EXA D6 4-20mA

INSTALLATION GUIDE

COPYRIGHT

Electrex is a trademark of Akse S.r.l. All rights reserved.

It is forbidden to duplicate, adapt, transcript this document without Akse written authorization, except when regulated accordingly by the Copyright Laws.

WARRANTY

This product is covered by a warranty against material and manufacturing defects for a 24 months period from the manufacturing date.

The warranty does not cover the defects that are due to:

- · Negligent and improper use
- Failures caused by atmospheric hazards
- · Acts of vandalism
- · Wear out of materials
- Firmware upgrades

Akse reserves the right, at its discretion, to repair or substitute the faulty products

The warranty is not applicable to the products that will result defective in consequence of a negligent and improper use or an operating procedure not contemplated in this manual.

RETURN AND REPAIR FORMALITIES

Akse accepts the return of instruments for repair only when authorized in advance. The transport costs are at customer charge.

RE-SHIPPING OF REPAIRED PRODUCT

The terms for re-shipment of repaired products are ex-works, i.e. the transport costs are at customer charge.

Products returned as detective but found to be perfectly working by our laboratories, will be charged a flat fee to account for checking and testing time irrespective of the warranty terms

SAFETY

This instrument was manufactured and tested in compliance with IEC 61010-1 CAT III - 300V class 2 standards for operating voltages up to 300 VAC rms phase to neutral. In order to maintain this condition and to ensure safe operation, the user must comply with the indications and markings contained in the following instructions:

- When the instrument is received, before starting its installation, check that it is intact and no damage occurred during transport.
- Before mounting, ensure that the instrument operating voltages and the mains voltage are compatible then proceed with the installation.
- The instrument power supply needs no earth connection.
- The instrument is not equipped with a power supply fuse; a suitable external protection fuse must be foreseen by the contractor.
- Maintenance and/or repair must be carried out only by qualified, authorized personnel
- If there is ever the suspicion that safe operation is no longer possible, the instrument must be taken out of service and precautions taken against its accidental use.
- Operation is no longer safe when:
- There is clearly visible damaged.
- 2) The instrument no longer functions.
- 3) After lengthy storage in unfavorable conditions.
- 4) After serious damage occurred during transport

The instruments must be installed in respect of all the local regulations.

OPERATOR SAFETY

Warning: Failure to observe the following instructions may lead to a serious danger of death.

- During normal operation dangerous voltages can occur on instrument terminals and on voltage and current transformers. Energized voltage and current transformers may generate lethal voltages. Follow carefully the standard safety precautions while carrying out any installation or service operation.
- The terminals of the instrument must not be accessible by the user after the installation.
 The user should only be allowed to access the instrument front panel where the display is located.
- Do not use the digital outputs for protection functions nor for power limitation functions.
 The instrument is suitable only for secondary protection functions.
- The instrument must be protected by a breaking device capable of interrupting both the power supply and the measurement terminals. It must be easily reachable by the operator and well identified as instrument cut-off device.
- The instrument and its connections must be carefully protected against short-circuit.

Precautions: Failure to respect the following instructions may irreversibly damage to the instrument.

- The outputs and the options operate at low voltage level; they cannot be powered by any unspecified external voltage.
- The application of currents not compatible with the current inputs levels will damage to the instrument.

Further documentation may be downloaded from our web site www.electrex.it.

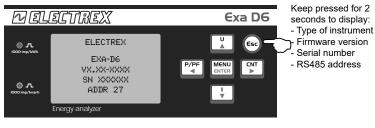
This document is owned by company AKSE that reserves all rights.

DECLARATION OF CONFORMITY

Akse hereby declares that its range of products complies with the following directives EMC 89/336/EEC 73/23CE 93/68 CE and complies with the following product's standard CEI EN 61326 - IEC 61326 CEI EN 61010 - IEC 61010.

The product has been tested in the typical wiring configuration and with peripherals conforming to the EMC directive and the LV directive.

