Inovance

MD380 Series
High Performance AC Drive

Hong Kong:
Inova Automation Co.,Limited
Unit B01,17/FMG Tower,
133 Hoi Bun Road, Kwun Tong, Hong Kong SAR
Tel:(852)2751 6080
Fax:(852)2751 6933
Email:info@inova-automation.com
Website:www.inovance.cn

India
Inova Automation Pvt.,Ltd.,
"NIBHI"Corporate Centre, 3rd Floor, No.7 C B I Colony,
1st Main Link Road, Perungudi, Chennai 600096.
Tel:(91)44 4380 0201
Fax:(91)44 4380 0201
Email: info.inovaindia@inova-automation.com

Copyright © Inova Automation Co.,Ltd 2013. All Rights Reserved.

CE

V2.1

ABOUT INOVANCE


Suzhou Factory

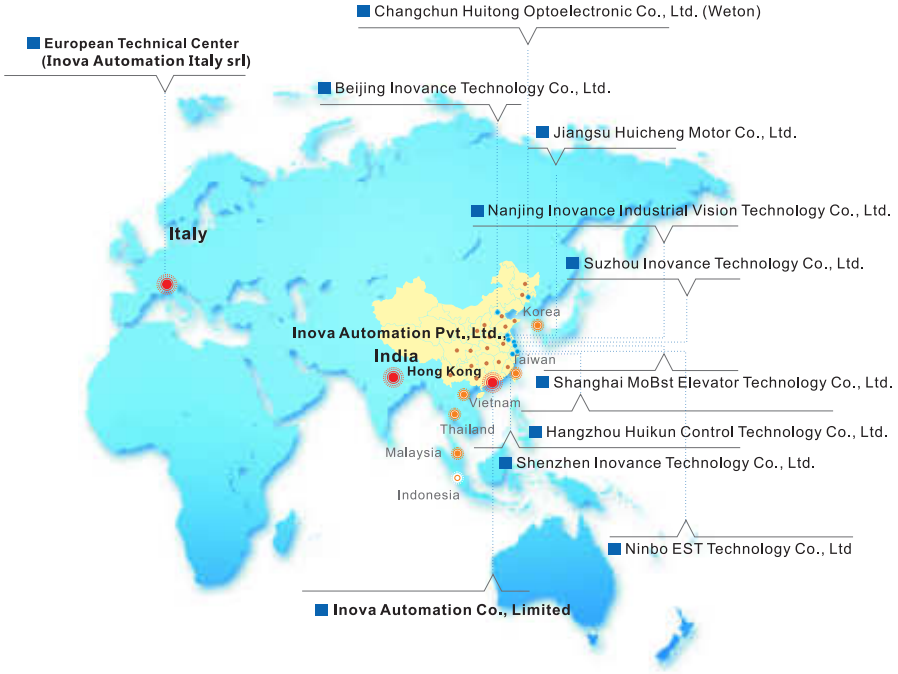
New Suzhou Plant in 2014

Shenzhen Inovance Technology Co., Ltd. (Shenzhen Stock Exchange code: 300124) is a leading industrial automation company who focuses on innovative technology, delivers manufacturing solutions designed with leading technologies to provide the most advanced industrial automation possible for numerous and diverse industries. Our product ranges include Low Voltage & Medium Voltage AC Drives, Servo Drives & Motors, PLC & HMI, Electric Vehicle Drives and Solar PV Inverters etc.

Inovance has over 2,000 employees, 2 manufacturing locations and 29 sales and technical support centres within China. Furthermore, we have branch offices in Hong Kong, India as well as European Technology Centre in Milan Italy, plus authorised distributors and service agents worldwide to provide overseas services and supports.

Inovance is ranked No 1 in Forbes's Most Potential SMEs 2012 in China. Our sales in Year 2012 were RMB 1,193,190,000 (approximately USD 194million). We manufactured and delivered over 400,000 units of inverters for our customers worldwide in Year 2012.

