8 Function diagrams

Basic functions

Page

Sheet 1 Overview ... 8-4
Inputs and outputs
Sheet 2 Binary inputs, terminals 36 to 39 ... 8-5
Sheet 3 Binary inputs, terminals 40 to 43 ... 8-6
Sheet 4 Binary outputs, terminals 46/47and 48/54 ... 8-7
Sheet 4 Binary outputs, terminals 50/51 and 52/53 ... 8-7
Sheet 5 Analog inputs, terminals 4/5, 6/7 and 103/104 ... 8-8
Sheet 6 Analog inputs, terminals 8/9 and 10/11 ... 8-9
Sheet 7 Analog outputs, terminals 14/15 and 16/17 ... 8-10
Sheet 8 Analog outputs, terminals 18/19 and 20/21 ... 8-11
Setpoint generation
Sheet 9 Fixed values ... 8-12
Sheet 9 Fixed control bits ... 8-12
Sheet 9 Constant fixed values and control bits ... 8-12
Sheet 9 Connector and binector displays ... 8-12
Sheet 10 Motorized potentiometer ... 8-13
Sheet 11 Fixed setpoint ... 8-14
Sheet 12 Forcing, oscillation ... 8-15
Sheet 13 Inching setpoint ... 8-16
Sheet 14 Crawling setpoint ... 8-17
Sheet 15 Setpoint processing ... 8-18
Sheet 16 Ramp-function generator ... 8-19
Actual speed value
Sheet 17 Pulse generator evaluation ... 8-20
Controllers
Sheet 18 Speed controller ... 8-21
Sheet 19 Friction compensation ... 8-22
Sheet 19 Compensation of moment of inertia (dv/dt injection) ... 8-22
Sheet 20 Torque limitation ... 8-23
Sheet 21 Current limitation ... 8-24
Sheet 22 Closed-loop armature current control, auto-reversing stage, armature gating unit ... 8-25
Sheet 23 Closed-loop EMF control ... 8-26
Sheet 24 Closed-loop field current control, field gating unit ... 8-27
Serial interfaces
Sheet 25 USS interface 1 ... 8-28
Sheet 26 USS interface 2 ... 8-29
Sheet 27 USS interface 3 ... 8-30
Sheet 28 Peer-to-Peer interface 2 ... 8-31
Sheet 29 Peer-to-Peer interface 3 ... 8-32
Dual Port RAM
Sheet 30 Data exchange with a technology board (TB) or the 1st communications board (CB) ... 8-33
Sheet 31 Data exchange with the 2nd communications board (CB) ... 8-34
Program structure
Sheet 32 Data sets ... 8-35
Control words, status words
Sheet 33 Control word 1 ... 8-36
Sheet 34 Control word 2 ... 8-37
Sheet 35 Status word 1 ... 8-38
Sheet 36 Status word 2 ... 8-39
Miscellaneous
Sheet 37 Motor interface (1) ... 8-40
Sheet 38 Motor interface (2) / binary inputs, terminals 211 to 214 ... 8-41
Sheet 39 Signals ... 8-42
Sheet 40 Fault memory ... 8-43
Sheet 41 Paralleling interface ... 8-44
Sheet 42 Field reversal with SIMOREG 6RA70 single-quadrant converter ... 8-45

Freely assignable function blocks (Technology software in the basic converter, S00 option)

			Page
Sheet B1	1	Voltage monitor for electronics power supply	8-47
Sheet B1	4	Fault message triggers	8-47
Sheet B1	4	Alarm message triggers	8-47
Sheet B2	3	Connector / binector converters	8-48
Sheet B3	3	Binector / connector converters	8-49
Sheet B4	12	Adders / subtracters	8-50
Sheet B4	4	Sign inverters	8-50
Sheet B4	2	Switchable sign inverters	8-50
Sheet B5	3	Dividers	8-51
Sheet B5	4	Multipliers	8-51
Sheet B5	3	High-resolution multipliers / dividers	8-51
Sheet B6	4	Absolute-value generators with filter	8-52
Sheet B6	3	Limiters	8-53
Sheet B7	3	Limit-value monitors with filter	8-53
Sheets B8/B9	7	Limit-value monitors without filter	54/55
Sheet B10	1	Maximum selection	8-56
Sheet B10	1	Minimum selection	8-56
Sheet B10	2	Tracking / storage elements	8-56
Sheet B10	2	Analog signal memories	8-56
Sheet B11	10	Analog signal selector switches	8-57
Sheet B12	3	Integrators	8-58
Sheet B12	3	DT1 elements	8-58
Sheet B13	3	Characteristic blocks	8-59
Sheet B13	3	Dead zones	8-59
Sheet B13	1	Setpoint branching	8-59
Sheet B14	1	Simple ramp-function generator	8-60
Sheet B15	1	Technology controller	8-61
Sheet B16	1	Velocity / speed calculator (n → v and v → n calculator)	8-62
Sheet B17	2	Decoders / demultiplexers, binary to 1 of 8	8-63
Sheet B18	28	AND elements with 3 inputs each	8-64
Sheet B19	20	OR elements with 3 inputs each	8-65
Sheet B19	4	EXCLUSIV OR elements with 2 inputs each	8-65
Sheet B20	16	Inverters	8-66
Sheet B20	12	NAND elements with 3 inputs each	8-66
Sheet B21	14	RS flipflops	8-67
Sheet B22	4	D flipflops	8-68
Sheet B23	6	Timers (0,000...60,000s)	8-69
Sheet B24	4	Timers (0,00...600,00s)	8-70
Sheet B24	5	Binary signal selector switches	8-70

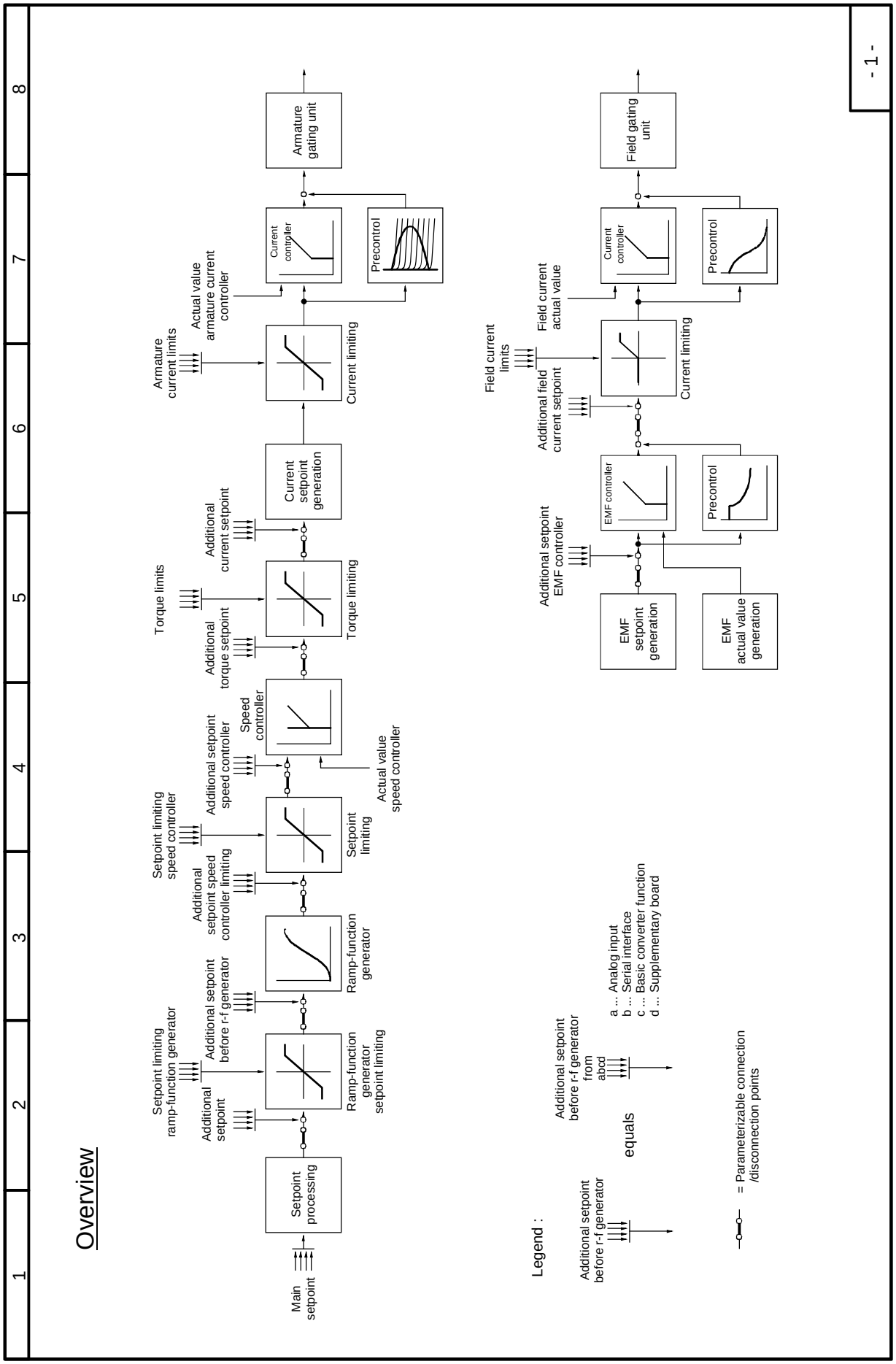
NOTE

Freely assignable function blocks are enabled in parameter U977.
For enabling instructions, please refer to Section 11, Parameter List, description of parameters U977 and n978.

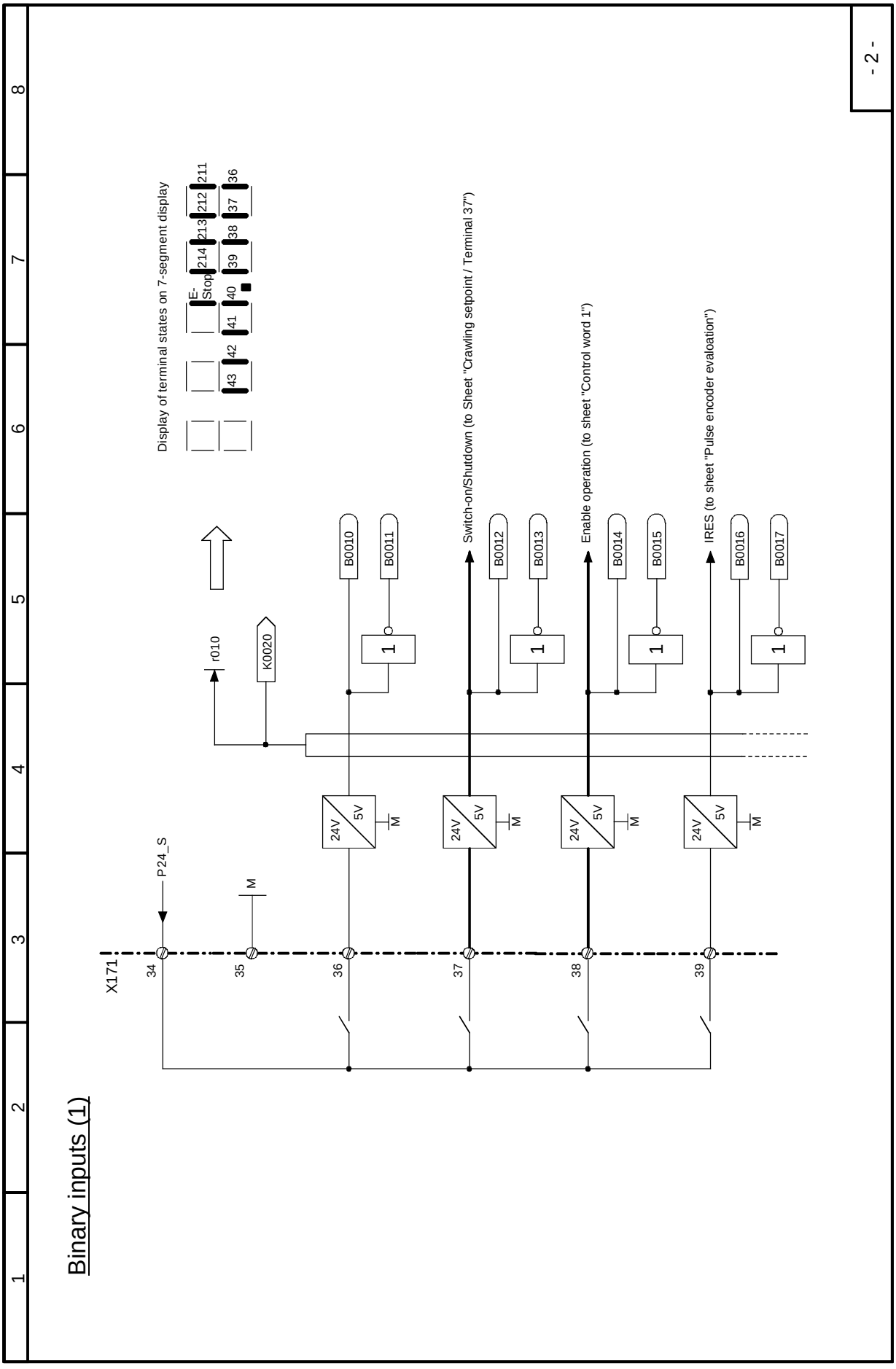
Optional supplementary boards

		Page
Bl. Z1	1st EB1: Analog inputs	8-71
Bl. Z2	1st EB1: Analog outputs	8-72
Bl. Z3	1st EB1: 4 bidirectional inputs- / outputs, 3 digital inputs	8-73
Bl. Z4	2nd EB1: Analog inputs	8-74
Bl. Z5	2nd EB1: Analog outputs	8-75
Bl. Z6	2nd EB1: 4 bidirectional inputs- / outputs, 3 digital inputs	8-76
Bl. Z7	1st EB2: Analog input, Analog output, 2 digital inputs, 4 relay outputs	8-77
Bl. Z8	2nd EB2: Analog input, Analog output, 2 digital inputs, 4 relay outputs	8-78
Bl. Z9	SBP pulse encoder evaluation	8-79
Bl. Z10	SIMOLINK board: Configuration, diagnosis	8-80
Bl. Z11	SIMOLINK board: Receiving, transmitting	8-81
Bl. Z12	OP1S operator panel	8-82

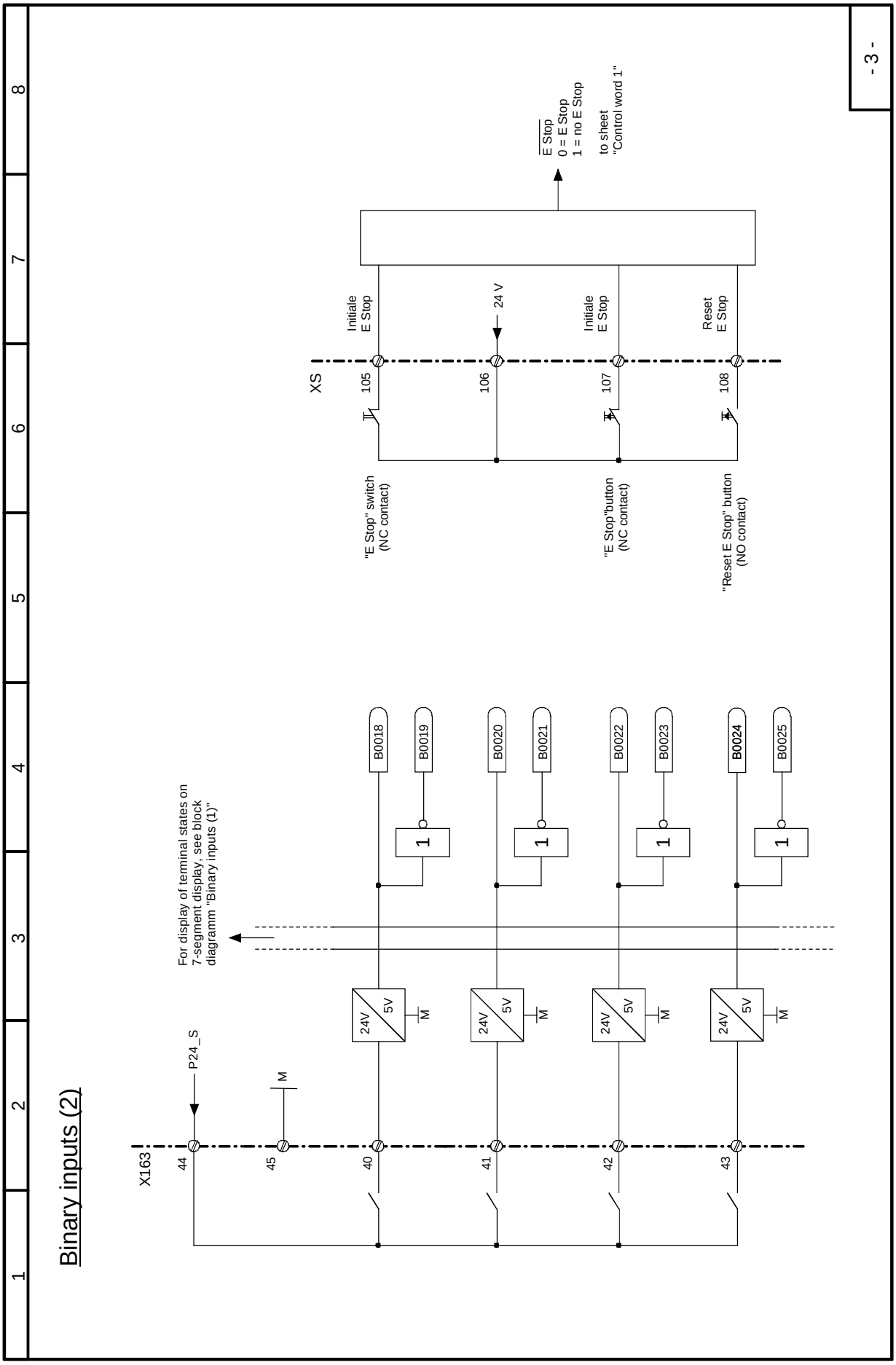
Sheet 1 Overview



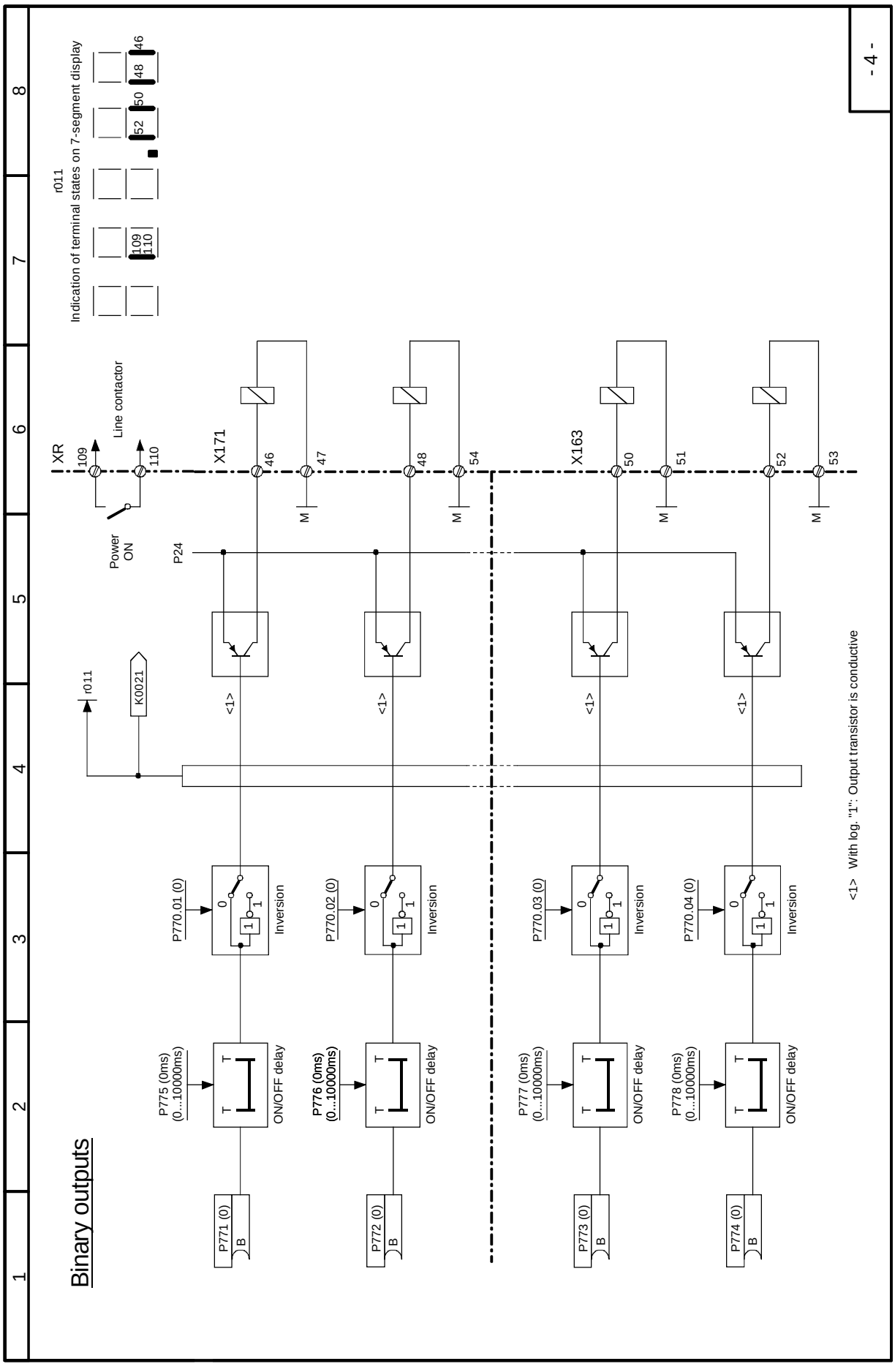
Sheet 2 Binary inputs, terminals 36 to 39



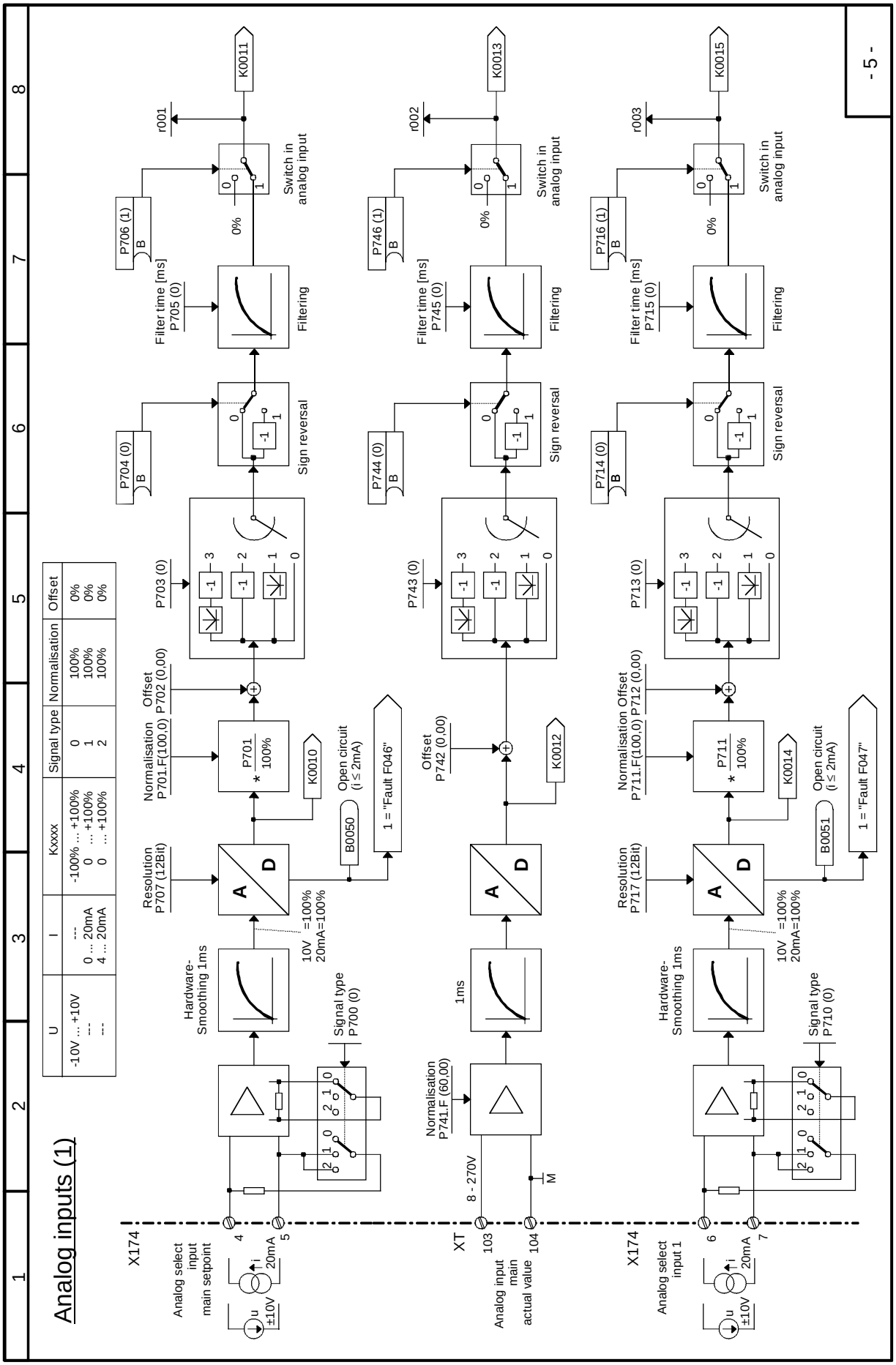
Sheet 3 Binary inputs, terminals 40 to 43



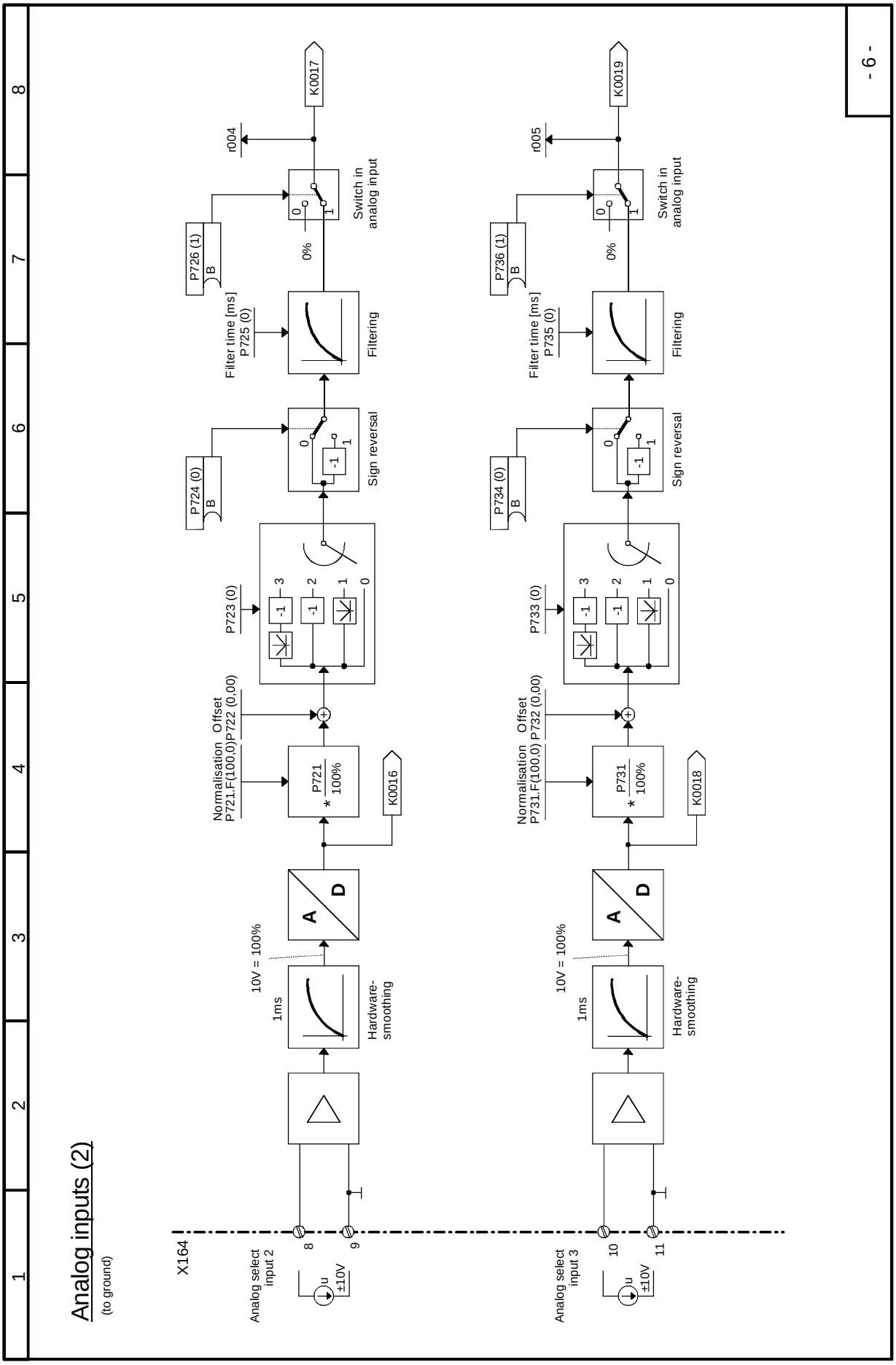
Sheet 4 Binary outputs, terminals 46/47 and 48/49
Binary outputs, terminals 50/51 and 52/53



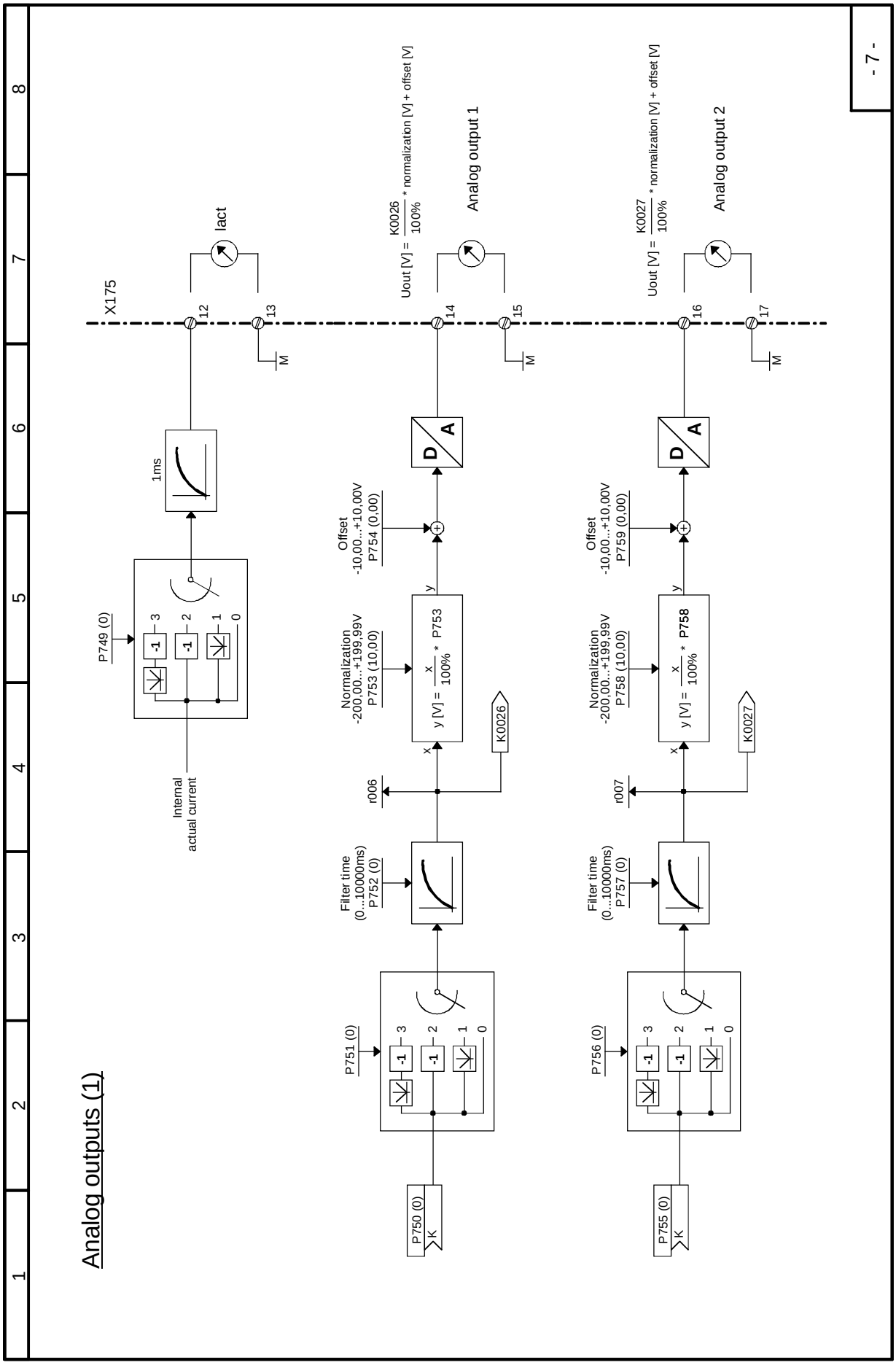
Sheet 5 Analog inputs, terminals 4/5, 6/7 and 103/104



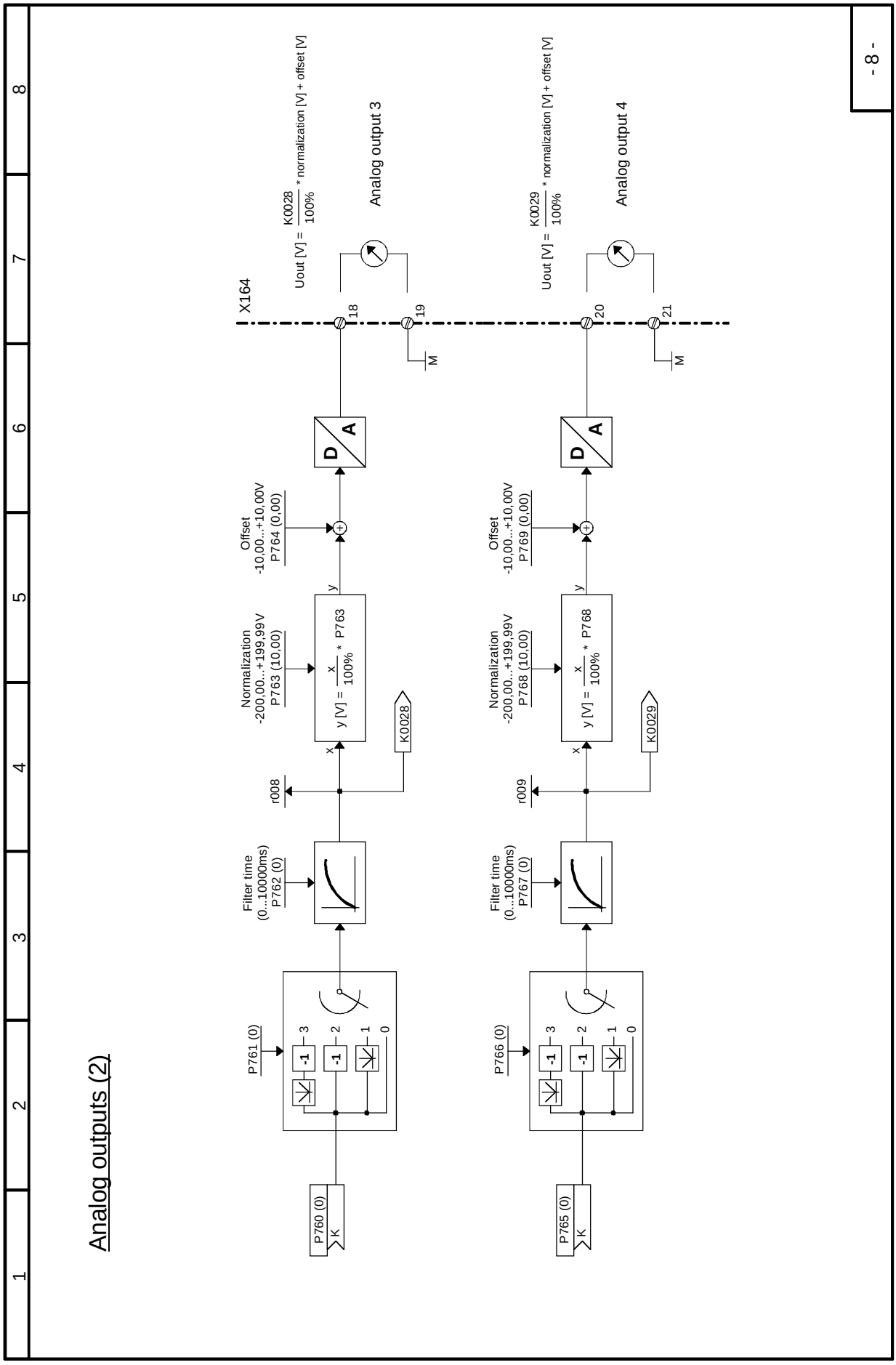
Sheet 6 Analog inputs, terminals 8/9 and 10/11



