IONICUBE 1X connectors and pinouts

From Granite Devices Knowledge Wiki

Contents

IONICUBE 1X connectors

X1.1 and X1.2
: RJ45 connector with SimpleMotion V2 interface. For pinout, seeSimpleMotion V2 port.

X2
: feedback device connector for motor

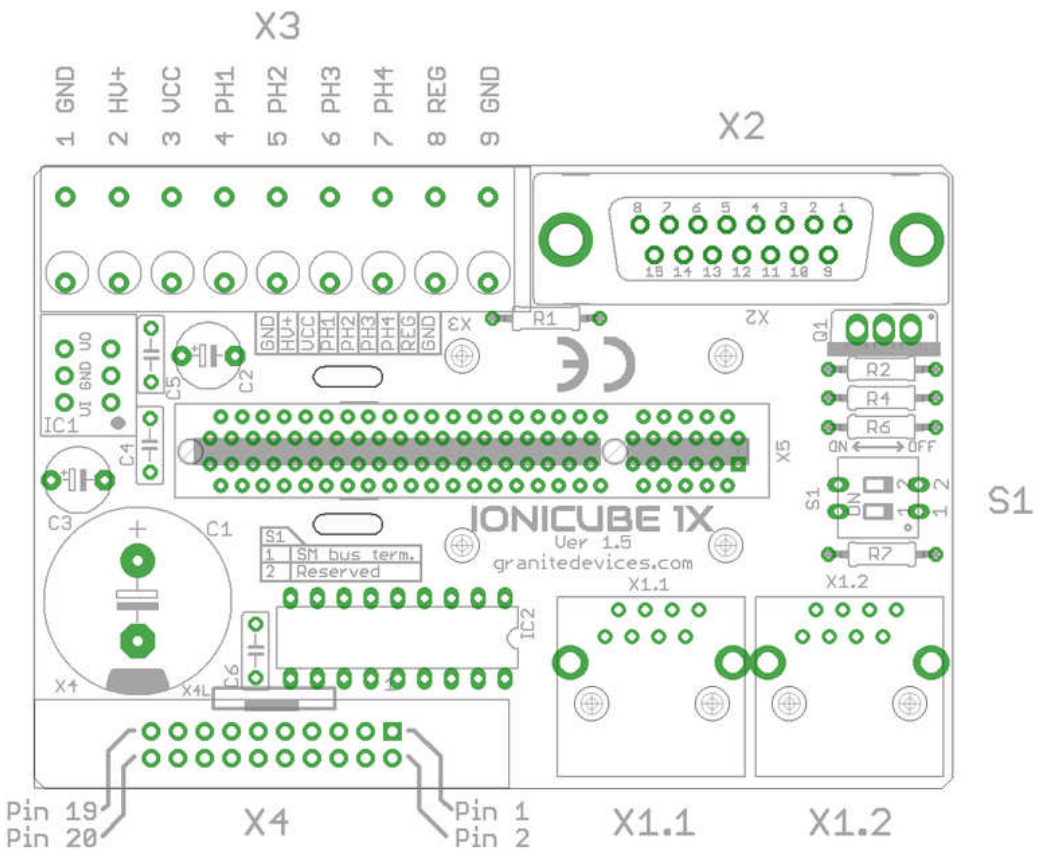
X3
: 9 pin wire terminal for HV DC bus supply, logic voltage supply, regenerative resistor and motor power output.

X4
: Control and setpoint signal port. Contains also output for motor solenoid holding brake.