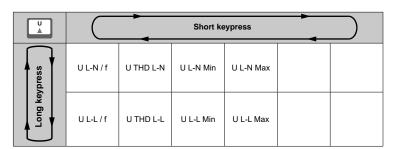
READINGS



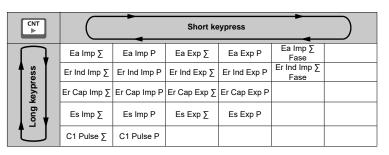
MEASURE LIST TABLE

The parameters available vary according to instrument configuration)

The parameters available vary according to instrument configuration)						
P/PF ◀	Short keypress					
	Р	P Avg Imp	P Avg Exp	P MD Imp	P MD Exp	
Long keypress	Q	Q Avg Imp	Q Avg Exp	Q MD Imp	Q MD Exp	
ong ke	s	S Avg Imp	S Avg Exp	S MD Imp	S MD Exp	
	PF					-







LEGEND OF PARAMETERS AND SYMBOLS

L-N	Phase Neutral	U	Voltage
L-L	Phase Phase	I	Current
THD	Total Harmonic Distortion	In	Neutral current
Avg	Average (rolling) value	P	Active Power
MD	Maximum Demand	Q	Reactive Power
Imp	Import value	S	Apparent Power
Exp	Export value	PF	Power Factor
Ind	Inductive	Ea	Active Energy
Сар	Capacitive	Er	Reactive Energy
Min	Minimum values (10 cycles time base)	Es	Apparent Energy
Max	Maximum values (10 cycles time base)	f	Frequency
CNT ∑	Pulse count (total)		
CNT P	Pulse count (partial)		

MECHANICAL CHARACTERISTICS			
Case	Self-extinguishing plastic material class V0		
Protection degree	IP40 on front panel, IP20 terminals side		
Size	105 x 90 x 58 mm (6 DIN modules)		
CURRENT INPUT			
Direct insertion	Up to 300 Vrms phase-neutral or 520 Vrms phase to phase		
With external VT:	Primary: programmable (max. 400 kV)		
	Secondary: programmable (max. 300 V)		
	Overload: 900 Vrms phase to phase for 1 sec		
Aux. power supply	230/240Vac +/- 10% 50/60Hz		
Self consumption:	< 2,5VA		
MODELS			
PFAE611-62	EXA D6 RS485 230-240V 2AO4-20mA		
	ENERGY ANALYZER		

DEVICE SETUP

DESCRIPTION OF KEY	1
--------------------	---

	Short keypress	Long keypress
MENU ENTER	Confirm parameter	Enter/Exit from the device's configuration menu
U A	Modify parameter	
- ¥	Modify parameter	
P/PF ◀	Go to previous value	Go to previous page
CNT ▶	Go to next value	Go to next page
Esc	Exit without saving the configuration	

AVAILABLE PARAMETERS

DEFAULT

+000.00

01 S/01 S 01 NORMAL

NORMAL

MIN

276

+000.00

01

SETUP SEQUENCE

PAGE MENU VOICE

	ORD REQUEST	0000 9999	000
RS485	DC405 Address	1 247	
	RS485 Address	2400, 4800, 9600, 19200, 38400	2940
	Rate	7 o 8	3840
	Data Bit		
	Parity	N = no parity, E = even, O = odd	
	Stop Bit	102	
	Silent Time (S.T.)	01000 (ms)	10
		RS-485 ADDR 027 COM 38400-8-N-2 S.T. 100	
IETWO	RK (note n.1)		
	Туре	3PH-4W, 2PH-2W, 1PH-2W, 3PH-4W-BAL,	3PH-4\
	* *	3PH-3W-2CT	-
	Export	NO, YES	N
	CT	110000 / 1 o 5	5.
	VT	1400000 / 1300	1.
		NETWORK TYPE 3PH-4W EXPORT NO CT 00005/5 VT 000001/001	
VG-MD	TIME (note n.2)	4 00 (minutes)	
	POWERS	160 (minutes)	1
	CURRENTS	160 (minutes)	
		AVG-MID TIME POWERS 15 CURRENTS 08	
LARM	1 / A (note n.11)	N	ı
	MODE (note n.3)	Normale, 1-OF-3, 3-OF-3, DERIV, UNBAL, UNBAL%	NORMA
	TYPE (note n.4)	MAX, MIN	MI
	MEAS (note n.5)	Controlled measure. See table n.1 for register	27
	THRE (note n.5)	selection Threshold value	+000.0
		ALARM 1/A MODE NORMAL TYPE MIN MEAS 200 THRE 000.00	
LARM			,
	HYST	1100 (%)	(
	DELAY	199 (seconds) ON/OFF	01 S/01
	AVG (note n.6)	199 (seconds)	(
	OUT (note n.7)	Normal, Hold, Pulse-L, Pulse-S	NORMA
		ALARM 1/B HYST Ø1 DELAY Ø1 S/Ø1 S AV6 Ø1 OUT NORMAL	
LARM	2 / A (note n.11)		,
	MODE (note n.3)	Normale, 1-OF-3, 3-OF-3, DERIV, UNBAL, UNBAL%	NORMA
	TYPE (note n.4)	MAX, MIN	MI
	MEAS (note n.5)	Controlled measure. See table n.1 for register	27
	THRE (note n.5)	selection Threshold value	+000.0
LARM		1.1110011010 10100	, 000.0
		1 100 (%)	
	HYST	1100 (%)	04.0/04
	DELAY	199 (seconds) ON/OFF	01 S/01
	AVG (note n.6)	199 (seconds)	(
	OUT (note n.7)	Normal, Hold, Pulse-L, Pulse-S	NORM/
LARM	3 / A (note n.11)		
		Normale, 1-OF-3, 3-OF-3, DERIV, UNBAL,	l
	MODE (note n.3)	UNBAL%	NORM/
	TYPE (note n.4)	MAX, MIN	MI
		Controlled measure. See table n.1 for register	
	MEAS (note n.5)	selection	27

