

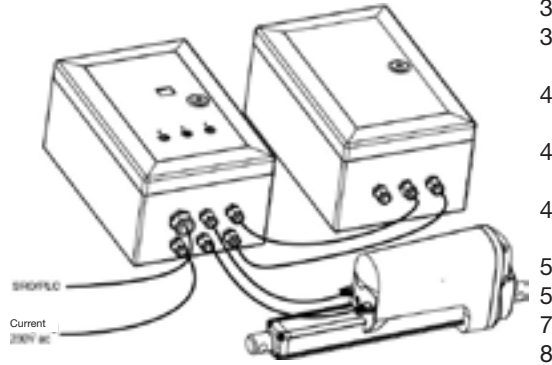


WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

TABLE OF CONTENTS

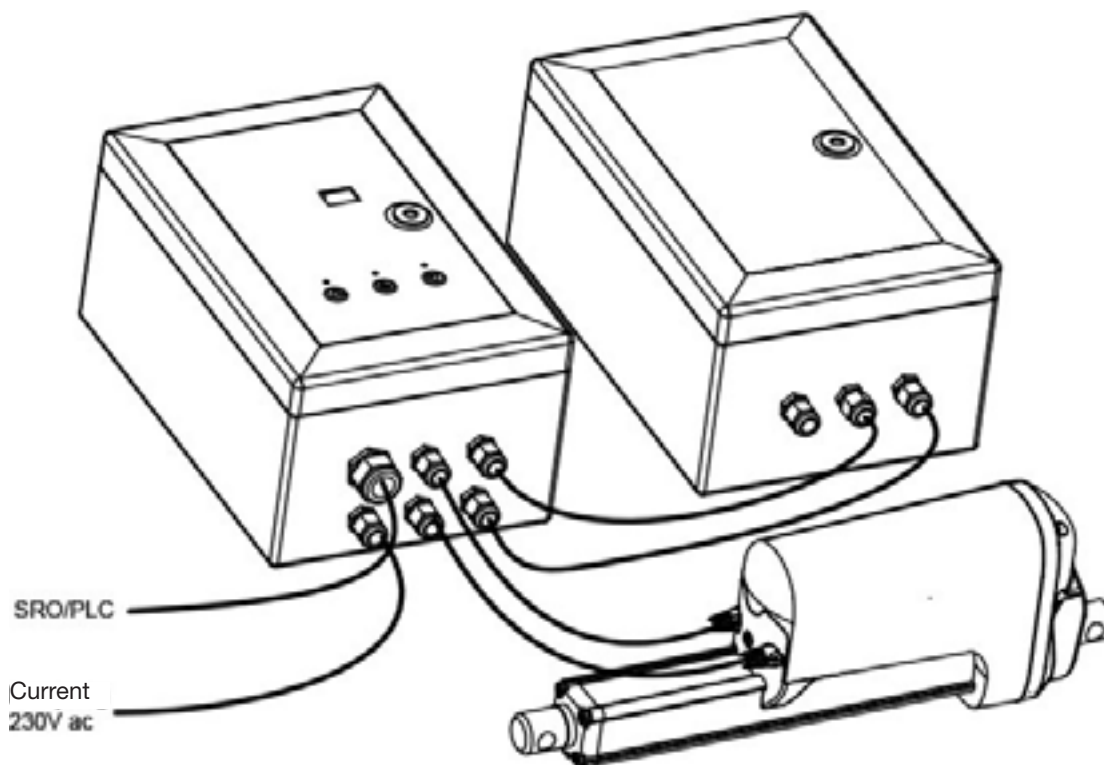
1. Introduction	3
2. Important information	3
3. Safety instructions	3
3.1. Before fitting, removal or troubleshooting	3
3.2. Before start-up	3
3.3. During operation	3
4. Classification	4
5. Environmental conditions	4
6. Warnings	4
7. Technical data	5
7.1. Description of the system	5
7.2. Dimensions	7
7.3. Data plate and labelling	8
8. Choice of actuator	8
8.1. Stroke length	8
8.2. Calculation of the force necessary for knife gate valves	8
8.3. Selection of piston rod and rear fixing plate type for knife gate valve	9
9. Installation and connection	9
9.1. Installing an actuator	10
9.1.1. Fitting an actuator in a knife gate valve	10
10. Before commissioning	10
10.1. Connection of the actuator	10
10.2. Connection diagram for actuator LA36/37	11
10.3. Installation of control unit and battery back-up	12
10.4. Connection of 230 V supply	13
10.5. Connection of the control unit	14
10.6. Connection of control unit to WCU-Basic	15
10.6.1. Connection of control unit to knife gate valves for analogue signal	15
10.6.2. Connection of control unit to knife gate valves for digital signal	16
10.7. Connection of control unit to WCU-Bus	17
11. Battery back-up WCU-UPS	18
11.1. Description	18
11.2. Control unit for battery back-up	18
11.3. Connection of battery back-up	19
12. Parameter settings	20
12.1. Programming unit 702-099-018	20
12.2. Parameter list	21
12.2.1. Explanation of parameters	22
12.3.2. Recommendations for the replacement parts	10
13. Special functions	24
13.1. Safe valve closing	24
13.2. Running pattern on supply error	24
13.3. Running pattern on battery error	24
13.4. Running pattern on a failed control signal bus	25
14. Bus communication system	25
14.1. Profibus commands	25



WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

15. Start-up/operation	27
15.1. Initial start-up	28
15.2. Operation	28
15.3. Intended use	29
15.4. Inappropriate use	29
16. Maintenance	29
16.1. Replacing actuator	29
15.2. Replacement of batteries in the WCU-UPS battery back-up	30
17. Troubleshooting	31
17.1. WCU-Basic/Bus	31
17.2. WCU-UPS	32
17.3. Reading monitoring values	33
17.3.1. Explanation of monitoring values	33
17.4. Self-help guide	33
18. Disposal	35



WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

1. INTRODUCTION

Dear customer,

This valve system consists of one LINAK actuator, a specially-designed motor control unit developed and produced by third party manufacturers and a special designed AVK knife gate valve. The function and operational reliability of the valve system have been tried and tested in every possible situation. In addition, we are continuously improving our products and systems in order to accommodate customers' requirements.

This instruction manual describes how to install and maintain your valve system. We are sure that your valve system will provide you with many years of problem-free operation.

Before our products leave the factory, they are subject to 100% function and quality testing. In the unlikely event that you experience problems with your systems, please contact your local AVK representation. You can find them on www.avkvalves.eu.

AVK provides a guarantee for all of its products and systems. However, this guarantee is subject to the condition that the product is used in accordance with the specifications, that maintenance is performed correctly, and that any repairs are carried out at a workshop that is authorised to repair AVK products.

Any alterations to the installation and use of AVK valve systems may affect their operability and durability. The products may not be opened by unauthorised persons.

2. IMPORTANT INFORMATION

Important information about LINAK products is presented under the following headings:



Warning! Failure to comply with these instructions may result in accidents, leading to serious personal injury.



NB! Failure to comply with these instructions may result in damage to or destruction of the product.

3. SAFETY INSTRUCTIONS

3.1 BEFORE FITTING, REMOVAL OR TROUBLESHOOTING:

- Stop the actuator.
- Disconnect the power supply and remove the mains plug from the socket.
- Relieve the actuator of any load that can be released during the work.

3.2 BEFORE START-UP:

- Make sure that the system has been installed as described in this instruction manual.
- Make sure that the voltage to the control box is correct before connecting the system to the power supply.
- System connection: the individual parts must be connected before the motor control unit is connected to the mains power.

3.3 DURING OPERATION:

- If the motor control unit emits unusual sounds or smells, disconnect the mains power and any external batteries.
- Make sure that the cables are intact.
- Disconnect the mains cable to mobile equipment before it is moved.
- The products are suitable for both indoor and outdoor use. However, you should always check that the individual products have the appropriate IP protection class (see product label).

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

4. CLASSIFICATION

The equipment is not suitable for use in the immediate vicinity of a flammable, anaesthetic mixture involving air, oxygen or laughing gas (nitrous oxide).

5. ENVIRONMENTAL CONDITIONS

Storage and transport

Operating:

Temperature	5°C to 40°C
Relative humidity	20% to 90% @ 30C - not condensing
Atmospheric pressure	700 to 1060 hPa

Storage:

Temperature	-10°C to +50°C
Relative humidity	20% to 90% @ 30C - not condensing
Atmospheric pressure	700 to 1060 hPa

6. WARNINGS



Warning!

The following applies if the actuator is used to operate a valve solution that entails a risk of personal injury: The manufacturer of the valve solution is responsible for implementing suitable safety measures to prevent the risk of personal injury in the event of actuator failure.



Warning!

Please note that in any valve solution in which an actuator is to be involved, steps must be taken to prevent personal injury – such as the risk of crushing fingers.



Warning!

The plastic components in the system cannot withstand the effects of cutting oil.

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

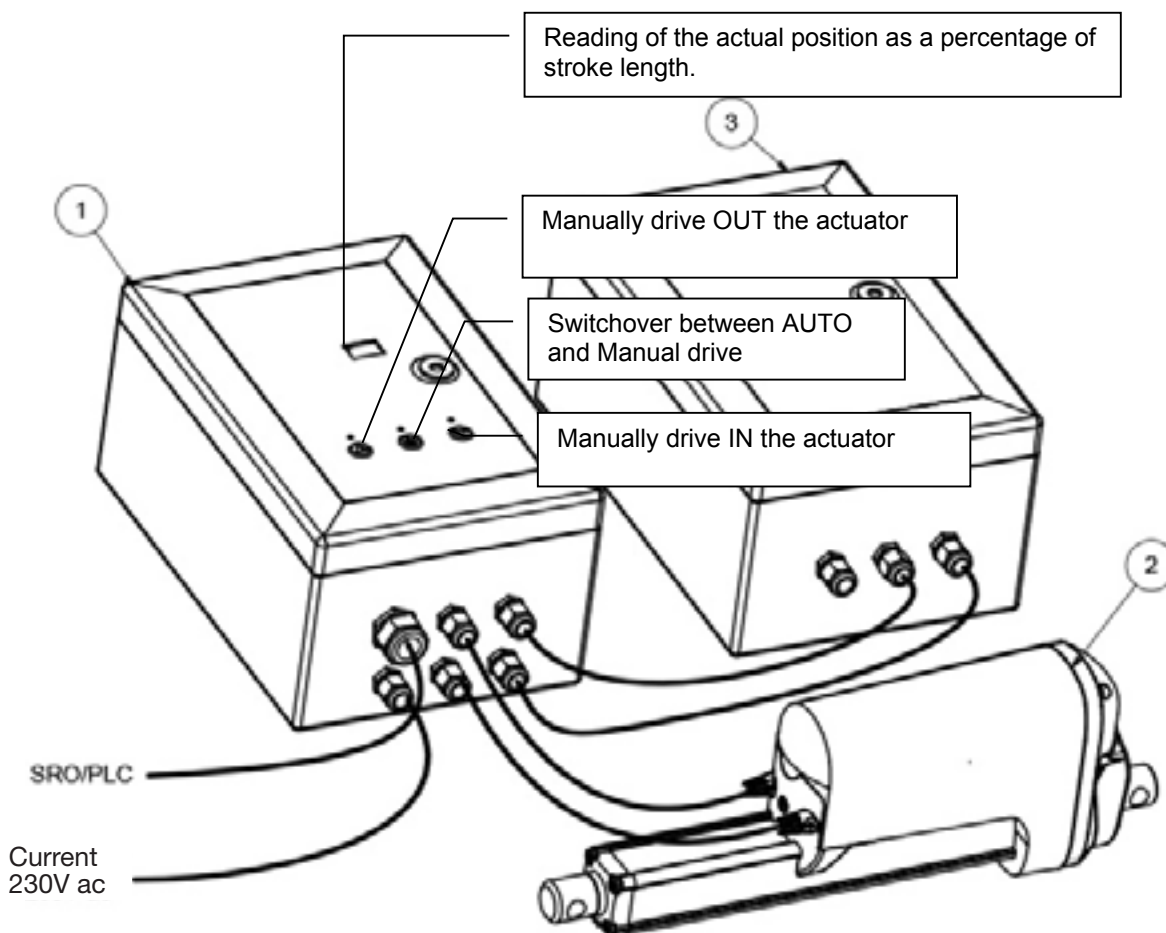
7. TECHNICAL DATA

The valve system type WCU consisting of: one control unit with power supply, one actuator and the opportunity to connect an external back-up battery (WCU-UPS).

7.1 DESCRIPTION OF THE SYSTEM

The system is intended to be included in a valve solution for regulation of the liquid flow, whereby the function is to open and close a knife gate valve using an electrical linear actuator with appurtenant control. The actuator's task is to transfer mechanical force to produce the movement needed to open/close a valve. The motor control unit's function is to supply the actuator with the correct voltage and current, to enable the fine adjustment of the actuator's stroke length (the valve's aperture), and to protect the actuator and valve from being overloaded. The motor control unit is also equipped with functions to feed back the actuator's outer positions.

The motor control unit can be operated manually, directly at the unit (service and repair) and remotely operated via a cable for automatic operation. Switchover between manual and automatic operation takes place on the front panel of the motor control unit.



WATER VALVE CONTROL UNIT FOR SERIES 702/73**WCU WITH 1 ACTUATOR****Motor control unit: (pos.1)**

Type designation:	WCU-Basic order no.:702-099-010 WCU-BUS order no.: 702-099-012
Motor control unit:	EM-329
Connection option:	1 unit
Fuse:	1.6A (ø5x20 mm)
The motor control unit's power limit:	Max. 13 A
Intermittence:	Max. 10%
Output voltage:	24 V DC
Supply voltage:	230 V AC

Actuator: (pos.2)

The system is compatible with LINAK LA36 actuator

Battery back-up: (pos.3)

The system can be connected to a battery back-up that is activated if the main supply to the system fails. The battery back-up is an option that must be ordered separately.

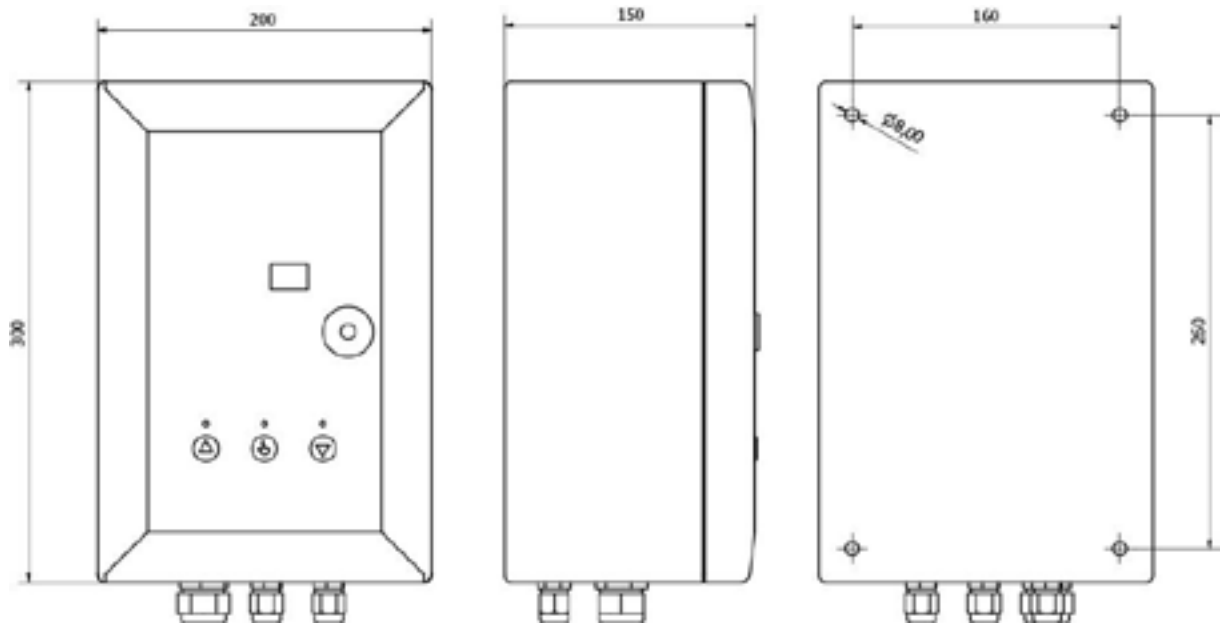
Type designation:	WCU-UPS order no.: 702-099-016
Motor control unit:	EM-311
Supply:	23-34 VDC
Power consumption with supply voltage connected:	Max. 0.9 A. on charge, 0.25mA at standby
Power consumption only with battery connected:	4mA standby, sleep mode 0.5mA
Output:	5 A Continuous; 12 A 5 min.; 15 A 10 sec. (with 1.2A/h/24 vdc)
Charge current:	Max. 0.5A
Output type:	PNP max. 20mA

WATER VALVE CONTROL UNIT FOR SERIES 702/73

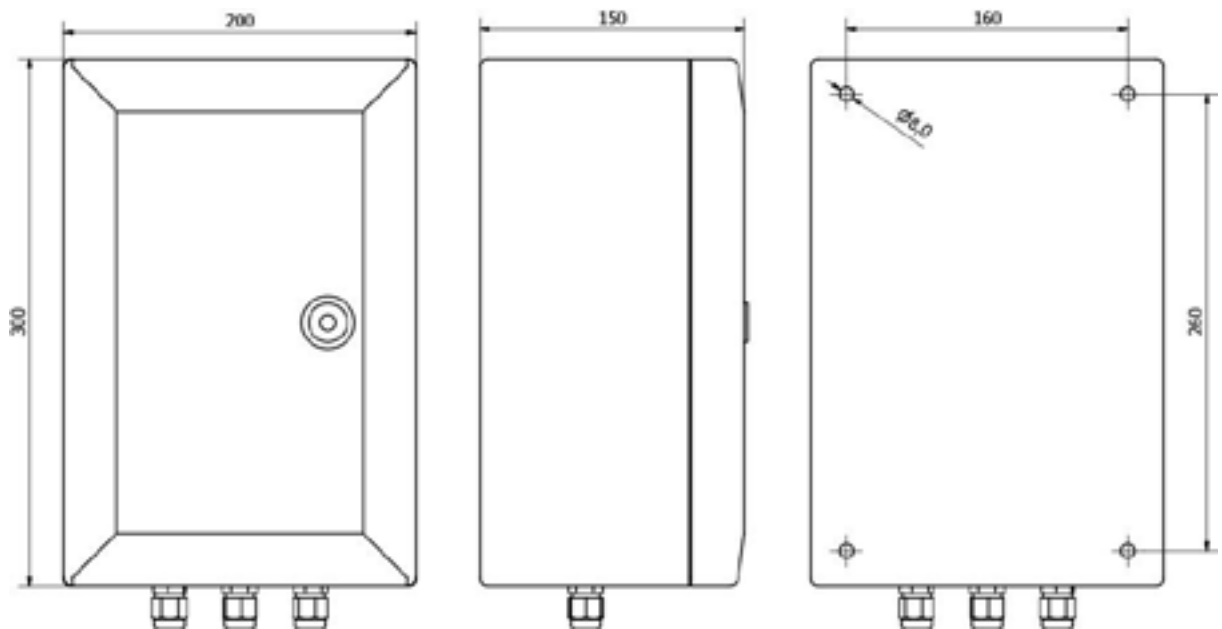
WCU WITH 1 ACTUATOR

7.2 DIMENSIONS

**Motor control unit:
WCU-Basic/WCU-BUS**



**Battery back-up:
WCU-UPS**



WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

7.3 DATA PLATE AND LABELLING

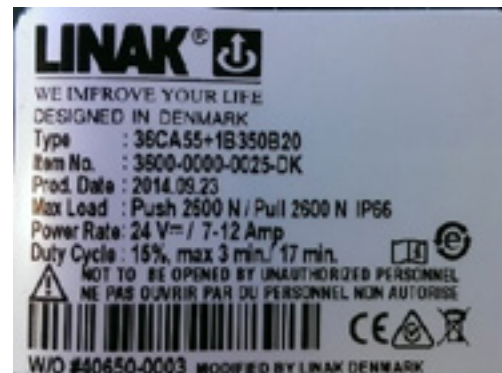
Data plate on control box

Motor control unit – WCU-Basic



Data plate on actuator.

Actuator LA36



8. CHOICE OF ACTUATOR

On choosing actuator, and thus before ordering, knowledge is required of the type of valve for which the actuator is to be used, and the required valve dimension.

- The valve dimension determines the stroke length of the actuator delivered.
- The valve type determines the force in N (Newton), for which the actuator is to be dimensioned.

The LA36 actuator can be delivered with forces from 1,700 to 15,000 N, and stroke lengths from 50 to 350 mm. (See also the product data sheet for further information.)

8.1 STROKE LENGTH

LINAK recommends that the following stroke min. lengths are chosen:

For a stroke length min. 50 mm longer than the valve diameter (e.g. DN200 = stroke length of 250 mm)

8.2 CALCULATION OF THE FORCE NECESSARY FOR KNIFE GATE VALVES

Tests and trials will often be required to find the force necessary to activate a given valve type. Several factors play a role, in addition to the actual valve's physical structure and choice of sealing. The valve's data sheet will therefore often not be sufficient. However, most valve manufacturers can deliver data and experienced values for their valves that will be a good help on selecting a suitable actuator.

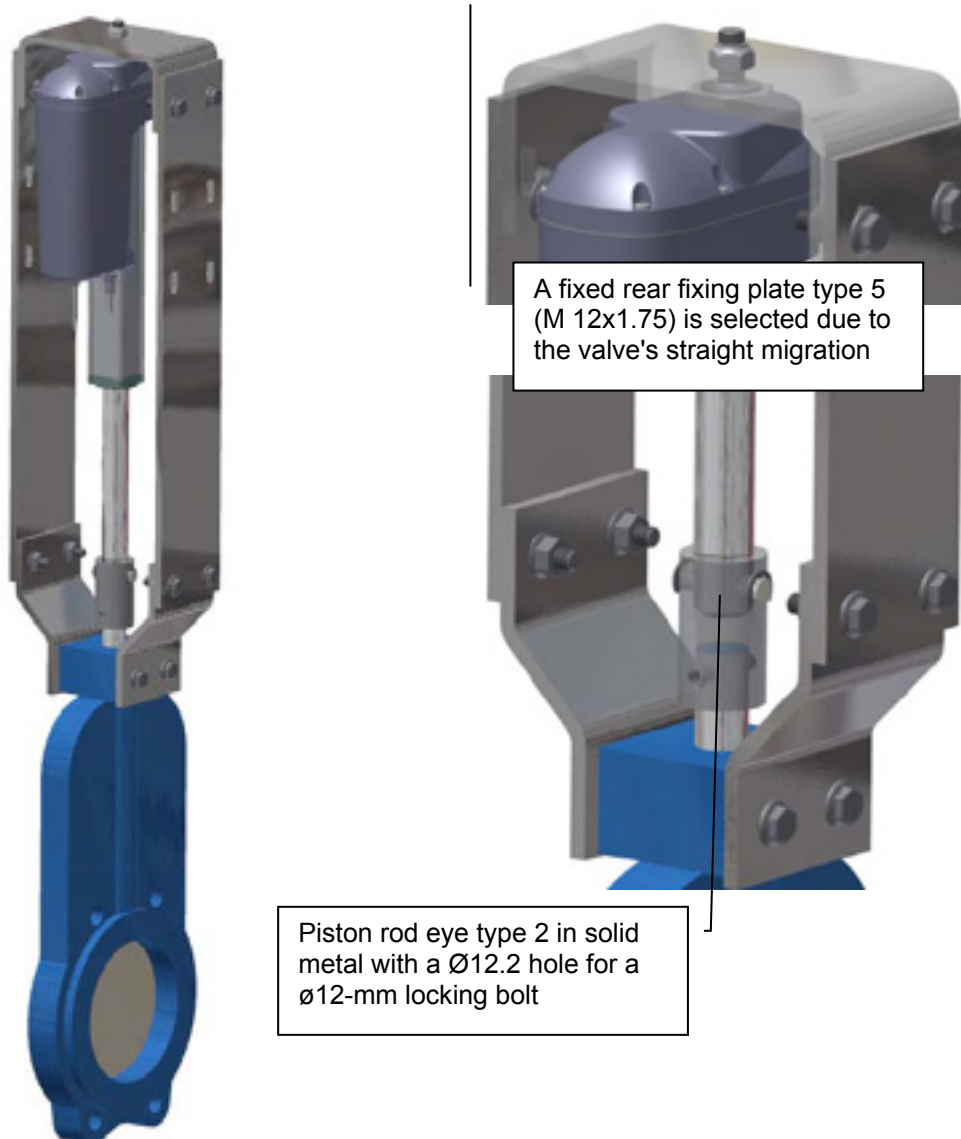
WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

8.3 SELECTION OF PISTON ROD AND REAR FIXING PLATE TYPE FOR KNIFE GATE VALVES

To a great extent the valve type determines the choice of piston rod and rear fixing plate type on the actuator, since these must follow the valve/actuator's migration on opening and closing. The fittings' structure also plays a decisive role, so that the following recommendations are indicative and solely consider the fittings shown.

Knife gate valves



9. INSTALLATION AND CONNECTION

The control unit and actuator are normally delivered as single parts and must then be installed and connected as described on the next pages. The control unit is factory set and tested for operation with actuator LA36/.

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

9.1 INSTALLING AN ACTUATOR

When installing an actuator, it is important to make sure that the actuator can move freely along its full stroke length, without being limited by the mechanical structure. Also make sure that the actuator is not exposed to twisting and pulling.



NB!

Actuators may **NOT** be turned manually, without being connected correctly to the control unit. There must **ALWAYS** be power connected to the Hall-pot. circuit when the motor is running.



NB!

The actuator must only be fastened using the piston rod eye and back fixture – never the outer tube of the spindle or the motor housing.

9.1.1 FITTING AN ACTUATOR IN A KNIFE GATE VALVE

On fitting an actuator in a knife gate valve, it is most important to be certain that the structure of the fitting takes account of min. 50 mm stroke length recommended for the actuator.

1. Run the actuator right IN till it reaches the end switch.
2. Pull the valve right OUT until it is FULLY open.
3. Then adjust/match the fittings and connector.

This procedure will ensure that the valve can always be opened COMPLETELY and that it is not pulled up too far in the valve's seat, thereby damaging it. On installation, in the piston rod end it is recommended to use either a cylinder pin or a pass bolt in a steel quality, equivalent to minimum 8.8



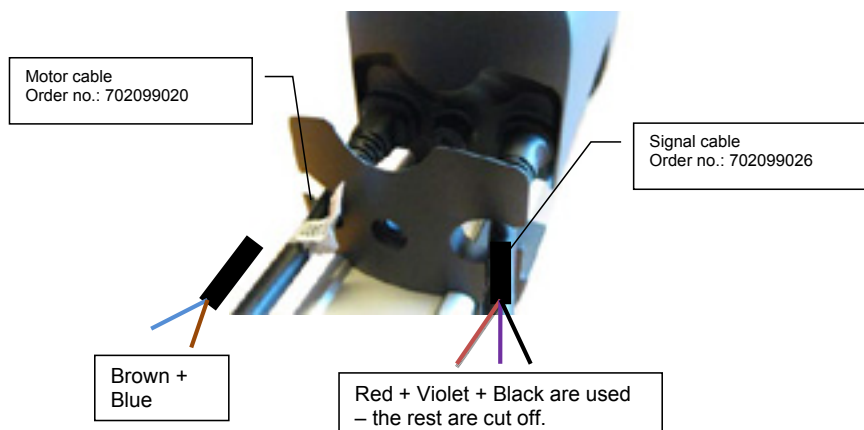
10. BEFORE COMMISSIONING

Before using the system, a number of aspects must be considered. Follow the points stated below to achieve the best result and faultless operation.

1. Connect the actuator (see the diagram on page 14)
2. Select type of operation (i.e. manual operation, PLC automatic el.) (see page 5)
3. Select valve type. As standard, the control unit is set for "analogue slide valve". The following options are available:
Connect the external control in accordance with the relevant connection diagram.
 1. Analogue knife gate valve valve (see the connection diagram on page 14)
 2. Digital knife gate valve (see the connection diagram on page 15)
 3. Profibus knife valve (see the connection on page 24)
4. Enter the correct parameters according to the relevant valve type (see page 21). NB! On selecting the standard setting, the parameters must not be changed.
5. The system is now ready for "Initial start-up". Follow the procedure on page 28

10.1 CONNECTION OF THE ACTUATOR

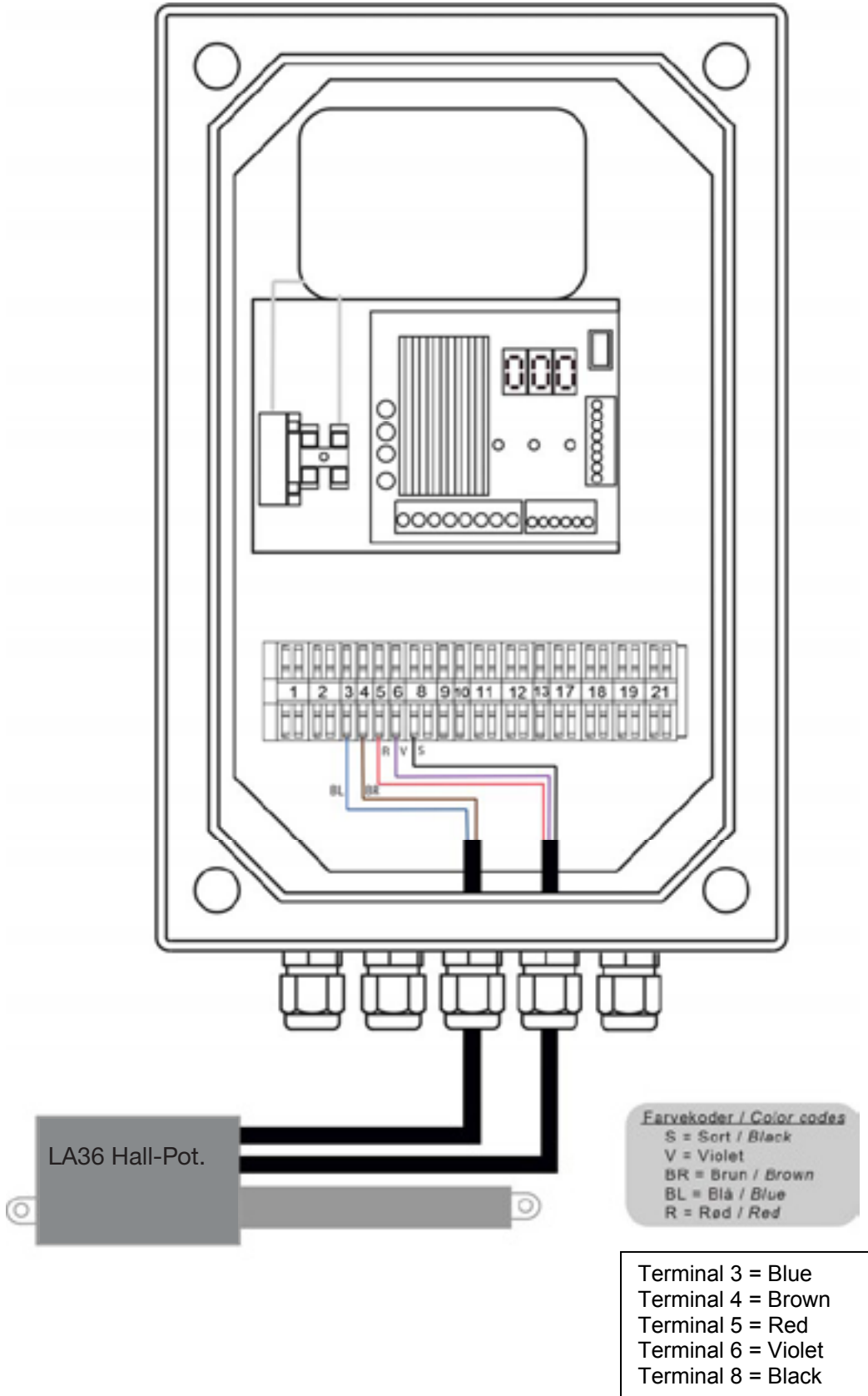
The actuator is connected in accordance with the diagram on the next page. Use the motor cable and signal cable as stated below.



WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

10.2 CONNECTION DIAGRAM FOR ACTUATOR LA36/37



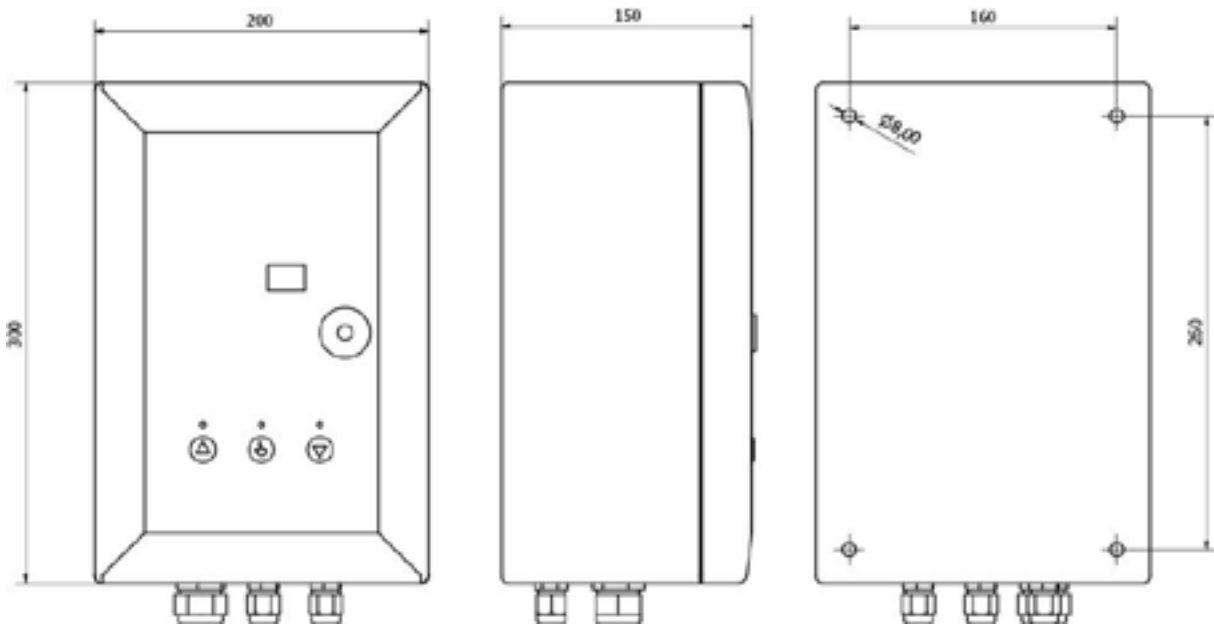
WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

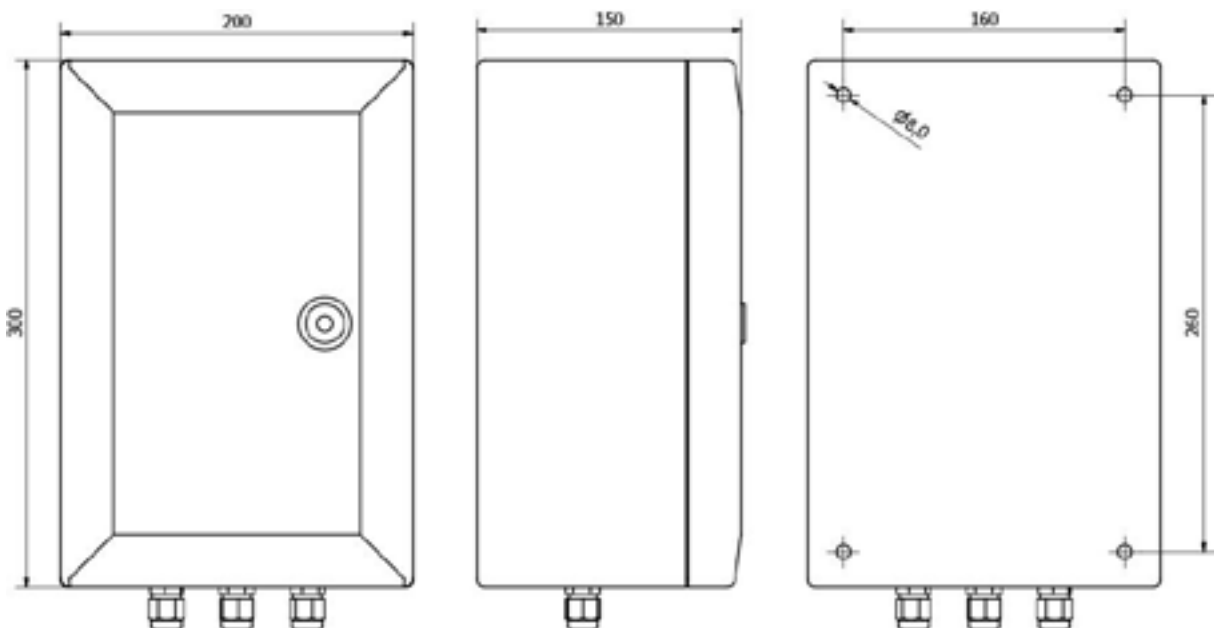
10.3 INSTALLATION OF CONTROL UNIT AND BATTERY BACK-UP

The control unit should be installed in the immediate vicinity of the actuator since the switches for manual/automatic

**Motor control unit:
WCU-Basic/WCU-BUS**



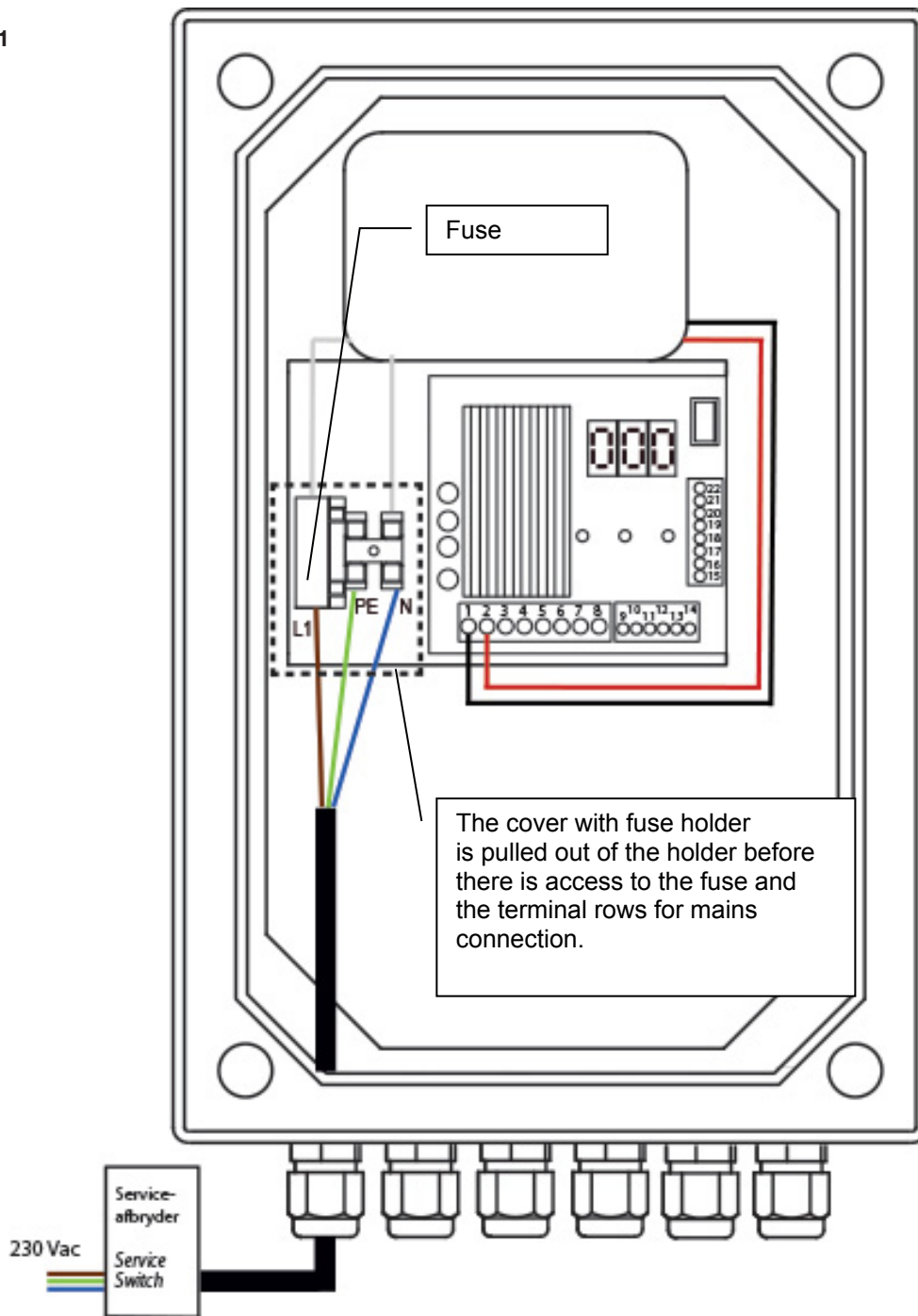
**Battery back-up:
WCU-UPS**



WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

1



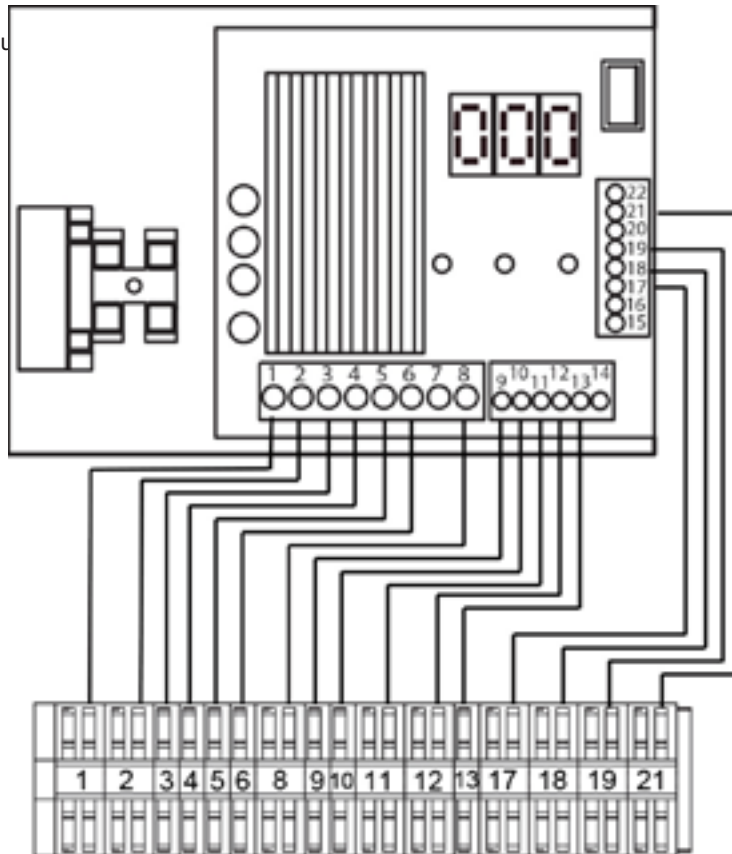
WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

10.5 CONNECTION OF THE CONTROL UNIT

The control unit u
unit.

ection terminals on the control



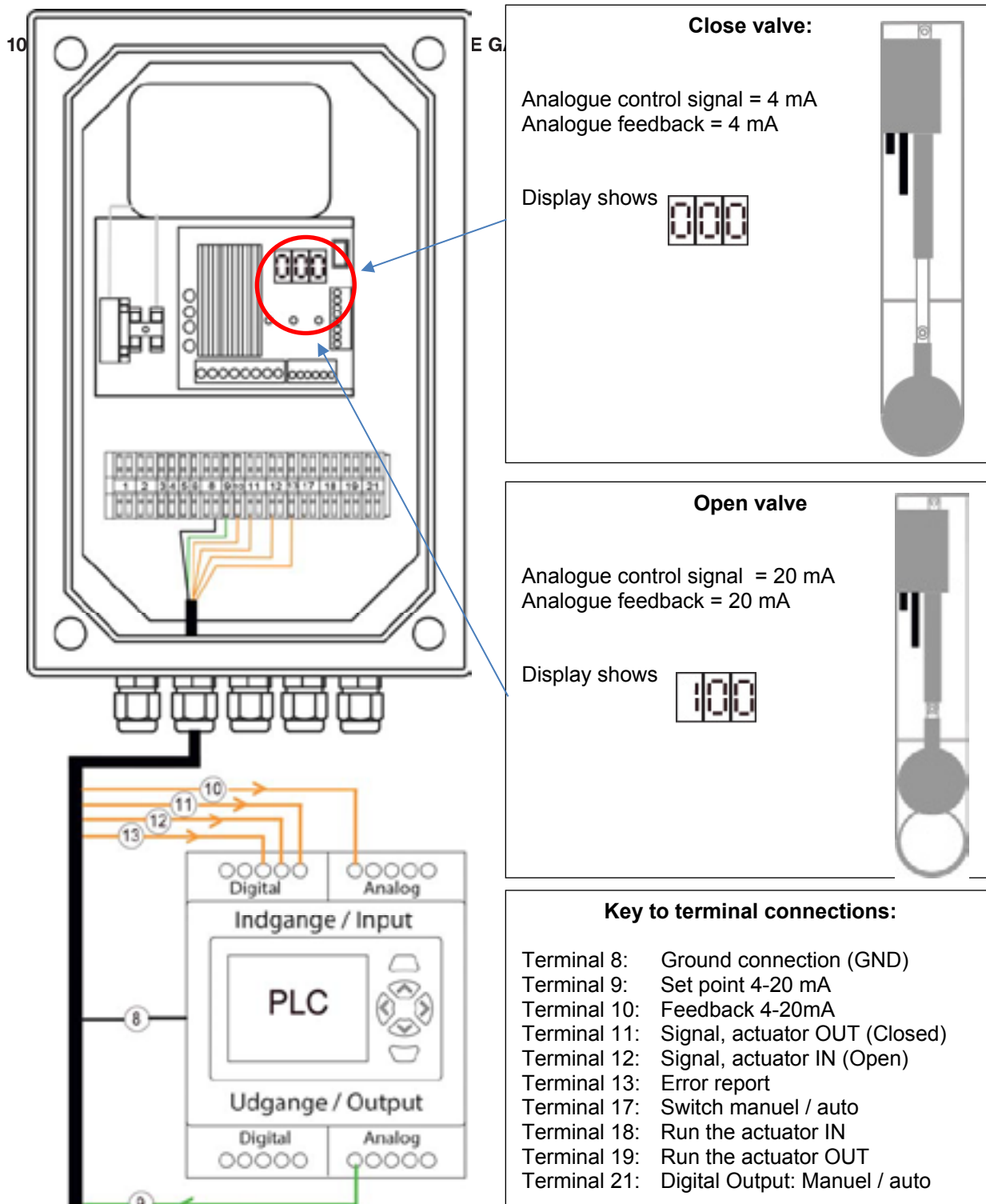
Terminal 1:	Internal supply voltage (- gnd) OUT
Terminal 2:	Internal supply voltage (+ 24 V DC) OUT
Terminal 3:	Actuator: Voltage to motor on actuator (-24 V DC)
Terminal 4:	Actuator: Voltage to motor on actuator (+24 V DC)
Terminal 5:	Actuator: Supply to Hall-pot
Terminal 6:	Actuator: Signal (0-10V) from hall-pot
Terminal 7:	Not in use
Terminal 8:	Common GND
Terminal 9:	Analogue Input: Actuator set point 4-20mA
Terminal 10:	Analogue Output: Actuator position 4-20mA
Terminal 11:	Digital Output: Signal from actuator IN
Terminal 12:	Digital Output: Signal from actuator OUT
Terminal 13:	Digital Output: Error
Terminal 14:	Internal voltage +: 5 V OUT
Terminal 15:	Digital Input: Signal power fail from battery (WCU UPS)
Terminal 16:	Digital Input: Signal Battery fail from battery (WCU UPS)
Terminal 17:	Digital Input: Switch Manuel/ Auto
Terminal 18:	Digital Input: Run the actuator IN
Terminal 19:	Digital Input: Run the actuator OUT
Terminal 20:	+24V supply to terminals 16, 17, 18
Terminal 21:	Digital Output: Manuel / auto
Terminal 22:	Not in use (aux in)

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

10.6 CONNECTION OF CONTROL UNIT TO WCU-BASIC

The WCU-Basic control unit is connected according to the valve type used in the relevant case. The next pages show diagrams of the connection and setting of the valve types most frequently used, combined with the various types of signal processing.

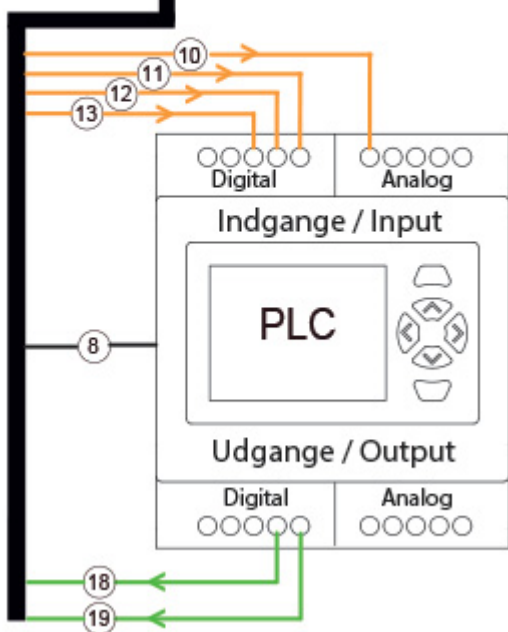
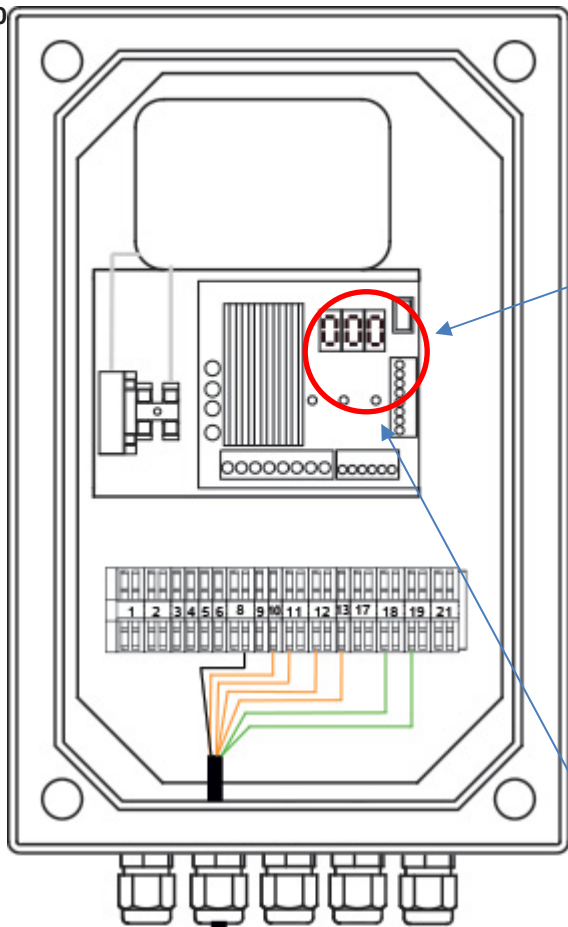


WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

NB! The parameters must be set correctly for function. See the parameter values on page 31, column 1

10 GATE VALVES FOR DIGITAL SIGNAL PROCESSING



Closed valve:

Analogue feedback = 4 mA

Display shows (%) **000**

Open valve:

Analogue feedback = 20 mA

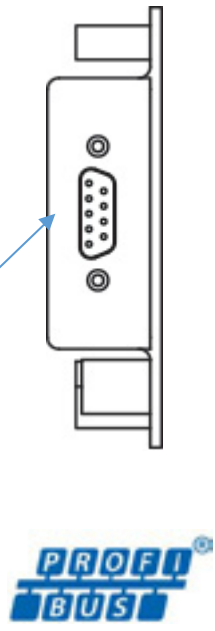
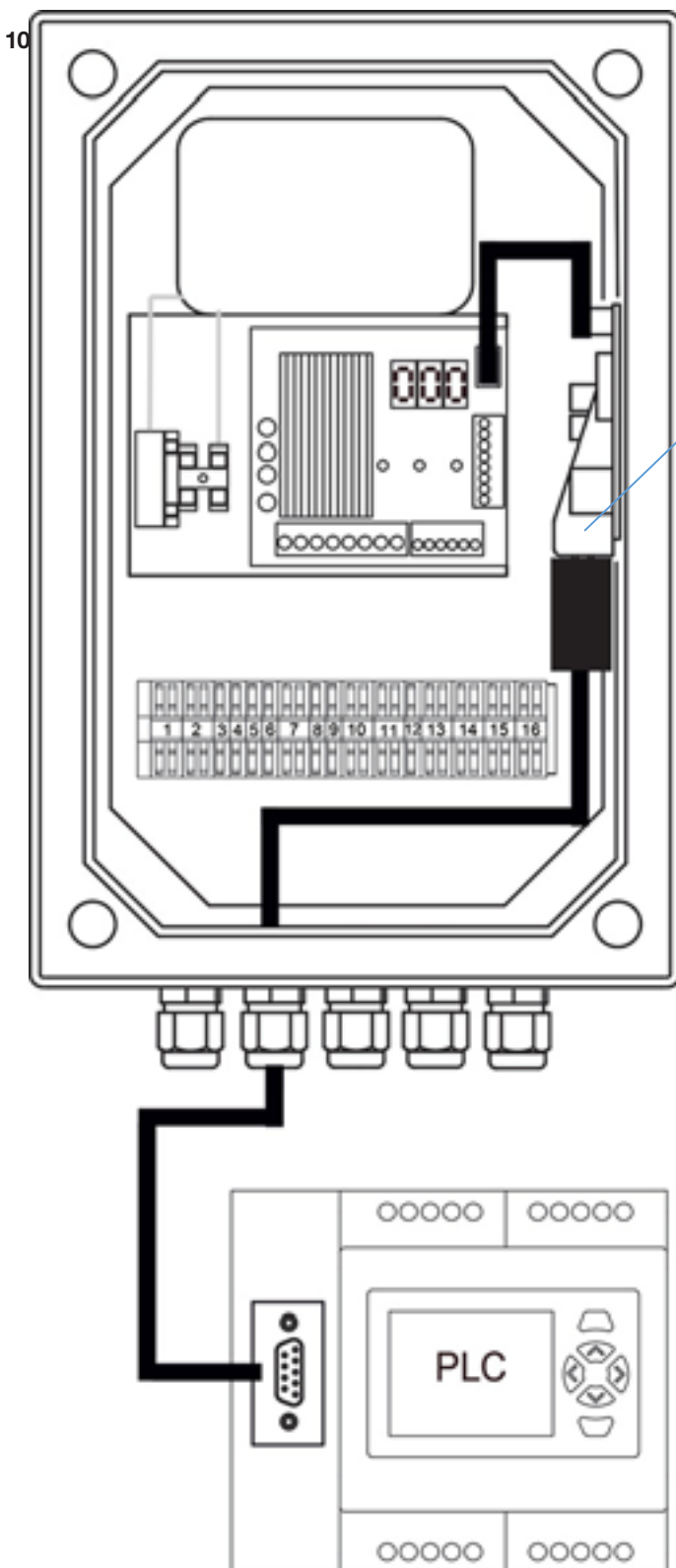
Display shows (%) **100**

- Key to terminal connections:**
- Terminal 8: Ground connection (GND)
 - Terminal 9: Setpoint 4-20 mA
 - Terminal 10: Feedback 4-20mA
 - Terminal 11: Signal, actuator OUT (Closed)
 - Terminal 12: Signal, actuator IN (Open)
 - Terminal 13: Error report
 - Terminal 17: Switch manual / auto
 - Terminal 18: Run the actuator IN
 - Terminal 19: Run the actuator OUT
 - Terminal 21: Digital Output: Manuel / auto

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

NB! The parameters must be set correctly for function. See the parameter values on page 31, column 2



The BUS communication module supports the Profibus technology. It can therefore be necessary to download a driver file to the PLC. Driver files and further information can be downloaded by following the link below:
<http://www.anybus.com/support/support.asp?PID=321&ProductType=Anybus-CompactCom>

Read more about BUS communication under BUS communication, page 25

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

NB! The parameters must be set correctly for function. See the parameter values on page 31, column 3

11. BATTERY BACK-UP WCU-UPS

11.1 DESCRIPTION

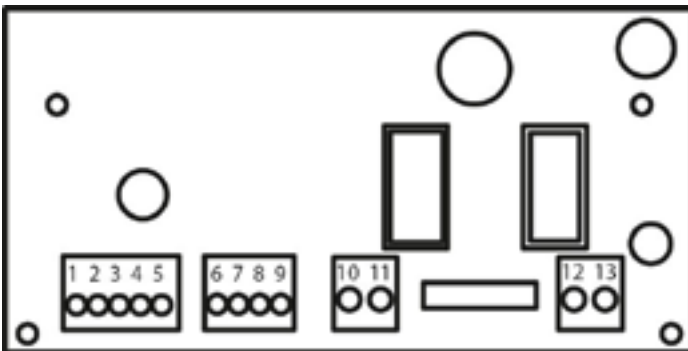
On disruption of the 230 V AC supply, WCU-UPS may supply the control unit with voltage, so that it is still possible to adjust the valve. Depending on the control unit's setting, the actuator can run to a pre-programmed position.

The battery back-up system consists of a 1.2 amp/h 24 V DC battery and an EM-312 control board. The control unit charges the battery and interrupts charging when the battery is fully charged.

During charging the control unit continuously tests that the battery is ok.

A battery test can be performed by pressing the test button.

The EM-312 control unit protects the battery from running down and stops before this takes place. The control unit closes down and goes into "sleep mode". There are outputs to indicate battery error, just as the diode on the PCB indicates the nature of the error.

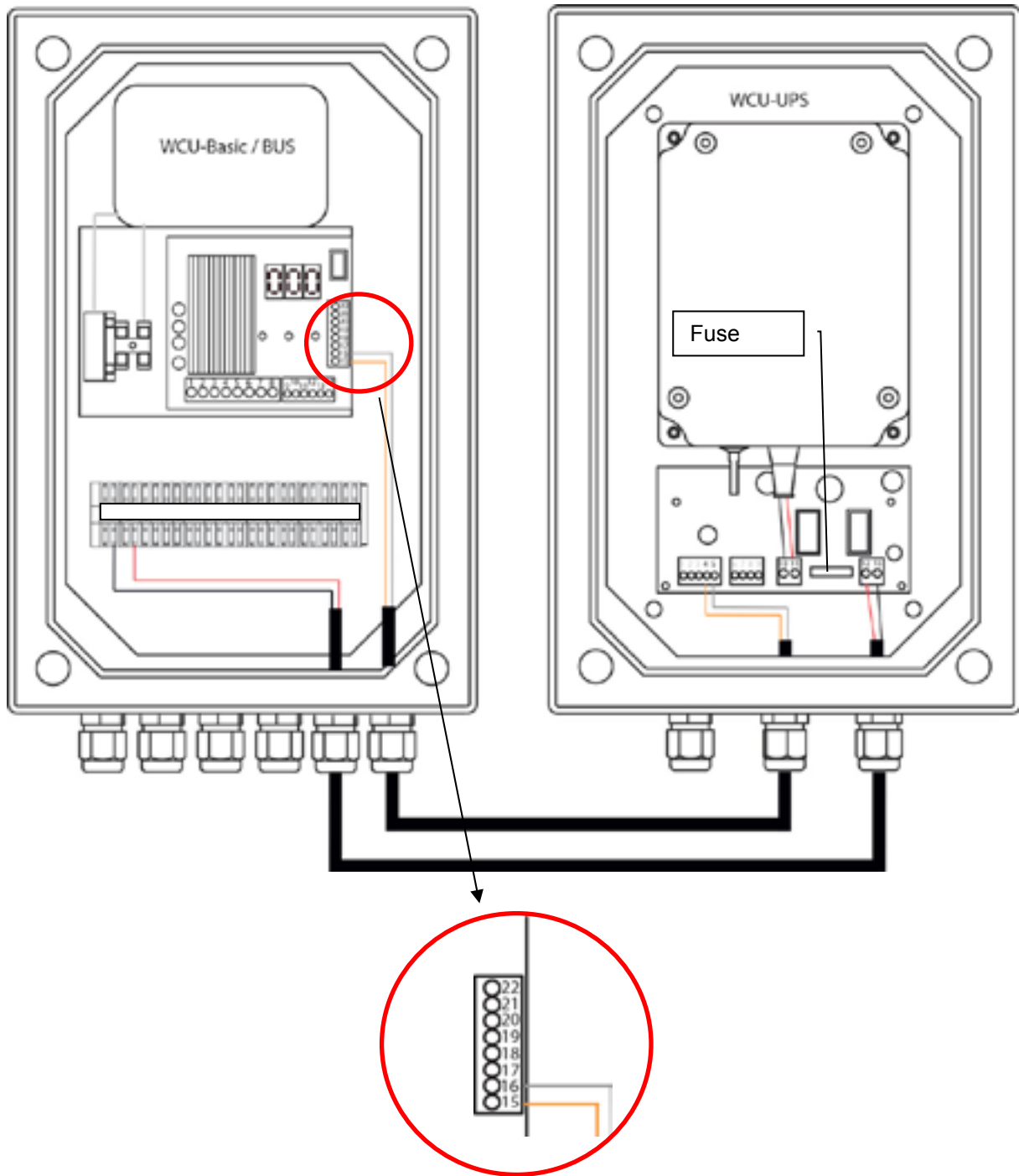


Terminal 1:	Not in use
Terminal 2:	Not in use
Terminal 3:	Not in use
Terminal 4:	Signal for WCU supply error to WCU-UPS
Terminal 5:	Signal for WCU battery error from WCU-UPS
Terminal 6:	Not in use
Terminal 7:	Not in use
Terminal 8:	Not in use
Terminal 9:	Not in use
Terminal 10:	Battery (-)
Terminal 11:	Battery (+)
Terminal 12:	Supply voltage to WCU-UPS (+)
Terminal 13:	Supply voltage to WCU-UPS (-)

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

11.3 CONNECTION OF BATTERY BACK-UP TO WCU



Use suitable cables for supply and signal, respectively. LINAK recommends the following:

- Supply cable, minimum 2 x 1.5 mm²
- Signal cable, minimum 2 x 0.75 mm²

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

12. PARAMETER SETTINGS

The driver unit has 26 parameters that can be set to match the individual system. To change these parameters, the programming unit 702-099-018 must be connected to the control unit.

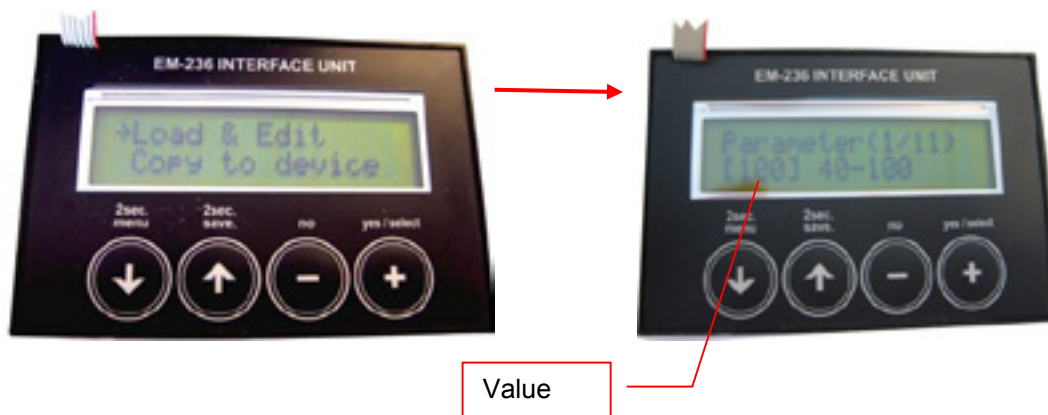
NB! To use the 702-099-018, the driver unit must first be connected to a power supply.



12.1 PROGRAMMING UNIT 702-099-018

Press ARROW DOWN for 2 seconds to call up the main menu on the handset. In the main menu, use ARROW UP or ARROW DOWN to select the menu item required. To open the menu in question, click on the + (plus) button.

To alter the parameter values, select the “Load & Edit” menu item.



/Use the arrow keys to select the parameter to be changed. The selected parameter is shown in the display as <1/11>, which means “parameter 1 of 11”. The value is presented in square brackets [] and can be changed by pressing the plus or minus buttons.

Once you have made the changes you require, save the new configuration by pressing ARROW UP for at least 2 seconds.

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

12.2 PARAMETER LIST

Parameter	Description	Column 1	Column 2	Column 3
		Analogue	Digital	Bus
1	Positioning accuracy, output 4 mA [0-40]	19	19	19
2	Positioning accuracy, output 20 mA [0-100]	50	50	50
3	Forward speed 20-100% [20-100]	100	100	100
4	Reverse speed 20-100% [20-100]	100	100	100
5	Service run speed 20-100% [20-100]	100	100	100
6	Disconnection limit, forward 0.1-20 A [1-200]	130	130	130
7	Disconnection limit, reverse 0.1-20 A [1-200]	130	130	130
8	Closing the valve [0 = position, 1 = torque >19.5 mA]	0	0	0
9	Not in use	0	0	0
10	Not in use	0	0	0
11	Load compensation [0-255]	0	0	0
12	Running time interrupted 1-255s [1-255] 0 = not used	0	0	0
13	Reset counter [1 = reset]	0	0	0
14	Supply error (WCU-UPS)	0	0	0
15	Battery error [WCU-UPS]	0	0	0
16	Display shown [0 = direct 1 = reverse]	1	1	1
17	Dead band 0.2-5% [2-50]	10	10	10
18	Ramp down area 1-8% [1-8]	3	3	3
19	Start ramp 0.1-2s [0-250]	10	10	10
20	Stop ramp 0.1-2s [0-250]	1	1	1
21	Min. input value [0-551]	475	470	550
22	Max. input value [0-551]	90	90	0
23	Max. stroke length, IN 0-50% [0-500]	5	5	5
24	Max. stroke length, OUT 0-50% [0-500]	outer limit	outer limit	outer limit
25	Communication [1 = analogue, 2 = bus, 3 = mobile phone, 4 = digital]	1	4	2
26	Maximum running on error	101	101	101

NB! Whenever the parameters are changed, a new learning procedure must be run.
(See under Initial start-up on page 28)

Open - Closing time/Amp. setpoint for actuator series 702/73			
DN	Times s	Amp.	Part no. Model
50	14	4,2	702099001
65	19	4,4	702099001
80	23	5,3	702099001
100	29	5,8	702099001
125	36	6,9	702099001
150	43	9,8	702099005
200	57	10,2	702099005
250	71	11,6	702099008
300	86	13,5	702099008

Note: The time is from open to close or close to open.

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

12.2.1 EXPLANATION OF PARAMETERS

The following section presents a more detailed explanation of the individual parameters. To set the parameters, enter a number in the display.

NB! AVK's recommended parameter values are presented on page 21.

1

**Positioning accuracy
Output 4mA:**

This parameter is used to define the required degree of accuracy of the position. This parameter is particularly important in systems where the actuator's stroke length is limited. The lower the figure entered, the more regulation the system will be obliged to perform. The following options are available: **1 to 40**

2

**Positioning accuracy
Output 20mA:**

This parameter is used to define the required degree of accuracy of the position. This parameter is particularly important in systems where the actuator's stroke length is limited. The lower the figure entered, the more regulation the system will be obliged to perform. The following options are available: **1 to 100**

3

Speed OUT:

This parameter makes it possible to set the actuator operating speed in the outward direction. The speed is stated in %. Max. speed = 100%. The following options are possible: **20 to 100**

4

Speed IN:

This parameter makes it possible to set the actuator operating speed in the inward direction. The speed is stated in %. Max. speed = 100%. The following options are possible: **20 to 100**

5

Speed (HOME/learn):

This parameter makes it possible to set the actuator operating speed while it is running in HOME/learn mode. The speed is stated in %. Max. speed = 100%. The following options are available: **20 to 100**

6

Power limit, OUT:

This parameter is used to state the max. permitted power consumption for the connected actuator when it runs OUT. The power limit is measured in Amp. From 0.1 – 20 A. The following options are available: **1 to 200**

7

Power limit, IN:

This parameter is used to state the max. permitted power consumption for the connected actuator when it runs IN. The power limit is measured in Amp. From 0.1 – 20 A. The following options are available: **1 to 200**

8

Closing the valve:

This parameter is used to select how the actuator closes the valve and is typically used for slide/gate valves to ensure that the valve always tightly seals the rubber gasket.
0 = actuator running at pre-set position
1 = actuator running past the pre-programmed end stop until it disconnects at overcurrent.
(See the description of the function on page 24)

9

Not in use:

This parameter is not used.

10

Not in use:

This parameter is not used.

11

Load compensation:

With this parameter it is possible to improve low speed and starting torque. If equalisation is too high, this will give unstable operation. Run the motor at low speed (30%) and increase equalisation very gradually until the motor control unit begins to operate in an unstable way. Then reduce the value by around 10%. The following options are available: **0 to 255**

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

12

Running time interrupted:

This parameter can be used to set the maximum permitted operating time for the actuator, measured in seconds.

The following options are available: 0 to 255 (0 = deactivated)

13

Reset: (Start and hour counter)

This parameter resets the start and hour counter. Reset the counter as follows:

Set this parameter to **1** and press Save. Then set the parameter to **0** again.

The following options are available: **0 to 1**

14

Supply error (UPS):

This parameter must be used if the control unit is connected to a battery back-up (UPS). The parameter determines how the control unit is to process low supply voltage.

The following options are available: **0 to 3**

0 = error report deactivated

1 = reports an error, but does nothing

2 = reports an error and runs the actuator right out

3 = reports an error and runs the actuator right in

15

Battery error (UPS):

This parameter must be used if the control unit is connected to a battery back-up (UPS). The parameter determines how the control unit is to process low battery voltage.

The following options are available: **0 to 2**

0 = error report deactivated

1 = reports an error, but does nothing

2 = reports an error and prevents the control unit from running

16

Display:

This parameter is used to state how the display in the front panel shows the actuator's position from 0 to 100%. If the parameter is set at "0", the display shows "0" when the actuator is run right IN. If the parameter is set at "1", the display shows "0" when the actuator is run right OUT.

The following options are available: **0 to 1**

17

Dead band:

This parameter is used to define the width of the "dead" zone in which the control unit considers the actuators' position to have been reached. The width can be set in the range of 0.2 to 5%

The following options are available: **2 to 50**

18

Braking accuracy:

This parameter states when the actuator is to begin to brake, before reaching its position. The accuracy can be set in the range of 1 to 8%

The following options are available: **1 to 8**

19

Start ramp:

This parameter is used to define a start ramp up to a soft start. The start ramp time is measured in seconds from 0.1 to 2.5 seconds.

The following options are available: **1 to 25**

20

Stop ramp:

This parameter is used to define a stop ramp down to a soft start. The stop ramp time is measured in seconds from 0.1 to 2.5 seconds.

The following options are available: **1 to 25**

21

Set value, MIN.: (Control unit signal)

This parameter can be used to state a minimum value for the control unit signal from 0 to 5.5 V. If the value 551 is stated, the value is found automatically by the control unit.

The following options are available: **0 to 551**

22

Set value, MAX.: (Control unit signal)

This parameter can be used to state a maximum value for the control unit signal from 0 to 5.5 V. If the value 551 is stated, the value is found automatically by the control unit.

The following options are available: **0 to 551**

23

Stroke length, IN:

This parameter is used to define the required limitation of the stroke length from 0 to 50% of the total stroke length IN.

NB! The "HOME" function overrides this parameter.

The following options are available: **0 to 500**

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

24

Stroke length, OUT:

This parameter is used to define the required limitation of the stroke length from 0 to 50% of the total stroke length OUT.

NB! The "HOME" function overrides this parameter.

The following options are available: **0 to 500**

25

Communication:

This parameter is used to state how to communicate with the control unit.

The following options are available: 1 to 4

1 = analogue

2 = Profibus

3 = mobile phone

4 = digital

26

Running on error (UPS):

With this parameter the actuator can be set to run to a pre-programmed position (% of stroke length) on any error.

