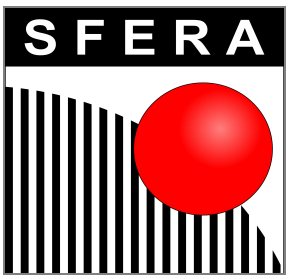


SFERA srl
MC6 Motion Controller
Hardware Technical Reference
hardware

version 1.0.0

Indice

Indice delle figure

1 Specification

1.1 Servo drive interface

- 6 independent channel on connectors P1-P6
- Quadrature incrementral encoder input, line driver RS422 or 5V push-pull; digital filter configuurable from 200 KHz to 10 MHz.

Analog output +/-10 V, 2 mA, 14 bit.

- Status LED for each channel.

1.2 Stepper motor interface

- 6 independent channel on connectors P1-P6
- RS422 step and direction ouutput, up to 1 MHz.

1.3 Communication interface

- RS232 serial interface on connector P10 up to 115200 baud
- RS485 serial interface on connector P9 up to 1 Mbaud
- CAN bus interface on connector P7 up to 1 Mbaud. Termination resistor selectable via jumper

1.4 Digitali input

- 2 high speed optocoupled inputs (DI1 and DI2): 24Vdc, 1.5Kohm.
- 14 standard speed optocoupleed inputs (DI3-DI16): 24Vdc, 4.7Kohm.

1.5 Analog input

- 8 channels (AI1AI8): +/-10V, 10 bit (12 bit option).

1.6 Digital ouput

- 16 optocoupled outputs (DO1-DO16): 24Vdc, 700mA max. per channel, protected against short circuit and overload.

1.7 Microprocessor and memory

- Processor: 32 bit RISC Hitachi SH2 44 Mhz with 256Kb program flash memory.
- FLASH: 4 Mb flash.
- RAM: 1 Mb.

1.8 Power supply rquirements

- 24 Vdc +/-15% 500mA for the controller (encoder supply and digital outputs load excluded).

1.9 Condizioni operative

- Temperature: 0-60◦C.
- Relative humidity: 10-90% not condensing.

1.10 Dimensions and mounting

- Dimensions: 190 mm x116 mm.
- To be mounted inside electrical cabinet (4 M4 screw, distance 175x100 mm).

