Inverter
MICROMASTER 430

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MICROMASTER 430

Description

Applications

The MICROMASTER 430 inverter is suitable for a variety of variable-speed drive applications. Its flexibility provides for a wide spectrum of applications. It is especially suitable for use with industrial pumps and fans. The inverter is especially characterized by its customer-oriented performance and ease-of-use. It has more inputs and outputs than the MICROMASTER 420, an optimized operator panel with manual/automatic switchover and adapted software functionality.

Design

The MICROMASTER 430 inverter has a modular design.

The operator panels and communication modules can be easily exchanged.

Main characteristics

- Easy, guided start-up
- Modular construction allows maximum configuration flexibility
- Six programmable isolated digital inputs
- Two scaleable analog inputs (0 V to 10 V, 0 mA to 20 mA) can also be used as a 7th/8th digital input
- Two programmable analog outputs (0 mA to 20 mA)
- Three programmable relay outputs (30 V DC/5 A resistive load; 250 V AC/2A inductive load)
- Low-noise motor operation thanks to high pulse frequencies, adjustable (observe derating if necessary)
- Complete protection for motor and inverter
- Control of up to three additional drives on the basis of PID control (motor staging)
- Operation of drive directly on mains (with external bypass circuit)
- Low-energy mode
- Detects dry run of pumps (belt failure detection).

Options (overview)

- Line commutating chokes
- Output chokes
- LC filter
- Gland plates
- Basic Operator Panel 2 (BOP-2) for parameterizing the inverter
- Communication modules
  - PROFIBUS
  - DeviceNet
  - CANopen
- PC connection kits
- Mounting kits for installing the operator panels in the control cabinet doors
- PC start-up tools executable under Windows 95/98 and NT/2000/ XP Professional.
- TIA integration with Drive ES

International standards

- The MICROMASTER 430 inverter complies with the requirements of the EU low-voltage guideline
- The MICROMASTER 430 inverter has the $C\epsilon$ marking
- acc. to ⓤ and cⓤ certified
- c-tick ⓒ

Note:

See Appendix for standards.

Mechanical features

- Modular design
- Operating temperature –10 °C to +40 °C (+14 °F to +104 °F)
- Compact housing as a result of high power density
- Easy cable connection, mains and motor connections are separated for optimum electromagnetic compatibility
- Detachable operator panels
- Screwless control terminal strip on detachable I/O board.

Performance features

- Latest IGBT technology
- Digital microprocessor control
- Flux Current Control (FCC) for improved dynamic response and optimized motor control
- Linear *V/f* characteristic
- Quadratic *V/f* characteristic
- Multipoint characteristic (programmable *V/f* characteristic)
- Flying restart
- Slip compensation
- Automatic restart following mains failure or fault
- Energy saving mode (stopping e.g. of a pump at low speeds)
- Motor staging (connection and disconnection of additional motors, use of inverter as control drive in a pump cascade)
- Manual/automatic mode
- Load torque monitoring (detects dry run of pumps)

- High-grade internal PID controller for simple process control
- Programmable acceleration/deceleration times from 0 s to 650 s
- Ramp smoothing
- Fast Current Limit (FCL) for trip-free operation
- Fast, repeatable digital input response time
- Fine adjustment using two high-resolution 10-bit analog inputs
- Compound braking for controlled rapid braking
- Four skip frequencies
- Removable "Y" capacitor for use on IT systems (with non-grounded mains supplies, the "Y" capacitor must be removed and an output choke installed).

Protection features

- Overload capability
  7.5 kW to 90 kW:
  Overload current 1.4 x rated output current (i.e. +140 % overload capability) for 3 s, and 1.1 x rated output current (i.e. 110 % overload capability) for 60 s, cycle time 300 s
  110 kW to 250 kW:
  Overload current 1.5 x rated output current (i.e. 150 % overload capability) for 1 s, and 1.1 x rated output current (i.e. 110 % overload capability) for 59 s, cycle time 300 s
- Overvoltage/undervoltage protection
- Inverter overtemperature protection
- Special direct connection for PTC or KTY to protect the motor
- Earth fault protection
- Short-circuit protection
- I^2t motor thermal protection
- Locked motor protection
- Stall prevention
- Parameter interlock

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Circuit diagrams

General circuit diagram

Operator panel (Option)

I   Hand   Fn   ▲
O   Auto   P   ▼

BOP Serial Protocol

380 to 480 V 3 AC
PE

FS1

PE

L1, L2, L3

+10 V   1
0 V   2
AIN1+   3   A/D
AIN1-   4
≥4,7 kΩ

AIN2+   10   A/D
AIN2-   11

DIN1   5
DIN2   6
DIN3   7
DIN4   8
DIN5   16
DIN6   17

Opto isolation

PNP   Output +24 V   9
or   (isolated)
NPN   Output 0 V   28
(isolated)

PTC A   14   A/D
Motor PTC/KTY   PTC B   15

AOUT1+   12   A/D
0 - 20 mA, max. 500 Ω   AOUT1-   13

AOUT2+   26   A/D
0 - 20 mA, max. 500 Ω   AOUT2-   27

CPU

AC / DC

DC / AC

RL1 - C   20   RL1
RL1 - B   19
RL1 - A   18

Output relay contacts
250 V AC, max. 2 A (inductive load)
30 V DC, max. 5 A (resistive load)

RL2 - C   22   RL2
RL2 - B   21

RL3 - C   25   RL3
RL3 - B   24
RL3 - A   23

When a communications module is connected, the serial interface doesn't work.

P+   29   RS485
N-   30

ADA51-5048c

Not used   60 Hz
50 Hz
1   2
DIP Switches (on Control Board)

AIN1 AIN2
0 - 20 mA
0 - 10 V
1   2
DIP Switches (on I/O Board)

PE   U, V, W

M 3~

For additional digital inputs (DIN 7, DIN 8) external connections should be made:

1
2
3
4
DIN 7

1
2
10
11
DIN 8

Notes:
- When an analog input is configured as a digital input the threshold values are as follows:
  1.75 V DC = off
  3.7 V DC = on

- AIN1: 0 V to 10 V, 0 mA to 20 mA and -10 V to +10 V
  AIN2: 0 V to 10 V and 0 mA to 20 mA

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Tinamics Co., Ltd.

Terminal connection diagram

Example, frame size C

Mains connections

View A

Motor connections

View A

AIN1	AIN2
S1	S2

DIP Switches:
0 mA to 20 mA
or
0 V to 10 V

A DA51-5025

	RL1-A	RL1-B	RL1-C	RL2-B	RL2-C	RL3-A	RL3-B	RL3-C
	18	19	20	21	22	23	24	25

Output relay contacts

AOUT1+	AOUT1-	PTC A	PTC B	DIN5	DIN6	AOUT2+	AOUT2-	PE 0 V	P+	N-
12	13	14	15	16	17	26	27	28	29	30

NPN *)

| Analog output 1 | Digital inputs | Analog output 2 | RS-485 (USS-protocol) |

+10 V	0 V	AIN1+ (DIN7)	AIN1-	DIN1	DIN2	DIN3	DIN4	+24 V	AIN2+ (DIN8)	AIN2-
1	2	3	4	5	6	7	8	9	10	11

PNP *)

