

ABB LV AC DRIVE

User Manual for PIHF Harmonic Filters

Applicable to ACS510/ACS530

ACx580-01/04

ACS880-01/04





List of Related Manuals

Drive Manuals and Guides	Code (English)	Code (Chinese)
<i>ACS510 Frequency Converter User Manual</i>	3ABD00017199	3ABD00016170
<i>ACS530 Frequency Converter Hardware Manual</i>	3AXD50000035400	3AXD50000035399
<i>ACS530 Standard Firmware Manual</i>	3AXD50000035402	3AXD50000035401
<i>ACS580-01 Frequency Converter Hardware Manual</i>	3AXD50000019738	3AXD50000018826
<i>ACS580 Standard Firmware Manual</i>	3AXD50000016097	3AXD50000016430
<i>ACS580-04 Drive Module Hardware Manual</i>	3AXD50000015497	3AXD50000016428
<i>ACH550-01 Frequency Converter User Manual</i>	3AFE68258537	3ABD00036052
<i>ACH580 Standard Firmware Manual</i>	3AXD50000027537	3ABD00045445
<i>ACH580-01 Frequency Converter Hardware Manual</i>	3AUA0000076331	3ABD00045444
<i>ACH580-04 Drive Module Hardware Manual</i>	3AXD50000048685	3ABD00046059
<i>ACQ580 Standard Firmware Manual</i>	3AXD50000035867	3ABD00045443
<i>ACQ580-01 Frequency Converter Hardware Manual</i>	3AXD50000035866	3ABD00045442
<i>ACQ580-04 Drive Module Hardware Manual</i>	3AXD50000048677	3ABD00046061
<i>ACS880-01 Hardware Manual</i>	3AUA0000078093	3AXD50000009104
<i>ACS880-04 Hardware Manual</i>	3AUA0000128301	3AXD50000023005
<i>ACS880 Primary Control Program Firmware Manual</i>	3AUA0000085967	3AXD50000009105

Tools and Maintenance Manual

<i>Drive composer PC Tool User Manual</i>	3AUA0000094606
---	----------------

Table of Contents

1. Manual Introduction

2. Safety Instructions

Contents 5

Safety of Installation and Maintenance 5

3. Guide on Installation and Debugging of Filters

Contents7

Product Overview7

Mechanical Installation10

Electrical Connection.....11

Model Information13

Technical Data.....15

Further Information

Product and service inquiries21

Product Training 21

Providing feedback on ABB Drives manuals 21

Document library on the Internet..... 21





1

Safety Instructions

Contents

The safety instructions necessary to the installation, operation and maintenance of harmonic filter units are described in this chapter. Ignoring these safety instructions may result in personal injury or damage to filters, drives, motors or other drive equipment. Please read this chapter carefully before operating the filter.

Safety of installation and maintenance

■ General safety instructions



Warning! All electrical installation and maintenance of harmonic filters shall be performed by qualified electrical engineers.

The harmonic filter and its connecting devices shall be grounded.

Never try any operation on the harmonic filter that has been powered on. After the power supply is cut off, the capacitor of the intermediate circuit shall be discharged for 5 minutes before operating the frequency converter, motor or motor cable. Before starting the operation, a voltage multimeter shall be used to check whether the incoming and outgoing terminals of harmonic filter have been discharged.

■ Safety instructions for harmonic filters

1. PIHF harmonic filter is matched with the frequency converter, which can only be mounted at the power inlet of the frequency converter.
2. The power of the selected filter shall be matched with that of the frequency converter as far as possible, to obtain the best filtering effect. If not matched, the filter with the higher power can be used for that with the lower power, but the filtering effect may be reduced.
3. A single PIHF filter can be used to power multiple frequency converters, but the total load shall not exceed the rated power value of PIHF filter.
4. The reactor in the filter is a heat generating device. It shall be mounted to keep a heat dissipation space of at least 150mm around the filter. When two filters are mounted in parallel, the distance between the filters shall be at least 200mm.
5. The capacitor in the filter is a temperature-sensitive device, of which the ambient temperature shall be kept below 50 °C .
6. A reliable ground wire shall be connected for mounting according to the wiring instructions in the circuit diagram.
7. If the harmonic filter needs to be operated, first measure whether there is any residual dangerous voltage on the incoming and outgoing terminals of the filter.

■ Grounding



Warning! Ignoring the following instructions may cause personal injury or death, and increase electromagnetic interference and equipment damage.

In any case, the harmonic filter, drive and its connecting equipment shall be grounded to ensure personal safety and reduce electromagnetic radiation and interference.

The size of the grounding conductor shall meet the requirements of local safety regulations.

