trig)	1	
Analog outputs:	y1 (Y1read)		
Digital outputs:	z1 (err) z2 (ready)		

Display texts

Default display		Fct. no.	Code
Text 1:	CSDO	80	B2

4.15 Programmer

APROG (Analog programmer - no. 24)

Process data

Des.	Description	R/W	Type	Range	Rem.	Code	Fct. no.
Block	Block access	R	Block	01, 03 .. 09		00	0
Status 1	Programmer status	R	ST1		A	01	
Status 2	Programmer status	R	ST2		B	02	
PNreff	eff. program number	R	FP	1..99		03	
Tnet	Program time net	R	FP	0 .. 59999		04	
Tbrut	Program time gross	R	FP	0 .. 59999		05	
WP	Programmer set-point	R	FP	-29999 .. 999999		06	
Trest	Remaining time programmer	R	FP	0 .. 59999		07	
Wend	End value active segment	R	FP	-29999 .. 999999		08	
Seg	Segment number	R	FP	1 .. 999		09	
Block	Block access	R		03		00	1
SegRest	Segment remaining time	R	BCD	-29999...200000		03	
Block	Block access	R	Block	21 .. 24		20	0
PRun	Program stop/run	R/W	INT	0 .. 1		21	
PRset	Programm continue / reset	R/W	INT	0 .. 1		22	
PSearch	Start program search run	R/W	INT	0 .. 1		23	
F-Key	F-key function (A/M switch-over)	R/W	INT	0 .. 1		24	
manual	Program Auto / Manual	R/W	INT	0 .. 1		25	
Block	Block access	R	Block	31, 35		30	0
Pnr	Program number effective	R/W	INT	1 .. 99		31	
PSet	Program preset value Pmode = Seg Pmode = time	R/W	FP	1 .. 999 0...59999		35	
WP Ppreset	Setpoint preset (inmanual operation!)	R/W		-29999...200000		36	

Programmer status 'Status 1'

		MSB				LSB					
		D7	D6	D5	D4	D3	D2	D1	D0	Status '0'	Status '1'
Bit no.	Name	Allocation								Status '0'	Status '1'
D0	P _{Run}	Program run								stop	running
D1	P _{End}	Program end								no	yes
D2	P _{Res}	Program reset								off	on
D3	Err1	Faulty parameter block								o.k.	error
D4	Err2	Infinite loop with parameter blocks								o.k.	error
D5	'0'	always '0'									
D6	'1'	always '1'									
D7		Parity									

Programmer status 'Status 2'

		MSB				LSB					
		D7	D6	D5	D4	D3	D2	D1	D0	Status '0'	Status '1'
Bit no.	Name	Allocation								Status '0'	Status '1'
D0	P _{Halt}	Program Halt								no Halt	Halt
D1	P _{Man}	Program Manual								Auto	Manual
D2		0									
D3		0									
D4		0									
D5	'0'	always '0'									
D6	'1'	always '1'									
D7		Parity									

Parameter data

Des.	Description	Range	Def.	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Wp0	Program set-point after reset	-29999 .. 999999	0,000		41	20		
W0	Lower setpoint limit	-29999 .. 999999	-29999	FP	42			
W100	Higher setpoint limit	-29999 .. 999999	999999		43			
WMode	Ramp function	0	0	INT	41	25	B2	0
	Step function	1						
PMode	Preset to segment	0	1	INT	42			
	Preset to time	1						
TPrio	Gradient priority	0	0		43			
	Time priority	1						
DP	Decimal point of setpoint	0...3	0		44			
RecMax	Max. recipes	1...99	99	INT	45			
SMode	Search run in the segment	0	0		46			
	Search run in program/ sequence	1						
	No search run	2						

Configuration data

Des.	Description	Range	Def.	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
PwrUp	Program continue	0	0	INT	71	35	B3	0
	Search run in actual segment	1						
	Continue at actual time	2						
PEnd	After program end: stop	0	0	INT	72	35		
	After program end: reset	1						
	Reset and halt	2						
Turbo	Time = hours : minutes	0	0	INT	73	35		
	Time = minutes : seconds	1						
FKey	A/M-Key switches F-Key output	0	0	INT	74	35		
	A/M-Key gives pulse to F-Key output	1						
	A/M-Key controls the programmer	2						

I/O data

					Fct. no.	Code
Analog inputs:	x1 (PSet)	x2 (DBlock)	x3 (ProgNo)	x4 (XVal)	0	B1
	x5 (Slav No)					
Digital inputs:	d1 (hide)	d2 (lock)	d3 (run)	d4 (reset)		
	d5 (preset)	d6 (search)	d7 (p-show)	d8 (halt)		
	d9 (manfree)					
Analog outputs:	y1 (Wp)	y2 (TNetto)	y3 (TBrutt)	y4 (TRest)	1	
	y5 (SegNo)	y6 (WEnd)	y7 (ProgNo)			
	y9 (Bl-no)					
Digital outputs:	z1 (run)	z2 (reset)	z3 (end)	z4 (fkey)		
	z5 (preset)	z6 (manual)				

Display texts

Default display	Fct. no.	Code
Text 1: APROG	80	B2

APROGD (APROG data - no. 25)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct.no.
TF1	Time for segment 1	0,0 .. 59999	-32000	FP	41	20	B2	0
WF1	End value of segment 1	-29999 .. 999999	0,000	FP	42	20		
TF2	Time for segment 2	0,0 .. 59999	-32000	FP	43	20		
WF2	End value of segment 2	-29999 .. 999999	0,000	FP	44	20		
TF3	Time for segment 3	0,0 .. 59999	-32000	FP	45	20		
WF3	End value of segment 3	-29999 .. 999999	0,000	FP	46	20		
TF4	Time for segment 4	0,0 .. 59999	-32000	FP	47	20		
WF4	End value of segment 4	-29999 .. 999999	0,000	FP	48	20		
TF5	Time for segment 5	0,0 .. 59999	-32000	FP	49	20		
WF5	End value of segment 5	-29999 .. 999999	0,000	FP	51	20		
TF6	Time for segment 6	0,0 .. 59999	-32000	FP	52	20		
WF6	End value of segment 6	-29999 .. 999999	0,000	FP	53	20		
TF7	Time for segment 7	0,0 .. 59999	-32000	FP	54	20		
WF7	End value of segment 7	-29999 .. 999999	0,000	FP	55	20		
TF8	Time for segment 8	0,0 .. 59999	-32000	FP	56	20		
WF8	End value of segment 8	-29999 .. 999999	0,000	FP	57	20		
TF9	Time for segment 9	0,0 .. 59999	-32000	FP	58	20		
WF9	End value of segment 9	-29999 .. 999999	0,000	FP	59	20		
TF10	Time for segment 10	0,0 .. 59999	-32000	FP	61	20		
WF10	End value of segment 10	-29999 .. 999999	0,000	FP	62	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 (DBlock)	0	B1
Analog outputs:	y1 (DBlock)	1	

Display texts

Default display	Fct. no.	Code
Text 1: APROGD	80	B2

APROGD 2

(APROG-Daten - Typ-Nr. 25)

Parameterdaten

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Type1	Time segment	0	←	INT	41	25	B2	0
	Gradient segment	1						
	Hold segment	2						
	Step segment	3						
	Time segment, wait at the end	4						
	Gradient segment, wait at the end	5						
	Hold segment, wait at the end	6						
Step segment, wait at the end	7							
Type2	Time segment	0	←	INT	42	25	B2	0
	Gradient segment	1						
	Hold segment	2						
	Step segment	3						
	Time segment, wait at the end	4						
	Gradient segment, wait at the end	5						
	Hold segment, wait at the end	6						
Step segment, wait at the end	7							
Type3	Time segment	0	←	INT	43	25	B2	0
	Gradient segment	1						
	Hold segment	2						
	Step segment	3						
	Time segment, wait at the end	4						
	Gradient segment, wait at the end	5						
	Hold segment, wait at the end	6						
Step segment, wait at the end	7							
:	Time segment	0	←	INT	:	:	B2	0
	Gradient segment	1						
	Hold segment	2						
	Step segment	3						
	Time segment, wait at the end	4						
	Gradient segment, wait at the end	5						
	Hold segment, wait at the end	6						
Step segment, wait at the end	7							

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Type9	Time segment	0	←	INT	49	25		
	Gradient segment	1						
	Hold segment	2						
	Step segment	3						
	Time segment, wait at the end	4						
	Gradient segment, wait at the end	5						
	Hold segment, wait at the end	6						
Type10	Time segment	0	←	INT	51	25		
	Gradient segment	1						
	Hold segment	2						
	Step segment	3						
	Time segment, wait at the end	4						
	Gradient segment, wait at the end	5						
	Hold segment, wait at the end	6						
Step segment, wait at the end	7							
TP9r1	Time for Segment 1	0,0 .. 59999	-32000	FP	41	20		
WP1	End value for Segment 1	-29999 .. 999999	0,000	FP	42	20		
TP9r2	Time for Segment 2	0,0 .. 59999	-32000	FP	43	20		
WP2	End value for Segment 2	-29999 .. 999999	0,000	FP	44	20		
TP9r3	Time for Segment 3	0,0 .. 59999	-32000	FP	45	20		
WP3	End value for Segment 3	-29999 .. 999999	0,000	FP	46	20		
TP9r4	Time for Segment 4	0,0 .. 59999	-32000	FP	47	20		
WP4	End value for Segment 4	-29999 .. 999999	0,000	FP	48	20		
TP9r5	Time for Segment 5	0,0 .. 59999	-32000	FP	49	20		
WP5	End value for Segment 5	-29999 .. 999999	0,000	FP	51	20		
TP9r6	Time for Segment 6	0,0 .. 59999	-32000	FP	52	20		
WP6	End value for Segment 6	-29999 .. 999999	0,000	FP	53	20		
TP9r7	Time for Segment 7	0,0 .. 59999	-32000	FP	54	20		
WP7	End value for Segment 7	-29999 .. 999999	0,000	FP	55	20		
TP9r8	Time for Segment 8	0,0 .. 59999	-32000	FP	56	20		
WP8	End value for Segment 8	-29999 .. 999999	0,000	FP	57	20		
TP9r9	Time for Segment 9	0,0 .. 59999	-32000	FP	58	20		
WP9	End value for Segment 9	-29999 .. 999999	0,000	FP	59	20		
TP9r10	Time for Segment 10	0,0 .. 59999	-32000	FP	61	20		
WP10	End value for Segment 10	-29999 .. 999999	0,000	FP	62	20		

I/O data

	Description	Fct. no	Code
Analog inputs:	x1 (DBlock)	0	B1
Analog outputs:	y1 (DBlock)	1	

Display texts

	Default display	Fct. no	Code
Text 1:	APROGD2	80	B2

DPROG (Digital programmer - no. 27)**Process data**

Des.	Description	R/W	Type	Range	Rem.	Code	Fct. no.
Block	Block access	R	Block	01 .. 05, 07, 09			00
Status 1	Programmer status 1	R	ST1		B		01
Status 2	Actual status of control outputs	R	ST1		C		02
PNreff	Eff. Program number	R	FP	1..99			03
Tnet	Program time net	R	FP	0 .. 59999			04
Tbrut	Program time gross	R	FP	0 .. 59999			05
Trest	Rest time programmer	R	FP	0 .. 59999			07
Seg	Segment number	R	FP	1 .. 999			09
Block	Block access	R		01, 03			00
Status 3	Status 3	R	ST1		D		01
SegRest	Segment remaining time	R	FP	-29999.. 200000			03
Block	Block access	R	block	21, 22, 24			20
PRun	Program stop/run	R/W	INT	0 .. 1			21
PRset	Program continue / reset	R/W	INT	0 .. 1			22
F-Key	F-key function (A/H switch-over)	R/W	INT	0 .. 1			24
manual	Program Auto / manual	R/W	INT	0 .. 1			25
Block	Block access	R	block	31, 35			30
Pnr	Program number effective	R/W	INT	1 .. 99			31
Pset	Program preset value Pmode = Seg Pmode = time	R/W	FP	1 .. 999 0...59999			35
do6...do1	Steuerspurvorgabe (im Handbetrieb!)	R/W	FP	000000...111111			36

Programmer status 'Status 1'

MSB				LSB				Status '0'	Status '1'
D7	D6	D5	D4	D3	D2	D1	D0		
Bit no.	Name	Allocation						Status '0'	Status '1'
D0	P _{Run}	Program run						stop	running
D1	P _{End}	Program end						no	yes
D2	P _{Res}	Program reset						off	on
D3	Err1	Faulty parameter block						o.k.	error
D4	Err2	Infinite loop with parameter blocks						o.k.	error
D5	'0'	always '0'							
D6	'1'	always '1'							
D7		Parity							

Actual statuses of control outputs 'Status 2'

