KERNEL Sistemi s.r.l. - Via Vignolese , 1138 - 41100 Modena
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FJ Series

GTP80, DMX40, TSP240, TSP350, TSP570, KS392, KS407, KS408, KS412, KS 417

USER MANUAL

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1.0 Memory

The PLC has 12288 internal memory locations, each one at 16 bits (1 word) each locations is called DATA . These locations are designed to contain the running program's variables, and they are called from **DATA.00** to **DATA.12288**. These locations are visible and shared from PLC side and also from the operator panel side, so they can be read and write from both two.
Some internal DATA are system words, or rather have fixed meaning, instead others are free and thay can be used, from the application program, for any purpose. The value write into a system DATA is interpreted as a specific parameter; the table 1.0 show the system data memory map.

Note
Typically to do calculations and insert values into the application program, are used the words from DATA.600 onwards .

1.1 16 and 32 bits operations

The operations on data memory are usually at 16 bits, namely they are of the same size of DATAs, any data memory can have a decimal value from 0 to 65535 (2^16) . However is possible need biggest size variables (long at 32 bits): these numerical values are stored into two consecutive DATAs (lowest address = least significant word, highest address = more significant word). The operations which work with long variables are preceded by the prefix 'L', and they take account of this format automatically, so for example:

Instruction list	Ladder	Commentary
LMOV #1234,DATA.100	#1234 LMOV DATA.100	put 0 value in DATA.100 and the 1234 value in DATA.101
LMOV #65537,DATA_100	#65537 LMOV DATA.100	put 1 in DATA.100 and 1 into DATA.101

Note
Using 16bit operations and others at 32bits, in the same application program, may generate chaos. It is therefore advisable to standardize the work method; alternatively be very careful to rimember that in case of LONG operations, the data memory indicated on software is always the most significant.

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1.2 Redempive memory and volatile memory

Volatile memory : words from **DATA.00** to **DATA.3999** are volatile, except of those otherwise specified in picture 4.0 .

Buffered RAM : Since the E²PROM has a maximum finite number of writings, declared by the manufacturer (more or less 100.000 for any single DATA) to meet the need of frequent and numerous saves, was planned a buffered RAM dedicated memory area. The locations are from **DATA.4000** to **DATA.4095** and they are automatically copied into buffered RAM every 100msec and reloaded at the PLC switch-on with the last value. The RAM is buffered with a rechargeable battery, with the fully charged battery the autonomy is **1 year**, *if the TSP is turned off for a longer time DATA may be lost*. The bufferd RAM is always enabled and don't needs abilitation.

E²PROM : The locations from **DATA.4096** to **DATA.12288** are used for the DATA saving into E²PROM and so they are non-volatile DATA. You can save the datas in E²PROM in two ways: automaticaly by the remote writing, or by software with a command. Remote writing means any external device connected to PLC by serial port with Kernel Sistemi protocol, which modifies the value of this DATA (also the Flash debug use the Kernel Sistemi protocol). Also the editing of a display's variable is considered remote writing. The software writing, instead, needs to use of **DATA.28**, **DATA.29** and **SYS.20** the two DATAs must contain respectively the address of the first DATA to save and the address of the last DATA to save whereas the saving will start setting SYS.20 who then will reset itself. At the switching time, the saved DATA, takes the last stored value.

Note

Before start to write the application program, it's good divide volatile datas and non-volatile datas. Once made this dinstinction, will be necessary think what non-volatile datas should be system paramiters and what should be machine parameters. Generally the working parameters are alla those values necessary to work which must be continuously saved to, for example, continue to work next day (for example the number of machined parts) , the machine parameters instead will be the values given like machine set up , which maybe will modify only a technician, into a page under password.

WARNING!

The EEPROM for their characteristic allow a limitate writes (more or less 100.000 for any single data memory address). Above that limit the EEPROM doesn't work anymore and must be replaced, is therefore recommended not to exceed this limit otherwise it can cause the device malfunction.

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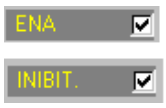
1.3 Memory map

Any DATA in this table is a 16 bits word. Any DATA which isn't speified in this table is to be considered “free”.

