Goodrive290 Series Low-Voltage Multifunction General-Purpose VFD Quick Start Guide

This guide briefly describes the external wiring, terminals, keypads, quick running, common function parameter settings, and common faults and solutions of Goodrive290 series low-voltage multifunction general-purpose series VFD.
Visit www.invt.com for more information and source download. For details, see the full version of corresponding product e-manual.

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⚠ Warning

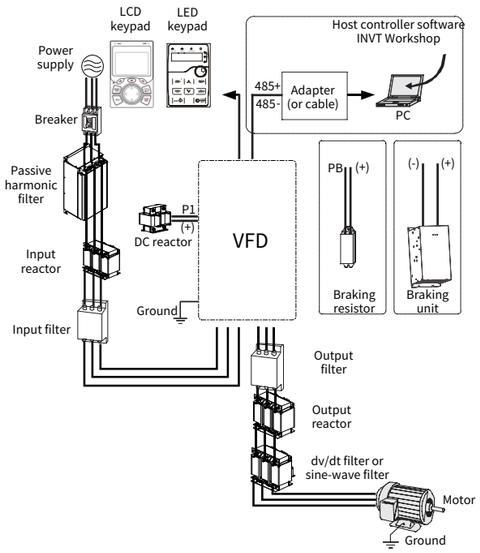
This guide only provides the basic installation and commissioning information. Failure to comply with the safety instructions and installation and commissioning instructions in the relevant documentation may result in accidents such as equipment damage, personal injury, or even death.
Only trained and 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 or until the DC bus voltage is less than 36V.

Minimum waiting time	VFD model
5 minutes	3PH 380V 0.75–110kW
15 minutes	3PH 380V 132–315kW
20 minutes	3PH 380V >355kW

1 External wiring



2 Terminal

Figure 2-1 Typical VFD wiring

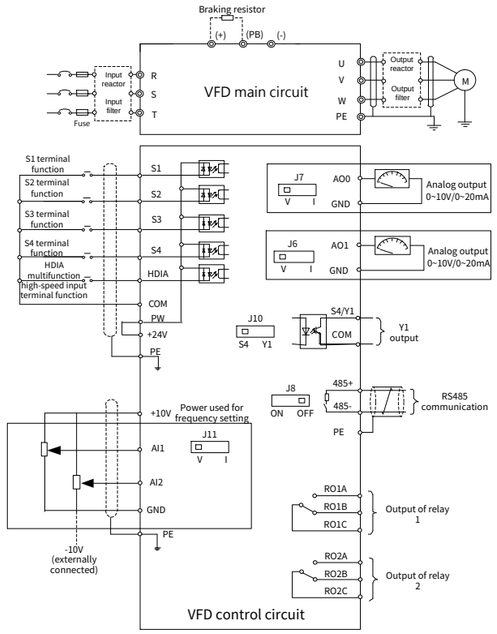


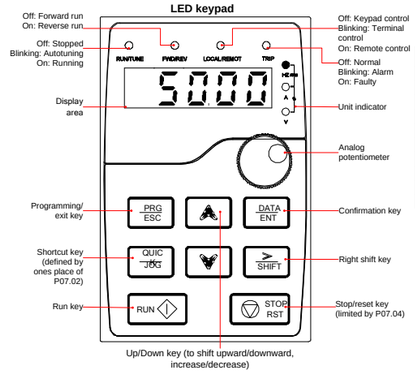
Table 2-1 VFD terminal description

Terminal	Description
Main circuit terminals	
R, S, T	3PH AC input terminals, connected to the grid
U, V, W	3PH AC output terminals, connected to the motor usually
(+)	(+) and (-) connect to external braking unit terminals or shared DC bus terminals.
(-)	
PB	PB and (+) connect to external braking resistor terminals.
⏚	PE terminal. The PE terminals of each machine must be grounded reliably.
Control circuit terminals	
+10V	Locally provided 10V power supply
AI1	Analog input, using voltage input by default, which can be changed to current input through the corresponding jumper; input range: 0–10V/0–20mA
AI2	Analog input. Input range: -10–10V
GND	+10V reference ground
AO0	Analog output, using voltage output by default, which can be changed to current output through the corresponding jumper; output range: 0–10V/0–20mA
AO1	
RO1A	Relay output. RO1A: NO; RO1B: NC; RO1C: common
RO1B	Relay output. RO2A: NO; RO2B: NC; RO2C: common
RO1C	Contact capacity: 3A/AC 250V, 1A/DC 30V
COM	+24V reference ground
485+	RS485 differential signal communication port. Use shielded twisted pairs for standard RS485 communication interfaces. You can determine whether to connect the 120Ω terminal matching resistor of RS485 communication through the corresponding switch or jumper.
485-	
PE	Grounding terminal
PW	External power input terminal for digital input circuits. In NPN mode, short connect PW and +24V. In PNP mode, short connect PW and COM.
+24V	User power supply provided by the VFD. Max. output current: 200mA
S1–S4	Digital input; max. frequency: 1kHz; internal impedance: 3.3kΩ Y1: open-collector output, sharing the terminal with S4; function selectable through a jumper.
HDIA	In addition to the digital input function, the terminal can also act as a high frequency pulse input channel. Max. input frequency: 50kHz

