

How to replace a LT6 by a TeSysT ?

I- Type of publication

☐	Typical application
☒	Best know Method (BKM)
☐	Troubleshooting guide

☐	Level 2 use
☐	Internal use
☒	Customer

II- Product

- Product range :

- Product family :

III- Introduction

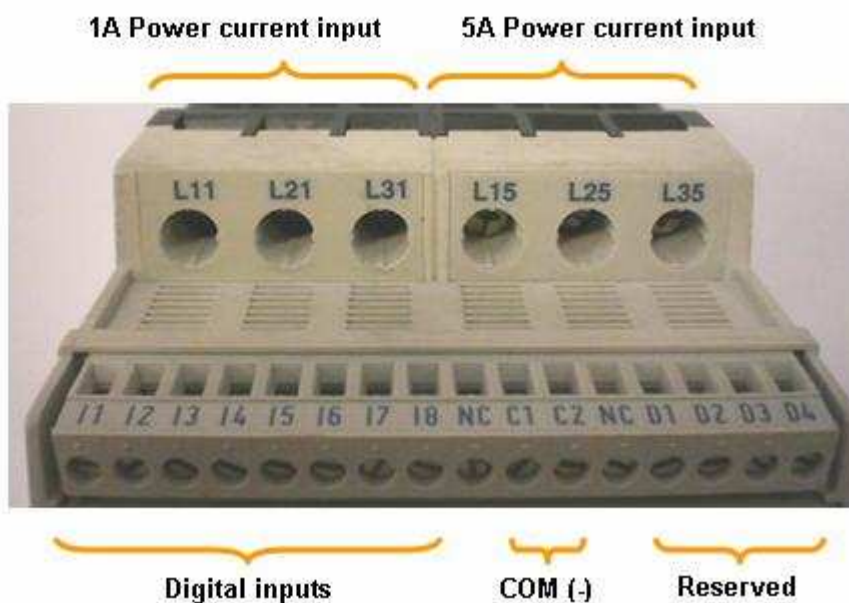
TeSysT is the new multifunction protection Controller which replace the old multifunction protection relay LT6. The aim of this document is to help you in the conversion from LT6 to TeSysT through:

- Wiring differences
- Protection/Control/Monitoring function differences
- Mapping equivalence

