Altivar 61-S387

110 kW (125 HP) ... 800 kW (900 HP)

Configuration guide

English

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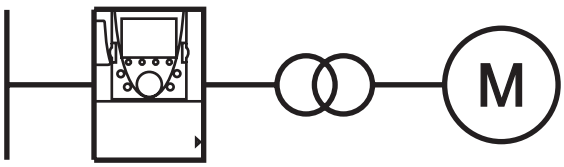

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General remarks

The following symbols should assist you in handling the instructions:

 Advice, tip !

 General information, note exactly !

The requirements for successful commissioning are correct selection of the device, proper planning and installation. If you have any further questions, please contact the supplier of the device.

Capacitor discharge !

Before performing any work on or in the device, disconnect it from the mains and wait at least 15 minutes until the capacitors have been fully discharged to ensure that there is no voltage on the device.

Automatic restart !

With certain parameter settings it may happen that the frequency inverter restarts automatically when the mains supply returns after a power failure. Make sure that in this case neither persons nor equipment is in danger.

Commissioning and service !

Work on or in the device must be done only by duly qualified staff and in full compliance with the appropriate instructions and pertinent regulations. In case of a fault contacts which are normally potential-free and/or PCBs may carry dangerous voltages. To avoid any risk to humans, obey the regulations concerning "Work on Live Equipment" explicitly.

Terms of delivery

The latest edition "General Terms of Delivery of the Austrian Electrical and Electronics Industry Association" form the basis of our deliveries and services.

Specifications in this document

We are always anxious to improve our products and adapt them to the latest state of the art. Therefore, we reserve the right to modify the specifications given in this document at any time, particular those referring to weights and dimensions. All planning recommendations and connection examples are non-binding suggestions for which we cannot assume liability, particularly because the regulations to be complied depend on the type and place of installation and on the use of the devices.

All foreign-language translations result from the German or English version. Please consider those in case of unclarity.

Basis of contract

The specifications in text and drawings of this document are no subject of contract in the legal sense without explicit confirmation.

Regulations

The user is responsible to ensure that the device and its components are used in compliance with the applicable regulations. It is not permitted to use these devices in residential environments without special measures to suppress radio frequency interferences.

Trademark rights

Please note that we do not guarantee that the connections, devices and processes described herein are free from patent or trademark rights of third parties.

Copyright

Altivar Frequency inverters for medium voltage motors

ATV61HC••N4D387 or ATV61HC••Y387

110...630, 3AC 380 to 480 V or 110...800, 3AC 500, 600 or 690 V

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Theme Page

The instructions in hand cover the topics rating and dimensioning as well as parameterization of a ATV61HC••N4D387 or ATV61HC••Y387 frequency inverter for the operation of medium voltage motors.

Use this instructions additionally to the device documentation "Description of functions" and "Mounting instructions".

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The inverter solution for medium voltage motors
(only with squared load torque)

The ATV61 adds even more numerous functions to the well-known and extremely well-proven features of the Altivar inverter range. It presents itself to the user as being even more robust with improved operation and having a clearly wider range of user possibilities.

The choice comprises the ATV61 frequency inverter in various cubicle designs in addition to the built-in and wall-mounting designs.

The basic design of the Altivar customized enclosure complies with protection degree IP23 and IP54 and includes a main switch, mains fuses, AC choke, sinus filter and motor terminals. Further installed components, such as circuit breaker, line contactor, various control options, alternatively with a field bus, safety relay, cubicle heating, and much more, see ATV61 catalogue.

In addition, special designs are available such as changed cubicle colour, cubicle cooling via an air conditioner or an air/water heat exchanger, and customer-specific control equipment.

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Application

There is a wide application area for medium voltage motors. Many existing systems from approx. 200 kW use medium voltage motors for pumps or fans. The flow control often takes place by simple mechanical components like valves and flaps and so it represents a very inefficient operation.

Also for new systems medium voltage motors with a power range below 1 MW are used. That applies mainly to pump technology for petrochemical and geothermal applications. The length of the motor cables often exceeds more than 1000 m but when using medium voltage motors undesired voltage drops at the lines can be avoided.

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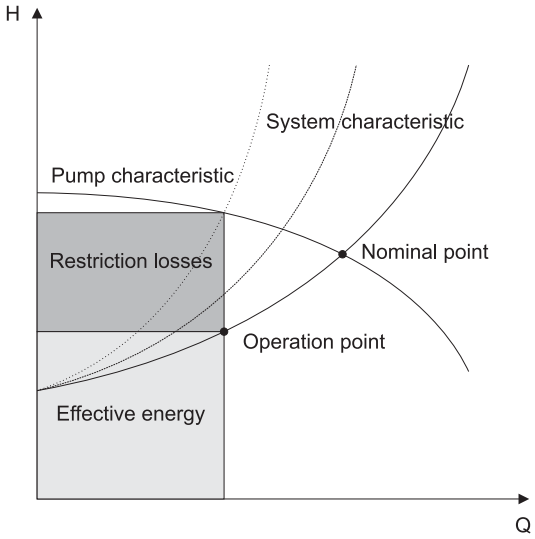
Advantages of the speed control

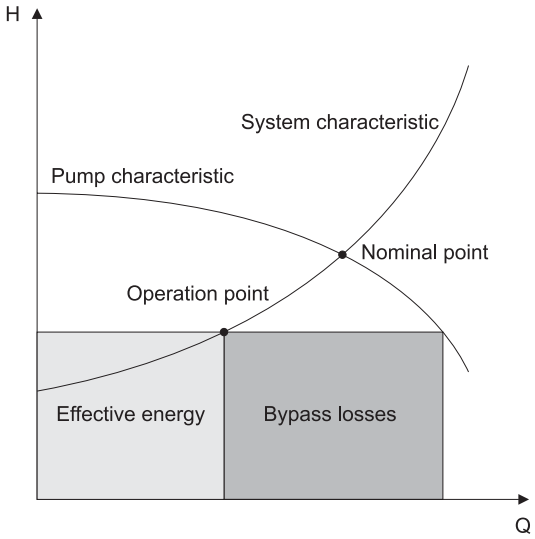
Restriction

The restriction of the flow rate is common practice. Thereby the system characteristic is changed by increasing the friction due to reduction of the cross section. The losses arising due to the restriction are proportional to the area Q x H.



Bypass

In case of a pump operated with constant speed the flow rate can be controlled in such a way that only those part is separated which is required for the system and the residual rate is returned to the intake area. The arising losses due to the returning flow medium is proportional to the area Q x H.



