

Performance Inverter P2

Excellent usability, high performance
inverters for advanced motor control



“ High performance, excellent usability and flexible to meet the needs of your application

▶ IP55

▶ Keyhole mounts for fast installation

▶ Modbus RTU and CANopen on board as standard

▶ Integrated brake transistor

▶ High-quality long-life fans

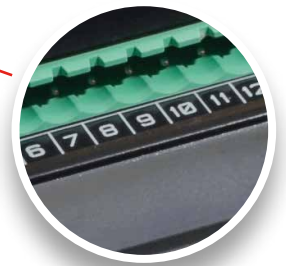
▶ Integrated EMC filter

▶ Integrated cable management

▶ Multi language OLED display for instance Swedish

▶ Pluggable control terminals

▶ Plug-in modules





▶ IP20

▶ Keyhole mounts for fast installation



▶ DIN rail mount

▶ Convenient reference card

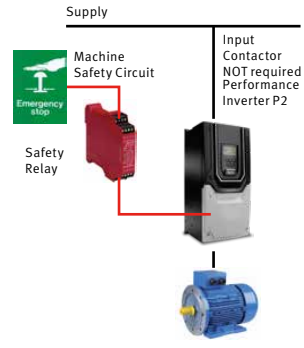
▶ Contactor-style power wiring arrangement

Safe torque off (provided as standard)

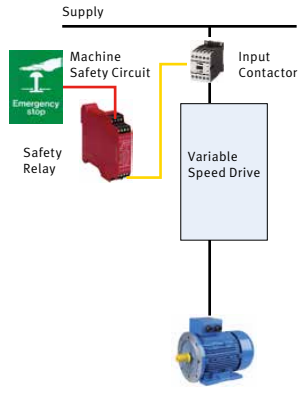
Performance Inverter P2 features a safe torque off function to allow simple integration into machine critical safety circuits.

- Simple machine design reduces component costs, saves panel space and minimizes installation time
- Faster shut down and reset procedures reduce system maintenance time
- Better safety standard compared to mechanical solution
- Better motor connection
- Single cable with no interruption

With



Without





“ World leading control for the latest generation of permanent magnet and standard induction motors

World leading motor control

The Performance Inverter P2 offers the perfect combination of high performance together with ease of use to allow even the most demanding applications to be tackled easily.

- Designed for fast installation and commissioning, Performance Inverter P2 provides the most cost effective solution for industry.
- All Performance Inverter P2 units provide 150% overload for 60 seconds as standard, 200% overload for 2 seconds, ensuring each drive is suitable for heavy duty applications, whilst the IP55/IP66 enclosed versions ensure the drive is tough enough to survive in industrial environments.
- Extensive I/O and communications interface capabilities ensure the drive can be integrated quickly and efficiently into a wide variety of control systems with the minimum commissioning time, ensuring rapid start-up. The simple parameter structure and carefully selected factory parameter settings ensure that commissioning time is kept to a minimum.



Compliant with international standards.

Drive system efficiency

The **blue line** represents what will be considered a “high efficiency” solution using an efficient IM motor, a modern AC drive and efficient gearbox.

The **purple line** represents efficiency of a typical PM motor and drive solution. Efficiency is improved at high speeds and loads, however it is actually reduced at very low loads, and output torque cannot be maintained at low speeds.

The **green line** represents the Performance Inverter P2 controlling the same PM motor. Efficiency is improved at all speeds and loads.

In simple terms, Performance Inverter P2 PM motor control produces the maximum amount of output shaft torque per electrical kW consumed across all speed and torque ranges.

Advanced motor control

- Beijer Electronics provides developed advanced mathematical algorithms and uses the very latest hardware technology to ensure Performance Inverter P2 provides exceptional motor control with a simple interface to help users easily apply the benefits to their applications.