3 Keypad

The product is equipped with a standard LED keypad and supports an optional LCD keypad.

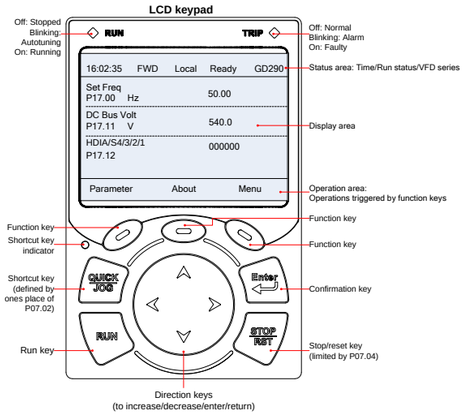
LED keypad



Digital display on LED keypad

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	o	n
O	O	P	P	r	r
S	S	t	t	U	U
v	v	-	.	_	-

LCD keypad



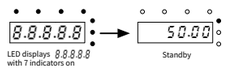
4 Quick running

4.1 Check before power-on

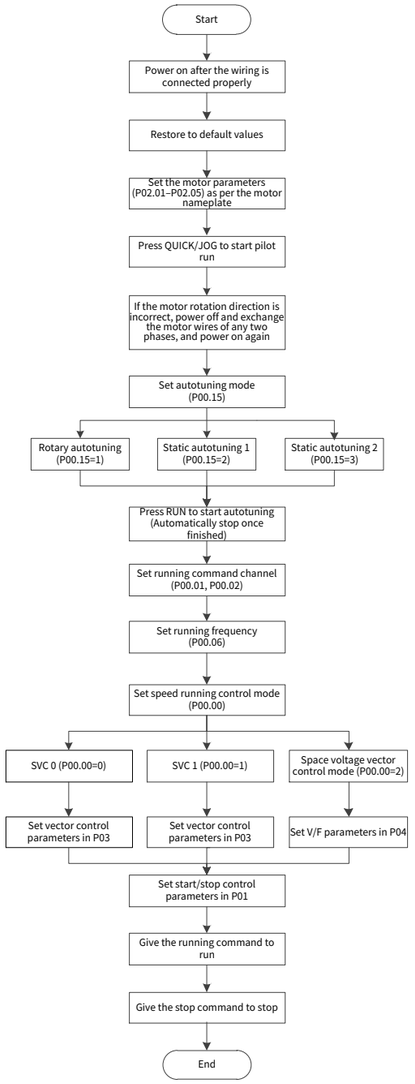
⚠	● Ensure that all terminals have been securely connected. ● Ensure that the motor power matches the VFD power.

4.2 Operating upon first power-on

After confirming the wiring and power are correct, close the air switch of the AC power at the VFD input side to power on the VFD. Using a LED keypad for example, the keypad displays 8.8.8.8.8. upon power-on and then the set frequency (50.00 in the example), indicating the VFD is initialized and ready to run.



The quick startup flowchart is as follows:



5 Common function parameter setup

The following briefly describes only some common function parameters and typical values.

"○" indicates that the value of the parameter can be modified when the VFD is in stopped or running state.

"◎" indicates that the value of the parameter cannot be modified when the VFD is in running state.

"●" indicates that the value of the parameter is detected and recorded, and cannot be modified.

(The VFD automatically checks and constrains the modification of parameters, which helps prevent incorrect modifications.)

