Promix
Engineering and Production Center

ELECTROMECHANICAL LOCK
Promix-SM307.10.3

OPERATING MANUAL
Technical Description. Installation Manual. Certificate.
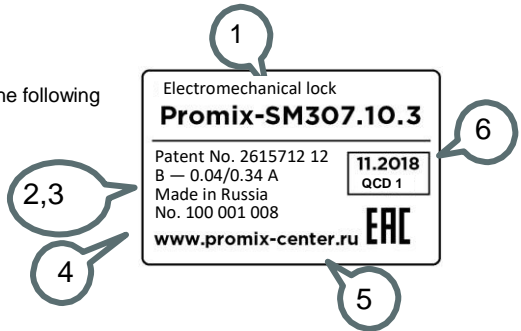ПШБА.304268.307 РЭ

PATENT FOR INVENTION
No. 2615712

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1. PURPOSE

Various versions of the Promix-SM307.10.3 electromechanical lock are intended to arrange parking of small motor vehicles and electric vehicles (balance bicycles, scooters, carts etc.). The lock fixes vehicles in a parking slot, monitors its own condition and unauthorized taking out of vehicles as well as identifies vehicles by their identification numbers.

2. LABELING

The label attached to the lock body contains the following information:

1. Lock model.
2. Rated supply voltage.
3. Rated consumed current.
4. Identification number.
5. Manufacturer's website.
6. Date of manufacture and QCD mark.

Electromechanical lock
Promix-SM307.10.3
Patent No. 2615712 12
B — 0.04/0.34 A
Made in Russia
No. 100 001 008
www.promix-center.ru
11.2018 QCD 1
EAC

Promix-**SM307.10.3-XXN**

Latch designation (standard, shortened or other customized)

Lock versions:
A – standard,
E – for electric vehicles
WA – standard with connection to access systems via internet. Wiegand-26
WE – for electric vehicles with connection via internet. Wiegand-26

Normally closed lock, with voltage supply of 12 V, with built-in sensor of latch and lock

List of modifications available to the order is given in cl.5.2.

3. SCOPE OF DELIVERY

1 – Lock   1 pc.
2 – Decorative front panel   1 pc.
3 – Latch   1 pc.

1. Lock

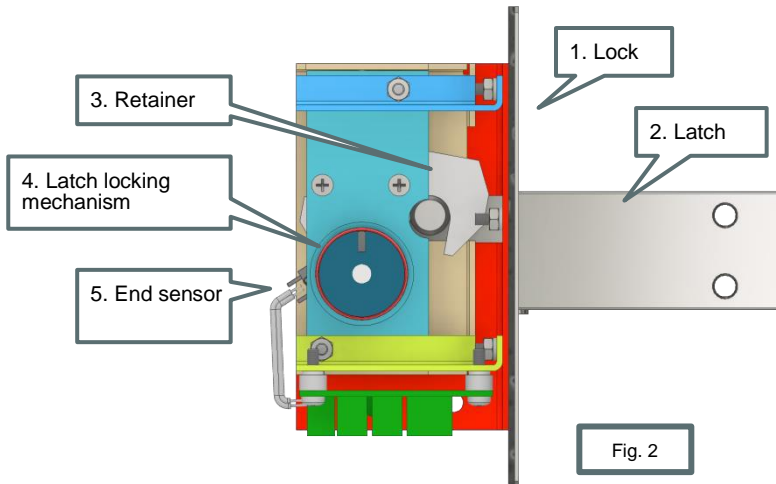2. Front panel

3. Latch

Fig. 1
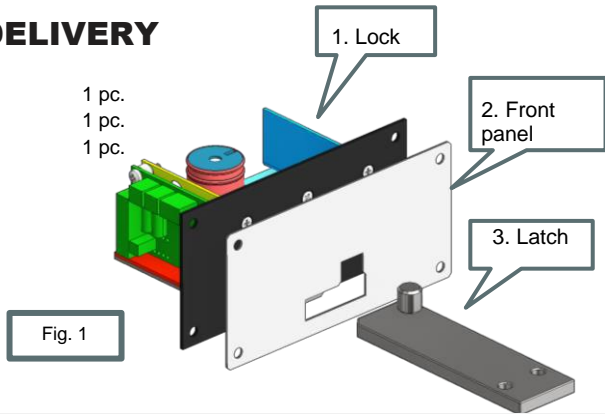
Check the scope of delivery of the product when buying! After buying, the manufacturer will not accept claims related to incomplete scope of delivery.

