

DC Driven Circulation Pump CM95HP

HIGH QUALITY BRUSHLESS MOTOR CIRCULATION PUMPS
FOR AUTOMOTIVE APPLICATIONS

IB-309 R04 EN (03/2024)

ORIGINAL INSTRUCTIONS/TRANSLATION OF ORIGINAL INSTRUCTIONS
READ AND UNDERSTAND THIS MANUAL PRIOR TO INSTALLING, OPERATING OR SERVICING THIS
PRODUCT



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Designed by SPX FLOW Johnson Pump®

Assembled in China

RELIABILITY ON BOARD

-SINCE 1968-

Circulation Pump CM95HP

Typical applications

Circulation in heating and cooling systems for vehicles, trains, etc. All-around pump wherever self-priming is not essential.

Table 1. Type specification:

CM95HP AL-1BL PUMP VERSIONS								
ART. NO.	HOSE CONNECTIONS [mm]	VOLTAGE	BRACKET	PLUS/ MINUS WIRES	SIGNAL WIRES	WIRE CONNECTORS	APPLICATION	
							SPEED CONTROL	STAND-ALONE
10-13606-10	25	27.2V	4xØ7 + 4xØ9	AWG 14	AWG 20	-	PWM	YES
10-13606-12	25	27.2V	4xØ7 + 4xØ9	AWG 14	AWG 20	DEUTSCH	PWM	YES
10-13607-10	38	27.2V	4xØ7 + 4xØ9	AWG 14	AWG 20	-	PWM	YES
10-13607-12	38	27.2V	4xØ7 + 4xØ9	AWG 14	AWG 20	DEUTSCH	PWM	YES

Features

- Centrifugal pump (must be primed)
- Magnetic drive (no shaft seal/mechanical seal)
- Brushless motor
- Long service life
- Designed for continuous duty
- Wide temperature range
- Built-in thermal overload protection
- Derating, automatic speed control at overheating
- Speed control via PWM as well as standalone application
- LIN-bus out, motor running status
- LIN-bus out, fault diagnosis
- Reversed polarity protection
- Locked-rotor protection
- Current limitation
- Low voltage protection
- Dry run protection
- CE and E24 mark

EMC:

UN ECE R10 rev. 5/E-mark
 Electromagnetic Compatibility
 Directive 2014/30/EU
 ISO 14982: 2009/CE-mark

Technical description

Parts in contact with liquid

- Pump housing:** Aluminum, black anodized
- Impeller:** PPS GF
- Intermediate part:** PPA GF
- Bushing:** Resin bonded carbon
- Shaft:** Stainless steel, hardened
- Impeller magnet:** PA12 bonded ferrite
- Magnet housing:** Stainless steel
- O-rings:** EPDM, peroxide cured
- Screw:** Stainless steel

Driving unit incl. motor

- Drive magnet:** PA6 bonded ferrite
- Screws:** Steel, surface treatment Zn/Ni
- Motor:** Permanent magnet brushless motor with ball bearings and electronics included
- Motor housing:** Aluminum, black KTL coating
- Bracket:** Stainless steel

Degree of protection:

IP6K9K (ISO 20653); IP67 (IEC 60529)

Connections:

25 mm (1") hose or 38 mm (1½") hose

Pressure and capacity data:

See Image 10, page 12

> English

Spare parts:

See service kits image 11, page 13

Warnings

The pump should be connected to a SELV (Safety Extra Low Voltage) system.

- Voltage >35V may cause damage to the electronics.
- Pump and motor surfaces may be hot. Do not touch. Risk for injuries.
- Do not use the pump with lake water, seawater, flammable or corrosive liquids.
- Soiled liquids reduce service life of the pump.

Installation recommendations

- The CM-series pumps are normal-priming centrifugal pumps and should be mounted in a manner that ensures that they are always flooded or else they should be primed before being switched on. In a closed system the pump should be placed at a low point.
- The pump should not be run dry, even if it withstands a shorter time of dry running. Max dry running 20 minutes. If the pump is run dry, noise may occur.
- Avoid dry running because it will always cause increased wear.
- Always fill up liquid in system before start of pump
- It is recommended to use at least 30% antifreeze in your liquid
- Use full hose diameter at the pump inlet. Reduced hose diameter at inlet gives reduced performance and a risk of cavitation, which can damage the pump.
- The direction of rotation is clock-wise, viewed from the body (see *direction of flow arrow, Img. 9, page 11*).
- The pump can be installed horizontally or vertically, on a flat surface.
- To avoid airlocks when mounted horizontally, the body should be turned in such a way that the outlet is directed upwards or is placed on the upper side of the pump body (see *Img. 2*). The outlet hose after the pump must be horizontal or directed upwards to evacuate air.

