

Smart connections.

Order catalogue

INVEOR frequency inverter

# KOSTAL competence – Using energy the smart way

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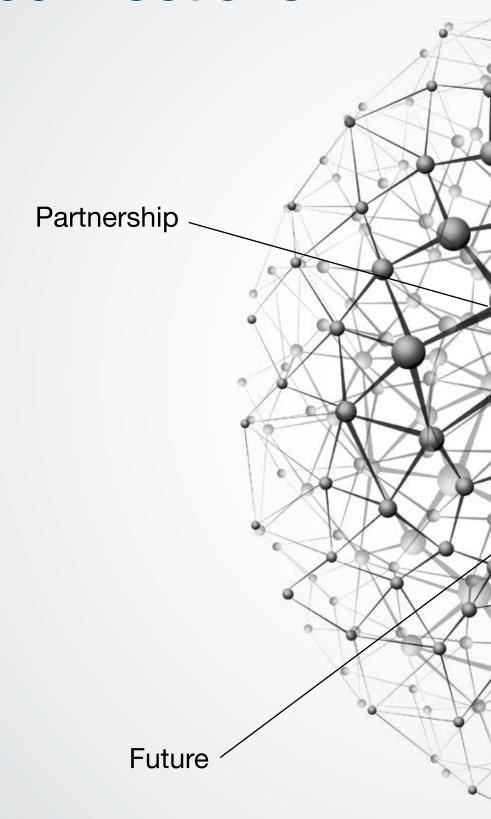


**INVEOR** 

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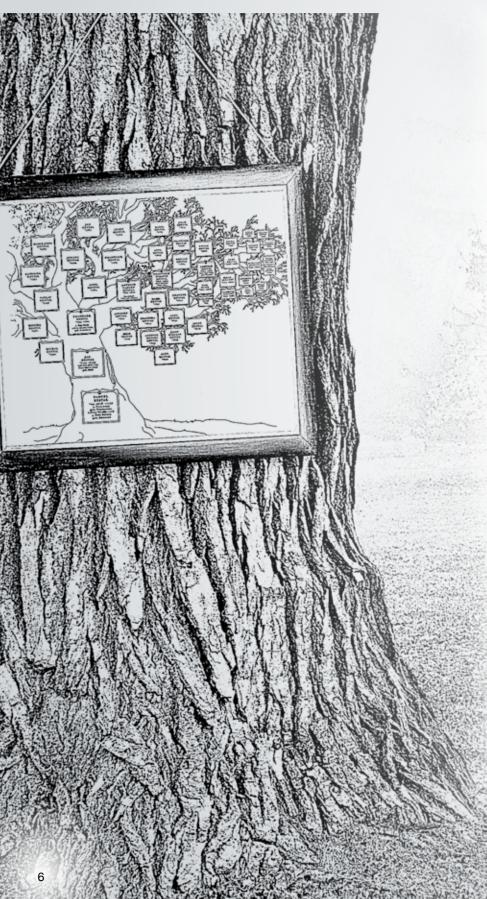


# KOSTAL-competence – Smart connections





# 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 19,600 people at 46 locations in 21 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.

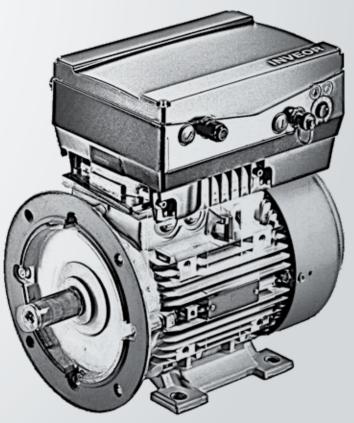
#### **Quality-offensive thinking**

The professional error management system – adopted from the automotive industry – guarantees a zero-errors 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.

#### **Shaping the future**

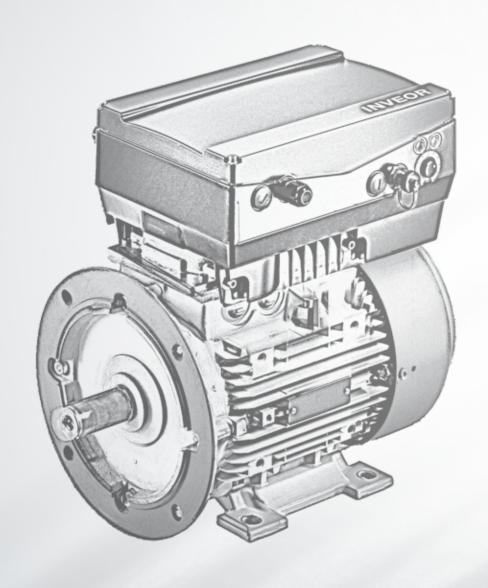
KOSTAL works tirelessly towards active knowledge transfer and intensive dialogue with its partners. Together the challenges presented by constant change can be overcome. The topic of energy efficiency (EN50598) in particular is gaining ever greater significance in this field. In close dialogue with partners,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

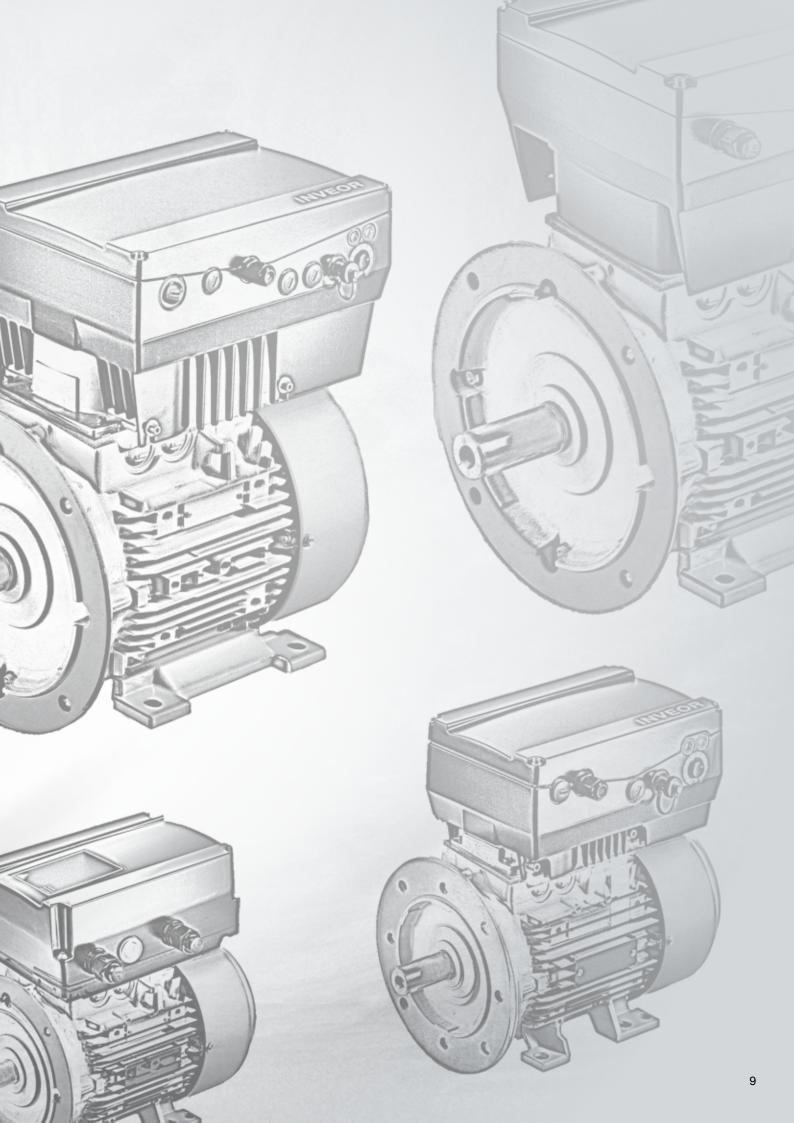
KOSTAL applies its brand promise and its competitive advantages in every aspect of its business activities, of course, this also includes development of the INVEOR line of drive controllers.



# INVEOR -

# Smart connections on five levels





#### INVEOR -

#### "Smart connections on five levels."

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 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 on the right.

#### **Overview of INVEOR product families**



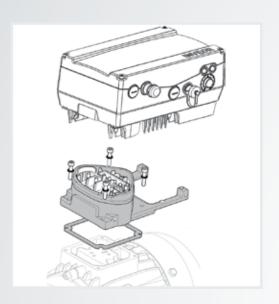


Suitability of application					Supported types of motor						
Pumps	Blowers	Compressors	Industry & automation	Conveyor	Door drives	Roller bearing drives	Asynchronous- motor	PMSM (magnets on outside)	IPMSM (magnets on inside)	Synchronous reluctance motor	Synchronous reluctance motor with assistance magnets
			L		-	5		THE PARTY OF THE P			
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							•	•	×	*	×

#### 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.



#### **INVEOR M**

Robust and efficient drive controller for applications with asynchronous and synchronous motors with extensive equipment, such as field-bus, Bluetooth, safety, soft PLC.



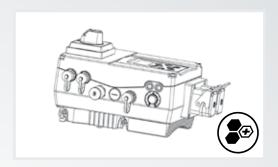
#### **INVEOR MP**

Robust and highly efficient drive controller for synchronous, synchronous reluctance and asynchronous motors in the extended speed range. Comprehensive configuration options, such as main switch, integrated brake resistor, fieldbus, Bluetooth and safety make an individual compilation possible.



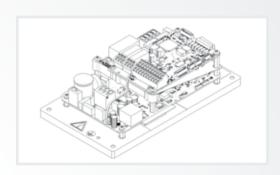
#### **INVEOR MPP**

Regardless of the requirements of your pump application, the INVEOR MPP fulfils them all with its numerous, specific pump functions in the best possible way and also saves costs. With the MPP, you can rely on the proven performance characteristics of the INVEOR frequency inverters. In this way, you achieve maximum efficiency with your application, remain as flexible as possible and are optimally equipped for the future.



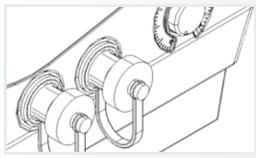
#### **INVEOR MPM**

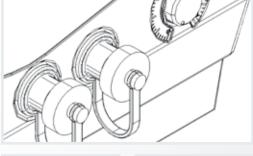
With the INVEOR MPM, all connections can be made using standardised plugs, significantly cutting the installation time. This robust and highly efficient drive controller is designed for synchronous, synchronous reluctance and asynchronous motors in the extended speed range. The entire drive controller functionality is located on one PCB. The space this frees up makes possible an innovative, modular concept, through which the device can be flexibly shaped using optional and I/O modules.

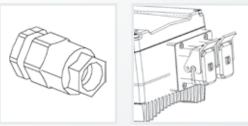


#### **INVEOR P**

Based on the same platform as INVEOR M, the INVEOR P includes the same electronics hardware on a standardised cold plate. Specific and therefore variable integration in the customer system is thus 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.

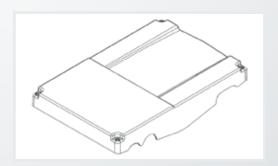






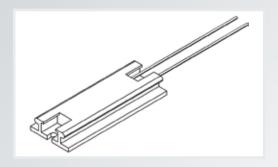
#### Plug&play as all components feature plug connectors

M12 plug to connect inputs/outputs and fieldbuses. Robust industrial plug connectors from Harting Han Q4/2 allow the supply voltage to be connected rapidly. This option also allows looping in (daisy chain). The QUICKON plug from Phoenix Contact with its convenient displacement connection allows the supply voltage to be connected with ease.



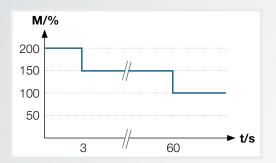
#### Individual surface

The covers of the INVEOR MP and MPM have a level surface, which allows customers to fit their own controls, for example.



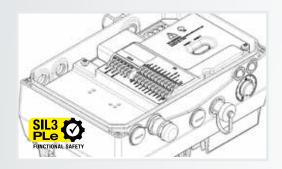
#### **Integrated brake resistor (PTC)**

Thanks to the integrated brake resistor, dynamic processes can be undertaken without additional, external brake resistors.



#### 200% overload

For processes with a high starting torque and dynamic ramps, 200% overload is available for 3 seconds and 150% for 60 seconds.