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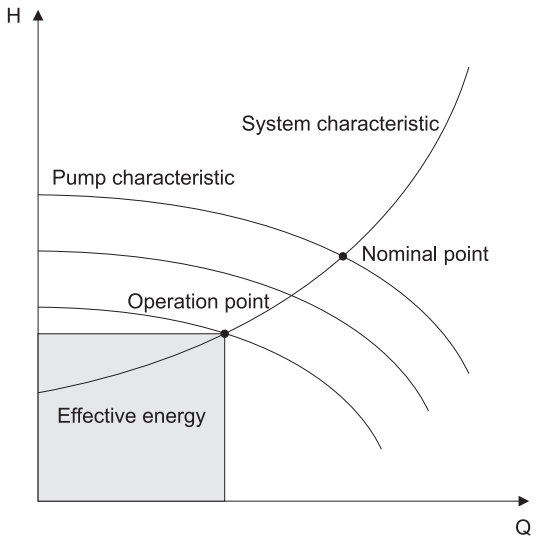
Speed control

Regarding technic and energy the most advantageous possiblity for changing the flow rate is the operation of the centrifugal pump with variable speed. This operating mode leads to a parallel displacement of the pump characteristic. In case of this method additional, continuous actuators in the system are not necessary because the pump also assumes the part of the actuator with integral function.

At the operation of a centrifugal pump the effect occurs that the efficiency remains within its optimum range for speed control ranges from 1:3 to 1:5. This property of the centrifugal pump is the basis for the fact that speed control is a very low price variant in comparison with other methods. Because of the achieved energy saving the costs for purchasing the frequency inverter amortize within short time.



Further advantages of the speed control are avoiding current peaks in the supplying mains due to direct-on-line starting as well as preserving the mechanics of the pump and avoiding shock pressures in the hydraulic system by controlled acceleration and deceleration along the set ramps.

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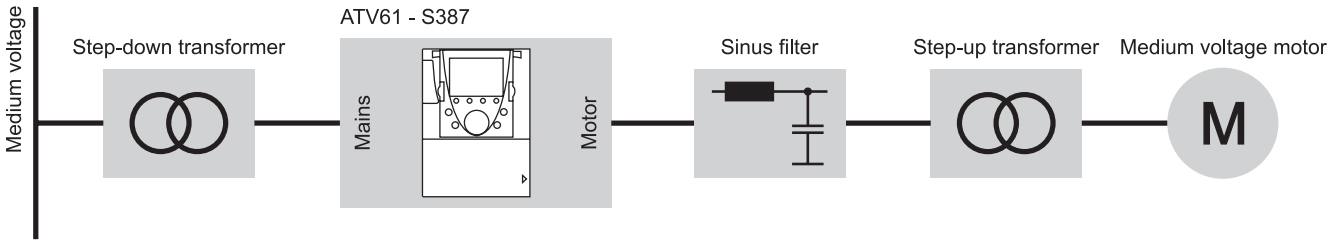
Speed control of medium voltage motors

A medium voltage frequency inverter is not the only solution for the speed control of medium voltage motors.

Based on standard well proven low voltage components the Altivar transformer solution is a very economical alternative.

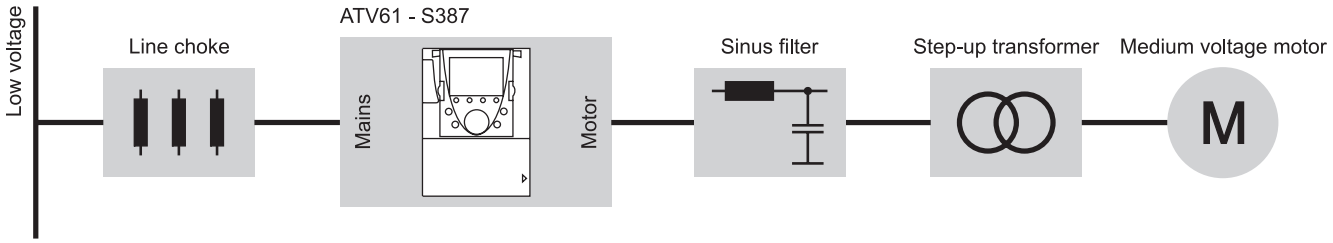
There are two configurations in principle:

1. The drive is connected in the medium voltage line of the motor



*) at V < 1 kV no sinus filter is necessary!!

2. The drive is supplied by low voltage and operates a medium voltage motor



*) at V < 1 kV no sinus filter is necessary!!

Thereby the medium voltage value of the motor is not defined because accurate adaptation takes place by the transformers.

These ATV61 are available from 110 kW and above!

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Specification

Technical data

Input		
Voltage	ATV61HC••N4D387: ATV61HC••Y387:	380 V -15% to 480 V +10% for TT, TN or IT-mains *) 500 V -15% to 690 V +10% for TT, TN or IT-mains *) not for corner grounded
Frequency	50 / 60 Hz ±5 % *)	
Overvoltage class	Class III according to EN 50178	
Output		
Control method	V/f-characteristic	
Voltage	3 AC 0...100% mains voltage, dynamic voltage stabilization	
Overload	20 % for 60 s or 35 % for 2 s	
Pulse frequency	2.5 kHz, not adjustable	
Frequency / Base frequency	0...100 Hz / 25...100 Hz, adjustable	
Short circuit protection	All-pole protected against short circuit and earth fault by means of overcurrent switch-off	
Design	Built-in unit for vertical mounting	
Cooling	forced	
Frequency resolution, digital	0.01 Hz / 50 Hz, frequency stability: ±0.01 % / 50 Hz	
Speed accuracy	Slip frequency	
Mechanical strength		
Mechanical vibration	according to IEC/EN 60068-2-6 ATV61HC11N4D387…63N4D387 ATV61HC11Y387…80Y387:	 1.5 mm in the range of 3...10 Hz, 0.6 g at 10...200 Hz (3M3 according to IEC/EN 60721-3-3)
Shock	according to IEC/EN 60068-2-27 ATV61HC11N4D387…16N4D387 ATV61HC11Y387…20Y387: ATV61HC22N4D387…63N4D387 ATV61HC25Y387…80Y387:	 7 g for 11 ms (3M3 according to IEC/EN 60721-3-3) 4 g for 11 ms (3M3 according to IEC/EN 60721-3-3)

*) See ATV61 catalogue for technical data and remarks for mains voltages.

