

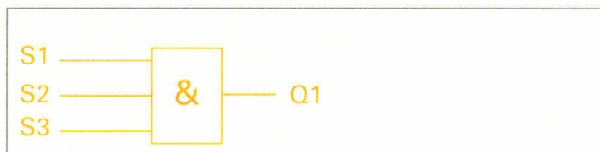
Lösungen zu Kapitel 8 – Grundfunktionen

1 Wertetabelle

Schaltzeichen	Benennung der Verknüpfung	Wertetabelle		
		b	a	x
	UND (AND)	0	0	0
		0	1	0
		1	0	0
		1	1	1
	ODER (OR)	0	0	0
		0	1	1
		1	0	1
		1	1	1
	NICHT (Inverter)		0	1
			1	0
	NAND (UND-NICHT)	0	0	1
		0	1	1
		1	0	1
		1	1	0
	NOR (ODER-NICHT)	0	0	1
		0	1	0
		1	0	0
		1	1	0
	XOR (Exclusive-ODER)	0	0	0
		0	1	1
		1	0	1
		1	1	0

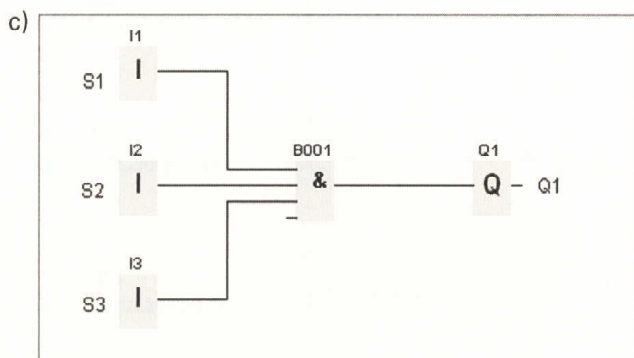
2 Stanze

a) Funktionsplan



b) Funktionsgleichung