MSB				LSB				Status '0'	Status '1'
D7	D6	D5	D4	D3	D2	D1	D0		
Bit no.	Name	Allocation						Status '0'	Status '1'
D0	Stsp1	Control output 1						off	on
D1	Stsp2	Control output 2						off	on
D2	Stsp3	Control output 3						off	on
D3	Stsp4	Control output 4						off	on
D4	Stsp5	Control output 5						off	on
D5	Stsp6	Control output 6						off	on
D6	'1'	always '1'							
D7		Parity							

Programmerstatus 'Status 3'

MSB				LSB				Status '0'	Status '1'
D7	D6	D5	D4	D3	D2	D1	D0		
Bit no.	Name	Allocation						Status '0'	Status '1'
D0	P _{Halt}	Program Halt						no Halt	Halt
D1	P _{Man}	Program Manual						Auto	Manual
D2		0							
D3		0							
D4		0							
D5	'0'	always '0'							
D6	'1'	always '1'							
D7		Parity							

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct.no.
PwrUp	Continue program	0	0	INT	71	35	B3	0
	Continue at actual time	2						
PEnd	After end of program: stop	0	0	INT	72	35		
	After end of program: reset	1						
	Reset and stop	2						
Turbo	Time = hours : minutes	0	0	INT	73	35		
	Time = minutes : seconds	1						
FKey	A/M-Key switches F-Key output	0	0	INT	74	35		
	A/M-Key gives pulse to F-Key output	1						
	A/M-Key control Programmer	2						

Parameter data

Des.	Description	Range	Def.	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
D0	Reset value for control outputs 6...0 after reset	0 .. 111111	0	FP	41	20	B2	0
PMode	Preset to segment	0	1	INT	41	25		
	Preset to time	1						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 (PSet) x2 (DBlock) x3 (ProgNo) x4 (SlavNo)	0	B1
Digital inputs:	d1 (hide) d2 (lock) d3 (run) d4 (reset) d5 (preset) d6 (p-show) d7 (halt) d8 (manfree)		
Analog outputs:	y1 (TNetto) y2 (TBrutt) y3 (TRest) y4 (SegNo) y5 (ProgNo) y6 (SegRest) y7 (BI-no)	1	
Digital outputs:	z1 (run) z2 (reset) z3 (end) z4 (fkey) z5 (do1) z6 (do2) z7 (do3) z8 (do4) z9 (do5) z10 (do6) z11 (preset) z12 (manual)		

Display texts

Default display	Fct. no.	Code
Text 1: DPROG	80	B2

DPROGD (DPROG data - no. 28)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct.no.
TF1	Time for segment 1	0,0 .. 59999	-32000	FP	41	20	B2	0
D1	Control output values for segm. 1	0 .. 111111	0	FP	42	20		
TF2	Time for segment 2	0,0 .. 59999	-32000	FP	43	20		
D2	Control output values for segm. 2	0 .. 111111	0	FP	44	20		
TF3	Time for segment 3	0,0 .. 59999	-32000	FP	45	20		
D3	Control output values for segm. 3	0 .. 111111	0	FP	46	20		
TF4	Time for segment 4	0,0 .. 59999	-32000	FP	47	20		
D4	Control output values for segm. 4	0 .. 111111	0	FP	48	20		
TF5	Time for segment 5	0,0 .. 59999	-32000	FP	49	20		
D5	Control output values for segm. 5	0 .. 111111	0	FP	51	20		
TF6	Time for segment 6	0,0 .. 59999	-32000	FP	52	20		
D6	Control output values for segm. 6	0 .. 111111	0	FP	53	20		
TF7	Time for segment 7	0,0 .. 59999	-32000	FP	54	20		
D7	Control output values for segm. 7	0 .. 111111	0	FP	55	20		
TF8	Time for segment 8	0,0 .. 59999	-32000	FP	56	20		
D8	Control output values for segm. 8	0 .. 111111	0	FP	57	20		
TF9	Time for segment 9	0,0 .. 59999	-32000	FP	58	20		
D9	Control output values for segm. 9	0 .. 111111	0	FP	59	20		
TF10	Time for segment 10	0,0 .. 59999	-32000	FP	61	20		
D10	Control output values for segm. 10	0 .. 111111	0	FP	62	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 (DBlock)	0	B1
Analog outputs:	y1 (DBlock)	1	

Display texts

Default display	Fct. no.	Code
Text 1: DPROGD	80	B2

4.16 Controller functions

CONTR (Control function - no. 90)

Process data

Des.	Description	R/W	Type	Range	Rem.	Code	Fct. no.
Block	Block access	R	block	01 .. 05, 07, 09		00	0
Status 1	status 1	R	ST1		A	01	
Status 2	status 2	R	ST1		B	02	
Weff	Eff. set-point	R	FP	-29999 .. 999999		03	
Xeff	Eff. process value	R	FP	-29999 .. 999999		04	
Yeff	Effective correcting variable	R	FP	-29999 .. 999999		05	
x-w	Control deviation	R	FP	-29999 .. 999999		06	
X1	Main variable 1	R	FP	-29999 .. 999999		07	
X2	Auxiliary variable 2	R	FP	-29999 .. 999999		08	
X3	Auxiliary variable 3	R	FP	-29999 .. 999999		09	
Block	Block access	R	block	01..03 05..07		00	1
Status 3	Status 3	R	ST1		C	01	
WStatus	Set-point status	R	ST1		D	02	
Yp	Position feedback	R	FP	-29999 .. 999999		03	
OVC+	Override control +	R	FP	-29999 .. 999999		05	
OVC-	Override control +	R	FP	-29999 .. 999999		06	
Wext	Ext. set-point	R	FP	-29999 .. 999999		07	
Block	Block access	R	block	01, 03		00	2
TStatus	Status Tuning 1	R/W	ST1		E	01	
POset	Parameter set for self-tuning	R/W	FP	1 .. 6		03	
Block	Block access	R	block	21 .. 26, 28		20	0
w/Y2	Additional correcting value on/off	R/W	INT	0 / 1		21	
PI/P	PI/P switch-over	R/W	INT	0 / 1		22	
A/M	Auto/manual switch-over	R/W	INT	0 / 1		23	
OStart	Self-tuning start	R/W	INT	0 / 1		24	
We/i	Wext/Wint switch-over	R/W	INT	0 / 1		25	
w/W2	w/W2 switch-over	R/W	INT	0 / 1		26	
Coff	Controller on/off	R/W	INT	0 / 1		28	
Block	Block access	R	Block	31, 32, 35, 36		30	1
Wnvol	internal set-point, non volatile (EEPROM)	R/W	FP	-29999 .. 999999		31	
Wvol	internal set-point, volatile (RAM)	R/W	FP	-29999 .. 999999		32	
dYman	Difference correcting variable	R/W	FP	-210 .. 210		35	
Yman	Absolute correcting variable	R/W	FP	-105 .. 105		36	
Block	Block access	R	block	31 .. 39		30	2
ParNr	Effective parameter set number	R/W	FP	1 .. 6		31	
Tu1	Delay time heating	R	FP	0 ..200000		32	
Vmax1	Rate of change heating	R	FP	0 .. 9,999		33	
Kp1	Process gain heating	R	FP	0 .. 9,999		34	
MSG1	Error code of self-tuning heating	R	FP	0 .. 8		35	
Tu2	Delay time cooling	R	FP	0 ..200000		36	
Vmax2	Rate of change cooling	R	FP	0 .. 9,999		37	
Kp2	Process gain cooling	R	FP	0 .. 9,999		38	
MSG2	Error code of self-tuning cooling	R	FP	0 .. 8		39	

'Status 1'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0	Y1	Switching output 1	off	on			
D1	Y2	Switching output 2	off	on			
D2	A/M	Auto/manual	auto	manual			
D3	y/Y2	y/Y2 switch-over	y	Y2			
D4	Coff	Controller switched off	no	yes			
D5	XFail	Sensor fail	no	yes			
D6	'1'	always '1'					
D7		Parity					

'Status 2'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0..D3	'0'	always '0'					
D4	PI/P	Status PI/P	PI	P			
D5	CFail	Status controller	ok	not ok			
D6	'1'	always '1'					
D7		Parity					

'Status 3'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0	'0'	always '0'					
D1	DOVC-	Override control-	off	on			
D2	DOVC+	Override control+	off	on			
D3..D5	'0'	always '0'					
D6	'1'	always '1'					
D7		Parity					

Set-point status 'WStatus'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0	w/W2	w/W2 switch-over	w	W2			
D1	We/Wi	Wext/Wint switch-over	Wext	Wint			
D2	HoldWeff	Weff frozen	no	yes			
D3	GrwOff	Set-point gradient suppressed	no	yes			
D4	Trk	Tracking	off	on			
D5	'0'	always '0'					
D6	'1'	always '1'					
D7		Parity					

Status Tuning 'TStatus'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0	OStab	Process at rest	no	yes			
D1	Orun	Self-tuning operation	off	on			
D2	Oerr	Self-tuning result	ok	error			
D3..D5	'0'	always '0'					
D6	'1'	always '1'					
D7		Parity					

Configuration data

Des.	Description	Range	Def.	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct.no.
Xn0	Span start	-29999 .. 999999	0	FP	71	30	B3	0
Xn100	Span end	-29999 .. 999999	100	FP	72	30		
SFac	Factor for stoichiometric ratio	0,010 .. 99,990	1,000	FP	73	30		
CFunc	Signaller_1_output	0	9	INT	71	35		
	Signaller_2_outputs	1						
	2-point controller	2						
	3-point controller: heating & cooling switch	3						
	3-point controller: heating cont./cooling switch	4						
	3-point controller: heating switch./cooling cont.	5						
	Δ / star / off controller	6						
	3-point stepping controller	7						
	3-point stepping controller with Yp	8						
	Cont. controller with position feedback Yp	9						
	Cont. controller with split-range	10						
Cont. controller with position feedback Yp	11							
CType	Standard controller	0	0	INT	72	35		
	Ratio controller	1						
	3-element controller	2						
WFunc	Set-point control	0	0	INT	73	35		
	Set-point/cascade control	1						
CMode	Output action inverse	0	0	INT	74	35		
	Output action direct	1						
CDiff	Differentiate Xw	0	0	INT	75	35		
	Differentiate X	1						
CFail	Neutral	0	0	INT	76	35		
	Ypid = Ymin (0%)	1						
	Ypid = Ymax (100%)	2						
	Ypid = Y2 (not adjustable from front)	3						
	Ypid = Y2 (automatic) or Yman (manual)	4						
COVC	No override control	0	0	INT	77	35		
	Override control +	1						
	Override control -	2						
	Override control + / -	3						
WTrac	No tracking of Wint	0	0	INT	78	35		
	Set-point tracking	1						
	Process value tracking	2						
Ratio	Ratio controller:(x1 + N0) / x2	0	0	INT	79	35		
	Ratio controller:(x1 + N0) / (x1 + x2)	1						
	Ratio controller:(x2 - x1 + N0) / x2	2						
XDF	Digits behind decimal point (process value)	0 .. 3	0	INT	81	35		
Disp	Contents of bargraph line: correcting variable	0	0	INT	82	35		
	Contents of bargraph line: Control deviation	1						
	Contents of bargraph line: Xeff	2						
OMode	Self-tuning mode: Standard	0	0	INT	83	35		
OCond	Condition for process at rest: grad = 0	0	0	INT	84	35		
	grad < 0 (controller inverse)	1						
	grad > 0 (controller direct)	1						
	grad \neq 0	2						

