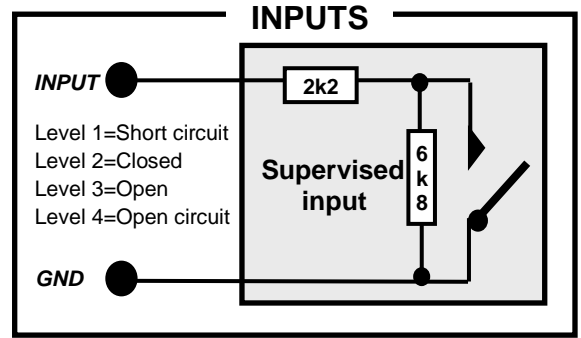
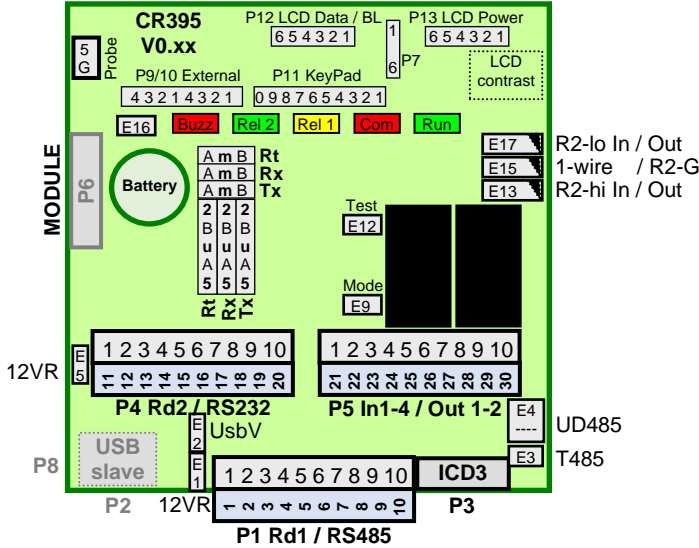


# CR395 CONNECTIONS

Revision 01.0F



LINK	FUNCTION	OPTION
E1	Rd1 12VR	In=12V, Out=via 60R
E2	USB power	In=USB powers
E3	485 termination	In=120R
E4	485 Pull up/down	In =10k
E5	Rd2 12VR	In=12V, Out=via 60R
E6	485/USB/232 RTS	1-2 ComA 485
E7	485/USB/232 RX	2-3 ComA USB
E8	485/USB/232 TX	3-4 ComB USB 4-5 ComB 232
E9	Mode	See table right
E10	Module RTS	1-2 ComB, 2-3 ComA
E11	Module RX	1-2 ComB, 2-3 ComA
E12	Test	See table right
E13	Rd2-Hi In / Out	1-2 Out, 2-3 In
E14	Module TX	1-2 ComB, 2-3 ComA
E15	1-wire / Rd2-Green	1-2 Rd2 green, 2-3 1-wire
E16	RTC Battery	
E17	Rd2-Lo In / Out	1-2 Out, 2-3 In

LINKS on powerup – LCD and LEDs show function		
TEST	MODE	FUNCTION
OUT	IN	ComA=FLAN, 19k2, 9 bit, no parity. Node 2
IN	IN or OUT	Test mode. Node=1 ComA=FLAN, 19k2, 9 bit, no parity ComB=TEST, 9k6, 8 bit, no parity
IN	OUT	LCD and LEDs 1 to 4 show input status, all flash every 2 seconds
IN	OUT to IN	LCD and LEDs Flashes node address 1-15, remove Mode link on required node. Remove Test link to exit (skip mode change)
IN	OUT to IN to OUT	Fast flashes controller mode. Replace Mode link on required mode LED1=FLAN LED2=Convert, LED1+2=LAN master LED3=Controller
IN	IN	Keypad select – Remove Test to default Xcol/Xrow and 4 x 4 - Remove Mode link when
IN	IN to OUT	LED1=Local, LED2=External. LED1+2=Column External While LEDs flash key (0=all flash)