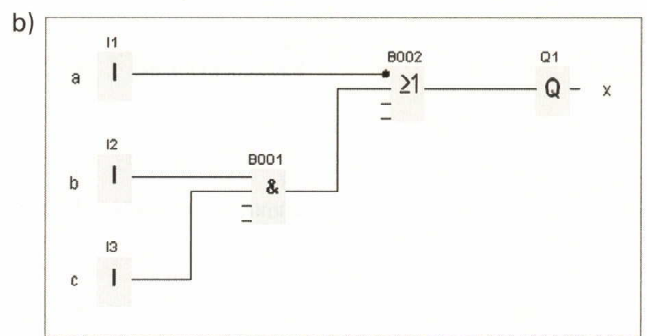
$$Q1 = S1 \wedge S2 \wedge S3$$



3 Grundverknüpfungen

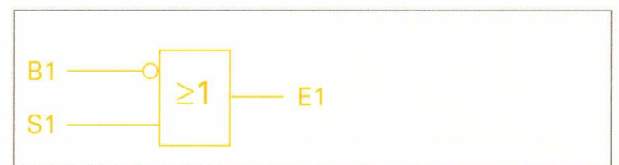
a) Wertetabelle

c	b	a	x
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1



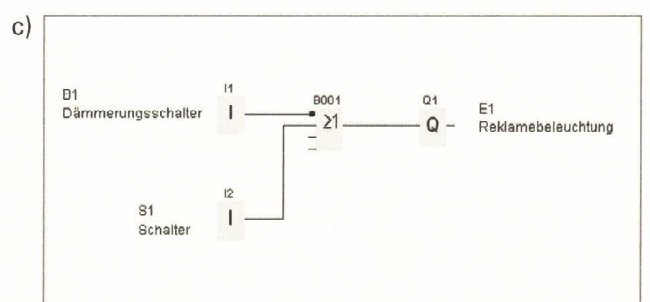
4 Reklamebeleuchtung

a) Funktionsplan



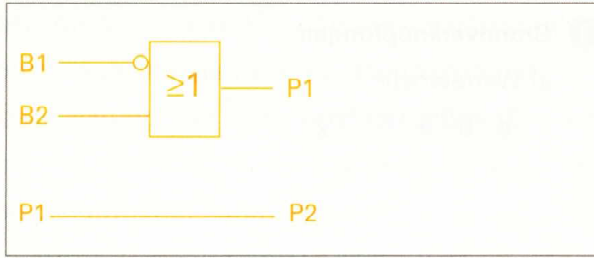
b) Funktionsgleichung

$$E1 = \overline{B1} \vee S1$$

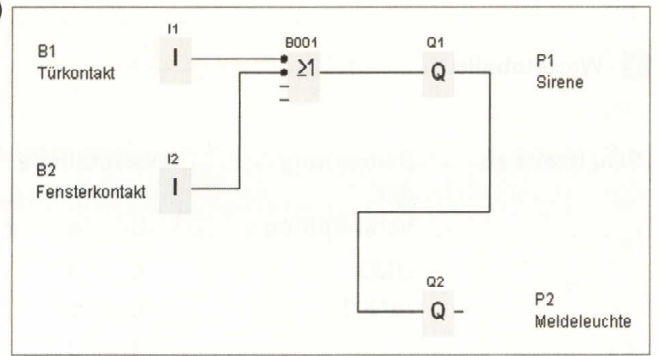


5 Alarmanlage

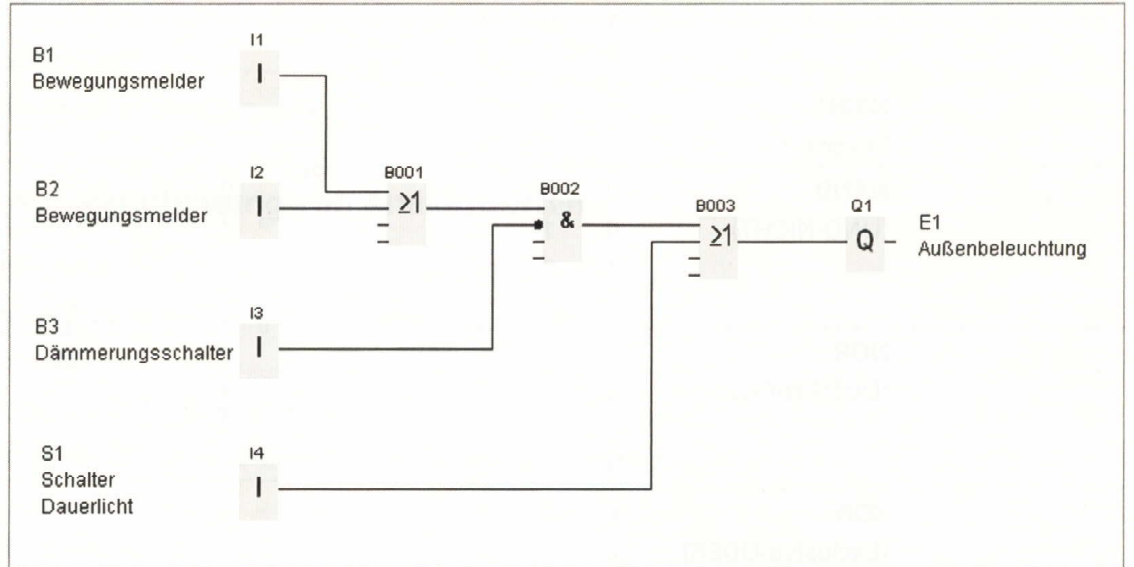
a) Funktionsplan



b)



