Variable frequency drive

A550 Plus

User manual

Version 5.1

Vybo Electric

CONTENTS

A 550 PLUS operating and installation manual

1. Introduction

Thank you for your choice of the A 550 PLUS series universal low-voltage frequency inverter from VYBO Electric a.s.
This manual is an operating and installation manual for universal low-voltage converters of the A 550 PLUS series. It provides all the relevant instructions for installation, wiring, setting of operating parameters, daily care and maintenance, fault diagnostics and troubleshooting A 550 PLUS series inverters.

In order to be able to use this series of inverters correctly, guarantee the best performance of the product and ensure the safety of users and devices, carefully read these operating and maintenance manual before using the A 550 PLUS series inverters. Incorrect and improper use of the device may cause an abnormality in the operation and failure of the inverter, reduce its lifetime, and may even result in personal injury or death due to electric shock.
This instruction manual is delivered with the device. Please also keep it for maintenance and diagnostics.

Due to the continuous improvement of products, some data may be changed without prior notice, therefore, as a precaution, check the presence of new versions of instructions on the website of VYBO Electric a.s. , www.vyboelectric.sk
and www.vyboelectric.cz.

A 550 PLUS operating and installation manual
Version: V.5.1
Date of revision: March 2023

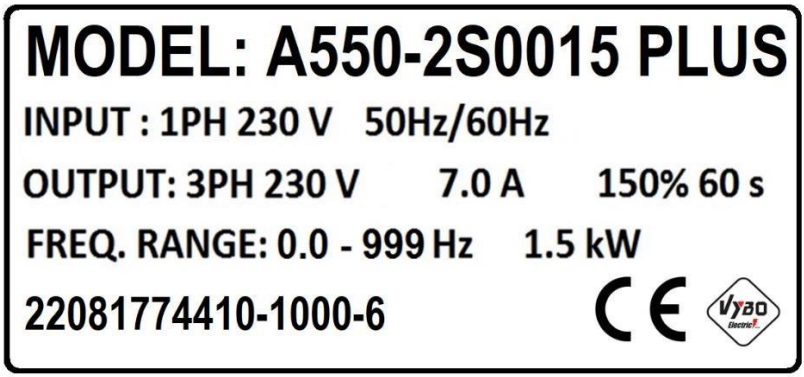
Chapter 1: Technical parameters and description

1.1 Parameters of the frequency inverter A550 PLUS

A 550 PLUS	
Rated voltage, frequency	1PH input / 3 PH output AC 230 V 50/60Hz...type: 2S..... 1PH input / 1 PH output AC 230 V 50/60Hz,..type: 2S....S 3PH input / 3 PH output AC 400 V 50/60Hz ..type: 4T.....
Voltage range input	230V: 170V - 240V; 400V: 330V - 440V
Voltage range output	230V: 0V - 230V; 400V: 0 - 400V
Display	Operating status / Alarm definition / Interactive set frequency, actual output frequency, output current, output speed, DC bus voltage, output voltage, etc.
Frequency output range	0.10 – 999.9Hz
Resolution of set frequency	Digital input: 0.01 Hz, analogue input: 0.1% of max. output frequency
Overloading	150% for 60 sec
Frequency setting	Analogue input: 0 to 10 V or 4 to 20 mA can be selected; Digital Input: Select with control wheel on control panel or RS485 or UP / DOWN button. The possibility of combining X+Y frequency inputs; X-Y; Switching between X and Y... Note: The AVI terminals can be used to select the analogue voltage input (0-10V) or the analogue current input (4-20mA) by the J2 switch.
Torque increase control	Automatic control: automatic torque increase when the drive is loaded. Manual control: allows you to set 0.0-30.0% torque increase manually as needed.
Multifunction input terminal block	Four multifunction input terminals, providing fifteen-section speed control functions, program run control, four-speed acceleration / deceleration switch, UP / DOWN function and emergency stop and other features
Multifunction output terminal block	One multifunction output terminal for displaying of running, zero speed, counter, external abnormalities, program operations and other information and warnings.
Set acceleration / deceleration time	The acceleration / deceleration time can be set individually in the range 0 ~ 999.9 sec.

PID controller	Built-in PID controller
Additional functions	JOG; Swing (jump) frequency; PLC functions
Constant pressure control	Constant pressure control SLP "sleep" mode; hP high pressure detection; LP low pressure detection; forced circulation of antifreeze liquid; Flow regulation; detects running "dry" LL; PID regulation for constant pressure
Type of communication interface	MODBUS
RS485	Standard communication function RS485 (MODBUS RTU)
V/F control	Setting V/F curve to meet load requirements.
Fixed speed	Four multi-function input terminal blocks, you can set 4 fixed speed sections
Safety function EMS STOP	In case of emergency, the „emergency stop system“ stops the inverter immediately, after activating the EMS STOP.
Automatic voltage regulation	Auto voltage control can be selected
Counter	Built-in 2 groups of counters
Protective devices for IEC applications	Protection for safety must be provided in accordance with IEC 60364 standard series and any additional local standards and regulations for electric installation.
Over voltage	Overvoltage protection can be set
Under voltage	Under voltage protection can be set
Other protection	Shortcut to output, over current, parameter blocking, etc.
EMC compatibility	IEC 61000-4-6; IEC 61000-4-4; IEC 61000-4-11; IEC 61000-4-5
Standards	EN/IEC 61800-3: 2017; C2, which is suitable for 1st Environment EN 61800-3:2004+A1:2012; EN 618-5-1:2007+A1:2017
Ambient temp.	-10°C to 40°C (without icing)
Ambient humid.	Max. 95% (without condensation) IEC 60068-2-3
Altitude	Under 1000 meters above sea
Vibration	Max. 0.5 g ; IEC 60068-2-6
Cooling	Forced air cooling
Degree of protection	IP 20; satisfy EN/IEC 61800-5-1:2007/A11:2021
Mounting method	On the wall or on a 35mm DIN rail
Installation environment	Inside, avoid direct sunlight, salt, dust, corrosive or flammable gas, smoke, steam. Resistance to chemical pollution, class 3C3 EN/IEC 60721-3-3. Resistance to dust pollution class 3S3EN/IEC 60721-3-3.

1.2 Factory label



Model: A 550 – 2S0015 - PLUS Type with extended functions

Inverter power: 0015 = 1,5 kW

Voltage range
2S: 1 PH AC 230V INPUT/ 3PH AC 230 V OUTPUT
S2…S: 1 PH AC 230V INPUT/ 1PH AC 230 V OUTPUT
4T: 3 PH AC 400V INPUT/ 3PH AC 400 V OUTPUT

Series: A550

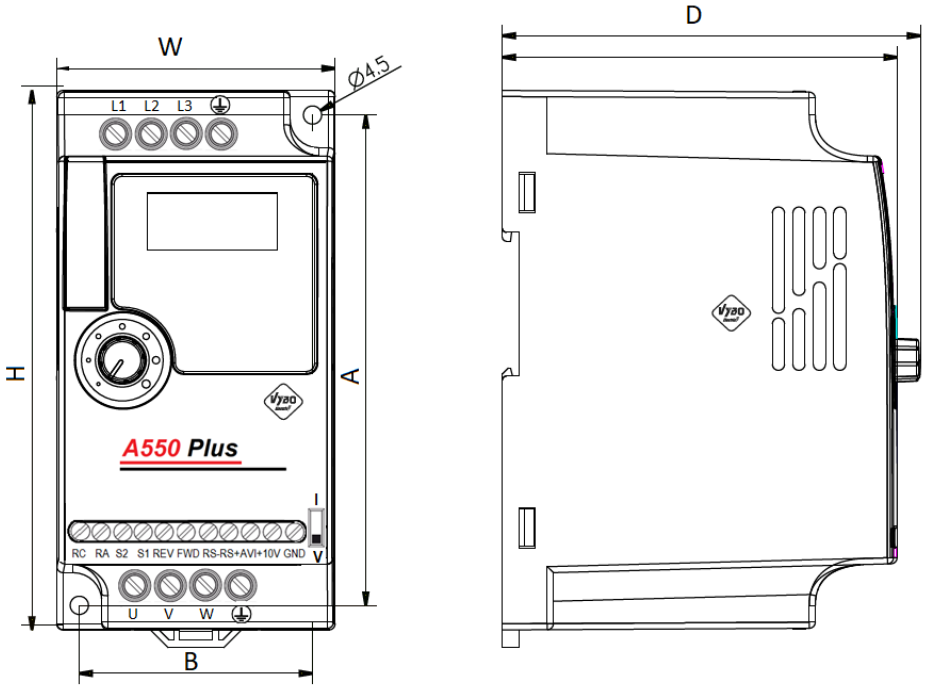
22081774410 - 1000-6

Software version

Production number (year; month; serial number))

Chapter 2: Dimensions

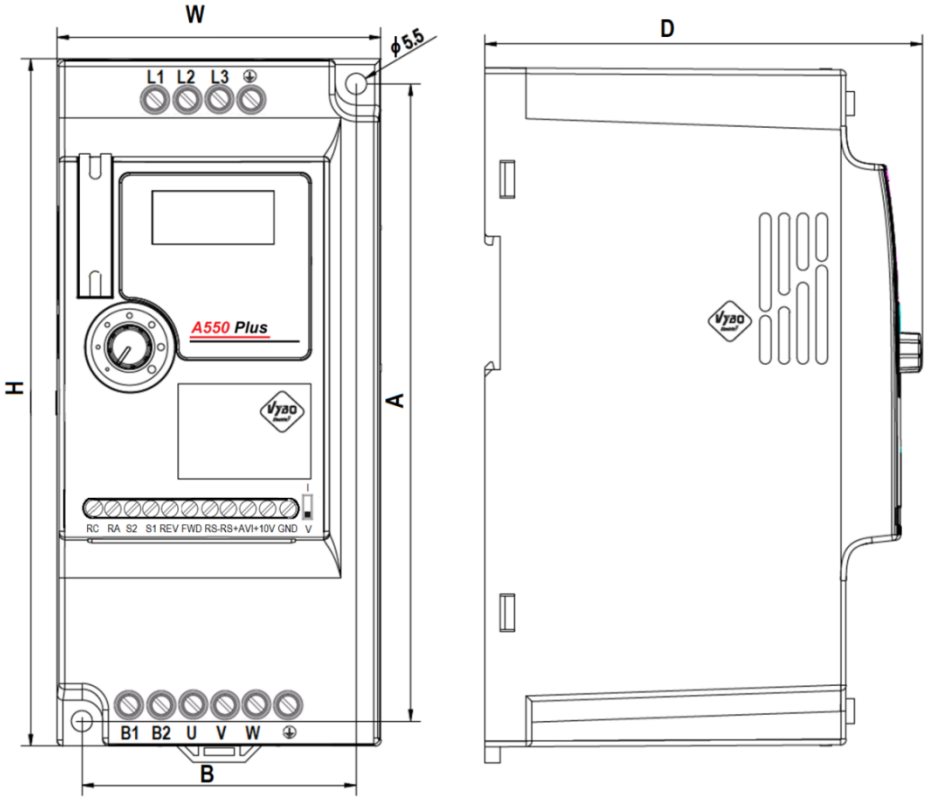
2.1 Dimensions of type models A1; A2 2S...0.4 - 1.5kW / 4T... 0.4 - 2.2 kW



Model	W	H	D	A	B	ød
A550-2S0004;2S0007; 2S0015; A550-2S0002S; 2S0004S; 2S0007S; A550-2S0015S	68	132	102	120	57	4.5
A550-2S0022; A550-4T0004;A550-4T0007;4T0011; 4T0015;4T0022	72	142	112.2	130	61	4.5

* Note: Up to size 4T0055 PLUS suitable for standard mounting on a 35 mm DIN rail

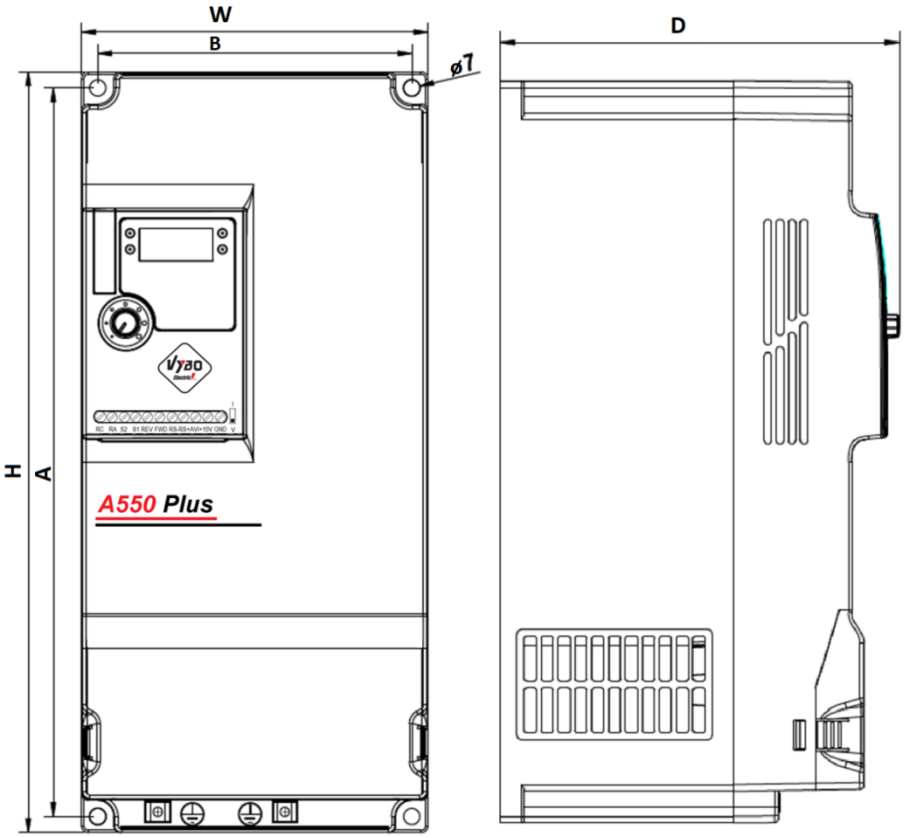
2.2 Dimensions of type models B2S...3.0 kW and 2.2 kW and B4T...3.0 kW to 11 kW



Model	W	H	D	A	B	ød
A550-2S0030 ; A550-2S0022S	85	180	116	167	72	5,5
A550-4T0030;4T0040;4T0055	85	180	116	167	72	5,5
A550-4T0075 ; A550-4T0110	106	240	153	230	96	5,5

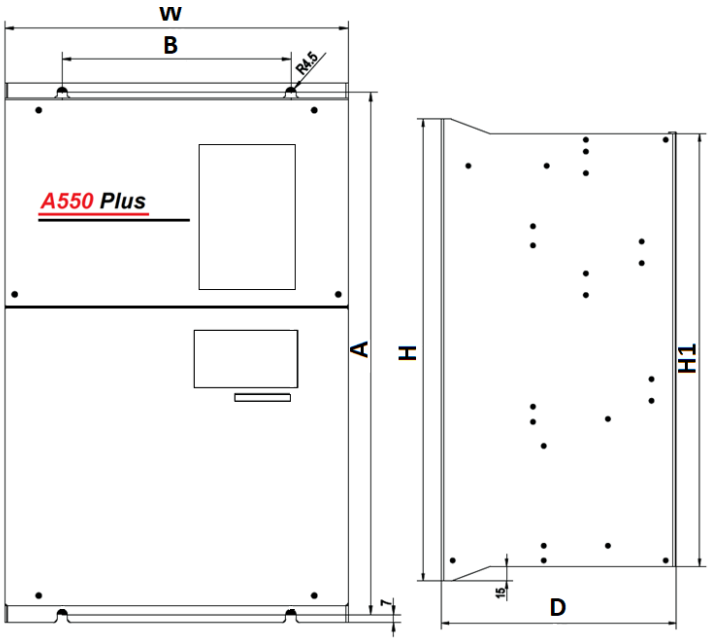
* Note: Up to size 4T0055 PLUS suitable for standard mounting on a 35 mm DIN rail

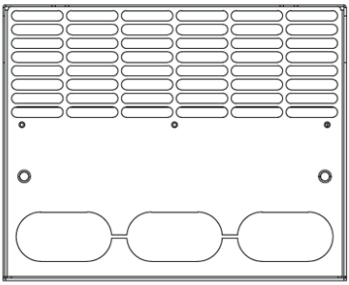
2.3 Dimensions of type models C 4T...15 kW to 37 kW



Model	W	H	D	A	B	Ød
A550-4T0150 ; 4T0185; 4T0220	151	332	165,5	318	137	7
A550-4T0300 ; A550-4T0370	217	400	201	385	202	7

2.4 Dimensions of type models D 4T...45 kW až 200 kW





Model	W	H	D	A	B	Ød
A550-4T0450; A550-4T0550	300	455	240	440	200	4,5
A550-4T0750; 4T0900; 4T1100	275	630	310	612	200	4,5
A550-4T1320; A550-4T1600	400	715	310	695	320	11
A550-4T2000	400	830	320	810	320	5,5

Chapter 3: Parameters of frequency converters A 550 PLUS

3.1 Power parameters of the A 550 PLUS series inverters

Inverter model of A550 PLUS	Output rated power (kW)	Maximum output current (A)	Output rated current (A)	Recomm. motor power (kW)
1PH / 1PH AC 230 V ±15% * only for suitable electric motors				
A550-2S0002S*	0.25	5.4	2.4	0.25
A550-2S0004S*	0.40	7.2	4.5	0.37
A550-2S0007S*	0.75	10.0	7.0	0.75
A550-2S0015S*	1.5	16.0	10.0	1.50
A550-2S0022S*	2.2	23.0	16.0	2.20
1PH / 3PH AC 230 V ±15%				
A 550-2S0004	0.4	5.4	2.4	0.4
A 550-2S0007	0.75	7.2	4.5	0.75
A 550-2S0015	1.5	10	7.0	1.5
A 550-2S0022	2.2	16	10.0	2.2
A 550-2S0030	3.0	23	16.0	3.0
3PH / 3PH AC 400 V ±15%				
A 550-4T0004	0.4	3.0	1.2	0.4
A 550-4T0007	0.75	3.8	2.5	0.75
A 550-4T0011	1.1	4.5	3.0	1.1
A 550-4T0015	1.5	5	3.7	1.5
A 550-4T0022	2.2	5.8	5.0	2.2
A 550-4T0030	3.0	7.9	6.8	3.0
A 550-4T0040	4.0	10.0	9.0	4.0
A 550-4T0055	5.5	15.0	13.0	5.5
A 550-4T0075	7.5	20.0	17.5	7.5
A 550-4T0110	11	26.0	25.0	11
A 550-4T0150	15	35.0	32.0	15
A 550-4T0220	22	46.0	45.0	22
A 550-4T0300	30	62.0	60.0	30
A 550-4T0370	37	76.0	75.0	37

*** Note: use the frequency converter A550-2S.....S PLUS only to control 1-phase electric motors suitable for this type of control**

3.2 Table of suitable braking resistors for A550 PLUS

Inverter model	Braking resistance		Braking unit (BU)	Recomm. motor power (kW)
	Resistance power (kW)	Resistance value ≥ (Ω)		
A550-2S0004	-	-	-	0,40
A550-2S0007	-	-	-	0,75
A550-2S0015	-	-	-	1,5
A550-2S0022	-	-	-	2,2
A550-2S0022S	**0,25**	**65**	**Built-in BU**	**2,2**
A550-2S0030	**0,25**	**65**	**Built-in BU**	**3,0**
A550-4T0004	-	-	-	0,4
A550-4T0007	-	-	-	0,75
A550-4T0011	-	-	-	1,1
A550-4T0015	-	-	-	1,5
A550-4T0022	-	-	-	2,2
A550-4T0030	**0,25**	**150**	**Built-in BU**	**3,0**
A550-4T0040	**0,30**	**130**	**Built-in BU**	**4,0**
A550-4T0055	**0,40**	**90**	**Built-in BU**	**5,5**
A550-4T0075	**0,50**	**65**	**Built-in BU**	**7,5**
A550-4T0110	**0,80**	**43**	**Built-in BU**	**11**
A550-4T0150	**1,00**	**32**	**Built-in BU**	**15**
A550-4T0185	**1,30**	**25**	**Built-in BU**	**18,5**
A550-4T0220	**1,50**	**22**	**Built-in BU**	**22**
A550-4T0300	**2,50**	**16**	**Built-in BU**	**30**
A550-4T0370	**3,70**	**12,6**	**Built-in BU**	**37**
A550-4T0450	-	-	Without BU	45
A550-4T0550	-	-	Without BU	55
A550-4T0750	-	-	Without BU	75
A550-4T0900	-	-	Without BU	90
A550-4T1100	-	-	Without BU	110
A550-4T1320	-	-	Without BU	132

Calculation of the braking resistance value: The braking resistance value is related to the DC current when braking the inverter. For a 400 V supply, the braking DC voltage is 800 V, and for a 230 V supply system, the DC braking voltage is 400 V. In addition, the braking resistance value refers to the braking torque Mbr%. The formula for calculating the braking resistance value is as follows:

$$R = \frac{U_{dc}^2 * 100}{P_{Motor} * M_{br}\% * \eta_{inverter} * \eta_{Motor}}$$

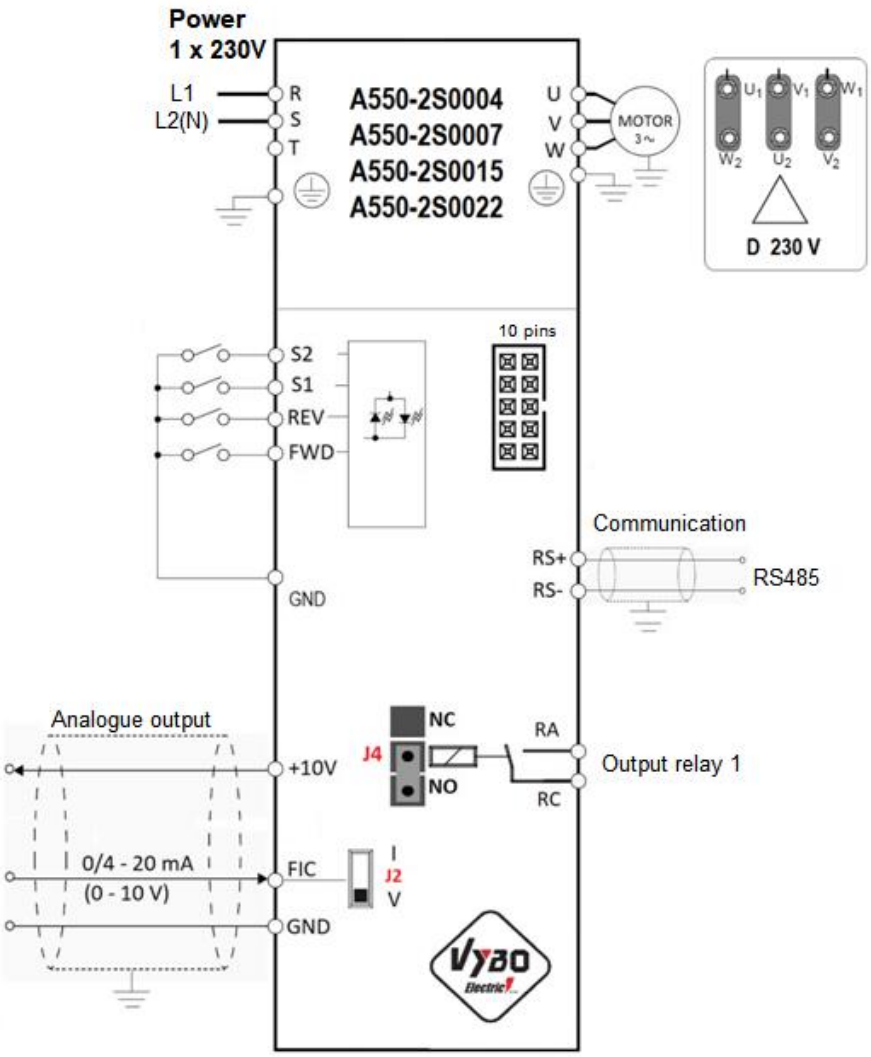
U_{dc} = DC braking voltage, P_{Motor}= motor power
Mbr = braking torque η_{Motor}= motor efficiency $\eta_{Inverter}$= converter efficiency

3.3 Performance parameters of the A 550 PLUS series inverters.

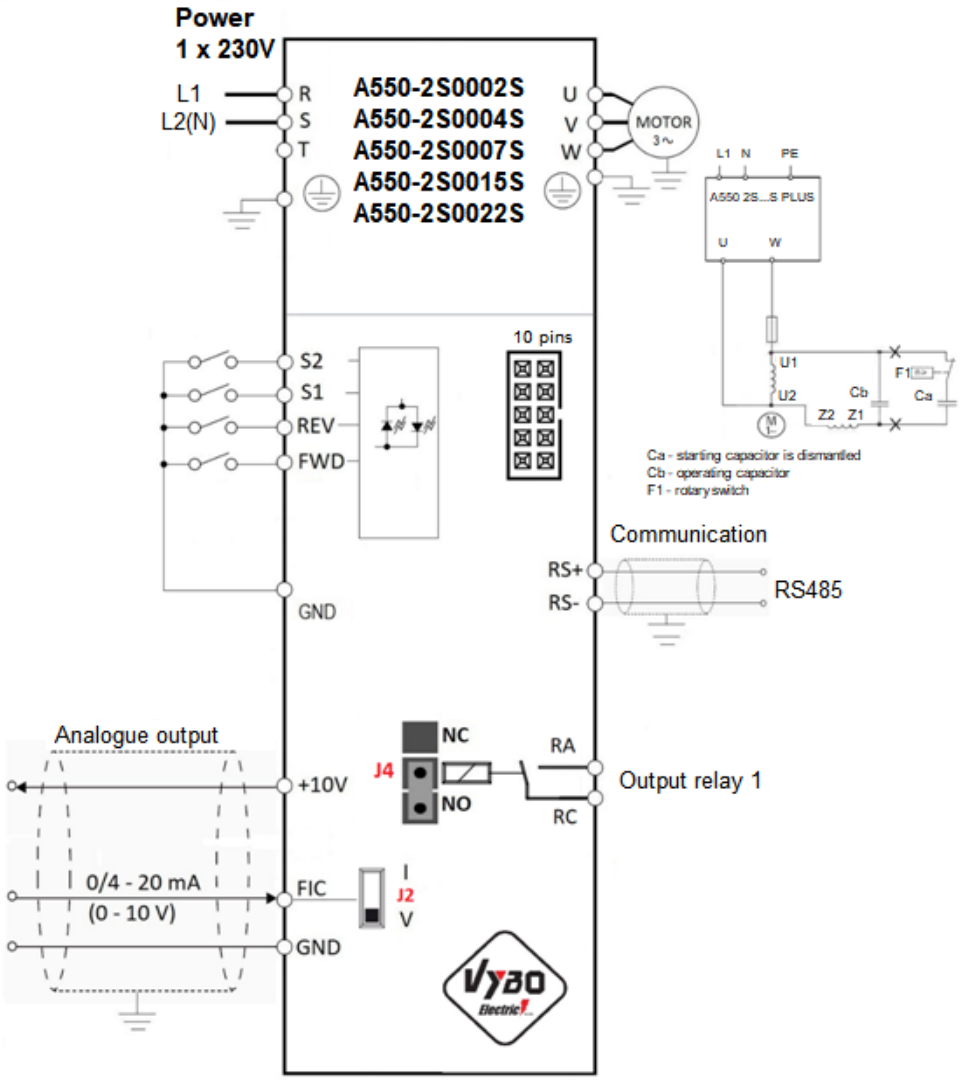
Type of inverter	Input power (V) 50/60Hz	Output (počet f)	Motor power (kW)	Recommended cable cross-section (mm^2)	Recommended circuit breaker (A)
A550-2S0002S*	**1 phase 1 x 230 V**	1 f	0.25	2.5	10
A550-2S0004S*		1 f	0.37	2.5	16
A550-2S0007S*		1 f	0.75	4.0	16
A550-2S0015S*		1 f	1.50	4.0	25
A550-2S0022S*		1 f	2.20	6.0	32
A 550-2S0004	**1 phase 1 x 230 V**	3 f	0.4	2.5	10
A 550-2S0007		3 f	0.75	2.5	16
A 550-2S0015		3 f	1.5	4.0	16
A 550-2S0022		3 f	2.2	4.0	25
A 550-2S0030		3 f	3.0	6.0	32
A 550-4T0004	**3 phase 3 x 400V**	3 f	0.4	2.5	6
A 550-4T0007		3 f	0.75	2.5	6
A 550-4T0011		3 f	1.1	2.5	6
A 550-4T0015		3 f	1.5	2.5	10
A 550-4T0022		3 f	2.2	2.5	10
A 550-4T0030		3 f	3.0	2.5	10
A 550-4T0040		3 f	4.0	4	16
A 550-4T0055		3 f	5.5	4	20
A 550-4T0075		3 f	7.5	4	32
A 550-4T0110		3 f	11	6	32
A 550-4T0150		3 f	15	6	40
A 550-4T0185		3 f	18,5	10	50
A 550-4T0220		3 f	22	10	63
A 550-4T0300		3 f	30	16	100
A 550-4T0370		3 f	37	25	100
A 550-4T0450		3 f	45	35	125

Chapter 4: Description of connection and power terminals

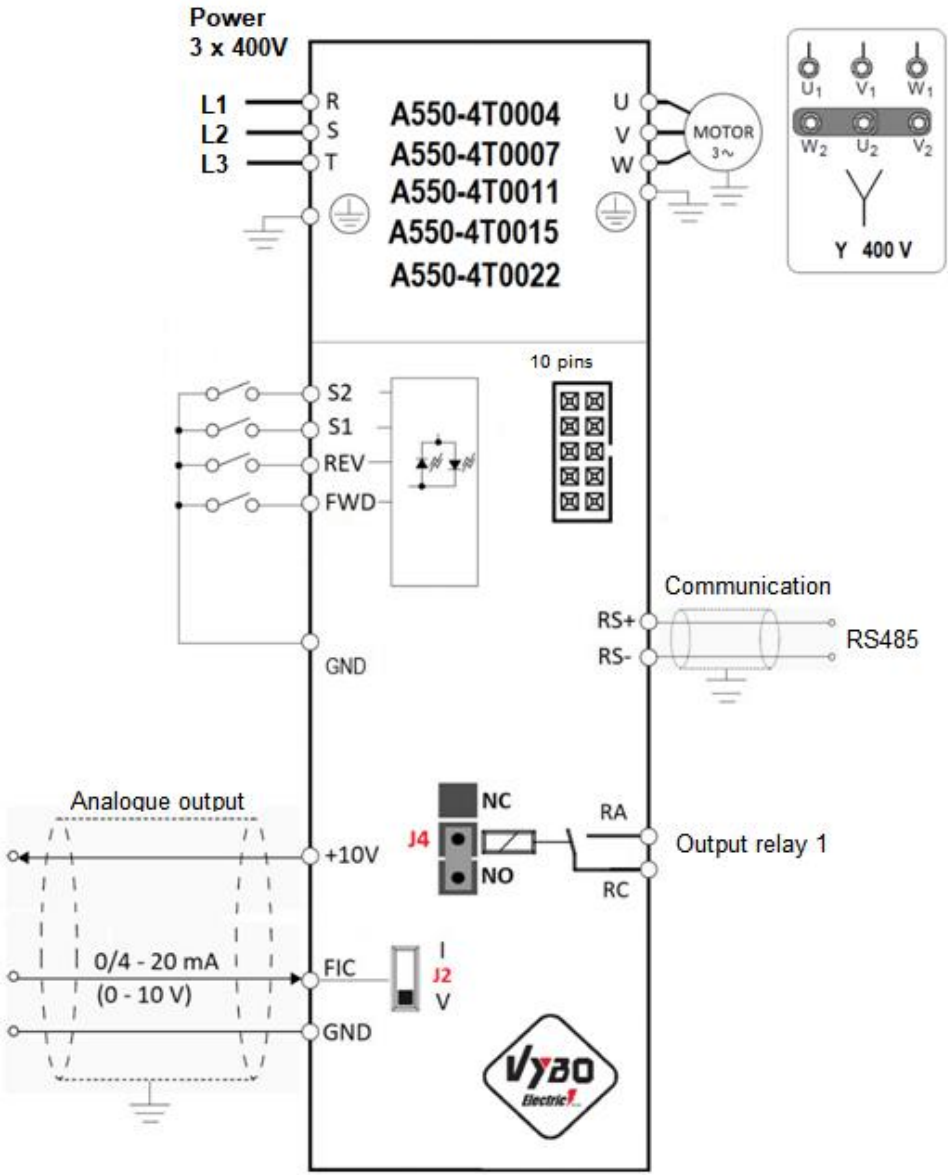
4.1 Wiring diagram of model A2S



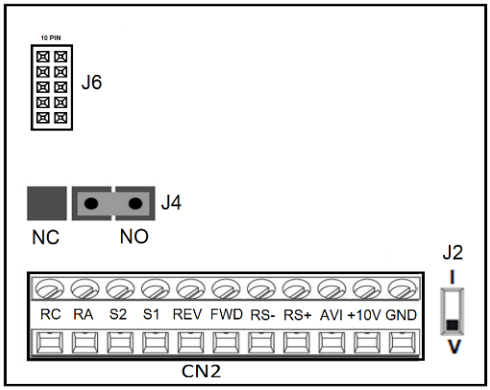
4.2 Wiring diagram of model A2S....S



4.3 Wiring diagram model A4T



4.3.1 Frequency inverter control terminals A550 Plus models A2S; A2S...S and A4T



Switch J4 determines the logic of the output relay NO or NC.