| Voltage supply 10 V | Analog input 1 | Digital inputs | Analog input 2 |

*) PNP or NPN possible

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Technical data

MICROMASTER 430 inverter

Mains voltage and Power ranges		3 AC 380 V to 480 V ± 10% 7.5 kW to 250 kW (variable torque)
Power frequency		47 Hz to 63 Hz
Output frequency	7.5 kW to 90 kW	0 Hz to 650 Hz
	110 kW to 250 kW	0 Hz to 267 Hz
Power factor		≥ 0.95
Inverter efficiency	7.5 kW to 90 kW	96 % to 97 %
	110 kW to 250 kW	97 % to 98 %
Overload capability	7.5 kW to 90 kW	Overload current 1.4 x rated output current (i.e. +140 % overload capability) for 3 s, and 1.1 x rated output current (i.e. 110 % overload capability) for 60 s, cycle time 300 s
	110 kW to 250 kW	Overload current 1.5 x rated output current (i.e. 150 % overload capability) for 1 s and 1.1 x rated output current (i.e. 110 % overload capability) for 60 s, cycle time 300 s
Inrush current		Less than rated input current
Control method		Linear V/f characteristic; quadratic V/f characteristic; multipoint characteristic (programmable V/f characteristic); flux current control (FCC), energy saving mode
Pulse frequency	7.5 kW to 90 kW	4 kHz (standard) 2 kHz to 16 kHz (in 2 kHz steps)
	110 kW to 250 kW	2 kHz (standard) 2 kHz to 4 kHz (in 2 kHz steps)
Fixed frequencies		15, programmable
Skip frequency ranges		4, programmable
Setpoint resolution		0.01 Hz digital 0.01 Hz serial 10 bit analog
Digital inputs		6 fully programmable isolated digital inputs; switchable PNP/NPN
Analog inputs		2 programmable analog inputs • 0 V to 10 V, 0 mA to 20 mA and −10 V to +10 V (AIN1) • 0 V to 10 V and 0 mA to 20 mA (AIN2) • both can be used as 7th/8th digital input
Relay outputs		3, programmable, 30 V DC/5 A (resistive load); 250 V AC/2A (inductive load)
Analog outputs		2, programmable (0/4 mA to 20 mA)
Serial interfaces		RS-485, optional RS-232
Motor cable length	7.5 kW to 90 kW without output choke	max. 50 m (shielded) max. 100 m (unshielded)
	without output choke 110 kW to 250 kW	see variant dependent options
	without output choke	max. 100 m (shielded) max. 150 m (unshielded)
	with output choke	Available soon
Electromagnetic compatibility	7.5 kW to 90 kW	Inverter with internal filter Class A available
	For inverters without filter 7.5 kW to 15 kW	EMC filter, Class B to EN 55 011 available as an option
	18.5 kW to 90 kW	EMC filter, Class B from Schaffner available as an option
	110 kW to 250 kW	EMC filter, Class A available as an option
Braking		DC braking, compound braking
Degree of protection		IP20
Operating temperature range	7.5 kW to 90 kW	−10 °C to +40 °C (+14 °F to +104 °F)
	110 kW to 250 kW	0 °C to +40 °C (+32 °F to +104 °F)
Storage temperature		−40 °C to +70 °C (−40 °F to +158 °F)
Relative humidity		95 % (non-condensing)
Installation altitude	7.5 kW to 90 kW	Up to 1000 m above sea level without derating
	110 kW to 250 kW	Up to 2000 m above sea level without derating
Protection features for		undervoltage, overvoltage, overload, earth faults, short-circuits, stall prevention, locked motor protection, motor overtemperature, inverter overtemperature, parameter change protection
Conformity with standards	7.5 kW to 90 kW	ⓤ, cⓤ, CE, c-tick ⚡
	110 kW to 250 kW	ⓤ available soon, cⓤ available soon, CE
CE marking		Conformity with low-voltage directive 73/23/EEC

Dimensions and weights (without options)	Frame size (FS)	H x W x D (mm)	Weight, approx. (kg)
	C	245 x 185 x 195	5.7
	D	520 x 275 x 245	17
	E	650 x 275 x 245	22
	F without filter	850 x 350 x 320	56
	F with filter	1150 x 350 x 320	75
	FX	1400 x 326 x 356	116
	GX	1533 x 326 x 545	176

Derating data

Pulse frequency

Output (for 3 AC 400 V)	Rated output current in A for a pulse frequency of							
kW	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
7.5	19.0	19.0	17.1	15.2	13.3	11.4	9.5	7.6
11.0	26.0	26.0	24.7	23.4	20.8	18.2	15.6	13.0
15.0	32.0	32.0	28.8	25.6	22.4	19.2	16.0	12.8
18.5	38.0	38.0	36.1	34.2	30.4	26.6	22.8	19.0
22	45.0	45.0	40.5	36.0	31.5	27.0	22.5	18.0
30	62.0	62.0	55.8	49.6	43.4	37.2	31.0	24.8
37	75.0	75.0	71.3	67.5	60.0	52.5	45.0	37.5
45	90.0	90.0	81.0	72.0	63.0	54.0	45.0	36.0
55	110.0	110.0	93.5	77.0	63.3	49.5	41.3	33.0
75	145.0	145.0	123.3	101.5	83.4	65.3	54.4	43.5
90	178.0	178.0	138.0	97.9	84.6	71.2	62.3	53.4
110	205.0	180.4	–	–	–	–	–	–
132	250.0	220.0	–	–	–	–	–	–
160	302.0	265.8	–	–	–	–	–	–
200	370.0	325.6	–	–	–	–	–	–
250	477.0	419.8	–	–	–	–	–	–

Operating temperature

Inverter 7.5 kW to 90 kW

G_DA51_EN_05045b

Inverter 110 kW to 250 kW

ADA51-5047a

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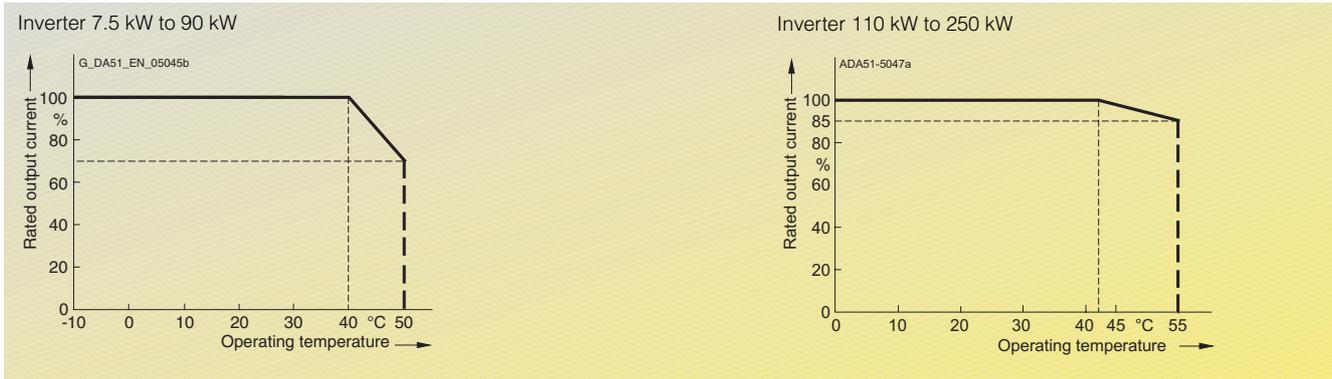
Technical data

Derating data (continued)

Installation height above sea level

Permissible output current
in % of the rated output current
Inverter 7.5 kW to 90 kW

ADA51-5018c

Inverter 110 kW to 250 kW

ADA51-5046
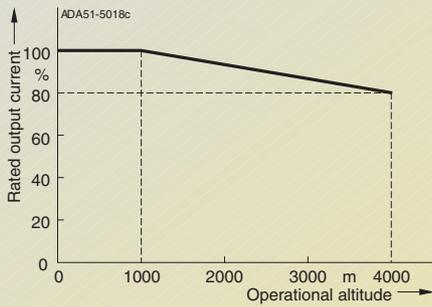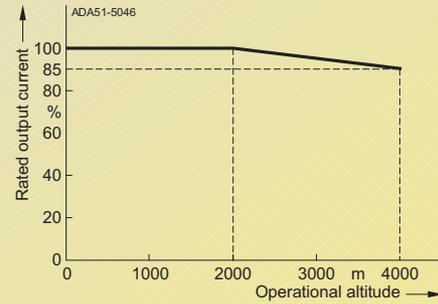
Permissible mains voltage
in % of the max. possible mains voltage
Inverter 7.5 kW to 90 kW