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Ambient conditions	
Operating temperature	-10...+45°C (3K3 according to IEC/EN 60721-3-3) up to +60°C with derating
Storage / Transport temperature	-25...+70°C
Protection degree	sideways, front IP31 top IP20 (IP31 with DC box) bottom IP00 (IP31 with terminal box)
Environmental class / Humidity	Class 3K3 in accordance with IEC/EN 60721-3-3 / no condensation, max. 95 % relative humidity
Altitude	ATV61HC••N4D387: up to 1000 m, beyond power decrease up to 3000 m ATV61HC••Y387: up to 1000 m, beyond power decrease up to 2400 m
Allowed pollution	Pollution degree 2 according to EN 61800-5-1
	3C2 and 3S2 according to EN 60721-3-3
Protection class	Class 1 according EN 50178
Standards	
Basic standard	The devices are designed, built and tested on the basis of EN 50178.
EMC immunity	According to EN 61800-3, 1st and 2nd environment (IEC 1000-4-2; IEC 1000-4-3; IEC 1000-4-4; IEC 1000-4-5; IEC 1000-4-6)
EMC emission	in accordance with product standard EN 61800-3, 2nd environment, category C3
Insulation	Galvanic insulation in accordance with EN 50178 PELV (Protective Extra Low Voltage)
Approvals	CE, UL, CSA

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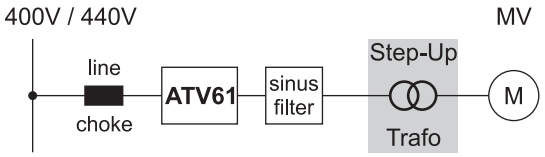
Mains voltage 400 ... 440 V, 50 Hz



The ATV61HC••N4D387 frequency inverter is supplied with low voltage. The voltage on the motor side will be transformed to medium voltage via a step-up transformer in order to supply the medium voltage motor.

ATV61HC	11N4D387	13N4D387	16N4D387	22N4D387	25N4D387
Motor rating					
P_N [kW]	110	132	160	200	250
Reachable motor power					
P [kW] V_N = 400 V	104	126	155	189	238
P [kW] V_N = 440 V	110	132	160	200	250
Nominal data					
Continuous output power					
$S_{N\,400}$ [kVA] V_N = 400 V	132	160	196	238	299
$S_{N\,440}$ [kVA] V_N = 440 V	149	181	221	270	338
Continuous output current					
I_N [A]	215	259	314	387	481
Maximum current for 60 s per 10 minutes					
I_{MAX} [A]	258	311	377	464	577
Input current					
I_{IN} [A]	188	226	271	338	418
Characteristics of the inverter					
Efficiency [%]	97.5	97.5	97.6	97.7	97.7
Losses [W] at I_N	2810	3330	3710	4450	5890
Weight approx. [kg]	60	74	80	110	140
Characteristics of sinus filter					
Losses [W] at I_N	945	1360	1600	1900	2100
Weight approx. [kg]	130	165	190	190	235
Ambient conditions					
Volume of cooling air [m^3/h]	400	600	600	800	1200
Sound pressure level [dB(A)]	61	69	71	72	73
Mains short circuit current [kA]	35	35	50	50	50

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ATV61HC	31N4D387	40N4D387	50N4D387	63N4D387
Motor rating				
P_N [kW]	315	400	500	630
Reachable motor power				
P [kW] V_N = 400 V	302	384	474	588
P [kW] V_N = 440 V	315	400	500	630
Nominal data				
Continuous output power				
$S_{N\,400}$ [kVA] V_N = 400 V	378	477	586	730
$S_{N\,440}$ [kVA] V_N = 440 V	427	539	661	826
Continuous output current				
I_N [A]	616	759	941	1188
Maximum current for 60 s per 10 minutes				
I_{MAX} [A]	739	911	1129	1426
Input current				
I_{IN} [A]	527	660	834	1037
Characteristics of the inverter				
Efficiency [%]	97.7	97.8	97.8	97.8
Losses [W] at I_N	7250	8810	11150	13830
Weight approx. [kg]	140	215	225	300
Characteristics of sinus filter				
Losses [W] at I_N	2370	3300	4100	5150
Weight approx. [kg]	235	600	600	600
Ambient conditions				
Volume of cooling air [m^3/h]	1200	1800	1800	2400
Sound pressure level [dB(A)]	73	75	75	75
Mains short circuit current [kA]	50	50	50	50

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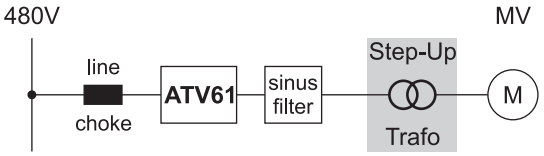
Mains voltage 480 V, 60 Hz



The ATV61HC••N4D387 frequency inverter is supplied with low voltage. The voltage on the motor side will be transformed to medium voltage via a step-up transformer in order to supply the medium voltage motor.

ATV61HC	11N4D387	13N4D387	16N4D387	22N4D387	25N4D387
Motor rating					
P_N [HP]	150	200	250	300	400
Reachable motor power					
P [HP] U_N = 480 V	150	200	245	298	376
Nominal data					
Continuous output power					
$S_{N\ 480}$ [kVA] V_N = 480 V	156	190	233	283	355
Continuous output current					
I_N [A]	215	259	314	387	481
Maximum current for 60 s per 10 minutes					
I_{MAX} [A]	258	311	377	464	577
Input current					
I_{IN} [A]	168	224	275	331	435
Characteristics of the inverter					
Efficiency [%]	97.5	97.5	97.6	97.7	97.7
Losses [W] at I_N	2810	3330	3710	4450	5890
Weight approx. [kg]	60	74	80	110	140
Characteristics of sinus filter					
Losses [W] at I_N	945	1360	1600	1900	2100
Weight approx. [kg]	130	165	190	190	235
Ambient conditions					
Volume of cooling air [m^3/h]	400	600	600	800	1200
Sound pressure level [dB(A)]	61	69	71	72	73
Mains short circuit current [kA]	35	35	50	50	50

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ATV61HC	31N4D387	40N4D387	50N4D387	63N4D387
Motor rating				
P_N [HP]	500	600	700	900
Reachable motor power				
P [HP] U_N = 480 V	475	600	700	900
Nominal data				
Continuous output power				
$S_{N\ 480}$ [kVA] V_N = 480 V	448	568	695	865
Continuous output current				
I_N [A]	616	759	941	1188
Maximum current for 60 s per 10 minutes				
I_{MAX} [A]	739	911	1129	1426
Input current				
I_{IN} [A]	544	644	760	964
Characteristics of the inverter				
Efficiency [%]	97.7	97.8	97.8	97.8
Losses [W] at I_N	7250	8810	11150	13830
Weight approx. [kg]	140	215	225	300
Characteristics of sinus filter				
Losses [W] at I_N	2370	3300	4100	5150
Weight approx. [kg]	235	600	600	600
Ambient conditions				
Volume of cooling air [m^3/h]	1200	1800	1800	2400
Sound pressure level [dB(A)]	73	75	75	75
Mains short circuit current [kA]	50	50	50	50

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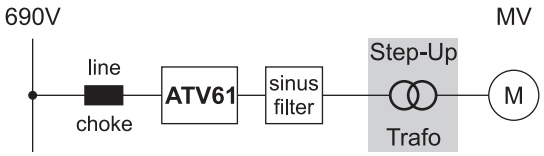
Mains voltage 690 V, 50 Hz



The ATV61HC••Y387 frequency inverter is supplied with low voltage. The voltage on the motor side will be transformed to medium voltage via a step-up transformer in order to supply the medium voltage motor.

