RS485 / ModbusRTU

TX485
FC-DA1608BK-470H10

RX485
FC-D1608UGK-520D10

+3V3

C36
1uF

RS485
M8 4pole female

+Battery

D4
B5819W_C8598

R67
1K

R66
1K

U8
KY3485LEEN

R37
1K

D10 D11
B5819W_C8598

prot+

TxD_SC

Dir485

RxD_SC

1 RO   VCC 8
2 RE#   B   7
3 DE   A   6
4 DI   GND 5

R30
10K

R38
1K

D19 D18

prot-

B_RS485

A_RS485

e.g.: http://www.amazon.de/dp/B08JV9J36T/

I2C external

IMU
M8 4pole female

+5V

5Vfused

D9   D20
B5819W_C8598

A4/SDA

A5/SCL

D8   D7
B5819W_C8598

CAN & Opto | Wheel Sensor

FC-D1608HOK-600H

U1
PC357N(B)(TA)-G

D23
B5819W_C8598

CAN
M8 4pole female

R17
1K

OUT1

D5/AuxOut

optional optocoupler output

nAux/0V

Aux/5V 5Vfused

CAN_PWR
A2541WV-2P

Shield

0V

CAN_PWR1
A2541WV-2P

wheel sensor: close jumpers

+3V3

+5V   C42
1uF

+5V

D12
ZMM5V6

prot+

TXCAN2

RXCAN2

R27 R56
10K 1K

U19
TJA1051T/3/1,

+3V3

D17 D16

R69
1K

A1/Ch_B

CAN_TX

1 TXD   S   8
2 GND   CANH 7
3 VCC   CANL 6
4 RXD   VIO 5

CANH/B

CANL/A

D2/Ch_A

CAN_RX

FC-DA1608BK-470H10
FC-D1608UGK-520D10

C41
100nF

D15 D14
B5819W_C8598

1K
R71

CAN

prot-

D13
ZMM5V6

Main connector

P1

A5/SCL	1	2	A4/SDA
CANH/B	3	4	CANL/A
A_RS485	5	6	B_RS485
nAux/0V	7	8	5Vfused
WorkSwitch	9	10	SteerSwitch
WAS	11	12	5Vfused
WAS_N	13	14	
Aux/5V	15	16	whatever
+Battery	17	18	-SupplyOutput'
+SupplyOutput'	19	20	-SupplyOutput'
6/2Out	21	22	
MA	23	24	MB

KT-0603R
BSMD0603-050-6V

+5V

R84
10K

F+5V

F5

S2C-SMT 3.50/24/90LF 3.2SN BK BX
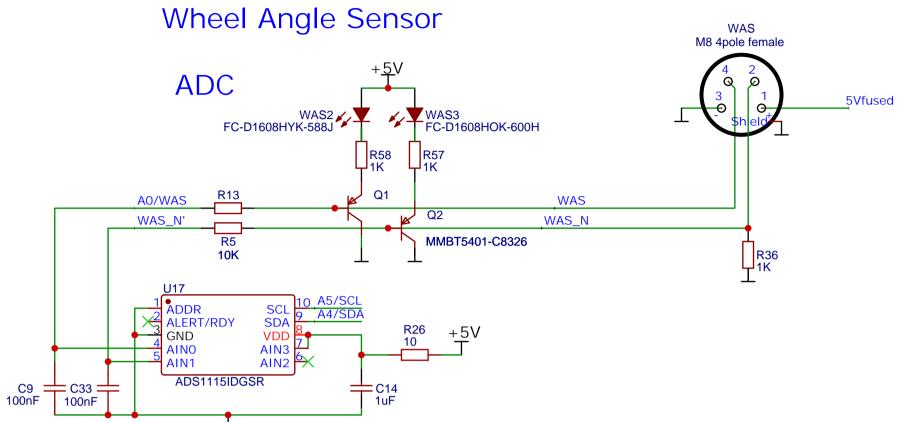
P1: Weidmuller 1289550000 + 1372870000
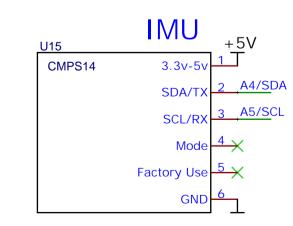S2C-SMT 3.50/24/90LF 3.2SN BK BX + B2CF 3.50/24/180LH SN BK BX

