Smart connections.

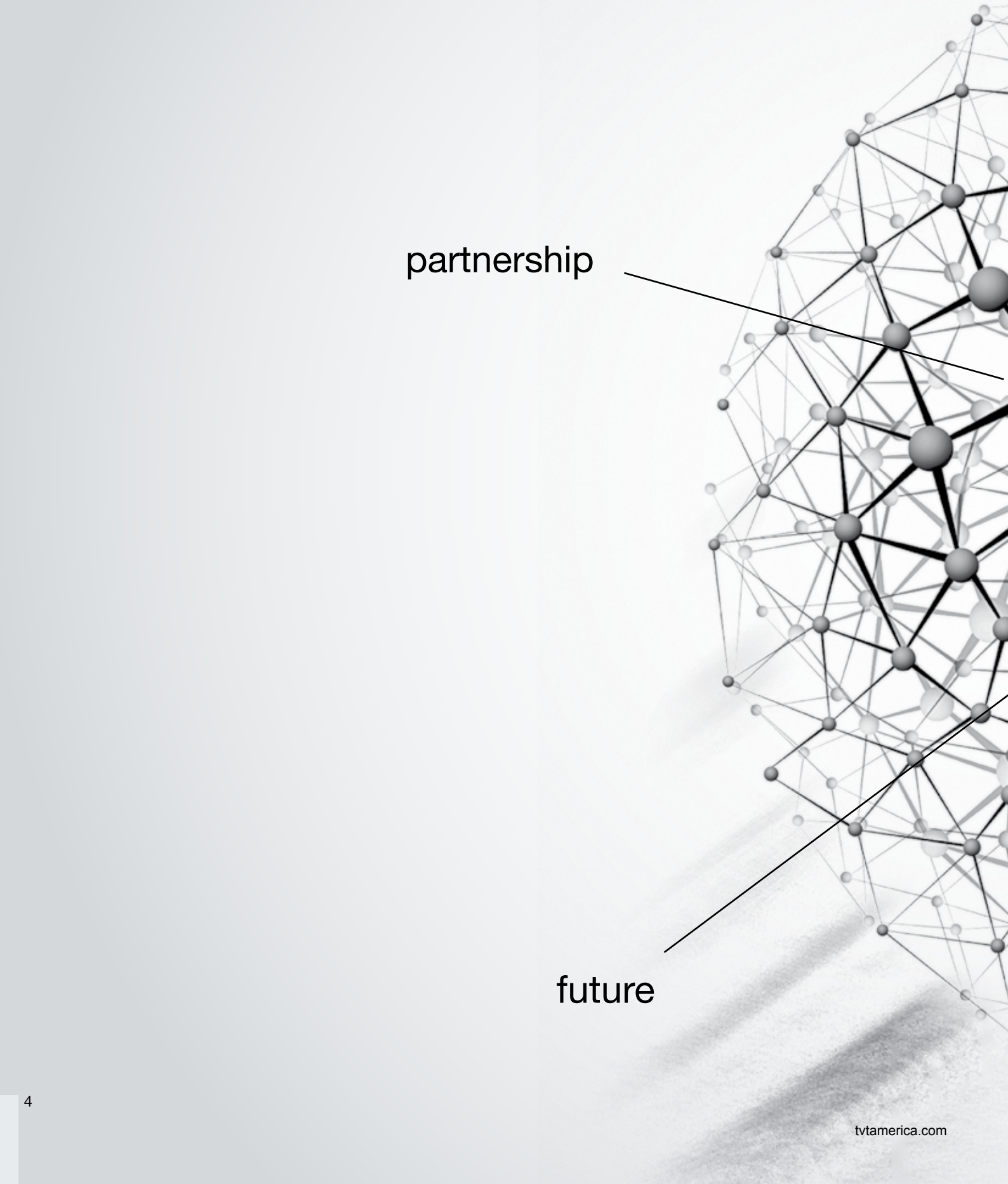
Order catalogue
Line of drive controllers

INVEOR M, INVEOR P, accessories

tvtamerica.com

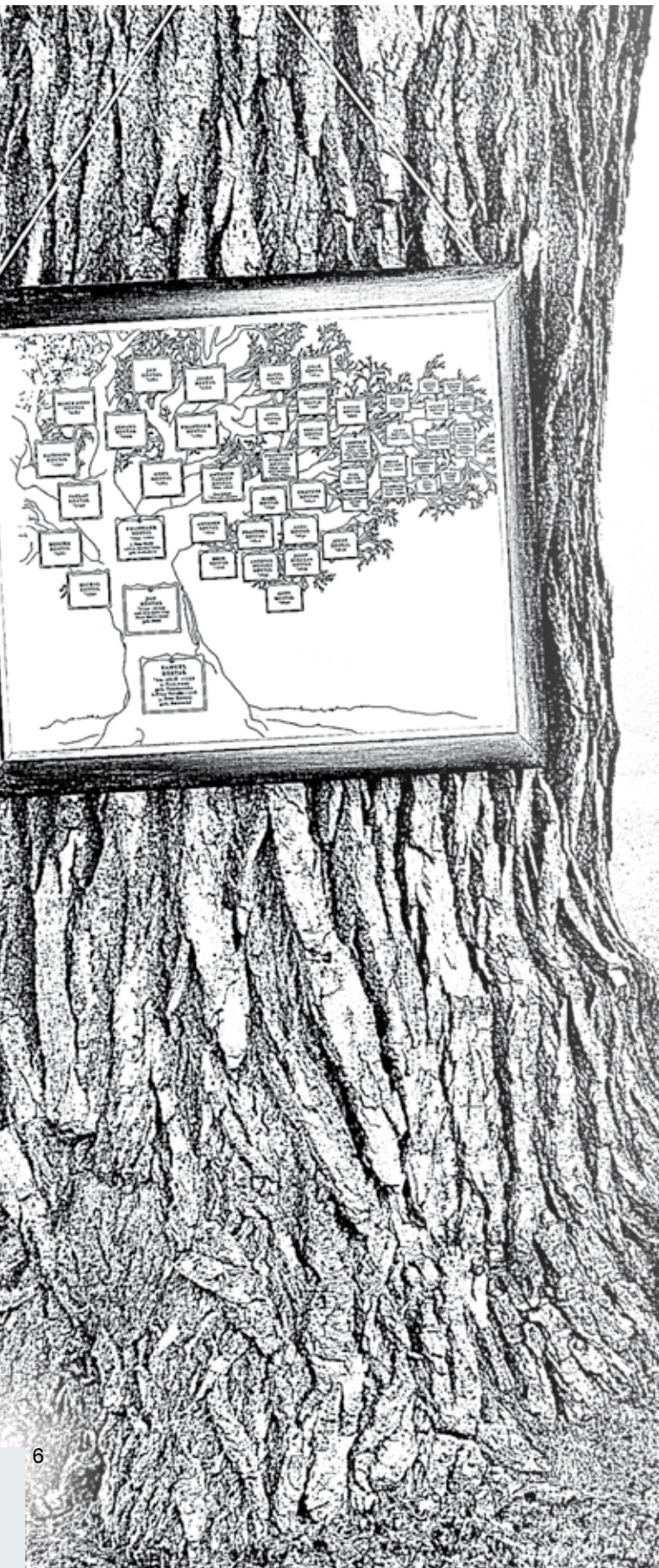
KOSTAL competence – Using energy smartly

KOSTAL competence – Smart connections




family
quality

KOSTAL competence – Smart connections



For over 100 years, KOSTAL has focused on values such as family, partnership, reliability, customer satisfaction, a zero-error approach and awareness of responsibility.

KOSTAL Group

- As an independent, family-owned company, the KOSTAL Group specialises in the development of high-quality electronic, electromechanical and mechatronic solutions for a wide range of automotive and industrial applications.
- The company was founded in 1912 by Leopold Kostal in Lüdenscheid, Germany, and today employs about 16,300 people at 39 locations in 18 countries.
- The KOSTAL Group has four divisions: Automotive Electrical Systems, Connectors, SOMA Test Technology and Industrial Electronics with its international sales company KOSTAL Solar Electric for photovoltaic inverters.
- The KOSTAL Group's partners include the world's leading automotive manufacturers and numerous major industrial companies.

KOSTAL Industrie Elektrik

- With the founding of KOSTAL Industrie Elektrik in 1995 under the umbrella of the KOSTAL Group, the stage was set for providing broad expertise from the automotive sector to additional markets, such as drive technology.
- Based in Hagen, Germany, the leading power electronics firm employs 300 members of staff in development, administration and production.
- Its core competences are drive technology (INVEOR drive controllers) and photovoltaics (PIKO inverters).

Smart connections

- The "Smart Connections." philosophy is the KOSTAL brand promise and is based on the KOSTAL Group's vast experience.

“Smart connections.” – the four pillars of the KOSTAL philosophy

For KOSTAL customers, "Smart Connections." means a partnership with a down-to-earth and sound company, guaranteeing long-term trusting business relationships at all levels.

KOSTAL family

In dealings with all partners, KOSTAL sees itself as a KOSTAL family, in which each member can rely on the others. This understanding and long-standing relations with our customers guarantee a code of conduct built on human values and tradition.

Partnership based on symbiosis

Using the idea of symbiosis as its guiding principle, by working closely with customers from project planning, qualification and system integration to market launch, KOSTAL is able to deliver optimum support and by treating customers as equals is able to take full account of individual requirements.

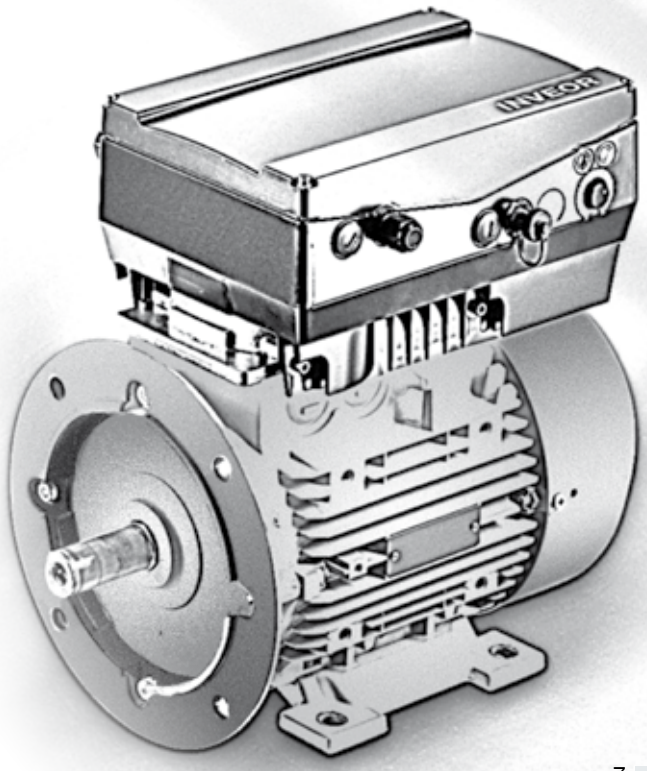
Quality-offensive thinking

The professional error management system – adopted from the automotive industry – guarantees a zero-error strategy. Highly automated volume production includes defined test loops through which every product passes. KOSTAL offers this partnership-based quality-offensive thinking with the INVEOR, a genuine, German-made quality product. Errors exist to be eliminated and to give us the opportunity to improve day after day, especially for the benefit of KOSTAL customers.

