BPE electronics

ELECTRONIC BOARDS AND TRANSDUCERS

Technical Catalogue

2017

brevini

The company
Brevini Fluid Power company, part of the Brevini group, was established in 2003 in Reggio Emilia where it has its head office. Brevini Fluid Power manufactures hydraulic components and application packages: a very large range suited to several operational requirements and applications thanks to a strict interaction between mechanical, hydraulic and electronic components.
Brevini Fluid Power is among the top manufacturers in Italy and a major player in Europe and in the world.

International presence
Brevini Fluid Power operates internationally with 15 branches all over the world, localized in some of the most industrialized countries like Italy, France, Germany, United Kingdom, Romania, Holland, Finland, China, India, Singapore and the United States. The network is constantly expanding by the opening new branches.
The branches are managed by people that has an excellent knowledge of their own country.
The advantages are evident:

- Reduced delivery times thanks to branches warehouses
- Easy system and product customization, according to customer needs, thanks to branches technical and servicing departments competence and professional skills
- Quick servicing
- A customer focused sales staff, close to customer, which ensures high flexibility and experience

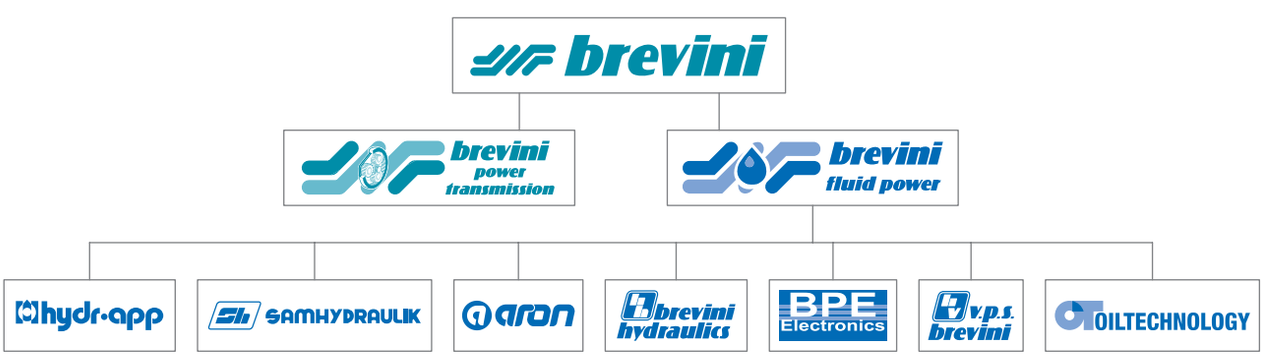
The production facilities are located throughout Reggio Emilia, Ozzano Emilia (BO), Noceto (PR), Campagnola Emilia (RE) and Yancheng (province of Jiangsu, China) which was inaugurated in 2009 and became operative since 2010.

Competitive Strategy
Innovation, combined with the focus on customers, is the strength of the Brevini Fluid Power brand, born from the forty-year-long experiences of Aron, Hydr-App, SAM Hydraulik, Oleodinamica Reggiana, VPS Brevini and Brevini Hydraulics.
Brevini Fluid Power proposes itself as a "local hub", (as it happened to BPE Electronics in 2008 and OT Oiltechnology in 2009), in order to create a new "Made in Italy" global player in the world of hydraulics, even more integrated with electronic.
The purpose is the development of a very large range of products, forming together integrated packages able to meet various application needs. Our ten-year-long partnership relations with hundreds of customers all over the world are the best synthesis of Brevini Fluid Power operational philosophy.

Sharing of know-how and experience have made Brevini Fluid Power a global company, even more present in the international markets and closer to its customers.

Product lines
The product lines are numerous and deeply structured to cover every need: a strong basis on which to develop the engineering of application packages and complete systems. The offer is improving in the direction of a solution supplier often developed in co-design with the customer, both for the mobile and industrial sector.

BPE Electronics Product Line: Sensors, transducers, electronic boards, controllers and HMI devices.
Hydr-App product line: Hydraulic power packs and mini hydraulic packs (whether standard or customized), cartridge valves and solenoid valves, gear boxes and transmission components.
S.A.M. Hydraulik product line: Axial piston pumps and motors for medium and high pressure, orbital motors.
Aron product line: Directional, flow, on-off and proportional pressure control valves. Modular and cartridge valves, subplates and blocks.
Brevini Hydraulics product line: Proportional directional valves, joysticks and electronic modules.
VPS Brevini product line: Mono-block and modular mobile valves.
OT Oiltechnology product line: Gear pumps and motors, flow dividers.



CONSTANTLY SEEK MAXIMUM PERFORMANCE IN TOTAL SAFETY

Apply the advantages of electronics at the service of mechanics and hydraulics. That is, since the early eighties, the entrepreneurial spirit that has driven BPE growth.
BPE has always made significant investments in research and development of electronic boards, transducers and innovative software, applied to mechanics and hydraulics.

Thanks to thirty years of growth, today BPE can claim a prestigious know-how, which is the base of fully customized systems and implementations, highly competitive in the areas of machine management, control and safety.

The company is headquartered in Campagnola Emilia (Reggio Emilia, Italy) and employs more than thirty people, with a high level of education, skills and dynamism. BPE has achieved a turnover of six millions of euros, which around 50% is given by exports.

Since 2002 the BPE quality management, structured and managed in accordance with the requirements of the ISO 9001 standard, is constantly revised following the evolution of the legislation.

Since 2008 BPE is part of the Brevini group and has been inserted into a development plan based on the synergies common across the Brevini Group.
The Brevini Group has a global turnover of more than 400 million of euros, with more than two thousand employees and several production facilities in Italy, Germany, China, United States and soon in Brazil, with around 40 branches around the world.

BPE is registered in the CiA roll, the "CAN in Automation" institute, the international organization of users and manufacturers that develops and supports CAN-based higher-layer protocols.
CiA represents the members in national and international standardization committees, such as ISO and IEC. CiA members develop specifications that are then published as CiA standards. These specifications cover physical and application layer definitions as well as device profile descriptions. The standard CANopen protocol is implemented with CAN and POWERLINK communication technologies.

Our past…
BPE was founded in 1987 in Novellara (Reggio Emilia), from the idea of applying the electronic potential and benefits to the mechanics and hydraulics.

BPE today has more than thirty years of experience in electronics and transducers applied to sectors like cranes, truck cranes, aerial work platforms, loaders, agricultural engineering, service lifts and various machines for specialized tasks like drills, winches, earth moving and many others.

The constant BPE mission has always been to find the machine maximum efficiency in total safety.

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Angle digital transducer

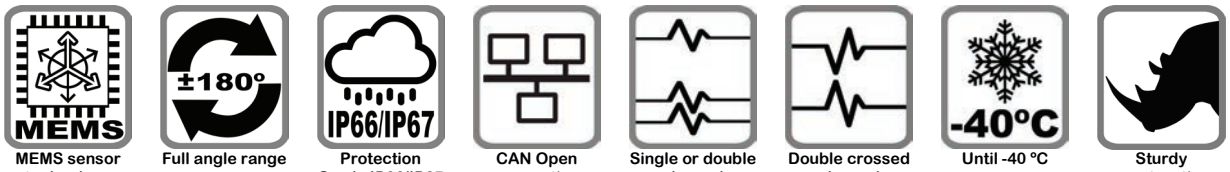
TAC MkII Series

- Programmable digital device to measure tilt on one axis
- Working range ±90°, ±135°, ±180°
- MEMS technology angular sensor (no moving parts)
- Factory programmed on custom request
- Voltage, current, ratiometric or CAN bus output
- Double device version in single housing
- Hardware and software filters to remove vibrations and interferences
- Inputs/outputs protected against polarity reversal, over voltages and short circuits
- Housed in a tough and compact shell made of glass fiber reinforced Nylon 6
- Electrical connection with M12x1 connectors

On request:
- Customizable angle range

Typical fields of application: mounted cranes, mobile cranes, aerial platforms, industrial automation and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



MEMS sensor technology | Full angle range | Protection Grade IP66/IP67 | CAN Open connection | Single or double channel | Double crossed channel | Until -40 °C | Sturdy construction

Technical data

Power supply	5±0.2 V_{DC}	from 9 to 33 V_{DC}		
Outputs	10% to 90% V_{IN} ratiometric	0.5 ÷ 4.5 V_{DC}	CAN bus	from 4 to 20 mA
Maximum output current	10 mA	10 mA	-	-
Current consumption [1] [double]	10 [20] mA	30 [60] mA		30+20 [60+40] mA

(1) Device supply current (and max output load for 4 to 20 mA version) for single and double channel version

Angular range	from 0 to 360 degrees
Angular transducer (linearity, hysteresis, repetibility) accuracy	±0.50 degrees
Angular transducer resolution	0.1degrees
Angular transducer temperature drift	± 0.01 degrees /°C
Std cable length	30 cm
Operating temperature	from -40 to +80 °C
Maximum weight	0.25 kg
Housing material	glass fiber reinforced Nylon 6
Coating	Two components polyurethane
Standard protection grade	IP66 / IP67
CE conformity	EMC Directive: 2014/30/EU
EMC: Immunity | Emission	EN 61000-6-2 | EN61000-6-3 | EN 13309 [3]
Vibration resistance: Sinus	EN 60068-2-6: 10 g, 10 – 150 Hz
Shock resistance: Shock	EN 60068-2-27: 200 g, 6 ms
MTTFd (electronic board)	EN 13849-1: ≥ 100 years (for every channel)

(3) Excluding Pulse 5 (ISO 7637)

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Angle digital transducer

TAC MkII Series

Ordering Code

TAC	D	W	180	99	M21	N	N
Transducer type	Channels	Rotation direction	Rotation angles	Output type	Electrical connection	CAN termination	Mechanical fitting

Channels

S	Single channel
D	Double channel
R	Double channel with crossed signals

Rotation direction

W	Clockwise rotation direction
C	Counterclockwise rotation direction

Rotation angles

180	± 90º
270	± 135º
360	± 180º For CAN version only

Output type

4_	Current output: 4 to 20 mA	(44 if double)
5_	Ratiometric output: 10% to 90% V_{IN}. V_{IN}=+5 V_{DC}	(55 if double)
7_	CAN output: CAN Open	(77 if double)
9_	Voltage output: 0.5÷4.5 V_{DC}. V_{IN}=9÷33 V_{DC}	(99 if double)

Electrical connection

cab	Electrical wiring harness code (see "Electrical connections" on the right)

CAN termination

N	Without embedded CAN bus termination

Mechanical fitting

N	Standard (see drawing below)

Custom configurations are available on request.

Electrical connections

Current output (4 to 20 mA)

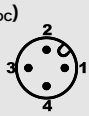
M12 plug

Code: **M70** single channel
Code: **M71** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Negative power supply
3: Signal

Voltage output (0.5 to 4.5 V_{DC})

M12 plug

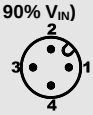
Code: **M20** single channel
Code: **M21** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Negative power supply
3: Signal



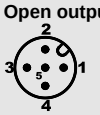
Ratiometric output (10% to 90% V_{IN})

M12 plug

Code: **M44** single channel
Code: **M48** double channel
1: V_{IN}=5 V_{DC}
2: Negative power supply
3: Signal



CAN Open output

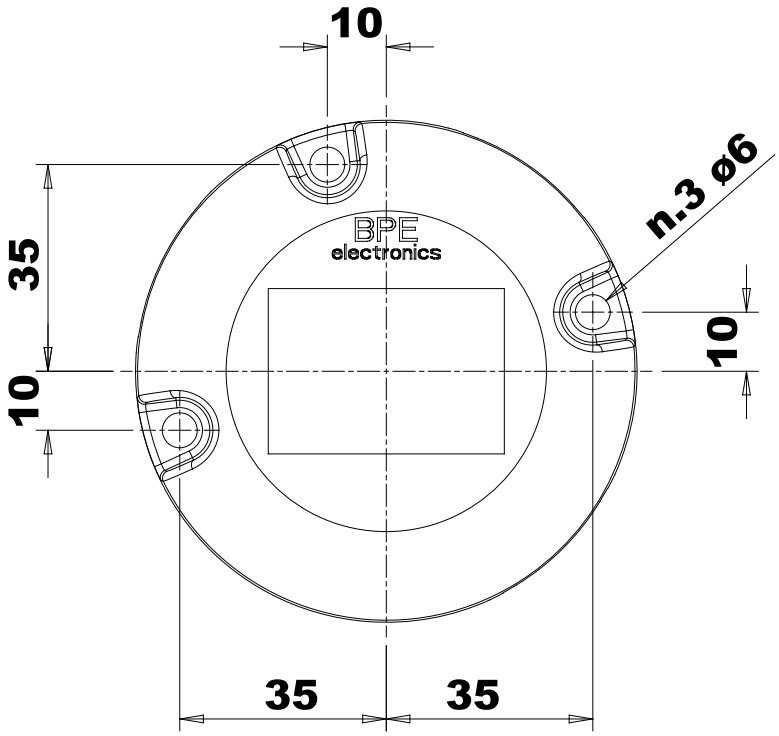


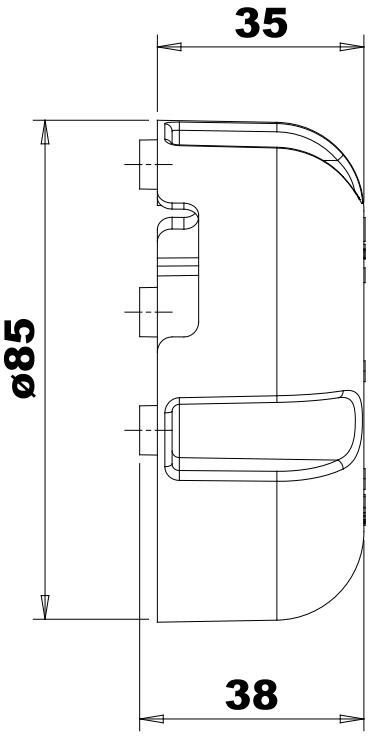
M12 plug

M12 receptable

Code: **M07** single or double channel
1: Cable shield
2: V_{IN}=9 to 33 V_{DC}
3: Negative power supply
4: CH
5: CL

Dimensions [mm]





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Accessories

Type	Description	Code	Notes
Counterpart Connector	M12 receptacle connector: loose connector with 4pin, screw terminals.	7.003.045	
Extension cable	Length 5000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.347	
Extension cable	Length 10000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.342	
CAN Counterpart Connector	M12 receptacle connector: loose connector with 5pin, screw terminals.	7.003.059	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green) , external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.469	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.409	
CAN Counterpart Connector	M12 plug connector: loose connector with 5pin, screw terminals.	7.003.071	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.486	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.514	
CAN Network Termination	M12 5 pin receptacle connector cap with CAN network termination.	7.003.069	
CAN Network Termination	M12 5 pin plug connector cap with CAN network termination.	7.003.070	

Digital inclinometer

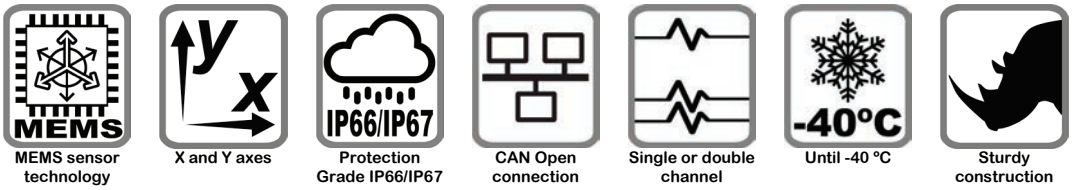
SP MkII Series

- Programmable digital device to measure tilt on 360° degrees
- Two analog outputs, X and Y axes
- Working range ±20°
- MEMS technology angular sensor (no moving parts)
- Factory programmed on custom request
- Voltage, current, ratiometric or CAN bus output
- Double version in the same shell (CAN bus version only) for systems that require redundant signals
- Hardware and software filters to remove vibrations and interferences
- Inputs/outputs protected against polarity reversal, over voltages and short
- circuits
- Housed in a tough and compact shell made of glass fiber reinforced Nylon 6
- Electrical connection with M12x1 connectors

On request:

- Working range configurable
- Temperature compensation
- Vertical installation (factory set)

Typical fields of application: mounted cranes, mobile cranes, aerial platforms, industrial automation and generic mobile machines.



MEMS sensor technology | X and Y axes | Protection Grade IP66/IP67 | CAN Open connection | Single or double channel | Until -40 °C | Sturdy construction

Technical data

Power supply	5±0.2 V_{DC}	from 9 to 33 V_{DC}		
Outputs	10% to 90% V_{IN} ratiometric	0.5 ÷ 4.5 V_{DC}	CAN bus	from 4 to 20 mA
Maximum output current	10 mA	10 mA	-	-
Current consumption (1) [double]	10 [20] mA	30 [60] mA		30+20 [60+40] mA

(1) Device supply current (and max output load for 4 to 20 mA version) for single and double channel version

Intervention range	from -20 to +20 degrees
Transducer (linearity, hysteresis, repetibility) accuracy	0.5% FS for angles lower than ±10° and 1.0% FS over ±10° and until ±20° (FS=40°)
Angular transducer resolution	0.025 degrees (0.015 degrees for CAN bus version)
Angular transducer temperature drift (zero point)	±0.008 degrees/°C (2) (typical)
Standard cable length	30 cm
Operating temperature	from -40 to +80 °C
Maximum weight	0.25 kg
Housing material	glass fiber reinforced Nylon 6
Coating	Two components polyurethane
Standard protection grade	IP66 / IP67
CE conformity	EMC Directive: 2014/30/EU
EMC: Immunity | Emission	EN 61000-6-2 | EN61000-6-3 | EN 13309 (3)
Vibration resistance: Sinus	EN 60068-2-6: 10 g, 10 – 150 Hz
Shock resistance: Shock	EN 60068-2-27: 200 g, 6 ms
MTTFd (electronic board)	EN 13849-1: ≥ 100 years (for every channel)

(2) For compensated devices, zero point: ±0.002 degree/°C. For compensated devices, gain: ±0.001 degree/°C

(3) Excluding Pulse 5 (ISO 7637)

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Ordering Code

SP	S	20/20	9_	M35	N	N	N
Transducer type	Channels	Axes angle range	Output type	Electrical connection	CAN termination	Mechanical fitting	Thermal compensation

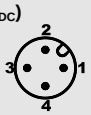
Channels	**S**	Single channel
	D	Double channel (CAN only)
Axes angle range	**20/20**	Maximum angle equal to 20/20 degrees
Output type	**4_**	Current output: 4 to 20 mA
	5_	Ratiometric output: 10% to 90% V_{IN}. V_{IN}=+5 V_{DC}
	7_	CAN output: CAN Open (77 if double)
	9_	Voltage output: 0.5÷4.5 V_{DC}. V_{IN}=9÷33 V_{DC}
Electrical connection	**cab**	Electrical wiring harness code (see "Electrical connections" on the right)
CAN termination	**N**	Without embedded CAN bus termination
Mechanical fitting	**N**	Standard (see drawing below)
Thermal compensation	**N**	Not compensated

Custom configurations are available on request.

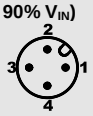
Electrical connections

Current output (4 to 20 mA)
M12 plug
Code: **M60** single channel
1: V_{IN}=9 to 33 V_{DC}
2: Negative power supply
3: X axis
4: Y axis

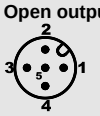
Voltage output (0.5 to 4.5 V_{DC})
M12 plug
Code: **M35** single channel
1: V_{IN}=9 to 33 V_{DC}
2: Negative power supply
3: X axis
4: Y axis



Ratiometric output (10% to 90% V_{IN})
M12 plug
Code: **M49** single channel
1: V_{IN}=+5 V_{DC}
2: Negative power supply
3: X axis
4: Y axis



CAN Open output

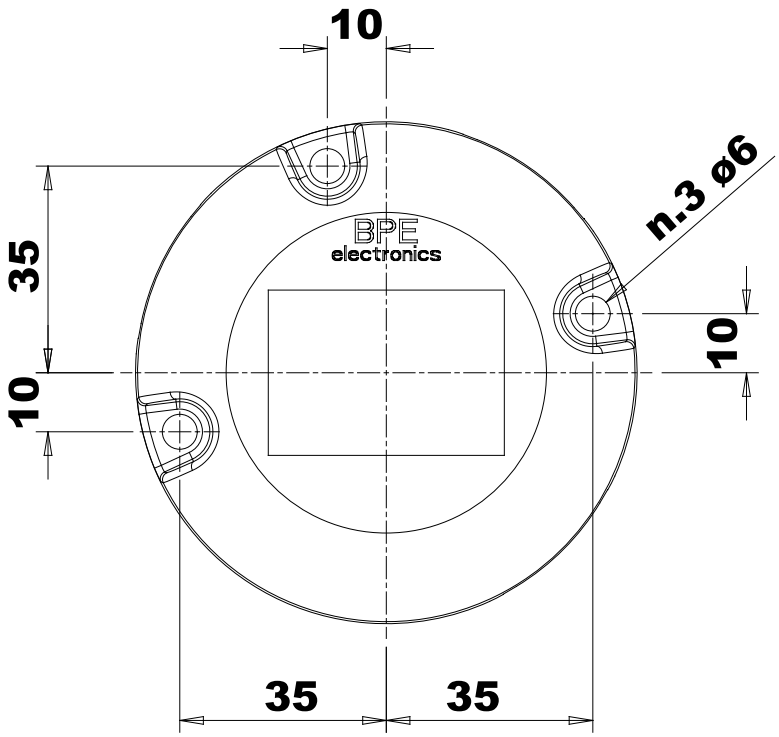


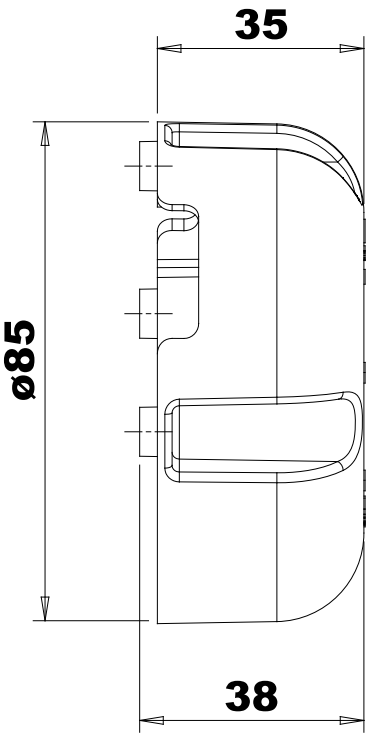
M12 plug

M12 receptable

Code: **M07** single or double channel
1: Cable shield
2: V_{IN}=9 to 33 V_{DC}
3: Negative power supply
4: CH
5: CL

Dimensions [mm]



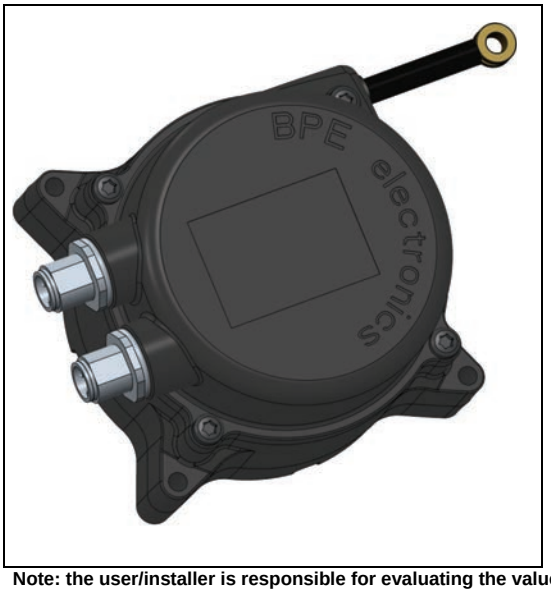


Accessories

Type	Description	Code	Notes
Counterpart Connector	M12 receptacle connector: loose connector with 4pin, screw terminals.	7.003.045	
Extension cable	Length 5000mm, multipolar cable for dynamic installations, 4 conductors (brown, grey, black, yellow/green) sections 0.5mm², external grey jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.431	
Extension cable	Length 10000mm, multipolar cable for dynamic installations, 4 conductors (brown, grey, black, yellow/green) sections 0.5mm², external grey jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.433	
CAN Counterpart Connector	M12 receptacle connector: loose connector with 5pin, screw terminals.	7.003.059	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green) , external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.469	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.409	
CAN Counterpart Connector	M12 plug connector: loose connector with 5pin, screw terminals.	7.003.071	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.486	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.514	
CAN Network Termination	M12 5 pin receptacle connector cap with CAN network termination.	7.003.069	
CAN Network Termination	M12 5 pin plug connector cap with CAN network termination.	7.003.070	

Micro length transducer

TLu66 Series



- Compact length transducer
- Single channel. Possible to have it with double channel for PL d (EN13849-1) systems
- Voltage, current, ratiometric or CAN bus output
- Waterproof, plastic, compact body
- Easy to install
- PA12-coated 7x19 AISI 316 stainless steel rope
- Ninety degrees orientable electrical connection with M12x1 connectors
- Ring for steel rope fast & easy fix

On request:
- Electrical connection with cable gland

Typical fields of application: mounted cranes, mobile cranes, aerial platforms, inside extensible outriggers, industrial automation and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Technical data

Power supply	5±0.2 V_{DC}	from 9 to 33 V_{DC}		
Outputs	10% to 90% V_{IN} ratiometric	0.5 to 4.5 V_{DC}	CAN bus	from 4 to 20 mA
Maximum output current	10 mA	10 mA	-	-
Current consumption (1) [double]	10 [20] mA	30 [60] mA		30+20 [60+40] mA

(1) Device supply current (and max output load for 4 to 20 mA version) for single and double channel version

Measurable length	up to 4.0 m	5.0 m
Length sensor (linearity, hysteresis, repetibility) accuracy	±0.50% FS	±0.75% FS
Length transducer resolution	0.03% FS	
Length transducer temperature drift	< 100 ppm / °C	
Rope diameter (with coating)	0.9 (1.1) mm	
Rope breaking force	615 N	
Min/max force to pull out the rope	3.8/7.0 N	
Max wire speed	3 m/s	
Max wire acceleration	5 m/s^2	
Operating temperature	from -40 to +70 °C	
Maximum weight	0.60 kg	
Electric insulation	6500 V_{AC}	
Housing material	PC/ABS	
Standard protection grade (electronics and spring box)	IP66 / IP67	
CE conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	
EMC: Immunity | Emission	EN 61000-6-2 | EN61000-6-3	
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	
MTTFd (electronic board)	EN 13849-1: ≥ 100 years	
Maximum number of mechanical cycles	$5x10^5$	

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Micro length transducer

TLu66 Series

Ordering Code

TLu66	5.0	D	UR	3	R	99	M31	3	M12	N	P5
Transducer type	**Length**	**Channels**	**Rope output**	**Steel rope**	**Ring type**	**Output type**	**Electrical connection**	**Electrical outlet**	**Connector type**	**CAN termination**	**Potentiometer**

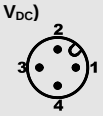
Length	x . y	Available lengths: 3.5 m, 4.0 m, 5.0 m
Channels	S	Single channel
	D	Double channel
	R	Double channel with crossed signals
Rope output	U R	Steel rope outlet on upper right side
	U L	Steel rope outlet on upper left side
	L R	Steel rope outlet on lower right side
	L L	Steel rope outlet on lower left side
Steel rope	3	AISI 316 stainless steel polyamide coated rope PA12 Ø 0.9/1.1 mm 7x19
Ring type	R	With metallic ring at the end of the steel rope ($Ø_{IN}/Ø_{OUT}$: 5/10 mm)
Output type	4 _	Current output: 4 to 20 mA (44 if double)
	5 _	Ratiometric output: 10% to 90% V_{IN}. V_{IN}=+5 V_{DC} (55 if double)
	7 _	CAN output: CAN Open (77 if double)
	9 _	Voltage output: 0.5÷4.5 V_{DC}. V_{IN}=9÷33 V_{DC} (99 if double)
Electrical connection	c a b	Electrical wiring harness code (see "Electrical connections" on the right)
Electrical outlet	0	Electrical outlet to hours "0" or "12"
	3	Electrical outlet to hours "3"
	6	Electrical outlet to hours "6"
	9	Electrical outlet to hours "9"
Connector type	M 1 2	Electrical connection type: M12
CAN termination	N	Without embedded CAN bus termination
Potentiometer	P 5	Potentiometer type: 10 KΩ, 1 round, 5 x 10^5 cycles

Custom configurations are available on request.

Electrical connections

Current output (4 to 20 mA)
M12 plug
Code: **M75** single channel
Code: **M76** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Length signal
3: Negative power supply

Voltage output (0.5 to 4.5 V_{DC})
M12 plug
Code: **M30** single channel
Code: **M31** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Length signal
3: Negative power supply



Ratiometric output (10% to 90% V_{IN})
M12 plug
Code: **M40** single channel
Code: **M41** double channel
1: V_{IN}=5 V_{DC}
2: Length signal
3: Negative power supply

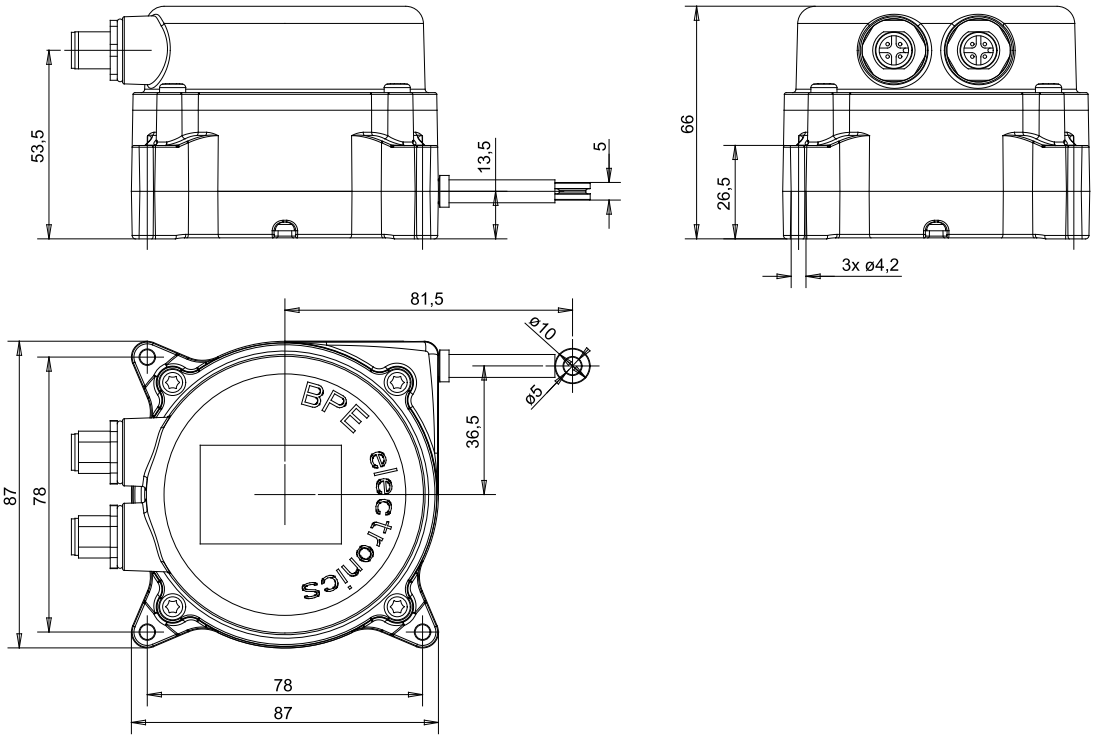
CAN Open output

M12 plug

M12 receptable

Code: **M07** single or double channel
1: Cable shield
2: V_{IN}=9 to 33 V_{DC}
3: Negative power supply
4: CH
5: CL

Dimensions [mm]

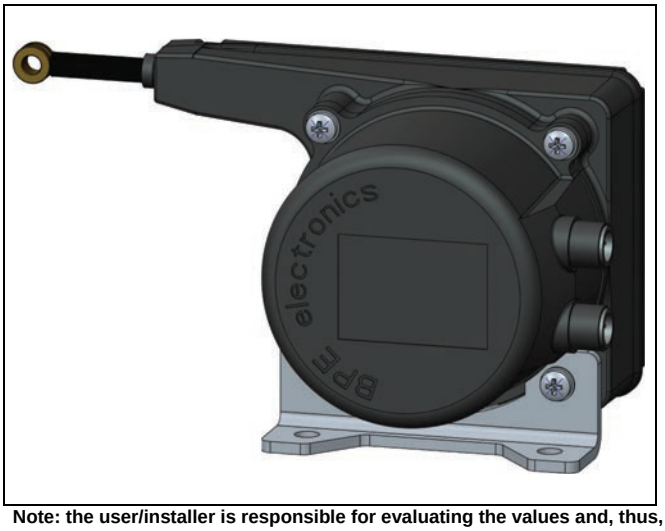


Accessories

Type	Description	Code	Notes
Counterpart Connector	M12 receptacle connector: loose connector with 4pin, screw terminals.	7.003.045	
Extension cable	Length 5000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.347	
Extension cable	Length 10000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.342	
CAN Counterpart Connector	M12 receptacle connector: loose connector with 5pin, screw terminals.	7.003.059	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green) , external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.469	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.409	
CAN Counterpart Connector	M12 plug connector: loose connector with 5pin, screw terminals.	7.003.071	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.486	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.514	
CAN Network Termination	M12 5 pin receptacle connector cap with CAN network termination.	7.003.069	
CAN Network Termination	M12 5 pin plug connector cap with CAN network termination.	7.003.070	
Adapter	Ring to threaded rod adapter	7.003.076	

Micro length transducer

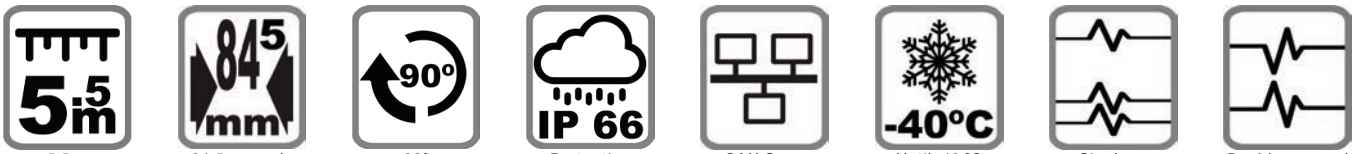
TLu Series



- Compact length transducer
- Single channel. Possible to have it with double channel for PL d (EN13849-1) systems
- Voltage, current, potentiometric or CAN bus output
- Waterproof, plastic, compact body
- Easy to install
- PA12-coated 7x7 AISI 316 stainless steel rope
- Ninety degrees orientable fixing bracket
- Ninety degrees orientable electrical connection with M12x1 connectors
- Ring for steel rope fast & easy fix

Typical fields of application: mounted cranes, mobile cranes, aerial platforms, inside extensible outriggers, industrial automation and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Technical data

Power supply	from 0 to 33 V_{DC}	from 9 to 33 V_{DC}		
Outputs	10% to 92%. For 5.5m: 10% to 89%	0.5 ÷ 4.5 V_{DC}	CAN bus	from 4 to 20 mA
Maximum output current	-	10 mA	-	-
Current consumption (1) [double]	3.3 [6.6] mA	30 [60] mA		30+20 [60+40] mA

(1) Device supply current (and max output load for 4 to 20 mA version) for single and double channel version

Measurable length	up to 4.0m	5.5m
Length sensor (linearity, hysteresis, repetibility) accuracy	± 0.50% FS	± 0.75% FS
Length transducer resolution	0.03% FS	
Length transducer temperature drift	< 100 ppm / °C	
Rope diameter (with coating)	0.63 (0.80) mm	
Rope breaking force	320 N	
Min/max force to pull out the rope	3.0/6.0 N	
Max wire speed	3 m/s	
Max wire acceleration	5 m/s^2	
Operating temperature	from -40 to +70 °C	
Maximum weight	0.60 kg	
Electric insulation	6500 V_{AC}	
Housing material	PA 6.6 + 35% glass reinforced and mineral filled	
Standard protection grade (electronics and spring box)	IP66	
CE conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	
EMC: Immunity | Emission	EN 61000-6-2 | EN61000-6-3	
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	
MTTFd (electronic board)	EN 13849-1: ≥ 100 years	
Maximum number of mechanical cycles	$1x10^5$ ($5x10^5$ on request)	

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Micro length transducer

TLu Series

Ordering Code

TLu	5.5	D	1	R	99	M31	3	S6	N	P1
Transducer type	**Length**	**Channels**	**Steel rope**	**Ring type**	**Electrical output**	**Electrical connection**	**Electrical outlet**	**Mounting bracket**	**CAN termination**	**Potentiometer**

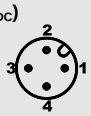
Length	**x . y**	Available lengths: 2.0 m, 4.0 m, 5.5 m
Channels	**S**	Single channel
	D	Double channel
	R	Double channel with crossed signals
Steel rope	**1**	AISI 316 stainless steel polyamide coated rope PA12 ø 0.63/0.80 mm 7x7
Ring type	**R**	With metallic ring at the end of the steel rope ($ø_{IN}/ø_{OUT}$: 5/10 mm)
Electrical output	**3 _**	Potentiometric output: see "Outputs" on previous table (33 if double)
	4 _	Current output: 4 to 20 mA (44 if double)
	7 _	CAN output: CAN Open (77 if double)
	9 _	Voltage output: 0.5÷4.5 V_{DC} (99 if double)
Electrical connection	**c a b**	Electrical wiring harness code (see "Electrical connections" on the right)
Electrical outlet	**0**	Set to hours "0" or "12"
	3	Set to hours "3"
	6	Set to hours "6"
	9	Set to hours "9"
Mounting bracket	**S 0**	Set to hours "0" or "12"
	S 3	Set to hours "3"
	S 6	Set to hours "6"
	S 9	Set to hours "9"
CAN termination	**N**	Without internal CAN bus termination
Potentiometer	**P 1**	Potentiometer type: 10 KΩ, 10 rounds, 1 x 10^5 cycles
	P 3	Potentiometer type: 10 KΩ, 5 rounds, 1 x 10^5 Cycles. For 2.0 meters only
	P 4	Potentiometer type: 10 KΩ, 10 rounds, 5 x 10^5 cycles

Custom configurations are available on request.

Electrical connections

Current output (4 to 20 mA)
M12 plug
Code: **M75** single channel
Code: **M76** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Length signal
3: Negative power supply

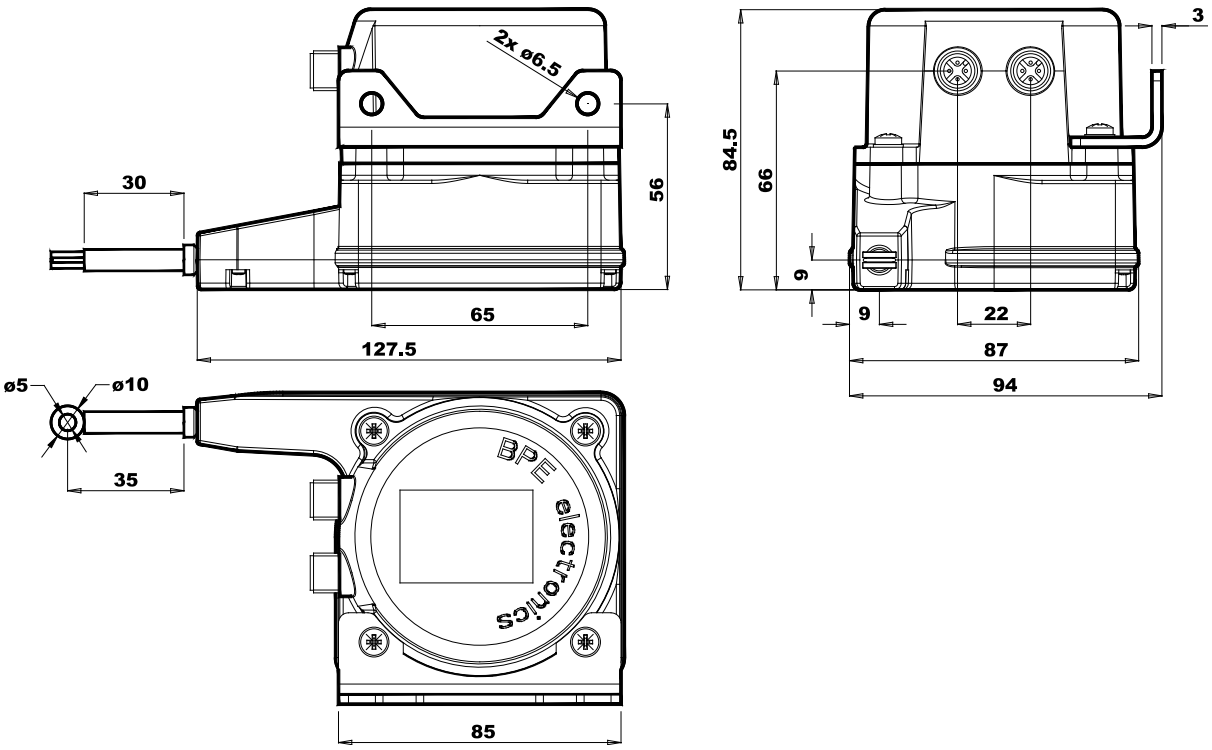
Voltage output (0.5 to 4.5 V_{DC})
M12 plug
Code: **M30** single channel
Code: **M31** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Length signal
3: Negative power supply



Potentiometric output
M12 plug
Code: **M55** single channel
Code: **M56** double channel
1: V_{IN}=0 to 33 V_{DC}
2: Length signal
3: Negative power supply

CAN Open output
Two M12 plug
Code: **M06** single or double channel
1: Cable shield
2: V_{IN}=9 to 33 V_{DC}
3: Negative power supply
4: CH
5: CL

Dimensions [mm]

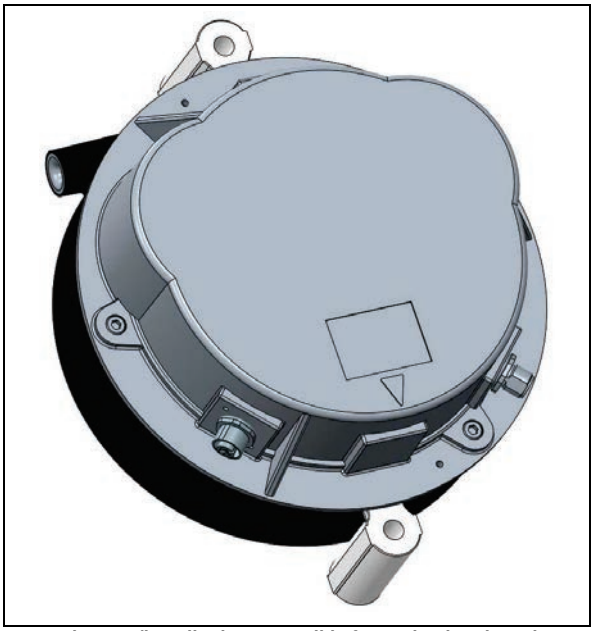


Accessories

Type	Description	Code	Notes
Counterpart Connector	M12 receptacle connector: loose connector with 4pin, screw terminals.	7.003.045	
Extension cable	Length 5000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.347	
Extension cable	Length 10000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.342	
Extension cable	Length 15000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.393	
CAN Counterpart Connector	M12 receptacle connector: loose connector with 5pin, screw terminals.	7.003.059	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green) , external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.469	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.409	
CAN Extension cable	Length 15000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.506	
CAN Network Termination	M12 5 pin receptacle connector cap with CAN network termination.	7.003.069	
Adapter	Ring to threaded rod adapter	7.003.076	

Length transducer

TL Series

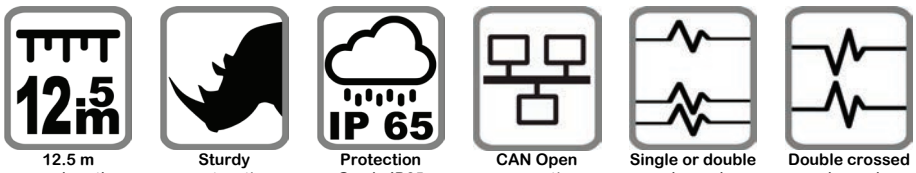


- Length transducer for work area management
- Single channel. Possible to have it with double channel for PL d (EN13849-1) systems
- Voltage, current, potentiometric or CAN bus output
- Electrical connection with M12x1 connectors
- Standard length: 8.5 and 12.5 meters
- PA12-coated 7x7 AISI 316 stainless steel rope
- Waterproof, compact aluminium body
- Easy to install
- Right or left side mounting version
- Provided with a plastic casing to protect the pulley

On request
- Special length
- Electrical connection with cable

Typical fields of application: truck mounted cranes, mobile cranes, aerial platforms and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



12.5 m max length | Sturdy construction | Protection Grade IP65 | CAN Open connection | Single or double channel | Double crossed channel

Technical data

Power supply	from 0 to 33 V_{DC}	from 9 to 33 V_{DC}		
Outputs	10% to 92%	0.5 ÷ 4.5 V_{DC}	CAN bus	from 4 to 20 mA
Maximum output current	-	10 mA	-	-
Current consumption (1) [double]	3.3 [6.6] mA	30 [60] mA		30+20 [60+40] mA

(1) Device supply current (and max output load for 4 to 20 mA version) for single and double channel version

Measurable length	up to 12.5m
Length transducer (linearity, hysteresis, repetibility) accuracy	± 1.0% FS
Length transducer resolution	0.03% FS
Length transducer temperature drift	< 100 ppm / °C
Rope diameter (with coating)	1.5 (2.0) mm
Rope breaking force	> 1000 N (greater than)
Min/max force to pull out the rope	9,5 N (± 40 %)
Max wire speed	3 m/s
Max wire acceleration	5 m/s^2
Operating temperature	from -25 to +70 °C
Maximum weight	2.3 kg
Housing material	aluminium body/ plastic pulley and casing
Standard protection grade (electronics and spring box)	IP65
CE conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC
EMC: Immunity | Emission	EN 61000-6-2 | EN61000-6-3
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz
MTTFd (electronic board)	EN 13849-1: ≥ 100 years
Maximum number of mechanical cycles	$1x10^5$ ($2.5x10^5$ on request)

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Ordering Code

TL	08.5	D	UL	5	F4	99	M31	D	N	P1	C
Transducer type	Length	Channels	Rope output	Steel rope	Suppl. rope	Electrical output	Electrical connection	Electrical outlet	CAN termination	Potentiometer	Casing type

Length — x x . y — Available lengths: 8.5 m, 12.5 m

Channels

S	Single channel
D	Double channel
R	Double channel with crossed signals

Rope output

U	R	Steel rope outlet on upper right side
U	L	Steel rope outlet on upper left side
L	R	Steel rope outlet on lower right side
L	L	Steel rope outlet on lower left side

Steel rope

5	AISI 316 stainless steel polyamide coated rope PA12 ø 1.5/2.0 mm 7x7

Supplementary rope

F	4 — Supplementary steel rope length (Standard: 04 meters)

Electrical output

3	_	Potentiometric output: see “Outputs” on previous table (33 if double)
4	_	Current output: 4 to 20 mA (44 if double)
7	_	CAN output: CAN Open (77 if double)
9	_	Voltage output: 0.5÷4.5 V_{DC} (99 if double)

Electrical connection — c a b — Electrical wiring harness code (see “Electrical connections” on the right)

Electrical outlet

L	Electrical connector used: left
R	Electrical connector used: right
D	Electrical connector used: both (for double transducers)

CAN termination — N — Without internal CAN bus termination

Potentiometer

P	1	Potentiometer type: 10 KΩ, 10 rounds, 1 x 10^5 cycles
P	4	Potentiometer type: 10 KΩ, 10 rounds, 2,5 x 10^5 cycles

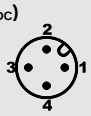
Casing type — C — With a plastic casing to protect the pulley

Custom configurations are available on request.

