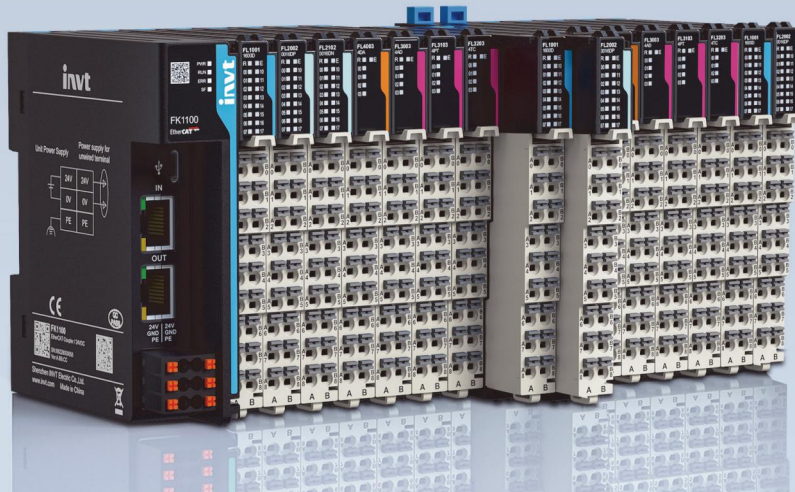


Flex Series I/O System Catalog



About Us



Corporate Introduction

INVT (Shenzhen INVT Electric Co., Ltd) has been concentrating on industry automation and energy power since its foundation in 2002 and is committed to "Providing the best product and service to allow customers more competitiveness". INVT goes public in 2010 and is the first A-share listed company (002334) in Shenzhen Stock Exchange in the industry. At present, INVT owns 15 subsidiaries and more than 4000 employees, over 40 branches, forming a sales network covering more than 100 overseas countries and regions.

INVT has been awarded as the Key High-tech Enterprise of National Torch Plan based on mastering of key technologies in power electronics, auto control and IT. With business covering industry automation, electric vehicle, network power and rail transit, INVT has established 11 R&D centers nationwide, boasts more than 1300 patents and owns the first lab in the industry awarded ACT qualification from TÜV SÜD, UL-WTDP and CNAS National Lab. The industrial parks in Shenzhen and Suzhou aim to provide customers with advanced integrated product development design management, comprehensive product R&D test and auto informational production. The worldwide INVT branches and warranty service centers are ready to offer customers all-around back-ups including professional solutions, technical trainings and service support.

In the next decade, INVT will continue to take " **Sincere Virtuous, Professional Aspiring**" as our business philosophy, enhance core business sectors including industrial automation, electric vehicle, network power and rail transit based on the three major technologies in industry automation and energy power fields, and strive to become a leading, responsible and harmonic international professional group armed with proper product structure, leading technologies, efficient management, robust profitability and superior competitiveness.



Industrial Park in Suzhou

Group's core industrial base and R&D center in East China



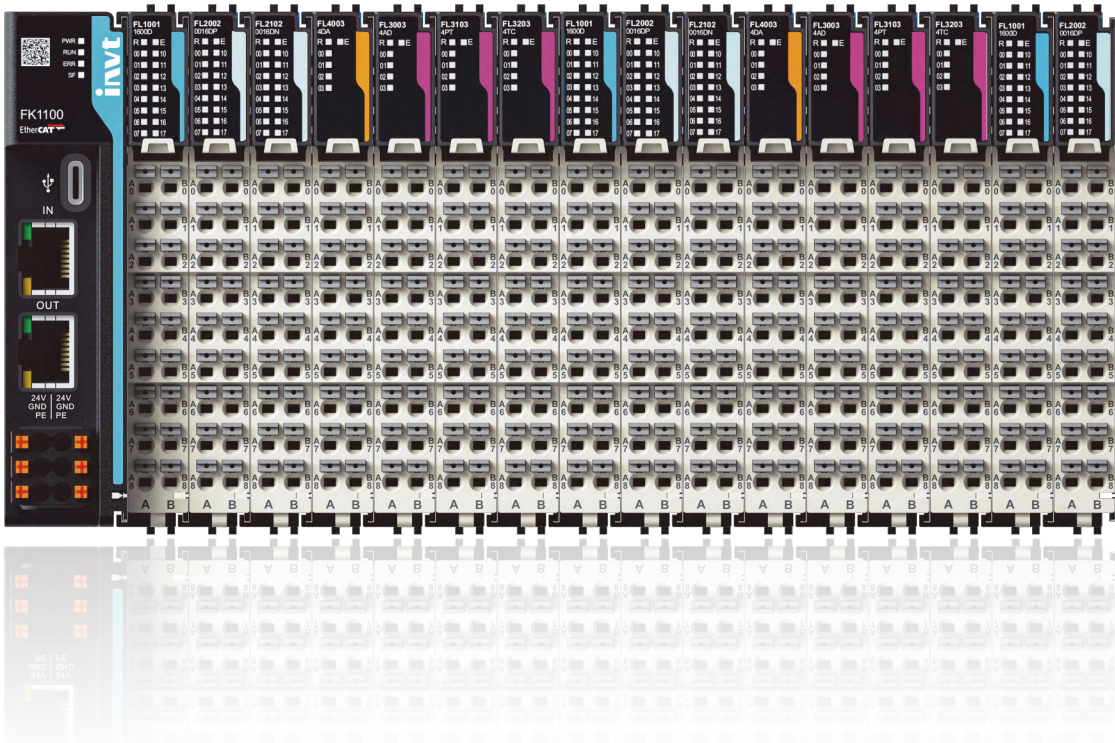
Industrial Park in Guangming Shenzhen

Group headquarters, new product development and new business incubation base



Flex series new generation distributed I/O system

INVT Flex series I/O system is a flexible, reliable, and efficient signal transmission system. The system is able to access to multiple standard communication networks, and equipped with rich signal modules to facilitate the deployment of personalized solutions while saving cabinet space, helping you develop more competitive personalized solutions.



