Operating Manual
Swell Control C1.1

Quick Guide

Getting started: system overview

Power supply 9-36V DC, 4A
Cable cross section 1-1,5mm^2

Control via digital inputs, Gray code 30-127 steps
PLC or potentiometer via optional AD converter

alternatively: control via ipMIDI Ethernet
e. g. Espressivo system, MIDI controller 127 steps

Connection to the drive unit
exclusively via the prefabricated
cable, length 5m

Travel of the push rod maximum 200mm
Positions for open and closed freely adjustable
Mounting position of the drive unit as desired

Attention:

The wooden push rod allows you to easily customise the unit, e.g. screwing on additional attachment points or changing the mountings.

However, never pull the rod out of the motor unit beyond the mounted stops. This will damage the internal potentiometer or the gearbox.
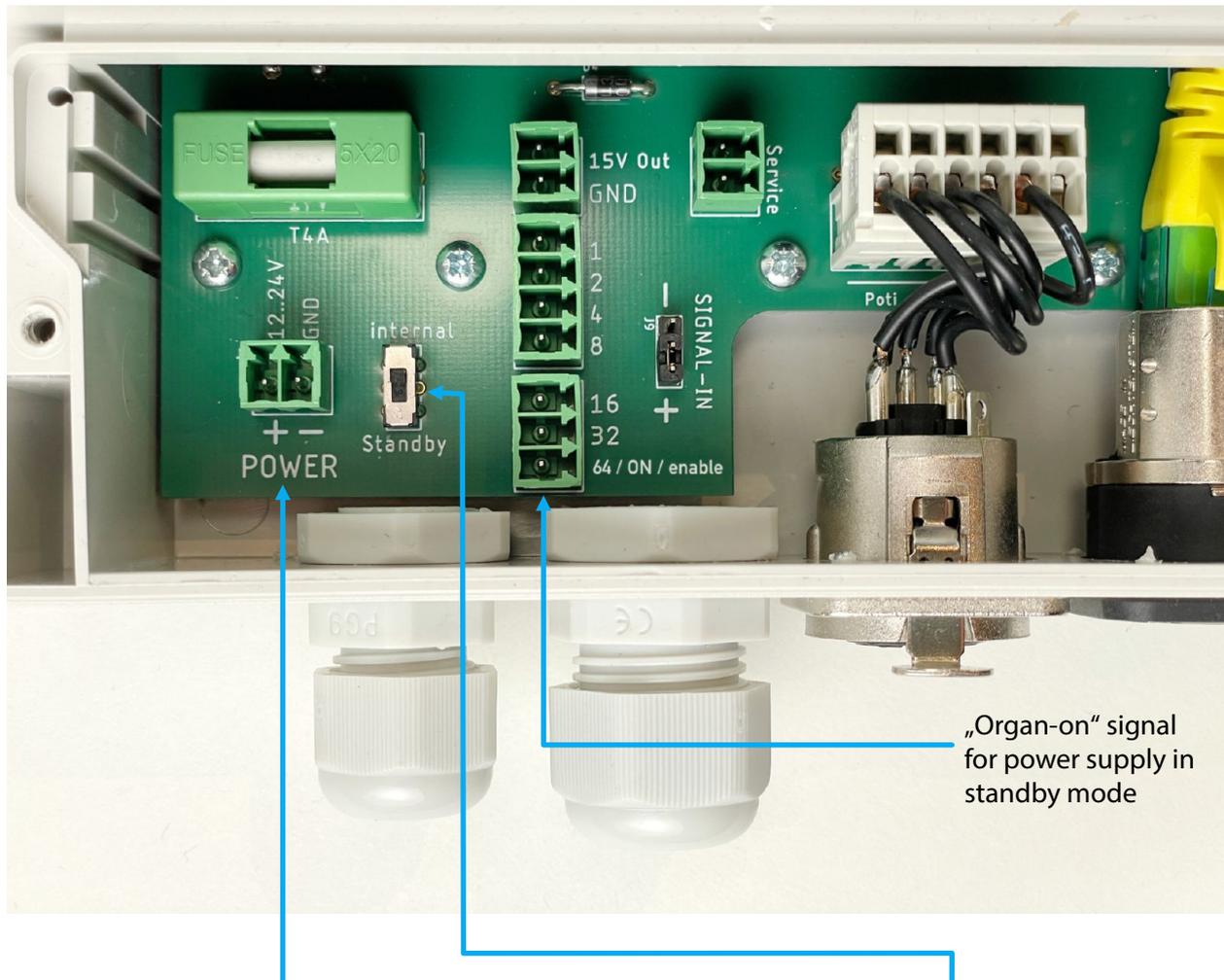
If you suspect problems with the motor unit, do not attempt to repair it yourself without consulting FSB.