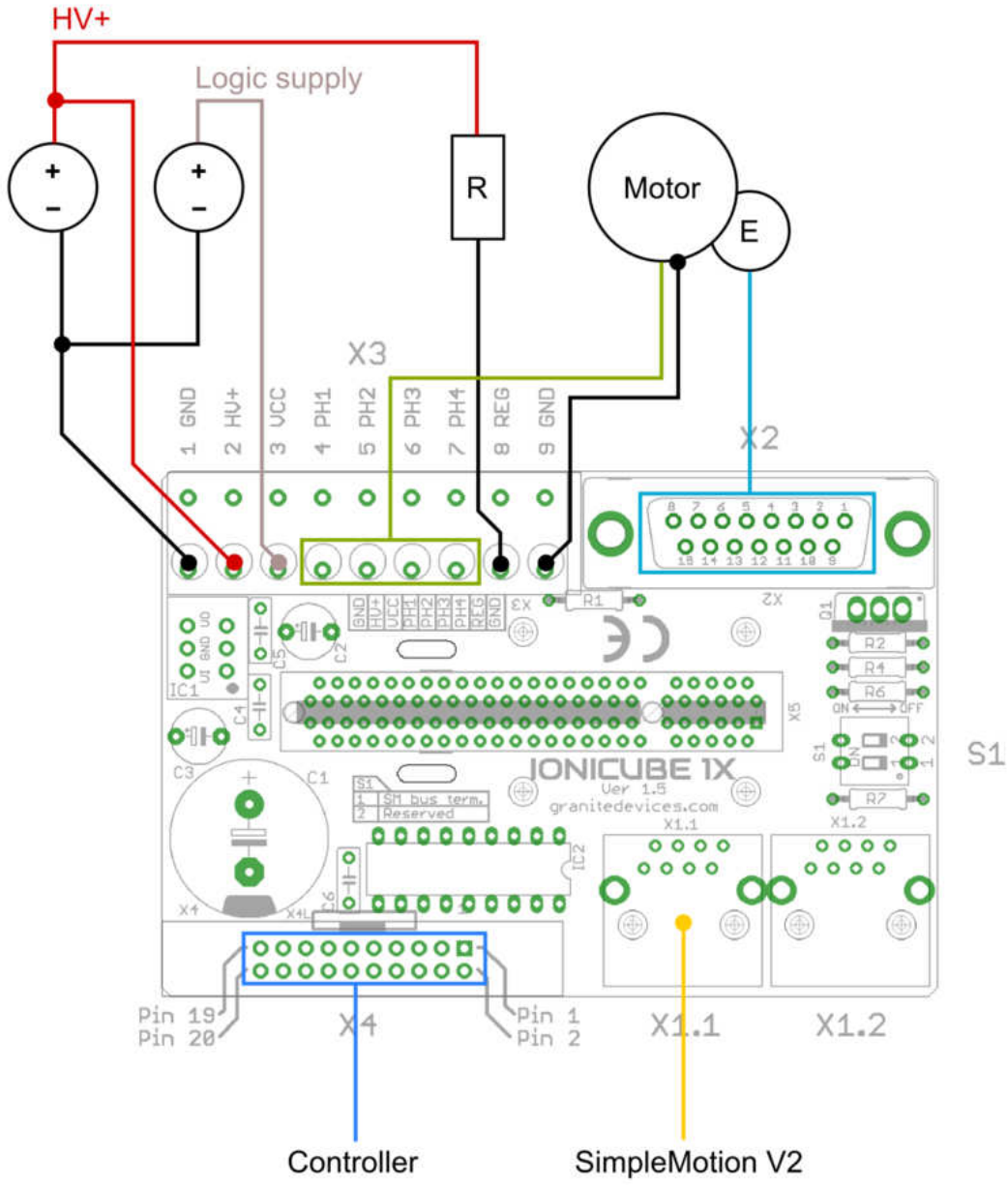
X5
: Card-edge connectors for IONI drive

Before inserting or removing IONI drives from IONICUBE, remove all power from it and discharge it's capacitors. To discharge remaining energy (~voltage) from capacitors, short circuit GND to HV+ by a conductor and measure that there is no DC voltage left between GND and HV+ terminals. Even few volts left to HV DC bus is known to cause permanent damage to IONICUBE when drives are plugged.

IONICUBE 1X connectors



Connector layout and naming



Wiring overview. R is regenerative resistor and E is encoder.

