

Ny utgave 2010

Vg2 elektro

Teori med
praktiske
øvinger

Kunnskaps-
løftet

Frank Fosbæk

Automatiserte anlegg

Vg2 elenergi

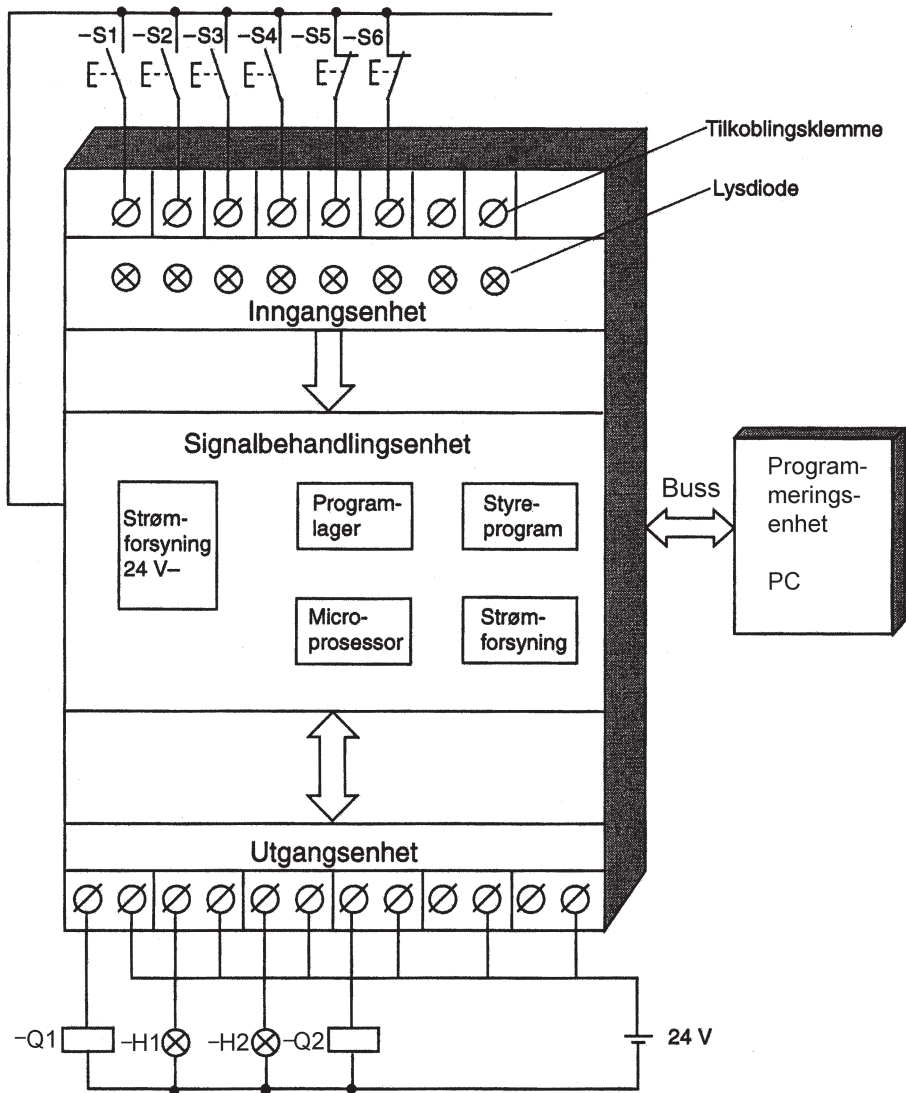
ELFORLAGET

Illustrasjoner til Automatiserte anlegg Vg2 elenergi

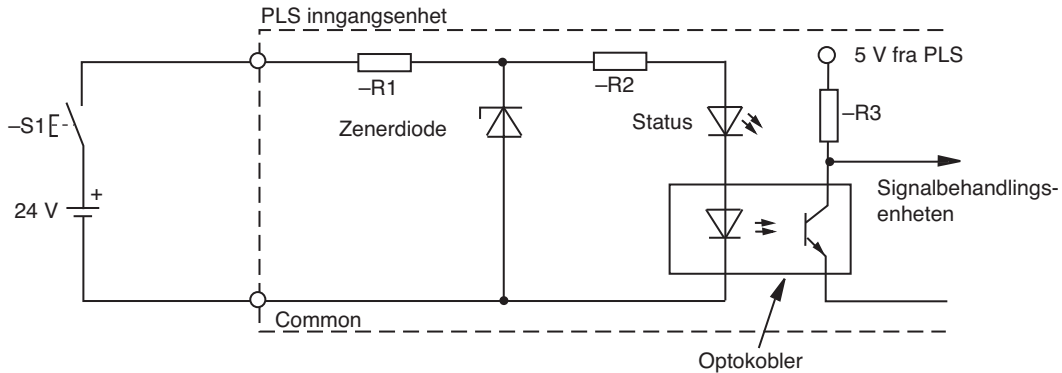
Kapittel 7

Illustrasjonene kan brukes fritt i undervisningen

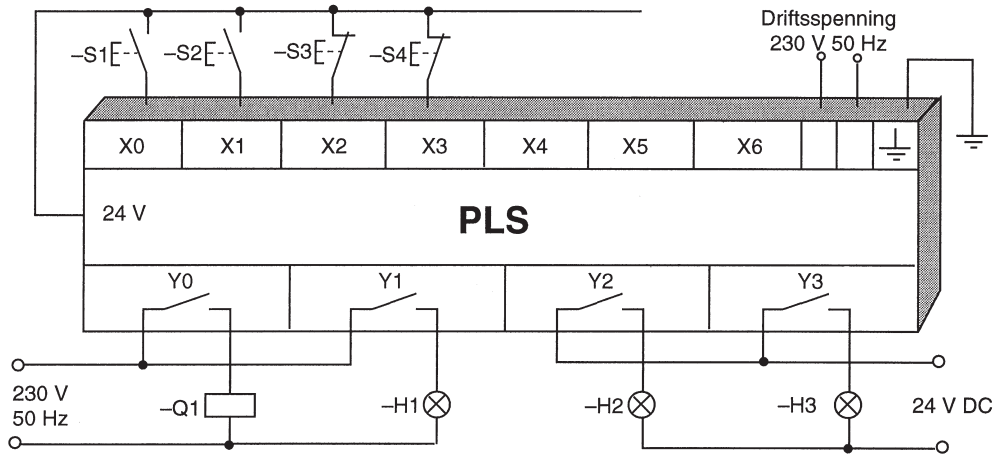
© Elforlaget 2011



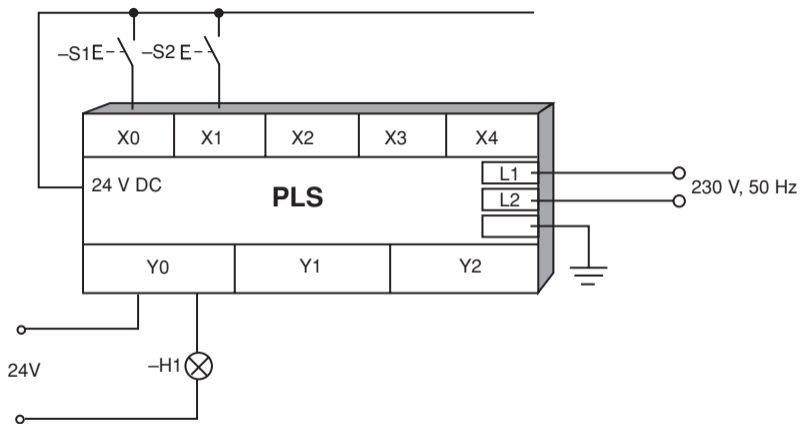
Figur 7.1 Prinsippskjema for en PLS



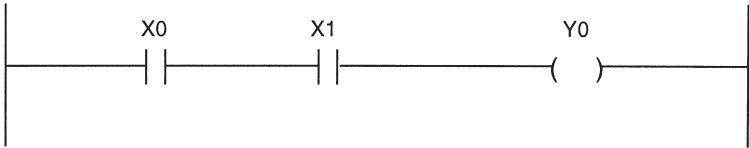
Figur 7.2 Prinsippskjema for en inngang med galvanisk skille