Note 1  
 Select keys 0-9, \*, # and if 4x4 A, B, C, D (if no A to D, wait)  
 Remove test link ends and saves new settings

Note 2  
 No test link, or when remove test link  
 version <006 Node flashes 5x, mode fast flashes 10x  
 version >005 Mode fast flash 5x if not FLAN, Node 5x if FLAN slave/CntP

T	P1	FUNCTION
1	1	Rd1 12VR via E1
2	2	Rd1 Lo / Data
3	3	Rd1 Hi / Clock
4	4	Gnd
5	5	Rd1 Green – Out3
6	6	Rd1 Red – Out4
7	7	12V supply
8	8	RS485 Data
9	9	RS485 /Data
10	10	Gnd

T	P4	FUNCTION
11	1	Rd2 / 1-wire 12VR via E4
12	2	Rd2 Lo / Clock, In/Out5 via E17
13	3	Rd2 Hi / Data, In/Out6 via E13
14	4	Gnd
15	5	Rd2 Green Out 8, 1-wire via E15
16	6	Rd2 Red / Buzzer - Out7
17	7	5V (V1.4) or 12V (Version <1.4)
18	8	RS232 Tx
19	9	RS232 Rx
20	10	Gnd

T	P5	FUNCTION
21	1	Gnd
22	2	Input 1
23	3	Input 2
24	4	Input 3
25	5	Input 4 (parallel with tamper)
26	6	Relay 1 – Out1
27	7	
28	8	Relay 2 – Out2
29	9	
30	10	12V

P3	ICD3
1	/MCLR
2	5V
3	Gnd
4	PGED
5	PGEC
6	NC

P6	MODULE
1	Gnd
2	TX (out)
3	RTS (out)
4	RX (in)
5	5V
6	12V

P6	MODULE
1	Gnd
2	TX (out)
3	RTS (out)
4	RX (in)
5	5V
6	12V

P9	X COLUMN
1	XCol 0
2	XCol 1
3	XCol 2
4	XCol 3

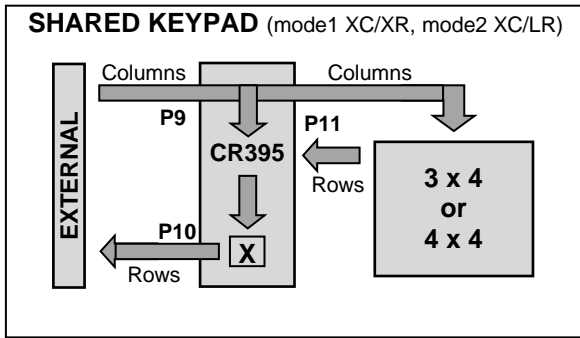
P10	X ROW
1	XRow 0
2	XRow 1
3	XRow 2
4	XRow 3

P11	KEYPAD
1	5V
2	Gnd
3	Row 0
4	Row 1
5	Row 2
6	Row 3
7	Column 0
8	Column 1
9	Column 2
10	Column 3

P12	LCD
1	D4
2	D5
3	D6
4	D7
5	LED+
6	LED-

P13	LCD
1	Gnd
2	5V
3	Contrast
4	RS
5	R/W
6	Ena

# Keypad Matrix



3x4 or 4x4 matrix Keypad connected to P11.  
Any matrix can be used.

The CR395 is set to "Learn Matrix" by power-up with Mode and Test links inserted (see set-up below).

## LOCAL KEYPAD

Columns strobed, and Rows read locally:  
mode0 = LC/LR

## EXTERNAL KEYPAD (shared)

Columns strobed by external system (**P9** duplicated to **P11**):  
mode1 = XC/XR  
mode2 = XC/LR

Rows read by local (**P11**) and external system (**P10**).

Rows to external system directly from keypad to external system:  
mode1 = XC/XR (**X** on)

Rows to external system en/disabled by CR395:  
mode2 = XC/LR (**X** controlled)

In this mode, rows are enabled by the host controller (CR391/2 requires Vend Set-up KeyShare = ID) or when CR395 input 3 is low.