- The bracket can be turned in steps of 90 degrees in relation to pump outlet.
- The pump should not be exposed to thermal radiation.
- Max 60% glycol/water mixture should be used.
- The pump should not be used with lake water, sea water or other soiled liquids, which reduce service life of the pump.
- The pump is designed for continuous duty.

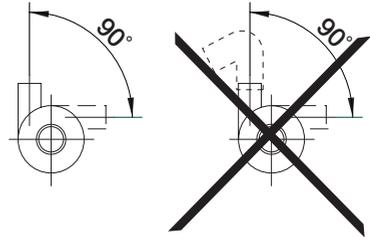


Image 2

Specifications

Enclosure

IP6K9K according to ISO 20653.

IP67 according to IEC 60529

Flammability

External polymer materials meet requirements according to UL94 Class V0.

Noise Level: 60dB at 1m distance.

Weight: 3.2 kg

Temperatures

Liquid temperature

-40°C to +100°C

Ambient temperature in operation

-40°C to +85°C

Above values valid at 27.2V rated voltage and 0.8 bar (11.6 PSI) operating pressure.

Storage ambient temperature (not in operation)

-40°C to +125°C (-40°F to +257°F).

Tested and verified in operation at 0,8 bar and with an ambient temperature of +85°C (185°F) and with a fluid temperature of +100°C (208°F).

- The motor has a built in temperature limitation. The speed will be reduced when the temperature reaches the top limit. The speed will return to full speed when temperature has cooled down to recommended limit.
- The motor will automatically shut off when it reaches the damaging limit. The motor will start again when it has cooled down to an acceptable level.

System pressure

-0,2 to 2,5 bar at +100°C (+212°F).

Service Life

The motor is designed for a service life of 40.000 hours at nominal voltage and ambient temperature of +40°C (+104°F).

Electric Installation

Nominal voltage 27,2V DC, measured at the cable connections of the motor.

Voltage range: 16 – 32V DC

The motor can withstand excessive voltage or excessive ambient temperature as long as they are within the given ranges. However, both excessive voltage and ambient temperature will have a negative impact on the service life of the pump.

In rush current

- When connecting the main power supply, red lead to positive (+) terminal and black lead to negative (-) terminal the capacitors will become charged. Peak value 85A during 0,6 ms.
- Current is limited electronically to 16A.

Fuse: Recommended fuse size 20 – 25A.

Cable connections

- Red to positive terminal (+), wire size AWG 14.
- Black to negative terminal (-), wire size AWG 14.
- White, control cable, PWM (see item Speed control below), wire size AWG 20.
- Blue, LIN-bus out, motor running status and fault diagnosis, wire size AWG 20.

The motor has a built in polarity protection to avoid damage if wrongly connected.

In order to start pump, supply nominal voltage at main power supply, red cable + and black cable - and PWM signal, 10V – 32V / 15 - 100% DC at white control cable. Voltage range for main power supply (red + and black – cable) 16 – 32V DC.

Use of a relay for start/stop function is not recommended.

Notes!

-Before installation with electrical control systems, check that equipment to be used is of sufficiently rated capacity to accept ampere draw of motor, 12 Amp.

-Voltage >35V may cause damage to the electronics.

-In order to avoid voltage transients, a battery should be included in the power supply circuit.

> English

Pump alternative with two wires **(stand alone application only.)**

- Connect red wire to positive terminal (+).
- Connect black wire to negative terminal (-).
- The pump will operate at full speed, no speed control

Pump alternative with four wires

1. Three wire connection (Stand alone application)

- Connect red and white wire to positive terminal (+).
- Connect black wire to negative terminal (-).
- LIN-bus out signal is available at blue wire,
- The pump will operate at full speed, no speed control.