Flexible

Rich communication couplers and I/O modules enable the flexible design of control systems.



Efficient

Fully upgraded F-BUS bus with a 100-megabit communication rate creates a high real-time communication system.



Reliable

Tight connection using the gold plating process ensures stable and reliable signal transmission.

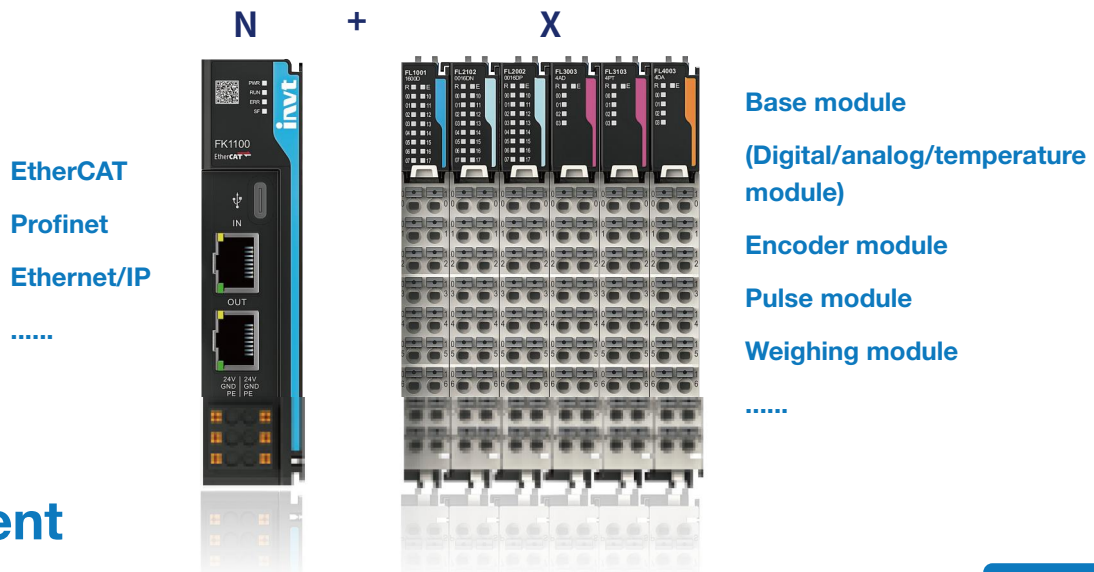


Compact

Ultra-thin design significantly saves cabinet space and helps the equipment layout miniaturization.

Flexible

The open **Flex series I/O system** adopts a **modular design**, supporting various bus network, and is equipped with rich signal modules to create personalized solutions. By importing the device description file to a third-party host controller, the module configuration can be achieved without specialized software configuration.



Efficient

The system is equipped with a **100Mbps F-BUS** backplane bus, with a response of I/O refresh in microseconds, achieving high-speed information exchange.



Reliable

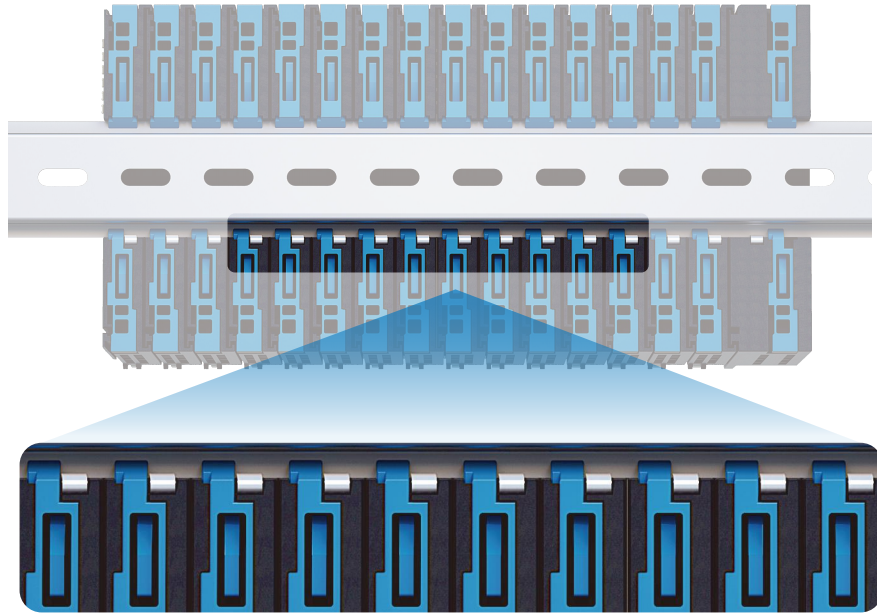
Spring-loaded connection technology and 5u" gold plating process keep the connectors away from various types of corrosion and ensure a long service life of connectors.



The entire series adopts three-resistance coating to prevent dust, moisture, and salt spray, meeting a wider range of operating conditions and extending service life.



Reliable grounding, further enhancing anti-interference capability.