Electrical connections

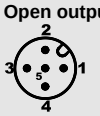
Current output (4 to 20 mA)
M12 plug
Code: **M75** single channel
Code: **M76** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Length signal
3: Negative power supply

Voltage output (0.5 to 4.5 V_{DC})
M12 plug
Code: **M30** single channel
Code: **M31** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Length signal
3: Negative power supply



Potentiometric output
M12 plug
Code: **M55** single channel
Code: **M56** double channel
1: V_{IN}=0 to 33 V_{DC}
2: Length signal
3: Negative power supply

CAN Open output

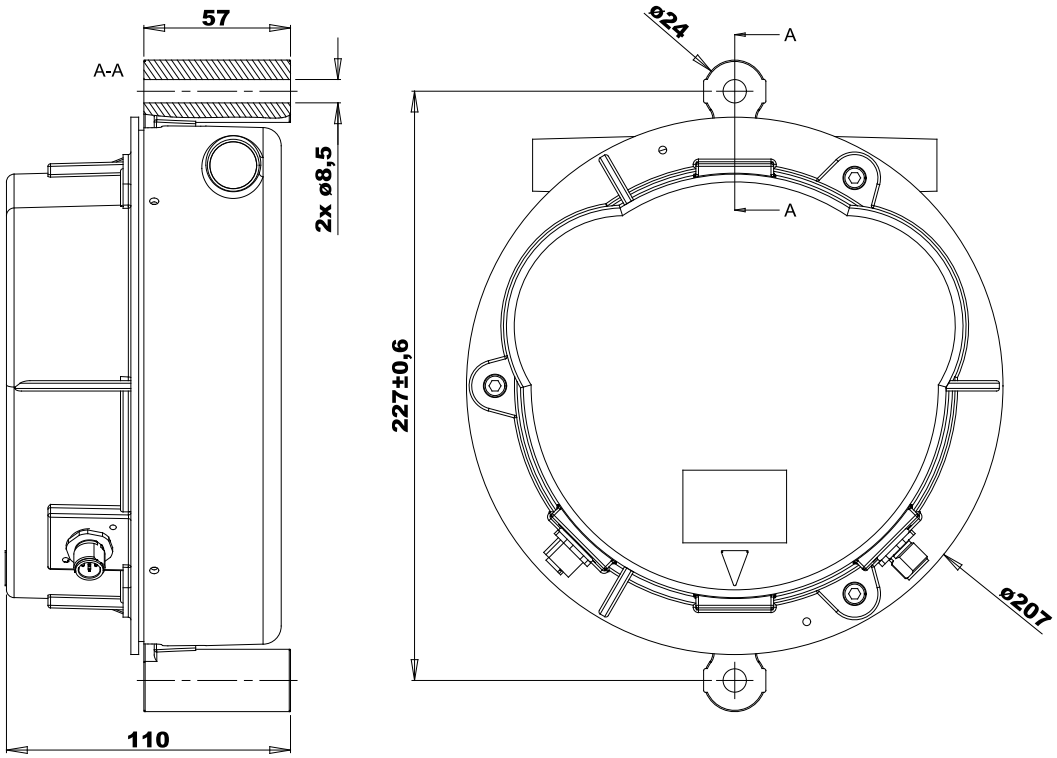


M12 plug

M12 receptable

Code: **M07** single or double channel
1: Cable shield
2: V_{IN}=9 to 33 V_{DC}
3: Negative power supply
4: CH
5: CL

Dimensions [mm]



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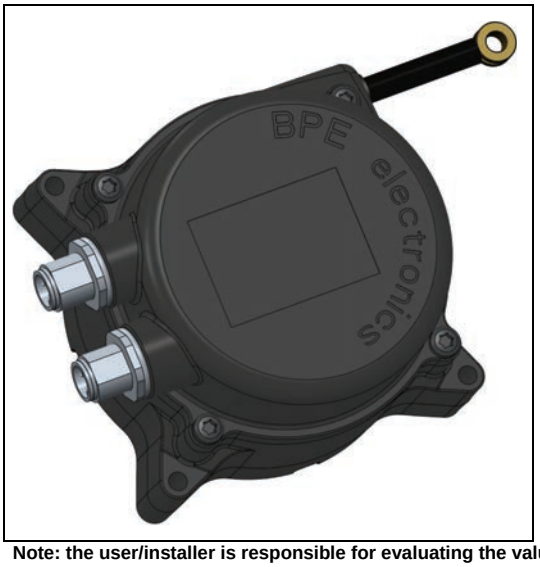
Accessories

Type	Description	Code	Notes
Counterpart Connector	M12 receptacle connector: loose connector with 4pin, screw terminals.	7.003.045	
Extension cable	Length 5000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.347	
Extension cable	Length 10000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.342	
CAN Counterpart Connector	M12 receptacle connector: loose connector with 5pin, screw terminals.	7.003.059	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green) , external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.469	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.409	
CAN Counterpart Connector	M12 plug connector: loose connector with 5pin, screw terminals.	7.003.071	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.486	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.514	
CAN Network Termination	M12 5 pin receptacle connector cap with CAN network termination.	7.003.069	
CAN Network Termination	M12 5 pin plug connector cap with CAN network termination.	7.003.070	

Micro angle/length transducer

ASu66 Series



- Compact angle and length transducer
- MEMS technology angular sensor
- Optimized to be used in small places
- Single channel. Possible to have it with double channel for PL d (EN13849-1) systems
- Voltage, current, ratiometric or CAN bus output
- Waterproof, plastic, compact body
- Easy to install
- PA12-coated 7x19 AISI 316 stainless steel rope
- Ninety degrees orientable electrical connection with M12x1 connectors
- Ring for steel rope fast & easy fix

On request:
- Electrical connection with cable gland

Typical fields of application: mounted cranes, mobile cranes, aerial platforms, industrial automation and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

66 mm only tickness | MEMS sensor technology | 5 m max length | Ultra durable | 7x19 stainless steel rope | Protection Grade IP66/IP67 | Until -40 °C | CAN Open connection | Single or double channel

Technical data

Power supply	5±0.2 V_{DC}	from 9 to 33 V_{DC}		
Outputs	10% to 90% V_{IN} ratiometric	0.5 to 4.5 V_{DC}	CAN bus	from 4 to 20 mA
Maximum output current	10 mA	10 mA	-	-
Current consumption (1) [double]	10 [20] mA	30 [60] mA		30+20 [60+40] mA

(1) Device supply current (and max output load for 4 to 20 mA version) for single and double channel version

Measurable length	up to 4.0 m	5.0 m
Length transducer (linearity, hysteresis, repetibility) accuracy	±0.50% FS	±0.75% FS
Length transducer resolution	0.03% FS	
Length transducer temperature drift	< 100 ppm / °C	
Angular range	from 0 to 360 degrees	
Angular transducer accuracy	± 0.5 degrees	
Angular transducer resolution	0.1 degrees	
Angular transducer temperature drift	± 0.01 degrees /°C	
Rope diameter (with coating)	0.9 (1.1) mm	
Rope breaking force	615 N	
Min/max force to pull out the rope	3.8/7.0 N	
Max wire speed	3 m/s	
Max wire acceleration	5 m/s^2	
Operating temperature	from -40 to +70 °C	
Maximum weight	0.60 kg	
Electric insulation	6500 V_{AC}	
Housing material	PC/ABS	
Standard protection grade (electronics and spring box)	IP66 / IP67	
CE conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	
EMC: Immunity | Emission	EN 61000-6-2 | EN61000-6-3	
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	
MTTFd (electronic board)	EN 13849-1: ≥ 100 years	
Maximum number of mechanical cycles	$5x10^5$	

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ASu66 Series

Ordering Code

ASu66	5.0	D	W	090090	UL	3	R	99	M26	3	M12	N	P5
Transducer type	Length	Channels	Rotation direction	Rotation angles	Rope output	Steel rope	Ring type	Output type	Electrical connection	Electrical outlet	Connector type	CAN termination	Potentiometer

Length — x . y
Available lengths: 3.5 m, 4.0 m, 5.0 m

Channels
- S — Single channel
- D — Double channel
- R — Double channel with crossed signals

Rotation direction
- W — Clockwise rotation direction (see “Available fittings configurations”)
- C — Counterclockwise rotation direction (see “Available fittings configurations”)

Rotation angles — A N 1 A N 2
AN1: angle opposed to rotation direction
AN2: angle concordant to rotation direction
(see “Available angle configurations”)

Rope output
- U R — Steel rope outlet on upper right side
- U L — Steel rope outlet on upper left side
- L R — Steel rope outlet on lower right side
- L L — Steel rope outlet on lower left side

Steel rope
- 3 — AISI 316 stainless steel polyamide coated rope PA12 ø 0.9/1.1 mm 7x19

Ring type
- R — With metallic ring at the end of the steel rope ($ø_{IN}/ø_{OUT}$: 5/10 mm)

Output type

4 _	Current output: 4 to 20 mA	(44 if double)
5 _	Ratiometric output: 10% to 90% V_{IN}. V_{IN}=+5 V_{DC}	(55 if double)
7 _	CAN output: CAN Open	(77 if double)
9 _	Voltage output: 0.5÷4.5 V_{DC}. V_{IN}=9÷33 V_{DC}	(99 if double)

Electrical connection — c a b
Electrical wiring harness code (see “Electrical connections” on the right)

Electrical outlet
- 0 — Electrical outlet to hours “0” or “12”
- 3 — Electrical outlet to hours “3”
- 6 — Electrical outlet to hours “6”
- 9 — Electrical outlet to hours “9”

Connector type — M 1 2
Electrical connection type: M12

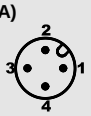
CAN termination — N
Without embedded CAN bus termination

Potentiometer — P 5
Potentiometer type: 10 KΩ, 1 round, 5 x 10^5 cycles

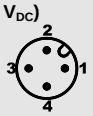
Custom configurations are available on request.

Electrical connections

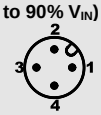
Current output (4 to 20 mA)
M12 plug
Code: **M65** single channel
Code: **M66** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Negative power supply
3: Angle signal 4: Length signal



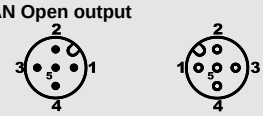
Voltage output (0.5 to 4.5 V_{DC})
M12 plug
Code: **M25** single channel
Code: **M26** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Negative power supply
3: Angle signal 4: Length signal



Ratiometric output (10% to 90% V_{IN})
M12 plug
Code: **M45** single channel
Code: **M46** double channel
1: V_{IN}=5 V_{DC}
2: Negative power supply
3: Angle signal 4: Length signal



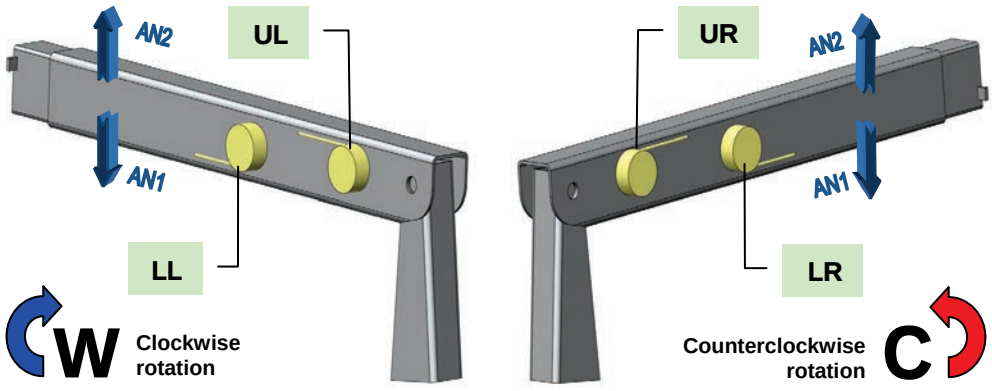
CAN Open output



M12 plug — **M12 receptable**
Code: **M07** single or double channel
1: Cable shield
2: V_{IN}=9 to 33 V_{DC}
3: Negative power supply
4: CH
5: CL

Available fittings configurations

Rotation direction - Rotation angles - Rope output



Available configurations:
W AN1AN2 UL
W AN1AN2 LL

Available configurations:
C AN1AN2 UR
C AN1AN2 LR

Available angle configurations

AN1	AN2	Range
045	135	180°
090	090	180°
135	135	270°
180	180	360°

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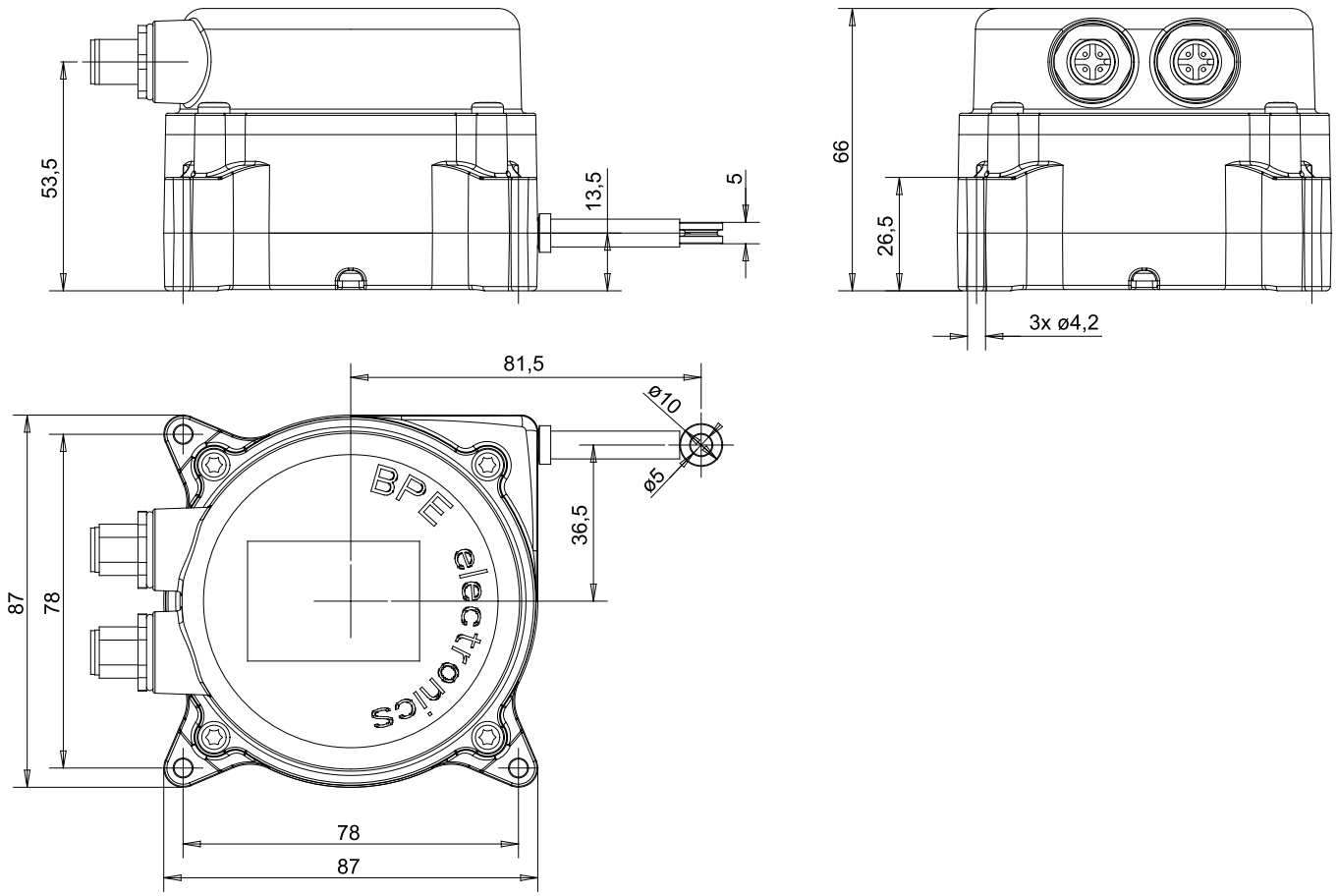
Dimensions [mm]



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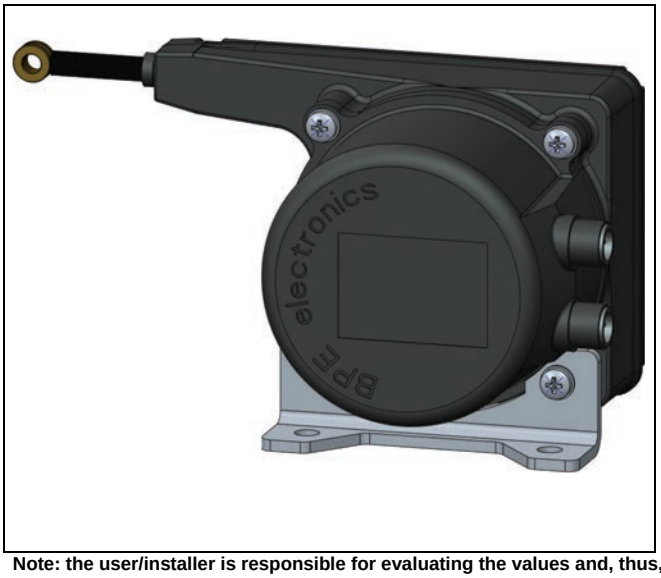
Accessories

Type	Description	Code	Notes
Counterpart Connector	M12 receptacle connector: loose connector with 4pin, screw terminals.	7.003.045	
Extension cable	Length 5000mm, multipolar cable for dynamic installations, 4 conductors (brown, grey, black, yellow/green) sections 0.5mm², external grey jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.431	
Extension cable	Length 10000mm, multipolar cable for dynamic installations, 4 conductors (brown, grey, black, yellow/green) sections 0.5mm², external grey jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.433	
CAN Counterpart Connector	M12 receptacle connector: loose connector with 5pin, screw terminals.	7.003.059	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green) , external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.469	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.409	
CAN Counterpart Connector	M12 plug connector: loose connector with 5pin, screw terminals.	7.003.071	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.486	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.514	
CAN Network Termination	M12 5 pin receptacle connector cap with CAN network termination.	7.003.069	
CAN Network Termination	M12 5 pin plug connector cap with CAN network termination.	7.003.070	
Adapter	Ring to threaded rod adapter	7.003.076	

Micro angle/length transducer

ASu Series



- Compact angle length transducer
- MEMS technology angular sensor
- Single channel. Possible to have it with double channel for PL d (EN13849-1) systems
- Voltage, current, ratiometric or CAN bus output
- Waterproof, plastic, compact body
- Easy to install
- PA12-coated 7x7 AISI 316 stainless steel rope
- Ninety degrees orientable fixing bracket
- Ninety degrees orientable electrical connection with M12x1 connectors
- Ring for steel rope fast & easy fix

Typical fields of application: mounted cranes, mobile cranes, aerial platforms, industrial automation and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

MEMS sensor technology | Full angle range | 5.5 m max length | 84.5 mm only tickness | Protection Grade IP66 | CAN Open connection | Until -40 °C | Single or double channel | Double crossed channel

Technical data

Power supply	5±0.2 V_{DC}	from 9 to 33 V_{DC}		
Outputs	10% to 90% V_{IN} ratiometric	0.5 ÷ 4.5 V_{DC}	CAN bus	from 4 to 20 mA
Maximum output current	10 mA	10 mA	-	-
Current consumption (1) [double]	10 [20] mA	30 [60] mA		30+20 [60+40] mA

(1) Device supply current (and max output load for 4 to 20 mA version) for single and double channel version

Measurable length	up to 4.0m	5.5m
Length transducer (linearity, hysteresis, repetibility) accuracy	± 0.50% FS	± 0.75% FS
Length transducer resolution	0.03% FS	
Length transducer temperature drift	< 100 ppm / °C	
Angular range	from 0 to 360 degrees	
Angular transducer accuracy	± 0.5 degrees	
Angular transducer resolution	0.1 degrees	
Angular transducer temperature drift	± 0.01 degrees /°C	
Rope diameter (with coating)	0.63 (0.80) mm	
Rope breaking force	320 N	
Min/max force to pull out the rope	3.0/6.0 N	
Max wire speed	3 m/s	
Max wire acceleration	5 m/s^2	
Operating temperature	from -40 to +70 °C	
Maximum weight	0.60 kg	
Electric insulation	6500 V_{AC}	
Housing material	PA 6.6 + 35% glass reinforced and mineral filled	
Standard protection grade (electronics and spring box)	IP66	
CE conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	
EMC: Immunity | Emission	EN 61000-6-2 | EN61000-6-3	
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	
MTTFd (electronic board)	EN 13849-1: ≥ 100 years	
Maximum number of mechanical cycles	$1x10^5$ ($5x10^5$ on request)	

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Ordering Code

ASu	5.5	D	W	090090	UL	1	R	99	M26	3	S6	N	P1
Transducer type	Length	Channels	Rotation direction	Rotation angles	Rope output	Steel rope	Ring type	Electrical output	Electrical connection	Electrical outlet	Mounting bracket	CAN termination	Potentiometer

Length

x	.	y

Available lengths: 2.0 m, 4.0 m, 5.5 m

Channels

S	Single channel
D	Double channel
R	Double channel with crossed signals

Rotation direction

W	Clockwise rotation direction (see “Available fittings configurations”)
C	Counterclockwise rotation direction (see “Available fittings configurations”)

Rotation angles

A	N	1	A	N	2

AN1: angle opposed to rotation direction
AN2: angle concordant to rotation direction
(see “Available angle configurations”)

Rope output

U	L
L	R

Steel rope outlet on upper left side
Steel rope outlet on lower right side

Steel rope

1

AISI 316 stainless steel polyamide coated rope PA12 ø 0.63/0.80 mm 7x7

Ring type

R

With metallic ring at the end of the steel rope ($Ø_{IN}/Ø_{OUT}$: 5/10 mm)

Electrical output

4	_	Current output: 4 to 20 mA (44 if double)
5	_	Ratiometric output: 10% to 90% V_{IN}. V_{IN}=+5 V_{DC} (55 if double)
7	_	CAN output: CAN Open (77 if double)
9	_	Voltage output: 0.5÷4.5 V_{DC}. V_{IN}=9÷33 V_{DC} (99 if double)

Electrical connection

c	a	b

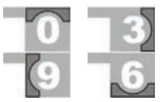
Electrical wiring harness code (see “Electrical connections” on the right)

Electrical outlet

0	Set to hours “0” or “12”
3	Set to hours “3”
6	Set to hours “6”
9	Set to hours “9”

Mounting bracket

S	0	Set to hours “0” or “12”
S	3	Set to hours “3”
S	6	Set to hours “6”
S	9	Set to hours “9”



CAN termination

N

Without internal CAN bus termination

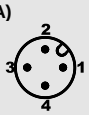
Potentiometer

P	1	Potentiometer type: 10 KΩ, 10 rounds, 1 x 10^5 cycles
P	3	Potentiometer type: 10 KΩ, 5 rounds, 1 x 10^5 Cycles. For 2.0 meters only
P	4	Potentiometer type: 10 KΩ, 10 rounds, 5 x 10^5 cycles

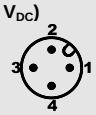
Custom configurations are available on request.

Electrical connections

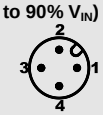
Current output (4 to 20 mA)
M12 plug
Code: **M65** single channel
Code: **M66** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Negative power supply
3: Angle signal 4: Length signal



Voltage output (0.5 to 4.5 V_{DC})
M12 plug
Code: **M25** single channel
Code: **M26** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Negative power supply
3: Angle signal 4: Length signal



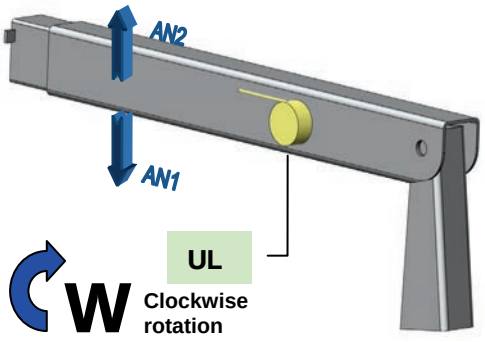
Ratiometric output (10% to 90% V_{IN})
M12 plug
Code: **M45** single channel
Code: **M46** double channel
1: V_{IN}=5 V_{DC}
2: Negative power supply
3: Angle signal 4: Length signal



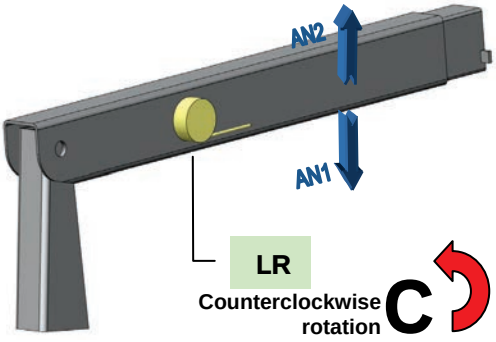
CAN Open output
Two M12 plugs
Code: **M06** single or double channel
1: Cable shield
2: VIN=9 to 33 VDC
3: Negative power supply
4: CH
5: CL

Available fittings configurations

Rotation direction - Rotation angles - Rope output



Available fitting configurations:
W AN1AN2 UL

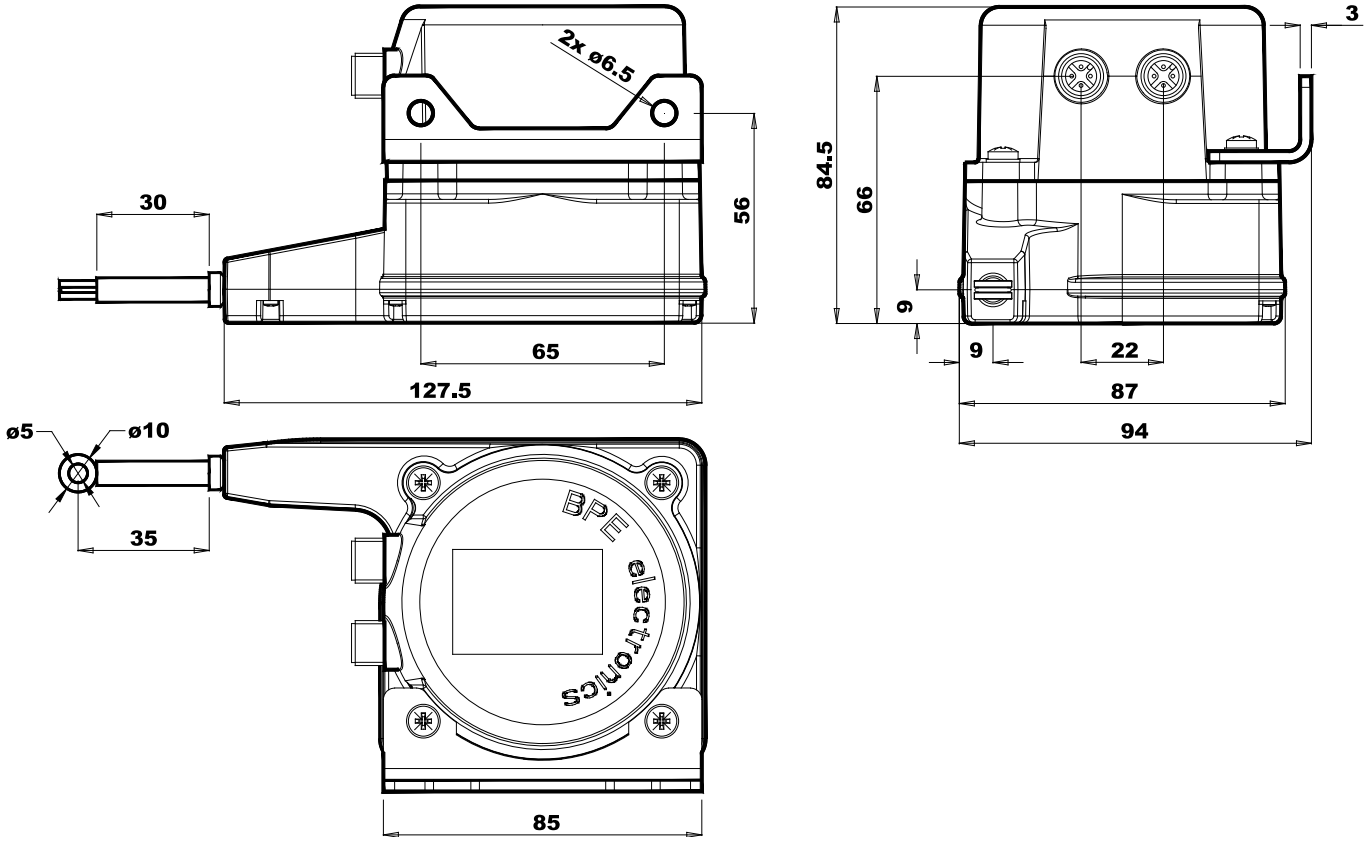


Available fitting configurations:
C AN1AN2 LR

Available angle configurations

AN1	AN2	Range
045	135	180°
090	090	180°
135	135	270°
180	180	360°

Dimensions [mm]

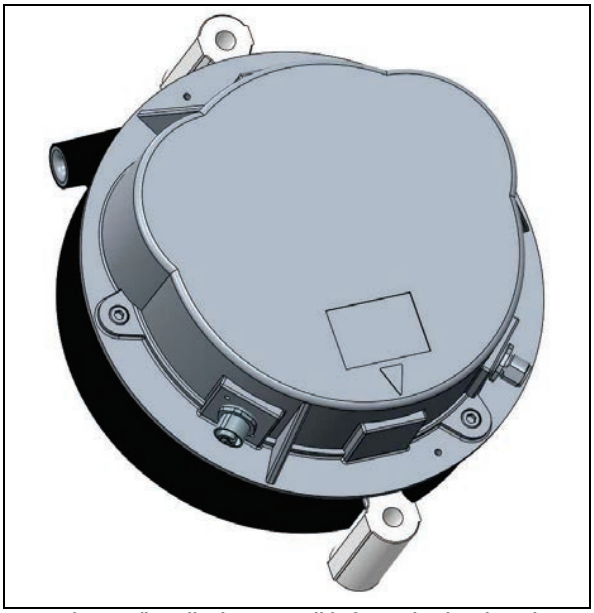


Accessories

Type	Description	Code	Notes
Counterpart Connector	M12 receptacle connector: loose connector with 4pin, screw terminals.	7.003.045	
Extension cable	Length 5000mm, multipolar cable for dynamic installations, 4 conductors (brown, grey, black, yellow/green) sections 0.5mm², external grey jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.431	
Extension cable	Length 10000mm, multipolar cable for dynamic installations, 4 conductors (brown, grey, black, yellow/green) sections 0.5mm², external grey jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.433	
CAN Counterpart Connector	M12 receptacle connector: loose connector with 5pin, screw terminals.	7.003.059	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green) , external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.469	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.409	
CAN Network Termination	M12 5 pin receptacle connector cap with CAN network termination.	7.003.069	
Adapter	Ring to threaded rod adapter	7.003.076	

Angle/length transducer

A/S Series



- Angle and length transducer for work area management
- MEMS technology angular sensor
- Single channel. Possible to have it with double channel for PL d (EN13849-1) systems
- Voltage, current, ratiometric or CAN bus output
- Electrical connection with M12x1 connectors
- Standard length: 8.5 and 12.5 meters
- PA12-coated 7x7 AISI 316 stainless steel rope
- Waterproof, compact aluminium body
- Easy to install
- Right or left side mounting version
- Provided with a plastic casing to protect the pulley

On request
- Special length
- Electrical connection with cable

Typical fields of application: truck mounted cranes, mobile cranes, aerial platforms, and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

MEMS sensor technology | Full angle range | 12.5 m max length | Sturdy construction | Protection Grade IP65 | CAN Open connection | Single or double channel | Double crossed channel

Technical data

Power supply	5±0.2 V_{DC}	from 9 to 33 V_{DC}		
Outputs	10% to 90% V_{IN} ratiometric	0.5 ÷ 4.5 V_{DC}	CAN bus	from 4 to 20 mA
Maximum output current	10 mA	10 mA	-	-
Current consumption (1) [double]	10 [20] mA	30 [60] mA		30+20 [60+40] mA

(1) Device supply current (and max output load for 4 to 20 mA version) for single and double channel version

Measurable length	up to 12.5m
Length transducer (linearity, hysteresis, repetibility) accuracy	± 1.0% FS
Length transducer resolution	0.03% FS
Length transducer temperature drift	< 100 ppm / °C
Angular range	from 0 to 360 degrees
Angular transducer accuracy	± 0.5 degrees
Angular transducer resolution	0.1 degrees
Angular transducer temperature drift	± 0.01 degrees /°C
Rope diameter (with coating)	1.5 (2.0) mm
Rope breaking force	> 1000 N (greater than)
Min/max force to pull out the rope	9,5 N (± 40 %)
Max wire speed	3 m/s
Max wire acceleration	5 m/s^2
Operating temperature	from -25 to +70 °C
Maximum weight	2.3 kg
Housing material	aluminium body/ plastic pulley and casing
Standard protection grade (electronics and spring box)	IP65
CE conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC
EMC: Immunity | Emission	EN 61000-6-2 | EN61000-6-3
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz
MTTFd (electronic board)	EN 13849-1: ≥ 100 years
Maximum number of mechanical cycles	$1x10^5$ ($2.5x10^5$ on request)

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Ordering Code

A/S	08.5	D	W	090090	UL	5	F4	99	M26	D	N	P1	C
Transducer type	Length	Channels	Rotation direction	Rotation angles	Rope output	Steel rope	Suppl. rope	Electrical output	Electrical connection	Electrical outlet	CAN termination	Potentiometer	Casing type

Length — x x . y — Available lengths: 8.5 m, 12.5 m

Channels

S	Single channel
D	Double channel
R	Double channel with crossed signals

Rotation direction

W	Clockwise rotation direction (see “Available fittings configurations”)
C	Counterclockwise rotation direction (see “Available fittings configurations”)

Rotation angles — A N 1 A N 2

AN1: angle opposed to rotation direction
AN2: angle concordant to rotation direction
(see “Available angle configurations”)

Rope output

U R	Steel rope outlet on upper right side
U L	Steel rope outlet on upper left side
L R	Steel rope outlet on lower right side
L L	Steel rope outlet on lower left side

Steel rope

5	AISI 316 stainless steel polyamide coated rope PA12 Ø 1.5/2.0 mm 7x7

Supplementary rope

F 4	Supplementary steel rope length (Standard: 04 meters)

Electrical output

4 _	Current output: 4 to 20 mA	(44 if double)
5 _	Ratiometric output: 10% to 90% V_{IN}. V_{IN}=+5 V_{DC}	(55 if double)
7 _	CAN output: CAN Open	(77 if double)
9 _	Voltage output: 0.5÷4.5 V_{DC}. V_{IN}=9÷33 V_{DC}	(99 if double)

Electrical connection — c a b — Electrical wiring harness code (see “Electrical connections” on the right)

Electrical outlet

L	Electrical connector used: left
R	Electrical connector used: right
D	Electrical connector used: both (for double transducers)

CAN termination

N	Without internal CAN bus termination

Potentiometer

P 1	Potentiometer type: 10 KΩ, 10 rounds, 1 x 10^5 cycles
P 4	Potentiometer type: 10 KΩ, 10 rounds, 2.5 x 10^5 cycles

Casing type

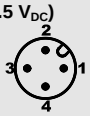
C	With a plastic casing to protect the pulley

Custom configurations are available on request.

Electrical connections

Current output (4 to 20 mA)
M12 plug
Code: **M65** single channel
Code: **M66** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Negative power supply
3: Angle signal 4: Length signal

Voltage output (0.5 to 4.5 V_{DC})
M12 plug
Code: **M25** single channel
Code: **M26** double channel
1: V_{IN}=9 to 33 V_{DC}
2: Negative power supply
3: Angle signal 4: Length signal



Ratiometric output (10% to 90% V_{IN})
M12 plug
Code: **M45** single channel
Code: **M46** double channel
1: V_{IN}=5 V_{DC}
2: Negative power supply
3: Angle signal 4: Length signal

CAN Open output

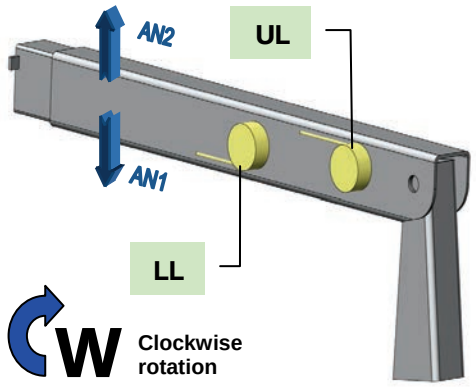
M12 plug

M12 receptable

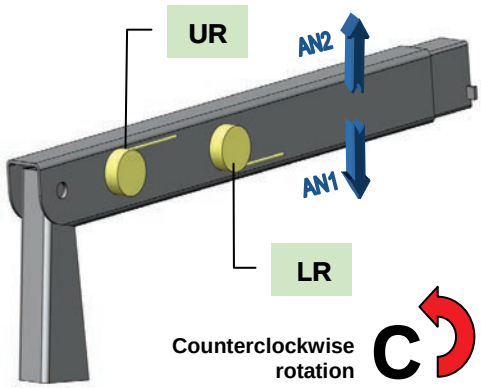
Code: **M07** single or double channel
1: Cable shield
2: V_{IN}=9 to 33 V_{DC}
3: Negative power supply
4: CH
5: CL

Available fittings configurations

Rotation direction - Rotation angles - Rope output



Available configurations:
W AN1AN2 UL
W AN1AN2 LL

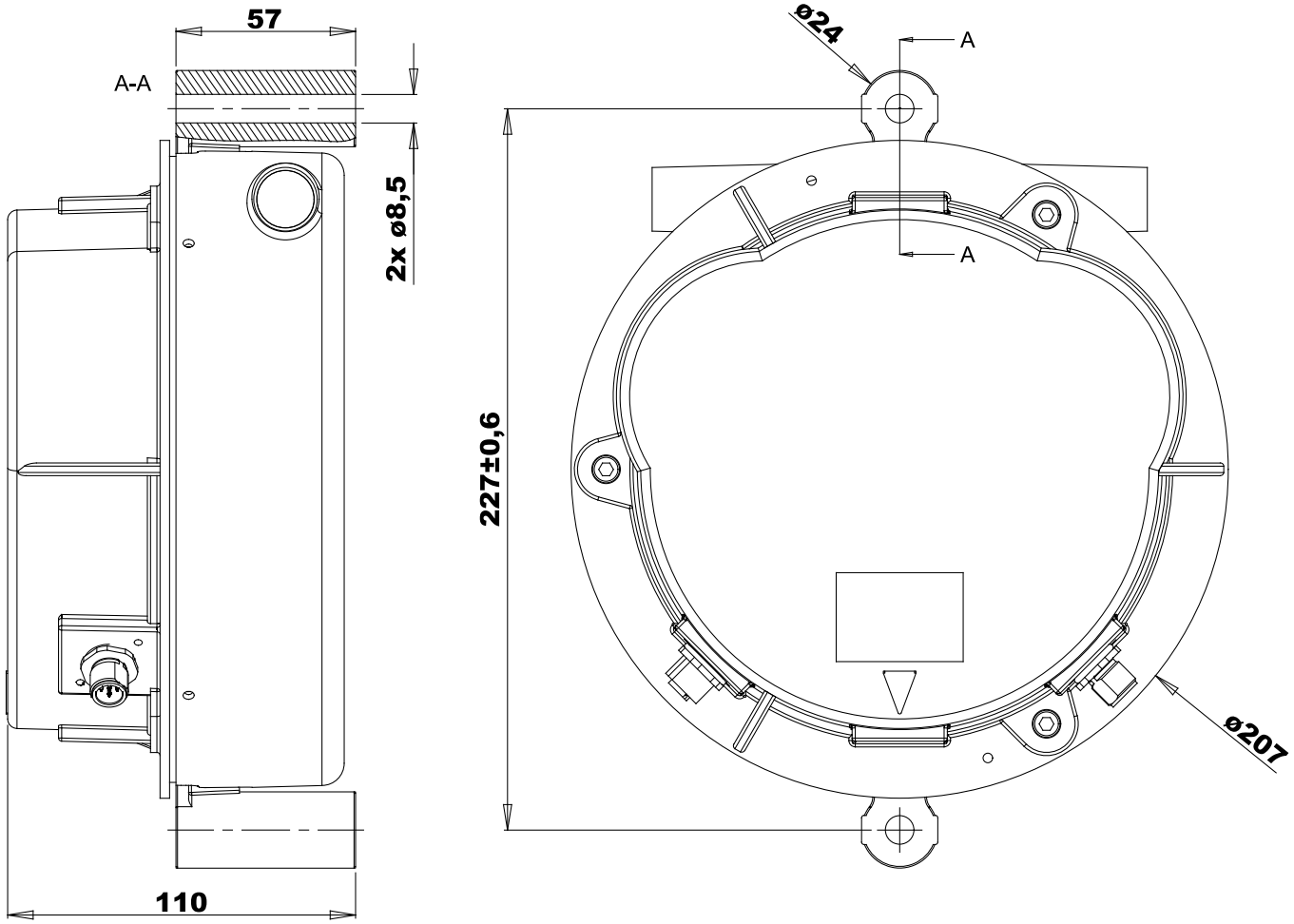


Available configurations:
C AN1AN2 UR
C AN1AN2 LR

Available angle configurations

AN1	AN2	Range
090	090	180°
135	135	270°
180	180	360°

Dimensions [mm]



Accessories

Type	Description	Code	Notes
Counterpart Connector	M12 receptacle connector: loose connector with 4pin, screw terminals.	7.003.045	
Extension cable	Length 5000mm, multipolar cable for dynamic installations, 4 conductors (brown, grey, black, yellow/green) sections 0.5mm², external grey jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.431	
Extension cable	Length 10000mm, multipolar cable for dynamic installations, 4 conductors (brown, grey, black, yellow/green) sections 0.5mm², external grey jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.433	
CAN Counterpart Connector	M12 receptacle connector: loose connector with 5pin, screw terminals.	7.003.059	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green) , external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.469	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.409	
CAN Counterpart Connector	M12 plug connector: loose connector with 5pin, screw terminals.	7.003.071	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.486	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.514	
CAN Network Termination	M12 5 pin receptacle connector cap with CAN network termination.	7.003.069	
CAN Network Termination	M12 5 pin plug connector cap with CAN network termination.	7.003.070	

Pressure transmitter

K1 Series

- Pressure transmitter for OEM applications
- Designed for use in heavy duty industrial environments
- 4 to 20 mA (2-wire) or 0.5 to 4.0 V_{DC} output
- Temperature compensated
- High vibration stability
- Waterproof, plastic and stainless steel compact body
- Electrical connection with M12x1 or DT04 connector
- Process connection G ¼ A (DIN 3852-E)

On request:
- With 5 and 10 meters electrical extension

Typical fields of application: mounted cranes, mobile cranes, aerial platforms, industrial automation and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Protection Grade IP67

Ultra durable

Until +125 °C

Technical data

Output signal	4 to 20 mA	10 to 80% ratiometric
Power supply (V_{IN})	10 to 36 V_{DC}	5V ± 0.5 V_{DC}
Accuracy, hysteresis and repeatability	< ±0.5 (BFSL), < ±1 %FS	
Operating temperature	from –40 to +125 °C	
Compensated temperature range	0 to +80 °C	
Thermal zero point shift	≤± 0.15 %FS/10K (1)	
Thermal sensitivity (span) shift	≤± 0.15 %FS/10K (1)	
Standard protection grade	IP67	
Maximum weight	70 g	
Construction material: wetted parts | case	Stainless steel | highly resistive, fiberglass-enforced plastic (PBT)	
Max driving torque	30 Nm	
CE conformity	EMC Directive: 2014/30/EU PED Directive: 97/23/EC	
EMC: Immunity | Emission	EN 61326-1 | EN 61326-2-3	
Vibration resistance: Sinus	EN 60068-2-6: 20 g	
Shock resistance: Shock	EN 60068-2-27: 500 g	
MTTFd (electronic board)	≥ 100 years	
Maximum number of mechanical cycles	$8x10^6$	

(1) Inside compensated temperature range

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Ordering Code

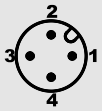
TP	V_	S	K1	250	G1A	M4P	N	NOT
Type	**Electrical output**	**Channels**	**Series**	**Pressure Range**	**Process connection**	**Output connection**	**Reserved**	**Custom configurations**

Electrical output	**A** _	Current output: 4 to 20 mA (2 wire)
	V _	Voltage output: 0.5÷4.0 V_{DC} (ratiometric, 3 wire)
Channels	**S**	Single channel
Series	**K 1**	K1 Series
Pressure range	**2 5 0**	0 … 250 bar
	4 0 0	0 … 400 bar
Process connection	**G 1 A**	G ¼ A (DIN 3852-E)
Output connection	**c a b**	Electrical wiring harness code (see "Electrical connections")
Reserved	**N**	•
Custom configurations	**N O T**	Standard

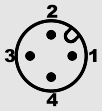
Custom configurations are available on request.

Electrical connections

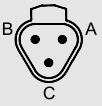
Current output
M12 plug
Code: **M6F**
1: $+V_{IN}$
2: Not used
3: $-V_{IN}$ (Output)
4: Not used



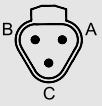
Voltage output
M12 plug
Code: **M4P**
1: V_{IN}=4.5 to 5.5 V_{DC}
2: Output
3: 0 V_{DC}
4: Not used



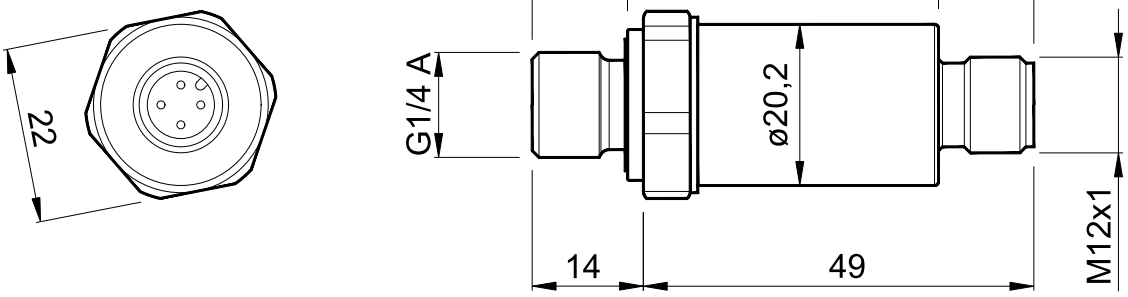
Current output
DT04-3P
Code: **D6F**
A: $+V_{IN}$
B: $-V_{IN}$ (output)
C: Not used

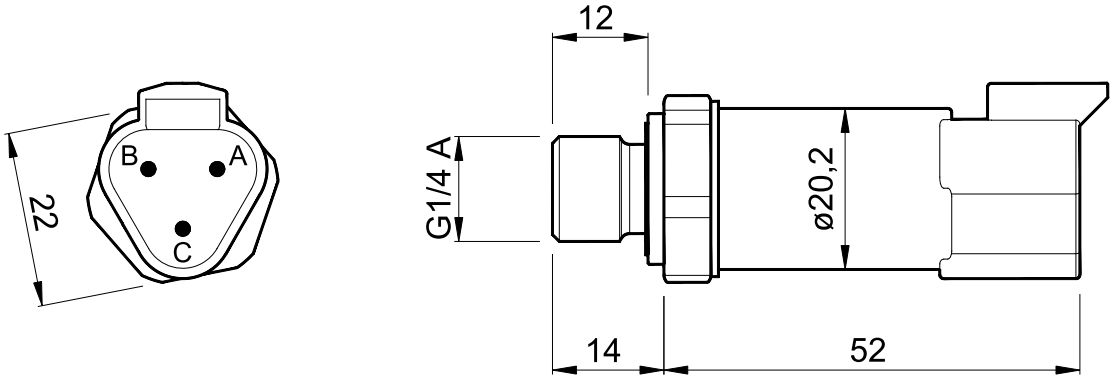


Current output
DT04-3P
Code: **D4P**
A: V_{IN}=4.5 to 5.5 V_{DC}
B: 0 V_{DC}
C: Output



Dimensions [mm]



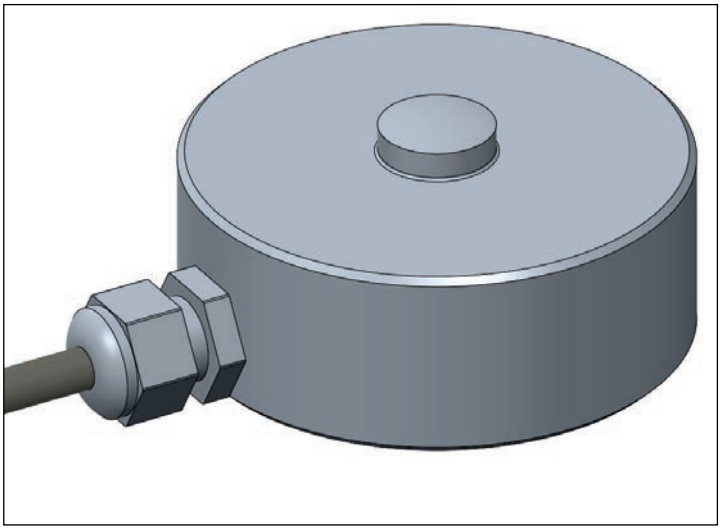


Accessories

Type	Description	Code	Notes
Counterpart Connector	M12 receptacle connector: loose connector with 4pin, screw terminals.	7.003.045	
Extension cable	Length 5000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.347	
Extension cable	Length 10000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.342	
Extension cable	Length 15000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.393	
Counterpart Connector	Deutsch DT06-3S plug connector with 3 female terminals (code 0462-201-16141) and wedge-lock (code W3S).	7.003.043	
Extension cable	Length 5000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. DEUTSCH DT06-3S plug connector with 3 female terminals.	7.180.430	
Extension cable	Length 10000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. DEUTSCH DT06-3S plug connector with 3 female terminals.	7.180.466	
Extension cable	Length 15000mm, multipolar cable for dynamic installations, 3 conductors (brown, blue, yellow/green) sections 0.5mm², external black jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. DEUTSCH DT06-3Splug connector with 3 female terminals.	7.180.458	

Compression load cell

TC35 Series



- Outer diameter 35 mm
- Made of stainless steel
- Single channel version with 4xAWG24 3.0 m shielded cable
- Double channel version, suitable for PL d (EN13849-1) systems, with 8xAWG24 1.5 m cable on M12 connector

On request:

- Special finishes and materials
- Load cell amplifier (to be ordered separately): BPE «ADS-200 MkII» series

Typical fields of application: Normally used to measure the load in winches and generic mobile machines

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Technical data

Power supply	from 0 to 15 V_{DC}
Output	2.0 mV/V
Nominal load	1500 / 2500 / 5000 daN
Linearity, repeatability, hysteresis	± 1% FS
Zero offset	± 1% FS
FS and zero temperature coefficient	0.008 (1) %FS / °C
Insulation	> 5 GΩ @ 15 V_{DC}
Input and output resistance	350 Ω
Safe overload	150%
Ultimate load	300%
Operating temperature	from -20 to +70°C
Maximum weight	0.3 kg
Housing material	stainless steel
Standard protection grade	IP67
CE conformity	EMC Directive: 2014/30/EU
EMC: Immunity | Emission	EN 61000-6-2 | EN 61000-6-3
Maximum number of mechanical cycles	$1x10^6$ cycles

(1) Between -10 °C and +40 °C

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Compression load cell

TC35 Series

Ordering Code

TC35	02500	S	H16	2	1M6_	L03000	NOT	CCF
Transducer type	Nominal load	Channels	Height	Housing material	Cable gland	Cable length	Custom configuration	Electrical connection

Nominal load	01500	1500 daN
	02500	2500 daN
	05000	5000 daN
Channels	S	Single channel
	D	Double channel
Height	H16	16.0 mm
Housing material	2	Stainless steel
Cable gland	1M6_	With M6 cable gland (single channel version)
	NOT_	Without cable gland (double channel version)
Cable length	L00300	Single channel: 3.0 m cable length
	L01500	Double channel: 1.5 m cable length (M12 connector)
Custom configuration	NOT	Not amplified signal
Electrical connection	cab	Electrical wiring harness code (see on the right)

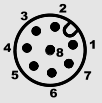
Custom configurations are available on request.

Electrical connections

Code: **CCF** single channel

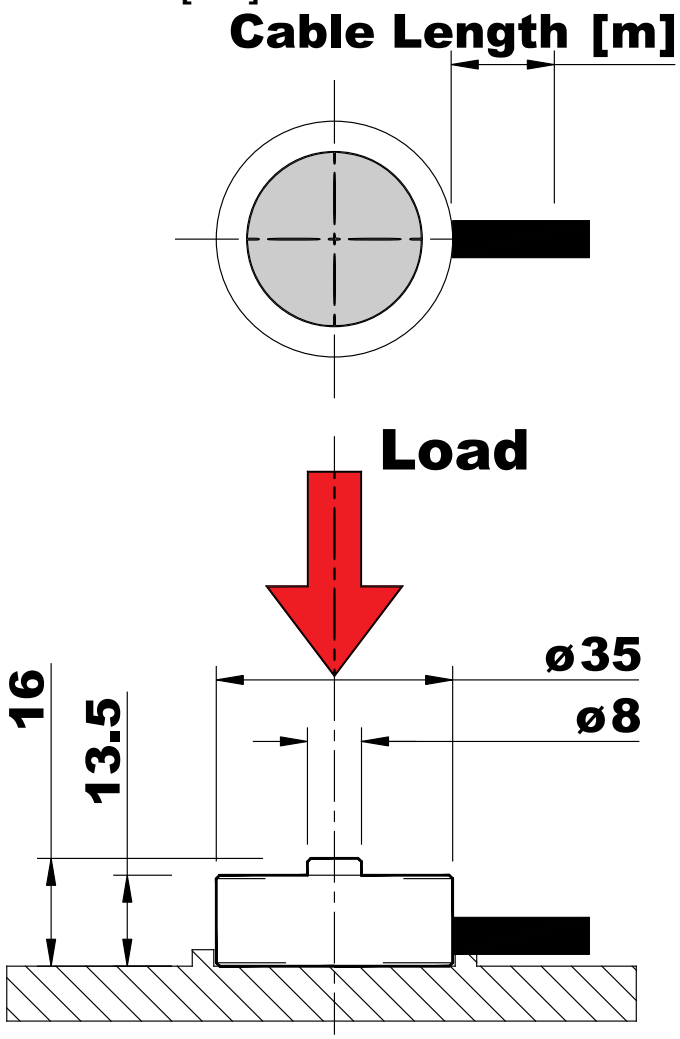
Red	: Positive Supply
Black	: Negative Supply
Yellow or Green	: Signal –
White	: Signal +
Shield	: Not connected

Code: **MC0** double channel **M12 plug**

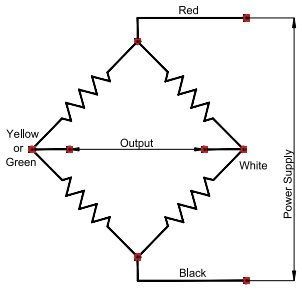


1: Positive Supply 1
2: Negative Supply 1
3: Signal 1+
4: Signal 1-
5: Positive Supply 2
6: Negative Supply 2
7: Signal 2+
8: Signal 2-

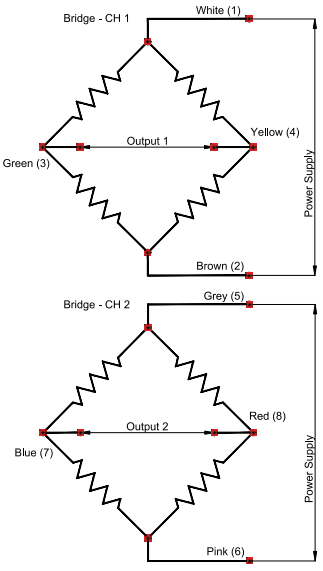
Dimensions [mm]



Single channel



Double channel



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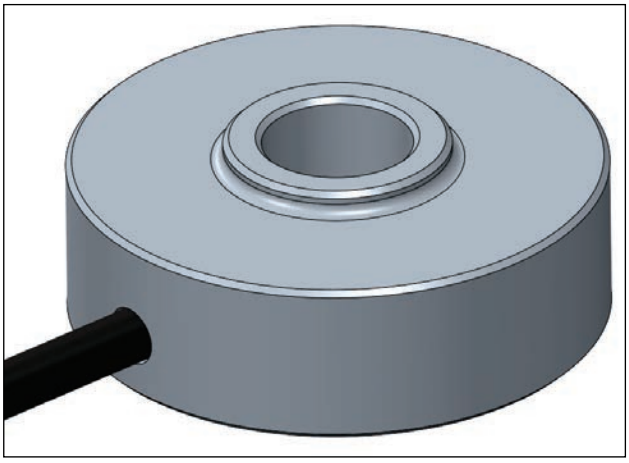
Accessories

Type	Description	Code	Notes
Counterpart Connector	M12 receptacle connector: loose connector with 8pin, screw terminals.	7.003.065	

Compression load cell

TC45 Series



- Outer diameter 45 mm
- Made of stainless steel
- Electrical connection with 4xAWG24 1.5 m shielded cable

On request:
- Special finishes and materials
- Load cell amplifier (to be ordered separately): BPE «ADS-200 MkII» series

Typical fields of application: Normally used to measure the load in winches and generic mobile machines

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Output Sensitivity | Protection Grade IP67 | Single channel

Technical data

Power supply	from 0 to 15 V_{DC}
Output	2.0 mV/V
Nominal load	2750 / 6000 daN
Linearity, repeatability, hysteresis	± 1% FS
Zero offset	± 1% FS
FS and zero temperature coefficient	0.008 (1) %FS / °C
Insulation	> 5 GΩ @ 15 V_{DC}
Input and output resistance	350 Ω
Safe overload	150%
Ultimate load	300%
Operating temperature	from -20 to +70°C
Maximum weight	0.2 kg
Housing material	stainless steel
Standard protection grade	IP67
CE conformity	EMC Directive: 2014/30/EU
EMC: Immunity | Emission	EN 61000-6-2 | EN 61000-6-3
Maximum number of mechanical cycles	1x10^6 cycles

(1) Between -10 °C and +40 °C

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Ordering Code

TC45	02750	S	H16	2	NOT_	L01500	NOT	CCF
Transducer type	**Nominal load**	**Channels**	**Height**	**Housing material**	**Cable gland**	**Cable length**	**Custom configuration**	**Electrical connection**

Nominal load	02750 06000	2750 daN 6000 daN
Channels	S	Single channel
Height	H16	16.0 mm
Housing material	2	Stainless steel
Cable gland	NOT_	Without cable gland
Cable length	L01500	1.5 m standard cable length
Custom configuration	NOT	Not amplified signal
Electrical connection	cab	Electrical wiring harness code (see on the right)

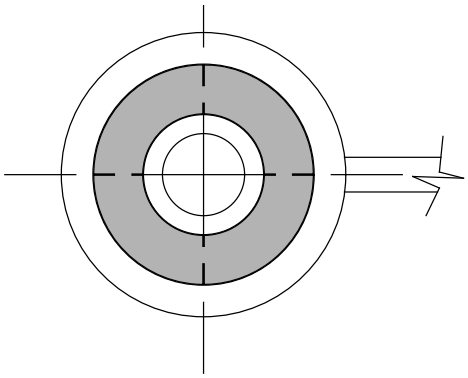
Custom configurations are available on request.

