

# MANUAL OPERATOR HASSI MESSAOUD

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Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 1 / 133
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Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 2 / 133



2     LEGEND.     7       3     INTRODUCTION     8       4     DESCRIPTION OF THE CONTROL SYSTEM.     9       4.1     LIST OF ITEMS DESCRIBED IN THE MANUAL.     9       4.2     DESCRIPTION OF ARCHITECTURE.     9       5.1     DISCRIPTION OF CONTROL AND VIEWING AREAS.     11       5.1     INTRODUCTION     12       5.3     DESCRIPTION OF CONTROL AND VIEWING AREAS.     14       5.3.1     OBJECT FOR * TORICAL SUMPRENT     15       5.3     OBJECT FOR * TORICAL SUMPRENT     17       5.4     OBJECT FOR * TORICAL SUMPRENT     17       5.4     OBJECT FOR * TELEVISA LLO R NOTHING'     15       5.3     OBJECT FOR * TELEVISA LLO R NOTHING'     15       5.4     ALARM MANGEMENT     22       5.4     LARM MANGEMENT     22       5.4     ALARIN MANGEMENT     22       5.5     PALID ARINGTRUMENTS     23       5.6     DESCRIPTION PASE ALARING     22       5.1     MAIN MANGEMENTS     24       5.1     MAIN MANGEMENTS     25	1 REFERENCE DOCUMENTS			6
3   INTRODUCTION	2 LEGEND			7
4     DESCRIPTION OF THE CONTROL SYSTEM     9       4.1     LIST OF ITENS DESCRIBED IN THE MANUAL     5       4.2     DESCRIPTION OF ARCHITECTURE     5       5     DESCRIPTION HIM SYSTEM     12       5.1     INTRODUCTION     12       5.2     PERSCRIPTION OF CONTROL AND VIEWING AREAS.     14       5.3     DESCRIPTION OF CONTROL AND VIEWING AREAS.     14       5.3     OBJECT FOR "ILECTRICAL EQUIPMENT"     15       5.4     AUBLECT FOR "ILECTRICAL EQUIPMENT"     15       5.4     OBJECT FOR "LECTRICAL EQUIPMENT"     15       5.4     OBJECT FOR "LECTRICAL EQUIPMENT"     15       5.6     OBJECT FOR "LECTRICAL EQUIPMENT"     15       5.6     OBJECT FOR "LECTRICAL EQUIPMENT"     15       5.6     OBJECT FOR "LECTRICAL EQUIPMENTS"     15       5.7     OBJECT FOR "FELSCHARDE     22       5.8     OBJECT FOR "LECTRICAL EQUIPMENTS"     22       5.4     ALARM MANAGEMENT     22       5.6     OPLENCIPM SAGE ALARMS     22       5.7     PALD CASA DECONTROL PAGE     33	3 INTRODUCTION			8
4.1   LIST OF ITEMS DESCRIBED IN THE MANUAL.   5     4.2   DESCRIPTION OF ARCHITECTURE   5     5   DESCRIPTION OF ARCHITECTURE   12     5.1   INTRODUCTION   12     5.1   INTRODUCTION OF CONTROL AND VIEWING AREAS.   14     5.1   DESCRIPTION OF CONTROL AND VIEWING AREAS.   14     5.2   DESCRIPTION OF CONTROL AND VIEWING AREAS.   14     5.3   O BLECT FOR "LIEGTRICAL EQUIPMENT.   15     5.3   O BLECT FOR "LIEGTRICAL EQUIPMENT.   15     5.3.6   OBLECT FOR "REQUATOR PID'.   22     5.4   ALARM MANAGEMENT.   26     5.4   ALARM MANAGEMENT.   26     5.4   CHARACTERZING PHASE ALARMS.   27     5.4   CHARACTERZING PHASE ALARMS.   26     5.4   CHARACTERZING PHASE ALARMS.   26     5.5   PALD GAS DISCHARGE   33     5.6   PALM MANAGEMENT.   26     5.7   PALD SYSTEM LUBRCATING OIL AND MOUTH.   33     5.4   PALD AR INSTRUMENTS.   35     5.5   PALD CONTROL PAGE   32     5.6   PALT STRUEATI	4 DESCRIPTION OF THE CONTROL	SYSTEM		9
42   DESCRIPTION OF ARCHITECTURE   1     5   DESCRIPTION   12     5.1   INTRODUCTION   12     5.2   HMI SYSTEM ARCHITECTURE   12     5.3   DESCRIPTION OF CONTROL AND VIEWING AREAS   14     5.1   OBJECT FOR "ANALOG SIGNALS"   14     5.3   DESCRIPTION OF CONTROL AND VIEWING AREAS   14     5.3.1   OBJECT FOR "RUN COUNTER HOURS"   15     5.3.5   OBJECT FOR "RUN COUNTER HOURS"   15     5.3.6   OBJECT FOR "RUN COUNTER HOURS"   15     5.4   ALARM MANAGEMENT   22     5.4   ALARM MANAGEMENT   22     5.4.1   CHARM CREATING OL AND MOUTH   23     5.5   P & ID: SYSTEM LUBRICATING OL AND MOUTH   33     5.5   P & ID: ONTROL PAGE   33     5.5   P & ID: CONTROL PAGE   33     5.5   P & ID: CONTROL PAGE   33     5.5   P & ID: AFTAGE COMPRESSOR   33     5.5   P & ID: AFTAGE COMPRESSOR   33     5.51   OCONTROL PAGE   33     5.510   CONTROLLER: ANTISURGE CONTROL   36 </td <td>4.1 LIST OF ITEMS DESCRIBED IN THE</td> <td>/ANUAL</td> <td></td> <td> 9</td>	4.1 LIST OF ITEMS DESCRIBED IN THE	/ANUAL		9
5     DESCRIPTION HMI SYSTEM     12       5.1     INTRODUCTION     12       5.2     HMI SYSTEM ARCHITECTURE     12       5.3     DESCRIPTION OF CONTROL AND VIEWING AREAS.     14       5.1     OBJECT FOR "ANALOG SIGNALS"     14       5.3     DESCRIPTION OF CONTROL AND VIEWING AREAS.     14       5.3     C OBJECT FOR "ELECTRICAL EQUIPMENT"     17       5.4     OBJECT FOR "ELECTRICAL EQUIPMENT"     16       5.3     C OBJECT FOR "ELECTRICAL EQUIPMENT"     16       5.4     OBJECT FOR "ELECTRICAL EQUIPMENT"     16       5.4     OBJECT FOR "ELECTRICAL EQUIPMENT"     17       5.4     OBJECT FOR "ELECTRICAL EQUIPMENT"     16       5.4     ALARM MANAGEMENT     22       5.4     ALARM MANAGEMENT     22       5.4     ACTIONS TO BE PERFORMED IN CASE OF OCCURRENCE OF AN ALARM     22       5.5     PAID CASIDEGHARGE     36       5.5     PAID CASIDEGHARGE     36       5.5     PAID CASIDEGHARGE     36       5.5     PAID CASIDEGHARGE     36       5.5     <	4.2 DESCRIPTION OF ARCHITECTURE			9
D DESCRIPTION HWI STSTEM     12       51 INTRODUCTION     12       52 HMI SYSTEM ARCHITECTURE     12       53 DESCRIPTION OF CONTROL AND VIEWING AREAS     14       53 DESCRIPTION OF CONTROL SIGNALS'     14       53 DESCRIPTION OF CONTROL SIGNALS'     16       53 COBJECT FOR "RUN COUNTER HOURS'     17       53 GUECT FOR "RUN COUNTER HOURS'     16       53 COBJECT FOR "RUN COUNTER HOURS'     17       54 OBJECT FOR "RUN COUNTER HOURS'     16       53 COBJECT FOR "RUN COUNTER HOURS'     17       54 OBJECT FOR "RUN COUNTER HOURS'     17       54 OBJECT FOR "RUN COUNTER HOURS'     17       54 ONTROL PAREMENT     22       54 ALARM MANAGEMENT     22       54 ALARM MANAGEMENT     22       55 OVERVIEW SCREEN PAGES     36       55 OVERVIEW SCREEN PAGES     36 <t< td=""><td></td><td></td><td></td><td>40</td></t<>				40
1.1     INIX ROUGHING     12       12     HMI SYSTEM ARCHITECTURE     12       13.1     DESCRIPTION OF CONTROL AND VIEWING AREAS     14       13.1     DELECT FOR "ANLOG SIGNALS"     14       13.2     OBLECT FOR "RUN COUNTER HOURS"     15       15.3     C. DELECT FOR "ELECTRICAL EQUIPMENT"     15       15.4     DELECT FOR "ELECTRICAL EQUIPMENT"     16       15.4     DELECT FOR "ELECTRICAL EQUIPMENT"     22       5.4     ALARM MANAGEMENT     26       5.4     PALACTERIZING PHASE ALARMS     27       5.5     OVERVIEW SCREEN PAGES     23       5.5     OVERVIEW SCREEN PAGES     33       5.5     PALID: GAS DISCHARGE     33       5.5     PALID: GAS DISCHARGE     33       5.5     PALID: GAST DISCHARGE     33       5.5     PALID: GAST DISCHARGE     33       5.5     PALID MALARER	5 DESCRIPTION HMI STSTEM			12
5.2   HMI SYSTEM ARCHITECTURE   11     5.3   DESCRIPTION OF CONTROL AND VIEWING AREAS.   14     5.3   DESCRIPTION OF CONTROL AND VIEWING AREAS.   14     5.3   DESCRIPTION OF CONTROL AND VIEWING AREAS.   16     5.3   O BLECT FOR "INLOG SIGNALS"   16     5.3   O BLECT FOR "EVALVES ALL OR NOTHING"   15     5.4   ALARM MANAGEMENT   22     5.4   ALARM MANAGEMENT   22     5.4   ALARM MANAGEMENT   26     5.5   OVERVIEW SCREEN PAGES   33     5.1   MAIN MENU   33     5.5   P & ID: AIR INSTRUMENTS   33     5.5   P & ID: AIR INSTRUMENTS   33     5.5   P & ID: AIR INSTRUMENTS   33     5.5.1   MAIN APPASS LOCKS   33     5.5.5   P & ID: AIR STABLE MCC   33     5.5.6   P & ID: AIR STABLE MCC   33     5.5.10	5.1 INTRODUCTION			12
5.3     DESCRIPTION OF CONTROL AND VIEWING AREAS	5.2 HMI SYSTEM ARCHITECTURE			12
3.3     Object For Biolana Signals     1       5.3.2     OBJECT FOR "ELECTRICAL EQUIPMENT"     17       5.3.4     OBJECT FOR "EVALVES ALL OR NOTHING"     15       5.3.5     OBJECT FOR "EVALVES ALL OR NOTHING"     15       5.3.6     OBJECT FOR "EVALVES ALL OR NOTHING"     12       5.3.6     OBJECT FOR "EVALVES ALL OR NOTHING"     12       5.4     ALARM MANAGEMENT     22       5.4     ALARM CTERIZING PHASE ALARMS     22       5.4     ALARM CTERIZING PHASE ALARMS     22       5.5     OVERVIEW SCREEN PAGES     36       5.5.1     MAIN MENU     33       5.5.4     PAID: GAS DISCHARGE     33       5.5.5     PAID: CONTROL PAGE     33       5.5.6     PA ID: AR INSTRUMENTS     33       5.5.7     PA ID: A GAS DISCHARGE CONTROL     34       5.5.1     CONTROLLER: ANTISURGE CONTROL     34       5.5.1     DIC AGER BOX     35       5.5.13     DIGNALS TABLE MCC     33       5.5.14     INPUT SIGNALS TABLE MCC     35       5.5.15     PRINT DATA LOGGINO	5.3 DESCRIPTION OF CONTROL AND VII	EWING AREAS		14
5.3.3   C OBJECT FOR "ELECTRICAL EQUIPMENT"   11     5.3.4   OBJECT FOR E "VALVES ALL OR NOTHING"   15     5.3.5   OBJECT FOR E "VALVES ALL OR NOTHING"   22     5.3.6   OBJECT FOR F REGULATOR PID"   22     5.3.6   OBJECT FOR F REGULATOR PID"   22     5.4   ALARM MANAGEMENT   22     5.4.1   CHARACTERIZING PHASE ALARMS   22     5.4   JALONS TO BE PERFORMED IN CASE OF OCCURRENCE OF AN ALARM   22     5.5   OVERVIEW SCREEN PAGES   36     5.5.1   MAIN MAUL   33     5.5.2   PAID: GAS DISCHARGE   32     5.5.3   P & ID: SYSTEM LUBRICATING OIL AND MOUTH   31     5.5.6   P & ID: TASTGE COMPRESSOR   32     5.5.7   P & ID: 2" STAGE COMPRESSOR   32     5.5.8   P & ID: 2" STAGE COMPRESSOR   32     5.5.10   DONTROLLER: TURBINE   33     5.5.11   MOS: MANUAL BYPASS LOCKS   33     5.5.13   DIGITAL INPUTS TABLE   33     5.5.14   INPUT STABLE   33     5.5.15   SMILAR THRESHOLD   34     5.5.16	5.3.2 OBJECT FOR ANALOG SIGNALS .	1		14
5.3.4   OBJECT FOR "RUN COUNTER HOURS"	5.3.3 C OBJECT FOR "ELECTRICAL EQU	IPMENT"		17
5.3.6   OBJECT FOR F "VALVES ALL OR NOTHING"   15     5.3.6   OBJECT FOR F "REGULATOR PID"   22     5.4   ALARM MANAGEMENT   26     5.4.1   CHARACTERIZING PHASE ALARMS   27     5.4.2   ACTONS TO BE PERFORMED IN CASE OF OCCURRENCE OF AN ALARM   26     5.5.1   MAIN MENU   33     5.5.1   DVERVIEW SCREEN PAGES   32     5.5.1   DVERVIEW SCREEN PAGES   33     5.5.2   P & ID: SYSTEM LUBRICATING OIL AND MOUTH   33     5.5.3   P & ID: SYSTEM LUBRICATING OIL AND MOUTH   33     5.5.4   P & ID: AIR INSTRUMENTS   33     5.5.5   P & ID: CONTROL PAGE   32     5.5.6   P & ID: Z" STAGE COMPRESSOR   32     5.5.7   P & ID: Z" STAGE COMPRESSOR   32     5.5.11   MOINTALLER: TURBINE   32     5.5.12   DIAGNOSTIC   32     5.511   MOINTALLER: TURBINE   32     5.512   DIAGNOSTIC   32     5.513   DIGITAL INPUTS TABLE   33     5.514   INPUT SIGNALS TABLE MCC   33     5.515   SIMILAR THRESHOLD	5.3.4 OBJECT FOR "RUN COUNTER HOL	JRS"		19
53.6   OBJECT FOR F "REGULATOR PID"   22     54.4   ALARM MANAGEMENT   22     54.1   CHARACTERIZING PHASE ALARMS   27     54.2   ACTIONS TO BE PERFORMED IN CASE OF OCCURRENCE OF AN ALARM   26     55.0   VERVIEW SCREEN PAGES   30     55.1   MAIN MENU   31     55.2   PAID: SYSTEM LUBRICATING OIL AND MOUTH   33     55.4   PA ID: AR INSTRUMENTS   33     55.5   P & ID: CONTROL PAGE   33     55.6   P & ID: AR INSTRUMENTS   33     55.7   P & ID: CONTROL PAGE   33     55.6   P & ID: AGR BOX   33     55.7   P & ID: AGR BOX   33     55.8   P & ID: A GRA BOX   34     55.10   CONTROLLER: TUBINE   33     55.11   DIGNOSTIC   36     55.12   DIAGNOSTIC   36     55.13   DIGITAL INPUTS TABLE   33     55.14   INPUT SIGNALS TABLE MCC   37     55.15   SIMILAR THRESHOLD   36     55.16   SIMILAR THRESHOLD   36     51.14   INPUT SIGNALS T	5.3.5 OBJECT FOR E "VALVES ALL OR N	OTHING"		19
5.4   ALARM MANAGEMENT   22     5.4.1   CHARACTERZING PHASE ALARMS   27     5.4.2   ACTIONS TO BE PERFORMED IN CASE OF OCCURRENCE OF AN ALARM   25     5.5   OVERVIEW SCREEN PAGES   30     5.5.1   MAIN MENU   31     5.5.2   PRID: GAS DISCHARGE   32     5.5.3   P & ID: SYSTEM LUBRICATING OIL AND MOUTH   31     5.5.4   P & ID: 14" STAGE COMPRESSOR   32     5.5.6   P & ID: 26" STAGE COMPRESSOR   33     5.5.7   P & ID: 26" STAGE COMPRESSOR   33     5.5.8   P & ID: 26" STAGE COMPRESSOR   33     5.5.11   MOIS: MANUAL BYPASS LOCKS   34     5.5.12   DIGITAL INPUTS TABLE   37     5.5.14   INICAT THRESHOL   36     5.5.15   SINILAR THRESHOL   36     5.5.16   PRINT DATA LOGGING   42     6   FUNCTIONAL DESCRIPTION   42     6.1   INTRODUCTION   42     6.2.2   OPERATION   42     6.3.1   COMPONENTS   44     6.3.2   OPERATION   42     6.1	5.3.6 OBJECT FOR F "REGULATOR PID"			22
5.4.1   CHARACTERIZING PHASE ALARMS   27     5.4.2   ACTIONS TO BE PERFORMED IN CASE OF OCCURRENCE OF AN ALARM   22     5.5   OVERVIEW SCREEN PAGES   33     5.5.1   MAIN MENU   36     5.5.2   PAID: GAS DISCHARGE   36     5.5.3   PAID: GAS DISCHARGE   31     5.5.4   PA ID: ANY STEM LUBRICATING OIL AND MOUTH   31     5.5.5   PA ID: CONTROL PAGE   32     5.6   PA ID: 2 <sup>rd</sup> STAGE COMPRESSOR   33     5.5.7   PA ID: 2 <sup>rd</sup> STAGE COMPRESSOR   33     5.5.9   CONTROLLER: TURBINE   34     5.5.10   CONTROLLER: ANTISURGE CONTROL   36     5.5.11   DIGNOSTIC   33     5.5.12   DIAGNOSTIC   36     5.5.13   DIGNAL INPUTS TABLE   37     5.5.14   INTAL INPUT STABLE   37     5.5.15   PRINT DATA LOGGING   44     6.5.17   ADMINISTRATION   44     6.2   PRIOCHAL DESCRIPTION   44     6.3.1   PRINT DATA LOGGING   44     6.3.1   COMPONENTS   44     6.3.1<	5.4 ALARM MANAGEMENT			26
5.4.2   ACTIONSI TO BE PERFORMED IN CASE OF OCCURRENCE OF AN ALARM   25     5.5   OVERVIEW SCREEN PAGES   33     5.5.1   MAIN MENU   33     5.5.2   P&ID: GAS DISCHARGE   36     5.5.3   P & ID: SYSTEM LUBRICATING OIL AND MOUTH   31     5.5.4   P & ID: SYSTEM LUBRICATING OIL AND MOUTH   31     5.5.5   P & ID: CONTROL PAGE   32     5.5.6   P & ID: 2 <sup>nd</sup> STAGE COMPRESSOR   33     5.5.7   P & ID: 2 <sup>nd</sup> STAGE COMPRESSOR   33     5.5.10   CONTROLLER: TURBINE   33     5.5.11   MG: MANUAL BYPASS LOCKS   36     5.5.12   DIGITAL INPUTS TABLE   33     5.5.13   DIGITAL INPUTS TABLE   33     5.5.14   MPUT SIGNALS TABLE MCC   33     5.5.15   SIMILAR THRESHOLD   44     6.5.17   ADMINISTRATION   44     6.1   INTRODUCTION   43     6.1   INTRODUCTION   44     6.3.1   COMPONENTS   44     6.3.1   COMPONENTS   44     6.3.1   COMPONENTS   44     6.5.	5.4.1 CHARACTERIZING PHASE ALARMS			27
5.5   OVERVIEW SCREEN PAGES   33     5.5.1   MAIN MENU   33     5.5.2   PAID: GAS DISCHARGE   33     5.5.3   PA ID: SYSTEM LUBRICATING OIL AND MOUTH   33     5.5.5   PA ID: SYSTEM LUBRICATING OIL AND MOUTH   33     5.5.6   PA ID: CONTROL PAGE   32     5.5.7   PA ID: 2 <sup>rd</sup> STAGE COMPRESSOR   32     5.5.7   PA ID: A GEAR BOX   34     5.5.9   CONTROLLER: TURBINE   34     5.5.10   DONTROLLER: ANTISURGE CONTROL   36     5.5.11   DIGGNOSTIC   35     5.5.12   DIGGNAL INPUTS TABLE   37     5.5.13   DIGITAL INPUTS TABLE   37     5.5.14   INPUT SIGNALS TABLE MCC   33     5.5.15   SIMILAR THRESHOLD   36     5.5.16   SIMILAR THRESHOLD   36     5.5.17   ADMINISTRATION   42     6   FUNCTIONAL DESCRIPTION   43     6.1   INTRODUCTION   42     6.2   ORIC SYSTEMS   44     6.3.1   COMPONENTS   44     6.3.2   OPERATION	5.4.2 ACTIONS TO BE PERFORMED IN C	ASE OF OCCURRENCE OF AN ALARM		29
3.5.1   MAIN MENU   3     5.5.2   P&ID: SYSTEM LUBRICATING OIL AND MOUTH   31     5.5.3   P&ID: SYSTEM LUBRICATING OIL AND MOUTH   31     5.5.4   P&ID: CONTROL PAGE   32     5.5.5   P&ID: 2 <sup>rd</sup> STAGE COMPRESSOR   32     5.5.6   P&ID: 2 <sup>rd</sup> STAGE COMPRESSOR   33     5.5.7   P&ID: 2 <sup>rd</sup> STAGE COMPRESSOR   33     5.5.8   P&ID: 2 <sup>rd</sup> STAGE COMPRESSOR   33     5.5.9   CONTROLLER: TURBINE   34     5.5.10   CONTROLLER: ANTISURGE CONTROL   36     5.5.11   DIGS: MANUAL BYPASS LOCKS   36     5.5.12   DIAGNOSTIC   36     5.5.13   DIGITAL INPUTS TABLE   37     5.5.14   INPUT SIGNAL ADESCRIPTION   36     6.5.17   ADMINISTRATION   42     6   FUNCTIONAL DESCRIPTION   42     6.1   INTRODUCTION   42     6.2   GAS CIRCUIT   42     6.3   OUS PRATION   44     6.3   OUS PRATION   44     6.3.1   COMPONENTS   44     6.3.2   PROR	5.5 OVERVIEW SCREEN PAGES			30
55.3   P & ID: SYSTEM LUBRICATING OIL AND MOUTH   31     55.4   P & ID: SYSTEM LUBRICATING OIL AND MOUTH   31     55.4   P & ID: CONTROL PAGE   32     55.6   P & ID: 2 <sup>nd</sup> STAGE COMPRESSOR   33     55.7   P & ID: 2 <sup>nd</sup> STAGE COMPRESSOR   33     55.8   P & ID: 1 <sup>d</sup> STAGE COMPRESSOR   34     55.9   CONTROLLER: TURBINE   34     55.10   CONTROLLER: ANTISURGE CONTROL   35     55.11   MOS: MANUAL BYPASS LOCKS   36     55.12   DIAGNOSTIC.   36     55.13   DIGTAL INPUTS TABLE   37     55.14   INPUT SIGNALS TABLE MCC   37     55.15   DIMILAR THRESHOLD   36     55.16   PRINT DATA LOGGING   44     55.17   ADMINISTRATION   42     6   FUNCTIONAL DESCRIPTION.   43     6.1   INTRODUCTION   44     6.2   GAS CIRCUIT   44     6.3   OLE SYSTEMS   44     6.3   OPERATION   44     6.4   CIRCUIT AND	5.5.1 MAIN MENU			30
55.4   P & ID: AIR INSTRUMENTS.   31     5.5.5   P & ID: ONTROL PAGE   32     5.5.6   P & ID: 4" STAGE COMPRESSOR   33     5.5.7   P & ID: AGE COMPRESSOR   33     5.5.8   P & ID: AGE COMPRESSOR   34     5.5.9   CONTROLLER: TURBINE   34     5.5.10   CONTROLLER: TURBINE   34     5.5.11   MOS: MANUAL BYPASS LOCKS   35     5.5.12   DIAGNOSTIC   36     5.5.13   DIGITAL INPUTS TABLE   37     5.5.14   INPUT SIGNALS TABLE MCC   37     5.5.15   SIMILAR THRESHOLD   38     5.5.16   PRINT DATA LOGGING   44     6.5.17   ADMINISTRATION   42     6   FUNCTIONAL DESCRIPTION.   43     6.1   INTRODUCTION   42     6.2.2   OPERATION   44     6.3.1   COMPONENTS   44     6.3.1   COMPONENTS   44     6.3.1   COMPONENTS   44     6.3.2   PRIOR   44     6.3.3   OPERATION   44     6.4.1 <td< td=""><td>5.5.3 P &amp; ID: SYSTEM LUBRICATING OIL</td><td>AND MOUTH</td><td></td><td> 31</td></td<>	5.5.3 P & ID: SYSTEM LUBRICATING OIL	AND MOUTH		31
555   P & ID: CONTROL PAGE   33     55.6   P & ID: 1 <sup>st</sup> STAGE COMPRESSOR   32     55.7   P & ID: 2 <sup>rd</sup> STAGE COMPRESSOR   33     55.8   P & ID: 2 <sup>rd</sup> STAGE COMPRESSOR   33     55.9   CONTROLLER: ANTISURGE CONTROL   33     55.10   CONTROLLER: ANTISURGE CONTROL   33     55.11   MOS: MANUAL BYPASS LOCKS   36     55.12   DIGITAL INPUTS TABLE   37     55.14   INPUT SIGNALS TABLE MCC   33     55.15   SIMILAR THRESHOLD   36     55.16   PRINT DATA LOGGING   42     55.17   ADMINISTRATION   42     6   FUNCTIONAL DESCRIPTION   42     6.1   INTRODUCTION   42     6.2.2   GPERATION   44     6.3.1   COMPONENTS   44     6.3.2   PRIOR   44     6.3.3   OPERATION   44     6.4.1   COMPONENTS   44     6.4.1   COMPONENTS   44     6.3.2   PRIOR   45     6.4.1   COMPONENTS   45     6.5.1	5.5.4 P & ID: AIR INSTRUMENTS			31
55.6   P & ID: 1" STAGE COMPRESSOR   32     55.7   P & ID: 2" STAGE COMPRESSOR   33     55.8   P & ID: A GEAR BOX   34     55.9   CONTROLLER: TURBINE   34     55.10   CONTROLLER: ANTISURGE CONTROL   35     55.11   MOS: MANUAL BYPASS LOCKS   36     55.12   DIAGNOSTIC   36     55.13   DIGITAL INPUTS TABLE   37     55.14   INPUT SIGNALS TABLE MCC   37     55.15   SIMILAR THRESHOLD   36     55.16   PRINT DATA LOGGING   42     6   FUNCTIONAL DESCRIPTION   42     6.1   INTRODUCTION   43     6.1   INTRODUCTION   43     6.1   INTRODUCTION   43     6.2.1   COMPONENTS   44     6.3.1   COMPONENTS   44     6.3.1   COMPONENTS   44     6.3.1   COMPONENTS   44     6.4.1   COMPONENTS   44     6.5.2   PRIOR   45     6.5.1   COMPONENTS   45     6.5.2   PRIOR   55 </td <td>5.5.5 P &amp; ID: CONTROL PAGE</td> <td></td> <td></td> <td> 32</td>	5.5.5 P & ID: CONTROL PAGE			32
5.5.7   P & ID: 2 STAGE COMPRESSOR   33     5.5.8   P & ID: A GEAR BOX   34     5.5.9   CONTROLLER: TURBINE   34     5.5.10   CONTROLLER: ANTISURGE CONTROL   35     5.5.11   MOS: MANUAL BYPASS LOCKS   35     5.5.12   DIAGNOSTIC   36     5.5.13   DIGITAL INPUTS TABLE   37     5.5.14   INPUT SIGNALS TABLE MCC   37     5.5.15   SIMILAR THRESHOLD   36     5.5.16   PRINT DATA LOGGING   42     6   FUNCTIONAL DESCRIPTION   42     6.1   INTRODUCTION   43     6.1   INTRODUCTION   43     6.2   GAS CIRCUIT   43     6.3.1   COMPONENTS   44     6.3.1   COMPONENTS   44     6.3.1   COMPONENTS   44     6.4.1   COMPONENTS   44     6.5.2   PRIOR   45     6.5.1   COMPONENTS   45     6.5.2   PRIOR   45     6.5.2   PRIOR   55     6.5.1   COMPONENTS   55	5.5.6 P & ID: 1 <sup>st</sup> STAGE COMPRESSOR			32
35.5 P & UN SDEAN   34     55.9 CONTROLLER: TURBINE   34     55.10 CONTROLLER: ANTISURGE CONTROL   35     55.11 MOS: MANUAL BYPASS LOCKS   36     55.12 DIAGNOSTIC   36     55.13 DIGITAL INPUTS TABLE   37     55.14 INPUT SIGNALS TABLE MCC   37     55.15 SIMILAR THRESHOLD   36     55.16 PRINT DATA LOGGING   42     6 FUNCTIONAL DESCRIPTION   42     6 FUNCTIONAL DESCRIPTION   43     6.1 INTRODUCTION   42     6.2 GAS CIRCUIT   42     6.3 OIL SYSTEMS   42     6.3.1 COMPONENTS   42     6.3.2 PRIOR   44     6.3.3 OPERATION   42     6.4.1 COMPONENTS   44     6.5.2 PRIOR   44     6.5.1 COMPONENTS   45     6.5.2 PRIOR   45     6.5.3 OPERATION   45     6.5.4.1 COMPONENTS   45     6.5.2 PRIOR   45     6.5.3 OPERATION   45     6.5.1 COMPONENTS   45     6.5.2 PRIOR   55     6.6.1 COMPONENTS   55     6.6.1 COMPONE	5.5.7 P & ID: 2 <sup>-6</sup> STAGE COMPRESSOR			33
55.10   CONTROLLER: ANTISURGE CONTROL   35     55.11   MOS: MANUAL BYPASS LOCKS   36     55.12   DIAGNOSTIC   36     55.13   DIGITAL INPUTS TABLE   37     55.14   INPUT SIGNALS TABLE MCC   37     55.15   SIMILAR THRESHOLD   36     55.16   PRINT DATA LOGGING   42     6   FUNCTIONAL DESCRIPTION   42     6.1   INTRODUCTION   42     6.2   GAS CIRCUIT   43     6.3.1   COMPONENTS   44     6.3.1   COMPONENTS   44     6.3.1   COMPONENTS   45     6.3.2   PRIOR   44     6.3.3   OPERATION   44     6.4   CIRCUIT AIR INSTRUMENTS   44     6.5.1   COMPONENTS   45     6.5.2   PRIOR   45     6.5.1   COMPONENTS   45     6.5.1   COMPONENTS   45     6.5.2   PRIOR   45     6.5.1   COMPONENTS   45     6.5.2   PRIOR   55     6.5.3				34
5.5.11   MOS: MANUAL BYPASS LOCKS   36     5.5.12   DIAGNOSTIC   36     5.5.13   DIGITAL INPUTS TABLE   37     5.5.14   INPUT SIGNALS TABLE MCC   37     5.5.15   SIMILAR THRESHOLD   38     5.5.16   PRINT DATA LOGGING   40     5.5.17   ADMINISTRATION   42     6   FUNCTIONAL DESCRIPTION   42     6.1   INTRODUCTION   43     6.2   GAS CIRCUIT   43     6.2.1   COMPONENTS   42     6.3.2   OPERATION   44     6.3.3   OPERATION   44     6.3.1   COMPONENTS   45     6.3.2   PRIOR   46     6.4   CIRCUIT AIR INSTRUMENTS   46     6.4.1   COMPONENTS   45     6.5.2   PRIOR   46     6.5.1   COMPONENTS   46     6.5.2   PRIOR   46     6.5.1   COMPONENTS   46     6.5.2   PRIOR   56     6.5.1   COMPONENTS   46     6.5.2   PRI	5.5.10 CONTROLLER: ANTISURGE CONT	rol		35
5.5.12   DIAGNOSTIC	5.5.11 MOS: MANUAL BYPASS LOCKS	-		35
5.5.13   DIGITAL INPUTS TABLE MCC	5.5.12 DIAGNOSTIC			36
5.5.14   INPUI SIGNALS TABLE MCC	5.5.13 DIGITAL INPUTS TABLE			37
3.3.13   SIMUAR THESTOL   36     5.5.16   PRINT DATA LOGGING   42     6   FUNCTIONAL DESCRIPTION   42     6.1   INTRODUCTION   43     6.2   GAS CIRCUIT   43     6.2.1   COMPONENTS   43     6.2.2   OPERATION   44     6.3   OIL SYSTEMS   45     6.3.1   COMPONENTS   45     6.3.2   PRIOR   46     6.3.3   OPERATION   46     6.4   CIRCUIT AIR INSTRUMENTS   46     6.4.1   COMPONENTS   46     6.5.1   COMPONENTS   45     6.5.1   COMPONENTS   45     6.5.2   PRIOR   50     6.5.3   OPERATION   45     6.5.1   COMPONENTS   45     6.5.1   COMPONENTS   45     6.5.2   PRIOR   50     6.5.3   OPERATION   50     6.5.4   COMPONENTS   50     6.5.1   COMPONENTS   50     6.5.3   OPERATION   50 <tr< td=""><td>5.5.14 INPUT SIGNALS TABLE MCC</td><td></td><td></td><td> 37</td></tr<>	5.5.14 INPUT SIGNALS TABLE MCC			37
5.5.10   ADMINISTRATION.   42     6   FUNCTIONAL DESCRIPTION.   43     6.1   INTRODUCTION   43     6.2   GAS CIRCUIT.   43     6.2.1   COMPONENTS   43     6.2.2   OPERATION   44     6.3   OIL SYSTEMS   44     6.3.1   COMPONENTS   45     6.3.2   PRIOR   44     6.3.3   OPERATION   46     6.4   CIRCUIT AIR INSTRUMENTS   46     6.4.1   COMPONENTS   46     6.5   CIRCUIT COMBUSTION AIR AND BURNING   46     6.5.1   COMPONENTS   42     6.5.2   PRIOR   50     6.5.3   OPERATION   50     6.5.1   COMPONENTS   42     6.5.1   COMPONENTS   50     6.5.3   OPERATION   50     6.5.4   PRIOR   50     6.5.5   OPERATION   50     6.6.1   COMPONENTS   50     6.6.2   PRIOR   50     6.6.1   COMPONENTS   50 </td <td>5.5.15 SIMILAR THRESHOLD</td> <td></td> <td></td> <td> 30</td>	5.5.15 SIMILAR THRESHOLD			30
6   FUNCTIONAL DESCRIPTION	5.5.17 ADMINISTRATION			40
6   FUNCTIONAL DESCRIPTION				
6.1   INTRODUCTION   43     6.2   GAS CIRCUIT   43     6.2.1   COMPONENTS   43     6.2.2   OPERATION   44     6.3   OIL SYSTEMS   45     6.3.1   COMPONENTS   45     6.3.2   PRIOR   45     6.3.3   OPERATION   46     6.4   CIRCUIT AIR INSTRUMENTS   46     6.4   CIRCUIT COMBUSTION AIR AND BURNING   46     6.5   CIRCUIT COMBUSTION AIR AND BURNING   49     6.5.1   COMPONENTS   49     6.5.2   PRIOR   50     6.5.3   OPERATION   50     6.5.4   COMPONENTS   50     6.5.3   OPERATION   50     6.6.1   COMPONENTS   50     6.6.1   COMPONENTS   53     6.6.2   PRIOR   53     Code. MD-XXX-09   Rev. 0   Date 22/06/15   pg 3 / 133	6 FUNCTIONAL DESCRIPTION			43
6.2   GAS CIRCUIT	6.1 INTRODUCTION			43
6.2.1   COMPONENTS   43     6.2.2   OPERATION   44     6.3   OIL SYSTEMS   45     6.3.1   COMPONENTS   45     6.3.2   PRIOR   46     6.3.3   OPERATION   46     6.4   CIRCUIT AIR INSTRUMENTS   46     6.4.1   COMPONENTS   48     6.5.1   COMPONENTS   48     6.5.2   PRIOR   49     6.5.3   OPERATION   49     6.5.3   OPERATION   49     6.5.1   COMPONENTS   49     6.5.2   PRIOR   50     6.5.3   OPERATION   50     6.5.4   COMPONENTS   50     6.5.3   OPERATION   50     6.6.1   COMPONENTS   50     6.6.1   COMPONENTS   50     6.6.2   PRIOR   53     Code. MD-XXX-09   Rev. 0   Date 22/06/15   pg 3 / 133	6.2 GAS CIRCUIT			43
6.2.2   OPERATION   44     6.3   OIL SYSTEMS   45     6.3.1   COMPONENTS   45     6.3.2   PRIOR   46     6.3.3   OPERATION   46     6.4   CIRCUIT AIR INSTRUMENTS   46     6.4.1   COMPONENTS   46     6.5   CIRCUIT COMBUSTION AIR AND BURNING   48     6.5.1   COMPONENTS   49     6.5.2   PRIOR   50     6.5.3   OPERATION   49     6.5.3   OPERATION   50     6.6.1   COMPONENTS   50     6.6.1   COMPONENTS   50     6.6.2   PRIOR   53     Code. MD-XXX-09   Rev. 0   Date 22/06/15   pg 3 / 133	6.2.1 COMPONENTS			43
6.3   OIL SYSTEMS	6.2.2 OPERATION			44
6.3.1   COMPONENTS   46     6.3.2   PRIOR   46     6.3.3   OPERATION   46     6.4   CIRCUIT AIR INSTRUMENTS   46     6.4.1   COMPONENTS   48     6.5   CIRCUIT COMBUSTION AIR AND BURNING   48     6.5.1   COMPONENTS   49     6.5.2   PRIOR   50     6.5.3   OPERATION   50     6.6   TURBINE CONTROL   50     6.6.1   COMPONENTS   53     6.6.2   PRIOR   53     Code. MD-XXX-09   Rev. 0   Date 22/06/15   pg 3 / 133	6.3 OIL SYSTEMS			45
6.3.3   OPERATION	6.3.1 CUMPUNENTS			45 16
6.4   CIRCUIT AIR INSTRUMENTS   48     6.4.1   COMPONENTS   48     6.5   CIRCUIT COMBUSTION AIR AND BURNING   49     6.5.1   COMPONENTS   49     6.5.2   PRIOR   50     6.5.3   OPERATION   50     6.6   TURBINE CONTROL   52     6.6.1   COMPONENTS   53     6.6.2   PRIOR   53     Code. MD-XXX-09   Rev. 0   Date 22/06/15   pg 3 / 133	6.3.3 OPERATION			46
6.4.1   COMPONENTS   48     6.5   CIRCUIT COMBUSTION AIR AND BURNING   49     6.5.1   COMPONENTS   49     6.5.2   PRIOR   50     6.5.3   OPERATION   50     6.6   TURBINE CONTROL   50     6.6.1   COMPONENTS   53     6.6.2   PRIOR   53     Code. MD-XXX-09   Rev. 0   Date 22/06/15   pg 3 / 133				10
6.5   CIRCUIT COMBUSTION AIR AND BURNING   49     6.5.1   COMPONENTS   49     6.5.2   PRIOR   50     6.5.3   OPERATION   50     6.6   TURBINE CONTROL   52     6.6.1   COMPONENTS   53     6.6.2   PRIOR   53     Code. MD-XXX-09   Rev. 0   Date 22/06/15   pg 3 / 133	6.4.1 COMPONENTS			48
6.5.1   COMPONENTS   49     6.5.2   PRIOR   50     6.5.3   OPERATION   50     6.6   TURBINE CONTROL   52     6.6.1   COMPONENTS   53     6.6.2   PRIOR   53     Code. MD-XXX-09   Rev. 0   Date 22/06/15   pg 3 / 133	6.5 CIRCUIT COMBUSTION AIR AND BUI	RNING		<u>4</u> 9
6.5.2   PRIOR   50     6.5.3   OPERATION   50     6.6   TURBINE CONTROL   52     6.6.1   COMPONENTS   53     6.6.2   PRIOR   53     Code. MD-XXX-09   Rev. 0   Date 22/06/15   pg 3 / 133	6.5.1 COMPONENTS			49
6.5.3 OPERATION	6.5.2 PRIOR			50
6.6   TURBINE CONTROL	6.5.3 OPERATION			50
6.6.1   COMPONENTS   53     6.6.2   PRIOR   53     >ode. MD-XXX-09   Rev. 0   Date 22/06/15   pg 3 / 133	6.6 TURBINE CONTROL			52
6.6.2     PRIOR     53       Code. MD-XXX-09     Rev. 0     Date 22/06/15     pg 3 / 133	6.6.1 COMPONENTS			53
Code. MD-XXX-09     Rev. 0     Date 22/06/15     pg 3 / 133	6.6.2 PRIOR			53
	ode. MD-XXX-09	Rev. 0	Date 22/06/15 pg 3 /	/ 133