Switch J2 determines whether AVI 0-10 V voltage input or 4-20 mA current input is selected.

J6 is a 10 PIN connector, used to connect an external control panel.

1x230V/1x230V

Model A2S....S

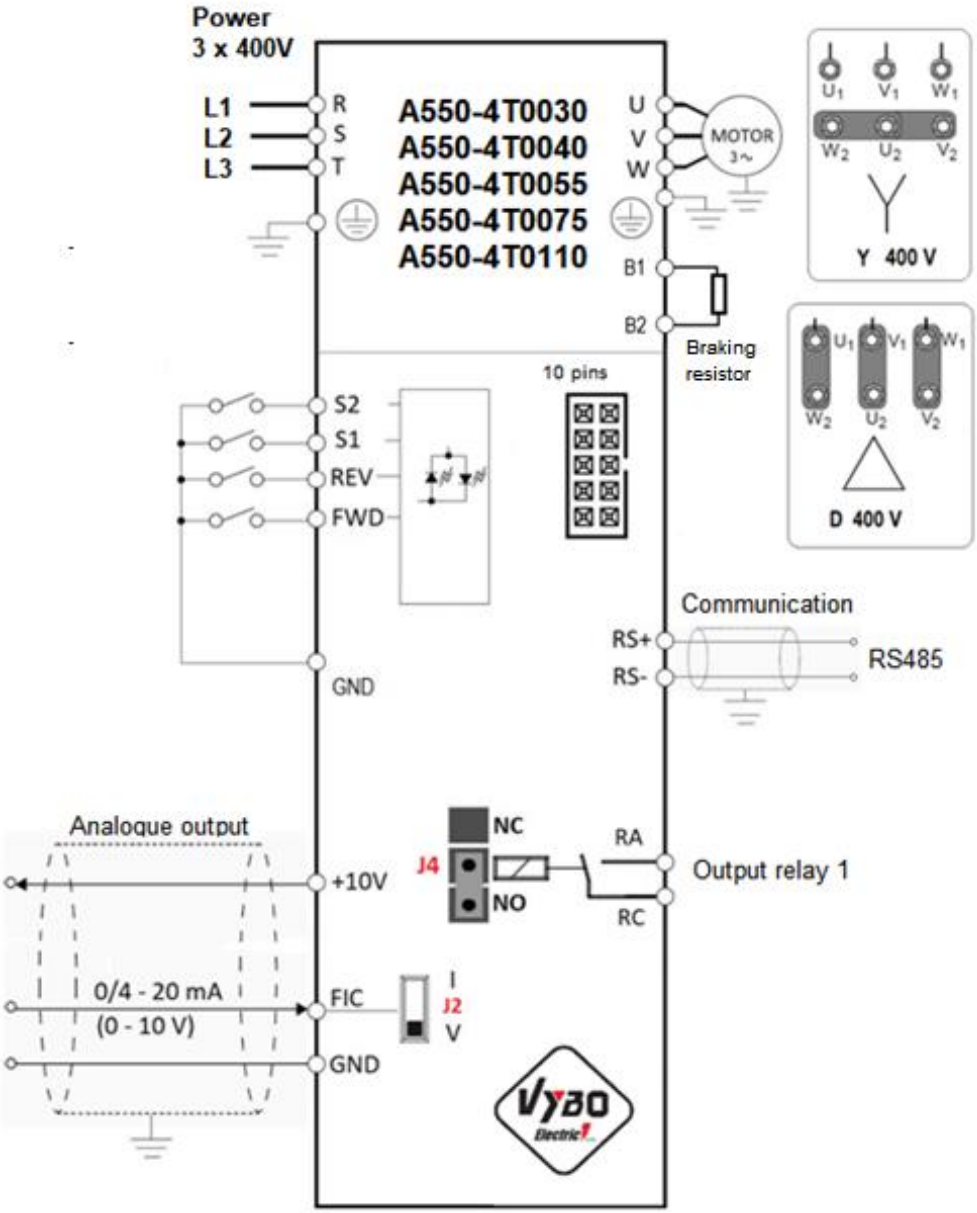
1x230V/3x230V

Model A2S

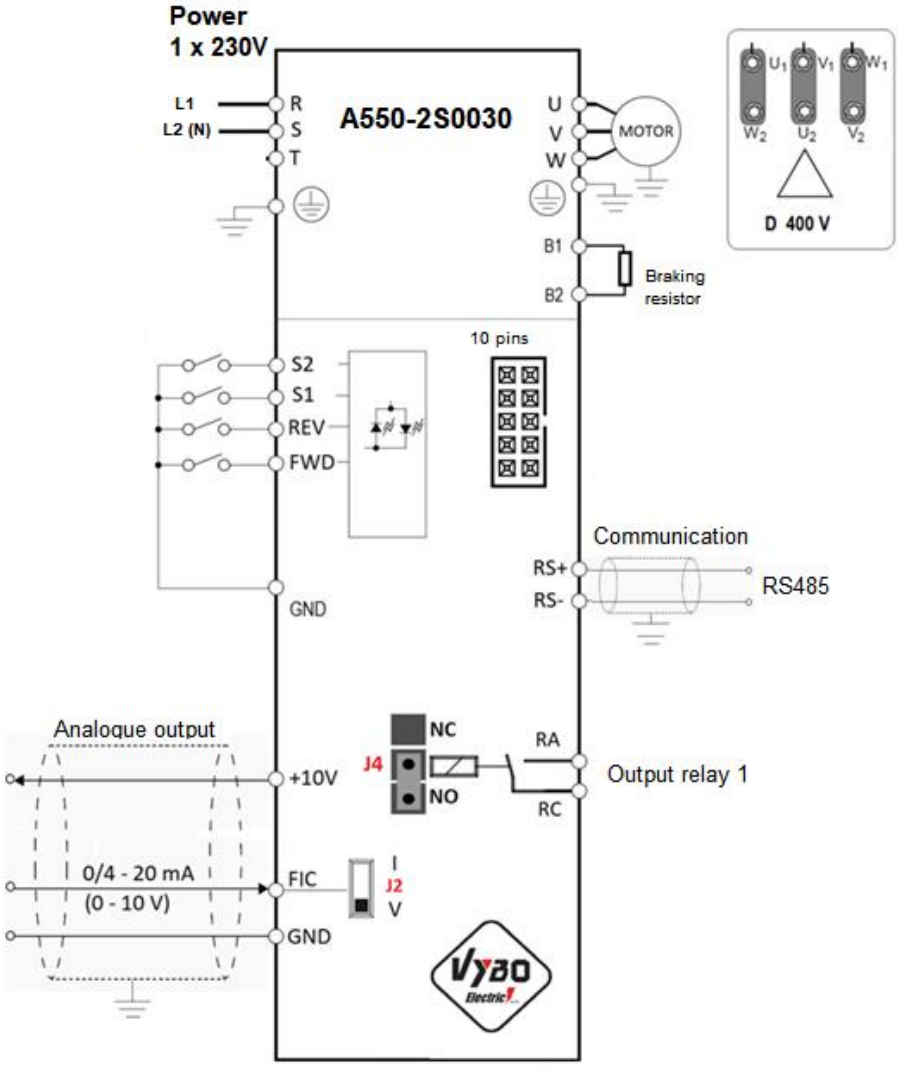
3x400V/3x400V

Model A4T

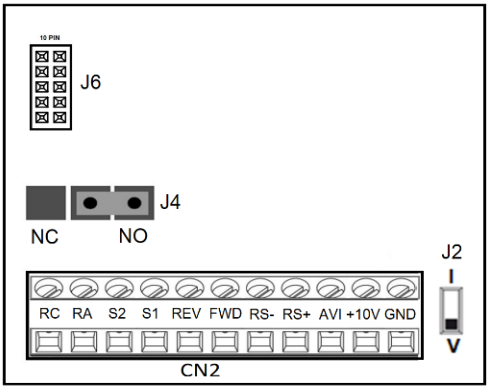
4.4 Wiring diagram model B4T



4.5 Wiring diagram model B2S



4.5.1 Frequency inverter control terminals A550 Plus models B4T and B2S



Switch J4 determines the logic of the output relay NO or NC.

Switch J2 determines whether AVI 0-10 V voltage input or 4-20 mA current input is selected.

J6 is a 10 PIN connector, used to connect an external control panel.

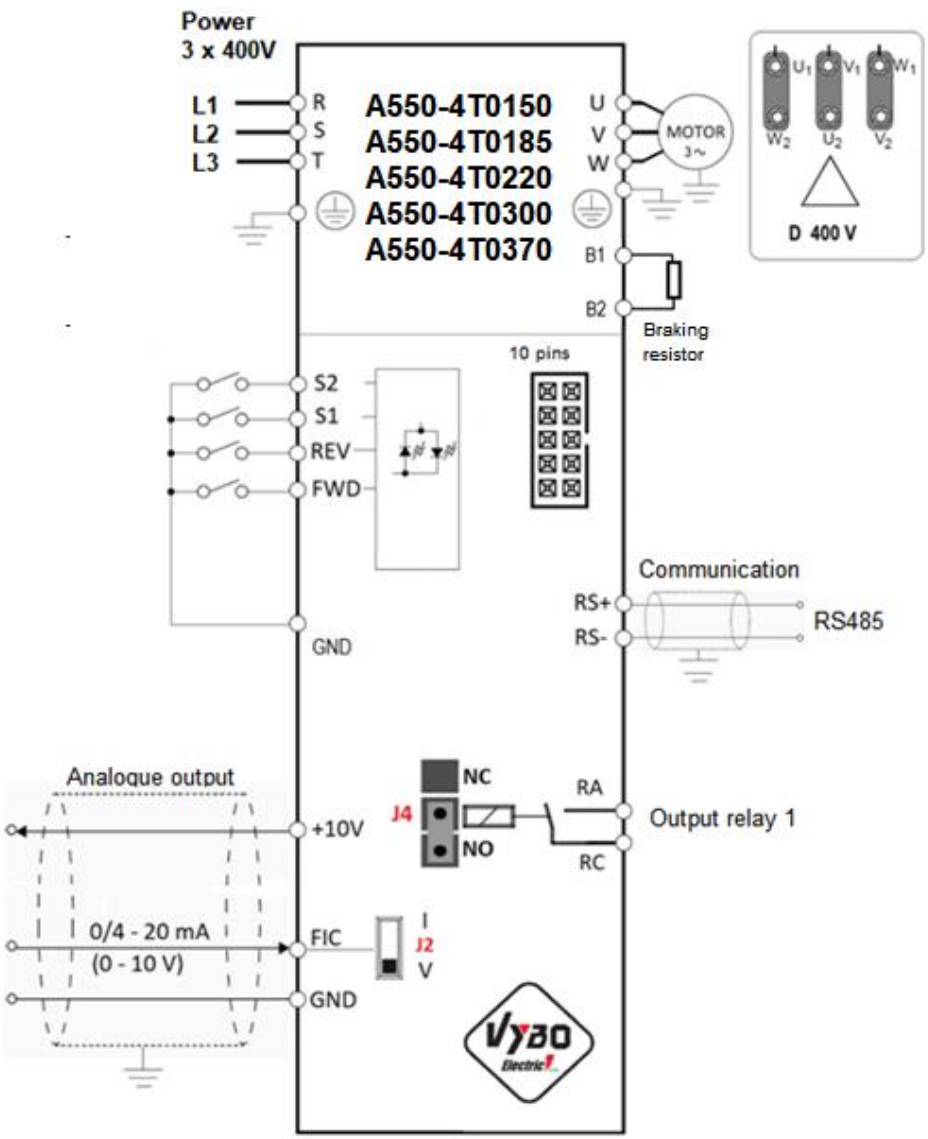
A550-4T0030 to 4T0110

Model B4T

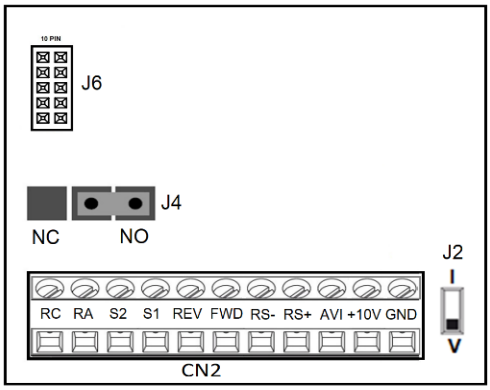
A550-2S0030

Model B2S

4.6 Wiring diagram model C



4.6.1 Frequency inverter control terminals A550 Plus model C

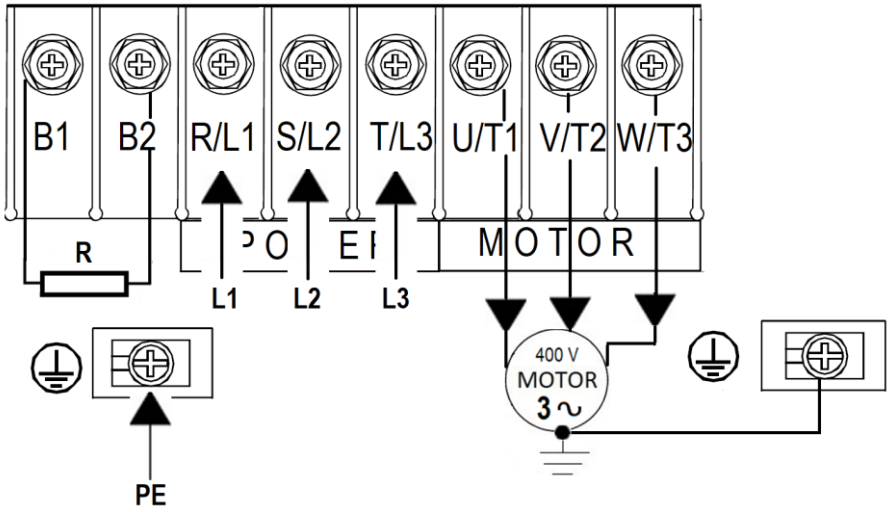


Switch J4 determines the logic of the output relay NO or NC.

Switch J2 determines whether AVI 0-10 V voltage input or 4-20 mA current input is selected.

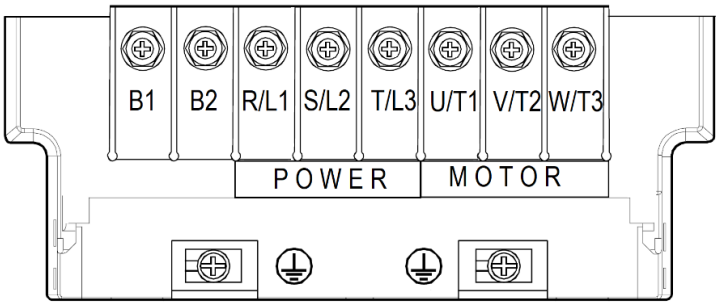
J6 is a 10 PIN connector, used to connect an external control panel.

Power part real wiring of the C model inverter



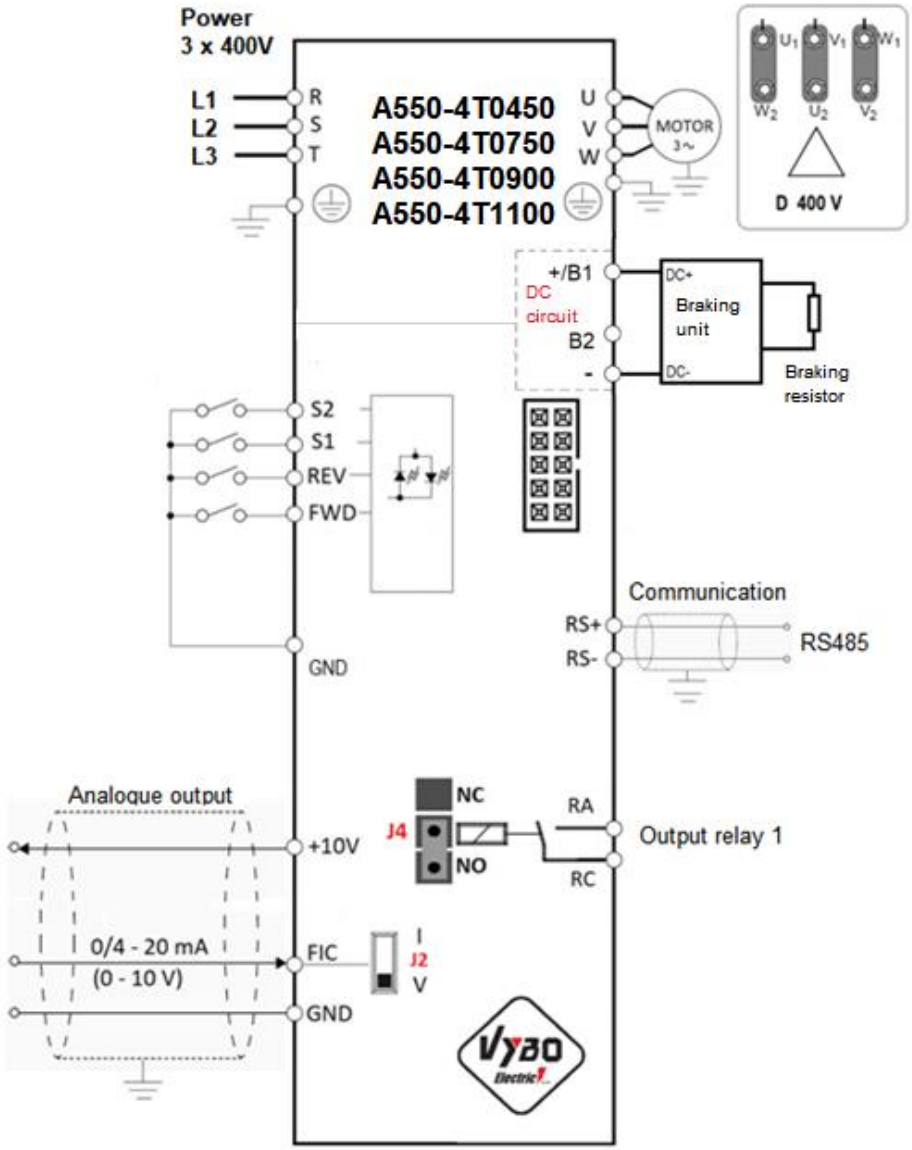
A550-4T0450 to 4T0370

Model C

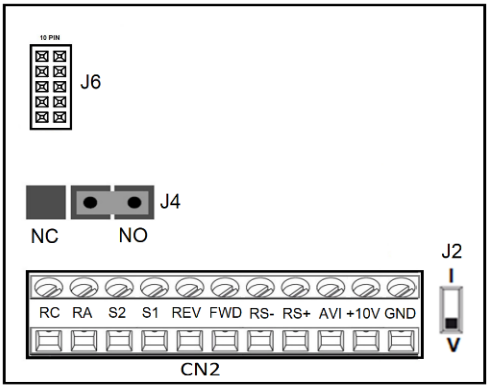


Power terminals of A550 Plus models, 15 kW to 37 kW

4.7 Wiring diagram model D



4.7.1 Frequency inverter control terminals A550 Plus model D

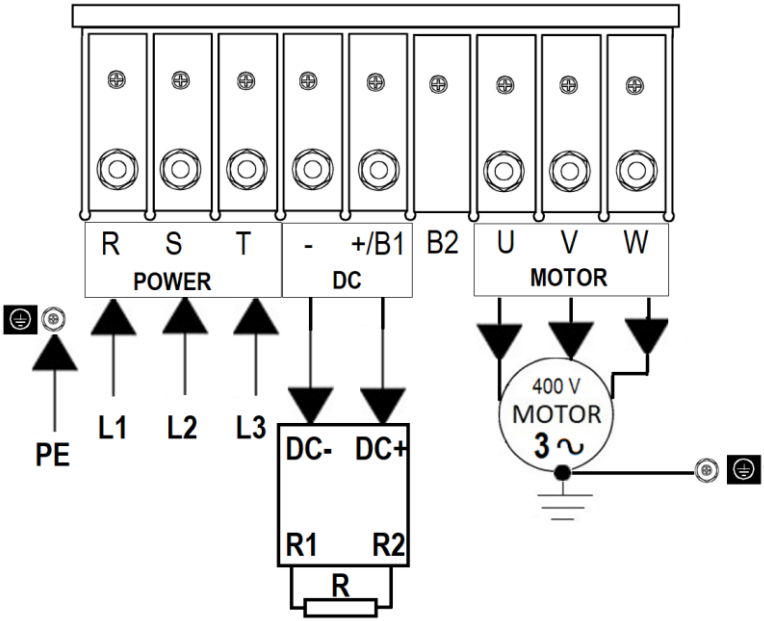


Switch J4 determines the logic of the output relay NO or NC.

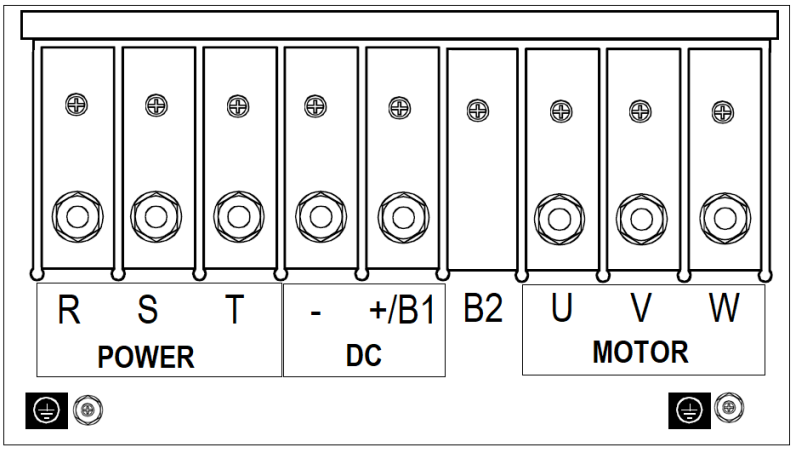
Switch J2 determines whether AVI 0-10 V voltage input or 4-20 mA current input is selected.

J6 is a 10 PIN connector, used to connect an external control panel.

Power part real wiring of the D model inverter



Model D



Power terminals of A550 PLUS models 45 kW and larger

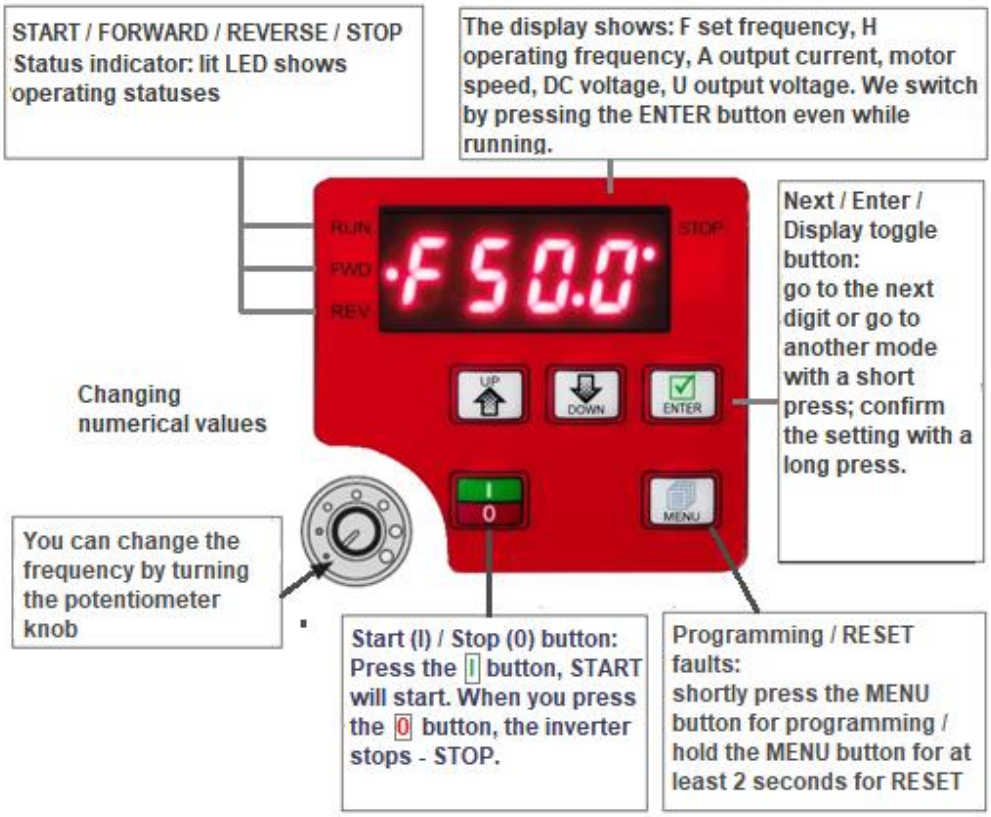
4.8 General description frequency inverter terminals of the A550 PLUS

Designation of clamps models 4T	Name of terminal	Description
L1/L2/L3	Input of power	Connection to the power supply network
U/V/W	Output	Connection of a three-phase motor
B_1/B_2	*Braking resistor	*Only some types Braking resistor connection
⏚E	Grounding	Grounding of the frame of the inverter. The inverter must be grounded.
Designation of clamps models 2S and S2...S	Name of terminal	Description
L1; N/L2 or L2; N/L3	Input of power	Connection to the power supply network
U/V/W	Output	Connection of a three-phase motor
U/W	Inverter output 2S.....S	Connection of a one-phase motor
B_1/B_2	*Braking resistor	*Only some types / Connecting of resistor
⏚E	Grounding	Grounding of the frame of the inverter.

