Motor Control Card

DC-link current measurement

DC_current

OverCurrentDetection1 DC (out) → I/O_DI_ocd1-dc
OverCurrentDetection2 DC (out) → I/O_DI_ocd2-dc
current_DC (out) → I/O_AI_current-dc
+DC-link → DC+ (in)
DC+ (out) → DC-link capacitors
I/O_AI_vcc-io → Vref

File: DC_current.kicad_sch

DC-link voltage measurement

DC-link voltage measurement

MEASURED_VOLTAGE_ADC → PC5
MEASURED_VOLTAGE_BRAKE → DC-LINK-VOLTAGE
InputVoltage (+) → +DC-link
InputVoltage (-) → GND (dc-link)

File: GateDriver.kicad_sch

DC-link connector

U19
Wago_2604-3104
PWR_FLAG → GND (dc-link)
PWR_FLAG → +DC-link

DC-link capacitors

R1_B1 500k
R2_B1 500k
R3_B1 500k
R4_B1 3.75k

J12 5019
C_dc-link1 14u
C_dc-link2 14u
C_DC-link

R_DC-link_1 ???
R_DC-link_2 ???
R_DC-link_3 ???
R_DC-link_4 ???

GND (dc-link)

J19 5019

U5 / U14 / U15
Heatsink_THT1
Heatsink_THT2
Collector_HS
Gate_HS
HS
Emitter_HS
Collector_LS
Gate_LS
LS
Emitter_LS
Inverter leg

TA+1_HS → TA+1_LS → L1 → TA-1_HS
TB+1_HS → TB+1_LS → L2 → TB-1_HS
TC+1_HS → TC+1_LS → L3 → TC-1_HS

J16 5019 J20 5019
J17 5019 J21 5019
J18 5019 J22 5019

Output PE

WAGO_2606-1101 J1

Output L1

WAGO_2606-1101 J2

Output L2

WAGO_2606-1101 J3

Output L3

WAGO_2606-1101 J4

ELECTRIC THREE PHASE INDUCTION MOTOR

L1 L1 RM1 LM1
L2 L2 RM2 LM2
L3 L3 RM3 LM3

CurrentMeasurement

L1 (in)
L2 (in)
L3 (in)

L1 (out)
L2 (out)
L3 (out)
current_L1 (out) → I/O_AI_current-L1
current_L2 (out) → I/O_AI_current-L2
current L3 (out) → I/O_AI_current-L3
Vcc_io → I/O_AI_vcc-io
OverCurrentDetection1 L1 (out) → I/O_DI_ocd1-L1
OverCurrentDetection1 L2 (out) → I/O_DI_ocd1-L2
OverCurrentDetection1 L3 (out) → I/O_DI_ocd1-L3
OverCurrentDetection2 L1 (out) → I/O_DI_ocd2-L1
OverCurrentDetection2 L2 (out) → I/O_DI_ocd2-L2
OverCurrentDetection2 L3 (out) → I/O_DI_ocd2-L3

File: CurrentMeasurement.kicad_sch

Microcontroller

I/O_DO_INLS-1 … I/O_DO_INLS-3
I/O_DO_INHS-1 … I/O_DO_INHS-3
I/O_DO_RS-1 … I/O_DO_RS-3
I/O_DI_RDY-1 … I/O_DI_RDY-3
I/O_DI_FLT-1 … I/O_DI_FLT-3
I/O_DI_ocd1-dc
I/O_DI_ocd1-L1 … I/O_DI_ocd1-L3
I/O_DI_ocd2-dc
I/O_DI_ocd2-L1 … I/O_DI_ocd2-L3
I/O_AI_current-dc
I/O_AI_current-L1 … I/O_AI_current-L3
I/O_AI_vcc-io
I/O_AI_dc-link-voltage
I/O_DI_sw-1 … I/O_DI_sw-3
I/O_DO_led-1 … I/O_DO_led-3
I/O_DI_braking-active
I2C-SDA-display
I2C-SCL-display
I/O_DI_enc_A1
I/O_DI_enc_B1
I/O_DI_enc_E1