Function code	Name	Description	Default	Modify
P00.00	Speed control mode	0: SVC mode 0 1: SVC mode 1 2: Space voltage vector control mode	Model depended	◎
P00.01	Channel of running commands	0: Keypad 1: Terminal 2: Communication	0	○
P00.03	Max. output frequency	P00.04–400.00Hz	50.00Hz	◎
P00.04	Upper limit of running frequency	P00.05–P00.03 (Max. output frequency)	50.00Hz	◎
P00.05	Lower limit of running frequency	0.00Hz–P00.04 (Upper limit of running frequency)	0.00Hz	◎

Function code	Name	Description	Default	Modify
P00.06	Setting channel of A frequency command	0: Keypad digital 1: AI1 2: AI2 3: AI3 4: High-speed pulse HDIA	0	○
P00.07	Setting channel of B frequency command	5: Simple PLC program 6: Multi-step speed running 7: PID control 8: Modbus/Modbus TCP communication 9: PROFIBUS/CANopen communication 10: Ethernet communication 11–12: Reserved 13: EtherCAT/PROFINET/EtherNet IP communication 14: Programmable card 15–17: Reserved 18: Keypad analog input (only applicable to 0R7G/1R5P–018G/022P) **Note:** Options 1–3 are not valid for 0R7G/1R5P–018G/022P models.	2	○
P00.10	Setting frequency through keypad	0.00Hz–P00.03 (Max. output frequency)	50.00Hz	○
P00.11	ACC time 1	0.0–3600.0s	Model depended	○
P00.12	DEC time 1			○
P00.13	Running direction	0: Run at the default direction. 1: Run at the opposite direction. 2: Disable reverse running.	0	○
P00.15	Motor parameter autotuning	0: No operation 1: Rotary autotuning 2: Static autotuning 1 3: Static autotuning 2	0	◎
P00.18	Function parameter restoration	0: No operation 1: Restore default values 2: Clear fault records 3: Lock all function codes	0	◎
P01.00	Running mode of start	0: Direct start 1: Start after DC braking 2: Start after speed tracking	0	◎
P01.08	Stop mode	0: Decelerate to stop 1: Coast to stop	0	○
P01.09	Starting frequency of braking for stop	0.00Hz–P00.03 (Max. output frequency)	0.00Hz	○
P01.11	DC braking current for stop	0.0–100.0%	0.00%	○
P01.12	DC braking time for stop	0.00–50.00s	0.00s	○
P01.18	Terminal-based running command protection at power-on	0: Invalid at power-on 1: Valid at power-on	0	◎
P02.01	Rated power of AM 1	0.1–3000.0kW	Model depended	◎
P02.02	Rated frequency of AM 1	0.01Hz–P00.03 (Max. output frequency)	50.00Hz	◎
P02.03	Rated speed of AM 1	1–60000rpm	Model depended	◎
P02.04	Rated voltage of AM 1	0–1200V	Model depended	◎
P02.05	Rated current of AM 1	0.8–6000.0A	Model depended	◎
P03.00	Speed-loop proportional gain 1	0.0–200.0	20.0	○
P03.01	Speed-loop integral time 1	0.000–10.000s	0.200s	○
P03.03	Speed-loop proportional gain 2	0.0–200.0	20.0	○
P03.04	Speed-loop integral time 2	0.000–10.000s	0.200s	○
P03.09	Current-loop proportional coefficient P	0–65535	1000	○
P03.11	Torque setting method selection	0: Keypad (P03.12) 1: Keypad (P03.12) 2: AI1 3: AI2 4: AI3 5: Pulse frequency HDIA 6: Multi-step torque 7: Modbus/Modbus TCP communication 8: PROFIBUS/CANopen communication 9: Ethernet communication 10: Reserved 11: EtherCAT/PROFINET/EtherNet IP communication	0	○