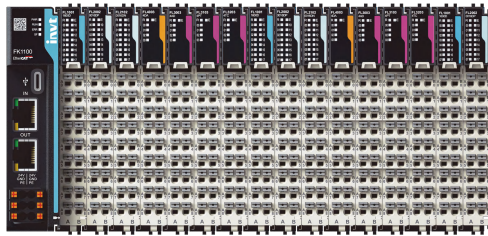
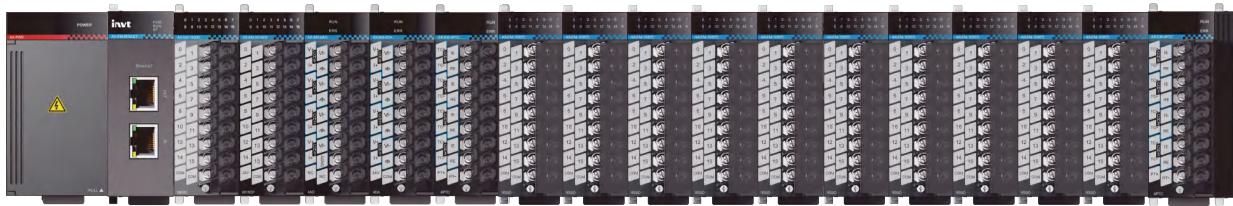


Capable of operating in **-25~55°C** and at an altitude of **3000m**, fearless of freezing weather.



Compact

12mm ultra-thin design, saving 64% of the cabinet space, achieving miniaturization of the cabinet.

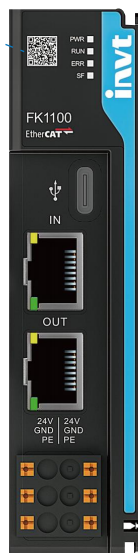


← **64%
space saving** →

Easy installation

The wiring diagram is printed on the module so the wiring can be completed without referencing a user manual. By scanning the QR code on the front, you can obtain an electronic version of the user manual for more information.

E-manual



Wiring diagram

E-manual

Model, module type

Tool-free quick connection

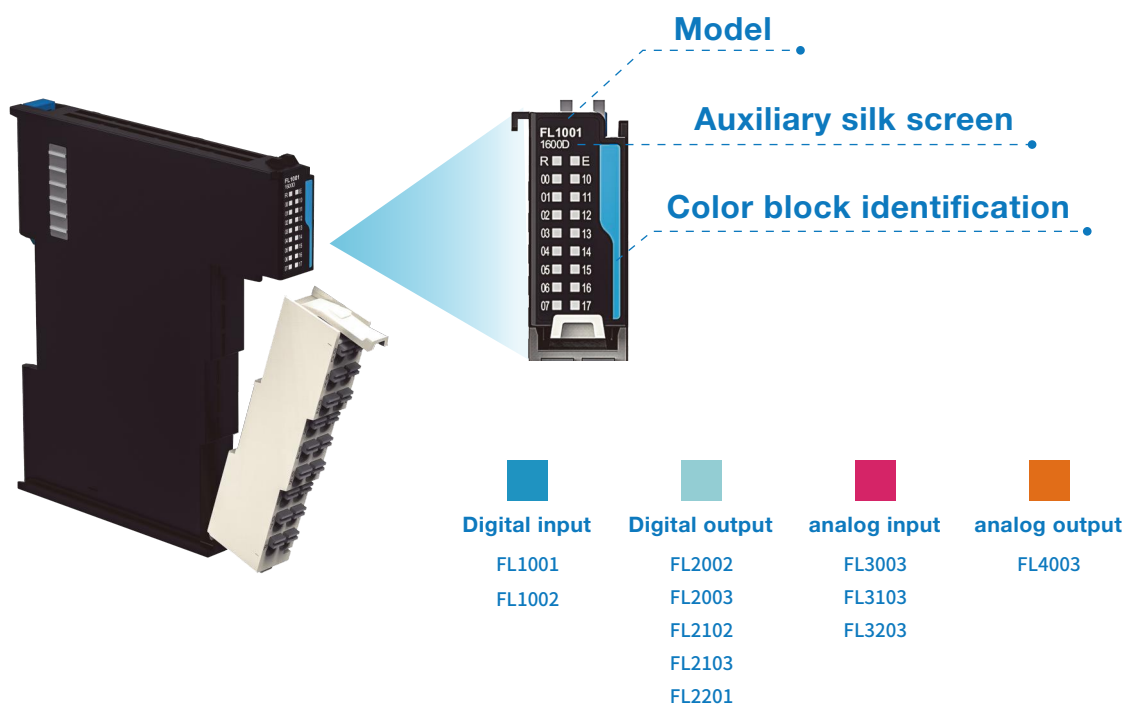
PUSH IN connection technology enables easy installation without any tools, with a 70% improvement in wiring efficiency compared to screw terminals, effectively reducing installation time while ensuring good reliability.



