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# Service manual of HCE-IOV-102 and HCE-IOV-201

#### **Overview**

Please read and understand this document before using the products, save this document for later use. Product specifications and accessories may be changed at any time, some specifications of the products may be changed without any notice. This is a generic manual, it's possible that your system is different: follow the instructions in this manual and in other user guides and schematics shipped with your vision system. For further information contact the technical assistance.

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### 1. General features of the modules HCE-IOV-102 and HCE-IOV-201

The modules HCE-IOV-102 and HCE-IOV-201 permits an interface between PC and 8 inputs and 8 digital outputs via USB port.

Is possible to mount the module HCE-IOV-102 on DIN rail.

The outputs and inputs of the module HCE-IOV-102 are optoisolated; the outputs have a temporary overcurrent protection with LED signal up to 400% of output current for up to 2 sec.

The modules are used (depending on version) for the control of a strobe light source, the commands allow to put some outputs in parallel in order to increase their power.

#### 2. Specifications of the HCE-IOV-102 module

#### Power: 24VDC 2A

**Input**: 8 optoisolated digital inputs, a voltage between 10VDC and 30VDC (3-10 mA) is recognized as logical 1, while a voltage between 0 and 3VDC is considered as logical 0. The voltages must be considered respect the 0V which supplies the device. Input filters are programmable from 0.25 mSecs up to 255mSecs

**ATTENTION:** in the communication protocol, inputs and outputs are numbered from 0, also in the label, while on the PCB of the device the numbers starts from 1.

N. input	0	1	2	3	4	5	6	7
Clamp HCE-IOV-102	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8



N. output	0	1	2	3	4	5	6	7
Clamp HCE-IOV-102	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8

**Output**: 8 optoisolated digital outputs (PNP transistor) protected from temporary overcurrent, resistive and inductive load allowed (voltage 24V DC), max current for a single output: 500mA, max current for each output with all outputs turned on: 200mA.



### 3. Specifications in strobe mode HCE-IOV-102-S(H).

The device permits to supply power to LED lamps in strobe mode, also with high current using multiple parallel outputs.

With the MLH command can be configured the high-speed strobe connected directly to the rising edge of an input, the scanning timings of a non filtered input are 0.25mSecs, the minimum duration of a pulse is 200  $\mu$ Secs.

For maximum supportable current look at the table below

**ATTENTION**: the HCE-IOV-102-S module is protected from temporary overcurrent, a continuous overcurrent (more than 2 sec) or a short circuit will irreparably damage the module. <u>These damages are not covered by warranty</u>. The use of the module in overcurrent mode, with variable duty cycles, is under the responsibility of the user.

**ATTENTION**: the HCE-IOV-102-SH module is NOT protected from overcurrent and short circuits. These damages are not covered by warranty.

Duty cycle	HCE-IOV-102-S	HCE-IOV-102-S	HCE-IOV-102-SH	HCE-IOV-102-SH
(cycle duration	Max current on a single	Max global	Max current on a	Max global
<1 sec)	output (all other off, or	supportable	single output (all other	supportable current
	with currents <50 mA)	current	off, or with currents	
			<50 mA)	
> 50%	3 A	3 A	6 A	6 A
20% < 50%	4 A	4 A	8 A	8 A
< 20%	6 A	6 A	10 A	10 A

## 4. Specifications of the HCE-IOV-201 module





**Power**: from USB

**Input**: 8 TTL digital inputs, input filters are programmable from 0.25 mSecs up to 255mSecs.

**Output**: 8 TTL digital outputs (10mA). **ATTENTION**: the HCE-IOV-201 is not optoisolated and is sold as electronic component, <u>damages caused by</u> <u>electrostatic discharges or wrong</u> <u>connections are not covered by warranty</u>. The terminals of the module have in sharing the 0V of the ground with the 0V of the USB port. Without an inside insulation, these terminals expose the PC to potential risks, because there is a direct connection.

In case of unexpected return of voltages there can be damages to the module and the PC.



### 5. Power supply of the HCE-IOV-102-S(H) module.

HCE-IOV-102-S and HCE-IOV-102-SH modules may also work with USB unplugged.

**ATTENTION**: When the product is used with the USB port connected, remove the jumpers OVER and JPOWER, otherwise malfunctions may occur to the PC, a temporary use is accepted by the pc for a few minutes..