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fkt.Nr
W0	Lower set-point limit (Weff)	-29999 .. 999999	0	FP	41	20	B2	0
W100	Upper set-point limit (Weff)	-29999 .. 999999	100	FP	42	20		
W2	Additional set-point	-29999 .. 999999	100	FP	43	20		
Grw+	Set-point gradient plus	0,001 .. 999999	-32000	FP	44	20		
Grw-	Set-point gradient minus	0,001 .. 999999	-32000	FP	45	20		
Grw2	Set-point gradient for W2	0,001 .. 999999	-32000	FP	46	20		
N0	Zero offset ratio	-29999 .. 999999	0,0	FP	47	20		
a	Factor a (3-element control)	-9,99 .. 99,99	1,00	FP	48	20		
Xsh	Trigger point separation	0,2 .. 20,0	0,2	FP	49	20		
TPuls	Minimum pos. step time	0,1 .. 2,0	0,3	FP	51	20		
Tm	Actuator response time	5 .. 999999	30	FP	52	20		
Xsd1	Switching difference of signaller	0,10 .. 999999	1,00	FP	53	20		
LW	Trigger point separation for additional contact	-29999 .. 999999	-32000	FP	54	20		
Xsd2	Switching difference for additional contact	0,10 .. 999999	1,00	FP	55	20		
Xsh1	Trigger point separation (PD)	0,0 .. 1000,0	0,0	FP	56	20		
Xsh2	Trigger point separation (PD)	0,0 .. 1000,0	0,0	FP	57	20		
Y2	Additional correcting value	-105,0 .. 105,0	0,0	FP	58	20		
Ymin	Lower correcting variable limit	-105,0 .. 105,0	0	FP	59	20		
Ymax	Upper correcting variable limit	-105,0 .. 105,0	100	FP	61	20		
Y0	Controller working point	-105,0 .. 105,0	0,0	FP	62	20		
Y0ftm	Corr. value with process at rest	-105,0 .. 105,0	0,0	FP	63	20		
dYopt	Step height with self-tuning	5 .. 100	100	FP	64	20		
WBlock	All setpoint switchover locked	0	←	INT	41	25		
	We switchover locked	1						
	W2 switchover locked	2						
	All setpoint switchover open	3						
XP1	Proportional band 1	0,1 .. 999,9	100,0	FP	65	20	1	
XP2	Proportional band 2	0,1 .. 999,9	100,0	FP	66	20		
Tn	Integral time	0,0 .. 999999	10,0	FP	67	20		
Tv	Derivative time	0,0 .. 999999	10,0	FP	68	20		
TF1	Cycle time heating	0,4 .. 999,9	5,0	FP	69	20		
TF2	Cycle time cooling	0,4 .. 999,9	5,0	FP	41	21		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 (X1) x2 (X2) x3 (X3) x4 (Wext) x5 (OVC+) x6 (OVC-) x7 (Yp) x8 (Yhm) x9 (Yadd)	0	B1
Digital inputs:	d1 (hide) d2 (lock) d3 (inc) d4 (dec) d5 (x f) d6 (yp f) d7 (a/m) d8 (w/w2) d9 (we/wi) d10 (pi/p) d11 (d ovc+) d12 (d ovc-) d13 (track) d14 (y/y2) d15 (off) d16 (sm/hm) d17 (ostart) d18 (w stop) d19 (gr off) d20 (rstart) d21 (o hide)		
Analog outputs:	y1 (Weff) y2 (X) y3 (Y) y4 (XW) y5 (W) y6 (Yout1) y7 (Yout2)	1	
Digital outputs:	z1 (y1) z2 (y2) z3 (c fail) z4 (off) z5 (a/m) z6 (y/y2) z7 (we/wi) z8 (pi/p) z9 (o run) z10 (o stab) z11 (o err) z12 (xw sup)		

Display texts

Default display	Fct. no.	Code
Text 1: CONTR	80	B2
Text 2: X-UNIT		

CONTR+ (Extended control function - no. 91)

Process data

Des.	Description	R/W	Type	Range	Rem.	Code	Fct. no.
Block	Block access	R	block	01 .. 05, 07, 09		00	0
Status 1	Status 1	R	ST1		A	01	
Status 2	Status 2	R	ST1		B	02	
Weff	eff. Set-point	R	FP	-29999 .. 999999		03	
Xeff	eff. Process value	R	FP	-29999 .. 999999		04	
Yeff	effective correcting variable	R	FP	-29999 .. 999999		05	
x-w	Control deviation	R	FP	-29999 .. 999999		06	
X1	Main variable 1	R	FP	-29999 .. 999999		07	
X2	Auxiliary variable 2	R	FP	-29999 .. 999999		08	
X3	Auxiliary variable 3	R	FP	-29999 .. 999999		09	
Block	Block access	R	block	01..03 05..07		00	1
Status 3	Status 3	R	ST1		C	01	
WStatus	Set-point status	R	ST1		D	02	
YF	Position feedback	R	FP	-29999 .. 999999		03	
OVC+	Override control +	R	FP	-29999 .. 999999		05	
OVC-	Override control -	R	FP	-29999 .. 999999		06	
Wext	Ext. set-point	R	FP	-29999 .. 999999		07	
Block	Block access	R	block	01, 03		00	2
TStatus	Status Tuning 1	R/W	ST1		E	01	
POrt	Parameters set for self-tuning	R/W	FP	1 .. 6		03	
Block	Block access	R	block	21 .. 26, 28		20	0
y/Y2	Additional correcting value on/off	R/W	INT	0 / 1		21	
PI/P	PI/P switch-over	R/W	INT	0 / 1		22	
A/M	Auto/manual switch-over	R/W	INT	0 / 1		23	
OStart	Self-tuning start	R/W	INT	0 / 1		24	
We/i	Wext/Wint switch-over	R/W	INT	0 / 1		25	
w/W2	w/W2 switch-over	R/W	INT	0 / 1		26	
Coff	Controller on/off	R/W	INT	0 / 1		28	
Block	Block access	R	block	31, 32, 35, 36		30	1
Wnv01	Internal set-point, non volatile (EEPROM)	L/S	FP	-29999 .. 999999		31	
Wv01	Internal set-point, volatile(RAM)	R/W	FP	-29999 .. 999999		32	
dYman	Difference correcting variable	R/W	FP	-210 .. 210		35	
Yman	Absolute correcting variable	R/W	FP	-105 .. 105		36	
Block	Block access	R	block	31 .. 39		30	2
ParNr	Effective parameter set number	R/W	FP	1 .. 6		31	
Tu1	Delay time heating	R	FP	0 .. 200000		32	
Umax1	Rate of change heating	R	FP	0 .. 9,999		33	
KP1	Process gain heating	R	FP	0 .. 9,999		34	
MSG1	Error code for self-tuning heating	R	FP	0 .. 8		35	
Tu2	Delay time cooling	R	FP	0 .. 200000		36	
Umax2	Rate of change cooling	R	FP	0 .. 9,999		37	
KP2	Process gain cooling	R	FP	0 .. 9,999		38	
MSG2	Error code of self-tuning cooling	R	FP	0 .. 8		39	

'Status 1'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0	Y1	Switching output 1	off	on			
D1	Y2	Switching output 2	off	on			
D2	A/M	Auto/manual	auto	hand			
D3	y/Y2	y/Y2 switch-over	y	Y2			
D4	Coff	Controller switched off	no	yes			
D5	XFail	Sensor fail	no	yes			
D6	'1'	always '1'					
D7		Parity					

'Status 2'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0..D3	'0'	always '0'					
D4	PI/P	Status PI/P	PI	P			
D5	CFail	Status controller	ok	not ok			
D6	'1'	always '1'					
D7		Parity					

'Status 3'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0	'0'	always '0'					
D1	DOVC-	Override control-	off	on			
D2	DOVC+	Override control+	off	on			
D3..D5	'0'	always '0'					
D6	'1'	always '1'					
D7		Parity					

Set-point status 'WStatus'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0	w/W2	w/W2 switch-over	w	W2			
D1	We/Wi	Wext/Wint switch-over	Wext	Wint			
D2	HoldWeff	Weff frozen	no	yes			
D3	GrwOff	set-point gradient suppressed	no	yes			
D4	Trk	Tracking	off	on			
D5	'0'	always '0'					
D6	'1'	always '1'					
D7		Parity					

Status Tuning 'TStatus'

MSB				LSB			
D7	D6	D5	D4	D3	D2	D1	D0
Bit no.	Name	Allocation	Status '0'	Status '1'			
D0	OStab	Process at rest	no	yes			
D1	Orun	Self-tuning operation	off	on			
D2	Oerr	Self-tuning result	ok	error			
D3..D5	'0'	always '0'					
D6	'1'	always '1'					
D7		Parity					

Configuration data

Des.	Description	Range	Def.	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct.no.
Xn0	Span start	-29999 .. 999999	0	FP	71	30	B3	0
Xn100	Span end	-29999 .. 999999	100	FP	72			
SFac	Factor for stoichiometric ratio	0,010 .. 99,990	1,000	FP	73			
CFunc	Signaller with one output	0	9	INT	71	35		
	Signaller with two outputs	1						
	2-point controller	2						
	3-point controller: heating & cooling switch	3						
	3-point controller: heating cont./cooling switch	4						
	3-point controller: heating switch./cooling cont.	5						
	Δ / star / off controller	6						
	3-point stepping controller	7						
	3-point stepping controller with Yp	8						
	Cont. controller with position feedback Yp	9						
	Cont. Controller with split range	10						
Cont. controller with position feedback Yp	11							
CType	Standard controller	0	0	INT	72			
	Ratio controller	1						
	3-element controller	2						
WFunc	Set-point control	0	0	INT	73			
	Set-point/cascade control	1						
CMode	Output action inverse	0	0	INT	74			
	Output action direct	1						
CDiff	Differentiate Xw	0	0	INT	75			
	Differentiate X	1						
CFail	Neutral	0	0	INT	76			
	Ypid = Ymin (0%)	1						
	Ypid = Ymax (100%)	2						
	Ypid = Y2 (not adjustable from front)	3						
	Ypid = Y2 (automatic) or Yman (manual)	4						
COVC	No override control	0	0	INT	77			
	Override control +	1						
	Override control -	2						
	Override control + / -	3						
WTrac	No tracking of Wint	0	0	INT	78			
	Set-point tracking	1						
	Process value tracking	2						
Ratio	Ratio controller:(x1 + N0) / x2	0	0	INT	79			
	Ratio controller:(x1 + N0) / (x1 + x2)	1						
	Ratio controller:(x2 - x1 + N0) / x2	2						
XDP	Digits behind decimal point (process value)	0 .. 3	0	INT	81			
Disp	Contents of bargraph line: correcting variable	0	0	INT	82			
	Contents of bargraph line: control deviation	1						
	Contents of bargraph line: Xeff	2						
OMode	Self-tuning mode: standard	0	0	INT	83			
OCond	Condition for process at rest: grad = 0	0	0	INT	84			
	grad < 0 (controller inverse)	1						
	grad > 0 (controller direct)	1						
	grad ≠ 0	2						

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct.no.
W0	Lower set-point limit (Weff)	-29999 .. 999999	0	FP	41	20	B2	0
W100	Upper set-point limit (Weff)	-29999 .. 999999	100	FP	42	20		
W2	Additional set-point	-29999 .. 999999	100	FP	43	20		
Grw+	Set-point gradient plus	0,001 .. 999999	-32000	FP	44	20		
Grw-	Set-point gradient minus	0,001 .. 999999	-32000	FP	45	20		
Grw2	Set-point gradient for W2	0,001 .. 999999	-32000	FP	46	20		
N0	Zero offset ratio control	-29999 .. 999999	0,0	FP	47	20		
a	Factor a (3-element control)	-9,99 .. 99,99	1,00	FP	48	20		
Xsh	Trigger point separation	0,2 .. 20,0	0,2	FP	49	20		
Tpuls	Minimum pos. step time	0,1 .. 2,0	0,3	FP	51	20		
Tm	Actuator response time	5 .. 999999	30	FP	52	20		
Xsd1	Switching difference of signaller	0,10 .. 999999	1,00	FP	53	20		
LW	Trigger point separation for additional contact	-29999 .. 999999	-32000	FP	54	20		
Xsd2	Switching diff. for add. contact	0,10 .. 999999	1,00	FP	55	20		
Xsh1	Trigger point separation (PD)	0,0 .. 1000,0	0,0	FP	56	20		
Xsh2	Trigger point separation (PD)	0,0 .. 1000,0	0,0	FP	57	20		
Y2	Additional correcting value	-105,0 .. 105,0	0,0	FP	58	20		
Ymin	Lower correcting variable limit	-105,0 .. 105,0	0	FP	59	20		
Ymax	Upper correcting variable limit	-105,0 .. 105,0	100	FP	61	20		
Y0	Controller working point	-105,0 .. 105,0	0,0	FP	62	20		
YOftm	Corr. value with process at rest	-105,0 .. 105,0	0,0	FP	63	20		
dYOft	Step height with self-tuning	5 .. 100	100	FP	64	20		
POft	Parameter set for self-tuning	1 .. 6	1	INT	41	25		
WBlock	All setpoint switchover locked	0	←	INT	41	25		
	We switchover locked	1						
	W2 switchover locked	2						
	All setpoint switchover open	3						
XF1 1	Proportional band 1	0,1 .. 999,9	100,0	FP	65	20	B2	1
XF2 1	Proportional band 2	0,1 .. 999,9	100,0	FP	66	20		
Tn 1	Integral time	0,0 .. 999999	10,0	FP	67	20		
Tv 1	Derivative time	0,0 .. 999999	10,0	FP	68	20		
TF1 1	Cycle time heating	0,4 .. 999,9	5,0	FP	69	20		
TF2 1	Cycle time cooling	0,4 .. 999,9	5,0	FP	41	21		
XF1 2	Proportional band 1	0,1 .. 999,9	100,0	FP	65	20	B2	2
XF2 2	Proportional band 2	0,1 .. 999,9	100,0	FP	66			
Tn 2	Integral time	0,0 .. 999999	10,0	FP	67			
Tv 2	Derivative time	0,0 .. 999999	10,0	FP	68			
TF1 2	Cycle time heating	0,4 .. 999,9	5,0	FP	69			
TF2 2	Cycle time cooling	0,4 .. 999,9	5,0	FP	41	21		
XF1 3	Proportional band 1	0,1 .. 999,9	100,0	FP	65	20	B2	3
XF2 3	Proportional band 2	0,1 .. 999,9	100,0	FP	66			
Tn 3	Integral time	0,0 .. 999999	10,0	FP	67			
Tv 3	Derivative time	0,0 .. 999999	10,0	FP	68			
TF1 3	Cycle time heating	0,4 .. 999,9	5,0	FP	69			
TF2 3	Cycle time cooling	0,4 .. 999,9	5,0	FP	41	21		
XF1 4	Proportional band 1	0,1 .. 999,9	100,0	FP	65	20	B2	4
XF2 4	Proportional band 2	0,1 .. 999,9	100,0	FP	66			
Tn 4	Integral time	0,0 .. 999999	10,0	FP	67			
Tv 4	Derivative time	0,0 .. 999999	10,0	FP	68			
TF1 4	Cycle time heating	0,4 .. 999,9	5,0	FP	69			
TF2 4	Cycle time cooling	0,4 .. 999,9	5,0	FP	41	21		
XF1 5	Proportional band 1	0,1 .. 999,9	100,0	FP	65	20	B2	5
XF2 5	Proportional band 2	0,1 .. 999,9	100,0	FP	66			
Tn 5	Integral time	0,0 .. 999999	10,0	FP	67			
Tv 5	Derivative time	0,0 .. 999999	10,0	FP	68			
TF1 5	Cycle time heating	0,4 .. 999,9	5,0	FP	69			
TF2 5	Cycle time cooling	0,4 .. 999,9	5,0	FP	41	21		