Wheel Angle Sensor

ADC

WAS
M8 4pole female

4 2
3 1
Shield

5Vfused

+5V

WAS2
FC-D1608HYK-588J

WAS3
FC-D1608HOK-600H

R58
1K

R57
1K

A0/WAS

R13

WAS

WAS_N'

R5
10K

WAS_N

Q1

Q2

MMBT5401-C8326

R36
1K

U17
1 ADDR SCL 10 A5/SCL
2 ALERT/RDY SDA 9 A4/SDA
3 GND VDD 8
4 AIN0 AIN3 7
5 AIN1 AIN2 6

ADS1115IDGSR

R26
10

+5V

C9
100nF

C33
100nF

C14
1uF

U300
BNO085

R303
10K

R302
10K

+3V3
C303
100nF

R301
10K

6 PS0/WAKE RESV_NC_1 1
C304
100nF

7 RESV_NC_2 VDDIO 28

+3V3
C302
100nF

X300
32.768KHz

8 RESV_NC_3 XIN32 27
9 CAP XOUT32/CLKSEL1 26
+3V3

10 CLKSEL0 GND_2 25

C300
22pF

C301
22pF

11 NRST RESV_NC_9 24
R300
10K

12 RESV_NC_4 RESV_NC_8 23
13 RESV_NC_5 RESV_NC_7 22
14 H_INTN RESV_NC_6 21
15 ENV_SCL H_SDA/H_MISO/TX 20

SDA3.3

ENV_SDA
SA0/H_MOSI
H_CSN
H_SCL/SCK/RX

PS1
BOOTN
VDD
GND_1

SCL3.3

R304
10K

R305
10K

+3V3

U3
Ardfruit BNO085

+5V

1 Vin
2 3v3
3 GND
4 SCL A5/SCL
5 SDA A4/SDA
6 INT
7 CS
8 DI
9 RST
10 P1
11 P0
12 BT

BNO085

IMU

U15
CMPS14

+5V

1 3.3v-5v
2 SDA/TX A4/SDA
3 SCL/RX A5/SCL
4 Mode
5 Factory Use
6 GND

Sparkfunk part PRT-14417
SMO4B-SRSS-TB(LF)(SN)
QWIIC SMD JST

0V

+3V3

1 GND
2 3.3V
3 SDA
4 SCL

SDA3.3

SCL3.3

NC2 6

NC1 5

QWIIC1

0V

0V

0V

QWIIC

Nano

U27
ATMEGA328P-AU

Left pins:
- D3/PWM0 1 (PCINT19/OC2B/INT1)PD3
- D4/INH 2 (PCINT20/XCK/T0)PD4
- 3 GND
- 4 VCC
- 5 GND
- 6 VCC
- 7 (PCINT6/XTAL1/TOSC1)PB6
- 8 (PCINT7/XTAL2/TOSC2)PB7
- D5/AuxOut 9 (PCINT21/OC0B/T1)PD5
- D6/StSw 10 (PCINT22/OC0A/AIN0)PD6
- D7/WkSw 11 (PCINT23/AIN1)PD7
- D8/_Off 12 (PCINT0/CLKO/ICP1)PB0
- D9/PWM1 13 (PCINT1/OC1A)PB1
- D10/nCS 14 (PCINT2/SS#/OC1B)PB2
- D11/MOSI 15 (PCINT3/OC2A/MOSI)PB3
- D12/MISO 16 (PCINT4/MISO)PB4

