Content

1 Introduction

Servo drives of the BL 4000-C series can replace ARS 2000 FS series devices in many cases. These instructions are intended to support users who are planning a changeover.
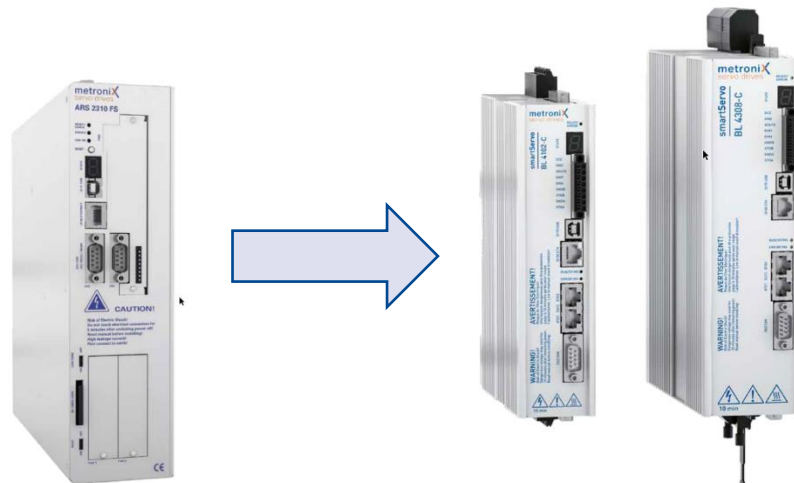

Figure 1: ARS 2000 FS (left), smartServo BL 4100-C and BL 4300-C (right)

ACHTUNG **Always refer to the manual of the BL 4000-C**

This application note lists common errors when switching from the ARS 2000 FS to the BL 4000-C. It does not claim to be complete. Always refer to the BL 4000-C manual when wiring and installing the servo drive!

Check all pin assignments **before the very first commissioning**!

› Advantages smartServo BL 4000-C

- • - STO module integrated
- • - Integrated fieldbus for EtherCAT and PROFINET
- • - Smaller size
- • - Larger DC link capacity for buffering braking energy
- • - Better support of new angle encoders (BISS, Tamagawa, Nikon A-Format)
- • - Also available as a decentralised variant

› **Advantages ARS 2000 FS**

- Support of long motor cables up to 50 m
- Peak current: four times the nominal current
- Higher resolution of the analogue inputs
- 2 analogue outputs
- Separate outputs for encoder emulation and master frequency input
- 10 instead of 9 digital inputs
- Support of Profibus, Sercos 2 and RS232/RS485 communication
- PFC stage on the devices ARS 2102 FS and ARS 2105 FS
- Connection of larger external braking resistors possible (single-phase devices)
- Boot switch, dip switch for bus addresses, switch for internal CAN terminating resistor, reset button
- FSM-MOV: Safely Limited Speed and Safe Operating Stop possible

2 Practical tips for the changeover

NOTICE **Pin assignment NOT compatible!**

Observe the following instructions to avoid irreparable damage to the servo drive:

- The pin assignment of the ARS 2000 FS servo drives is **not** compatible with the pin assignment of the BL 4000-C servo drives. Details can be found in the following chapters.
- The ARS 2000 FS Control panels cannot be used for the BL 4000-C servo drives. Similarly, BL 4000-C Control panels cannot be used for ARS 2000 FS servo drives.

2.1 Power supply connector [X9]

In the past, more and more cases have been reported where the mating connector [X9] of the ARS 2105 FS has been plugged into a BL 4104-C.

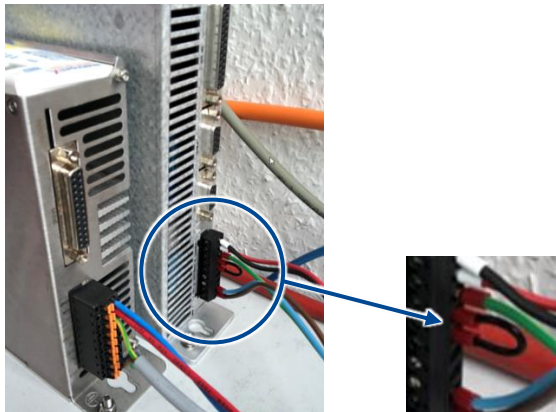Both plugs are NOT ONLY mechanically but also electrically NOT compatible!

