

LAMPIRAN



Pemasangan Komponen



Proses Penyolderan



Proses Penyolderan



Uji Coba Alat



Uji Coba Alat



Pengambilan Data

Pengujian

1. Pengujian Tanpa Beban



2. Pengujian dengan Beban Resistif Penuh



Pengukuran

1. Pengukuran Tegangan Keluaran VSD

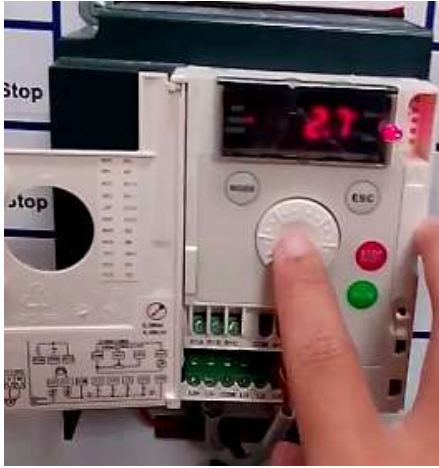


2. Pengukuran Kecepatan Putaran Motor



Monitoring

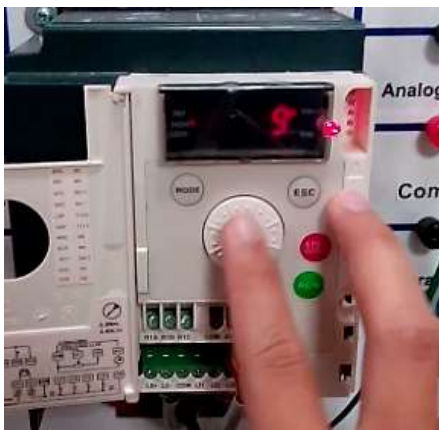
1. *Monitoring Arus Motor*



2. *Monitoring Main Voltage*



3. *Monitoring Status Termal Motor*



4. *Monitoring Status Termal Drive*



5. *Monitoring Output Power*



Datasheet Kontaktor S-N12

Performance of Series S-N Contactors

Electrical Life

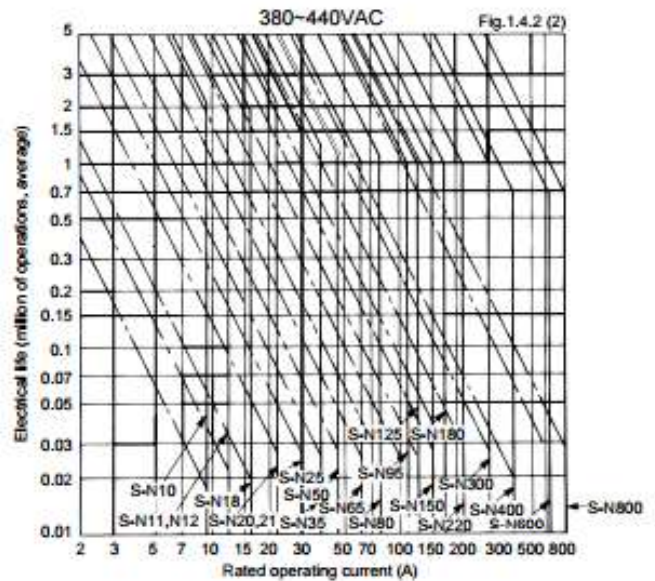
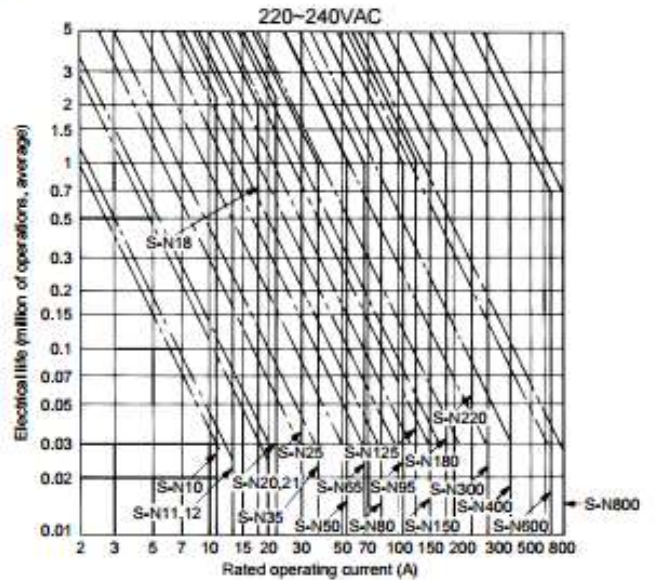
The electrical life of the main contacts of a contactor is determined mainly by the circuit-opening duty it will perform. The relationship between electrical life and rated current of Mitsubishi contactors under normal and jogging duties of squirrel-cage motors is shown in Fig. 1.4.2(1) and 1.4.2(2). In the case of a mixture of normal and jogging duties, the expected contactor life can be determined as follows:

$$N = Nr/1 + \frac{\alpha}{100} (Nr/Ni - 1) \dots\dots\dots \text{Eq.1.1}$$

- where
- N : Life in the case of α% jogging duty
 - Nr : Life in the case of normal duty
 - Ni : Life in the case of 100% jogging duty
 - α : Percentage of jogging duty

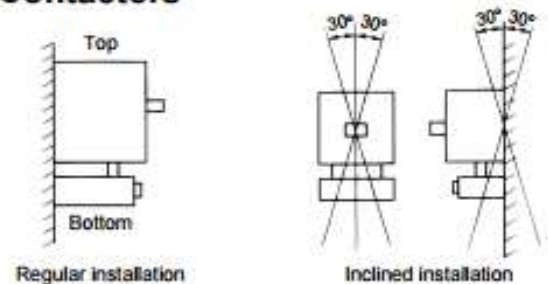
Electrical life versus rated operating current

- Normal duty, 6le on, 6le off, on-load factor 40%, 1200 operations/hour (AC3)
- - - Jogging duty, 6le on, 6le off, on-load factor 7%, 600 operations/hour (AC4)-S-N10-S-N300
300 operations/hour (AC4)-S-N400-S-N600
150 operations/hour (AC4)-S-N800



1.4.3 Mounting Attitude of Starters and Contactors

To assure proper performance, Mitsubishi magnetic motor starters and contactors should be mounted on a vertical supporting surface with the line terminals upwards and the load terminals downwards. The supporting surface may have a maximum inclination of 30° from the vertical in any direction.



Selection Table of Contactors

Type S-N□, SD-N□

Ordering Designation

Model name S-N10
 Coil designation (See page 13) AC400V
 If required special aux. contact (never specify for standard) 1B

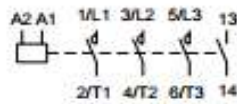
Complete type designation S-N10*AC400V*1B

Note: Mark*indicates a blank space.