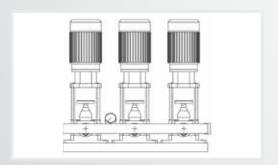
#### Input/output configuration

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



#### **Optional modules**

Further additional functions, such as a brake module, can be depicted by selecting an optional module.



#### **Multiple-pump operation**

For applications in which pumps are connected or disconnected depending on demand, for example a booster station, the INVEOR MP and MPP series offers multiple-pump operation. In this scenario up to 6 pumps (1 master, 5 slaves) can be networked with one another using the internal CANopen interface. The INVEOR master monitors the entire process and connects the slave drives if required. Automatic changeover (dependent on operating hours) ensures that the pumps are subject to equal levels of wear.



#### **Vibration Monitoring**

The Vibration Monitoring function monitors vibrations in the application. This data can be used for predictive maintenance and made available via MQTT, for example.



#### **Bidirektionale IOs**

Bidirectional IOs can be assigned as inputs or outputs as desired. This offers the greatest possible flexibility in the use of inputs and outputs.



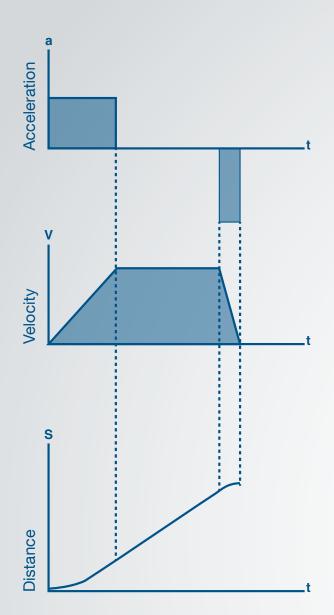
#### Temperaturfühlereingang

Possibility of connecting a PT1000 resistance temperature sensor for monitoring and controlling the temperature in the application.



#### **Low Duty Variante**

With the Low Duty variant, it is possible to resort to a more cost-effective, smaller size and still obtain the same performance as the original size.



#### **Encoderless positioning - KOSTAL ISP**

When we talk about motion control, we are talking about means controlling a movement in such a way that it stops at a defined position stops. This is usually accompanied by Sensors are used that provide information about the position back to the frequency inverter. This sensor system However, it is expensive and makes the system more susceptible to Disturbances.

Thanks to the patented sensorless control process enables Kostal positioning applications completely without donor.

With the INVEOR MP and MPM you get thus a positioning function completely sensorless and supplied without any further effort on your part. We call the KOSTAL Integrated Sensorless Positioncontrol.



#### Comprehensive communication interfaces

The choice of the preferred fieldbus 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.



#### \*from Q4/2021

#### Ethernet fieldbus module

The Ethernet fieldbus module offers 4 fieldbuses on one module: PROFINET, ETHERCAT, SERCOS III AND ETHERNET IP. The module is downward compatible with all INVEOR frequency converter with Ethernet fieldbus. The required fieldbus is simply selected by a parameter.

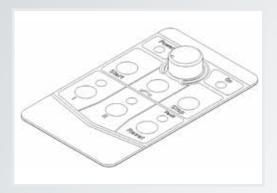
In this way, storage is reduced and more flexibility is achieved.

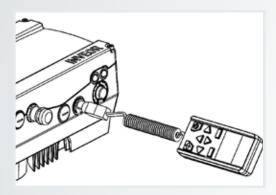


#### **MQTT** protocol

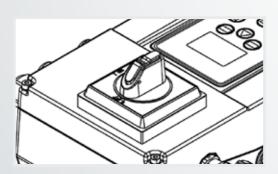
The INVEOR MP now supports the MQTT protocol for machine-to-machine communication. This means that the performance class of the KOSTAL frequency inverter is IoT-capable and ready for the requirements of Industry 4.0.

In recent years, MQTT has become the standard protocol for machine-to-machine communication between devices and applications.











#### 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.

#### Handheld controller Man-Machine-Interface (MMI)

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 Man-Machine-Interface (MMI)**

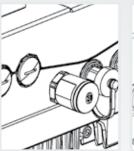
The full functionality of the handheld controller, combined with 5 freely selectable status screens, enables parameterization and operation on the drive controller itself. Everything complies with the IP device protection class. The MMI functionality can be selected as an option in the INVEOR configuration.

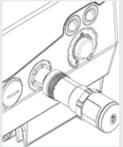
#### Main switch (option)

The integrated main switch allows the supply voltage to be fully disconnected.

#### **Pump display**

The pump display enables control based on pump-specific process variables. For example, pressure or pressure flow can be set directly. set.







#### Bluetooth / app (accessory / option)

The KOSTAL INVERTERapp provides a very convenient way of commissioning and observing the application. Either an integrated or pluggable solution is available for communication with the INVEOR.







#### **Touch operating terminal**

You can conveniently automate several INVEOR drive controllers without a fieldbus using the touch operating terminal, which is available as an accessory.



#### **KOSTAL INVERTERpc software**

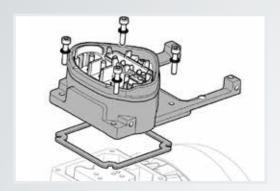
The user will get to grips with intuitive PC software interface with virtually no assistance. Commissioning can be easily undertaken by oscilloscope, parameter adaptation and the cloning of drive axes. Automatic motor identification, parameter presettings and customer-specific actual value displays automate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

https://kostal-drives-technology.com/INVERTERpc

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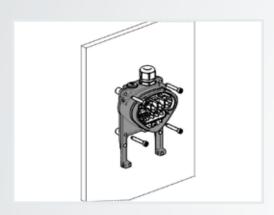
#### Soft PLC, IEC 61131-3

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.



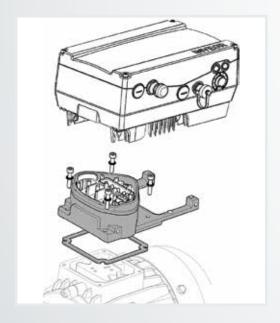
#### Motor adapter plate

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 perwith 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.



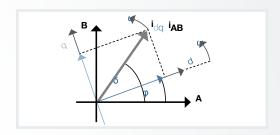






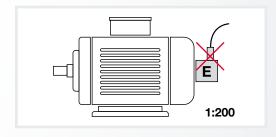
#### All motor types

The INVEOR supports all motor technologies from asynchronous and the various PM synchronous motors to the synchronous reluctance motor and synchronreluctance with assistant magnets.



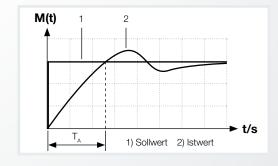
#### Field-oriented sensor-free control

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



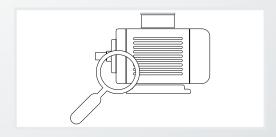
#### Maximum speed range (without sensors)

The innovative control technology of the INVEOR drive controller without rotary encoder feedback perwiths a speed range of 1:200. This means that even processes requiring a very high level of precision can be depicted.



#### **Torque control**

Torque control and torque liwithation perwith use in applications such as extruder worms or winding applications where constant torque is essential. The function is available in the entire speed range without additional encoder feedback.



#### **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 M / INVEOR P



INVEOR M / P	Equipment features	from page 24
INVEOR M	Order code Configuration	from page 26 from page 29
INVEOR P	Oder code Configuration	from page 34 from page 37



### Equipment features

## Overview of INVEOR M / INVEOR P

By selecting the application PCB 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 PCBs.

#### Application PCBs available per INVEOR size

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

Size	α	A, B, C	A, B, C, D	
Application circuit board model	Standard	Basic	Standard	Functional safety
Size α, 1Ph (0.25 kW - 0.75 kW)	-			
Size A, 1Ph (0.37 kW – 1.5 kW)			<b>■</b> *	
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)			•	•

<sup>\*</sup> not 1.5 kW

#### **Operation and observation**

Size	α	A, B, C	A, B,	C, D
Application circuit board model	Standard	Basic	Standard	Functional safety
Soft-SPS. IEC 61131-3		-	-	
KOSTAL INVERTERpc software				
KOSTAL INVERTERapp		-		
Potentiometer on device	Accessories		•	•
Integrated foil keypad				
Integrated foil keypad option with potentiometer		•	Cannot be combined with fieldbus option	•
Bluetooth module			•	•
Bluetooth stick	Accessories	Accessories	Accessories	Accessories
Integrated MMI		•	•	•
MMI handheld controller	Accessories	Accessories	Accessories	Accessories
Touch operating terminal	Accessories	Accessories	Accessories	Accessories

#### Fieldbus options

Size	α	A, B, C	А, В,	C, D
Application circuit board model	Standard	Basic	Standard	Functional safety
Modbus RTU		-		
CANopen			•	•
PROFIBUS			•	•
PROFINET				
EtherCAT			•	•
Sercos III				
Ethernet fieldbus module (PROFINET, Sercos III)			•	•
Fieldbus address coding switch			CANopen, PROFIBUS DP, Sercos III	

#### Housing versions and attachments

Size	α	A, B, C	А, В,	C, D
Application circuit board model	Standard	Basic	Standard	Functional safety
M12 plug for MMI, PC or Modbus	Accessories			

#### **Functions and characteristics**

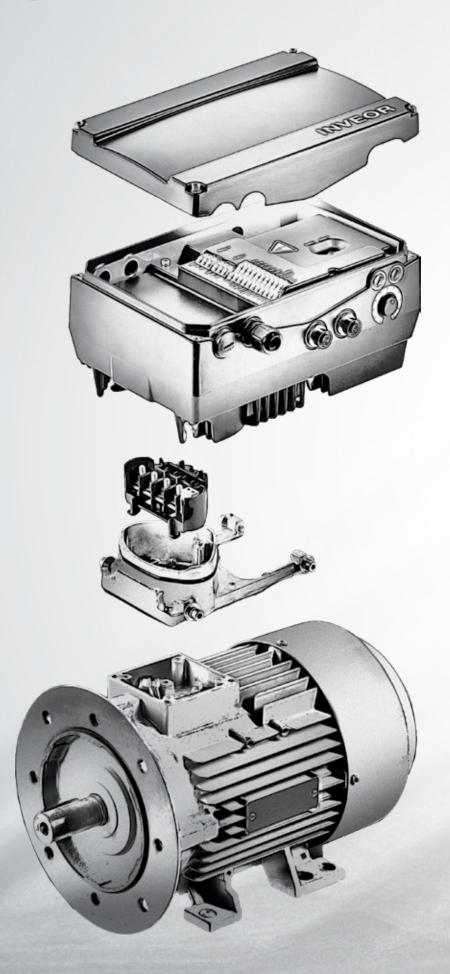
Size	α	A, B, C	А, В,	C, D
Application circuit board model	Standard	Basic	Standard	Functional safety
PID control			-	-
Digital inputs	2	2	4	4
Digital outputs	1	1	2	2
Analogue inputs*	1	1	2	2
Analogue outputs			1	1
Hardware enable, digital			-	
STO inputs				2
Digital input 5, rapid stop SS1				-
STO diagnosis relay				-
24 V voltage supply				-
24 V Einspeisung für die Steuerteilkarte			-	-
10 V voltage supply			-	-
Relay	1		2	
Motor temperature evaluation			-	

<sup>\*</sup> can be configured as digital inputs

#### Power PCB card options

INVEOR sizes	α	Α	В	С	D
Brake chopper		•	-	-	•
IT network	•				

# INVEOR M



# Order code

The INVEOR order code comprises a total of 9 individual items. Each item determines one stage of the INVEOR configuration relating to the various device characteristics.