Function code	Name	Description	Default	Modify
		12: Programmable card 13–17: Reserved 18: Keypad analog input (only applicable to 0R7G/1R5P–018G/022P) **Note:** A non-zero value indicates torque mode.		
P04.01	Torque boost of motor 1	0.0%: (Automatic torque boost), 0.1%–10.0%	0.0%	○
P04.09	V/F slip compensation gain of motor 1	0.0–200.0%	100.0%	○
P04.10	Low-frequency oscillation control factor of motor 1	0–100	10	○
P04.11	High-frequency oscillation control factor of motor 1	0–100	10	○
P05.01	Function of S1	0: No function 1: Run forward (FWD) 2: Run reversely (REV) 3: Three-wire running control (SIN) 4: Jog forward 5: Jog reversely 6: Coast to stop 7: Reset faults 9: External fault input 10: Increase frequency setting (UP) 11: Decrease frequency setting (DOWN)	1	◎
P05.02	Function of S2		4	◎
P05.03	Function of S3		7	◎
P05.04	Function of S4		0	◎
P05.37	AI2 lower limit	0.00V–P05.39	0.00V	○
P05.39	AI2 upper limit	P05.37–10.00V	10.00V	○
P06.01	Y1 output	0: Invalid 1: Running 2: Running forward 3: Running reversely 4: Jogging 5: VFD in fault 6: Frequency level detection FDT1 8: Frequency reached	0	○
P06.03	Relay output selection		1	○
P06.04			5	○
P06.14–P06.15	Analog output selection	0: Running frequency 1: Set frequency 3: Rotation speed (Relative to twice the motor synchronous rotation speed) 4: Output current (relative to twice the VFD rated current) 5: Output current (relative to twice the motor rated current) 6: Output voltage (relative to 1.5 times the VFD rated voltage) 7: Output power (relative to twice the motor rated power)	0	○
P06.16	HDO high-speed pulse output		0	○
P06.17–P06.26	AO output upper/lower limit settings	For details, see the full version of product e-manual.	-	○
P07.00	User password	0–65535	0	○
P14.00	Local communication address	1–247 **Note:** The communication address of a slave cannot be to 0.	1	○
P14.01	Communication baud rate setting	0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps 5: 38400 bps	4	○
P14.02	Data bit check	0: No check (N, 8, 1) for RTU 1: Even check (E, 8, 1) for RTU 2: Odd check (O, 8, 1) for RTU 3: No check (N, 8, 2) for RTU 4: Even check (E, 8, 2) for RTU 5: Odd check (O, 8, 2) for RTU	1	○

6 Common faults and solutions

Fault code	Fault type	Possible cause	Solution
OUt1	Inverter unit U-phase protection	ACC/DEC is too fast. The IGBT module is damaged. Misoperation is caused by interference. Drive wires are poorly connected. To-ground short circuit occurred. Sparks have occurred inside due to poor use environment conditions.	Increase ACC/DEC time. Change the inverter unit. Check whether the devices and system are grounded reliably. Check for loose drive wires. Check for abnormal motor wiring and motor-to-ground short connection. Remove the dust or oil stain inside the VFD regularly.
OUt2	Inverter unit V-phase protection		
OUt3	Inverter unit W-phase protection		

Fault code	Fault type	Possible cause	Solution
OC1	Overcurrent during ACC	ACC/DEC is too fast. The grid voltage is too low. The VFD power is too small. A load transient or exception has occurred. 3PH output current imbalance. There are strong external interference sources (contactor switchover or improper grounding).	Increase ACC/DEC time. Increase grid input voltage. Select a VFD with larger power. Check for motor stalling, short connection, and load device exceptions. Check for abnormal VFD 3PH output voltage and motor 3PH resistance imbalance. Check for strong interference (whether motor cable is far away from contactor and system is grounded reliably).
OC2	Overcurrent during DEC		
OC3	Overcurrent during constant speed running		
OV1	Overvoltage during ACC	ACC/DEC time is too short. Abnormal input voltage. The motor starts during rotating. Load energy regeneration is too large. Dynamic braking is disabled.	Increase ACC/DEC time. Check the input voltage. Use the speed tracking start function. Add dynamic braking devices or regenerative units. Set dynamic braking function parameters.
OV2	Overvoltage during DEC		
OV3	Overvoltage during constant speed running		
UV	Bus undervoltage fault	The grid voltage is too low. Abnormal bus voltage display. Abnormal pre-charge contactor closing.	Increase grid input voltage. Contact the manufacturer. Contact the manufacturer.
OL1	Motor overload	The grid voltage is too low. The motor rated current is set incorrectly. Motor stalling has occurred or load sudden change is too great.	Increase grid input voltage. Reset the motor rated current in the motor parameter group. Check the load and adjust the torque boost value.
OL2	VFD overload	ACC is too fast. The motor is restarted during rotating. The grid voltage is too low. Load is too large. VFD power is too small.	Increase ACC time. Avoid restart upon stop or enable speed tracking start. Increase grid input voltage. Select a VFD with larger power.
SPI	Input side phase loss	Phase loss or violent fluctuation has occurred on inputs R, S, and T. Input-side screws are loose.	Check whether the input power is normal and input cables are loose. Set parameters to screen out the fault.
SPO	Output side phase loss	Output cables are broken or to-ground short circuit has occurred. U/V/W output phase loss or severe three-phase load imbalance.	Check for loose or broken output cables. Check for sharp load fluctuation and motor 3PH resistance imbalance.
OH2	Inverter module overheating	The air duct is blocked or the fan is damaged. Ambient temperature is too high. Long-time overload running.	Ventilate the air duct or replace the fan. Keep good ventilation to lower ambient temperature. Select a VFD with larger power.
CE	RS485 communication fault	Improper baud rate. Communication line fault. Incorrect communication address. Communication suffers from strong interference.	Set a proper baud rate. Check the communication port wiring. Set the communication address correctly. Replace or change wiring to enhance anti-interference.
tE	Motor-autotuning fault	The motor capacity does not match the VFD capacity. Improper motor parameter setting. Autotuned parameter settings deviate sharply from the standard ones. Autotuning timeout.	Change the VFD model. Set the motor type and nameplate parameters correctly. Empty the motor load and re-perform autotuning. Check motor wiring and parameter settings. Check whether the upper limit frequency is greater than 2/3 of the rated frequency.

