

Goodrive390L Series Lift-dedicated VFD

Quick Start Guide

This guide briefly describes the peripheral wiring, terminals, keypads, quick running, and common function parameter settings of Goodrive390L series lift-dedicated variable frequency drive (VFD).

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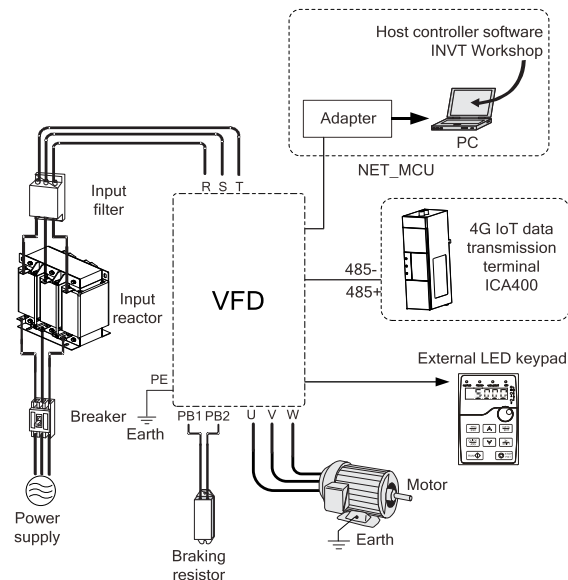
- Warning**
 - This guide only provides the basic installation and commissioning information. Failure to comply with the safety instructions and installation and commissioning instructions in the relevant documentation may result in accidents such as equipment damage, personal injury, or even death.
 - Only trained and qualified professionals are allowed to carry out related operations.

Danger

- Do not perform any operations including wiring, inspection, or component replacement when power supply is applied. Before performing these operations, ensure all the input power supplies have been disconnected, and wait for at least the time designated on the VFD.

Minimum waiting time	VFD model
5 minutes	1PH 220V 2.2kW; 3PH 220V 2.2kW-18.5kW; 3PH 380V 4kW-37kW

1 Peripheral wiring



2 Terminal function

Figure 2-1 Main circuit wiring diagram

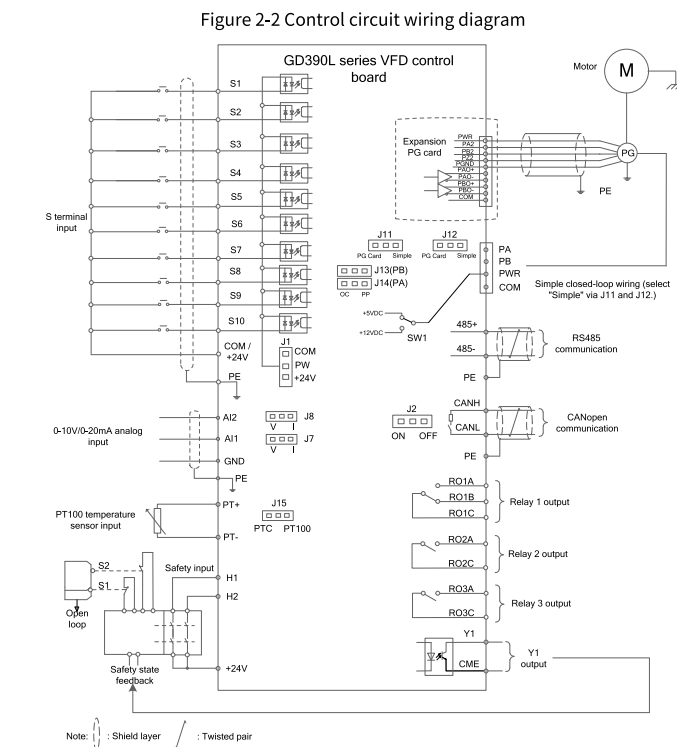
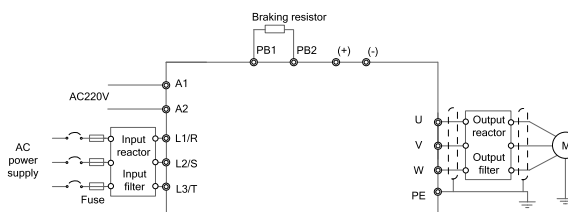