If you remove the stops on the push rod or open the motor housing, the warranty will be invalidated and any repairs to the motor unit will be charged at cost.

Contents

Connecting the unit: Power Supply

„Organ-on" signal
for power supply in
standby mode

Unlike earlier devices, the swell controller no longer requires a separate power supply. It has internal energy storage (so-called supercapacitors), which bring the swell shades into rest position (selectable, commonly open) after switching off the organ.

Therefore, you can connect the controller to any type of power supply that is switched on and off with the organ.

Make sure that 4A current is available for the swell shades. Fuse the supply line (cross-section 1mm² - 1.5mm²) appropriately.

If you want to use the internally stored energy to move the swell shades to the rest position, set the switch to "internal".

Alternatively, you can operate the swell shades on a power supply that is constantly energized ("standby power supply"). Then set the switch to "Standby").

In this mode you need another signal that indicates whether the organ is on or off. Connect this signal to the "64 / ON / enable" connector.
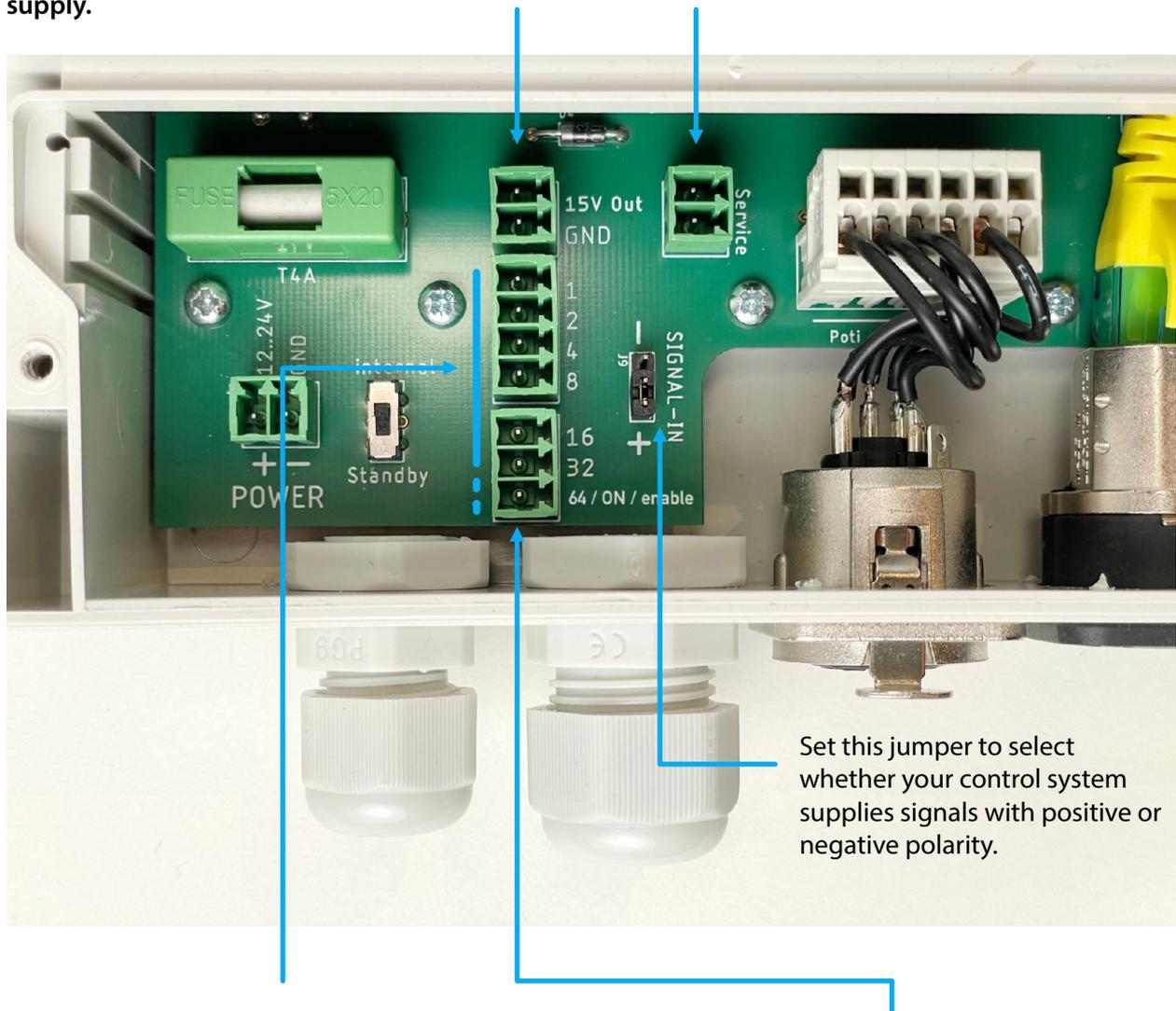
Note:

In this mode, the input is not available for "enable", and the number of steps for control via Gray code can only be used up to 60 steps.

Connecting the unit: Control Signals

The 15V output is only used for direct connection of older swell pedals that are powered by the controller.

The ground connection (GND) has to be connected to the negative pole of the organ control system if it is not operated on the same power supply.

You can connect a maintenance switch to the "Service" terminals. When this is closed, the swell shades move to an adjustable maintenance position. This can be helpful, e.g. when tuning, to open swell shades without having to go to the console or to the control unit.

Set this jumper to select whether your control system supplies signals with positive or negative polarity.

Swell control units are usually controlled via digital signals with so-called Gray code. For common resolutions up to 60 steps, 6 control lines are required at inputs 1...32. High resolution controls up to 127 steps require 7 signals (incl. 64).

This signal can be used for several functions:

a) Gray code up to 127 levels (code value 64).

b) "organ on" signal (see above for standby power supply)

c) "enable" of the Gray code signal, adjustable. It is used when the connected organ control system needs a longer start time to provide correct control values. If enable is configured to "active", Gray code signals are ignored as long as no enable signal is present.

Changing the system language
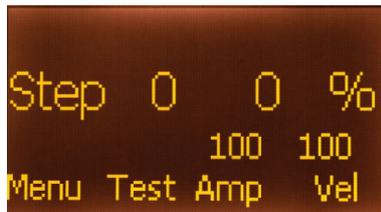
As you are reading the English version of this manual, you may want to change the display language of the control unit from the factory default German to English (if this hasn't been done already by someone else during installation).

Press the "menu" button.

Use the rotary knob to highlight „Language/ Sprache".

Press „select".

Use the rotary knob to select German or English.

Save the setting with "set".

Press the "Exit" key (several times if necessary) to return to the main display.

Initial operation: Setting up drive unit travel

```
Set open/close!


              100   100
Menu  Test  Amp     Vel
```

First connect the drive unit with the pre-fabricated cable by plugging the cable into the motor base plate and plugging the XLR connector into the control unit.

Connect the control unit to the power supply.

After a short boot process, the main display appears, which can also be seen during normal operation.

The display shows the note "Set open/close!"

As long as the positions of the swell motor for open/close are not set, the system is only operational to a limited extent. In this state, the swell shades can only be moved using the Test position function (see there).

Press the "Menu" button.

```
Language/Sprache
Travel
Progression
...
Exit    select
```

Operate the knob until the menu option "Travel" is selected.

Press the "select" button.

```
Pos. open      154
Pos. closed    0
Pos. Service   0
cur. Pos.      154

Exit  select   < 60  >
```

In the submenu "Travel" settings you can select different positions with the rotary knob and then set them.

For example, start with the open position.

When this line is selected, press "select" to select the parameter.

```
Pos. open      154
Pos. closed    0
Pos. Service   0
cur. Pos.      154

Exit    set    < 60  >
```

Now the open position is selected.

Use the arrow keys to move the swell shades.

Set the desired position. The value changes with the current position.

Pos. open   207
Pos. closed   0
Pos. Service   0
cur. Pos.   207

Exit   set   < 60 >

Now, for example, the position has been changed to 207.

Press the "set" button to save this position as the open position.

Open and close positions can be selected as desired within the travel range. It does not matter which position has the larger numerical value.

Pos. open   207
Pos. closed   0
Pos. Service   0
cur. Pos.   207

Exit   select   < 60 >

The cursor jumps back to the menu line. The open position is stored.

The Closed position is now set and saved in the same way.

Pos. open   207
Pos. closed   42
Pos. Service   0
cur. Pos.   42

Exit   set   < 60 >

Here, for example, the open position is set to 42. The control is now ready for operation. All steps are now converted to the opening between Open and Closed.

Press the Exit key (several times if necessary) to return to the main display.

Pos. open   207
Pos. closed   42
Pos. Service   110
cur. Pos. 41 %   110

Exit   select   < 60 >

Pos. open   207
Pos. closed   42
Pos. Service   110
cur. Pos. 41 %   110

Exit   set   < 44 >

To facilitate the positioning of the swell shades with the arrow keys, you can also change the speed at which the keys move the motor.

To do this, use the knob to select the numerical value between the arrows, press "select", change the value with the knob and press "set".

This setting has no meaning for normal operation. If the value is too low, the swell shades may not move at all, depending on the load.

Setting up the service position

```
Pos.open        207
Pos.closed      42
Pos.Service     110
cur.Pos.41 %    110

Exit   set    < 60  >
```

In addition to the open and close positions, you can also define a third position in the path menu, the "Service" position.

This position is triggered as soon as an optionally connected service switch is actuated.

This can be helpful e.g. when you are tuning, to simply open or close the swell wall without having to go to the console or the control unit.
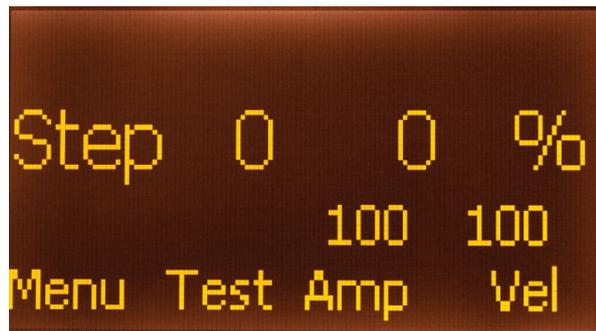
For example, you can set the service position identical to the open position. Then you can first close the swell shades completely from the console, which may be necessary for access into certain parts of the organ. For access to swell pipes, you can then open the swell shades again with a switch located there.

The service position can also be set outside the range of open and close. This makes it possible to limit the open position to a position where the swell shades lose their acoustic effect. In the service position, however, an even larger opening would be possible to facilitate access.

The service position can also be selected as an option for the rest position of the swell shades, which is approached when the organ is turned off. This is advantageous when a position other than "open" or "closed" is desired for climatic reasons.

It is not necessary to set the service position for the swell shades to function normally. It can be set or changed at any time without affecting the other settings.

Test Mode: Position / Step

You can switch from the normal operating display to test mode by pressing the "Test" button.

```
Step  0    0 %
          100 100
Menu Test Amp   Vel
```

The test mode has two different modes:

a) Position (display in millimeters).

Here you move the swell shades with the arrow key. Set the speed with the rotary control (if the speed is too low, the swell shades may not move at all).

The percentage opening refers to the set open and close positions.

It is also possible to move beyond these points! A mechanical blockage is indicated by "BLK" above the respective arrow.

```
Position 93
    30  %
Exit  Steps   < 44 >
```

b) Steps

In this test mode, use the rotary knob to change the number of steps as with the swell pedal between 0 and the maximum step. The percentage opening shows the position between open and closed. Depending on the selected progression curve, changes in small or large steps have different effects on the actual opening of the swell shades.

```
Step    0
      0  %
Exit Travel
```

```
Step    19
     31  %
Exit Travel
```

Here, e.g. in a system with 60 steps and linear progression, step 19 leads to an opening of 31 %.

Basic settings: Number of Steps
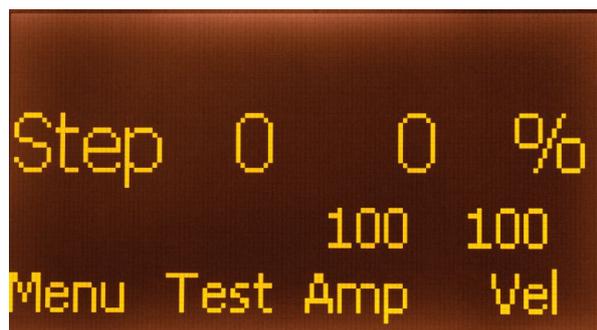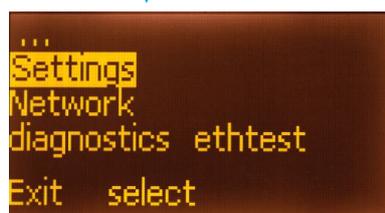
Swell pedals and control systems are built with different numbers of steps. Widely used are systems from 0...30 or 0...60. Modern systems can display up to 127 steps.