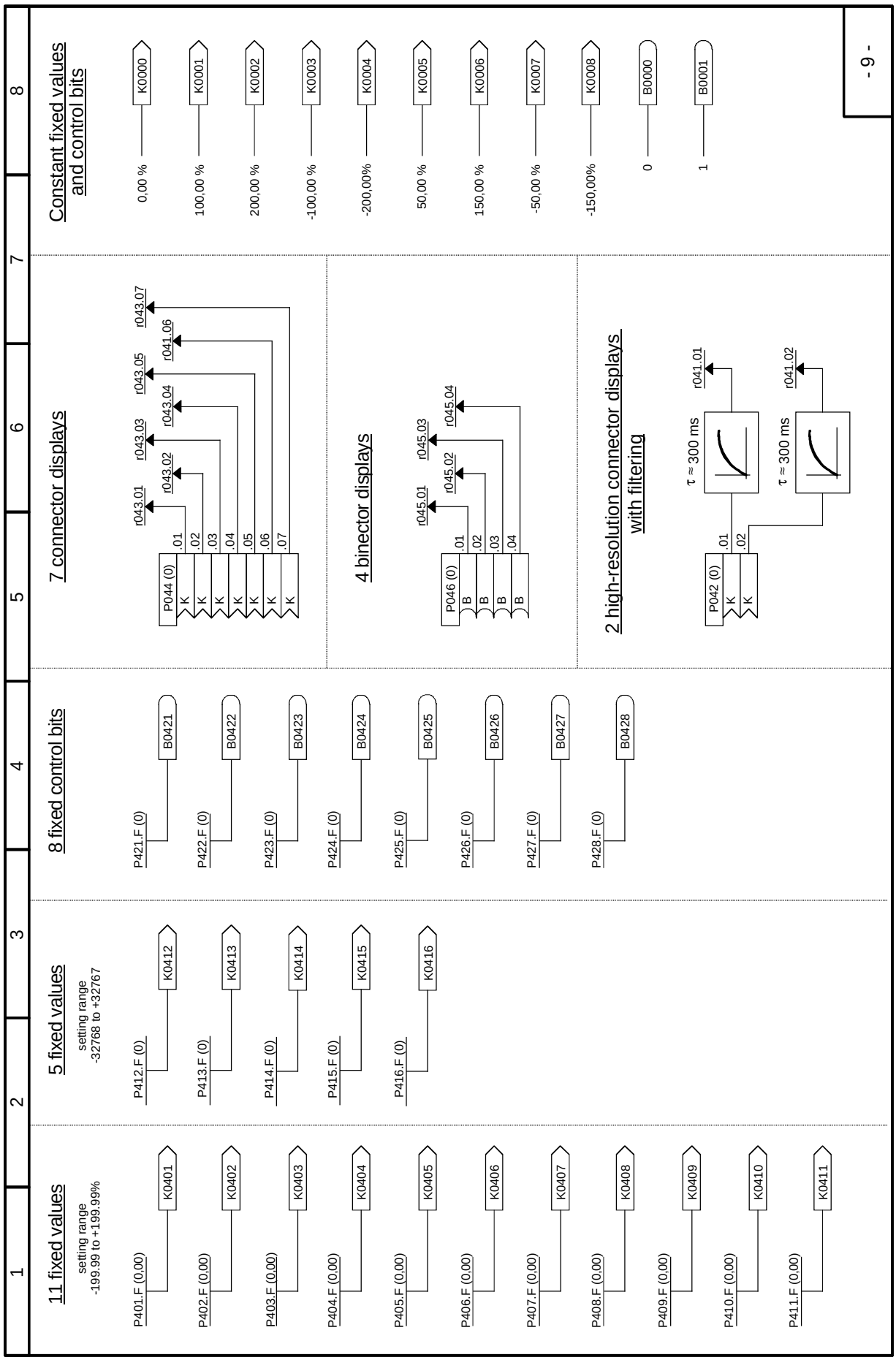
Sheet 7 Analog outputs, terminals 14/15 and 16/17



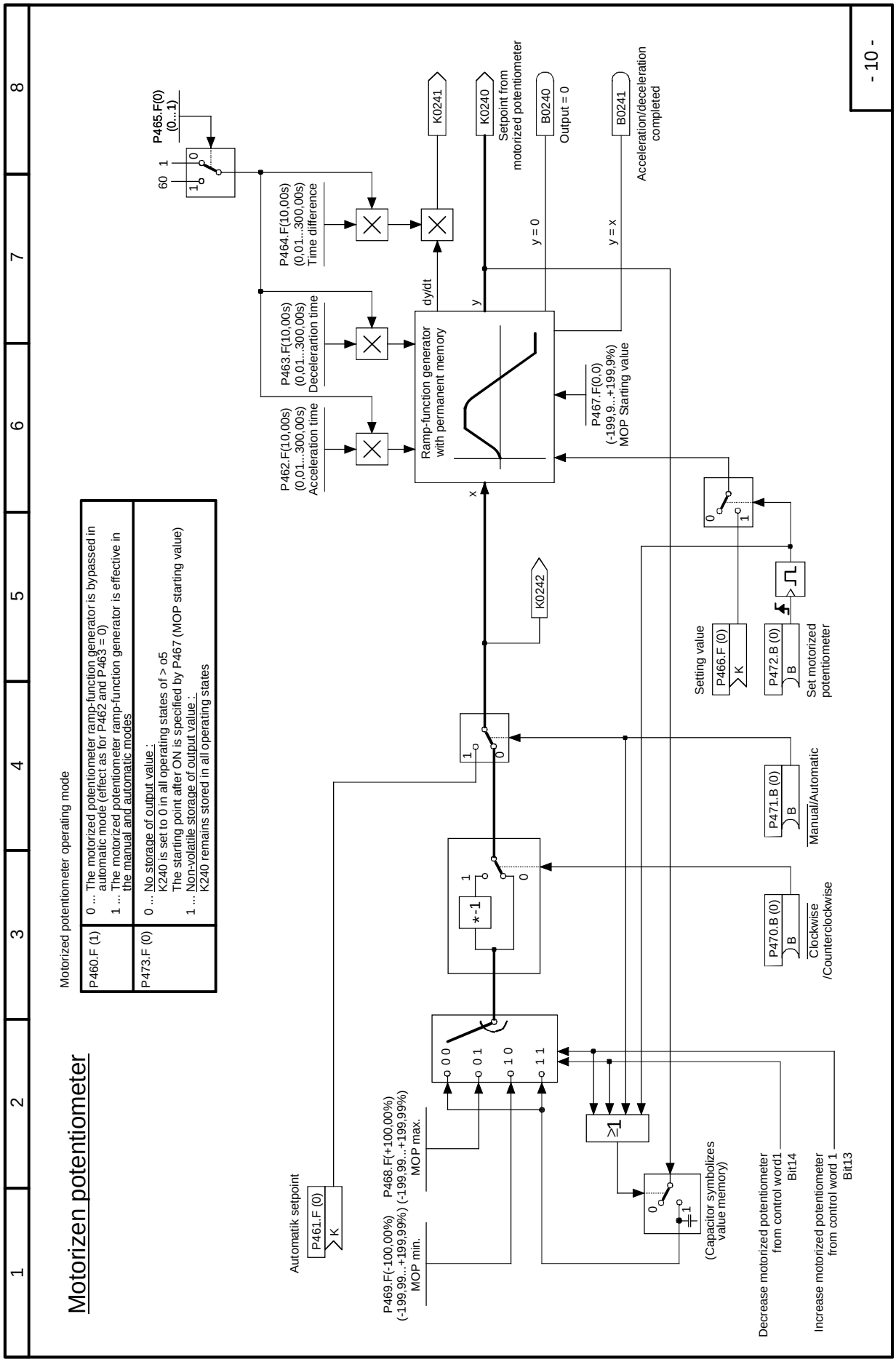
Sheet 8 Analog outputs, terminals 18/19 and 20/21



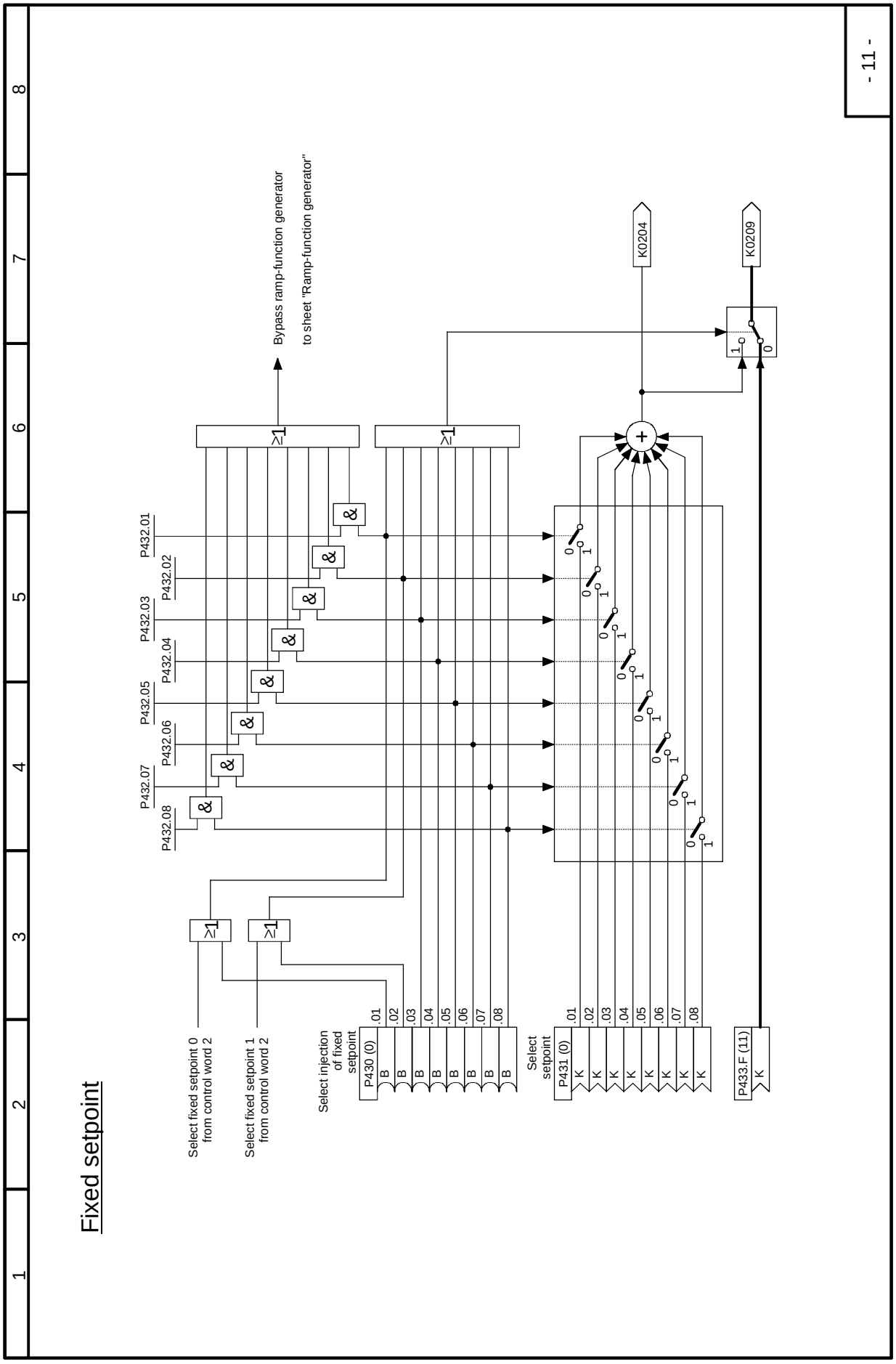
Sheet 9 Fixed values, fixed control bits, constant fixed values and control bits, connector and binector displays