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct.no.
XP1 6	Proportional band 1	0,1 .. 999,9	100,0	FP	65	20	B2	6
XP2 6	Proportional band 2	0,1 .. 999,9	100,0	FP	66			
Tn 6	Integral time	0,0 .. 999999	10,0	FP	67			
Tv 6	Derivative time	0,0 .. 999999	10,0	FP	68			
TF1 6	Cycle time heating	0,4 .. 999,9	5,0	FP	69			
TF2 6	Cycle time cooling	0,4 .. 999,9	5,0	FP	41	21		

I/O data

	Description				Fct. no.	Code
Analog inputs:	x1 (X1)	x2 (X2)	x3 (X3)	x4 (Wext)	0	B1
	x5 (OVC+)	x6 (OVC-)	x7 (Yp)	x8 (Yhm)		
	x9 (Yadd)	x10 (ParNo)	x11 (Casc)			
Digital inputs:	d1 (hide)	d2 (lock)	d3 (inc)	d4 (dec)		
	d5 (x f)	d6 (yp f)	d7 (a/m)	d8 (w/w2)		
	d9 (we/wi)	d10 (pi/p)	d11 (d ovc+)	d12 (d ovc-)		
	d13 (track)	d14 (y/y2)	d15 (off)	d16 (sm/hm)		
	d17 (ostart)	d18 (w stop)	d19 (gr off)	d20 (rstart)		
	d21 (o_hide)					
Analog outputs:	y1 (Weff)	y2 (X)	y3 (Y)	y4 (XW)	1	
	y5 (W)	y6 (Yout1)	y7 (Yout2)	y8 (ParNo)		
	y9 (bl-no)					
Digital outputs:	z1 (y1)	z2 (y2)	z3 (c fail)	z4 (off)		
	z5 (a/m)	z6 (y/y2)	z7 (we/wi)	z8 (pi/p)		
	z9 (o run)	z10 (o stab)	z11 (o err)	z12 (xw sup)		

Display texts

Default display	Fct. no.	Code
Text 1: CONTR+	80	B2
Text 2: X-UNIT		

PIDMA (controller function - Type-Nr. 93)**Process data**

Des.	Description	L/S	Type	Bereich	Bem.	Code	Fct. no.
Block	Block access	L	Block	01 .. 05, 07, 09		00	0
Status 1	Status 1	L	ST1		A	01	
Status 2	Status 2	L	ST1		B	02	
Weff	Eff. setpoint	L	FP	-29999 .. 999999		03	
Xeff	Eff. measured value	L	FP	-29999 .. 999999		04	
Yeff	Eff. actuator value	L	FP	-29999 .. 999999		05	
x-w	Control deviation	L	FP	-29999 .. 999999		06	
X1	Main process value 1	L	FP	-29999 .. 999999		07	
X2	Help process value 2	L	FP	-29999 .. 999999		08	
X3	Help process value 3	L	FP	-29999 .. 999999		09	
Block	Block access	L	Block	01..03 05..07		00	1
Status 3	Status 3	L	ST1		C	01	
WStatus	Setpoint status	L	ST1		D	02	
YF	Position feedback	L	FP	-29999 .. 999999		03	
OUC+	Overridecontrol +	L	FP	-29999 .. 999999		05	
OUC-	Overridecontrol -	L	FP	-29999 .. 999999		06	
Wext	Ext. setpoint	L	FP	-29999 .. 999999		07	
Block	Block access	L	Block	01, 03		00	2
TStatus	Status Tuning 1	L/S	ST1		E	01	
POpt	Parameterset to be optimized	L/S	FP	1 .. 6		03	
Block	Block access	L	Block	21 .. 26, 28		20	0
y/Y2	Additional correcting value on/off	L/S	INT	0 / 1		21	
A/M	Manual-automatic switch-over	L/S	INT	0 / 1		23	
OStart	Start self optimizing	L/S	INT	0 / 1		24	
We/i	Switch over Wext/Wint	L/S	INT	0 / 1		25	
w/W2	Switch over w/W2	L/S	INT	0 / 1		26	
Coff	Controller on/off	L/S	INT	0 / 1		28	
Block	Block access	L	Block	31, 32, 35, 36		30	1
Wnv01	Internal setpoint, non volatile (EEPROM)	L/S	FP	-29999 .. 999999		31	
Wv01	Internal setpoint, volatile (RAM)	L/S	FP	-29999 .. 999999		32	
dYman	Differential actuator value	L/S	FP	-210 .. 210		35	
Yman	Absolute actuator value	L/S	FP	-105 .. 105		36	

'Status 1'

		MSB				LSB					
		D7	D6	D5	D4	D3	D2	D1	D0	Status '0'	Status '1'
Bit-No.	Name	Allocation								Status '0'	Status '1'
D0	Y1	Switching output 1								off	on
D1	Y2	Switching output 2								off	on
D2	A/M	Automatic/manual								Auto	Man.
D3	y/Y2	y/Y2-switch over								y	Y2
D4	Coff	Controller switched off								no	yes
D5	XFail	Sensorfail								no	yes
D6	'1'	Always '1'									
D7		Parity									

'Status 2'

		MSB				LSB					
		D7	D6	D5	D4	D3	D2	D1	D0	Status '0'	Status '1'
Bit-No.	Name	Allocation								Status '0'	Status '1'
D0..D3	'0'	always '0'									
D4	-	-									
D5	CFail	Status controller								ok	not ok
D6	'1'	Always '1'									
D7		Parity									

'Status 3'

		MSB				LSB					
		D7	D6	D5	D4	D3	D2	D1	D0	Status '0'	Status '1'
Bit-No.	Name	Allocation								Status '0'	Status '1'
D0	'0'	Always '0'									
D1	-	-									
D2	-	-									
D3..D5	'0'	Always '0'									
D6	'1'	Always '1'									
D7		Parity									

Setpoint status 'WStatus'

		MSB				LSB					
		D7	D6	D5	D4	D3	D2	D1	D0	Status'0'	Status'1'
Bit-No.	Name	Allocation								Status'0'	Status'1'
D0	w/W2	w/W2 Switch over								w	W2
D1	We/Wi	Wext/Wint Switch over								Wext	Wint
D2	HoldWeff	Weff frozen								no	yes
D3	GrwOff	Setpointgradient suppressed								no	yes
D4	Trk	Tracking								off	on
D5	'0'	Always '0'									
D6	'1'	Always '1'									
D7		Parity									

Status tuning 'TStatus'

		MSB				LSB					
		D7	D6	D5	D4	D3	D2	D1	D0	Status'0'	Status'1'
Bit-No.	Name	Allocation								Status'0'	Status'1'
D0	-	-									
D1	Orun	Self optimization running								off	on
D2	Oerr	Self optimization result								ok	error
D3..D5	'0'	Always '0'									
D6	'1'	Always '1'									
D7		Parity									

Configuration data

Des.	Description	Range	Def.	Type	Single access		Block access	
					Code	Fct. no.	Code	Fkt.Nr.
Xn0	Span start	-29999 .. 999999	0	FP	71	30	B3	0
Xn100	Span end	-29999 .. 999999	100	FP	72	30		
SFac	Factor for stoichiometric ratio	0,010 .. 99,990	1,000	FP	73	30		
CFunc	2-point controller	0	9	INT	71	35		
	Continuous controller	1						
	3-point controller: heating & cooling switch	2						
	3-point controller: heating cont./cooling switch	3						
	3-point controller: heating switch./cooling cont.	4						
	Cont. Controller with split range	5						
	3-point stepping controller	6						
	3-point stepping controller with Yp	7						
	Cont. controller with position feedback Yp	8						
CType	Standard controller	0	0	INT	72	35		
	Ratio controller	1						
	3-element controller	2						
WFunc	Set-point control	0	0	INT	73	35		
	Set-point/cascade control	1						
CMode	Output action inverse	0	0	INT	74	35		
	Output action direct	1						
CFail	Neutral	0	0	INT	75	35		
	Ypid = Ymin (0%)	1						
	Ypid = Ymax (100%)	2						
	Ypid = Y2 (not adjustable from front)	3						
	Ypid = Y2 (automatic) or Yman (manual)	4						
COVC	No override control	0	0	INT	76	35		
	Override-Control +	1						
	Override-Control -	2						
	Override-Control +/-	3						
WTrac	No tracking of Wint	0	0	INT	77	35		
	Set-point tracking	1						
	Process value tracking	2						
Ratio	Ratio controller: $(x1 + NO) / x2$	0	0	INT	78	35		
	Ratio controller: $(x1 + NO) / (x1 + x2)$	1						
	Ratio controller: $(x2 - x1 + NO) / x2$	2						
XDF	Digits behind decimal point (process value)	0 .. 3	0	INT	79	35		
Disp	Contents of bargraph line: correcting variable	0	0	INT	80	35		
	Contents of bargraph line: control deviation	1						
	Contents of bargraph line: Xeff	2						

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fkt.Nr.
W0	Lower set-point limit (Weff)	-29999 .. 999999	0	FP	41	20		
W100	Upper set-point limit (Weff)	-29999 .. 999999	100	FP	42	20		
W2	Additional set-point	-29999 .. 999999	100	FP	43	20		
Grw+	Set-point gradient plus	0,001 .. 999999	-32000	FP	44	20		
Grw-	Set-point gradient minus	0,001 .. 999999	-32000	FP	45	20		
Grw2	Set-point gradient for W2	0,001 .. 999999	-32000	FP	46	20		
N0	Zero offset ratio control	-29999 .. 999999	0,0	FP	47	20		
a	Factor a (3-element control)	-9,99 .. 99,99	1,00	FP	48	20		
Tpause	Min pause duration	0,1 .. 999999	0,1	FP	49	20		
TPuls	Min.pos.step time	0,1 .. 2,0	0,3	FP	51	20		
Tm	Actuator response time	5 .. 999999	30	FP	52	20		
thron	Switch-on point of step. output	0,10 .. 999999	1,00	FP	53	20		
throff	Switch-off point of step. output	-29999 .. 999999	-32000	FP	54	20		
Y2	Additional correcting value	-105,0 .. 105,0	0,0	FP	55	20		
Ymin	Min. output limiting	-105,0 .. 105,0	0	FP	56	20		
Ymax	Max. output limiting	-105,0 .. 105,0	100	FP	57	20		
Y0	Controller working point	-105,0 .. 105,0	0,0	FP	58	20		
dYopt	Self-tuning step height	5 .. 100	100	FP	59	20		
Xlimit	Switch-off point for dYopt	0,0 .. 999999	10	FP	61	20		
Tdrift	Drift estimation time	0,0 .. 999999	30	FP	62	20		
Tnoise	Noise estimation time	0,0 .. 999999	30	FP	63	20		
KP	Control gain	0,1 .. 999,9	1	FP	64	20		
Tn	Integral time set	0,0 .. 999999	10,0	FP	65	20		
Tv	Derivative time set	0,0 .. 999999	10,0	FP	66	20		
TF1	Cycle time heating	0,4 .. 999,9	5,0	FP	67	20		
TF2	Cycle time cooling	0,4 .. 999,9	5,0	FP	68	20		
VD	Derivative gain	1 .. 999999	4	FP	69	20		
bWLP	Set-point weighing factor p-part	0 .. 1	1	FP	41	21		
cWLD	Set-point weighing factor d-part	0 .. 1	0	FP	42	21		
Tsat	Time constant "Anti reset wind up"	1 .. 999999	50	FP	43	21		
Xsh	Trigger point separation	0 .. 999999	0	FP	44	21		
PType	Line type (with Compensation)	1	1	INT	41	25		
	Integral line	2						
Drift	Drift compensation off	0	0	INT	42	25		
	Drift compensation on	1						
CSpeed	Control dynamic slow	1	1	INT	43	25		
	normal	2						
	fast	3						
WBlock	All setpoint switchover locked	0	←	INT	41	25		
	We switchover locked	1						
	W2 switchover locked	2						
	All setpoint switchover open	3						