▶ IP55

Wall mount units available up to 160 kW



▶ IP66

Wall mount units available up to 7.5 kW



▶ IP20

Din-rail units available up to 11 kW

Drive system efficiency

With today's ever increasing energy costs, efficiency is a key factor in relation to drive system component selection. In many cases, an efficiency figure can be arrived at by simply multiplying the efficiencies of the various components together to find a combined efficiency figure, however this may not tell the whole story. The efficiency of components such as drives, motors and gearboxes can vary considerably with speed and load, hence simply combining the 'headline' efficiency figures can often be very misleading. In reality, the efficiency curves for the whole system should be overlaid, to provide a true efficiency figure for the system across the desired speed and load range.

Modern AC inverters will typically have an electrical efficiency of around 98%, which represents the difference between the electrical output power compared to electrical input power only. A further factor that is often overlooked is the efficiency of the motor control strategy employed by the drive. This can have a significant effect on the overall system efficiency and is often not considered when energy saving calculations are made.

Future-proof energy efficiency

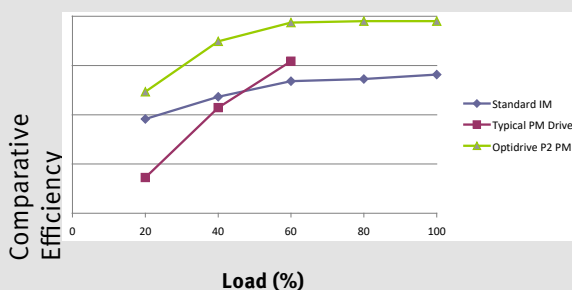
Performance Inverter P2 has been designed and developed to work with both standard induction motors, which typically meet the IE2 efficiency standards currently in place in Europe, and the latest generation of high efficiency PM motors designed to meet the future IE4 requirements. This means that an efficient drive can now be purchased, allowing for a future update of the motor without requiring a change to the installed drive.

Performance Inverter P2 works with all PM motors, controlling them with optimum efficiency for the most efficient PM motor control available.

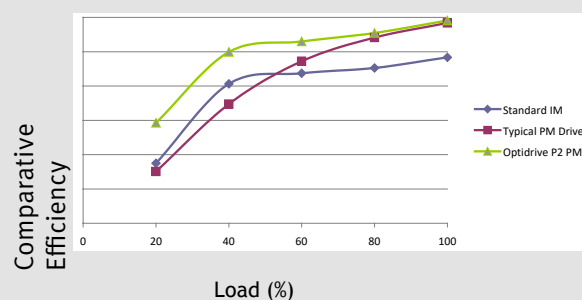
The graphs below clearly demonstrate these factors:

- The overall efficiency of the system varies with speed and load and is not a constant.
- Motor control efficiency significantly affects overall system efficiency.
- The graphs are generated by measuring the electrical power drawn from the mains supply compared to the torque generated at the output shaft. These are based on a system requirement of 2.2kW motor power generated at the output shaft. These are based on a system requirement of 2.2kW motor power.

Improvement in efficiency at 10% rated speed output



Improvement in efficiency at 100% rated speed output





“ High performance, accurate motor control for even the most demanding of applications



Mining & quarrying

- Feed conveyers
- Crushers
- Cranes



Metals & processing

- Grinding
- Cutting
- Polishing
- Drilling
- Rolling



Rubber & plastics

- Extruders
- Moulding
- Mixers
- Winding



Food & beverage

- Conveyers
- Pumps
- Mixers
- Palletizers



Cranes

Requirements:

- High starting torque
- Smooth motor operation throughout starting and stopping phases
- Motor holding brake control
- Avoidance of load droop and sag
- Regeneration and braking capability during load lowering

Performance Inverter P2 provides:

- Dedicated hoist mode operation with motor holding brake control algorithm
- Up to 200% torque from zero speed in vector operation without encoder feedback
- Multiple preset speed or variable speed operation
- Built-in dynamic braking transistor, requires only an external resistor

Compressors

Requirements:

- Precise regulation of speed to ensure a consistent end product
- High starting torque demand in many applications
- Maximum efficiency under all conditions
- Safe operation to prevent accidents and injuries

Performance Inverter P2 provides:

- PM motor control mode to allow open loop operation with permanent magnet motors for maximum efficiency
- Maximum starting torque with standard AC motors
- Better than 0.5% speed holding accuracy in open loop vector operation
- Dedicated safe torque off input complies with EN62061 SIL level 2 for safe operation

Winding

Requirements:

- Precise control of motor torque over a broad speed range
- Accurate control of material tension under all conditions
- Open or closed loop control capability, based on tension feedback or winding diameter
- Web break protection in case of material breakage

Performance Inverter P2 provides:

- PID closed loop tension control with feedback from a load cell or dancer arm
- Open loop vector control provides optimum control of the output torque level
- Encoder feedback option allows for a very wide speed range, even down to zero speed
- Safe torque off input immediately disables the drive in emergency conditions



“ Modbus RTU and CANopen on board as standard

Plug-in option modules



Expansion modules

Extended functionality

Encoder feedback

- Closed loop encoder feedback, compatible with a wide range of incremental encoders

Extended I/O

- Additional 3 digital inputs and 1 digital output
- Additional 3 relay output

Fieldbus interfaces - Communication options

Profibus DP



DeviceNet



Ethernet IP



Profinet



Modbus TCP



Ethercat



CC-link





“ A range of external EMC filters, brake resistors, input chokes and output filters are available, to suit all installation requirements

BFI Tools



Powerful PC software

Drive commissioning and parameter backup

- Real-time parameter editing
- Drive network communication
- Parameter upload, download and storage
- Simple PLC function programming
- Parameter upload, download and storage
- Real time scope function and data logging
- Real time data monitoring

Compatible with Windows XP, Windows Vista & Windows 7, Windows 8, Windows 8.1, Windows 10.

Smartstick



 **Bluetooth®**

Rapid commissioning

- Allows rapid copying of parameters between multiple drives
- Provides Bluetooth wireless interface to a PC running BFI Tools or the BFI-Tools Mobile app on a smartphone
- Onboard NFC (Near Field Communication) for rapid data transfer