Appendix A Energy efficiency data

Table A-1 Power loss and IE class

VFD model	Relative loss (%)								Standby loss (W)	IE class
	(0;25)	(0;50)	(0;100)	(50;25)	(50;50)	(50;100)	(90;50)	(90;100)		
GD290-0R7G/1R5P-4	0.89	1.05	1.19	1.13	1.21	1.42	1.61	2.13	9	IE2
GD290-1R5G/2R2P-4	0.82	0.99	1.11	1.09	1.19	1.34	1.53	2.06	13	IE2
GD290-2R2G/003P-4	0.78	0.95	1.03	0.86	1.07	1.23	1.35	1.99	17	IE2
GD290-003G/004P-4	0.71	0.87	0.95	0.79	0.97	1.13	1.26	1.91	21	IE2
GD290-004G/5R5P-4	0.82	0.97	1.18	1.02	1.20	1.73	1.52	2.11	15	IE2
GD290-5R5G/7R5P-4	0.75	0.83	1.09	0.93	1.02	1.57	1.43	1.95	17	IE2

VFD model	Relative loss (%)								Standby loss (W)	IE class
	(0;25)	(0;50)	(0;100)	(50;25)	(50;50)	(50;100)	(90;50)	(90;100)		
GD290-7R5G/011P-4	0.81	1.07	1.71	0.83	1.52	1.83	1.62	2.08	25	IE2
GD290-011G/015P-4	0.63	0.87	1.59	0.65	1.36	1.70	1.45	1.94	27	IE2
GD290-015G/018P-4	0.78	1.01	1.55	1.29	1.55	1.83	1.64	2.06	30	IE2
GD290-018G/022P-4	0.72	0.95	1.43	1.20	1.44	1.72	1.52	1.97	30	IE2
GD290-022G/030P-4	0.83	1.05	1.88	1.31	1.89	2.05	1.97	2.12	30	IE2
GD290-030G/037P-4	0.71	0.98	1.76	1.22	1.83	1.96	1.92	2.07	30	IE2
GD290-037G/045P-4	0.45	0.61	1.12	1.05	1.23	1.87	1.47	2.06	30	IE2
GD290-045G/055P-4(-B)	0.63	0.94	1.48	1.18	1.55	1.91	1.74	2.06	31	IE2
GD290-055G/075P-4(-B)	0.52	0.80	1.35	1.06	1.42	1.84	1.67	1.96	32	IE2
GD290-075G/090P-4(-B)	0.42	0.69	1.04	0.98	1.19	1.72	1.45	1.91	33	IE2
GD290-090G/110P-4(-B)	0.50	0.73	1.28	0.97	1.12	1.74	1.33	2.03	32	IE2
GD290-110G/132P-4(-B)	0.42	0.69	1.20	0.84	0.98	1.67	1.27	1.95	34	IE2
GD290-132G/160P-4	0.70	1.14	1.50	1.44	1.51	1.91	1.58	2.03	34	IE2
GD290-160G-4	0.64	1.05	1.41	1.35	1.42	1.87	1.49	2.00	35	IE2
GD290-185P-4	0.61	1.01	1.32	1.26	1.33	1.82	1.42	1.97	36	IE2
GD290-200P-4	0.53	0.98	1.28	1.21	1.29	1.79	1.37	1.94	37	IE2
GD290-185G-4	0.65	0.91	1.45	1.14	1.25	1.92	1.34	2.01	38	IE2
GD290-200G-4	0.48	0.81	1.33	0.99	1.08	1.89	1.28	1.99	39	IE2
GD290-220P-4	0.47	0.79	1.30	0.96	1.05	1.87	1.24	1.96	40	IE2
GD290-250P-4	0.41	0.75	1.28	0.89	1.01	1.82	1.19	1.91	42	IE2
GD290-220G-4	0.72	1.01	1.87	1.35	1.71	1.92	1.79	2.00	43	IE2
GD290-250G-4	0.68	0.98	1.92	1.27	1.56	1.88	1.62	1.94	44	IE2