selection
Threshold value

1...99 (seconds) ON/OFF 1...99 (seconds) Normal, Hold, Pulse-L, Pulse-S

Normale, 1-OF-3, 3-OF-3, DERIV, UNBAL, UNBAL% MAX, MIN

Controlled measure. See table n.1 for register selection

1...100 (%)

ALARM 3 / B
HYST
DELAY
AVG (note n.6)
OUT (note n.1)
ALARM 4 / A (note n.1)

THRE (note n.5)

MODE (note n.3) TYPE (note n.4)

MEAS (note n.5)

THRE (note n.5)

ALARM 4 / B		
HYST	1100 (%)	01
DELAY	199 (seconds) ON/OFF	01 S/01 S
AVG (note n.6)	199 (seconds)	01
OUT (note n.7)	Normal, Hold, Pulse-L, Pulse-S	NORMAL
ANALOG OUT 1		
MEAS (note n.5)	Controlled measure. See table n.1 for register selection	200
MODE	4-20, 0-20	4-20
LOW (note n.9)		000.00
HIGH (note n.9)		000.00
ANALOG OUT 2	LOW 000.00 HIGH 000.00	th 200
MEAS (note n.5)	Controlled measure. See table n.1 for register	200
	selection	
MODE	4-20, 0-20	4-20
LOW (note n.9)		000.00
HIGH (note n.9)		000.00
DISPLAY	1	
CONTRAST	20 - 45	27
CLEAR REGISTERS	110.150	
TOTAL CNT	NO, YES	NO
PARTIAL CNT	NO, YES	NO
MIN-MAX	NO, YES	NO
MAX DEMAND	NO, YES	NO
RESTORE FACTORY SETTINGS	NO, YES	NO
ENTER NEW PASSWORD	0000 9999	0000