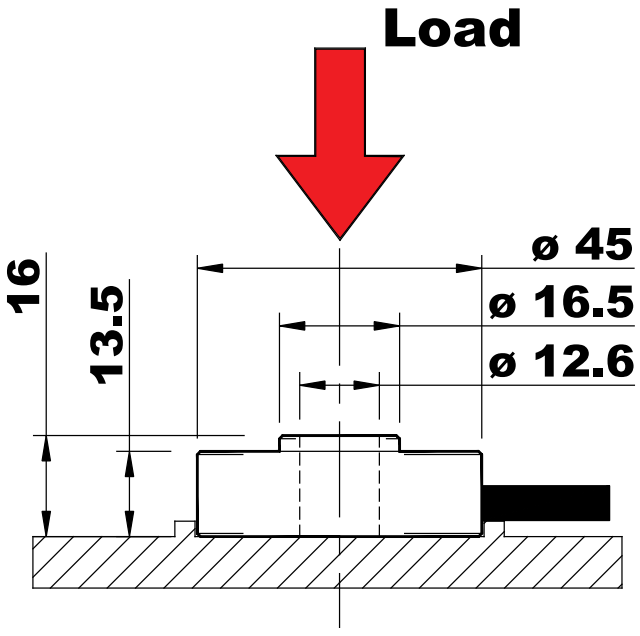
Electrical connections

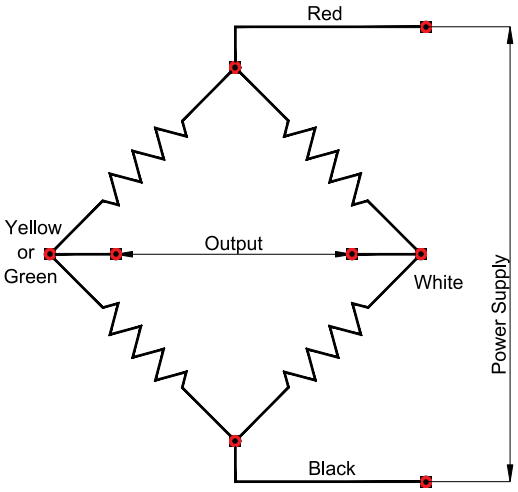
Code: **CCF** single channel

Red	: Positive Supply
Black	: Negative Supply
Yellow or Green	: Signal –
White	: Signal +
Shield	: Not connected

Dimensions [mm]

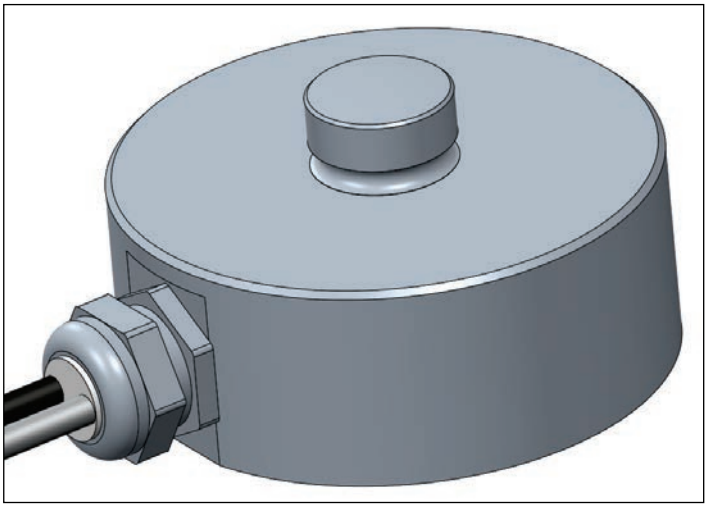






Compression load cell

TC82 Series



- Outer diameter 82 mm
- Made of stainless steel
- Double channel version suitable for PL d (EN13849-1) systems
- Electrical connection with 4xAWG24 5.0 m shielded cable

On request:

- Special finishes and materials
- Load cell amplifier (to be ordered separately): BPE «ADS-200 MkII» series

Typical fields of application: Normally used to measure the load in an aerial basket/work platform cages and generic mobile machines

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Technical data

Power supply	from 0 to 15 V_{DC}
Output	2.0 mV/V
Nominal load	1000 / 2500 / 5000 DaN
Linearity, repeatability, hysteresis	± 1% FS
Zero offset	± 1% FS
FS and zero temperature coefficient	0.008 (1) %FS / °C
Insulation	> 2 GΩ @ 15 V_{DC}
Input and output resistance	350 Ω
Safe overload	150%
Ultimate load	300%
Operating temperature	from -20 to +70°C
Maximum weight	1.25 Kg
Housing material	Stainless steel
Standard protection grade	IP66 / IP67
CE conformity	EMC Directive: 2014/30/EU
EMC: Immunity | Emission	EN 61000-6-2 | EN 61000-6-3
Maximum number of mechanical cycles	$1x10^6$ cycles

(1) Between -10 °C and +40 °C

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Compression load cell

TC82 Series

Ordering Code

TC82	01000	S	H44	2	1P11	L05000	NOT	CCF
Transducer type	**Nominal load**	**Channels**	**Height**	**Housing material**	**Cable gland**	**Cable length**	**Custom configuration**	**Electrical connection**

Nominal load	0 1 0 0 0	1000 daN
	0 2 5 0 0	2500 daN
	0 5 0 0 0	5000 daN
Channels	S	Single channel
	D	Double channel
Height	H 4 4	44.0 mm
Housing material	2	Stainless steel
Cable gland	1 P 1 1	With PG11 cable gland
Cable length	L 0 5 0 0 0	5.0 m cable length
Custom configuration	N O T	Not amplified signal
Electrical connection	c a b	Electrical wiring harness code (see on the right)

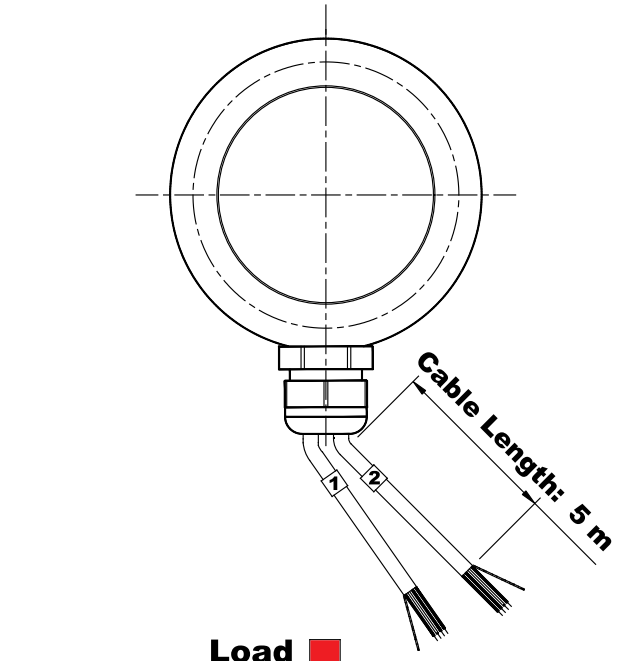
Custom configurations are available on request.

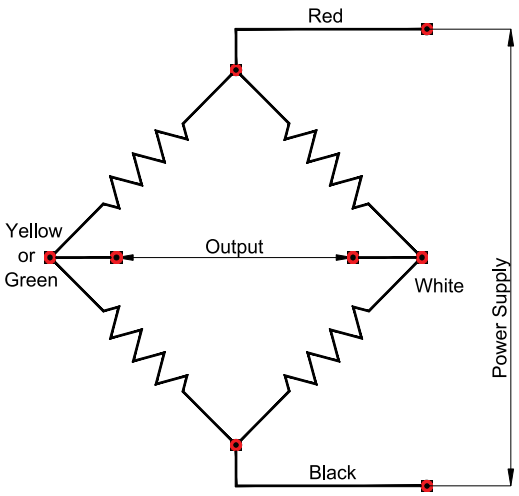
Electrical connections

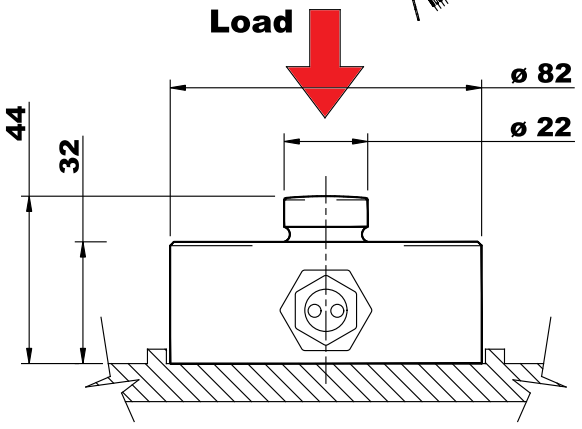
Code: **CCF** single or double channel

Red	: Positive Supply
Black	: Negative Supply
Yellow or Green	: Signal –
White	: Signal +
Shield	: Not connected

Dimensions [mm]







Product image for illustration purposes only

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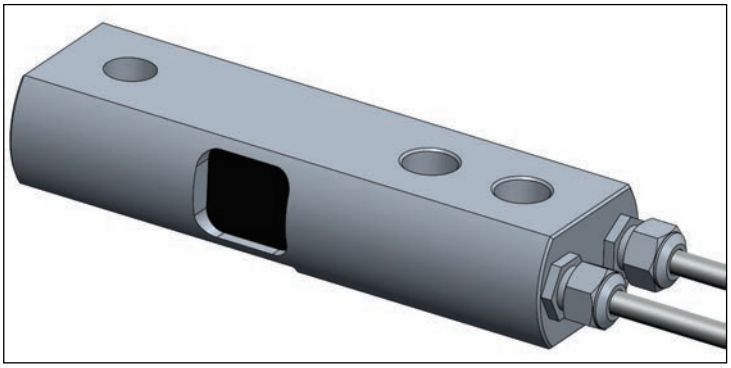
Shear load cell

TT Series



- Made of alloy structural steel
- Electrical connection with 4m shielded cable (4xAWG24)
- Double channel version suitable for PL d (EN13849-1) systems

On request:

- Special finishes and materials are available
- Load cell amplifier (to be ordered separately): BPE ADS-200 MkII

Typical fields of application: Normally used to measure the load in an aerial basket/work platform cages and generic mobile machines

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Output Sensitivity

Protection Grade IP67


Single or double channel

Technical data

Power supply	from 0 to 15 V_{DC}		
Output	2.0 mV/V	1.0 mV/V	1.7 mV/V
Nominal load	350 daN	1000 daN	5000 daN
Linearity, repeatability, hysteresis	± 1%FS		
Zero offset	± 1%FS		
FS and zero temperature coefficient	0.008 (1) %FS / °C		
Insulation	> 5 GΩ @15V_{DC}		
Input and output resistance	350 Ω		
Safe overload	150%		
Ultimate load	300%		
Operating temperature	from -20 to +70 °C		
Mounting bolt tightening torque (screws class 10.9)	65 Nm	65 Nm	280 Nm
Maximum weight	0.85 kg	0.9 kg	1.3 kg
Housing material	Alloy structural steel		
Standard protection grade	IP67		
CE conformity	EMC Directive 2014 / 30 / UE		
EMC: Immunity | Emission	EN 61000-6-2 | EN61000-6-3		
Maximum number of mechanical cycles	$1x10^6$ cycles		

(1) Between -10 °C and +40 °C

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Shear load cell

TT Series

Ordering Code

TT	01000	S	35	23	115	1	L04000	NOT	CCF
Transducer type	Nominal load	Channels	Outer diameter	Height	Length	Housing material	Cable length	Custom configuration	Electrical connection

Nominal load	00350	350 daN
	01000	1000 daN
	05000	5000 daN
Channels	S	Single channel
	D	Double channel
Outer diameter	35	350 daN and 1000 daN load
	38	5000 daN load
Height	23	350 daN and 1000 daN load
	32	5000 daN load
Length	115	Alloy structural steel
Housing material	1	Alloy structural steel
Cable length	L04000	4 m standard cable length
Custom configuration	NOT	No amplified signal
Electrical connection	cab	Electrical wiring harness code (see on the right)

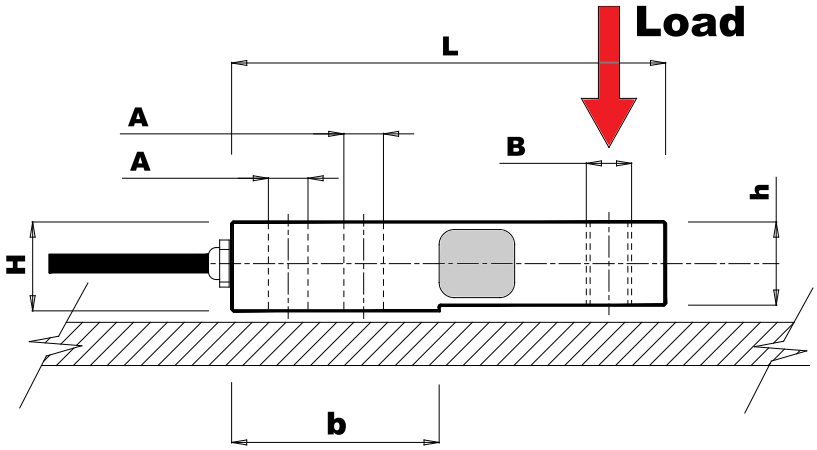
Custom configurations are available on request.

Electrical connections

Code: **CCF** single or double channel

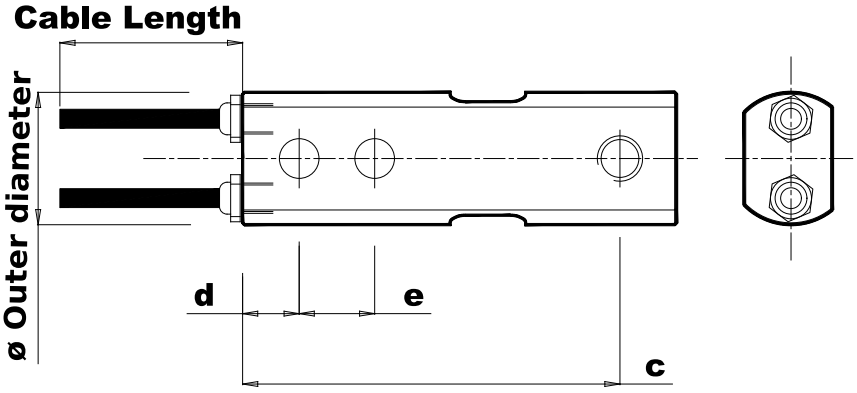
Red	: Positive Supply
Black	: Negative Supply
Yellow or Green	: Signal –
White	: Signal +
Shield	: Not connected

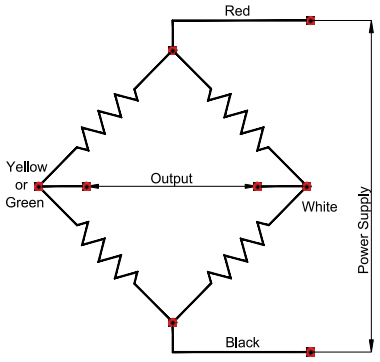
Dimensions [mm]



Load	Ø OD	L	b	c	d	e	h	H	Lc
350	35	115	55	100	15	20	22	23,5	4000
1000	35	115	55	100	15	20	22	23,5	4000
5000	38	115	58	95.5	16	25.4	30	32	4000

Load	A	B
350	Ø 10.5	M12
1000	Ø 10.5	M12
5000	Ø 16.5	Ø 20.5





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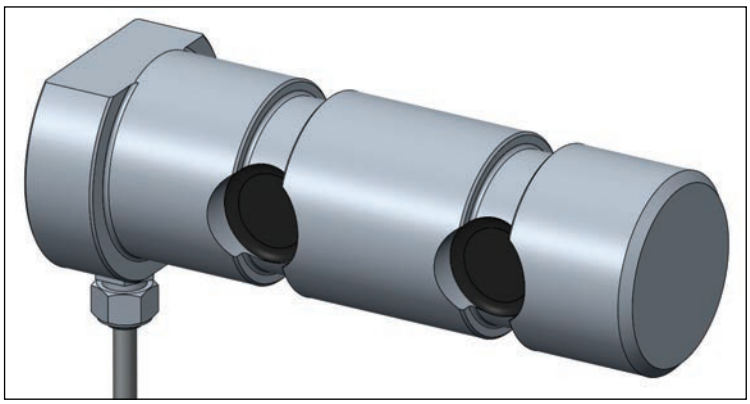
Pin load cell

TPE Series



- Made of alloy structural steel or stainless steel
- Double channel version suitable for PL d (EN13849-1) systems
- Electrical connection with 4xAWG24 4.0 m shielded cable
- Customizable nominal load and physical dimensions

On request:

- Special finishes and materials
- Load cell amplifier (to be ordered separately): BPE «ADS-200 MkII» series

Typical fields of application: Normally used to measure the load in mobile machines or on rotating components (pulley, sheaves, etc.)

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Technical data

Power supply	from 0 to 15 V_{DC}
Output	1.0 ÷ 2.0 mV/V
Nominal load	from 500 to 200000 daN
Linearity, repeatability, hysteresis	± 1% FS
Zero offset	± 1% FS
FS and zero temperature coefficient	0.008 (1) %FS / °C
Insulation	> 5 GΩ @15 V_{DC}
Input and output resistance	350 Ω
Safe overload	150%
Ultimate load	300%
Operating temperature	from -20 to +70 °C
Maximum weight	•
Housing material	alloy structural steel or stainless steel
Standard protection grade	IP67
CE conformity	EMC Directive: 2014/30/EU
EMC: Immunity | Emission	EN 61000-6-2 | EN 61000-6-3
Maximum number of mechanical cycles	$1x10^6$ cycles

(1) Between -10 °C and +40 °C

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Pin load cell

TPE Series

Ordering

Pin load cells are normally manufactured on custom request. It is compulsory to have a design or sketch drawing from customer. It is also compulsory to have the data shown in the following tables.

Nominal load	x x x x x x	Nominal load (daN)
Channels	S	Single channel
	D	Double channel
Outer diameter	Ø x x X . x	Expressed in millimeters. Compulsory to define tolerances
Pin length	L x x x . x	Expressed in millimeters. Define tolerances where necessary
Dimension	b x x x . x	See the following draw: supports width, distance between fixed and mobile part
Dimension	c x x x . x	
Dimension	d x x x . x	
Dimension	e x x x . x	
Housing material	1	Structural steel alloy
	2	Stainless steel (if possible: function of dimensions, load, etc.).
Cable length	x x x x x	Standard value is 4,000 mm
Electrical outlet	C R	Radial outlet
	C A	Axial outlet
Anti-rotation lock	✱	Define type and position for pin lock system
Output type	N O T	Not amplified signal
Electrical connection	c a b	Electrical wiring harness code (see on the right)

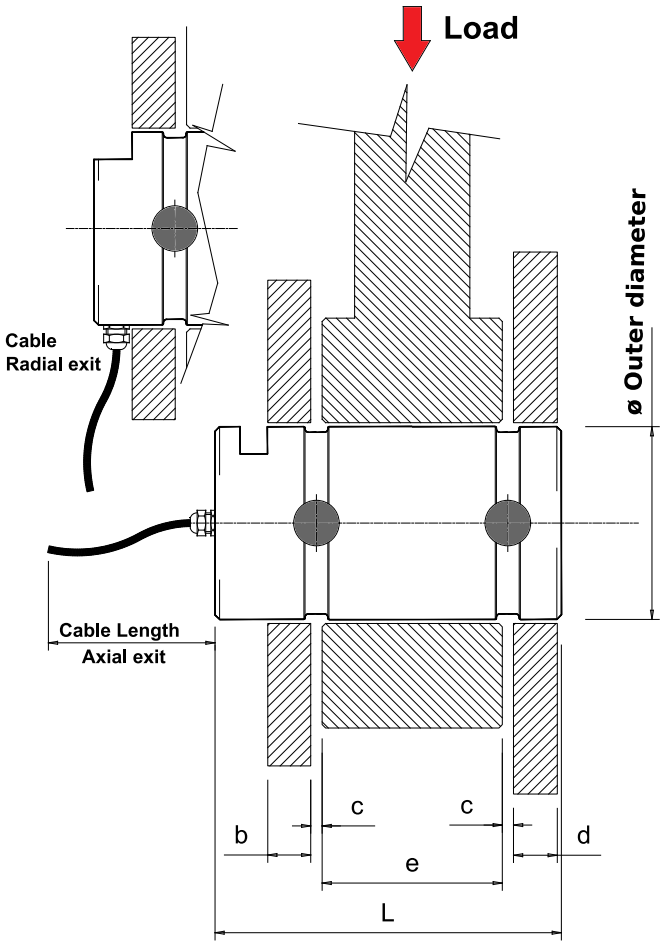
Custom configurations are available on request.

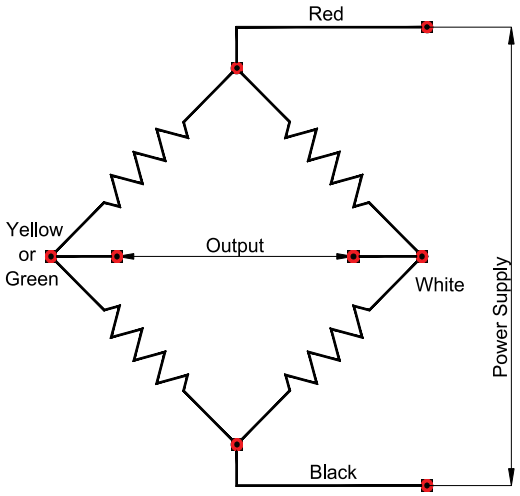
Electrical connections

Code: **CCF** single or double channel

Red	: Positive Supply
Black	: Negative Supply
Yellow or Green	: Signal –
White	: Signal +
Shield	: Not connected

Main dimensions [mm]





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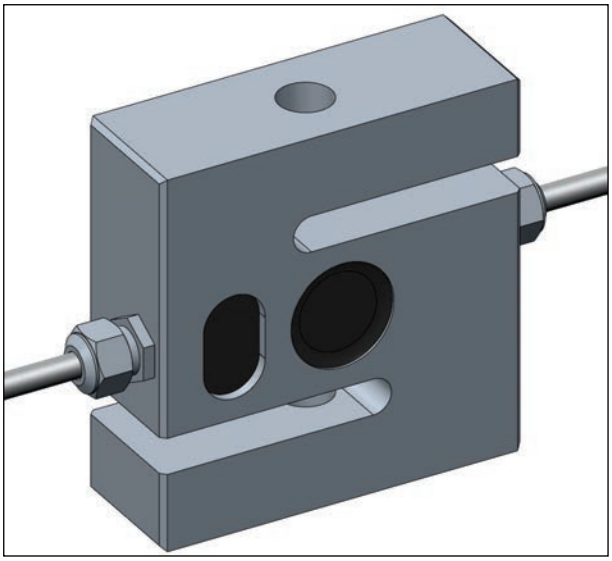
Tension load cell

TR1 Series



- Made of or stainless steel
- Double channel version suitable for PL d (EN13849-1) systems
- Electrical connection with two 6xAWG24 5.0 m shielded cables

On request:
- Special finishes and materials
- Load cell amplifier (to be ordered separately): BPE «ADS-200 MkII» series

Typical fields of application: Normally used to measure the load in an aerial basket/work platform cages and generic mobile machines

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Technical data

Power supply	from 0 to 15 V_{DC}
Output	2.0 mV/V
Nominal load	2500 daN
Linearity, repeatability, hysteresis	± 1% FS
Zero offset	± 1% FS
FS and zero temperature coefficient	0.008 (1) %FS / °C
Insulation	> 5 GΩ @ 15 V_{DC}
Input and output resistance	350 Ω
Safe overload	150%
Ultimate load	300%
Operating temperature	from -20 to +70 °C
Maximum weight	1.2 kg
Housing material	stainless steel
Standard protection grade	IP67
CE conformity	EMC Directive: 2014/30/EU
EMC: Immunity | Emission	EN 61000-6-2 | EN 61000-6-3
Maximum number of mechanical cycles	$1x10^6$ cycles

(1) Between -10 °C and +40 °C

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Tension load cell

TR1 Series

Ordering Code

TR 1	02500	D	M12	S1	2	2M8_	L5000	NOT	CCA
Transducer type	Nominal load	Channels	Fixing holes	Size	Housing material	Cable gland	Cable length	Custom configuration	Electrical connection

Nominal load	0 2 5 0 0	2500 daN
Channels	D	Double channel
Fixing holes	M 1 2	Fixing holes with M12 thread
Size	S 1	Standard size
Housing material	2	Stainless steel
Cable gland	2 M 8 _	With two M8 cable gland
Cable length	L 0 5 0 0 0	5.0 m standard cable length
Custom configuration	N O T	Not amplified signal
Electrical connection	c a b	Electrical wiring harness code (see on the right)

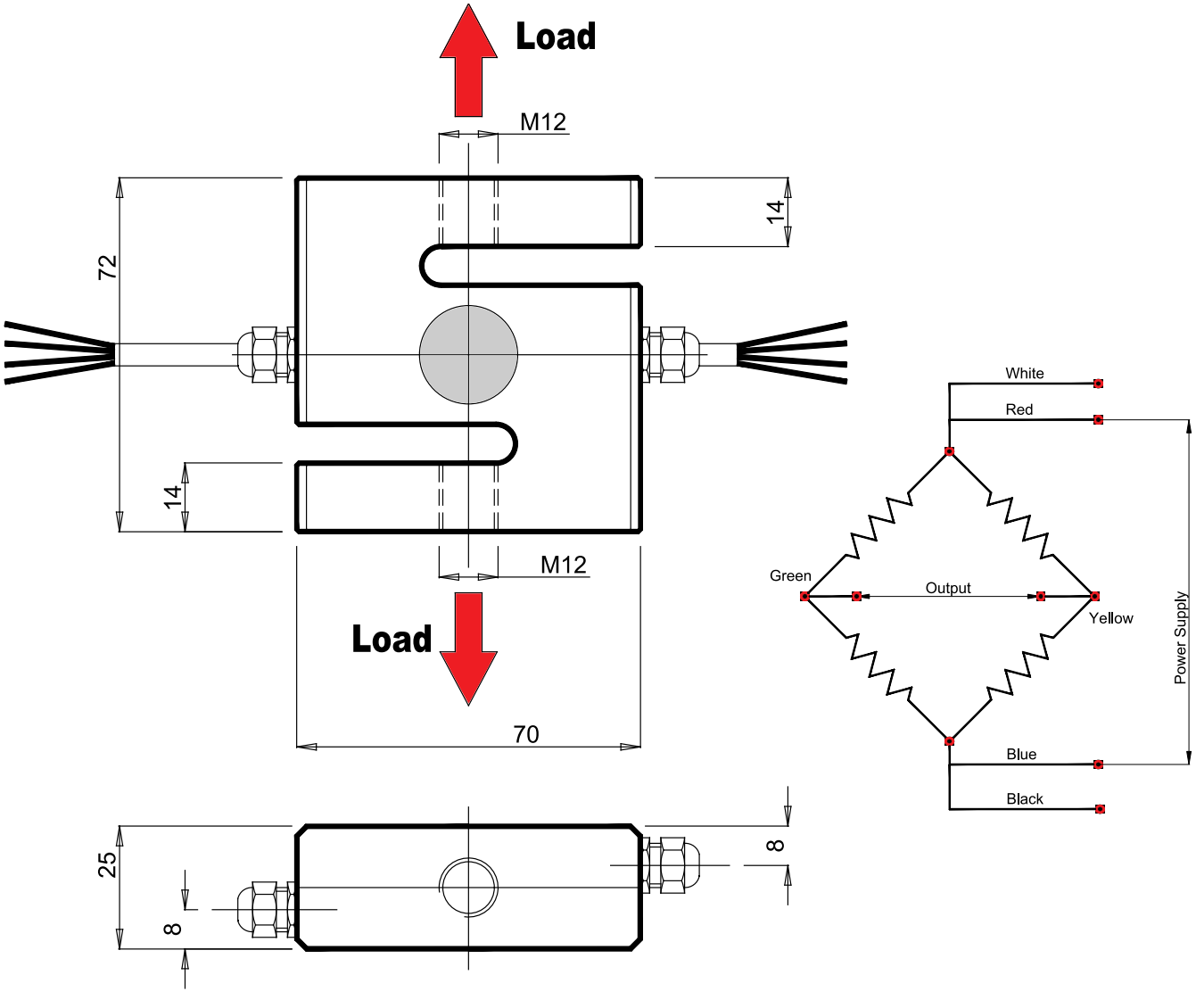
Custom configurations are available on request.

Electrical connections

Code: **CCA** double channel

Red	: Positive Supply
Blue	: Negative Supply
Green	: Signal –
Yellow	: Signal +
Black	: Sense –
White	: Sense +
Shield	: Not connected

Dimensions [mm]



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Tension load cell

TR2 Series

- Made of stainless steel
- Electrical connection with 5.0 m shielded cable 4xAWG24 for single channel transducer

On request:

- Double channel version suitable for PL d (EN13849-1) systems
- Special finishes and materials
- Load cell amplifier (to be ordered separately): BPE «ADS-200 MkII» series

Typical fields of application: Normally used to measure suspended loads, rope loads or loads in generic mobile machines

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Output Sensitivity | **Protection Grade IP67** | **Single channel**

Technical data

Power supply	from 0 to 15 V_{DC}
Output	1.0 mV/V
Nominal load	from 6500 daN to 12000 daN
Linearity, repeatability, hysteresis	± 1% FS
Zero offset	± 1% FS
FS and zero temperature coefficient	0.008 (1) %FS / °C
Insulation	> 5 GΩ @ 15 V_{DC}
Input and output resistance	350 Ω
Safe overload	150%
Ultimate load	500%
Operating temperature	from -20 to +70 °C
Maximum weight	from 4.5 kg to 11.5 kg
Housing material	stainless steel
Standard protection grade	IP67
CE conformity	EMC Directive: 2014/30/EU
EMC: Immunity | Emission	EN 61000-6-2 | EN 61000-6-3
Maximum number of mechanical cycles	$1x10^6$ cycles

(1) Between -10 °C and +40 °C

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Tension load cell

TR2 Series

Ordering Code

TR2	06500	S	F26	34	2	1M8_	L05000	NOT	CCF
Transducer type	Nominal load	Channels	Fixing holes	Width	Housing material	Cable gland	Cable length	Custom configuration	Electrical connection

Nominal load	0 6 5 0 0	6500 daN
	1 2 0 0 0	12000 daN
Channels	S	Single channel
Fixing holes	F 2 6	Fixing holes diameters 26 mm (6500 daN nominal load)
	F 3 6	Fixing holes diameters 36 mm (12000 daN nominal load)
Width	3 4	Width 34 mm (6500 daN nominal load)
	5 0	Width 50 mm (12000 daN nominal load)
Housing material	2	Stainless steel
Cable gland	1 M 8 _	With one M8 cable gland
Cable length	L 0 5 0 0 0	5 m standard cable length
Custom configuration	N O T	Not amplified signal
Electrical connection	c a b	Electrical wiring harness code (see on the right)

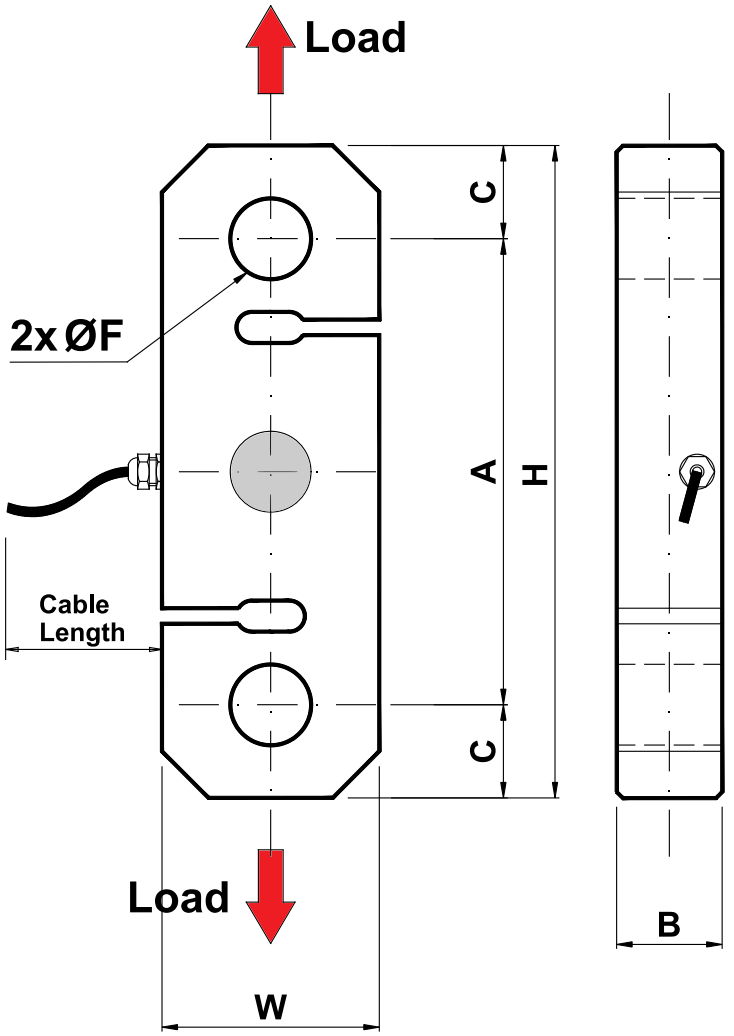
Custom configurations are available on request.

Electrical connections

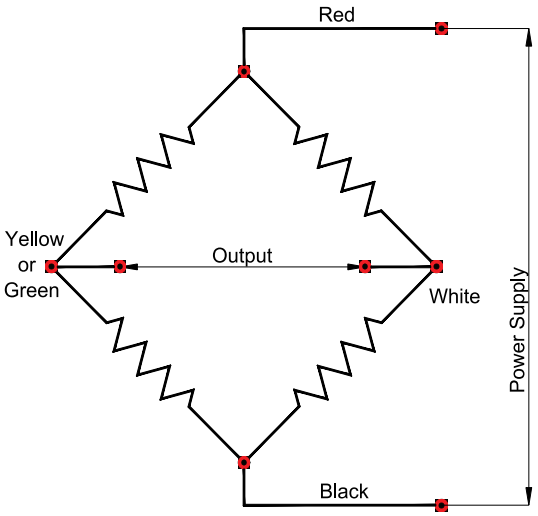
Code: **CCF** single channel

Red	: Positive Supply
Black	: Negative Supply
Yellow or Green	: Signal –
White	: Signal +
Shield	: Not connected

Main dimensions [mm]



Load	ØF	H	A	C	W	B	Lc
6500	26	210	150	30	70	34	5000
12000	36	270	186	42	100	50	5000



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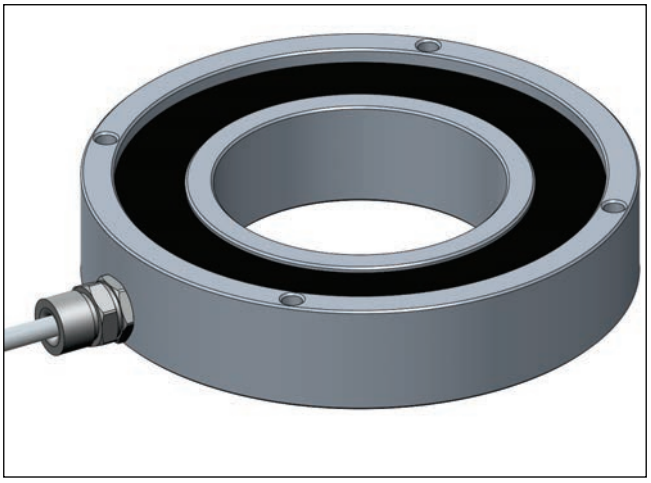
Ring load cell

TAN Series



- Made of stainless steel
- Single or double channel version
- Electrical connection with 5 m shielded cable: 4xAWG24 for the single channel and 6xAWG26 for double channel

On request:

- Special finishes and materials
- Load cell amplifier (to be ordered separately): BPE «ADS-200 MkII» series

Typical fields of application: Normally used to measure the load in aerial basket/work platform cages and generic mobile machines

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Output Sensitivity | Protection Grade IP67 | Single or double channel

Technical data

Power supply	from 0 to 15 V_{DC}
Output	2.0 mV/V
Nominal load	1000 daN
Linearity, repeatability, hysteresis	± 1% FS
Zero offset	± 1% FS
FS and zero temperature coefficient	0.008[(1)] %FS / °C
Insulation	> 5 GΩ @ 15 V_{DC}
Input and output resistance	350 Ω
Safe overload	150%
Ultimate load	300%
Operating temperature	from -20 to +70 °C
Maximum weight	0.9 kg
Housing material	Stainless steel
Standard protection grade	IP67
CE conformity	EMC Directive: 2014/30/UE
EMC: Immunity | Emission	EN 61000-6-2 | EN 61000-6-3
Maximum number of mechanical cycles	$1x10^6$ cycles

(1) Between -10 °C and +40 °C

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Ring load cell

TAN Series

Ordering Code

TAN	01000	D	118	62	25	4D04	2	1PF7	L05000	NOT	CC5
Transducer type	**Nominal load**	**Channels**	**Outer diameter**	**Inner diameter**	**Height**	**Holes**	**Housing material**	**Cable gland**	**Cable length**	**Custom configuration**	**Electrical connection**

Nominal load	0 1 0 0 0	1000 daN
Channels	S	Single channel
	D	Double channel
Outer diameter	1 1 8	Expressed in millimeters
Inner diameter	6 2	Expressed in millimeters
Height	2 5	Expressed in millimeters
Holes	4 D 0 4	Four 4.5 mm holes
Housing material	2	Stainless steel
Cable gland	1 M 8 _	One M8 cable gland (for single channel version)
	1 P F 7	One thread PG7 cable gland (for double channel version)
Cable length	L 0 5 0 0 0	5 m standard cable length
Custom configuration	N O T	Not amplified signal
Electrical connection	c a b	Electrical wiring harness code (see on the right)

Custom configurations are available on request.

Electrical connections

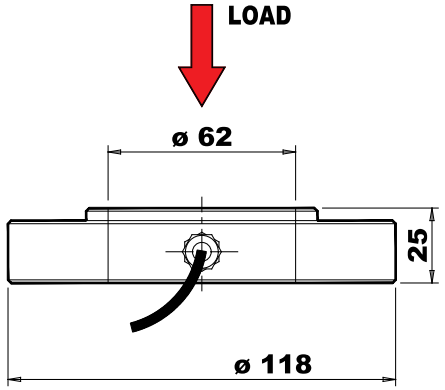
Code: **CCF** single channel

Red	: Positive Supply
Black	: Negative Supply
Yellow or Green	: Signal –
White	: Signal +
Shield	: Not connected

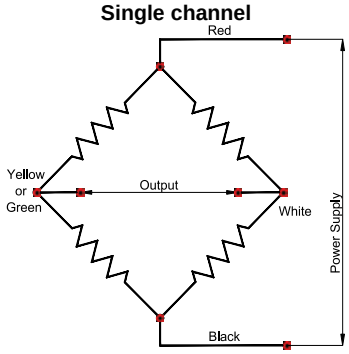
Code: **CC5** double channel

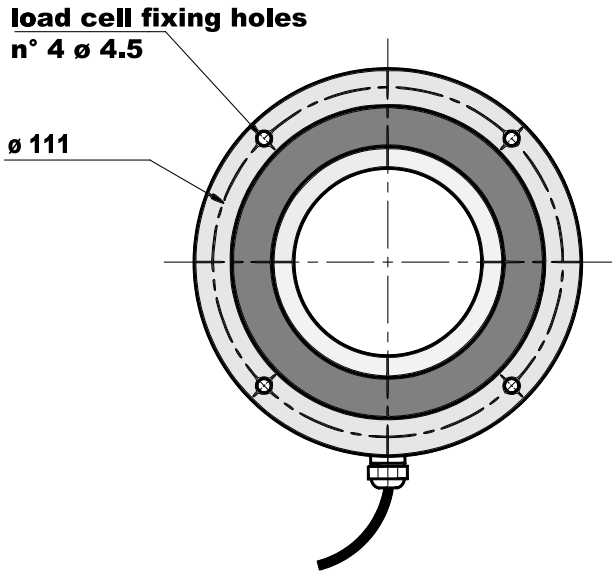
Red	: Positive Supply
Blue	: Negative Supply
Green	: Signal 1–
Yellow	: Signal 1+
Black	: Signal 2–
White	: Signal 2+
Shield	: Not connected

Dimensions [mm]

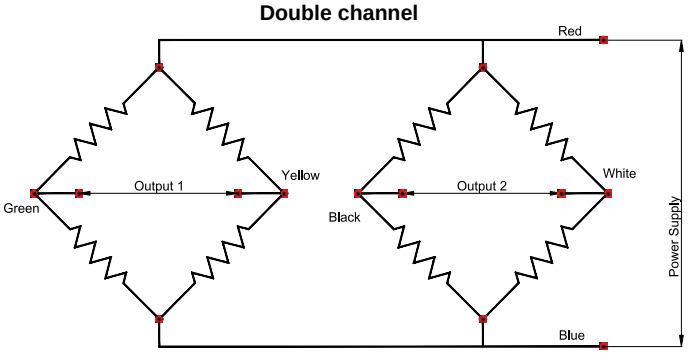


Single channel





Double channel



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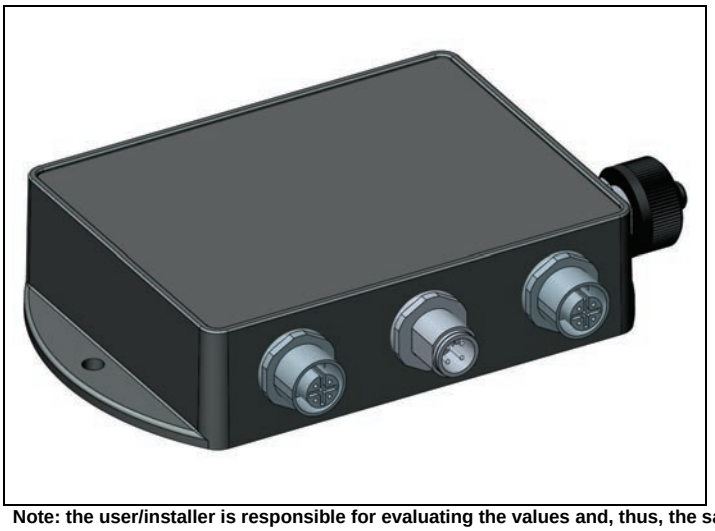
Load cell amplifier
Signal converter

ADS-200 MkII Series

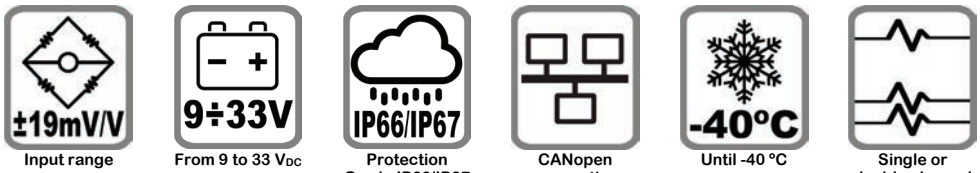


- Conversion of differential or amplified signals into voltage/current amplified or CAN bus signals
- For 12/24 V_{DC} power sources
- Double channel version available
- Protected against over tensions and polarity inversion
- Waterproof, plastic, compact body (40% fiber glass reinforced PBT)
- Electrical connection with M12x1 connectors

On request:
- CAN bus termination
- Customizable digital inputs

Typical fields of application: industrial automation and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Input range | From 9 to 33 V_{DC} | Protection Grade IP66/IP67 | CANopen connection | Until -40 °C | Single or double channel

Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs	two 4 to 20 mA or two 0.5 to 4.5 V_{DC} or one differential (mV)	Protected against short circuits and operator error (1)
Analog inputs resolution	4÷20 mA o 0.5÷4.5: 12 bit differentials: 16 bit, Gain=128	-
Differential input range	-19 mV/V ≤ d ≤ +19 mV/V @ common mode 2.5 Vdc	-
Input resistor range (strain gauge)	350 | 175 | 87 Ω ≤ Ri ≤ 10000 Ω	With V_{CC} max @ 33 | 30 | 15 V_{DC} (2)
Digital inputs	2	On request
Digital outputs	none	-
Analog outputs	one 4 to 20 mA or 0.5 to 4.5 V_{DC}	1.0÷9.0 V_{DC} on request
CANbus connection	1	
RS-232 connction	1	For diagnostic use only
Operating temperature	from -40 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	PBT + 40% glass fiber	-
Coating	two components polyurethane	-
Standard protection grade	IP66 / IP67	-
CE Conformity	EMC Directive: 2014/30/EU	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	Heavy industrial
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Schock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 100 years	-

(1) Maximum current equal to 35 mA with 200 Ω shunt and for 4 to 20 mA inputs

(2) Special version with input resistance equal to 87 Ω and independent from input voltage on request

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Load cell amplifier
Signal converter

ADS-200 MkII Series

Ordering Code

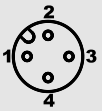
ADS-200 MKII	D	2.0	MC3	0	99	M3A	N	NO	B	NOT
Type	Channels	Analog input	Input connection	Digital input	Electrical output	Output connection	CAN termination	Diagnostic	Box	Custom configurations

Channels	**S**	Single channel
	D	Double channel
Analog input	**x . y**	Maximum input signal (mV/V)
Input connection	**c a 1**	Electrical wiring harness code (see “Input connections” on the right)
Digital input	**0**	None in standard configurations
Electrical output	**4 _**	Current output: 4 to 20 mA (44 if double)
	7 _	CAN output: CAN Open (77 if double)
	9 _	Voltage output: 0.5÷4.5 V_{DC}. V_{IN}=9÷33 V_{DC} (99 if double)
Output connection	**c a 2**	Electrical wiring harness code (see “Electrical connections” on the bottom)
CAN termination	**N**	Without internal CAN bus termination
Diagnostic	**P C**	RS232 connection
	N O	None
Box	**B**	With standard box
Custom configurations	**N O T**	Standard

Custom configurations are available on request.