To ensure that the movement of the swell shades covers the entire range of the swell pedal, the highest step must be set to match the system of the console.

At the factory, the widely used level 60 is set as the maximum. Adjust this value if necessary.

To do this, switch to the menu, use the rotary knob to select the continuation on the 2nd menu page (...) and there to the "Settings" page.

There you select the line "max. level", then the parameter with "select".

Now you can change the value of the highest level as desired with the rotary knob.

Confirm the selection with "set".

Press the Exit button (possibly several times) to return to the main display.

If, e.g., a swell pedal with mechanical code generator only outputs up to level 59 instead of 60 levels, you can also set this value to make full use of the range.

For operation with 127 stages via Gray code, the "Enable" connection must be configured and connected as "Code64" (see Connection).

Control via ipMIDI network always works with 127 steps. However, the number of steps must also be set appropriately here. In addition, ipMIDI reception must be activated in the network settings (see Network).

Basic Settings: Rest Position

When the organ is switched off, the control system automatically moves the swell shades to the rest position.

This is usually open so that temperature fluctuations do not cause zones of different temperatures to form in the organ chamber, which would cause the divisions to be out of tune with each other. However, closed swell shades may also be desired for optical reasons.

In the settings menu this rest position can be selected.

As always, first navigate through the menu pages to "settings" and there to the "off position" line. After "select" choose between three options:

" open" is the default setting

"closed" may be desired in special cases, e.g. if a swell panel is embedded in a stage back wall and this should remain invisible when the organ is not in use.

Since the service position can be set independently of the open and closed positions, it may be useful to use it as a rest position as well.

This would allow the swell shades to be opened only as far as they still acoustically provide a swell effect when the organ is in use. For climate compensation when the organ is switched off, however, the shades could be opened even further.
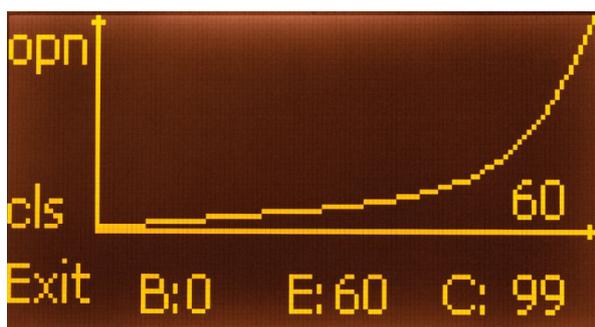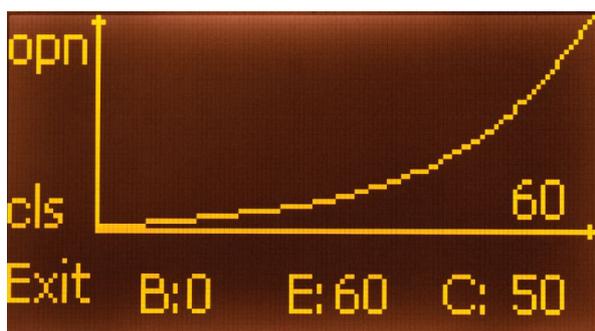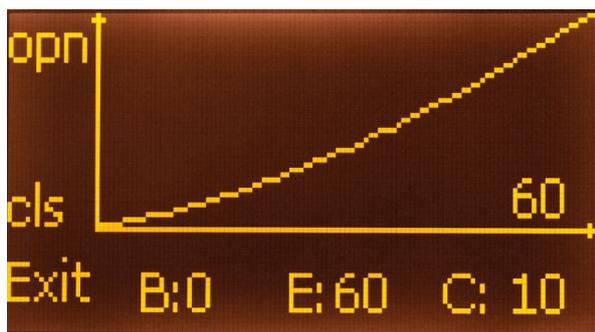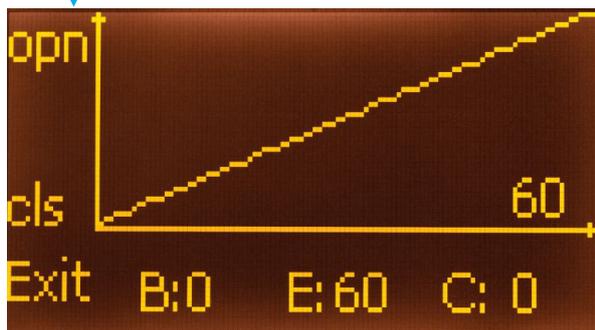
Adjustments: Progression

The adjustment of the so-called progression is crucial for the acoustic effect of the swell shades. In most cases, the volume changes much more during the first few centimeters of the opening than when the swell shades are already somewhat wider open. Moreover, depending on the design of the swell shades and its position in the organ chamber, the effect on the sound radiation varies.