Name of terminal	Meaning	
FWD	Multifunctional input terminal (P315)	Multifunctional terminal block S1, S2 – digital inputs REV ... run REVERSE FWD ... run FORWARD
REV	Multifunctional input terminal (P316)	
S1	Multifunctional input terminal (P317)	
S2	Multifunctional input terminal (P318)	
GND	Zero potential of digital inputs / GND	
RC/RA	Output relay terminals (NO or NC by J4) (or P331= 0000 NC / P331=0010 NO)	max. 250V AC / 3A
+10V	Power source +10 V DC	
AVI	Analog voltage/current to input terminal J2	0 - 10V / 0 - 20mA
RS+/RS-	RS485 for MODBUS RTU communication	MODBUS RTU
J2	Switching analog input 0-10V / 4-20mA	Factory set to V
J4	Switching the output relay logic NO or NC	Factory set to NO
J6	10 PIN connector for connecting an external panel	

Chapter 5: Description of the controls A 550 PLUS

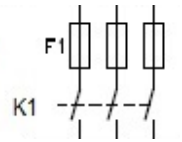
5.1 Keyboard description



5.2 Display description

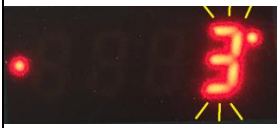
	Displayed item e.g.	Description
0	**F50.0**	The value of the set frequency is 50.0 Hz (the mode is STOP) 
1	**H50.0**	The current operating frequency is 50.0 Hz (the mode is RUN) 
2	**A2.5**	The output current from the inverter during operation is 2.5 A (RUN) 
3	**1460**	Displays the output speed of the electric motor, 1460 rpm. 
4	**323.8**	It shows the voltage of the DC circuit 323.8V= 
5	**U 220**	It shows the output voltage of the inverter 220V~ 
6	**0**	Displays the value of the PID feedback signal (0 = no PID) 

5.3 Description of displaying display parameters

No.	Action	Button	Display	Description
1	Turns on mains power		F50.0	①The inverter is in standby mode. ②The display shows the set frequency.
2	Press once		F50.0	Inverter start ① The inverter is in operation if the RUN LED is on (lit). ② The picture shows the set frequency of 50.0 Hz
3	Press once		H50.0	Switching the display by pressing the ENTER button. The actual output frequency will be displayed. ① Actual output frequency is 50Hz.
4	Press again		A02.5	Switching the display by pressing the ENTER button. The actual output current will be displayed. ① Actual output current is 2.5A.
5	Press again		1460	Switching the display by pressing the ENTER button again will show the engine output speed. Note: Don't forget to set parameter P212 correctly first ① The speed of the electric motor is 1460 rpm
6	Press again		323.8	Switching the display by pressing the ENTER button again will show the DC link DC voltage of the inverter ① DC link voltage is 323.8 V DC
7	Press again		U220	It shows the output voltage of the inverter 220 V AC

5.4 Entering parameters (Example of entering parameter P101=3 to P101=1)

	Displayed item e.g.	Description
1		To enter the parameters on the A550 PLUS inverter, first shortly press the MENU button 
2		The display shows **P000** and the last "**0**" starts flashing
3		Press **ENTER**  and the first "**0**" starts flashing
4		Press **UP**  (up arrow) and the display will show **P100** and "**1**" will flash
5		Press **ENTER** twice  and "**0**" at the end will start flashing
6		Press **UP**  (up arrow) and the display will show **P101**

7		Press the **ENTER** button  and hold it down for **3** seconds
8		"**3**" will appear on the display (and it flashes), this means that the parameter is set to **P101=3**
9		Press **DOWN** twice  (šípku dole) a na displeji bude blikať „**1**“
10		Press **ENTER**  and hold it for **3** seconds The value P101=1 has been stored in the memory and the display will flash to P102 and start flashing (this means that P102 is ready to change the parameter)
11		If you want to end parameterization, press **MENU**  and the value of the set frequency **F** is displayed on the display
	Note	By pressing the **ENTER** button,  you scroll from right to left and from left to right on the display. Arrows **UP**  and **DOWN**  you increase or decrease the number in the given position.

5.5 Connection of type A 550 PLUS inverters (regulations)

(1) Make sure that fuses are connected between the power source and the inverter to prevent malfunction in case there is a wiring error.

(2) In order to reduce electromagnetic interference, you can connect an EMC filter, input choke, etc. in the surrounding circuit of the frequency converter.

(3) For the transmission of analog signals, such as AI frequency setting and instrument loop (AO) and others, use shielded cables with a cross-section greater than 0.3 mm². The shield must be connected to the grounding terminal E of the frequency converter, and the length of the line should be less than 30 m.

(4) For the input and output loops of FWD, REV, S1 to S4, or relays, use a stranded shielded wire with a cross section greater than 0.75 mm². The shielding layer must be connected to the common port of the CM control terminals, and the length of the line should be less than 50 m.

(5) The control wire must be separated from the main loop power line. It must be installed at a distance of min. 10 cm from the power line, for parallel lines or when lines cross.

(6) The connecting wire between the inverter and the motor should be shorter than 30 m. If it is longer than 30 m, the carrier frequency of the inverter must be reduced accordingly.

(7) All supply wires must be firmly attached to the terminals to ensure good contact.

(8) The insulation protection of all supply wires must be in accordance with the voltage class of the inverter.

(9) To secure the input of the converter, it is recommended to use, for example fuses with gR and gG characteristics (fuses for securing semiconductors). Fast fuses of the type: gG protect only a short circuit; gR short circuit + overload protection.

(10) The shielding of the motor cable is grounded on both the frequency converter and the motor side. In order to minimize radio-frequency interference, the grounding of the motor cable shielding on the inverter side is carried out in a shielding layout with a 360° attachment in an EMC industrial outlet, and the resulting braided shielding in a defined shape is connected to the protective terminal of the PE inverter.

(11) On the motor side, the grounding of the shielding is carried out in the way of the shielding distribution with 360° mounting in the EMC industrial terminal, or the braided shielding in a defined shape is brought out and connected to the protective terminal of the PE motor.

(12) Before installing and commissioning the frequency inverter, read very carefully all warnings and recommendations on the following pages!

Disregarding these warning recommendations and warnings can lead to severe or even fatal injuries! In case of violation of applicable safety standards and decrees, the manufacturer does not assume responsibility for damages!

(13) *Assembly and assembly-related work with inverters may only be performed by authorized persons with qualifications at least according to § 21 to 24 of Decree 508/2009 Coll.

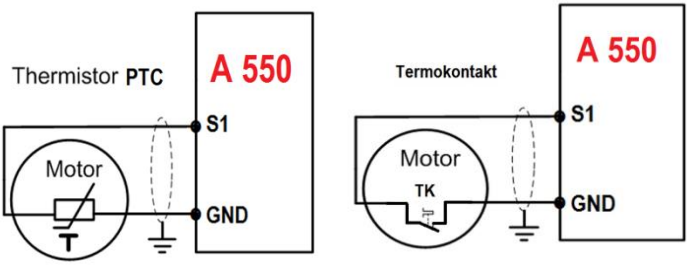
(14) Before starting and setting up the inverter, it is necessary to make sure that the mains voltage is compatible with the supply voltage range of the frequency inverter. An incompatible supply voltage can cause irreparable damage to the inverter. For safety reasons, it is recommended to equip the inverter with a main contactor, to safely disconnect the power part of the inverter from the power supply network.

(15) When dimensioning the output cables leading to the motor, it is recommended to use shielded cables of the type e.g. NYCY 3 x cross-section, NYCWY 3 x cross-section, or ÖLFLEX® 4G, to minimize radio frequency interference.

**Each type A 550 PLUS frequency converter is already programmed at the factory. Parameterization is set to control parameters from the inverter panel. After connecting the inverter correctly, set the electric motor data to the P2 group parameters, and then press START and set the frequency with the rotary knob on the panel.

WARNING! If the inverter is in operation mode (RUN), some parameters cannot be changed. Stop the drive and then change the necessary parameters!

Important notice!
If the electric motor is equipped with PTC or TK thermal protection, do not forget to connect them to the terminals, e.g. S1/GND.
Parameter P317 = 32



5.6 Troubleshooting

If an alarm occurs in the inverter, the protection function is activated, which stops the inverter and the control panel automatically switches to one of the following fault indications (alarm).
If your fault does not correspond to any of the following faults or if you have a different problem, please contact your device supplier*.
* If the protection function is activated in the event of a serious fault, the display will automatically switch to the above display.
** The reset method will stop the inverter output after the protection function is activated. Therefore, the inverter cannot be restarted.

5.7 First, check where the fault occurred

If the causes of the malfunction are still unknown after repeated checking, it is recommended to initialize the parameters (Factory settings P117), then restore the desired parameter values and check again.

(1) It is not possible to write parameters. Causes and remedies:
a: Check the selection of the P118 parameter entry. If unlocked, P118=0
b: Check frequency setting P101 / P102 - Operation mode selection.
c: Make sure the operation has not been performed. Stop the inverter and adjust it.

(2) Engine does not rotate. Causes and remedies:
a: Check the correctness of the operation mode setting P102.
b: Check that the starting frequency setting is not greater than the operating frequency.
c: Check the main circuit and control circuit.
d: Check if the output stop signal or RESET is not on.
e: Check that the reverse rotation protection option is not selected - parameter P104.
f: Check that the frequency setting for each individual frequency (eg step operation - fixed frequencies) is not zero.
g: Check that the P105 maximum frequency setting is not zero.
h: Check that the P400 (JOG) frequency setting is not lower than the P202 start frequency setting.
i: Check that the load is not too large or that the drive is not stuck.

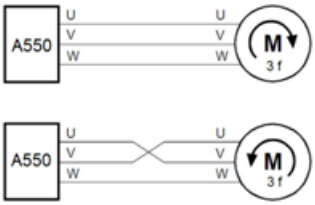
(3) Engine overheats. Causes and remedies:
a: Check that the load is not too large. Reduce the load.
b: Is the engine fan running? (check the deposited dust and suction area).
c: Check that the P208 torque boost setting is correct.
d: Has the engine type been set? Check engine settings P209; 210; 212; 213; 215

(4) Engine makes unusual noise. Causes and remedies:
a: Check that there are no vibrations of metal parts at the carrier frequency (metal sounds). Check the setting of P115 carrier frequency (see the detailed description of parameter 115).
b: Check mechanical looseness of connections, etc.

c: Contact the engine manufacturer.

(5) The motor rotates in the opposite direction. Causes and remedies:
a: Check whether the phase sequence of the output terminals U/V/W is correct.
b: Check that the control signals (forward rotation, reverse rotation) are connected correctly.

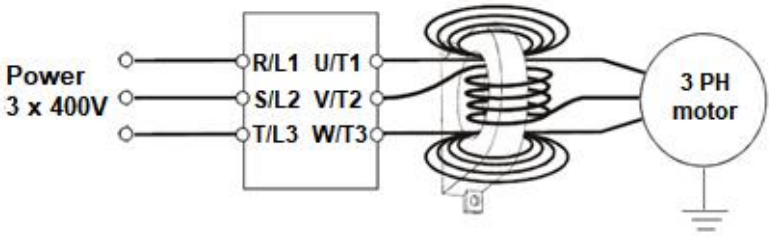
The direction of rotation of the motor can be changed by swapping the two output lines on the inverter or motor.



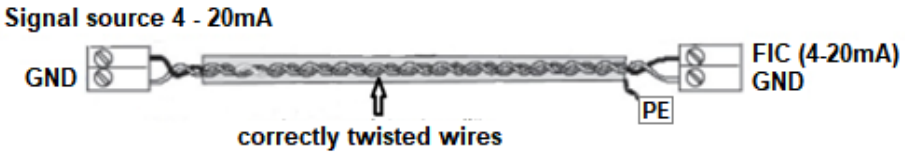
(6) Speed does not increase. Causes and remedies:
a: Check if the maximum frequency (P105) is set correctly. (if you want to run the motor at 120Hz or more, set the maximum frequency of P105 to 120Hz or more).
b: Check that the load is not too high (the load may be higher in winter).
c: Check that the braking resistor is not accidentally connected to the terminals P / + - -P / -.

(7) The inverter may interfere with other devices. Causes and remedies:
The input/output (main circuit) of the inverter contains high frequency components that can radiate signals to communication equipment used near the inverter. In this case, install a suitable EMI filter to minimize interference.
a: Lower the carrier frequency (P115).
b: Install a noise filter on the output side of the inverter to reduce the electromagnetic noise generated from the inverter.
c: Install an input choke on the input side of the inverter.
d: To reduce the induced noise from the power supply line of the inverter, it is recommended to ground the cable by inserting it into the grounding terminal of the inverter.
e: To avoid malfunction due to noise, place the signal cables more than 10 cm away from the power cables.
f: Control circuit cables should be shielded, or the cable should be installed in a metal tube.

(8.) Interference generated by converters and ways to reduce it
Interference is emitted by the inverter and can harm peripheral devices. Although the inverter is designed not to emit interfering signals, it sometimes still emits low-level signals, so some installations in some environments require the following techniques. Inverters emit a signal mainly at a high carrier frequency. If this interference causes peripheral equipment to malfunction, interference suppression measures should be taken. These techniques differ slightly depending on how the interference is propagated.
An example of suppression with a ferrite core:

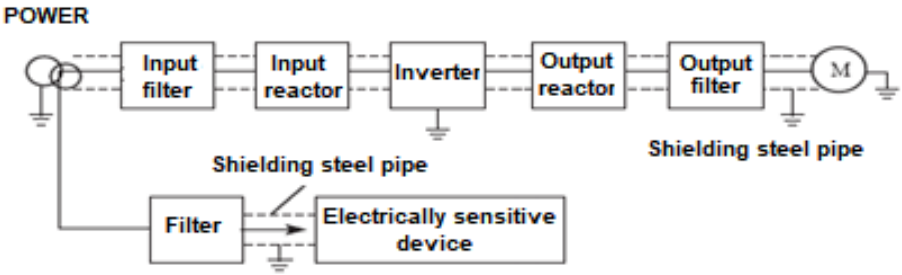


(8.2) Techniques to reduce noise that enters the converter and causes it to malfunction.
• Do not lay the power cables (I/O cables) and signal cables of the inverter parallel to each other and do not bundle them.
• Use coiled cables with twisted pairs to connect sensors and control signal cables, and connect the cable shield to the SC terminal.
• Ground the inverter, motor, etc., at one point.



Signal source 0 - 10 V

If devices are installed that produce a lot of interference (which use magnetic contactors, electromagnetic brakes, many relays) and the inverter can be damaged by this interference, the following measures must be taken:
• Provide surge protection for devices that generate interference.
• Connect the filters to the data cables.
• Ground the shielding of cables from sensors and control signal cables.
(8.1) An example of noise reduction



Chapter 6: Parameters A 550 PLUS- shortened

6.1 Parameters - table

Param.	Name	Set range	Factory
Group P0: Monitoring functions			
P000	Default displaying on the display (you can switch with the ENTER button during operation)	00: Set frequency 01: Output frequency 02: Output current 03: Output speed 04: DC bus voltage 05: Output voltage 06: Inverter module temperature (only models above 7.5 kW) 07: PID feedback signal value 08: PID setting	00
P001	Set frequency	Displays the set frequency. Resolution: 0.10 Hz	
P002	Output frequency	Displays the output frequency. Resolution: 0.10 Hz	
P003	Output current	Displays the output current. Resolution: 0.01 A	
P004	Output speed	Displays the speed of the electric motor. Resolution: 1 rpm	
P005	DC bus voltage	Displays the DC voltage value between the circuit. Resolution: 0.10 V =	
P006	Inverter temperature (from 4T0075 to up)	Displays the temperature of the inverter cooler. Resolution: 0.10 °C	
P007	PID value	Displays the set PID value. Resolution: 0.01	
P008	Time in operation	Cumulative time in operation ("motor hours"). Resolution: 1.0 hrs.	
P009	AC output voltage	Displays the output AC voltage. Resolution: 0.01 V	

Fault records			
P010	1 Alarm record	0: Empty memory 1: Reserve 2: Overcurrent during acceleration OC1 3: Overcurrent during deceleration OC2 4: Overcurrent during constant speed 5: DC circuit overvoltage during acceleration 6: DC circuit overvoltage during deceleration 7: DC circuit overvoltage at constant speed 8: Brake resistor overload 9: Undervoltage 10: Inverter overload 11: Overload of the driven electric motor 12: Reserve 13: Reserve 14: Overheating of the inverter power module 15: External error 16: Communication error 17 to 23: Reserve 24: Low pressure detected in "LP" device 25 and 26: Reserve 27: High pressure recorded in "hP" device 28: Fluid loss in the "LL" system 29: The set running time has been reached " TE" 30: Reserve 31: Loss of PID feedback signal while running	
P011	2 Alarm record		
P012	3 Alarm record		
P013	Reserve	-	
P014	Frequency setting during the last alarm	Records the set frequency at the last alarm	0.1 Hz
P015	Output frequency setting during the last alarm	Records the output frequency reached at the last alarm	0.1 Hz
P016	Output current during the last alarm	Records the output current at the last alarm	0.0 A
P017	Output voltage during the last alarm	Records the output voltage at the last alarm	0.1 V
P018	Output DC bus voltage during the last alarms	Records the DC bus output voltage at the last alarm	0.1 V
P019	Reserve		
P020	Reserve		
P021	Input terminal status	Bit:0 = FWD; Bit:1 = REV; Bit:2 = S1; Bit:3 = S2	

P022	Output terminal status	Bit:1 = RA/ RC active Bit:0 = RA/ RC in active		
P023	AI input voltage	0.00 to 10.00 V		
P024	Reserve			
P025	Reserve			
P026	Reserve			
P027	The cause of the malfunction	0: No fault 1: Reserve 2: Overcurrent during acceleration 3: Overcurrent during deceleration 4: Overcurrent during constant speed 5: DC circuit overvoltage during acceleration 6: DC circuit overvoltage during deceleration 7: DC circuit overvoltage at constant speed 8: Brake resistor overload 9: Low-voltage 10: Overload of the driven electric motor 11: Inverter overload 12: Reserve 13: Reserve 14: Overheating of the inverter power module 15: External error 16: Communication error 17 to 23: Reserve 24: Low pressure detected in the device 25: Reserve 26: Reserve 27: High pressure detected in the device 28: Loss of liquid in the device 29: The set running time has been reached 30: Reserve 31: Loss of PID feedback signal while running	- OC1 OC2 OC3 OU1 OU2 OU3 POF LU OL1 OL2 - - OH EF CO - LP - - hP LL TE - 20	
P028	Running status in the event of a fault	0: STOP 1: FWD 2: REV		
P050	Software version			By type

Group P1: Basic parameters			
P100	Numerical frequency setting	0.00 to maximum frequency 999.9 Hz (P105)	0.0
P101	**Choice of frequency setting X A 550 PLUS**	0: Digital setting with UP / DOWN buttons (after switching off, it is reset if P812=0) 1: AVI (FIV/FIC analog 0-10 V or 4-20 mA) 2: By potentiometer on the external keyboard 3: By potentiometer on the keyboard 4: UP / DOWN external frequency setting 5: RS485 frequency setting via communication 6: Fixed speed (fixed frequencies) 7: Frequency setting via PLC 8: Frequency setting via PID 9: Reserve	3
P102	**Selection of control signal location**	0: Control panel (FWD/REV/STOP) 1: I/O terminal (external control) 2: Communication (RS485)	0
P103	Reserve		
P104	Reverse rotation protection option	0: Reverse rotation disabled 1: Reverse rotation enabled	1
P105	Maximum generated frequency A 550 PLUS	Adjustable from 50.0 HZ to 999.9 Hz	50.0 Hz
P106	Minimum frequency	0.00 - maximum frequency	0.0 Hz
P107	**Acceleration time 1**	0 to 999.9 sec	By type
P108	**Deceleration time 1**	0 to 999.9 sec	By type
P109	V/F maximum voltage	V/F medium voltage up to 500.0 V	4T = 380V or 2S = 220V
P110	V/F fundamental frequency	V/F medium frequency - max. frequency	50.00 Hz
P111	V/F medium voltage	V/F minimum voltage - V/F maximum voltage	By type
P112	V/F medium frequency	V/F minimum frequency — V/F fundamental frequency	2.50 Hz
P113	V/F minimum voltage	0 - V/F mean voltage value	By type
P114	V/F minimum frequency	0 - V/F mean frequency value	1.2 Hz

P115	Carrier frequency	1.0 kHz - 15.0 kHz	By type
P116	Reserve		
P117	**Return to factory default A550 parameters**	**8: initialization of the factory setting**	0
P118	Lock the parameters	0: Unlocked parameters 1: Locked parameters	0
P119	Direction of rotation	0: Forward rotation 1: Reverse rotation	0
P120	Selection of Y source frequency	0: Digital setting with UP / DOWN buttons (after switching off, it is reset if P812=0) 1: AVI (FIV/FIC analogue 0-10 V or 4-20 mA) 2: By potentiometer on the external keyboard 3: By potentiometer on the keyboard 4: UP / DOWN external frequency setting 5: RS485 frequency setting via communication 6: Fixed speed (fixed frequencies) 7: Frequency setting via PLC 8: Frequency setting via PID	0
P121	Frequency source selection	**.X:** (frequency source) 0: Main frequency source 1: X and Y operations (operating mode determined by tens) 2: Switching between X and Y 3: Switching between X and "X and Y" 4: Switching between Y and "X and Y" **X.:** (X and Y operation) 0: X+Y 1: X-Y 2: Maximum X and Y	00
P122	Selection of Y frequency auxiliary source	0: Considering the maximum frequency 1: Given the source frequency X	0
P123	Range of frequency auxiliary source Y	0 up to 150 %	100 %
P124	Frequency shift of the auxiliary frequency source for X and Y operations	0.00 Hz up to max. frequency P105	0.0 Hz

P125	Basic frequency of UP / DOWN adjustments during operation	0: Running frequency 1: Set frequency	1
P126	**Upper max. output frequency**	Lower frequency limit P106 to maximum generated frequency (P105)	50.0 Hz
P127	Base frequency during acceleration and deceleration	0: maximum frequency 1: Set frequency 2: 100 Hz	0

Group P2: Electric motor parameters and DC braking			
P200	Select the start-up mode	0: Normal start 1: Reserve	0
P201	**Select the stop mode**	**0: Decrease by curve** **1: Coasting**	0
P202	Starting frequency	0.10 to 50.00 Hz	0.5 Hz
P203	Frequency at stop	0.10 to 50.00 Hz	0.5 Hz
P204	Voltage at which DC braking is initiated (Braking start)	0 to 10.0% of rated motor voltage	0.0 %
P205	DC braking start operating time	0 až 100.0 sec	0.0 s
P206	Voltage at which DC braking ends (Stop Braking)	0.1 až 10.0 % rated voltage of the motor	0.0 %
P207	DC braking end operation time	0 až 100.0 sec	0.0 s
P208	**Torque boost**	**0.10 - 30.0 %** **0.00 – torque boost is off**	4.0 %
P209	**Rated motor voltage**	**0 - 500.0 V according to the label of the motor**	380.0 V
P210	**Rated motor current**	**According to the label of the motor**	A

P211	Current without engine load (idle)	0 - 100%	50 %
P212	**Rated motor rotation speed**	0 až 6000 rpm / min	1460 rpm
P213	Number of motor poles	0 – 20 (e.g. 2900 rpm = 2; 1480 rpm t=4; 990 rpm =6; 740 rpm =8)	4
P214	Rated motor slip	0 - 10.00 Hz	2.5%
P215	**Rated motor frequency**	0 - 999.9 Hz (according to the label of the motor)	50.00 Hz
P216	Resistance of stator	0 – 100.0 Ohm	By type
P217	Resistance of rotor	0 – 100.0 Ohm	By type
P218	Self inductance of rotor	0 – 1.000 H	By type
P219	Mutual inductance of rotor	0 – 1.000 H	By type

Group P3: I / O parameters (Input / Output)			
P300	AVI minimum voltage input	0 - 10 V = 0,0; for 4-20 mA = 1,00	0.00 V
P301	AVI maximum voltage input	0 - 11 V = 10,0; for 4-20 mA = 5,00	10.00 V
P302	AVI input filter time	0 - 10.0 sec	0.1 s
P303	Reserve		
P3...	Reserve		
P309	Reserve		
P310	Min. limited frequency of analogue setting	0 - 999.8	0.0 Hz
P311	Direction of rotation at min. analogue signal	0: Forward direction 1: Reverse direction	0
P312	Max. limited frequency of analogue setting	0 - 999.9 Hz	50.00 Hz
P313	Direction of rotation at max. analogue signal	0: Forward direction 1: Reverse direction	0
P314	Reserve		

P315	Input terminal FWD (0 - 32)	0: Invalid 1: JOG mode 2: JOG forward FWD 3: JOG reverse REV 4: Forward / reverse 5: Run RUN 6: Forward FWD 7: Reverse REV 8: STOP 9: Fixed speed 1 10: Fixed speed 2 11: Fixed Speed 3 12: Fixed speed 4 13: Acceleration / deceleration terminal 1 14: Acceleration / deceleration terminal 2 15: Signal of increasing frequency (UP) 16: Signal of decreasing frequency (DOWN) 17: Emergency stop signal EMS (STOP) 18: Signal for inverter RESET 19: PID in running 20: PLC in running 21: Starting signal for timer 1 22: Starting signal for timer 2 23: Pulse signal of the counter 24: Reset of the counter 25: Break in progress (Pause) 26: 25: Break in progress (Pause) 26: Switching the frequency channel between X and Y 27 to 31: Reserve 32: PTC / TK thermal motor protection 33 to 59: Reserve	6
P316	Input terminal REV (0 - 32)		7
P317	Input terminal S1 (0 - 32)		18
P318	Input terminal S2 (0 - 32)		9
P319	S3 for models over 45 kW		0
P320	S4 for models over 45 kW		0
P321	Reserve		
P322 P323 P324	Reserve		0

P325	Output terminal of the programmable relay RA, RC (0-32)	0: Invalid 1: In running (RUN) 2: Frequency achieved 3: Alarm 4: Zero speed (if in STOP) 5: Frequency FDT1 achieved 6: Frequency FDT2 achieved 7: Acceleration 8: Deceleration 9: Indication of under-voltage 10: Timer 1 reached 11: Timer 2 reached 12: Stop the process 13: Process indication 14: PID maximum 15: PID minimum 16: 4 – 20 mA disconnection 17: Overloaded of motor 18: Overloaded of inverter 19 to 26: Reserve 27: Finished timer operation 28: Medium setting value reached 29: Liquid supply by constant voltage *T on / 0” off 30: The inverter is ready 31 a 32: Reserve	3
P326	Reserve		
P327	Reserve		
P328	Signal filtering time	0.000 to 1.000 sec	0.010 s
P329	Methods of control from an external terminal	0: Two-wire control 1 1: Two-wire control 2 2: Three-wire control 1 3: Three-wire control 2	0
P330	Control range from UP/DOWN terminal	0.01 Hz to 99.99 Hz	1.00 Hz
P331	RA / RC output relay mode	..X: Reserve 0: Positive logic 1: Negative logic . X.: valid for RA/RC Set: H.010 relay NC 0: Positive logic Set: H.000 relay NO 1: Negative logic	H.000
P332	FWD delay time	0.0 s to 999.9 s	0.0 s

P333	Delay time REV	0.0 s to 999.9 s	0.0 s
P334	Delay time S1	0.0 s to 999.9 s	0.0 s
P335	X mode selection	...X: valid for FWD 0: Valid high level 1: Valid low level ..X.: valid for REV 0: Valid high level 1: Valid low level .X..: valid for S1 0: Valid high level 1: Valid low level X...: valid for S2 0: Valid high level 1: Valid low level	0000

Group P4: Auxiliary application functions			
P400	Frequency setting in JOG mode	0.00 - maximum frequency	5.0 Hz
P401	Time of acceleration 2	0 to 999.9s	10.0 s
P402	Time of deceleration 2	0 to 999.9s	10.0 s
P403	Time of acceleration 3	0 to 999.9s	10.0 s
P404	Time of deceleration 3	0 to 999.9s	10.0 s
P405	Time of acceleration 4 / time of acceleration in JOG mode	0 to 999.9s	10.0 s
P406	Time of deceleration 4/ time of deceleration in JOG mode	0 to 999.9s	10.0 s
P407	Preset value of the counter	0 to 999.9s	100 s
P408	Average counter value	0 to 999.9s	50 s
P409	Limitations of torque during acceleration	50 to 200%	150.0 %

P410	Overcurrent when stopped	0 to 100%	0.0 %
P411	Over voltage protection	0: Overvoltage protection off 1: Overvoltage protection on	1
P412	V/F overexcitation – gain control	0 to 100 %	10.0 %
P413	Over voltage protection during deceleration – gain control	0 to 200%	50.0 %
P414	Initiation of dynamic braking via braking resistor at DC voltage	4T models: 700.0 V DC (560 – 800 V DC) 2S models: 370.0 V DC (360 – 400 V DC)	700 / 370
P415	Reserve		
P416	Protection against restart after immediate shutdown	0: Restart protection enabled (restart disabled) 1: Restart protection disabled (restart	1
P417	Selection of action in case of immediate power failure	0: No action 1: Slow down on a curve 2: Slow down on a curve and stop	0
P418	Reserve		1
P419	Reserve		1
P420	Number of restart attempts	0 to 20	0
P421	Delay time for auto restart after fault	0.1 s to 100.0 s	1.0 s
P422	Reserve		
P423	**Motor overcurrent detection level (100% = value set in P210)**	0 to 200% 0.0% = Overcurrent detection the electric motor is switched off	0.0 %
P424	**Motor overcurrent detection time**	999.9 s	10.0 s
P425	Reaching the frequency 1	0.00 - maximum frequency	0.0 Hz

P426	Reaching the frequency 2	0.00 - maximum frequency	0.0 Hz
P427	Timer 1 setting	0 to 999.9 s	10.0 s
P428	Timer 2 setting	0 to 999.9 s	20.0 s
P429	Reserve		
P430	Frequency detection hysteresis (FDT2)	0.0 % to 100.0 % (FDT1 or FDT2)	5.0 %
P431	Jump frequency 1	0.00 - maximum frequency	0.00 Hz
P432	Jump frequency 2	0.00 - maximum frequency	0.00 Hz
P433	The width of the hysteresis loop	0.00 - maximum frequency	0.00 Hz
P434 to P499	Reserve		

Group P5: PLC operation			
P500	PLC memory mode	.X: Select function after stop 0: Off 1: On X.: Selection of function after power failure 0: Off 1: On	00
P501	PLC starting mode	0: If set P101 = 7 PLC active 1: PLC start method	
P502	PLC run modes	0: PLC stops after one cycle 1: Keeps the last values after the inverter completes one cycle 2: The PLC repeats the cycle again after completing the first cycle 3 and 4: Reserve	0
P503	Fixed speed 1	0.00 - maximum frequency	5.0 Hz
P504	Fixed speed 2	0.00 - maximum frequency	10.0 Hz
P505	Fixed speed 3	0.00 - maximum frequency	20.0 Hz
P506	Fixed speed 4	0.00 - maximum frequency	25.0 Hz
P507	Multiple speed 5	0.00 - maximum frequency	30.0 Hz
P508	Multiple speed 6	0.00 - maximum frequency	35.0 Hz
P509	Multiple speed 7	0.00 - maximum frequency	40.0 Hz

