

# MANUAL

## TCP SERIAL-BRIDGE



# SPIDER<sub>NET</sub>

<b>Title</b>	
TCP Serial-Bridge	
<b>Project</b>	
SPIDERnet®	
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## Terms and abbreviations

**SPIDERnet®-Server / SPIDERnet®** - stands for Simplified Platform Independent Data Exchange Relays – a new universal data exchange platform which is used in automation systems.

**ASCII** – stands for American Standard Code for Information Interchange – a format which represents data as symbols (e.g. symbols as “A” to “Z” or “0” to “9”). It shows how symbols are displayed in the computer language.

**Hex** – hexadecimal – This format represents data as a hexadecimal code. It is often used to display binary data in a more readable way. The advantage of the hexadecimal system is that every byte (8 bit) is shown individually as two hexadecimal numbers (e.g. hex 3F = decimal 63 = binary 00111111).

**Line termination or end-of-line** – the way in which text lines are divided in the computer display.

**CR** – Carriage Return - (ASCII CR = HEX 0D) – this string moves the cursor to the beginning of the line without going to the next line. It is often used for line-termination.

**LF** – Line Feed - (ASCII LF = HEX 0A) – this string moves the cursor down to the next line without going back to the beginning of the line. It is often used for line-termination.

**CRLF** – Combination of CR, followed by LF – moves the cursor to both directions: down to the next line as well as to the beginning of the line. It is often used for line-termination.

## 1 The objective of the document

The purpose of this document is to provide a step by step instruction which describes the installation and usage of TCP Serial-Bridge.

## 2 Application description

TCP Serial-Bridge is a software tool which allows you to make a serial port available via the existing infrastructure in the network without using an additional hardware device. You can use the software locally or via the network. If you use the software locally, you should pay attention to the IP address of your local COM port (by default 127.0.0.1). The serial port is assigned to a specific TCP port so that data can be transmitted between them.

Please refer to chapter **7 Byte processing in TCP Serial-Bridge** for more detailed information about the data transfer.

## 3 System requirements

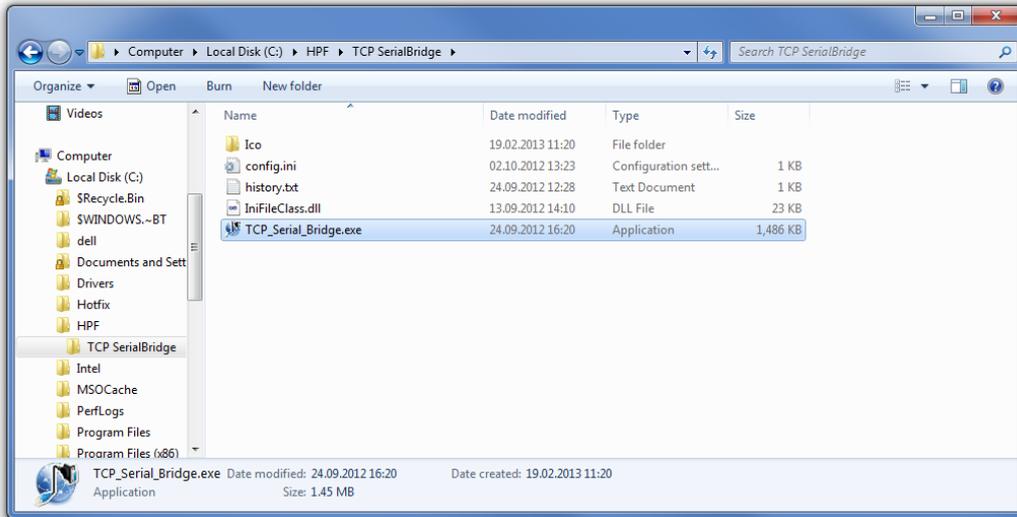
The computer on which you want to install TCP Serial-Bridge should have a COM port or an adapter from USB to COM port.

The **.net Framework Version 3.5** has to be installed on your computer in order to start TCP Serial-Bridge. Check your framework version in the register of your computer:  
`C:\WINDOWS\Microsoft.NET\Framework\ v.?`

TCP Serial-Bridge can be performed in the operating system Windows 2000 SP 4 to 7.