Legend

Color
Supply pin
Input pin
Output pin

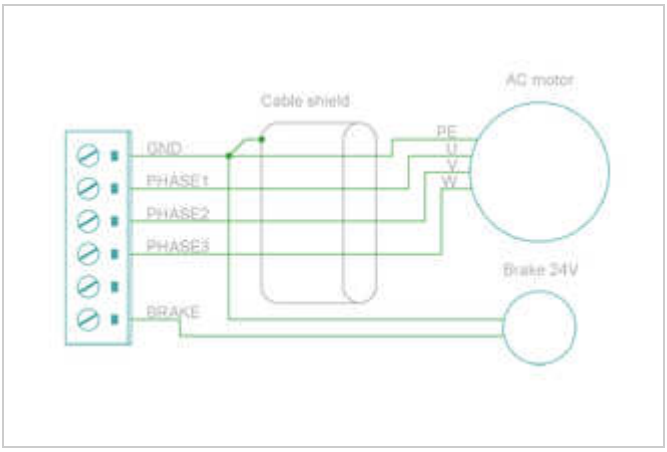
X3 pinout

This is a wire terminal connector for power input and output

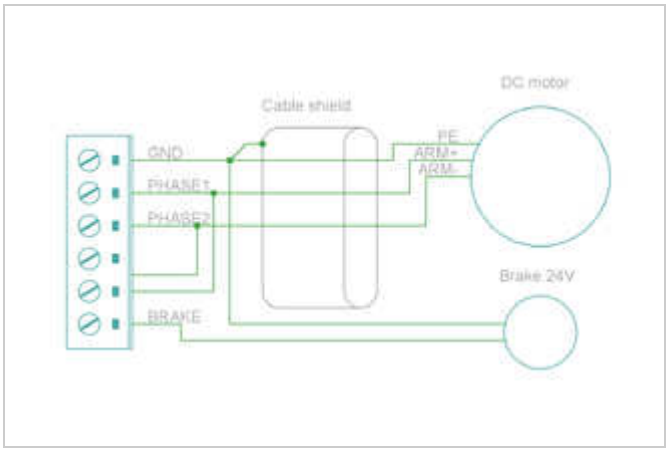
Pin number	Signal name	Usage
1	GND	Ground
2	HV+	Motor power supply, HV DC bus (see IONI drive voltage range spec)
3	VCC	24V logic supply
4	PH1 (PHASE1)	Motor phase 1
5	PH2 (PHASE2)	Motor phase 2
6	PH3 (PHASE3)	Motor phase 3
7	PH4 (PHASE4)	Motor phase 4
8	REG	Regenerative resistor output
9	GND	Ground

Motor & brake wiring schematics

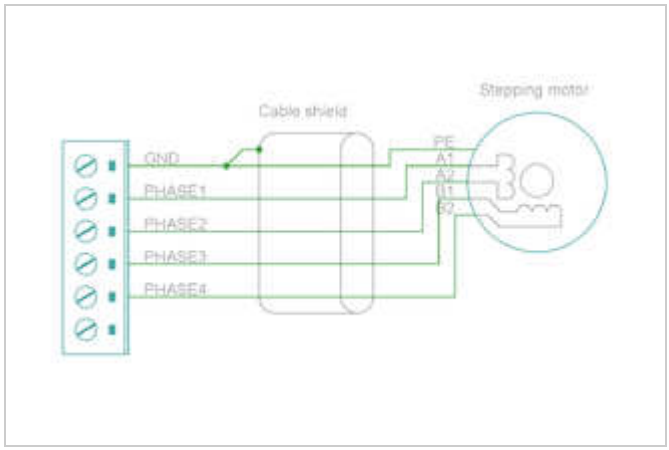
Note: the images below are drawn for IONICUBE 4 axis version. IONICUBE 1X wiring is equivalent except there is no brake output in the X3. Brake output pin is located in X4.



Wiring of three phase AC servo motor. Brake is optional.



Wiring of Brush-DC servo motor. Brake is optional.



Wiring of two phase stepping motor. Brake can be fitted like in the other examples. Also 6 and 8 wire motors can be wired (the two drive coils connect always to the same PHASE outputs).

An easy way to verify correctness of two phase **stepper** connection: unplug the 6 pin connector and then measure resistance between phases 1-2 and 3-4. Multimeter should show the same resistance for both cases (typically 0.1 - 5 ohms). Also when measuring between phases 1-3, 1-4, 2-3 and 2-4, the multimeter should indicate open circuit.

Regenerative resistor

Regenerative resistor is optional and may be connected between REG and HV+ terminals. The on board transistor is capable of carrying max 10 Amp current on regenerative resistor, so *minimum* allowed resistance can be calculated from: $R_{min}=HV_{voltage}/10$. I.e. with 48VDC HV supply, the minimum resistance is 48V/10A = 4.8 Ohms. Suggested resistor power capability is 20-100 W.

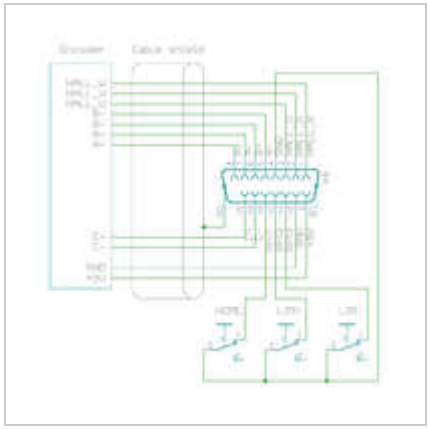
When multiple IONICUBE 1X's are connected to a shared HV supply, then it is typically sufficient to have regenerative resistor only in one IONICUBE 1X as it will help to prevent voltage build-up in the HV supply line.

X2 pinout

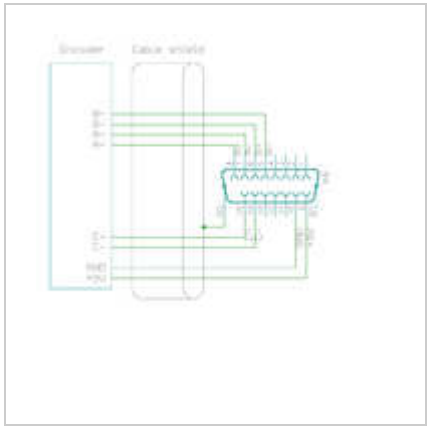
X2 is the feedback device connector of motor

Pin #	Pin name	Electrical type (in most feedback device modes)	Alternate electrical type (in some feedback device modes)	Connection with various feedback devices
Shell	GND	Earth/case		Feedback cable shield
1	HALL_W	Digital input W		Hall sensor input, phase W
2	HALL_V	Digital input V		Hall sensor input, phase V
3	HALL_U	Digital input U		Hall sensor input, phase U
4	GND	Encoder supply ground		
5	B-	Differential input B-	Analog input B+	Quadrature encoder (B channel)/SinCos/serial encoder/resolver input
6	B+	Differential input B+	Analog input B-	
7	A-	Differential input A-	Analog input A-	Quadrature encoder (A channel)/SinCos/serial encoder/resolver input
8	A+	Differential input A+	Analog input A+	
9	5V_OUT	Encoder supply 5V output		Encoder power supply
10	GND	Encoder supply ground		
11	GPI3	Axis negative direction end limit switch (optional)		Connect normally closed (NC) limit switch between this pin and GND pin
12	GPI2	Axis positive direction end limit switch (optional)		Connect normally closed (NC) limit switch between this pin and GND pin
13	GPI1	Axis home switch switch (optional)		Connect normally closed (NC) limit switch between this pin and GND pin
14	C-	Differential input C-		Quadrature encoder index channel (Z channel)/serial encoder input
15	C+	Differential input C+		

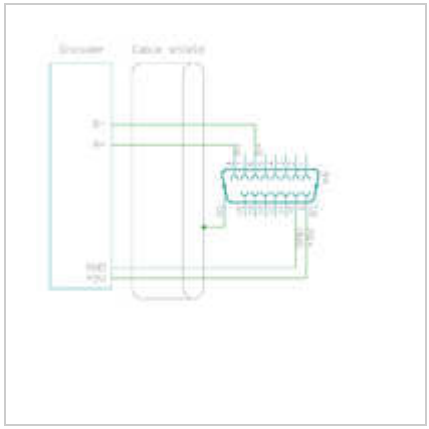
Examples of feedback device and switch wiring



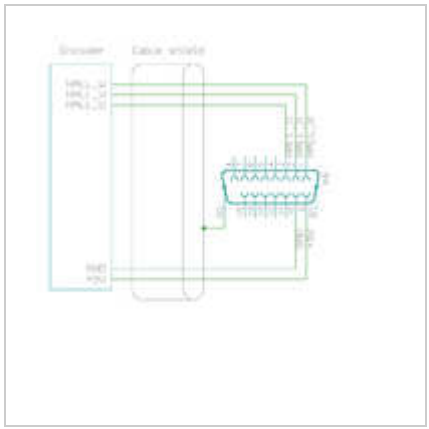
Fully wired port with differential incremental encoder, hall sensors and switches