ATV61HC	11Y387	13Y387	16Y387	20Y387	25Y387
Motor rating					
P_N [kW]	110	132	160	200	250
Reachable motor power					
P [kW] V_N = 690 V	108	130	158	192	250
Nominal data					
Continuous output power					
S_N [kVA]	139	167	201	242	326
Continuous output current					
I_N [A]	125	150	180	220	290
Maximum current for 60 s per 10 minutes					
I_{MAX} [A]	150	180	216	264	348
Input current					
I_{IN} [A]	117	137	163	199	257
Characteristics of the inverter					
Efficiency [%]	97.9	97.9	97.9	97.9	98.0
Losses [W] at I_N	2320	2750	3290	4030	5160
Weight approx. [kg]	80	80	80	80	140
Characteristics of sinus filter					
Losses [W] at I_N	800	1000	1200	1500	1900
Weight approx. [kg]	210	210	210	210	300
Ambient conditions					
Volume of cooling air [m^3/h]	600	600	600	600	1200
Sound pressure level [dB(A)]	71	71	71	71	73
Mains short circuit current [kA]	28	28	35	35	35

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ATV61HC	31Y387	40Y387	50Y387	63Y387	80Y387
Motor rating P_N [kW]	315	400	500	630	800
Reachable motor power P [kW] V_N = 690 V	315	371	495	605	749
Nominal data					
Continuous output power S_N [kVA]	395	463	612	752	924
Continuous output current I_N [A]	355	420	543	675	840
Maximum current for 60 s per 10 minutes I_{MAX} [A]	426	504	652	810	1008
Input current					
I_{IN} [A]	317	394	505	616	775
Characteristics of the inverter					
Efficiency [%]	98.0	98.0	98.0	98.0	98.0
Losses [W] at I_N	6310	7550	9660	11950	14980
Weight approx. [kg]	140	140	300	300	300
Characteristics of sinus filter					
Losses [W] at I_N	2300	2800	3200	3800	4810
Weight approx. [kg]	300	300	400	400	400
Ambient conditions					
Volume of cooling air [m^3/h]	1200	1200	2400	2400	2400
Sound pressure level [dB(A)]	73	73	75	75	75
Mains short circuit current [kA]	35	42	42	42	42

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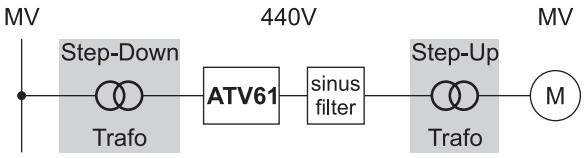
Step-down transformer (up to 6 kV mains voltage)



The ATV61HC••N4D387 frequency inverter is supplied via a step-down transformer with low voltage from a medium voltage mains. The voltage on the motor side will be transformed to medium voltage via a step-up transformer again in order to supply the medium voltage motor.

ATV61HC	11N4D387	13N4D387	16N4D387	22N4D387	25N4D387
Motor rating					
P_N [kW]	110	132	160	200	250
Reachable motor power					
P [kW] V_N = 440 V	110	132	160	200	250
Nominal data					
Continuous output power					
S_N [kVA]	151	184	224	273	342
Continuous output current					
I_N [A]	215	259	314	387	481
Maximum current for 60 s per 10 minutes					
I_{MAX} [A]	258	311	377	464	577
Input current					
I_{IN} [A]	188	226	271	338	418
Characteristics of the inverter					
Efficiency [%]	97.5	97.5	97.6	97.7	97.7
Losses [W] at I_N	2810	3330	3710	4450	5890
Weight approx. [kg]	60	74	80	110	140
Characteristics of sinus filter					
Losses [W] at I_N	945	1360	1600	1900	2100
Weight approx. [kg]	130	165	190	190	235
Ambient conditions					
Volume of cooling air [m^3/h]	400	600	600	800	1200
Sound pressure level [dB(A)]	61	69	71	72	73

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ATV61HC	31N4D387	40N4D387	50N4D387	63N4D387
Motor rating				
P_N [kW]	315	400	500	630
Reachable motor power				
P [kW] V_N = 440 V	315	400	500	630
Nominal data				
Continuous output power				
S_N [kVA]	433	546	670	836
Continuous output current				
I_N [A]	616	759	941	1188
Maximum current for 60 s per 10 minutes				
I_{MAX} [A]	739	911	1129	1426
Input current				
I_{IN} [A]	527	660	834	1037
Characteristics of the inverter				
Efficiency [%]	97.7	97.8	97.8	97.8
Losses [W] at I_N	7250	8810	11150	13830
Weight approx. [kg]	140	215	225	300
Characteristics of sinus filter				
Losses [W] at I_N	2370	3300	4100	5150
Weight approx. [kg]	235	600	600	600
Ambient conditions				
Volume of cooling air [m^3/h]	1200	1800	1800	2400
Sound pressure level [dB(A)]	73	75	75	75

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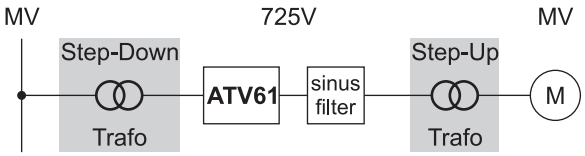
Step-down transformer (up to 6 kV mains voltage)



The ATV61HC••Y387 frequency inverter is supplied via a step-down transformer with low voltage from a medium voltage mains. The voltage on the motor side will be transformed to medium voltage via a step-up transformer again in order to supply the medium voltage motor.

ATV61HC	11Y387 *)	13Y387 *)	16Y387 *)	20Y387 *)	25Y387 *)
Motor rating					
P_N [kW]	110	132	160	200	250
Reachable motor power					
P [kW] V_N = 725 V	110	132	160	200	250
Nominal data					
Continuous output power					
S_N [kVA]	144	173	209	252	339
Continuous output current					
I_N [A]	125	150	180	220	290
Maximum current for 60 s per 10 minutes					
I_{MAX} [A]	150	180	216	264	348
Input current					
I_{IN} [A]	117	137	163	199	257
Characteristics of the inverter					
Efficiency [%]	97.9	97.9	97.9	97.9	98.0
Losses [W] at I_N	2320	2750	3290	4030	5160
Weight approx. [kg]	80	80	80	80	140
Characteristics of sinus filter					
Losses [W] at I_N	800	1000	1200	1500	1900
Weight approx. [kg]	210	210	210	210	300
Ambient conditions					
Volume of cooling air [m^3/h]	600	600	600	600	1200
Sound pressure level [dB(A)]	71	71	71	71	73

*) ... Can be used as alternative to the 400V drives.

