

Linear actuator CAHB series



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CAHB series

Linear actuator

CAHB series with 7 families of linear actuator, virtually maintenance-free, self-locking up to 2 times the rated load and up to IP69K/66M, covers low, medium and high loads for mobile applications,

Additional design options are available like limit switches, positioning feedback and manual override.

The smart CAHB-20S, CAHB-21S and CAHB-22S offer unique features at a competitive cost with integrated controller and advanced functions.



Features

New smart version CAHB-20S, -21S and -22S

- Integrated controller with I/O and CAN bus SAE J1939
- Motion with soft start/soft stop, adjustable end stop and parallel movement
- Key actuator functions monitoring with diagnostic

For all versions

- Electronic or mechanical overload protection and thermal protection
- Long stroke and high speed
- High holding force up to 20 000 N
- Low backlash
- Absolute or incremental Position feedback and limit switches option
- Manual override option
- Ingress protection IP69K/66M with vent
- Anti-rotation with free spinning
- Stainless steel push tube with anti rotation, free spinning attachment and corrosion protected metal parts
- Wide temperature range (-40 to 85 °C)
- High efficiency
- Virtually maintenance-free
- Mechanical, electrical and climatic tests

See pages 50 to 55 for test results.

Benefits

- Higher productivity with fast and smooth movement
- Easy and quick integration into customer equipment
- Higher reliability and protection
- Cost effective and virtually maintenance-free
- Monitoring and onboard diagnostic

Performance overview of the CAHB series

Family	Version	Rated force	Speed at rated force	Max stroke	Voltage	Smart	Page
		N	mm/s	mm	V	Integrated controller	
CAHB-10 xx A	CAHB-10-x1A	120	45	300	12 or 24 VDC	No	6
	CAHB-10-x2A	240	24	300	12 or 24 VDC	No	
	CAHB-10-x3A	500	13	300	12 or 24 VDC	No	
	CAHB-10-x4A	750	8	300	12 or 24 VDC	No	
	CAHB-10-x5A	1 000	6	300	12 or 24 VDC	No	
	CAHB-10-x6A	1 500	5	300	12 or 24 VDC	No	
CAHB-20 xx A	CAHB-20-x1A	1 500	27	610	12 or 24 VDC	No	12
	CAHB-20-x2A	2 500	13	610	12 or 24 VDC	No	
CAHB-20 xx E/S	CAHB-20-x1E or S	1 500	27	700	12 or 24 or 48 or 24-48 VDC	Yes	16
	CAHB-20-x2E or S	2 500	18	700	12 or 24 or 48 or 24-48 VDC	Yes	
	CAHB-20-x3E or S	4 500	10	700	12 or 24 or 48 or 24-48 VDC	Yes	
CAHB-21 xx E/S	CAHB-21-x1E or S	1 500	46	700	12 or 24 or 48 or 24-48 VDC	Yes	20
	CAHB-21-x2E or S	2 500	31	700	12 or 24 or 48 or 24-48 VDC	Yes	
	CAHB-21-x3E or S	4 500	18	700	12 or 24 or 48 or 24-48 VDC	Yes	
CAHB-22 xx E/S	CAHB-22-x1E or S	2 300	48	700	12 or 24 or 48 or 24-48 VDC	Yes	24
	CAHB-22-x2E or S	3 500	34	700	12 or 24 or 48 or 24-48 VDC	Yes	
	CAHB-22-x3E or S	6 800	16	610	12 or 24 or 48 or 24-48 VDC	Yes	
	CAHB-22-x4E or S	10 000	10	450	12 or 24 or 48 or 24-48 VDC	Yes	
CAHB-30 xx A	CAHB-30-x1A	1 500	25	610	115 VAC / 60 Hz or 230 VAC / 50Hz	No	42
	CAHB-30-x2A	2 300	12	610	115 VAC / 60 Hz or 230 VAC / 50Hz	No	
CAHB-31 xx N	CAHB-31-x1N	2 300	48	610	115 VAC / 60 Hz or 230 VAC / 50Hz	No	46
	CAHB-31-x2N	4 500	22	610	115 VAC / 60 Hz or 230 VAC / 50Hz	No	
	CAHB-31-x3N	6 000	13	610	115 VAC / 60 Hz or 230 VAC / 50Hz	No	



CAHB-10

Linear actuator

Benefits

- Designed and tested under demanding conditions
- Reliable and cost-effective
- Reduced overall set time
- Virtually maintenance-free

Features

- Compact and robust design, IP66S/69K, wide temperature range and corrosion resistant
- Integrated limit switches, optional absolute or incremental positioning feedback
- Integrated thermal protection

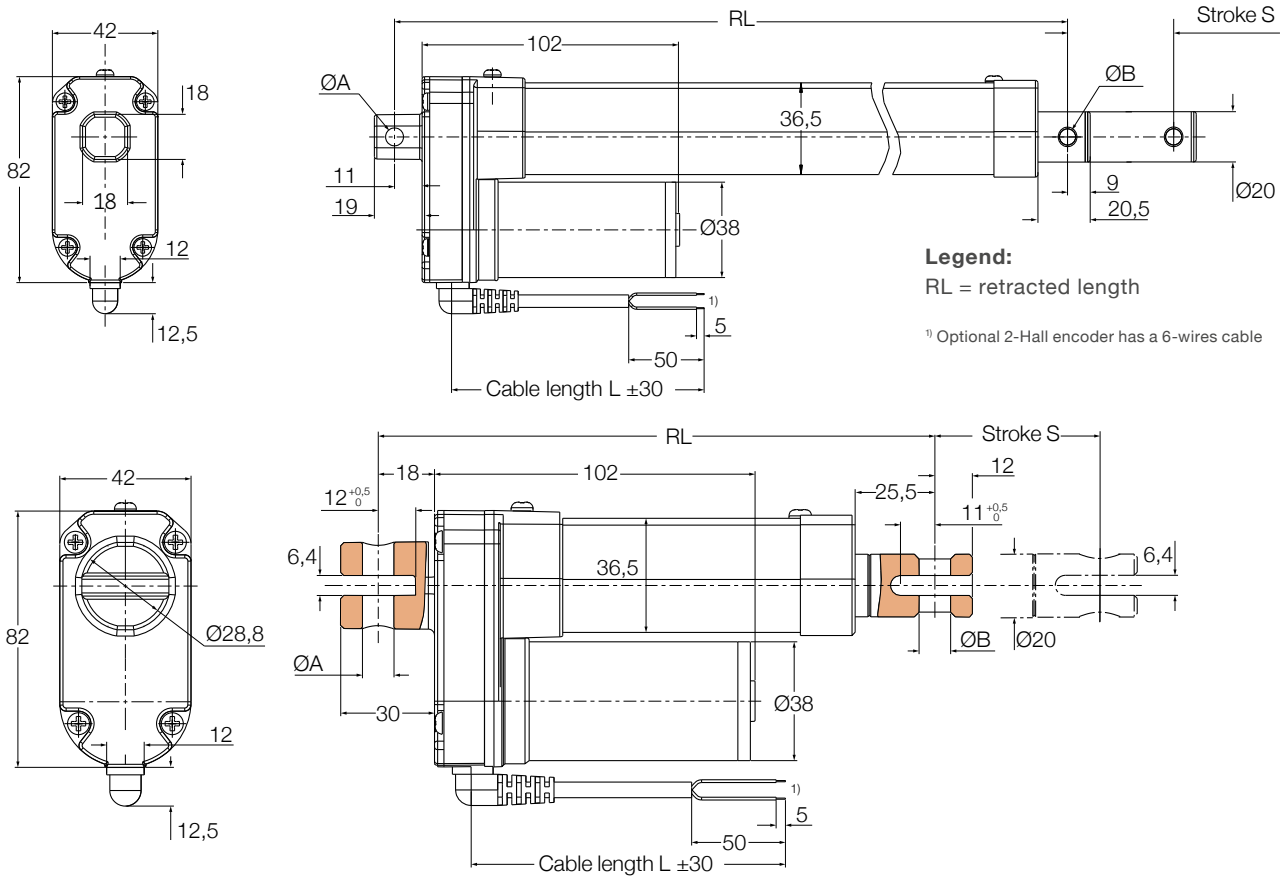


Technical data

Designation	Unit	CAHB-10... 1	CAHB-10... 2	CAHB-10... 3	CAHB-10... 4	CAHB-10... 5	CAHB-10... 6
Push load	N	120	240	500	750	1 000	1 500
Pull load	N	120	240	500	750	1 000	1 500
Speed (full load to no load)	mm/s	45 to 56	24 to 30	13 to 16	8 to 10	6 to 8	5 to 8
Stroke	mm	50 to 300	50 to 300	50 to 300	50 to 300	50 to 300	50 to 300
Voltage	V DC	12 or 24	12 or 24	12 or 24	12 or 24	12 or 24	12 or 24
Nominal current 12 V DC	A	4	3,5	3,2	3	2,8	4,4
24V DC	A	2,2	2	1,8	1,8	1,6	2,8
Duty cycle	%	25	25	25	25	25	20
Ambient temperature	°C	-40 to +85	-40 to +85	-40 to +85	-40 to +85	-40 to +85	-40 to +85
Type of protection	IP	66s/69k	66s/69k	66s/69k	66s/69k	66s/69k	66s/69k
Weight (at 300 mm stroke)	kg	1,5	1,5	1,5	1,5	1,5	1,5
Color	-	Silver	Silver	Silver	Silver	Silver	Silver
Limit switches	-	Yes	Yes	Yes	Yes	Yes	Yes
Thermal protection	-	Yes	Yes	Yes	Yes	Yes	Yes

Dimensional drawing

Basic configuration and optional 2-Hall encoder



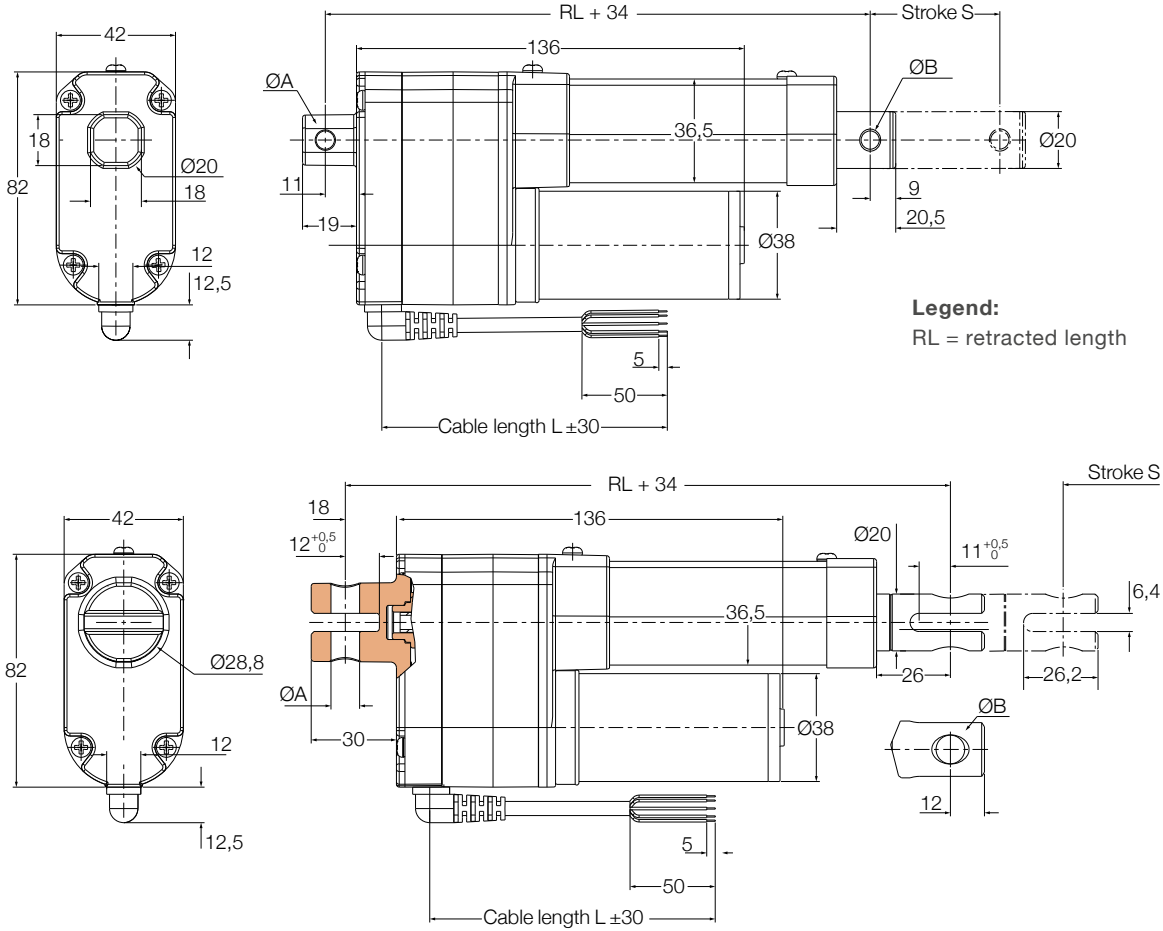
Front / Rear attachment	Ø A	Ø B	RL tolerance	S tolerance
Option A	6,4 (0, +0,1)	6,4 (0, +0,1)	CAHB10...1 and 2 (-5, +1)	(-1, +5)
Option B	8,0 (0, +0,1)	8,0 (0, +0,1)	CAHB10...3 and 4 (-3, +3)	(-3, +3)
Option C	10,1 (0, +0,1)	10,1 (0, +0,1)	CAHB10...3 and 4 (-2, +4)	(-4, +2)

Retracted length calculation (RL)

Stroke [mm]	50	100	150	200	250	300
Retracted length (RL) with Rod end (Front) + Rod end (Rear)	158	209	260	311	362	413
Retracted length (RL) with Rod end (Front) + Fork head (Rear)	165	216	267	318	369	420
Retracted length (RL) with Fork head (Front) + Rod end (Rear)	172	223	274	325	376	427
Retracted length (RL) with Fork head (Front) + Fork head (Rear)	179	230	281	332	383	434

Dimensional drawing

Optional potentiometer and absolut analogue



Front / Rear attachment	Ø A	Ø B
Option A	6,4 (0, +0,1)	6,4 (0, +0,1)
Option B	8,0 (0, +0,1)	8,0 (0, +0,1)
Option C	10,1 (0, +0,1)	10,1 (0, +0,1)

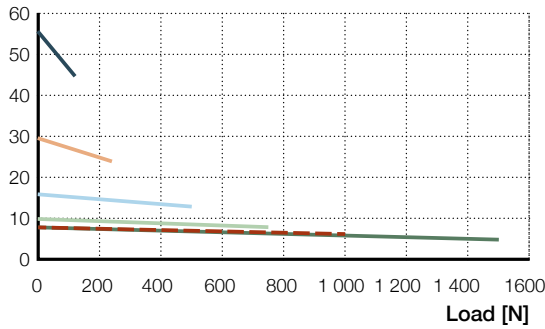
	RL tolerance	S tolerance
CAHB10...1 and 2	(-5, +1)	(-1, +5)
CAHB10...3 and 4	(-3, +3)	(-3, +3)
CAHB10...3 and 4	(-2, +4)	(-4, +2)

Retracted length calculation (RL)

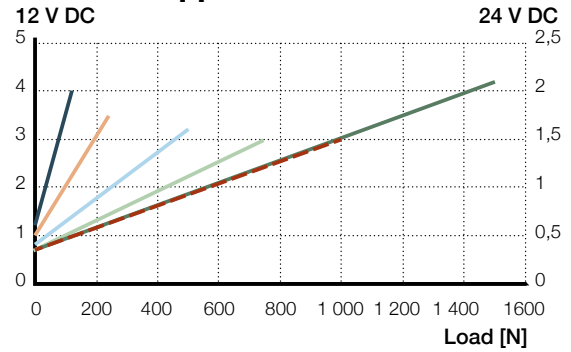
Stroke [mm]	50	100	150	200	250	300
Retracted length (RL) with Rod end (Front) + Rod end (Rear)	192	243	294	345	396	447
Retracted length (RL) with Rod end (Front) + Fork head (Rear)	199	250	301	352	403	454
Retracted length (RL) with Fork head (Front) + Rod end (Rear)	206	257	308	359	410	461
Retracted length (RL) with Fork head (Front) + Fork head (Rear)	213	264	315	366	417	468

Performance diagrams

Speed-load diagram
Speed [mm/s]



Current-load diagram
Nominal current [A]
12 V DC



- CAHB-10...1
- CAHB-10...3
- CAHB-10...5
- CAHB-10...2
- CAHB-10...4
- CAHB-10...6

Encoder resolution

Type	CAHB-10...1	CAHB-10...2	CAHB-10...3	v CAHB-10...4	CAHB-10...5/6
mm/pulse	0,3	0,15	0,075	0,05	0,0375

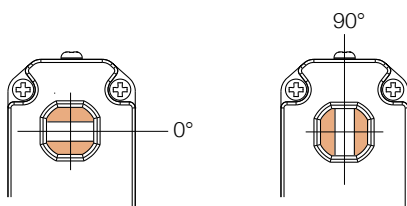
Potentiometer resolution

Stroke [mm]	50~80	80~160	160~300
Minimum resistance value of potentiometer	700~1 300 Ω	700~1 300 Ω	700~1 300 Ω
Potentiometer resolution	100 Ω/mm	50 Ω/mm	16,6 Ω/mm

Absolute analog output

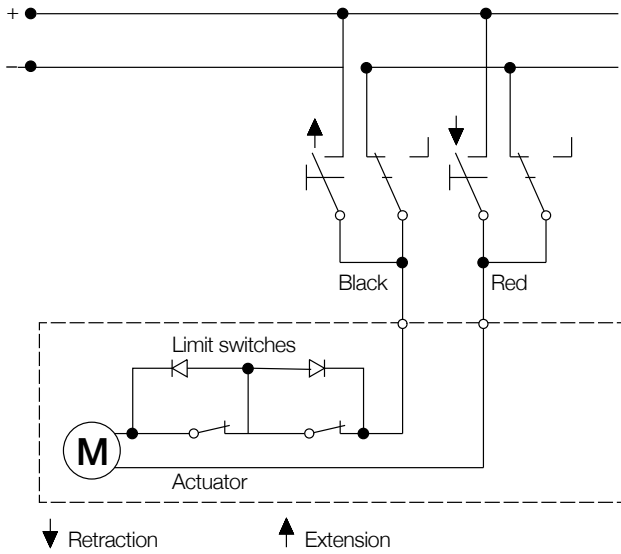
Stroke [mm]	50~80	80~160	160~300
Initial value VS RL position (V)	0,5	0,5	0,5
Resolution (mm)	0,024	0,049	0,146
Position feedback change (V/mm)	0,05	0,025	0,0083

