Elettra Sincrotrone Trieste

A2720

High Stability 20A 50V Bipolar Power Supply

Technical Information Manual

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Elettra Sincrotrone Trieste

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Safety Information and warnings

Elettra - Sincrotrone Trieste S.C.p.A. will repair or replace any product within the guarantee period if the Guarantor declares that the product is defective due to workmanship or materials and has not been caused by mishandling, negligence on behalf of the User, accident or any abnormal conditions or operations.

Please read carefully the manual before operating any part of the instrument

⚠WARNING ⚠

High voltage / current inside, do NOT open the boxes

Elettra - Sincrotrone Trieste S.C.p.A. declines all responsibility for damages or injuries caused by an improper use of the Modules due to negligence on behalf of the User. It is strongly recommended to read thoroughly this User's Manual before any kind of operation.

Elettra - Sincrotrone Trieste S.C.p.A. reserves the right to change partially or entirely the contents of this manual at any time and without giving any notice.

Disposal of the Product

The product must never be dumped in the Municipal Waste. Please check your local regulations for disposal of electronics products.

Read through all this instruction manual before installing and using this instrument.

WARNING:

Do not use this instrument for any other use which has not been specified by the manufacturer

Do not use the instrument if it is damaged. Check for any cracks on the external case before using.

Do not operate the instrument in a gas/vapor filled environment.

Do not install/modify any parts inside the instrument.

The table below reports the general environmental requirements for the instrument:

Environmental Conditions	Requirements
Operating Temperature	10°C / 50°F to 30°C / 86°F*
Operating Humidity	25% to 85% RH (non-condensing)
Storage Temperature	-10°C / 14°F to 60°C / 140°F
Storage Humidity	10% to 95% RH (non-condensing)

***For fan less operation, the operating temperature of the rack where the PS crate is positioned must not exceed 25°C / 77°F**

Contents:

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Document Revisions

Document Revision	Date	Comments
0.1	December 28^{th} 2017	Pre Release
1.0	January 15^{th} 2018	New Photos added
2.0	January 22^{nd} 2018	Safety information added
3.0	February 16^{th} 2018	Changed Layout
3.1	April 5^{th} 2018	Draft Release for v3.1
3.1.1	**March 19^{th} 2019**	**Release for v3.1.1**

General Description

1.1 Overview

High efficiency, high stability, easiness of configuration and maintenance are the key features of this power supply (PS) system.
The A2720 Power Supply System houses up to 4 independent current-controlled bipolar power supply modules (A2720 DC/DC) capable of delivering up to 20 A_{DC} @ 50 V_{DC} (i.e. 1000 W), in a single 19-inch 3U standard crate
Each module implements a digital control loop with PWM generation that makes the system versatile and easy to “tune” to any magnet/load condition.
The A2720 System is composed by the crate of the power supplies and a bulk Power Supply AC/DC, connected electrically by a proprietary backplane.
Remote communication is guaranteed by means of a 100 Mbps Ethernet auto-sensing socket present on each A2720 module front panel.

1.2 Safety information and installation requirements

1.2.1 General safety information

This section contains the fundamental safety rules for the installation and operation of the system. Read thoroughly this section before starting any procedure of installation or operation of the product.

1.3.1.1 Safety Terms and Symbols on the Product
These terms and/or symbols may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.

- WARNING indicates an injury hazard or a possible hazard not immediately accessible as you read the marking.

1.2.2 Injury Precautions

Review the following precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use the product only as specified. Only qualified personnel should perform service procedures.

1.2.2.1 Caution
The following safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with the safety precautions or warnings in this document violates safety standards of design, manufacture and intended use of this equipment and may impair the built-in protections within.
Elettra - Sincrotrone Trieste S.C.p.A. shall not be liable for user's failure to comply with these requirements.
To avoid electrical shock or fire hazard, do not apply a voltage to a load that is outside the range specified for that load.
Do Not Operate Without Covers.
To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.
Do Not Operate in Wet/Damp Conditions.
To avoid electrical shock, do not operate this product in wet or damp conditions.
Do Not Operate in an Explosive Atmosphere.
To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.
Do Not Operate With Suspected Failures.
If you suspect there is damage to this product, have it inspected by qualified service personnel.

1.2.3 Grounding

To minimize shock hazard, the A2720 System must be connected to a protective ground (also known as PE). The earth terminal is present on back side of the crate of the backplane. The A2720 crate must be connected to PE to detect Earth Fault. Therefore, at least a 2-sq.mm wire must be connected between the crate and the rack protective earth terminal.

1.2.4 Input ratings

Do not use auxiliary and bulk DC supply which exceed the input voltage of this instrument. For input voltage rating of the modules see chapter 2.1.

1.2.5 Output connectors

Do not plug or unplug output connectors when power converters are on.

1.2.6 Live circuits

There are no live circuits on this product, as all DC input power sources come from AC/DC power converters that meet low voltage normative.
Operating personnel must not remove the 19” crates covers. No internal adjustment or component replacement is allowed to non-Elettra - Sincrotrone Trieste S.C.p.A. personnel. Never replace components with power cables connected. To avoid injuries, always disconnect power; discharge circuits and remove external voltage source before touching components (wait 15 min at least).

1.2.7 Parts substitutions and modifications

Always disconnect power; discharge circuits and remove external voltage source prior to fuse replacement (wait 15 minutes at least). Other parts substitutions and/or modifications are allowed by authorized Elettra - Sincrotrone Trieste S.C.p.A. service personnel only.

1.3 Installation

This Chapter contains instructions for preparation for use, initial inspection.

1.3.1 Preparation for use

In order to be operational the system must be connected to an appropriate DC source. The DC source voltage should be within the unit specification.

1.3.2 Initial inspection

Prior to shipment, this system was inspected and found free of mechanical or electrical defects. Upon unpacking of the system, inspect for any damage, which might have occurred in transit. The inspection should confirm that there is no exterior damage to the system such as broken knobs or connectors and that the front panel and display face are not scratched or cracked. Keep all packing material until the inspection has been completed. If damage is detected, file a claim with the carrier immediately and notify Elettra - Sincrotrone Trieste S.C.p.A. service personnel.

1.3.3 Mounting

The A2720 System crate does not require any fan unit to operate if the average maximum output current is below 16 A. For higher average output currents (i.e. 20 A_{dc} continuous), please operate the unit with a fan tray positioned just below the PS crate.

For fan-less operation, please allow 3U space on top AND 3U space on bottom of the unit for free air convection.

The unit has bottom cover removed to help air convection

1.3.4 Connections

1.3.4.1 AUX PS and DC-Link connections

To connect the A2720 System, plug all 4 DC-link cables on respective output channels**.**

Pay attention to connect the DC-Link cables with the right polarity as shown on backplane serigraphy.

It is possible to fine-adjust the output voltage of each DC-Link power supply by means of its rotary trimmer located on the front of the DC-Link PS.