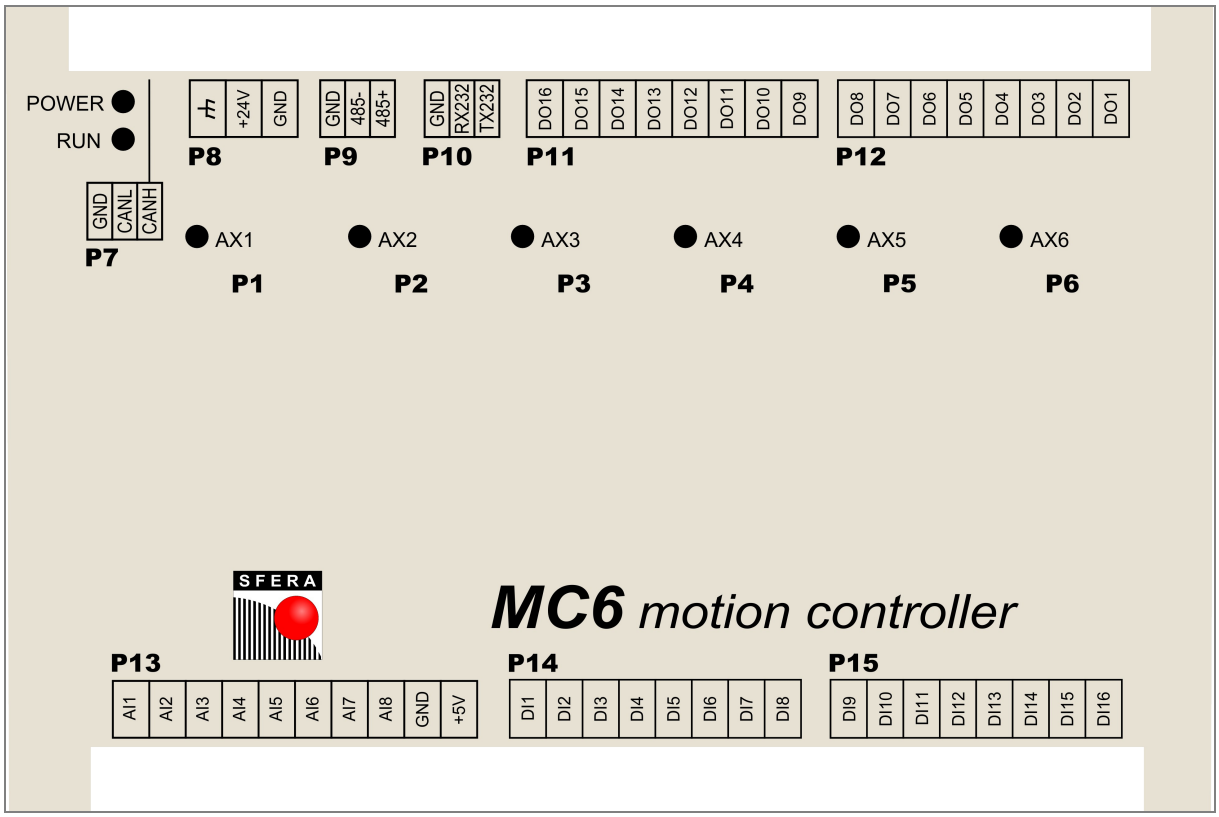
2 Mechanical

2.1 Mounting

Requires four M4 holes in the mounting panel, with a rectangular pattern sized 175 mm by 100 mm.
Leave at least 80 mm on the connector sides for the wiring.

2.2 Connettor layout

The connectors are located as in the following picture:



3 Connettors

3.1 P1: servo drive interface (axis 1) e passo-passo (axis 7)

15 poles female D-sub connector

Pin	*Name*	*Description*	*Electical characteristics*
P1.1	*+5Vext*	*Encoder power supply*	*5Vdc power*
P1.2	*IH1*	*Encoder index 1*	*RS422 input*
P1.3	*BH1*	*Encoder phase B 1*	*RS422 input*
P1.4	*AH1*	*Encoder phase A 1*	*RS422 input*
P1.5	*GND*	*Digital ground*	*Digital ground*
P1.6	*SH1*	*Step 1*	*RS422 output*
P1.7	*DH1*	*Direction 1*	*RS422 output*
P1.8	*REF1*	*Servo reference 1*	*Analog output +/-10V*
P1.9	*IL1*	*Encoder index 1 complementary*	*RS422 input*
P1.10	*BL1*	*Fase B encoder 1 complementary*	*RS422 input*
P1.11	*AL1*	*Encoder phase A 1 complementary*	*RS422 input*
P1.12	*GND*	*Digital ground*	*Digital ground*
P1.13	*SL1*	*Step 1 complementary*	*RS422 output*
P1.14	*DL1*	*Direction 1 complementary*	*RS422 output*
P1.15	*AGND*	*Servo reference return 1*	*Analog ground*

3.2 P2: servo drive interface (axis 2) e passo-passo (axis 8)

15 poles female D-sub connector

Pin	*Name*	*Description*	*Electical characteristics*
P2.1	*+5Vext*	*Encoder power supply*	*5Vdc power*
P2.2	*IH2*	*Encoder index 2*	*RS422 input*
P2.3	*BH2*	*Encoder phase B 2*	*RS422 input*
P2.4	*AH2*	*Encoder phase A 2*	*RS422 input*
P2.5	*GND*	*Digital ground*	*Digital ground*
P2.6	*SH2*	*Step 2*	*RS422 output*
P2.7	*DH2*	*Direction 2*	*RS422 output*
P2.8	*REF2*	*Servo reference 2*	*Analog output +/-10V*
P2.9	*IL2*	*Encoder index 2 complementary*	*RS422 input*
P2.10	*BL2*	*Fase B encoder 2 complementary*	*RS422 input*
P2.11	*AL2*	*Encoder phase A 2 complementary*	*RS422 input*
P2.12	*GND*	*Digital ground*	*Digital ground*

Pin	Name	Description	Electical characteristics
P2.13	SL2	Step 2 complementary	RS422 output
P2.14	DL2	Direction 2 complementary	RS422 output
P2.15	AGND	Servo reference return 2	Analog ground

3.3 P3: servo drive interface (axis 3) e passo-passo (axis 9)

15 poles female D-sub connector

Pin	Name	Description	Electical characteristics
P3.1	+5Vext	Encoder power supply	5Vdc power
P3.2	IH3	Encoder index 3	RS422 input
P3.3	BH3	Encoder phase B 3	RS422 input
P3.4	AH3	Encoder phase A 3	RS422 input
P3.5	GND	Digital ground	Digital ground
P3.6	SH3	Step 3	RS422 output
P3.7	DH3	Direction 3	RS422 output
P3.8	REF3	Servo reference 3	Analog output +/-10V
P3.9	IL3	Encoder index 3 complementary	RS422 input
P3.10	BL3	Fase B encoder 3 complementary	RS422 input
P3.11	AL3	Encoder phase A 3 complementary	RS422 input
P3.12	GND	Digital ground	Digital ground
P3.13	SL3	Step 3 complementary	RS422 output
P3.14	DL3	Direction 3 complementary	RS422 output
P3.15	AGND	Servo reference return 3	Analog ground

