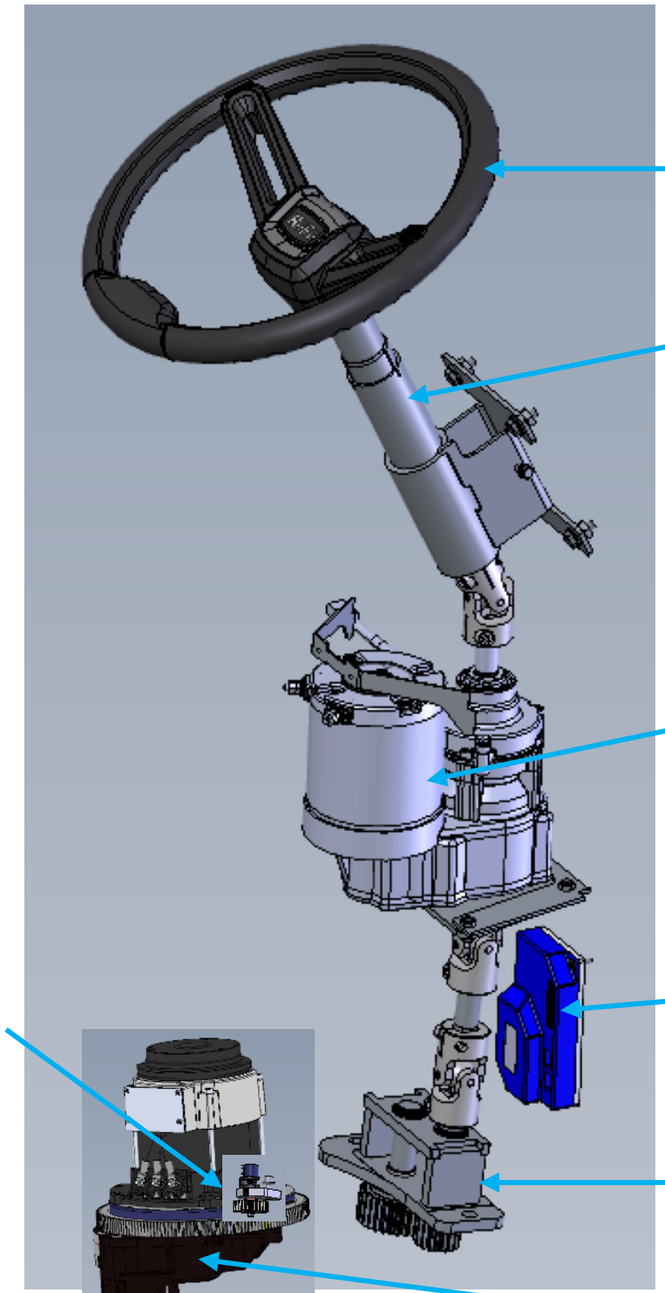
4.1.1 Steering AMER

All B400R/RM/RH with a running number smaller as 1000 are equipped with an AMER steering.

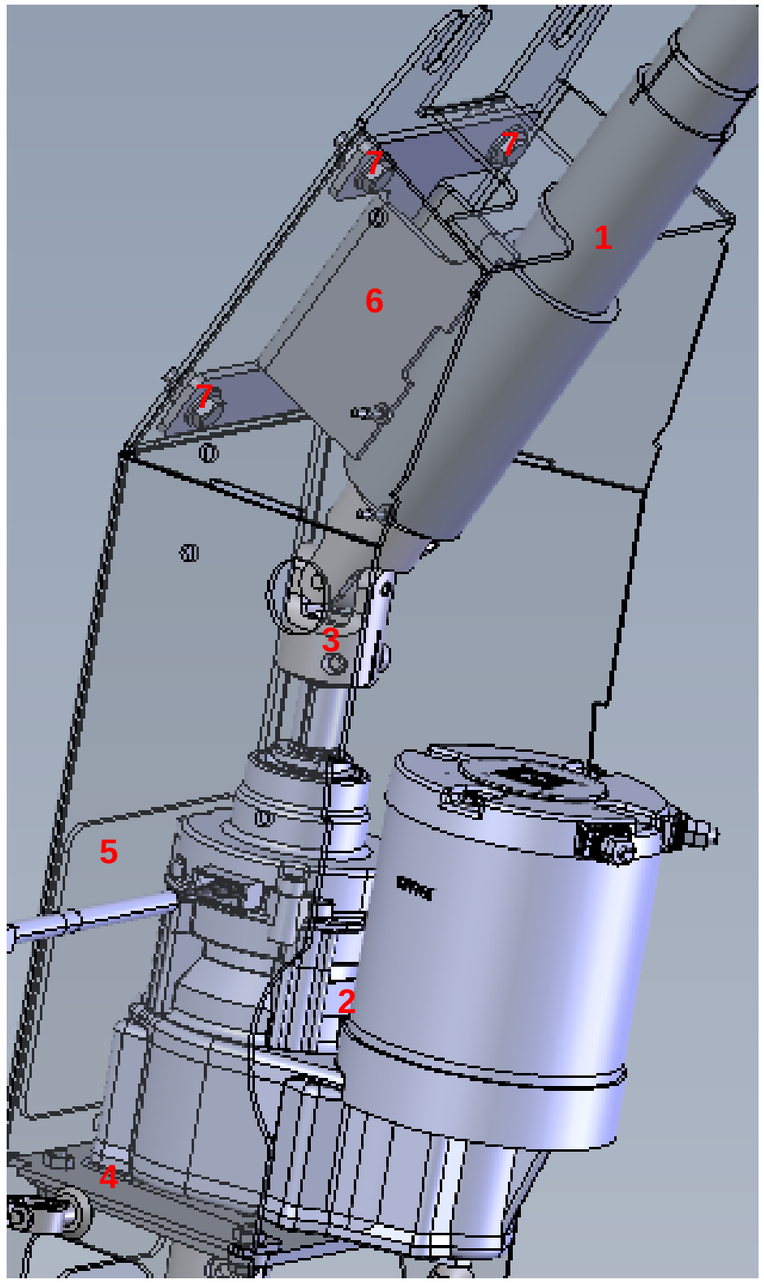
Description 7190VVJxxxxM
VV = Type (00 / 10 / 20 / 25 / 60 / 70)
J = Year
xxxx = running number; must be < 999 then AMER Steering
> 1000 Documents in document 4.1.2 Steering Steer by Wire
M = Month