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ATV61HC	31Y387 *)	40Y387 *)	50Y387 *)	63Y387 *)	80Y387
Motor rating					
P_N [kW]	315	400	500	630	800
Reachable motor power					
P [kW] V_N = 725 V	315	387	500	630	780
Nominal data					
Continuous output power					
S_N [kVA]	411	481	637	783	962
Continuous output current					
I_N [A]	355	420	543	675	840
Maximum current for 60 s per 10 minutes					
I_{MAX} [A]	426	504	652	810	1008
Input current					
I_{IN} [A]	317	394	505	616	775
Characteristics of the inverter					
Efficiency [%]	98.0	98.0	98.0	98.0	98.0
Losses [W] at I_N	6310	7550	9660	11950	14980
Weight approx. [kg]	140	140	300	300	300
Characteristics of sinus filter					
Losses [W] at I_N	2300	2800	3200	3800	4810
Weight approx. [kg]	300	300	400	400	400
Ambient conditions					
Volume of cooling air [m^3/h]	1200	1200	2400	2400	2400
Sound pressure level [dB(A)]	73	73	75	75	75

*) ... Can be used as alternative to the 400V drives.

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Technical data of the power transformer (step-down)

A three-phase resin-encapsulated transformer has to be used which is suitable to supply a frequency inverter with a diode rectifier.

Select the primary voltage in accordance to the mains voltage. The transformer must contain taps to adapt the voltage between ±5 % (or 2 x ±2.5 %).

The secondary voltage (no-load voltage of the transformer) is 440 V at ATV61HC••N4D387 and 725 V at ATV61HC••Y387.

Choose the nominal transformer power from the table below.

Altivar	Transformer output current	Recommended vSC	Harmonic content
ATV61HC11N4D387	188 A	4 %	42 %
ATV61HC13N4D387	226 A	4 %	42 %
ATV61HC16N4D387	271 A	4 %	42 %
ATV61HC22N4D387	338 A	4 %	42 %
ATV61HC25N4D387	418 A	4 %	42 %
ATV61HC31N4D387	527 A	4 %	42 %
ATV61HC40N4D387	660 A	6 %	35 %
ATV61HC50N4D387	6-pulse: 834 A 12-pulse: 2 x 417 A	6 %	35 %
ATV61HC63N4D387	6-pulse: 1037 A 12-pulse: 2 x 519 A	6 %	35 %
ATV61HC11Y387	117 A	4 %	42 %
ATV61HC13Y387	137 A	4 %	42 %
ATV61HC16Y387	163 A	4 %	42 %
ATV61HC20Y387	199 A	4 %	42 %
ATV61HC25Y387	257 A	4 %	42 %
ATV61HC31Y387	317 A	4 %	42 %
ATV61HC40Y387	394 A	6 %	35 %
ATV61HC50Y387	6-pulse: 505 A 12-pulse: 2 x 253 A	6 %	35 %
ATV61HC63Y387	6-pulse: 616 A 12-pulse: 2 x 308 A	6 %	35 %
ATV61HC80Y387	6-pulse: 775 A 12-pulse: 2 x 388 A	6 %	35 %

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12-pulse supply

The following inverters are standard equipped with two parallel input rectifiers and therefore are suitable for a 12-pulse rectification

ATV61HC50N4D387…HC63N4D387

ATV61HC50Y387…HC80Y387

The supply results from a separate transformer with two out-of-phase secondary windings (e.g. Yy6d5).

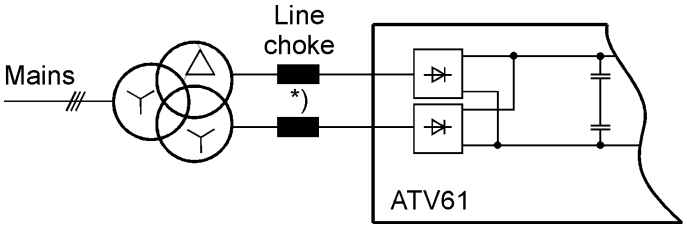
On the main side of the transformer the 5th and 7th current harmonics are practically non-existent as they have been cancelled by the shifted transformer windings.

The transformer must keep to the following tolerances in order to guarantee a constant current sharing:

Tolerance of the transmission rates ± 0.3 % of r_{NOM}

Tolerance of the relative short circuit voltage ± 5.0 % of v_{SC_NOM}

The nominal output voltage of a transformer is specified at no load operation. Therefore this value has to be appr. 5 % higher than the rated voltage of the drive.



*) Line chokes are only necessary if a transformer is used for several inverters or if the transformer power is notedly larger than the inverter power.

In case of 12-pulse supply the radio frequency interference filters, which are built into the ATV61 as standard, must be reconnected onto setting "IT mains".

Technical data of the output transformer (step-up)

A three-phase resin-encapsulated transformer has to be used.

Select the primary voltage as well as the secondary voltage (no-load voltage) of the transformer in the table below for motors with a nominal voltage of 6kV:

Input voltage of the frequency inverter	Primary voltage of the transformer	Secondary voltage of the transformer	
		at v_{SC} = 4 %	at v_{SC} = 6 %
ATV61HC••N4D387 at 400V mains	365 V	6450 V	6550 V
ATV61HC••N4D387 at 440V mains	410 V	6400 V	6500 V
ATV61HC••N4D387 at 480V mains	430 V	6450 V	6500 V
ATV61HC••N4D387 with step-down transformer	410 V	6400 V	6500 V
ATV61HC••Y387 at 690V mains	645 V	6500 V	6500 V
ATV61HC••Y387 with step-down transformer	670 V	6500 V	6500 V

The no-load voltage of the transformer can be calculated for motors with different nominal voltage as follows:

Transformer no-load voltage = Secondary transformer voltage (acc. table) * nominal motor voltage / 6000 V

Example: ATV61HC••N4D387 at 400 V mains, with step-up transformer with 4 % v_{SC} and motor with 4160 V nominal voltage

Transformer no-load voltage = 6450 V * 4160 V / 6000 V = 4472 V

☞ The transformer must be designed for a DC-voltage share of 100 mV.