Attachment orientation (refer to ordering key Attachment orientation)

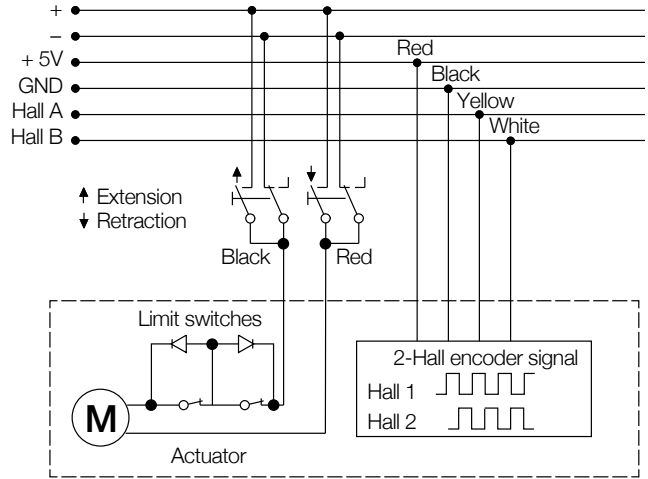


Connecting diagram

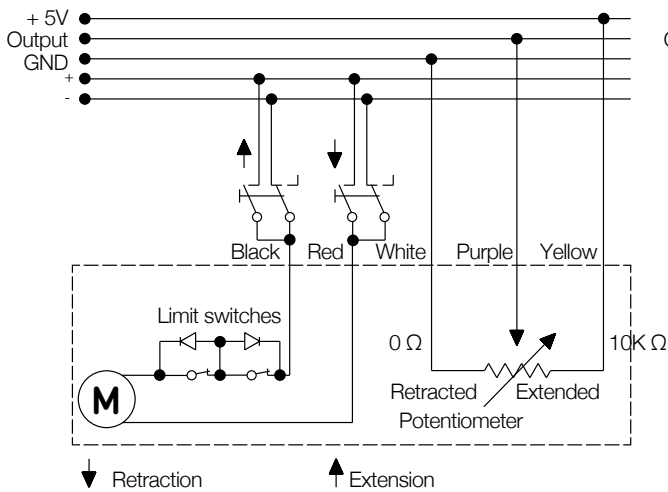
Basic configuration 12/24 V DC



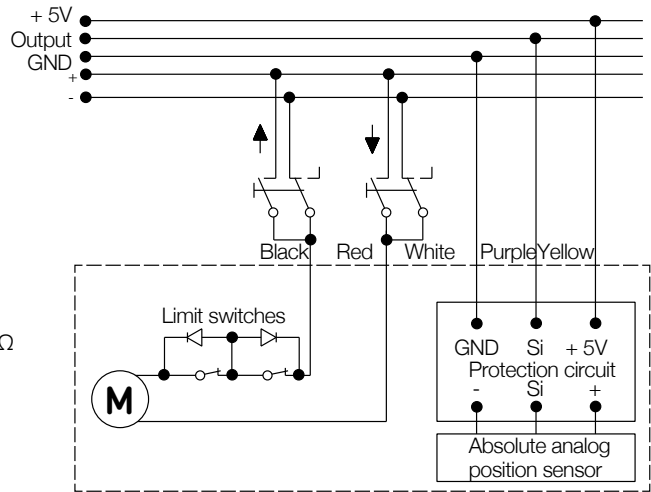
2-Hall encoder 12/24 V DC



Potentiometer 12/24 V DC



Absolute analog output 12/24 V DC



Ordering key

	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">C</td> <td style="padding: 2px;">A</td> <td style="padding: 2px;">H</td> <td style="padding: 2px;">B</td> <td style="padding: 2px;">-</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">-</td> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> <td style="padding: 2px;">-</td> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> <td style="padding: 2px;">-</td> <td style="padding: 2px;">A</td> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> <td style="padding: 2px;">-</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> </tr> </table>	C	A	H	B	-	1	0	-			-					-	A					-	0	0	0
C	A	H	B	-	1	0	-			-					-	A					-	0	0	0		
Type _____																										
Voltage _____																										
A 12 V DC																										
B 24 V DC																										
Load _____																										
1 120 N																										
2 240 N																										
3 500 N																										
4 750 N																										
5 1 000 N																										
6 1 500 N																										
Screw _____																										
A TR12 screw																										
X Customized																										
Stroke _____																										
050 50 mm																										
100 100 mm																										
150 150 mm																										
200 200 mm																										
250 250 mm																										
300 300 mm																										
Retracted length ¹⁾ _____																										
Please refer to the table "Retracted length calculation" on page 7 and 8																										
IP _____																										
A Standard (IP 66s/69k)																										
Front attachment _____																										
A Rod with hole Ø6,4 (0, +0,1) mm																										
B Rod with hole Ø8 (0, +0,1) mm																										
C Fork head with hole Ø10,1 (0, +0,1) mm																										
X Customized																										
Rear attachment _____																										
A Rod with hole Ø6,4 (0, +0,1) mm																										
B Rod with hole Ø8 (0, +0,1) mm																										
C Fork head with hole Ø10,1 (0, +0,1) mm																										
X Customized																										
Hole direction of the attachments _____																										
A 0°																										
B 90°																										
Option 1: Position output _____																										
0 None																										
A Absolute analog output																										
P Potentiometer																										
H 2-Hall encoder																										
Cable lenght _____																										
A 600 mm without connector																										
B 1 000 mm without connector																										
C 1 500 mm without connector																										
D 2 000 mm without connector																										
E 2 500 mm without connector																										
F 3 000 mm without connector																										
Customized _____																										
X																										

CAHB-20A

Linear actuator

Benefits

- Compact design which has been tested for vigorous use
- Robust and reliable
- Thermal protection and virtually maintenance-free

Features:

- Integrated overload and thermal protection
- Robust design
- IP66
- Optional potentiometer and limit switches

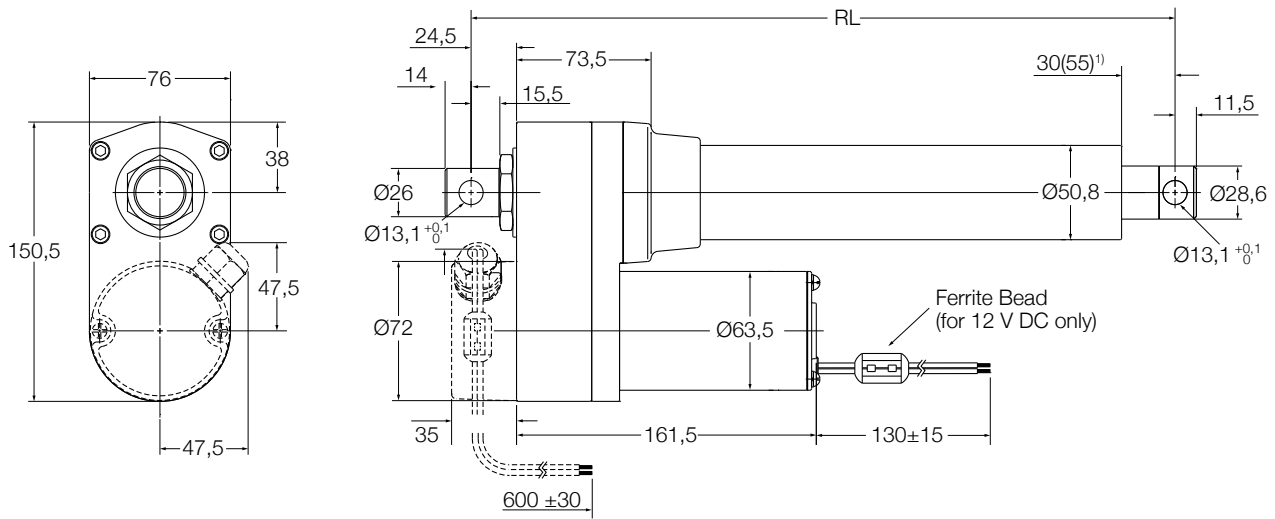


Technical data

Designation	Unit	CAHB-20-x1A	CAHB-20-x2A
Performance data			
Push load	N	1 500	2 500
Pull load	N	1 500	2 500
Speed (full load to no load)	mm/s	27 to 33	13 to 17
Stroke	mm	102 to 610	102 to 610
Voltage	V DC	12 or 24	12 or 24
Nominal current 12 V DC	A	16	14
24 V DC	A	8	7
Duty cycle	%	25	25
Ambient temperature	°C	-40 to +85	-40 to +85
Type of protection	IP	66	66
Weight (at 305 mm stroke)	kg	5,5	5,5
Color	-	Black	Black

Dimensional drawing

Basic configuration (dashed line for optional limit switch)



Attachment orientation (see page 14)

¹⁾ 55 = dimension with limit switch

Without limit switch:

RED (+) & BLACK (-) = retraction
 RED (-) & BLACK (+) = extension

With limit switch:

RED (+) & BLACK (-) = extension
 RED (-) & BLACK (+) = retraction

Legend:

RL = retracted length

Retracted length calculation (RL)

Stroke [mm]	With limit switch ¹⁾						Without limit switch ²⁾					
	102	153	204	305	457	610	102	153	204	305	457	610
Retracted length (RL)	338	389	440	592	744	897	262	313	364	465	668	821

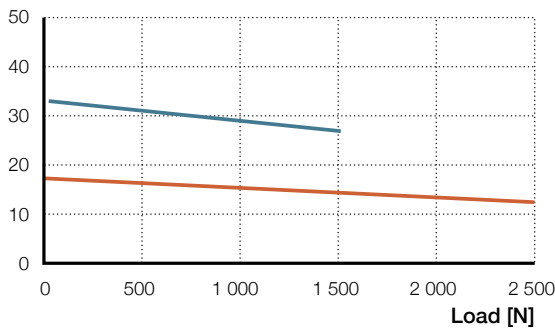
¹⁾ Tolerance: S and RL = ± 5,0 mm (If S ≥ 305 mm, S = ± 7,5 mm)

²⁾ Tolerance: S = ± 2,5 mm and L = ± 3,8 mm

Performance diagrams

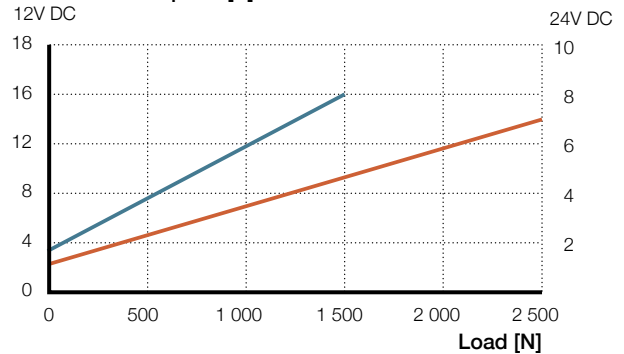
Speed-load diagram

Speed [mm/s]



Current-load diagram

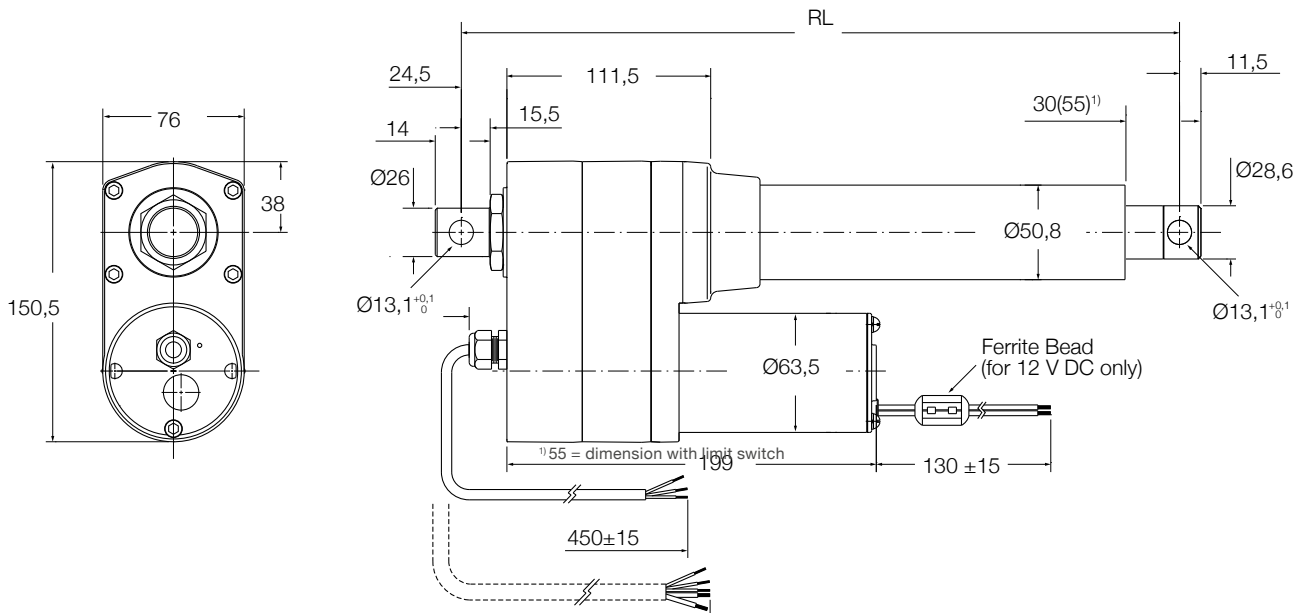
Current consumption [A]



— CAHB-20...1 — CAHB-20...2

Dimensional drawing

Optional potentiometer (dashed line for optional limit switch)



Without limit switch:
 RED (+) & BLACK (-) = retraction
 RED (-) & BLACK (+) = extension

With limit switch:
 RED (+) & BLACK (-) = extension
 RED (-) & BLACK (+) = retraction

Legend:
 RL = retracted length

Retracted length calculation (RL)

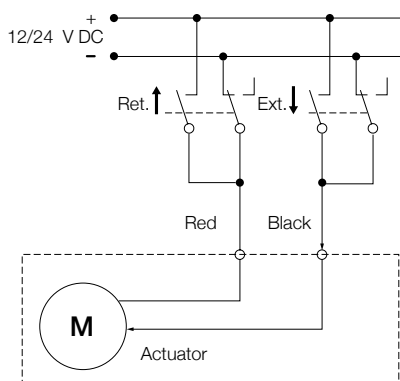
Stroke [mm]	With limit switch ¹⁾						Without limit switch ²⁾					
	102	153	204	305	457	610	102	153	204	305	457	610
Retracted length (RL)	376	427	478	630	782	935	300	351	402	503	706	859

¹⁾ Tolerance: S and RL = ± 5,0 mm (If S ≥ 305 mm, S = ± 7,5 mm)
²⁾ Tolerance: S = ± 2,5 mm and RL = ± 3,8 mm

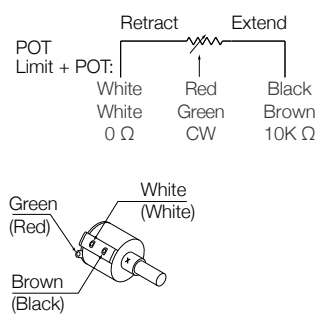
Potentiometer resolution

Stroke [mm]	102	153	204	305	457	610
Ω/mm	59,0	59,0	29,5	29,5	9,84	9,84

Connecting diagram

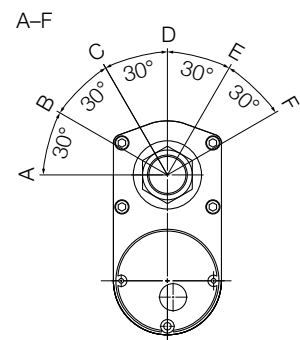


Electrical diagrams



Attachment orientation

(refer to ordering key Attachment orientation)



CAHB-20E and -20S

Linear actuator



Benefits

- High productivity
- Reliability and safety
- Save development time
- Cost effectiveness
- Quick time to market (for Smart version)

Features:

- Holding force
- Overload protection
- Corrosion protection and stainless steel tube
- Manual override option
- Enhanced ingress protection and virtually maintenance free

Smart version S features

- Integrated controller with complete motion control
- True absolute position contactless sensor
- Monitoring and onboard diagnostic (force, voltage, temperature)
- I/O and CAN bus SAE J1939 communication

Technical data

Designation	Unit	CAHB-20E / 12 V			CAHB-20E / 24 V		
Performance data							
Rated Push Force	N	1 500	2 500	4 500	1 500	2 500	4 500
Rated Pull Force	N	1 500	2 500	4 500	1 500	2 500	4 500
Max pull / push Force ¹⁾	N	2 600	3 800	6 300	2 600	3 800	6 300
Holding force ²⁾	N						
Speed without load ³⁾	mm/s	27,0	23,5	13,5	29,0	22,0	13,0
Speed with the rated force ³⁾	mm/s	24,5	17,5	10,5	25,5	19,0	11,0
Electric data							
Nominal voltage	V DC	12	12	12	24	24	24
Nominal current @ rated load ³⁾	A	12,5	15	17	5	6,5	8
Rated current (clutch activation)	A	18,4	21	22,4	6,8	8,8	10,4
Duty cycle	%	10 (85/765 s)	10 (85/765 s)	10 (85/765 s)	20 (85/340 s)	20 (85/340 s)	20 (85/340 s)
Mechanical data							
Stroke	mm	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700
Backlash	mm	0,6	0,6	0,6	0,6	0,6	0,6
Weight for 200 mm stroke	kg	4,5	4,5	4,5	4,5	4,5	4,5
Colour	–	Black	Black	Black	Black	Black	Black
Environment and standards							
Ambient temperature ⁴⁾	°C	–40 ... 85	–40 ... 85	–40 ... 85	–40 ... 85	–40 ... 85	–40 ... 85
Degree of protection	–	IP 69K/66M					
Standards / EMC	–	EN61000-6-2:2005, EN61000-6-4:2007/A1:2011					
Salt spray test	–	ISO 9227:2012, 250 hours					