P510	Multiple speed 8	0.00 - maximum frequency	45.0 Hz
P511	Multiple speed 9	0.00 - maximum frequency	50.0 Hz
P512	Multiple speed 10	0.00 - maximum frequency	10.0 Hz
P513	Multiple speed 11	0.00 - maximum frequency	10.0 Hz
P514	Multiple speed 12	0.00 - maximum frequency	10.0 Hz
P515	Multiple speed 13	0.00 - maximum frequency	10.0 Hz
P516	Multiple speed 14	0.00 - maximum frequency	10.0 Hz
P517	Multiple speed 15	0.00 - maximum frequency	10.0 Hz
P518	PLC - operating time 1	0 - 9999 s	3 s (h)
P519	PLC - operating time 2	0 - 9999 s	4 s (h)
P520	PLC - operating time 3	0 - 9999 s	5 s (h)
P521	PLC - operating time 4	0 - 9999 s	0 s (h)
P522	PLC - operating time 5	0 - 9999 s	0 s (h)
P523	PLC - operating time 6	0 - 9999 s	0 s (h)
P524	PLC - operating time 7	0 - 9999 s	0 s (h)
P525	PLC - operating time 8	0 - 9999 s	0 s (h)
P526	PLC - operating time 9	0 - 9999 s	0 s (h)
P527	PLC - operating time 10	0 - 9999 s	0 s (h)
P528	PLC - operating time 11	0 - 9999 s	0 s (h)
P529	PLC - operating time 12	0 - 9999 s	0 s (h)
P530	PLC - operating time 13	0 - 9999 s	0 s (h)
P531	PLC - operating time 14	0 - 9999 s	0 s (h)
P532	PLC - operating time 15	0 - 9999 s	0 s (h)
P533	PLC direction of operation	0 - 9999	0000
P534	Reserve		
P535	Reserve		
P536	Direction of PLC operation in high level	0 to 3	0
P537	PLC runtime units	0: seconds 1: hours	0
P538	Fixed speed	0: valid setting from P503 1 to 6: Reserve	0
P539	Acceleration / deceleration time of a simple reference PLC 1	0 to 3	0
P540	Acceleration / deceleration time of a simple reference PLC 2	0 to 3	0
P541	Acceleration / deceleration time of a simple reference PLC 3	0 to 3	0
P542	Acceleration / deceleration time of a simple reference PLC 4	0 to 3	0

P543	Acceleration / deceleration time of a simple reference PLC 5	0 to 3	0
P544	Acceleration / deceleration time of a simple reference PLC 6	0 to 3	0
P545	Acceleration / deceleration time of a simple reference PLC 7	0 to 3	0
P546	Acceleration / deceleration time of a simple reference PLC 8	0 to 3	0
P547	Acceleration / deceleration time of a simple reference PLC 9	0 to 3	0
P548	Acceleration / deceleration time of a simple reference PLC 10	0 to 3	0
P549	Acceleration / deceleration time of a simple reference PLC 11	0 to 3	0
P550	Acceleration / deceleration time of a simple reference PLC 12	0 to 3	0
P551	Acceleration / deceleration time of a simple reference PLC 13	0 to 3	0
P552	Acceleration / deceleration time of a simple reference PLC 14	0 to 3	0
P553	Acceleration / deceleration time of a simple reference PLC 15	0 to 3	0
P554	Oscillation frequency adjustment mode	0: Relative to the fundamental frequency 1: Relative to the maximum frequency	0
P555	The amplitude of the oscillation frequency	0.0 to 100.0 %	0.0 %
P556	Amplitude of the jump frequency	0.0 to 50.0 %	0.0 %
P557	Oscillation frequency cycle	0.1 s to 999.9 s	10.0 s
P558	Triangle wave rise coefficient	0.1 to 100.0 %	50.0 %
P559 to P599	Reserve		

Group P6: PID Operations			
P600	PID operating mode	0: PID off 1: PID enabled 2: PID start from external terminal	0
P601	PID operation mode selection	0: Negative feedback 1: Positive feedback	0
P602	PID setting of the action point	0: Digital mode (P604) 1: AVI (FIV or FIC) 2 to 6: Reserved	0
P603	PIO feedback value selection	0: AVI from analog control If J2 is I: 4 to 20 mA (P300 = 1.00 V and P301 = 5.00 V) If J2 is V: 0 to 10 V (P300 = 0.00 V and P301 = 10.00 V) 1 až 5: Reserved	0
P604	PID figure setting target value	Range: 0.00 bar to 50.00 bar Set the target pressure value = setpoint	2.50 bar
P605	PID upper limit	P606 to 10.00 bars	10.00 bar
P606	PID lower limit	0.0 to P605 bars If you set P606=0, then when there is a lack of water in the system, it reacts after 100 seconds. "LL" warning (Low level)	0.00 bar
P607	PID proportional band	0.0 to 600.0 %	100.0 %
P608	PID integral time	0.0 to 10.0 s. 0.0 means closed	2.00 s
P609	PID differential time	0.0 to 9.99 s 0.0 means closed	0.00 s
P610	Increasing the value of the "Boost set point"	0.00 to 99.99 %	2.00 %
P611	PID sleep frequency “SLP”	0.00 to 999.9 Hz 0.00 Hz : the sleep function is inactive	25.0 Hz
P612	PID sleep detection time "SLP"	0 to 9999 s	10.0 s
P613	PID wakeup value "Wake up value"	0.0 to 100.0% of the set value of P604 Eg: If P604=3 bar and P613=090.0%, it wakes up when the pressure reaches 2.70 bar	90.0 %
P614	Scale - The range of the pressure transducer	0.00 to 99.99 bar	10.00 bar

P615	PID number of display digits	1 to 4	4
P616	PID number of decimal digits of the display	0 to 4	2
P617	PID upper frequency limit	0.0 to maximum frequency	48.00 Hz
P618	PID lower frequency limit	0.0 to maximum frequency	20.00 Hz
P619	PID detection time	0 to 9999 s	20 s
P620	PID deviation limit	0.00 to 100.0 %	0.1 %
P621	AVI circuit disconnection detection	0: Disabled (does not recognize disconnection) 1: On (recognizes open circuit) error code "20" 2: On + STOP (recognizes and stops the drive) "20"	0
P622	Feedback loss detection value	Range: 0.0 to 10.0 V * if the current feedback is 4-20 mA, then set the detection to less than 2 mA (P622=0.50 V)	0.50 V
P623	Feedback loss detection time setting value	0.0 to 20.0 s	1.0 s
P624	Limit frequency of PID reverse run	0.00 to maximum frequency	0.00 Hz
P625	PID differential limit	0.00 to 99.99 %	0.10 %
P626	PID change time setting	0.00 to 99.99 s	0.00 s
P627	Setting the feedback filtering time	0.00 to 60.00 s	0.00 s
P628	Setting the PID output filtering time	0.00 to 60.00 s	0.00 s
P629	Reserve		0000
P630	PID proportional gain P2	0.0 to 600.0 %	200.0 %
P631	PID proportional gain I2	0.0 to 10.00 s	0.50 s
P632	PID proportional gain D2	0.0 to 9.999 s	0.000 s
P633	PID parameter switching status	0: Does not switch 1: Switches via X2 2: Automatically switches	0
P634	Parameter transition deviation PID 1	00.0 % to 10.0 %	05.0 %
P635	Parameter transition deviation PID 2	0.0 % to 100.0 %	10.0 %
P636	Initial PID value	0.0 % to 100.0 %	0.0 %

P637	PID initial value retention time	0.00 to 99.99 s	0.00 s
P638	Reserve		
P639	PID integral time	.X: Integration separation 0: Inactive 1: Integral time separated X.: If the integration reaches the set limit so 0: Continues integration 1: Stops integration	00
P640	PID stop operation STOP	0: No PID operation when stopped 1: PID operation when stopped	0
P641	Pressure detection value in case of lack of medium (liquid, gas, etc.). If P606=0	0.0 to 2.50 bar (if set to 0.00, the function is disabled) The time during which the low level is detected is set in P644. Then it will announce "LL"	0.50 bar
P642	Setting the time after which the high/low pressure warning is reset. Valid when "LP" is activated.	0: High/low pressure warning is not reset 1: When a high pressure warning is displayed on the inverter, the warning will automatically reset after the pressure returns to normal (after a set time) 2: When the low pressure warning is displayed on the inverter, it will automatically reset after returning to normal (after the set time), setting range: 0 to 9999s	0010 s
P643	Device low pressure detection time, valid when "LP" is activated	If the pressure is lower than the setting in P606, parameter P643 keeps the device running for a certain set time. Range: 0 -	0010 s
P644	The detection time of the warning of a lack of liquid in the device. If P606=0, "LL	0 to 9999 s We set the detection value in P641. When low level is detected, it will announce "LL".	0100 s
P645	Enable run delay time after automatic power recovery	0: OFF 1: ON	0000
P646	The first 10 time intervals after auto reset due to low pressure in the device	0 to 9999 s (setting the interval length)	0600 s
P647	Setting the length of the pause time between the first 10 autoreset	0 to 1000 min (break between intervals)	0060 min.
P648	Protection against liquid freezing in the device	0: Protection OFF 1: Protection ON	0

P649	Setting the pause time between cycles antifreeze circulation	0 to 9999 s	0900 s
P650	Antifreeze circulation time setting	0 to 9999 s	0030 s
P651	Setting the running frequency for circulation against freezing	0 to 500.0 Hz	015.0 Hz
P652	"Sleep" mode level, lower frequency setting	0.0 to 100.0 Hz (works when the frequency is <P652)	000.5 Hz
P653	Pressure drop level value in "sleep" mode	0.0 to 10.0 % allowed pressure during reduced frequency)	00.6 %
P654	Requency drop level value /second for "sleep" mode	0.0 to 100.0 Hz	000.3 Hz
P655	Number of reduced frequency cycles for "sleep" mode	0 to 1000 times	0010 times
P656	"Sleep" mode level, upper frequency setting	0.0 to maximum frequency by P105 (If frequency > P656, sleep mode is inactive)	42.0 Hz
P657	PID sampling time	0 to 1000 ms	0004 ms

Group P7: Communication parameters (RS 485)

P700	Communication speed	0: 4800 bps **1: 9600 bps** 2: Reserve 3: Reserve	1
P701	Communication mode A 550 PLUS	0: No check (8-N-1) for ASC 1: Even parity check (8-E-1) for ASC 2: Odd parity check (8-0-1) for ASC **3: No check (8-N-1) for RTU** 4: Even parity check (8-E-1) for RTU 5: Odd parity check (8-0-1) for RTU	3
P702	Communication address	1 to 249 (slave address) ; 0: master address	001
P703	Communication faults	0: No fault 1: Malfunction, display Co 2: Display Co and STOP	

Group P8: Specific setting parameters			
P800	Lockout of parameters	0: Locked 1: Unlocked	1
P801	Reserve		
P802	Constant or variable torque	0: G Constant torque (linear characteristic with constant torque increase). In this mode, the inverter allows an overload of 150% for 1 min. with the factory current setting in parameter P210. 1: P Variable torque quadratic characteristic). In this mode of operation, the inverter allows an overload of 120% for 1 min, but the inverter in P210 will automatically increase the current value by one power level higher.	By model
P803	Setting the overvoltage protection	400 V DC for models 2S and 2S....S 810 V DC for models 4T	By model
P804	Setting low-voltage protection	150 V DC for models 2S and 2S....S 310 V DC for models 4T	By model
P805	Set overheat protection	40 to 120 °C	115°C
P806	Reserve		
P807	Reserve		
P808	Reserve		
P809	Reserve		
P810	Reserve		
P811	Reserve		
P812	UP/DOWN memory frequency options	0: Resets memory after power off 1: Keeps in memory after power off	0
P813	Reserve		
P814	Setting the inverter overload factor	0.20 to 10.00	1.00

P815	PWM switching frequency setting	0.0 to 15.0 Hz	12.0 Hz
P816	Inverter overload protection	0: Disabled 1: Enabled	1

Chapter 7: Troubleshooting A 550 PLUS

7.1. Fault messages

Operation panel indication	Name	Possible fault reason	Corrective action
OC1 (2)	Over current during acceleration	1: The acceleration time is too short 2: Curve V/F not set correctly 3: Motor or power supply have short circuit to the ground 4: The torque boost is set too fast 5: The input voltage is too low 6: The inverter setting is not correct 7: The capacity of the inverter is not sufficient for the size of the drive load	1: Increase acceleration time 2: Correctly set V/F curve 3: Check the insulation of motor and motor wire 4: Reduce the value of torque boost. 5: Check input voltage 6: Check the load 7: Enlarge capacity of inverter
OC2 (3)	Over current during deceleration	1: Deceleration time is too short 2: Power - parameters of the inverter are inappropriately set 3: The inverter is interference by the RF signal	1: Increase deceleration time 2: Increase the power of the inverter 3: Remove the source of interference 4: Install the braking resistor
OC3 (4)	Over current during constant speed	1: The insulation of motor and motor wire is not good 2: Load fluctuation 3: Fluctuation of input voltage and the voltage is low 4: Inverter capacity is inappropriately set 5: Excessive drive load 6: VF interference	1 : Check the insulation of motor and motor wire 2: Check load situation and lubrication 3: Check input voltage 4: Enlarge the capacity of inverter 5: Increase the power supply capacity (the "hardness" of the power supply) 6: Remove interference resource
OU1 (5)	Over voltage during acceleration	1: Abnormal power supply 2: Peripheral circuitry is incorrectly set (switch control ON or OFF, etc.)	1: Check the input voltage 2: Do not use the power switch on switching the inverter on or off
OU2 (6)	Over voltage during deceleration	1: Deceleration time is too short 2: The supply voltage is abnormal. 3: Large load inertia 4: Incorrect configuration of the braking resistor 5: The setting of the brake parameters is inappropriate	1: Extend the deceleration time 2: Check the power supply 3: Install the brake unit and brake resistor 4: Reconfigure the braking resistor 5: Correctly set parameters such as braking start operating voltage, etc.
OU3 (7)	Over voltage during constant speed	1: The supply voltage is abnormal 2: Energy feedback 3: Incorrect configuration of the braking resistor	1: Check the supply voltage 2: Mount the brake unit and brake resistor 3: Check the brake resistor configuration again
POF (8)	Overloading of balancing resistors by voltage	1: Incorrect supply voltage 2: Missing phase	1: Check the input voltage 2: Check the input voltage and the switch whether the phase has "dropped out".

Operation panel indication	Name	Possible fault reason	Corrective action
LU (9)	Low voltage	1: Incorrect supply voltage 2: Missing phase	1: Check the input voltage 2: Check the input voltage and the switch whether the phase has "dropped out".
OL1 (11)	Motor overloaded	1: The motor is overloaded 2: The acceleration time is too short 3: Low motor protection setting 4: The V / F curve is not set correctly 5: Increasing the torque is too fast 6: Faulty motor insulation 7: Small motor - low engine power	1: Reduce the load. 2: Increase acceleration time 3: Increase the protection setting 4: Correctly set the V / F curve. 5: Reduce the torque 6: Inspect the engine insulation and replace the motor 7: Use a larger motor
OL2 (10)	Inverter overloaded	1: Overloading 2: Acceleration time is too short 3: Torque boost is too fast 4: V/ F curve incorrectly set 5: Under voltage of input 6: Before motor stops, inverter starts up 7: Fluctuation or blocking of loading	1: Reduce the load or increase inverter capacity 2: Increase acceleration time 3: Reduce torque 4: Correctly set V/F curve. 5: Check input voltage, increase inverter capacity 6: Start the inverter only when the motor has stopped 7: Check the load condition to see if the drive is blocked
OH (14)	Overheating of the inverter	Overloading or clogged cooling	Ensure adequate cooling, check the air supply ....
EF (15)	External fault	External device fault	Eliminate the fault on the external device
CO (16)	Communication fault	1: Connection of the communication line has a fault 2: The communication parameter is incorrectly set 3: The transfer format is incorrect	1: Ensure that the RS-485 terminals are properly connected 2: Re-set the parameter 3: Check the data transfer format
LP (24)	Low press	Low system pressure has been detected (with pressure control)	Increase pressure in the system
hP (27)	High press	High system pressure has been detected (when controlling pressure)	Decrease pressure in the system
LL (28)	Water shortage warning	A lack of fluid was detected in the system	Make sure there is enough fluid in the system
20 (31)	Loss of PID signal	1: Free terminal; the signal line is incorrectly connected 2: The pressure transducer has a fault 3: The parameters are entered incorrectly	1: Make the correct connection of the 4-20mA terminals and wiring 2: Replace the pressure transducer (temperatures...) 3: Set the parameters correctly

7.2. Warning messages

Pr	Parameter write fault	Parameter setting is incorrect	Once the operation is complete, perform the parameter setting.
Err	Incorrect group of parameters	The parameter does not exist or is set at the factory	Leave this parameter
ES	Emergency stop	The drive was stopped by the safety STOP button	Reset the inverter

SLP	Inverter is in "sleep" mode	-	-
Pt	PTC motor protection	PTC motor protection has been activated or PTC has been disconnected	Check the connection of the PTC protection or the temperature of the electric motor

Chapter 8: Warranty conditions of the A 550 PLUS series inverters

8.1. Tests of inverter

Before the shipment, the manufacturer has thoroughly checked and pre-programmed the frequency converter. The product properties correspond to the technical documentation, provided that it is installed and used in accordance with the instructions and recommendations given in the technical documentation and in the operating instructions.

Tested circuit		Test result	The relevant standard
Insulation resistance		>1MΩ	GB12668
Insulation strength		2.5kV AC. 60s, leakage current < 1mA	GB12668
ESD	Constant discharge	+/- 4kV	EN61000-4-2
	Air discharge	+/- 8kV	
	Discharge in connections	+/- 4kV	
EFT		+/- 2kV	EN61000-4-4
		+/- 2.5kV	
	Signal paths	+/- 4kV	
Overvoltage in wires	Phase-to-phase	+/- 2kV	EN61000-4-5
	Counter-direction	+/- 4kV	
CS test (freq. range 150kHz - 80Mhz)		10 V (e.m.f)	EN61000-4-6

8.2. Warranty period:

The warranty period is 24 months from the date of sale.

8.3. Warranty conditions:

The warranty covers only defects and faults that have been caused by a mistake in the manufacture or using of the defective materials. The warranty is prolonged by the time the frequency inverter has been repaired. A warranty service is applied by the customer on the seller. The buyer will transport the frequency inverter to the seller for repair on own expense.

8.4. The warranty does not apply to defects caused by:

1. Seller's or user's fault, mechanical damage (for example, when transporting or falling) or use in contravention of the technical documentation, mistake in wiring or if the defect was caused by improper intervention with the product.
2. Damage to the device through external influences (dusting internal parts of the inverter, humidifying internal circuits) and natural events (effects of high overvoltage due to lightning, fire, water flooding, etc.).
3. Incorrect storage, improper connection, damage by external influences, mainly due to the effects of electrical influences of inadmissible value.

Chapter 9: Wiring and parameterization examples

9.1 Example No. 1: Brief parameterization procedure for beginners

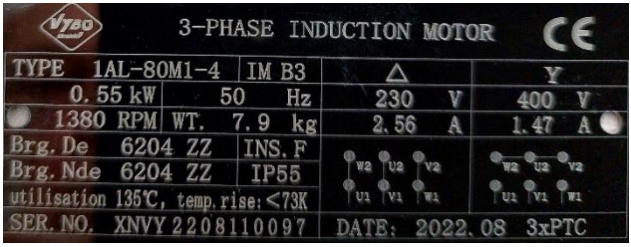
After an authorized person with qualifications according to § 21 to 24 of Decree 508/2009 Coll. connected the frequency converter A 550 Plus correctly and according to the operating instructions, enter the following basic parameters:

P209 = e.g. 400 (V; rated voltage according to the electric motor label)
P210 = e.g. 5.50 (A; rated current according to the electric motor label)
P212 = e.g. 1460 (rpm)
P213 = e.g. 4 (number of motor poles 4 = approx. 1460 rpm)
P215 = e.g. 50 (Hz; nominal frequency of the electric motor)
P107 = e.g. 15 (s; acceleration time 15 seconds)
P108 = e.g. 10 (s; 10 second deceleration time)
P109 = e.g. 400 (V; 3-phase mains voltage or 230 V with 1-phase supply)
P208 = e.g. 10 (% torque boost)

If you need to increase the output frequency of the inverter, set parameter P105.
P105 = e.g. 70 (Hz; the maximum output frequency is set to 70 Hz).

9.2 Example No. 2: Examples of parameterization A550-4T0007 and A550-2S0007

*The electric motor is connected to a 400 V star.



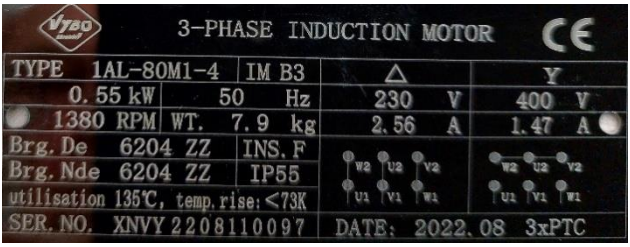
Installed inverter A550-4T0007 (input: 3x400 V/ output: 3x400 V)

P209=400(V; rated voltage according to the electric motor label)
P210=1.47(A; rated current according to the electric motor label)
P212=1380 (rpm; nominal speed of the electric motor)
P213 = 4 (number of motor poles)
P215=50(Hz; nominal frequency of the electric motor)
P107=15(s; acceleration time 15 seconds)
P108=10(s; deceleration time 10 seconds)
P109=400V

P317 = 32 (activation of PTC thermal protection of the electric motor)
P816 = 1 (electric motor overload protection enabled)
P423 = 110 (% ; value from P210=100%; Calculation: 1.47x1.1=1.61A) FM will turn off the drive when detecting an output current of 1.61 A for the time set in P424
P424 = 30 (s; the inverter will detect the current set in P423 for 30 s) FM will turn off the drive after this time of 30 s and declare an OL2 error

.

* The electric motor is connected to D 230 V.

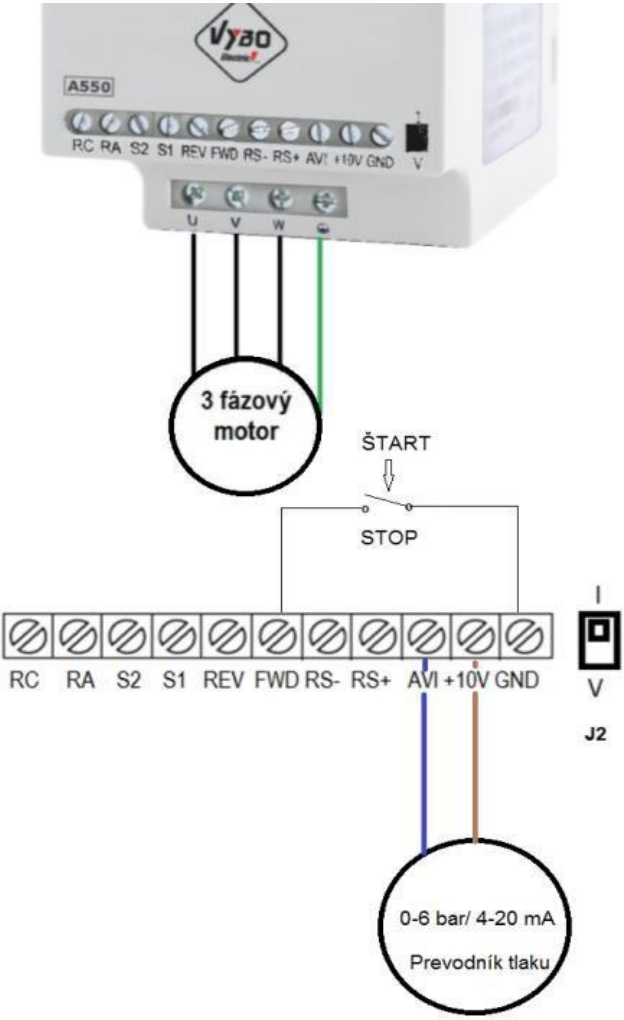


Installed frequency converter A550-2S0007 (input: 1x230 V/ output: 3x230 V)

P209=230(V; nominal voltage according to the electric motor label)
P210=2.56(A; rated current according to the electric motor label)
P212=1380 (rpm; nominal speed of the electric motor)
P213 = 4 (number of motor poles)
P215=50(Hz; nominal frequency of the electric motor)
P107=15(s; acceleration time 15 seconds)
P108=10(s; deceleration time 10 seconds)
P109=230V
P317 = 32 (activation of PTC thermal protection of the electric motor)
P816 = 1 (electric motor overload protection enabled)
P423 = 105 (% ; value from P210=100%; Calculation: 2.56x1.05=2.69 A) FM will turn off the drive when detecting an output current of 2.69 A for the time set in P424 = 60 (s; the inverter will detect the current set in P423 for 60 s) FM will turn off the drive after this time of 60 s and declare an OL2 error

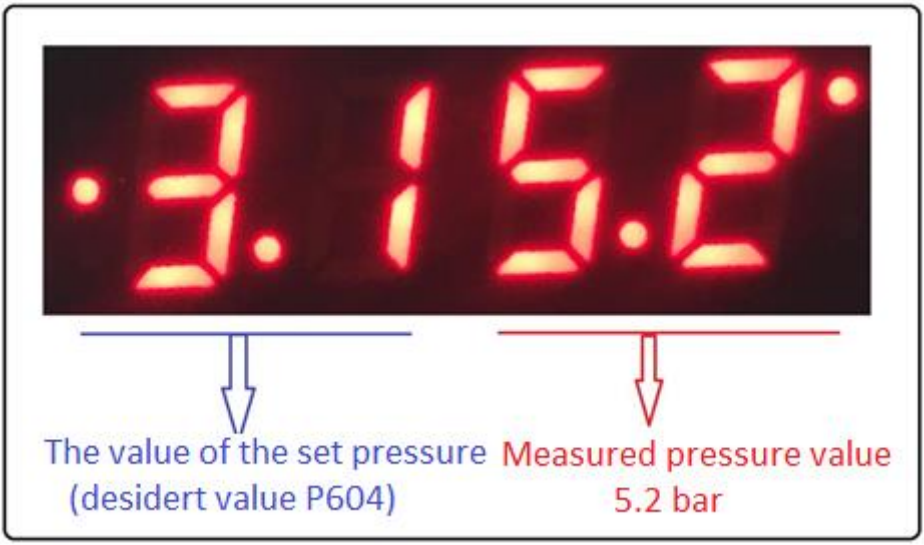
9.3 Example No. 3: Connecting the A550 PLUS inverter for controlling the pump/compressor at constant pressure

Wiring diagram



*** The wiring diagram applies only to a pressure transducer with an output of 4-20 mA**

J2	I	Current control 4 to 20 mA
P101	1	AI input frequency source selection
P102	1	Selection of I/O external terminal selection
P104	0	Selection of protection against reverse operation
P106	0	Minimum operating frequency (Hz)
P300	1	Minimum analog input current (1=4 mA)
P301	5	Maximum analog input current (5=20 mA)
P600	1	PID start enabled
P601	0	Negative feedback mode
P602	0	PID set according to P604
P603	0	PID feedback selection via AI (analog input)
P604	4	Setting the target pressure value (e.g. 4bar)
P605	10.0	PID upper alarm limit
P606	15	PID lower alarm limit
P607	100	If P606=0, then “LL” reacts after 100 seconds when there is a lack of water. Range 0-600%
P608	2.00	PID integration time
P609	0.000	PID derivative time
P610	2.00	Increasing the output value
P611	25	PID frequency at which the SLP will go into standby mode (Hz)
P612	0003	Time to detect sleep mode and put into sleep “SLP” (seconds)
P613	090.0	PID wake-up values (%)
P614	6	Pressure transducer range (e.g. 6bar) 0– 99.99
P615	4	1 - 4
P616	2	0 - 4
P617	48	PID upper frequency limit
P618	20	PID lower frequency limit
P619	0005	PID detection time
P620	000.1	PID deviation limit
P641	00.50	Dry run pressure detection value
P642	0060	Setting the time after which the LP/HP warning is reset
P643	0030.0	The time during which the device detects low pressure P606= e.g. 1.5 Applies to activation of "LP"
P644	0100	Sec applies to activation of "LL"
P652	020.0	Display SLP
P000	07	Display of pressure setting / actual pressure



When the inverter enters the "sleep" state, the display shows SLP

When the set pressure in the system exceeds the upper limit, the inverter stops operation and the display shows the message hP (high pressure)

During PID operation (constant pressure control), you can use the up arrow (button) to add the desired set pressure, and conversely, use the down arrow (button) to decrease the value of the desired pressure even during operation.

Pressure increase **Pressure reduction**

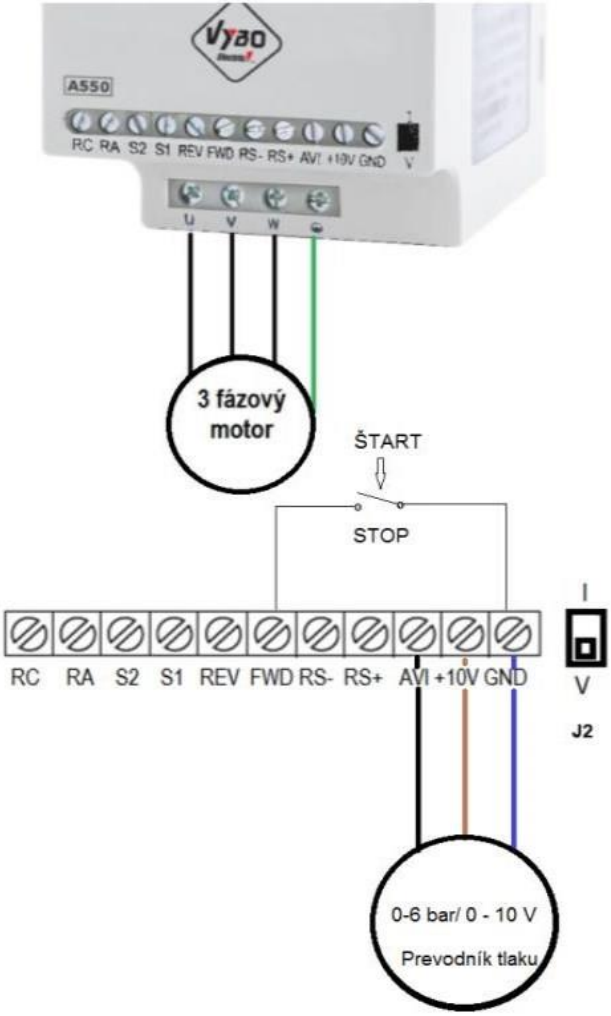
If the inverter evaluates the lack of liquid in the system (running dry), the message "LL" (low level) will appear on the display and the inverter will stop operation.