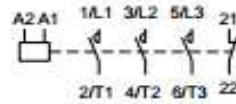
Rated operational current AC-3	Rated motor capacity 3-phase AC-2 & AC-3				Model name		Standard aux. contacts	Finger protection terminal cover	Additional auxiliary contact block						
	220V (A)	380V (A)	220V (kW)	380V (kW)	500V (kW)	690V (kW)			AC operated	DC operated	UN-AX2(CX)	UN-AX4(CX)	UN-AX11(CX)	UN-AX80	UN-AX150
11	9	2.5	4	4	4	S-N10 S-N10CX* S-N10(1B) S-N10CX(1B)	—	1	—	Provided					
13	12	3.5	5.5	5.5	5.5	S-N11 S-N11CX* S-N11(1B) S-N11CX(1B)	SD-N11 SD-N11CX* SD-N11(1B) SD-N11CX(1B)	1	—	Provided		2	—	—	—
13	12	3.5	5.5	5.5	5.5	S-N12 S-N12CX* S-N12(2A) S-N12CX(2A)	SD-N12 SD-N12CX* SD-N12(2A) SD-N12CX(2A)	1	1	Provided					
18	16	4.5	7.5	7.5	7.5	S-N18 S-N18CX* S-N18 S-N18CX*	—	—	—	Provided					
22	22	5.5	11	11	7.5	S-N20 S-N20CX* S-N20(2A) S-N20CX(2A)	—	1	1	Provided					
22	22	5.5	11	11	7.5	S-N21 S-N21CX* S-N21 S-N21CX*	SD-N21 SD-N21CX* SD-N21 SD-N21CX*	2	2	Provided					
30	30	7.5	15	15	11	S-N25 S-N25CX* S-N25 S-N25CX*	—	2	2	Provided		2	—	—	—
40	40	11	18.5	18.5	15	S-N35 S-N35CX* S-N35 S-N35CX*	SD-N35 SD-N35CX* SD-N35 SD-N35CX*	2	2	Provided					
55	50	15	22	22	22	S-N50 S-N50CX* S-N50 S-N50CX*	SD-N50 SD-N50CX* SD-N50 SD-N50CX*	2	2	Provided					
65	62	18.5	30	37	30	S-N65 S-N65CX* S-N65 S-N65CX*	SD-N65 SD-N65CX* SD-N65 SD-N65CX*	2	2	Provided					
85	85	22	45	45	45	S-N80 S-N80CX* S-N80 S-N80CX*	SD-N80 SD-N80CX* SD-N80 SD-N80CX*	2	2	Provided					
105	105	30	55	55	55	S-N95 S-N95CX* S-N95 S-N95CX*	SD-N95 SD-N95CX* SD-N95 SD-N95CX*	2	2	Provided	—	—	—	Max. 2	—
125	120	37	60	60	60	S-N125 S-N125CX* S-N125 S-N125CX*	SD-N125 SD-N125CX* SD-N125 SD-N125CX*	2	2	Provided					
150	150	45	75	90	90	S-N150 S-N150CX* S-N150 S-N150CX*	SD-N150 SD-N150CX* SD-N150 SD-N150CX*	2	2	Provided					
180	180	55	90	110	110	S-N180 S-N180CX* S-N180 S-N180CX*	SD-N180 SD-N180CX* SD-N180 SD-N180CX*	2	2	Provided				Max. 2	—
250	250	75	132	132	132	S-N220 S-N220CX* S-N220 S-N220CX*	SD-N220 SD-N220CX* SD-N220 SD-N220CX*	2	2	Provided	—	—	—	—	—
300	300	90	160	160	200	S-N300 S-N300CX* S-N300 S-N300CX*	SD-N300 SD-N300CX* SD-N300 SD-N300CX*	2	2	Provided					
400	400	125	220	225	250	S-N400 S-N400CX* S-N400 S-N400CX*	SD-N400 SD-N400CX* SD-N400 SD-N400CX*	2	2	Provided					
630	630	190	330	330	330	S-N600 S-N600CX* S-N600 S-N600CX*	SD-N600 SD-N600CX* SD-N600 SD-N600CX*	2	2	Provided	—	—	—	—	—
800	800	220	440	500	500	S-N800 S-N800CX* S-N800 S-N800CX*	SD-N800 SD-N800CX* SD-N800 SD-N800CX*	2	2	Provided	—	—	—	—	—

Note: 1 "CX" denotes with finger protection terminal covers.

