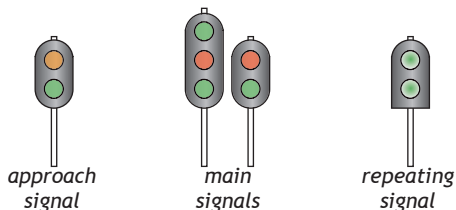


5.19. NORWEGIAN SIGNALS

! To control Norwegian signals directly you need a **Qdecoder** with **Signal** extension for Norwegian signals.

5.19.1. MAIN SIGNALS

The Norwegian signalling system is a classical one consisting of main and approach signals. The main signal gives the driver information on the track segment behind the signal. Approach signals are used to inform about the state of the following main signal.













An announcing signal gives always the same aspect as the following main signal.

If the main signal is hard to be seen or between the announcing and the main signals the train stops typically (e.g. at a station) another signals can be used to repeat the announcing. These repeaters (called "Togsporsignal") are used only for exit and inner exit signals.

SIGNAL ASPECTS

Norwegian main and announcing signals can show the following aspects:

aspect	main signal	announcing signal	repeating signal
stop	 (signal 20A)	 (signal 23)	
	 (signal 20B)		






aspect	main signal	announcing signal	repeating signal
go diverging	 (signal 21)	 (signal 24)	 (signal 36A)
go	 (signal 22)	 (signal 25)	 (signal 36B)

The flashing signal aspect 20A is used for station entry signals and block signals. The permanently activated signal 20B is used for station exit and inner signals.

The "go diverging" aspect indicates a speed reduction.

ADD ON SIGNALS

There are some signals that give additional information. They are mounted either below or above the main signal.

description	signal
drive carefully	32 
direction indication	35B 
departure signal	39 
indicated speed allowed	68E 
A disturbed (dark) signal is of course no add-on signal, but an error. Qdecoders can switch to a dark background by an accessory command.	

Signal 32 indicates a short or dead-end track. It is given in combination with signal 21.

Signal 35B shows in combination with either signal 21 or signal 22 the first letter of the name of the track or the destination. Signal 39 allows the driver to leave the station platform.

Signal ✓
 Ampek
 Licht ×

Basis × base class
 Standard × standard class
 Alleskönner × all-in-one class

Signal 68E informs about the speed that is allowed to pass the first diverging point. Without the speed indication 40 km/h are allowed. The shown figure is 1/10th of the signalled speed ("8" means 80 km/h).

CONTROLLING NORWEGIAN SIGNALS

The accessory address of the signal A_{signal} is written to the address configuration variable relating to the first function output the signal is connected to. Two addresses (A_{signal} and $A_{\text{signal}} + 1$) are used for switching of signal aspects typically.

command	aspect
A_{signal} ■	stop
A_{signal} ■	go
$A_{\text{signal}} + 1$ ■	go diverging

Main Signals

mode		2	81	82	83
function outputs	1				
	2				
	3	-	-		
control commands					
A_{signal} ■		20B	20A	20B	20A
A_{signal} ■		go			
$A_{\text{signal}} + 1$ ■		-	-	go diverging	

Announcing and Repeater Signals

mode		153	84	85
function outputs	1			
	2			
control commands				
A_{signal} ■		expect stop		
A_{signal} ■		expect go		
$A_{\text{signal}} + 1$ ■		-	expect go diverging	

Add-On Signals

Add-on signals are connected to the function output of the decoder that follows the outputs used for the main signal

directly. A main signal can be combined with any number of add-on signals.

mode		203	206	218
function output	1			
control commands				
$A_{\text{add-on}}$ ■		off	signal is on	
$A_{\text{add-on}}$ ■		on	signal is off	

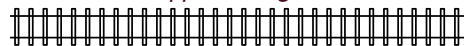
Mode 203: The add-on signal is associated with a proceed aspect. If the add-on signal is switched on while the main signal shows stop the main signals switches to "go diverging" automatically. Changing the main signal aspect to stop will switch off the add-on signal too.

Mode 206: The add-on signal is associated with the proceed diverging aspect. If the add-on signal is switched on while the main signal shows another aspect the main signal switches to "go diverging" automatically. Changing the main signal aspect will switch off the add-on signal too.

Mode 218: The disturbed signal is switched on and off using commands of an accessory address that is written to the address configuration variable of any function output the signal is connected to.