Direct plug-in connection, effectively reducing installation time

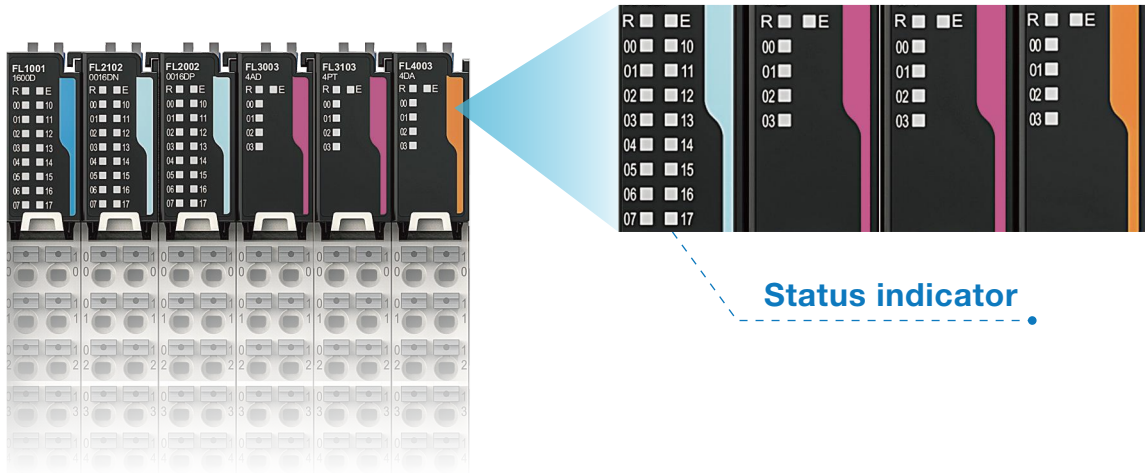
Clear identification

Different modules are distinguished by **color blocks and auxiliary codes**, making identification and positioning more accurate and convenient.



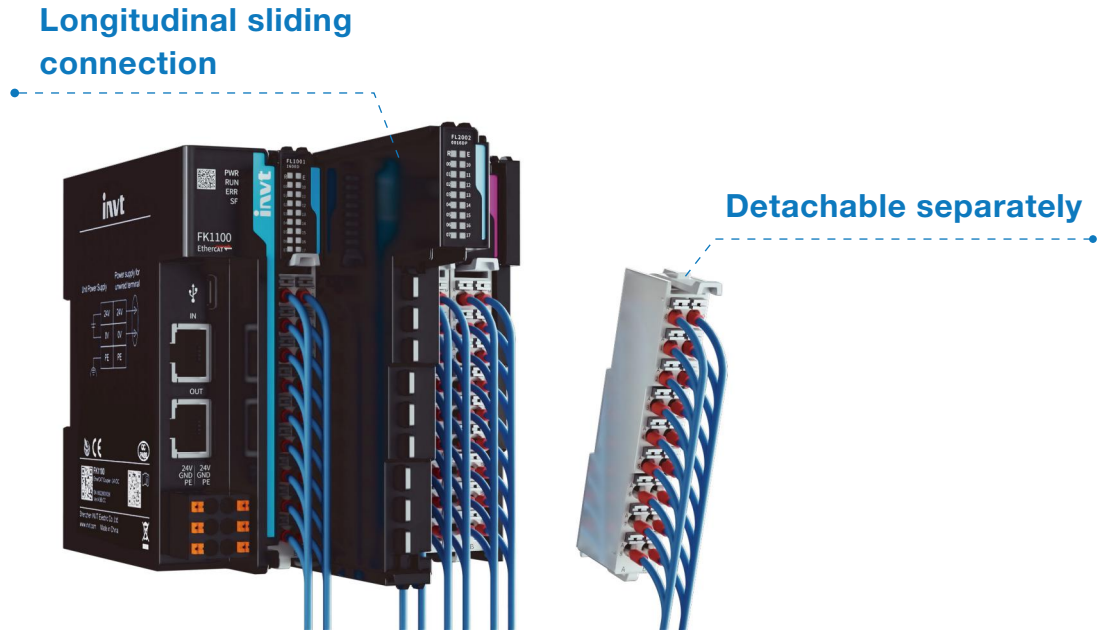
Channel-level diagnosis

Each channel has a **status indicator light**, and each module can independently display its working status. The operating status and fault information are clear at a glance.



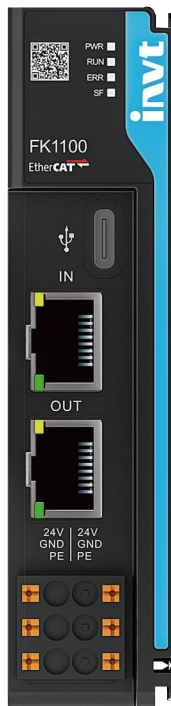
Easy to maintain

Longitudinal sliding connection allows terminal assembly and disassembly without moving the left and right modules. Adopting a two-section modular design, the wiring terminals can be disassembled separately without repeated wiring.



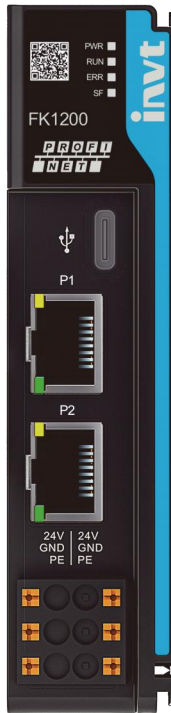
Specification parameters

Communication coupler (EtherCAT)