## Keypad Set-up

1. Power off.
2. Insert links Test and mode.
3. Power-up.

If LCD, mode options are displayed

LC/LR (mode 0)  
XC/XR (mode 1)  
XC/LR (mode 2)

LEDs flash mode options

LEDs all on LC/LR (mode 0)  
LED 1 on XC/XR (mode 1)  
LED 1, 2 on XC/LR (mode 2)

4. Remove Mode link when require mode option indicated.

If LCD, Key to press is displayed

LEDs flash Key number to press

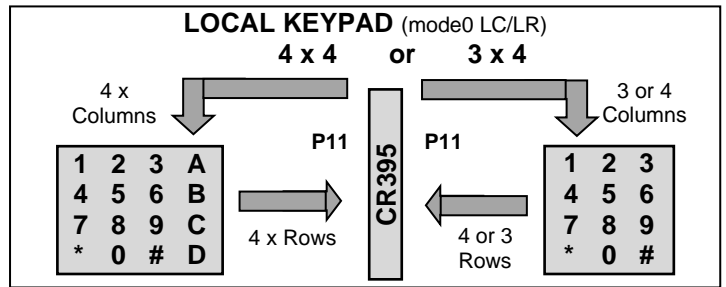
0=All on 1=1 on 2=2 on 3=2,1 on  
4=3 on 5=3,1 on 6=3,2 on 7=3,2,1 on  
8=4 9=4,1 on \*=4,2 on #=4,2,1 on  
A=4,3 on B=4,3,1 on C=4,3,2 on D=4,3,2,1 on

5. Press key indicated. Wait fir timeout if no A, B, C, D.
6. Selecting key is displayed on LCD.
7. Remove test link. Set-up is saved.

## Keypad Cursor

Moving the LCD cursor when host controller edit:

Left \* and 2, or C Right \* and 3, or D  
Down \* and 5, or B Up \* and 6, or A  
# Enter\* Shift (kept in for above) or Exit



**Test link Power-up** COMB defaults to RS232 test (9k6, 8 bit, no parity). Connecting COMB linked as USB or RS232 to a terminal (e.g. Hyperlink on PC) displays BITE (till link removed). Removing (and no power up), displays cards read.

Selecting ? on the terminal shows setup:

FW version and serial number are displayed

**Built In Test (BITE)** When the CR395 is powered-up with the Test link inserted, the BITE is executed:

- Inputs status (open = 1 or closed = 0) is displayed on the LCD and on the LEDs (LED 1 to 4 corresponds to input 1 to 4). All LEDs flash every two seconds.
- Cards that are badged are displayed on the LCD and to the serial port set for Test (connect a PC via USB or RS232 to ComB and run HyperTerminal at 9k600 baud, 8 bit, no parity). The card data is shown in RAW format – the number of bits and the HEX data are displayed. Note the USB cable only inserted one way around – if Widows displays USB unknown, power CR395 down and up. Only run HyperTerminal after USB is detected.
- Selecting Enter in HyperTerminal displays the FW version, the Node and the MAC (ID).

**Setup** Power-up with Test link inserted (BITE), then remove link. Com port B is set to Test (see HyperTerminal below).

**Mode 1: FLAN SLAVE.** CR395 is an I/O expander / HandHeld programmer to a Controller (e.g.CR391) via a RS485 Com port (generally 19k2, 9 bit, no parity) set as type FLAN slave. The FLAN node address is set 1 to 15.

No other settings are used.

**Mode 2: CONVERT.** Reads cards on reader1 and if valid (see reader settings), card data is sent as an ASCII string on the Com port set as Test RS232, as per the serial format.

**Outputs** can be activated on valid read and on 4 (legacy) or 5 ASCII characters from the Com port (terminated with 0Dhex)

O (4Fh),

1 or 2 chars out port 0 to 6 (30h to 36h),

Level 0 (30h off) or 1 (31h on),

1 (30h) to 9 (39h) sec (0=no timeout)

e.g Output 2 on 5 sec OQ215 (4FH, 30H 32H, 31H, 35H, 0DH)

Output 3 off OQ300 (4FH, 30H 33H, 30H, 30H, 0DH)

Current status can be requested by Opp (pp output port, 00=all).

Responds with OppL or for all OxxL (xx=maximum port) to O01L.

**Input** changes are reported to the Com port (4 ASCII characters, terminated with 0Dhex):

I (49h),

2 characters port 1 to 4 (30h and 31h to 34h),

level 0 (30h closed) or 1 (31h open).

e.g Input 4 open IQ41 (49H, 30H 34H, 31H, 0DH)

Input 2 closed IQ20 (49H, 30H 32H, 30H, 0DH)

Current status can be requested by Ipp (pp input port, 00=all).

Responds with IppL or for all IxxL (xx=maximum port) to O01L.

# FW Programming

The uP program (Firmware) is loaded during production and may require future updated to enable additional features. Currently no Bootloader exists to update the FW remotely.



Programming is by using the Microchip ([www.microchip.com](http://www.microchip.com)) MPLABX IPE software (installed on a PC) and the ICD3 or ICD4 programmer. Only the IPE needs to be installed (and not the IDE – used for development).

Connect the ICD3/4 programming tool to a USB port and run the IPE. Select Device PIC18F46K40 and apply.

The tool name should be displayed.



If not and MPLAB8 has been used on the PC, close the IPE and Run MPLAB switcher – select the MPLAB and the device and update.



```
Connecting to MPLAB ICD 3...
Currently loaded firmware on ICD 3
Firmware Suite Version....01.56.00
Firmware type.....PIC32MX
Now Downloading new Firmware for target device: PIC18F46K40
Downloading AP...
AP download complete
Programming download...
```

```
Currently loaded firmware on ICD 3
Firmware Suite Version....01.56.00
Firmware type.....Enhanced Midrange
Target voltage detected
Target device PIC18F46K40 found.
Device Revision ID = a043
Environment loaded.
Environment description: new
Environment loaded successfully
Loading code from C:\PROJECTS\CR395\HEX\CR395.001.131.hex...
2019-06-19 12:41:58 +0200 - Hex file loaded successfully.
```

Connect the tool to the CR39 and click on connect. The log of events should be as above (“now downloading...Programming download...” may only occur the first time the IPE is used or after programming other uP Device types).

Should no device be detected, ensure the CR395 is powered up and disconnect / reconnect the Tool (unplug USB) and click on Connect. If any warning boxes that pop-up, simply select yes or ok.

Select File / Import / Environment and open file CR395.pen supplied by Softcon. If the error “No device is selected. Failed to load Environment information” is displayed, reselect the device PIC18F46K40 after selecting any other, and repeat opening CR395.pen.

In the Operate Tab, select Browse Hex File, select the required CR395 hex file supplied by Softcon and click on Program.

IPE can be used to program CR391 by selecting device PIC32MX795F512L. No environment selection needed – simply select the device, connect, select the HEX file and program. Note that once both PIC types have been selected, simply select Device – recently used and select require Device.

# Settings via HyperTerminal

Connect a USB cable between the PCB connector and a PC/Laptop (requires links Rt, Rx and Rt to be Bu).

Alternatively, connect P4-8, P4-9, P4-10 to RS232 to a PC/Laptop (requires links Rt, Rx and Rt to be B2u).

Check the COM port on the PC (Device Manager > Ports).

Run HyperTerminal – select the Com port, the Baud rate (default is 9k6), **Flow control = None** (simply select Restore Defaults).

Selecting ? on HyperTerminal displays the local setup that can be changed by moving the cursor via the arrow keys and overwriting the setting. **ALL DATA IS IN HEX**