**ATTENTION**: **If JPOWER jumper is connected also the OVER jumper must be connected**, otherwise malfunctions may occur to the PC and the module. <u>These damages are not covered by warranty.</u>



## 6. Insulation of the HCE-IOV-102 module

Is possible to remove the optoisolation between the external 0V and the 0V of the PC by connecting the *OVER* jumper. This will reduce the problems of interference in case there are large and instable differences of potential between external 0V and the 0V of the PC.

#### 7. Summary table of the jumpers.

The OVER jumper connects the internal 0V (PC-USB) to the external 0V (24V DC).

The *JPOWER* jumper supplies the power to the microprocessor module when USB port isn't connected to the PC.

Below there is a table of the combination of jumpers.

Description	Factory Settings	OVER	JPOWER
The device is optoisolated and the CPU is powered by PC	HCE-IOV-102-L	NO	NO
The device isn't optoisolated (USB 0V is connected to		YES	NO
external 0V) and the CPU is powered by PC			
The device isn't optoisolated (USB 0V is connected to	HCE-IOV-102-S(H)	YES	YES
external 0V) and the CPU is powered by external 24V			
(lowered to 5V)			
WRONG AND DANGEROUS COMBINATION		<mark>NO</mark>	<b>YES</b>



#### 8. Drivers install and electronic connections.

Download the updated drivers from site: <u>www.vea.it</u>. The driver can be found on products/optics and other/IO device menu (In english: <u>http://www.vea.it/sito2010/prodotti/varie/IO/io\_en.htm</u>). Unzip the files in a temporary directory (e.g.: "c:\temp").

#### ATTENTION: follow the steps below in the right order:

- 1. connect the device to the power supply unit (24V), connecting the negative terminal first (0V)
- 2. connect the device to the PC with a USB cable (not included in the product).

The connection between PC and the device needs an USB cable. This cable is like that used in printers, namely: Type A connector on the PC side and Type B connector on the IO side.

In factory automation we recommend using the cable HAC-IOV-180 with double-ferrite, with high impedance, which reduces the signal losses caused by electromagnetic interference.

#### ATTENTION: tips to reduce interference for industrial use.

In factory automation, there may be devices that emit electromagnetic interference.

- For this reason, for a continuous operation of the product we give the following advice:
- Do not route the USB cable along with outgoing cables from the inverter, motor drives, robots, and other power devices
- do not put the HCE-IOV device near inverters, motor drives, power robots.
- Do not use USB cables for PC office.
- Do not use USB cables longer than 2 m
- in case of heavy and unstable potential differences between the PC and 0V external, can cause interference, you can put the OVER jumper (see Chapter 6).

Type A connector of the USB cable. Connect to the Vision System



Type B connector of the USB cable. Connect to the **HCE-IOV-101** module



Wait for device detection.

On Windows XP, the following screens will appear, respond as indicated in the yellow ovals.

Installazione guidata nuovo hardware Installazione guidata nuovo hardware Verrà effettuata una ricerca di software attuale e aggiornato nel computer, nel CD di installazione dell'hardware o nel sito Web di Windows Update (con l'autorizzazione dell'utente). Leggere l'informativa sulla privacy Installazione guidata nuovo hardware. Consentire la connessione a Windows Update per la ricerca di software? C Sì, solo in questa occasione Questa procedura guidata consente di installare il software per: oni volta che viene connessa una periferica VEA IO No, non ora Se la periferica è dotata di un CD o un disco floppy di installazione, inserirlo nell'apposita unità. Scediere Avanti per continuare < II dietro Avanti > / Annulla Scegliere una delle seguenti opzioni: O lestalla il solivvare automaticamente (socila comiglista) Installazione guidata nuovo hardware. Installa da un elenco o percorso specifico (per utenti esperti) Selezionare le opzioni di ricerca e di installazione. E Solo Per continuare, scegliere Avanti. < Indie o Avanti > Annulla C Ricerca il miglior driver disponibile in questi percorsi. Utilizzare le caselle di controllo che seguono per limitare o espandere la ricerca predefinita, che include percorsi locali e supporti rimovibili. Il miglior driver disponibile verrà installato. 🔲 Cerca nei supporti rimovibili (unità floppy, CD-ROM...) Includi il seguente percorso nella ricerca. Installazione guidata nuovo hardware. (CAN) такина Сталана с Cfoglia Selezionare il driver di periferica da installare per l'hardware. Non effettuare la ricerca. La scelta del driver da installare verrà effettuata manualmente. Scegliere questa opzione per selezionare da un elenco il driver di periferica. Il driver contenuto nell'elenco potrebbe non essere quello più aggiornato per la periferica. Selezionare il produttore e il modello della periferica hardware, quindi scegliere Avanti. Se si dispone di un disco contenente il driver da installare, scegliere Disco driver. 3 Mostra hardware compatibile < Indiet Avanti > Annulla Modello VEA IO Installazione da disco floppy x Inserire il disco di installazione e assicurarsi che sia OK selezionata la corretta unità. 🚹 Driver senza firma digitale. Disco driver... Annulla Informazioni sulla firma del driver < Indie ro Avanti > Annulla Copiare i file del produttore da: Individua file ? × Sfoglia. C:\temp Cerca in: 🛅 temp - 🖸 🗘 🖻 🖽 🚞 amd64 **i**386 Itdibus.inf Itdiport.inf Nome file: ftdibus.inf • Apri Informazioni di installazione (\* inf) 🔟 🔄 Minulla <u>T</u>ipo file:





Everything should be done two times, once for the driver and once for the physical emulation of the serial port.



## 9. Serial port configuration

The module emulates a serial port of your PC, for know which "COM " is emulated go on the "My Computer " icon, right click on this icon, "properties", "Hardware", "Device Manager" button.



**ATTENTION**: every new device is detected with a different COM number; this is done to allow the connection of multiple IO devices. To force the number of COM go on the "VEA I / O ", double click of the mouse, on the window select "Port Settings", "Advanced" button and select the COM number, then click OK. We recommend forcing the port number if you do not plan future expansions, in this way, if there will be a module replacement, the COM port number will remain the same.

In case of a new install of the device or an additional module install, the computer will require new drivers, so it's good to keep them always available, we suggest using our driver and do not perform the automatic search of the driver of Windows, it is possible that compatible drivers, but with different features than the drivers provided, will be installed. The device operates at **115200 baud 8N1 without flow control**.



## 10. Use of HyperTerminal

To test the module I / O can use Windows HyperTerminal (in Windows XP is under Programs / Accessories / Communications, does not exist in Vista and Windows 7, can be downloaded from internet) configure it in this way:

Menu "File> Properties" "Connect To"and select the modem port of the device.

oprietà - COM4	?
Impostazioni della porta	
Bit per secondo: 115200	•
Bjt di dati: 8	•
Parità: Nessuno	•
Bit di <u>s</u> top: ┃	•
Controllo di flusso: Nessuno	
	ipristina
OK Annulla	Applica



Press the "Configure" and set the fields as in the picture, then press OK

Go to "Settings " and press the "ASCII Setup"as described in the picture below.

oprietà - 115200 io-vea	?
Connetti a Impostazioni	
Tasti funzione, di direzione e combinazioni con C • Tasti terminale • Tasti Windows	TRL agiscono come -
II tasto BACKSPACE trasmette	
CTRL+H C CANC C CTRL+H	, spazio, CTRL+H
Emulazione:	
Rilev. aut.	Imposta terminale
ID del terminale Telnet: ANSI	
Buffer per scorrimento all'indietro: 500	
Emetti segnale acustico alla connessione o dis	connessione
Converti input   Impostaz	ioni ASCII
OF	K Annulla

Set the fields as in Figure on the left, then press OK



#### 11. I/O Protocol

Legend:

<CR>: control character equivalent to code ASCII=13 [n]: variable code, usually "n" is a number "standard replies": \$ = ok ? = error (if [ASCII mode = on] must be followed by <CR>)

Note: in ASCII MODE=ON every number is readable otherwise must be considered as ASCII code, tutti i numeri sono leggibili altrimenti sono da intendersi come codice ascii, for example the same command (in BASIC string): ASCII=on "w26"+chr\$(13)

ASCII=off "w" + chr\$(26)

Note: commands that start with M are always considered as ASCII = on, also in ASCII=off mode.