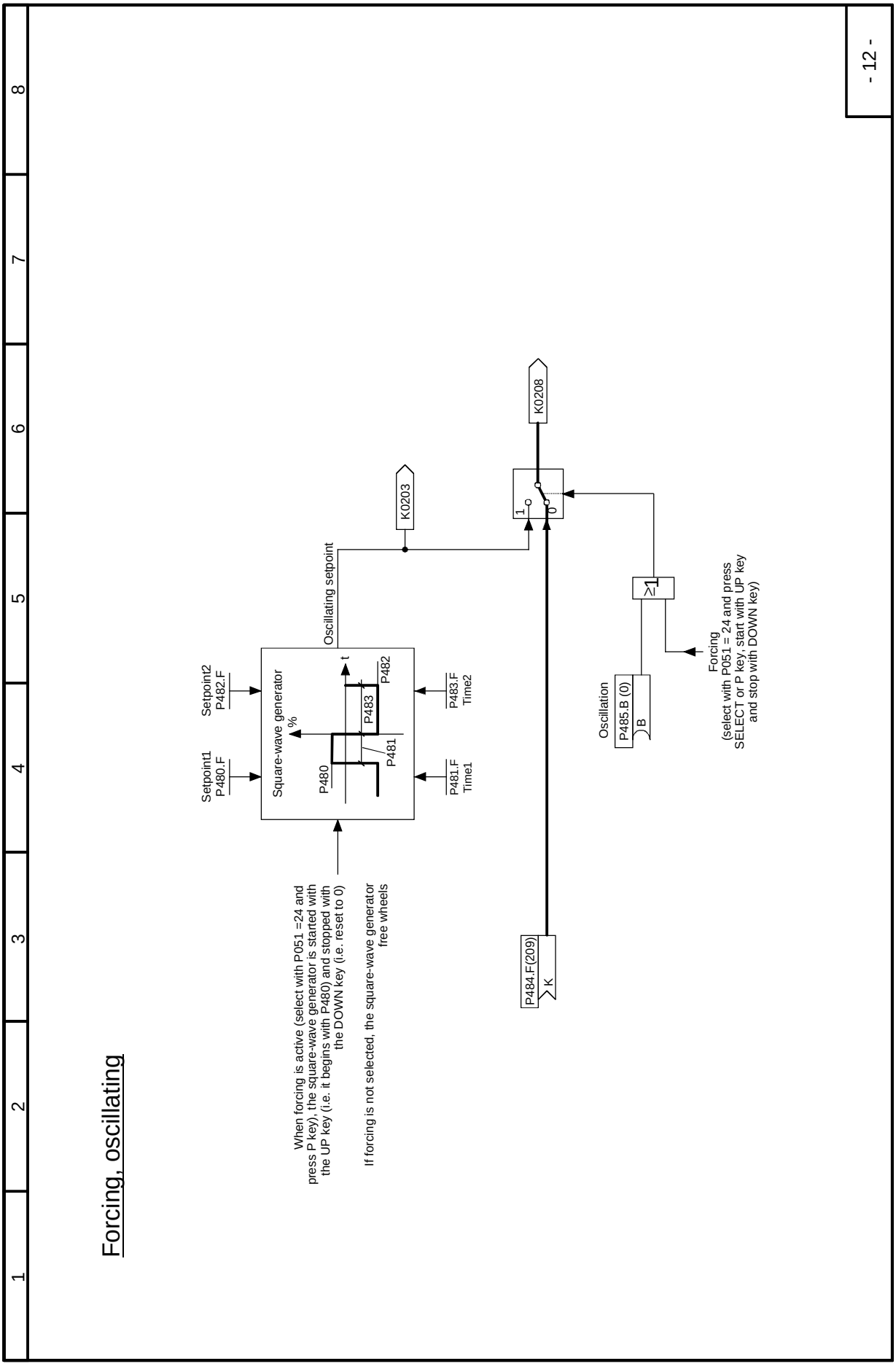
Sheet 10 Motorized potentiometer



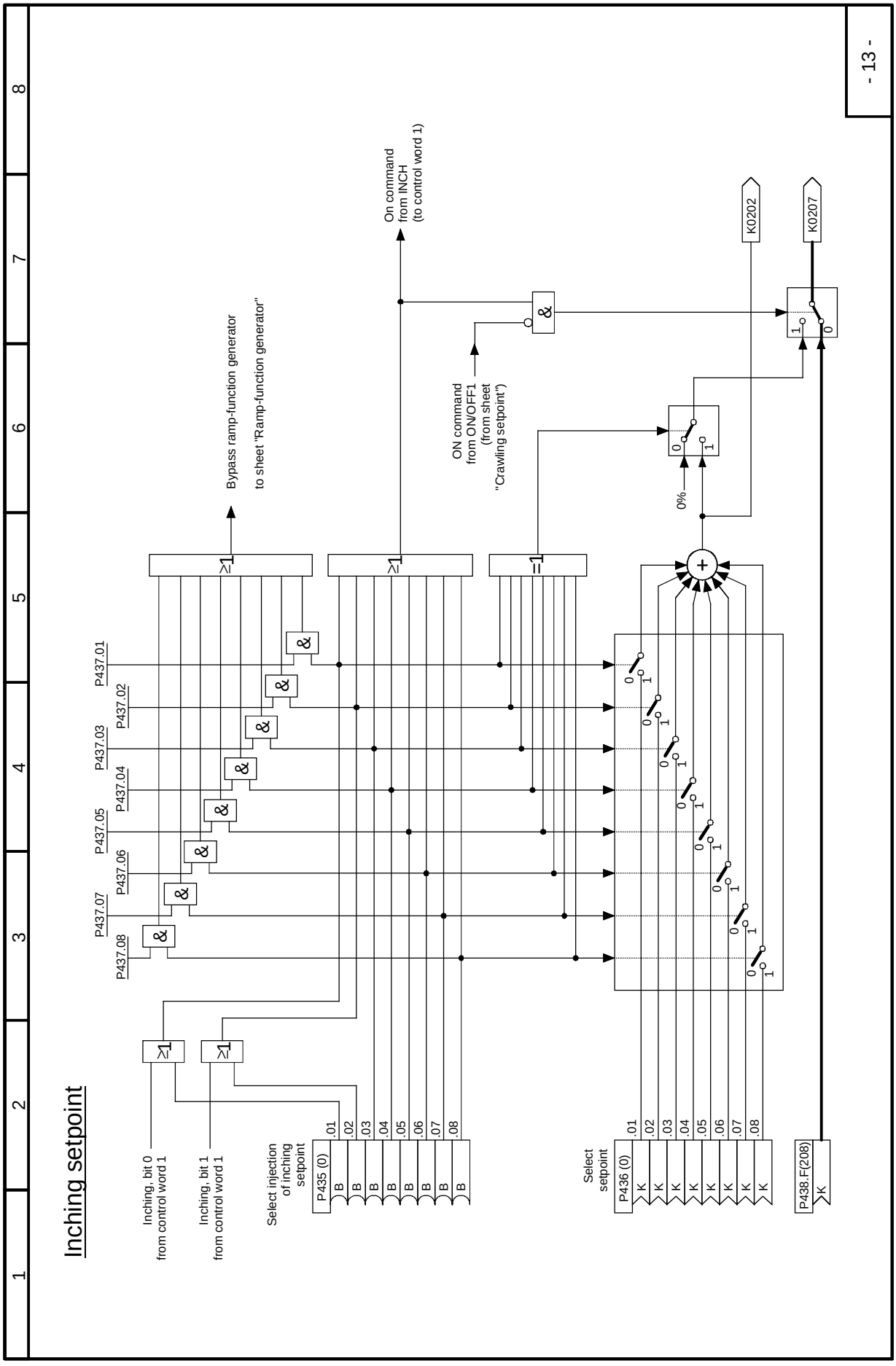
Sheet 11 Fixed setpoint



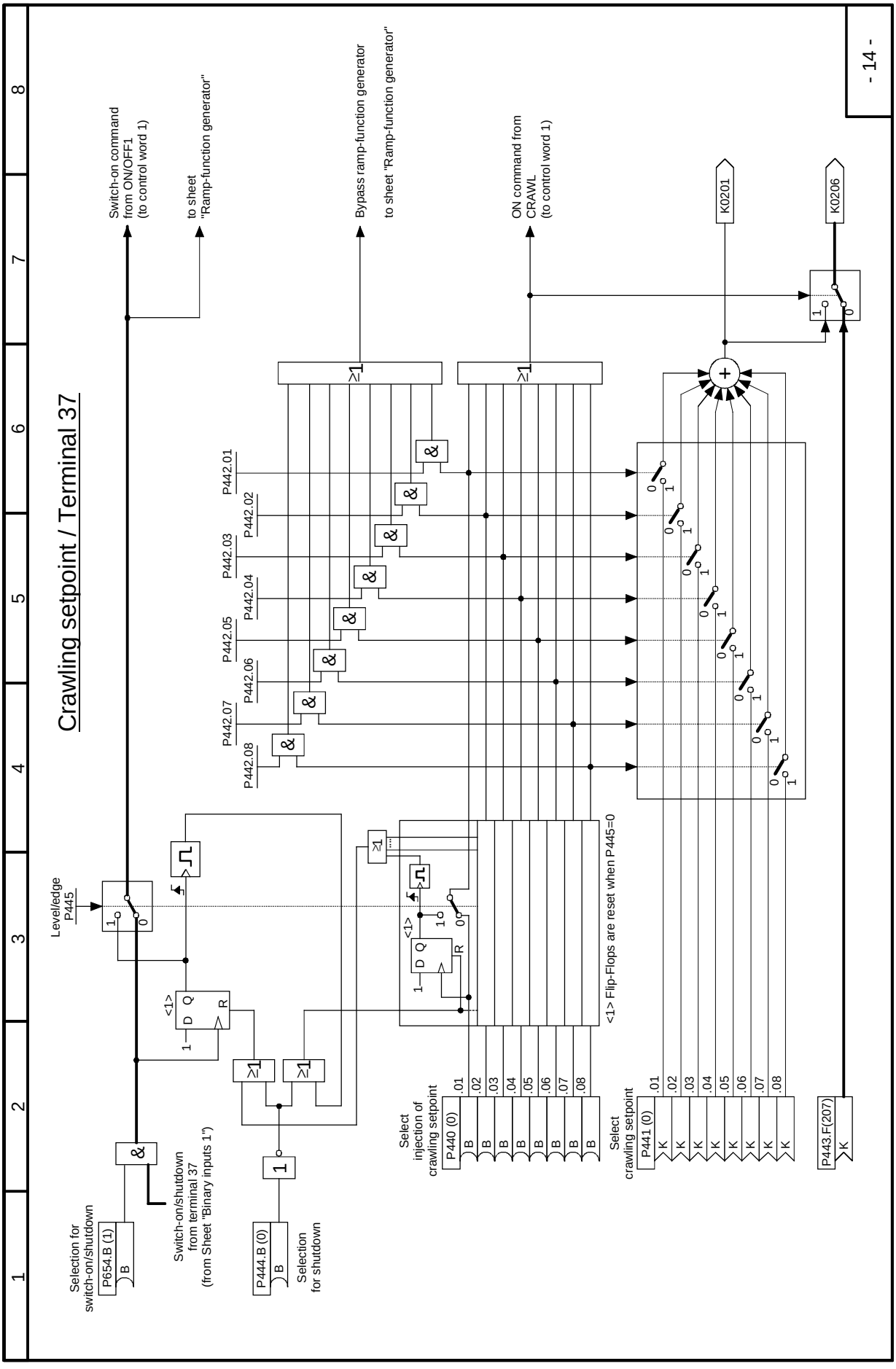
Sheet 12 Forcing, oscillation



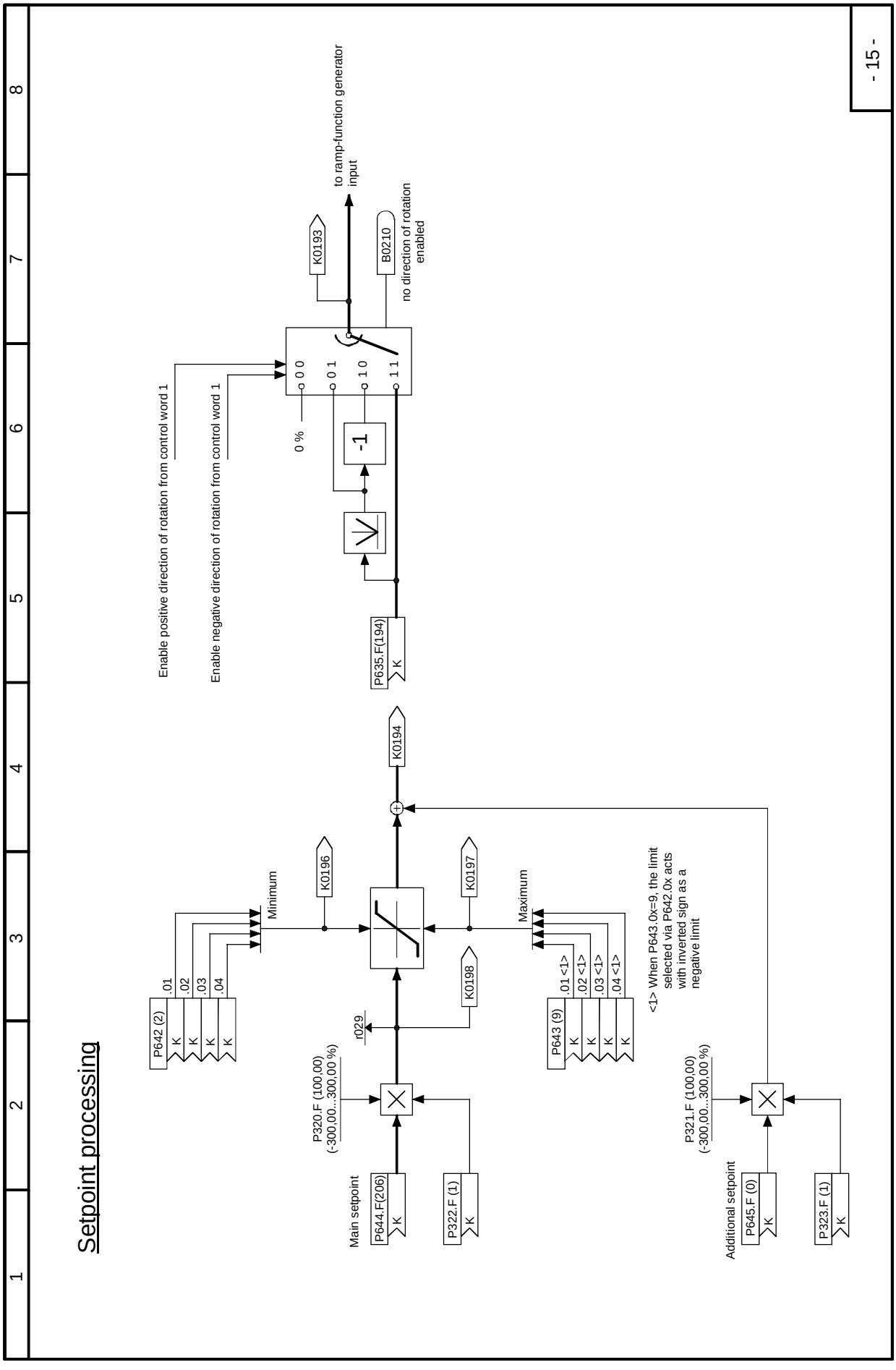
Sheet 13 Inching setpoint



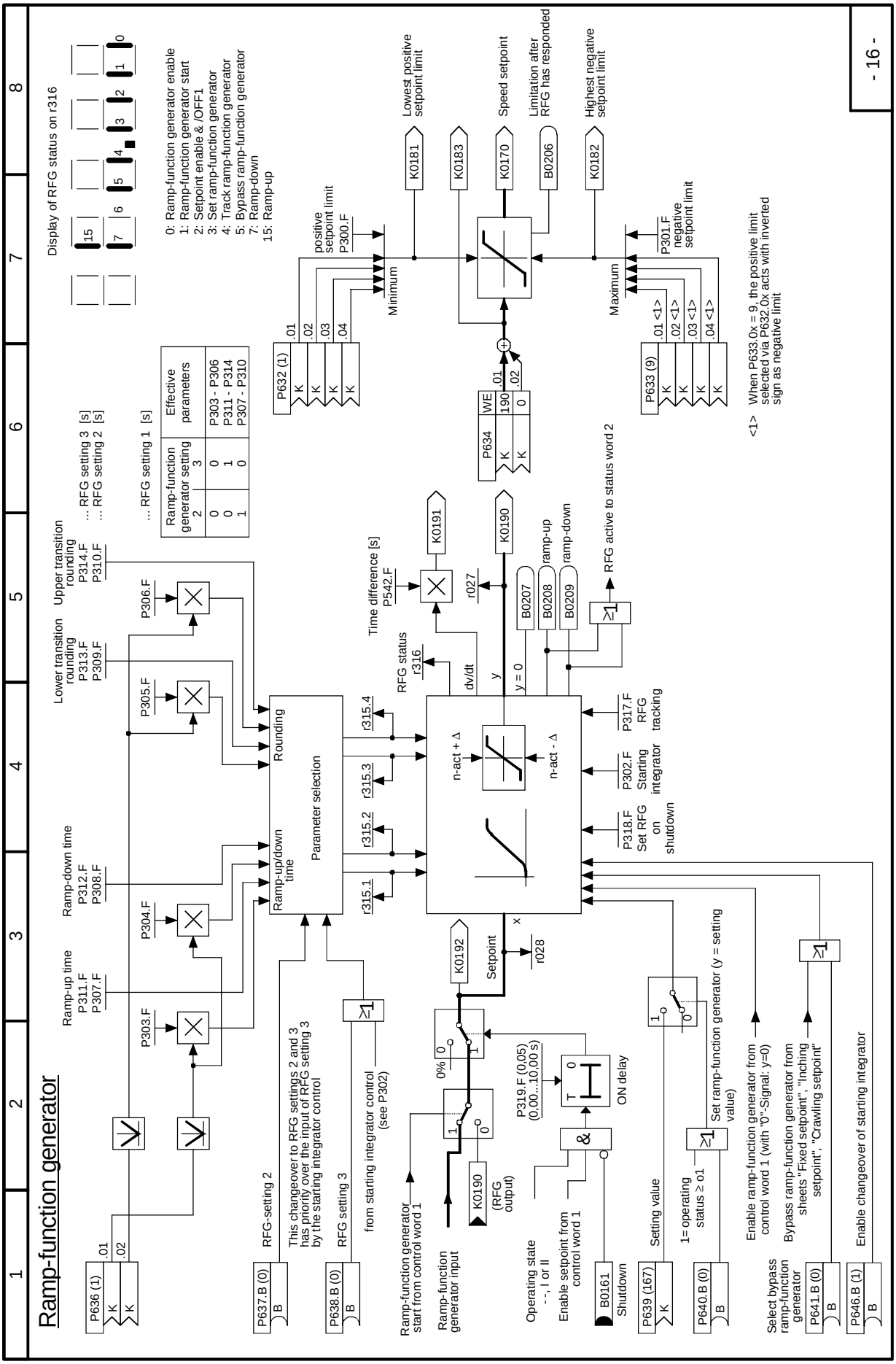
Sheet 14 Crawling setpoint



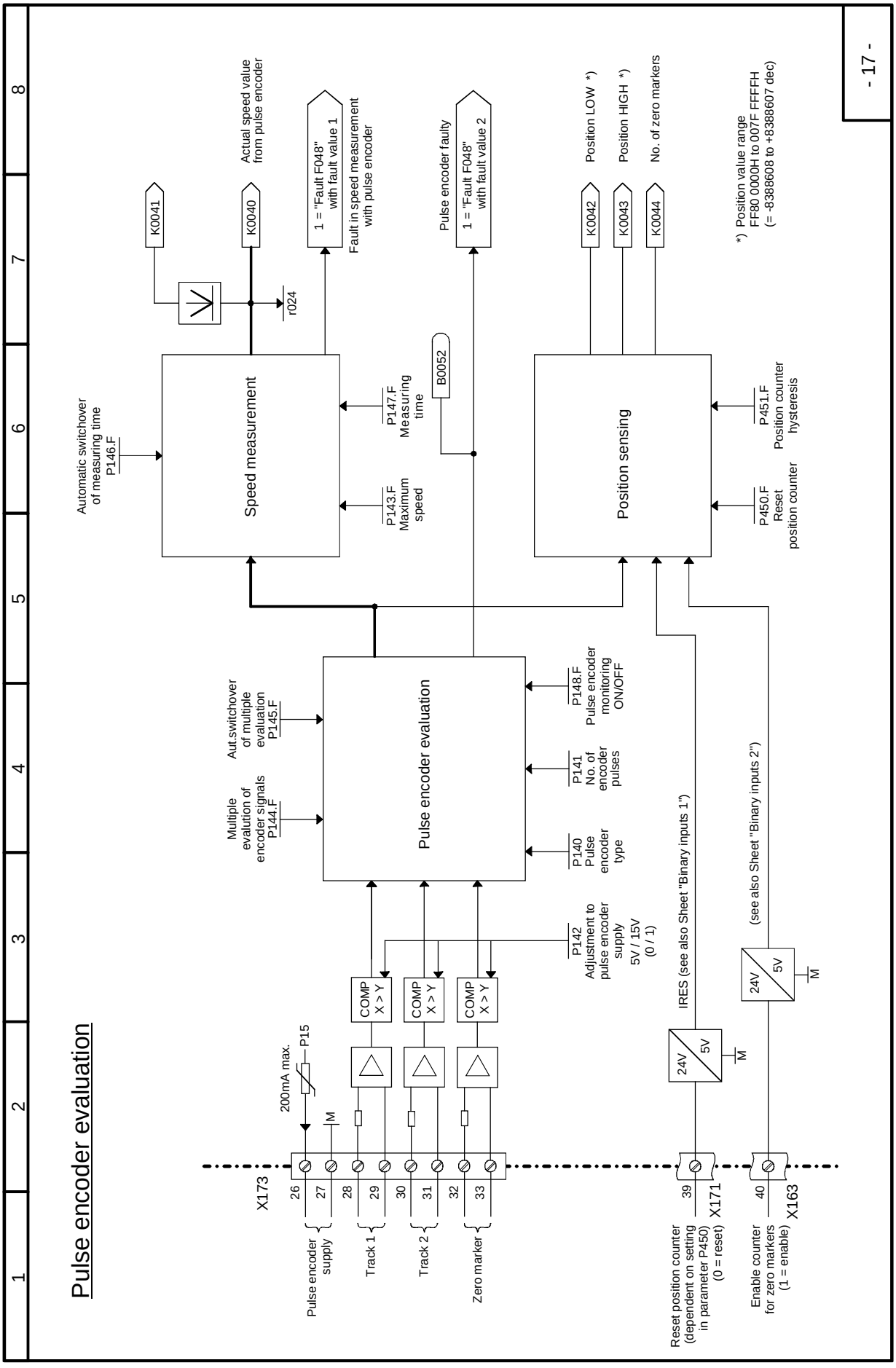
Sheet 15 Setpoint processing



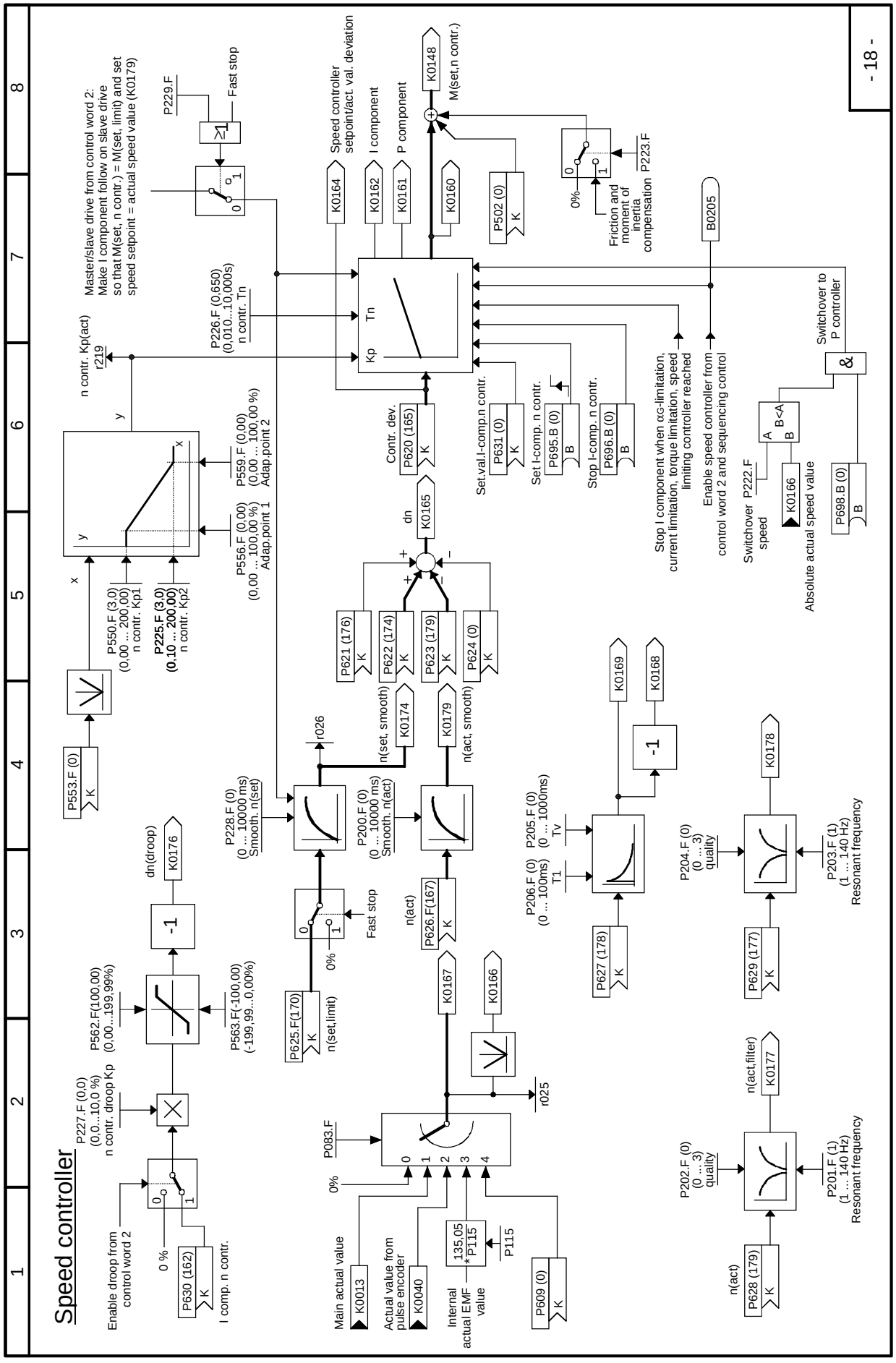
Sheet 16 Ramp-function generator



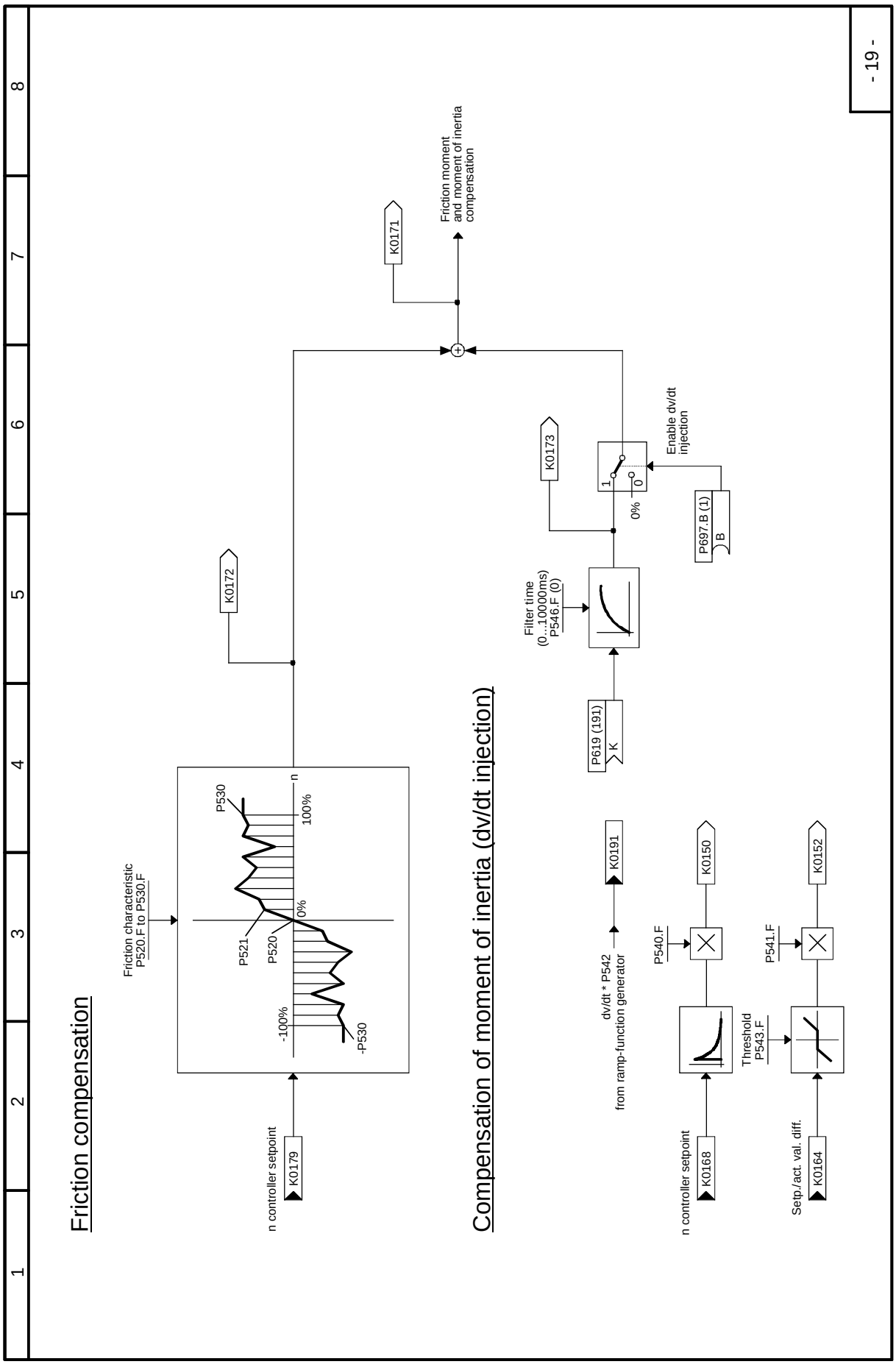
Sheet 17 Pulse encoder evaluation



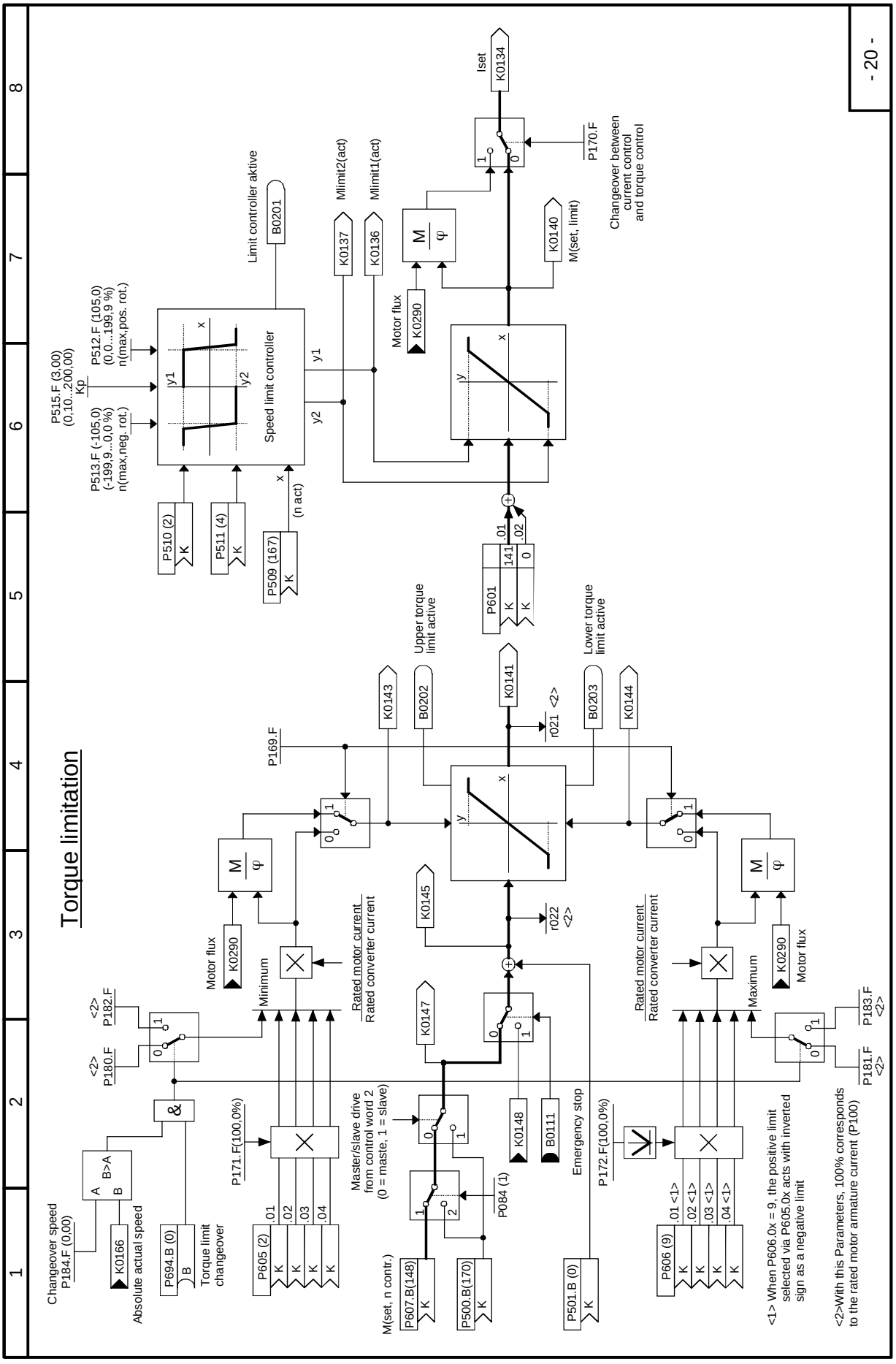
Sheet 18 Speed controller



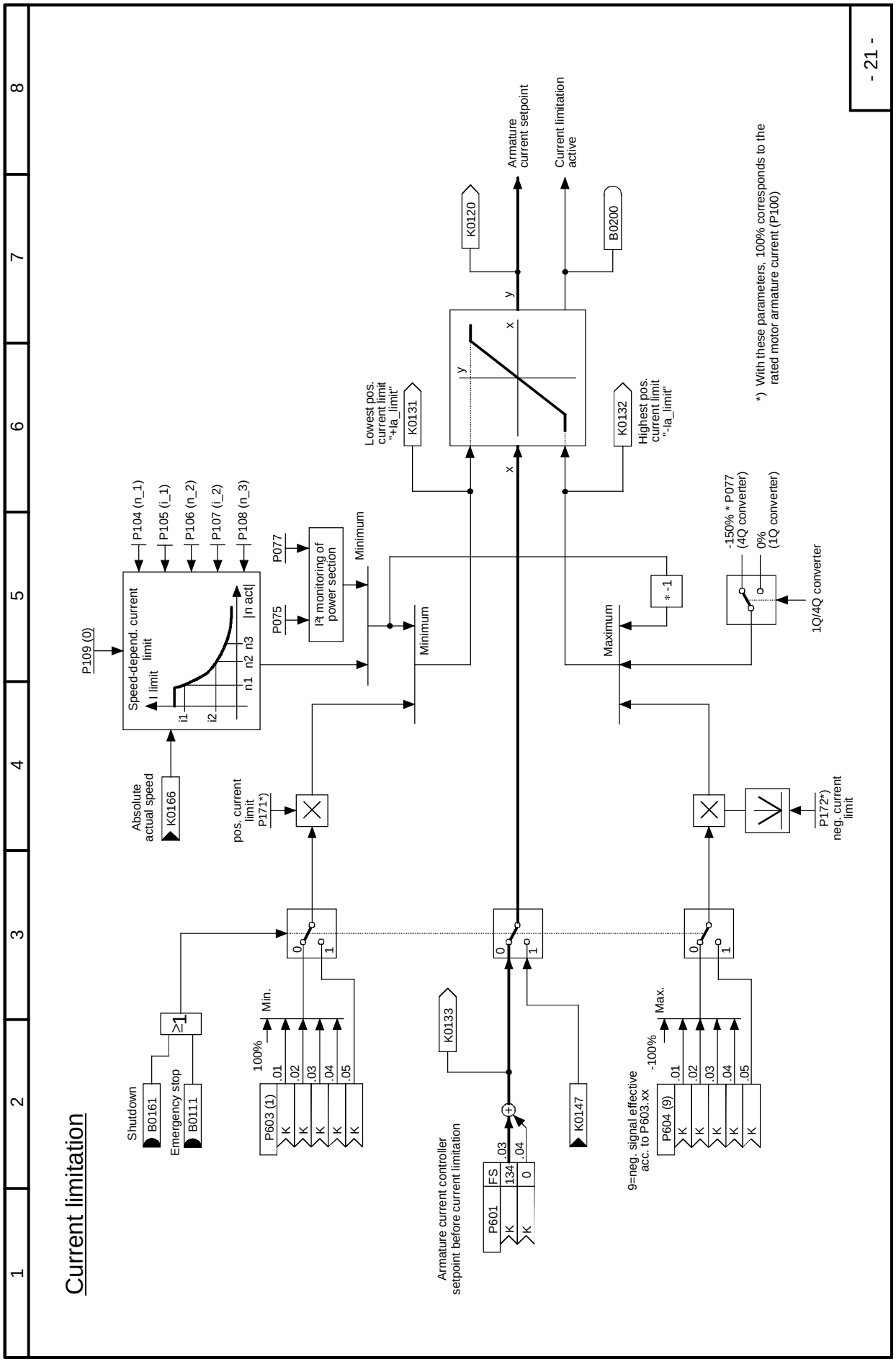
Sheet 19 Friction compensation
Compensation of moment of inertia (dv/dt injection)



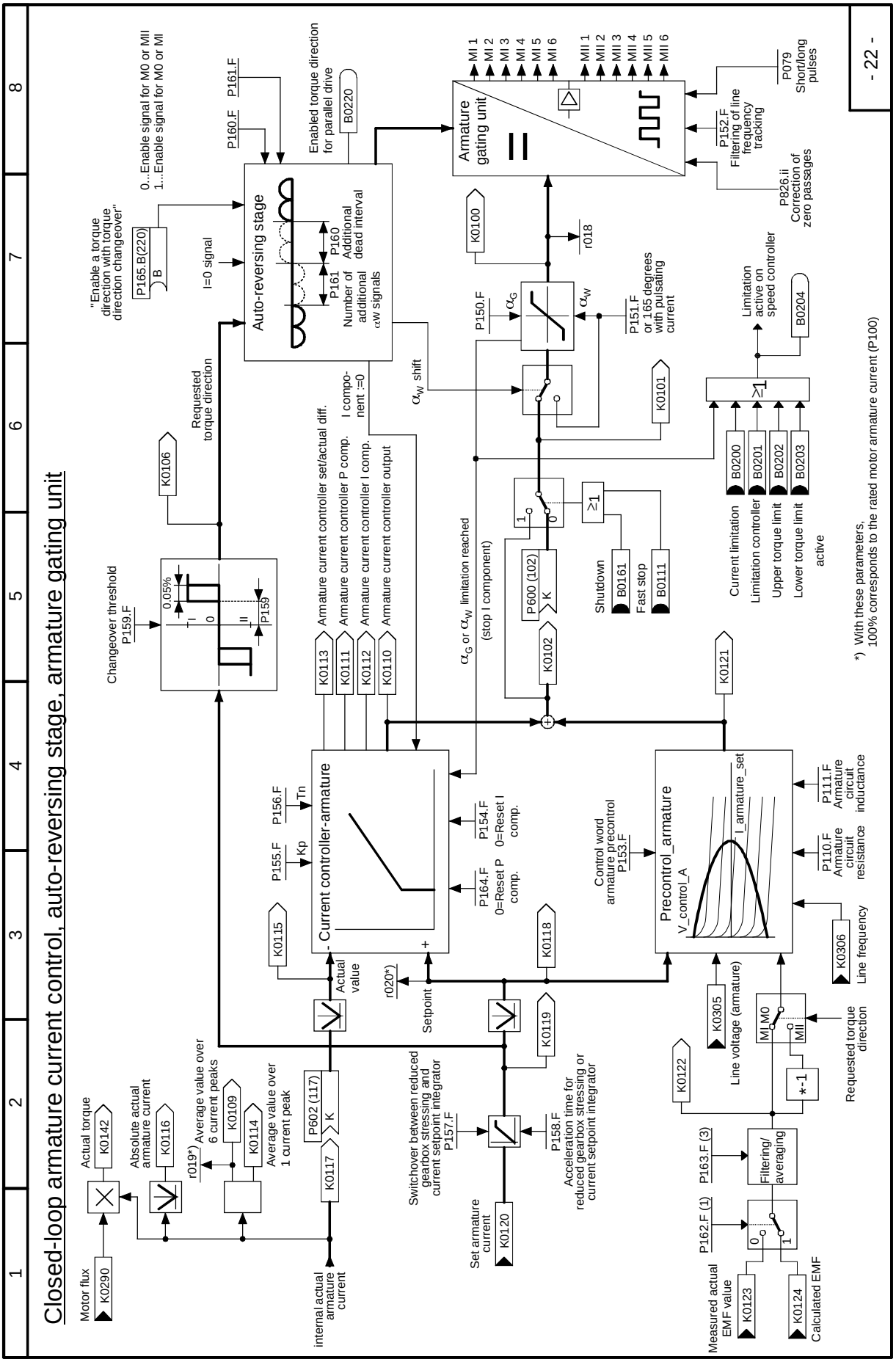
Sheet 20 Torque limitaton



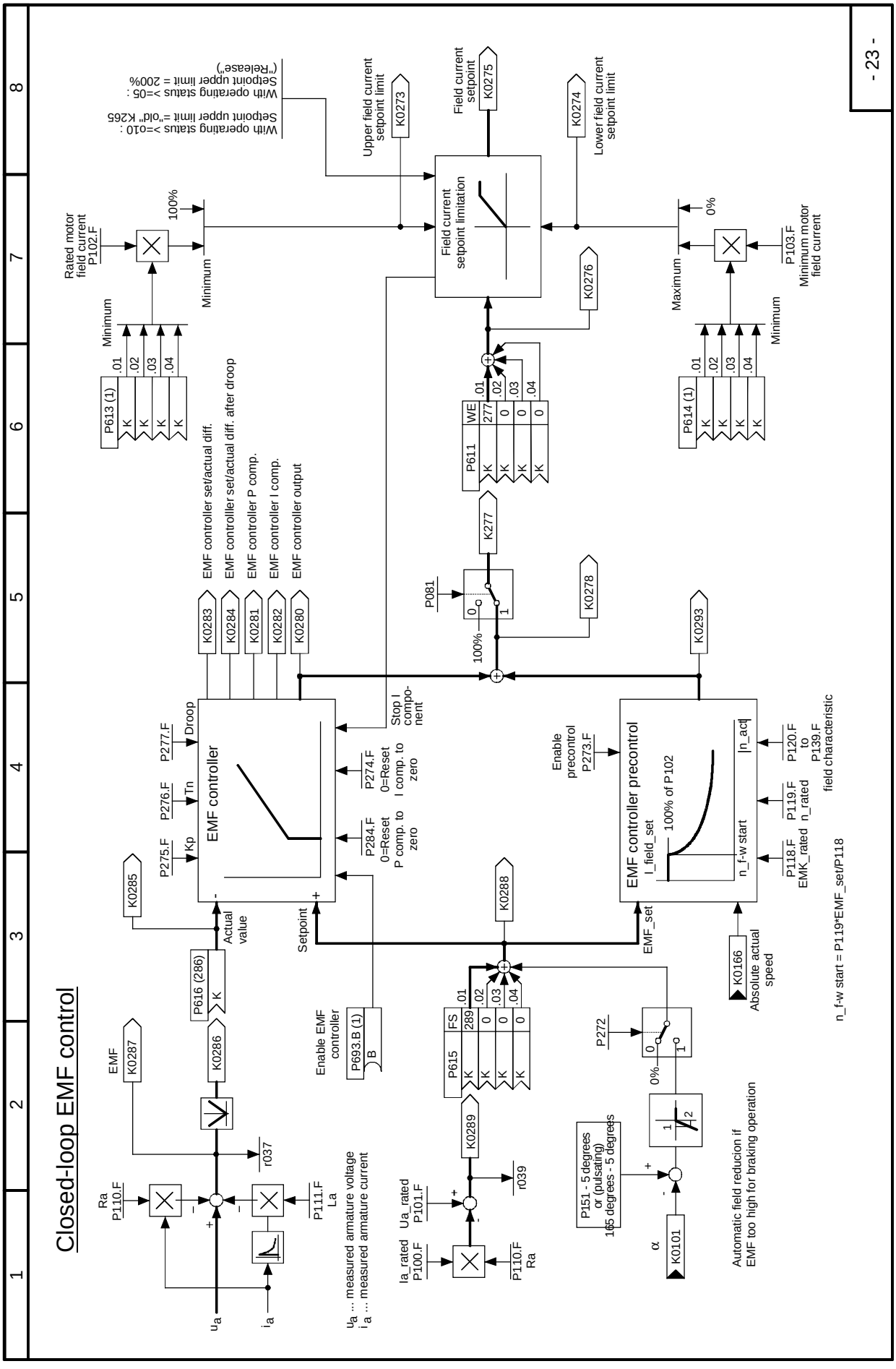
Sheet 21 Current limitation



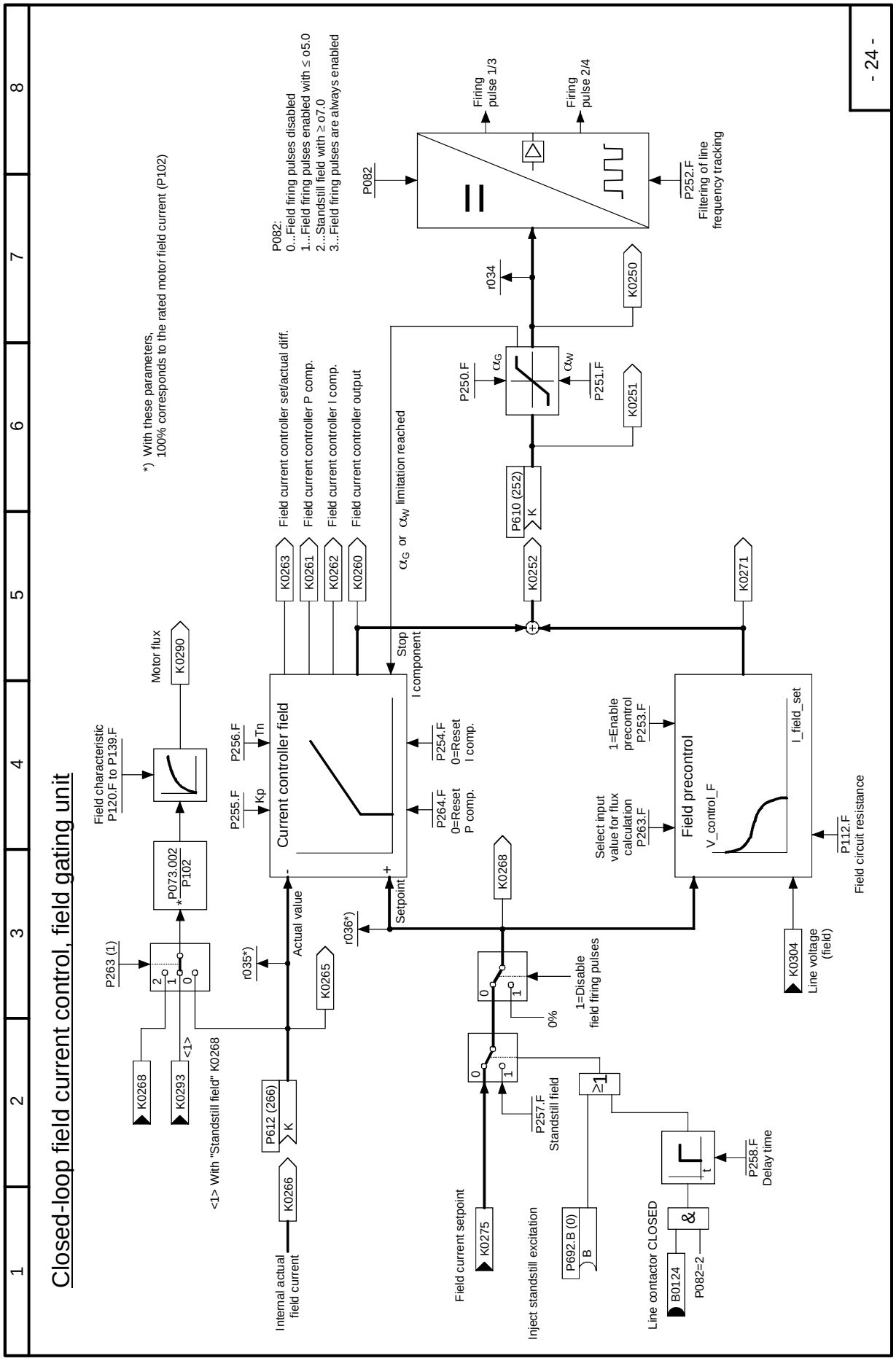
Sheet 22 Closed-loop armature current control, auto-reversing stage, armature gating unit



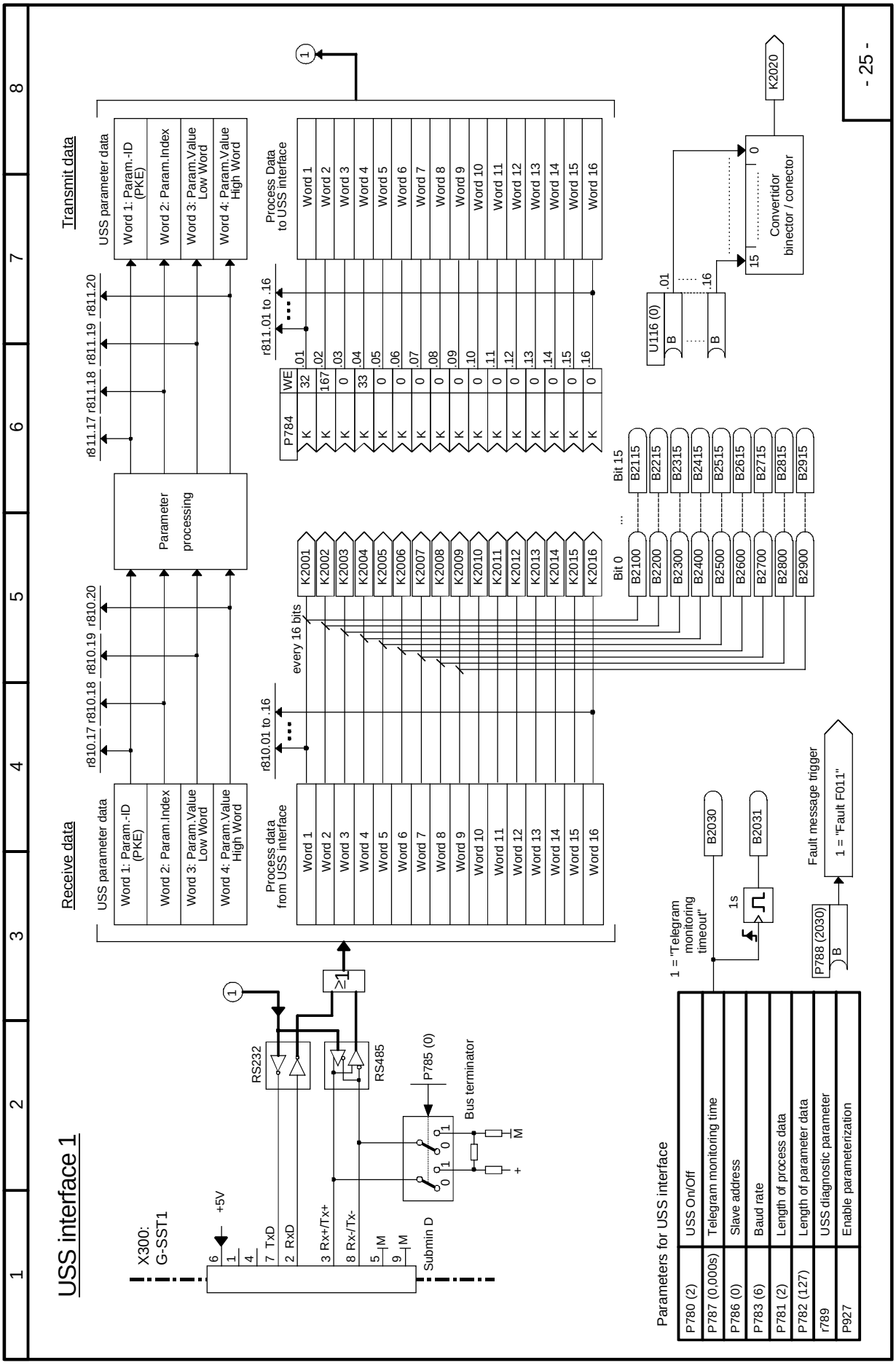
Sheet 23 Closed-loop EMF control



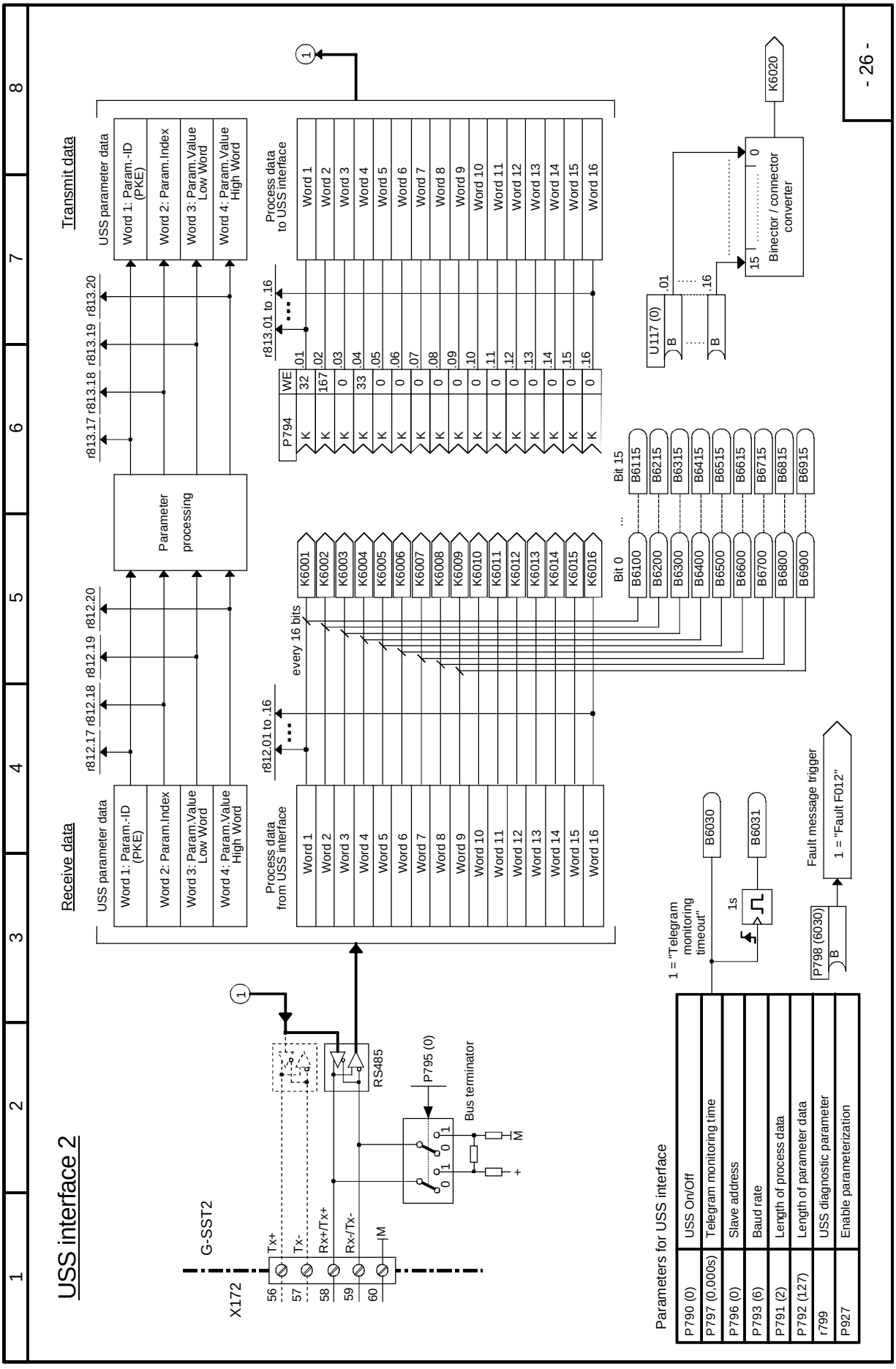
Sheet 24 Closed-loop field current control, field gating unit