Item	Code	
1	INV M	INVEOR type motor-mounted
2	x	<b>Size</b> 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 PCB with and without brake chopper
6	APxx	Configuration of the application PCB Input/output configuration, fieldbus or safety technology
7	GHxx	Housing configuration Cooling type, screw connections, potentiometer and attachments
8	DKxx	Cover variant and controls
9	СОхх	Model Standard or special model

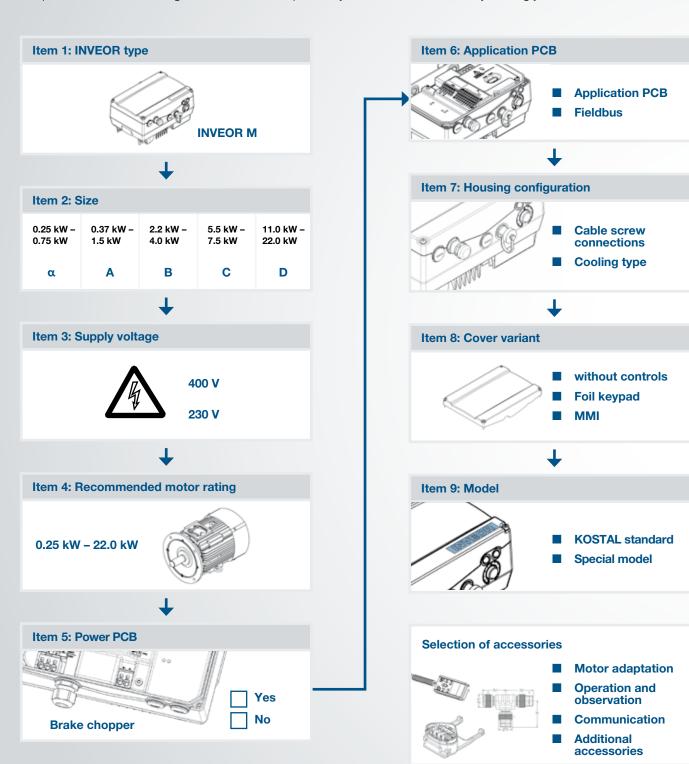
#### Here you can configure the INVEOR and enter the order code:

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

#### The route

# to your INVEOR M

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.



Selection of accessories: Motor adaptation, operation and observation, communication, additional accessories as of **page 72**.

# Configuration INVEOR M



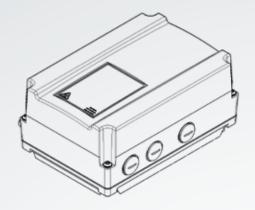
The motor rating is key to the choice of size. Please select the power range into which your motor rating falls.

#### Size selection

Motor rating		Size	Item number
0.25 kW – 0.75 kW	<b>→</b>	<b>α</b> go to page 30	10111287
0.37 kW – 1.5 kW	<del></del>	<b>A</b> go to page 32	10094115
2.2 kW – 4.0 kW	<del></del>	B go to page 32	10102294
5.5 kW – 7.5 kW		C go to page 32	10102295
11.0 kW – 22.0 kW		<b>D</b> go to page 32	10102296

Other configuration are listed on the following pages.

# Configuration INVEOR M Size α (0.25 – 0.75 kW)



Item 3: Supply voltage IVxx

1 x 100 VAC -15%...230 VAC +10%

VO2

#### **Item 4: Recommended motor rating**

**PWxx** 

Power class	Nominal current [A]*	Overload 60 sec.*	
0.25 kW	1.4	150%	PW01
0.37 kW	2.2	150%	PW02
0.55 kW	2.7	150%	PW03
0.75 kW	3.3	150%	PW04

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

<sup>\*</sup> details see data sheet

Item 5: Power PCB	LPxx	
Standard		LP01
IT network		LP07

 $\triangle$  INVEOR  $\alpha$  without brake chopper option

Item 6: Application PCB	APxx		
Variant	Field bus		with 🗱
Standard 2 DI   1 DO   1 AI   1 relays		AP12	AP40
<b>Standard</b> 2 DI   1 DO   1 AI   1 relays	CANOPER	AP13	AP42

Details on page 74/75

Item 7: Housing configuration	GHxx	
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

⚠ Please remember that an adapter plate is needed for each device.

Details on page 74 / 75

Item 8: Cover variant	DKxx	
Cover without foil keypad		DK01
Cover with foil keypad		DK04

Details on page 22

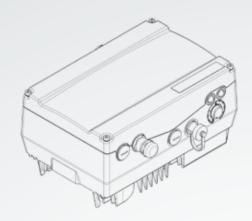
item 9: Model	COxx	
KOSTAL Standard		CO00

 $\underline{\Lambda}$  For models with a customer label, please get in touch with your KOSTAL contact.

#### Suitable accessories

	Description	Item number
	Cable set Cable set for extending the motor connection (including crimp material)	10118226
310	Adapter for jack plug on M12 Adapter for jack plug on M12 for MMI/PC cable connection	10118219
	M12 screw-in coupling MMI/ PC / Modbus/IO plug M12 screw-in coupling on JST 4-pin, A-coded, cable length 240 mm, M16 x 1.5, including captive protective ca	10118216
	Potentiometer Potentiometer on JST 3-pin for screwing in, cable length 180 mm, including reducer M16 x 1.5 and scale	10118232
	M12 screw-in plug CANopen M12 screw-in plug on JST 3-pin, for CANopen connection, A-coded, cable length 110 mm, M16 x 1.5, including captive protective cap	10118224

## Configuration **INVEOR M** Size A-D (0.37 – 22 kW)



Item 3: Supply voltage		IVxx	
Size	Variant		
Α	1 x 100 VAC -15%230 VAC +10%		IV02
A - D	3 x 200 VAC -10%480 VAC +10%		IV01

em 4: Re	commended motor rat	ing		PWxx	
Size	Supply voltage	Power Class	Nominal current [A]*	Overload 60 sec.*	
	1 x 230 VAC	0.37 kW	2.3	150%	PW02
	1 x 230 VAC	0.55 kW	3.2	150%	PW03
	3 x 400 VAC	0.55 kW	1.7	150%	PW03
	1 x 230 VAC	0.75 kW	3.9	150%	PW04
Α	3 x 400 VAC	0.75 kW	2.3	150%	PW04
	1 x 230 VAC	1.10 kW	5.2	150%	PW05
	3 x 400 VAC	1.10 kW	3.1	150%	PW05
	1 x 230 VAC**	1.50 kW	7.0	125%	PW90**
	3 x 400 VAC	1.50 kW	4.0	150%	PW06
	3 x 400 VAC	2.20 kW	5.6	150%	PW07
В	3 x 400 VAC	3.00 kW	7.5	150%	PW08
	3 x 400 VAC	4.00 kW	9.5	150%	PW09
С	3 x 400 VAC	5.50 kW	13.0	150%	PW10
C	3 x 400 VAC	7.50 kW	17.8	150%	PW11
	3 x 400 VAC	11.00 kW	28.0	150%	PW12
D	3 x 400 VAC	15.00 kW	34.0	150%	PW13
	3 x 400 VAC	18.50 kW	40.0	150%	PW14
	3 x 400 VAC	22.00 kW	48.0	130%	PW15

⚠ Recommended motor rating (4-pole asynchr. motor) is given based on the 230 VAC or 400 VAC supply voltage. \* details see data sheet \*\* only with AP03 or AP41 and LP99 and DK01

Item 5: Pov	Item 5: Power PCB		
Size	Variant	without brake chopper	with brake chopper*
	Basic version	LP01	LP02
A	Basic version (only with PW 90)	LP99	-
В	Basic version	LP01	LP02
В	Heavy duty version	-	LP54
	Basic version	LP01	LP04
С	Heavy duty version	-	LP54
D	Basic version	LP03	LP04
	Heavy duty version	LP53	LP54

Item 6: Application PCB			APxx	
Size	Variant	Field bus		with 🚯
A - C	<b>Basic</b> 2 DI   1 DO   1 AI		AP03	AP41
	<b>Standard</b> 4 DI   2 DO   2 AI   1 AO   2 relays		AP01	AP40
	<b>Standard *</b> 4 DI   2 DO   2 AI   1 AO   2 relays	CANOPER	AP05	AP42
	<b>Standard *</b> 4 DI   2 DO   2 AI   1 AO   2 relays	Ether CAT.	AP06	
	<b>Standard *</b> 4 DI   2 DO   2 AI   1 AO   2 relays	लुक्ला° किंग्रेड	AP16	AP46
A - D	<b>Standard *</b> 4 DI   2 DO   2 AI   1 AO   2 relays	Sercos the automation bus	AP17	AP47
A-D	Functional safety ** 2 STO   4 DI   2 DO   2 AI   1 AO FUNCTIONAL SAFETY		AP10	AP50
	Functional safety ** 2 STO   4 DI   2 DO   2 AI   1 AO	CANOPER	AP21	AP51
	Functional safety ** 2 STO   4 DI   2 DO   2 AI   1 AO	Ether CAT.	AP22	
	Functional safety ** 2 STO   4 DI   2 DO   2 AI   1 AO	PROFII <sup>®</sup>	AP25	AP55
	Functional safety ** 2 STO   4 DI   2 DO   2 AI   1 AO	Sercos the automation bus	AP26	AP56

<sup>\*</sup> not with membrane keyboard DKx2 \*\* only with IV01

Item 7: Hou	using configuration	GHxx	
Size	Variant	without potentiometer	with potentiometer
A - C	Passive cooling type, standard screw connections	GH02	GH01
D	Active cooling type, standard screw connections	GH09	GH06

 $\triangle$  Please remember that an adapter plate is needed for each device. Details on page 70 / 71

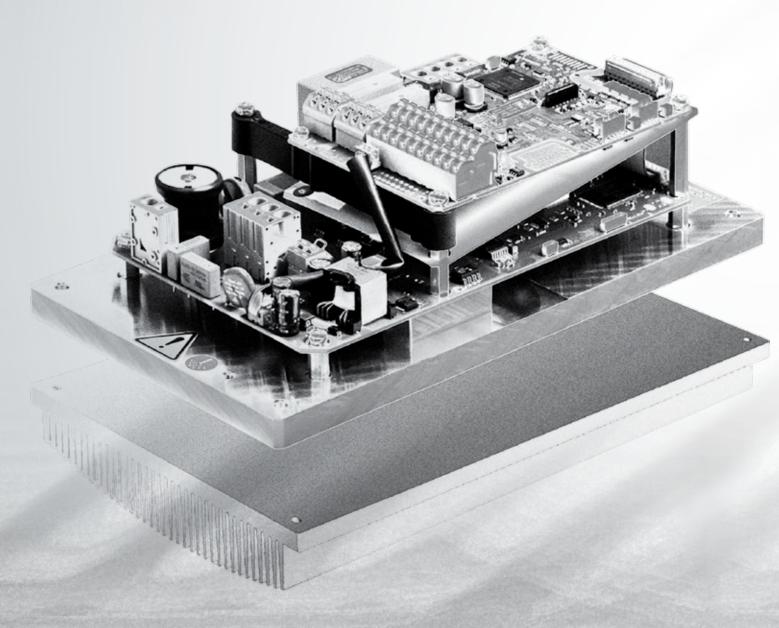
Item 8: Co	ver variant	DKxx	
Size	Variant		
	Cover without controls	DK01	
A - D	Cover with foil keypad and potentiometer*	DK02	2
	Cover with integrated MMI**	DK05	5

<sup>\*</sup> Size A-C only with GH02, size D only with GH09. Not in combination with standard application board and fieldbus. Details on **page 24** \*\* Not in combination with accessory "Bluetooth Stick" – Mat. no. 10447294

Item 9: Mo	del	COxx
Size	Variant	
A - D	KOSTAL standard	CO00

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

# INVEOR P



# Order code

The INVEOR order code comprises a total of 9 individual items. Each item determines one stage of the INVEOR configuration relating to the various device characteristics.

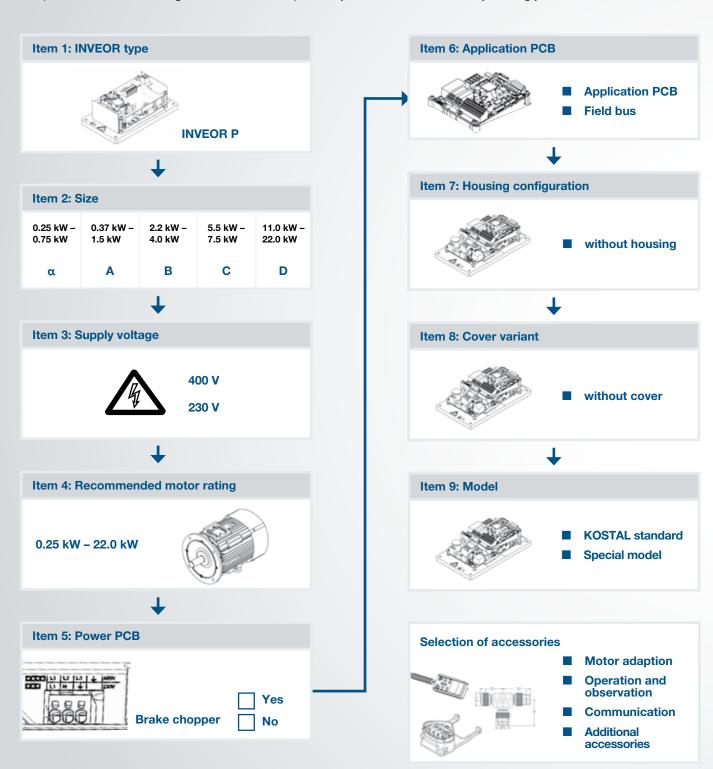
Item	Code	
1	INV P	INVEOR type cold plate
2	х	<b>Size</b> α, A, B, C, D
3	IVxx	<b>Supply voltage</b> 230 V or 400 V
4	PWxx	<b>Recommended motor rating</b> 0.25 kW to 22 kW
5	LPxx	Configuration of power PCB with and without brake chopper
6	APxx	Configuration of the application PCB Input/output configuration, fieldbus or safety technology
7	GHxx	Housing configuration Cooling type, screw connections, potentiometer and attachments
8	DKxx	Cover variant and controls
9	СОхх	<b>Model</b> 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

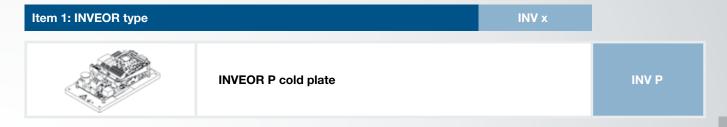
# The route to your INVEOR P

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.