TABLE OF CONTENTS

4. DESIGN AND PRINCIPLE OF OPERATION

1. Lock

2. Latch

3. Retainer

4. Latch locking mechanism

5. End sensor

Fig. 2

The lock (Fig. 2-1, Fig. 1-1) arranges a parking space.

Vehicles are held in parking space by locking the latch mounted on vehicle (Fig. 2-2, Fig. 1-3): when filling in the parking space, the latch is automatically fixed by retainer (Fig.2-3) and is closed by locking mechanism of latch (Fig. 2-4).

Vehicles taking out is controlled by mechanical end sensor (Fig. 2-5).

Unique identification number of vehicles is assigned by RFID tag in latch and is read when vehicles are parked in parking slot.

There are 4 versions of lock (see cl.5.2 Technical properties and cl. 5.3 Description of versions) with various control principles (vehicles taking out procedures, vehicles number plate reading etc.), connectivity to various access systems and availability of the electric vehicles charging facilities.

Parking slots are integrated into parking area and monitored by the upper-level control devices (mini PC, server, tablets, terminals etc.) with various OS (Linux, Android and other UNIX-like, Windows).

5. TECHNICAL CHARACTERISTICS

5.1 OPERATING CONDITIONS

Climatic operating conditions:

- for operation under shed or indoors,

- ambient air temperature: -10°C to +50°C,

- air relative humidity no higher than 95% at 35°C or lower temperatures without moisture condensation and frost formation.

5.2 TECHNICAL SPECIFICATIONS

Version (see detailed description in cl. 5.3)	Promix-SM307.10.3-A	Promix-SM307.10.3-E	Promix-SM307.10.3-WA	Promix-SM307.10.3-WE
Connection of safety device of		+		+
Support of the Promix-Locker system	+	+		
Support of access systems via Wiegand-26 protocol			+	+
Lock power supply voltage, V	12±2			
Electric vehicles charging voltage, V	-	Up to 60	-	Up to 60
Current consumed, A	0.04			
Current consumed when taking out vehicles, A	0.34			
Voltage of the latch locking mechanism, V	12±2			
Vehicles taking out duration, s	0.5 – 32			
Length of the local network communication line, m	Up to 400*		To be defined by the access system	
Number of locks in local network	Up to 32		To be defined by the access system	
Lock weight (max.), kg	0.45	0.55	0.45	0.55
Holding force (minimum), kg	400			

*Increase in the line length over 400 m is conducted by the Promix-AD.RI.01 converter

Lock leads marking:

Marking of the latch locking mechanism leads:	ZAM	black lead
	+12B	red lead
Marking of the retainer position sensor leads:	0V	black lead
	DAT1 (+5B)	white lead

Terminals and jumpers of controller in the lock versions A, E:

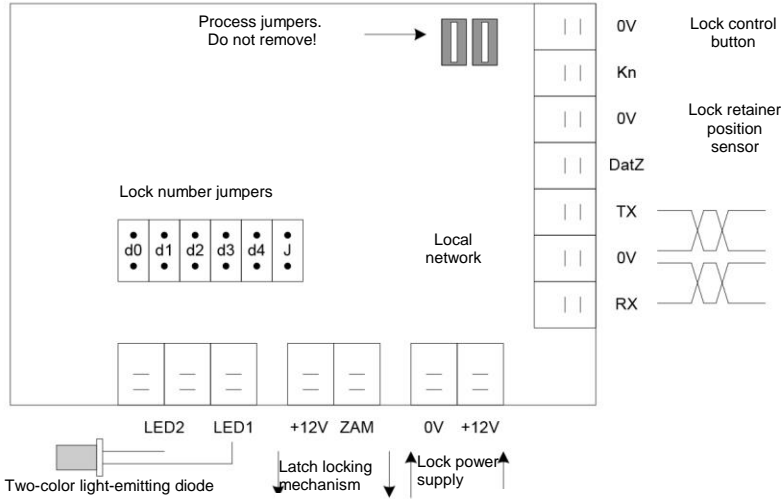| 0V – +12V	voltage of the controller power supply
ZAM – +12V	electromechanical retainer connection
Tx – 0V	connection of the twisted pair in the local network transmission line
Rx – 0V	connection of the twisted pair in the local network reception line
0V – DatZ	retainer position sensor
0V – Kn	lock opening button
LED1 – LED2	two-color light-emitting diode
0V – LED2	connection of additional external indicator
d0 – d4	jumpers of the lock network number and testing mode
Jn	jumper of setting the lock testing modes

Location of terminals and jumpers in lock versions A, E

Process jumpers.
Do not remove!

Lock number jumpers

d0 d1 d2 d3 d4 J

Local
network

0V — Lock control button
Kn
0V — Lock retainer position sensor
DatZ
TX
0V
RX

LED2 LED1 +12V ZAM 0V +12V

Two-color light-emitting diode

Latch locking mechanism

Lock power supply

Fig.3

Terminals and jumpers of controller in the lock versions WA, WE:

0V – +12V	voltage of the controller power supply
0V – D1 – D0	connection to the access system via Wiegand-26 protocol

Location of terminals in lock versions WA, WE

0V
D1 — Wiegand interface
D0

+12V — Controller power
0V

Jumper of the Wiegand
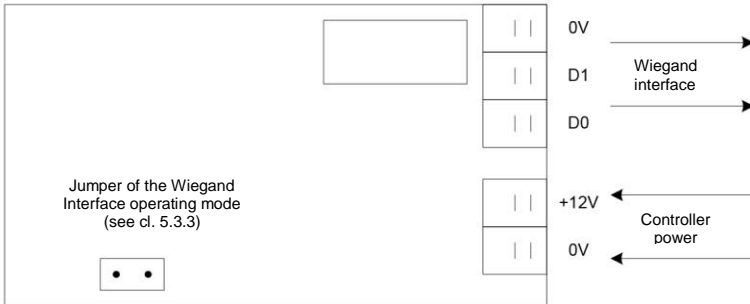Interface operating mode
(see cl. 5.3.3)

Fig.4

5.3 DESCRIPTION OF VERSIONS

5.3.1. Version A – standard

Version **A** is a part of the Promix-Locker network system and is integrated into parking area for 32 parking slots via local network.

Local network (see Fig. 5) is arranged by the Promix- CN.LN.01 local network controller with input interfaces USB, UART or by interface converter Promix-AD.RI.01 with COM interface (serial port). Length of local network is 400 m.

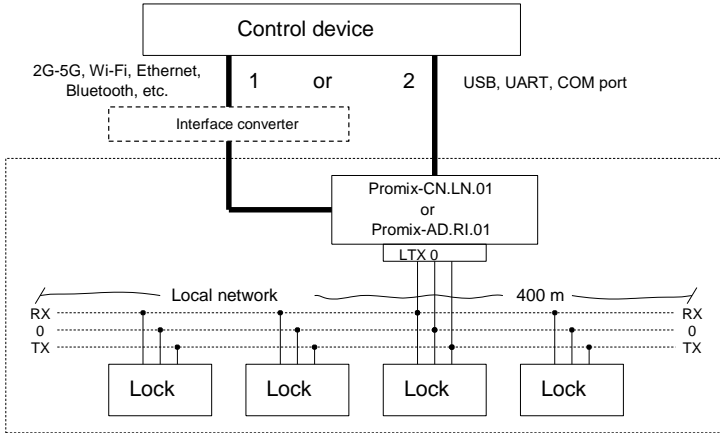### Parking structure for A version

Fig. 5.

Control devices may integrate parking areas to each other via 2G-5G, Wi-Fi, Ethernet protocols etc., creating local, district, city networks.

Lock control (taking out vehicles, reading of the vehicle identifier) is conducted by short network commands (see cl. 9). Commands transmission principle is specified in the manual to the Promix-CN.LN.01 local network controller.

The lock supports the modes of parking, storage and detaching of vehicles (see cl.7.1–7.3), lock functioning test modes are available (see cl. 7.4). Lock operation is indicated by two-color light-emitting diode.

Overall dimensions of the version **A** lock are given in the Figure 6.
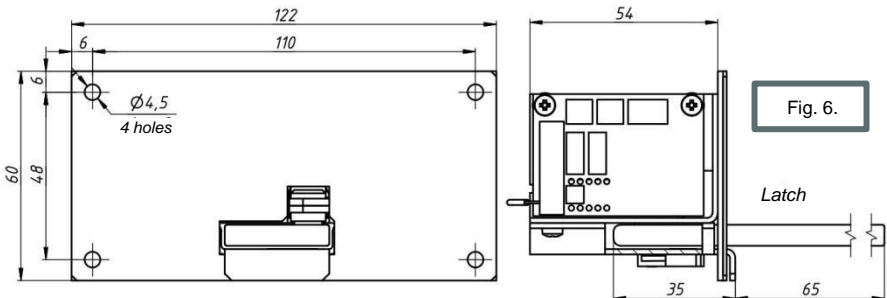
Overall dimensions of the A version lock

Fig. 6.

6

5.3.2. Version E – for electric vehicles

Locks of **E** version are similar to **A** version with possibility of charge transfer to the electric vehicle battery via pair of wires in latch and lock. Used in the Promix-Locker system.

Overall dimensions of the version **E** lock are given in the Figure 7.

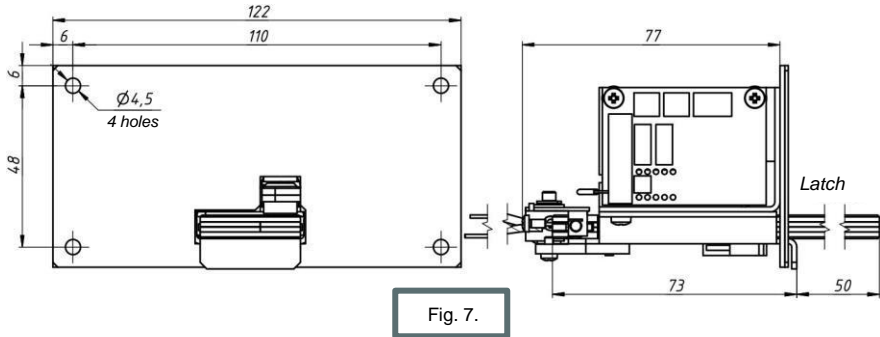## Overall dimensions of the version E lock

Fig. 7.

5.3.3. Version WA – standard W26.

Locks of **WA** version may be integrated with various access systems via Wiegand-26 interface and have free access to mechanisms.

3 channels are used for interaction of the access system with the lock:

1. Leads of the vehicles taking out control mechanism (see Fig. 2(4) and cl. 5.2. Lock leads marking),

2. Wiegand-26 protocol (standard for contactless readers) for sending the vehicles plate number to the access system (see Fig.4),

3. Leads of the end sensor of latch taking out control (see Fig. 2(5) and cl. 5.2. Lock leads marking).

See Fig. 6, cl. 5.3.1 Overall dimensions of the lock

Jumper on plate (see Fig. 4) is mounted to set operating mode of the Wiegand interface.

When the jumper is removed: as soon as a vehicle is parked in slot, the lock transmits the vehicle plate number minimum 8 times via interface and then the number is transmitted minimum once every 20 seconds.

When the jumper is mounted: standard transmission mode of the Wiegand readers is simulated, i.e. single transmission of number during the vehicle parking.

5.3.4. Version WE – for electric vehicles W26

Locks of **WE** version may be integrated with various access systems via Wiegand-26 interface, they have free access to mechanisms and transferability of charge to battery of electric vehicles using pair of wires in latch and lock.

See overall dimensions in Fig. 7, cl. 5.3.2.

6. INSTALLATION AND CONNECTION

6.1 LOCK MOUNTING

Lock is mounted into horizontal cavity with dimensions:

Version	A	E	WA	WE
Length x Width, mm	98x54	98x54	98x54	98x54
Depth (minimum), mm	64	100	64	100

Seat dimensions
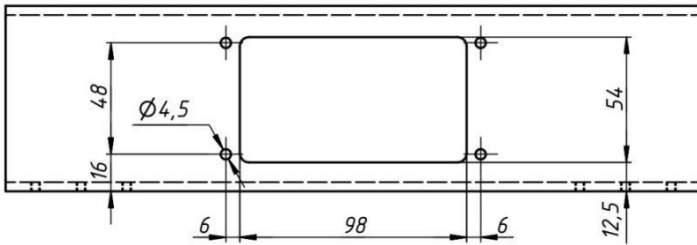

Fig. 8.

Lock is fastened with pop rivets every 4 holes with diameters of 4 mm or other available fasteners.

6.2 LATCH MOUNTING

Latch is mounted on vehicle via mounting holes or via welding. Latch material – stainless steel AISI 304 (08X18H10).

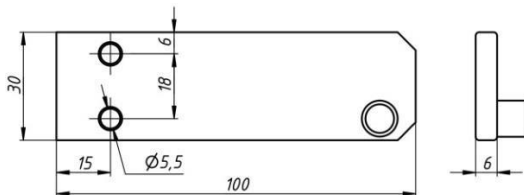**Version A1 latch dimensions (standard):**

Fig. 9.

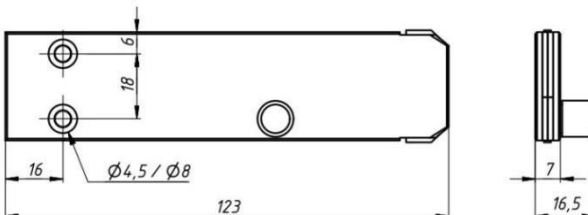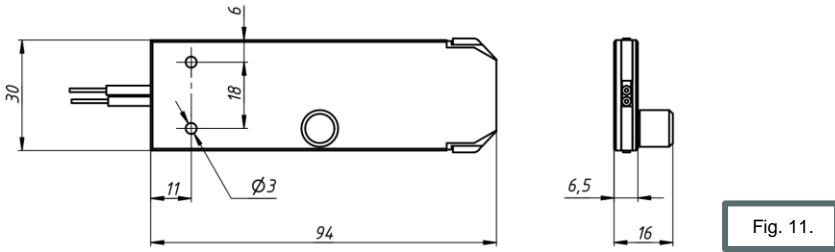**Dimensions of the version E1 latch (for electric vehicles):**

Fig. 10.

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Dimensions of the version E2 latch (for electric vehicles):

Fig. 11.

6.3 CONNECTING PROCEDURE

For version A

Locks are integrated into network using two pairs of twisted wires 0V-TX and 0V-RX in a line bus and are inversely connected to the controller of the Promix-CN.LN.01 local network: 0V-TX in 0B-LRX and 0V-RX in 0B-LTX (see Fig. 5 cl. 5.3.1 and Fig. 11 below).

Indication may be additionally connected (two-color light-emitting diode in LED1-LED2 terminals, additional external indicator in 0V-LED2) and the vehicle taking out button (in 0V-Kn terminals). 12 V power supply source is connected to the 0V-12V lock power terminals.

For version E

Similar to **A**. In addition, leads are connected to transfer the charge to electric vehicles from the electric vehicle charging device.

For version WA

Lock is connected to the access system via Wiegand-26 protocol using 0V-DAT0-DAT1 terminals. Power supply voltage is connected to 0V-12V.

For version WE

Similar to **WA**. In addition, leads are connected to transfer the charge to electric vehicles from the electric vehicle charging device.

Connection of lock to the Promix-CN.LN.01 local network controller or Promix-AD.RI.01 converter:
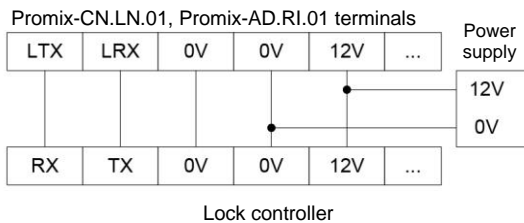
Network connection and lock power supply diagram

Fig. 12.

> Ensure a reliable electric contact. To prevent short-circuit, insulate the places of connection.

7. LOCK OPERATING MODE

(Only for versions A, E)

Lock controller ensures following modes:

- vehicle parking,
- vehicle storage,
- vehicle detaching,

as well as lock testing modes.

Figure 12 represents the diagram of main operating modes of the lock in versions **A**, **E** with input conditions. Description of modes is given below.

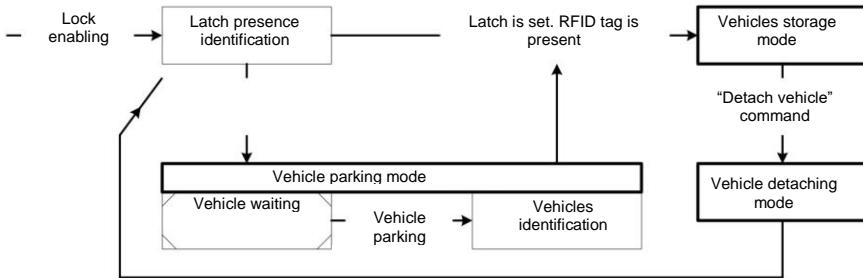### Lock operating modes diagram (for A, E versions)

Fig. 13.

7.1. Vehicles parking mode

In the vehicles parking mode, the lock fixes and identifies a vehicle in parking slot.

The following procedures are conducted during the vehicle parking; registration of the retainer closed position; reading of the vehicle tag-identifier. Information flags shall be mounted to show the position of retainer, presence or absence of tag as well as tag number is registered.

Read tag and fixed lock are indicated by red color of LED, after which the lock is switched into the vehicles storage mode with the mode flag setting. Current value of lock flags is read by command "Transfer flags of the lock devices status" (cl. 8.5).

7.2. Vehicle storage mode

Vehicles are held in the parking slot in the storage mode.

The mode is entered after a vehicle is parked. In this case, periodic scanning of the retainer position, presence of tag and setting relevant information flags of lock, is conducted. In accordance with status of information flags, control of unauthorized taking out of vehicles may be conducted. Environmental factors shall be taken into account that impact the ability of processing by the tag sensor (quality of UPS, data transfer medium, temperature etc.).

To verify the presence of vehicle in the storage mode, it is recommended to use timeout when the tag is disappeared.

Vehicle storage mode is indicated by red light of the LED in case when parking slot is non-faulty. Emergency situation may be indicated by alternate red and green blinking of the command "Indication enabled "Blinking: Red and green" (cl. 8.6).

7.3. Vehicle detaching mode

In the vehicle detaching mode, the lock is released.

The mode is entered using 2 options:

- Direct opening of the lock with the "Release lock" (cl. 8.1) command used remotely. In this case the lock is opened and vehicles are taken out within the period set by command "Set the vehicles taking out time" (cl. 8.2) of 0.5 to 32 seconds.

- Via "Detach vehicles" command (cl. 8.3), used during local registration with terminal station, administrator etc. In this case, within the vehicle detaching time set by command "Set the vehicle detaching time" (cl. 8.4) of 5 seconds to 20 minutes, the lock is opened by pushing the opening button. Following the button push, the vehicle is taken out within the time set by the command
"Set the vehicle taking out time" (cl. 8.2) of 0.5 to 32 seconds.

Within the vehicle detaching time, the LED blinks in green. If the button is not pushed or vehicle is not taken out, the lock is switched into the storage mode.

7.4. Testing modes

Testing modes are intended for checking the lock devices serviceability.

Testing modes enable to check:

- lock control button,
- locking mechanism and retainer position sensor,
- latch identifier reading.

For entry, it is required to disconnect the power supply voltage of the lock, remove d0-d2 and J jumpers (Fig. 13). Mount one of the d0-d2 jumper. Supply power.

Mounting the testing mode jumpers

| J | d4 | d3 | d2 | d1 | d0 |

Testing mode of the lock control button

Testing mode of the locking mechanism and the retainer position sensor

Testing mode of the latch identifier reading
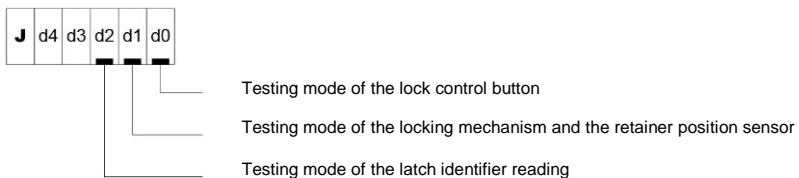
Fig. 14

7.4.1. Testing mode of the lock control button (d0)

Upon pushing the lock opening button, the LED will become green.

7.4.2. Testing mode of the locking mechanism and the retainer position sensor (d1)

Testing is conducted by means of mounting the test latch or any latch not mounted on vehicles. Serviceability of the blocker is defined by tactile perception as the latch is fixed in the lock, serviceability of the retainer position sensor – indication by green light of LED. The retainer is released to pull the latch by pushing the lock opening button.

7.4.3. Testing mode of the latch identifier reading (d2)

Test is conducted by means of mounting any latch not mounted on vehicles. Absence of identifier, malfunction of identifier or reader is indicated by red LED while successful reading of identifier is indicated by green color.