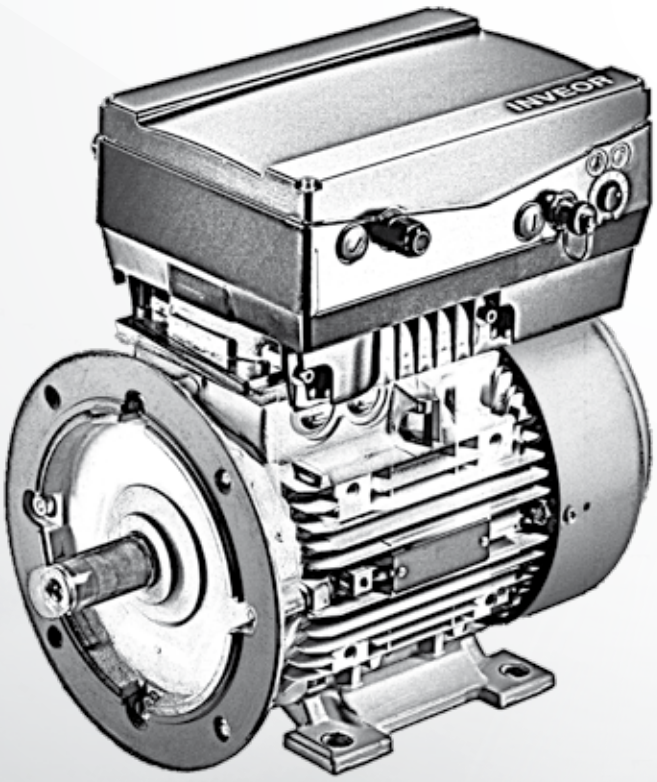
Envisioning the future

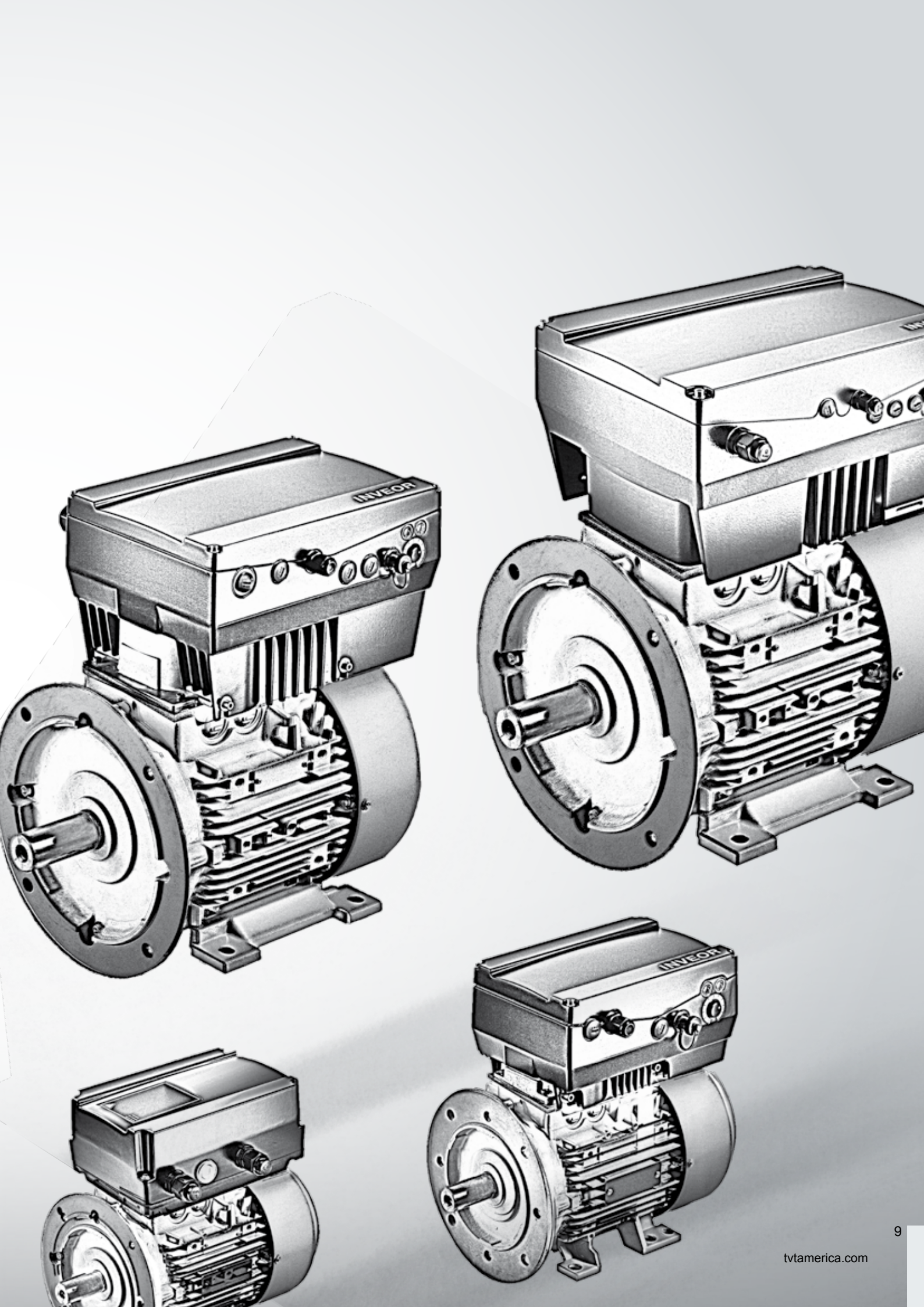
KOSTAL works tirelessly towards active knowledge transfer and intensive dialogue with its partners. Together the challenges presented by constant change can be overcome. The topic of energy efficiency (EN50598) in particular is gaining ever greater significance in this field. In close dialogue with partners, KOSTAL creates new product developments for future requirements. In other words, envisioning the future together.

KOSTAL applies its brand promise and competitive advantages to all aspects of business, which of course includes development of the INVEOR line of drive controllers.



INVEOR –
Smart connections on five levels




INVEOR
INVEOR

INVEOR –
“Smart connections.” ...

The “Smart connections.” claim is not only the brand claim of KOSTAL Industrie Elektrik. It also stands for the philosophy behind the development of the INVEOR line of drive controllers. The goal for the INVEOR was to develop a product that is ideally oriented to the requirements of customers and their respective applications without sacrificing the advantages of volume production. This has resulted in a product with a modular configuration, which customers can put together to suit their needs. On the basis of INVEOR, the key interfaces to the customer application were therefore defined and analysed in order to offer ideal solutions. These solutions, or smart connections, exist at five levels – as is shown below.

... on five levels

1. The INVEOR: Five sizes covering motor ratings from 0.25 to 22 kW, each available in the motor-mounted, wall-mounted and cold plate variants. The INVEOR drive controllers can also be fitted with the Safe Torque Off function (STO = functional safety)

2. Communication: Through CANopen, EtherCAT, Modbus, PROFIBUS, PROFINET and Sercos, the INVEOR is compatible with almost all common control environments. Customers can select the bus system relevant to their needs and thereby ideally integrate the INVEOR into the control environment of their application

3. Operation and observation: For operation, a foil keypad, an external and an integrated MMI handheld controller, operation via an external touch operating terminal and PC software are available depending on requirements

4. Motor adaptations: Thanks to its innovative adaptation concept with a wide range of standard and motor-specific adapter plates, the INVEOR can be used with virtually any motor on the market

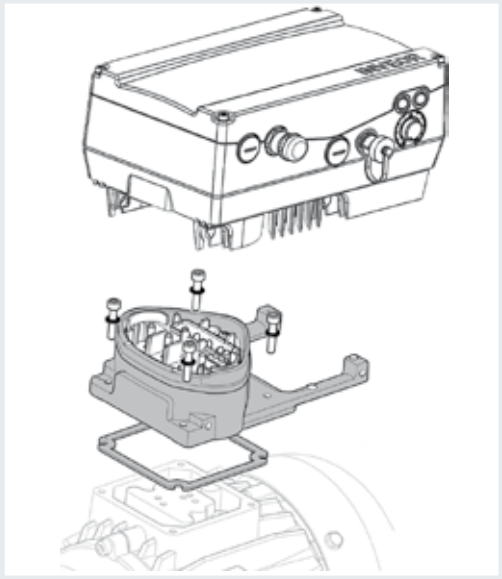
5. Control process: The regulating concept of the INVEOR is conceived of in such a way that all motors, from asynchronous to synchronous machines, can be operated

Once you consider all these interfaces and the various configuration options of the INVEOR, you could say that the KOSTAL line of drive controllers adapts in various ways to the customer's needs and the application situation. – "Smart connections." on five levels.

The following pages will give you more detailed insight into the five levels of the INVEOR's smart connections.

Five levels
at a glance

1 The INVEOR



Decentralised drive controller concept

Being installed directly on the motor minimises wiring and installation work and therefore also project planning and installation costs for systems covering large areas. The application section can be extended with ease as no additional space is needed for control cabinets. The individual units can be fully pre-wired, pre-tested and standardised. This makes project planning and commissioning faster than with comparable projects where several drive controllers are fitted in the control cabinet. Shielded motor cables are very short if they are needed at all.

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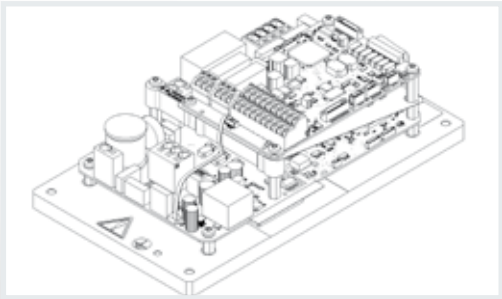
INVEOR M

The motor-mounted INVEOR M product family comes in five sizes and covers the power range between 0.25 kW and 22 kW in 1- and 3-phase variants, motor-mounted or wall-mounted. You select the size to suit your motor rating in the configuration.



RoHS 2011/65/EU

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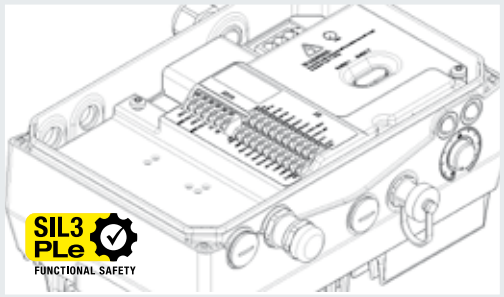
INVEOR P

Based on the same platform, the INVEOR P includes the electronics hardware from the INVEOR M family on a standardised cold plate. Specific and therefore variable integration in the customer system is thereby made possible. The electronics are cooled via the cold plate's attachment to the customer's cooling surfaces such as installation plates, cast parts or ribbed housing parts. The extensive configuration options, derived from the INVEOR M platform, are still available here. You select the INVEOR type in the configuration.



Input/output configuration

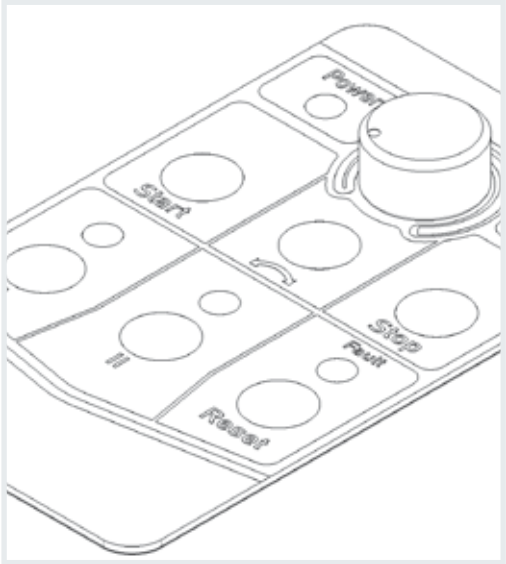
The number of inputs/outputs and the model with and without functional safety (STO) can be configured through the choice of integrated application unit.

2 Communication

Comprehensive communication interfaces

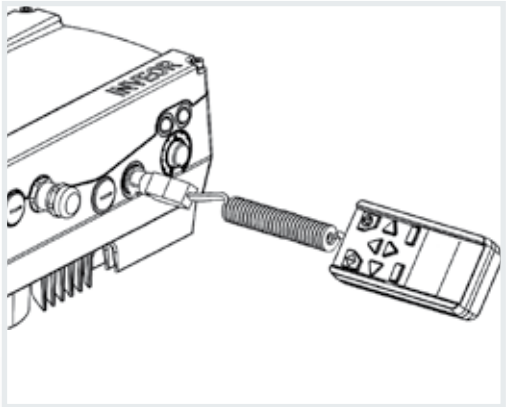
The choice of the preferred field bus usually depends on the controller manufacturer used in the system, the geographic region, the functional requirements in terms of speed and network spread and availability of suitable field devices. The INVEOR product family offers a large number of communication options, allowing it to be easily integrated in existing automation processes without having to depart from the fieldbus systems used previously in the application. The fieldbus systems can be selected as options.

3 Operation and observation



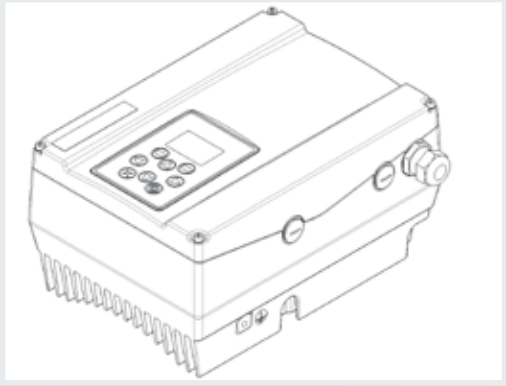
Integrated foil keypad

Decentralised drive controllers are easy to access in the field and can also be operated locally thanks to the integrated foil keypad. Changes in direction of rotation, parameter changes, changes in the target value and start and stop commands are therefore possible. What's more, the integrated potentiometer allows target values to be specified with ease. The foil keypad can be selected as an option in the INVEOR configuration.



MMI* handheld controller

For commissioning, parameter adaptations and service purposes, our flexible MMI handheld controller is available as an alternative to the PC software. You can edit and save parameters and copy parameter sets from one device to another (clone devices). You can also specify target values and display actual values. The MMI handheld controller is available as an accessory to the INVEOR.



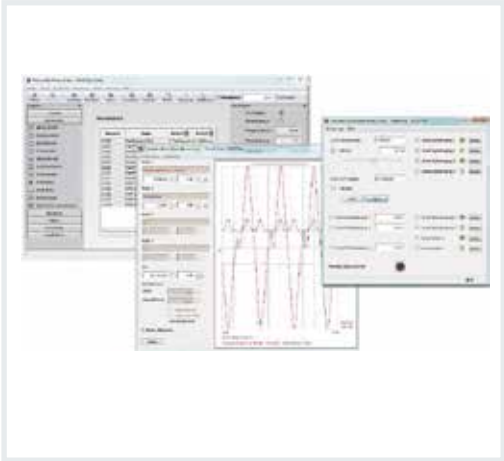
Integrated MMI*

The full functionality of the handheld controller, combined with 5 freely selectable status screens, enables parameterization and operation on the drive controller itself. Everything complies with the IP device protection class. The MMI functionality can be selected as an option in the INVEOR configuration.

*Man-Machine-Interface

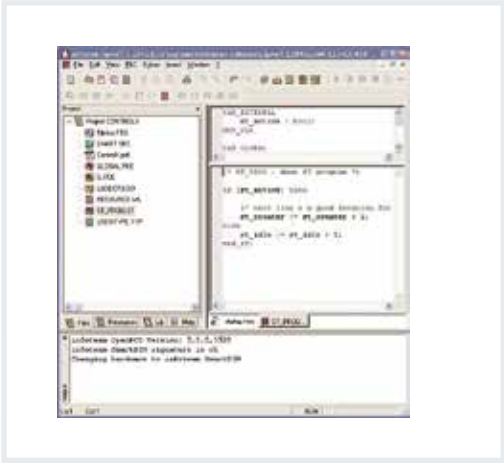
Touch operating terminal

You can conveniently automate several INVEOR drive controllers without a fieldbus using the touch operating terminal. Two variants of this touch operating terminal are available as accessories to the INVEOR.