2. Four wire connection/full speed control

- See image 3, page 7.
- Using this alternative, full voltage is required at main power supply (red (+) positive terminal and black (-) negative terminal).
- The pump starts up at supply of a PWM signal (DC > 15%) in to white, control wire. At no PWM signal or DC < 10%, pump stops (no action). Power consumption at DC 1-10% (no action) is 78 mA.
- Pump speed can be controlled by PWM signal (DC 15 - 90%).
- LIN-bus out signal is available at blue wire.

3. Connection/control via an external Micro controller

- See Image 4, page 7.

Speed control

- In order to start up the pump, supply nominal voltage at main power supply, red (+) and black (-) and a PWM signal at white wire.

Speed control via PWM **(Puls Width Modulation)**

- White control wire.
- PWM amplitude x PWM duty cycle = actual speed
- Pump operates at duty cycles 15% - 100%, see speed map on page 8.

Wire Connectors

Pumps: 10-13606-12
10-13607-12

Two connectors included:
DEUTSCH DTP04-4P-C015
black(-) - pin 2
red(+) - pin 3
AMP SUPERSEAL 1.5 282104-1
white - pin 1
blue - pin 2

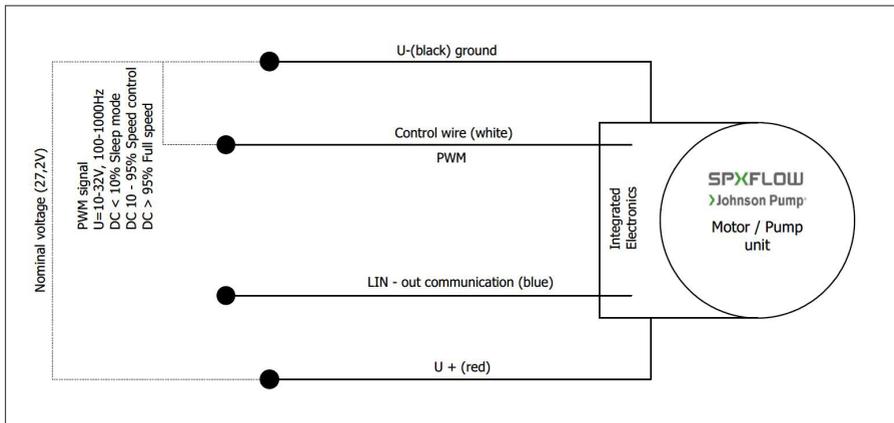


Image 3. Four wire connection/sleep mode/speed control

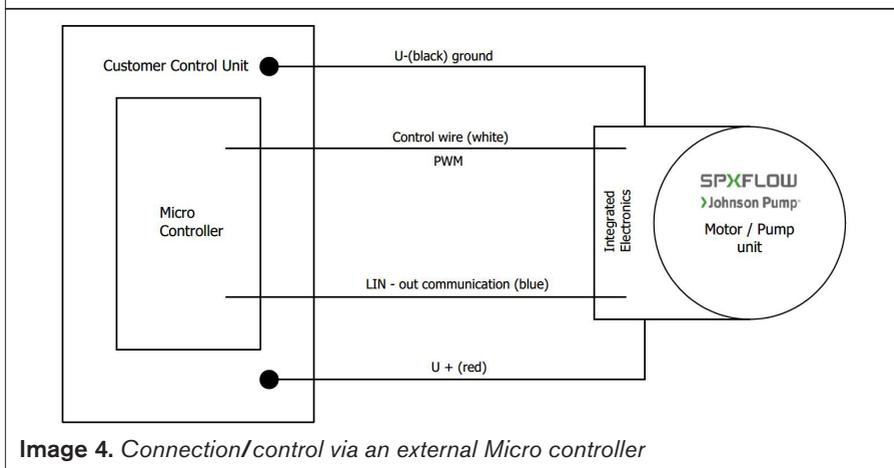


Image 4. Connection/control via an external Micro controller

9866 Speed map for CM95HP

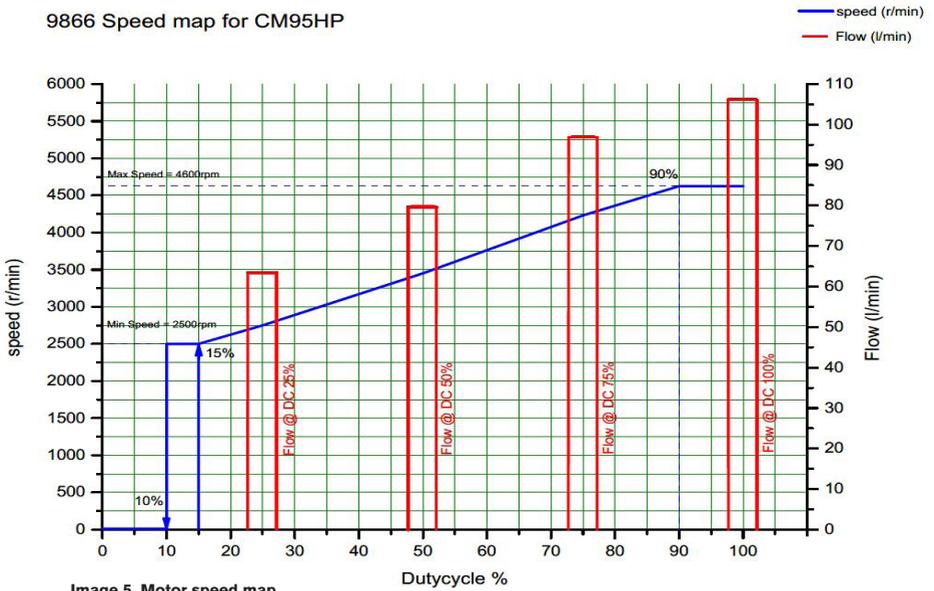


Image 5. Motor speed map

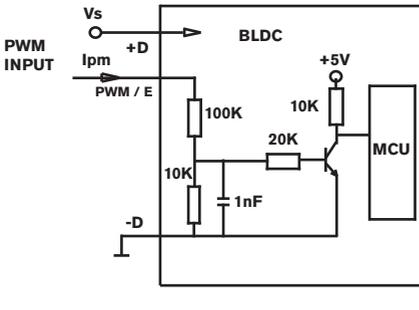


Image 6. PWM input circuit
 PWM input is high level active signal

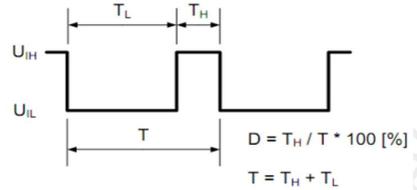


Image 7. PWM signal duty cycle definition
 Duty cycle is calculated by high active time divided by period time

Table 2. PWM signal parameters

Parameter	Min.	Typical	Max.	Unit	Symbol