Complete steering train



Machines till SN 719000100666
719010100135
719020100166
719025100086

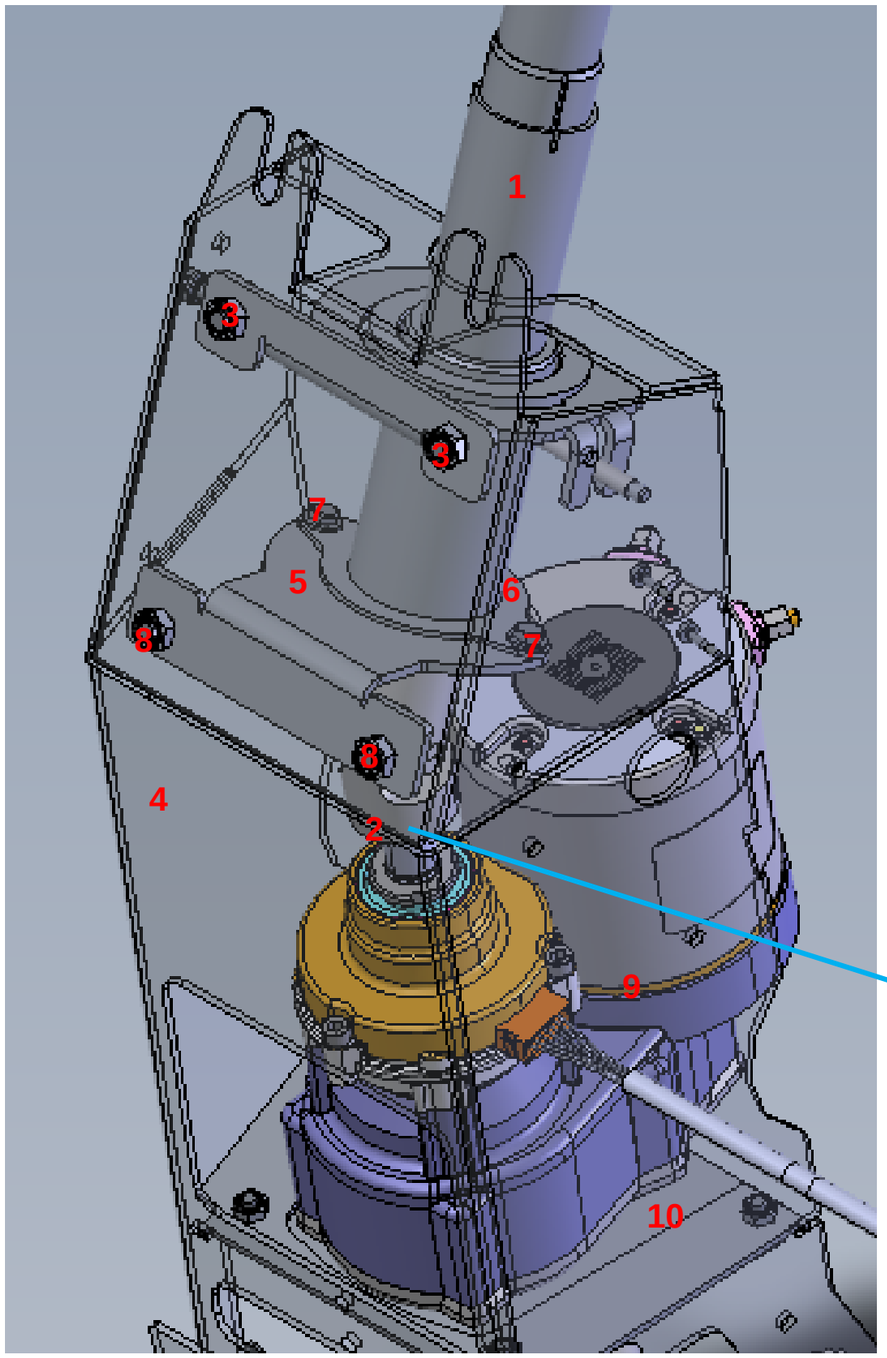
Steering linkage (old)



Sequence for tension-free assembly:

1. Mount steering linkage (1) and steering drive (2) with universal joint (3).
2. Fasten the steering drive (2) to the support plate (5) with the flange plate (4).
3. Screw the steering linkage holder (6) to the support plate using the four screws (7). To do this, first tighten all screws crosswise, evenly hand-tight. Then first tighten the two lower screws with 20Nm, then the two upper ones

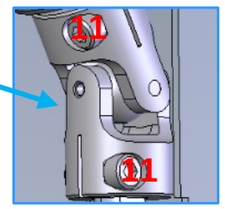
Machines from SN 719000200671
719010200141
719020200171
719025200092



Steering linkage (new)