INVEOR PC software

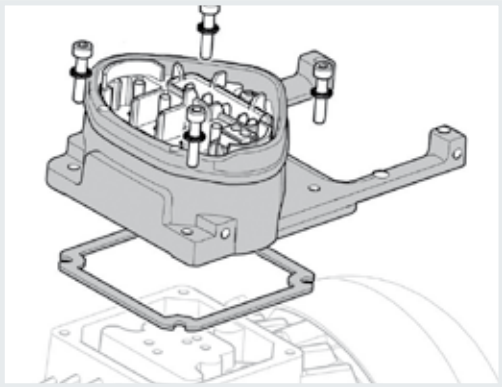
The user will get to grips with intuitive PC software interface with virtually no assistance. Commissioning can be easily undertaken by oscilloscope, parameter adaptation and the cloning of drive axes. Automatic motor identification, parameter presettings and customer-specific actual value displays automate and speed up application commissioning. The INVEOR PC software is available to download for free from the following website: www.kostal-industrie-elektrik.com



Soft PLC, IEC 61131-3

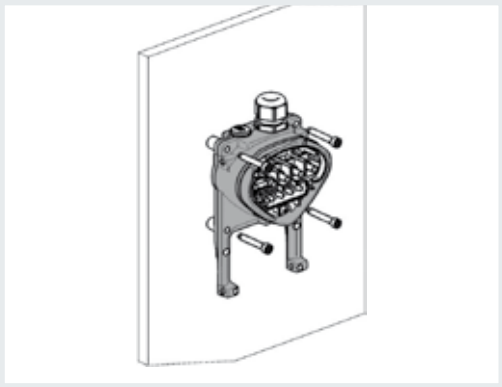
The INVEOR provides a freely programmable soft PLC solution with complete access to the device parameters and status data. Programming and depiction can take place in a function block diagram (FBD), structured text (ST) and a list of instructions (AWL). There are 20 technology parameters, which you can use for your specific functions in your application. Each INVEOR is equipped with the soft PLC solution as standard.

4 Motor adaptations



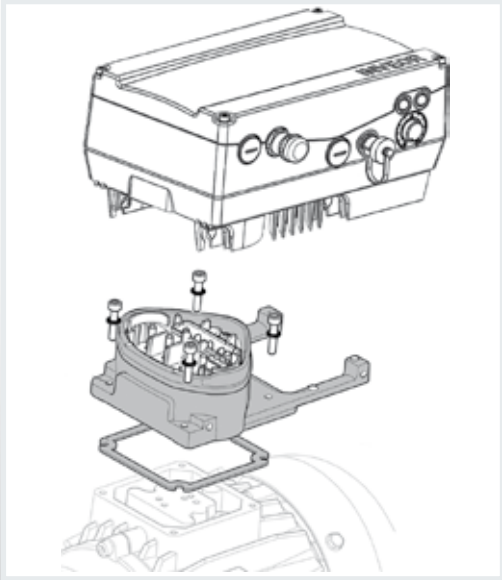
Motor adapter plate

In order to mechanically install the drive controller on the motor, the INVEOR adapter plate (ADP) is used in place of the terminal box. The INVEOR can then be attached directly to this (plug-and-play). Thanks to the large number of adapter plates available, virtually any motor can be adapted. You will find suitable adapter plates in the accessories area.



Mounting adapter plate on wall

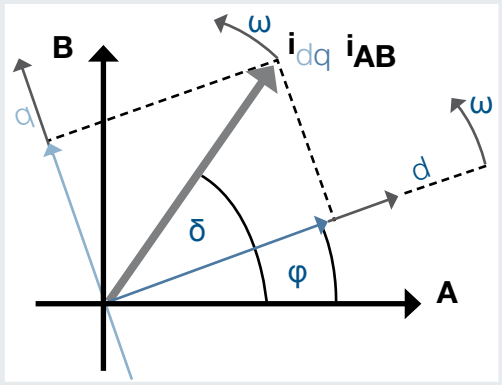
If the application does not permit installation on the motor, installation close to the motor is possible. As an alternative to the motor adapter plate, KOSTAL provides an adapter plate for wall mounting. You will find wall mounting plates in the accessories area.



Extensive range of adapter plates

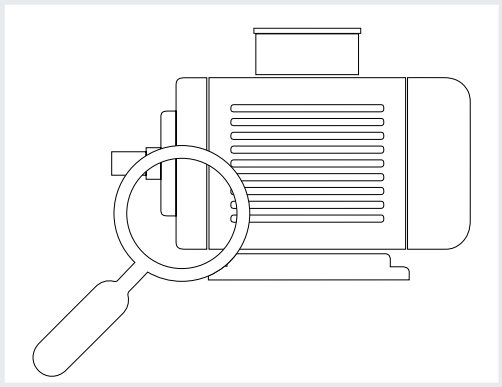
The range includes a large number of adapter plates and intermediate adapters for many common motor types. Specific adapter plates are also available for special motors and can be set up to match requirements and quantities. Please get in touch with your KOSTAL contact for more details.

5 Control process



Field-oriented sensorless control for asynchronous and synchronous motors

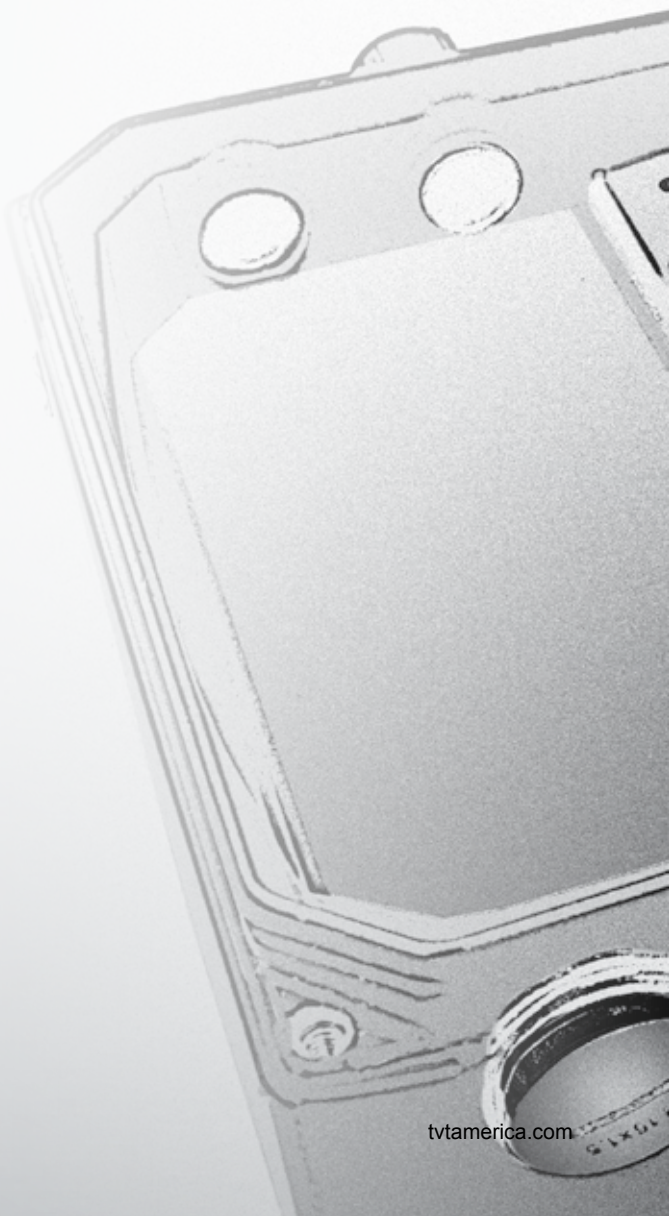
Compared with controlled processes such as voltage/frequency control, the INVEOR attains improved start-up torques, better efficiency and optimised control quality. Expensive rotary encoder feedback can be dispensed with.

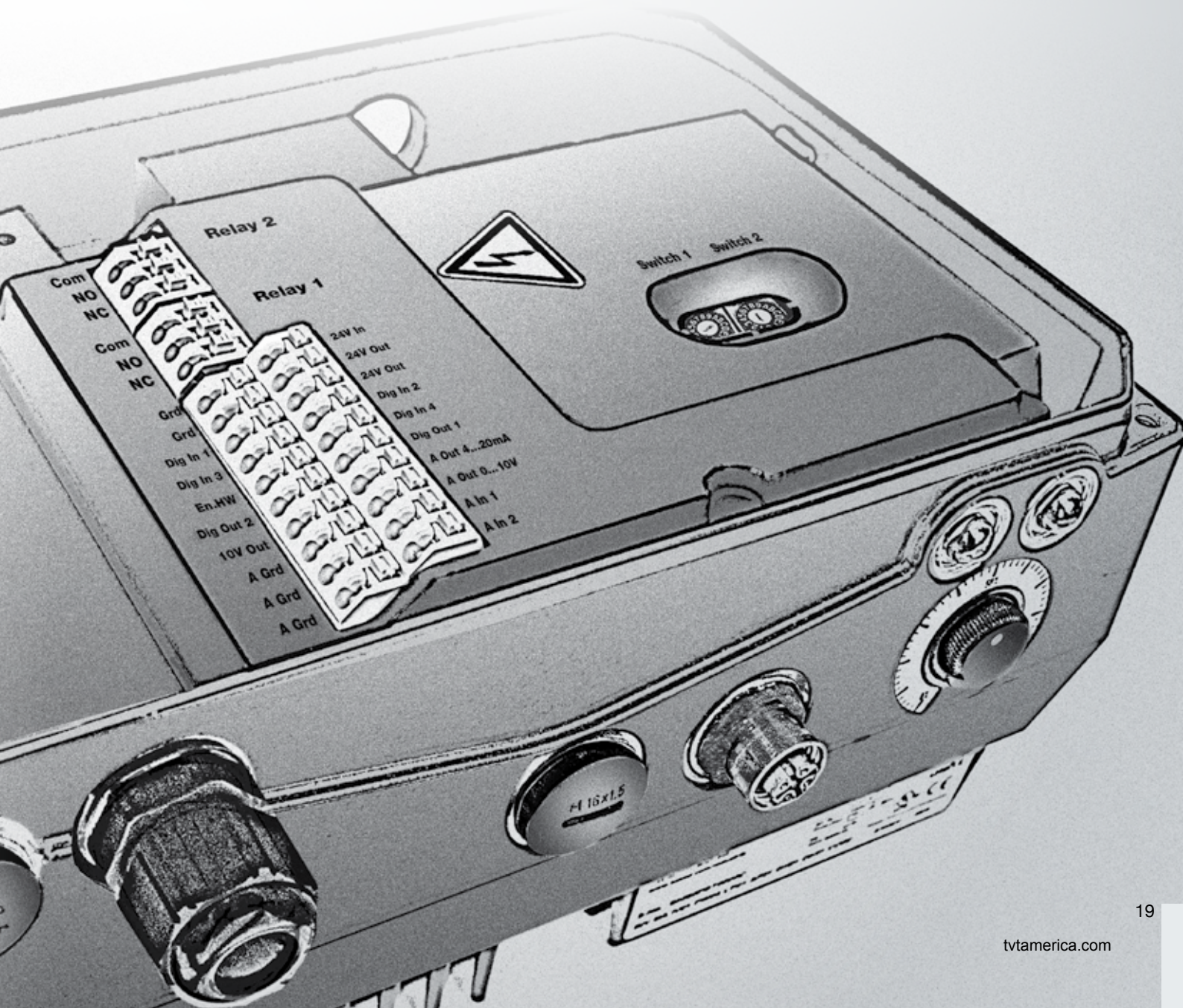


Automatic motor identification

To speed up the process of commissioning the drive controller in combination with external motors, the INVEOR family provides automatic motor identification. Only the type plate data has to be entered to start the identification process.

INVEOR
Equipment features and standard configurations




Relay 2
Com
NO
NC
Relay 1
Com
NO
NC
Grd
Grd
Dig In 1
Dig In 3
En.HW
Dig Out 2
10V Out
A Grd
A Grd
A Grd
24V In
24V Out
24V Out
Dig In 2
Dig In 4
Dig Out 1
A Out 4...20mA
A Out 0...10V
A In 1
A In 2
Switch 1
Switch 2
M16x1.5

Equipment features at a glance

By selecting the application unit as part of the INVEOR configuration, you define the main functionalities and features, in particular the interfaces and fieldbus options, of your drive controller. The following overviews provide a summary of the equipment features of the individual application unit.

Application units available per INVEOR size

Depending on size (A, B, C, D), there are up to three application units: basic, standard and functional safety. There is only a standard application unit for the α size. You can see the application units available per size below.

Size	α	A, B, C	A, B, C, D	
Application unit type	**Standard**	**Basic**	**Standard**	**Functional safety**
Size α, 1Ph (0.25 kW – 0.75 kW)	■■			
Size A, 1Ph (0.37 kW – 1.1 kW)		■	■	
Size A, 3Ph (0.55 kW – 1.5 kW)		■	■	■
Size B, 3Ph (2.2 kW – 4.0 kW)		■	■	■
Size C, 3Ph (5.5 kW – 7.5 kW)		■	■	■
Size D, 3Ph (11.0 kW – 22.0 kW)			■	■

Operation and observation

Depending on the choice of application unit, various operation and observation options exist.

