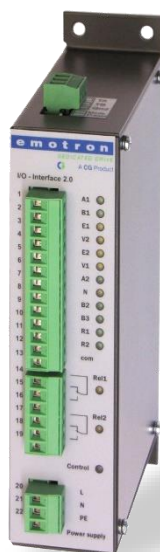




Emotron I/O Interface

Crane & Lift Extension module



Manual
English

e m o t r o n

DEDICATED DRIVE



A CG Product

Emotron I/O Interface

Manual - English

Software versions

I/O Interface: $\geq$ v5.0.31

DSV: $\geq$ v5.x

VFX: $\geq$ V5.14

Document number: 01-3456-01

Revision r1.04

Release date: 24.06.2025

© Copyright CG Drives & Automation
Germany GmbH 2025

CG Drives & Automation Germany GmbH
reserves the right to change product
specifications without prior notice. This
document may not be modified and / or
reproduced without the approval of CG
Drives & Automation Germany GmbH.

**Please read this manual carefully
before beginning with your work!**

Safety rules

Manual

Please read the entire manual carefully first!

Safety

Read additional safety notes in DSV / VFX manual!

Technically qualified people

Any work with or on motor, inverter or plc, including installation, dismantling and measuring, may only be handled by authorized persons.

Installation

Refer and act accordingly to the local rules and regulations of your country/state for the installation.



DANGER!

Take all precautions to prevent damage during installation and commissioning, e.g. by falling loads.

Opening the housing of the inverter



DANGER!

ALWAYS disconnect the power supply before opening the inverter.

The connections for control signals and the jumpers are high-voltage-isolated from the mains voltage. Nevertheless, take all necessary safety precautions before opening the inverter.

Removing or dismantling the I/O Interface



WARNING!

Disconnect the I/O interface and the DSV or VFX inverter from the mains before disassembling it.

Precautions for peripheral applications



Carefully observe the precautions in the enclosed operating instructions. Check these functions with high care.

Use this option with these frequency inverters:

Technical data for frequency inverters **Emotron**

	DSV35	and	VFX48/52/69
	3-phase		3-phase
Nominal power	0.37 - 30 kW		0.75 - 3000 kW
Net voltage (±10%)	380 - 480 V		380 - 480 V
Nominal current	1.3 – 61.0 A		3 - 3000 A
Protection class	IP20		IP20/IP54
Approval class	CE / UL		CE / UL

For further technical information, article numbers and precise type designations, please find the data in the technical data sheets for our Emotron DSV35 or VFX(48).



Figure 1: DSV and VFX

Contents

1.	General information I/O Interface + DSV35/VFX Frequency inverter	10
1.1	Introduction.....	10
1.2	Components.....	10
1.3	Notes, warnings, dangers	11
1.4	Description	12
1.5	Standards and norms.....	12
2.	Hardware	13
2.1	I/O Interface – Technical Data	13
2.2	Mounting I/O Interface	15
2.3	Conductor cross-section.....	15
2.4	Selector switches “Mode” and “Preset”	16
2.5	Terminal designation.....	17
2.6	Connections Interface	17
3.	Quick Start-up DSV.....	19
3.1	Installation	19
3.2	Signal check.....	19
3.3	Loading factory settings	19
3.4	Fine adjustments / Manual parameterization	20
4.	Quick Start-up VFX	21
4.1	Installation	21
4.2	Signal check.....	22
4.3	Loading crane-specific factory settings and commissioning	22
5.	Controlling with DSV inverter.....	23
5.1	4-Speeds Switch	23
5.2	Connection Example 4-Speeds Switch.....	24
5.3	3-Position Switch	24
5.4	Connection Example 3-position Switch	25
5.5	Operational and Pre-limit Switches	26
5.6	Counter-Locking.....	26
5.7	Communication	26
6.	Controlling with VFX Inverter	27
6.1	4-Speeds Switch	27
6.2	Connection Example 4-Speeds Switch.....	28
6.3	3-Position Switch	29
6.4	Connection Example 3-Position Switch	30
6.5	Analog Control.....	31
6.6	Connection Example for Analog Control.....	32

6.7 Operation and Pre-limit Switches33

6.8 Counter-Locking.....33

6.9 Communication33

7. Brake Resistors34

8. Setup/Parameters DSV (Excerpt)35

9. Error Diagnosis DSV38

Table of Figures

Figure 1: DSV and VFX..... 6

Figure 2: Front view of Emotron I/O interface 13

Figure 3: Detail drawing of I/O interface..... 14

Figure 4: Terminal assignment I/O interface 230V(AC) 17

Figure 5: „Preset“ (S2) is „ON“, loading factory settings..... 19

Figure 6: View of control unit screen after loading factory settings. 19

Figure 7: Mode switch “S1” is “On”, operation mode “4-speeds switch” chosen 23

Figure 8: Mimic of a 4-speeds switch with zero position contact 23

Figure 9: Connection example 4-speeds switch 24

Figure 10: Mode switch “S1” is “Off”, operation mode “3-position switch” chosen 24

Figure 11: Mimic of a 3-position switch with zero position contact..... 24

Figure 12: Connection example 3-position switch..... 25

Figure 13: Functionality of (pre-) limit switch..... 26

Figure 14: Connection example 4-speeds switch..... 28

Figure 15: Connection example 3-position switch..... 30

Figure 16: Connection example analog control..... 32

Figure 17: Functionality (pre-) limit switch 33

1. GENERAL INFORMATION

I/O INTERFACE + DSV35/VFX FREQUENCY INVERTER

1.1 Introduction

The I/O interface is an option for the DSV35 and VFX inverters for (potential-free) expansion of the inputs and outputs for crane and lift applications. It is also suitable for comparable applications such as winches.

Advantages:

- Electrical isolation
- Better EMC
- Direct input connection for control signals from 24 V(DC) to 230 V(AC)
- No coupling relays for I/O necessary
- Easy start of operation with automatic parametrization
- Easy diagnostics thanks to visual feedback of I/O signals (LED indication)

1.2 Components

Drive package with DSV inverter

	<u>Article number</u>
A common drive package consists of:	
○ I/O Interface	
for 230VAC input:	590059DSV
or	
for 24VDC input:	590060DSV
○ DSV35 Frequency inverter	<i>see technical catalog</i>
Incl. Connection for brake resistor	
Incl. Connection for PTC	
○ Incl. RS485 Modbus RTU interface:	01-6192-00
○ Optional: STO „Safe stop“	01-6198-00
○ Optional: Control unit	01-6179-00
○ Optional: USB interface	01-6180-00
○ Optional: USB 2.0 cable 1.2m	01-6180-05
(A plug to Micro B plug)	
○ Optional: Modbus connection cable 30 to 150cm	
○ Brake resistor	<i>see chapter 7, page 34</i>

You can find software for connecting to the DSV at: easystarter.emotron.com

Communication between the I/O interface and the DSV frequency inverter takes place via RS485 (3-core cable, shielded, twisted, not included in the scope of delivery). The Modbus RTU protocol is used. The DSV frequency inverter therefore requires a standard I/O with Modbus RTU. The locking screw on the Modbus standard I/O card must be **firmly** tightened!

Drive package with VFX inverter

A common drive package consists of:

- **I/O Interface**
for 230VAC input:
or
for 24VDC input:
- **VFX Frequency inverter**
Incl. Connection for brake resistor
- Optional: STO „Safe stop“
- Optional: Encoder card (for hoist drives)
- Optional: Control unit PPU
- Optional: Modbus connection cable 30 to 150cm
- **Brake resistor**

Article number

590059DSV

590060DSV

see technical catalog

see chapter 7, page 34

Communication between the I/O interface and the VFX frequency inverter takes place via the RS485 interface (A+, B-) on the control board.

1.3 Notes, warnings, dangers

Important notes in this manual are highlighted as uppercase, bold, or with this icon:

NOTE! Additional information to avoid problems!

ATTENTION!



**Ignoring this information
will cause damage**

DANGER!



**Risk of death by electric
shock or other means**

1.4 Description

This description explains the installation and handling of DSV35/VFX in conjunction with an I/O interface for the following frequency inverters:

- DSV35-1P3 to DSV35-061
- VFX48-003 to VFX48 2920
- VFX52-003 to VFX52-074
- VFX69-002 to VFX69- 3k0

This manual is intended for the following groups:

- Installation personnel
- Maintenance/service people
- Owners of lift/escalator
- Planning engineers/office

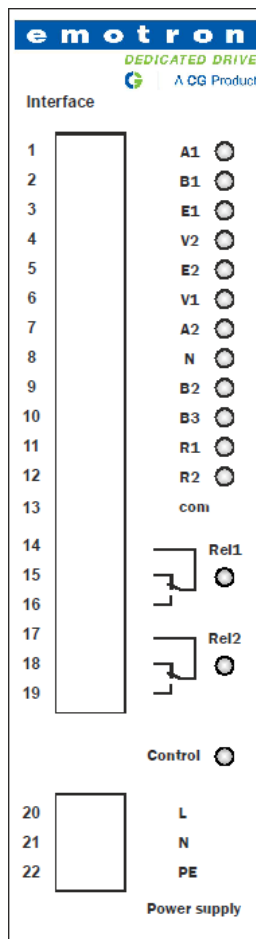
1.5 Standards and norms

See more details in the DSV35 / VFX manuals.

2. HARDWARE

2.1 I/O Interface – Technical Data

Figure 2: Front view of Emotron I/O interface



The LEDs indicate the status of the inputs and the relays. The HIGH-active signals (e.g. move commands) light up “**green**” when voltage is applied. The LOW-active signals (e.g. limit switches) light up “**yellow**” when voltage is applied.

The “**Control**” LED shows the status of the I/O interface:

1 Hz green flashing:

Interface OK, communication to DSV/VFX established; no error on DSV/VFX.

1 Hz alternating green and red flashing:

Automatic Loading of factory settings, for more information see chapter 3.3 on page 19 and chapter 4.3 on page 22.

4 Hz green flashing:

ID Run preselected, instructions for “ID Run” see page 20.

20 Hz green flashing:

ID Run active, instructions for “ID Run” see page 20.

4 Hz red flashing:

Error with DSV/VFX.

Please check inverter (error code). Switch the enable (R2) off and on again - to acknowledge the error.

or

Communication to DSV/VFX interrupted.

Switch the enable (R2) off and on again - to acknowledge the error. Should the error happen permanently or regularly: please check cabling and parameters.

LED is off:

No voltage on I/O interface (terminals 20/21).

Control LED is permanently red or green or off:

Internal error of interface. Please contact service.

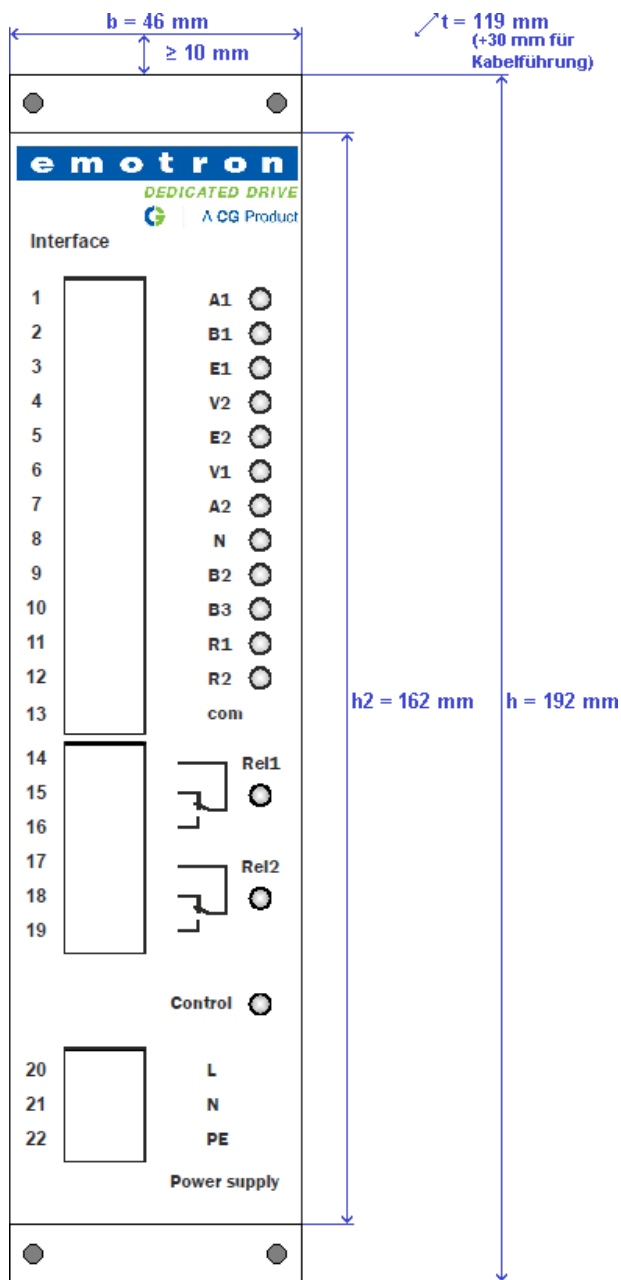


Figure 3: Detail drawing of I/O interface

Dimensions H x W x D: 192 x 46 x 119 [mm]

NOTE on installation depth!

Required installation depth at least 150 mm to leave space for the connection cables!

NOTE on installation height!

Please leave at least 10 mm additional space at the top for the serial connection cable!

<u>Mass</u> (weight):	- ca. 500 g	
	230VAC version:	24VDC version:
<u>Supply voltage:</u>	- 230 VAC	- 230 VAC
<u>Supply frequency:</u>	- 50/60 Hz	- 50/60 Hz
<u>Fuse</u> , internal:	- 400 mA (T)	- 400 mA (T)
<u>Input voltage:</u>	- 85-265 VAC	- 15-36 VDC
<u>Input frequency:</u>	- 50/60 Hz	- //////////////
<u>Input resistance:</u>	- 47 k Ω	- 2,7 k Ω
<u>Nominal current per input:</u>	- 5 mA (230V)	- 7 mA (24V)

2.2 Mounting I/O Interface

The I/O interface is mounted outside the inverter on a mounting plate. It is connected directly to the DSV/VFX via a shielded, twisted cable. A brake resistor is selected depending on the application and connected directly to the DSV/VFX. Determining whether a DSV or VFX frequency inverter is connected.

2.3 Conductor cross-section

Signal inputs, relay outputs, supply voltage:

Cross-section without ferrule:	0.20..2.50 mm ²
Cross-section with ferrule:	0.25..2.50 mm ²
Cross-section for 2 conductors, without ferrule:	0.20..1.50 mm ²
Cross-section for 2 conductors, with twin ferrule:	0.25..1.50 mm ²
Connection torque:	0.50..0.60 Nm

Serial bus connectors:

Cross-section without ferrule:	0.14..1.50 mm ²
Cross-section with ferrule with plastic sleeve:	0.25..0.50 mm ²
Connection torque:	0.22..0.25 Nm
(Screwdriver: SZS 0.4 x 2.5)	

2.4 Selector switches “Mode” and “Preset”

If the interface is correctly connected to the DSV or VFX and both devices are switched on, the factory settings are **automatically loaded with the “Preset” switch (S2)** to make commissioning much easier.

To do this, activate the switch before turning on the interface. After loading the factory settings, reset the switch to its default position.

For **DSV**, you can switch the operation mode between 3-position and 4-speeds mode with the switch “**Mode**” (S1) (see *chapter 5*).

When paired with **VFX**, the switch “**Mode**” (S1) activates drive control, which is necessary for winch applications such as hoists and luffing gear.

After loading the crane-specific factory settings, the “Preset” switch must be reset to the initial position. Otherwise, customer-specific settings will be lost after a new power reset!



The jumper positions become active immediately after the module is switched on. Changing the switch position during operation has no effect on the operating behavior. If a voltage reset (interruption of the supply voltage) is carried out, crane-specific factory settings or the set operating mode are automatically loaded.

When using VFX Frequency inverter

When paired with VFX, the switch “Mode” (S1) activates drive control (*for more information see chapter 4.3*).

The 4-speeds switching or 3-position switch is selected in VFX menu 3A2 (see *chapter 6*).

2.5 Terminal designation

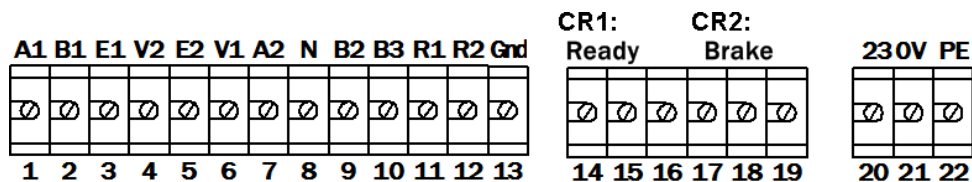


Figure 4: Terminal assignment I/O interface 230V(AC)

2.6 Connections Interface

NOTE! Inputs E1, V2, E2, V1, N and R2 must be set to HIGH potential when not in use.

No.	Connection	Function
1	A1 (High active)	Counterclockwise rotation to the left with level 1 active parameterizable, default: 10 Hz (Parameter 450.01)
2	B1 (High active)	Level 2 active parameterizable, default: 25 Hz (Parameter 450.02)
3	E1 (Low active)	Final limit left drive stops in direction left, no limit for right-hand direction. No restart when a run command is present, when signal E1 becomes active again.
4	V2 (Low active)	Pre-limit switch right with pre-limit speed Speed limited in right-hand direction, no limit for left-hand direction. parameterizable, default: 5 Hz (Parameter 450.06)
5	E2 (Low active)	Final limit right drive stops in direction right, no limit for left-hand direction. No restart when a run command is present, when signal E2 becomes active again.
6	V1 (Low active)	Pre-limit switch left with pre-limit speed Speed limited in left-hand direction, no limit for right-hand direction. parameterizable, default: 5 Hz (Parameter 450.06)
7	A2 (High active)	Clockwise rotation to the right with speed 1 active parameterizable, default: 10 Hz (Parameter 450.01)
8	N (Low active)	Zero position contact Condition for mains input, must be active for enable <i>Must be permanently active for applications without zero position!</i>
9	B2 (High active)	Level 3 active parameterizable, default: 35 Hz (Parameter 450.03)

No.	Connection	Function
10	B3 (High active)	Level 4 active parameterizable, default: 50 Hz (Parameter 450.04)
11	R1 (High active)	Second acceleration and deceleration ramps (see manual DSV15/35) as well as second level 4 (Parameter 450.05) may be used.
12	R2 (Low active)	Inverter lock active Drive coasts to a stop or does not start High: Drive can start = Enable Low-High flank = Reset* (*only possible, when Null [8: N] active and no run command [1: A1 or 7: A2] active)
13	GND	Signal ground (Reference potential input connection 1 to 12)
14	CR1	COM
15		NC
16		NO
17	CR2	COM
18		NC
19		NO
20	230 V~	L
21		N
22	PE	Protective Earth; PE must always be connected!

For the connection of the interface and DSV/VFX via the serial interface (RS485), the following pin assignment applies:

Interface connection (4-pole)	Function	DSV connection (3-pole)	VFX connection (Control board)
PE (1)	Housing earth (<u>not</u> shielding here!)		
TA (2)	Data channel A	TA	Pin B-
TB (3)	Data channel B	TB	Pin A*
GND (4)	Mass RS485	COM	Pin 12 (COM)



Always use a **twisted-pair shielded cable** for the RS485 connection between the I/O interface and the frequency inverter!
Lay the shield over a large area on both sides of the housing with the shield connections provided!

The plugs of the I/O interface are designed so that they cannot be mixed up during installation or device replacement and therefore cannot be inserted incorrectly.

3. QUICK START-UP DSV

3.1 Installation

- Remove the DSV and the I/O interface from the packaging unit.
- Screw the components onto a mounting plate.
- Connect the I/O interface and the DSV to the RS485 interfaces. Keep the cable length between the DSV and the interface as short as possible (max. 1.5 m). Use shielded, twisted cable for this. If possible, lay the cable separately and not parallel to the motor and resistor cables.
- Wire both components according to the terminal diagram and specified designation.
- Wire the master switches, e.g. based on the connection examples (chapter 5.2 or 5.4), depending on the selected operating mode.

3.2 Signal check

- After switching on the control voltage, check whether all commands are present at the interface. The supply voltage (20/21) does not necessarily have to be switched on for this.

3.3 Loading factory settings

- Switch on the DSV **without** the I/O interface connected and set parameter **P700.01 to "1"**, then confirm with Enter. Then press Enter until SET no longer flashes.
- Before switching on the IO interface, set the **"Preset" switch (S2)** for loading the crane-specific factory settings on the DSV to **"On"**.
- Use the **"Mode" switch (S1)** to set the desired control mode (4-speeds (S1=on) or 3-position (S1=off)).
- Turn on the I/O interface and the DSV.
- The "Control" LED flashes alternately **"green"** and **"red"** at **1 Hz intervals** until the automatic configuration process is complete. Duration: approx. 30 seconds.
- Set the **"Preset" switch (S2)** back to **"Off"**.

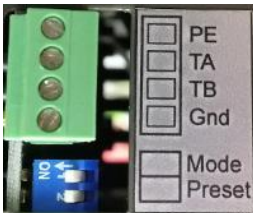


Figure 5: „Preset“ (S2) is „ON“, loading factory settings



Figure 6: View of control unit screen after loading factory settings

3.4 Fine adjustments / Manual parameterization

- Parameters 320 ff. – The **motor data** should be entered manually according to the nameplate information on the motor!
- Perform **Motor ID Run** (please only with correct motor data):
It is necessary that the enable (R2) and at least one limit switch (E1 or E2) are active.
 - Perform Motor ID Run
 - P327.04 = 1** (On)
 - The Control LED flashes **“green”** in **4 Hz** intervals now (“ID Run preselected”).
 - Briefly give a drive command (A1 or A2).
 - The Control LED flashes **“green”** in **20 Hz** intervals now (“ID Run active“). Drive command (see step 3) may not be active anymore.
 - The ID Run is completed,
 - As soon as the Control LED flashes **“green”** in **1 Hz** intervals again.
 - Cancel the ID Run prematurely?
 - Switching off the enable (R2) cancels the ID Run.
- The following **parameters** can be adjusted as necessary:
 - P220.00 ff. – Start-up and delay times
 - P300.00 – Switching drive mode (SLVC or VFC)
 - P450.01..450.04 – Frequency values for levels 1 to 4
 - P450.05 – Second level 4 (usable with input pin R1)
 - P450.06 – Pre-limit speed
 - P712.02/03 – Time to open/close brakes, for sliding armature motors set P712.03 to “0 ms”.
 - P303.01 / P303.02 – Motor cut-off voltage/cut-off frequency.
Example 1 (older motors): If the rated motor voltage is 380 V according to the rating plate, P320.07 and P303.01 must be set to the value “380” volts.
Example 2 (e.g. Demag special motors): If the rated motor frequency is 100 Hz according to the rating plate, P320.05 and P303.02 must be set to the value “100” Hertz.
 - P308.01 and P308.03 – Please activate I²t monitoring for operation without connected PTC (PTC thermistor motor winding protection).

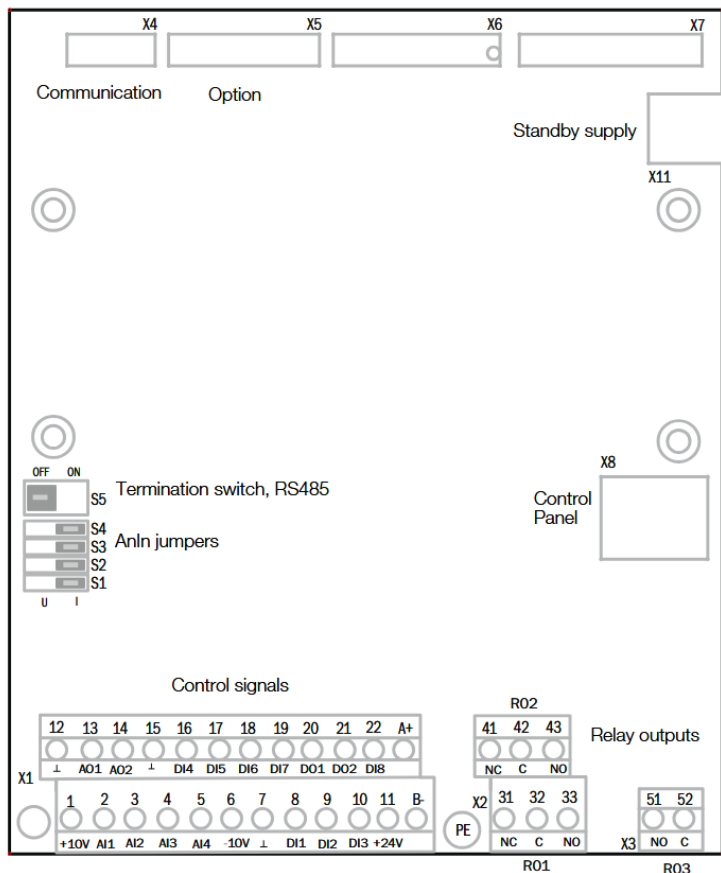


Please note that the “Load factory settings” switch (“Preset”, S2) is reset (=off) after loading, as otherwise any (customer-specific) settings you have changed afterwards will be lost the next time you switch on the device.

4. QUICK START-UP VFX

4.1 Installation

- Remove the VFX and the I/O interface from the packaging unit.
- Screw the external I/O interface onto a mounting panel close to the frequency inverter.
- Connect the I/O interface and the VFX to the RS485 interfaces. Keep the cable length for the Modbus connection between the VFX and the interface as short as possible. Use shielded, twisted cable for this. If possible, lay the cable separately and not parallel to the motor and resistor cables.



- Wire both components according to the terminal diagram and specified designation.
- Wire the master switches based on the connection examples (chapter 6.2, 6.4 or 6.6) depending on the selected operating mode.

4.2 Signal check

- After switching on the control voltage, check whether all commands are present at the interface. The supply voltage (20/21) does not necessarily have to be switched on for this.
- **NOTE!** Inputs E1, V2, E2, V1, N and R2 are LOW active and must be set to HIGH potential when not in use.

4.3 Loading crane-specific factory settings and commissioning

- Switch on the VFX **without** the IO interface connected and set parameter [243] to **“Factory settings”**, then confirm with Enter and change the answer to the ‘Change’ question to “Yes” and confirm with Enter.
- Before switching on the I/O interface, set the **“Preset” switch (S2)** for loading the crane-specific factory settings on the VFX to **“On”**.
- Switch on the VFX **and** the connected I/O interface. The parameter group [3A0] is visible in the VFX when communication is established. Activate the CRIO (I/O interface) in parameter [3A1] by selecting “Serial Com” (do not select “ON”).
- Loading the crane-specific factory settings takes approx. 5-10 seconds, a warning with the status “CRA” is briefly displayed during loading. Parameter set B is then active, start/stop and set point source have been changed to “Com”.
- Set the **“Preset” switch (S2)** back to **“Off”**.
- Set the **“Mode” switch (S1)** to **“Off”**, drive control is deactivated.
- Enter the motor data according to menu 220 and carry out a short ID Run in menu 229.
- Select the desired control type in menu 3A2 (3-position / 4-speed mode).
- Optimize the parameters in menu group [3Ax], the acceleration and deceleration time [331+332], brake settings [33C-33F] and maximum speed [343].
- If you are using an encoder (encoder card mounted in the frequency inverter), compare the encoder speed (positive/negative) in menu 22D with the speed in menu 100. If the directions of rotation do not match, the channels must be swapped (A and A' with B and B'). Then switch the encoder to ON in menu 22B.
- Activate the drive control (switch MODE= ON).
- Optimize the drive control settings [3AB+3AC].

5. CONTROLLING WITH DSV INVERTER

Two different operating modes are possible, which can be set using the “Mode” switch (S1). A **power-on reset** (switching the device off and on again) must be carried out for a **change of operating mode** to take effect.

5.1 4-Speeds Switch

Up to four different fixed frequencies can be selected using a 4-speeds switch. These four frequencies can be freely programmed in the DSV menus.

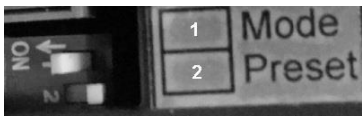


Figure 7: Mode switch “S1” is “On”, operation mode “4-speeds switch” chosen

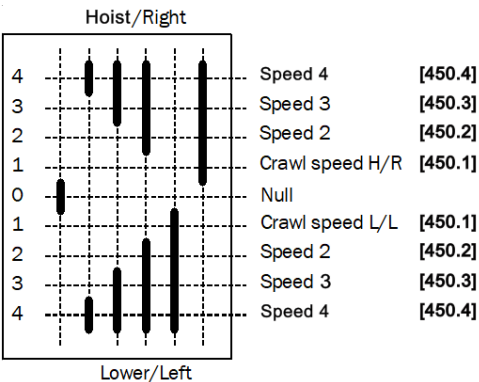


Figure 8: Mimic of a 4-speeds switch with zero position contact

5.2 Connection Example 4-Speeds Switch

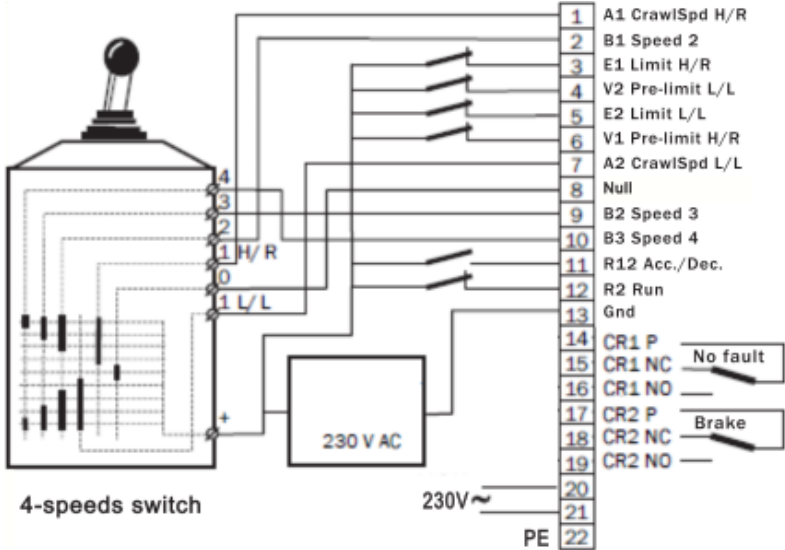


Figure 9: Connection example 4-speeds switch

NOTE! Inputs E1, V2, E2, V1, N and R2 are LOW active and must be set to HIGH potential when not in use.

5.3 3-Position Switch

The 3-position switch can be used to realize any frequency between the first and fourth stage.



Figure 10: Mode switch “S1” is “Off”, operation mode “3-position switch” chosen

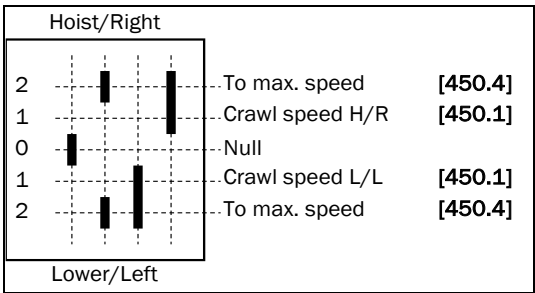


Figure 11: Mimic of a 3-position switch with zero position contact

5.4 Connection Example 3-position Switch

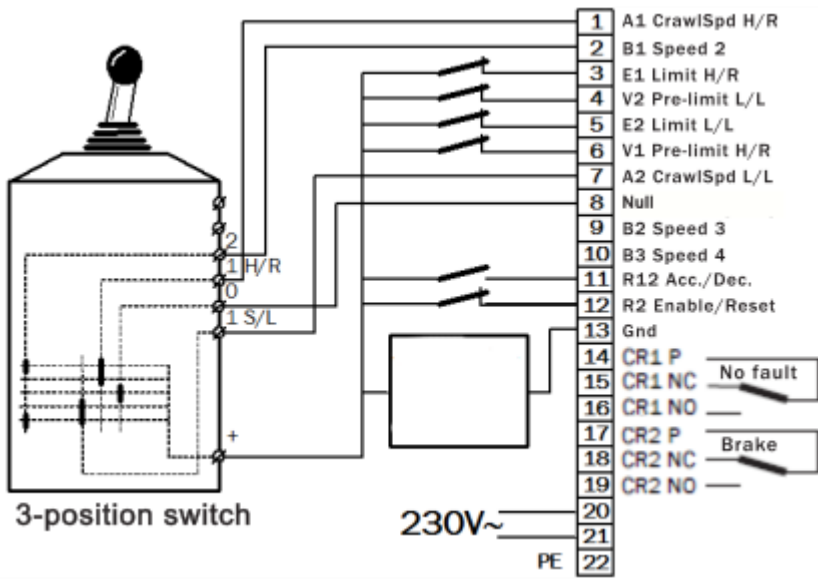


Figure 12: Connection example 3-position switch

NOTE! Inputs E1, V2, E2, V1, N and R2 are LOW active and must be set to HIGH potential when not in use.

5.5 Operational and Pre-limit Switches

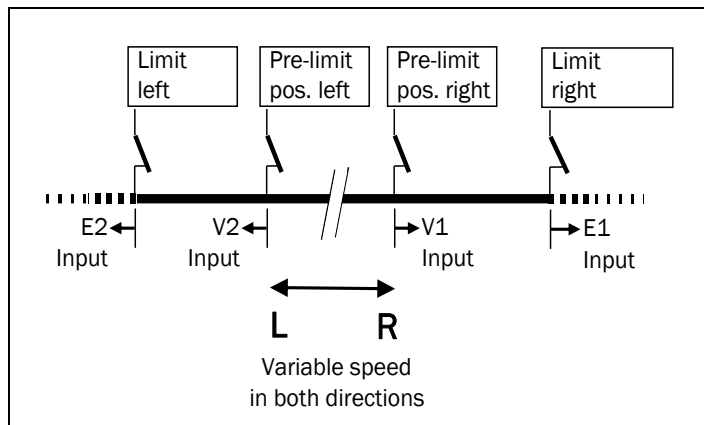


Figure 13: Functionality of (pre-) limit switch

There is no speed limit between the two pre-limit positions. If a pre-limit switch is active (LOW active), the drive operates at the pre-limit frequency or at a speed between the first stage and the pre-limit stage. There is no limitation in the opposite direction. When the end position is reached, i.e. when a limit switch is active (LOW active), the drive switches to stop and the brake is applied. There is no limitation in the opposite direction.

5.6 Counter-Locking

If the master switch is deflected in the opposite direction during operation, the second deceleration ramp is always used. If this is programmed to a shorter deceleration time, the drive automatically stops faster.

If you do not want to use a second ramp when counter-locking, set the value for the second deceleration ramp to the same value as for the first deceleration ramp.

5.7 Communication

In the event of a communication error, the drive stops automatically and the brake is applied immediately. The “Control” LED serves as a status check (see *chapter 2.1*).

In case of a communication error:

- Carry out a power-on reset or send a low-high edge to input R2 (enable).
- An error reset is only possible if the zero position is active and no movement command is present.

6. CONTROLLING WITH VFX INVERTER

There are three possible operation modes, which can be selected in parameter [3A2].

6.1 4-Speeds Switch

Up to four different fixed frequencies can be selected using a 4-speeds switch. These four frequencies can be freely programmed in the VFX menus.

Menu no.	Menu name	Functionality
3A1	Crane enable	On
3A2	Control	4-speeds
3A3	Crane Relay1	No error
3A4	Crane Relay2	Brake
3A5	PreLimSwSpd	Pre-limit switch speed
3A6	CrawlSpd H/R	Crawl speed H/R
3A7	CrawlSpd L/L	Crawl speed L/L
3A8	Speed 2	2 nd speed
3A9	Speed 3	3 rd speed
3AA	Speed 4	4 th speed
3AB	Dev bandwidth	Drive control bandwidth
3AC	Dev time	Drive control response delay
3AD	LAFS Load	Load-dependent field weakening
3AG	Crane N Func	Crane N Function

Brake programming

Menu no.	Menu name	Functionality
33C	Brk Release	Brake opening time
33D	Release speed	Start speed
33E	Brk Engage	Brake engagement time
33F	Brk Wait	Brake delay
33H	Brk Fault	Brake error time

NOTE! Inputs E1, V2, E2, V1, N and R2 are LOW active and must be set to HIGH potential when not in use.

6.2 Connection Example 4-Speeds Switch

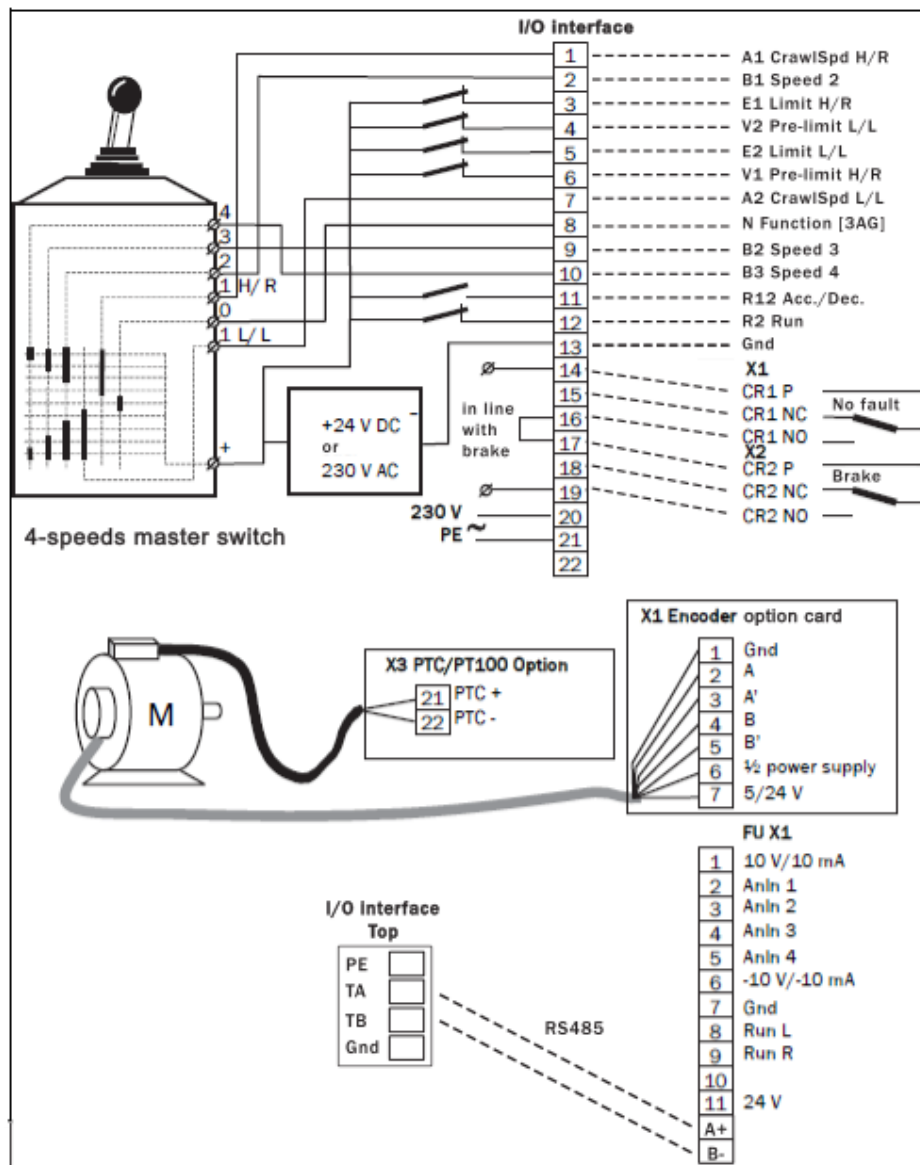


Figure 14: Connection example 4-speeds switch

6.3 3-Position Switch

The 3-position switch can be used to realize any frequency between the first and fourth stage.

Menu no.	Menu name	Functionality
3A1	Crane enable	On
3A2	Control	3-Position
3A3	Crane Relay1	No error
3A4	Crane Relay2	Brake
3A5	PreLimSwSpd	Pre-limit switch speed
3A6	CrawlSpd H/R	Crawl speed H/R
3A7	CrawlSpd L/L	Crawl speed L/L
3AA	Speed 4	4 th speed
3AB	Dev bandwidth	Drive control bandwidth
3AC	Dev time	Drive control response delay
3AD	LAFS Load	Load-dependent field weakening
3AG	Crane N Func	CRIO N Function

Brake programming

Menu no.	Menu name	Functionality
33C	Brk Release	Brake opening time
33D	Release speed	Start speed
33E	Brk Engage	Brake engagement time
33F	Brk Wait	Brake delay
33H	Brk Fault	Brake error time

NOTE! Inputs E1, V2, E2, V1, N and R2 are LOW active and must be set to HIGH potential when not in use.

6.4 Connection Example 3-Position Switch

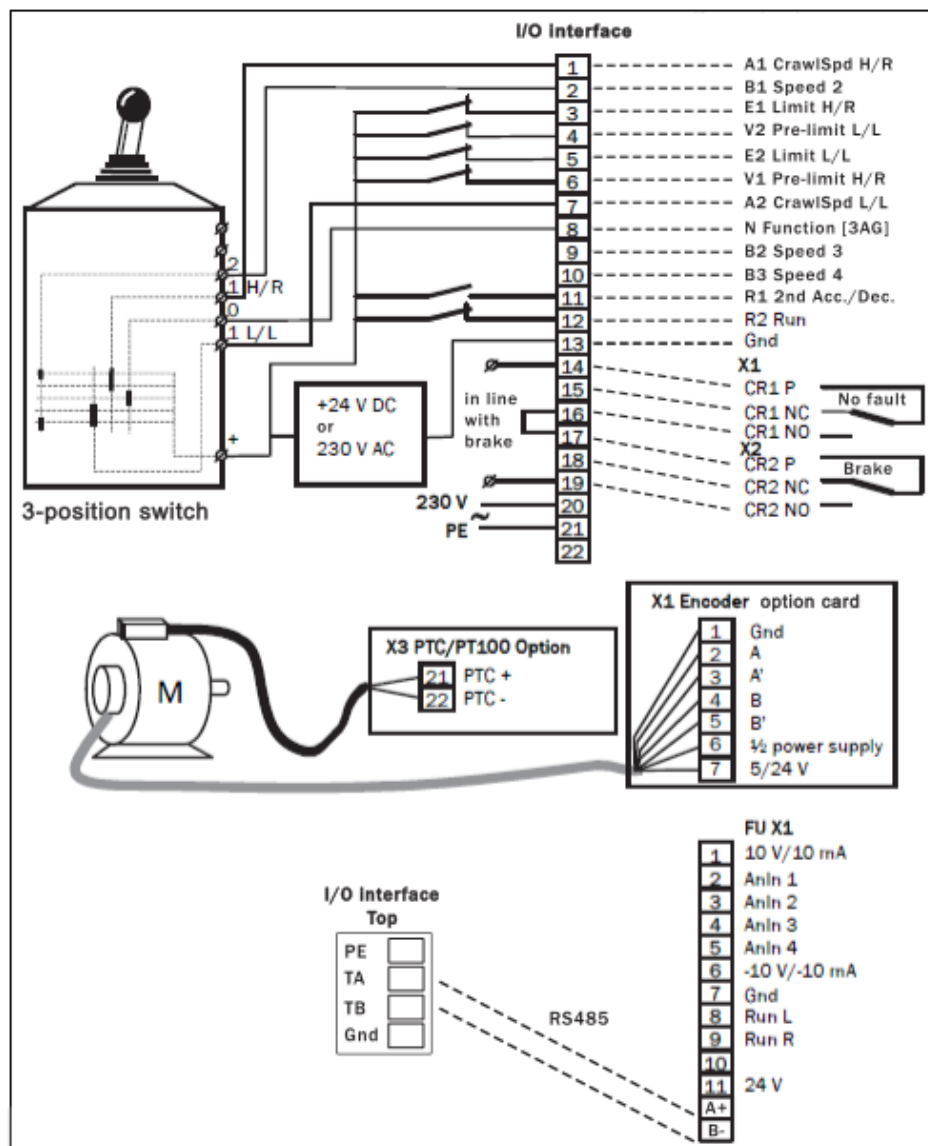


Figure 15: Connection example 3-position switch

6.5 Analog Control

By means of a master switch with analog output, any frequency between the first and fourth stage can be realized continuously.

Menu no.	Menu name	Functionality
3A1	Crane enable	On
3A2	Control	Analogue
3A3	Crane Relay1	No error
3A4	Crane Relay2	Brake
3A5	PreLimSwSpd	Pre-limit switch speed
3A6	CrawlSpd H/R	Crawl speed H/R
3A7	CrawlSpd L/L	Crawl speed L/L
3AA	Speed 4	4 th speed
3AB	Dev bandwidth	Drive control bandwidth
3AC	Dev time	Drive control response delay
3AD	LAFS Load	Load-dependent field weakening
3AG	Crane N Func	CRIO N Function

Brake programming

Menu no.	Menu name	Functionality
33C	Brk Release	Brake opening time
33D	Release speed	Start speed
33E	Brk Engage	Brake engagement time
33F	Brk Wait	Brake delay
33H	Brk Fault	Brake error time

Settings for analog input 1

Menu no.	Menu name	Functionality
512	AnIn Setup	2-10 V / 4-20 mA (if 4-20 mA chosen)