6.6.3 OPERATION				
6.6.3.1 RESET OF TRIGGERS				
6.6.3.2 STARTING THE TURBINE	••••••		••••••	
	=0			
66351 TABLE STARTS	_0			
6636 PARAMETERS CONFIGURE		NI		0. 6
		·		
6.7 COMPRESSOR				
6.7.1 COMPONENTS				b.
6.7.2 PRIOR				b
0.7.3 OPERATION				0
7 FUNCTIONAL DESCRIPTION		OMPONENTS		6
				b
7.1.1 AUXILIART OIL FUIVIF. FIVIOA				0
	 г			0 6
7.1.1.2 AUTOMATIC MANAGEMEN				06
				06
				۰۰۰۰۰۰۰۰ ج
7121 MANAGEMENT MANUA				0 م
7.1.2.2 AUTOMATIC MANAGEMEN	Г			
7.1.2.3 PRESENCE OF PRIORITY (	ONTROL (OVF	RRIDE)		6
7.1.2.4 FAULTS		·····		
7.1.3 OIL COOLER: EH1				
7.1.3.1 MANAGEMENT MANUAL				
7.1.3.2 AUTOMATIC MANAGEMEN	Г			7
7.1.3.3 PRESENCE OF PRIORITY (	ONTROL (OVE	RRIDE)		7
7.1.3.4 FAULTS	·····			7
7.1.4 EXTRACTION OF OIL FUMES	: OIL STEAM E	XTR		7
7.1.4.1 MANAGEMENT MANUAL				
7.1.4.2 AUTOMATIC MANAGEMEN	Г			7
7.1.4.3 PRESENCE OF PRIORITY (	ONTROL (OVE	RRIDE)		7
7.1.4.4 FAULTS				
7.1.5 FAN OIL COOLER: T2AB				7
7.1.5.1 MANAGEMENT MANUAL OF	BJECT E1			
7.1.5.2 AUTOMATIC MANAGEMEN	I OBJECI E1			
7.1.5.3 PRESENCE OF PRIORITY C		RRIDE)		
7.1.5.4 MANAGEMENT MANUAL OF				
7.1.5.5 AUTOMATIC MANAGEMEN				
				۲۰ ۲۰ م
7.1.6 FAN OIL COOLER. 1200				00 و
7.1.6.2 ALITOMATIC MANAGEMEN				0 פ
7.1.6.3 PRESENCE OF PRIORITY (	CONTROL (OV/F	RRIDE)		ຍ ຂ
7.1.6.4 MANAGEMENT MANUAL OF	BJECT "F2 INI/"	· · · · · · · · · · · · · · · · · · ·		
7.1.6.5 AUTOMATIC MANAGEMEN		CT "F2 INV" .		ຍ
7.1.6.6 FAULTS				
7.1.7 TURNING GEAR: VIR				
7.1.7.1 MANAGEMENT MANUAL				
7.1.7.2 AUTOMATIC MANAGEMEN	Г			
7.1.7.3 PRESENCE OF PRIORITY (	ONTROL (OVE	RRIDE)		
7.1.7.4 FAULTS	·····			
7.1.8 AIR TREATMENT SYSTEM IN	STRUMENTS:	DRY-COOLER		8
7.1.8.1 MANAGEMENT MANUAL				8
7.1.8.2 FAULTS				8
7.1.9 EXTRACTION OF SAND: S-EN	Л1			9
7.1.9.1 MANAGEMENT MANUAL				9
7.1.9.2 AUTOMATIC MANAGEMEN	Γ			9
7.1.9.3 PRESENCE OF PRIORITY (	ONTROL (OVE	RRIDE)		9
7.1.9.4 FAULTS				9
7.1.10 Cleaning system (PULSE JET	): SQZ1			9
7.1.10.1 MANAGEMENT MANUAL	·····			
7.1.10.2 AUTOMATIC MANAGEMEN				
7.1.10.3 PRESENCE OF PRIORITY	CONTROL (OV	EKKIDE)		
			I	
Code. MD-XXX-09	Rev. 0		Date 22/06/15	pg 4 / 133



7.1.10.4 FAULTS	
7.1.11 INTERSTAGE AIR COOLER FAN EL. MOTOR	
7.1.11.1 MANAGEMENT MANUAL	
7.1.11.2 AUTOMATIC MANAGEMENT	
7.1.11.3 FAULTS	
7.1.12 COMPRESSOR SEAL/LUBE OIL MAIN & AUX EL. MOTOR	
7.1.12.1 MANAGEMENT MANUAL	
7.1.12.2 AUTOMATIC MANAGEMENT	
7.1.12.3 FAULTS	
7.1.13 COMPRESSOR SEAL/LUBE OIL EMERGENCY EL. MOTOR	
7.1.13.1 MANAGEMENT MANUAL	
7.1.13.2 AUTOMATIC MANAGEMENT	
7.1.13.3 FAULTS	
	102
7.2 VALVES ALL OR NOTHING	
7.2.1 STOP GAS FUEL VALVE, FGV1	
7.2.1.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)	
7.2.2 FURGE VALVE FUEL GAS. FGV0	
7.2.2.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)	
7.2.3 ISOLATION VALVE FUEL GAS. FGV4	
7.2.3.1 MANAGEMENT MANOAL	
7.2.3.5 FRESENCE OF FRIORITT CONTROL (OVERRIDE)	
7.2.4 VALVE ANTINFOUNFAGE. VDT	
7.2.4.1 MANAGEMENT MANAGEMENT	
7.2.4.4 EAULTS	
1.2.4.4 FAULIS	106
8 SCHEDULES	120
8.1 DISPLAY HISTORICAL DATA (HISTORIAN VIEWER)	121
8.1.1 MAIN WINDOW OF THE HISTORIAN VIEWER	
8.1.2 VIEW TREND (TREND DISPLAY)	122
8.1.3 DISPLAY OF LEGENDS	
8.1.4 SAVE / LOAD SETTING TRACKS	126
8.1.4.1 CSV EXPORT TO DATA	

Code. MD-XXX-09 Rev. 0 Date 22/06/15 pg 5 / 1	Rev. 0 Date 22/0	5 pg 5 / 133
---	------------------	--------------



# 1 REFERENCE DOCUMENTS

ID	No.	DESCRIPTION	REV
1	MD-222-09	Diagram piping and instrumentation	6
2			
3			
8			
4			
5			
6			
7			

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 6 / 133
-----------------	--------	---------------	------------



# 2 LEGEND

DCS	:	Distributed control system
ESM	:	Motor launch
FGV	:	Gas Valve
HMI	:	Operator interface (screen pages)
MOS	:	Minimum operating speed
SOV	:	Solenoid
VIR	:	Rotator

, <del>,</del>	Code. MD-XXX-09 R	Rev. 0	Date 22/06/15	pg 7 / 133
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# **3** INTRODUCTION

The purpose of this document is to provide the central Sonatrach Hassi Messaoud operators the information needed to drive the gas turbine through the interfaces to the table UCP (group control panel) and the MCC chart (control station engines).

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 8 / 133



# 4 DESCRIPTION OF THE CONTROL SYSTEM

## 4.1 LIST OF ITEMS DESCRIBED IN THE MANUAL

The elements that are part of the control system, the operation is the subject of this manual listed below:

- UCP: Unit Control Panel;
- MCC switchboard for supplying electrical equipment and alternating voltage;
- HMI: Human-Machine Interface;
- E1, E2: UPS units for lube oil fans;

The Figure 4-1 below shows a map with the spatial arrangement of the control system tables.



Figure 4-1

# 4.2 DESCRIPTION OF ARCHITECTURE

The schema Figure 4-2 Architecture of the system & co Figure 4-2 illustrates the architecture of the control system.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 9 / 133





Figure 4-2 : Control System Architecture

Code. MD-XXX-09 Rev. 0	Date 22/06/15	pg 10 / 133
------------------------	---------------	-------------



Referring to the Figure 4-2, Hereinafter lists the various subsystems with a brief description of the function they perform:

- UCP, Control panel. He understands:
  - Redundant system CPU:
    - CPU 1;
      - CPU 2;
  - Rack I / O cards for controlling the turbine:
    - RACK / O A;
  - o Monitoring and protection system and turbine vibration generator:
    - ENTEK A;
    - ENTEK B;
    - ENTEK C;
  - o Rack I / O cards for control of auxiliary components:
    - RACK E/S B;
  - o HUB-SWITCH (switching node) for the interconnection of devices ETHERNET:
    - ETHERNET;
  - Industrial OP for historical data logging and serial communications management:
  - Security API (Safety PLC) for contact management from:
    - Emergency pushbuttons;
- Interface, Interface system between operators and the control system, consisting of the following units that communicate with the PCU via Ethernet:
  - **HMI**: Desktop that performs the human-machine interface function to act on the control system;
  - **TURBINE** Industrial OP without keyboard, with touch screen interface type for the conFiguretion of the turbine control parameters;
  - **ENGINEER**: Laptop that performs the engineering station function, which includes among others the display client software from HISTORIAN historical data;
- Main valve of the turbine fuel (**FGV3**). This is a valve type fuel metering ("Fuel Metering"), she received the PCU a 4-20 mA signal type and interprets it as a debit reference: a high performance control system Built in the same valve modulates the opening of the valve so that the flow rate is equal to that requested by the PCU.
- Inverters for control of the oil cooler fans (E1 and E2). They receive signal of 4-20mA PCU and based on this signal, modulating the speed of the powered engines.
- MCC, Motor Control Centre (motor control center). He understands:
  - System Remote I / O connected to the CPUs of the PCU:
    - RACK A MCC
    - RACK B MCC
    - MCC drawers type A characterized by:
      - Contactor controlled by a digital output of the RACK OF MCC;
      - Disconnect coil controlled by a digital output of the RACK OF MCC;
      - Feedback "switch activated" to a digital input of the RACK OF MCC;
    - MCC drawers **type B** characterized by:
      - Disconnect coil controlled by a digital output of the RACK OF MCC;
      - Feedback "switch activated" to a digital input of the RACK OF MCC;
    - Device for starting the understeer (VIR);
    - Device for the start of the backup pump (i.e. **PMOE**);

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 11 / 133



# 5 DESCRIPTION HMI SYSTEM

## 5.1 INTRODUCTION

The purpose of this chapter is to describe the structure and operation of the video interface system to the operator, also called HMI.

#### 5.2 HMI SYSTEM ARCHITECTURE

Each screen page is divided into five sections.



Figure 5-5-1Structure HMI

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 12 / 133



The upper band contains the following information:

- Names and logos of companies MESIT and Sonatrach;
- Title screen page;

#### • SECTION 2

This area contains buttons to display the different screen pages.

#### • SECTION 3

This area contains important information such as:

- $\circ$  State of the turbine;
- o Speed;
- Temperature to the combustion chambers;
- Discharge pressure axial compressor;
- Exhaust temperatures;
- o Load;
- Temperature at the chimney;
- Opening of the main valve;
- Opening the starting valve.

#### • SECTION 4

Alarm Banner. Top thereof the most recent messages are display.

#### • SECTION 5

Area that depends on the applied specific screen-page.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 13 / 133
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# 5.3 DESCRIPTION OF CONTROL AND VIEWING AREAS

The pages contain multiple objects with monitoring function or command. Below is provide an explanation of these objects.