I/O-Data

	Description	Fkt Nr.	Code		
Analog inputs:	x1 (X1) x2 (X2) x3 (X3) x4 (Wext) x5 (OVC+) x6 (OVC-) x7 (Yp) x8 (Yhm) x9 (Yadd) x10 (Casc)	0	B1		
Digital inputs:	d1 (hide) d2 (lock) d3 (inc) d4 (dec) d5 (x f) d6 (yp f) d7 (a/m) d8 (w/w2) d9 (we/wi) d10 (track) d11 (y/y2) d12 (off) d13 (sm/hm) d14 (ostart) d15 (w stop) d16 (gr off) d17 (rstart) d18 (o hide) d19 (oplock)				
Analog outputs:	y1 (Weff) y2 (X) y3 (Y) y4 (XW) y5 (W) y6 (Yout1) y7 (Yout2) y8 (BI-no)			1	
Digital outputs:	z1 (y1) z2 (y2) z3 (c fail) z4 (off) z5 (a/m) z6 (y/y2) z7 (we/wi) z8 (o run) z9 (o err) z10 (xw sup)				

Display texts

Default-display	Fct. no.	Code
Text 1: PIDMA	80	B2
Text 2: X-UNIT		

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Inputs

AINP1 (Analog input 1 - no. 110) Fixed block number 63

Process data

Des.	Description	R/W	Type	Range	Rem.	Code	Fct. no.
X0t	Trigger for calibration X0	R/W	INT	0 / 1		21	0
X100t	Trigger for calibration X100	R/W	INT	0 / 1		22	0

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x0	Physical value at 0%	-29999 .. 999999	0,000	FP	71	30	B3	0
x100	Physical value at 100%	-29999 .. 999999	100,00	FP	72	30		
XFail	Substitute value with sensor fail	-29999 .. 999999	0,000	FP	73	30		
Tfm	Filter time constant [s]	0,0 .. 999999	0,5	FP	74	30		
Tkref	Reference temperature with STK = 2	0,000 .. 140,00	0,000	FP	75	30		
TYP	Type L -200...900 \$C	0	0	INT	71	35		
	Type J -200...900 \$C	1						
	Type K -200...1350 \$C	2						
	Type N -200...1300 \$C	3						
	Type S -50...1760 \$C	4						
	Type R -50...1760 \$C	5						
	Type I -200...400 \$C	6						
	Type W 0...2300 \$C	7						
	Type E -200...900 \$C	8						
	Type B 0...1820 \$C	9						
	Pt 100 -99,9...850,0 \$C	20						
	Pt 100 -99,9...250,0 \$C	21						
	2x Pt 100 -99,9...850 \$C	25						
	2x Pt 100 -99,9...250,0 \$C	26						
	0...20 mA	30						
	4...20 mA	31						
	0...10 V	32						
2...10 V	33							
Pot.transducer 0...500 Ω	40							
Resistance 0...500 Ω (linear)	45							
Resistance 0...250 Ω (linear)	46							
Fail	Fail function off	0	1	INT	72	35		
	z1 = 1, y1 = x100	1						
	z1 = 1, y1 = x0	2						
	z1 = 1, y1 = XFail	3						
Xkorr	Measured value correction off	0	0	INT	73	35		
	Measured value correction	1						
Unit	Unit = \$C	1	1	INT	74	35		
	Unit = \$F	2						
STK	Int. temperature compensation	0	1	INT	75	35		
	Ext. temperature compensation	1						

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x1in	Meas.value correct. P1, input	-29999 .. 999999	0,000	FP	41	20	B2	0
x1out	Meas.value correct. P1, output	-29999 .. 999999	0,000	FP	42	20		
x2in	Meas.value correct. P2, input	-29999 .. 999999	100,00	FP	43	20		
x2out	Meas.value correct. P2, output	-29999 .. 999999	100,00	FP	44	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 (Y)	0	B1
Digital inputs:	d1 (lock) d2 (hide)		
Analog outputs:	y1 (Inp1)	1	
Digital outputs:	z1 (fail) z2 (a/m) z3 (inc) z4 (dec)		

Display texts

Default display	Fct. no.	Code
Text 1: AINP1	80	B2

AINP3 (Analog input 3 - no. 112) Fixed block number 63**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x0	Physical value at 0%	-29999 .. 999999	0,000	FP	71	30	B3	0
x100	Physical value at 100%	-29999 .. 999999	100,00	FP	72	30		
XFail	Substitute value at sensor fail	-29999 .. 999999	0,000	FP	73	30		
Tfm	Filter time constant [s]	0,0 .. 999999	0,5	FP	74	30		
Typ	0..20 mA	30	30	INT	71	35		
	4..20 mA	31						
Fail	Fail function disabled	0	1	INT	72	35		
	z1 = 1, y1 = x100	1						
	z1 = 1, y1 = x0	2						
	z1 = 1, y1 = XFail	3						
Xkorr	Meas. value correction disabled	0	0	INT	73	35		
	Measured value corection	1						

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x1in	Meas. value correct. P1, input	-29999 .. 999999	0,000	FP	41	20	B2	0
x1out	Meas. value correct. P1, output	-29999 .. 999999	0,000	FP	42	20		
x2in	Meas. value correct. P2, input	-29999 .. 999999	100,00	FP	43	20		
x2out	Meas. value correct. P2, output	-29999 .. 999999	100,00	FP	44	20		

I/O data

		Fct. no.	Code
Analog outputs:	y1 (Inp3)	1	B1
Digital outputs:	z1 (fail)		

Display texts

Default display		Fct. no.	Code
Text 1:	AINP3	80	B2

AINP4 (Analog input 4 - no. 113) Fixed block number 64**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x0	Physical value at 0%	-29999 .. 999999	0,000	FP	71	30	B3	0
x100	Physical value at 100%	-29999 .. 999999	100,00	FP	72	30		
XFail	Substitute value with sensor fail	-29999 .. 999999	0,000	FP	73	30		
Tfm	Filter time constant [s]	0,0 .. 999999	0,5	FP	74	30		
Typ	0..20 mA	30	30	INT	71	35		
	4..20 mA	31						
Fail	Fail function off	0	1	INT	72	35		
	z1 = 1, y1 = x100	1						
	z1 = 1, y1 = x0	2						
	z1 = 1, y1 = XFail	3						
Xkorr	Meas. value correction off	0	0	INT	73	35		
	Measured value correction	1						

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x1in	Meas. value correct. P1, input	-29999 .. 999999	0,000	FP	41	20	B2	0
x1out	Meas. value correct. P1, output	-29999 .. 999999	0,000	FP	42	20		
x2in	Meas. value correct. P2, input	-29999 .. 999999	100,00	FP	43	20		
x2out	Meas. value correct. P2, output	-29999 .. 999999	100,00	FP	44	20		

I/O data

		Fct. no.	Code
Analog outputs:	y1 (Inp4)	1	B1
Digital outputs:	z1 (fail)		

Display texts

Default display		Fct. no.	Code
Text 1:	AINP4	80	B2

AINP5 (Analog input 5 - no. 114) Fixed block number 65**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x0	Physical value at 0%	-29999 .. 999999	0,000	FP	71	30	B3	0
x100	Physical value at 100%	-29999 .. 999999	100,00	FP	72	30		
XFail	Substitute value with sensor fail	-29999 .. 999999	0,000	FP	73	30		
Tfm	Filter time constant [s]	0,0 .. 999999	0,5	FP	74	30		
Typ	0..20 mA	30	30	INT	71	35		
	4..20 mA	31						
	0..10 V	32						
	2..10 V	33						
Fail	Fail function off	0	1	INT	72	35		
	z1 = 1, y1 = x100	1						
	z1 = 1, y1 = x0	2						
	z1 = 1, y1 = XFail	3						
Xkorr	Meas. value correct. disabled	0	0	INT	73	35		
	Measured value correction	1						

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x1in	Meas. value correct. P1, input	-29999 .. 999999	0,000	FP	41	20	B2	0
x1out	Meas. value correct. P1, output	-29999 .. 999999	0,000	FP	42	20		
x2in	Meas. value correct. P2, input	-29999 .. 999999	100,00	FP	43	20		
x2out	Meas. value correct. P2, output	-29999 .. 999999	100,00	FP	44	20		

I/O data

		Fct. no.	Code
Analog outputs:	y1 (Inp5)	1	B1
Digital outputs:	z1 (fail)		

Display texts

Default display		Fct. no.	Code
Text 1:	AINP3	80	B2

AINP6 (Analog input 6 - no. 115) Fixed block number 66**Process data**

Des.	Description	R/W	Type	Range	Rem.	Code	Fct. no.
X0t	Trigger for calibration X0	R/W	INT	0 / 1		21	0
X100t	Trigger for calibration X100	R/W	INT	0 / 1		22	0

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x0	Physical value at 0%	-29999 .. 999999	0,000	FP	71	30	B3	0
x100	Physical value at 100%	-29999 .. 999999	100,00	FP	72	30		
XFail	Substitute value with sensor fail	-29999 .. 999999	0,000	FP	73	30		
Tfm	Filter time constant [s]	0,0 .. 999999	0,5	FP	74	30		
Typ	0..20 mA	30	30	INT	71	35		
	4..20 mA	31						
	Pot. transducer 0..500 Ω	40						
Fail	Fail function off	0	1	INT	72	35		
	z1 = 1, y1 = x100	1						
	z1 = 1, y1 = x0	2						
	z1 = 1, y1 = XFail	3						
Xkorr	Meas. value correct. disabled	0	0	INT	73	35		
	Measured value correction	1						

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
x1in	Meas. value correct. P1, input	-29999 .. 999999	0,000	FP	41	20	B2	0
x1out	Meas. value correct. P1, output	-29999 .. 999999	0,000	FP	42	20		
x2in	Meas. value correct. P2, input	-29999 .. 999999	100,00	FP	43	20		
x2out	Meas. value correct. P2, output	-29999 .. 999999	100,00	FP	44	20		

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 (Y)	0	B1
Digital inputs:	d1 (lock) d2 (hide)		
Analog outputs:	y1 (Inp6)	1	
Digital outputs:	z1 (fail) z2 (a/m) z3 (inc) z4 (dec)		

Display texts

Default display	Fct. no.	Code
Text 1: AINP6	80	B2

DINPUT

(Digital inputs - no. 121) Fixed block number 91

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Inv1	Output direct (z1 = di1)	0	0	INT	71	35	B3	0
	Output inverse (z1 = di1)	1						
Inv2	Output direct (z2 = di2)	0	0	INT	72	35		
	Output inverse (z2 = di2)	1						
Inv3	Output direct (z3 = di3)	0	0	INT	73	35		
	Output inverse (z3 = di3)	1						
Inv4	Output direct (z4 = di4)	0	0	INT	74	35		
	Output inverse (z4 = di4)	1						
Inv5	Output direct (z5 = di5)	0	0	INT	75	35		
	Output inverse (z5 = di5)	1						
Inv6	Output direct (z6 = di6)	0	0	INT	76	35		
	Output inverse (z6 = di6)	1						
Inv7	Output direct (z7 = di7)	0	0	INT	77	35		
	Output inverse (z7 = di7)	1						
Inv8	Output direct (z8 = di8)	0	0	INT	78	35		
	Output inverse (z8 = di8)	1						
Inv9	Output direct (z9 = di9)	0	0	INT	79	35		
	Output inverse (z9 = di9)	1						
Inv10	Output direct (z10 = di10)	0	0	INT	81	35		
	Output inverse (z10 = di10)	1						
Inv11	Output direct (z11 = di11)	0	0	INT	82	35		
	Output inverse (z11 = di11)	1						
Inv12	Output direct (z12 = di12)	0	0	INT	83	35		
	Output inverse (z12 = di12)	1						

I/O data

	Description	Fct. no.	Code
Digital outputs:	z1 z2 z3 z4 z5 x6 x7 x8 z9 x10 x11 x12	1	B1

