

**INSTRUCTION MANUAL
ACTUATOR CLASSE II**

TYPE MAS4

BBERNARD

L. BERNARD	CONTENTS	<u>Number</u> : NR 1085	Page : 2/21
		<u>Revision</u> : A	
INSTRUCTION MANUAL			

INSTALLATION

Instruction for storage of actuators	3
Electrical connections	4
Outline dimension drawings	5

COMMISSIONING INSTRUCTIONS

1) Commissioning instructions	6
<i>1-1 Adjustment of quarter-turn actuator mechanical stops</i>	
<i>1-2 Direction of rotation</i>	
<i>1-3 Setting of dead band</i>	
<i>1-4 End of travel setting</i>	
<i>1-5 Setting of 0%</i>	
<i>1-6 Setting of 100%</i>	
2) Additional technical informations	10
<i>2-1 0% and 100% setting with a voltmeter</i>	
<i>2-2 How to use the output signal of the positioner</i>	
<i>2-3 Modifications of the input signal</i>	
<i>2-4 Input signal inversion</i>	
<i>2-5 Closing anticlockwise</i>	
<i>2-6 Remote impulsional command</i>	
<i>2-7 Alarm relay (optional)</i>	
<i>2-8 Commissioning instructions electronic position transmitter type TAM2</i>	

MAINTENANCE

<i>Lubrication</i>	
<i>Trouble shooting</i>	
<i>Spare parts</i>	

16

APPENDIX

Body parts	20
Wiring diagram	21

L. BERNARD	INSTALLATION	Number : NR 1085	Page : 3/21
		Revision : A	
INSTRUCTION MANUAL			

INSTRUCTION FOR STORAGE OF ACTUATORS

The actuators includes electric and electronic equipment as well as grease lubricated gear stages. In spite of the weatherproof enclosure, oxidation, jamming and other alterations are possible if actuator is not correctly stored.

Storage

The actuators should be stored under a shelter in a clean, dry place and protected from constant changes in temperature. Avoid placing the actuators directly on the floor.

It is recommended that you connect and give supply to heat resistance especially if the place of storage is humid (standard voltage 230 Volts, unless otherwise specified).

Check that the temporary sealing plugs of the cable entries are well in place. Make sure that the covers and the boxes are well closed to ensure weatherproof sealing.

Control after storage

- Maintain a visual check of electric equipment,
- Operate manually the microswitches, buttons, selectors, etc., to insure the correct mechanical function,
- Operate appartus manually,
- Verify the correct grease consistency.

Storage exceeding one year :

Sometimes the actuators are installed on site but the electric wiring cannot yet be installed. During this period :

- Be sure that the cable gland and the electrical boxes are weatherproof,
- Cover the actuator with a plastic tarp.

We advise to give supply to the heating elements while the actuator is out of service, even if it is only temporarily awaiting final wiring hook up.

Storage of actuators equipped with electronic components :

The long term storage of electronic components which are not in service risk malfunctioning. This practice is therefore highly unadvisable.

If a long storage is absolutely necessary, we strongly recommend a revision of the electronic cards in our factory before actuator usage.

L. BERNARD	INSTALLATION	<u>Number</u> : NR 1085	Page : 4/25
		<u>Revision</u> : A	
<i>INSTRUCTION MANUAL</i>			

ELECTRICAL CONNECTIONS

All control elements of the actuator are wired to a terminal strip in the switching compartment. Remove the cover and insert the cables through the cable glands in order to reach the terminal strip.

