Instrument							Function	Rem. p.78
Module	Query Param.	Response						
12	Q02	D	1	5	fC		Slot 2	
		●	–	●	+	0 M2=UNUSED	free	
		●	–	●		10 M2=AI4-mV	4 x thermocouple/ mV	
		●	–	●		15 M2=AI2-mAmA i	2 x mA with electrical isolation	
		●	–	●		16 M2=AI2-mAmV i	1 x mA + 1 x thermocouple with isolation	
		●	–	●		17 M2=AI2-mVmA i	1 x thermocouple + 1 x mA with isolation	
		●	–	●		18 M2=AI2-mVmV i	2 x thermocouple with isolation	
		●	–	●		20 M2=AI4 mA p	4 x mA with potential isolation	
		●	–	●		24 M2=AI4-f/t	Frequency or time measurement	
		●	–	●		25 M2=AI4_mA_MUS	4 x mA with transmitter supply	
		●	–	●		30 M2=AI4-Pt-2W	4 x Pt100 2-wire circuit	
		●	–	●		35 M2=AI2-Pt-3/4	2 x Pt100 3/4-wire circuit	
		●	–	●		40 M2=AO3-V	Output 3 x V	
		●	–	●		50 M2=AO3-mA	Output 3 x 20 mA	
		●	–	●		60 M2=BIO6-BIN.	6-fold binary input/output	
		–	●	●		2 M2=RS-485	Serial port	
		●	●	●		4 M2=PROFIBUS	PROFIBUS module	
	Q03	D	1	5	fC		Slot 3	
		●	–	●	+	0 M3=UNUSED	free	
		●	–	●		10 M3=AI4-mV	4 x thermocouple/ mV	
		●	–	●		15 M3=AI2-mAmA i	2 x mA with electrical isolation	
		●	–	●		16 M3=AI2-mAmV i	1 x mA + 1 x thermocouple with isolation	
		●	–	●		17 M3=AI2-mVmA i	1 x thermocouple + 1 x mA with isolation	
		●	–	●		18 M3=AI2-mVmV i	2 x thermocouple with isolation	
		●	–	●		20 M3=AI4 mA p	4 x mA with potential isolation	
		●	–	●		24 M3=AI4-f/t	Frequncy or time measurement	
		●	–	●		25 M3=AI4_mA_MUS	4 x mA with transmitter supply	
		●	–	●		30 M3=AI4-Pt-2W	4 x Pt100 2-wire circuit	
		●	–	●		35 M3=AI2-Pt-3/4	2 x Pt100 3/4-wire circuit	
		●	–	●		40 M3=AO3-V	Output 3 x V	
		●	–	●		50 M3=AO3-mA	Output 3 x 20 mA	
		●	–	●		60 M3=BIO6-BIN.	6-fold binary input/output	
		●	–	●		4 M3=PROFIBUS	PROFIBUS module	
	Q04	D	1	5	fC		Slot 4	
		●	–	●	+	0 M4=UNUSED	free	
		●	–	●		10 M4=AI4-mV	4 x thermocouple/ mV	
		●	–	●		15 M4=AI2-mAmA i	2 x mA with electrical isolation	
		●	–	●		16 M4=AI2-mAmV i	1 x mA + 1 x thermocouple with isolation	
		●	–	●		17 M4=AI2-mVmA i	1 x thermocouple + 1 x mA with isolation	
		●	–	●		18 M4=AI2-mVmV i	2 x thermocouple with isolation	
		●	–	●		20 M4=AI4 mA p	4 x mA with potential isolation	
		●	–	●		24 M4=AI4-f/t	Frequncy or time measurement	
		●	–	●		25 M4=AI4_mA_MUS	4 x mA with transmitter supply	
		●	–	●		30 M4=AI4-Pt-2W	4 x Pt100 2-wire circuit	
		●	–	●		35 M4=AI2-Pt-3/4	2 x Pt100 3/4-wire circuit	
		●	–	●		40 M4=AO3-V	Output 3 x V	
		●	–	●		50 M4=AO3-mA	Output 3 x 20 mA	
		●	–	●		60 M4=BIO6-BIN.	6-fold binary input/output	
		●	–	–		2 M4=RS-485	Serial port	
		●	–	●		4 M4=PROFIBUS	PROFIBUS module	
	Q05	for Protronic 500/550 like slot 3					like slot 3	2

Instrument							Function	Rem. p.78
Module	Query Param.	Response						
12	Q06	D	1	5	fC		Slot 6	2
		–	–	●	+	0 M6=UNUSED	free	
		–	–	●		10 M6=AI4-mV	4 x thermocouple/ mV	
		–	–	●		15 M6=AI2-mAmA i	2 x mA with electrical isolation	
		–	–	●		16 M6=AI2-mAmV i	1 x mA + 1 x thermocouple with isolation	
		–	–	●		17 M6=AI2-mVmA i	1 x thermocouple + 1 x mA with isolation	
		–	–	●		18 M6=AI2-mVmV i	2 x thermocouple with isolation	
		–	–	●		20 M6=AI4 mA p	4 x mA with potential isolation	
		–	–	●		24 M6=AI4-f/t	Frequncy or time measurement	
		–	–	●		25 M6=AI4_mA_MUS	4 x mA with transmitter supply	
		–	–	●		30 M6=AI4-Pt-2W	4 x Pt100 2-wire circuit	
		–	–	●		35 M6=AI2-Pt-3/4	2 x Pt100 3/4-wire circuit	
		–	–	●		40 M6=AO3-V	Output 3 x V	
		–	–	●		50 M6=AO3-mA	Output 3 x 20 mA	
		–	–	●		60 M6=BIO6-BIN.	6-fold binary input/output	
		–	–	●		70 M6=BO4-RELAIS	Output 4 x relay	
		–	–	●		4 M6=PROFIBUS	PROFIBUS module	
	Q07	like slot 6					like slot 6	2
20		***PASSWORD***						
	Q01	D	1	5	fC			
		●	●	●	+	0 PASSWORD OFF	Password protection is switched off, not activated, but available	
		●	●	●		1 PASSWORD_ON	Password protection is activated	
		●	●	●		2 PASSWORD_TIME	Password protection is activated, but stays off for about 30 s after returning to the operating level.	
	P02	D	1	5	fC		Password definition	
		●	●	●	+	PASSWORD		
						_ _ _ _ _		
30		***COMMUNICATION***						
	P01	D	1	5	fC			
		●	●	●	+	ADDRESS 1...127	Unit address on bus 00 = Global address 1 = Factory setting	
	Q02	D	1	5	fC		Baud rate	
		●	●	●	+	1 300 BAUD	300	
		●	●	●		2 600 BAUD	600	
		●	●	●		3 1200 BAUD	1200	
		●	●	●		4 2400 BAUD	2400	
		●	●	●		5 4800 BAUD	4800	
		●	●	●		6 9600 BAUD	9600	
		●	●	●		7 19200 BAUD	19200	
		●	●	●		8 38400 BAUD	38400	
		●	●	●		9 57600 BAUD	57600 ┐	
		●	●	●		10 115200 BAUD	115200 ├ only for lateral communication	
		●	●	●		11 187500 BAUD	187500 ┘ Protronic 500 / 550, Digitric 500	
	Q03	D	1	5	fC		Protocol	
		●	●	●	+	2 MODBUS RTU	Modbus RTU	
	Q04	D	1	5	fC		Parity	
		●	●	●	+	0 NONE	no parity test	
		●	●	●		2 EVEN	even	
	Q05	D	1	5	fC		Time out, time monitoring of miss. telegr. on bus	
		●	●	●	+	0 NO TIMEOUT	without monitoring	
		●	●	●		1 SECOND	1 s	
						|	|	
		●	●	●		25 SECONDS	25 s	
	Q06	D	1	5	fC			
		●	●	●		DP-SLAVE-ADDR 1...125	PROFIBUS device address 1 = Factory setting	

Instrument							Function	Rem. p.78
Module	Query Param.	Response						
	Q07	D	1	5	fC		Default DP configuration Input data	
		●	●	●		0 CFG_I_NONE		
		●	●	●		1 CFG_I_1WORD		
		●	●	●		2 CFG_I_2WORDS		
		●	●	●		3 CFG_I_4WORDS		
		●	●	●		4 CFG_I_8WORDS		
		●	●	●		5 CFG_I_16WORDS		
	Q08	D	1	5	fC		Default DP configuration Output data	
		●	●	●		0 CFG_O_NONE		
		●	●	●		1 CFG_O_1WORD		
		●	●	●		2 CFG_O_2WORDS		
		●	●	●		3 CFG_O_4WORDS		
		●	●	●		4 CFG_O_8WORDS		
		●	●	●		5 CFG_O_16WORDS		

1 Only modules can be configured, which have already been input into the unit.

For the automatic recognition of the existing modules, the query Q01 in module 11 must be answered with 1. Upon acknowledging with the key <Enter>, the slotted modules are recognized and entered into Module 12. The query Q01 is reset to 0.

If modules are to be configured, which are not (yet) available, these must be manually input into the module B12 .

2 Not required for Digitric 500.

AI Definition			Function	Rem. p.81
Module	Query Param.			
01 to ...			***Protronic 100: AI01 ... AI02*** ***Protronic 500/550: AI01 ... AI74*** ***Digitric 500: AI01 ... AI44***	
	Q01	fC +		
		0 AIxy UNUSED	Signal range Universal used for unused not AI01 and AI02 (Factory setting AI11 to AI74)	
		1 AI01 0...20 mA	0...20 mA	
		2 AI01 4...20 mA	4...20 mA	
		3 AI01 TC	Thermocouple	
		4 AI01 RTD-2W	Pt 100 in 2-wire circuit	
		5 AI01 RTD-3W	Pt 100 in 3-wire circuit	
		6 AI01 RTD-4W	Pt 100 in 4-wire circuit	1
		7 AI01 POT.150	Teletransmitter nominal range ca. 150 Ohm	1
		8 AI01 POT.1500	Teletransmitter nominal range ca. 1500 Ohm	
		9 AI01 PERIOD20	Time measurement	6
		10 AIx1 FREQ 10k	Frequency measurement up to 10 kHz	6
		11 AIx1 FREQ 20k	Frequency measurement up to 20 kHz	6,7
		12 AIx1 PULSE	Pulse counter	
		13 AIx1 INCREMNT	Increm. transm. and direct. of rotat. (2 inputs)	
		14 AIx1 INCREM.0	Increm. transm. with zero transm. (3 inputs)	

AI Definition				Function	Rem. p.81
Module	Query Param.				
01	Q02	fC	1 AI01-LINEAR	Linearization linear	
			2 AI01-SQR1	Square rooting (switch-off < PV0)	
			3 AI01-SQR2	Square rooting (linear under PV0)	
			4 AI01-TYPE L	Type L (-200...1000 °C)	
			5 AI01-TYPE J	Type J (-200...1200 °C)	
			6 AI01-TYPE K	Type K (-200...1400 °C)	
			7 AI01-TYPE U	Type U (-200... 600 °C)	
			8 AI01-TYPE R	Type R (0...1700 °C)	
			9 AI01-TYPE S	Type S (0...1800 °C)	
			10 AI01-TYPE T	Type T (-200... 400 °C)	
			11 AI01-TYPE B	Type B (0...1800 °C)	
			12 AI01-TYPE D	Type D (0...2300 °C)	
			13 AI01-TYPE E	Type E (-200...1000 °C)	
			14 AI01-RTD-200	Pt 100 -200 ... 200 °C	
			15 AI01-RTD-450	Pt 100 0 ... 450 °C	2
			16 AI01-RTD-800	Pt 100 -200 ... 800 °C	
			17 AI01-TAB1	Table 1	
			18 AI01-TAB2	Table 2	
			19 AI01-TAB3	Table 3	
			20 AI01-TAB4	Table 4	
	Q03	fC +	0 AI01 DIM NONE	Dimension for AI01 none	
			1 AI01 DIM USER	4-digit user-defined	
			2 AI01 DIM %		
			3 AI01 DIM °C	°C	
			4 AI01 DIM °F	°F automatic range switch-over	
			5 AI01 DIM mbar		
			6 AI01 DIM bar		
			7 AI01 DIM m3/h		
			8 AI01 DIM kg/h		
			9 AI01 DIM t/h		
			10 AI01 DIM l/h		
			11 AI01 DIM hl/h		
			12 AI01 DIM pH		
			13 AI01 DIM mm		
			14 AI01 DIM m		
			15 AI01 DIM m/h		
			16 AI01 DIM mV		
			17 AI01 DIM V		
			18 AI01 DIM mA		
			19 AI01 DIM A		
	P04	fC +	AI01-USER-DIM - - - -	Edit dimension in the display, if Q03 = 1	
to ..	P05	fC +	AI01-SCAL.LO Value	Start of scaling (for sensor automatically in °C) Range: -9999 to 99999 Resolution : 1 Factory setting 0 % of measuring range (0.00000)	4
	P06	fC +	AI01-SCAL.HI Value	End of scaling (for sensor automatically in °C) Range: -9999 to 99999 Resolution : 1 Factory setting 100 % of measuring range (100.00)	4

AI Definition				Function	Rem. p.81
Module	Query Param.				
	Q07	fC	0 AI01 NONE 1 AI01 TREF INT 2 AI01 TREF 0 C 3 AI01 TREF 20C 4 AI01 TREF 50C 5 AI01 TREF 60C	Reference junction compensation no reference junction internal external 0 °C external 20 °C external 50 °C external 60 °C	5
	P08	fC	AI01-SQR Value	Square rooting value of PV0 Range -9999 to +99999, Resolution 0.01 Factory setting 0.0	
	P09	fC	AI01-FILTERT. Value	T-Filter time constant Range 0 to 120 s Resolution 1 s Factory setting 0 s (0.00.00 h)	
	Q10	fC	1 AI01-FAIL.VAL 2 AI01-OLD VAL.	Default value strategy for sensor fault Default value Hold last measured value	
	P11	fC	AI01-FAIL.VAL Value	Default value Range 0 to 102 % Resolution 0.0001 Factory setting 102 %	
	Q12	fC	0 AI01-ERR=N.BO 1 AI01-ERR=BO01 | 76 AI01-ERR=BO76	Error message via BOx No message BO01 | BO76	
	Q13	fC	0 AI01=N.FLG 1 AI01ERR=FLG01 2 AI01ERR=FLG02 3 AI01ERR=FLG03 4 AI01ERR=FLG04 5 AI01ERR=FLG05 6 AI01ERR=FLG06	Error message via Flag No message via Flag 1 via Flag 2 via Flag 3 via Flag 4 via Flag 5 via Flag 6	
	Q15	fC	1 NAMUR + 2 NAMUR - 3 NAMUR +/- 4 24 V POS 5 24 V NEG 6 24 V +/- 7 TTL POS 8 TTL NEG 9 TTL +/-	Pick-up acc. to NAMUR DIN 19 232 positive edge Pick-up acc. to NAMUR DIN 19 232 negative edge Pick-up acc. to NAMUR DIN 19 232 both edges binary signal 0/24 V positive edge binary signal 0/24 V negative edge binary signal 0/24 V both edges TTL signal 0/5 V positive edge TTL signal 0/5 V negative edge TTL signal 0/5 V both edges	6

1 Only for AI01 and module 2_Pt100_3/4L.

2 For modules for Pt 100.

3 Text in unit AIxy-Bxy-Fn
Module number is identical with input number
x = Module on slot, y = input y on module x

4 Scaling is according to the transmitter data. The scaling for the control variable can deviate from this. See Lx-B03-P07, P08.

5 Reference junction only for thermocouple.

6 Only modules.

7 If only one input per module is used.

8 Two pulse inputs required for measuring.

9 Three pulse inputs required for measuring.

AO Definition			function	Rem. p.81
Module	Query Param.			
01 to ...		***Protronic 100: AO01*** ***Protronic 500/550: AO01 ... AO73*** ***Digitric 500: AO01 ... AO43*** (Analog outputs)		
	Q01	fC +	Signal range output AOxy	
		0 UNUSED	unused (not for AO01)	
		1 AO01 DEAD ZERO	0...20 mA	1
		2 AO01 LIFE ZERO	4...20 mA	1
		4 AO01 10 mA	10 mA constant current for current module	
		5 AO01 20 mA	20 mA constant current for current module	
	Q02	fC	Output of impedance monitoring, Output via	
		0 AO01 LD=N.BO	No output	
		1 AO01 LD.=BO01	BO01	
		|	|	
		76 AO01 LD.=BO76	BO76	
	Q03	fC	Error message via Flag	
		0 AO01 LD=N.FLG	No messge	
		1 AO01 LD=FLG01	via Flag 1	
		2 AO01 LD=FLG02	via Flag 2	
		3 AO01 LD=FLG03	via Flag 3	
		4 AO01 LD=FLG04	via Flag 4	
		5 AO01 LD=FLG05	via Flag 5	
		6 AO01 LD=FLG06	via Flag 6	

1 For output module AO3_V:
0...20 mA stands for 0...10 V
4...20 mA stands for 2...10 V

BIO-Definition			Function	Rem. p.81
Module	Query Param.			
01 to ...		***Protronic 100: BIO01 ... BIO 04*** ***Protronic 500/550: BIO01 ... BIO74*** ***Digitric 500: BIO01 ... BIO46***		
	Q01	fC +		1
		0 UNUSED	Unused for modules	2
		1 BI01 DIRECT	Binary 1 = input contact = "1"	
		2 BI01 INVERS	Binary 1 = input contact = "0"	
		3 BO01 ENGISED	Binary 1 = output - operating current	
		4 BO01 DENGISED	Binary 1 = output - quiescent current	

1 In Digitric 500, BO03 and BO04 are designed as relay outputs and cannot be configured as inputs.
Q01 = 0 not for BIO01 to BIO04

2 With free configuration, only the following functions can be exchanged subsequently in the list configuration: function 1 for 3 and/or function 2 for 4.

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
01							**CONTROLLER FUNCTION**	
	Q01	D	1	5	fC			
		●	●	●	+	1 SINGLE LOOP	Single-channel controller	
		●	●	●		3 SLAVE CONTR.	Slave controller in cascade	
		●	●	●		4 OVERR.M.MIN	Min. override adjustment Master controller	
		●	●	●		5 OVERR.M.MAX	Max. override adjustment Master controller	
		●	●	●		8 MANUALSTATION	Single-channel manual station	
		●	●	●		9 SETPT.STATION	Single-channel set point station	
		●	●	●		10 RATIO STATION	Single-channel ratio station	
		●	●	●		11 POSITIONER	Single-channel positioner	
	Q02	D	1	5	fC		Controller output	
		●	●	●		1 CONTINUOUS	K = continuous	
		●	●	●		2 STEP CONTR.	S = step	
		●	●	●		3 ON/OFF CONTR.	Z = two-position	
		●	●	●		5 H-OFF-C (S+S)	D = three position heat-o-cool (relay)	
		●	●	●		6 H-OFF-C (C+S)	D = three-position Heat (cont.)-o-cool (relay)	
		●	–	●		7 SPLIT.R.(C+C)	KK = split range with 2 continuous outputs	
	Q03	D	1	5	fC		Manual characteristic	
		●	●	●		1 M:CHAR-DIR	Z=K: off / on	
		●	●	●		2 M:CHAR-INV	Z=K: on / off	
		●	●	●		3 M:INV-DIR	D = KK: out2on / out2off / out1off / out1on	
		●	●	●		4 M:DIR-DIR	D = KK: out2off / out2on / out1off / out1on	
		●	●	●		5 M:INV-INV	D = KK: out2on / out2off / out1on / out1off	
		●	●	●		6 M:DIR-INV	D = KK: out2off / out2on / out1on / out1off	
							S = independent of wiring	
							off = permanenty off or 0/4 mA; on = permanently on or 20 mA	
	Q04	D	1	5	fC		y-feedback signal and display	
		●	●	●	+	0 NO PS.FBACK	No y-feedback signal	
		●	●	●		1 POS.FBCK=AI01	AI01	
		●	●	●		2 POS.FBCK=AI02	AI02	
		●	–	●		|	|	
		●	–	●		44 POS.FBCK=AI44	AI44	
		–	–	●		|	|	
		–	–	●		74 POS.FBCK=AI74	AI74	
	Q05	D	1	5	fC		Self-tuning	
					+	0 SELFTUNE OFF	Off	
						1 SELFTUNE1 ON	On	
02							**CONTROLLER PARAMETER**	
	Q01	D	1	5	fC		Aut. characteristic	
		●	●	●		1 A:CHAR.-DIR.	automatic direct action characteristic	
		●	●	●		2 A:CHAR.-INV.	Automatic indirect action characteristic	
	Q02	D	1	5	fC		PI-behaviour	
		●	●	●	+	1 P CONTROL	P (I for step controller)	
		●	●	●		2 PI CONTROL	PI	
		●	●	●		3 PD CONTROL	PD (not with step controller)	
		●	●	●		4 PID CONTROL	PID	
		●	●	●		5 PI+DEADTIME	Smith Predictor with PI	
		●	●	●		6 PID+DEADTIME	Smith Predictor with PID	
	Q03	D	1	5	fC		D compartment connected with	
		●	●	●		1 DIFF. PV	controlled variable	
		●	●	●		2 DIFF. ERROR	Controller deviation	