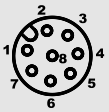
Electrical connections: input

M12 receptacle
Code: **MC4** single channel
Code: **MC3** double channel



1: V_{IN}=+5 V_{DC}
2: Negative for transducers
3: Signal+ 4: signal -

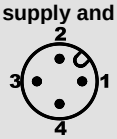
M12 receptacle
Code: **MC9**
double channel



1: V_{IN1}=+5 V_{DC}
2: Negative for transducers 1
3: Signal1+ 4: Signal1 -
5: V_{IN2}=+5 V_{DC}
6: Negative for transducers 2
7: Signal2+ 8: Signal2 –

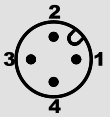
Electrical connections: power supply and output

M12 plug
Current output (4 to 20 mA)
Code: **M75** single channel
Code: **M7A** double channel



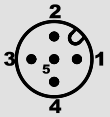
1: V_{IN}=9 to 33 V_{DC}
2: Signal 1
3: Negative power supply
4: Signal 2 (M7A only)

M12 plug
Voltage output (0.5 to 4.5 V_{DC})
Code: **M30** single channel
Code: **M3A** double channel



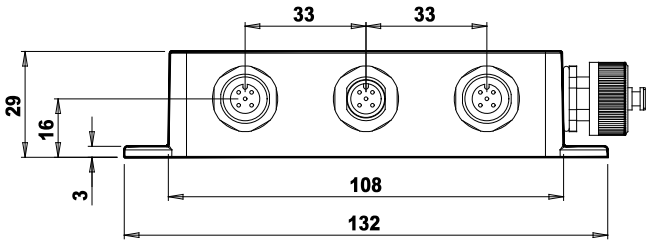
1: V_{IN}=9 to 33 V_{DC}
2: Signal 1
3: Negative power supply
4: Signal 2 (M3A only)

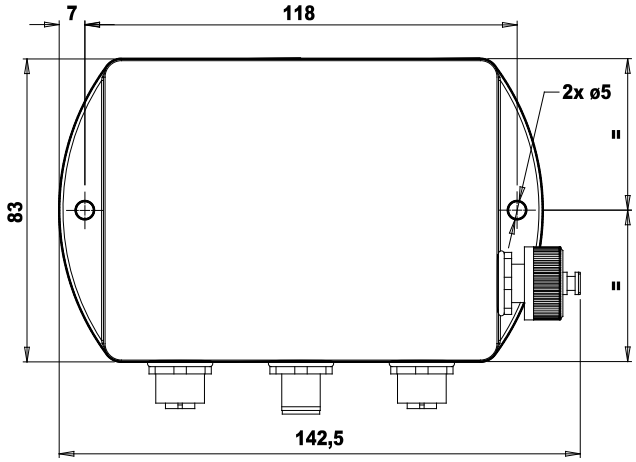
M12 plug
CAN Open
Code: **M05** single or double channel

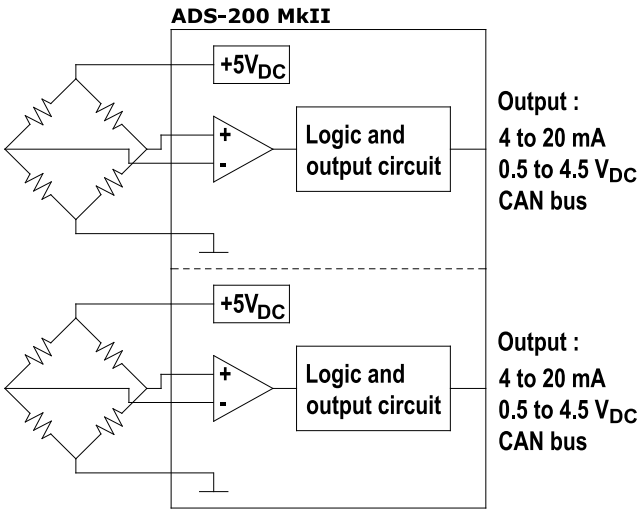


1: Cable shield
2: V_{IN}=9 to 33 V_{DC}
3: Negative power supply
4: CH
5: CL

Dimensions [mm]







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Accessories

Type	Description	Code	Notes
Counterpart Connector	M12 plug connector: loose connector with 4pin, screw terminals.	7.003.053	input connection
Counterpart Connector	M12 plug connector: loose connector with 8pin, screw terminals.	7.003.060	input connection
Counterpart Connector	M12 receptacle connector: loose connector with 4pin, screw terminals.	7.003.045	output connection
Extension cable	Length 5000mm, multipolar cable for dynamic installations, 4 conductors (brown, grey, black, yellow/green) sections 0.5mm², external grey jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.431	output connection
Extension cable	Length 10000mm, multipolar cable for dynamic installations, 4 conductors (brown, grey, black, yellow/green) sections 0.5mm², external grey jacket with excellent resistance to abrasive action, ordinary industrial oils and chemical agents. M12 4pin receptacle connector.	7.180.433	output connection
CAN Counterpart Connector	M12 receptacle connector: loose connector with 5pin, screw terminals.	7.003.059	output connection
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green) , external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.469	output connection
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.409	output connection
CAN Extension cable	Length 15000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.506	output connection
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 Serial cable RS-232 DB9/M12 L=4000 P/N 7.045.422; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.005	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (M12x1 4pin receptable connector) L=4meters	7.045.422	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Electronics Boards and Controllers

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ON/OFF solenoid valve digital management

MAV1 Series

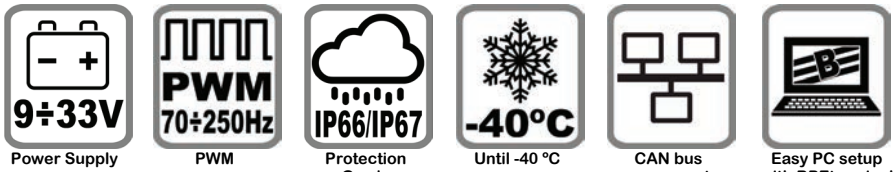
- Direct piloting of five double ON/OFF solenoid valves and one proportional solenoid valve
- Current closed loop control
- Output for venting valve
- Digital input to do a start up safety check
- Same power supply for 12/24 V_{DC} systems
- Waterproof, plastic, compact body
- Electrical connection with «FCI Sicma 2» connector
- Customizable via RS-232 serial port to support all commercial joystick
- BPEterminal custom software can be used to change, for each section, the following parameters and many others:
  - the PWM frequency
  - the minimum and maximum currents
  - the proportional solenoid valve opening and closing ramps

On request:

- CAN bus interface
- PL d (EN 13849-1) output for venting valve
- Two customizable digital inputs

Typical fields of application: bancable hydraulic valves for industrial and mobile applications.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Power Supply | PWM | Protection Grade IP66/IP67 | Until -40 °C | CAN bus on request | Easy PC setup with BPEterminal

Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs for joystick	five 0 to 5 V_{DC} or five 0 to10 V_{DC} or five 4[(1)] to 20 mA	Protected against short circuits and operator errors
Digital inputs	1 + 2 (on request)	1 input only if CAN bus connection is present
ON/OFF digital outputs	5x2	Positive. I_{MAX} = 3 A. Protected against short circuits
Proportional PWM outputs	1	Positive. Programmable from 70 to 250 Hz. I_{MAX} = 2 A. Protected against short circuits
Digital outputs	1	Positive. I_{MAX} = 3 A. Protected against short circuits [(2)]
CAN bus interface	1	On request
RS-232 interface	1 for calibration and diagnostic	AMP Superseal 1.5 series 3P connector (282105-1)
Operating temperature	from -40 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	40% fiberglass reinforced PBT	-
Coating	Two components polyurethane	-
Standard protection grade	IP66 / IP67	-
CE Conformity	EMC Directive: 2014/30/EU	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 100 years	-

(1) Or 0 to 20 mA, without range check

(2) Available and programmable on request in PLd (EN 13849-1)

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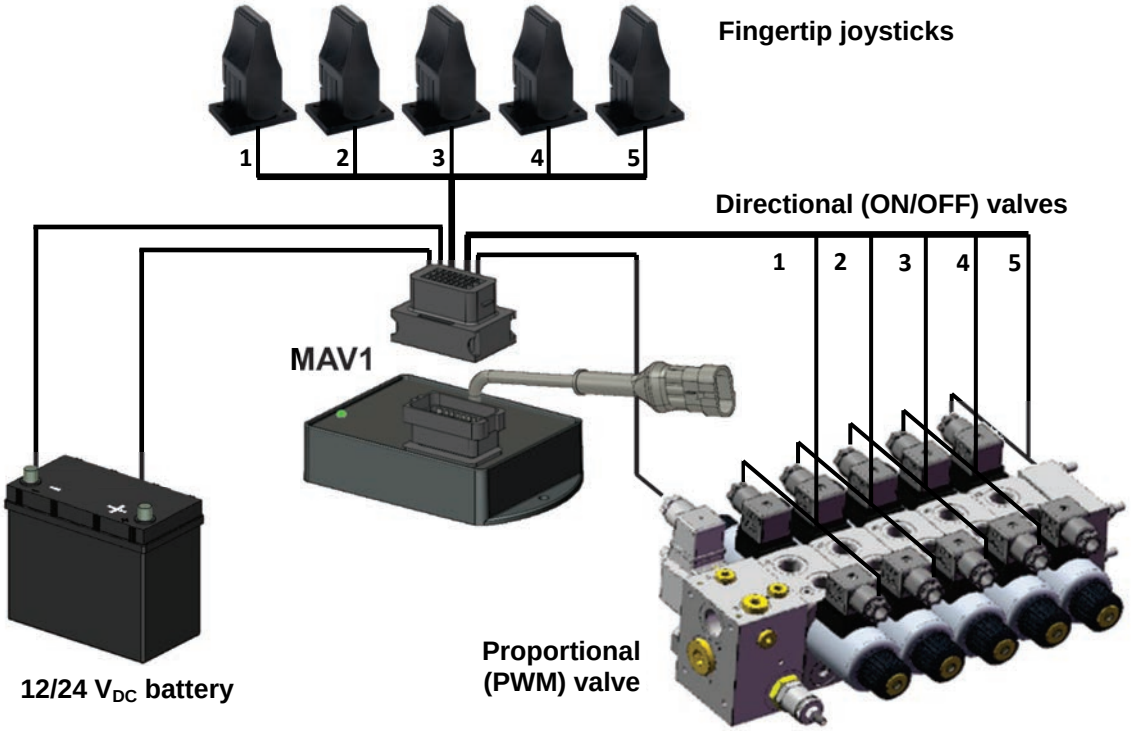
ON/OFF solenoid valve digital management

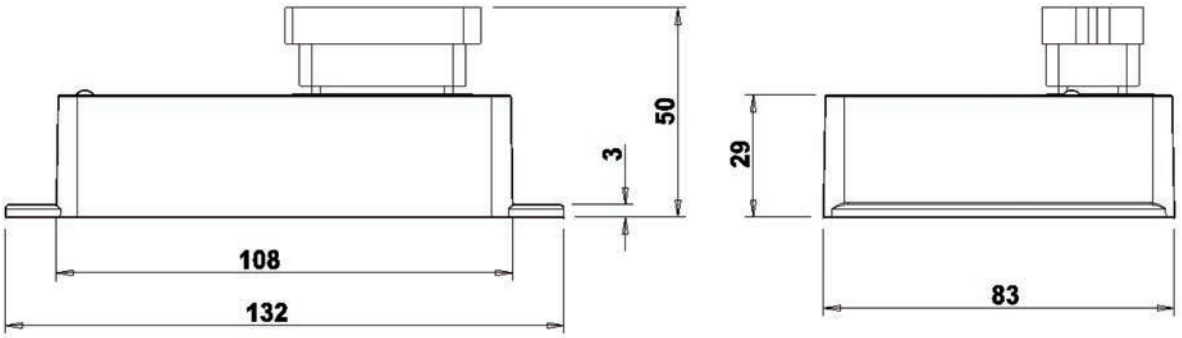
MAV1 Series

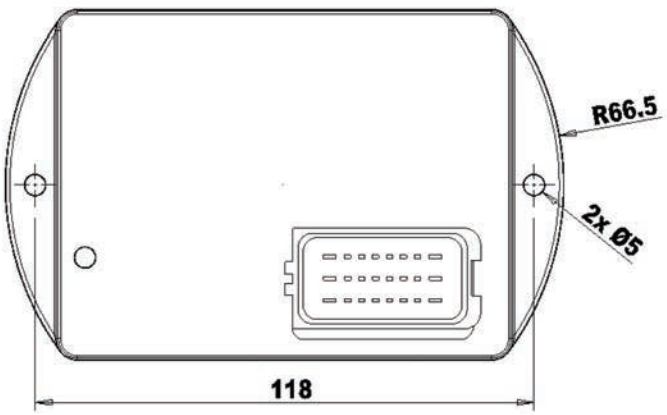
Ordering Code

MAV1	F	V3	5	1	150



Dimensions [mm]





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ON/OFF solenoid valve digital management

MAV1152 Series

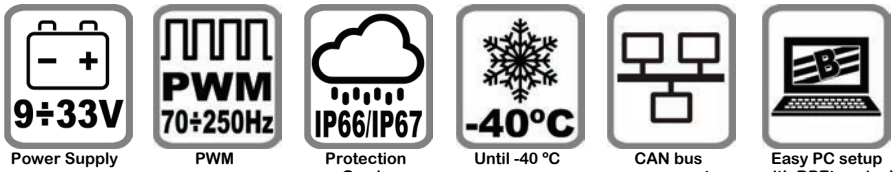
- Direct piloting of five double ON/OFF solenoid valves and one proportional solenoid valve
- Current closed loop control
- Output for venting valve
- Digital input to do a start up safety check
- Same power supply for 12/24 V_{DC} systems
- Waterproof, plastic, compact body
- Electrical connection with «FCI Sicma 2» connector
- Customizable via RS-232 serial port to support all commercial joystick
- BPEterminal custom software can be used to change, for each section, the following parameters and many others:
  - the PWM frequency
  - the minimum and maximum currents
  - the proportional solenoid valve opening and closing ramps

On request:

- CAN bus interface
- PL d (EN 13849-1) output for venting valve
- Two customizable digital inputs

Typical fields of application: bancable hydraulic valves for industrial and mobile applications.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Power Supply | PWM | Protection Grade IP66/IP67 | Until -40 °C | CAN bus on request | Easy PC setup with BPEterminal

Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs for joystick	five 0 to 5 V_{DC} or five 0 to10 V_{DC} or five 4[(1)] to 20 mA	Protected against short circuits and operator errors
Digital inputs	1 + 2 (on request)	1 input only if CAN bus connection is present
ON/OFF digital outputs	5x2	Positive. I_{MAX} = 3 A. Protected against short circuits
Proportional PWM outputs	1	Positive. Programmable from 70 to 250 Hz. I_{MAX} = 2 A. Protected against short circuits
Digital outputs	1	Positive. I_{MAX} = 3 A. Protected against short circuits [(2)]
CAN bus interface	1	On request
RS-232 interface	1 for calibration and diagnostic	AMP Superseal 1.5 series 3P connector (282105-1)
Operating temperature	from -40 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	40% fiberglass reinforced PBT	-
Coating	Two components polyurethane	-
Standard protection grade	IP66 / IP67	-
CE Conformity	EMC Directive: 2014/30/EU	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 100 years	-

(1) Or 0 to 20 mA, without range check

(2) Available and programmable on request in PLd (EN 13849-1)

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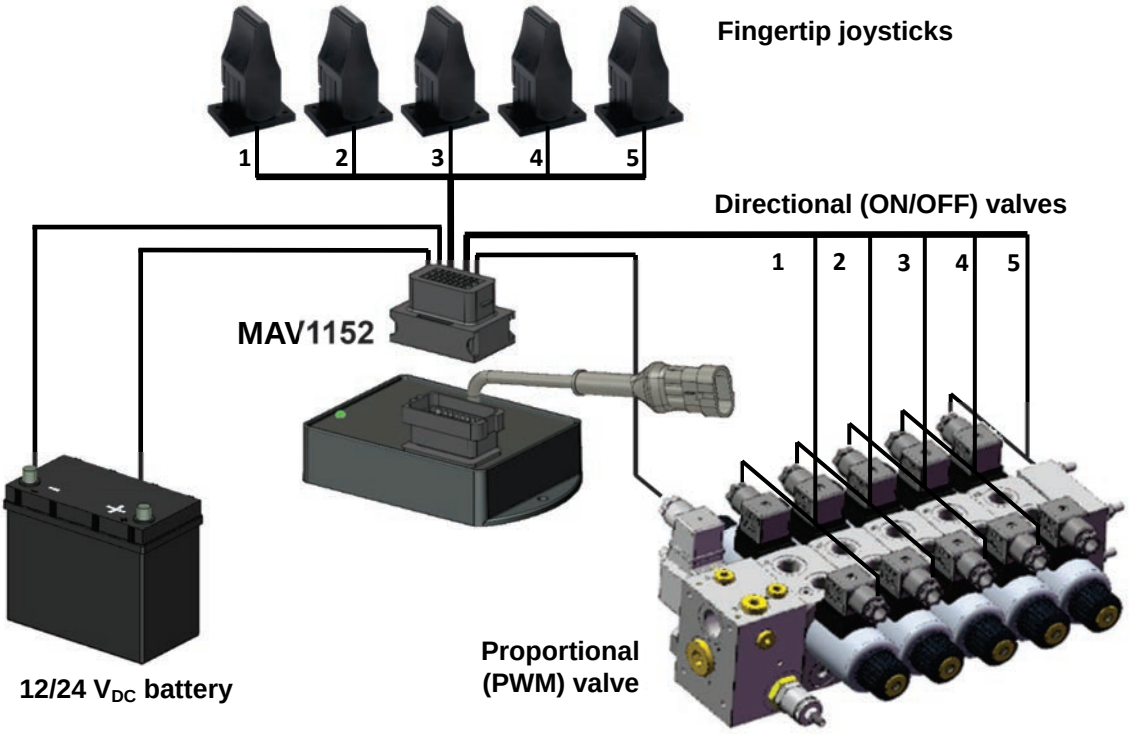
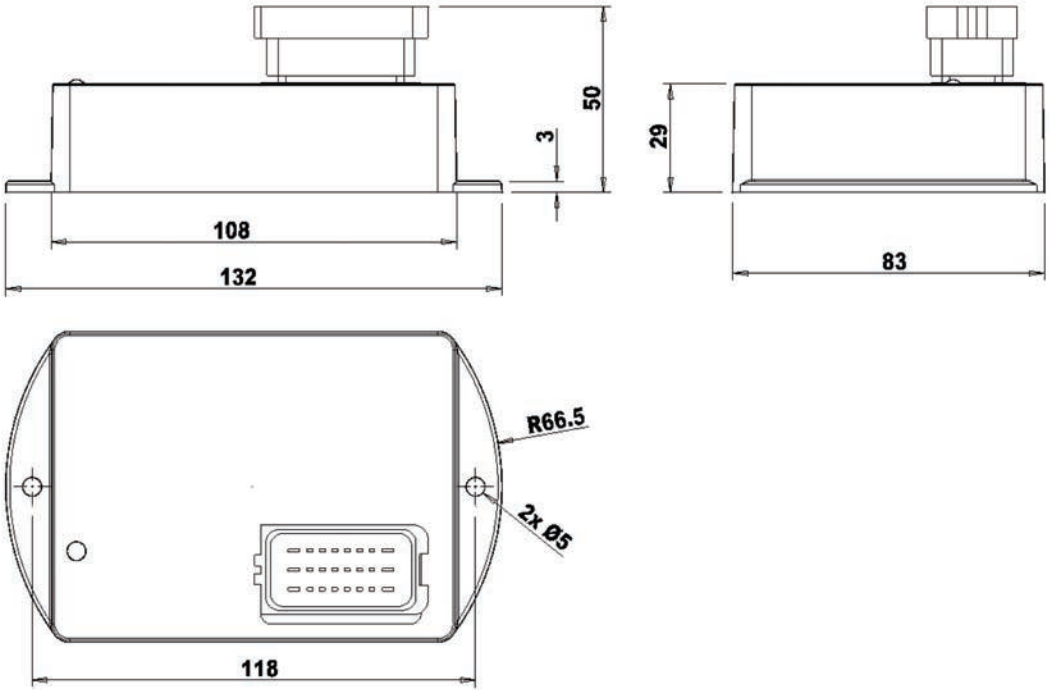
MAV1152 Series

Ordering Code

MAV1152	F	V3	5	1	150



Dimensions [mm]



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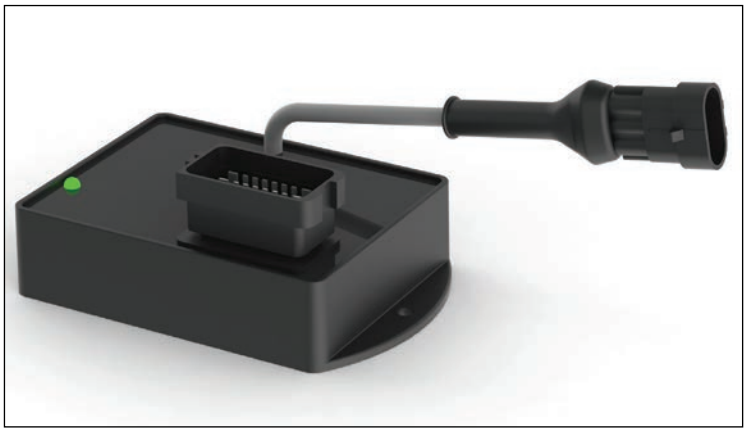
Accessories

Type	Description	Code	Notes
Counterpart Connector	SICMA FCI 24pin connector composed by: № 1 FCI Black Connector Female Housing 24 ways № 18 female terminals 1.5mm № 6 female terminals 2.8mm № 1 Locking cam for 24w Female Housing № 20 Filler plugs № 1 Rubber cap	7.003.054	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	L=1000mm black extension cable, 24x1.5-1 SICMA FCI 24pin, numbered.	7.180.403	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Hydrostatic transmission management

MAV4211SH Series



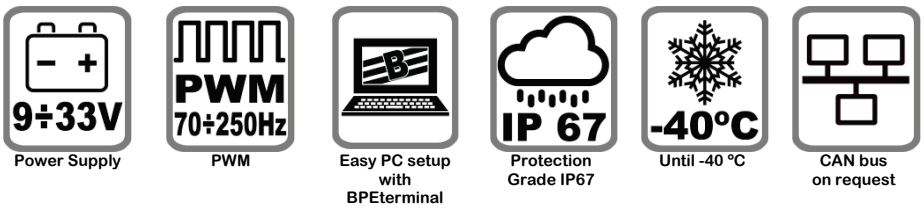
- Customized for hydrostatic pumps and motors management
- Five preset operating modes
- Variable displacement pumps management
- Fully independent brakes management
- Can be supplied factory set
- With BPEterminal custom software is possible to configure all commercial joysticks and, for every movement, to set: the PWM frequency, the minimum and maximum currents, the proportional solenoid valve opening and closing ramps
- Same power supply for 12/24 V_{DC} systems
- Waterproof, plastic, compact body (40% fiber glass reinforced PBT)
- Electrical connection with FCI SICMA2

On request:

- CAN bus connection
- PL d (EN 13849-1) output for brakes

Typical fields of application: hydrostatic trasmission, closed and open loop pumps management.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs for joystick	two 0 to 5 V_{DC} or two 0 to10 V_{DC} or two 4 to 20 mA	Protected against short circuits and operator errors
Digital inputs	3	1 input only if CAN bus connection is present
Proportional PWM outputs	2x2 + 1	Positive. Programmable from 70 to 250 Hz. I_{MAX} = 2 A. Protected against short circuits
Digital outputs	2	Positive. I_{MAX} = 3 A. Protected against short circuits (1)
CANbus connection	1	On request
RS-232 connection	1	AMP Superseal 1.5 series 3P connector (282105-1)
Operating temperature	from -40 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	40% fiberglass reinforced PBT	-
Coating	Two components polyurethane	-
Standard protection grade	IP67	-
CE Conformity	EMC Directive: 2014/30/EU	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	Heavy industrial
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 100 years	-

(1) Available and programmable on request in PLd (EN 13849-1)

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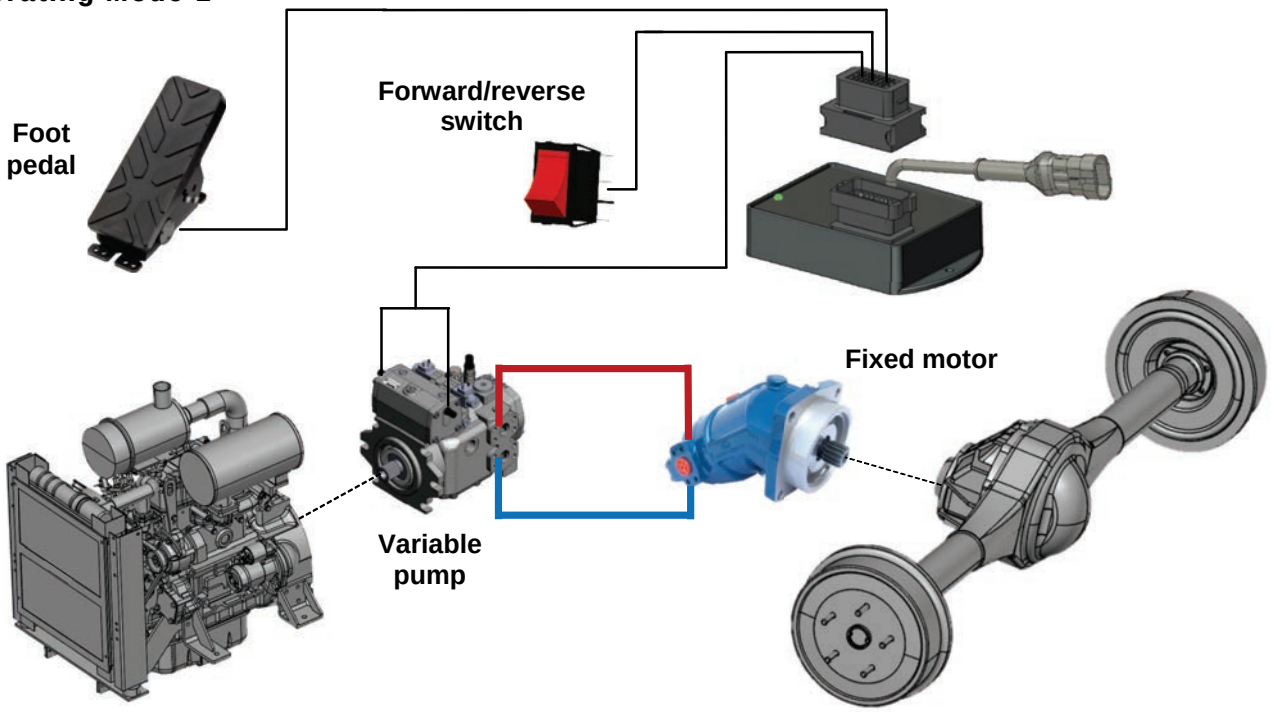
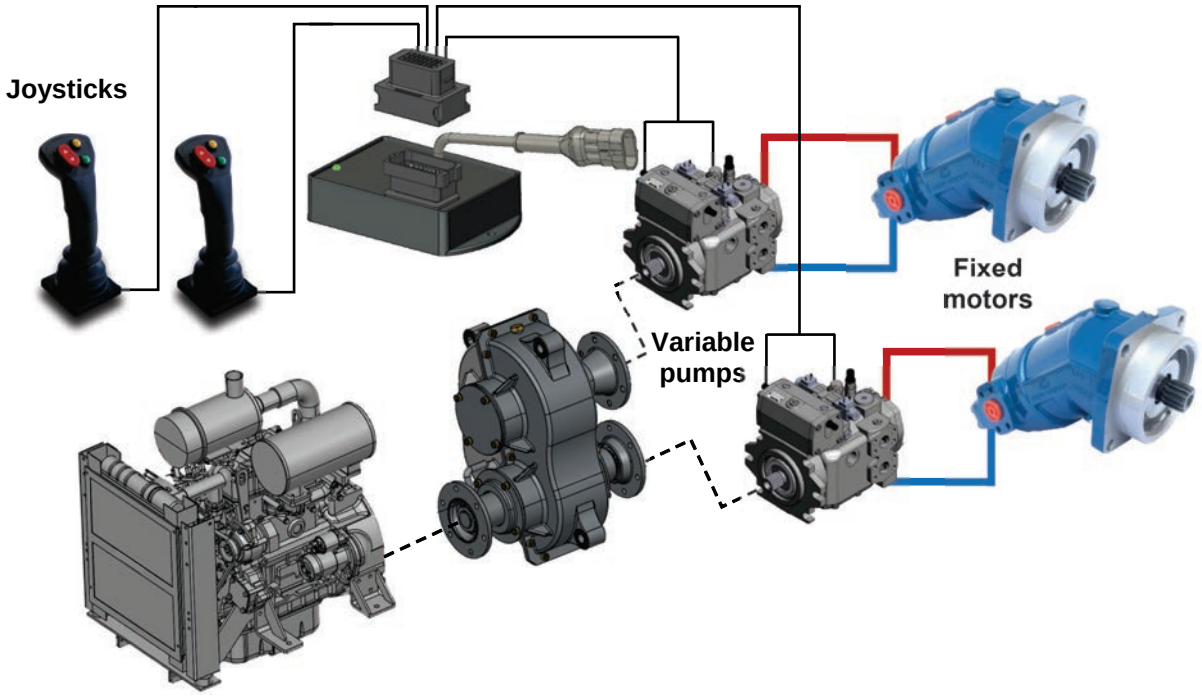
Ordering Code

MAV4211SH	W	V3	2	_	110	0200	0600	A	SH1	_N

Operating Mode 1



Operating Mode 2



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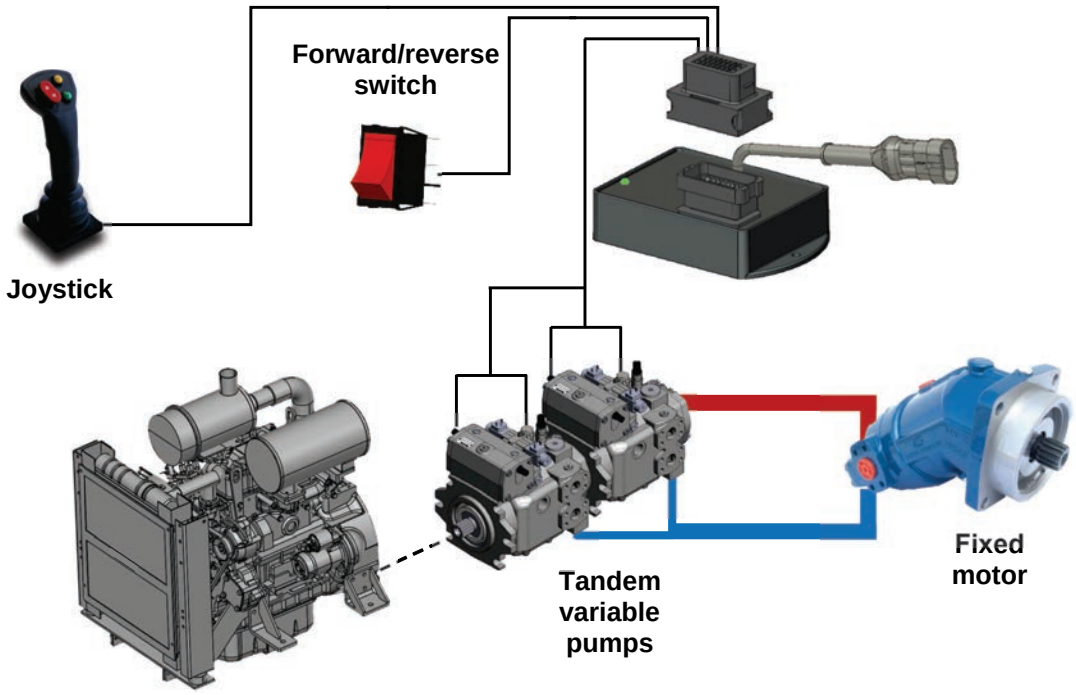
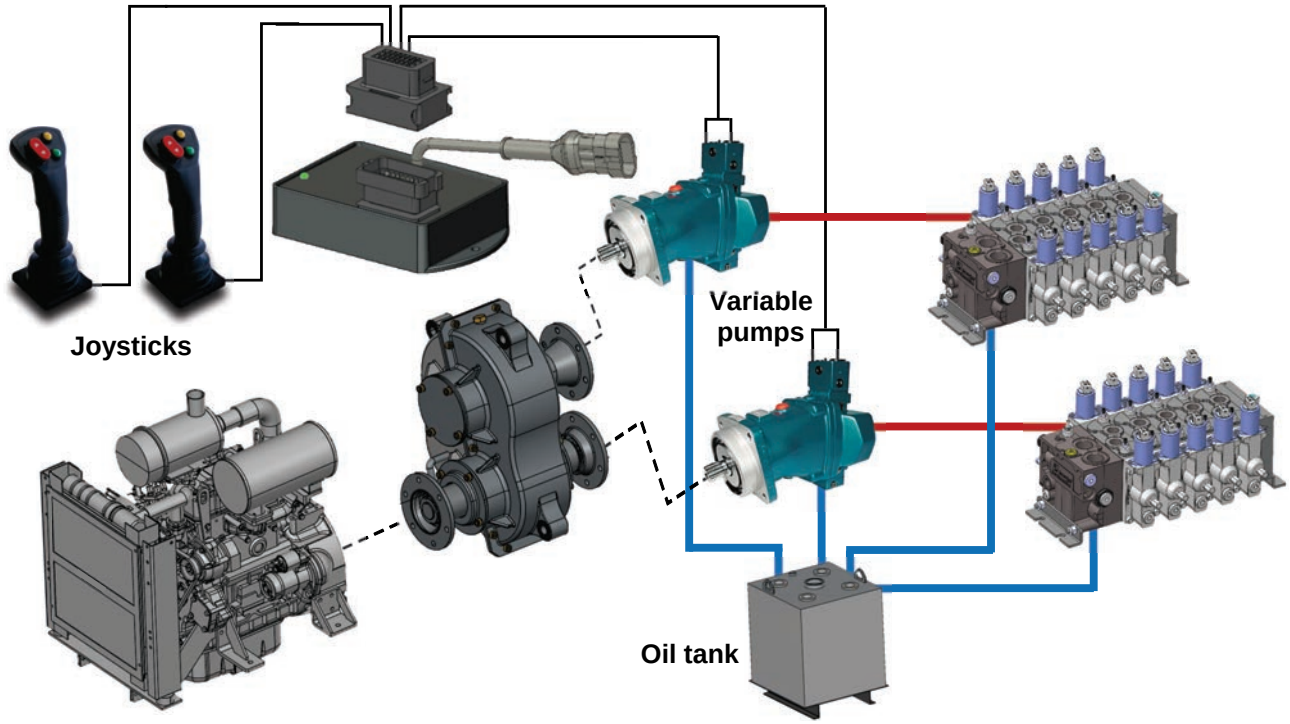
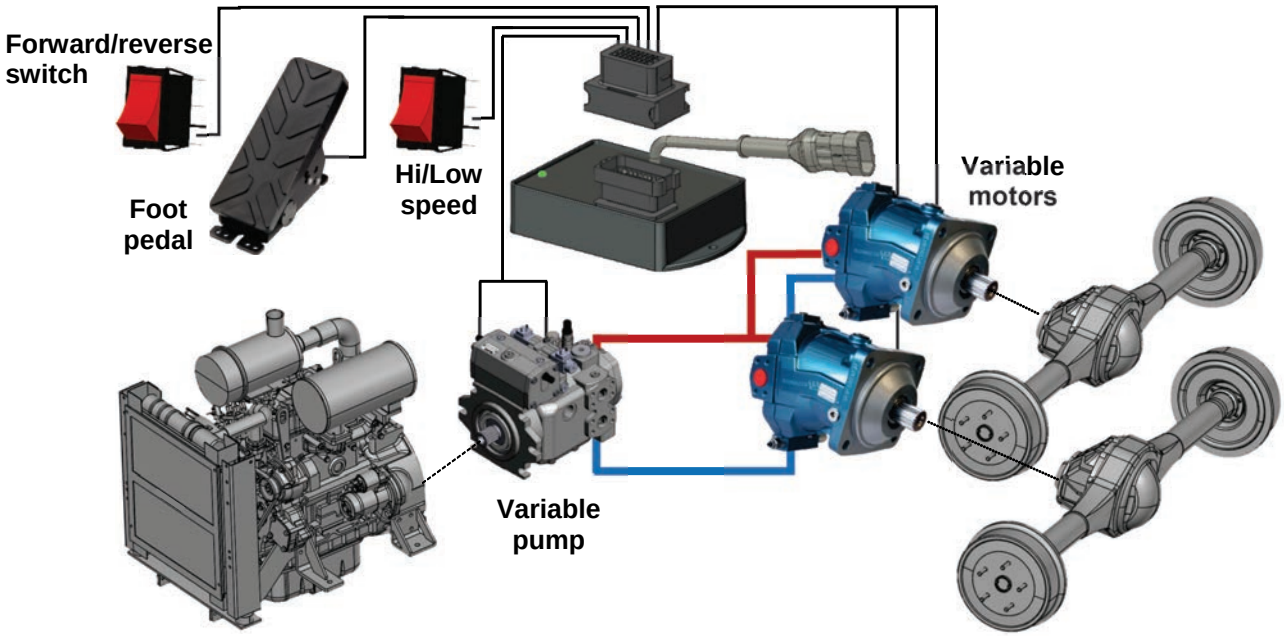
Operating Mode 3



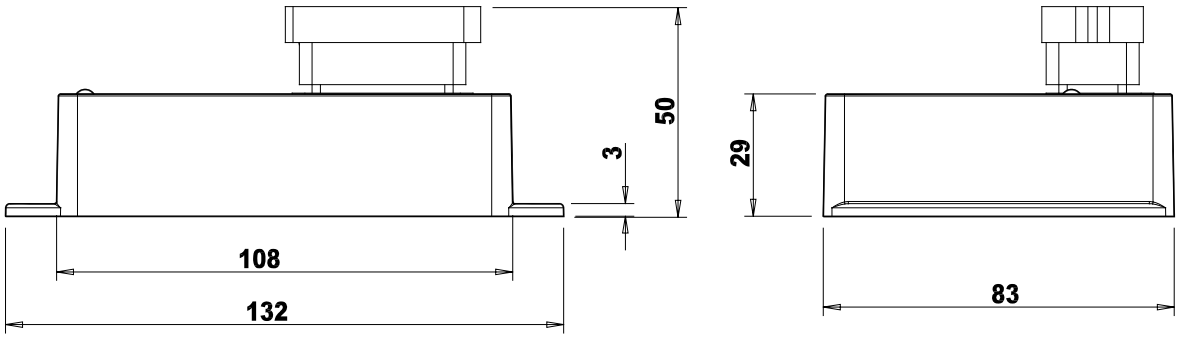
Operating Mode 4

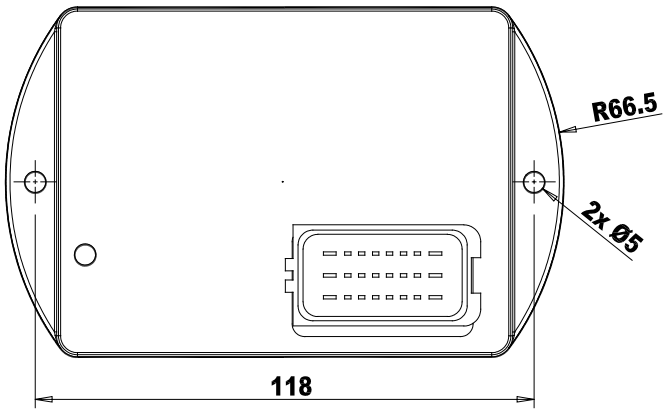


Operating Mode 5



Dimensions [mm]





Product image for illustration purposes only

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Accessories

Type	Description	Code	Notes
Counterpart Connector	SICMA FCI 24pin connector composed by: № 1 FCI Black Connector Female Housing 24 ways № 18 female terminals 1.5mm № 6 female terminals 2.8mm № 1 Locking cam for 24w Female Housing № 20 Filler plugs № 1 Rubber cap	7.003.054	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	L=1000mm black extension cable, 24x1.5-1 SICMA FCI 24pin, numbered.	7.180.403	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Proportional solenoid valve digital management

MAV4211 Series

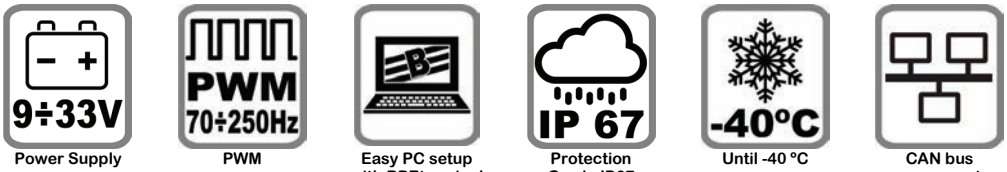
- Direct piloting of four proportional solenoid valves
- Output for venting valve
- Start-up safety control digital input
- Same power supply for 12/24 V_{DC} systems
- With BPEterminal custom software is possible to configure all commercial joysticks and, for every movement, to set: the PWM frequency, the minimum and maximum currents, the proportional solenoid valve opening and closing ramps
- Waterproof, plastic, compact body (40% fiber glass reinforced PBT)
- Electrical connection with FCI SICMA2

On request:

- CAN bus connection
- PL d (EN 13849-1) output for venting valve
- Two customizable digital inputs

Typical fields of application: bancable hydraulic valves for industrial and mobile applications.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs for joystick	four 0 to 5 V_{DC} or four 0 to10 V_{DC} or four 4[(1)] to 20 mA	Protected against short circuits and operator errors
Digital inputs	1 + 2 (on request)	1 input only if CAN bus connection is present
ON/OFF digital outputs	-	-
Proportional PWM outputs	4x2	Positive. Programmable from 70 to 250 Hz. I_{MAX} = 2 A. Protected against short circuits
Digital outputs	1	Positive. I_{MAX} = 3 A. Protected against short circuits [(2)]
CANbus connection	1	On request
RS-232 connection	1	AMP Superseal 1.5 series 3P connector (282105-1)
Operating temperature	from -40 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	40% fiberglass reinforced PBT	-
Coating	Two components polyurethane	-
Standard protection grade	IP67	-
CE Conformity	EMC Directive: 2014/30/EU	
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	Heavy industrial
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 100 years	-

(1) Or 0 to 20 mA, without range check

(2) Available and programmable on request in PLd (EN 13849-1)

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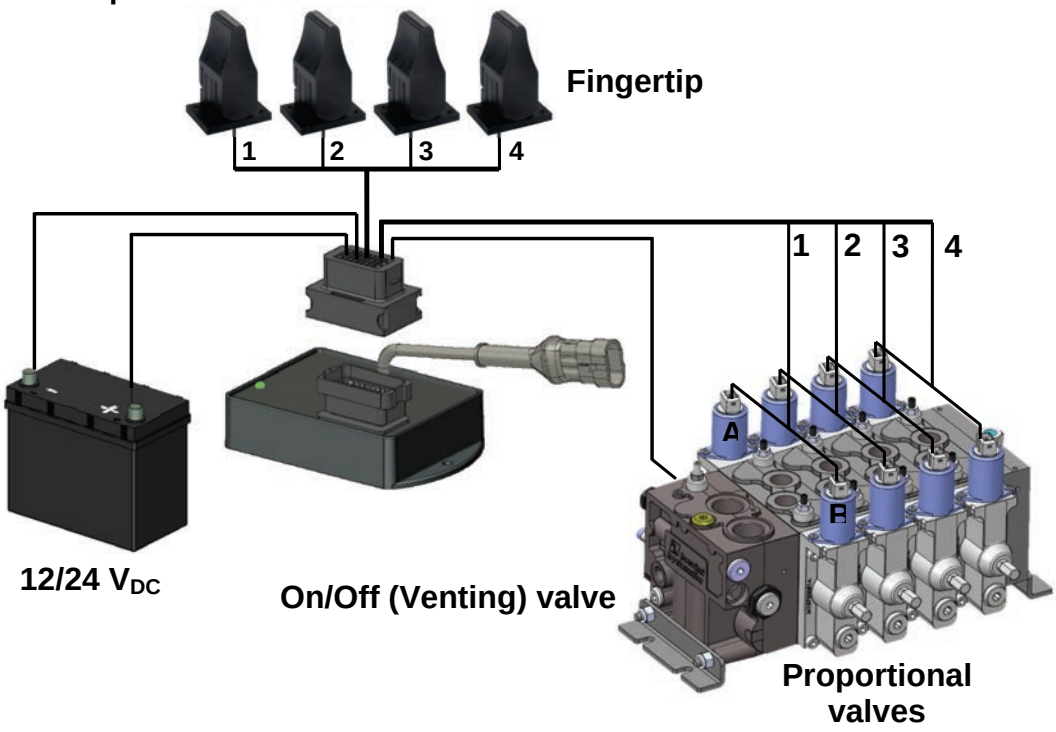
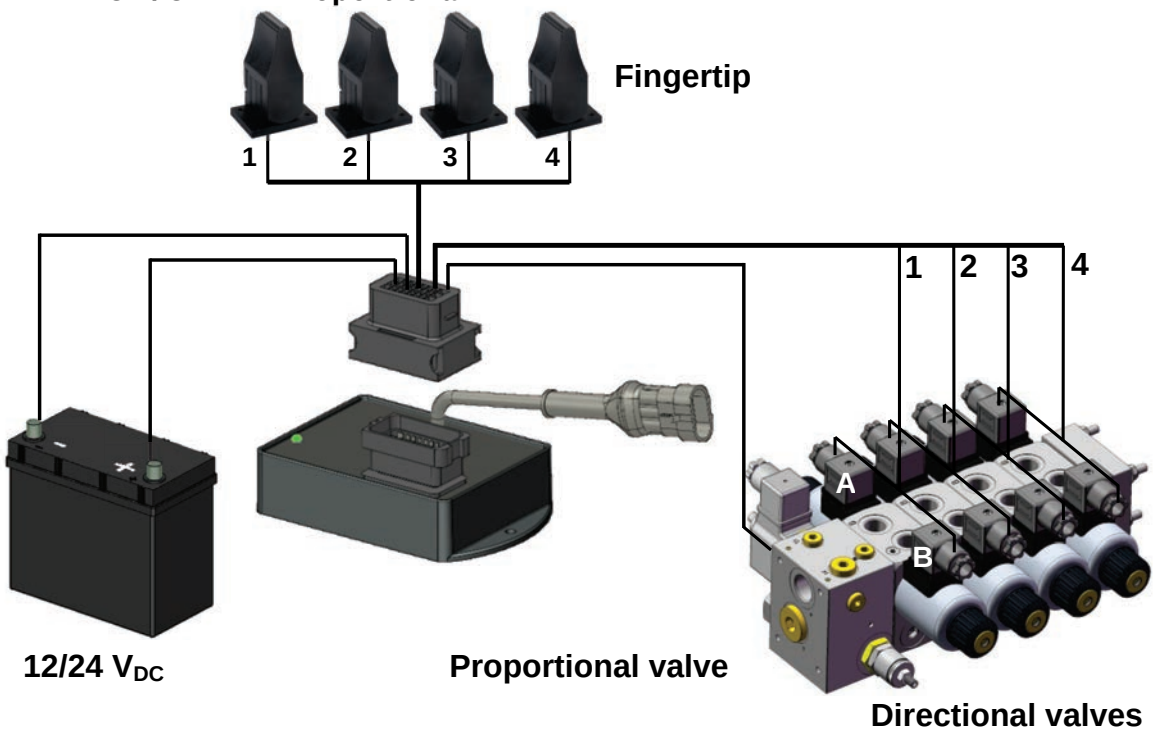
Ordering Code

MAV4211	W	V3	4	_	150

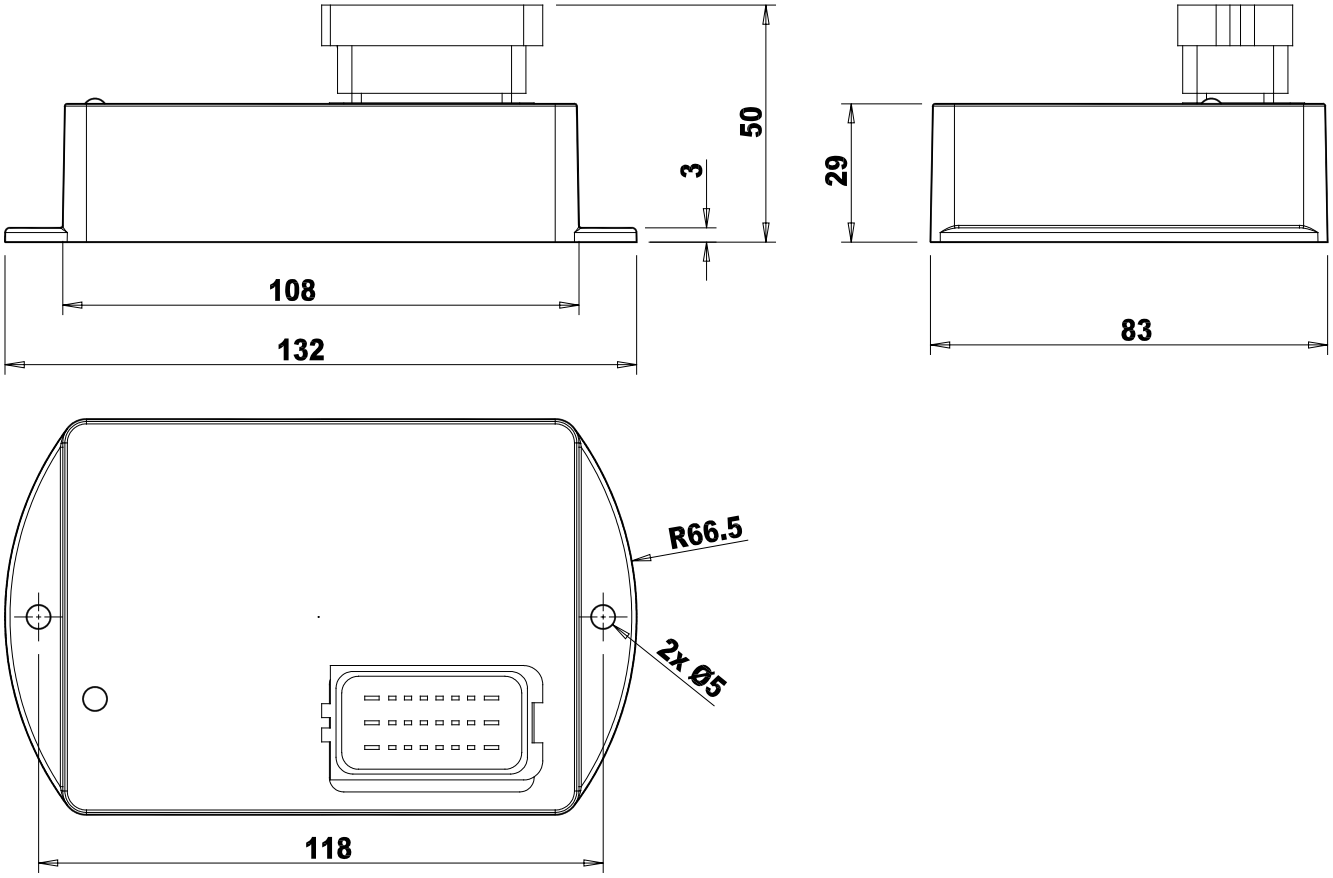
MAV4211 4x2 Proportional + 1 On/Off



MAV4211 4x2 On/Off + 1 Proportional



Dimensions [mm]



Accessories

Type	Description	Code	Notes
Counterpart Connector	SICMA FCI 24pin connector composed by: № 1 FCI Black Connector Female Housing 24 ways № 18 female terminals 1.5mm № 6 female terminals 2.8mm № 1 Locking cam for 24w Female Housing № 20 Filler plugs № 1 Rubber cap	7.003.054	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	L=1000mm black extension cable, 24x1.5-1 SICMA FCI 24pin, numbered.	7.180.403	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Proportional solenoid valve digital management

MAV8 Series

- Direct piloting of eight double proportional solenoid valves
- Current closed loop control
- Output for venting valve
- Start-up safety control digital input
- Same power supply for 12/24 V_{DC} systems
- With BPEterminal custom software is possible to configure all commercial joysticks and, for every movement, to set: the PWM frequency, the minimum and maximum currents, the proportional solenoid valve opening and closing ramps
- Waterproof, alluminum, compact box
- Electrical connection with FCI SICMA2
- Eight digital inputs for enabling functions

On request:
- CAN bus interface
- PL d (EN 13849-1) output for venting valve

Typical fields of application: bancable hydraulic valves for industrial and mobile applications.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs for joystick	eight 0 to 5 V_{DC} or eight 0 to10 V_{DC} or eight 4[(1)] to 20 mA	Protected against short circuits and operator errors
Digital inputs	8	-
ON/OFF digital outputs	2	Positive. I_{MAX} = 3 A. Protected against short circuits[(2)]
Proportional PWM outputs	8x2	Positive. Programmable from 70 to 250 Hz. I_{MAX} = 2 A. Protected against short circuits
CAN bus interface	1	On request
RS-232 interface	1 for calibration and diagnostic	M12 connector
Operating temperature	from -40 to +70 °C	-
Maximum weight	1.0 kg	-
Housing material	Alluminum alloy	-
Standard protection grade	IP66	-
CE Conformity	EMC Directive: 2014/30/EU	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	Heavy industrial
MTTFd	EN 13849-1: ≥ **55** years	-

(1) Or 0 to 20 mA, without range check
(2) Available and programmable on request in PLd (EN 13849-1)