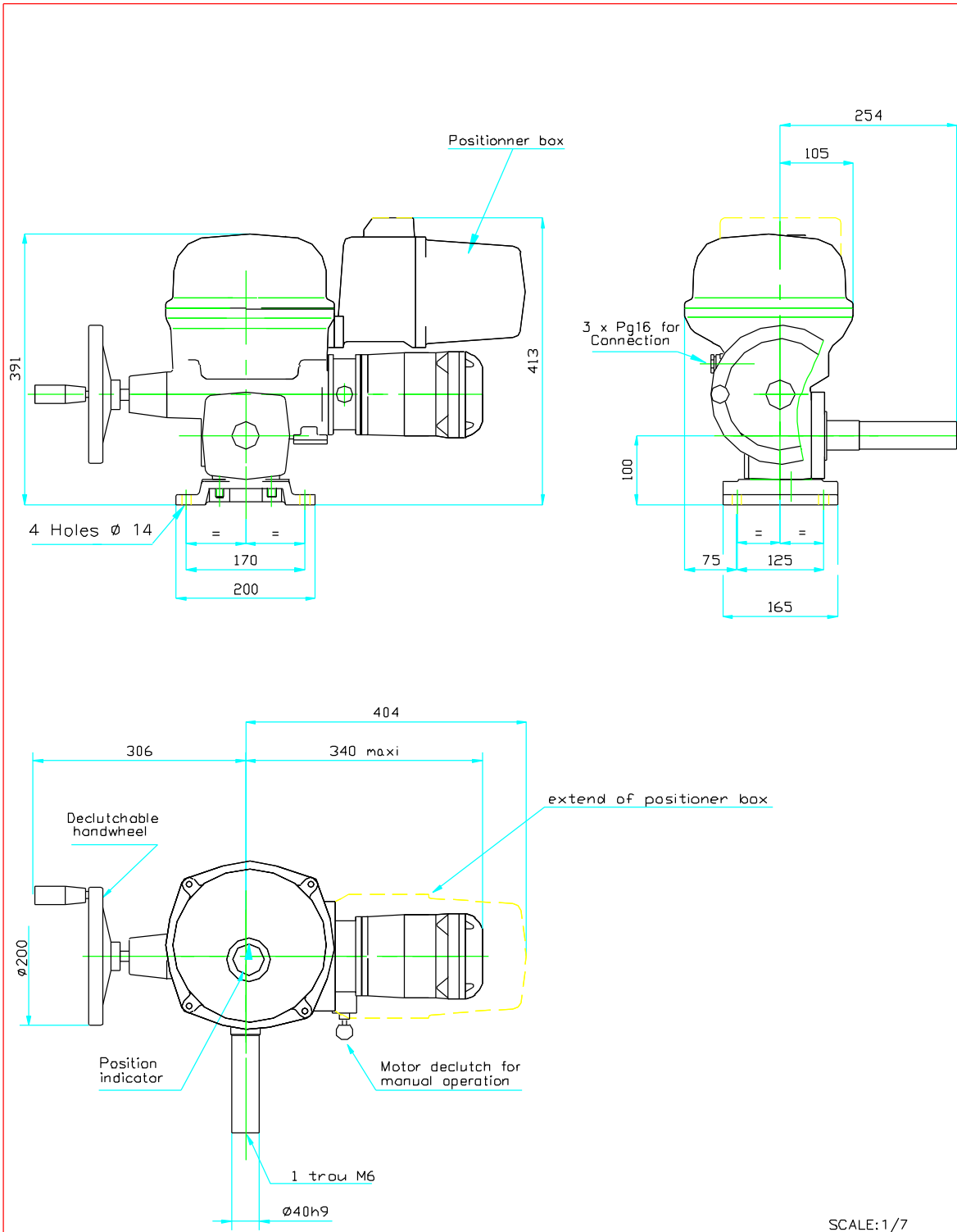
The connection are made in accordance with the diagram. Before beginning this procedure, make sure that power supply voltage is in accordance with the actuator nameplate.

Notes concerning the electrical connection

It is possible to control the positioner GAMX with an analogue signal and also with an on-off pulse signal. Furthermore it can supply an output signal for the position indication. The control cable for these signals has to be separated from the others (minimum 1 inch distance) or armoured otherwise there could be a risk of interference. The shield of the armoured cable can be connected to terminal 71 and should be isolated from the earth.

L. BERNARD	INSTALLATION	Number : NR 1085	Page : 5/25
		Revision : A	
INSTRUCTION MANUAL			

OUTLINE DIMENSION DRAWING



						Z1011/02
EXTERNAL DIMENSIONS						
MAS4 + GAMX - WITH FOOT PLATE + MALE SHAFT						
A	24/06/97	SALVUCCI				
IND.	DATE	AUTEUR	VERIF.	APPROUV.	MODIF.	
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L. BERNARD	COMMISSIONING INSTRUCTIONS	Number : NR 1085 Revision : A	Page : 6/21
INSTRUCTION MANUAL			

1- COMMISSIONING INSTRUCTIONS

1-1 ADJUSTMENT OF QUARTER-TURN ACTUATORS WITH MECHANICAL STOPS

All quarter-turn actuators are provided with a mechanical stop device at each end of travel. The advantage of this arrangement serves to avoid over-travel with the handwheel going beyond the 1/4 turn rotation and preserve the adjustment of the travel limit switches. As the handwheel is fitted to the gearworm, the operation effort is relatively low for the valve drive.

Actuators and gears are supplied and tested for 90° operation. Fine adjustment is available, utilizing the stop screws (max. $\pm 2^\circ$ which corresponds to 1.5 revolutions of the stop screws). The stop screws must be secured with the lock nut after any adjustment.

The 90° travel must always be limited by the travel limit switches so they must be set to trip just before mechanical stop contact. To archive this, loosen stop screws by 2 1/2 turns. Then, after travel limit switch setting is terminated (see paragraph 1.4)), operate the actuator electrically to closed position. Now rotate stop screws to mechanical contact, re loosen 1 turn, and secure by lock nut. Proceed in the same way in open position.

It is emphasized that the mechanical stops are only a safety design feature to prevent over-travel in the event of travel limit switch failure or when the actuator is being operated manually.

1-2 DIRECTION OF ROTATION

After the assembly of the actuator on the valve, position the valve manually (handwheel) at mid-travel.