# 5.3.1 OBJECT FOR "ANALOG SIGNALS"



Details display:







View B; Value;

Intervention thresholds:



Alarm Presence:

- m. Blanc: The alarm cause is no longer present, necessary acquittal;
- n. Light Blue: Information Alarm;
- o. Yellow: Warning;
- p. Red: Exception;
- q. Magenta: Fault;

Indication unit of measurement.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 15 / 133
-----------------	--------	---------------	-------------



## 5.3.2 OBJECT FOR B "DIGITAL SIGNALS"

GAS HEATER FUEL GAS PRESSURE	
📅 🎮 🔛 🎉 🏹 🛛 🔀	
ALARM	
Substitute PV	
s Comm Failure PSLL_202_3	PSLL/202/3 S ALARM
Figure 5-5-5: Main view	Figure 5-5-6: View the type display

Details display:



Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 16 / 133



- c. Yellow: Warning;
- d. Red: Exception;
- e. Magenta: Fault;

# 5.3.3 C OBJECT FOR "ELECTRICAL EQUIPMENT"

EMERGENCY OIL PUMP	
者 🎮 🎎 🕱 🛛 🔽	
Program	
Enabled	
Stopped	
	Stopped
Comm OK PMOE	PMOE
Figure 5-5-7: Main view	Figure 5-5-8: View the type display

Details display:



- A. State Equipment:
  - a. Blue: By train to stop;
  - b. Grey: Stopped;
  - c. Blue: starting up;
  - d. Dark Green: Running
- B. Status indicator:



: Device in maintenance mode;

b.

: Device in Manual mode (local);



Command window Details:

EMERGENCY OIL PUMP	
📩 🔀 🐹 🏹 🛛 🔽	
Program	م
Enabled	В
	C C
Stopped	D
	E
	_
	F
Comm OK PMOE	

- Block Operator Position (Manual);
- Unblock Operator position;
- Owner of the order:
  - a. Operator;
  - b. Program (automatic);
  - c. Override;
- Manual stop control;
- Manual start command;
- Current state of equipment



## 5.3.4 OBJECT FOR "RUN COUNTER HOURS"



Figure 5-5-9. Main View

## 5.3.5 OBJECT FOR E "VALVES ALL OR NOTHING"



Figure 5-5-10: Main view

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 19 / 133





- A. : State solenoid coils:
  - a. Gray: No line reel;
  - b. Turquoise powered reel;
- B. State of the valve:
  - a. Blue: In the process of closing;
  - b. Grey: Closed;
  - c. Blue: In the process of opening;
  - d. Dark green: Open;
- C. Status Indicators:
  - a. Device in maintenance mode;
  - b. : Device in Manual mode (local);
  - c. If the device has been disabled;

d. Device in Operator mode;

- e. . . . . . Override Device in manual (override);
- f. Alarm Inhibition (removed or disabled);
  - S
  - : Communication Failure (outdated);
  - : Invalid conFiguretion;
- D. See C;
- E. Label of the valve;

g.

h.



- F. Alarm indicator:
  - a. Blanc: The alarm cause is no longer present, necessary acquittal;
  - b. Light Blue: Information Alarm;
  - c. Yellow: Warning;
  - d. Red: Exception;
  - e. Magenta: Fault;

Command window Details:

OVERS	PEED SOLENOID VA	LVE			
	🗶 🛃 🔍	Ń	? 🔀		
	🔒 Program	Ê	a 🗸		A
	Enabled			_	E
					С
	Closed	M 🛃	•	-	D
		PI			E
					F
	Comm OK		FGV_1		

- A. Block Operator Position (Manual);
- B. Unblock Operator position;
- C. Owner of the order:
  - a. Operator;
  - b. Program (automatic);
  - c. Override;
- D. Manual closing command;
- E. Manual opening command;
- F. Current state of the valve

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 21 / 133





Figure 5-5-11: View the type display

[PL	CJTIC_17	A
	8	0
SP PV	150,00	Operator Auto
	75,00	Program Operator
SP PV Trk PV	57 <b>42,22</b>	Auto Manual
SP TARGET 57 SP SLOPE 1,00 BYPASS		r  ; 100 %

Figure 5-5-12: Main view

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 22 / 133
			15





Figure 5-5-13: View changes

[PLC]TIC_17A
Control Equation PIDE
Proportional
1,00000 1,000 KP TARGET
BYPASS 🧹 0,000 KP SLOPE
Integral 10,00000 (1/min)
Derivative

Figure 5-5-14: Window view settings

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 23 / 133





- A. PID label;
- B. Value of the reference (SP = setpoint);
- C. Value of the operating variable (PV);
- D. Auto Selector;
- E. Manual mode selector;
- F. Value of the controller output (Control Variable = CV);
- G. Desired setpoint value;
- H. The set rate of change;
- I. Instant Mode setpoint change (H point rate has no effect);
- L. Push button and indicator for the presence of an anomaly;
- M. Push button to access the window changes

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 24 / 133





- A. Push button to access the adjustment window controls;
- B. Legend PV (operating variables);
- C. Legend SP (instructions);
- D. Legend CV (control variables)

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 25 / 133
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Details window setting control parameters:

[PLC]TIC_17A	
Control Equation PIDE	A
Proportional	
1,00000 1,000 KP TARGET	
BYPASS V 0,000 KP SLOPE	
Integral	∕ в
10,00000 (1/min)	∕ c
_ Derivative	► D
0,00000 (0,00000) (min)	

- A. Desired value of the proportional gain;
- B. The proportional gain variation rate;
- C. Fashion instantaneous change of the proportional gain (rate B has no effect);
- D. Integration time;

#### 5.4 ALARM MANAGEMENT

Alarm management is accomplished through a list always in the foreground located at the foot of the screen page (ref. Figure 5-5-15), With a set of indicators and controls always right foreground on the page (ref. Figure 5-5-16) And with a specialized window (ref. Figure 5-5-17).



Figure 5-5-15: Alarm list at bottom of page

3	0	ALARME CUMULATIF	DÉCLENCHEMENT COMMUN
		RESET DES ALARMES	2

#### Figure 5-5-16 Signaling and controls for alarm management

Code. MD-XXX-09 Rev. 0 Date 22/06/15 pg 26 / 13
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1 10:53:14 AM 1 10:53:14 AM 1 10:53:14 AM	TAG PT_9G_IS_FIRST_ALM PT_9G_STS_LL_ALM	Message PLUS BAS PRESSION GAZ ALIMENTATION EST LA PRÉMIÈRE	Type TRIP
1 10:53:14 AM 1 10:53:14 AM 1 10:53:14 AM	PT_96_IS_FIRST_ALM PT_96_STS_LL_ALM	PLUS BAS PRESSION GAZ ALIMENTATION EST LA PRÉMIÈRE	TRIP
10.53.14 AM	PT_96_STS_LL_ALM	PRICE REAL REPORTED IN THE REPORT OF THE REAL PRICE PR	
105314 AM		PLUS BASSE PRESSION ENTREE AIRE GAZ DE ALIMENTATION	ALARM
	PT_SG_STS_L_ALM	ALARME BASSE PRESSION ENTRÉE AIRE GAZ DE ALIMENTATION	ALARM
9.33.58 AM	GT_ALR_EXH_T3_ALM	ÉTAT DE DÉFAUT DU DETECTEUR DE TEMPERATURE T3 DÉCHARGE TURBINE	ALARM
9.33.58 AM	GT_ALR_SPD_PU2_ALM	ALARM DÉFAUT PICK-UP VITESSE 2	ALARM
9.33 58 AM	GT_ALR_SPD_PU1_ALM	ALARM DÉFAUT PICK-UP VITESSE 1	ALARM
9.33.58 AM	GT_ALR_EXH_T4_ALM	ÉTAT DE DÉFAUT DU DETECTEUR DE TEMPERATURE TA DÉCHARGE TURBINE	ALARIM
9,33.58 AM	GT_ALR_CHIMNEY_T4_ALM	ALARME DÉFAUT DETECTEUR TEMPERATURE CHEMINÉE DE LA TURBINE T4	ALARM
9.33 58 AM	INV_RD_ALM	REGULATEUR DE VITESSE M.L. PRÊT À MARCHER (CUMULATIF ALARME)	ALARIM
9 33 58 AM	INV RIVER ALM	CONTRÔLE DE MARCHE MOTELIR DE LANCEMENT (CLIMULATIE ALARME)	AL ARM
	9.3358 AM 9.3358 AM 9.3358 AM 9.3358 AM 9.3358 AM 9.3358 AM 9.3358 AM	9.3358 AM     GT_ALR_SPD_PU2_ALM       9.3358 AM     GT_ALR_SPD_PU1_ALM       9.3358 AM     GT_ALR_EXH_T4_ALM       9.3358 AM     GT_ALR_CHIMNEY_T4_ALM       9.3358 AM     GT_ALR_CHIMNEY_T4_ALM       9.3358 AM     GT_ALR_CHIMNEY_T4_ALM       9.3358 AM     INV_RD_ALM       9.3358 AM     INV_RD_ALM	I 9.33 58 AM     GT_ALR_SPD_PU2_ALM     ALARM DÉFAUT PICK-UP VITESSE 2       I 9.33 58 AM     GT_ALR_SPD_PU1_ALM     ALARM DÉFAUT PICK-UP VITESSE 1       I 9.33 58 AM     GT_ALR_DOH_T4_ALM     ÉTAT DE DÉFAUT DU DETECTEUR DE TEMPERATURE T4 DÉCHARGE TURBINE       I 9.33 58 AM     GT_ALR_DOH_T4_ALM     ÉTAT DE DÉFAUT DU DETECTEUR DE TEMPERATURE T4 DÉCHARGE TURBINE       I 9.33 58 AM     GT_ALR_DOH_T4_ALM     ÉTAT DE DÉFAUT DETECTEUR TEMPERATURE CHEMINÉE DE LA TURBINE T4       I 9.33 58 AM     GT_ALR_DOH_T4_ALM     ALARM DÉFAUT DETECTEUR TEMPERATURE CHEMINÉE DE LA TURBINE T4       I 9.33 58 AM     INV_RD_ALM     REGULATEUR DE VITESSE M.L PRÊT À MARCHER (CUMULATIF ALARME)       I 9.33 58 AM     INV_RIPR_ALM     CONTRIÑI E DE MARCHE MOTEUR DE LANCEMENT IDIMULATIF ALARME)

Figure 5-5-17: Window dedicated to alarms

## 5.4.1 CHARACTERIZING PHASE ALARMS

When an alarm occurs, it is present as a first array element of Figure 5-5-15. This condition is represented with the symbol  $\checkmark$  indicating not yet acknowledged by the operator alarms.

appears in the

When this event occurs, the siren starts to ring (if it is not already ringing) and symbol region of Figure 5-5-16.

The event that caused the alarm is stored on a specialized element, which must be reset to remove the alarm from the list, once the cause is no longer present. The reset action of alarm and siren deactivation is accomplished by means of the RESET push-button located in the Figure 5-5-16.

The area shown in the Figure 5-5-16 has two leds that are lit in case of:

- Presence of at least one alarm: CUMULATIVE ALARM;
- Presence of at least one trigger: TRIGGER CUMULATIVE;

To access the full list of existing alarms must press a which provides access to the window Figure 5-5-17.



	🛃 Alarm and Event	t Summary - 709S'	TD2703_INAMENAS//			×
Α 🔶	🗸 🗹 🖉 🖗 😭 🤇	? 🖶 🔛 🛛 (No Filter	1 🔽 🏹 🥹			
в 🔶	. 오 Event Time		TAG	Message	Туре	^
	🔺 👃 10/11/2011	10:53:14 AM	PT_9G_IS_FIRST_ALM	PLUS BAS PRESSION GAZ ALIMENTATION EST LA PRÉMIÉRE	TRIP	
	10/11/2011	10:53:14 AM	PT_9G_STS_LL_ALM	PLUS BASSE PRESSION ENTRÉE AIRE GAZ DE ALIMENTATION	ALARM	
0	🔺 🛕 10/11/2011	10:53:14 AM	PT_9G_STS_L_ALM	ALARME BASSE PRESSION ENTRÉE AIRE GAZ DE ALIMENTATION	ALARM	
	🔺 🐓 10/10/2011	9:33:58 AM	GT_ALR_EXH_T3_ALM	ÉTAT DE DÉFAUT DU DETECTEUR DE TEMPERATURE T3 DÉCHARGE TURBINE	ALARM	
	10/10/2011	9:33:58 AM	GT_ALR_SPD_PU2_ALM	ALARM DÉFAUT PICK-UP VITESSE 2	ALARM	
	🔒 🕹 10/10/2011	9:33:58 AM	GT_ALR_SPD_PU1_ALM	ALARM DÉFAUT PICK-UP VITESSE 1	ALARM	
	🔒 🕹 10/10/2011	9:33:58 AM	GT_ALR_EXH_T4_ALM	ÉTAT DE DÉFAUT DU DETECTEUR DE TEMPERATURE T4 DÉCHARGE TURBINE	ALARM	
	🔒 🎍 10/10/2011	9:33:58 AM	GT_ALR_CHIMNEY_T4_ALM	ALARME DÉFAUT DETECTEUR TEMPERATURE CHEMINÉE DE LA TURBINE T4	ALARM	
	🔒 🕹 10/10/2011	9:33:58 AM	INV_RD_ALM	REGULATEUR DE VITESSE M.L.PRÊT À MARCHER (CUMULATIF ALARME)	ALARM	
	📕 🛦 👫 10/10/2011	9:33:58 AM	INV BNFR ALM	CONTRÔLE DE MARCHE MOTELIR DE LANCEMENT (CLIMULATIE ALARME)	ALARM	
D	Priority: Alarm State: Event Time: In Alarm Time: Acknowledge Time: Out of Alarm Time: Condition Name: Event Category: Type: Area: Server Name: TAG: Message:	Medium In Alarm, Unacked 10/11/2011 10:53:14 10/11/2011 10:53:14 TRIP Discrete TRIP Alarm and Event Serv PT_9G_IS_FIRST_AL PLUS BAS PRESSIO	Severity: 500 Current Value: 1 AM Limit Value Exceeded: AM Tag 1 Value: Tag 2 Value: Tag 3 Value: Tag 4 Value: Alarm Count: 1 er M M M GAZ ALIMENTATION EST LA PRE	MÉRE		
E 🔶	🐌 🌐 170	<b>⊉</b> 3	<b>∜</b> 167 <b>●</b> 0			

#### Figure 5-5-18: Details of the window dedicated to alarms

Compared to the Figure 5-5-18 :

- A. All commands:
  - a. a.
  - b. . Exchowledgement of alarms selected with the addition of a comment;

  - d. Method in the list;
  - e. 11: Shows details for the selected alarms;
  - f. 📥: Prints the alarm list;
  - g. Defines alarm visualization of the order;
  - h. 2: Run a search in the alarm list;
- B. Bar containing the titles of the displayed fields: If you select the title you force the order of the list based on the corresponding field;
- C. Alarm status:
  - a. 🚇: Unacknowledged alarm;
  - b. 📩: Alarm paid;
- D. Auxiliary information:
  - a. Led indicating the correct operation of the alarm monitoring system;
  - b. 170: Number of events present in the list;
  - c. 43: Number of unacknowledged alarms;
  - d. 167: Number of non-rearmed but acknowledged alarms;

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 28 / 133



# 5.4.2 ACTIONS TO BE PERFORMED IN CASE OF OCCURRENCE OF AN ALARM

The actions to be taken in case of occurrence of an alarm are:

- Turn off the siren;
- Understand what it is alarm;
- Check the option to remove the cause that caused it, see 8.1 ;
- Acknowledge the alarm;
- Repeat the above actions for all alarms.

Code. MD-XXX-09 Rev. 0	Date 22/06/15	pg 29 / 133
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#### 5.5 OVERVIEW SCREEN PAGES

#### 5.5.1 MAIN MENU

This page is a summary of all the screen pages. Through pushbuttons is possible to access the corresponding screen page.

MES	Senatres ME	NU PRINCIPALE			PC 8487FA4D4B41
				PROCESSUS DE DAZ DE SYNTHÊSE	AIR DES INSTRUMENT
SYNOPTIO	DUE	CONNECTION OPERATEU	R	COMPRESSEUR: HUILE DE GRAISSAGE ET BOUCHE	MACHINERIE
	PROCESSUS DE GAZ DE SYNTHÈSE	CONNECTION	SORTHE	TURBINE: HUILE DE GRAISSAGE ET BOUCHE	BOITE À ÉNGRENAGI
	1º ÉTAGE DE COMPRESSION	OPERATEUR ACTUEL	PC-8487FA4D4B41\	CONTRÓLEUR	CONTRÔLEUR
	2* ÉTAGE DE COMPRESSION			TURBINE A GAZ	ANTIFOMPAGE
	REFROIDISSEMENT GAZ ET	CONTROLEUR	and the second	ENTRÉES DIGITALES TABLEAU	SIGNAUX ENTRÉE TABLEAU MCC
	EIDON DECHARDEMENT	CONTRÔLEUR TURÐINE A GAZ	CONTRÔLEUR ANTIPOMPAGE	HISTORIQUE ALARME	DIAGNOSTIQUE
	GAZ COMBUSTIBLE			DATALOG	MENU PRINCIPALE
	CONTRÔLE DAZ COMBUSTIBLE	HISTORIQUE / DIAGNOSTI	QUE / AUXILIAIRE		DECLENCHE
	COMPRESSEUR: HUILE DE GRAISSAGE ET BOUCHE	HISTORIQUE ALARME	DIADNOSTIQUE	ALARME CUMULATA	
	TUREINE: HUILE DE ORAISSAGE ET BOUCHE	DATALOG	MCC AUXILIAIRE	PAUNEAU DISTO	
	AIR DES INSTRUMENTS			DEMARRADE ACTIVE	- Mentanen
	MACHINERIE	DATA		ARRETO	URGENCE
	BOÎTE À ÉNORENAGES	ENTRÉES DIOITALES	SIGNAUX ENTRÉE	VITESSE	TEMP. OU COMBUS
		ENTRÉES DIGITALES	SIGNAUX ENTRÉE	COP	TEAL
		TABLEAU CNET4	PROCESSUS	VANNE ANTIPOMPAGE	TEMP DU CRÉMIN
				0.0.5% VANNE DE MARRADE	VANNE METUR CA.
	i mana i katalan	and the second second		-10.0 %	210.0 %
13/12/2014	107.28.05 TM_2_0_SRF 107.28.05 TM_2_A_SPF	TM_2_D_SRF_PROCESS GAS 2N TM_2_A_SPF_PROCESS GAS 2N TANK 2D_SUBL CAS HEATER HIS	D STG DISCHARGE COOLER'S FAN D STG DISCHARGE COOLER'S FAN	MOTOR TM_2_D STARTING FAILURE	ALARM
13122014	▲66 \$ <b>4</b> 0 <b>↓</b> 0	18	AT THOSE CARE ON FLOID		V 40 4 1



View 6.2



Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 30 / 133



**5.5.3 P & ID: SYSTEM LUBRICATING OIL AND MOUTH** View 6.3



# 5.5.4 P & ID: AIR INSTRUMENTS

View 6.4



Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 31 / 133





5.5.6 P & ID: 1<sup>st</sup> STAGE COMPRESSOR



Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 32 / 133
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5.5.7 P & ID: 2<sup>nd</sup> STAGE COMPRESSOR



Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 33 / 133



#### 5.5.8 *P* & *ID*: *A* GEAR BOX



## 5.5.9 CONTROLLER: TURBINE

View 6.6



Code. MD-XXX-09 Rev. 0	Date 22/06/15	pg 34 / 133
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# 5.5.10 CONTROLLER: ANTISURGE CONTROL

View 6.6



## 5.5.11 MOS: MANUAL BYPASS LOCKS

	MESIT	MOS: COMMANDE MANU	EL BYP/	ASS VEF	RO	JILLAGES	
	18				- 1	PAID: GAZ DE REFOULEMENT	PAID: SYSTÈME HUILE DE GRAISSAGE ET ROUCHE
[	TSHH_1_1_MOS	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	MOS			PAID: AID DES INSTRUMENTS	PáiD: PAGE DE CONTRÓLE
	TSHH_1_2_MOS	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	MOS			Pálų:	PAID:
	TSHH_2_1_MOS	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	MOS			GÉNERATEUR ÉLECTRIQUE	BOITE À ÉNGRENAGES
	T5HH_2_2_M05	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	MOS			CONTRÔLEUR: TURBINE	CONTRÔLEUR: GÉNERATEUR ÉLECTRIQUE
	TSHH_3_1_MOS	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	MOS			MOS	DIAGNOSTIQUE
	TSHH_3_2_MOS	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	MOS				
	TSHH_4_1_MOS	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	MOS			ENTRÉES DIGITALES TABLEAU	SIGNAUX ENTRÉE TABLEAU MCC
	TSHH_4_2_MOS	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	MOS			SEUIL ANALOGUES	IMPRIMER DATA LOGGING
	TSHH_5_1_MOS	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	MOS				
	TSHH_5_2_MOS	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	MOS			MENU PRINCIPAL	ADMINISTRATION
	TSHH_6_1_MOS	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	MOS		(	ALARME CUMULATIF	
	TSHH_6_2_MOS	TEMPERATURE CHAMBRE DE COMBUSTION TURBINE	моз				COMMON
	TE_6B_STS_HH_MOS	TEMPERATURE DE SORTIE HUILE PALIER GEN COTE EXC	MOS			RESET DES ALAS	MES 🛃
	TE_8_STS_HH_MOS	TEMPERATURE CHÉMINÉE TURBINE	MOS			PANNEAU INSTRU	IMENTATION
	TE_9_STS_HH_MOS	TEMPERATURE CHÉMINÉE TURBINE	MOS			DÉMARRAGE ACTIVÉ	
	TE_12_STS_HH_MOS	TEMPERATURE PALIER D'EPÉE TURBINE	MOS			ARRÉT D	URGENCE
	TE_13_STS_HH_MOS	TEMPERATURE PALIER FROID TURBINE	MOS			PRÊT AU DEMARRAGE	DÉMARRAGE ACTIVÉ
	TE_33_STS_LL_MOS	TEMPERATURE GAZ D'ALIMENTATION	MOS			S,5 rpm	0,0 °C
	TE_33_STS_HH_MOS	TEMPERATURE GAZ D'ALIMENTATION	MOS			COP	TEMP. D' ECHAPPEMENT
	TE_110_STS_HH_MOS	TEMPERATURE PALIER GENERATEUR COTE EXCITATION	MOS			-0,000 Kg/6m	TEMP. DU CHÉMINÉS
						0,0 %	0,0 °C
			PG.	1/2 -> 6010 P0.2		VANNE DÉMARRAGE -10,0 %	VANNE MESUR. GAZ COMB
Δ.	10/11/2011 10:53:14 AM	PT_9G_IS_FIRST_ALM PLUS BAS PRESSION GAZ ALIMENT	ATION EST LA PRÉ	ÉMIÉRE			TRIP
Δ.	10/11/2011 10:53:14 AM	PT_9G_STS_L_ALM ALARME BASSE PRESSION ENTRÉE	AIRE GAZ DE AU	MENTATION			ALARM
5	<b>Å</b> 3	tv 166 ≱ 4 🕐 0					🗸 🔩 🔳 🖾 🗘

Code. MD-XXX-09

Rev. 0



		_		P&ID: GAZ DE REFOULEMENT	PAID: SYSTÈME HU GRAISSAGE ET DO
E_111_STS_HH_MOS	TEMPERATURE PALIER GENERATEUR COTE TURBINE	MOS	•	P&ID AIR DES INSTRUMENTS	PAGE DE CONTR
E_200_STS_HH_MOS	OIL HEADER TEMPERATURE	MQS	•	PAID of MERATEUR & ECTRODUC	PAID: point à éxopeux
E_203_STS_HH_MOS	TURBINE THRUST BEARING OUTLET OIL TEMPERATURE	MOS			BOILT A CHONCH
E_204_STS_HH_MOS	TURBINE COLD BEARING OUTLET OIL TEMPERATURE	MOS		TURBINE	GÉNERATEUR ÉLEC
T_1_STS_LL_MOS	LUBE OIL HEADER PRESSURE	MOS	٠	MOS	DIAGNOSTIQU
T_9G_STS_LL_MOS	PRESSION ENTRÉE GAZ DE ALIMENTATION	MOS			
DT_205_1_STS_HH_MOS	FUEL GAS FILTER DIFF PRESSURE	MOS		TABLEAU	TABLEAU MC
SHH_205_4_FINE_IN_MOS	FUEL GAS SEPARATOR HIGH HIGH LEVEL	MOS		SEUL	IMPRIMER DATA LODGIN
CG_SDTB_FINE_IN_MOS	DI FROM GCP :SHUTDOWN TURBINE	MOS		MENU PRINCIPAL	ADMINISTRAT
IV_EMRG_FINE_IN_MOS	DI FROM ESM INVERTER : EMERGENCY	MOS			
				PANNEAU INSTRU	IMENTATION
				DÉMARRAGE ACTIVE	
				ARRET D	URGENCE
				PRÊT AU DEMARRAGE	
				PRÊT AU DEMARRAGE VITESSE	DÉMARRA TEMP. BU COM
				PRÉT AU DEMARRAGE VITESSE 5,5 / pro	DÉMARRA TEMP: DU COM
				PRÉT AU DEMARRAGE VITESSE 5,5 (SP -0,000 Kg/sm	DÉMARRA TEMP. BU COM TEMP. D' ECHA
				PRÉT AU DEMARRADE VITESSE COP 	DÉMARRA TEMP. DU COM TEMP. DI COM TEMP. DI CHAN
		ļ	9070	PRÉT AU DEMARRADE VITESE 0,2 rpm -0.000, Kalom Charlog 0,0 % Vanue Demarkade	DÉMARRA TEMP. DU COM TEMP. D'ECHA TEMP. D'ECHA TEMP. DU CHEN U VANNE MESUR

Pages (2 in total) make available a selector; called MOS (Manual Override Switch) for certain causes trigger to avoid certain conditions that otherwise would cause the outbreak of the machine. In the displayed page, the MOS refers to the trigger caused by the intervention of the high temperature threshold for the TE-1 instrument. Activation of a MOS because the occurrence of an alarm.

#### 5.5.12 DIAGNOSTIC

The page shows colorful animations by the presence of faults in the PLC system.