ADA51-5019b

Inverter 110 kW to 250 kW

ADA51-5019b
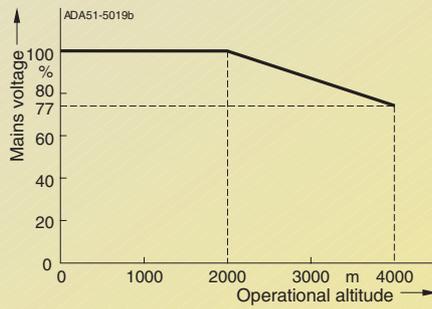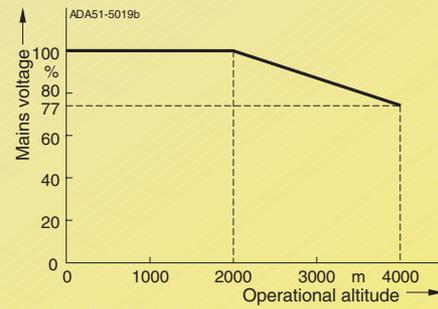
MICROMASTER 430 inverter

Output		Rated input current	Rated output current	Frame size	Order No.	
					MICROMASTER 430 without filter [4])	**MICROMASTER 430 with internal filter Class A [3])**
kW	hp	A	A	(FS)		
Mains operating voltage 3 AC 380 V to 480 V						
7.5	10	20.2 [1])	19	C	**6SE6430-2UD27-5CA0**	**6SE6430-2AD27-5CA0**
11.0	15	29.0 [1])	26	C	**6SE6430-2UD31-1CA0**	**6SE6430-2AD31-1CA0**
15.0	20	39.0 [1])	32	C	**6SE6430-2UD31-5CA0**	**6SE6430-2AD31-5CA0**
18.5	25	45.2 [1])	38	D	**6SE6430-2UD31-8DA0**	**6SE6430-2AD31-8DA0**
22	30	54.7 [1])	45	D	**6SE6430-2UD32-2DA0**	**6SE6430-2AD32-2DA0**
30	40	74.8 [1])	62	D	**6SE6430-2UD33-0DA0**	**6SE6430-2AD33-0DA0**
37	50	91.0 [1])	75	E	**6SE6430-2UD33-7EA0**	**6SE6430-2AD33-7EA0**
45	60	111.0 [1])	90	E	**6SE6430-2UD34-5EA0**	**6SE6430-2AD34-5EA0**
55	75	143.0 [1])	110	F	**6SE6430-2UD35-5FA0**	**6SE6430-2AD35-5FA0**
75	100	190.0 [1])	145	F	**6SE6430-2UD37-5FA0**	**6SE6430-2AD37-5FA0**
90	120	223.0 [1])	178	F	**6SE6430-2UD38-8FA0**	**6SE6430-2AD38-8FA0**
110	150	204.5 [2])	205	FX	**6SE6430-2UD41-1FA0**	–
132	200	244.5 [2])	250	FX	**6SE6430-2UD41-3FA0**	–
160	250	296.4 [2])	302	GX	**6SE6430-2UD41-6GA0**	–
200	300	354.0 [2])	370	GX	**6SE6430-2UD42-0GA0**	–
250	350	442.0 [2])	477	GX	**6SE6430-2UD42-5GA0**	–

See Appendix for note on ordering.

All MICROMASTER 430 inverters are supplied with a Status Display Panel (SDP). A BOP-2 or other options have to be ordered separately (see Pages 3/11 to 3/13).

Motors for MICROMASTER 430

Catalog M 11 contains selection and ordering data for motors which are particularly suitable for operation with the MICROMASTER 430 inverters (see Appendix for overview).

This catalog is suitable for IEC motors. For motors according to US standards (NEMA) please refer to: http://www.sea.siemens.com/motors

1) Supplementary conditions: Input current at rated operating point, applicable at short-circuit voltage of the supply U_{SC} = 1 % with reference to the inverter rated power and rated mains operating voltage of 400 V without a line commutating choke.

If a line commutating choke is used, the specified values at 380 V to 480 V are reduced to between 70 % and 80 %

2) Supplementary conditions: Input current at rated operating point, applicable at short-circuit voltage of the supply $U_{SC} \geq 2.33$ % with reference to the inverter rated power and rated mains voltage of 400 V.

3) Use of MICROMASTER inverters with internal filter is not permissible on non-grounded mains supplies.

4) Generally suited to heavy industrial applications. For details please refer to Appendix on page A/4.

MICROMASTER 430

Overview

EMC filter, Class A

All 7.5 kW to 90 kW inverters are supplied with an internal filter Class A.
For inverters 110 kW to 250 kW, EMC filters Class A are available. In this performance range, the EMC filters are only permitted to be used in combination with a line commutating choke.

The requirements are fulfilled using shielded cables with a max. length of 25 m.

EMC filter, Class B

Available for inverters 7.5 kW to 15 kW with an internal Class A EMC filter.

The requirements are fulfilled using shielded cables with a max. length of 25 m.

For inverters 18.5 kW to 90 kW without filters, EMC filters of Class B from Schaffner can be used.

The requirements are fulfilled using shielded cables with a max. length of 25 m to 50 m (depending on the type, details on request).

With this filter, the inverter complies with the emission standard EN 55 011, Class B.

Leakage currents:

The leakage currents of the inverters with/without filter (internal/external) may exceed 30 mA. Typical values in practice are between 10 mA and 50 mA. The exact values depend on the design, environment and cable lengths. Interference-free operation with residual current operated devices with a trigger value of 30 mA cannot be guaranteed.

However, operation with residual current operated devices with a trigger value of 300 mA is possible. Please refer to the Instruction Manual for details.

LC filter

The LC filter limits the rate of rise of voltage and the capacitive charge/discharge currents which usually occur with inverter operation. This means that much longer shielded motor cables are possible when using LC filters and the service life of the motor achieves values similar to those with direct mains operation. Use of an output choke isn't required with that. The LC filters can be used for all MICROMASTER 430 inverters of frame sizes C to F.

- Frame size C:
Only one footprint component is permissible for frame size C. If a line choke and LC filter are used, the line choke must be located on the left of the inverter. Required spacing: 75 mm.

- Frame sizes D to F:
The LC filters, frame sizes D to F, are designed for mounting upright in the control cabinet. Due to leakage flux lines caused by physical sources, a minimum distance of 50 mm to adjacent modules and metal parts is recommended.

Please note when using LC filters:

- Only *V/f*, FCC control permissible
- Increased inverter load: approx. 10 % to 15 %
- Operation only permissible with 4 kHz pulse frequency
- The output frequency is limited to 150 Hz.

Line commutating choke

Line commutating chokes are used to smooth voltage peaks or to bridge commutating dips.
In addition, line commutating chokes reduce the effects of harmonics on the inverter and the power supply. If the line impedance is < 1 %, a line commutating choke must be used in order to reduce the current peaks.

No limits are currently defined in the EN 61 000-3-2 standard for professionally used devices with a connected load > 1 kW.

This means that the inverters with an output power ≥ 0.75 kW comply with the EN 61 000-3-2 standard.

Output choke

Output chokes can be supplied for reducing the capacitive compensation currents and d*V*/d*t* in the case of motor cables >50 m (shielded) or > 100 m (unshielded).

For max. permissible cable lengths, see Technical Data.

Gland plate

Gland plates are available for inverters of frame size C. In frame sizes D, E and F, the gland plates are integrated.

The gland plate facilitates the shield connection of power and control cables and thus ensure optimum EMC performance.