GD290-280G-4	0.66	0.94	1.88	1.19	1.47	1.83	1.56	1.91	45	IE2
GD290-280P-4	0.63	0.87	1.71	1.08	1.39	1.79	1.48	1.89	48	IE2
GD290-315P-4	0.61	0.84	1.67	1.02	1.31	1.74	1.42	1.87	50	IE2
GD290-355P-4	0.57	0.78	1.63	0.98	1.29	1.71	1.37	1.84	52	IE2
GD290-315G-4	0.72	0.85	1.64	1.14	1.38	1.86	1.43	1.96	50	IE2
GD290-355G-4	0.70	0.82	1.52	1.08	1.27	1.83	1.37	1.93	52	IE2
GD290-400G-4	0.69	0.78	1.40	0.90	1.10	1.79	1.25	1.89	55	IE2
GD290-400P-4	0.66	0.73	1.32	0.88	1.07	1.76	1.21	1.85	55	IE2
GD290-450P-4	0.63	0.70	1.27	0.84	1.02	1.73	1.16	1.83	58	IE2
GD290-500P-4	0.60	0.68	1.23	0.81	0.97	1.69	1.11	1.80	60	IE2

Table A-2 Rated specifications

VFD model	Apparent power (kVA)	Rated output power (kW)	Rated output current (A)	Max. working temperature (°C)	Rated power frequency (Hz)	Rated power voltage (V)
GD290-0R7G/1R5P-4	2.44	1.5	3.7	50°C Derate by 1% for every increase of 1°C when the temperature exceeds 40°C.	50Hz/60Hz. Allowed range: 47–63Hz	3PH 380V
GD290-1R5G/2R2P-4	3.98	2.2	5			
GD290-2R2G/003P-4	4.48	3	6.8			
GD290-003G/004P-4	6.2	4	9.5			
GD290-004G/5R5P-4	8.6	5.5	13			
GD290-5R5G/7R5P-4	12.2	7.5	17			
GD290-7R5G/011P-4	16.5	11	25			
GD290-011G/015P-4	21	15	32			
GD290-015G/018P-4	24	18.5	38			
GD290-018G/022P-4	30	22	45			
GD290-022G/030P-4	39.5	30	60			
GD290-030G/037P-4	49	37	75			
GD290-037G/045P-4	60	45	92			
GD290-045G/055P-4(-B)	75.7	55	115			
GD290-055G/075P-4(-B)	98.7	75	150			
GD290-075G/090P-4(-B)	120	90	180			
GD290-090G/110P-4(-B)	142	110	215			
GD290-110G/132P-4(-B)	172	132	250			
GD290-132G/160P-4	200	160	305			
GD290-160G-4	200	160	305			
GD290-185P-4	217	185	330			
GD290-200P-4	250	200	380			
GD290-185G-4	217	185	340			
GD290-200G-4	250	200	365			
GD290-220P-4	280	220	425			
GD290-250P-4	316	250	460			
GD290-220G-4	280	220	425			
GD290-250G-4	316	250	480			
GD290-280G-4	349	280	520			
GD290-280P-4	349	280	530			
GD290-315P-4	395	315	600			
GD290-355P-4	425	355	650			
GD290-315G-4	395	315	600			
GD290-355G-4	425	355	650			
GD290-400G-4	474	400	720			
GD290-400P-4	474	400	720			
GD290-450P-4	540	450	820			
GD290-500P-4	566	500	860			