Choose the primary current from the table below:

Altivar	Transformer input current	Recommended v_{SC}
ATV61HC11N4D387	215 A	4 %
ATV61HC13N4D387	259 A	4 %
ATV61HC16N4D387	314 A	4 %
ATV61HC22N4D387	387 A	4 %
ATV61HC25N4D387	481 A	4 %
ATV61HC31N4D387	616 A	4 %
ATV61HC40N4D387	759 A	4 %
ATV61HC50N4D387	941 A	6 %
ATV61HC63N4D387	1188 A	6 %
ATV61HC11Y387	125 A	4 %
ATV61HC13Y387	150 A	4 %
ATV61HC16Y387	180 A	4 %
ATV61HC20Y387	220 A	4 %
ATV61HC25Y387	290 A	4 %
ATV61HC31Y387	355 A	4 %
ATV61HC40Y387	420 A	4 %
ATV61HC50Y387	543 A	6 %
ATV61HC63Y387	675 A	6 %
ATV61HC80Y387	840 A	6 %

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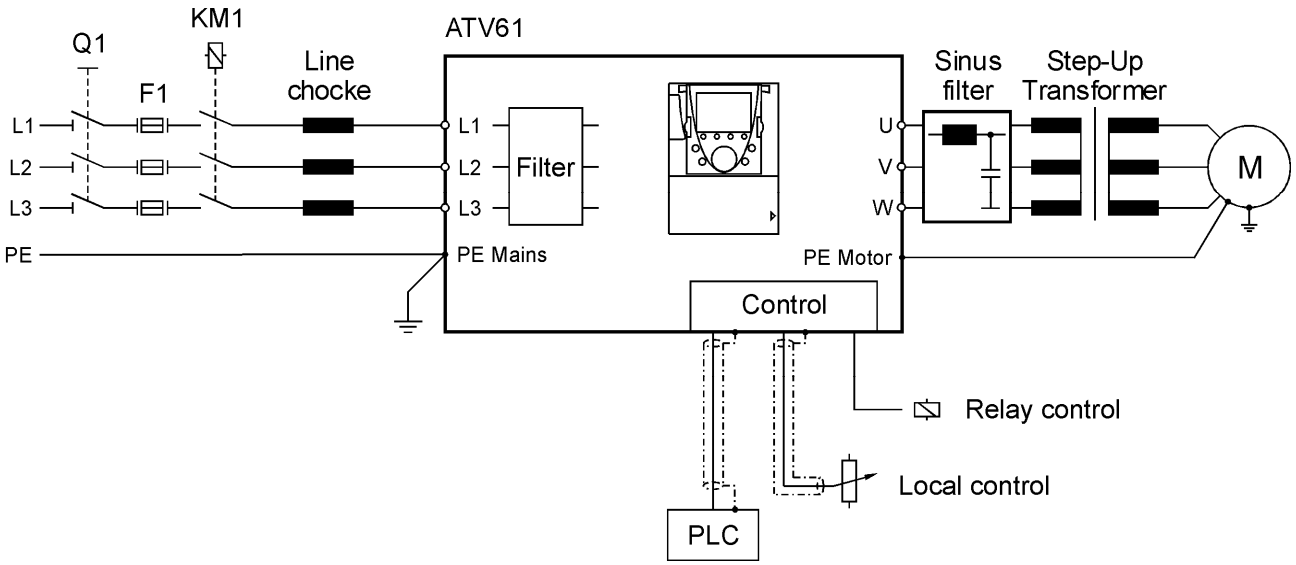
Wiring and connection

Wiring diagram for low voltage supply

The following diagrams show the typical wiring of the ATV61 frequency inverters including the options which may be required for protection of the plant or the device, depending on the application.

ATV61HC11N4D387…HC40N4D387 or ATV61HC11Y387… HC40Y387

supplied by a low voltage mains



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ATV61 ..... Frequency inverter

Q1 ..... Main switch (to be used if required according to the local regulations)

F1 ..... Mains fuses considering the table in the product catalogue (absolutely necessary)

KM1 ..... Mains contactor (to be used if required according to the local regulations)

line choke..... Line reactor
Option to reduce the current harmonics on the mains caused by the DC link.

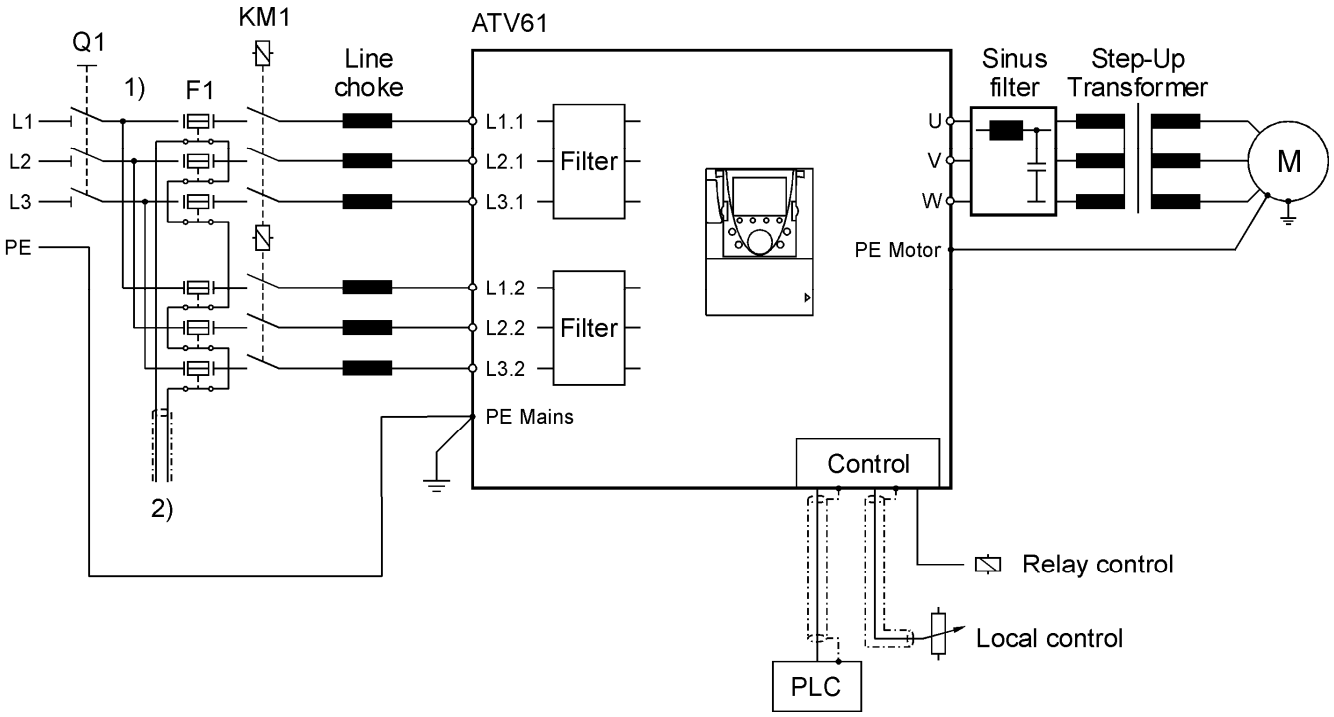
internal filter ..... Radio frequency interference filter built-in as standard
considering category C3 according to EN 61800-3 "Use in industrial environments"

sinus filter..... Output sinus filter
To uncouple the step-up transformer from the PWM output voltage of the frequency inverter.