¹⁾ Upper limit of the pull/push force limited by the clutch. The lower limit is just above the rated force. The limitation of the force will happen between these 2 limits

²⁾ Ultimate Static Load, refer to the "Static load" diagrams

³⁾ The data of speed and current on this list is defined at +20 °C

⁴⁾ Full performance from 0 °C to +40 °C

Designation	Unit	CAHB-20E / 48 V		
Performance data				
Rated Push Force	N	1 500	2 500	4 500
Rated Pull Force	N	1 500	2 500	4 500
Max pull / push Force ¹⁾	N	2 600	3 800	6 300
Holding force ²⁾	N			
Speed without load ³⁾	mm/s	31,0	23,0	13,0
Speed with the rated force ³⁾	mm/s	27,5	20,0	11,0
Electric data				
Nominal voltage	V DC	48	48	48
Nominal current @ rated load ³⁾	A	2,6	3,8	4,2
Rated current (clutch activation)	A	4,3	5,6	5,8
Duty cycle	%	20 (85/340 s)	20 (85/340 s)	20 (85/340 s)
Mechanical data				
Stroke	mm	50 ... 700	50 ... 700	50 ... 700
Backlash	mm	0,6	0,6	0,6
Weight for 200 mm stroke	kg	4,5	4,5	4,5
Colour	–	Black	Black	Black
Environment and standards				
Ambient temperature ⁴⁾	°C	–40 ... 85	–40 ... 85	–40 ... 85
Degree of protection	–	IP 69K/66M		
Standards / EMC	–	EN61000-6-2:2005, EN61000-6-4:2007/A1:2001		
Salt spray test	–	ISO 9227:2012, 250 hours		

¹⁾ Upper limit of the pull/push force limited by the clutch. The lower limit is just above the rated force. The limitation of the force will happen between these 2 limits

²⁾ Ultimate Static Load, refer to the "Static load" diagrams

³⁾ The data of speed and current on this list is defined at +20 °C

⁴⁾ Full performance from 0 °C to +40 °C

Designation	Unit	CAHB-20S / 12 V			CAHB-20S / 24 – 48 V		
Performance data							
Rated Push Force	N	1 500	2 500	4 500	1 500	2 500	4 500
Rated Pull Force	N	1 500	2 500	4 500	1 500	2 500	4 500
Max pull / push Force ¹⁾	N	2 600	3 800	6 300	2 600	3 800	6 300
Holding force ²⁾	N						
Speed without load ³⁾	mm/s	27,0	23,5	13,5	29,0	22,0	13,0
Speed with the rated force ³⁾	mm/s	24,5	17,5	10,5	25,5	19,0	11,0
Electric data							
Nominal voltage ⁴⁾	V DC	12	12	12	24 – 48	24 – 48	24 – 48
Nominal current ³⁾	A	12,5	15,0	17,0	5,0 – 2,5	6,5 – 3,3	8,0 – 4,0
Max. current, rated current ⁵⁾	A	31,3	31,3	31,3	20,7 – 10,4	20,7 – 10,4	20,7 – 10,4
Duty cycle ⁶⁾	%	10	10	10	20	20	20
Mechanical data							
Stroke	mm	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700
Backlash	mm	0,6	0,6	0,6	0,6	0,6	0,6
Max. manual override torque	Nm	1,5	1,2	1,0	1,5	1,2	1,0
Max. manual override speed	rpm	1 600	1 600	1 600	1 600	1 600	1 600
Weight for 200 mm stroke	kg	4,8	4,8	4,8	4,8	4,8	4,8
Colour	–	Black	Black	Black	Black	Black	Black
Environment and standards							
Ambient temperature ⁷⁾	°C	–40 ... 85	–40 ... 85	–40 ... 85	–40 ... 85	–40 ... 85	–40 ... 85
Degree of protection	–	IP69K/66M					
Standards / EMC	–	EN61000-6-2:2005, EN61000-6-4:2007/A1:2011					
Salt spray test	–	ISO 9227:2012 500 hours					

¹⁾ Upper limit of the pull/push force, limited by the E-clutch.

²⁾ Ultimate static load, refer to the "Static load" diagrams.

³⁾ The data of speed and current on this list is defined temperature at +20°C, PWM 100%

⁴⁾ 12 V version use 12 V DC motor, 24 – 48 V version use 24 V DC motor.

⁵⁾ Max. current is the upper limit of the input current to the actuator. In any circumstances, the current will not exceed to max. current.

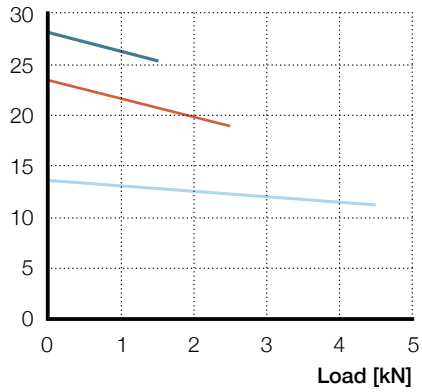
⁶⁾ Duty cycle is defined temperature at +20°C. 10% is 85 s on / 765 s off; 20% is 85 s on / 340 s off.

⁷⁾ Full performance from 0°C to +40°C

Performance diagrams

Speed-Load diagram

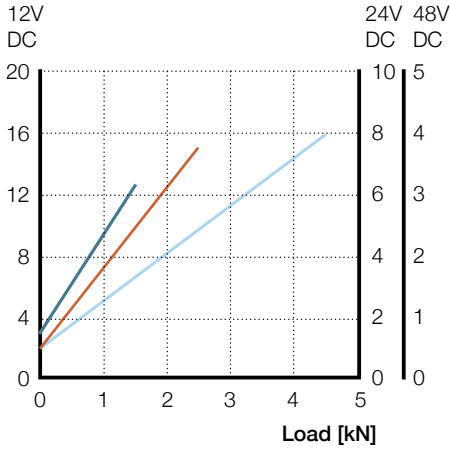
Speed [mm/s]



- CAHB-20-x1E
- CAHB-20-x2E
- CAHB-20-x3E

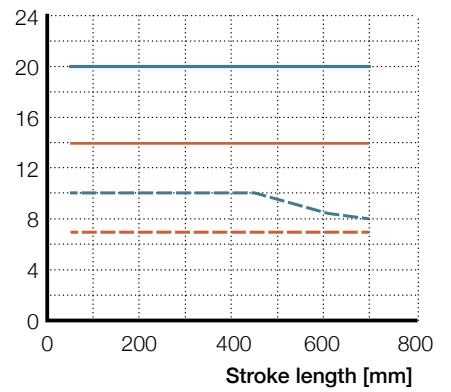
Current-Load diagram

Current consumption [A]



Static load-Stroke length

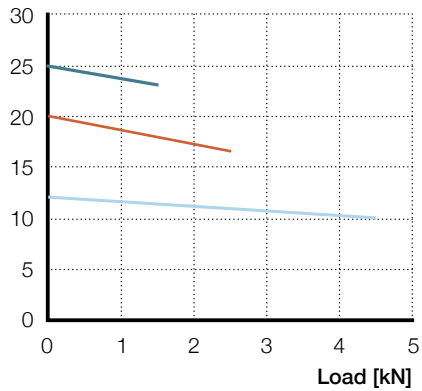
Load [kN]



- Ultimate CAHB-20-xxE (pull)
- Ultimate CAHB-20-xxE (push)
- Recommended CAHB-20-xxE (pull)
- Recommended CAHB-20-xxE (push)

Speed-Load diagram

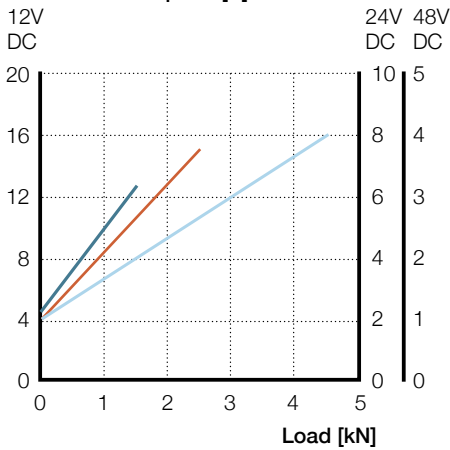
Speed [mm/s]



- CAHB-20-x1S
- CAHB-20-x2S
- CAHB-20-x3S

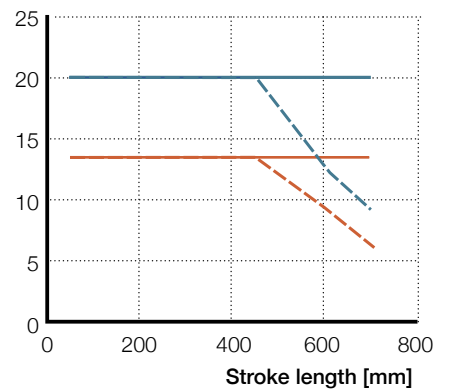
Current-Load diagram

Current consumption [A]



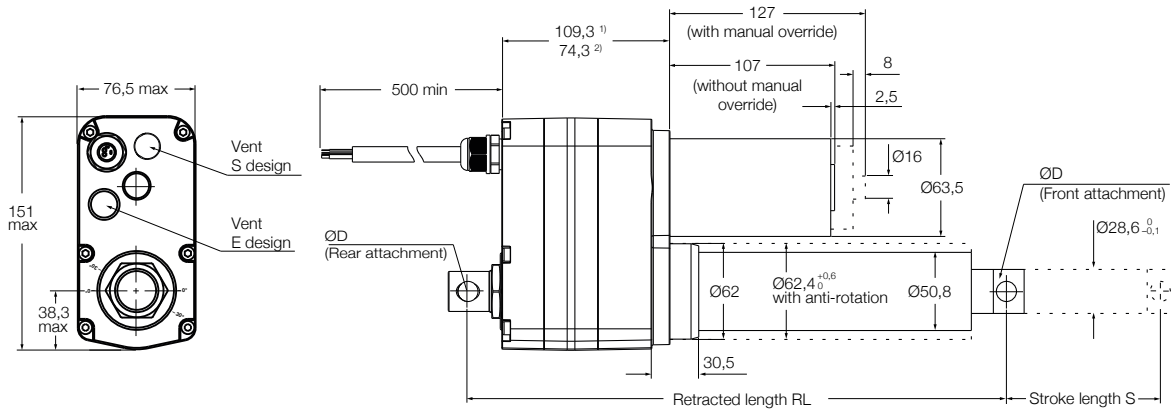
Static load-Stroke length

Load [kN]



- Ultimate CAHB-20-xxS (pull)
- Ultimate CAHB-20-xxS (push)
- Recommended CAHB-20-xxS (pull)
- Recommended CAHB-20-xxS (push)

Dimensional drawing CAHB-20E and -20S



¹⁾ 109,3 for E design with position output
²⁾ 74,3 for E design without position output and S design

	Stroke tolerance	Retracted length tolerance
E design	±2	±2
S design	±1	±1

Retracted length calculation (RL)

Stroke [mm]	Baseline : Rod with hole attachment		Fork head attachment	Anti-rotation tube with free spinning front attachment		Rod end Spherical plain bearing with anti rotation tube	
	50-305	306-700	50-700	50-305	306-700	50-305	306-700
CAHB-20E							
Retracted length (RL) no position output ¹⁾	160 + S	211 + S	+12	+5	-11	+47	+19
Retracted length (RL) with position output ²⁾	195 + S	246 + S	+12	+5	-11	+47	+19
CAHB-20S							
Retracted length (RL)	167+S	202+S	+12	+0	+0	+43	+33

Example for Ordering key, in red baseline configuration:

¹⁾ **160 + 50** (stroke) **+12** (Fork head attachment) **+5** (Anti-rotation tube with free spinning front attachment) = **227**

²⁾ **246 + 400** (stroke) **+19** (Rod end Spherical plain bearing with anti rotation tube)= **665**

CAHB-21E and -21S

Linear actuator



Benefits

- High productivity
- Reliability and safety
- Save development time
- Cost effectiveness
- Quick time to market (for Smart version)

Features:

- High holding force
- High speed
- Mechanical overload protection
- Corrosion protection and stainless steel tube
- Manual override option
- Enhanced ingress protection, virtually maintenance free

Smart version S features

- Integrated controller with complete motion control
- True absolute position contactless sensor
- Monitoring and on board diagnostic (force, voltage, temperature)
- I/O and CAN bus SAE J1939 communication

Technical data

Designation	Unit	CAHB-21E / 12 V			CAHB-21E / 24 V		
Performance data							
Rated Push Force	N	1 500	2 500	4 500	1 500	2 500	4 500
Rated Pull Force	N	1 500	2 500	4 500	1 500	2 500	4 500
Max pull / push Force ¹⁾	N	2 500	3 600	6 300	2 500	3 600	6 300
Holding force ²⁾	N						
Speed without load ³⁾	mm/s	49,5	37	24,0	52,5	38	22,5
Speed with the rated force ³⁾	mm/s	43	31,5	19,0	50	31,5	21,0
Electric data							
Nominal voltage	V DC	12	12	12	24	24	24
Nominal current @ rated load ³⁾	A	14,5	16	19	7	7,5	10,5
Rated current (clutch activation)	A	19,2	20,2	24,8	9,1	9,3	13,7
Duty cycle	%	10 (85/765 s)	10 (85/765 s)	10 (85/765 s)	20 (85/340 s)	20 (85/340 s)	20 (85/340 s)
Mechanical data							
Stroke	mm	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700
Backlash	mm	0,6	0,6	0,6	0,6	0,6	0,6
Weight for 200 mm stroke	kg	4,8	4,8	4,8	4,8	4,8	4,8
Colour	-	Black	Black	Black	Black	Black	Black
Environment and standards							
Ambient temperature ⁴⁾	°C	-40 ... 85	-40 ... 85	-40 ... 85	-40 ... 85	-40 ... 85	-40 ... 85
Degree of protection	-	IP 69K/66M					
Standards / EMC	-	EN61000-6-2:2005, EN61000-6-4:2007/A1:2011					
Salt spray test	-	ISO 9227:2012, 250 hours					

¹⁾ Upper limit of the pull/push force limited by the clutch. The lower limit is just above the rated force. The limitation of the force will happen between these 2 limits

²⁾ Ultimate Static Load, refer to the "Static load" diagrams

³⁾ The data of speed and current on this list is defined at +20 °C

⁴⁾ Full performance from 0 °C to +40 °C

Designation	Unit	CAHB-21E / 48 V		
Performance data				
Rated Push Force	N	1 500	2 500	4 500
Rated Pull Force	N	1 500	2 500	4 500
Max pull / push Force ¹⁾	N	2 500	3 600	6 300
Holding force ²⁾	N			
Speed without load ³⁾	mm/s	51,5	41,0	23,5
Speed with the rated force ³⁾	mm/s	46,0	33,5	19,0
Electric data				
Nominal voltage	V DC	48	48	48
Nominal current @ rated load ³⁾	A	4,0	4,5	5,0
Rated current (clutch activation)	A	5,6	6,1	6,4
Duty cycle	%	20 (85/340 s)	20 (85/340 s)	20 (85/340 s)
Mechanical data				
Stroke	mm	50 ... 700	50 ... 700	50 ... 700
Backlash	mm	0,6	0,6	0,6
Weight for 200 mm stroke	kg	4,8	4,8	4,8
Colour	–	Black	Black	Black
Environment and standards				
Ambient temperature ⁴⁾	°C	–40 ... 85	–40 ... 85	–40 ... 85
Degree of protection	–	IP 69K/66M		
Standards / EMC	–	EN61000-6-2:2005, EN61000-6-4:2007/A1:2011		
Salt spray test	–	ISO 9227:2012, 250 hours		

¹⁾ Upper limit of the pull/push force limited by the clutch. The lower limit is just above the rated force. The limitation of the force will happen between these 2 limits

²⁾ Ultimate Static Load, refer to the "Static load" diagrams

³⁾ The data of speed and current on this list is defined at +20 °C

⁴⁾ Full performance from 0 °C to +40 °C

Designation	Unit	CAHB-21S / 12 V			CAHB-21S / 24 – 48 V		
Performance data							
Rated Push Force	N	1 500	2 500	4 500	1 500	2 500	4 500
Rated Pull Force	N	1 500	2 500	4 500	1 500	2 500	4 500
Max pull / push Force ¹⁾	N	2 500	3 600	6 300	2 500	3 600	6 300
Holding force ²⁾	N						
Speed without load ³⁾	mm/s	49,5	37,0	24,0	52,5	38,0	22,5
Speed with the rated force ³⁾	mm/s	43,0	31,5	19,0	50,0	31,5	21,0
Electric data							
Nominal voltage ⁴⁾	V DC	12	12	12	24 – 48	24 – 48	24 – 48
Nominal current ³⁾	A	14,5	16,0	19,0	7,0 – 3,5	7,5 – 3,8	10,5 – 5,3
Max. current, rated current ⁵⁾	A	31,3	31,3	31,3	20,7 – 10,4	20,7 – 10,4	20,7 – 10,4
Duty cycle ⁶⁾	%	10	10	10	20	20	20
Mechanical data							
Stroke	mm	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700	50 ... 700
Backlash	mm	0,6	0,6	0,6	0,6	0,6	0,6
Max. manual override torque	Nm	1,0	1,0	1,0	1,0	1,0	1,0
Max. manual override speed	rpm	1 600	1 600	1 600	1 600	1 600	1 600
Weight for 200 mm stroke	kg	4,8	4,8	4,8	4,8	4,8	4,8
Colour	–	Black	Black	Black	Black	Black	Black
Environment and standards							
Ambient temperature ⁷⁾	°C	–40 ... 85	–40 ... 85	–40 ... 85	–40 ... 85	–40 ... 85	–40 ... 85
Degree of protection	–	IP69K/66M					
Standards / EMC	–	EN61000-6-2:2005, EN61000-6-4:2007/A1:2011					
Salt spray test	–	ISO 9227:2012 500 hours					

¹⁾ Upper limit of the pull/push force, limited by the E-clutch..