In order for the swell pedal to have an even effect on the sound over its entire actuation range, the swell should open with smaller movements at the beginning of small step numbers, and with larger movements at the end of the step scale.

This swell control unit allows for a particularly sensitive adjustment. This is done in the "Progression" menu via the "C" parameter, the progression curve. This is clearly shown on the display and can be changed.

In the basic setting C: 0, there is a linear dependency between "swell step" (horizontal axis from 0 to the respective maximum step of the system) and the actual position from "closed" to "open" (vertical axis).

Keep the K button pressed and change the value with the rotary knob. When you release the button, the curve will be recalculated and the swell shades will immediately respond to the new setting.

From 0 (linear) to 99 (strongly exponential) you can set in fine nuances how strongly the progression curve should be curved. Check the acoustic effect with different registrations of the swell division. A little experimentation is musically worthwhile.

It may be useful to set the "open" position of the swell shades lower than the maximum mechanically possible opening, if there is no more change in sound at the end of the actuation range (see "travel" settings).

In general, it makes sense to use as high a number of steps as possible so that a sufficiently fine resolution of the position is possible in all areas of the progression.

Progression using multiple swell shade units
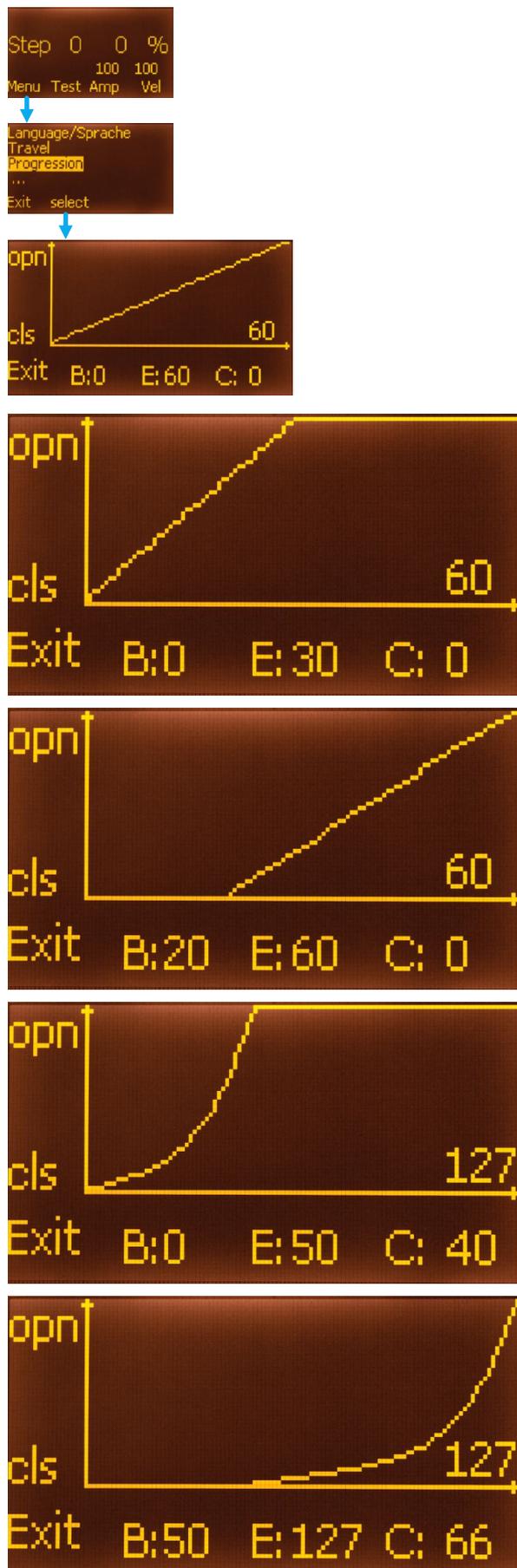
Large swell panels often make it difficult to achieve an acoustic effect over a wide range. Inevitably, even a small opening of the large panel causes a sharp increase in volume, and at wide openings there is often no perceptible effect.

This swell control unit allows fine tuning of multiple swell panels by allowing them to open one after the other.

Thus, a relatively small swell panel can initially open at small swell steps, while another large panel still remains closed in the same division. Only when the small swell panel is partially or fully open does the opening of the large swell panel begin.