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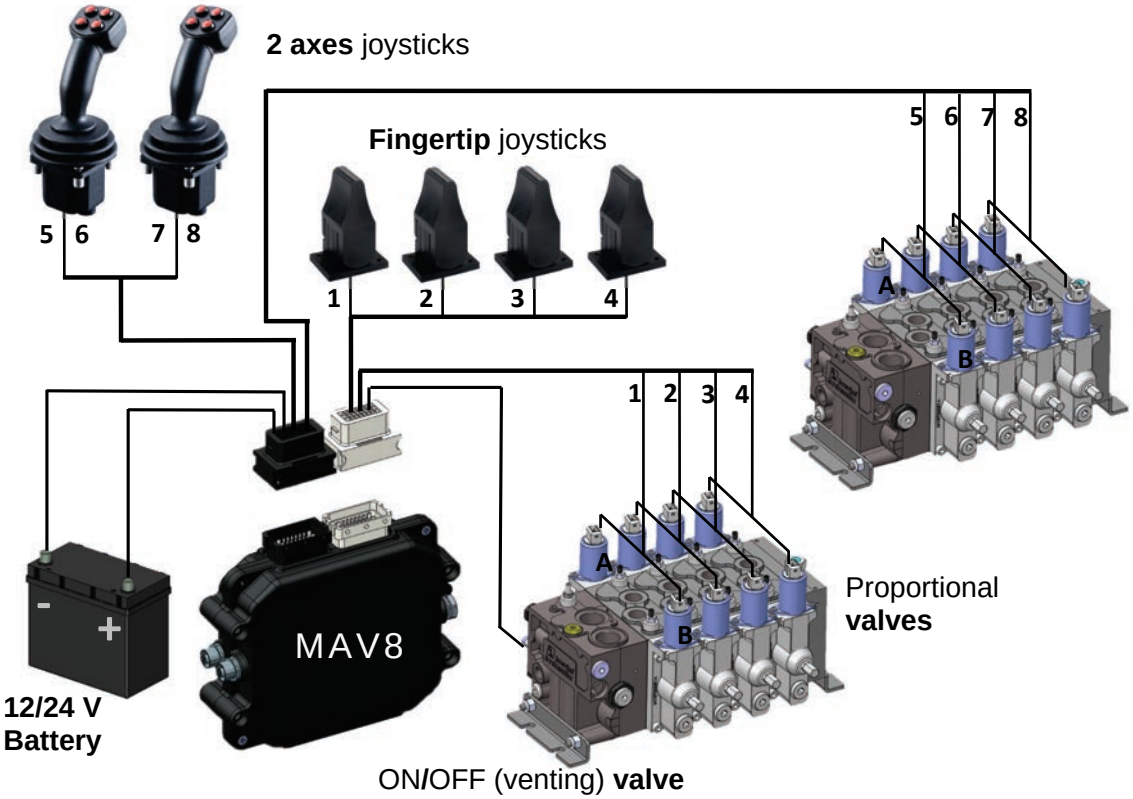
Proportional solenoid valve digital management

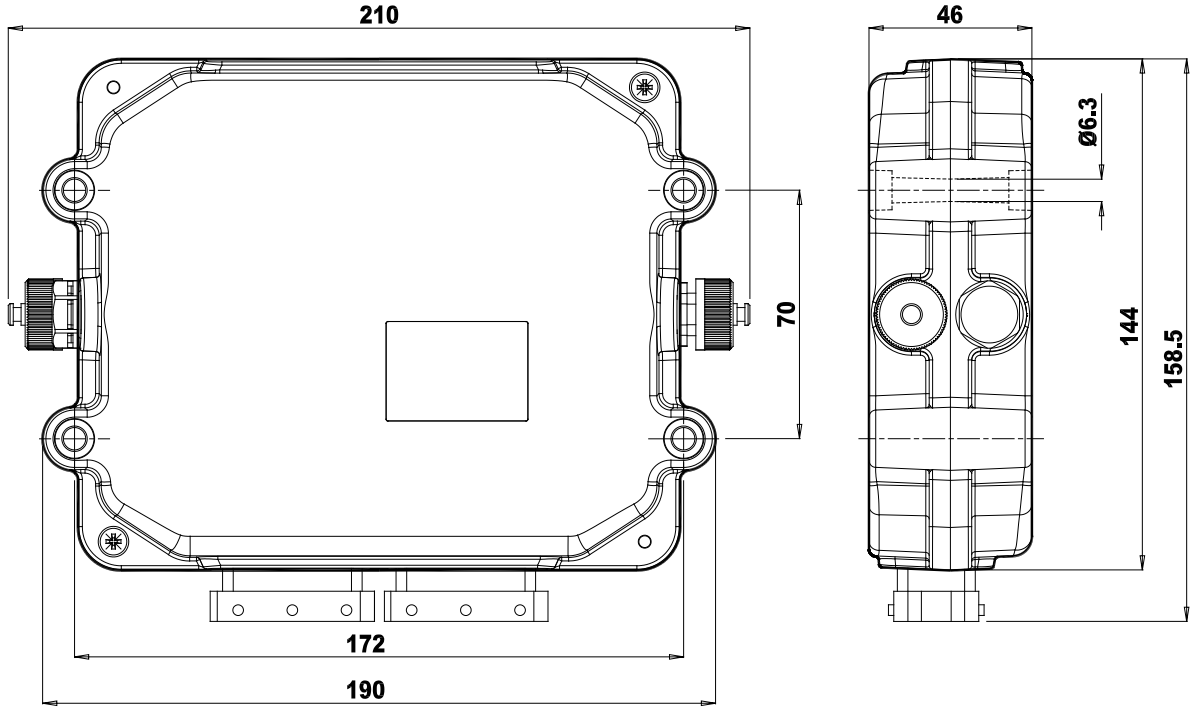
MAV8 Series

Ordering Code

MAV8	W	V3	8	_	150



Dimensions [mm]



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Accessories

Type	Description	Code	Notes
Counterpart Connector	SICMA FCI 24pin black+grey connectors composed by: № 1 FCI Black Connector Female Housing 24 ways № 1 FCI Grey Connector Female Housing 24 ways № 36 female terminals 1.5mm № 12 female terminals 2.8mm № 2 Locking cam for 24w Female Housing № 38 Filler plugs № 2 Rubber cap	7.003.019	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	Length 2000mm, black SICMA2 FCI receptable 24 pin connector with 24 black conductors (1.5-1 mm²) + grey SICMA2 FCI receptable 24 pin connector with 24 black conductors (1.5-1 mm²).	7.180.500	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 Serial cable RS-232 DB9/M12 L=4000 P/N 7.045.422; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.005	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (M12x1 4pin receptable connector) L=4meters	7.045.422	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Fan drive control

MAV1FD Series

- Fan Drive control
- Direct piloting of proportional solenoid valve and ON/OFF solenoid valves for Fan Drive management
- Current closed loop control
- Up to 4 temperature sensors, analog or CAN bus
- Same power supply for 12/24 V_{DC} systems
- Waterproof, plastic, compact body (40% fiber glass reinforced PBT)
- Electrical connection with FCI SICMA2
- With BPEterminal custom software is possible to change the following parameters and many others:
  - number and type of temperature sensors
  - low and high temperature thresholds
  - priority level of temperature sensors
  - min and max current for PWM valve
  - enabling of retarder and reverse
  - current ramps and direction change synchronization to avoid motor pressure shocks

Typical fields of application: fan drive for mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Power Supply | PWM | Protection Grade IP66/IP67 | Until -40 °C | CAN bus | Easy PC setup with BPEterminal

Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs for joystick	Four 0 to 5 V_{DC} or four 0 to10 V_{DC} or four 4 to 20 mA	Protected against short circuits and operator errors
Digital inputs	2 + 2 (on request)	2 inputs only if CAN bus interface is present
ON/OFF digital outputs	5x2	Positive. I_{MAX} = 3 A. Protected against short circuits
Proportional PWM outputs	1	Positive. Programmable from 70 to 250 Hz. I_{MAX} = 2 A. Protected against short circuits
Digital outputs	1	Positive. I_{MAX} = 3 A. Protected against short circuits
CAN bus interface	1	-
RS-232 interface	1 for calibration and diagnostic	AMP Superseal 1.5 series 3P connector (282105-1)
Operating temperature	from -40 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	40% fiberglass reinforced PBT	-
Coating	Two components polyurethane	-
Standard protection grade	IP66 / IP67	-
CE Conformity	EMC Directive: 2014/30/EU	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 100 years	-

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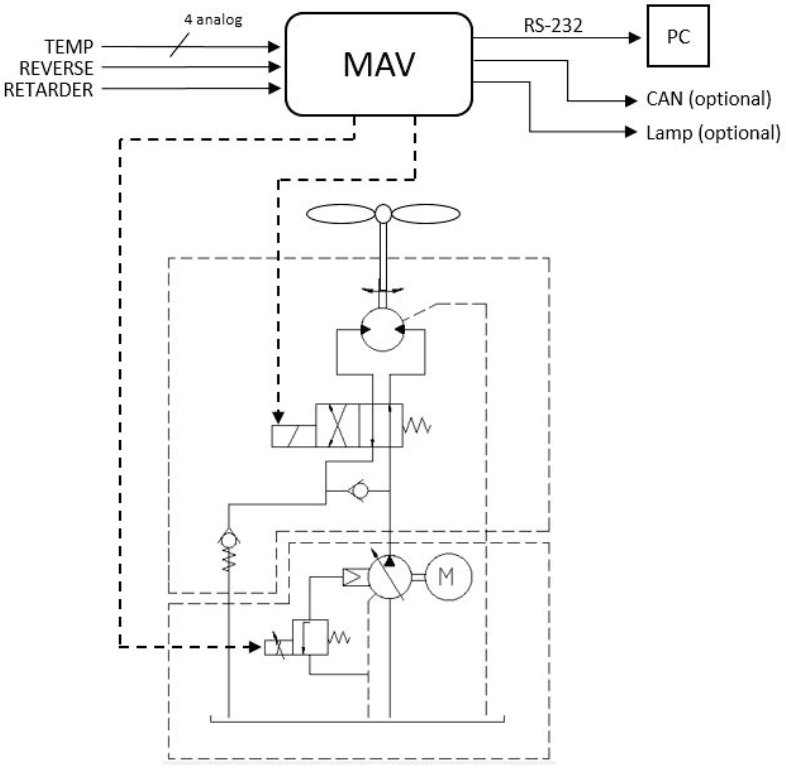
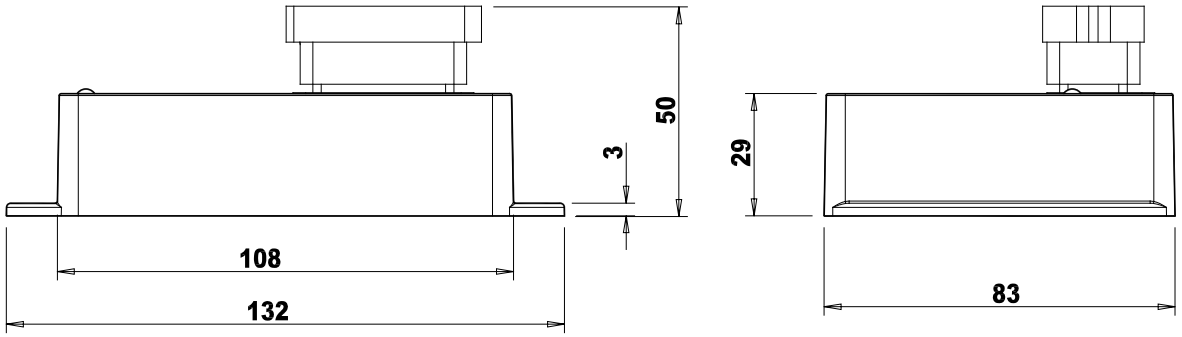
MAV1FD Series

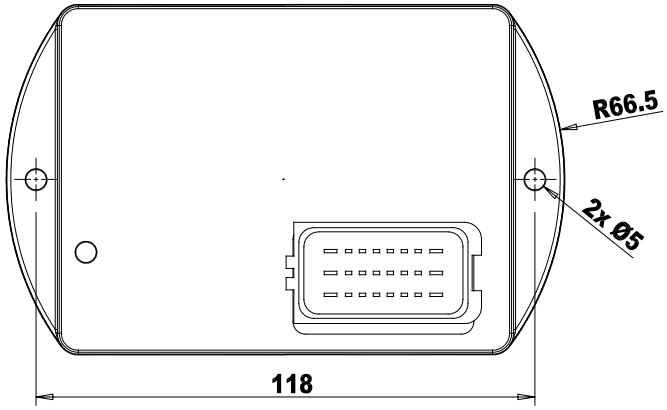
Ordering Code

MAV1FD F V3 _ _ 150



Dimensions [mm]





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Accessories

Type	Description	Code	Notes
Counterpart Connector	SICMA FCI 24pin connector composed by: № 1 FCI Black Connector Female Housing 24 ways № 18 female terminals 1.5mm № 6 female terminals 2.8mm № 1 Locking cam for 24w Female Housing № 20 Filler plugs № 1 Rubber cap	7.003.054	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	L=1000mm black extension cable, 24x1.5-1 SICMA FCI 24pin, numbered.	7.180.403	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Electronic amplifier plug version for single solenoid proportional valve

CEP Series

- Direct piloting for single proportional solenoid valve
- Designed according to EN 175301-803 (DIN 43650)
- Can be used with proportional valves series “XD.*.A…”, “XDP.*.A…”, “XP.3…”, “XQP.*…”, “CXQ.3…”
- Same power supply for 12/24 V_{DC} systems
- PWM output with current feedback
- Embedded trimmers to set gain, minimum current and rise/descent ramp time
- The output current to the solenoid can be measured via test points
- Waterproof, plastic, compact body
- Electrical connection with screw terminals

Typical fields of application: bancable hydraulic valves for industrial and mobile applications.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Technical data

Power supply	10.5 to 30 V_{DC}	Protected against polarity inversion
Analog input	1	Input signal reference 0 to10 V_{DC}
Proportional PWM output	1	Protected against short circuits. Factory pre-setting: • I_{MAX} = 2.50 A • I_{MAX} = 1.76 A • I_{MAX} = 0.88 A
External reference	10 V_{DC}	Protected against short circuits. I_{MAX} = 10 mA
Current minimum adjustment Gain adjustment Ramp time adjustment PWM frequency adjustement	0 to 50% of I_{MAX} 30 to 100% of I_{MAX} 0 to 10 s 150 to 400 Hz	-
Current test point	1V = 1A	-
Operating temperature	from -10 to +70 °C	-
Maximum weight	0.25 kg	-
Housing material	ABS	-
Standard protection grade	IP65	-
CE Conformity	EMC Directive: 2014/30/EU	-
EMC: Immunity | Emission	EN 61000-6-2, EN 61000-6-3	-
MTTFd	EN 13849-1: ≥ 100 years	-

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Electronic amplifier plug version for single solenoid proportional valve

CEP Series

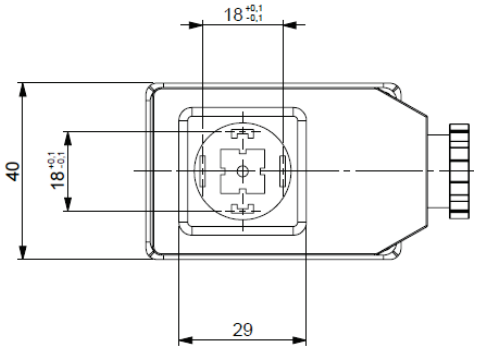
Ordering Code

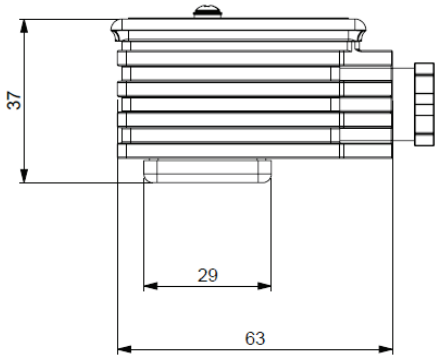
CEP	S	RS	X	0	3	00	2
Type	Control	Ramp	Imax	Input	PWM frequency	Variant	Revision

Control	**S**		Single solenoid control
Ramp	**R**	**S**	Symmetrical ramp
Imax	**X**		Max. output current I_{MAX} = 0.88 A
	Y		Max. output current I_{MAX} = 1.76 A
	Z		Max. output current I_{MAX} = 2.50 A
Input	**0**		Input signal reference 0 to10 V_{DC}
PWM frequency	**2**		400Hz
	3		150Hz
Variant	**0**	**0**	None
	R	**W**	Electrical circuit protected with silicone paint
Revision	**2**		-

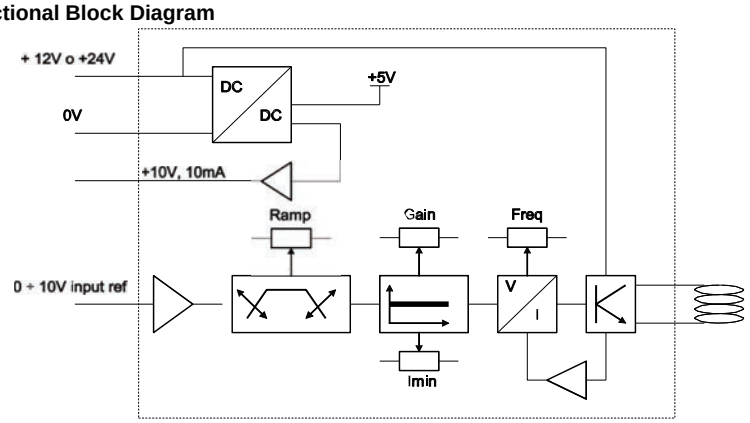
Custom configurations are available on request.

Dimensions [mm] and electrical connections

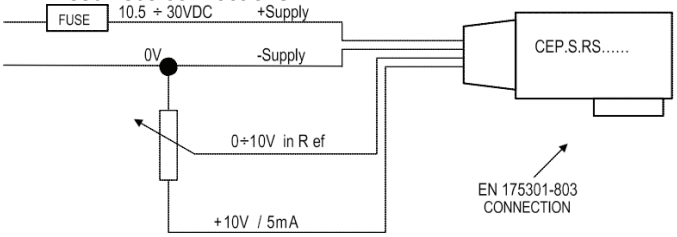




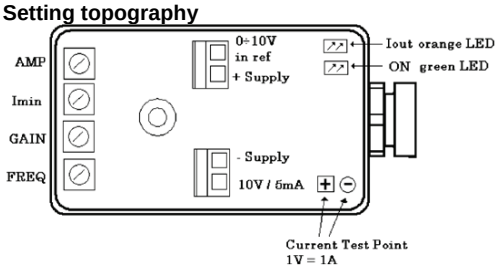
Functional Block Diagram



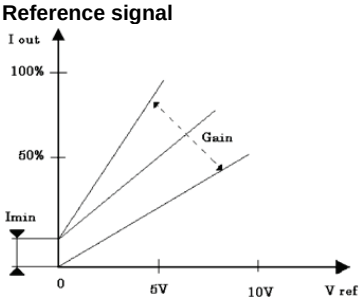
Electrical EN 175301-803 connections



Setting topography



Reference signal



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Electronic regulator for single solenoid proportional valve

REM.S Series

- Direct piloting a double proportional solenoid valve
- Can be used with double proportional solenoid valves series “XD.*.C” and “XDP.3.C”
- Same power supply for 12/24 V_{DC} systems
- PWM (pulse-width modulation) output stage with current feedback
- Gain, minimum current and rise/fall ramp time adjustments with embedded trimmers
- Output current to solenoid valve can be check via test points
- Serial port for fast, easy and repeatable setup
- Electrical connection with UNDECAL type housing (typical relay mounting standard)
- When input signal reference (pin 9) is lost, output goes back to neutral position

Typical fields of application: bancable hydraulic valves for industrial and mobile applications.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Power Supply


Dither


Easy setup


Trimmer setup

Technical data

Power supply	10 to 30 V_{DC} (1)	Protected against polarity inversion
Analog input	1	Reference input signal setting by dip switches: • 0 to 2 V_{DC} • 0 to 10 V_{DC} • 0 to 5 V_{DC} • 0 to 20 mA
Proportional PWM output	2x1	Protected against short circuits. f_{PWM} = 4kHz + Dither Current output setting by dip switches: • I_{MAX} = 2.80 A • I_{MAX} = 1.76 A I_{MAX} = 0.88 A
External reference	5 V_{DC}	Protected against short circuits. I_{MAX} = 10 mA
I_{MIN} minimum adjustment	0 to 50% of I_{MAX}	Dip switch configurable
Gain adjustment	50 to 100% of I_{MAX}	Dip switch configurable
Ramp time adjustment	0 to 20 s	Dip switch configurable
Dither frequency adjustement	100 Hz or 330 Hz	Dip switch configurable
Current test point	1V = 1A	-
Operating temperature	from -20 to +70 °C	-
Maximum weight	0.10 kg	-
Housing material	ABS	-
Standard protection grade	IP 20	-
CE Conformity	EMC Directive: 2014/30/EU	
EMC: Immunity | Emission	EN 61000-6-2, EN 61000-6-4	-
MTTFd	EN 13849-1: 59 years	-

(1) Maximum voltage rating: 36 V_{DC}

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Electronic regulator for single solenoid proportional valve

REM.S Series

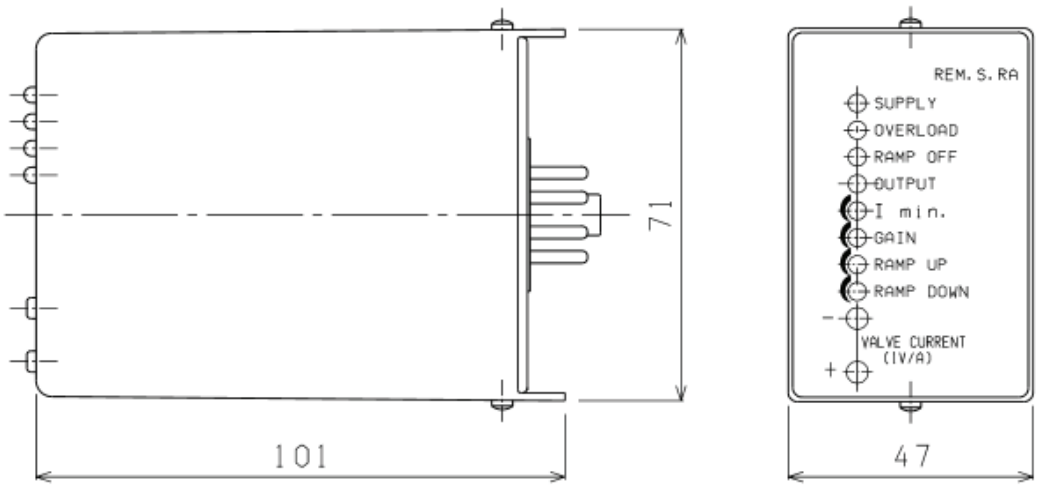
Ordering Code

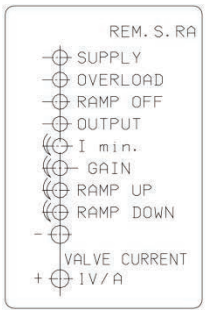
REM	S	RA	X	5	1	C	00	4
Type	**Control**	**Ramp**	**Imax**	**Input**	**Dither frequency**	**Min initial current**	**Variant**	**Revision**

Control	**S**	Double solenoid
Ramp	**R A**	Asymmetrical ramp
Imax	**X**	Max. output current I_{MAX} = 0.88 A
	Y	Max. output current I_{MAX} = 1.76 A
	Z	Max. output current I_{MAX} = 2.80 A
Input	**0**	Input signal reference -10 to +10 V_{DC}
	2	Input signal reference -2 to +2 V_{DC}
	5	Input signal reference 0 to +5 V_{DC} or -5 to +5 V_{DC}
	A	Input signal reference 0 to 20 mA or -20 to 20 mA (factory pre-setting)
Dither frequency	**1**	100 Hz (standard)
	2	330 Hz
Min. initial current	**G**	Step adjustment
	C	Continuous adjustment (normally for “XP.3”, “XQ.3”, “XQP.*.” and “CXQ.3” valves)
Variant	**0 0**	None
Revision	**4**	-

Custom configurations are available on request.

Dimensions [mm] and Electrical Connections





ADJUSTMENT PANEL

Supply	10VDC ÷ 30VDC (green led)
Overload	Protection against overload (red led)
Ramp off	Ramp off (red led)
Output	Output (current at solenoid, yellow led)
I. min.	Minimum current adjustment
Gain	Gain adjustment
Ramp up	Rump up adjustment time
Ramp down	Rump down adjustment time
Valve Current	Current test point at solenoid (1V =1A)

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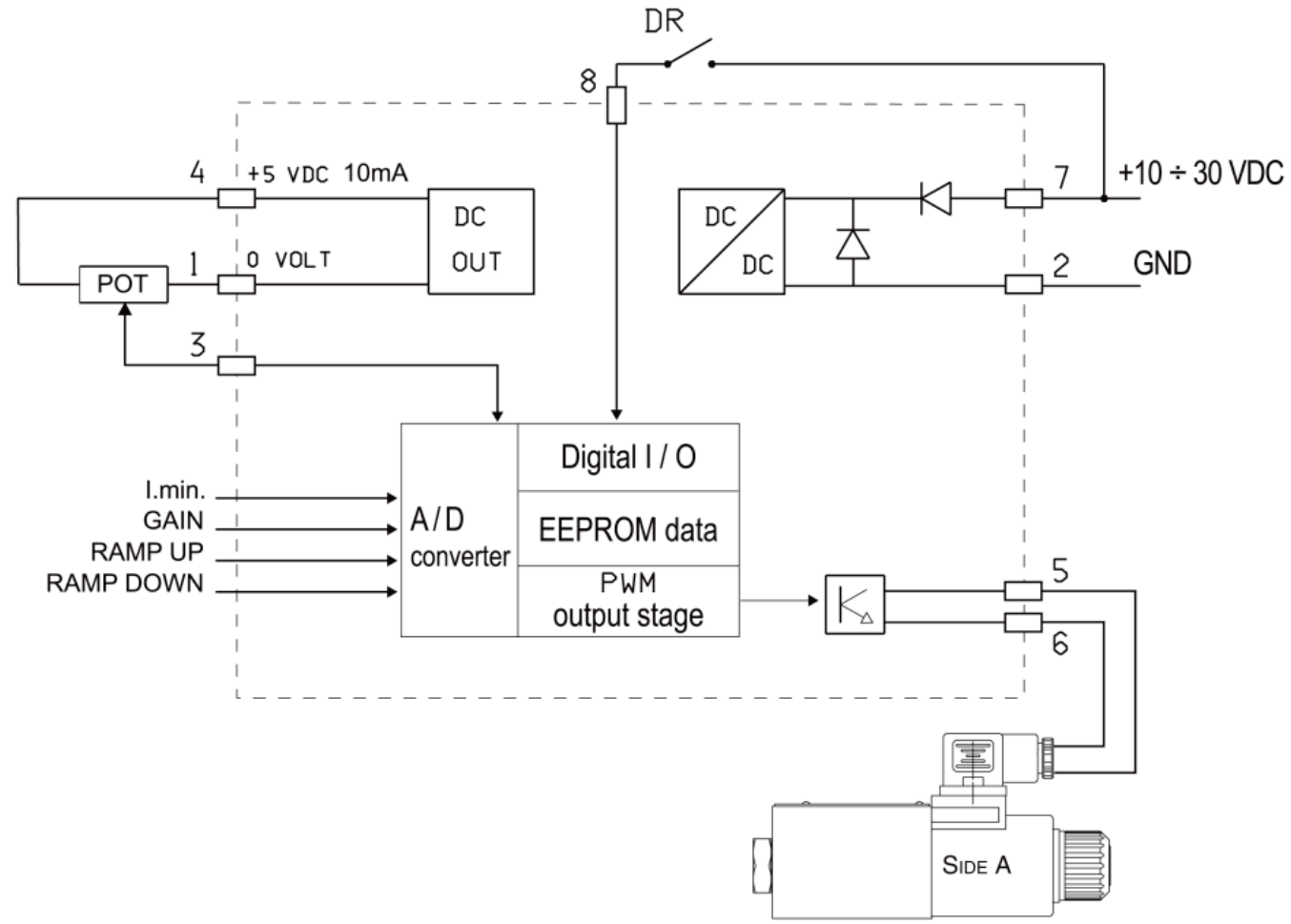
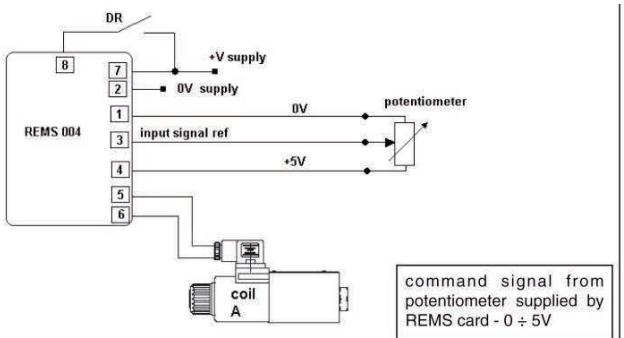
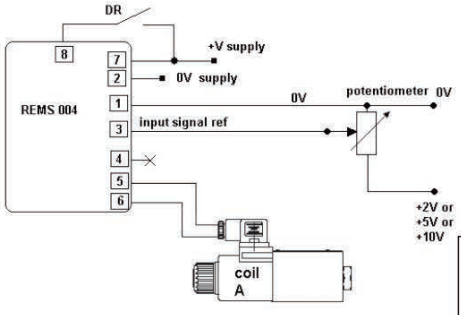
Dimensions [mm] and Electrical Connections

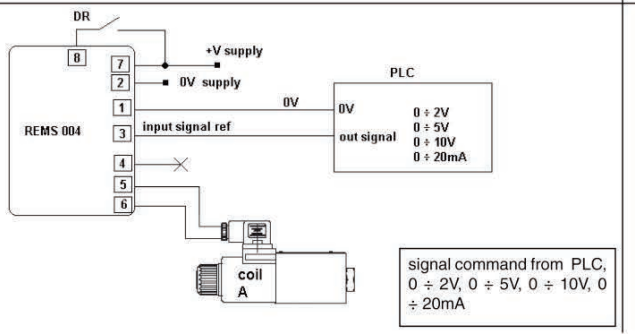




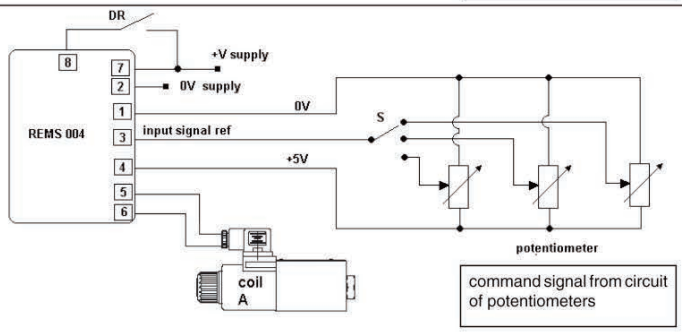
command signal from potentiometer supplied by REMS card - 0 ÷ 5V



command signal from potentiometer supplied by external power source, 0 ÷ 2V, 0 ÷ 5V, 0 ÷ 10V



signal command from PLC, 0 ÷ 2V, 0 ÷ 5V, 0 ÷ 10V, 0 ÷ 20mA



command signal from circuit of potentiometers

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Accessories

Type	Description	Code	Notes
Counterpart Connector	OCTAL socket for REMS boards	7.003.067	
RS-232 connection kit	RS-232 connection kit for REMS/REMD boards	7.045.546	

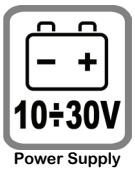
Electronic regulator for double solenoid proportional valve

REM.D Series

- Direct piloting a double proportional solenoid valve
- Can be used with double proportional solenoid valves series “XD.*.C” and “XDP.3.C”
- Same power supply for 12/24 V_{DC} systems
- PWM (pulse-width modulation) output stage with current feedback
- Gain, minimum current and rise/fall ramp time adjustments with embedded trimmers
- Output current to solenoid valve can be check via test points
- Serial port for fast, easy and repeatable setup
- Electrical connection with UNDECAL type housing (typical relay mounting standard)
- When input signal reference (pin 9) is lost, output goes back to neutral position

Typical fields of application: bancable hydraulic valves for industrial and mobile applications.

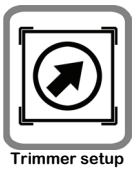
Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Power Supply


Dither


Easy setup


Trimmer setup

Technical data

Power supply	10 to 30 V_{DC} (1)	Protected against polarity inversion
Analog input	1	Reference input signal setting by dip switches: • 0 to 5 V_{DC} • -5 to 5 V_{DC} • 0 to 20 mA • -10 to 10 V_{DC} • -2 to 2 V_{DC} • -20 to 20 mA
Proportional PWM output	2x1	Protected against short circuits. f_{PWM} = 4kHz + Dither Current output setting by dip switches: • I_{MAX} = 2.80 A • I_{MAX} = 1.76 A I_{MAX} = 0.88 A
External reference	5 V_{DC}	Protected against short circuits. I_{MAX} = 10 mA
I_{MIN} minimum adjustment	0 to 50% of I_{MAX}	Dip switch configurable
Gain adjustment	50 to 100% of I_{MAX}	Dip switch configurable
Ramp time adjustment	0 to 20 s	Dip switch configurable
Dither frequency adjustement	100 Hz or 330 Hz	Dip switch configurable
Current test point	1V = 1A	-
Operating temperature	from -20 to +70 °C	-
Maximum weight	0.12 kg	-
Housing material	ABS	-
Standard protection grade	IP 20	-
CE Conformity	EMC Directive: 2014/30/EU	
EMC: Immunity | Emission	EN 61000-6-2, EN 61000-6-4	-
MTTFd	EN 13849-1: 59 years	-

(1) Maximum voltage rating: 36 V_{DC}

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Electronic regulator for double solenoid proportional valve

REM.D Series

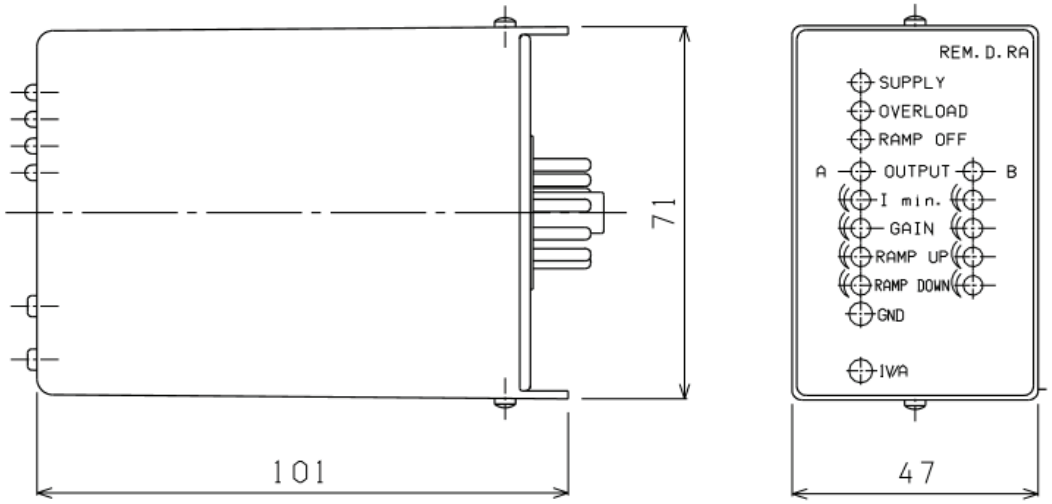
Ordering Code

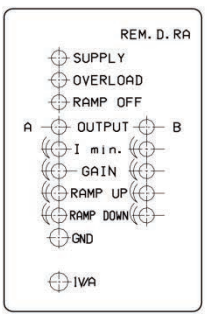
REM	D	RA	X	5	1	G	00	4
Type	Control	Ramp	Imax	Input	Dither frequency	Min initial current	Variant	Revision

Control	**D**	For double solenoid
Ramp	**R A**	Asymmetrical ramp
Imax	**X**	Max. output current I_{MAX} = 0.88 A
	Y	Max. output current I_{MAX} = 1.76 A
	Z	Max. output current I_{MAX} = 2.80 A
Input	**0**	Input signal reference -10 to +10 V_{DC}
	2	Input signal reference -2 to +2 V_{DC}
	5	Input signal reference 0 to +5 V_{DC} or -5 to +5 V_{DC}
	A	Input signal reference 0 to 20 mA or -20 to 20mA (factory pre-setting)
Dither frequency	**1**	100 Hz (standard)
	2	330 Hz
Min. initial current	**G**	Step adjustment
Variant	**0 0**	None
Revision	**4**	-

Custom configurations are available on request.

Dimensions [mm] and Electrical Connections





ADJUSTMENT PANELL

Supply	10Vdc ÷ 30Vdc (green led)
Overload	Protection against over (red led)
Ramp off	Ramp off (red led)
Output	Output (current at solenoid A/B, yellow led)
I. min.	Minimum current adjustment A/B
Gain	A/B gain adjustment
Ramp up	A/B rump up adjustment time
Ramp down	A/B rump down adjustment time
GND	Ground
1V/A	Current test point at solenoid

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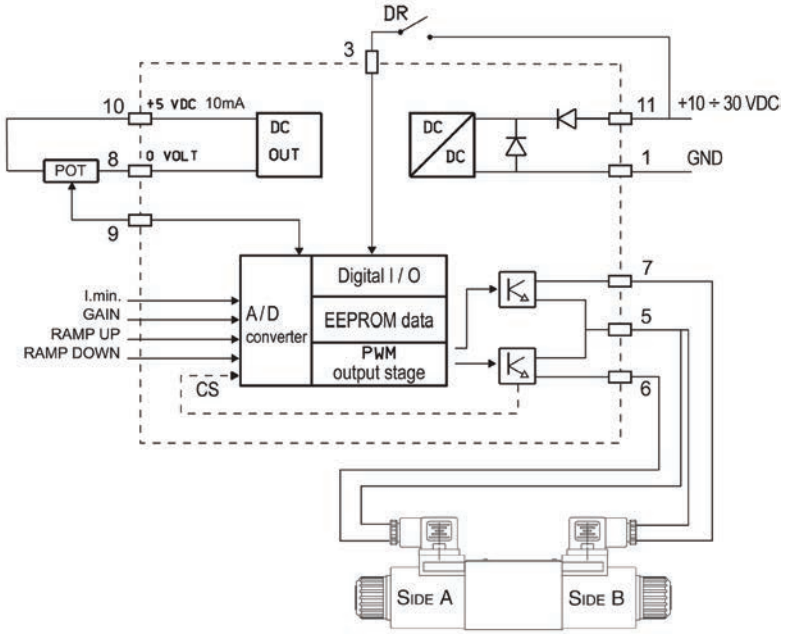
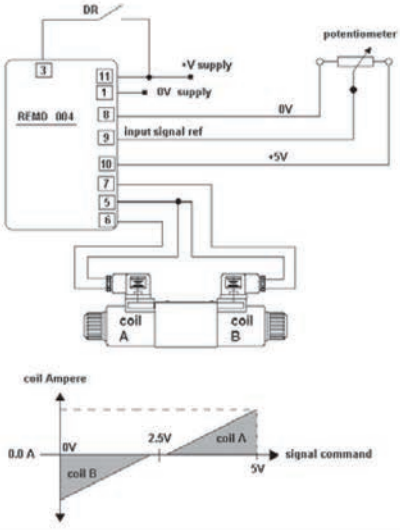
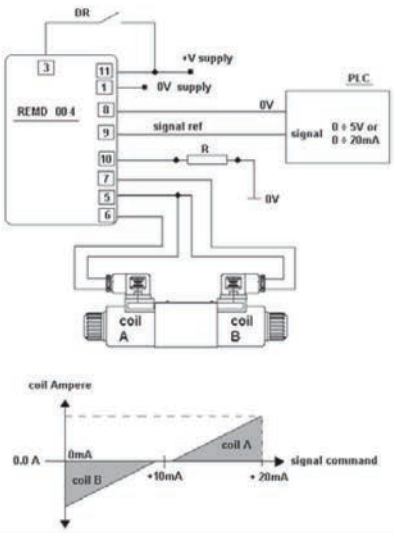
Dimensions [mm] and Electrical Connections



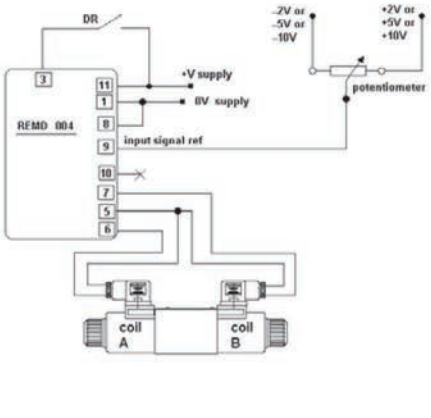
command signal from potentiometer supplied by REMD card
- 0 ÷ 2.5V ÷ 5V



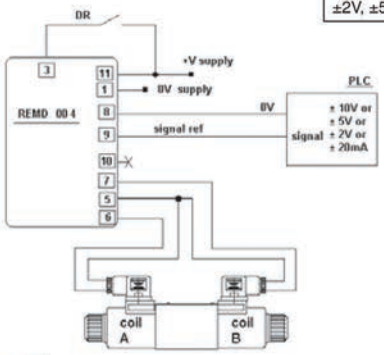
signal command from PLC, 0 ÷ 5V, 0 ÷ 20mA

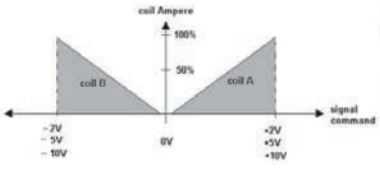


command signal from potentiometer supplied by external power source, ±2V, ±5V, ±10V



signal command from PLC, ±2V, ±5V, ±10V





Accessories

Type	Description	Code	Notes
Counterpart Connector	UNDECAL socket for REMD boards	7.003.075	
RS-232 connection kit	RS-232 connection kit for REMS/REMD boards	7.045.546	

Programmable basket load limiter

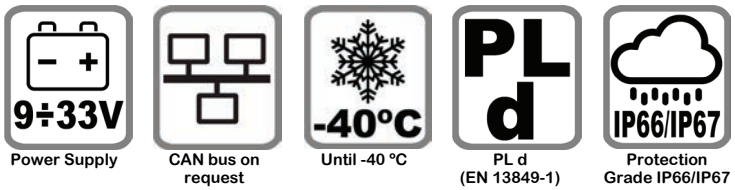
M92 Load Series

- Load limiting system for basket platforms
- Two PL d (according to EN13849-1) outputs
- Two analog inputs to read a double load cell
- Analog low signal direct inputs for 0.5 mV up to 19 mV signals
- Same power supply for 12/24 V_{DC} systems
- Waterproof, plastic, compact body (40% fiber glass reinforced PBT)
- Electrical connection with FCI SICMA2
- Easy max load calibration
- RS-232 serial interface

On request:
- CAN bus interface

Typical fields of application: access platforms

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Power Supply | CAN bus on request | Until -40 °C | PL d (EN 13849-1) | Protection Grade IP66/IP67

Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs	2	From 0.5 mV to 19 mV
Digital inputs	4	-
ON/OFF safety outputs	2	PL d (according to EN13849-1) Positive. I_{MAX} = 3 A. Protected against short circuits
ON/OFF signal outputs	5	Positive. I_{MAX} = 3 A. Protected against short circuits
CAN bus interface	1	On request
RS-232 interface	for calibration and diagnostic	AMP Superseal 1.5 series 3P connector (282105-1)
Operating temperature	from -40 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	40% fiberglass reinforced PBT	-
Coating	Two components polyurethane	-
Standard protection grade	IP66 / IP67	-
CE Conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 100 years	-

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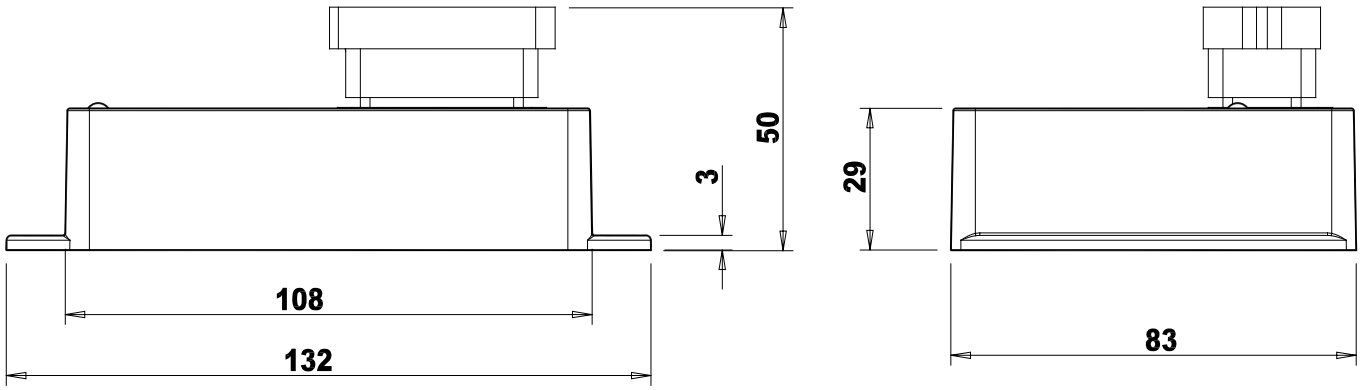
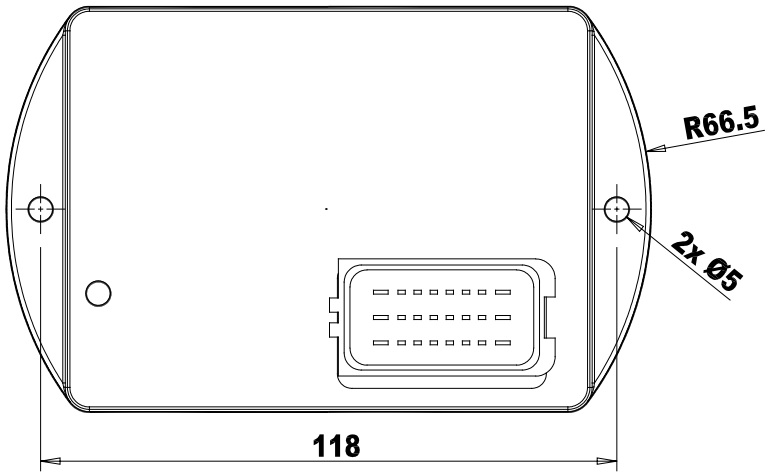
Ordering Code

M92	P2	NOT	2TD_	NOT	PLd	_2	NOT	NOT

Dimensions [mm]





Accessories

Type	Description	Code	Notes
Counterpart Connector	SICMA FCI 24pin connector composed by: № 1 FCI Black Connector Female Housing 24 ways № 18 female terminals 1.5mm № 6 female terminals 2.8mm № 1 Locking cam for 24w Female Housing № 20 Filler plugs № 1 Rubber cap	7.003.054	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	L=1000mm black extension cable, 24x1.5-1 SICMA FCI 24pin, numbered.	7.180.403	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Programmable moment control or area limiter

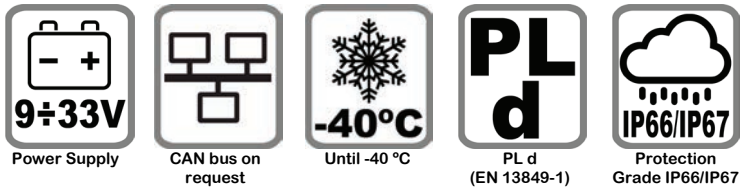
M92 Moment or Area Series

- Moment limiting system for access platforms
- Two PL d (according to EN13849-1) outputs
- Six analog inputs to read:
  - one double angle sensor, two pressure transmitter for bottom side of main cylinder, and two pressure transmitter for rod side (moment)
  - or to read two angle sensors and two length sensors (area)
- Same power supply for 12/24 V_{DC} systems
- Waterproof, plastic, compact body (40% fiber glass reinforced PBT)
- Electrical connection with FCI SICMA2
- Easy limit curves calibration
- RS-232 serial interface

On request:
- CAN bus interface

Typical fields of application: access platforms

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs	6	2 for double angle sensor 2 for pressure transmitters on bottom, 2 for pressure transmitters on rod
Digital inputs	4	-
ON/OFF safety outputs	2	PL d (according to EN13849-1), Positive. I_{MAX} = 3 A. Protected against short circuits
ON/OFF signal outputs	5	Positive. I_{MAX} = 3 A. Protected against short circuits
CAN bus interface	1	On request
RS-232 interface	for calibration and diagnostic	AMP Superseal 1.5 series 3P connector (282105-1)
Operating temperature	from -40 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	40% fiberglass reinforced PBT	-
Coating	Two components polyurethane	-
Standard protection grade	IP66 / IP67	-
CE Conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 100 years	-

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Programmable moment control or area limiter

M92 Moment or Area Series

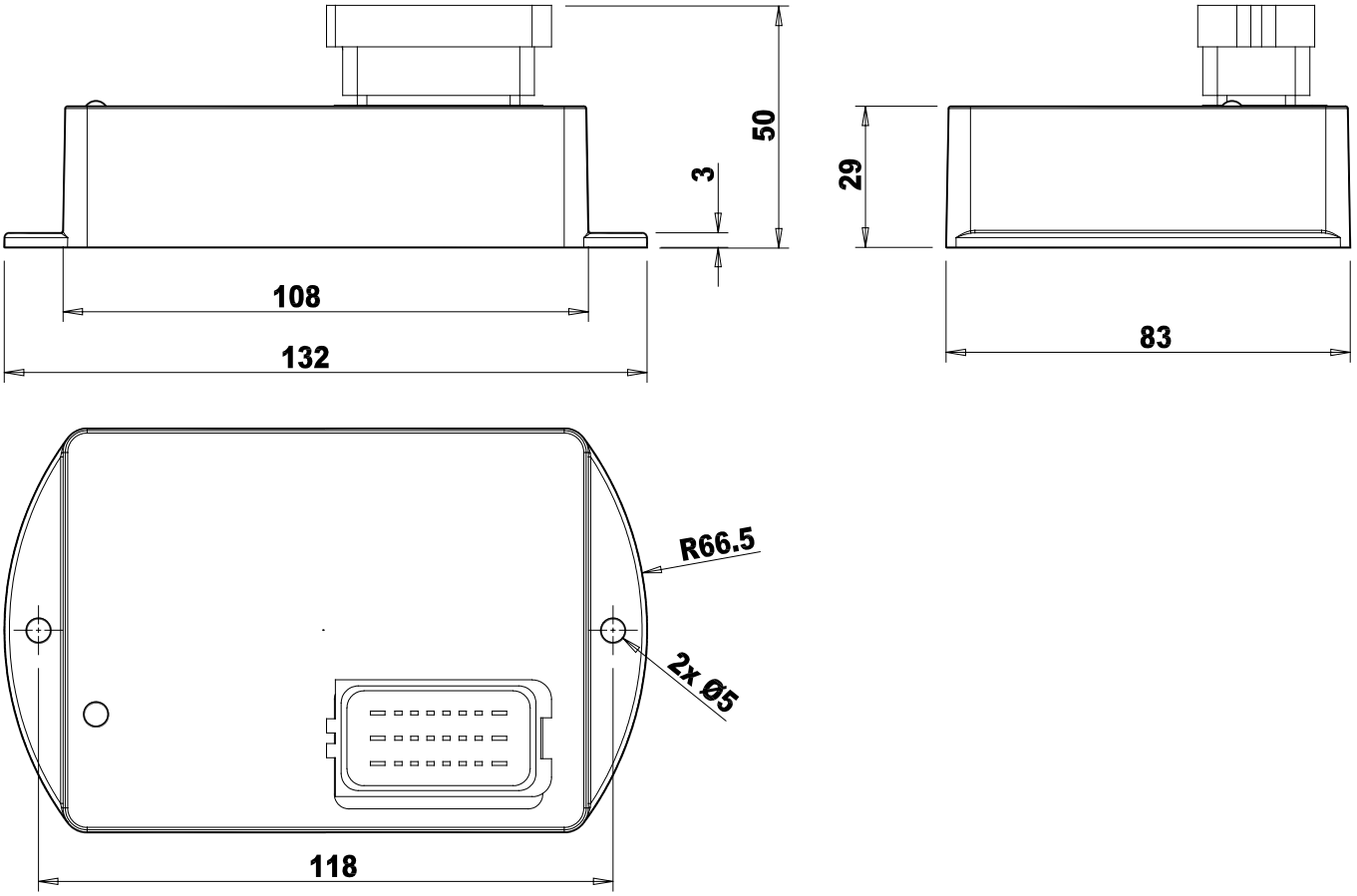
Ordering Code for Moment Control

M92	P2	2TA	2DV_	NOT	PLd	_2	NOT	NOT

Ordering Code for Area Control

M92	P2	2AS	NOT_	NOT	PLd	_2	NOT	NOT

Dimensions [mm]



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Accessories

Type	Description	Code	Notes
Counterpart Connector	SICMA FCI 24pin connector composed by: № 1 FCI Black Connector Female Housing 24 ways № 18 female terminals 1.5mm № 6 female terminals 2.8mm № 1 Locking cam for 24w Female Housing № 20 Filler plugs № 1 Rubber cap	7.003.054	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	L=1000mm black extension cable, 24x1.5-1 SICMA FCI 24pin, numbered.	7.180.403	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Load limitation system for scissor platforms

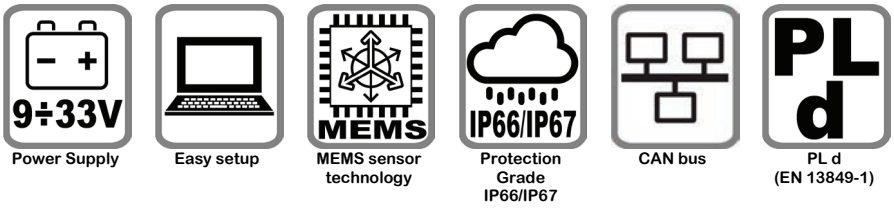
M92-Sc Series

- Load limiting system for scissor platforms
- Based on height (angle) and pressure measurement
- 2 Outputs PL d according to EN13849-1
- Same power supply for 12/24 V_{DC} systems
- Tilt device features with internal MEMS sensor
- Waterproof, plastic, compact body (40% fiber glass reinforced PBT)
- CAN bus interface
- Electrical connection with FCI SICMA2
- Easy automatic setting phase for max load
- RS-232 serial interface

On request:
- Display OPUS A3e connected via CAN bus interface, to order separately

Typical fields of application: scissor access platoforms

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Power Supply | Easy setup | MEMS sensor technology | Protection Grade IP66/IP67 | CAN bus | PL d (EN 13849-1)

Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs	Up to 4 inputs for pressure transmitters	Protected against short circuits and operator errors
Digital inputs	Up to 5	-
ON/OFF safety outputs	2	PL d (according to EN13849-1) Positive. I_{MAX} = 3 A. Protected against short circuits
ON/OFF signal outputs	Up to 7	Positive. I_{MAX} = 3 A. Protected against short circuits
CAN bus interface	1	
RS-232 interface	for calibration and diagnostic	AMP Superseal 1.5 series 3P connector (282105-1)
Operating temperature	from -20 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	40% fiberglass reinforced PBT	-
Coating	Two components polyurethane	-
Standard protection grade	IP66 / IP67	-
CE Conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 100 years	-

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Load limitation system for scissor platforms

M92-Sc Series

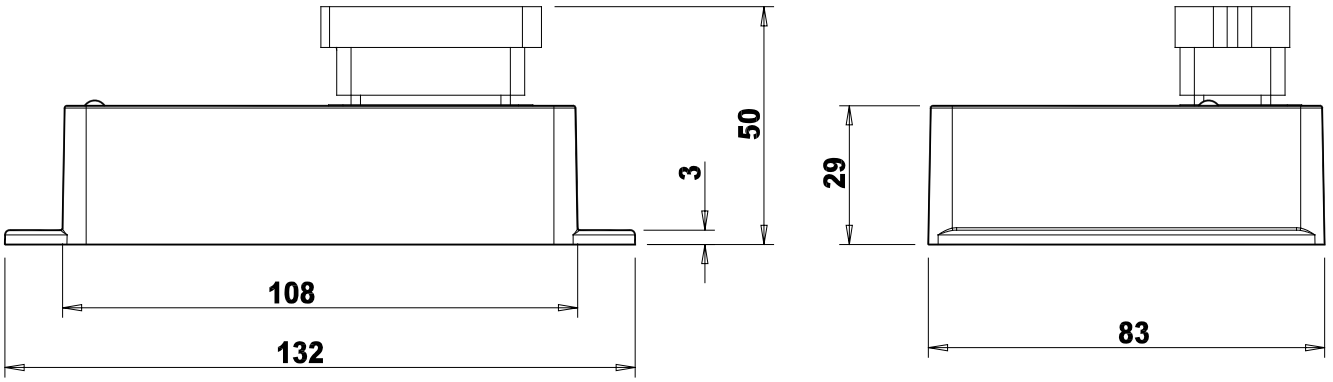
Ordering Code

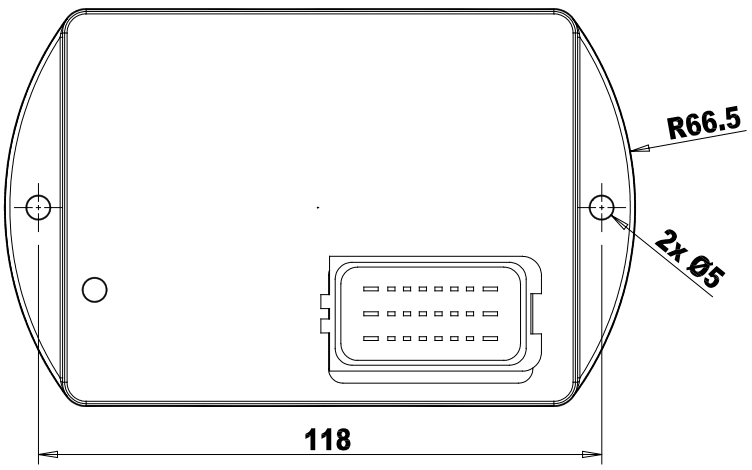
M92-Sc	PU24	2TA	2TPV	PLd
Master Module	Operating mode	No. of angle transducers	No. of pressure transducers	Safety lavel

Operating mode	**PU24**	One output to limit rise, one output to limit descent
	PU25	One output for max height condition, one output for overload condition
	PU26	One output to limit rise and tilt, one output to limit descent and tilt
	PU27	One output for max height condition or tilt condition, one output for overload condition or tilt condition
No. of angle transducer	**2TA**	Double angle transducer
No. of pressure transducer	**2TPV**	For single phase cylinder (pressure transducers fit on bottom side only)
	4TPV	For double phase cylinder (pressure transducers fit on bottom and rod side)
Safety	**PLd**	Safety level for the two safety outputs

Custom configurations are available on request.