IV- Description

■ Wiring differences : - LT6

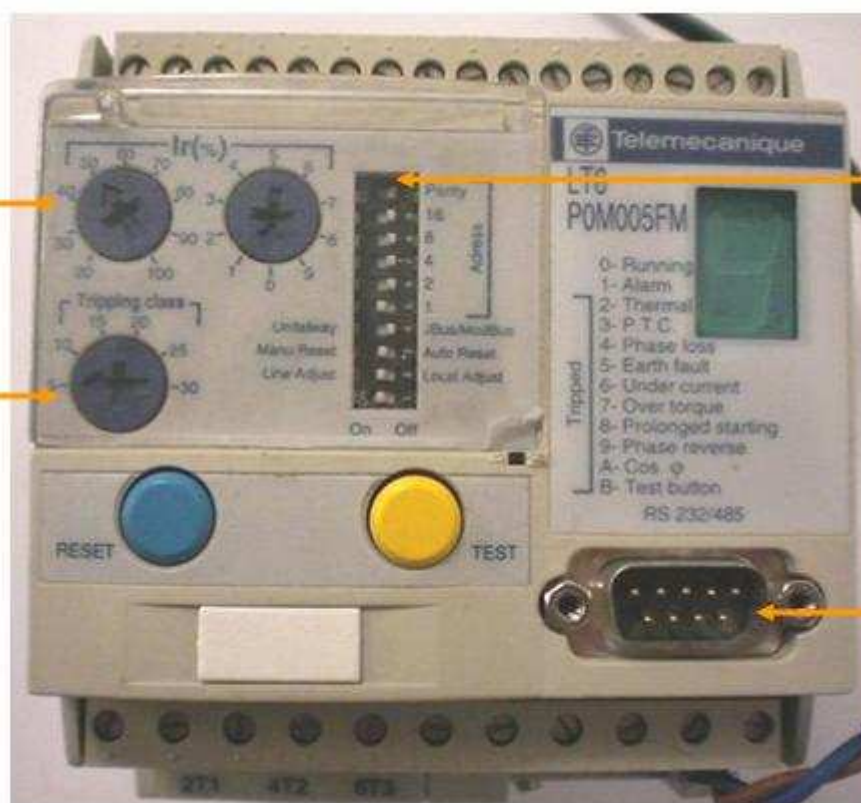
Top View



Current setting

Front View

Tripping class

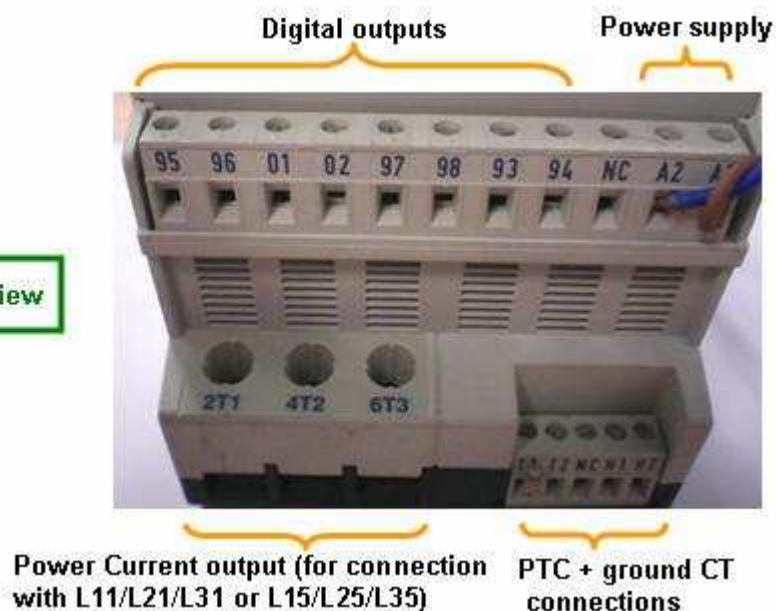


Configuration dip switches

Communication port (configuration by computer + network)