Worldwide Locations



Our Brands

Inovance

Shenzhen Inovance Technology
(Parent Group Company)

inova automation

Inova Automation
(subsidiary of Inovance)
(International Business)

Monarch®

Suzhou Monarch Elevators
(subsidiary of Inovance)

Our Main Business Segments

Industrial Automation

Small & Medium Power Rating


Elevator


CNC machine tool


Plastic & Rubber

High Power Rating


Mining


Hoisting


Metallurgy

Renewable Energy


EV


PV power generation


Rail transportation

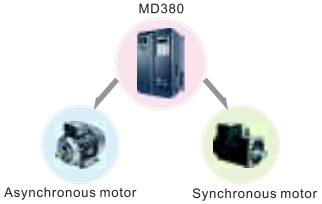
MD380 Series AC Drive

MD380 is a featured series of Inovance Inoflex AC drives. Based on precise understanding of customer needs and with consistent pursuit of high quality and reliability, we believe that MD380 series will bring you a fantastic using experience.

Excellent Performance

Supporting vector control of multiple motors

- Supporting vector control of three-phase AC asynchronous and three-phase AC synchronous motors.
- Supporting vector control of PMSM without absolute position feedback unit.



- Supporting multiple types of encoders


Differential encoder
(synchronous and asynchronous motors)


Open-collector encoder
(synchronous and asynchronous motors)


UVW encoder

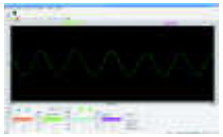

Resolver
(synchronous and asynchronous motors)

Excellent SVC control

- SVC control enables stall operation with a 150% rated torque output at 0 Hz.
- Applicable to applications such as winding control and load distribution where multiple motors drive the same load.

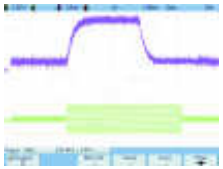
High starting torque

- SVC mode: starting torque 0.5Hz/150%;
  CLVC mode: starting torque 0Hz/180%.
  (SVC: sensorless vector control;
  CLVC: closed-loop vector control)



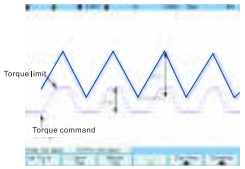
Quick response

- SVC mode: Torque response time < 20ms;
  CLVC mode: Torque response time < 5ms.



Protective torque limit

- When the torque command exceeds the maximum torque that the machine can bear, the MD380 AC drive can protect the machine better providing that the machine realizes its maximal efficiency when the torque command is restricted below the maximum torque.

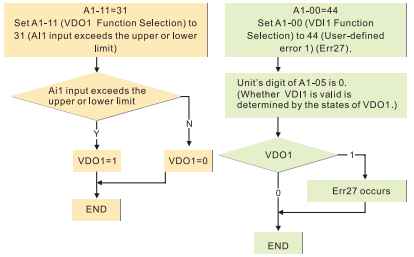


Powerful Functions

Virtual I/O

- Five groups of virtual DIs and DOs can be set and the state of a virtual DI terminal can be set directly by function code or bound to a corresponding virtual DO.

▼ To realize that the AC drive reports Err27 when AI1 exceeds the upper or lower limit

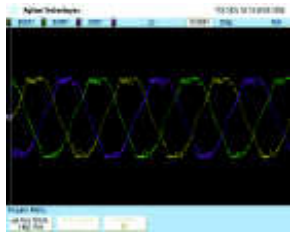


Flexible and practical analog I/O ports

- Each analog input (AI1~AI3) can be assigned with a four-point curve, which is more flexible;
- Calibration of AI1~AI3 curves can be conducted upon delivery or on user site, with a precision up to 20 mV;
- AO can realize factory calibration or user field calibration of linear curve null drift and gain. After calibration, the precision will up to 20 mV;
- AI1~AI3 can function as DI;
  AI3 is an isolated input port, which can be used for input of Pt100, PT1000 or ±10V voltage.

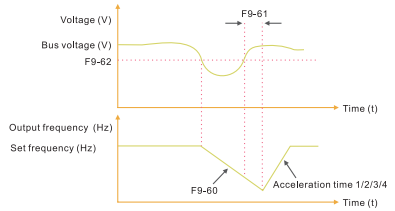
Rapid current limiting

- Rapid current limiting function can avoid frequent overcurrent alarms. When the current exceeds the current protection point, the fast current limiting function can quickly limit the current within the current protection point in order to protect the safety of the equipment. This can avoid overcurrent alarms caused by interference or abrupt increase of the load.



