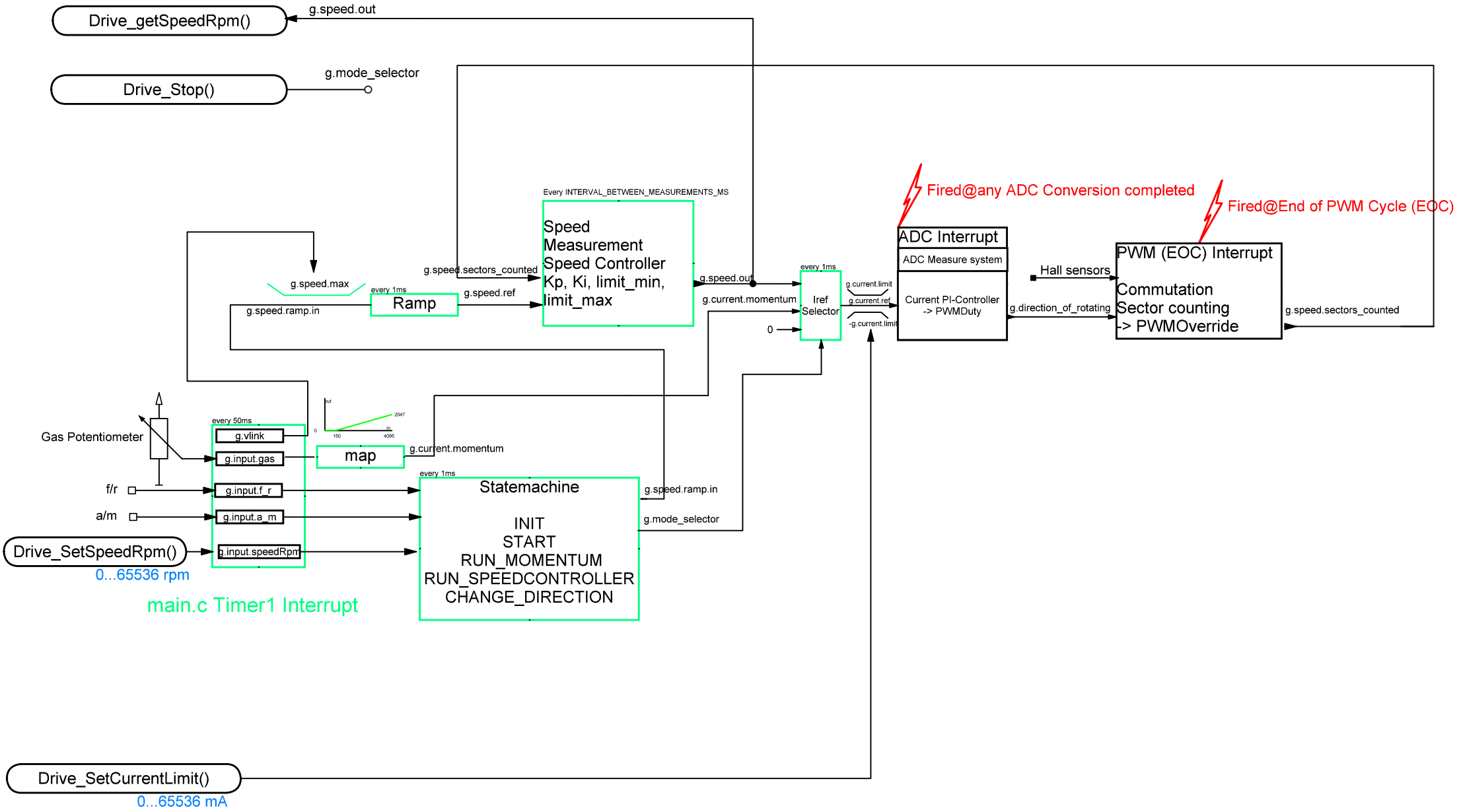
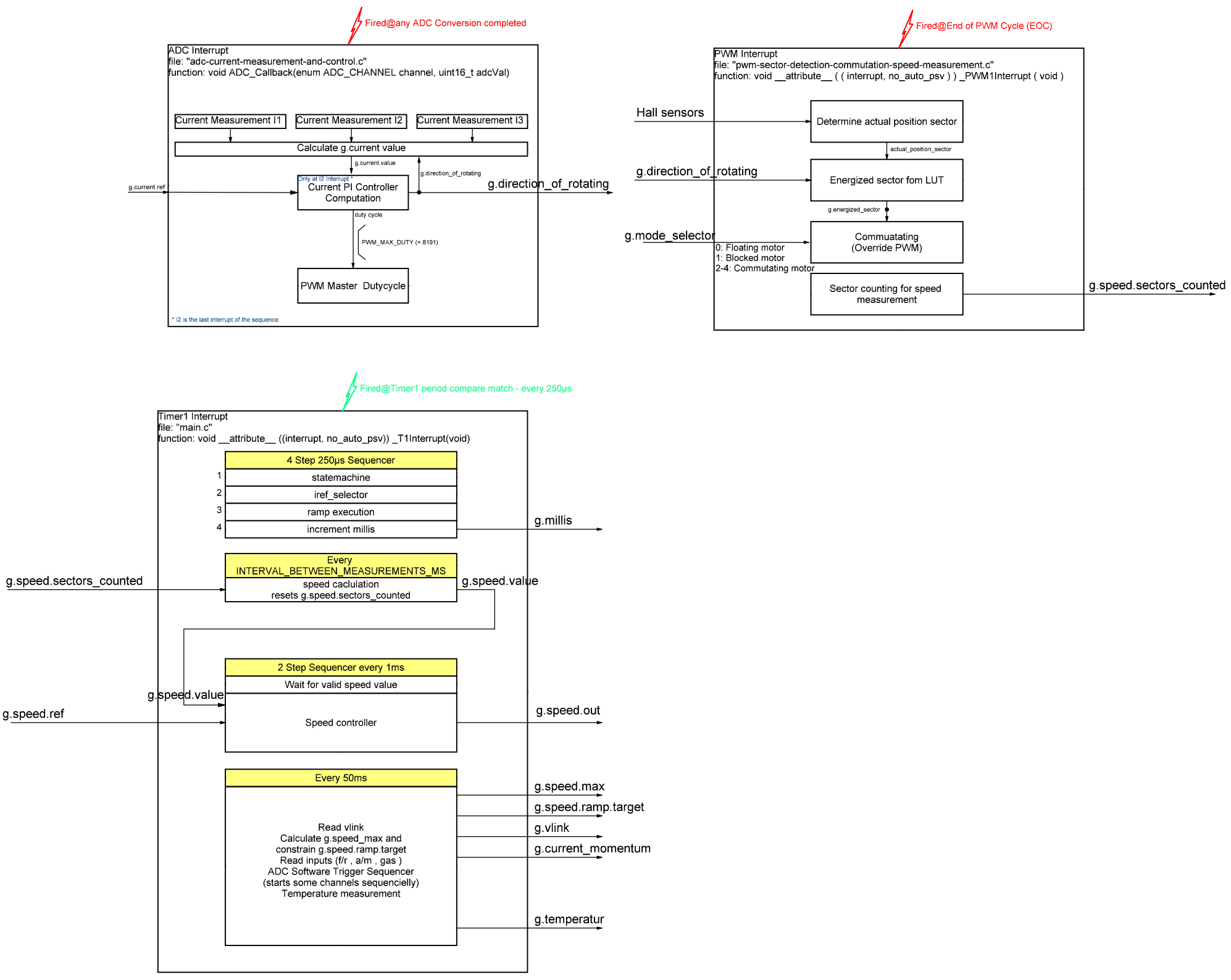
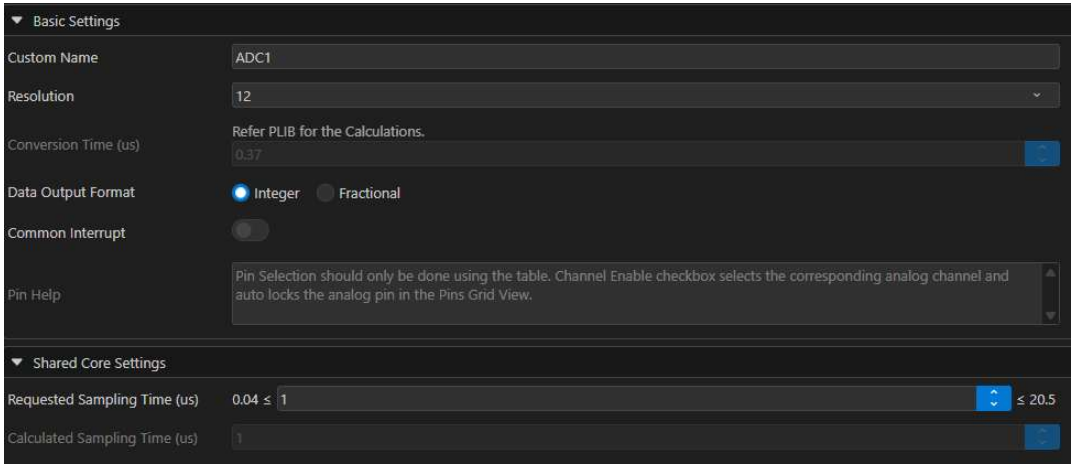

Drive_getSpeedRpm()
g.speed.out
Drive_Stop()
g.mode_selector
Every INTERVAL_BETWEEN_MEASUREMENTS_MS
Speed Measurement
Speed Controller
Kp, Ki, limit_min, limit_max
g.speed.sectors_counted
g.speed.out
g.speed.max
every 1ms
Ramp
g.speed.ref
g.speed.ramp.in
every 1ms
Iref Selector
g.current.momentum
0
g.current.limit
g.current.ref
-g.current.limit
Fired@any ADC Conversion completed
ADC Interrupt
ADC Measure system
Current PI-Controller
-> PWMDuty
Hall sensors
g.direction_of_rotating