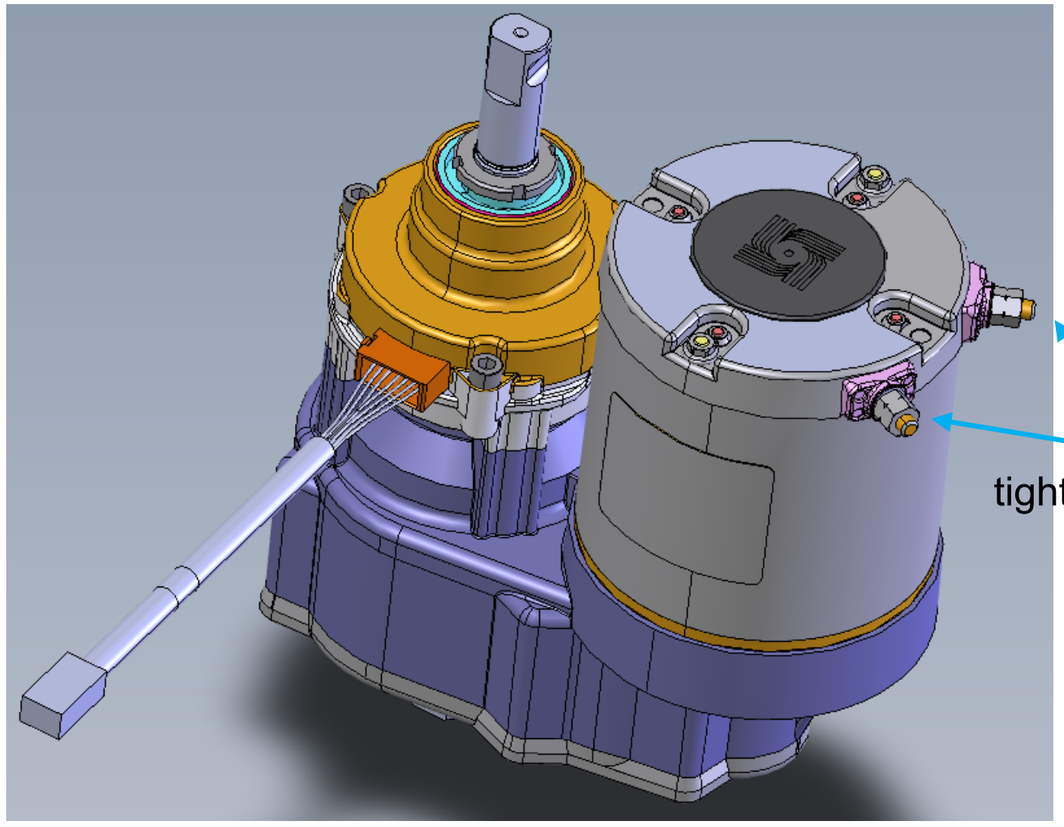
Sequence for tension-free assembly:

1. Mount the steering linkage (1) with the universal joint (2) and tighten the two screws (3) on the carrier plate (4).
2. Preassemble the catch ring (5) and setting ring (6) with the self-tapping screws (7) (catch ring and setting ring must still be able to be moved relative to each other).
3. Thread the two rings (5 + 6) onto the steering linkage (1) and fix them to the carrier plate with the screws (8).
4. Mount the steering drive (9) with the flange plate (10) on the carrier plate (4).
5. Tighten the screws (11) on the universal joint (2).
6. Position the adjusting ring (6) on the steering tube of the linkage (1) so that there is an even distance around the circumference. Now the screws (7) can be tightened.



Old steering drive, sliding contact sensor

Used till end of April 2024



Steering drive (old sensor)

Electrical machine	Value
Machine type	Permanent magnet DC
Rated voltage	36 V
Rated current	17 A
Rated power (P2) / (P3)	500 W / 450 W
Rated speed (P2) / (P3)	3354 1/min / 130 1/min
Rated torque (P2) / (P3)	1,4 Nm / 32,5 Nm
System of protection	IP 44
Duty cycle	S3 - 10% - max. 1min
Insulation class	F
Numbers of poles	4
Rotation wise (view of the shaft)	CW and CCW
Maximum ambient temperature	40°C
Type of carbon brush	Grafite
Life of carbon brush (at rated current)	1000 hrs
Rotor inductivity	0,43 mH
Rotor resistance	0,3 Ohm
Demagnetisation current at 0°C	142 A
Inrush current at 0°C	131,5 A
Demagnetisation current at 20°C	154 A
Inrush current at 20°C	120 A

P1 = electrical power (input electrical machine)
P2 = mechanical power (output electrical machine)
P3 = mechanical power (output gear)

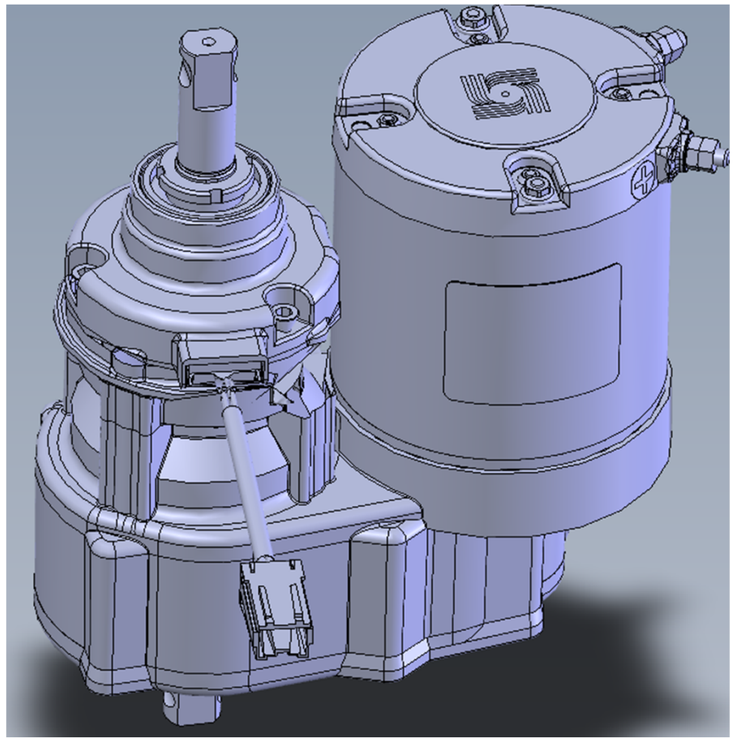
Gear box	Value
Gear type	Spur gear
Gear ratio	1:25,8
Gear efficiency	0,9
Max. torque (Input side)	90 Nm