Dimensions [mm]





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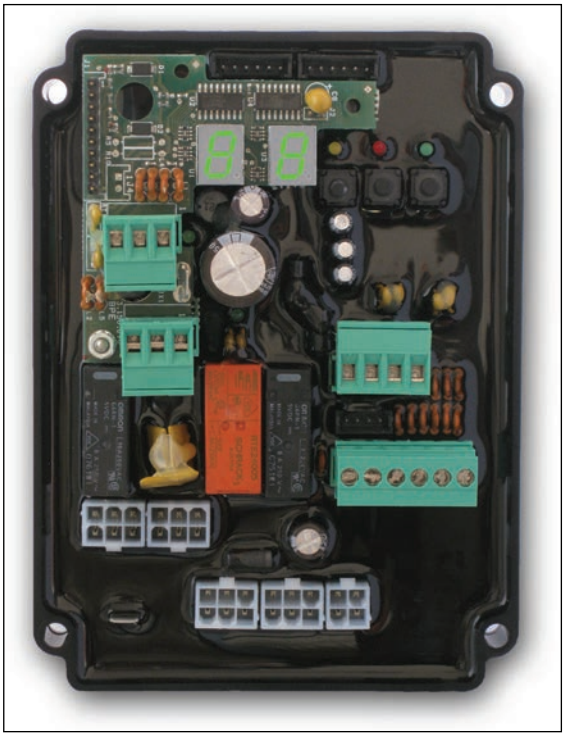
Accessories

Type	Description	Code	Notes
Counterpart Connector	SICMA FCI 24pin connector composed by: № 1 FCI Black Connector Female Housing 24 ways № 18 female terminals 1.5mm № 6 female terminals 2.8mm № 1 Locking cam for 24w Female Housing № 20 Filler plugs № 1 Rubber cap	7.003.054	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	L=1000mm black extension cable, 24x1.5-1 SICMA FCI 24pin, numbered.	7.180.403	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Programmable moment limiter

M82E Moment Series

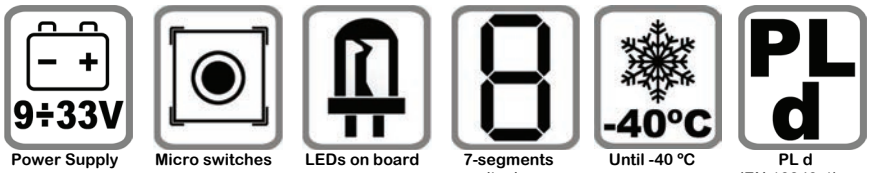


- Moment limiting system for access platforms
- Doubled PL d output (according to EN13849-1)
- Six analog inputs to read:
  - two angle sensor (or one double)
  - two pressure transmitter (main cylinder bottom side)
  - two pressure transmitter (main cylinder rod side)
- Easy calibration via push buttons and LEDs on board or via RS-232 serial port
- Diagnostic through LEDs on board or via RS-232 serial port
- Digital outputs for alarm and pre-alarm signaling
- More alarm levels available
- Same power supply for 12/24 V_{DC} systems
- Auto test for:
  - short circuit on power outputs
  - transducers open or in short circuit
- Plastic, compact, resin body
- Electrical connection with Molex Mini-Fit® and Sauro CVF connectors (counterparts provided)
- RS-232 serial interface

On request:
- Working states data log
- Special functions
- Enhanced power safety outputs
- Input for zero check
- Doubled PL c output (according to EN13849-1) version for cranes

Typical fields of application: access platforms, cranes (PL c version)

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Power Supply | Micro switches | LEDs on board | 7-segments display | Until -40 °C | PL d (EN 13849-1)

Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs	six 0.5 to 4.5 V_{DC} or 4 to 20 mA (PL d version) four 0.5 to 4.5 V_{DC} or 4 to 20 mA (PL c version)	-
Digital inputs	8	
ON/OFF safety outputs	2 with three relays (one double, two single)	Independent. PL d (according to EN13849-1) I_{MAX} = 3 A. Protected against short circuits or I_{MAX} = 3+3 A. Not protected against short circuits
ON/OFF signal outputs	2	Positive. I_{MAX} = 3 A. Protected against short circuits
RS-232 interface	for calibration and diagnostic	AMP Modu 2 connector (282105-1)
Operating temperature	from -40 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	ABS	-
Coating	two components polyurethane	-
CE Conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 90 years	-

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Ordering Code

Moment limiting system for access platforms

M82	P2C0	2TA	_2DV	NOT	PLd	_2	R	2O
			0.5 to 4.5 V_{DC}					

M82	P2C0	2TA	_2DA	NOT	PLd	_2	R	2O
			4 to 20 mA					

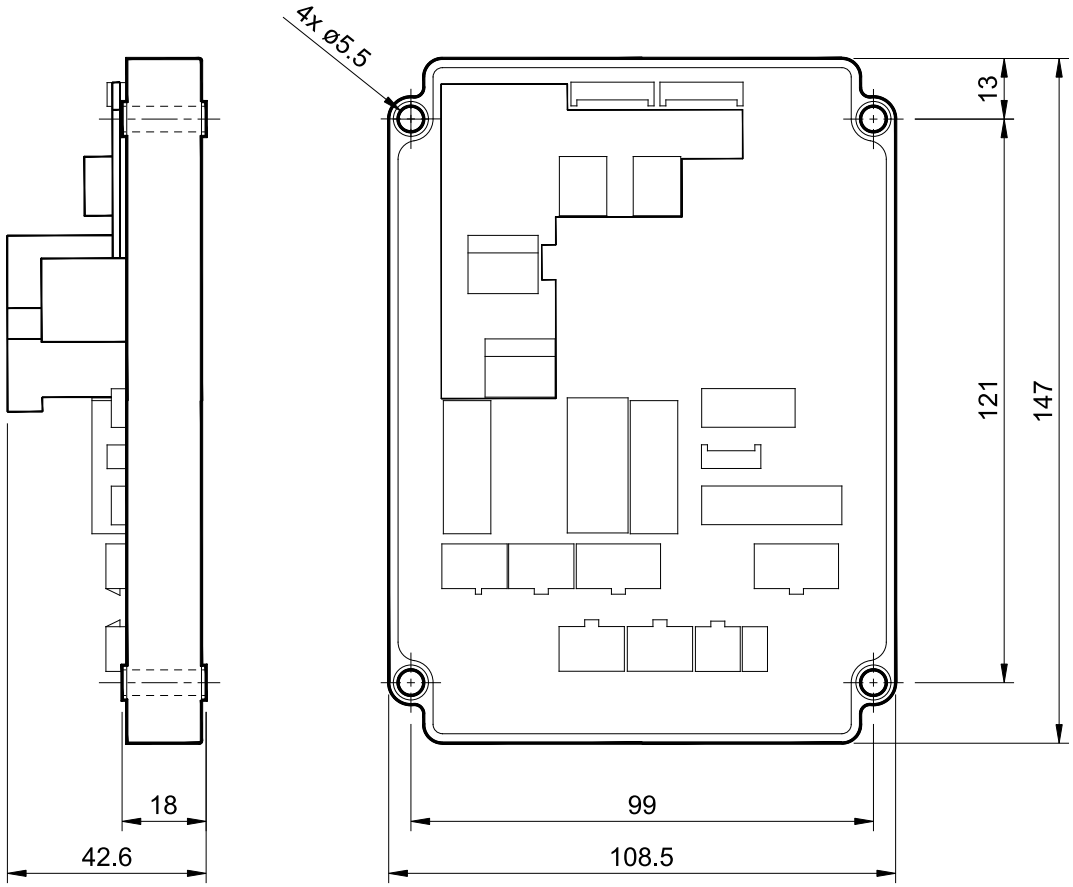
Moment limiting system for cranes (two pressure transmitters: bottom and rod)

M82	P2C0	NOT	_1DA	NOT	PLc	_2	R	2O

Moment limiting system for cranes (one pressure transmitter: bottom)

M82	P2C0	NOT	1TPA	NOT	PLc	_2	R	2O

Dimensions [mm]



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Accessories

Type	Description	Code	Notes
Counterpart Connector	MOLEX 4 pin plug connector composed by: № 1 loose connector 4 pin P/N Molex 5557-04R; № 4 female terminals P/N Molex 5556.	7.003.002	
Counterpart Connector	MOLEX 6 pin plug connector composed by: № 1 loose connector 6 pin P/N Molex 5557-06R; № 6 female terminals P/N Molex 5556.	7.003.003	
Counterpart Connector	Kit MOLEX Mini-Fit female terminals, composed by: № 100 MOLEX female terminals P/N 5556.	7.003.034	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Programmable basket load limiter

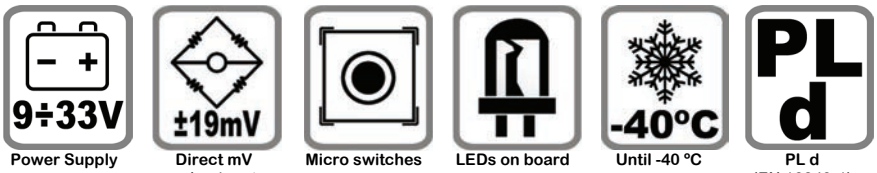
M82 Load Series

- Load limiting system for basket platforms
- Doubled PL d output (according to EN13849-1)
- Two independent channels for double load cells
- Analog low signal direct inputs for 0.5 mV up to 19 mV signals
- Easy calibration via push buttons and LEDs on board or via RS-232 serial port
- Diagnostic through LEDs on board or via RS-232 serial port
- Digital outputs for alarm and pre-alarm signaling
- More alarm levels available
- Same power supply for 12/24 V_{DC} systems
- Auto test for:
  - short circuit on power outputs
  - transducers open or in short circuit
- Plastic, compact, resin body
- Electrical connection with Molex Mini-Fit® and Sauro CVF connectors (counterparts provided)
- RS-232 serial interface

On request:
- Analog inputs to read amplified load cells
- Self-calibration push button
- Working states data log
- Special functions
- Enhanced power safety outputs
- Input for zero check

Typical fields of application: access platforms

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs	two differential	From 0.5 mV to 19 mV
Digital inputs	8	
ON/OFF safety outputs	2 with three relays (one double, two single)	Independent. PL d (according to EN13849-1) I_{MAX} = 3 A. Protected against short circuits or I_{MAX} = 3+3 A. Not protected against short circuits
ON/OFF signal outputs	3	Positive. I_{MAX} = 3 A. Protected against short circuits
RS-232 interface	for calibration and diagnostic	AMP Modu 2 connector (282105-1)
Operating temperature	from -40 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	ABS	-
Coating	two components polyurethane	-
CE Conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 90 years	-

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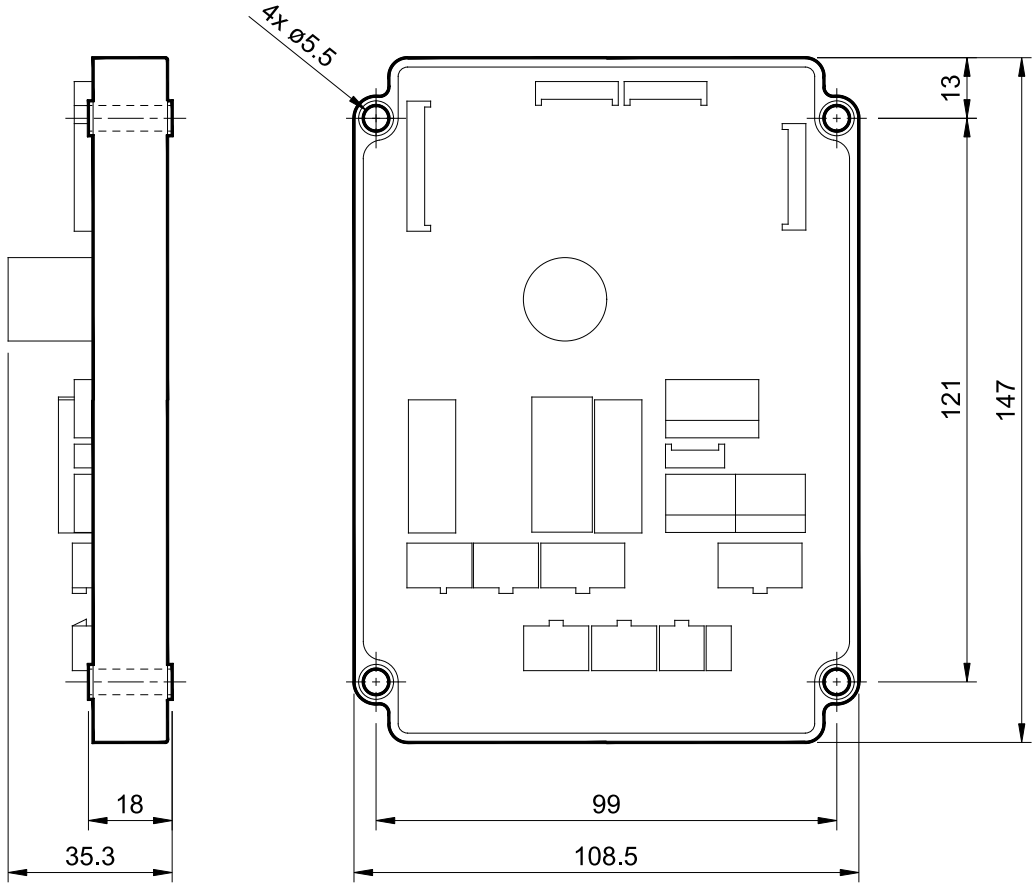
Ordering Code

M82	P2C0	NOT	2TD_	NOT	PLd	_2	R	2O

Dimensions [mm]



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Accessories

Type	Description	Code	Notes
Counterpart Connector	MOLEX 4 pin plug connector composed by: № 1 loose connector 4 pin P/N Molex 5557-04R; № 4 female terminals P/N Molex 5556.	7.003.002	
Counterpart Connector	MOLEX 6 pin plug connector composed by: № 1 loose connector 6 pin P/N Molex 5557-06R; № 6 female terminals P/N Molex 5556.	7.003.003	
Counterpart Connector	Kit MOLEX Mini-Fit female terminals, composed by: № 100 MOLEX female terminals P/N 5556.	7.003.034	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Programmable area limiter

M82 Area Series

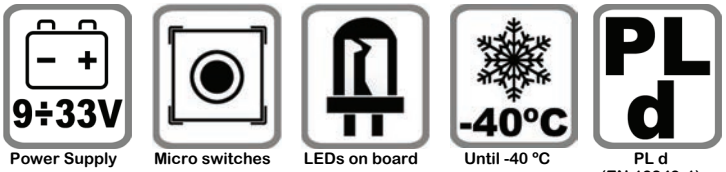
- Area limiting system for access platforms
- Doubled PL d output (according to EN13849-1)
- Four analog inputs to read:
  - two angle sensors (or one double)
  - two length sensors (or one double)
- Easy calibration via push buttons and LEDs on board or via RS-232 serial port
- Diagnostic through LEDs on board or via RS-232 serial port
- Movements check inputs
- Digital outputs for alarm and pre-alarm signaling
- More alarm levels available
- Same power supply for 12/24 V_{DC} systems
- Auto test for:
  - short circuit on power outputs
  - transducers open or in short circuit
- Plastic, compact, resin body
- Electrical connection with Molex Mini-Fit® and Sauro CVF connectors (counterparts provided)
- RS-232 serial interface

On request:

- 7-segments diagnostic displays
- Working states data log
- Special functions
- Enhanced power safety outputs
- Input for zero check
- Current inputs for 4 to 20 mA transducers

Typical fields of application: access platforms

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Technical data

Power supply	9 to 33 V_{DC}	Protected against polarity inversion
Analog inputs	four 0.5 to 4.5 V_{DC}	-
Digital inputs	8	
ON/OFF safety outputs	2 with three relays (one double, two single)	Independent. PL d (according to EN13849-1) I_{MAX} = 3 A. Protected against short circuits or I_{MAX} = 3+3 A. Not protected against short circuits
ON/OFF signal outputs	3	Positive. I_{MAX} = 3 A. Protected against short circuits
RS-232 interface	for calibration and diagnostic	AMP Modu 2 connector (282105-1)
Operating temperature	from -40 to +70 °C	-
Maximum weight	0.40 kg	-
Housing material	ABS	-
Coating	two components polyurethane	-
CE Conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 90 years	-

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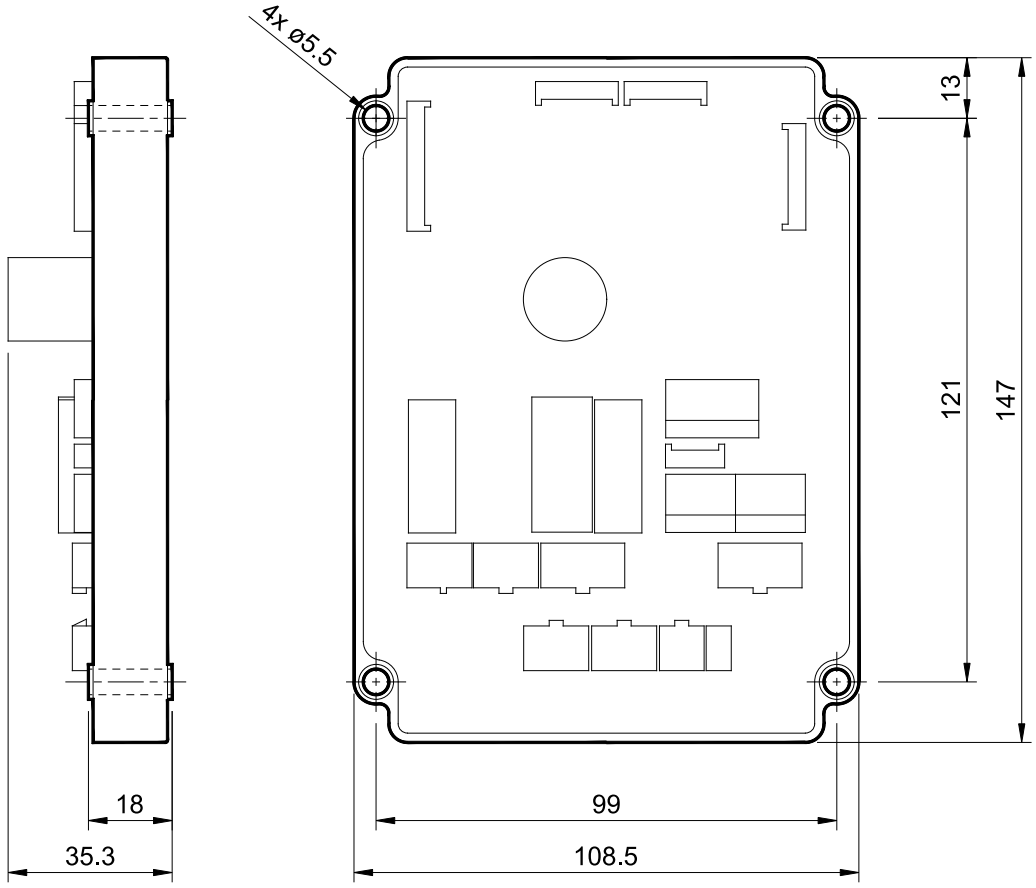
Ordering Code

M82	P2C0	2AS	NOT_	NOT	PLd	_2	R	2O

Dimensions [mm]



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Accessories

Type	Description	Code	Notes
Counterpart Connector	MOLEX 4 pin plug connector composed by: № 1 loose connector 4 pin P/N Molex 5557-04R; № 4 female terminals P/N Molex 5556.	7.003.002	
Counterpart Connector	MOLEX 6 pin plug connector composed by: № 1 loose connector 6 pin P/N Molex 5557-06R; № 6 female terminals P/N Molex 5556.	7.003.003	
Counterpart Connector	Kit MOLEX Mini-Fit female terminals, composed by: № 100 MOLEX female terminals P/N 5556.	7.003.034	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Tilt switch

IDXYmP MkII & IDXYmP-ID3 MkII Series

- Programmable micro controller device able to measure tilt on two axes
- Up to two supplementary outputs for axes or four for semi-axes
- MEMS technology (no moving parts). Can be mounted upside down.
- Safety level for IDXYmP: up to PL b (EN 13849-1)
- Safety level for IDXYmP-ID3: PL d (EN 13849-1)
- Could be factory programmed with custom configuration
- Programmable intervention range from -20 to +20 degrees
- Planarity output with free polarized relay contact or positive transistor
- Positive transistor axes or semi-axes outputs
- Hardware and software filtering to remove vibrations and noise
- Inputs and outputs protected against polarity inversion and short circuit
- Waterproof, plastic, compact body (glass fiber reinforced Nylon 6)
- Easy setup with BPE software (RS-232 connection)
- Zero cable to store the device zero

On request:
- Digital input for second alarm level selection
- Auxiliary transistor output for pre-alarm function (instead axes and semi-axes outputs)

Typical fields of application: mounted cranes, mobile cranes, aerial platforms, industrial automation and generic mobile machines.

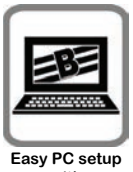
Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

MEMS sensor technology

PLd (EN 13849-1)

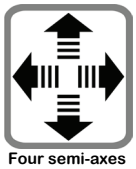
Intervention range

Protection Grade IP66/IP67


Easy PC setup with BPEterminal

Until -40 °C


Vertical mounting


Four semi-axes

Automatic levelling

Technical data

	Transistor ID output	Relay ID output
Power supply	9 to 33 V_{DC}	12 V_{DC}: from 9 to 16.8 V_{DC} @ 20°C (2) 24 V_{DC}: from 18 to 33 V_{DC} @ 20°C (2)
Axes and semi-axes outputs max current	1.5 A (2.5 A if only one output is activated) (3)	
Planarity output max current	Positive: 3.0 A | Negative: 0.6 A	3.0 A (4)
Power draw	30 mA (5)	
Intervention range	from –20 degrees to +20 degrees on every axis	
Accuracy	1% FS	
Resolution	0.025 degrees	
Temperature drift (zero point)	±0.008 degrees/°C (typ.)	
Operating temperature	from -40 to +70 °C (6)	
Maximum weight	0.25 kg	
Housing material	glass fiber reinforced Nylon 6	
Sealing	two component polyurethane resin	
Standard protection grade	IP66 / IP67	
Standard cable length	45 cm	
Buzzer (Optional)	105dB, alternating tone, IP54	
CE conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3 | EN 13309 (7)	
Vibration resistance – Sinus	EN 60068-2-6: 10 g, 10 to 150 Hz	EN 60068-2-6: 5g, 10 to 150Hz
Shock resistance – Shock	EN 60068-2-27: 200 g, 6 ms	EN 60068-2-27: 30g, 6ms
MTTFd	EN 13849-1: ≥ 100 years (for every channel) for the planarity transistor output version	

(1) Planarity relay output must be protect with an external fuse (not supplied)
(2) 12 V_{DC}: from 10.2 to 16.2 V_{DC} @ 70°C. 24 V_{DC}: from 20.4 to 32.4 V_{DC} @ 70°C
(3) Mutually exclusive, maximum two contemporary enabled
(4) Protected by external fast fuse
(5) Without loads on the output
(6) From -20 to +70 °C for Cat. 3 or PL d versions (IDXYmP-*ID3* MkII)
(7) Excluding Pulse 5 (ISO 7637)

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IDXYmP MkII & IDXYmP-ID3 MkII Series

Ordering Code

	Type	Power supply	Main "ID" output	Safety level	Axes outputs	Alarm levels	Angular zone	RS-232 serial port cable	Zero setting cable	Electrical connection	Flange	Buzzer	Placement	Sup. dig. output
IDXYmP MkII		UNI	PT	C	PLb_	4AP_	A	1	R	PC	SWZ	C80	N	N	H	0
IDXYmP-*ID3* MkII		UNI	PT	C	PLd_	4AP_	A	1	R	PC	SWZ	C90	N	N	H	0

Power supply

12	12 V_{DC} power supply
24	24 V_{DC} power supply
UNI	Power supply from 9 to 33 V_{DC}. No "CR" ID output. No buzzer.

Main "ID" output

CR	IDXYmP-ID3: polarized relay output IDXYmP: free relay output
PT	Positive transistor output
NT	Negative transistor output

C	"ID" output closed when in planarity condition
A	"ID" output opened when in planarity condition

Safety level

NOT_	Main "ID" output safety or performance level equal to nothing
PLb_	Main "ID" output performance level equal to PL b (EN 13849-1)
PLd_	Main "ID" output performance level equal to PL d (EN 13849-1)

Axes outputs

NOT_	No axes outputs
4AP_	Four positive axes outputs

N	Used when no semi-axes outputs
C	Semi-axes outputs output closed when in planarity condition
A	Semi-axes outputs output opened when in planarity condition

Alarm level

1	Standard

Angular zone

R	Rectangular angular response
E	Elliptical Rectangular angular response (for main "ID" output only)

RS-232 serial cable

NO	Without serial connection for configuration and calibration
PC	With serial connection for configuration and calibration

Zero setting cable

SWZ	With cable for zero calibration

Electrical connection

C80	45cm free cables (for IDXYmP only)
C90	45cm free cables (for IDXYmP-ID3 only)

Flange

FM	With flange and spacers
FMN	With flange and springs
N	Without flange

Buzzer

N	Without buzzer
Z	With buzzer

Placement

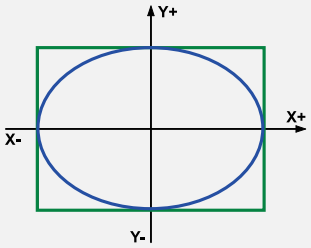
H	Horizontal mounting
V	Vertical mounting

Digital output

0	Supplementary digital output not available in standard configurations

Custom configurations are available on request.

Angular zone



Blue ellipsis: elliptical angular response. Green rectangle: rectangular angular response. They define the region where outputs change their value.

Default programming

Main "ID" ouput: 3.0 degrees
Axes outputs: 1.5 degrees
Activation delay: 1 seconds

Custom configurations on request.

Possible configurations

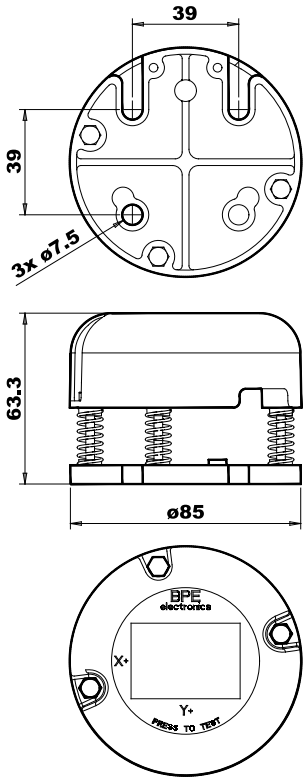
IDXYmP-ID3 MkII

12V 24V	CR	C	PLd_	NOT_ 4AP_	N C A	1	R E	NO PC	SWZ	C90	F M	N Z	H V	0
											N	N		
UNI	PT	C	PLd_	NOT_ 4AP_	N C A	1	R E	NO PC	SWZ	C90	F M N	N	H V	0

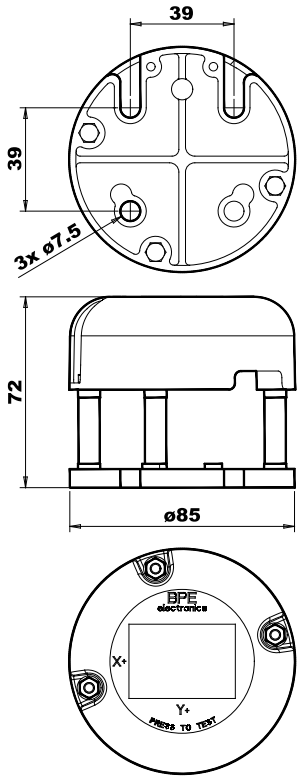
IDXYmP MkII

12V 24V	CR	C	PLb_	NOT_ 4AP_	N C A	1	R E	NO PC	SWZ	C80	F M	N Z	H V	0
		A	NOT_											
UNI	PT	C	PLb_	NOT_ 4AP_	N C A	1	R E	NO PC	SWZ	C80	F M N	N	H V	0
		A	NOT_											
	NT	C	PLb_											
		A	NOT_											

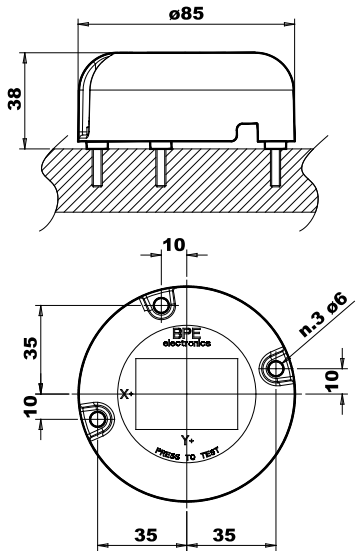
Dimensions [mm]



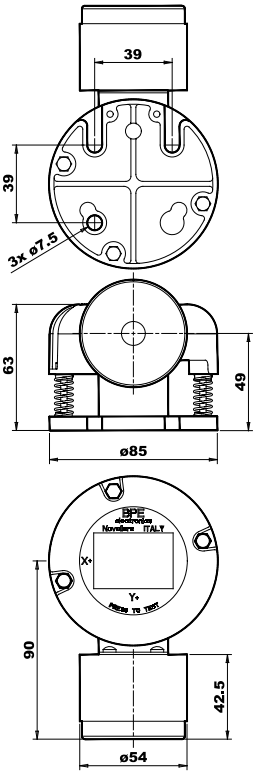
M: With flange and springs



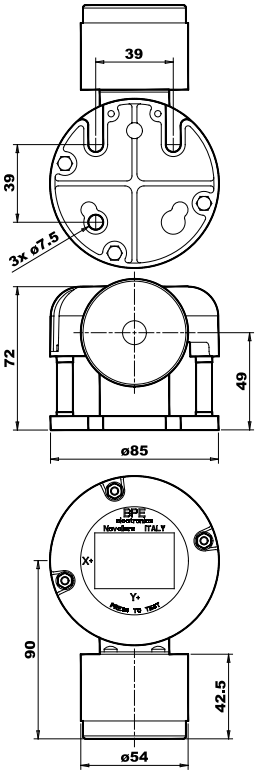
F: With flange and spacers



N: Without flange



M Z: With spring and buzzer



F Z: With spacers and buzzer

Accessories

Type	Description	Code	Notes
Fitting kit	Springs and flange kit	7.003.049	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Outriggers auto-leveling system

GP200 MkII Series

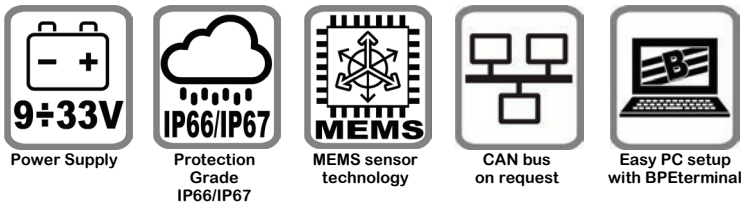
- Integrated MEMS technology tilt sensor with no moving parts
- Same power supply for 12/24 V_{DC} systems
- 4x2 ON/OFF outputs for outriggers descent/rise management
- Two signalling digital outputs for outriggers on the ground and leveled system signalling
- BPEterminal custom software for easy customization

On request:

- CAN bus interface
- PL d (EN 13849-1) output for venting valve
- Two customizable digital inputs

Typical fields of application: access platforms, truck mounted cranes

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Power Supply | Protection Grade IP66/IP67 | MEMS sensor technology | CAN bus on request | Easy PC setup with BPEterminal

Technical data

Power supply	from 9 to 33 V_{DC}	Protected against polarity reversal
Digital inputs	9	7, if the CAN bus connection is available
ON/OFF digital outputs	4x2	Positive. Imax = 3 A. Protected against short circuits
PWM proportional outputs	1	ON request
Digital outputs	2	Positive. Imax = 3 A. Protected against short circuits
Accuracy	1% FS	-
Resolution	0.1 degree	-
Temperature drift (zero point)	±0.008 degree/°C (typ.)	-
Operating temperature	from -20 to +70 °C	-
CAN bus interface	1	ON request
RS-232 interface	1 for calibration and diagnostic	AMP Superseal 1.5 series 3P connector (282105-1)
Maximum weight	0.40 kg	-
Housing material	40% fiberglass reinforced PBT	-
Coating	Two components polyurethane	-
Standard protection grade	IP66 / IP67	-
CE Conformity	EMC Directive: 2014/30/EU	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3	-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz	-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms	-
MTTFd	EN 13849-1: ≥ 100 years	-

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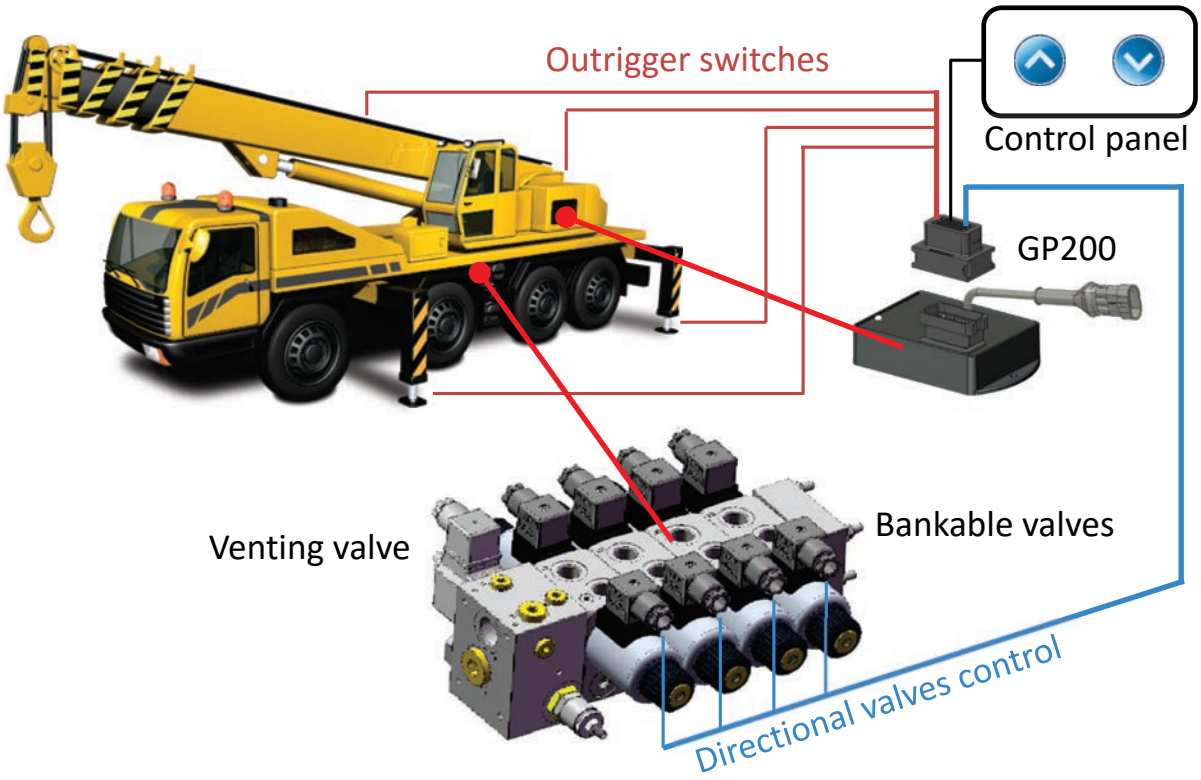
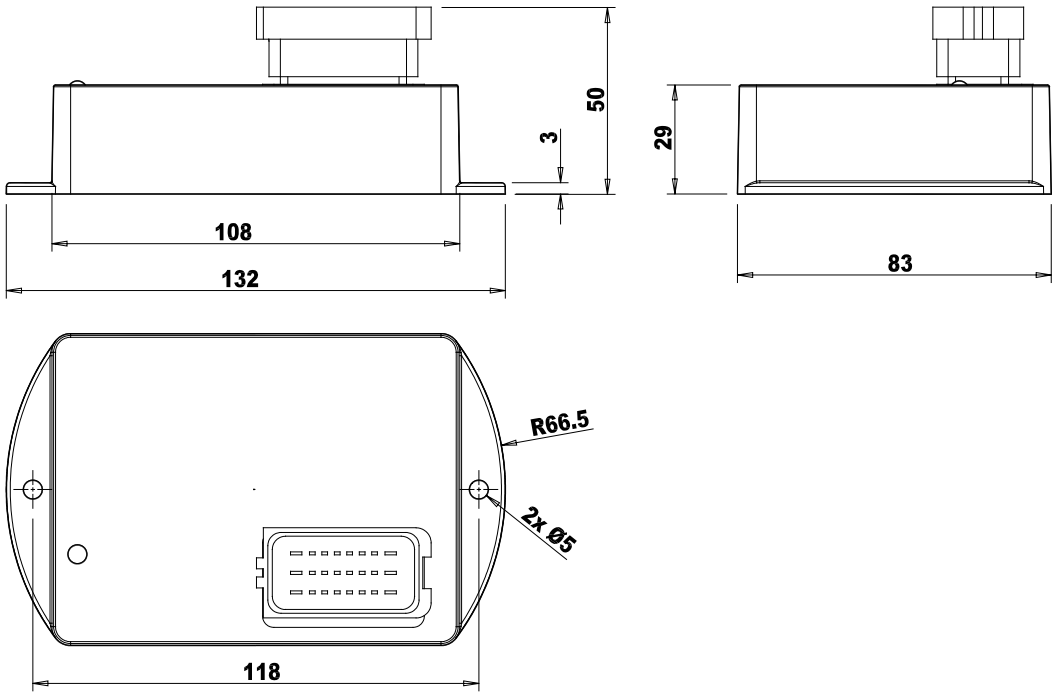
Ordering Code

GP200 MkII	P2	L2	ST1	LEG1	PP0	CAN0



Dimensions [mm]

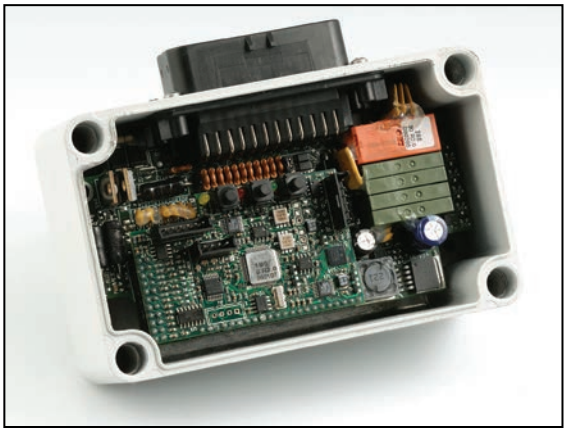


Accessories

Type	Description	Code	Notes
Counterpart Connector	SICMA FCI 24pin connector composed by: № 1 FCI Black Connector Female Housing 24 ways № 18 female terminals 1.5mm № 6 female terminals 2.8mm № 1 Locking cam for 24w Female Housing № 20 Filler plugs № 1 Rubber cap	7.003.054	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	L=1000mm black extension cable, 24x1.5-1 SICMA FCI 24pin, numbered.	7.180.403	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Basket automatic levelling and load limiting

LAB3 Series



- Integrated system for automatic levelling on one axis with integrated planarity sensors
- Load limiting with amplified or differential transducers
- Crossed double channels architecture for signals elaboration
- Calibration via push buttons and on board LEDs or with BPEterminal custom software
- For 12/24 V_{DC} power sources
- LEDs diagnostic on board or via RS-232 serial port
- It is possible to mount the box in different positions
- Electrical connections with AMPSEAL side connector with 35 poles
- Auto diagnostic for:
  - Short circuit on power outputs
  - Disconnected or short circuited transducers

On request:
- CAN bus connection

Typical fields of application: aerial platforms, pile drivers.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Automatic levelling

- Not linear system for automatic optimization in every single boom configuration (with supplementary angle transducer)
- Easy setup with BPE software
- Levelling with operative adaptive controller
- No more instable behaviour, in all conditions
- Hydraulic power pre-selection
- Automatic detection of working axis and directions
- One or two programmable safety outputs (max 10 degrees)
- Four programmable tilt signalling outputs

Basket load limiting

- Outputs for alarm and pre-alarm signalling
- Overload safety output
- Digital input for double alarm level selection
- Push button to set the system zero calibration

Safety Levelling: PL d (EN 13849-1), *without mercury switch*
Load limiting: PL d (EN 13849-1), with doubled transducers only

MEMS sensor technology | EN 13849-1 PL d | Limiting on two load levels | From 9 to 33 V_{DC} | Easy PC setup with BPEterminal | CAN Open on request | Protection Grade IP66 | Until -40 °C | Double channel

Technical data

Power supply	9 to 33 V_{DC}	-
Digital inputs	3	-
Analog inputs	1 + 2 differential	Protected against short circuits and operator error
Digital outputs	3 + 2 positives	Imax = 1 A. Imax = 2 A if single activated. Protected against short circuit
Digital safety outputs	2 + 1 with polarized relay	Imax = 2 A. Protected against short circuit
Levelling outputs	2	PWM with current control (1) | ON/OFF (1) | analogue for Danfoss™
Connections	RS-232 serial port	CAN bus available on request
Operating temperature	-40 to 70 °C	-
Maximum weight	0.66 kg	-
Housing material	aluminium	-
Standard protection grade	IP 66	Inside BPE box
CE Conformity	EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-4	-
MTTFd	EN 13849-1: ≥ 100 years	-

(1) Maximum current: 3 A

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Basket automatic levelling and load limiting

LAB3 Series

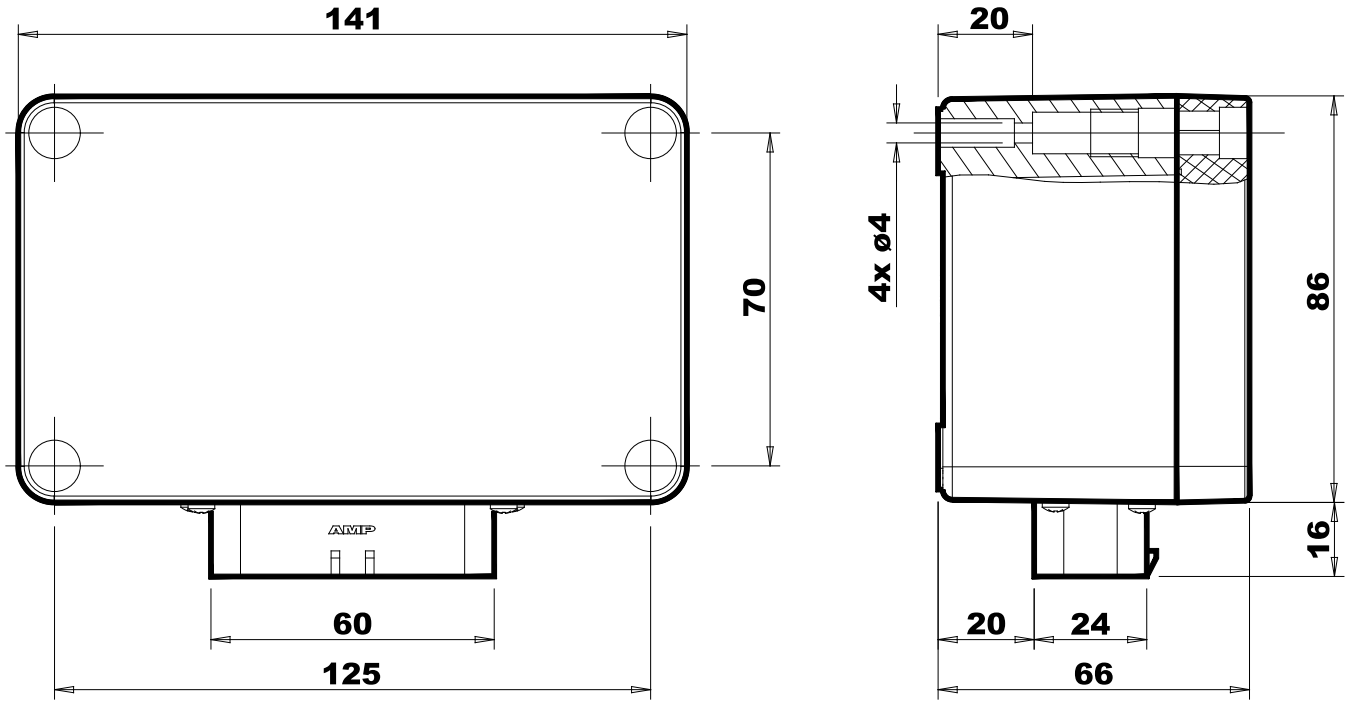
Ordering Code

LAB3	LW	P	1	_N	PL_dd	NOT	M00
Board type	**Control function**	**Valves type**	**Electrical connection**	**Angle transducer**	**Performance level**	**CAN bus on request**	**Operating mode**

Control functions	_ L	Levelling control only
	L W	Levelling and basket load control
Valves type	P	Outputs for PWM solenoid valves
	D	Outputs for Danfoss™ valves
	F	Outputs for ON/OFF valves
Electrical connection	1	Electrical connection with 35 poles panel connector
Angle transducer	_ N	Without boom angle transducer
	_ A	With boom angle transducer
Safety level	P L _ d d	PL d safety level for levelling and load control
	P L _ _ d	PL d safety level for levelling (without load control)
CAN bus connection	N O T	Without CAN bus connection
Operating mode	M 0 0	Standard operating mode

Custom configurations are available on request.

