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HOME AND BUILDING AUTOMATION

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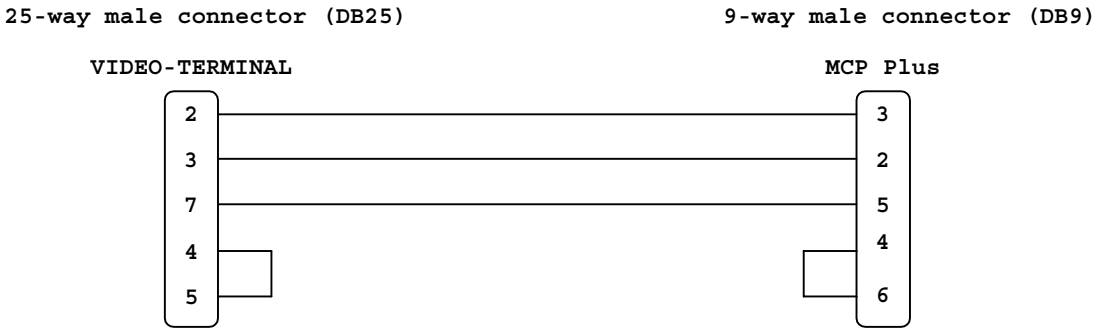
SUGGESTIONS FOR INTERFACING CONTATTO MCP PLUS TO FUJI VIDEOTERMINALS (TOUCH SCREENS)

Introduction

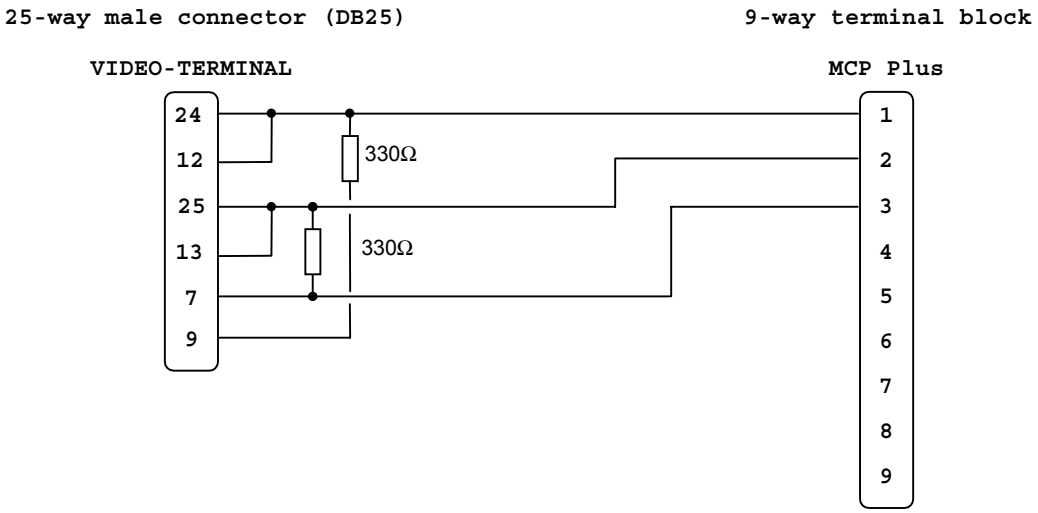
This application note gives some basic elements for interfacing Contatto MCP Plus controller to touch screen video-terminals by Fuji. The communication between the two devices occurs according to the MODBUS RTU protocol, where the video-terminal is the Master device and MCP Plus is the Slave peripheral.
The communication line can be either RS232 and RS485; the proper cable wiring will be described in the following.
This application note presupposes that user already knows the video-terminal software tool and MCP programming.
Remember that the MODBUS protocol and the address of MCP (in the range 1 to 31) must be included in the MPCP program.

Wiring

RS232



RS485



Note: the two resistor 330Ω/0.25W must be soldered directly on the 25-way connector. The dip-switch on the back side of the video-terminal must be set as follows: SW7 and SW8 to OFF, the other ones to the factory settings.

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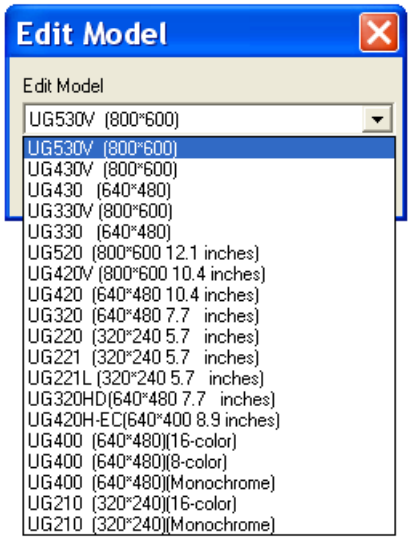
Main setting of the video-terminal

To set the video-terminal, the Fuji software tool has to be used.