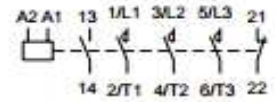
Connections and Contact Arrangement



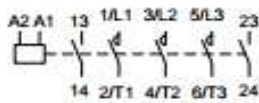
**S-N10, N11(1NO)
SD-N11(1NO)**



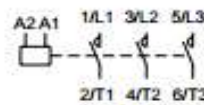
**S-N10, N11(INC)
SD-N11(INC)**



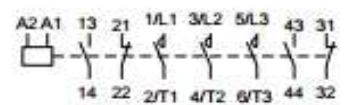
**S-N12, N20
SD-N12**



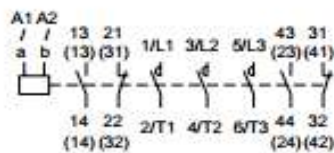
**S-N12(2NO)
S-N20(2NO)**



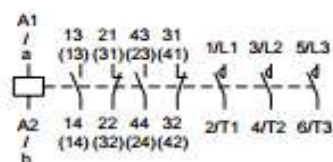
S-N18



**S-N21, N25, N35
SD-N21, N35**

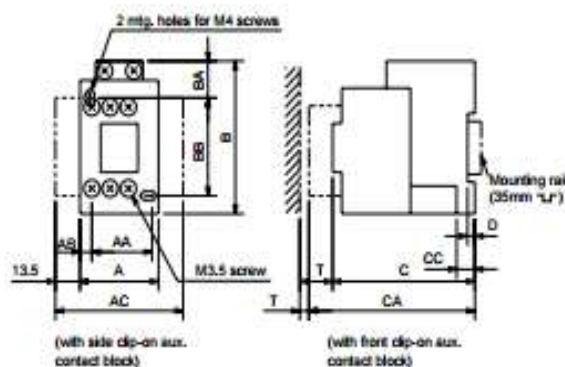


**S-N50-N400
SD-N50-N400**



S-N600, N800

Outline Dimensions



• Dimensions

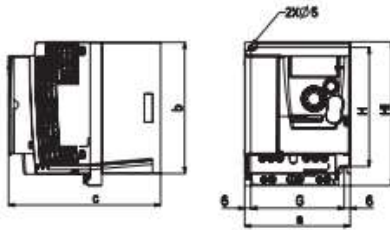
Type	A	B	C	AA	AB	AC	BB	BA	CC	CA	D	Mass(rg)	T
S-N10(CX), N11(CX)	43	78	78	35	4.5	70	50	19	10	106	4	0.3	5
S-N12(CX)	53	78	78	40	4.5	—	50	19	10	106	4	0.32	5
S-N18(CX)	43	79	81	30	6	—	60	13	10	109	4	0.33	5
SD-N11(CX)	43	78	110	35	4.5	70	50	19	10	138	4	0.62	5
SD-N12(CX)	53	78	110	40	4.5	—	50	19	10	138	4	0.64	5

Note: Front clip-on and side clip-on aux. contact blocks should not be mounted both.

Datasheet VSD ATV303

Dimensions and weights

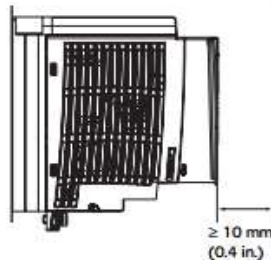
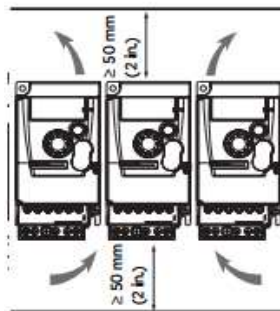
ATV303HU15N4, ATV303HU22N4



ATV303H	a mm (in.)	b mm (in.)	c mm (in.)	G mm (in.)	H mm (in.)	H1 mm (in.)	Ø mm (in.)	For screws	Weight kg (lb)
U15N4	105 (4.13)	130 (5.12)	151 (5.94)	93 (3.66)	118 (4.65)	143 (5.63)	5 (0.20)	M4	1.1 (2.43)
U22N4	105 (4.13)	130 (5.12)	151 (5.94)	93 (3.66)	118 (4.65)	143 (5.63)	5 (0.20)	M4	1.1 (2.43)

Mounting

Mounting



Install the drive vertically, at $\pm 10^\circ$.

Do not place it close to heating elements.

Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the drive.

Free space in front of unit: 10 mm (0.4 in.) minimum.

When IP20 protection is adequate, we recommend that the vent cover(s) on the top of the drive be removed, as shown below.

We recommend that the drive is installed on a dissipative surface.

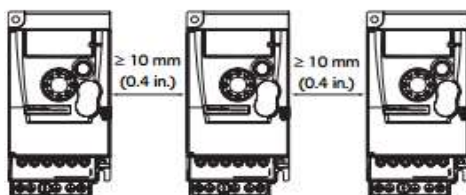
Drive installation should employ fastening washers and screws in combination.

Removing the vent cover



Mounting types

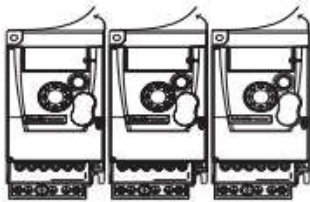
Type A mounting



Free space ≥ 10 mm (0.4 in.) on each side, with vent cover fitted. Mounting type A is suitable for drive operation at surrounding air temperatures less than or equal to 55°C .

When temperature exceeds 55°C , the top vent cover should be removed to ensure cooling.

Type B mounting



Drives mounted side-by-side with vent covers removed. Mounting type B is suitable for drive operation at surrounding air temperatures less than or equal to 55°C.

With these types of mounting, drives with a Switching frequency range of 4 kHz can be used up to an ambient temperature of 55°C.