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
02	Q05	D	1	5	fC		Differentiation	
		●	●	●		1 DIFF.BIPOLAR	bipolar	
		●	●	●		2 DIFF.POSITIV	only positive changes	
		●	●	●		3 DIFF.NEGATIV	only negative changes	
	Q07	D	1	5	fC		G control	1
		●	●	●		0 G CONST	off	
		●	●	●		1 G LIN PV	linear from PV	
		●	●	●		2 G LIN SP	linear from SP	
		●	●	●		3 G LIN OUT	linear from Out	2
		●	●	●		4 G LIN ERR	linear from Err	
		●	●	●		5 G LIN |ERR|	linear from |Err|	
		●	●	●		7 G TAB1 PV	via Table 1 of PV ┐	
		●	●	●		8 G TAB1 SP	via Table 1 of SP |	
		●	●	●		9 G TAB1 OUT	for loop 2-4	2
		●	●	●		10 G TAB1 ERR	via Table 1 of Out ├	
		●	●	●		11 G TRANS.ALM4	Table 2-4	
		●	●	●		12 G TRANS=BIx	via Table 1 of Err ┘	
		●	●	●		13 G CONTR.AIx	G changeover with AL4 Parameter 02/03	
							G changeover with BIx see query 8	
							G of AIx see query 9	
	Q08	D	1	5	fC		G Changeover	
		●	●	●		0 G TRANS=OFF	No G-Changeover	
		●	●	●		1 G TRANS=BI01	Changeover with BI01 Parameter 02/03	
		●	●	●		|	|	
		●	●	●		4 G TRANS=BI04	Changeover with BI04 Parameter 02/03	
		●	–	●		|	|	
		●	–	●		46 G TRANS=BI64	Changeover with BI46 Parameter 02/03	
		–	–	●		|	|	
		–	–	●		76 G TRANS=BI76	Changeover with BI76 Parameter 02/03	
	Q09	D	1	5	fC		G-Steuer.AIx	
		●	●	●		0 G V. AIx=OFF	No G control by AIx	
		●	●	●		1 G V. AI01	controlled by AI01	
		●	●	●		2 G V. AI02	controlled by AI02	
		●	–	●		|	|	
		●	–	●		44 G V. AI44	controlled by AI44	
		–	–	●		|	|	
		–	–	●		74 G V. AI74	controlled by AI74	
	Q10-Q12						Tn Control like G	
	Q13-Q15						Tv Control like G	
	Q16-Q18						Y0 Control like G	
	Q19-Q21						Tt Control Smith Predictor like G	
	Q22-Q24						T1 Control Smith Predictor like G	
	Q25-Q27						Ks Control Smith Predictor like G	
	Q28	D	1	5	fC		Disturbance Variable Out + Z	
		●	●	●		0 FF:ADD=OFF	No disturbance variable feedforward to Out	
		●	●	●		1 FF:ADD=AI01	AI01 adds to Out	
		●	●	●		2 FF:ADD=AI02	AI02 adds to Out	
		●	–	●		|	|	
		●	–	●		44 FF:ADD=AI44	AI44 adds to Out	
		–	–	●		|	|	
		–	–	●		74 FF:ADD=AI74	AI74 adds to Out	
		●	–	●		91 FF:ADD=ZK1	Output state correction 1 adds to Out	
		●	–	●		92 FF:ADD=ZK2	Output state correction 2 adds to Out	

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
	Q29	D	1	5	fC		Disturbance variable adds to Out	
		●	●	●		1 FF:LINEAR	linear	
		●	●	●		2 FF:DIF.BIPOL	different. bipolar	
		●	●	●		3 FF:DIF.UNIPOL+	different. unipolar positive changes	
		●	●	●		4 FF:DIF.UNIPOL-	different. unipolar negative changes	
03							***INPUT CIRCUIT***	
	Q01	D	1	5	fC		Input circuit	
		●	●	●		0 NO INPUT CIRC	Without input signal connection (stations)	1
		●	●	●		1 ONE PV	Fixed value Err = IC1 - SP	
		●	●	●		2 3 COMPONENT	Multicomponents Err = IC1 x K1 - SP + K2 x (IC2 + K3 x IC3)	
		●	●	●		3 MULTIPLICATE	Multiplication Err = IC1 x (IC2 + K3 x IC3) - SP	
		●	●	●		4 RATIO1	ratio1 Err = IC1 - (R x (IC2 + K3 x IC3) + Bias + IC4)	
		●	●	●		5 FIX/RATIO1	Fixed value/ratio1 switchable (1 <-> 4)	
		●	●	●		6 RATIO2	ratio2 Err = IC1 - [(R / (1 - R)) x (IC2 + K3 x IC3) + Bias + IC4]	14
		●	●	●		7 FIX/RATIO2	Fixed value/ratio2 switchable (1 <-> 6)	
		●	●	●		8 EXTR.PV.MAX	Extreme value PV: Err = Max(IC1,..IC3) - SP	
		●	●	●		9 EXTR.PV.MIN	Extreme value PV: Err = Min(IC1,..IC3) - SP	
		●	●	●		10 EXTR.SP.MAX	Extreme value SP: Err = IC1 - Max(SP1,IC2,IC3)	
		●	●	●		11 EXTR.SP.MIN	Extreme value SP: Err = IC1 - Min(SP1,IC2,IC3)	
		●	–	●		12 LOAD AIR	Air control for air (only loop 1)	
		●	–	●		13 LOAD FUEL	Air control for fuel (only loop 2)	
	Q02	D	1	5	fC		Multicomponents - Structure ΣPV = K2 x (IC2 + K3 x IC3) Err= | D | PVan,PVdi | SPan PV - SP, | ΣPVh | PV | SP	
		●	●	●		1 3 COMPONENT_01		
		●	●	●		2 3 COMPONENT_02	PV+ΣPVh-SP | PV | PV+ΣPVh | SP	
		●	●	●		3 3 COMPONENT_03	PV+ΣPVh-SP | ΣPVh | PV | SP	
		●	●	●		4 3 COMPONENT_04	PV+ΣPVh-SP | ΣPVh | PV+ΣPVh | SP	
		●	●	●		5 3 COMPONENT_05	PV+ΣPVh-SP | PV+ΣPVh | PV+ΣPVh | SP	14
		●	●	●		6 3 COMPONENT_06	PV+ΣPVh-SP | ΣPVh | PV | SP	
		●	●	●		7 3 COMPONENT_07	PV+ΣPVh-SP | PV+ΣPVh | PV | SP	
		●	●	●		8 3 COMPONENT_08	PV-(SP+ΣPVh) | PV | PV | SP	
		●	●	●		9 3 COMPONENT_09	PV-(SP+ΣPVh) | PV | PV | SP+ΣPVh D D component connected with PVan,PVdi Analog and digital display for PV SPan Analog display for SP	
	Q03	D	1	5	fC		Display of the control deviation	
		●	●	●		1 IND.ERR:%	in percent (100 % = measuring range of IC1)	
		●	●	●		2 IND.ERR:EU	in EU like IC1	
	Q04	D	1	5	fC		Dimension for control variable and setpoint (not ratio and multiplication)	
		●	●	●	+	0 P,S NO DIM.	Without dimension	
		●	●	●		1 P,S USER DIM.	4-digit dimension freely definable	
		●	●	●		2 P,S DIM.%	%	
		●	●	●		3 P,S DIM.°C	°C	
		●	●	●		4 P,S DIM.°F	°F with automatic range changeover	
						|		
						etc.	see AI Definition Q03	
	P05	D	1	5	fC		Edit the user dimension	
		●	●	●	+	L1 USER DIM.	(if Q04 = 1)	
						- - - -	see AI Definition Q03	

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
03	Q06	D	1	5	fC		Decimal places for PV, SP	
		●	●	●	+	0 P,S 10000.	0 decimal places	
		●	●	●		1 P,S 1000.0	1 decimal place	
		●	●	●		2 P,S 100.00	2 decimal places	
		●	●	●		3 P,S 10.000	3 decimal places	
		●	●	●		4 P,S 1.0000	4 decimal places	
		●	●	●		5 P,S FLOAT.PT.	Display of floating decimal point	
	P07	D	1	5	fC	DIG.IND.LO.	Scaling for PV, SP Start	3
		●	●	●		Value	Factory setting SP = 0,0 Range -9999 to 99999	
	P08	D	1	5	fC	DIG.IND.HI	Scaling for PV, R(SP) End	3
		●	●	●		Value	Factory setting SP = 100,0 Range -9999 to 99999	
	Q09	D	1	5	fC		Digital display for ratio	
		●	●	●	+	1 RATIO IS/SP	Ract and Rset	
		●	●	●		2 ES1, RATIO x ES2	IC1 and R x IC2	
	Q10	D	1	5	fC		Dimension R ratio for ratio and multiplication	
		●	●	●	+	0 NO DIM.	without dimension (e.g. ratio)	
		●	●	●		1 USER DIM.	4-digit dimension freely definable	
		●	●	●		2 DIM.= %	% (Factory setting for ratio 2)	
	P11	D	1	5	fC		Edit the user dimension ratio	
		●	●	●	+	R USER DIM. - - - -	(if Q04 = 1) see AI Definition Q04	
	Q12	D	1	5	fC		Decimal places of R-points for R-display	
		●	●	●		0 R 10000.	0 Decimal places	
		●	●	●		1 R 1000.0	1 Decimal places	
		●	●	●		2 R 100.00	2 Decimal places	
		●	●	●		3 R 10.000	3 Decimal places	
		●	●	●		4 R 1.0000	4 Decimal places	
		●	●	●		5 R FLOAT.PT.	Display of floating decimal point	
	P14	D	1	5	fC	SCAL.RATIO	Scaling for ratio Factory setting R = 100.0	
		●	●	●		Value	Range -9999 to 99999	
	Q15	D	1	5	fC		Analog display for ratio	8
		●	●	●		1 ANALOG PV,SP	PV1 and R x PV2	
		●	●	●		2 ANALOG RATIO	Ract and Rset	
	P16	D	1	5	fC	ANALOG.0	Analog.0% s. B03-Q15 Value of analog display for 0 %	9
		●	●	●		Value	Factory setting 0.0 Range -9999 to 99999	
	P17	D	1	5	fC	ANALOG.100	Analog.100% see B03-Q15 Value of analog display for 100 %	9
		●	●	●		Value	Factory setting 100.0 Range -9999 to 99999	
	Q18	D	1	5	fC		PV retransmission Current control variable or Ract to	
		●	●	●		0 PV,R=NO AO	Not routed to output	
		●	●	●		1 PV,R=AO01	Analog output AO01	
		●	–	●		|	|	
		●	–	●		43 PV,R=AO43	Analog output AO43	
		–	–	●		|	|	
		–	–	●		73 PV,R=AO73	Analog output AO73	

Loop 1			Function	Rem. S.96
Module	Query Param.	Response		

04 ROUTING_ES-AI

Routing of the analog inputs and the input circuit)

Q01	D	1	5	fC		Routing_IC1 IC1 of input circuit connected with:
	●	●	●		0 ES1=0%	fixed value 0 %
	●	●	●		1 ES1=AI01	AI01 for loop
	●	●	●		2 ES1=AI02	AI02
	●	–	●		|	|
	●	–	●		44 ES1=AI44	AI44
	–	–	●		|	|
	–	–	●		74 ES1=AI74	AI74
	●	–	●		91 ES1=FC_1	Output of the state correction 1
	●	–	●		92 ES1=FC_2	Output of the state correction 2
	●	●	●		94 ES1=TAB4	Output of Table 4
	●	●	●		100 ES1=100%	Fixed value 100 %

Q02	D	1	5	fC		Routing_IC2 IC2 of the input circuit connected with:
					like Q01	as IC1

Q03	D	1	5	fC		Routing_IC3 IC3 of the input circuit connected with:
					like Q01	like IC1

Q04	D	1	5	fC		Rangier_IC4 IC4 of the input circuit connected with:
					like Q01	like IC1

Q05	D	1	5	fC		TAB4.AI Table 4 connected with
	●	●	●		0 TAB4 NO.AI	Not individually used
	●	●	●		1 TAB4.AI01	AI01
	●	●	●		2 TAB4.AI02	AI02
	●	–	●		|	|
	●	–	●		44 TAB4.AI44	AI44
	–	–	●		|	|
	–	–	●		74 TAB4.AI74	AI74

Q06	D	1	5	fC		Routing_B1 Routing of binary signal with BIx
	●	●	●		0 B1 NO BI	B1 unused
	●	●	●		1 B1=BI01	BI01
	●	●	●		|	|
	●	●	●		4 B1=BI04	BI04
	●	–	●		|	|
	●	–	●		46 B1=BI46	BI46
	–	–	●		|	|
	–	–	●		76 B1=BI76	BI76

05 SETPOINTS

Q01	D	1	5	fC		Setpoint 1 of controller 1
	●	●	●		0 SP1.INT=OFF	off
	●	●	●		1 SP1.INT=ON	can only be changed per keys or interface
	●	●	●		2 SP1.INT=TRACK	follows current set point

Q02	D	1	5	fC		Type SP1 SP1 as parameter (then becomes part of the configuration and can be taken over by other unit per Confi)
	●	●	●		0 SP1=NO PARAM.	no
	●	●	●		1 SP1=PARAM.	yes is not tracked

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
05	Q03	D	1	5	fC		Set point 2 = ratio set point 1 SR1	
		●	●	●		0 SP2.INT=OFF	off	
		●	●	●		1 SP2.INT=ON	Only changeable per key or interface	
		●	●	●		2 SP2.INT=PARA.FLX	Only operatable at paralevel Delta only	
		●	●	●		3 SP2=DELTA.PAR	operatable at paralevel	
		●	●	●		4 SP2=RATIO.TRK	SR1 follows actual ratio	
	Q04	D	1	5	fC		Set point 3 = ratio set point 2 SR2	
		●	●	●		0 SP3.INT=OFF	off	
		●	●	●		1 SP3.INT=ON	Only changeable per key or interface	
		●	●	●		2 SP3.INT=PARA.FLX	Only operatable at paralevel Delta only	
		●	●	●		3 SP3=DELTA.PAR	operatable at paralevel	
	Q05	D	1	5	fC		Set point 4 = ratio set point 3 SR3	
		●	●	●		0 SP4.INT=OFF	off	
		●	●	●		1 SP4.INT=ON	only changeable per keys or interface	
		●	●	●		2 SP4.INT=PARA.FLX	Only operatable at paralevel	
		●	●	●		3 SP4=DELTA.PAR	Delta only operatable at paralevel	
	Q06	D	1	5	fC		External set point	
		●	●	●		0 SP.EXT=OFF	off	
		●	●	●		1 SP.EXT=AI01	AI01	
		●	●	●		2 SP.EXT=AI02	AI02	
		●	–	●		|	|	
		●	–	●		44 SP.EXT=AI44	AI44	
		–	–	●		|	|	
		–	–	●		74 SP.EXT=AI74	AI74	
	Q07	D	1	5	fC		Computer set point	
		●	●	●		0 SP.COMP=OFF	off	
		●	●	●		1 SP.COMP=ON	on	
	Q08	D	1	5	fC		Program transmitter set point	4
		●	●	●		0 SP.PRGRM=OFF	off	
		●	●	●		1 SP.PRGRM=ON	on	
	Q09	D	1	5	fC +		SP Display Display of set point falsified temporarilly by ramp	
		●	●	●		1 SP:IND/TARGT	Display of the targeted set point	
		●	●	●		2 SP.IND.RAMP	Display of the falsified value. The targeted set point is displayed during set point adjustment, 3 s after the last actuating key of the current set point.	
	Q10	D	1	5	fC		Current set point to AOx	
		●	●	●		0 SP.ACT.NO AO	Set point not on output	
		●	●	●		1 SP.ACT=AO01	Analog output AO01	
		●	–	●		|	|	
		●	–	●		43 SP.ACT=AO43	Analog output AO43	
		–	–	●		|	|	
		–	–	●		73 SP.ACT=AO73	Analog output AO73	
	Q11	D	1	5	fC		SP Changeover Set point changeover	
		●	●	●		0 SP.TRANS=OFF	off	
							BIx | BIy | Setpoint	
		●	●	●		1 SP1-SP2 BIx	0 | 0 | 1	
							1 | 0 | 2	
		●	●	●		2 SP1-SP4 BIy	0 | 1 | 3	
							1 | 1 | 4	
							Definition BIx, BIy see B09-Q13, Q14	

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
06						**TREND INDICATION**		
	Q01	D	1	5	fC +		Time for trend display in graphic display of Protronic 550	13
		–	–	●		1 TREND 75 sec	Time difference between current time and 1. point on left display edge	
		–	–	●		2 TREND 3 min		
		–	–	●		3 TREND 5 min		
		–	–	●		4 TREND 10 min		
		–	–	●		5 TREND 20 min		
		–	–	●		6 TREND 30 min		
		–	–	●		7 TREND 1 h		
		–	–	●		8 TREND 2 hrs		
		–	–	●		9 TREND 3 hrs		
		–	–	●		0 TREND 5 hrs		
07						**CONTROLLER MODES**		
	Q01	D	1	5	fC		Type of operation	
		●	●	●		1 MODE=MAN/AUTO	Manual/Automatic	
		●	●	●		2 MODE=MAN	only manual	
		●	●	●		3 MODE=AUT	only automatic	
		●	●	●		4 MODE=AUTO_MIN	only automatic, manual adjustment has effect on min. threshold for Out	10
		●	●	●		5 MODE=AUTO_MAX	only automatic, manual adjustment has effect on max. threshold for Out	10
		●	●	●		6 MAN/AUT/CASC	manual/automatic/cascade	
		●	●	●		7 MAN/AUT/DDC	manual/automatic/computer(DDC)	
		●	●	●		8 MAN/DDC	manual/computer(DDC)	
	Q02	D	1	5	fC		SP-Tracking (SP is set to PV)	
		●	●	●		0 TRACK SP OFF	SP1 tracking for Man OFF	
		●	●	●		1 TRACK SP/ACT	SP1 tracking for Man On has effect on SP1 and RAMP	
		●	●	●		2 TRACK SP	SP1 tracking for Man On has effect only on RAMP	
	Q03	D	1	5	fC		DDC function	
		●	●	●		0 DDC=OFF	No DDC	
							In case of computer failure:	
		●	●	●		1 DDC=MAN,HOLD	Manual + last correction value	
		●	●	●		2 DDC=MAN OUT=0	Man. + safety correct. value 0 %	
		●	●	●		3 DDC=MAN OUTS1	Manual + saftey correct. value 1	
		●	●	●		4 DDC=MAN OUTS2	Manual + safety correct. value 2	
		●	●	●		5 DDC=AUTO	begins automatically with last correction value	
		●	●	●		6 DDC=CASC	cascade	
	Q04	D	1	5	fC		SP Back-up	
							Set point in case of computer failure (HOST)	
		●	●	●		0 SP-ACTUAL	Adjusted set point	
		●	●	●		1 SP-COMP.	Computer set point	
		●	●	●		2 PV-ACTUAL	last control variable (PV-tracking)	
	Q05	D	1	5	fC		OM Operation	
							Operation mode after mains resumption	
		●	●	●		1 POWER=OLDMODE	Previous operation mode	
		●	●	●		2 POWER=MAN,HLD	Manual last correction value	
		●	●	●		3 POWER=MAN,0%	Manual safety correct. value 0 %	
		●	●	●		4 POWER=MAN,S1	Manual safety correct. value 1	
		●	●	●		5 POWER=MAN,S2	Manual safety correct. value 2	
	Q06	D	1	5	fC		Operation mode during fault at input (fault on PV)	
		●	●	●		1 ?AI=OLD MODE	No change	
		●	●	●		2 ?AI=MAN,HOLD	Manual, last correction value	
		●	●	●		3 ?AI=MAN,0%	Man., safety correct. value 0 %	
		●	●	●		4 ?AI=MAN,S1	Manual, safety correct. value 1	
		●	●	●		5 ?AI=MAN,S2	Manual, safety corect. value 2	

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
08						**ALARMS**		
	Q01	D	1	5	fC		Alarm value 1	
		●	●	●		0 ALARM1=OFF	Alarm value without function	
		●	●	●		1 ALARM1 SP.MIN	Alarm value to PV - Min	
		●	●	●		2 ALARM1 SP.MAX	Alarm value to PV - Max	
		●	●	●		3 ALM1 ERR-MIN	Alarm value to Err - Min	
		●	●	●		4 ALM1 ERR-MAX	Alarm value to Err - Max	
		●	●	●		6 ALM1 |ERR|-MX	Alarm value to |Err| - Max	
		●	●	●		7 AL1 ER-SP%MIN	Alarm value to Err - Min in % of SP	
		●	●	●		8 AL1 ER-SP%MAX	Alarm value to Err - Max in % of SP	
		●	●	●		10 AL1 |ERR|S%,MAX	Alarm value to |Err| - Max in % of SP	
		●	●	●		11 AL1 DX/DT-MAX	Alarm value dx/dt Max	
		●	●	●		12 AL1 RATIO MIN	Alarm value R = Min. for input Ratio	
		●	●	●		13 AL1 RATIO MAX	Alarm value R = Max. for input Ratio	
		●	●	●		14 AL1 OUT-MIN	Alarm value to Out - Min	
		●	●	●		15 AL1 OUT-MAX	Alarm value to Out - Max	
	Q02	D	1	5	fC		Alarm value 2 like alarm value 1	
		●	●	●		2 ALARM2 SP.MAX	default alarm value to PV - Max	
	Q03	D	1	5	fC		Alarm value 3 like alarm value 1	
		●	●	●		3 ALM3 ERR-MIN	Alarm value to Err - Min	
	Q04	D	1	5	fC		Alarm value 4 like alarm value 1	
		●	●	●		4 ALM4 ERR-MAX	Alarm value to Err - Max	
	Q05	D	1	5	fC		Type Alarm 1 adjustable to | displayed in	
		●	●	●		1 ALM1 OP/OP	Operation level | Operation level	
		●	●	●		2 ALM1 PAR/OP	Para-Level | Operation level	
		●	●	●		3 ALM1 PAR/PAR	Para-Level | Para-Level	
	Q06	D	1	5	fC		Type Alarm 2 adjustable to | displayed in	
		●	●	●		1 ALM2 OP/OP	Operation level | Operation level	
		●	●	●		2 ALM2 PAR/OP	Para-Level | Operation level	
		●	●	●		3 ALM2 PAR/PAR	Para-Level | Para-Level	
	Q07	D	1	5	fC		Type Alarm 3 adjustable to | displayed in	
		●	●	●		1 ALM3 OP/OP	Operation level | Operation level	
		●	●	●		2 ALM3 PAR/OP	Para-Level | Operation level	
		●	●	●		3 ALM3 PAR/PAR	Para-Level | Para-Level	
	Q08	D	1	5	fC		Type Alarm 4 adjustable to | displayed in	
		●	●	●		1 ALM4 OP/OP	Operation level | Operation level	
		●	●	●		2 ALM4 PAR/OP	Para-Level | Operation level	
		●	●	●		3 ALM4 PAR/PAR	Para-Level | Para-Level	
09						**BINARY INPUTS**		
	Q01	D	1	5	fC		Changeover to Manual with last Out-value	
		●	●	●		0 MAN.BI OFF	No function	
		●	●	●		1 MAN.BI01	BI01	
		●	●	●		|	|	
		●	●	●		4 MAN.BI04	BI04	
		●	–	●		|	|	
		●	–	●		46 MAN.BI46	BI46	
		–	–	●		|	|	
		–	–	●		76 MAN.BI76	BI76	