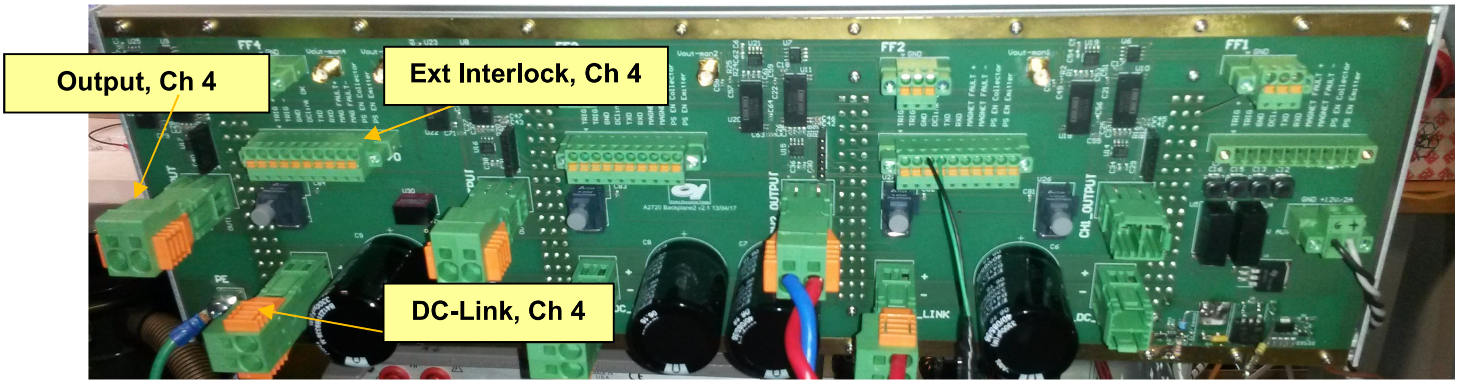

Figure 1: DC-Link, interlock and output connections

Connect the AUX +12V cable to its socket as seen in figure 2.
After this, it is needed to connect all 4 outputs cable connectors to the loads.

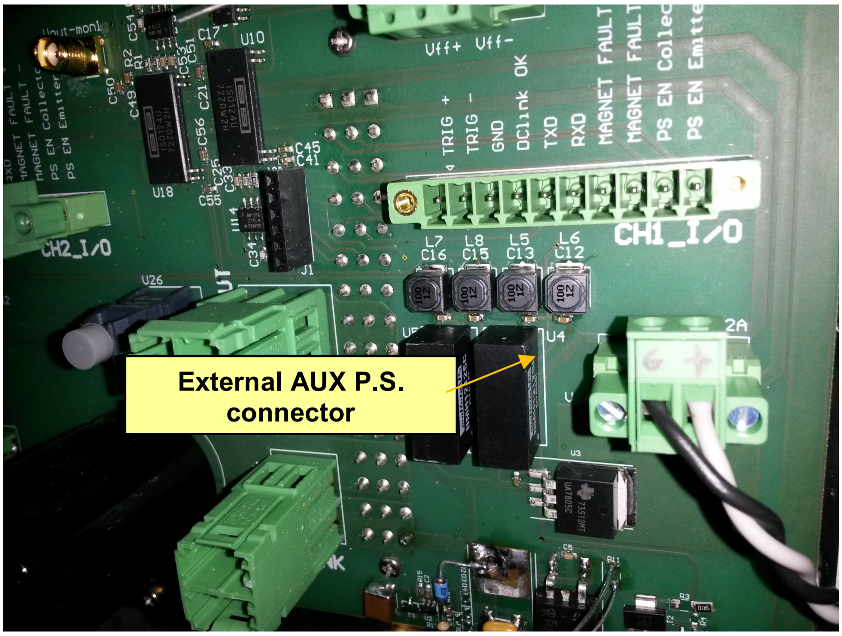

Figure 2: AUX P.S. connections

1.3.4.2 Outputs

Four output connectors Phoenix PCV 5/2 are available on the rear panel of the A2720 Crate. The connector has two pins capable to house up to 10 mm^2 wires:

- OUT 1: positive output (right hand side pin)
- OUT 2: negative output

1.3.4.3 Interlock and status

Each A2720 module has one interlock input and one status output. On the same connector other signals are present. Pin index is summarized in **Table 1**:

Table 1: Interlock connector pin-out

Pin Number (Figure)	Function
1	Trigger IN +
2	Trigger IN -
3	GND
4	DC-link Warning in
5	USART TX (not used)
6	USART RX (not used)
7	Magnet fault +
8	Magnet fault -
9	PS enabled output (C)
10	PS enabled return (E)

All pins are completely isolated from ground and outputs terminals, nevertheless the absolute maximum voltage, referred to ground, that pins can withstand is 50V.

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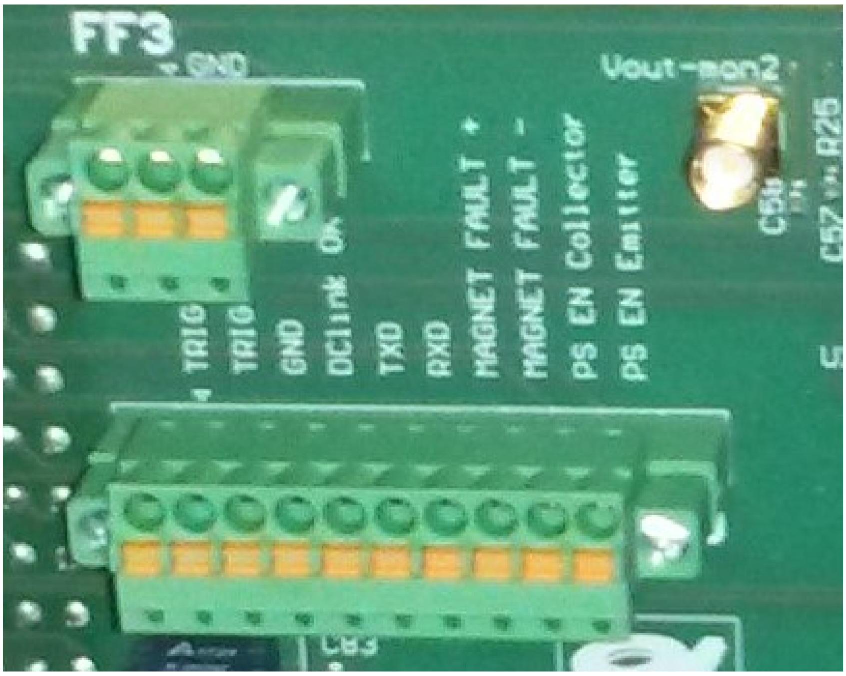

Figure 3: Interlock connector on A2720 backplane

Normal operation is activated when between pin 7 and its return pin 8, a 24 V (2 mA) voltage signal is applied. If higher voltages are available (e.g. 48V), a 12kOhm resistor must be connected in series. Magnet fault then appears when voltage on this input disappears. Such signal must be present for the DC/DC converter to work.

PS EN(abled) output is a free contact available through pins 9 and 10 (respectively collector and emitter of an optocoupler).On version v3.1, when the converter is operating, the dry contact between pins 9 and 10 is closed.

Trigger input is connected through Pins 1 and 2 (pins are labelled + and -). This makes the PS perform in pulsed mode. As an example, if the output current has been set to 10 A and the pulse width is set to 10 ms, with the application of an external trigger, the PS will start ramping (with the set slew rate) from 0 A to 10 A (set point) and will keep the current for the desired (10 ms) time, then goes back to 0 A waiting for the next trigger

DC-Link OK contact is connected to Pin 3 (GND) and Pin 4. These wires have to be connected to the DC-link good terminal at the output of the DC-Link power converters.

Pin 5 and 6 are reserved for future use.

1.3.4.4 Ethernet

Ethernet connector on the front panel allows the remote control of the DC/DC module and communication with a remote computer. The connector is a standard RJ-45 connector (Figure 4); pin-out is shown in Table 2.