File: Microcontroller.kicad_sch

GateDriver1

COM (2) → COM HS
COM (1) → COM LS
I/O_DO_INHS-1 → INHS
I/O_DO_INLS-1 → INLS
I/O_DI_RDY-1 → RDY
I/O_DI_FLT-1 → /FLT
I/O_DO_RS-1 → /RS

VCC2HS → +15 V (2)
VCC2LS → +15 V (1)
VEE2HS → -8.7 V (2)
VEE2LS → -8.7 V (1)
GND2HS → TA+1_LS
GND2LS → GND (dc-link)
OUTHS → TA+1_HS
OUTLS → TA-1_HS
DESATHS → TA+1_HS
DESATLS → TA-1_HS

File: GateDriver1.kicad_sch

GateDriver2

COM (4) → COM HS
COM (3) → COM LS
I/O_DO_INHS-2 → INHS
I/O_DO_INLS-2 → INLS
I/O_DI_RDY-2 → RDY
I/O_DI_FLT-2 → /FLT
I/O_DO_RS-2 → /RS

VCC2HS → +15 V (4)
VCC2LS → +15 V (3)
VEE2HS → -8.7 V (4)
VEE2LS → -8.7 V (3)
GND2HS → TB+1_LS
GND2LS → GND (dc-link)
OUTHS → TB+1_HS
OUTLS → TB-1_HS
DESATHS → TB+1_HS
DESATLS → TB-1_HS

File: GateDriver1.kicad_sch

GateDriver3

COM (6) → COM HS
COM (5) → COM LS
I/O_DO_INHS-3 → INHS
I/O_DO_INLS-3 → INLS
I/O_DI_RDY-3 → RDY
I/O_DI_FLT-3 → /FLT
I/O_DO_RS-3 → /RS

VCC2HS → +15 V (6)
VCC2LS → +15 V (5)
VEE2HS → -8.7 V (6)
VEE2LS → -8.7 V (5)
GND2HS → TC+1_LS
GND2LS → GND (dc-link)
OUTHS → TC+1_HS
OUTLS → TC-1_HS
DESATHS → TC+1_HS
DESATLS → TC-1_HS

File: GateDriver1.kicad_sch

Power Supplies

PowerSupply
+5 V
GND (+5 V)
+3.3 V
GND (+3.3 V)

File: PowerSupply.kicad_sch

GateDriverPwrSply

+15 V (1) → +15 V (1)
COM (1) → COM (1)
-8.7 V (1) → -8.7 V (1)
+15 V (2) → +15 V (2)
COM (2) → COM (2)
-8.7 V (2) → -8.7 V (2)
+15 V (3) → +15 V (3)
COM (3) → COM (3)
-8.7 V (3) → -8.7 V (3)
+15 V (4) → +15 V (4)
COM (4) → COM (4)
-8.7 V (4) → -8.7 V (4)
+15 V (5) → +15 V (5)
COM (5) → COM (5)
-8.7 V (5) → -8.7 V (5)
+15 V (6) → +15 V (6)
COM (6) → COM (6)
-8.7 V (6) → -8.7 V (6)

File: GateDriverPwrSply.kicad_sch

Braking system (Currently not in use)

Braking

+15 V (6) → +15 V (6)
COM (6) → COM (6)
I/O_DI_braking-active → Braking_active
DC-LINK-VOLTAGE → Voltage_bridge_input
DC-LINK (+)
DC-LINK (-)