6.6 Connection Example for Analog Control

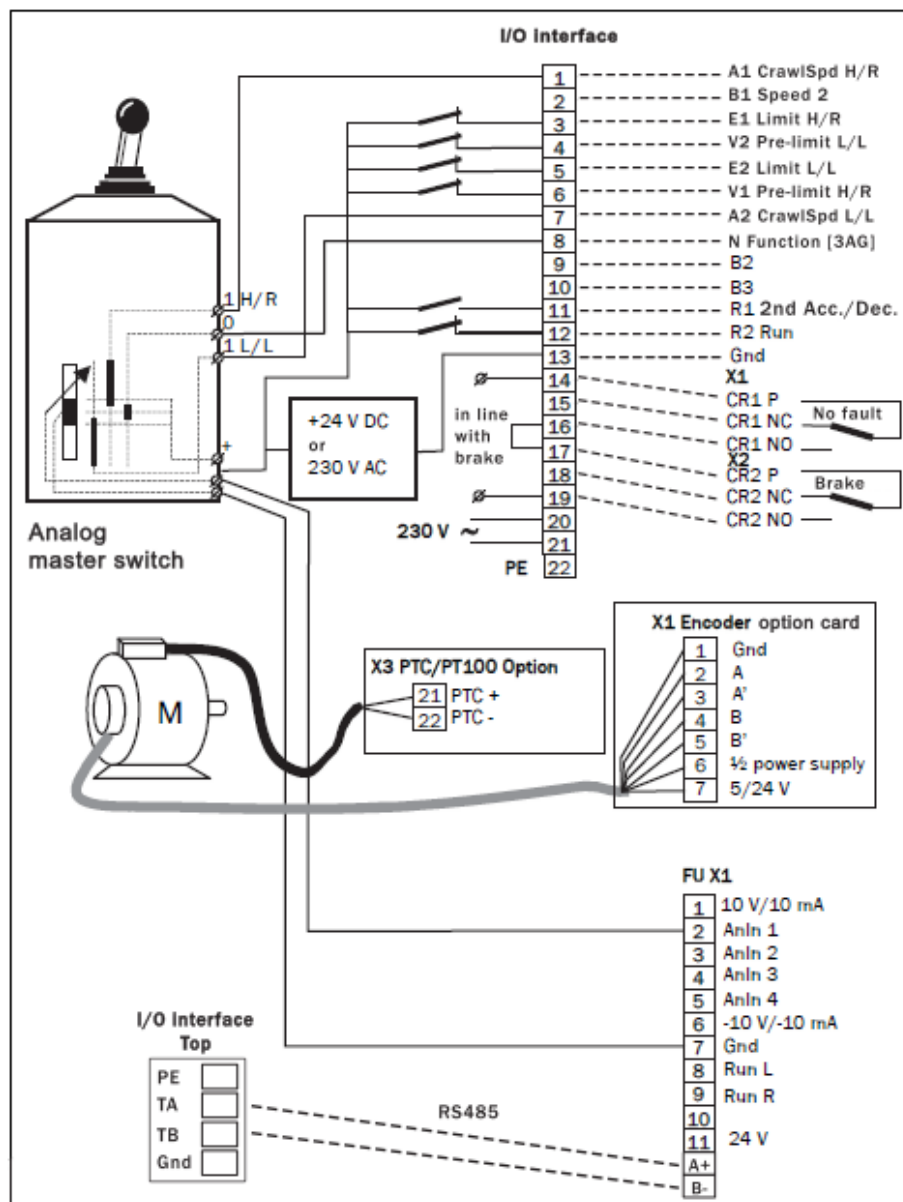


Figure 16: Connection example analog control

6.7 Operation and Pre-limit Switches

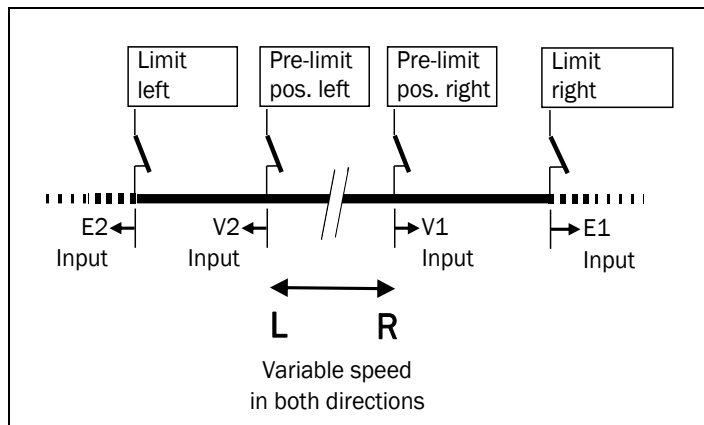


Figure 17: Functionality (pre-) limit switch

There is no speed limit between the two pre-limit positions. If a pre-limit switch is active (LOW active), the drive operates at the pre-limit frequency or at a speed between the first stage and the pre-limit stage. There is no limitation in the opposite direction. When the end position is reached, i.e. when a limit switch is active (LOW active), the drive switches to stop and the brake is applied. There is no limitation in the opposite direction.

6.8 Counter-Locking

If the master switch is deflected in the opposite direction during operation, the second deceleration ramp is always used by switching the active parameter set from set B to set A. If this ramp is programmed to a shorter deceleration time in set A, the drive automatically stops faster.

The counter-locking function is enabled with the setting in parameter [241] = Com.

If no second ramp is to be used for counter-locking, set the value for the second deceleration ramp to the same value as for the first deceleration ramp or set parameter [241] "Select set" back to = B.

6.9 Communication

In the event of a communication error, the drive stops automatically and the brake is applied immediately. The "Control" LED serves as a status indicator (see *chapter 2.1*). In case of a communication error:

- Carry out a power-on reset or send a low-high edge to input R2 (enable).
- An error reset is only possible if the zero position is active and no movement command is present.

7. BRAKE RESISTORS

Brake resistors are required for applications where a load with a high inertia must be stopped quickly. It is necessary to use resistors that match the braking power to absorb the energy generated by the load when stopping. Otherwise, the frequency inverter will report an overvoltage error and malfunction.

The selection of the resistor depends on the duty cycle and the load cycle of the application. The types recommended in the following table are only valid for a duty cycle (ED) of 6%. For other duty cycles (e.g. hoists/winches), please contact your local CG sales representative.

The characteristics of the connected braking resistors must be entered in the DSV parameters.

Example: 2x RXLG-Z-100W-100R are connected in parallel, i.e. **P707.02** = 50 Ω , **P707.03** = 200 W.

Please refer to the VFX operating instructions for the rated resistors to be used for frequency inverters with a 3-phase 400 V supply.

Please refer to the operating instructions for DSV15/35 for the pin assignment. All brake resistors include a 50 cm connection cable.

For the exact technical data of the individual braking resistors, please refer to the separate data sheet for the respective resistors.

8. SETUP/PARAMETERS DSV (EXCERPT)

An excerpt of the most important parameters for the DSV application with the I/O interface extension:

Parameter	Set value		Value range	Functionality
	Customer	Default		
P211.00		50.0 Hz	See DSV manual	Maximum frequency
P220.00		5.0 s		Acceleration time 1
P221.00		3.0 s		Deceleration time 1
P222.00		5.0 s		Acceleration time 2
P223.00		3.0 s		Deceleration time 2
P300.00		6 (V/f)		Drive mode
P303.01		230 / 400 V		V/f base voltage
P303.02		50.0 Hz		V/f base frequency
P305.00		21 (8 kHz)		Switching frequency
P308.03		0 (Off)		I ² t monitoring
P315.01		100%	When "oscillating" or E.3210 (Overvolt. error) set both to 0%.	Slip compensation
P318.01		150%		Oscillation damping
P316.01		4.4%	See DSV manual	IxR comp., fixed
P316.02		0.0%		IxR comp., at acceleration
P320.04		Enter the motor data according to the nameplate specifications! For setting ranges, see DSV instructions. If the motor voltage is changed, also set P303.01 accordingly; if the frequency is changed, also set P303.02 accordingly.		Rated motor speed
P320.05				Rated motor freq.
P320.06				Rated motor power
P320.07				Rated motor voltage
P320.08				Motor cos(φ)
P322.00				Maximum speed
P323.00				Motor current
P324.00		200%	See DSV manual	Max. motor current
P327.04		0 (Off)	See page 20 of this manual (I/O interface)	Motor ID Run For optimization of the internal motor model
P450.01		5.0 Hz	See DSV manual	Speed 1
P450.02		25.0 Hz		Speed 2
P450.03		35.0 Hz		Speed 3
P450.04		50.0 Hz		Speed 4
P450.05		50.0 Hz		Second Speed 4
P450.06		5.0 Hz		Pre-limit stage
P515.02		2.0 s		Timeout COM time
P705.00		1 (English)		Language

Parameter	Set value		Value range	Functionality
	Customer	Default		
P706.03		45 V	See DSV manual	Reduced threshold U_bcc
P707.02		... Ω	Enter the values of the connected brake resistor!	Brake-R R _{Nom}
P707.03		... W		Brake-R P _{Nom}
P712.02		500 ms	See DSV manual	Brake closing time (tbf)
P712.03		100 ms		Brake opening time (tbh)
P712.07		0.0 Hz		Brake closing threshold
P712.12		0 ms		Brake closing threshold delay (tba)

Note for operation with 87 Hz characteristic: Enter the motor data according to the rating plate, but enter the 87 Hz data for the V/f base voltage and the V/f base frequency!