PWM Frequency	50	200	1000	Hz	Fpwii
PWM Duty Cycle	0		100	%	DRAM
PWM High Level	10			V	
PWM Low Level			4	V	
PWM Precision		1		%	

LIN-out communication

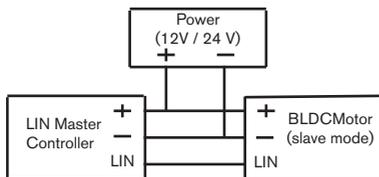


Image 8. Hardware Connection Diagram

Table 3. Unconditional Frames									
Unconditional Frames	Message ID	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
BCM Status 1	0x35	PCBA Temp	Input Voltage _Hi	Input Voltage _Lo	Motor Current	Actual Speed	Actual Speed	Speed Setting	Speed Setting
BCM Status 2	0x34	Fault Status	Protection Status	Protection recover Status	N/A	N/A	Input Signal Duty Cycle	Input Signal Duty Cycle	N/A

Table 4. BCM Status					
Name	Scale	Length (bits)	Actual Value Range	Range (DEC)	Range (HEX)
PCBA Temperature	1 °C / bit	8	0~150 °C	0~150	0~0x96
Input Voltage	0.1 V / bit	16	0~50 V	0~500	0~0x1 fa
Motor Current	0.25 A / bit	8	0~63.7 A	0~255	0~0xff
Actual Speed	1 rpm / bit	16	0~12000 rpm	0~12000	0~0x2ee0
Speed Setting	1 rpm / bit	16	0~12000 rpm	0~12000	0~0x2ee0
Input PWM signal DutyCycle	0.1 % / bit	16	0~100 %	0~1000	0~0x3e8

Table 5. Fault Status	
Bit	Fault
0	N/A
1	Current Error
2	Temperature Error
3	Voltage Error
4	N/A
5	N/A
6	N/A
7	N/A

Motor status communication:
 -ID index 0x34. Status 2 Fault status
 -ID index 0x35. Status 1, Temperature, Voltage, Current, Actual speed and Setting speed

> English

Software functions

Temperature limitations

The maximum temperatures are a function of ambient temperature vs liquid temperature. Nominal upper temperature limits are ambient temp. +85°C, and liquid temp. +100°C at nominal voltage 27,2V and operating pressure 0,8 bar, without any derating. Lower liquid temperature means higher ambient temperature and vice versa.