Picture 4.0

<table>
<tr><td>DATA.00</td><td>Current page number. This DATA is in reading mode and also in writing mode, so will be read to know what page is show on diplay and it can be write to change the page.</td></tr>
<tr><td>DATA.01</td><td>DATA command. Some bits of this DATA have a special meaning :
<table>
<tr><th>N° bit</th><th>descrizione</th></tr>
<tr><td>0</td><td>Signalling but not alarm displaying. If this bit is enable, the TSP beeps repeated, blink the ALR led and on display will appear a “bell button” which blink. Pushing the “bell button” (if at least one alarm bit is active) you will enter in pages of alarm management.</td></tr>
<tr><td>1</td><td>Immediate alarm displaying. If it is active with also an alarm bit, the alarm page is immediately shown on display.</td></tr>
<tr><td>2</td><td>Display alarm mode. This bit is active when on the TSP screen is shown an alarm page. If is programmed a scroll alarm time into “project option” page, the TSP will do the automatic alarm scroll with the programmed time. If the operator push the “E” button into the alarm page, is resetted the alarm bit into TSP.</td></tr>
<tr><td>3</td><td>It is active in variable's input mode. Input variable mode is enabled when is push the variable on touch screen to insert a new value and appear the numeric keyboard; in this case, the bit number three of DATA.01 is one, and go to zero when the new value is confirmed with the “E” button.</td></tr>
<tr><td>10</td><td>Print current page. Print of the current page if is selected the PRINTER protocol on serial port.</td></tr>
<tr><td>11</td><td>Read/write variables inhibition. Is possile enable or disable from PLC the variables modifing. To do this is necessary select the box ENA into the variable's settings window (which allow the variable modify from touch screen) and the INIBIT. Box (which the variable modify in accordance with this bit state).
 
</td></tr>
</table></td></tr>
</table>

...

DATA.04	Last modified variable address.

...

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DATA.06

DEDICATED

First alarm word. From alarm 0 to 15. For each bit is associated the corresponding alarm page. **THIS ALARM WORD IS FULLY DEDICATED TO COMUNICATION ERRORS OR SYSTEM ALARMS (don't use this DATA)**

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
ALR 15	ALR 14	ALR 13	ALR 12	ALR 11	ALR 10	ALR 9	ALR 8	ALR COM 5	ALR COM 4	ALR COM 3	ALR COM 2	ALR COM 1	ALR COM 0	ALR CAN 1	ALR CAN 0

DATA.07

From alarm 16 to alarm 31. **FIRST USABLE ALARM WORD**

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
ALR 31	ALR 30	ALR 29	ALR 28	ALR 27	ALR 26	ALR 25	ALR 24	ALR 23	ALR 22	ALR 21	ALR 20	ALR 19	ALR 18	ALR 17	ALR 16

DATA.08	From alarm 32 to alarm 47. Each bit is associated to the respective alarm page.
DATA.09	From alarm 48 to alarm 63. Each bit is associated to the respective alarm page.
DATA.10	From alarm 64 to alarm 79. Each bit is associated to the respective alarm page.
DATA.11	From alarm 80 to alarm 95. Each bit is associated to the respective alarm page.
DATA.12	From alarm 96 to alarm 111. Each bit is associated to the respective alarm page.
DATA.13	From alarm 112 to alarm 127. Each bit is associated to the respective alarm page.
DATA.14	From alarm 128 to alarm 143. Each bit is associated to the respective alarm page.
DATA.15	From alarm 144 to alarm 159. Each bit is associated to the respective alarm page.
DATA.16	From alarm 160 to alarm 175. Each bit is associated to the respective alarm page.
DATA.17	From alarm 176 to alarm 191. Each bit is associated to the respective alarm page.
DATA.18	From alarm 192 to alarm 207. Each bit is associated to the respective alarm page.
DATA.19	From alarm 208 to alarm 223. Each bit is associated to the respective alarm page.
DATA.20	From alarm 224 to alarm 239. Each bit is associated to the respective alarm page.
DATA.21	From alarm 240 to alarm 255. Each bit is associated to the respective alarm page.