9.4 Example no. 4: Connection of the A550 PLUS inverter for controlling the pump / compressor for constant pressure (0-10 V)

J2	V	Voltage control 0 to 10
P101	1	AI input frequency source selection
P102	1	Selection of I/O external terminal selection
P104	0	Selection of protection against reverse operation
P106	0	Minimum operating frequency (Hz)
P300	0	Minimum analog input voltage (0 V)
P301	10	Maximum analog input voltage (10 V)

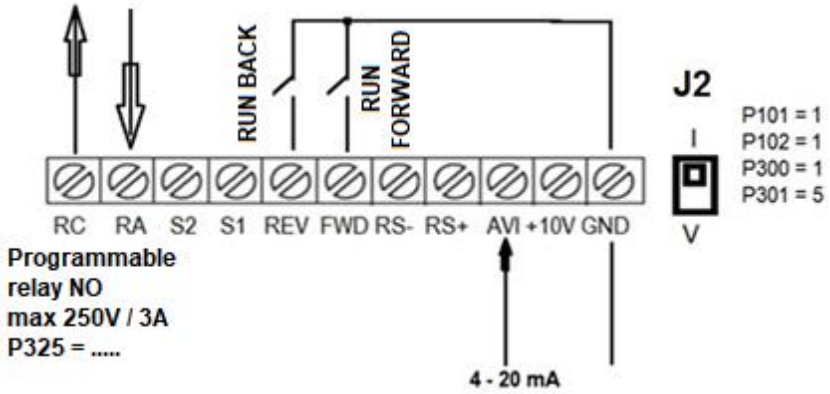
* Other parameters are set in the same way as for 4-20 mA control

Connection diagram of pressure transducer with voltage output



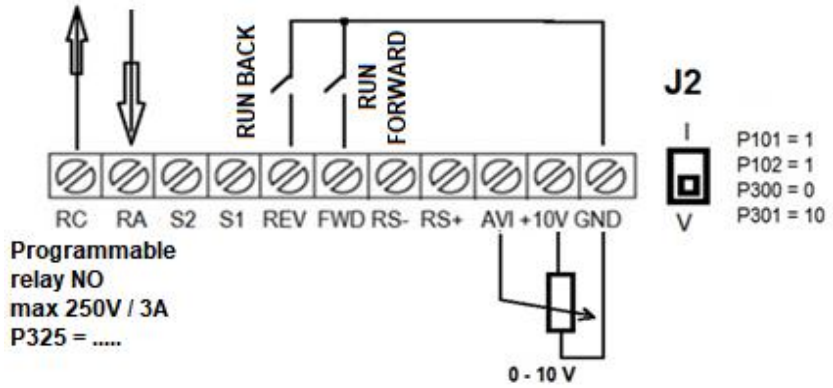
9.5 Example no. 5: External control and frequency control with a current of 4-20 mA

An example of connection of the control terminal board for controlling the frequency with a current of 4-20mA



9.6 Example No. 6: External control and frequency control with 0-10 V voltage

An example of connecting the control terminal block for frequency control with a voltage of 0-10 V

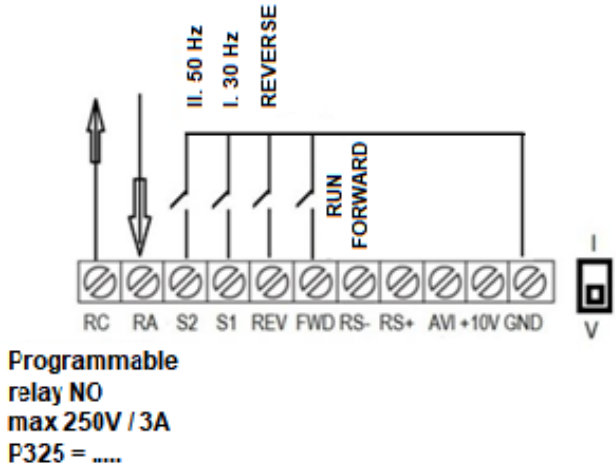


9.7 Example No. 7: Connection and parameter for driving at fixed speeds

Parameterization
P101=6
P102=1
P317=9 (1 Fixed speed) S1
P318= 10 (2 P Fixed speed) S2
P503= 30 (Hz)
P504= 50 (Hz)

If you connect FWD/GND and S1/GND ... at the same time, the inverter works at a speed of 30 Hz, if you connect FWD/GND and S2/GND..... at the same time, the inverter works at a speed of 50 Hz

Wiring diagram:

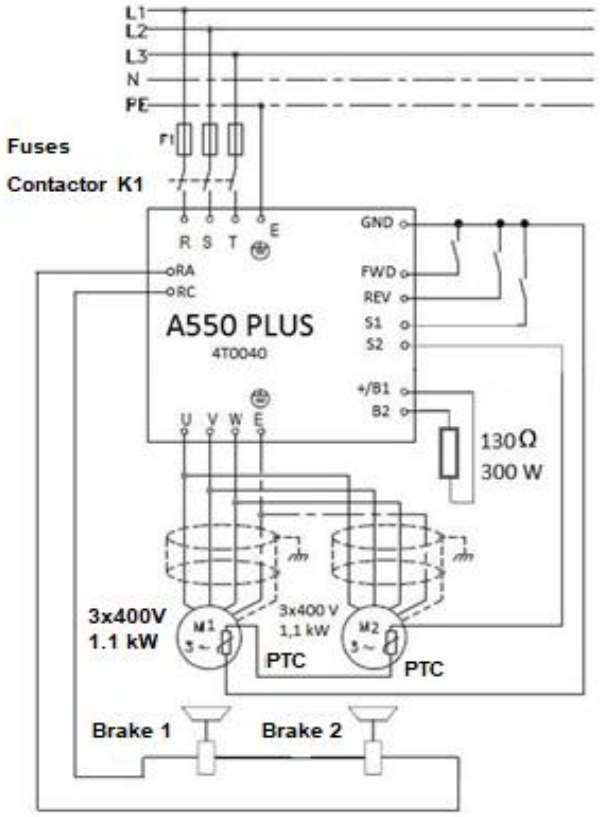


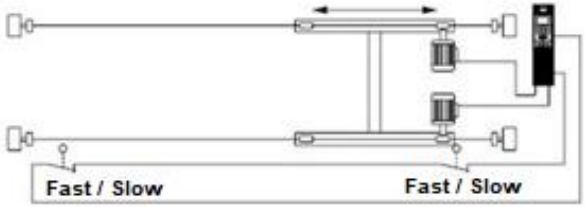
9.8 Example No. 8: Parameterization for high-frequency spindle control

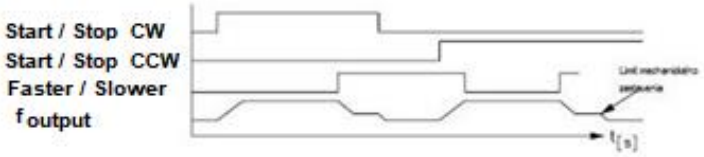
Spindle operating frequency: 200Hz
P110=200
P105=200
P112=10
P114=5

9.9 Example No. 9: Gantry crane drive control

Parameters: P101=6; P102=1; P318=32; P325=1; .....



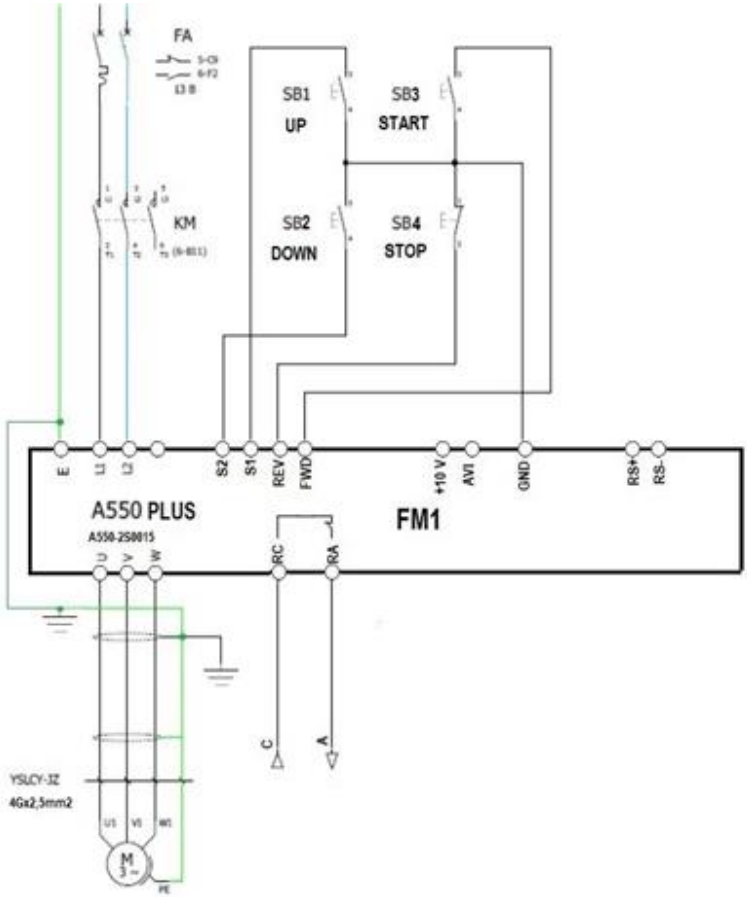




9.10 Example No.10: Parameterization of the A550 Plus and wiring for control by buttons (impulse)

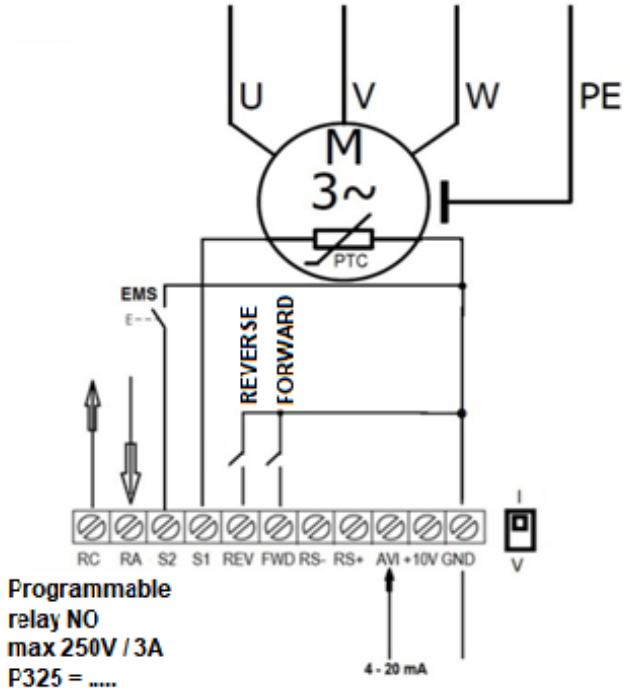
Parameterization

P101=4 (UP/DOWN frequency control)
P102=1 (commands via external terminal)
P315=6 (Forward FWD) ..... FWD input terminal
P316=8 (STOP) ..... input terminal REV
P317=15 (frequency increase signal) ..... input terminal S1
P318=16 (frequency reduction signal) ..... input terminal S2
P315=8 (FWD jumper START)
P329=2 (3-wire mode 1)



9.11 Example No.11: Connection of external control with connection of PTC protection of the electric motor and with connection of EMS (CENTRAL STOP) safety button

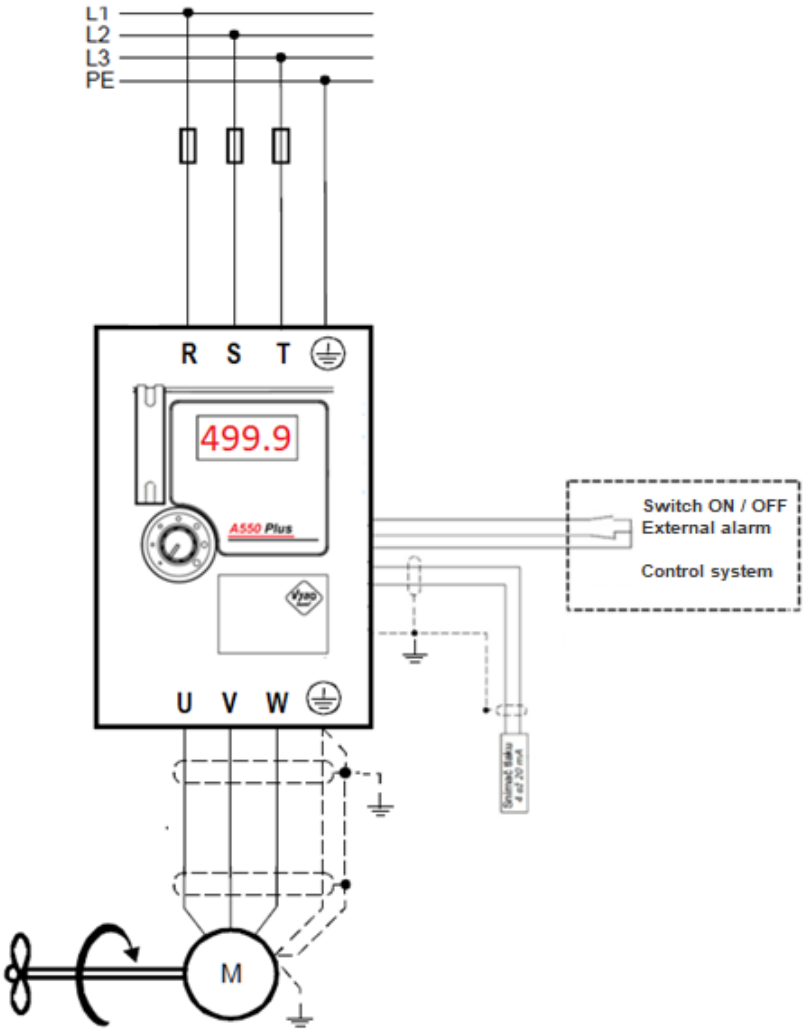
Wiring diagram



Parameterization:

P101= 1 (frequency control via AVI by analog signal; position J2 to I)
P102= 1 (external control)
P300= 1 (1= 4 mA)
P301= 5 (5 = 20 mA)
P315= 6 (Go forward) P316= 7 (Reverse)
P317= 32 (activation of PTC protection of the electric motor ... when the motor temperature is exceeded, Pt is displayed on the display, the inverter disconnects the drive)
P318= 17 (activation of EMS-emergency STOP; CENTRAL STOP when connecting S2/GND, the inverter immediately stops the drive and displays ES on the display)
P325=3 (fault message - in the event of a relay failure, the RC switches on with the RA contact)

9.12 Example No.11: Correct wiring in compliance with EMC requirements



Declaration of Conformity

VYBO Electric a.s.
Radlinského 18
05201 Spišská Nová Ves, Slovak republic

We at our own risk confirm the conformity of the following products

the frequency converters of the A 550, E 550, X 550, V 350, V 560, V 800, V810 series according to:

Machinery Directive	**2006/42 / EC**
Low Voltage Directive	**2006/95 / EC**
Directive EMS	**2004/108 / EC**
Harmonized standards used:	**EN 13849-1: 2008** **EN 61800-5-1: 2007** **EN 61800-3: 2007**

The frequency converters of the above-mentioned type series are intended for speed control of asynchronous motors with short armature and synchronous electric motors by changing the frequency and amplitude of their terminal voltage.
The frequency converters of the above-mentioned type series have been manufactured, assessed and tested in accordance with the above-mentioned harmonized standards and comply with the regulations of the Government of the Slovak Republic no. 308/2004 Coll., No. 318/2007 Coll.

The product must only be used for the purposes for which it was designed and manufactured and must be installed in accordance with the technical documentation provided.

All safety and technical parts of the product documentation (operating instructions, manual, etc.) must be observed throughout the product life cycle.

Spišská Nová Ves, February 27, 2017

The frequency converters of V 350, V 560, E 550 type series are intended for speed control of asynchronous motors with short armature and synchronous electric motors by changing the frequency and amplitude of their terminal voltage.
The frequency converters of V 350, V 560, E 550 type series have been manufactured, assessed and tested in accordance with the above-mentioned harmonized standards and meet the conditions under a Government regulation of the Slovak Republic no. 308/2004 Coll., No. 318/2007 Coll.

Ing. Babeta Vybošťoková
Vice Chairman

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WE RESERVE THE RIGHT TO TYPOGRAPHICAL ERRORS

Chapter 10: Detailed explanation of the functional parameters A 550 PLUS

10.1 P0: Monitoring parameters

Parameter	Name	Setting range	Description
P000	Selection of the main displayed data (initial value: 0; setting range 0-8)	0	Displays the set frequency
		1	Displays the output frequency of inverter
		2	Displays the output current
		3	Displays the motor speed
		4	Displays the voltage of the DC bus
		5	Displays the output voltage of the inverter
		6	Inverter module temperature (only models above 7.5
		7	Displays the value of the PID feedback signal
		8	Displays the PID setting

For example, if you want to monitor the speed through the control panel, the user can set the parameter P000 to 3. The initial value P000 is 0, so if the inverter is not changed, the A 550 PLUS will display the set frequency.
The user can set the initial display of the inverter via parameter P000.

P001	Displays the set frequency

Use this parameter to track the set frequency of the inverter.

P002	Displays the output frequency

You can monitor the current output frequency of the inverter using parameter P002

P003	Displays the output current

You can monitor the current output current using parameter P003.

P004	Displays the motor speed

You can monitor the actual engine speed by using parameter P004

P005	Displays the voltage of the DC bus

You can monitor the actual DC bus voltage by parameter P005.

P006	Inverter module temperature (only models above 7.5 kW)

You can monitor the current temperature of the inverter using parameter P006, which will help you assess the operating status of the inverter. This feature is available for models 4T0075 and above.

P007	Displays the set PID feedback value
P008	Displays the cumulative time in operation
P009	Displays the average value of the inverter's output AC voltage

In other parameters, you can check the conditions of the last three faults by examining P010 to P012. These 3 parameters can help the user to judge the operation status of the inverter and find the cause of the malfunction and eliminate the hidden problems.

P010	Displays the first fault (fault code: 0 to 31)
P011	Displays the second fault (fault code: 0 to 31)
P012	Displays the third fault (fault code: 0 to 31)
P013	Reserved
P014	Records the set frequency at the last alarm (fault)
P015 to P018	The parameters show the detailed status when the last error occurred. You can check the current frequency setting, the current output frequency, the actual output voltage and the DC voltage of the main circuit in the inverter.

Based on the above data, you can analyze the cause of the fault and quickly find a solution that will help maintenance personnel repair.

The inverter series A 550 PLUS shows the frequency setting on the display after switching on. If the frequency is set, e.g. 25.6 Hz, the inverter will display F25.6 (means: Frequency 25.60 Hz)

Other data can be viewed by pressing the button as shown in the following table.

Parameters P019 and P020 are reserve. Parameters P021 to P028 are described in detail in chapter 7.1 Parameters-table

10.2 P1: Basic parameters

P100	Digital frequency setting (initial value: 0.00Hz)			
	Setting range	0.00-Max. frequency (P105)	unit	0.01

When P101 is set to 0, the inverter works in digital frequency setting mode. The frequency value is set using P100.
During operation, you can change the frequency by adjusting the P100 parameter or by pressing the button "↑" or "↓" to change the frequency. If you change the frequency by modifying the P100, when the inverter is in STOP or is OFF, the edited content may be remembered.
If you change the frequency by pressing the button "↑" or "↓", when the inverter is in STOP or is OFF, the edited content will not be remembered (if P812=0); the original P100 content will be remembered. After starting the inverter, it will work at the original P100 value.

P101	Choice of frequency setting X A 550 PLUS		Initial value: 3	
	Range of setting	0-9	Unit	1
A 550 PLUS	Explanation	0: Digital setting with the UP / DOWN buttons, (resets to zero after switching off if P812=0) 1: AVI (FIV/FIC analogue 0-10 V or 4-20 mA) 2: Potentiometer on the external panel 3: Potentiometer on the panel 4: UP / DOWN external frequency setting 5: RS485 frequency setting via communication 6: Fixed speed (fixed frequencies) 7: Frequency setting via PLC 8: Frequency setting via PID 9: Reserve		

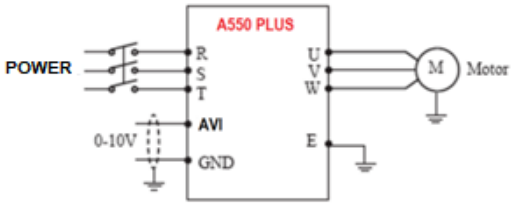
The frequency setting option can be used to determine the output frequency of the inverter.

0: Digital frequency adjustment

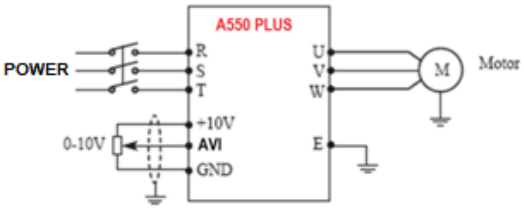
The output frequency of the inverter controls the parameter P100. In general, you can change the output frequency by pressing the button "↑" or "↓" on keyboard. See the P100 parameter for more information.

1: FIC (0—10 V DC or 4 – 20 mA DC) according to the position of J2

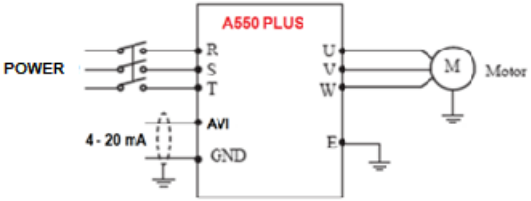
The output frequency of the inverter is controlled by an external voltage signal (0-10 V), which is fed to the inverter through the AVI terminal or a current signal of 4-20 mA.
There are two voltage signal modes: one is an external signal supply in the range of 0 to 10 V two-wire; the other is set by a potentiometer - its own voltage signal that the inverter generates from the +10 V terminal. See the following connection diagram.



Explanation: the output frequency is controlled via the AVI terminal (0-10V).



Explanation: the control output frequency of the inverter is controlled using the AVI voltage signal from an external POT (eg 10 kΩ). Position J2 = V

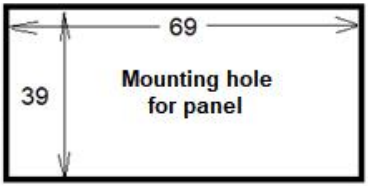


The output frequency of the inverter is controlled by an external current signal (4-20 mA), which is fed to the inverter through the AVI terminal (position J2 = I).

2: Potentiometer on the external panel

You can control the frequency setting of the A 550 PLUS inverters using the POT rotary knob on the external panel, which is structurally identical to the main panel.

Potentiometer POT
on the external panel



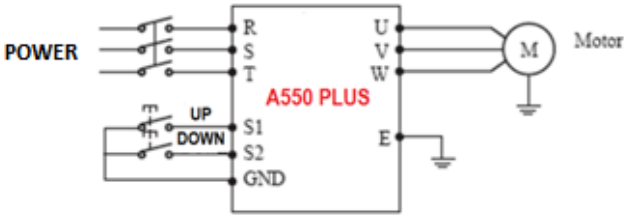
Connected external control panel

3: Set up via control panel (main panel)

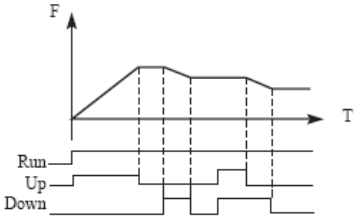
Turn the POT knob on the panel to change the output frequency

4: Frequency adjustment via UP/DOWN (external terminals)

The output frequency of the inverter is controlled by external UP / DOWN terminals. External terminals can be selected by P315 to P322, one of the external terminals is selected as UP / DOWN. When UP is active, the frequency increases. If DOWN is active, the frequency will decrease. When both UP and DOWN inputs are active, the frequency remains the same.



Example: P317 = 15, terminal S1 will be set in UP mode.
P318 = 16, terminal S2 will be set in DOWN mode.



Explanation: If UP is active (UP is closed), the frequency will increase. If DOWN is active (DOWN is closed), the frequency will decrease.

5: Frequency setting via RS 485 communication.
In this mode, we control the frequency through MODBUS serial communication. You can find a more detailed description in chapter 7.0 and in the special appendix MODBUS Communication.

6: Setting fixed frequencies (fixed speeds).
The A 550 PLUS inverter allows us to set 4 fixed speeds. The control of fixed speeds is handled via the terminal (i.e. external control). It is enough to reconfigure the parameters of the FWD, REV, S1 and S2 terminals.

7: Frequency setting via own PLC
The inverter is equipped with a built-in simple PLC that you can configure in the parameters of chapter 5.0.

8: Setting the frequency via PID
The inverter is also equipped with PID regulation. Setting is possible using the parameters of chapter 6.0.

9: Reserve

P102	Select the startup method		Initial value: 0	
	Range of setting	0-2	Unit	1
	Explanation	0: Via the control panel FWD/REW/STOP 1: I/O terminal (multifunction terminal) 2: RS485 communication		

Start signal selection is used to set the signal source.

0: Control panel - main (FWD / REV / STOP)
The selected parameter is displayed on the control panel. The control of the inverter can be controlled by the button Press the button for START. Press the button to STOP inverter operation.

1: I/O terminal
In the initial setup, the forward and reverse rotation signals are used as the start and stop signals. Turn on either of the forward and reverse rotation directions to start the motor in the appropriate direction. If both are off (or on) during operation, the inverter decelerates to a stop (or maintains the original operating state). You can use the two-wire or three-wire control mode using the I/O terminal.

2: RS485 communication mode
The inverter can receive control and data from the computer via MODBUS RTU serial communication.

P 103 ...Reserve

P104	Choice of reversing protection		Initial value: 1	
	Range of setting	0-1	Unit	1
	Explanation	0: Reverse run disabled 1: Reverse run enabled		

Many devices only allow rotation in one direction. In this case, you can set this parameter in one-way rotation mode.
0: Reverse run disabled
Reverse run of the motor is disabled. If P104 is set to Reverse, the switch between Forward and Reverse is disabled.
1: Reverse run enabled
The reverse run of the motor is enabled; the forward and reverse switching is active.

P105	Maximum generated frequency	Initial value: 50
	Range of setting	Adjustable from 50.0 to 999.9 Hz

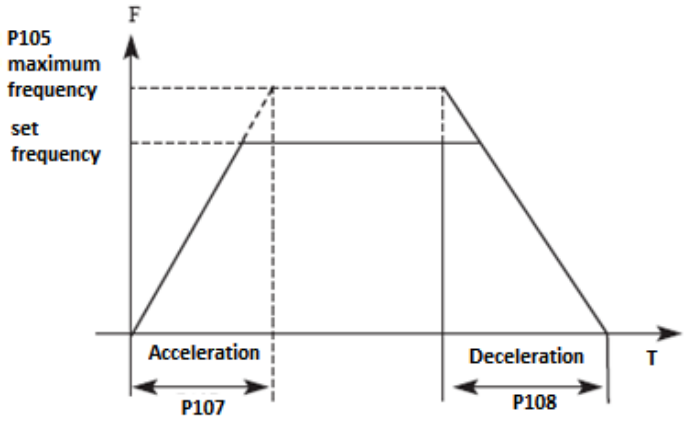
The output frequency range of the inverter is 0.1 – 999.9 Hz. Therefore, the inverter can drive the motor above 50/60 Hz, which can cause mechanical damage or accident.
This parameter limits the output frequency of the inverter to prevent the engine from running at higher speeds.

P106	Minimum frequency	Initial value: 0
	Range of setting	0.0 Hz - maximum frequency

This parameter sets the minimum output frequency of the inverter. If the set frequency is lower than the minimum frequency of the inverter, it will run at min. frequency. In some applications, this feature could prevent overheating of the motor due to low speed operation.

P107	Acceleration time	Initial value: 0
P108	Deceleration time	Initial value: 0
	Range of setting	0.1 – 6000 s

Acceleration time means the time at which the inverter reaches a maximum frequency of 0.00 Hz. The deceleration time refers to the time when the frequency of the inverter is reduced to 0.00 Hz from the maximum frequency.

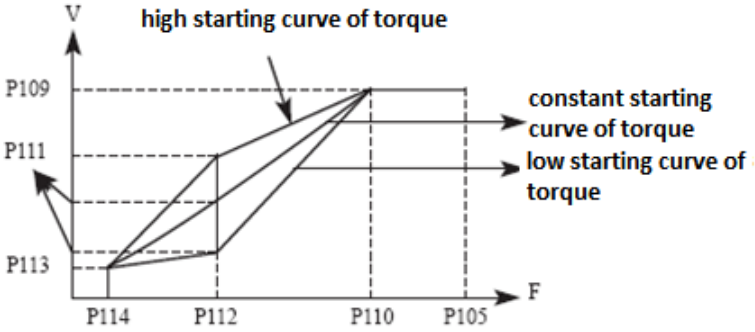


The preset deceleration / acceleration value is the primary time. Another deceleration / acceleration time can be selected by an external terminal.

P109	V/F maximum voltage		Initial value: 380 (4T), 220 (2S)	
	Range of setting	V/F middle voltage to 500.0 V	Unit	0.01
P110	V/F basic frequency		Initial value: 50	
	Range of setting	V/F middle frequency to max. frequency	Unit	0.01
P111	V/F middle voltage		Initial value: change	
	Range of setting	V/F min. voltage to V/F max. voltage	Unit	0.1
P112	V/F middle frequency		Initial value: 2.5	
	Range of setting	V/F minimum frequency to V/F basic frequency	Unit	0.01
P113	V/F minimum voltage		Initial value: 15	
	Range of setting	0 to V/F middle voltage	Unit	0.1
P114	V/F minimum frequency		Initial value: 1.2	
	Range of setting	0 to V/F middle frequency	Unit	0.01

Parameters from P109 to P114 determine the V / F curve of the inverter.

Set the corresponding V / F curves according to different loads.
Constant torque curve: application for constant torque load, output voltage and output frequency are in linear relation.
Bottom (variable) torque curve: application for variable torque load, such as fan and pump. The load increases with increasing speed.
Torque curve with high start: application for high load and load, which requires a high starting torque.



P109: The maximum V / F voltage
It is set according to the connected motor. Generally, it is set to the rated motor voltage. When the motor is near the inverter, usually up to 30 meters, it should be set to a higher value.

P110: Basic V / F frequency
Set the base frequency V / F to the motor operating frequency. In general, do not change the base frequency V / F because it is very likely that you will damage the engine.

P111: V/F middle voltage
Set the middle V / F voltage to the specific load. Incorrect setting can cause excessive motor current or insufficient torque or even cause protection of the inverter. An increase in P111 may increase the output torque and output current. Monitor the output current when changing the P111 value. When changing P111, set the value slowly until the required output torque is reached. Too high setting can cause the inverter to protect or malfunction.