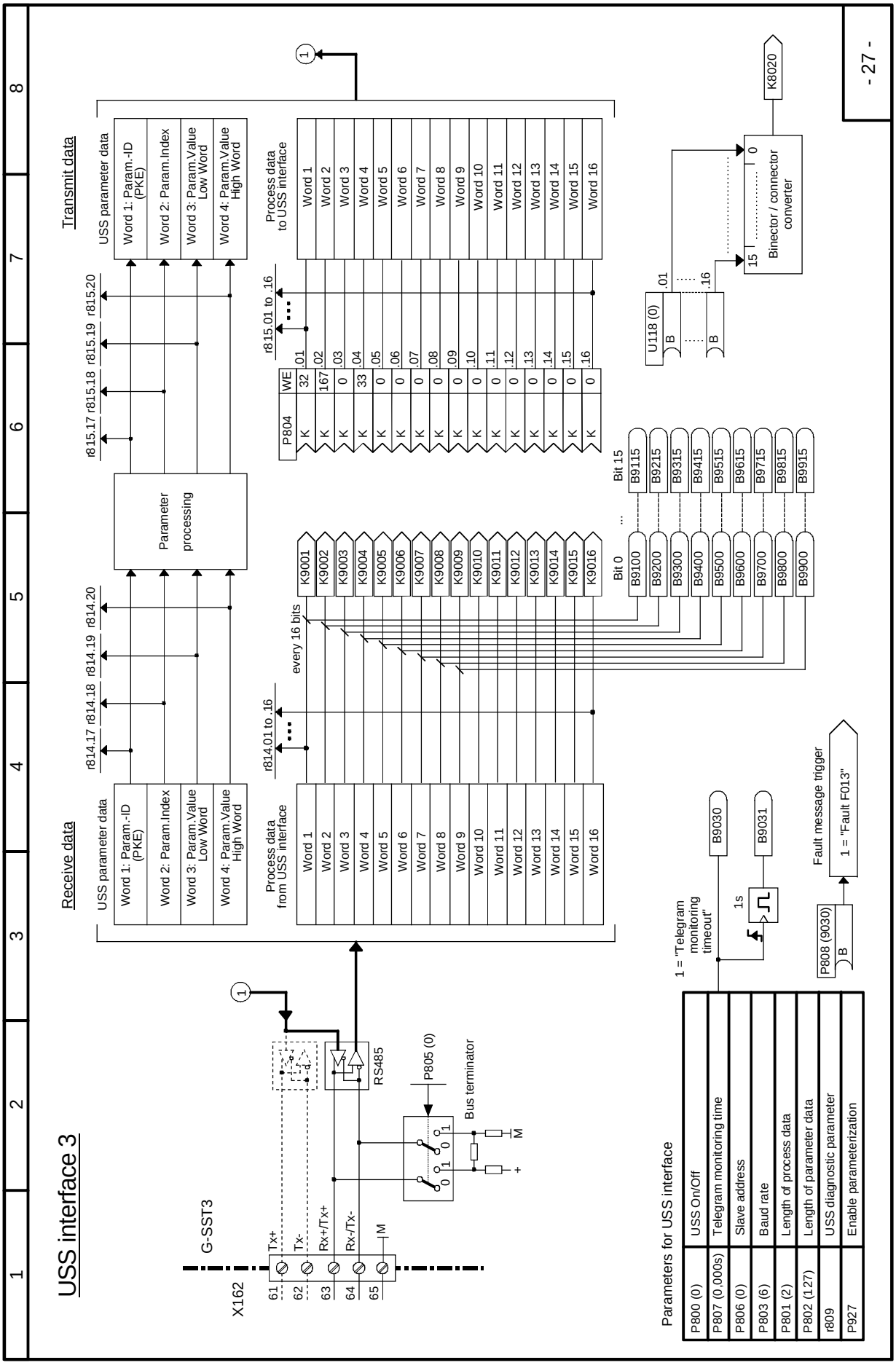
Sheet 25 USS interface 1



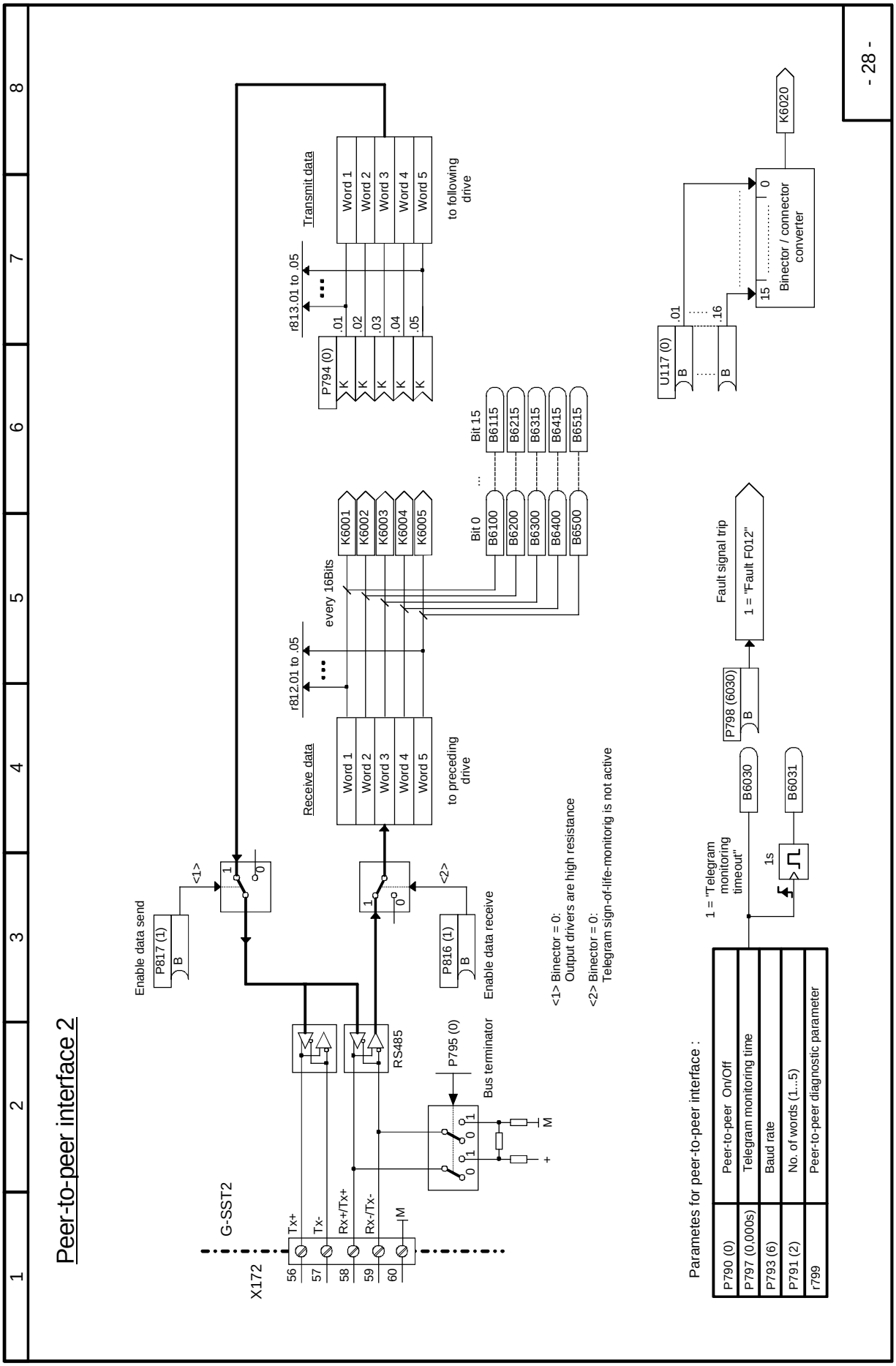
Sheet 26 USS interface 2



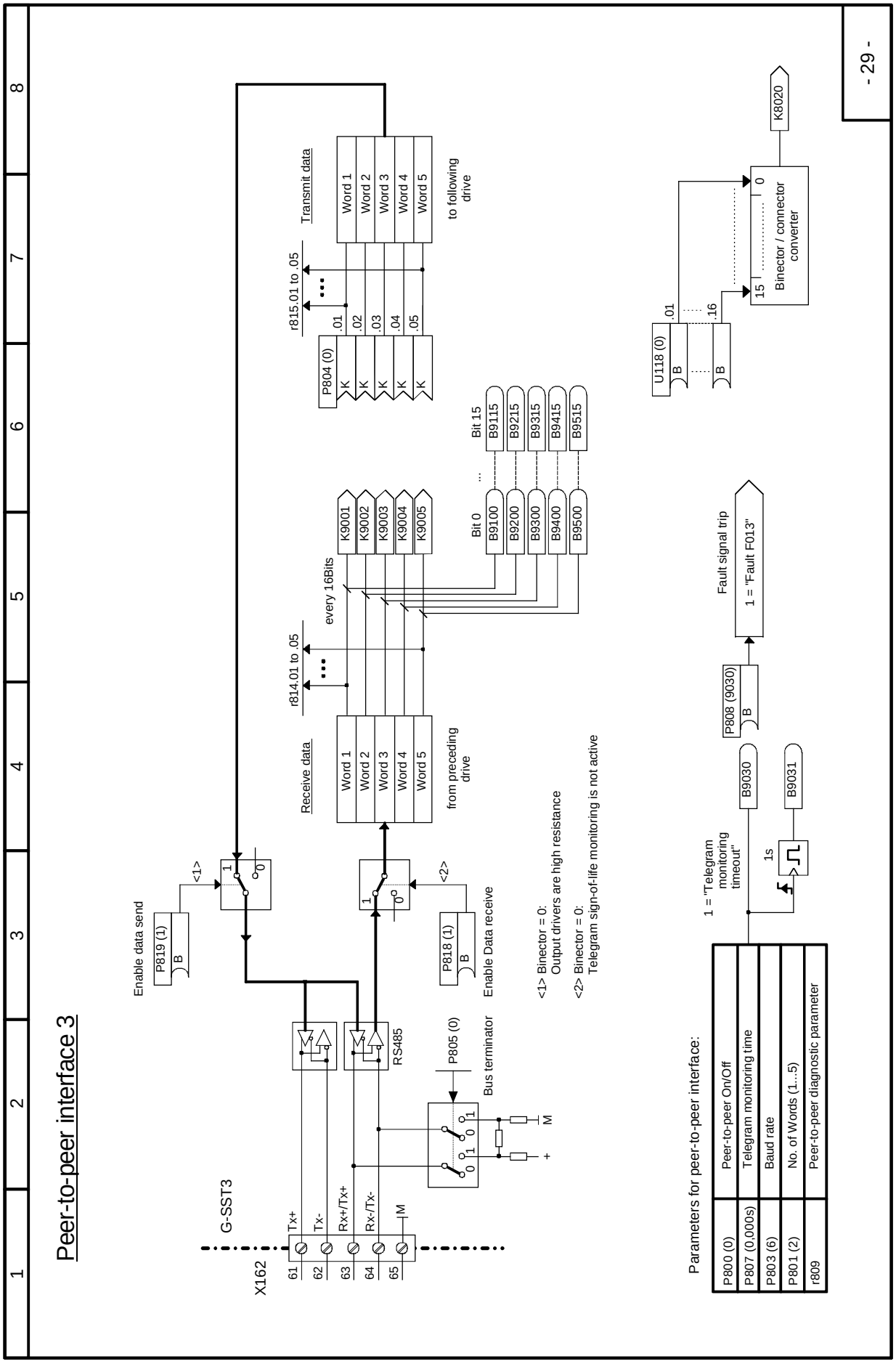
Sheet 27 USS interface 3



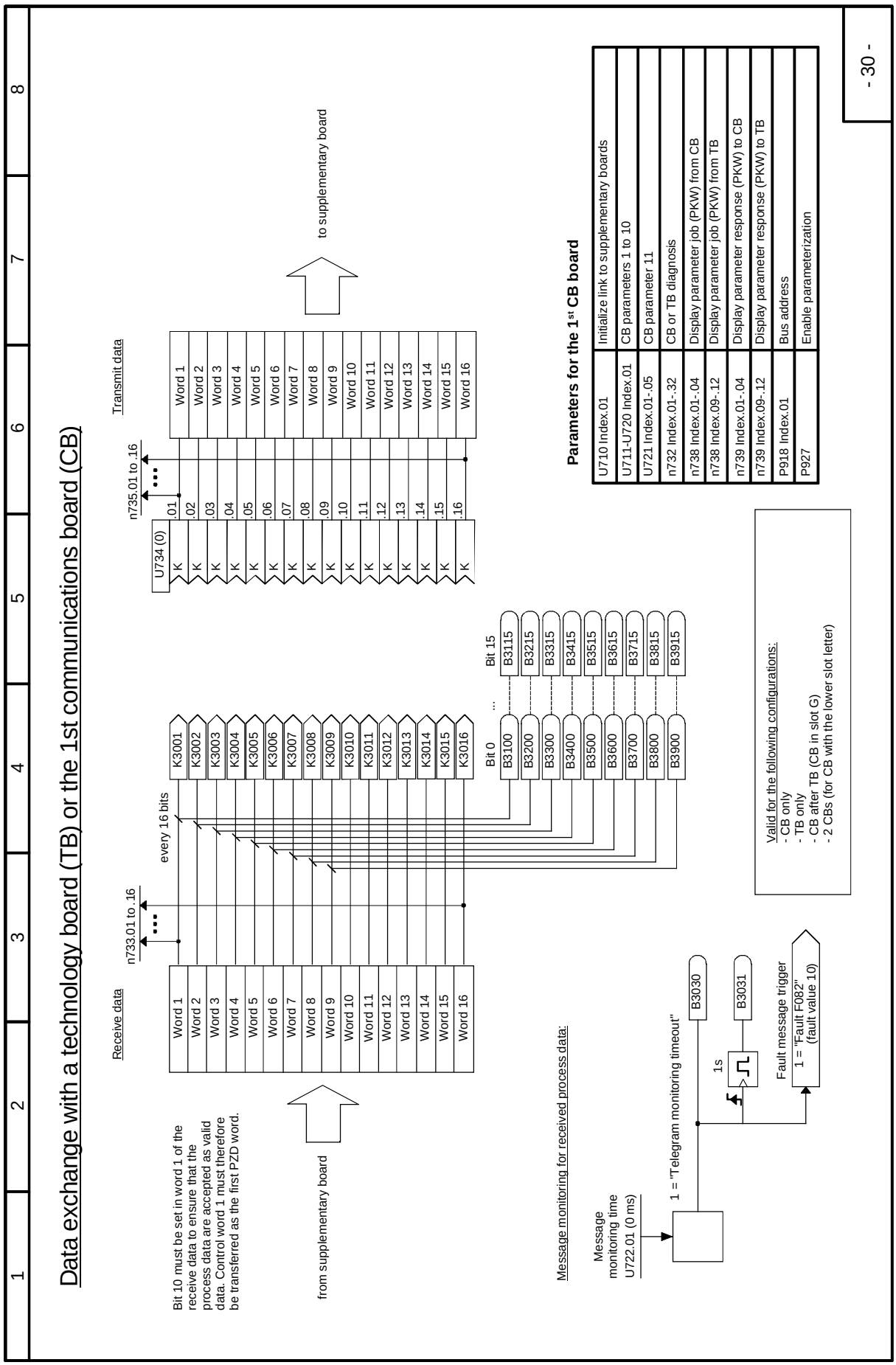
Sheet 28 Peer-to-Peer interface 2



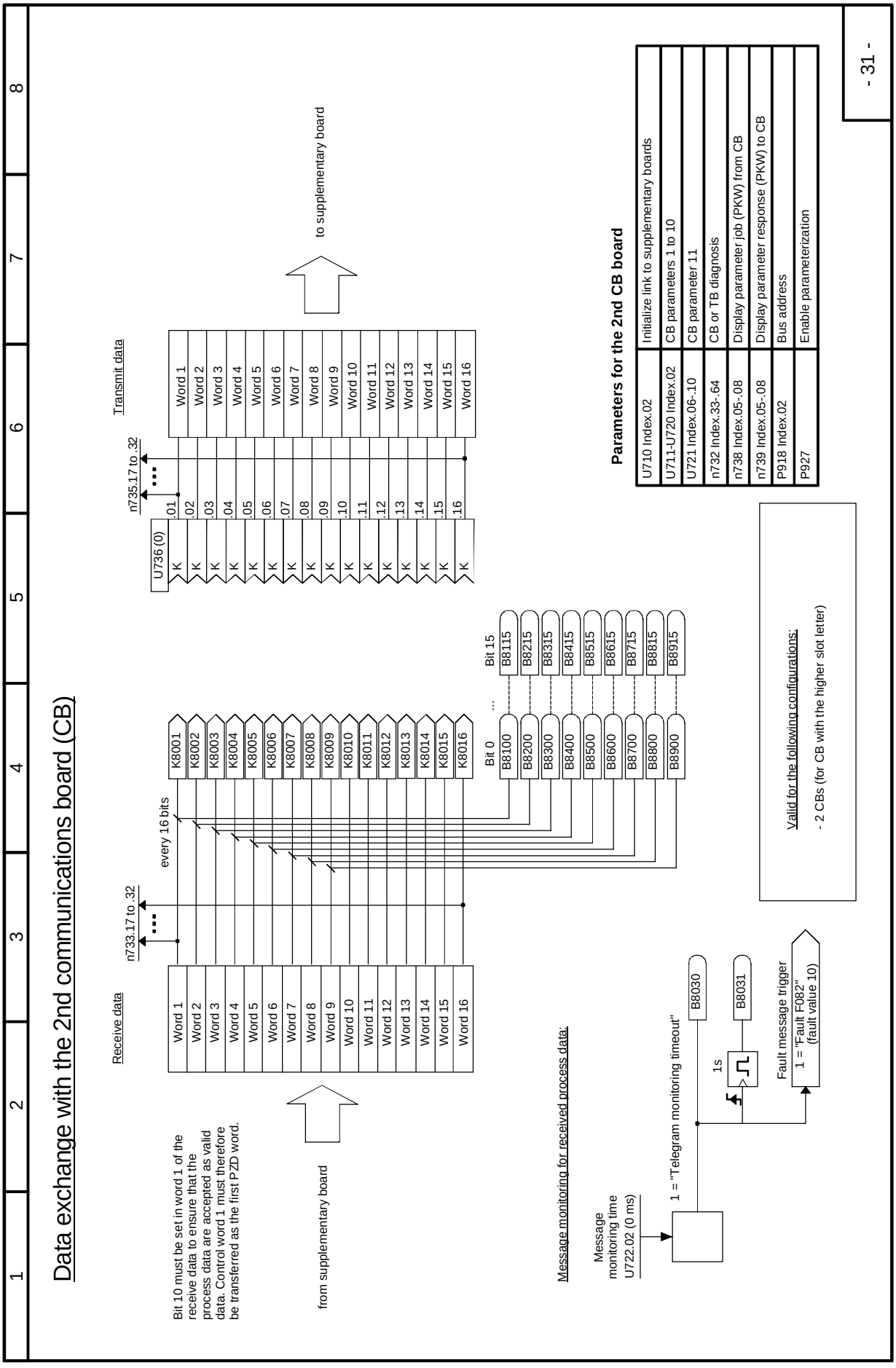
Sheet 29 Peer-to-Peer interface 3



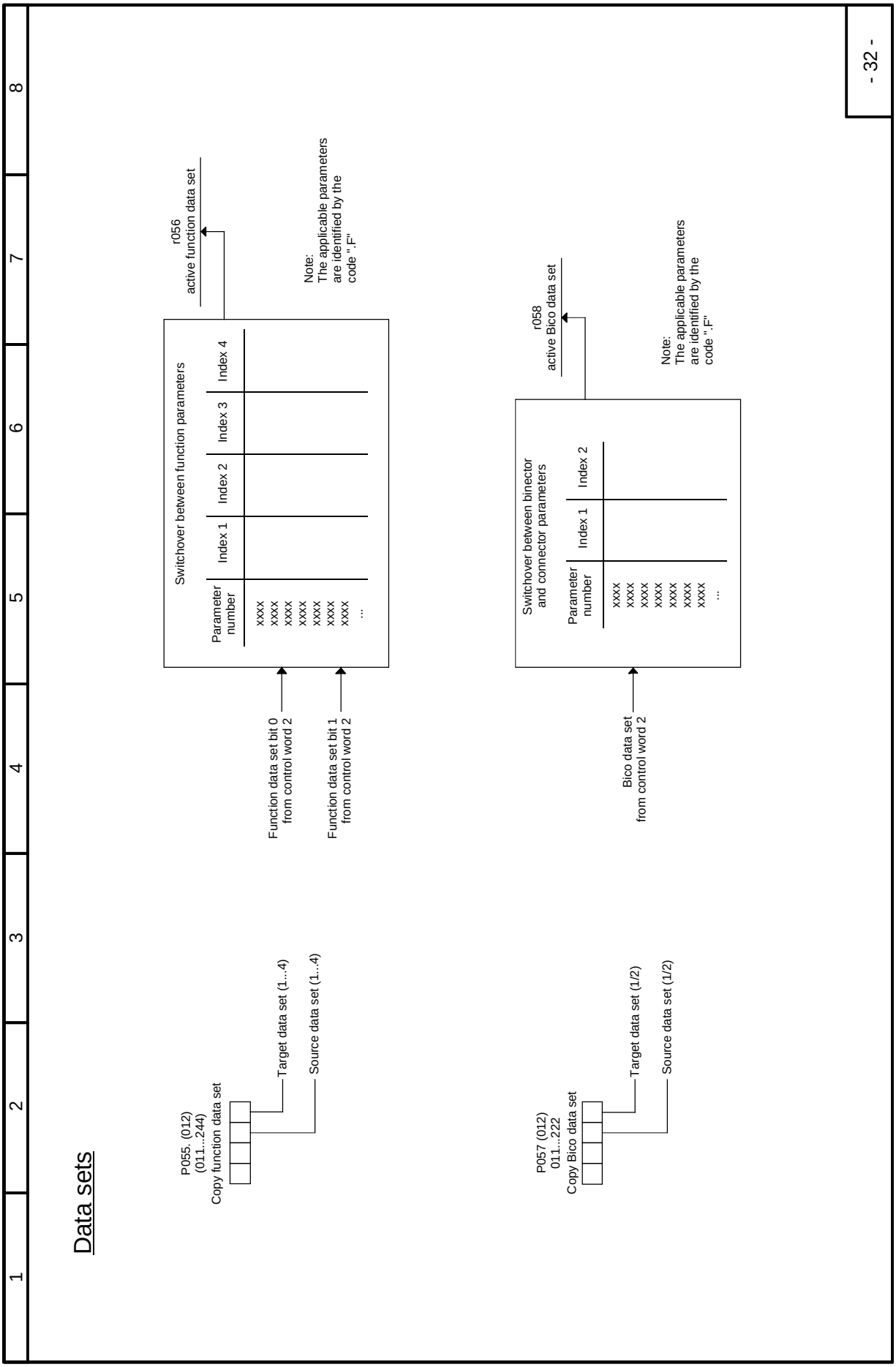
Sheet 30 Data exchange with a technology board (TB) or the 1st communications board (CB)



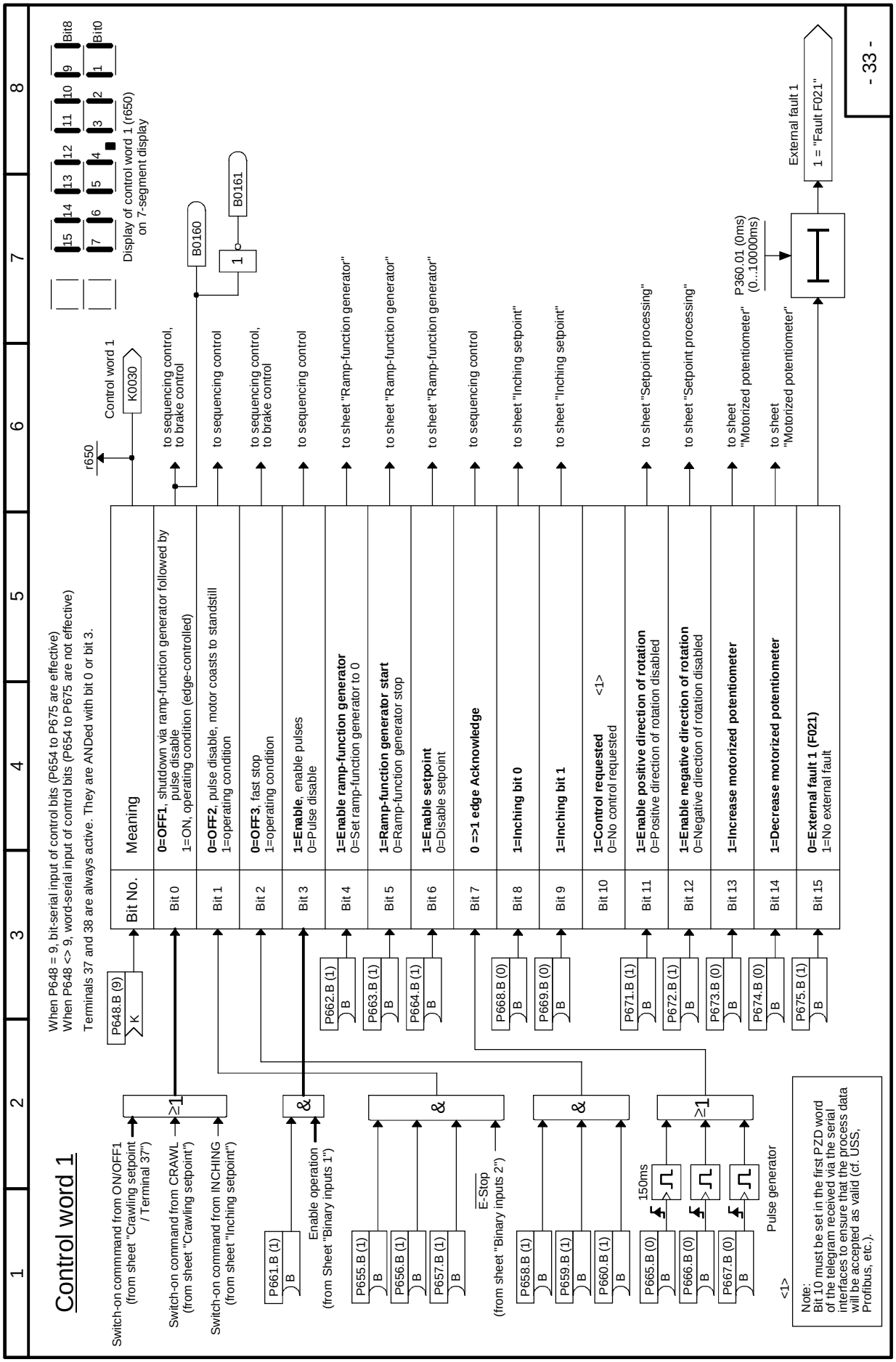
Sheet 31 Data exchange with the 2nd communications board (CB)



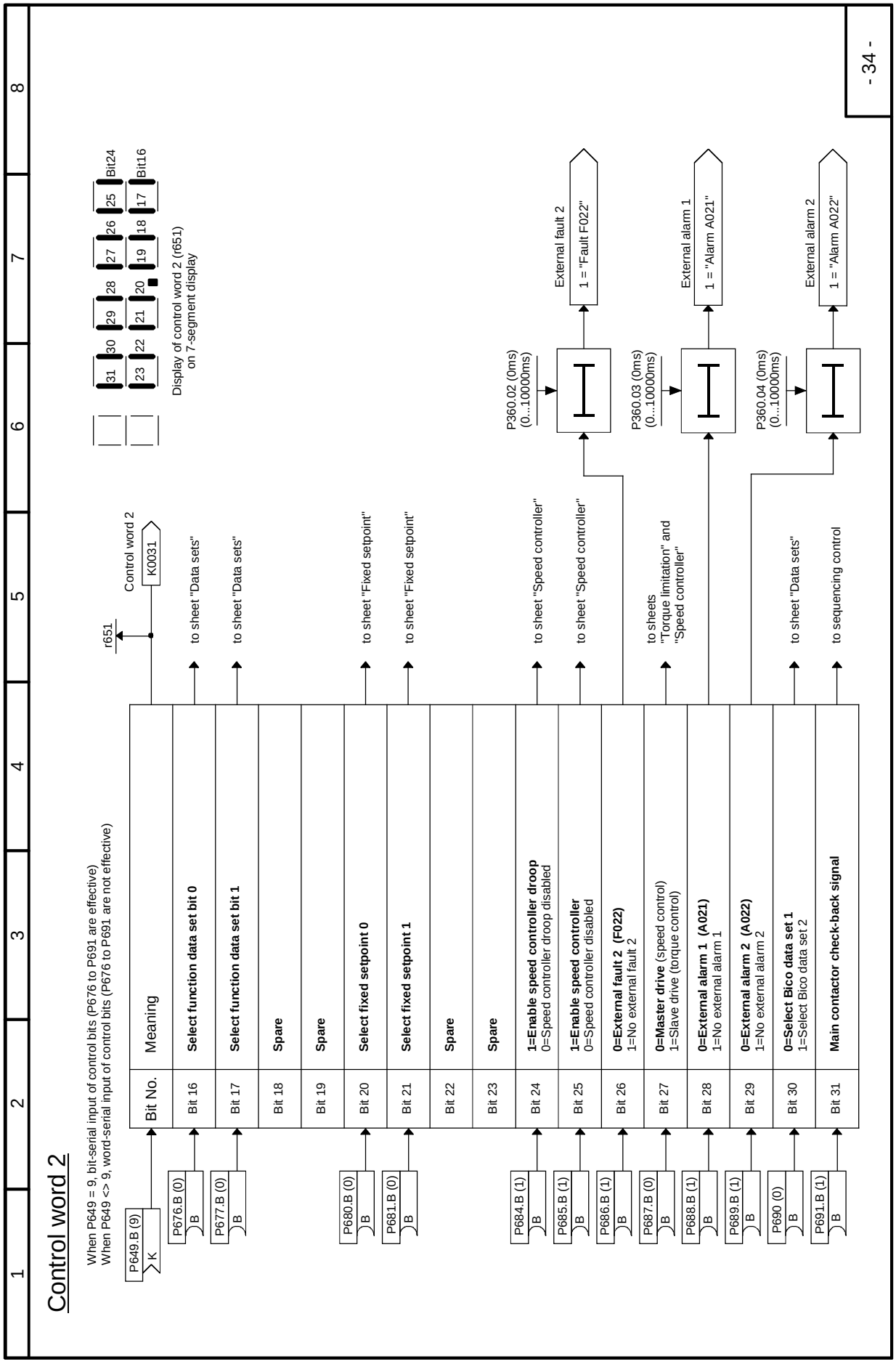
Sheet 32 Data sets



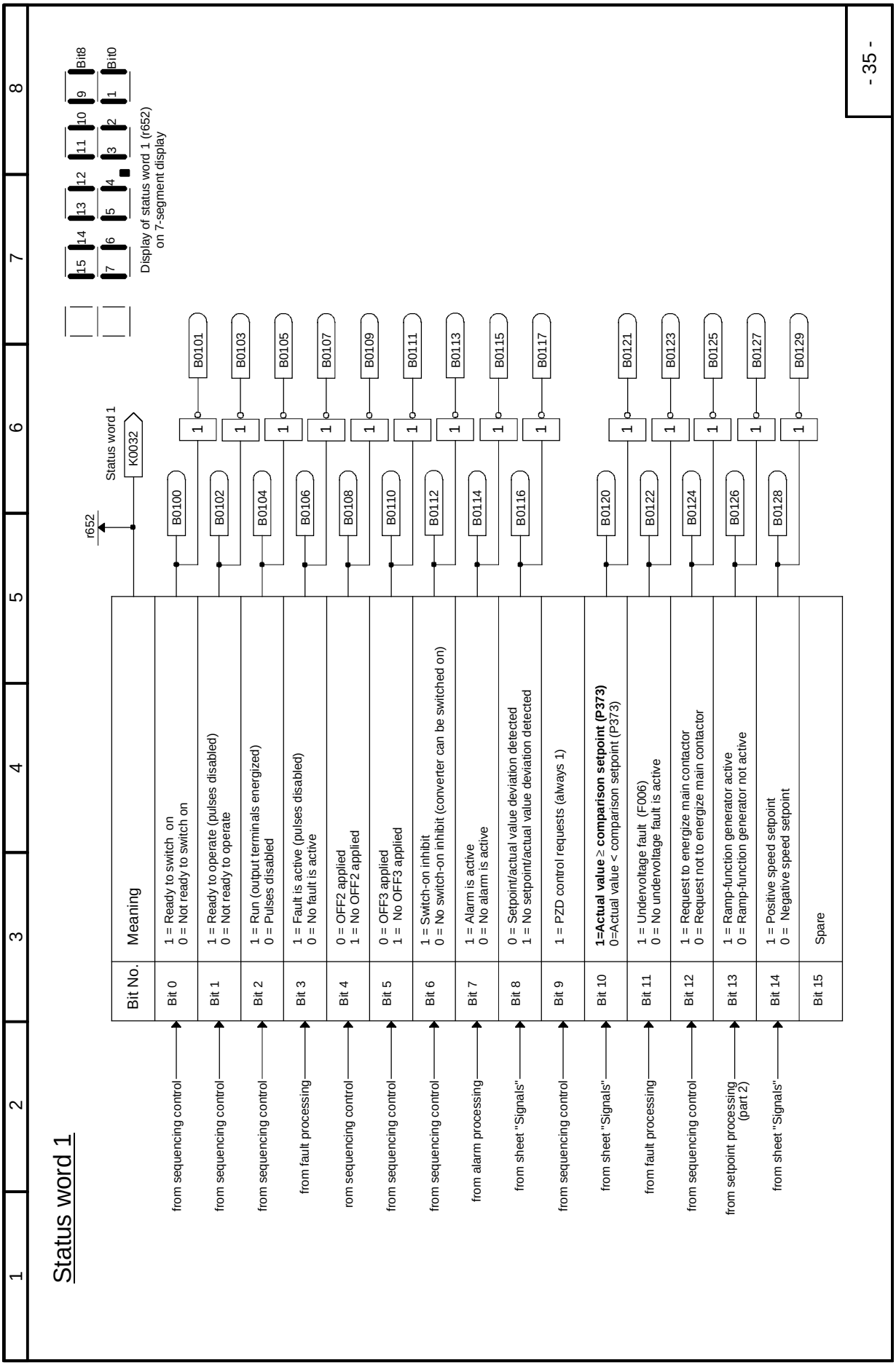
Sheet 33 Control word 1



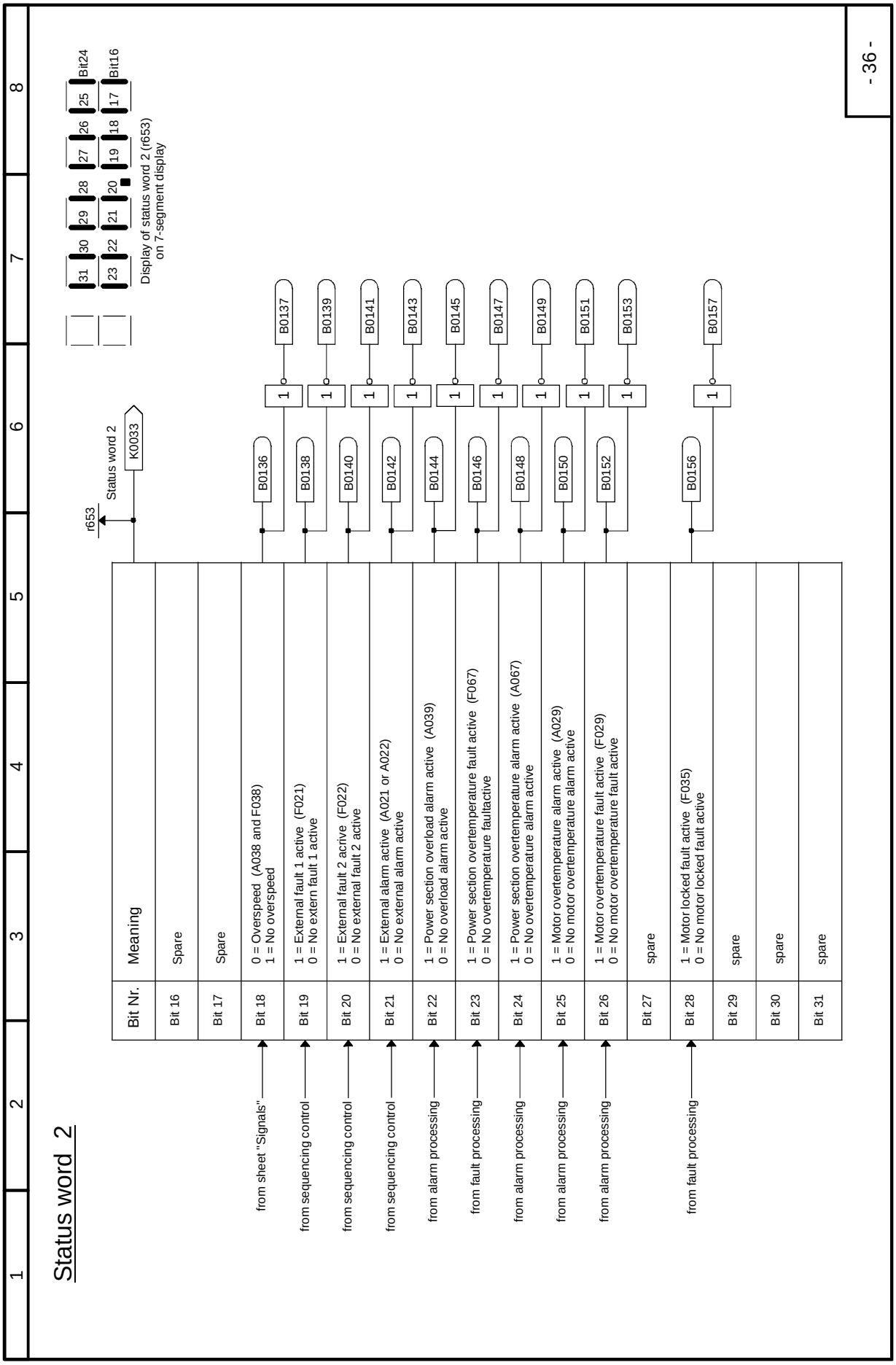
Sheet 34 Control word 2



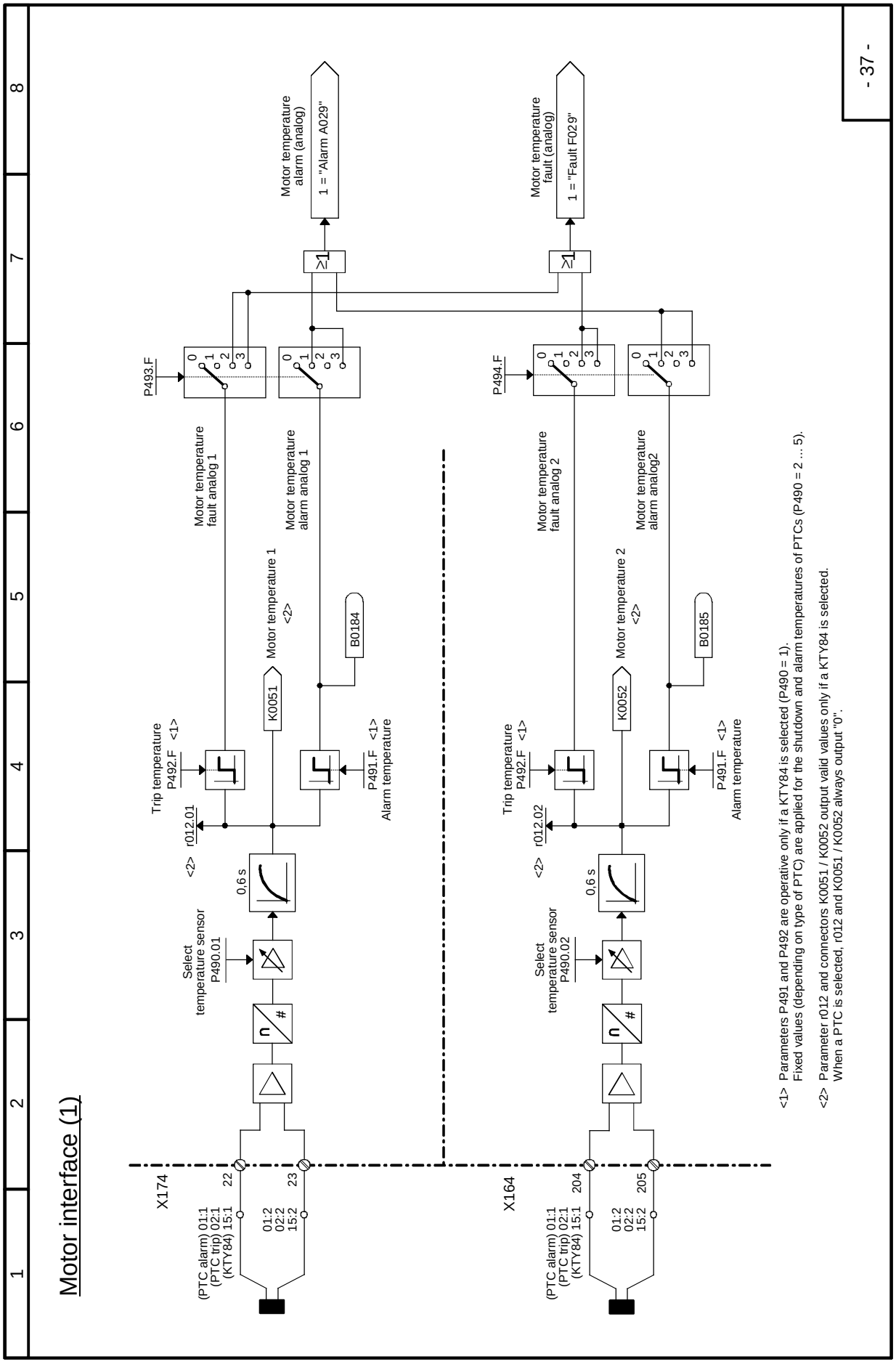
Sheet 35 Status word 1



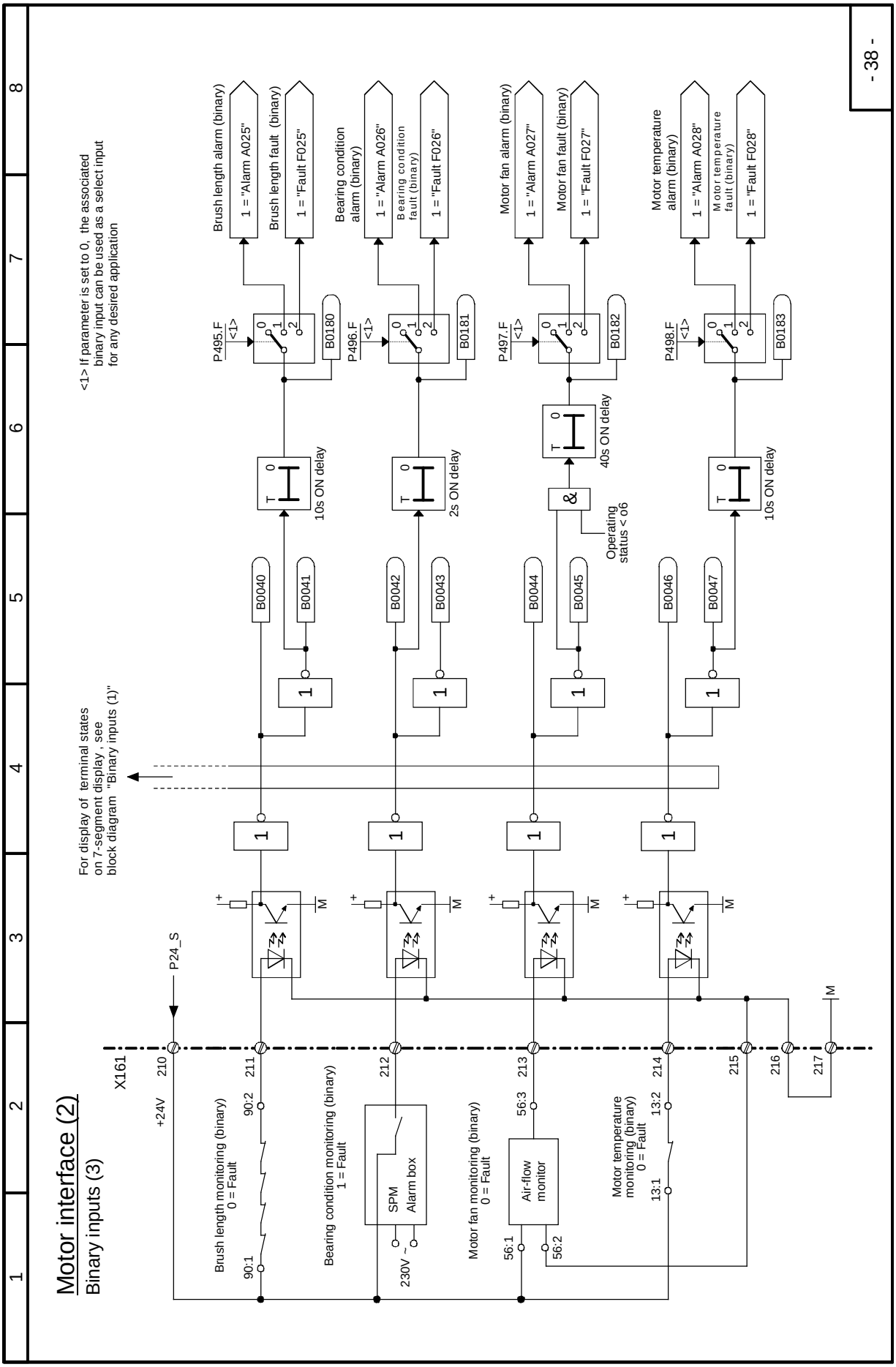
Sheet 36 Status word 2



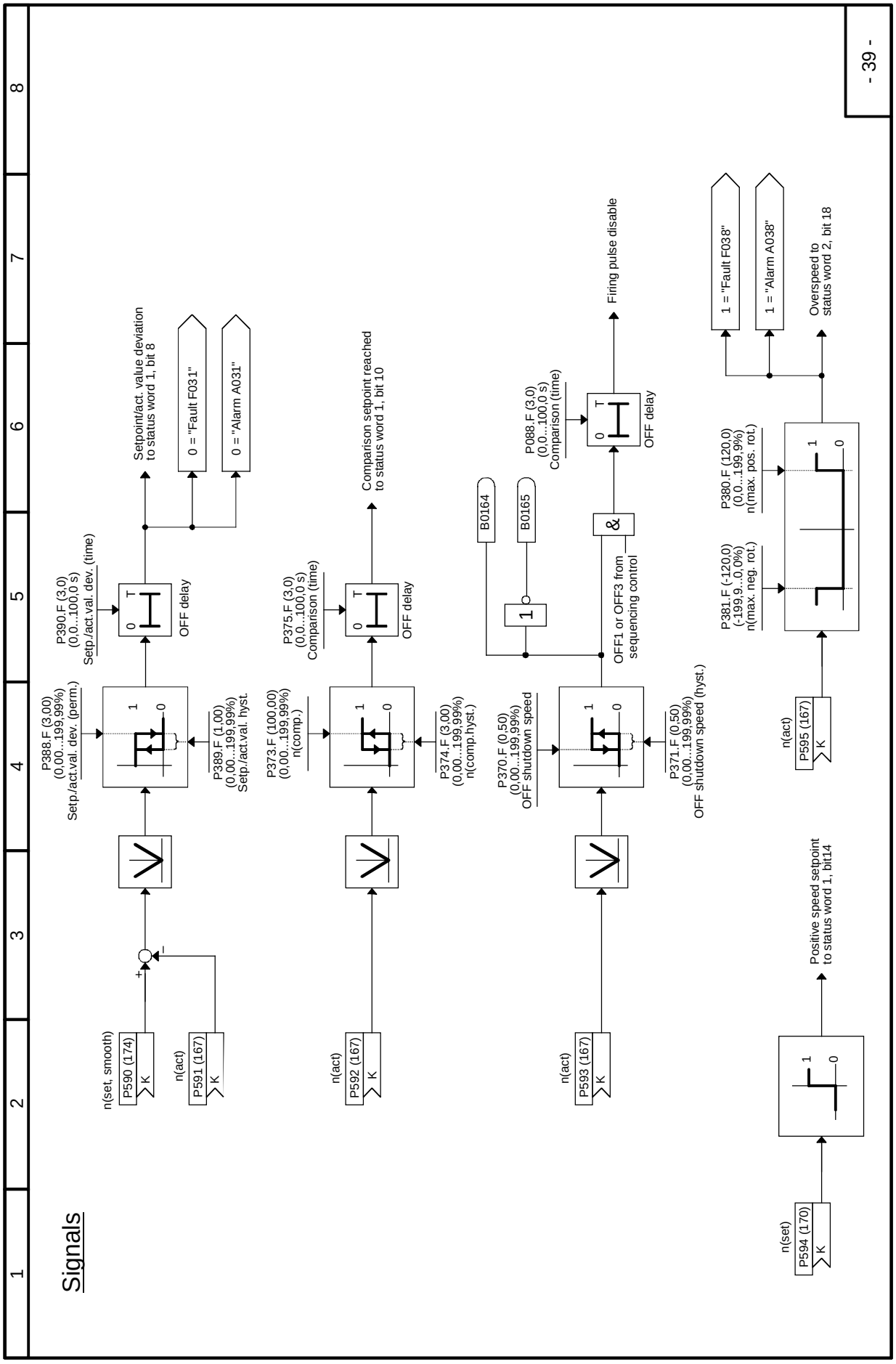
Sheet 37 Motor interface (1)