6 Außenbeleuchtung

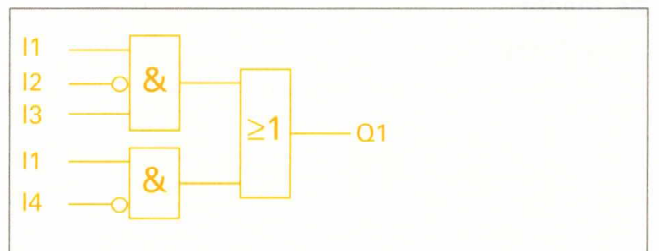


7 Funktionsgleichung 1

a) Wahrheitstabelle

I4	I3	I2	I1	Q1
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0

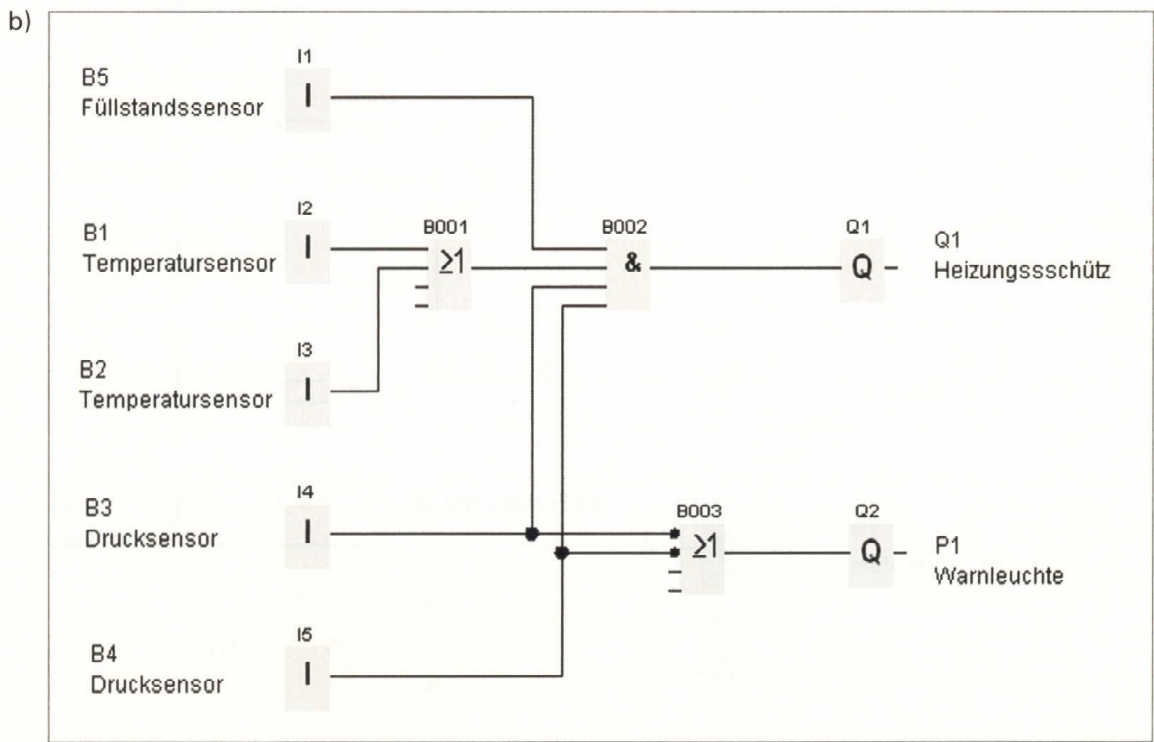
b) Funktionsplan



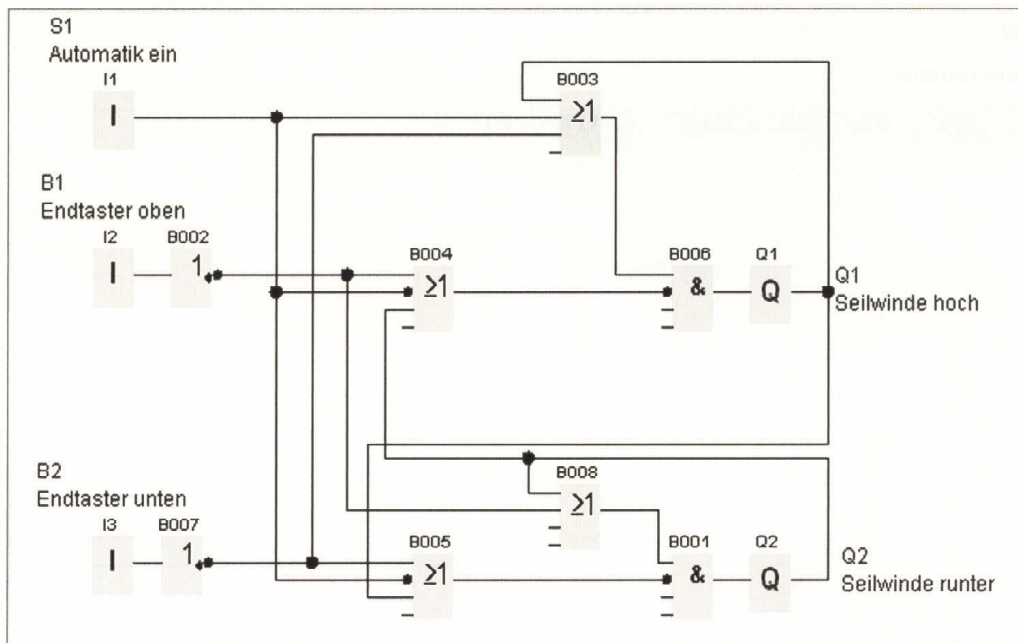
8 Braukessel

a) Wahrheitstabelle

B5	B4	B3	B2	B1	Q1	P1
0	0	0	0	0	0	1
0	0	0	0	1	0	1
0	0	0	1	0	0	1
0	0	0	1	1	0	1
0	0	1	0	0	0	1
0	0	1	0	1	0	1
0	0	1	1	0	0	1
0	0	1	1	1	0	1
0	1	0	0	0	0	1
0	1	0	0	1	0	1
0	1	0	1	0	0	1
0	1	0	1	1	0	1
0	1	1	0	0	0	0
0	1	1	0	1	0	0
0	1	1	1	0	0	0
0	1	1	1	1	0	0
1	0	0	0	0	0	1
1	0	0	0	1	0	1
1	0	0	1	0	0	1
1	0	0	1	1	0	1
1	0	1	0	0	0	1
1	0	1	0	1	0	1
1	0	1	1	0	0	1
1	0	1	1	1	0	1
1	1	0	0	0	0	1
1	1	0	0	1	0	1
1	1	0	1	0	0	1
1	1	0	1	1	0	1
1	1	1	0	0	0	0
1	1	1	0	1	1	0
1	1	1	1	0	1	0
1	1	1	1	1	1	0



9 Nikolauspuppe



10 Schaltungsanalyse

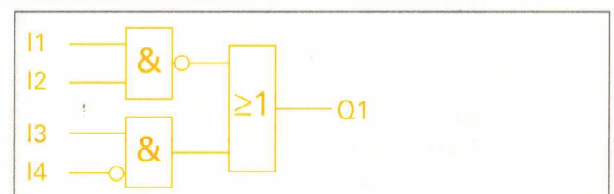
S4	S3	S2	S1	E1
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