Table 2: Ethernet pinout

Pin Contact (Figure 2)	Function
1	TX + OUT
2	TX - OUT
3	RX + IN
4	NOT USED
5	NOT USED
6	RX - IN
7	NOT USED
8	NOT USED

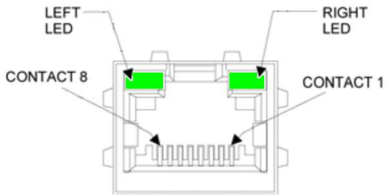

Figure 4: Ethernet port

Two LEDs on the RJ-45 connector show the Ethernet connectivity status: see Table 3.If the modules are connected to an Ethernet switch, a standard Ethernet CAT 5e UTP cable has to be used; a crossed-version is required if the module has to be directly connected to a computer port if it is not auto-sensed.

Table 3: Ethernet port LEDs meaning

Link LED (left)		*Activity LED (right)*	
Color	*Status*	*Color*	*Status*
Off	No Link	Off	No Activity
Amber	10 Mbps	Amber	Half-Duplex
Green	100 Mbps	Green	Full-Duplex

Before connection, the IP addresses of each A2720 DC/DC module must be configured: see Annex A. Standard protocol communication is TCP.

Technical specifications

2.1 Components technical specifications

Table 4: A2720 System

Physical dimensions W×H×D	**19” × 3U + 1U × 430mm**
Number of A2720 DC/DC	**Up to 4**
Total weight	**12 kg**
DC Link LED	**DC Ok**
AC/DC bulk & aux Input voltage	**4 × 90~264V_{AC} Universal Input**
AC/DC bulk & aux Input frequency	**47~63 Hz**
Max Input Power per System	**4000 W**

Table 5: A2720 DC/DC module

Physical dimensions W×H×D	**18.5TE × 3U × 340 mm**
Output Stage DC-DC Topology	**4 - quadrant**
Input voltage (control)	**12 V_{DC}**
Maximum input current (control)	**0.5 A**
Maximum Input voltage (power)	**60 V_{DC}**
Maximum input current (power)	**20 A**
Maximum output current	**± 20 A**
Maximum output voltage	**0.95 V_{in}**
Maximum output power	**1000 W**
Current Resolution	**40 µA (20 bit)**
Switching Frequency	**100 kHz**
Bandwidth -3dB (@Load = 3 Ω)	**10 kHz (option for different bandwidths)**
Slew-rate (SR)	**0 – 10 kA/s**
Long-term Output Stability (140h)	**25 ppm F.S.**
Output Current Read back	**40 µA (20 bit)**
Accuracy	**5 ppm F.S. (80 µA)**
DC-DC Efficiency (typical)	**> 90% @ full load**
Max Ripple (pk-pk)	**600 µA (1 Hz filter)**

2.2 A2720 DC/DC module

The A2720 is a power supply system especially designed to supply magnets. It is composed of digital current-controlled SMPS (Switched Mode Power Supplies) with high resolution and stability performances to match the strict requirements usually needed when executing physics experiments. Multiple hardware and software protections are provided in order to increase the power supply reliability, a key factor in this field of operation.

The power supply connection to the control system is guaranteed by an Ethernet 10/100 connection on a RJ-45 socket; the available communication protocol is TCP-IP.

2.2.1 Internal Protection / Faults

Each channel/power supply is equipped with multiple internal protections (hardware and software) to avoid unwanted behaviors or eventual damages.
Software and Hardware protections are all installed on the A2720 Power Board and are here listed:

- DC-Link Fuses;
- Cross-conduction protection;
- Overcurrent;
- CB (Crowbar protection);
- DC-Link under-voltage protection;
- MOSFETs over-temperature;

Some protections are redundant (hardware + software): this was made to guarantee a double level of reliability for the specified power supply.

2.2.2 Status Register

Each A2720 DC/DC module has an internal status register that contains all useful information about the power supply operation; this register is updated in real-time and it is always accessible by the users via the remote connection.

The internal status register structure is presented in Table 6 (please note that bit numbers are correctly reported)

Table 6: Internal status register

	bit 26	bit 25	bit 15	bit 13	bit 12	bit 7	bit 6	bit 3	bit 2	bit 0
if 1	Earth fault	No warning	Magnet fault	Vaux undervol tage	Cross conduction	MOS Overtemp	DCCT fault	Crowbar	Over Current	Gate OFF
if 0	No fault	DC Link warning	No fault	No fault	No fault	No fault	No fault	No fault	No fault	Gate ON

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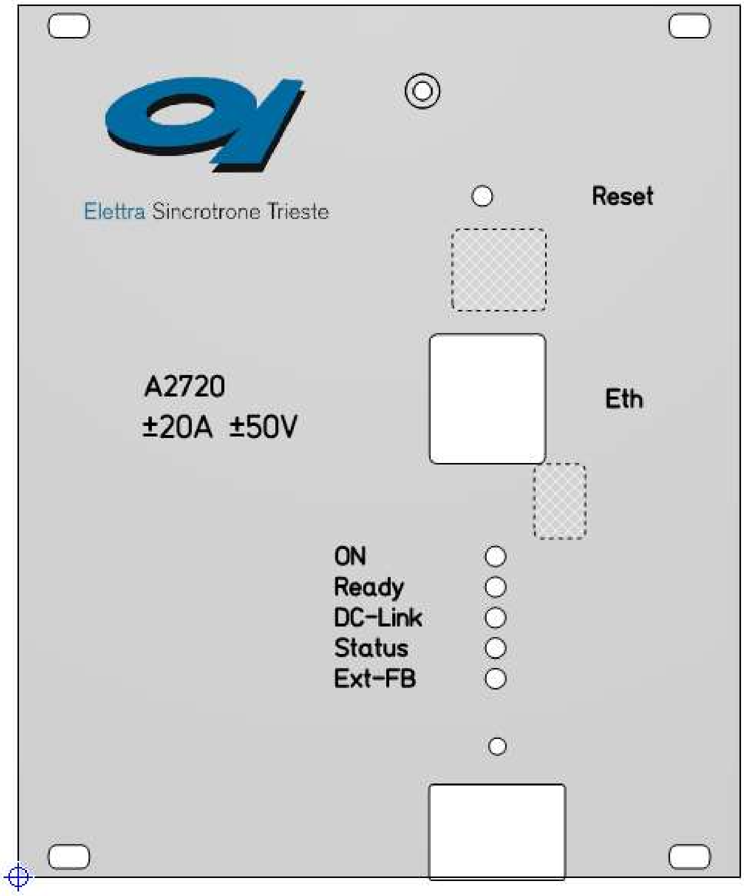
2.2.3 Front Panel



The LEDs on the front panel are indicators of the power supply status and have to be interpreted as follows:

- **On**: GREEN indicates that the A2720 module is in ON state (it can be supplying current if set, or not), while RED means it is in OFF state.
- **Ready**: GREEN indicates the A2720 module is ready for operation, while RED indicates a failure on control electronic section.
- **DC-Link**: Warning led.1 GREEN indicates that the bulk power supply voltage is correctly feeding the A2720 module, while RED indicates a failure or missing DC-Link voltage.
- **Status**: RED indicates that the A2720 module has experienced a generic fault that can be either an internal protection trip or an external interlock intervention. This light does not turn green after a fault until a local or a remote module reset has been performed, while GREEN means status is normal.
- **Ext-FB**: ORANGE light indicates that the A2720 module can accept an external analog input (located at the backplane) to be added to the digital set point for orbit correction ease (this input is an optional feature)

It is important to notice that the **On** LED and the **Interlock** LED cannot be lit at the same time, as the module cannot regulate any output current if a fault is experienced and the output stage of the power supply is safely disabled.