Wiring of differential incremental encoder



Minimal wiring of incremental encoder (single ended, no index channel)



Wiring of Hall sensors only (only torque mode possible)

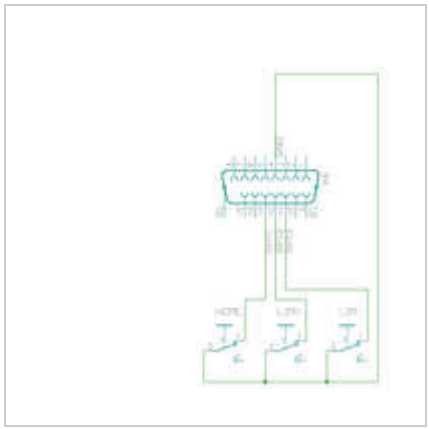


Illustration of wiring limit and home switches. In addition to this, encoder and/or halls are needed.

In case of single-ended encoder, connect encoder's A, B, Z only to drive's A+, B+ and C+ and leave drive's A-, B- and C- unconnected.

With differential Hall sensor (which provides U+, U-, V+, V-, W+ and W-, connect only sensor's U+, V+ and W+ to drive's HALL_U/V/W.

Never connect sensor negative outputs (A-/B-/C-/U-/V-/W-) to GND. Connect them to drive's A-/B-/C- or leave unconnected.

Feedback devices with differential signaling may use varying naming schemes of signal pairs. For example differential signal X (which contains two electrical wires) may be denoted as: X+ and X-, or X and \X or X and $\overline{X}$. In this Wiki we mark them X+ and X-. Some Fanuc encoders have quadrature signals named as PCA, /PCA, PCB, /PCB, PCZ and /PCZ which are equivalent to A, B and Z signal pairs.

X4 pinout

This section is unfinished. Don't use until this notice is removed.

X4 is main control and setpoint signal port consisting Enable input signal, Fault output signal, pulse and direction/quadrature/PWM setpoint inputs and digital outputs for home switch status. X4 is directly wired to conform most common parallel port style pulse & direction CNC controllers.

Pin number in header	Signal name	Typical usage	Signal name	Typical usage	
1	GND	Ground	2	5V_OUT	5V output for optional external circuity
3	HSIN2	Depending on setpoint mode, can be either: pulse input (of pulse/dir), PWM input or quadrature B input	4	HSIN1	Depending on setpoint mode, can be either: direction input (of pulse/dir or PWM) or quadrature A input
5	ANAIN+	+/-10V analog setpoint input[2]	6	ANAIN-	+/-10V analog setpoint input[2]
7	GPI2	Enable positive feed (also in X2)[1]	8	GPI1	Home switch input (also in X2)[1]
9	GPI4	Clear faults[1]	10	GPI3	Enable negative feed (also in X2)[1]
11	REGEN_OUT	Regenerative resistor power switch state (redundant, IONICUBE 1X has internal power switch)	12	GPI5	Start homing[1]
13	MECH_BRAKE_OUT	Mechanical holding brake output[3]	14	GPO5	Reserved for future use[1]
15	GPO4	Limit switch output	16	GPO3	Fault on any axis or E-stop (active low)[1]
17	GPO2	Tracking error warning[1]	18	GPO1	Servo ready[1]
19	STO2	Safe torque off input (this pin also present in X1[4])	20	ENABLE	Enable drive (with or without chargepump) (this pin also present in X1[4])

1) For detailed pin function and alternative functions in various modes, refer to IONI connector pinout

2) Setpoint voltage is measured from the difference of voltage potentials between ANAIN+ and ANAIN-. Both ANAIN inputs must always lie within +/-12V from GND (meaning that controller's zero voltage reference, i.e. GND must be connected to the GND if drive to prevent voltage potentials from floating.

3) This output can directly drive a 24V solenoid brake (max 500mA) if VCC is supplied by 24 volts. In such case, connect brake wires between MECH_BRAKE_OUT and VCC.

4) The same pin is routed also to X1 connectors. Use only either ENABLE/STO2 pins of X4 *or* X1, not both.

Connect X4 directly only to 3.3V or 5V logic systems. For 24V logic, see chapter below.