²⁾ Ultimate static load, refer to the "Static load" diagrams.

³⁾ The data of speed and current on this list is defined temperature at +20°C, PWM 100%

⁴⁾ 12 V version use 12 V DC motor, 24 – 48 V version use 24 V DC motor

⁵⁾ Max. current is the upper limit of the input current to the actuator. In any circumstances, the current will not exceed to max. current.

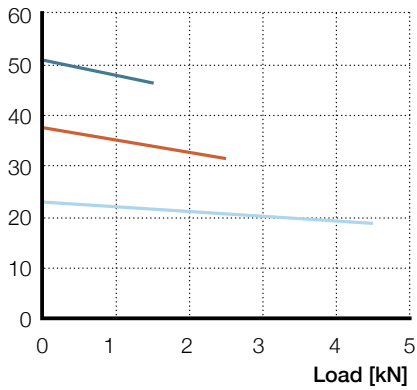
⁶⁾ Duty cycle is defined temperature at +20°C. 10% is 85 s on / 765 s off; 20% is 85 s on / 340 s off.

⁷⁾ Full performance from 0°C to +40°C

Performance diagrams

Speed-Load diagram

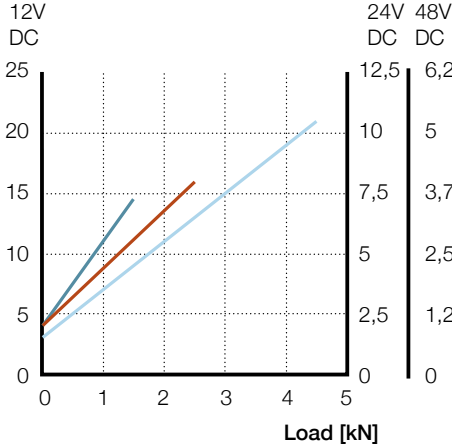
Speed [mm/s]



- CAHB-21-x1E
- CAHB-21-x2E
- CAHB-21-x3E

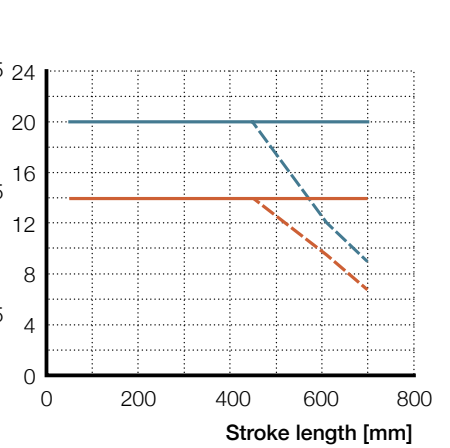
Current-Load diagram

Current consumption [A]



Static load-Stroke length

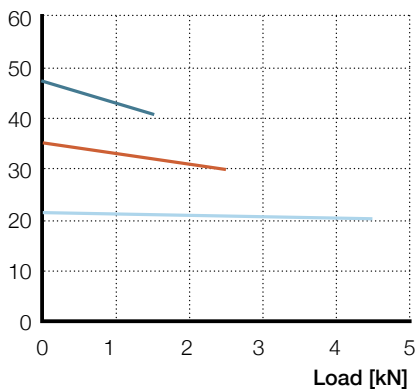
Load [kN]



- Ultimate CAHB-21-xxE (pull)
- - - Ultimate CAHB-21-xxE (push)
- Recommended CAHB 21-xxE (pull)
- - - Recommended CAHB 21-xxE (push)

Speed-Load diagram

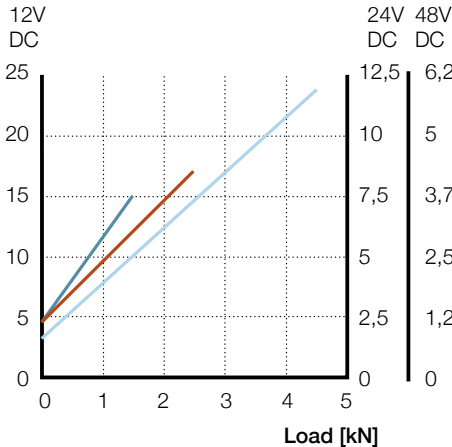
Speed [mm/s]



- CAHB-21-x1S
- CAHB-21-x2S
- CAHB-21-x3S

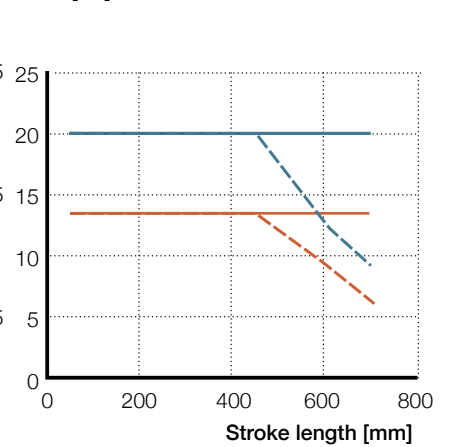
Current-Load diagram

Current consumption [A]



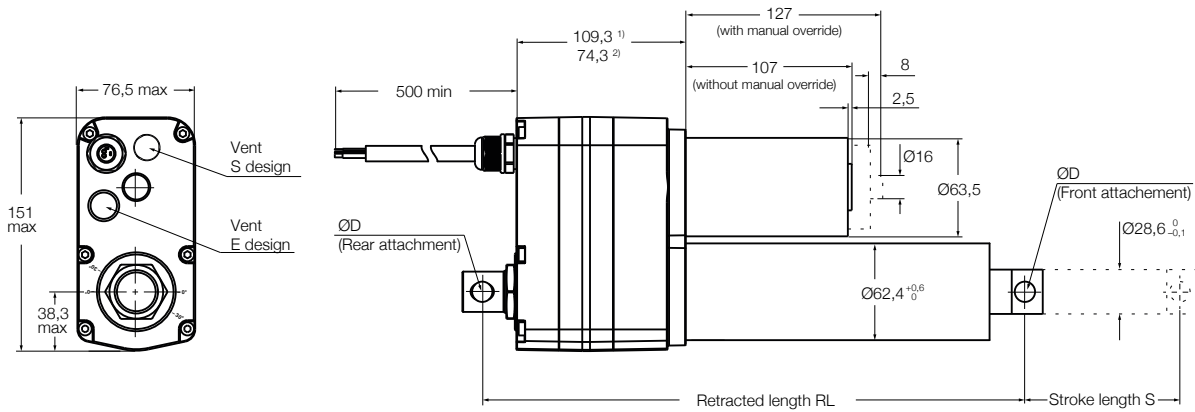
Static load-Stroke length

Load [kN]



- Ultimate CAHB-21-xxS (pull)
- - - Ultimate CAHB-21-xxS (push)
- Recommended CAHB-21-xxS (pull)
- - - Recommended CAHB-21-xxS (push)

Dimensional drawing CAHB-21E and -21S



¹⁾ 109,3 for E design with position output
²⁾ 74,3 for E design without position output and S design

	Stroke tolerance	Retracted length tolerance
E design with LS (S<=305)	±2	±2
E design without LS (S<=305)	(-2, -0.5)	±2
E design with LS (S>305)	±3	±2
E design without LS (S>305)	(-3, -1)	±2
S design	±1	±1

Retracted length calculation (RL)

S Stroke [mm]	Baseline : Rod with hole attachment		Fork head attachment	Anti-rotation tube with free spinning front attachment	Rod end Spherical plain bearing with anti rotation tube	
	50-305	306-700	50-700	50-700	50-305	306-700
CAHB-21E						
Retracted length (RL) no option ¹⁾	182+S	217+S	+12	+1	+43	+31
Retracted length (RL) with LS	191+S	226+S	+12	+1	+43	+31
Retracted length (RL) with position output	217+S	252+S	+12	+1	+43	+31
Retracted length (RL) with LS and position output ²⁾	226+S	261+S	+12	+1	+43	+31
CAHB-21S						
Retracted length (RL)	182+S	217+S	+12	+0	+43	+33

Example for Ordering key, in **red** baseline configuration:

¹⁾ **182 + 50** (stroke) + **12** (Fork head attachment) + **1** (Anti-rotation tube with free spinning front attachment) = **245**

²⁾ **261 + 400** (stroke) + **31** (Rod end Spherical plain bearing with anti rotation tube)= **692**

CAHB-22E and -22S

Linear actuator



Benefits

- High productivity
- Reliability and safety
- Save development time
- Cost effectiveness
- Quick time to market (for Smart version)

Features

- High force
- High speed
- High holding force
- Mechanical overload protection
- Corrosion protection and stainless steel tube
- Manual override option
- Enhanced ingress protection, virtuality maintenance free

Smart version S features

- Integrated controller with complete motion control
- True absolute position contactless sensor
- Monitoring and onboard diagnostic (force, voltage, temperature)
- I/O and CAN bus SAE J1939 communication

Technical data

Designation	Unit	CAHB-22E / 12 V				CAHB-22E / 24 V			
Performance data									
Rated Push Force	N	2 300	3 500	6 800	10 000	2 300	3 500	6 800	10 000
Rated Pull Force	N	2 300	3 500	6 800	10 000	2 300	3 500	6 800	10 000
Max pull / push Force ¹⁾	N	3 500	4 900	9 500	14 000	3 500	4 900	9 500	14 000
Holding force ²⁾	N								
Speed without load ³⁾	mm/s	55,0	45,0	22,0	13,0	53,0	45,0	22,0	13,0
Speed with the rated force ³⁾	mm/s	42,0	36,0	15,5	10,2	42,0	37,0	17,0	10,2
Electric data									
Nominal voltage	V DC	12	12	12	12	24	24	24	24
Nominal current @ rated load ³⁾	A	18	19,5	19,5	19	8	9,5	9,5	8,5
Rated current (clutch activation)	A	24,3	25,5	25,5	25	10,6	12,3	12,3	10,9
Duty cycle	%	10 (85/765 s)	10 (85/765 s)	10 (85/765 s)	10 (85/765 s)	20 (85/340 s)	20 (85/340 s)	20 (85/340 s)	20 (85/340 s)
Mechanical data									
Stroke	mm	50 ... 700	50 ... 700	50 ... 610	50 ... 450	50 ... 700	50 ... 700	50 ... 610	50 ... 450
Backlash	mm	1,0	1,0	0,6	0,6	1,0	1,0	0,6	0,6
Weight for 200 mm stroke	kg	4,8	4,8	4,8	4,8	4,8	4,8	4,8	4,8
Colour	-	Black	Black	Black	Black	Black	Black	Black	Black
Environment and standards									
Ambient temperature ⁴⁾	°C	-40 ... 85	-40 ... 85	-40 ... 85	-40 ... 85	-40 ... 85	-40 ... 85	-40 ... 85	-40 ... 85
Degree of protection	-	IP 69K/66M							
Standards / EMC	-	EN61000-6-2:2005, EN61000-6-4:2007/A1:2011							
Salt spray test	-	ISO 9227:2012, 250 hours							

¹⁾ Upper limit of the pull/push force limited by the clutch. The lower limit is just above the rated force. The limitation of the force will happen between these 2 limits

²⁾ Ultimate Static Load, refer to the "Static load" diagrams

³⁾ The data of speed and current on this list is defined at +20 °C

⁴⁾ Full performance from 0 °C to +40 °C

Designation	Unit	CAHB-22E / 48 V			
Performance data					
Rated Push Force	N	2 300	3 500	6 800	10 000
Rated Pull Force	N	2 300	3 500	6 800	10 000
Max pull / push Force ¹⁾	N	3 500	4 900	9 500	14 000
Holding force ²⁾	N				
Speed without load ³⁾	mm/s	57,0	45,0	22,0	13,0
Speed with the rated force ³⁾	mm/s	50,0	37,0	18,5	10,2
Electric data					
Nominal voltage	V DC	48	48	48	48
Nominal current @ rated load ³⁾	A	4,5	5	5	4,3
Rated current (clutch activation)	A	6,5	7	7	5,5
Duty cycle	%	20 (85/340 s)	20 (85/340 s)	20 (85/340 s)	20 (85/340 s)
Mechanical data					
Stroke	mm	50 ... 700	50 ... 700	50 ... 610	50 ... 450
Backlash	mm	1,0	1,0	0,6	0,6
Weight for 200 mm stroke	kg	4,8	4,8	4,8	4,8
Colour	–	Black	Black	Black	Black
Environment and standards					
Ambient temperature ⁴⁾	°C	–40 ... 85	–40 ... 85	–40 ... 85	–40 ... 85
Degree of protection	–	IP 69K/66M			
Standards / EMC	–	EN61000-6-2:2005, EN61000-6-4:2007/A1:2011			
Salt spray test	–	ISO 9227:2012, 250 hours			

¹⁾ Upper limit of the pull/push force limited by the clutch. The lower limit is just above the rated force. The limitation of the force will happen between these 2 limits

²⁾ Ultimate Static Load, refer to the "Static load" diagrams

³⁾ The data of speed and current on this list is defined at +20 °C

⁴⁾ Full performance from 0 °C to +40 °C

Designation	Unit	CAHB-22S / 12 V				CAHB-22S / 24 – 48 V			
Performance data									
Rated Push Force	N	2 300	3 500	6 800	10 000	2 300	3 500	6 800	10 000
Rated Pull Force	N	2 300	3 500	6 800	10 000	2 300	3 500	6 800	10 000
Max pull / push Force ¹⁾	N	3 500	4 900	9 500	14 000	3 500	4 900	9 500	14 000
Holding force ²⁾	N								
Speed without load ³⁾	mm/s	55,0	45,0	22,0	13,0	53,0	45,0	22,0	13,0
Speed with the rated force ³⁾	mm/s	42,0	36,0	15,5	10,2	42,0	37,0	17,0	10,2
Electric data									
Nominal voltage ⁴⁾	V DC	12	12	12	12	24 – 48	24 – 48	24 – 48	24 – 48
Nominal current ³⁾	A	18,0	19,5	19,5	19,0	8,0 – 4,0	9,5 – 4,8	9,5 – 4,8	8,5 – 4,3
Max. current, rated current ⁵⁾	A	31,3	31,3	31,3	31,3	20,7 – 10,4	20,7 – 10,4	20,7 – 10,4	20,7 – 10,4
Duty cycle ⁶⁾	%	10	10	10	10	20	20	20	20
Mechanical data									
Stroke	mm	50 ... 700	50 ... 700	50 ... 610	50 ... 450	50 ... 700	50 ... 700	50 ... 610	50 ... 450
Backlash	mm	1,0	1,0	0,6	0,6	1,0	1,0	0,6	0,6
Max. manual override torque	Nm	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Max. manual override speed	rpm	1 600	1 600	1 600	1 600	1 600	1 600	1 600	1 600
Weight for 200 mm stroke	kg	4,8	4,8	4,8	4,8	4,8	4,8	4,8	4,8
Colour	–	Black	Black	Black	Black	Black	Black	Black	Black
Environment and standards									
Ambient temperature ⁷⁾	°C	–40 ... 85	–40 ... 85	–40 ... 85		–40 ... 85	–40 ... 85	–40 ... 85	
Degree of protection	–	IP69K/66M							
Standards / EMC	–	EN61000-6-2:2005, EN61000-6-4:2007/A1:2011							
Salt spray test	–	ISO 9227:2012 500 hours							

¹⁾ Upper limit of the pull/push force, limited by the E-clutch.

²⁾ Ultimate static load, refer to the "Static load" diagrams.

³⁾ The data of speed and current on this list is defined temperature at +20°C, PWM 100%

⁴⁾ 12 V version use 12 V DC motor, 24 – 48 V version use 24 V DC motor.

⁵⁾ Max. current is the upper limit of the input current to the actuator. In any circumstances, the current will not exceed to max. current.

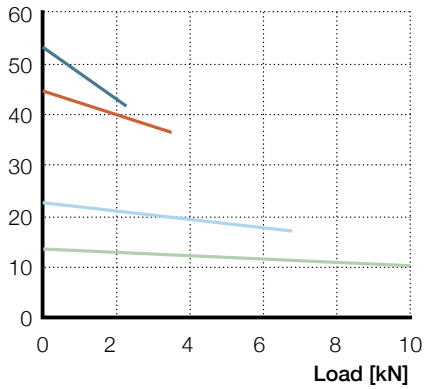
⁶⁾ Duty cycle is defined temperature at +20°C. 10% is 85 s on / 765 s off; 20% is 85 s on / 340 s off.