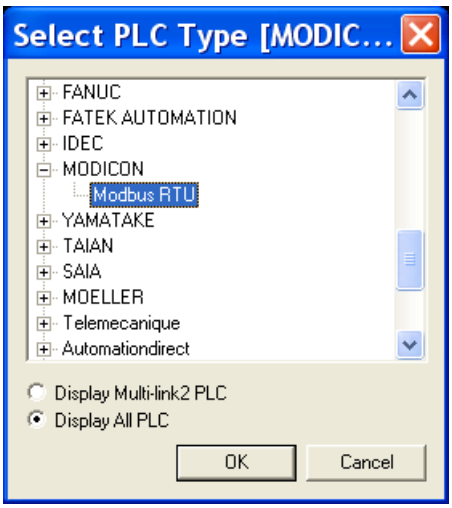
The first window appearing when creating a new program is the following:



This window allows to select the video-terminal to be used; the relationship between the codes listed in the window and the available model is the following:

- UG221 = All 5.7 inches models (Monochrome, STN, TFT)
- UG320 = 7.7 inches model (STN)
- UG420 = All 10.4 inches models (STN e TFT)
- UG520 = 12.1 inches model (TFT)

After having confirmed the model, the next window ask to select the communication protocol. Select the item MODICON: Modbus RTU



The next step is the setting of the parameters concerning the communication between the two devices (MCP and video-terminal). This procedure will be done by the two TABs of the next window:

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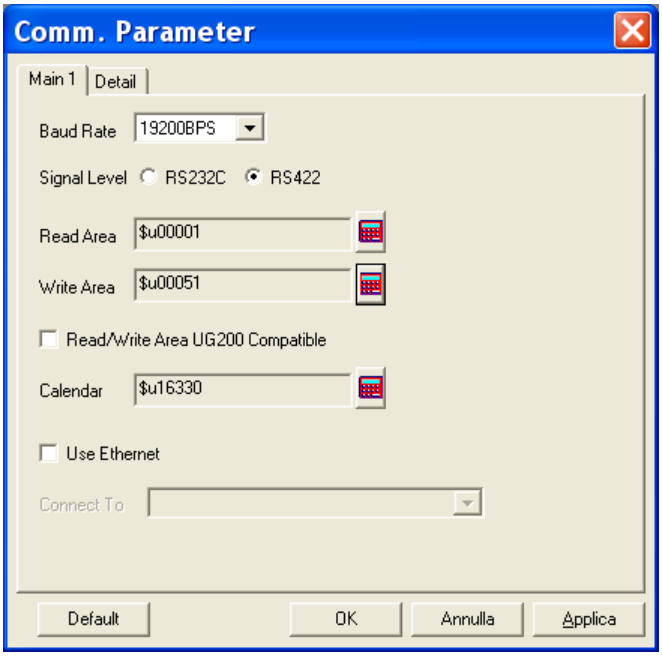
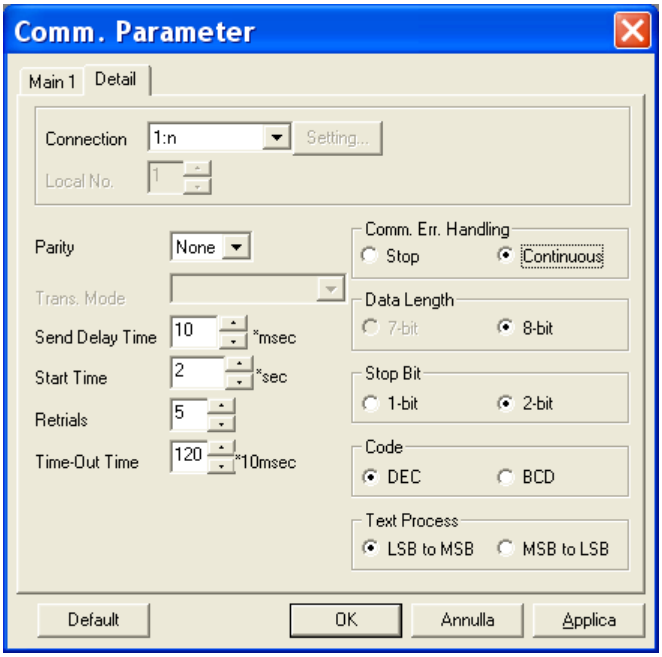
TAB MAIN1:



- Baud Rate: select the desired communication rate (suggested: 19200BPS).
- Signal Level: select the communication type (RS232C for RS232 or RS422 for RS485).
- Read Area: enter the parameter $u0001 clicking on the keyboard symbol.
- Write Area: enter the parameter $u0051 clicking on the keyboard symbol.

Left the other option as shown in the previous figure.

