Version 3.0

solutions for POWERTRAIN

Date 01/04/2014

Changes index

Date	Change	Comments
04.12.07	New title of document	New Release V2.3
22.03.07	Update	-
22.01.04	New Release	New Release V2.2
15.11.04	Modification of components	-
05.05.05	TL2000 blocks documentation is updated.	**SoftwareGuideBlocks_US** is added.
06.05.05	Header, Part counter page, Stacklight manager block description are added.	-
28.03.06	FPT logo is added	-
14.07.06	Use of OP7HH and PP012 has been cancelled.	-
07.06.07	Component List is updated.	
20.09.07	Update	-
14.01.14	Update for GSE	
03.02.14	Minor update.	Descriptions have been update.
01.04.14	Update for EMEA	-

Table of Contents

1 Preamble

Important

This manual is a supplement to the *FGA Engine and Transmission* specifications and it shall help the machine supplier to build its machine according to them. In any case of dispute, the *FGA Engine and Transmission* specifications shall be considered the only valid and official specifications.

Objective

The documentation specifies the deviations for the *FGA Engine and Transmission* from the Siemens standard specifications “Solution for POWERTRAIN“.

Addressee

This present documentation is meant for OEMs using SINUMERIK 840D SL, SINAMICS and SIMATIC S7.

Notes

The following notes with special meaning are used in the document:

Note

This symbol appears in this document whenever further additional facts are stated.

Important

This symbol appears in this document whenever an important issue is to be heeded.

Order data supplement

This symbol refers you to an order data supplement. The function described can only be used if the control system is used with the option specified.

Warning Notes

The following warning notes are used in the document. There are different levels of significance:

Danger

This warning note means that death, grievous bodily harm or considerable damage to property **will** occur if the respective precautions are not taken.

Warning

This warning note means that death, grievous bodily harm or considerable damage to property **may** occur if the respective precautions are not taken.

Caution

This warning note (with a hazard warning triangle) means that slight bodily harm **may** occur if the respective precautions are not taken.

Caution

This warning note (without a hazard warning triangle) means that damage to property **may** occur if the respective precautions are not taken.

Attention

This warning note means that an undesirable event or condition **may** occur if the respective notes are not heeded.

Trademarks

2 Contacts

Note

In the contacts are listed all relevant contact person and hotlines for the *FGA Engine and Transmission* project and Solutions for Powertrain TRANSLINE 2000 project.

3 Project requirements

Note

This file shows all differents inside a project to the standard of Solutions for Powertrain TRANSLINE 2000.

4 Overview

Note

This documentation provides an overview of Solutions for Powertrain TRANSLINE 2000. It includes a short description all used components of the control, drive, visualization and programming techniques.

5 Component list

Important

The **only** valid document of approved components is the **FGA_ET-CPT-ComponentList_2_0_1_EMEA .**

6 Sample Applications

Important

The application examples binding for *FGA Engine and Transmission* plants are stated in **FGA E&T-E-Controls (Controls Section)** and **FGA_ET_Project_Book_V2.0.2_EMEA** .

7 Software Guide

- ***Configuration / programming Software***

Step7

> **Important**
>
> The Software Guide structure is not a specific standard for *FGA Engine and Transmission*.
> The PLC blocks have to be programmed using Step7 LAD language.

S7 Graph

> **Important**
>
> Use of S7 Graph is not permitted.

S7 HiGraph

> **Important**
>
> Use of S7 HiGraph is not permitted.

- ***Standard blocks***

TRANSLINE 2000 Standard blocks

> **Note**
>
> TL2000 Standard blocks are described in **TRANSLINE HMI PRO sl Configuration manual .**

- ***Fault and operation messages***

DB2 Standard alarm system

> **Attention**
>
> According to specification **FGA E&T-E-Controls** for *FGA Engine and Transmission* plants use of the DB 2 as interface for alarms and messages is not permitted. All user alarms and messages are to realised via interface DB126 (*TRANSLINE HMI PRO sl Configuration manual* Chapter 5.1.5) in accordance with the groups defined in **FGA E&T-E-Controls (Chapter 4) .**
> **Detailed information is provided in specification FGA E&T-E-Controls**

- ***FGA E&T softwares***

FGA E&T Failure Log and Efficiency data

Attention

According to specification **FGA E&T-E-Controls** for *FGA Engine and Transmission* plants Failure Log and Efficiency Data programs must be installed in PCU50 by customers.
Installation programs are available in E-Business site.
Failure Log is compatible only with following configuration:

- PCU50 + HMI Advanced + HMI PRO RT
- PCU50 + HMI PRO RT

- ***FGA E&T blocks***

Note

In order to standardize the software, in addition to the standard TL2000 blocks, additional OEM blocks have also been developed which are used in the following way. These OEM blocks (**FGA_OEM_Blocks_V1_7)**, available on E-Business Site ("Service and Support" directory), are described in this Section.