## 4 Installation

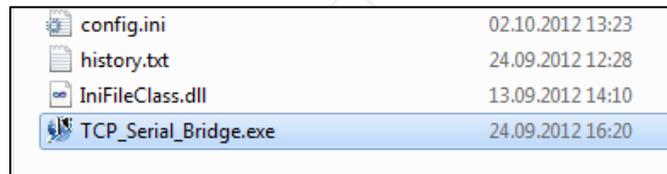
There is no installation for TCP Serial-Bridge required. Just copy the whole folder in a path of your choice.



ill. 1 TCP Serial Bridge Data

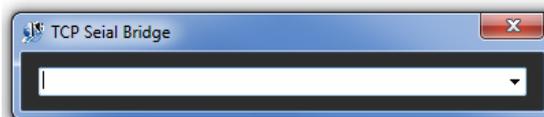
## 5 Startup procedure

Start the program by double clicking the file *TCP\_Serial\_Bridge.exe*.



ill. 2 Start TCP Serial-Bridge

TCP Serial-Bridge appears as window on the desktop and as small icon in the task bar.



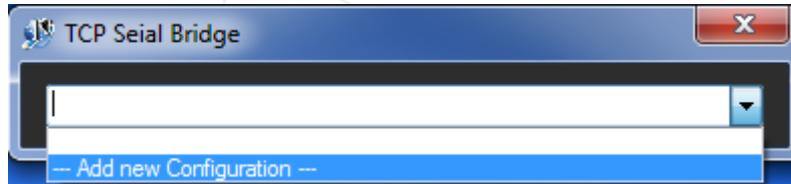
ill. 3 Project selection window



ill. 4 Icon in the task bar

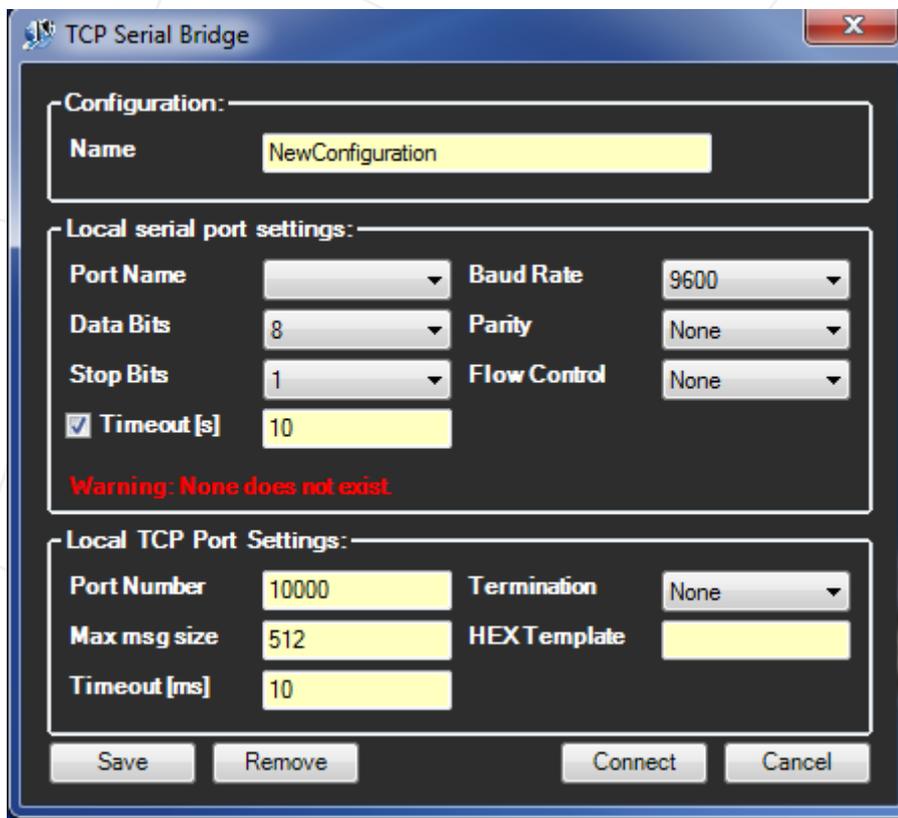
## 5.1 Create a new configuration

Click the arrow on the right side and select --- *Add new configuration* --- from the drop-down menu.



ill. 5 Create a new configuration

Then the menu for the project settings should appear on your screen.



ill. 6 Configuration settings

The menu window is divided into 3 categories: *Configuration*, *Local Serial Port Settings* and *Local TCP Port Settings*.