Size	α	A, B, C	A, B, C, D	
Application unit type	**Standard**	**Basic**	**Standard**	**Functional safety**
Soft PLC. IEC 61131-3	■■	■■	■■	■■
INVEOR PC software	■■	■■	■■	■■
Potentiometer on device	Accessories	■	■	■
Integrated foil keypad	■			
Integrated foil keypad with potentiometer		■	■ Cannot be combined with fieldbus option	■
Integrated MMI		■	■	■
MMI handheld controller	Accessories	Accessories	Accessories	Accessories
Touch operating terminal	Accessories	Accessories	Accessories	Accessories

■■ available as standard ■ option

Fieldbus options

Depending on the choice of application unit, various fieldbus options can be added as options.

Size	α	A, B, C	A, B, C, D	
Application unit type	**Standard**	**Basic**	**Standard**	**Functional safety**
Modbus RTU	■■	■■	■■	■■
CANopen	■		■	■
PROFIBUS			■	■
PROFINET			■	■
EtherCAT			■	■
Sercos III			■	■
Fieldbus address coding switch			■■ CANopen, PROFIBUS DP, Sercos III	

Housing versions and attachments

Size	α	A, B, C	A, B, C, D	
Application unit type	**Standard**	**Basic**	**Standard**	**Functional safety**
M12 plug for RS485	Accessories	■■	■■	■■

■■ available as standard ■ option

Functions and characteristics

Size	α	A, B, C	A, B, C, D	
Application unit type	**Standard**	**Basic**	**Standard**	**Functional safety**
PID control	■■	■■	■■	■■
Digital inputs	2	2	4	4
Digital outputs	1	1	2	2
Analogue inputs*	1	1	2	2
Analogue outputs			1	1
Hardware enable, digital	■■	■■	■■	
STO inputs				2
Digital input 5, quick stop SS1				■■
STO diagnosis relay				■■
24 V supply voltage	■■	■■	■■	■■
24 V feed-in for the control part card			■■	■■
10 V voltage supply	■■	■■	■■	■■
Relay	1		2	
Motor temperature evaluation	■■	■■	■■	■■

*can be configured as digital inputs

Power unit card options

	INVEOR sizes				
	α	A	B	C	D
Brake chopper		■	■	■	■
IT network	■				

■■ available as standard ■ option

Device sizes and standard configurations

The standard variants of the INVEOR M and INVEOR P drive controllers provide the basis for each device configuration and are shown in the following overviews. The complete device configuration comprises 9 items, which produce the complete order code.

Standard variants of INVEOR M

1.	2.	3.	4.	5.	6.	7.	8.	9.
INVEOR type	**Size**	**Supply voltage**	**Recommended motor rating**	**Power unit card configuration**	**Selection of application unit and fieldbus option**	**Housing configuration: Type of cooling / cable glands**	**Cover variant and operating option**	**Model**
INV M motor-mounted	**α**	**IV02** 230 V	**PW04** 0.75 kW	**LP01** without brake chopper	**AP12** standard version	**GH01** passive cooling type	**DK01** cover without foil keypad	**CO00** KOSTAL standard
INV M motor-mounted	**A**	**IV01** 400 V	**PW06** 1.5 kW	**LP01** without brake chopper	**AP01** standard version	**GH01** passive cooling type, potentiometer, standard cable glands	**DK01** cover without foil keypad	**CO00** KOSTAL standard
INV M motor-mounted	**B**	**IV01** 400 V	**PW09** 4.0 kW	**LP01** without brake chopper	**AP01** standard version	**GH01** passive cooling type, potentiometer, standard cable glands	**DK01** cover without foil keypad	**CO00** KOSTAL standard
INV M motor-mounted	**C**	**IV01** 400 V	**PW11** 7.5 kW	**LP01** without brake chopper	**AP01** standard version	**GH01** passive cooling type, potentiometer, standard cable glands	**DK01** cover without foil keypad	**CO00** KOSTAL standard
INV M motor-mounted	**D**	**IV01** 400 V	**PW15** 22.0 kW	**LP03** without brake chopper	**AP01** standard version	**GH06** active cooling type, potentiometer, standard cable glands	**DK01** cover without foil keypad	**CO00** KOSTAL standard

Standard variants for INVEOR P

1.	2.	3.	4.	5.	6.	7.	8.	9.
INVEOR type	**Size**	**Supply voltage**	**Recommended motor rating**	**Power unit card configuration**	**Selection of application unit and fieldbus option**	**Housing configuration: Type of cooling / cable glands**	**Cover variant and operating option**	**Model**
INV P Cold-Plate	**α**	**IV02** 230 V	**PW04** 0.75 kW	**LP01** without brake chopper	**AP12** standard version	**GH03** cold plate cooling type	**DK03** without cover	**CO00** KOSTAL standard
INV P Cold-Plate	**A**	**IV01** 400 V	**PW06** 1.5 kW	**LP01** without brake chopper	**AP01** standard version	**GH03** cold plate cooling type	**DK03** without cover	**CO00** KOSTAL standard
INV P Cold-Plate	**B**	**IV01** 400 V	**PW09** 4.0 kW	**LP01** without brake chopper	**AP01** standard version	**GH03** cold plate cooling type	**DK03** without cover	**CO00** KOSTAL standard
INV P Cold-Plate	**C**	**IV01** 400 V	**PW11** 7.5 kW	**LP01** without brake chopper	**AP01** standard version	**GH03** cold plate cooling type	**DK03** without cover	**CO00** KOSTAL standard
INV P Cold-Plate	**D**	**IV01** 400 V	**PW15** 22.0 kW	**LP03** without brake chopper	**AP01** standard version	**GH03** cold plate cooling type	**DK03** without cover	**CO00** KOSTAL standard

INVEOR

Order code


INVEOR

INVEOR
Order code

The INVEOR order code comprises a total of nine individual items. Each item determines one stage of the INVEOR configuration relating to the various device characteristics.

Item	Code	
1	INV x	**INVEOR type** motor-mounted or as Cold-Plate
2	x	**Size** α, A, B, C, D
3	IVxx	**Supply voltage** 230 V or 400 V
4	PWxx	**Recommended motor rating** 0.25 kW to 22 kW
5	LPxx	**Configuration of power unit** with and without brake chopper
6	APxx	**Configuration of the application unit** Input/output configuration, fieldbus or safety technology
7	GHxx	**Housing configuration** Cooling type, cable glands, potentiometer and attachments
8	DKxx	**Cover variant** and controls
9	COxx	**Model** Standard or special model

Here you can configure the INVEOR and enter the order code:

Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9

The configuration starts on page 29.
Please state this complete order code when ordering.

The route to your INVEOR

The route to your INVEOR configuration is illustrated below. For each of the 9 items, you make a configuration decision, producing one part of the order code. Together all 9 sub-codes produce your total order code, clearly defining your INVEOR.

Item 1:
INVEOR type


INVEOR P


INVEOR M

Item 2:
INVEOR size depending on motor rating


α A B C D

Item 3:
Supply voltage


400 V

230 V

Item 4:
Recommended motor rating

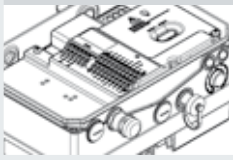
0.25 kW – 22.0 kW

Item 5:
Configuration of the power unit


Brake chopper

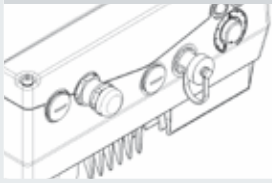
☐ Yes
☐ No

Item 6:
Selection of application unit and fieldbus option



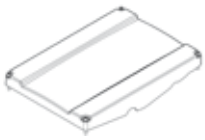
- Application-unit
- Fieldbus

Item 7:
Housing configuration



- Cable glands
- Cooling type

Item 8:
Choice of cover variant

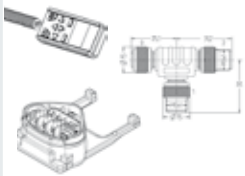


- Without controls
- Foil keypad
- MMI

Item 9:
Model

- KOSTAL standard
- Special model

Selection of accessories

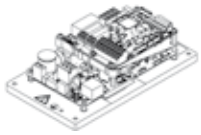


- Motor adaptation
- Operation and observation
- Communication
- Additional accessories

Configuration
INVEOR

Item 1: INVEOR type	INV x

Here a distinction is made between motor- and wall-mounted in IP65/55 and Cold-Plate with IP00.

INV M		**INVEOR** **motor- and wall-mounted**	INV M
INV P		**INVEOR Cold-Plate***	INV P

*INVEOR Cold-Plate only offers limited configuration options. Please note the colour coding on the following pages: **INV M** **INV P**

Item 2: INVEOR size depending on motor rating	x

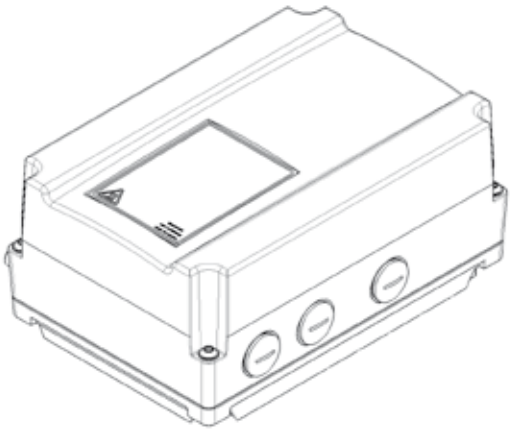
The motor rating is key to the choice of size.
Please select the power range into which your motor rating falls.

Size selection

	Motor rating	Size	Go to page
	**0.25 kW – 0.75 kW** →	α	30
	**0.37 kW – 1.5 kW** →	A	32
	**2.2 kW – 4.0 kW** →	B	34
	**5.5 kW – 7.5 kW** →	C	36
	**11.0 kW – 22.0 kW** →	D	38

Other configuration points depend on the size and are listed on the following pages.

Configuration
INVEOR α



Item 3: Supply voltage — IVxx

Selection of supply voltage

INV M	INV P		
		1 x 100 VAC -15%...230 VAC +10%	**IV02**

Item 4: Recommended motor rating — PWxx

Selection of power class depending on INVEOR type

INV M		**0.25 kW**	**PW01**
		0.37 kW	**PW02**
		0.55 kW	**PW03**
	INV P	**0.75 kW**	**PW04**

⚠ Recommended motor rating (4-pole asynchr. motor) is given based on the 230 VAC supply voltage.

Item 5: Configuration of the power unit — LPxx

Selection of power stack

INV M	INV P		
		Standard	**LP01**
		IT network	**LP07**

⚠ INVEOR α without brake chopper option

Item 6: Configuration of the application unit — APxx

Selection of the application unit

INV M	INV P		
		Standard 2 DI | 1 DO | 1 AI | 1 relay	**AP12**
		Standard + CANopen 2 DI | 1 DO | 1 AI | 1 relay	**AP13**

Details on **page 21 and page 22**

Item 7: Housing configuration — GHxx

Selection of housing type depending on INVEOR type

INV M	INV P		
		Passive cooling type for power of between 0.25 and 0.37 kW	GH11
		Passive cooling type (ribbed) for power of between 0.55 and 0.75 kW	GH10
		Cold plate in IP00 cooling type	GH03

⚠ Please remember that an adapter plate is needed for each device.
Details on **page 48 / 49**

Item 8: Cover variant — DKxx

Selection of cover model depending on INVEOR type

INV M	INV P		
		Cover without foil keypad	DK01
		Cover with foil keypad	DK04
		Without cover (only for INV P)	DK03

Details on **page 20**

Item 9: Model — COxx

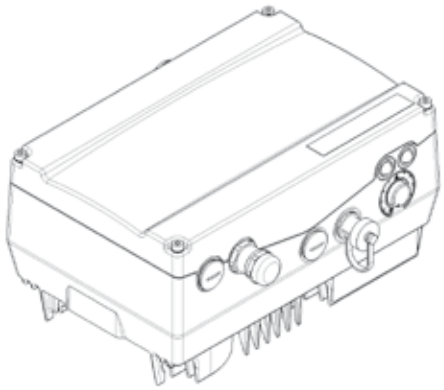
Selection of standard or special model

INV M	INV P		
		KOSTAL standard	CO00

⚠ For models with a customer label, please get in touch with your KOSTAL contact.

Accessoires for α size can be found on page 55

Configuration
INVEOR A
(0.37 – 1.5 kW)



Item 3: Supply voltage — IVxx

Selection of supply voltage

INV M	INV P		
		3 x 200 VAC -10%...480 VAC +10%	IV01
		1 x 100 VAC -15%...230 VAC +10%	IV02

Item 4: Recommended motor rating — PWxx

Selection of power class depending on INVEOR type and supply voltage

INV M				
		1 x 230 VAC	0.37 kW	PW02
		1 x 230 VAC	0.55 kW	PW03
		3 x 400 VAC		
		1 x 230 VAC	0.75 kW	PW04
		3 x 400 VAC		
	P	1 x 230 VAC	1.10 kW	PW05
		3 x 400 VAC		
	INV P	3 x 400 VAC	1.50 kW	PW06

⚠ Recommended motor rating (4-pole asynchr. motor) is given based on the 230 VAC or 400 VAC supply voltage.