File: Braking.kicad_sch

MOUNTING HOLES

H6 H7 H8 H9

Encoder

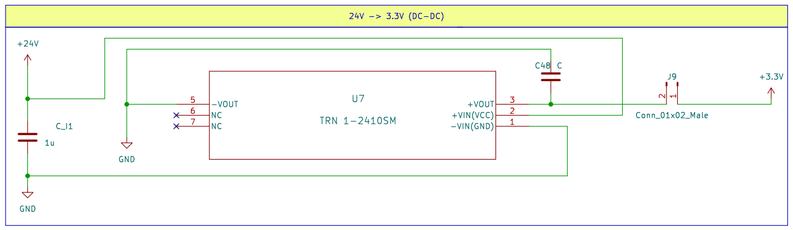
File: Encoder_sch.kicad_sch

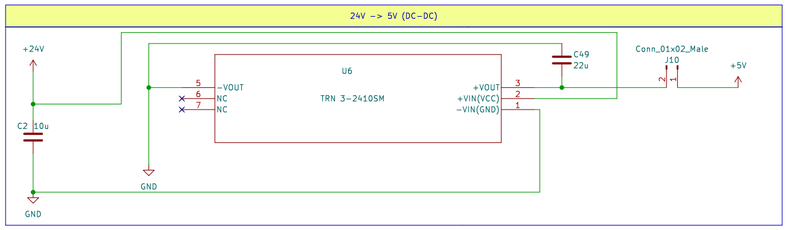
Marius Englund
Eirik Skorve Haugland
Ingrid Hovland

Sheet: /
File: SV-PWM_card_R01.kicad_sch

Title: 3-phase DC/AC converter with SV-PWM

Size: A2	Date: 2023-03-16	Rev: V. 1.1
KiCad E.D.A. 8.0.8		Id: 1/12



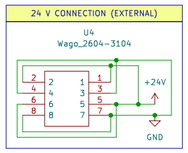


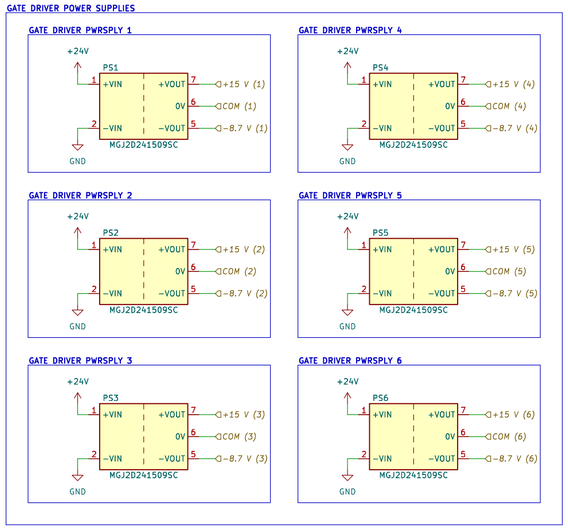
Marius Englund
Elrik Skorve Haugland
Ingrid Hovland

Sheet: /PowerSupply/
File: PowerSupply.kicad_sch

Title: 3-phase DC/AC converter with SV-PWM

Size: A2	Date: 2023-03-16	**Rev: V. 1.1**
KiCad E.D.A. 8.0.8		Id: 2/12





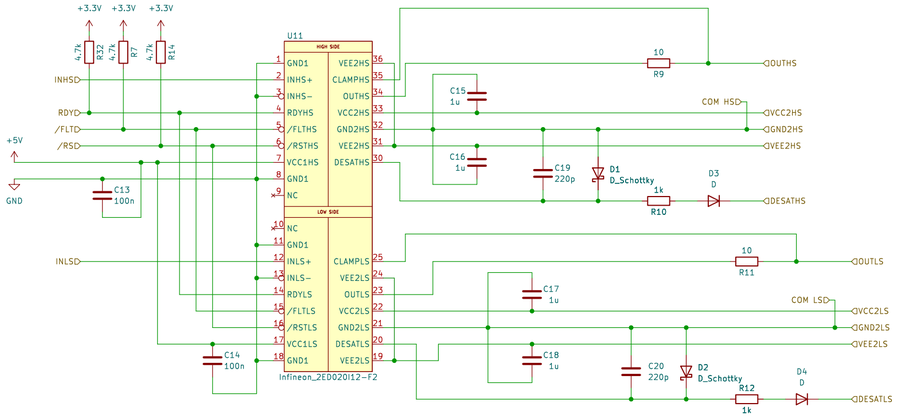
Marius Englund
Elrik Skorve Haugland
Ingrid Hovland