Very Important

Before using these OEM blocks check table in **FGA E&T OEM S7 Blocks Projects** , available on E-Business Site ("Service and Support" directory).

FGA E&T Interconnection Block (FB155)

Note

This OEM block is described in **"FGA E&T OEM Blocks manual"** - Interconnection block section, available on E-Business Site ("Service and Support" directory).

FGA E&T Monitoring System and Workpiece Counter Block (FB154,DB13)

Note

This OEM block is described in **"FGA E&T OEM Blocks manual"**-FB154 Monitoring System and Workpiece Counter block section, available on E-Business Site ("Service and Support" directory).

The standard TL2000 PLC block FB152 must **not** be used !

FGA E&T Offline Test Block (FB160)

Note

This OEM block is described in **"FGA E&T OEM Blocks manual"**-Offline Test block section, available on E-Business Site ("Service and Support" directory).

FGA E&T Stacklight Manager (FC127)

Note

This OEM block is described in **"FGA E&T OEM Blocks manual"**-Stacklight Manager block section, available on E-Business Site ("Service and Support" directory).

FGA E&T HMI-Lite Blocks (FC69, FC160, DB160)

Note

This OEM block is described in **"FGA E&T Hmi Lite Manual"** , available on E-Business Site ("Service and Support" directory).

8 Operation Visualisation Diagnostics

- ***Machine operation***

Header information

> **Important**
>
> The *FGA Engine and Transmission* inventory number of the installation must be entered in the header's "Unit" output field.

Header on machining equipment

> **Important**
>
> Machine conditions (icon rappresentation) must be according to PT_TS_EC_HMI

Header on assembly equipment

> **Important**
>
> Machine conditions (icon rappresentation) must be according to PT_TS_EC_HMI

- ***Header components***

Operating modes

TL2000 description	Data bit in DB59	Icon	Project function
Complete machine, automatic (chaining on) - thick border	DBX86.0		☹ It is not allowed
Automatic (selected, not started)	DBX86.1		Automatic mode selected (in case of master of transfer machine: every units must be on automatic mode)
Single-step operation	DBX86.2		Single cycle
Single step	DBX86.3		Single step
Setting-up operation (unlocked)	DBX86.4		Set up mode selected
Automatic start (started)	DBX95.0		Cycle is running
Manual operation (setting-up mode locked)	DBX95.1		Manual mode selected

Plant states

TL2000 description	Data bit in DB59	Icon	Project function
Ready (no error)			Ready
Warning	DBX88.4		Warning
Logistics control	DBX93.0		☹ It is not allowed
Error - Local alarm	DBX88.2		Local alarm
Error - Alarm, complete plant	DBX88.5		☹ It is not allowed

Initial setting

TL2000 description	Data bit in DB59	Icon	Project function
Initial setting, local	DBX86.7		Home position
Tool change setting	DBX93.4		Tool change position
Transport setting	DBX95.2		☹ It is not allowed

Initial setting, complete machine	DBX88.6	☹ It is not allowed

Finished message

TL2000 description	Data bit in DB59	Icon	Project function
Finished message, local	DBX86.5		Finished work
Finished message, complete machine	DBX88.7		☹ It is not allowed

Tool change

TL2000 description	Data bit in DB59	Icon	Project function
Tool change warning	DBX93.6		Tool change warning
Tool change alarm	DBX93.3		Tool change alarm

Lamp test/Group acknowledgment

TL2000 description	Data bit in DB59	Icon	Project function
Group acknowledgment	DBX78.0		Group acknowledgment
Lamp test	DBX78.2		Lamp test