New steering drive, contact less sensor

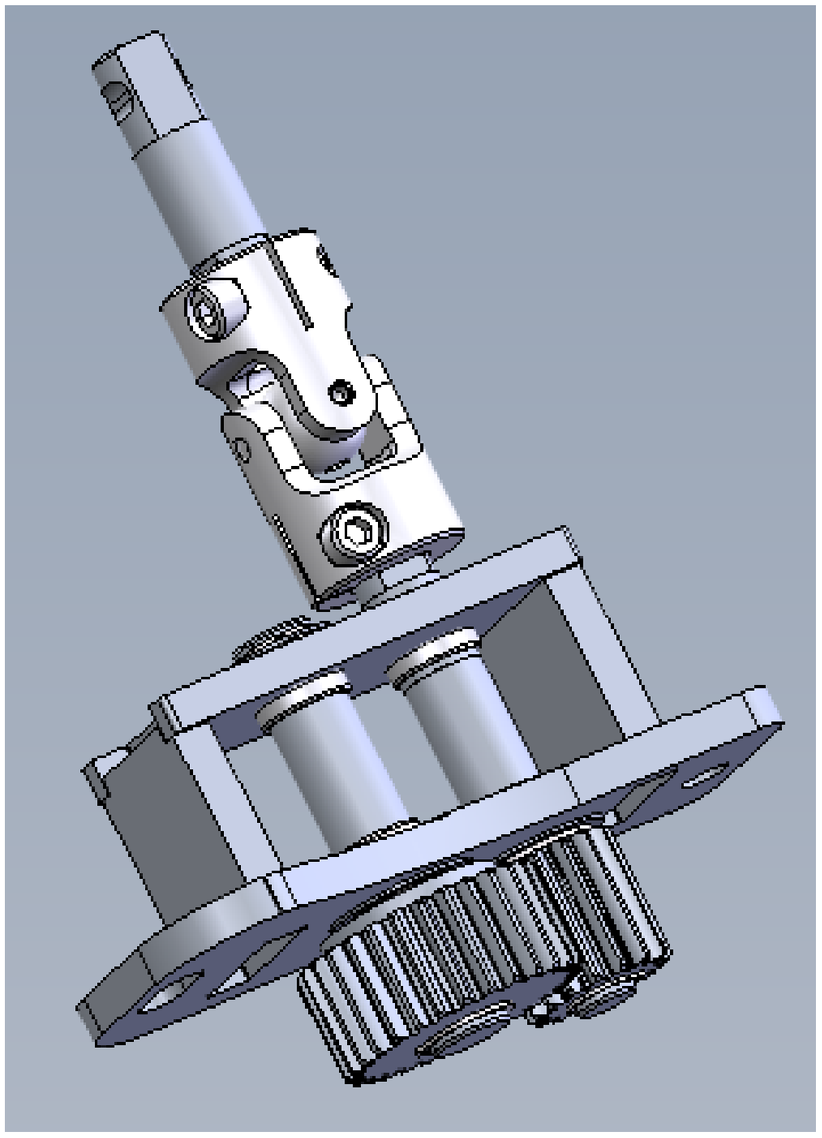
Only as spare part availible

After installing the new steering drive or replacing the steering controller the following parameters must be changed.
The change could be made with the programming device 03503540

1. Connect the programming device to the 4-pin socket on the steering controller
2. Key switch (machine) to ON
3. Press the UP button until REFERENCE RANGE is displayed
4. Activate with the MODE button
5. Change the value to 600mV using the UP or DOWN button
6. Save with the MODE button
7. Press the UP button until REF. DEADBAND is displayed
8. Activate with the MODE button
9. Change the value to 220mV using the UP or DOWN button
10. Save with the MODE button
11. Key switch to OFF
12. Disconnect the programming device from the 4-pin socket of the steering control



Steering drive (new sensor)