Item 5: Configuration of the power unit — LPxx

Selection of power stack and brake chopper

INV M	INV P		
		Without brake chopper	LP01
		With brake chopper	LP02

Item 6: Configuration of the application unit — APxx

Selection of application unit depending on INVEOR type

INV M	INV P		
		Standard 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP01
		Basic 2 DI | 1 DO | 1 AI	AP03
		Standard + PROFIBUS 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP16
		Standard + CANopen 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP05

INV M	INV P	**Standard + EtherCAT** 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP06
		Standard + PROFINET 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP09
		Standard + Sercos III 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP14
		Functional safety (only with IV01) 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP10
		Functional safety + PROFIBUS (only with IV01) 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP25
		Functional safety + CANopen (only with IV01) 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP21
		Functional safety + EtherCAT (only with IV01) 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP22
		Functional safety + PROFINET (only with IV01) 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP23
		Functional safety + Sercos III (only with IV01) 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP24

Details on **page 21 and page 22**

Item 7: Housing configuration — GHxx

Selection of housing type depending on INVEOR type

INV M		**Passive cooling type, potentiometer, standard cable glands**	GH01
		Passive cooling type, standard cable glands	GH02
	INV P	**Cold plate in IP00 cooling type**	GH03

⚠ Please remember that an adapter plate is needed for each device.
Details on **page 48 / 49**

Item 8: Cover variant — DKxx

Selection of cover model depending on INVEOR type

INV M		**Cover without controls**	DK01
		Cover with foil keypad and potentiometer (only with GH02)	DK02
		Cover with integrated MMI	DK05
	INV P	**Without cover**	DK03

Details on **page 20**

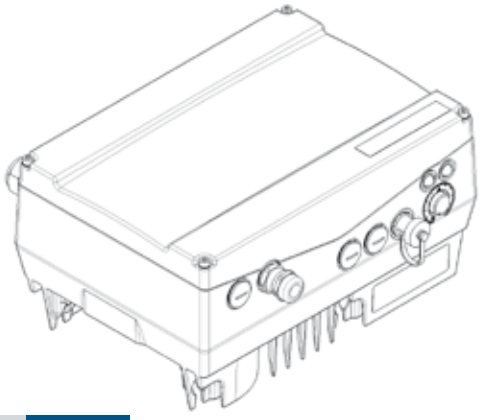
Item 9: Model — COxx

Selection of standard or special model

INV M	INV P	**KOSTAL standard**	CO00

⚠ For models with a customer label, please get in touch with your KOSTAL contact.

Configuration
INVEOR B
(2.2 – 4.0 kW)



Item 3: Supply voltage — IVxx

Selection of supply voltage

INV M	INV P		
		3 x 200 VAC -10%...480 VAC +10%	**IV01**

Item 4: Recommended motor rating — PWxx

Selection of power class depending on INVEOR type

INV M	INV P		
		2.20 kW	**PW07**
		3.00 kW	**PW08**
		4.00 kW	**PW09**

⚠ Recommended motor rating (4-pole asynchr. motor) is given based on the 400 VAC supply voltage.

Item 5: Configuration of the power unit — LPxx

Selection of power stack and brake chopper

INV M	INV P		
		Without brake chopper	**LP01**
		With brake chopper	**LP02**

Item 6: Configuration of the application unit — APxx

Selection of application unit depending on INVEOR type

INV M	INV P		
		Standard 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	**AP01**
		Basic 2 DI | 1 DO | 1 AI	**AP03**
		Standard + PROFIBUS 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	**AP16**
		Standard + CANopen 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	**AP05**
		Standard + EtherCAT 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	**AP06**
		Standard + PROFINET 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	**AP09**

INV M	INV P	**Standard + Sercos III** 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP14
		Functional safety 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP10
		Functional safety + PROFIBUS 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP25
		Functional safety + CANopen 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP21
		Functional safety + EtherCAT 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP22
		Functional safety + PROFINET 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP23
		Functional safety + Sercos III 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP24

Details on **page 21 and page 22**

Item 7: Housing configuration — GHxx

Selection of housing type depending on INVEOR type

INV M		**Passive cooling type, potentiometer, standard cable glands**	GH01
		Passive cooling type, standard cable glands	GH02
	INV P	**Cold plate in IP00 cooling type**	GH03

⚠ Please remember that an adapter plate is needed for each device.
Details on **page 48 / 49**

Item 8: Cover variant — DKxx

Selection of cover model depending on INVEOR type

INV M		**Cover without controls**	DK01
		Cover with foil keypad and potentiometer (only with GH02)	DK02
		Cover with integrated MMI	DK05
	INV P	**Without cover**	DK03

Details on **page 20**

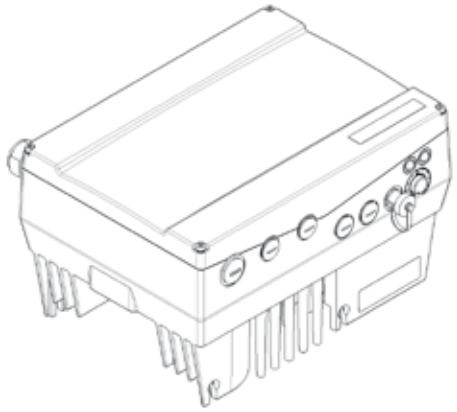
Item 9: Model — COxx

Selection of standard or special model

INV M	INV P	**KOSTAL standard**	CO00

⚠ For models with a customer label, please get in touch with your KOSTAL contact.

Configuration
INVEOR C
(5.5 – 7.5 kW)



Item 3: Supply voltage — IVxx

Selection of supply voltage

INV M	INV P		
		3 x 200 VAC -10%...480 VAC +10%	**IV01**

Item 4: Recommended motor rating — PWxx

Selection of power class depending on INVEOR type

INV M			
		5.50 kW	**PW10**
	INV P	**7.50 kW**	**PW11**

⚠ Recommended motor rating (4-pole asynchr. motor) is given based on the 400 VAC supply voltage.

Item 5: Configuration of the power unit — LPxx

Selection of power stack and brake chopper

INV M	INV P		
		Without brake chopper	**LP01**
		With brake chopper	**LP04**

Item 6: Configuration of the application unit — APxx

Selection of application unit depending on INVEOR type

INV M	INV P		
		Standard 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	**AP01**
		Basic 2 DI | 1 DO | 1 AI	**AP03**
		Standard + PROFIBUS 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	**AP16**
		Standard + CANopen 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	**AP05**
		Standard + EtherCAT 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	**AP06**
		Standard + PROFINET 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	**AP09**

INV M	INV P	**Standard + Sercos III** 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP14
		Functional safety 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP10
		Functional safety + PROFIBUS 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP25
		Functional safety + CANopen 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP21
		Functional safety + EtherCAT 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP22
		Functional safety + PROFINET 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP23
		Functional safety + Sercos III 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP24

Details on **page 21 and page 22**

Item 7: Housing configuration — GHxx

Selection of housing type depending on INVEOR type

INV M		**Passive cooling type, potentiometer, standard cable glands**	GH01
		Passive cooling type, standard cable glands	GH02
	INV P	**Cold plate in IP00 cooling type**	GH03

⚠ Please remember that an adapter plate is needed for each device.
Details on **page 48 / 49**

Item 8: Cover variant — DKxx

Selection of cover model depending on INVEOR type

INV M		**Cover without controls**	DK01
		Cover with foil keypad and potentiometer (only with GH02)	DK02
		Cover with integrated MMI	DK05
	INV P	**Without cover**	DK03

Details on **page 20**

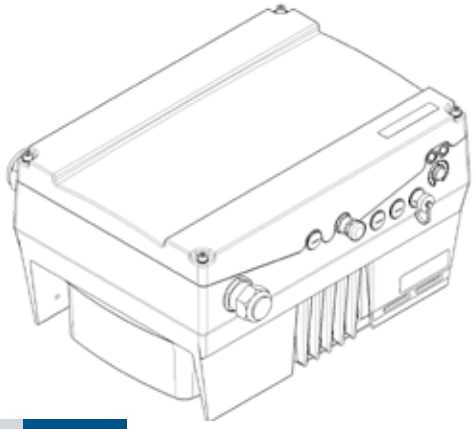
Item 9: Model — COxx

Selection of standard or special model

INV M	INV P	**KOSTAL standard**	CO00

⚠ For models with a customer label, please get in touch with your KOSTAL contact.

Configuration
INVEOR D
(11 – 22 kW)



Item 3: Supply voltage — IVxx

Selection of supply voltage

INV M	INV P		
		3 x 200 VAC -10%...480 VAC +10%	IV01

Item 4: Recommended motor rating — PWxx

Selection of power class depending on INVEOR type

INV M			
		11.00 kW	PW12
	INV P	15.00 kW	PW13
		18.50 kW	PW14
	INV P	22.00 kW	PW15

⚠ Recommended motor rating (4-pole asynchr. motor) is given based on the 400 VAC supply voltage.

Item 5: Configuration of the power unit — LPxx

Selection of power stack and brake chopper

INV M	INV P		
		Without brake chopper	LP03
		With brake chopper	LP04

Item 6: Configuration of the application unit — APxx

Selection of application unit depending on INVEOR type

INV M	INV P		
		Standard 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP01
		Standard + PROFIBUS 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP16
		Standard + CANopen 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP05
		Standard + EtherCAT 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP06
		Standard + PROFINET 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP09
		Standard + Sercos III 4 DI | 2 DO | 2 AI | 1 AO | 2 relays	AP14

INV M		**Functional safety** 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP10
		Functional safety + PROFIBUS 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP25
		Functional safety + CANopen 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP21
		Functional safety + EtherCAT 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP22
		Functional safety + PROFINET 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP23
		Functional safety + Sercos III 2 STO inputs | 4 DI | 2 DO | 2 AI | 1 AO	AP24

Details on **page 21 and page 22**

Item 7: Housing configuration — GHxx

Selection of housing type depending on INVEOR type

INV M		**Active cooling type, potentiometer, standard cable glands**	GH06
		Active cooling type, standard cable glands	GH09
	INV P	**Cold plate in IP00 cooling type**	GH03

⚠ Please remember that an adapter plate is needed for each device.
Details on **page 48 / 49**

Item 8: Cover variant — DKxx

Selection of cover model depending on INVEOR type

INV M		**Cover without controls**	DK01
		Cover with foil keypad and potentiometer (only with GH09)	DK02
		Cover with integrated MMI	DK05
	INV P	**Without cover**	DK03