**Configuration Name:** You need to state a project name in order to distinguish the different configurations. Later you can find the configuration under the stated name and make changes.

The next step is to make the settings for the local serial port.

## 5.2 Local Serial Port Settings

### Basic parameters

You have to customize the following parameters.

**Port Name:** Select a port (e.g. COM1).

**Data Bits:** You can parameterize 7 (e.g. ASCII) or 8 data bits depending on the connection type.

**Stop Bits:** The Stop bit is scheduled for the identification of the end-of-message. You can select between one and two Stop bits.

**Timeout:** The Timeout states how many seconds after a data transfer interruption it takes until the activity of the serial port is checked. You can activate this function optionally.

**Baud Rate:** The baud rate states the transfer speed per second in bits.

**Parity:** The parity is used for the safety of the data transfer. The Parity bit is set per mode and number of the binary "1" in the message which is to be transferred. You can select between the modes *Even*, *Odd* and *None*.

**Flow Control:** The dataflow control. As the reception buffers are limited there might be a need for dataflow control. You can activate it via Xon/Xoff signal in the software or via handshake lines (RTS/DTS) in the hardware.

Afterwards you should customize the TCP settings.

## 5.3 Local TCP Port Settings

### Basic parameters

**Port Number:** can be defined freely (e.g. 10000). You need to configure the firewall if you want to access it from the network.

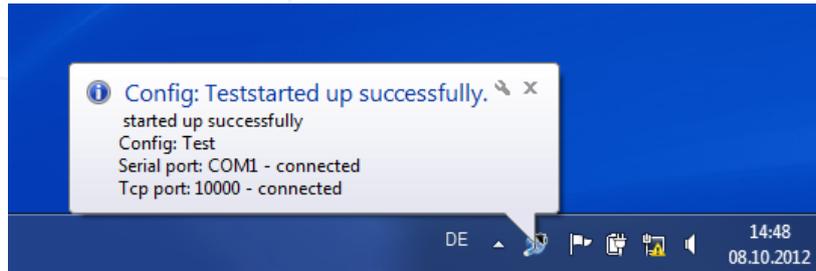
**Max Msg Size:** Accordingly to the maximum size of the message in bit. If the message you want to send is bigger than the stated size, it will be transferred in multiple blocks. The size is freely selectable.

**Timeout:** After this time period the by now accumulated message will be sent (if it is smaller than the maximum message size and no termination was identified).

**Termination:** Is the character string which is used to complete the message. You can select from *CR*, *LF*, *CRLF* and a self-chosen termination sequence *Custom* which can be entered in the *HEX Template* (as HEX string).

**HEX Template:** Here you can state your own hexadecimal coded termination sequence according to the *Termination*.

Afterwards you should save the configuration by clicking the *Save* button. Then you can establish a connection by clicking the *Connection* button.



ill. 7 Connection was established successfully

TCP Serial-Bridge was started successfully. The notification window informs you if a connection between the serial port and the TCP port was possible via the application.

Please refer to chapter **8 Troubleshooting** if a connection problem occurs.

## 6 Start TCP Serial-Bridge with an existing configuration

If you started TCP Serial-Bridge before and already created a saved configuration you will have two options to open it.

**Option 1:** Select the configuration manually.



ill. 8 Select an available configuration

After you started **TCP\_Serial\_Bridge.exe**, click on the arrow and select a name from the list.

**Option 2:** Start the program via command line parameter.

The following command line parameter is provided.

`-config <name>`

Whereas <name> is your configuration name.

You can create shortcuts for the usage of this option.

Click the right mouse button on the file **TCP\_Serial\_Bridge.exe**.

→ "Create shortcut".