Display texts

Default display	Fct. no.	Code
Text 1: DINPUT	80	B2

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Outputs

OUT1 (Process output 1 - no. 116) Fixed block number 81

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
×0	Value of x1 at 0%	-29999 .. 999999	0,000	FP	71	30	B3	0
×100	Value of x1 at 100%	-29999 .. 999999	100,00	FP	72	30		
Src	Signal source: d1 (digital)	0	0	INT	71	35		
	Signal source: x1 (analog)	1						
Mode	direct / normally open	0	1	INT	72	35		
	inverse / normally closed	1						
Typ	Logic 0/20mA	0	0	INT	73	35		
	0 .. 20mA	1						
	4 .. 20mA	2						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1		

Display texts

Default display	Fct. no.	Code
Text 1: OUT1	80	B2

OUT2 (Process output 2 - no. 117) Fixed block number 82

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
×0	Value of x1 at 0%	-29999 .. 999999	0,000	FP	71	30	B3	0
×100	Value of x1 at 100%	-29999 .. 999999	100,00	FP	72	30		
Src	Signal source: d1 (digital)	0	0	INT	71	35		
	Signal source: x1 (analog)	1						
Mode	Direct / normally open	0	1	INT	72	35		
	Inverse / normally closed	1						
Typ	Logic 0/20mA	0	0	INT	73	35		
	0 .. 20mA	1						
	4 .. 20mA	2						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1		

Display texts

Default display	Fct. no.	Code
Text 1: OUT2	80	B2

OUT3 (Process output 3 - no. 118) Fixed block number 83

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
×0	Value of x1 at 0%	-29999 .. 999999	0,000	FP	71	30	B3	0
×100	Value of x1 at 100%	-29999 .. 999999	100,00	FP	72	30		
Src	Signal source: d1 (digital)	0	0	INT	71	35		
	Signal source: x1 (analog)	1						
Mode	Direct / normally open	0	1	INT	72	35		
	Inverse / normally closed	1						
Typ	Logic 0/20mA	0	0	INT	73	35		
	0 .. 20mA	1						
	4 .. 20mA	2						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital inputs:	d1		

Display texts

Default display	Fct. no.	Code
Text 1: OUT3	80	B2

OUT4**(Process output 4 - no. 119) Fixed block number 84**

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
×0	Value of x1 at 0%	-29999 .. 999999	0,000	FP	71	30	B3	0
×100	Value of x1 at 100%	-29999 .. 999999	100,00	FP	72	30		
Src	Signal source: d1 (digital)	0	0	INT	71	35		
	Signal source: x1 (analog)	1						
Mode	Direct / normally open	0	1	INT	72	35		
	Inverse / normally closed	1						

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1	0	B1
Digital input:	d1		

Display texts

Default display	Fct. no.	Code
Text 1: OUT4	80	B2

OUT5**(Process output 5 - no. 120) Fixed block number 85**

Configuration data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
×0	Value of x1 at 0%	-29999 .. 999999	0,000	FP	71	30	B3	0
×100	Value of x1 at 100%	-29999 .. 999999	100,00	FP	72	30		
Src	Signal source: d1 (digital)	0	0	INT	71	35		
	Signal source: x1 (analog)	1						
Mode	Direct / normally open	0	1	INT	72	35		
	Inverse / normally closed	1						

I/O data

	Description	Fct. no.	Code
Analog input:	x1	0	B1
Digital inputs:	d1		

Display texts

Default display	Fct. no.	Code
Text 1: OUT5	80	B2

DIGOUT (Digital outputs - no. 122) Fixed block number 95**Configuration data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Inv1	Output direct (do1 = d1)	0	0	INT	71	35	B3	0
	Output inverse (do1 = d1)	1						
Inv2	Output direct (do2 = d2)	0	0	INT	72	35		
	Output inverse (do2 = d2)	1						
Inv3	Output direct (do3 = d3)	0	0	INT	73	35		
	Output inverse (do3 = d3)	1						
Inv4	Output direct (do4 = d4)	0	0	INT	74	35		
	Output inverse (do4 = d4)	1						
Inv5	Output direct (do5 = d5)	0	0	INT	75	35		
	Output inverse (do5 = d5)	1						
Inv6	Output direct (do6 = d6)	0	0	INT	76	35		
	Output inverse (do6 = d6)	1						

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1 d2 d3 d4 d5 d6	0	B1

Display texts

Default display	Fct. no.	Code
Text 1: DIGOUT	80	B2

4.19 Supplementary functions

LED (LED display - no. 123) Fixed block number 96

Parameter data

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Inv1	No inversion (LED1 = d1)	0	0	INT	41	25	B2	0
	Inverted status (LED1 = $\bar{d}1$)	1						
Inv2	No inversion (LED2 = d2)	0	0	INT				
	Inverted status (LED2 = $\bar{d}2$)	1						
Inv3	No inversion (LED3 = d3)	0	0	INT				
	Inverted status (LED3 = $\bar{d}3$)	1						
Inv4	No inversion (LED4 = d4)	0	0	INT				
	Inverted status (LED4 = $\bar{d}4$)	1						

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1 d2 d3 d4	0	B1

Display texts

Default display	Fct. no.	Code
Text 1: LED	80	B2

INFO (Information function - no. 124) Fixed block number 97

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1 d2 d3 d4 d5 d6 d7 d8 d9 d10 d11 d12	0	B1

Display texts

Default display	Fct. no.	Code
Text 1: >INFORMATION 1<	80	B2
Text 2: >INFORMATION 2<		
...		
Text 12: >INFORMATION 12<		

STATUS (Status function - no. 125) Fixed block number 98

I/O data

	Description	Fct. no.	Code
Digital inputs:	d1 (p-hide) d2 (c-hide) d3 (m-hide) d4 (b-lock) d5 (n.c.) d6 (n.c.)	0	B1
Analog outputs:	Y1 (minute) Y2 (hour) Y3 (day) Y4 (month) Y5 (year) Y6 (week-d) Y7 (langu.) Y8 (n.c.)	1	
Digital outputs:	z1 (p-hide) z2 (c-hide) z3 (m-hide) z4 (b-lock) z5 (switch) z6 (fail) z7 (safe) z8 (pwrchk) z9 (start) z10 (n.c.) z11 (n.c.) z12 (n.c.)		

Display texts

Default display	Fct. no.	Code
Text 1: STATUS	80	B2

CONST (Constants function - no. 126) Fixed block number 99**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
C1	Analog constant 1	-29999 .. 999999	0,000	FP	41	20	B2	0
C2	Analog constant 2	-29999 .. 999999	0,000	FP	42	20		
C3	Analog constant 3	-29999 .. 999999	0,000	FP	43	20		
C4	Analog constant 4	-29999 .. 999999	0,000	FP	44	20		
C5	Analog constant 5	-29999 .. 999999	0,000	FP	45	20		
C6	Analog constant 6	-29999 .. 999999	0,000	FP	46	20		
C7	Analog constant 7	-29999 .. 999999	0,000	FP	47	20		
C8	Analog constant 8	-29999 .. 999999	0,000	FP	48	20		
C9	Analog constant 9	-29999 .. 999999	0,000	FP	49	20		
C10	Analog constant 10	-29999 .. 999999	0,000	FP	51	20		
C11	Analog constant 11	-29999 .. 999999	0,000	FP	52	20		
C12	Analog constant 12	-29999 .. 999999	0,000	FP,53	20			
C13	Analog constant 13	-29999 .. 999999	0,000	FP	54	20		
C14	Analog constant 14	-29999 .. 999999	0,000	FP	55	20		
C15	Analog constant 15	-29999 .. 999999	0,000	FP	56	20		
C16	Analog constant 16	-29999 .. 999999	0,000	FP	57	20		

I/O data

	Description	Fct.no.	Code
Analog outputs:	Y1 ----- Y2 ----- Y3 ----- Y4 ----- Y5 ----- Y6 ----- Y7 ----- Y8 ----- Y9 ----- Y10 ----- Y11 ----- Y12 ----- Y13 ----- Y14 ----- Y15 ----- Y16 -----	1	B1
Digital outputs:	z1 ----- z2 -----		

Display texts

Default display	Fct. no.	Code
Text 1: CONST	80	B2

SAFE (Safety function - no. 94)**Parameter data**

Des.	Description	Range	Default	Type	Single access		Block access	
					Code	Fct. no.	Code	Fct. no.
Y1	Output value for analog output 1	-29999 .. 999999	0,000	FP	41	20	B2	0
Y2	Output value for analog output 2	-29999 .. 999999	0,000	FP	42			
Y3	Output value for analog output 3	-29999 .. 999999	0,000	FP	43			
Y4	Output value for analog output 4	-29999 .. 999999	0,000	FP	44			
Y5	Output value for analog output 5	-29999 .. 999999	0,000	FP	45			
Y6	Output value for analog output 6	-29999 .. 999999	0,000	FP	46			
Y7	Output value for analog output 7	-29999 .. 999999	0,000	FP	47			
Y8	Output value for analog output 8	-29999 .. 999999	0,000	FP	48			
z1	Output value for digital output 1	0 / 1	0	INT	41	25		
z2	Output value for digital output 2	0 / 1	0	INT	42			
z3	Output value for digital output 3	0 / 1	0	INT	43			
z4	Output value for digital output 4	0 / 1	0	INT	44			
z5	Output value for digital output 5	0 / 1	0	INT	45			
z6	Output value for digital output 6	0 / 1	0	INT	46			
z7	Output value for digital output 7	0 / 1	0	INT	47			
z8	Output value for digital output 8	0 / 1	0	INT	48			

I/O data

	Description	Fct. no.	Code
Analog inputs:	x1 ----- x2 ----- x3 ----- x4 ----- x5 ----- x6 ----- x7 ----- x8 -----	0	B1
Digital inputs:	d1 ----- d2 ----- d3 ----- d4 ----- d5 ----- d6 ----- d7 ----- d8 ----- d9 (select)		
Analog outputs:	y1 ----- y2 ----- y3 ----- y4 ----- y5 ----- y6 ----- y7 ----- y8 -----	1	
Digital outputs:	z1 ----- z2 ----- z3 ----- z4 ----- z5 ----- z6 ----- z7 ----- z8 -----		

Display texts

Default display	Fct. no.	Code
Text 1: SAFE	80	B2

5 Function module for SIMATIC® S5/S7

5.1 Function module for SIMATIC® S5

Function modules FB206 (PMA-FIX) and FB207 (PMAFLOAT) are used for easy access to the controller parameter and configuration data (in the P area).

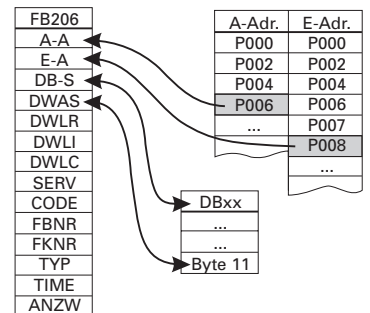
5.1.1 Structure

The parameters of the function module are:

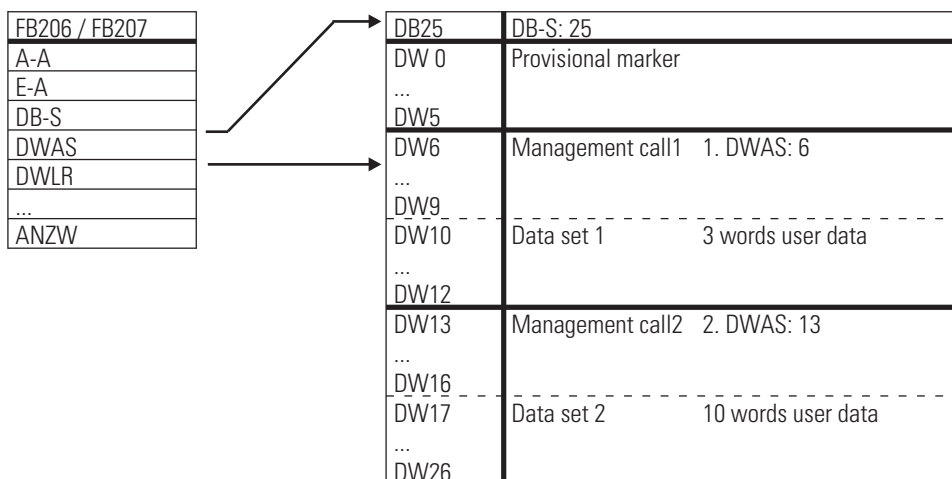
Name	Type	Description / function																																															
A-A	KF	Start of output bytes for send window																																															
E-A	KF	Start of input bytes for receive window																																															
DB-S	B	Data module for parameter data																																															
DWAS	W	Data word start for order in DB																																															
DWLR	W	Number of real values																																															
DWLI	W	Number of integer values																																															
DWLC	W	Number of char values (number of char values including the contained SUB characters!)																																															
SERV	W	Service (read/write)																																															
CODE	W	Code																																															
FBNR	W	Function block no.																																															
FKNR	W	Function no.																																															
TYP	W	Type no.																																															
TIME	KH	Timeout in time units, is decremented at each FB call, must be higher than the timeout in the DP module.																																															
ANZW	W	The actual transmission status for the selected data area is given in the display word. The structure of the display word is:																																															
		<table border="1"> <thead> <tr> <th>15</th> <th>14</th> <th>13</th> <th>12</th> <th>11</th> <th>10</th> <th>9</th> <th>8</th> <th>7</th> <th>6</th> <th>5</th> <th>4</th> <th>3</th> <th>2</th> <th>1</th> <th>0</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Timeout (FB)</td> <td>Service faulty</td> <td></td> <td></td> <td></td> <td>NAK (access not accepted by the controller)</td> <td>Parity error</td> <td>Timeout internal (controller)</td> <td></td> <td>Wait for end telegram</td> <td>Service (0=read; 1=write)</td> <td>Reset order</td> <td>Wait for acknowledgement</td> <td>Order finished with error</td> <td>Order finished without error</td> <td>Order running</td> </tr> </tbody> </table>	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0																		Timeout (FB)	Service faulty				NAK (access not accepted by the controller)	Parity error	Timeout internal (controller)		Wait for end telegram	Service (0=read; 1=write)	Reset order	Wait for acknowledgement	Order finished with error
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0																																		
	Timeout (FB)	Service faulty				NAK (access not accepted by the controller)	Parity error	Timeout internal (controller)		Wait for end telegram	Service (0=read; 1=write)	Reset order	Wait for acknowledgement	Order finished with error	Order finished without error	Order running																																	

The function module reads or writes KS98 parameter/configuration data.