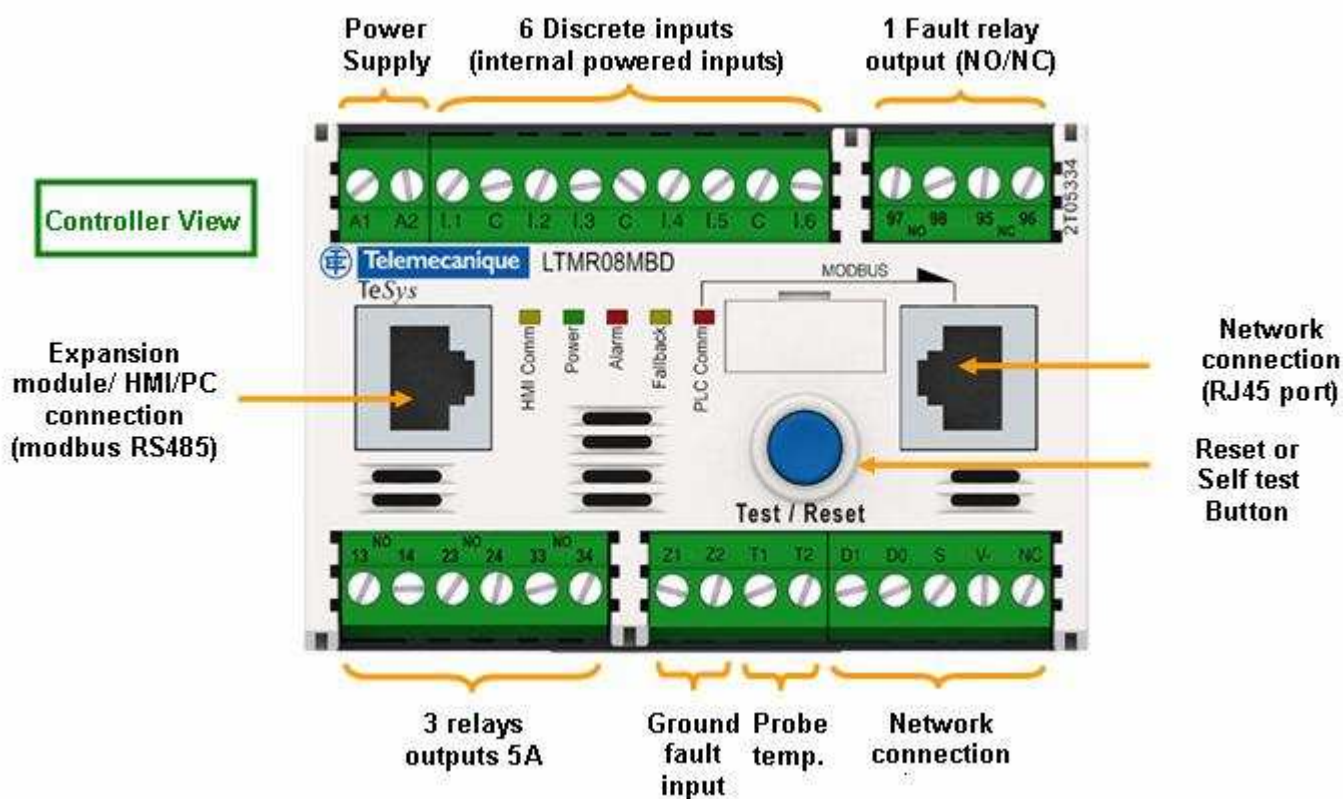
- LT6

Bottom view

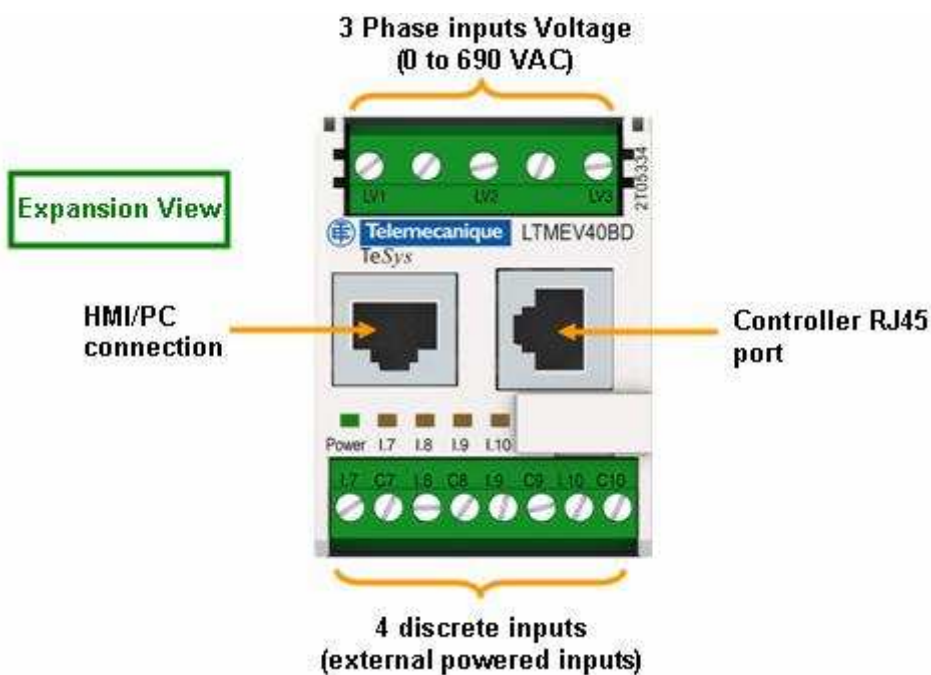


- TeSysT

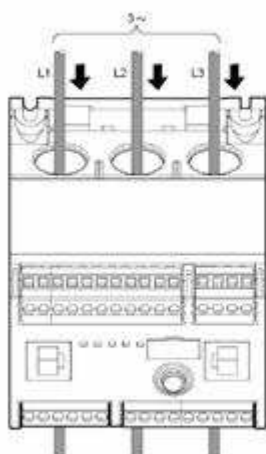
Controller View



- *TesysT*

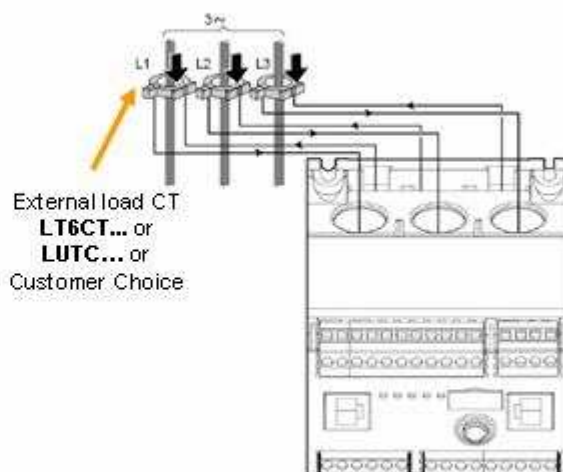


Internal CT for current range up to 100A



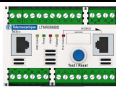
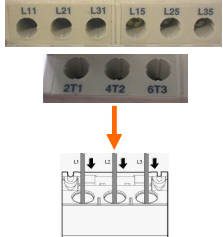
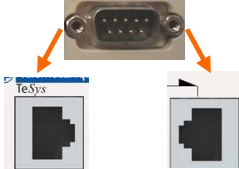
3 windows with embedded CT for measuring the phase current