Selection of accessories: Motor adaptation, operation and observation, communication, additional accessories as of **page 72**.

# Configuration INVEOR P



Item 2: Size x

The motor rating is key to the choice of size.

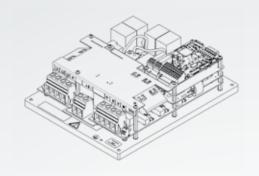
Please select the power range into which your motor rating falls.

## Size selection

Motor rating		Size	Item number
0.25 kW – 0.75 kW	<b>→</b>	α	10135174
0.37 kW – 1.5 kW	<del></del>	А	10135189
2.2 kW – 4.0 kW		В	10135173
5.5 kW – 7.5 kW		С	10135191
11.0 kW – 22.0 kW		D	10135192

Other configuration points are listed on the following pages.

# Configuration INVEOR P Size α-D (0.25 – 22 kW)



Item 3: Sup	ply voltage	IVxx	
Size	Variant		
α - Α	1 x 100 VAC -15%230 VAC +10%		IV02
A - D	3 x 200 VAC -10%480 VAC +10%		IV01

item 4: Recommended motor rating			PWXX		
Size	Supply voltage	Power class	Nominal current [A]*	Overload 60 sec.*	
α	1 x 230 VAC	0.75 kW	3.3	150%	PW04
Α	1 x 230 VAC	1.10 kW	5.2	150%	PW05
A	3 x 400 VAC	1.50 kW	4.0	150%	PW06
В	3 x 400 VAC	4.00 kW	9.5	150%	PW09
С	3 x 400 VAC	7.50 kW	17.8	150%	PW11
D	3 x 400 VAC	15.00 kW	34.0	150%	PW13
	3 x 400 VAC	22.00 kW	48.0	130%	PW15

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

<sup>\*</sup> details see data sheet

Item 5: Power PCB		LPxx	
Size	Variant	without brake chopper	with brake chopper*
	Basic version	LP01	-
α	Basic version IT network	LP07	-
Α	Basic version	LP01	LP02
В	Basic version	LP01	LP02
С	Basic version	LP01	LP04
D	Basic version	LP03	LP04

<sup>\*</sup> for connecting a brake resistor

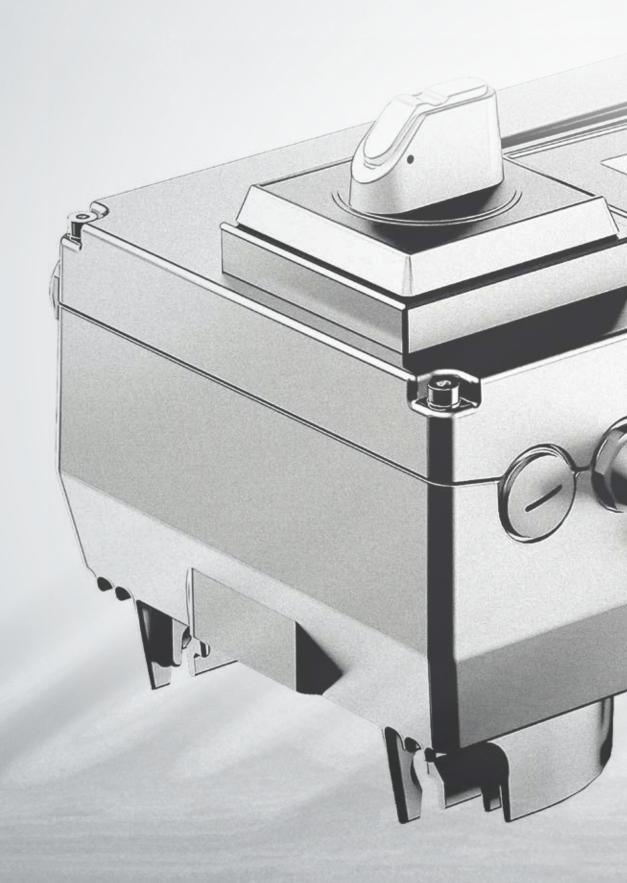
n 6: App	lication PCB	APxx	
Size	Variant	Field bus	
	Standard 2 DI   1 DO   1 AI   1 relays		AP12
α	Standard 2 DI   1 DO   1 AI   1 relays	CANOPER	AP13
A - C	<b>Basic</b> 2 DI   1 DO   1 AI		AP03
	<b>Standard</b> 4 DI   2 DO   2 AI   1 AO   2 relays		AP01
	<b>Standard *</b> 4 DI   2 DO   2 AI   1 AO   2 relays	CANOPER	AP05
A - D	<b>Standard *</b> 4 DI   2 DO   2 AI   1 AO   2 relays	Ether <b>CAT</b>	AP06
	<b>Standard *</b> 4 DI   2 DO   2 AI   1 AO   2 relays	<i><b>. </b></i>	AP16
	<b>Standard *</b> 4 DI   2 DO   2 AI   1 AO   2 relays	Sercos the automation bus	AP17

 $<sup>^{\</sup>star}$  not with membrane keyboard DKx2  $\,$ 

Item 7: Hous	sing configuration	GHxx	
Size	Variant		
α - D	Cold plate cooling type in IP00		GH03
Item 8: Cove	er variant	DKxx	
Size	Variant		
α - D	without cover		DK03
Item 9: Mod	lel .	COxx	
Size	Variant		
α - D	KOSTAL standard		CO00

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

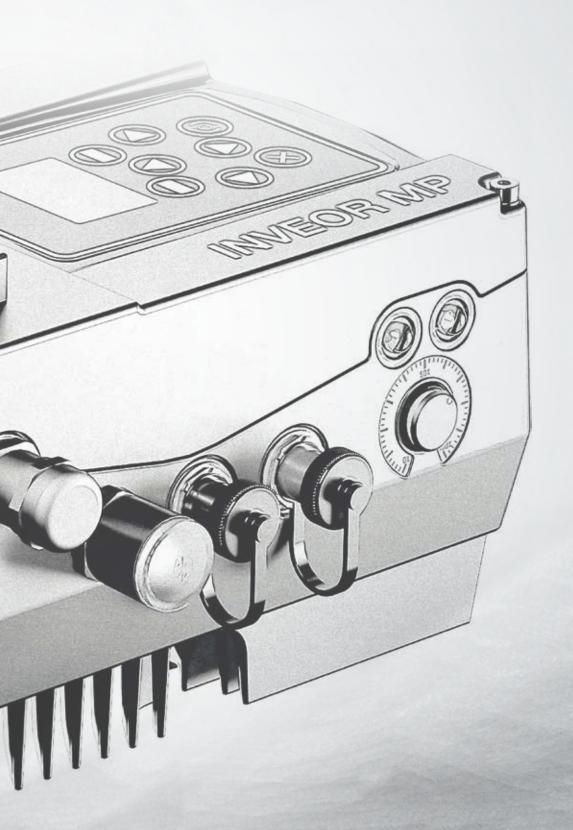
## INVEOR MP



Equipment features from page 42

Order code from page 45

Configuration from page 47



# Equipment features at a glance for INVEOR MP

By selecting the application PCB 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 PCBs.

#### Application PCBs available per INVEOR size

Depending on size (A, B, C or D), there are three application PCBs: basic, standard and functional safety. You can see the application PCBs available per size below.

Application circuit board model	Basic	Standard	Functional safety
Size A, 3Ph (0.55 kW - 2.2 kW)	•		•
Size B, 3Ph (2.2 kW - 5.5 kW)	•		•
Size C, 3Ph (5.5 – 11 kW)			•
Size D, 3Ph (11 kW - 30 kW)			•

#### **Operation and observation**

Application circuit board model	Basic	Standard	Functional safety
Soft PLC. IEC 61131-3			-
KOSTAL INVERTERpc software	-		
KOSTAL INVERTERapp			-
Potentiometer on device			•
Integrated foil keypad option with potentiometer		Cannot be combined with fieldbus option	•
Bluetooth module			•
Bluetooth stick	Accessories	Accessories	Accessories
Integrated MMI	•	•	•
MMI handheld controller	Accessories	Accessories	Accessories
Touch operating terminal	Accessories	Accessories	Accessories
Main switch	•		•
Brake module (brake rectifier)	•	•	•

<sup>\*</sup> only size A + B

### **Fieldbus options**

Application circuit board model	Basic	Standard	Functional safety
Modbus RTU			
CANopen			•
PROFIBUS			•

Application circuit board model	Basic	Standard	Functional safety
PROFINET		•	•
EtherCAT		•	•
Ethernet fieldbus module (PROFINET, Sercos III)		•	•
Fieldbus address coding switch		CANopen, PROFIBUS DP, Sercos III	

### **Functions and characteristics**

Application circuit board model	Basic	Standard	Functional safety
PID control		••	
Torque control*			
Digital inputs	2	4	4
Digital outputs	1	2	2
Analogue inputs**	1	2	2
Analogue outputs		1	1
Hardware enable, digital	-		
STO inputs			2
Digital input 5, rapid stop SS1			
STO diagnosis relay			
24 V voltage supply	-	-	
24 V feed-in for the control part card		••	
10 V voltage supply	-		
Relay		2	
Motor temperature evaluation	-		

<sup>\*</sup> only possible with CANopen fieldbus\*\* can be configured as digital inputs

### Housing configurationen und Anbauteile

INVEOR sizes	Α	В	С	D
M12 plug for RS485 (für MMI, Modbus or PC)	••			
Harting plug (Han Q4/2)				
Phoenix Quickon			•	
Internal brake resistor		•	•	

### **Power PCB card options**

INVEOR sizes	Α	В	С	D
Brake chopper		•	•	-

## INVEOR MP



## Order code

The INVEOR MP order code comprises a total of 11 individual items. Each item determines one stage of the INVEOR MP configuration relating to the various device characteristics.