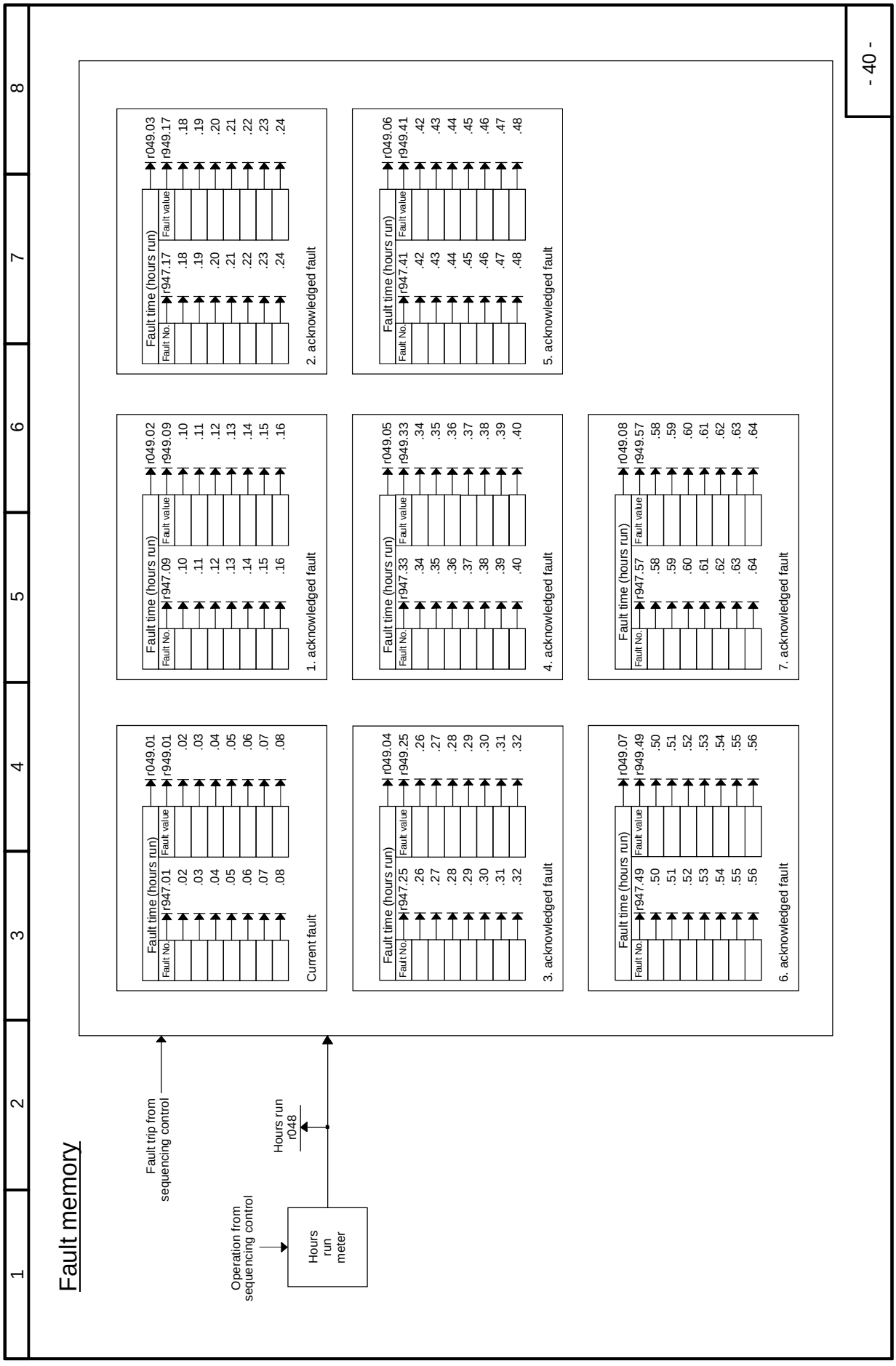
Sheet 38 Motor interface (2) / binary inputs, terminals 211 to 214



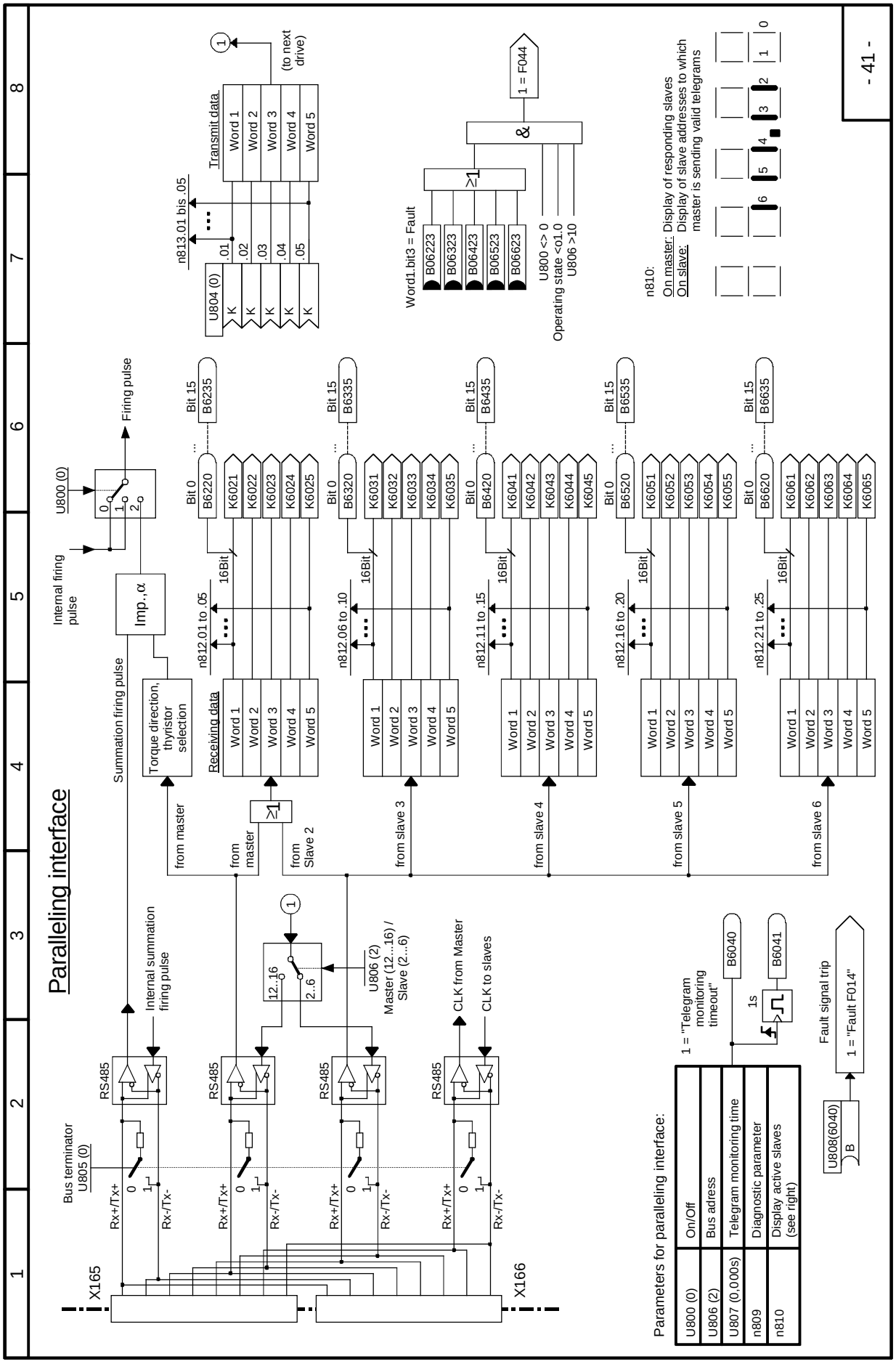
Sheet 39 Signals



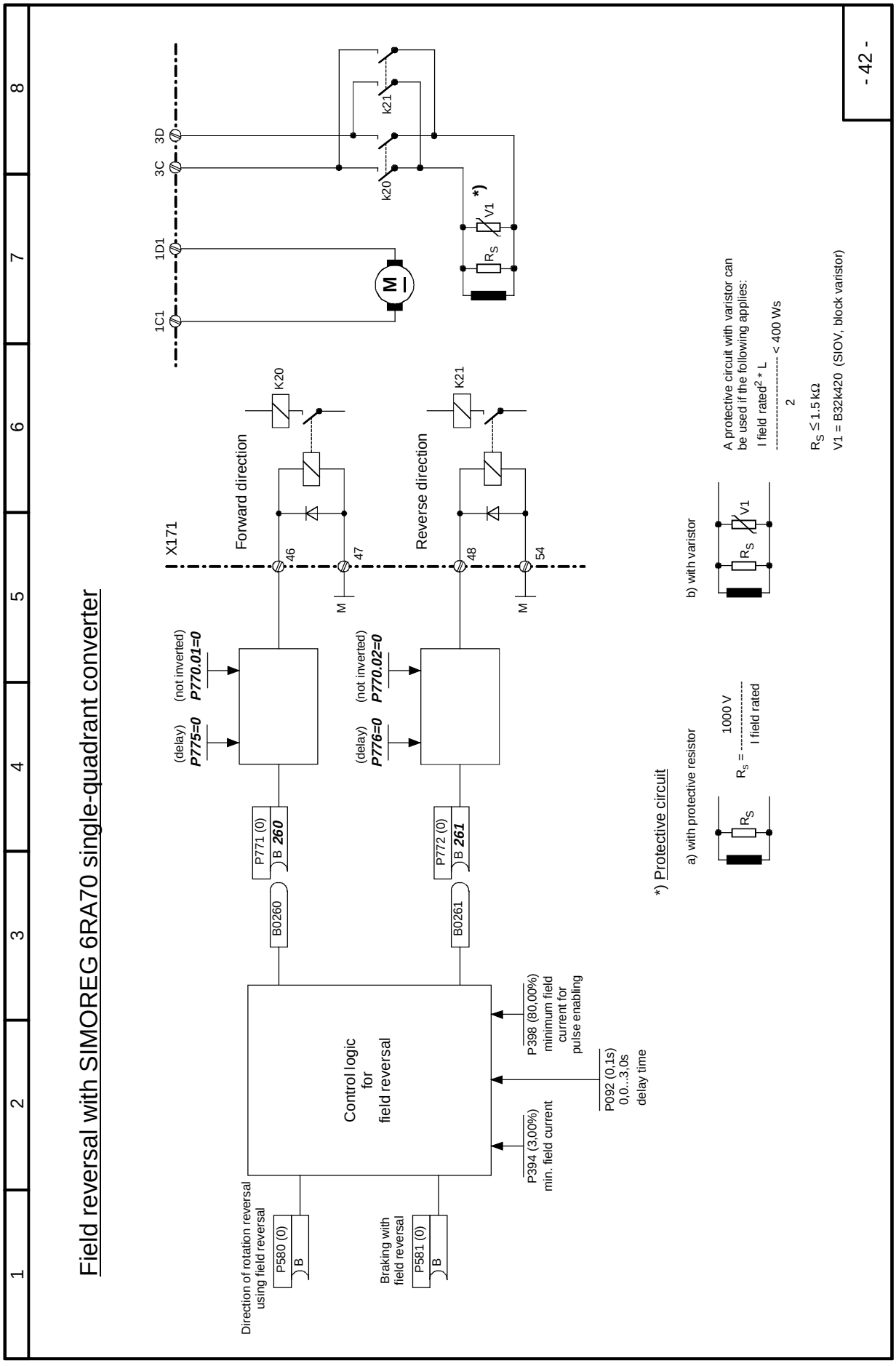
Sheet 40 Fault memory



Sheet 41 Paralleling interface



Sheet 42 Field reversal with SIMOREG 6RA70 single-quadrant converter



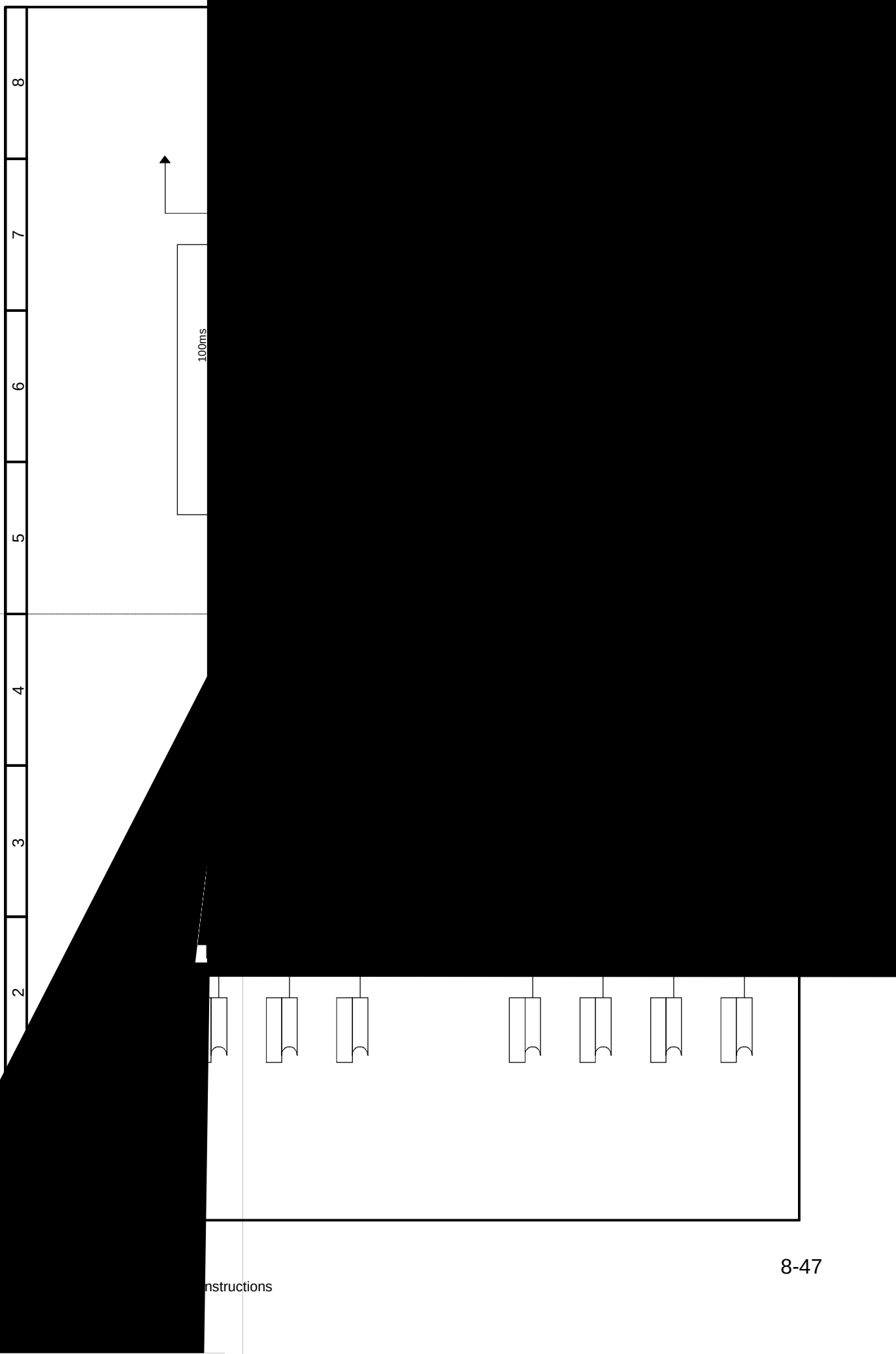
Freely assignable function blocks Sheets B1 to B24

(Technology software in the basic converter, S00 option)

NOTE

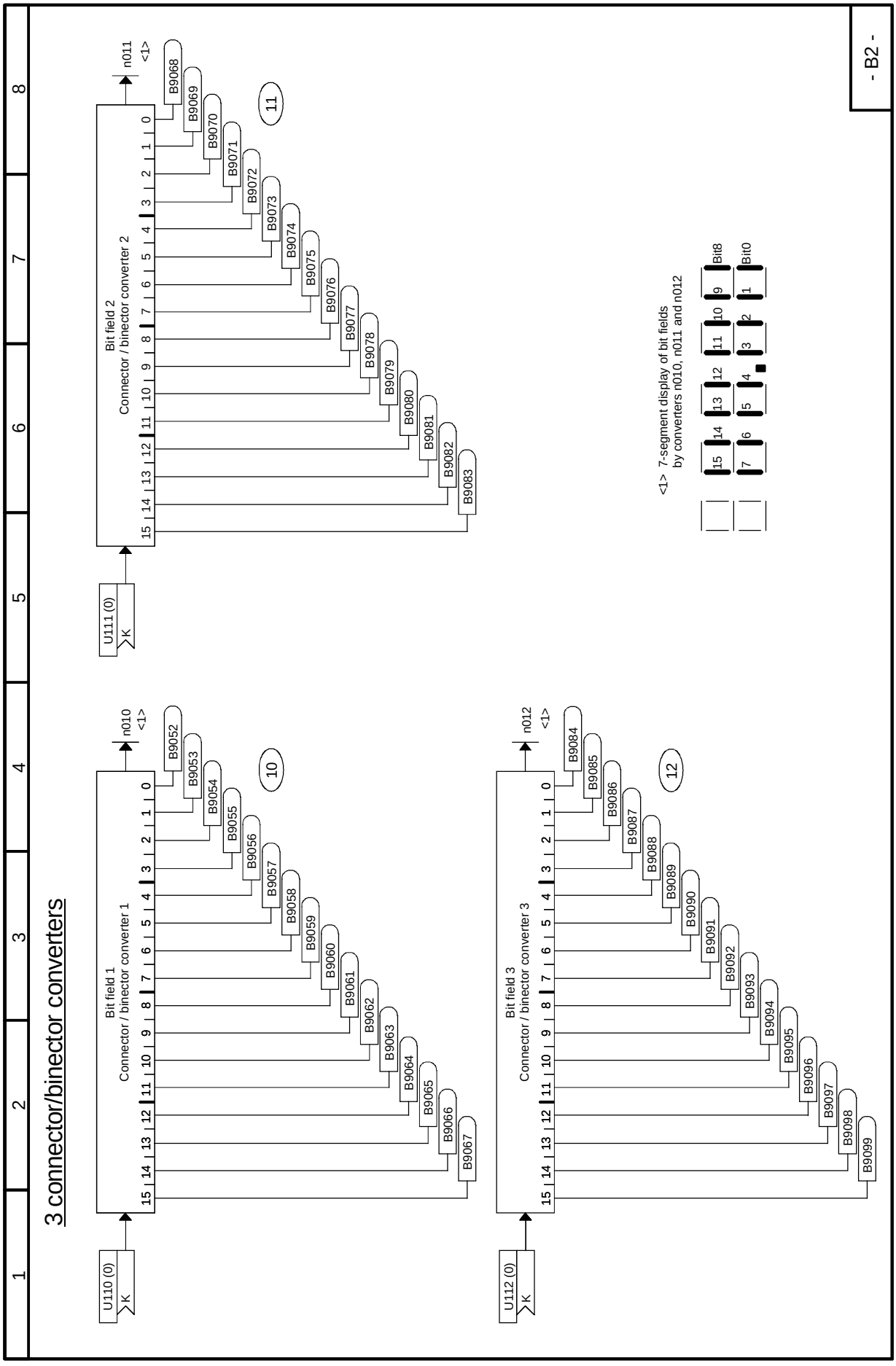
Freely assignable function blocks are enabled in parameter U977.
For enabling instructions, please refer to Section 11, Parameter List, description of parameters U977 and n978.

Sheet B1 Voltage m

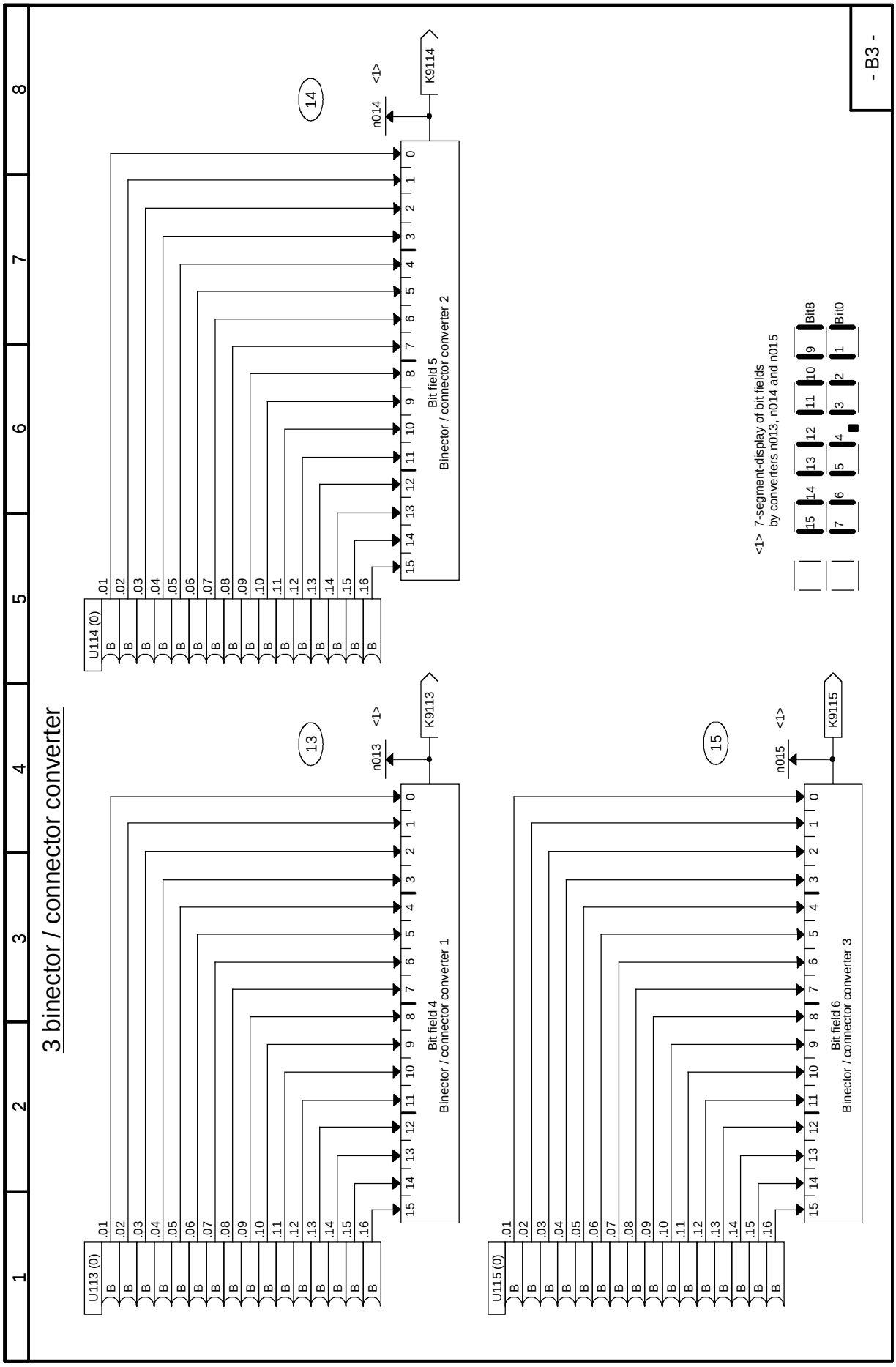


nstructions

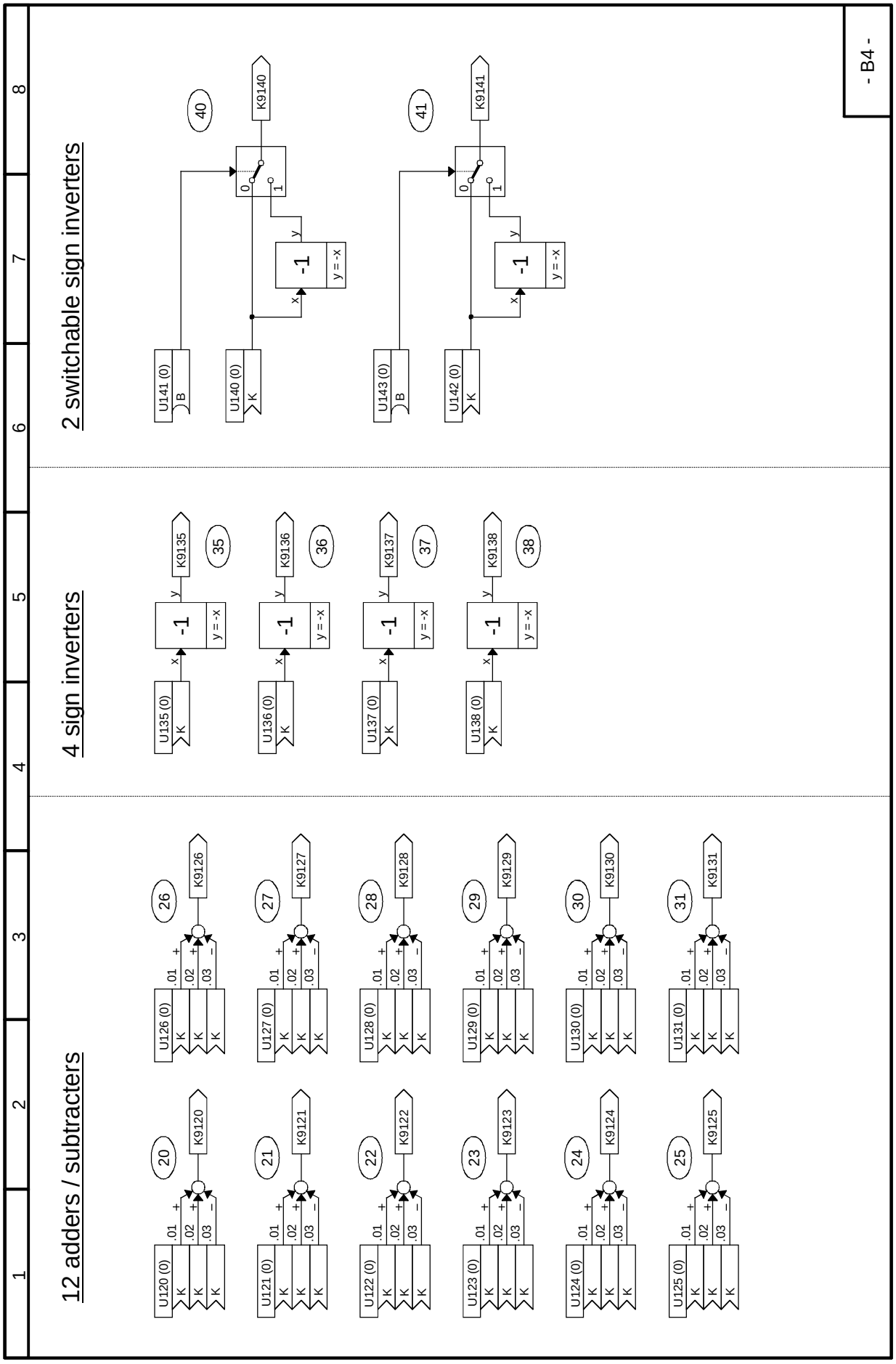
Sheet B2 Connector / binector converters



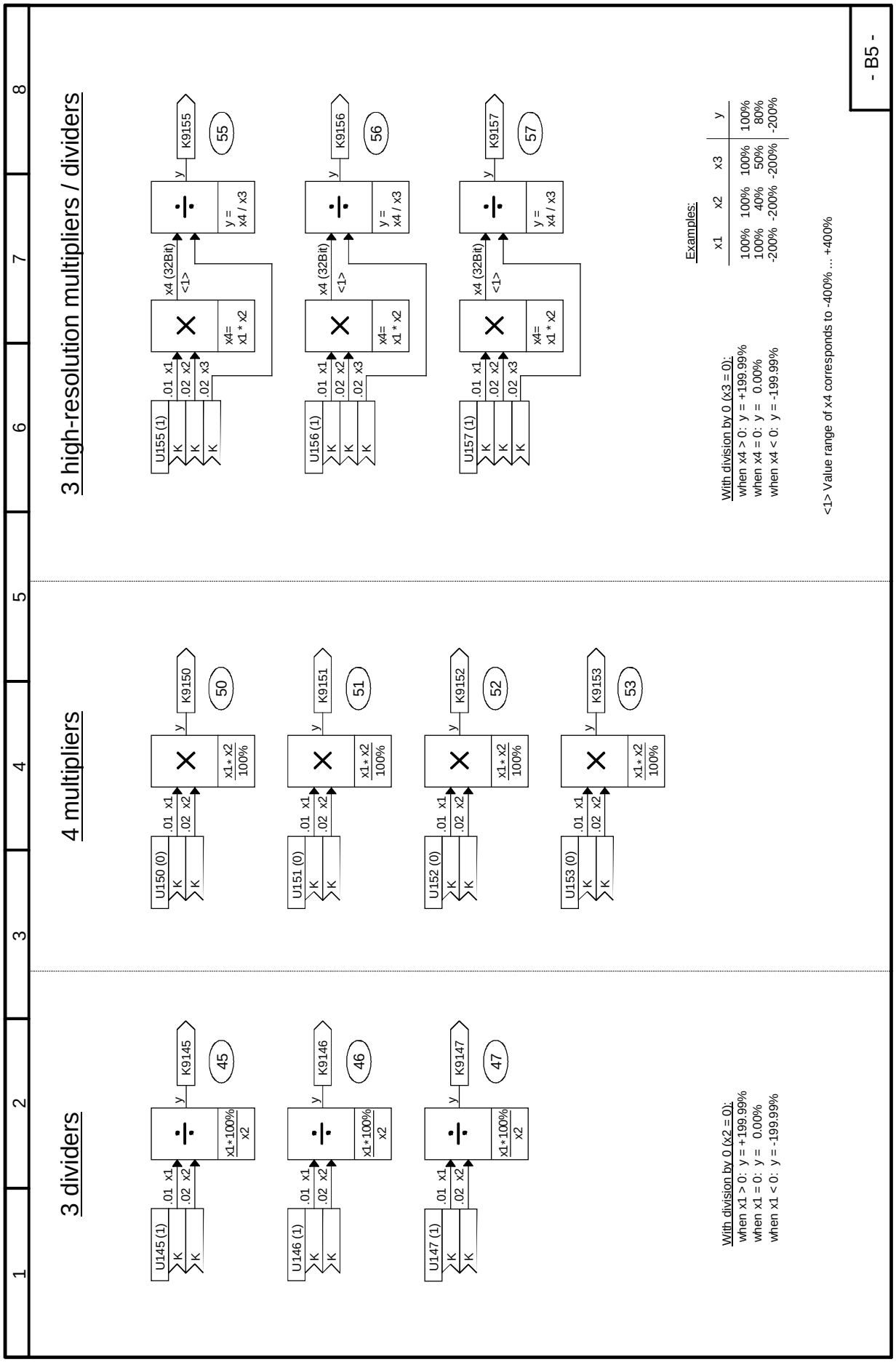
Sheet B3 Binector / connector converters



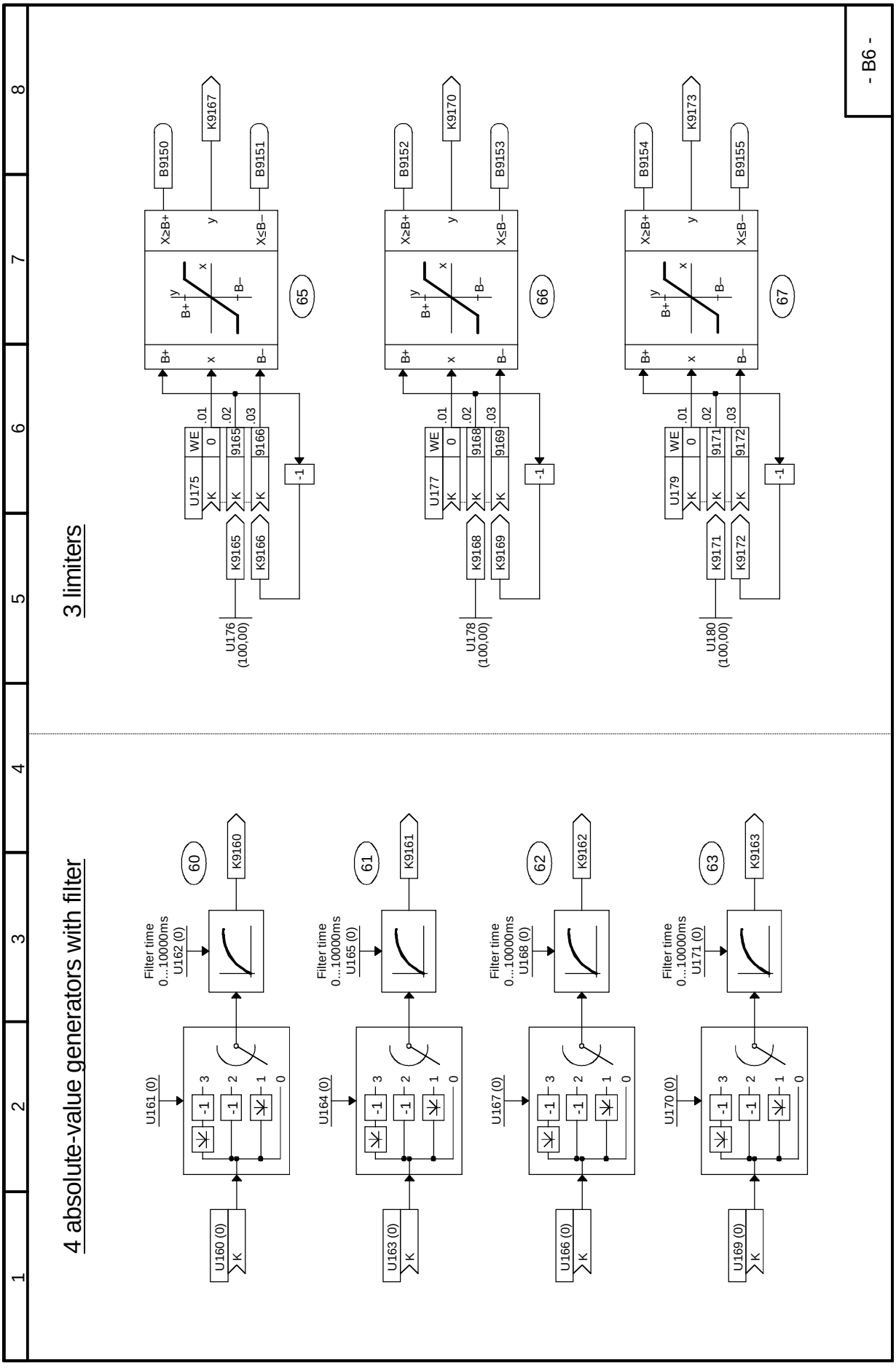
Sheet B4 Adders / subtracters, sign inverters