11 Funktionsgleichung 2

a) Wahrheitstabelle

I4	I3	I2	I1	Q1
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

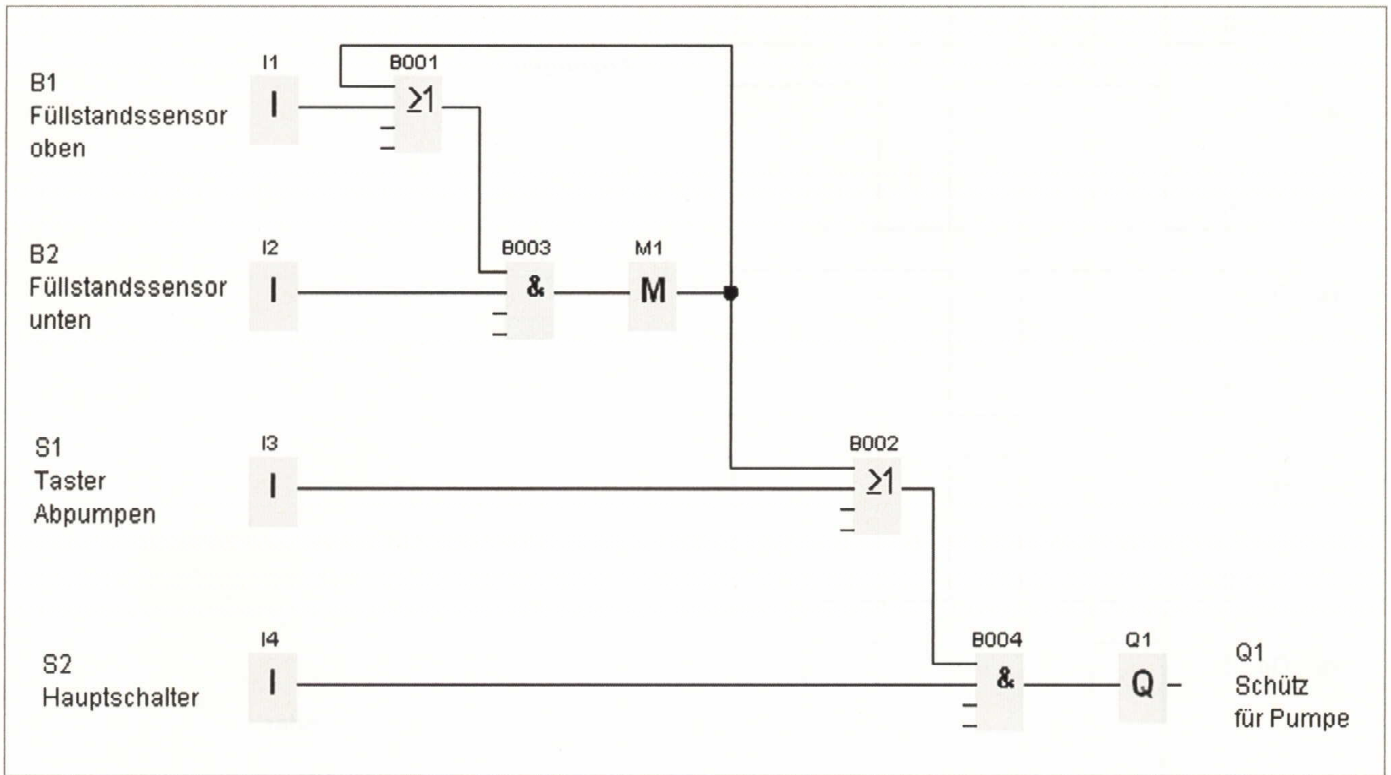
b) Funktionsplan



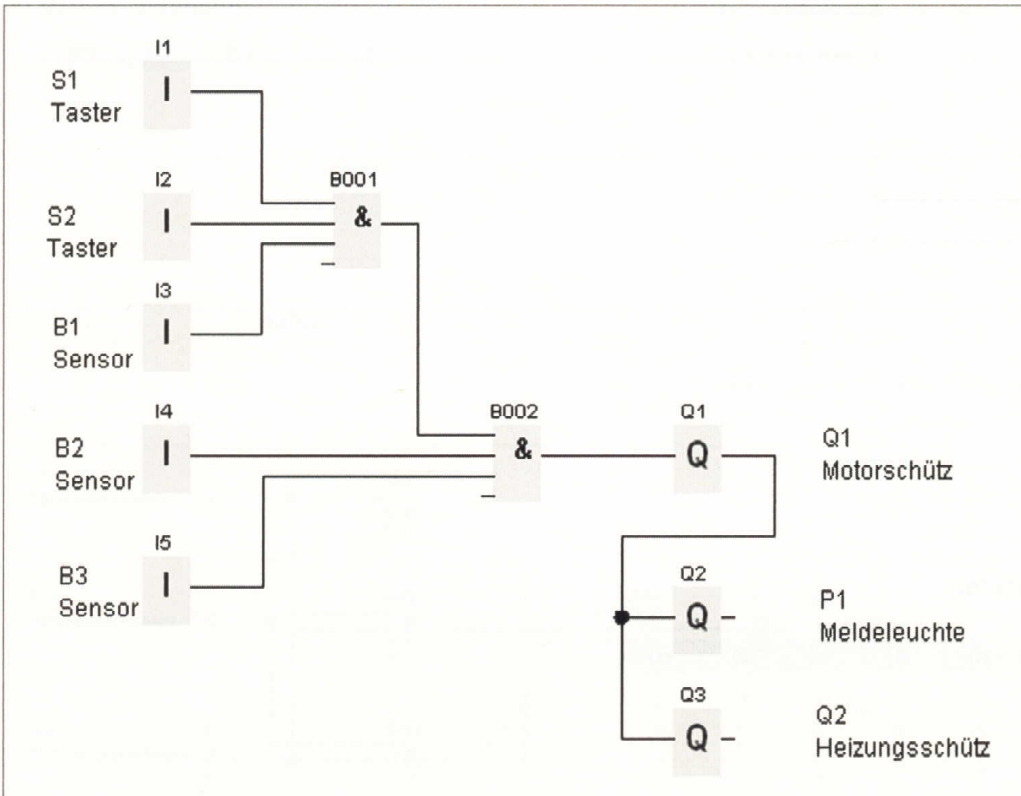
12 Schaltungsanalyse