Item	Code	
1	INV MP	INVEOR type Inverter, motor-integrated, performance
2	Х	<b>Size</b> A, B, C, D
3	VSxx	<b>Version</b> Performance
4	IVxx	Supply voltage 400 V
5	PWxx	Recommended motor rating 0.55 kW to 30 kW
6	LPxx	Configuration of power PCB with and without brake chopper
7	APxx	Configuration of the application PCB Input/output configuration, fieldbus or safety technology, Bluetooth
8	GHxx	Housing configuration Cooling type, screw connections, potentiometer and attachments, plug
9	DKxx	Cover variant and controls
10	OAxx	<b>Option module</b> Brake module, main switch
11	СОхх	<b>Model</b> Standard or special model

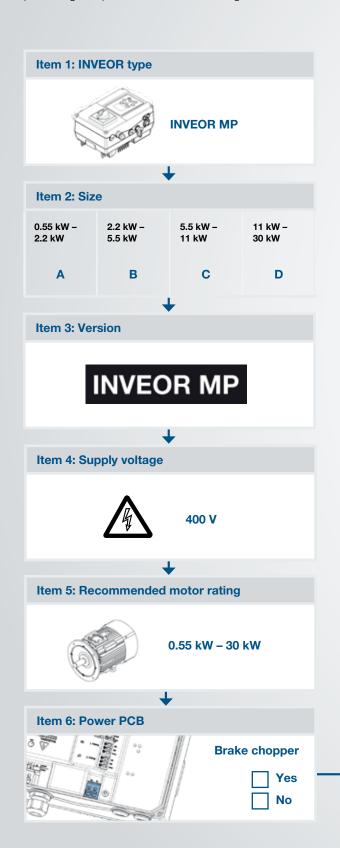
## Here you can configure the INVEOR and enter the order code:

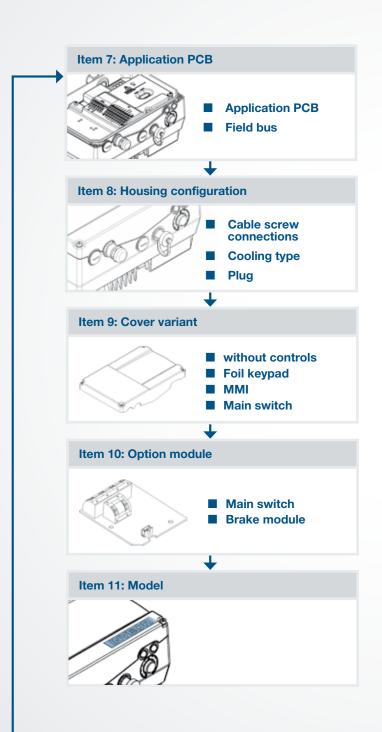
Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11

## The route

## to your INVEOR MP

The route to your INVEOR MP configuration is illustrated below. For each of the 11 items, you make a configuration decision, producing one part of the order code. Together all 11 sub-codes produce your total order code, clearly defining your INVEOR MP.





Selection of accessories: Motor adaptation, operation and observation, communication, additional accessories as of page 72.

# Configuration INVEOR MP



The motor rating is key to the choice of size.

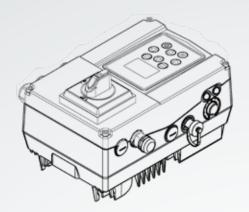
Please select the power range into which your motor rating falls.

### Size selection

Motor rating		Size	Item number
0.55 kW – 2.2 kW	<b>→</b>	A	10352047
2.2 kW – 5.5 kW	<b>→</b>	В	10352048
5.5 kW – 11 kW	<del></del>	С	10352049
11 kW – 30 kW		D	10352060
Item 3: Version		VSxx	
Performance			VS01
Item 4: Supply voltage		IVxx	
400 V			IV01

Other configuration points are listed on the following pages.

# Configuration INVEOR MP Size A-D (0.55 – 30 kW)



tem 5: Recommended motor rating					
Size	Power Class	Nominal current [A]*	Overload 60 sec.*	Overload 3 sec.*	
	0.55 kW	1.7	150%	200%	PW03
	0.75 kW	2.3	150%	200%	PW04
Α	1.10 kW	3.1	150%	200%	PW05
	1.50 kW	4.0	150%	200%	PW06
	2.20 kW LD*	4.8	110%	150%	PW46
	2.20 kW	5.6	150%	200%	PW07
В	3.00 kW	7.5	150%	200%	PW08
В	4.00 kW	9.5	150%	200%	PW09
	5.50 kW LD*	11.0	110%	150%	PW49
	5.50 kW	13.0	150%	200%	PW10
С	7.50 kW	16.5	150%	200%	PW11
	11.00 kW LD*	22.0	110%	150%	PW51
	11.00 kW	28.0	150%	200%	PW12
	15.00 kW	34.0	150%	200%	PW13
D	18.50 kW	40.0	150%	200%	PW14

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

46.0

60.0

22.00 kW

30.00 kW LD\*

Item 6: Power PCB	LPxx	
without brake chopper		LP01
with brake chopper (for connecting a brake resistor)		LP02

150%

110%

200%

150%

PW15 PW55

<sup>\*</sup> LD = Low Duty, details see data sheet

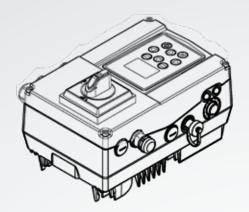
Item 7: App	lication PCB		APxx	
Size	Variant	Field bus		with 🐉
A - B	<b>Basic</b> 2 DI   1 DO   1 AI		AP03	AP41
	<b>Standard</b> 4 DI   2 DO   2 AI   1 AO   2 relays		AP01	AP40
	<b>Standard *</b> 4 DI   2 DO   2 AI   1 AO   2 relays	CANOPOR	AP05	AP42
	<b>Standard *</b> 4 DI   2 DO   2 AI   1 AO   2 relays	<i><b><u> </u></b></i>	AP16	AP46
A - D	<b>Standard *</b> 4 DI   2 DO   2 AI   1 AO   2 relays	Sercos the automation bus  Ether CAT. Ether Net/IP	AP17	<b>AP4</b> 7
	Functional safety 2 STO   4 DI   2 DO   2 AI   1 AO FUNCTIONAL SAFETY		AP10	AP50
	Functional safety 2 STO   4 DI   2 DO   2 AI   1 AO RINGTONAL SAFETY	CANOPOR	AP21	AP51
	Functional safety 2 STO   4 DI   2 DO   2 AI   1 AO	PROFII®	AP25	AP55
	Functional safety 2 STO   4 DI   2 DO   2 AI   1 AO	Sercos the automation bus Ether CAT. Ether Net/IP	AP26	AP56

<sup>\*</sup> not with membrane keyboard DKx2

## Konfiguration

## **INVEOR MP**

Baugröße A-D (0,55 – 30 kW)



Item 8: Ηοι	Item 8: Housing configuration		
Size	Variant	without potentiometer	with potentiometer**
	Passive cooling type	GH02	GH01
	Passive cooling type, Quickon	GH43	GH42
A - C	Passive cooling type, brake resistor*	GH45	GH44
	Passive cooling type, brake resistor*, Quickon	GH49	GH48
A - B	Passive cooling type, Harting	GH41	GH40
A-D	Passive cooling type, brake resistor*, Harting	GH47	GH46
С	Active cooling type, brake resistor*	GH62	GH61
C - D	Active cooling type	GH09	GH06

⚠ Please remember that an adapter plate is needed for each device. Details on page 74 / 75.

<sup>\*\*</sup> not with DKx2

Item 9: Cover variant		DKxx	
Size	Variant	without main switch	with main switch***
A - D	Cover without controls	DK01	DK11
A-D	Cover with integrated MMI*	DK05	DK15
A - B	Cover with foil keypad and potentiometer**	DK02	DK12

<sup>\*</sup> Not in combination with accessory "Bluetooth Stick" - Mat. no. 10447294

<sup>\*</sup> only with LP02

<sup>\*\*</sup> Only in combination with a housing configuration without a potentiometer. Not in combination with standard application board and fieldbus. Details on **page 42** 

<sup>\*\*\*</sup> Only with OA1x

Item 10: Option module	OAxx	
no option module		OA00
Main switch (only with DK1X)		OA10
Brake module (brake rectifier)		OA30
Item 11: Model	COxx	
KOSTAL standard		CO00

 $\triangle$  For models with a customer label, please get in touch with your KOSTAL contact.

## INVEOR MPP



Equipment features from page 54

Order code from page 57

Configuration from page 59



## Equipment features

## at a glance for INVEOR MPP

The INVEOR MP Pump is equipped with many pump-specific functions. With the selection of an IO extension, the unit becomes even more flexible.

#### **Operation and observation**

	Availability
Soft-SPS. IEC 61131-3	
KOSTAL INVERTERpc Software	
KOSTAL INVERTERapp	
Potentiometer on device	
Integrated foli keypad with potentiometer*	•
Bluetooth module	•
Bluetooth stick	Zubehör
Integriertes MMI	•
MMI handheld controller	Zubehör
Touch operating terminal	Zubehör
Main switch (nur BG B-D)	-

<sup>\*</sup> only sizes A+B

Variant IO-extension	Standard (AP 70)	For CANopen (AP 71)
Modbus RTU		
CANopen		
Ethernet fieldbus (Profinet/Sercos III, Ethercat, Ethernet IP)	•	

### **Functions and characteristics**

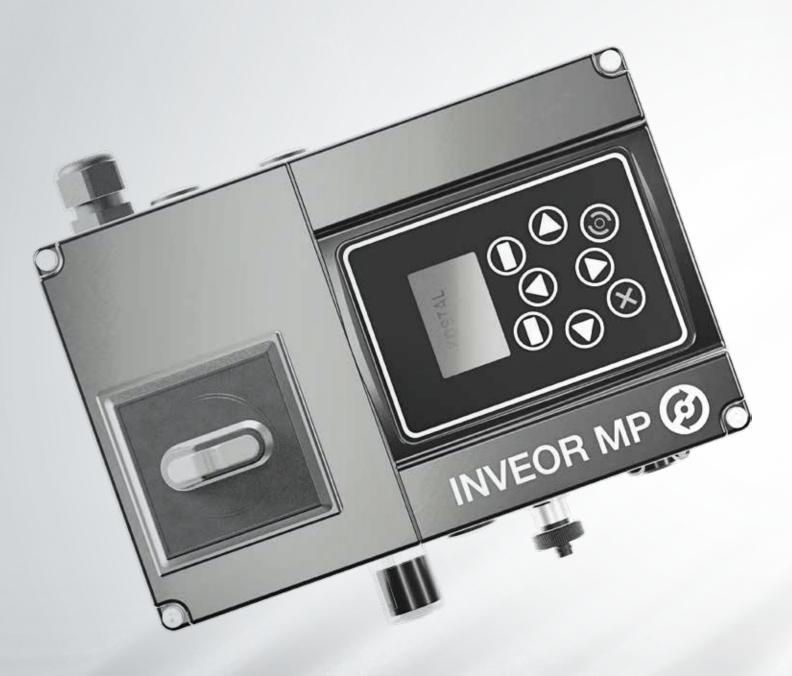
The possible functions and characteristics are shown below depending on the IO module selected.

	Availability
PID Regelung	••
Digital inputs	4
Digital outputs	1
Digital I/O (bidirectional)	2
Analogue inputs	2
Analogue I/O (bidirectional)	1
STO inputs	1
24 V power supply	
24 V supply for the control section card	••
10 V Power supply	**
Relay	2
Motor temperature evaluation	**
Multi-pump operation	
Pump display	
PT1000 temperature sensor	••
Vibration Monitoring	•
Brake chopper	•
Brake resistor	•

### **Housing versions and attachments**

Variant IO-extension	Standard (AP 70)	For CANopen (AP 71)
M12 plug for MMI, PC or Modbus		
M12 plug for CANopen		
Phoenix Quickon (Size A-C)		
Internal brake resistor		

## INVEOR MPP



## Order code

The INVEOR MPP order code comprises a total of 12 individual items. Each item determines one stage of the INVEOR MPP configuration relating to the various device characteristics.