MESIT Construct	DIAGNOS	STIQUE				
CPU_1		CNET_1A_FAIL CNET_1A_FAIL CNET_1B_FAIL			PAID GAZ DE REFOULEMENT PAID AIR DES INSTITUMENTS PAID GÉNERATEUR ÉLECTRIQUE CONTRÔLEUR: TURBINE	Paro: système Huile De GRAISSAGE ET SOUCHE Paro: Paro: De Contrôle Paro: Boîte à Éngrenages Contrôleur: Génerateur électrique
	CNET 1	A				
CNET_3		-		CNET_4	MOS ENTRÉES DIGITALES TABLEAU	SIGNAUX ENTRÉE TABLEAU MCC
					SEUIL	IMPRIMER DATA LOGGINO
CRET_3_FAIL TC_1_FAIL	TC_2_FAIL AI_1_FAIL	AL3.FAIL	MCM_1_FAIL AI_4_FAIL	AL2_FAIL A0_2_FAIL	MENU PRINCIPAL	ADMINISTRATION
AO_1_FAIL DI_1_FAIL	DI_2_FAIL	DI_3_FAIL	DL4_FAIL	DI_6_FAIL		
		DO 2 FAIL	. DO 3 FAIL	DO 4 FAIL	RESET DES ALARM	160
DIG_TAIL					PANNEAU INSTRUMENTATION	
CNET_1B					ARRÉT D'URGENCE	
					PRÊT AU DEMARRADE VITEOSE	DÉMARRAGE ACTIVÉ TEMP. DU COMBUSTEUR 0.0 %
GAS_TURBINE_MCC_FAR DIG_1_0_15_FAR					-0.000 Kolom	0.0.00 TEMP. DU CHÉMINÉE
016 J.0.2.FAL 016 J.0.3.FAL					0.0 % VANNE DEMARRAGE -10.0 %	0.0 °C VANNE MESUR, GAZ COMB. -10,0 %
A     10/11/2011 10:53:14 AM     PT_96_91       A     10/11/2011 10:53:14 AM     PT_96_95_1       A     10/11/2011 10:53:14 AM     PT_96_81       B     10/11/2011 10:53:14 AM     PT_96_81       B     10/11/2011 10:53:14 AM     PT_96_81	FIRST ALM	PLUS BASSE PRESSION GA ALARME BASSE PRESSIO	ENTREE ARE GAZ D Z ALIMENTATION ES' ON ENTRÉE AIRE GA	E ADMENTATION T LA PRÉMIÈRE Z DE ALIMENTATION		

Code. MD-XXX-09

Rev. 0


# 5.5.13 DIGITAL INPUTS TABLE

The pages list the digital inputs managed by the internal board cards UCP.

ENTRÉES DIGITALES TABLEAU CNET_3	
K	PAG: GAZ DE REPOULEMENT PAG: SYSTÈME HUILE DE GAZ DE REPOULEMENT PAG: PAG
CNET_3:7 1756-IB16I DI_1	CONTRÓLEUR: TURBINE OÉNERATEUR ÉLECTRIQUE MOS DIAGNOSTIQUE
LSHH200H ZSH 2 ZSH 6 ZSH 70 ZSH 70	MORES SUBJECT SUB
CNET_3:8 1756-IB16I DI_2 PGL-06 HISGEN-15TP HISGEN-15TP FILE PGL 0 HISGEN-15TP FILE FILE FILE FILE FILE FILE FILE FILE	ALARME CUMULATIF OCCLENCHEMENT COMMUN REGET DES ALARMES
PSL20229 EL_WV_OVLD FGV3#	DÉMARRADE ACTIVE ANDÉ D'IRREANCE PRÉT AU DEMARRADE VITESE DEMARRADE ACTIVE TEMP. DU COMPUSITION
	3.5 cpm         0.0 °C           COP         TEMP (P ECLAPPEMENT 0.0 °C           -0.000 regen         0.0 °C           CURROE         TEMP (D) CHEMINES           CURROE         TEMP (D) CHEMINES           CURROE         TEMP (D) CHEMINES           VANNE (BMARRAGE         VANNE MELIK, GAZ COME
Internation         PLOS DASE PRESSION GAZ ALMENTATION ENTRE ARE GAZ DE ALMENTATION           Intracti 10/31/10/3114/AM         P1/96_15_PIRST_ALM         PLUS BAS PRESSION GAZ ALMENTATION EST APRÉMIERE           Intracti 10/31/10/3114/AM         P1/96_15_PIRST_ALM         PLUS BAS PRESSION GAZ ALMENTATION EST APRÉMIERE           Intracti 10/31/10/3114/AM         P1/96_15_PIRST_ALM         ALARME BASE PRESSION ENTRÉE ARE GAZ DE ALMENTATION           Intracti 10/31/10/3114/AM         P1/96_15_PIRST_ALM         ALARME BASE PRESSION ENTRÉE ARE GAZ DE ALMENTATION	-10.0 % -10.0 % -10.0 % -10.0 % 
ENTRÉES DIGITALES TABLEAU CNET_4	
CNET_4:5 1786-IB16I DI_3	PAID: PAID: SYSTÈME HUILE DE GAZ DE REFOULEMENT GRAISSAGE ET BOUCHE
QCG-AS QCG-EPRM RV-T0STF RV-ALM	AIR DES INSTRUMENTS PAGE DE CONTRÔLE PAGE DE CONTRÔLE PAGE GÉNERATEUR ÉLECTRIQUE BOÎTE À ÉNORENAGES
QCG-AS     QCG-EP FM     INV-T05TF     INV-ALM       QCG-AS     QCG-6505T     INV-AD     INV-AD       QCG-AS     QCG-6505T     INV-AD	AR DES INSTRUMENTS PAGE DE CONTRÔLE DES INSTRUMENTS PAGE DE CONTRÔLE DES INSTRUMENTS DES
OCG-AS         OCG-EPRM         RVV:T0GTF         RVV.T0GTF           INTERNATION         INTERNATION         INTERNATION	AIR DES NOTIONEURS PAGE PAGE DEVENTEMENTS PAGE PAGE CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR CONTRÓLEUR MAGE CONTRÓLEUR SEULA ANALOCIUES SEULA ANALOCIUES MERIO PRINCIPAL ADMINISTRATION
OCC-AS       OCC-EFRM       PXV/D0TF       PXV-ALM         Image: State	AR DESISTICATIONENTS PAGE DE CONTRÓLE PAGE DE CONTRÓLEUR DEMENSIONENTS ELECTRIQUE DE CONTRÓLEUR DE CONTRÓLEUR DE CONTRÓLEUR DE CONTRÓLEUR DE CONTRÓLEUR MOS DE CONTRÓLEUR MOS DE CONTRÓLEUR ENTRÉESE DE CONTRÓLEUR MOS DE CONTRÓLEUR DE CONTRÓLEUR MOS DE CONTRÓLEUR MOS DE CONTRÓLEUR MENU PRINCIPAL ADMINISTRATION RESECTORS ALAMAES PANNEAU INSTRUMENTATION
QCG-AS       QCG-EFRM       RVV/T0GTF       RVV-ALM         QCG-AS       QCG-AS       QCG-AS       QCG-AS         PALADS       QCG-AS       QCG-AS       QCG-AS         PG-AP-AL       PG-AP-AL       QCG-AS       QCG-AS         PG-AP-AL       PG-AP-AL       QCG-AS       QCG-AS         PG-AP-AL       PG-AP-AL       QCG-AS       QCG-AS         PG-AP-AL       PG-AP-AL       QCG-AS       Q	AR DESISTICATIONS PAGE DE CONTRÓLE PAGE DEVENTER RECENTIQUE DEVENTER RECENTIQUE DONNTRÓLEUR ONNER RECENTIQUE MOS DIAGNOSTIQUE RECEANTRÓLE RECEANTRÓLE RECEANTRÓLE RECEANTRÓLE DEVENTER RECEANTRÓLE DEVENTER RECETORS ALANKE DEVANERADE ACTIVE RECETORS ALANKE TEMP DEVANERADE ACTIVE TEMP DE COMPORTANTE
000.45       000.45011       000.4001       000.4001         000.16       000.4001       000.4001       000.4001         000.16       000.4001       000.4001       000.4001         000.16       000.4001       000.4001       000.4001         000.16       000.4001       000.4001       000.4001         000.16       000.4001       000.4001       000.4001         000.16       000.4001       000.4001       000.4001         000.16       000.4001       000.4001       000.4001         000.4001       000.4001       000.4001       000.4001         000.4001       000.4001       000.4001       000.4001         000.4001       000.4001       000.4001       000.4001         000.4001       000.4001       000.4001       000.4001         000.4001       000.4001       000.4001       000.4001         000.4001       000.4001       000.4001       000.4001         000.4001       000.4001       000.4001       000.4001         000.4001       000.4001       000.4001       000.4001         000.4001       000.4001       000.4001       000.4001         000.4001       000.4001       000.4001       000	AR DES NOTIONEURS PAGE DE CONTRÓLE DÉREAR-TEUR ÉLECTRIQUE DÉREAR-TEUR ÉLECTRIQUE DONTRÓLEUR OCNITIÓLEUR OCNITIÓLEUR OCNITIÓLEUR OCNITIÓLEUR OCNITIÓLEUR OCNITIÓLEUR OCNITIÓLEUR OCNITIÓLEUR OCNITIÓLEUR OCNITIÓLEUR SELECU ADISOUES DES NOTIONEUR DES NOTIONEUR D

# 5.5.14 INPUT SIGNALS TABLE MCC

The pages list the digital inputs managed by internal boards MCC chart.

	Code. MD-XXX-09 Rev. 0	Date 22/06/15	pg 37 / 133
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MESI	Sonatrach	SIGNAUX	ENTRÉE TA	BLEAU MC	с		
						P4ID: GAZ DE REFOULEMENT P4ID: AIR DES INSTRUMENTS	PAID: SYSTÈME HUILE DE GRAISSAGE ET BOUCHE PAID: PAGE DE CONTRÔLE
6		ENTE	RÉES DIGITALES			D'AID: GÉNERATEUR ÉLECTRIQUE	P&ID: BOÎTE À ÉNGRENAGES
	C:0:1 1794-IB16X	0B16P/A DIG   0 1		C:0:1 1794-IB16XOB16	P/A DIG I O 3	CONTRÔLEUR: TURBINE	CONTRÔLEUR: GÉNERATEUR ÉLECTRIQU
MS-IN001	MS-IN061	MS-IN111	MS-IN003	MS-IN053	MS-IN100	MOS	DIAGNOSTIQUE
MS-IN011	MS-IN081	MS-IN131	MS-IN013	MS-IN063	MS_IN113	ENTRÉES DIGITALES TABLEAU	SIGNAUX ENTRÉE TABLEAU MCC
ON MS-IN021	ON MS-IN091	RUN MS-IN161	MS-IN023	RUN MS-IN083	MS-IN133	SEUIL	IMPRIMER DATA LOGGING
ON MS-IN051	RUN MS-IN101	ON	MS-IN040	MS-IN090	MS-IN140	MENU PRINCIPAL	ADMINISTRATION
	ON	_	ON				DÉCLENCHEME
	<b>F</b> GA	S_TURBINE_MCC:0:1 1794	HB16XOB16P/A DIG_I_O	2		RESET DES ALAR	
		MS	-1N002				
			ON			DÉMARRADE ACTIVÉ	ACTIATION
		PÓW	/ER ON			ARRÉTO	URGENCE
		MS	-IN122 -			PRÊT AU DEMARRAGE	DÉMARRAGE AC TEMP. DU COMBUSTE
						5,6 rpm	0,0 *0
						-0,000 Kg/cm	TEMP. D' ECHAPPEN 0.0 °C
						CHARGE 0.0 %	TEMP. DU CHÉMINÉ
						VANNE DÉMARRAGE	VANNE MESLIR GAZ

### 5.5.15 SIMILAR THRESHOLD

Pages (3 total) reported the thresholds associated with the analog instrumentation with an explanation of their effect.

TAG	EV	u	L	н	нн	ACTION	PAID:	PAID: SYSTÈME HUILE D
FGV-3-FDB	%			1	]		PBID.	PAID.
PDT-11	mBar			1000,0			AIR DES INSTRUMENTS	PAGE DE CONTROLE
PDT-205	mBar	Ĵ.					GÉNERATEUR ÉLECTRIQUE	BOITE À ÉNORENAGES
PT-A	Barg		2,00		ļ		CONTRÔLEUR: TURBINE	CONTRÔLEUR: GÉNERATEUR ÉLECTRIQU
PT-05	Barg	0,90	0,92			-	-	
PT-1	Barg	0,59	0,85			LL ALARME: FERMÉE CHAUFFE EH1; DEMARRÉE POMP HULE D'URGENCE NON L'ALARME: PERMISSIF AU DÉMARRAGE; FERMÉE POMP HULE D'URGENCE	MOS	DIAGNOSTIQUE
PT-1 EU_VAL	Barg		0,58			NON L ALARME: PERMISSIF AU VIRATEUR	ENTRÉES DIGITALES TABLEAU	SIGNAUX ENTRÉE TABLEAU MCC
рт-ј	Barg		5,00	6,37	- i	L: DEMARRÉE POMP HUILE AUXILIAIRE H: ARRÊT POMP HUILE AUXILIAIRE	SEUL	IMPRIMER
PT-6	Barg					1200	ANALUGUES	DAIACODOING
PT-7	Barg	1,5E38	0,85			LL ALARME: ACTIVÉE APRÈS ALLUMAGE NON L ÉTAT: PERMISSIF AU DÉMARRADE	MENU PRINCIPAL	ADMINISTRATION
PT-8	Barg		0,60		1	ACTIVÉE APRÈS DEMARRADE		
PT-9G	Barg	3,00	9,50			NON L ALARME PERMISSIF AU DÉMARRAGE		COMMUN
PT-11	Barg		2,80		1	-	RESET DES ALAS	omes 🥜
PT-16G	Barg					22	PANNEALI INSTRI	IMENTATION
TE-1	°C				700,0	SEUIL POR LE DEMARRAGE	DÉMARRAGE ACTIVE	
TE-2	*c				700,0	SEUR POR LE DEMARRAGE	ARRÉT D	URGENCE
TE-3	°C				700,0	SEUIL POR LE DEMARRAGE	PRÊT AU DEMARRAGE	
TE-4	°C				700,0	SEUIL POR LE DEMARRADE	VITEGSE	TEMP. DU COMBUSTE
TE-5	°C				700,0	SEUL POR LE DEMARRAGE	CDP	TEMP, D ECHAPPEN
TE-6	°C				700,0	SEUIL POR LE DEMARRAGE	-0,000 Holem	0,0 MC
TE-16	*C			600,0	700,0	TEMPERATURE MOIENNE CHAMBRE DE COMBUSTOR, SEUIL POR LE DEMARRAGE	CHARGE	TEMP. DU CHÉMINÉE
						0070 603 ← P6.13 → 6070 603	VANNE DÉMARRAGE	VANNE MESUR, DAZ 0

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 38 / 133



TAG	EU	u	L	н	нн	ACTION	P4ID:	PAID: SYSTÈME HUILE DE
ECC-CRR	A					(m.)	GAZ DE REFOULEMENT	GRAISSAGE ET BOUCHE PAID:
ECC-VLT	v					-	AIR DES INSTRUMENTS	PAGE DE CONTRÔLE
TE-1 TSHH	*C	i i			950,0	SEUL POR LE MARCHE NORMAL	GÉNERATEUR ÉLECTRIQUE	BOITE À ÉNGRENAGES
TE-2 TSHH	°C	1			950,0	SEUL POR LE MARCHE NORMAL	CONTRÔLEUR: TURRINE	CONTRÔLEUR: GÉNERATEUR ÉLECTRIQUE
TE-3 TSHH	*c				950,0	SEUL POR LE MARCHE NORMAL	TONEINE	CENERALEON ELECTRIQUE
TE-4 TSHH	*C				950,0	SEUIL POR LE MARCHE NORMAL	MOS	DIAGNOSTIQUE
TE-5 TSHH	*c				950,0	SEUR FOR LE MARCHE NORMAL	ENTRÉES DIGITALES	SIGNAUX ENTRÉE TABLEAU MCC
TE-6 TSHH	*C				950,0	SEUL POR LE MARCHE NORMAL	SEUL	IMPRIMER
TE-16 TSHH	°C			855,0	950,0	TEMPERATURE MOIENNE CHAMBRE DE COMBUSTOR SEUIL POR LE MARCHE NORMAL	ANALOGUES	DATA LOGGING
TE-T1	°C						MENU PRINCIPAL	ADMINISTRATION
TE-T2	*C	1						-
TE-TO	°C		-			8		COMMUN
TE-T4	*C						RESET DES ALAF	MES 2
TE-T14	*C			450,0	460,0	TEMPERATURE MOIENNE ECHAPEMANT TURBINE	DANNEAU INCTO	MENTATION
TE-7	°C			430,0			PARICAD IN STRU	MENTATION
TE-8	*C				450,0		ARRÉTO	URGENCE
TE-9	°C		-		450,0			
TE-10	°C						VITESSE	TEMP. DU COMBUSTEUR
TE-10A	*c						5.5 (945	
TE-10B	°C		-				-0,000 Kg/cm	0,0 *C
TE-710B	°C			600,0	700,0	TEMPERATURE MOIENNE CHAMBRE DE COMBUSTOR DEMARRAGE	CHARGE	TEMP. DU CHÉMINÉE
			_				un se	
						GOT0 F0.1 ← PG.20 → GOT0 F0.3	-10,0 %	-10,0 %
10/11/2011	10:53.14	AM PT	96 IS FI	RST_ALM		PLOS DASSE PRESSION EXTREE AIRE GAZ DE ADMENTATION PLUS BAS PRESSION GAZ ALIMENTATION EST LA PRÉMIÈRE		TRIP
10/11/2011	10:53:14	AM PT	9G STS	L ALM		ALARME BASSE PRESSION ENTRÉE AIRE GAZ DE ALIMENTATION		ALARM

TAG	EU	u	L	н	нн	ACTION	P6ID:	PAID: SYSTÈME HUILE D
TE-1A	°C			75,0	100,0	*	GAZ DE REFOULEMENT PBID:	GRAISSAGE ET BOUCHE PAID:
TE-6A	°C			70,0		*	AIR DES INSTRUMENTS	PAGE DE CONTRÔLE
TE-6B	°C		1		1,5E38	*	GÉNERATEUR ÉLECTRIQUE	BOITE À ÉNGRENAGES
TE-11	°C	1					CONTRÔLEUR: TURRINE	CONTRÔLEUR:
TE-12	°C			95,0	115,0			
TE-13	*C			95,0	115.0	4	MOS	DIAGNOSTIQUE
TE-14	°C					*	ENTRÉES DIGITALES	SIGNAUX ENTRÉE TARLEAU MCC
TE-17	*C					*	SEUR	IMPRIMER
TE-17A	*C	1		60,0		97. 19	ANALOGUES	DATA LODDING
re-33	°C	10,0	15,0		60,0		MENU PRINCIPAL	ADMINISTRATION
E-110	*C			95,0	105,0	4	-	
TE-111	°C			95,0	105,0	÷.		COMMUN
TE-113	°C			75,0		*	RESET DES ALA	
TE-114	*C			75,0		*	PANNEAU INSTRU	IMENTATION
TE-115	°C			55,0			DÉMARRAGE ACTIVE	MEMIATION
E-116	°C			55.0		×	ARRETO	URGENCE
TE-200	°C			60,0	70,0	2	PRÉT AU DEMARRAGE	
TE-201	°C		30,0	55,0			VITESSE	TEMP. DU COMBUST
TE-202	*c					¥	CDP	TEMP IT ECHAPPEN
TE-203	°C			70,0	100,0		-0,000 Kolom	0,0 %
re-204	°C			70,0	100,0	4	CHARDE	TEMP. DU CHÉMINÉE
TE-205	°C		1,5E38			2	VANNE DÉMARRAGE	VANNE MESUR, GAZ
	12 10					0010 - PG.33 - 0010	-10,0 %	-10,0 %

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 39 / 133



# 5.5.16 PRINT DATA LOGGING

If you press this push-button printing is started from the state in that time some "critical" variables for regulating the turbine.

The following reports a copy of possible impressions.

MESIT Streatesh	G7 S/N 406 GR.1 OWER PLANT ATA LOGGING	DATE 1 HEU	1/10/2 RE 17:21:	011 51
VITESSE GÉNERATEUR		5,5	RPM	i.
POISSANCE ACTIVE		0,000	MW	
PRESSION BAROMÉTRIQUE	PT-05	1,007	Bera	
TEMPÉRATURE AMBIANT	TE-202 / 14	29,32 /	30,13	°C
TEMPÉRATURE GAZ	TE-33	33,3	°C	
TEMPÉRATURE 1 CHAMBRE DE COMBUSTION	TE-1	32,1	°C	
TEMPÉRATURE 2 CHAMBRE DE COMBUSTION	TE-2	30,9	°C	
TEMPÉRATURE 3 CHAMBRE DE COMBUSTION	TE-3	30,9	°C	
TEMPÉRATURE 4 CHAMBRE DE COMBUSTION	TE-4	30,0	°C	
TEMPÉRATURE 5 CHAMBRE DE COMBUSTION	TE-5	30,6	°C	
TEMPERATURE 6 CHAMBRE DE COMBUSTION	TE-6	31,4	°C	
TEMPÉRATURE MOYENNE CHAMBRES DE COMBUSTION		0.0	°C	
TEMPÉRATURE SORTIE COMPRESSEUR AXIAL	TE-11	28,2	*C	
TEMPÉRATURE 1 ÉCHAPPEMANT TURBINE	TE-T1	32,5	*C	
TEMPÉRATURE 2 ÉCHAPPEMANT TURBINE	TE-T2	30,9	°C	
TEMPÉRATURE 3 ÉCHAPPEMANT TURBINE	TE-T3	33,9	*C	
TEMPÉRATURE 4 ÉCHAPPEMANT TURBINE	TE-T4	31,0	*C	
TEMPERATURE MOYENNE ECHAPPEMANT TURBINE		0,0	°C	
EMPÉRATURE 1 CONDUIT D'ÉCHAPPEMANT (CHEMINÉE	) TE-7	29,4	*C	
EMPÉRATURE 2 CONDUIT D'ÉCHAPPEMANT (CHEMINÉE	) TE-8	30,2	°C	
TEMPÉRATURE 3 CONDUIT D'ÉCHAPPEMANT (CHEMINÉE	) TE-9	29,4	°C	
IEMPERATURE 4 CONDUIT D'ÉCHAPPEMANT (CHEMINÉE	) TE-10	28,1	°C	
TEMPÉRATURE 5 CONDUIT D'ÉCHAPPEMANT (CHEMINÉE	) TE-10A	30,3	°C	
EMPÉRATURE 6 CONDUIT D'ÉCHAPPEMANT (CHEMINÉE	) TE-10B	30,6	°C	
EMPÉRATURE MOYENNE CONDUIT D'ÉCHAPPEMANT (C	HEMINÉE)	0,0	°C	
EMPÉRATURE RESERVOIR HUILLE (FOND/HAUT)	TE-201 / 205	42,15 /	42,15	°C
EMPÉRATURE HUILLE ENTRÉE REFRIGERANTE	TE-17	42,15	'C	
EMPÉRATURE HUILLE SORTIE REFRIGERANTE (3)	TE-17A	42,67	*C	
EMPÉRATURE HUILLE COLLECTEUR ALIMENTATION PAL	JER TE-200	42.22	*C	
EMPÉRATURE HUILLE DÉCHARGER PALIER TURBINE (5)	TE-1A	42,80	*C	
TEMPÉRATURE HUILLE DÉCHARGER PALIER COMPRESS	EUR TE-204	33,22	°C	
EMPÉRATURE HUILLE DÉCHARGER PAILER DE BUTÉE (	4) TE 203	43,12	°C	
EMPÉRATURE METAL BLANC PALIER DE BUTÉE (ACTIF/F	ASSIF) TE 13 / 12	41.34 /	42,79	°C
EMPÉRATURE HUILE SORTIE RÉDUCTEUR (6)	TE 6A / 6B	42,13 /	43,20	°C
EMPERATURE METAL BLANC PALIER ALTERNATEUR CO	TÉ RÉDUCT. (7) TE 110	40,98	°C	
EMPÉRATURE MÉTAL BLANC PALIER ALTERNATEUR CÔ	TÉ EXCIT. (8) TE 111	40.25	°C	
EMPÉRATURE AIR ENTRÉE ALTERNATEUR (CONDUIT/IN	TERNE) TE 116 / 115	29,6 /	29,5	°C
EMPÉRATURE AIR ÉCHAPPEMENT ALTERNATEUR (INTER	RNE/CONDUIT) TE 114 / 113	27,5 /	27,5	°C
			PAGE	1/2

	Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 40 / 133
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MESIT Senatrach	57 S/N 406 GR.1 OWER PLANT ATA LOGGING	DATE 11/10/201 HEURE 17:21:52	1
PRESSION HUILE DÉCHARGER POMPE URGENCE/AUXILIA	IRE PT 1	1.00 Barg	
PRESSION HUILE DÉCHARGER POMPE PRINCIPAL	PT 3	1.66 Barg	
PRESSION HUILE DE SURVITESSE	PT 7	0,48 Barg	
PRESSION GRAISSAGE	PT 1	1,00 Barg	
DELTA P FILTRES HUILE	PDT 11	256,2 mBar	
PRESSION GAZ AVANT SURVITESSE SOUPAGE	PT9G	2,000 Barg	
PRESSION DE BRULEUR	PT 16G	-0,004 Barg	
PRESSION AIR PISTON DE BALANCEMENT	PT8	0,005 Barg	
PRESSION DE REFOULEMENT COMPRESSEUR	PT6	-0,000 Barg	
ALTERNATEUR FRÉQUENCE		0.00 Hz	
ALTERNATEUR MOYENNE COURANT		0.00 A	
ALTERNATEUR MOYENNE TENSION		0.0 V	
ALTERNATEUR PUISSANCE ACTIVE		0.000 MW	
ALTERNATEUR PUISSANCE RÉELLE		0.000 MVar	
ALTERNATEUR PUISSANCE ACTIVE TOTAL APPROVISION	NE	324,492 MWh	
ALTERNATEUR PUISSANCE RÉELLE TOTAL APPROVISION	NÊ	48.043 MVarh	
ALTERNATEUR FACTEUR DE PUISSANCE		1.000	
ALTERNATEUR TEMPÉRATURE STATOR PLUS CHAUDS		28.00 °C	
VIBRATIONS MESURÉES CÔTÉ TURBINE	VT 1	0.0 ips	
VIBRATIONS MESURÉES CÔTÉ GÉNÉRATEUR (RÉDUCTEU	R) XT 103 / 104	0.078 ( 0.075 m	nils
VIBRATIONS MESURÉES CÔTÉ GÉNÉRATEUR (ECCITATEU	IR) XT 101 / 102	0.048 / 0.054 #	nils
		PAGE 2	12

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 41 / 133
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The figure below shows the administration page of the HMI system.