Sheet: /GateDriverPwrSply/
File: GateDriverPwrSply.kicad_sch

Title: 3-phase DC/AC converter with SV-PWM

Size: A2	Date: 2023-03-16	**Rev: V. 1.1**
KiCad E.D.A. 8.0.8		Id: 3/12

GATE DRIVER CIRCUIT



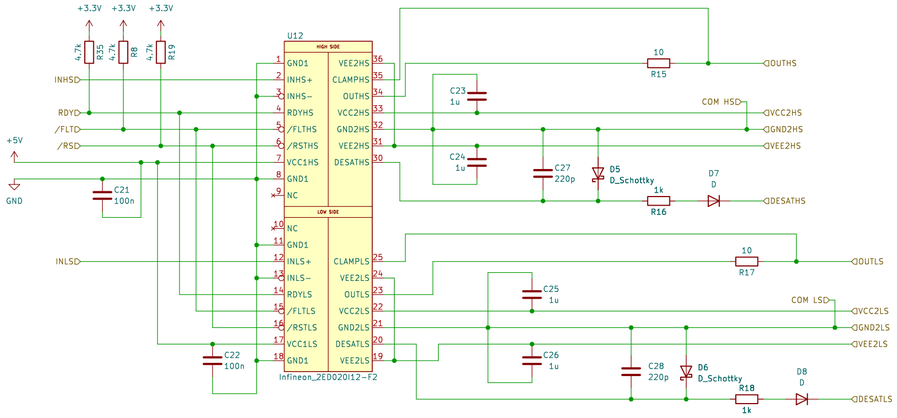
Marius Englund
Elrik Skorve Haugland
Ingrid Hovland

Sheet: /GateDriver1/
File: GateDriver1.kicad_sch

Title: 3-phase DC/AC converter with SV-PWM

Size: A2	Date: 2023-03-16	**Rev: V. 1.1**
KiCad E.D.A. 8.0.8		Id: 4/12

GATE DRIVER CIRCUIT



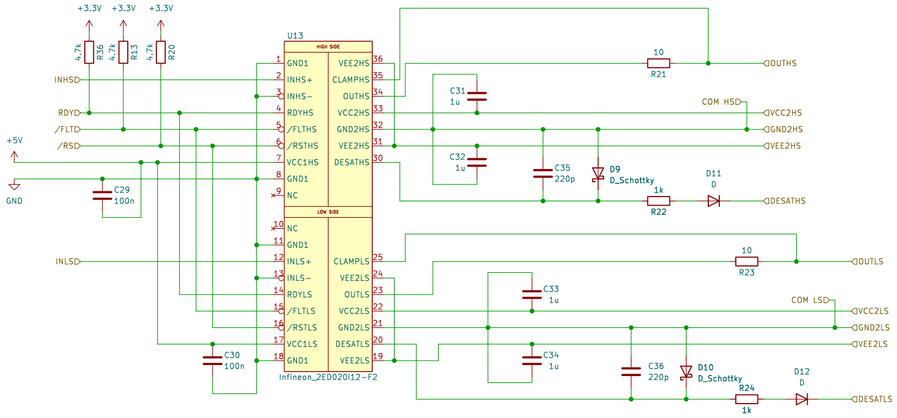
Marius Englund
Elrik Skorve Haugland
Ingrid Hovland