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Technical data

LC filter

Mains voltage	3 AC 380 V to 480 V
Current at (40 °C / 50 °C)	
For frame size C (7.5 to 15 kW)	32.6 A/ 29.7 A
For frame size D (18.5 kW)	38.8 A/ 32 A
For frame size D (22 kW)	45.9 A/ 38 A
For frame size D (30 kW)	63.2 A/ 45 A
For frame size E (37 kW)	76.5 A/ 62 A
For frame size E (45 kW)	112.2 A/ 90 A
For frame size F (55 kW)	112.2 A/ 90 A
For frame size F (75 kW)	147.9 A/110 A
For frame size F (90 kW)	181.6 A/145 A
Limiting of motor overvoltage	≤ 1078 V
dV/dt limiting	≤ 500 V/μs
Pulse frequency	4 kHz
Max. motor frequency	150 Hz
Max. permissible motor cable lengths Shielded	200 m
Unshielded	300 m
Insulation strength	Overvoltage category III to VDE 0110
Electromagnetic compatibility	Up to 200 m motor cable length with emissions to Class A according to EN 55 011 in conjunction with filtered inverters and unshielded cables
Conformity	CE according to the low-voltage directive 73/23/EEC
Approvals	UL available soon
Strain resistance	EN 60 068-2-31
Humidity	95 % humidity, non-condensing
Degree of protection Frame size C	IP20 (to EN 60 529)
Frame sizes D to F	IP00 / IP20 (to EN 60 529 with terminal covers)
Insulation class	H (180 °C)
Temperature range Operation	−10 °C to +40 °C (+14 °F to +104 °F) 100 % P_n
	to +50 °C (to +122 °F) 80 % P_n
Storage	−25 °C to +70 °C (−13 °F to +158 °F)
Installation altitude Frame size C	Up to 2000 m: 100 % P_n
	2000 to 4000 m: 62.5 % P_n
Frame sizes D to F	to 1000 m: 100 % P_n
	1000 to 4000 m: 12.5 % derating for each 1000 m
Mounting position	Vertical
Free space	100 mm
	100 mm
	100 mm
Connection system Input, litz wire or terminal	1U1, 1V1, 1W1
Output, terminals	1U2, 1V2, 1W2
Torque for conductor connections	Terminal cross-section Torque
Frame size C	– 1.5 Nm to 1.8 Nm
Frame sizes D to F	16 mm² 2.0 Nm to 4.0 Nm
	35 mm² 2.5 Nm to 5.0 Nm
	50 mm² 3.0 Nm to 6.0 Nm
	95 mm² 6.0 Nm to 12.0 Nm
	150 mm² 10.0 Nm to 20.0 Nm
Weight, approx. for frame size C	29 kg
for frame size D	21 kg to 34 kg
for frame size E	49.5 kg to 67 kg
for frame size F	67 kg to 77.5 kg

Max. permissible cable lengths from the motor to the inverter when using output chokes

The following table shows the maximum permissible cable lengths from the motor to the inverter when using output chokes.

Frame size	Output choke	Max. permissible motor cable lengths (shielded/unshielded) for a mains voltage of	
(FS)	Type	380 V to 400 V ± 10 %	401 V to 480 V ± 10 %
C	6SE6400-3TC03-2CD3	200 m/300 m	100 m/150 m
D to F	6SE6400-3TC . .-. . D0	200 m/300 m	200 m/300 m
FX/GX	Available soon		

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MICROMASTER 430

Options
Variant dependent options

Selection and ordering data

The options listed here (filters, chokes, gland plates, fuses and circuit-breakers) must be selected to match the inverter.

The inverter and the associated options have the same voltage ratings.

All options are certified to ⓤ, except fuses.
The 3NE1 fuses are ⓤ-listed (equivalent to Ⓡ).

● Use in America requires Ⓡ-listed fuses such as the Class NON range from Bussmann.

Mains voltage	Output		Inverter **without** filter	Order No. of the options		
	kW	hp		**EMC filter, Class A**	**EMC filter, Class B**	**LC filter**
3 AC 380 V to 480 V	7.5	10	6SE6430-2UD27-5CA0	–	–	**6SE6400-3TD03-2CD0**
	11.0	15	6SE6430-2UD31-1CA0	–	–	
	15.0	20	6SE6430-2UD31-5CA0	–	–	
	18.5	25	6SE6430-2UD31-8DA0	–	EMC filter, Class B, available from Schaffner	**6SE6400-3TD03-7DD0**
	22	30	6SE6430-2UD32-2DA0	–		**6SE6400-3TD04-8DD0**
	30	40	6SE6430-2UD33-0DA0	–		**6SE6400-3TD06-1DD0**
	37	50	6SE6430-2UD33-7EA0	–		**6SE6400-3TD07-2ED0**
	45	60	6SE6430-2UD34-5EA0	–		**6SE6400-3TD11-5FD0**
	55	75	6SE6430-2UD35-5FA0	–		
	75	100	6SE6430-2UD37-5FA0	–		**6SE6400-3TD15-0FD0**
	90	120	6SE6430-2UD38-8FA0	–		**6SE6400-3TD18-0FD0**
	110	150	6SE6430-2UD41-1FA0	**6SL3000-0BE32-5AA0 *)**	–	Available soon
	132	200	6SE6430-2UD41-3FA0	**6SL3000-0BE34-4AA0 *)**	–	
	160	250	6SE6430-2UD41-6GA0		–	
	200	300	6SE6430-2UD42-0GA0		–	
	250	350	6SE6430-2UD42-5GA0	**6SL3000-0BE36-0AA0 *)**	–	

*) Must be used in combination with a line commutating choke.

Mains voltage	Output		Inverter **without** filter	Order No. of the options		
	kW	hp		**Line commutating choke**	**Output choke**	**Gland plate**
3 AC 380 V to 480 V	7.5	10	6SE6430-2UD27-5CA0	**6SE6400-3CC02-2CD3**	**6SE6400-3TC03-2CD3**	**6SE6400-0GP00-0CA0**
	11.0	15	6SE6430-2UD31-1CA0			
	15.0	20	6SE6430-2UD31-5CA0	**6SE6400-3CC03-5CD3**		
	18.5	25	6SE6430-2UD31-8DA0	**6SE6400-3CC04-4DD0**	**6SE6400-3TC05-4DD0**	Integrated as standard
	22	30	6SE6430-2UD32-2DA0		**6SE6400-3TC03-8DD0**	
	30	40	6SE6430-2UD33-0DA0	**6SE6400-3CC05-2DD0**	**6SE6400-3TC05-4DD0**	
	37	50	6SE6430-2UD33-7EA0	**6SE6400-3CC08-3ED0**	**6SE6400-3TC08-0ED0**	
	45	60	6SE6430-2UD34-5EA0		**6SE6400-3TC07-5ED0**	
	55	75	6SE6430-2UD35-5FA0	**6SE6400-3CC11-2FD0**	**6SE6400-3TC14-5FD0**	
	75	100	6SE6430-2UD37-5FA0		**6SE6400-3TC15-4FD0**	
	90	120	6SE6430-2UD38-8FA0	**6SE6400-3CC11-7FD0**	**6SE6400-3TC14-5FD0**	
	110	150	6SE6430-2UD41-1FA0	**6SL3000-0CE32-3AA0**	Available soon	
	132	200	6SE6430-2UD41-3FA0	**6SL3000-0CE32-8AA0**		
	160	250	6SE6430-2UD41-6GA0	**6SL3000-0CE33-3AA0**		
	200	300	6SE6430-2UD42-0GA0	**6SL3000-0CE35-1AA0**		
	250	350	6SE6430-2UD42-5GA0			

Mains voltage	Output		Inverter **without** filter	Order No. of the options		
				Fuses (see Catalog LV 10)		**Circuit-breaker**
	kW	hp		**3NA3**	**3NE1 (Ⓡ)**	(see Catalog LV 10)
3 AC 380 V to 480 V	7.5	10	6SE6430-2UD27-5CA0	3NA3807	●	3RV1031-4EA10
	11.0	15	6SE6430-2UD31-1CA0	3NA3812		3RV1031-4FA10
	15.0	20	6SE6430-2UD31-5CA0	3NA3814		3RV1031-4HA10
	18.5	25	6SE6430-2UD31-8DA0	3NA3820	3NE1817-0	3RV1042-4KA10
	22	30	6SE6430-2UD32-2DA0	3NA3822	3NE1818-0	
	30	40	6SE6430-2UD33-0DA0	3NA3824	3NE1820-0	3RV1042-4MA10
	37	50	6SE6430-2UD33-7EA0	3NA3830	3NE1021-0	3VL1712-.DD33-....
	45	60	6SE6430-2UD34-5EA0	3NA3832	3NE1022-0	3VL1716-.DD33-....
	55	75	6SE6430-.UD35-5FA0	3NA3836	3NE1224-0	3VL3720-.DC36-....
	75	100	6SE6430-2UD37-5FA0	3NA3140	3NE1225-0	3VL3725-.DC36-....
	90	120	6SE6430-2UD38-8FA0	3NA3144	3NE1227-0	3VL4731-.DC36-....
	110	150	6SE6430-2UD41-1FA0	–		On request
	132	200	6SE6430-2UD41-3FA0	–	3NE1230-0	
	160	250	6SE6430-2UD41-6GA0	–	3NE1332-0	
	200	300	6SE6430-2UD42-0GA0	–	3NE1333-0	
	250	350	6SE6430-2UD42-5GA0	–	3NE1435-0	