•			
MESIT			
	CONNECTION OPERATEUR DOTE CONNECTOR CONNECTOR	ALCOR REPORT BEAM ALCOR REPORT BEAM ALCOR REPORT BEAM ALCOR REPORT DEFENSION DEFENS	
A A 10/17/2011 3/51:10 PM 28 A 10/17/2011 3/51:10 PM 28 A 168	SH_4_ALM VANHE ISOLEMENT GAZ ADMENTATION OVVERTE (COMOLATIF ADAMME) SH_2_ALM VANNE DÉMARRAGE GAZ ALIMENTATION OUVERTE (CUMULATIF ALARME) 1/21 0 00	100	ALARM ALARM

The carrier selection function allows the user to select the system with the corresponding authorizations. Access is protected by a password. The table below shows the rights of different users:

User	Password	Operator Mode / Program	Threshold	Description, etc.	Maintenance
operator	****	Х	-	-	-
engineer	****	Х	Х	Х	-
supervisor	****	Х	Х	Х	Х

An order in this page also allows the passage of the English language to the French language.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 42 / 133



# 6 FUNCTIONAL DESCRIPTION

# 6.1 INTRODUCTION

The purpose of this chapter is to describe the operating logic of the control system.

# 6.2 GAS CIRCUIT

The gas system is shown schematically in the document MD-222-09 page 3.

# 6.2.1 COMPONENTS

The components parts of the gas circuit, which also applies to the control system, is reported below:

- Gas Heater:
  - o PSLL 202/3: Alarm;
- Gas filtration skid:
  - LSHH 205/4: Triggered by the separator too high;
  - o LSHH 205/3: high level alarm of the separator;
  - PDT 205/1, differential pressure at the ends of the filter:
    - Alarm per intervention threshold H;
    - Actuation by interference threshold HH;
- Transmitters:
  - TE 33, the fuel gas temperature:
    - Actuation by interference threshold HH, set @ 60 ° C;
    - Actuation by interference threshold LL, set @ 10 ° C;
    - Startup permission to temperatures above 15 ° C
  - o PT 9G, fuel gas pressure at the entrance:
    - The action level alarm, set @ 9.5 bar;
    - Actuation by interference threshold LL, set @ 3 bar;
  - PT 16G, gas pressure at the exit of skid;
- Vannes ALL OUT THERE:
  - FGV 1 Stop valve of fuel gas:
    - Operated by FGV SOV 1
    - ZSH 1: Sw. open end of race
    - ZSL 1: Sw. closed limit
  - FGV 6, purge valve fuel gas:
    - Driven by SOV V2G
    - ZSH 6: interr. open end of race
    - ZSL 6: interr. closed limit
  - FGV 4, isolation valve fuel gas:
    - Powered by SOV V1G
    - ZSH 6: interr. open end of race
    - ZSL 6: interr. closed limit
- Control valves:

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 43 / 133



- FGV 2 starter valve fuel gas:
  - Actuated by a 4-20 mA signal from the table, acting through an electro converter and positioner
  - ZSH 2: interr. open end of race
  - ZSL 2: interr. closed limit
- FGV 3 Main valve fuel gas:
  - Electrically actuated by the control signal types 4-20mA from Table
  - ZSH 3: interr. open end of race
  - ZSL 3: interr. closed limit

### 6.2.2 OPERATION

The gas from the battery input is processed by the heating system, the operation of which is indicated by the PSLL 202/3 state that should not be in alarm. The gas is processed by the system which has the functions of separation and filtration. During normal operation, the following alarms should NOT be present:

- LAH 205/3
- LAHH 205/4
- PDAH 205/1
- PDAHH 205/1

After passing the separation-filtration system, the gas arrives at the input of the skid of the turbine gas valves. Abnormal pressure values and gas temperature cause the following events:

- TE 33, the fuel gas temperature:
  - o Actuation by interference threshold HH, set @ 60 ° C;
  - Actuation by interference threshold LL, set @ 10 ° C;
  - Startup permission to temperatures above 15 ° C
- PT 9G, fuel gas pressure at the entrance:
  - The action level alarm, set @ 9.5 bar;
  - o Actuation by interference threshold LL, set @ 3 bar;

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 44 / 133
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## 6.3 OIL SYSTEMS

The oil circuit is shown schematically in the document MD-222-09 page 5.

# 6.3.1 COMPONENTS

The components parts of the oil circuit, which also applies to the control system, is reported below:

- Oil pumps:
  - Main pump driven by the accessory gearbox
  - Auxiliary pump: PMOA;
  - Emergency pump: PMOE;
- Fans of the oil cooler:
  - o T2AB
  - o T2BB
- Oil Cooler: EH1
- Oil vapor extractor: PRESS
- Transmitters / thermocouples:
  - PT 1, oil pressure to the collector:
    - Low pressure alarm @ 0.85 bar
    - Threshold L @ 0.58 bar as permission for the march to tacking
    - Triggered by pressure too low @ 0.59 bar
  - PT 3 oil discharge pressure of the mechanical pump:
    - Low pressure threshold @ 5 bar to start PMOA;
    - High pressure threshold @ 6.37 bar to start PMOA;
  - PT 7, the mechanical system pressure overspeed:
    - Low pressure threshold @ 0.85 bar as start permission;
    - Triggered by pressure too low @ 0.75 bar
  - o LS 10: oil tank level status;
  - o TE 201: bottom oil temperature reservoir
  - TE 205: tank top oil temperature:
    - Threshold L @ 30 ° C for management EH1 (ref. 0)
  - o TE 17: upstream oil temperature of the radiator;
  - TE 17 °: downstream oil temperature of the radiator;
  - o PDT 11: pressure at the ends of the filter:
  - High pressure alarm @ 1000 mbar
  - TE 200: oil temperature downstream of the filter:
    - High temperature alarm @ 60 ° C
    - Triggered by too high temperature @ 70 ° C
  - TE 1A discharge oil temperature exhaust side turbine bearing:
    - High temperature alarm @ 75 ° C
    - Triggered by too high temperature 100 ° C @
  - TE 203: Discharge oil temperature thrust bearing axial turbine compressor side:
    - High temperature alarm @ 70 ° C

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 45 / 133



- Triggered by too high temperature 100 ° C @
- TE 204: Discharge oil temperature thrust bearing axial turbine compressor side:
  - High temperature alarm @ 70 ° C
  - Triggered by too high temperature 100 ° C @
- TE 12: white metal temperature thrust bearing axial turbine compressor side:
  - High temperature alarm @ 95 ° C
  - Triggered by too high temperature 115 ° C @
- TE 13 white metal temperature thrust bearing axial turbine compressor side:
  - High temperature alarm @ 95 ° C
  - Triggered by too high temperature 115 ° C @
- TE 6A discharge oil temperature bearing gearbox, turbine side:
  - High temperature alarm @ 70 ° C
- TE 6B discharge oil temperature bearing gearbox, turbine side:
  - Triggered by too high temperature 100 ° C @
- TE 110: white metal bearing temperature turbine compressor side:
  - High temperature alarm @ 95 ° C
  - Triggered by too high temperature 105 ° C @
- TE 111: white metal bearing temperature compressor side:
  - High temperature alarm @ 95 ° C
  - Triggered by too high temperature 105 ° C @

# 6.3.2 PRIOR

All equipment listed below should be left in automatic mode:

- Oil pumps:
  - Auxiliary pump: PMOA;
  - Emergency pump: PMOE;
  - Emergency pump: RPM-3C
  - Auxiliary pump: RPM-3B
  - Main pump: RPM-3A
  - Fans oil cooler:
    - o T2AB
    - o T2BB
  - Oil Cooler: EH1
  - Oil vapor extractor: PRESS

# 6.3.3 OPERATION

During operation of the turbine lubrication is guaranteed by the main pump.

During the start-up and shutdown, lubrication is guaranteed by PMOA, which starts automatically if the pressure measured by PT 3 is low.

At very low manifold pressure PT 1, the standby pump starts, PMOE. The main causes of the low pressure manifold (PT 1) are:

• Failure of the PMOA

If the oil tank is unsuitable temperatures, the radiator is on EH 1, provided that the oil is going to flow, ref. 0.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 46 / 133



The oil circulating through the cooling radiator, where T2AB fans, T2BB, powered by the corresponding inverters, eliminate excess heat to keep the temperature measured by TE 205-50  $^{\circ}$  C, The regulator used is 17A ICT set with reference to 50  $^{\circ}$  C.

If the mechanical system overspeed occurs, the pressure measured by PT 7 downward and thus causes the activation of the system.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 47 / 133



# 6.4 CIRCUIT AIR INSTRUMENTS

The instrument air system is shown schematically in the document MD-222-09 page 9.

# 6.4.1 COMPONENTS

The components parts of the air circuit instruments, which also applies to the control system, is reported below:

- Air treatment system DRY-COOLER
- Solenoid:
  - o SOV 10 for controlling the anti-surge valve VBY axial compressor
  - o SOV V2G, for controlling the FGV6 valve
  - SOV V1G for control of FGV4 valve
- Transmitters:
  - PT A, discharge pressure of the air compressor:
    - Low pressure alarm @ 2 bar
  - PT 11, pressure to the compressed air manifold
    - Low pressure alarm @ 2.8 bar
  - o PT 8, pressure compensating cylinder
    - Low pressure alarm @ 0.6 bar
  - o PT 6, axial compressor discharge pressure
- Digital Instruments:
  - HSP 6, axial compressor discharge pressure switch:
    - Set @ 0.4 bar
  - o ZSH VBY: limit switch anti-surge valve opening;
  - o ZSL VBY: end of anti-surge valve closing stroke;

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 48 / 133
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# 6.5 CIRCUIT COMBUSTION AIR AND BURNING

The combustion air circuit and the combustion is shown schematically in document MD-222-09 on page 7. For specific descriptions of the operation of turbine regulator, see 6.6.

### 6.5.1 COMPONENTS

The list of the component parts of the combustion air system and combustion, which also applies to the control system, is reported below:

- Electrical equipment:
  - o S-EM1, sand extractor
  - SQZ1, cleaning system filter room:
    - 35 PSL: low air pressure to the hallway of the cleaning system (pulse-jet);
    - PDAH 32: high differential pressure at the ends of the filter chamber;
  - VIR, rotator:
    - Protecting the motor shaft turning gear mounted properly: ZSH 100;
  - ESM Starting electric motor:
    - During torque transfer clutch (engaged): ZSH 101;
  - Spark plugs ÷ TR6 TR1;
- Transmitters / thermocouples:
  - TE 202, filter room air temperature;
  - TE 14, turbine inlet air temperature;
  - PT 05 turbine inlet air pressure:
    - Low pressure alarm per intervention threshold;
    - Actuation by interference too low pressure threshold;
  - TE-11, air temperature at the outlet of the axial compressor;
  - o TE-1, 1-temperature combustion chamber:
    - Triggered by too high temperature at start @ 700 ° C;
    - Triggered by too high temperature load condition @ 950 ° C;
  - TE-2, combustion chamber temperature 2:
    - Triggered by too high temperature at start @ 700 ° C;
    - Triggered by too high temperature load condition @ 950 ° C;
  - TE-3, combustion chamber temperature 3:
    - Triggered by too high temperature at start @ 700 ° C;
    - Triggered by too high temperature load condition @ 950 ° C;
  - TE-4, combustion chamber temperature 4:
    - Triggered by too high temperature at start @ 700 ° C;
    - Triggered by too high temperature load condition @ 950 ° C;
  - TE-5, 5 combustion chamber temperature:
    - Triggered by too high temperature at start @ 700 ° C;
    - Triggered by too high temperature load condition @ 950 ° C;
  - TE-6, 6-temperature combustion chamber:
    - Triggered by too high temperature at start @ 700 ° C;

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 49 / 133



- Triggered by too high temperature load condition @ 950 ° C;
- o TE-T1, turbine exhaust temperature;
- o TE-T2, turbine exhaust temperature;
- TE-T3, turbine exhaust temperature;
- o TE-T4, turbine exhaust temperature;
- o TE-7, temperature exhaust chimney pipe:
  - High temperature alarm @ 430 ° C;
- TE-8, temperature exhaust chimney pipe:
  - Triggered by too high temperature @ 450 ° C;
- TE-9-temperature exhaust chimney pipe:
  - Triggered by too high temperature @ 450 ° C;
- TE-10 temperature exhaust chimney pipe;
- TE-10A-temperature exhaust chimney pipe;
- o TE-10B-temperature exhaust chimney pipe;
- VT-1. Turbine Vibration:
  - High vibration alarm threshold during startup @ 6 fps;
  - High vibration alarm threshold during start @ 8 fps;
  - High vibration alarm threshold for the charging plug @ 3 fps;
  - High vibration alarm threshold for the charging plug @ 4 fps;

### 6.5.2 **PRIOR**

All attachments listed below should be left in automatic mode:

- S-EM1, sand extractor;
- SQZ1, cleaning system filter room;
- VIR, rotator

### 6.5.3 OPERATION

The incoming air to the intake of the turbine axial compressor goes through the room S-EM1 filters and extracted from the chamber the sand collected on the bottom of the space upstream of the filters. When S-EM1 is running one of the following conditions happen:

- DPA-32;
- Manual Request for operator pushbutton: HSSEM\_1\_STR;

Automatic sequence of cleaning system (pulse-jet) is started.

When the filter status is compromised, the pressure measured by PT-5 will tend to assume still lower values, reaching the threshold value too low causes the turbine trip.

The ZSH-100 signal strength stop tacking VIR in order to prevent accidents during the manual shift operations.

The ZSH-101 signal indicates whether the clutch by which the starter motor provides torque to the turbine is engaged or not.

The management of these signals:

- PT-6;
- HSP-6;
- TE-TE-1 ÷ 6;
- TE-TE-T1 ÷ T4;
- TE-TE-7 ÷ 10B;
- And management of the following electrical equipment:
  - ESM;

|--|



Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 51 / 133



The control of the turbine is divided into two phases. The first is the startup / shutdown of the turbine and the second load management. The two phases are managed in two HMI control pages:

- 1. Control: Turbine
- 2. Control: Antisurge



Figure 6-1 Turbine control



Figure 6-2 Antisurge control

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 52 / 133
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The instruments involved in the control of the turbine are many and below we offer a list:

- Speed Sensors (ST-SR1,2)
- Temperatures combustion chambers (TE-1..6)
- Turbine exhaust temperatures (TE\_T1..T4)
- Temperatures exhaust pipe chimney (TE-7..10B)
- Barometric pressure (PT-05)
- Axial compressor discharge pressure switch (PSH-6)
- Axial compressor discharge pressure (PT-6)
- Rotator (VIR)
- Starter motor (ESM)
- Gas line valves
- Overspeed FGV1 by SOV-solenoid FGV1
- FGV6 evacuation by the SOV-V2G solenoid
- Isolation solenoid FGV4 SOV-V1G
- Start gas valve (FGV2)
- Valve control gas (FGV3)
- Anti-surge valve (bypass) by VBY solenoid valve (SOV-10).

#### 6.6.2 **PRIOR**

Pre turbine control are basically three:

- Mode selection of the turbine start sequence
- elimination of triggers
- Startup permissions

The modes of the starting sequence of the turbine can only be changed by triggering the same condition and turbine are:

1. 2. 3.	Automatic – Semi-Automatic Stop (Off) –						
		$\bigcirc$	AUTO	$\circ$	SEMI		OFF
		$\bigcirc$	START	$\bigcirc$	LAUNCH	$\bigcirc$	IGNITE

Figure 6-3 Operating Modes

Automatic startup executes the beginning of the startup sequence at the end, without need for intervention from the operator.

The Semi-Automatic Boot runs the startup sequence with two breaks for the launch sequence and the flame outlet of the turbine. This mode requires commands by the operator to perform the following sequence.

Off Mode (off) does not allow the turbine to start.

Triggers are eliminated, after resetting all alarms and after performing the RESET MASTER (main reset) control, using the push button only present in the screen page dedicated to turbine control, as shown in first figure of paragraph 6.6.

The turbine control needs a permission to be available at startup. Permission is the result of a set of conditions necessary to consider the subsidiary system ready to start. The state of the permission is available in the turbine control page, highlighted in the corresponding screen page in the section 6.6.3.1 (Figure 6-6).

	Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 53 / 133
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The table below shows all the necessary conditions for the start permission. The list is split into two blocks as shown on the next page:

Block permissions 1: description	Bypass
Automatic auxiliary oil pump (PMOA)	NO
Automatic emergency oil pump (PMOE)	NO
PT 9G> State BAS	NO
Gas heater according	NO
Ready to launch engine start	NO
******	***
*******	***
Fan 1 oil cooling (E1) in automatic	YES
Oil cooling fan 2 (E2) Automatic	YES
Automatic management candles	NO
PT 1> State BAS	NO

#### Table 6-1 First block permissions

Block permissions 2: description	Bypass
********	**
*********	**
Overspeed (SOV-V2) Automatic	NO
**********	**
*******	**
Anti-surge valve open	NO
PT 7> Status BAS	NO
Closed gas control valve	NO
Speed <down state<="" td=""><td>YES</td></down>	YES
Automatic engine start	NO
Automatic turbine inlet oil temperature control	NO
Inhibition turbine startup after shutdown	NO

#### Table 6-2 Second permissions block

For completeness we must add that during the interview, not enabled the operator user, it is possible to avoid certain permissions, and some not, as indicated in the table indication.

If all listed states are active, permission is available (green led); While some states are avoided (bypass), but permission is still available (green led), the derivation is highlighted with all avoided by (yellow) alarm. The following figures show the situation just described.

MESIT	General led permissi	ons NO OK			
TE_T1 32,5 °C TE_T2 30,9 °C TE_T2 30,9 °C TE_T3 33,9 °C TE_T4 31,0 °C CESTION DU CHARGE	ARME CUMULATIF DECLEMCHEMENT COMMUN RESET DES ALARMES D PANNEAU INSTRUMENTATION MARRAGE ACTIVÉ PRÉT AU DEMARRAGE DÉMARRAGE DÉMARRAGE ACTIVÉ	GESTION DU CHARG	TE_T2 30.9 °C TE_T2 30.9 °C TE_T3 33.9 °C TE_T4 31,0 °C	ALARME CUMULATIF RESET DES ALARM PANNEAU INSTRUM DÉMARRAGE ACTIVÉ PRÉT AU DEMARRAGE VITESSE	DÉCLENCHEMENT COMMUN HES DE ARNTATION HARRAGE DÉMARRAGE ACTIVÉ TEMP. DU COMBUSTEUR
0,0 %	5,5 rpm         0,0 °C           COP         TEMP. D' ECHAPPEMENT           -0,00C Kg/km         0,0 °C           CHARGE         0,0 °C           CHARGE         0,0 °C           VAINE DÉMARRAGE         0,0 °C           -10,0 %         -10,0 %		0,0 % AUGMENTER PERMISSIVES MASTER RESET	5,6 rpm CDP -0,000 Kg/cm CHARGE 0,0 % VANNE DÉMARRAGE -10,0 %	0,0 °C TEMP. D' ECHAPPEMENT Q.0 °C TEMP. DU CHÉMINÉE Q.0 °C VANNE MESUR GAZ COMB. -10.0 %
		J	,		



🗷 PERMISSIVE DETAIL - /09STD2703_INAMENAS// 📃 🗖 🔀	🜌 PERMISSIVE DETAIL - /09STD2703_INAMENAS// 📃 🗖 🔀
PERMISSIVES AU DÉMARRAGES	PERMISSIVES AU DÉMARRAGES
1 = PERMISSIF AU DÉMARRAGE	1 = PERMISSIF AU DÉMARRAGE
PERM_1 0 Not-Bypassed PERM_2 1 Not-Bypassed PERM_2 1	PERM_1 O A Bypassed
PERMISSIVE_OK 0	PERMISSIVE_OK 0

Figure 6-5 Permissions window

# 6.6.3 OPERATION

The operation of the turbine control is mainly divided into two phases shown in the screen-pages dedicated to:

- Control: turbine takes care of startup / shutdown of the turbine and monitoring of the main variables involved in the regulation and can be further subdivided as follows:
  - a. Reset triggers
  - b. Starting the turbine
  - c. Control and safety devices
  - d. Planned shutdown
  - e. Surveillance

In the following paragraphs are reported in the order that we will describe the turbine control functions.

# 6.6.3.1 RESET OF TRIGGERS

The triggers reset operation is a delicate and main phase to turn the turbine, therefore we provide a careful description below.

Code. MD-XXX-09 Ro	Rev. 0	Date 22/06/15	pg 55 / 133
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#### Figure 6-6 Reset triggers

- Keep pressed the alarm reset push button, to remove the current alarm. 1.
- Wait a few seconds to give time to the visual rearmament. 2.
- 3. Keep pressed the push-button Master Reset to eliminate the triggers of the currently active turbine.
- The led triggers turns green.
   Repeat the first two points.
- 6. The led of the cumulative trigger turns green.
- 7. Manual reset of the launch engine, to perform on the local table.
- 8. Manual reset of the launch engine, to perform on the local table.
- 9. Repeat step 3 of the sequence.
- 10. The led permissions turns green, if there are no causes that inhibit the release.

### 6.6.3.2 STARTING THE TURBINE

The start sequence is divided into three sequences:

- 1. Start-up
- 2. Launching
- Ignition 3.

Note: the control takes into account the expected inconsistency between control and feedback, and in such a case by means of its activation is protected turbine.

The following illustrates the automatic sequence. The semi-automatic mode is strictly identical to the automatic mode, but requires an order by the operator to complete the sub-sequences listed above. If necessary we mentionera the command for the semi-automatic mode.

Once you meet the requirements shown in the above paragraph, the turbine is ready to start, unless it is stopped (off). The startup sequence begins with the start command by the operator.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 56 / 133





### Figure 6-6-7 Commands and signals starting phase

#### 1. <u>Start:</u>

The current control instantly completes the start-up phase and automatically switches to that launch, while in semiautomatic mode the operator must press the push button to begin the sequence LAUNCH.

#### 2. Launch:

The control automatically switches to the launch phase, while in semi-automatic mode the operator must press the push button to begin the sequence LAUNCH.

The launch sequence produces the following:

- a1. Launch engine ignition.
- a2. Increased launch engine speed reference
- a3. Stopping the VIR
- a4. Cleaning the turbine with compressor air.
- a5. Opening of the overspeed valve (SOV-FGV1) triggering HSP-6 (Table 6-3Point 13).
- a6. Opening the gas discharge valve (SOV-V2G).
- a7. Closing the gas discharge valve (SOV-V2G) Timed (Table 6-3Point 14).
- a8. Locking the launch engine speed reference.

#### 3. Ignition:

The control automatically switches to the ignition phase, while in semi-automatic mode the operator must press the push button to start the sequence IGNITE.

The ignition sequence produces the following:

- i1. Lighting the candles combustion chambers (Table 6-3Point 15).
- i2. Opening the isolation valve (SOV-V1G) after an adjustable delay to the previous point (Table 6-3Point 16).
- i3. Taken flame if the median temperature of the combustion chamber (GT\_PRV\_COMBUSTOR) exceeds the flame confirmation threshold. It is important to note that the gas-start valve has a pre-calibrated mechanical opening to provide just the input gas with compressed air, ensuring the ignition of the combustion chambers (Table 6-3Point 17).
- i4. From that time, if a temperature of the combustion chamber (TE-1..6) Or the median falls below the flame failure threshold, the turbine is protected by a trigger (Table 6-3Point 18).
- i5. After the flame outlet, the launch engine speed reference starts to rise again.
- i6. Beginning of the control action on the valve start-up and regulation of the gas when the discharge pressure of the axial compressor (PT-6) meet the threshold (Table 6-3Point 19).
- i7. Launch engine shutdown. When the speed reaches the maximum speed threshold of the launch engine (Table 6-3Point 20), an adjustable timer is started, during which the starter motor speed is kept constant and equal to its maximum. At the end of the delay (Table 6-3Point 21) the starter motor is actually stopped. It is important to note that the turbine is already able to support themselves before this, but to avoid any thermal control problem and make the smoothest possible start is delayed engine shutdown to continue to benefit from its contribution.
- i8. Closing the anti-surge valve (SOV-10 bypass) obtained when a compressor discharge pressure threshold is reached or exceeded the corresponding speed threshold (Table 6-3Point 22).
- i9. Phase stabilization or preheating of the turbine, after reaching the reference speed and its maximum speed without load, now coincide with the timing of the turbine speed (Table 6-3Point 23).
- i10. At the end of the stabilization phase, the boot sequence is completed.

The figure below shows a generic temporal sequence of starting the turbine.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 57 / 133





Figure 6-6-8 Starting Sequence

# 6.6.3.3 CONTROL AND SAFETY

During operation of the turbine he controllers, limitations and active safety (ves) for the major variables in play. In particular controls, limitations and following parameters listed in the Table 6-3 are active:

- 1. Limiting speed for starting the turbine (Table 6-3Point 24).
- 2. Active cruise control when the target speed is reached (speed according to the active ramp that ends with the target Table 6-3Point 25).
- 3. Limitation temperature combustion chambers (Table 6-3Point 1).
- 4. Limitation temperature exhaust pipe chimney (temperature depending on the compressor discharge pressure and barometric pressure).

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 58 / 133



5. Limitation of acceleration (Table 6-3Point 9).

The always active safety in the control are:

- 1. Temperature combustion chambers: alarm and trip to the median of six temperatures (Table 6-3Point 2 and 3).
- 2. Exhaust turbine temperature: alarm and trip to the median of four temperatures (Table 6-3Point 4 and 5).
- 3. Temperature exhaust pipe chimney: alarm and trip to the median of six temperatures (Table 6-3Point 7 and 8).
- 4. Lack of flame, valid for each sensor and the combustion chamber center (Table 6-3Point 18).
- 5. Electronic overspeed alarm and trip (Table 6-3Point 10 and 11).
- 6. Congruence control / valve response.
- 7. Disagreement redundant combustion temperature signals, exhaust turbine and exhaust pipe (Table 6-3Point 6)

#### 6.6.3.4 STOP PLANNED

The shutdown sequence planned door to stop the turbine. It is activated by pressing the push button present in the control page and followed the steps described below.

	SE SE	м	$\bigcirc$	OFF	$\Theta$	STOP
START	LAU	осн Со	mando di	controlled sto	op	HALT

Figure 6-6-9 Turbine stop command planned

- 1. Signaling controlled stop GCP which precedes the opening of 52G before the outbreak of "reverse power" (power back).
- 2. Control gradually decreases the load to acceleration of the opening by the GCP, the 52G switch.
- 3. Control decreases the speed up to the minimum operating speed (MOS).
- 4. The control maintains the speed for the MOS of the turbine cooling time.
- 5. At the end of the cooling control command to stop the turbine.

### 6.6.3.5 MONITORING OF MEASURES

In the turbine control of the page there are areas and tables showing substantial quantities for turbine management as shown in the figure below.

