TeSys DFB Offer V2 for PL7

User Manual

09/2009

1672600

www.schneider-electric.com

Schneider Electric

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

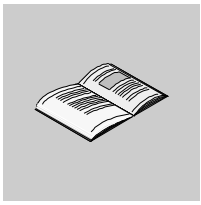
All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

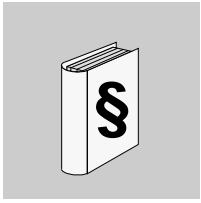
Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Table of Contents



Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

CAUTION

CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** equipment damage.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved.

BEFORE YOU BEGIN

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠ WARNING

UNGUARDED MACHINERY CAN CAUSE SERIOUS INJURY

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only the user can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine; therefore, only the user can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, the user should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

START-UP AND TEST

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

⚠ CAUTION

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in injury or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and grounds, except those grounds installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

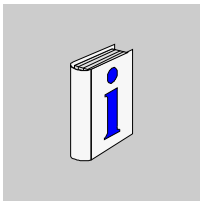
- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove ground from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

OPERATION AND ADJUSTMENTS

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Book



At a Glance

Document Scope

This manual describes the DFB (Derived Function Block) offer dedicated to TeSys D contactors protected with GV circuit breakers, TeSys U starter-controllers, and TeSys T motor management systems.

It is intended for design engineers and system integrators who have a good knowledge of PL7 PLC programming platforms.

The purposes of this manual are to
- describe the scope of the DFB offer and platform compatibility,
- describe the DFB characteristics and the download procedure from the Schneider Electric website,
- explain how to implement the DFB in the PLC application.

Validity Note

The TeSys DFB offer V2 is compatible and usable with the following versions of PL7:
- PL7 Junior version 4.0 minimum
- PL7 Pro version 4.0 minimum

This manual describes all versions of the TeSys DFB offer. The following table describes the differences between versions 1 and 2 of the TeSys DFB offer:

Version	Date	Evolution
V1	09/2008	Initial version
V2	07/2009	Addition of 6 new DFBs for parallel connection: ● lo_lu9g02_d_dir ● lo_lu9g02_d_rev ● lo_epi2145_d_dir ● lo_epi2145_d_rev ● lo_lu9g02_u ● lo_epi2145_u

Related Documents

Title of Documentation	Reference Number
TeSys U LUCM and LUCMT Multifunction Control Unit User Manual	1743237
TeSys U Communication Variables User Manual	1744082
TeSys U LULC032-033 Modbus Communication Module User Manual	1743234
TeSys U LULC15 Advantys STB Communication Module User Manual	1744083
TeSys U LULC08 CANopen Communication Module User Manual	1744084
TeSys U LULC07 Profibus DP Communication Module User Manual	1672610
TeSys T LTM R Modbus Motor Management Controller User Manual	1639501
TeSys T LTM R Profibus Motor Management Controller User Manual	1639502
TeSys T LTM R CANopen Motor Management Controller User Manual	1639503
TeSys T LTM R Modbus/TCP Motor Management Controller User Manual	1639505
LAD9AP3•• Quickfit Instruction Sheet	1568984
LUFC00 Parallel Wiring Module Instruction Sheet	1743239
LU9G02 Splitter Box Instruction Sheet	1638822
LU9G03 Splitter Box Instruction Sheet	AAV90641
TeSys DFB Offer for Unity Pro User Manual	1672609

You can download these technical publications and other technical information from our website at www.schneider-electric.com.

User Comments

We welcome your comments about this document. You can reach us by e-mail at techcomm@schneider-electric.com.

Introduction

1

Introduction

This chapter gives an overview of the TeSys D, TeSys U and TeSys T DFB (Derived Function Block) offer, presents the DFB offer download procedure from the Schneider Electric website, and describes the sequencing system used to synchronize the treatment between DFBs.

What's in this Chapter?

This chapter contains the following topics:

Presentation

Aim of the TeSys DFB Offer

The TeSys DFB offer has been developed to simplify and optimize the integration of TeSys D contactors associated with GV circuit breakers,TeSys U starter-controllers and TeSys T motor management systems in PLC applications, for both PLC programmers and end users.

Advantages for the PLC Programmer

The TeSys DFB offer enables the PLC programmer to

- simplify the program design: the program is split by functions (control, command, data treatment,...),
- optimize the programming time: the DFB is tested and can be re-used for different applications,
- increase the program understanding: the applications are coded in the same way using the common DFB,
- optimize the program size: the same code is used for each DFB instantiation,
- simplify the TeSys U and TeSys T integration: the data mapping management is masked.

Advantages for the End User

The TeSys DFB offer enables the end user to

- optimize the communication response time:
  - the Modbus requests management is optimized,
  - the data exchange management is optimized,
  - the product performance is taken into account,
- have a functional view of the motor-starter by providing direct access to common functions (Ready, Fault, Alarm, Run, Stop,...),
- group data related to a specific application (diagnostic, maintenance, measurement,...) through a program number,
- facilitate debugging: all variables used by the DFB are identified on its interface.

PLC Platform Compliance

The TeSys DFB offer can be integrated in the following programming platforms:

- the PL7 programming platform with Premium PLC platforms
- the Unity Pro programming platform with Quantum, Premium and M340 PLC platforms

This manual describes only DFBs relevant for the PL7 programming platform. For more information regarding DFBs for the Unity Pro programming platform, see the *TeSys DFB Offer for Unity Pro User Manual*.

TeSys Compliance

The TeSys DFB offer is compliant with:

- TeSys D contactors with spring terminal up to 65 A associated with GV circuit breakers and connected in parallel through TeSys Quickfit cabling system,
- TeSys U starter-controllers (up to 32 A/15 kW or 20 hp),
- TeSys T motor management system.

Parallel Connection and Communication Protocol Compliance

The following table describes the TeSys DFB offer compliance with parallel connection and communication protocols and the corresponding TeSys D, TeSys U, and TeSys T assemblies.

Connection/Protocol	TeSys D	TeSys U	TeSys T
Parallel connection to Premium PLCs	TeSys D contactors with spring terminal up to 65 A associated with GV circuit breakers and Quickfit cabling system	Starter-controller (up to 12 A/5.5 kW or 7 hp) with LUFC00 parallel wiring module	–
Modbus SL (Serial Line)	–	Starter-controller (up to 32 A/15 kW or 20 hp) with LULC033 Modbus communication module	LTMR••M•• Modbus SL controller with or without the LTM E expansion module
Modbus/TCP	–	Starter-controller (up to 32 A/15 kW or 20 hp) with LULC033 Modbus communication module and Ethernet gateway (TeSysPort, TSXETG100, TSXETG1000,...)	LTMR••E•• Modbus/TCP controller with or without the LTM E expansion module
Profibus DP	–	Starter-controller (up to 32 A/15 kW or 20 hp) with LULC07 Profibus DP communication module	LTMR••P•• Profibus DP controller with or without the LTM E expansion module
CANopen	–	Starter-controller (up to 32 A/15 kW or 20 hp) with LULC08 CANopen communication module	LTMR••C•• CANopen controller with or without the LTM E expansion module
Advantys STB with communication module	–	Starter-controller (up to 32 A/15 kW or 20 hp) with LULC15 Advantys STB communication module	–
Advantys STB with parallel connection	TeSys D contactors with spring terminal up to 65 A associated with GV circuit breakers and Quickfit cabling system	Starter-controller (up to 12 A/5.5 kW or 7 hp) with LUFC00 parallel wiring module	–

TeSys DFB Offer Overview

TeSys DFB Offer Organization

The following table lists the TeSys DFB offer according to the communication protocol and service and their availability according to the TeSys model:

Communication Protocol/Service	DFB Name	TeSys D	TeSys U	TeSys T
Parallel Connection	Io_lu9g02_d_dir	√	–	–
	Io_lu9g02_d_rev	√	–	–
	Io_epi2145_d_dir	√	–	–
	Io_epi2145_d_rev	√	–	–
	Io_lu9g02_u	–	√	–
	Io_epi2145_u	–	√	–
Modbus SL	Ctrl_cmd_mdb_u	–	√	–
	Comm_manager_u	–	√	–
	Ctrl_cmd_mdb_t	–	–	√
	Comm_manager_t	–	–	√
Modbus SL and Modbus/TCP	Custom_mdb	–	√	√
	Special_mdb_u	–	√	–
	Special_mdb_t	–	–	√
Profibus DP	Ctrl_pfb_u_ms	–	√	–
	Ctrl_pfb_u_mms	–	√	–
	Ctrl_pfb_t_mms	–	–	√
Cyclic control/command (Modbus/TCP (IO scanning), CANopen, and Advantys STB)	Ctrl_cmd_u (Modbus/TCP (IO scanning), CANopen, and Advantys STB)	–	√	–
	Ctrl_cmd_t (Modbus/TCP (IO scanning) and CANopen)	–	–	√
PKW	Special_pkw_u	–	√	–
	Special_pkw_t	–	–	√
	Custom_pkw	–	√	√
Treatment	Timestamp	–	√	–
	Scale	–	√	–

Parallel Connection DFB Offer

The following table describes the parallel connection DFB offer:

DFB	Description	For More Information
Io_lu9g02_d_dir	This DFB is dedicated to the control and command by bits of up to 8 direct motor starters built with TeSys D contactors associated with GV circuit breakers connected in parallel with the Quickfit cabling system to a Premium PLC I/O module TSXDMY28FK via a LU9G02 splitter box. This DFB can also be used in case of a combination of direct starters and reversing starters.	*Io_lu9g02_d_dir: TeSys D Parallel Control/Command Direct Through LU9G02 Splitter Box, page 24*
Io_lu9g02_d_rev	This DFB is dedicated to the control and command by bits of up to 4 reversing motor starters built with TeSys D contactors associated with GV circuit breakers connected in parallel with the Quickfit cabling system to a Premium PLC I/O module TSXDMY28FK via a LU9G02 splitter box.	*Io_lu9g02_d_rev: TeSys D Parallel Control/Command Reversing Through LU9G02 Splitter Box, page 27*
Io_epi2145_d_dir	This DFB is dedicated to the control and command by bits of up to 4 direct motor starters built with TeSys D contactors associated with GV circuit breakers connected in parallel with the Quickfit cabling system to an Advantys STB island via a STBEPI2145 splitter box. This DFB can also be used in case of a combination of 2 direct starters and 1 reversing starter.	*Io_epi2145_d_dir: TeSys D Parallel Control/Command Direct Through STBEPI2145 Splitter Box, page 30*
Io_epi2145_d_rev	This DFB is dedicated to the control and command by bits of up to 2 reversing motor starters built with TeSys D contactors associated with GV circuit breakers connected in parallel with the Quickfit cabling system to an Advantys STB island via a STBEPI2145 splitter box.	*Io_epi2145_d_rev: TeSys D Parallel Control/Command Reversing Through STBEPI2145 Splitter Box, page 34*
Io_lu9g02_u	This DFB is dedicated to the control and command of up to 8 TeSys U motor starter-controllers connected in parallel with the LUFC00 parallel wiring module to a Premium PLC via the LU9G02 splitter box. The first 4 starter-controllers can work as inverters in 2 directions, the last 4 starter-controllers works only in one direction. Ready and Running status information are available for the 8 starter-controllers.	*Io_lu9g02_u: TeSys U Parallel Control/Command Through LU9G02 Splitter Box, page 37*
Io_epi2145_u	This DFB is dedicated to the control and command of up to 4 TeSys U motor starter-controllers connected in parallel with the LUFC00 parallel wiring module to an Advantys STB island via a STBEPI2145 splitter box. The 4 starter-controllers can work as inverters in 2 directions, Ready and Running status information are available for the 4 starter-controllers.	*Io_epi2145_u: TeSys U Parallel Control/Command Through STBEPI2145 Splitter Box, page 40*