2.2.4 Firmware reset

It is possible to reset the digital controller by pushing the reset button accessible by the 3 mm diameter hole marked as “Reset”. Allow some time for the firmware to reload and be ready for operation as seen on front panel LED status.

2.2.5 Module extraction

Before removing any of the modules, please be sure to disconnect power both from aux and dc-link and wait at least 5 minutes for capacitors to discharge.
To remove the A2720 DC/DC module it is sufficient to unscrew the four Phillips screws on frontal panel.

2.3 DC-Link & Aux

2.3.1 DC-Link v3.1

On version v3.1 of this power supply system, the DC-Link power converters are composed by 4 units commercial off the shelf high-reliability AC/DC power converters that feed the power electronic with 24 V.

The power converter provides 24 V (DC-Link voltage) to the H-Bridge output stage of the A2720 DC/DC modules and they are powered by a 400 V grid power line (L1, L2, L3 + PE).

2.3.2 Aux v3.1

On version v3.1.1 the Aux power converters are composed by 2 units commercial off the shelf high-reliability AC/DC power converters that feed the control electronic with 12 V. They are powered by 220V line (L1, N). The modules are redundant 1+1 and they are connected in parallel with a step diode module. Each power supply is dimensioned to work with full load.

Operational description

3.1 Remote Control

Any A2720 DC/DC module is remotely controlled via a standard Ethernet link using TCP-IP communication responding to a predefined set of commands. To ensure a correct link some rules need to be followed:

- Commands to the power supply must be sent with '\r\n' (carriage return, 0x0D and line feed 0x0A) termination characters.
- Replies from the power supply controller then have '\r\n' (carriage return, 0x0D and line feed 0x0A) termination characters.

The list of the commands is listed in Table 7.

Please note that the setting of any of these values via TCP-IP is runtime temporary and a power cycle of the PS will lose the settings.

If a permanent modification of any parameter has to be performed, please check annex A.

Table 7: A2720 DC/DC module Command List

Command	Description	Read/Write
MOFF	Turn the module OFF	W
MON	Turn the module ON	W
MRESET	Reset the module	W
MRKP	Read Kp parameter	R
MRKI	Read Ki parameter	R
MRSR	Read Slew rate	R
MRKFF	Read Fast feedback gain	R
MRIMAX	Read Max current	R
MRIMIN	Read Min current	R
MRIA0	Read a0 coefficient Current	R
MRIA1	Read a1 coefficient Current	R

MRIA2	Read a2 coefficient Current	R
MRIA3	Read a3 coefficient Current	R
MRIA4	Read a4 coefficient Current	R
MRIA5	Read a5 coefficient Current	R
MRVXA0	Read a0 coefficient V auxiliary	R
MRVXA1	Read a1 coefficient V auxiliary	R
MRVA0	Read a0 coefficient V output	R
MRVA1	Read a0 coefficient V output	R
MRVDCA0	Read a0 coefficient V DC-Link	R
MRVDCA1	Read a0 coefficient V DC-Link	R
MRTA0	Read a0 coefficient Oven temperature	R
MRTA1	Read a1 coefficient Oven temperature	R
MRTHA0	Read a0 coefficient Heat sink temperature	R
MRTHA1	Read a1 coefficient Heat sink temperature	R
MRIS	Read output current value setting	R
MRI	Read actual output current value	R
MRVX	Read Auxiliary voltage value	R
MRVDC	Read DC-Link voltage value	R
MRV	Read output voltage value	R
MRTH	Read output stage heat sink temperature	R
MRT	Read module oven temperature	R
MRST	Read module status	R
MRSN	Read module serial number	R
MRID	Read module identification	R
MRCD	Read module calibration date	R
MRPD	Read Pulse duration	R
MWKP	Write Kp parameter	W

MWKI	Write Ki parameter	W
MWSR	Write Slew rate	W
MWKFF	Write Fast feedback gain	W
MWIMAX	Write Max current	W
MWIMIN	Write Min current	W
MWIA0	Write a0 coefficient Current	W
MWIA1	Write a1 coefficient Current	W
MWIA2	Write a2 coefficient Current	W
MWIA3	Write a3 coefficient Current	W
MWIA4	Write a4 coefficient Current	W
MWIA5	Write a5 coefficient Current	W
MWVXA0	Write a0 coefficient V auxiliary	W
MWVXA1	Write a1 coefficient V auxiliary	W
MWVA0	Write a0 coefficient V output	W
MWVA1	Write a0 coefficient V output	W
MWVDCA0	Write a0 coefficient V DC-Link	W
MWVDCA1	Write a0 coefficient V DC-Link	W
MWTA0	Write a0 coefficient Oven temperature	W
MWTA1	Write a1 coefficient Oven temperature	W
MWTHA0	Write a0 coefficient Heat sink temperature	W
MWTHA1	Write a1 coefficient Heat sink temperature	W
MWI	Write actual current output value	W
MWPD	Write Pulse duration	W

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3.2.1 Commands Overview

The power supply controller replies every time that termination characters ‘\r\n’ are received. Replies could have different behaviors:

- an acknowledgment ‘#AK’ string is sent back in case of a correct setting command;
- a non-acknowledgment ‘#NAK\r\n’ string is sent back in case of a wrong/unrecognized command (write commands are marked with a ‘W’ in Table 13);
- A standard reply, preceded by a ‘#’ and followed by ‘\r\n’ characters, is sent back as a response to a reading command.

A brief description for each command, in alphabetical order, is herein presented with some example annotations; the correct interpretation for these examples is as follows:

Command sent to the power supply →

← **Reply from the power supply**

3.2.2 “MOFF” Command

The ‘MOFF\r\n’ command is intended to turn off the A2720 DC/DC module output driver, thus disabling the output current terminals.
The ‘MOFF\r\n’ command automatically disables the drivers; thus a crowbar error can be generated if this command is issued before setting its output to 0 A - especially for high currents and strongly inductive loads.

Replies from the A2720 DC/DC module to a ‘MOFF\r\n’ command are in the form ‘#AK\r\n’ or ‘#NAK\r\n’.

Sending a ‘MOFF\r\n’ command when the module output is already disabled generates an acknowledgment response – i.e. ‘#AK\r\n’.

Examples:

MOFF example when the A2720 module output is already disabled:

MOFF\r\n →

← #AK\r\n

MOFF example when the A2720 module is ON and sourcing current:

MOFF\r\n →

← #AK\r\n

3.2.3 "MON" Command

The 'MON\r\n' command is intended to turn on the A2720 DC/DC module output driver, thus enabling the output current terminals and allowing the power supply to regulate and feed current to the connected load.
After the reception of a 'MON\r\n' command, the power supply automatically sets its output current to 0 A (zero) when enabling the output.

Replies from the A2720 DC/DC module to a 'MON\r\n' command are in the form '#AK\r\n' – when the command is correctly executed - or '#NAK\r\n'. The '#NAK\r\n' reply is obtained if:

- the DC-link power supply is not enabled;
- the A2720 module is in a FAULT condition (it is necessary to reset the status register after a generic fault condition in order to turn the power supply ON again - see command 'MRESET\r\n').

Sending a 'MON\r\n' command when the module output is already enabled generates an acknowledgment response – i.e. '#AK\r\n'.