- To exit the setup mode and save changes made, select Esc Esc.
- Note that serial port changes only take effect after Esc Esc – and requires HyperTerminal setting to match Com port changes

```
CR395C00B.13Q C39B311910460000
?=setup/display card, Esc Esc to exit and save. Set-up in HEX
Node 1-8      01
Mode 1,2     02 None /FLAN /Convert/LanM /Alone /
ComType AB   12 03 00=none, 03=RS232, 12=FLAN slave
ComBaud AB   00 01 19k2/9k6/4k8/2k4/1k2/38k4/57k6
ComBits AB   00 01 9/8/7
ComPari AB   00 00 n/e/o/hi/lo
Card In      00.02 FF.FF.FF.FF.FF.FF Bits.CodeType, Bits=0=all
CC In        0000 0000 0000 0000 0000 0000 0000 0000
SC In        00 00 FF 00 02 0B 02 0B
Nr S,E In    02 0B
Fac S,E In   00 00
Clk Pol In   00
Parity In    01
Out Ena      00 00 00 00 00 00 00 00 Bit0=Cmd, Bit1=Card, Bit2=Tg
Out Second   05 05 05 00 00 00 00 00
Out Pol      00 00 00 00 00 00 00 00
Serial Out   DA FF E2 0D 0A FF FF FF FF FF FF FF FF FF FF
Hex bytes: Cmd_Length, Stuff
Cmd: F=none, E=next Chars, (D=Card, B=FC 9=CC 7=SC)=ms, (-1)=ls
```

For Mode setting, see Setup on the second page above

**Com settings:** 2 digit setting for ports A (1<sup>st</sup> 2<sup>nd</sup> digits) and B (3<sup>rd</sup> 4<sup>th</sup> digits):

<b>Type</b>	00=not used,	03=RS232 test,	12=FLAN slave (these settings match system numbers)
<b>Baud</b>	00=19k2,	01=9k6,	02=4k8, 03=2k4, 04=1k2, 05=38k4, 06=57k6
<b>Bits</b>	01=9,	01=8,	02=7
<b>Parity</b>	00=none,	01=even,	02=odd, 03=hi, 04=lo

**Reader In** (data read from reader 1)

**Card** (Number of bits . Code Type)

If number of bits=0, then all cards read. Code type is the decode type for the number of bits read (used in all systems)

e.g. 1A.04, 2C.14, 00.02 = 26 bit (1AH) cards use type 4, 44 bit (2CH) use type 20 (14H) and all others use type 2.

If only 26 and 44 bit must be decode then 1A.04, 2C.14, FF.FF.

For MAG, set 00.0E, FF.FF

**Client** (4 digits) **and Site** (2 digits) **codes** (8 pairs)

Cards with site and client codes, must find matched site and client code pair setup (0000 00 = ignore site and client code read).

**Number and Facility Start and End**

Digit number where Number and Facility start and end in the string read

<b>Polarity of clock</b>	0=normal, 1=invert
<b>Parity</b>	0=ignore, 1=check

**Output** (for each output, controller by serial command, when card passes, when Tg is active)

Out1=Relay1,	Out2=Relay2,	Out3=Rd1 Green,	Out4=Rd1 Red,
Out5=Out Hi,	Out6=Out Lo,	Out7= Rd2 Green,	Out8=Rd2 Red.

**Enable** (bit setting 0=disable, 1=enable) Bit0=Serial commands, Bit1=Card passed, Bit2=Tg active  
e.g. 01=serial, 02=Card, 04=Tg, 03=Serial or Card, 7=serial, card or Tg

**Pulse** (seconds active) 0 is continuous

**Serial format** is set with multiple 2 hex bytes commands as required (except E? sets send the next ? bytes).

The 1<sup>st</sup> digit of the 1<sup>st</sup> byte is command, 2<sup>nd</sup> digit is length for the command and 2<sup>nd</sup> byte is the stuffing byte (FF is no stuffing, e.g. 30H is zero and 20H is space).

Command F=none (no more data is sent), E=next characters, D=card number, B=facility code, 9=client code, 7=site code

Commands D, B, 9, 7=most significant digit 1st (e.g. 12345=12 thousand...), 1 less (C, A, 8, 6) sends least significant 1st (e.g. 54321)

e.g. DA FF E2 0D 0A card number (D) 10 (AH) digits, no leading characters (FF), 2 byte - carriage return (0DH), line feed (0AH).

e.g. D8 20 E1 0D card number (D) 8 digits, leading spaces (20H), 1 byte - carriage return (0DH).