- a) 1
- b) 1
- c) 0

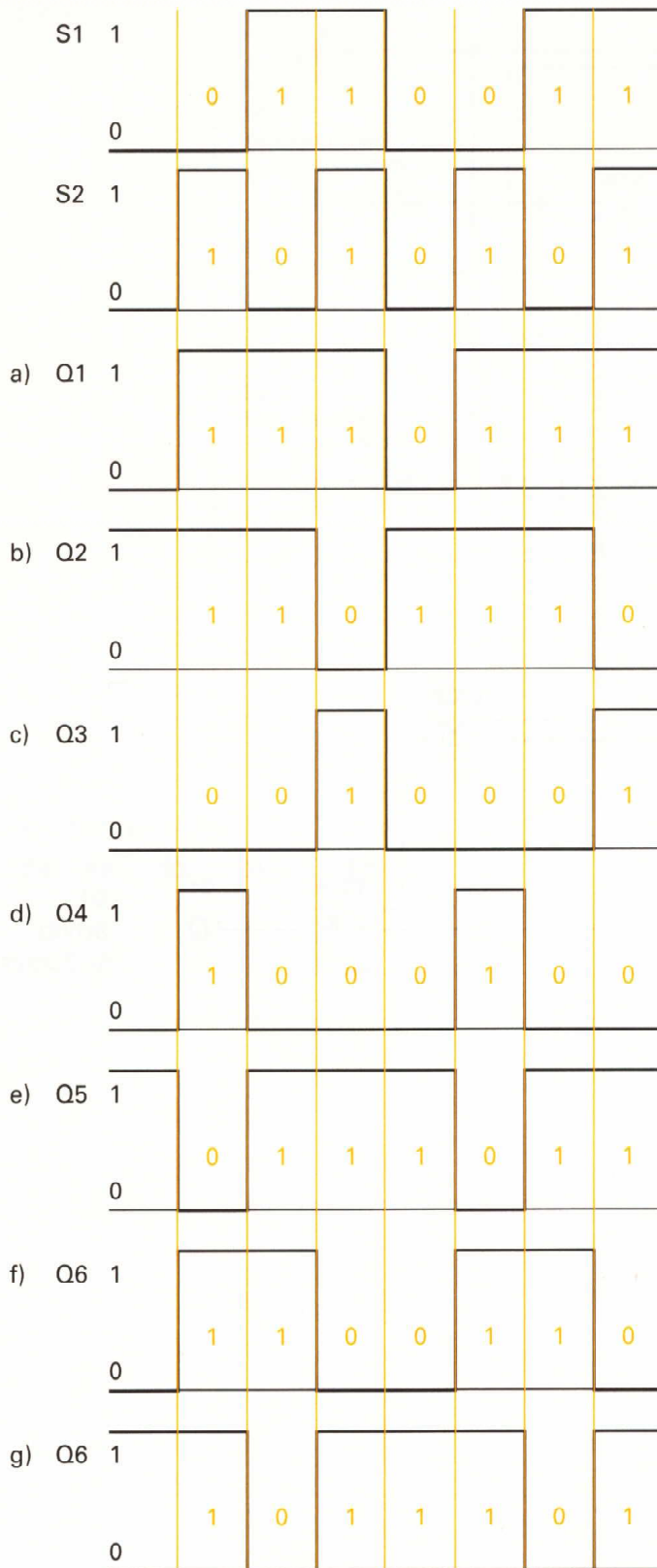
13 Pumpensteuerung



14 Abfrage von Ausgängen



15 Signal-Zeit-Plan



Lösungen



oder



oder



oder

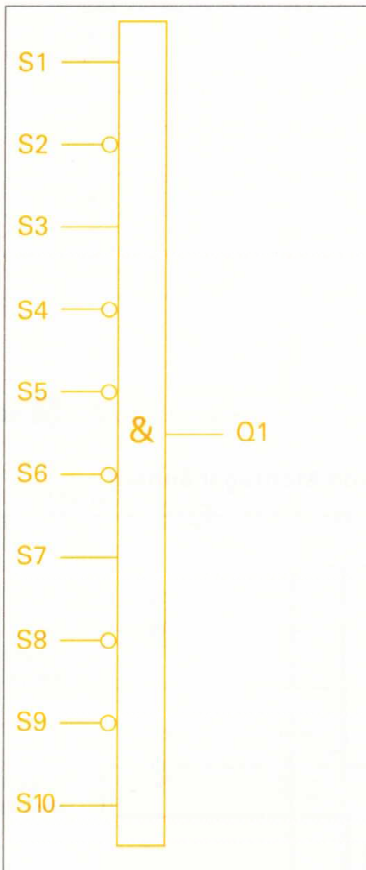


Wahrheitstabelle (Lösungshilfe)