TAB DETAIL:



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Connection: select the connection type (depending on the application) as here bottom listed:

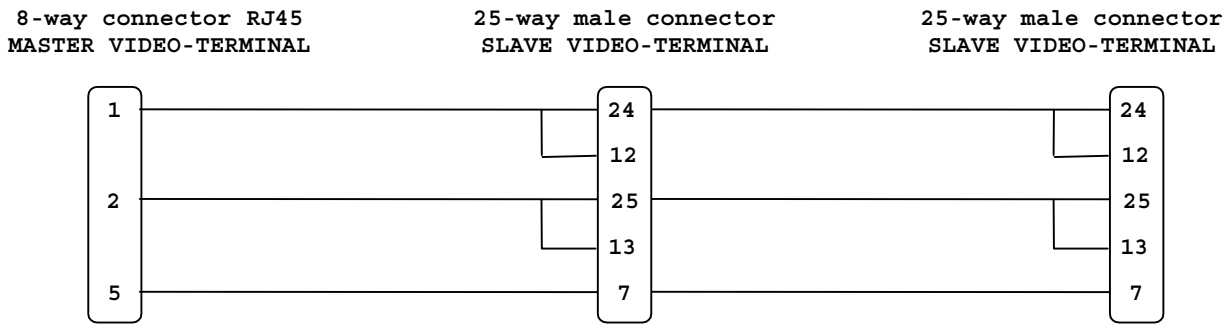
1:1	=	1 MCP and 1 Terminal (Point to Point)
1:n	=	n MCPs and 1 Terminal (Multi-Drop)
Multilink2	=	1 MCP and con n Terminals
Multilink	=	For accepted protocol only.

- Local No.: enter the address ("ADDRESS" function) of the MCP Plus to be connected (In Multi-Drop mode this selection is disabled)
- Parity: select None

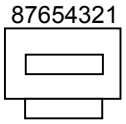
Left the other options as shown in the previous figure.

Multilink2

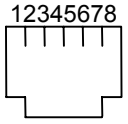
More MCP Plus controllers can be connected to more Fuji video-terminals; This connection is named Multilink2. In this case a proper cable must be assembled to connect the Master video-terminal (to which are connected the MCP controller as described before) to the other Slave video-terminals.
The cable must be assembled as shown in the following figure (this is an example for 3 video-terminals).



Connector RJ45:



Pin 1 of the male RJ45 is the first on the left, looking it from the bottom side with the safety lock on the bottom.



Front view of the female connector on the video-terminal.

Note: for more details on the Multi-Link2 mode, refer to the manual FEH364 on the Fuji CD-ROM.

MCP Plus programming

To enable the MODBUS protocol and to assign an address to MCP Plus, the following equations must be included in the program:

```
PROTOCOL = MODBUS
ADDRESS = 1
```

Note: the address (ADDRESS) must be assigned according to the application requirements.

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Bit operations

The bit operations are the writing and reading of digital input and output points (real and virtual). These operations will be executed when symbols as LED and button are placed on the video-terminal.
The address of the bit to be read or written is arranged as follows:

`i:4mmmmm-bb`

where:

`i`	is the address assigned to MCP Plus
`4`	is a fixed parameter that means operation on the memory
`mmmmm`	is the address (**in decimal format**) of the Word to be read or written (this address is increased by 1 in respect to the RAM map of MCP)
`bb`	is the bit to be read or written (in the range 0 to 15); in the case of real input and output points, it is the input/output point number decreased by 1

Concerning the RAM memory map of MCP Plus, refer to the related manual; this map is however included in this application note.

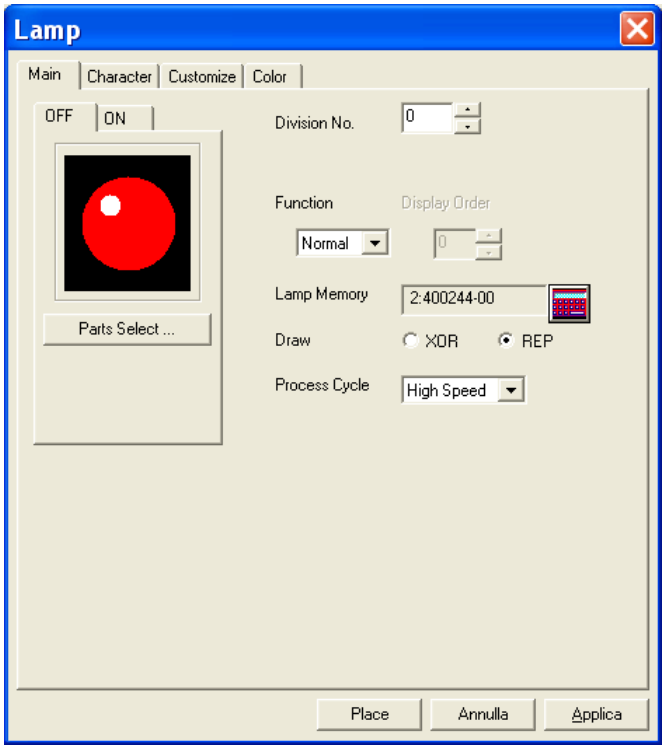
Example 1: to place a “lamp” on the video-terminal reporting the status of the output point O115.1, and supposing to have assigned the address 2 to MCP Plus, the following Word/Bit address has to be specified:

`2:400244-00`

In facts, the real output points are mapped in the MCP RAM starting from the address 129 decimal (0x81 hex), and each memory “cell” contains the status of the 8 output points.