Figure 2:   Power supply connector BL 4104-C (Weidmüller plug, left device) and
              Power supply connector ARS 2105 FS (Phoenix plug, right device)

NOTICE **Short circuit of brake chopper**

The bridge for the internal braking resistor of the ARS 2000 FS must not be present on the BL 4100-C under any circumstances.
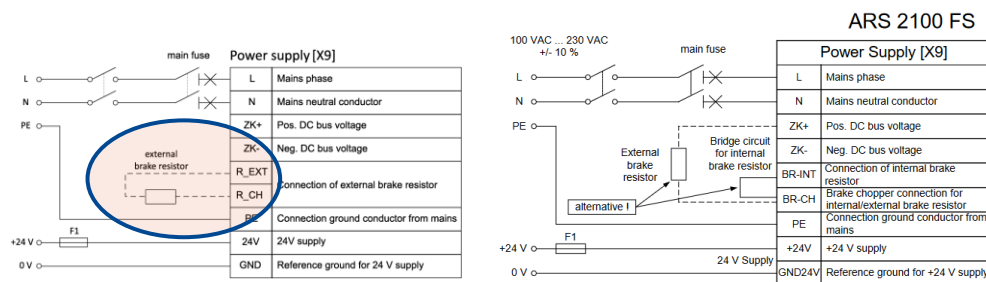
Figure 3: Pin assignment of connector [X9] BL 4100-C (left) and ARS 2105 FS (right)

2.2 Motor connector [X6]

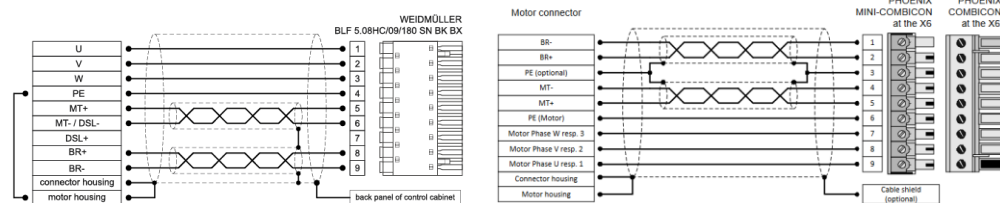The connector [X6] of the BL 4100-C is also not compatible with the ARS 2000 FS.

Figure 4: Pin assignment of connector [X6] BL 4100-C (left) and ARS 2105 FS (right)

For the BL 4100-C, the order of the pin assignment has been changed and the PE connection in the middle has been omitted.

> **NOTICE** **Destruction of the servo drive**
>
> Incorrect assignment of the connector [X6] can cause serious damage to the servo drive.

2.3 Encoder connector [X2A]/[X2B]

The pin assignment of the angle encoder interfaces is largely compatible with the ARS 2000 FS. However, the following deviations should be noted:

- The BL 4000-C outputs 10 V instead of 12 V for the supply of Hiperface encoders.
- The level of the resolver carrier is reduced on the BL 4000-C and the resolution and quality of the resolver evaluation is lower compared to the ARS 2000 FS.

2.4 STO connector [X3]

The pin assignment of the inputs STOA and STOB as well as their reference potentials (GNDA and GNDB) are designed to be compatible with the FSM 2.0 STO. The 24 V auxiliary supply has been replaced by DOUT0 so that a switchable 24 V supply is available. Instead of the feedback contacts C1/C2, the limit switch inputs DIN6 and DIN7 are also located on the connector [X3] of the BL 4000-C.

2.5 I/O connector [X1]

> **NOTICE** **Connector X1 not compatible**
>
> Never connect an ARS 2000 FS Control panel to the BL 4000-C, as this would damage the device!