Sheet: /GateDriver2/
File: GateDriver1.kicad_sch

Title: 3-phase DC/AC converter with SV-PWM

Size: A2	Date: 2023-03-16	**Rev: V. 1.1**
KiCad E.D.A. 8.0.8		Id: 5/12

GATE DRIVER CIRCUIT

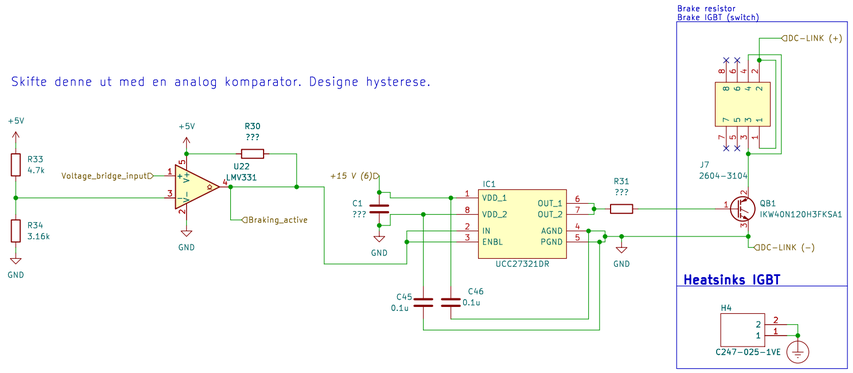


Marius Englund
Elrik Skorve Haugland
Ingrid Hovland

Sheet: /GateDriver3/
File: GateDriver1.kicad_sch

Title: 3-phase DC/AC converter with SV-PWM

Size: A2	Date: 2023-03-16	**Rev: V. 1.1**
KiCad E.D.A. 8.0.8		Id: 6/12



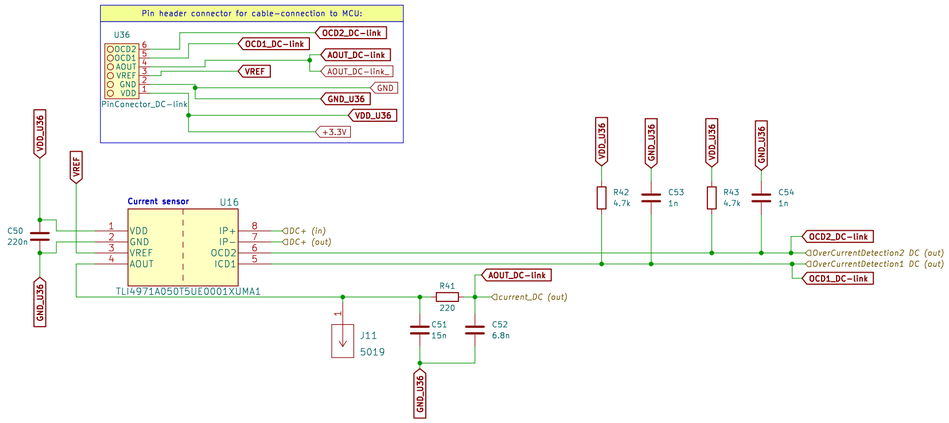
HVOR STOR SKAL KONDENSATOR PÅ VDD_1 OG VDD_2 VÆRE??
HVOR STOR SKAL R PÅ UTGANG VÆRE?
HVOR KOMMER 15V FORSYNING INN?

Marius Englund
Elrik Skorve Haugland
Ingrid Hovland

Sheet: /Braking/
File: Braking.kicad_sch

Title: 3-phase DC/AC converter with SV-PWM

Size: A2	Date: 2023-03-16	**Rev: V. 1.1**
KiCad E.D.A. 8.0.8		Id: 7/12



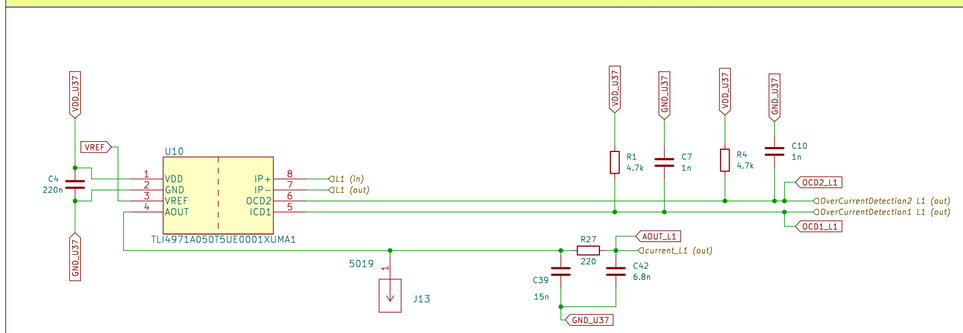
Marius Englund
Elrik Skorve Haugland
Ingrid Hovland