Remember that the bits, for usually numbered starting from 0, while the “real” points of the Contatto system are numbered from 1 to 8, so the point 1 is the bit 0.

The Table 2 of this application note furnish directly the **`mmmmm`** value as function of the output module address; at the address O115 in the Table 2, in fact, the value 244 is shown.
To place on the video-terminal a “Lamp” referred to O115.1, select “Lamp” from the Parts menu of the Fuji tool program; the following window will be shown:



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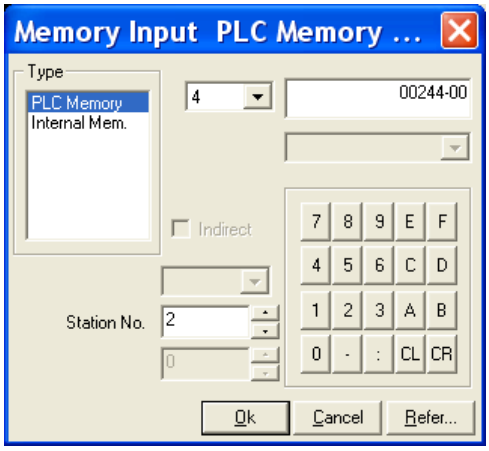
In this window select the address of the output point clicking on the red keyboard on the right side of the “Lamp Memory” entry box ; the following window will be shown:



This window shows the parameters to be set:

- Type: select “PLC Memory”
- The MODBUS function: 4
- The Word address and the bit number related to the Contatto point: the output O115.1 in this example is related to the Word-bit 00244-00
- Station No.: the MCP Plus address (2 in this example)

Example 2: to show the status of the Contatto input point I1.1 by a lamp on the video-terminal, and having assigned the address 3 to MCP Plus, the following Word/bit address has to be specified:

```
3:00002-00
```

In facts, from Table 1 of this application note, the MODBUS Word address related to I1.1 is 002, bit 0; remember that the bit are usually numbered starting from 0, while the real points of Contatto system are numbered from 1 to 8, so the point 1 is related to the bit 0.

Example 3: to command the virtual point V821 of MCP Plus (which address is 1) by a “switch” on the video-terminal, the following Word/bit address has to be specified:

```
1:00616-04
```

In facts, from Table 3 of this application note, the MODBUS Word address related to V821 is 616, bit 4.

WORD operations

The WORD operations are executed, for example, on analog modules and counters. These operations will be executed when placing on the video-terminal items as bargraphs, numerical displays and similar objects.

The address of the word is arranged as follows:

```
i:mmmmm
```

where:

`i` is the address assigned to MCP Plus

`mmmmm` is the address (**in decimal format**) of the Word to be read or written (this address is increased by 1 in respect to the RAM of MCP)

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Concerning the list and the meaning of the words of MCP Plus, refer to the RAM mapping in the MCP manual, also reported in this application note.

Example 1: to display the content of counter C10 (16-bit) of MCP Plus (assigned address is 3) by a numerical display on the video-terminal, the following word address has to be specified:

```
3:01291
```

In facts, the counters are mapped in MCP memory starting from the address 1280 decimal (0x0500 hex). Therefore the counter C10 wil be mapped at the RAM address 1280+10=1290, so 1290+1=1291. Table 4 lists, in a simple way, the relationship between the counter number and the MODBUS word address.

Concerning the counters that must be read and written by the video-terminal, it is recommended to define them as 16-bit counters. As option, or anyway in the case where the 8-bit counter is necessary, **do not use the counter having whose identifier is C(x-1)**; in example, if the counter C10 has to be read and it was defined as 8-bit counter, do not use the counter C9. In addition, in this case, to read the counter C10 the address of C9 must be specified as in the following example.

Example 2: to display the content of the counter C10 (defined as 8-bit counter) of MCP Plus (whose assigned address is 3) by a numerical display on the video-terminal, the following word address has to be specified:

```
3:01290
```

that is the address of the counter C9 that CANNOT be used by MCP.

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RAM MEMORY MAPPING OF MCP PLUS

The following table shows the RAM mapping of MCP Plus module for the commonly used parameters. The RAM addresses are in hexadecimal format.