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
09	Q02	D ● ●	1 ● ●	5 ● ●	fC	1 MAN STATIC 2 MAN DYNAMIC	Dyn.<-->Stat. function depends on duration of bin. input (0 = PREVIOUS MODE, 1 = MAN) Changing 0 to 1 switches MAN-AUT-MAN	7
	Q03	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 CASC.BI AUS 1 CASC.BI01 | 4 CASC.BI04 | 46 CASC.BI46 | 76 CASC.BI76	Cascade BIx Changeover Autom <--> Cascade like query 1	
	Q04	D ● ●	1 ● ●	5 ● ●	fC	1 CASC STATIC 2 CASC DYNAMIC	Dynamic <-> Static function depends on duration of binary input Changing 0 to 1 switches	
	Q05	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 MAN Y=0% BI OFF 1 MAN Y=0% BI01 | 4 MAN Y=0%.BI04 | 46 MAN Y=0%.BI46 | 76 MAN Y=0%.BI76	Changeover to manual mode with Out = 0 % like query 1	7,11
	Q06	D ● ●	1 ● ●	5 ● ●	fC	1 MAN 0%.STATIC 2 MAN 0%.DYNAM	Dynamic <-> Static function depends on duration of the binary input Changing 0 to 1 switches	7,11
	Q07	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 MAN YS1 BI OFF 1 MAN YS1.BI01 | 4 MAN YS1.BI04 | 46 MAN YS1.BI46 | 76 MAN YS1.BI76	Changeover to manual mode with safety output value 1 like query 1	11
	Q08	D ● ●	1 ● ●	5 ● ●	fC	1 MAN YS1 STATIC 2 MAN YS1 DYNAM	Dynamic <-> Static function depends on duration of the binary input Changing 0 tof 1 switches	7,11
	Q09	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 MAN YS2 BI OFF 1 MAN YS2.BI01 | 4 MAN YS2.BI04 | 46 MAN YS2.BI46 | 76 MAN YS2.BI76	Changeover to manual mode with safety output value 1 like query 1	11
	Q10	D ● ●	1 ● ●	5 ● ●	fC	1 MAN YS2 STATIC 2 MAN YS2 02	Dynamic <-> Static function depends on like query 2	7,11
	Q11	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 TRCKOUT BI OFF 1 TRCKOUT.BI01 | 4 TRCKOUT.BI04 | 46 TRCKOUT.BI46 | 76 TRCKOUT.BI76	Switch on output tracking (Out = AIxy) like query 1 see Lx-B10-Q10	11

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
09	Q12	D	1	5	fC	0 SRAMP BI OFF 1 SRAMP=0.BI01 | 4 SRAMP=0.BI04 | 46 SRAMP=0.BI46 | 76 SRAMP=0.BI76	Ramp stop static SP ramp stopped. like query 1	
	Q13	D	1	5	fC	0 SP1-4 BIx OFF 1 SP1-4 BIx=BI01 | 4 SP1-4 BIx=BI04 | 46 SP1-4 BIx=BI46 | 76 SP1-4 BIx=BI76	SP changeover: Definition of BIx (B05-Q11) No setpoint changeover with BIx with BI01 | BI04 | BI46 | with BI76	
	Q14	D	1	5	fC	0 SP1-4 BIy OFF 1 SP1-4 BIy=BI01 | 4 SP1-4 BIy=BI04 | 46 SP1-4 BIy=BI46 | 76 SP1-4 BIy=BI76	SP changeover: Definition of BIy (B05-Q11) No setpoint changeover with BIy with BI01 | BI04 | BI46 | with BI76	
	Q15	D	1	5	fC	0 SPI-EXT BI OFF 1 SPI-EXT.BI01 | 4 SPI-EXT.BI04 | 46 SPI-EXT.BI46 | 76 SPI-EXT.BI76	SPint <-> SPext static changeover like query 1	
	Q16	D	1	5	fC	0 CHAR BI OFF 1 CHAR BI.BI01 | 4 CHAR BI.BI04 | 46 CHAR BI.BI46 | 76 CHAR BI.BI76	DIR <-> INV static Changeover of characteristic like query 1	
	Q17	D	1	5	fC	0 LOCK SP BI OFF 1 LOCK SP.BI01 | 4 LOCK SP.BI04 | 46 LOCK SP.BI46 | 76 LOCK SP.BI76	Locking SP change static Inhibition of the SP adjustment capability with like query 1	
	Q18	D	1	5	fC	0 REMOTE BI=OFF 1 REMOTE SP 2 REMOTE OUT 3 A=SP,M=OUT	Enabling of teleadjustment (static) Inhibition of teleadjustment only setpoint (in all operation states) only correction value (in manual) setpoint in automatic, Out in manual	

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
09	Q19	D	1	5	fC		Teleadjustment (more) 100%/60s- adjustment	
		●	●	●		0 MORE BI OFF		
		●	●	●		1 MORE.BI01	with BI01	
		●	●	●		|	|	
		●	●	●		4 MORE.BI04	with BI04	
		●	–	●		|	|	
		●	–	●		46 MORE.BI46	with BI46	
		–	–	●		|	|	
		–	–	●		76 MORE.BI76	with BI76	
	Q20	D	1	5	fC		Teleadjustment (less) 100%/60s-adjustment	
		●	●	●		1 LESS BI OFF	with BI01	
		●	●	●		|	|	
		●	●	●		4 LESS.BI04	with BI04	
		●	–	●		|	|	
		●	–	●		46 LESS.BI46	with BI46	
		–	–	●		|	|	
		–	–	●		76 LESS.BI76	with BI76	
	Q21	D	1	5	fC		Computation ready	
		●	●	●		0 CR BI OFF	not used	
		●	●	●		1 CR BI01	via binary input BI01	
		●	●	●		|	|	
		●	●	●		4 CR BI04	via binary input BI04	
		●	–	●		|	|	
		●	–	●		46 CR BI46	via binary input BI46	
		–	–	●		|	|	
		–	–	●		76 CR BI76	via binary input BI76	
10	**ROUTE OUT** (Routing of the controller outputs)							
	Q01	D	1	5	fC		Routing Out1 to AOx first continuous controller output to	
		●	●	●		0 OUT1 NO AO	for switching controllers	
		●	●	●		1 OUT1.CON=AO01	Analog output AO01	
		●	–	●		|	|	
		●	–	●		43 OUT1.CON=AO43	Analog output AO43	
		–	–	●		|	|	
		–	–	●		73 OUT1.CON=AO73	Analog output AO73	
	Q02	D	1	5	fC		Routing Out2 to AOx second continuous controller output (split range) Unsed	
		●	●	●		0 OUT2 NO AO	Analog output AO01	
		●	●	●		1 OUT2.CON=AO01	|	
		●	–	●		|	Analog output AO43	
		●	–	●		43 OUT2.CON=AO43	|	
		–	–	●		|	Analog output AO73	
		–	–	●		73 OUT2.CON=AO73		
	Q03	D	1	5	fC		Routing Out to AOx Diagram of position display Out for switching controllers and split range	
		●	●	●		0 OUTA NO AO	No output	
		●	●	●		1 OUTA.CON=AO01	Analog output AO01	
		●	–	●		|	|	
		●	–	●		43 OUTA.CON=AO43	Analog output AO43	
		–	–	●		|	|	
		–	–	●		73 OUTA.CON=AO73	Analog output AO73	
	Q04	D	1	5	fC		Routing Out1 to BOx First switch contact (for step controller 'more')	
		●	●	●		0 OUT1=NO BO	for continuous controller	
		●	●	●		1 OUT1=BO01	to binary output BO01	
		●	●	●		|	|	
		●	–	●		4 OUT1=BO04	to binary output BO04	
		●	–	●		|	|	
		–	–	●		46 OUT1=BO46	to binary output BO46	
		–	–	●		|	|	
						76 OUT1=BO76	to binary output BO76	

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
10	Q05	D	1	5	fC		Routing of Out2 to BOx second switch contact (for step controller 'less')	
		●	●	●		0 OUT2=NO BO	for continuous controller	
		●	●	●		1 OUT2=BO01	to binary output BO01	
		●	●	●		|	|	
		●	●	●		4 OUT2=BO04	to binary output BO04	
		●	–	●		|	|	
		●	–	●		46 OUT2=BO46	to binary output BO46	
		–	–	●		|	|	
		–	–	●		76 OUT2=BO76	to binary output BO76	
	Q06	D	1	5	fC		Output limits	6
		●	●	●		0 OUT.LIMIT=OFF	always inactive (for step controller)	
		●	●	●		1 OUT.LIMIT.AUT	active only in automatic operation	
		●	●	●		2 OUT.LIMIT=ON	active in manual and automatic operation	
	Q08	D	1	5	fC	0 OUT-MAX=PAR	Out-Max int./extern. defined	
		●	●	●		1 OUT-MAX=AI01	Internal parameter	
		●	●	●		2 OUT-MAX=AI02	routed through AI01	
		●	●	●		|	routed through AI02	
		●	–	●		44 OUT-MAX=AI44	|	
		●	–	●		|	routed through AI44	
		–	–	●		74 OUT-MAX=AI74	|	
		–	–	●			routed through AI74	
	Q09	D	1	5	fC		Out-Min int/extern. defined	
		●	●	●		0 OUT-MIN=PARAM.	Internal parameter	
		●	●	●		1 OUT-MIN=AI01	routed through AI01	
		●	●	●		2 OUT-MIN=AI02	routed through AI02	
		●	–	●		|	|	
		●	–	●		44 OUT-MIN=AI44	routed through AI44	
		–	–	●		|	|	
		–	–	●		74 OUT-MIN=AI74	routed through AI74	
	Q10	D	1	5	fC		Out Track (see B09-Q11)	
		●	●	●		0 OUT-TRCK=AUS	No Out tracking	
		●	●	●		1 OUT-TRCK=AI01	Out = AI01 if BIx	
		●	●	●		2 OUT-TRCK=AI02	Out = AI02 if BIx	
		●	–	●		|	|	
		●	–	●		44 OUT-TRCK=AI44	Out = AI44 if BIx	
		–	–	●		|	|	
		–	–	●		74 OUT-TRCK=AI74	Out = AI74 if BIx	
11							***BINARY OUTPUTS***	
	Q01	D	1	5	fC		Alarm value 1 to output	
		●	●	●		0 ALARM1.NO BO	No output	
		●	●	●		1 ALARM1.BO01	BO01	
		●	●	●		|	|	
		●	●	●		4 ALARM1.BO04	BO04	
		●	–	●		|	|	
		●	–	●		46 ALARM1.BO46	BO46	
		–	–	●		|	|	
		–	–	●		76 ALARM1.BO76	BO76	
	Q02	D	1	5	fC		Alarm value 2 to output	
		●	●	●		0 ALARM2.NO BO	like alarm value 1	
		●	●	●		1 ALARM2.BO01		
		●	●	●		|		
		●	●	●		4 ALARM2.BO04		
		●	–	●		|		
		●	–	●		46 ALARM2.BO46		
		–	–	●		|		
		–	–	●		76 ALARM2.BO76		

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
11	Q03	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 ALARM3.NO BO 1 ALARM3.BO01 | 4 ALARM3.BO04 | 46 ALARM3.BO46 | 76 ALARM3.BO76	Alarm value 3 to output like alarm value 1	
	Q04	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 ALARM4.NO BO 1 ALARM4.BO01 | 4 ALARM4.BO04 | 46 ALARM4.BO46 | 76 ALARM4.BO76	Alarm value 4 to output like alarm value 1	
	Q05	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 MAN NO BO 1 MAN NO.BO01 | 4 MAN NO.BO04 | 46 MAN NO.BO46 | 76 MAN NO.BO76	Feedback signal manual to output like alarm value 1	
	Q06	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 AUTO NO BO 1 AUTO NO.BO01 | 4 AUTO NO.BO04 | 46 AUTO NO.BO46 | 76 AUTO NICHT.BO76	Feedback signal automatic to output like alarm value 1	
	Q07	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 CASC.NO BO 1 CASC.NO.BO01 | 4 CASC.NO.BO04 | 46 CASC.NO.BO46 | 76 CASC.NO.BO76	Feedback signal cascade to output like alarm value 1	
	Q08	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 WEXT NO BO 1 WEXT NO.BO01 | 4 WEXT NO.BO04 | 46 WEXT NO.BO46 | 76 WEXT NO.BO76	Feedback signal - external set point like alarm value 1	
	Q09	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 PRG.END NO BO 1 PRG.END NO BO01 | 4 PRG.END NO BO04 | 46 PRG.END NO BO46 | 76 PRG.END NO BO76	Program end signal to output like alarm value 1	

Loop 1							Function	Rem. S.96
Module	Query Param.	Response						
11	Q10	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 PRG.BIN1 NO BO 1 PRG.BIN1 NO BO01 | 4 PRG.BIN1 NO BO04 | 46 PRG.BIN1 NOBO46 | 76 PRG.BIN1 NOBO76	Binary track 1 of the programmer to binary output like alarm value 1	
	Q11	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 PRG.BIN2 NO BO 1 PRG.BIN2 NO BO01 | 4 PRG.BIN2 NO BO04 | 46 PRG.BIN2 NOBO46 | 76 PRG.BIN2 NOBO76	Binary track 2 of the programmer to binary output like alarm value 1	
	Q12	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 PRG.BIN3 NO BO 1 PRG.BIN3 NO BO01 | 4 PRG.BIN3 NO BO04 | 46 PRG.BIN3 NOBO46 | 76 PRG.BIN3 NOBO76	Binary track 3 of the programmer to binary output like alarm value 1	
	Q13	D ● ● ● ● ● ● – –	1 ● ● ● ● – – – –	5 ● ● ● ● ● ● ● ●	fC	0 PRG.BIN4 NO BO 1 PRG.BIN4 NO BO01 | 4 PRG.BIN4 NO BO04 | 46 PRG.BIN4 NOBO46 | 76 PRG.BIN4 NOBO76	Binary track 4 of the programmer to binary output like alarm value 1	
12		***BINARY FLAGS*** (Function of binary flags in display)						
	Q01	D ● ● ● ● ●	1 ● ● ● ● ●	5 ● ● ● ● ●	fC	0 ALARM1.NO FLG 1 ALARM1.FLG1 | 6 ALARM1.FLG6	Alarm value1 Alarm value1 not connected to Flag1 Display with Flag 1 | Display with Flag 6	
	Q02	D ● ● ● ● ●	1 ● ● ● ● ●	5 ● ● ● ● ●	fC	0 ALARM2.NO FLG 1 ALARM2.FLG1 | 6 ALARM2.FLG6	Alarm value 2 like query 1	
	Q03	D ● ● ● ● ●	1 ● ● ● ● ●	5 ● ● ● ● ●	fC	0 ALARM3.NO FLG 1 ALARM3.FLG1 | 6 ALARM3.FLG6	Alarm value 3 like query 1	
	Q04	D ● ● ● ● ●	1 ● ● ● ● ●	5 ● ● ● ● ●	fC	0 ALARM4.NO FLG 1 ALARM4.FLG1 | 6 ALARM4.FLG6	Alarm value 4 like query 1	

1 In split range mode the G control has effect on both controller outputs. If the parameter variation is not desired in a controller output, the values for G start and G end should be set equally.

2 Not for three-position controllers and split range.

3 The difference between Lx-B03-P07 and P08 is the reference value for G. The values must lie within the measuring range limits of the analog input. They can match, they can however also deviate. See examples in Section on 'Fixed value control'.

4 Only available in the loop in which the programmer was first switched. Configure additionally: PG01-P0x.

5 Display in the front require activation of the alarm management for unit: G-B10-Q01 = 1.

6 For step controllers.

7 OLDMODE = previous operation mode

8 Not for Digitric 500.

9 For Digitric 500 for scaling the analog output, when Q18 <> 0.

10 Not for Digitric 500.

11 Invalid for step controllers.

12 Changeable but changes eventually lead to faulty displays.

13 Only Protronic 550.

14 IC3 and IC4 not with Protronic 100.

Loop 2, 4 (Protronic 100: only loop 2)							function	Rem. S.96
Module	Query Param.	Response						
01							***CONTROLLER FUNCTION***	
	Q01	D	1	5	fC		Controller function	
		●	●	●		0 NO CONTROLLER	Unused	
		●	–	●		1 SINGLE LOOP	Single-channel controller	
		●	●	●		2 MASTER CONTR.	Master controller in cascade	
		●	–	●		3 SLAVE CONTR.	Slave controller in cascade (for 2 slave controllers)	
		●	●	●		6 OVERR.SL.MIN	Min. override controller adjustment	
		●	●	●		7 OVERR.SL.MAX	Max. override controller adjustment	
		●	–	●		8 MANUALSTATION	Single-channel manual station	
		●	–	●		9 SETPT.STATION	Single-channel set point station	
		●	–	●		10 RATIO STATION	Single-channel ratio station	
		●	–	●		11 POSITIONER	Single-channel positioner	1
		●	–	●		12 RAT.STAT.CASC	Ratio station in cascade (only loop 4)	
	Q02	D	1	5	fC		Controller output (not required for Q1 = 2,6,7)	
		●	●	●		1 CONTINUOUS	K = continuous	
		●	●	●		2 STEP CONTR.	S = step	
		●	●	●		3 ON/OFF CONTR.	Z = two-position	
		●	●	●		5 H-OFF-C (S+S)	D = three-position heat-o-cool (relay)	
		●	●	●		6 H-OFF-C (C+S)	D = three-position heat (cont.)-o-cool (relay)	
		●	–	●		7 SPLIT.R.(C+C)	KK = split range with 2 continuous outputs	
	Q03	D	1	5	fC		Manual characteristic (not required for Q1 = 2, 6, 7, 12)	
		●	●	●		1 M-CHAR-DIR		
		●	●	●		2 M-CHAR-INV		
		●	–	●		3 M:INV-DIR		
		●	–	●		4 M:DIR-DIR		
		●	–	●		5 M:INV-INV		
		●	–	●		6 M:DIR-INV		

Position display =

	0 %	50 %		100 %
Z=K	off			on
	on			off
D	Out2on	Out2off	Out1off	Out1on
=	Out2off	Out2on	Out1off	Out1on
KK	Out2on	Out2off	Out1on	Out1off
	Out2off	Out2on	Out1on	Out1off
S	depending on the wiring			

off = permanently off or 0/4 mA;
on = permanently on or 20 mA

B01-Q04+Q05 and module 02 to 12 as Loop 1

1 Cascade with two slave controllers and ratio station (see page 50).

Loop 3 (not Protronic 100)							Function	Rem.
Module	Query Param.	Response						
01							***CONTROLLER FUNCTION***	
	Q01	D	1	5	fC		Control function	
		●	–	●		0 NO CONTROLLER	Unused	
		●	–	●		1 SINGLE LOOP	Single-channel controller	
		●	–	●		2 MASTER CONTR.	Master controller in cascade for 2 slaves.	
		●	–	●		3 SLAVE CONTR.	Slave controller in cascade	
		●	–	●		6 OVERR.SL.MIN	Override min. override controller adjustment	
		●	–	●		7 OVERR.SL.MAX	Override max. override controller adjustment	
		●	–	●		8 MANUALSTATION	Single-channel manual station	
		●	–	●		9 SETPT.STATION	Single-channel set point station	
		●	–	●		10 RATIO STATION	Single-channel ratio station	
		●	–	●		11 POSITIONER	Single-channel positioner	
	Q02	D	1	5	fC		Controller output (not required for Q1 = 6, 7)	
		●	–	●		1 CONTINUOUS	K = continuous	
		●	–	●		2 STEP CONTR.	S = step	
		●	–	●		3 ON/OFF CONTR.	Z = two-position	
		●	–	●		5 H-OFF-C (S+S)	D = three position heat-o-cool (relay)	
		●	–	●		6 H-OFF-C (C+S)	D = three-position heat (cont.)-o-cool (relay)	
		●	–	●		7 SPLIT.R.(C+C)	KK = split range with 2 continuous outputs	
	Q03	D	1	5	fC		Manual characteristic (unnecessary for Q1 = 6, 7)	
		●	–	●		1 M-CHAR-DIR		
		●	–	●		2 M-CHAR-INV		
		●	–	●		3 M:INV-DIR		
		●	–	●		4 M:DIR-DIR		
		●	–	●		5 M:INV-INV		
		●	–	●		6 M:DIR-INV		

Position display =

	0 %	50 %		100 %
Z	off			on
	on			off
D	Out2on	Out2off	Out1off	Out1on
=	Out2off	Out2on	Out1off	Out1on
KK	Out2on	Out2off	Out1on	Out1off
	Out2off	Out2on	Out1on	Out1off
S	depending on wiring			

off = permanently off or 0/4 mA;
on = permanently on or 20 mA

B01-Q04+Q05 and module 02 to 12 as Loop 1

Note
The state correction can only be edited, after it has been integrated into the configuration in a loop.