P112: V/F middle frequency
The middle V / F frequency determines the midpoint of the V / F curve. Incorrect setting can cause insufficient torque or excessive protection for the inverter. In general, do not change this parameter during use.

P113: V/F minimum voltage
Setting the minimum V / F voltage is relevant for torque start. Correctly increasing the value of this parameter may increase the torque at startup, may also cause excessive current. In general, there is no need to change P113.

P114: V/F minimum frequency
The minimum V / F frequency determines the starting point of the V / F curve, this is the minimum value in the V / F curve.

See the following table for each model's specific default setting:

Parameter / Model	P107	P108	P111	P115
A 550-2S0007 PLUS	8	8	14	10
A 550-2S0015 PLUS	9	9	14	9
A 550-4T0007 PLUS	8	8	27	5
A 550-4T0015 PLUS	9	9	26	5
A 550-4T0022 PLUS	10	10	25	5

P115	Carrier frequency		Factory setting
	Range of setting	1.0 - 15.0 kHz	By model

The carrier frequency determines the frequency of switching on the internal power module. The factory setting of inverters with different capacity is different because it affects motor noise, motor heating and malfunctions.

Carrier frequency 1 to 15 kHz	Motor noise 1 to 15 kHz	Motor heating 1 to 15 kHz	Interference 1 to 15 kHz
low -> high	high -> low	low -> high	low -> more

Therefore, if the environment requires noise free operation, increase the P115 value, the maximum load on the inverter will be reduced. If the motor is far away from the inverter, reduce the value of P115 to reduce the lead current between the wires and the conductor to the ground. If the ambient temperature or motor load is high, reduce the value of P115 to reduce the heating of the inverter. See table in P114 for factory setting parameter P115.

P117	Parameters reset		Initial value: 0	
	Range of setting	0-8	Unit	1
	Explanation	**8: initialization of the factory setting**		

If parameter setting is incorrect or when incorrect operation results in an incorrect parameter setting, you can set P117 to 08 to reset all parameters to factory settings and then re-set them to suit your current needs.
Warning: When parameters are locked, thus P118 = 1, you cannot initialize the parameters and change them. Change P118 first and then set these parameters.

P118	Lock the parameters		Initial value : 0	
	Range of setting	0-1	Unit	1
	Explanation	0: Unlocking the parameters 1: Locking the parameters		

0: Parameters are unlocked
1: Parameters are locked

You can lock the parameter using the P118 function to avoid an unexpected change in the inverter setting. When parameter P118=1, no other parameters than P100 (main frequency setting) can be change.

P119	Direction of rotation	0: Forward 1: In the opposite direction	0

P120	Selection of Y source frequency	0: Digital setting with UP / DOWN buttons (after switching off, it is reset if P812=0) 1: AVI (FIV/FIC analogue 0-10 V or 4-20 mA) 2: By potentiometer on the external keyboard 3: By potentiometer on the keyboard 4: UP / DOWN external frequency setting 5: RS485 frequency setting via communication 6: Fixed speed (fixed frequencies) 7: Frequency setting via PLC 8: Frequency setting via PID 9: Reserve	0

In this parameter, you can choose the Y auxiliary frequency source.

P121	Selection of source frequency	**....X:** (frequency source) 0: Main frequency source 1: X and Y operations (operating mode determined by tens) 2: Switching between X and Y 3: Switching between X and "X and Y" 4: Switching between Y and "X and Y" **..X.:** (X and Y operation) 0: X+Y 1: X-Y 2: Maximum X and Y 3: Minimum X a Y	0

Parameter P121 allows you to select frequency sources and their interaction.

P122	Selection of Y frequency auxiliary	0: Considering the maximum frequency 1: Given the source frequency X	0

P123	Range of frequency auxiliary source Y	0 up to 150 %	100 %

P124	Frequency shift of the auxiliary frequency source for X and Y operations	0.00 Hz up to max. frequency P105	0.0 Hz

P125	Basic frequency of UP / DOWN adjustments during operation	0: Running frequency 1: Set frequency	1

P126	Upper cut-off frequency (upper output limit)	Lower frequency limit P106 to maximum frequency (P105)	50.0 Hz

P127	Base frequency during acceleration and deceleration	0: maximum frequency 1: Set frequency 2: 100 Hz	0

10.3 P2: Electric motor parameters and DC braking

P200	Select the start-up mode		Initial value: 0	
	Range of setting	0	Unit	1
	Explanation	0: Normal start 1: Reserve		

0: Normal start

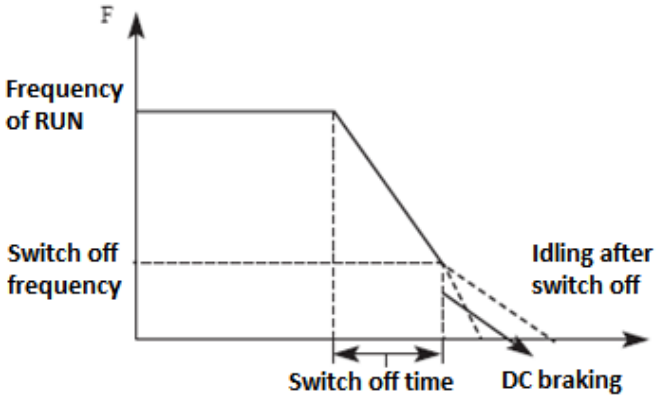
Most types of load do not have special requirements at start. The output of the inverter is the start frequency.

P201	Selection of the stop mode		Initial value: 0	
	Range of setting	0 - 1	Unit	1
	Explanation	0: Deceleration up to stop according to curve 1: Coasting up to stop		

You can choose the appropriate stop mode according to the actual load.

0: Deceleration up to stop according to curve

Upon receipt of the stop command, the inverter reduces the output frequency by the deceleration time.

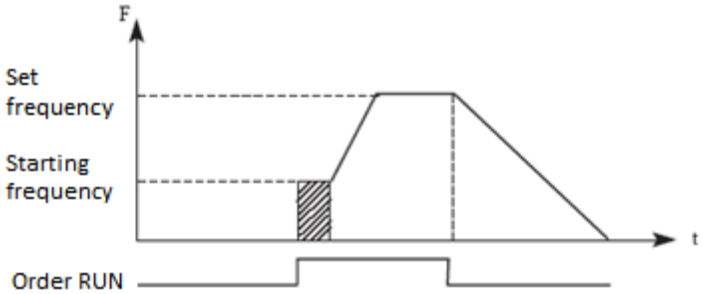


With regard to stop mode after reaching stop frequency, you can select the DC brake and other options. If you do not select DC braking, the engine will automatically stop in the idle mode.

1: Coasting up to stop

When the inverter receives a stop command, it stops the frequency output and the motor stops automatically.

P202	Starting frequency		Initial value: 0.5	
	Range of setting	0.10 - 50.00 Hz	Unit	0.01



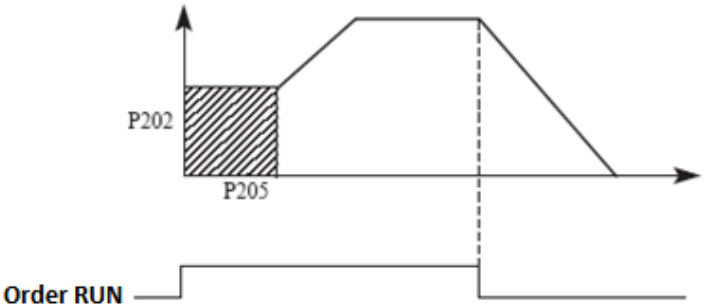
The starting frequency is the initial frequency at the start of the inverter. For equipment with a heavy load or requiring a large starting torque, the starting frequency is increased. However, if the starting frequency is too high, it may cause the overload protection to activate.

P203	Frequency at stop		Initial value : 0.5	
	Range of setting	0.10 - 50.00 Hz	Unit	0.01 Hz

If the inverter receives a stop command, reduces the output frequency to the stop frequency, then starts the self-stop or DC braking mode according to the setting.

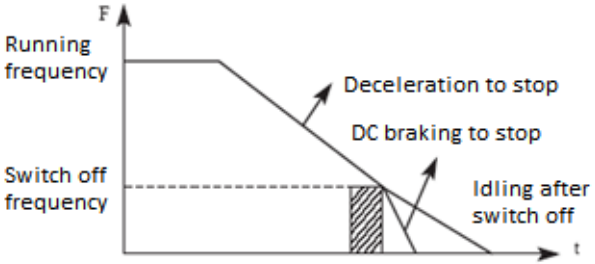
P204	Voltage at which DC braking is initiated (Start braking)		Initial value: 0.0	
	Range of setting	0 – 10.0% of the rated voltage of the motor	Unit	0.1
P205	DC braking start operating time		Initial value: 0.0	
	Range of setting	0 – 100.0 s	Unit	0.1

DC braking at start is an application suitable for e.g. for the fan, in stop mode or with variable load.
Because the motor is in the idling mode before the inverter starts, and the direction of rotation is unknown, it is easy to cause overload protection at the start. Therefore, you should use the DC brake in advance to stop the motor before starting.
DC braking current at start is a relative part of the rated current of the inverter. The P204 setting may have different braking torques. When setting the parameter value, you can set the low to high value until sufficient braking torque is obtained according to the current load. The DC braking time is the duration of DC braking. If the setting is 0, the DC brake is inactive.



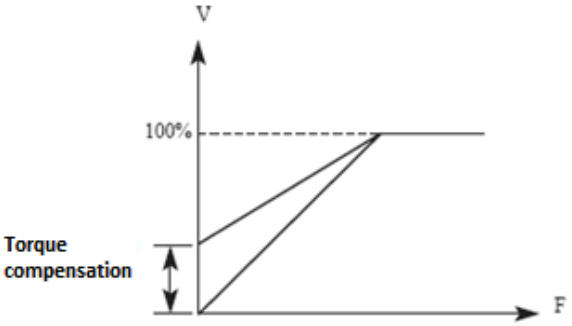
P206	Voltage at which DC braking ends (Stop Braking)		Initial value: 0.0	
	Range of setting	0.1 to 10.0 % rated voltage of the motor.	Unit	1
P207	DC braking end operation time		Initial value: 0.0	
	Range of setting	0 to 100.0 sec	Unit	1

DC braking in STOP mode is suitable for a load that has a braking request. DC braking current in STOP mode is a relative part of the rated current of the inverter. Setting this parameter can cause different braking torques.
The DC braking time in the STOP mode is the duration of the DC braking mode. If the setting is 0, the DC brake is inactive. See the explanations P203, P204 and P205 for details.



P208	**Torque boost**		Initial value: 4.0 %	
	Range of setting	0.0 to 30.0 %	Unit	0.1

Setting the P208 parameter can increase the voltage and achieve a higher torque.
Warning: too high value may cause engine overheating. Increase the value step by step until you reach the required starting torque.



P209	Rated motor voltage		Initial value : 380 V	
	Range of setting	0 - 500.00 V According to the motor nameplate	Unit	0.01
P210	Rated motor current		Initial value : rated	
	Range of setting	According to the motor nameplate	Unit	0.1
P211	Rated motor current without load		Initial value : 50 %	
	Range of setting	0 - 100 %	Unit	1
P212	Rated motor speed		Initial value : 1460	
	Range of setting	0 - 6000 rpm	Unit	1
P213	Number of motor poles		Initial value : 4	
	Range of setting	0 - 20	Unit	1
P214	Rated motor slip		Initial value : 2.5	
	Range of setting	0 to 10.0 %	Unit	0.1

Set the above parameters according to the motor label.

P209: Rated motor voltage
Set the rated motor voltage according to the voltage value on the motor nameplate.

P210: Rated motor current
Set the rated motor current according to the current value on the nameplate. If the current exceeds the rated current value, the inverter switches off to protect the motor.

P211: Rated motor current without load
The rated current of the motor may affect the slip compensation. Rated motor current without load is the percentage of motor current.

P212: Rated motor speed
The value of parameter P112 is the rotation speed at 50 Hz. It refers to the displayed speeds. In general, it is set according to the value on the nameplate.

P213: Number of motor poles
Set the number of pole pairs of the motor by adjusting this parameter according to the value on the rating plate.

P214: Rated motor slip

If we increase the load when driving the motor with the inverter, the engine may slip. The P214 setting can compensate for slipping and the engine speed approaches the desired speed.

P215	Rated frequency of the motor		Initial value : 50 Hz	
	Range of setting	0.00 – 999.9 Hz according to the motor nameplate	Unit	0.01
P216	Resistance of stator		Initial value : -	
	Range of setting	0-100.0 Ω	Unit	0.1
P217	Resistance of rotor		Initial value : -	
	Range of setting	0-100.0 Ω	Unit	0.1
P218	Own rotor induction		Initial value : -	
	Range of setting	0-100.0 mH	Unit	0.01
P219	Mutual rotor induction		Initial value : -	
	Range of setting	0-100.0 mH	Unit	0.01

10.4 P3: I/O parameters (Input/Output)

P300	AVI minimum input value		Initial value : 0.0 V	
	Control 0-10 V	0 = 0 V	Unit	0.1
	Control 4-20 mA	4 mA = 1 V	Unit	0.1
P301	AVI maximum input value		Initial value : 10 V	
	Control 0-10 V	10 = 10 V	Unit	0.1
	Control 4-20 mA	20 mA = 5 V	Unit	0.1
P302	AVI input filter time		Initial value : 0.1 s	
	Range of setting	0-1.0 s	Unit	1

P300: AVI minimum input value
The input value of the minimum AVI voltage is related to the equivalent frequency of the analogue inputs. A command with a voltage below this value is considered an invalid command.

P301: AVI maximum input value
The input value of the maximum AVI voltage is related to the analogue input frequency. At a voltage higher than this value, the device will still work only at this value. P300 and P301 determine the range of input voltage and current.

P302: AVI input filter time
The input filter time value determines the speed of the inverter's response to an analogue change. With an increase in P302, the inverter will respond to the analogue change more slowly.
P303 to P309 ... Reserved

P310	Minimum limited frequency of analogue setting	Initial value : 0.00

	Range of setting	0 – 999.8 Hz	Unit	0.01
P311	Direction at minimum analogue input		Initial value: 0	
	Range of setting	0 - 1	Unit	1
	Explanation	0: Forward direction 1: Reverse direction		
P312	Maximum limited frequency in analogue setting		Initial value: 50	
	Range of setting	0 – 999.8 Hz	Unit	0.01
P313	Direction at maximum analogue input		Initial value : 0	
	Range of setting	0 - 1	Unit	1
	Explanation	0: Forward direction 1: Reverse direction		

Parameter Group P310-P313 controls analogue signals including output frequency and direction. Depending on the actual needs of the user, they can create various control curves.

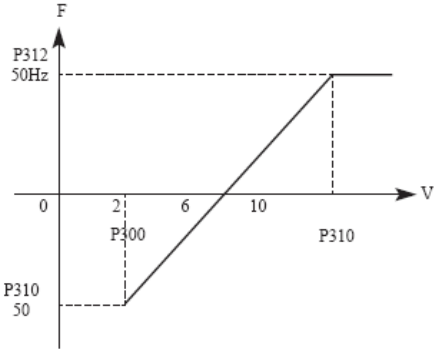
P310: Frequency at minimum analogue input
The frequency of the smaller analogue determines the output frequency of the smallest analogue input corresponding to the input of the analogue minimum voltage (current).

P311: Direction at minimum analogue input
The direction of the smaller analogue determines the operating condition at low frequency, whether forward or backward.

P312: Frequency at maximum analogue input
The high analogue frequency determines the higher output frequency and corresponds to the input of the analogue maximum voltage (current).

P313: Direction at maximum analogue input
The analogue direction determines whether the high-frequency state is forward or backward.

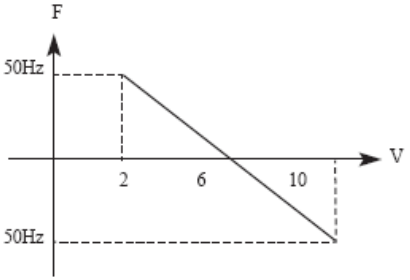
Example 1: Upper output PC 2-10 V signal for inverter control, 50 Hz reverse 50 Hz forward.



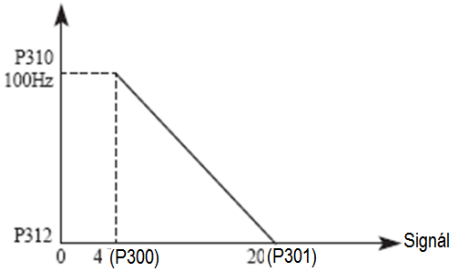
P300 = 2, minimum voltage input FIV: 2V (the inverter considers signals below 2 V for invalid signals);
P301 = 10, maximum voltage input FIV: 10V (signals above 10 V are considered as 10 V);

P310 = 50, analogue lower frequency: 50 Hz;
P311 = 1, lower level analogue direction: 1 (reverse run);
P312 = 50, analogue high frequency: 50 Hz;
P313 = 0, analogue high-level direction: 0 (forward);

Note: in the different curves, the forward and reverse switching commands remain effective when switching back and forth the curve will be inverted and the curve diagram is as follows:



Example: Switch J2 = I (current input)
Output from the control PC is 4 - 20 mA and the inverter has a set output frequency: 100 Hz – 0 Hz



Parameters:
P300 = 1, (FIC minimum input current)
P301 = 5, (FIC maximum input current)
P310 = 100.0, frequency at minimum analogue input
P311 = 0, direction at minimum analogue input (run forward)
P312 = 0.0, frequency at maximum analogue input

A special inverted curve can be created using the P310-P313 parameters.
Note: an input signal below 4mA is considered an invalid signal.
P314 .... Reserved

P315	Multifunctional input terminal—FWD terminal	Preset 6

P316	Multifunctional input terminal—REV terminal	Preset 7
P317	Multifunctional input terminal—S1 terminal	Preset 18
P318	Multifunctional input terminal—S2 terminal	Preset 9
P319	Models above 45 kW —S3 terminal	Preset 0
P320	Models above 45 kW —S4 terminal	Preset 0
P321	Reserved—S5 terminal	Preset 0
P322	Reserved —S6 terminal	Preset 0
P323 - P324	Reserved	Unit 1

P315 to P322	Setting	0: Invalid 1: JOG 2: JOG forward 3: JOG reverse 4: Forward FWD / Reverse REV 5: RUN 6: Forward FWD 7: Reverse REV 8: STOP 9: Fixed speed 1 10: Fixed speed 2 11: Fixed speed 3 12: Fixed speed 4 13: Acceleration / deceleration, terminal 1 14: Acceleration / deceleration, terminal 2 15: Signal increasing frequency (UP) 16: Signal decreasing frequency (DOWN) 17: EMS emergency stop signal (STOP) 18: Signal for inverter RESET 19: PID running 20: PLC running 21: Start signal for timer 1 22: Start signal for timer 2 23: Counter pulse signal 24: RESET counter 25: Break in progress (Pause) 26: Switching the frequency channel between X and Y 27 to 31: Reserved 32: PTC protection of the electric motor 33 to 59: Reserved

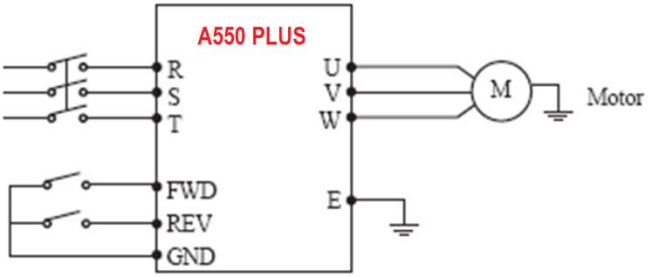
0: Invalid - no function

1: JOG (typing) this parameter sets the JOG, usually used in test operation, belt loading, etc. Normal operation is 5 Hz.

2: JOG forward. Sets the JOG forward.

3: JOG backward. Sets JOG backward.

4: Forward FWD / REV Backward. Sets forward / reverse switching, if the terminal is defined as active, the running direction is REV - backward. If it is inactive, the drive direction remains FWD - forward.



Parameters: P102 = 1, P315 = 6, P316 = 4

Terminal status		Conditions of operation
FWD	REV	
ON	OFF	Forward
ON	ON	Back
OFF	OFF	Stop

5: In operation - Sets the terminal as a signal for RUN operation.

6: Forward - If the terminal is active, the motor runs forward - FWD.

7: Reverse - If the terminal is active, the operation is reverse - REV.

8: Stop - If the terminal is active, the motor will stop - STOP.

9: Fixed speed 1

10: Fixed speed 2

11: Fixed speed 3

12: Fixed speed 4

The system allows you to select 15 speeds by combining parameters P503 to P517, in 4 steps.

Multi-speed terminal block				Status and explanation
Fixed speed 1	Fixed speed 2	Fixed speed 3	Fixed speed 4	

0	0	0	0	The primary frequency is given by P100 or a potentiometer
1	0	0	0	Multi-speed 1 (P503)
0	1	0	0	Multi-speed 2 (P504)
0	0	1	0	Multi-speed 3(P505)
0	0	0	1	Multi-speed 4 (P506)
1	1	0	0	Multi-speed 5 (P507)
1	0	1	0	Multi-speed 6 (P508)
1	0	0	1	Multi-speed 7 (P509)
0	1	1	0	Multi-speed 8 (P510)
0	1	0	1	Multi-speed 9 (P511)
0	0	1	1	Multi-speed 10 (P512)
1	1	1	0	Multi-speed 11 (P513)
1	1	0	1	Multi-speed 12 (P514)
1	0	1	1	Multi-speed 13 (P515)
0	1	1	1	Multi-speed 14 (P516)
1	1	1	1	Multi-speed 15 (P517)

Notes:
0 = terminal invalid
1 = terminal valid
13: Acceleration / Deceleration 1
14: Acceleration / Deceleration 2

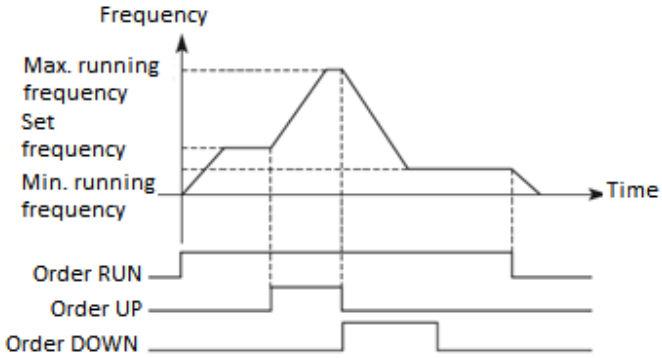
4 types of acceleration/deceleration times can be selected for terminals 1 and 2.

Multifunctional terminal		Status and result of deceleration/acceleration
Selection of acceleration / deceleration 1	Selection of acceleration / deceleration 2	
0	0	Acceleration / deceleration time 1 (P107, P108)
1	0	Acceleration / deceleration time 2 (P401, P402)
0	1	Acceleration / deceleration time 3 (P403, P404)
1	1	Acceleration / deceleration time 4 (P405, P406)

15: Signal increasing the frequency (ascending signal UP) When this terminal is active, the frequency increases at a constant rate until the desired frequency is reached.

16: Signal decreasing the frequency (down signal DOWN) When this terminal is active, the frequency is reduced at a constant rate until the lowest operating frequency is reached.

Warning: the inverter will not remember the frequency setting changed by "UP" and "DOWN" signal. After power off and reset again, the inverter still remembers parameter P100 unless you change parameter P812 = 1



17: STOP emergency stop signal - EMS stop.

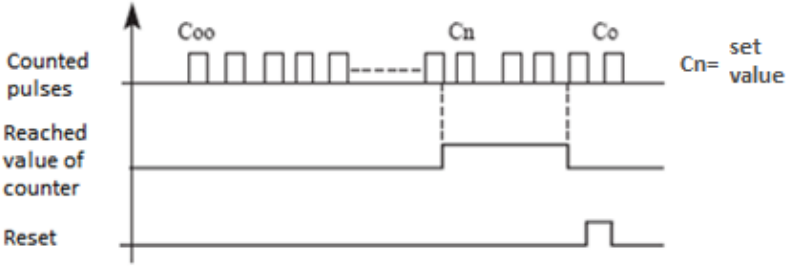
18: RESET fault In the event of an alarm, the inverter resets, this function of the terminal is the same as the function of the RESET button on the panel.

19: Enable PID function. When the terminal is active, the PID function is activated.

20: Enable the PLC function. When this contact is closed, the PLC function starts.

21: Timer 1 starts
22: Timer 2 starts
When this contact is on, the timer will start and time will be measured when the timer reaches the set value, the corresponding action of the multifunction output is performed.

23: Pulse counter input - This terminal can receive pulse signals with a maximum frequency of 250 Hz.



24: Reset the counter. The counter will be reset.

25: Break in progress. If the terminal with this parameter is active, the inverter takes a break in operation - PAUSE.

26: Switching the frequency channel between X and Y. If the terminal is activated, the frequency input channel is switched to Y.

27 to 31: Reserved

32: If the electric motor is equipped with PTC thermal protection, set parameter P317=32 and the PTC terminals, e.g. to terminals S1 / GND.

33 to 59: Reserved

P325	Output terminal of programmable relay RA / RC (0-32) A 550 PLUS		Initial value: 03	
	Range of setting	0-32	Unit	1

Setting P325	0: Invalid 1: RUN 2: Frequency reached 3: Alarm (error) 4: Zero speed (if STOP) 5: Frequency 1 was reached 6: Frequency 2 was reached 7: Acceleration 8: Deceleration 9: Undervoltage indication 10: Reached value of timer 1 11: Reached value of timer 2 12: Stop the process 13: Process indication 14: PID maximum 15: PID minimum 16: 4 – 20 mA disconnected - error 17: Engine overload 18: Inverter overload 19 to 26: Reserved 27: Finished timer operation 28: Medium setting value reached 29: Liquid supply by constant voltage*T on / 0” off 30: Inverter ready 31, 32: Reserved

0: Invalid. As an unoccupied terminal, no function

1: In operation. Sets the terminal as a signal for operation. The output is ON.

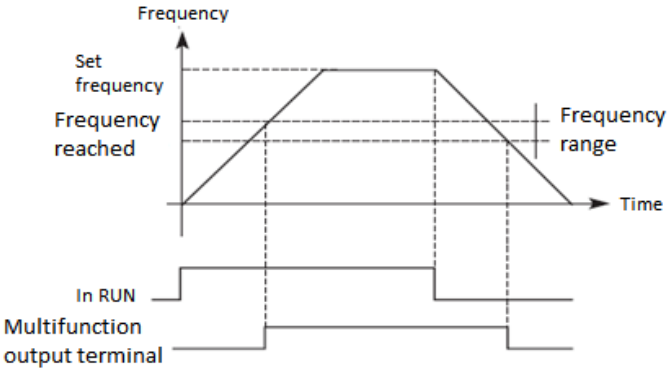
2: Reached frequency. When the frequency reaches the set value, this contact turns ON.

3: In failure. When the inverter detects an unusual condition, this contact will be closed (ON).

4: Zero speed. If the output frequency of the inverter is less than the starting frequency, this contact will be closed (ON).

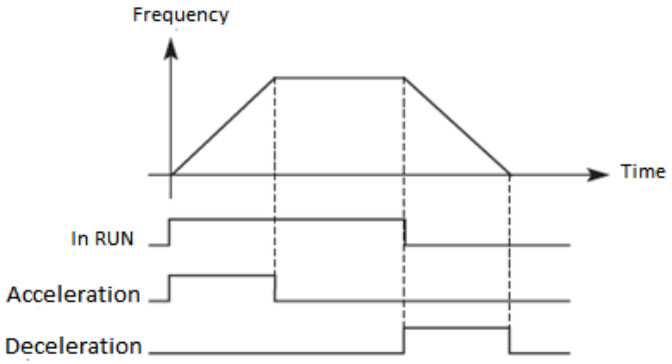
5: FDT 1 set frequency reached. When the frequency reaches the set value, this contact turns ON.

6: FDT 2 frequency reached. When the frequency reaches the set value, this contact turns ON.



7: Acceleration. If the inverter is in acceleration state, this contact is ON.

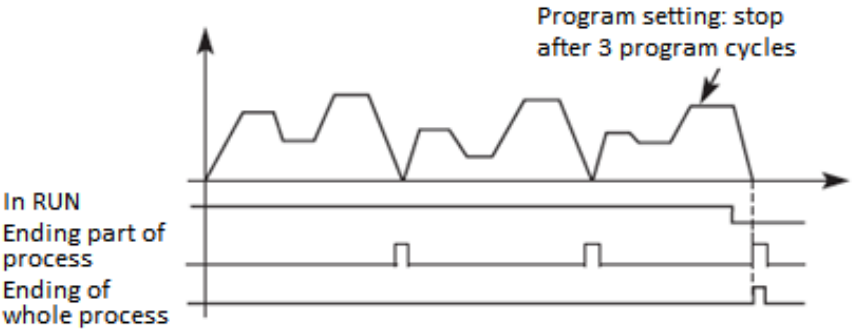
8: Slowdown. If the inverter is in deceleration state, this contact is ON.



9: Low voltage (alarm) - When the inverter detects that the DC bus voltage is lower than the set value, this contact is on and an alarm is activated. The low voltage limit and alarm can be changed using the extended group of application parameters.
10: Timer 1 value reached

11: Timer 2 value reached. When the inverter reaches the set value, this contact turns ON, when the timer trigger signal turns OFF, this contact turns OFF.

12: Completion of Program Section. In PLC operating mode, the inverter will generate this pulse signal when the drive has completed a part of the program.



13: Indication of the end of the process. In PLC operation mode, the inverter will generate this pulse signal when the inverter has finished the whole program.

14: Upper PID limit. If the PID feedback value exceeds the set upper limit value, the contact turns ON.

15: Lower PID limit. If the PID feedback value is less than the set value, the contact turns ON.

16: The 4-20 mA loop (circuit) is broken. When the FIC input signal is disconnected, this contact is ON and the alarm is active.

17: Overloading. If the inverter detects motor overload, this contact is ON.

18: Inverter overload. If the inverter detects its overload, this contact is closed.

19 to 26: Reserved

27: Finished timer operation. When the operation is finished, this contact is switched ON.

28: Middle value of counter setting reached.

29: Liquid supply by constant voltage, 1 ON / 0 OFF.

30: The inverter is ready for operation - reports the readiness of the inverter.