TABLE n.1	(ModBus Registers for alarm configuration)		
REGISTE	RDESCRIPTION	SYMBOL	UNITS
200	Phase to Neutral Voltage, THD	THD U1N	[%]
202	Phase to Neutral Voltage, THD	THD U2N	[%]
204	Phase to Neutral Voltage, THD	THD U3N	[%]
206	Phase to Phase Voltage, THD	THD U12	[%]
208	Phase to Phase Voltage, THD	THD U23	[%]
210	Phase to Phase Voltage, THD	THD U31	[%]
212	Phase Current, THD	THD I1	[%]
214	Phase Current, THD	THD I2	[%]
216	Phase Current, THD	THD I3	[%]
218	Frequency of U1N	f	[Hz]
220	Phase to Neutral Voltage, RMS Amplitude	U1N	[V]
222	Phase to Neutral Voltage, RMS Amplitude	U2N	[V]
224	Phase to Neutral Voltage, RMS Amplitude	U3N	[V]
226	Phase to Phase Voltage, RMS Amplitude	U12	[V]
228	Phase to Phase Voltage, RMS Amplitude	U23	[V]
230	Phase to Phase Voltage, RMS Amplitude	U31	[V]
232	Phase Current, RMS Amplitude	11	[A]
234	Phase Current, RMS Amplitude Phase Current, RMS Amplitude	12	[A]
236	Phase Current, RMS Amplitude Phase Current, RMS Amplitude	13	
		IN	[A]
238	Neutral Current, RMS Amplitude		[A]
240	Phase Active Power (Imp/ Exp)	P1	[W]
242	Phase Active Power (Imp/ Exp)	P2	[W]
244	Phase Active Power (Imp/ Exp)	P3	[W]
246	Phase Reactive Power (Imp/ Exp)	Q1	[var]
248	Phase Reactive Power (Imp/ Exp)	Q2	[var]
250	Phase Reactive Power (Imp/ Exp)	Q3	[var]
252	Phase Apparent Power	S1	[VA]
254	Phase Apparent Power	S2	[VA]
256	Phase Apparent Power	S3	[VA]
258	Phase Power Factor (Imp/ Exp)	PF1	[-]
260	Phase Power Factor (Imp/ Exp)	PF2	[-]
262	Phase Power Factor (Imp/ Exp)	PF3	[-]
264	Phase to Neutral Voltage, Mean THD	THD UI	[%]
266	Phase to Phase Voltage, Mean THD	THD UD	[%]
268	Phase Current, Mean THD	THD I	[%]
270	Phase to Neutral Voltage, Mean RMS Amplitude	UI	[V]
272	Phase to Phase Voltage, Mean RMS Amplitude	UD	[V]
274	Three phase current, RMS Amplitude	I	[A]
276	Total active power (Imp/ Exp)	PS	[W]
278	Total reactive power (Imp/ Exp)	QS	[var]
280	Total apparent power	SS	[VA]
282	Total power factor (Imp/ Exp)	PFS	[-]
332	Phase Current, RMS Amplitude, AVG	I1 AVG	[A]
334	Phase Current, RMS Amplitude, AVG	I2 AVG	ÍΑÌ
336	Phase Current, RMS Amplitude, AVG	I3 AVG	[A]
344	Total imported active power, AVG	P Imp AVG	[W]
346	Total imported inductive power, AVG		[var]
348	Total imported capacitive power, AVG	Qcap Imp AVG	
350	Total imported apparent power, AVG	S Imp AVG	[VA]
352	Total exported active power, AVG	P Exp AVG	[W]
354	Total exported inductive power, AVG	Qind Exp AVG	
356	Total exported inductive power, AVG	Qcap Exp AVG	
358	Total exported capacitive power, AVG	S Exp AVG	[VA]
376	External Pulse Counter, With Weight, Total counter	CNT1 S	[1/2]
570	or Tariff T1	CIVIII	
384	External Pulse Counter, With Weight, Partial	CNT1 P	
304	Counter or Tariff T2	CIVITE	
	Counter of faffill 12		