State correction 1/2

(not Protronic 100)

Module	Query Param.	Response	Function	Rem. p.100
01			**TASK**	
	Q01	D 1 5 fC	State correction	
		● ● ● 0 UNUSED	Unused	
		● – ● 1 GAS ORIF	Gas flow (m3/h) - differential pressure method	
		● – ● 2 GAS VOLUM	Gas flow (m3/h) - volume measurement	
		● – ● 3 STEAM,ORI	Steam mass flow - differential pressure	
		● – ● 4 SATSTEAM,P	Saturated steam pressure correction	
		● – ● 5 SATSTEAM,T	Saturated steam temperature correction	
		● – ● 6 WATER ORI	Water mass flow - differential pressure	
		● – ● 7 WATER VOL	Water mass flow - volume measurement	
		● – ● 8 BOIL.LEV.	Tank water level	

	D 1 5 fC Q01 = >	Required parameters for 1	2	3	4	5	6	7	8	
P02	Qn-CALCUL Value	Qn,r Qm,r	-	Qm,r	Qm,r	Qm,r	Qm,r	-	-	
P03	dP-CALCUL Value	dP,r	-	dP,r	dP,r	dP,r	dP,r	-	-	
P04	P-atm-CALCUL Value	Patm,r	Patm,r	Patm,r	Patm,r	-	Patm,r	Patm,r		
P05	P-CALCUL Value	Pü,r	-	Pü,r	Pü,r	-	Pü,r	Pü,r	-	
P06	T-CALCUL Value	T,r	-	T,r	-	T,r	T,r	-	-	
P07	Z-CALCUL (P,r;T,r) Value	Z,r	-	-	-	-	-	-	-	
P08	RHO-CALCUL Value	RHOnr	RHOnr	-	-	-	-	-	-	
P10	P-MIN Value	Pmin	Pmin	Pmin	Pmin	-	Pmin	Pmin	Pmin	
P11	P-MAX Value	Pmax	Pmax	Pmax	Pmax	-	Pmax	Pmax	Pmax	
P12	T-MIN Value	Tmin	Tmin	Tmin	-	Tmin	Tmin	Tmin	-	
P13	T-MAX Value	Tmax	Tmax	Tmax	-	Tmax	Tmax	Tmax	-	
P14	RHO-MIN Value	Rho min	Rho min	-	-	-	-	-	-	
P15	RHO-MAX Value	Rho max	Rho max	-	-	-	-	-	-	
P16	DISTANCE Value	-	-	-	-	-	-	-	HAB	
P17	T-REFERENC Value		-	-	-	-	-	-	Tvgl	1
Q18	0 OVERPRESSURE 1 ABS. PRESSURE	x x	x x	x x	x x	- -	x x	x x	x x	
P20	COMP.COEF Z1 Value	Z(1)	Z(1)	-	-	-	-	-	-	
...	to	...	...	-	-	-	-	-	-	
		1	2	3	4	5	6	7	8	
P28	COMP.COEF Z9 Value	Z(9)	Z(9)	-	-	-	-	-	-	

State correction 1/2

(not Protronic 100)

Module	Query Param.	Response	Function	Rem. p.100
	Q29	0 LINEAR 1 SQR	- - - - - - - - No square rooting in the transmitter or in AIxy Square rooting in transmitter or in AIxy	
	P30	RANGE LO Value	0 0 0 0 0 0 0 Value lower range value of the corrected signal corresponds to 0/4 mA for analog output	0 = pre-set
	P31	Value RANGE HI	upper range value of the corrected signal corresponds to 20 mA for analog output	
	Q32	0 NO DIM. 1 DIM USER DIM. 7 DIM = m³/h 8 DIM = kg/h 9 DIM = t/h | n	Dimension for AI01 No dimension 4-digit, freely definable Q33 m³/h kg/h t/h | see AI-Bxy-Q03	
	P33	DIMENSION - - - -	Editing of the user dimension if query 32 = 1	

02 ROUTING AI

(Routing of the analog inputs to the state correction)

	D	1	5	fC		
Q01	●	–	●		1 IFC Q=AI01	Flow measured value, differential pressure when B01-Q01 = 8
	●	–	●		2 IFC_Q=AI02	AI01
	●	–	●		|	AI02
	●	–	●		44 IFC_Q=AI44	|
	–	–	●		|	AI44
	–	–	●		74 IFC_Q=AI74	|
						AI74
Q02	D	1	5	fC		Pressure measured value (P) in bar
	●	–	●		0 IFC P CALC	Not used P = Pr
	●	–	●		1 IFC_P=AI01	AI01
	●	–	●		2 IFC_P=AI02	AI02
	●	–	●		|	|
	●	–	●		44 IFC_P=AI44	AI44
	–	–	●		|	|
	–	–	●		74 IFC_P=AI74	AI74
Q03	D	1	5	fC		Temperature measured value (T) in °C
	●	–	●		0 IFC T CALC	not used T = Tr
	●	–	●		1 IFC_T=AI01	AI01
	●	–	●		2 IFC_T=AI02	AI02
	●	–	●		|	|
	●	–	●		44 IFC_T=AI44	AI44
	–	–	●		|	|
	–	–	●		74 IFC_T=AI74	AI74
Q04	D	1	5	fC		Density measured value in kg/m³
	●	–	●		0 IFC DENS=CALC	not used Rho = Rhonr
	●	–	●		1 IFC_D=AI01	AI01
	●	–	●		2 IFC_D=AI02	AI02
	●	–	●		|	|
	●	–	●		44 IFC_D=AI44	AI44
	–	–	●		|	|
	–	–	●		74 IFC_D=AI74	AI74

03 ROUTING AO

(Routing of the result of the state correction on analog output)

	D	1	5	fC		
Q01	●	–	●		0 FC1=NO AO	State correction on analog output
	●	–	●		1 FC1=AO01	No output
	●	–	●		|	AO01
	●	–	●		43 FC1=AO43	|
	–	–	●		|	AO43
	–	–	●		73 FC1=AO73	|
						AO73

1 Up to version 3.4.0. Afterwards replaced by T-MIN = T-MAX = Tvgl or direct measured values. Routing ZKx-B02-Q03. Then T-MIN unequal to T-MAX.

Abbreviations and terms

Index "r" for "calculated values" (values for defining orifice)

Qv	Operating volume flow in m^3/h
Qn	Volume flow in standard condition in m3/h
Qm	Mass flow in standard condition t/h
P	in absolute bar or overpressure (depending on the transmitter)
Pr	in absolute pressure
T	Temperature in °C
Pn	Standard pressure 1.0135 bar
Tn	Standard temperature 273,15 K = 0 °C
RHO	Density in kg/m^3
RHO-MIN	Correction range for RHO
RHO-MAX	Correction range for RHO
Patm	atmospheric pressure in absolute bar
Pr	in absolute bar
Zn	Real gas factor for Pn and Tn (compressibility figure)
Pmin/Pmax	Correction range for P (according to transmitter)
Tmin/Tmax	Correction range for T
P20...28	Real gas factors (factory setting 1.00) (compressibility figure)

	Tmin	Tmitte	Tmax
Pabsmin	P20	P23	P26
Pabsmitte	P21	P24	P27
Pabsmax	P22	P25	P28

HAB	Nozzle spacing in mm produces water level in mm.
Tvgl	Temperature of the reference column in °C (up to version 3.4.0. After that replaced by T-MIN = T-MAX = Tvgl or direct measured value. Routing ZKx-B02-Q03. Then T-MIN unequal to T-MAX).

Notice
The programs can only be edited, when the programmer has been activated as set point source in a loop (Lx-B05-Q08 = 1).

Programmer							Function	Rem.
Module	Query Param.	Response						
01							*PROGRAMMER*	
	1	D ●	1 ●	5 ●	fC	0 PROGR1=OFF	Program 1 Not activated, without function	
		●	●	●		1 PG1-START SP0	Start at programmed value	
		●	●	●		2 PG1-START PV	Start at instantaneous value	
	|						Program 2 to 9	
	10	D ●	1 ●	5 ●	fC	0 PROGR10=OFF	Program 10 Not activated, without function	
		●	●	●		1 PG10-START SP0	Start at programmed value	
		●	●	●		2 PG10-START PV	Start at instantaneous value	

Fault messages

Unit fault messages

When reading or writing in the non-volatile flash memory (all controllers) or in the memory card (only Protronic 500/550), faults can occur. These are reported in the upper text line of the display as

!Fault ....

Instead of the four dots, the fault number of the particular fault will be stated (4-digit). Table 10 gives information on the cause and eventual remedy of the faults involved. The input "xy" in a fault number refers to Table 11 on page 99, which provides more exact details on the faults.

It can happen that a fault cannot be remedied, despite the information provided for remedy. In such case, the manufacturer should be informed, supplying the following details:

- unit version,
- firmware version,
- IBIS_*R*/IBIS_*R*+ version,
- action already undertaken,
- configuration,
- project and
- fault number.

Fault messages

Fault number	Fault description	Remarks on fault remedy
32	faults have occured during download of a configuration	reset unit to factory setting and restart the downloading of the configuration after approximately 2 minutes
3100	insufficient flash memory available for storing a configuration	reset unit to factory setting and restart the downloading of the configuration after approximately 2 minutes or reduced configuration and restart the download exercise
3200 3201	internal computing process is incorrect	inform the manufacturer
40xy	a fault has occured during the storage of back documentation information	after approximately 2 minutes of configuration without reverse documentation information, restart the download
41xy	a fault has occured during the storage of the project head	inform the manufacturer
42xy	a fault has occured during the storage of the list configuration	inform the manufacturer
43xy 44xy	a fault has occured during the storage of the project version data	inform the manufacturer
45xy	a fault has occured during the storage of the hardware configuration	inform the manufacturer
46xy	a fault has occured during the storage of the self-tuned variables.	inform the manufacturer
47xy		
48xy	a fault has occured during the storage of changes made on the online parameters	inform the manufacturer
49xy		
60xy	the reverse documentation cannot be read	reset unit to factory setting and restart the downloading of the configuration again, if the error persists, let the Flash-memory be exchanged by the manufacturer

Fault number	Fault description	Remarks on fault remedy
61xy	the project head cannot be read	as 60xy
62xy	the list configuration cannot be read	as 60xy
63xy	the project version data cannot be read	as 60xy
64xy		
65xy	the hardware configuration cannot be read	as 60xy
66xy	the self-tuned variables cannot be read	inform the manufacturer
67xy	the free configuration cannot be read	as 60xy
68xy	the changes in the online parameters cannot be read	as 65xy
69xy		
80xy	general hardware fault	let manufacturer conduct maintenance
81xy	flash memory cannot be initialized completely	as 65xy
82xy	due to grave fault in the flash memory, this has been completely deleted	as 60xy
83xy 84xy 85xy 86xy 87xy		

Tab. 13 Instrument error messages

1 During download of a configuration, it can take up to 2 minutes until the data is stored in the failproof flash memory. In case of power failure during this time, not all configuration parts will be found upon starting.

Fault legend

xy	**Fault description** (refers to flash memory in unit)
0	CRC error when reading a block
1	no free block is found during writing
2	an invalid block number is output during a function call-up
3	a much bigger address offset is stated during a function call-up
4	the flash memory is faulty
5	the flash memory is not available
6	(memory) block not found
7	the stated files were not found
8	(memory) block cannot be deleted
9	power failure
10	power failure during initialization
20	(memory) block content cannot be deleted
21 - 24, 29	incorrectible errors have been made during writing
26	type of memory card invalid
27, 35	no memory card found
28	write protection for memory card active
30	no free storage space available
31 - 34, 36, 39	internal fault
37	read file on memory card is faulty
38	required utility is not available

Tab. 14 Fault legend

Fault messages in the controller self-tune mode

The fault is output in the form

S.Par.Err.X

Here is **X** the fault numbers 1 to 5:

Fault number	Faulty behaviour	Recommendation
1	**general errors** the conditions for a fault-free processing of the self-tune mode are not provided, however, it cannot be clearly determined, if there is any faulty behaviour	restart the self-tuning exercise
2	***rauschband*** the *rauschband* determined by the unit itself at the beginning of self-tuning has turned out to be too small in the course of the self-tuning exercise, this is then the case when interferences greatly increase during self-tuning	restart the self-tuning exercise
3	**change of control variable** to be able to analyse the controlled system behaviour, there is too little movement in the controlled system	the definable output variable change should be increased
4	**time overflow** in the controlled system, no movement was determined for a period of 10 hours	the measured value wiring and configuration should be checked for errors, if there are no errors, then the controlled system cannot be identified, due to a too great dead time
5	**no relaxation** within a time window, no relaxation of the controlled system can be perceived, a stationary condition of the controlled system is however necessary for identification	exit the self-tune mode and switch the control loop to "Manual", wait until the controlled systems no longer show any "visible" movements, restart the self-tuning exercise
6	only for Selftune2	

Tab. 15 Error messages of the controller self-tune mode

Error messages of the input/output level

On switching on the supply voltage, the unit checks the calibration data for the inputs and outputs. If during this, errors are discovered, these are output in clear text.

Error text	Error description	Remarks for error remedy
E_AI01CONF 3	at least one calibration of AI01 has infringed upon the lower alarm threshold only the values required according to configuration AI01-Q01 are checked here	configured mA- or thermocouple input, the signal transmitters can be recalibrated by way of the front panel, in case of Pt100 input, the calibration must be made by the manufacturer
E_AI01CONF 4	at least one calibration value of AI01 has infringed upon the upper alarm threshold only the values required according to configuration AI01-Q01 are checked here	as E_AI01CONF 3
E_AI02CONF 3	at least one calibration value of AI02 has infringed upon the lower alarm threshold	since AI02 can only be configured as mA input, it can be recalibrated via the front panel with the appropriate signal transmitters
E_AI02CONF 4	at least one calibration value of AI02 has infringed upon the upper alarm thershold	as E_AI02CONF 3
E_BIOCONF 3	at least one calibration value from BIO01 to BIO04 has infringed upon the lower alarm threshold	the calibration must be done by the manufacturer
E_BIOCONF 4	at least one calibration value from BIO01 to BIO04 has infringed upon the upper alarm threshold	as E_BIOCONF 3

Tab. 16 Error messages of the input/output level

Index

A

B

C

D

E

F

G

H

I

L

M

N

O

P

R

S

T

U

W

Z

General menu overview

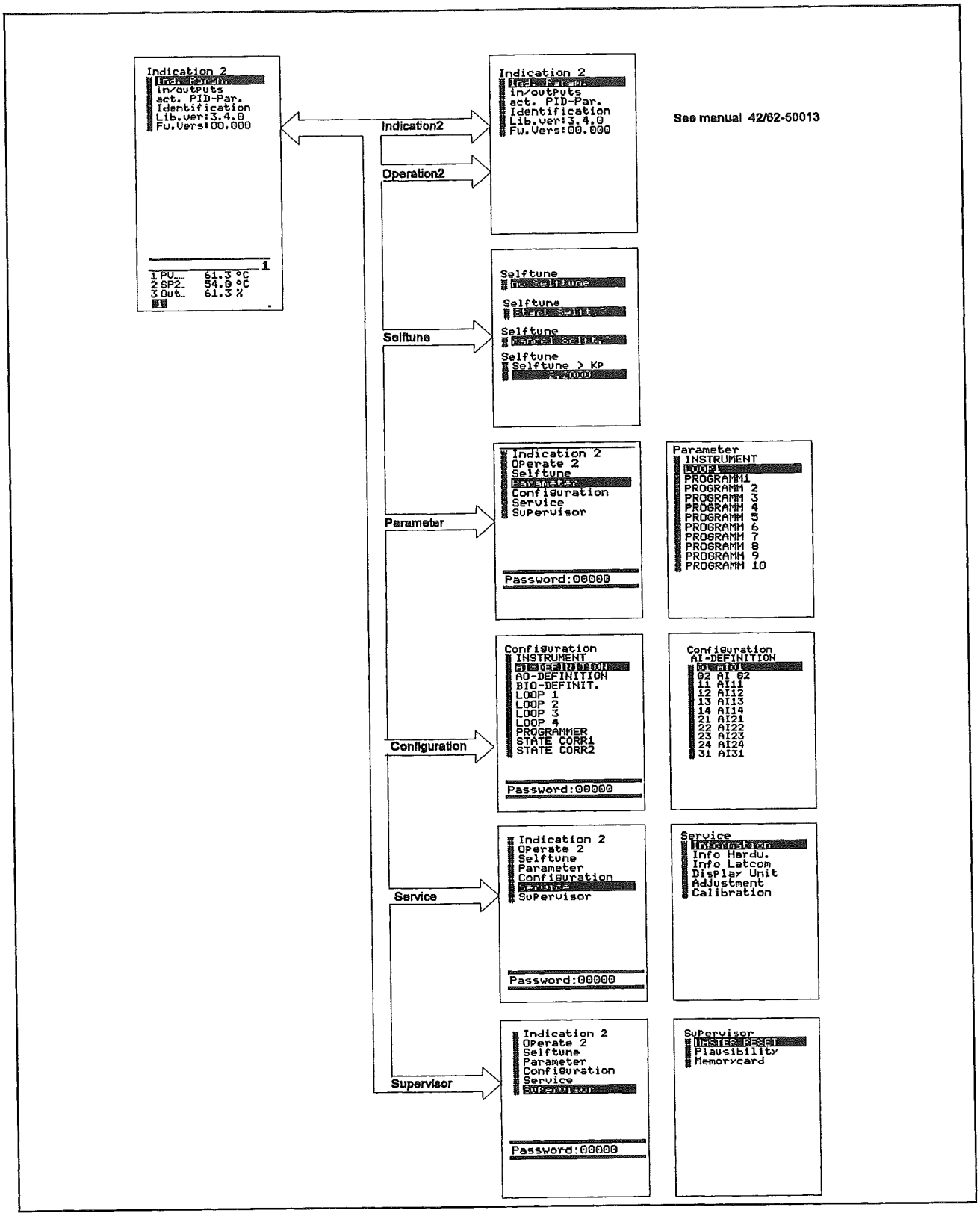


Fig. 95 General menu overview

Subject to technical changes.

ABB

ABB Automation Products GmbH
Höseler Platz 2
D-42579 Heiligenhaus
Tel. +49(0)20 56 12 - 51 81
Fax +49(0)20 56 12 - 50 81
http://www.abb.com

Subject to technical changes.
Printed in the Fed. R. of Germany
42/62-50012 EN Rev. 06
Edition 03.01

User Manual

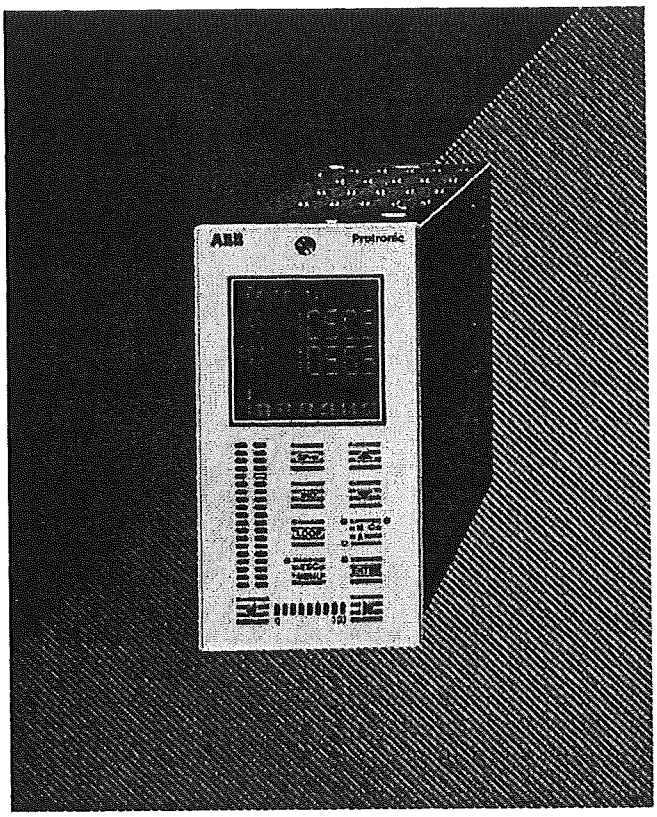
42/62-50013 EN

ControlIT

Process controller P100/500

(Protronic 100/500)
Versatile controller with powerful PLC functionality,
extensible with hardware modules

IndustrialIT enabled



PROFIBUS

ABB

Process controller P100/500 (Protronic 100/500)

Versatile controller with powerful PLC functionality, extensible with hardware modules

User Manual

Document No. 42/62-50013 EN

Date of issue: 07.03
Revision: 05

Manufacturer:

ABB Automation Products GmbH
Hoeseler Platz 2
42579 Heiligenhaus
Germany

Tel: +49 2056 - 12-5181
Fax: +49 2056 - 12-5081

Content ..... Page

Preface

The documentation included in the P100/500 (Protronic 100/500) package consists of the following parts:

Commissioning Instructions P100/500 (Protronic 100/500)	42/62-50011
Configuration Instructions P100/500 (Protronic 100/500)/ D500 (Digitric 500)	42/62-50012
User Manual P100/500 (Protronic 100/500)	**42/62-50013**

Also available on request:

User Manual IBIS-R, List Configuration	42/62-50020
User Manual IBIS-R, Free Configuration	42/62-50030

The User Manual in this manual include all important information for menu-guided configuration and parameterization of the device. All necessary entries can be made locally via the device's front panel operating elements, or remotely from a PC with the IBIS-*R* configuration and parameterization program.