Selection and ordering data (continued)

Mains voltage	Output		Inverter **with** internal filter Class A	Order No. of the options LC filter	Line commutating choke	Output choke
	kW	hp				
3 AC 380 V to 480 V	7.5	10	6SE6430-2AD27-5CA0	**6SE6400-3TD03-2CD0**	**6SE6400-3CC02-2CD3**	**6SE6400-3TC03-2CD3**
	11.0	15	6SE6430-2AD31-1CA0			
	15.0	20	6SE6430-2AD31-5CA0		**6SE6400-3CC03-5CD3**	
	18.5	25	6SE6430-2AD31-8DA0	**6SE6400-3TD03-7DD0**	**6SE6400-3CC04-4DD0**	**6SE6400-3TC05-4DD0**
	22	30	6SE6430-2AD32-2DA0	**6SE6400-3TD04-8DD0**		**6SE6400-3TC03-8DD0**
	30	40	6SE6430-2AD33-0DA0	**6SE6400-3TD06-1DD0**	**6SE6400-3CC05-2DD0**	**6SE6400-3TC05-4DD0**
	37	50	6SE6430-2AD33-7EA0	**6SE6400-3TD07-2ED0**	**6SE6400-3CC08-3ED0**	**6SE6400-3TC08-0ED0**
	45	60	6SE6430-2AD34-5EA0	**6SE6400-3TD11-5FD0**		**6SE6400-3TC07-5ED0**
	55	75	6SE6430-2AD35-5FA0		**6SE6400-3CC11-2FD0**	**6SE6400-3TC14-5FD0**
	75	100	6SE6430-2AD37-5FA0	**6SE6400-3TD15-0FD0**		**6SE6400-3TC15-4FD0**
	90	120	6SE6430-2AD38-8FA0	**6SE6400-3TD18-0FD0**	**6SE6400-3CC11-7FD0**	**6SE6400-3TC14-5FD0**

Mains voltage	Output		Inverter **with** internal filter Class A	Order No. of the options Additional EMC filter, Class B	Gland plate
	kW	hp			
3 AC 380 V to 480 V	7.5	10	6SE6430-2AD27-5CA0	**6SE6400-2FS03-8CD0**	**6SE6400-0GP00-0CA0**
	11.0	15	6SE6430-2AD31-1CA0		
	15.0	20	6SE6430-2AD31-5CA0		
	18.5	25	6SE6430-2AD31-8DA0	An inverter **without** filter must be selected to satisfy the EMC requirements of Class B. In addition, an appropriate EMC filter of Class B is from Schaffner is required.	Integrated as standard
	22	30	6SE6430-2AD32-2DA0		
	30	40	6SE6430-2AD33-0DA0		
	37	50	6SE6430-2AD33-7EA0		
	45	60	6SE6430-2AD34-5EA0		
	55	75	6SE6430-2AD35-5FA0		
	75	100	6SE6430-2AD37-5FA0		
	90	120	6SE6430-2AD38-8FA0		

Mains voltage	Output		Inverter **with** internal filter Class A	Order No. of the options Fuses (see Catalog LV 10) 3NA3	3NE1 (Ⓤ)	Circuit-breaker (see Catalog LV 10)
	kW	hp				
3 AC 380 V to 480 V	7.5	10	6SE6430-2AD27-5CA0	**3NA3807**	●	**3RV1031-4EA10**
	11.0	15	6SE6430-2AD31-1CA0	**3NA3812**		**3RV1031-4FA10**
	15.0	20	6SE6430-2AD31-5CA0	**3NA3814**		**3RV1031-4HA10**
	18.5	25	6SE6430-2AD31-8DA0	**3NA3820**	**3NE1817-0**	**3RV1042-4KA10**
	22	30	6SE6430-2AD32-2DA0	**3NA3822**	**3NE1818-0**	
	30	40	6SE6430-2AD33-0DA0	**3NA3824**	**3NE1820-0**	**3RV1042-4MA10**
	37	50	6SE6430-2AD33-7EA0	**3NA3830**	**3NE1021-0**	**3VL1712-.DD33-....**
	45	60	6SE6430-2AD34-5EA0	**3NA3832**	**3NE1022-0**	**3VL1716-.DD33-....**
	55	75	6SE6430-2AD35-5FA0	**3NA3836**	**3NE1224-0**	**3VL3720-.DC36-....**
	75	100	6SE6430-2AD37-5FA0	**3NA3140**	**3NE1225-0**	**3VL3725-.DC36-....**
	90	120	6SE6430-2AD38-8FA0	**3NA3144**	**3NE1227-0**	**3VL4731-.DC36-....**

● Use in America requires Ⓤ-listed fuses such as the Class NON range from Bussmann.

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MICROMASTER 430

Overview

Basic Operator Panel 2 (BOP-2)

With the BOP-2, individual parameter settings can be made. Values and units are shown on a 5-digit display.

Basic Operator Panel (BOP-2)

A BOP-2 can be used for several inverters. It can be directly mounted on the inverter or in a control cabinet door using a mounting kit.

PROFIBUS module

For a complete PROFIBUS connection with up to ≤ 12 Mbaud. Remote control of the inverter is possible with the PROFIBUS module. Remote control and operation at the inverter can be combined using an operator panel plugged onto the PROFIBUS module. The PROFIBUS module can be supplied by an external 24 V DC power supply and is thus also active when the inverter is disconnected from the power supply.

Connection by means of a 9-pin Sub-D connector (available as an option).

DeviceNet module

For networking the inverters to the DeviceNet fieldbus system widely used on the American market. A maximum transmission rate of 500 kbaud is possible. Remote control of the inverter is possible with the DeviceNet module.

Remote control and operation at the inverter can be combined using an operator panel plugged onto the DeviceNet module.

The connection to the DeviceNet bus system is made using a 5-pin connector with terminal strip.

CANopen module

Using the CANopen communications module, an inverter can be linked to the CANopen fieldbus system and remote control is then possible.

Remote control and operation at the inverter can be combined using an operator panel plugged onto the CANopen module.

The module is connected to the bus system through a 9-pin Sub-D connector.

Connection kit for PC to inverter

For controlling an inverter directly from a PC if the appropriate software has been installed (e.g. STARTER). Isolated RS-232 adapter module for reliable point-to-point connection to a PC. Includes a Sub-D connector and an RS-232 standard cable (3 m).

Operator panel door mounting kit for single inverter

For mounting an operator panel BOP-2 in a control cabinet door. Degree of protection IP56. Contains a cable adapter module with screwless terminals for use with user's own RS-232 cables [1].

Start-up tools

- STARTER
  is a graphic start-up software for guided start-up for MICROMASTER 410/420/430/440 frequency inverters under Windows NT/2000/XP Professional. Parameter lists can be read out, altered, stored, entered and printed.

- DriveMonitor
  is a start-up software for list-oriented programming of frequency inverters. This program executes under Windows 95/98/NT/2000/XP Professional.

Both programs are included on the Docu CD which is provided with every inverter.

[1] A shielded cable of type Belden 8132 (28 AWG) is recommended.
The maximum cable length is 5 m for RS-232.

Selection and ordering data

The options listed here are suitable for all MICROMASTER 430 inverters.