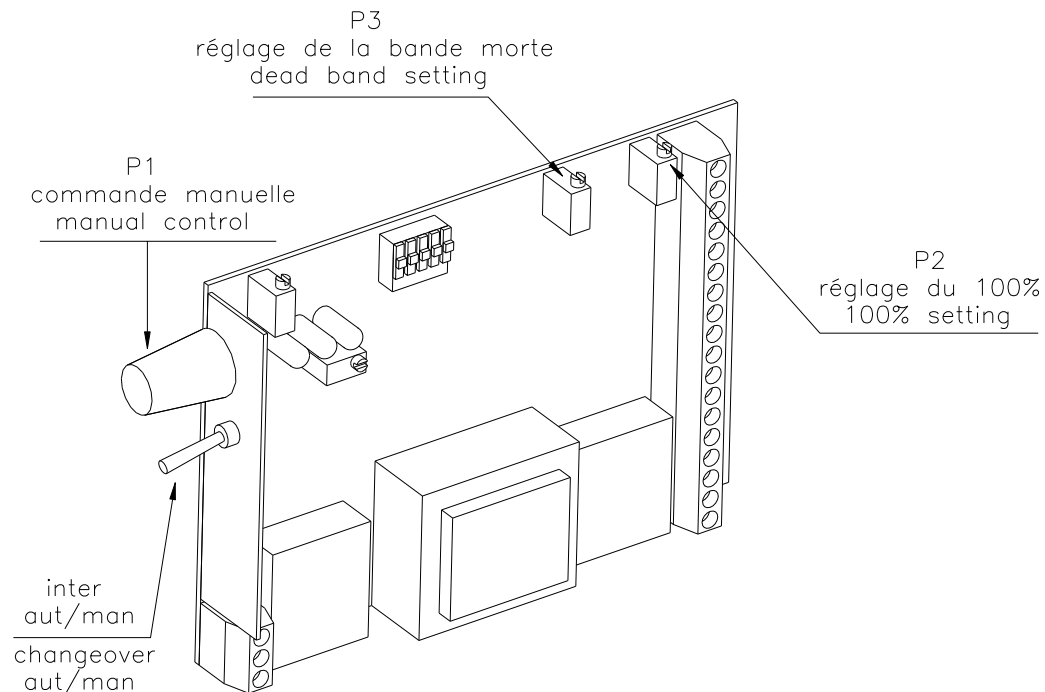
Open actuator and positioner covers.

Check the positioner is not switched off by the remote impulsional command (links 19-34, 35 and 36 must be open).

Set changeover switch of the positioner in manual position "MAN".

Supply the power voltage (see diagram).

L. BERNARD	COMMISSIONING INSTRUCTIONS	Number : NR 1085	Page : 7/21
		Revision : A	
INSTRUCTION MANUAL			



Direction of rotation verification :

GREEN LED on, open direction (when rotating handwheel anticlockwise)

RED LED on, close the direction (when rotating handwheel clockwise)

In any other case, disconnect immediatly power supply and check that the wiring between the motor and positioner is correct.

Then, with the incorporated manual control knob P1, check that positioner works correctly.

An ORANGE LED is ON when the torque limit switch is tripped. This protection is effective even in the case of a wrong direction of rotation of the motor.

1-3 SETTING OF DEAD BAND

(Potentiometer p3)

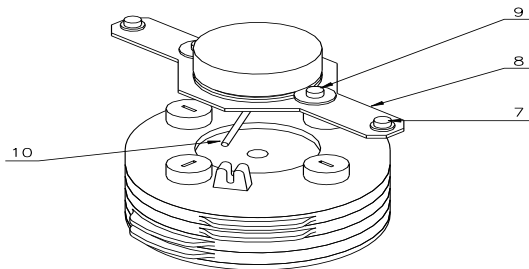
This setting is already done in our works but it's possible to obtain a finer accuracy by regulating potentiometer P3 (dead band will decrease when P3 is turned CCW). If setting is too narrow, actuator is hunting.

Note : If dead band is excessively narrow, actuator may operate in one direction only.

L. BERNARD	COMMISSIONING INSTRUCTIONS	Number : NR 1085	Page : 8/21
		Revision : A	
INSTRUCTION MANUAL			

1-4 END OF TRAVEL SETTING

Remove potentiometer support item 8 by loosening the 2 fixing screws item 7.
The cam block is equipped with 4 cams different colours. White and black cams for end travel limits.



Turn the button P1 to operate the actuator in a closed or open direction.
Put the actuator in open position. Using a screw rotate the came to the position in which it can trip the limit switch.
Proceed the same way for the closed position.
Put the power supply "OFF".
Fix the potentiometer plate (item 8) and put the power supply "ON".

1-5 SETTING OF 0%

Turn manual control knob P1 clockwise until mechanical stop is reached (0% position).

Actuator starts in a closed direction and stops before reaching the closed travel limit switch.

Loosen the 2 fixing screws item 9 and turn carefully the potentiometer until the actuator reaches closed travel limit switch and RED LED is off.

Tighten the 2 fixing screws item 9.

Special case :

Actuator starts in closed direction and doesn't stop before reaching closed travel limit switch. In this case, loosen the 2 fixing screws item 9 and turn potentiometer in other direction until RED LED is off. Tighten the 2 fixing screws item 9.