Right pins:
- PD2(INT0/PCINT18) 32 D2/Ch_A
- PD1(TXD/PCINT17) 31 D1/TX
- PD0(RXD/PCINT16) 30 D0/RX
- PC6(RESET#/PCINT14) 29 _Reset_Steer
- PC5(ADC5/SCL/PCINT13) 28 SCL3.3
- PC4(ADC4/SDA/PCINT12) 27 SDA3.3
- PC3(ADC3/PCINT11) 26 A3
- PC2(ADC2/PCINT10) 25 A2/whatever
- PC1(ADC1/PCINT9) 24 A1/Ch_B
- PC0(ADC0/PCINT8) 23 A0/Current
- ADC7 22 A7/WorkAnalog
- GND 21
- AREF 20 AVCC
- ADC6 19 A6/SafeSense
- AVCC 18
- PB5(SCK/PCINT5) 17 D13/SCK

+3V3

C80 1uF   C79 1uF

X4 16MHz

C82 22pF   C81 22pF

PRGBOOT
A2541WV-7P
+3V3

1 1 D13/SCK
2 3 D12/MISO
3 4 D11/MOSI
4 5 D10/nCS
5 6 _Reset_Steer
6 7
7

USBoff

D22   D27 ZMM3V3

B5819W_C8598

+3V3

R103 1K   R101 1K

FC-DA1608BK-470H10   TXD3

RXD3
FC-D1608UGK-520D10

R105 1K

D2/Ch_A
D1/TX
D0/RX

R104   TxD_Steer
_RxD_Steer

PT1
Testpoint
1 1

+3V3

R98 10

C78 100nF

Protected General Propose Inputs

+3V3

R39 1K

WORKINP
FC-D1608HOK-600H

WorkSwitch

R6 5.1K   R15 1K
D7/WkSw

WorkAnalog

Q3 2N7002

R9 1K   C1 100nF

Annotation: ISO 11786, pin 5 is inverted = active-low

INPUTS
+5V

WorkSwitch
SteerSwitch

whatever

R7
R16
R33
1K

Shield

M12A 5pole female

+5V   +5V

D5 SMCJ5.0A   R1 22   D2 SS34_C8678

C2 100uF

+3V3

R34 1K

STEERINP
19-213/Y2C-CQ2R2L/3T(CY)

SteerSwitch

R23 1K
D6/StSw

Q5 2N7002

R10 10K   C5 100nF

LED colors:
white: power
green/blue: serial data RxD/TxD
yellow/orange: I/O
red: error

to Section Control board

LED colors:
white: power
green/blue: serial data RxD/TxD
yellow/orange: I/O
red: error

+5V

R89 1K
R106 1K

RXD2
FC-D1608UGK-520D10

FC-DA1608BK-470H10
TXD2

R108 1K

TxD_SC
RxD_SC

R107

+5V
H10
A2541WV-2X4P

1	2	WorkSwitch
3	4	SteerSwitch
5	6	DTR_SC
7	8	RTS_SC

GPIO, e. g. Serial

USB A/F 90° Outside the buckle straight foot

+5V USB2
VCC
D-
D+
GND

+5V

C57 1uF
C21 1uF
R4 10K

U23 CH340B

GND	VCC	
TXD	TNOW	
RXD	RTS#	Dir485
V3	DTR#	
UD+	DCD#	
UD-	RI#	
RST#	DSR#	
NC.	CTS#	

RxD_SC
TxD_SC

R42 1K

RTS_SC
DTR_SC

USB_SC
A2541WV-2P

USBoff

4 Port USB Hub

FC-D1608UGK-520D10 ACT
FC-DA1608BK-470H10 PORT
FC-D1608UGK-520D10 SCTRL
FC-DA1608BK-470H10 GNSS
FC-D1608UGK-520D10 STEER

R80 10K
R75 1K
R77 1K
R76 1K

X2
12MHz

U18   FE1.1S

28	VD18	VSS	1
27	TESTJ	XOUT	2
26	OVCJ	XIN	3
25	PWRJ	DM4	4
24	LED2	DP4	5
23	LED1	DM3	6
22	DRV	DP3	7
21	VD33_O	DM2	8
20	VDD5	DP2	9
19	BUSJ	DM1	10
18	VBUSM	DP1	11
17	XRSTJ	VD18_O	12
16	DPU	VD33	13
15	DMU	REXT	14

