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# 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

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## 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!

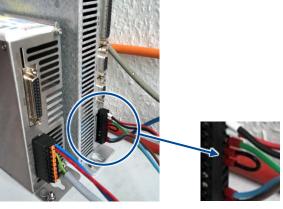


Figure 2: Power supply connector BL 4104-C (Weidmüller plug, left device) and Power supply connector ARS 2105 FS (Phoenix plug, right device)

#### 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.

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#### ARS 2100 FS 100 VAC ... 230 VAC +/- 10 % Power Supply [X9] Power supply [X9] Mains phase Ν Mains neutral conductor os. DC bus voltage ZK+ Pos. DC bus voltage ZK-Neg. DC bus volta resistor Brake chopper connection for BR-CH internal/external brake resistor Connection ground conductor PF GND24V Reference ground for +24 V supply

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.

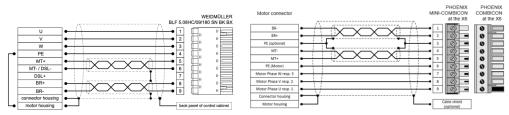


Figure 4: Pin assignment of connector [X6] BL 4100-C (left) and ARS 2105 FS (right)

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.

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# 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].

) Pi	n assi	ignment [X1]		Table	Table 36: Pin assignment: I/O communication [X1]				
Pin		Name	Specification	Pin	No.	Denomination	Values	Specification	
1		#AIN1	Analogue input 1, input voltage 30 ∨ max.	1		AGND	0 V	Shield for analog signals, AGND	
	14	AIN1			14	AGND	0 V	Reference potential for analog signals	
2		#AIN0	Analogue input 0, input voltage 30 ∨ max.	2		AIN 0	U <sub>In</sub> = ± 10 V	Setpoint input 0, differential, max. 30 V input	
	15	AIN0			15	#AIN 0	$R_1 \ge 30 \text{ k}\Omega$ vol	voltage	
3		A/CLK	Incremental encoder signal A/stepper motor signal CLK	3		AIN 1	U <sub>In</sub> = ± 10 V	Setpoint inputs 1 and 2, single ended, max.	
	16	#A / CLK	Incremental encoder signal #A/stepper motor signal CLK		16	AIN 2	$R_1 \ge 30 \text{ k}\Omega$	30 V input voltage	
4		B/DIR	Incremental encoder signal B/stepper motor signal DIR	4		+VREF	+ 10 V	Reference output for setpoint potentiometer	
	17	#B / DIR	Incremental encoder signal #B/stepper motor signal DIR		17	AMON 0	± 10 V	Analog monitor output 0	
5		N	Incremental encoder index pulse N	5		AMON 1	± 10 V	Analog monitor output 1	
	18	#N	Incremental encoder index pulse #N		18	+24V	24 V / 100 mA	Auxiliary voltage for IOs at X1	
6		GND24	Reference potential for I/Os at [X1]	6		GND24	Reference GND	Reference potential for digital I/Os	
	19	DIN0	Digital input 0 (target 0)		19	DIN 0	POS Bit 0	Target selection positioning Bit 0	
7		DIN1	Digital input 1 (target 1)	7		DIN 1	POS Bit 1	Target selection positioning Bit 1	
	20	DIN2	Digital input 2 (target 2)		20	DIN 2	POS Bit 2	Target selection positioning Bit 2	
8		DIN3	Digital input 3 (target 3)	8		DIN 3	POS Bit 3	Target selection positioning Bit3	
	21	DIN4	Digital input 4 (input)		21	DIN 4	FG_E	Power stage enable	
9		DIN5	Digital input 5 (servo drive enable signal)	9		DIN 5	FG_R	Input controller enable	
	22	DIN6	Digital input 6 (limit switch 0)		22	DIN 6	END 0	Input end switch 0 (locks n < 0)	
10		DIN7	Digital input 7 (limit switch 1)	10		DIN 7	END 1	Input end switch 1 (locks n > 0)	
	23	DIN8	Input (flying saw)		23	DIN 8	START	Input for positioning start	
11		5 V	Encoder supply (see pin 3 to 18)	11		DIN 9	SAMP	High-speed input	
	24	24 V	Auxiliary voltage for I/Os at [X1]		24	DOUT 0 / READY	24 V / 100 mA	Output operational	
12		DOUT0	Freely programmable digital output	12		DOUT 1	24 V / 100 mA	Output freely programmable	
	25	DOUT1	Freely programmable digital output		25	DOUT 2	24 V / 100 mA	Output freely programmable	
13		DOUT2	Freely programmable digital output	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/).

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## **Original Application note**

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