Table 2-1 Main circuit terminal description

Terminal symbol	Terminal name	Function description
L1/R, L2/S, L3/T	Main circuit power input	3PH AC input terminals, connected to the grid 1PH AC220V models: Connect any two of L1/R, L2/S, and L3/T.
PB1, PB2	Braking resistor terminal	To connect the external braking resistor
(+), (-)	DC bus terminal	To connect the DC48V emergency power supply (an additional external battery protection adapter board is required)
U, V, W	VFD output	3PH AC output terminals, connected to the motor usually
A1, A2	Auxiliary power input terminals for internal control circuit	When using the DC48V battery emergency power supply scheme, the A1 and A2 terminals need to be connected to the AC220V power supply. Note: A1 and A2 are not motor drive power supply terminals.
PE	Grounding terminal for safe protection	Grounding terminal for safe protection; each machine must carry two PE terminals and proper grounding is required.

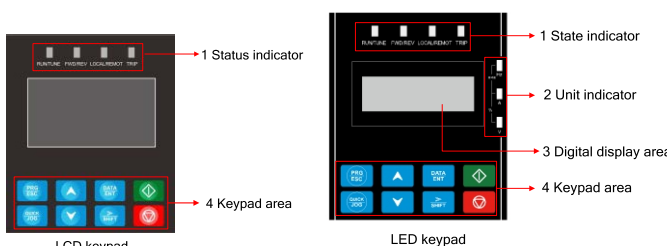
Table 2-2 Control circuit terminal description

Terminal name	Description
+24V	Used to externally provide 24V $\pm 10\%$ power supply. Max. output current: 200mA
COM	Common terminal of +24V
S1-S10	Regular digital input terminals - Internal impedance: 3.3kΩ 12-30V voltage input is acceptable. - Bi-direction input terminal, supporting NPN and PNP (switching through the jumper J1) - Max. input frequency: 1kHz - Programmable digital input terminals, the functions of which can be set through the related parameters
Y1, CME	Open collector outputs - Switch capacity: 50mA/30V - Output frequency range: 0-1kHz
RO1, RO2, RO3	Three programmable relay outputs. - One group of NC and NO outputs: RO1A: NO; RO1B: NC; RO1C: common - Two groups of NO outputs: RO2A, RO2C; RO3A, RO3C - Contact capacity: 3A/AC250V, 1A/DC30V
A11, A12	Input range: 0-10V or 0-20mA, set through the J7 and J8 jumpers - Input impedance: 20kΩ for voltage input; 500Ω for current input - Resolution: 5mV when 10V corresponds to 50Hz - Error: $\pm 1\%$ at 25°C
PT+, PT-	PT100 temperature detection or PTC overtemperature detection input terminals (selected through the J15 jumper). The PT100/PTC detection function can be enabled through parameter P97.03, and it is disabled by default. PT100: Resolution of 1°C; detection range of -20°C-150°C; detection accuracy of $\pm 3^\circ\text{C}$

Terminal name	Description
PTC: Ts $\pm 5^\circ\text{C}$	
PA, PB	Simplified closed-loop encoder signal interfaces (The interfaces default to open-collector encoder signals, which can be switched to push-pull encoder signals through the J13 and J14 jumpers). - Applicable to 5V/12V push-pull, OC encoders - Response frequency: 100kHz
PWR	Encoder power interface. The common terminal is COM which can be set to 5V or 12V through SW1.
CANH, CANL	CANopen communication interfaces. The terminal matching resistor can be connected through the J2 jumper.
485+, 485-	RS485 communication interfaces
H1, H2	STO function input terminals - Connected to external NC contacts. When the contacts open, STO acts and VFD output stops. - H1 and H2 are redundant inputs. They are short connected to +24V by default. Remove the jumper before using STO function. - Use the shielded cable with a length shorter than 25m.

3 Keypad

Figure 3-1 Keypad



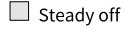
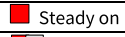
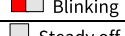
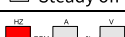
Digital display on LED keypad

Display	Means	Display	Means	Display	Means	Display	Means
0	0	1	1	2	2	3	3
4	4	5	5	6	6	7	7
8	8	9	9	A	A	b	b
C	C	d	d	E	E	F	F
H	H	I	I	L	L	N	N
n	n	O	O	P	P	r	r
S	S	t	t	U	U	v	v
.	.	-	-				

Note:

Some models of the product carry a LCD keypad, which supports multiple languages (press **ENT** on the main interface to enter the language selection interface), parameter copying function, and four-row high-definition display. The other models carry a LED keypad. Set P00.01=2 if using an LCD keypad; set P00.01=0 if using an LED keypad.