Power dip ride through

- With this function, the AC drive will not stop when transient power failure occurs. Specifically, in case of power failure or sudden voltage reduction, the AC drive can decrease the output speed and keep running in a short time by using the regenerative energy for compensation of voltage reduction.

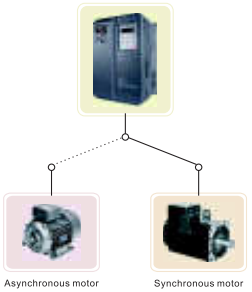


Motor overheat protection

- Analog input terminal AI3 of the I/O expansion card supports input of PT100 of PT1000. When motor temperature exceeds the alarm value, the AC drive outputs a pulse signal indicating overheat; and when motor temperature exceeds the overheat protection value, the AC drive outputs an error prompt and meanwhile provides proper protection to the motor.

Switchover among multiple motors

- Four groups of motor parameters are maintained. That means four motors (synchronous and asynchronous motors) can be switched over via these four groups of parameters.

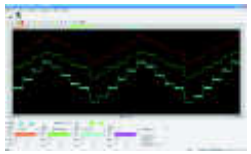


Easy to Use

Powerful monitor

Uploading/downloading of AC drive parameters and real-time oscilloscope can be realized on the monitor.

◆Monitor interface



◆Oscilloscope

◆Modifying AC drive parameters on the monitor

Restore user settings

If debugging or wrong operation leads to disordered parameters, factory settings or the pre-saved user settings can be restored.

Restore factory settings

Restore user settings

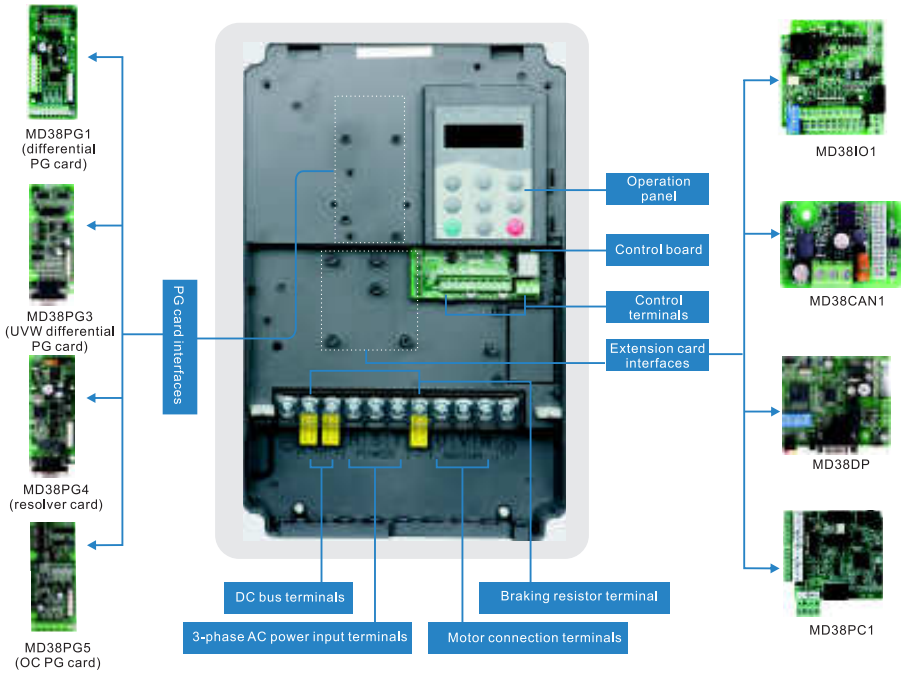
Supporting multiple types of field buses

Multiple types of field buses are supported, which facilitates communication between the AC drive and other peripheral devices.

Supported communication protocols:
* RS485
* PROFIBUS-DP
* CANlink
* CANopen

Note: CANlink is a field bus protocol developed by Inovance.

Rich Extension Capability



Reliability Design

Configured DC reactor for 7.5kW and above

Effectively increase the power factor at the input side.
Improve the efficiency and thermal stability of the AC drive.
Effectively eliminate the impact on the AC drive caused by the high frequency harmonics of the input side and reduce the drive's conducted and radiated interference.