External CT to expand the current range up to 810A

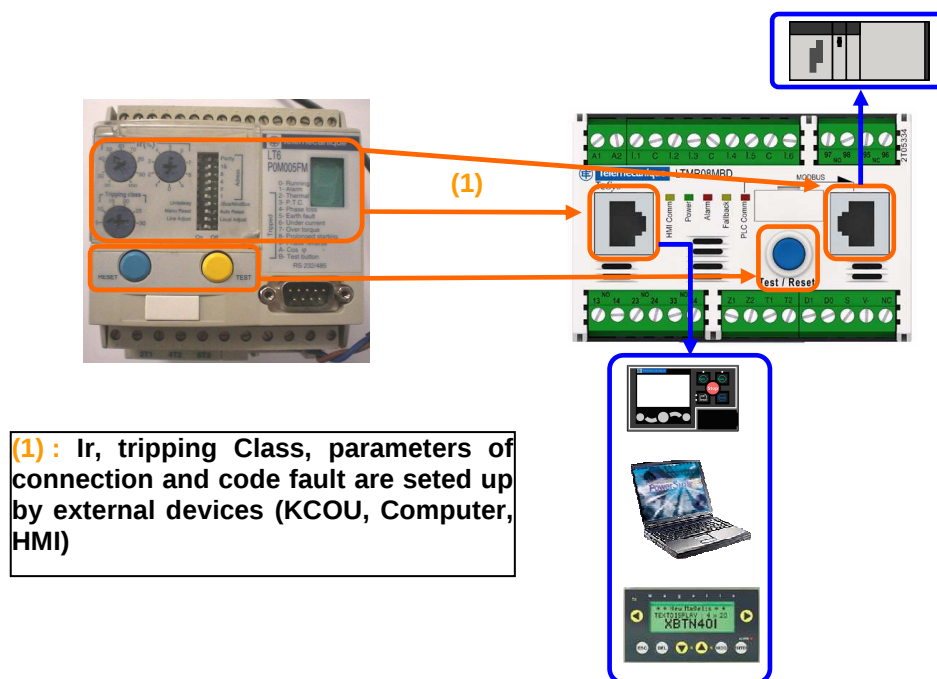


Controller accept 5A and 1A secondary signal from external CT

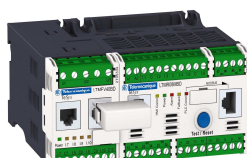
Multifunction Relay	LT6	TesysT Modbus (in 3-Wire mode)	Comments
Power supply of the relay 	A1	A1	LT6 : 110/230 Vac - 110/125 Vdc TesysT : 24Vdc or 100-240 Vac
	A2	A2	
Logic Inputs 	I1	I5	Reset fault
	I2	I6	Local/Remote
	I3	I1	Start Output A or 1
	I4	I2	Start Output B or 2
	I5	I4	Stop output A&B or 1&2: I4 for TesysT available only on 3-Wire
	I6	I3 or I7 or I8 or I9 or I10	I7-I8-I9-I10 : available only with LTMEV**
	I7	I3 or I7 or I8 or I9 or I10	I7-I8-I9-I10 : available only with LTMEV**
	I8	I3 or I7 or I8 or I9 or I10 or LV1-LV2-LV3	I7-I8-I9-I10-LV1-LV2-LV3 : available only with LTMEV**. <i>Be careful</i> : LV1-LV2-LV3 are connection to measure voltage three phase. Contrary to LT6 you do not need a transformer to measure voltage
COM (-) of logic inputs 	C1	None	For Logic Inputs of LTMR***** : A2 supplies in internal COM (-) (use 24Vdc or 100-240 Vac provided by connection "C" to switch on logic inputs or thanks to the same power supply connected on A1)
	C2	C7 or C8 or C9 or C10	For Logic Inputs of LTMEV** : COM (-) is provided by an external power supply.
Ground CT 	H1	Z1	The ground CT are the same for LT6 and TesysT
	H2	Z2	
Temperature Input 	T1	T1	LT6 : only PTC TesysT : PTC, PT100 and NTC
	T2	T2	
Logic Outputs 	95	13	LT6 : Output A
	96	14	TesysT : Output 1
	01	23	LT6 : Output B
	02	24	TesysT : Output 2
	97	95	LT6 : Fault Output
	98	96	TesysT : Fault Output 4
	93	33	LT6 : Thermal Warning Output
	94	34	TesysT : All Warning Output 3

 			
Multifunction Relay	LT6	TesysT Modbus (in 3-Wire mode)	Comments
Power connection 	L11/L15 - 2T1	Internal CT	External CT with TesysT : Secondary of External CT through internal CT
	L21/L25 - 4T2	Internal CT	
	L31/L35 - 6T3	Internal CT	
Communication connector 	SUB-D	RJ45 (Left Side: Computer/HMI)	LT6 : RS232 for Computer and RS485 for PLC TesysT : - Computer : Converter RS232/RS485 - PLC/HMI : RS485
		RJ45 (Right Side: PLC)	

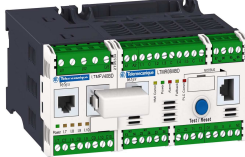
- Button Equivalent between LT6 and TesysT :



■ Protection/Control/Monitoring function differences

Multifunction Relay	LT6	TeSys T	TeSys T + expansion
			
General information Communication, form factor, size, installation, maintenance			
Width (mm)	86	91	45
Height (mm)	116	58	58
Depth (mm)	130	120	120
Volume (dm ³)	1,30	0,63	0,95
ModBus Communication	X	X	X
CanOpen Communication		X	X
Profibus Communication		X	X
DeviceNet Communication	Through gateway	X	X
Ethernet Communication		X	X
Off line addressing and configuration	X		
Protection			
Current overload	X	X	X
Jam (rotor stopped during run)	X	X	X
Long start or stall (rotor stopped during start)	X	X	X
Phase Loss	X	X	X
Earth Leakage with external tore	X	X	X
Current imbalanced	X	X	X
Earth Fault from internal calculation	X	X	X
Direct temperature protection through sensor	X	X	X
Over voltage	X		X
Under voltage	X		X
Voltage imbalanced			X
Load shedding	X		X
Phase reversal control	X	X	X
Power factor protection	X		X
Rapid Cycle (time between starts - chattering)		X	X
Control			
Direct on line control	X	X	X
Reverser control	X	X	X
2 steps control (Star Delta)	X	X	X
2 speeds control		X	X
Terminal strip Local control	X	X	X
HMI/Panel Local control		X	X
Remote control though communication port	X	X	X