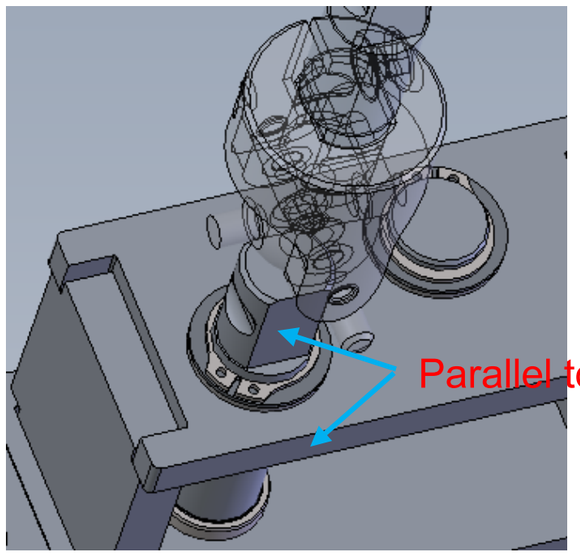


Steering gear

Reduction
ratio 16 : 29

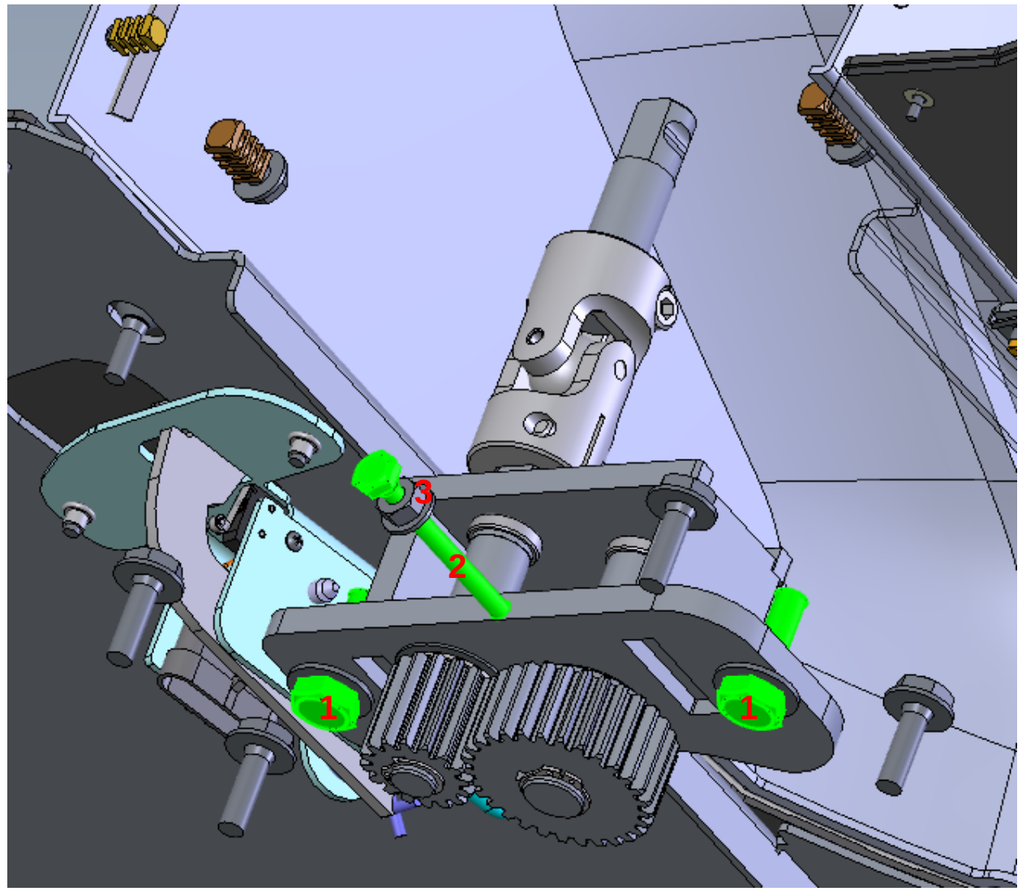
97150833

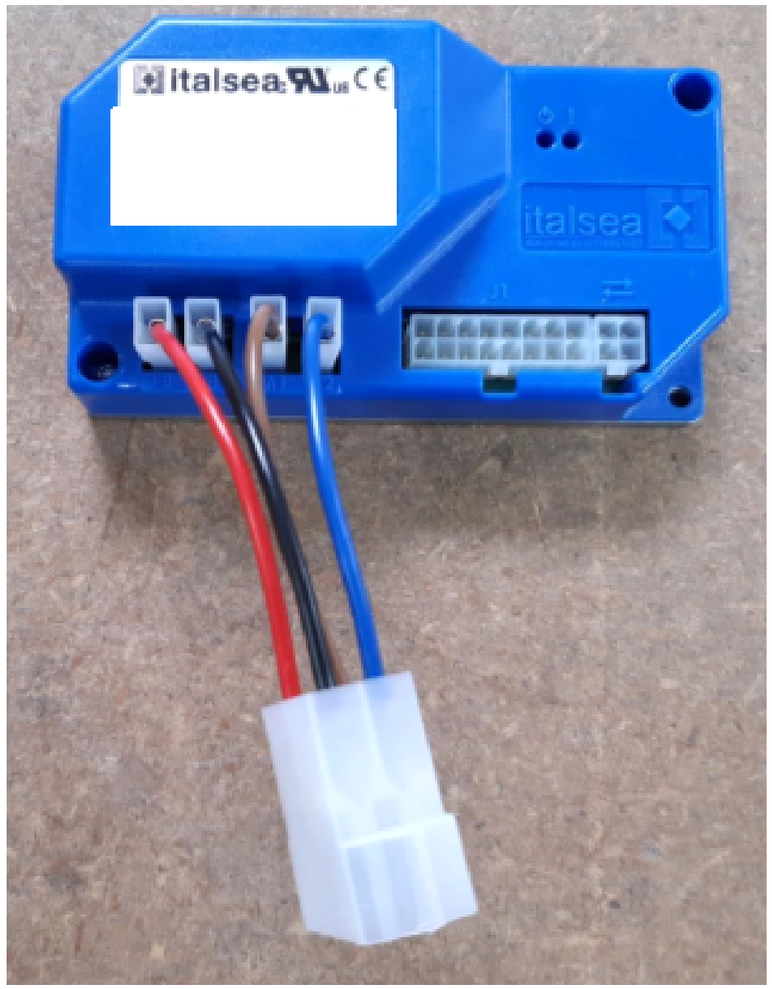
Mounting instructions steering gear



Mounting steering gear:

1. Tighten the screws (1) hand-tight
2. Tighten the fixing screw (2) with 1Nm.
3. Then loosen 1/8 turn and lock with nut (3).
4. Tighten screws (1).