Table 3-1 Keypad introduction

Indicator	State	Meaning	
RUN/TUNE	 Steady on	The VFD is running.	
	 Blinking	The VFD is in parameter autotuning.	
	 Steady off	The VFD has stopped.	
FWD/REV	 Steady on	The VFD is running reversely.	
	 Steady off	The VFD is running forward.	
LOCAL/REMOT	 Steady on	The VFD uses communication as the command running channel.	
	 Blinking	The VFD uses terminal as the command running channel.	
	 Steady off	The VFD uses keypad as the command running channel.	
TRIP	 Steady on	The VFD is in fault state.	
	 Blinking	The VFD is in alarm state.	
	 Steady off	The VFD is in normal state.	
Unit indicator		Hz	Frequency unit
		RPM	Rotation speed unit
		A	Current unit
		%	Percentage
		V	Voltage unit
		m/s	Linear speed unit

Key	Function
	Programming key Press it to enter or exit level-1 menus.
	Confirmation key Press it to enter menus in cascading mode or confirm the setting of a parameter.
	UP key Press it to increase data or move upward.
	Down key Press it to decrease data or move downward.
	Right-shifting key Press it to select display parameters rightward in the interface for the VFD in stopped or running state or to select digits to change during parameter setting.
	Run key Press it to run the VFD when using the keypad for control.
	Stop/Reset key Press it to stop the VFD that is running. The function of this key is restricted by P07.04. In fault alarm state, this key can be used for reset in any control modes.
	Multifunction shortcut key The function is determined by P07.02.

4 Quick startup

4.1 Check before power-on

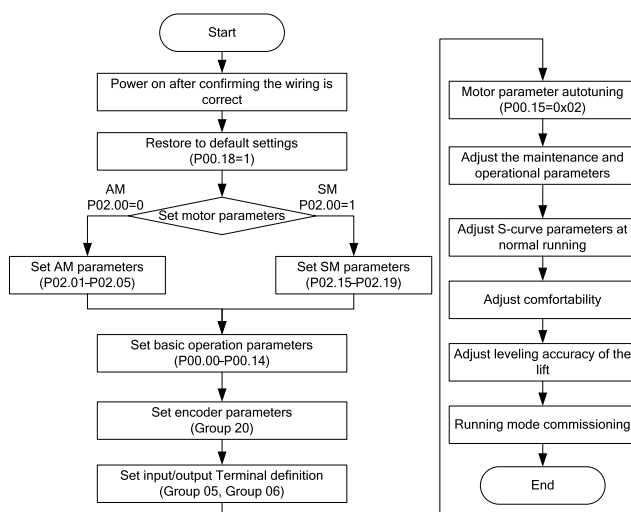
	- Ensure that all terminals have been securely connected. - Ensure that the motor power matches the VFD power.
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4.2 First power-on

After confirming the wiring and power are correct, close the air switch of the AC power supply at the VFD input side to power on the VFD. The keypad displays as the following figure, indicating that the VFD is ready for run.



The quick startup diagram is as follows:



4.3 Procedures of motor autotuning

Step 1 After setting the correct motor data, first set the VFD to keypad control mode.

Step 2 After completing the settings, set P0.15 to 02, and the drive will display "TUN".

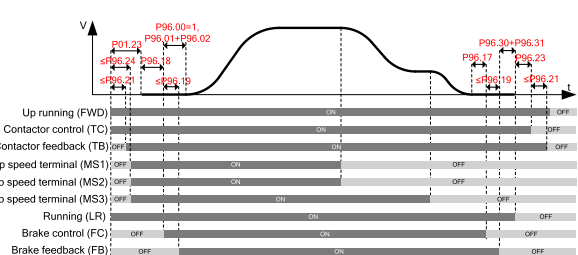
Step 3 After pressing the RUN button, the motor contactor will close, and the motor will emit a sound. Keep the RUN button pressed.