AN EXAMPLE

Let us have a look on the following track. The example is not a real life one but illustrates the way signals are controlled using Qdecoders. A main signal called "B" has an add-on signal. A second signal "A" has an additional approach signal.



announcing signal „A“



main signal „A“

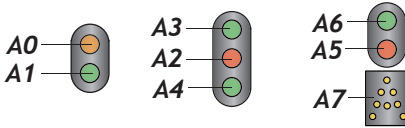


main signal „B“

The signals have a total of 8 bulbs. We choose a Z1-16 with **Signal** extension.

Signal “A” shall be controlled by commands of accessory address 1, accessory address 5 is used for signal “B”. The departure signal has address 6.

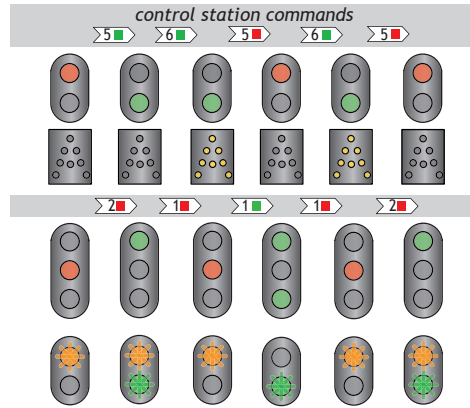
First connect the signals to the decoder one after another:



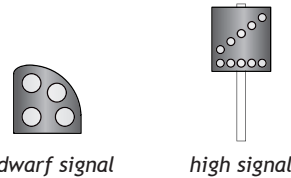
Next program the configuration variables according to the following table. The values given in grey do not need programming but they are written automatically when programming the values written on while background.

	signal	address	mode
function outputs	A0	A _{signalA} CV1=1	CV550=TODO
	A1	- CV552	CV553
	A2	A _{signalA} CV555=1	CV556=81
	A3	- CV558	CV559
	A4	- CV561	CV562
	A5	A _{signalB} CV564=5	CV565=2
	A6	- CV567	CV568
A7	A _{depart} CV570=6	CV571=203	
...	use for others		

Now you can switch signal aspects by sending control commands (“1 ■■” means pressing the green switching key on the control station after choosing accessory address 1):



5.19.2. SHUNTING SIGNALS



There are two types of shunting signals in Norway. The highly placed shunting signals prohibit or permit shunting in a local prescribed area (e. g. in a station with CTC with a shunting key release).








The dwarf shunting signals are interlocked with shunting routes (except if indicating “local permission”). Standalone dwarf signals are labeled with “R” and / or a number and white square mark usually. Dwarf signals that have a combined place with a main signal do not have own labels. It is allowed to place them on a signal mast not higher than 1 meter to improve visibility. They are placed on the right hand side of the track.

SIGNAL ASPECTS

Norwegian shunting signals can show the following aspects:

Signal ✓
 Ampek
 Licht ×







Basis × base class
 Standard × standard class
 Alleskönner × all-in-one class

aspect	dwarf signal	high signal
shunting forbidden	 (signal 43)	 (signal 41)
shunting permitted with caution	 (signal 44)	-
shunting permitted	 (signal 45)	 (signal 42)
shunting with local permission allowed	 (signal 46A)	-
	 (signal 46B)	-

The closed dwarf shunting signal is also valid for train movements, the closed shunting signal applies to shunting movements only.



CONTROLLING SHUNTING SIGNALS

The accessory address of the signal A_{signal} is written to the address configuration variable relating to the first function output the signal is connected to. Either one (for high signal) or two addresses (A_{signal} and $A_{\text{signal}}+1$) are used for switching of signal aspects of shunting signals.





mode	86	87	2
function outputs	1		
	2		-
	3		-
	4		-
control commands			
A_{signal} 	stop		
A_{signal} 	shunting permitted		
$A_{\text{signal}}+1$ 	46A	46B	-
$A_{\text{signal}}+1$ 	signal 44		-

5.19.3. BRAKE TEST SIGNALS

Brake test signals are used for communication from the shunter to the driver of a train during test of trains brakes.





description	signal
apply brakes	37 
loose brakes	38 

Qdecoders offer a special mode for brake test signals:

mode	88	
address	A_{signal}	A_{signal}
function outputs	1	
	2	
	3	
control commands		
A_{signal} 	(off)	
A_{signal} 	37	
$A_{\text{signal}}+1$ 	38	






5.19.4. TURNOUT SIGNALS

On diamond crossings with slips special turnout signals are used to give information about the switch stands.