2

Guide on Installation and Debugging of Filters

Contents

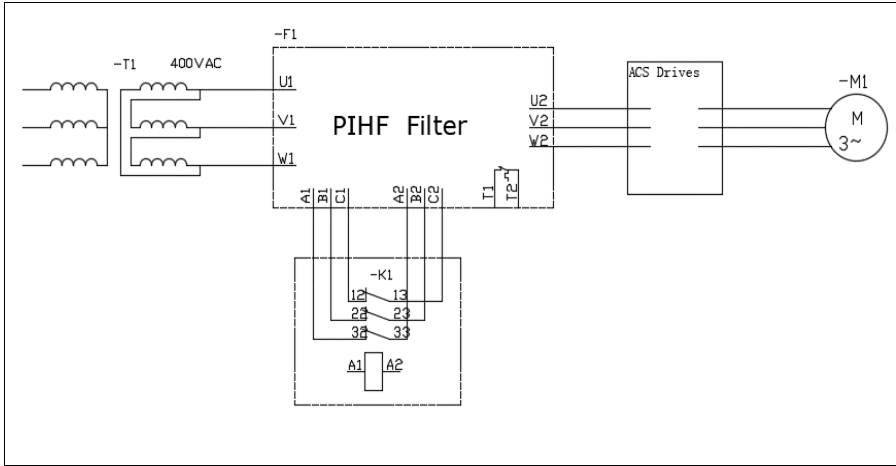
The operating principle and structure of the harmonic filter are briefly described in this chapter.

Product overview

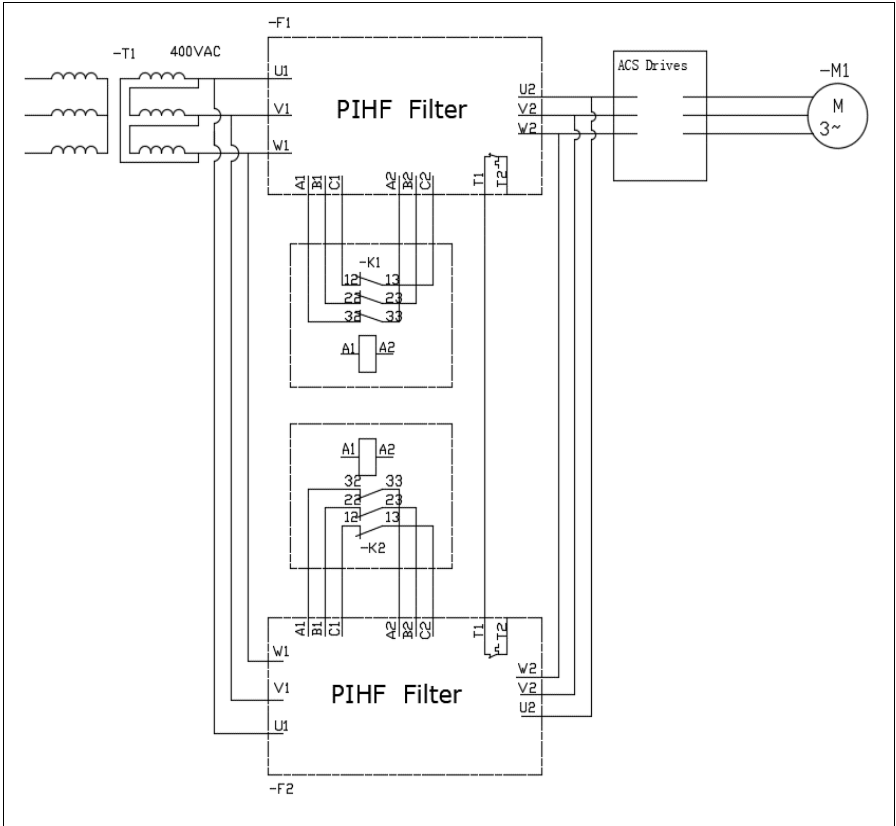
■ Wiring diagram

The harmonic filter is a low-pass filter that suppresses high-frequency harmonic currents on the input side of the drive. The figure below shows a drive system with harmonic filters.

Wiring diagram of single filter (1.5-250kW)