Options	Order No.
Basic Operator Panel 2 (BOP-2)	**6SE6400-0BE00-0AA0**
PROFIBUS module	**6SE6400-1PB00-0AA0**
DeviceNet module	**6SE6400-1DN00-0AA0**
CANopen module	**6SE6400-1CB00-0AA0**
RS485/PROFIBUS bus connector	**6GK1500-0FC00**
Connection kit for PC to inverter	**6SE6400-1PC00-0AA0**
Operator panel door mounting kit for single inverter	**6SE6400-0PM00-0AA0**

Technical data of the communication modules

		PROFIBUS module 6SE6400-1PB00-0AA0	**DeviceNet module** 6SE6400-1DN00-0AA0
Size (height x width x depth)		161 mm x 73 mm x 46 mm	
Degree of protection		IP20	
Degree of pollution		2 to IEC 60 664-1 (DIN VDE 0110/T1), no condensation permitted during operation	
Strain resistance • Stationary • Transport	Deflection Acceleration Deflection Acceleration	to IEC 60 068-2-6 (if module is installed correctly) 0.15 mm in the frequency range of 10 Hz to 58 Hz 19.6 m/s^2 in the frequency range of 58 Hz to 500 Hz 3.5 mm in the frequency range of 5 Hz to 9 Hz 9.8 m/s^2 in the frequency range of 9 Hz to 500 Hz	
Climatic category (during operation)		3K3 to IEC 60 721-3-3	
Cooling method		Natural air cooling	
Permissible ambient or cooling agent temperature • Operation • Storage and transport		−10 °C to +50 °C (+14 °F to +122 °F) −25 °C to +70 °C (−13 °F to +158 °F)	
Relative humidity (permissible humidity rating) • Operation • Storage and transport		≤ 85 % (non-condensing) ≤ 95 %	
Electromagnetic compatibility	Emission Interference	to EN 55 011 (1991) Class A to IEC 60 801-3 and EN 61 000-4-3	
Power supply		6.5 V ± 5 %, max. 300 mA, internal from inverter or 24 V ± 10 %, max. 350 mA, external	6.5 V ± 5 %, max. 300 mA internal from inverter or 24 V, max. 60 mA from DeviceNet-Bus
Output voltage		5 V ± 10 %, max. 100 mA, galvanically isolated supply • for terminating the serial interface bus or • for supplying the OLP (Optical Link Plug)	–
Data transmission rate		max. 12 Mbaud	125, 250 and 500 Kbaud

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MICROMASTER 430

■ **Technical data of the communication modules** (continued)

	CANopen module 6SE6400-1CB00-0AA0
Size (height x width x depth)	161 mm x 73 mm x 46 mm
Degree of protection	IP20
Degree of pollution	2 to IEC 60 664-1 (DIN VDE 0110/T1), no condensation permitted during operation

Strain resistance
• Stationary   Deflection
     Acceleration
• Transport   Deflection
     Acceleration
	to IEC 60 068-2-6 (if module is installed correctly)
	0.15 mm in the frequency range of 10 Hz to 58 Hz
	19.6 m/s^2 in the frequency range of 58 Hz to 500 Hz
	3.5 mm in the frequency range of 5 Hz to 9 Hz
	9.8 m/s^2 in the frequency range of 9 Hz to 500 Hz

Climatic category (during operation)	3K3 to IEC 60 721-3-3
Cooling method	Natural air cooling
Permissible ambient or cooling agent temperature • Operation • Storage • Transport	 −10 °C to +50 °C (+14 °F to +122 °F) −40 °C to +70 °C (−40 °F to +158 °F) −25 °C to +70 °C (−13 °F to +158 °F)
Relative humidity (permissible humidity rating) • Operation • Storage and transport	 ≤ 85 % (non-condensing) ≤ 95 %
Power supply	The CAN bus is supplied from the inverter power supply
Data transmission rate	10, 20, 50, 125, 250, 500, 800 Kbaud and 1 Mbaud

Documentation

■ **Selection and ordering data**

| Type of documentation	Language	Order No.
Docu pack, supplied with each inverter, containing CD-ROM [1]) and Getting Started Guide [2]) (paper version)	Multilanguage	**6SE6400-5AE00-1AP0**
Operating instructions[2]) (paper version)	German	**6SE6400-5AE00-0AP0**
	English	**6SE6400-5AE00-0BP0**
	French	**6SE6400-5AE00-0DP0**
	Italian	**6SE6400-5AE00-0CP0**
	Spanish	**6SE6400-5AE00-0EP0**
Parameter list [2]) (paper version)	German	**6SE6400-5AF00-0AP0**
	English	**6SE6400-5AF00-0BP0**
	French	**6SE6400-5AF00-0DP0**
	Italian	**6SE6400-5AF00-0CP0**
	Spanish	**6SE6400-5AF00-0EP0**

1) The CD-ROM contains operating instructions, parameter list, commissioning tools STARTER and DriveMonitor, multilanguage

2) Available on Internet at http://www.siemens.com/micromaster

MICROMASTER 430 inverter

| Frame size	3 AC 380 V to 480 V
C	7.5 kW to 15 kW
D	18.5 kW to 30 kW
E	37 kW to 45 kW

Drill pattern

204 (8.03)

ADA51-5002d

174 (6.85)
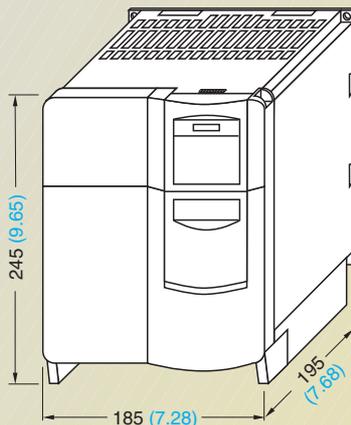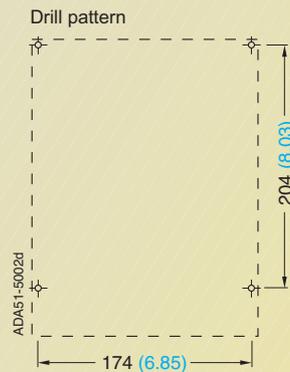
Fixing with
4 x M5 bolts
4 x M5 nuts
4 x M5 washers

Tightening torque with washers fitted:
3.0 Nm

Ventilation clearance required at top
and bottom: 100 mm

245 (9.65)

195 (7.68)

185 (7.28)

Inverter frame size **C**

309 (12.16)

ADA51-5009b
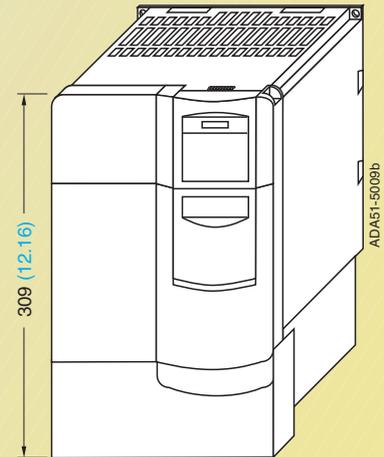
Inverter frame size **C**
with **gland plate**
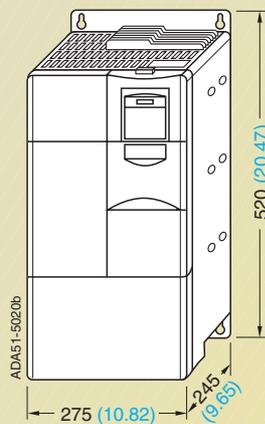
Drill pattern

486 (19.13)

235 (9.25)

Fixing with
4 x M8 bolts
4 x M8 nuts
4 x M8 washers

Tightening torque with
washers fitted: 3.0 Nm

Ventilation clearance
required at top and bottom:
300 mm

520 (20.47)

ADA51-5020b

245 (9.65)

275 (10.82)

Inverter frame size **D**

650 (25.59)

ADA51-5021b

245 (9.65)

275 (10.82)

Inverter frame size **E**

Drill pattern

616.4 (24.27)

235 (9.25)

Fixing with
4 x M8 bolts
4 x M8 nuts
4 x M8 washers

Tightening torque with
washers fitted: 3.0 Nm

Ventilation clearance
required at top and bottom:
300 mm

3
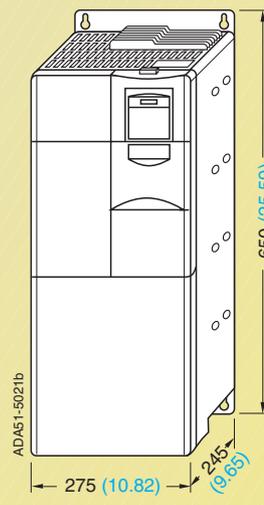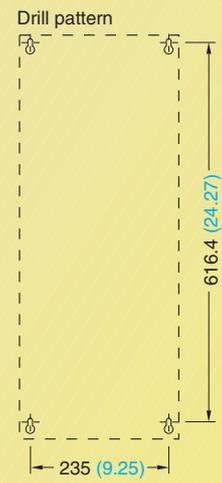
With the communication module, the mounting depth increases
for frame size C by 23 mm (0.91 inches).