Examples:

MON example when the dc-link power supply is enabled and no fault conditions:

MON\r\n →

← #AK\r\n

MON example when the dc-link power supply is still disabled (i.e. OFF):

MON\r\n →

← #NAK\r\n

3.2.4 "MRESET" Command

The 'MRESET\r\n' command performs a complete reset of the module status register: this is needed, for example, to enable the channel output again after a fault condition has been fixed. Reply from the A2720 DC/DC module is '#AK\r\n'.

Examples:

MRESET example:

MRESET\r\n →

← #AK\r\n

3.2.5 “MRKP” Command

The ‘MRKP\r\n’ command returns the PI loop Kp (proportional gain) value set. Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the Kp value.

The MRKP command, being a reading command, returns a response in any module condition.

Examples:

MRKP example:

MRKP\r\n →

← #2.123456E-1\r\n

3.2.6 “MRKI” Command

The ‘MRKI\r\n’ command returns the PI loop Ki (integral gain) value set.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the Ki value.

The MRKI command, being a reading command, returns a response in any module condition.

Examples:

MRKI example:

MRKI\r\n →

← #2.123456E-1\r\n

3.2.7 “MRSR” Command

The ‘MRSR\r\n’ command returns the Slew rate parameter value set.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:
- value is the floating point representation of the slew rate value.

The MRSR command, being a reading command, returns a response in any module condition.

Examples:

MRSR example:

MRSR\r\n →

← #10.5\r\n

3.2.8 “MRKFF” Command

The ‘MRKFF\r\n’ command returns the fast feedback gain parameter value set. Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the fast feedback gain value.

The MRKFF command, being a reading command, returns a response in any module condition.

Examples:

MRKFF example:

MRKFF\r\n →

← #10.5\r\n

3.2.9 “MRIMAX” Command

The ‘MRIMAX\r\n’ command returns the maximum current parameter value.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the maximum current available.

The MRIMAX command, being a reading command, returns a response in any module condition.

Examples:

MRIMAX example:

MRIMAX\r\n →

← #20.000\r\n

3.2.10 "MRIMIN" Command

The 'MRIMIN\r\n' command returns the minimum current parameter value.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the minimum current available.

The MRIMIN command, being a reading command, returns a response in any module condition.

Examples:

MRIMIN example:

MRIMIN\r\n →

← #-20.000\r\n

3.2.11 “MRIA0” Command

The ‘MRIA0\r\n’ command returns the current coefficient parameter value A0. Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRIA0 command, being a reading command, returns a response in any module condition.

Examples:

MRIA0 example:

MRIA0\r\n →

← #-0.5678E-4\r\n

3.2.12 “MRIA1” Command

The ‘MRIA1\r\n’ command returns the current coefficient parameter value A1.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRIA1 command, being a reading command, returns a response in any module condition.

Examples:

MRIA1 example:

MRIA1\r\n →

← #-0.5678E-4\r\n

3.2.13 "MRIA2" Command

The 'MRIA2\r\n' command returns the current coefficient parameter value A2. Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRIA2 command, being a reading command, returns a response in any module condition.

Examples:

MRIA2 example:

MRIA2\r\n →

← #-0.5678E-4\r\n

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3.2.14 “MRIA3” Command

The ‘MRIA3\r\n’ command returns the current coefficient parameter value A3. Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRIA3 command, being a reading command, returns a response in any module condition.

Examples:

MRIA3 example:

MRIA3\r\n →

← #-0.5678E-4\r\n

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3.2.15 "MRIA4" Command

The 'MRIA4\r\n' command returns the current coefficient parameter value A4. Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRIA4 command, being a reading command, returns a response in any module condition.

Examples:

MRIA4 example:

MRIA4\r\n →

← #-0.5678E-4\r\n

3.2.16 "MRIA5" Command

The 'MRIA5\r\n' command returns the current coefficient parameter value A5. Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRIA5 command, being a reading command, returns a response in any module condition.

Examples:

MRIA5 example:

MRIA5\r\n →

← #-0.5678E-4\r\n

3.2.17 "MRVXA0" Command

The 'MRVXA0\r\n' command returns the auxiliary voltage coefficient parameter value A0.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRVXA0 command, being a reading command, returns a response in any module condition.

Examples:

MRVXA0 example:

MRVXA0\r\n →

← #-0.5678E-4\r\n

3.2.18 “MRVXA1” Command

The ‘MRVXA1\r\n’ command returns the auxiliary voltage coefficient parameter value A1.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRVXA1 command, being a reading command, returns a response in any module condition.

Examples:

MRVXA1 example:

MRVXA1\r\n →

← #-0.5678E-4\r\n

3.2.19 "MRVA0" Command

The 'MRVA0\r\n' command returns the output voltage coefficient parameter value A0. Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRVA0 command, being a reading command, returns a response in any module condition.

Examples:

MRVA0 example:

MRVA0\r\n →

← #-0.5678E-4\r\n

3.2.20 “MRVA1” Command

The ‘MRVA1\r\n’ command returns the output voltage coefficient parameter value A1. Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRVA1 command, being a reading command, returns a response in any module condition.

Examples:

MRVA1 example:

MRVA1\r\n →

← #-0.5678E-4\r\n

3.2.21 "MRVDCA0" Command

The 'MRVDCA0\r\n' command returns the DC-Link voltage coefficient parameter value A0.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRVDCA0 command, being a reading command, returns a response in any module condition.

Examples:

MRVDCA0 example:

MRVDCA0\r\n →

← #-0.5678E-4\r\n

3.2.22 "MRVDCA1" Command

The 'MRVDCA1\r\n' command returns the DC-Link voltage coefficient parameter value A1.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRVDCA1 command, being a reading command, returns a response in any module condition.

Examples:

MRVDCA1 example:

MRVDCA1\r\n →

← #-0.5678E-4\r\n

3.2.23 “MRTA0” Command

The ‘MRTA0\r\n’ command returns the oven temperature coefficient parameter value A0.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:
- value is the floating point representation of the parameter.

The MRTA0 command, being a reading command, returns a response in any module condition.

Examples:

MRTA0 example:

MRTA0\r\n →

← #-0.5678E-4\r\n

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3.2.24 “MRTA1” Command

The ‘MRTA1\r\n’ command returns the oven temperature coefficient parameter value A1.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRTA1 command, being a reading command, returns a response in any module condition.

Examples:

MRTA1 example:

MRTA1\r\n →

← #-0.5678E-4\r\n

3.2.25 “MRTHA0” Command

The ‘MRTHA0\r\n’ command returns the heat sink temperature coefficient parameter value A0.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRTHA0 command, being a reading command, returns a response in any module condition.

Examples:

MRTHA0 example:

MRTHA0\r\n →

← #-0.5678E-4\r\n

3.2.26 "MRTHA1" Command

The 'MRTHA1\r\n' command returns the heat sink temperature coefficient parameter value A1.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating point representation of the parameter.

The MRTHA1 command, being a reading command, returns a response in any module condition.

Examples:

MRTHA1 example:

MRTHA1\r\n →

← #-0.5678E-4\r\n

3.2.27 "MRIS" Command

The 'MRIS\r\n' command returns the actual current value set to the power supply. Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating value.

The MRIS command, being a reading command, returns a response in any module condition.

Examples:

MRIS example:

MRIS\r\n →

← #150.37\r\n

3.2.28 “MRI” Command

The ‘MRI\r\n’ command returns the actual current value of the power supply.
Current Read back values have 24-bit resolution (23-bit + sign) and they are presented with a 5-digit precision.

Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the floating value.

The MRI command, being a reading command, returns a response in any module condition.

Examples:

MRI example when the module is OFF:

MRI\r\n →

← #+0.00004\r\n

MRI example when the module is ON and regulating:

MRI\r\n →

← #-28.34563\r\n

3.2.29 "MRVX" Command

The 'MRVX\r\n' command returns the value of the auxiliary power supply actual voltage, measured at the A2720 module input terminals.
Read back values have a unipolar 12-bit resolution (i.e. no sign).

Replies from the power supply A2720 controller to this command are in the following format:

#value*\r\n*

where:

- value Is the measured auxiliary voltage [V].

The MRVX command, being a reading command, returns a response in any module condition.

Examples:

MRVX example:

MRVX*\r\n* →

← #12.2*\r\n*

3.2.30 "MRVDC" Command

The 'MRVDC\r\n' command returns the value of the dc-link power supply actual voltage, measured at the A2720 module input terminals.
Read back values have a unipolar 12-bit resolution (i.e. no sign).

Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value Is the measured dc-link voltage [V].

The MRVDC command, being a reading command, returns a response in any module condition.

Examples:

MRVDC example:

MRVDC\r\n →

← #49.2\r\n

3.2.31 "MRV" Command

The 'MRV\r\n' command returns the value of the output actual voltage, measured at the A2720 module output terminals.
Read back values have a unipolar 12-bit resolution (i.e. no sign).

Replies from the power supply A2720 controller to this command are in the following format:

#value*\r\n*

where:

- value Is the measured output voltage [V].

The MRV command, being a reading command, returns a response in any module condition.

Examples:

MRV example:

MRV*\r\n* →

← #32.2*\r\n*

3.2.32 “MRTH” Command

The ‘MRTH\r\n’ command returns the value of the temperature directly measured on the output stage MOSFET heatsink.
Read back values have a unipolar 12-bit resolution (i.e. no sign).

Replies from the power supply A2720 controller to this command are in the following form:

#value\r\n

where:

- value is temperature value [°C = Celsius] measured on the output stage heatsink.

The MRTH command, being a reading command, returns a response in any module condition.

Examples:

MRTH example:

MRTH\r\n →

← #35.7\r\n

3.2.33 "MRT" Command

The 'MRT\r\n' command returns the value of the temperature measured on the analog circuitry oven.
Read back values have a unipolar 12-bit resolution (i.e. no sign).

Replies from the power supply A2720 controller to this command are in the following form:

#value\r\n

where:

- value is temperature value [°C = Celsius] measured on the oven.

The MRT command, being a reading command, returns a response in any module condition.

Examples:

MRT example:

MRT\r\n →

← #42.7\r\n

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3.2.34 “MRST” Command

The ‘MRST\r\n’ command returns the value of the power supply internal status register.

Replies from the power supply module to this command are in the following format:

#value\r\n

where:

- value is the ASCII representation of the internal status register value, composed by an unsigned integer number, and corresponding to the 10-bit wide status register.

The MRST command, being a reading command, returns a response in any module condition.

Examples:

MRST example with the module ON and no fault conditions:

MRST\r\n →

← #1\r\n

3.2.35 "MRSN" Command

The 'MRSN\r\n' command returns the value of the power supply serial number. Replies from the power supply module to this command are in the following format:

#value\r\n

where:

- value is the ASCII representation of the serial number composed by a string.

The MRSN command, being a reading command, returns a response in any module condition.

Examples:

MRSN example:

MRSN\r\n →

← #A2720-422015\r\n

3.2.36 “MRID” Command

The ‘MRID\r\n’ command returns the actual module identification.
Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the string value.

The MRID command, being a reading command, returns a response in any module condition.

Examples:

MRID example:

MRID\r\n →

← #PSCH_S1.2\r\n

3.2.37 “MRCD” Command

The ‘MRCD\r\n’ command returns the module calibration date.
Replies from the power supply module to this command are in the following format:

#value\r\n

where:

- value is the ASCII representation of the calibration date.

The MRCD command, being a reading command, returns a response in any module condition.

Examples:

MRCD example:

MRCD\r\n →

← #04/09/2015\r\n

3.2.38 “MRPD” Command

The ‘MRPD\r\n’ command returns the duration of pulse set to the power supply. Replies from the power supply A2720 controller to this command are in the following format:

#value\r\n

where:

- value is the duration expressed in milliseconds.
  The value is a multiple of 20us steps, so the value read in this field is affected by an error of +/- 20us in case the set value is not an exact multiple.

The MRPD command, being a reading command, returns a response in any module condition.

Examples:

MRPD example:

MRPD\r\n →

← #10\r\n

3.2.39 “MWKP” Command

The ‘MWKP\r\n’ command writes the PI loop Kp (proportional gain) value.
The correct form format for this command is as follows:

MWKP:Kp_param\r\n

where:

- Kp_param is the PI loop compensation proportional gain parameter;

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWKP command, when:

- the param is out-of-range;

Examples:

MWKP example:

MWKP:-2.21E-4\r\n →

← #AK\r\n

3.2.40 “MWKI” Command

The ‘MWKI\r\n’ command writes the PI loop Ki (integral gain) value.
The correct form format for this command is as follows:

MWKI:Ki_param\r\n

where:

- Ki_param is the PI loop compensation integral gain parameter;

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWKI command, when:

- the param is out-of-range;

Examples:

MWKI example:

MWKI:0.2121E-1\r\n →

← #AK\r\n

3.2.41 “MWSR” Command

The ‘MWSR\r\n’ command writes the slew rate value.
The correct form format for this command is as follows:

MWSR:slew_rate\r\n

where:

- slew_rate is the slew rate value [A/s] to be set on the power supply;

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWSR command, when:

- the param is out-of-range;

Examples:

MWSR example:

MWSR:10\r\n →

← #AK\r\n

3.2.42 “MWKFF” Command

The ‘MWKFF\r\n’ command writes the fast feedback gain parameter value set.
The correct form format for this command is as follows:

MWKFF:value\r\n

where:

- value is the floating point representation of the fast feedback gain value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWKFF command, when:

- the param is out-of-range;

Examples:

MWKFF example:

MWKFF:1.0\r\n →

← #AK\r\n

3.2.43 "MWIMAX" Command

The 'MWIMAX\r\n' command writes the maximum current parameter value.
The correct form format for this command is as follows:

MWIMAX:value\r\n

where:

- value is the floating point representation of the maximum current value.