8. ASSIGNMENT OF THE LOCK NETWORK NUMBER

(Only for versions A, E)

Network number is intended for the lock identification in local network. To assign the number, it is required to switch off the power, insert the J jumper, and using d4 – d0 jumpers, assign the lock network number (below Table) and switch on the power.

Conditions of d4…d0 jumpers defining the lock number in hexadecimal (Hex) and decimal (Dec) format.

∷ – jumper is not inserted ■ – jumper is inserted

Insertion of the lock network number jumpers											
HEX (DEC) lock number	d0	d1	d2	d3	d4	HEX (DEC) lock number	d0	d1	d2	d3	d4
00 (0)	■	■	■	■	■	10 (16)	■	■	■	■	∷
01 (1)	∷	■	■	■	■	11 (17)	∷	■	■	■	∷
02 (2)	■	∷	■	■	■	12 (18)	■	∷	■	■	∷
03 (3)	∷	∷	■	■	■	13 (19)	∷	∷	■	■	∷
04 (4)	■	■	∷	■	■	14 (20)	■	■	∷	■	∷
05 (5)	∷	■	∷	■	■	15 (21)	∷	■	∷	■	∷
06 (6)	■	∷	∷	■	■	16 (22)	■	∷	∷	■	∷
07 (7)	∷	∷	∷	■	■	17 (23)	∷	∷	∷	■	∷
08 (8)	■	■	■	∷	■	18 (24)	■	■	■	∷	∷
09 (9)	∷	■	■	∷	■	19 (25)	∷	■	■	∷	∷
0A (10)	■	∷	■	∷	■	1A (26)	■	∷	■	∷	∷
0B (11)	∷	∷	■	∷	■	1B (27)	∷	∷	■	∷	∷
0C (12)	■	■	∷	∷	■	1C (28)	■	■	∷	∷	∷
0D (13)	∷	■	∷	∷	■	1D (29)	∷	■	∷	∷	∷
0E (14)	■	∷	∷	∷	■	1E (30)	■	∷	∷	∷	∷
0F (15)	∷	∷	∷	∷	■	1F (31)	∷	∷	∷	∷	∷

9. LOCK CONTROL COMMANDS

(Only for versions A, E)

8.1. "Release lock" command

» byte 0 – 8AH – header of the lock controller query,

» byte 1 – bits d4 – d0 of the lock network number,

» byte 2 – 01H – command number.

> 8A 00 01

8.2. "Set the vehicle taking out time" command

» byte 0 – 8AH – header of the lock controller query,

» byte 1 – bits d4 – d0 of the lock network number,

» byte 2 – 02H – number of command,

» byte 3 – xxH – time value byte,

Range of value: 01H-40H, time interval: 0.5-32 sec, increment – 0.5 sec.

> 8A 00 02 0A (5 seconds)

8.3. "Detach vehicle" command

» byte 0 – 8AH – header of the lock controller query,

» byte 1 – bits d4 – d0 of the lock network number,

» byte 2 – 03H – number of command,

» byte 3 – 00H – stop detaching the vehicle,

       01H – detach the vehicle.

> 8A 00 03 01

8.4. "Set the vehicle detaching time" command

» byte 0 – 8AH – header of the lock controller query,

» byte 1 – bits d4 – d0 of the lock network number,

» byte 2 – 04H – number of command,

» byte 3 – xxH – time value byte,

Range of value: 01H-F0H, time interval: 5-1,200 sec (20 min), increment – 5 sec.

> 8A 00 04 0C (1 minute)

8.5. Command "Transfer the lock devices status flags"

» byte 0 – 8AH – header of the lock controller query,

» byte 1 – bits d4 – d0 of the lock network number,

» byte 2 – 05H – number of command.

> 8A 00 05

Response to command "Transfer the lock devices status flags"

» byte 0 – 8BH – header of the lock controller query,

» byte 1 – bits d4 – d0 of the lock network number,

» byte 2 – 05H – number of response command,

» byte 3 – status flags,

Bit 0 – lock status (1 – open, 0 – close),

Bit 1 – lock operating mode (1 – parking mode, 0 – storage mode)

Bit 2 – presence of the vehicle identifier (1 – inserted, 0 – missing),

Bit 7 – lock enabling status (1– start, 0– operation),

» byte 4 – byte 0 (upper) of the vehicle identifier number,

» byte 5 – byte 1 of the vehicle identifier number,

» byte 6 – byte 2 of the vehicle identifier number,

» byte 7 – byte 3 (lower) of the vehicle identifier number.