S2	S1	a)	b)	c)	d)	e)	f)	g)
0	0	0	1	0	0	1	0	1
0	1	1	1	0	0	1	1	0
1	0	1	1	0	1	0	1	1
1	1	1	0	1	0	1	0	1

16 Sicherheitscode

a) Funktionsplan



b) Schaltungskombinationen

Kombinationen = $2^{\text{Anzahl der Eingänge}}$

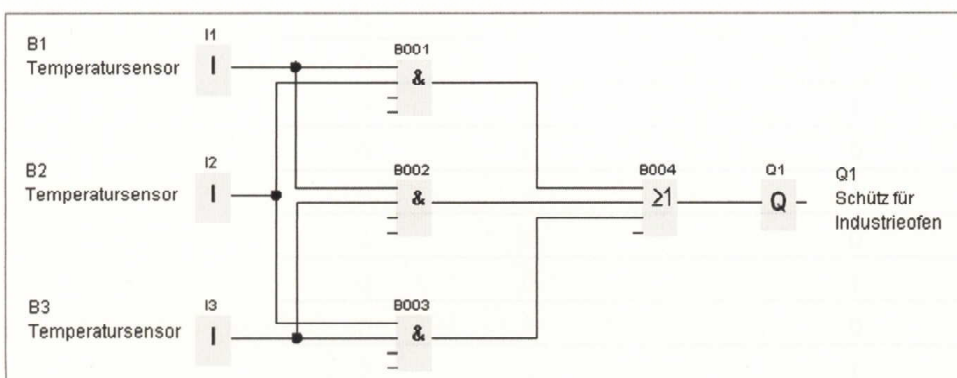
Kombinationen = 2^{10}

Kombinationen = **1024**

17 Temperaturüberwachung

a) Wahrheitstabelle

B3	B2	B1	Q1
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

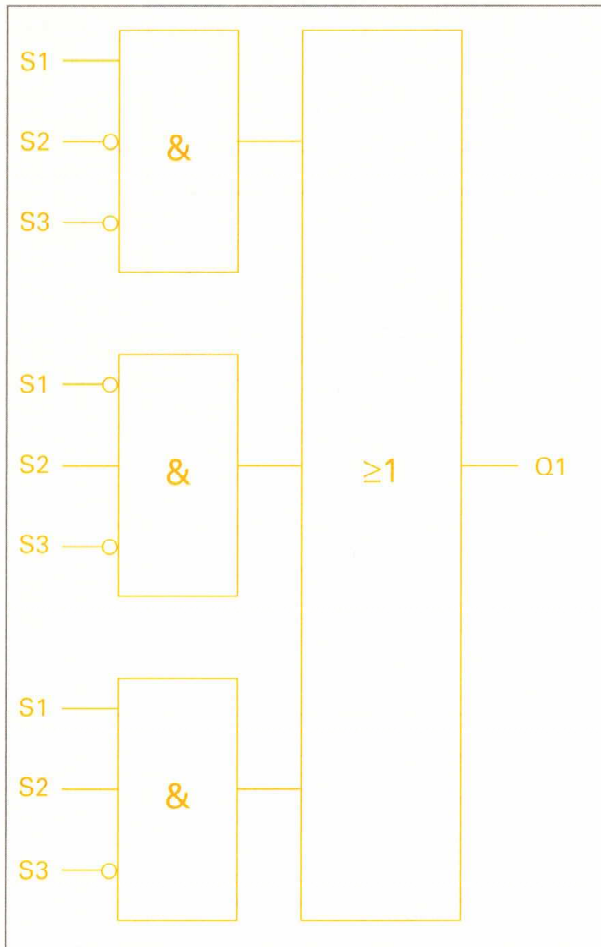


18 Wahrheitstabelle

a) Funktionsgleichung

$$Q = (\overline{S3} \wedge \overline{S2} \wedge S1) \vee (\overline{S3} \wedge S2 \wedge \overline{S1}) \vee (\overline{S3} \wedge S2 \wedge S1)$$

b) Funktionsplan

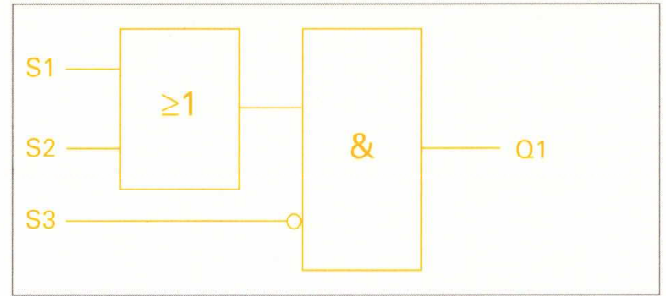


Vereinfachte Lösung (alternativ)