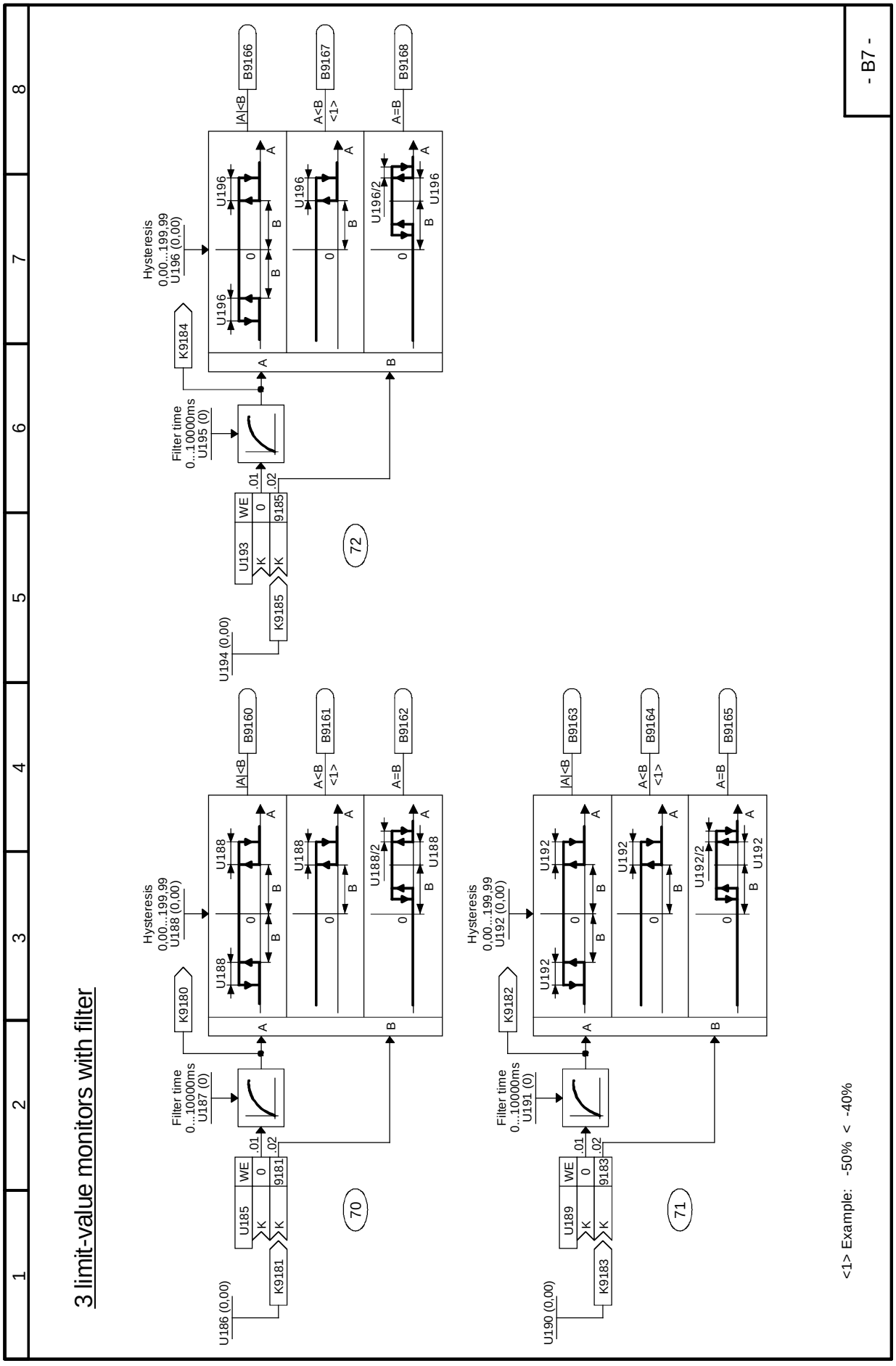
Sheet B5 Dividers, multipliers, high-resolution multipliers / dividers



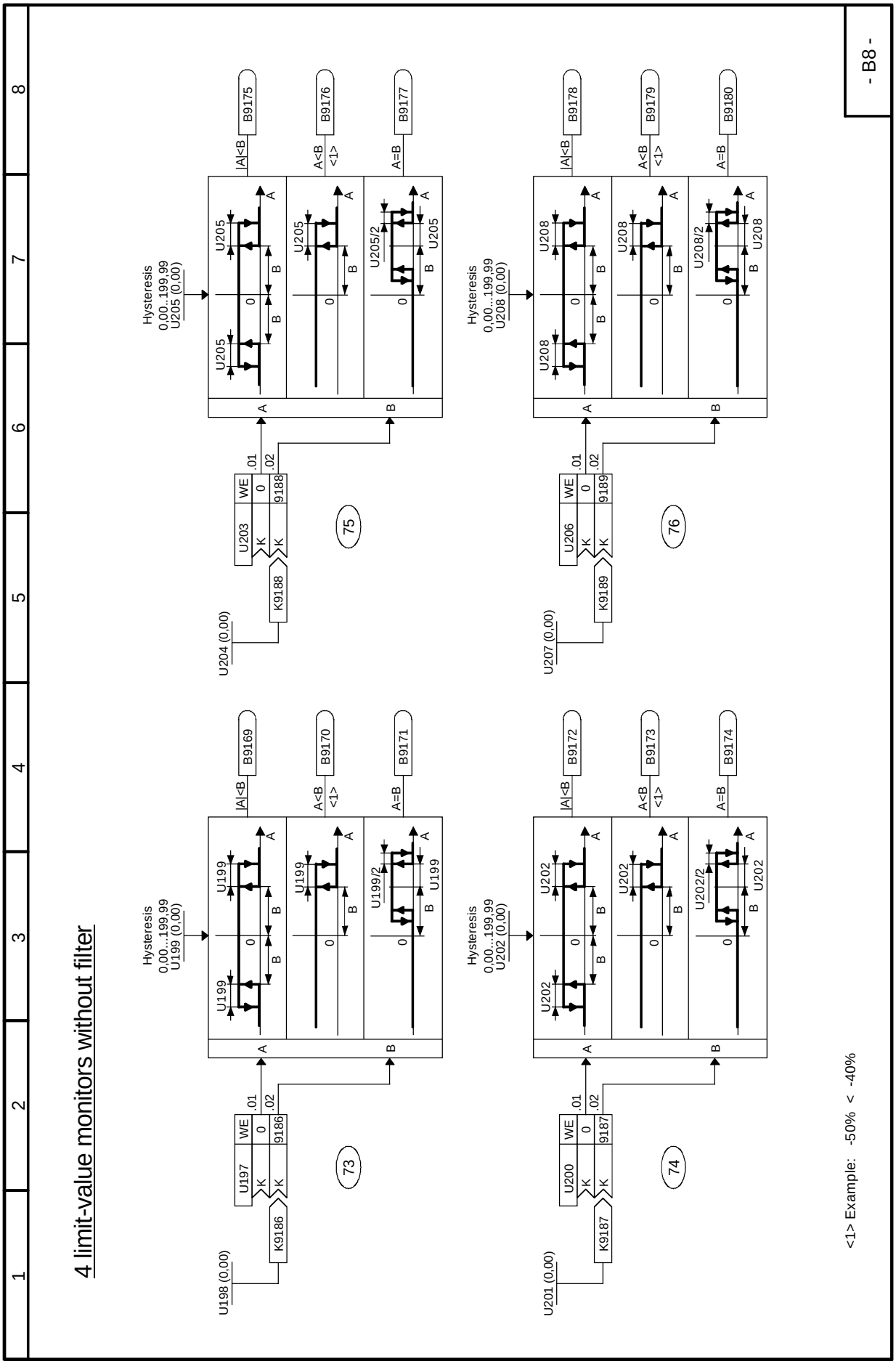
Sheet B6 Absolute-value generators with filter, limiters



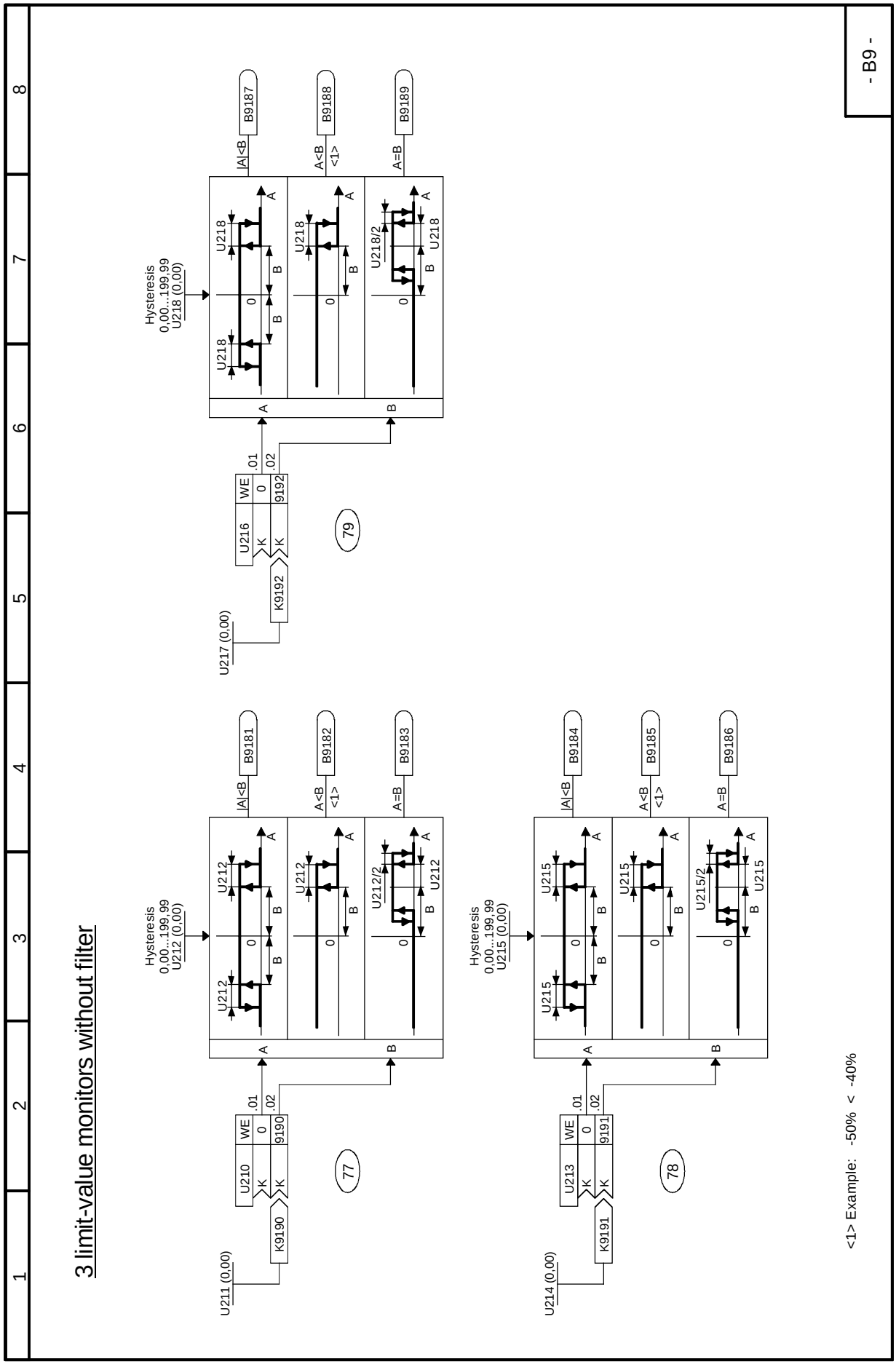
Sheet B7 Limit-value monitors with filter



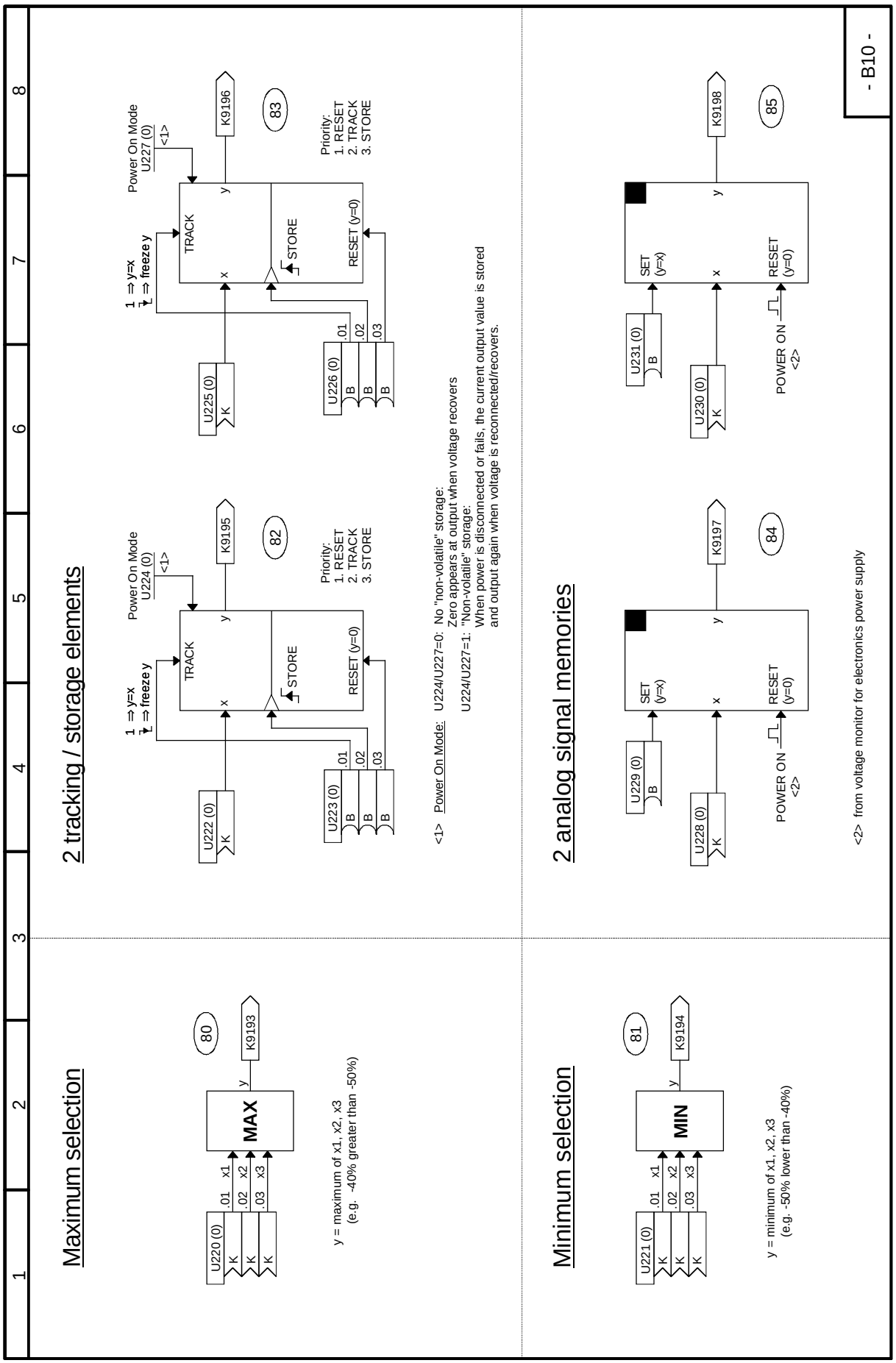
Sheet B8 Limit-value monitors without filter



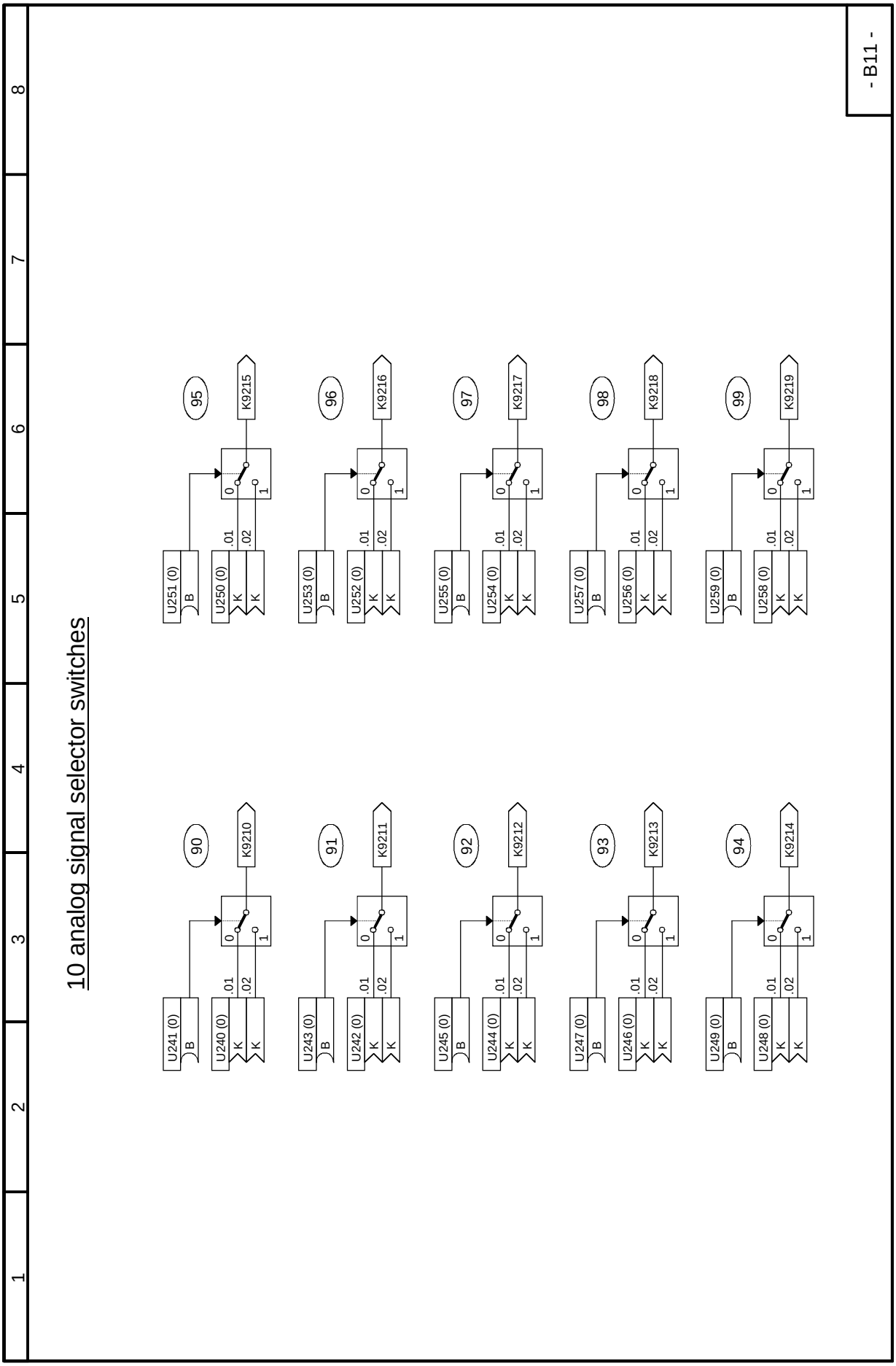
Sheet B9 Limit-value monitors without filter



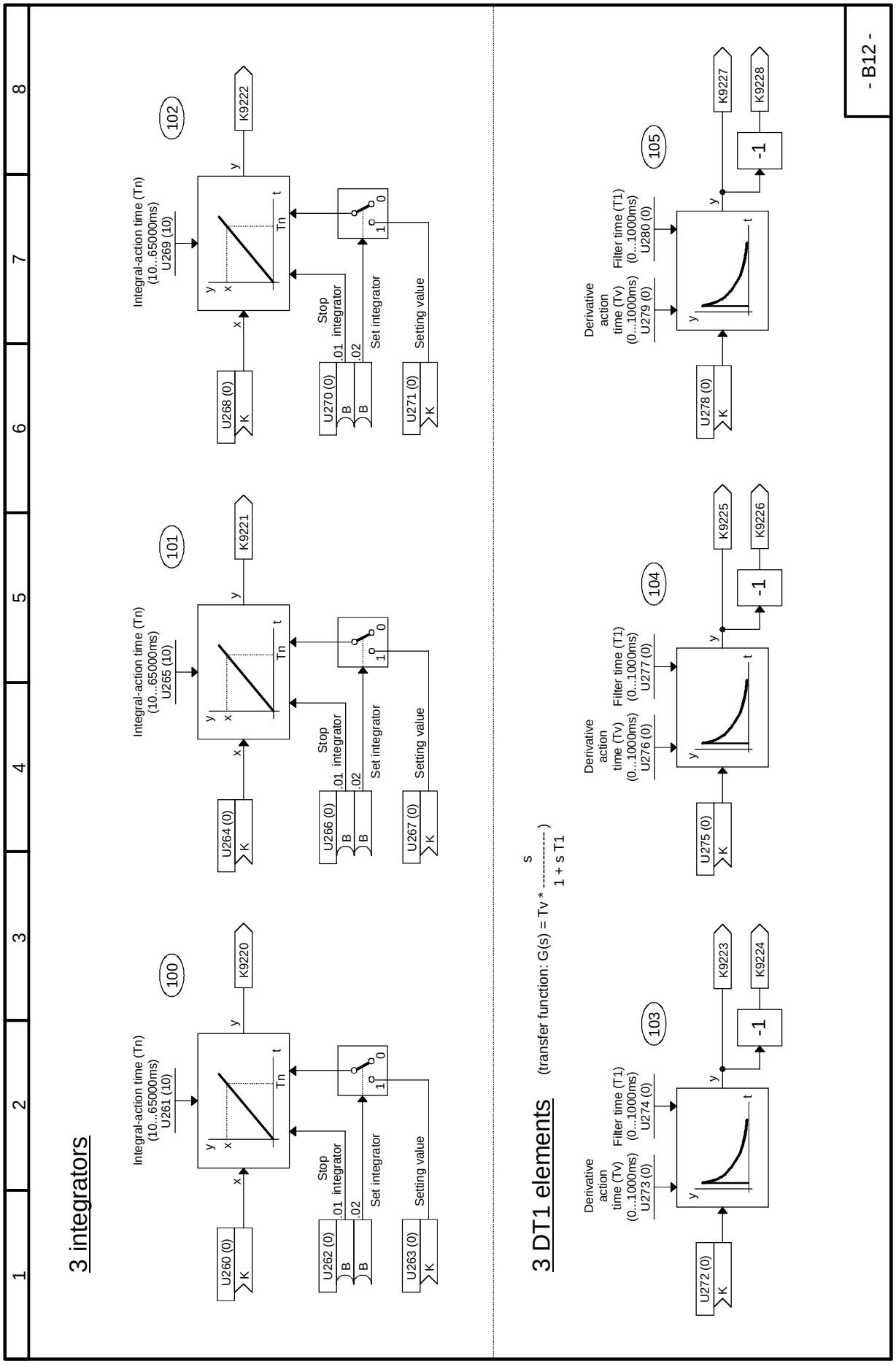
Sheet B10 Maximum selection, minimum selection, tracking / storage elements, analog signal memories



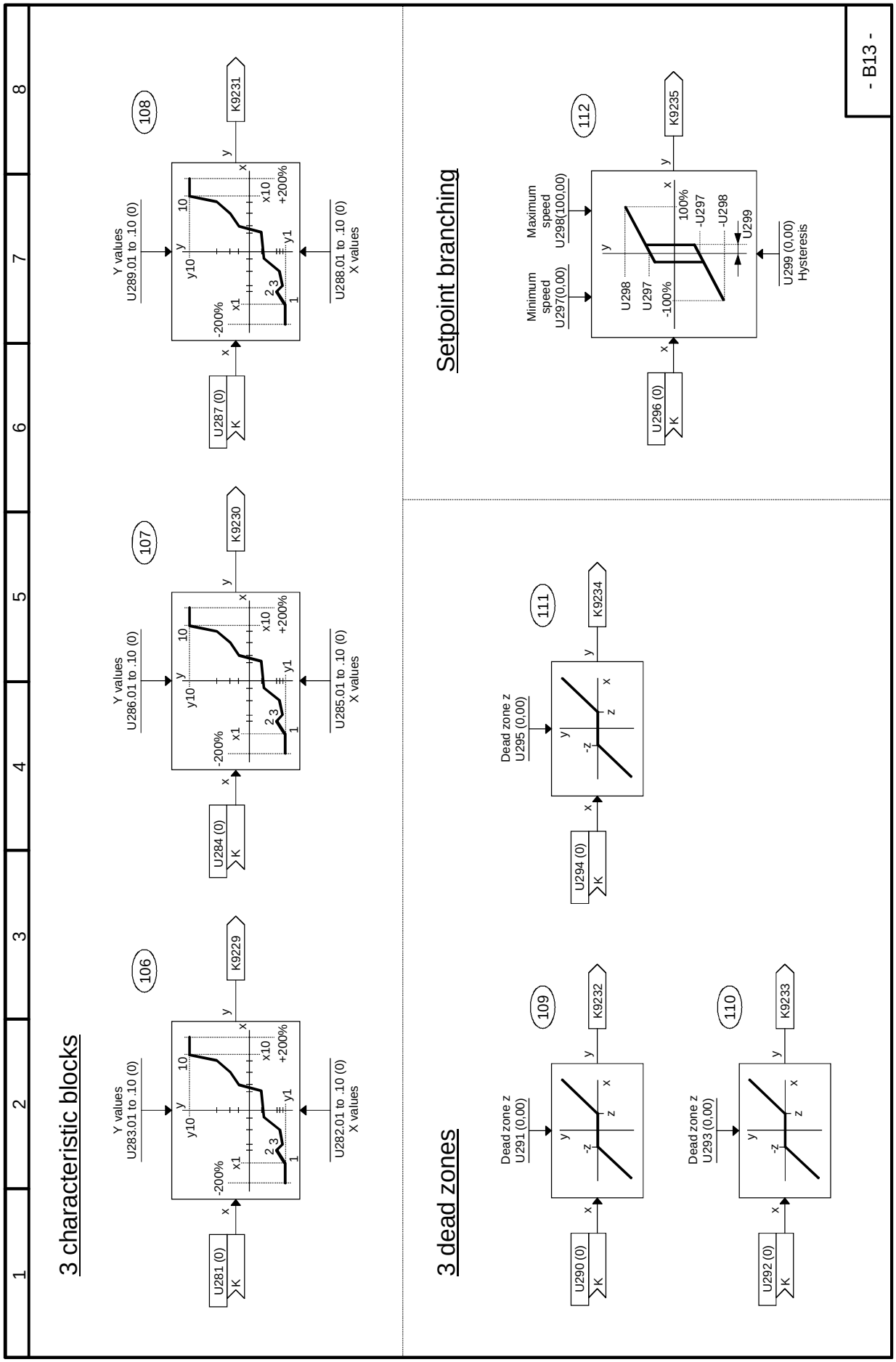
Sheet B11 Analog signal selector switches



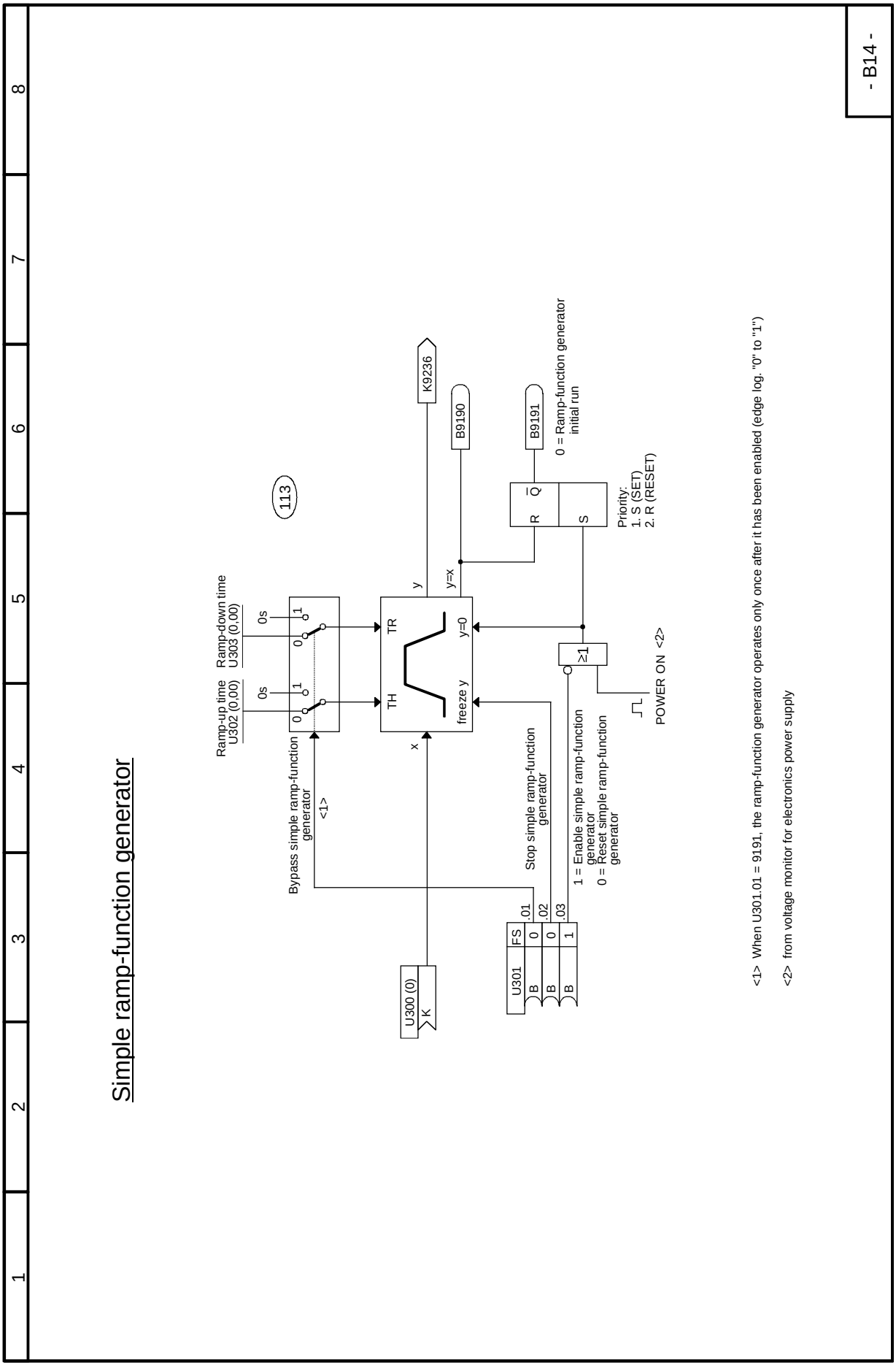
Sheet B12 Integrators, DT1elements



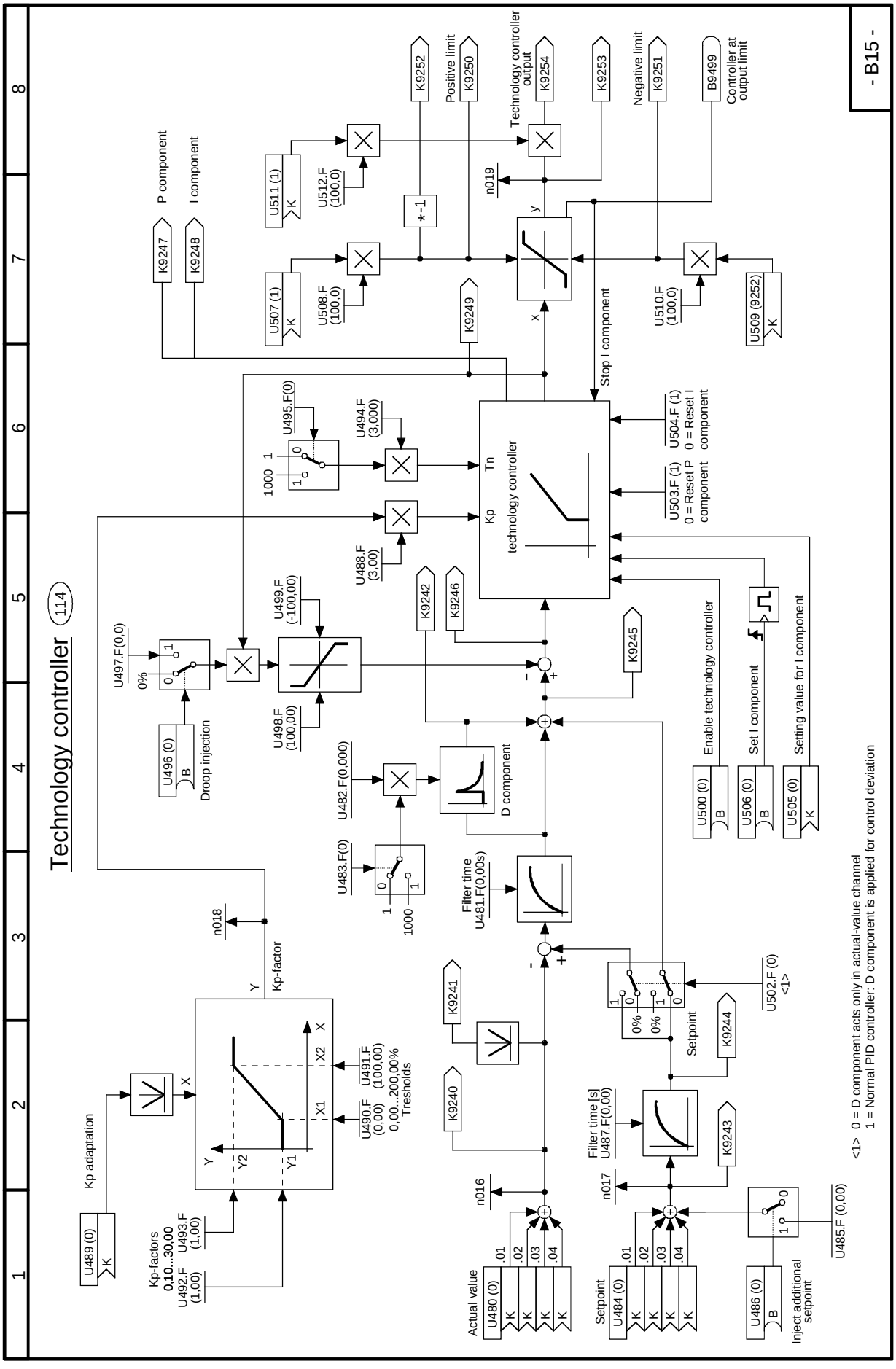
Sheet B13 Characteristic blocks, dead zones, setpoint branching



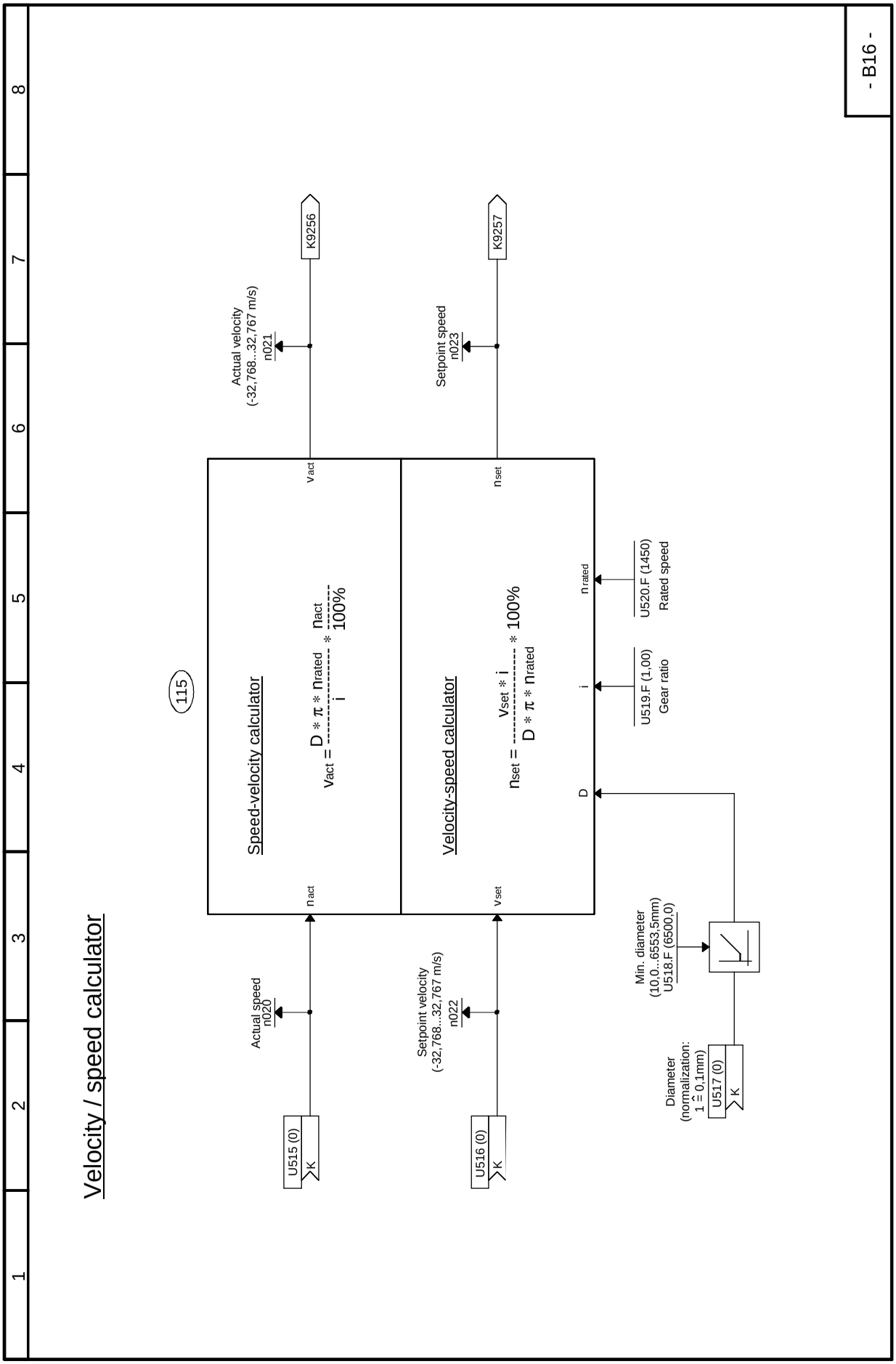
Sheet B14 Simple ramp-function generator