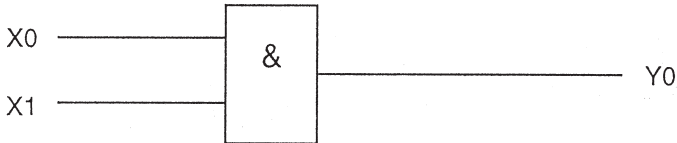
Figur 7.3 Eksempel på kobling av PLS



Figur 7.4 PLS med tilkoblinger



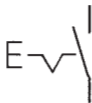
Figur 7.5 Ladderdiagram



Figur 7.6 Funktionsblokkdiagram

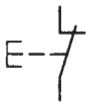


Brytekontakt

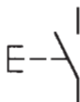


Sluttekontakt

Monostabile brytere

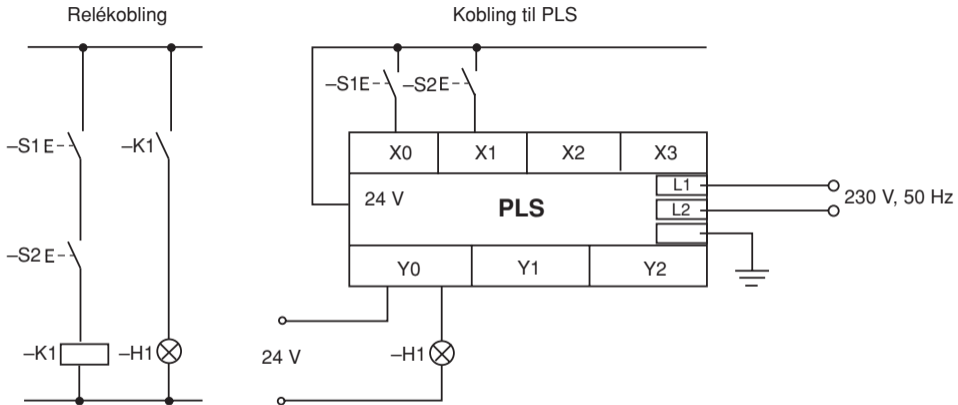


Brytekontakt

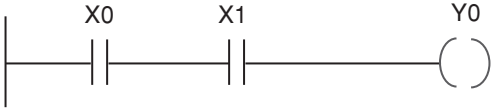


Sluttekontakt

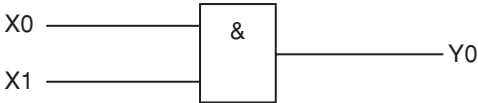
Figur 7.7 Symboler for bistabile og monostabile brytere



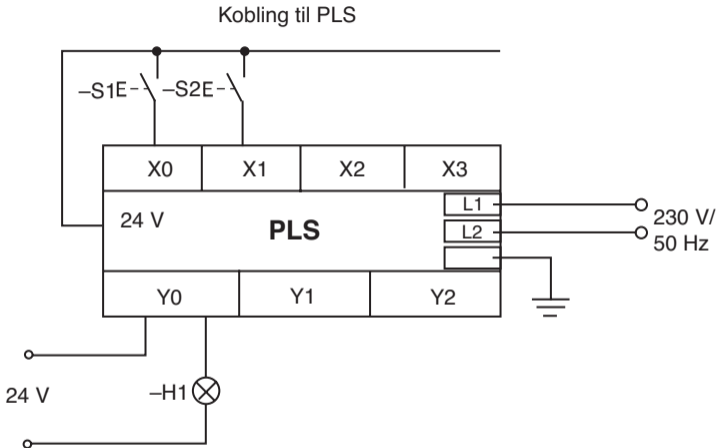
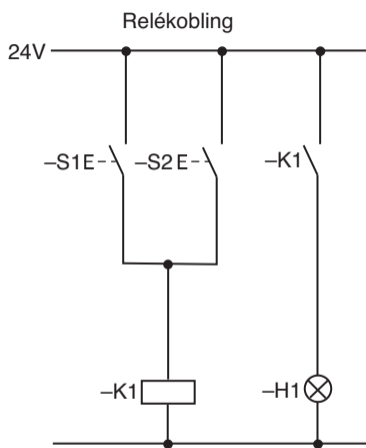
Figur 7.8 OG-funksjon