Step 4 After autotuning is completed, "SUC" will be displayed, and the contactor will open again. Then set P0.01 to 1 and try running the motor.

Step 5 If an error "FAL" appears, try setting P20.02 to 101, 001, or 100, and restart from Step 1.

4.4 Running timing diagram

Figure 4-1 Timing diagram for lift multi-step speed running in closed-loop mode



Function code	Name	Description	Default	Modify
P02.02	Rated frequency of AM	Setting range: 0.00Hz~P00.03	50.00Hz	⊙
P02.03	Rated speed of AM	Setting range: 1~60000rpm	Model depended	⊙
P02.04	Rated voltage of AM	Setting range: 0~1200V	Model depended	⊙
P02.05	Rated current of AM	Setting range: 0.8~6000.0A	Model depended	⊙
P02.06	Stator resistance of AM	Setting range: 0.001~65.535Ω	Model depended	○
P02.07	Rotor resistance of AM	Setting range: 0.001~65.535Ω	Model depended	○
P02.08	Leakage inductance of AM	Setting range: 0.1~6553.5mH	Model depended	○
P02.09	Mutual inductance of AM	Setting range: 0.1~6553.5mH	Model depended	○
P02.10	No-load current of AM	Setting range: 0.1~6553.5A	Model depended	○
P02.15	Rated power of SM	Setting range: 0.1~3000.0kW	Model depended	⊙
P02.16	Rated frequency of SM	Setting range: 0.00Hz~P00.03	50.00Hz	⊙
P02.17	Number of pole pairs of SM	Setting range: 1~128	2	⊙
P02.18	Rated voltage of SM	Setting range: 0~1200V	Model depended	⊙
P02.19	Rated current of SM	Setting range: 0.8~6000.0A	Model depended	⊙
P03.00	Speed-loop proportional gain 1	Setting range: 0.0~200.0	20.0	○
P03.01	Speed-loop integral time 1	Setting range: 0.000~10.000s	0.600s	○
P03.02	Low-point frequency for switching	Setting range: 0.00~P03.05(Hz)	5.0Hz	○
P03.03	Speed-loop proportional gain 2	Setting range: 0.0~200.0	20.0	○
P03.04	Speed-loop integral time 2	Setting range: 0.000~10.000s	0.600s	○
P03.05	High-point frequency for switching	Setting range: P03.02~P00.03(Hz)	10.00Hz	○
P03.06	Speed-loop output filter	Setting range: 0~8	0	○
P03.09	Current loop bandwidth	Setting range: 0~2000Hz	400Hz	○
P05.01	Function of S1	Setting range: 0~40	0	⊙
P05.02	Function of S2	0: No function	1	⊙
P05.03	Function of S3	1: Up running (FWD)	2	⊙
P05.04	Function of S4	2: Down running (REV)	8	⊙
P05.05	Function of S5	3: Running in inspection (EXM)	9	⊙
P05.06	Function of S6	4: Emergency running (EMER)	10	⊙
P05.07	Function of S7	5: Coast to stop (FSTP)	0	⊙
P05.08	Function of S8	6: Fault reset (RET)	0	⊙
P05.09	Function of S9	7: External fault (EF)	0	⊙
P05.10	Function of S10	8: Multi-step speed terminal 1 (MS1)	0	⊙
		9: Multi-step speed terminal 2 (MS2)		
		10: Multi-step speed terminal 3 (MS3)		
		11: Up forced DEC 1 (UFS1)		
		12: Up forced DEC 2 (UFS2)		
		13: Up forced DEC 3 (UFS3)		
		14: Down forced DEC 1 (DFS1)		
		15: Down forced DEC 2 (DFS2)		
		16: Down forced DEC 3 (DFS3)		
		17: Contactor feedback signal (TB)		
		18: Brake feedback signal (FB)		
		19: VFD enabling (ENA)		
		20: Forced decelerate to stop		
		21: Emergency mode		
		22: Motor overheating		
		23: Main power supply input disconnected (for India)		