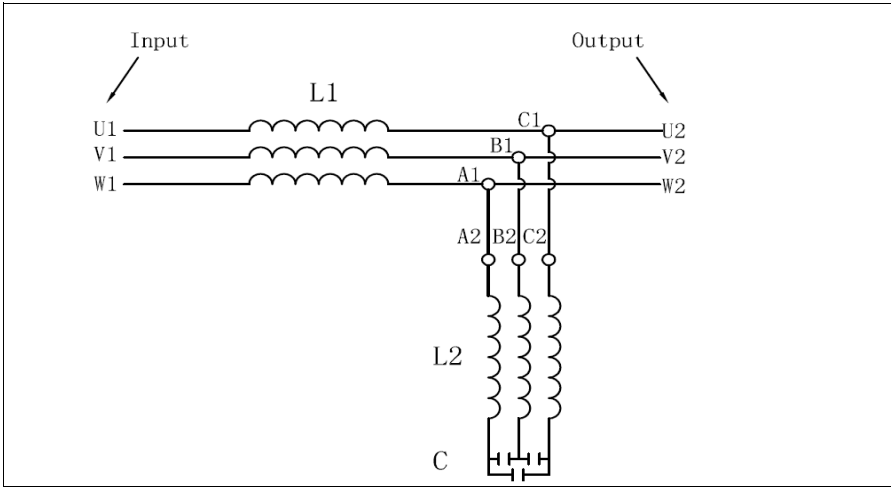
Wiring diagram of parallel filters (250-400kW)



1. The input terminals (U1,V1,W1) of the parallel filter are all connected to the power supply side, and the output terminals (U2,V2,W2) are all connected to the incoming line side of the frequency converter.
2. The over-temperature protection terminals of the parallel filter are connected in series before connection into the frequency converter.
3. Before connecting the contactor, A1-A2, B1-B2, and C1-C2 short-connected plates (short-connected for factory default) shall be removed, and the rated current of the contactor shall be greater than I_{filter} . It is recommended to use AC-3 contactors.
4. When connecting in parallel, the contactors with disconnected capacitors on each filter shall be allocated separately, and it is not allowed to share one contactor with several filters.
5. It is recommended that the cable length between the filter and the frequency converter should not be greater than 10 meters.

Electrical diagram

The figure below shows the electrical diagram of harmonic filters.



Model label



ABB Beijing Drive
Systems Co.Ltd
No.1,Block D,A-10
Jiuxianqiao Beilu
Chaoyang District
Beijing China

PIHF-0030-4-10

Un 400VAC
In 30A
f 50Hz
THDI < 10%
WGT 48kg

IP00

Origin China
Made in China





S/N: A1010026EA
3ABD00040056

FRAME

S3

Harmonic content: 10=10%

Rated voltage: 4=400V

Rated current: 0004=4A

Product: PIHF harmonic filter

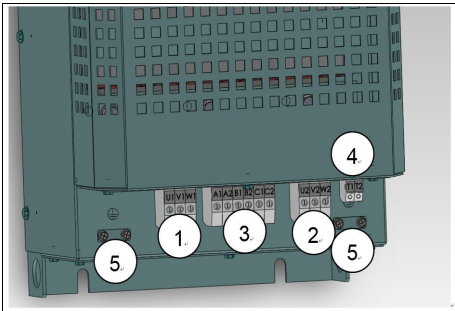
PIHF-xxxx-x-xx

Mechanical installation

The protection degree of PIHF harmonic filter is IP00. The filter shall be installed in a suitable housing or cabinet to ensure safety. The filter adopts natural cooling. Please keep a heat dissipation space of at least 150mm around the filter. If the filters are installed in parallel, the installation distance between the filters shall be at least 200mm. There shall be enough fresh cooling air for use, and hot air can freely escape from the filter housing or cabinet.

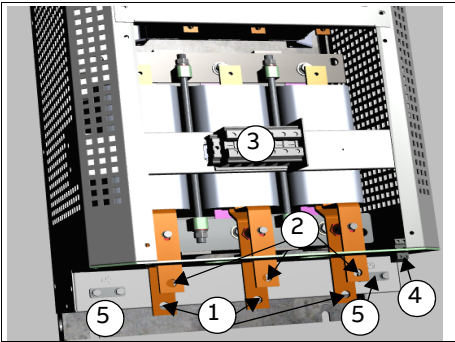
Electrical connection

S1...S4



No.	Terminal No.	Description
1	U1/V1/W1	PIHF filter input terminal
2	U2/V2/W2	PIHF filter output terminal
3	A1/B1/C1/A2/B2/C2	PIHF filter loop control terminal (external contactor control)
4	T1/T2	Overheat protection switch terminal
5		Protective earthing

S5...S6



No.	Terminal No.	Description
1	U1/V1/W1	PIHF filter input terminal
2	U2/V2/W2	PIHF filter output terminal
3	A1/B1/C1/A2/B2/C2	Filter branch bypass control terminal of PIHF filter (external contactor control)
4	T1/T2	Overheat protection switch terminal
5		Protective earthing

*For the use of bypassing the filter branch, after removing the short wiring of A1-A2, B1-B2, and C1-C2, the user selects the appropriate control contactor according to the I_{filter} current value in the selection information.

*Overheating protection terminals T1- T2 can be connected to the frequency converter as overheating protection signals. In the normal state, it is normally closed. When the temperature limit of the overheat protection is reached, the state will turn to off.