Details on **page 20**

Item 9: Model — COxx

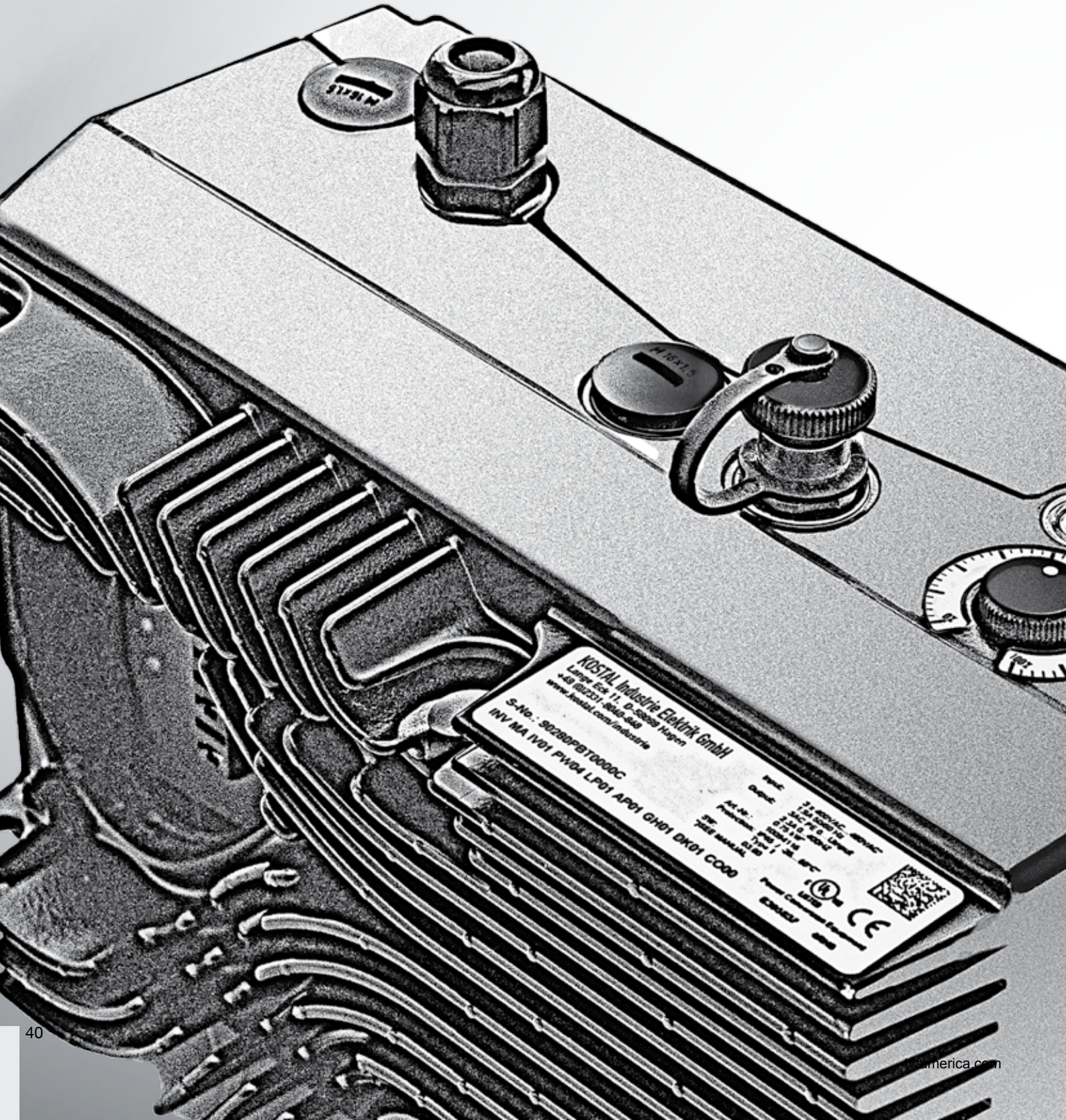
Selection of standard or special model

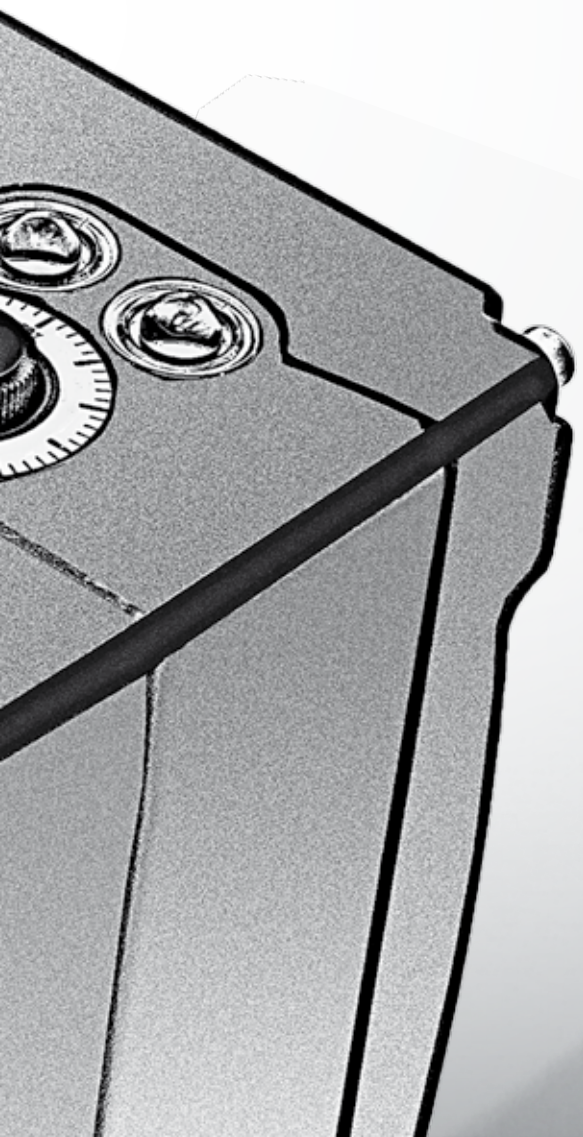
INV M	INV P	**KOSTAL standard**	CO00

⚠ For models with a customer label, please get in touch with your KOSTAL contact.

INVEOR

Technical data





230 V devices, technical data for INVEOR M

	Size	α				A			
Electrical data	Recommended motor rating[1] [kW]	0.25	0.37	0.55	0.75	0.37	0.55	0.75	1.1
	Grid voltage	1 x 100 VAC -15 %...230 VAC +10 % 140 VDC -15 %...320 VDC +10 %							
	Grid frequency	50/60 Hz ± 6%							
	Mains configurations	TN / TT / IT (option)				TN / TT			
	Line current [A]	4.5	4.5	5.8	7.3	4.5	5.6	6.9	9.2
	Rated current output eff. [IN at 8 kHz]	1.4	2.2	2.7	3.3	2.3	3.2	3.9	5.2
	Min. brake resistance [Ω]	-				50			
	Overload for 60 sec.	150 %							
	Switching frequency	4 kHz, 8 kHz, 16 kHz, (factory setting 8 kHz)							
	Output frequency	0 Hz – 400 Hz							
	Mains cycles of operation / restart	Every 2 min.							
	DIN EN 61800-5 touch current	< 10 mA[2]							
Functions	Protective function	Overvoltage and undervoltage, I^2t restriction, short-circuit, ground leak, motor and drive controller temperature, stall prevention, blocking detection, PID dry run protection							
	Software functions	Process control (PID controller), fixed frequencies, data record changeover, flying restart, motor current limit							
	Soft PLC	IEC61131-3, FBD, ST, AWL							
Mechanical data	Housing	Plastic adapter plate / aluminium die-cast casing				Two-part aluminium die-cast casing			
	Dimensions [L x W x H] mm	187 x 126 x 70		187 x 126 x 80		233 x 153 x 120			
	Weight including adapter plate	1.5 kg				3.9 kg			
	Protection class [IPxy]	IP 65							
	Cooling	Passive cooling							
Environmental conditions	Ambient temperature	-10 °C (non-condensing) to +40 °C (50 °C with derating)							
	Storage temperature	-25 °C…+85 °C							
	Altitude of the installation location	Up to 1000 m above sea level / over 1000 m with reduced performance (1 % per 100 m) / above 2000 m see operating manual							
	Relative air humidity	≤ 96 %, condensation not permitted.							
	Vibration resistance (DIN EN 60068-2-6)	50 m/s²; 5…200 Hz[3]							
	Shock resistance (DIN EN 60068-2-27)	300 m/s²							
	EMC (DIN-EN-61800-3)	C2				C1			
	Certificates and conformity	RoHS 2011/65/EU		CE		cULus LISTED			

Technical data for 230 V devices INVEOR M (subject to technical changes)
[1] Recommended motor rating (4-pole asynchr. motor) is given based on the 230 VAC supply voltage.
[2] With 1LA7 asynchronous motor, motor-mounted
[3] Combined vibration test, part 4, severity 2 in accordance with FN942017

400 V devices, technical data for INVEOR M

	Sizes	A				B			C		D			
Electrical data	Recommended motor rating[1] [kW]	0.55	0.75	1.1	1.5	2.2	3.0	4.0	5.5	7.5	11.0	15.0	18.5	22.0
	Grid voltage	3 x 200 VAC -10 %...480 VAC +10 % 280 VDC -10 %...680 VDC +10 %												
	Grid frequency	50/60 Hz ± 6 %												
	Mains configurations	TN / TT												
	Line current [A]	1.4	1.9	2.6	3.3	4.6	6.2	7.9	10.8	14.8	23.2	28.2	33.2	39.8
	Rated current output eff. [IN at 8 kHz]	1.7	2.3	3.1	4.0	5.6	7.5	9.5	13.0	17.8	28.0	34.0	40.0	48.0
	Min. brake resistance [Ω]	100				50			50		30			
	Overload for 60 sec. in %	150												130
	Switching frequency	4 kHz, 8 kHz, 16 kHz, (factory setting 8 kHz)												
	Output frequency	0 Hz – 400 Hz												
	Mains cycles of operation / restart	Unlimited									2 min.			
	DIN EN 61800-5 touch current	< 3.5 mA[2]												
Functions	Protective function	Overvoltage and undervoltage, I^2t restriction, short circuit, ground leak, motor and drive controller temperature, stall prevention, blocking detection, PID dry run protection												
	Software functions	Process control (PID controller), fixed frequencies, data record changeover, flying restart, motor current limit												
	Soft PLC	IEC61131-3, FBD, ST, AWL												
Mechanical data	Housing	Two-part aluminium die-cast casing												
	Dimensions [L x W x H] mm	233 x 153 x 120				270 x 189 x 140			307 x 223 x181		414 x 294 x 232			
	Weight including adapter plate	3.9 kg				5.0 kg			8.7 kg		21.0 kg			
	Protection class	IP 65									IP 55			
	Cooling	Passive cooling									Active cooling			
Environmental conditions	Ambient temperature	-25 °C (non-condensing) to + 50 °C (without derating)												
	Storage temperature	-25 °C…+85 °C												
	Altitude of the installation location	Up to 1000 m above sea level / over 1000 m with reduced performance (1 % per 100 m) / above 2000 m see operating manual												
	Relative air humidity	≤ 96 %, condensation not permitted.												
	Vibration resistance (DIN EN 60068-2-6)	50 m/s²; 5…200 Hz[3]												
	Shock resistance (DIN EN 60068-2-27)	300 m/s²												
	EMC (DIN-EN-61800-3)	C2												
	Certificates and conformity	RoHS 2011/65/EU				CE			cULus LISTED					

Technical data for 400 V devices INVEOR M (subject to technical changes)
[1] Recommended motor rating (4-pole asynchr. motor) is given based on the 400 VAC supply voltage.
[2] With 1LA7 asynchronous motor, motor-mounted
[3] Combined vibration test, part 4, severity 2 in accordance with FN942017

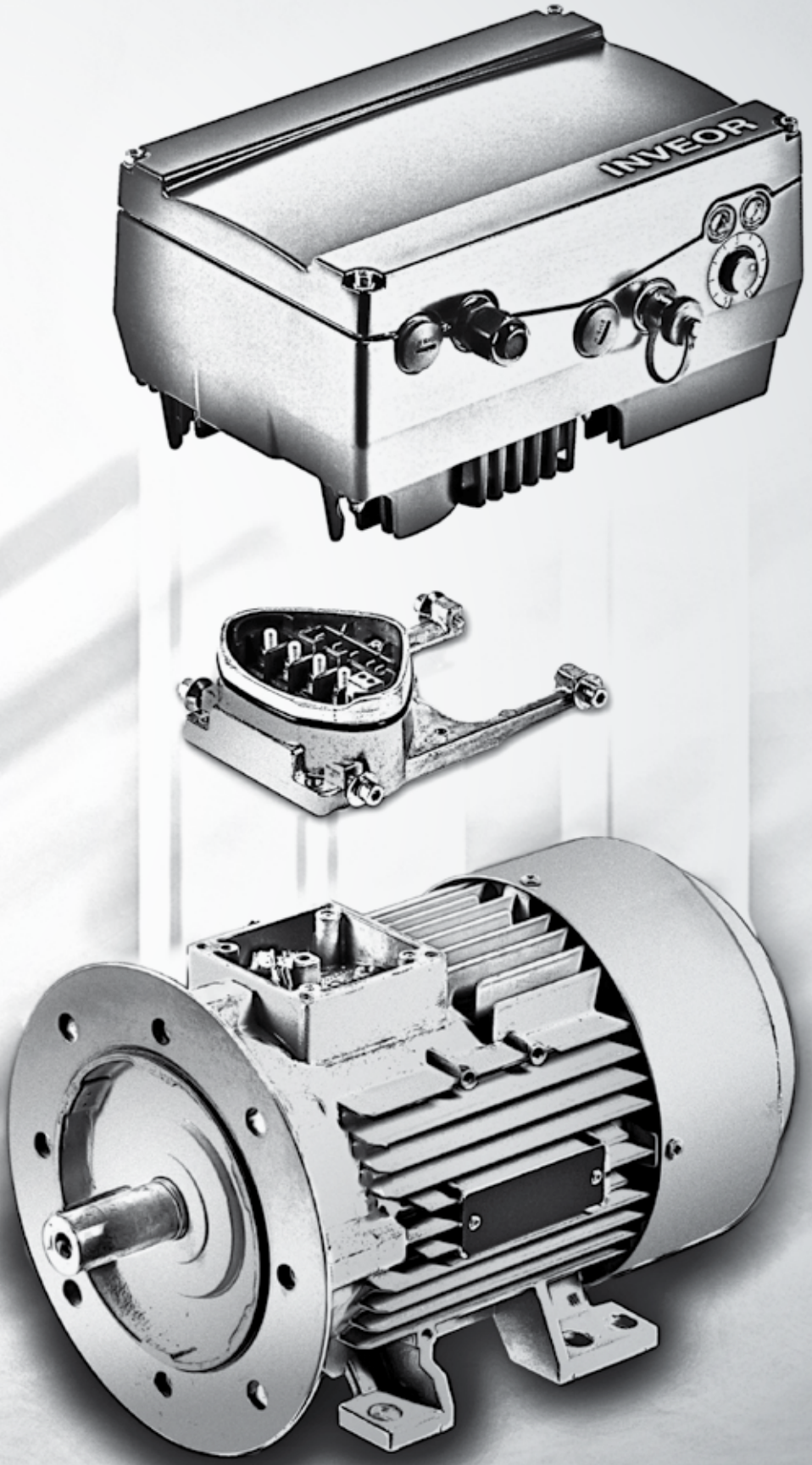
400 V and 230 V devices, technical data for INVEOR P

	Size	230 V		400 V				
		α	A	A	B	C	D	D
Electrical data	Recommended motor rating[1] [KW]	0.75	1.1	1.5	4.0	7.5	15.0	22.0
	Supply voltage [V]	1 x 100 VAC -15 % … 230 VAC +10 % 140 VDC -15 % … 220 VDC +10 %		3 x 200 VAC -10 %…480 VAC +10 % 280 VDC -10 %…680 VDC +10 %				
	Grid frequency [Hz]	50 Hz / 60 Hz ± 6 %						
	Mains configurations	TN / TT, IT (option)		TN / TT				
	Line current [A]	7.3	9.2	3.3	7.9	14.8	28.2	39.8
	Rated current output eff. [IN at 8 kHz]	3.3	5.2	4.0	9.5	17.8	34.0	48.0
	Min. brake resistance [Ω]	-	50	100	50	50	30	
	Overload for 60 sec	150 %						130 %
	Switching frequency	4 kHz, 8 kHz, 16 kHz, (factory setting 8 kHz)						
	Output frequency	0 Hz – 400 Hz						
	Mains cycles of operation / restart	Every 2 min.		Unlimited			Every 2 min.	
	DIN EN 61800-5 touch current	< 10 mA[2]		< 3.5 mA[2]				
Functions	Protective function	Overvoltage and undervoltage, I^2t restriction, short-circuit, ground leak, motor and drive controller temperature, stall prevention, blocking detection, PID dry run protection						
	Software functions	Process control (PID controller), fixed frequencies, data record changeover, flying restart, motor current limit						
	Soft PLC	IEC61131-3, FBD, ST, AWL						
Mech. data	Dimensions [L x W x H] mm	210x120x71	261.5x150x 82.9	261.5x150x 82.9	300x185x 83.3	330x220x91	343x270x113	
	Weight including cooling plate [kg]	1.6	2.2	2.2	2.9	4.2	6.5	
	Protection class [IPxy]	IP 00 (type of protection is determined by the final application)						
Environmental conditions	Ambient temperature [°C]	-10 °C (non-condensing) to +40 °C (50 °C with derating)		-25 °C (non-condensing) to +50 °C (without derating)			-25 °C (non-condensing) to +40 °C (without derating)	
	Storage temperature	-25 °C…+85 °C						
	Altitude of the installation location	Up to 1000 m above sea level / over 1000 m with reduced performance (1 % per 100 m) / above 2000 m see operating manual						
	Relative air humidity	≤ 96 %, condensation not permitted.						
	Vibration resistance (DIN EN 60068-2-6)	10 m/s²; 5…200 Hz[3]						
	Shock resistance (DIN EN 60068-2-27)	300 m/s²						
	EMC (DIN-EN-61800-3) prepared for	C2	C1	C2				
	Certificates and conformity	RoHS 2011/65/EU						