Step-up trafo ..... Output transformer to adapt the inverter output voltage to the medium voltage motor.

ATV61HC50N4D387…HC63N4D387 or ATV61HC50Y387… HC80Y387

supplied by a low voltage mains



ATV61 .....Frequency inverter

Q1 .....Main switch (to be used if required according to the local regulations)

F1 .....Mains fuses considering the table in the product catalogue (absolutely necessary)

KM1.....Mains contactor (to be used if required according to the local regulations)

line choke.....Line reactor
Option to reduce the current harmonics on the mains caused by the DC link.

internal filter .....Radio frequency interference filter built-in as standard
considering category C3 according to EN 61800-3 "Use in industrial environments"

sinus filter.....Output sinus filter
To uncouple the step-up transformer from the PWM output voltage of the frequency inverter.

Step-up trafo .....Output transformer to adapt the inverter output voltage to the medium voltage motor.

1. The inverter supply must be split up in front of the line reactors, if they are used.
2. The monitoring of the fuses is used to protect the inverter against unbalanced load. It must act on mains contactor or pulse inhibit (e.g. assign a digital input to EtF "External fault"). This is not obligatory, because the inverter monitors the mains voltage. Therefor set the parameter IPL "Input phase loss" to "YES".

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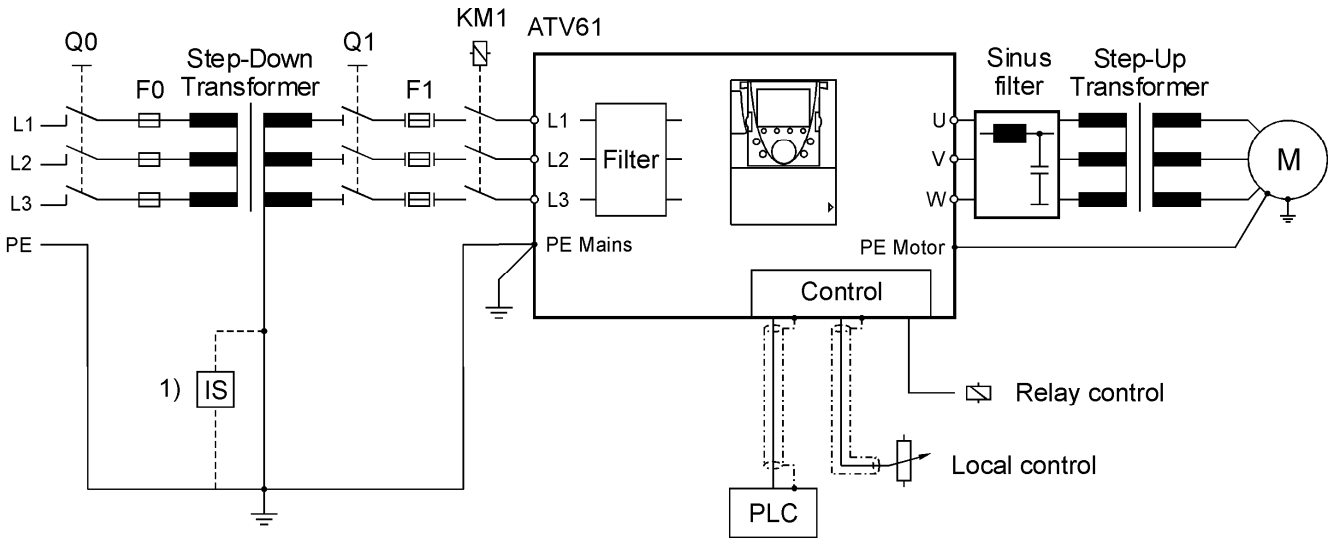
Wiring diagram for medium voltage supply

ATV61HC11N4D387…HC40N4D387 or ATV61HC11Y387… HC40Y387

with supply by means of a step-down transformer



ATV61 ..... Frequency inverter

Step-down trafo.... Mains transformer for the adaptation of the mains voltage from medium- to low voltage.

Q0 ..... Disconnecting switch (to be used according to the local regulations)

F0 ..... Mains fuses to protect the transformer (alternatively a circuit breaker can be used)

Q1 ..... Main switch (to be used if required according to the local regulations)

F1 ..... Mains fuses considering the table in the product catalogue (absolutely necessary)

KM1 ..... Mains contactor (to be used if required according to the local regulations)

internal filter ..... Radio frequency interference filter built-in as standard considering category C3 according to EN 61800-3 "Use in industrial environments"

sinus filter..... Output sinus filter
To uncouple the step-up transformer from the PWM output voltage of the frequency inverter.

Step-up trafo ..... Output transformer to adapt the inverter output voltage to the medium voltage motor.

1. The neutral point of the step-down transformer can be grounded or alternatively an insulation monitoring relay can be used.

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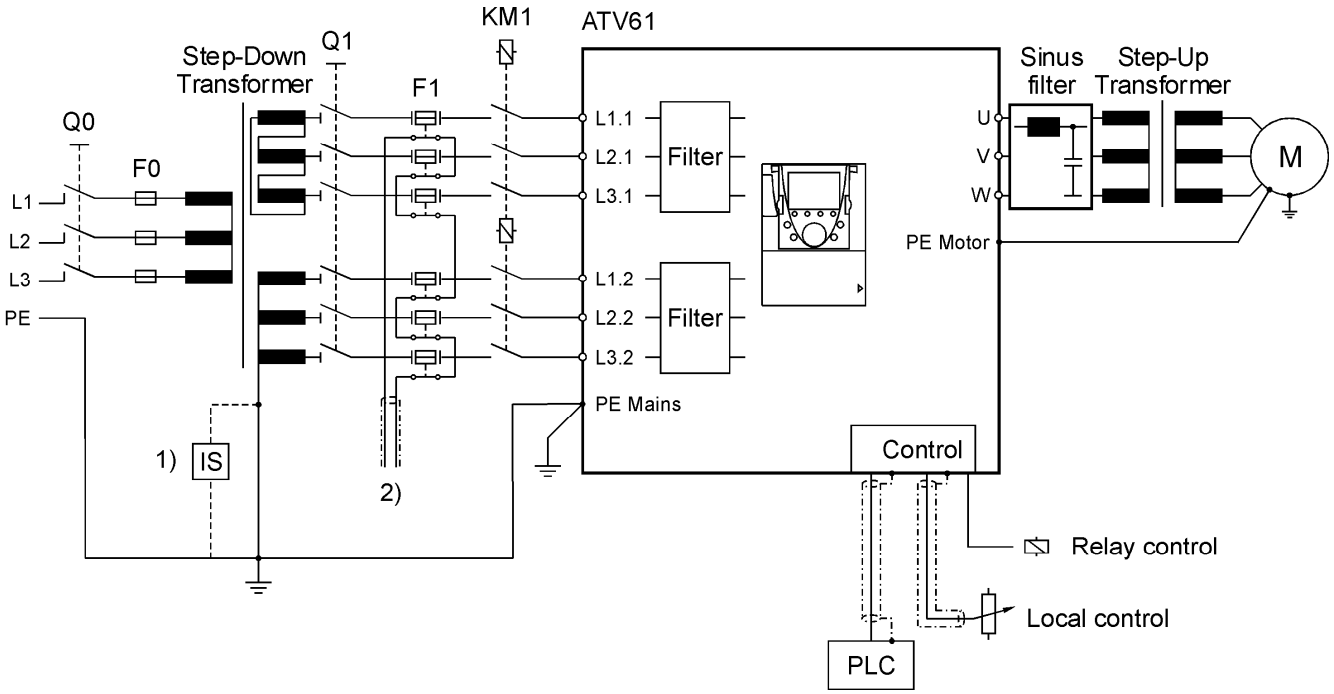
ATV61HC50N4D387…HC63N4D387 or ATV61HC50Y387… HC80Y387