The pin assignment of the connector [X1] is NOT compatible with the ARS 2000 FS. If, for example, a voltage is applied to DIN9 (SAMP on the ARS 2000 FS), the device will be damaged, as this is a 5 V output on the BL 4000-C. Likewise, pins 1...5/14...18 or 11...13/24...25 are assigned incompatibly, since the connections for the encoder emulation and the master frequency input ([X10]/[X11] on the ARS 2000 FS) are now also located on [X1].

> Pin assignment [X1]

Pin		Name	Specification
1		#AIN1	Analogue input 1, input voltage 30 V max.
	14	AIN1	
2		#AIN0	Analogue input 0, input voltage 30 V max.
	15	AIN0	
3		A / CLK	Incremental encoder signal A/stepper motor signal CLK
	16	#A / CLK	Incremental encoder signal #A/stepper motor signal CLK
4		B / DIR	Incremental encoder signal B/stepper motor signal DIR
	17	#B / DIR	Incremental encoder signal #B/stepper motor signal DIR
5		N	Incremental encoder index pulse N
	18	#N	Incremental encoder index pulse #N
6		GND24	Reference potential for I/Os at [X1]
	19	DIN0	Digital input 0 (target 0)
7		DIN1	Digital input 1 (target 1)
	20	DIN2	Digital input 2 (target 2)
8		DIN3	Digital input 3 (target 3)
	21	DIN4	Digital input 4 (input)
9		DIN5	Digital input 5 (servo drive enable signal)
	22	DIN6	Digital input 6 (limit switch 0)
10		DIN7	Digital input 7 (limit switch 1)
	23	DIN8	Input (flying saw)
11		5 V	Encoder supply (see pin 3 to 18)
	24	24 V	Auxiliary voltage for I/Os at [X1]
12		DOUT0	Freely programmable digital output
	25	DOUT1	Freely programmable digital output
13		DOUT2	Freely programmable digital output

Table 36: Pin assignment: I/O communication [X1]

Pin No.		Denomination	Values	Specification
1		AGND	0 V	Shield for analog signals, AGND
	14	AGND	0 V	Reference potential for analog signals
2		AIN 0	$U_{in} = \pm 10$ V, $R_i \geq 30$ kΩ	Setpoint input 0, differential, max. 30 V input voltage
	15	#AIN 0		
3		AIN 1	$U_{in} = \pm 10$ V, $R_i \geq 30$ kΩ	Setpoint inputs 1 and 2, single ended, max. 30 V input voltage
	16	AIN 2		
4		+VREF	+ 10 V	Reference output for setpoint potentiometer
	17	AMON 0	± 10 V	Analog monitor output 0
5		AMON 1	± 10 V	Analog monitor output 1
	18	+24V	24 V / 100 mA	Auxiliary voltage for IOs at X1
6		GND24	Reference GND	Reference potential for digital I/Os
	19	DIN 0	POS Bit 0	Target selection positioning Bit 0
7		DIN 1	POS Bit 1	Target selection positioning Bit 1
	20	DIN 2	POS Bit 2	Target selection positioning Bit 2
8		DIN 3	POS Bit 3	Target selection positioning Bit3
	21	DIN 4	FG_E	Power stage enable
9		DIN 5	FG_R	Input controller enable
	22	DIN 6	END 0	Input end switch 0 (locks n < 0)
10		DIN 7	END 1	Input end switch 1 (locks n > 0)
	23	DIN 8	START	Input for positioning start
11		DIN 9	SAMP	High-speed input
	24	DOUT 0 / READY	24 V / 100 mA	Output operational
12		DOUT 1	24 V / 100 mA	Output freely programmable
	25	DOUT 2	24 V / 100 mA	Output freely programmable
13		DOUT 3	24 V / 100 mA	Output freely programmable

Figure 5: Pin assignment of connector [X1] BL 4100-C (left) and ARS 2105 FS (right)

2.6 Real-time Ethernet connector [X21] and CAN connector [X4]

The pin assignment of [X21] and [X4] is compatible.

In case of a change, however, the control programs must be converted to new Function blocks and/or modified GSDML, EDS or ESI files. The corresponding files can be downloaded from the Metronix homepage (https://www.metronix.de/metronixweb/en/downloads/fieldbuses/).

Original Application note

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