The configuration options of the device menu are also available in the IBIS-R program. The description of this program is beyond the scope of this user manual.

Delivery state

The devices are delivered off stock and without customized settings. The factory setting is adjusted to the following functions:

- Single-loop continuous controller
- Input: 4...20 mA
- Output: 4...20 mA
- Language: German

The factory setting and its definitions are described in detail in this user manual.

Customized versions are available upon special request.

Switching on the device

Upon power-on or return of the power after power failure the device automatically performs a selftest of the internal functions. The progress of the test program can be seen on the display. Usually, no special attention has to be paid to this display.

1 Important information in advance

1.1 Symbols

To ensure optimum use of these user manual and a safe use of the assemblies during commissioning, operation and maintenance, please observe the following explanations regarding the symbols used.

Explanations of symbols used.

	**Warning**	Indicates a risk or potentially hazardous situation which, if not avoided, could result in death or serious injury.
	**Caution**	Indicates a potentially hazardous situation or alerts against unsafe practices which, if not avoided, may result in injury of persons or property damage.
	**Notice**	Indicates a potentially harmful situation which, if not avoided, may result in damage of the product itself or of adjacent objects.
	**Important**	Indicates useful hints or other special information which, if not observed, could lead to a decline in operating convenience or affect the functionality.

Apart from the information in these user manual you must also observe commonly valid safety and accident prevention directives.

If the information contained in these user manual is not sufficient for an application our service organisation will gladly be at your disposal for further information.

Please read these assembly and user manual carefully prior to installation.

1.2 Conventions used in these user manual

<Enter>	Keys on the device, with their labels
<Ind>, <Loop>	
<Menu>, <Enter>	Keys available at all times for operator actions.
P-W	Flashing texts or text fragments from the digital display
P-W, A	Texts or text fragments from the digital display
/8/	Reference to numbers in Fig. 3-1
M○, A○, C○	Light-emitting diodes (LEDs) alongside the keys with the same name are lit.
Menu○, Enter○	Light-emitting diodes (LEDs) alongside the keys with the same name are lit.
M●, A●, C●	Light-emitting diodes (LEDs) alongside the keys with the same name are not lit.
Menu●, Enter●	Light-emitting diodes (LEDs) alongside the keys with the same name are not lit.
Sxt	External setpoint source
Hand	Operating mode

2 Application according to designation, general safety instructions

Important instructions for your safety!
Please read and observe.

2.1 Range of application, application according to designation

P100 (Protronic 100) is a 1-loop compact controller (2nd loop cascade and override)
P500 (Protronic 500) is a 1...4-loop compact controller.

The devices are designated for the instrumentation of single control loops and for automating small and medium-sized processes in control engneering.

For proper use it is required to observe the „Technical Data section " in the Data Sheets. You will find the technical data in the data Sheets 10/62-6.11 (P100) and 10/62-6.15 (P500).

Any other use is considered improper.

2.2 Safe operation

The technology of the **devices** is state of the art.

The devices are constructed and tested according to EN 61 010-1 = IEC 1010-1 = DIN VDE 0411 Part 1 "Safety Requirements for Electronic Measurement Apparatus" and have left the factory in a safe condition. To maintain this state and guarantee hazard-free operation, all safety instructions in this manual headed by "Warning, Caution or Notice" must be observed.
Otherwise, personnel might be endangered and the mass flow meter itself or other devices and equipment could be damaged.

Prerequisites for safe operation.

These user manual contain important information about the safe and proper operation of the equipment. Observing these instructions is mandatory for safe operation.
Failure to observe the instructions can cause hazards for life and limb of the user respectively property damages at the devices or the entire system.

Proper and safe operation of the mass flow meter requires proper transportation and storage, installation and commissioning by qualified personnel, operation within its design limits, and careful maintenance observing all information in these user manual.

Qualification of personnel

Only personnel familiar with the installation, commissioning, and maintenance of similar devices and having the required qualifications for their tasks are allowed to work on the device.

Operator

The operator of the plant is fully and solely responsible for proper and workmanlike and, thus, safe operation.
The operator must make sure that the user manual have been understood by the target audience.
A copy of the user manual must be stored in a suitable place at the usage location of the device at all times.
Read these user manual prior to commissioning, decommissioning, maintaining, or repairing a device.

National regulations

The regulations, standards, and guidelines mentioned in these user manual are valid for Germany. When using the devices in other countries the appropriate and valid national regulations must be observed.

Notes and regulations to be observed

Observe
- the contents of these user manual and references to other documents and their contents
- the safety regulations affixed to the device
- the appropriate and valid safety instructions for the construction and operation of electrical systems
- the regulations and directives regarding explosion protection.

During operation

The operator must commission a qualified electrician to inspect and examine the system at defined intervals. The examination intervals must be chosen in such a way that any damages that can be expected can be recognised in time.
The examinations must be performed at least every three years.
The examinations can be skipped if the electrical system is continuously monitored by a responsible engineer

Duties of the operator:
- maintain the system in proper condition
- continuously monitor the system
- execute required maintenance and repair work immediately
- carry out required safety measures

If the devices are used in areas where dusts can cause explosion hazards, you must clean the devices frequently.

Use genuine spare parts, only.

3 Operation

3.1 Operating elements on the P100/500 front panel

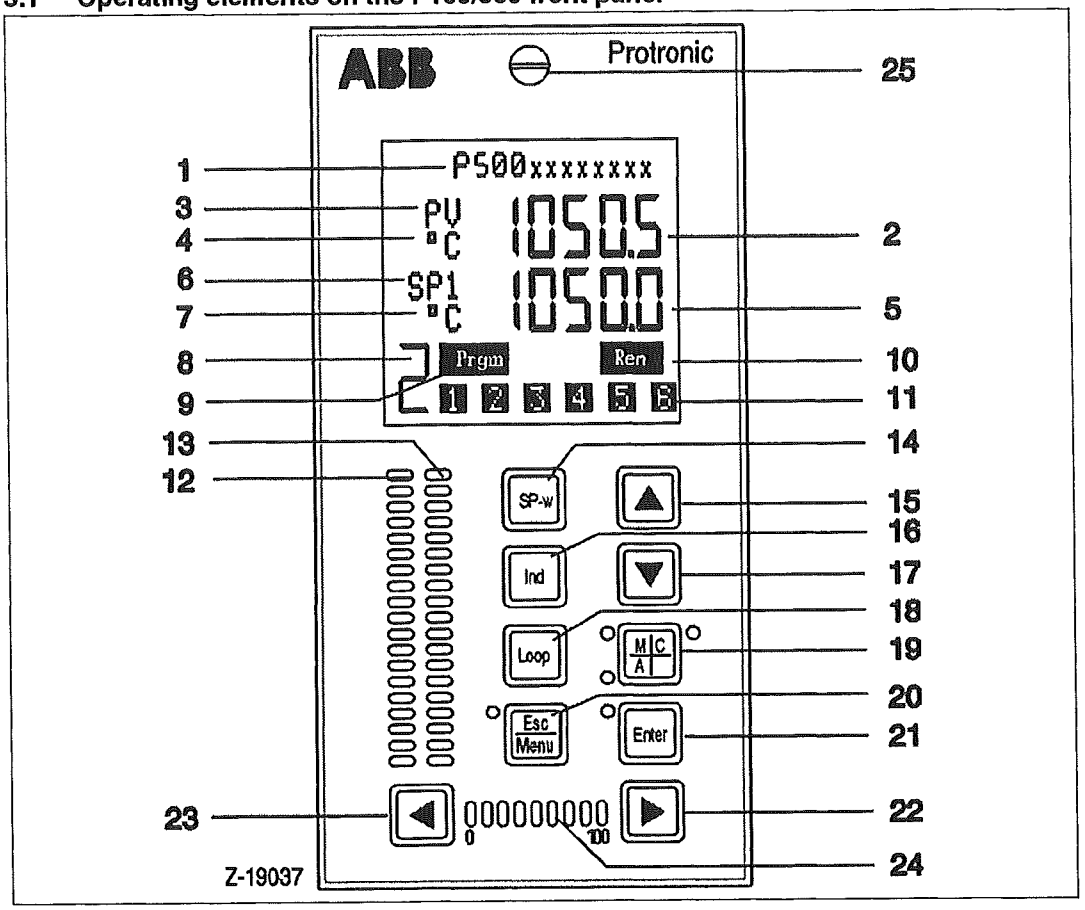


Fig. 3-1 Front panel P100/500 (Protronic 100/500)

1 Text line
2 Digital indicator for process value PV
3 Designation of the process value
4 Dimension of the process value
5 Digital indicator: indicates setpoint SP in automatic mode and output value OUT in manual mode

6 Designation of the indicated value
7 Dimension of the value indicated value
8 Number of the control loop displayed, interchanges with display „A" if alarm is output
9 Indicator for programmer activity
10 Remote control indicator

11 Configurable binary messages (flags)
12 Analog display for controlled variable PV
13 Analog display for set point SP
14 Setpoint changeover (see chpt. „Setpoints")
15 Button for incrementing the values indicated in 5, 6 and 7

16 Toggle switch for indicators 5, 6 and 7
17 Button for decrementing the values indicated in 5, 6 and 7
18 Loop transfer switch
19 Mode switch for selecting manual or automatic mode, with indicator LEDs
20 Button for accessing the configuration or parameterization level
The appropriate LED lights up as soon as the operator control level is exited; at the same time menu symbol is visible in the text line

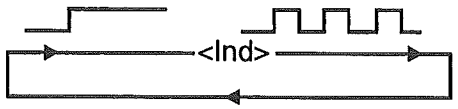
21 Button for alarm acknowledgement and confirmation of data (configuration and parameters)
22 Up button for incrementing in manual mode
23 Down button for decrementing in manual mode
24 Analog display for controller output „OUT"
25 Srew for fastening display/keypad

The numbers of the individual control and display elements are used consistently throughout the device documentation.

3.2 LC-Display

The values seen in the "2nd line" column of the table below can be accessed in two different ways:

1. From left to right:
   Press <Ind> button (several times).
2. From right to left:
   Press and hold <Ind> button



Input circuit/ function		1st line	2nd line Controller								Programmer	
Fixed value (FV)		PV	SP1-SP4		Sxt	SPC	P0x	–	Err	OUT	ALi		
Multi components		PV	SP1-SP4		Sxt	SPC	P0x	–	Err	OUT	ALi		
Multiplication		PV	SP1-SP4		Sxt	SPC	P0x	–	Err	OUT	ALi		
Ratio (RPV, SR)		RPV	SR1-SR3		Rxt	SRC	P0x	SR	Err	OUT	ALi		
Ratio (PV,SR*IC2)		PV	SR1-SR3		Rxt	SRC	P0x	SR	Err	OUT	ALi		
Fixed value/Ratio	FV	RPV	SP1	SR1-SR3	Rxt	SRC	P0x	SR	Err	OUT	ALi		
(RPV, SR)	Ratio	RPV	SP1	SR1-SR3	Rxt	SRC	P0x	SR	Err	OUT	ALi	PS	PGt
Fixed value/ratio	FV	PV	SP1	SR1-SR3	Rxt	SRC	P0x	SR	Err	OUT	ALi		
(PV, SR*IC2)	Ratio	PV	SP1	SR1-SR3	Rxt	SRC	P0x	SR	Err	OUT	ALi		
Extreme value (Max, Min, PV, SP)		PV	SP1-SP4		Sxt	SPC	P0x	–	Err	OUT	ALi		
Load control – air		same as ratio											
Load control – fuel		same as fixed value											
Manual station		PV	–		–	–	–	–	–	OUT	ALi	–	–
Setpoint station		–	SP1-SP4		Sxt	SPC	P0x	–	–	–	–		
Ratio station		PV	SR1-SR3		Rxt	SRC	P0x	SR	–	–	–	PS	PGt
Positioner		PV=OUTfb	SP1-SP4		Sxt	SPC	P0x	–	Err	OUT	ALi		

Table 3-1 Grayed indicators flash. These values are only displayed, but are currently not active.

PV	Measured value (with ratio control: measured value in the quotient numerator)
SP1-SP4	Setpoints 1 to 4
SR1 - SR3	Ratio setpoints 1 -3
Sxt, Rxt	External setpoint
SPC, SRC	Computer setpoint
P0x	Programmer setpoint (indicated as P01 to P10)
IC2	With ratio control: measured value in the quotation denominator
SR	Setpoint active during ratio control (R* IC2) or (R*IC2)/(1-R)
Err	Control deviation
OUT	Controller output
OUTfb	Position feedback
ALi	Alarm limits AL1 to AL4, if enabled
Programmer:	
PS	Currently executed program segment PS
PGt	Program run time since startup

Setpoints are only indicated when they are enabled in the configuration.

Display color switchover

All Controllers P100 and P500 with a negativ display (illuminated signs on a dark background, new since July 2003) allow to switch the color of the display between red and green if the firmware of the controller is V1.206 or later. The switchover has to be done in the menu. First of all you have to navigate to any subitem of „Service/Display Unit" (if you see at the „Display Unit" you must press once „Enter").
If you are in this subitems and you press the keys <LOOP> and <IND> at once, the color will immediatelly change. The adjusted color will be stored on non volatile memory.
In the future software library 3.70 (controller firmware 1.3xx or later) the color switchover will be realised as separat item in the menu. The description for this will then be written in the configuration manual.

3.3 Alarm handling

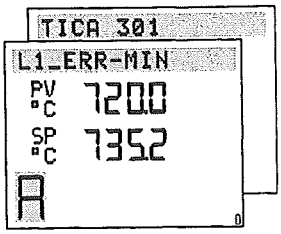


Fig. 3-2 Alarm message
z-19000

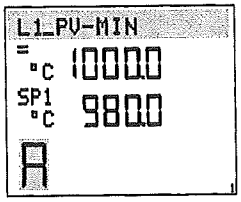


Fig. 3-3 Alarm value is set to 1000.0
z-19001

When an alarm or error occurs or an alarm value is exceeded during an operating cycle,
- a flashing "A" appears in the bottom right corner of the display,
- the error or alarm source is indicated in the first line of the display instead of the TAG name,
- the <Enter> LED is lighted.

Note

Unconfirmed operating instructions displayed in the text line have priority over error codes. As long as the operating instruction is still unconfirmed, the alarm is only indicated by the flashing "A". Alarm acknowledgement is not possible in this situation!

Displaying the exceeded alarm value

Press <Ind> to display the alarm value.

Acknowledging the alarm

press <Enter> (standard configuration):

If there is no other alarm:
The display is reset and the normal values are indicated.

The LED is extinguished, whether the alarm is still active or not.

If there are other alarms
More alarms are indicated in the same way as described above and have to be acknowledged individually.

3.4 Channel switching

If several controllers are configured in one device, <Loop> can be used to switch the control cycles. There are up to 4 Loops (P100 max. 2 loops).

3.5 Automatic mode (A)

Possible operator actions

When the controller is switched over from manual to automatic mode, the active setpoint is seen on the digital indicator. Other values can be selected by pressing the <Ind> button.

<M/A/C>	Switch over from manual to automatic mode
<SP-w>	Switch over the setpoint (if configured)
<▼> <▲>	Increment/decrement the setpoint
<Menu>	Switch over to another menu level

3.6 Manual mode (M)

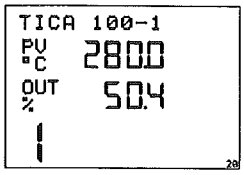


Fig. 3-4 Output OUT is indicated
z-19020

The functions of the < ▲> and <▼> buttons are defined either through configuration or, in case of the step controller, through the appropriate wiring. Usually, a more critical state - e.g. a higher furnace temperature - is reached by pressing the < ▲> button.

After the controller has been changed over from automatic to manual mode, the output variable OUT is shown by the digital indicator. Other values can be selected by pressing the <Ind> button.

In the case of controllers with double output (split range or heating-off-cooling) the display 0...100% corresponds to the full output range of both outputs.

Example:
Heating-off-cooling (with normal characteristic curve)
OUT = 0 % corresponds to 100 % cooling
OUT = 50 % corresponds to 0 % cooling and 0 % heating
OUT = 100 % corresponds to 100 % heating

Possible operator actions

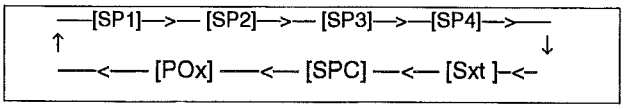
<▶> <◀>	Increment/decrement the output signal Press and hold <Enter>, additionally press <◀>: control output jumps to end value -5 % Press and hold <Enter>, additionally press <▶> control output jumps to end value +105 %
<▼> < ▲>	SP indicator: increment/decrement the setpoint
<M/A/C>	Switch over between manual, automatic mode, cascade
<SP-w>	Switch over the setpoint (if configured)
<Menu>	Select another menu level

3.7 Setpoints

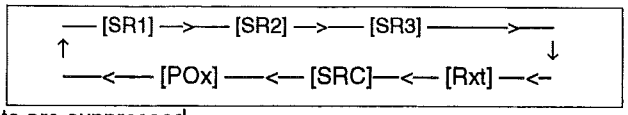
The <SP-w> button can be used to toggle between several setpoint sources, provided that the controller has been configured accordingly.

Possible setpoint sources are:
- setpoints SP1 to SP4 (or ratio setpoints SR1 to SR3) that can be selected on the device by pressing the < ▲> or <▼> button or
- an external setpoint Sxt (Rxt) via analog input
  or
- a computer setpoint SPC (SRC) via serial interface
  or
- a programmer with 10 programs P01 to P10

Display in field /6/:



For ratio control:



Unconfigured setpoints are suppressed.

Pressing the <SP-w> button will call up the current setpoint for display by the digital indicator, independent of the number of available setpoints.

The setpoint is indicated immediately, but first flashes and becomes active with a delay of 3 seconds. This means that only the last setpoint selected becomes active when the setpoints are switched over quickly.

3.8 Ratio controller

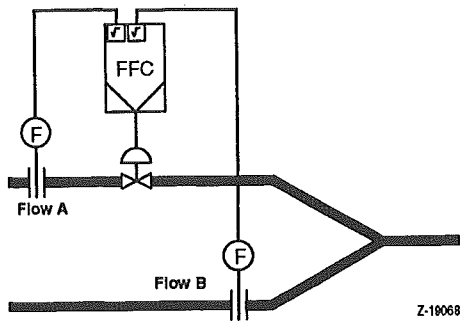


Fig. 3-5 Ratio control
z-.19068

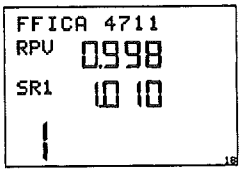


Fig. 3-6 Display RPV and SR1, SR1 is adjustable
z-19018

The ratio controller controls

$$RPV(\text{ratio process value}) = SR(\text{set ratio}) = \frac{FlowA}{FlowB}$$

or, depending on the configuration,

$$RPV = SR = \frac{FlowA}{FlowA + FlowB}$$

The ratio controller can output the actual ratio to an analog output (0/4...20 mA) if configured accordingly.

When the RPV and SR displays are configured, the ratio setpoint is indicated in the fields /5/, /6/ and /7/ of the digital indicator and can be set.

If configured accordingly, several setpoint sources (SR1 to SR3, Rexternal or program generator) can be selected by pressing the <SP-w> button.

The measured actual ratio is indicated in the fields /2/, /3/ and /4/.

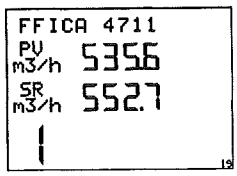


Fig. 3-7 Process value PV= flow A and SP = setpoint flow A
z-19019

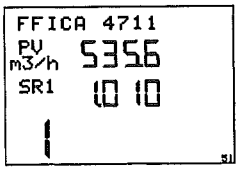


Fig. 3-8 SR1 is adjustable
z-190051

When the PV and SP displays are configured, the calculated setpoint of flow A is indicated in the fields /5/, /6/ and /7/.

The fields /2/, /3/, /4/ indicate the measured actual value of flow A.

Press the <Ind> button to call up the SR1value in the display fields (/5/, /6/, /7/) and then change it.

3.9 Programmer

A programmer can be configured in the controller. Up to 10 different programs with 15 segments each can be saved. Refer to „Configuration instruction" 42/62-50012 for details about setting the values.

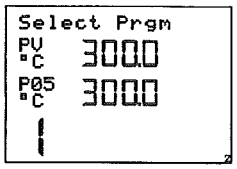


Fig. 3-9 Program has been selected, but not yet started
z-19002

3.9.1 Selecting the program

If the programmer is configured, the [Pxy] display can be selected by pressing the <SP-w> button. The flashing Pxy display indicates the number of the currently selected program.

Press <▲> or <▼> to toggle between up to 10 saved programs (P01 to P10).

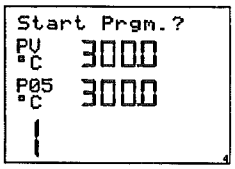


Fig. 3-10 Start ?
z-19004

3.9.2 Starting the program

Once the Pxy display has stopped flashing, the program can be started by pressing the <Enter> button. The question if the program is to be started appears for 3 second in the text line. Confirm with <Enter>. The question mark is replaced with an exclamation mark for a few seconds. If the selection is not confirmed with <Enter> within 3 seconds, the selection is ignored and program selection is enabled again.