The motor has a built-in temperature limitation function, which senses the temperature at the circuit board and reduces the speed at temperatures above the set level, derating. The speed returns to full speed when the temperature has decreased below set level.

The motor will shut off when temperature reaches a critical level, but will restart automatically at the acceptable level.

The temperature at motor surface is approx. 4°C higher than the liquid temperature

Low voltage protection

Motor shuts off at main power supply <13V, and restarts automatically when voltage reaches 15,5V.

Reverse polarity protection

Motor and electronics include a reverse polarity protection in order to protect from faulty polarity connections.

Dry run protection

When the pump runs with no liquid, it will shut off after 20 minutes.

The electronics sense torque requirement of the pump every second minute. If the torque requirement has not exceeded the stipulated level after 20 minutes, the pump will shut off. In order to restart, all power supply must be disconnected for 5 minutes (red + cable, black – cable and white control cable).

Voltage transients

The pump includes a protection for voltage transients in accordance with EMC standard.
Note! Voltage over 35 volt may damage the electronics.

Current limitation

The motor has an internal current limitation, 16A

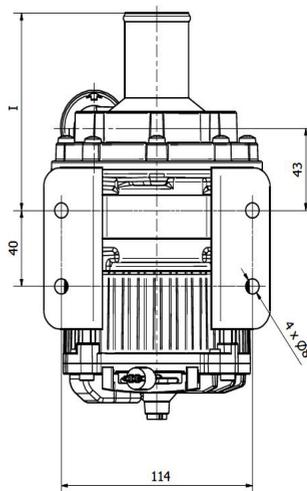
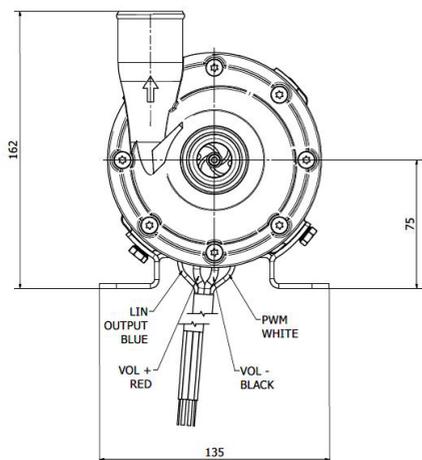
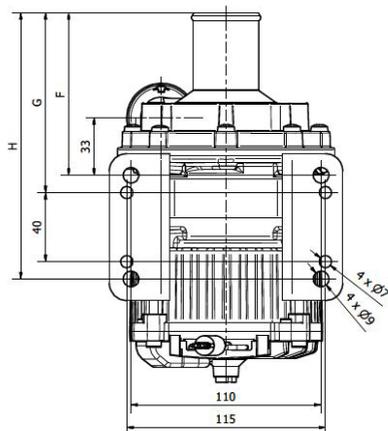
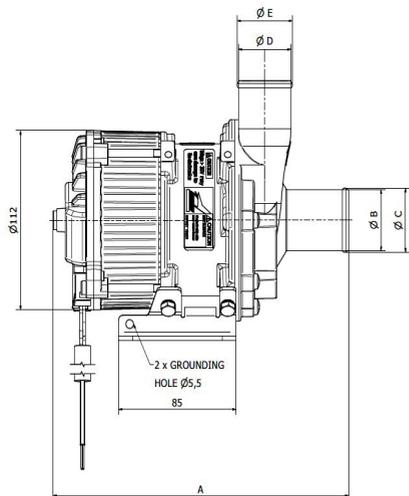
Locked rotor protection

The motor has a built in protection if the rotor is locked, which protects the motor from overheating.

Waste management/Recycling

Dispose of the product in accordance with existing regulations. Where appropriate, dismantle and sort the product by its materials.