L. BERNARD	COMMISSIONING INSTRUCTIONS	Number : NR 1085 Revision : A	Page : 9/21
INSTRUCTION MANUAL			

1-6 SETTING OF 100%

Turn manual control knob P1 until mechanical stop has reached (100%) position.
Actuator starts in open direction and stops before reaching open travel limit switch.
Turn potentiometer P2 (pot. multi-turn 20 revolutions) counterclockwise until actuator reaches open travel limit switch.

Other case :

Actuator starts in open direction and doesn't stop before reaching open travel limit switch. In this case, turn potentiometer P2 CW until GREEN LED is off.

- Connect input signal (see diagram).
- Set changeover switch in "AUT" position.

Actuator positions itself at 4mA to 0% and at 20mA to 100% and proportionally to all intermediate signals.

L. BERNARD	COMMISSIONING INSTRUCTIONS	Number : NR 1085 Revision : A	Page : 10/21
INSTRUCTION MANUAL			

2- ADDITIONAL TECHNICAL INFORMATIONS

2-1 0% AND 100% SETTING WITH A VOLTMETER

0% and 100% setting can be done with more precision by using a DC voltmeter.

Connect voltmeter between terminals 71 and 17 (electronic card terminals).

Turn control knob P1 to 0%, actuator will run to closed position.

Loosen the 2 fixing screws item 9 of the potentiometer on actuator and turn carefully potentiometer to area where the voltage reads 1 volt on the voltmeter.

Set potentiometer at point just when voltage starts increasing.

Tighten the 2 fixing screws item 9.

Now, position actuator in open position. Set potentiometer P2 to read exactly 5 volts on voltmeter.

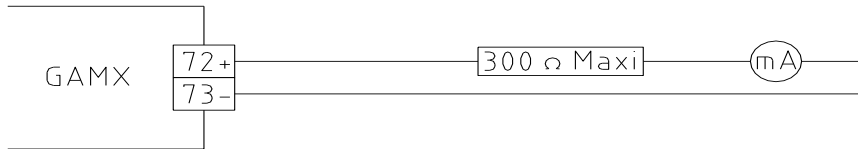
2-2 HOW TO USE THE OUTPUT SIGNAL OF THE POSITIONER

Terminals 72+ AND 736. No supply is required from outside.

Important note :

This signal is not electrically isolated from the input signal.

L. BERNARD	COMMISSIONING INSTRUCTIONS	Number : NR 1085	Page : 11/21
		Revision : A	
INSTRUCTION MANUAL			



2-3 MODIFICATIONS OF THE INPUT SIGNAL

The GAMX can receive on request different input signals :

- 4-20 mA
- 0-20 mA
- 4-12 mA
- 12-20mA
- 0-10 V

- Put the switches from 1 to 5 in the position shown in the table.

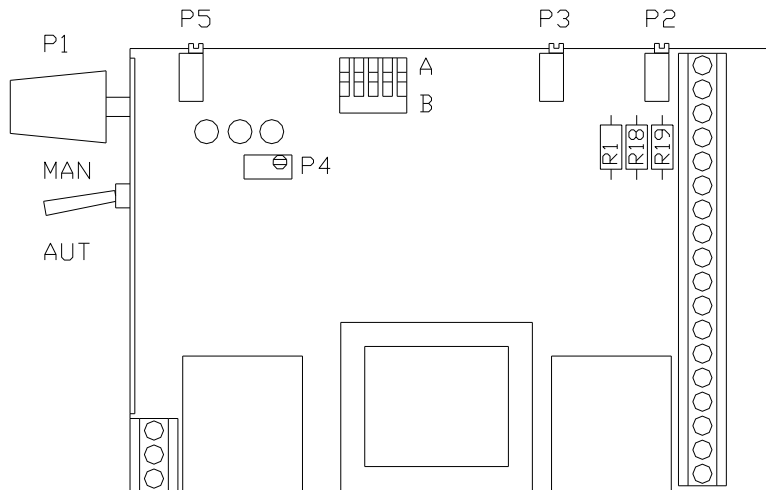
Signal	Mini switches				
	1	2	3	4	5
4 - 20 mA	A	A	A	A	A
0 - 20 mA	B	A	A	A	B
4 - 12 mA	A	A	B	A	B
12 - 20 mA	A	B	A	A	B
0 - 10 V	B	A	A	A	B

For the original 0-10 V, replace R1 by a resistance 4,99 kOhms (1%). Add another resistance of R18 4,99 kOhms (1%) at the allocated place and cut on the other side the circuit which is shown with an X

Remark :

When you have an i/p signal of 0-10 V, the remote indication is always ref 0-20 mA.

L. BERNARD	COMMISSIONING INSTRUCTIONS	Number : NR 1085	Page : 12/21
		Revision : A	
INSTRUCTION MANUAL			



2-4 INPUT SIGNAL INVERSION

This specification here after describes the changes which must be done to inverse the input signal.

Example : 4mA = Valve is open
20mA = Valve is closed

Wiring :

Compared to the standard wiring diagram (closing direction clockwise 4mA) the following changes have to be made on terminals of electronic card :

- exchange 16 and 18 (potentiometer)
- exchange 11 and 14 (travel limit switches)
- change the rotational direction of the motor by inverting 2 cables of the motor supply or by inverting cables 31 and 33 (positioner relay)
- do not inverse the labels open and closed of the switches
- do not inverse the labelling open/closed of the handwheel.