NOTE n.1		
TYPE	3PH-4W	3 phases 4 wires, Star
	2PH-2W	2 phases 2 wires, biphase
	1PH-2W	1 phase 2 wires, monophase
	3PH-4W-BAL	3 phases 4 wires, Star Balanced
	3PH-3W-2CT	2 phases 3 wires, triangle
CT	Primary / Secondary of the currer	nt transformer (CT)
VT	Primary / Secondary of the voltag	e transformer (VT)
NOTE n.2		
POWERS	power (from 1 to 60 minutes)	alue (AVG) and peak value (MD) for
CURRENTS	Integration time of the average vacurrent (from 1 to 60 minutes)	alue (AVG) and peak value (MD) for
NOTE n.3	T	
NORMALE		a fixed threshold or to maximum and
	minimum delay and applicable hy	steresis. "AVG" parameter is not used.
1-OF-3	Works on a fixed max or min	gisters of the selected one in "MEAS". In threshold with delay and applicable ster exceed the threshold the alarm goes
3-OF-3	Consider also the 2 following re	gisters of the selected one in "MEAS".
	Works on a fixed max or min thresl	hold with delay and applicable hysteresis. d the threshold the alarm goes on. "AVG"
DERIV		6 value, "AVG" parameter is used. The
	instant value applied to the alarn mediated obtained on the basis instantaneous value combined ala (setting "MIN") from the average	n on "MEAS" is compared with its value s of the time set on "AVG". When the arm differs in more (setting "Max") or less value (" AVG ") of the percentage set on
UNBAI	"THRE" the alarm goes on. With o	
	"THRE" parameter becomes a % three register is different from the the higher value of the three rea	gisters of the selected one in "MEAS". b value. Alarm goes on when one of the p percentage set on "THRE" comply with d register if "MAX" is set on "TYPE", or three register if "MIN" is set on "TYPE" ssis.
NOTE n.4		
MAX	Alarm setting in excess compared With the exception of "UNBAL".	d with the established conditions.
MIN	Alarm setting in decrease compar With the exception of "UNBAL"	red with the established conditions.
NOTE n.5	To the second se	
MEAS	Indicates which register (and thus	measure) the alarm is related.
	See table n.1 input register.	
THRE	Alarm threshold in absolute value and "UNBAL" in which the value in	with the exception made for "DERIV" nserted becomes a percentage.
NOTE n.6	Danis da la	DIV #
AVG	rence (in seconds) used to create readings.	RIV" mode. Is the duration of the refe- e a reference value for the istantaneous
NOTE n.7	DI : 1 4 4 5 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
NORMAL	restores automatically	ed during the duration of the alarm. It
HOLD	Output remains excited until man	
PULSE-L	Output generate a 500ms impulse	
PULSE-S	Output generate a 100ms impulse	e wnen the alarm goes ON.
NOTE n.8 ALLARME 1	Only MODRIJS clarm	
	Only MODBUS alarm Only MODBUS alarm	
ALLARME 2	Only MODBUS alarm Only MODBUS alarm	
ALLARME 3 ALLARME 4	Only MODBUS alarm	
NOTE n.9	Only MODBOS dialili	
LOW	Starting value of the scale related	I to 0 and 4 mΔ
HIGH	Full scale value related to 20 mA	1 to 0 and 7 m/t
	I all codic value related to 20 IIIA	

MESSAGE "CFG ERROR"

During the set up operation a "CFG ERROR" message could appear. This means that some wrong parameters are typed. To restore the factory default settings use the following procedure (RESTORE FACTORY SETTING):





RESTORE FACTORY SETTINGS YES

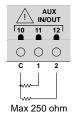


Once this procedure is done the meter is configured with its factory default settings. Stored data will remain after the restore operation.

ANALOGUE OUTPUTS CONNECTION

For loads with impedance less than or equal to 250 ohms follow the diagrams below.

ANA	ANALOGUE OUTPUT			
С	Common (negative)			
1	Output 1 (positive)			
2	Output 2 (positive)			



R max

435 583

694 1138

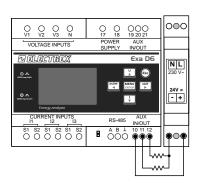
For loads with higher impedance of 250 ohms it is necessary to include in series an external power supply.

The voltage to be applied is given by the following formula: R max = (Vdc / 0.027) + 250

V = (R-250) x 0.027

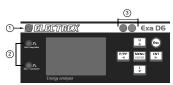
(Eg. with an impedance of 1 ohm, the voltage to be applied $\frac{9}{12}$ is:

(1000-250) x 0.027= 20.25 Vdc



LED

Description of the LEDs



LED (1)	Under the sine wave symbol next to the Electrex logo a red LED indicates the operation status
LED (2)	Two red LEDs, for calibration checking, pulse with a frequency proportional to the active and reactive energy imported.
LED (3)	Two other LEDs, below the white band, indicate the communication activities of the RS485 port (red LED TX, green LED RX)

ALARM SET UP EXAMPLE

To ensure that the exit "DIGITAL OUT 1" remain excited for the alarm duration (latching) when average active power (MEAS 344) exceeds the value of 100 kW, hysteresis, 5% and latency of 5 seconds set the parameters such as table:

	MODE (note n.2)	Normal, 1-OF-3, 3-OF-3, DERIV, UNBAL	NORMAL	
	TYPE (note n.3)	MAX, MIN	MAX	
ALARM 1 / A	MEAS (note n.4)	Controlled measure. See table n.1 for register	344	
	IVIEAS (Note 11.4)	selection		
	THRE (note n.4)	Threshold value	100000	
	HYST	1100 (%)	5	
ALARM 1 / B	DELAY	199 (seconds)	5	
ALAKWI 1 / B	AVG (note n.5)	199 (seconds)	1	
	OUT (note n.6)	Normal, Hold, Pulse-L, Pulse-S	NORMAL	
DIGITAL OUT 1	MODE	PULSE, ALARM, REMOTE	ALARM	
DIGITAL OUT 1	POLARITY	NO. NC	NO	