Replies from the power supply are in the form '#AK\r\n', or '#NAK\r\n'; this non-acknowledgment reply is generated, as it is for the MWIMAX command, when:

- the param is out-of-range;

Examples:

MWIMAX example:

MWIMAX:20\r\n →

← #AK\r\n

3.2.44 “MWIMIN” Command

The ‘MWIMIN\r\n’ command writes the minimum current parameter value.
The correct form format for this command is as follows:

MWIMIN:value\r\n

where:

- value is the floating point representation of the minimum current value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWIMIN command, when:

- the param is out-of-range;

Examples:

MWIMIN example:

MWIMIN:-20\r\n →

← #AK\r\n

3.2.45 “MWIA0” Command

The ‘MWIA0\r\n’ command writes current coefficient parameter value A0.
The correct form format for this command is as follows:

MWIA0:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWIA0 command, when:

- the param is out-of-range;

Examples:

MWIA0 example:

MWIA0:0.234E-1\r\n →

← #AK\r\n

3.2.46 “MWIA1” Command

The ‘MWIA1\r\n’ command writes current coefficient parameter value A1.
The correct form format for this command is as follows:

MWIA1:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWIA1 command, when:

- the param is out-of-range;

Examples:

MWIA1 example:

MWIA1:0.234E-1\r\n →

← #AK\r\n

3.2.47 “MWIA2” Command

The ‘MWIA2\r\n’ command writes current coefficient parameter value A2.
The correct form format for this command is as follows:

MWIA2:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWIA2 command, when:

- the param is out-of-range;

Examples:

MWIA2 example:

MWIA2:0.234E-1\r\n →

← #AK\r\n

3.2.48 “MWIA3” Command

The ‘MWIA3\r\n’ command writes current coefficient parameter value A3.
The correct form format for this command is as follows:

MWIA3:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWIA3 command, when:

- the param is out-of-range;

Examples:

MWIA3 example:

MWIA3:0.234E-1\r\n

#AK\r\n

3.2.49 "MWIA4" Command

The 'MWIA4\r\n' command writes current coefficient parameter value A4.
The correct form format for this command is as follows:

MWIA4:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form '#AK\r\n', or '#NAK\r\n'; this non-acknowledgment reply is generated, as it is for the MWIA4 command, when:

- the param is out-of-range;

Examples:

MWIA4 example:

MWIA4:0.234E-1\r\n →

← #AK\r\n

3.2.50 "MWIA5" Command

The 'MWIA5\r\n' command writes current coefficient parameter value A5.
The correct form format for this command is as follows:

MWIA5:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form '#AK\r\n', or '#NAK\r\n'; this non-acknowledgment reply is generated, as it is for the MWIA5 command, when:

- the param is out-of-range;

Examples:

MWIA5 example:

MWIA5:0.234E-1\r\n →

← #AK\r\n

3.2.51 “MWVXA0” Command

The ‘MWVXA0\r\n’ command writes auxiliary voltage coefficient parameter value A0. The correct form format for this command is as follows:

MWVXA0:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWVXA0 command, when:

- the param is out-of-range;

Examples:

MWVXA0 example:

MWVXA0:0.5\r\n →

← #AK\r\n

3.2.52 “MWVXA1” Command

The ‘MWVXA1\r\n’ command writes auxiliary voltage coefficient parameter value A1. The correct form format for this command is as follows:

MWVXA1:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWVXA1 command, when:

- the param is out-of-range;

Examples:

MWVXA1 example:

MWVXA1:0.5\r\n →

← #AK\r\n

3.2.53 “MWVA0” Command

The ‘MWVA0\r\n’ command writes voltage coefficient parameter value A0.
The correct form format for this command is as follows:

MWVA0:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWVA0 command, when:

- the param is out-of-range;

Examples:

MWVA0 example:

MWVA0:0.5\r\n →

← #AK\r\n

3.2.54 “MWVA1” Command

The ‘MWVA1\r\n’ command writes voltage coefficient parameter value A0.
The correct form format for this command is as follows:

MWVA1:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWVA1 command, when:

- the param is out-of-range;

Examples:

MWVA1 example:

MWVA1:0.5\r\n →

← #AK\r\n

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3.2.55 “MWVDCA0” Command

The ‘MWVDCA0\r\n’ command writes DC-Link voltage coefficient parameter value A0. The correct form format for this command is as follows:

MWVDCA0:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWVDCA0 command, when:

- the param is out-of-range;

Examples:

MWVDCA0 example:

MWVDCA0:0.5E-2\r\n →

← #AK\r\n

3.2.56 "MWVDCA1" Command

The 'MWVDCA1\r\n' command writes DC-Link voltage coefficient parameter value A1. The correct form format for this command is as follows:

MWVDCA1:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form '#AK\r\n', or '#NAK\r\n'; this non-acknowledgment reply is generated, as it is for the MWVDCA1 command, when:

- the param is out-of-range;

Examples:

MWVDCA1 example:

MWVDCA1:0.5E-2\r\n →

← #AK\r\n

3.2.57 “MWTA0” Command

The ‘MWTA0\r\n’ command writes oven temperature coefficient value A0.
The correct form format for this command is as follows:

MWTA0:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWTA0 command, when:

- the param is out-of-range;

Examples:

MWTA0 example:

MWTA0:0.5E-2\r\n →

← #AK\r\n

3.2.58 “MWTA1” Command

The ‘MWTA1\r\n’ command writes oven temperature coefficient value A1.
The correct form format for this command is as follows:

MWTA1:value\r\n

where:
- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWTA1 command, when:

- the param is out-of-range;

Examples:

MWTA1 example:

MWTA1:0.5E-2\r\n →

← #AK\r\n

3.2.59 “MWTHA0” Command

The ‘MWTHA0\r\n’ r’ command writes heat sink temperature coefficient value A0. The correct form format for this command is as follows:

MWTHA0:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWTHA0 command, when:

- the param is out-of-range;

Examples:

MWTHA0 example:

MWTHA0:0.5E-2\r\n →

← #AK\r\n

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3.2.60 "MWTHA1" Command

The 'MWTHA1\r\n' command writes heat sink temperature coefficient value A1. The correct form format for this command is as follows:

MWTHA1:value\r\n

where:

- value is the floating point representation of the coefficient value.

Replies from the power supply are in the form '#AK\r\n', or '#NAK\r\n'; this non-acknowledgment reply is generated, as it is for the MWTHA1 command, when:

- the param is out-of-range;

Examples:

MWTHA1 example:

MWTHA1:0.5E-2\r\n →

← #AK\r\n

3.2.61 “MWSN” Command

The ‘MWSN\r\n’ command can be used to write the module serial number.
The correct form format for this command is as follows:

MWSN:value\r\n

where:

- value is the ASCII representation of the serial number.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’;

Examples:

MRSN example:

MRSN: A2720-01/2015\r\n →

← #AK\r\n

3.2.62 “MWCD” Command

The ‘MWCD\r\n’ command can be used to write the module calibration date.
The correct form format for this command is as follows:

MWCD:value\r\n

where:

- value is the ASCII representation of the calibration date.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’;

Examples:

MWCD example:

MWCD:10/12/2016\r\n →

← #AK\r\n

3.2.63 "MWI" Command

The 'MWI' command can be used to set the output current value and it is used when fast set-point changes are needed.
This command is usually needed when running feedback-related applications and for small changes in the output current.
The correct form format for this command is as follows:

MWI:value\r\n

where:

- value is the desired output current value [A].

Replies from the power supply are in the form '#AK\r\n', or '#NAK\r\n'; this non-acknowledgment reply is generated, as it is for the MWI command, when:

- the set value is out-of-range

Examples:

MWI example with the module ON and already regulating:

MWI:13.50\r\n →

← #AK\r\n

It is very important to notice that, even if the module is ON and regulating the output current correctly, an MWI command can generate a "Crowbar" intervention and a consequent fault if the current change step is too large, especially for large inductive loads; this is due to the large di/dt that generates voltage peaks. If such step is needed, please adjust "Slew rate" parameter or divide the step in few steps.

3.2.64 “MWPD” Command

The ‘MWPD\r\n’ command writes pulse duration to the controller.
The correct form format for this command is as follows:

MWPD:value\r\n

where:

- value is the pulse duration expressed in milliseconds.
  The value is a multiple of 20us steps, so the value written in this field must be an integer multiple of 20us to get the exact duration, otherwise the duration will be affected by an error of +/- 20us.