Display cycle types

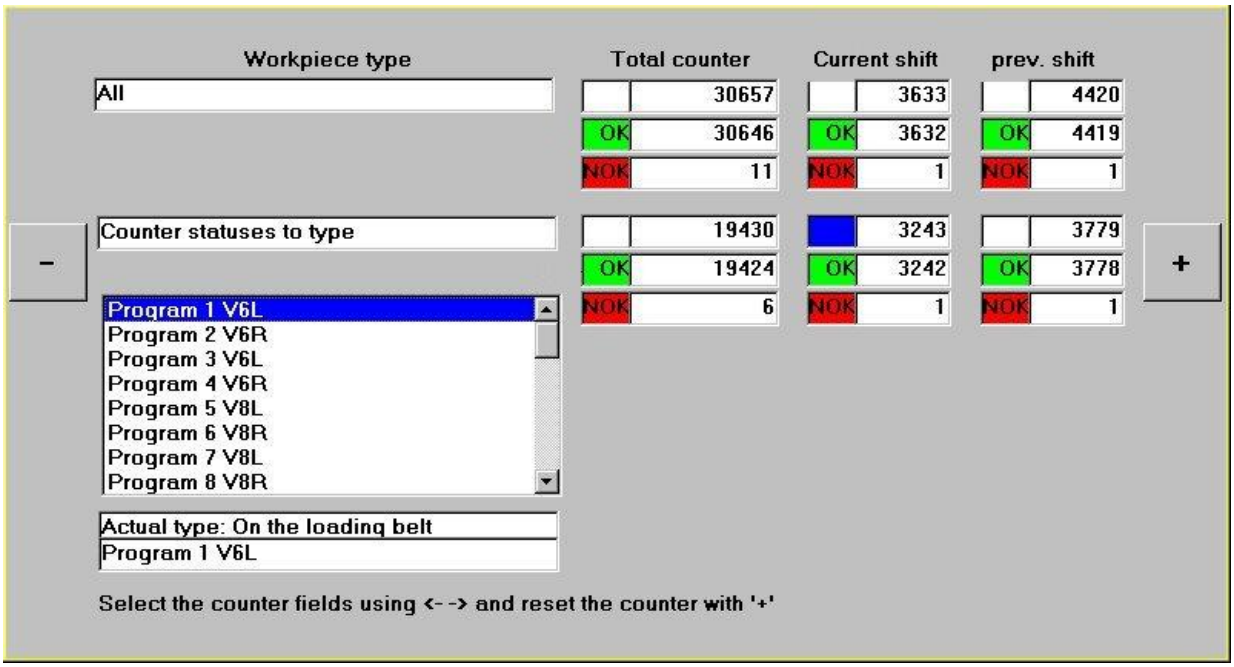
Rapresentation must be as text (binary representation is not allowed ☹).
One of the texts configured in the **Cycle types** screen is output as a language-dependent text in the header.

If several cycle types are selected, the text for the lowest-cycle is displayed.

- ***Customized page***

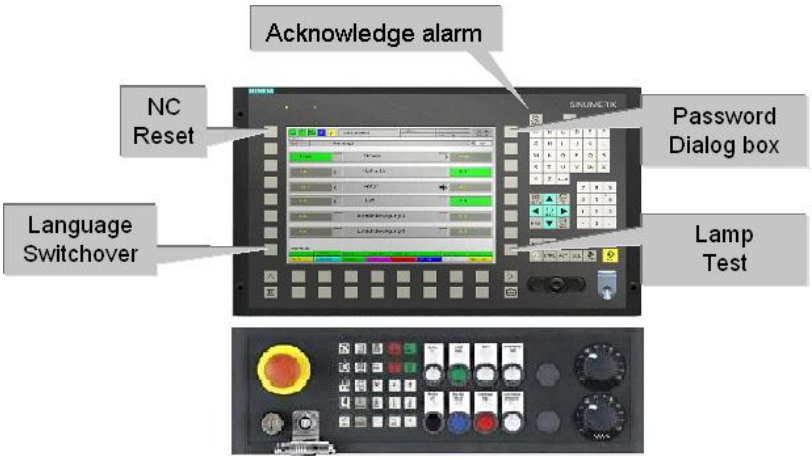
Part counter

Description texts, on part counter page, are customized.



Customization procedure and files are available on E-Business Site ("Service and Support" directory).

Function keys



Acknowledge alarm

Acknowledgement of active alarm messages must be possible via the “ALARM Acknowledgement“ system key independent of the screen displayed in front.

Of course, any hazard to humans or the machine must be ruled out!

Password Dialog box

Password Dialog box must be possible via the “Password Dialog box“ system key independent of the screen displayed in front.