- A-A, E-A**
 The input addresses or output addresses of the parameter channel are entered into these parameters. The addresses are defined during configuration of the unit connected to the PROFIBUS (→ Fig.:7 S.31)
- DB-S**
 DB-S is used for allocating the data module pertaining to the function module, in which all FB operations are handled. The data module must have been opened previously.
 Data word 0..3 of the data module are "provisional markers", which are free again after FB handling.
- DWAS**
 DWAS marks the start of the data area. The four words after DWAS are required for internal use of the function module and must not be used otherwise.



Example: 2 data sets shall be stored with high packing density in DB25.



- DWLR (Real), DWLI (Integer), DWLC (Char)
After a read access, these parameters contain the relevant number of received data. With a write access, they contain the relevant number of data to be transmitted.
- SERV
This parameter determines the access mode (write/read) → ID1.

Write access:	F0 = Integer	Read access:	0 = Integer
	F1 = Real		1 = Real
	F2 = Char		2 = Char

Data write/read is via the function block protocol, whereby the various access mechanism are:

Single access

With this access (code xx), a single process value of a function can be read or written. Single access to parameter and configuration data is not possible.

Valid values for service:

Configuration as FixPoint:	0, F0	Float values are transmitted as an integer (without digits behind the decimal point).
	1, F1	Float values are transmitted as a FixPoint (1 digit behind the decimal point).
Configuration as Float:	0, F0	Transmission as integer in the 2nd data word (LSword)
	1, F1	Transmission as a 4-byte real value.

Block access (tens block)

Max. nine process values (always as REAL values) of a function can be read with this access (code x0).

Valid values for service:

Configuration as Fix-Point:	0, 1	Transmission as a FixPoint value
Configuration as Float:	0, 1	Transmission as 4-byte real value

y

Block access (overall block)

This access can be used for reading or writing all parameters (code 178) and configuration data (code 179) of a function. The following conditions are applicable for this access:

- For writing data with 'code 179', the unit must be switched to configuration mode (→ see page 'OpMod'). All newly entered configuration data and parameters are valid only, when the unit was switched back to on-line again.
- All data of a message must be defined, omissions are not permissible.
- Even if parts of a message are not in use (HW and SW options), the complete message must be transmitted. Checking of non-existing data is omitted.
- With faulty block write accesses, the following rule is applicable: a message is replied with NAK, if at least one datum is faulty. Already valid values are stored.

Valid values for service:

Configuration as FixPoint:	0, 1, F0, F1	Float values are transmitted as FixPoint values, integer values are transmitted as integers.
	2, F2	transparent transmission as a character string (for structure, see ISO1745 message), word transmission stored in the LSByte
Configuration as Float:	0, 1, F0, F1	Float values are transmitted as 4-byte float values, integer values are transmitted as integers in the 2nd data word (LSword).
	2, F2	Transparent transmission as a character string (for structure, see ISO1745 message), word transmission stored in the LSByte

Single access

With this access (code xx), a single process value of a function can be read or written.

Valid values for ID1:

Configuration as FixPoint:	0	Real values are transmitted as an integer (without digits behind the decimal point).
	1	Real values are transmitted as a FixPoint (1 digit behind the decimal point).

- **CODE**
The code identification is decimal and the range is within '00'...'99', '177' = B1, '178' = B2 and '179' = B3.
- **FBNR.** (function block number)
A function block is addressed with a function block number, which is within '0' and '250'.
Function number ranges:
0 general data for the overall unit
1 - 99 fixed function blocks
100 - 250 freely adjustable function blocks
- **FKTNR** (function number)
A function as a partial address of a function block is also addressed with a function number within '0' and '99'.
Function number ranges:
0 Function general
1 - 99 Other functions
- **TYP** (function type)
A function type number within '0' and '111' is allocated to each function block.
Function type ranges:
0 General function type
1 - 111 Other function types
- **TIME**
Timeout counter: range 0x0000 & TIME & 0x7FFF
-decremented during each PLC cycle (max. 32767)
- timeout with 0 if the CPU is too fast, call up FB206/FB207 with delay via timer block.
- **ANZW**
This display word represents the actual transmission status. Bit 4 can be used also as input for resetting FB 206 / FB 207.

5.2 Calling up the function module

List representation:

```

:SPA    FB 206
Name    :PMA-FIX
A-A     :
E-A     :
DB-S    :
DWAS    :
DWLR    :
DWLI    :
DWLC    :
SERV    :
CODE    :
FBNR    :
FKNR    :
TYP     :
TIME    :
ANZW    :

```

5.3 Function module for SIMATIC® S7

The handling principle of S7-FB corresponds to the S5 variant. Calling up the FB is indispensable when starting an order and as long as the order is active.

Dependent of S7-CPU and DP master, there are differences in the I/O handling. With a CPU315-2 DP with used on-board DP interface, SFC modules 14 and 15 must be used for consistent data transmission. SFC modules 14 and 15 copy the I/O areas into the marker or data module area. When using an external CP (CP 342-5 DP), the relevant SEND and RECEIVE FBs at the cycle start and end must be called up.

The FB has an instance DB, which must also be specified when calling up the FB.

5.3.1 Structure

The call-up parameters of the function module are:

Name	Type	Description / function																																
A-start	Pointer	Output word address area start (e.g. address data area 'RECORD' of SFC 15, Ax, y when using an external CP). The DB no. must also be transmitted when specifying a data word (e.g. DB4.DBX0.0)																																
E-start	Pointer	Input word address area start (e.g. address data area 'RECORD' of SFC 15, Ex, y when using an external CP). The DB no. must also be transmitted when specifying a data word (e.g. DB4.DBX0.0)																																
DB-Para	Pointer	Specification of data module with the parameter setting data. The entry comprises the data module no. and the data word no. at which the parameter data start. Thereby, no offset needs being taken into account. The data are interpreted as parameter data (useful data) by the specified address. The DB must be specified in the following form e.g. DB6.DBX10.0																																
Service	WORD	Service (Read/Write)																																
Code_nr	WORD	Code																																
FB_nr	WORD	Function block no. (channel addressing)																																
FKT_nr	WORD	Function no.																																
Typ	WORD	No function (always '0')																																
Timeout	DWORD	Timeout value, is decremented with each call. With a value of = 1, the order is cancelled with error message 'timeout'.																																
DWLR	WORD	Length of real values																																
DWLI	WORD	Length of integer values																																
DWLC	WORD	D.c. always '0'																																
ANZW	W	The current transmission status for the selected data area is given in the display word. The structure of the display word is:																																
		<table border="1"> <thead> <tr> <th>15</th> <th>14</th> <th>13</th> <th>12</th> <th>11</th> <th>10</th> <th>9</th> <th>8</th> <th>7</th> <th>6</th> <th>5</th> <th>4</th> <th>3</th> <th>2</th> <th>1</th> <th>0</th> </tr> </thead> <tbody> <tr> <td>Timeout (FB)</td> <td>Service faulty</td> <td></td> <td></td> <td></td> <td>NAK (access by controller not accepted)</td> <td>Parity error</td> <td>Timeout internal (controller)</td> <td></td> <td>Waiting for end telegram</td> <td>Service (0=Read; 1=Write)</td> <td>Reset order</td> <td>Waits for acknowledgement</td> <td>Order finished with error</td> <td>Order finished without error</td> <td>Order running</td> </tr> </tbody> </table>	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Timeout (FB)	Service faulty				NAK (access by controller not accepted)	Parity error	Timeout internal (controller)		Waiting for end telegram	Service (0=Read; 1=Write)	Reset order	Waits for acknowledgement	Order finished with error	Order finished without error	Order running
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0																			
Timeout (FB)	Service faulty				NAK (access by controller not accepted)	Parity error	Timeout internal (controller)		Waiting for end telegram	Service (0=Read; 1=Write)	Reset order	Waits for acknowledgement	Order finished with error	Order finished without error	Order running																			

The function module reads or writes KS800 parameter/configuration data.

- A-Start, E-Start
Enter the input addresses or output addresses of the parameter channel into these parameters. The addresses are determined when configuring the unit connected to the PROFIBUS (STEP 7 - hardware configuration)
- DB-Para
DB-Para is a pointer to the data module into which read data can be written, or from which data can be used for writing.
- Service
This parameter determines the access type (write / read) r ID1

Write access	F0	△	Integer	Read access:	0	△	Integer
	F1	△	Real		1	△	Real
	F2	△	Char		2	△	Char

Data write/read is via the function block protocol, whereby the access mechanisms are:

Single access

This access (code xx) can be used for reading or writing a single value of a function.

Single access to parameter and configuration data is not possible.

Valid values for service

Configuration as a FixPoint:	0, F0	Float values are transmitted as an integer (without digits behind the decimal point).
	1, F1	Float values are transmitted as a FixPoint (1 digit behind the decimal point).
Configuration as Float:	0, F0	Transmission as integer in the 2nd data word (LSword)
	1, F1	Transmission as a 4-byte real value.

Block access (tens block)

Max. nine process values (always as REAL values) of a function can be read with this access (code x0).

Valid values for service

Configuration as a FixPoint:	0, 1	Transmission as a FixPoint value
Configuration as Float:	0, 1	Transmission as 4-byte real value

Block access (overall block)

This access can be used for reading or writing all parameters (code 178) and configuration data (code 179) of a function. The following conditions are applicable for this access:

- For writing data with 'code 179', the unit must be switched to configuration mode (r see page 'OpMod'). All newly entered configuration data and parameters are valid only, when the unit was switched back to on-line again.
- All data of a message must be defined, omissions are not permissible.
- Even if parts of a message are not in use (HW and SW options), the complete message must be transmitted. Checking of non-existing data is omitted.
- With faulty block write accesses, the following rule is applicable: a message is replied with NAK, if at least one datum is faulty. Already valid values are stored.

Valid values for service

Configuration as a FixPoint:	0, 1, F0, F1	Float values are transmitted as FixPoint values, integer values are transmitted as integers.
	2, F2	transparent transmission as a character string (for structure, see ISO1745 message), word transmission stored in the LSByte
Configuration as Float:	0, 1, F0, F1	Float values are transmitted as 4-byte float values, integer values are transmitted as integers in the 2nd data word (LSword).
	2, F2	transparente Übertragung als Zeichenstring (Aufbau siehe ISO1745 Nachricht), Wortübertragung als Ablage im LSByte

Single access

With this access (code xx), a single process value of a function can be read or written.

Valid values for ID1:

Configuration as a FixPoint:	0 1	Real values are transmitted as integers (without digit behind the decimal point). Real values are transmitted as FixPoint (1 digit behind the decimal point)
---------------------------------	--------	---

- Code_nr
The code identification is decimal and the range is within '00'...'99', '177' = B1, '178' = B2 and '179' = B3.
- FB_nr. (function block number)
A function block is addressed with a function block number, which is within '0' and '250'.
Function number ranges:
 - 0 general data for the overall unit
 - 1 - 99 fixed function blocks
 - 100 - 250 freely adjustable function blocks
- FKT_nr (function number)
A function as a partial address of a function block is also addressed with a function number within '0' and '99'.
Function number ranges:
 - 0 Function general
 - 1 - 99 Other functions
- Typ (function type)
A function type number within '0' and '111' is allocated to each function block.
Function type ranges:
 - 0 General function type
 - 1 - 111 Other function types
- Timeout
Timeout counter: range 0x0000 & TIME & 0x7FFF
– decremented during each PLC cycle (max. 32767)
– timeout with 0 if the CPU is too fast, call up FB206/FB207 with delay via timer block.
- DWLR (Real), DWLI I (Integer), DWLC (Char)
After a read access, these parameters contain the number of received data. With a write access, the number of data to be transmitted must be entered.
- ANZW
This display word represents the actual transmission status. Bit 4 can be used also as input for resetting FB 206 / FB 207.