| Item | Specifications | | | |
|----------------------|--|--|---|--|
| Ordering code | 11016-00005 | | | |
| Model | FK1100 | | | |
| Product type | EtherCAT communication coupler | | | |
| Power supply | Rated voltage | 24VDC (-15% – +20%) | | |
| | Power consumption of module | <10W | | |
| | Isolation | No isolation | | |
| | Power supply protection | Protection against reverse connection, overcurrent, and surges | | |
| interface | USB2.0 | ×1, for module upgrade | | |
| | RJ45 | ×2, EtherCAT IN&OUT | | |
| | EtherCAT slave | Synchronization method | Distributed clocks or input and output synchronization | |
| | | Physical layer | 100BASE-TX | |
| | | Baud rate | 100Mbit/s | |
| | | Output distance | Less than 100m between two nodes | |
| | | Transmission mode | Full duplex | |
| | | Topology structure | Linear, star-shape, tree-shape | |
| | | Slave address range | Assigned by the system | |
| | | Quantity of input PDO | Up to 768 bytes | |
| | | Quantity of output PDO | Up to 768 bytes | |
| | | Input mailbox size | Up to 128 bytes | |
| | Output mailbox size | Up to 128 bytes | | |
| | Expansion bus | Number of I/O expansions | 16, internal bus. The coupler can automatically identify the I/O type and quantity on the backplane | |
| Output power supply | | 5V/3.5A | | |
| Certification | CE, RoHS | | | |
| Environment | IP rating | IP20 | | |
| | Working temperature | -25°C–55°C | | |
| | Working humidity | 10%–95%RH (no condensation) | | |
| | Air | No corrosive gas | | |
| | Storage temperature | -40°C–70°C (RH<90%RH, no condensation) | | |
| | Altitude | Lower than 3000m | | |
| | Pollution degree | Degree 2, compliant with IEC61131-2 | | |
| | Anti-interference | 2kV power cable compliant with IEC61000-4-4 | | |
| | EMC anti-interference level | Zone B, IEC61131-2 (General industrial environment) | | |
| | Vibration resistant | IEC60068-2-6 5Hz–8.4Hz, vibration amplitude of 3.5mm, 8.4Hz–150Hz, acceleration 9.8m/s ² , 100 minutes for each in X, Y, and Z directions (10 times, 10 minutes each time, a total of 100 minutes) | | |
| | Impact resistance | IEC60068-2-27, 9.8m/s ² , 11ms, X/Y/Z, 3 times for each of 3 axes and 6 directions | | |
| Installation method | 35mm standard rail | | | |
| Weight (kg) | Net: 0.25 | Gross: 0.28 | | |
| Dimensions W×H×D(mm) | Product dimension: 25×105×96 Package dimension: 29×109×100 | | | |

communication coupler (Profinet)



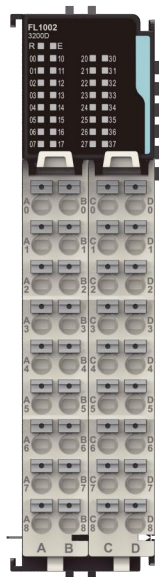
| Item | Specifications | | | |
|----------------------|---|--|---|--|
| Ordering code | 11016-00012 | | | |
| Model | FK1200 | | | |
| Product type | PROFINET communication coupler | | | |
| Power supply | Rated voltage | 24VDC (-15% - +20%) | | |
| | Power consumption of module | <10W | | |
| | Isolation | No isolation | | |
| | Power supply protection | Protection against reverse connection, overcurrent, and surges | | |
| interface | USB2.0 | x1, for module upgrade | | |
| | RJ45 | x2, Profinet P1&P2 | | |
| | Profinet slave | Physical layer | 100BASE-TX | |
| | | Baud rate | 100Mbit/s | |
| | | Output distance | Less than 100m between two nodes | |
| | | Transmission mode | Full duplex | |
| | | Topology structure | Linear, star-shape, tree-shape | |
| | | Communication protocol | Profinet IO Device | |
| | | Communication mode | RT | |
| | | Communication period | Min. 1ms | |
| | | Process data zone | Input max. 1440 bytes, output max. 1440bytes; IM0-IM3 | |
| | | Profinet switch function | Supports networking function | |
| | | Ethernet service | Supports TCP/IP, SNMP, LLDP, ping, arp | |
| | | Port diagnosis | Supported | |
| | Port disabling | Supported | | |
| | Factory settings reset | Supported | | |
| Expansion bus | Number of I/O expansions | 16, internal bus. The coupler can automatically identify the I/O type and quantity on the backplane | | |
| | Output power supply | 5V/3.5A | | |
| Certification | CE, RoHS | | | |
| Environment | IP rating | IP20 | | |
| | Working temperature | -25°C-55°C | | |
| | Working humidity | 10%-95%RH (no condensation) | | |
| | Air | No corrosive gas | | |
| | Storage temperature | -40°C-70°C (RH<90%RH, no condensation) | | |
| | Altitude | Lower than 3000m | | |
| | Pollution degree | Degree 2, compliant with IEC61131-2 | | |
| | Anti-interference | 2kV power cable compliant with IEC61000-4-4 | | |
| | EMC anti-interference level | Zone B, IEC61131-2 (General industrial environment) | | |
| | Vibration resistant | IEC60068-2-6 5Hz-8.4Hz, vibration amplitude of 3.5mm, 8.4Hz-150Hz, acceleration 9.8m/s ² , 100 minutes for each in X, Y, and Z directions (10 times, 10 minutes each time, a total of 100 minutes) | | |
| Impact resistance | IEC60068-2-27, 9.8m/s ² , 11ms, X/Y/Z, 3 times for each of 3 axes and 6 directions | | | |
| Installation method | 35mm standard rail | | | |
| Weight (kg) | Net: 0.25 | Gross: 0.28 | | |
| Dimensions W×H×D(mm) | Product dimension: 25×105×96 Package dimension: 29×109×100 | | | |