You can use the Password Dialogbox to change the password level for SINUMERIK protection levels 0-3.

It is possible to display the individual and current protection levels as header graphics at the top right in the header.

If the required rights are not present for selecting a screen, performing an action or executing special functions within a screen, a password dialog box appears.

Language Switchover

Language Switchover must be possible via the “Language Switchover“ system key independent of the screen displayed in front.

It switches between Language 1 and Language 2.

Lamp Test

Lamp test must be possible via the “Lamp Test“ system key independent of the screen displayed in front.

It tests the machine lamps.

NC Reset

The top left function key must be designed as “NC Reset“. Labelling must be **by the machine manufacturer** using the “labelling strip“.

Note

The signal from the function key is sent to the PLC as direct key signal via the interface of the MPP483 and the user must evaluate it accordingly.

- ***MPP 483 Color button layout***

For the button and colour assignment it is mandatory to follow the actual version of the FGA E&T specification: FGA E&T-E-Controls.

Menu overview

Menu structure for mechanical production

> **Important**
>
> The menu structure must be according to PT_TS_EC_HMI .
> The menu structure structure is mandatory. Only pages not applicable to the machine or not supported by the operator interface can be omitted.

Menu structure for assembly production

> **Important**
>
> The menu structure must be according to PT_TS_EC_HMI .
> The menu structure structure is mandatory. Only pages not applicable to the machine or not supported by the operator interface can be omitted.

- ***Screens***

> **Important**
>
> The masks used of HMI Pro and all other function screens must as a rule be discussed and agreed with the *FGA Engine and Transmission* planning department.
> The masks must according to PT_TS_EC_HMI .

Release List of the Screens for machining equipment

Screen name	Main / Single	Station
Start conditions	X	X
Cycle types	X	X
Group selection / deselection	X	X
Special functions (Nutrunner selection / deselection)	X	X
Part Type selection	X	X
Shift model	-	-
Machine utilisation	-	-
Override	X	X
SetUp List	X	X
Layout overview	X	X
Station overview as ProToolPro template	-	-
Cycle time	X	X
Parts tracking	-	-
Parts counter	X	X
Parts overview	X	X
Part monitoring	X	X
Offline Test	X	-
Alarms, Messages	X	X
History	-	-
Alarm Analysis	X	X
ProAgent unit	-	-
Pro Agent alarm	-	-
Pro Agent detail	-	-
ASI Diagnose	-	-
Profibus Diagnostics	X	X
Moby Diagnostics	-	-
611 Universal Diagnostics	-	-
Repair	-	-
Tool life overview	-	-
TDM Tool life overview	X	X
Tool storehouse	X	X
Nutrunner values	-	-
Moby info (table)	-	-
Interconnection	X	X
TPM overview system	-	-
TPM current activities	-	-
TPM completed activities	-	-
TPM help	-	-
Archiving	-	-
Password	-	-
Operating hours (Setting data)	-	-
Internet / Acrobat Help	-	-
Safety Check-sum	O	O
Software Version	X	X

X Always use screen
O Optional screen; only use if and when required.
- Only use screen with **special approval.**

Release List of the Screens for assembly equipment

Screen name	Autom. station	Master station	Repair station
Start conditions	X	X	X
Cycle types	X	-	X
Group selection / deselection	X	-	-
Special functions (Nutrunner selection / deselection)	X	-	-
Part Type selection	X	-	X
Shift model	-	-	-
Machine utilisation	-	-	-
Override	X	-	-
SetUp List	X	X	X
Layout overview	X	X	-
Station Status as DLL	X	-	X
Cycle time	X	-	-
Parts tracking	-	-	-
Parts counter	X	-	X
Parts overview	-	-	-
Part monitoring	-	-	-
Offline Test	-	-	-
Alarms, Messages	X	X	X
History	-	-	-
Alarm Analysis	X	X	X
ProAgent unit	-	-	-
Pro Agent alarm	-	-	-
Pro Agent detail	-	-	-
ASI Diagnosi	-	-	-
Profibus Diagnostics	X	X	X
Moby Diagnostics	-	-	-
611 Universal Diagnostics	-	-	-
Repair	-	-	X
Operator Help	X	-	X
Tool life overview	-	-	-
TDM Tool life overview	-	-	-
Tool storehouse	-	-	-
Nutrunner overview	X	-	X
Moby Info (table)	X	X	X
Interconnection	X	X	-
TPM overview system	-	-	-
TPM current activities	-	-	-
TPM completed activities	-	-	-
TPM help	-	-	-
Archiving	-	-	-
Password	-	-	-
Operating hours (Setting data)	-	-	-
Internet / Acrobat Help	-	-	-
Safety Check-sum	O	-	-
Change Language	-	-	-
Software Version	X	X	X

X Always use screen
O Optional screen; only use if and when required.
- Only use screen with **special approval.**

9 Data Backup

☹!