Fired@End of PWM Cycle (EOC)
PWM (EOC) Interrupt
Commutation
Sector counting
-> PWMOverride
g.speed.sectors_counted
Gas Potentiometer
every 50ms
g.vlink
g.input.gas
map
g.current.momentum
f/r
g.input.f_r
a/m
g.input.a_m
Drive_SetSpeedRpm()
g.input.speedRpm
0...65536 rpm
every 1ms
Statemachine
INIT
START
RUN_MOMENTUM
RUN_SPEEDCONTROLLER
CHANGE_DIRECTION
g.speed.ramp.in
g.mode_selector
main.c Timer1 Interrupt
Drive_SetCurrentLimit()
0...65536 mA

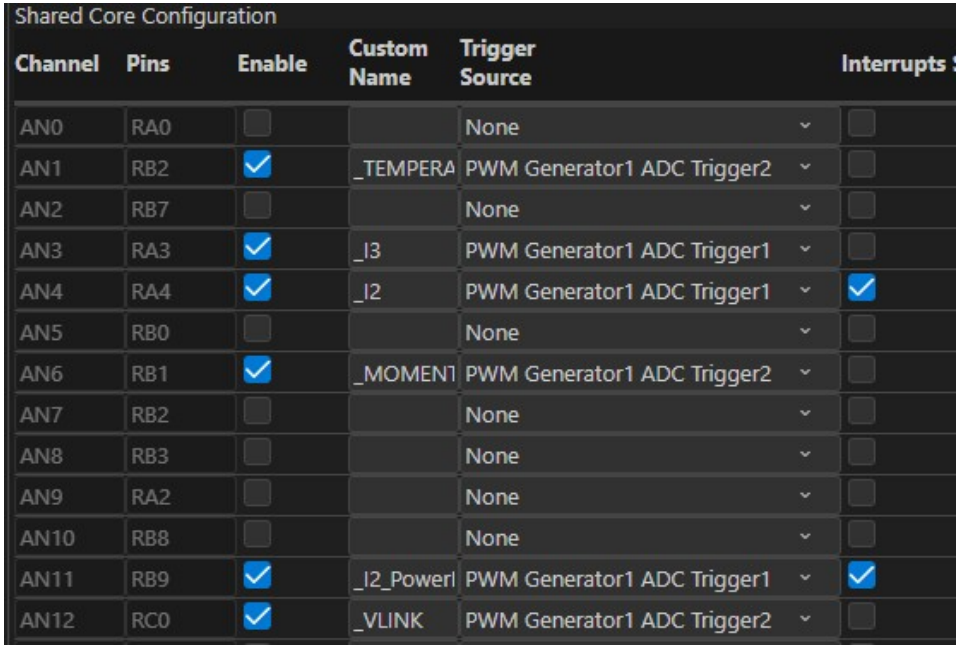

Fired@any ADC Conversion completed
ADC Interrupt
file: "adc-current-measurement-and-control.c"