description	signal
from left to right	52A 
from right to left	52B 
from left to left	52C 
from right to right	52D 

Qdecoders offer a special mode for the norwegian turnout signal:



mode		89
address	A ₁	A _{signal}
function outputs	1	
	2	
	3	
	4	
control commands		
A _{signal}		52A
A _{signal}		52B
A _{signal} +1		52C
A _{signal} +1		52D

5.19.5. LEVEL CROSSING SIGNALS





Level crossing signals are placed just before a street level crossing. Announcing signals are used to inform the driver about the signal aspect that he has to expect at the next level crossing signal.







approach signal





level crossing signal




aspect	crossing signal	announcing signal
stop before the crossing	 (signal 55)	 (signal 57)
crossing is secured : pass	 (signal 56)	 (signal 58)

mode		153	153
function outputs	1		
	2		
control commands			
A _{signal}		stop	
A _{signal}		pass	

5.19.6. LANDSLIDE SIGNALS

The “Landslide Signal” gives no stopping order but instructs the driver to stop close of the section with landslide protection equipment in beaking distance (marked by yellow-white pales) and to examine the section. So it is a “warning” aspect.

description	signal
landslide warning	59 
no landslide warning - pass the landslide stretch	60 

mode		153
function outputs	1	
	2	
control commands		
A _{signal}		warning
A _{signal}		no warning

5.19.7. CONTROLLING SIGNALS BY INPUT KEYS

Any signal - including add-on signals - can be controlled by an input key connected to a function output of the Qdecoder using a 220 Ω resistor. Use one of the modes 226 or 227 for the function output for reading key input. Mode 227 is used when connecting a LED in parallel to the key. The LED might be used as signalling LED on the control desk for example. (See chapter „An Example“ in the handbook for details.)

function	mode	
	without	with
The key controls ...	LED	
... the signal connected to the anterior function keys of the decoder using the signal switching flow	226	227

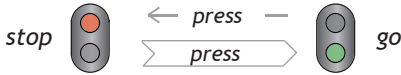
Once configured the key controls signal

Signal ✓
 Ampek ✓
 Licht ×

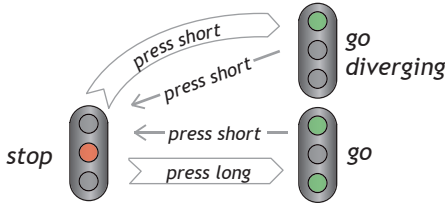
Basis × base class
 Standard × standard class
 Alleskönner × all-in-one class

aspects depending on the signal aspect count.

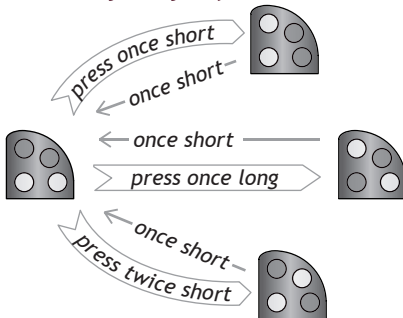
All signals with two aspects switch to the other aspect with a single key pressing.



On signals with three aspects there is a distinction between pressing the key for a short and a long time (about 1/2 second).

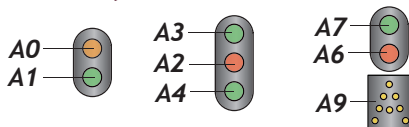


Dwarf signals make a distinction between 4 different signal aspects. They are controlled by a key as follows:



OUR EXAMPLE

Our example from page 121 needs a slight change when inserting keys for aspect control. We need one key for signal „A“ and another for and „B“:



- A5: key for signal „A“
- A8: key for signal „B“
- A10: key for departure signal „B“

Next program the configuration variables

according to the following table. The values given in grey do not need programming but they are written automatically when programming the values written on while background.

	signal	address	mode
function outputs	A0	A _{signal}	CV1=1 CV550=TODO
	A1	-	CV552 CV553
	A2	A _{signal}	CV555=1 CV556=19
	A3	-	CV558 CV559
	A4	-	CV561 CV562
	A5	key „A“	CV564 CV565=226
	A6	A _{signal}	CV567=5 CV568=2
	A7	-	CV570 CV571
	A8	key „B“	CV573 CV574=226
	A9	A _{depart}	CV576=6 CV577=203
A10	key departure	CV579 CV580=226	
...	use for others		

The same signal aspect sequence can now be reached by pressing the keys:

