NENUTEC®

INNOVATIVE MEMBER OF SWIS✚TEC

MACA – STANDARD DAMPER ACTUATOR

5 Nm | MODBUS RTU CONTROL

MACA...05 (S1) SERIES

MACA standard damper actuators are specially designed and produced for applications in the HVAC Systems. Our wide range of Nenutec standard damper actuators has been developed to operate and position air dampers of different sizes.

- Torque: 5 Nm
- Damper size 1.0 m^2
- Power supply 24 $V_{AC/DC}$
- Shaft dimensions – Ø 6...15 mm / square 5...10.5 mm
- Adapter supplied for From Fit 8 or 10 mm square
- Minimum shaft length 45 mm
- Adjustable angle of rotation
- Direction of rotation selectable by switch
- Actuator with 1 m connection cable
- Optional 1 adjustable SPDT auxiliary switch
- Manual over ride by push button when required

The appearance of the product may differ from the illustration. Technical specifications are subject to change.

MODEL SELECTION TABLE

Model/type	Torque	Power supply	Running time	Auxiliary switch
MACA 1-05	5 Nm	24 $V_{AC/DC}$ ± 10%	60...90 s	-
MACA 1-05S1	5 Nm	24 $V_{AC/DC}$ ± 10%	60...90 s	1 x SPDT (adjustableS)

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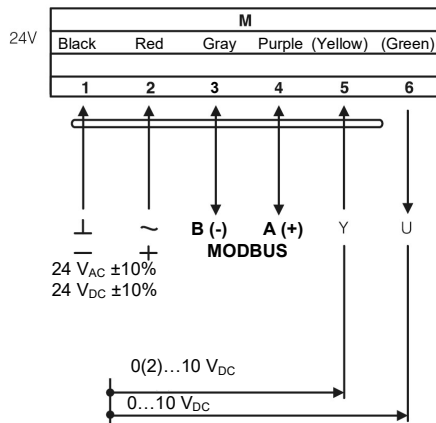
ACTUATOR DIMENSIONS [mm]
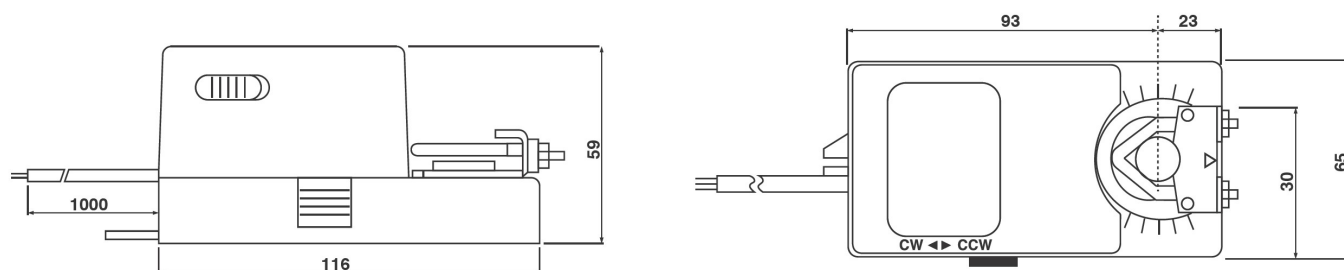
TECHNICAL SPECIFICATION

|	MACA 1-05 (S1)
Torque	5 Nm
Damper size	1.0 m²
Shaft dimensions	Ø 6...15 mm / □ 5...10.5 mm
Power supply	24 $V_{AC/DC}$ ± 10%
Frequency	50...60Hz
Communication	MODBUS RTU
Baud rate ; STOP bits; parity ; address	2400/4800/9600/19200/38400/57600/115200 ; 1 / 2 ; EVEN/ODD/NONE ; 1-247 – default (9600 ; 1 ; NONE ; 19)
Control signal (input) – optional	0(2)…10 V_{DC} / 0(4)…20 mA
Position signal (output) – optional	0…10 V_{DC}
Power consumption	
• In operation	4.0 W
• End position	2.0 W
Rated power	4.0 VA
Electrical Connection	1 m Cable
Auxiliary switch rating	3 (1.5) A / 250 VAC
Protection class	Class III
Angle of rotation	90° (95° mechanical limitation)
Weight	<0.7 kg
Durability	60,000 rotations
Sound level	40 dB
IP protection class	IP54
Working temperature range	-20°C...50°C as per IEC 721-3-3
Storage temperature	-30°C...+60°C / IEC 721-3-2
Ambient humidity	5...95% rH (non condensing) / EN
Maintenance	Maintenance free
Principle of operation	Type 1 (acc. to EN 60730-1)
Electromagnetic compatibility	CE, UL 873 & ISO 9000 EN / EEC