The following options are available: 0 to 100%

This parameter depends on the choice made in parameter 25 if:

Parameter 25 = 1 = Active on a control signal below 4 mA

Parameter 25 = 2 = Active if the communication to the Profibus fails.

(See the description of the function on page 24.)

13. SPECIAL FUNCTIONS

The control unit can handle a number of special functions that can be activated by setting a number of parameters. The functions are described in further detail below.

13.1 SAFE VALVE CLOSING

This function ensures that the valve closes on torque, instead of at the programmed position.

Depending on the operating mode selected (normal or reverse running direction), this function will ensure that the valve is closed at the torque setting when the actuator runs forward. At a control signal between 4 and 4.5 mA or 19.5 to 20 mA, depending on programming, the control unit will overrule the programmed end stop and switch off at overcurrent. The function is activated by changing parameter 8.

13.2 RUNNING PATTERN ON SUPPLY ERROR

It is possible to select several running patterns on a supply error. This function is used when a battery back-up is connected (WCU-Ups).

If the input "power fail" terminal 15 is activated, the control unit can react in four different ways that can be set in parameter 14.

0 = error report deactivated

1 = reports an error on the error output and bus system, but does nothing

2 = reports an error and runs the actuator right out

3 = reports an error and runs the actuator right in

13.3 RUNNING PATTERN ON BATTERY ERROR

It is possible to select several running patterns on a battery error. This function is used when a battery back-up is connected (WCU-Ups).

If the input "battery fail" terminal 16 is activated, the control unit can react in three different ways that can be set in parameter 15.

0 = error report deactivated

1 = reports an error on the output and bus, but does nothing

2 = reports an error and prevents the motor from running

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

13.4 RUNNING PATTERN ON A FAILED CONTROL SIGNAL/BUS COMMUNICATION

On a failed control signal from the analogue signal, or if the bus communication fails, the actuator can be set to run to a pre-programmed position.

The position is selected in parameter 26.

- If the value is 101, the function is deactivated.
- If the value is between 0 and 100%, the actuator will be set at this position if there is no signal.

The function depends on parameter 25. If this is 1, the function will be active at a control signal below 4 mA, and if the value is 2 the function will be active if the communication to the Profibus disappears.

14. BUS COMMUNICATION SYSTEM

The WCU-BUS control unit is fitted with a BUS communication module. The BUS communication module supports the Profibus technology. It can therefore be necessary to download a driver file to the PLC. Driver files and further information can be downloaded by following the link below:

<http://www.anybus.com/support/support.asp?PID=321&ProductType=Anybus-CompactCom>

For further information concerning the Profibus communication module, see the Anybus website. <http://www.anybus.com/>

NB! The communication module can take up to a minute to get online. It is ready for communication when the green "ST" diode is "on".

14.1 PROFIBUS COMMANDS

The user has three different commands to control the WCU-BUS control unit via the Bus module. It is possible to select two different parameter types:

- mode 0, the parameters are limited; or
- mode 1, all parameters are available.

The memory area is read and written every second.

Command is written in parameter 2

- 0x54 runs to position
- 0x5A read parameter (can only be used in mode 1)
- 0x60 write to parameter (area 15-66) only mode 1
- 0x90 command read parameter 6, limited parameter or full pack

Write the required position before the start command is given.

Mode 0: Limited parameter

All data is 16 bit:

Output numbers are the same as on the PROFIBUS Master simulator program

- (1)
- (2) Command = 54 drive to target (value written in the word HEX), 5A reads status value, all parameters can be changed, cannot write until after reading, dangerous to play with. 60 = write new value in parameter.
- (3)
- (4) Position 0 ... 100
- (5)
- (6) Mode 0 = limited parameter, 1 = all parameters.
- (7)
- (8)
- (9)
- (10)
- (11)
- (12)

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

User read area (Input)

All data is 16 bit:

Input numbers are the same as on the PROFIBUS Master simulator program

- (1)
- (2) Last received command
- (3)
- (4) Status: actuator run, 1 FW, 2 BW, 0 stop
- (5)
- (6) Position 0 ... 100
- (7)
- (8) Auto 0/Manual 1
- (9)
- (10) Error codes
- (11)
- (12) Reading end stop 0= no limit, 1= actuator. Back, 2 = actuator forward

Mode 1, all parameters are available.

All data is 16 bit:

Output numbers are the same as on the PROFIBUS Master simulator program

(1)	(25) Parameter 6	(49) Parameter 18
(2) Command	(26) Parameter 6	(50) Parameter 18
(3)	(27) Parameter 7	(51) Parameter 19
(4) Position 0 ... 100	(28) Parameter 7	(52) Parameter 19
(5)	(29) Parameter 8	(53) Parameter 20
(6)	(30) Parameter 8	(54) Parameter 20
(7)	(31) Parameter 9	(55) Parameter 21
(8)	(32) Parameter 9	(56) Parameter 21
(9)	(33) Parameter 10	(57) Parameter 22
(10)	(34) Parameter 10	(58) Parameter 22
(11)	(35) Parameter 11	(59) Parameter 23
(12)	(36) Parameter 11	(60) Parameter 23
(13)	(37) Parameter 12	(61) Parameter 24
(14)	(38) Parameter 12	(62) Parameter 24
(15) Parameter 1, msb	(39) Parameter 13	(63) Parameter 25
(16) Parameter 1, lsb	(40) Parameter 13	(64) Parameter 25
(17) Parameter 2	(41) Parameter 14	(65) Parameter 26
(18) Parameter 2	(42) Parameter 14	(66) Parameter 26
(19) Parameter 3	(43) Parameter 15	(67)
(20) Parameter 3	(44) Parameter 15	(68)
(21) Parameter 4	(45) Parameter 16	(69)
(22) Parameter 4	(46) Parameter 16	(70)
(23) Parameter 5	(47) Parameter 17	
(24) Parameter 5	(48) Parameter 17	

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

User read area (Input)

All data is 16 bit:

Input numbers are the same as on the PROFIBUS Master simulator program

(1)	(25) Parameter 6	(48) Parameter 17
(2) Last received command	(26) Parameter 6	(49) Parameter 18
(3)	(27) Parameter 7	(50) Parameter 18
(4) Status: actuator run, 1 FW, 2 BW, 0 stop	(28) Parameter 7	(51) Parameter 19
(5)	(29) Parameter 8	(52) Parameter 19
(6) Position 0 ... 100	(30) Parameter 8	(53) Parameter 20
(7)	(31) Parameter 9	(54) Parameter 20
(8) Auto 0/Manual 1	(32) Parameter 9	(55) Parameter 21
(9)	(33) Parameter 10	(56) Parameter 21
(10) Error codes	(34) Parameter 10	(57) Parameter 22
(11)	(35) Parameter 11	(58) Parameter 22
(12) Reading end-stop 0 = no Limit, 1 = actuator Back, 2 = actuator forward	(36) Parameter 11	(59) Parameter 23
(13)	(37) Parameter 12	(60) Parameter 23
(14)	(38) Parameter 12	(61) Parameter 24
(15) Parameter 1, msb	(39) Parameter 13	(62) Parameter 24
(16) Parameter 1, lsb	(40) Parameter 13	(63) Parameter 25
(17) Parameter 2	(41) Parameter 14	(64) Parameter 25
(18) Parameter 2	(42) Parameter 14	(65) Parameter 26
(19) Parameter 3	(43) Parameter 15	(66) Parameter 26
(20) Parameter 3	(44) Parameter 15	(67)
(21) Parameter 4	(45) Parameter 16	(68)
(22) Parameter 4	(46) Parameter 16	(69)
(23) Parameter 5	(47) Parameter 17	(70)
(24) Parameter 5		

15. START-UP/OPERATION

Before starting to use the system, it is important that all of the motor control unit parameters are set correctly (see page 21). It is also necessary to perform a HOME and learn procedure (see page 28).

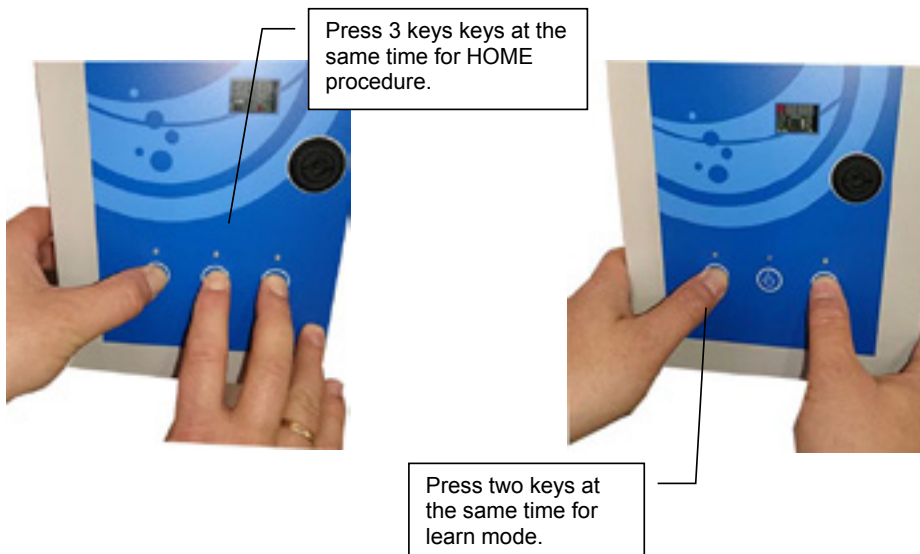
WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

15.1 INITIAL START-UP

The first time the system is started up, it is necessary to perform a HOME followed by a learn- procedure. This procedure takes place by manually pressing keys on the PCB at the same time (see below). The procedure is done in 2 steps:

1. Set the system in manual mode.
2. The HOME procedure is done by pressing all 3 keys at the same time. After app. 10 sec. the actuator runs IN to its absolute inner end position. NOTE! A HOME / learn procedure over rules any stroke limitation typed in parameter 23 and 24.
3. The learn procedure is done by pressing 2 keys (FW + REV) at the same time. After app. 10 sec. the actuator runs OUT. NOTE! Releasing the keys will store the actual position as "Valve closed" a green LED on the PCB will lid up showing that the procedure is done. The display will show "00". Switch in automatic mode and the system is ready for operation.

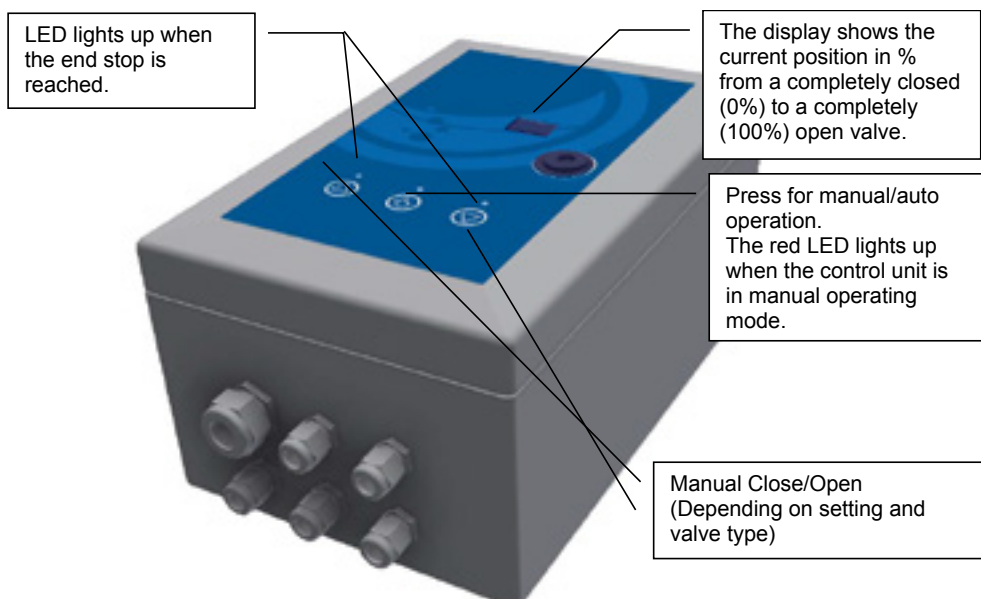


NOTE!