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DATA.22	When it's different to zero, the PLC read the specified external variable.	
DATA.23	External variable number's which must be write (look § External Variables)	
DATA.24	Value to write on the external variable (look § External Variables)	
DATA.25	Least significant word in case that the value to write is 32bits value.	
DATA.26	Support word of keystrokes	
DATA.27	Support word of keystrokes	
DATA.28	Address first data to save in E²PROM	
DATA.29	Address last data to save in E²PROM	
DATA.30	PLC speed (in µsec)	
DATA.31	Day of the month (calendar clock)	RO
DATA.32	Day of the week (calendar clock)	RO
DATA.33	Month (calendar clock)	RO
DATA.34	Year (calendar clock)	RO
DATA.35	Hour (calendar clock)	RO
DATA.36	Minutes (calendar clock)	RO
DATA.37	Seconds (calendar clock)	RO
DATA.38	Number of days elapsed since the beginning of the year.	RO
DATA.39	Number of minutes elapsed since the beginning of the year.	RO
DATA.40	Astronomical dawn (in base ai parametri forniti da DATA.44 a DATA.50)	RO
DATA.41	Tramonto astronomico (based on the parameters provided from DATA.44 to DATA.50)	RO
DATA.42	Civil dawn (based on the parameters provided from DATA.44 to DATA.50)	RO
DATA.43	Civil sunset (based on the parameters provided from DATA.44 to DATA.50)	RO
DATA.44	Time zone in reference to the zero meridian (+/- 180)	
DATA.45	Latitude (degrees)	
DATA.46	Latitude (degree tenths)	
DATA.47	Latitude (degree thousandths)	

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DATA.48	Longitude (degree)	
DATA.49	Longitude (degree tenths)	
DATA.50	Longitude (degree thousandths)	
DATA.51	Altitude (NOT CURRENTLY MANAGED)	

....

DATA.55	Recipe number	
DATA.56	Start recipe data memory (specify only the DATA number)	
DATA.57	Recipe size (DATAs number)	
DATA.58	CAN node moni.	RO
DATA.59	CAN node which generate the error	RO

....

DATA.60	Fast counter N°0 free running on 1msec base (enabled by SYS.60)
DATA.61	Fast counter N°1 free running on 1msec base (enabled by SYS.61)
DATA.62	Fast counter N°2 free running on 1msec base (enabled by SYS.62)
DATA.63	Fast counter N°3 free running on 1msec base (enabled by SYS.63)
DATA.64	Fast counter N°4 free running on 1msec base (enabled by SYS.64)
DATA.65	Fast counter N°5 free running on 1msec base (enabled by SYS.65)
DATA.66	Fast counter N°6 free running on 1msec base (enabled by SYS.66)
DATA.67	Fast counter N°7 free running on 1msec base (enabled by SYS.67)

....

DATA.80	Group number (group select) [BANDS PROGRAMMER]	
DATA.81	Daily time band (select the time band) [BANDS PROGRAMMER]	
DATA.82	Corresponding value [BANDS PROGRAMMER]	

....

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DATA.84	Group N°0	
DATA.85	Daily time band N°0	
DATA.86	Value associated at group 0 band 0	
DATA.87	Group N°0	
DATA.88	Daily time band N°1	
DATA.89	Value associated at group 0 band 1	
DATA.90	Group N°0	
DATA.91	Daily time band N°2	
DATA.92	Value associated at group 0 band 2	
DATA.93	Group N°0	
DATA.94	Daily time band N°3	
DATA.95	Value associated at group 0 band 3	
DATA.96	Group N°0	
DATA.97	Daily time band N°4	
DATA.98	Value associated at group 0 band 4	
DATA.99	Group N°0	
DATA.100	Daily time band N°5	
DATA.101	Value associated at group 0 band 5	
DATA.102	Group N°0	
DATA.103	Daily time band N°6	
DATA.104	Value associated at group 0 band 6	
DATA.105	Group N°0	
DATA.106	Daily time band N°7	
DATA.107	Value associated at group 0 band 7	
DATA.108	Group N°1	