Item	Code	
1	INV MP	INVEOR type Inverter, motor-integrated, Performance
2	х	<b>Size</b> A, B, C, D
3	VSxx	<b>Version</b> MPP
4	IVxx	Supply voltage 400 V
5	PWxx	Recommended motor rating 0.55 kW to 30 kW
6	LPxx	Power PCB with and without brake chopper
7	APxx	IO extension
8	GHxx	Housing configuration Cooling type, screw connections, potentiometer and attachments, plug
9	DKxx	Cover variant and controls
10	OAxx	<b>Option module</b> Main switch
11	lOxx	IO module Input/output configuration, Bluetooth, Field bus
12	СОхх	<b>Model</b> Standard or special model

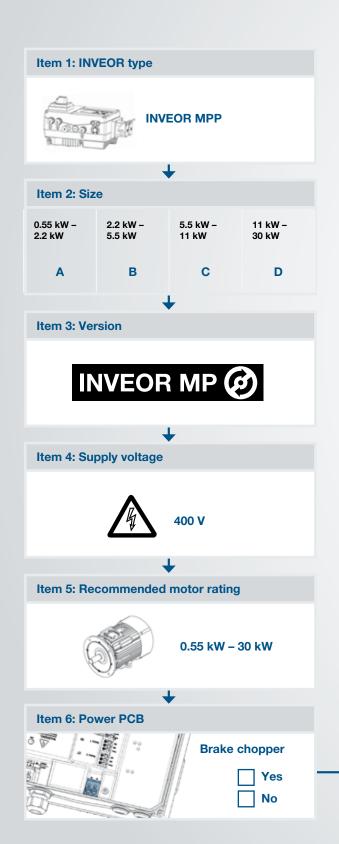
## Here you can configure the INVEOR and enter the order code:

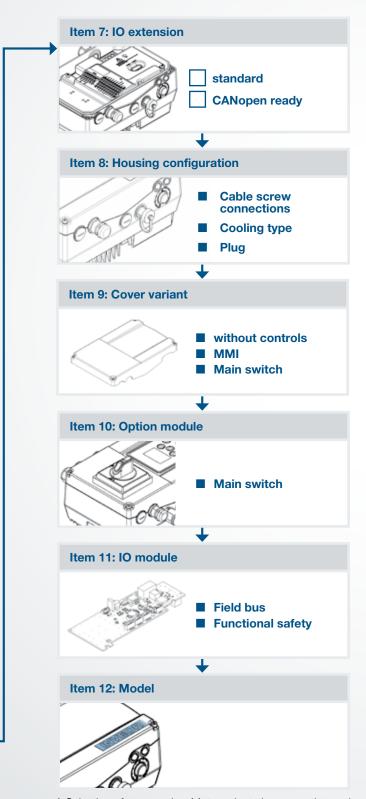
Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 9	Item 10	Item 12

## The route

## to your INVEOR MPP

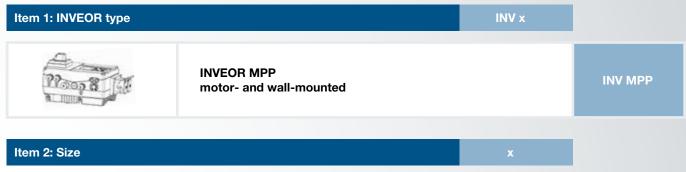
The route to your INVEOR MPP configuration is illustrated below. For each of the 12 items, you make a configuration decision, producing one part of the order code. Together all 12 sub-codes produce your total order code, clearly defining your INVEOR MPP.





A Selection of accessories: Motor adaptation, operation and observation, communication, additional accessories as of **page 72** 

# Configuration INVEOR MPP



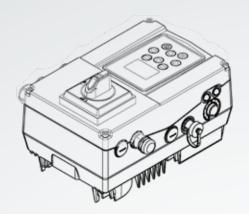
The motor rating is key to the choice of size.

Please select the power range into which your motor rating falls.

### Size selection

Size selection			
Motor rating		Size	Item number
0,55 kW – 2,2 kW	<b>→</b>	Α	12185010
2,2 kW – 5,5 kW	<del></del>	В	12185011
5,5 kW – 11 kW		С	12185012
11 kW – 30 kW	-	D	12185013
Item 3: Version		VSxx	
МРР			VS03
Item 4: Supply voltage		IVxx	
400 V			IV01

# Configuration INVEOR MPP Size A-D (0.55 – 30 kW)



Item 5: Rec	ommended motor ra	ting		PWxx	
Size	Power Class	Nominal current [A]*	Overload 60 sec.*	Overload 3 sec.*	
	0,55 kW	1,7	150%	200%	PW03
	0,75 kW	2,3	150%	200%	PW04
Α	1,10 kW	3,1	150%	200%	PW05
	1,50 kW	4,0	150%	200%	PW06
	2,20 kW LD*	4,8	110%	150%	PW46
	2,20 kW	5,6	150%	200%	PW07
	3,00 kW	7,5	150%	200%	PW08
В	4,00 kW	9,5	150%	200%	PW09
	5,50 kW LD*	11,0	110%	150%	PW49
	5,50 kW	13,0	150%	200%	PW10
С	7,50 kW	16,5	150%	200%	PW11
	11,0 kW LD*	22,0	110%	150%	PW51
	11,0 kW	28,0	150%	200%	PW12
	15,0 kW	34,0	150%	200%	PW13
D	18,5 kW	40,0	150%	200%	PW14
	22,0 kW	46,0	150%	200%	PW15
	30,0 kW LD*	60,0	110%	150%	PW55

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

<sup>\*</sup> LD = Low Duty, Details see data sheet

Item 6: Power PCB		LPxx	
without brake chopper			
with brake chopper (for connecting a brake resistor)			L
Item 7: IO extension	Fieldbus	APxx	
Standard - 4 DI   1 DO   2 DIO   2 AI   1 AIO   2 Relay*			A
prepared for CANopen - 4 DI   1 DO   2 DIO   2 AI   1 AIO   2 Relay**	CANOPER		А

<sup>\*</sup> Possible IO modules: all

<sup>\*\*</sup> Possible IO modules: IO03, IO13

Item 8: Hou	sing configuration	GHxx	
Size	Variant	with potentiometer in the lid**	with potentiometer in housing
	Passive cooling type	GH02	GH01
A D	Passive cooling type, Quickon	GH43	GH42
A - B	Passive cooling type, brake resistor*	GH45	GH44
	Passive cooling type, brake resistor*, Quickon	GH49	GH48
	Passive cooling type	-	GH01
	Passive cooling type, Quickon	-	GH42
С	Passive cooling type, brake resistor*	-	GH44
	Passive cooling type, brake resistor*, Quickon	-	GH48
	Active cooling type, brake resistor*	-	GH61
C - D	Active cooling type	-	GH06

only with LP02

⚠ Please remember that an adapter plate is needed for each device. Details on page 74 / 75

Item 9: Cov	er variant	DKxx	
A - B	Cover with foil keypad and potentiometer*	DK	02
В	Cover with main switch, foil keypad and potentiometer*	DK	12
A - D	Cover without controls	DK	01
A-D	Cover with integrated MMI**	DK	05
B - D	Cover with main switch (only with OA1X)	DK	11
	Cover with main switch, MMI (only with OA1X)**	DK	15

 $<sup>^{\</sup>star}~$  only in combination with a housing configuration without a potentiometer  $^{\star\star}$  Not in combination with accessory "Bluetooth Stick" – Mat. no. 10447294

Item 10: Option module	OAxx	
no option module	OA	.00
Main switch (only with DK1X)	OA	.10

## Item 11: IO module

Variant		Fieldbus		with 🚯
IO module 1 with M12 MMI plug			IO03	IO04*
IO module 1 with M12 MMI plug 1 M12 STO	SIL2 C		IO13	IO14*
IO module 1 with M12 MMI plug* Vibration Monitoring		PROFIT®	IO23	IO24
IO module 1 with M12 MMI plug* 1 M12 STO, Vibration Monitoring	SIL2 O	EtherNet/IP EtherCAT.	IO33	IO34

<sup>\*</sup> Not in combination with AP71

Item 12: Model	СОхх	
Selection of standard or special model		
KOSTAL standard	CO	00

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

only in combination with DK02 and DK12  $\,$ 

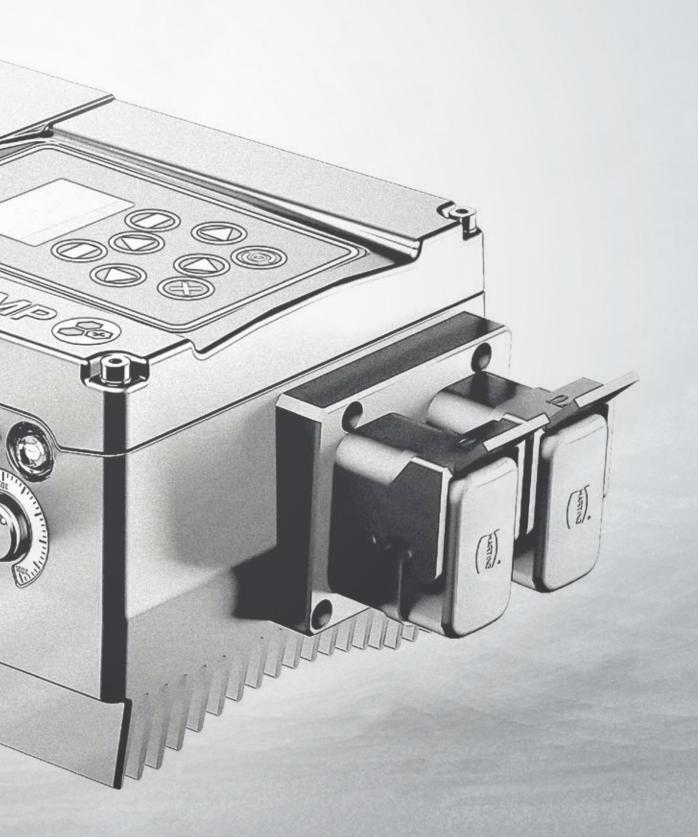
# INVEOR MPM



Equipment features from page 64

Order code from page 67

Configuration from page 69



# Equipment features at a glance for INVEOR MPM

The INVEOR MPM is equipped with a smart power stack, which reproduces key functions without additional equipment. By selecting an IO module, the device can be fitted with further options.

#### Application PCBs available per INVEOR size

For sizes A and B, there are optional IO modules available which open up additional equipment options. You will find these options in the following tables.

Size	with IO module with IO module 1		
Size A, 3Ph (0.55 kW - 2.2 kW)		•	
Size B, 3Ph (2.2 kW - 5.5 kW)			
Size C, 3Ph (5.5 kW – 11 kW)			
Size D, 3Ph (11 kW - 30 kW)		•	

#### **Operation and observation**

Model IO module	without IO module	with IO module 1
KOSTAL INVERTERpc software		
KOSTAL INVERTERapp		
Potentiometer on device		
Bluetooth module		
Bluetooth stick		
Integrated MMI		
MMI handheld controller		
Touch operating terminal		Accessories
Main switch		•
Brake module (brake rectifier)		

#### **Fieldbus options**

Without an IO module, either Modbus RTU or CANopen is available. With an IO module, more fieldbuses are available.

Variant	without IO module	with IO module 1
Modbus RTU / CANopen*	••	••
Modbus RTU		•
Ethernet fieldbus (Profinet / EthernetIP / EtherCAT)	•	•

<sup>\*</sup> optional and only with separate plug from the accessories

#### **Functions and characteristics**

The possible functions and characteristics are shown below depending on the IO module selected.

Variant	without IO module	with IO module 1
Digital inputs		3
Digital outputs		1
24 V voltage supply		••
24 V supply for the IO module *		
STO input		
STO diagnosis relay		•
Motor temperature evaluation		••

<sup>\*</sup> only with STO or fieldbu

### **Housing versions and attachments**

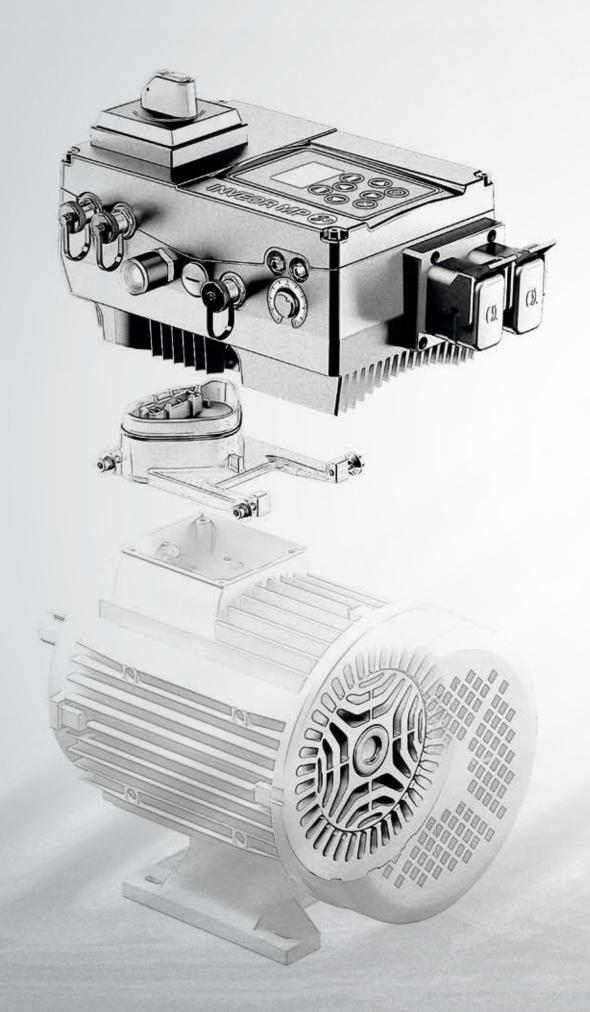
Variant	without IO module	with IO module 1
M12 plug for MMI, PC or Modbus	••	
M12 plug for CANopen	Accessories	
M12 IO plug (2 Items)*		
Harting plug (Han Q4/2, Size A-B)	•	
Phoenix Quickon (Size A-C)	•	•
Internal brake resistor	•	•

<sup>\*</sup> size A-C only in combination with Harting or Quickon

### **Power PCB card options**

INVEOR sizes	Α	В	С	D
Brake chopper	•	•	•	•

## INVEOR MPM



## Order code

The INVEOR MPM order code comprises a total of 12 individual items. Each item determines one stage of the INVEOR MPM configuration relating to the various device characteristics.