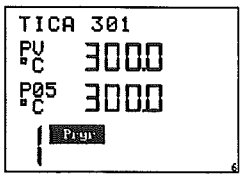


Fig. 3-11 Displaying the current program setpoint 300,0 °C
z-19006

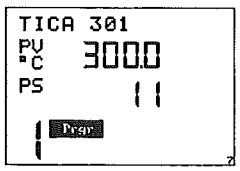


Fig. 3-12 Program is in the 11th segment
z-19007

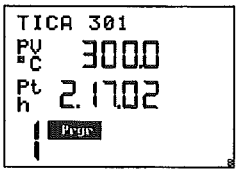


Fig. 3-13 Program run time so far 2h:17min:02s
z-19008

3.9.3 Displays during program execution

Press the <Ind> button to switch over the display, either while the program is being executed or after it has stopped. Besides the current setpoint the following items can be indicated:

- Program segment
- Program run time.

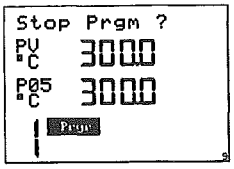


Fig. 3-14 Question: Stop program ?
z-19009

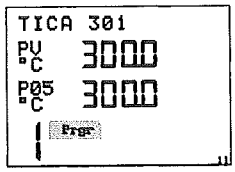


Fig. 3-15 Programmer has stopped.
z-19011 Program (Prgm) is flashing.

3.9.4 Stopping the program

When the <Enter> button is pressed again once the program is running, the question for the system stop seen here appears.

When the question is answered with yes by pressing the <Enter> button, a confirmation is shown for 3 seconds.

The program is stopped, and the [Prgm] indicator flashes. The question mark is replaced with an exclamation mark for a short time to confirm.

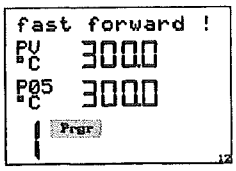


Fig. 3-16 Fast forward indication
z-19012

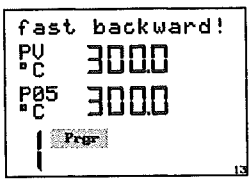


Fig. 3-17 Fast backward indication
z-19013

3.9.5 Fast forward/backward

When a program has been stopped, a fast forward/backward run can be achieved by pressing the < ▲> or <▼> button. Actuating the < ▲> button will shift the program forward to values later in time. When this button is pressed, the fast forward action is confirmed in the display.

How far the program has run forward can be derived from the setpoint, the segment indicator or the time indicator.

A fast backward run of the program can be started by pressing the <▼> button.

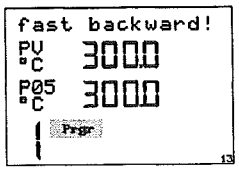


Fig. 3-18 Question: Reset?
z19014

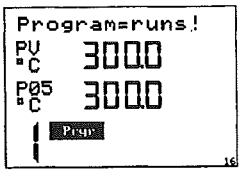


Fig. 3-19 During running program switching
z19016 to other setpoints is not possible

3.9.6 Resetting (cancelling) the program

If a program is restarted after it has been run down completely, it starts automatically in the 1st segment. No reset is required in this case.

A stopped program ca be reset or cancelled by pressing the <SP-w> button.

If the question is answered with yes by pressing the <Enter> button within 3 seconds, the program is reset to the start. The message "Reset!" appears for a short time.

If the operator attempts to switch during a running program to another setpoint (e.g. SP1) by actuating the <SP-w> button, the warning "Program runs" appears in the display for 3 seconds, see Fig. 3-19.

3.10 Cascade control

3.10.1 Cascade with one slave controller

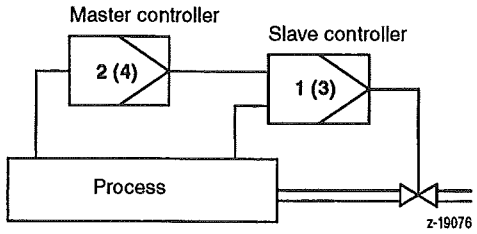


Fig. 3-20 Cascade with a slave controller

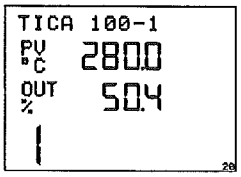


Fig. 3-21 Slave controller TICA 100-1 display, Controller output in display
(z-19020)

Cascade operation

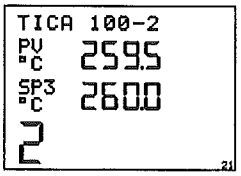


Fig. 3-22 Master controller TICA 100-2
(z-19021)

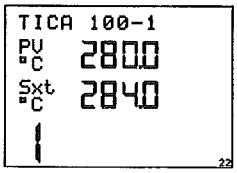


Fig. 3-23 Slave controller TICA 100-1
(z-19022)

Operating mode switching
Switching is always in the sequence below:

– [Man M] —> [Auto A] —> [Cascade C] —
↑ ↓
←

Manual operation applies only to the slave controller. Both in manual and automatic mode the master controller is always synchronised in such a manner that the switchover can take place smoothly.

When switching, the selected operating mode does not come into effect until 3 s have elapsed since the last key press.

At the same time as the operating mode is changed, the display also switches to the more important loop. It is always possible to switch manually to the other loop.

Manual	→ automatic	on Loop 1
Automatic	→ cascade	on Loop 2
Cascade	→ manual	on Loop 1
Cascade	→ automatic	on Loop 1

OUT always shows the actual output to the final control element or the final control element position reported back.

By switching from automatic to cascade the slave controller switched to **external set point**, the master controller's output. The transition from automatic to cascade is performed smoothly as the master controller's output is synchronised in such manner that the slave controller is not subjected to any control
deviation at the moment of switchover.

When changing from automatic to cascade the system automatically switches to loop 2, the master controller.

Control actions allowed

Display	Keys/Operating mode	Master controller	Slave controller
	Manual M		
	<SP-w>	+	+
Sxt	<▲> <▼>	+	+
	<M/A/C>	operates on slave contr.	+
OUT	<▲> <▼>	–	+
	Automatic A		
	<SP-w>	+	+
Sxt	<▲> <▼>	+	+
	<M/A/C>	operates on slave contr.	+
OUT	<▲> <▼>	–	–
	Cascade C		
	<SP-w>	+	–
Sxt	<▲> <▼>	+	–
	<M/A/C>	operates on slave contr.	+
OUT	<▲> <▼>	–	–

+ operative, can be changed, – inoperative in this operating mode

3.10.2 Cascade with several slave controllers (not P100)

General

The integral controllers in a device in a cascade with several slave controllers have their own mode selector switches which are largely independent.
Thus the operation of such controllers is similar to the operation of the equivalent cascade comprising individual controllers.
For the master controller there is the additional operating mode **TRACK** in which none of the three LEDs on the <M/A/C> key is lit. This operating mode is imposed through the slave controller's operating mode and cannot be changed at the master controller.

Cascade with two slave controllers with the same set point.

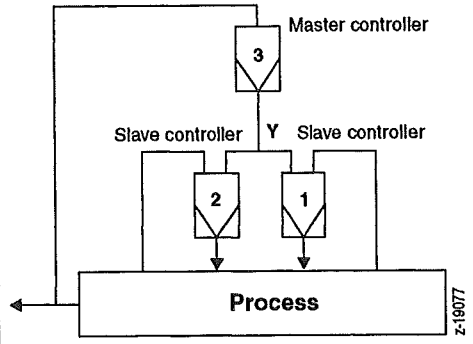


Fig. 3-24

The master controller gives the same set point to both slave controllers. The controller output (OUT = 0...100%) produces the set point range configured in the slave controllers.
The controller output is not displayed on the master controller.
Operating modes available:
Open cascade with
- Manual operation in both slave controllers or
- one slave controller in manual and one in automatic mode or
- both slave controllers in automatic mode

Closed cascade with
- both slave controllers in automatic mode
- just one slave controller in automatic mode

Important

When the first slave controller is switched to cascade the controller is switched to manual. At first the output signal altered, but this can be done manually.
Where there is a large difference between set points following message is displayed before switching over (Fig. 3-25).

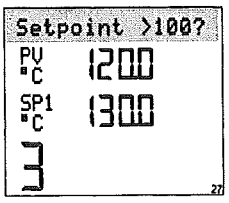


Fig. 3-25
(z-19027)

A set point jump can be avoided by:
- Resetting: first set both controllers to automatic mode and then adjust set points to equal.
- Defining a set point ramp

As long as one slave controller is still set to automatic, when the master controller is switched to automatic the following message is issued (Fig. 3-26).

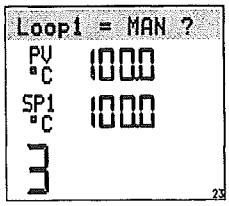


Fig. 3-26 (z-19023)

After this message is acknowledged by pressing <Enter>, the intended switchover is performed. The master controller then operates on only one slave controller.
When slave controllers are reset from cascade to automatic the master controller retains its operating mode as long as one slave controller remains in cascade.

Operating modes

Loop 1: Slave controller 1	Loop 2: Slave controller 2	Loop 3: Master controller
Manual	Manual	Track
Automatic	Manual	Track following slave controller 1
Manual	Automatic	Track following slave controller 2
Automatic	Automatic	Track average
Cascade	Manual or Automatic	Manual or Automatic
Manual or Automatic	Cascade	Manual or Automatic
Cascade	Cascade	Manual or Automatic

Table 3-2 Track following slave controller: The slave controller's setpoint sychronises the master controller
Track average: The master controller is synchronised to the average of the slave controller's setpoints.

Cascade with two slave controllers and ratio station (not P100)

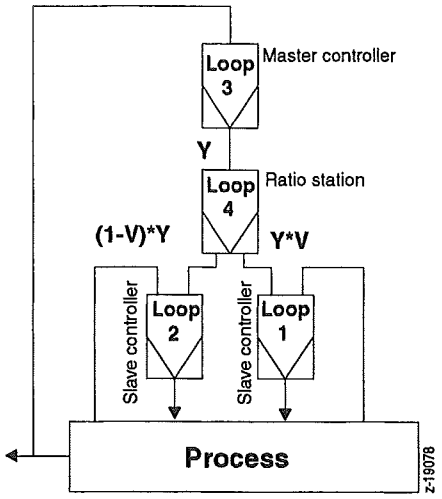


Fig. 3-27 Example:
Loop 3 temperature controller
Loop 2 air flow rate controller
Loop 1 gas flow rate controller

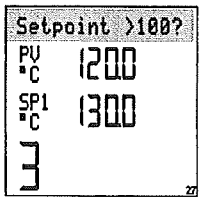


Fig. 3-28
(z-19027)

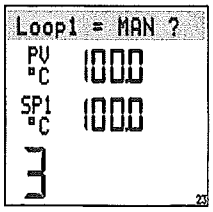


Fig. 3-29
(z-19023)

A ratio station is connected between the master controller and the slave controllers. Using an adjustable ratio, this distributes the master controller's output signal to the two slave controllers as set points.

Operating modes available:
Open cascade with
- Manual operation in both slave controllers or
- one slave controller in manual and one in automatic mode or
- both slave controllers in automatic mode

Closed cascade with
- both slave controllers in automatic mode
- just one slave controller in automatic mode

The ratio station is always in automatic mode, and the input signal apportioned to both outputs.

Important
When the first slave controller is switched to cascade the master controller is switched to manual. At first the output signal is not altered, but this can be done manually.

If the set point total is > 100%, before actually switching over the system issues the message: Fig. 3-28.

A set point jump can be avoided by:
- Resetting: first set both controllers to automatic mode and then adjust set points to equal.
- Defining a set point ramp

As long as one slave controller is still set to automatic, when the master controller is switched to automatic the following message is issued: Fig. 3-29.

After this message is acknowledged by pressing <Enter>, the intended switchover is performed. The master controller then operates on only one slave controller.

When slave controllers are reset from cascade to automatic the master controller retains its operating mode as long as one slave controller remains in cascade.

Operating modes

Loop 1: Slave controller 1	Loop 2: Slave controller 2	Loop 3: Master controller
Manual	Manual	Track not alterable
Automatic: SP = SP1i	Manual	Track: SP1i/SR
Manual	Automatic: SP = SP2i	Track: SP2i/(1-SR)
Automatic: SP = SP1i	Automatic: SP = SP2i	Track: SP1i + SP2i <100 %
Cascade	Manual or Automatic	Manual or Automatic
Manual or Automatic	Cascade	Manual or Automatic
Cascade	Cascade	Manual or Automatic

Table 3-3
SP1i = current set point on controller 1
SP2i = current set point on controller 2
Track SP1i/SR:
The master controller's output is synchronised to the value of SP1i/SR as long as this value is less than 100 %.
Track SP2i/(1-V):
The master controller's output is synchronised to the value of SP2/(1-SR) as long as this value is less than 100 %.
Track SP1i +SP2i < 100%
The master controller's output is synchronised to the value of SP1i + SP2 as long as this value is less than 100 %.

3.10.3 Combustion control (not P100)

(Load control)

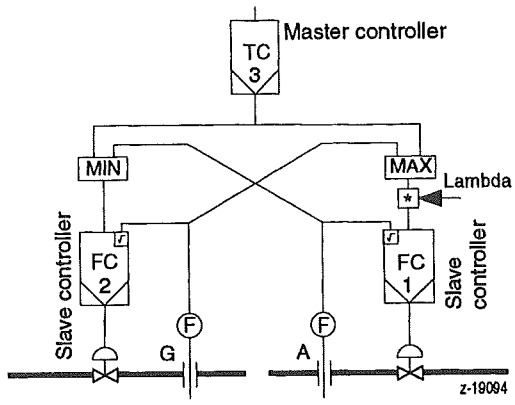


Fig. 3-30 G = gas (fuel)
A = air

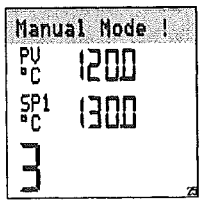


Fig. 3-31
(z-19025)

Load control ensures that as the load changes, a shortage of air is never allowed to occur.

Operating modes available:
Open cascade with
- Manual operation in both slave controllers or
- one slave controller in manual and one in automatic mode or
- both slave controllers in automatic mode

Closed cascade with
- both slave controllers in automatic mode

Some of the operation modes can be locked by changing the configuration.

The master controller cannot be switched to manual mode until the slave controllers are operating in cascade mode.

If this is not the case, the following message is issued if an attempt is made to switch the master controller from track to manual or automatic:
Fig. 3-31.

This message cannot be suppressed.

When both slave controllers are switched commonly from cascade to automatic the master controller is switched to manual. At first the output signal is not altered, but this can be done manually.

When a slave controller is switched back to manual the master controller is automatically switched to track operation.

Operating modes

Loop 1: Slave controller 1	Loop 2: Slave controller 2	Loop 3: Master controller
Manual	Manual	Track
Automatic: Fixed value A, SP= SP1i	Manual	Track: SP1i/SR
Manual	Automatic: Fixed value G, SP= SP2i	Track: SP2i
Automatic: Fixed value A, SP= SP1i	Automatic: Fixed value G, SP= SP2i	Track: A/R
Cascade	Automatic	Manual
Automatic	Cascade	Manual
Cascade	Cascade	Manual or Automatic

Table 3-4 Track:
Controller is locked in Track mode.
Track A/R:
The controller output is synchronised to the air/ratio value
A = Air
G = Gas (fuel)
R = Ratio

3.11 Override-control

(Limiting control)

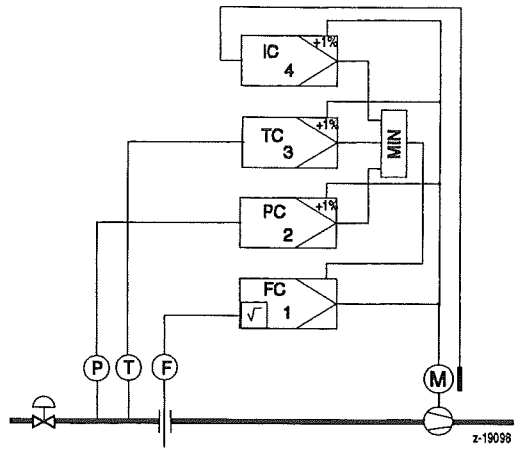


Fig. 3-32 3 override controllers (z-19098)

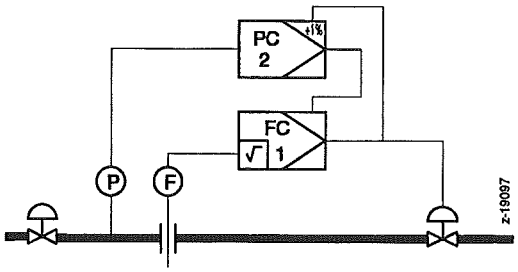


Fig. 3-33 1 Override controller
Override control of pressure P
Primary controlled variable: flow F

In override control one primary controlled variable is managed. One or more additional controllers make sure that the (limiting) set points are neither over- nor under-stepped. All the controllers here access a single final control element.

Example (Fig. 3-32):
Primary controlled variable: Flow
Limitation of: Pressure
Temperature
Current drain by the compressor drive

Operating modes available:
The mode selector switches only ever affects loop 1. Every time there is a mode change the system switches automatically to loop 1.

The operation of the limiting controllers is restricted to setting set points.

Manual operation (M◎)
The main controller is in manual mode, the limiting controller(s) is/are in automatic mode.
The limiting controllers can't be switched to manual.
Manual operation is carried out only through loop 1. The limiting controllers are not involved.

Automatic (A◎)
The main controller is in automatic and is the only unit working on the final control element.
The limiting controllers are not involved.

Cascade (C◎)
The main controller and limiting controllers are engaged.

If a limiting controller should become temporarily inoperative its set point must be altered to the limit of the range and thus rendered inoperative.

3.12 DDC-Control (Direct Digital Control)

With DDC control a supervisory computer provides for control. In case of a computer failure the Digitric controller bumplessly takes over control via interface RS 485 (MODBUS RTU) or PROFIBUS DP.
The superimposed computer writes via the bus on the variables Lx_YCOMPUTER of the respective loop X and, thus , determines the controller output. In case the superimposed computer should fail, the controller itself bumplessly takes

Possible operating modes

- ● LED is off
- ⊙ LED is flashing with 0,5 to 1 Hz
- ⊗ LED is flashing with 2 Hz
- ☼ LED is on

CR The computer is ready, i.e. there is regular data traffic via the serial interface.
M, A, C LEDs to the side of button 19 on the front panel (Fig. 3-1)

DDC configuration with manual backup mode

Operating mode	LED M	LED A	LED C	CR
Manual	☼	●	●	0
Automatic	●	☼	●	0
DDC	disabled			0
Manual	☼	●	⊙	1
Automatic	●	☼	⊙	1
DDC	☼	●	☼	1
Backup mode				
M-backup	☼	●	⊗	0
M-backup	☼	●	☼	1

DDC configuration with automatic backup mode

Operating mode	LED M	LED A	LED C	CR
Manual	☼	●	●	0
Automatic	●	☼	●	0
DDC	disabled			0
Manual	☼	●	⊙	1
Automatic	●	☼	⊙	1
DDC	●	☼	☼	1
Backup mode				
M-backup	●	☼	⊗	0
M-backup	●	☼	⊙	1

DDC configuration with cascade backup mode

Operating mode	LED M	LED A	LED C	CR
Manual	☼	●	●	0
Automatic	●	☼	●	0
Cascade	●	●	☼	0
DDC	disabled			0
Manual	☼	●	⊙	1
Automatic	●	☼	⊙	1
Cascade	●	⊙	☼	1
DDC	●	☼	☼	1
Backup mode				
M-backup	●	⊗	☼	0
M-backup	●	⊙	☼	1

No computer ready signal (CR = 0)

As long as no computer ready (CR) signal is available, the controller cannot be switched to DDC mode.

Computer ready (CR = 1)

The changeover to DDC operation is enabled. In "manual" mode LED A flashes with low frequency. In "automatic" backup mode LED M flashes with low frequency.
It is possible to switch from DDC operation to manual or automatic mode at any time.

Computer not ready

If the CR signal is not received any longer, the controller takes over control in the configured mode.
In backup mode "manual" LED A flashes with increased frequency.
In backup mode "automatic" LED M flashes with increased frequency.
It is not possible to switch over to another mode (non-DDC).
The LED of the disabled mode flashes. The LED of the active mode is lighted permanently.

3.13 Stations

3.13.1 Manual station

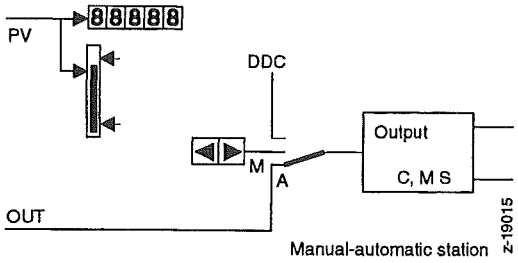


Fig. 3-34

Operating mode	LED M	A	C	CR
Manual	☼	●	●	0
DDC	disabled			0
Manual	☼	●	⊙	1
DDC	☼	●	☼	1
Backup mode				
M-backup	☼	●	⊗	0
M-backup	☼	●	⊙	1

The manual station is a controller that can be used in "manual" mode only.
All indicators that can be selected by pressing <Ind> do not display setpoints or the control deviation in this mode.
The PV indicator can indicate a measured value which can be monitored for limit values.
The operation of the manual station depends on the respective configuration.