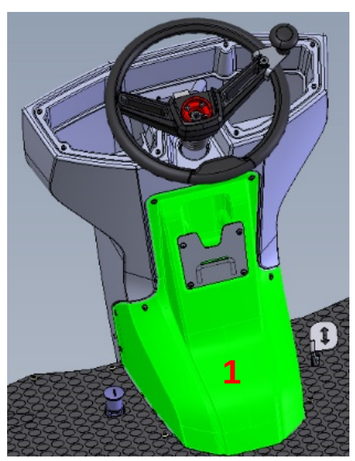


Steering controller

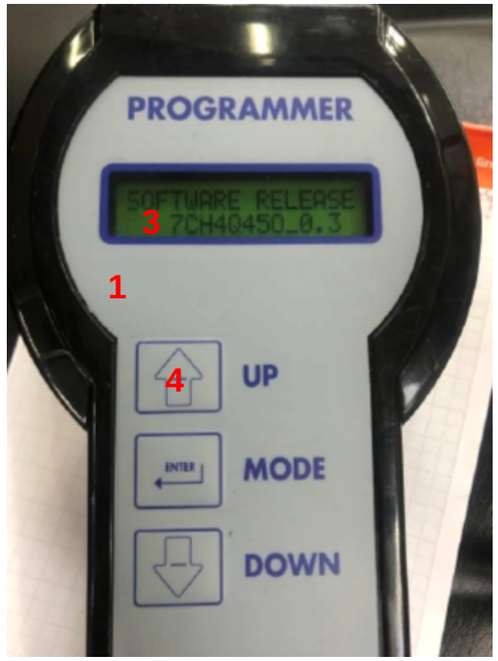
Calibration of steering

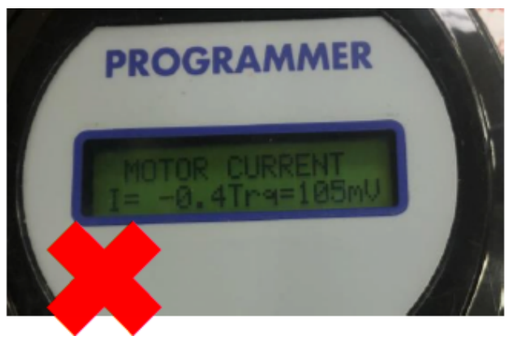
- Bring the steering wheel to the center position
- Turn off the machine
- Remove cover (1).Connect the open plug X32 (2) to the calibration tool (3) (should the plug not be found on this side of the engine, check on the other side)
- Switch on the machine, push the micro switch of the calibration tool 4x within 3 seconds
- If the calibration was successful, the red LED (4) on the steering controller will light up for 2 seconds

After calibration, the steering assistance is the same in both steering directions.



Identify tension



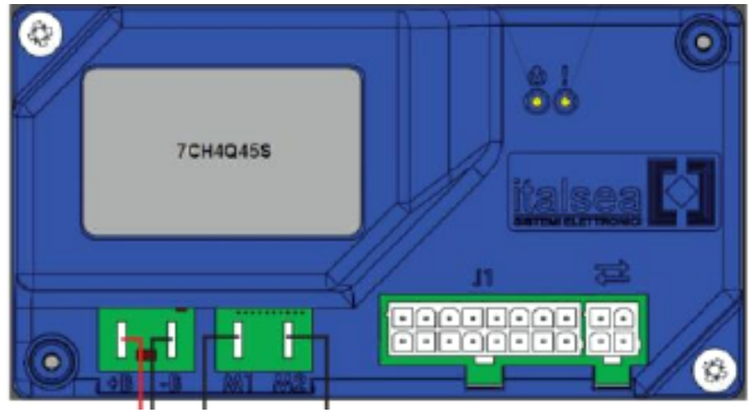


1. Connect the programming device (1) to the 4-pin socket (2) on the steering control
2. Key switch (machine) to ON
3. First check the software variant (3) (should be equal to/higher than 7CH40450_0.8)
4. Press the UP button (4) once
5. MOTOR CURRENT displayed must be I= 0.0 (A) and Trq (torque) < 50mV

Test: Turn the steering wheel to the right and left => the current and voltage values must drop back quickly.

SCM B400R/RH_7190

PIN	Steering Controller Manual	Controller Steering A9	Remarks
J1 PIN1	Positiv encoder (highside) plus 5V supply	Steering encoder RD from M26/1	
J1 PIN2	Positiv encoder (highside) signal input	Steering encoder BU from M26/2	Signal range 1,5V till 3,0V
J1 PIN3	Negativ encoder (lowside) ground supply	Steering encoder BK from M26/3	
J1 PIN4	Negativ encoder (lowside) signal input	Steering encoder VT from M26/1	Signal range 3,0V till 1,5V
J1 PIN5	not used	not connected	
J1 PIN6	Motor temperature sensor input	not connected	
J1 PIN7	not used	not connected	
J1 PIN8	not used	not connected	
J1 PIN9	not used	not connected	
J1 PIN10	5V supply external alarm LED	A1.X16/3 (OPTO3)	(Error message display 3.315)
J1 PIN11	not used	not connected	
J1 PIN12	Calibration push button input	X32/1	Special tool 03024380
J1 PIN13	not used	not connected	
J1 PIN14	Plus 36V supply	X32/2	Special tool 03024380
J1 PIN15	Key switch input	S1 PIN2 - XS5	
J1 PIN16	not used	not connected	
J3 PIN4 ((+) B)	Battery Plus	X1/P - F8 - F9	
J3 PIN3 ((-) B)	Battery Ground	X1/N - X43	
J3 PIN1 (M1)	Motor ground output	M26/M(+)	
J3 PIN2 (M2)	Motor plus output	M26/M(-)	
J2 PIN1	TX	/	Diagnose tool 03503540
J2 PIN2	RX	/	Diagnose tool 03503540
J2 PIN3	Plus 5V Supply	/	Diagnose tool 03503540
J2 PIN4	Ground (output)	/	Diagnose tool 03503540