function: void ADC_Callback(enum ADC_CHANNEL channel, uint16_t adcVal)
Current Measurement I1
Current Measurement I2
Current Measurement I3
Calculate g.current value
g.current.value
g.direction_of_rotating
g.current.ref
Only at I2 Interrupt *
Current PI Controller Computation
g.direction_of_rotating
duty cycle
PWM_MAX_DUTY (= 8191)
PWM Master Dutycycle
* I2 is the last interrupt of the sequence
Fired@End of PWM Cycle (EOC)
PWM Interrupt
file: "pwm-sector-detection-commutation-speed-measurement.c"
function: void __attribute__ ((interrupt, no_auto_psv)) _PWM1Interrupt (void)
Hall sensors
Determine actual position sector
actual_position_sector
g.direction_of_rotating
Energized sector fom LUT
g.energized_sector
g.mode_selector
Commuatating (Override PWM)
0: Floating motor
1: Blocked motor
2-4: Commutating motor
Sector counting for speed measurement
g.speed.sectors_counted
Fired@Timer1 period compare match - every 250µs
Timer1 Interrupt
file: "main.c"
function: void __attribute__ ((interrupt, no_auto_psv)) _T1Interrupt(void)
4 Step 250µs Sequencer
1 statemachine
2 iref_selector
3 ramp execution
4 increment millis
g.millis
Every INTERVAL_BETWEEN_MEASUREMENTS_MS
speed caclulation
resets g.speed.sectors_counted