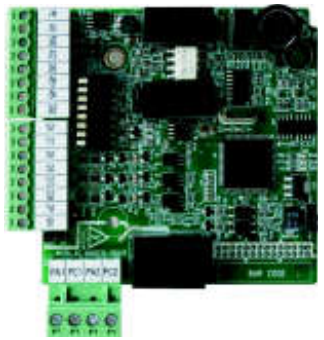
Environment resistance design

PCB with conformal coatings which are dust-proof, moisture-proof and fungus-proof
Broad voltage range
Independent air ventilation channel
Compliant to RoHS standard

Easy fan replacement

Much easier to clean, maintain and replace fans

PLC Card



The PLC card and the main CPU of the AC drive communicates fast, data between which can be updated within 2 ms.

The user software can realize operation of the drive variables and port resources.

Programming can be performed in ladder diagram format and is compatible with programming of the H1U series PLC.

User resources provided by MD38PC1

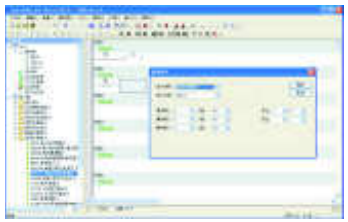
User resources provided by MD38PC1 include: AI x 1, AO x 1, DI x 5, RELAY x 2, RS485 x 1

Resource	Quantity	Description
Analog input	1	Isolated input, ±10V/±20mA analog input, PT100 input, PTC
Analog output	1	0~10V/0~20mA output
Digital input	5	Common digital input < 100 Hz
Relay output	2	Normally open
Communication (RS485)	1	MODBUS with master/slave station

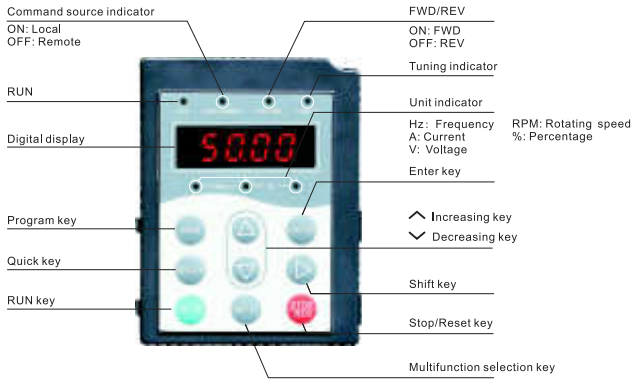
Functions which standard "PLC + AC drive" do not support

- PLC card operates drive variables and port resources;
- MD380 AC drive provides dedicated PLC parameters;
- MD380 AC drive supports dedicated PLC error codes;
- 2ms data interaction cycle;
- MD380 AC drive supports monitoring of PLC internal variables.

Programming environment in Visual Studio style



Simple Operation



Model and Technical Data

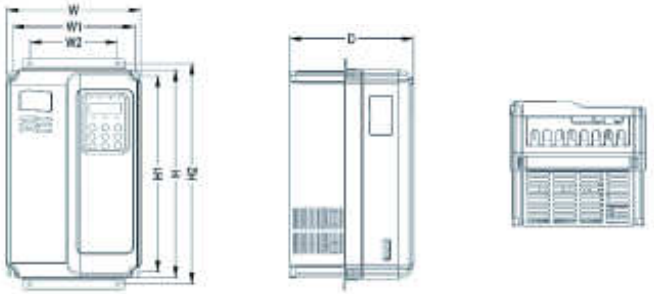
MD380 T 0.7 G B H

- AC drive series
- Voltage class
  - S: Single-phase 220V
  - 2T: Three-phase 220V
  - T: Three-phase 380V
  - 5T: Three-phase 480V
  - 7T: Three-phase 690V
  - CT: Three-phase 1140V
- Adaptable motor power
  - Correspondence
  - Mark: 0.4 0.75 ... 11 ...
  - Motor Power (kW): 0.4 0.75 ... 11 ...
- Type
  - G: General type
- Braking Unit
  - Blank: None
  - B: With braking unit
- Narrow body