Image 9. Dimensions



VERSION DEPENDANT PUMP DIMENSIONS [mm]									
	A	B	C	D	E	F	G	H	I
Diameter 25mm	208	25	27	25	27	88	98	148	98
Diameter 38mm	214	38	40	38	40	94	104	154	104

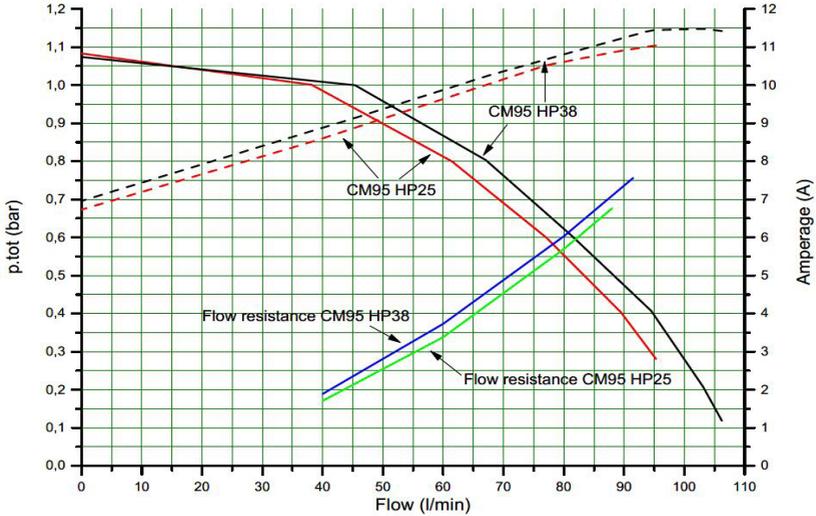
Image 10. Performance curves

9869 PERFORMANCE CURVE CM95HP

Date: 2020-02-10
 CM95 27.2V, Ø25 & Ø38
 Curve 9843: 10-13606-02
 Mfg no: 000001, Housing no.: 01-24908
 Curve 9846: 10-13607-02
 Mfg no: 000008, Housing no.: 01-24909
 Impeller no.: 04-36319 Bot:PPS GF30

Motor: Bergstrom Motor
 Volt to motor: 27.2V; PWM signal: 500Hz; PWM signal DC 100% Stand-alone
 Liquid: Water

— Ø25 9843 (Mfg: 000001) p.tot (bar)
 — Ø38 9846 (Mfg: 000008) p.tot (bar)
 — Ø25 9843 p.tot (bar) CM95 HP25
 — Ø38 9846 p.tot (bar) CM95 HP38
 - - Ø25 9843 (Mfg: 000001) Amperage (A)
 - - Ø38 9846 (Mfg: 000008) Amperage (A)



9841 PERFORMANCE CURVE CM95HP

Date: 2019-06-12
 CM95 27.2V, Ø38
 Housing no.: 01-24909
 Impeller no.: 04-36319

Motor: Bergstrom Motor B, Sample #7
 Volt to motor: 27.2V; PWM signal: 500Hz;
 PWM signal DC 100%, 75%, 50%, 25%
 Test sample: 1002204171
 Software: D0205-002

— DC 100% P.tot(bar) — DC 100% Amperage(A) - - DC 100% n(r/min)
 — DC 75% P.tot(bar) — DC 75% Amperage(A) - - DC 75% n(r/min)
 — DC 50% P.tot(bar) — DC 50% Amperage(A) - - DC 50% n(r/min)
 — DC 25% P.tot(bar) — DC 25% Amperage(A) - - DC 25% n(r/min)