To ensure that the exit "DIGITAL OUT 2" remain excited for the alarm duration (latching) when average active power (MEAS 344) goes down the value of 90 kW, hysteresis, 5% and latency of 5 seconds set the parameters such as table:

ALARM 2 / A	MODE (note n.2)	Normal, 1-OF-3, 3-OF-3, DERIV, UNBAL	NORMAL
	TYPE (note n.3)	MAX, MIN	MIN
	MEAS (note n.4)	Controlled measure. See table n.1 for register	344
		selection	
	THRE (note n.4)	Threshold value	90000
ALARM 2 / B	HYST	1100 (%)	5
	DELAY	199 (seconds)	5
	AVG (note n.5)	199 (seconds)	1
	OUT (note n.6)	Normal, Hold, Pulse-L, Pulse-S	NORMAL
DIGITAL OUT 2	MODE	PULSE, ALARM, REMOTE	ALARM
	POLARITY	NO, NC	NO

VOLTAGE AND CURRENT CONNECTION

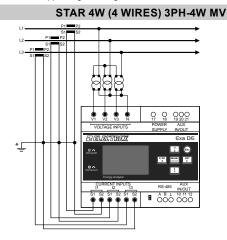
Voltage connection: Use cables with max cross-section of 2,5 mm2 if stranded 4 mm2 if rigid and connect them to the clamps marked VOLTAGE INPUT on the instrument according to the applicable diagrams that follow.

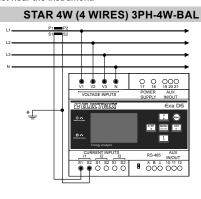
Current connection: It is necessary to use external CTs with a primary rating adequate to the load to be measured and with a 5A or 1A secondary rating. Connect the CT output(s) to the terminals marked I1, I2, I3 (CURRENT INPUT) of the instrument according to the applicable diagrams that follow. Use cables with cross-section adequate to the VA rating of the CT and to the distance to be covered. The max cross-section for the terminals is 2,5 mm² if stranded and 4 mm² if rigid.

N.B. The CT secondary must always be in short circuit when not connected to the instrument in order to avoid damages and risks for the operator.

Scrupulously respect the matching of phase between the voltage signals and current signals (RTD) and the direction of insertion of CT (P1-P2 and S1-S2). Failure to comply with this correspondence and connection diagrams gives rise to measurement errors. (*) The grounding of S2 must be close to the CT and not near the instrument.

STAR 4W (4 WIRES) 3PH-4W LV O O OOC *__ B A B 1 10 11 12

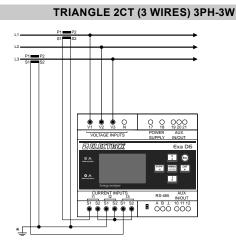


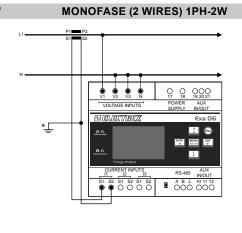


*

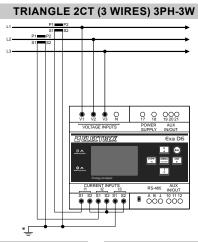
B AB 1 10 11 12

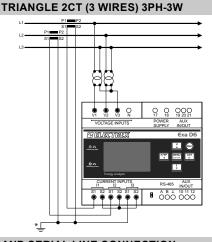
TRIANGLE 3W (3 WIRES) 3PH-3W





TRIANGLE 2CT(3 WIRES) 3PH-3W O O OOC A B 1 10 11 12 *_





BI-PHASE (2 WIRES) 2PH-2W O O \$2 \$1 \$2 \$1 \$2 \$ 0 0 0 0 A B 1 10 11 12

POWER SUPPLY AND SERIAL LINE CONNECTION

The instrument is fitted with a separate power supply. The power supply terminals are numbered (17 e 18). Use cables with max cross-section of 2,5 mm² if stranded, 4 mm² if rigid.