For this purpose, the beginning (B) and the end (E) of the progression can be set individually at the respective control. To do this, hold down the B or E button and change the value with the rotary knob. After releasing the button, the curve is recalculated.

For example, if the end (E) of the progression is set to 30, then the first set of swell shades will be fully open from this level onwards. Swell shades with B:20, on the other hand, remain fully closed until step 20 and only then start to open.

You can also set a different curvature of the progression curve in these subranges using the curve parameter (C).

The examples show a system with 127 steps, where the second swell panel takes over from step 50. Since this is larger than the first, a stronger curvature of the curve is used here to control the beginning of the opening more delicately.

Fine Adjustments
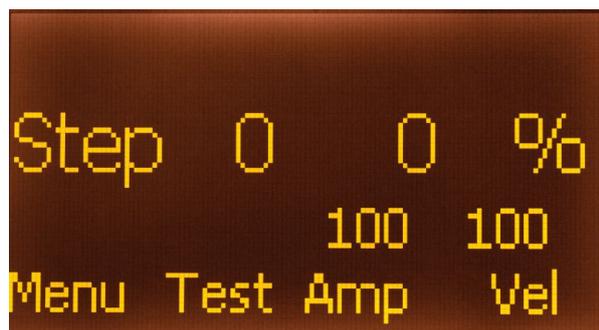
Directly on the normal operating display, you can change two parameters of the swell control unit to adapt the behavior more finely to the swell panel.

To do this, hold down one of the "Amp" or "Vel" buttons and change the value with the rotary knob.

The parameters change the dynamic behavior of the drive unit. With the default settings "100" the swell shades react as fast as possible to the movement of the swell pedal. However, this may not be desirable for certain swell panel designs, e.g. if jerky movements cause rattling noises or a swell panel starts to judder if it travels too fast in certain areas.

The parameter "Amp" (like amps) limits the maximum motor current. If you reduce it, the drive unit will travel slower overall. The value 0 is also permissible, there should still be enough power to move a typical swell panel.

The parameter "Vel" (like Velocity) determines how much the swell panel accelerates for large movements. Again, it may be useful to reduce this parameter if unwanted noise occurs when the swell pedal moves quickly.

Whether these settings lead to an improvement can only be determined by trial and error.

Network Settings: ipMIDI

In addition to the classic Gray code via several digital control signals, this swell unit can also be controlled via a modern network connection (Ethernet).

This simplifies cabling and provides the highest possible resolution of 127 steps.

This control is particularly easy in conjunction with the Espressivo keyboard system. Its add-on module "DI" has three analog inputs for potentiometers which are transmitted to the network as MIDI controllers 7, 8 and 9 on an adjustable MIDI channel.

To use this function, first activate ipMIDI "receive". If this is active, the swell control unit will no longer respond to Gray code signals. After power-on, the swell shades will remain in the rest position until the first MIDI controller message is received.

By default, the IP address of the controller, UDP port and MIDI channel and controller number are selected to match the default settings of an Espressivo master and DI module. If you use multiple swell control units and swell pedals, select a separate IP address and matching controller for each control.

Several swell units can also be controlled by the same MIDI controller. However, all devices in the network should always have different IP addresses.

If ipMIDI signals are to be received from an organ control system, IP addresses and UDP port may need to be adjusted. Consult about this with the manufacturer of the organ control system.

Several swell control units can also communicate with each other via the network. For this purpose, the function "Send ipMIDI" is activated on one controller. This unit is controlled via Gray code and transmits the current stage via ipMIDI to other swell controllers that are set to receive ipMIDI.

In this way, the multi-core control line only needs to be routed to one control, while further swell panels are controlled via network cables.

Settings: Enable

The connector for the high-resolution Gray code bit (see "Connecting") can alternatively be used to "enable" the code.

This is helpful in the following situation:

Some control systems require a relatively long time until they are ready for operation. During this process, there are either no control signals for the swell shades yet (corresponds to stage 0) or even uncontrollable signals are output.

Since the swell shades are usually open when the organ is switched off, the swell shades may therefore close abruptly at first when the organ is switched on, and then open again after the control system has started (if the swell pedal is in the appropriate position). There may even be strange twitching of the swell panel while the control system is starting.

This can be avoided by the control system issuing an additional enable signal, which is only set when the control system is completely ready for operation and applies a valid Gray code.

To do this, set the enable signal "active". Then the swell control unit ignores all Gray code signals as long as no enable signal is applied.