Function code	Name	Description	Default	Modify
		24: UPS input disconnected by main control (for India)		
		25: Base lockout		
		26: Brake feedback signal 2		
		27: Brake travel feedback 1		
		28: Brake travel feedback 2		
		29: Brake travel feedback 3		
		30: Brake travel feedback 4		
		31: Reserved		
		32: Upper door zone		
		33: Middle door zone		
		34: Lower door zone		
		35: High-speed trigger point		
		36: Medium-speed trigger point		
		37: Low-speed trigger point		
		38~40: Reserved		
P05.13	Input terminal polarity	Setting range: 0x000~0x3FF Bit0~bit9 corresponds to S1~S10 in sequence. Specifies the polarity of the input terminal. When a bit is 0, the input terminal is positive. When a bit is 1, the input terminal is negative.	0x000	○
P05.14	Digital input filter time	Setting range: 0.000~1.000s The function code is used to specify the filter time of S1~S10 terminal sampling. In strong interference cases, increase the value to avoid maloperation.	0.010s	○
P06.01	Y1 output	Setting range: 0~30	1	○
P06.03	RO1 output	0: No output	0	○
P06.04	RO2 output	1: Lift in operation	7	○
P06.05	RO3 output	2: Up operation 3: Down running 4: Fault output 5: Running at zero speed 6: Ready for running 7: Brake control 8: Contactor control 9: Any frequency reached 10: Frequency level detection FDT1 output 11: Frequency level detection FDT2 output 12: Brake 2 control 13: Light-load direction detection completed 14: Down as the light-load direction detection result 15: Up as the light-load direction detection result 16: Running 1 (excluding current withdrawal) 17: STO action 18: SPI fault output 19: UPS control signal output (India) 20: Star-sealing output 21: STO safety contactor control 22~30: Reserved	8	○
P06.06	Output terminal polarity selection	Specifies the polarity of the output terminal. Setting range: 0x00~0x0F	0x00	○
P07.01	Parameter copy	Setting range: 0~3 0: No operation 1: Upload parameters to keypad 2: Download all parameters (including motor parameters) 3: Download non-motor parameters	0	⊙
P08.28	Auto fault reset count	Setting range: 0~10	0	○
P08.29	Auto fault reset interval	Setting range: 0.1~3600.0s	3.0s	○

Function code	Name	Description	Default	Modify
P08.52	STO-SAFE status reset selection	Setting range: 0~3 0: Manual reset, with triggering fault output 1: Automatic reset, with triggering fault output 2: Manual reset, without triggering fault output 3: Automatic reset, without triggering fault output	3	○
P10.00~P10.07	Multi-step speed 0~Multi-step speed 7	Setting range: 0.000m/s~P00.06	0.000m/s	○
P10.38	S-curve ACC start segment duration	Setting range: 0.1~360.0s	2.0s	⊙
P10.39	S-curve ACC end segment duration	Setting range: 0.1~360.0s	2.0s	⊙
P10.40	ACC time	Setting range: 0.1~360.0s	2.0s	⊙
P10.41	S-curve DEC start segment duration	Setting range: 0.1~360.0s	2.0s	⊙
P10.42	S-curve DEC end segment duration	Setting range: 0.1~360.0s	2.0s	⊙
P10.43	DEC time	Setting range: 0.1~360.0s	2.0s	⊙
P10.44	S-curve start segment duration during stop	Setting range: 0.1~360.0s	2.0s	⊙
P10.45	S-curve end segment duration during stop	Setting range: 0.1~360.0s	2.0s	⊙
P10.46	Running speed at maintenance	Setting range: 0.000~P00.06(m/s)	0.200m/s	⊙
P10.47	ACC/DEC time at maintenance	Setting range: 0.1~360.0s	4.0s	⊙
P10.48	Forced DEC time	Setting range: 0.1~360.0s	2.0s	⊙
P10.49	Emergency running speed	Setting range: 0.001~P00.06(m/s)	0.100m/s	⊙
P10.50	Emergency ACC/DEC time	Setting range: 0.1~360.0s	20.0s	⊙
P10.53	DEC time for creeping to stop	Setting range: 0.1~360.0s During deceleration to stop, when the speed reached the value set in P01.15, the curve of deceleration to stop switches to those set in P10.44, P10.45, and P10.53.	2.0s	⊙
P10.54	Frequency threshold for light-load detection in open-loop control	Setting range: 5.00~20.00Hz	5.00Hz	⊙
P11.00	Phase loss protection	Setting range: 0x000~0x111 Ones place: 0: Disable input phase loss protection 1: Enable input phase loss protection Tens place: 0: Disable output phase loss protection 1: Enable output phase loss protection Hundreds place: 0: Output phase loss detection not enabled before startup 1: Output phase loss detection enabled before startup	0x011	○
P11.08	OL/UL pre-alarm selection	Setting range: 0x0000~0x1132 Ones place: Overload/underload (OL/UL) detection method 0: Motor OL/UL, relative to the motor rated current. 1: VFD OL/UL, relative to the VFD rated current. 2: Motor output torque OL/UL, relative to motor rated torque.	0x0000	○