■ Typical power cable specifications (copper) and wiring torque

Harmonic filter model	Incoming and outgoing line terminal U1/V1/W1 U2/V2/W2		Capacitor switching terminal A1/B1/C1 A2/B2/C2		Temperature control terminal T1/T2		PE	
PIHF-0004-4-10	1.5mm ² AWG14	1.1-1.5 N.m	1.5mm ² AWG14	1.1-1.5 N.m	1.5mm ² AWG16	0.6-0.8 N.m	1.5mm ² AWG14	1.1-1.5 N.m
PIHF-0007-4-10								
PIHF-0012-4-10								
PIHF-0015-4-10	6mm ² AWG8	2.5-2.8 N.m	2.5mm ² AWG14	1.1-1.5 N.m	1.5mm ² AWG16	0.6-0.8 N.m	6mm ² AWG8	1.1-1.5 N.m
PIHF-0030-4-10	10mm ² AWG6		4mm ² AWG10				10mm ² AWG6	
PIHF-0045-4-10	16mm ² AWG6		4mm ² AWG10					
PIHF-0075-4-10	35mm ² AWG3	4.3-4.6 N.m	6mm ² AWG8	2.5-3 N.m	1.5mm ² AWG16	0.6-0.8 N.m	16mm ² AWG6	4.2-5.1 N.m
PIHF-0090-4-10			10mm ² AWG6					
PIHF-0160-4-10	120mm ² AWG3/0	37.5-50.8 N.m	16mm ² AWG6	2.5-3 N.m	1.5mm ² AWG16	0.6-0.8 N.m		10-13.5 N.m
PIHF-0205-4-10	150mm ² 300MCM		25mm ² AWG3	3.2-3.7 N.m			70mm ² AWG2/0	
PIHF-0290-4-10	2x95mm ² 2xAWG3/0		35mm ² AWG2				95mm ² AWG3/0	
PIHF-0363-4-10	2*150mm ²		70mm ²	8-10 N.m			150mm ²	
PIHF-0430-4-10	2x300MCM		AWG2/0				300MCM	

■ Parameter setting

Under the default setting of ACS510, the parameter **26.19** (*enabling or disabling the DC voltage regulator*) is used for disabling.

The DC voltage regulator is used to prevent possible voltage oscillation in the DC bus of the frequency converter due to the motor load or weak grid. In case of voltage fluctuation, the frequency converter will adjust the frequency reference to stabilize the bus voltage, thereby stabilizing the oscillation of load torque.

When the filter is matched with ACS510 frequency converter, if bus oscillation occurs, the parameter **26.19** shall be set to **ENABLE** state to reduce bus oscillation so as to avoid input phase loss of the frequency converter.

When the filter is matched with ACS530/ACx580/ACS880 frequency converter, the parameter **97.48** and **227.17** shall be set to obtain the same adjusting effect.

Model information

■ Selection information table

PIHF-	ACS510 -01	Frame size	ACS530 -01	Frame size	ACx580 -01	Frame size	ACS880 -01	Frame size
3ph 400VAC								
0004-4-10	-	-	02A6	R0	02A7	R1	02A4	R1
	03A3	R1	03A3	R0	03A4	R1	03A3	R1
	04A1	R1	04A0	R0	04A1	R1	04A0	R1
0007-4-10	05A6	R1	05A6	R0	05A7	R1	05A6	R1
	07A2	R1	07A2	R0	07A3	R1	07A2	R1
0012-4-10	09A4	R1	09A4	R0	09A5	R1	09A4	R1
	012A	R1	12A6	R1	12A7	R1	12A6	R1
0015-4-10	017A	R2	017A	R2	018A	R2	017A	R2
0030-4-10	025A	R2	025A	R2	026A	R2	025A	R2
	031A	R3	033A	R3	033A	R3	032A	R3
0045-4-10	038A	R3	039A	R3	039A	R3	038A	R3
	046A	R3	046A	R3	046A	R3	045A	R4
0075-4-10	060A	R4	062A	R4	062A	R4	061A	R4
	072A	R4	073A	R4	073A	R4	072A	R5
0090-4-10	088A	R4	088A	R5	088A	R5	087A	R5
0160-4-10	-	-	106A	R5	106A	R5	105A	R6
	125A	R5	145A	R6	145A	R6	145A	R6
	157A	R6	169A	R7	169A	R7	169A	R7
0205-4-10	180A	R6	-	-	-	-	-	-
	195A	R6	206A	R7	206A	R7	206A	R7
0290-4-10	246A	R6	246A	R8	246A	R8	246A	R8
	290A	R6	293A	R8	293A	R8	293A	R8
0363-4-10	-	-	363A	R9	363A	R9	363A	R9
0430-4-10	-	-	430A	R9	430A	R9	430A	R9
PIHF-	ACS510 -01	Frame size	ACS530 -01	Frame size	ACx580- 04	Frame size	ACS880 -04	Frame size
0505-4-10	-	-	-	-	505A	R10	505A	R10
0585-4-10	-	-	-	-	585A	R10	585A	R10
0650-4-10	-	-	-	-	650A	R10	650A	R10
0725-4-10	-	-	-	-	725A	R11	725A	R11