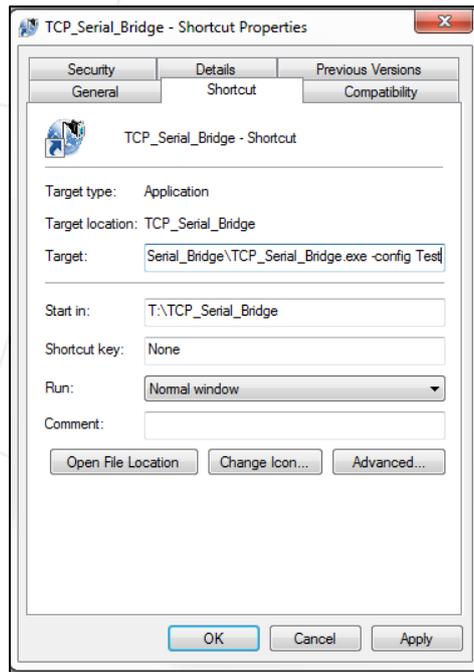
Click the right mouse button on the created shortcut

→ "Properties"

→ "Shortcut"

→ "Target field"

→ add `-config <Name of the project>` after `...\\TCP_Serial_Bridge.exe`  
(e.g. `TCP_Serial_Bridge.exe - config Test`).

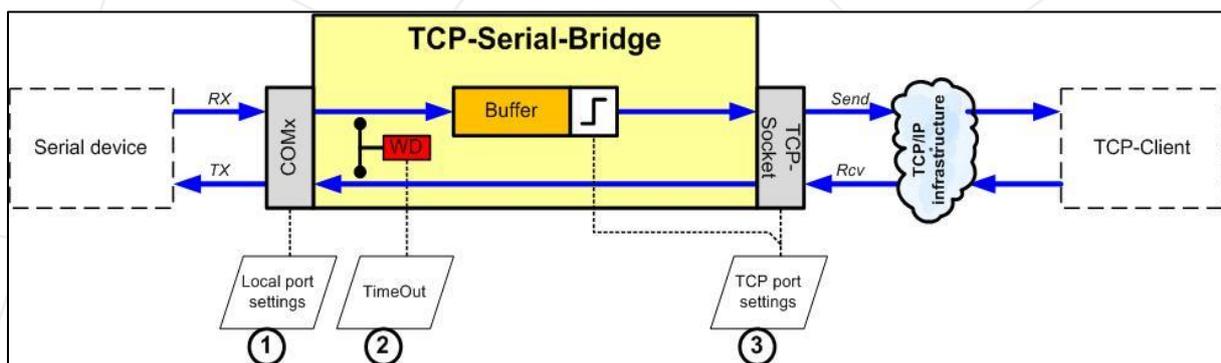


ill. 9 Shortcut settings

## 7 Byte processing in TCP Serial-Bridge

The Byte processing in TCP Serial-Bridge is based on the TCP/IP protocol (a connection oriented transport protocol). The data transfer between the sender and the addressee is performed bidirectional via a software interface which is called socket. You need the IP and the port of both participants in order to establish a connection between the server and the client.

The following illustration displays the Byte processing in TCP Serial-Bridge and briefly explains the particular processes in the data transfer.



ill. 10 Structure of the Byte processing in TCP Serial-Bridge

**Direction 1:** The Serial Device sends the data to the COM port (RX). The COM port passes them to the buffer which accumulates the data in order to achieve higher data transfer efficiency. As soon as it receives a transmission trigger, the buffer packs the data to a data package and passes it on to the TCP socket. Then the TCP socket transmits the data via a TCP/IP infrastructure to the TCP client.

**Direction 2:** The TCP client packs the data to a data package and sends it via TCP/IP infrastructure to the TCP socket. The TCP socket passes the data to the TCP Serial-Bridge which extracts the user

data and sends it to the COM port. The particular bytes will now be sent from the COM port to the Serial Device.

**1 – Local Port Settings:** contain

- Port Name
- Data Bits
- Stop Bits
- Timeout
- Baud Rate
- Parity
- Flow Control

You can find more detailed information about the particular settings in chapter **5.2 Local Serial Port Settings**.

**2 – TimeOut:** The Watch Dog monitors the data transfer regarding occurring blackouts. If you activated Timeout in the *Local Serial Port Settings* and the data transfer is interrupted for longer than the stated time, the Watch Dog is activated and it checks if the serial port is still available.

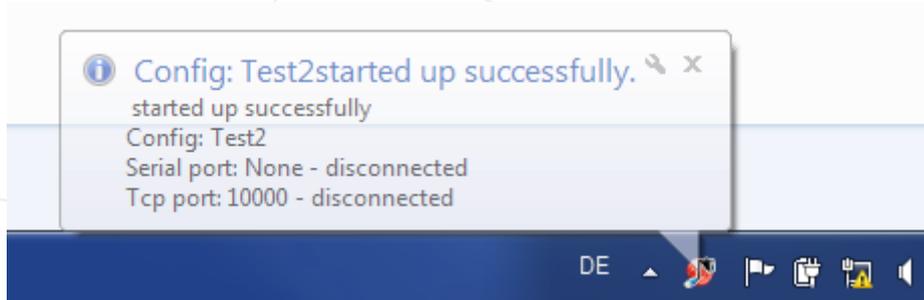
**3 – TCP Port Settings:** contain

- Port Number
- Max Msg Size
- Timeout
- Termination

You can find more detailed information about the particular settings in chapter **5.3 Local TCP Port Settings**.

## 8 Troubleshooting

The red blinking TCP Serial-Bridge symbol in the task bar and a notification inform you about a communication interruption.



ill. 11 Text about the Tray Icon while communication is interrupted

Error	Possible reasons	Solutions
TCP Serial-Bridge is started successfully but the connection to one or more ports was not established.	1. You did not enter a port in the <i>Local Serial Port Settings</i> .	Open your configuration and select a port in the <i>Local Serial Port Settings</i> (e.g. COM1).
	2. If you use an adapter from USB to COM port, it is possible that the adapter did not establish a connection.	Check if the adapter fits correctly and therefore the connection to the COM port is possible.
It is not possible to save the configuration (the configuration was not entered in the config file)	You did not state a configuration name.	Create a new configuration and enter the name in <i>Configuration</i> → <i>Name</i> .

## 9 Automatic reconnection

If the connection was interrupted, TCP Serial-Bridge automatically tries to reconnect in a certain period of time.

TCP Serial-Bridge waits for the port to answer within the *Timeout* interval, which was entered in the *Local Serial Port Settings*. If it receives no answer, you will get a notification in the task bar regarding troubleshooting.

TCP Serial-Bridge will reestablish the communication automatically as soon as the problem is solved. You do not have to restart the application. After the reconnection you will see a TCP Serial-Bridge notification which informs you that TCP Serial-Bridge was started successfully.

## Attachment I

### Decimal-Hexadecimal-ASCII (Character) Conversion Table

Source: <http://www.lookuptables.com/>.