Adjustment :

The adjustment of the positioner is done in the same way as the standard unit. But the action on the manual control knob is not the same as the standard which means :

- position 0% = opening (Red LED)
- position 100% = closing (Green LED)

The feed back of the signal is in phase with the input.

L. BERNARD	COMMISSIONING INSTRUCTIONS	Number : NR 1085	Page : 13/21
		Revision : A	
INSTRUCTION MANUAL			

- signal 4mA = output signal = 4mA

2-5 CLOSING ANTICLOCKWISE

This specification here after describes the changes which must be done to move a device closing in anticlockwise direction.

Wiring :

Compared to the standard wiring diagram (closing direction clockwise 4mA) the following changes have to be made on terminals of electronic card :

- exchange 16 and 18 (potentiometer)
- exchange 11 and 14 (travel limit switches)
- change the rotational direction of the motor by inverting 2 cables of the motor supply or by inverting 2 cables of the motor supply or by inverting cables 31 and 33 (positioner relay)
- exchange the labels open and closed of the switches
- exchange the labelling open/closed of the handwheel.

Adjustment :

The adjustment of the positioner is done in the same way as the standard unit.
The feedback of the signal is in phase with the input.

- Input 4mA = Output signal 4mA

2-6 REMOTE IMPULSIONAL COMMAND

It is possible to operate the GAMX for open and close operation when you turn off the positioner.

Shunt 19-34 = the positioner is switched off

Shunt 34-35 = close command

Shunt 34-36 = open command

(Current: 1,7 mA - Voltage 24 VDC about)

All securities, signalling and position signals are still operational.

2-7 ALARM RELAY (OPTIONAL)

This relay is connected on the electronic card terminals 19+ and 60.

It is normally activated.

Releasing in case of :

- motor thermal overload

L. BERNARD	COMMISSIONING INSTRUCTIONS	Number : NR 1085 Revision : A	Page : 14/21
INSTRUCTION MANUAL			

- faulty electronic card supply voltage.
Contact rating: 250 VAC - 5A

2-8 COMMISSIONING INSTRUCTIONS ELECTRONIC POSITION TRANSMITTER TYPES TAM2

2.8.1- ELECTRICAL CONNECTION:

The actuator is prewired according to the choice of utilization : 2, 3 or 4 wires.

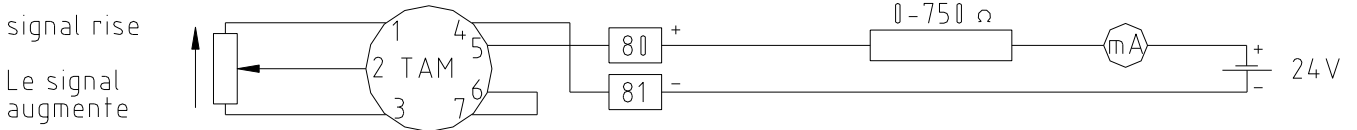
The power must be DC, filtered or stabilized between 12 and 32 V.

The total load should not exceed the following values depending on voltage

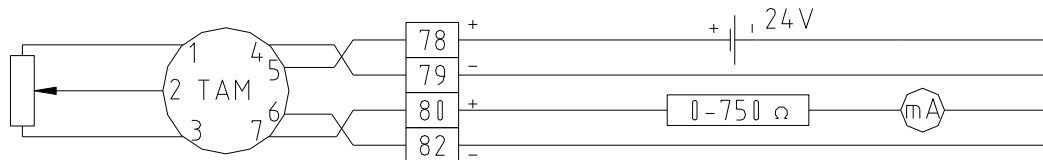
Energy Supply DC (Volt)	Max. Admissible load (Ohm)
12	150
24	750
30	1050

2.8.2- WIRING

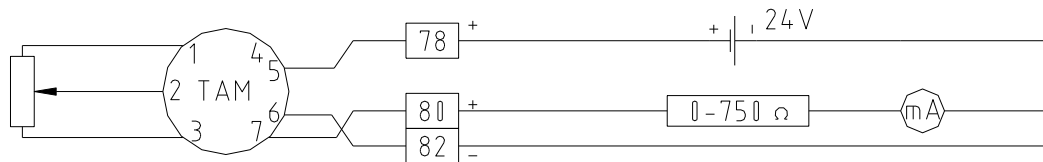
2 Wires - 4/20mA
2 fils - 4/20mA



4 Wires - 0/20mA ou 4/20mA
4 fils - 0/20mA ou 4/20mA



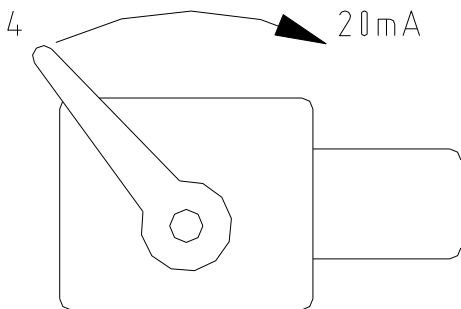
3 Wires - 0/20mA ou 4/20mA
3 fils - 0/20mA ou 4/20mA



2.8.3-SIGNAL DIRECTION INVERSION:

The TAM2 transmitter is supplied as standard with a signal that rises when the actuator operates counterclockwise.