Maximum, heat dissipation and noise level

Harmonic filter model	I _{max} (A)	P _{max} (kW)	I _{filter} (A)	Noise level (dB)	Heat dissipating capacity (W)	CFMm3/h (CFM)
PIHF-0004-4-10	4.1	1.5	1.8	70	90	-
PIHF-0007-4-10	7.2	3	3	70	90	-
PIHF-0012-4-10	12.6	5.5	4.5	70	140	-
PIHF-0015-4-10	17	7.5	6	70	150	-
PIHF-0030-4-10	32	15	12	70	220	-
PIHF-0045-4-10	46	22	20	72	330	-
PIHF-0075-4-10	72	37	28	72	460	-
PIHF-0090-4-10	88	45	36	72	510	-
PIHF-0160-4-10	169	75	60	75	660	343(203)
PIHF-0205-4-10	206	110	75	75	850	343(203)
PIHF-0290-4-10	293	160	95	75	1050	592 (350)
PIHF-0363-4-10	363	200	125	75	1070	592 (350)
PIHF-0430-4-10	430	250	125	75	1150	592 (350)
PIHF-0505-4-10	505	250	-	80	1880	2*592 (2*350)
PIHF-0585-4-10	585	315	-	80	2100	2*592 (2*350)
PIHF-0650-4-10	650	355	-	80	2120	2*592 (2*350)
PIHF-0725-4-10	725	400	-	80	2200	2*1318 (2*780)

Rating	
I _{max}	Maximum sustained current
P _{max}	Maximum power
I _{filter}	Filter branch current



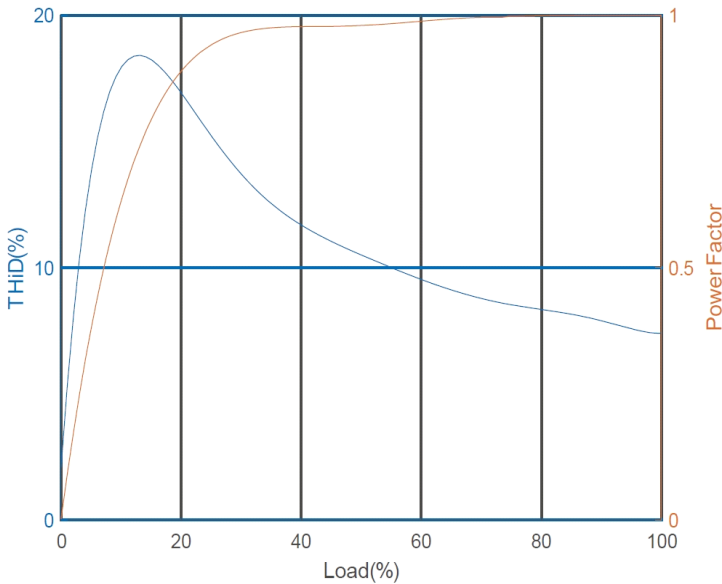
Note! The power of the selected filter shall be matched with that of the frequency converter as far as possible, to obtain the best filtering effect. If not matched, the filter with the higher power can be used for that with the lower power, but the filtering effect may be reduced.

Technical data

This chapter describes the technical specifications of the harmonic filter, such as operating conditions, frame size and parameter settings.

Power connection	
Rated voltage	Three-phase, $U_N=380$ to $415V$ +10% to -15%
Protection class	IP00
Harmonic filtering effect*	Under full load conditions, the total harmonic current distortion at the input of the filter (THDI) is less than 10% (the background voltage THDU is lower than 2%, and the ratio between the short-circuit power of the grid and the installed load is higher than 66)
Frequency	50 Hz
Insulation class	Overvoltage category III (in accordance with EN61800-5-1)
Overheating protection	155 °C
Operating conditions	
Cooling mode	Air cooling
Ambient temperature (operating)	Under full load, -25 °C to +40 °C
Storage temperature	-25 °C to +70 °C
Work altitude	0 to 2000m
Relative humidity	0 to 95%, no condensation

* In a typical motor drive system, the THDI can be reduced to less than 19% at any load ratio.Under 100% load ratio, the THDI can be controlled below 10%.