Modbus SL DFB Offer

The following table describes the Modbus SL (Serial Line) DFB offer:

DFB	Description	For More Information
Ctrl_cmd_mdb_u	This DFB is dedicated to the control and command of a single TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with any control unit and a LULC033 Modbus communication module. This DFB enables the user to ● read status register 455, ● write command register 704, ● reset communication loss warning (register 703, bit 3). The program number enables the user to select bit or word control.	*Ctrl_cmd_mdb_u : TeSys U Control/Command for Modbus SL, page 46*
Comm_manager_u	This DFB is dedicated to the control and command of up to 31 TeSys U starter-controllers (up to 32 A/15 kW or 20 hp) with any control unit and a LULC033 Modbus communication module. It must be associated with the Ctrl_cmd_mdb_u DFBs to manage the Modbus requests sequencing. It enables the user to ● optimize the response time by taking into account the response time of the devices, ● send write requests only when necessary, ● manage the disconnection and reconnection of a TeSys U Modbus slave. The program number enables the user to select different Modbus request sequences.	*Comm_manager_u: TeSys U Communication Management for Modbus SL, page 50*
Ctrl_cmd_mdb_t	This DFB is dedicated to the control and command of a single TeSys T LTMR••M•• Modbus SL controller with or without the LTM E expansion module. This DFB enables the user to ● read status registers 455 and 456, ● write command register 704. The program number enables the user to select bit or word control.	*Ctrl_cmd_mdb_t : TeSys T Control/Command for Modbus SL, page 54*
Comm_manager_t	This DFB is dedicated to the control and command of several TeSys T LTMR••M•• Modbus SL controllers with or without the LTM E expansion module. It must be associated with the Ctrl_cmd_mdb_t DFBs to manage the Modbus requests sequencing. It enables the user to ● optimize the response time by taking into account the response time of the devices, ● send write requests only when necessary, ● manage the disconnection and reconnection of a TeSys U Modbus slave. The program number enables the user to select different Modbus requests sequences.	*Comm_manager_t: TeSys T Communication Management for Modbus SL, page 58*

Modbus SL and Modbus/TCP Offer

The following table describes the Modbus SL and Modbus/TCP offer:

DFB	Description	For More Information
Special_mdb_u	This DFB is dedicated to the reading of up to 16 predefined registers (diagnostic, maintenance, measurement,...) of a TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with a LUCM multifunction control unit and a LULC033 Modbus communication module. The program number enables the user to select the predefined registers.	*Special_mdb_u : TeSys U DFB for Modbus SL and Modbus/TCP, page 64*
Special_mdb_t	This DFB is dedicated to the reading of up to 16 predefined registers (diagnostic, maintenance, measurement,...) of a TeSys T Modbus SL controller or TeSys T Modbus/TCP controller with or without the LTM E expansion module. The program number enables the user to select the predefined registers.	*Special_mdb_t : TeSys T DFB for Modbus SL and Modbus/TCP, page 70*
Custom_mdb	This DFB is dedicated to the reading of up to 5 sets of registers in one single TeSys device. A set of registers is defined by the address of the first register to read and the length of the set (up to 16 registers per set).	*Custom_mdb : Custom Read DFB for Modbus SL and Modbus/TCP, page 82*

Profibus DP DFB Offer

The following table describes the Profibus DP DFB offer:

DFB	Description	For More Information
Ctrl_pfb_u_ms	This DFB is dedicated to the control and command of a single TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with any control unit and a LULC07 Profibus communication module using the Motor Starter profile.	*Ctrl_pfb_u_ms: TeSys U Control/Command for Profibus DP MS, page 86*
Ctrl_pfb_u_mms	This DFB is dedicated to the control and command of a single TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with a LUCM multifunction control unit and a LULC07 Profibus DP communication module using the Motor Management Starter profile.	*Ctrl_pfb_u_mms: TeSys U Control/Command for Profibus DP MMS, page 88*
Ctrl_pfb_t_ms	This DFB is dedicated to the control and command of a single TeSys T LTMR••P•• Profibus controller with or without the LTM E expansion module.	*Ctrl_pfb_t_mms: TeSys T Control/Command for Profibus DP MMS, page 90*

Cyclic Control/Command DFB Offer

The following table describes the cyclic control/command (Modbus/TCP (IO scanning), CANopen, and Advantys STB) DFB offer:

DFB	Description	For More Information
Ctrl_cmd_u	This DFB is dedicated to the control and command of a single TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with any control unit and a LULC08 CANopen, a LULC15 STB communication module, or a LULC033 Modbus communication module with an Ethernet gateway.	*Ctrl_cmd_u: TeSys U Cyclic Control/Command, page 94*
Ctrl_cmd_t	This DFB is dedicated to the control and command of a single TeSys T LTMR••C•• CANopen controller or a TeSys T LTMR••E•• Modbus/TCP controller, with or without the LTM E expansion module.	*Ctrl_cmd_t: TeSys T Cyclic Control/Command, page 96*

PKW DFB Offer

The following table describes the PKW DFB offer:

DFB	Description	For More Information
Special_pkw_u	This DFB is dedicated to the reading of up to 16 predefined registers (diagnostic, maintenance, measurement,...) of a single TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with a LUCM multifunction control unit and one of the following communication modules that support PKW exchanges: • LULC07 (Profibus) • LULC08 (CANopen) • LULC15 (Advantys STB) The program number enables the user to select the predefined registers.	*Special_pkw_u: TeSys U DFB for PKW Exchanges, page 100*
Special_pkw_t	This DFB is dedicated to the reading of up to 16 predefined registers (diagnostic, maintenance, measurement,...) of a single TeSys T LTMR••P•• Profibus controller or a LTMR••C•• CANopen controller with or without the LTM E expansion module. The program number enables the user to select the predefined registers.	*Special_pkw_t: TeSys T DFB for PKW Exchanges, page 106*
Custom_pkw	This DFB is dedicated to the reading of up to 5 sets of registers of a single TeSys device supporting PKW exchanges. A set of registers is defined by the address of the first register to read and the length of the set (up to 16 registers per set).	*Custom_pkw: Custom Read DFB for PKW Exchanges, page 119*

Treatment DFB Offer

The following table describes the treatment DFB offer:

DFB	Description	For More Information
Scale	This DFB is dedicated to the conversion of current measurement unit from relative value (% FLC) to Amps for a TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with a LUCM multifunction control unit. It also enables the user to select another unit in the A...mA range.	*Scale: TeSys U DFB for Measurement Unit Conversion, page 124*
Timestamp	This DFB is dedicated to the time-stamping of up to 8 input registers of a TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with a LUCM multifunction control unit. It provides an output table of the 8 time-stamped registers and 4 date and time registers.	*Timestamp : TeSys U DFB for Data Time-Stamping, page 127*

TeSys DFB Offer Download

Download Procedure

The following table describes the steps to follow to download the TeSys DFB offer from the www.schneider-electric.com website:

Step	Action
1	Open the Schneider Electric website: www.schneider-electric.com.
2	Click Products and Services, and then click Automation and Control.
3	In the Downloads section of the left menu bar, click Current offers.
4	• In the Choose a function drop-down list, select Motor Control. • In the Choose a range drop-down list, select TeSys U. • In the Choose a type of document drop-down list, select Software/Firmware. Click >Find
5	Select TeSys DFB offer package V2 and download the zip file.
6	Extract the TeSys PL7 DFB offer package V2.zip file content to a single directory on your hard disk. The following directories will be created on your hard disk:  • Each folder contains the corresponding derived function blocks (DFBs). • For more information regarding the implementation of a DFB with the PL7 programming platform, see the *PL7 User Manual*.

TeSys DFB Sequencing

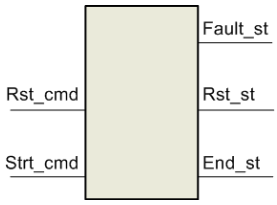
Introduction

Some of the TeSys DFBs use a sequencing system using dedicated inputs and outputs that enable the sequencing and the synchronization of the treatment between DFBs.

The following derived function blocks use a sequencing system:
- Ctrl_cmd_mdb_u
- Ctrl_cmd_mdb_t
- Special_mdb_u
- Special_mdb_t
- Custom_mdb
- Special_pkw_u
- Special_pkw_t
- Custom_pkw
- Timestamp

Sequencing System Principle

The sequencer has 2 boolean inputs and 3 boolean outputs:



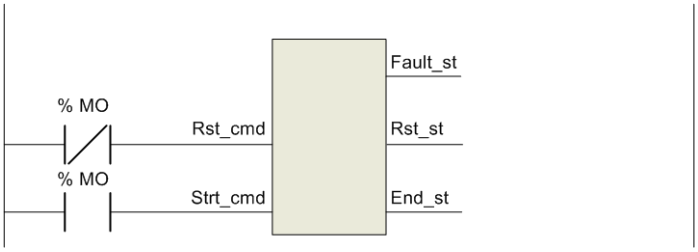
- The **_cmd** suffix indicates a command dedicated to the DFB sequencer function.
- The **_st** suffix indicates a status information concerning the DFB sequencer function.

The following table describes the sequencer inputs and outputs:

Input/Output	Description
Rst_cmd	This command resets the DFB and/or restarts the DFB treatment if Strt_cmd is set to 1.
Strt_cmd	This command starts the DFB treatment.
Fault_st	This status bit indicates ● a parameterization error (value out of range), ● a communication fault. If a fault occurs, the applicative boolean outputs are reset to 0, and the output words are forced to –1.
Rst_st	This status bit indicates ● a reset in progress, ● a treatment in progress.
End_st	This status bit indicates the end of the DFB treatment.