C22   C23
33pF 33pF

USB_Ext_N
USB_Ext_P
USB_SC_N
USB_SC_P
USB_RTK_N
USB_RTK_P
USB_Steer_N
USB_Steer_P

+5V

U5 CH340B

C10 1uF
C19 1uF
R2 10K

GND	VCC	
TXD	TNOW	
RXD	RTS#	RTS
V3	DTR#	DTR
UD+	DCD#	
UD-	RI#	
RST#	DSR#	
NC.	CTS#	

RxD_RTK
TxD_RTK

RSTb

EN_RTK

R40 10K
Q10
BC846AMTF

BC846AMTF
Q13

R41 10K
D8/_Off

USB-C PC/Tablet

USBC1
TYPE-C-31-M-12

A12	GND	GND	B1
A9	VBUS	VBUS	B4
A8	SBU1	CC2	B5
A7	DN1	DP2	B6
A6	DP1	DN2	B7
A5	CC1	SBU2	B8
A4	VBUS	VBUS	B9
A1	GND	GND	B12

R43 5.1K

R46 5.1K

USB-B
A2541WV-5P

C28 10uF

+5V

R74 10K
USB_Up_P
USB_Up_N

URES

3V3Hub
1V8Hub

C29   C31
10uF   10uF

R81 2.7k

Close J1 1-2, J2 1-2 and J3 if only
steering is used (no USB hub)

Close J1 2-3, J2 2-3 and J3 if only
dual-RTK is used (no USB hub)

A2541WV-2P A2541WV-3P_C609572

J3   J1   J2

URES
USB_Steer_P
USB_Up_P
USB_RTK_P
USB_Steer_N
USB_Up_N
USB_RTK_N

+5V USB1
VCC
D-
D+
GND

USB A/F 90° Outside the buckle straight foot +5V

+3V3

C54 1uF
C56 100nF

U22 CH340B

GND	VCC	
TXD	TNOW	
RXD	RTS#	
V3	DTR#	
UD+	DCD#	
UD-	RI#	
RST#	DSR#	
NC.	CTS#	

RxD_Steer
TxD_Steer

R64 1K

C55 100nF

Reset_Steer

USBoff

USB_STEER
A2541WV-2P

Ardusimple Onboard Module(s)
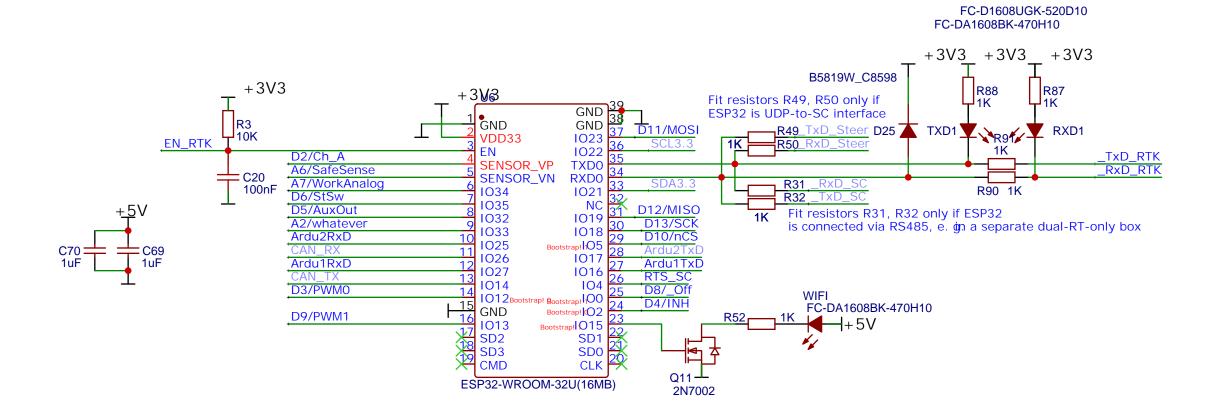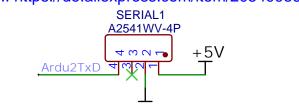
Interface I² C 3.3V <-> 5V