■ Frame size

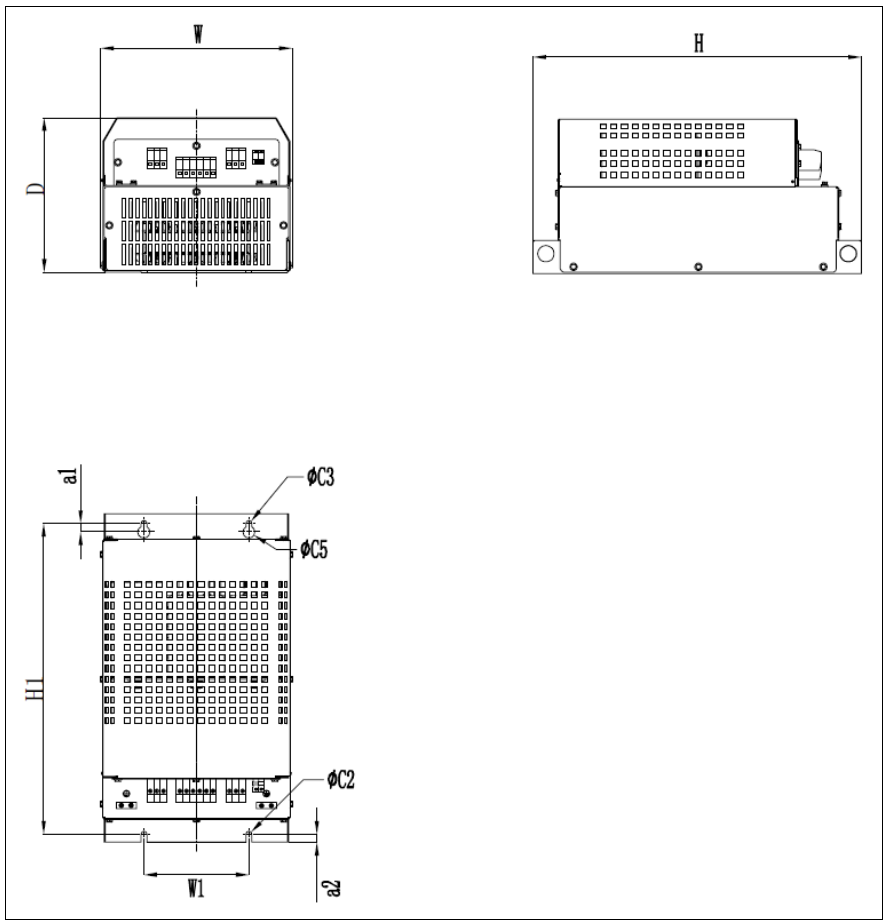
Model code of harmonic filter	Frame size	H (mm)	W (mm)	D (mm)	Weight (kg)
PIHF-0004-4-10	S1	400	220	175	12
PIHF-0007-4-10					14
PIHF-0012-4-10	S2	500	292	235	23
PIHF-0015-4-10					30
PIHF-0030-4-10	S3	600	306	275	50
PIHF-0045-4-10					55
PIHF-0075-4-10	S4	605	387	315	67
PIHF-0090-4-10					70
PIHF-0160-4-10	S5	950	455	335	140
PIHF-0205-4-10					145
PIHF-0290-4-10	S6	1060	485	365	190
PIHF-0363-4-10					195
PIHF-0430-4-10					195
PIHF-0505-4-10	PIHF-205-4-10 PIHF-290-4-10 Parallel installation	-	-	-	-
PIHF-0585-4-10	PIHF-290-4-10 PIHF-290-4-10 Parallel installation	-	-	-	-
PIHF-0650-4-10	PIHF-205-4-1 PIHF-430-4-10 Parallel installation	-	-	-	-
PIHF-0725-4-10	PIHF-290-4-10 PIHF-430-4-10 Parallel installation	-	-	-	-