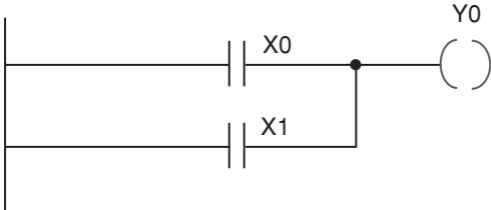
Figur 7.9 Ladderdiagram



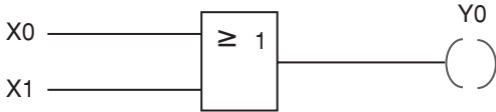
Figur 7.10 Funksjonsblokkdiagram



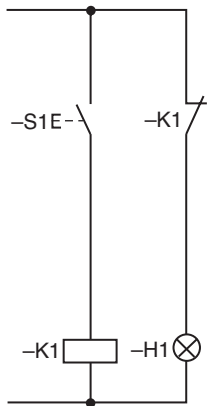
Figur 7.11 ELLER-funksjon



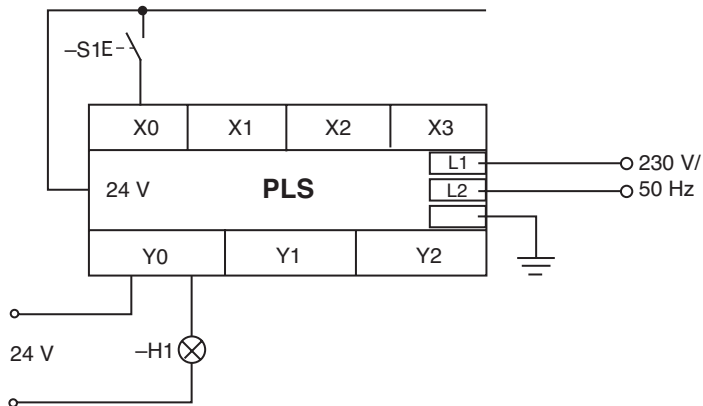
Figur 7.12 Ladderdiagram



Figur 7.13 Funksjonsblokkdiagram

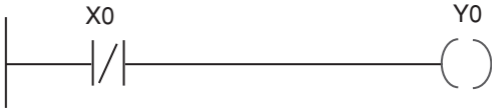


Reléstyring

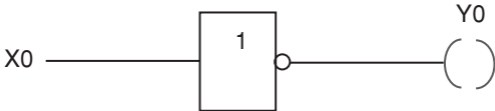


PLS-styring

Figur 7.14 Inverter-funksjon

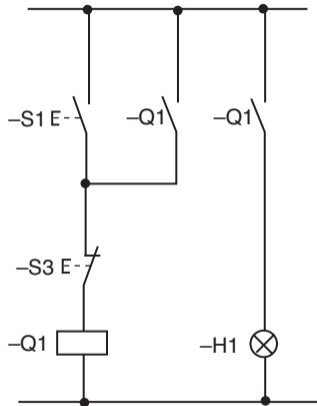


Figur 7.15 Ladderdiagram

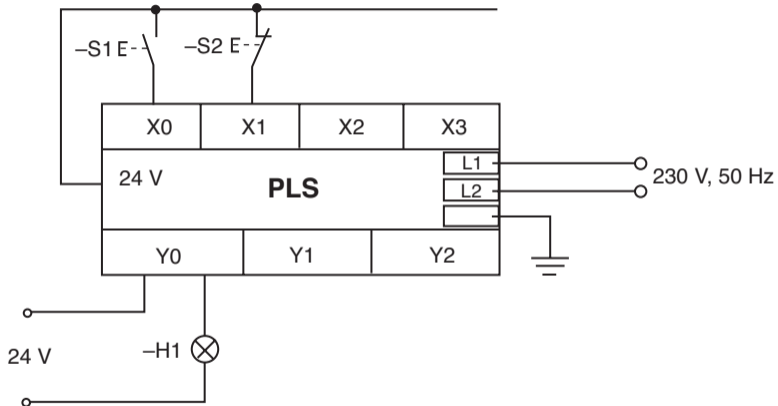


Figur 7.16 Funksjonsblokkdiagram

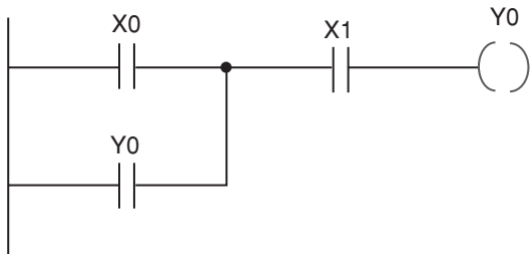
Relékobling:



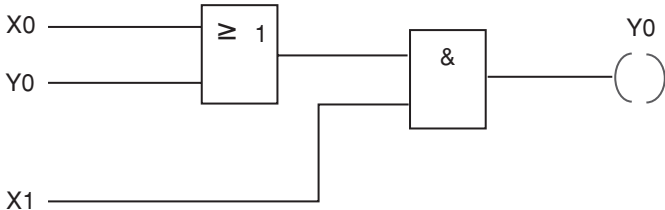
Kobling til PLS:



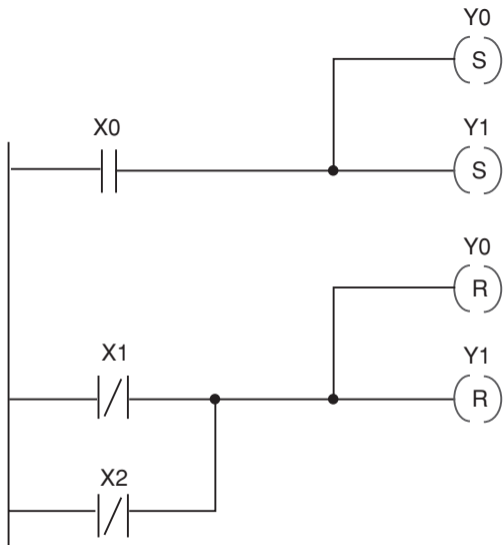
Figur 7.17 Holdefunksjon



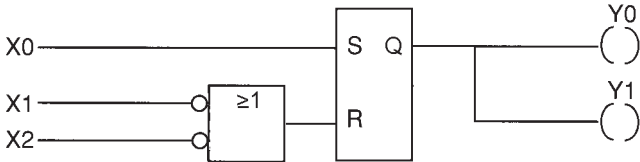
Figur 7.18 Ladderdiagram



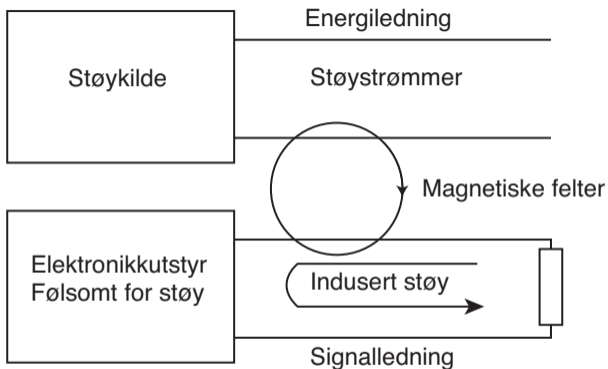
Figur 7.19 Funksjonsblokkdiagram



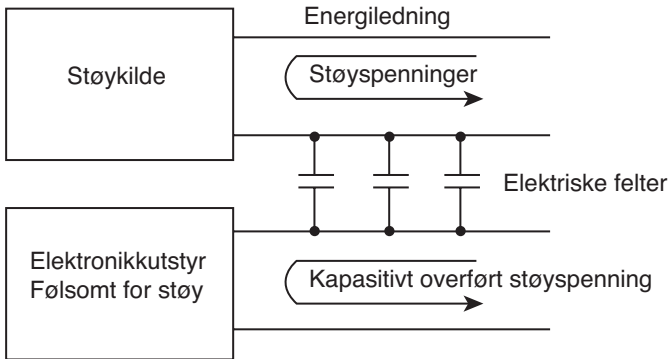
Figur 7.21 Ladderdiagram



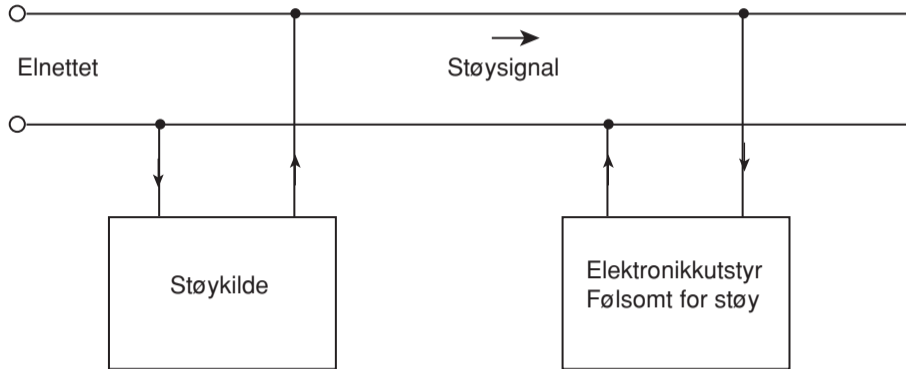
Figur 7.22 Funksjonsblokkdiagram



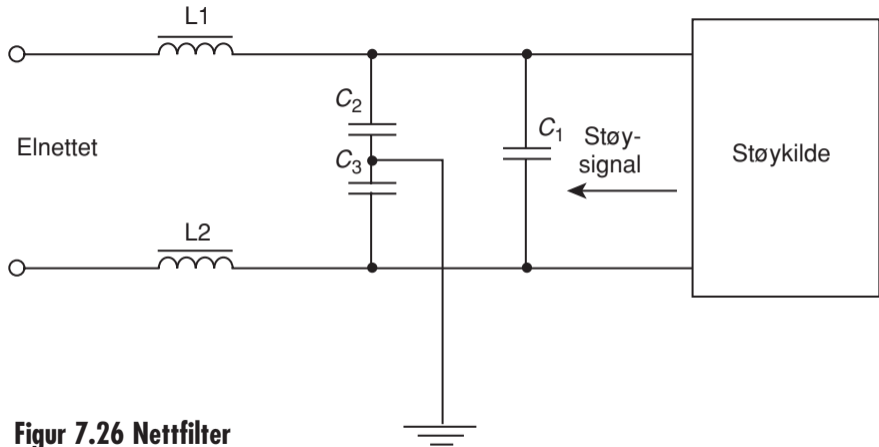
Figur 7.23 Indusert elektrisk støy



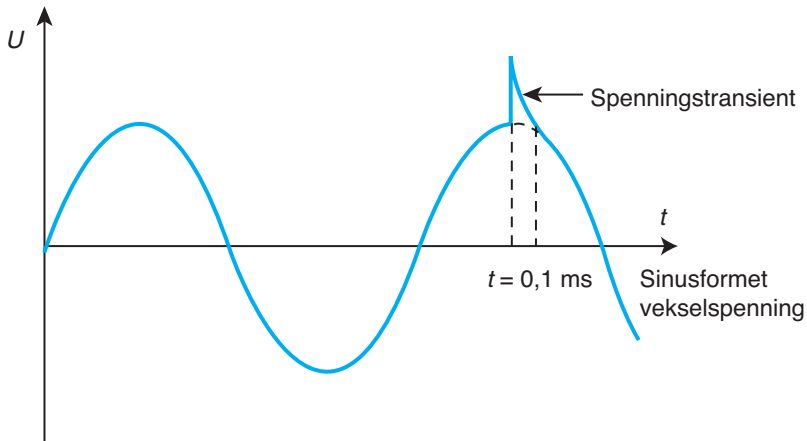
Figur 7.24 Kapasitivt overført støy



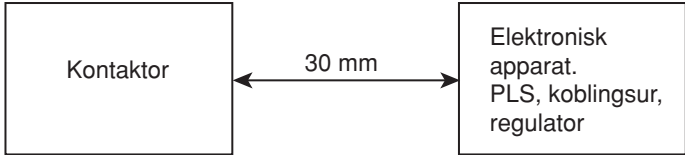
Figur 7.25 Overføring av støy gjennom ledningsnett



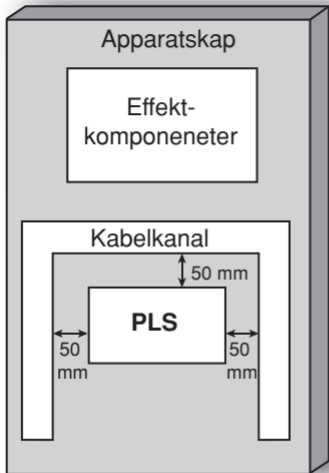
Figur 7.26 Nettfilter



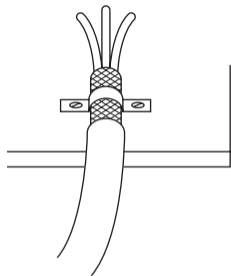
Figur 7.27 Eksempel på spenningstransient



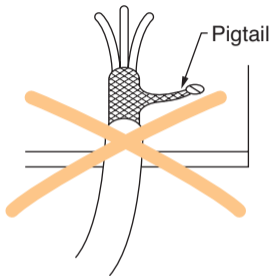
Figur 7.28 Eksempel på plassering av en kontaktor



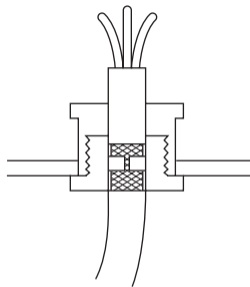
Figur 7.29 Plassering av apparater i apparatskap