Code. MD-XXX-09 Rev. 0	Date 22/06/15	pg 59 / 133
------------------------	---------------	-------------



	VIR CLUTCH ENGAGED ESM EMERGENCY	V Table sta	ibrations	TURBINE VIBRATION VT_1 (ips) 0,049	GENERATEUR DE           XT_103 (mils)         0,078           GENERATEUR DE         10,075           XT_104 (mils)         0,075	GENERATEUR NDE           XT_101 (mils)         0,048           GENERATEUR NDE         XT_102 (mils)         0,054
	OIL PUMP AUXILIARY OIL PUMP GEN-FAN EXT. HUILE VAPOUR SAND EXTRACTION PULSE JET		START-UP PANEL Quantité de Démarrages Quantité de Démarrages Man Heures d funct. Nominal GAZ Heures d funct. d Pointe GAS Heures d funct. d Pointe GAS Heures d funct. de Pointe LIQ Heures d funct. Crude OIL		E_7 29,4 °C	TE_10 28,1 °C
	те_200 42,2 •с Sett Рт_7 Ger 0,477 barg	tings nerals	Heures d funct. Équivalente	221 C		
	PT_9G 12,374 barg PT_16G -0,004 barg TE_33 33,3 °C		TE_2	30,9 °C 30,9 °C 30,9 °C 30,9 °C Combus	atures: pipe turbine tion chambers	TE_T1 32,5 °C
	PT_6 -0,000 barg TE_11 28,2 °C PT_5 1,007 barg	TE_13 HI,3 °C	TE_6	30,6 °C	GESTION DU CHARGE	TE_13 333°C
L	TE_14 30,1 °C				DIMINUER	
		<u> </u>	OFF	STOP		PERMISSIVES
	START	LAUNCH		HALT		MASTER RESET

### Figure 6-6-10 Boxes monitoring

On the main control is monitored temperatures:

- combustion chambers,
- turbine exhaust,
- exhaust pipe chimney,

but also monitors the main values on control in the table on the left (0) And vibration (0). In the center of the page there is the table of starts (6.6.3.6.2) And below, in addition to push buttons with the main controls of the turbine, the anti-surge valve (bypass) with its state is displayed.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 60 / 133



# Figure 6-6-11 Parameter Description

Beside the table also indicates the metal temperatures of the thrust bearing.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 61 / 133
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The table starts indicates the number of starts as well as non-successful starts.

Set to start it indicates the hours of operation of the turbine in the different possible conFiguretions fuel, as gas, liquid and crude oil. The operation is divided into normal and crest.

START-UP PANEL	
Quantité de Démarrages	16
Quantité de Démarrages Manque	3
Heures d funct. Nominal GAZ	63
Heures difunct, diPointe GAS	0
Heures d funct. Nominal LIQUID	0
Heures d'funct, de Pointe LIQUID	0
Heures d funct. Crude OIL	0
Heures d'funct. Équivalente	223

Figure 6-6-12 Table start

Among the parameters, the most important parameter is the equivalent operating hours, fundamental for the maintenance scheduling of the turbine.

# 6.6.3.6 PARAMETERS CONFIGURETION CONTROL

The main parameters of turbine control conFiguretion are listed in the table below:

	Description		threshol d	unit
1.	Combustion chamber temperatures: Reference		630	° C
2.	Temperatures combustion chamber: alarm (start / load)		600/855	° C
3.	Temperatures combustion chamber: Trigger (start / load)		700/950	° C
4.	Turbine exhaust temperatures: Alarm		450	° C
5.	Turbine exhaust temperatures: Trigger		460	° C
6.	Disagreement redundant signals (start / load)		80/120	° C
7.	Temperatures exhaust pipe: Alarm		430	° C
8.	Temperatures exhaust pipe: Trigger		440	° C
9.	Acceleration: Reference		10	turn / s
10.	Overspeed: Alarm		3200	rev / min
11.	Overspeed: Trigger		3250	rev / min
12.	Threshold VIR stop		300	rev / min
13.	Threshold HSP-6 indication *: PT-6 Pressure	speed	~ 0045 600 ~	barg rev / min

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 62 / 133
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14.	Relief valve delay SOV-V2G	10	dry
15.	Delay of TR13 spark plug	3	min
16.	Delay opening isolation valve SOV-V1G-	20	dry
17.	Flame temperature confirmation	250	° C
18.	Release temperatures flame failure	200	° C
19.	Threshold control gas valves, axial compressor discharge pressure PT-6	0.22	barg
20.	Threshold motor stop launching turbine speed	1790	rev / min
21.	Delay launching engine stop	10	min
22.	Threshold bypass closure: PT-6 Pressure speed	3.3 2700	barg rev / min
23.	Turbine preheating delay	2	min
24.	Speed limit during startup MOS	2940	rev / min
25.	Target speed	3000	rev / min

#### **Table 6-3 Control parameters**

\* Note: The values are indicative because it is a pressure switch.

### 6.7 COMPRESSOR

The compressor is shown schematically in the document MD-222-09 page 3-4.

# 6.7.1 COMPONENTS

The components parts of the compressor, which also applies to the control system, is reported below:

- Transmitters:
  - o LT-2101, Scrubber M2 level:
    - Low threshold Alarm @ (To be decided on site);
  - PT-4002A, Scrubber M2 pressure:

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 63 / 133



- Low threshold Alarm @ (To be decided on site);
- PT-4702, Scrubber M2 pressure:
  - Low Low threshold Alarm @ (To be decided on site);
- TE-3002, Scrubber M24 inlet temperature:
  - High threshold Alarm @ 80°C
- TE-3702, Scrubber M24 inlet temperature:
  - High High threshold Alarm @ 90°C
- LT-2101, Scrubber M24 level:
  - Low threshold Alarm @ (To be decided on site);
- LT-2820, OIL BUFFER TANK level:
  - High threshold Alarm @ (To be decided on site);
  - High High threshold Alarm @ (To be decided on site);
  - Low Low threshold Alarm @ (To be decided on site);
  - Low threshold Alarm @ (To be decided on site);
- PDT-41021, SEAL OIL inlet delivery line differential pressure:
  - Low threshold Alarm @ (To be decided on site);
- PT-4820, SEAL OIL inlet supply line pressure (From lube oil):
  - Low Low threshold Alarm @ (To be decided on site);

# 6.7.2 PRIOR

All equipment listed below should be left in automatic mode:

- RPM-3C, Seal oil emergency pump:
- RPM-3B, Seal oil auxiliary pump:
- RPM-3A, Seal oil main pump:
- LCV-2820
- TM-2-E
- TM-2-F
- ROV-5011
- ROV-5004
- LCV-2104
- ROV-5010
- ROV-5005
- ROV-5008
- FCV-1003
- ROV-5006
- ROV-5003
- LCV-2102
- SOV-1001A
- FCV-1001A
- ROV-5009

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 64 / 133



# 6.7.3 OPERATION

Make sure all Antisurge parameters settings are inserted and antisurge vale is in AUTO by relevant indicator on Antisurge dashboard page:



When you ready to export gas push relevant push button on Antisurge dashboard page:



# 7 FUNCTIONAL DESCRIPTION AUXILIARY COMPONENTS

# 7.1 ELECTRICAL EQUIPMENT

### 7.1.1 AUXILIARY OIL PUMP: PMOA

It has access to the pump controls with the corresponding section of the screen page "LUBRICATING OIL TURBINE SYSTEM AND MOUTH". The graphic object is identified by the abbreviation "PMOA".



**OBJECT PMOA** 

It can be run in manual and automatic modes.

7.1.1.1 MANAGEMENT MANUAL

If one selects the "Operator" the pump can be started and stopped manually, regardless of installation conditions.



### 7.1.1.2 AUTOMATIC MANAGEMENT

If one selects the "Program" the pump is managed automatically, based on the installation conditions.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 65 / 133



AUXILI	ORY OIL PUMP		
₿	🗶 🚂 🏹	Ŋ	? 🔀
	Program	ſ	
	Enabled		
	Running		
		P (	
	Comm OK		PMOA

The following conditions cause the automatic start of the pump: • Low pressure PT\_3;

The following conditions cause the automatic pump stop:

• High pressure PT\_3;

# 7.1.1.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

Regardless of the mode "Auto" or "Manual" in the presence of an override the pump is off. For PMOA causes override are:

Open main switch: MS\_IN001\_FINE\_IN\_ALM;

AUXILIORY OIL PUMP	
📅 🎮 🚅 🎉 🏹 🧧	2 🔀
Image: Point of the second	
Stopped P T	
Comm OK	PMOA

Presence Override (Override)

# 7.1.1.4 FAULTS

The following causes may cause the non-starting the pump:

- 1. Non-activated Drawer:
  - o Display:

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 66 / 133



- Alarm "Not Start" PMOA\_ALM1\_ALM
- o Action:
  - Enable and reset the MCC drawer 4
- 2. Intervention of electrical protection:
  - o Display:
    - Alarm "Not Start" PMOA\_ALM1\_ALM
  - o Action:
    - Check the cause and reset the MCC drawer 4
- 3. API protection for Intervention:
  - o Display:
    - Alarm "Non-stop": PMOA\_ALM2\_ALM
  - o Action:
    - Check the cause and reset the MCC drawer 4
- 4. Open main switch:
  - o Display:
    - Showing override (override) on screen page
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
  - o Action:
    - Check the cause and closing the main switch
- 5. Intervention Fire detection system and gas:
  - o Display:
    - View "Trigger system for detecting fires and gas": FG\_ALM\_GEN\_ALM\_FINE\_IN\_ALM
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
    - Alarm "Not Start" PMOA\_ALM1\_ALM
  - o Action:
    - Wait until the intervention of the detection system Fire & Gas
    - Turn off main switch

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 67 / 133
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# 7.1.2 OIL PUMP RELIEF: PMOE

It has access to the pump controls with the corresponding section in the screen page "SYSTEM LUBRICATING OIL AND MOUTH TURBINE".

The corresponding graphic object is identified by the initials "PMOE."



**PMOE OBJECT** 

It can be run in manual and automatic modes.

#### 7.1.2.1 MANAGEMENT MANUAL

If you select the "Operator" mode the pump can be started and stopped manually, regardless of installation conditions.

EMERGENCY OIL PUMP
📅 🎮 🚅 🎉 🎞 🔹 😢
○ 🔒 Operator
Enabled
Stopped
P 1
Comm OK PMOE

# 7.1.2.2 AUTOMATIC MANAGEMENT

If you select the "Program" mode the pump is managed automatically, based on the installation conditions.

Code. MD-XXX-09 Rev. 0 Date 22/06/15 pg 68 / 13	Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 68 / 133
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The following conditions cause the automatic start of the pump:

• Very low pressure PT\_1;

The following conditions cause the automatic pump stop:

- NO PT\_1 low pressure;
- •

1

2

# 7.1.2.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

The PMOE pump provides no way of Override.

### 7.1.2.4 FAULTS

The following causes may cause the non-starting the pump:

- Intervention of electrical protection (HQ-DC):
  - Signalling:
    - Switch open alarm HQ-DC MS\_IN043\_FINE\_IN\_ALM
    - Alarm "Not Start" PMOE\_ALM1\_ALM
    - Action:
    - Check the cause of the intervention and close HQ-DC
- Anomaly starter CC:
  - Signalling:
    - Alarm Fault start system KF-GTH75: MS\_IN133\_FINE\_IN\_ALM
    - Alarm "Not Start" PMOE\_ALM1\_ALM
  - Action:
    - o Check the cause and reset the alarm "Fault start system KF-GTH75"
- 3 Intervention Fire detection system and gas:
  - Signalling:
    - View "Trigger system for detecting fires and gas": FG\_ALM\_GEN\_ALM\_FINE\_IN\_ALM
       Alarm "Not Start" PMOE\_ALM1\_ALM
  - Action:
    - o Wait until the intervention of the detection system Fire & Gas



# 7.1.3 OIL COOLER: EH1

It has access to the radiator controls by the relevant section in the screen page "SYSTEM LUBRICATING OIL AND MOUTH TURBINE". The corresponding graphic object is identified by the abbreviation "EH1."



EH1 OBJECT

It can be run in manual and automatic modes.

## 7.1.3.1 MANAGEMENT MANUAL

If you select the "Operator" mode, the heater can be started and stopped manually, regardless of installation conditions.

TURBINE OIL RESERVOIR EL. HEATER
🕆 🔎 🔛 🌠 🏹 🛛 🛛
o
Enabled
Stopped
<b>P I</b>
Comm OK EH1
Comm OK EH1

# 7.1.3.2 AUTOMATIC MANAGEMENT

If one selects the "Program" the radiator is handled automatically, based on the installation conditions.

|--|



TURBIN	IE OIL RESERVOIR	EL. HEATER	
	F 📫 🏽	121	
	Program	<u> </u>	
	Enabled		
	Stopped	P	
	Comm OK		EH1

The following conditions cause the automatic start of the radiator:

• Low temperature TE\_205 NOT Intervention LSL\_10;

The following conditions cause the automatic shutdown of the radiator:

• Low temperature or NO response TE\_205 LSL\_10;

# 7.1.3.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

Regardless of the mode "Auto" or "Manual" in the presence of an override control the heater is turned off. For EH1 causes override are:

- Open main switch: MS\_IN001\_FINE\_IN\_ALM;
- Very low pressure PT\_1;
- LSL\_10 response;



Presence Override (Override)

# 7.1.3.4 FAULTS

The following causes may cause the non-start of the radiator:

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 71 / 133



- 1. Non-activated Drawer:
  - Signalling:
    - Alarm "Not Start" EH1\_ALM1\_ALM
  - Action:
    - Enable and reset the MCC drawer 3
- 2. Intervention of electrical protection:
  - o Signalling:
    - Alarm "Not Start" EH1\_ALM1\_ALM
  - o Action:
    - Check the cause and reset the MCC drawer 3
- 3. API protection for Intervention:
  - o Signalling:
    - Alarm "Non-stop" EH1\_ALM2\_ALM
  - o Action:
    - Check the cause and reset the MCC drawer 3
- 4. Open main switch:
  - Signalling:
    - Showing override (override) on screen page
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
  - o Action:
    - Check the cause and closing the main switch
- 5. Intervention Fire detection system and gas:
  - Signalling:
    - Display "Trigger system for detecting fires and Gas": FG\_ALM\_GEN\_ALM\_FINE\_IN\_ALM
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
    - Alarm "Not Start" EH1\_ALM1\_ALM
  - o Action:
    - Wait until the intervention of the detection system Fire & Gas
    - Turn off main switch


# 7.1.4 EXTRACTION OF OIL FUMES: OIL STEAM EXTR

It has access to the extractor orders the corresponding section in the screen page "LUBRICATING OIL TURBINE SYSTEM AND MOUTH". The corresponding graphic object is identified by the acronym "OIL VAPOUR EXTR".



#### **OBJECT OIL EXTR VAPOEUR**

It can be operated in manual and automatic modes.

#### 7.1.4.1 MANAGEMENT MANUAL

If you select the "Operator" extractor mode can be started and stopped manually, regardless of installation conditions.

OIL VAPOR EXTRACTION	
🕆 🔑 🔛 🌋 🏹	? 🔀
• 🔒 Operator	<mark>}</mark>
Enabled	
Running	
P 1	
Comm OK	PRESS

### 7.1.4.2 AUTOMATIC MANAGEMENT

If you select the mode "Programme" extractor is handled automatically, based on the installation conditions.

	Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 73 / 133
--	-----------------	--------	---------------	-------------



OIL VAPOR EXTRACTION
🕆 🏹 🎎 💥 🖄 🔽
Program
Enabled
Running
P 1
Comm OK PRESS

The following conditions cause the automatic start of the extractor:

• Virateur running or speed of the turbine is not zero;

The following conditions cause the automatic shutdown of the extractor:

• None of the conditions that cause automatic operation;

### 7.1.4.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

Regardless of the mode "Auto" or "Manual" in the presence of an override control the extractor is turned off. For "EXTR OIL VAPOR" the causes of priority order are:

• Open main switch: MS\_IN001\_FINE\_IN\_ALM;

OIL VAPOR EXTRACTION	
者 🎮 🔛 🎉 🏹 🚺	? 🗙
Image: Override   H M   P O	<u>a</u>
Enabled	
Stopped P I	
Comm OK	PRESS

Presence Override (Override)



The following causes may cause the non-start of the extractor:

- 1. Non-activated Drawer:
  - o Signalling:
    - Alarm "Not Start" PRESS\_ALM1\_ALM
  - o Action:
    - Enable and reset the MCC drawer 11
  - 2. Intervention of electrical protection:
    - Signalling:
      - Alarm "Not Start" PRESS\_ALM1\_ALM
    - o Action:
      - Check the cause and reset the MCC drawer 11
  - 3. API protection for Intervention:
    - o Signalling:
      - Alarm "Non-stop": PRESS\_ALM1\_ALM
    - o Action:
      - Check the cause and reset the MCC drawer 11
  - 4. Main switch
  - 5. Display open:
    - o Signalling:
      - Override on screen page
      - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
    - o Action:
      - Check the cause and closing the main switch
  - 6. Intervention Fire detection system and gas:
    - Signalling:
      - View "Trigger system for detecting fires and gas": FG\_ALM\_GEN\_ALM\_FINE\_IN\_ALM
      - Alarm "open Main switch"
      - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
    - o Action:
      - Wait until the intervention of the detection system Fire & Gas
      - Turn off main switch

Code. MD-XXX-09 [Rev. 0 ] Date 22/06/15 [ pg 75 / 13	Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 75 / 133
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### 7.1.5 FAN OIL COOLER: T2AB

Fans commands you have access to the relevant section in the screen page "LUBRICATING OIL TURBINE SYSTEM AND MOUTH".

The electric fan control is performed by MCC drawer and a case containing an inverter. The graphic object is identified by the corresponding "E1" acronym for MCC drawer, and "E1 INV" to the inverter.



It can be operated in manual and automatic modes.

7.1.5.1 MANAGEMENT MANUAL OBJECT E1

If you select the "Operator" mode the fan can be started and stopped manually, regardless of installation conditions.

TURBINE OIL AIRCOOL EL FAN MOTOR
者 🎮 🔛 🎉 🎞 🔹 🔀
● <mark>● Operator</mark>
Enabled
Stowned
P 1
Comm OK

7.1.5.2 AUTOMATIC MANAGEMENT OBJECT E1

If you select the "Program" mode the fan is automatically controlled, based on the installation conditions.



TURBINE OIL AIRCOOL EL FAN MOTOR
者 🎮 🔛 🌠 🏹 🛛 🛛
Program 📑 🔒
Enabled
Stopped Definition of the second seco
Comm OK

The following condition causes the automatic start of the fan:

• ICT temperature controller output 17A of the upper threshold High Temp. matching;

🗷 E1_INVERT R_PANEL - /09STD2703_INAMENAS//					
MESIT Sundneth	REGULATEUR DE VITESSE E1				
RÉTOUR DE MARCHE	REGULATEUR DE VITE	SSE E1 ABILIT DE VA	ATION SECONDE RAMPE RIATION VITESSE		
ÉTAT DE SURCHARGE	$\bigcirc$		HE EN AVANT		
DÉFAUT	$\bigcirc$		SANS CONTRÖLE		
ALIMENTATION MOTEUR PAR REGULATEUR DE VITESSE	$\bigcirc$		NCHEMENT INTERRUPTEUR		
MARCHE DIRECTE	$\bigcirc$		IMANDE DÉMARRAGE EGULATEUR DE VITESSE		
			ANDE DÉMARRAGE TE PAR LE RESEAU		
E1_INV_SF H 47,64	р %	1_INV_SP_AOU 48,44 % 43,54 OU	T T		

The following conditions cause the automatic shutdown of the fan:

• ICT temperature controller output 17A below the threshold of low temp. matching;

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 77 / 133
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7.1.5.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

No override mode is provided.

# 7.1.5.4 MANAGEMENT MANUAL OBJECT "E1 INV"

If the "Operator" mode is selected in the graphic object "AO TO INVERTER E1" fan speed can be adjusted manually, regardless of installation conditions.

	EL - /09STD2703_INAMENA	IS//	
MESIT Sunatuch	REGULATEUR DE VIT	ESSE E1	
			AO YO INVERTER E1 4-20mA
RÉTOUR DE MARCHE		ABILITATION SECONDE RAMPE DE VARIATION VITESSE	A 20 20 20 20 20 20 20 20 20 20 20 20 20
ÉTAT DE SURCHARGE	$\circ$ $\circ$	MARCHE EN AVANT	○ 🗎 Operator
DÉFAUT	0 0	ARRÊT SANS CONTRŎLE	Enabled
ALIMENTATION MOTEUR PAR REGULATEUR DE VITESSE	•	DÉCLENCHEMENT INTERRUPTEUR	-10% _1% +1% +10%
MARCHE DIRECTE	0 0	COMMANDE DÉMARRAGE PAR REGULATEUR DE VITESSE	ļll
	$\bigcirc$	COMMANDE DÉMARRAGE DIRECTE PAR LE RESEAU	
E1_INV_SF	E1_INV_3 % 0,00 0,00	SP_AOUT 0 % 0 OUT	At Target   Max Rate of Change 2,00 2,00   Comm OK E1_INV_SP_AOUT

# 7.1.5.5 AUTOMATIC MANAGEMENT OF THE OBJECT "E1 INV"

If you select the "Operator" mode in the graphic object "AO TO INVERTER E1" fan speed tracks the value requested by the PIC 17A.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 78 / 133



	EL - /09STD2703_INAMENA	s//	
MESIT Sunatruch	REGULATEUR DE VIT	ESSE E1	
RÉTOUR DE MARCHE	REGULATEUR DE VITESSE EI	ABILITATION SECONDE RAMPE DE VARIATION VITESSE	AO TO INVERTER E1 4-20mA
ÉTAT DE SURCHARGE	0 0	MARCHE EN AVANT	
DÉFAUT	• •	ARRÊT SANS CONTRÖLE	Controlled Variable 0,00 0,00
ALIMENTATION MOTEUR PAR REGULATEUR DE VITESSE	• •	DÉCLENCHEMENT INTERRUPTEUR	-10% -1% +1% +10%
MARCHE DIRECTE	• • •	COMMANDE DÉMARRAGE PAR REGULATEUR DE VITESSE COMMANDE DÉMARRAGE	
E1_INV_SF	× E1_INV_S % 0,00	0 0UT	Image: Common Commo

# 7.1.5.6 FAULTS

The following causes may cause the non-fan start:

- 1. Non-activated Drawer:
  - o Signalling:
    - Alarm "Not Start" E1\_ALM1\_ALM
  - o Action:
    - Enable and reset the MCC drawer 1
- 2. Intervention electrical protection MCC drawer 1:
  - o Signalling:
    - Alarm "Not Start" E1\_ALM1\_ALM
  - o Action:
    - Check the cause and reset the MCC drawer 1
- 3. UPS not available Table E1:
  - o Signalling:
    - Alarm "Not Start" E1\_ALM1\_ALM
  - o Action:
    - Reset the MCC drawer 1
- 4. Intervention Table E1 electrical inverter protections:
  - o Signalling:
    - Alarm "Not Start" E1\_ALM1\_ALM
  - o Action:
    - Check cause and reset Table E1 UPS
- 5. Intervention of specific protections E1 UPS:

```
o Signalling:
```

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 79 / 133



- Display on screen page E1 INV object colored yellow
- Alarm not available Inverter: E1\_INV\_FAULT\_FINE\_IN\_ALM
- o Actions:
  - Check cause
  - Rearm E1 UPS by pressing the push button corresponding



- Feed Table E2 UPS
- 6. API protection for Intervention:
  - Signalling:
    - Alarm "Non-stop" E1\_ALM2\_ALM
  - o Action:
    - Check the cause and reset the MCC drawer 1
- 7. Open main switch:
  - Signalling:
    - Showing override (override) on screen page
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
    - o Action:
      - Check the cause and closing the main switch
- 8. Intervention Fire detection system and gas:
  - o Signalling:
    - View "Trigger system for detecting fires and gas": FG\_ALM\_GEN\_ALM\_FINE\_IN\_ALM
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
    - Alarm "Not Start" E1\_ALM1\_ALM
  - o Action:
    - Wait until the intervention of the detection system Fire & Gas
    - Turn off main switch

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 80 / 133



# 7.1.6 FAN OIL COOLER: T2BB

Fans commands you have access to the relevant section in the screen page "LUBRICATING OIL TURBINE SYSTEM AND MOUTH".

The electric fan control is performed by MCC drawer and a case containing an inverter. The graphic object is identified by the corresponding "E2" acronym for MCC drawer, and "E2 INV" to the inverter.



It can be operated in manual and automatic modes.

7.1.6.1 MANAGEMENT MANUAL OBJECT E2

If you select the "Operator" mode the fan can be started and stopped manually, regardless of installation conditions.

TURBINE AIR COOL EL FAN MOTOR	
🕈 🎮 🔛 🎇 🏹 🛛 🔽	X
• 🔒 Operator	
Enabled	
Running	
P I	
Comm OK	E2

7.1.6.2 AUTOMATIC MANAGEMENT OBJECT E2

If you select the "Program" mode the fan is automatically controlled, based on the installation conditions.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 81 / 133





The following condition causes the automatic start of the fan:

• ICT temperature controller output 17A of the upper threshold High Temp. matching;

🛃 E1_INVERT	EL - /09STD2703_IN/	MENAS/	/ 🔳 🛛
MESIT Sundach	REGULATEUR D	E VITES	SSE E1
RÉTOUR DE MARCHE	REGULATEUR DE VITE	SSE E1	BILITATION SECONDE RAMPE
ÉTAT DE SURCHARGE	$\bigcirc$	О м	ARCHE EN AVANT
DÉFAUT	$\circ$		RRÊT SANS CONTRŎLE
ALIMENTATION MOTEUR PAR REGULATEUR DE VITESSE	$\bigcirc$	O DÉ	ÉCLENCHEMENT INTERRUPTEUR
MARCHE DIRECTE	$\bigcirc$		COMMANDE DÉMARRAGE AR REGULATEUR DE VITESSE
			DMMANDE DÉMARRAGE IRECTE PAR LE RESEAU
E1_INV_SF H 47,64	р %	1_INV_SP 48,44 43,64	AOUT % OUT

The following conditions provocano automatic shutdown della fan:

• ICT temperature controller output 17A below the threshold of low temp. matching;

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 82 / 133
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7.1.6.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE) No override mode is provided.

#### 7.1.6.4 MANAGEMENT MANUAL OBJECT "E2 INV"

If the "Operator" mode is selected in the graphic object "AO TO INVERTER E1" fan speed can be adjusted manually, regardless of installation conditions.