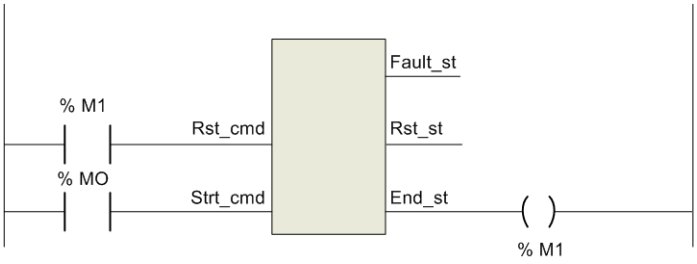
Stand-Alone with Manual Restart

In the stand-alone with manual restart configuration, the DFB is not linked to another DFB and it is activated each time %M0 is set to 1:



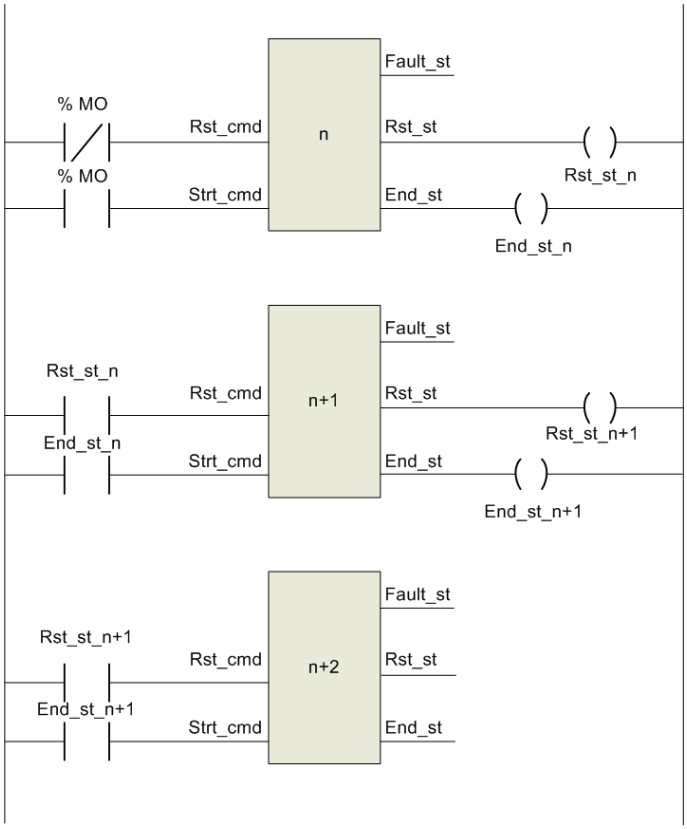
Stand-Alone with Automatic Restart

In the stand-alone with automatic restart configuration, the DFB is not linked to another DFB and it is activated continuously when %M0 is set to 1:



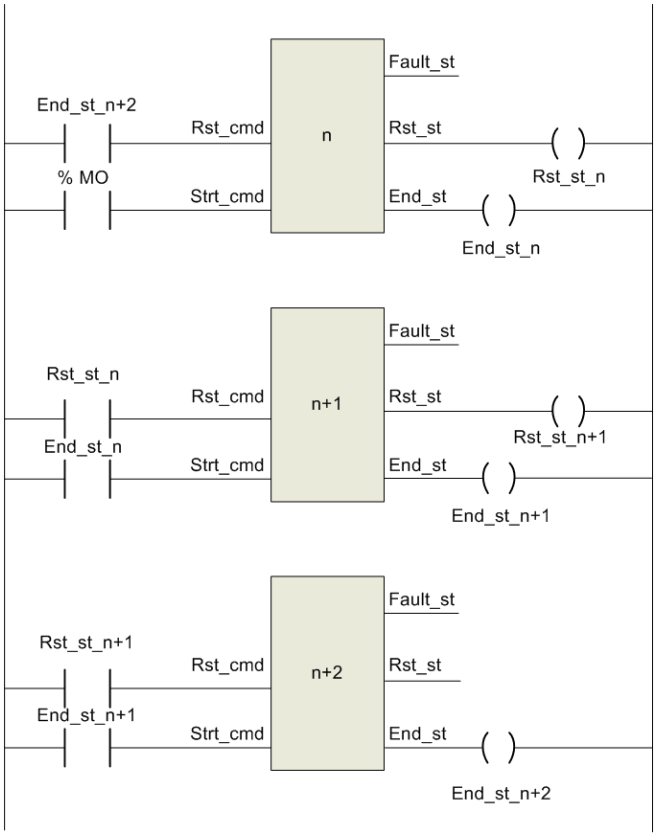
DFB Chaining with Manual Restart

In the DFB chaining with manual restart configuration, the DFB is linked to other DFBs and it is activated each time %M0 is set to 1:



DFB Chaining with Automatic Restart

In the DFB chaining with automatic restart configuration, the DFB is linked to other DFBs and it is activated continuously when %M0 is set to 1:



Parallel Connection DFB

2

Introduction

This chapter describes the TeSys D and TeSys U Parallel Communication DFBs.

What's in this Chapter?

This chapter contains the following topics:

Io_lu9g02_d_dir: TeSys D Parallel Control/Command Direct Through LU9G02 Splitter Box

Presentation

The Io_lu9g02_d_dir DFB is dedicated to the control and command by bits of up to 8 direct motor starters built with TeSys D contactors associated with GV circuit breakers connected in parallel with the Quickfit cabling system to a Premium PLC I/O module TSXDMY28FK via the LU9G02 splitter box.

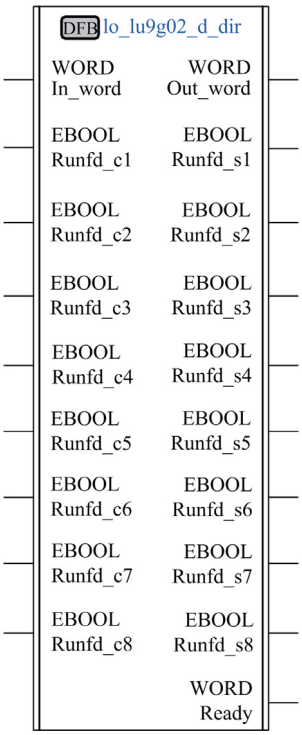
This DFB can also be used in case of a combination of direct starters and reversing starters.

For more information, see:
- *LU9G02 Splitter Box Instruction Sheet*
- *LAD9AP3 Quickfit Instruction Sheet*

Characteristics

Characteristic	Value
Name	Io_lu9g02_d_dir
Version	00.36
Input	9
Output	10
Input/Output	0
Public Variable	0

Graphical Representation

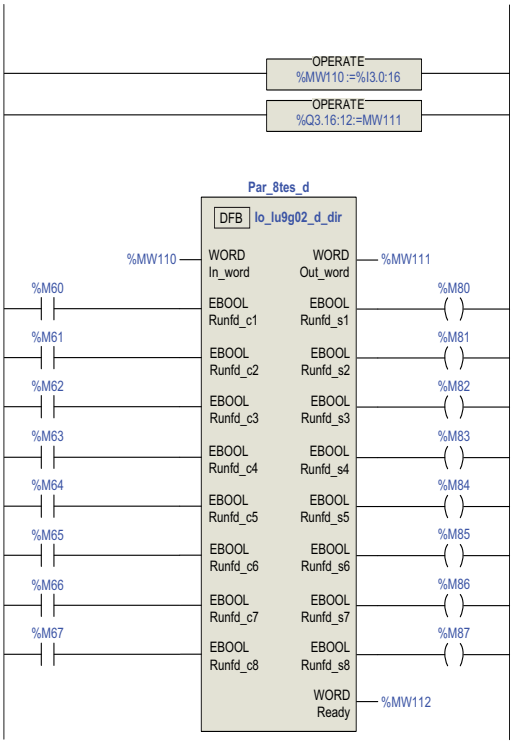


TeSys D Compliance

The Io_lu9g02_d_dir DFB is compliant with the following sub-assemblies:
- From 0 to 18A:
  - Contactor: LC1 D contactors from 9 to 25A with spring terminal
  - Circuit breakers: GV2 ME with spring terminal
- From 9 to 65A:
  - Contactor: LC1 D contactors from 40 to 65A with spring terminal
  - Circuit breaker: GV3 P with spring terminal
- Quickfit control/command pre-wiring component: LAD9AP3D1
- Parallel splitter box: LU9G02

Software Implementation

Example of software implementation with Premium I/O module TSXDMY28FK integrated in slot 3.



Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
In_word	WORD	–	–	Word to link to input bits of I/O module
Runfd_c1	EBOOL	0...1	0	Motor 1 run forward command
Runfd_c2	EBOOL	0...1	0	Motor 2 run forward command
Runfd_c3	EBOOL	0...1	0	Motor 3 run forward command
Runfd_c4	EBOOL	0...1	0	Motor 4 run forward command
Runfd_c5	EBOOL	0...1	0	Motor 5 run forward command
Runfd_c6	EBOOL	0...1	0	Motor 6 run forward command
Runfd_c7	EBOOL	0...1	0	Motor 7 run forward command
Runfd_c8	EBOOL	0...1	0	Motor 8 run forward command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Out_word	WORD	–	–	Word to link to output bits of I/O module
Runfd_s1	EBOOL	0...1	0	Motor 1 running forward
Runfd_s2	EBOOL	0...1	0	Motor 2 running forward
Runfd_s3	EBOOL	0...1	0	Motor 3 running forward
Runfd_s4	EBOOL	0...1	0	Motor 4 running forward
Runfd_s5	EBOOL	0...1	0	Motor 5 running forward
Runfd_s6	EBOOL	0...1	0	Motor 6 running forward
Runfd_s7	EBOOL	0...1	0	Motor 7 running forward
Runfd_s8	EBOOL	0...1	0	Motor 8 running forward
Ready	WORD	–	0	One or several motors ready

The following table describes the Ready word:

Output	Type	Bit	Description
Ready	WORD	0	Motor 1 ready to start
		1	Motor 2 ready to start
		2	Motor 3 ready to start
		3	Motor 4 ready to start
		4	Motor 5 ready to start
		5	Motor 6 ready to start
		6	Motor 7 ready to start
		7	Motor 8 ready to start
		8...15	Reserved

DFB Bit Assignment in Case of Combination of Direct Starters and Reversing Starters

The following table describes the assignment of DFB input bits in case of a combination of direct starters and reversing starters:

Input	1 Reverse Starter and 6 Direct Starters	2 Reverse Starters and 4 Direct Starters	3 Reverse Starters and 2 Direct Starters
Runfd_c1	Runfw_c1	Runfw_c1	Runfw_c1
Runfd_c2	Runrv_c1	Runrv_c1	Runrv_c1
Runfd_c3	Runfw_c2	Runfw_c2	Runfw_c2
Runfd_c4	Runfw_c3	Runrv_c2	Runrv_c2
Runfd_c5	Runfw_c4	Runfw_c3	Runfw_c3
Runfd_c6	Runfw_c5	Runfw_c4	Runrv_c3
Runfd_c7	Runfw_c6	Runfw_c5	Runfw_c4
Runfd_c8	Runfw_c7	Runfw_c6	Runfw_c5

The following table describes the assignment of DFB output bits in case of a combination of direct starters and reversing starters:

Output	1 Reverse Starter and 6 Direct Starters	2 Reverse Starters and 4 Direct Starters	3 Reverse Starters and 2 Direct Starters
Runfd_s1	Runfw_s1	Runfw_s1	Runfw_s1
Runfd_s2	Runrv_s1	Runrv_s1	Runrv_s1
Runfd_s3	Runfw_s2	Runfw_s2	Runfw_s2
Runfd_s4	Runfw_s3	Runrv_s2	Runrv_s2
Runfd_s5	Runfw_s4	Runfw_s3	Runfw_s3
Runfd_s6	Runfw_s5	Runfw_s4	Runrv_s3
Runfd_s7	Runfw_s6	Runfw_s5	Runfw_s4
Runfd_s8	Runfw_s7	Runfw_s6	Runfw_s5

The following table describes the assignment of DFB Ready bits in case of a combination of reverse starters and direct starters:

Output	Type	Bit	1 Reverse Starter and 6 Direct Starters	2 Reverse Starters and 4 Direct Starters	3 Reverse Starters and 2 Direct Starters
Ready	WORD	0	Motor 1 ready to start	Motor 1 ready to start	Motor 1 ready to start
		1	Reserved	Reserved	Reserved
		2	Motor 2 ready to start	Motor 2 ready to start	Motor 2 ready to start
		3	Motor 3 ready to start	Reserved	Reserved
		4	Motor 4 ready to start	Motor 3 ready to start	Motor 3 ready to start
		5	Motor 5 ready to start	Motor 4 ready to start	Reserved
		6	Motor 6 ready to start	Motor 5 ready to start	Motor 4 ready to start
		7	Motor 7 ready to start	Motor 6 ready to start	Motor 5 ready to start
		8...15	Reserved	Reserved	Reserved

Io_lu9g02_d_rev: TeSys D Parallel Control/Command Reversing Through LU9G02 Splitter Box

Presentation

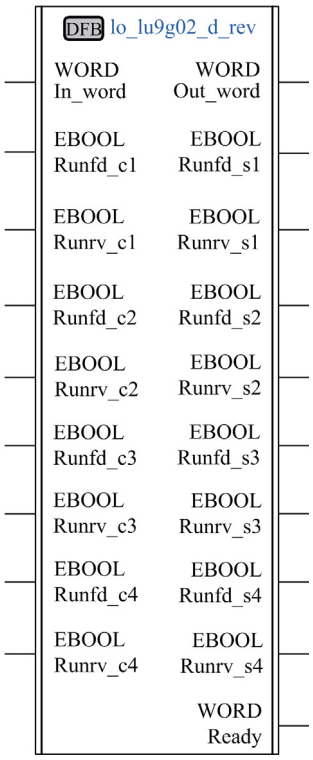
The Io_lu9g02_d_rev DFB is dedicated to the control and command by bits of up to 4 reversing motor starters built with TeSys D contactors associated with GV circuit breakers connected in parallel with the Quickfit cabling system to a Premium PLC I/O module TSXDMY28FK via a LU9G02 splitter box.