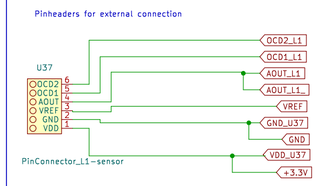
Sheet: /DC_current/
File: DC_current.kicad_sch

Title: 3-phase DC/AC converter with SV-PWM

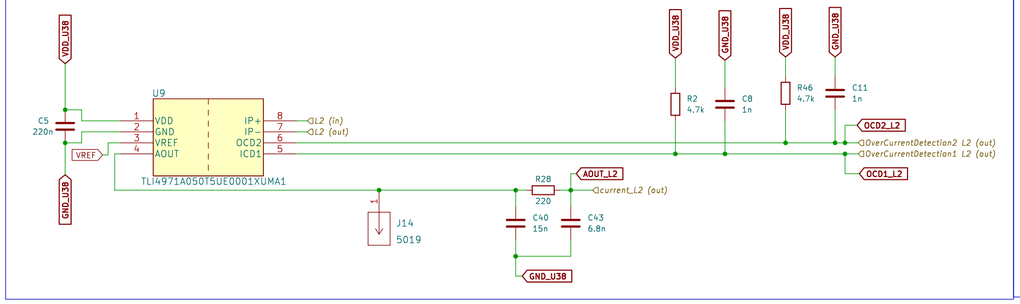
Size: A2	Date: 2023-03-16	**Rev: V. 1.1**
KiCad E.D.A. 8.0.8		Id: 8/12

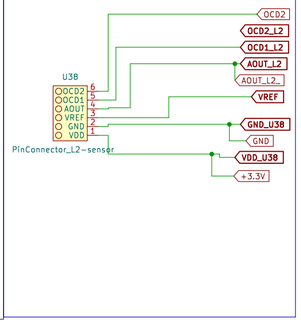
Current meassurement L1:



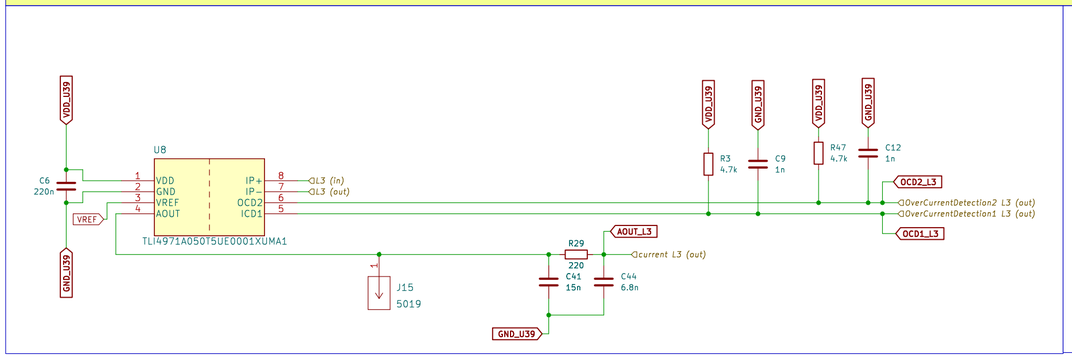


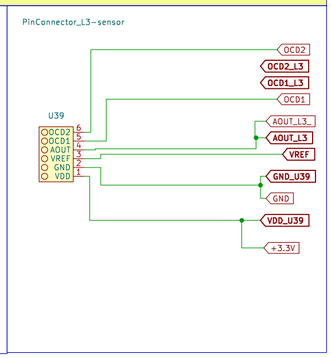
Current meassurement L2





Current meassurement L3





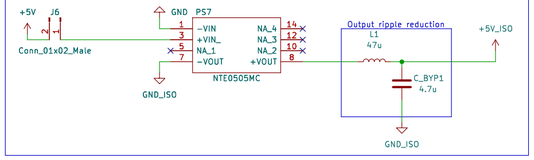
Marius Englund
Elrik Skorve Haugland
Ingrid Hovland