Command	Description	Return
?	Device identification	V1.13 VEA USB I/O <cr></cr>
MA[n] < CR >	n=0 : ASCII mode OFF, n=1: ASCII mode ON (default ascii=1)	standard
MDDI <cr></cr>	Return the number of digital inputs	[n] <cr></cr>
		e.g.: 8 [CR])
MDDO <cr></cr>	Return the number of digital outputs.	[n] <cr></cr>
		e.g.: 8 [CR])
MER <cr></cr>	The following commands are read from the EEPROM:	standard
(from ver. 1.13)	MA, MF, MI, MKIW, MLH, MMIW	
MEW <cr></cr>	The following commands are written to EEPROM:	standard
(from ver. 1.13)	MA, MF, MI, MKIW, MLH, MMIW	
	ATTENTION: Writing to EEPROM takes about 300 mSecs, in	
	the meantime, the module will not process any command	
$MF[f] \leq CR >$	Inputs filter, [f] set me mSecs of the filter	standard
	e.g.: MF100 <cr></cr>	
	sets a filter on the inputs of 100 mSecs	
	Max value: 255 mSecs	
	Min value: 0 mSecs (equivalent to approximately 0.25 mSecs)	
MI	Interrupt mask (also with (ascii=off))	standard return to the command
	MI[p(nnn)]/[d(nnn)] <cr>: set the interrupt mask for each port,</cr>	
	e.g.: « MI0/255 <cr> » ensures that all inputs on port 0 (first</cr>	every change of state of an input
	port) generate an interrupt	contained in the interrupt mask
		(ascii=off) ![d] 2 bytes
	default: no interrupts for inputs	(ascii=on) ![d(nnn)] <cr></cr>
		for the meaning of [d] see
		command "w"



Command	Description	Return
MKN[n] <cr></cr>	Internal numerical key	[n] <cr></cr>
	[n]= integer number to be converted	es: 49847891 [CR])
	returns an unambiguous number (the coding is the same for all	
	modules)	
	e.g.: "MKN541 <cr>"</cr>	
	(upon request, the numerical key can be customized)	
MKIW[n] <cr></cr>	Writes a configurable numerical key	standard
	[n]= integer number to store	
	e.g.: "MKIW1234 <cr>"</cr>	
	ATTENTION: the key will be saved in EEPROM	
MKIR[n] <cr></cr>	Configurable numerical key	[n] <cr></cr>
	[n]=integer number to be converted	es: 112822816 [CR]
	returns an unambiguous number (the coding depends on the	
	number stored with the function MKIW)	
	e.g.: "MKIR541 <cr>"</cr>	
MLH[i][p][u]	High speed strobe (in microseconds)	standard
<cr></cr>	[i]= trigger input for the pulse	
	[p]=byte of the port 0 (0= strobe disabled)	
	[u]=impulse duration in microSecs (range from 200 to 200000)	
	e.g.: "MLH 4 15 500 <cr>"</cr>	
	when the input 4 switches to high, the outputs 0,1,2,3,	
	corresponding to the decimal number 15, turn on for 0.5 mSecs	
	ATTENTION: This instruction has priority over any other	
	function of the module; during the pulse the module can not	
	perform any action, so other commands can not operate	
	correctly during the pulse.	
MLR <cr></cr>	Turns off all flashing/strobe	standard
MLS[n][u][d]	Flashing or strobe	standard
<cr></cr>	[n]=output number 0 – 71	
	[u]=time ON in mSecs (0= turns off the flashing or the pulse)	
	[d]=time OFF in mSecs (0= unique pulse)	
	e.g.: "MLS 2 1000 1000 <cr>"</cr>	
	flashing on output 2	
MLGS[n1][n2][u]	Flashing/strobe group	standard
[d] < CR >	[n1]=first output number $(0 - 71)$	
	[n2]=last output number $(0 - 71)$	
	[u] = time ON in mSecs (0= turns off the flashing or the pulse)	
	[d]= time OFF in mSec (0= unique pulse)	
	e.g.: "MLGS 0 7 10 0 <cr>"</cr>	
	strobe pulse on outputs from 0 to 7, duration 10 mSecs	

To use the codes of the keys is recommended to store a number of sequences "number to be transformed", "number transformed" and build a program that requires them randomly.

Command	Description	Return
MMIR <cr></cr>	Reads an integer number without sign Returns the number memorized with function MMIW	[n] <cr> e.g.: 1234 [CR]</cr>
MMIW[n] <cr></cr>	Writes an integer number without sign e.g.: "MMIW1234 <cr>"</cr>	standard



MMDRESET <cr></cr>	Restores the default values except the numerical keys.	standard
(from ver. 1.13)	ATTENTION: the values stored in the EEPROM will not be	
	modified	
MRIG[n1][n2]	Reads the input associated to an interrupt for a group of port	for each input contained in the
<cr></cr>	Returns the actual values in interrupt format	interrupt mask
	[n1]=number of the first port $(0-8)$	(ascii=off) ![d] 2 bytes
	[n2]=number of the last port $(0-8)$	(ascii=on) ![d(nnn)] <cr></cr>
	e.g.: "MRIG 0 2 <cr>"</cr>	for the meaning of [d] see the
	reads the input linked to interrupt on the ports 0,1,2	command "w"
MTR <cr></cr>	Time from power on, in mSecs	[n] <cr></cr>
		e.g.: 3451234 [CR]
MTT <cr></cr>	Returns the number of the pulse per second used in the high	[n] <cr></cr>
	speed mode	e.g.: 1430615[CR]

Comando	Descrizione	Risposta
W	Writes a byte on the outputs	standard
	(ascii=off) W[p][d]: writes a byte (p=port, d=data) 3 bytes total.	
	(ascii=on) W[p(nnn)]/[d(nnn)] <cr>: writes a byte</cr>	
	ego. « W0/23 <cr> » writes 23 on the port 0 (the first port)</cr>	
	note: separator "/" can also be a space	
W	Writes an output	standard
	(ascii=off) w[d=(0-127)]: set 0 on the corresponding output (up to 15	
	ports: 0-7 port 0, 8-15 port 1, etc) 2 bytes total	
	(ASCII=off) w[d=(128-255)]: set 1 on the corresponding output (up to	
	15 ports: 128-135 port 0, 136-143 port 1, etc.)	
	(ASCII=on) w[d=(0-127)] <cr>: set 0 on the corresponding output</cr>	
	(up to 15 ports: 0-7 port 0, 8-15 port 1, etc.)	
	(ASCII=on) w[d=(128-255)] <cr>: set 1 on the corresponding output</cr>	
	(up to 15 ports: 128-135 port 0, 136-143 port 1, etc.)	
R	Reads the input one byte at a time	(ascii=off) [d] the data in one
	(ascii=off) R[p]: reads one byte (p=port) 2 bytes total.	byte
	(ascii=on) R[p(nnn)] <cr>: reads one byte (p=port)</cr>	(ascii=on) [d(nnn)] <cr></cr>
	e.g. « R1 <cr> » reads from port 1 (the second port)</cr>	
r	Reads an input	0 (off)
	(ASCII=off) r[d=(0-127)]: reads the corresponding input (up to 15	1 (on)
	port: 0-7 port 0, 8-15 port 1, etc.) 2 bytes total	
	(ASCII=on) r[d=(0-127)] <cr>: reads the corresponding input (up to</cr>	
	15 ports: 0-7 port 0, 8-15 port 1, etc.)	

<u>Please Note:</u> The module is sold in various versions depending on the country and uses, it is possible that some commands are not available for the version you purchased.



## 12. Summary Specifications HCE-IOV-102.

product type	industrial optoisolated usb i/o
fixing	din rail
number of inputs	8 PNP (0V common)
number of outputs	8 PNP (0V common)
optoisolation	1000V
maximum current for a single output ON(the others OFF) ver. L	1,5 A
maximum current for a single output ON (the others OFF) ver. S	3 A
maximum current for a single output ON (the others OFF) ver. SH	6 A
maximum current for a single output ON (all outputs ON) ver. L	250 mA at 30° - 200 mA at 50°
maximum current for a single output ON (all outputs ON) ver. S	375 mA at 30° - 250 mA at 50°
maximum current for a single output ON (all outputs ON) ver. SH	750 mA at 30° - 500 mA at 50°
supply voltage	12 – 30 V (typical 24V)
PC interface	USB 1.1
dimension	70 x 91 x h 63 mm
weight	123 g
operating temperature range	0° 55°
storage temperature range	-30° 70°
relative humidity	max 90% at 25°C (77°F)

## 13. Summary specification HCE-IOV-201.

product type	usb i/o microcircuit
fixing	pin or 2 holes
number of inputs	8 TTL
number of outputs	8 TTL
maximum current on a single output	10 mA
supply voltage	USB (5V)
PC interface	USB 1.1
dimension	54,7(without USB connector) x 24,2 x h
	7,5 (13,5 with pin connector) mm
weight	9 g
operating temperature range	0° 55°
storage temperature range	-30° 70°
relative humidity	max 90% a 25°

Features may change without notice.