g.speed.sectors_counted
g.speed.value
2 Step Sequencer every 1ms
Wait for valid speed value
g.speed.value
g.speed.ref
Speed controller
g.speed.out
Every 50ms
Read vlink
Calculate g.speed_max and constrain g.speed.ramp.target
Read inputs (f/r , a/m , gas)
ADC Software Trigger Sequencer
(starts some channels sequencielly)
Temperature measurement
g.speed.max
g.speed.ramp.target
g.vlink
g.current_momentum
g.temperatur

Pin Grid

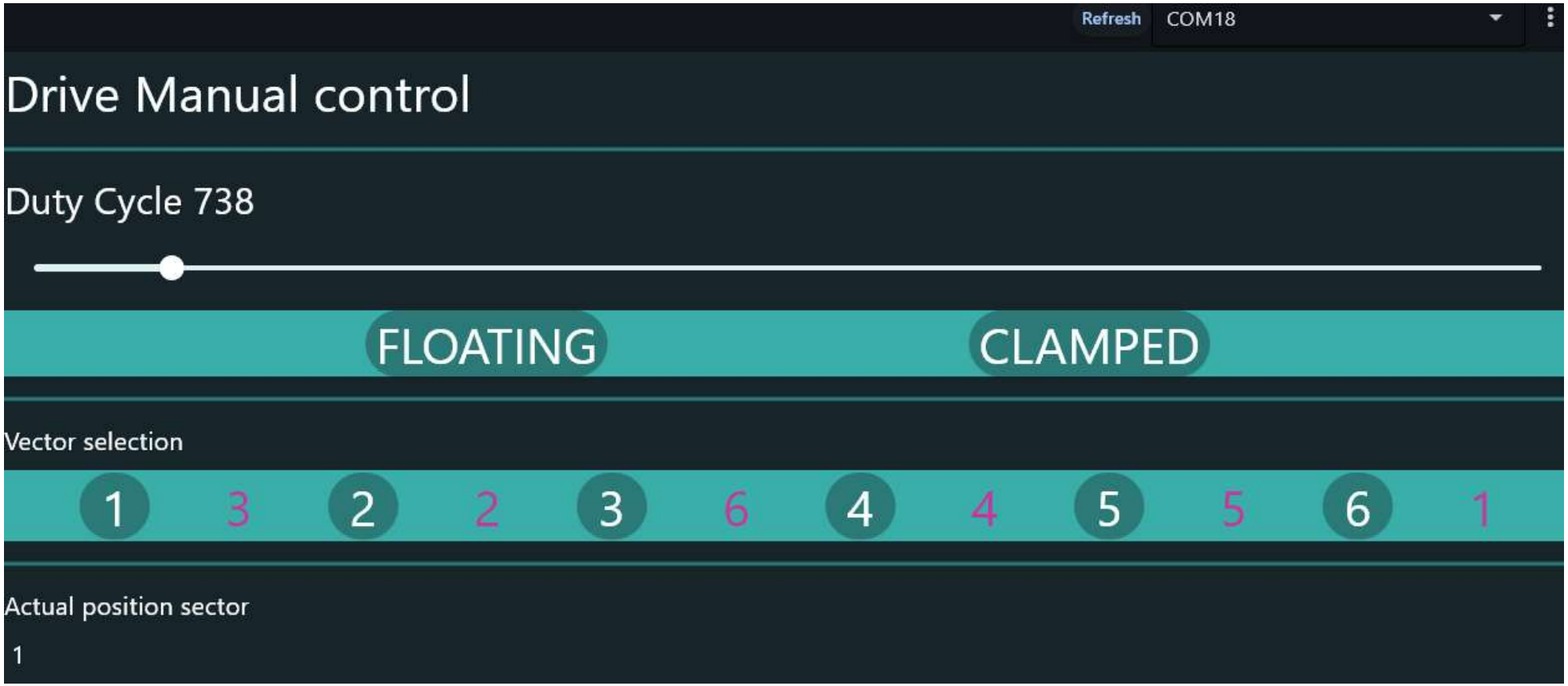
ADC Basic



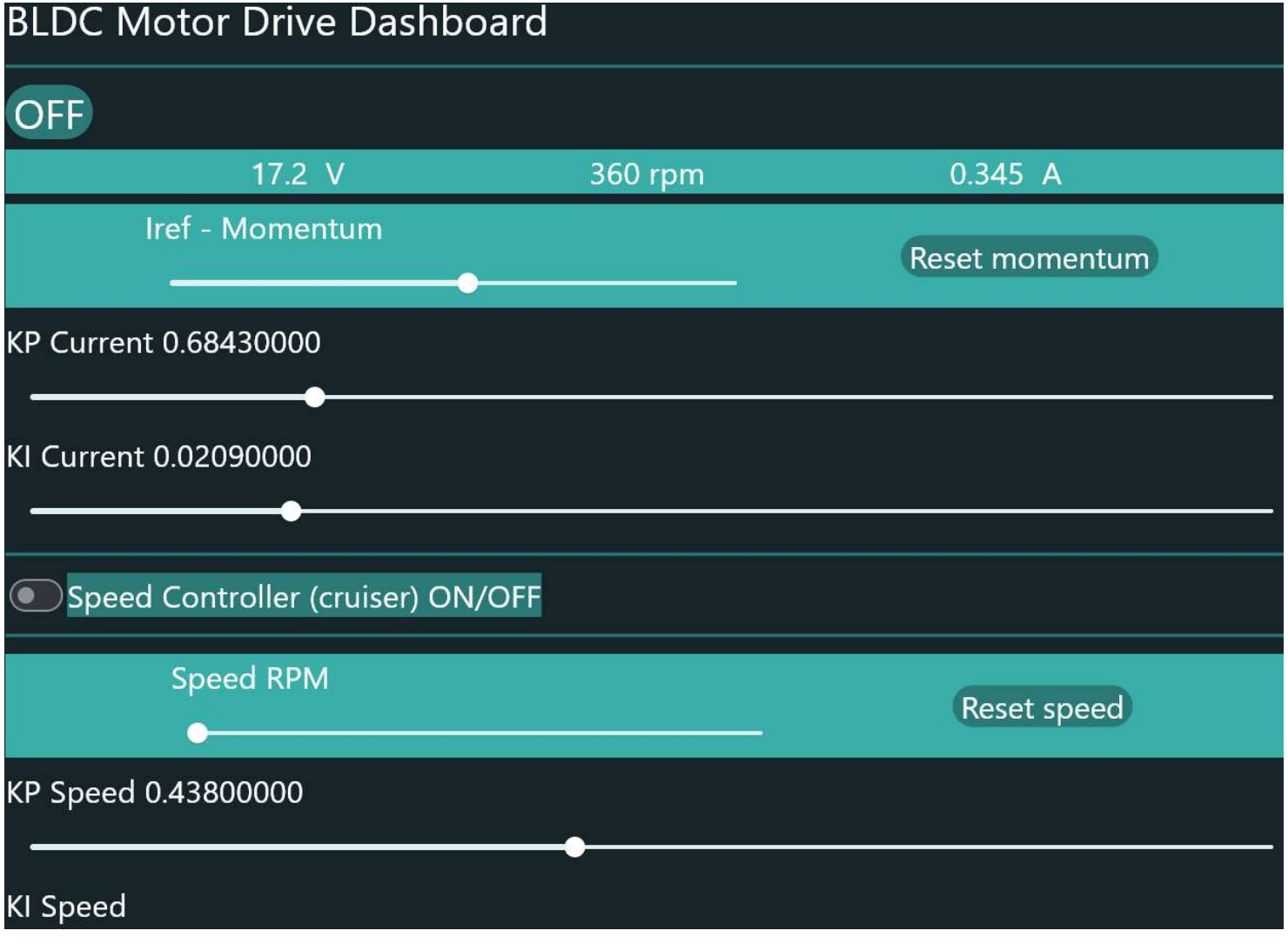
ADC Shared Core Settings



```
21
22    // #define FLETUINO_APPLICATION_DEMO