Order number	Description	Part Number
BFI-P2 Input 1-phase 200-240 VAC, Output 3-phase, IP20, EMC-filter, LED, Braketransistor		
BFI-P2-22-0043-1F42-SN	0,75kW, 4, 3A, Size 2	60101
BFI-P2-22-0070-1F42-SN	1,5kW, 7A, Size 2	60102
BFI-P2-22-0105-1F42-SN	2,2kW, 10,5A, Size 2	60103
BFI-P2 Input 1-phase 200-240 VAC, Output 3-phase, IP66, EMC-filter, OLED, Braketransistor		
BFI-P2-22-0043-1F4X-TN	0,75kW, 4, 3A, Size 2	60111
BFI-P2-22-0070-1F4X-TN	1,5kW, 7A, Size 2	60113
BFI-P2-22-0105-1F4X-TN	2,2kW, 10,5A, Size 2	60115
BFI-P2 Input 1-phase 200-240 VAC, Output 3-phase, IP66, EMC-filter, OLED, Braketransistor, Main switch, Handcontrol		
BFI-P2-22-0043-1F4Y-TN	0,75kW, 4, 3A, Size 2	60121
BFI-P2-22-0070-1F4Y-TN	1,5kW, 7A, Size 2	60123
BFI-P2-22-0105-1F4Y-TN	2,2kW, 10,5A, Size 2	60125
BFI-P2 Input 3-phase 200-240 VAC, Output 3-phase, IP20, EMC-filter, Braketransistor		
0,75 to 45 kW. Contact Beijer for more information.		
BFI-P2 Input 3-phase 200-240 VAC, Output 3-phase, IP66, EMC-filter, OLED, Braketransistor		
0,75 to 4 kW. Contact Beijer for more information.		
BFI-P2 Input 3-phase 200-240 VAC, Output 3-phase, IP66, EMC-filter, OLED, Braketransistor, Main switch, Handcontrol		
0,75 to 4 kW. Contact Beijer for more information.		
BFI-P2 Input 3-phase 200-240 VAC, Output 3-phase, IP55, EMC-filter, OLED, Braketransistor		
5,5-75 kW. Contact Beijer for more information.		
BFI-P2 Input 3-phase 380-480 VAC, Output 3-phase, IP20, EMC-filter, Braketransistor		
BFI-P2-24-0022-3F42-SN	0,75kW, 2,2A, Size 2, LED	60200
BFI-P2-24-0041-3F42-SN	1,5kW, 4,1A, Size 2, LED	60201
BFI-P2-24-0058-3F42-SN	2,2kW, 5,8A, Size 2, LED	60202
BFI-P2-24-0095-3F42-SN	4kW, 9,5A, Size 2, LED	60203
BFI-P2-24-0140-3F42-SN	5,5kW, 14A, Size 3, LED	60204
BFI-P2-24-0180-3F42-SN	7,5kW, 18A, Size 3, LED	60205
BFI-P2-24-0240-3F42-SN	11kW, 24A, Size 3, LED	60206
BFI-P2-44-0300-3F42-MN	15kW, 30A, Size 4, TFT	60207
BFI-P2-44-0390-3F42-MN	18kW, 39A, Size 4, TFT	60208
BFI-P2-44-0460-3F42-MN	22kW, 46A, Size 4, TFT	60209
BFI-P2-54-0610-3F42-MN	30kW, 61A, Size 5, TFT	60290
BFI-P2-54-0720-3F42-MN	37kW, 72A, Size 5, TFT	60291
BFI-P2-64-0900-3F4N-MN	45kW, 90A, Size 6A, TFT	60292
BFI-P2-64-1100-3F4N-MN	55kW, 110A, Size 6A, TFT	60293
BFI-P2-64-1500-3F4N-MN	75kW, 150A, Size 6B, TFT	60294
BFI-P2-64-1800-3F4N-MN	90kW, 180A, Size 6B, TFT	60295
BFI-P2-84-3700-3F42-TN	200kW, 370A, Size 8, OLED	60265
BFI-P2-84-4500-3F42-TN	250kW, 450A, Size 8, OLED	60268
BFI-P2 Input 3-phase 380-480 VAC, Output 3-phase, IP66, EMC-filter, OLED, Braketransistor		
BFI-P2-24-0022-3F4X-TN	0,75kW, 2,2A, Size 2	60211
BFI-P2-24-0041-3F4X-TN	1,5kW, 4,1A, Size 2	60213
BFI-P2-24-0058-3F4X-TN	2,2kW, 5,8A, Size 2	60215
BFI-P2-24-0095-3F4X-TN	4kW, 9,5A, Size 2	60217
BFI-P2-24-0140-3F4X-TN	5,5kW, 14A, Size 3	60219
BFI-P2-24-0180-3F4X-TN	7,5kW, 18A, Size 3	60221
BFI-P2 Input 3-phase 380-480 VAC, Output 3-phase, IP66, EMC-filter, OLED, Braketransistor, Main switch, Handcontrol		
BFI-P2-24-0022-3F4Y-TN	0,75kW, 2,2A, Size 2	60271
BFI-P2-24-0041-3F4Y-TN	1,5kW, 4,1A, Size 2	60273
BFI-P2-24-0058-3F4Y-TN	2,2kW, 5,8A, Size 2	60275
BFI-P2-24-0095-3F4Y-TN	4kW, 9,5A, Size 2	60277
BFI-P2-24-0140-3F4Y-TN	5,5kW, 14A, Size 3	60279
BFI-P2-24-0180-3F4Y-TN	7,5kW, 18A, Size 3	60281
BFI-P2 Input 3-phase 380-480 VAC, Output 3-phase, IP55, EMC-filter, OLED, Braketransistor		
BFI-P2-44-0240-3F4N-TN	11kW, 24A, Size 4	60223
BFI-P2-44-0300-3F4N-TN	15kW, 30A, Size 4	60225
BFI-P2-44-0390-3F4N-TN	18kW, 39A, Size 4	60227
BFI-P2-44-0460-3F4N-TN	22kW, 46A, Size 4	60229
BFI-P2-54-0610-3F4N-TN	30kW, 61A, Size 5	60231
BFI-P2-54-0720-3F4N-TN	37kW, 72A, Size 5	60233
BFI-P2-64-0900-3F4N-TN	45kW, 90A, Size 6	60237
BFI-P2-64-1100-3F4N-TN	55kW, 110A, Size 6	60241
BFI-P2-64-1500-3F4N-TN	75kW, 150A, Size 6	60245
BFI-P2-64-1800-3F4N-TN	90kW, 180A, Size 6	60249
BFI-P2-74-2020-3F4N-TN	110kW, 202A, Size 7	60253
BFI-P2-74-2400-3F4N-TN	132kW, 240A, Size 7	60257
BFI-P2-74-3020-3F4N-TN	160kW, 302A, Size 7	60261