For more information, see:
- *LU9G02 Splitter Box Instruction Sheet*
- *LAD9AP3 Quickfit Instruction Sheet*

Characteristics

Characteristic	Value
Name	Io_lu9g02_d_rev
Version	00.35
Input	9
Output	10
Input/Output	0
Public Variable	0

Graphical Representation

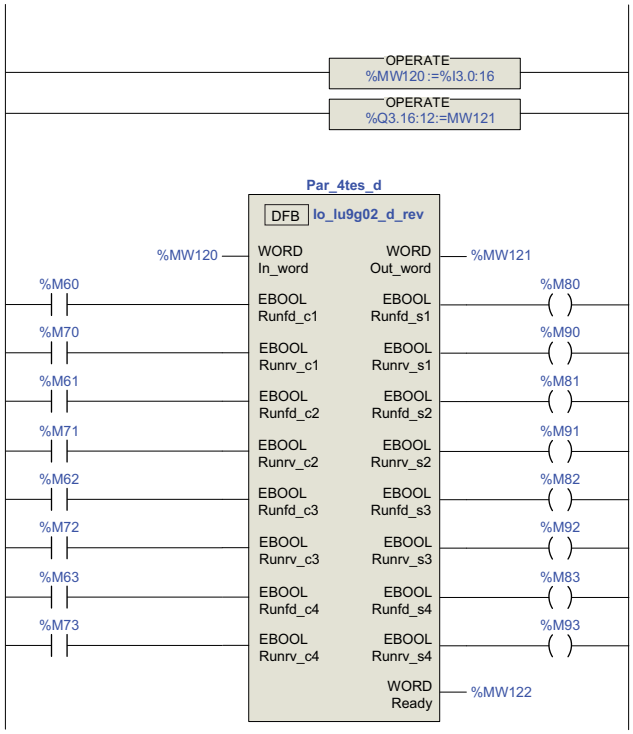


TeSys D Compliance

The Io_lu9g02_d_rev DFB is compliant with the following sub-assemblies:
- From 0 to 18 A:
  - Contactor: LC1 D contactors from 9 to 25 A with spring terminal
  - Circuit breaker: GV2 ME with spring terminal
- From 9 to 65 A:
  - Contactor: LC1 D contactors from 40 to 65 A with spring terminal
  - Circuit breaker: GV3 P with spring terminal
- Quickfit control/command pre-wiring component: LAD9AP3D2
- Parallel splitter box: LU9G02

Software Implementation

Example of software implementation with Premium I/O module TSXDMY28FK integrated in slot 3.



Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
In_word	WORD	–	–	Word to link to input bits of I/O module
Runfd_c1	EBOOL	0...1	0	Motor 1 run forward command
Runrv_c1	EBOOL	0...1	0	Motor 1 run reverse command
Runfd_c2	EBOOL	0...1	0	Motor 2 run forward command
Runrv_c2	EBOOL	0...1	0	Motor 2 run reverse command
Runfd_c3	EBOOL	0...1	0	Motor 3 run forward command
Runrv_c3	EBOOL	0...1	0	Motor 3 run reverse command
Runfd_c4	EBOOL	0...1	0	Motor 3 run forward command
Runrv_c4	EBOOL	0...1	0	Motor 3 run reverse command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Out_word	WORD	–	–	Word to link to output bits of I/O module
Runfd_s1	EBOOL	0...1	0	Motor 1 running forward
Runrv_s1	EBOOL	0...1	0	Motor 1 running reverse
Runfd_s2	EBOOL	0...1	0	Motor 2 running forward
Runrv_s2	EBOOL	0...1	0	Motor 2 running reverse
Runfd_s3	EBOOL	0...1	0	Motor 3 running forward
Runrv_s3	EBOOL	0...1	0	Motor 3 running reverse
Runfd_s4	EBOOL	0...1	0	Motor 4 running forward
Runrv_s4	EBOOL	0...1	0	Motor 4 running reverse
Ready	WORD	–	0	One or several motors ready

The following table describes the Ready word:

Output	Type	Bit	Description
Ready	WORD	0	Motor 1 ready to start
		1	Motor 2 ready to start
		2	Motor 3 ready to start
		3	Motor 4 ready to start
		4...15	Reserved

Io_epi2145_d_dir: TeSys D Parallel Control/Command Direct Through STBEPI2145 Splitter Box

Presentation

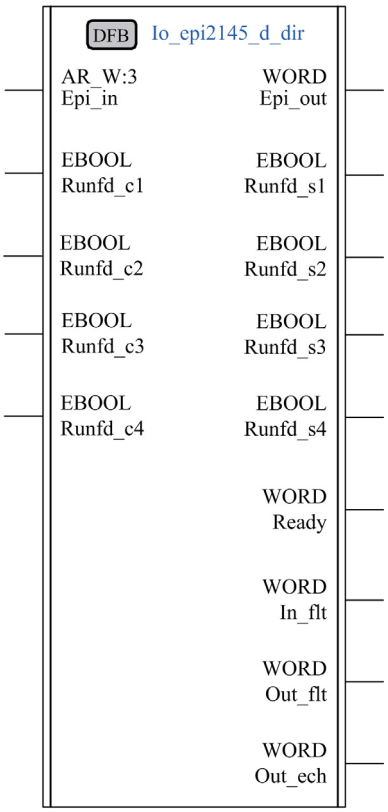
The Io_epi2145_d_dir DFB is dedicated to the control and command by bits of up to 4 direct motor starters built with TeSys D contactors associated with GV circuit breakers connected in parallel with the Quickfit cabling system to an Advantys STB island via a STBEPI2145 splitter box.

For more information, see the *LAD9AP31 Quickfit Instruction Sheet*.

Characteristics

Characteristic	Value
Name	Io_epi2145_d_dir
Version	0.28
Input	5
Output	9
Input/Output	0
Public Variable	0

Graphical Representation



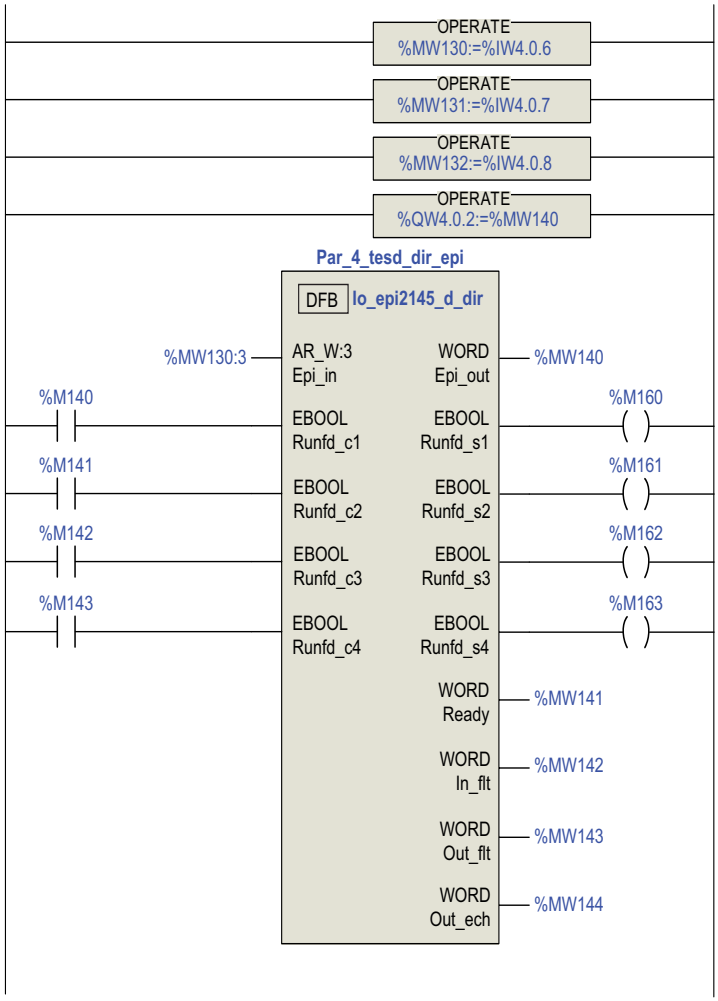
TeSys D Compliance

The Io_epi2145_d_dir DFB is compliant with the following sub-assemblies:

- From 0 to 18 A:
  - Contactor: LC1 D contactors from 9 to 25 A with spring terminal
  - Circuit breaker: GV2 ME with spring terminal
- From 9 to 65 A:
  - Contactor: LC1 D contactors from 40 to 65 A with spring terminal
  - Circuit breaker: GV3 P with spring terminal
- Quickfit control/command pre-wiring component: LAD9AP3D1
- Advantys STB parallel splitter box: STBEPI2145

Software Implementation

Example of software implementation with Advantys island connected through Profibus on a Premium Profibus coupler TSXPBY100 in slot 4.



Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
In_word	ARRAY[0...2] OF WORD	–	–	Array to link to STBEPI2145 input process image area
Runfd_c1	EBOOL	0...1	0	Motor 1 run forward command
Runfd_c2	EBOOL	0...1	0	Motor 2 run forward command
Runfd_c3	EBOOL	0...1	0	Motor 3 run forward command
Runfd_c4	EBOOL	0...1	0	Motor 4 run forward command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Out_word	WORD	–	–	Word to link to STBEPI2145 output process image area
Runfd_s1	EBOOL	0...1	0	Motor 1 running forward
Runfd_s2	EBOOL	0...1	0	Motor 2 running forward
Runfd_s3	EBOOL	0...1	0	Motor 3 running forward
Runfd_s4	EBOOL	0...1	0	Motor 4 running forward
Ready	WORD	–	–	One or several motors ready
In_flt	WORD	–	–	One or several STBEPI2145 inputs are not operational: input power missing or short circuit on the field input power.
Out_flt	WORD	–	–	One or several STBEPI2145 outputs are not operational: output power missing or short circuit on the field output power, or output thermal overload.
Out_ech	WORD	–	–	Echo of STBEPI2145 outputs

The following table describes the Ready word:

Output	Type	Bit	Description
Ready	WORD	0	Motor 1 ready to start
		1	Motor 2 ready to start
		2	Motor 3 ready to start
		3	Motor 4 ready to start
		4...15	Reserved

The following table describes the In_flt word:

Output	Type	Bit	Description
In_flt	WORD	0	Motor 1 ready to start STBEPI2145 input is not significant.
		1	Motor 1 running forward STBEPI2145 input is not significant.
		2...3	Reserved
		4	Motor 2 ready to start STBEPI2145 input is not significant.
		5	Motor 2 running forward STBEPI2145 input is not significant.
		6...7	Reserved
		8	Motor 3 ready to start STBEPI2145 input is not significant.
		9	Motor 3 running forward STBEPI2145 input is not significant.
		10...11	Reserved
		12	Motor 4 ready to start STBEPI2145 input is not significant.
		13	Motor 4 running forward STBEPI2145 input is not significant.
		14...15	Reserved

The following table describes the Out_flt word:

Output	Type	Bit	Description
Out_flt	WORD	0	Motor 1 run forward command STBEPI2145 output is not operational.
		1...3	Reserved
		4	Motor 2 run forward command STBEPI2145 output is not operational.
		5...7	Reserved
		8	Motor 3 run forward command STBEPI2145 output is not operational.
		9...11	Reserved
		12	Motor 4 run forward command STBEPI2145 output is not operational.
		13...15	Reserved

The following table describes the Out_ech word:

Output	Type	Bit	Description
Out_ech	WORD	0	Echo of the Motor 1 run forward command STBEPI2145 output
		1...3	Reserved
		4	Echo of the Motor 2 run forward command STBEPI2145 output
		5...7	Reserved
		8	Echo of the Motor 3 run forward command STBEPI2145 output
		9...11	Reserved
		12	Echo of the Motor 4 run forward command STBEPI2145 output
		13...15	Reserved

Io_epi2145_d_rev: TeSys D Parallel Control/Command Reversing Through STBEPI2145 Splitter Box

Presentation

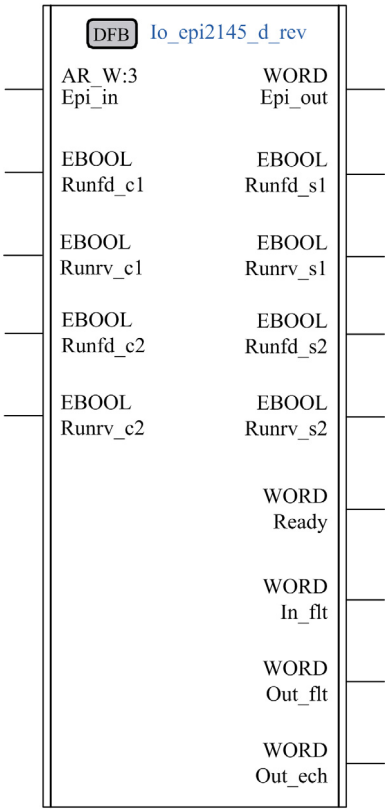
The Io_epi2145_d_rev DFB is dedicated to the control and command by bits of up to 2 reversing motor starters built with TeSys D contactors associated with GV circuit breakers connected in parallel with the Quickfit cabling system to an Advantys STB island via a STBEPI2145 splitter box.

For more information, see the *LAD9AP31 Quickfit Instruction Sheet*.

Characteristics

Characteristic	Value
Name	Io_epi2145_d_rev
Version	00.20
Input	5
Output	9
Input/Output	0
Public Variable	0

Graphical Representation



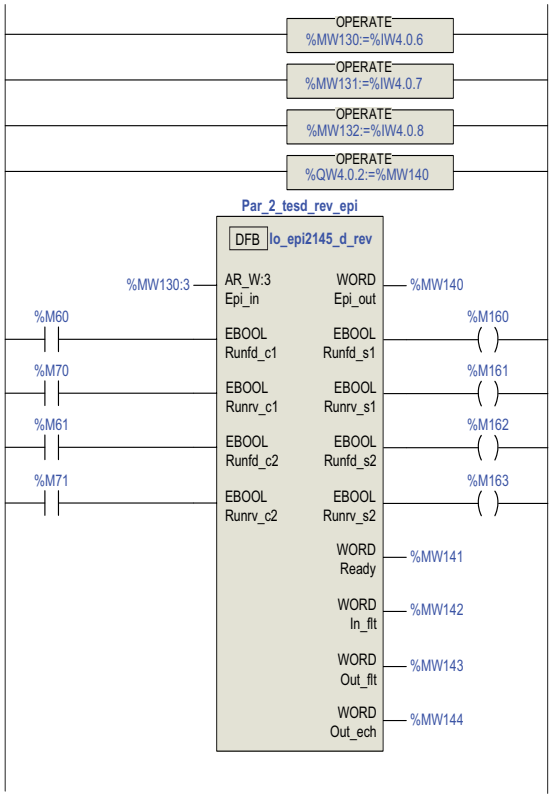
TeSys D Compliance

The Io_epi2145_d_rev DFB is compliant with the following sub-assemblies:

- From 0 to 18 A:
  - Contactor: LC1 D contactors from 9 to 25 A with spring terminal
  - Circuit breaker: GV2 ME with spring terminal
- From 9 to 65 A:
  - Contactor: LC1 D contactors from 40 to 65 A with spring terminal
  - Circuit breaker: GV3 P with spring terminal
- Quickfit control/command pre-wiring component: LAD9AP3D2
- Advantys STB parallel splitter box: STBEPI2145

Software Implementation

Example of software implementation with Advantys island connected through Profibus on a Premium Profibus coupler TSXPBY100 in slot 4.



Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
In_word	ARRAY[0...2] OF WORD	–	–	Array to link to STBEPI2145 input process image area
Runfd_c1	EBOOL	0...1	0	Motor 1 run forward command
Runrv_c1	EBOOL	0...1	0	Motor 1 run reverse command
Runfd_c2	EBOOL	0...1	0	Motor 2 run forward command
Runrv_c2	EBOOL	0...1	0	Motor 2 run reverse command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Out_word	WORD	–	–	Word to link to STBEPI2145 output process image area
Runfd_s1	EBOOL	0...1	0	Motor 1 running forward
Runrv_s1	EBOOL	0...1	0	Motor 1 running reverse
Runfd_s2	EBOOL	0...1	0	Motor 2 running forward
Runrv_s2	EBOOL	0...1	0	Motor 2 running reverse
Ready	WORD	–	–	One or several motors ready
In_flt	WORD	–	–	One or several STBEPI2145 inputs are not operational: input power missing or short circuit on the field input power.
Out_flt	WORD	–	–	One or several STBEPI2145 outputs are not operational: output power missing or short circuit on the field output power, or output thermal overload.
Out_ech	WORD	–	–	Echo of STBEPI2145 outputs

The following table describes the Ready word:

Output	Type	Bit	Description
Ready	WORD	0	Motor 1 ready to start
		1	Motor 2 ready to start
		2...15	Reserved

The following table describes the In_flt word:

Output	Type	Bit	Description
In_flt	WORD	0	Motor 1 ready to start STBEPI2145 input is not significant.
		1	Motor 1 running forward STBEPI2145 input is not significant.
		2	Motor 1 running reverse STBEPI2145 input is not significant.
		3	Reserved
		4	Motor 2 ready to start STBEPI2145 input is not significant.
		5	Motor 2 running forward STBEPI2145 input is not significant.
		6	Motor 2 running reverse STBEPI2145 input is not significant.
		7...15	Reserved

The following table describes the Out_flt word:

Output	Type	Bit	Description
Out_flt	WORD	0	Motor 1 run forward command STBEPI2145 output is not operational.
		1	Motor 1 run reverse command STBEPI2145 output is not operational.
		2...3	Reserved
		4	Motor 2 run forward command STBEPI2145 output is not operational.
		5	Motor 2 run reverse command STBEPI2145 output is not operational.
		6...15	Reserved

The following table describes the Out_ech word:

Output	Type	Bit	Description
Out_ech	WORD	0	Echo of the Motor 1 run forward command STBEPI2145 output
		1	Echo of the Motor 1 run reverse command STBEPI2145 output
		2...3	Reserved
		4	Echo of the Motor 2 run forward command STBEPI2145 output
		5	Echo of the Motor 2 run reverse command STBEPI2145 output
		6...15	Reserved

Io_lu9g02_u: TeSys U Parallel Control/Command Through LU9G02 Splitter Box

Presentation

The Io_lu9g02_u DFB is dedicated to the control and command of up to 8 TeSys U motor starter-controllers (up to 12 A/5.5 kW or 7 hp) connected in parallel with the LUFC00 parallel wiring module to a Premium PLC I/O module TSXDMY28FK via the LU9G02 splitter box.

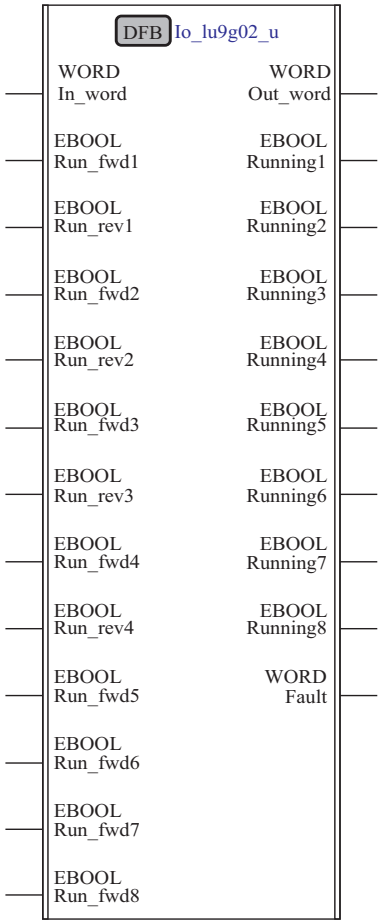
The first 4 starter-controllers can work as inverters in 2 directions, the last 4 starter-controllers works only in one direction. Ready and Running status information are available for the 8 starter-controllers.

For more information, see:
- *LU9G02 Splitter Box Instruction Sheet*
- *LUFC00 Parallel Wiring Module Instruction Sheet*

Characteristics

Characteristic	Value
Name	Io_lu9g02_u
Version	00.30
Input	13
Output	10
Input/Output	0
Public Variable	0

Graphical Representation



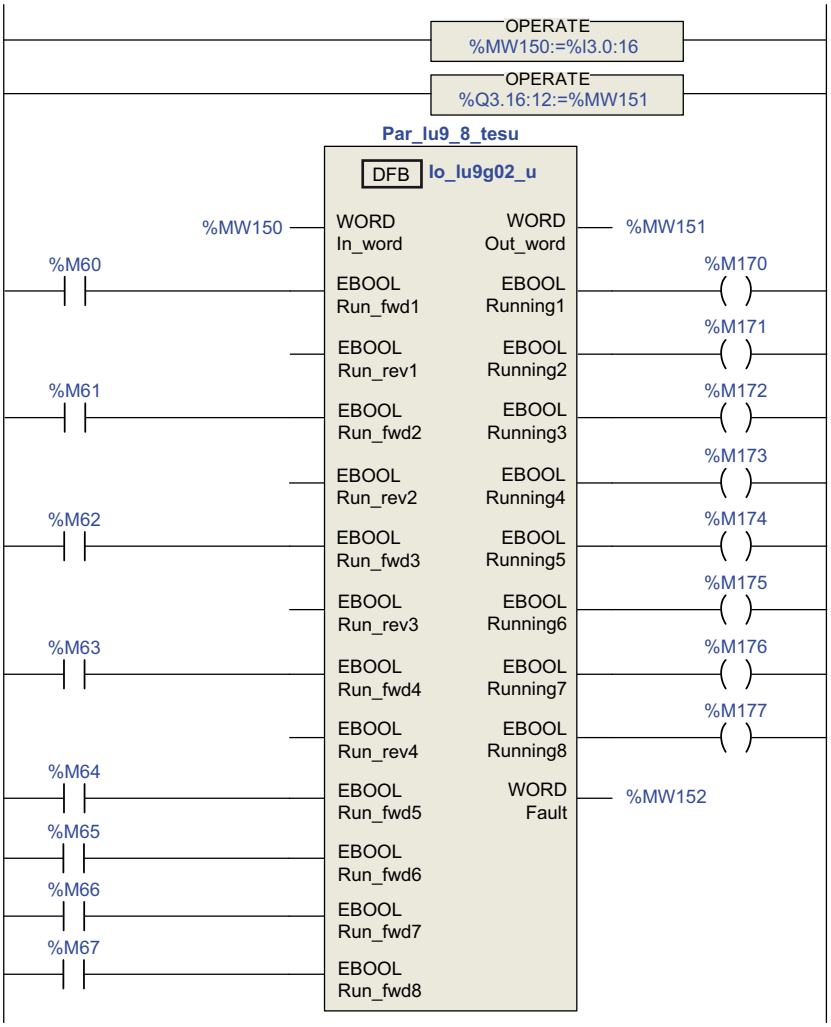
TeSys U Compliance

The Io_lu9g02_u DFB is compliant with the following TeSys U sub-assemblies:

Power base	• LUB12 non-reversing power base (up to 12 A/5.5 kW or 7 hp) • LU2B12 reversing power base (up to 12 A/5.5 kW or 7 hp)
Control unit	• LUCA standard control unit (up to 12 A/5.5 kW or 7 hp) • LUCB, LUCC, and LUCD advanced control units (up to 12 A/5.5 kW or 7 hp) • LUCM multifunction control unit (up to 12 A/5.5 kW or 7 hp) • LUCL magnetic control unit (up to 12 A/5.5 kW or 7 hp)
Connection module	• LUFC00 parallel wiring module • LU9G02 splitter box

Software Implementation

Example of software implementation with Premium I/O module TSXDMY28FK integrated in slot 3.



Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
In_word	WORD	–	–	Word to link to input bits of I/O module
Run_fwd1	EBOOL	0...1	0	Motor 1 run forward command
Run_rev1	EBOOL	0...1	0	Motor 1 run reverse command
Run_fwd2	EBOOL	0...1	0	Motor 2 run forward command
Run_rev2	EBOOL	0...1	0	Motor 2 run reverse command
Run_fwd3	EBOOL	0...1	0	Motor 3 run forward command
Run_rev3	EBOOL	0...1	0	Motor 3 run reverse command
Run_fwd4	EBOOL	0...1	0	Motor 4 run forward command
Run_rev4	EBOOL	0...1	0	Motor 4 run reverse command
Run_fwd5	EBOOL	0...1	0	Motor 5 run forward command
Run_fwd6	EBOOL	0...1	0	Motor 6 run forward command
Run_fwd7	EBOOL	0...1	0	Motor 7 run forward command
Run_fwd8	EBOOL	0...1	0	Motor 8 run forward command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Out_word	WORD	–	–	Word to link to output bits of I/O module
Running1	EBOOL	0...1	0	Motor 1 running
Running2	EBOOL	0...1	0	Motor 2 running
Running3	EBOOL	0...1	0	Motor 3 running
Running4	EBOOL	0...1	0	Motor 4 running
Running5	EBOOL	0...1	0	Motor 5 running
Running6	EBOOL	0...1	0	Motor 6 running
Running7	EBOOL	0...1	0	Motor 7 running
Running8	EBOOL	0...1	0	Motor 8 running
Fault	WORD	–	0	1 or several motor starters in tripped position

The following table describes the Fault word:

Output	Type	Bit	Description
Fault	WORD	0	Motor starter 1 is in tripped position.
		1	Motor starter 2 is in tripped position.
		2	Motor starter 3 is in tripped position.
		3	Motor starter 4 is in tripped position.
		4	Motor starter 5 is in tripped position.
		5	Motor starter 6 is in tripped position.
		6	Motor starter 7 is in tripped position.
		7	Motor starter 8 is in tripped position.
		8...15	Reserved

Io_epi2145_u: TeSys U Parallel Control/Command Through STBEPI2145 Splitter Box

Presentation

The Io_epi2145_u DFB is dedicated to the control and command by bits of up to 4 TeSys U starter-controllers connected in parallel with the LUFC00 parallel wiring module to an Advantys STB island via a STBEPI2145 splitter box.

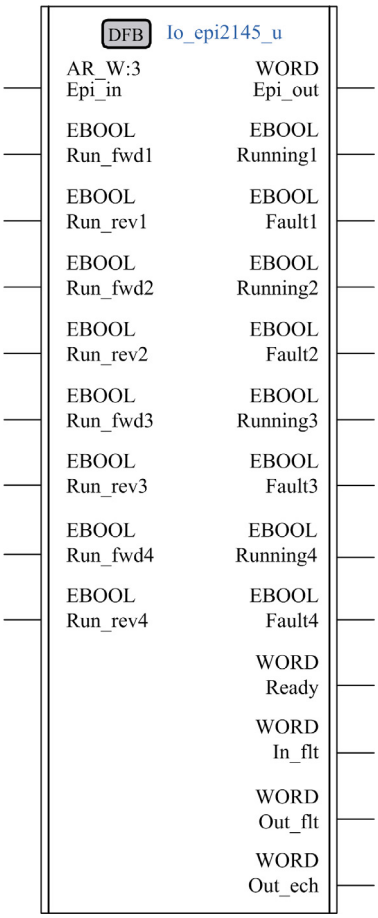
The 4 starters can work as inverters in 2 directions, Ready and Running status information are available for the 4 starters.

For more information, see the *LU9G02 Splitter Box Instruction Sheet*.

Characteristics

Characteristic	Value
Name	Io_epi2145_u
Version	00.16
Input	9
Output	13
Input/Output	0
Public Variable	0

Graphical Representation



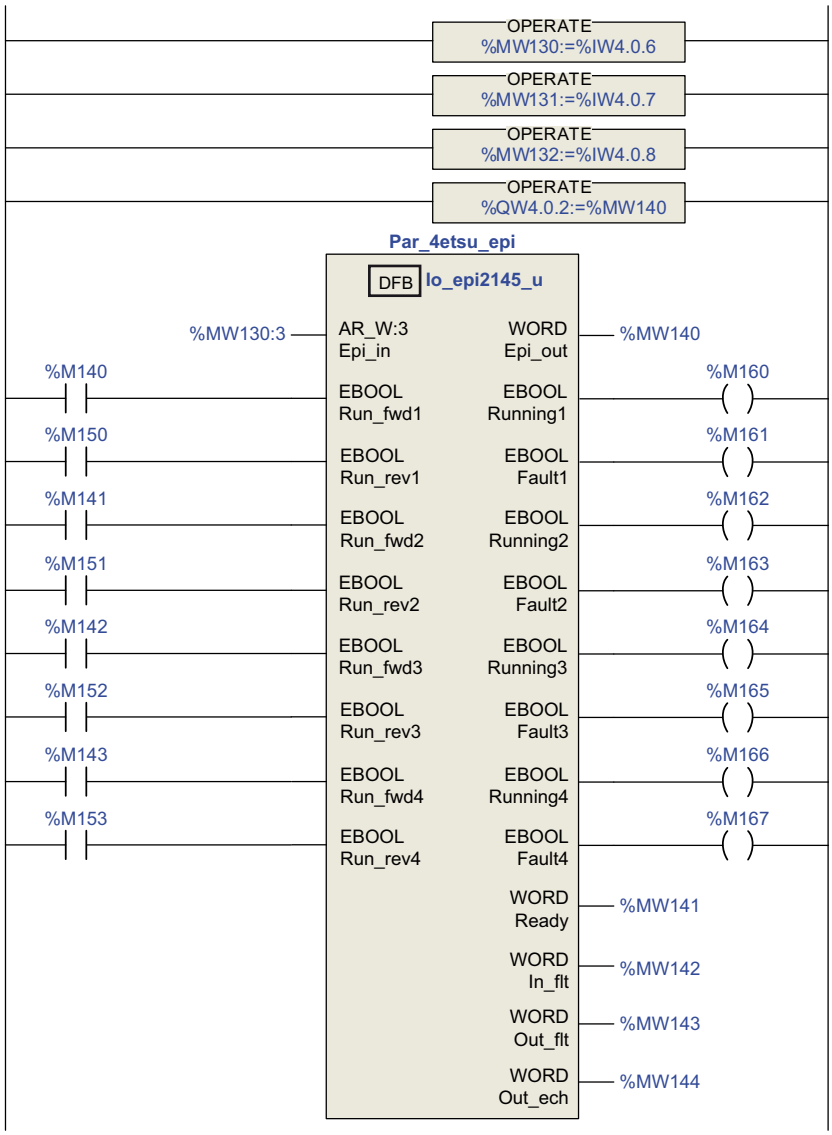
TeSys U Compliance

The Io_epi2145_u DFB is compliant with the following TeSys U sub-assemblies:

Power base	• LUB•• non-reversing power base (up to 12 A/5.5 kW or 7 hp) • LU2B•• reversing power base (up to 12 A/5.5 kW or 7 hp)
Control unit	• LUCA standard control unit • LUCB, LUCC, and LUCD advanced control units • LUCM multifunction control unit
Communication module	• LUFC00 parallel wiring module • STBEPI2145 on Advantys STB island

Software Implementation

Example of software implementation with Advantys island connected through Profibus on a Premium Profibus coupler TSXPBY100 in slot 4.



Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
In_word	ARRAY[0...2] OF WORD	–	–	Array to link to STBEPI2145 input process image area
Run_fwd1	EBOOL	0...1	0	Motor 1 run forward command
Run_rev1	EBOOL	0...1	0	Motor 1 run reverse command
Run_fwd2	EBOOL	0...1	0	Motor 2 run forward command
Run_rev2	EBOOL	0...1	0	Motor 2 run reverse command
Run_fwd3	EBOOL	0...1	0	Motor 3 run forward command
Run_rev3	EBOOL	0...1	0	Motor 3 run reverse command
Run_fwd4	EBOOL	0...1	0	Motor 4 run forward command
Run_rev4	EBOOL	0...1	0	Motor 4 run reverse command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Out_word	WORD	–	–	Word to link to STBEPI2145 output process image area
Running1	EBOOL	0...1	0	Motor 1 running
Fault1	EBOOL	0...1	0	Motor starter 1 is in tripped position.
Running2	EBOOL	0...1	0	Motor 2 running
Fault2	EBOOL	0...1	0	Motor starter 2 is in tripped position.
Running3	EBOOL	0...1	0	Motor 3 running
Fault3	EBOOL	0...1	0	Motor starter 3 is in tripped position.
Running4	EBOOL	0...1	0	Motor 4 running
Fault4	EBOOL	0...1	0	Motor starter 4 is in tripped position.
Ready	WORD	–	–	One or several motors ready
In_flt	WORD	–	–	One or several STBEPI2145 inputs are not operational: input power missing or short circuit on the field input power.
Out_flt	WORD	–	–	One or several STBEPI2145 outputs are not operational: output power missing, short circuit on the field output power, or output thermal overload.
Out_ech	WORD	–	–	Echo of STBEPI2145 outputs

The following table describes the Ready word:

Output	Type	Bit	Description
Ready	WORD	0	Motor 1 ready to start
		1	Motor 2 ready to start
		2	Motor 3 ready to start
		3	Motor 4 ready to start
		4...15	Reserved

The following table describes the In_flt word:

Output	Type	Bit	Description
In_flt	WORD	0	Motor 1 ready to start STBEPI2145 input is not significant.
		1	Motor 1 running STBEPI2145 input is not significant.
		2	Motor starter 1 is in tripped position STBEPI2145 input is not significant.
		3	Reserved
		4	Motor 2 ready to start STBEPI2145 input is not significant.
		5	Motor 2 running STBEPI2145 input is not significant.
		6	Motor starter 2 is in tripped position STBEPI2145 input is not significant.
		7	Reserved
		8	Motor 3 ready to start STBEPI2145 input is not significant.
		9	Motor 3 running STBEPI2145 input is not significant.
		10	Motor starter 3 is in tripped position STBEPI2145 input is not significant.
		11	Reserved
		12	Motor 4 ready to start STBEPI2145 input is not significant.
		13	Motor 4 running STBEPI2145 input is not significant.
		14	Motor starter 4 is in tripped position STBEPI2145 input is not significant.
		15	Reserved

The following table describes the Out_flt word:

Output	Type	Bit	Description
Out_flt	WORD	0	Motor 1 run forward command STBEPI2145 output is not operational.
		1	Motor 1 run reverse command STBEPI2145 output is not operational.
		2...3	Reserved
		4	Motor 2 run forward command STBEPI2145 output is not operational.
		5	Motor 2 run reverse command STBEPI2145 output is not operational.
		6...7	Reserved
		8	Motor 3 run forward command STBEPI2145 output is not operational.
		9	Motor 3 run reverse command STBEPI2145 output is not operational.
		10...11	Reserved
		12	Motor 4 run forward command STBEPI2145 output is not operational.
		13	Motor 4 run reverse command STBEPI2145 output is not operational.
		14...15	Reserved

The following table describes the Out_ech word:

Output	Type	Bit	Description
Out_ech	WORD	0	Echo of the Motor 1 run forward command STBEPI2145 output
		1	Echo of the Motor 1 run reverse command STBEPI2145 output
		2...3	Reserved
		4	Echo of the Motor 2 run forward command STBEPI2145 output
		5	Echo of the Motor 2 run reverse command STBEPI2145 output
		6...7	Reserved
		8	Echo of the Motor 3 run forward command STBEPI2145 output
		9	Echo of the Motor 3 run reverse command STBEPI2145 output
		10...11	Reserved
		12	Echo of the Motor 4 run forward command STBEPI2145 output
		13	Echo of the Motor 4 run reverse command STBEPI2145 output
		14...15	Reserved

Modbus SL DFB

3

Introduction

This chapter describes the TeSys U and TeSys T Modbus SL (Serial Line) DFBs.

What's in this Chapter?

This chapter contains the following topics:

Ctrl_cmd_mdb_u : TeSys U Control/Command for Modbus SL

Presentation

The Ctrl_cmd_mdb_u DFB is dedicated to the control and command of a single TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with any control unit and a LULC033 Modbus communication module through the Modbus SL (Serial Line) network.

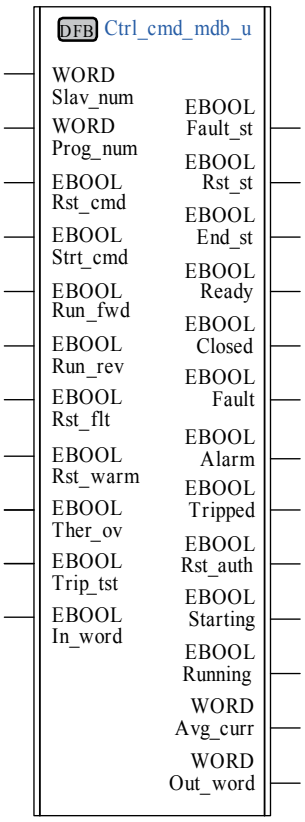
Ctrl_cmd_mdb_u uses XWAY addressing and is dedicated to Premium PLCs.

For more information, see the *TeSys U LULC032-033 Modbus Communication Module User Manual*.

Characteristics

Characteristic	Value
Name	Ctrl_cmd_mdb_u
Version	01.46
Input	11
Output	13
Input/Output	0
Public Variable	6

Graphical Representation



TeSys U Compliance

The Ctrl_cmd_mdb_u DFB is compliant with the following TeSys U sub-assemblies:

Power base	• LUB•• non-reversing power base (up to 32 A/15 kW or 20 hp) • LU2B•• reversing power base (up to 32 A/15 kW or 20 hp)
Control unit	• LUCA standard control unit • LUCB, LUCC, and LUCD advanced control units • LUCL magnetic control unit • LUCM multifunction control unit
Communication module	• LULC033 Modbus communication module

Software Implementation

- The parameters and the inputs can only be changed if the End_st output variable is set to 1.
- The output data is only valid if the End_st output variable is set to 1 and if there is no fault detected (Fault_st = 0).

Input Characteristics

The following table describes the DFB inputs and their availability according to the control unit:

Input	Type	Range	Default Value	Description	LUCA LUCL	LUCB LUCC LUCD	LUCM
Slav_num	WORD	1...31	1	Modbus slave number	√	√	√
Prog_num	WORD	1...30	–	See *Program Number, page 48*	√	√	√
Rst_cmd	EBOOL	0...1	0	Reset command	√	√	√
Strt_cmd	EBOOL	0...1	0	Start command	√	√	√
Run_fwd	EBOOL	0...1	0	Motor run forward command	√	√	√
Run_rev	EBOOL	0...1	0	Motor run reverse command	√	√	√
Rst_flt	EBOOL	0...1	0	Reset device (if register 451 = 102 or 104, fault acknowledgment causes a return to communication module factory settings)	√	√	√
Rst_warn	EBOOL	0...1	0	Reset warning (for example, communication loss)	√	√	√
Ther_ov	EBOOL	0...1	0	Automatic thermal overload fault test	–	–	√
Trip_tst	EBOOL	0...1	0	Overcurrent trip test via communication bus	–	–	√
In_word	WORD	–	–	This input is only used when program number is 10, 20, or 30. See next table and program number description.	–	–	–

The following table describes the In_word input:

Input	Type	Bit	Description	LUCA LUCL	LUCB LUCC LUCD	LUCM
In_word	WORD	0	Motor run forward command	√	√	√
		1	Motor run reverse command	√	√	√
		2	Reserved			
		3	Reset device (if register 451 = 102 or 104, fault acknowledgment causes a return to communication module factory settings)	√	√	√
		4	Reserved	–	–	–
		5	Automatic thermal overload fault test	–	–	√
		6	Overcurrent trip test via communication bus	–	–	√
		7	Reserved	–	–	–
		8	Reset warning (for example, communication loss)	√	√	√
		9...15	Reserved	–	–	–

Program Number

The program number enables the user to select bit or word control.

The following table describes the programs of the DFB:

Program Number	Description
1	Read registers 455 and 456, then write register 704 (systematic)
2	Read registers 455 and 456, then write register 704 (conditional)
3	Write register 704
10	Same as program 1 but using the In_word input and the Out_word output
20	Same as program 2 but using the In_word input and the Out_word output
30	Same as program 3 but using the In_word input and the Out_word output

Output Characteristics

The following table describes the DFB outputs and their availability according to the control unit:

Output	Type	Range	Default Value	Description	LUCA LUCL	LUCB LUCC LUCD	LUCM
Fault_st	EBOOL	0...1	0	Fault detected	√	√	√
Rst_st	EBOOL	0...1	0	Reset state	√	√	√
End_st	EBOOL	0...1	0	End state	√	√	√
Ready	EBOOL	0...1	0	System ready: the rotary handle is turned to On position and there is no fault	√	√	√
Closed	EBOOL	0...1	0	Pole status: closed	√	√	√
Fault	EBOOL	0...1	0	All faults	√	√	√
Alarm	EBOOL	0...1	0	All warnings	√	√	√
Tripped	EBOOL	0...1	0	System tripped: the rotary handle is turned to Trip position	√	√	√
Rst_auth	EBOOL	0...1	0	Fault reset authorized	–	√	√
Starting	EBOOL	0...1	0	Start in progress: 0 = descending current is lower than 150% FLA 1 = ascending current is greater than 10% FLA	–	√	√
Running	EBOOL	0...1	0	Motor running with detection of current, if greater than 10% FLA	–	√	√
Avg_curr	WORD	0...200	0	Average motor current (x 1% FLA)	–	√	√
Out_word	WORD	–	–	This output is only used when program number is 10, 20, or 30. See next table and program number description.	–	–	–

The following table describes the Out_word output:

Output	Type	Bit	Description	LUCA LUCL	LUCB LUCC LUCD	LUCM
Out_word	WORD	0	System ready: the rotary handle is turned to On position and there is no fault	√	√	√
		1	Pole status: closed	√	√	√
		2	All faults	√	√	√
		3	All warnings	√	√	√
		4	System tripped: the rotary handle is turned to Trip position	√	√	√
		5	Fault reset authorized	–	√	√
		6	Reserved	–	–	
		7	Motor running with detection of current, if greater than 10% FLA	–	√	√
		8...13	Average motor current (% FLA) 32 = 100% FLA 63 = 200% FLA	–	√	√
		14	Reserved	–	–	–
		15	Start in progress: 0 = descending current is lower than 150% FLA 1 = ascending current is greater than 10% FLA	–	√	√

Public Variables Characteristics

The following table describes the Ctrl_cmd_mdb_u DFB public variables and their availability according to the control unit:

Public Variable	Type	Range	Default Value	Description	LUCA LUCL	LUCB LUCC LUCD	LUCM
Net_num	WORD	100...255	100	Network address	√	√	√
Stat_num	WORD	0...255	0	Station address	√	√	√
Rack_num	WORD	0...7	0	Destination rack address	√	√	√
Slot_num	WORD	0...10	0	Destination slot address	√	√	√
Chan_num	WORD	0...1	0	Destination channel address	√	√	√
Sq_princ	WORD	0...7	0	Reserved for support	√	√	√

Comm_manager_u: TeSys U Communication Management for Modbus SL

Presentation

The Comm_manager_u DFB is dedicated to the control and command of up to 31 TeSys U starter-controllers (up to 32 A/15 kW or 20 hp) with any control unit and a LULC033 Modbus communication module though the Modbus SL (Serial Line) network. It must be associated with the Ctrl_cmd_mdb_u DFB to manage the Modbus requests sequencing.

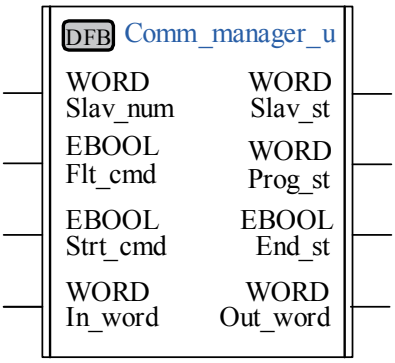
The number of TeSys U Modbus slaves is defined in the Slav_num variable (Slav_num = 1...31).

For more information, see the *TeSys U LULC032-033 Modbus Communication Module User Manual*.