23    // #define FLETUINO_PI_CONTROLLER_SETTINGS
24    #define FLETUINO_MANUAL_CONTROL
25
```



```
// #define FLETUINO_APPLICATION_DEMO
#define FLETUINO_PI_CONTROLLER_SETTINGS
// #define FLETUINO_MANUAL_CONTROL
```



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21
22    #define FLETUINO_APPLICATION_DEMO
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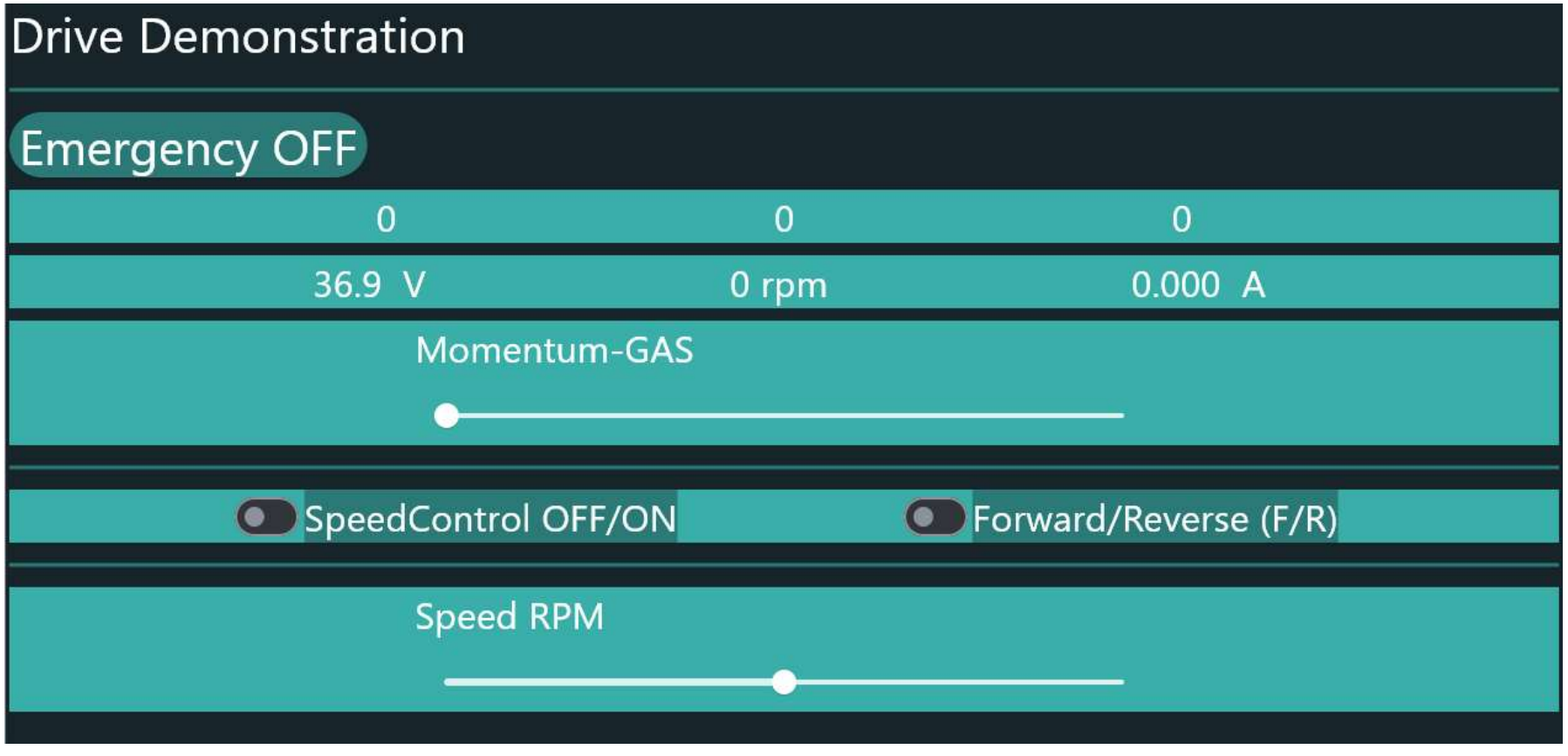
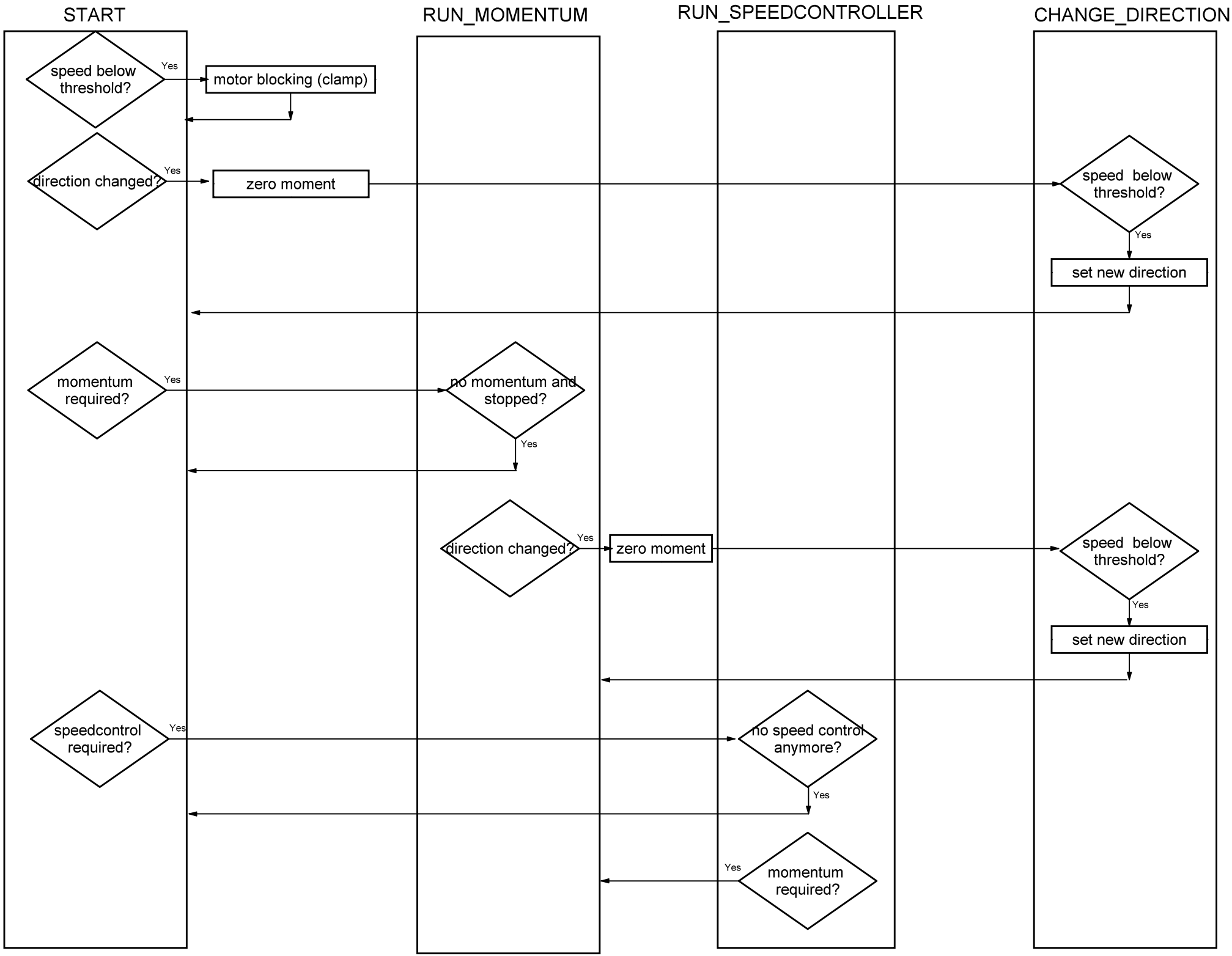
24    // #define FLETUINO_MANUAL_CONTROL
25
```




START
RUN_MOMENTUM
RUN_SPEEDCONTROLLER
CHANGE_DIRECTION
speed below threshold?
Yes
motor blocking (clamp)