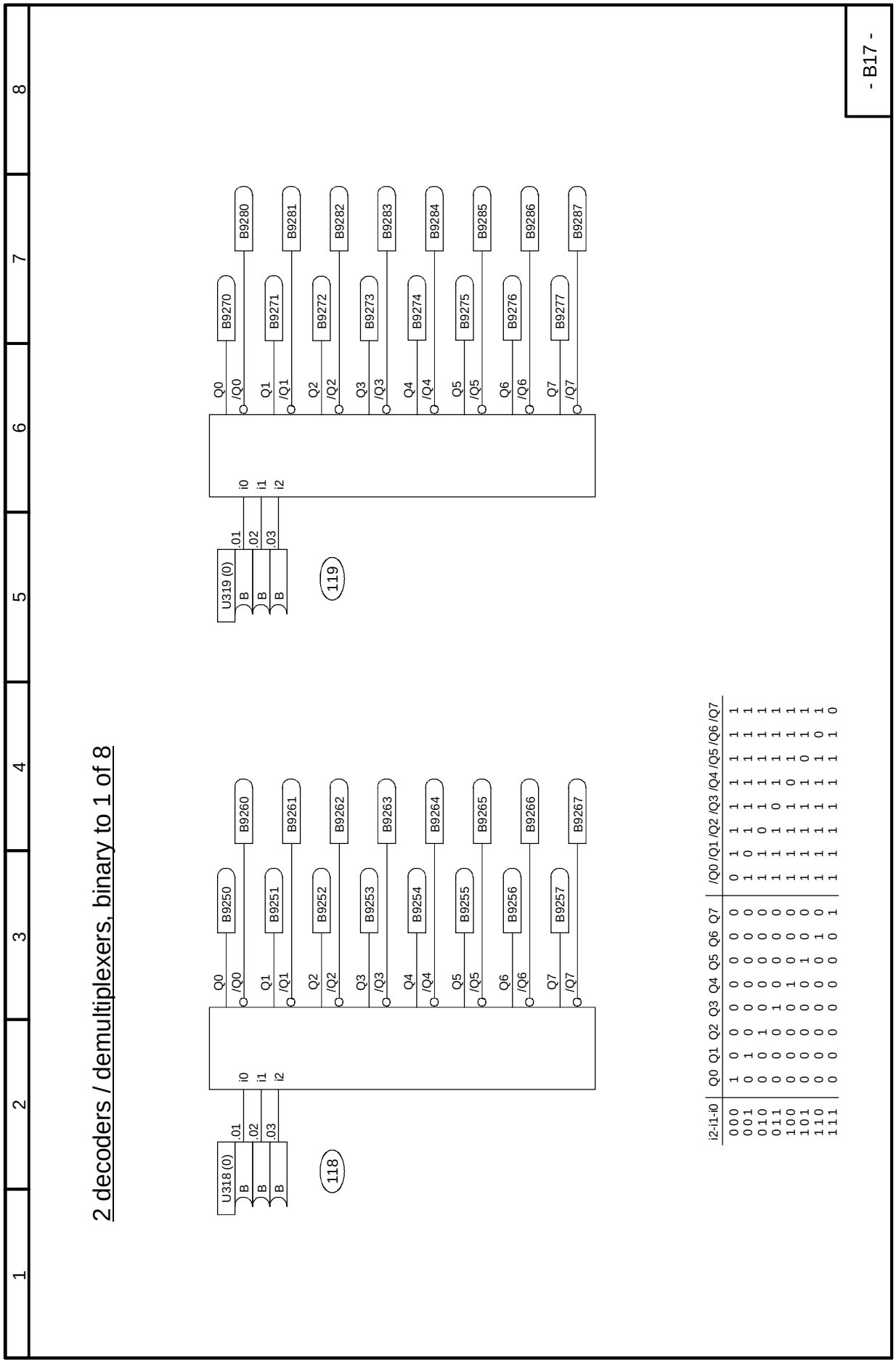
Sheet B15 Technology controller



Sheet B16 Velocity / speed calculator

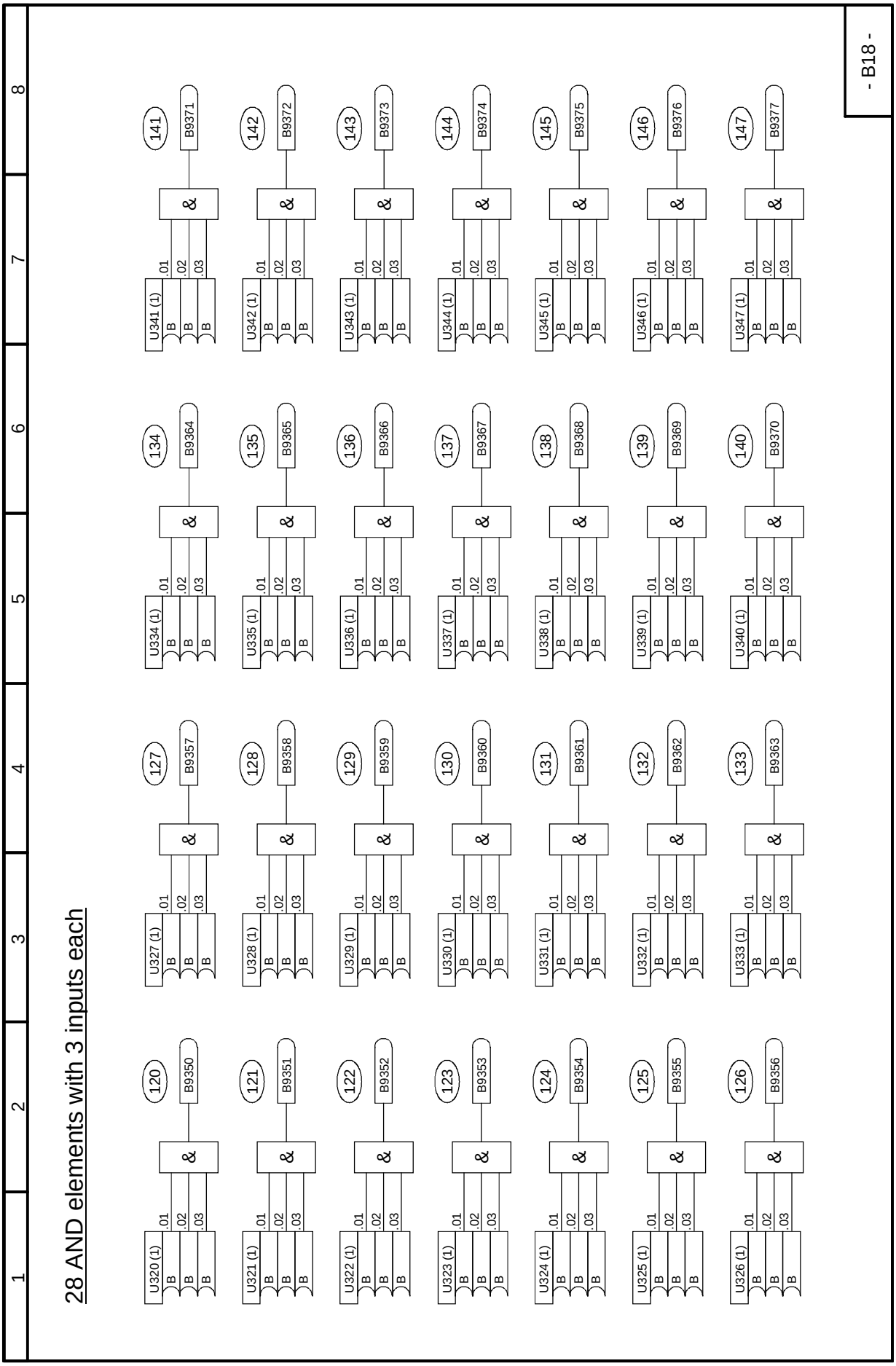


Sheet B17 Decoders / demultiplexers, binary to 1 of 8

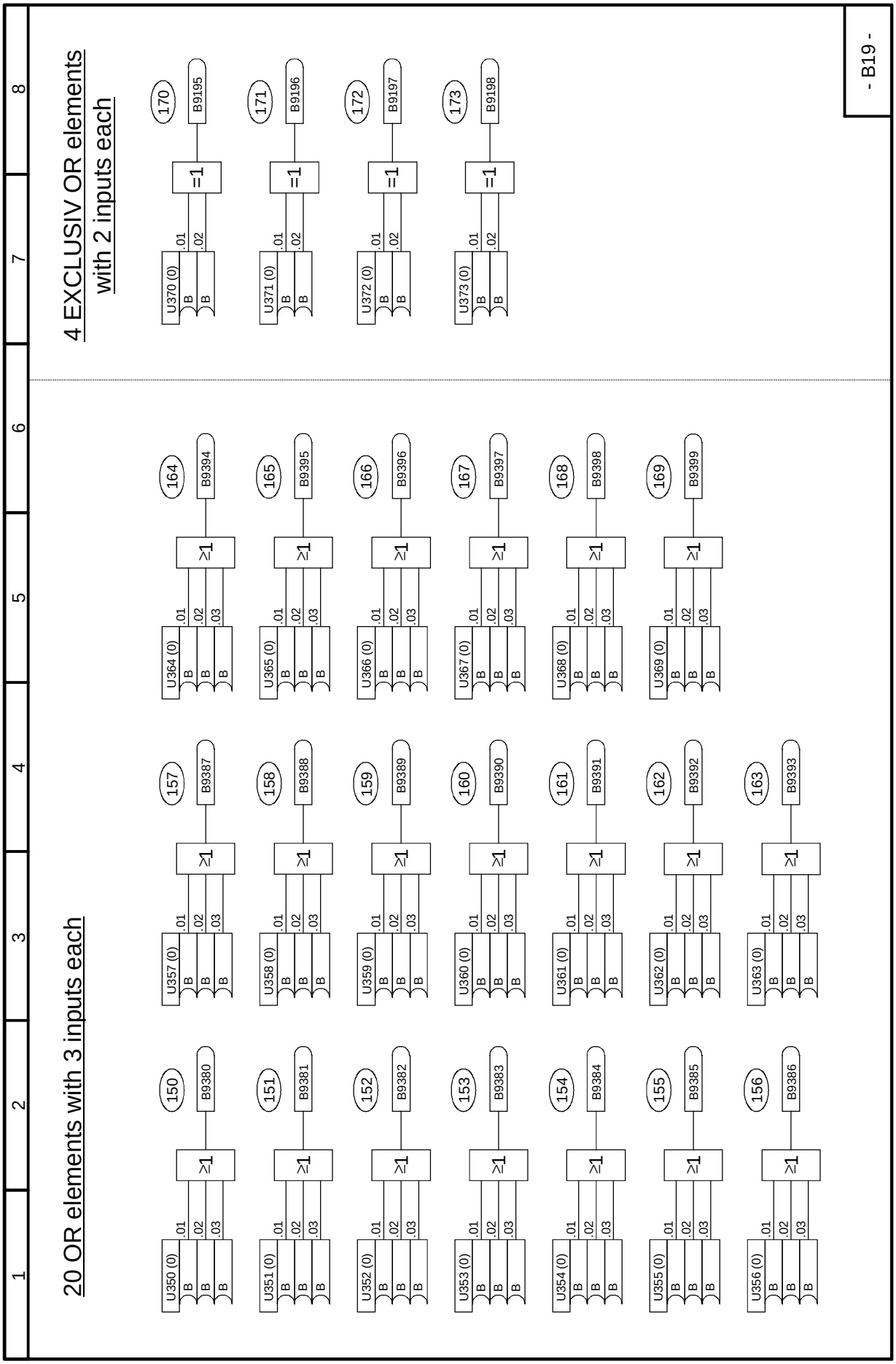


i2-i1-i0	Q0	Q1	Q2	Q3	Q4	Q5	Q6	Q7	/Q0	/Q1	/Q2	/Q3	/Q4	/Q5	/Q6	/Q7
0 0 0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
0 0 1	0	1	0	0	0	0	0	0	1	0	1	1	1	1	1	1
0 1 0	0	0	1	0	0	0	0	0	1	1	0	1	1	1	1	1
0 1 1	0	0	0	1	0	0	0	0	1	1	1	0	1	1	1	1
1 0 0	0	0	0	0	1	0	0	0	1	1	1	1	0	1	1	1
1 0 1	0	0	0	0	0	1	0	0	1	1	1	1	1	0	1	1
1 1 0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	1
1 1 1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0

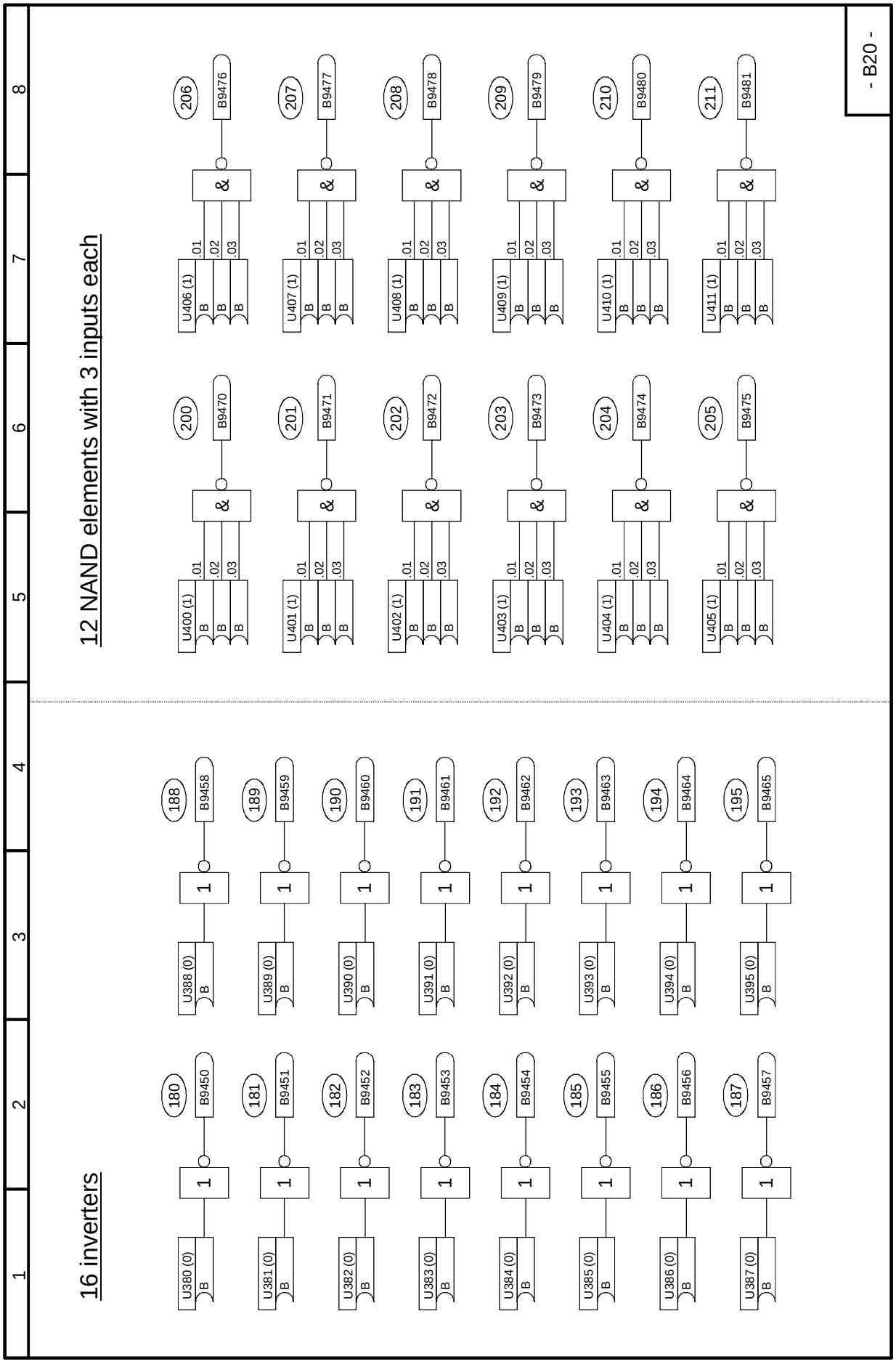
Sheet B18 AND elements



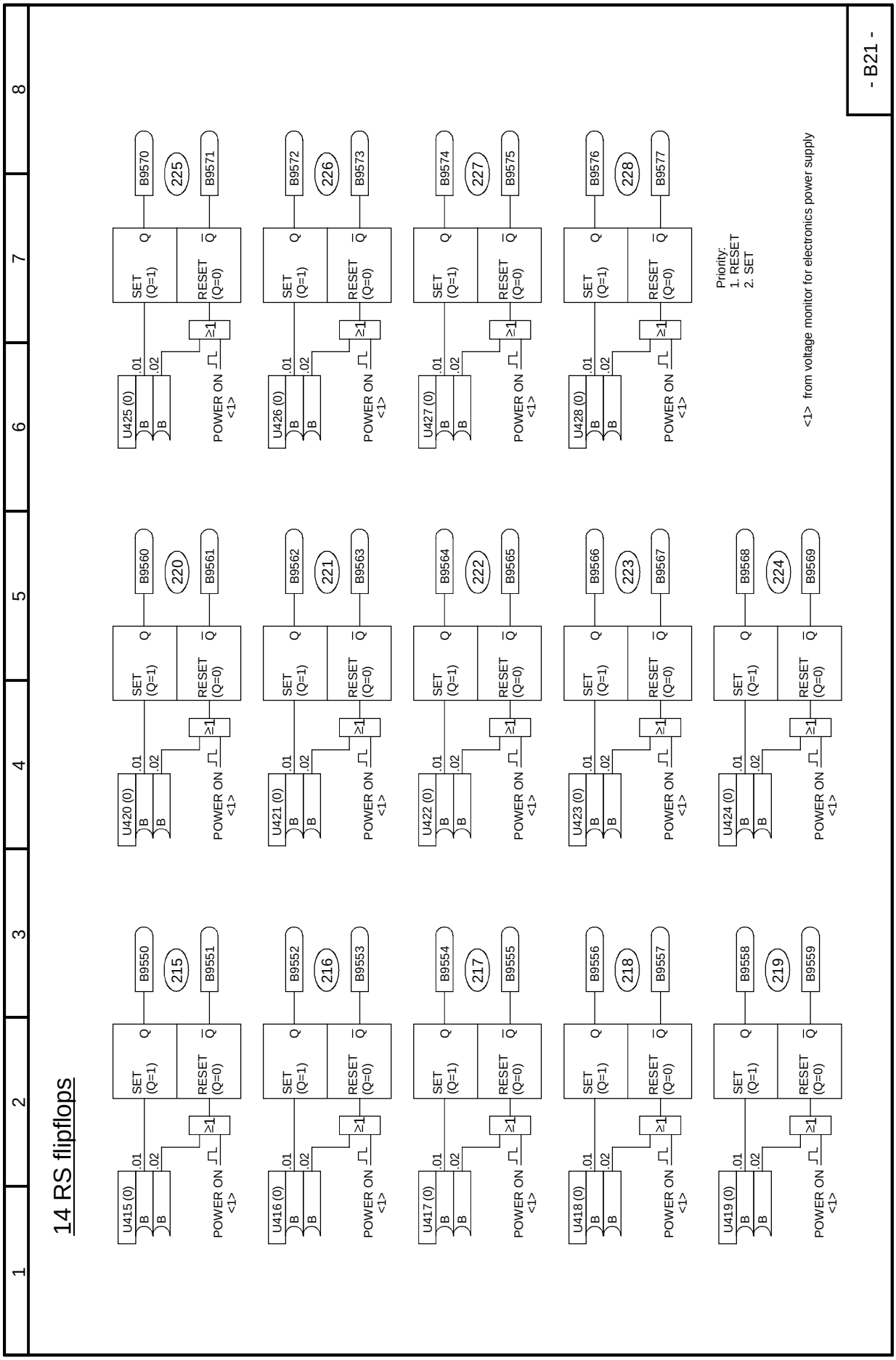
Sheet B19 OR-elements, EXCLUSIV OR elements



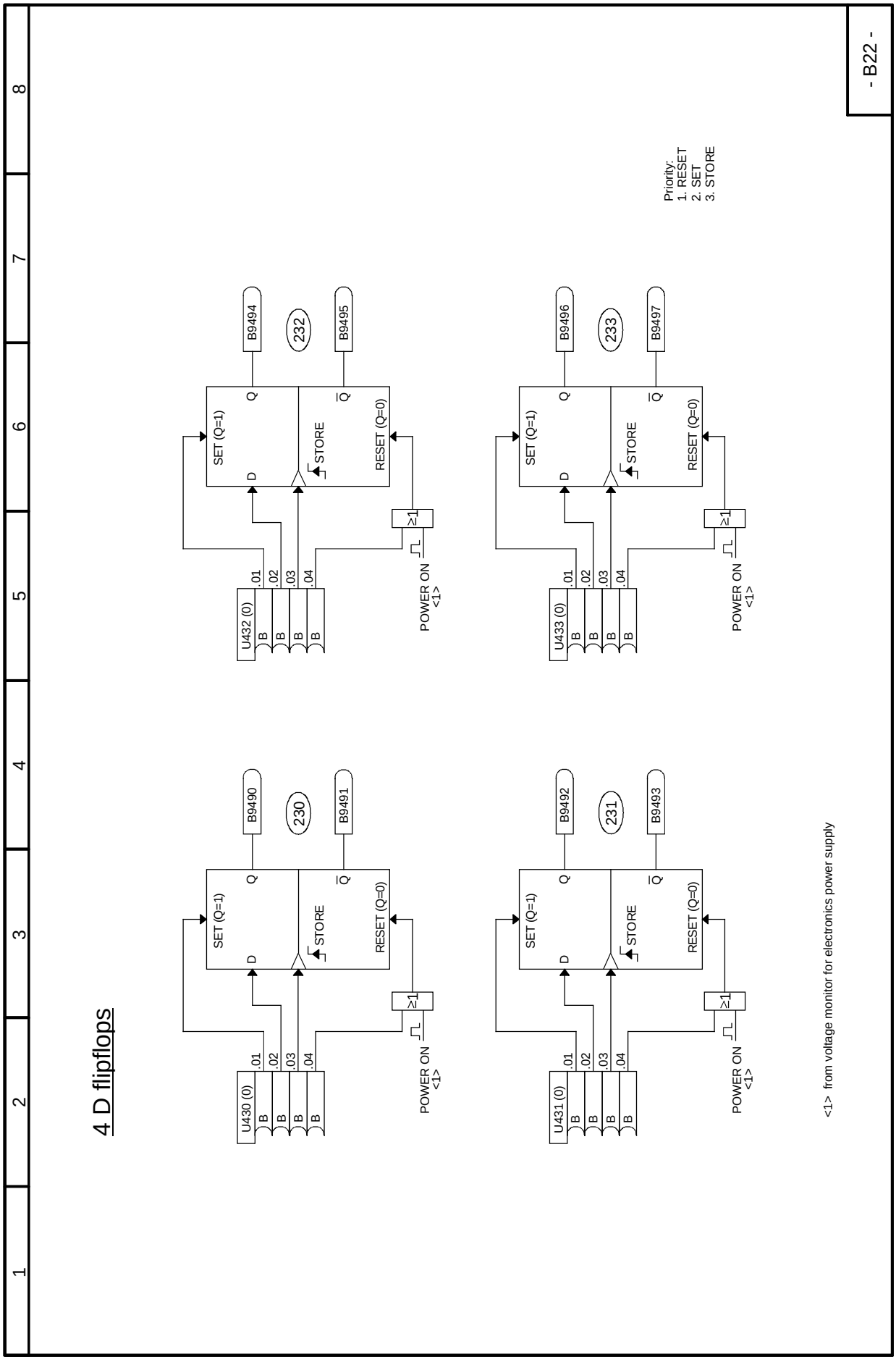
Sheet B20 Inverters, NAND elements



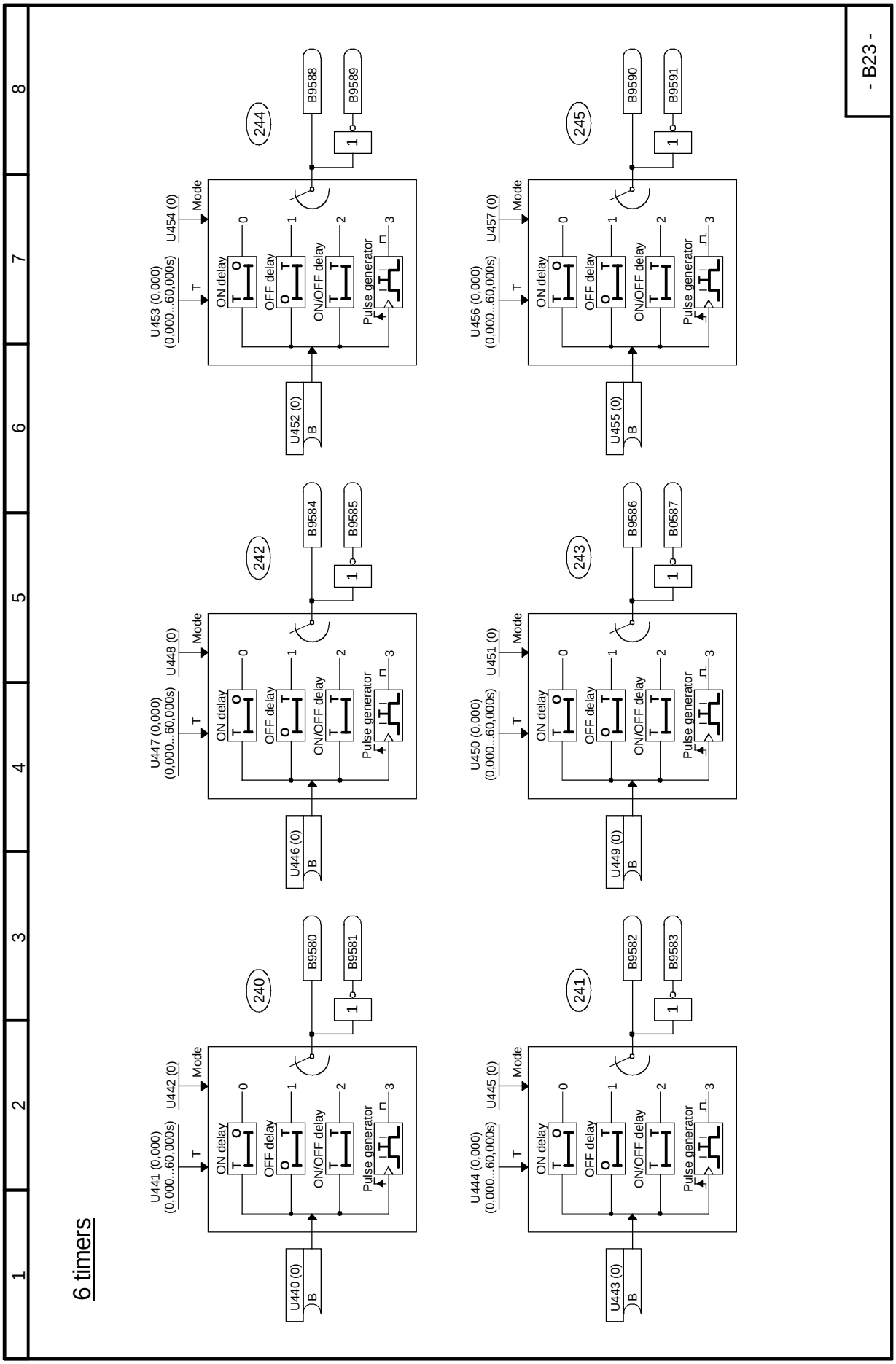
Sheet B21 RS flipflops



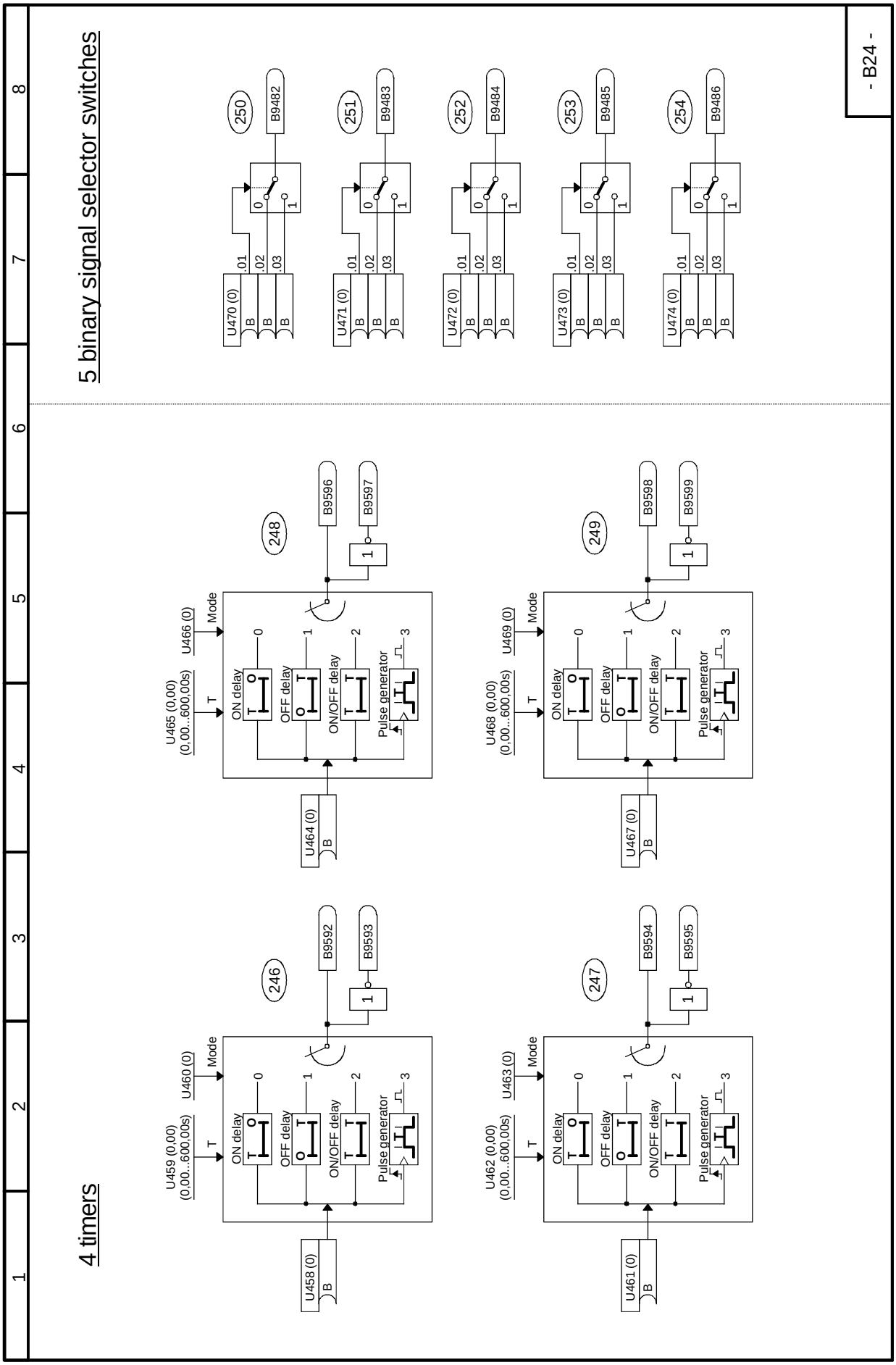
Sheet B22 D flipflops



Sheet B23 Timers (0,000...60,000s)