Technical data for 230 V and 400 V devices INVEOR P (subject to technical changes)
[1] Recommended motor rating (4-pole asynchr. motor) for single-phase and three-phase devices is given based on the 230 VAC and 400 VAC supply voltage.
[2] With 1LA7 asynchronous motor, motor-mounted
[3] Combined vibration test, part 4, severity 2 in accordance with FN942017

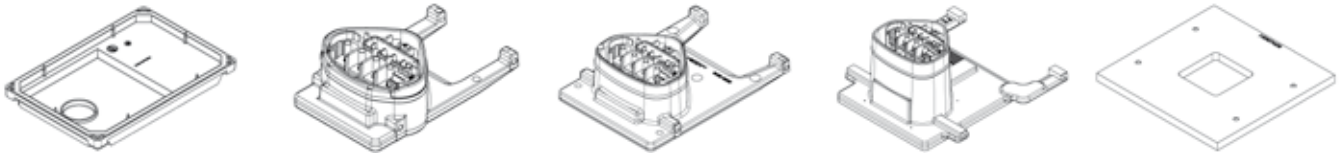
INVEOR

Accessories


INVEOR

Motor adaptations

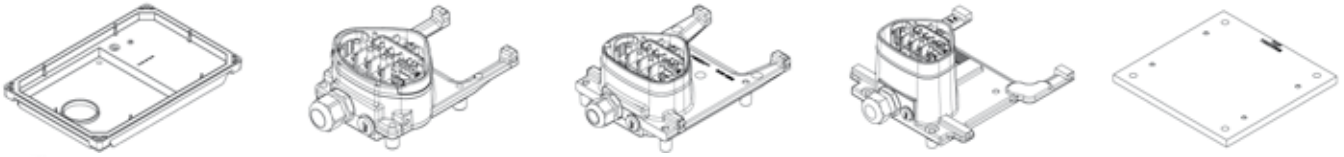
Thanks to the innovative adapter plate concept, the INVEOR drive controller is compatible with virtually all motors. With the standard adapter plates without holes, customers can flexibly produce hole patterns to suit their needs themselves. There are also pre-drilled adapter plates for many motor models. Wall mounting plates are available for mounting close to the motor.



Standard adapter plates (ADP)

Motor size											
63	71	80	90	100	112	132	160	180	INVEOR size	Hole pattern	Art. no.
dependent on motor									α	freely selectable*	10117052
									A	freely selectable*	10108906
									B	freely selectable*	10026184
									C	freely selectable*	10025632
									D	freely selectable*	10098202

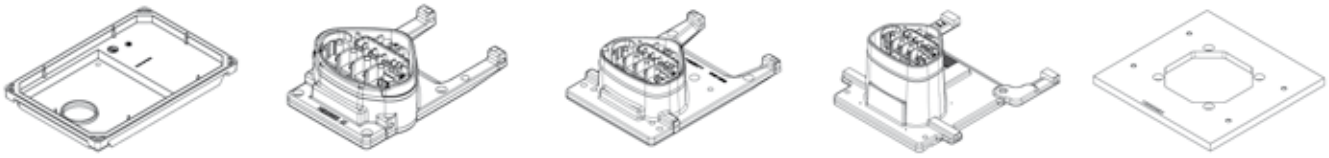
*The hole pattern is produced by the customer and can therefore be flexibly adapted to the motor



Adapter plates for wall mounting

Motor size										
63	71	80	90	100	112	132	160	180	INVEOR size	Art. no.
not dependent on motor									α	10117051
									A	10023107
									B	10026185
									C	10025932
									D	10098170

⚠ Please refer to your KOSTAL contact partner regarding precise lot sizes of individual accompanying items. The illustration may deviate from the original.



Adapter plate for motors 1LA7 / 1LA9

Motor size												
63	71	80	90	100	112	132	160	180	INVEOR size	Hole pattern [mm] Terminal box holder	Thread	Art. no.
■	■	■	■						α	51x51	M4	10117056
■	■	■	■						A	64x64	M4	10023843
■	■	■	■						B	64x64	M4	10114861
				■	■				B	105x105	M5	10091120
				■	■				C	105x105	M5	10106344
						■			C	125x125	M5	10025933
						■			D	125x125	M5	10107137
							■		D	150x150	M5	10101828

Adapter plate for motors 1LE1…1

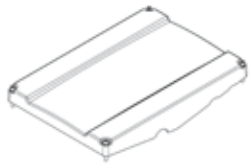
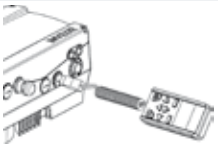
Motor size												
63	71	80	90	100	112	132	160	180	INVEOR size	Hole pattern [mm] Terminal box holder	Thread	Art. no.
		■	■						α	47x22	M4	10117054
		■	■						A	47x22	M4	10112586
				■	■				B	75x75	M4	10096094
				■	■				C	75x75	M4	10108013
						■			C	90x90	M4	10096099
						■			D	90x90	M4	10098193
							■		D	100x100	M5	10101827

Adapter plate for motors FCA

Motor size												
63	71	80	90	100	112	132	160	180	INVEOR size	Hole pattern [mm] Terminal box holder	Thread	Art. no. ADP
■	■	■							A	54x54	M5	10112914
			■	■					A	60x60	M5	10112915
			■	■					B	60x60	M5	10112916
					■	■			B	68x68	M5	10112918
					■	■			C	68x68	M5	10112921
							■	■	D	102x102	M6	10130526

⚠ Please refer to your KOSTAL contact partner regarding precise lot sizes of individual accompanying items. The illustration may deviate from the original.

Operation and observation

	Description	Article number
	**INVEOR cover size A** without label, including cover screws, ZUB MA DECKEL .- 0 1	10116057
	INVEOR cover size B without label, including cover screws, ZUB MB DECKEL .- 0 1	10116058
	INVEOR cover size C without label, including cover screws, ZUB MC DECKEL .- 0 1	10116059
	INVEOR cover size D without label, including cover screws, ZUB MD DECKEL .- 0 1	10116060
	**INVEOR cover size A with foil keypad + potentiometer** without label, neutral foil keypad, including cover screws ZUB MA COVER FOIL .- 0 1	10116583
	INVEOR cover size B with foil keypad + potentiometer without label, neutral foil keypad, including cover screws ZUB MB COVER FOIL .- 0 1	10116584
	INVEOR cover size C with foil keypad + potentiometer without label, neutral foil keypad, including cover screws ZUB MC COVER FOIL .- 0 1	10116585
	INVEOR cover size D with foil keypad + potentiometer without label, neutral foil keypad, including cover screws ZUB MD COVER FOIL .- 0 1	10116586
	**INVEOR cover size A with integrated MMI** without label, including cover screws INVZUB A RP/COV/MMI/-	10174751
	INVEOR cover size B with integrated MMI without label, including cover screws INVZUB B RP/COV/MMI/-	10174752
	INVEOR cover size C with integrated MMI without label, including cover screws INVZUB C RP/COV/MMI/-	10174753
	INVEOR cover size D with integrated MMI without label, including cover screws INVZUB D RP/COV/MMI/-	10174754
	**MMI handheld controller** including 3 m connection cable RJ9 on M12 plug ZUB M- MMI .S00 000 1	10004768
	**Programming and diagnosis cable 2 m** for PC, USB on M12 plug, RS485 with integrated converter ZUB M- LEITUNG PC .- 000 1	10023950
	**INVEOR PC software**	www.kostal-industrie-elektrik.com
	**Touch operating terminal SC103** 3.5", colour, incl. RTC and RS485 SAS interface P SC1030101, 3.5"	10266305
	**Touch operating terminal SC107** 7", colour, incl. RTC and RS485 SAS interface P SC107A 0111, 7"	10266309

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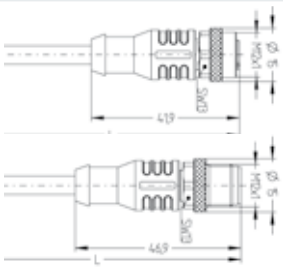
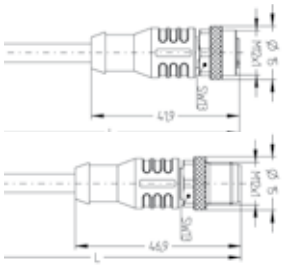
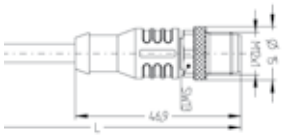
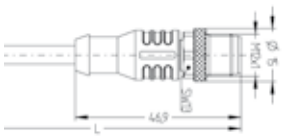
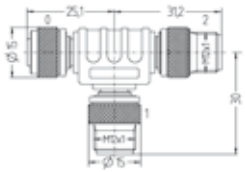
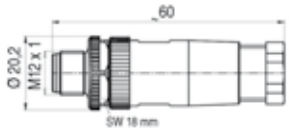
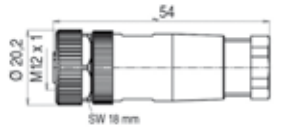
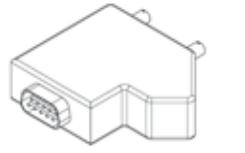
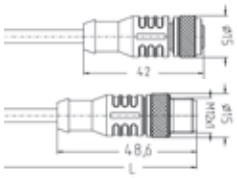
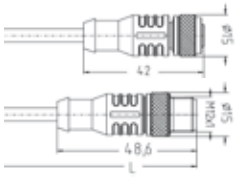
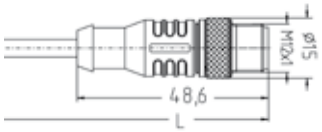
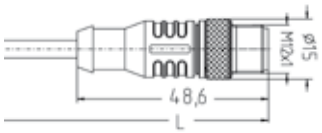
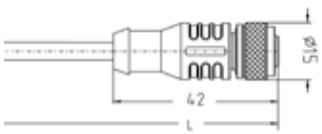
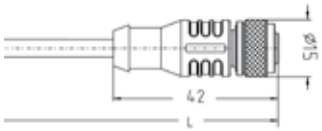
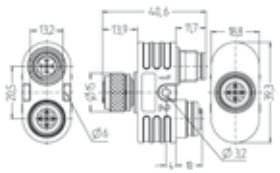
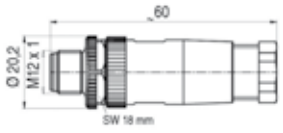
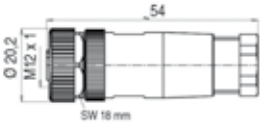
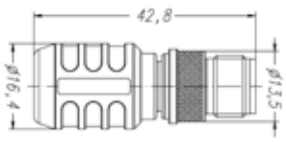
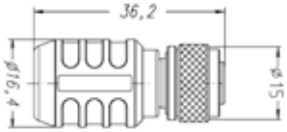
Communication – fieldbus components

RS485 fieldbus components

	Description	Article number
	**M12 connecting cable 2 m** M12 plug on M12 coupling / RS485 / 4-pin / 2 m / A-coded P AL-WAK4-m-AL_8044041	10272382
	**M12 connecting cable 5 m** M12 plug on M12 coupling / RS485 / 4-pin / 5 m / A-coded P AL-WAK4-m-AL-WAS4/S37080	10272793
	**M12 connection cable open 2 m** M12 plug / open / RS485 / 4-pin / 2 m / A-coded P AL-WAS4-m/S370 8043817	10272795
	**M12 connection cable open 10 m** M12 plug / open / RS485 / 4-pin / 10 m / A-coded P AL-WAS4-m/S370 8043819	10272794
	**M12 T splitter** M12 plug on plug and socket / RS485 / 4-pin / A-coded J FKM4-FSM4-FSM4, 8008139	10272829
	**M12 plug can be self-assembled** M12 plug / RS485 / 4-pin / A-coded INVZUB - L/CF/RS/M12M/- /- /A/	10137294
	**M12 coupling can be self-assembled** M12 coupling / RS485 / 4-pin / A-coded P WAKC4K 8004811	10272796
	**D-SUB bus plug** D-SUB bus plug with screw connection, RS485, 9-pin J SUBCON 9/M-SH, 2761509	10272797

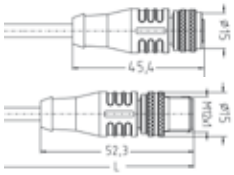
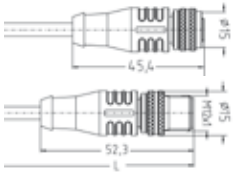
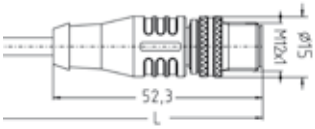
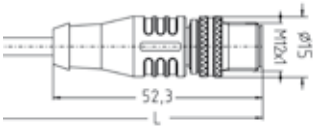
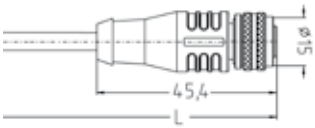
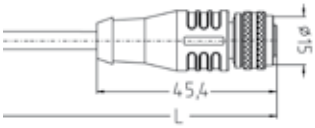
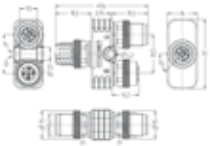
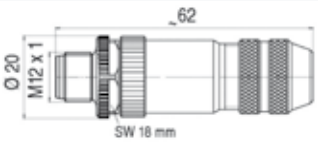
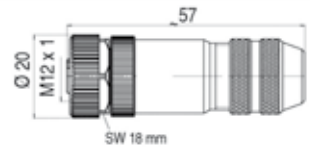
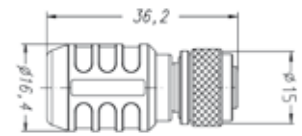
⚠ Please refer to your KOSTAL contact partner regarding precise lot sizes of individual accompanying items. The illustration may deviate from the original.