All dimensions in mm (values in brackets are in inches)

MICROMASTER 430

■ **MICROMASTER 430 inverter**

Frame size	3 AC 380 V to 480 V
F	55 kW to 90 kW

ADA51-5022b

850 (33.46)

Drill pattern

810 (31.89)

300 (11.81)

350 (13.78)

320 (12.6)

Inverter frame size **F** without filter

Fixing with
4 x M8 bolts
4 x M8 nuts
4 x M8 washers
Tightening torque with
washers fitted: 3.0 Nm

Ventilation clearance
required at top and bottom:
350 mm

ADA51-5023b

Drill pattern

1150 (45.28)

1110 (43.70)

300 (11.81)

350 (13.78)

320 (12.6)

Inverter frame size **F** with filter

Fixing with
4 x M8 bolts
4 x M8 nuts
4 x M8 washers
Tightening torque with
washers fitted: 3.0 Nm

Ventilation clearance
required at top and bottom:
350 mm

All dimensions in mm (values in brackets are in inches)

MICROMASTER 430 inverter

Frame size	3 AC 380 V to 480 V
FX	110 kW to 132 kW
GX	160 kW to 250 kW
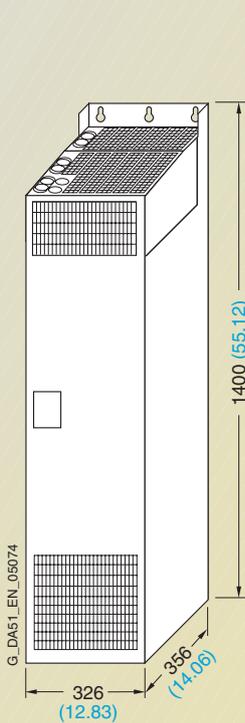
Drill pattern

125 (4.92) 125 (4.92)

1375 (54.13)

125 (4.92) 125 (4.92)

Inverter frame size **FX**

1400 (55.12)
356 (14.06)
326 (12.83)

Fixing with
6 x M8 bolts
6 x M8 nuts
6 x M8 washers

Tightening torque
with washers
fitted: 13.0 Nm

Ventilation clearance
required:
at top: 250 mm
at bottom: 150 mm
in front: 100 mm

Inverter frame size **GX**

1533 (60.35)
545 (21.46)
326 (12.83)

Drill pattern

125 (4.92) 125 (4.92)

1508 (59.37)

125 (4.92) 125 (4.92)
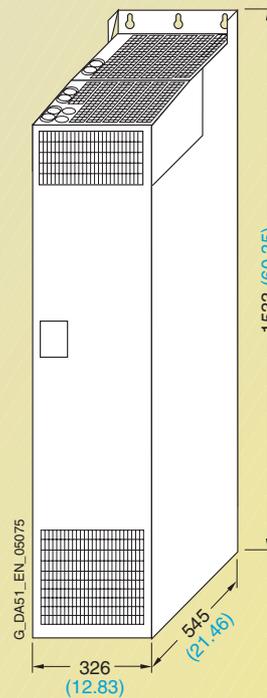
Fixing with
6 x M8 bolts
6 x M8 nuts
6 x M8 washers

Tightening torque
with washers
fitted: 13.0 Nm

Ventilation clearance
required:
at top: 250 mm
at bottom: 150 mm
in front: 100 mm

All dimensions in mm (values in brackets are in inches)

MICROMASTER 430

Dimension drawings

■ EMC filter

38 (1.5)
185 (7.28)
156 (6.14)
4 x M5
245 (9.65)
204 (8.03)
219 (8.62)
232 (9.13)
ADA51-5012c
174 (6.85)
54 (2.13)
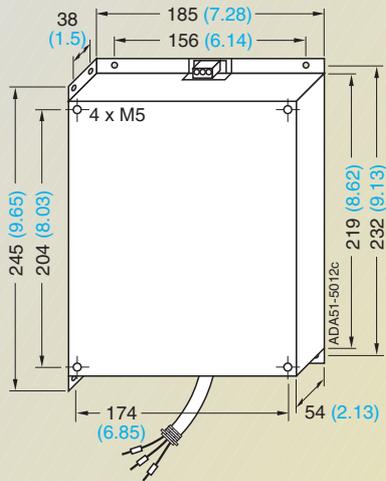
EMC filter for frame size **C**

b₁
n₄
b
c
n₃
a
a₁
G_DA51_XX_05103
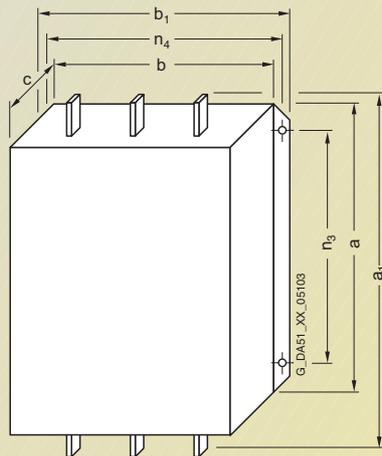
| EMC filter Class A Type 6SL3000-	for inverter	Dimensions							Weight, approx.
	Frame size (FS)	a	a₁	b	b₁	c	n₃	n₄	kg
0BE32-5AA0	**FX**	270 (10.63)	360 (14.17)	200 (7.87)	240 (9.45)	116 (4.57)	210 (8.27)	220 (8.66)	12.3
0BE34-4AA0	**FX/GX**	270 (10.63)	360 (14.17)	200 (7.87)	240 (9.45)	116 (4.57)	210 (8.27)	220 (8.66)	12.3
0BE36-0AA0	**GX**	310 (12.2)	400 (15.75)	215 (8.46)	265 (10.43)	140 (5.51)	250 (9.84)	240 (9.45)	19.0

EMC filter for frame sizes **FX** and **GX**

All dimensions in mm (values in brackets are in inches)

3
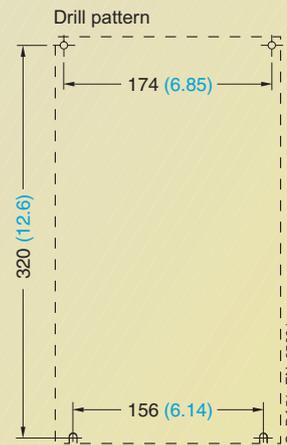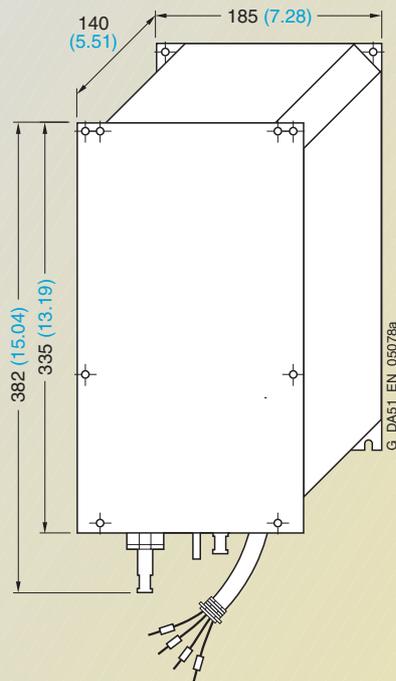
LC filter

LC filter 6SE6400-3TD03-2CD0 for frame size **C**

Drill pattern

Fixing with M5 bolts
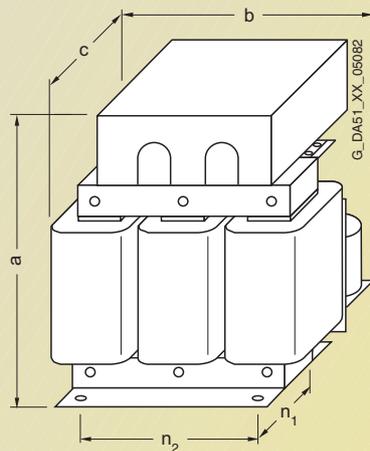
Fixing with M10 bolts