X1 connector

X1 connectors are for SimpleMotion V2 bus which is used for drive configuration with Granity software and control over a multidrop capable serial data link. For pinout, see SimpleMotion V2 port.

Never connect an Ethernet to X1. While it uses similar connector and cabling, it is electrically incompatible with Ethernet. Devices may be permanently damaged by mixing Ethernet and SimpleMotion V2.

Do now wire SimpleMotion V2 ports with crossover RJ45 cables (see details) (http://en.wikipedia.org/wiki/Ethernet_crossover_cable). Always use straight/non-crossover patch cables. If unsure about what is the type of your RJ45 cable, don't use it.

Using 24 Volt control signals

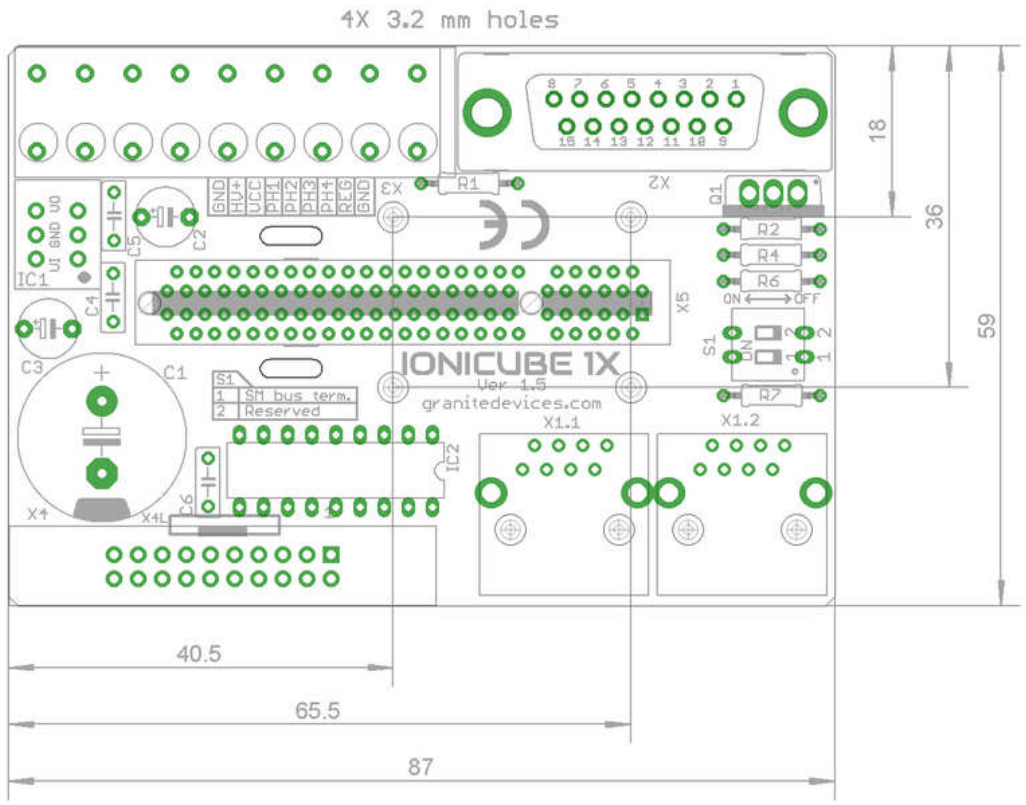
As many industrial environments use 24V signaling for logic, interfacing IONICUBE 1X has been designed to accept these voltages with small adjustments.

TODO. This section updated later.

Dimensions and mounting

IONICUBE 1X can be mounted by screws to a base or with optional DIN rail clips to a standard DIN rail.

To mount in DIN rail, obtain 2 pcs of Phoenix Contact part number 1201578. Such part is available from many distributors including Digikey 277-2296-ND (http://www.digikey.com/scripts/dksearch/dksus.dll?vendor=0&keywords=277-2296-ND)



Dimensions and mounting hole locations

.

Retrieved from "http://granitedevices.com/w/index.php?title=IONICUBE_1X_connectors_and_pinouts&oldid=4048"

Categories: IONI user guide | IONICUBE

- This page was last modified on 8 June 2015, at 14:36.
- This page has been accessed 364 times.