Order number	Description	Part Number
Internal Options		
ABCC-ECT	EtherCat 2-port Module	63163
ABCC-EIT_2P	Modbus TCP 2 port Module	63165
ABCC-PRT_2P	Profinet 2 port Module	63164
ABCC-EIPT_2P	Ethernet IP 2 port Module	63122
ABCC-DPVI-2	Profibus DP D-sub Module	63142
ABCC-DEV-2	Devicenet Module	63120
ABCC-CCL	CC-Link Module	63250
OPT-2-EXTIO-BFI	Extended I/O, 3 digital inputs, 1 relay output	63123
OPT-2-CASCD-BFI	Extended Relay, 3 relay outputs	63119
OPT-2-ENCOD-BFI	TTL Encoder Module, 5 VDC	63121
OPT-2-ENCHT-BFI	TTL Encoder Module, 12-30 VDC	63170
OD-BR100-BFI	Internal Brakeresistor for IP20, 100ohm, 200W	63101
OD-BRES4-BFI	Internal brake resistor, 33 ohm, 500W, IP55, Size 4 and 5	63230
External Options		
OPT-BR050-IN-I55-BFI	External Brake resistor, IP55, 50 ohm, 200 W	63231
OPT-2-ISOL4-BFI	Isolator Switch Box, Size 4	63150
OPT-2-ISOL5-BFI	Isolator Switch Box, Size 5	63151
OPT-2-OPPAD-BFI	OLED Remote External Keypad	63201
OPT-2-OPORT-BFI	Basic External Keypad, 5 digits	63141
OPT-3-STICK-BFI	BFI SmartStick Bluetooth, Copy/Paste Parameters/PLC-program, Supports Smartphones and BFI-Tools on Windows 10	63489
OPT-3-WLKIT-BFI	BFI SmartStick Bluetooth, Copy/Paste Parameters/PLC-program, Supports Smartphones and BFI-Tools on Windows 7, 8, 10	63490
OPT-3-PCKIT-BFI	BFI SmartStick Bluetooth, Copy/Paste Parameters/PLC-program, Supports Smartphones and BFI-Tools on Windows 7, 8, 10, NFC	63491
OPT-I4505-BFI	RS-485 Data Cable 0,5m	63144
OPT-I4510-BFI	RS-485 Data Cable 1,0m	63145
OPT-I4530-BFI	RS-485 Data Cable 3,0m	63146
OPT-2-I45SP-BFI	RS485 Serial communication Data Cable 2-port Splitter for BFI-P2, BFI-H3, BFI-E3 for Modbus RTU and CANopen	63148
OPT-2-RJTRM-BFI	RJ-45 End termination plug for CANopen and Modbus RTU communication with BFI	63202
CAB113	3m cable with 9-pole D-sub and RJ-45 between X2 HMI and BFI-H3/P2/E3 for Modbus RTU communication*	660000290
CAB114	3m cable for screwterminals and RJ-45 between PLC and BFI-H3/P2/E3 for Modbus RTU communication	660000291
CAB115	3m cable with USB and RJ45 (RS485) between PC and BFI-H3/P2/E3 for BFI-Tools	660000292
CAB154	3m cable with 9-pole D-sub and RJ-45 between X2 control, BFI-H3/P2/E3 for CANopen communication	100-1179
CAB 155	3m cable for screwterminals and RJ-45 between PLC and BFI-H3/P2/E3 for CANopen communication	100-1180
BFI-Tools PLC-licence	BFI-Tools PLC-licence	63300