LC filter for frame sizes **D** to **F**

LC filter Type	for inverter Frame size (FS)	Dimensions				
		a	b	c	n₁	n₂
6SE6400-3TD03-7DD0	**D**	278 (10.94)	240 (9.45)	230 (9.06)	115 (4.53)	190 (7.48)
6SE6400-3TD04-8DD0	**D**	290 (11.42)	240 (9.45)	240 (9.45)	125 (4.92)	190 (7.48)
6SE6400-3TD06-1DD0	**D**	345 (13.58)	300 (11.81)	220 (8.66)	120 (4.72)	240 (9.45)
6SE6400-3TD07-2ED0	**E**	355 (13.98)	300 (11.81)	235 (9.25)	145 (5.71)	240 (9.45)
6SE6400-3TD11-5FD0	**E/F**	460 (18.11)	360 (14.17)	235 (9.25)	125 (4.92)	264 (10.39)
6SE6400-3TD15-0FD0	**F**	460 (18.11)	360 (14.17)	250 (9.84)	140 (5.51)	264 (10.39)
6SE6400-3TD18-0FD0	**F**	520 (20.47)	420 (16.54)	290 (11.42)	173 (6.81)	316 (12.44)

All dimensions in mm (values in brackets are in inches)

3

Dimension drawings

■ **Line commutating chokes**
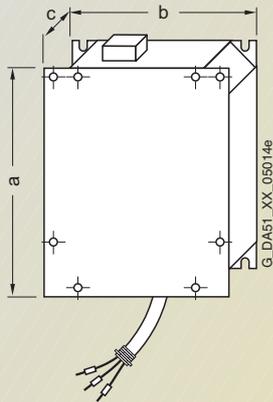
Line commutating choke for	Dimensions			Weight (max.)
	a	b	c	kg
Frame size **C**	245 (9.65)	185 (7.28)	50 (1.97)	2.3

Line commutating choke for frame size **C**
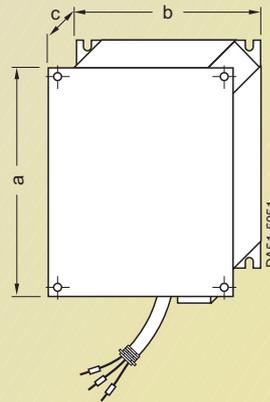
Line commutating choke for	Dimensions			Weight (max.)
	a	b	c	kg
Frame size **D**	520 (20.47)	275 (10.83)	85 (3.35)	9.5
Frame size **E**	650 (25.59)	275 (10.83)	95 (3.74)	17.0

Line commutating choke for frame sizes **D** and **E**

Line commutating choke type 6SE6400-	for inverter Frame size	Dimensions					Weight (max.)
		a	b	c	n_1	n_2	kg
3CC11-....	**F**	210 (8.27)	240 (9.45)	141 (5.55)	109 (4.29)	190 (7.48)	25.0
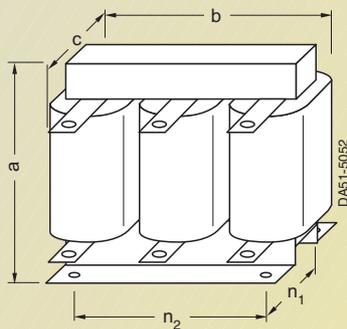
Line commutating choke for inverter frame size **F**

Line commutating choke type 6SL3000-	for inverter Frame size (FS)	Dimensions					Weight (max.)
		a	b	c	n_1	n_2	kg
0CE32-....	**FX**	248 (9.76)	255 (10.04)	203 (7.99)	101 (3.98)	200 (7.87)	24.0
0CE33-....	**GX**	248 (9.76)	255 (10.04)	203 (7.99)	101 (3.98)	200 (7.87)	25.0
0CE35-....	**GX**	269 (10.59)	275 (10.83)	210 (8.27)	118 (4.65)	224 (8.82)	35.0
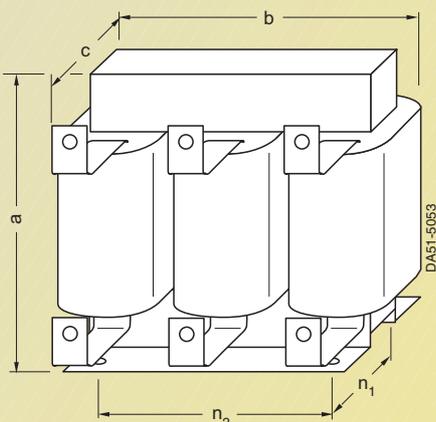
Line commutating choke for inverters of frame sizes **FX** and **GX**

All dimensions in mm (values in brackets are in inches)

Output chokes
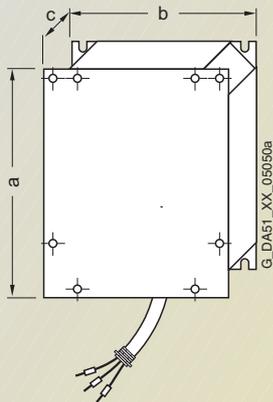
Line commutating choke
for frame size **C**

| Output chokes for	Dimensions			Weight (max.)
	a	b	c	kg
Frame size **C**	245 (9.65)	185 (7.28)	80 (3.15)	5.6
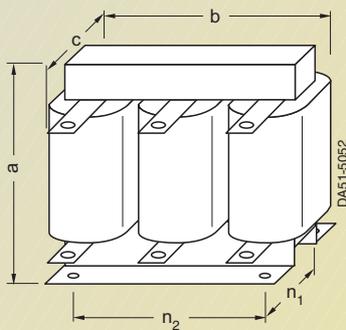
Output chokes
for inverters of size **D**, **E** and **F**

Output choke type 6SE6400-	for inverter Frame size (FS)	Dimensions					Weight (max.)
		a	b	c	n₁ (to DIN 41308)	n₂	kg
3TC03-8DD0	**D**	210 (8.27)	225 (8.86)	179 (7.05)	76 (2.99)	176 (6.93)	19.1
3TC05-4DD0	**D**	210 (8.27)	225 (8.86)	150 (5.91)	76 (2.99)	176 (6.93)	11.3
3TC07-5ED0	**E**	248 (9.76)	270 (10.63)	209 (8.23)	88 (3.46)	200 (7.87)	26.7
3TC08-0ED0	**E**	210 (8.27)	225 (8.86)	150 (5.91)	76 (2.99)	176 (6.93)	12.2
3TC14-5FD0	**F**	321 (12.64)	350 (13.78)	288 (11.34)	120 (4.72)	264 (10.39)	55.9
3TC15-4FD0	**F**	210 (8.27)	225 (8.86)	150 (5.91)	76 (2.99)	176 (6.93)	24

3

All dimensions in mm (values in brackets are in inches)

Dimension drawings

Assembly of inverter and options
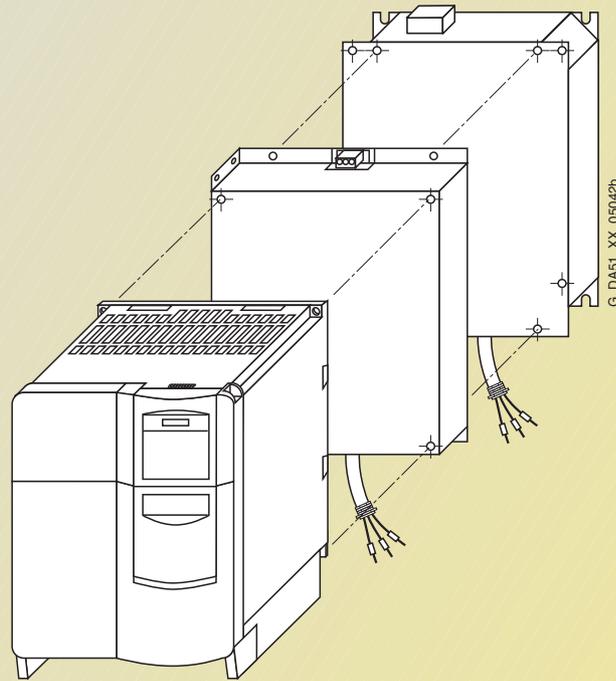
Example:
Assembly of
inverter, filter and choke
If additional options are
required, they must be
mounted on the side.