Dimensions [mm]



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Accessories

Type	Description	Code	Notes
Counterpart Connector	AMPSEAL 35pin plug connector composed by: № 1 loose connector 35pin P/N AMP 776164-1; № 35 female terminals AMP 770520/1/5K.	7.003.055	
Extension cable	Length 2000mm, AMPSEAL plug connector with 35 black conductors (1mm²)	7.180.377	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

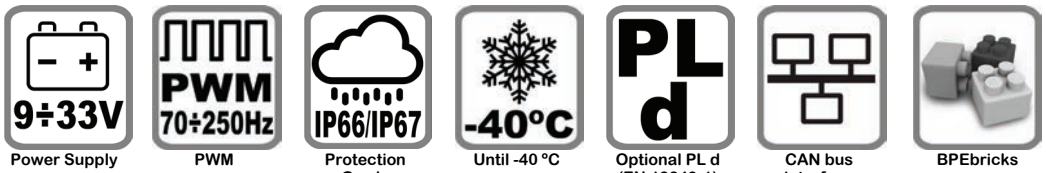
Multipurpose and programmable master unit

BM20, BMS20, BM25, BMS25

- Electronic control unit
- Easy to program with BPEbricks software suite
- CAN bus interface for expanding I/O
- Easy to connect to other BPE “BE” Series extension units
- Same power supply for 12/24 V_{DC} systems
- Waterproof, plastic, compact body (40% fiber glass reinforced PBT)
- Electrical connection with FCI SICMA2
- Serial interface for bootloading and runtime diagnostic
- PWM outputs with closed loop current control
- MS20 and MS25 version with two outputs with double channel to reach PL d according to EN 13849-1 (see reference manual)

Typical fields of application: generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Technical data

Power supply	9 to 33 V_{DC}				Protected against polarity inversion
Module Model	**BM20**	**BMS20**	**BM25**	**BMS25**	-
Core	32 bit Cypress® FM4 ARM® Cortex® M4F				-
Safety ouputs	none	2	none	2	Positive. I_{MAX}=3 A. Protected against short circuits
ON/OFF Digital outputs	11	9	2	none	Positive. I_{MAX}=3 A. Protected against short circuits
Analog inputs	5		4		Single programmable as: 0 to 5 V_{DC} or 0 to 20 mA or 0 to 33 V_{DC} digital inputs
Digital inputs	2		1		-
Proportional PWM outputs	1		4x2		Positive. Programmable from 70 to 250 Hz. I_{MAX}=2 A. Protected against short circuits Single programmable as ON/OFF digital outputs
CAN bus interface	1				-
RS-232 interface	One, for firmware upgrade and diagnostic				AMP Superseal 1.5 series 3P connector (282105-1)
Operating temperature	from -40 to +70 °C				-
Maximum weight	0.40 kg				-
Housing material	40% fiberglass reinforced PBT				-
Coating	Two components polyurethane				-
Standard protection grade	IP66 / IP67				-
CE Conformity	EMC Directive: 2014/30/EU				-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3				-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz				-
Schock resistance: Shock	EN 60068-2-27: 30 g, 6 ms				-
MTTFd	EN 13849-1: ≥ 100 years				-

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Multipurpose and programmable master unit

BM20, BMS20, BM25, BMS25

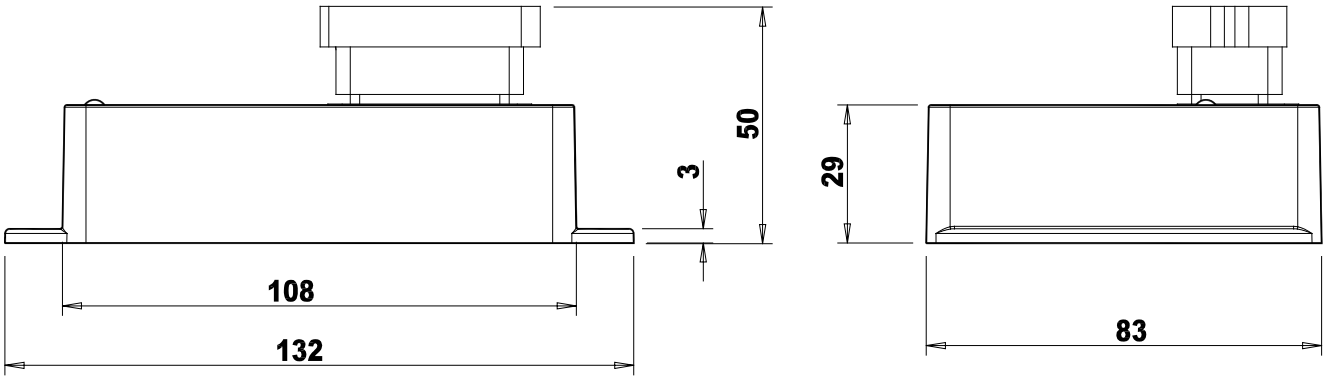
Ordering Code

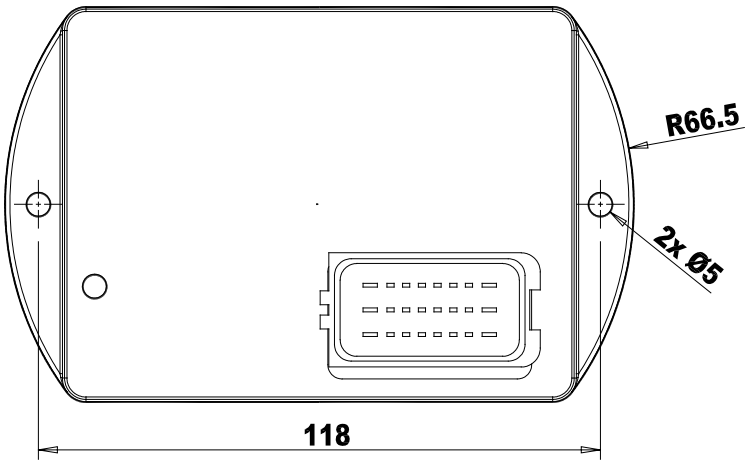
BM	S	20	N
Master Module	Safety	Model	CAN termination

Safety	_	Without Safety outputs
	S	With 2 safety outputs
Model	20	One PWM Output, 5 analogue inputs
	25	4x2 PWM Outputs, 4 analogue inputs
CAN termination	N	Without embedded CAN bus termination

Custom configurations are available on request.

Dimensions [mm]





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Accessories

Type	Description	Code	Notes
Counterpart Connector	SICMA FCI 24pin connector composed by: № 1 FCI Black Connector Female Housing 24 ways № 18 female terminals 1.5mm № 6 female terminals 2.8mm № 1 Locking cam for 24w Female Housing № 20 Filler plugs № 1 Rubber cap	7.003.054	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	L=1000mm black extension cable, 24x1.5-1 SICMA FCI 24pin, numbered.	7.180.403	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

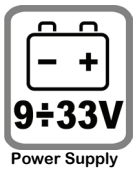
Multipurpose and programmable master unit

BMS55, BMS55D, BMS56, BMS56D, BMS65

- Electronic control unit
- Easy to program with BPEbricks software suite
- Two CAN bus interface for expanding I/O
- Easy to connect to other BPE "BE" Series extension units
- Same power supply for 12/24 V_{DC} systems
- Waterproof, alluminum compact body
- Electrical connection with FCI SICMA2 and M12
- Serial interface for bootloading and runtime diagnostic
- PWM outputs with closed loop current control or voltage ratiometric outputs 0.25 V_{DC} to 0.75 V_{DC}
- Two outputs with double channel to reach PL d according to EN 13849-1 (see reference manual)

Typical fields of application: generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

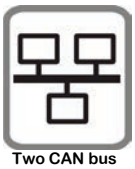


Power Supply

PWM Outputs or Volt ratiometric outputs

PL d (EN 13849-1)

Until -40 °C


Two CAN bus interface


BPEbricks

Technical data

Power supply	9 to 33 V_{DC}			Protected against polarity inversion
Module model	**BMS55, BMS55D**	**BMS56, BMS56D**	**BMS65**	-
Microcontroller core	16 bit Cypress®	16 bit Cypress®	32 bit Cypress® FM3 ARM® Cortex® M3	-
Safety ouputs	2	2	2	Positive. I_{MAX} = 3 A. Protected against short circuits
ON/OFF Digital outputs	7	0	none	Positive. I_{MAX} = 3 A. Protected against short circuits
ON/OFF Digital outputs	6	5	none	Positive. I_{MAX} = 2 A. Protected against short circuits
Analog inputs	8	8	8	Programmable as: 0 to 5 V_{DC} or 0 to 20 mA or 0 to 33 V_{DC} digital inputs
Digital inputs	16	16	16	-
Proportional PWM outputs, high freq	1x2	-	-	Positive. 4KHz + diether configurable in amplitude and frequency. I_{MAX}=3 A. Protected against short circuits
Proportional PWM outputs, low freq	-	-	8x2	Positive. Programmable from 70 to 250 Hz. I_{MAX} = 2 A. Protected against short circuits Single programmable as ON/OFF digital outputs
Voltage ratiometric outputs 0.25 V_{DC} to 0.75 V_{DC}	-	6	-	Protected against short circuits
CAN bus interface	2			-
RS-232 interface	One, for firmware upgrade and diagnostic			M12 connector
Operating temperature	from -40 to +70 °C			from -20 to +70 °C for MS55D and MS56D
Maximum weight	1.0 kg			-
Housing material	Alluminum alloy			-
Standard protection grade	IP66			-
CE Conformity	EMC Directive: 2014/30/EU			-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3			-
MTTFd	EN 13849-1: ≥ 55 years			-

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Multipurpose and programmable master unit

BMS55, BMS55D, BMS56, BMS56D, BMS65

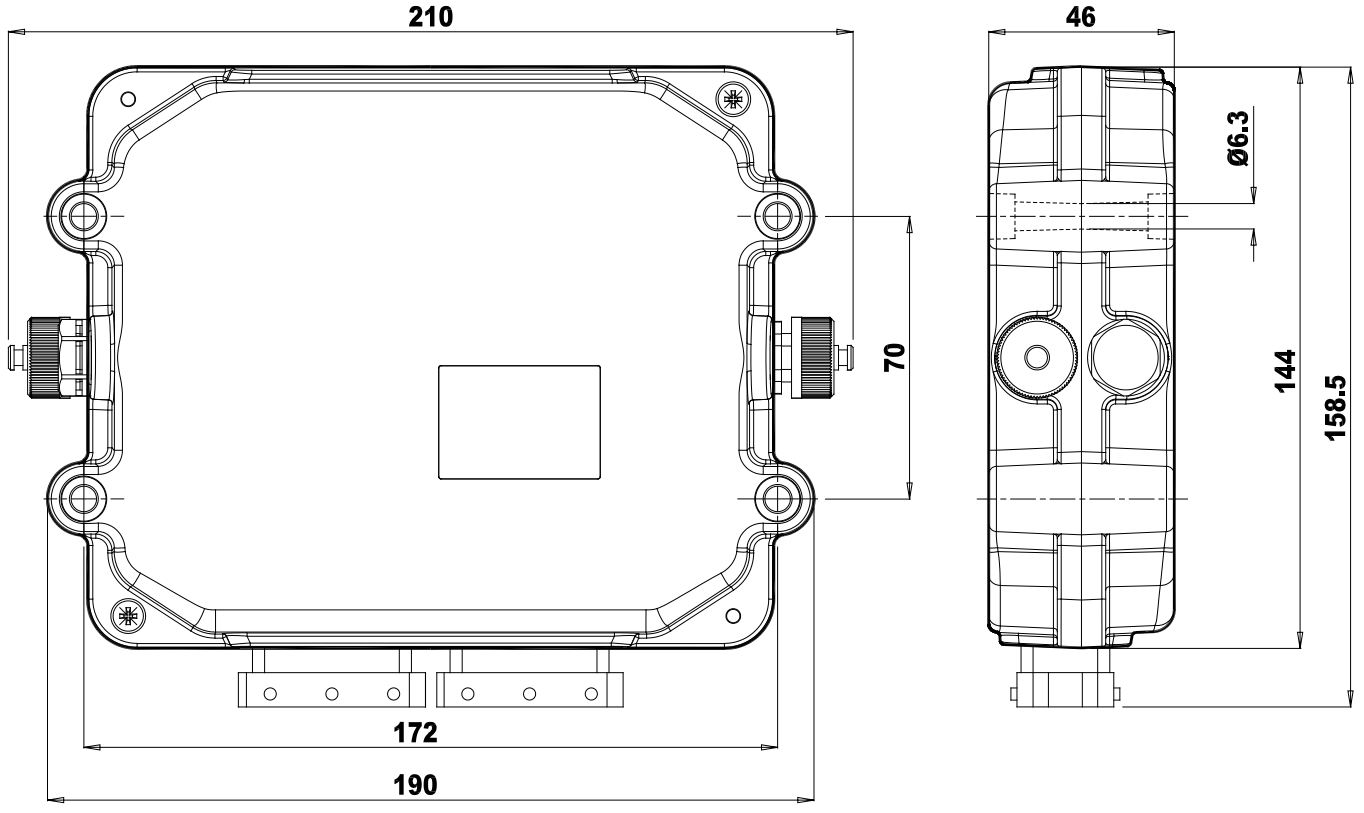
Ordering Code

BM	S	55	D	N
Master Module	Safety	Model	Display	CAN termination

Safety	**S**	Without display and with two safety outputs
Model	**55**	1x2 PWM outputs
	56	Six voltage ratiometric outputs
	65	8x2 PWM outputs
Display	**_**	Without display
	D	2x20 characters alphanumeric display. Not available for MS65 model.
CAN termination	**N**	Without embedded CAN bus termination

Custom configurations are available on request.

Dimensions [mm]



Product image for illustration purposes only

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Accessories

Type	Description	Code	Notes
BMS5xx - BES5x Counterpart Connector kit	BMS55 BMS55D BMS56 BMS56D BES55 counterpart connector kit composed by: № 1 SICMA FCI 24pin black+grey connectors P/N 7.003.019 № 1 M12 plug loose connector with 8pin, screw terminals P/N 7.003.060	7.003.078	
BMS65 BES65 Counterpart Connector kit	BMS65 BES65 counterpart connector kit composed by: № 1 SICMA FCI 24pin black+grey connectors P/N 7.003.019 № 2 M12 receptable loose connector with 8pin, screw terminals P/N 7.003.065	7.003.079	
Counterpart Connector	SICMA FCI 24pin black+grey connectors composed by: № 1 FCI Black Connector Female Housing 24 ways № 1 FCI Grey Connector Female Housing 24 ways № 36 female terminals 1.5mm № 12 female terminals 2.8mm № 2 Locking cam for 24w Female Housing № 38 Filler plugs № 2 Rubber cap	7.003.019	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	Length 2000mm, black SICMA2 FCI receptable 24 pin connector with 24 black conductors (1.5-1 mm²) + grey SICMA2 FCI receptable 24 pin connector with 24 black conductors (1.5-1 mm²).	7.180.500	
Counterpart Connector	M12 receptacle connector: loose connector with 8pin, screw terminals.	7.003.065	
Counterpart Connector	M12 plug connector: loose connector with 8pin, screw terminals.	7.003.060	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 Serial cable RS-232 DB9/M12 L=4000 P/N 7.045.422; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.005	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (M12x1 4pin receptable connector) L=4meters	7.045.422	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

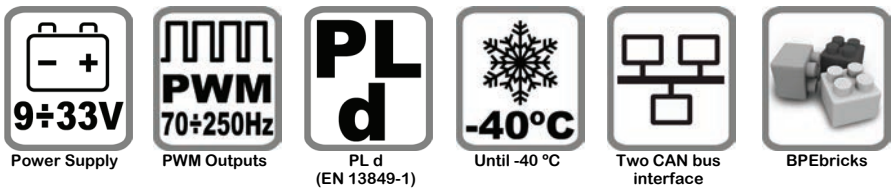
Multipurpose and programmable master unit

BMS110, BMS120, BMS130

- Electronic control unit that can work as Master unit
- Easy to program with BPEbricks software suite
- Two CAN bus interfaces to support more CAN protocols and extension units
- Easy to connect to other BPE "BE" Series extension units
- Same power supply for 12/24 V_{DC} systems
- Waterproof, alluminum compact body
- Electrical connection with FCI SICMA2 and M12
- Serial interface for bootloading and runtime diagnostic
- PWM outputs with closed loop current control
- Four outputs with double channel to reach PL d according to EN 13849-1 (see reference manual)

Typical fields of application: generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application



Technical data

Power supply	9 to 33 V_{DC}			Protected against polarity inversion
Module model	**BMS110**	**BMS120**	**BMS130**	-
Microcontroller core	16 bit Cypress® FX16	32 bit Cypress® FM3 ARM® Cortex® M3	32 bit Cypress® FM3 ARM® Cortex® M3	-
Safety ouputs	4	4	4	Positive. I_{MAX}=3 A. Protected against short circuits
ON/OFF Digital outputs	14	7	none	Positive. I_{MAX}=3 A. Protected against short circuits
ON/OFF Digital outputs	12	none	none	Positive. I_{MAX}=2 A. Protected against short circuits
Analog inputs	16	16	16	Programmable as: 0 to 5 V_{DC} or 0 to 20 mA or 0 to 33 V_{DC} digital inputs
Digital inputs	32	32	16	-
Proportional PWM outputs, high frequency	2x2	1x2	-	Positive. 4KHz plus amplitude and frequency configurable diether. I_{MAX}=3 A. Protected against short circuits
Proportional PWM outputs, low frequency	-	8x2	16x2	Positive. Programmable from 70 to 250 Hz. I_{MAX} = 2 A. Protected against short circuits Single programmable as ON/OFF digital outputs
CAN bus interface	2			-
RS-232 interface	One, for firmware upgrade and diagnostic			M12 connector
Operating temperature	from -40 to +70 °C			-
Maximum weight	1.1 kg			-
Housing material	alluminum alloy			-
Standard protection grade	IP66			-
CE Conformity	EMC Directive: 2014/30/EU			-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3			-
MTTFd	EN 13849-1: ≥ 55 years			-

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Multipurpose and programmable master unit

BMS110, BMS120, BMS130

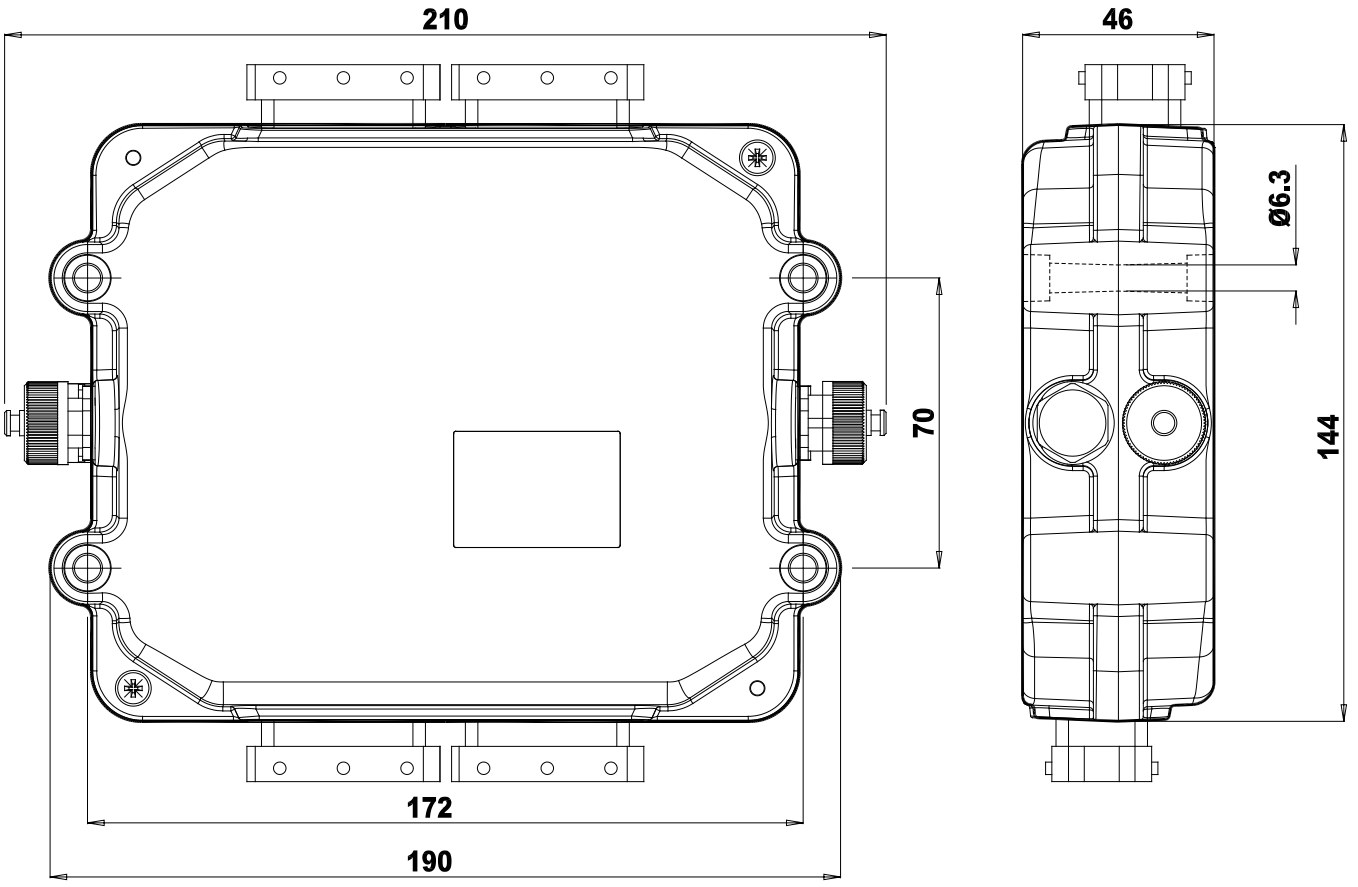
Ordering Code

BM	S	110	N
Master Module	Safety	Model	CAN termination

Safety	**S**	With four safety outputs
Model	**1 1 0**	2x2 PWM outputs
	1 2 0	9x2 PWM outputs
	1 3 0	16x2 PWM outputs
CAN termination	**N**	Without embedded CAN bus termination

Custom configurations are available on request.

Dimensions [mm]



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Accessories

Type	Description	Code	Notes
BMS110 Counterpart Connector kit	BMS110 counterpart connector kit composed by: № 2 SICMA FCI 24pin black+grey connectors P/N 7.003.019 № 2 M12 plug loose connector with 8pin, screw terminals P/N 7.003.060	7.003.080	
BMS120 BMS130 Counterpart Connector kit	BMS120 BMS130 counterpart connector kit composed by: № 2 SICMA FCI 24pin black+grey connectors P/N 7.003.019 № 2 M12 receptable loose connector with 8pin, screw terminals P/N 7.003.065	7.003.081	
Counterpart Connector	SICMA FCI 24pin black+grey connectors composed by: № 1 FCI Black Connector Female Housing 24 ways № 1 FCI Grey Connector Female Housing 24 ways № 36 female terminals 1.5mm № 12 female terminals 2.8mm № 2 Locking cam for 24w Female Housing № 38 Filler plugs № 2 Rubber cap	7.003.019	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	Length 2000mm, black SICMA2 FCI receptable 24 pin connector with 24 black conductors (1.5-1 mm²) + grey SICMA2 FCI receptable 24 pin connector with 24 black conductors (1.5-1 mm²).	7.180.500	
Counterpart Connector	M12 receptacle connector: loose connector with 8pin, screw terminals.	7.003.065	
Counterpart Connector	M12 plug connector: loose connector with 8pin, screw terminals.	7.003.060	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 Serial cable RS-232 DB9/M12 L=4000 P/N 7.045.422; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.005	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (M12x1 4pin receptable connector) L=4meters	7.045.422	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Multipurpose I/O extension unit

BE20, BES20, BE25, BES25

- Slave electronic control unit
- Used to expand the I/O for BPE Master modules. Programmable with BPEbricks software suite
- Easy to connect to with BPE Master modules via CAN bus interface
- Same power supply for 12/24 V_{DC} systems
- Waterproof, plastic, compact body
- Electrical connection with FCI SICMA2
- PWM outputs with closed loop current control
- BES20 and BES25 version with two outputs and double channel to reach PL d according to EN 13849-1 (see reference manual)

Typical fields of application: generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Power Supply | PWM | Protection Grade IP66/IP67 | Until -40 °C | Optional PL d (EN 13849-1) | CAN bus interface | BPEbricks

Technical data

Power supply	9 to 33 V_{DC}				Protected against polarity inversion
Module model	**BE20**	**BES20**	**BE25**	**BES25**	
Safety ouputs	none	2	none	2	Positive. I_{MAX}=3 A. Protected against short circuits
ON/OFF Digital outputs	11	9	2	none	Positive. I_{MAX}=3 A. Protected against short circuits
Analog inputs	5		4		Single programmable as: 0 to 5 V_{DC} or 0 to 20 mA or 0 to 33 V_{DC} digital inputs
Digital inputs	2		1		
Proportional PWM outputs	1		4x2		Positive. Programmable from 70 to 250 Hz. I_{MAX} = 2 A. Protected against short circuits Single programmable as ON/OFF digital outputs
CAN bus interface	1				-
RS-232 interface	One, for firmware upgrade and diagnostic				AMP Superseal 1.5 series 3P connector (282105-1)
Operating temperature	from -40 to +70 °C				-
Maximum weight	0.40 kg				-
Housing material	40% fiberglass reinforced PBT				-
Coating	Two components polyurethane				-
Standard protection grade	IP66 / IP67				-
CE Conformity	EMC Directive: 2014/30/EU				-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3				-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz				-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms				-
MTTFd	EN 13849-1: ≥ 100 years				-

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Multipurpose I/O extension unit

BE20, BES20, BE25, BES25

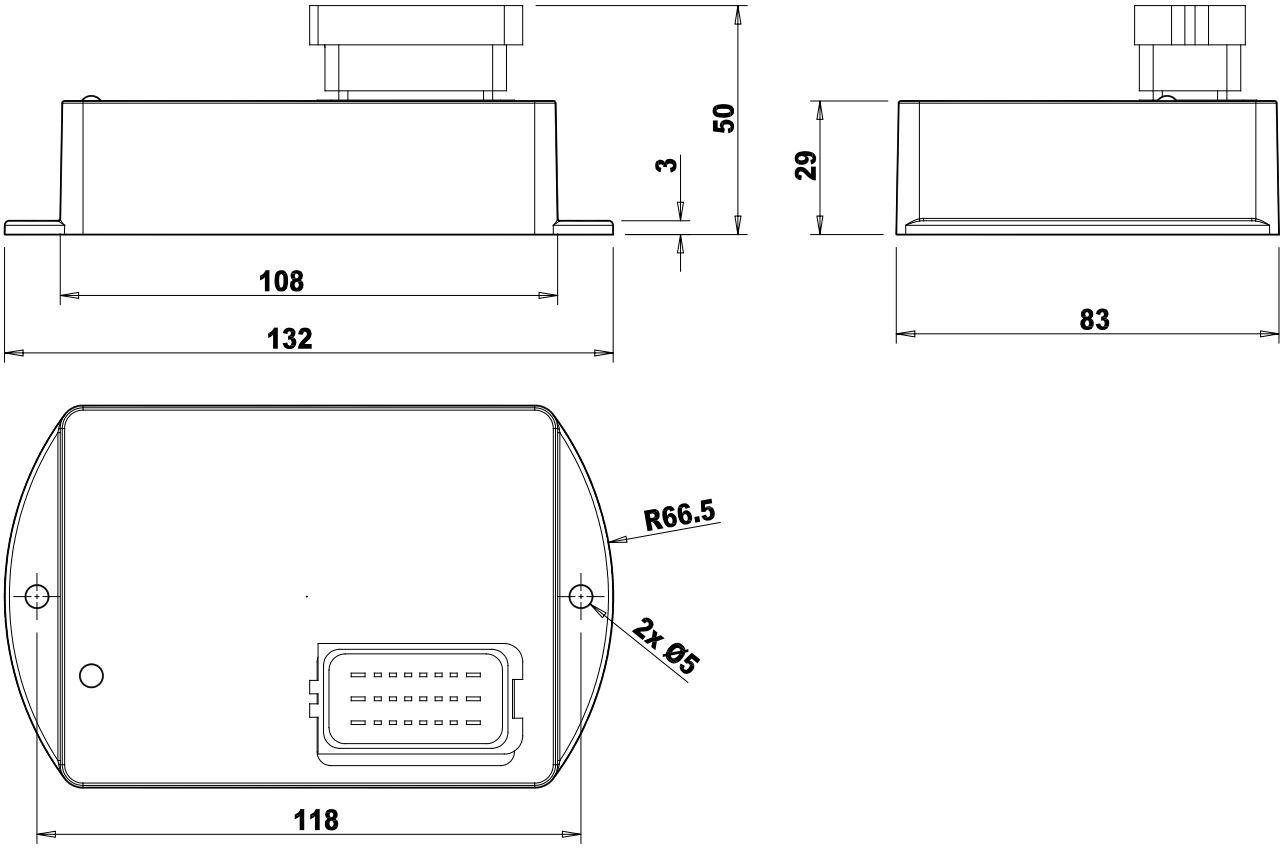
Ordering Code

BE	S	20	N
Expansion Module	Safety	Model	CAN termination

Safety	_	Without safety outputs
	S	With two safety outputs
Model	**2 0**	One PWM Output, five analogue inputs
	2 5	4x2 PWM Outputs, four analogue inputs
CAN termination	**N**	Without embedded CAN bus termination

Custom configurations are available on request.

Dimensions [mm]



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Accessories

Type	Description	Code	Notes
Counterpart Connector	SICMA FCI 24pin connector composed by: № 1 FCI Black Connector Female Housing 24 ways № 18 female terminals 1.5mm № 6 female terminals 2.8mm № 1 Locking cam for 24w Female Housing № 20 Filler plugs № 1 Rubber cap	7.003.054	
Extension cable	L=1000mm black extension cable, 24x1.5-1 SICMA FCI 24pin, numbered.	7.180.403	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 RS-232 serial connection cable L=4 meters P/N 7.045.068; № 1 RS-232 AMPSSEAL/Modu2 serial adapter P/N 7.045.069; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.022	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (AMPModu2 connector) L=4meters	7.045.068	
RS-232 connection	AMP Sseal 3p connector adapter for serial cables P/N 7.045.067 or 7.045.068.	7.045.069	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Multipurpose I/O extension unit

BES55, BES65

- Slave electronic control unit
- Used to expand the I/O for BPE Master Modules. Programmable with BPEbricks software suite
- Easy to connect to BPE Master modules via CAN bus interface
- Same power supply for 12/24 V_{DC} systems
- Waterproof, alluminum compact body
- Electrical connection with FCI SICMA2 and M12
- PWM outputs with closed loop current control
- Two outputs with double channel to reach PL d according to EN 13849-1 (see reference manual)

Typical fields of application: generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Power Supply | PWM Outputs or Volt ratio outputs | PL d (EN 13849-1) | Until -40 °C | CAN bus interface | BPEbricks

Technical data

Power supply	9 to 33 V_{DC}		Protected against polarity inversion
Module model	**BES55**	**BES65**	-
Safety ouputs	2	2	Positive. I_{MAX}=3 A. Protected against short circuits
ON/OFF Digital outputs	13	none	Positive. I_{MAX}=3 A. Protected against short circuits
Analog inputs	8	8	Programmable as: 0 to 5 V_{DC} or 0 to 20 mA or 0 to 33 V_{DC} digital inputs
Digital inputs	16	16	-
Proportional PWM outputs, high freq	1x2	-	Positive. 4KHz + diether configurable in amplitude and frequency. I_{MAX}=3 A. Protected against short circuits
Proportional PWM outputs, low freq	-	8x2	Positive. Programmable from 70 to 250 Hz. I_{MAX}=2 A. Protected against short circuits Single programmable as ON/OFF digital outputs
CAN bus interface	2		-
RS-232 interface	One, for firmware upgrade and diagnostic		-
Operating temperature	from -40 to +70 °C		-
Maximum weight	1.0 kg		-
Housing material	Alluminum alloy		-
Standard protection grade	IP66		-
CE Conformity	EMC Directive: 2014/30/EU		-
EMC: Immunity | Emission	EN 61000-6-2, EN61000-6-3		-
MTTFd	EN 13849-1: ≥ 55 years		-

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Multipurpose I/O extension unit

BES55, BES65

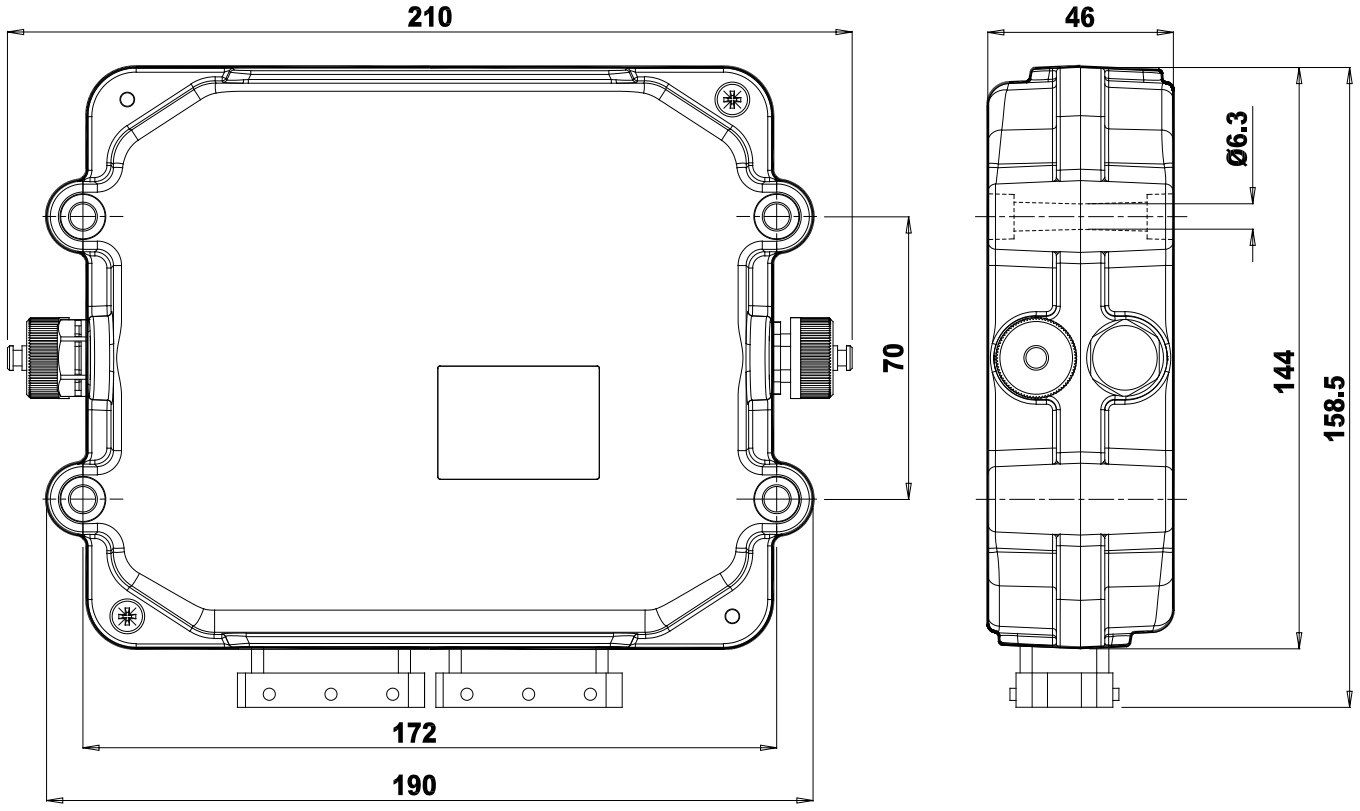
Ordering Code

BE	S	55	N
Expansion Module	Safety outputs	Model	CAN termination

Safety	**S**	With two safety outputs
Model	**5 5**	1x2 PWM outputs
	6 5	8x2 PWM outputs
CAN termination	**N**	Without embedded CAN bus termination

Custom configurations are available on request.

Dimensions [mm]



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Accessories

Type	Description	Code	Notes
BMS65 BES65 Counterpart Connector kit	BMS65 BES65 counterpart connector kit composed by: № 1 SICMA FCI 24pin black+grey connectors P/N 7.003.019 № 2 M12 receptable loose connector with 8pin, screw terminals P/N 7.003.065	7.003.079	
Counterpart Connector	SICMA FCI 24pin black+grey connectors composed by: № 1 FCI Black Connector Female Housing 24 ways № 1 FCI Grey Connector Female Housing 24 ways № 36 female terminals 1.5mm № 12 female terminals 2.8mm № 2 Locking cam for 24w Female Housing № 38 Filler plugs № 2 Rubber cap	7.003.019	
Caps for connector	211 series SICMA FCI caps kit composed by № 20 green filler plugs (FCI P/N: 210 A015019)	7.003.057	
Extension cable	Length 2000mm, black SICMA2 FCI receptable 24 pin connector with 24 black conductors (1.5-1 mm²) + grey SICMA2 FCI receptable 24 pin connector with 24 black conductors (1.5-1 mm²).	7.180.500	
Counterpart Connector	M12 receptacle connector: loose connector with 8pin, screw terminals.	7.003.065	
RS-232 connection kit	RS-232/USB connection kit for BPE boards, composed by: № 1 Serial cable RS-232 DB9/M12 L=4000 P/N 7.045.422; № 1 USB/RS-232 DB9 adapter P/N 7.045.008;	7.045.005	
RS-232 connection	RS-232 serial cable to connect a PC (DB9 connector) to BPE boards (M12x1 4pin receptable connector) L=4meters	7.045.422	
RS-232 connection	USB/RS-232 DB9 adapter	7.045.008	

Human Machine Interface (HMI)

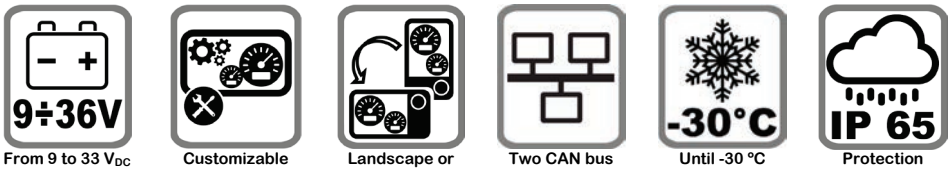
OPUS A3	LCD display	128
OPUS A6	LCD display	131
PAIL	Radio remote control	134
GENESIS	Radio remote control	136
BJ200	CAN bus joystick	138
FPH16	Foot pedal	141

LCD display

OPUS A3 Series

- Wachendorff OPUS A3 series is a reliable high technology display that can be perfectly integrated in BPE systems
- Bright 4.3” TFT display
- Two CAN bus interfaces
- Fully customizable graphical layout on request
- Used to display system status, data from sensors, alarms etc.
- Monitor interface for system check and fault detection
- Also available with embedded encoder and push buttons (A3S model)
- IP65 protection degree
- Electrical connection with AMPSeal connector

On request
- Resistive touch screen
- Integrated buzzer 65 dbA



From 9 to 33 V_{DC} | Customizable layout | Landscape or portrait orientation | Two CAN bus interfaces | Until -30 °C | Protection Grade IP65

Technical data

Power supply	9 to 36 V_{DC}		Protected against polarity inversion
Model	**OPUS A3E Basic**	**OPUS A3S Basic**	
Keypad push buttons	none	8 + 3	Keys with tactile feedback
Encoder	none	1	Electromechanical encoder with 16 mechanical detents and push function
Weight	0.30 Kg	0.45 Kg	-
Display	4.3”, TFT, transmissive, 480x272, 400 cd/m² max brightness, 400:1 max contrast		With LED backlight
Flash mass storage	512 MB		Approximately 450 MB for customer use
RAM	128 MB DDR2		-
RTC	1		Minimum 14 days, buffered with gold cap
CAN bus interface	2		-
Serial interface	1x RS-232		-
USB interface	1x USB 2.0		-
Main connector	AMP Seal		26 pins
Operating temperature	from -30 to +70 °C		-
Housing material	Plastic housing, colored light grey (RAL 7035) with black rubber frame		-
Standard protection grade	IP65		-
CE Conformity	EMC Directive: 2014/30/EU		-
EMC: Immunity | Emission	EN 12895, EN 13309, EN ISO 14982		-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz		-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms		-

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LCD display

OPUS A3 Series

Ordering Code

OPUS A3	S	D
Model	Type	Mounting

Type	**E**	Without key buttons
	S	With 8+3 key buttons and one encoder
Mounting	**_**	Without mounting tools
	D	Tool for in-dash mounting

Custom configurations are available on request.

Completely change the end user experience

Fully customizable display layout on request

Shows any system information, analogue and digital sensors, I/O status, joysticks, engine status etc.

Adds a service menu for system check, showing internal variables and components status

Visualizes warning and alarms to help the user to keep the system under control

Interact with the machine through a fully customized graphical user interface

Enhanced «A3S» model, with solid and reliable push buttons, an encoder, eight softkeys and three hardkeys for customized functionalities

Also available a resistive touchscreen to help the user interface interaction

Can both be mounted with portrait or landscape orientation

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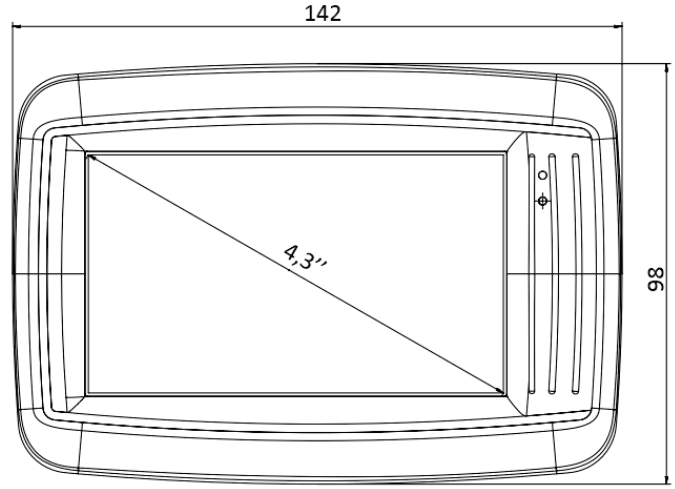
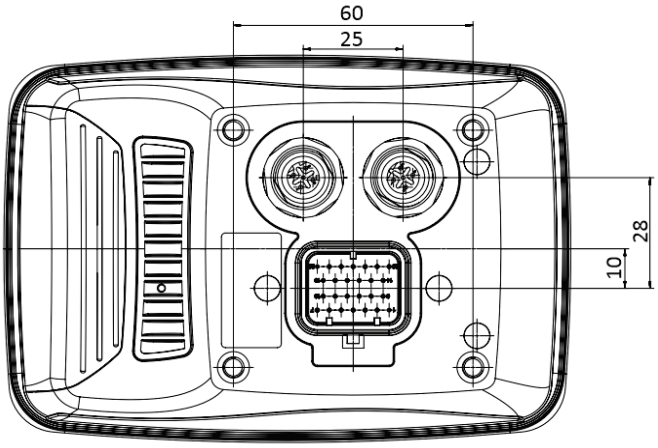
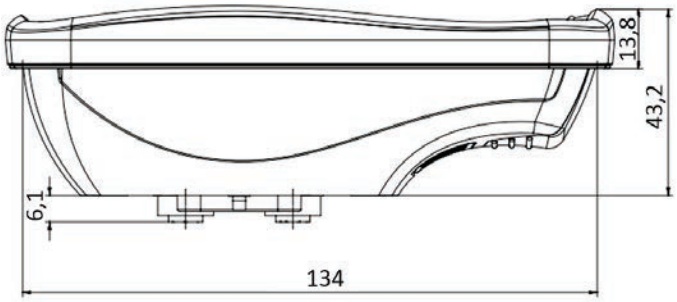
OPUS A3 Series

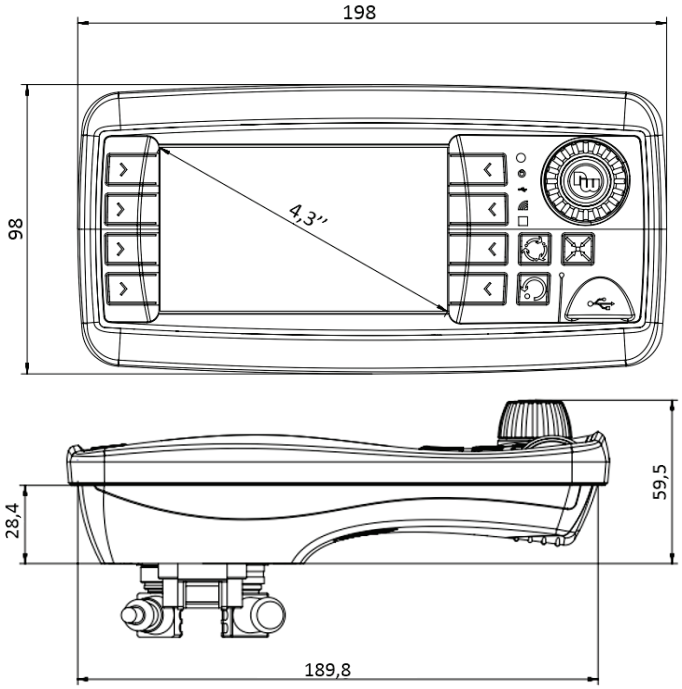
OPUS A3E: Dimensions

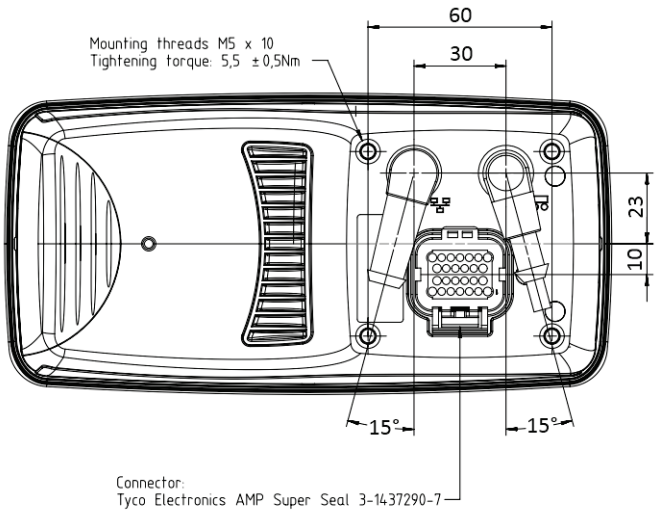






OPUS A3S: Dimensions





LCD display

OPUS A6 Series

- Wachendorff OPUS A6 series is a reliable high technology display that can be perfectly integrated in BPE systems
- Bright 7” TFT display
- Two CAN bus interfaces
- Fully customizable graphical layout on request
- Used to display system status, data from sensors, alarms etc.
- Monitor interface for system check and fault detection
- Also available with embedded encoder and push buttons (A3S model)
- IP65 protection degree
- Electrical connection with AMPSeal connector

On request
- Resistive touch screen
- Integrated buzzer 65 dbA

From 9 to 33 V_{DC}


Customizable layout


Landscape or portrait orientation


Two CAN bus Interface

Until -30 °C

Protection Grade IP65


Video input

Technical data

Power supply	9 to 36 V_{DC}		Protected against polarity inversion
Model	**OPUS A6E Basic**	**OPUS A6S Basic**	
Keypad buttons	none	12 + 3	Keys with tactile feedback
Encoder	none	1	Electromechanical encoder with 16 mechanical detents and push function
Weight	0.9 Kg	1.1 Kg	-
Display	7” , TFT, transmissive, 800x480, 400 cd/m² max brightness, 400:1 max contrast		TFT Color Graphic LCD with LED backlight
Flash mass storage	1 GB		Approximately 900 MB for customer use
RAM	256 MB DDR2		-
RTC	1		Minimum 14 days, buffered with gold cap
CAN bus interface	2		-
Serial interface	1x RS-232		-
USB interface	1x USB 2.0		-
Video Input	1x PAL		-
Main connector	Tyco AMP Seal		26 pins
Operating temperature	from -30 to +70 °C		-
Housing material	Plastic housing, colored light grey (RAL 7035) with black rubber frame		-
Standard protection grade	IP65		-
CE Conformity	EMC Directive: 2014/30/EU		-
EMC: Immunity | Emission	EN 12895, EN 13309, ENISO 14982		-
Vibration resistance: Sinus	EN 60068-2-6: 5 g, 10 to 150 Hz		-
Shock resistance: Shock	EN 60068-2-27: 30 g, 6 ms		-

LCD display

OPUS A6 Series

Ordering Code

OPUS A6	S	D
Model	Type	Mounting

Type	**E**	Without key buttons
	S	With 12+3 key buttons and one encoder
Mounting	**_**	Without mounting tools
	D	Tool for in-dash mounting

Custom configurations are available on request.

High Technology Human Interface

Fully customizable 7” display layout on request

Shows any system information, analogue and digital sensors, I/O status, joysticks, engine status etc.