6

Annex

6.1

Diagnosis

For test purposes, an additional debug access which signals the error messages of the last write or read access is available. Reading is possible for (→ see also page 36):

WrErr	Error number of last write access	0 = no error	Code = 21	Fct. no. = 2
WrErPos	Position of the faulty datum at last write access	0 = no error or addressing error 1 = first datum is faulty (also with individual accesses) n = nth datum is faulty (with block accesses)	Code = 22	Fct. no. = 2
ReErr	Error number of last read access	0 = no error	Code = 23	Fct. no. = 2

The following error messages are defined:

Err. no.	Description	Error name
101	Non-defined error	ERR_UNSPECIFIED
102	Reading not permitted	ERR_RD_NOTALLOWED
103	Writing not permitted	ERR_WR_NOTALLOWED
104	Local operation / no write access	ERR_LOCOPERAT
105	Non-defined key code	ERR_KEYIDENT
106	Range overflow function block no.	ERR_FB_OVERFL
107	Range overflow function no.	ERR_FCT_OVERFL
108	Write or range overflow	ERR_WR_RANGE_OV
109	Char is not a digit	ERR_NODIGIT
110	No '^O' in the correct position found	ERR_ENDDDELIMITER
111	No '=' in the correct position	ERR_NO_EQUALSIGN
112	Faulty ST1 format (status)	ERR_NO_ST1FORMAT
113	No ',' in the correct position	ERR_NO_COMMA
114	Byte range overflow	ERR_BYTE_OVERFL
115	Digit no. exceeded	ERR_DIGIT_OVERFL
116	Range 9999 exceeded	ERR_RG9999_OVERFL
117	Undefined protocol type	ERR_UNDEF_PRTCTYPE
118	Undefined parameter reference	ERR_UNDEF_PARAMREF
119	Undefined decimal point	ERR_UNDEF_DECPNT
120	No STX in the write message	ERR_NO_STX
121	INT number faulty	ERR_INT_ANZ
122	REAL number faulty	ERR_REAL_ANZ
123	Faulty access type	ERR_ZUGRIFF
124	No Config level	ERR_WR_NO_CONF
125	Local operation	ERR_WR_LOCAL
126	Error FU switch-over	ERR_WR_FU_UM
127	Receive faulty BCC value	ERR_BCC_INVALID
128	Function type does not exist	ERR_TYP_OVERFL
129	Faulty number of analog inputs	ERR_AI_ANZ
130	Faulty number of digital inputs	ERR_DI_ANZ
131	Memory capacity exceeded (RAM or EEPROM)	ERR_MEMORY

6.2**Terms**

COM ET200	Configuration tool (also COM PROFIBUS) of the Siemens company for PROFIBUS
FB	Abbr. f. function block
Fkt	Abbr. for function
ET	Abbr. f. engineering tool
Function	a self-contained partial function of a function block seen from the interface
Function block	self-contained processing unit
GSD file	Geräte Stammdaten Datei
HW	Abbr. f. hardware
ISO1745	Standard communication protocol ISO 1745, ASCII-based
PC-interface	Controller front-panel interface for connecting an engineering tool
PCI	Process Control Instrument
PCI protocol	ISO 1745-based protocol, implemented for PMA controllers
PROFIBUS-DP	Standard communication protocol acc. to EN50170 vol.2 (DP: decentral periphery)
RS422	Standard 4-wire connection, Full duplex, (EIA RS 422); in this case: separate send/receive channels with up to 32 units
RS485	Standard 2-wire connection, Half duplex, (EIA RS 485)
S5	Siemens AG PLC series
Serial interface	Rear-panel bussable controller interface
SW	Abbr. for software
TTL	Signal level at module level
Type file	Configuration file for COM ET200

6.3**GSD file**

```

;=====
; Device Database File for product  K S 9 8 / D P
; Copyright (C) PMA Prozeß- und Maschinen Automation GmbH 1998-1999
; D-34123 Kassel, Miramstr. 87, Tel. +49 (0) 561/ 505 -1307
; Release : V2.0
; File:      PMA_9801.gsd
;=====
;
#Profibus_DP
GSD_Revision = 1
Vendor_Name = "PMA GmbH"
Model_Name = "KS98/DP"
Revision="V 2.0"
Ident_Number = 0x9801
Protocol_Ident = 0      ; DP
Station_Type = 0       ; Slave
FMS_supp = 0           ; only DP
Hardware_Release="HV 01.01"
Software_Release="SV 01.01"
;Product supports the baud rates:
9.6_supp = 1
19.2_supp = 1
45.45_supp = 1
93.75_supp = 1
187.5_supp = 1
500_supp = 1
1.5M_supp = 1
3M_supp = 1
6M_supp = 1
12M_supp = 1
;max. time to answer after a request
MaxTsdr_9.6 = 60
MaxTsdr_19.2 = 60
MaxTsdr_45.45 = 60
MaxTsdr_93.75 = 60
MaxTsdr_187.5 = 60
MaxTsdr_500 = 100
MaxTsdr_1.5M = 150

```

```

MaxTsdr_3M=250
MaxTsdr_6M=450
MaxTsdr_12M=800
Redundancy = 0 ; not supported
Repeater_Ctrl_Sig = 0 ; not available
24V_Pins = 0 ; not available
Bitmap_device="PMA9801N"
Bitmap_Diag="PMA9801D"
Bitmap_SF="PMA9801F"
;-DP-Slave related key words---
;
Freeze_Mode_supp = 1 ; supported
Sync_Mode_supp = 1 ; supported
Auto_Baud_supp = 1 ; supported
Set_Slave_Add_supp = 1 ; supported
User_Prm_Data_Len = 0 ; no user parameter
;minimum slave poll cycle (based on 100us)
Min_Slave_Intervall = 1
Modular_Station = 1 ; modular device
Max_Module = 0x01 ; max. number of modules
Max_Input_Len = 112
Max_Output_Len = 112
Max_Data_Len = 224
;Module description
;A.1: process data for one channel
Module = "A: 1 channel (FixP)" \
    0x10,0x10,0x50,0x50,0x50,0x50,0x50,0x50,\
    0x20,0x20,0x60,0x60,0x60,0x60,0x60,0x60
EndModule
;
;A.2: process data for one channel + parameter channel
Module = "A: 1 channel (Float)" \
    0x10,0x10,0xD1,0xD1,0xD1,0xD1,0xD1,0xD1,\
    0x20,0x20,0xE1,0xE1,0xE1,0xE1,0xE1,0xE1
EndModule
;B.1: process data for one channel + parameter channel
Module = "B: 1 channel+parameter (FixP)"
    0x10,\
    0x10,0x50,0x50,0x50,0x50,0x50,0x50,\
    0x20,0x20,0x60,0x60,0x60,0x60,0x60,0x60,0xF3
EndModule
;
;B.2: process data for one channel + parameter channel
Module = "B: 1 channel+parameter (Float)" \
    0x10,0x10,0xD1,0xD1,0xD1,0xD1,0xD1,0xD1,\
    0x20,0x20,0xE1,0xE1,0xE1,0xE1,0xE1,0xE1,0xF3
EndModule
;
;C.1: process data for two channels + parameter channel
Module = "C: 2 channels+parameter (FixP)" \
    0x10,0x10,0x50,0x50,0x50,0x50,0x50,0x50,\
    0x10,0x10,0x50,0x50,0x50,0x50,0x50,0x50,\
    0x20,0x20,0x60,0x60,0x60,0x60,0x60,0x60,\
    0x20,0x20,0x60,0x60,0x60,0x60,0x60,0x60,0xF3
EndModule
;
;C.2: process data for two channels + parameter channel
Module = "C: 2 channels+parameter (Float)" \
    0x10,0x10,0xD1,0xD1,0xD1,0xD1,0xD1,0xD1,\
    0x10,0x10,0xD1,0xD1,0xD1,0xD1,0xD1,0xD1,\
    0x20,0x20,0xE1,0xE1,0xE1,0xE1,0xE1,0xE1,\
    0x20,0x20,0xE1,0xE1,0xE1,0xE1,0xE1,0xE1,0xF3
EndModule
;
;D.1: process data for three channels + parameter channel
Module = "D: 3 channels+parameter (FixP)" \
    0x10,0x10,0x50,0x50,0x50,0x50,0x50,0x50,\
    0x10,0x10,0x50,0x50,0x50,0x50,0x50,0x50,\
    0x10,0x10,0x50,0x50,0x50,0x50,0x50,0x50,\
    0x20,0x20,0x60,0x60,0x60,0x60,0x60,0x60,\
    0x20,0x20,0x60,0x60,0x60,0x60,0x60,0x60,\
    0x20,0x20,0x60,0x60,0x60,0x60,0x60,0x60,0xF3
EndModule

```

```

;
;D.2: process data for three channels + parameter channel
Module = "D: 3 channels+parameter (Float)" \
  0x10,0x10,0xD1,0xD1,0xD1,0xD1,0xD1,0xD1,\
  0x10,0x10,0xD1,0xD1,0xD1,0xD1,0xD1,0xD1,\
  0x10,0x10,0xD1,0xD1,0xD1,0xD1,0xD1,0xD1,\
  0x20,0x20,0xE1,0xE1,0xE1,0xE1,0xE1,0xE1,\
  0x20,0x20,0xE1,0xE1,0xE1,0xE1,0xE1,0xE1,\
  0x20,0x20,0xE1,0xE1,0xE1,0xE1,0xE1,0xE1,0xF3
EndModule
;
;E.1: process data for four channels + parameter channel
Module = "E: 4 channels+parameter (FixP)" \
  0x10,0x10,0x50,0x50,0x50,0x50,0x50,0x50,\
  0x10,0x10,0x50,0x50,0x50,0x50,0x50,0x50,\
  0x10,0x10,0x50,0x50,0x50,0x50,0x50,0x50,\
  0x10,0x10,0x50,0x50,0x50,0x50,0x50,0x50,\
  0x20,0x20,0x60,0x60,0x60,0x60,0x60,0x60,\
  0x20,0x20,0x60,0x60,0x60,0x60,0x60,0x60,\
  0x20,0x20,0x60,0x60,0x60,0x60,0x60,0x60,\
  0x20,0x20,0x60,0x60,0x60,0x60,0x60,0x60,0xF3
EndModule
;
;E.2: process data for four channels + parameter channel
Module = "E: 4 channels+parameter (Float)" \
  0x10,0x10,0xD1,0xD1,0xD1,0xD1,0xD1,0xD1,\
  0x10,0x10,0xD1,0xD1,0xD1,0xD1,0xD1,0xD1,\
  0x10,0x10,0xD1,0xD1,0xD1,0xD1,0xD1,0xD1,\
  0x10,0x10,0xD1,0xD1,0xD1,0xD1,0xD1,0xD1,\
  0x20,0x20,0xE1,0xE1,0xE1,0xE1,0xE1,0xE1,\
  0x20,0x20,0xE1,0xE1,0xE1,0xE1,0xE1,0xE1,\
  0x20,0x20,0xE1,0xE1,0xE1,0xE1,0xE1,0xE1,\
  0x20,0x20,0xE1,0xE1,0xE1,0xE1,0xE1,0xE1,0xF3
EndModule
;
;F.1: process data for three channels + parameter channel
; compact format
Module = "F: 3 channels+par (FixP) compact" \
  0x11,0x55,\
  0x11,0x55,\
  0x11,0x55,\
  0x21,0x65,\
  0x21,0x65,\
  0x21,0x65,0xF3
EndModule
;
;G.1: process data for four channels + parameter channel
; compact format
Module = "G: 4 channels+par (FixP) compact" \
  0x11,0x55,\
  0x11,0x55,\
  0x11,0x55,\
  0x11,0x55,\
  0x21,0x65,\
  0x21,0x65,\
  0x21,0x65,\
  0x21,0x65,0xF3
EndModule
;
; Device related diagnostic data
Unit_Diag_Bit(0) = "Configuration state"
Unit_Diag_Bit(1) = "Sensor Fail"
Unit_Diag_Bit(2) = "Error process data writing"
Unit_Diag_Bit(3) = "Parameter changed"
;
Slave_Family=5
Max_Diag_Data_Len = 8
Fail_safe=0
;OrderNumber="9407-96x-3xxxx1"

```


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Subject to alterations without notice
Änderungen vorbehalten
Sous réserve de toutes modifications

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