Important

The Data Backup for *Solutions for Powertrain TRANSLINE 2000* documentation is **not** a specific standard for *FGA Engine and Transmission* project.

Note

Data Backup for *Solutions for Powertrain TRANSLINE 2000* documentation covers decentral and central data storage concepts, as well it explains the tool A&D DataManagement.

!

Important

This document has the object to determine the formats of the various files, relating to PLC/CNC/Siemens MMI software, that the machine Supplier must deliver at machine arrival at the plant.

!

Important

A CD ROM containing software data back-up shall be delivered by OEMs to FGA E&T. It shall contain:
- PLC data back up file
- CNC data back up file
- HMI data back up file
- Complete sw data back up file using Ghost

- ***General notes***

Magnetic media format for the documentation
Software must be supplied on CD-Rom.

Type of various siemens components
Siemens components, relating to this standard, are:
- PLC S7-300
- CNC 840D SL
- MMI : KP400 Comfort – TP700 Comfort – TP1200 Comfort - OP08T - OP012

- ***Software structure***

Software for plc S7-300

There are two types of architectures:

- PLC S7-300
- PLC S7-300 integrated in the 840D SL CNC

For both types, the software must be filed, as a compressed project, via the STEP 7 program version 5.2 through the software "ZIP", so that a "FILENAME.ZIP" file is generated. The FILENAME must have a mnemonic reference to the machine operation number and the relative line it belongs to; e.g.: PLC10TCI.ZIP (PLC software for operation 10 lower cylinder head). The filing of the PCU50 on hard disk must be carried out in the directory F:\DH\STEP7.DIR.
In this directory, the project S7 must not be present, but only the archive file in ZIP format.

All the functional blocks (e.g.: FC, FB, etc..) must not be of the "protected" type, or rather it must be possible to freely view them without the need of the "sources" (you must not insert, in the source functional block, the reading "know_how_protect"). If the supplier needs to protect some functional blocks, this must be agreed with the Purchaser and however you must always supply the printout of the block itself.

Software for CNC 840D

The files for these components must be obtained through the archive function of the software "HMI-Advanced" phase "Series start-up", so that files type " FILENAME.ARC" are obtained. The FILENAME must have a mnemonic reference to the machine operation number and the relative line it belongs to; e.g.: NC10TCI.ARC (NC for OP 10 lower cylinder head). This ".ARC " type file allows filing of:

- part-programs
- machine data
- drives data
- tool data

In the case the machine is equipped with OP012, it is also necessary to file the configuration data of the MMI in a "MMI10TCI.ARC" file (MMI for OP 10 lower cylinder head). This file will contain all the monitor setting data.
The filing of the PCU50 on hard disk must be carried out in the directory F:\DH\ARC.DIR

HMI Software generated by the machine manufacturer

This software contains the various files of the texts, personalised by the machine manufacturer, in case he uses a type OP012 MMI with HMI-Advanced + TL2000 HMI PRO.
The filing of the PCU50 on hard disk must be carried out in the directory F:\DH\HMIWINPRO.DIR.
E.g.:

```
TST10TCI          (directory name – texts for op10 lower cylinder head)
├->sk_it.txt      (name of the various files)
├-> file.dat             "     "
├-> file.ini              "     "
├-> etc….                 "     "
```

This structure is necessary in order to allow the re-loading, in a MMI with Win-NT HMI-Advanced + TL2000 HMI PRO, of the various texts through the HMI PRO CS program.

Software KP400 Comfort – TP700 Comfort – TP1200 Comfort

This software must be generated with the program *TIA WinCC V12*. The files must have a "FILENAME.HMI" e.g.: OP101TCI.HMI (software OP for operation 10 unit 1 lower cylinder head).