NOT TO SCALE

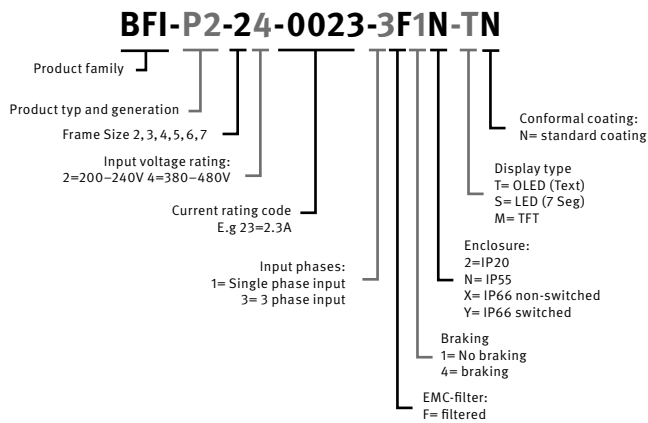


Size	2	2	3	3	4	4	5	5	6A	6B	6	7	8
Enclosure	IP20	IP66	IP20	IP66	IP20	IP55	IP20	IP55	IP20	IP20	IP55	IP55	IP20
Height (mm)	221	257	261	310	418	440	486	540	614	726	865	1280	995
Width (mm)	112	188	131	211	160	171	222	235	286	330	330	330	482
Depth (mm)	185	238	205	256	240	240	260	270	320	320	330	360	480
Weight (kg)	1.8	4.8	3.5	7.7	9.2	11.5	18.2	23	32	43	55	89	128
Package weight (kg)	1.9	4.8	3.5	8.4	11	13.2	20	24	-	-	57	97	128
Fixings	4xM4	4xM4	4xM4	4xM4	4xM8	4xM8	4xM8	4xM8	4xM8	4xM10	4xM10	4xM10	-