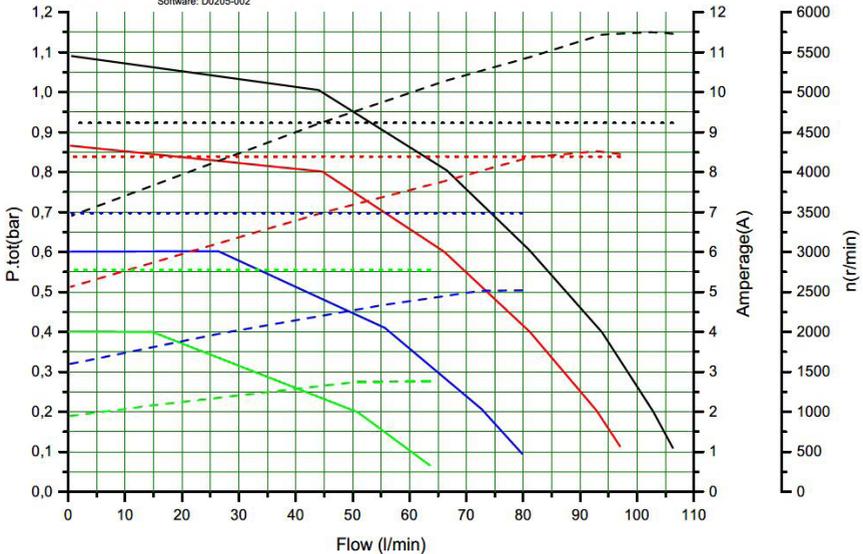
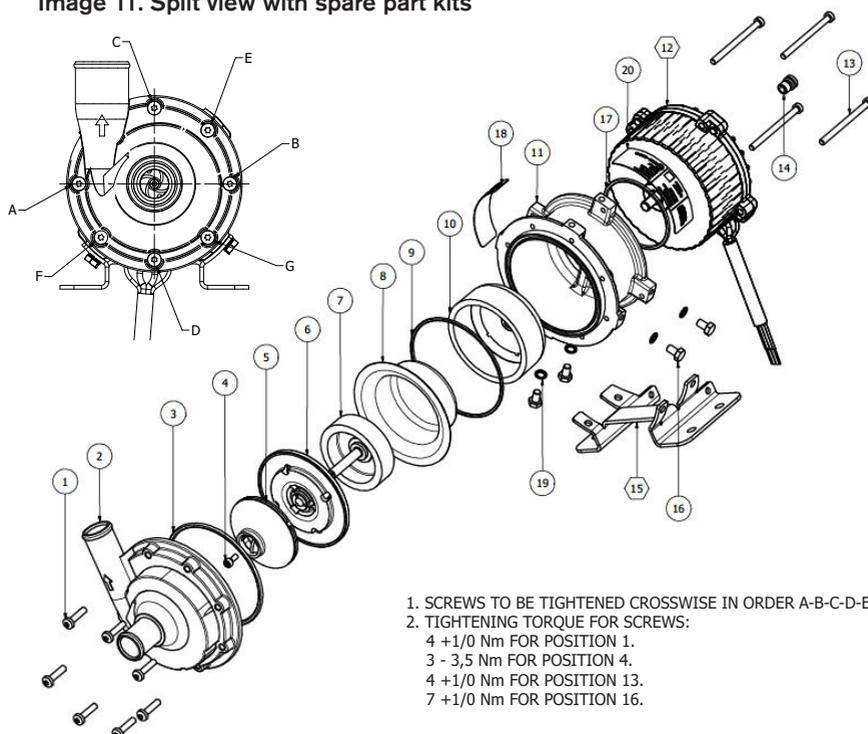


Image 11. Split view with spare part kits



1. SCREWS TO BE TIGHTENED CROSSWISE IN ORDER A-B-C-D-E-F-G
2. TIGHTENING TORQUE FOR SCREWS:
 - 4 +1/0 Nm FOR POSITION 1.
 - 3 - 3,5 Nm FOR POSITION 4.
 - 4 +1/0 Nm FOR POSITION 13.
 - 7 +1/0 Nm FOR POSITION 16.

Service Kits

Housing kit CM95HP Port diameter 25mm 09-47652		
Position	Description	Quantity
2	Pump housing D25	1
3	O-ring	1
1	Screw	7

Housing kit CM95HP Port diameter 38mm 09-47653		
Position	Description	Quantity
2	Pump housing D38	1
3	O-ring	1
1	Screw	7

Bracket kit CM95HP 09-47708 (4 holes version)		
Position	Description	Quantity
15	Bracket	1
16	Screw	4
19	Lock washer	4

Hydraulic kit CM95HP 09-47679		
Position	Description	Quantity
3	O-ring	1
4	Screw	1
5	Impeller	1
6	Intermediate part	1
7	Impeller magnet	1

Bracket kit CM95HP 09-47680 (8 holes version)		
Position	Description	Quantity
15	Bracket	1
16	Screw	4
19	Lock washer	4



CM95HP

HIGH QUALITY BRUSHLESS
MOTOR CIRCULATION
PUMPS FOR AUTOMOTIVE
APPLICATIONS

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