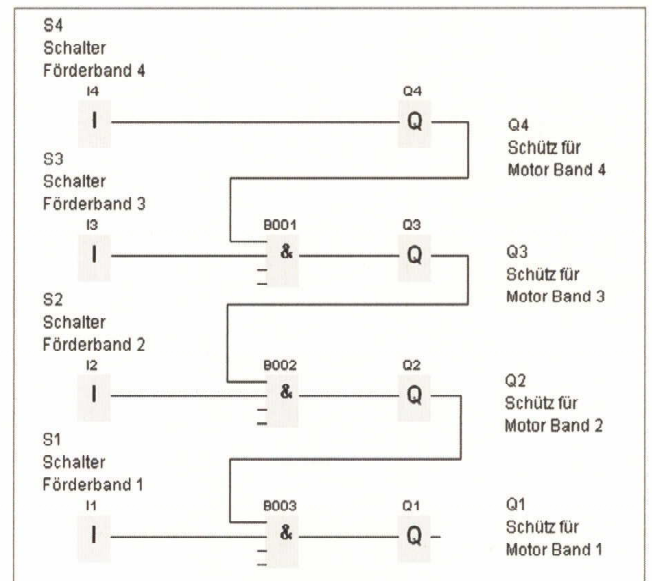
a) Funktionsgleichung

$$Q = \overline{S3} \wedge (S1 \vee S2)$$

b) Funktionsplan



19 Folgeschaltung von Montagebändern



Beispielaufgabe: Rauchmeldeanlage

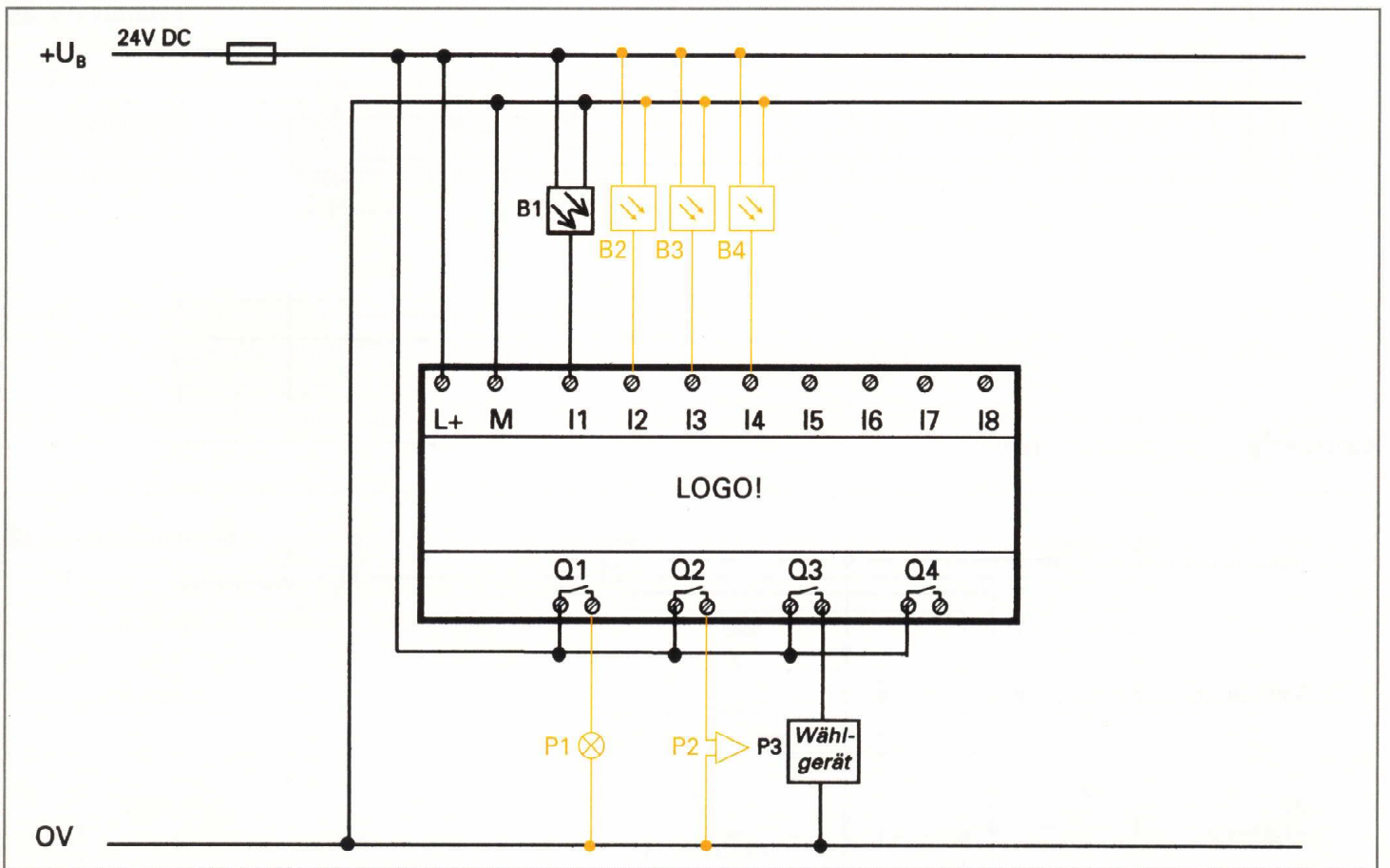
Aufgabe 1: Wahrheitstabelle

B1	B2	B3	B4	P1	P2	P3
0	0	0	0	1	1	1
0	0	0	1	1	1	0
0	0	1	0	1	1	0
0	0	1	1	1	1	0
0	1	0	0	1	1	0
0	1	0	1	1	1	0
0	1	1	0	1	1	0
0	1	1	1	1	0	0
1	0	0	0	1	1	0
1	0	0	1	1	1	0
1	0	1	0	1	1	0
1	0	1	1	1	0	0
1	1	0	0	1	1	0
1	1	0	1	1	0	0
1	1	1	0	1	0	0
1	1	1	1	0	0	0