8.2.1- External RAM Memory Mapping

Address (Hex)	Description	Comments
0001-007F	Map of input modules status	127 input modules
0081-00FF	Map of output modules status	127 output modules
0101-017D	Map of current status of virtual points	1000 virtual points (digital only)
0181-01FF	Control mode for real outputs	127 output modules If bit = 0 (automatic)→ output controlled by the equation If bit = 1 (manual)→ output controlled by RS232 port (supervisor)
0201-027D	Map of new status of virtual points	1000 virtual points (digital only)
0289	Year in BCD format	Read from internal timekeeper chip. **Note 4**
028A	Day of week in BCD format	Read from internal timekeeper chip; 0=Sunday….6=Saturday. **Note 4**
028B	Month in BCD format	Read from internal timekeeper chip. **Note 4**
028C	Day of month in BCD format	Read from internal timekeeper chip. **Note 4**
028D	Hours in BCD format	Read from internal timekeeper chip. **Note 4**
028E	Minutes in BCD format	Read from internal timekeeper chip. **Note 4**
028F	Seconds in BCD format	Read from internal timekeeper chip. **Note 4**
0300-04FF	Modem alarms	512 bytes reporting the alarms that generated the modem call. **Note 3**
0500-06FF	Counter registers	512 8-bit counters / 256 16-bit counters
0700-077F	Refresh queue for serial device	If bit = 1 then the message related to the virtual point must cycled. **Note 1**
0780-07BF	Changed counters	32 bytes = 512 bits. If bit = 1 the counter contents has changed
1000-13FF	Timers	1024 bytes for 256 timers. **Note 2**
1408-17FF	Map of external 16-bit counter modules	1016 bytes for 127 4-channel 16-bit modules. **Note 5**
1808-1BFF	Map of 16-bit analog input modules	1016 bytes for 127 4-channel 16-bit modules. **Note 5**
2000-2FFF	Event list in chronological order	4096 bytes to store 1023 events together date and time. **Note 3**
3000-3080	Reset of counter modules	

Note 1: When an alarm, generating a message on the serial display, has activated, it will be included in the refresh queue (and related bit set to 1). It will be removed either when de-activated (if set as NOMEM), or when a RESET is performed (if set as MEM). Every 2 seconds, MCP sends to serial display the message to be visualized according to the queue. The refresh will not be executed in chronological order.
Note 2: Each timer takes 4 bytes in the RAM memory: 2 bytes for the timer, 11 bits for the controlled output, 5 flags.
Note 3: When an alarm generating a modem call or an event storing occurs, 4 bytes are included in the list to report the virtual point that generated the event, together to date and time. In this way it is possible to store in chronological order 127 modem alarms or 1023 events. The list has to be reset by the supervisor.
Note 4: MCP Plus only. Cells from 0289 to 028F contain the status of MCP internal timekeeper chip; in addition to reading, these cells may be written and in this case the timekeeper chip will be updated with passed new parameters. This feature allows reading and writing of the timekeeper by RAM reading and writing functions instead of using specific commands; in this way it is possible the reading and setting of the timekeeper through MODBUS protocol. Every times one of these parameters is changed, seconds will be reset to zero.
Note 5: When the register is 16-bit format, the cell having lower address contains the most significant byte and the cell having higher address contains the less significant byte of register itself.

Internal RAM memory mapping

Address (Hex)	Description	Comments
013F	Higher address	Higher address among the modules included in the loaded program (for FXPRO)
0140-014F	Input modules configuration	128 flags reporting input modules included in the loaded program
0150-015F	Output modules configuration	128 flags reporting output modules included in the loaded program
0160-016F	Fault input modules	128 flags reporting fault input modules included in the loaded program
0170-017F	Fault output modules	128 flags reporting fault output modules included in the loaded program
0180-018F	Doubled input modules	128 flags reporting doubled input modules (with the same address)
0190-019F	Doubled output modules	128 flags reporting doubled output modules (with the same address)
01C0-01CF	16-bit external counter modules configuration	128 flags reporting 16-bit counter modules included in the loaded program
01D0-01DF	16-bit analog input modules configuration	128 flag reporting 16-bit analog input modules included in the loaded program

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TABLE 1: RELATIONSHIP BETWEEN THE ADDRESSES OF CONTATTO INPUT MODULES AND THE MODBUS WORD ADDRESSES

IN	001	010	020	030	040	050	060	070	080	090	100	110	120
000	-	011	021	031	041	051	061	071	081	091	101	111	121
001	002	012	022	032	042	052	062	072	082	092	102	112	122
002	003	013	023	033	043	053	063	073	083	093	103	113	123
003	004	014	024	034	044	054	064	074	084	094	104	114	124
004	005	015	025	035	045	055	065	075	085	095	105	115	125
005	006	016	026	036	046	056	066	076	086	096	106	116	126
006	007	017	027	037	047	057	067	077	087	097	107	117	127
007	008	018	028	038	048	058	068	078	088	098	108	118	128
008	009	019	029	039	049	059	069	079	089	099	109	119	-
009	010	020	030	040	050	060	070	080	090	100	110	120	-