Digital input



| Item | Performance Specification |
|--------------------------|--|
| Ordering code | 11016-00004 |
| Model | FL1001 |
| Product type | Digital input, supporting source type/sink type |
| Power loss,typ | 0.75W |
| Number of channels | 16 |
| Input type | Source/sink |
| Input voltage | DC24V ± 10% |
| Input current,typ | 7mA |
| Max. input frequency | 500Hz (duty ratio: 40%–60%) |
| Port filter time | Setting range: 1–65535 (default 1000), unit: 10μs; 1000 indicates 10ms. Able to set two groups of filter parameter. Every eight channels use a group of filter parameter |
| Signal of logic 1 | ≥15V DC |
| Signal of logic 0 | ≤5V DC |
| OFF-ON response time | 100μs |
| ON-OFF response time | 100μs |
| Isolation method | Optocoupler |
| Input frequency decrease | Derate by 75% when operating at 55°C (with no more than 12 input points that are on at the same time), or by 10°C when all input points are on |
| Weight (kg) | Net: 0.15 Gross: 0.18 |
| DimensionsW×H×D(mm) | Product dimension: 12.5×105×96 Package dimension: 17.5×109×100 |

Digital input



| Item | Performance Specification |
|--------------------------|---|
| Ordering code | |
| Model | FL1002 |
| Product type | Digital input, supporting source type/sink type |
| Power loss,typ | 0.75W |
| Number of channels | 32 |
| Input type | Source/sink |
| Input voltage | DC24V ± 10% |
| Input current,typ | 7mA |
| Max. input frequency | 500Hz (duty ratio: 40%–60%) |
| Port filter time | Setting range: 1–65535 (default 1000), unit: 10μs; 1000 indicates 10ms. Able to set two groups of filter parameter. Every eight channels use a group of filter parameter. |
| Signal of logic 1 | ≥15V DC |
| Signal of logic 0 | ≤5V DC |
| OFF-ON response time | 100μs |
| ON-OFF response time | 100μs |
| Isolation method | Optocoupler |
| Input frequency decrease | Derate by 75% when operating at 55°C (with no more than 12 input points that are on at the same time), or by 10°C when all input points are on |
| Weight (kg) | Net: 0.30 Gross: 0.33 |
| DimensionsW×H×D(mm) | Product dimension: 25×105×96 Package dimension: 29×109×100 |

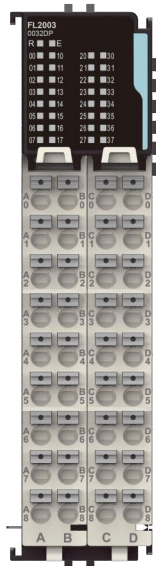
Contact local sales personnel for specific delivery times

Digital output (source type)



| Item | Specifications |
|---|---|
| Ordering code | 11016-00006 |
| Model | FL2002 |
| Product type | Digital output, transistor source type output, active high |
| Power loss,typ | 0.75W |
| Number of channels | 16 |
| External power | DC24V(-15% ~ +20%) |
| Output voltage | 24V±10% |
| Max. output frequency | 1kHz |
| Max. load | Resistive load: 0.5A/point; 2A/module |
| | Inductive load: 7.2W/point, 12W/module |
| | Illumination load: 5W/point, 18W/module |
| Leakage current/point | <10μA |
| OFF-ON | 100μs |
| ON-OFF | 100μs |
| Protection against overheat/overcurrent/overvoltage | Supported |
| Exception check of external power | Supported |
| Isolation method | Magnetic |
| Short-circuit protection output | Yes |
| Weight (kg) | Net: 0.15 Gross: 0.18 |
| DimensionsW×H×D(mm) | Product dimension: 12.5×105×96 Package dimension: 17.5×109×100 |

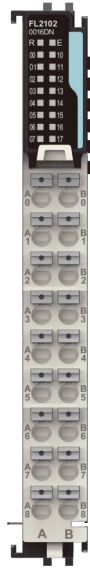
Digital output (source type)



| Item | Specifications |
|---|---|
| Ordering code | |
| Model | FL2003 |
| Product type | Digital output, transistor source type output, active high |
| Power loss,typ | 0.75W |
| Number of channels | 32 |
| External power | DC24V(-15% ~ +20%) |
| Output voltage | 24V±10% |
| Max. output frequency | 1kHz |
| Max. load | Resistive load: 0.5A/point; 2A/module |
| | Inductive load: 7.2W/point, 12W/module |
| | Illumination load: 5W/point, 18W/module |
| Leakage current/point | <10μA |
| OFF-ON | 100μs |
| ON-OFF | 100μs |
| Protection against overheat/overcurrent/overvoltage | Supported |
| Exception check of external power | Supported |
| Isolation method | Magnetic |
| Short-circuit protection output | Yes |
| Weight (kg) | Net: 0.30 Gross: 0.33 |
| DimensionsW×H×D(mm) | Product dimension: 25×105×96 Package dimension: 29×109×100 |

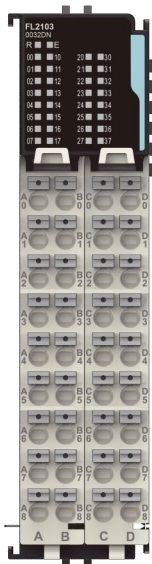
Contact local sales personnel for specific delivery times

Digital output (sink type)



| Item | Specifications |
|---|--|
| Ordering code | 11016-00003 |
| Model | FL2102 |
| Product type | Digital output, transistor sink type output, active low |
| Power loss,typ | 1W |
| Number of channels | 16 |
| External power | DC24V(-15% ~ +20%) |
| Output voltage | 24V±10% |
| Max. output frequency | 1kHz (duty ratio: 40%~60%) |
| Max. load | Resistive load: 0.5A/point, 4A/module |
| | Inductive load: 7.2W/point, 24W/module |
| | Illumination load: 5W/point, 18W/module |
| Leakage current/point | <10μA |
| OFF-ON | 100μs |
| ON-OFF | 100μs |
| Protection against overheat/overcurrent/overvoltage | Supported |
| Exception check of external power | Supported |
| Isolation method | Magnetic |
| Short-circuit protection output | Yes |
| Weight (kg) | Net: 0.15 Gross: 0.18 |
| DimensionsW×H×D(mm) | Product dimension:12.5×105×96 Package dimension: 17.5×109×100 |