Dec	Hx	Oct	Char	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr
0	0	000	<b>NUL</b> (null)	32	20	040	&#32;	Space	64	40	100	&#64;	@	96	60	140	&#96;	`
1	1	001	<b>SOH</b> (start of heading)	33	21	041	&#33;	!	65	41	101	&#65;	A	97	61	141	&#97;	a
2	2	002	<b>STX</b> (start of text)	34	22	042	&#34;	"	66	42	102	&#66;	B	98	62	142	&#98;	b
3	3	003	<b>ETX</b> (end of text)	35	23	043	&#35;	#	67	43	103	&#67;	C	99	63	143	&#99;	c
4	4	004	<b>EOT</b> (end of transmission)	36	24	044	&#36;	\$	68	44	104	&#68;	D	100	64	144	&#100;	d
5	5	005	<b>ENQ</b> (enquiry)	37	25	045	&#37;	%	69	45	105	&#69;	E	101	65	145	&#101;	e
6	6	006	<b>ACK</b> (acknowledge)	38	26	046	&#38;	&	70	46	106	&#70;	F	102	66	146	&#102;	f
7	7	007	<b>BEL</b> (bell)	39	27	047	&#39;	'	71	47	107	&#71;	G	103	67	147	&#103;	g
8	8	010	<b>BS</b> (backspace)	40	28	050	&#40;	(	72	48	110	&#72;	H	104	68	150	&#104;	h
9	9	011	<b>TAB</b> (horizontal tab)	41	29	051	&#41;	)	73	49	111	&#73;	I	105	69	151	&#105;	i
10	A	012	<b>LF</b> (NL line feed, new line)	42	2A	052	&#42;	*	74	4A	112	&#74;	J	106	6A	152	&#106;	j
11	B	013	<b>VT</b> (vertical tab)	43	2B	053	&#43;	+	75	4B	113	&#75;	K	107	6B	153	&#107;	k
12	C	014	<b>FF</b> (NP form feed, new page)	44	2C	054	&#44;	,	76	4C	114	&#76;	L	108	6C	154	&#108;	l
13	D	015	<b>CR</b> (carriage return)	45	2D	055	&#45;	-	77	4D	115	&#77;	M	109	6D	155	&#109;	m
14	E	016	<b>SO</b> (shift out)	46	2E	056	&#46;	.	78	4E	116	&#78;	N	110	6E	156	&#110;	n
15	F	017	<b>SI</b> (shift in)	47	2F	057	&#47;	/	79	4F	117	&#79;	O	111	6F	157	&#111;	o
16	10	020	<b>DLE</b> (data link escape)	48	30	060	&#48;	0	80	50	120	&#80;	P	112	70	160	&#112;	p
17	11	021	<b>DC1</b> (device control 1)	49	31	061	&#49;	1	81	51	121	&#81;	Q	113	71	161	&#113;	q
18	12	022	<b>DC2</b> (device control 2)	50	32	062	&#50;	2	82	52	122	&#82;	R	114	72	162	&#114;	r
19	13	023	<b>DC3</b> (device control 3)	51	33	063	&#51;	3	83	53	123	&#83;	S	115	73	163	&#115;	s
20	14	024	<b>DC4</b> (device control 4)	52	34	064	&#52;	4	84	54	124	&#84;	T	116	74	164	&#116;	t
21	15	025	<b>NAK</b> (negative acknowledge)	53	35	065	&#53;	5	85	55	125	&#85;	U	117	75	165	&#117;	u
22	16	026	<b>SYN</b> (synchronous idle)	54	36	066	&#54;	6	86	56	126	&#86;	V	118	76	166	&#118;	v
23	17	027	<b>ETB</b> (end of trans. block)	55	37	067	&#55;	7	87	57	127	&#87;	W	119	77	167	&#119;	w
24	18	030	<b>CAN</b> (cancel)	56	38	070	&#56;	8	88	58	130	&#88;	X	120	78	170	&#120;	x
25	19	031	<b>EM</b> (end of medium)	57	39	071	&#57;	9	89	59	131	&#89;	Y	121	79	171	&#121;	y
26	1A	032	<b>SUB</b> (substitute)	58	3A	072	&#58;	:	90	5A	132	&#90;	Z	122	7A	172	&#122;	z
27	1B	033	<b>ESC</b> (escape)	59	3B	073	&#59;	;	91	5B	133	&#91;	[	123	7B	173	&#123;	{
28	1C	034	<b>FS</b> (file separator)	60	3C	074	&#60;	<	92	5C	134	&#92;	\	124	7C	174	&#124;	
29	1D	035	<b>GS</b> (group separator)	61	3D	075	&#61;	=	93	5D	135	&#93;	]	125	7D	175	&#125;	}
30	1E	036	<b>RS</b> (record separator)	62	3E	076	&#62;	>	94	5E	136	&#94;	^	126	7E	176	&#126;	~
31	1F	037	<b>US</b> (unit separator)	63	3F	077	&#63;	?	95	5F	137	&#95;	_	127	7F	177	&#127;	DEL

Source: [www.LookupTables.com](http://www.LookupTables.com)