Manual station

With the manual station the control output can be set manually. All output types of the controller are possible.

Manual/automatic station (not step controller)
In automatic mode, this station applies an externally fed continuous signal to the output. It is possible to switch over to manual mode and set the output manually.
No step output is possible.

DDC manual station (not step controller)
The DDC manual station combines the functionality of the manual station with the manual function of the DDC controller.

3.13.2 Setpoint station

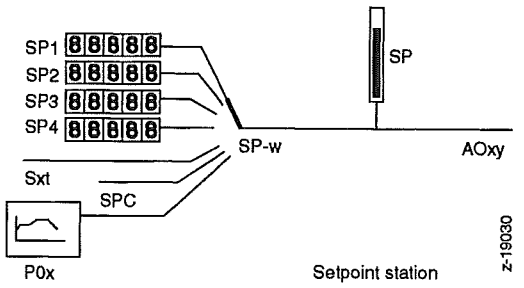


Fig. 3-35

The setpoint station generates setpoints and outputs them as 0/4...20 mA signal.

All indicators for the process value or control deviation are disabled.

The button <Sp-w> can be used to switch between different setpoint sources and the program generator, if configured.

3.13.3 Ratio station

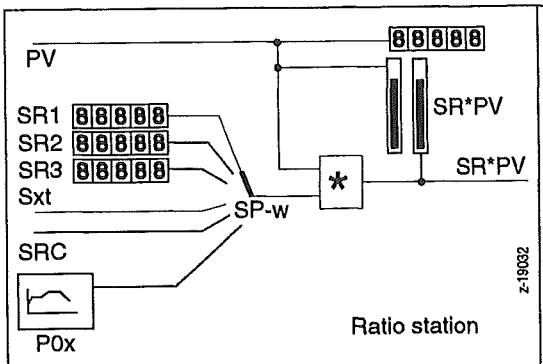


Fig. 3-36 P100

The ratio station multiplies an input signal by an adjustable ratio factor SR. The input signal is treated as a measured value. Limit values may be set.

P100

The signal (SR * input) is available as output signal.

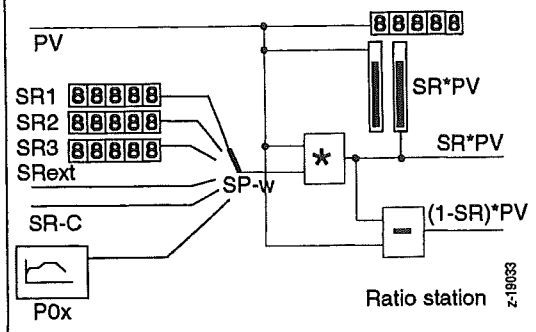


Fig. 3-37 P500

P500

The signal „SR*input" and „(1-SR)*input" are provided for output.

3.13.4 Positioner

The positioner is a motorized valve controller (step controller) which tracks the actuator position (valve position) to an external setpoint. This task requires position feedback.

The returned position is indicated on the controller as the process value PV and the position feedback OUT.

3.14 Remote control (Profibus or Modbus)

Only remote control

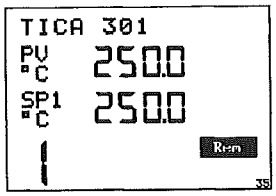


Fig. 3-38 Remote control is active
z-19035

The [Rem] indicator is active. The control buttons on the controller front panel are disabled, with some exceptions.

Possible operator actions

<Ind> Permits to switch over the display

<Menu> Accesses the configuration menu, among other reasons to start remote control.

Press <Menu> to switch to the menu level from which remote control can be disabled.

4 Error information on the display

Operating notes	Meaning	Configuration
locked by BI	Access to parameterization, configuration, service, and supervisor level is blocked through a binary input.	I-B02-Q01 I-B02-Q02
generate	After configuration the instrument is busy with the program generation.	
locked for ST	Self-tuning is blocked for this control loop. It can only be released via the configuration.	L1- B01-Q05
no adjustment possible	The selected input has not been activated for the type intended for the adjustment (e. g. no Pt100 input). This message is displayed for mA position feedback or remote transmitters fed with constant current, if the difference between start and end value is smaller than 10%.	
no adjustment	The configured module does not permit an adjustment respectively does not require an adjustment.	
local only	The instrument has only been configured for local operation. It cannot be switched to exclusive remote operation.	I-B04-Q01
remote only	The instrument has been configured for remote operation. For local operation it must be enabled via menu "Operate 2" or via the configuration.	I-B04-Q01

Table 4-1 Error information

Error message	Cause	Remedy
Error xxxx	An error occurred while processing the program. The number is intended as help for the service.	If this message does not disappear within a few seconds you can try to initiate a restart by switching off the supply voltage for approximately 60 s. If the error persists, the factory settings must be restored via the "supervisor" menu or the configuration must be reloaded via IBIS_*R* .
IP stopped!	Processing has been temporarily stopped. This error occurs during downloading.	If this message does not disappear within a few seconds after downloading you can try to initiate a restart by switching off the supply voltage for approximately 60 s. If the error persists, the factory settings must be restored via the "supervisor" menu or the configuration must be reloaded via IBIS-R .
Slot X!	When downloading a configuration the configuration request a module that is located in the instrument.	Insert the correct module in slot Xand register the module (I-B11-Q01 = 1). Note: X = 1 to 4
invalid response	The response entered may be incompatible with other existing settings. Enter is activated together with this message.	Get the invalid response on the display with <Enter> and change it.
Card fault	There was an attempt to read or write the configuration on a defective memory card.	Try again. If fault persits, use another memory card.
No M-card	There was an attempt to read or write the configuration of a memory card which is not available.	Push memory card into the terminal provided on device.
Confi. incomplete	The configuration stored on the memory card is incomplete.	
write protection	There was an attempt to write the configuration on a write-protected memory card.	

Table 4-2 Error information

5 Menu structure

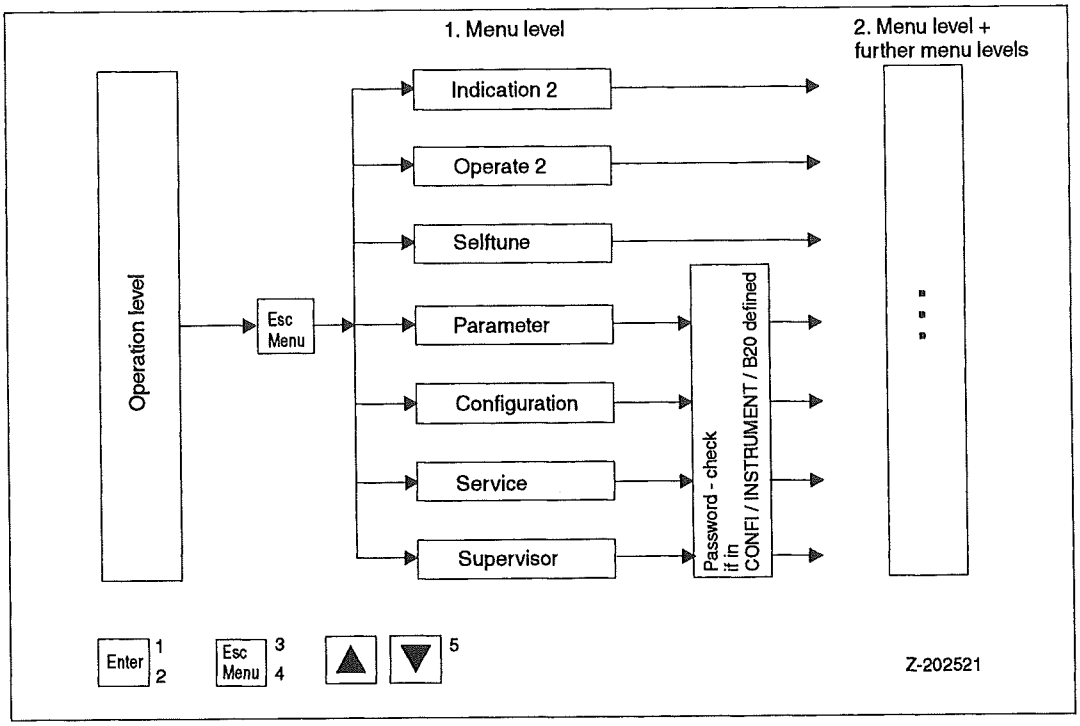


Fig. 5-1 Menu structure
1 Confirm selection, go down one menu level
2 Change or confirm input, go down one menu level
3 Go up one menu level without change(press 3 s → main operating level)
4 From main operating level to menu
5 Move sideways within one menu level

Indication 2
In this menu you can view all parameters, measuring values, and settings of the controller, but you cannot change them (see also chapter 5.1 "Indication 2" on page 26).

Operate 2
In this menu you can toggle between local and remote operation.
(See also chapter 5.2 "Operate 2" on page 28.)

Selftune
Self-tuning is enabled in the configuration menu under
CONFI / LOOP1 / B01 / Q05
After enabling it can be used without knowing a password .
(See Configuration Instruction 42/62-50012.)

Parameter
This menu contains the settings of the parameters required for the configured functionality. During parameterization the control action stays on. (See Configuration Instruction 42/62-50012.)

Configuration
This menu contains sub-menus for instrument function definition (e. g. actuator output type).
During configuration the control action is switched off (actuator outputs are frozen).
(See Configuration Instruction 42/62-50012.)

Service
This menu contains sub-menus for calibration, Adjustment, etc. (see also „Configuration Instruction" 42/62-50012).
Calibration is only required in exceptional cases. If it is not executed in an expert manner, the instrument is rendered unusable.

Supervisor
This menu contains the sub-menus: Master reset, Plausibility, and Template. (See „Configuration Instruction" 42/62-50012.)

5.1 Indication 2

Example navigation in menu „Indication 2"

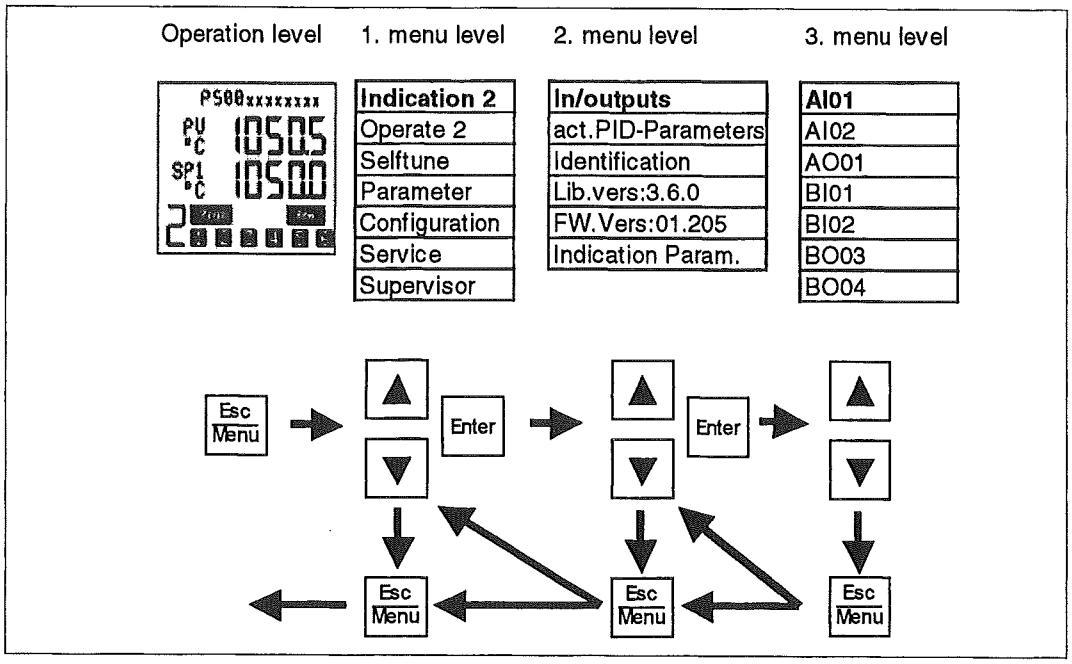


Fig. 5-2 Navigation in menu „Indication 2"

5.1.1 Inputs/outputs

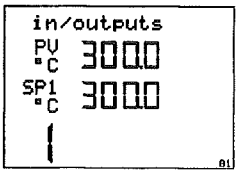


Fig. 5-3 z-19081 Start menu for displaying inputs and outputs

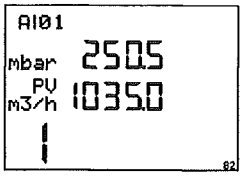


Fig. 5-4 z-19082 Analog input AI01 = 250,5 mbar

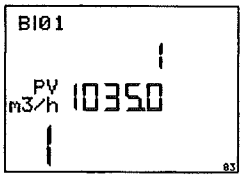


Fig. 5-5 z-19083 Binary input BIE01 = 1

In this menu you can display all binary and analog inputs and outputs used in the application.

Press <Enter> to switch to the next menu level.

The value of analog input AI01 is displayed in the first line of the selected scale.

The bottom line shows the PV. In simple control tasks with only one measuring value both values are identical, possibly with different decimal point position.

Press < ▲> and <▼> to select the desired input or output.

Currently, binary input BI01 has the value logical "1".

5.1.2 Parameter display

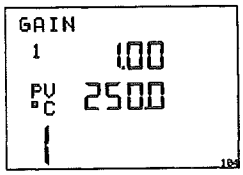


Fig. 5-6 Parameter display
z-19104

In this menu you can display all parameters of the instrument.

Parameter changes can only be performed via the password-protected parameterization menu.

5.1.3 Effective PID parameter

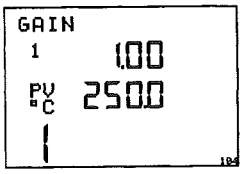


Fig. 5-7 PID parameter display
z-19104

In this menu you can display the effective PID parameters of the instrument.

Parameter changes can only be performed via the password-protected parameterization menu.

5.1.4 Identification

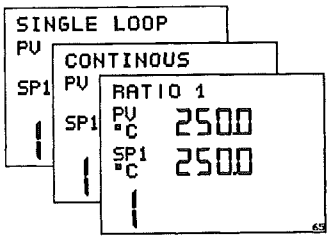


Fig. 5-8 The display shows an example of the information when called from Loop 1.
z-19065

Selecting menu option "Identification" displays the function of the selected control loop.

5.1.5 Library identification

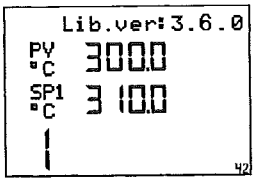


Fig. 5-9 Library identification
z-19080

The configuration is based on library 3.6.0. This information is only relevant for processing the configuration with IBIS-R.

5.1.6 Version display

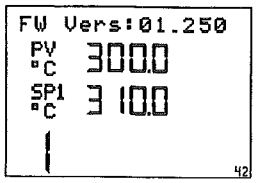


Fig. 5-10 The firmware (instrument software) has the
z-19042 Index 01.250

This is the firmware version used in the instrument itself. It may be required to know this version number when using the IBIS-R PC software.

5.2 Operate 2

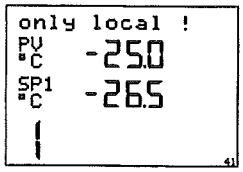


Fig. 5-11 Not intended for remote operation
z-19041

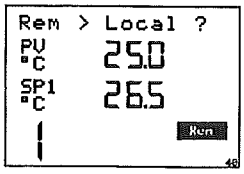


Fig. 5-12 Remote operation is activated
z-19040

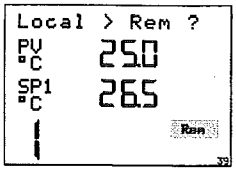


Fig. 5-13 Remote operation is deactivated
z-19039

If the instrument has been configured exclusively for remote operation, the remote operation can be disabled temporarily – e. g. for emergency intervention – via menu "Operate 2".

Depending on the configuration the following display appears when selecting the menu option:

Not intended for remote operation

The operation cannot be changed.

Note

Remote operation means that values are input to the instrument via Modbus RTU respectively PROFIBUS DP.

Rempote operatiopn is activated

Remote operation "Rem" can be toggled to local operation.

The question "Toggle to local operation?" = "Rem>Local?" is confirmed with <Enter> or negated with <Esc>.

If the instrument is toggled to local operation the keys are enabled and [Rem] starts flashing.

Remote operation is deactivated

Remote operation is – temporarily – switched off. Press <Enter> to restore the operating condition "Remote operation" as defined by the configuration. Then, the instrument can only be remote-operated.

[Rem] stops flashing.

6 Password protection

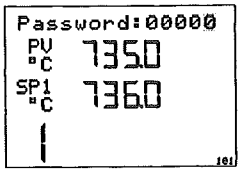


Fig. 6-1 z-19101 Input of password. 1st field from the right

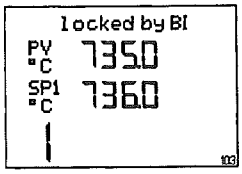


Fig. 6-2 z-19103 Locking the parameterization and configuration level via binary input

If the password protection has been configured (I-B20), you must enter a password to access the protected levels, by changing the predefined value "00000".

The password is a 5-digit number.

1. Shift a flashing (= changeable) field: <Ind>
2. Change digit: < ▲> and <▼>
3. Confirm password: <Enter>

When the password is correct, the desired level is entered. You can now switch between all levels of the menu system without having to re-enter the password (Question: I-B20-Q01).

If the password is not correct, the main operating level is displayed again.

If a hardware lock has been configured (I-B02-Q01) and the binary input is set, the message "locked by BI" is displayed when attempting to open a protected level.

The message is displayed for 3 s, then the operating level is automatically switched back.

Cancelling the password input

Cancel with<Esc>

Forgotten password

If a password is no longer known, the password can be reset by temporarily rearranging a jumper within the instrument. For this action the control loop must be switched off.

7 Index

ABB has Sales & Customer Support expertise in over 100 countries worldwide.

www.abb.com

Printed in the Fed. Rep. of Germany (07.03)

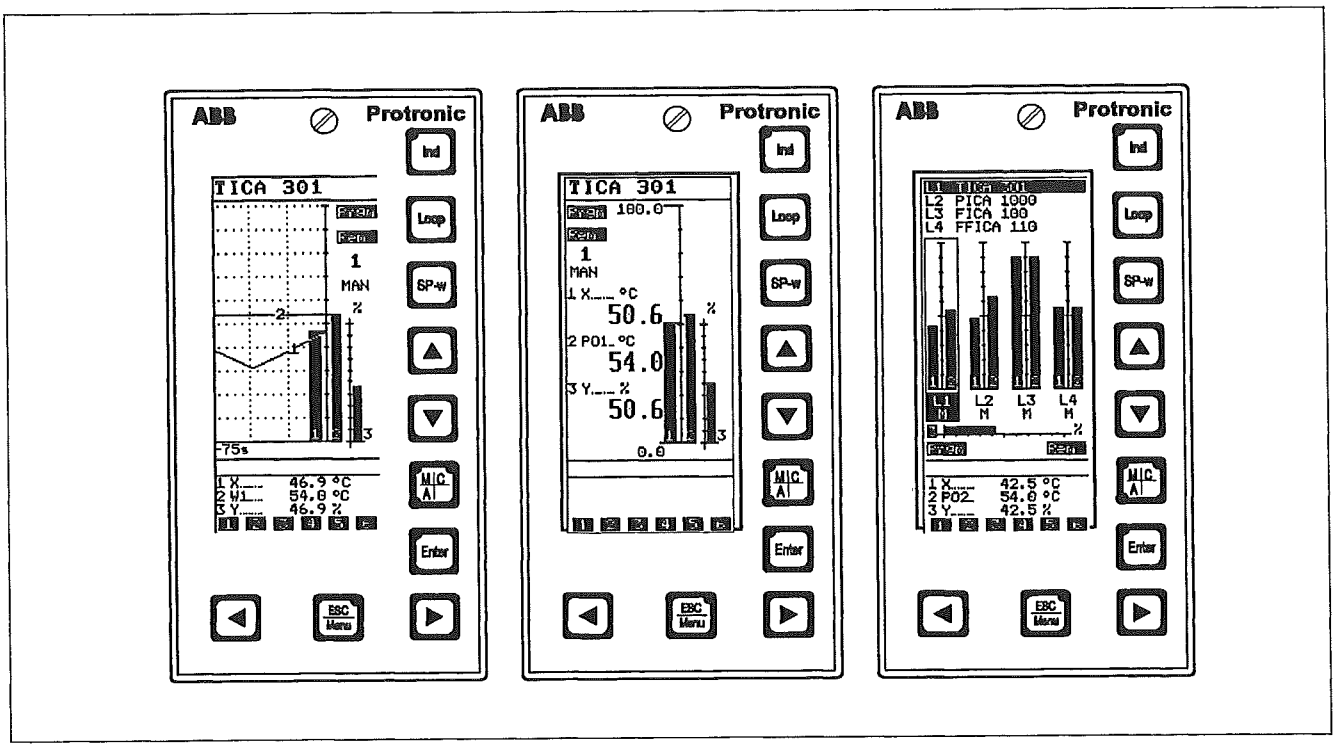
42/62-50013 EN Rev. 05

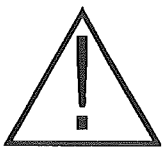
ABB Automation Products GmbH
Hoeseler Platz 2
42579 Heiligenhaus
Germany
Tel: +49 2056 12-5181
Fax: +49 2056 12-5081

Protronic 550

Controllers for
Process engineering

Supplement to the operating manual 42/62-55013 EN Rev. 01





Notes

All safety notes and displays in these operating instructions apply to both the Protronic 500 and the Protronic 550

Contents

Process operation

Description of the operator panel

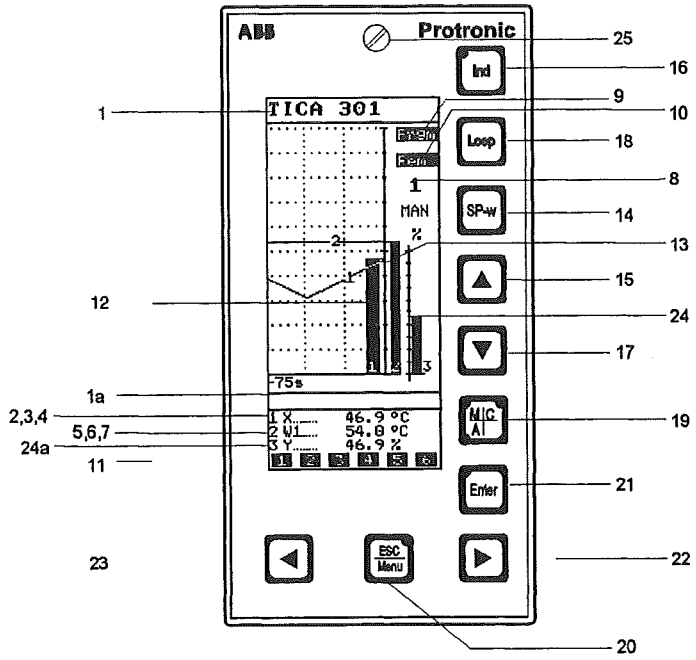


Fig. 1 Protronic 550 - trend display

1	Measurement point number (TAG 12-digit)
1a	Message line
2	Digital display controlled variable X
3	Label controlled variable X
4	Dimension controlled variable X
5	Digital display which can be changed over with <Ind>: in automatic mode normal W, in manual mode normal Y
6	Label of the value displayed
7	Dimension of the value displayed
8	Number of the control loop displayed changes with "A" in alarm
9	Display for active programmer
10	Display for activated remote control
11	Binary flags (freely configurable messages for binary events)
12	Analog display controlled variable X
13	Analog display setpoint W
14	Setpoint switch-over
15	"Raise" adjustment of the value displayed in 5,6,7
16	Display selector switch for 5,6,7 LED lights up in past-history mode
17	"Lower" adjustment of the value displayed in 5,6,7
18	Channel (loop) switch-over, shift key for key 16
19	Operating mode transfer, manual-automatic (cascade) with associated LEDs
20	Entry into the parameter-definition and configuration levels. Associated LED lights up immediately the operator control level has been left.
21	Acknowledgement of alarms and parameter setting and configuration data
22	Manual mode "raise"
23	Manual mode "lower"
24/24a	Controller output Y
25	Closing screw

The numbers of the individual control and display elements are used identically in all parts of the documentation of the unit.