AC Drive Model	Power Supply Capacity (kVA)	Input Current (A)	Output Current (A)	Adaptable Motor (kW)	Adaptable Motor (HP)
Single-phase 200V, 50/60Hz					
MD380S0.4GB	1.0	5.4	2.3	0.4	0.5
MD380S0.7GB	1.5	8.2	4.0	0.75	1
MD380S1.5GB	3.0	14.0	7.0	1.5	2
MD380S2.2GB	4.0	23.0	9.6	2.2	3
Three-phase 380V/400V/415V, 50 /60Hz					
MD380T0.7GB	1.5	3.4	2.1	0.75	1
MD380T1.5GB	3.0	5.0	3.8	1.5	2
MD380T2.2GB	4.0	5.8	5.1	2.2	3
MD380T3.7GB	5.9	10.5	9.0	3.7	5
MD380T5.5GB	8.9	14.6	13.0	5.5	7.5
MD380T7.5GB	11.0	20.5	17.0	7.5	10
MD380T11GB	17.0	26.0	25.0	11.0	15
MD380T15GB	21.0	35.0	32.0	15.0	20
MD380T18.5G	24.0	38.5	37.0	18.5	25
MD380T22G	30.0	46.5	45.0	22	30
MD380T30G	40.0	62.0	60.0	30	40
MD380T37G	57.0	76.0	75.0	37	50
MD380T45G	69.0	92.0	91.0	45	60
MD380T55G	85.0	113.0	112.0	55	75
MD380T75G	114.0	157.0	150.0	75	100
MD380T90G	134.0	180.0	176.0	90	125
MD380T110G	160.0	214.0	210.0	110	150
MD380T132G	192.0	256.0	253.0	132	200
MD380T160G	231.0	307.0	304.0	160	250
MD380T200G	250.0	385.0	377.0	200	300
MD380T220G	280.0	430.0	426.0	220	300
MD380T250G	355.0	468.0	465.0	250	400
MD380T280G	396.0	525.0	520.0	280	370
MD380T315G	445.0	590.0	585.0	315.0	500
MD380T355G	500.0	665.0	650.0	355.0	420
MD380T400G	565.0	785.0	725.0	400.0	530
Three-phase 690V, 50/60Hz					
MD380-7T55G	84.0	70.0	65.0	55	70
MD380-7T75G	107.0	90.0	86.0	75	100
MD380-7T90G	125.0	105.0	100.0	90	125
MD380-7T110G	155.0	130.0	120.0	110	150
MD380-7T132G	192.0	170.0	150.0	132	175
MD380-7T160G	231.0	200.0	175.0	160	210
MD380-7T200G	250.0	235.0	215.0	200	260
MD380-7T220G	280.0	247.0	245.0	220	300
MD380-7T250G	355.0	265.0	260.0	250	350
MD380-7T280G	396.0	305.0	299.0	280	370
MD380-7T315G	445.0	350.0	330.0	315	420
MD380-7T355G	500.0	382.0	374.0	355	470
MD380-7T400G	565.0	435.0	410.0	400	530
MD380-7T450G	630.0	490.0	465.0	450	600
MD380-7T500G	700.0	595.0	550.0	500	660