■ *Protection/Control/Monitoring function differences*

Multifunction Relay	LT6	TeSys T	TeSys T + expansion
			
Setting & Programming			
Manual/Automatic Reset	X	X	X
Electrical Reset (local by dedicated input)	X	X	X
Remote Reset	X	X	X
Local parameters settings	X	X	X
Remote parameters settings	X	X	X
User Map (Re-arrange the sequence of registers)		X	X
Measurements			
Current per phase	X	X	X
Average Current	X	X	X
Ground Current by External Tore	X	X	X
Ground Current by Calculation	X	X	X
Thermal capacity used (calculation)	X	X	X
Direct teMperature mesurement through sensor	X	X	X
Inter phase voltage			X
Average voltage	X		X
Power factor (Cos Phi) measure	X		X
Active Power (kW)	X		X
Reactive Power (kVAR)	X		X
Energy Consumed (kWh)			X
Frequency measure	X		X
Diagnosis			
LED	X	X	X
Last trips conditions (thermal level, currents, ...)	X	X	X
Last starts conditions (starting current, starting time)		X	X
Trip Counters	X	X	X
Overload ALARM	X	X	X
Display fault code	X	X	X
Diagnostic fault (including internal fault)	X	X	X
Motor status	X	X	X

■ Mapping equivalence

LT6	TeSysT		
Address	Address	Variable Name	Comments
Statistics registers			
0	150	Fault Code n-0	Fault n-0
1/2	152	Thermal Capacity Level n-0	
3	154	L1 Current Ratio n-0	
4	155	L2 CurrentRatio n-0	
5	156	L3 Current Ratio n-0	
7	157	Ground Current Ratio n-0	
6	159	Current Phase Imbalance n-0	
8	172	Power Factor n-0	
9	166	Average Voltage n-0	
10	180	Fault Code n-1	Fault n-1
11/12	182	Thermal Capacity Level n-1	
13	184	L1 Current Ratio n-1	
14	185	L2 Current Ratio n-1	
15	186	L3 Current Ratio n-1	
16	189	Current Phase Imbalance n-1	
17	187	Ground Current Ratio n-1	
18	202	Power Factor n-1	
19	196	Average Voltage n-1	
20	210	Fault Code n-2	Fault n-2
21/22	212	Thermal Capacity Level n-2	
23	214	L1 Current Ratio n-2	
24	215	L2 Current Ratio n-2	
25	216	L3 Current Ratio n-2	
26	219	Current Phase Imbalance n-2	
27	217	Ground Current Ratio n-2	
28	232	Power Factor N2	
29	226	Average Voltage n-2	
30	240	Fault Code n-3	Fault n-3
31/32	242	Thermal Capacity Level n-3	
33	244	L1 Current Ratio n-3	
34	245	L2 Current Ratio n-3	
35	246	L3 Current Ratio n-3	
36	249	Current Phase Imbalance n-3	
37	247	Ground Current Ratio n-3	
38	262	Power Factor N3	
39	256	Average Voltage n-3	
40	270	Fault Code n-4	Fault n-4
41/42	272	Thermal Capacity Level n-4	
43	274	L1 Current Ratio n-4	
44	275	L2 Current Ratio n-4	
45	276	L3 Current Ratio n-4	
46	279	Current Phase Imbalance n-4	
47	277	Ground Current Ratio n-4	
48	292	PowerFactor n-4	
49	286	Average Voltage n-4	