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WIRING DIAGRAM MACA...05 (S1) POWER SUPPLY 24 V$_{AC/DC}$

M					
Black	Red	Gray	Purple	(Yellow)	(Green)
1	2	3	4	5	6

24V

$\perp$ ~ **B (-)** **A (+)** Y U

MODBUS

24 V$_{AC}$ ±10%
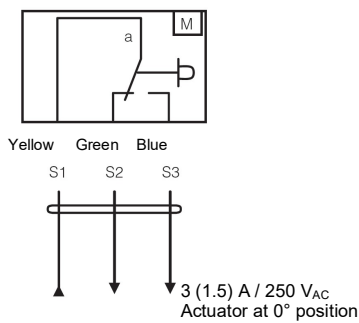24 V$_{DC}$ ±10%

0(2)…10 V$_{DC}$

0…10 V$_{DC}$

DIRECTION OF ROTATION MACA...05 (S1)

Factory setting: clockwise (CW). Direction of rotation can be changed by toggling between CW/CCW switch on the actuator housing.
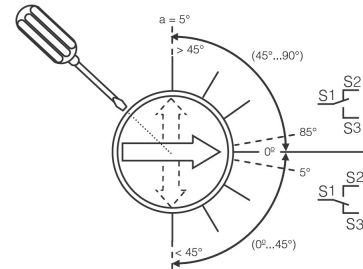
CW CCW
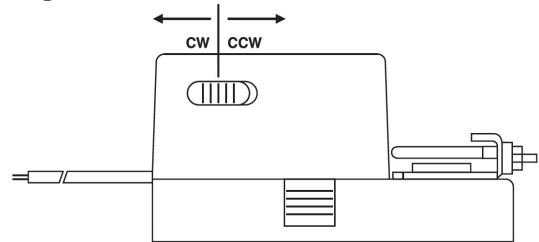
WIRING DIAGRAM MACA...05 (S1) AUXILIARY SWITCH

M

a

Yellow   Green   Blue

S1   S2   S3

3 (1.5) A / 250 V$_{AC}$
Actuator at 0° position

AUXILIARY SWITCH MACA...05 (S1)

Switch **a** factory-set at 5º. The auxiliary switch can be adjusted in the range 0°...90°.

a = 5°
> 45°
(45°...90°)
S2
S1
S3
85°
0°
5°
S2
S1
S3
< 45°
(0°...45°)

■ Version o request MACA...05 (S1)

Additional control signal (analogue)	0…10 V$_{DC}$ or 2…10 V$_{DC}$
Input resistance for additional control signal	Ri 100 kOhm or 500 kOhm
Additional position signal	0…10 V$_{DC}$
Optional fixed termination resistor for MODBUS	120 Ohm

■ Releasing the adapter MACA...05 (S1)