Function code	Name	Description	Default	Modify
		Tens place: Action selection after OL/UL condition is triggered 0: The VFD continues to work, while keeping the OL/UL alarm. 1: For a UL fault, the VFD continues to work, while keeping the alarm; for an OL fault, it reports the fault and stops. 2: For an OL fault, the VFD continues to work, while keeping the alarm; for a UL fault, it reports the fault and stops. 3: The VFD reports the OL/UL fault and stops. Hundreds place: Detection method 0: Always detect 1: Detect during constant speed running. Thousands: VFD overload current reference selection 0: Related to the current correction coefficient 1: Not related to the current correction coefficient		
P11.09	Overload pre-alarm detection level	If the VFD or motor output current is larger than the overload pre-alarm detection level (P11.09), and the duration exceeds the overload pre-alarm detection time (P11.10), overload pre-alarm signal will be outputted. Setting range: 50%~200% (relative value determined by the ones place of P11.08)	G type: 150% P type: 150%	○
P11.10	Overload alarm detection time	Setting range: 0.1~3600.0s	1.0s	○
P14.00	Local serial communication address	Setting range: 1~247	1	○
P15.01	CANopen module address	Setting range: 0~127	2	⊙
P20.00	Encoder type selection	0: Incremental encoder 1: Reserved 2: Sin/Cos encoder without CD signals 3: EnDat absolute encoder 4: SSI absolute encoder 5: Sin/Cos encoder with CD signals 6: Reserved	0	⊙
P20.01	Encoder pulse count	Setting range: 0~16000	1024	⊙
P20.02	Encoder direction	Setting range: 0x000~0x111 Ones place: AB direction 0: Forward 1: Reverse Tens place: Reserved Hundreds place: CD/absolute position pole signal direction 0: Forward 1: Reverse	0x000	⊙
P96.00	Non-weighing compensation enable	Setting range: 0~1 0: Disable 1: Enable	0	⊙
P96.01	Load compensation time	Setting range: 0.000~5.000s	0.400s	⊙
P96.02	Load compensation reduction time	Setting range: 0.000~5.000s	0.100s	⊙
P96.03	Load compensation ASR gain	Setting range: 0.0~100.0	25.0	○
P96.04	Load compensation ASR integral time	Setting range: 0.001~1.000s	0.160s	○
P96.05	Load compensation current coefficient KP gain	Setting range: 0.0~200.0%	50.0%	○

Function code	Name	Description	Default	Modify
P96.17	Brake close delay	Setting range: 0.00~5.00s	0.10s	⊙
P96.18	Brake release delay	Setting range: 0.0~5.0s	0.10s	⊙
P96.23	Contactor switch-off delay	Setting range: 0.00~10.00s	0.50s	⊙
P96.24	Speed signal detection time	Setting range: 0.0~5.0s	2.0	⊙
P96.29	Braking frequency during shutdown	Setting range: 0.00~5.00Hz	0.40Hz	○
P96.30	Stop delay	Setting range: 0.00~5.00s	0.10s	⊙
P96.31	Current withdrawal time after stop	Setting range: 0.00~5.00s	0.00s	⊙
P96.32	Enable light load direction search	Setting range: 0~2 0: Disable 1: Enable auto running 2: Enable to only provide running direction	0	⊙
P96.33	Light-load direction detection time	Setting range: 0.000~5.000s	2.000s	⊙
P96.34	Safety gear mode	Setting range: 0~1 0: Disable 1: Enable	0	⊙
P96.35	Enable electronic stator shorting	Setting range: 0~1 0: Disable 1: Enable	1	○

6 More information

Please contact us for any information about the product. It is necessary to provide the product model and serial number during consultation. To obtain more information, you can:

- Contact INVT local office.
- Visit www.invt.com or scan the following QR code of INVT official website.