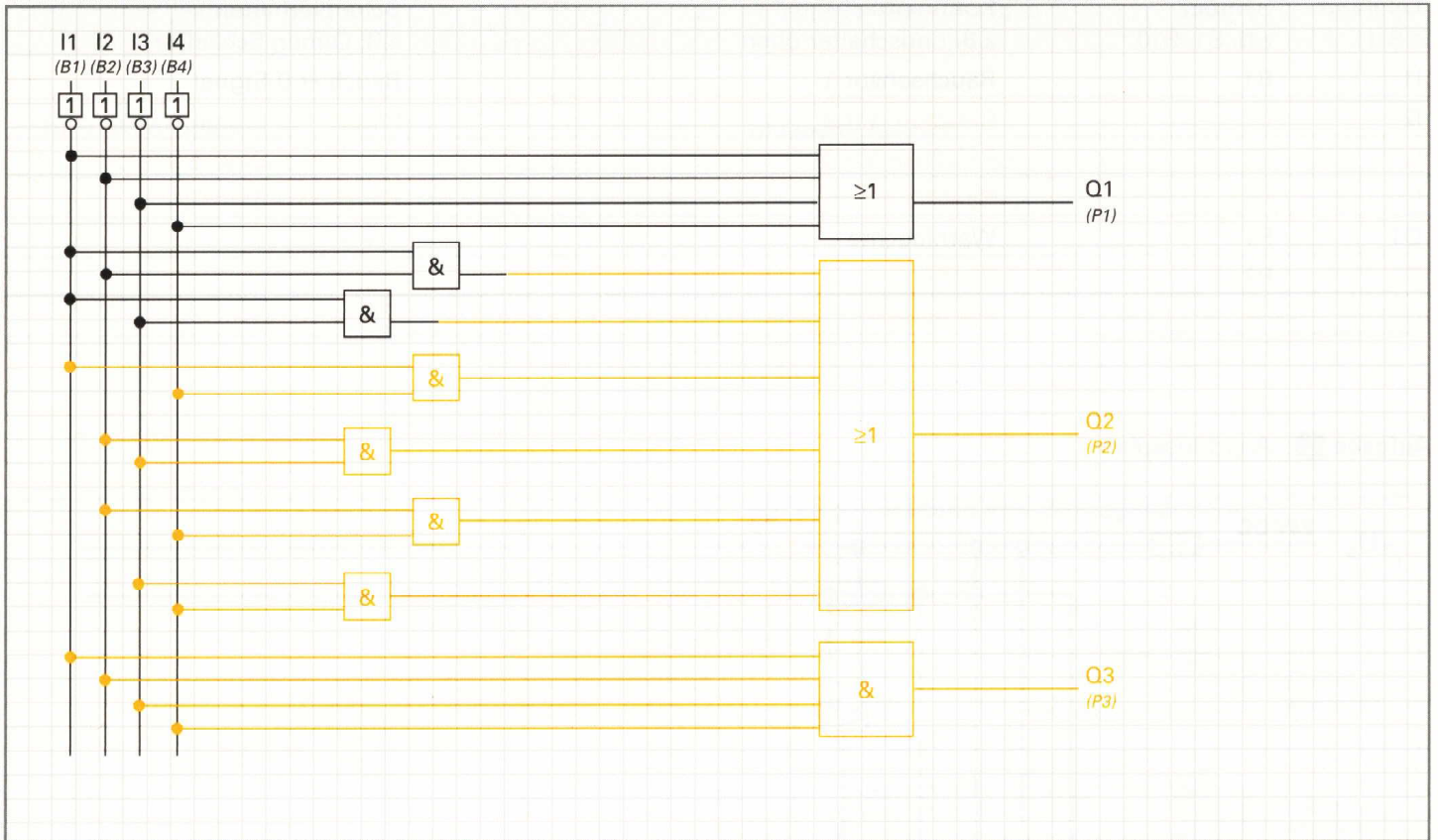
Aufgabe 2: Zuordnungsliste

Operand z.B. I1	Symbol z.B. S1, B10	Kommentar z.B. Endschalter oben	Schaltverhalten z.B. Öffner, Schließer
I1	B1	Rauchsensoren 1	Rauch → 0-Signal
I2	B2	Rauchsensoren 2	Rauch → 0-Signal
I3	B3	Rauchsensoren 3	Rauch → 0-Signal
I4	B4	Rauchsensoren 4	Rauch → 0-Signal
Q1	P1	Warnleuchte	---
Q2	P2	Sirene	---
Q3	P3	Wählgerät	---

Aufgabe 3: Anschlussplan



Aufgabe 4: Funktionsplan



Aufgabe 5: Steuerungsprogramm