Example

Motor data according to type plate:

U(D) = 220V, U(Y) = 380 V, f = 50 Hz, n = 1390 U/Min,

P = 1,1 kW, I(D) = 5,3 A, I(Y) = 3,1 A, cos(phi) = 0,79

Settings at 87 Hz characteristic curve (D)

P211.00 = 87.0 Hz

P303.01 = 380 V

P303.02 = 87.0 Hz

P320.04 = 1390 rpm

P320.05 = 50.0 Hz

P320.06 = 1.1 kW

P320.07 = 220 V

P320.08 = 0.79

P323.00 = 5.3 A

P450.04 = 87.0 Hz

P450.05 = 87.0 Hz

Settings for standard curve (Y)

50.0 Hz

380 V

50.0 Hz

1390 rpm

50.0 Hz

1.1 kW

380 V

0.79

3.1 A

50.0 Hz

50.0 Hz

Internal parameters: Please check if there are problems with communication or unspecific problems with the application.

Parameter	Value, Default	Value range	Functionality
P200.00	0	INTERNAL, please do <u>not</u> change these!	
P201.01	5		
P400.02	1		
P400.37	1		
P420.11	69		
P420.12	50		
P420.13	56		
P420.18	115		
P505.01	39		
P505.02	17		
P505.03	8		
P505.04	13		
P505.05	4		
P505.06 to 16	0		
P530.01	P450.01		
P530.02	P450.02		
P530.03	P450.03		
P530.04	P450.04		
P530.05	P450.05		
P530.06	P450.06		
P530.07	P593.01		
P530.08	P593.06		
P530.09	P150.00		
P530.10	P591.01		
P530.11	P119.00		
P530.12 to 14	P590.01		
P530.15	P592.05		
P530.16	P732.00		
P530.16 to 24	0		
P531.01 to 16	2500 to 2515		
P531.17 to 24	0		
P706.01	0		
P707.10	0		
P707.11	0		
P712.01	0		
P732.00	1		

9. ERROR DIAGNOSIS DSV

Error type	Possible cause	Solution
Control LED flashes red at 4 Hz intervals.	Error at DSV	- Check DSV. - Acknowledge error (Off/on R2)
	Communication to DSV interrupted permanently or temporarily	- Does the DSV have the correct parameter settings? See chapter Fehler! Verweisquelle konnte nicht gefunden werden. "Quick Start-up DSV" - Is DSV switched on? - Check serial connection cable - Check shielding - Parameters - Acknowledge error (Off/on R2)
Control LED does not light up.	Interface has no internal control voltage	- Check voltage between pins 20 and 21 - If voltage present: Replace I/O interface
Control LED is continuously lit up.	Controller or EEPROM defect	Replace I/O interface
LEDs of input signals do not light up, despite applied voltage.	Reference potential is missing	- Is pin 13 connected with to the neutral conductor of the signal voltage? - Check voltage between signal input and pin 13
Relays 1 (Ready) is not active / all signals OK, Reset does not help, DSV shows no fault	Input 8 (N) zero position missing at mains input	- for master switches or wireless control without zero position, permanently activate the input (bridge)
Motor accelerates in second speed preset until fourth speed.	DIP switch „S1 Mode“ is set to "Off" (3-Pos)	Set DIP switch "S1 Mode" to "On" (4-0-4), see chapter 2.4 Selector switches "Mode" and "Preset"
Motor does not rotate, no faults present.	Missing input signal	Check limit switches (E1, E2), Enable (R2) und direction commands (A1, A2).
Motor only rotates slowly.	Missing input signal	Check pre-limit switches (V1, V2) and speeds (B1, B2, B3)
DSV shows error at "Preset", e.g. "F.62B1"	Please contact CG!	Acknowledge error (Turn R2 "Enable" off and on again).
Error at DSV: "Timeout Modbus F.81A1"	Communication to DSV interrupted	See error type "Control LED flashes red at 4 Hz intervals". Check EMC measures!

Error type	Possible cause	Solution
Brake is not activated, LED lights up but relay 2 does not energize, DSV/Motor works	Relay 2 defect	Short-term solution: If possible, use relay on DSV, set P420.01 ="115" additionally Permanent solution: Replace I/O interface
Brake is not activated, LED for relay 2 does not light up, DSV/Motor works	Parameters in DSV are not set correctly	Set parameter P420.18 to value "115" (mechanical brake).
	Defect control	Replace I/O interface
Problems with communication or unspecified problems with the application	Parameters in DSV are not set correctly.	- Execute a "Preset", see chapter 2.4 Selector switches "Mode" and "Preset" - If this does not work, check all parameters, including "internal" parameters, see chapter 8 Setup/Parameters DSV (Excerpt)
Drive fails when stopping, DSV shows error "F.FF36"	The brake resistance monitor has reported an error.	Deactivate monitoring in parameter P707.11 ="0" (Off), or adjust the characteristics of the resistor (P707.xx).
Drive is only ready after ca. 20 to 30 seconds.	The I/O interface is set to "Preset", the factory settings are loaded on startup.	Set the switch " Preset S2 " to " Off ". See chapter 3.3 „Loading factory settings“.
Settings are not applied after switching on again.		
Settings are not applied after switching on again. "Preset" is off!	Check if P732.00 is set to "1".	Set P732.00 = "1" and press Enter until "SET" does not flash anymore.

Error type	Possible cause	Solution
Drive “vibrates” when running.	Some DSV control parameters are unsuitable for your application.	Set P315.01 and P318.01 to 0% .
DSV only shows e.g. 3 Hz, despite 5 Hz set point.		
The DSV displays the error message “F.3210”. Everything is ok with the braking resistor and the associated settings. Mains voltage is ok.		
The motor is activated, but the drive does not start. The motor current is clearly too high.	Incorrect Motor data and/or wrong V/f characteristic curve.	Check installation (star/triangle) and compare characteristics with parameters P303.01 , P303.02 , P303.05 , P303.07
The brake on the sliding anchor does not open (the motor is activated) or opens significantly too late.	Settings at DSV not optimal.	Set P712.03 to 0 ms , check motor data (see above), increase P316.01 in 1% increments, set P315.01 and P318.01 to 0%

NOTE! You can only acknowledge an **error of the I/O interface when zero position is active** and there are **no present drive commands**. An error is **acknowledged** via a **rising edge at the enable input**. **Modbus Timeout errors** are **acknowledged automatically** (when **no drive command** is present and **enable is active**).

HINT! You can find the **error log** of the **DSV** in parameter **P155**.

Notes



CG Drives & Automation Germany GmbH
Gießbergweg 3
38855 Wernigerode
Germany

Telephone: 0049 (0)3943/92050
Fax: 0049 (0)3943/92055
E-Mail: info.de@cgglobal.com

www.emotron.de / www.cgglobal.com