TABLE 2: RELATIONSHIP BETWEEN THE ADDRESSES OF CONTATTO OUTPUT MODULES AND THE MODBUS WORD ADDRESSES

OUT	001	010	020	030	040	050	060	070	080	090	100	110	120
000	-	139	149	159	169	179	189	199	209	219	229	239	249
001	130	140	150	160	170	180	190	200	210	220	230	240	250
002	131	141	151	161	171	181	191	201	211	221	231	241	251
003	132	142	152	162	172	182	192	202	212	222	232	242	252
004	133	143	153	163	173	183	193	203	213	223	233	243	253
005	134	144	154	164	174	184	194	204	214	224	234	244	254
006	135	145	155	165	175	185	195	205	215	225	235	245	255
007	136	146	156	166	176	186	196	206	216	226	236	246	256
008	137	147	157	167	177	187	197	207	217	227	237	247	-
009	138	148	158	168	178	188	198	208	218	228	238	248	-

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TABLE 3: RELATIONSHIP BETWEEN THE VIRTUAL POINTS OF CONTATTO MCP PLUS AND THE MODBUS WORD ADDRESSES

	514	**515**	**516**	**517**	**518**	**519**	**520**	**521**	**522**	**523**	**524**	**525**	**526**	**527**	**528**	**529**
Bit 0	V1	V9	V17	V25	V33	V41	V49	V57	V65	V73	V81	V89	V97	V105	V113	V121
Bit 1	V2	V10	V18	V26	V34	V42	V50	V58	V66	V74	V82	V90	V98	V106	V114	V122
Bit 2	V3	V11	V19	V27	V35	V43	V51	V59	V67	V75	V83	V91	V99	V107	V115	V123
Bit 3	V4	V12	V20	V28	V36	V44	V52	V60	V68	V76	V84	V92	V100	V108	V116	V124
Bit 4	V5	V13	V21	V29	V37	V45	V53	V61	V69	V77	V85	V93	V101	V109	V117	V125
Bit 5	V6	V14	V22	V30	V38	V46	V54	V62	V70	V78	V86	V94	V102	V110	V118	V126
Bit 6	V7	V15	V23	V31	V39	V47	V55	V63	V71	V79	V87	V95	V103	V111	V119	V127
Bit 7	V8	V16	V24	V32	V40	V48	V56	V64	V72	V80	V88	V96	V104	V112	V120	V128

	530	**531**	**532**	**533**	**534**	**535**	**536**	**537**	**538**	**539**	**540**	**541**	**542**	**543**	**544**	**545**
Bit 0	V129	V137	V145	V153	V161	V169	V177	V185	V193	V201	V209	V217	V225	V233	V241	V249
Bit 1	V130	V138	V146	V154	V162	V170	V178	V186	V194	V202	V210	V218	V226	V234	V242	V250
Bit 2	V131	V139	V147	V155	V163	V171	V179	V187	V195	V203	V211	V219	V227	V235	V243	V251
Bit 3	V132	V140	V148	V156	V164	V172	V180	V188	V196	V204	V212	V220	V228	V236	V244	V252
Bit 4	V133	V141	V149	V157	V165	V173	V181	V189	V197	V205	V213	V221	V229	V237	V245	V253
Bit 5	V134	V142	V150	V158	V166	V174	V182	V190	V198	V206	V214	V222	V230	V238	V246	V254
Bit 6	V135	V143	V151	V159	V167	V175	V183	V191	V199	V207	V215	V223	V231	V239	V247	V255
Bit 7	V136	V144	V152	V160	V168	V176	V184	V192	V200	V208	V216	V224	V232	V240	V248	V256

	546	**547**	**548**	**549**	**550**	**551**	**552**	**553**	**554**	**555**	**556**	**557**	**558**	**559**	**560**	**561**
Bit 0	V257	V265	V273	V281	V289	V297	V305	V313	V321	V329	V337	V345	V353	V361	V369	V377
Bit 1	V258	V266	V274	V282	V290	V298	V306	V314	V322	V330	V338	V346	V354	V362	V370	V378
Bit 2	V259	V267	V275	V283	V291	V299	V307	V315	V323	V331	V339	V347	V355	V363	V371	V379
Bit 3	V260	V268	V276	V284	V292	V300	V308	V316	V324	V332	V340	V348	V356	V364	V372	V380
Bit 4	V261	V269	V277	V285	V293	V301	V309	V317	V325	V333	V341	V349	V357	V365	V373	V381
Bit 5	V262	V270	V278	V286	V294	V302	V310	V318	V326	V334	V342	V350	V358	V366	V374	V382
Bit 6	V263	V271	V279	V287	V295	V303	V311	V319	V327	V335	V343	V351	V359	V367	V375	V383
Bit 7	V264	V272	V280	V288	V296	V304	V312	V320	V328	V336	V344	V352	V360	V368	V376	V384