If an opposite signal is required, the signal can be inverted by exchanging wires 1 and 3 on the TAM2 transmitter.



*Counter clockwise rotation
looking from opposite side*

L. BERNARD	COMMISSIONING INSTRUCTIONS	Number : NR 1085 Revision : A	Page : 16/21
INSTRUCTION MANUAL			

2.8.4- COMMISSIONING AND ADJUSTMENT:

- Adjustment should always start by 0/4 mA. Drive actuator to Close position (Clockwise)
- Loosen the potentiometer holding screws, then rotate the potentiometer until the point reaching where the current has its minimum value
- Position the potentiometer at the point where the signal starts to increase
- Refasten the holding screws. The potentiometer is at the beginning of its range
- With a little screwdriver, turn the screw '0/4mX on the TAM - 2 in order to read exactly 4 mA on the ammeter (or 0 mA if 3 or 4 wires wiring is used)
- Drive actuator to Open (Counterclockwise) = 20 mA position
- Turn the screw 20mA in order to read exactly 20 mA on the ammeter.

* : commissioning is explained for the standard 4/0 mA = Closed (Clockwise). If opposite signal is required :

- 1) Do signal inversion
- 2) in the adjustment procedure, replace Closed by Open.

L. BERNARD	COMMISSIONING INSTRUCTIONS	<u>Number</u> : NR 1085 <u>Revision</u> : A	Page : 17/21
	<i>INSTRUCTION MANUAL</i>		

L. BERNARD	MAINTENANCE	Number : NR 1085	Page : 18/21
		Revision : A	
INSTRUCTION MANUAL			

MAINTENANCE

If actuators is correctly mounted and sealed, no special maintenance is required. Check once a year function of motor and make sure that switch and electronic compartment are condensation free.

LUBRICATION

Periodic lubrication is not required on L.BERNARD actuator. Only in most severe applications and during major shut downs, the gears can be inspected to determine the need to relubricate this gear. If it becomes necessary to renew the grease, use a product which is at least equivalent (refer to list hereafter).

Note : When changing the grease, first remove the old one.

General characteristics of lubricant (for normal conditions) :

- Duty temperature (grease : -30°C to + 135°C),
- Penetration ASTM at +25°C : 265/295,
- Drop point : +180°C.

Equivalent Table

(Normal conditions = -20°C to +20°C

ELF	TOTAL	SHELL	MOBIL	ESSO
EPEXA250	MULTIS EP2	ALVANIA EP2	MOBILUX EP2	BEACON EP2

L. BERNARD	MAINTENANCE	Number : NR 1085	Page : 19/21
		Revision : A	
INSTRUCTION MANUAL			

3 -TROUBLE SHOOTING

If there are troubles with the operation of the unit, place first changeover switch AUT/MAN of positioner to "MAN" position. Now rotate the manual control knob PI.

PROBLEM	REASON	REMEDY
The red or green LED are not energised	-No supply voltage of electronic card	Check supply voltage 220V (or 110 V) ~ between electronic card terminals 37-38 and see wiring diagram for supply voltage.
	-The positioner is out of service because of the remote impulsional command.	Temporary disconnect the remote impulsional command:- terminals 19-34-35-36 and check
	- The positioner is equipped with a stayput card	Turn the switch OFF of the stay- put card.
The actuator is opening or closing independently of position of p 1	-Wrong direction of rotation of the motor.	See para 1-2 at commissioning instructions.
	-The direction of rotation is not in accordance with specification. For example: closing anticlockwise but the actuator is std (<u>closing clockwise</u>).	See 2-5.
	-The dead band is too narrow.	See 1-3.
	- The potentiometer of the actuator is in a wrong position.	Rotate the potentiometer a quarter turn and test again according to commissioning instructions.
	- Problem with the actuator potentiometer.	Check connections: electronic card terminals 16-17-18. Check the right position of connection: when the red LED is ON, the voltage between 16 and 17 is decreasing. If not interchange 16 and 18. Check the voltage between terminals 71 and 17 on the electronic card. The indicated voltage must

L. BERNARD	MAINTENANCE	<u>Number</u> : NR 1085	Page : 20/21
		<u>Revision</u> : A	
INSTRUCTION MANUAL			

		<p>be vary from 1 to 5 volts (or 0-4 V depending on option) for the full stroke.</p> <p>Note: The maximum value 5 V (4V) is depending of the adjustment of P2.</p> <p>An irregular variation of voltage is probably due to faulty potentiometer.</p>
Actuator is not working when the switch is in "AUT" position with the input signal.	-The input signal is faulty.	Test it with a milliamperemeter.
	-Wrong adaptation to the input signal.	<p>Check the input impedance: switch off the positioner and disconnect the input signal. Measure the resistance on terminals 70-71 with an ohmmeter.</p> <p>Find value: 250 Ohms</p> <p>Except for signal 0-10V: 10KOhms (see 2-3)</p>
	-Signal polarity.	Check if the plus of the signal is connected on terminal 70.
The positioner is not adjustable for the full stroke.	-Non conformity of the stroke.	Check the accordance between the stroke of the driven unit and the stroke of the actuator.
	- Bad adjustment at potentiometer.	Check 0% position.