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DATA.109	Daily time band N°0	
DATA.110	Value associated at group 1 band 0	
DATA.111	Group N°1	
DATA.112	Daily time band N°1	
DATA.113	Value associated at group 1 band 1	
DATA.114	Group N°1	
DATA.115	Daily time band N°2	
DATA.116	Value associated at group 1 band 2	
DATA.117	Group N°1	
DATA.118	Daily time band N°3	
DATA.119	Value associated at group 1 band 3	
DATA.120	Group N°1	
DATA.121	Daily time band N°4	
DATA.122	Value associated at group 1 band 4	
DATA.123	Group N°1	
DATA.124	Daily time band N°5	
DATA.125	Value associated at group 1 band 5	
DATA.126	Group N°1	
DATA.127	Daily time band N°6	
DATA.128	Value associated at group 1 band 6	
DATA.129	Group N°1	
DATA.130	Daily time band N°7	
DATA.131	Value associated at group 1 band 7	
DATA.132	Group N°2	
DATA.133	Daily time band N°0	

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DATA.134	Value associated at group 2 band 0	
DATA.135	Group N°2	
DATA.136	Daily time band N°1	
DATA.137	Value associated at group 2 band 1	
DATA.138	Group N°2	
DATA.139	Daily time band N°2	
DATA.140	Value associated at group 2 band 2	
DATA.141	Group N°2	
DATA.142	Daily time band N°3	
DATA.143	Value associated at group 2 band 3	
DATA.144	Group N°2	
DATA.145	Daily time band N°4	
DATA.146	Value associated at group 2 band 4	
DATA.147	Group N°2	
DATA.148	Daily time band N°5	
DATA.149	Value associated at group 2 band 5	
DATA.150	Group N°2	
DATA.151	Daily time band N°6	
DATA.152	Value associated at group 2 band 6	
DATA.153	Group N°2	
DATA.154	Daily time band N°7	
DATA.155	Value associated at group 2 band 7	
DATA.156	Group N°3	
DATA.157	Daily time band N°0	
DATA.158	Value associated at group 3 band 0	

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DATA.159	Group N°3	
DATA.160	Daily time band N°1	
DATA.161	Value associated at group 3 band 1	
DATA.162	Group N°3	
DATA.163	Daily time band N°2	
DATA.164	Value associated at group 3 band 2	
DATA.165	Group N°3	
DATA.166	Daily time band N°3	
DATA.167	Value associated at group 3 band 3	
DATA.168	Group N°3	
DATA.169	Daily time band N°4	
DATA.170	Value associated at group 3 band 4	
DATA.171	Group N°3	
DATA.172	Daily time band N°5	
DATA.173	Value associated at group 3 band 5	
DATA.174	Group N°3	
DATA.175	Daily time band N°6	
DATA.176	Value associated at group 3 band 6	
DATA.177	Group N°3	
DATA.178	Daily time band N°7	
DATA.179	Value associated at group 3 band 7	
DATA.180	Week prog	
DATA.181	Week prog	
DATA.182	Week prog	
DATA.183	Week prog	

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DATA.184	Week prog	
DATA.185	Week prog	
DATA.186	Week prog	
DATA.187	Week prog	
DATA.188	Week prog	
DATA.189	Week prog	
DATA.190	Week prog	
DATA.191	Week prog	
DATA.192	Week prog	
DATA.193	Week prog	
DATA.194	Week prog	
DATA.195	Week prog	
DATA.196	Week prog	
DATA.197	Week prog	
DATA.198	Week prog	
DATA.199	Week prog	
DATA.200	Week prog	
DATA.201	Week prog	
DATA.202	Week prog	
DATA.203	Week prog	
DATA.204	Week prog	
DATA.205	Week prog	
DATA.206	Week prog	
DATA.207	Week prog	