A HOME- and learn-procedure can done at any time and the newest position will then be stored and used.

15.2 OPERATION

The control unit can be operated manually, directly at the unit (service and repair) and can be remotely operated via a cable for automatic operation. Switching between manual and automatic operation takes place on the control unit's front panel, which should therefore be mounted in the immediate vicinity of the valve unit.



WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

15.3 INTENDED USE:

- The actuator system is only intended/designed to be used to adjust the valve.
- After installation, test the system to check that it functions correctly.
- The application should be allowed free movement along the full stroke length of the actuator.
- Bolts for attachment to the actuator's piston rod eye and back fixture must be secured with locking nut.
- Make sure that the correct voltage is connected to the system.

15.4 INAPPROPRIATE USE:

- Duty cycle must not exceed 10%: max. two minutes of operation followed by an 18-minute pause.
- The actuator must not bear a load in excess of the max. load stated on the data plate.
- The actuator must not bear a transverse load.
- The actuator must not be subject to knocks and violent jolts.
- The system must not be connected to a different voltage than the voltage stated on the data plate.
- The control unit and power supply must not be covered.
- The equipment is not suitable for use in the vicinity of flammable, anaesthetic mixtures of air, oxygen or laughing gas (nitrous oxide).
- The system is not suitable for applications which can be described as:
 - Medical devices
 - Equipment for use in the offshore industry (ATEX)
 - Aircraft
 - Nuclear power plant
- The system must not be used until it has been incorporated safely into the end product.

16. MAINTENANCE

- Clean the surface of the systems at appropriate intervals to remove dust and dirt, and check for signs of damage and breakage.
- Check all connections, cables, housing and connectors, and check that the system functions correctly.
- With the exception of motor control units with PCB or for installation in an electrical panel, the control boxes are sealed and maintenance-free.
- Check all connections, cables, housing and connectors.
- For actuators with sealing class IPX6 rating and better: if cleaned using water, these units should only be washed when the piston rod (spindle) is fully extended.

16.1 REPLACING AN ACTUATOR

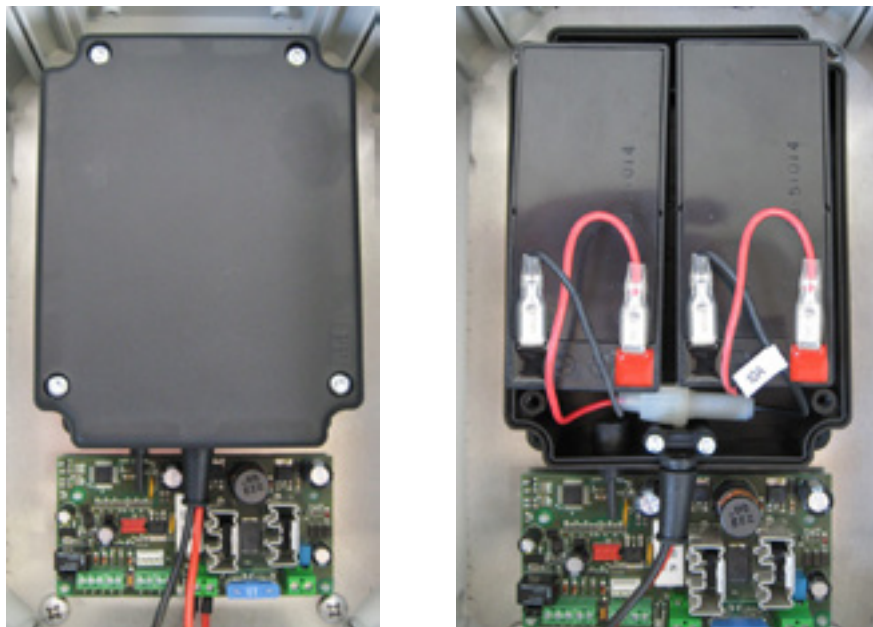
If an actuator requires replacement due to wear or damage, please note the following:

- Always choose the same type of actuator as the one to be replaced. If in doubt, contact AVK International A/S.
- Fit the actuator as described on pages 9-10.
- Plug and connect the actuator correctly to the control unit BEFORE it is activated for the first time. This is especially important for actuators with Hall-pot. feedback.

OPERATION & MAINTENANCE INSTRUCTIONS - ORIGINAL VERSION
WATER VALVE CONTROL UNIT FOR SERIES 702/73
WCU WITH 1 ACTUATOR

16.2 REPLACEMENT OF BATTERIES IN THE WCU-UPS BATTERY BACK-UP

The batteries can easily be replaced by removing the four screws (Torx 20) in the battery cover.



The battery pack (BA18) is for 24V (2 x 12V connected in series). The batteries can be replaced with batteries of the same type: 12V, 1.2Ah or ordered from AVK International A/S under order no.: CP1212S.

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

17. TROUBLESHOOTING

If an error occurs, stop the actuator and the error status will be indicated by a red LED on the PCB. The LED is visible when the control unit cover is removed.

17.1 WCU-BASIC/BUS



LED flashes
on errors

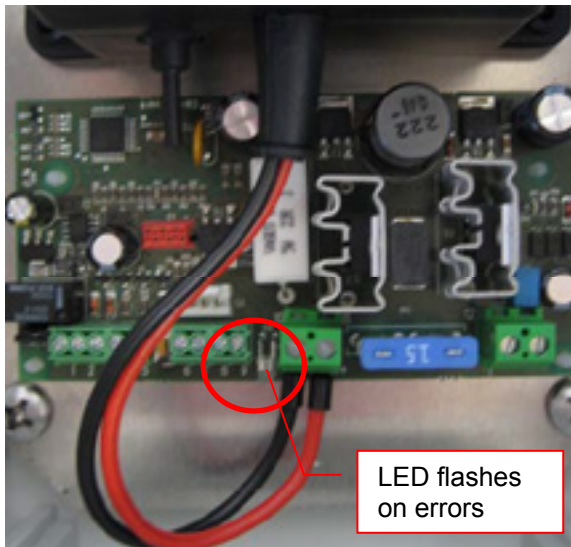
In the event of an error, the red LED on the PCB will flash. The flashes signify the following:

LED flash	Significance	Remedy
1 flash	Interrupted on overcurrent	Find out whether anything is blocking the actuator, and rectify. Check whether the switch limit matches the actuator in question.
2 flashes	Power supply error	Signal from the “power supply fail” input, terminal 15. If the battery is connected, the control unit will continue running.
3 flashes	Battery error	Battery error input terminal 16, the control unit stops, depending on the parameter.
4 flashes	Time-out	The actuator has run longer than the time set. See whether anything is wrong with the actuator, or switch off the time.
5 flashes	Overheating of the control unit	Switch off or stop the control unit until it has cooled down, as the actuator intermittence may be too high.
6 flashes	Overvoltage	The intake voltage is too high; examine whether the voltage level is below 35 V.
7 flashes	Error input:	Lacking control voltage or lacking bus communication.

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

17.2 WCU-UPS



On error, the LED on the PCB will light up/flash. The flashes/lights signify the following:

LED light	Significance	Remedy
RED for one second, and then GREEN for one second.	The supply is connected the first time	Control unit OK
GREEN uninterrupted	Stand by = OK	Control unit OK
GREEN with short intervals	Standby and charging of battery	Control unit OK
GREEN + RED uninterrupted	Battery test in progress	Control unit OK
GREEN and 2 x RED flash	Low battery voltage	Battery may be defect; replace battery
GREEN and 3 x RED flash	Battery test error	Wait to see whether this is corrected
GREEN and 4 x RED flash	Battery not connected or fuse error	Connect battery and check fuse
RED flash ever two seconds	Supply error	Check cables and plug, and possible battery fuse
RED flash ever eight seconds	Sleep status	Control unit ok and is in Sleep mode.
RED flash for 2 seconds and then GREEN for 2 seconds, followed by RED for 2 seconds.	Battery over-voltage (Ubat > 13.8V/27.6V)	Over-voltage on battery, check the voltage on the charging circuit.

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

17.3 READING MONITORING VALUES

Using a 702-099-018 portable serial interface handset, it is possible to read the current values for the system. Ten values can be displayed.



In the main menu, use ARROW DOWN to select the “Monitor Values” menu.

17.3.1 EXPLANATION OF MONITORING VALUES

1. Reading error codes:	(see the form on the previous page Error reading)
2. The motor’s current power consumption:	0-200 [0-20A]
3. The control unit’s current temperature:	0-1000
4. Supply voltage (current):	0-1000 [0-50V]
5. SET input value	0-1000 [0-5.5V]
6. Feedback value:	0-1000 [0-11V]
7. Current position	0-100 = [the value is shown in the display]
8. Hour counter:	Max. 65535 [hours]
9. Number of starts:	Max. 65535 [start]
10. Help counter for number of starts	

To reset errors

All errors are reset when the actuator is restarted.

17.4 SELF-HELP GUIDE

The actuator seems to be running erratically. See below how this can be rectified.

Description	Remedy
The actuator runs forward and back to find the position.	The braking time is too low, parameter 18, raise the value.
Feedback in mA does not fit.	The mA signal can be adjusted with parameter 1 and 2.
Analogue control signal does not fit.	The mA signal can be adjusted in parameter 21 and 22.
Display does not fit.	Read in the stroke length again.
Display does not change.	Feedback from the actuator may be missing. Measure the voltage between terminal 8 (GND) and the signal from the actuator. On terminal 6 the signal must be between 0 and 10 volts. Actuator In = 0V act. Out = 10 volt. Feedback can also be seen in the monitor on EM-236 parameter 6.
The actuator cannot run in completely.	The zero point in the actuator may have been moved if there has been no current to the hall potentiometer when run with the actuator. Remedy by removing the motor cable and connecting it to a battery or other supply, and then run the actuator right in until it reaches the end point. Perform a HOME procedure described on page 37.

OPERATION & MAINTENANCE INSTRUCTIONS - ORIGINAL VERSION

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

Key to symbols



NB! Not all of the symbols described here can be found on the products in question.

	Type B equipment, as per EN 60601-1		Lock function
	Protection against contact/foreign matter (first character) and water (second character) as per EN60529		Release function
	Class 2 equipment		Charge indicator
	For indoor use		Safety switch/enable button
	Safety isolating		
	Protective earth		
	Alternating Current		
	Direct current		
	Attention, consult accompanying documents		
	Demko approval	File E97199	UL file number
	Fimko approval	File E175209	UL file number
		File E151104	UL file number
			CSA
APPROVAL V94265	Australian approval mark		PSE-Mark
APPROVAL NO.:97122	Australian approval mark		Product with a thermofuse
	Recognised - Component Mark		For indoor use (House).
	Canadian Recognised - Component Mark		Safety isolating transformer.
	Recognised Component Mark for Canada and the United States		Electronics scrap
	T-Mark		Equipment KI.2 (Double square)
	RW-TÜV approval		Patient part of type R (Mand)
	TÜV Rheinland		Patient part of type BF
			Earth protective
		KL1	Equipment class1.
	TUV Product Service		Earth
	ETL		CE Mark
	C-ETL		C-TICK
CS95145V			
LGA	LGA		
	UL Listing Mark		
	C-UL Listing Mark		
	C-UL US Listing Mark		
	UL Listing Mark		

WATER VALVE CONTROL UNIT FOR SERIES 702/73

WCU WITH 1 ACTUATOR

18. DISPOSAL OF AVK PRODUCTS

To dispose of A products, start by sorting them into different categories for recycling or incineration. We recommend that you dismantle your product as fully as possible for disposal, and that the parts are recycled. Sorting categories may include:

- metal
- plastic
- cables
- flammable material
- reuse

It is possible to subdivide within some of these categories. For example, “metal” can be subdivided into steel and aluminium, while “plastic” can be divided into ABS and PP. As an example of sorting, the categories in which the various AVK components must be placed are shown below:

Product	Component	Recycling group
Actuator:	Spindle and motor	Metal scrap
	Plastic housing	Plastic recycling or combustion
	Cable	Cable scrap or combustion
Control box:	PC-board	Electronics scrap
	Plastic housing	Plastic recycling or combustion
	Cable	Cable scrap or combustion
	Transformer	Metal scrap
	Batteries	Recoverable resources
Control:	Plastic housing	Plastic recycling or combustion
	Cable	Cable scrap or combustion
	PC-board	Electronics scrap