Sheet: /CurrentMeasurement/
File: CurrentMeasurement.kicad_sch

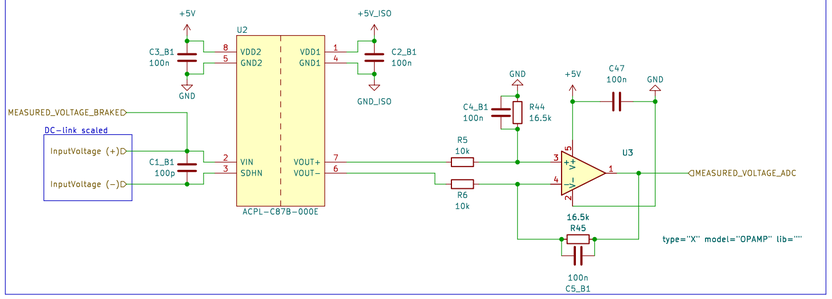
Title: 3-phase DC/AC converter with SV-PWM

Size: A2	Date: 2023-03-16	**Rev: V. 1.1**
KiCad E.D.A. 8.0.8		Id: 9/12

5V -> 5V (DC-DC ISOLATED)



SCALING MEASURED VOLTAGE TO ADC IN MC



Marius Englund
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Ingrid Hovland

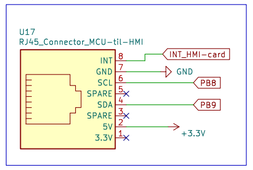
Sheet: /DC-link voltage measurement/
File: GateDriver.kicad_sch

Title: 3-phase DC/AC converter with SV-PWM

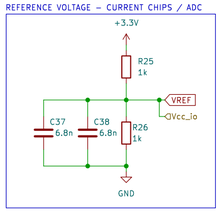
Size: A2	Date: 2023-03-16	**Rev: V. 1.1**
KiCad E.D.A. 8.0.8		Id: 10/12

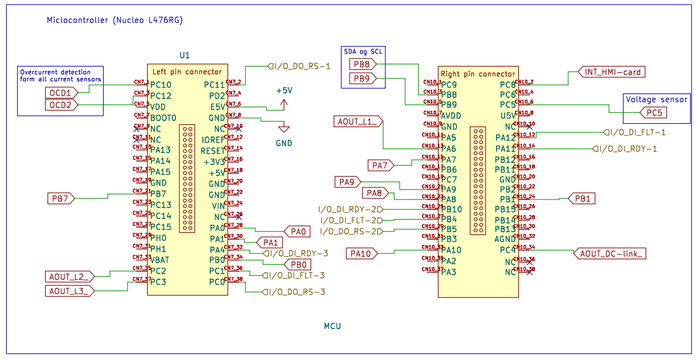
I/O oversikt:
1) – reference voltage – strømsensor