At ambient temperatures between +55°C and +65°C:

- Remove top safeguard covers on drives
- Derate current by 1.5% for every 1°C of temperature rise
- Switching frequency range will adjust according to the internal temperature of the drive

Wiring

Recommendations

Keep power cables separate from devices containing circuits with low-level signals (detectors, PLCs, measuring apparatus, video, telephone). Always cross control and power cables at 90° if possible.

Power and circuit protection

Adhere to wire size recommendations contained in local codes and standards.

Before wiring power terminals, connect the ground terminal to the grounding screws located below the output terminals.

The drive must be grounded in accordance with the applicable safety standards.

When upstream protection by means of a residual current device is required by the installation standards, a type A circuit breaker should be used for single-phase drives and type B for 3-phase drives. Choose a suitable model incorporating:

- High frequency current filtering
- A time delay which prevents tripping caused by the load from stray capacitance on power-up. The time delay is not possible for 30mA devices.

In this case, choose devices with high interference immunity, such as RCDs with SI type leakage protection.

If the installation includes several drives, provide one "residual current device" per drive.

Control

For control and speed reference circuits, we recommend using shielded twisted cables with a pitch of between 25 and 50 mm (1 and 2 in.). Connect the shielding to ground.

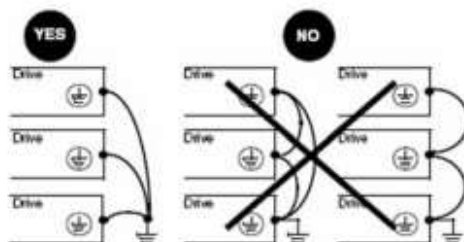
Length of motor cables

Please use output filters for shielded motor cable lengths longer than 25 m (82 ft) and unshielded cables longer than 50 m (164 ft).

For accessory part numbers, please refer to the catalogue.

Equipment Grounding

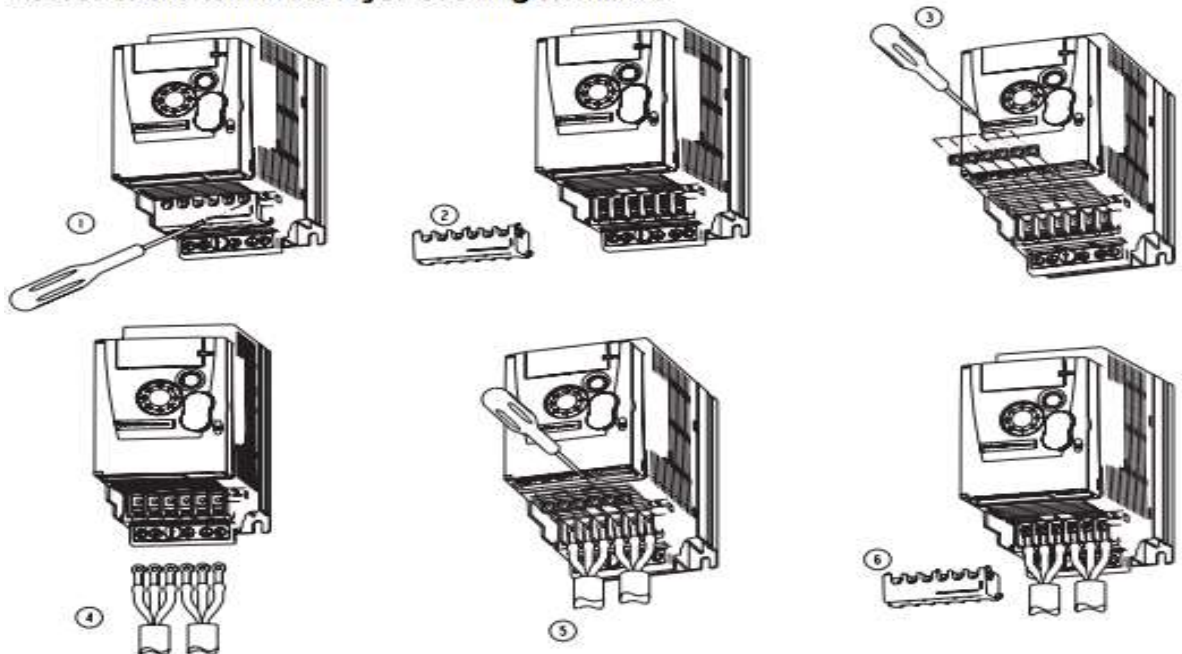
Ground the drive according to local and national code requirements. A minimum wire size of 10 mm² may be required to meet standards limiting leakage current.