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DATA.208	Week prog	
DATA.209	Week prog	
DATA.210	Week prog	
DATA.211	Week prog	
DATA.212	Week prog	
DATA.213	Week prog	
DATA.214	Week prog	
DATA.215	Week prog	
DATA.216	Week prog	
DATA.217	Week prog	
DATA.218	Week prog	
DATA.219	Week prog	
DATA.220	Week prog	
DATA.221	Week prog	
DATA.222	Week prog	
DATA.223	Week prog	
DATA.224	Week prog	
DATA.225	Week prog	
DATA.226	Week prog	
DATA.227	Week prog	
DATA.228	Frequency PWM generator channel 0	
DATA.229	Duty Cycle PWM generator channel 0	
DATA.230	Frequency PWM generator channel 1	
DATA.231	Duty Cycle PWM generator channel 1	

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DATA.232	Duty cycle OUT.03 *(from 0 to 1023)*
DATA.233	Duty cycle OUT.07 *(from 0 to 1023)*
DATA.234	Duty cycle OUT.11 *(from 0 to 1023)*

....

DATA.248	Start RAMP 0 (enable by SYS.48)
DATA.249	Stop RAMP 0 (enable by SYS.48)
DATA.250	Time RAMP 0 (enable by SYS.48)
DATA.251	Base RAMP 0 (enable by SYS.48)
DATA.252	Value RAMP 0 (enable by SYS.48)
DATA.253	Timer RAMP 0 (enable by SYS.48)
DATA.254	Start RAMP 1 (enable by SYS.49)
DATA.255	Stop RAMP 1 (enable by SYS.49)
DATA.256	Time RAMP 1 (enable by SYS.49)
DATA.257	Base RAMP 1 (enable by SYS.49)
DATA.258	Value RAMP 1 (enable by SYS.49)
DATA.259	Timer RAMP 1 (enable by SYS.49)
DATA.260	Start RAMP 2 (enable by SYS.50)
DATA.261	Stop RAMP 2 (enable by SYS.50)
DATA.262	Time RAMP 2 (enable by SYS.50)
DATA.263	Base RAMP 2 (enable by SYS.50)
DATA.264	Value RAMP 2 (enable by SYS.50)
DATA.265	Timer RAMP 2 (enable by SYS.50)
DATA.266	Start RAMP 3 (enable by SYS.51)

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DATA.267	Stop RAMP 3 (enable by SYS.51)
DATA.268	Time RAMP 3 (enable by SYS.51)
DATA.269	Base RAMP 3 (enable by SYS.51)
DATA.270	Value RAMP 3 (enable by SYS.51)
DATA.271	Timer RAMP 3 (enable by SYS.51)
DATA.272	Start RAMP 4 (enable by SYS.52)
DATA.273	Stop RAMP 4 (enable by SYS.52)
DATA.274	Time RAMP 4 (enable by SYS.52)
DATA.275	Base RAMP 4 (enable by SYS.52)
DATA.276	Value RAMP 4 (enable by SYS.52)
DATA.277	Timer RAMP 4 (enable by SYS.52)
DATA.278	Start RAMP 5 (enable by SYS.53)
DATA.279	Stop RAMP 5 (enable by SYS.53)
DATA.280	Time RAMP 5 (enable by SYS.53)
DATA.281	Base RAMP 5 (enable by SYS.53)
DATA.282	Value RAMP 5 (enable by SYS.53)
DATA.283	Timer RAMP 5 (enable by SYS.53)
DATA.284	Start RAMP 6 (enable by SYS.54)
DATA.285	Stop RAMP 6 (enable by SYS.54)
DATA.286	Time RAMP 6 (enable by SYS.54)
DATA.287	Base RAMP 6 (enable by SYS.54)
DATA.288	Value RAMP 6 (enable by SYS.54)
DATA.289	Timer RAMPA 6 (enable by SYS.54)
DATA.290	Start RAMPA 7 (enable by SYS.55)

DATA.291	Stop RAMP 7 (enable by SYS.55)	
DATA.292	Time RAMP 7 (enable by SYS.57)	
DATA.293	Base RAMP 7 (enable by SYS.57)	
DATA.294	Value RAMP 7 (enable by SYS.57)	
DATA.295	Timer RAMP 7 (enable by SYS.57)	
DATA.296	Cold junction temperature	**RO**

....