Option: RS232/Speed Pulse DIN9684

RS232 e.g.: https://de.aliexpress.com/item/2054995985.html

Fit resistors R49, R50 only if
ESP32 is UDP-to-SC interface

Fit resistors R31, R32 only if ESP32
is connected via RS485, e. g. in a separate dual-RT-only box

ESP32-WROOM-32U(16MB)

Danfoss (no H Bridge needed)

+SupplyOutput

R800 10K
R801 1K
R802 47
C4 10uF

U800 LM2904DR2G

MB
1 OUT/A   VCC 8
2 -IN/A   OUT/B 7
3 +IN/A   -IN/B 6
4 VEE/GND +IN/B 5

PWM0'

R803 47
MA

PWM1'

INH
R22 1.8K
1.8K R35

Q9 2N7002
Q12 2N7002

-SupplyOutput'

acc. ISO13850

H Bridge

+3V3

R48 10K

A6/SafeSense
R53 10K   +SupplyOutput
R61 10K
R8 10K
Q6 MMBT5401-C8326

D4/INH
R109 10K
Q4 BC846AMTF

Q8 SED4060G
8 D   S 1
7 D   S 2
6 D   S 3
5 D   G 4

-SupplyOutput'

D21

R19 750

C30 10uF   C6 180uF   C7 180uF   C12 180uF   C13 180uF

R96 10K

BZT52C18_C266571
Q7 SED4060G

R72 10K
R55 10K
Q19 MMBT5401-C8326

D3/PWM0
R113 10K
Q18 BC846AMTF

U9 BTN8982TAAUMA1
1 GND
2 IN
3 INH
4 OUT   OUT 8
5 SR
6 IS
7 VS

PWM0'
INH

R11 1K
1K R12

R73 10K
R51 10K

R44 1K   M3
FC-D1608HOK-600H
19-213/Y2C-CQ2R2L/3T(CY)

R29 1.8K   R24 1.8K
M1

M2
FC-D1608HOK-600H

MB   C17 100pF   MA

C16 180uF   C15 180uF

R82 10K
R62 10K
Q20 MMBT5401-C8326

Q21 BC846AMTF
R114 10K   D9/PWM1

U10 BTN8982TAA
1 GND
2 IN   PWM1'
3 INH   INH
4 OUT   OUT 8
5 SR
6 IS
7 VS

R21 1K
1K R20
D26 ZMM5V6

R92 10K

U2 U14
9 EP
1 GND OUT 8
2 IN   OUT 7
3 DEN OUT 6
4 IS   NC 5
BTS50301EJAXUMA1
Option to control a 6/2 valve

R54 10K

-SupplyOutput

R25 2k2

R18 10K

A0/Current

+5V   +5V   +3V3

R94 10K   R95 10K   R78 1K

_OFF
FC-D1608HOK-600H
D8/_Off

Q22 Q23

R28 value

Q24 BC846AMTF

MMBT5401-C8326

Steering wheel motor: Detection of manual interaction

C8 1uF

Steering Out

+3V3

STEERING

D3
R59 1K   whatever

A2/whatever

Option for engangment sensor or servo

D39 B5819W_C8598

2
1 5 3
4 Shield

M12A 5pole female

6/2Out
-SupplyOutput'

C18 100pF

(or valves)

Power Input Connector / ISO 11786 plug (Amphenol C016 30H006 110 12)