⁷⁾ Full performance from 0°C to +40°C

Performance diagrams

Speed-Load diagram

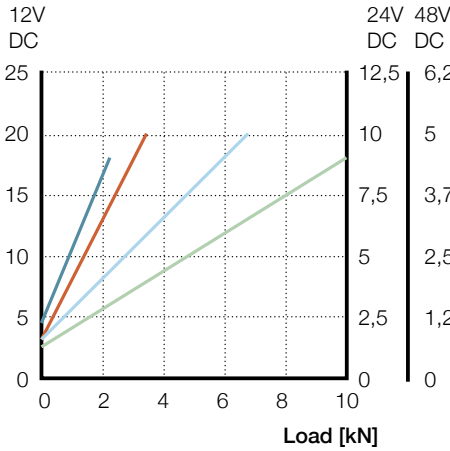
Speed [mm/s]



- CAHB-22-x1E
- CAHB-22-x2E
- CAHB-22-x3E
- CAHB-22-x4E

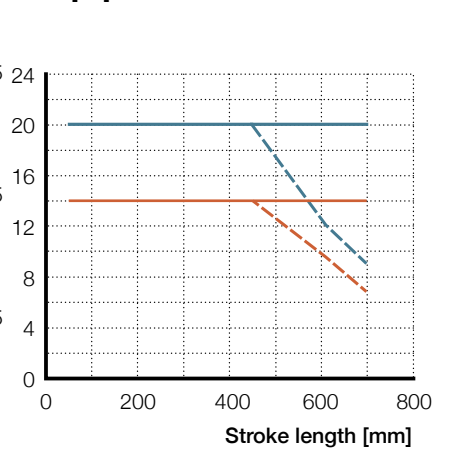
Current-Load diagram

Current consumption [A]



Static load-Stroke length

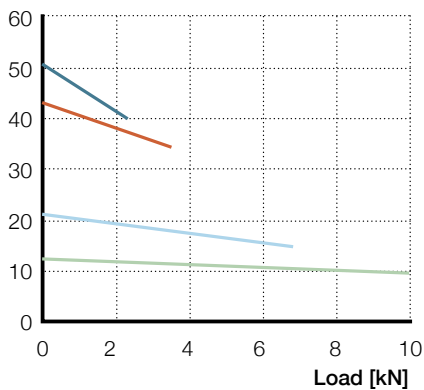
Load [kN]



- Ultimate CAHB-22-xxE (pull)
- - Ultimate CAHB-22-xxE (push)
- Recommended CAHB 22-xxE (pull)
- - Recommended CAHB 22-xxE (push)

Speed-Load diagram

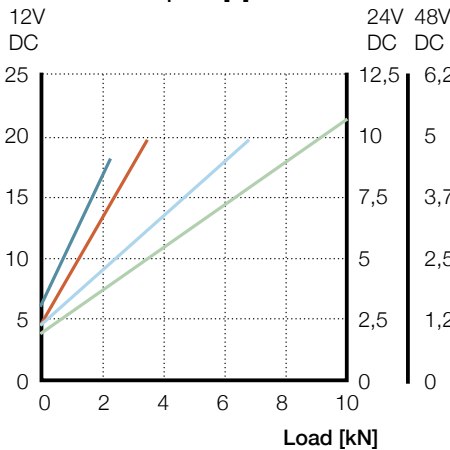
Speed [mm/s]



- CAHB-22-x1S
- CAHB-22-x2S
- CAHB-22-x3S
- CAHB-22-x4S

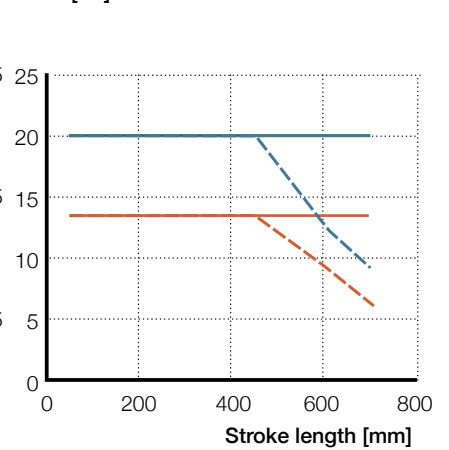
Current-Load diagram

Current consumption [A]



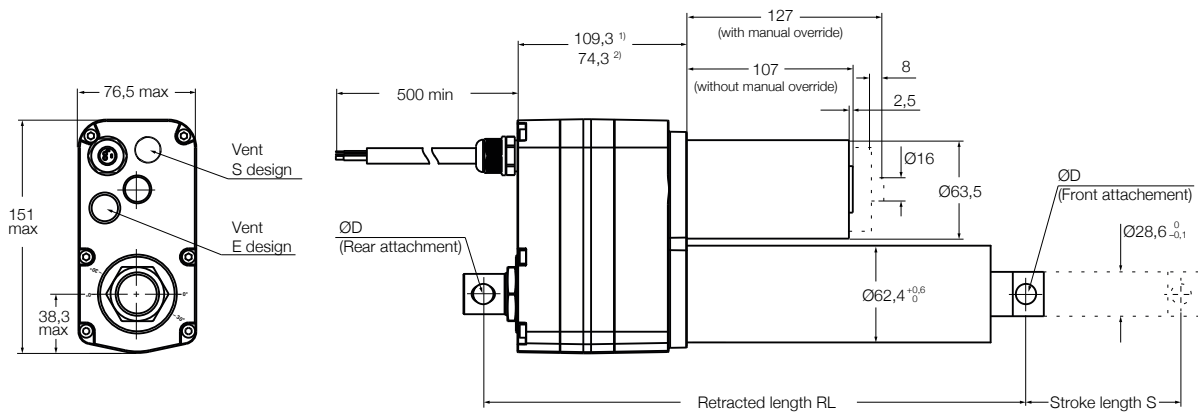
Static load-Stroke length

Load [kN]



- Ultimate CAHB-22-xxS (pull)
- - Ultimate CAHB-22-xxS (push)
- Recommended CAHB-22-xxS (pull)
- - Recommended CAHB-22-xxS (push)

Dimensional drawing CAHB-22E and -22S



¹⁾ 109,3 for E design with position output

²⁾ 74,3 for E design without position output and S design

	Stroke tolerance	Retracted length tolerance
E design with LS (S<=305)	±2	(0, +4)
E design without LS, 1E/2E (S<=305)	(-3, -1.5)	(0, +4)
E design without LS, 3E/4E (S<=305)	(-2, -0.5)	(0, +4)
E design with LS (S>305)	±3	(0, +4)
E design without LS, 1E/2E (S>305)	(-4, -2)	(0, +4)
E design without LS, 3E/4E (S>305)	(-3, -1)	(0, +4)
S design	±1	±1

Retracted length calculation

Stroke [mm]	Baseline : Rod with hole attachment		Fork head attachment	Anti-rotation tube with free spinning front attachment	Rod end Spherical plain bearing with anti rotation tube	
	50-305	306-700	50-700	50-700	50-305	306-700
CAHB-22E						
Retracted length (RL) no option ¹⁾	194+S	229+S	+12	+7	+49	+37
Retracted length (RL) with LS	200+S	235+S	+12	+7	+49	+37
Retracted length (RL) with position output	229+S	264+S	+12	+7	+49	+37
Retracted length (RL) with LS and position output ²⁾	235+S	270+S	+12	+7	+49	+37
CAHB-22S						
Retracted length (RL)	200+S	235+S	+12	+0	+43	+33

Example for Ordering key, in **red** baseline configuration:

¹⁾ **194 + 50** (stroke) + **12** (Fork head attachment) + **7** (Anti-rotation tube with free spinning front attachment) = **263**

²⁾ **270 + 400** (stroke) + **37** (Rod end Spherical plain bearing with anti rotation tube) = **707**

Electrical specifications (valid for CAHB-20E, -21E, -22E)

Power input voltage tolerance

Power input	Tolerance
12 V DC version	10-16 V DC
24 V DC version	21-26 V DC
48 V DC version	40-55 V DC

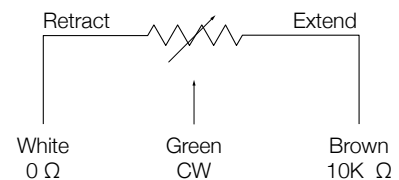
Wire connection without position output

Wire no.	AWG	Colour	Application
1	14	Red	Motor power(+) → Extension, (-) → Retraction
2	14	Black	Motor power(-) → Extension, (+) → Retraction

Wire connection with position output

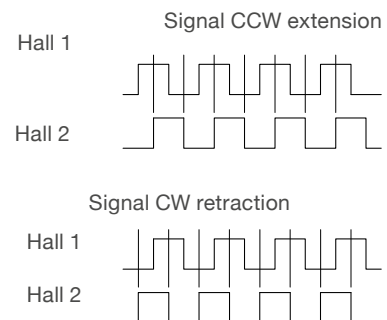
Wire connection with potentiometer			
Wire no.	AWG	Colour	Application
1	22	Green	See picture description
2	22	White	See picture description
3	22	Brown	See picture description
4	14	Red	Motor power(+) → Extension, (-) → Retraction
5	14	Black	Motor power(-) → Extension, (+) → Retraction

Potentiometer



Wire connection with encoder			
Wire no.	AWG	Colour	Application
1	26	Green	Sensor signal 1 Encoder
2	26	Yellow	Sensor signal 2 Encoder
3	26	Black	Sensor power GND Encoder
4	26	Red	Sensor power 5 V Encoder
5	14	Red	Motor power(+) → Extension, (-) → Retraction
6	14	Black	Motor power(-) → Extension, (+) → Retraction

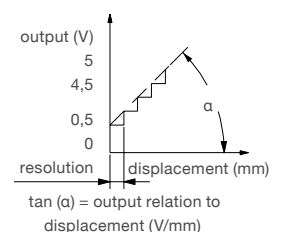
Encoder



Wire connection with absolute analog output			
Wire no.	AWG	Colour	Application
1	22	Green	Output signal
2	22	White	Sensor power GND
3	22	Brown	Sensor power +10~55 VDC
4	14	Red	Motor power(+) → Extension, (-) → Retraction
5	14	Black	Motor power(-) → Extension, (+) → Retraction

Absolut analog position output

Input voltage: 10~55 V DC
 Current consumption: 15 mA max.
 Output analog signal (voltage): 0~5 V DC
 Max current output: 5 mA
 Absolute analog output set up:
 retracted 0,5±0,15 V
 extended 4,5 V to the maximum



Output relation to displacement and resolution

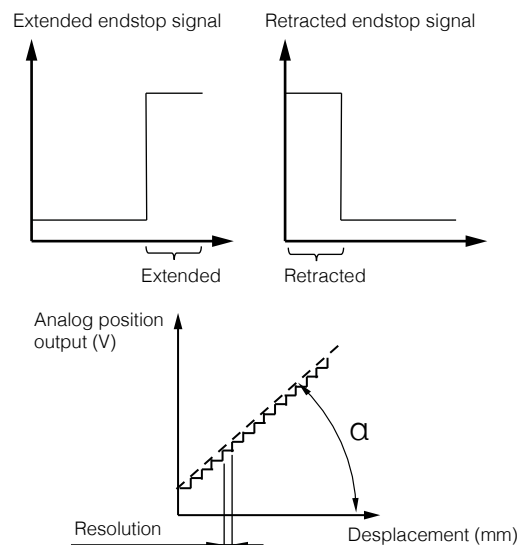
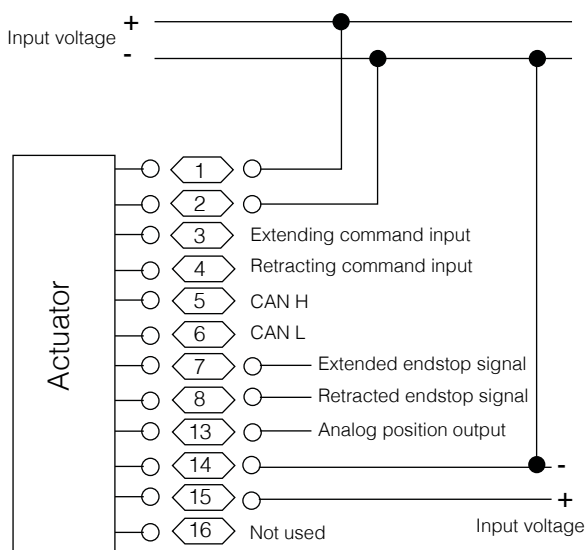
Actuator type	Hall sensor [pulses/mm]	Potentiometer [Ω /mm]	Absolute analogue position output [V/mm]	Resolution of the absolute analog position output [mm]
CAHB-20...E	2,76	59,06 if S=050-125	0,0295 if S=050-125	0,0413 if S=050-125
		29,53 if S=126-250	0,0148 if S=126-250	0,0827 if S=126-250
		9,84 if S=251-700	0,0049 if S=251-700	0,2480 if S=251-700
CAHB-21...E	1,56	33,33 if S=050-222	0,0167 if S=050-222	0,0732 if S=050-222
		16,67 if S=223-444	0,0083 if S=223-444	0,1465 if S=223-444
		5,56 if S=445-700	0,0028 if S=445-700	0,4395 if S=445-700
CAHB-22...1E	1,4	30 if S=050-254	0,0150 if S=050-254	0,0814 if S=050-254
CAHB-22...2E	1,4	15 if S=255-508	0,0075 if S=255-508	0,1628 if S=255-508
		5 if S=509-700	0,0025 if S=509-700	0,4883 if S=509-700
CAHB-22...3E	2,8	60 if S=050-127	0,030 if S=050-127	0,0407 if S=050-127
CAHB-22...4E	2,8	30 if S=128-254	0,015 if S=128-254	0,0814 if S=128-254
		10 if S=255-700	0,005 if S=255-700	0,2441 if S=255-700

Electrical specifications (valid for CAHB-20S, -21S, -22S)

Analog I/O + CAN bus version (code A and C)

Ordering key pages 37, 39, 41 (Cable and I/O Option 1)

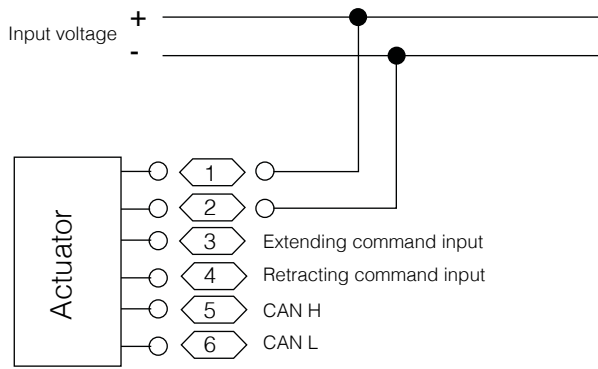
Wire no.	AWG	Colour	Application
1	14	Red	Power (+) VCC Connect to positive 9 to 16 V DC (12 V version) 18 to 55 V DC (24 – 48 V version)
2	14	Black	Power (-) GND Connect to negative
3	26	Red	Extending command 5 to 55 V DC Max. current consumption: 1mA Delay before movement and stop: 50 ms
4	26	Black	Retracting command 5 to 55 V DC Max. current consumption: 1mA Delay before movement and stop: 50 ms
5	26	Yellow	CAN H (CAN bus J1939)
6	26	Blue	CAN L (CAN bus J1939)
7	26	Grey	End stop signal (Digital output, open collector) Normal (L): High-Z Extended (H): Power supply voltage Max. current consumption: 50 mA
8	26	Orange	End stop signal (Digital output, open collector) Normal (L): High-Z Retracted (H): Power supply voltage Max. current consumption: 50 mA
13	26	Green	Analog position signal output Retraction: 0,5±0,02 V Extension: 5 V or 10 V (default) Max. current output: 15 mA Ripple max: 200 mV Transaction delay: 20 ms Linear feedback 0,5% tan(α)=4,5 / stroke (V/mm), code A or 9,5 / stroke (V/mm), code C Resolution: 10 V / 1000 / tan(α)
14	26	White	Analog position sensor power (-) GND Common ground with wire No. 2
15	26	Brown	Analog position sensor power (+) 8 to 27 V DC (0 ~ 5 V output) 13 to 27 V DC (0 ~ 10 V output) Max. current consumption: 15 mA
16	26	Purple	Reserved, not to be connected



CAN bus + input (Code B)

Ordering key pages 37, 39, 41 (Cable and I/O Option 1)

Wire no.	AWG	Colour	Application
1	14	Red	Power (+) VCC Connect to positive 9 to 16 V DC (12 V version) 18 to 55 V DC (24 – 48 V version)
2	14	Black	Power (-) GND Connect to negative
3	26	Red	Extending command 5 to 55 V DC Max. current consumption: 1mA Delay before movement and stop: 50 ms
4	26	Black	Retracting command 5 to 55 V DC Max. current consumption: 1mA Delay before movement and stop: 50 ms
5	26	Yellow	CAN H (CAN bus J1939)
6	26	Blue	CAN L (CAN bus J1939)

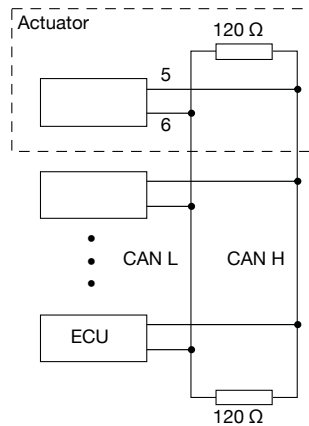
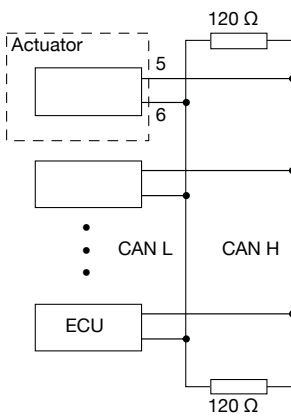


Termination resistance option

Ordering key pages 37, 39, 41 (Bus type Option 2)

Without termination resistor (code C)

With termination resistor (code T)



NOTE.

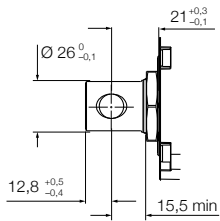
The CAN bus system of the vehicle request termination resistor.
The CAHB 2xS could be equipped one.