### 7.1.6.5 AUTOMATIC MANAGEMENT OF THE OBJECT "E2 INV"

If you select the "operator" mode in the graphic object "AO TO INVERTER E1" fan speed tracks the value requested by the PIC 17A.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 83 / 133



	EL - /09STD2703_INAMENA	IS//		
MESIT Sunatuch	REGULATEUR DE VIT	ESSE E1		
RÉTOUR DE MARCHE	REGULATEUR DE VITESSE E1	ABILITATION SECONDE RAMPE DE VARIATION VITESSE	AO TO INVERTER E1 4-20mA	3
ÉTAT DE SURCHARGE	0 0	MARCHE EN AVANT	Program	
DÉFAUT	• •	ARRÊT SANS CONTRÖLE	Controlled Variable 0,00 0,00	ī
ALIMENTATION MOTEUR PAR REGULATEUR DE VITESSE	0 0	DÉCLENCHEMENT INTERRUPTEUR	-1% +1% +10%	
MARCHE DIRECTE	• •	COMMANDE DÉMARRAGE PAR REGULATEUR DE VITESSE COMMANDE DÉMARRAGE DIRECTE PAR LE RESEAU		
E1_INV_SF	> E1_INV_3 % 0,00 0,00	SP_AOUT 0 % 0 OUT	At Target   Max Rate of Change 2,00   Comm OK E1_INV_SP_AOU	JT

# 7.1.6.6 FAULTS

The following causes may cause the non-fan start:

- 1. Non-activated Drawer:
  - o Signalling:
    - Alarm "Not Start" E2\_ALM1\_ALM
  - o Action:
    - Enable and reset the MCC drawer 1
- 2. Intervention electrical protection MCC drawer 1:
  - Signalling:
    - Alarm "Not Start" E2\_ALM1\_ALM
  - o Action:
    - Check the cause and reset the MCC drawer 1
- 3. UPS not available Table E2:
  - Signalling:
    - Alarm "Not Start" E2\_ALM1\_ALM
  - o Action:
    - Reset the MCC drawer 1
- 4. Intervention Table E2 electrical inverter protections:
  - o Signalling:
    - Alarm "Not Start" E2\_ALM1\_ALM
  - o Action:
    - Check cause and reset Table E2 UPS
- 5. Intervention of specific protections UPS E2:
  - o Signalling:



- Display on screen page E2 INV object colored yellow
- Alarm not available Inverter: E2\_INV\_FAULT\_FINE\_IN\_ALM
- o Actions:
  - Check cause
  - Reset E2 UPS by pressing the push button corresponding



- Feed Table E2 UPS
- 6. API protection for Intervention:
  - Signalling:
    - Alarm "Non-stop": E2\_ALM2\_ALM
  - o Action:
    - Check the cause and reset the MCC drawer 1
- 7. Open main switch:
  - Signalling:
    - Showing override (override) on screen page
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
    - o Action:
      - Check the cause and closing the main switch
- 8. Intervention Fire detection system and gas:
  - o Signalling:
    - View "Trigger system for detecting fires and gas": FG\_ALM\_GEN\_ALM\_FINE\_IN\_ALM
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
    - Alarm "Not Start" E2\_ALM1\_ALM
  - o Action:
    - Wait until the intervention of the detection system Fire & Gas
    - Turn off main switch

Code. MD-XXX-09 Rev	v. 0	Date 22/06/15	pg 85 / 133
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# 7.1.7 TURNING GEAR: VIR

Tacking the commands you have access to the relevant section in the screen page "GEAR BOX WARDROBE." The corresponding graphic object is identified by the abbreviation "VIR."



VIR OBJECT

It can be operated in manual and automatic modes.

#### 7.1.7.1 MANAGEMENT MANUAL

If you select the "Operator" mode the understeer can be started and stopped manually, regardless of installation conditions.

TURNING GEAR	
📅 🎜 🚅 🎉 🌋 🙎	
○ 🔒 Operator	
Enabled	
Stopping	
P I	
Comm OK	VIR

#### 7.1.7.2 AUTOMATIC MANAGEMENT

If you select the "Program" mode the turning gear is handled automatically, based on the installation conditions.





The following conditions cause the automatic start of tacking:

- Very low pressure PT\_1;
- The following conditions cause the automatic shutdown of tacking:
  - NO PT\_1 low pressure;

# 7.1.7.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

VIR provides no way of Override.

7.1.7.4 FAULTS

The following causes may cause the non-start tacking:

- 1. Intervention of electrical protection (HQ-DC):
  - Signalling:
    - Switch open alarm HQ-DC MS\_IN043\_FINE\_IN\_ALM
    - Alarm "Not Start" VIR\_ALM1\_ALM
  - o Action:
    - Check the cause of the intervention and close HQ-DC
- 2. Anomaly starter CC:
  - o Signalling:

.

- Alarm Fault start system KF-GTH50: MS\_IN143\_FINE\_IN\_ALM
- Alarm "Not Start" VIR\_ALM1\_ALM
- o Action:
  - Check the cause and reset the alarm "Malfunction KF-GTH50"
- 3. Intervention Fire detection system and gas:
  - Signalling:
    - View "Trigger system for detecting fires and gas": FG\_ALM\_GEN\_ALM\_FINE\_IN\_ALM
    - Alarm "Not Start" VIR\_ALM1\_ALM
  - o Action:
    - Wait until the intervention of the detection system Fire & Gas

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 87 / 133



# 7.1.8 AIR TREATMENT SYSTEM INSTRUMENTS: DRY-COOLER

It has access to the controls of the air treatment system instruments by the relevant section in the screen page "AIR TURBINE INSTRUMENTATION". The corresponding graphic object is identified by the abbreviation "DRY".



**OBJECT DRY** 

It can only be managed manually.

#### 7.1.8.1 MANAGEMENT MANUAL

The air drying system must be started manually using the selector in the corresponding MCC drawer 15. The video interface only allows to stop the device, by using the disconnect coil: after operation the drawer must be manually reset.



#### 7.1.8.2 FAULTS

The following causes may cause the non-starting the dryer:

- 1. Non-powered equipment:
  - Signalling:
    - Feedback walk NOT present;
  - o Action:
    - Powering the device via the switch on the MCC drawer 15
- 2. Non-activated Drawer:
  - o Signalling:
    - Feedback walk NOT present;
  - o Action:
    - Activate the drawer and power the unit using the switch on the MCC drawer 15

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 88 / 133



- 3. Intervention of electrical protection:
  - Signalling:
    - Feedback walk NOT present;
  - o Action:
    - Check the cause and power the unit using the switch on the MCC drawer 15
- 4. Open main switch:
  - Signalling:
    - Feedback walk NOT present;
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
  - Action:
    - Check the cause and closing the main switch
- 5. Intervention Fire detection system and gas:
  - o Signalling:
    - View "Trigger system for detecting fires and gas": FG\_ALM\_GEN\_ALM\_FINE\_IN\_ALM
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
    - Feedback walk NOT present;
  - o Action:
    - Wait until the intervention of the detection system Fire & Gas
    - Turn off main switch

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 89 / 133
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# 7.1.9 EXTRACTION OF SAND: S-EM1

It controls access to the extractor by the corresponding section in the screen page "PAGE CONTROL TURBINE". The corresponding graphic object is identified by the initials "S-EM1".



**OBJECT S-EM1** 

It can be operated in manual and automatic modes.

### 7.1.9.1 MANAGEMENT MANUAL

If you select the "Operator" extractor mode can be started and stopped manually, regardless of installation conditions.

TURBINE AIR FILTER EXTR.FAN	
📅 🎮 🚅 🎉 🌋 🧴	2 🛛
o 🔒 Operator	<b></b>
Enabled	
k 🐓	
Stopping	
P 1	
Comm OK	S_EM1

#### 7.1.9.2 AUTOMATIC MANAGEMENT

If you select the mode "Programme" extractor is handled automatically, based on the installation conditions.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 90 / 133



TURBI	NE AIR FILTER EXTR	.FAN	
₿	🔉 🔛 🗸		? 🗙
	Program	<b>a</b>	<u>a</u>
	Enabled		
		*	
	Stopping		
		P 1	
	Comm OK		S_EM1

The following conditions cause the automatic start of the extractor:

• VIR on, or Turbine running;

- The following conditions cause the automatic shutdown of the extractor:
  - None of the conditions that cause automatic operation;

# 7.1.9.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

Regardless of the mode "Auto" or "Manual" in the presence of an override the extractor is turned off. For S-EM1 causes override are:

Open main switch: MS\_IN001\_FINE\_IN\_ALM;

TURBI	NE AIR FILTER EXTR.FAN	
	🔎 🚅 🄉 🏹	? 🔀
<u>!</u>	Override H M I P O Enabled	
	Stopped	]
	Comm OK	S_EM1

#### Presence Override (Override)

#### 7.1.9.4 FAULTS

The following causes may cause the non-start of the extractor:

1. Non-activated Drawer:

#### • Signalling:

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 91 / 133



- Alarm "Not Start" S\_EM1\_ALM1\_ALM
- o Action:
  - Enable and reset the MCC drawer 17
- 2. Intervention of electrical protection:
  - Signalling:
    - Alarm "Not Start" S\_EM1\_ALM1\_ALM
  - o Action:
    - Check the cause and reset the MCC drawer 17
- 3. API protection for Intervention:
  - Signalling:
    - Alarm "Non-stop": S\_EM1\_ALM1\_ALM
  - o Action:
    - Check the cause and reset the MCC drawer 17
- 4. Open main switch:
  - Signalling:
    - Showing override (override) on screen page
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
  - o Action:
    - Check the cause and closing the main switch
- 5. Intervention Fire detection system and gas:
  - Signalling:
    - View "Trigger system for detecting fires and gas": FG\_ALM\_GEN\_ALM\_FINE\_IN\_ALM
    - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
    - Alarm "Not Start" S\_EM1\_ALM1\_ALM
  - o Action:
    - Wait until the intervention of the detection system Fire & Gas
    - Turn off main switch

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 92 / 133
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# 7.1.10 Cleaning system (PULSE JET): SQZ1

It has access to the commands of the cleaning system (Pulse Jet) by the corresponding section in the screen page "PAGE CONTROL TURBINE". The corresponding graphic object is identified by the abbreviation "SQZ1".



It can be operated in manual and automatic modes.

#### 7.1.10.1 MANAGEMENT MANUAL

If one selects the "Operator" the cleaning system (Pulse Jet) can be started and stopped manually, regardless of installation conditions.

ALSE JET LC PANEL FEEDER STAT FB	
Home - Operator	? 🔀
o 🚊 Operator	<mark>}</mark>
Enabled	
Stopped P I	
Comm OK	SQZ1

## 7.1.10.2 AUTOMATIC MANAGEMENT

If one selects the "Program" the cleaning system (Pulse Jet) is handled automatically, based on the installation conditions.



PULSE	JET LC PANEL FEED	ER STAT FB	
	🗶 🚂 🏹	T	? 🗙
	Program	ſ	A
	Enabled		\$
		*	_
	Starting		
		P (	
	Comm OK		SQZ1

The following conditions cause the automatic start of the cleaning system:

- PDH\_32 response;
- Manual control by HSSEM\_1 local operator;

The following conditions cause the automatic shutdown of the cleaning system:

• None of the conditions that cause automatic operation;

Automatic running condition lasts until at least one cycle of the cleaning system is completed.

#### 7.1.10.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

Regardless of the mode "Auto" or "Manual" in the presence of an override the cleaning system is off. For SQZ1 causes override are:

- Open main switch: MS\_IN001\_FINE\_IN\_ALM;
- S-EM1 not running;

PULSE JET LC PANEL FEEDER STAT FB	
🚹 🎮 🚅 🎉 🏹 🧯	2 🔀
Override   H M   P O	
Enabled	
Stopped P	
Comm OK	SQZ1

#### Presence Override (Override)

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 94 / 133
		1	10



The following causes may cause the non-starting the cleaning system (Pulse Jet):

- 1. Non-activated Drawer:
  - o Signalling:
    - Alarm "Not Start" SQZ1\_ALM1\_ALM
  - o Action:
    - Enable and reset the MCC drawer 19
  - 2. Intervention of electrical protection:
    - Signalling:
      - Alarm "Not Start" SQZ1\_ALM1\_ALM
    - o Action:
      - Check the cause and reset the MCC drawer 19
  - 3. API protection for Intervention:
    - o Signalling:
      - Alarm "Non-stop": SQZ1\_ALM2\_ALM
    - o Action:
      - Check the cause and reset the MCC drawer 19
  - 4. Open main switch:
    - o Signalling:
      - Showing override (override) on screen page
      - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
    - o Action:
      - Check the cause and closing the main switch
  - 5. Intervention Fire detection system and gas:
    - o Signalling:
      - View "Trigger system for detecting fires and gas": FG\_ALM\_GEN\_ALM\_FINE\_IN\_ALM
      - Alarm "open Main switch" MS\_IN001\_FINE\_IN\_ALM
      - Alarm "Not Start" SQZ1\_ALM1\_ALM
    - o Action:
      - Wait until the intervention of the detection system Fire & Gas
      - Turn off main switch



# 7.1.11 INTERSTAGE AIR COOLER FAN EL. MOTOR

It can be operated in manual and automatic modes.

#### 7.1.11.1 MANAGEMENT MANUAL

If you select the "Operator" mode the fan can be started and stopped manually, regardless of installation conditions.

INTERSTAGE AIR COOLER	FAN EL. MOTOR
📅 🎜 🔛 🎉	23 💽 🖸
o 🔒 Operator	<b>a</b>
Enabled	J
Stopped	
	P 1
ß	
Comm OK	GEN_FAN

# 7.1.11.2 AUTOMATIC MANAGEMENT

If you select the "Program" mode the fan is automatically controlled, based on the installation conditions.

INTER	STAGE AIR COOLE		
	Stopped	P	•
	Comm OK		GEN_FAN

The following conditions cause the automatic start of the fan: Turbine ready to service;

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 96 / 133



- High threshold reached for TE\_3002;
- Low threshold reached for TE\_3002;

The following conditions cause the automatic shutdown of the fan:

• None of the conditions that cause automatic operation;

#### 7.1.11.3 FAULTS

The following causes may cause the cooler start:

- 1. Non-activated Drawer:
  - Signalling:
    - Alarm "Not Start"
  - o Action:
    - Enable and reset the MCC drawer 5
- 1. Intervention of electrical protection:
  - o Signalling:
    - Alarm "Not Start"

Action:

0

3.

Ο

- Check the cause and reset the MCC drawer 5
- 2. API protection for Intervention:
  - o Signalling:
    - Alarm "Non-stop"
  - o Action:
    - Check the cause and reset the MCC drawer 5
  - Open main switch:

•

- o Signalling:
  - Showing override (override) on screen page
  - Alarm "open Main switch"
  - Action:
    - Check the cause and closing the main switch
- 4. Intervention Fire detection system and gas:
  - Signalling:
    - View "from Trigger Fires and Gas detection system"
    - Alarm "open Main switch"
    - Alarm "Not Start"
  - o Action:
    - Wait until the intervention of the detection system Fire & Gas
    - Turn off main switch

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 97 / 133
-----------------	--------	---------------	-------------



# 7.1.12 COMPRESSOR SEAL/LUBE OIL MAIN & AUX EL. MOTOR

It can be operated in manual and automatic modes.

#### 7.1.12.1 MANAGEMENT MANUAL

If you select the "Operator" mode the pump can be started and stopped manually, regardless of installation conditions.

COMPR. SEAL/LUBE OIL N	IAIN PUMP EL. MOTOR
🕈 🕫 🔛 🎉	∑" 🔽 🔀
0 🔒 Operator	<b>a</b>
Enabled	
Stopped	
	PI
Comm OK	GEN_H1

# 7.1.12.2 AUTOMATIC MANAGEMENT

If you select the "Program" mode the pump is handled automatically, based on the installation conditions.

COMP	R. SEAL/LUBE OIL	AUX PU	MP EL	MOTOR
	ي 🔛 🍕	$\Sigma$		2 🔀
	Program	- 6	ſ	<u>a</u>
	Enabled			
	Stopped			I
		P	1	
	Comm OK	1		GEN_H1

The following conditions cause the automatic start of the pump:



- Speed > 0;
- PT\_4308 Low Low threshold
- PT\_4308 Low threshold

# 7.1.12.3 FAULTS

The following causes may cause the non-starting of the pump:

- 1. Non-activated Drawer:
  - o Signalling:
    - Alarm "Not Start"
  - o Action:
    - Enable and reset the MCC drawer 6
- 2. Intervention of electrical protection:
  - o Signalling:
    - Alarm "Not Start"
  - o Action:
    - Check the cause and reset the MCC drawer 6
- 3. API protection for Intervention:
  - Signalling:
    - Alarm "Non-stop"
  - o Action:
    - Check the cause and reset the MCC drawer 6
- 4. Open main switch:
  - Signalling:
    - Showing override (override) on screen page
    - Alarm "open Main switch"
  - o Action:
    - Check the cause and closing the main switch
- 5. Intervention Fire detection system and gas:
  - o Signalling:
    - View "from Trigger Fires and Gas detection system"
    - Alarm "open Main switch"
    - Alarm "Not Start"
  - o Action:
    - Wait until the intervention of the detection system Fire & Gas
    - Turn off main switch

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 99 / 133
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# 7.1.13 COMPRESSOR SEAL/LUBE OIL EMERGENCY EL. MOTOR

It can be operated in manual and automatic modes.

#### 7.1.13.1 MANAGEMENT MANUAL

If you select the "Operator" mode the pump can be started and stopped manually, regardless of installation conditions.

COMPR. SEAL/LUBE OIL N	IAIN PUMP EL. MOTOR
🕈 🕫 🔛 🎉	∑" 🔽 🔀
0 🔒 Operator	<b>a</b>
Enabled	
Stopped	
	PI
Comm OK	GEN_H1

# 7.1.13.2 AUTOMATIC MANAGEMENT

If you select the "Program" mode the pump is handled automatically, based on the installation conditions.

COMPR. SEAL/LUBE OIL	AUX PUMP EL.MOTOR
🕈 P 🔛 🕱	23 💽
Program	<b>e e</b>
Enabled	
Stopped	
	P 1
Comm OK	GEN_H1

The following conditions (together) cause the automatic start of the pump:

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 100 / 133
-----------------	--------	---------------	--------------



- LY\_2820 STS\_L or PT\_1\_STS\_LL;
- Not PT\_03\_L;
- PT\_4305 > 0.2

## 7.1.13.3 FAULTS

The following causes may cause the non-starting of the pump:

- 1. Non-activated Drawer:
  - o Signalling:
    - Alarm "Not Start"
  - o Action:
    - Enable and reset the MCC drawer 7
- 2. Intervention of electrical protection:
  - o Signalling:
    - Alarm "Not Start"
  - o Action:
    - Check the cause and reset the MCC drawer 7
- 3. API protection for Intervention:
  - Signalling:
    - Alarm "Non-stop"
  - o Action:
    - Check the cause and reset the MCC drawer 7
- 4. Open main switch:
  - Signalling:
    - Showing override (override) on screen page
    - Alarm "open Main switch"
  - o Action:
    - Check the cause and closing the main switch
- 5. Intervention Fire detection system and gas:
  - o Signalling:
    - View "from Trigger Fires and Gas detection system"
    - Alarm "open Main switch"
    - Alarm "Not Start"
  - o Action:
    - Wait until the intervention of the detection system Fire & Gas
    - Turn off main switch

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 101 / 133
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## 7.2.1 STOP GAS FUEL VALVE: FGV1

The valve is shown in the "GAS VALVE TURBINE POWER". Next to it we find the signs of the states of:

- ZSH-1 opening limit;
- ZSL-1 closing limit;





The valve is controlled by means of air instruments, by the use of the solenoid valve "SOV-FGV-1" which is the "AIR TURBINE INSTRUMENTATION" page.



SOV-FGV-1

### 7.2.1.1 MANAGEMENT MANUAL

Manual management of the valve is not possible

#### 7.2.1.2 AUTOMATIC MANAGEMENT

Automatic management of the valve is performed by the SOV-FGV-1.

INSTRU	JMEN	T AIR TO FGV	1	
	F	<b>1</b>	C 🏹	? 🔀
	<u></u>	Program		
		Enabled		
<b>↓</b>	CI Fransi	<mark>osing</mark> t Stall	P	
S	С	iomm Failure	•	SOV_FGV_1

Automatic opening:

• The automatic opening is described in the chapter 6.6.3.2

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 102 / 133



# 7.2.1.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

In the presence of the master control valve is closed. The causes of priority order are: Triggering non-reset

INSTRUMENT AIR TO FGV 1
者 泽 🎎 🕱 🌋 🔀
Image: Point of the second
Enabled
Transit Stall
S Comm Failure 🐓 SOV EGV 1

Presence Override (Override)

# 7.2.1.4 FAULTS

The following causes can cause erroneous operation of the valve:

1. Blown fuse:

0

- o Signalling:
  - Alarm FGV\_1\_ALM1\_ALM
  - Action:
    - Find the cause and replace the fuse
- 2. End of non-infringement opening race:
  - Signalling:

Alarm FGV\_1\_ALM1\_ALM

- o Action:
  - Check the travel of the valve and the acquisition of the limit switch
- 3. Plea of infringement closing stroke:
  - Signalling:
    - Alarm FGV\_1\_ALM1\_ALM
  - o Action:
    - Check the travel of the valve and the acquisition of the limit switch
- 4. Simultaneous reading of the closing limit switches and openness:
  - Signalling:
    - Alarm FGV\_1\_ALM1\_ALM
  - o Action:
    - Check the position of limit switches and their acquisition



# 7.2.2 PURGE VALVE FUEL GAS: FGV6

The valve is shown in the "GAS VALVE TURBINE POWER". Next to it we find the signs of the states of:

- ZSH-6 opening limit;
- ZSL-6: closing limit;





The valve is controlled by means of air instruments, the use of SOV-V2G solenoid valve, which is the "AIR TURBINE INSTRUMENTATION"



SOV-V2G

#### 7.2.2.1 MANAGEMENT MANUAL

Manual management of the valve is not possible

# 7.2.2.2 AUTOMATIC MANAGEMENT

Automatic management of the valve is performed by the SOV-V2G.



Automatic opening:

- The automatic opening is described in the chapter 6.6.3.2
- Automatic closing:
  - When triggered.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 104 / 133



7.2.2.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

In the presence of the master control valve is closed. The causes of priority order are:

• Triggering non-reset

VENT F.O.	
📅 🎜 🏹 🎉 🌋 😨	
Image: Participation Image: Participation   Image: How Participation Image: Participation	
Enabled	
P I	
<b>S Comm Failure</b> 🐓 FG	V_6

Presence Override (Override)

# 7.2.2.4 FAULTS

The following causes can cause erroneous operation of the valve:

1. Blown fuse:

0

- Signalling:
  - Alarm FGV\_6\_ALM1\_ALM
- o Action:
  - Find the cause and replace the fuse
- 2. End of non-infringement opening race:
  - o Signalling:
    - Alarm FGV\_6\_ALM1\_ALM
    - Action:
  - Check the travel of the valve and the acquisition of the limit switch
- 3. Plea of infringement closing stroke:
  - Signalling:
    - Alarm FGV\_6\_ALM1\_ALM
  - Action:
    - Check the travel of the valve and the acquisition of the limit switch
- 4. Simultaneous reading of the closing limit switches and openness:
  - o Signalling:
    - Alarm FGV\_6\_ALM1\_ALM
  - o Action:
    - Check the position of limit switches and their acquisition



# 7.2.3 ISOLATION VALVE FUEL GAS: FGV4

The valve is shown in the "GAS VALVE TURBINE POWER". On his side are the indications of the states of:

- ZSH-4: opening limit;
- ZSL-4: closing limit;



FGV4

The valve is controlled by means of air instruments, the use of SOV-V1G solenoid valve, which is the "AIR TURBINE INSTRUMENTATION"



SOV-V1G

#### 7.2.3.1 MANAGEMENT MANUAL

Manual management of the valve is not possible

#### 7.2.3.2 AUTOMATIC MANAGEMENT

Automatic management of the valve is performed by the SOV-V1G.



Automatic opening:

• The automatic opening is described in the chapter 6.6.3.2 Automatic closing:

	Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 106 / 133
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# 7.2.3.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

In the presence of the master control valve is closed. The causes of priority order are:

• Triggering non-reset



Presence Override (Override)

# 7.2.3.4 FAULTS

The following causes can cause erroneous operation of the valve:

Blown fuse:

0

• Signalling:

Alarm FGV\_4\_ALM1\_ALM

- Action:
  - Find the cause and replace the fuse
- 2. End of non-infringement opening race:
  - o Signalling:
    - Alarm FGV\_4\_ALM1\_ALM
  - o Action:
    - Check the travel of the valve and the acquisition of the limit switch
- 3. Plea of infringement closing stroke:
  - Signalling:
    - Alarm FGV\_4\_ALM1\_ALM
  - o Action:
    - Check the travel of the valve and the acquisition of the limit switch
- 4. Simultaneous reading of the closing limit switches and openness:
  - Signalling:
    - Alarm FGV\_4\_ALM1\_ALM
  - Action:
    - Check the position of limit switches and their acquisition

# 7.2.4 VALVE ANTISURGE: VBY

The valve is shown in the "AIR TURBINE INSTRUMENTATION". Next to it we find the signs of the states of: • ZSH-VBY: opening limit;

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 107 / 133





VBY

The valve is controlled by means of air instruments, by the use of the SOV-10 solenoid valve, which is on the same page.



SOV-10

# 7.2.4.1 MANAGEMENT MANUAL

Manual management of the valve is not possible

#### 7.2.4.2 AUTOMATIC MANAGEMENT

Automatic management of the valve is performed by the SOV-10.

AIR REGUL TO PILOT ANTIS AXIAL CO	
📅 🎮 🔛 🎉 🌋	? 🔀
🔒 Program	
Enabled	
Opening → ↓	
	2014 42
S Comm Failure 💱	SOV_10

#### Automatic opening:

• The automatic opening is described in the chapter 6.6.3.2 Automatic closing:

• In the absence of the opening control.

7.2.4.3 PRESENCE OF PRIORITY CONTROL (OVERRIDE)

For this valve management override is NOT intended.