	562	**563**	**564**	**565**	**566**	**567**	**568**	**569**	**570**	**571**	**572**	**573**	**574**	**575**	**576**	**577**
Bit 0	V385	V393	V401	V409	V417	V425	V433	V441	V449	V457	V465	V473	V481	V489	V497	V505
Bit 1	V386	V394	V402	V410	V418	V426	V434	V442	V450	V458	V466	V474	V482	V490	V498	V506
Bit 2	V387	V395	V403	V411	V419	V427	V435	V443	V451	V459	V467	V475	V483	V491	V499	V507
Bit 3	V388	V396	V404	V412	V420	V428	V436	V444	V452	V460	V468	V476	V484	V492	V500	V508
Bit 4	V389	V397	V405	V413	V421	V429	V437	V445	V453	V461	V469	V477	V485	V493	V501	V509
Bit 5	V390	V398	V406	V414	V422	V430	V438	V446	V454	V462	V470	V478	V486	V494	V502	V510
Bit 6	V391	V399	V407	V415	V423	V431	V439	V447	V455	V463	V471	V479	V487	V495	V503	V511
Bit 7	V392	V400	V408	V416	V424	V432	V440	V448	V456	V464	V472	V480	V488	V496	V504	V512

	578	**579**	**580**	**581**	**582**	**583**	**584**	**585**	**586**	**587**	**588**	**589**	**590**	**591**	**592**	**593**
Bit 0	V513	V521	V529	V537	V545	V553	V561	V569	V577	V585	V593	V601	V609	V617	V625	V633
Bit 1	V514	V522	V530	V538	V546	V554	V562	V570	V578	V586	V594	V602	V610	V618	V626	V634
Bit 2	V515	V523	V531	V539	V547	V555	V563	V571	V579	V587	V595	V603	V611	V619	V627	V635
Bit 3	V516	V524	V532	V540	V548	V556	V564	V572	V580	V588	V596	V604	V612	V620	V628	V636
Bit 4	V517	V525	V533	V541	V549	V557	V565	V573	V581	V589	V597	V605	V613	V621	V629	V637
Bit 5	V518	V526	V534	V542	V550	V558	V566	V574	V582	V590	V598	V606	V614	V622	V630	V638
Bit 6	V519	V527	V535	V543	V551	V559	V567	V575	V583	V591	V599	V607	V615	V623	V631	V639
Bit 7	V520	V528	V536	V544	V552	V560	V568	V576	V584	V592	V600	V608	V616	V624	V632	V640

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	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609
Bit 0	V641	V649	V657	V665	V673	V681	V689	V697	V705	V713	V721	V729	V737	V745	V753	V761
Bit 1	V642	V650	V658	V666	V674	V682	V690	V698	V706	V714	V722	V730	V738	V746	V754	V762
Bit 2	V643	V651	V659	V667	V675	V683	V691	V699	V707	V715	V723	V731	V739	V747	V755	V763
Bit 3	V644	V652	V660	V668	V676	V684	V692	V700	V708	V716	V724	V732	V740	V748	V756	V764
Bit 4	V645	V653	V661	V669	V677	V685	V693	V701	V709	V717	V725	V733	V741	V749	V757	V765
Bit 5	V646	V654	V662	V670	V678	V686	V694	V702	V710	V718	V726	V734	V742	V750	V758	V766
Bit 6	V647	V655	V663	V671	V679	V687	V695	V703	V711	V719	V727	V735	V743	V751	V759	V767
Bit 7	V648	V656	V664	V672	V680	V688	V696	V704	V712	V720	V728	V736	V744	V752	V760	V768

	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625
Bit 0	V769	V777	V785	V793	V801	V809	V817	V825	V833	V841	V849	V857	V865	V873	V881	V889
Bit 1	V770	V778	V786	V794	V802	V810	V818	V826	V834	V842	V850	V858	V866	V874	V882	V890
Bit 2	V771	V779	V787	V795	V803	V811	V819	V827	V835	V843	V851	V859	V867	V875	V883	V891
Bit 3	V772	V780	V788	V796	V804	V812	V820	V828	V836	V844	V852	V860	V868	V876	V884	V892
Bit 4	V773	V781	V789	V797	V805	V813	V821	V829	V837	V845	V853	V861	V869	V877	V885	V893
Bit 5	V774	V782	V790	V798	V806	V814	V822	V830	V838	V846	V854	V862	V870	V878	V886	V894
Bit 6	V775	V783	V791	V799	V807	V815	V823	V831	V839	V847	V855	V863	V871	V879	V887	V895
Bit 7	V776	V784	V792	V800	V808	V816	V824	V832	V840	V848	V856	V864	V872	V880	V888	V896

	626	627	628	629	630	631	632	633	634	635	636	637	638
Bit 0	V897	V905	V913	V921	V929	V937	V945	V953	V961	V969	V977	V985	V993
Bit 1	V898	V906	V914	V922	V930	V938	V946	V954	V962	V970	V978	V986	V994
Bit 2	V899	V907	V915	V923	V931	V939	V947	V955	V963	V971	V979	V987	V995
Bit 3	V900	V908	V916	V924	V932	V940	V948	V956	V964	V972	V980	V988	V996
Bit 4	V901	V909	V917	V925	V933	V941	V949	V957	V965	V973	V981	V989	V997
Bit 5	V902	V910	V918	V926	V934	V942	V950	V958	V966	V974	V982	V990	V998
Bit 6	V903	V911	V919	V927	V935	V943	V951	V959	V967	V975	V983	V991	V999
Bit 7	V904	V912	V920	V928	V936	V944	V952	V960	V968	V976	V984	V992	**V1000**