Attachment option (valid for CAHB-20, -21, -22 E and S)

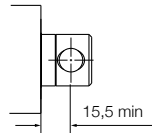
Attachment type

Rod end with hole (refer to ordering key Attachment diameter A - E)

Rear attachment

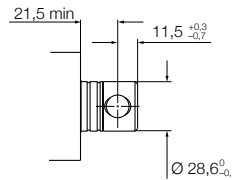


Front attachment without anti rotation tube

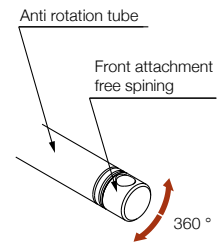


Attachment orientation: "A" to "F"

Front attachment with anti rotation tube



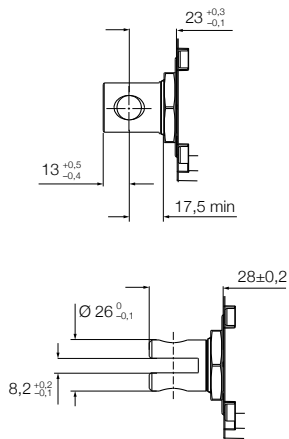
Attachment orientation: "G" to "L"



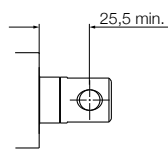
Hole version	A	B	C	D	E
Hole diameter Ø [mm]	13,1	12,8	12,5	14	12,2
Tolerance	H11	H11	H11	H11	H11

Fork head with hole (refer to ordering key Attachment diameter F - G)

Rear attachment

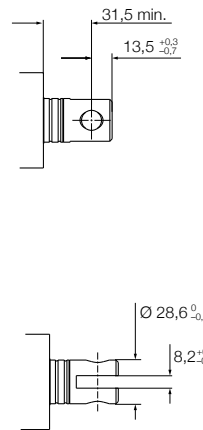


Front attachment without anti rotation tube

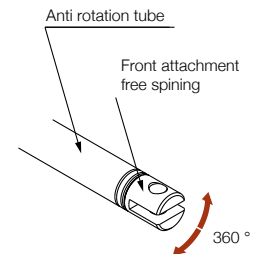


Attachment orientation: "A" to "F"

Front attachment with anti rotation tube



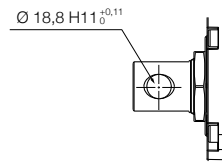
Attachment orientation: "G" to "L"



Hole version	F	G
Hole diameter Ø [mm]	12,2	12,8
Tolerance	H11	H11

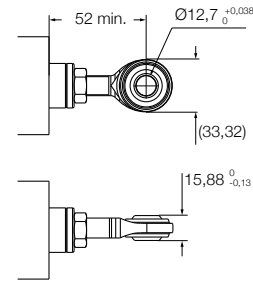
Rod end Spherical plain bearing (refer to ordering key Attachment diameter I)

Rear attachment



"I" and "B" have the same rear attachment

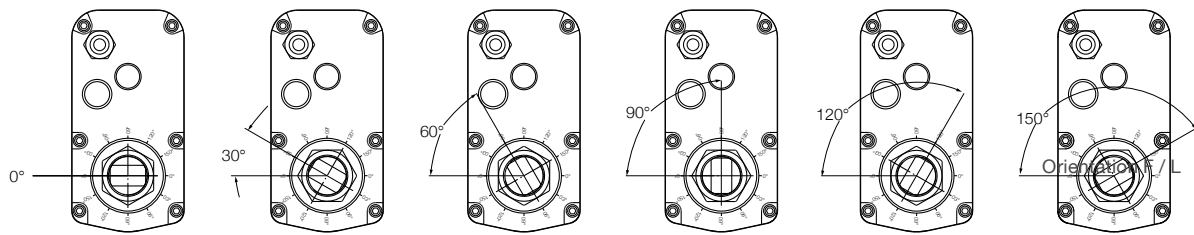
Front attachment with anti rotation tube



Attachment orientation: "G" to "L"

Hole version	I (Rear Attachment)	I (front Attachment)
Hole diameter \varnothing [mm]	12,8	12,7

Attachment orientation (refer to ordering key Attachment orientation)



Orientation A / G

Orientation B / H

Orientation C / I

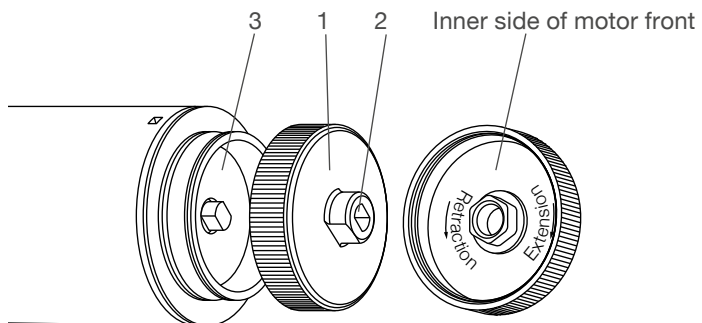
Orientation D / J

Orientation E / K

Attachment orientation	Description
A	0° without anti rotation tube
B	30° without anti rotation tube
C	60° without anti rotation tube
D	90° without anti rotation tube
E	120° without anti rotation tube
F	150° without anti rotation tube
G	0° : with anti rotation tube and free spinning front attachment
H	30° with anti rotation tube and free spinning front attachment
I	60° with anti rotation tube and free spinning front attachment
J	90° with anti rotation tube and free spinning front attachment
K	120° with anti rotation tube and free spinning front attachment
L	150° with anti rotation tube and free spinning front attachment

Manual override

Release the motor cover (1). Use the slot (2) to rotate the motor shaft (3) in the proper direction



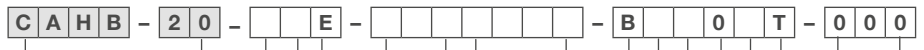
List of function CAHB-20S, -21S, -22S

		CAHB-2xS only	I/O Analog + CAN bus Ordering key Option 1 code A or C	CAN bus + Input Ordering key Option 1 code B
Interface	Voltage version	12 VDC	●	●
		24-48 VDC	●	●
	Cable	Power wires	2	2
		Low current wires	10	4
BUS	CAN bus SAE J1939, 250 or 500 kbps	250 kbps or 500 kbps	250 kbps or 500 kbps	
Functions	Motion	soft start / soft stop	●	●
	E clutch	Force limitation (calibration, temperature compensation)	●	●
		Adjustable retracted and extended length by I/O and CAN bus	●	●
	Parallel motion	Drive actuator with the same length , up to	8 pcs	8 pcs
Parallel motion	Drive actuator with the same length , up to	8 pcs	8 pcs	
Command	Command I/O	Motion Extend / Retract	●	●
		Motion Extend / Retract	●	●
	Command CAN bus J1939	Run to an actuator length in 1/10 mm	●	●
		Speed, command set in %	●	●
		Set max force in N	●	●
Real-time feedback	I/O End stop signal	End stop extended	●	–
		end stop retracted	●	–
	position feedback by I/O	0-10V or 0-5V absolute analog	●	–
		CAN bus J1939 feedback	Actuator length in 1/10 mm	●
	Force in N		●	●
	Speed in %		●	●
	Flag of Endstop retracted		●	●
	Flag of endstop extended		●	●
	Flag of run in retraction		●	●
	Flag of run in extension		●	●
Diagnostic by CAN bus	Application monitoring	Voltage upper limit reached	●	●
		Temperature upper limit reached	●	●
		Force upper limit reached	●	●
		Actuator blocking	●	●
	Onboard diagnostic / Integrity monitoring	Error code	●	●
Regulation and test	Compliance	CE marking, Declaration of incorporation for partly completed machine : electricity supply, RoHS, EMC + Reach	●	●
	Functional Safety	Safe Torque Off (STO) SIL 2	Option on request	Option on request
		ISO 25119 evaluation	●	●
	Environmental test (see pages 50-55)	Mechanic	Extended	Extended
		Climatic	Extended	Extended
		Electric	Extended	Extended
		Load Dump protection, chassis connected to negative terminal	●	●
	Load Dump protection, chassis not connected	●	●	
Reinforced load dump protection ¹⁾ , chassis connected to negative terminal	Option for 12 VDC	Option for 12 VDC		
Reinforced load dump protection ¹⁾ , chassis not connected	Option for 12 VDC	Option for 12 VDC		

● Available

¹⁾ For vehicle without centralized load dump protection

Ordering key



Type

Voltage

- A 12 V DC
- B 24 V DC
- D 48 V DC
- E 12 V DC with manual override
- F 24 V DC with manual override
- H 48 V DC with manual override

Load

- 1 1 500 N
- 2 2 500 N
- 3 4 500 N

Design

E

Stroke

- 50 50 mm
- 100 100 mm
- 150 150 mm
- 200 200 mm
- 250 250 mm
- 300 300 mm
- 350 350 mm
- 400 400 mm
- 450 450 mm
- 500 500 mm
- 600 600 mm
- 700 700 mm

Retracted length

Please refer to the table "Retracted length calculation" on page 19

Ingress protection

B Standard: IP69K/IP66M

Attachment diameter (Front and rear)

- A Rod end with hole Ø 13,1 mm
- B Rod end with hole Ø 12,8 mm
- C Rod end with hole Ø 12,5 mm
- D Rod end with hole Ø 14 mm
- E Rod end with hole Ø 12,2 mm
- F Fork head with hole Ø 12,2 mm and slot 8,2 mm
- G Fork head with hole Ø 12,8 mm and slot 8,2 mm
- I Rod end Spherical plain bearing Ø 12,7 mm, rear end with hole Ø 12,8 mm (request anti rotation tube option)
- X Customized

Attachment orientation (Front and rear)

- A 0° without anti rotation tube
- B 30° without anti rotation tube
- C 60° without anti rotation tube
- D 90° without anti rotation tube
- E 120° without anti rotation tube
- F 150° without anti rotation tube
- G 0° : with anti rotation tube and free spinning front attachment
- H 30° with anti rotation tube and free spinning front attachment
- I 60° with anti rotation tube and free spinning front attachment
- J 90° with anti rotation tube and free spinning front attachment
- K 120° with anti rotation tube and free spinning front attachment
- L 150° with anti rotation tube and free spinning front attachment
- X Customized

Option 1: Limit switch

0 Not available

Option 2: Position output

- 0 None
- A Absolute analog output
- P Potentiometer
- E Encoder

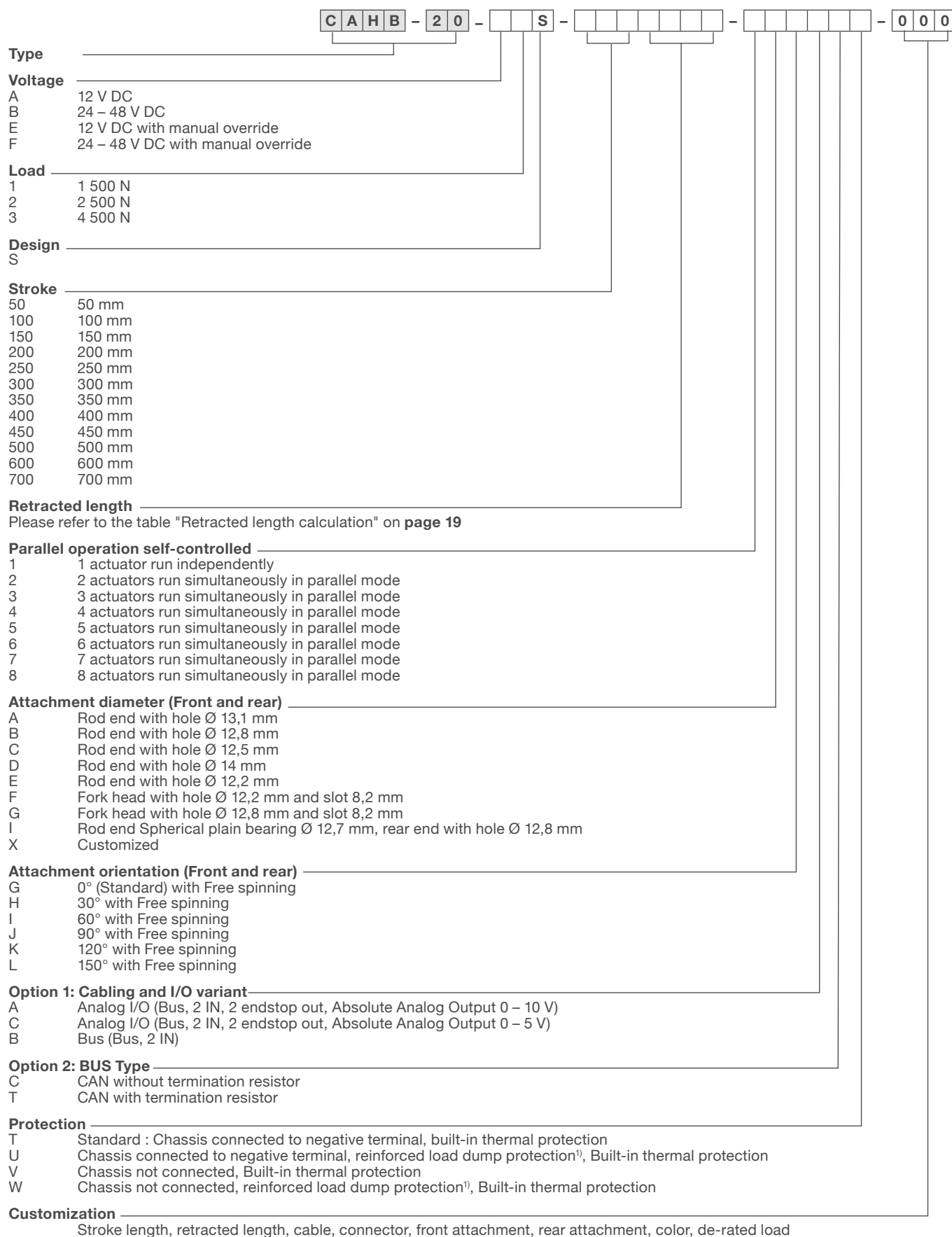
Thermal protection

T Standard: Built-in thermal switch

Customization

Stroke length, retracted length, cable, connector, front attachment, rear attachment, color, de-rated load

Standard actuators are IP69K / IP66M and equipped with a vent, built-in thermal protection, protection Clutch and EMC filter.



¹⁾ For vehicle without centralized load dump protection , option valid only for 12V.



Type

Voltage

- A 12 V DC
- B 24 V DC
- D 48 V DC
- E 12 V DC with manual override
- F 24 V DC with manual override
- H 48 V DC with manual override

Load

- 1 1 500 N
- 2 2 500 N
- 3 4 500 N

Design

E

Stroke

- 50 50 mm
- 100 100 mm
- 150 150 mm
- 200 200 mm
- 250 250 mm
- 300 300 mm
- 350 350 mm
- 400 400 mm
- 450 450 mm
- 500 500 mm
- 600 600 mm
- 700 700 mm

Retracted length

Please refer to the table "Retracted length calculation" on page 23

Ingress protection

B Standard: IP69K/IP66M

Attachment diameter (Front and rear)

- A Rod end with hole Ø 13,1 mm
- B Rod end with hole Ø 12,8 mm
- C Rod end with hole Ø 12,5 mm
- D Rod end with hole Ø 14 mm
- E Rod end with hole Ø 12,2 mm
- F Fork head with hole Ø 12,2 mm and slot 8,2 mm
- G Fork head with hole Ø 12,8 mm and slot 8,2 mm
- I Rod end Spherical plain bearing Ø 12,7 mm, rear end with hole Ø 12,8 mm (request anti rotation tube option)
- X Customized

Attachment orientation (Front and rear)

- A 0° without anti rotation tube
- B 30° without anti rotation tube
- C 60° without anti rotation tube
- D 90° without anti rotation tube
- E 120° without anti rotation tube
- F 150° without anti rotation tube
- G 0° : with anti rotation tube and free spinning front attachment
- H 30° with anti rotation tube and free spinning front attachment
- I 60° with anti rotation tube and free spinning front attachment
- J 90° with anti rotation tube and free spinning front attachment
- K 120° with anti rotation tube and free spinning front attachment
- L 150° with anti rotation tube and free spinning front attachment
- X Customized

Option 1: Limit switch

- 0 None (mandatory for 1 500 N, 2 500 N version and the 48 VDC version)
- L Limit switch (valid only for load version 4 500 in 12 or 24 V DC)

Option 2: Position output

- 0 None
- A Absolute analog output
- P Potentiometer
- E Encoder

Thermal protection

T Standard: Built-in thermal switch

Customization

Stroke length, retracted length, cable, connector, front attachment, rear attachment, color, de-rated load

Standard actuators are IP69K / IP66M and equipped with a vent, built-in thermal protection, protection Clutch and EMC filter.



Type

Voltage

- A 12 V DC
- B 24 V DC
- D 48 V DC
- E 12 V DC with manual override
- F 24 V DC with manual override
- H 48 V DC with manual override

Load

- 1 2 300 N
- 2 3 500 N
- 3 6 800 N
- 4 10 000 N

Design

E

Stroke

- 50 50 mm
- 100 100 mm
- 150 150 mm
- 200 200 mm
- 250 250 mm
- 300 300 mm
- 350 350 mm
- 400 400 mm
- 450 450 mm
- 500 500 mm
- 600 600 mm
- 700 700 mm

Retracted length¹⁾

please refer to the table "Retracted length calculation" on page 27

Ingress protection

B Standard: IP69K/IP66M

Attachment diameter (Front and rear)

- A Rod end with hole Ø 13,1 mm
- B Rod end with hole Ø 12,8 mm
- C Rod end with hole Ø 12,5 mm
- D Rod end with hole Ø 14 mm
- E Rod end with hole Ø 12,2 mm
- F Fork head with hole Ø 12,2 mm and slot 8,2 mm
- G Fork head with hole Ø 12,8 mm and slot 8,2 mm
- I Rod end Spherical plain bearing Ø 12,7 mm, rear end with hole Ø 12,8 mm (request anti rotation tube option)
- X Customized

Attachment orientation (Front and rear)

- A 0° without anti rotation tube
- B 30° without anti rotation tube
- C 60° without anti rotation tube
- D 90° without anti rotation tube
- E 120° without anti rotation tube
- F 150° without anti rotation tube
- G 0° : with anti rotation tube and free spinning front attachment
- H 30° with anti rotation tube and free spinning front attachment
- I 60° with anti rotation tube and free spinning front attachment
- J 90° with anti rotation tube and free spinning front attachment
- K 120° with anti rotation tube and free spinning front attachment
- L 150° with anti rotation tube and free spinning front attachment
- X Customized

Option 1: Limit switch

- 0 None (mandatory for 1 500 N, 2 500 N version and the 48 VDC version)
- L Limit switch (valid for load version 6 800 N and 10 000 N)

Option 2: Position output

- 0 None
- A Absolute analog output
- P Potentiometer
- E Encoder

Thermal protection

T Standard: Built-in thermal switch

Customization

Stroke length, retracted length, cable, connector, front attachment, rear attachment, color, de-rated load

Standard actuators are IP69K / IP66M and equipped a vent, built-in thermal protection, protection Clutch and EMC filter.