CANopen fieldbus components

	Description	Article number
	**M12 connecting cable 2 m** M12 plug on M12 coupling / CANopen / 5-pin / 2 m / A-coded INVZUB - L/CL/CO/M12M/M12F/2m /A/-	10138812
	**M12 connecting cable 5 m** M12 plug on M12 coupling / CANopen / 5-pin / 5 m / A-coded INVZUB - L/CL/CO/M12M/M12F/5m /A/-	10138813
	**M12 connection cable open 2 m** M12 plug / open / CANopen / 5-pin / 2 m / A-coded INVZUB - L/CL/CO/M12M/OPEN/2m /A/-	10138804
	**M12 connection cable open 10 m** M12 plug / open / CANopen / 5-pin / 10 m / A-coded INVZUB - L/CL/CO/M12M/OPEN/10m /A/-	10138806
	**M12 connection cable open 2 m** M12 coupling / open / CANopen / 5-pin / 2 m / A-coded INVZUB - L/CL/CO/M12F/OPEN/2m /A/-	10138807
	**M12 connection cable open 10 m** M12 coupling / open / CANopen / 5-pin / 10 m / A-coded INVZUB - L/CL/CO/M12F/OPEN/10m /A/-	10138809
	**M12 Y splitter** M12 coupling on plug and coupling / CANopen / 5-pin / A-coded INVZUB - L/YD/CO/M12M/M12F/- /A/-	10138791
	**M12 plug can be self-assembled** M12 plug / CANopen / 5-pin / A-coded INVZUB - L/CF/CO/M12M/- /- /A/-	10138799
	**Coupling can be self-assembled** M12 coupling / CANopen / 5-pin / A-coded INVZUB - L/CF/CO/M12F/- /- /A/-	10138801
	**M12 terminating resistor** M12 plug / CANopen / 5-pin / A-coded INVZUB - L/TE/CO/M12M/- /- /A/-	10138792
	**M12 terminating resistor** M12 coupling / CANopen / 5-pin / A-coded INVZUB - L/TE/CO/M12F/- /- /A/-	10138793

⚠ Please refer to your KOSTAL contact partner regarding precise lot sizes of individual accompanying items. The illustration may deviate from the original.

PROFIBUS fieldbus components

	Description	Article number
	**M12 connecting cable 2 m** M12 plug on M12 coupling / PROFIBUS / 5-pin / 2 m / B-coded / colour: purple P PB-WASSW2.012/S180080438	10272791
	**M12 connecting cable 5 m** M12 plug on M12 coupling / PROFIBUS / 5-pin / 5 m / B-coded / colour: purple P PB-WASSW2.012/S1800 8043	10272792
	**M12 connection cable open 2 m** M12 plug / open / PROFIBUS / 5-pin / 2 m / B-coded / colour: purple P PB-WASSW2.012-m/S1800 80	10272786
	**M12 connection cable open 10 m** M12 plug / open / PROFIBUS / 5-pin / 10 m / B-coded / colour: purple PB-WASSW2.012-m/S1800 80	10272789
	**M12 connection cable open 2 m** M12 coupling / open / PROFIBUS / 5-pin / 2 m / B-coded / colour: purple P PB-WAKSW2.012-m/S1800804	10272790
	**M12 connection cable open 10 m** M12 coupling / open / PROFIBUS / 5-pin / 10 m / B-coded / colour: purple P PB-WAKSW2.012-m/S18000	10272385
	**M12 Y splitter** M12 plug on coupling and plug / PROFIBUS / 5-pin / B-coded P Profibus Y-piece 0798540	10272780
	**M12 plug can be self-assembled** M12 plug / PROFIBUS / 5-pin / A-coded P PB-WASCSW4.5K 8031375	10272785
	**M12 coupling can be self-assembled** M12 coupling / PROFIBUS / 5-pin / B-coded P PB-WAKCSW4.5K 8031376	10272387
	**M12 terminating resistor** M12 plug / PROFIBUS / 5-pin / A-coded P PB-WASSW4.5-AS 8043520	10272784

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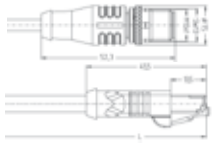
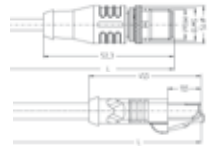
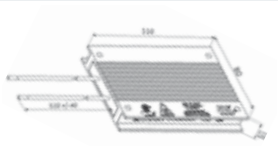
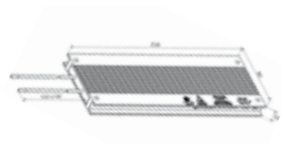
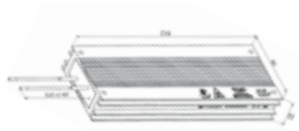
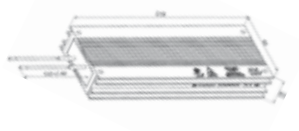
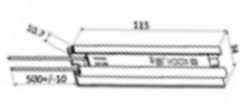
EtherCAT, PROFINET, Sercos III fieldbus components

	Description	Article number
	**M12 connecting cable 2 m** M12 plug / RJ45 plug / 4-pin / 2 m / D-coded / colour: green INVZUB - L/CL/IE/M12M/RJ45/2m /D/-	10138814
	**M12 connecting cable 5 m** M12 plug / RJ45 plug / 4-pin / 5 m / D-coded / colour: green INVZUB - L/CL/IE/M12M/RJ45/5m /D/-	10138847
	**M12 connecting cable 2 m** M12 plug / M12 plug / 4-pin / 2 m / D-coded / colour: green INVZUB - L/CL/IE/M12M/M12M/2m /D/-	10138848
	**M12 connecting cable 10 m** M12 plug / M12 plug / 4-pin / 10 m / D-coded / colour: green INVZUB - L/CL/IE/M12M/M12M/10m /D/-	10138849

Brake resistors

	Description	Output [W]	ED [%]	Article number
	**INVEOR M/P brake resistor** Size A 100 W, 100 Ω, IP65, connection cable 510 mm, L=110 mm W=80 mm H=15 mm INVZUB/-/R/001/100R/10W/IP65/50/-/-	550 750 1100 1500	13.60 10.00 6.80 5.00	10138851
	**INVEOR M/P brake resistor** Size B 200 W, 50 Ω, IP65, connection cable 510 mm, L=216 mm W=80 mm H=15 mm INVZUB/-/R/002/50R/20W/IP65/50/-/-	2200 3000 4000	9.00 6.66 5.00	10138852
	**INVEOR M/P brake resistor** Size C 240 W or 400 W*, 7 Ω, IP65, connection cable 510 mm, L=216 mm W=80 mm H=30 mm INVZUB/-/R/003/72R/40W/IP65/50/-/-	5500 7500	4.3 / 7.3* 3.2 / 5.3*	10138853
	**INVEOR M/P brake resistor** Size D 2 x 240 W or 2 x 400 W*, 2 x 72 Ω, IP65, connection cable 510 mm, 2 x L=216 mm W=80 mm H=30 mm INVZUB/-/R/003/72R/40W/IP65/50/-/-	11 000 15 000 18 500 22 000	4.4 / 7.2* 3.2 / 5.3* 2.6 / 4.3* 2.2 / 3.6*	2 x 10138853

(*) without UL

	Description	Article number
	**Brake resistors with mounting frame** Assembly kit for INVEOR M size C including 2 x 100 Ω brake resistor, mounting frame, screws ZUB MC BREMSWIDERST. 1	10121035
	**PTC brake resistor** Self-protecting, 70 W, 175 Ω, IP20, Connection cable 500 mm, L=115 mm W=34 mm H=10.5 mm T PTC800643 brake resistor	10268264

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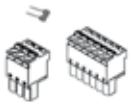
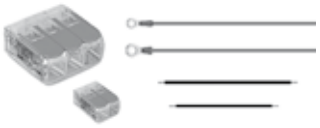
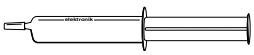
Specific accessories for INVEOR Mα and INVEOR P

	Description	Type / size	Article number
	**Cable glands** Cable glands (2x M16) and blind plugs (2x M16 black, 1x M16 transparent) ZUB Mα VERSCHRAUBUN.- 0 1	**INVEOR M** Size α	10118230
	**Screws** 4x cooling element screws + 1x ground screw ZUB Mα SCHRAUBEN .- 0 1	**INVEOR M** Size α	10118227
	**Terminals** Plug terminals for connecting mains cable and motor supply cable/PTC including jumper ZUB Mα E BAUTEILE .- 0 1	**INVEOR M/P** Size α	10118222
	**Cable set** Cable set for extending the motor connection (including crimp material) ZUB Mα KABELSATZ .- 0 1	**INVEOR M/P** Size α	10118226
	**Adapter for jack plug to M12** Adapter for jack plug to M12 for MMI/PC cable connection ZUB Mα LEITUNG MMI .- 0 1	**INVEOR M/P** Size α	10118219
	**M12 receptacle MMI/ PC** M12 female receptacle to JST 4-pin, A-coded, cable length 240 mm, M16 x 1.5, including captive protective cap ZUB M- LEITUNG MMI .- 0 1	**INVEOR M** Size α **INVEOR P** Sizes α to D	10118216
	**Potentiometer** Potentiometer on JST 3-pin for screwing in, cable length 180 mm, including reducer M16 x 1.5 and scale ZUB Mα POTI .- 0 1	**INVEOR M** Size α **INVEOR P** Sizes α to D	10118232
	**M12 receptacle CANopen** M12 female receptacle to JST 3-pin, for CANopen connection, A-coded, cable length 110 mm, M16 x 1.5, including captive protective cap ZUB Mα CANOPEN OB .- 0 1	**INVEOR M** Size α **INVEOR P** Sizes α to D	10118224
	**M12 receptacle PROFIBUS** M12 female receptacle to JST 9-pin, for PROFIBUS connection, B-coded, cable length 100 mm, M16 x 1.5 Line set. Inveor 4-pin Profibus cpl.	**INVEOR P** Sizes A to D	10056418
	**M12 receptacle EtherCAT / PROFINET / Sercos III** M12 female receptacle to RJ45 for EtherCAT / PROFINET / Sercos III connection, D-coded, cable length 170 mm, M16 x 1.5 Line set. Inveor EtherCAT 4-pin cpl.	**INVEOR P** Sizes A to D	10085888
	**Heat transfer paste** Heat transfer paste for connecting INVEOR P cooling plate to thermal sink, contents 5 ml INVZUB - OP HTP/- / -	**INVEOR P** Sizes α to D	10139778

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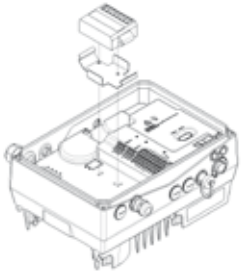
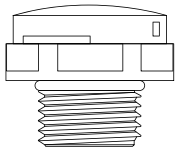
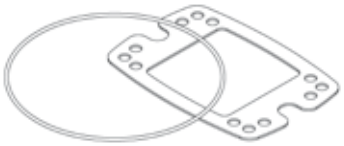
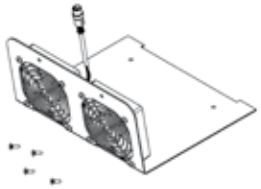
Small parts and attachments

	Description	Article number
	**Brake module** to control a mechanical brake on the motor end, including retaining plate, screws, varistor ⚠ not in combination with α size or basic application unit ZUB M- GLEICHRICHTE.-	10136409
	**M16 ventilation element** M16x1.6, material: PA 6 housing, ventilation element Acrylic Co-Polymer on Nylon Support, Chloroprene seal ZUB M- VERSCHRAUBUN.- 0	10142939
	**Sealing set for cup INVEOR M size D** O-ring, flat seal, 2x fixing screws with spring washer ZUB MD BECHER .- 0 -	10253835
	**Fan unit with fixing screws** for size D INVZUB D RP HSG/FAN/-	10142453
	**Screws for adapter plates for INVEOR M size A / B / C** 4x fixing screws for adapter plate, 1x ground screw with spring washer Zubehör. Inveor MABC Bef. BGR	10072211

Documentation

	Description	Article number
	**Documentation for INVEOR M DE** Operating manual for INVEOR M sizes A to D DE BA. INVEOR M PAP	10075087

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