The enable function and the high-resolution Gray code can only be used if the power supply is operated in "internal" mode. With "standby" power supply, the connection for the "organ on" signal is required.

With enable signal, Gray code resolution is limited to 60 levels because the connector is not available for code bit 64.

With ipMIDI control the "enable" signal has no function. In this case the swell panel remains in idle position anyway until the control system has received a valid MIDI command.

Reboot and restore factory default settings
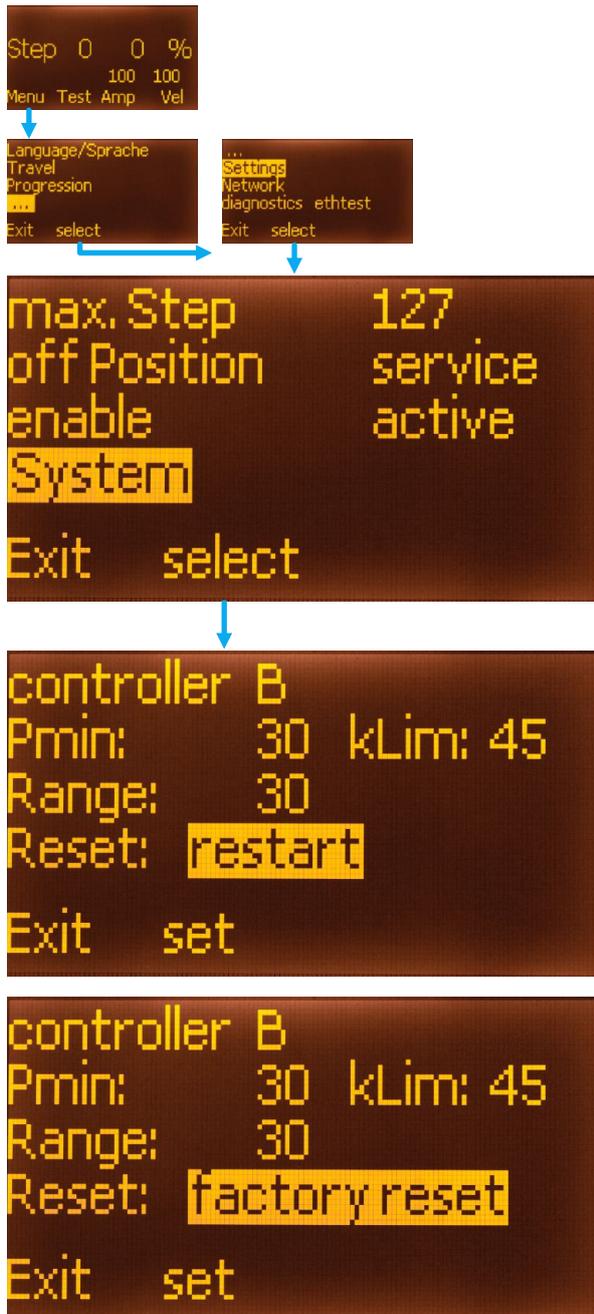
The "Settings" menu takes you to the "System" submenu.

There you will find the options for a reset.

After selecting "Restart", you trigger a restart of the control system with "set". The settings are not changed, but error messages like blockades are reset.

If you select the "Factory settings" option, the controller is reset to factory settings after you press the "set" button.

All settings are deleted in the process. The positions for "open" and "close" of the swell shades must also be set again.

Diagnostics

The "Settings" menu takes you to the "Diagnostics" menu.

These functions are not very relevant for you as an organ builder. Use them only after consultation with the Orgelpunkt support. Here, above all, the states of the control lines can be displayed.

Do not operate the buttons with the test positions (30, 120, 200) if the drive unit is connected to a swell panel!

These functions move to fixed positions on the push rod to test a motor that is not installed. This is likely to cause blockages and possibly injury or damage in the case of a swell panel.

Internal control parameters

Step 0   0 %
            100 100
Menu Test Amp Vel

Language/Sprache
Travel
Progression
...
Exit   select

...
Settings
Network
diagnostics ethtest
Exit   select

max. Step   127
off Position   service
enable   active
System

Exit   select

controller B
Pmin: 30 kLim: 45
Range: 30
Reset: restart

Exit   set

The "Settings" menu takes you to the "System" submenu.

There you will also find options for setting internal control parameters of the swell shade unit. Do not change these settings without specific consultation with Orgelpunkt support. Improper settings can lead to malfunctions.

If you have changed the settings by mistake, perform a reset to factory settings.