Adds a service menu for system check, showing internal variables and components status

Visualizes warning and alarms to help the user to keep the system under control

Tested to resist in any condition

Wachendorff displays are tested in harsh conditions to resist to cold, heat, water, corrosion, vibration, snow. Everything that your machine can encounter during
operation and even more

Enhanced «A6S» model, with solid and reliable push buttons, an encoder, twelve softkeys and three hardkeys for customized functionalities

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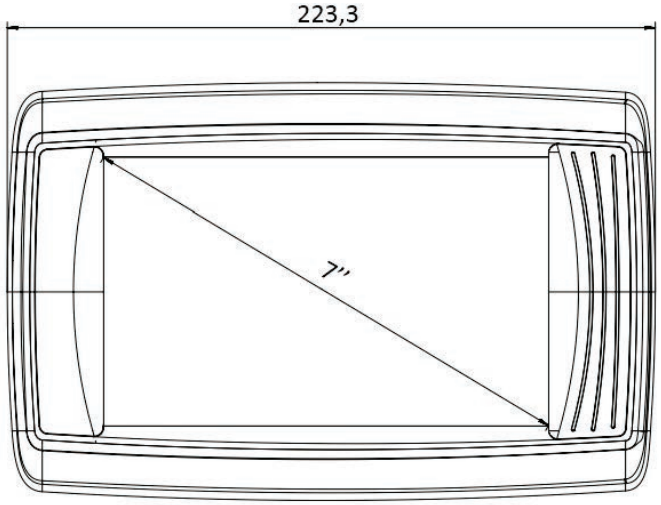
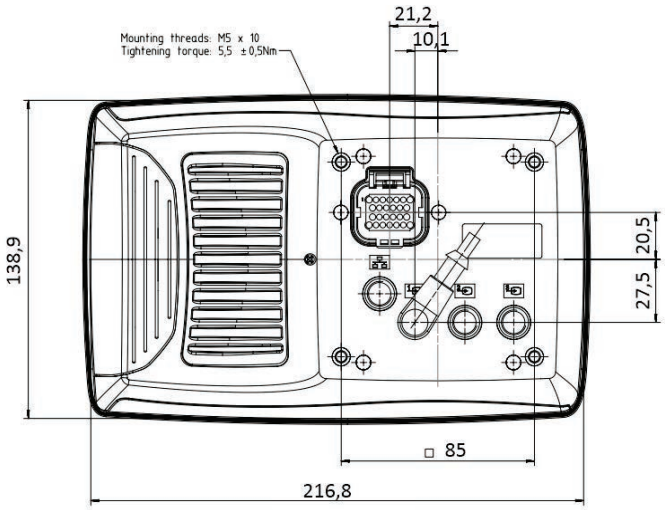
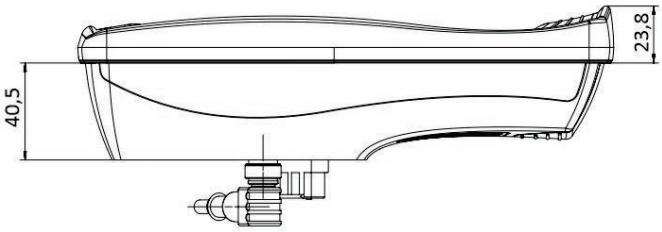
OPUS A6 Series

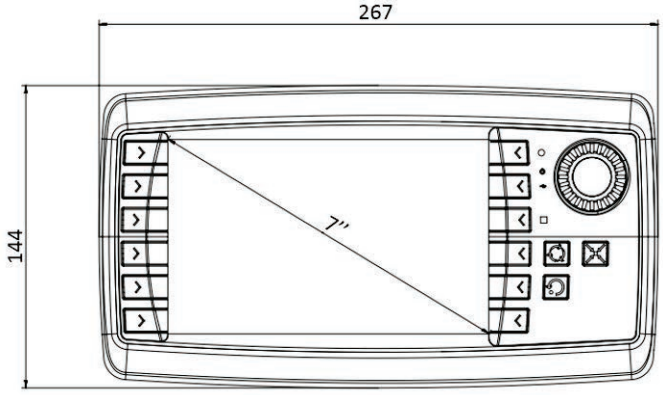
OPUS A6E: Dimensions

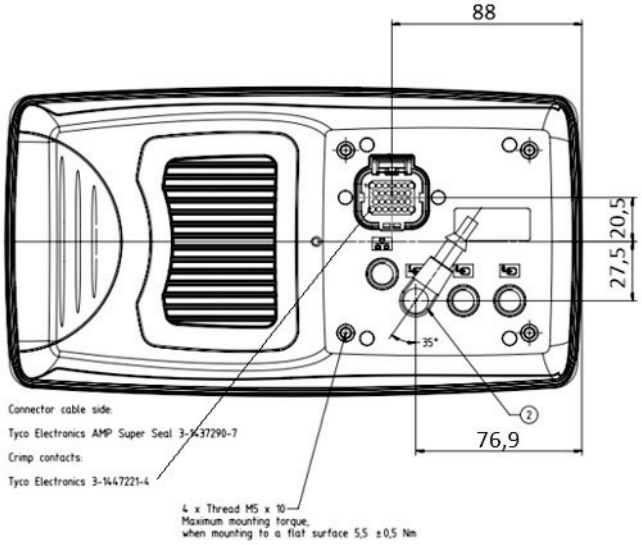


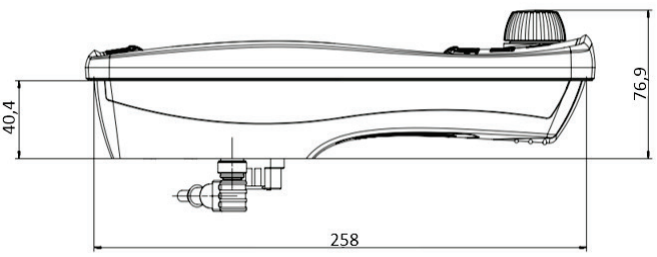




OPUS A6S: Dimensions







Radio remote control

PAIL Series

- CANopen comunication, fully integrated with BPE systems
- Up to 5 fingertip joysticks for proportional control
- Up to 5 push bottoms or selector switchs
- Internal battery (35 hours operation)
- Patented contactless recharging technology
- 72 channels – ISM band
- Rugged, light and easy to handle
- Waterproof, plastic, compact body

On request:
- Custom panel drawing
- Grafic display

Typical fields of application: mounted cranes, mobile cranes, aerial platforms, industrial automation and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Wide range integrated antenna

Protection Grade IP65


CAN BUS Connection

Emergency Stop: EN 13849 PLd

Graphic display on request

Proportional control

Internal long life battery


Contactless Battery charger

Technical data	Receiver	Trasmitter
Power supply	from 9 to 30 V_{DC}	3.6 V_{DC}
Power draw	-	45 mA (max)
Radio frequency output power	-	from 1 mW to 10 mW
Operating life	-	35 hours
Low battery warning	-	60 minutes
Operative frequency	Multiband Full Duplex, 72 channels – ISM band, Hamming code distance > 4	
Modulation	FM – Manchester coding	
Working range	100m	
Emergency stop output (1)	one (4A)	-
Commands response time	45 ms (2)	
Emergengy stop response time	45 ms (2)	
Operating temperature	from -20 to +70 °C	
Weight	0.46 kg	0.93 kg (2)
Dimensions (LxWxD)	177 x 123 x 50 mm	200 x 135 x 130 mm
Housing material	Naylon PA6 FG	
Standard protection grade	IP65	
CE Conformity	R&TT Directive: 99/5/EC (Annex III) LVD Directive: 2014/35/EU EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	
EMC: Immunity | Emission	EN 301 489-3 EN 300 220-3 EN 61000-6-2	
MTTFd	100 years	74 years

(1) PL d (EN 13849-1)
(2) It depends on the configuration

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PAIL Series

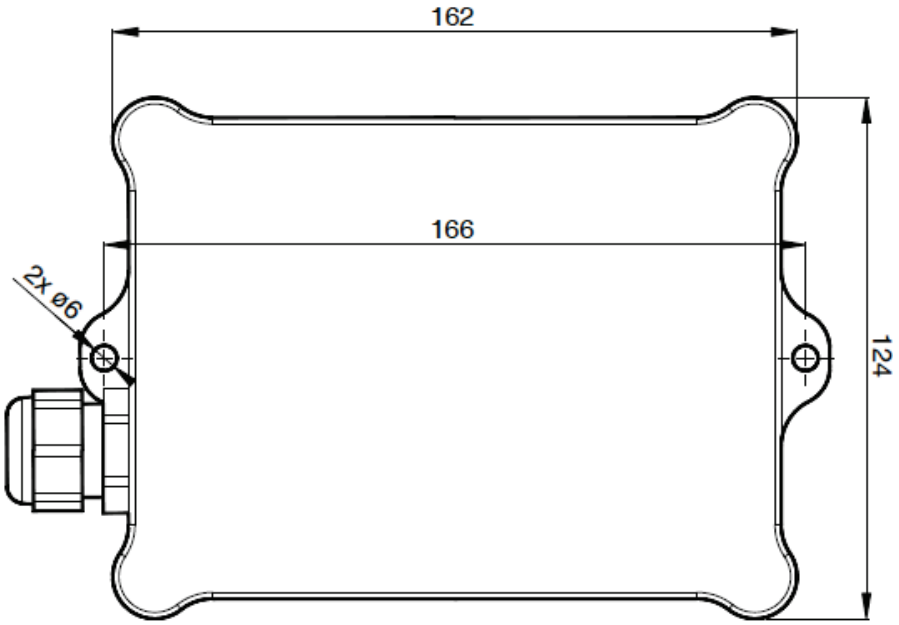
Ordering Code

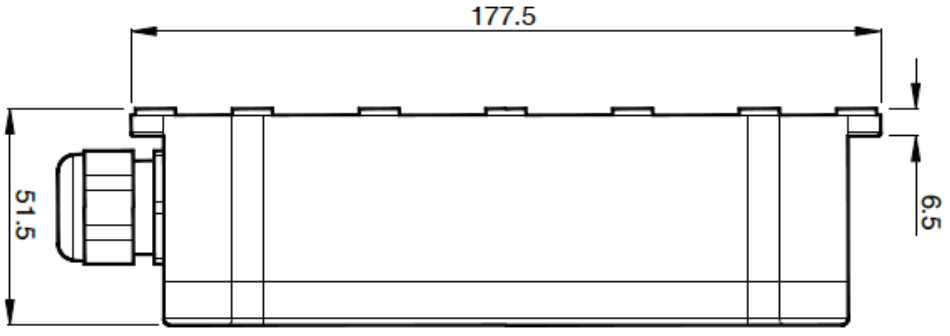
PAIL	5	1	3	0
Type	**Fingertips**	**Emergency Stop**	**Switch**	**Display**

Fingertips	**4**	Four fingertips joysticks
	5	Five fingertips joysticks
Emergency Stop	**1**	Available
Switch	**0**	Without any switch
	X	With “n” switches
Display	**0**	Not available

Custom configurations are available on request.

Receiver dimensions [mm]





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Radio remote control

Genesis Series

- CANopen comunication, fully integrated with BPE systems
- Up to 8 fingertip joysticks for proportional control
- Up to 10 push bottoms or selector switches
- Grafic display with 16x16 icons or full screen at 128x64 pixel
- Internal battery (30 hours operation) or external Li-ION battery for non-stop operation
- Patented contactless recharging technology
- 72 channels – ISM band
- Rugged, ergonomic and easy to handle
- Waterproof, plastic, compact body

On request:
- Custom panel drawing

Typical fields of application: mounted cranes, mobile cranes, aerial platforms, industrial automation and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Wide range integrated antenna

Protection grade IP65


CAN bus connection

Emergency Stop EN 13849 PL e EN 62061 SIL3

Graphic display

Proportional control

Internal long life battery

External Li-Ion battery


Contactless battery charger

Technical data	Receiver	Trasmitter
Power supply	from 9 to 30 V_{DC}	3.6 V_{DC}
Power draw	-	50 mA (max)
Radio frequency output power	-	from 1 mW to 10 mW
Operating life	-	30 hours (internal battery) 20 hours (external battery)
Low battery warning	-	30 minutes
Operative frequency	Multiband Full Duplex, 72 channels – ISM band, Hamming code distance > 4	
Modulation	FM – GFSK	
Working range	100 m	
Emergency stop output (1)	one (4 A)	-
Commands response time	from 20 ms to 80 ms (2)	
Emergengy stop response time	from 20 ms to 80 ms (2)	
Operating temperature	from -20 to +70 °C	
Weight	0.46 kg	1.58 kg (2)
Dimensions (LxWxD)	177 x 123 x 50 mm	310 x 193 x 163 mm
Housing material	Nylon PA6 FG	
Standard protection grade	IP65	
CE Conformity	R&TT Directive: 99/5/EC (Annex III) LVD Directive: 2014/35/EU EMC Directive: 2014/30/EU Machine Directive: 2006/42/EC	
EMC: Immunity | Emission	EN 301 489-3, EN 300 220-3, EN 61000-6-2	
MTTFd	100 years	52 years

(1) PL e (EN 13849-1) and SIL3 (EN 62061)
(2) It depends on the configuration

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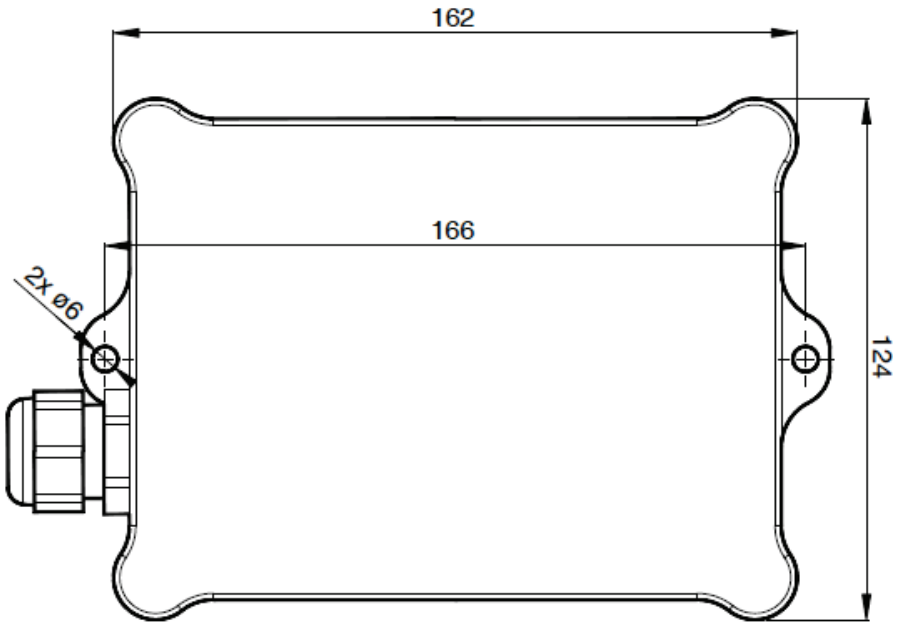
Ordering Code

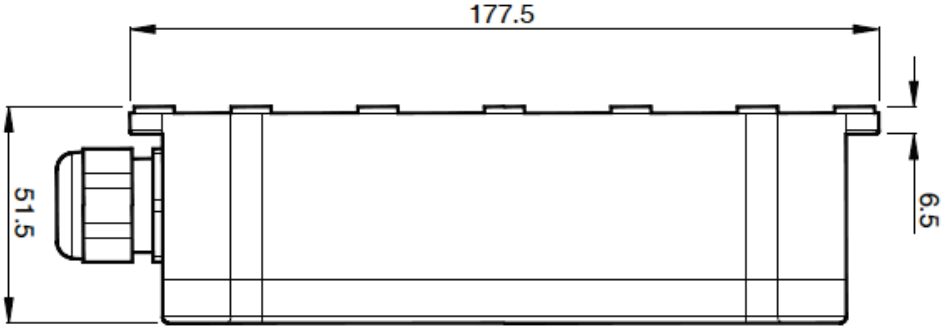
Genesis	6	1	5	1
Type	**Fingertips**	**Emergency Stop**	**Switches**	**Display**

Fingertips	**6**	Six fingertips joysticks
	7	Seven fingertips joysticks
	8	Eight fingertips joysticks
Emergency Stop	**1**	Available
Switch	**0**	Without any switch
	n	With “n” switches
Display	**0**	Not available
	1	With graphical LCD display

Custom configurations are available on request.

Receiver dimensions [mm]





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CAN bus joystick

BJ200 Series

- Joystick for heavy duty applications
- Hall effect sensor technology
- Single or double axes
- Round or cross gate pattern
- CAN bus output
- Waterproof, plastic, compact body
- Electrical connection with DT04-6P or M12x1 connectors

On request:
- PL d (EN13849-1)

Typical fields of application: mounted cranes, mobile cranes, aerial platforms, industrial automation and generic mobile machines.

Note: the user/installer is responsible for evaluating the values and, thus, the safety of the application

Hall effect sensor | Double axes | Protection Grade IP66 | CAN Open connection | PL d (EN13849-1) on request

Technical data

Power supply	from 9 to 30 V_{DC}
Current consumption	25mA
Outputs	CAN bus
Mechanical angle	20 degrees
Operating force	9.5 N
Maximum load	1000 N
Maximum torque	100 N/m
Operating temperature	from -30 to +80 °C
Maximum weight	0.5 kg
Housing material	25% fiberglass reinforced PA6.6
Standard protection grade	IP66
CE conformity	EMC Directive: 2014/30/EU
EMC: Immunity | Emission	EN 12895
Vibration resistance: Random	6 g rms, 2.5Hz to 1000Hz
Shock resistance: Shock	EN 60068-2-27: 50 g, 11 ms
MTTFd (electronic board)	EN 13849-1: ≥ 100 years
Number of mechanical cycles	> $10x10^6$

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CAN bus joystick

BJ200 Series

Ordering Code

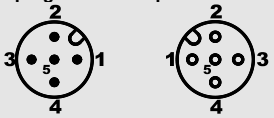
BJ200	2	NOT	N	DMN	2 1	7	M07	N
Type	Axes	Performance Level	Friction lock	Dead Man	Input	Electrical output	Electrical connection	CAN termination

Axes	**1**	Single
	2	Double (round)
	X	Double (cross)
Performance Level	**N O T**	None
Friction lock	**N**	Without friction lock
	F	With friction lock
Dead Man	**D M N**	With dead man (person present)
	N O T	Without dead man (person present)
Input	**0 0**	0 buttons, 0 rocker switches
	2 0	2 buttons, 0 rocker switches
	4 0	4 buttons, 0 rocker switches
	0 1	0 buttons, 1 rocker switch
	2 1	2 buttons, 1 rocker switch
	0 2	0 buttons, 2 rocker switches
Electrical output	**7**	CANopen output
Electrical connection	**c a b**	Electrical wiring harness code (see "Electrical connections" on the right)
CAN termination	**N**	Without internal CAN bus termination

Custom configurations are available on request.

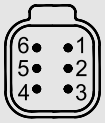
Electrical connections

M12 plug + M12 receptable



Code: **M07** double channel
1: Cable shield
2: V_{IN}=9 to 30 V_{DC}
3: Negative power supply
4: CH
5: CL

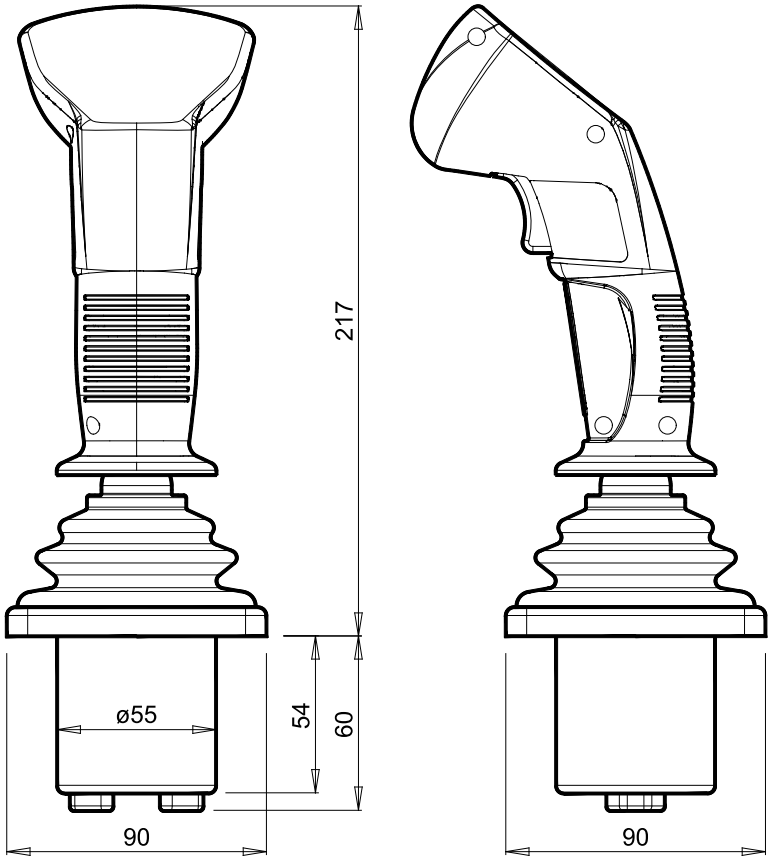
DT04-6P plug

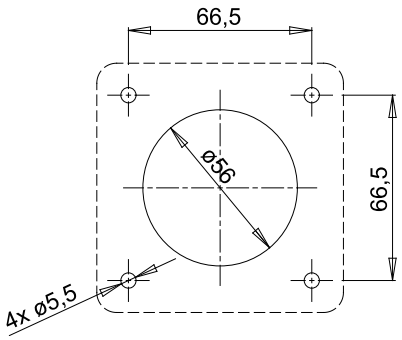


Code: **D01** double channel

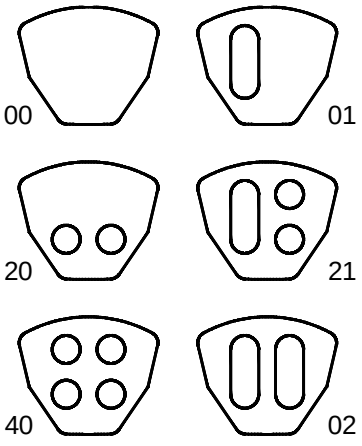
1: V_{IN}=9 to 30 V_{DC}
2: Negative power supply
3: CH
4: CL
5: not connected
6: not connected

Dimensions [mm]





Fixing template



Input configuration

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Accessories

Type	Description	Code	Notes
CAN Counterpart Connector	M12 receptacle connector: loose connector with 5pin, screw terminals.	7.003.059	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green) , external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.469	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin receptacle connector.	7.180.409	
CAN Counterpart Connector	M12 plug connector: loose connector with 5pin, screw terminals.	7.003.071	
CAN Extension cable	Length 5000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.486	
CAN Extension cable	Length 10000mm, multipolar cable for dynamic installations, 2x2xAWG22 conductors (brown, white, yellow, green), external purple jacket with excellent resistance to abrasive action, ordinary industrial oils, chemical agents and UV. M12 5pin plug connector.	7.180.514	
CAN Network Termination	M12 5 pin receptacle connector cap with CAN network termination.	7.003.069	
CAN Network Termination	M12 5 pin plug connector cap with CAN network termination.	7.003.070	
CAN Counterpart Connector	Deutsch DT06-6S plug connector with 6 female terminals (code 0462-201-16141) and wedge-lock (code W6S).	7.003.058	

Foot pedal

FPH16 Series

- Mechatronic pedals with “Press-by-wire” technology, no need of steel cables
- Easy to install and connect to modern electronic units and endothermic engines
- Embedded control signal to increase safety (8 to 36 V_{DC} only)
- Hall effect technology for measurements without friction
- Double return spring for maximum reliability
- Various rest positions inclinations for user maximum comfort
- Broad and non-slip pedal available in S, M and L sizes
- Horizontal or vertical cable output
- Accelerator behavior

Options:

- Enhanced safety with double channel architecture
- Double channel architecture with crossed outputs
- Customizable on request

Hall effect sensor | Double Mechanical spring | Protection Grade IP67 | Various rest positions | Various pedal sizes | Until -40 °C | Single channel | Double channel | Double crossed channel

Technical data

Power supply	5 ± 0.2 V_{DC} or 8 to 36 V_{DC}
Outputs	0.5 to 4.5 V_{DC}
Sensor technology	Hall effect
Maximum power draw	20 mA to 50 mA
Linearity	2%
Footrest length	Small (193 mm) | Medium (214 mm) | Long (238 mm)
Footrest material	PA66 (Nylon) GF30 (Glass fiber)
Inclination at rest	30/35/40/45 degrees
Operative angle	20 degrees
Duration stress (full rotation)	$1x10^7$ cycles @ 60 cycles/min
Duration stress (±2 degrees)	$8x10^7$ cycles @ 300 cycles/min
Return springs	2
Springs forces	Start: 1 kg, end of stroke: 3.5 kg
Frame structure	Steel thickness 3 mm
Springs and frame treatment	Black cataphoresis
Standard cable length	30 cm
Connectors	Deutsch™ DT Series
Mechanical regulations	FMVSS-124
Operating temperature	from -40 to +85 °C
Weight	1.2 kg
Standard protection grade	IP 67
CE Conformity	EMC Directive: 2014/30/EU
EMC: Immunity | Emission	EN 61000-6-2 | EN 61000-6-3, EN 13309
Vibration resistance: Sinus	EN 60068-2-6: 20 g @ 100 Hz
Shock resistance: Shock	EN 60068-2-27: 50 g @ 10 ms

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Foot pedal

FPH16 Series

Ordering Code

FPH16	M	35	S	U	9	H
Pedal model	**Footrest dimension**	**Opening angle**	**Channels type**	**Power supply**	**Output signal**	**Cable output**

Footrest dimension	**S**		Small footrest (193 mm)
	M		Medium footrest (214mm)
	L		Long footrest (238mm)
Opening angle	**3**	**0**	Opening angle in rest position equal to 30°
	3	**5**	Opening angle in rest position equal to 35°
	4	**0**	Opening angle in rest position equal to 40°
	4	**5**	Opening angle in rest position equal to 45°
Channels type	**S**		Single channel
	D		Double channel
	X		Double channel with crossed signals
Power supply	**U**		8 to 36 V_{DC} power supply. Not available for double channel versions
	C		+5 V_{DC} power supply
Output signal	**5**		0.5 to 4.5 V_{DC} output. Input voltage V_{IN}=5 V_{DC}
	9		0.5 to 4.5 V_{DC} output. Input voltage V_{IN}=8 to 36 V_{DC}
Cable output	**H**		Horizontal direction cable output
	V		Vertical direction cable output

Electrical connections

Voltage output (V_{IN}=+5 V_{DC})

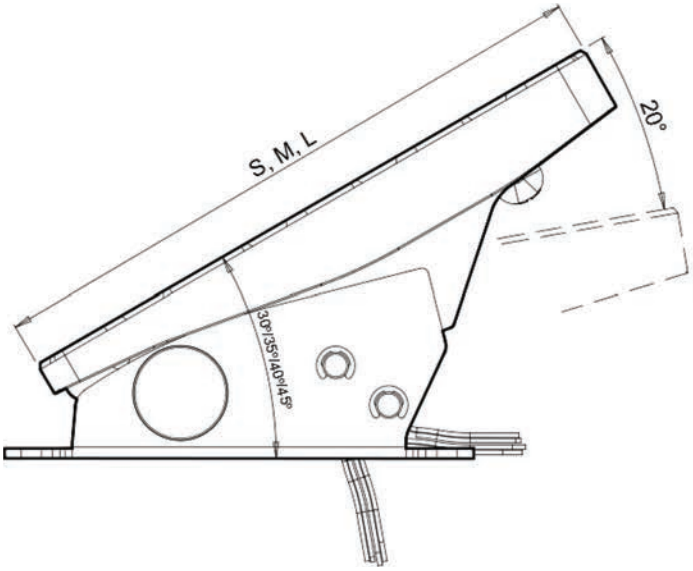
DT04-4P plug
Code: **D4A** single channel
1: V_{IN}=+5 V_{DC}
2: Negative power supply
3. Output 0.5 to 4.5 V_{DC}
4: Validation

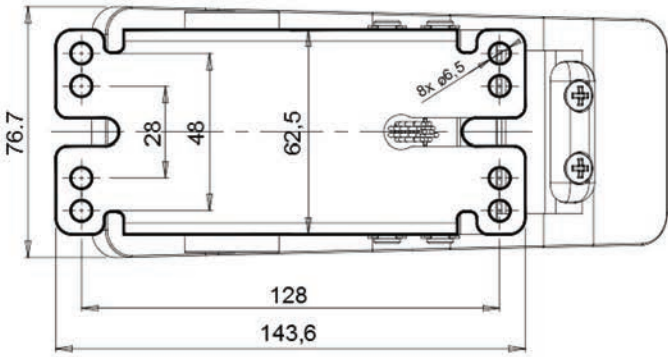
DT04-6P plug
Code: **D4F** double channel
1: V_{IN}=+5 V_{DC} [ch.1]
2: Negative power supply [ch.1]
3. Output 0.5 to 4.5 V_{DC} [ch.1]
4: V_{IN}=+5 V_{DC} [ch.2]
5: Negative power supply [ch.2]
6: Output 0.5 to 4.5 V_{DC} [ch.2]

Voltage output (V_{IN}=8 to 36 V_{DC})

DT04-4P plug
Code: **D2A** single channel
1: V_{IN}=8 to 36 V_{DC}
2: Negative power supply
3: Output 0.5 to 4.5 V_{DC}
4: Validation

Dimensions [mm]





Product image for illustration purposes only

FPH16 v.1.00 2015

Accessories

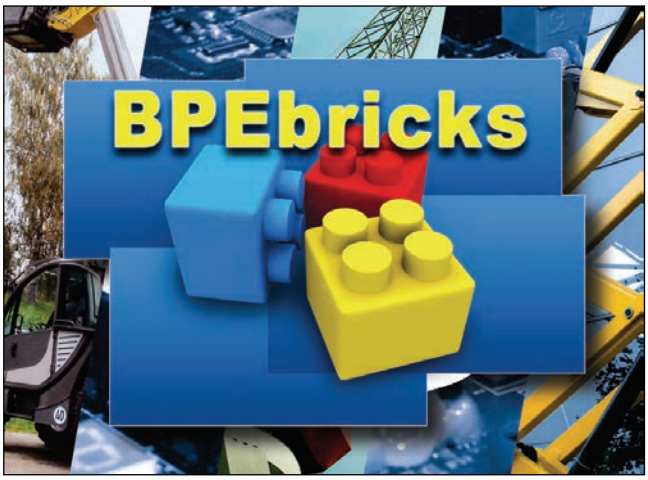
Type	Description	Code	Notes
Counterpart Connector	Deutsch DT06-4S plug connector with 4 female terminals (code 0462-201-16141) and wedge-lock (code W4S).	7.003.030	
CAN Counterpart Connector	Deutsch DT06-6S plug connector with 6 female terminals (code 0462-201-16141) and wedge-lock (code W6S).	7.003.058	

Software Tools

BPEbricks	Firmware development tool	146
BPEbricks SDK	Starter Development Kit (SDK)	150
BPEterminal	Software to setup and manage electronic boards	152

Firmware development tool

BPEbricks platform



- User-friendly interface
- Based on NetBeans IDE
- Intuitive graphical programming approach
- Fast development of the application
- Drag and drop placement of functional blocks
- Application and hardware custom libraries like for:
  - Area limitation
  - Load limitation for mobile cranes limitation
  - Outriggers self levelling
  - Solenoid valves PWM outputs management
  - Analog and CANopen transducers management
  - and many more
- Integrated blocks for CAN bus communication management
- Easy setup of Master/Slave multi boards systems
- Embedded BPEterminal interfaces automatic builder
- Embedded BPEterminal interfaces editor

No programming skill required | Intuitive graphical interface | Drag and drop components | Embedded BPEterminal Interface builder | Easy CAN bus Communication setup | Reduced firmware development time

The BPEbricks is a fast and easy way to build your specific application's firmware, based on an intuitive graphical approach. No programming skills are required. Just setup your system in few steps:

1 Select your board.
All the input and output resources of your electronic will be immediately available on the screen.

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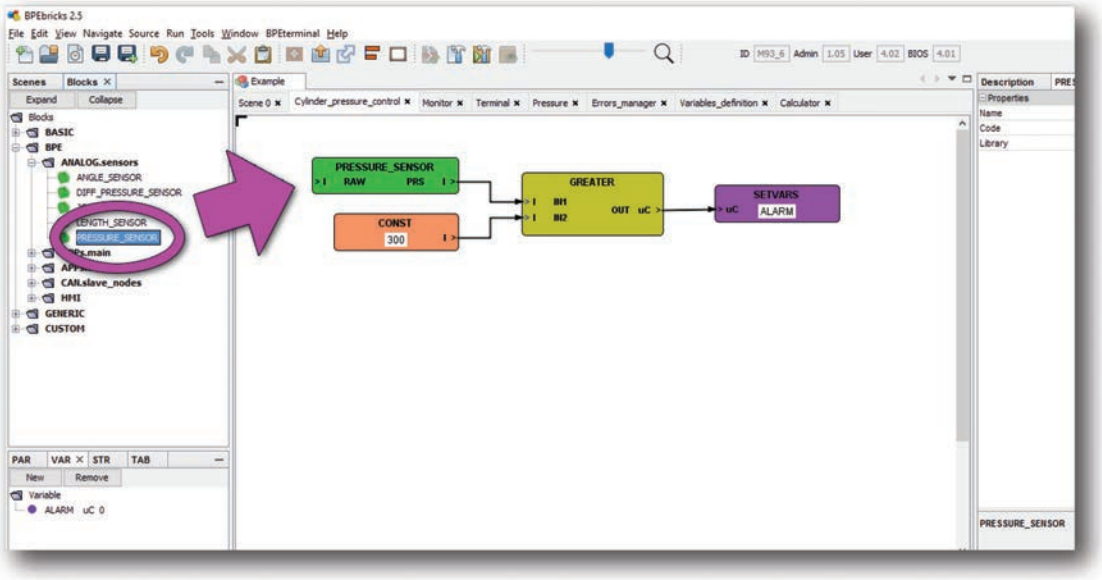
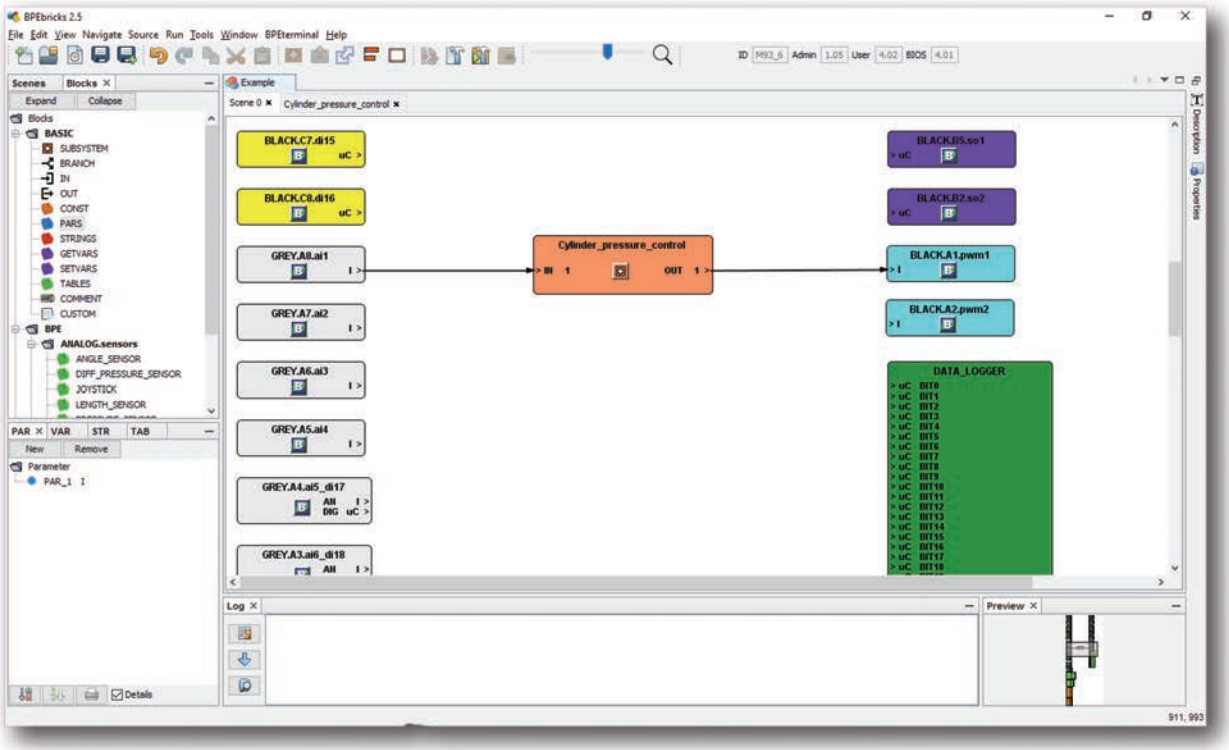
2 Define variables and parameters.
Drag and drop blocks and connect them to design your function.



3 Connect your function to physical I/O pins of the board.



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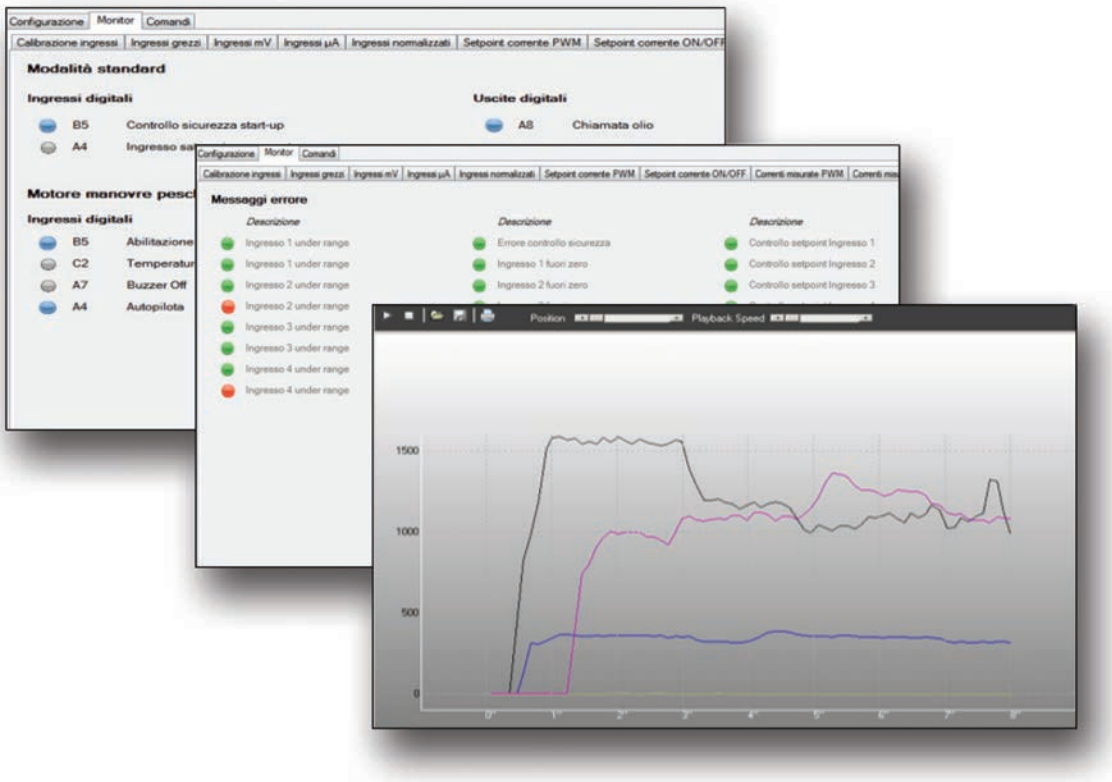
4 Build the software and download it to the electronic board.

5 Debug and test the firmware through BPEterminal.



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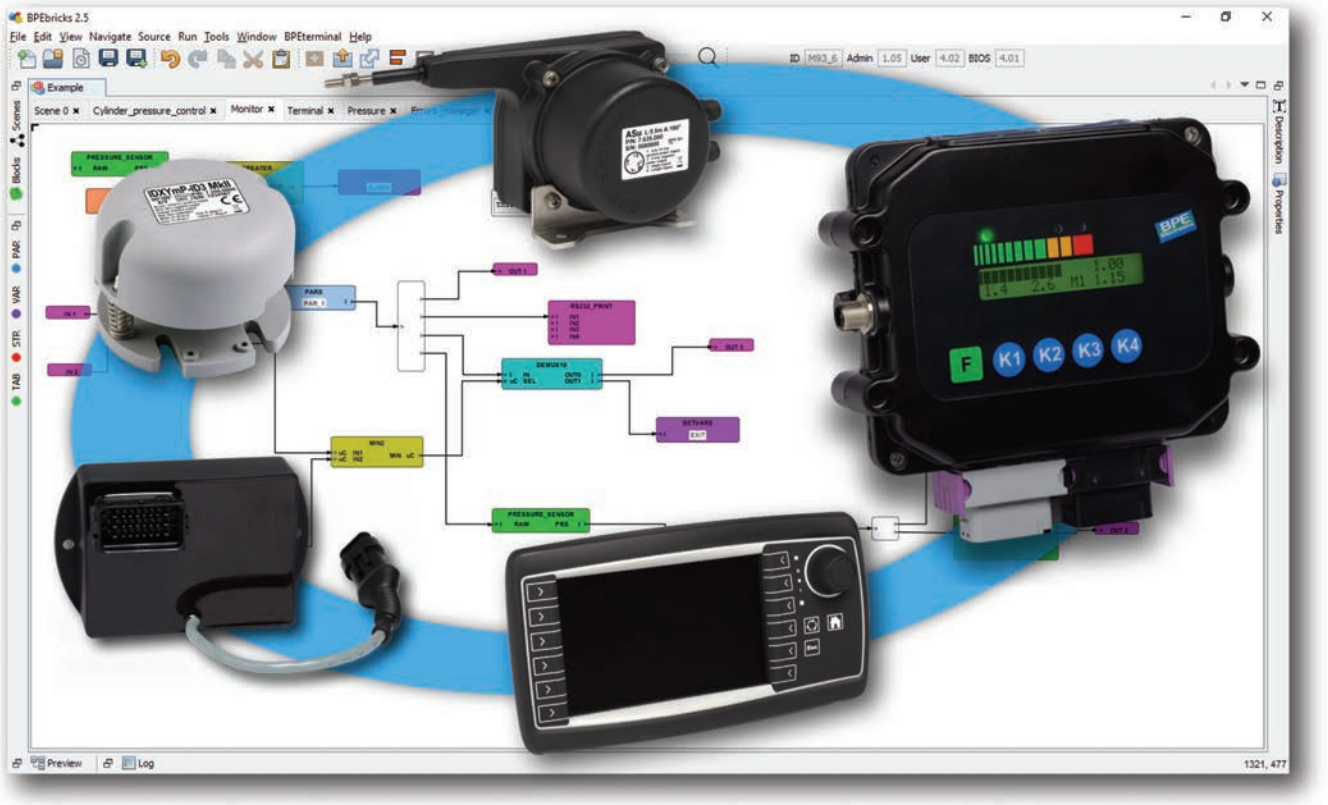
BPEbricks platform

6 Increase the complexity of your system with more sensors, switches, alarm lamps and any other kind of components.
Add slave and I/O expansion boards for extra resources and connect them through CAN bus connectivity.



With the BPEbricks suite it is easy to customize the standard firmware to any application.

Available:
- Starter kit
- Development cable

For any support or further information, please contact BPE Srl or your local reseller.

For Microsoft Windows™ IA-32, x86-64 operating systems only.
See software manual for full system requirements.
An RS-232 serial port is required for electronic board communication.
Custom cable can be required to connect the electronic board to a standard PC.

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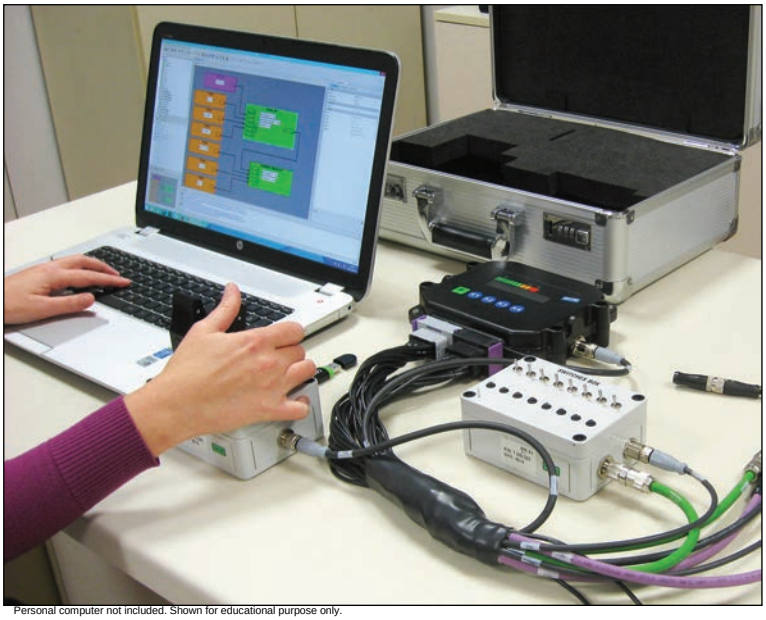
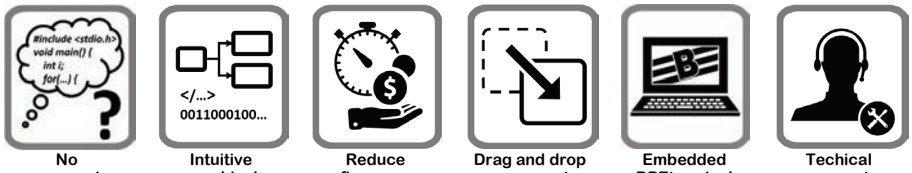
Starter Development Kit (SDK)

BPEbricks platform



Personal computer not included. Shown for educational purpose only.

- A complete kit for a demo develop a of your application
- BMS55D master electronic board with embedded display
- Input/output demo boards ready to use
- BES25 slave board for proportional valves control
- Preassembled electrical wiring harness
- Intuitive grapical programming approch
- Fast application development
- Ready to use libraries for transducers, signal filtering, logical functions etc.
- Embedded tool to build custom BPEterminal interfaces
- From low level function detail to high level object integration
- Fully supported by BPE custom developers



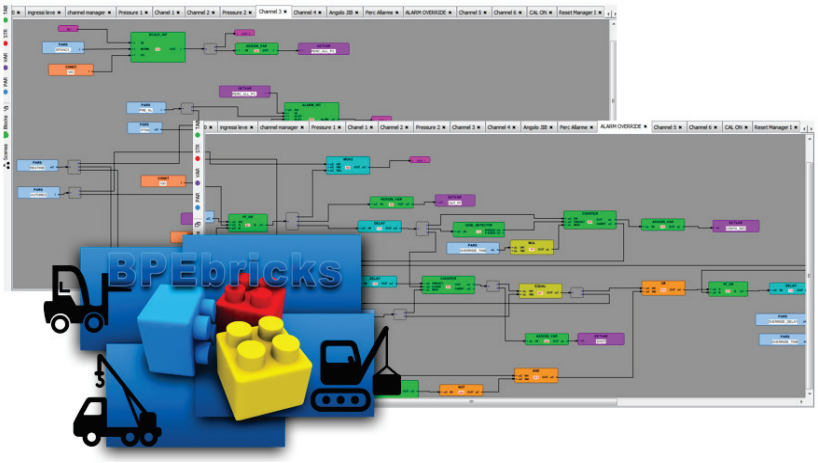
*Get started with **application development**!*

The Starter Development Kit is the easiest way to get started with BPEbricks, the innovative development environment made by BPE Electronics.

BPEbricks is a powerful tool with a graphical programming approach.

No advanced programming skills are required.

Just drag and drop basic functional blocks and connect them together to build up complex functions for your machine.



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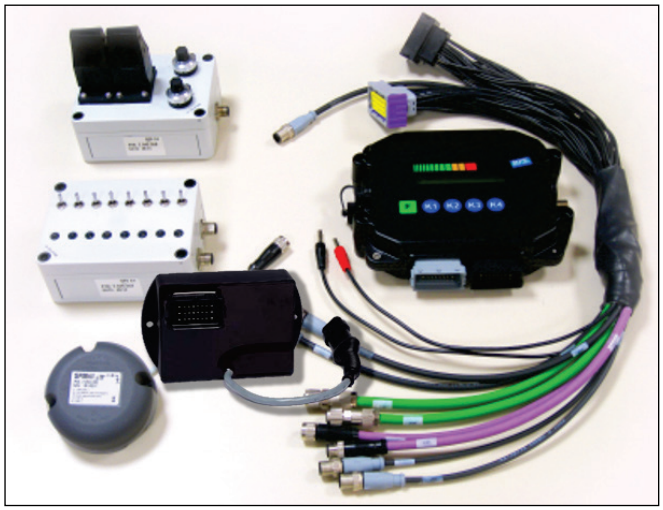
Starter Development Kit (SDK)

BPEbricks platform

The kit includes all you need to set up a basic system and learn how easy is to implement the software for your control application.

Add analog or digital sensors, switches, signaling lamps and all other components you need.

Start with simple functions up to sophisticated system integration.



Use the embedded interface builder to design a specific BPEterminal user interface for your application.

Open it with BPEterminal and directly change settings, calibrate sensors and joysticks, enable optional functionalities, modify parameters and much more[(1)].

The BPEbricks SDK includes:

- USB storage device with BPEbricks software suite (with all needed libs)
- BMS55D master electronic board with PL d safety outputs (EN 13849-1), embedded two rows graphic display, CAN bus communication
- BES25 slave expansion electronic board with four proportional valves control PWM outputs
- Analog inclination sensor SP MkII with MEMS technology
- Analog input electronic demo board with four potentiometric commands (two fingertip type joystick with centering spring, two rotary potentiometers)
- ON/OFF input/output electronic demo board with toggle switches and signaling LEDs
- Plug & play electrical wiring harness to connect all system parts
- RS-232 serial communication cable and USB adapter for PC connection

For Microsoft Windows™ IA-32, x86-64 operating systems only. See software manual for full system requirements.
An RS-232 serial port is required for electronic board communication. Custom cable can be required to connect the electronic board to a standard PC.

(1) For safety reason BPE reserves the right to deny access to some safety functions

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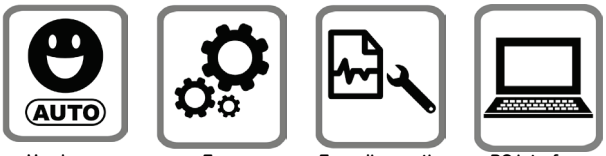
Software to setup and manage electronic boards

BPEterminal platform

- For electronic board and system complete configuration, calibration and full diagnostic on the field
- Automatic smart detection of electronic boards
- Customized GUI (Graphic User Interface) interfaces to many BPE electronic boards
- Graphical plot of analog and digital inputs
- Full system configuration, backup and cloning
- Many security levels for manufacturer, service, user and guest
- Graphical display of system and transducers errors for fast & easy detection at a glance
- Password protected to prevent not allowed use
- Custom license to granted users only
- RS-232 serial protocol for PC interface
- Custom GUI can be created with the BPEbricks software or on request



Hardware smart detection | **Easy System setup** | **Easy diagnostic and error detection** | **PC interface**

Product image for illustration purposes only

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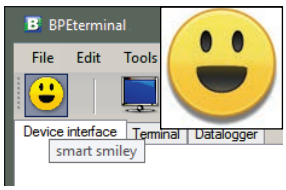
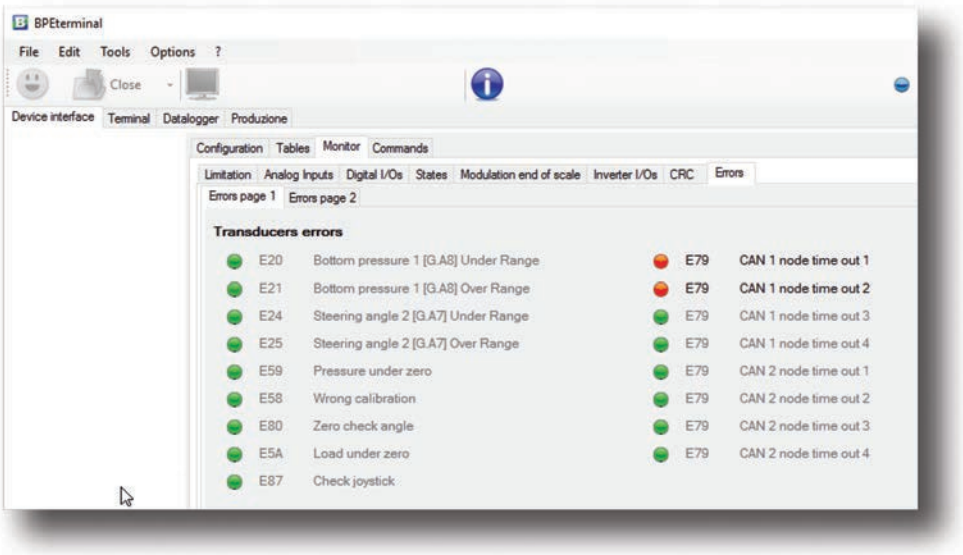
Software to setup and manage electronic boards

BPEterminal platform



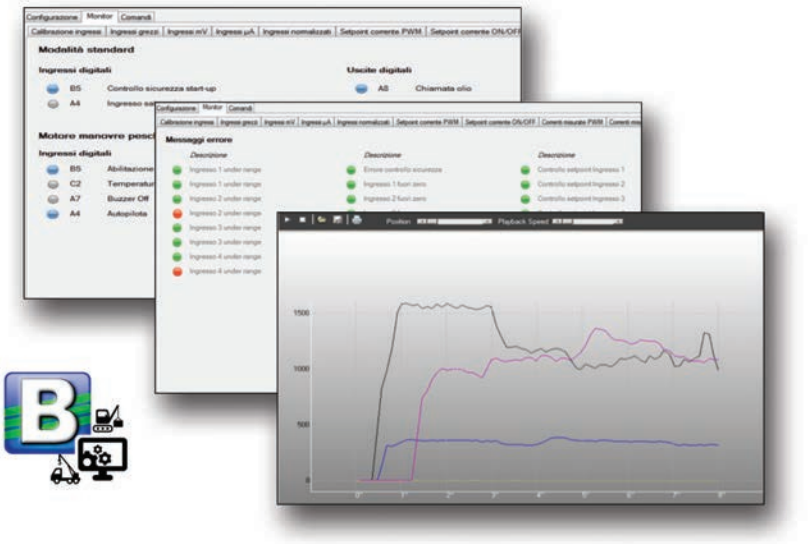
Fast & easy auto detection of any BPE electronic board with the “Smiley function”.
Electronic board GUI and configuration are automatically loaded.

Machine functionality and errors easy check with the aid of the graphical interface.



Signals from transducers, joystick and digital I/O are also shown graphically.

A powerful tool for fast calibration and service of any system!



For Microsoft Windows™ IA-32, x86-64 operating systems only.
See software manual for full system requirements.
An RS-232 serial port is required for electronic board communication.
Custom cable can be required to connect the electronic board to a standard PC.

brevini

Code D.759.2017.01

BPE electronics

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QUALITY SYSTEM CERTIFICATION
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ISO 9001