Physical Appearance

Physical Appearance



Mounting Dimensions of 0.4kW~15kW Models

Mounting Dimensions of 18.5kW~400kW Models

※ Models of 110kW and above: top inlet, bottom outlet

Mounting Dimensions

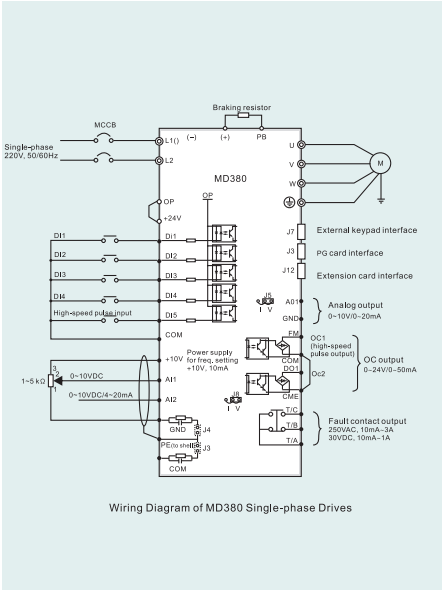
AC Drive Model	Mounting Hole (mm)		Physical Dimension (mm)				Diameter of Mounting Hole (mm)	Weight (kg)
	A	B	H	H1	W	D		
MD380S0.4GB	113	172	186	/	125	164	ø5.0	1.1
MD380S0.7GB								
MD380S1.5GB								
MD380S2.2GB								
MD380T0.7GB								
MD380T1.5GB								
MD380T2.2GB								
MD380T3.7GB	148	236	248	/	160	183	ø5.0	2.5
MD380T5.5GB								
MD380T7.5GB	190	305	322	/	208	192	ø6	6.5
MD380T11GB								
MD380T15GB								
MD380T18.5G	235	447	432	463	285	228	ø6.5	20
MD380T22G								
MD380T30G								
MD380T37G	260	580	549	600	385	265	ø10	32
MD380T45G								
MD380T55G								
MD380T75G	343	678	660	700	473	307	ø10	47
MD380T90G								
MD380T110G	449	903	880	930	579	380	ø10	90
MD380T132G								
MD380T160G								
MD380T110GH	320	1166	1090	1192	440	310	ø10	90
MD380T132GH								
MD380T160GH								
MD380T200G	420	1030	983	1060	650	377	ø12	130
MD380T220G								
MD380T250G								
MD380T280G								
MD380T315G	520	1300	1203	1358	800	400	ø16	200
MD380T355G								
MD380T400G								
MD380-7T55G	250	570	557	600	400	330	ø10	47
MD380-7T75G								
MD380-7T90G								
MD380-7T110G								
MD380-7T132G								
MD380-7T160GH	320	1166	1090	1192	440	310	ø10	90
MD380-7T200GH								
MD380-7T220GH								
MD380-7T250GH								
MD380-7T280G	420	1030	983	1060	650	377	ø12	130
MD380-7T315G								
MD380-7T355G								
MD380-7T400G	520	1300	1203	1358	800	400	ø16	200
MD380-7T450G								
MD380-7T500G								

Technical Specifications

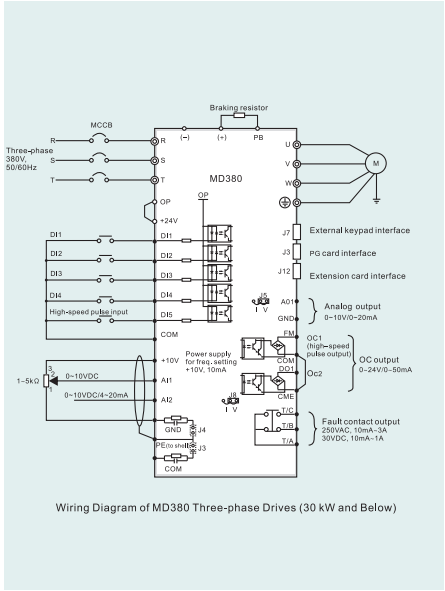
Item		Specifications
Standard functions	Maximum frequency	Vector control: 0–300 Hz; V/F control: 0-320Hz
	Carrier frequency	0.5–16 kHz The carrier frequency is automatically adjusted based on the load features
	Input frequency resolution	Digital setting: 0.01 Hz Analog setting: maximum frequency x 0.025%
	Control mode	Sensorless flux vector control (SFVC) Closed-loop vector control (CLVC) Voltage/Frequency (V/F) control
	Starting torque	0.5Hz/150%(SFVC); 0Hz/180%(CLVC)
	Speed range	1:200 (SFVC) 1:1000 (CLVC)
	Speed stability accuracy	±0.5% (SFVC); ±0.02% (CLVC)
	Torque control accuracy	±5% (CLVC)
	Overload capacity	60s for 150% of the rated current, 3s for 180% of the rated current
	Torque boost	Fixed boost; Customized boost 0.1%–30.0%
	V/F curve	Straight-line V/F curve; Multi-point V/F curve; N-power V/F curve (1.2-powe/1.4-powe/1.6-powe/1.8-powe/square)
	V/F separation	Two types: Complete separation; half separation
	Ramp mode	Straight-line or S curve ramp; four groups of acceleration/deceleration time with the range of 0.0 to 6500.0s
	DC braking	DC braking frequency: 0.00 to maximum frequency; braking time: 0.0s to 36.0s; braking acting current value: 0.0% to 100.0%
	JOG control	JOG frequency range: 0.00 to 50.00Hz; JOG acceleration/deceleration time: 0.0 to 6500.0s
	Onboard multiple preset speeds	It implements up to 16 speeds via the simple PLC function or combination of DI terminal states
	Onboard PID	It realizes process-controlled closed loop control system easily.
	Auto voltage regulation (AVR)	It can keep constant output voltage automatically when the mains voltage changes
	Overvoltage/Overcurrent stall control	The current and voltage are limited automatically during the running process so as to avoid frequent tripping due to overvoltage/overcurrent
	Torque limit and control	It can limit the torque automatically and prevent frequent over current tripping during the running process. Torque control can be implemented in the CLVC mode
Individualized functions	High performance	Control of asynchronous motor and synchronous motor are implemented through the high-performance current vector control technology
	Power dip ride through	The load feedback energy compensates the voltage reduction so that the AC drive can continue to run for a short time
	Rapid current limit	It helps to avoid frequent over current faults of the AC drive
	Virtual I/Os	Five groups of virtual DI/DOs can realize simple logic control
	Timing control	Time range: 0.0–6500.0 minutes
	Multi-motor switchover	Four motors can be switched over via four groups of motor parameters
	Multiple communication protocols	It supports communication via Modbus-RTU, PROFIBUS-DP, CANlink and CANopen
	Motor overheat protection	The optional I/O extension card enables AI3 to receive the motor temperature sensor input (PT100, PT1000) so as to realize motor overheat protection
	Multiple encoder types	It supports various encoders such as differential encoder, open-collector encoder, resolver, UVW encoder, and SIN/COS encoder
	User programmable function	The optional programming card helps you to realize secondary development. Its programming environment is compatible with that of the PLC of Inovance
	Advanced background software	It supports the operation of AC drive parameters and virtual oscillograph function, via which the state inside the AC drive is monitored

Item		Specifications
RUN	Running command source	Operation panel Control terminals Serial communication port You can perform switchover between these sources in various ways
	Frequency source	There are a total of 10 frequency sources, such as digital setting, analog voltage setting, analog current setting, pulse setting and serial communication port setting. You can perform switchover between these sources in various ways
	Auxiliary frequency source	There are ten auxiliary frequency sources. It can implement fine tuning of auxiliary frequency and frequency synthesis
	Input terminal	Standard: 5 digital input (DI) terminals, one of which supports up to100 kHz high-speed pulse input 2 analog input (AI) terminals, one of which only supports 0–10V voltage input and the other supports 0–10V voltage input or 4–20 mA current input Expanding capacity: 5 DI terminals 1 AI terminal that supports -10 –10V voltage input and also supports PT100\PT1000
	Output terminal	Standard 1 high-speed pulse output terminal (open-collector) that supports 0 –100kHz square wave signal output 1 digital output (DO) terminal 1 relay output terminal 1 analog output (AO) terminal that supports 0–20mA current output or 0–10V voltage output Expanding capacity: 1 DO terminal 1 relay output terminal 1 AO terminal that supports 0–20mA current output or 0–10V voltage output
Display and operation on the operation panel	LED display	It displays the parameters
	Key locking and function selection	It can lock the keys partially or completely and define the function range of some keys so as to prevent mis-function
	Protection mode	Motor short-circuit detection at power-on, input/output phase loss protection, overcurrent protection, overvoltage protection, undervoltage protection, overheat protection and overload protection
	Optional parts	LCD operation panel, braking unit, I/O extension card 1, I/O extension card 2, user programmable card, RS485 communication card,PROFIBUS-DP communication card, CANlink communication card, CANopen communication card, differential input PG card, UVW differential input PG card, resolver PG card and OC input PG card
Environment	Installation location	Indoor, free from direct sunlight, dust, corrosive gas, combustible gas, oil smoke, vapour, drip or salt
	Altitude	Lower than 1000 m
	Ambient temperature	-10°C to +40°C (de-rated if the ambient temperature is between 40°C and 50°C)
	Humidity	Less than 95%RH, without condensing
	Vibration	Less than 5.9 m/s^2 (0.6 g)
	Storage temperature	-20°C to +60°C
	IP level	IP20
	Pollution degree	PD2
	Power distribution system	TN , TT