#### 7.2.4.4 FAULTS

The following causes can cause erroneous operation of the valve:

- 1. Blown fuse:
  - o Signalling:

Code. MD-XXX-09 Rev. 0 Date 22/06/15 pg 108 / 133	Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 108 / 133
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- Alarm SOV\_10\_EVB\_ALM1\_ALM
- o Action:
  - Find the cause and replace the fuse
- 2. End of non-infringement opening race:
  - o Signalling:
    - Alarm SOV\_10\_EVB\_ALM1\_ALM
  - o Action:
    - Check the travel of the valve and the acquisition of the limit switch
- 3. Plea of infringement closing stroke:
  - Signalling:
    - Alarm SOV\_10\_EVB\_ALM1\_ALM
  - o Action:
    - Check the travel of the valve and the acquisition of the limit switch
- 4. Simultaneous reading of the closing limit switches and openness:
  - Signalling:
    - Alarm SOV\_10\_EVB\_ALM1\_ALM
  - o Action:
- 5. Check the position of limit switches and their acquisition

|--|



### 7.2.5 COMPRESSOR ANTISURGE VALVE

### **GENERAL FEATURES**

For each compressor speed, it's possible to determine, on the plane SUCTION FLOW -COMPRESSION RATIO, a curve that describes all compressor operating points. Each obtained Curve meets its limits on the surge point, corresponding to the maximum polytrophic head. All Surge points, defined for different speeds represent the limit line, on the left of this line (called SURGE LIMIT LINE "SLL") the compressor operates in an unstable area. The purpose of the "ANTISURGE CONTROL SYSTEM' is to avoid that the operating point "A" reaches the "SLL". To achieve this objective, it's defined, on the right of the "SLL", a Protection line where (point "B") the control system will operate opening the Antisurge valve. This line is called "SURGE CONTROL LINE" ("SCL"). The opening of the Antisurge valve Increases the suction flow moving the operating point along the speed characteristic curve, from The critical condition to the stable operating area (fig. 1).



Fig. 1

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 110 / 133



#### SYMBOLS LEGEND

N =compressor speed

- KI, K2, K3, K4 = constant
- Qs = volumetric flow
- Hp = polytrophic head
- Pd = discharge pressure
- Ps = suction pressure
- Z = compressibility factor
- $R = gas \ constant$
- T = gas absolute temperature
- n = polytrophic head exponent
- f3 = characteristic orifice constant
- hs = dp across the orifice
- J's = suction gas density
- PSA = absolute suction pressure
- PDA = absolute discharge pressure
- PSD = design suction pressure
- K = deviation margin
- S11 = surge limit line
- Scl = surge control line
- Pv = process variable (compressor operating point)

### ANTISURGE CONTROL LAW

Considering a monostage centrifugal compressor, it is possible to verify the followings relations, varing the compressor speed, for each surge point:

(1)  $Q_8 = K_1 * N$ (2)  $Hp = K_2 * N^2$ 

From (1) and (2) we obtain

(3) 
$$Hp = ZRT\left(\frac{n}{n-1}\right)\left[\frac{Pd^{\left(\frac{n-1}{n}\right)}}{Ps}-1\right]$$

(4) 
$$Hp = K_2 \left(\frac{Qs}{K_1}\right)^2$$
 where  $\frac{K_2}{(K_1)^2} = K_3 = \text{constant}$ . So:  $Hp = K_3 (Q_s)^2$ 

Code. MD-XXX-09         Rev. 0         Date 22/06/15         pg 111	Code. MD-XXX-09	Date 22/06/15 pg 111 / 133



(5) 
$$ZRT\left(\frac{n}{n-1}\right)\left[\left(\frac{P_d}{P_s}\right)^{\left(\frac{n-1}{n}\right)} - 1\right] = K_3(Q_s)^2$$

If Qs is measured through a calibrated orifice mounted on the compressor suction, we can express it related to the measured  $\Delta p$ 

$$Q_s = \beta_{\sqrt{\frac{h_s}{\gamma_s}}}$$

since 
$$\gamma_s = \frac{P_s}{RZT}$$
 the (6) becomes  $Q_s = \beta \sqrt{\frac{h_s * RZT}{P_s}}$  (7)

so we can describe the (5) as: 
$$ZRT\left(\frac{n}{n-1}\right)\left[\left(\frac{P_d}{P_s}\right)^{\left(\frac{n-1}{n}\right)} - 1\right] = K_3\beta^2 \frac{h_s ZRT}{P_s}$$

Simplifying ZRT in the expression, the obtained equation, that represents all the surge points in function of the orifice  $\Delta p$ ; we can demonstrate how the surge phenomenon is not influenced by the gas condition and composition.

(8) 
$$h_s = \frac{P_s}{K_3 \star \beta^2} \left(\frac{n}{n-1}\right) \left[ \left(\frac{P_d}{P_s}\right)^{\left(\frac{n-1}{n}\right)} - 1 \right]$$

Moreover we can demonstrate that for small compression ratios and small n variations, the terms

$$\frac{n}{n-1} \in \frac{n-1}{n} \text{ becomes roughly 1 and } \left(\frac{n}{n-1}\right) \left[\left(\frac{P_d}{P_s}\right)^{\left(\frac{n-1}{n}\right)} - 1\right] \cong \frac{P_d}{P_s} - 1 \text{ ; so the (8) becomes :}$$

$$h_s = \frac{P_s}{K_3 \star \beta^2} \left[ \frac{P_d}{P_s} - 1 \right] \text{ where } \frac{1}{K_3 \star \beta^2} = K_4 \text{ is a constant}$$

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 112 / 133



(9) 
$$h_s = P_s * K_4 * \left[\frac{P_d}{P_s} - 1\right] \implies \frac{h_s}{\left(\frac{P_d}{P_s} - 1\right) * P_s * K_4} = 1$$

The equation (9) defines the "SLL" shape, on the plane of compression ratio ( $\rho$ ) versus flow (Q), represented by a parabola which has the minimum located in  $\rho = 1$  and Q = 0, Fig 1a.



The fig. 1a represents a theoretical performance characteristic for a single stage compressor (one impeller only), while the Fig. 1b represents a typical characteristic for a multistage compressor. As we can see in the latter conditions the antisurge control line can not be realized utilizing a parabola without cutting a large zone of compressor operability.

In order to avoid this inconvenient, the Surge Control Line is calculated by a ten break lines function generator  $f\left(\frac{P_d - P_s}{P_s}\right)$  that permits to realize the SLL and consequently the relevant SCL.

The SCL will be positioned at a pre-set percentage margin (K), to the right of the first one .



Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 113 / 133



### ANTISURGE CONTROL ALGORITHM

In order to meet the described requests, the control algorithm will be developed inside the controller is the follows :

$$\frac{h_s * \frac{P_{sd}}{P_s}}{f\left(\frac{P_d - P_s}{P_s}\right)} = K^2$$

Where :

- hs = differential pressure on calibrated orifice mounted at the compressor suction (Eng. unit).
- Pd = compressor discharge pressure (eng. unit).
- **Ps** = compressor suction pressure (eng. unit).
- Psd = compressor suction pressure <u>at design conditions</u>

The controller set-point is  $K^2$ . It represents the deviation margin between "SLL" and "SCL". In the "Antisurge Control Line configuration sheet", the margin is expressed in percentage of flow. The algorithm takes in account the  $\Delta P$  measured across the flow element (indicated by "hs") that is proportional to <u>square suction flow</u> (hs =  $Q^2$ ).

The controller algorithm compensates continuously the **hs** signal according to the suction pressure variation, taking in account the suction pressure measured and comparing it with the **design suction pressure**.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 114 / 133
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The picture 2 shows the antisurge system diagram. With reference to the picture, the instruments range will be :

INSTRUMENT	MEASURED VARIABLE	RANGES
PT4200XA	SUCTION PRESSURE	0 – 300 Psig
PT4200XC	DISCHARGE PRESSURE	0 – 300 Psig
FIT4200X	ORIF. DIFFER. PRESSURE	0 – 2863 mmH2O



### COMPRESSOR

Fig. 2

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 115 / 133



### -Surge Limit Line

$$hs(sll) = \left(\frac{Qsurge}{Vol.\,flow.span@\,ref.cond.}\right)^2 Diff.press.span$$

# -Surge Control Line $hs(scl) = hs(sll) \left[ \frac{(Flow.mar. + 100)}{100} \right]^2$

### -Point R (real point)

This portion of values could be use for verify the operating point position during compressor running.

### -Point N (normal point)

Represents the compressor operating point @ performance curve reference conditions

### -FE design values

Values used for the design of flow element (data from FE calculation sheet) .

### -FE values @ refer. condition

FE design values converted to the compressor reference condition.

### -Surge value @ reference condition

Surge values expressed by volumetric suction flow and (Pd/Ps)-1 at compressor reference condition.

### -hs\_safe

Represent the antisurge controller setpoint in case of one or both pressure transmitters in fault.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 116 / 133
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### ANTISURGE CONTROLLER OPERATION

Controller Operation; Cascade PI control by direct action with the following signals:

### Inputs :

- a) Suction pressure (PS)
- b) Discharge Pressure (PD)
- c) Differential pressure on suction orifice "Suction Flow" (hs)
- d) "HIC" Antisurge valve manual opening/closing command.
- e) Safety Protection/Correction disabling.
- f) External protection (EP)
- g) "L3" (min. control speed) antisurge controller enable / disable.
- h) External Transient.
- i) PURGE command.
- j) Zero Speed.
- k) Solenoid Reset push button.
- External override controller.

### **Outputs**:

- a) Antisurge valve control signal (ASVC)
- b) Solenoid Valve Command.
- c) Transmitter Failure indication.
- d) Safety Protection/Correction disabling indication.
- e) A/S Solenoid Valve de-energize indication.
- f) A/S Controller Manual Control indication.
- g) Feedback to external override controller.

Code. MD-XXX-09 Rev. 0	Date 22/06/15	pg 117 / 133
------------------------	---------------	--------------



### a) Dead band function :

If the difference between parameter and margin is included between imposed value, the controller output does not change. This function permits to make the controller less sensitive to the noise of flow transmitter.

### b) Transient Absorption :

If the measure decreases very fast, to anticipate the controller response, the controller set point is incremented by a fixed value.

When the condition resets, the set point return to the previous value following a pre-set ramp.



### c) Safety Correction :

When the PV is lower of SLL plus 5% the antisurge controller output decreases following fixed steps in fixed time gaps until the PV goes back at a value higher than SLL plus 5%.

### d) Safety Protection :

When the PV is lower of SLL plus 2% the antisurge controller output decreases following quick opening ramp until the PV goes back at the right of the safety correction line.

### e) Rate limiter function :

It's used to avoid instability phenomenon on antisurge control introducing an output limit of variation, which can be set by the keyboard,.

### f) Safety disabling function :

Allows disabling the safety protection and safety correction functions. Password protected. A typical application of this function is the compressor surge points test, using the controller in manual mode.

### g) Manual operation override function :

Allows the automatic disabling of manual control in case PV reaches the "Safety Correction" limit.

### h) Controller Enabling/Disabling

When the controller is disabled the antisurge valve is forced to open position. Controller is generally enabled when min. control speed is reached.

### i) Purge function :

Allows the complete closing of the antisurge valve when the compressor is stopped. Password protected.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 119 / 133



## 8 SCHEDULES



### 8.1 DISPLAY HISTORICAL DATA (HISTORIAN VIEWER)

### 8.1.1 MAIN WINDOW OF THE HISTORIAN VIEWER

All functions are executed in this window (Figure 8-1)

Main Historian Viewer UserName: supervisor Level: 10	×
Main Setting Windows Change User	
	S 🗱 🗐

#### Figure 8-1

#### Open New Trend (open new trend):

Click on the push button "New Trend" (new trend) Trends to open a window and add the push button on the window bar.

### New Open Table (open new table):

"New Table" (new table) , <u>Application is not available in this project</u>.

### Open Trend RealTime (open real-time trend, only if the function is installed):

"Open RealTime Trend" . Application is not available in this project.

### Auto Point Open Search (open automatic search points):

Click on the push button "Open Point Auto Search" to open the search window automatically points (Point Auto Search).

### Historian Viewer Setting (Setting the display of historical data):

Click on the push button "Setting" to select from "User Setting" (user settings), "Function Level Setting" (function level setting) and "Database Connection Setting" (connection settings database) (Figure 8-2)



#### Figure 8-2

#### Change User (switch user):

Click on the pushbutton "Change User" to change the current user.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 121 / 133



### Application Exit (exit the application):

Click on the push-button Release Historian Viewer to exit.

### Selecting windows to open:

Any trend window or table can be selected Historian Viewer using the Windows Menu (Figure 8-3)

Main Historian Viewer UserName: supervisor Level: 10		
Main Setting	Windows	Change User
NITTO A	LUBE_C	DIL_TREND
	EVENTS	5_01
EVENTS_ Close All Windows		Il Windows



Click with the left mouse button on the name of the desired window to open.

Click with the left mouse button on "Close All Windows" (close all windows) to close all open windows.

### 8.1.2 VIEW TREND (TREND DISPLAY)

🖳 Tre	end1				🛛 🔀
Trend	View Mode				
12/31/99	00:00:00	01/02/00 06:00:00	01/04/00 12:00:00	01/06/00 18:00:00	01/09/00 00:00:00
				Plots Setting Trend	Setting
ß	0	🌒 🌗	resetX	iga 🖓	8 5
Zoom M	ode Auto Updal	te Disable X: Y:			1.

Figure 8-4

#### Add New Plots (add new plots):

Click on the push button "Insert Point" (enter point) (Figure 8-4) To open the window below that allows the user to select the data set table. (Figure 8-5).

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 122 / 133



InputPointSelection		🛛
DATA_SCAN_DETAIL	FLOAT_1 FLOAT_2 FLOAT_3 FLOAT_4 FLOAT_5 FLOAT_5 FLOAT_6 FLOAT_7 FLOAT_7 FLOAT_9 FLOAT_10 FLOAT_11 FLOAT_12 FLOAT_12 FLOAT_13 FLOAT_15 FLOAT_15 FLOAT_16 FLOAT_16 FLOAT_17 FLOAT_18 FLOAT_18 FLOAT_17 FLOAT_18 FLOAT_17 FLOAT_18 FLOAT_10 FLOAT_10 FLOAT_10 FLOAT_11 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_13 FLOAT_14 FLOAT_14 FLOAT_15 FLOAT_15 FLOAT_15 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_13 FLOAT_14 FLOAT_16 FLOAT_15 FLOAT_16 FLOAT_11 FLOAT_11 FLOAT_11 FLOAT_11 FLOAT_11 FLOAT_11 FLOAT_11 FLOAT_11 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_14 FLOAT_11 FLOAT_11 FLOAT_11 FLOAT_12 FLOAT_11 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_12 FLOAT_14 FLOAT_14 FLOAT_14 FLOAT_14 FLOAT_17 FLOAT_11 FLOAT	From Data(dd/MM/yyyy HH:mm) 23/06/2005 07:59      To Data(dd/MM/yyyy HH:mm) 23/06/2005 08:59      Black
	FLOAT_13	

Figure 8-5

Select Table Source in the first list box (listBox). In the second list box, the data points (data points) existing appear.

Select the item in the second list box (multiple selections Points allowed).

Select or délectionner the "From Data" filter (data) and "To Data" (up given).

Select the font color. (Only if the user selects only one item, the multiple points are colored randomly).

Click the acceptance push button it to draw the point.

Click on the push-button Release  $\mathfrak{A}$  to close the window.

### Plots Delete (delete points):

Click on the push-button to open the list of Points (fig.8).



Figure 8-6

Select the item in the listbox (multiple selections are allowed).

Click the acceptance push button it to delete the selected points of the trend.

Click on the push-button release 🗐 to close the window.

### 8.1.3 DISPLAY OF LEGENDS

Code. MD-XXX-09         Rev. 0         Date 22/06/15         pg 123 / 13	D-XXX-09
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A list of tracks (Plots) loaded is shown in the bottom of the trend, and allows the user to know the current path for each color, the name e the value by using the Cursor Mode (Cursor Mode).

### Zoom Mode (Zoom mode)

Click on the pushbutton "Zoom enable mode" (activate zoom mode) (Fig. 6) to zoom in on the plot area.

#### Scroll Mode (Scroll mode):

Click on the pushbutton "Scroll enable mode" (enable scroll mode) (Fig. 6) to move the display patterns on the X axis and on the Y axis

#### Cursor mode (cursor mode):

Click on the pushbutton "Cursor enable mode" (enable cursor mode) [1] (Fig. 6) to review the plot area with a cross cursor and display the value of the X axis and Y axis The slider allows the user to see the current value for each line of the trend by the display of captions (Fig.9).

### Y Axis Reset (resetting Y axis status):

Click on the push button "reset Y" (resetting state Y) reset? to resize the Y axis according to the current points range.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 124 / 133



#### Reset X Axis (resetting state X-axis):

Click on the push button "reset X" (resetting state X) reset to resize the Y axis as the selected range of time from the scroll bar.

#### ScrollBar (scroll bar):

The scroll bar resizes the axis X visibility range of 1 minute minimum up to a maximum of 3 days.

#### Trend ConFiguretion (conFiguretion of the trend)

Click with the right mouse button on the pushbutton Plots Area (plot area) to open the popup to display menu with multiple functionality.

#### **Configuring Points**



Click "Select" (select) to set the current range of the Y axis with the selected item. Click on "Visible" to enable or disable the visibility of the item selected. Click "Change Line Color" (change the line color) to set a new color for the selected item.

#### Grid conFiguretion



Figure 8-9

Check "Enable Grid" (enable grid) to enable or disable the grid line on the Path area.

Click on "Set Y Axis Grid Division" (set Y axis grid division) to select the number of divisions of the grid on the Y axis

Click on "Set X Axis Grid Division" (set X axis grid division) to select the number of divisions of the grid on the X axis

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 125 / 133





Click on "Auto Update Enable" (enable automatic updates) to activate the update in real time from the plots with the databases that do not have a maximum time limit.

Click "Only Real Plot Points" (draw only real points) to draw, for each plot, only Actual Points.

Click on "Set Line width" (adjust line width) to set the width of the line of the route.

#### **Colour Settings**





Click on "Background Color" (background color) to change the background color of the plot area.

Click on "Cursor Color" (cursor color) to change the color of the cross cursor.

#### 8.1.4 SAVE / LOAD SETTING TRACKS

This tool allows the user to record Historian Viewer in a set of selected paths with a name. The entire conFiguretion is always available for reloading.



Figure 8-12

#### Save settings

Click on the recording-button <sup>(Fig.14)</sup> to open a new dialog box in which the user can enter the name of the ConFiguretion and choose whether to share settings with other users or not (fig.15)

Code. MD-XXX-09 Rev. 0 Date 22/06/15 pg 126 / 13	Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 126 / 133
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Enter the name, choose a private or public use and click on the Accept button it to save the conFiguretion (if the conFiguretion name already exists, the Utilsiateur can overwrite or not).

Click on the push-button Release 🕺 to close the window without saving.

#### Load settings

Click on the loading pushbutton (Fig.14) to open a new dialog box in which the user can select the settings to load. (Fig.16)

UserSettingHistorian	X
User: 'supervisor' - Config Name: Lube	DATA_SCAN_DETAIL - FLOAT_2 DATA_SCAN_DETAIL - FLOAT_3 DATA_SCAN_DETAIL - FLOAT_1 DATA_SCAN_DETAIL - FLOAT_1
	✓ 🗟 🛐

Figure 8-14

Select settings in the list on the left. Users may see an expected list of saved tracks to the right.

Click the acceptance push button it to open the selected settings.

Click on the push-button deletion to delete the selected settings.

Click on the push-button Release 🗐 to close the window.

#### Save / load settings of the trend

This tool allows the recording in a Viewer Historian ConFiguretion tendency User (Grid Colors Grid Division etc.).

Trend	Setting
1	-

Figure 8-15

#### Save settings



Click on the recording-button (Fig.17) to open a new dialog box in which the user can enter the name of the ConFiguretion and choose whether to share settings with other users or not (fig.18).

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 127 / 133





#### Figure 8-16

Enter the name, choose the private or public use and click on the Accept button it to save the conFiguretion (if the conFiguretion name already exists, the user can overwrite it or not).

Click on the push-button Release 🕺 to close the window without saving.

#### LOADING SETTINGS

Click on the loading pushbutton (Fig.17) to open a new dialog box in which the user can select the settings to load.

UserSettingHistorian	
User: 'AllUser' - Config Name: Default White (default)	
	a 🗖
	· ·



Click the Default button to load the default settings of Trend Setting selected for the current user (the default settings are automatically loaded to view the trend window).

Click the acceptance push button it to open the selected settings.

Click on the push-button deletion to delete the selected settings.

Click on the push-button Release it to close the window.

8.1.4.1 CSV EXPORT TO DATA



Figure 8-18



Click on the push button "Export to CSV ..." (export to CSV) the Trend Menu (trend), enter a file name and click on the registration push button.

Exporting create a file with two columns for each route, one for the X axis and one for the Y axis The Excel software to open a CSV file with more than 65000 rows.

	Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 129 / 133
--	-----------------	--------	---------------	--------------



### VIEW TABLE (TABLES DISPLAY)

п.	able1			🛛 🔀
Table	View			
	TimeStamp	Point Name	Point Description	Point Value 🔺
•	23/06/2005 11:32:23:320	FLOAT_12	IL SECONDO FLOAT	360
	23/06/2005 11:32:23:320	FLOAT_14	IL QUARTO FLOAT	360
	23/06/2005 11:32:23:320	FLOAT_16	IL SESTO FLOAT	360
	23/06/2005 11:32:23:320	FLOAT_18	OTTAVO FLOAT	360
	23/06/2005 11:32:23:320	FLOAT_20	IL DECIMO FLOAT	360
	23/06/2005 11:32:23:310	FLOAT_20	IL DECIMO FLOAT	359
	23/06/2005 11:32:23:310	FLOAT_1	IL PRIMO FLOAT	360
	23/06/2005 11:32:23:310	FLOAT_3	IL TERZO FLOAT	360
	23/06/2005 11:32:23:310	FLOAT_5	IL QUINTO FLOAT	360
	23/06/2005 11:32:23:310	FLOAT_7	IL SETTIMO FLOAT	360
	23/06/2005 11:32:23:310	FLOAT_9	IL NONO FLOAT	360
	23/06/2005 11:32:23:300	FLOAT_7	IL SETTIMO FLOAT	359
	23/06/2005 11:32:23:300	FLOAT_9	IL NONO FLOAT	359
	23/06/2005 11:32:23:300	FLOAT_12	IL SECONDO FLOAT	359 👻
•				
	• 🔷 📿			🥪 🛛 됏

Figure 8-19

#### **OPEN TABLE OF EVENTS**

Click Table loading the pushbutton a table of configured events.

(Fig.20) to open the window below that allows the user to select data from

InputPointSelection	_ 🗆 🔀
DATA_CHANGE_REAL	From Data(dd/MM/yyyy HH:mm) 23/06/2005 10:41
	<b>To Data(dd/MM/yyyy HH:mm)</b> 23/06/2005 11:41
	Filter Point
	Filter Description
]	<ul> <li>✓</li> <li>✓</li> </ul>

#### Figure 8-20

Select the Table of Events, edit selection filter with the time limit ("From data" and "To Data"), the limit points (use '\*' as a special character).

Click the acceptance push button it to load the table with the selected limits.

Click on the push-button Release If to close the window without loading the table.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 130 / 133



### EDIT THE FILTER SELECTION

Click on the Remove pushbutton ket diatation to open the dialog box of the filter table Current Events.

Filter 💶 🗖 🔀
✓ From Data(dd/MM/yyyy HH:mm) 23/06/2005 10:34
<b>To Data(dd/MM/yyyy HH:mm)</b> 23/06/2005 11:34
☐ Filter Point (%) <tag></tag>
Filter Description (%)
✓

Figure 8-21

Edit the settings and click the accept button it to confirm the changes.

Click on the push-button Release 🕺 to close the window without editing the filter selection.

### REFRAÎCHIR TABLE OF EVENTS

Click on the pushbutton Refraîchir 💌 to reload the current table from the database.

#### Save / load settings table

This tool allows the viewer to record Historian in Table settings with a name User. All conFiguretions are always available for reloading.

Click on the recording-button (Fig.20) to open a new dialog box in which the user can enter the name of the ConFiguretion and choose whether to share settings with other users is not.

Input Text	×
InsertConfigName	
<ul> <li>Visible only for 'supervisor' User</li> </ul>	
C Visible for All Users	¥ <b>9</b>

Figure 8-22

Click on the loading pushbutton (Fig.20) to open a new dialog box in which the user can select the settings to load.

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 131 / 133
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#### Figure 8-23

Select Table Settings from the list e click the accept button it to load the selected table settings. Click on the push-button deletion to delete the selected settings. Click on the push-button Release to close the window without loading table settings.

#### Export to CSV data



Figure 8-24

Click on the push button "Export to CSV ..." (export to CSV) from the Table menu (Table), enter a file name and click on the registration push button.

The Excel does not open a CSV file with more than 65000 rows.

### **RESEARCH POINTS AUTOMATIC**

Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 132 / 133
			10



Historian Search	
Point Name Filter	
✓ From Data(dd/MM/yyyy HH:mm) 23/06/2005 10:59	□ To Data(dd/MM/yyyy HH:mm) Search! 23/06/2005 11:59
OnScan Tables	OnChange Tables
DATA_SCAN_DETAIL_FLOAT_1 DATA_SCAN_DETAIL_FLOAT_2 DATA_SCAN_DETAIL_FLOAT_3 DATA_SCAN_DETAIL_FLOAT_3 DATA_SCAN_DETAIL_FLOAT_4 DATA_SCAN_DETAIL_FLOAT_6 DATA_SCAN_DETAIL_FLOAT_6 DATA_SCAN_DETAIL_FLOAT_7 DATA_SCAN_DETAIL_FLOAT_9 DATA_SCAN_DETAIL_FLOAT_10 DATA_SCAN_DETAIL_FLOAT_11 DATA_SCAN_DETAIL_FLOAT_12 DATA_SCAN_DETAIL_FLOAT_13 DATA_SCAN_DETAIL_FLOAT_14 DATA_SCAN_DETAIL_FLOAT_15 DATA_SCAN_DETAIL_FLOAT_15 DATA_SCAN_DETAIL_FLOAT_15 DATA_SCAN_DETAIL_FLOAT_16 DATA_SCAN_DETAIL_FLOAT_17 DATA_SCAN_DETAIL_FLOAT_116 DATA_SCAN_DETAIL_FLOAT_17 DATA_SCAN_DETAIL_FLOAT_17 DATA_SCAN_DETAIL_FLOAT_17	
SHOW	SHOW

Figure 8-25

Enter the Point Name (special character '\*'), select a time range with "Data From" and "To Data", click the search-

button and wait for the result in the list boxes. (The search works only with Historian type tables. Select On Point Scan (multiple selection allowed) or On Change Table and click the "SHOW" push button for viewing.

Code. MD-XXX-09 Rev. 0 Date 22/06/15 pg 133 / 1	Code. MD-XXX-09	Rev. 0	Date 22/06/15	pg 133 / 133
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