God

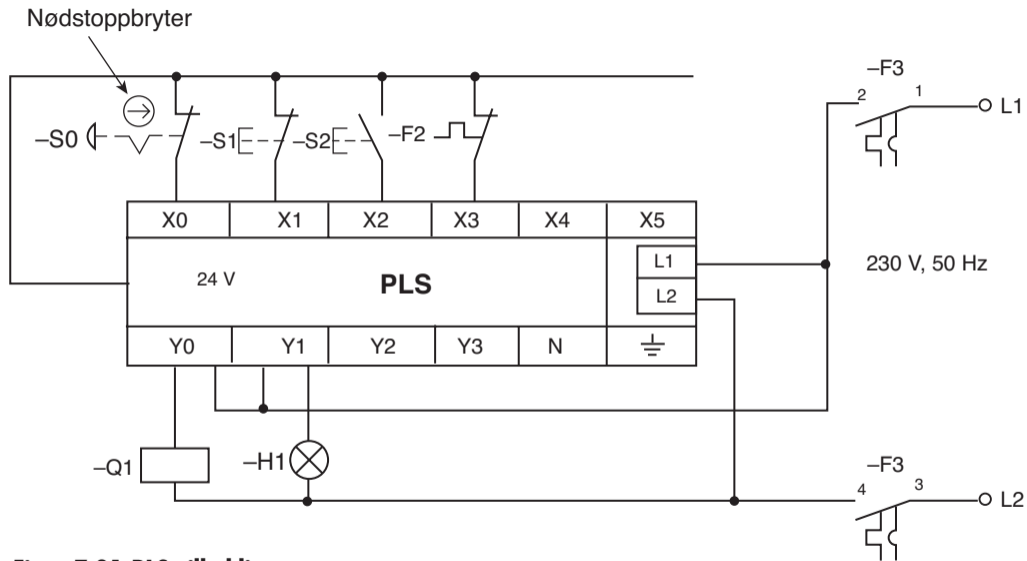


Dårlig

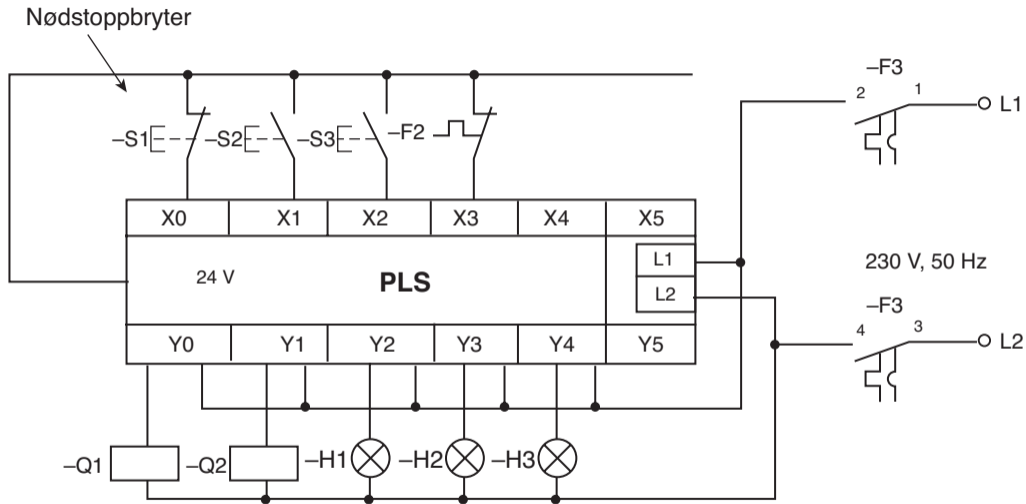


God

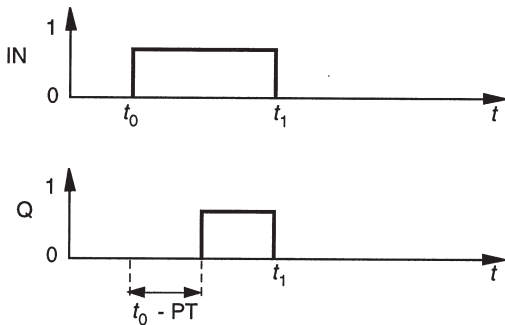
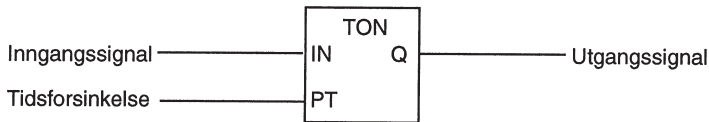
Figur 7.30 Eksempel på koblingen av en skjermkabels skjerm til jordskinnen



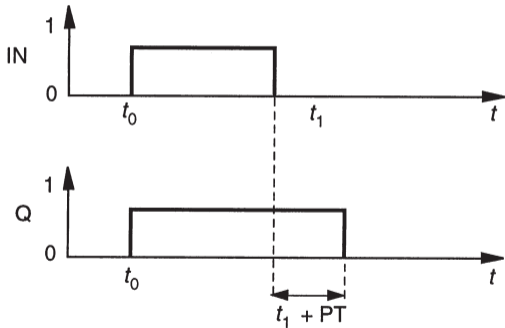
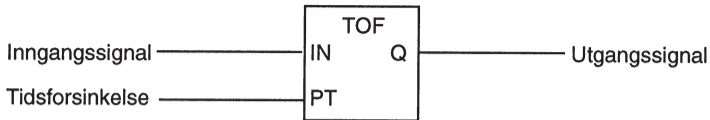
Figur 7.31 PLS-tilkoblinger