DATA.300	Analog input channel 0 - *ISTANT VALUE* [bit]	
DATA.301	Analog input channel 1 - *ISTANT VALUE* [bit]	
DATA.302	Analog input channel 2 - *ISTANT VALUE* [bit]	
DATA.303	Analog input channel 3 - *ISTANT VALUE* [bit]	

....

DATA.308	Analog input channel 0 – *AVERAGED VALUE* [bit]	
DATA.309	Analog input channel 1 - *AVERAGED VALUE* [bit]	
DATA.310	Analog input channel 2 - *AVERAGED VALUE* [bit]	
DATA.311	Analog input channel 3 - *AVERAGED VALUE* [bit]	

....

DATA.316	Temperatur Analog input channel 0 [degrees]	
DATA.317	Temperature Analog input channel 1 [degrees]	
DATA.318	Temperature Analog input channel 2 [degrees]	
DATA.319	Temperature Analog input channel 3 [degrees]	

....

DATA.324	Input – PID 0 REGULATOR	
DATA.325	Set Point – PID 0 REGULATOR	

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DATA.326	Cycle time (dsec) – PID 0 REGULATOR	
DATA.327	Regulation band – PID 0 REGULATOR	
DATA.328	Integral value – PID 0 REGULATOR	
DATA.329	Derivative value – PID 0 REGULATOR	
DATA.330	Alarm level – PID 0 REGULATOR	
DATA.331	Actuation (regulation PID output from 0 to 255 to DAC) – PID 0 REGULATOR	RO
DATA.332	Input – PID 1 REGULATOR	
DATA.333	Set Point – PID 1 REGULATOR	
DATA.334	Cycle time (dsec) – PID 1 REGULATOR	
DATA.335	Regulation band – PID 1 REGULATOR	
DATA.336	Integral value – PID 1 REGULATOR	
DATA.337	Derivative value – PID 1 REGULATOR	
DATA.338	Alarm level – PID 1 REGULATOR	
DATA.339	Actuation (regulation PID output from 0 to 255 to DAC) – PID 1 REGULATOR	RO
DATA.340	Input – PID 2 REGULATOR	
DATA.341	Set Point – PID 2 REGULATOR	
DATA.342	Cycle time (dsec) – PID 2 REGULATOR	
DATA.343	Regulation band – PID 2 REGULATOR	
DATA.344	Integral value – PID 2 REGULATOR	
DATA.345	Derivative value – PID 2 REGULATOR	
DATA.346	Alarm level – PID 2 REGULATOR	
DATA.347	Actuation (regulation PID output from 0 to 255 to DAC) – PID 2 REGULATOR	RO
DATA.348	Input – PID 3 REGULATOR	
DATA.349	Set Point – PID 3 REGULATOR	

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DATA.350	Cycle time (dsec) – PID 3 REGULATOR	
DATA.351	Regulation band – PID 3 REGULATOR	
DATA.352	Integral value – PID 3 REGULATOR	
DATA.353	Derivative value – PID 3 REGULATOR	
DATA.354	Alarm level – PID 3 REGULATOR	
DATA.355	Actuation (regulation PID output from 0 to 255 to DAC) – PID 3 REGULATOR	RO

....

DATA.388	PID actuation for PWM (dsec) channel 0	
DATA.389	PID actuation for PWM (dsec) channel 1	
DATA.390	PID actuation for PWM (dsec) channel 2	
DATA.391	PID actuation for PWM (dsec) channel 3	

....

DATA.405	Encoder value 0 [H] (more significant word MSW)
DATA.406	Encoder value 0 [L] (least significant word LSW)
DATA.407	Encoder value 1 [H] (more significant word MSW)
DATA.408	Encoder value 1 [L] (least significant word LSW)

....

DATA.412	Preset value enco 0 [H] (more significant word MSW)
DATA.413	Preset value enco 0 [L] (least significant word LSW)
DATA.414	Preset value enco 1 [H] (more significant word MSW)
DATA.415	Preset value enco 1 [L] (least significant word LSW)
DATA.416	Output value DAC 0 (0...4095) from -10V to +10V
DATA.417	Output value DAC 1 (0...4095) from -10V to +10V
DATA.418	Output value DAC 2 (0...4095) from -10V to +10V

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DATA.419	Output value DAC 3 (0...4095) from -10V to +10V
DATA.420	Connected CAN modules state
DATA.421	Connected CAN modules state
DATA.422	Connected CAN modules state
DATA.423	Connected CAN modules state
DATA.424	Connected CAN modules state
DATA.425	Connected CAN modules state
DATA.426	Connected CAN modules state
DATA.427	Connected CAN modules state

....

DATA.429	Cams counter	RO
DATA.430	Cams outputs [H]	RO
DATA.431	Cams outputs [L]	RO
DATA.432	Cams time base (msec)	
DATA.433	Cams maximum value	
DATA.434	Cams 0 value	
DATA.435	Cams 1 value	
DATA.436	Cams 2 value	
DATA.437	Cams 3 value	
DATA.438	Cams 4 value	
DATA.439	Cams 5 value	
DATA.440	Cams 6 value	
DATA.441	Cams 7 value	
DATA.442	Cams 8 value	

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DATA.443	Cams 9 value	
DATA.444	Cams 10 value	
DATA.445	Cams 11 value	
DATA.446	Cams 12 value	
DATA.447	Cams 13 value	
DATA.448	Cams 14 value	
DATA.449	Cams 15 value	
DATA.450	Cams 16 value	
DATA.451	Cams 17 value	
DATA.452	Cams 18 value	
DATA.453	Cams 19 value	
DATA.454	Cams 20 value	
DATA.455	Cams 21 value	
DATA.456	Cams 22 value	
DATA.457	Cams 23 value	
DATA.458	Cams 24 value	
DATA.459	Cams 25 value	
DATA.460	Cams 26 value	
DATA.461	Cams 27 value	
DATA.462	Cams 28 value	
DATA.463	Cams 29 value	
DATA.464	Cams 30 value	
DATA.465	Cams 31 value	

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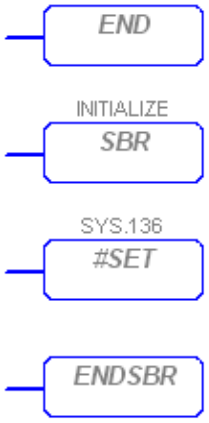
Legend	
commentary	***icon***
E²PROM saved DATA	
Read only DATA	

2.0 System flags

The TSP have more or less 180 system flags (SYS). Every system flag is write like : " **SYS.nn** " . The SYS are single bits (0 o 1) and it can be of two types :

- The SYS used by operative system to signal a resource state (for example there are the time SYS, enabled every second, every minute etc ...)
- Otherwise there are SYS which must be enabled by the application program to enable a specific PLC resource (for example the encoder input isn't a fast encoder input if isn't triggered the appropriate SYS, and so on for other resources)

The second case, namely a resource enable with a SYS, is usually done inside the INITIALIZE subroutine; because this subroutine is read always the first PLC cycle, in this way the resourece will be enable from the PLC start for all the program duration.
Example, if you want use the monodirectional encoder 0:

Instruction list	Ladder	Commentary
END SBR INITIALIZE #SET SYS.136 ENDSBR		The unconditional SYS setting runs immediately at the first program cycle, enabling in this way the encoder. Just as they would through a switch, at the application start the program put ON this resource.

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Complete map of all the system flags :

SYS.00	Always false
SYS.01	Always true
SYS.02	Enable only the first program cycle
SYS.03	Flag used by the CMP intruction (compare) : SYS.03 enabled if the two compared operands are equal. OPR1 = OPR2
SYS.04	Flag used by the CMP intruction (compare) : SYS.04 enabled if the first operand is lower than second. OPR1 < OPR2
SYS.05	Flag used by the CMP intruction (compare) : SYS.05 enabled if the first operand is higher than second. OPR1 > OPR2
SYS.06	Math Flag : carry (not used)

...