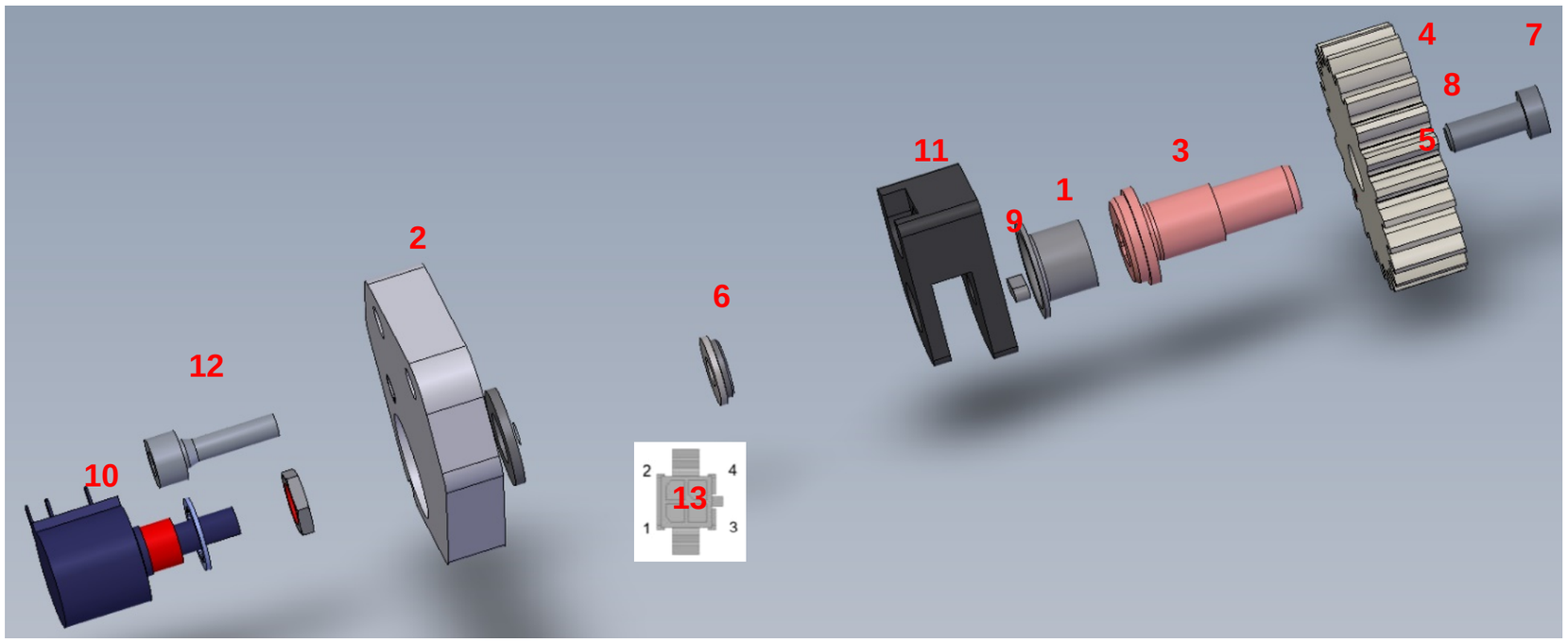


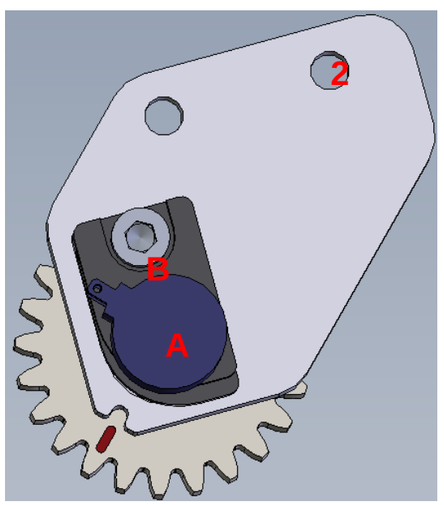
Configuration settings

The configuration settings in chapter 5 must be selected as follows:

Chapter	Configuration	Content	Description
5	4	1	Steering controller from ITALSEA
5	6	0	Brake wear sensor not present

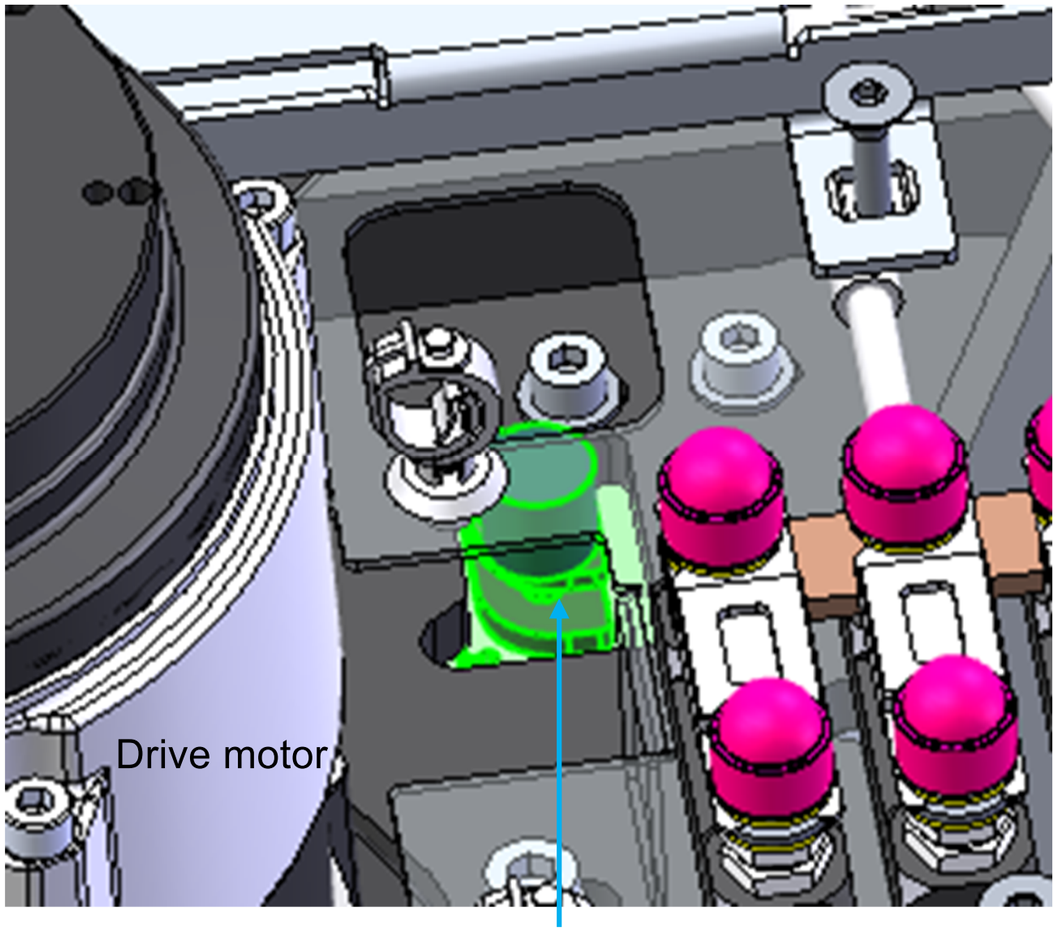
Additional steering angle sensor for rear-wheel drive