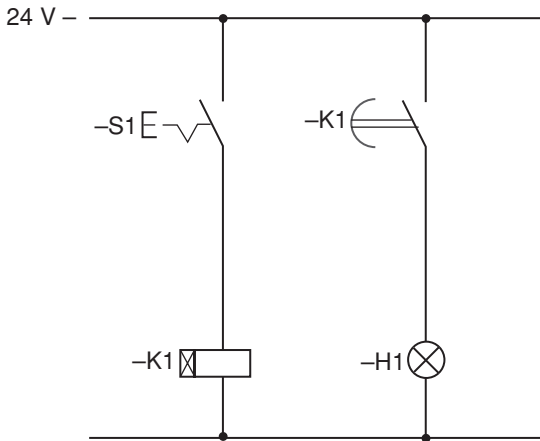
Figur 7.32 PLS-tilkoblinger



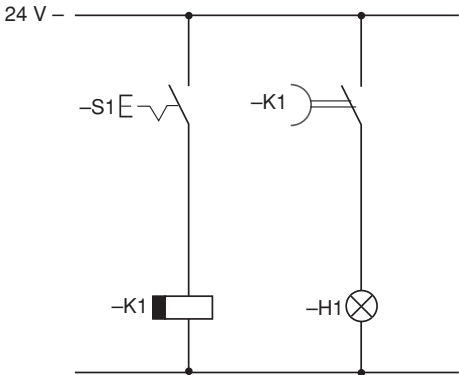
Figur 7.33 Forsinket innkobling



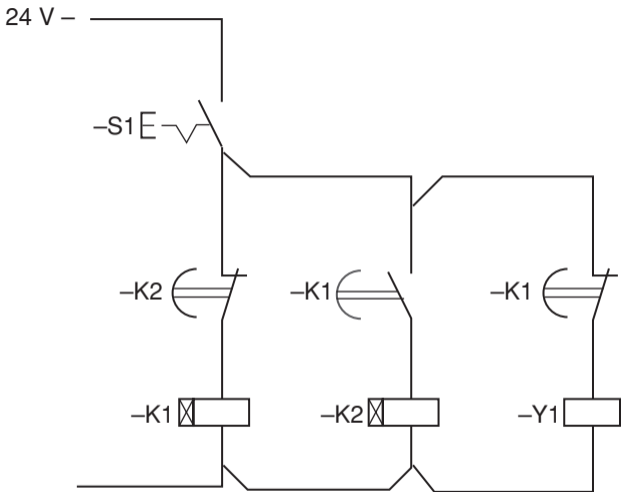
Figur 7.34 Forsinket utkobling



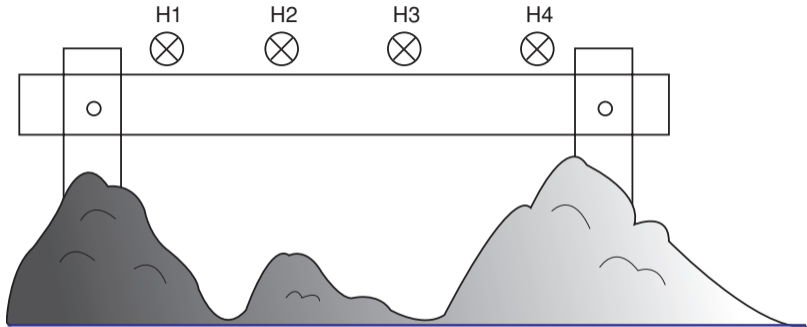
Figur 7.35 Relékobling



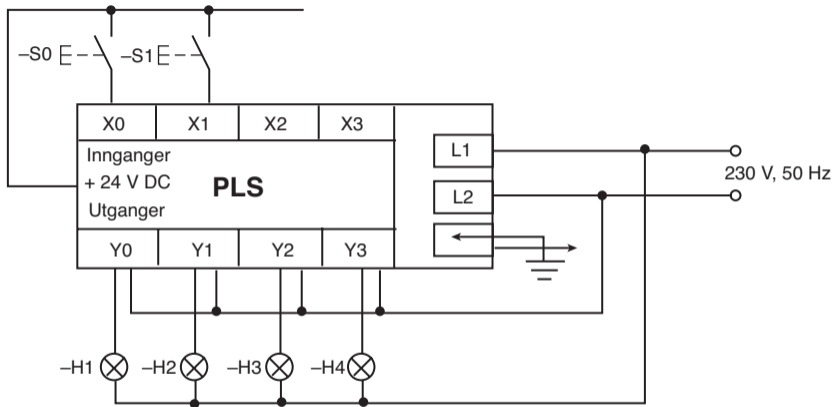
Figur 7.36 Relékobling



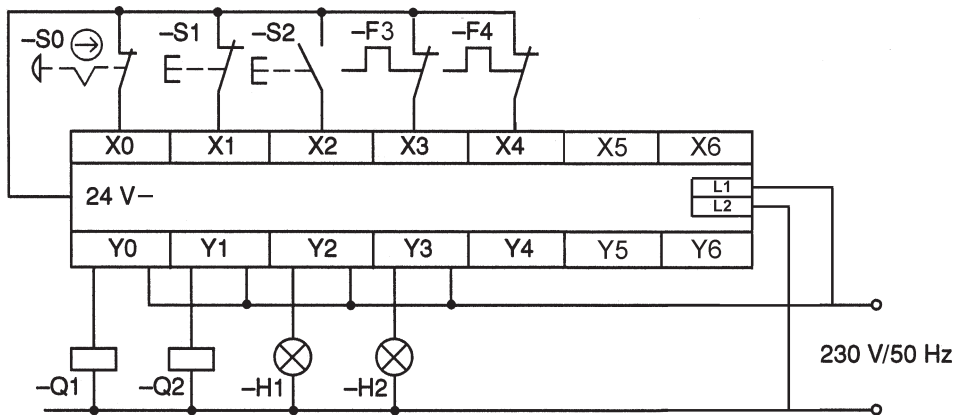
Figur 7.37 Relékobling



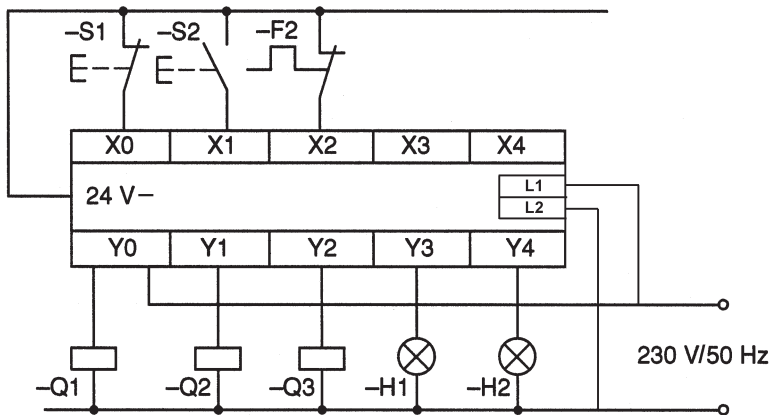
Figur 7.38 Lysbjelke



Figur 7.39 Koblinger til PLS-en



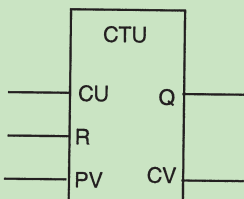
Figur 7.40 PLS-tilkoblinger



Figur 7.41 PLS tilkoblinger

Oppteller, *Up-counter*

Symbol

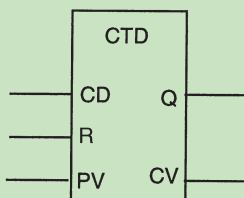


Virkemåte

Når R blir satt til 1, blir CV satt til 0.
Når CU blir satt til 1, øker antall tellepulser på CV med 1, $CV = CV + 1$.
Utgangen Q blir 1 når CV er lik eller større enn PV.

Nedteller, *Down-counter*

Symbol

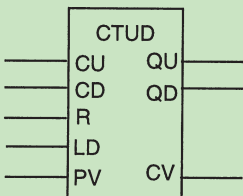


Virkemåte

Når R blir satt til 1, blir CV satt til 0.
Når CD blir satt til 1, reduseres antall tellepulser på CV med 1, $CV = CV - 1$.
Utgangen Q blir 1 når CV er lik eller mindre enn PV.

Opp/ned teller, *Up-down-counter*

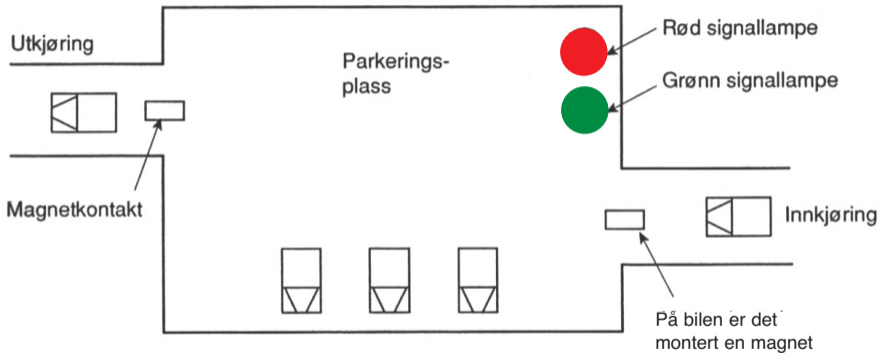
Symbol



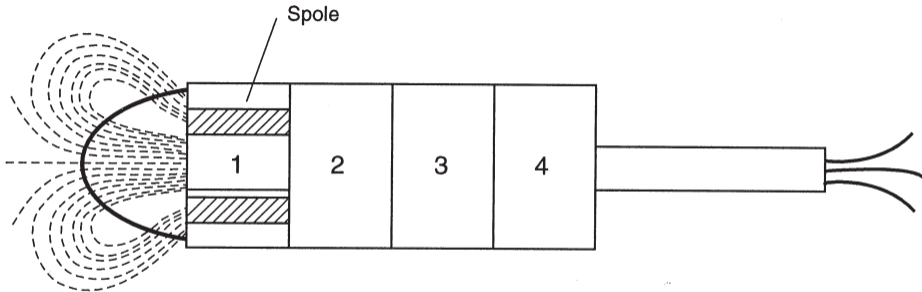
Virkemåte

Når R blir satt til 1, blir CU satt til 0.
Når LD blir satt til 1, blir CV satt til PV. Når CU blir satt til 1, øker tellepulsene på CV med 1, $CV = CV + 1$.
Når CD blir satt til 1, reduseres antall tellepulser på CV med 1, $CV = CV - 1$.
Utgangen QD blir satt til 1 når $CV = 0$.
Utgangen QU blir satt til 1 når $CV = PV$.

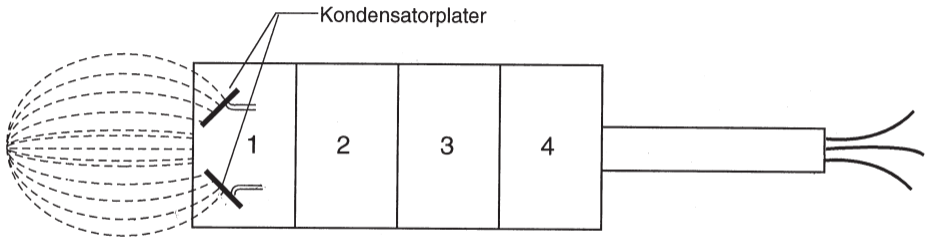
Figur 7.42 Tellernes skjemasymbol og funksjon



Figur 7.43 Lysregulert parkeringsplass

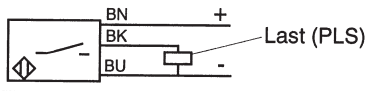


Figur 7.44 Induktiv næreffektbryter skjematisk tegnet

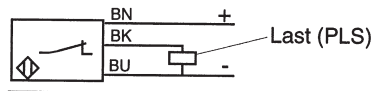


Figur 7.45 Kapasitiv næreffektbryter skjematisk tegnet

Type: Tretrådet PNP

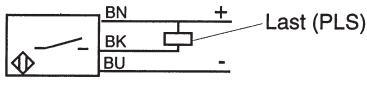


Gir (+) signal i forhold til (-) når den blir aktivisert.
Den gir *ikke* signal når den *ikke* er aktivisert