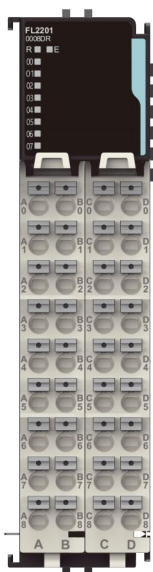
Digital output (sink type)



| Item | Specifications |
|---|---|
| Ordering code | |
| Model | FL2103 |
| Product type | Digital output, transistor sink type output, active low |
| Power loss,typ | 1W |
| Number of channels | 32 |
| External power | DC24V(-15% ~ +20%) |
| Output voltage | 24V±10% |
| Max. output frequency | 1kHz (duty ratio: 40%~60%) |
| Max. load | Resistive load: 0.5A/point, 4A/module |
| | Inductive load: 7.2W/point, 24W/module |
| | Illumination load: 5W/point, 18W/module |
| Leakage current/point | <10μA |
| OFF-ON | 100μs |
| ON-OFF | 100μs |
| Protection against overheat/overcurrent/overvoltage | Supported |
| Exception check of external power | Supported |
| Isolation method | Magnetic |
| Short-circuit protection output | Yes |
| Weight (kg) | Net: 0.30 Gross: 0.33 |
| DimensionsW×H×D(mm) | Product dimension: 25×105×96 Package dimension: 29×109×100 |

Contact local sales personnel for specific delivery times

Digital output (relay)



| Item | Performance Specification |
|--------------------------|-------------------------------|
| Ordering code | 11016-00009 |
| Model | FL2201 |
| Product type | Digital output, relay output |
| Power loss,typ | 1.5W |
| Number of channels | 8 |
| Contact type | N.O. contact |
| Contact load (resistive) | 3A 250VAC/30VDC |
| Max. switching voltage | 250VAC/125VDC@0.3A |
| Max. switching current | 5A |
| Service life of relay | Electrical: 100,000 times |
| | Mechanical: 20,000,000 times |
| OFF-ON response time | ≤15ms |
| ON-OFF response time | ≤10ms |
| Weight (kg) | Net: 0.30 |
| | Gross: 0.33 |
| DimensionsW×H×D(mm) | Product dimension: 25×105×96 |
| | Package dimension: 29×109×100 |

Analog input



| Item | Specifications |
|---|---|
| Ordering code | 11016-00011 |
| Model | FL3003 |
| Product type | 4 channels of analog input |
| Power loss,typ | 1W |
| Number of channels | 4 |
| Voltage range | ±5V, ±10V, +5V, +10V |
| Current range | 0–20mA, 4–20mA, ±20mA |
| Accuracy in room temperature (of 25°C) | Voltage±0.1%FS, current±0.1%FS |
| Converting speed | 320μs/channel |
| Max. common-mode voltage between channels | 30VDC |
| Disconnection detection | Support (only voltage) |
| Isolation method | Between I/O port and power supply: isolated |
| | Between channels: not isolated |
| Resolution | 16 bits |
| Weight (kg) | Net: 0.15 |
| | Gross: 0.18 |
| DimensionsW×H×D(mm) | Product dimension: 12.5×105×96 |
| | Package dimension: 17.5×109×100 |

Analog output



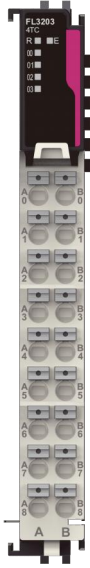
| Item | Specifications |
|--|---|
| Ordering code | 11016-00008 |
| Model | FL4003 |
| Product type | 4 channels of analog output |
| External power | 24VDC (-15%~20%) |
| Power loss,typ | 0.75W |
| Number of channels | 4 |
| Voltage range | ±5V, ±10V, 0-5V, 1-5V, 0-10V |
| Current range | 0-20mA, 4-20mA |
| Accuracy in room temperature (of 25°C) | Voltage±0.1%FS, current±0.1%FS |
| Converting speed | 40µs/channel |
| Min. load resistance during voltage output | 1kΩ |
| Max. load resistance during current output | 600Ω |
| Disconnection detection | Support (only current) |
| Isolation method | Between I/O port and power supply: isolated |
| | Between channels: not isolated |
| Resolution | 16 bits |
| Weight (kg) | Net: 0.15 |
| | Gross: 0.18 |
| DimensionsW×H×D(mm) | Product dimension: 12.5×105×96 |
| | Package dimension: 17.5×109×100 |

Temperature measuring (thermistor)



| Item | Specifications |
|--|---|
| Ordering code | 11016-00007 |
| Model | FL3103 |
| Product type | 4 channels of thermistor input |
| Power loss,typ | 1.25W |
| Number of channels | 4 |
| Wiring method | Two-, three-, or four-wire |
| Supported thermal resistors | PT100, PT500, PT1000, CU100 |
| Sensitivity | 0.0625 /0.0625 |
| SamplePeriod | 240ms/channel (typical value) |
| Accuracy in room temperature (of 25°C) | ±0.3%FS |
| Accuracy in working temperature | ±1%FS |
| Filter time | Adjustable |
| Accuracy in working temperature | ±1%FS |
| Isolation method | Between I/O port and power supply: isolated |
| | Between channels: not isolated |
| Weight (kg) | Net: 0.15 |
| | Gross: 0.18 |
| DimensionsW×H×D(mm) | Product dimension: 12.5×105×96 |
| | Package dimension: 17.5×109×100 |