Releasing the adapter is not required.
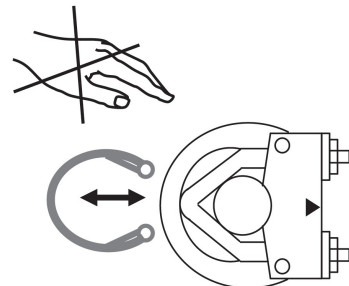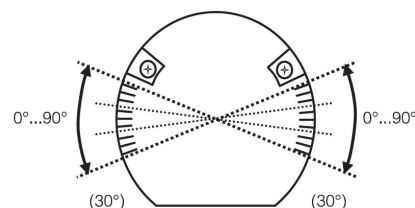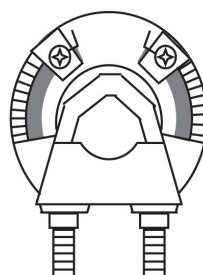
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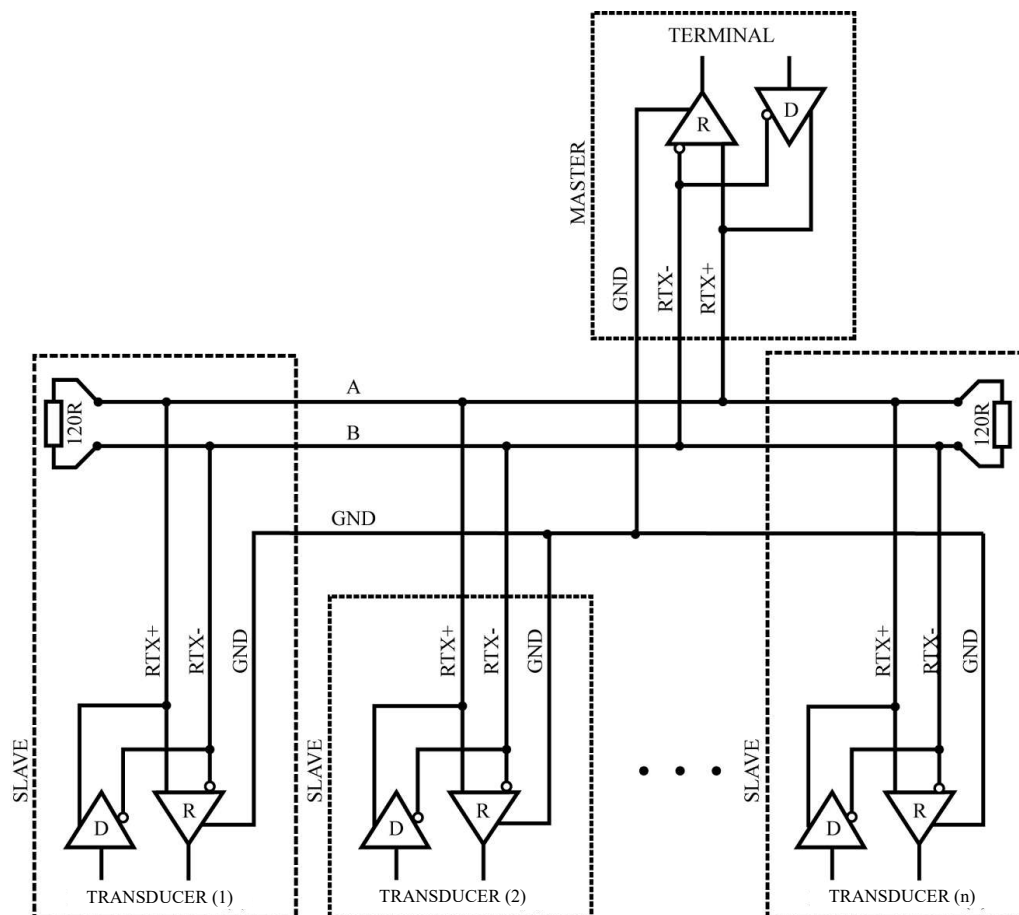
■ LIMITING ANGLE OF ROTATION MACA...05 (S1)

Adjustment of mechanical limiter.
1. Loosen the screw of mechanical limiter.
2. Move limiter to appropriate position
3. Tighten the screw.

*Working range of 90° can be reduced up to 30° from end position.

■ MODBUS

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■ **MODBUS transmission parameters**

The actuator has the following default (factory) settings of transmission parameters:

- **ID address: 19 decimal = 13 hex**
- **Baud rate – number of data bits – parity – number of stop bits = 19200 – 8 – None – 1**

To change the above settings, use the MODBUS CONFIGURATOR device manufactured by NENUTEC.