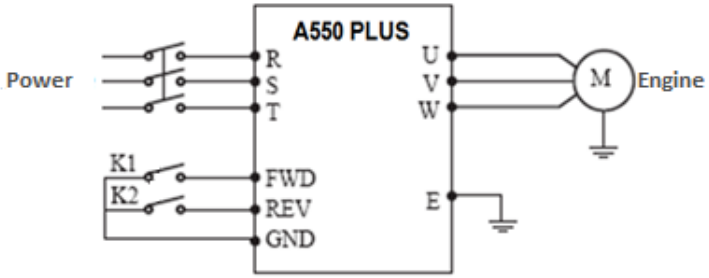
P326 and P 327: Reserved

P328	Signal filtering time	0.000 to 1.000 s	0.010 s

Sets the response time to RA/RC relay signals.

	Range of setting	0-3	Unit	1
P329	Methods of control from an external terminal		Initial value : 0	
	Input terminal setup	0: Two-wire control 1 1: Two-wire control 2 2: Three-wire control 1 3: Three-wire control 2		

0: Two-wire mode 1 - two-wire connection is shown below:

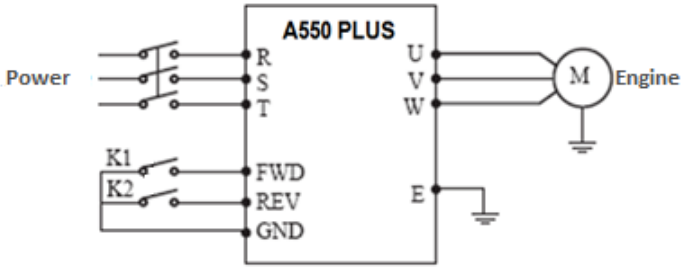


Parameters: P102 = 1; P315 = 6; P316 = 7; P329=0
The labelled terminals Sx and Sy are the FWD and REV functions; S1 and S2 remain as multifunctional

Terminal	The set parameter	Description of the parameter
Sx	6	Run forward (FWD)
Sy	7	Run reverse (REV)

Input selection		Inverter status
K1	K2	
OFF	OFF	STOP
ON	OFF	FORWARD (FWD)
OFF	ON	REVERSE (REV)
ON	ON	STOP

1: Two-wire mode 2 - use this setting when the Sx terminal determines operation and the Sy terminal is for triggering.

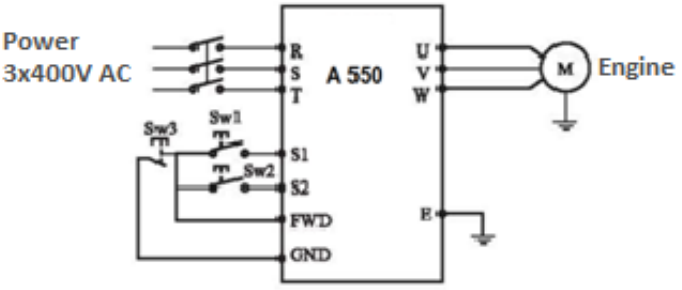


Terminal	The set parameter	Description of the parameter
Sx	6	Run forward (FWD)
Sy	7	Run reverse (REV)

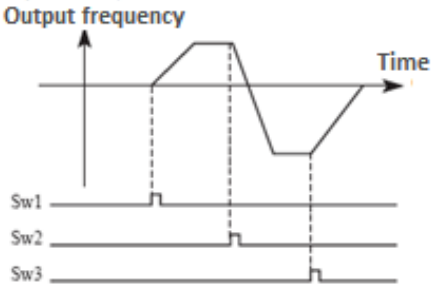
Explanation of control:

Input selection		Inverter status
K1	K2	
OFF	OFF	STOP
ON	OFF	FORWARD (FWD)
ON	ON	REVERSE (REV)
OFF	ON	STOP

2: Connect three-wire mode - in this mode, the Sw3 terminal enables RUN and the direction is determined by the Sw1 and Sw2 terminals.



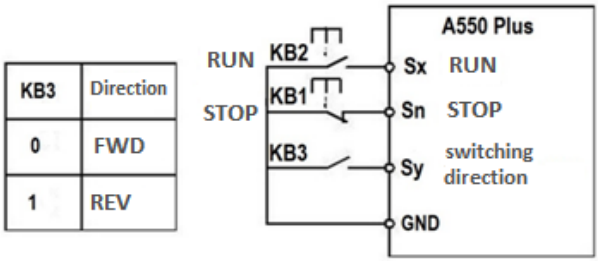
The parameterization will be as follows:
P317 = 6 (S1 is FORWARD) - SW1
P318 = 7 (S2 is REVERSE) - SW2
P315 = 8 (FWD / STOP) - SW3
P102 = 1 (external control)
P329 = 2 (3-wire mode 1)



3: Three-wire mode 2 - In this mode, Sn enables command execution. The CHOD command is given by the Sx signal and the direction is determined by the Sy signal.

The setup parameters are listed below:

Terminal	Value	Description
Sx	6	FORWARD (FWD)
Sy	7	REVERSE (REV)
Sn	8	STOP (Three-wire control)



KB1: STOP button, KB2: RUN button

P330	Range of control from UP/DOWN terminal	0.01 Hz to 99.99 Hz	1.00 Hz
P331	RA / RC output relay mode Range: H.000 to H.457	**..X: Reserve** 0: Positive logic 1: Negative logic **.X.: applies to RA/RC** 0: Positive logic - Set: H.010 relay NC 1: Negative logic - Set: H.000 relay NO	H.000

P332	Delay time FWD	0.0 s to 999.9 s	0.0 s

P333	Delay time REV	0.0 s to 999.9 s	0.0 s
P334	Delay time S1	0.0 s to 999.9 s	0.0 s
P335	Mode selection X	**...X: Applies to FWD** 0: Valid high level 1: Valid low level **..X.: Applies to REV** 0: Valid high level 1: Valid low level **.X..: Applies to S1** 0: Valid high level 1: Valid low level **X...: Applies to S2** 0: Valid high level 1: Valid low level	0000

10.5 P4: Auxiliary application functions

P400	Frequency setting in JOG mode		Initial value 5.00	
	Range of setting	0.00 - maximum frequency	Unit	0.01

The jog frequency setting (JOG) is usually applied to the test run. This function can be called via an external terminal only. When JOG is reached, other commands are ignored. When the JOG signal is active, the inverter decelerates to stop, the JOG acceleration / deceleration time is set in the 4th acceleration / deceleration parameter.
Priority level of control:
JOG -> external multiturn -> PLC operating means -> PID means -> triangle wave (transition function) -> winding -> means for adjusting the frequency conversion.

P401	Acceleration time 2		Initial value10.0 s	
P402	Deceleration time 2		Initial value10.0 s	
P403	Acceleration time 3		Initial value10.0 s	
P404	Deceleration time 3		Initial value10.0 s	
P405	Acceleration time 4		Initial value10.0 s	
P406	Deceleration time 4		Initial value10.0 s	
	Range of setting	0 - 999.9 s	Unit	0.1

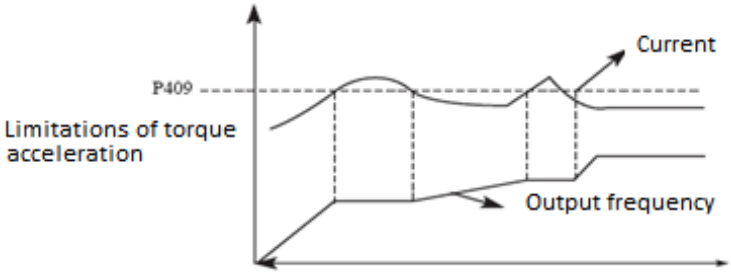
The inverters A 550 PLUS series offers the ability to set 4 acceleration / deceleration times. For normal operation, the default value is 1. For JOG operation, the default value is acceleration / deceleration time 4.

P407	Desired counter value		Initial value 100 s	
P408	Average counter value		Initial value 50 s	
	Range of setting	0-999.9 s	Unit	1

The inverters A 550 PLUS series has 2 sets of counters. An impulse signal up to 250 Hz can be received via a multifunctional terminal. If the counter value reaches the set value, the relevant multifunction output terminal is on, the counter input terminal resets the counter signal, clears the counter, and starts counting again.

P409	Limitations of torque during acceleration		Initial value150 %	
	Range of setting	50 to 200 %	Unit	1

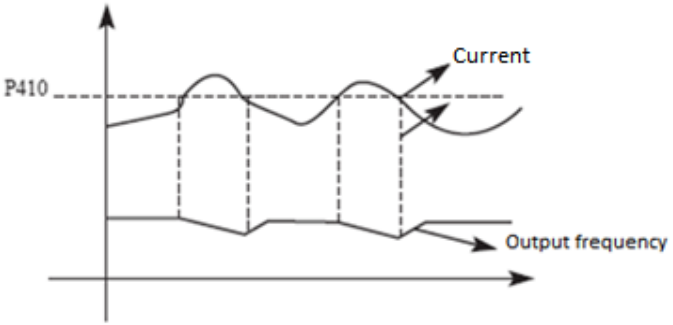
Parameter P409 is the torque limit value during acceleration. When the output current reaches the set value, the inverter stops, if the current is below the set value, the inverter continues to accelerate.



100% of the current is the rated current of the inverter; if P409 is set to 0 then the torque limitation is inactive and does not have a protective function.

P410	Overcurrent when stopped – gain regulation		Initial value 0.0 %	
	Range of setting	0 – 100 %	Unit	1

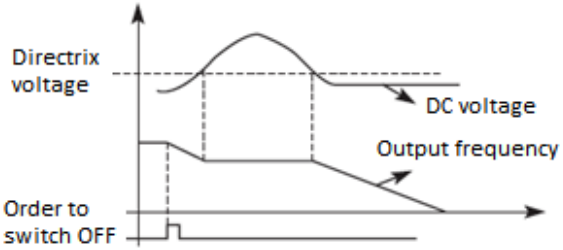
Parameter P410 is a torque limitation at constant speed. When the output current reaches the setting value, the inverter automatically reduces the output frequency to reduce the load. When the output current drops, the inverter increases the output frequency to the setting value



P411	Over voltage protection		Initial value1	
	Range of setting	0-1	Unit	1
	Setting	0: Overvoltage protection OFF 1: Overvoltage protection ON		

0: Protection is OFF
During deceleration the DC bus voltage may increase. If the overvoltage protection selection is inactive, the inverter may be in a fault for DC over voltage.

1: Protection is ON
During deceleration when the DC bus voltage reaches the set value, the inverter stops the deceleration process. When the DC bus voltage returns to the permissible value, the inverter will resume the deceleration.



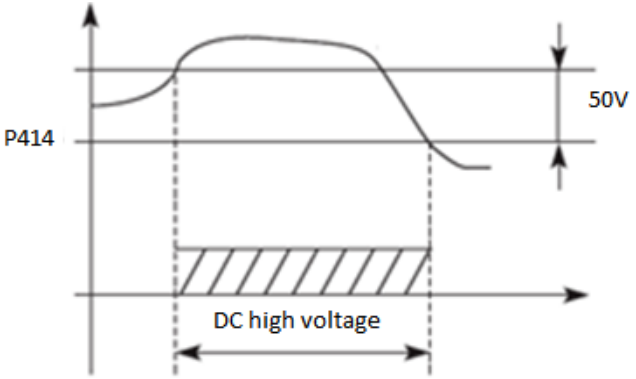
P412	V/F overexcitation – gain control		Initial value 10.0 %	
	Range of setting	0 - 100 %	Unit	1

P413	Over voltage protection during deceleration – gain control		Initial value 50.0 %	
	Range of setting	0 – 200 %	Unit	1

P414	Initiation of dynamic braking via braking resistor at DC voltage		4T models: 700.0 V DC 2S models: 370.0 V DC	
	Range of setting	Series 4T... Series 2S.... and 2S....S	Unit	1
P415	Reserved			

P414: DC braking voltage

If the DC voltage of inverter is high and is higher than the set value P414, the built-in brake unit will switch ON. Energy is released by braking resistor. Then the DC voltage drops back to a certain value at which the built-in brake unit is switched OFF.



If the P414 value is too high, the DC voltage may be too high and may cause switch ON of the inverter protection. If the P414 value is too low, the braking resistor may be too hot.

P416	Restart after sudden power OFF		Initial value 1	
	Range of setting	0 - 1	Unit	1
	Setting	0: Restart disabled after an immediate power OFF 1: Restart enabled after an immediate power OFF		

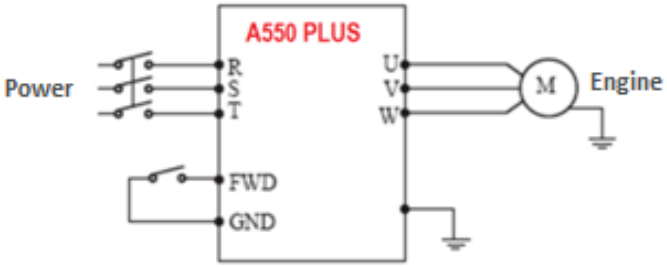
0: Restart disabled

After a power OFF, the inverter clears the command being run. After the power is restored, the inverter does not start automatically.

1: Restart enabled

In the case of a short-term power outage, the inverter keeps the command being started as effective. When power is restored in a short time, the inverter will monitor the motor speed and restart.

Warning: if an immediate start is triggered after a power failure, the inverter can start the motor automatically. Take care when using this feature!



Example:
Using K1 (FWD), inverter control.
If K1 is closed, the frequency conversion is performed, when K1 is disconnected, the inverter stops. When the power is turned off and K1 stays connected and the power turns on, the inverter suddenly starts running, which can be very dangerous. Therefore, use other control methods such as, for example, three-wire method of connecting to the system.

P417	Selection of action in case of immediate power failure		Initial value: 0	
	Range of setting	0 - 2	Unit	1
		0: No action 1: Slow down on a curve 2: Slow down on a curve and		

P417: you can set what action the inverter should perform after a power failure

P418 - P419: Reserved

P420	Number of restart attempts		Initial value 0	
	Range of setting	0- 20	Unit	1
P421	Delay time for auto restart after fault		Initial value 1.0 s	
	Range of setting	0.1 - 100.0 s	Unit	1

After an alarm (e.g. for a current, excessive voltage, etc.), after the time interval set by parameter P421, the inverter automatically starts (in the case of a non-zero value set according to P420) according to the set trigger parameters (P200).
After startup, if there is no alarm within 60 seconds, the inverter will automatically reset the P420.

If the alarm occurs again within 60 seconds, the inverter will record the number of alarms and when the number of alarms reaches the set value of P420, the inverter will stop the output.
Warning: If P420 = 0, the restart after a fault is ineffective. When the restart after failure function is active, the engine may start suddenly, so be careful when using this function.

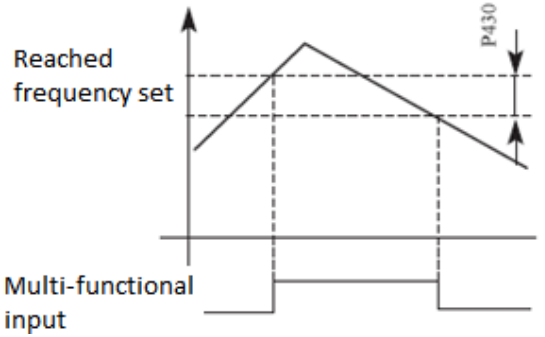
P422: Reserved

P423	Motor overcurrent detection level		Initial value: 0.0 %	
	Range of setting	0 – 200 %	Unit	1
P424	Motor overcurrent detection time		Initial value: 10.0 s	
	Range of setting	0 - 999.9 s	Unit.	1

Parameter P423 is conditioned by parameter P210 (rated motor current), the current value set in P210 is 100% of the value in P423. For example if we set P210=5, in parameter P423=100% (5A).
If the output current to the electric motor exceeds the set value of P423, the inverter starts counting the time of exceeding the overcurrent. If the duration exceeds the set value in P424, the inverter alarm output signal OL1 is activated and the inverter stops the drive.
If P423 = 0.0 the electric motor overcurrent detection is not active, the current flowing into the electric motor is 100% of the nominal value of the frequency inverter current.

P425	Reaching the frequency 1 (FDT 1)		Initial value: 0.0 Hz	
	Range of setting	0.00 - maximum frequency	Unit	0.1
P426	Reaching the frequency 2 (FDT 2)		Initial value: 0.0 Hz	
	Range of setting	0.00 - maximum frequency	Unit	0.1

The A 550 PLUS inverter series uses two groups of frequencies. If the output frequency reaches the set values of P425 and P426, the corresponding multifunctional output terminal is switched on. The frequency width is the width of the hysteresis loop, which is set by parameter P430.



P427	Timer 1 setting	Initial value: 10.0 s

	Range of setting	0.0-999.9 s	Unit	0.1
P428	Timer 2 setting		Initial value: 20.0 s	
	Range of setting	0.0-999.9 s	Unit	0.1

The A 550 PLUS series has two timers. When the timer reaches the set value (set by P427 and P428), the corresponding multi-function terminal will turn on. The timer start is controlled by an external multi-function input terminal. Some simple programs can be executed using these two timers.

P429 : Reserved

P430	Hysteresis loop frequency bandwidth (FDT1 or FDT2)		Initial value: 5.0 %	
	Range of setting	0.0 - 100.0 %	Unit	0.01

This parameter sets the bandwidth of the frequency being reached, see P425 and 426 introductory sections for details.

P431	Jump frequency 1		Initial value: 0.0 Hz	
	Range of setting	0.00 - maximum frequency	Unit	0.01
P432	Jump frequency 2		Initial value: 0.0 Hz	
	Range of setting	0.00 - maximum frequency	Unit	0.01
P433	The width of the hysteresis loop		Initial value: 0.00 Hz	
	Range of setting	0.00 - 999.9 Hz	Unit	0.01

If there is a resonance of the machine at a certain frequency, we can use the jump frequency function to skip the resonant point. The 550 PLUS series supports 2 jumper frequencies according to parameters P431 and P432. The width of the hysteresis jump loop can be adjusted using P433.

Parameters P434 to P499: Reserved

10.6 P5: PLC operations

P500	PLC memory mode		Initial value: 00	
	Range of setting	0: No memory 1: Memory	Unit	1
	Setting	.X: Select function after stop 0: Off 1: On X.: Selection of function after power failure 0: Off 1: On		

0: No memory

If the device stops due to an error or other reasons, the inverter does not remember the state in which it was stopped. After restarting, it will start running from the initial state.

1: Memory
If the device stops due to an error or other reasons, the inverter remembers the state before the stop. After restarting, the inverter will continue to operate according to the program.

Warning: the power must not be disconnected. If you stop the device and disconnect the power, the inverter will not remember the state before the power failure. After restarting, the inverter starts according to the initial program from the beginning.

P501	PLC starting mode		Initial value: 0	
	Range of setting	0 - 1	Unit	1
	Setting	0: Invalid (PLC does not start) 1: Valid (PLC start)		

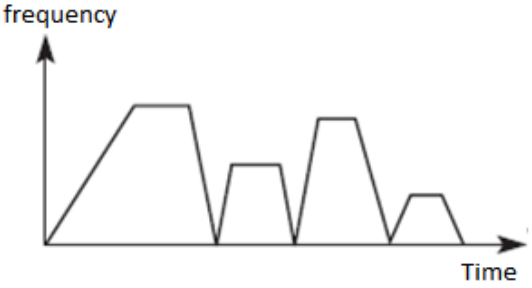
The P501 determines the startup mode of the PLC of the inverter. P501 = 0 means that the PLC is blocked. The inverter is controlled by the normal mode.
When P501 = 1, PLC works. The drive selects a PLC program that will start. At the stage of PLC startup, for various operating commands and programs, the inverter will be controlled according to the priority level showed in next table:

Priority level	Priority number	Item
High -> Low	1	JOG
	2	External multiple speed
	3	Internal multiple speed
	4	PID
High -> Low	5	Triangular wave
	6	Winding
	7	Inverter setting mode

P502	PLC mode of operation		Initial value: 0	
	Range of setting	0-4	Unit	1
	Setting	0: PLC stop after one cycle 1: PLC stop mode, it stops after one cycle 2: PLC repeats again after completing the first cycle 3: Reserved 4: Reserved		

The PLC operation mode determines the start state of the internal multiple speed, either one cycle is started or the cycle continues. P502 is only valid when the PLC is started.

The PLC pause mode means that when each of the speed phases is completed, the speed is reduced, stopped and accelerated to the next speed. The illustration for illustration is shown below:



Users can select the correct mode of operation according to the current conditions.

P503	Fixed speed 1		Initial value: 5.0 Hz	
P504	Fixed speed 2		Initial value: 10.0 Hz	
P505	Fixed speed 3		Initial value: 20.0 Hz	
P506	Fixed speed 4		Initial value: 25.0 Hz	
P507	Multiple speed 5		Initial value: 30.0 Hz	
P508	Multiple speed 6		Initial value: 35.0 Hz	
P509	Multiple speed 7		Initial value: 40.0 Hz	
P510	Multiple speed 8		Initial value: 45.0 Hz	
P511	Multiple speed 9		Initial value: 50.0 Hz	
P512	Multiple speed 10		Initial value: 10.0 Hz	
P513	Multiple speed 11		Initial value: 10.0 Hz	
P514	Multiple speed 12		Initial value: 10.0 Hz	
P515	Multiple speed 13		Initial value: 10.0 Hz	
P516	Multiple speed 14		Initial value: 10.0 Hz	
P517	Multiple speed 15		Initial value: 10.0 Hz	
	Range of setting	0.00 - maximum frequency	Unit	0.1

Speeds are set in P503 - P517. When it comes to relationships between several speed and external terminal, see instructions 1, 2, 3, 4 step (fixed speed).

P518	PLC operating time 1		Initial value: 3 s	
P519	PLC operating time 2		Initial value: 4 s	
P520	PLC operating time 3		Initial value: 5 s	
P521	PLC operating time 4		Initial value: 0 s	
P522	PLC operating time 5		Initial value: 0 s	
P523	PLC operating time 6		Initial value: 0 s	
P524	PLC operating time 7		Initial value: 0 s	
P525	PLC operating time 8		Initial value: 0 s	
P526	PLC operating time 9		Initial value: 0 s	
P527	PLC operating time 10		Initial value: 0 s	
P528	PLC operating time 11		Initial value: 0 s	
P529	PLC operating time 12		Initial value: 0 s	
P530	PLC operating time 13		Initial value: 0 s	
P531	PLC operating time 14		Initial value: 0 s	
P532	PLC operating time 15		Initial value: 0 s	
	Range of setting	0.0 - 999.9 s	Unit	1

The operating time of the PLC is determined by the internal control, which varies by the nominal operating time for each segment.

P533	PLC operation direction		Initial value: 0000	
	Range of setting	0 - 9999	Unit	1

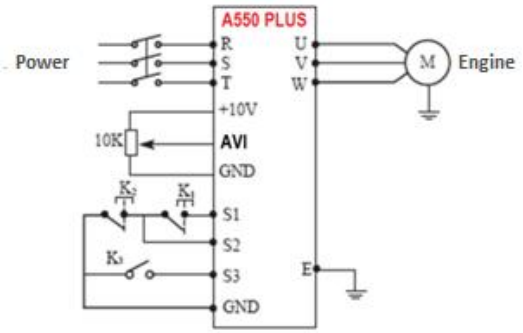
P533 sets the operating direction in each segment.

Way of setting the direction of operation: using a 16-bit binary system and then transferring to a decimal system; each bit determines the corresponding direction of operation: 0 is forward (FWD) and 1 is reversed (REV). This parameter is only valid when the PLC is on

For example: we have a five segment program, the cycle setting will be as follows:

Item	Output frequency	Operation direction	Operation time
Main frequency	The potentiometer is adjustable	Forward	
Segment 1	20.0	Reverse	20
Segment 2	60.0	Forward	25
Segment 3	40.0	Reverse	30
Segment 4	15.0	Forward	20

Two buttons, one is for running, the other is for stopping; the main frequency requires an adjustable potentiometer. Example of model A550-4T0450 .....



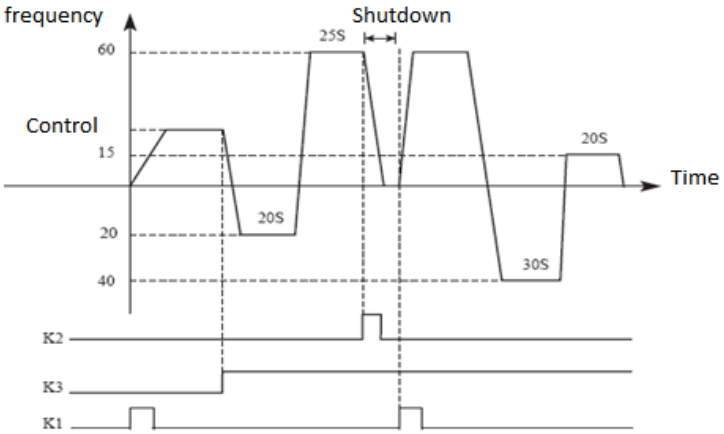
(1) Connection picture
(2) Parameter setting
PLC operation direction setting: (P533 setting)

segment 1	segment 2	segment 3	segment 4	main frequency	
4	3	2	1	0	--> position (bit)
0	1	0	1	0	-->direction of run <0 forward, 1 reverse
0*24	1*23	0*22	1*21	0*20	--> transfer to the decimal system

Binary number 01010 is transferred to the decimal system as follows:
1 * 21 + 1 * 23 + 8 = 10
Setting: P533 = 10

Define the parameters as follows:

P101 = 3, potentiometer setting mode: the dominant frequency is controlled by the potentiometer
P102 = 2, start method selected: multifunction terminal input
P105 = 60, maximum frequency is 60 Hz
P107 = 10, P108 = 10, acceleration / deceleration time 10S
P314 = 6, end S1, running forward
P318 = 8, end S2, stop
P319 = 20, end S3, the PLC is running
P500 = 11, PLC programming memory
P501 = 1, the PLC is on
P502 = 0, the PLC stops after one cycle
P503 = 1, segment 1, set to 20 Hz
P504 = 60, segment 1 set to 60 Hz
P505 = 40, segment 1 set to 40 Hz
P506 = 15, segment 1, set to 15 Hz
P518 = 10, the set duration of segment 1 is set to 10 seconds
P519 = 20, the set duration of segment 1 is set to 20 seconds
P520 = 25, the set duration of segment 1 is set to 25 seconds
P521 = 30, the set duration of segment 1 is set to 30 seconds

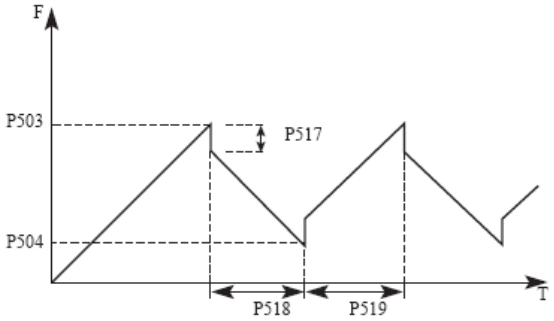


Instructions:
①To start the inverter, press the K1 button and set the output frequency with the potentiometer.

②Press the K3 key, the PLC runs the program segment 1 of the PLC, which executes one cycle and then stops.

③If the program is running or if a fault occurs and the transducer stops, press K3. When the fault is resolved, press K1 and the inverter will continue forward as a program.

④If P500 = 1 and the program is not in memory, the program will start from the very beginning.



P534, P535: Reserved
P536 - P558: The parameters are described in the parameter table P5
P559 - 599: Reserved

10.7 P6: PID operation

The inverter can be used to control the process, e.g. controls flow, air volume or pressure. AIV input terminals or parameter setting is used as the set value, and the FIV/FIC terminal input signal can also be used as the feedback value to form a feedback system for PID control.

P600	PID operating mode		Initial value: 0	
	Range of setting	0 - 2	Unit	1
	Setting	0: PID off 1: PID enabled 2: PID start from external terminal		

0: The PID is disabled, the PID controller cannot be used.
1: PID START
The PID controller works in addition to the external input signal and is also enabled without an external input.
2: The PID will start under certain conditions; PID will start when some external input is on.

P601	PID operation mode selection		Initial value: 0	
	Range of setting	0 - 1	Unit	1
	Setting	0: Normal feedback mode 1: Inverse feedback mode		

0: Normal feedback mode
If the feedback value (P603)> set value (P602), the inverter decreases the output frequency.
If the feedback value (P603) <set value (P602), the inverter increases the output frequency.
1: Inverse feedback mode
If the feedback value (P603)> set value (P602), the inverter decreases the output frequency.
If the feedback value (P603) <setting value (P602), the inverter increases the output frequency.

P602	PID setting of the action point		Initial value: 0	
	Range of setting	0 - 6	Unit	1
	Setting	0: Digital mode (P604) 1: AVI (0-10 V or 4-20 mA) 2 to 6: Reserved		

0: Select numeric mode
Set the value (P604) from the control panel or from the parameter unit.
1: AVI Terminal input is set value (0-10 DC V or 4-20 mA).
2 to 6: Reserved

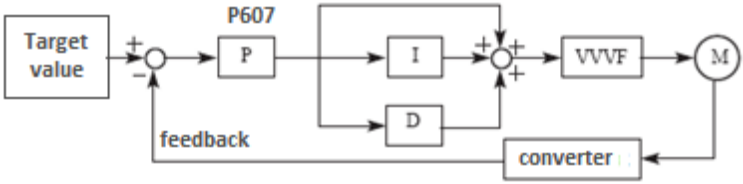
P603	PIO feedback value selection		Initial value: 0	
	Range of setting	0 - 5	Unit	1
	Setting	0: AVI from analogue control If J2 is I: 4 to 20 mA (P300 = 1.00 V and P301 = 5.00 V) If J2 is V: 0 to 10 V (P300 = 0.00 V and P301 = 10.00 V) 1 - 5: Reserved		

0: Feedback signal source is from AVI analogue input

P604	PID figure setting target value		Initial value: 2.50 bar	
	Range of setting	0.0 bar - P614	Unit	0.01

The set maximum value corresponds to an analogue voltage of 10 V or 20 mA. Closed-loop PID control is often used to control processes such as pressure and temperature. The feedback signal is conducted from a temperature sensor or a pressure sensor. In the case of PID control, the input channel of the feedback signal is an analogue signal of 4 - 20 mA or 0 - 10 V. There are two channels for setting.