- ***Data backup tools***

The data backup procedure itself is carried-out using the appropriate engineering tools provided by the manufacturers of the devices. When using the tool, the ability to save data on the appropriate backup media is integrated in the tool itself, It goes without saying that the tools utilize the actual operating system mechanisms and their properties.

Data backup using Ghost®

PCU50 have hard disks which are subject to a certain wear.
This means that it is absolutely necessary to have an effective hard disk backup routine in place.

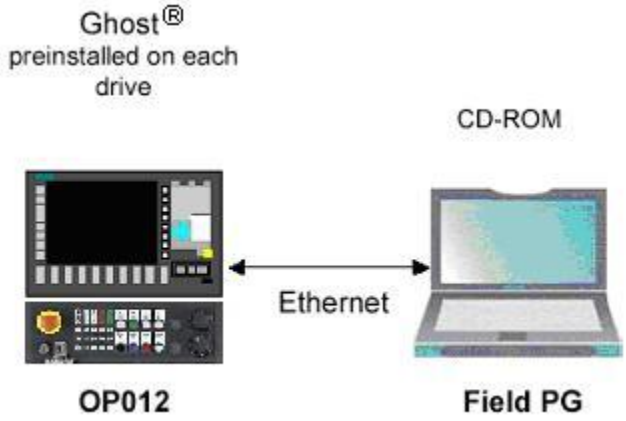
Using Ghost®

A hard disk in the system is defective and must be replaced. In this particular case, the hard disk can be restored using the installation file. The time required is immense.
In this case, the solution is to generate an image file of the hard disk before it becomes defective. After a hard disk has been replaced, this image can be quickly and simply downloaded. This means that the system is up and running in the shortest time.
In this case, the tool required is the backup software Norton Ghost®.

Norton Ghost® functions

Backup
Complete hard disks/partitions can be written in compressed image files (an image file is the physical image of a hard disk, its files and directory structures).
Restore
These image files can also be downloaded onto hard disks. In this case, image files can be downloaded to non-partitioned or non-formatted hard disks ("formats on the fly"). The new target hard disk can even be bigger or smaller than the original one (as long as the data quantity is not too high). This means that images are subsequently independent of larger replacement hard disks.

Backing-up a hard disk using Norton Ghost®



For backup and restore, a backup computer is connected to the PC via the Ethernet interface.
Ghost® is installed as standard on all PCU hard disks and is also entered in the standard service menu.
The Ghost® is started here using the appropriate menu items. Data backup or restore runs without

having to do anything else. If the server menu extension still does not exist, then the Ghost® can be manually supplied with the required parameters or via the command line.
The image files must be saved on CD-ROM.
The image file name must have a mnemonic reference to the machine operation number and the relative line it belongs to; e.g.: 10TCI.GHO (NC for OP 10 lower cylinder head).

10 Safety Integrated

Important

According to Component List design of the machines in accordance with “Safety Integrated SP1 and SP2“ is allowed.

11 Motion Control Information System

☹!

Important

This documentation is **not** a specific standard for *FGA Engine and Transmission* project.

Note

This document provides a overview of the MCIS modules at Solution for Powertrain TRANSLINE 2000.

It includes description for packages of Production Data Management, NC-Program Management, Tool Management, Maintenance Management as well as Service Management.

Valid only in combination with HMI Advanced 7.x.

Note

This document provides a overview of the Sinumerik Integrate TRANSLINE 2000.

It includes description for packages of Create-it! , Lock-it! , Run-it! , Manage-it! , Access-it! , Analyze-it! .

Valid only in combination with Sinumerik Operate.

12 IT-Configuration

☹!

Important

This documentation is **not** a specific standard for *FGA Engine and Transmission* project.

Note

This manual explains the IT-Configuration at Solutions for Powertrain TRANSLINE 2000. It covers as well the general concept of networking the production range (structure and hardware components), as well diagnostic (network management) and security.

- ***Networks***

!

Important

Coordination of the software and hardware components for an Ethernet connection are the OEMs responsibility and shall be carried out with the respective planning departments of *FGA Engine and Transmission***.**

As a rule, the machine manufacturer must ensure that machine-internal communication based on an Ethernet network doesn't affect the workshop hall network. Appropriate measures must be discussed and agreed with the planning departments of *FGA Engine and Transmission*.

Note

For further information see FGA E&T-E-Controls .

13 Appendix

Note

The appendix includes additional documents inside Solutions for Powertrain TRANSLINE 2000 projects.