Item	Code	
1	INV MP	INVEOR type Inverter, motor-integrated, Performance
2	x	<b>Size</b> A, B, C, D
3	VSxx	<b>Version</b> MPM
4	IVxx	Supply voltage 400 V
5	PWxx	Recommended motor rating 0.55 kW to 30 kW
6	LPxx	Power PCB with and without brake chopper
7	APxx	Module carrier
8	GHxx	Housing configuration Cooling type, screw connections, potentiometer and attachments, plug
9	DKxx	Cover variant and controls
10	OAxx	<b>Option module</b> Brake module, main switch
11	IOxx	IO module Input/output configuration, Bluetooth, Field bus
12	СОхх	<b>Model</b> Standard or special model

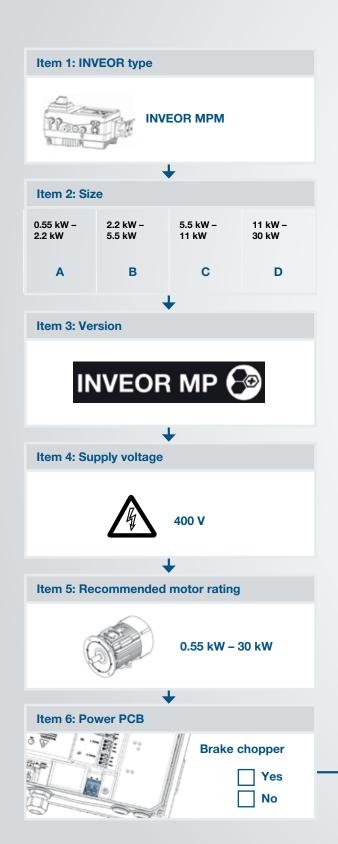
## Here you can configure the INVEOR and enter the order code:

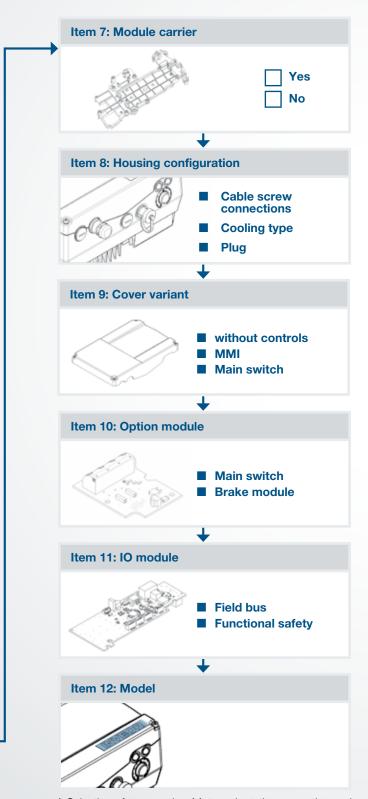
Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12

## The route

## to your INVEOR MPM

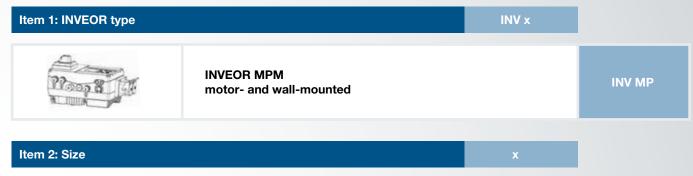
The route to your INVEOR MPM configuration is illustrated below. For each of the 12 items, you make a configuration decision, producing one part of the order code. Together all 12 sub-codes produce your total order code, clearly defining your INVEOR MPP.





A Selection of accessories: Motor adaptation, operation and observation, communication, additional accessories as of **page 72**.

# Configuration INVEOR MPM



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	Item number
0,55 kW – 2,2 kW	A	10352061
2,2 kW – 5,5 kW	В	10352062
5,5 kW – 11 kW	С	10352063
11 kW – 30 kW	D	10352064
Item 3: Version	VSxx	
МРМ		VS02
Item 4: Supply voltage	IVxx	
400 V		IV01

# Configuration INVEOR MPM Size A-D (0.55 – 30 kW)



### **Item 5: Recommended motor rating**

**PWxx** 

Size	Power Class	Nominal current [A]*	Overload 60 sec.*	Overload 3 sec.*	
	0.55 kW	1.7	150%	200%	PW03
	0.75 kW	2.3	150%	200%	PW04
Α	1.10 kW	3.1	150%	200%	PW05
	1.50 kW	4.0	150%	200%	PW06
	2.20 kW LD*	4.8	110%	150%	PW46
	2.20 kW	5.6	150%	200%	PW07
_	3.00 kW	7.5	150%	200%	PW08
В	4.00 kW	9.5	150%	200%	PW09
	5.50 kW LD*	11.0	110%	150%	PW49
	5.50 kW	13.0	150%	200%	PW10
С	7.50 kW	16.5	150%	200%	PW11
	11.0 kW LD*	22.0	110%	150%	PW51
	11.0 kW	28.0	150%	200%	PW12
D	15.0 kW	34.0	150%	200%	PW13
	18.5 kW	40.0	150%	200%	PW14
	22.0 kW	46.0	150%	200%	PW15
	30.0 kW LD*	60.0	110%	150%	PW55

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

<sup>\*</sup> LD = Low Duty, Details see data sheet

Item 6: Pow	er PCB	LPxx		
Size	Variant			
A - D	without brake chopper			
A-D	with brake chopper (for connecting a brake resistor)			
В	without brake chopper, heavy duty version		LP53	

### Item 7: Module carrier APxx

The module carrier is absolutely essential for the main switch, brake module or I/O module options

with module carrier (not with IO00, IO99)	AP00
without module carrier (only with OA00 and IO00, IO99)	AP90

Item 8: Hou	sing configuration	GHxx	
Size	Variant	without Potentiometer	with Potentiome
	Passiva cooling typo	GH02	GH01

	Size	Variant	without Potentiometer	with Potentiometer**
A -		Passive cooling type	GH02	GH01
	<b>^</b> C	Passive cooling type, brake resistor*	GH45	GH44
	A-C	Passive cooling type, Quickon, M12 IO**	GH53	GH52
		Passive cooling type, brake resistor*, Quickon, M12 IO**	GH57	GH56

Item 8: Housing configuration		GHxx	
Size	Variant	without potentiometer	with potentiometer**
A - B	Passive cooling type, Harting, M12 IO**	GH51	GH50
	Passive cooling type, brake resistor*, Harting, M12 IO**	GH55	GH54
С	Active cooling type	GH09	GH06
	Active cooling type, brake resistor*	GH62	GH61
D	Active cooling type	GH09	GH06
	Active cooling type, M12 IO**	GH64	GH63

<sup>\*</sup> only with LP02

⚠ Please remember that an adapter plate is needed for each device. Details on page 74 / 75.

Item 9: Cover variant	DKxx	
Cover without controls	DK	01
Cover with integrated MMI (not with IO00 - IO02, IO99)*	DK	05
Cover with main switch (only with OA1X)	DK	11
Cover with main switch, MMI (only with OA1X / not with IO00 - IO02, IO99)*	DK	15

<sup>\*</sup> Not in combination with accessory "Bluetooth Stick" - Mat. no. 10447294

Item 10: Option module	OAxx
------------------------	------

To select an option, the AP00 module carrier is required.

no option module	OA00
Main switch (only with DK1X)	OA10
Brake module (brake rectifier)	OA30
Main switch (only with DK1X) + brake module (Not with Ethernet fieldbus)	OA13

Item 11: IO module	IOxx
--------------------	------

Depending on the variant, the AP00 or AP90 module has to be configured.

Variant	Module	Field bus		with 🐉
without IO module	AP90	CANOPOR***	1000	-
without IO module with M12 MMI plug	AP90	CANOPOR***	1099	-
IO module 1 3DI* / 1DO* / 1 potentiometer**	AP00	CANOPOR***	IO01	IO02
IO module 1 with M12 MMI plug 3DI* / 1DO* / 1 potentiometer**	AP00	CANOPO®***	1003	IO04
IO module 1 with M12 MMI plug 1 M12 STO / 3DI* / 1DO* / 1 potentiometer**	AP00	CANOPO®***	IO13	IO14
IO module 1 with M12 MMI plug 3DI* / 1DO* / 1 Potentiometer**	AP00	PROFIT*	IO23	IO24
IO module 1 with M12 MMI plug 1 M12 STO / 3DI* / 1DO* / 1 potentiometer**	AP00	EtherNet/IP EtherCAT.	1033	IO34

<sup>\*</sup> can be done using M12 IO plugs (2 items), should also be configured via the GH feature. Details on page 64

<sup>\*\*\*</sup> CANopen can only be used with M12 plug in accessories item no. 10118224 and not in combination with Bluetooth IO02, IO04, IO14

Item 12: Model	COxx

Selection of standard or special model

KOSTAL standard CO00

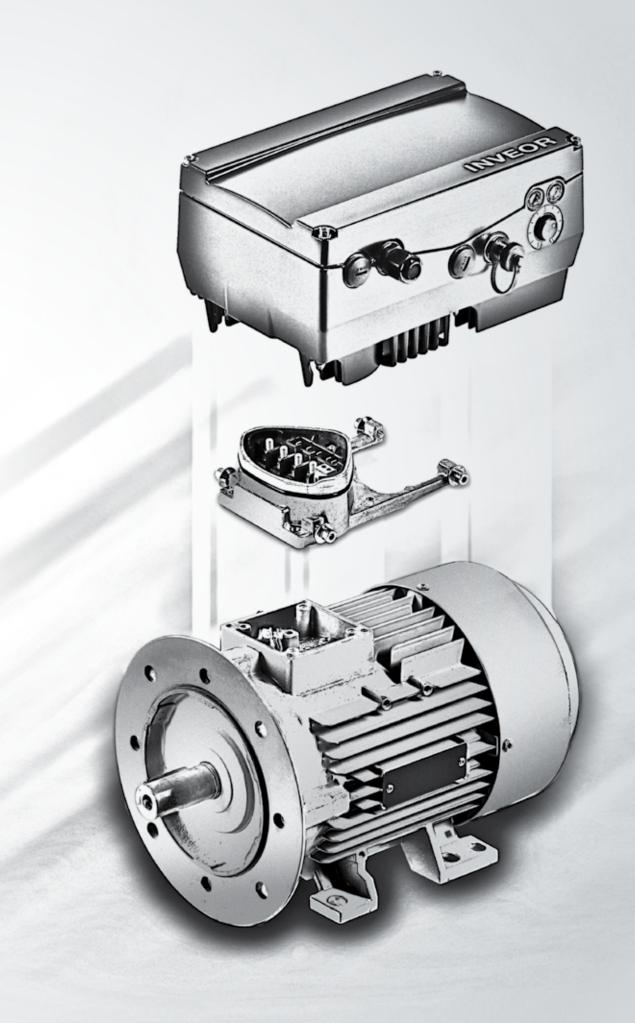
 $<sup>^{\</sup>star\star}$  not with IO00, IO99

<sup>\*\*</sup> The potentiometer should also be configured via the GH feature

## INVEOR

## Accessories

**Motor adaptation** 74 Operation and observation 76 Communication 77 fieldbus components **Brake resistors** 80 Specific accessories for INVEOR M α, INVEOR MPM 81 and INVEOR P 82 Small parts and attachments



### **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	Item number
									α	freely selectable*	10117052
									A INVEOR M	freely selectable*	10108906
									A INVEOR MP / MPM	freely selectable*	10506789
		(	depen	dent or	n moto	r			В	freely selectable*	10026184
									С	freely selectable*	10025632
									D	freely selectable*	10098202
									D HD model	freely selectable*	10145362

<sup>\*</sup> The hole pattern is produced by the customer and should therefore be flexibly adapted to the motor











### Mounting adapter plates on wall

	Motor size									
63	71	80	90	100	112	132	160	180	INVEOR size	Item number
									α	10117051
									A INVEOR M	10023107
									A INVEOR MP / MPM	10506806
		no	t depe	endent	on mo	tor			В	10026185
									C	10025932
									D	10098170
									D HD model	10340314