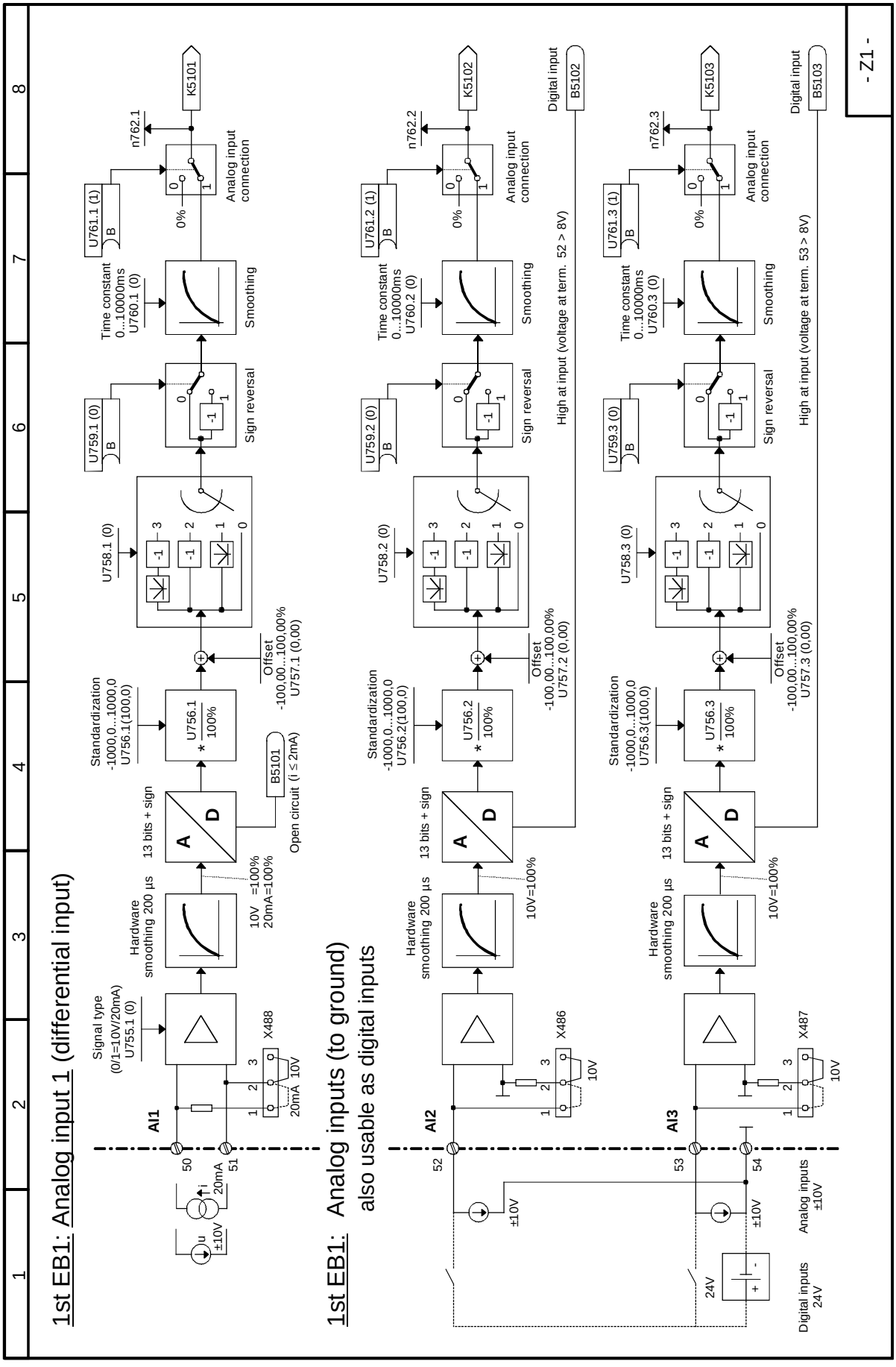


Sheet B24 Timers (0,00...600,00s), binary signal selector switches

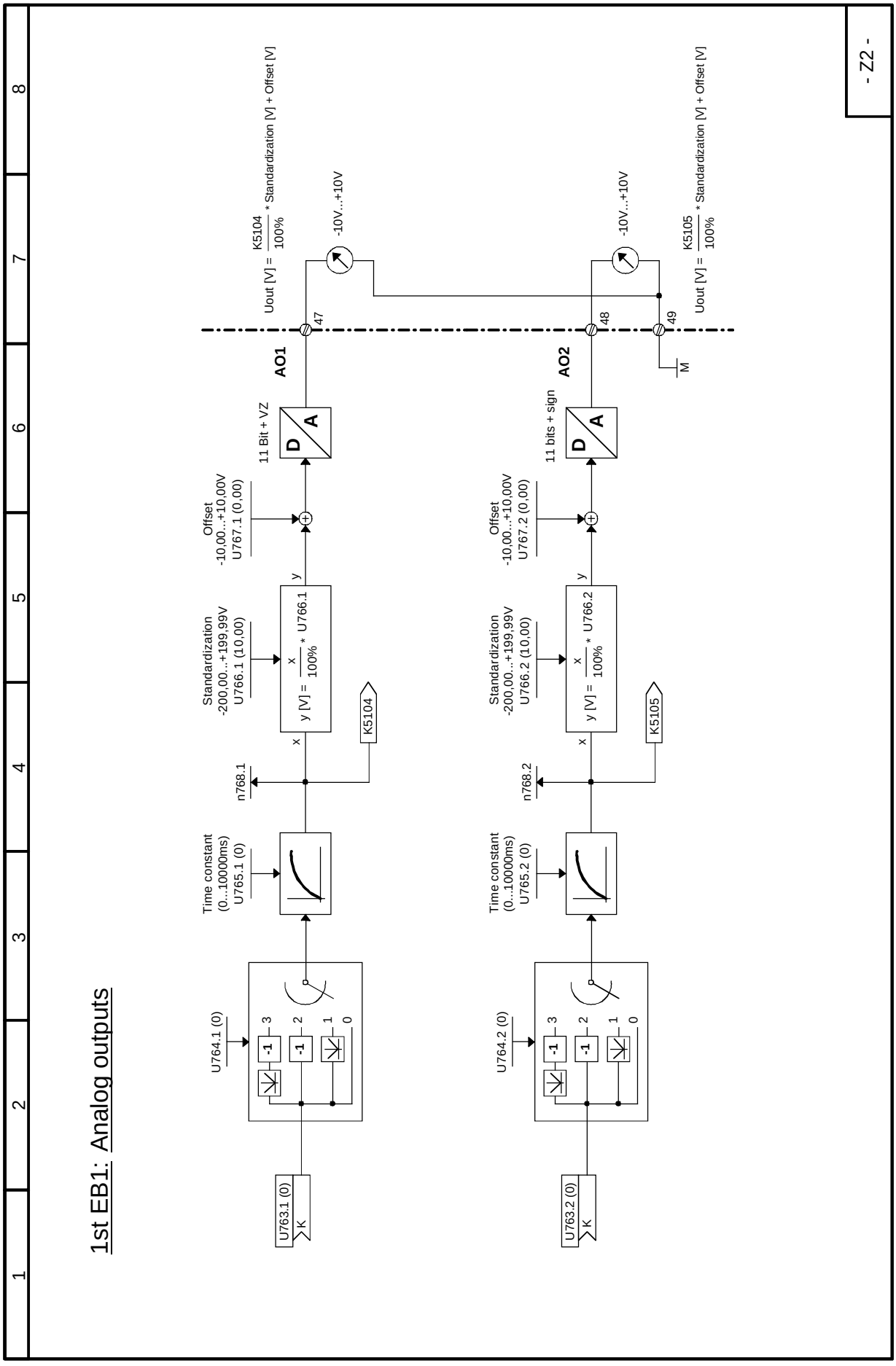


Optional supplementary boards Sheets Z1 to Z12

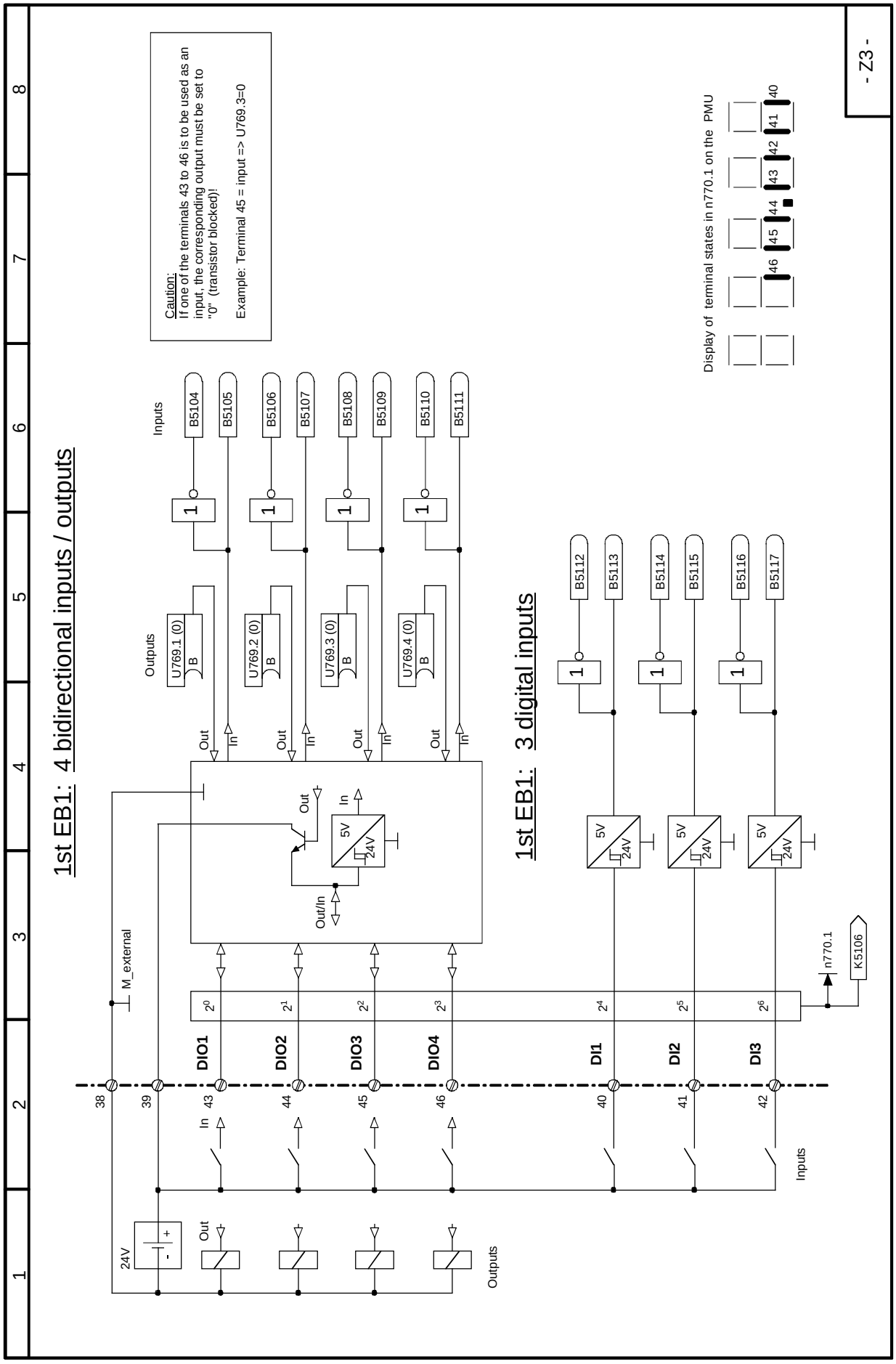
Sheet Z1 1st EB1: Analog inputs

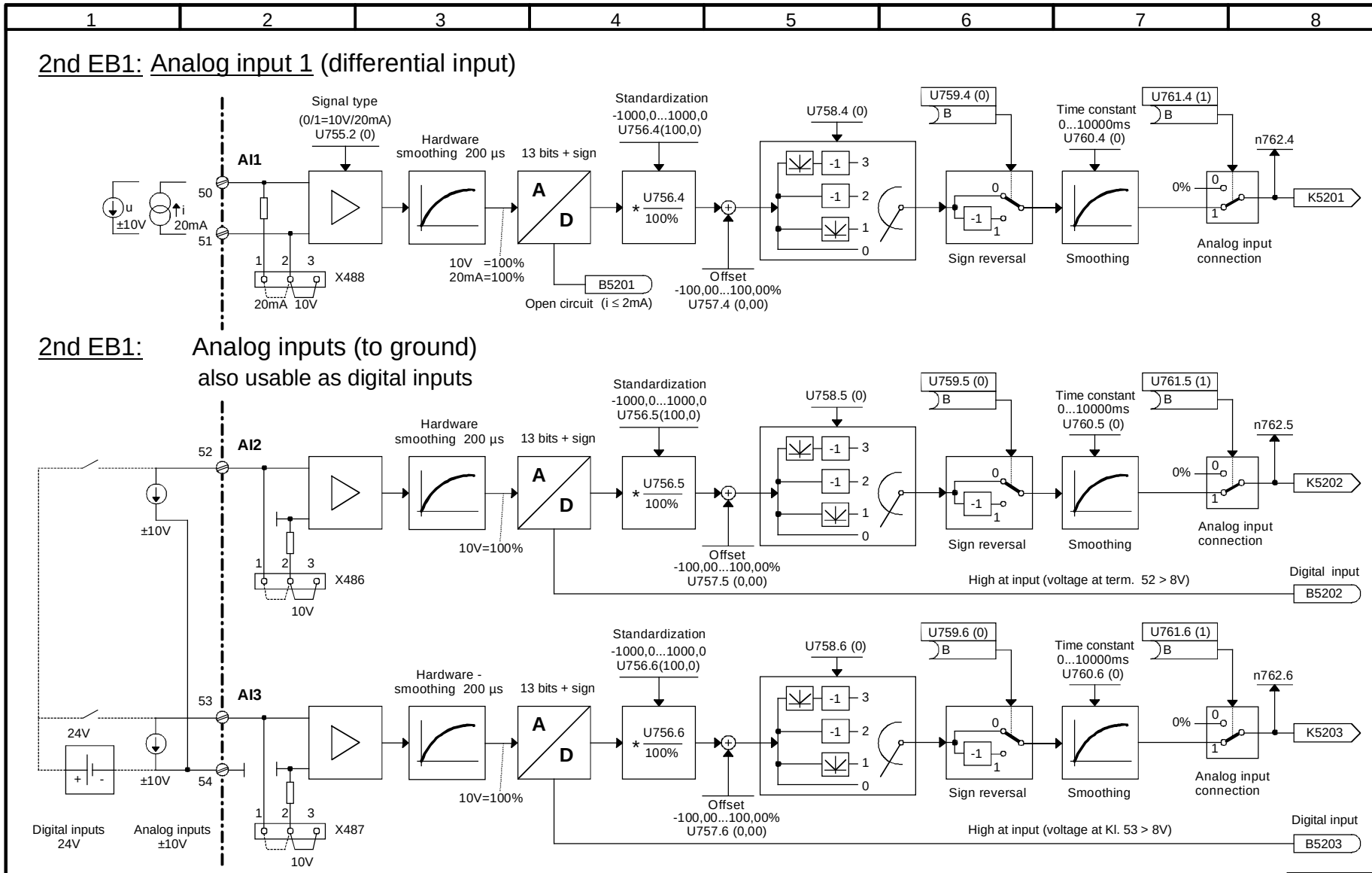


Sheet Z2 1st EB1: Analog outputs

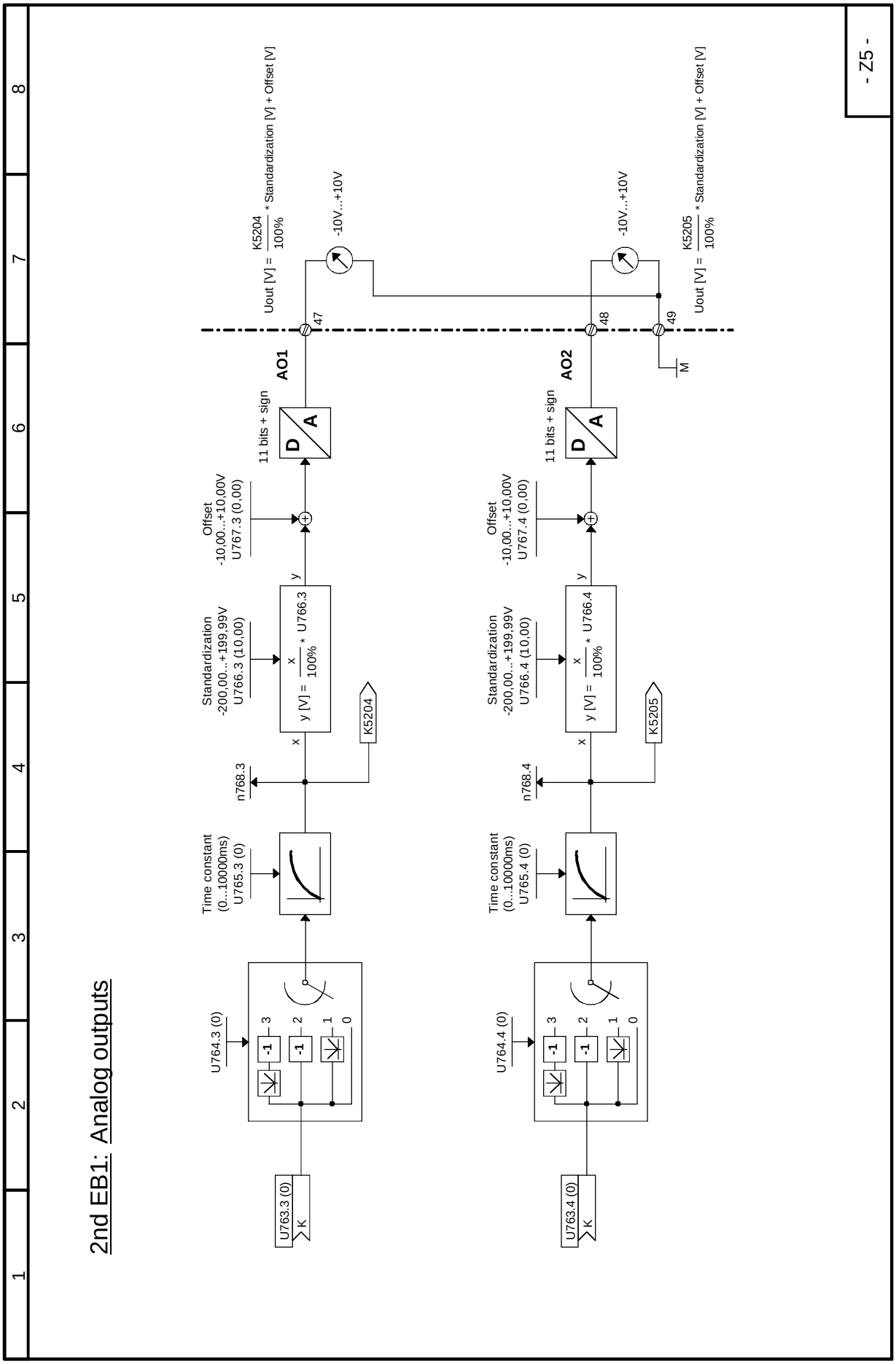


Sheet Z3 1st EB1: 4 bidirectional inputs- / outputs, 3 digital inputs

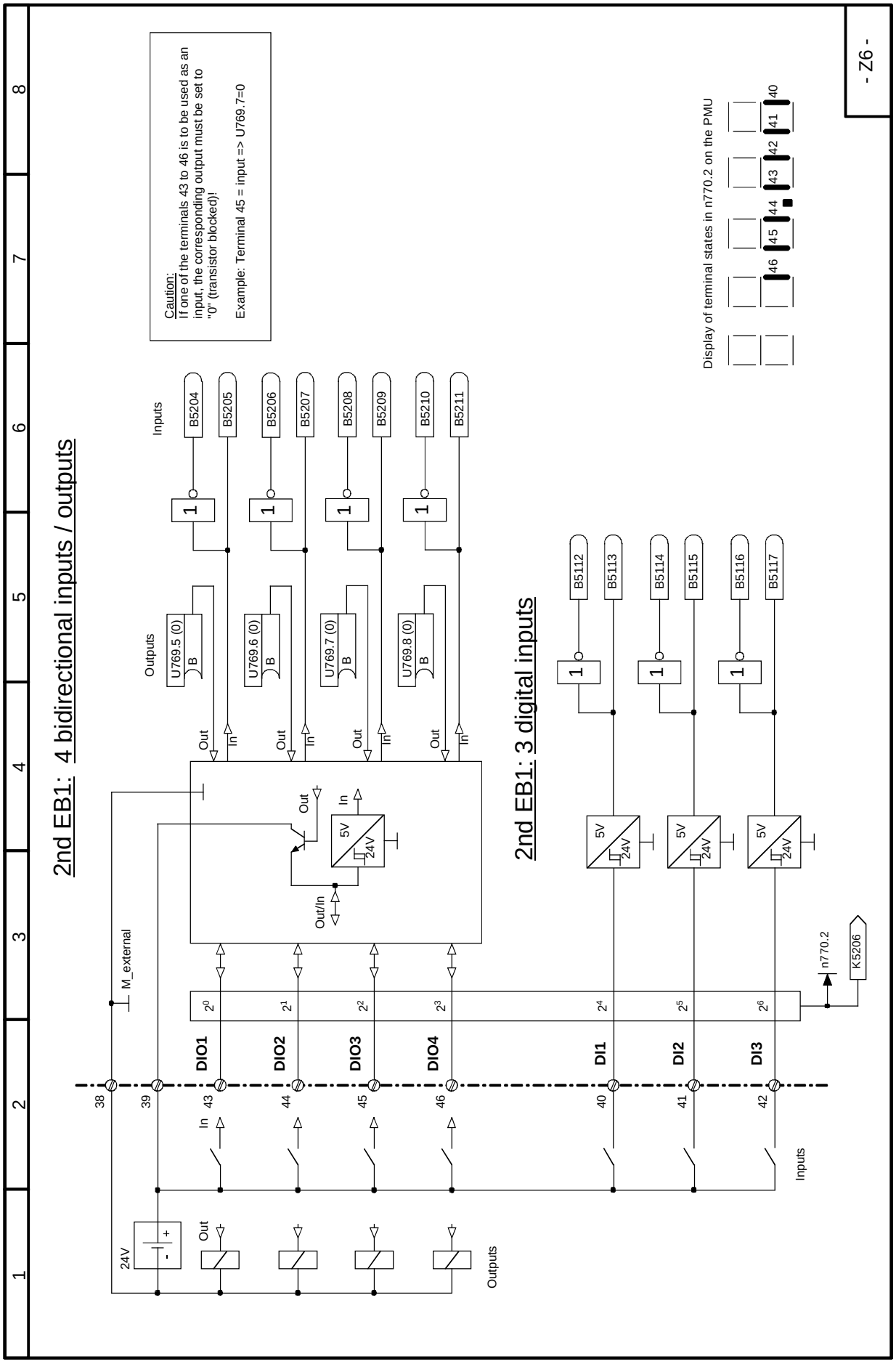



1
2
3
4
5
6
7
8
2nd EB1: Analog input 1 (differential input)
Signal type
(0/1=10V/20mA)
U755.2 (0)
AI1
50
51
u
±10V
i
20mA
1 2 3
X488
20mA 10V
Hardware
smoothing 200 µs
10V =100%
20mA=100%
13 bits + sign
A
D
Standardization
-1000,0...1000,0
U756.4(100,0)
* U756.4 / 100%
B5201
Open circuit (i ≤ 2mA)
Offset
-100,00...100,00%
U757.4 (0,00)
U758.4 (0)
-1
3
2
1
0
U759.4 (0)
B
Sign reversal
Time constant
0...10000ms
U760.4 (0)
Smoothing
U761.4 (1)
B
n762.4
0%
K5201
Analog input
connection
2nd EB1: Analog inputs (to ground)
also usable as digital inputs
52
AI2
±10V
1 2 3
X486
10V
Hardware
smoothing 200 µs
10V=100%
13 bits + sign
Standardization
-1000,0...1000,0
U756.5(100,0)
* U756.5 / 100%
Offset
-100,00...100,00%
U757.5 (0,00)
U758.5 (0)
U759.5 (0)
B
Sign reversal
Time constant
0...10000ms
U760.5 (0)
Smoothing
U761.5 (1)
B
n762.5
0%
K5202
Analog input
connection
High at input (voltage at term. 52 > 8V)
Digital input
B5202
53
AI3
24V
+ -
±10V
54
1 2 3
X487
10V
Hardware -
smoothing 200 µs
10V=100%
13 bits + sign
Standardization
-1000,0...1000,0
U756.6(100,0)
* U756.6 / 100%
Offset
-100,00...100,00%
U757.6 (0,00)
U758.6 (0)
U759.6 (0)
B
Sign reversal
Time constant
0...10000ms
U760.6 (0)
Smoothing
U761.6 (1)
B
n762.6
0%
K5203
Analog input
connection
High at input (voltage at Kl. 53 > 8V)
Digital input
B5203
Digital inputs
24V
Analog inputs
±10V
- Z4 -

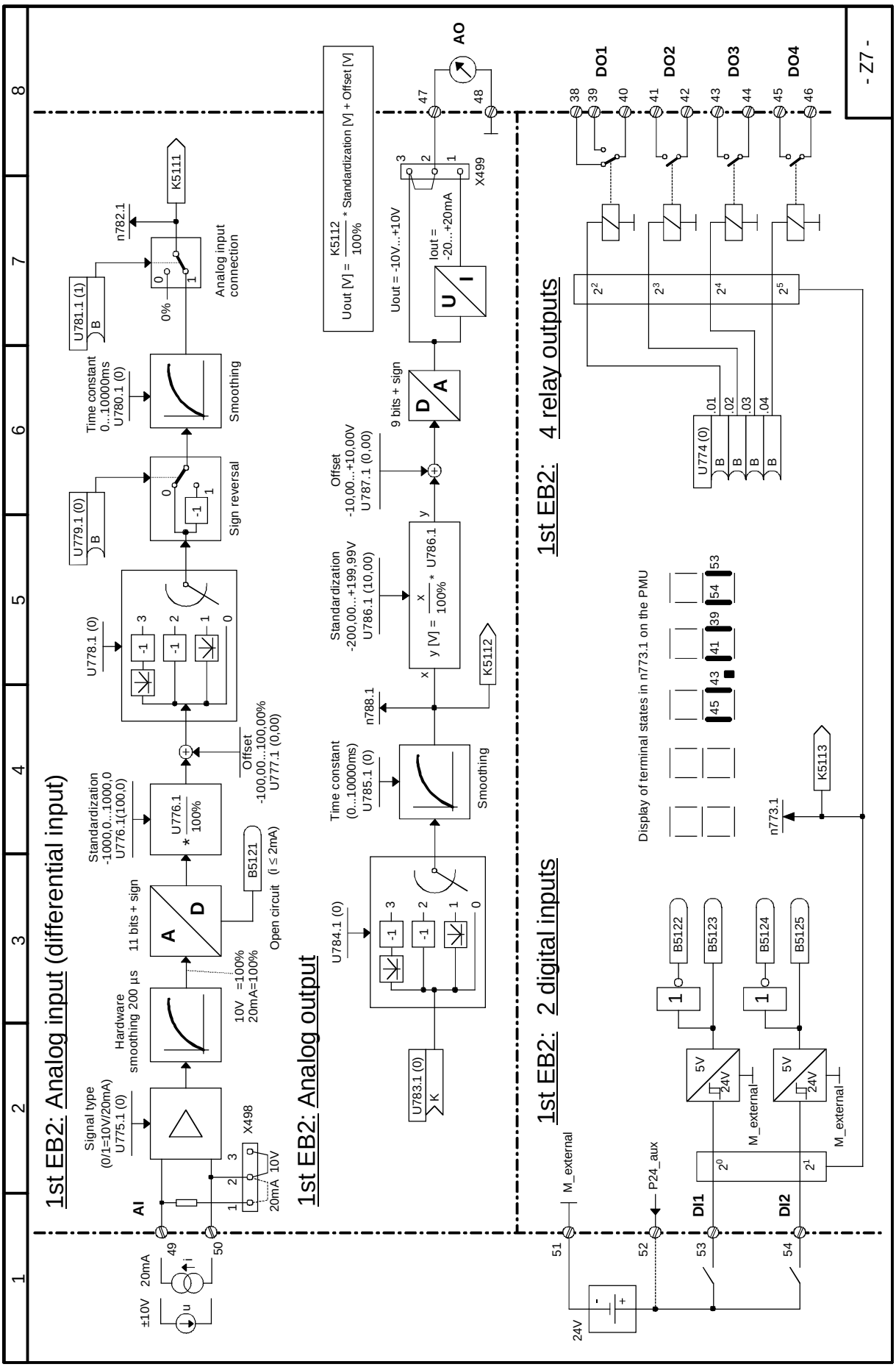
Sheet Z5 2nd EB1: Analog outputs



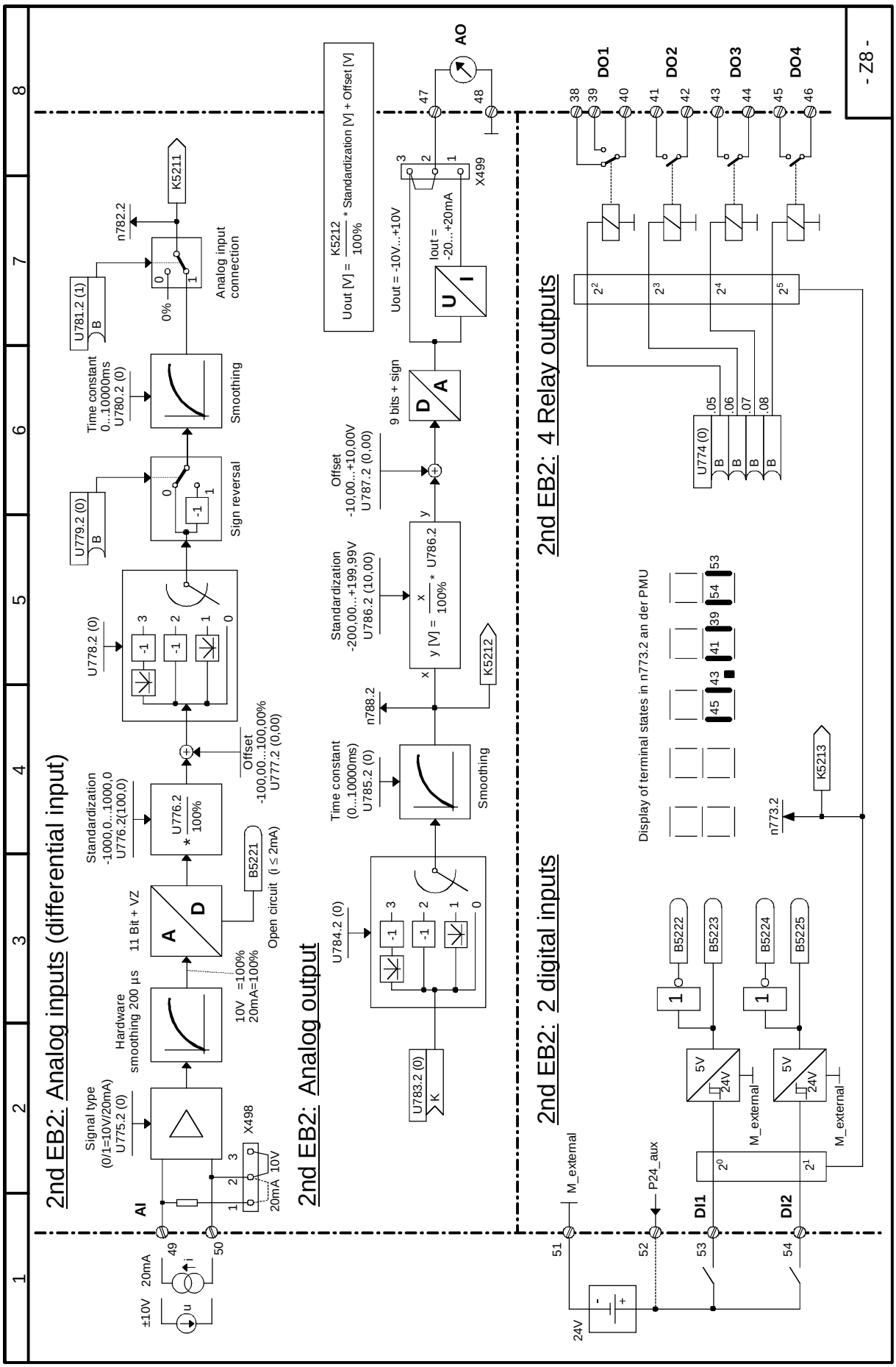
Sheet Z6 2nd EB1: 4 bidirectional inputs- / outputs, 3 digital inputs



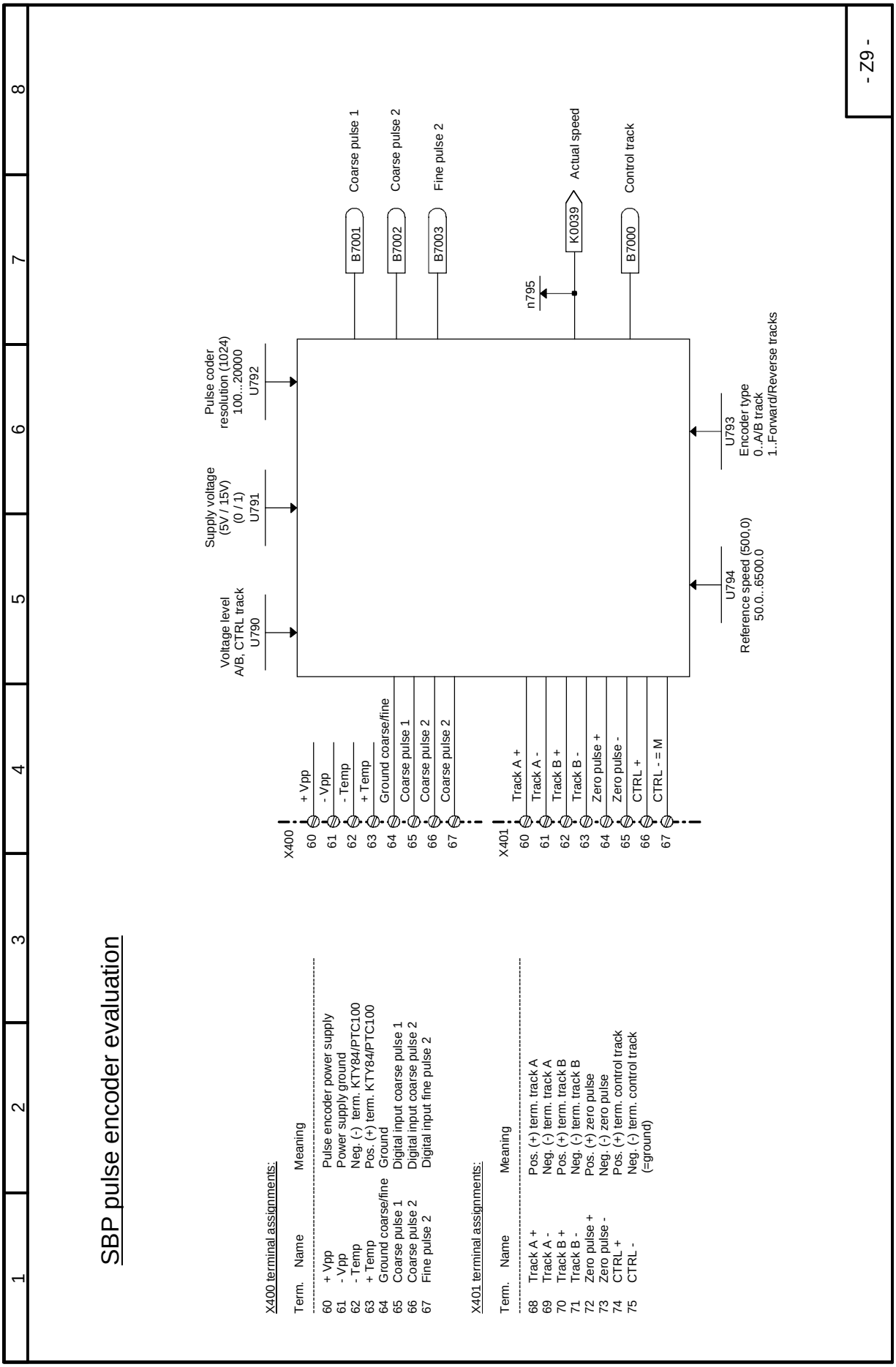
Sheet Z7 1st EB2: Analog input, Analog output, 2 digital inputs, 4 relay outputs



Sheet Z8 2nd EB2: Analog input, Analog output, 2 digital inputs, 4 relay outputs



Sheet Z9 SBP pulse encoder evaluation



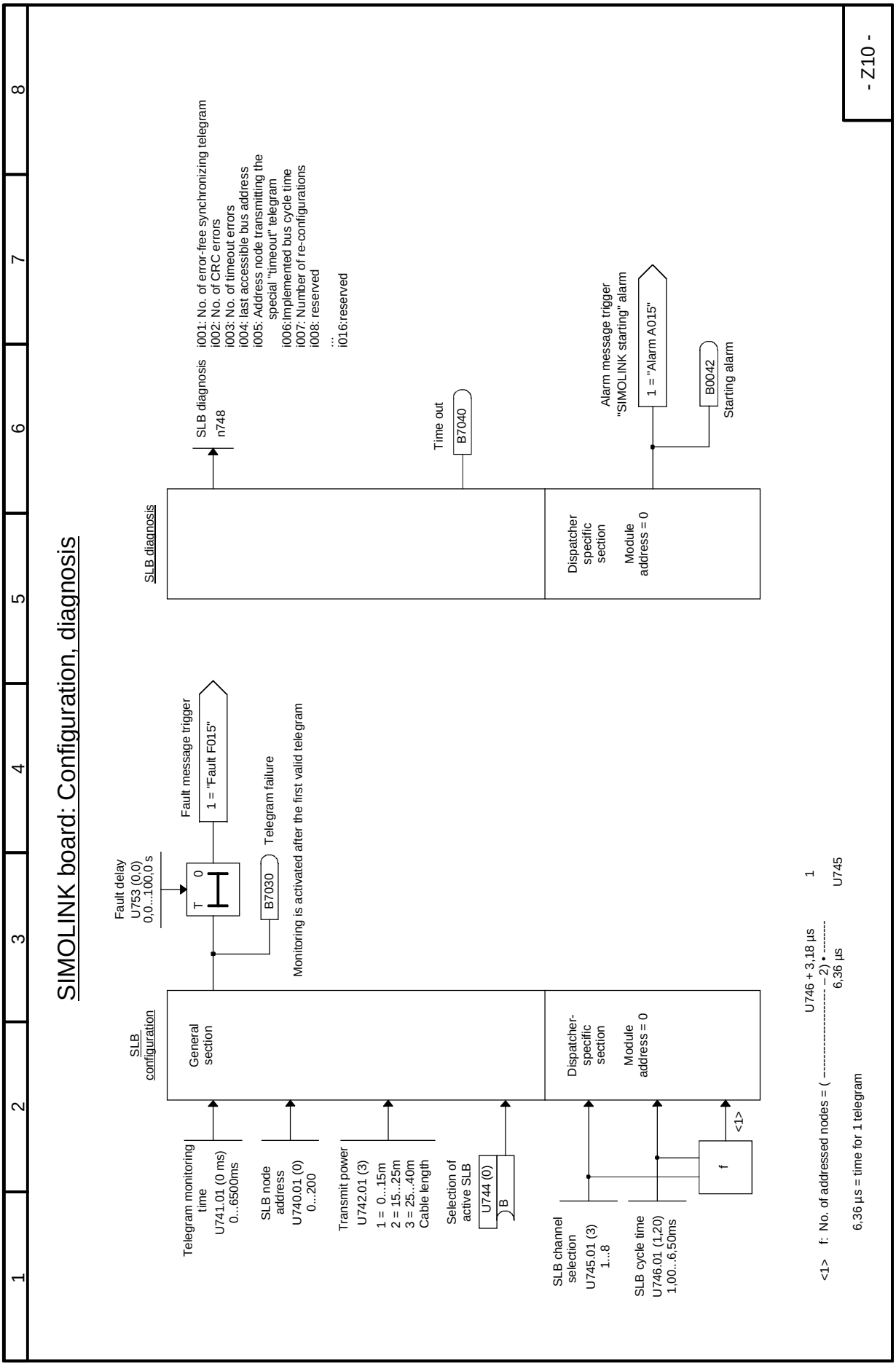
X400 terminal assignments:

Term.	Name	Meaning
60	+ Vpp	Pulse encoder power supply
61	- Vpp	Power supply ground
62	- Temp	Neg. (-) term. KTY84/PTC100
63	+ Temp	Pos. (+) term. KTY84/PTC100
64	Ground coarse/fine	Ground
65	Coarse pulse 1	Digital input coarse pulse 1
66	Coarse pulse 2	Digital input coarse pulse 2
67	Fine pulse 2	Digital input fine pulse 2

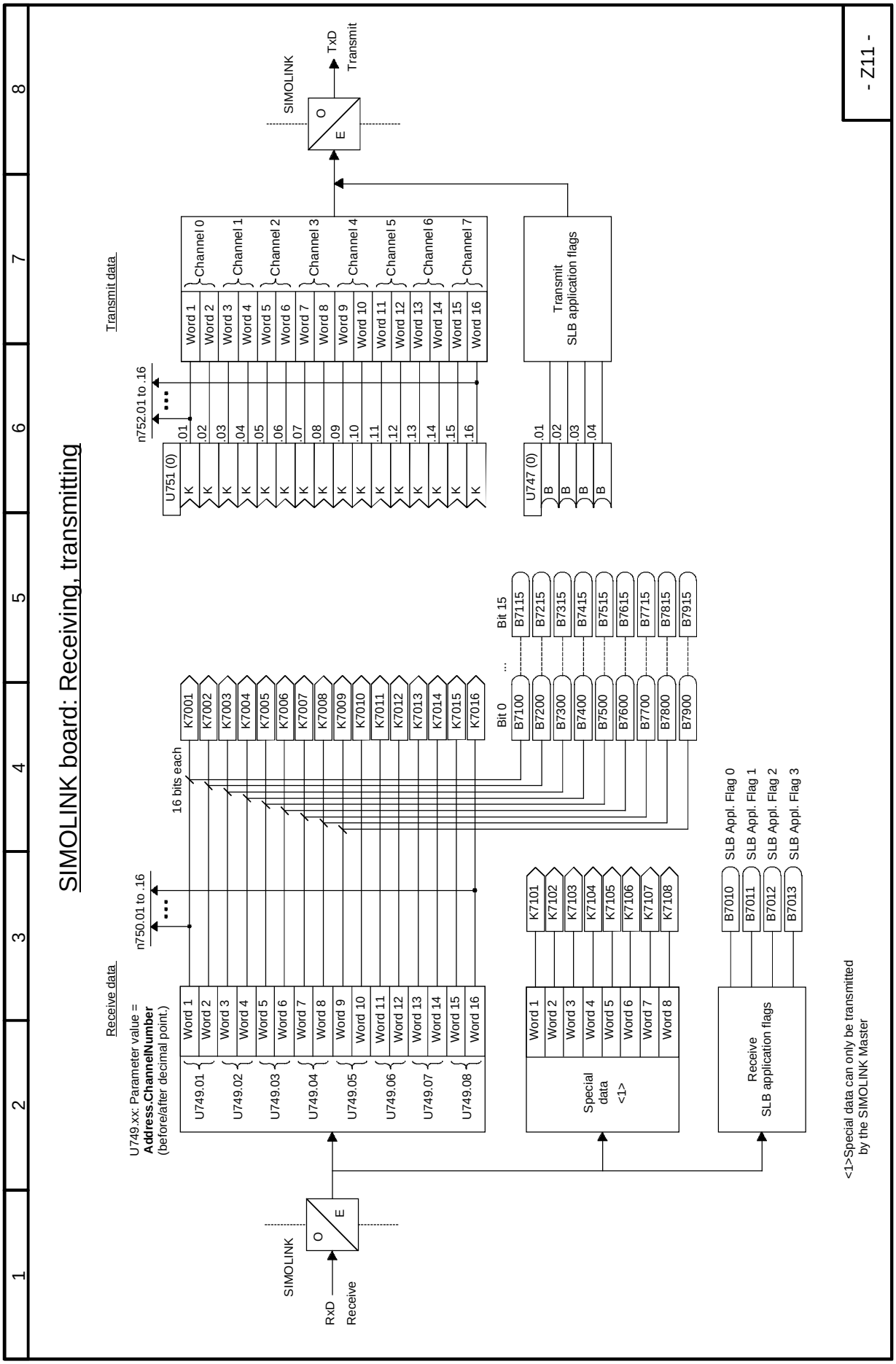
X401 terminal assignments:

Term.	Name	Meaning
68	Track A +	Pos. (+) term. track A
69	Track A -	Neg. (-) term. track A
70	Track B +	Pos. (+) term. track B
71	Track B -	Neg. (-) term. track B
72	Zero pulse +	Pos. (+) zero pulse
73	Zero pulse -	Neg. (-) zero pulse
74	CTRL +	Pos. (+) term. control track
75	CTRL -	Neg. (-) term. control track (=ground)

Sheet Z10 SIMOLINK board: Configuration, diagnosis



Sheet Z11 SIMOLINK board: Receiving, transmitting



Sheet Z12 OP1S operator panel