■ Installation dimensions

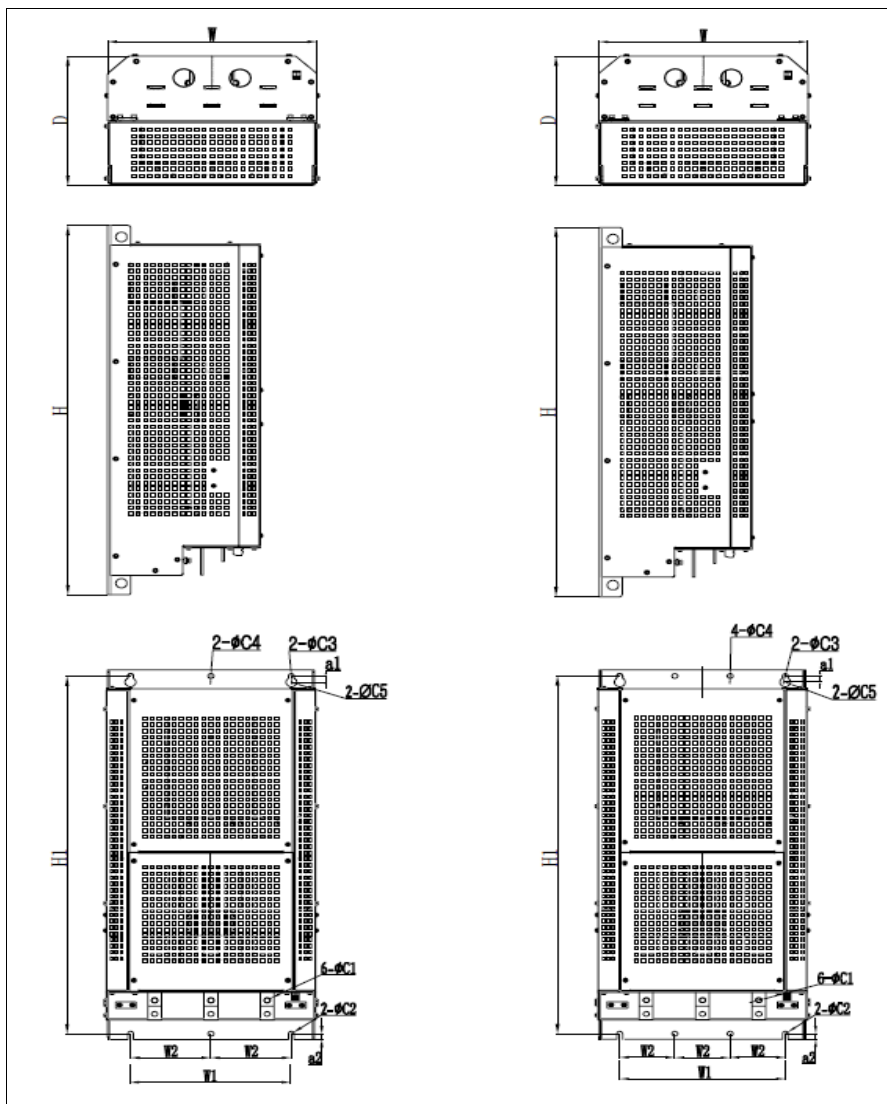
Frame size	W	W1	W2	D	H	H1	a1	a2	C1...C4	C5
S1	220	160	-	175	400	373	13	12	9	18
S2	292	160	-	235	500	473	13	12	9	18
S3	306	190	-	275	600	570	16	15	11	22
S4	387	300	-	315	605	575	16	15	11	22
S5	455	350	175	335	950	920	18	15	13	26
S6	485	375	125	365	1060	1030	18	15	13	26

Unit: mm

■ Product outline drawing (S1 to S4)

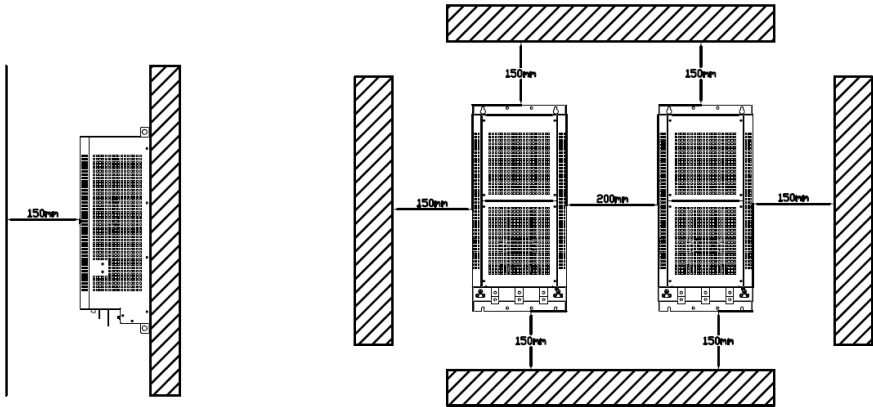


■ Product outline drawing (S5,S6)



■ **Parallel Installation Diagram**

For the model that needs two filters installed in parallel, the wall mounted mode shall be selected, and the installation distance between the filters shall be at least 200mm to ensure a sufficient heat dissipation space. The recommended installation diagram is shown as follows.





Further information

Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to abb.com/search/channels.

Product training

For information on ABB product training, navigate to new.abb.com/service/training.

Providing feedback on ABB Drives manuals

Your comments on our manuals are welcome. Navigate to new.abb.com/drives/manuals-feedback-form.

Document library on the Internet

You can find manuals and other product documents in PDF format on the Internet at abb.com/drives/documents.

Contact us

www.abb.com/drives

www.abb.com/drivespartners

ABB Beijing Drive Systems Co., Ltd.