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TABLE 4: RELATIONSHIP BETWEEN THE COUNTERS OF CONTATTO MCP PLUS AND THE MODBUS WORD ADDRESSES

C	001	010	020	030	040	050	060	070	080	090	100	110	120
000	1281	1291	1301	1311	1321	1331	1341	1351	1361	1371	1381	1391	1401
001	1282	1292	1302	1312	1322	1332	1342	1352	1362	1372	1382	1392	1402
002	1283	1293	1303	1313	1323	1333	1343	1353	1363	1373	1383	1393	1403
003	1284	1294	1304	1314	1324	1334	1344	1354	1364	1374	1384	1394	1404
004	1285	1295	1305	1315	1325	1335	1345	1355	1365	1375	1385	1395	1405
005	1286	1296	1306	1316	1326	1336	1346	1356	1366	1376	1386	1396	1406
006	1287	1297	1307	1317	1327	1337	1347	1357	1367	1377	1387	1397	1407
007	1288	1298	1308	1318	1328	1338	1348	1358	1368	1378	1388	1398	1408
008	1289	1299	1309	1319	1329	1339	1349	1359	1369	1379	1389	1399	1409
009	1290	1300	1310	1320	1330	1340	1350	1360	1370	1380	1390	1400	1410

C	130	140	150	160	170	180	190	200	210	220	230	240	250
000	1411	1421	1431	1441	1451	1461	1471	1481	1491	1501	1511	1521	1531
001	1412	1422	1432	1442	1452	1462	1472	1482	1492	1502	1512	1522	1532
002	1413	1423	1433	1443	1453	1463	1473	1483	1493	1503	1513	1523	1533
003	1414	1424	1434	1444	1454	1464	1474	1484	1494	1504	1514	1524	1534
004	1415	1425	1435	1445	1455	1465	1475	1485	1495	1505	1515	1525	1535
005	1416	1426	1436	1446	1456	1466	1476	1486	1496	1506	1516	1526	1536
006	1417	1427	1437	1447	1457	1467	1477	1487	1497	1507	1517	1527	1537
007	1418	1428	1438	1448	1458	1468	1478	1488	1498	1508	1518	1528	1538
008	1419	1429	1439	1449	1459	1469	1479	1489	1499	1509	1519	1529	1539
009	1420	1430	1440	1450	1460	1470	1480	1490	1500	1510	1520	1530	1540

C	260	270	280	290	300	310	320	330	340	350	360	370	380
000	1541	1551	1561	1571	1581	1591	1601	1611	1621	1631	1641	1651	1661
001	1542	1552	1562	1572	1582	1592	1602	1612	1622	1632	1642	1652	1662
002	1543	1553	1563	1573	1583	1593	1603	1613	1623	1633	1643	1653	1663
003	1544	1554	1564	1574	1584	1594	1604	1614	1624	1634	1644	1654	1664
004	1545	1555	1565	1575	1585	1595	1605	1615	1625	1635	1645	1655	1665
005	1546	1556	1566	1576	1586	1596	1606	1616	1626	1636	1646	1656	1666
006	1547	1557	1567	1577	1587	1597	1607	1617	1627	1637	1647	1657	1667
007	1548	1558	1568	1578	1588	1598	1608	1618	1628	1638	1648	1658	1668
008	1549	1559	1569	1579	1589	1599	1609	1619	1629	1639	1649	1659	1669
009	1550	1560	1570	1580	1590	1600	1610	1620	1630	1640	1650	1660	1670

C	390	400	410	420	430	440	450	460	470	480	490	500	510
000	1671	1681	1691	1701	1711	1721	1731	1741	1751	1761	1771	1781	1791
001	1672	1682	1692	1702	1712	1722	1732	1742	1752	1762	1772	1782	1792
002	1673	1683	1693	1703	1713	1723	1733	1743	1753	1763	1773	1783	-
003	1674	1684	1694	1704	1714	1724	1734	1744	1754	1764	1774	1784	-
004	1675	1685	1695	1705	1715	1725	1735	1745	1755	1765	1775	1785	-
005	1676	1686	1696	1706	1716	1726	1736	1746	1756	1766	1776	1786	-
006	1677	1687	1697	1707	1717	1727	1737	1747	1757	1767	1777	1787	-
007	1678	1688	1698	1708	1718	1728	1738	1748	1758	1768	1778	1788	-
008	1679	1689	1699	1709	1719	1729	1739	1749	1759	1769	1779	1789	-
009	1680	1690	1700	1710	1720	1730	1740	1750	1760	1770	1780	1790	-