3.4 P4: servo drive interface (axis 4) e passo-passo (axis 10)

15 poles female D-sub connector

Pin	Name	Description	Electical characteristics
P4.1	+5Vext	Encoder power supply	5Vdc power
P4.2	IH4	Encoder index 4	RS422 input
P4.3	BH4	Encoder phase B 4	RS422 input
P4.4	AH4	Encoder phase A 4	RS422 input
P4.5	GND	Digital ground	Digital ground
P4.6	SH4	Step 4	RS422 output
P4.7	DH4	Direction 4	RS422 output
P4.8	REF4	Servo reference 4	Analog output +/-10V
P4.9	IL4	Encoder index 4 complementary	RS422 input

Pin	Name	Description	Electical characteristics
P4.10	BL4	Fase B encoder 4 complementary	RS422 input
P4.11	AL4	Encoder phase A 4 complementary	RS422 input
P4.12	GND	Digital ground	Digital ground
P4.13	SL4	Step 4 complementary	RS422 output
P4.14	DL4	Direction 4 complementary	RS422 output
P4.15	AGND	Servo reference return 4	Analog ground

3.5 P5: servo drive interface (axis 5) e passo-passo (axis 11)

15 poles female D-sub connector

Pin	Name	Description	Electical characteristics
P5.1	+5Vext	Encoder power supply	5Vdc power
P5.2	IH5	Encoder index 5	RS422 input
P5.3	BH5	Encoder phase B 5	RS422 input
P5.4	AH5	Encoder phase A 5	RS422 input
P5.5	GND	Digital ground	Digital ground
P5.6	SH5	Step 5	RS422 output
P5.7	DH5	Direction 5	RS422 output
P5.8	REF5	Servo reference 5	Analog output +/-10V
P5.9	IL5	Encoder index 5 complementary	RS422 input
P5.10	BL5	Fase B encoder 5 complementary	RS422 input
P5.11	AL5	Encoder phase A 5 complementary	RS422 input
P5.12	GND	Digital ground	Digital ground
P5.13	SL5	Step 5 complementary	RS422 output
P5.14	DL5	Direction 5 complementary	RS422 output
P5.15	AGND	Servo reference return 5	Analog ground

3.6 P6: servo drive interface (axis 6) e passo-passo (axis 12)

15 poles female D-sub connector

Pin	Name	Description	Electical characteristics
P6.1	+5Vext	Encoder power supply	5Vdc power
P6.2	IH6	Encoder index 6	RS422 input
P6.3	BH6	Encoder phase B 6	RS422 input
P6.4	AH6	Encoder phase A 6	RS422 input
P6.5	GND	Digital ground	Digital ground
P6.6	SH6	Step 6	RS422 output

Pin	Name	Description	Electical characteristics
P6.7	DH6	Direction 6	RS422 output
P6.8	REF6	Servo reference 6	Analog output +/-10V
P6.9	IL6	Encoder index 6 complementary	RS422 input
P6.10	BL6	Encoder phase B 6 complementary	RS422 input
P6.11	AL6	Encoder phase A 6 complementary	RS422 input
P6.12	GND	Digital ground	Digital ground
P6.13	SL6	Step 6 complementary	RS422 output
P6.14	DL6	Direction 6 complementary	RS422 output
P6.15	AGND	Servo reference return 6	Analog ground

3.7 P7: CAN bus interface

3.81 mm, 3 poles block terminal connector

Pin	Name	Description	Electical characteristics
P7.1	CANH	CAN bus data+	CAN standard
P7.2	CANL	CAN bus data- (complementary)	CAN standard
P7.3	GNDCAN	CAN bus Ground	ground (isolated)

3.8 P8: power supply

5 mm, 3 poles block terminal connector

Pin	Name	Description	Electical characteristics
P8.1	GND	Ground	Supply return
P8.2	+24V	24V power	24Vdc +/- 15%
P8.3	EARTH	Chassis ground	Earth