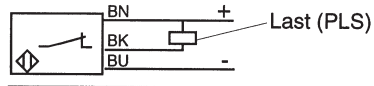


Gir (+) signal når den *ikke* er aktivisert og gir *ikke* signal når den er aktivisert

Type: Tretrådet NPN



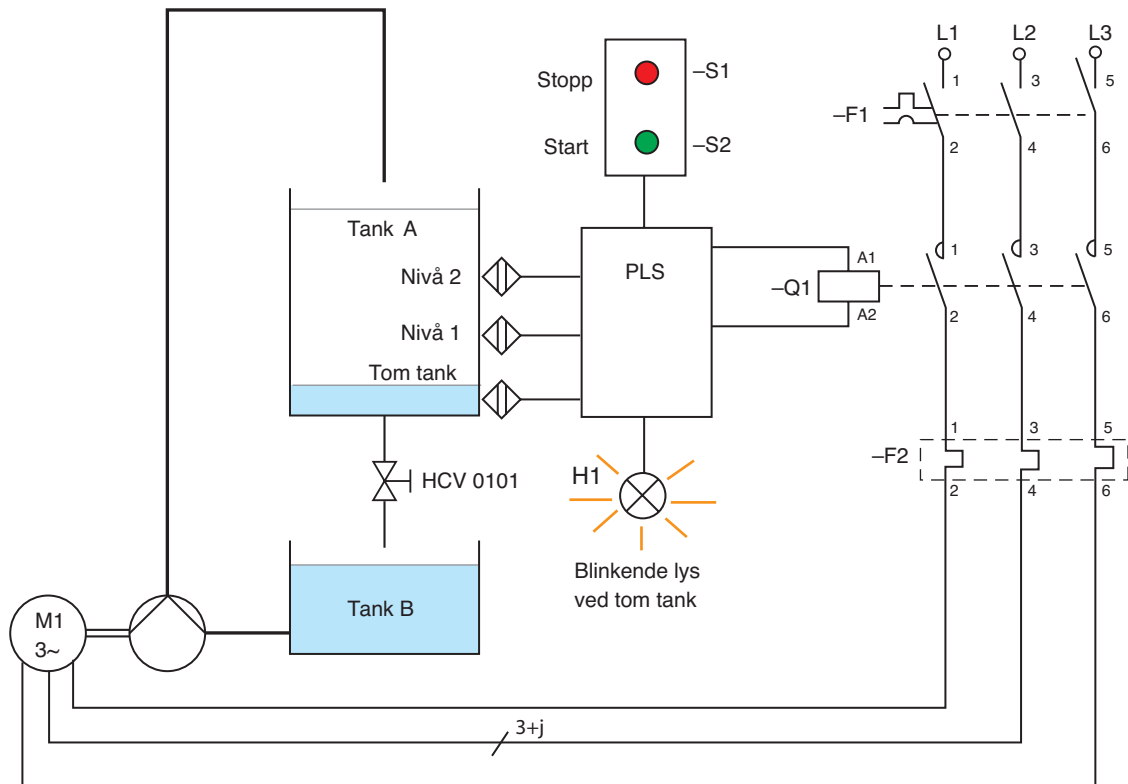
Gir (-) signal i forhold til (+) når den blir aktivisert.
Den gir *ikke* signal når den *ikke* er aktivisert



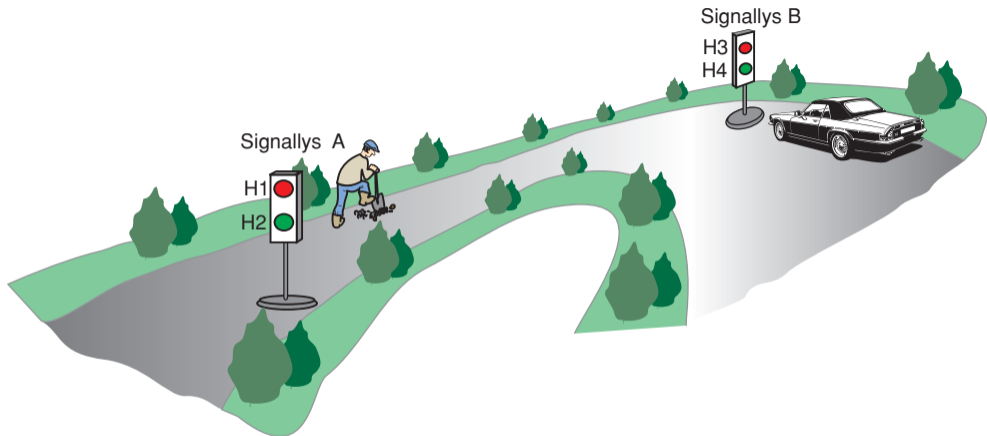
Gir (-) signal når den *ikke* er aktivisert og gir *ikke* signal når den er aktivisert

BN er brun
BK er sort
BU er blå

















Figur 7.46 Koblingskjemaer for næreffektbrytere



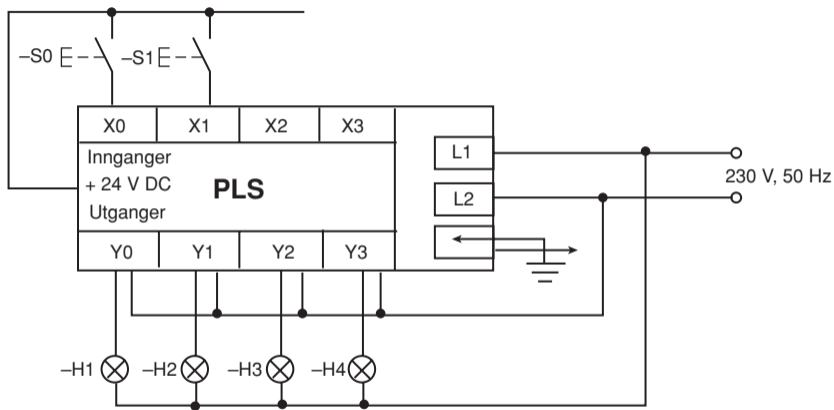
Figur 7.47 Prinsippskisse av pumpeanlegget