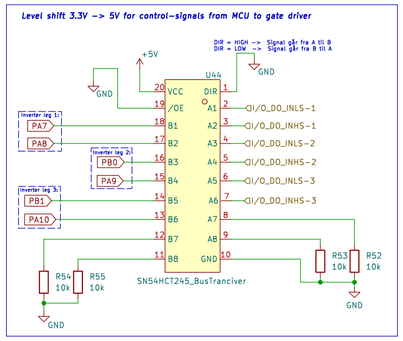
RJ45 til HMI

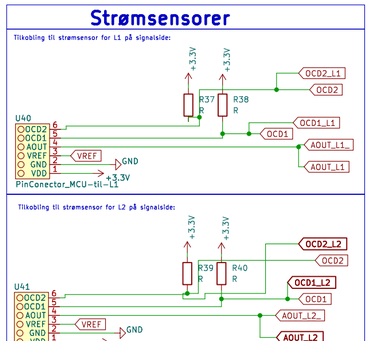


REFERENCE VOLTAGE – CURRENT CHIPS / ADC







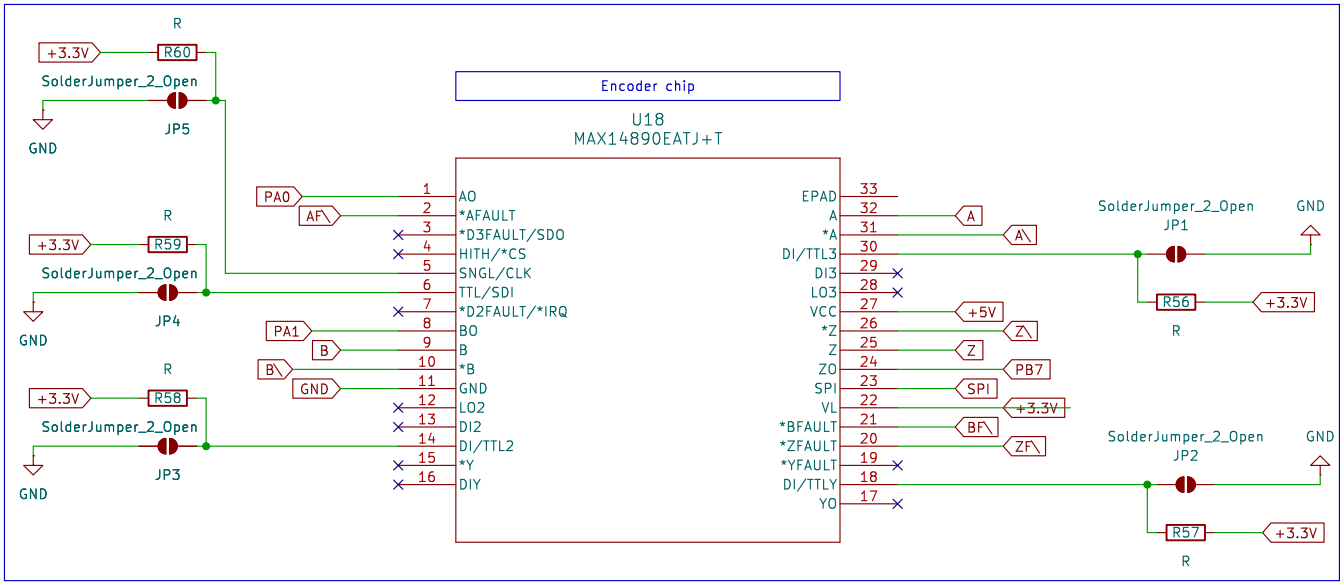


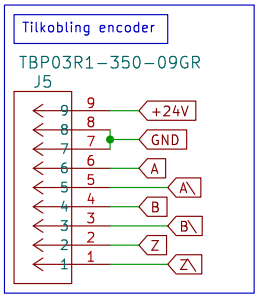
Marius Englund
Eirik Skorve Haugland
Ingrid Hovland

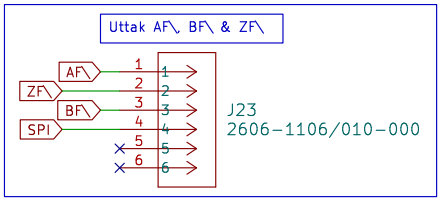
Sheet: /Microcontroller/
File: Microcontroller.kicad_sch

Title: 3-phase DC/AC converter with SV-PWM

Size: A2	Date: 2023-03-16	**Rev: V. 1.1**
KiCad E.D.A. 8.0.8		Id: 11/12







Sheet: /Encoder/
File: Encoder_sch.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 12/12