Replies from the power supply are in the form ‘#AK\r\n’, or ‘#NAK\r\n’; this non-acknowledgment reply is generated, as it is for the MWIP command, when:

- the param is not recognized;

Examples:

MWPD example:

MWPD:10\r\n →

← #AK\r\n

Annex A

A.1 Ethernet IP configuration

The easiest way to modify all the configurable parameters of the power supply is to address the web browser to the IP of the power supply.

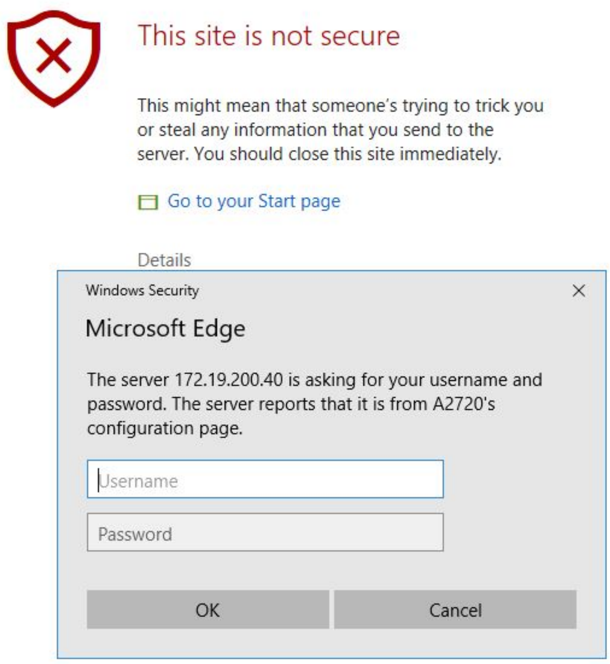

Figure 4. getting access to WebConfig configuration control program

Enter the credentials to get access to the webconfig page as seen in Figure 5

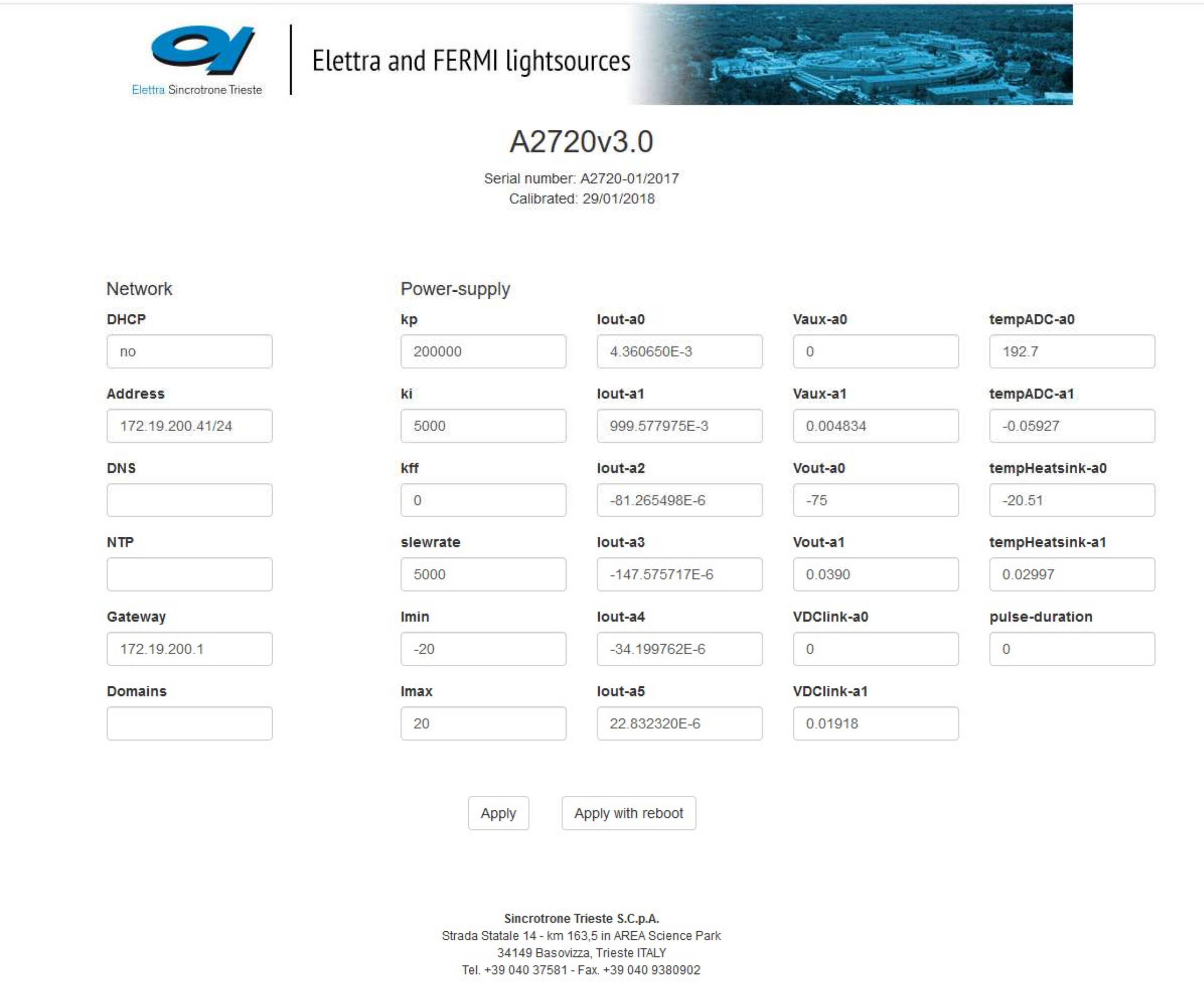

Figure 5. WebConfig configuration control program

Here the user can change the network settings:

- To set the converter IP address as STATIC, change its IP address and/or NTP address into respective text boxes and then put no on **DHCP**.
  If you wish your DHCP to set the converter IP address, put yes on **DHCP** setting. For this setting to work correctly, you need to prior communicate the MAC address of the converter to your IT service.
  After choosing this, please press **Apply** or **Apply with reboot** to write all settings to the power supply. Then you can safely exit the program.
  Apply with reboot is needed when changing parameters of the compensator, as these values are read once at the reboot and then if the user need to change them real time, he can use the TCP commands, bearing in mind that TCP commands are lost at the reboot.

A.2 Standard configuration

Standard parameter configuration is as follows:

kp = 2.000000E+5
ki = 5.000000E+3
kff = 0.000000E+0
slewrate = 5.000000E+3
Imin = -2.000000E+1
Imax = 2.000000E+1
Iout-a0 = 4.3E-3
Iout-a1 = 1E0
Iout-a2 = -81E-6
Iout-a3 = -147E-6
Iout-a4 = -34E-6
Iout-a5 = 22E-6
Vaux-a0 = 0.000000E+0
Vaux-a1 = 4.834000E-3
Vout-a0 = -7.500000E+1
Vout-a1 = 3.900000E-2
VDClink-a0 = 0.000000E+0
VDClink-a1 = 1.918000E-2
tempADC-a0 = 1.927000E+2
tempADC-a1 = -5.927000E-2
tempHeatsink-a0 = -2.051000E+1
tempHeatsink-a1 = 2.997000E-2
pulse-duration 0
serial-number = A2720-01/2017
calibration-date = 01/01/2018
identification-name = A2720v3.1