Beijing 100015, P.R.China,

Address: Building 401, No. A-10, Jiuxianqiao Beilu, Chaoyang District, Beijing

Tel: +86 10 58217788

Fax: +86 10 58217618

24h × 365d technical hotline: +86 400 810 8885

Website: www.abb.com.cn/drives

Contact information of sales representative offices across the country:

ABB Branches in Shanghai

Shanghai, China 200023

16F, HongKong Prosperity Tower, No.763

Mengzi Road, Huangpu District

Tel: +86 21 2328 8888

Fax: +86 21 2328 8678

ABB Branches in Shenyang

Shenyang, Liaoning Province, China 110001

16F, Tower 2, City Plaza, No.206 Nanjing

North Street, Heping District

Tel: +86 24 3132 6688

Fax: +86 24 3132 6699

ABB Branches in Urumqi

Urumqi, Xinjiang, China 830002

6B, China Development Bank Tower,

Zhongquan Square, No.339 Zhongshan Road

Tel: +86 991 283 4455

Fax: +86 991 281 8240

ABB Branches in Chongqing

Chongqing, China 400021

6F, Block A, Neptune Tech Building, No.62

Starlight Road, Northern New District

Tel: +86 023 6788 5732

Fax: +86 023 6280 5369

ABB Branches in Shenzhen

Shenzhen, Guangdong Province, China

518031

Room 1504A, AVIC Center, No.1018 Huafu

Road, Futian District

Tel: +86 755 8831 3038

Fax: +86 755 8831 3033

ABB Branches in Hangzhou

Hangzhou, Zhejiang Province, China 310000

8F, Huarun Building A, No.1366 Qianjiang

Road

Tel: +86 571 8763 967

Fax: +86 571 8790 1151

ABB Branches in Changsha

Changsha, Hunan Province, China 410005

Suite 12B01, Ping He Tang Commercial

Building, No.88 Huangxing Middle Road

Tel: +86 731 8268 3005

Fax: +86 731 8444 5519

ABB Branches in Guangzhou

Guangzhou, China 519623

Unit 01-06A, 29F, Pearl River Tower, No.15

Zhujiang West Road, Zhujiang New Town

Tel: +86 20 3785 0688

Fax: +86 20 3785 0608

ABB Branches in Chengdu

Chengdu, Sichuan, China 610041

T1-8F, Raffles Plaza, No.3, Section 4,

Renmin South Road

Tel: +86 28 8526 8800

Fax: +86 28 8526 8900

ABB Branches in Xiamen

Xiamen, Fujian Province, China 361009

No. 559, Weili Road, Information and

Photoelectricity Park, Huli Torch High-tech Zone

Tel: +86 592 630 3058

Fax: +86 592 630 3531

ABB Branches in Kunming

Kunming, Yunnan Province, China 650032

Room 2404, Master Building, No.1

Chongren Street

Tel: +86 871 6315 8188

Fax: +86 871 6315 8186

ABB Branches in Zhengzhou

Zhengzhou, Henan Province, China

450007

1006 Room, Tower A, Yuda World Trade

Center, No.220 Zhongyuane Road

Tel: +86 371 6771 3588

Fax: +86 371 6771 3873

ABB Branches in Guiyang

Guiyang, Guizhou, China 550022

10F, Building 5, Century JinYuan Shopping

Center, No.6 Jinyang South Road,

Guanshanhu District

Tel: +86 851 8221 5890

Fax: +86 851 8221 5900

ABB Branches in Xi'an

Xi'an, Shaanxi Province, China, 710075

3F, No.158, Wenjing Road, Economic

and Technological Development Zone

Tel: +86 29 8575 8288

Fax: +86 29 8575 8299

ABB Branches in Wuhan

Wuhan, Hubei Province, China 430060

21F, Wuhan Wanda Center, No.96

Linjiang Road, Wuchang District

Tel: +86 27 8839 5888

Fax: +86 27 8839 5999

ABB Branches in Fuzhou

Fuzhou, Fujian Province, China 350028

706-709 Room, Tower A1, Cangshan

Wanda Plaza,

Tel: +86 591 8785 8224

Fax: +86 591 8781 4889

ABB Branches in Harbin

Harbin, Heilongjiang Province, China

150090

14F, Chenneng Building, No.99-9

Changjiang Road, Nangang District,

Harbin

Tel: +86 451 5556 2291

Fax: +86 451 5556 2295

ABB Branches in Lanzhou

Lanzhou, Gansu Province, China

730030

23F, Zhongguang Mansion, No.87

Zhangye Road, Chengguan District

Tel: +86 931 818 6466

Fax: +86 931 818 6755

ABB Branches in Jinan

Jinan, Shandong Province, China

250011

Room 8601, 6F, Huaneng Building,

No.17 Quancheng Road

Tel: +86 531 8609 2726

Fax: +86 531 8609 2724