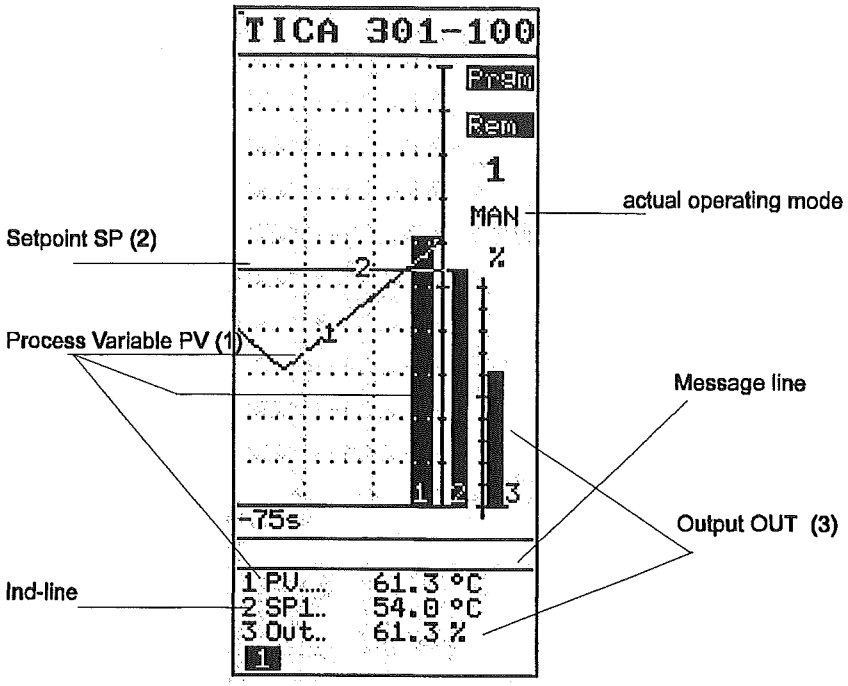


Fig. 2. Trend display

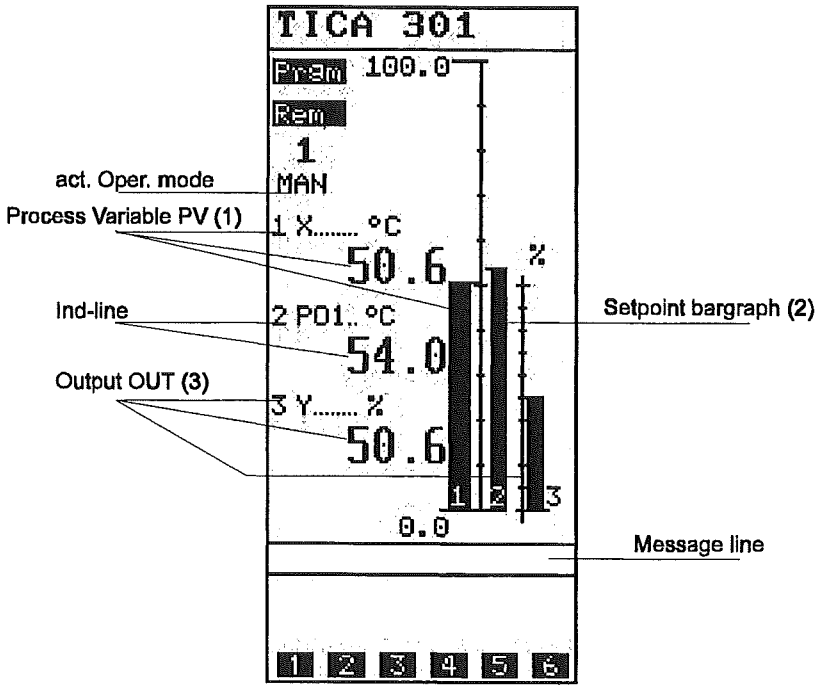
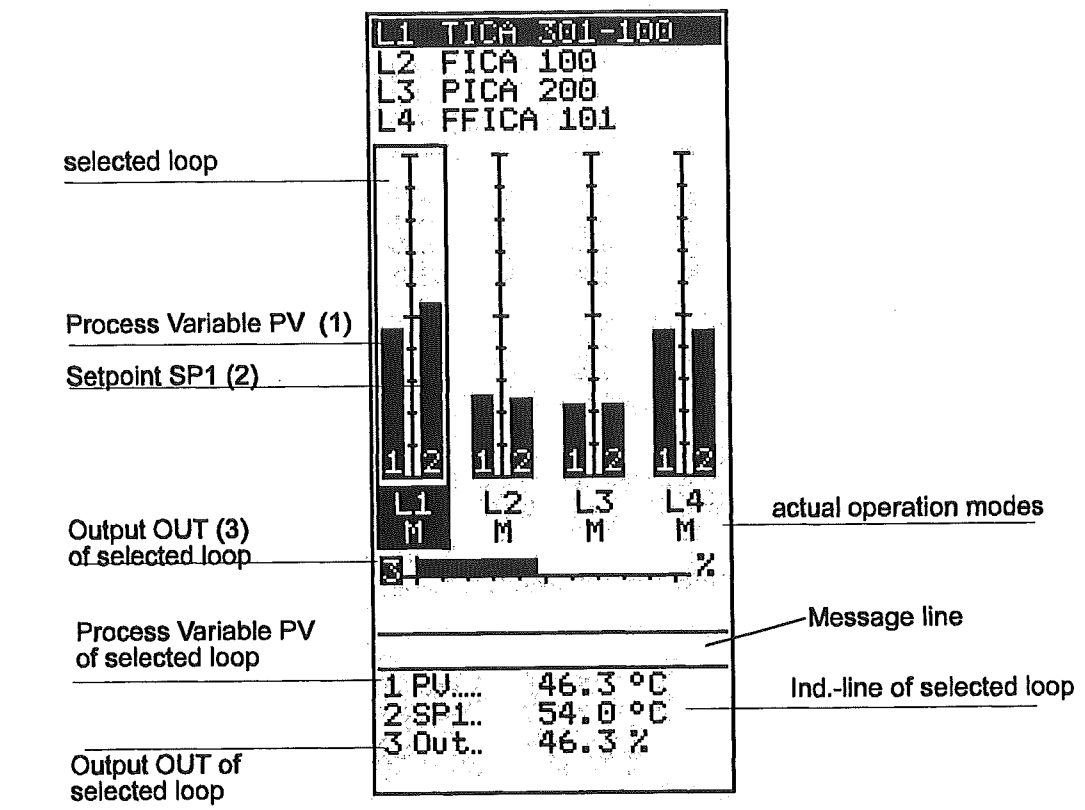


Fig. 3. Numerical display



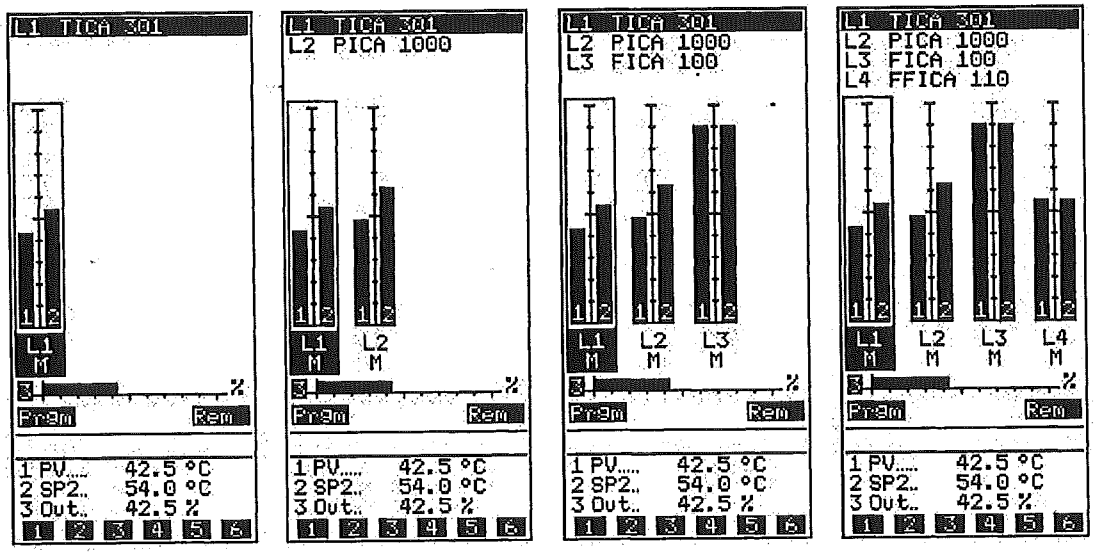


Fig. 5 Overview display with one to four loops

Display switch-over

Holding down <Loop> switches over the displays cyclically at intervals of 2 seconds.

Alarm handling

Alarm message

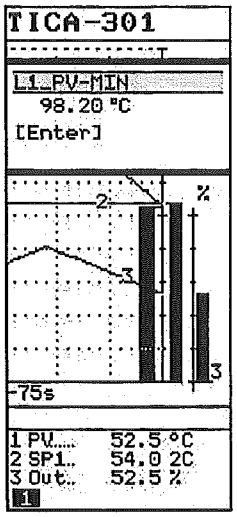


Fig. 6. Trend display with alarm window

If an alarm message has been configured in the display,

- a flashing error message with precise information on the cause of the fault and the value of the infringed alarm value is entered in the display field
- the red LED next to the <Enter> key lights up,

when an alarm value infringement or an error in the operating cycle occurs.

Alarm acknowledgement

Alarms displayed are acknowledged with <Enter>.

If further alarms are present, they are acknowledged either singly or collectively, depending on the configuration.

Acknowledged alarms are no longer visible.

Past-history mode

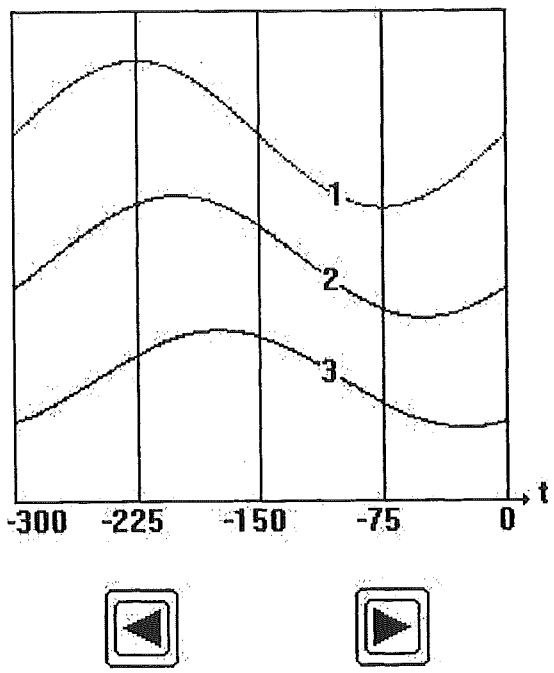


Fig. 7 Past-history mode

"The transfer to "past-history" mode is achieved by holding down the **<Loop>** key and actuating the **<Ind>** key. The LED in the <Ind> key lights up.

300 values (each) which were stored up to the moment of mode transfer, are displayed for X, W and Y. After this they are then no longer updated automatically and remain until an updating, or a new calling of the past-history mode (see "Quitting").

The interval between the measured values is defined by the configuration of the trend display.

The controller cannot be operated in this mode. It is not possible to change setpoint, correction value or operating mode.

The recording of the current values continues without interruption In the configured loops (1 to 4).

It is possible each time to scroll 75 points of the recording using the **<>>** and **<<>** keys.

Quitting past-history mode

There are two ways of quitting the past-history mode:

1. Temporary quitting

Quitting without deleting the display
- during an update or
- in order to look at the stored values again later.

Key **<Ind>**

2. Final quitting

If the past-history mode is called again, the current values of the current loop are automatically brought into the display.
Key **<Esc>** followed by key **<Ind>**

Updating the recording

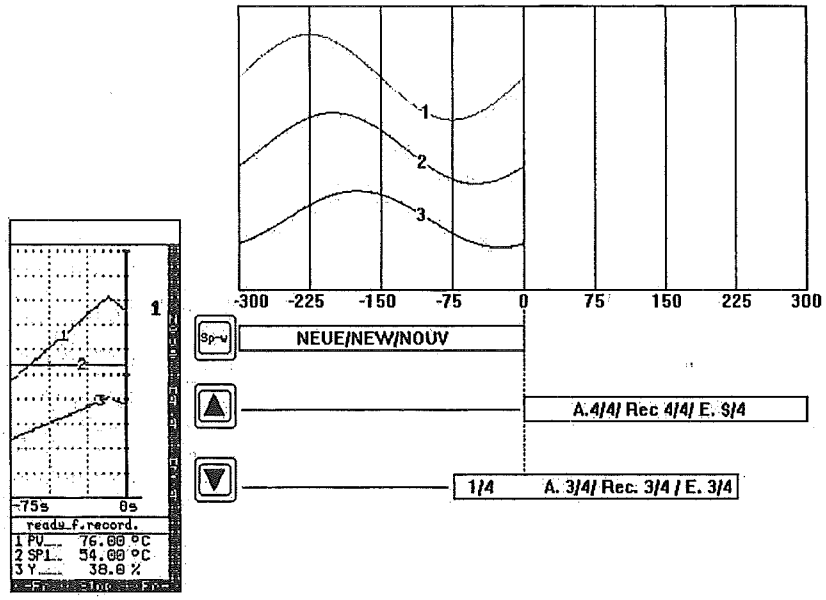


Fig. 8. Updating

After the past-history mode has been called, the values stored for the display can be updated at any time. This possibility is signalled in the message line.

`Ready f. record`

Three options are offered for this.

1. 300 measured values stored in the direct past history
2. 75 measured values in the direct past history and the recording of a further 225 updated measured values
3. The recording of 300 new measured values.

The keys <Sp-w>, <<> and <>> are used to call one of these updates. These keys now have the following functions:

<Sp-w> = <New> copies 300 values from the direct past into the display memory. The transfer of the measured values into the memory is confirmed in the message line.

`new rec. ready`

<^> = < A4/4> starts the recording of 300 new values. The fact that recording is taking place is confirmed in the message line:

`rec 4/4 runs`

<v> = <A3/4> copies the 75 newest values into the display memory and starts the recording of 225 new values. The fact that recording is taking place is confirmed in the message line.

`rec 3/4 runs`

Immediately the measured values are available the message appears in the message line

`rec 3/4 ready`

or

`rec 4/4 ready`

The data are always stored in the display memory and they remain available in this until they are overwritten by new data.

It is possible each time to scroll 75 points of measurement with the <<> and <>> keys.

<Esc> = <Stop> aborts the updating.

Operator control level 2

Indicating 2

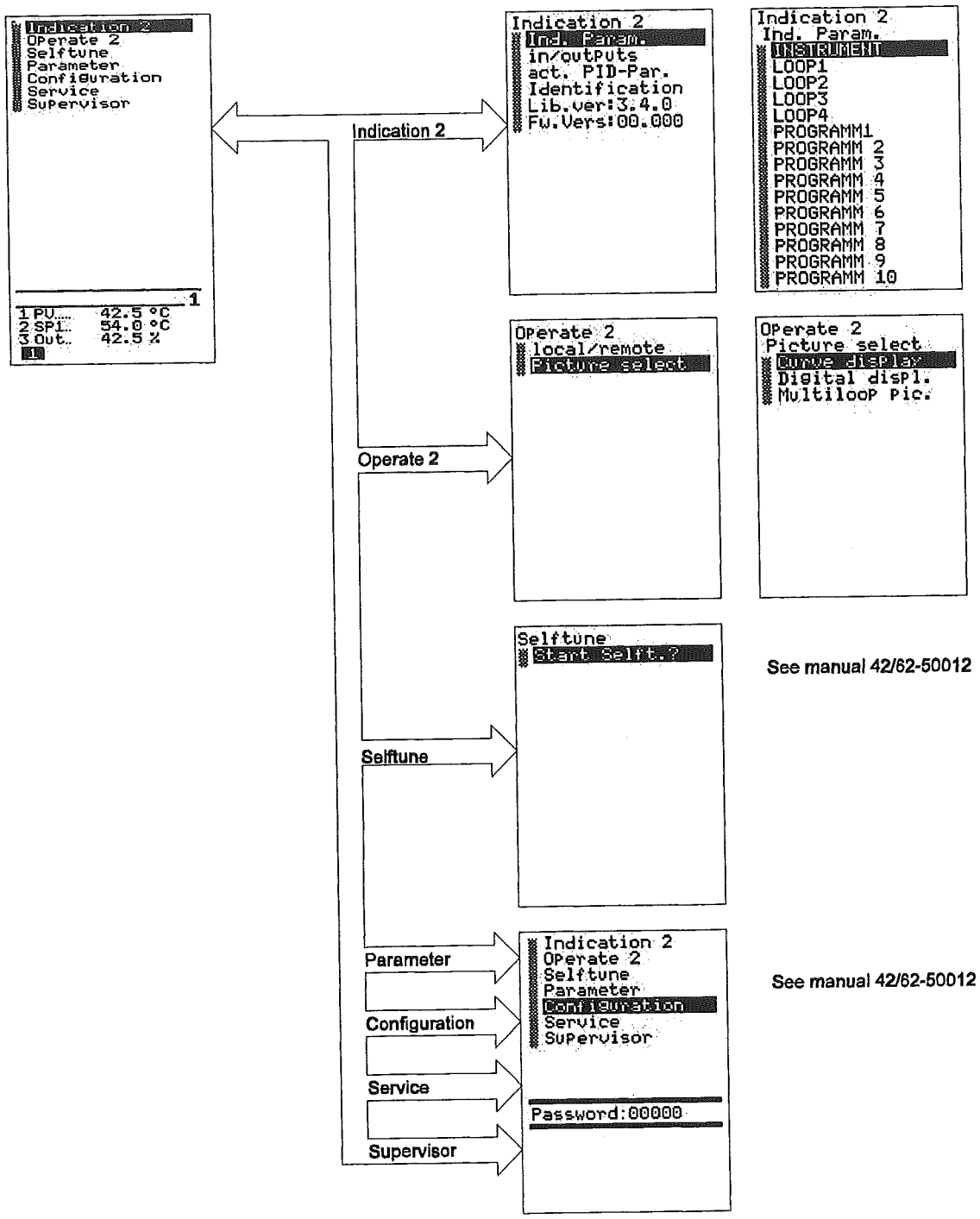


Fig. 9 Operator control level 2, displays 2

Subject to technical changes.

ABB Automation Products GmbH
Hoeseler Platz 2
D-42579 Heiligenhaus
Phone +49 (0)20 56 12 - 51 81
Fax +49 (0)20 56 12 - 50 81
http://www.abb.com

Subject to technical changes.
Printed in the Fed. Rep. of Germany
42/62-55013 EN Rev. 01
Edition 11.01