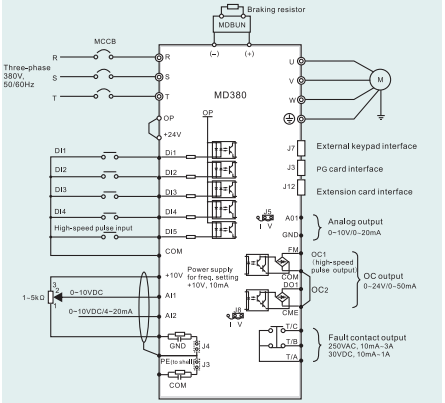
Typical Wiring Diagram



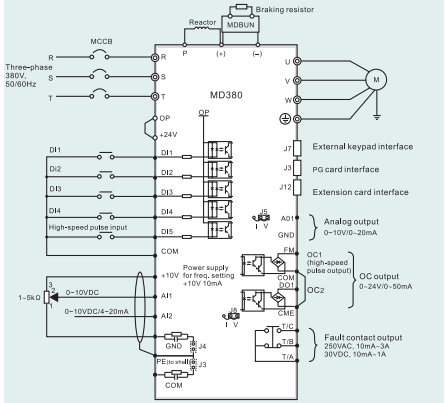
Wiring Diagram of MD380 Single-phase Drives



Wiring Diagram of MD380 Three-phase Drives (30 kW and Below)



Wiring Diagram of MD380 Three-phase Drives (37 kW to 55 kW)



Wiring Diagram of MD380 Three-phase Drives (75 kW and Above, 7T Series)

Optional Parts

Picture	Model	Description
	MD38PG1	Differential PG card: 1. External power supply of 5V 2. Supporting differential input signals of three channels (A, B, Z), among which signals of channels A and B can be input at a frequency up to 500 kHZ 3. With frequency dividing output (1:1) 4. Encoder interface is a terminal.
	MD38PG3	UVW differential PG card: 1. External power supply of 5V 2. Supporting differential input signals of six channels (A, B, Z, U, V, W), among which signals of channels A and B can be input at a frequency up to 500 kHz 3. DB15 interface 4. No frequency dividing output
	MD38PG4	Resolver card: 1. Excitation output: 10 kHz, 7V Rms 2. Resolution: 12 bit 3. DB9 interface 4. No frequency dividing output
	MD38PG5	OC PG card: 1. External power supply of 15V 2. Supporting open collector signals of three channels (A, B, Z), among which signals of channels A and B can be input at a frequency up to 100 kHZ 3. With frequency dividing output (1:1)
	MD38PG6	Differential PG card: 1. External power supply of 5V 2. Supporting differential input signals of three channels (A, B, Z), among which signals of channels A and B can be input at a frequency up to 500 kHZ 3. With frequency dividing output (1:1) 4. Encoder interface: DB9
	MD38IO1	IO and communication card: 1. With one isolated analog input AI3 which supports input of ± 10V, PT100 and PT1000; they cannot be used simultaneously. 2. Supporting CANlink and Modbus communication (which can't be used simultaneously but can be switched via jumper) 3. DI x 5, DO x 1, RELAY x 1, AO x 1 4. Applicable to models of 3.7 kW and above
	MD38CAN1	CANlink communication card: 1. Supporting CANlink protocol
	MD38CAN2	CANopen communication card
	MD38DP1	PROFIBUS-DP communication card: 1. Supporting CANlink communication 2. Supporting PROFIBUS-DP communication 3. Applicable to models of 3.7 kW and above
	MD38PC1	PLC card: 1. With one isolated analog input AI which supports input of ± 10V, ± 20mA, PT100 and PTC; they cannot be used simultaneously. 2. Isolated RS485 communication interface 3. DI x 5, RELAY x 2, AO x 1 4. Applicable to models of 3.7 kW and above
	MD38TX1	RS485 communication card
	MDKE7	External LCD keypad, which can realize parameter copy.