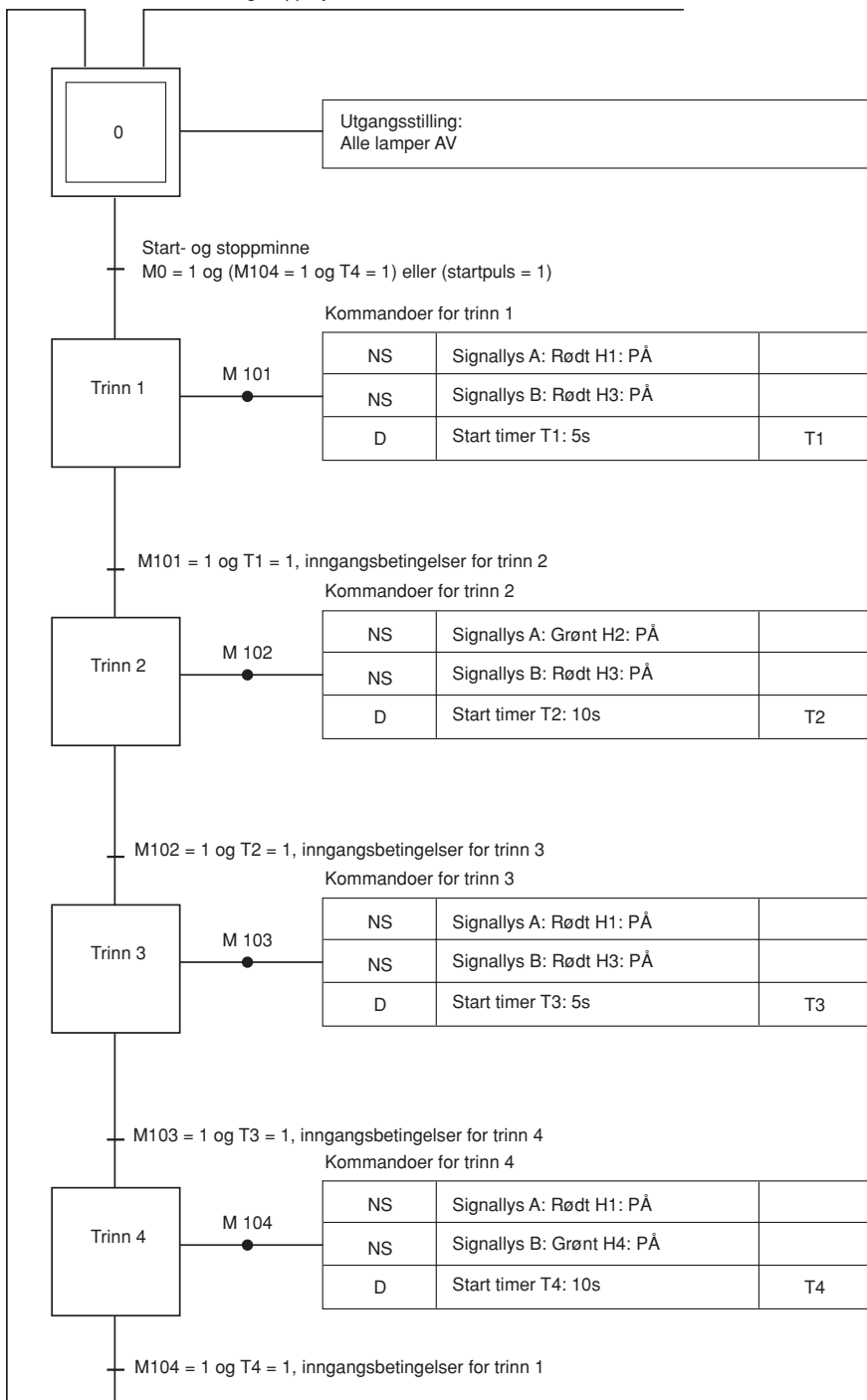
Figur 7.48 Lysanlegg for veiarbeid

	Signallys A		Signallys B		Tid i sek.
	H1 rødt	H2 grønt	H3 rødt	H4 grønt	
Trinn 1					5
Trinn 2					10
Trinn 3					5
Trinn 4					10
Trinn 1	Som trinn 1				

Figur 7.49 Funksjonstabell for lysanlegget



Figur 7.50 Koblingskjema for styring av lysanlegget



Figur 7.51 Sekvensielt funksjonsdiagram for anlegget

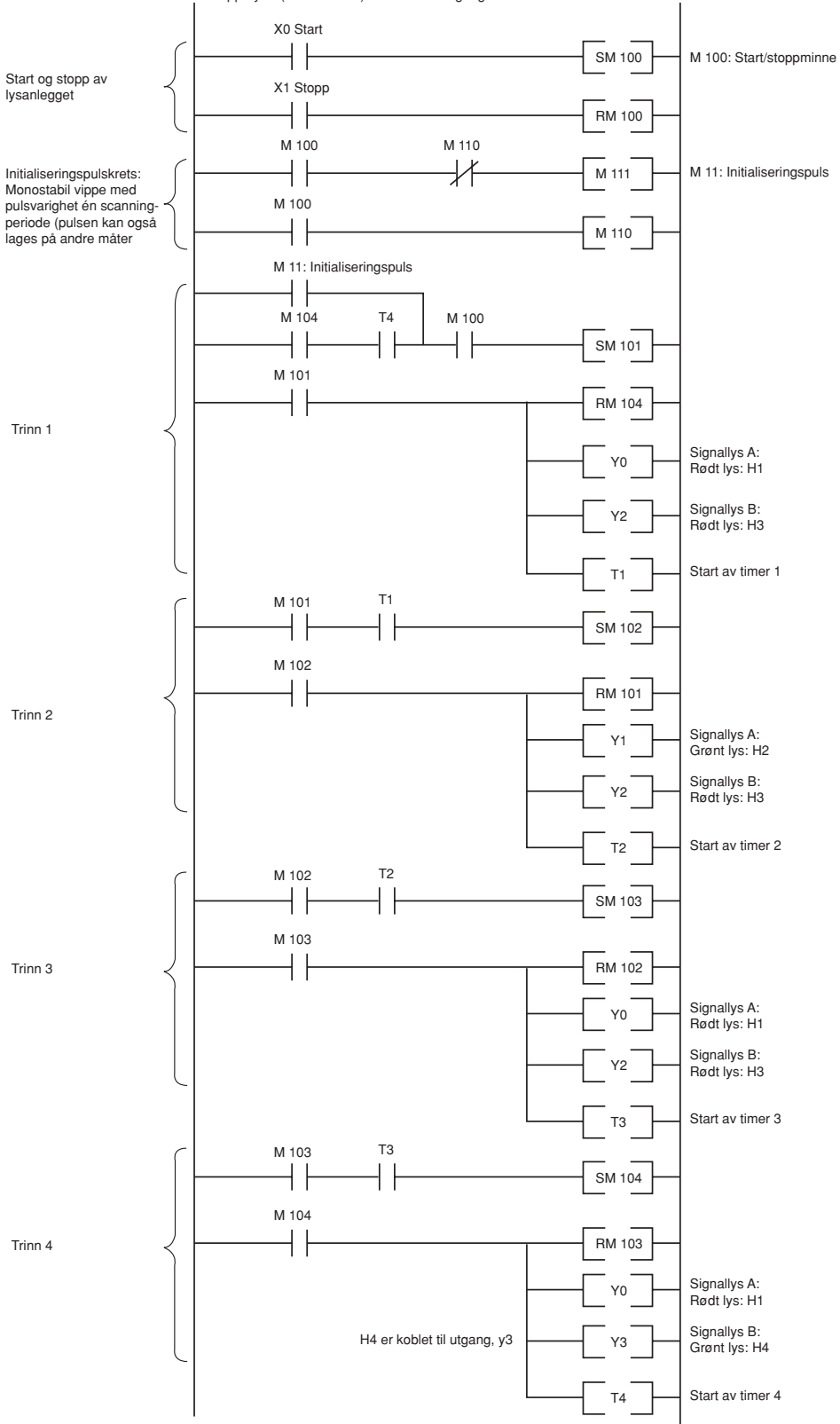


Figur 7.52 Kommandosymbol

NS	Signallys A: Rødt H1: PÅ	
NS	Signallys A: Rødt H3: PÅ	
D	Tidsforsinkelse 5 s. Start timer T1	T1

Figur 7.53 Kommandoer for trinn 1

Startbryter (sluttekontakt) er koblet til inngang: X0
 Stoppbryter (sluttekontakt) er koblet til inngang: X1



Figur 7.54 Eksempel på et ladderdiagram