1. Drive the DU socket (1) into the base plate (2) using a drive-in socket.
2. Insert shaft (3) into DU socket.
3. Disc (4); Press gear (5) and washer (6) onto shaft (3).
4. Mount screw (7) and washer (8). (Bolt adhesive medium strength e.g. Loctite type 243 / tightening torque 9Nm)
5. Insert the key (9) and grease the upper end of the shaft to protect against corrosion. (e.g. Mobilgrease MB2)
6. Screw the sensor support (11) with the rotary potentiometer (10) onto the base plate (2) using the screw (12). (Bolt adhesive medium strength e.g. Loctite type 243 / tightening torque 9Nm)
7. Set the resistance value of 2.5 kOhm at pin 2 (brown) and pin 3 (black) of the connector (13) of the rotary potentiometer (10) by turning the gear wheel.
8. Mark the tooth aligned with groove (B) with a line (A).
9. Secure gear position with adhesive strips.
10. Marked tooth A must point to groove B after installation with drive wheel aligned straight.

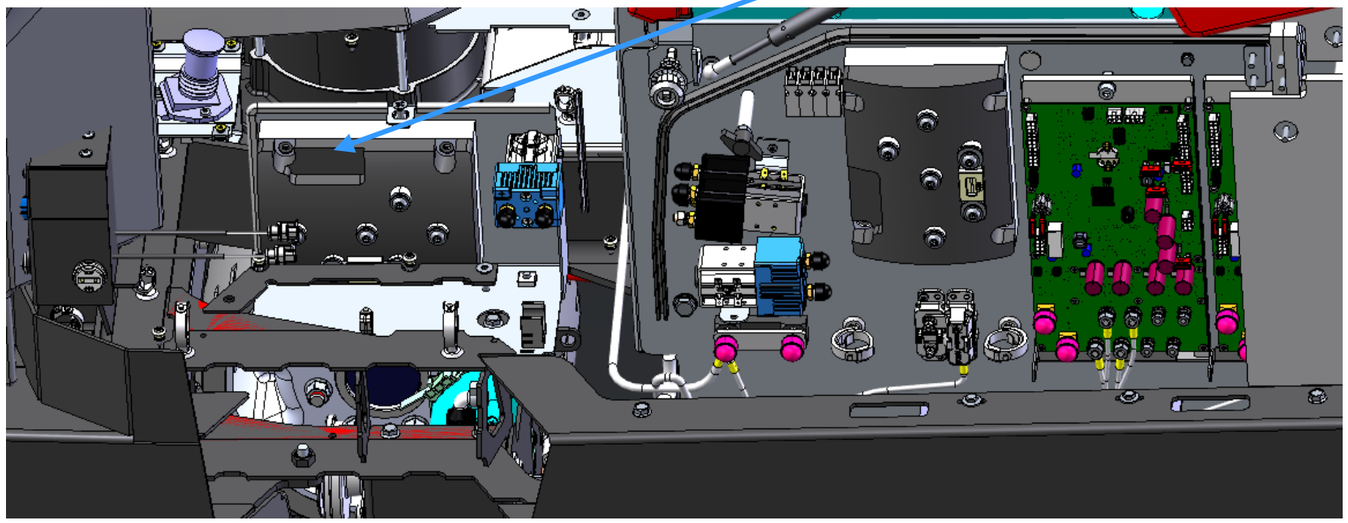
Installation position of rotation angle sensor

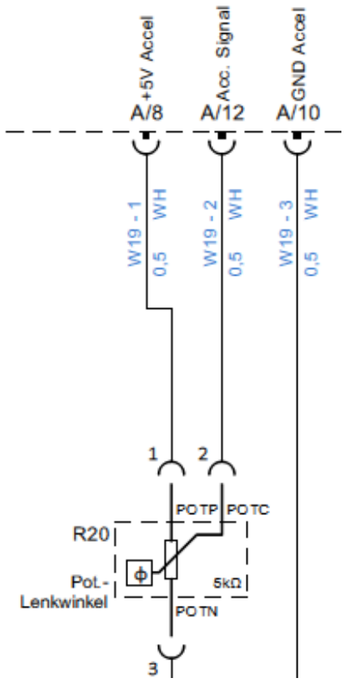


Middle base plate and electrical cover removed

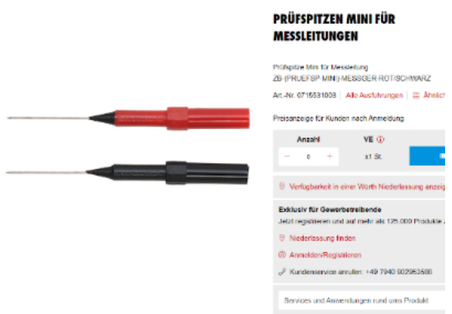
Completely assembled rotation angle sensor

On rear wheel drive controller A05 connector A





A steering angle outside of 1.85V to 3.15V results in rear drive being switched off!



Use the above measuring tip or similar to measure

Steering in middle position

Between A12 (Acc. Signal) and A10 (GND) => 2.5V
Between A12 (Acc. Signal) and A8 (+5V) => 2.5V
Both must have the same (average) value