Block diagram of PID control:



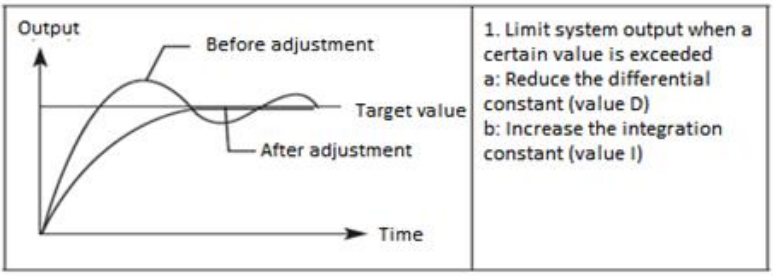
The general regulatory method for PID control:

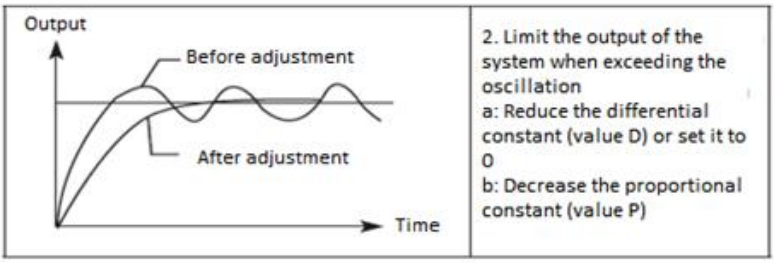
(1) Select the correct sensor / transmitter for which the standard 4-20 mA or 0 - 10 V signal is selected.

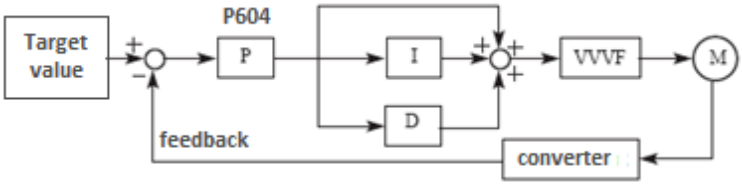
(2) Set the PID action value correctly.

(3) Increase the value of the proportional constant (P) in the case of non-oscillating output.

(4) Reduce the integrating constant (Ti) in the case of non-oscillating output.







Set the upper limit value. If the feedback value exceeds the set value, an alarm will be triggered. The maximum input (20 mA / 10 V) of the measured value (terminal AVI) corresponds to 100%.

P605	PID upper limit		Initial value: 10.00 bar	
	Range of setting	P606 - P614	Unit	0.01
P606	PID lower limit		Initial value: 0.00 bar	
	Range of setting	0.00 bar - P605	Unit	0.01

Set the lower limit value. If the feedback value drops below the setting range, an signal will be output.

P607	PID P (Setting the PID proportional band)		Initial value: 100.0 %	
	Range of setting	0.00 - 600.0 %	Unit	0.1

If the proportional band is narrow (the parameterization is small), the controlled variable changes considerably with a small change in the measured value. Therefore, when the proportional band narrows, the responsiveness of the response (enhancement) is improved, but the stability deteriorates, e.g. there will be oscillation.

P608	PID I (integration constant – integration time)		Initial value: 2.00s	
	Range of setting	0.00 to 10.0 s	Unit	0.1

For the deviation step input, the time (Ti) is only needed for the integration (I) and controls the variable as for the proportional setting (P). When the integral time decreases, the desired value is reached earlier, but the incidence of oscillation will increase.

If P608=0.00, the parameter is closed.

P609	PID D (derivative constant – derivative time)		Initial value: 0.00 s	
	Range of setting	0.00 - 9.99s	Unit	0.01

For input deviation, time (Td) is only needed for controlling the variable for proportional (P) action. When the differential time increases, the response is a larger change of variance. If P609=0.00, the parameter is closed.

P610	Increasing the value of the "Boost set point" output		Initial value: 2.00 %	
	Range of setting	0.00 -100.00 %	Unit	0.01
P611	PID frequency in “SLP” mode		Initial value: 25.0 Hz	
	Range of setting	0.00 - 999.9Hz	Unit	0.01
P612	PID detection time in "SLP" mode		Initial value: 10.0 s	
	Range of setting	0.0 – 999.9 s	Unit	0.1
P613	PID wakeup value		Initial value: 90.0%	
	Range of setting	0.0 – 100.0 %	Unit	0.1

P611: PID frequency in (standby) sleep mode. P611 must reach the minimum frequency in PID standby mode. When the frequency in operation is less than the value of P610, the (standby) sleep time starts to count.

P612: PID standby time If the drive operation time is longer than the P612 sleep mode time, the drive will go into sleep mode automatically. It then stops the output and disconnects from the PID, but monitor the PID feedback - parameter P613.

P613: PID values on wake-up. When the drive detects that the feedback value is lower than the set wake-up value (P613), the PID function is activated and the drive starts working.

P614	Scale PID		Initial value: 10.00 bar	
	Range of setting	0.00 – 99.99 bar	Unit	1
P615	PID, number of display digits		Initial value: 4	
	Range of setting	1 - 4	Unit	1
	Setting	1: Display 1 digit 2: Display 2 digits 3: Display 3 digits 4: Display 4 digits		
P616	PID number of decimal digits of the display		Initial value: 2	
	Range of setting	0 - 4	Unit	1
	Setting	0: Does not display the digit after the decimal point 1: Displays 1 digit 2: Displays 2 digits 3: Displays 3 digits 4: Displays 4 digits		

P614: PID corresponding scale display value.
The setting value of P614 corresponds to the max. analogue voltage +10 V. If the value of P614 is set to 50.00 bars, it means that the full range is 50.00 which corresponds to a voltage of +10 V.

P615: sets the number of displayed digits.
Users can choose the displayed number according to the current need.

P616: PID decimal display digit.
P616 sets the number of digits displayed after the decimal point.

P617	PID upper frequency limit	0.0 to maximum frequency	48.00 Hz
P618	PID lower frequency limit	0.0 to maximum frequency	20.00 Hz
P619	PID detection time	0.0 – 9999s	20.0 s
P620	PID deviation limit	0.0 - 100.0 %	0.1 %

P621	AVI circuit disconnection detection	0: Disabled (does not recognize disconnection) 1: On (recognizes open circuit) error code "20" 2: On + STOP (recognizes and stops the drive) "20"	0
P622	Feedback loss detection value	Range: 0.0 to 10.0 V * if the current feedback is 4-20 mA, then set the detection to less than 2 mA (P622=0.50 V)	0.50 V
P623	Feedback loss detection time setting value	0.0 - 20.0 s	1.0 s
P624	Limit frequency of PID reverse run	0.0 to maximum frequency	0.00 Hz
P625	PID differential limit	0.00 - 99.99 %	0.10 %
P626	PID change time setting	0.00 - 99.99 s	0.00 s
P627	Setting the feedback filtering time	0.00 - 60.00 s	0.00 s
P628	Setting the PID output filtering time	0.00 - 60.00 s	0.00 s

P629: Reserved

Parameters P630 to P657 are sufficiently described in the table Group of parameters P6.

Parameters P658 to 699 are empty.

10.8 P7: Communication parameters (RS 485)

They are used to make the required settings for communication between the inverter and the computer.

P700	Baud rate		Initial value: 0	
	Range of setting	0-3	Unit	1
	Setting	0: 4800 bps 1: 9600 bps 2: Reserved 3: Reserved		

For example, when the value is set to "1", the communication speed is 9600 bps.

P701	Communication mode A 550 PLUS		Initial value: 3	
	Range of setting	0 - 5	Unit	1
	Setting	0: No check (8-N-1) for ASC 1: Even parity check (8-E-1) for ASC 2: Odd parity check (8-0-1) for ASC 3: No check (8-N-1) for RTU 4: Even parity check (8-E-1) for RTU 5: Odd parity check (8-0-1) for RTU		

In P701, set the communication data format. For detailed information, refer to the appropriate communication description.

P702	Communication address RS-485		Initial value: 001	
	Range of setting	1 - 249	Unit	1

Each inverter must have its station number, which will be defined by the P702. The communication interface of the inverter can be combined with 249 others. If P702 is set to "0", the transmitter address is master.

P703	Communication faults		Initial value: 0	
	Range of setting	0 - 2	Unit	1
		0: No fault 1: Malfunction, display Co 2: Display Co and STOP		

10.9 P8: Specific setting parameters

P800	Lock application parameters		Initial value: 1	
	Range of setting	0-1	Unit	1
	Setting	0: Locked 1: Unlocked		

If parameter P800 is set to "0", you cannot use extended parameters!

P801: Reserved

P802	Constant or variable torque		Initial value: 0	
	Range of setting	0-1	Unit	1
	Setting	0: G Constant torque 1: P Variable torque		

0: G Constant torque (linear characteristic with constant torque increase). In this mode, the inverter allows an overload of 150% for 1 min. with the factory current setting in parameter P210.
1: P Variable torque quadratic characteristic). In this mode of operation, the inverter allows an overload of 120% for 1 min, but the inverter in P210 will automatically increase the current value by one power level higher.

Example: Model A550-4T0040 PLUS has a factory setting of In=8.6A (P210=8.6; P802=0).
In this setting, the inverter overload capacity is 150% for 1 min. If you reset parameter P802=1; the inverter automatically resets parameter P210=13.0A. In this setting, the inverter overload capacity is 120% for 1 min.

P803	Setting the overvoltage protection		Initial value: 810 V for 4T, 400 V for 2S	
	Range of setting	780 – 820 V for 4T models	Unit	1

P803 sets the DC bus overvoltage protection level.

P804	Setting low-voltage protection		Initial value: 310 V for 4T, 150 V for 2S	
	Range of setting	380 – 450 V for 4T models	Unit	1

P804 sets the voltage protection level. If the input voltage is low, the inverter is easily tripped by undervoltage. This function should be used to avoid undervoltage of the inverter protection.

P805	Set overheat protection		Initial value: 115°C	
	Range of setting	40 - 120°C	Unit	1

P805 sets the level of protection against overheating of the inverter. However, too high a setting value will damage the IGBT, so the only solution is an improvement in cooling.

P806 - P811: Reserved

P812	UP/DOWN memory frequency options		Initial value: 0	
	Range of setting	0: Resets memory after power off 1: Keeps in memory after power off	Unit	1

P813: Reserved

P814	Setting the inverter overload factor		Initial value: 1.00	
	Range of setting	0.20 - 10.0	Unit	1

This parameter is conditional on the correct setting of the nominal value of the motor current in parameter P210. Overload factor if you set it to:

1.00 = the overload factor is 150% of the value set in P210, during a period of 4 min. (e.g.: P210=10 A; P816=1; P814=1.00...after detecting a current above 15 A after 4 min. of operation, the inverter announces the OL2 alarm and stops the drive)

0.20 = the overload factor is 150% of the value set in P910, during a period of 1 min. (e.g.: P210=10 A; P916=1; P814=0.20...after detecting a current above 15 A after 1 min. of operation, the inverter announces the OL2 alarm and stops the drive)

P815	PWM switching frequency setting		Initial value: 12.0 Hz	
	Range of setting	0.0 - 15.0 Hz	Unit	1

This parameter is used for V/F control. It is used to determine the wave modulation mode when controlling the V / F asynchronous motor.
If the frequency is lower than the value of this parameter, the waveform is a 7-segment continuous modulation. If the frequency is higher than the value of this parameter, the waveform is a 5-segment discontinuous modulation.

7-segment continuous modulation causes more loss but less current ripple.
5-segment discontinuous modulation causes less loss but more current ripple. This can lead to motor instability at high frequency. Do not normally change this parameter. For V/F control instability, see parameter P4.11. If the temperature rises, see parameter P0.17.

P816	Inverter overload protection		Initial value: 1	
	Range of setting	0: Disabled overload protection 1: Overload protection enabled	Unit	1

Chapter 11: MODBUS communication protocol and directories

11.1 MODBUS communication protocol of the A 550 PLUS series of drivers

The MODBUS communication protocol of the A 550 PLUS series of drivers uses ASCII (American standard code for information interchange): Each byte consists of 2 ASCII characters, for example:
The numerical value of 54 Hex ASCII means that "54" consists of "5" (35 Hex) and 4 (34 Hex).

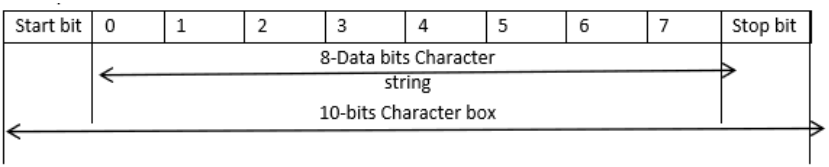
1. Definition of coding

The communication protocol belongs to the hexadecimal system, in which each character represents the following information.

Character	“0”	“1”	“2”	“3”	“4”	“5”	“6”	“7”
ASCII code	30H	31H	32H	33H	34H	35A	36A	37A
Character	“8”	“9”	“A”	“B”	“C”	“D”	“E”	“F”
ASCII code	38A	39H	41H	42H	43A	44A	45H	46H

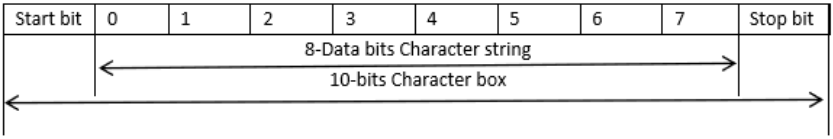
2. Character structure

10-bit character field (for ASCII)
Data Master: 8N1 for ASCII

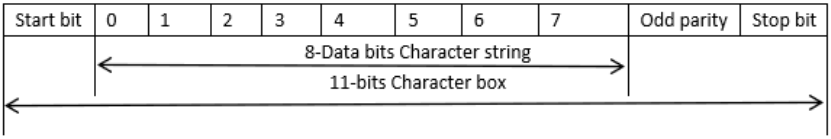


10 – Bit character box (For RTU)

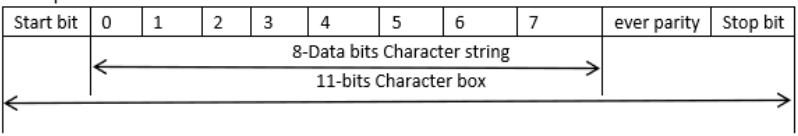
Data pattern: 8N1 for RTU



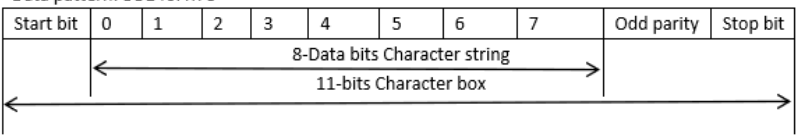
Data pattern: 8O1 for ASCII



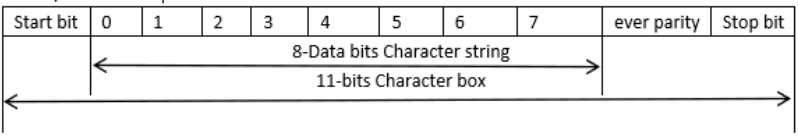
Data pattern: 8E1 for ASCII



Data pattern: 8O1 for RTU



Data pattern: 8E1 for RTU



3.Structure of communication data / Data array format:

ASCII mode:

STX	Start character = ':' (3AH)
Address Hi	Communication address:
Address Lo	8-bit address consists of 2 ASCII codes
Function Hi	Function code:
Function Lo	8-bit function code consists of 2 ASCII codes
DATA (n-1)	Data characters:
.....	n × 8-bit data content consists of 2n ASCII codes
DATA 0	n ≤ 16, with the maximum of 32 ASCII codes
LRC CHK Hi	LRC Check:
LRC CHK Lo	8-bit LRC Check consists of 2 ASCII codes
END Hi	End character:
END Lo	END Hi = CR (0DH), END Lo = LF (0AH)

RTU mode:

START	Keep that zero-input signal is more than or equal to 10 ms
Address	Communication address: 8-bit binary address
Function	Function code: 8-bit binary address
DATA (n-1)	Data characters: n × 8-bit data, n = 16
.....	
DATA 0	
CRC CHK Low	CRC Check:
CRC CHK High	16-bit CRC Check consists of 2 8-bit binary systems
END	Keep that zero-input signal is more than or equal to 10 ms

Communication address

00H: All inverters transmit
01H: For inverter with 1st address
0FH: For inverter with 15th address
10H: For an inverter with a 16th address, by analogy, it can reach a maximum of 240.

Function code and data characters

03H: Read the contents of temporary memory
06H: Write the Word to temporary memory;

Function code

03H: Read the contents of temporary memory.

For example: Converter address 01H, reads data from two consecutive temporary memory addresses: Memory starting address 2102H

Function code

06H: Writes Word to temporary memory

ASCII mode:

Format of enquiry message character string:

STX	**':'**
Address	**0**
	1
Function	**0**
	3
Starting address	**2**
	1
	0
	2
Number of data (count by word)	**0**
	0
	0
	2
LRC Check	**D**
	7
END	**CR**
	LF

Format of response message character string:

STX	**':'**
Adress	**0**
	1
Function	**0**
	3
Number of data	**0**
	4
Conten of starting adress 2102H	**1**
	7
	7
	0
Content of adress 2103H	**0**
	0
	0
	0
LRC Check	**7**
	1
END	**CR**
	LF

RTU mode:

Format of enquiry message:

Address	**01H**
Function	**03H**
Starting data address	**21H**
	02H
Number of data (count by word)	**00H**
	02H
CRC CHK Low	**6FH**
CRC CHK High	**F7H**

Format of response message:

Address	**01H**
Function	**03H**
Number of data (count by byte)	**04H**
Content of data address 8102H	**17H**
	70H
Content of data address 8103H	**00H**
	00H
CRC CHK Low	**FEH**
CRC CHK High	**5CH**

For example: Driver address 01H, writes 6000 (1770H) into the internal setting parameter 0100H of driver.

LRC ASCII mode parity check

ASCII mode:

Format of enquiry message character string:

STX	**':'**
Address	**0**
	1
Function	**0**
	6
Data address	**0**
	1
	0
	0
Data content	**1**
	7
	7
	0
LRC Check	**7**
	1
END	**CR**
	LF

Format of response message character string:

STX	**':'**
Address	**0**
	1
Function	**0**
	6
Data address	**0**
	1
	0
	0
Data content	**1**
	7
	7
	0
LRC Check	**7**
	1
END	**CR**
	LF

RTU mode:

Format of enquiry message:

Address	**01H**
Function	**06H**
Data address	**01H**
	00H
Data content	**17H**
	70H
CRC CHK Low	**86H**
CRC CHK High	**22H**

Format of response message:

Address	**01H**
Function	**06H**
Data address	**01H**
	00H
Data content	**17H**
	70H
CRC CHK Low	**86H**
CRC CHK High	**22H**

LRC control is a value added from an address to data content. For example, the LRC check of the above challenge 3.3.1 is as follows: 01H + 03H + 21H + 02H + 00H + 02H = 29H, then add 2 (D7H).

CRC control in RTU modes

The CRC check is from address to data content and the rule of operation is as follows:

Step 1: Write the 16-bit word to temporary memory (temporary CRC storage) = FFFFH.

Step 2: Compute the XOR with the first 8-bit byte of the message command with the lower byte of the 16-bit CRC register, putting the result in the CRC register.

Step3: Move CRC temporary storage one more bit, and fill 0 into high bit position.

Step 4: If the LSB CRC register is 0, move the CRC register one bit to the right with MSB with zero, then repeat step 3. If the LSB of the CRC register is 1, move the CRC register one bit to the right

with the addition m MSB zero, calculate the CRC register XOR with the poly noted value A001H, then repeat step 3.

Step 5: Repeat steps 3 and 4 until eight shifts are performed. When this occurs, the result is a complete 8-bit byte.

Step 6: Repeat steps 2 through 5 for the next 8-bit byte command message. Continue to do so until all bytes have been processed. The final content of the CRC register is the CRC value. When transmitting CRC in a message, the upper and lower bytes of the CRC value must be swapped, i.e. the lower byte will be transmitted first.

The following is the example of CRC Check running written in C language:

```
Unsignedchardata←//Messageinstruction pointer
Unsignedcharlength←//Lengthofmessageinstruction
unsignedintcrc_chk (unsignedchar*data, unsignedcharlength)
{
int j;
unsignedint reg_crc=0XFFFF;
while( 1ength--) {
reg_crc^=*data ;
for (j = 0; j<?; j ) {
if (reg_crc& Ox01) { /*LSB (b0) =1 */
reg_ere= (reg_crc>>1) ^OXa001;
}else{
reg_cre=reg_crc>>1;
}
}
retumreg_crc; //Finallyfeedbackthevalueof CRC temporarystorage
```

Data Address	Bit Address	Content	Read /write	Address
2000H (P102=2)	BIT1~BIT0	00B：no action 01B：stop 10B：start 11B：JOG start	write	2000H
	BIT2~BIT3	00B：no action 01B：Rev 10B：Fwd 11B：change direction		
	BIT4	0B：no action 1B：reset alarm		
	BIT5~BIT15	reserved		
2001H (P101=5)	BIT0~BIT15	Freq. Command 0000~4000 1 digit after decimal point， unit: Hz	write	2001H
P027	Alarm code		read only	001BH
	BIT0	1：UC； 0：no alarm		
	BIT1	1： Oc； 0：no alarm		
	BIT2	1：communication err.NF； 0：no alarm		
	BIT3	1：output loss phase LO； 0：no alarm		
	BIT4	1：OU； 0：no alarm		
	BIT5	reserved		
	BIT6	1: LU； 0: no alarm		
	BIT7	1: motor overload OL； 0: no alarm		

	BIT8	1：over torque OT ; 0：no alarm		
	BIT9	1：overheat OH ; 0：no alarm		
	BIT10	1：no 4-20mA signal ; 0：no alarm		
	BIT11~BIT14	reserved		
	BIT15	1：alarm ; 0：no alarm		
P028	BIT0	0: Forward 1: Reversed	read only	001CH
	BIT1	0: stop 1: run		

Directories – List of functional parameters:

Function	Parameters	Name	Command address
Monitor functions	P001	Display the set frequency	0001H
	P002	Display the output frequency	0002H
	P003	Display the output current	0003H
	P004	Display the motor speed	0004H
	P005	Display the DC bus voltage value	0005H
	P006	Display the temperature of inverter	0006H
	P007	Display PID	0007H
	P009	Output voltage	0009H
	P010	Alarm record 1	000AH
	P011	Alarm record 2	000BH
	P012	Alarm record 3	000CH
	P013	Alarm record 4	000DH
	P014	The frequency setting in the last alarm	000EH
	P015	The output frequency in last alarm	000FH
	P016	The output current in last alarm	0010H
	P017	The output voltage in last alarm	0011H
	P018	The output DC bus voltage in last alarm	0012H
	P020	Output power	0014H
	P100	Digital frequency setting	0064H
	P101	Frequency setting selection	0065H

Basic funtions	P102	Start signal selection	0066H
	P103	“stop” key lock operation selection	0067H
	P104	Reverse rotation prevention selection	0068H
	P105	Maximum frequency	0069H
	P106	Minimum frequency	006AH
	P107	Acceleration time 1	006BH
	P108	Deceleration time 1	006CH
	P109	V/F maximum voltage	006DH
	P110	V/F base frequency	006EH
	P111	V/F intermediate voltage	006FH
	P112	V/F intermediate frequency	0070H
	P113	V/F minimum voltage	0071H
	P114	V/F minimum frequency	0072H
	P115	Carrier frequency	0073H
	P116	Automatic carrier line up	0074H
	P117	Initialization of parameters	0075H
	P118	Parameter lock	0076H
	P200	Start mode selection	00C8H
	P201	Stop mode selection	00C9H
	P202	Starting frequency	00CAH
	P203	Stopping frequency	00CBH
	P204	DC injection brake operation current (start)	00CCH
	P205	DC injection brake operatio time (start)	00CDH
	P206	DC injection brake operation current (stop)	00CEH
	P207	DC injection brake operation time (stop)	00CFH
	P208	Torque boost	00D0H
	P209	Rated motor voltage	00D1H
	P210	Rated motor current	00D2H
	P211	No load current ratio of motor	00D3H
	P212	Rated motor rotation speed	00D4H
	P213	Number of motor poles	00D5H
	P214	Rated motor slip	00D6H
	P215	Rated motor frequency	00D7H
	P216	Resistance of stator	00D8H
	P217	Resistance of rotor	00D9H
	P218	Self inductance of rotor	00DAH
	P219	Mutual inductance of rotor	00DBH

I/O functions	P300	AVI minimum voltage input	012CH
	P301	AVI maximum voltage input	012DH
	P302	AVI input filter time	012EH
	P303	Reserved	012FH
	P304	Reserved	0130H
	P305	Reserved	0131H
	P306	Reserved	0132H
	P307	Reserved	0133H
	P310	Frequency of low analog	0136H
	P311	Direction of low analog	0137H
	P312	Frequency of high analog	0138H
	P313	Direction of high analog	0139H
	P314	Analog input reverse selection	013AH
	P315	Input terminal FWD (0~32)	013BH
	P316	Input terminal REV (0~32)	013CH
	P317	Input terminal S1 (0~32)	013DH
	P318	Input terminal S2 (0~32)	013EH
	P319	Reserved	013FH
	P320	Reserved	0140H
	P321	Reserved	0141H
	P322	Reserved	0142H
	P323	Reserved	0143H
	P324	Reserved	0144H
	P325	Alarm output terminal RA, RB, RC (0~32)	0145H
	P326	Reserved	0146H
	P327	Reserved	0147H
Secondary application	P400	Jog frequency setting	0190H
	P401	Acceleration time 2	0191H
	P402	Deceleration time 2	0192H
	P403	Acceleration time 3	0193H
	P404	Deceleration time 3	0194H
	P405	Acceleration time 4/Jog acceleration time	0195H

	P406	Deceleration time 4/Jog deceleration time	0196H
	P407	Designated value of counter	0197H
	P408	Intermediate value of counter	0198H
	P409	Limitation of acceleration torque	0199H
	P410	Limitation of constant speed torque	019AH
	P411	Over voltage prevention selection in deceleration	019BH
	P412	Automatic voltage regulation selection	019CH
	P413	Automatic-energy-saving selection	019DH
	P414	DC Braking voltage	019EH
	P415	Braking duty	019FH
	P416	Restart after instant power off	01A0H
	P417	Allowable time of power cut	01A1H
	P418	Flank restart current limited level	01A2H
	P419	Flank restart time	01A3H
	P420	Fault restart times	01A4H
	P421	Delay time for restart after fault	01A5H
	P422	Over torque action	01A6H
	P423	Over torque detection level	01A7H
	P424	Over torque detection time	01A8H
	P425	Reaching frequency 1	01A9H
	P426	Reaching frequency 2	01AAH
	P427	Timer 1 setting	01ABH
	P428	Timer 2 setting	01ACH
	P429	Constant-speed torque limiting time	01ADH
	P430	Width of arrival of frequency in hysteretic loop	01AEH
	P431	Jump frequency 1	01AFH
	P432	Jump frequency 2	01B0H
	P433	Jump frequency hysteresis loop width	01B1H
	P434	UP/DOWN frequency step	01B2H
	P435	UP/DOWN frequency memory options	01B3H

PLC operation	P500	PLC memory mode	01F4H
	P501	PLC starting mode	01F5H
	P502	PLC running mode	01F6H
	P503	Multi-speed 1	01F7H
	P504	Multi-speed 2	01F8H
	P505	Multi-speed 3	01F9H
	P506	Multi-speed 4	01FAH
	P507	Multi-speed 5	01FBH
	P508	Multi-speed 6	01FCH
	P509	Multi-speed 7	01FDH
	P510	Multi-speed 8	01FEH
	P511	Multi-speed 9	01FFH
	P512	Multi-speed 10	0200H
	P513	Multi-speed 11	0201H
	P514	Multi-speed 12	0202H
	P515	Multi-speed 13	0203H
	P516	Multi-speed 14	0204H
	P517	Multi-speed 15	0205H
	P518	PLC operation time 1	0206H
	P519	PLC operation time 2	0207H
	P520	PLC operation time 3	0208H
	P521	PLC operation time 4	0209H
	P522	PLC operation time 5	020AH
	P523	PLC operation time 6	020BH
	P524	PLC operation time 7	020CH
	P525	PLC operation time 8	020DH
	P526	PLC operation time 9	020EH
	P527	PLC operation time 10	020FH
	P528	PLC operation time 11	0210H
	P529	PLC operation time 12	0211H
	P530	PLC operation time 13	0212H

	P531	PLC operation time 14	0213H
	P532	PLC operation time 15	0214H
	P533	PLC operation direction	0215H
PID operation	P600	PID starting mode	0258H
	P601	PID operation mode selection	0259H
	P602	PID action set point	025AH
	P603	PID feedback value selection	025BH
	P604	PID figure target value setting	025CH
	P605	PID upper limit alarm value	025DH
	P606	PID lower limit alarm value	025EH
	P607	PID proportional band	025FH
	P608	PID integral time	0260H
	P609	PID differential time	0261H
	P610	PID action step-lergth	0262H
	P611	PID standby frequency	0263H
	P612	PID standby duration	0264H
	P613	PID wake-up value	0265H
	P614	PID corresponding value of display	0266H
	P615	PID digit of display	0267H
	P616	PID decimal digits of display	0268H
	P617	PID upper limit frequency	0269H
	P618	PID lower limit frequency	026AH
	P619	PID working mode	026BH
Advanced application	P800	Advanced application parameter lock	0320H
	P801	System 50Hz/60Hz setting	0321H
	P802	Constant torque or variable torque selection	0322H
	P803	Over-voltage protection setting	0323H

	P804	Under-voltage protection setting	0324H
	P805	Over-temperature protection setting	0325H
	P806	Current display filter time	0326H
	P807	0-10V analogue output low end calibration coefficient	0327H
	P808	0-10V analog output high end calibration coefficient	0328H
	P809	0-20mA analogue output low end calibration coefficient	0329H
	P810	0-20mA analog output high end calibration coefficient	032AH
	P811	Compensation frequency point for dead time	032BH
	P812	UP/DOWN frequency memory options	032CH

No number off registers to read instantaneous values of the following quantities, e.g.:

current frequency: 0002H required frequency: 0001H current, power: 0003H

Register numbers (holding or input) for recording values of the following quantities:

Requested frequency: 2001H
Alternatively, control START/STOP, enter direction 2000H
（write 000AH FWD 0006H REV 0001H STOP）