Socket DIN 9681-1 ISO 11786 e. g. Fendt X007 plug / Steyr, etc:
pin 4 => WorkSwitch digital (low = lower end, high = higher end pos)
pin 5 (Fendt, if connected) => WorkSwitch analog instead of pin 4 (0V = lower end, 10/14V = upper end pos)
pin 6 (Fendt) => +Battery and via Stopp switch (5A max for ISO plug!)
pin 7 (Fendt) => -Battery

POWER
M12A 5pole male

-SupplyOutput'
D1 SMCJ33CA   C27 100nF
WorkSwitch
+SupplyOutput

2
3 5 1
4 Shield

C11 100nF

0V

+Battery

or

Option: Ethernet

+3V3 — L200 22nH — 3.3VA

C206 100nF · C207 100nF · C208 100nF · C209 100nF · C210 100nF · C211 100nF · C212 100nF · C213 100nF

RJ200
HR913550A

R200 1K — Y_LED — +3V3
R201 1K — G_LED

2KV 1000pF
4X75 ohms

R202 51 · R203 1K · R204 51

R205 51 · C200 10nF · R206 51 · C201 10nF · C214 10nF

TX+ J1
TX- J2
RX+ J3
J4
J5
RX- J6
J7
J8

TXP
TXN
RXP
RXN

TD+
TD-
RD+
RD-

GND
NC

3.3VA

U200 — W5500

48 AGND
47 NC
46 NC
45 PMODE0
44 PMODE1
43 PMODE2
42 RSVD
41 RSVD
40 RSVD
39 RSVD
38 RSVD
37 RSTn

1 TXN
2 TXP
3 AGND
4 AVDD
5 RXN
6 RXP
7 DNC
8 AVDD
9 AGND
10 EXRES1
11 AVDD
12 NC

13 NC
14 AGND
15 AVDD
16 AGND
17 AVDD
18 VBG
19 AGND
20 TOCAP
21 AVDD
22 1V2O
23 RSVD
24 SPDLED

36 INTn — D11/MOSI
35 MOSI — D12/MISO
34 MISO — D13/SCK
33 SCLK — D10/nCS
32 SCSn
31 XO — XO
30 XI/CLKIN — XI
29 GND
28 VDD
27 ACTLED — G_LED
26 DUPLED — Y_LED
25 LINKLED

R207 2.2K
R212 10K
R211 1K
C202 · C203 100nF

R208 10K — +3V3
R209 10K
R210 1M
X1 25MHz
C204 18pF · C205 18pF

TITLE:
W5500 Ethernet driver

REV: 2.0

Company: https://discourse.agopengps.com Sheet: 7/8
Date: 2021-09-18   Drawn By: buithehao1512

Switch Mode Power Supply Batt => 5V
(needed for Ethernet and Wifi only)

BZT52C18_C266571

R260
1K

Inrush current limitation

ON1
A2541WV-2P

D250

12V
0603White light_C2290

+Vin

U250
TPS54331DR

R251
51

R261
10K

R263

Q250
AO3400A

+Battery

D6

R259
1K

R252
R262
1M

+Vin   2 VIN   PH 8 SW!
EN_1.24 3 EN   BOOT 1
SS   4 SS VSENSE 5
COMP   6 COMP   GND 7

C254
100nF

L250
6.8uH

+5V

R256
10K

5V
0603White light_C2290

B5819W_C8598

REV
KT-0603R

C258
180uF

C250
22uF

C3
1uF

R253
100k

R254
100k
R255

C251
4.7nF

C252
4.7nF

C253
33pF

D251
SS34_C8678

C255
22uF

C256
22uF

C257
22uF

R257
1.8K

R258
1.8K

R250
1.8K

FB_.8V

Power Supply 5V => 3V3

U4
AMS1117-3.3

+5V

1 GND/ADJ
2 Vout   Vout 4
3 Vin

3V3
0603White light_C2290
+3V3

C67
10uF

C66
10uF

C65
10uF

R14
1K

D24/3
B5819W_C8598

+3V3

+5V