SYS.08	Enabled every 10 msec
SYS.09	Enabled every 100 msec
SYS.10	Enabled every second
SYS.11	Enabled every minute
SYS.12	Enabled every 15 minutes
SYS.13	Enabled every hour
SYS.14	Blinking 0.5 sec ON , 0.5 sec OFF
SYS.15	Beeper enable

...

SYS.19	Reading forcing. Will be read all the external variables.
SYS.20	EEPROM save forcing (DATA.28 = start, DATA.29 = stop)
SYS.21	Memory bank saving into EEPROM
SYS.22	Memory bank restoration from EEPROM

...

SYS.24	Enable PID regulation PWM mode Channel 0
SYS.25	Enable PID regulation MODULATING mode Channel 0

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SYS.26	Enable PID regulation PWM mode Channel 1
SYS.27	Enable PID regulation MODULATING mode Channel 1
SYS.28	Enable weekly programmer
SYS.29	Enable MAC_SEGMENT
SYS.30	Enable cams

...

SYS.32	Weekly program N°1 enable
SYS.33	Weekly program N°2 enable
SYS.34	Weekly program N°3 enable
SYS.35	Weekly program N°4 enable
SYS.36	Weekly program N°5 enable
SYS.37	Weekly program N°6 enable
SYS.38	Weekly program N°7 enable
SYS.39	Weekly program N°8 enable
SYS.40	Weekly program N°9 enable
SYS.41	Weekly program N°10 enable
SYS.42	Weekly program N°11 enable
SYS.43	Weekly program N°12 enable
SYS.44	Weekly program N°13 enable
SYS.45	Weekly program N°14 enable
SYS.46	Weekly program N°15 enable
SYS.47	Weekly program N°16 enable

...

SYS.60	Enable free running timer N°0 base 1msec
SYS.61	Enable free running timer N°1 base 1msec

SYS.62	Enable free running timer N°2 base 1msec
SYS.63	Enable free running timer N°3 base 1msec
SYS.64	Enable free running timer N°4 base 1msec
SYS.65	Enable free running timer N°5 base 1msec
SYS.66	Enable free running timer N°6 base 1msec
SYS.67	Enable free running timer N°7 base 1msec

…

SYS.72	Enable P.I.D. 0
SYS.73	P.I.D. 0 temperature regulation
SYS.74	Enable attuation DAC - P.I.D. 0
SYS.75	P.I.D. 0 output
SYS.76	Ready (enable inside the regulation band SP +/- Band) P.I.D. 0
SYS.77	Alarm (enable over the temperature SP + alarm band) P.I.D. 0

…

SYS.80	Enable P.I.D. 1
SYS.81	P.I.D. 1 temperature regulation
SYS.82	Enable attuation DAC - P.I.D. 1
SYS.83	P.I.D. 1 output
SYS.84	Ready (enable inside the regulation band SP +/- Band) P.I.D. 1
SYS.85	Alarm (enable over the temperature SP + alarm band) P.I.D. 1

…

SYS.88	Enable P.I.D. 2
SYS.89	P.I.D. 2 temperature regulation
SYS.90	Enable attuation DAC - P.I.D. 2
SYS.91	P.I.D. 2 output

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SYS.92	Ready (enable inside the regulation band SP +/- Band) P.I.D. 2
SYS.93	Alarm (enable over the temperature SP + alarm band) P.I.D. 2

...

SYS.96	Enable P.I.D. 3
SYS.97	P.I.D. 3 temperature regulation
SYS.98	Enable attuation DAC - P.I.D. 3
SYS.99	P.I.D. 3 output
SYS.100	Ready (enable inside the regulation band SP +/- Band) P.I.D. 3
SYS.101	Alarm (enable over the temperature SP + alarm band) P.I.D. 3

...

SYS.144	Enable encoder 0 monodirectional
SYS.145	Enable encoder 0 bidirectional

...

SYS.148	Enable encoder 1 monodirectional
SYS.149	Enable encoder 1 bidirectional

...

SYS.180	Enable OUT.03 PWM
SYS.181	Enable OUT.07 PWM
SYS.182	Enable OUT.11 PWM