3.9 P9: RS485 serial interface

3.81 mm, 3 poles block terminal connector

Pin	Name	Description	Electical characteristics
P9.1	DT485+	Serial data	RS485
P9.2	DT485-	Serial data (complementary)	RS485
P9.3	GND	Ground	Digital ground

3.10 P10: RS232 serial interface

3.81 mm, 3 poles block terminal connector

Pin	Name	Description	Electical characteristics
P10.1	TX232	Transmit	RS232
P10.2	RX232	Receive	RS232
P10.3	GND	Ground	Digital ground

3.11 P11: digital output DO9-DO16

5 mm, 8 poles block terminal connector

Pin	*Name*	*Description*	*Electical characteristics*
P11.1	*DO9*	*Digital output DO9*	*24V 700mA source (PNP)*
P11.2	*DO10*	*Digital output DO10*	*24V 700mA source (PNP)*
P11.3	*DO11*	*Digital output DO11*	*24V 700mA source (PNP)*
P11.4	*DO12*	*Digital output DO12*	*24V 700mA source (PNP)*
P11.5	*DO13*	*Digital output DO13*	*24V 700mA source (PNP)*
P11.6	*DO14*	*Digital output DO14*	*24V 700mA source (PNP)*
P11.7	*DO15*	*Digital output DO15*	*24V 700mA source (PNP)*
P11.8	*DO16*	*Digital output DO16*	*24V 700mA source (PNP)*

3.12 P12: digital output DO1-DO8

5 mm, 8 poles block terminal connector

Pin	*Name*	*Description*	*Electical characteristics*
P12.1	*DO1*	*Digital output DO1*	*24V 700mA source (PNP)*
P12.2	*DO2*	*Digital output DO2*	*24V 700mA source (PNP)*
P12.3	*DO3*	*Digital output DO3*	*24V 700mA source (PNP)*
P12.4	*DO4*	*Digital output DO4*	*24V 700mA source (PNP)*
P12.5	*DO5*	*Digital output DO5*	*24V 700mA source (PNP)*
P12.6	*DO6*	*Digital output DO6*	*24V 700mA source (PNP)*
P12.7	*DO7*	*Digital output DO7*	*24V 700mA source (PNP)*
P12.8	*DO8*	*Digital output DO8*	*24V 700mA source (PNP)*

3.13 P13: analog input AI1-AI8

5 mm, 10 poles block terminal connector

Pin	*Name*	*Description*	*Electical characteristics*
P13.1	*AI11*	*Analog input AI1*	*+/-10V*
P13.2	*AI2*	*Analog input AI2*	*+/-10V*
P13.3	*AI3*	*Analog input AI3*	*+/-10V*
P13.4	*AI4*	*Analog input AI4*	*+/-10V*
P13.5	*AI5*	*Analog input AI5*	*+/-10V*
P13.6	*AI6*	*Analog input AI6*	*+/-10V*
P13.7	*AI7*	*Analog input AI7*	*+/-10V*
P13.8	*AI8*	*Analog input AI8*	*+/-10V*
P13.9	*AGND*	*Analog ground*	*Analog ground*
P13.10	*+5Vext*	*Alimentazione analogica*	*5Vdc power*

3.14 P14: digital input DI1-DI8

5 mm, 8 poles block terminal connector

Pin	*Name*	*Description*	*Electical characteristics*
P14.1	*DI1*	*Digital input DI1*	*24V +/-15% sink (PNP)*
P14.2	*DI2*	*Digital input DI2*	*24V +/-15% sink (PNP)*
P14.3	*DI3*	*Digital input DI3*	*24V +/-15% sink (PNP)*
P14.4	*DI4*	*Digital input DI4*	*24V +/-15% sink (PNP)*
P14.5	*DI5*	*Digital input DI5*	*24V +/-15% sink (PNP)*
P14.6	*DI6*	*Digital input DI6*	*24V +/-15% sink (PNP)*
P14.7	*DI7*	*Digital input DI7*	*24V +/-15% sink (PNP)*
P14.8	*DI8*	*Digital input DI8*	*24V +/-15% sink (PNP)*

3.15 P15: digital input DI9-DI16

5 mm, 8 poles block terminal connector

Pin	*Name*	*Description*	*Electical characteristics*
P15.1	*DI9*	*Digital input DI9*	*24V +/-15% sink (PNP)*
P15.2	*DI10*	*Digital input DI10*	*24V +/-15% sink (PNP)*
P15.3	*DI11*	*Digital input DI11*	*24V +/-15% sink (PNP)*
P15.4	*DI12*	*Digital input DI12*	*24V +/-15% sink (PNP)*
P15.5	*DI13*	*Digital input DI13*	*24V +/-15% sink (PNP)*
P15.6	*DI14*	*Digital input DI14*	*24V +/-15% sink (PNP)*
P15.7	*DI15*	*Digital input DI15*	*24V +/-15% sink (PNP)*
P15.8	*DI16*	*Digital input DI16*	*24V +/-15% sink (PNP)*