- Ensure that the resistance of the ground is one ohm or less.
- When grounding several drives, you must connect each one directly, as shown in the figure to the left.
- Do not loop the ground cables or connect them in series.

Power terminals

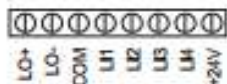
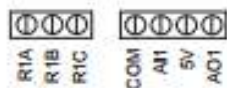
Access to the terminals if you use ring terminals



Characteristics and functions of power terminals

Terminal	Function	For ATV303
+	Ground terminal	All ratings
R/L1 - S/L2 - T/L3	Power input terminal	All ratings
PA/+	Brake resistor terminal (DC Bus + output)	ATV303HU1 5N4...ATV303HD1 1N4
PB	Brake resistor terminal	ATV303HU1 5N4...ATV303HD1 1N4
U/T1 - V/T2 - W/T3	Motor wiring terminal	All ratings

Arrangement of control terminals



RJ45

- R1A Normally open (NO) contact of the relay
- R1B Normally closed (NC) contact of the relay
- R1C Common pin of the relay
- COM COMmon of analog and logic I/Os
- AI1 Analog Input
- 5V +5V supply provided by the drive
- AO1 Analog Output
- LO+ Logic Output (collector)
- LO- Common of the logic Output (emitter)
- COM COMmon of analog and logic I/Os
- LI1 Logic Input
- LI2 Logic Input
- LI3 Logic Input
- LI4 Logic Input
- +24V +24 V supply provided by the drive
- RJ45 Modbus network or remote display panel interface.

ATV303 Control terminals	Applicable wire size (1) mm ² (AWG)	Tightening torque (2) N·m (lb.in)
R1A, R1B, R1C	0.75 to 1.5 (18 to 16)	0.5 to 0.6 (4.4 to 5.3)
Other terminals	0.14 to 1.5 (26 to 16)	

Control terminals

Characteristics and functions of the control terminals

Terminal	Function	Electrical characteristics
R1A	NO contact of the relay	Minimum switching capacity: - 5mA for 24 V ~
R1B	NC contact of the relay	Maximum switching capacity: - on inductive load ($\cos \varphi = 0.4$ and $L/R = 7$ ms): 2A for 250V ~ and 30V ~
R1C	Common pin of the relay	- on resistive load ($\cos \varphi = 1$ and $L/R = 0$): 3A for 250V ~, 4A for 30V ~ - response time: 30ms maximum.
COM	Common of analog and logic I/Os	
AI1	Voltage or current analog input	- resolution: 10 bits - precision: $\pm 1\%$ at 25°C (77°F) - linearity: $\pm 0.3\%$ (of full scale) - sampling time: 20 ms \pm 1 ms Analog voltage input 0 to +5 V or 0 to +10 V (maximum voltage 30 V) impedance: 30 k Ω Analog current input x to y mA, impedance: 250 Ω
5V	Power supply for reference potentiometer	- precision: $\pm 5\%$ - maximum current: 10 mA
AO1	Voltage or current analog output	- resolution: 8 bits - precision: $\pm 1\%$ at 25°C (77°F) - linearity: $\pm 0.3\%$ (of full scale) - sampling time: 4 ms (max. 7 ms) Analog voltage output: 0 to +10 V (maximum voltage +1%) - minimum output impedance: 470 Ω Analog current output: x to 20 mA - maximum output impedance: 800 Ω
LO+	Logic output	- voltage: 24 V (maximum 30 V) - impedance: 1 k Ω , maximum 10 mA (100 mA in open collector) - linearity: $\pm 1\%$ - sampling time: 20 ms \pm 1 ms.
LO-	Common of the logic output (emitter)	
LI1 LI2 LI3 LI4	Logic inputs	Programmable logic inputs - +24 V power supply (maximum 30 V) - impedance: 3.5 k Ω - state: 0 if < 5 V, state 1 if > 11 V in positive logic - state: 1 if < 10 V, state 0 if > 16 V or switched off (not connected) in negative logic - sampling time: < 20 ms \pm 1 ms.
+24V	+24 V supply provided by the drive	+24 V $\pm 15\%$ $\pm 20\%$ protected against short-circuits and overloads. Maximum customer current available: 100 mA