CAHB-30A

Linear actuator

Benefits

- Powered by AC voltage
- Designed and tested for harsh environments
- Reliable and cost-effective
- Reduced development and start-up times
- Virtually maintenance-free

Features

- Optional potentiometer and limit switches
- Self-locking
- Integrated thermal and overload protection
- Robust design, IP65, wide temperature range, corrosion resistant

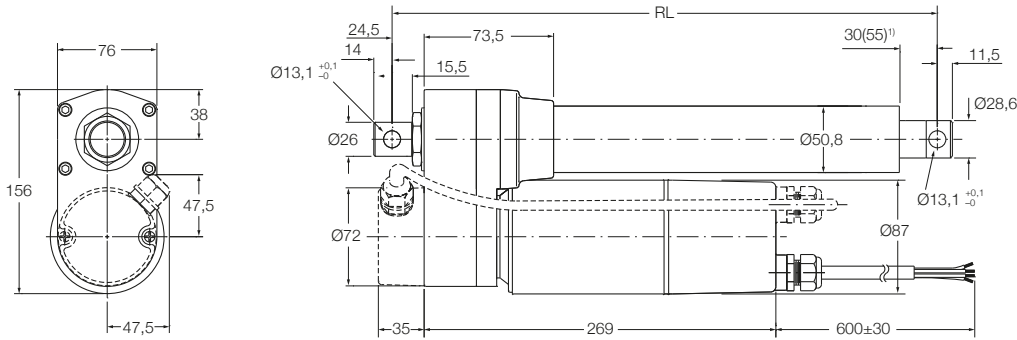


Technical data

		Unit	CAHB-30A... 1	CAHB-30A... 2
Rated push load		N	1 500	2 300
Rated pull load		N	1 500	2 300
Speed (full load to no load)	115 V AC/60 Hz	mm/s	25 to 26	12 to 13
	230 V AC/50 Hz	mm/s	21 to 22	11 to 12
Stroke		mm	102 to 610	102 to 610
Voltage		V AC	115 or 230	115 or 230
Nominal current	115 V AC/60 Hz	A	2,3	1,8
	230 V AC/50 Hz	A	1,35	1,4
Duty cycle		%	25 (94/376 s)	25 (94/376 s)
Ambient temperature		°C	-26 to +65	-26 to +65
Type of protection		IP	65S	65S
Weight		kg	9	9
Color		-	Black	Black

Dimensional drawing

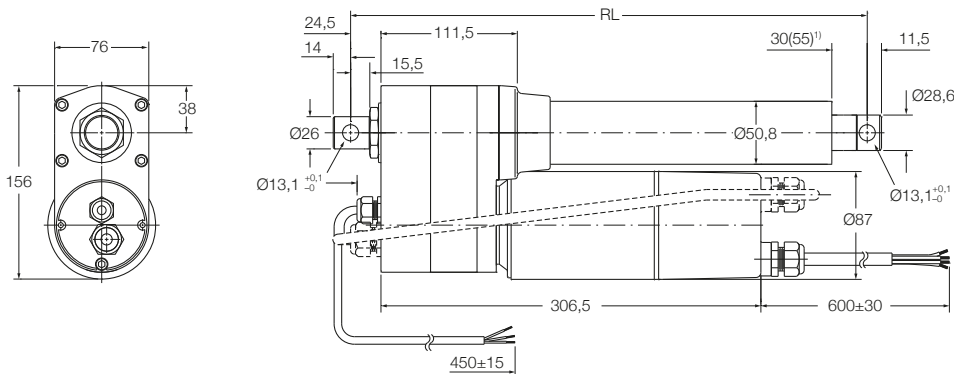
Basic configuration (dashed line for optional limit switch)



Legend:
RL = retracted length

¹⁾ 55 = dimension with limit switch

Optional potentiometer (dashed line for optional limit switch)



Legend:
RL = retracted length

¹⁾ 55 = dimension with limit switch

Retracted length calculation (RL)

Basic configuration

Stroke [mm]	With limit switch ¹⁾						Without limit switch ²⁾					
	102	153	204	305	457	610	102	153	204	305	457	610
Retracted length (RL)	440	440	440	592	744	897	380	415	415	465	668	821

¹⁾ Tolerance: S and RL = ± 5,0 mm (If S ≥ 305 mm, S = ± 7,5 mm)

²⁾ Tolerance: S = ± 2,5 mm and RL = ± 3,8 mm

Optional potentiometer

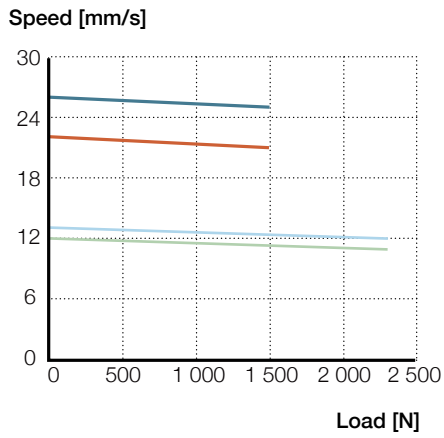
Stroke [mm]	With limit switch ¹⁾						Without limit switch ²⁾					
	102	153	204	305	457	610	102	153	204	305	457	610
Retracted length (RL)	478	478	478	630	782	935	418	453	453	503	706	859

¹⁾ Tolerance: S and RL = ± 5,0 mm (If S ≥ 305 mm, S = ± 7,5 mm)

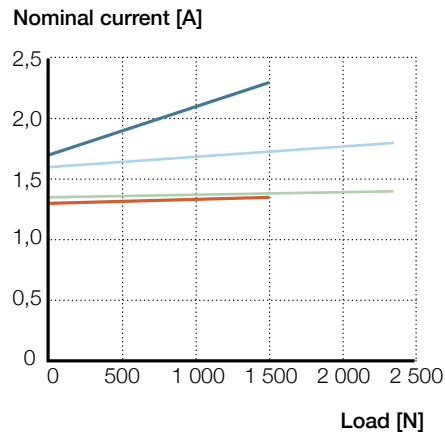
²⁾ Tolerance: S = ± 2,5 mm and RL = ± 3,8 mm

Performance diagrams

Speed-load diagram



Current-load diagram

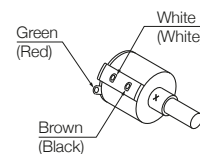
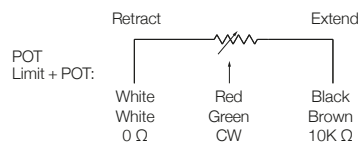
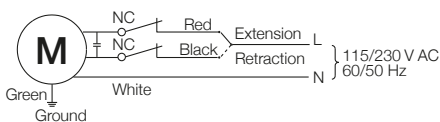
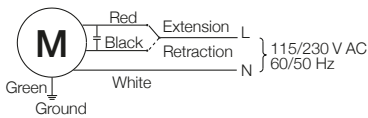


— 1 (115 VAC) — 1 (230 VAC) — 2 (115 VAC) — 2 (230 VAC)

Electrical specifications

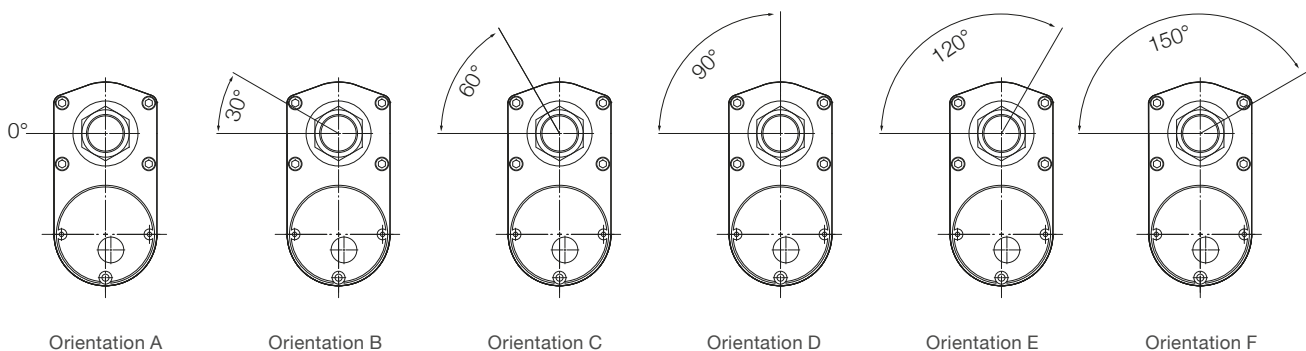
Potentiometer resolution

Stroke [mm]	102	153	204	305	457	610
Ω/mm	59,0	59,0	29,5	29,5	9,84	9,84



Attachment orientation

(refer to ordering key Attachment orientation)



Ordering key

	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">C</td> <td style="padding: 2px;">A</td> <td style="padding: 2px;">H</td> <td style="padding: 2px;">B</td> <td style="padding: 2px;">3</td> <td style="padding: 2px;">0</td> </tr> </table> - <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px; text-align: center;">A</td> </tr> </table> - <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table> - <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px; text-align: center;">A</td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px; text-align: center;">0</td> </tr> </table> - <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px; text-align: center;">0</td> <td style="width: 20px; height: 20px; text-align: center;">0</td> <td style="width: 20px; height: 20px; text-align: center;">0</td> </tr> </table>	C	A	H	B	3	0			A					A					0	0	0	0
C	A	H	B	3	0																		
		A																					
A					0																		
0	0	0																					
Type																							
Voltage																							
N	115 V AC																						
P	230 V AC																						
Load																							
1	1 500 N																						
2	2 300 N																						
Screw																							
A	Acme screw																						
Stroke																							
102	102 mm																						
153	153 mm																						
204	204 mm																						
305	305 mm																						
457	457 mm																						
610	610 mm																						
Retracted length																							
Please refer to the table "Retracted length calculation" on page 43																							
IP																							
A	Standard (IP 65)																						
Front attachment																							
A	Standard (hole: Ø13,1 mm)																						
X	Customized ¹⁾																						
Rear attachment																							
A	Standard (0° and hole: Ø13,1 mm)																						
B	30°																						
C	60°																						
D	90°																						
E	120°																						
F	150°																						
X	Customized ¹⁾																						
Option 1																							
0	None																						
L	Limit switch (only for load version 2 300 N)																						
Option 2																							
0	None																						
P	Potentiometer																						
Customization																							

¹⁾ Only available on request. Contact Ewellix for more information on minimum quantities and additional costs.

CAHB-31N

Linear actuator

Benefits

- Powered by AC voltage
- High efficiency
- Designed and tested for harsh environments
- Reliable and cost-effective
- Reduced development and start-up times
- Virtually maintenance-free

Features

- Optional potentiometer and limit switches
- Ball screw with a brake
- Self-locking
- Integrated thermal and overload protection
- Robust design, IP65, wide temperature range, corrosion resistant

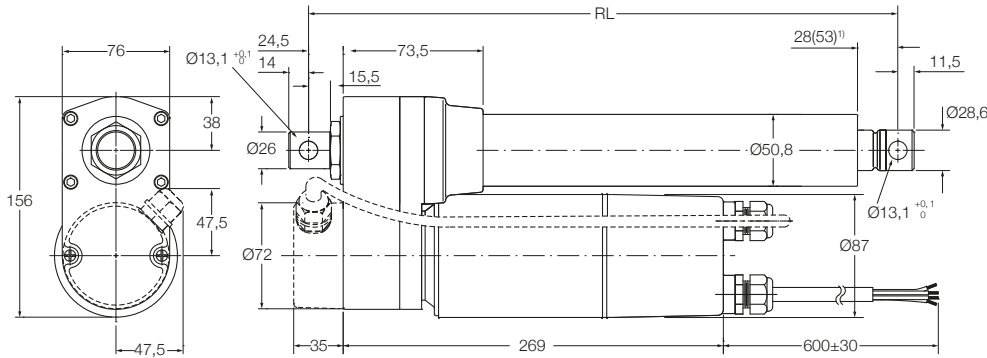


Technical data

		Unit	CAHB-31N... 1	CAHB-31N... 2	CAHB-31N... 3
Rated push load		N	2 300	4 500	6 000
Rated pull load		N	2 300	4 500	6 000
Speed (full load to no load)	115 V AC/60 Hz	mm/s	48 to 57	22 to 28	13 to 15
	230 V AC/50 Hz	mm/s	40 to 50	20 to 24	11 to 13
Stroke		mm	102 to 610	102 to 610	102 to 610
Voltage		V AC	115 or 230	115 or 230	115 or 230
Nominal current	115 V AC/60 Hz	A	3	2,6	2,2
	230 V AC/50 Hz	A	1,5	1,4	1,4
Duty cycle		%	25 (94/376 s)	25 (94/376 s)	25 (94/376 s)
Ambient temperature		°C	-26 to +65	-26 to +65	-26 to +65
Type of protection		IP	65S	65S	65S
Weight		kg	9,5	9,5	9,5
Color		-	Black	Black	Black

Dimensional drawing

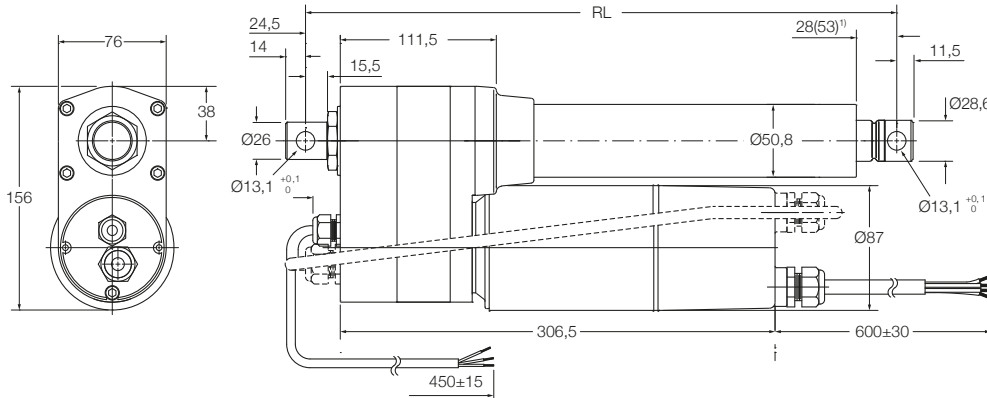
Basic configuration (dashed line for optional limit switch)



Legend:
RL = retracted length

¹⁾ 53 = dimension with limit switch

Optional potentiometer (dashed line for optional limit switch)



Legend:
RL = retracted length

¹⁾ 53 = dimension with limit switch

Retracted length calculation (RL)

Basic configuration

Stroke [mm]	With limit switch ¹⁾						Without limit switch ²⁾					
	102	153	204	305	457	610	102	153	204	305	457	610
Retracted length (RL)	444	444	495	659	811	964	380	419	419	521	735	888

¹⁾ Tolerance: S and RL = ± 5,0 mm (If S≥305 mm, S = ± 7,5 mm)

²⁾ Tolerance: S = ± 2,5 mm and RL = ± 3,8 mm

Optional potentiometer

Stroke [mm]	With limit switch ¹⁾						Without limit switch ²⁾					
	102	153	204	305	457	610	102	153	204	305	457	610
Retracted length (RL)	482	482	533	697	849	1002 (code A02)	418	457	457	559	773	926

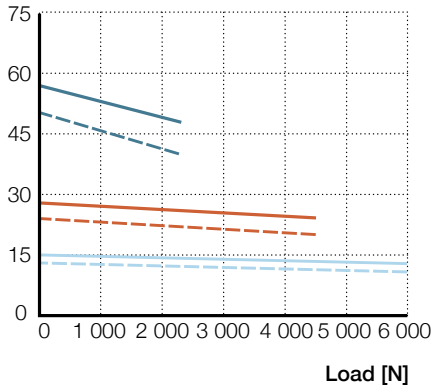
¹⁾ Tolerance: S and RL = ± 5,0 mm (If S≥305 mm, S = ± 7,5 mm)

²⁾ Tolerance: S = ± 2,5 mm and RL = ± 3,8 mm

Performance diagrams

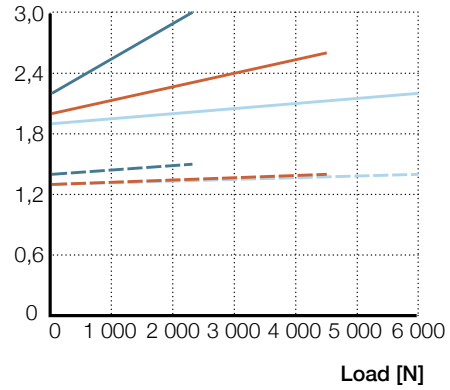
Speed-load diagram

Speed [mm/s]



Current-load diagram

Nominal current [A]



- 1 (115 VAC) — 2 (115 VAC) — 3 (115 VAC)
- - - 1 (230 VAC) - - - 2 (230 VAC) - - - 3 (230 VAC)