128	Ç	144	É	160	á	176	⋯	192	⊥	208	⊥	224	α	240	≡
129	ü	145	æ	161	í	177	⋮	193	⊥	209	⊥	225	β	241	≠
130	é	146	Æ	162	ó	178	⋮	194	⊥	210	⊥	226	Γ	242	≥
131	â	147	ô	163	ú	179		195	⊥	211	⊥	227	π	243	≤
132	ä	148	ö	164	ñ	180	⊥	196	—	212	⊥	228	Σ	244	∫
133	à	149	ò	165	Ñ	181	⊥	197	+	213	⊥	229	σ	245	∫
134	â	150	û	166	ª	182	⊥	198	⊥	214	⊥	230	μ	246	+
135	ç	151	ù	167	º	183	⊥	199	⊥	215	⊥	231	τ	247	±
136	ê	152	ÿ	168	¿	184	⊥	200	⊥	216	⊥	232	Φ	248	°
137	ë	153	Ö	169	⌈	185	⊥	201	⊥	217	⊥	233	⊙	249	.
138	è	154	Ü	170	⌋	186	⊥	202	⊥	218	⊥	234	Ω	250	.
139	ï	155	◊	171	½	187	⊥	203	⊥	219	■	235	δ	251	√
140	î	156	£	172	¼	188	⊥	204	⊥	220	■	236	∞	252	π
141	ï	157	⌘	173	¡	189	⊥	205	=	221	■	237	φ	253	²
142	Ä	158	Ⓔ	174	«	190	⊥	206	⊥	222	■	238	e	254	■
143	Å	159	f	175	»	191	⊥	207	⊥	223	■	239	∩	255	

Source: [www.LookupTables.com](http://www.LookupTables.com)

Decimal-Hexadecimal-Octal-Binary Conversion table

Source: <http://www.docstoc.com>.

Conversion Table – Decimal, Hexidecimal, Octol, Binary

Dec	Hex	Oct	Bin												
0	0	000	00000000	16	10	020	00010000	32	20	040	00100000	48	30	060	00110000
1	1	001	00000001	17	11	021	00010001	33	21	041	00100001	49	31	061	00110001
2	2	002	00000010	18	12	022	00010010	34	22	042	00100010	50	32	062	00110010
3	3	003	00000011	19	13	023	00010011	35	23	043	00100011	51	33	063	00110011
4	4	004	00000100	20	14	024	00010100	36	24	044	00100100	52	34	064	00110100
5	5	005	00000101	21	15	025	00010101	37	25	045	00100101	53	35	065	00110101
6	6	006	00000110	22	16	026	00010110	38	26	046	00100110	54	36	066	00110110
7	7	007	00000111	23	17	027	00010111	39	27	047	00100111	55	37	067	00110111
8	8	010	00001000	24	18	030	00011000	40	28	050	00101000	56	38	070	00111000
9	9	011	00001001	25	19	031	00011001	41	29	051	00101001	57	39	071	00111001
10	A	012	00001010	26	1A	032	00011010	42	2A	052	00101010	58	3A	072	00111010
11	B	013	00001011	27	1B	033	00011011	43	2B	053	00101011	59	3B	073	00111011
12	C	014	00001100	28	1C	034	00011100	44	2C	054	00101100	60	3C	074	00111100
13	D	015	00001101	29	1D	035	00011101	45	2D	055	00101101	61	3D	075	00111101
14	E	016	00001110	30	1E	036	00011110	46	2E	056	00101110	62	3E	076	00111110
15	F	017	00001111	31	1F	037	00011111	47	2F	057	00101111	63	3F	077	00111111

Dec	Hex	Oct	Bin												
64	40	100	01000000	80	50	120	01010000	96	60	140	01100000	112	70	160	01110000
65	41	101	01000001	81	51	121	01010001	97	61	141	01100001	113	71	161	01110001
66	42	102	01000010	82	52	122	01010010	98	62	142	01100010	114	72	162	01110010
67	43	103	01000011	83	53	123	01010011	99	63	143	01100011	115	73	163	01110011
68	44	104	01000100	84	54	124	01010100	100	64	144	01100100	116	74	164	01110100
69	45	105	01000101	85	55	125	01010101	101	65	145	01100101	117	75	165	01110101
70	46	106	01000110	86	56	126	01010110	102	66	146	01100110	118	76	166	01110110
71	47	107	01000111	87	57	127	01010111	103	67	147	01100111	119	77	167	01110111
72	48	110	01001000	88	58	130	01011000	104	68	150	01101000	120	78	170	01111000
73	49	111	01001001	89	59	131	01011001	105	69	151	01101001	121	79	171	01111001
74	4A	112	01001010	90	5A	132	01011010	106	6A	152	01101010	122	7A	172	01111010
75	4B	113	01001011	91	5B	133	01011011	107	6B	153	01101011	123	7B	173	01111011
76	4C	114	01001100	92	5C	134	01011100	108	6C	154	01101100	124	7C	174	01111100
77	4D	115	01001101	93	5D	135	01011101	109	6D	155	01101101	125	7D	175	01111101
78	4E	116	01001110	94	5E	136	01011110	110	6E	156	01101110	126	7E	176	01111110
79	4F	117	01001111	95	5F	137	01011111	111	6F	157	01101111	127	7F	177	01111111