4 Schematics

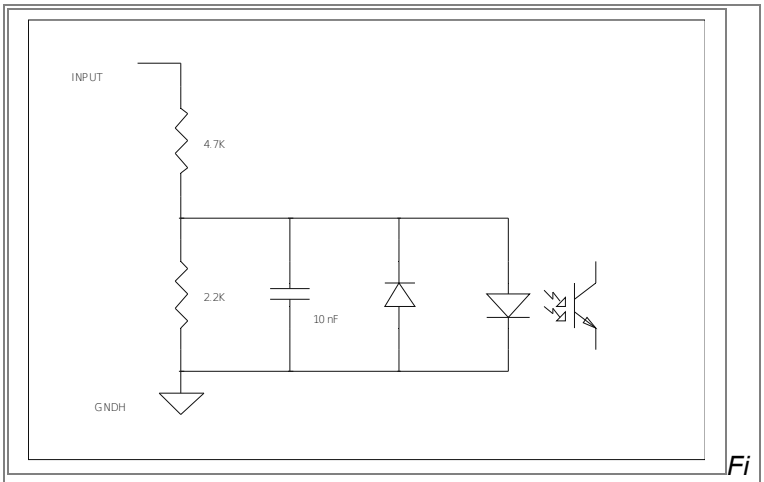


Figure 1: standard digital input circuit

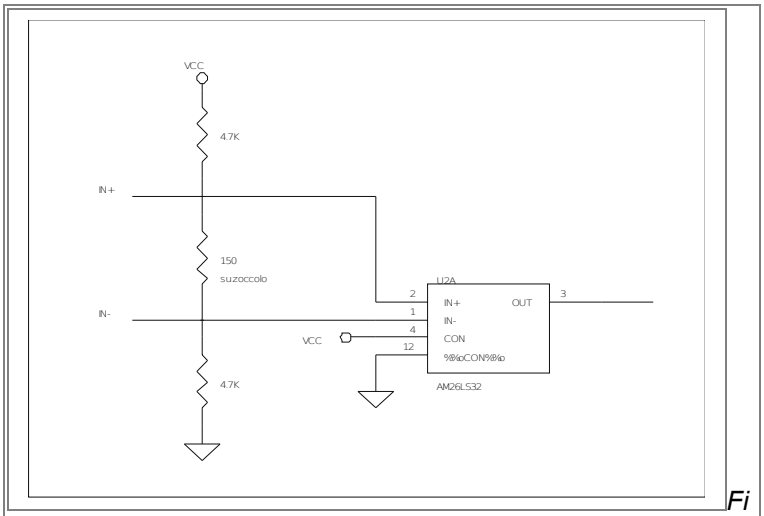


Figure 2: encoder input circuit

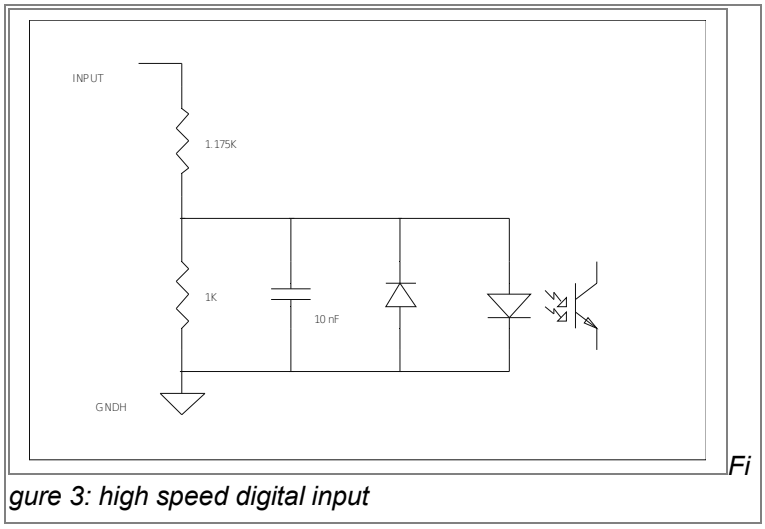


Figure 3: high speed digital input