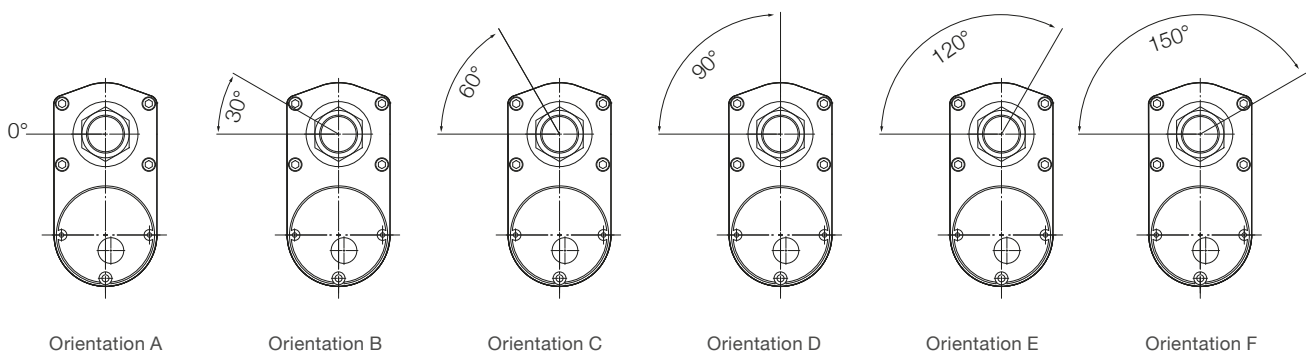
Electrical specifications

Potentiometer resolution

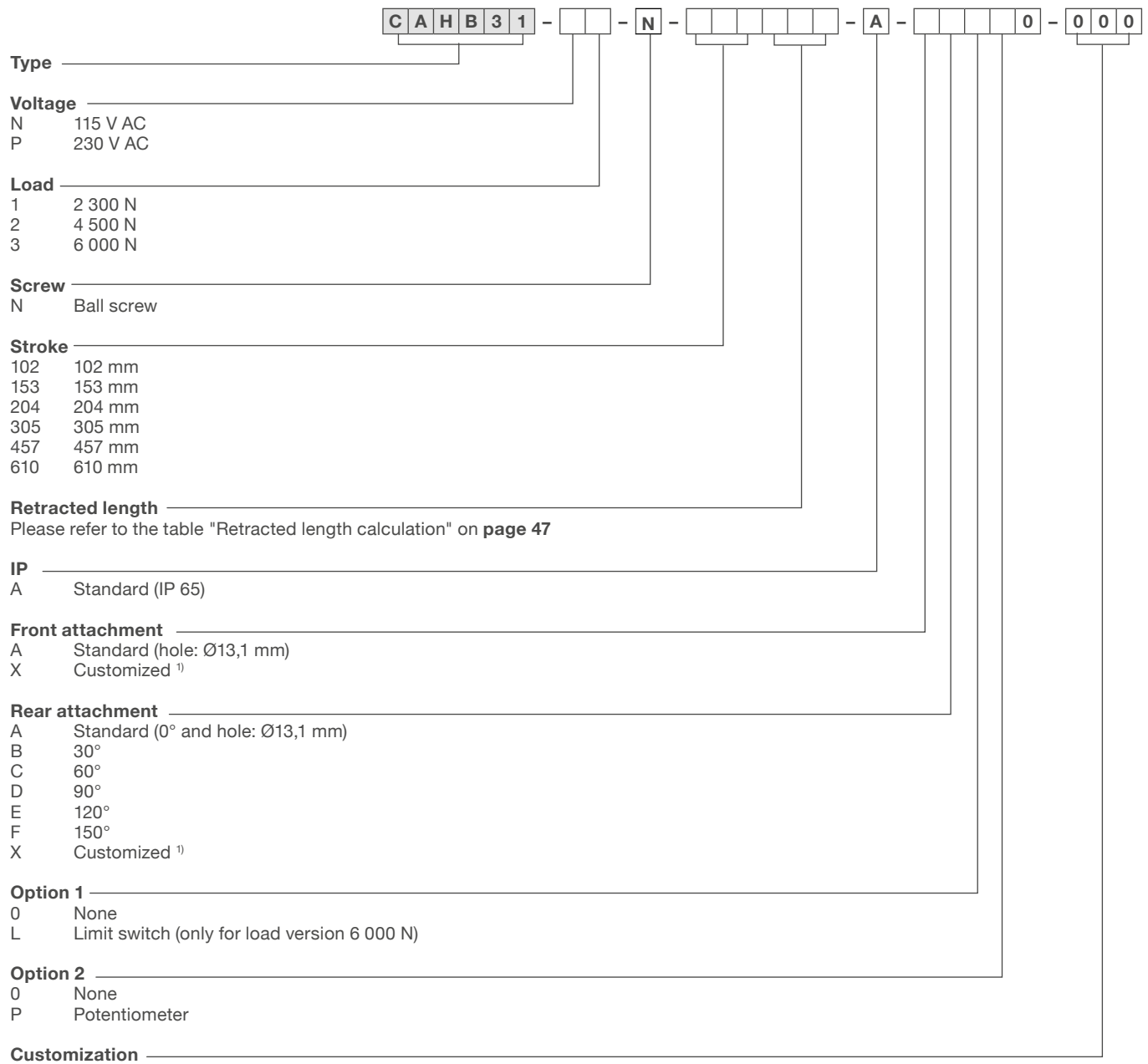
Stroke [mm]	102	153	204	305	457	610
Ω/mm	59,0	59,0	29,5	29,5	9,84	9,84

Attachment orientation

(refer to ordering key Attachment orientation)



Ordering key



¹⁾ Only available on request. Contact Ewellix for more information on minimum quantities and additional costs.

CAHB series - Environmental tests

Climatic tests						
Test and Standard	CAHB-20xE, CAHB-21xE, CAHB-22xE		CAHB-10		CAHB-30, CAHB-31	
	Performance	Report No.	Performance	Report No.	Performance	Report No.
Cold test EN60068-2-1 (Ab)	Storage at low temperature Temperature: -40 °C Duration: 6 hours Not connected Tested at room temperature.	PH_TR0295	Storage at low temperature Temperature: -40 °C Duration: 96 hours Not connected Tested at room temperature.	"Low temperature for CAHB-10"	Storage at low temperature: Temperature: -40 °C Duration: 8 hours Not connected Tested at room temperature.	PH_TR0265
Cold test EN60068-2-1 (Ad)	Storage at low temperature Temperature: -30 °C Duration: 6 hours Actuator is not activated/ connected Tested at low temperature.	PH_TR0295	Storage at low temperature Temperature: -20 °C Duration: 96 hours Actuator is not activated/ connected Tested at low temperature.	"Low temperature for CAHB-10"	Storage at low temperature: Temperature: -26 °C Duration: 8 hours Not connected Tested at room temperature.	PH_TR0265
Dry Heat EN60068-2-2 (Bb)	Storage at high temperature Temperature: +90 °C Duration: 72 hours Actuator is not activated/ connected. Tested at room temperature	PH_TR0278	Storage at high temperature Temperature: +85 °C Duration: 96 hours Actuator is not activated/ connected. Tested at room temperature	"High temperature for CAHB-10"	-	-
Change of temperature EN60068-2-14 (Na)	Rapid change of temperature High temperature: +100 °C in 60 min. Low temperature: -30 °C in 60 min. Transition time: < 10 seconds Duration: 100 cycles Actuator is not activated/ connected. Tested at room temperature.	PH_TR0278	-	-	-	-
Salt mist EN60068-2-52 (Kb)	Salt spray test Salt solution: 5 % sodium chloride (NaCl) 4 spraying periods, each of 2 hours. Humidity storage 7 days after each. Actuator not activated/ connected. Exposure time: 250 hours	PH_TR0268	Salt spray test Salt solution: 5 % sodium chloride (NaCl) 4 spraying periods, each of 2 hours. Humidity storage 7 days after each. Actuator not activated/ connected. Exposure time: 96 hours	"Salt spray test for CAHB-10"	-	-
Degrees of protection IEC 60529	1. Test Item: IP6XM Test Condition: Movement Test Dust: Talcum powder Dust Concentration: 2 kg/m ³ chamber volume and be kept in suspension during the test Test Duration: 8 hours	SHIN1607036235PS	1. Test Item: IP6XS Test Condition: Static Type of dust: Talcum powder Test Duration: 8 hours	COM12-GPE080184AN, COM12-GPE080183AN	-	-
Degrees of protection IEC 60529	2. Test Item: IPX6M Test Condition: Movement Flux: 100 L/min Nozzle diameter: Ø12,5 mm Distance: 2,5 ~ 3,0 m Test duration: 3 min	SHIN1607036235PS	2. Test Item: IPX6S Test Condition: Static Flux: 100 (1 ±5 %) L/min Nozzle diameter: Ø12,5 mm Distance: 2,5 ~ 3,0 m Test duration: 3 min	COM12-GPE080184AN, COM12-GPE080183AN	2. Test Item: IPX5S Test Condition: Static Flux: 12,5 L/min Nozzle diameter: Ø6,3 mm Distance: 2,5 ~ 3,0 m Test duration: 3 min	SHIN1608042057MR
Degrees of protection ISO 20653:2013	3. Test Item: IPX9K Test Condition: Static Water flow: 14~16 L/min Water pressure: 8 000~10 000 kPa Water temperature: 80 to -5 °C Test angle: 0°, 30°, 60°, 90° Test distance from jet to sample: 100~150 mm Test duration: 30 s/position	SHIN1607036235PS	3. Test Item: IPX9K Test Condition: Static Water flow: 14~16 L/min Water pressure: 8 000~10 000 kPa Water temperature: 80 to -5 °C Test angle: 0°, 30°, 60°, 90° Test distance from jet to sample: 100~150 mm Test duration: 30 s/position	SHIN1510048959MR-01	-	-

Climatic tests						
Test and Standard	CAHB-20xE, CAHB-21xE, CAHB-22xE		CAHB-10		CAHB-30, CAHB-31	
	Performance	Report No.	Performance	Report No.	Performance	Report No.
Resistance to chemical product	-	-	Reagent on the surface 3 days 100 hours 0# Diesel Mobile H46 antiwear hydraulic Hydraulic DOT brake oil 50% Ethyleneglycol solution Urea saturated solution DEF NPK (15-15-15)	SHIN2104020949MR-01	-	-

Climatic tests		
Test and Standard	CAHB-20xS, CAHB-21xS, CAHB-22xS Performance	Report No.
Temperature shock test	-55°C to +95°C, ≤15S 100 cycles	SHIN2007039234MR
Temperature cycle test	-40°C to +85°C 18h/cycle 10 cycles	SHIN2106042981PS
High temperature soak test (Operational)	+85°C, 96 hours	SHIN2012077900MR-01
Low temperature soak test (Operational)	-40°C, 96 hours	SUIN2101000352MR
Storage temperature	-55°C to +110°C, 24 hours	SUIN2012009686MR
Humidity and temperature cycles ISO16750-4:2010 Section 5.6	+25°C, 95%RH to +55°C, 95%RH 24 hours/cycle, 6 cycles	SUIN2012009687MR
Salt mist EN60068-2-52 (Kb)	500 hours	PH_TR0404
Degrees of protection IEC 60529	IP6xS, IP6xM	SHIN1607036235PS
Degrees of protection ISO 20653: 2013	IPx9K	SHIN1607036235PS
Resistance to chemical product	Reagent on the surface 3 days 100 hours 0# Diesel Mobile H46 antiwear hydraulic Hydraulic DOT brake oil 50% Ethyleneglycol solution Urea saturated solution DEF NPK (15-15-15)	SHIN2104020959MR-01

Mechanical tests

Test and Standards	CAHB-20xE, CAHB-21xE, CAHB-22xE		CAHB-10	Report No.	CAHB-30, CAHB-31	
	Performance	Report No.	Performance		Performance	Report No.
Vibration	Test Item: Random vibration					
EN60068-2-6 (Fdb)	Frequency (Hz)	Power spectral density level				
EN60068-w2-6(Fc)	10	0,005				
	200	0,02				
	300	0,01				
	350	0,002				
	Test Direction: X/Y/Z axis					
	Test Duration: 2 hours/axis, Total 6 hours					
	Test Item: Sinusoidal vibration					
	Test Condition:					
	Frequency range: 5~25~200 Hz					
	Amplitude: 3,3 mm (p-p)					
	Acceleration: 4g					
	Sweep Rate: 10 ct/min					
	Test Direction: X/Y/Z axis					
	Test Duration: 2 hours/axis, Total 6 hours					
Vibration	-	-	Test Item:	SHIN1805034119SC	-	-
Ewellix Specified			Vibration Set Point (Grms)	Dwell Time(min)		
Conditions			5	10		
			10	10		
			15	10		
			20	10		
			20	20		
			20	30		
			Test Equipment Name			
			Halt Tester	Typhoon-2,5+		

Mechanical tests

Test and Standard	CAHB-20xS, CAHB-21xS, CAHB-22xS Performance	Report No.
Mechanical shock	245-500 m/s ² 3-100 impacts/axis	SUIN2106004489MR
Mechanical shock (Drop)	1m height onto concrete	PH_TR0430
Random vibration for AG/CE wheeled vehicle	24 hours/axis 5 Hz @ PSD 5.29 (m/s) ² /Hz 100 Hz @ PSD 14.44 (m/s) ² /Hz 1 000 Hz @ PSD 14.44 (m/s) ² /Hz 2 000 Hz @ PSD 3.66 (m/s) ² /Hz	SUIN2106004491MR-01
Vibration-random resistance	6.9 g RMS 2 hours/axis	SHIN2011076082PS

Electrical tests

Test and Standards	CAHB-20xE, CAHB-21xE, CAHB-22xE		CAHB-10		CAHB-30, CAHB-31	
	Performance	Report No.	Performance	Report No.	Performance	Report No.
Power supply 12 VDC ASAE EP455 (1990)	Operating voltages: +10 V ~ +16 V Over voltage: +26 V / 5 min. Reverse polarity: -26 V / 5 min. Short circuit to ground: 16 V / 5 min. Short circuit to supply: 16 V	PH_TR0267 PH_TR0302	-	-	-	-
Power supply 24 VDC ASAE EP455 (1990)	Operating voltages: +21 V ~ +26 V Over voltage: +36 V / 5 min Reverse polarity: -36 V / 5 min Short circuit to ground: 32 V / 5 min Short circuit to supply: 32 V	PH_TR0267 PH_TR0302	-	-	-	-
Safety Low Voltage Directive EN 60335-1: 2012 + A11: 2014	-	-	-	-	Rated Voltage: 230 V AC Rated frequency: 50 Hz Rated Current: 1,5 A Degree of protection: IP65	UL 4787638796
EN 60335-2-97 : 2006 + A11: 2008 + A2:2010 + A12: 2015 EN 62233 : 2008	-	-	-	-	Rated Voltage: 230 V AC Rated frequency: 50 Hz Rated Current: 1,5 A Degree of protection: IP65	UL 4787638796
EMC, HF-immunity EN 61000-6-1	-	-	Pass the test for 12 V / 24 V Motor	70.888.12.1063.02	-	-
EN 61000-6-2	Pass the test for 12 V / 24 V Motor	708881688102-00				
EMC, Emission EN 61000-6-3	-	-	Inside limits for 12 V / 24 V motor	70.888.12.1063.02	-	-
EN 61000-6-4	Inside limits for 12 V / 24 V motor	708881688102-00	-	-	-	-
EN 50081-2 (1993) EN 55011 (1998)	-	-	-	-	Class B	EM99777 (IA4=CAHB-30 CAHB-31 series)
EMC, Automotive transients ISO 7637-2	ISO 7637 Load dump test only accepted on motor power connection	708881688103-00	-	-	-	-
UL certification					UL 325 ANSI/CAN/UL-Door	20190822-E507157

Electrical tests

Test and Standard	CAHB-20xS, CAHB-21xS, CAHB-22xS Performance	Report No.
Electrical Steady State 12 VDC ISO16750-2 3rd edition	<ul style="list-style-type: none"> • Operating voltage: 14±0.2 (Engine running), 12±0.2 (Engine not running) • Over Voltage: 18V/60mins • Reverse Polarity: -26V/5mins • Short circuit to ground: 16V/5mins • Short circuit to supply: 16V/1mins/10times • Jump Start: 24V/60±6s • Ground Reference and Supply Offset: power line offset ±2 V, ground line offset ±1 V • Ground Reference Disconnection • Power Supply Disconnection • Superimposed Alternating Voltage on Supply lines: 16 V/Upp 4 V/120s/5times • Start Cycle: Level I to IV/Tol. -0.2V/Duration ±10% • Slow Decrease and Increase of Supply Voltage: Us-min 6 - 10V, Us-max 16 - 21V, 0.5V/min • Momentary drop in supply voltage: 100ms/4.5V • Reset behavior after voltage drop: Us-min 4.5V decrease 0.5V/10s • Load Dump: Test A(without centralized protection) 100V/400ms/1Ω 	WTU21U03019493V-2
Electrical Steady State 24 VDC ISO16750-2 3rd edition	<ul style="list-style-type: none"> • Operating voltage: 28±0.2 (Engine running), 24±0.2 (Engine not running) • Over Voltage: 36V/60mins • Reverse Polarity: -36V/5mins • Short circuit to ground: 32V/5mins • Short circuit to supply: 32V/1mins/10times • Jump Start: 36V/60±6s • Ground Reference and Supply Offset: power line offset ±2 V, ground line offset ±1 V • Ground Reference Disconnection • Power Supply Disconnection • Superimposed Alternating Voltage on Supply lines: 32 V/Upp 4 V/120s/5times • Start Cycle: Level I to III/Voltage tol. -0.2V/Duration ±10% • Slow Decrease and Increase of Supply Voltage: Us-min 8 - 18V, Us-max 32V, 0.5V/min • Momentary drop in supply voltage: 100ms/9V • Reset behavior after voltage drop: Us-min 10V decrease 0.5V/10s • Load Dump: Test B(with centralized protection) 58V/350ms/2Ω 	WTU21U03019492V-2
Sinusoid Changes of Supply Voltage	12V systems: Test level: Vb1: 12V, Vb2: 6V, Vb3: 8V 24V systems: Test level: Vb1: 24V, Vb2: 8V, Vb3: 10V	WTU21U03019493V-2 (12V) WTU21U03019492V-2 (24V)
EMC Transient Conducted Disturbances ISO7637-3	CCC, ICC	WTU21U03019493V-1 (12V) WTU21U03019492V-1 (24V)
EMC Conducted Transient Immunity Power Line ISO7637-2	Positive Inductance Transient Tests Pulse 2a 2b Positive and Negative Burst Coupling Tests Pulse 3a 3b Pulse 4, Cranking Test Cranking Test at Low Temperature Pulse 4	WTU21U03019493V-1 (12V) WTU21U03019492V-1 (24V)
EMC Conducted Emissions/Interference Test	Class 3	WTU21U08086163V (12V)
EMC Conducted Emission EN61000-6-4	0.15 to 0.5 MHz QP=79, AV=66 (dBμV) 0.5 to 30 MHz QP=73, AV=60 (dBμV)	EED39M000483 (12V)
EMC Radiated Emissions/Interference Test CISPR 25-2008	Class 3	WTU21U08086163V (12V)
EMC Radiated Emission EN61000-6-4	30 to 230 MHz QP=50 (dBμV/m) 230 to 1000 MHz QP=57 (dBμV/m)	EED39M000483 (12V) EED39M000482 (24V)
EMC Radiated Emission EN55011	Class A	WTU21U09098252E (24V)
EMC ESD IEC61000-4-2	Air discharge: ±8kV Contact discharge: ±4kV	EED39M000483 (12V) EED39M000482 (24V)
EMC Electrical fast transient/burst immunity (EFT) IEC61000-4-4	5kHz, 5/50 ns, 15ms, 300ms Power line ±2kV, signal line ±1kV	EED39M000483 (12V) EED39M000482 (24V)
EMC Power-frequency magnetic field immunity IEC61000-4-8	50Hz, 1min, XYZ, 30A/m	EED39M000483 (12V) EED39M000482 (24V)



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