L. BERNARD	MAINTENANCE	<u>Number</u> : NR 1085	Page : 21/21
		<u>Revision</u> : A	
INSTRUCTION MANUAL			

Type MAS4 - class II
 ACTUATOR - SERVOMOTEUR
 Drawing/plan n°X1746-01

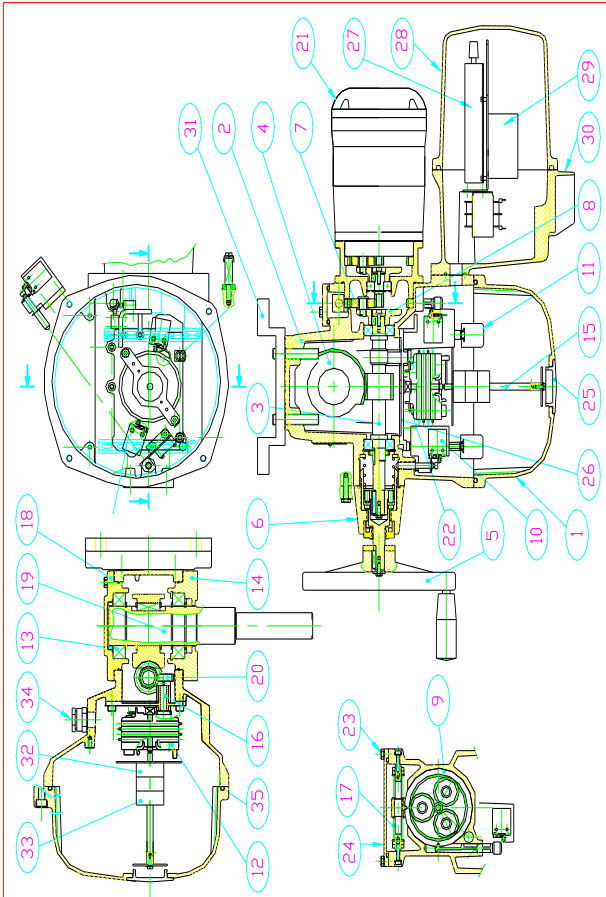
SPARE PARTS LIST - LISTE DE PIECES DE RECHANGE

TYPE 1

ITEM	PART NAME	DESIGNATION	CODE
1	COVER	COUVERCLE	
2	HOUSING	CARTER	
18	UPPER FLANGE	JOUE SUPERIEUR	
14	FIXING FLANGE	BRIDE DE SORTIE	
5	HANDWHEEL	VOLANT DE CDE MAN.	
6	Declutching Device	Débrayage de Cde manuelle	
15	POINTER DISK	INDICATEUR DE POSITION	
25	INDICATOR WINDOW	FENETRE D'INDICATEUR	
12	CAMBLOCK	BLOC A CAMES	
9	CROWN	COURONNE	
7 + 8	PLANETARY GEAR+3 SATELLITES	PORTE SATELLITES - 3	
3	WORM (worm-wheel)	VIS SANS FIN (vsf/roue)	
4	QUADRANT	SECTEUR	
20	WHEEL TLS-1	ROUE FIN DE COURSE	
16	PINION TLS	FIN DE COURSE	
22	WHEEL TLS-2	ROUE FIN DE COURSE	
26	SWITCH PLATE	PLATEAU DE FIN DE COURSE	
17	SPRING (torque device)	RESSORT DE LIMITEUR	
24	Torque Cover	Couvercle limiteur	
13	BALL BEARING SET	POCHETTE DE ROULEMENTS	
23	Set of external SCREWS	Pochette VISSERIE extérieure	
35	GASKETS & O-RINGS SET	POCHETTE DE JOINTS	
19	MAIN DRIVE SHAFT	ARBRE DE SORTIE	
31	FOOT PLATE	SOCLE	
21	MOTOR	MOTEUR	
10	Microswitch	Microrupteur	83 160
11	Terminal	Borne	DR4/8
32	Potentiometer Class II	Potentiomètre class II	1000 ohm
33	Transmitter TAM	Transmetteur TAM 4/20 mA	
34	Cable gland	Presse étoupe	Pg16
28+30	Positioner Box	Boîte Positionneur	
27	Positioner Card ModuGAM	Carte Positionneur	MODUGAM
29	Solid state relay	Relais statique	
			REF-LIST SP-MAS4