Temperature measuring (thermocouple)

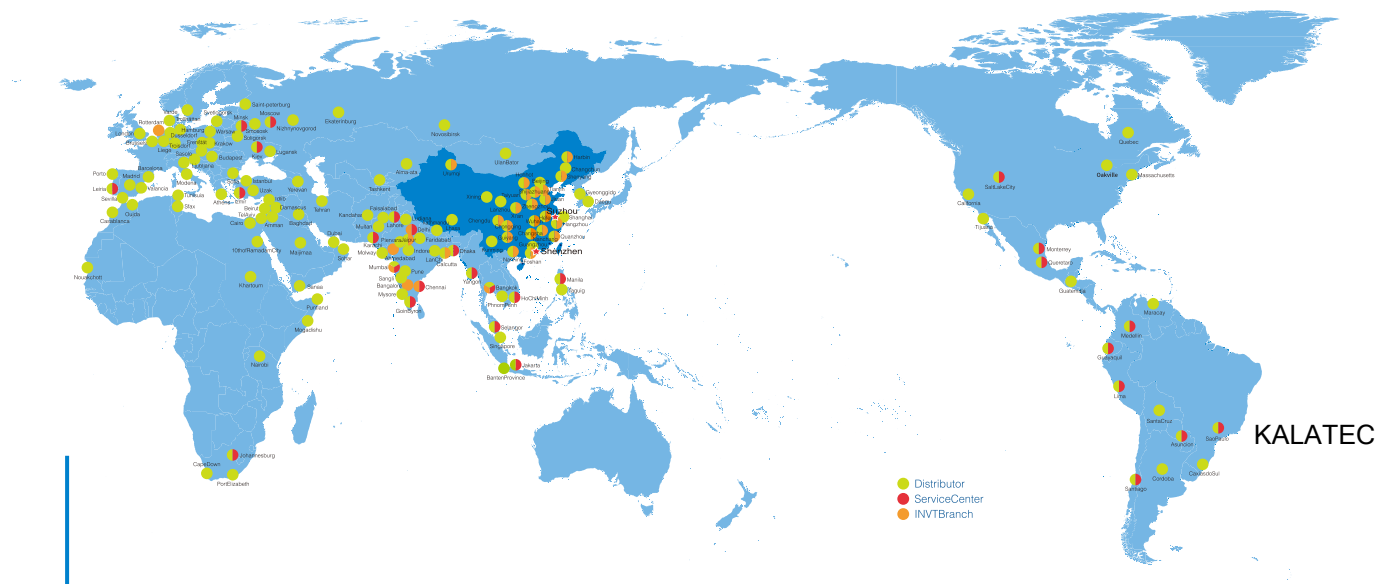


| Item | Specifications |
|--|---|
| Ordering code | 11016-00010 |
| Model | FL3203 |
| Product type | 4 channels of thermocouple input |
| Power loss,typ | 1.25W |
| Number of channels | 4 |
| Supported thermocouples | Types B, E, J, K, N, R, S, and T |
| Sensitivity | 0.0625°C/0.0625°F |
| SamplePeriod | 360ms/channel |
| Accuracy in room temperature (of 25°C) | ±0.1%FS+cold junction compensation error |
| Accuracy in working temperature | ±0.3%FS+cold junction compensation error |
| Cold junction compensation method | Internal |
| Disconnection detection | Supported |
| Isolation method | Between I/O port and power supply: isolated |
| | Between channels: not isolated |
| Weight (kg) | Net: 0.15 Gross: 0.18 |
| DimensionsW×H×D(mm) | Product dimension: 12.5×105×96 |
| | Package dimension: 17.5×109×100 |

Ordering list

| Ordering code | Model | Product type | Specifications |
|---------------|--------|--------------------------------------|---|
| 11016-00005 | FK1100 | Communication coupler (EtherCAT) | Coupler, EtherCAT, 24VDC; RoHS |
| 11016-00012 | FK1200 | Communication coupler (Profinet) | Coupler, Profinet,24VDC;RoHS |
| 11016-00004 | FL1001 | Digital input | Digital input module, 16 channels, supporting the source and sink types, 500mA@ 24 VDC inputs; RoHS |
| 11016-00006 | FL2002 | Digital output (source type) | Digital output module, with 16 channels of PNP transistor output, 500mA @ 24 VDC; RoHS |
| 11016-00003 | FL2102 | Digital output (sink type) | Digital output module, with 16 channels of NPN transistor output, 500mA @ 24 VDC; RoHS |
| 11016-00009 | FL2201 | Digital output (relay) | Digital output module, with 8 channels of relay output, dry contact, 3A @ 30VDC/250VAC; RoHS |
| 11016-00011 | FL3003 | Analog input | Analog input module; 4 channels, 16-bit resolution, room-temperature accuracy±0.1%FS; RoHS |
| 11016-00008 | FL4003 | Analog output | Analog output module; 4 channels, 16-bit resolution, room-temperature accuracy±0.1%FS; RoHS |
| 11016-00007 | FL3103 | Temperature measuring (thermistor) | Thermistor, 4 channels, 24-bit resolution, sensitivity of 0.1°C/°F; RoHS |
| 11016-00010 | FL3203 | Temperature measuring (thermocouple) | Thermocouples, 4 channels, 24-bit resolution, sensitivity of 0.1°C/°F; RoHS |

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