■ Mapping equivalence

LT6	TeSysT		
Address	Address	Variable Name	Comments
Statistics registers			
50/51	103	Thermal Overload Faults Count	Counters
52	132	Motor Temp Sensor Faults Count	
53	106	Current Phase Imbalance FaultsCount	
53	131	Current Phase Loss Faults Count	
54	102	Ground Current Faults Count	
55	107	Under Current Faults Count	
56	105	Jam Faults Count	
57	104	Long Start Faults Count	
58	135	WiringFaultsCount	
60	140	Under Power Factor Faults Count	
60	141	Over Power Factor Faults Count	
61	117	Motor Starts Count	
61	118	Motor Starts Count MSB	
62	119	Operating Time	
62	120	Operating Time MSB	
63	124	Motor LO1 Starts Count	
63	125	Motor LO1 Starts Count MSB	
64	126	Motor LO2 Starts Count	
64	127	Motor LO2 Starts Count MSB	
Monitoring registers			
65/66	465	Thermal Capacity Level	Status&fault
67	467	L1 Current Ratio	
68	468	L2 Current Ratio	
69	469	L3 Current Ratio	
70	471	Current Phase Imbalance	
71	470	Ground Current Ratio	
72	450	Minimum Wait Time	
73	481	Power Factor	
74	476	Average Voltage	
75	474	Frequency	
78,0	455,2	System fault	
78,3	456,8	Network port com loss	
78,4	456,8	Network port com loss	

■ Mapping equivalence

LT6	TeSysT		
Address	Address	Variable Name	Comments
Monitoring registers			
78,6	LI6	Remote / Local	
78,7	452,11	Controller internal fault	
79,0	694	network parity	
79,1	696	network address	
79,2	696	network address	
79,3	696	network address	
79,4	696	network address	
79,5	696	network address	
79,7	602	reset setting	
80,0	459,0	Input1	
80,1	459,1	Input2	
80,2	459,3	Input4	
80,3	1200,6	Remote/Local Mode	
80,4	459,4	Input5	
80,8	455,15	Motor starting	
80,9	455,17	Motor running	
80,B	456,4	loadshedding	
80,C	459,12	Output1	
80,D	459,13	Output2	
80,E	455,4	system tripped	
80,F	455,3	system warning	
81,0	452,3	thermal overload	
81,1	452,3	thermal overload	
81,2	453,6	motor temp sensor	
81,3	453,7	phase imbalance	
81,4	452,2	ground current	
81,5	452,7	Undercurrent	
81,6	452,5	Jam	
81,7	452,4	Long start	
81,8	453,5	phase reversal	
81,9	453,14	Under power factor	
81,F	453,2	wiring	
82,0	461,3	thermal overload	
82,1	461,6	phase imbalance	
82,1	462,4	phase loss	
82,2	461,2	ground fault	
82,3	461,7	undercurrent	
82,4	461,5	jam	
82,5	462,1	power factor	

■ Mapping equivalence

83,3	704,5	Test
83,D	705,1	Clear statistic
83,E	705,1	Clear statistic
83,F	705,3	Return to factory setting

LT6 Address	TeSysT Address	Variable Name	Comments
Configuration registers			
84	652	Motor Full Load Current Ratio	
85	606	MotorTrip Class	
86	609	Thermal Overload Warning Threshold	
87	615	Current Phase Imbalance Fault Threshold	
87	616	Current Phase Imbalance Warning Threshold	
88	613	Current Phase Imbalance Fault Timeout Starting	
89	614	Current Phase Imbalance Fault Timeout Running	
90	611	Internal Ground Current Fault Threshold	
90	612	Internal Ground Current Warning Threshold	
91	610	Internal Ground Current Fault Timeout	
92	624	Long Start Fault Threshold	
92	625	Long Start Warning Threshold	
93	623	Long Start Fault Timeout	
94	621	Under Current Fault Threshold	
94	622	Under Current Warning Threshold	
95	620	Under Current Fault Timeout	
96	618	Jam Fault Threshold	
96	619	Jam Warning Threshold	
97	617	Jam Fault Timeout	
98	591	UnderPower Factor Fault Threshold	
98	592	UnderPower Factor Warning Threshold	
99	590	UnderPower Factor Fault Timeout	
100	579	LoadShedding Threshold	
101	578	LoadShedding Timeout	
102	581	LoadShedding RestartThreshold	
103	580	LoadShedding RestartTimeout	
104	638, 640, 642	Time before reset available (in auto. for TesysT)	

V- Limitation

This document makes a comparison between LT6 and TesysT. Be careful, you can only make an equivalence if you have a TesysT Modbus (reference : LTMR**M**). We advise to use a LTMEV** with the controller LTMR**M**. This configuration gets all functions of protections available with TesysT product.