direction changed?
Yes
zero moment
speed below threshold?
Yes
set new direction
momentum required?
Yes
no momentum and stopped?
Yes
direction changed?
Yes
zero moment
speed below threshold?
Yes
set new direction
speedcontrol required?
Yes
no speed control anymore?
Yes
Yes
momentum required?

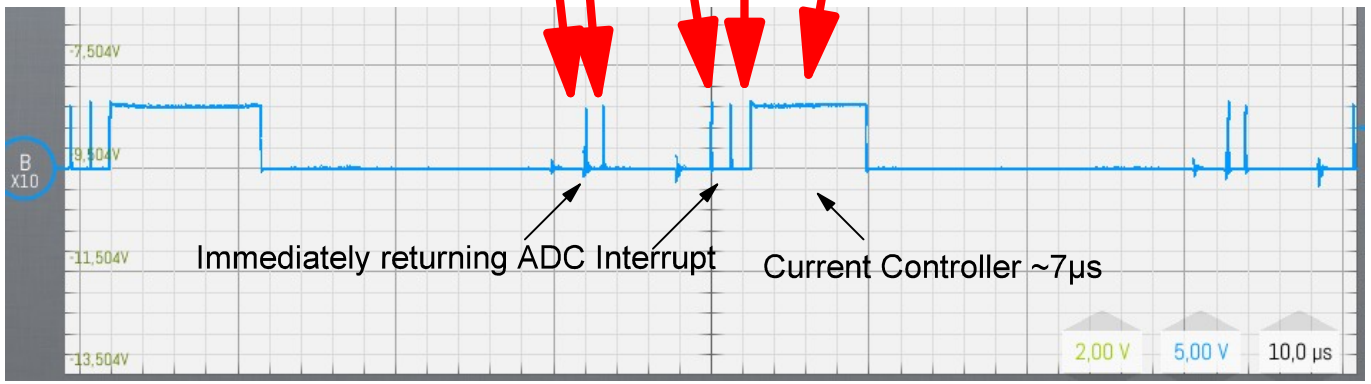
Shared Core Configuration

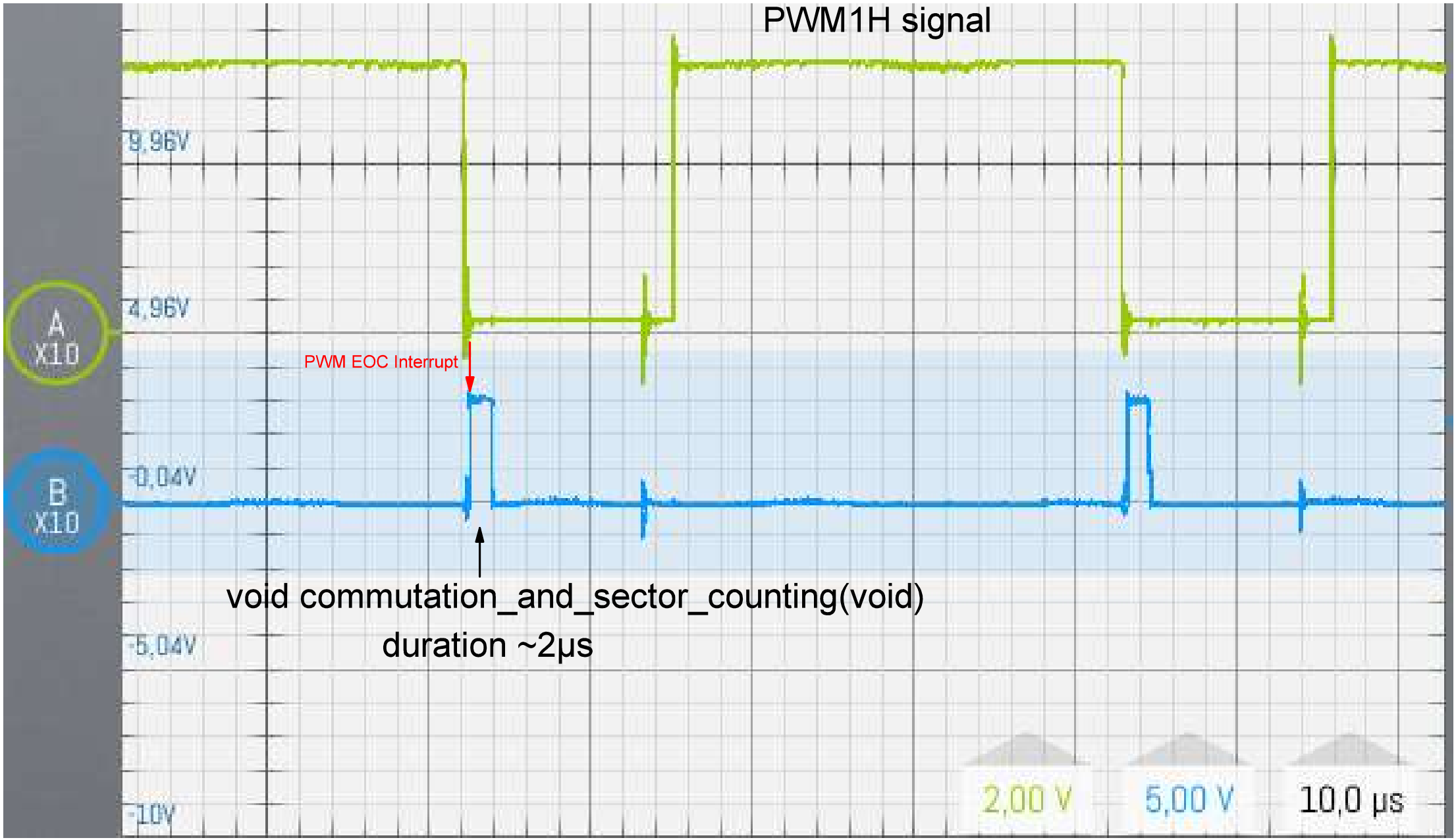
Channel	Pins	Enable	Custom Name	Trigger Source	Interrupts
AN0	RA0	☐		None	☐
AN1	RB2	☑	_TEMPERA	PWM Generator1 ADC Trigger2	☐
AN2	RB7	☐		None	☐
AN3	RA3	☑	_I3	PWM Generator1 ADC Trigger1	☐
AN4	RA4	☑	_I2	PWM Generator1 ADC Trigger1	☑
AN5	RB0	☐		None	☐
AN6	RB1	☑	_MOMENT	PWM Generator1 ADC Trigger2	☐
AN7	RB2	☐		None	☐
AN8	RB3	☐		None	☐
AN9	RA2	☐		None	☐
AN10	RB8	☐		None	☐
AN11	RB9	☑	_I2_Power	PWM Generator1 ADC Trigger1	☑
AN12	RC0	☑	_VLINK	PWM Generator1 ADC Trigger2	☐

Interrupt ausgelöst, obwohl nicht aktiviert !

Interrupt wird nicht ausgelöst! Wie erwartet!!

adc-current-measurement-and-control.c
void ADC_Callback(enum ADC_CHANNEL channel, uint16_t adcVal)




PWM1H signal
9,96V
4,96V
-0,04V
-5,04V
-10V
A
X10
B
X10
PWM EOC Interrupt
void commutation_and_sector_counting(void)
duration ~2µs
2,00 V
5,00 V
10,0 µs