» byte 8 – upper byte of the response integrity,

» byte 9 – lower byte of the response integrity.

> $8B^0$ 00^1 05^2 04^3 00^4 27^5 05^6 $A9^7$ 01^8 69^9

The response integrity consists of 2 bytes and is calculated as sum of 0-7 bytes.

Example: 8Bh + 00h + 05h + 04h + 00h + 27h + 05h + A9h = 01h 69h Flags status examples:

0xxxx000 B – (00H) – no identifier, the lock is closed, storage mode,

0xxxx001 B – (01H) – no identifier, the lock is open, storage mode,

0xxxx010 B – (02H) – no identifier, the lock is closed, parking mode,

0xxxx011 B – (03H) – no identifier, the lock is open, parking mode,

0xxxx100 B – (04H) – identifier is inserted, the lock is closed, storage mode,

0xxxx101 B – (05H) – identifier is inserted, the lock is open, storage mode,

0xxxx110 B – (06H) – identifier is inserted, the lock is closed, parking mode,

0xxxx111 B – (07H) – identifier is inserted, the lock is open, parking mode,

1xxxxbbb B – (8XH) – the lock is being started.

8.6. Command "Indication enabled "Blinking: Red and green""

» byte 0 – 8AH – header of the lock controller query,

» byte 1 – bits d4 – d0 of the lock network number,

» byte 2 – 06H – number of command,

» byte 3 – 00H – indication disabled "Blinking: Red and green",

01H – indication enabled "Blinking: Red and green".

> 8A 00 06 01

Red and green blinking with an interval of 0.5 s.

10. MAINTENANCE

Maintenance of the item is performed at least once every two months and includes:
- Visual inspection of the item to check the reliability of fastening. If necessary, tighten fasteners of the item.

The lock does not need lubrication!

11. STORAGE AND TRANSPORTATION

Until being put into operation, the products must be stored in the manufacturer's package, in rooms with ambient temperature of -30 to +50°C and a relative humidity no higher than 98% at 25ºC in compliance with storage conditions as per GOST 15150-69.

Product transportation conditions must comply with group C as per GOST 23216-78 in terms of exposure to mechanical factors, and Ж2 as per GOST 15150-69 in terms of exposure to climatic factors.

12. SAFETY REQUIREMENTS

The design of the items ensures safety of personnel involved in mounting and maintenance.

Due to low DC supply voltage, the products correspond to class III as per GOST 12.2.007.0-75 and are electrically safe.

Fire safety of items is ensured by use of non-combustible or hardly combustible materials, and low supply voltage.

13. DISPOSAL

The product is not hazardous for human life and health or for the environment; disposal after its service life is performed without taking any special measures for environment protection.

14. WARRANTY LIABILITIES

The manufacturer, ETC PROMIX LLC, warrants the conformity of Promix-SM307.10.3 locks to requirements of the current Technical Specifications provided that transportation, storage, installation and operation rules established in this Manual are observed.

The guaranteed operation period is 12 months from the date of sale but no longer than 18 months from the day of acceptance by the manufacturer's QCD

Within the warranty period ETC PROMIX LLC undertakes to repair defective products free of charge. Expenses for transporting the product to the place of repair and back will be borne by the Buyer.

Warranty liabilities do not cover any defects and damages caused by:

- Improper maintenance by the Buyer;
- Use of the product under conditions that do not comply with the operation requirements;
- Mechanical damages or disassembly of the products by the Buyer;
- Non-observance of the transportation and storage rules.

Faulty products are accepted for repair only together with the latch, with the obligatory condition that factory labels are retained on the product body.

On expiration of the warranty service period, the manufacturer provides after-warranty service on a contractual basis.

To improve product quality the manufacturer reserves the right to make modifications to the product design without prior notice.

15. ACCEPTANCE AND PACKING CERTIFICATES

Electromechanical lock Promix-SM307.10.3 in quantity of _____ pieces (1 pc. by default) bearing the manufacturing date and QCD mark on the body, was manufactured and accepted in compliance with the Specifications ПШБА.304268.003 ТУ, the obligatory requirements of state standards and current technical documentation, recognized as fit for operation and packed by ETC PROMIX LLC.

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