Dec	Hex	Oct	Bin												
128	80	200	10000000	144	90	220	10010000	160	A0	240	10100000	176	B0	260	10110000
129	81	201	10000001	145	91	221	10010001	161	A1	241	10100001	177	B1	261	10110001
130	82	202	10000010	146	92	222	10010010	162	A2	242	10100010	178	B2	262	10110010
131	83	203	10000011	147	93	223	10010011	163	A3	243	10100011	179	B3	263	10110011
132	84	204	10000100	148	94	224	10010100	164	A4	244	10100100	180	B4	264	10110100
133	85	205	10000101	149	95	225	10010101	165	A5	245	10100101	181	B5	265	10110101
134	86	206	10000110	150	96	226	10010110	166	A6	246	10100110	182	B6	266	10110110
135	87	207	10000111	151	97	227	10010111	167	A7	247	10100111	183	B7	267	10110111
136	88	210	10001000	152	98	230	10011000	168	A8	250	10101000	184	B8	270	10111000
137	89	211	10001001	153	99	231	10011001	169	A9	251	10101001	185	B9	271	10111001
138	8A	212	10001010	154	9A	232	10011010	170	AA	252	10101010	186	BA	272	10111010
139	8B	213	10001011	155	9B	233	10011011	171	AB	253	10101011	187	BB	273	10111011
140	8C	214	10001100	156	9C	234	10011100	172	AC	254	10101100	188	BC	274	10111100
141	8D	215	10001101	157	9D	235	10011101	173	AD	255	10101101	189	BD	275	10111101
142	8E	216	10001110	158	9E	236	10011110	174	AE	256	10101110	190	BE	276	10111110
143	8F	217	10001111	159	9F	237	10011111	175	AF	257	10101111	191	BF	277	10111111

Dec	Hex	Oct	Bin												
192	C0	300	11000000	208	D0	320	11010000	224	E0	340	11100000	240	F0	360	11110000
193	C1	301	11000001	209	D1	321	11010001	225	E1	341	11100001	241	F1	361	11110001
194	C2	302	11000010	210	D2	322	11010010	226	E2	342	11100010	242	F2	362	11110010
195	C3	303	11000011	211	D3	323	11010011	227	E3	343	11100011	243	F3	363	11110011
196	C4	304	11000100	212	D4	324	11010100	228	E4	344	11100100	244	F4	364	11110100
197	C5	305	11000101	213	D5	325	11010101	229	E5	345	11100101	245	F5	365	11110101
198	C6	306	11000110	214	D6	326	11010110	230	E6	346	11100110	246	F6	366	11110110
199	C7	307	11000111	215	D7	327	11010111	231	E7	347	11100111	247	F7	367	11110111
200	C8	310	11001000	216	D8	330	11011000	232	E8	350	11101000	248	F8	370	11111000
201	C9	311	11001001	217	D9	331	11011001	233	E9	351	11101001	249	F9	371	11111001
202	CA	312	11001010	218	DA	332	11011010	234	EA	352	11101010	250	FA	372	11111010
203	CB	313	11001011	219	DB	333	11011011	235	EB	353	11101011	251	FB	373	11111011
204	CC	314	11001100	220	DC	334	11011100	236	EC	354	11101100	252	FC	374	11111100
205	CD	315	11001101	221	DD	335	11011101	237	ED	355	11101101	253	FD	375	11111101
206	CE	316	11001110	222	DE	336	11011110	238	EE	356	11101110	254	FE	376	11111110
207	CF	317	11001111	223	DF	337	11011111	239	EF	357	11101111	255	FF	377	11111111