# 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	Item number
									α	51 x 51	M4	10117056
									A (INV M)	64×64	M4	10023843
									A (INV MPx)	64×64	M4	12212343
									В	64×64	M4	10114861
									В	105×105	M5	10091120
									С	105×105	M5	10106344
									С	125×125	M5	10025933
									D	125×125	M5	10107137
									D	150×150	M5	10101828

# Adapter plate for motors 1LE1...1

	Motor size												
63	71	80	90	100	112	132	160	180	200	INVEOR size	Hole pattern [mm] Terminal box holder	Thread	Item number
										α	47 x 22	M4	10117054
										A (INV M)	47 x 22	M4	10112586
		•	•							A (INV MP / MPx)	47×22	M4	10516595
										В	47 x 22	M4	10175186
										В	75×75	M4	10096094
										С	75×75	M4	10108013
										С	90×90	M4	10096099
										D	90×90	M4	10098193
										D	100×100	M5	10101827
										D	80x 80	M6	10529838

# 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	Item number ADP
									A (INV M)	54×54	M5	10112914
									A (INV MPx)	54×54	M5	12212635
									A (INV M)	60×60	M5	10112915
									A (INV MPx)	60×60	M5	12212638
									В	60×60	M5	10112916
									В	68×68	M5	10112918
									С	68×68	M5	10112921
									D	102×102	M6	10130526

# Operation and observation

	Description	Item number
	INVEOR M cover size A without label, including cover screws	10116057
	INVEOR M cover size B without label, including cover screws	10116058
	INVEOR M cover size C without label, including cover screws	10116059
	INVEOR M cover size D without label, including cover screws	10116060
	INVEOR M cover size A with foil keypad + potentiometer without label, neutral foil keypad, including cover screws	10116583
	INVEOR M cover size B with foil keypad + potentiometer without label, neutral foil keypad, including cover screws	10116584
	INVEOR M cover size C with foil keypad + potentiometer without label, neutral foil keypad, including cover screws	10116585
	INVEOR M cover size D with foil keypad + potentiometer without label, neutral foil keypad, including cover screws	10116586
	INVEOR M cover size A with integrated MMI without label, including cover screws	10174751
	INVEOR M cover size B with integrated MMI without label, including cover screws	10174752
	INVEOR M cover size C with integrated MMI without label, including cover screws	10174753
	INVEOR M cover size D with integrated MMI without label, including cover screws	10174754
No control	MMI handheld controller including 3 m connection cable RJ9 on M12 plug	10004768
	<b>Programming and diagnosis cable 2m</b> for PC, USB on M12 plug, RS485 with integrated converter	10023950
	Bluetooth stick for M12 service interface for wireless communication with mobile devices (Cannot be used in combination with cover variants DK05, DK15 applicable)	10447294
	Touch operating terminal (Modbus RTU) 7" TFT LCD Touch Screen 16M Color 600MHz RISC CPU Ethernet	10507912

# **Communication fieldbus components**

# RS485 fieldbus components /Modbus RTU/Touch operating terminal

	Description	Item number
	M12 connecting cable 2 m M12 plug on M12 coupling / RS485 / 4-pin / 2 m / A-coded	10272382
	M12 connecting cable 5 m M12 plug on M12 coupling / RS485 / 4-pin / 5 m / A-coded	10272793
UUU F F G G	M12 connection cable open 2 m M12 plug / open / RS485 / 4-pin / 2 m / A-coded	10272795
	M12 connection cable open 10 m M12 plug / open / RS485 / 4-pin / 10 m / A-coded	10272794
42 42	M12 connection cable open 2 m M12 coupling / open / RS485 / 5-pin / 2 m / A-coded	10138807
42	M12 connection cable open 10 m M12 coupling / open / RS485 / 5-pin / 10 m / A-coded	10138809
	M12 T-splitter M12 plug on plug and socket / RS485 / 4-pin / A-coded	10272829
00 00 00 00 00 00 00 00 00 00 00 00 00	M12 plug can be self-assembled M12 plug / RS485 / 4-pin / A-coded	10137294
SW III mm	M12 coupling can be self-assembled M12 coupling / RS485 / 4-pin / A-coded	10272796
	M12 terminating resistor 120 Ohm M12 plug / RS485 / 5-pin / A-coded	10343387
	<b>D-SUB bus plug</b> D-SUB bus plug with screw connection, RS485, 9-pin Socket	10519423

<sup>⚠</sup> Please talk to your KOSTAL contact regarding precise batch sizes of individual accompanying items. Illustrations may deviate from the original.

# **CANopen fieldbus components**

	Description	Item number
1000 1000 1000 1000 1000 1000 1000 100	M12 connecting cable 2 m M12 plug on M12 coupling / CANopen / 5-pin / 2 m / A-coded	10138812
42 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	M12 connecting cable 5 m M12 plug on M12 coupling / CANopen / 5-pin / 5 m / A-coded	10138813
48,6	M12 connection cable open 2 m M12 plug / open / CANopen / 5-pin / 2 m / A-coded	10138804
48,6	M12 connection cable open 10 m M12 plug / open / CANopen / 5-pin / 10 m / A-coded	10138806
42 42	M12 connection cable open 2 m M12 coupling / open / CANopen / 5-pin / 2 m / A-coded	10138807
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	M12 connection cable open 10 m M12 coupling / open / CANopen / 5-pin / 10 m / A-coded	10138809
	M12 Y-splitter M12 coupling on plug and coupling / CANopen / 5-pin / A-coded	10138791
2020	M12 plug can be self-assembled M12 plug / CANopen / 5-pin / A-coded	10138799
7 1 X 2 M 18 em	Coupling can be self-assembled M12 coupling / CANopen / 5-pin / A-coded	10138801
36,2 000 0,5 4	M12 terminating resistor M12 coupling / CANopen / 5-pin / A-coded	10138793

# **PROFIBUS** fieldbus components

	Description	Item number
45,4. 1 45,4. 1 1 2 35 57,3. 1	M12 connecting cable 2 m M12 plug on M12 coupling / PROFIBUS / 5-pin / 2 m / B-coded / colour: purple	10272791
45.4 i i i i i i i i i i i i i i i i i i i	M12 connecting cable 5 m M12 plug on M12 coupling / PROFIBUS / 5-pin / 5 m / B-coded / colour: purple	10272792
000 M M S S S S S S S S S S S S S S S S	M12 connection cable open 2 m M12 plug / open / PROFIBUS / 5-pin / 2 m / B-coded / colour: purple	10272786
000 M M S S S S S S S S S S S S S S S S	M12 connection cable open 10 m M12 plug / open / PROFIBUS / 5-pin / 10 m / B-coded / colour: purple	10272789
45,4	M12 connection cable open 2 m M12 coupling / open / PROFIBUS / 5-pin / 2 m / B-coded / colour: purple	10272790
45,4	M12 connection cable open 10 m M12 coupling / open / PROFIBUS / 5-pin / 10 m / B-coded / colour: purple	10272385
	M12 Y-splitter M12 plug on coupling and plug / PROFIBUS / 4-pin / B-coded P PROFIBUS Y-Stück 0798540	10272780
00 SW 18 mm	M12 plug can be self-assembled M12 plug / PROFIBUS / 5-pin / B-coded	10272785
57 SW 18 mm	M12 coupling can be self-assembled M12 coupling / PROFIBUS / 5-pin / B-coded	10272387
36,2	M12 terminating resistor M12 plug / PROFIBUS / B-coded	10272784

# EtherCAT, PROFINET, Sercos III, Ethernet IP

	Description	Item number
	M12 connecting cable 2 m M12 plug / RJ45 plug / 4-pin / 2 m / D-coded / colour: green	10138814
W 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	M12 connecting cable 5 m M12 plug / RJ45 plug / 4-pin / 5 m / D-coded / colour: green	10138847
	M12 connecting cable 2 m M12 plug / M12 plug / 4-pin / 2 m / D-coded / colour: green	10138848
w 1 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	M12 connecting cable 5 m M12 plug / M12 plug / 4-pin / 5 m / D-coded / colour: green	10138849

### **Brake resistors**

	Description	Power [W]	ED [%]	Item num- ber
913 0 018	INVEOR M/P brake resistor	550 750	13.60 10.00	
and the same of th	Size A 100 W, 100 $\Omega$ , IP65, connection cable	1,100	6.80	10138851
The state of the s	510 mm, L=110 mm W=80 mm H=15 mm	1,500	5.00	
	INVEOR M/P brake resistor	2,200	9.00	
Parameter Commence	Size B	3,000	6.66	10138852
in the second se	200 W, 50 Ω, IP65, connection cable 510 mm, L=216 mm W=80 mm H=15 mm	4,000	5.00	
	INVEOR M/P brake resistor	5,500	4.3 / 7.3*	
	Size C 240 W or 400 W*, 72 Ω, IP65, connection cable 510 mm, L=216 mm W=80 mm H=30 mm	7,500	3.2 / 5.3*	10138853
	INVEOR M/P brake resistor	11,000	4.4 / 7.2*	2 x 10138853
	Size D	15,000	3.2 / 5.3*	
	2 x 240 W or 2 x 400 W*, 2 x 72 Ω, IP65,	18,500	2.6 / 4.3*	
S. A. M. 150	connection cable 510 mm, 2 x L=216 mm W=80 mm H=30 mm	22,000	2.2 / 3.6*	

### (\*) without UL

	Description	Item number
	Brake resistors with mounting frame Assembly kit for INVEOR M size C including 2 x 100 $\Omega$ brake resistor, mounting frame, screws	10121035
135 500+/30	PTC brake resistor Self-protecting, 70 W, 175 $\Omega$ , IP20, Connection cable 500 mm, L=115 mm W=34 mm H=10.5 mm	10268264

80

### Specific accessories for INVEOR M $\alpha_{\mbox{\tiny N}}$ MPM and INVEOR P

Description	Typ / Size	Item number
Screw connections Screw connections (2x M16) and blind plugs (2x M16 black, 1x M16 transparent)	<b>INVEOR M</b> Size α	10118230
Screws 4x cooling element screws + 1x ground screw	<b>INVEOR M</b> Size α	10118227
Terminals Plug terminals for connecting mains cable and motor supply cable/PTC including jumper	<b>INVEOR M/P</b> Size α	10118222
Cable set Cable set for extending the motor connection (including crimp material)	<b>INVEOR M/P</b> Size α	10118226
Adapter for jack plug on M12 Adapter for jack plug on M12 for MMI/PC cable connection	<b>INVEOR M/P</b> Size α	10118219
M12 screw-in coupling MMI/ PC / Modbus/IO plug M12 screw-in coupling on JST 4-pin, A-coded, cable length 240 mm, M16 x 1.5, in- cluding captive protective cap	INVEOR M Size α  NVEOR MPM Size A-D  INVEOR P Size 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	INVEOR M Size α INVEOR P Size α to D	10118232
M12 screw-in plug CANopen M12 screw-in plug on JST 3-pin, for CANopen connection, A-coded, cable length 110 mm, M16 x 1.5, including captive protective cap	INVEOR M Size α  NVEOR MPM Size A-D  INVEOR P Size α to D	10118224
M12 screw-in coupling PROFIBUS M12 screw-in coupling on 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 screw-in coupling EtherCAT / PROFINET / Sercos III M12 screw-in coupling on 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 cold plate to thermal sink, contents 5 ml	<b>INVEOR P</b> Sizes α to D	10139778

### **Small parts and attachments**

	Description	Item number
es cess	Brake module for INVEOR M to control a mechanical brake on the motor end, including retaining plate, screws, varistor  Not in combination with size α or the basic application circuit board	10136409
	M16 aeration element M16x1.6, material: PA 6 housing, ventilation element Acrylic Co-Polymer on Nylon Support, Chloroprene seal	10142939
600000000000000000000000000000000000000	Sealing set for cups INVEOR size D O-ring, flat seal, 2x retaining bolts with spring ring	10253835
	Fan unit with retaining bolts for size D	10142453
	Screws for adapter plates for INVEOR size A / B / C 4x retaining bolt for adapter plate, 1x ground screw with spring ring Accessories. Inveor MABC Bef. BGR	10072211
	Insert for adapter plate BG A for INVEOR MP family For converting motor-specific adapter plates of the INVEOR M family	10538853

# Your smart connection to us

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