with 12-pulse supply by means of a step-down transformer



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ATV61 .....Frequency inverter

Step-down trafo....Mains transformer with two out-of-phase secondary windings (e.g. Yy6 d5) for adaptation of the mains voltage from medium- to low voltage.

Q0 .....Disconnecting switch (to be used according to the local regulations)

F0 .....Mains fuses to protect the transformer (alternatively a circuit breaker can be used)

Q1 .....Main switch (to be used if required according to the local regulations)

F1 .....Mains fuses considering the table in the product catalogue (absolutely necessary)

KM1.....Mains contactor (to be used if required according to the local regulations)

TS.....Disconnecting switch (to be used according to the local regulations)

internal filter .....Radio frequency interference filter built-in as standard considering category C3 according to EN 61800-3 "Use in industrial environments"

sinus filter.....Output sinus filter
To uncouple the step-up transformer from the PWM output voltage of the frequency inverter.

Step-up trafo .....Output transformer to adapt the inverter output voltage to the medium voltage motor.

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1. The neutral point of the step-down transformer can be grounded or alternatively an insulation monitoring relay can be used.
2. The monitoring of the fuses is used to protect the inverter against unbalanced load. It must act on mains contactor or pulse inhibit (e.g. assign a digital input to EtF "External fault"). This is not obligatory, because the inverter monitors the mains voltage. Therefor set the parameter IPL "Input phase loss" to "YES".

ATV61 frequency inverters are a product of the restricted sales according to IEC 61800-3. In a residential environment this product can cause radio frequency interferences whereupon the user can be called on to take suitable measures.

Allocation table for options depending on the power

Altivar	Line choke	Sinus filter
ATV61HC11N4D387	VW3 A4 559	VW3 A5 207 S387
ATV61HC13N4D387	VW3 A4 560	VW3 A5 208 S387
ATV61HC16N4D387	VW3 A4 568	VW3 A5 209 S387
ATV61HC22N4D387	VW3 A4 561	VW3 A5 209 S387
ATV61HC25N4D387	VW3 A4 569	VW3 A5 210 S387
ATV61HC31N4D387	VW3 A4 564	VW3 A5 210 S387
ATV61HC40N4D387	VW3 A4 565	VW3 A5 211 S387
ATV61HC50N4D387	2 x VW3 A4 569	VW3 A5 211 S387
ATV61HC63N4D387	2 x VW3 A4 564	VW3 A5 211 S387
ATV61HC11Y387	VW3 A4 570	VW3 A5 212 S387
ATV61HC13Y387	VW3 A4 570	VW3 A5 212 S387
ATV61HC16Y387	VW3 A4 571	VW3 A5 212 S387
ATV61HC20Y387	VW3 A4 571	VW3 A5 212 S387
ATV61HC25Y387	VW3 A4 560	VW3 A5 213 S387
ATV61HC31Y387	VW3 A4 572	VW3 A5 213 S387
ATV61HC40Y387	VW3 A4 572	VW3 A5 213 S387
ATV61HC50Y387	2 x VW3 A4 568	VW3 A5 214 S387
ATV61HC63Y387	2 x VW3 A4 572	VW3 A5 214 S387
ATV61HC80Y387	2 x VW3 A4 572	VW3 A5 214 S387

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Parameterization

Due to the use of a step-up transformer at the inverter output all parameter data referring to the motor have to be calculated.

The autotuning function which allows high drive performance is not necessary in combination with a step-up transformer at the inverter output. Because of this the factory default settings should not be changed in normal case.

Frequency inverter settings

- UrES "Mains voltage"

Input voltage of the frequency inverter	Mains voltage (UrES)
ATV61HC••N4D387 at 400V mains	400 V
ATV61HC••N4D387 at 440V mains	440 V
ATV61HC••N4D387 at 480V mains	480 V
ATV61HC••N4D387 with step-down transformer	440 V
ATV61HC••Y387 at 690V mains	690 V
ATV61HC••Y387 with step-down transformer	690 V

- Ctt "Motor control type"
  This parameter has always to be set to "UF9“.
- LSP "Low speed"
  Remain this parameter at setting "5Hz".
- SFr "Switching freq."
  Do not change the factory default setting "2.5 kHz" of this parameter.
- OFI "Sinus filter"
  This parameter has always to be set to "YES“.

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Motor data

- nPr "Rated motor power"
  Set this parameter according to the nominal motor power of the name plate.
- nCr "Rated mot. current"
  Calculate the nominal current in accordance with the ratio of the step-up transformer in order to set this parameter.

$$nCr = I_{MOT\_LV} = \frac{I_{MOT\_HV} \times V_{TRAFO\_HV}}{V_{TRAFO\_LV}}$$

- UnS "Rated motor volt."
  Setting of the nominal point of the motor voltage. This motor voltage depends on the mains voltage of the inverter mains supply.

Input voltage of the frequency inverter	Rated motor volt. (UnS)
ATV61HC●●N4D387 at 400V mains	365 V
ATV61HC●●N4D387 at 440V mains	410 V
ATV61HC●●N4D387 at 480V mains	430 V
ATV61HC●●N4D387 with step-down transformer	410 V
ATV61HC●●Y387 at 690V mains	645 V
ATV61HC●●Y387 with step-down transformer	670 V

- FrS "Rated motor freq."
  Set this parameter according to the nominal motor frequency of the name plate.
- nSP "Rated motor speed"
- Set this parameter according to the nominal motor speed of the name plate.

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