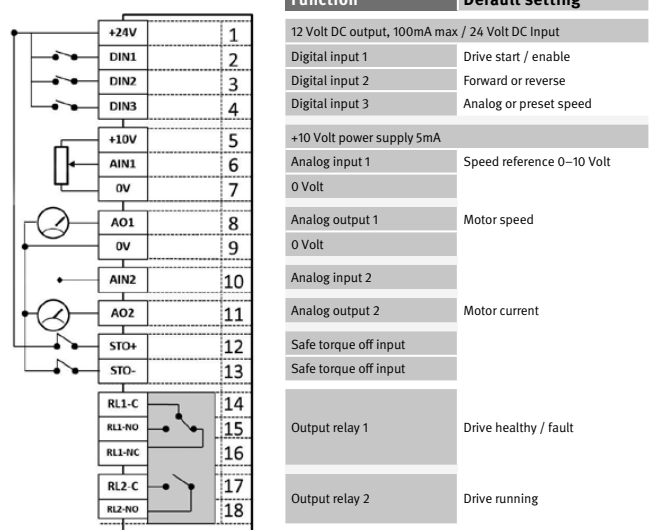
Drive specification

Input ratings	Supply voltage	200 – 240V ± 10% 380 – 480V ± 10%	Control specification	Control method	V/F voltage vector Energy optimised V/F Sensorless vector speed control Sensorless vector torque control Closed loop (encoder) speed control	Control features	Hoist operation	Dedicated hoist operation mode	
	Supply frequency	48 – 62Hz		Stopping mode	Ramp to stop : user adjustable 0.1–600 seconds Coast to stop		PID control	Internal PID control with feedback display, sleep mode	
	Displacement power factor	> 0.98		Braking	Motor flux braking Built-in braking transistor (optional for frame sizes 6 & 7)		PLC	Internal PLC	
	Phase imbalance	3% maximum allowed		Skip frequency	Single point, user adjustable		Master/slave	Master/slave control of 63 BFI	
	Inrush current	< rated current		Setpoint control	0 to 10 volts 10 to 0 volts -10 to 10 volts 0 to 20mA 20 to 0mA 4 to 20mA 20 to 4 mA		Modbus master	BFI can be configured as Modbus RTU master	
	Power cycles	120 per hour maximum, evenly spaced		Supported protocols	Fieldbus or ethernet		Maintenance & diagnostics	Fault memory	Last 4 trips stored with time stamp
Output ratings	Output power	230V 1 phase input: 0.75–2.2kW 230V 3 phase input: 0.75–75kW 400V 3 phase input: 0.75–250kW	Communication	Power supply	24 Volt DC, 100mA, short circuit protected 10 Volt DC, 5mA for potentiometer	Standards	Data logging	Logging of data prior to trip for diagnostic purposes : Output current, drive temperature, DC bus voltage	
	Overload capacity	150% for 60 seconds 200% for 2 seconds		Programmable inputs	5 total as standard (optional additional 3) 3 digital (optional additional 3) 2 analog / digital selectable		Maintenance indicator	Maintenance indicator with user adjustable maintenance interval Onboard service life monitoring	
	Output frequency	0 – 500Hz, 0.1Hz resolution		Digital inputs	10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms		Relay outputs	Maximum voltage : 250 VAC, 30 VDC Switching current capacity : 6A AC, 5A DC	Monitoring
Typical efficiency	98%	Analog inputs		Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset	Relay outputs		Maximum voltage : 250 VAC, 30 VDC Switching current capacity : 6A AC, 5A DC	Low Voltage Directive	2014/35/EU
Ambient Conditions	Temperature	Storage : -40 to 60°C Operating : -10 to 40°C, IP55/66 -10 to 50°C, IP20		I/O specification	Safety		Safe torque off SIL2/pld	EMC Directive	2014/30/EU
	Altitude	Up to 1000m ASL without derating Up to 2000m maximum UL approved Up to 4000m maximum (non UL) Above 1000m : derate by 1% per 100m			Programmable outputs		4 total (optional additional 3) 2 analog / digital 2 relays (optional additional 3)	Additional Conformance	UL, cUL, CE
	Humidity	95% max, non-condensing	Relay outputs		Maximum voltage : 250 VAC, 30 VDC Switching current capacity : 6A AC, 5A DC	Marine Certification	DNV/GL Type Approval		
Enclosure	Ingress Protection	IP20 (size 2, 3, 4, 5, 6A, 6B) IP40 (size 8) IP55 (size 4, 5, 6, 7) IP66 (size 2, 3)	Programming		Analog outputs	0 to 10 Volt 0 to 20mA 4 to 20mA	Environmental Conditions	Designed to meet IEC 60721-3-3, in operation: IP20 Drives: 3S2/3C2 IP55 & 66 Drives: 3S3/3C3	
	Keypad	Built-in keypad as standard Optional remote mountable keypad			App for Android and IOS	BFI-Tools Mobile	Safety	EN 61800-5-2:2007: SIL2 EN ISO 13489-1: PL d IEC 60204-1: Stop Category 0	

Model code guide



Connection diagram



About Beijer Electronics

Beijer Electronics is a multinational, cross-industry innovator that connects people and technologies to optimize processes for business-critical applications. Our offer includes operator communication, automation solutions, digitalization, display solutions and support. As experts in user-friendly software, hardware and services for the Industrial Internet of Things, we empower you to meet your challenges through leading-edge solutions.

Beijer Electronics is a Beijer Group company. Beijer Group has a sale over 1.4 billion SEK in 2018 and is listed on the NASDAQ OMX Nordic Stockholm Small Cap list under the ticker BELE. www.beijergroup.com

CHINA

Shanghai

NORWAY

Drammen

TAIWAN

Taipei

DENMARK

Roskilde

SOUTH KOREA

Seoul

TURKEY

Istanbul

FRANCE

Paris

SWEDEN

Göteborg

Malmö

UNITED KINGDOM

Nottingham

GERMANY

Nürtingen

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USA

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