■ **MODBUS register map**

Adr	R/W	Name	Values	Default	Description	Notes
0	RW	SET_POINT	0 ÷ 100	100	Set point [%]	1)
1	RW	OVERRIDE	0 ÷ 5	0	0 – normal operation / the actuator moves to SET_POINT 1 – ignore SET_POINT and stop / lock position , 2 – ignore SET_POINT and move to 0% 3 – ignore SET_POINT and move to 100% 4 – ignore SET_POINT and move to LOW_LIM, 5 – ignore SET_POINT and move to HIGH_LIM.	2)
2	R	**rsv**	0x0000	0x0000	**reserved**	
3	R	EXT_POW	0 ÷ 2	--	0 – no external power supply 1 – external power supply present 2 – connected to the MODBUS CONFIGURATOR device	
4	R	DAMPER_POS	0 ÷ 100	0 ÷ 100	Current position (momentary) [%]	
5	R	BAT_CHARGE	0 ÷ 100	0 ÷ 100	Battery charge level [%]	
6	R	DIRECTION	0 / 1	0 / 1	0 – clockwise (CW) / 1 – counter-clockwise (CCW)	
100	R	DEV_ID	0x200C	–	Device ID (actuator without safety function)	
101	R	**rsv**	0x0000	0x0000	**reserved**	
102	R	**rsv**	0x0000	0x0000	**reserved**	
103	R	SOFT_VER	0 ÷ 0x9999	–	Firmware version (eg. 0x3210 indicates version 3.21a)	
104	R	STATUS	0 ÷ 2, 10, 20	–	0 – no error, actuator in position according to the control signal 1 – no error, actuator moves to the position according to the control signal 2 – no error, no movement, battery charging 10 – motor current exceeding limit, retry movement to the position according to the control signal 20 – motor current exceeding limit, the position according to the control signal not reached	3)
105	RW	LOW_LIM	0 ÷ 100	0		4)
106	RW	HIGH_LIM	0 ÷ 100	100		
107	RW	**rsv**	0x0000	0x0000	**reserved**	
108	RW	BUS_FAIL_POS	0÷100, 200	200	Position in case of communication loss (bus fail position)	5)
109	RW	SETPOINT_INIT	0 ÷ 100, 200	100	SET_POINT initial value (after switching on the power or reset)	1)
110	RW	WR_UNLOCK	0x0000 / 0xC5A3 / 0x6781	0x0000	0x0000 – write / change NV registers not allowed, 0xC5A3 – change NV registers allowed, 0x6781 – write NV registers.	

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NOTES:
- R – read register; W – write register; RW – read & write register
1. SET_POINT initial value is taken from the volatile register SETPOINT_INIT.
   A value in the range 0-100 means the actuator reached the set position.
   The value 200 in SETPOINT_INIT register means automatic copying of VREG value (0..10 V or 2..10 V control input) to the SET_POINT register (this means control via VREG analogue input).
2. Writing to OVERRIDE register (address 1) doesn't change the SET_POINT value (address 0).
3. STATUS = 10 means that the actuator encounters increased mechanical resistive force and makes repeated attempts to move to the set position.
   STATUS = 20 means that the actuator encounters increased mechanical resistive force and stopped movement after 5 attempts to reach the set position (failure).
   Each writing in SET_POINT or OVERRIDE register resets STATUS and restarts the movement to set position.
4. LOW_LIM and HIGH_LIM registers limit range of actuator movement to LOW_LIM (lower limit) and HIGH_LIM (upper limit) values, respectively.
   In addition, the following conditions must be fulfilled: 0% <= LOW_LIM and LOW_LIM+30% <= HIGH_LIM <=100% (minimum range of movement 30%).
5. BUS_FAIL_POS contains actuator position in the case of MODBUS communication failure (after 120 sec. form the loss of communication).
   The value BUS_FAIL_POS = 200 deactivates this function (the actuator doesn't react to loss of communication).

■ Changing device settings

All registers with address 100-109 are non-volatile (NV). If WR_UNLOCK = 0x0000, an attempt to change the value of the NV registers will have no effect.

After writing WR_UNLOCK = 0xC5A3, it is possible to change values in NV registers, but their new values are not yet taken into account.

After writing WR_UNLOCK = 0x6781, the new values of NV registers are written to non-volatile memory and taken into account for operation of the device.

⚠ IMPORTANT REMARKS

This actuator includes electrical and electronic components and may not be disposed as household waste. Please consider the local valid legislation.

24 $V_{AC/DC}$:	Connect via safety isolating transformer.
230 V_{AC}:	To isolate from the main power supply, the system must incorporate a device which disconnects the phase conductor (with at least a 3mm contact gap.)

Consult NENUTEC representatives for specific requirements and material selections for your intended application. The entire content of this technical datasheet is protected by copyright. All rights are reserved ©.

The performance specifications are nominal and conform to acceptable industry standards. Nenutec shall not be liable for damages resulting from misapplication or misuse of its products.

CUSTOMISED VERSION

NENUTEC offers you actuators in customised versions, e.g. with your own brand name, with colour-coordinated applications and with your particular demand on request.

For further information please contact us or our local representative.

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