L. BERNARD	MAINTENANCE	<u>Number</u> : NR 1085 <u>Revision</u> : A	Page : 22/21
<i>INSTRUCTION MANUAL</i>			

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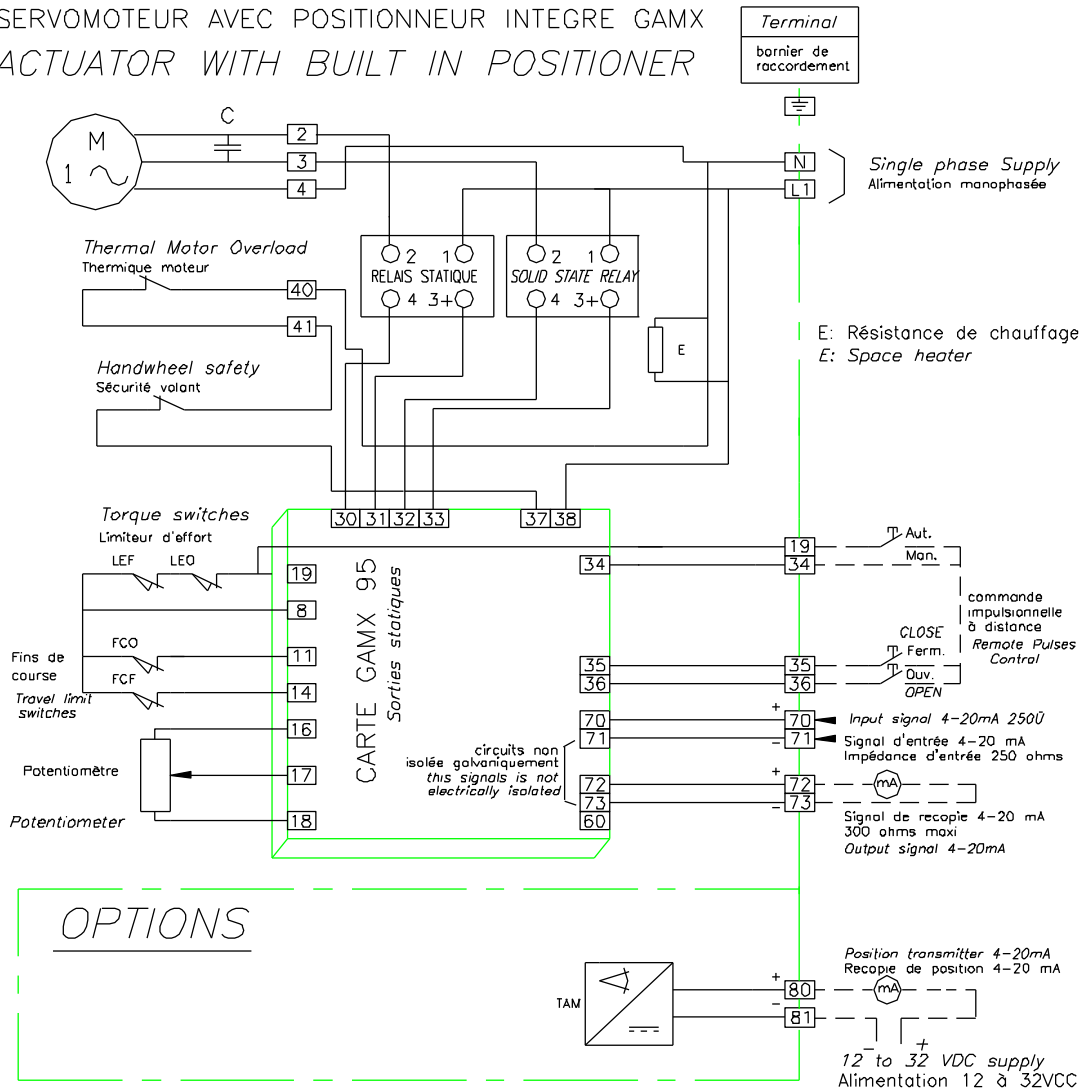


					X1746-01
					PIECES DE RECHANGE / SPARE PARTS
A	24/06/97	SALVUCCI			
IND.	DATE	AUTHEUR	VERIF.	APPROUV.	MODIF.
L. BERNARD		60 av. du President WILSON	3321 LA PLAINE St DENIS, FRANCE	Tel: (1) 48.09.28.12	Fax: (1) 48.09.28.29
					MAS4 + GAMX - WITH FOOT PLATE + MALE SHAFT

L. BERNARD	APPENDIX	Number : NR 1085 Revision : A	Page : 24/21
<i>INSTRUCTION MANUAL</i>			

WIRING DIAGRAM

SERVOMOTEUR AVEC POSITIONNEUR INTEGRE GAMX
ACTUATOR WITH BUILT IN POSITIONER



A	09/07/97	SCHWEBEL			
REV.	DATE	AUTEUR	VERIF.	APPROUV.	MODIF.
		Ets LBERNARD, 60 av. du PRESIDENT WILSON, 93211 LA PLAINE ST DENIS		TEL. (1)48.09.29.12 FAX. (1)48.09.25.29	

DESIGNATION : **S16201/13**

SCHEMA DE CABLAGE

GAMX MONOPHASEE CLASS II

Single Phase GAMX CLASS II