Characteristics

Characteristic	Value
Name	Comm_manager_u
Version	00.63
Input	4
Output	4
Input/Output	0
Public Variable	3

Graphical Representation



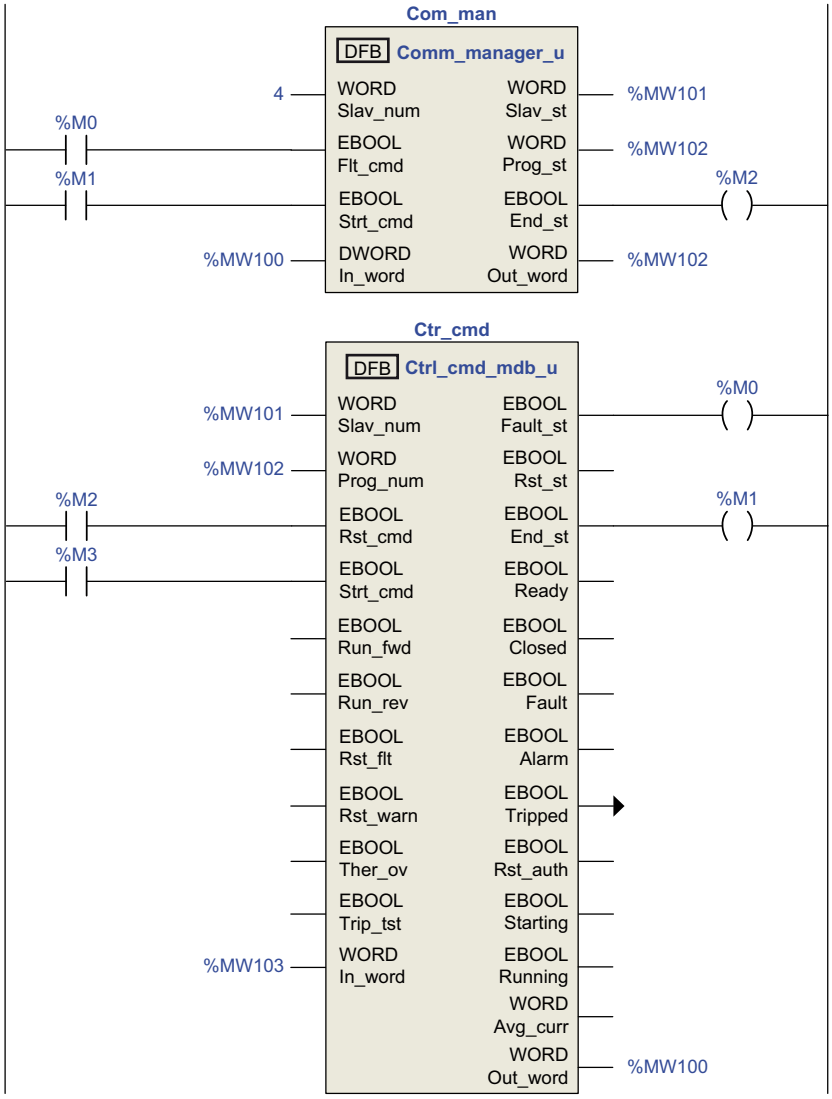
TeSys U Compliance

The Comm_manager_u DFB is compliant with the following TeSys U sub-assemblies:

Power base	• LUB•• non-reversing power base (up to 32 A/15 kW or 20 hp) • LU2B•• reversing power base (up to 32 A/15 kW or 20 hp)
Control unit	• LUCA standard control unit • LUCB, LUCC, and LUCD advanced control units • LUCL magnetic control unit • LUCM multifunction control unit
Communication module	• LULC033 Modbus communication module

Software Implementation

The following figure shows a PL7 program extract in ladder language showing how to interconnect the Ctrl_cmd_mdb_u and the Comm_manager_u DFBs:



Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Slav_num	WORD	1...31	1	Modbus slave number
Flt_cmd	EBOOL	0...1	0	Reset command
Strt_cmd	EBOOL	0...1	0	Start command
In_word	EBOOL	–	–	To connect to the Out_word output of the Ctrl_cmd_mdb_u DFB

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Slav_st	WORD	1...31	1	Modbus slave number
Prog_st	WORD	20 or 30	–	Program number of the Ctrl_cmd_mdb_u DFB
End_st	EBOOL	0...1	0	End state
Out_word	WORD	–	–	To connect to the In_word input of the Ctrl_cmd_mdb_u DFB

Public Variables Characteristics

The following table describes the DFB public variables:

Public Variable	Type	Range	Default Value	Description
In_cmd[0]...[31]	ARRAY [0...31] of WORD	–	–	See *In_cmd[0]...[31] Public Variable, page 52*
Out_urg	WORD	–	–	Priority level Bit 0 = Pulling Bit 1 = Writing priority Bit 2 = Reading priority Bit 3 = Fault priority
Out_st[0]...[31]	ARRAY [0...31] of WORD	–	–	See *Out_st[0]...[31] Public Variable, page 53*

In_cmd[0]...[31] Public Variable

The In_cmd[0]...[31] public variable is a table of 32 words corresponding to the TeSys U Modbus slave address. The following table describes the In_cmd[0]...[31] public variable:

Public Variable	Type	Bit	Description Corresponding to the TeSys U Slave 1...31	LUCA LUCL	LUCB LUCC LUCD	LUCM
In_cmd[0]	WORD	–	Not significant	–	–	–
In_cmd[1]...[31]	WORD	0	Motor run forward command	√	√	√
		1	Motor run reverse command	√	√	√
		2	Reserved	–	–	–
		3	Reset device (if register 451 = 102 or 104, fault acknowledgment causes a return to communication module factory settings)	√	√	√
		4	Reserved	–	–	–
		5	Automatic thermal overload fault test	–	–	√
		6	Overcurrent trip test via communication bus	–	–	√
		7	Reserved	–	–	–
		8	Reset warning (for example, communication loss)	√	√	√
		9...15	Reserved	–	–	–

Out_st[0]...[31] Public Variable

The Out_st[0]...[31] public variable is a table of 32 words corresponding to the TeSys U Modbus slave address. The following table describes the Out_st[0]....[31] public variable:

Public Variable	Type	Bit	Description Corresponding to the TeSys U Slave 1...31	LUCA LUCL	LUCB LUCC LUCD	LUCM
Out_st[0]	WORD	–	Not significant	–	–	–
Out_st[1]...[31]	WORD	0	System ready: the rotary handle is turned to On position and there is no fault	√	√	√
		1	Pole status: closed	√	√	√
		2	All faults	√	√	√
		3	All warnings	√	√	√
		4	System tripped: the rotary handle is turned to Trip position	√	√	√
		5	Fault reset is authorized	–	√	√
		6	Reserved	–	–	–
		7	Motor running with detection of current, if greater than 10% FLA	–	√	√
		8...13	Average motor current (% FLA) 32 = 100% FLA 63 = 200% FLA	–	√	√
		14	Reserved	–	–	–
		15	Start in progress: 1 = ascending current is greater than 10% FLA 0 = descending current is lower than 150% FLA	–	√	√

Ctrl_cmd_mdb_t : TeSys T Control/Command for Modbus SL

Presentation

The Ctrl_cmd_mdb_t DFB is dedicated to the control and command of a single TeSys T LTMR••M•• Modbus SL controller with or without the LTM E expansion module through the Modbus SL network.

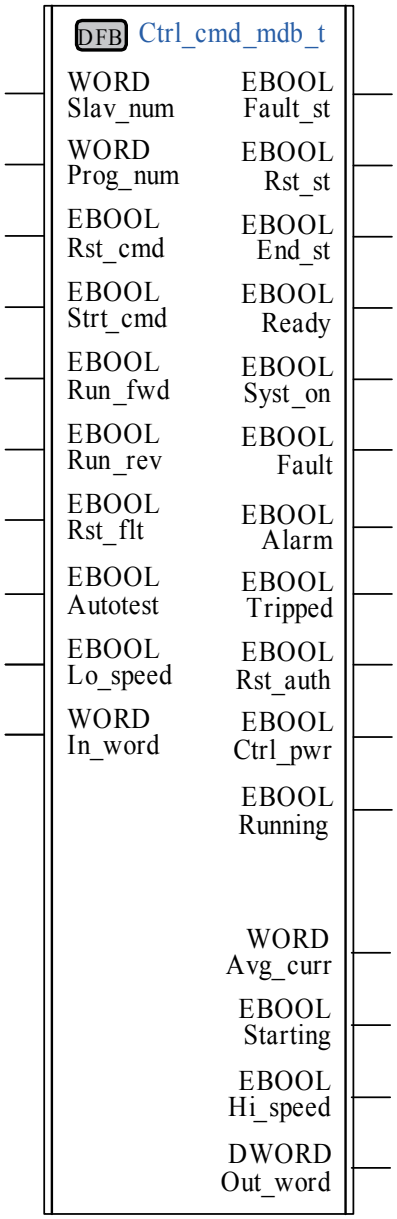
Ctrl_cmd_mdb_t uses XWAY addressing and is dedicated to Premium PLCs.

For more information, see the *TeSys T LTM R Modbus Motor Management Controller User Manual*.

Characteristics

Characteristic	Value
Name	Ctrl_cmd_mdb_t
Version	01.63
Input	10
Output	15
Input/Output	0
Public Variable	6

Graphical Representation



TeSys T Compliance

The Ctrl_cmd_mdb_t DFB is compliant with all the TeSys T LTM R••M•• controller versions, with or without the LTM E expansion module.

Software Implementation

- The parameters and the inputs can only be changed if the End_st output variable is set to 1.
- The output data is only valid if the End_st output variable is set to 1 and if there is no fault detected (Fault_st = 0).

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Slav_num	WORD	1...31	1	Modbus slave number
Prog_num	WORD	1...30	–	See *Program Number, page 55*
Rst_cmd	EBOOL	0...1	0	Reset command
Strt_cmd	EBOOL	0...1	0	Start command
Run_fwd	EBOOL	0...1	0	Motor run forward command
Run_rev	EBOOL	0...1	0	Motor run reverse command
Rst_flt	EBOOL	0...1	0	Fault reset command
Autotest	EBOOL	0...1	0	Self test command
Lo_speed	EBOOL	0...1	0	Motor low speed command
In_word	WORD	–	–	This input is only used when program number is 10, 20, or 30. See next table and program number description.

The following table describes the In_word input:

Input	Type	Bit	Description
In_word	WORD	0	Motor run forward command
		1	Motor run reverse command
		2	Reserved
		3	Fault reset command
		4	Reserved
		5	Self test command
		6	Motor low speed command
		7...15	Reserved

Program Number

The program number enables the user to select bit or word control.

The following table describes the programs of the DFB:

Program Number	Description
1	Read registers 455 and 456, then write register 704 (systematic)
2	Read registers 455 and 456, then write register 704 (conditional)
3	Write register 704
10	Same as program 1 but using the In_word input and the Out_word output
20	Same as program 2 but using the In_word input and the Out_word output
30	Same as program 3 but using the In_word input and the Out_word output

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Fault_st	EBOOL	0...1	0	Fault detected
Rst_st	EBOOL	0...1	0	Reset state
End_st	EBOOL	0...1	0	End state
Ready	EBOOL	0...1	0	System ready
Syst_on	EBOOL	0...1	0	System On
Fault	EBOOL	0...1	0	System fault
Alarm	EBOOL	0...1	0	System warning
Tripped	EBOOL	0...1	0	System tripped
Rst_auth	EBOOL	0...1	0	Fault reset authorized
Ctrl_pwr	EBOOL	0...1	0	Controller power
Running	EBOOL	0...1	0	Motor running (with detection of a current, if greater than 10% FLC)
Avg_curr	WORD	0...200	0	Motor average current ratio (x 1% FLC)
Starting	EBOOL	0...1	0	Motor starting (start in progress) 0 = descending current is less than 150% FLC 1 = ascending current is greater than 10% FLC
Hi_speed	EBOOL	0...1	0	Motor high speed
Out_word	DWORD	–	–	This output is only used when program number is 10, 20, or 30. See next table and program number description.

The following table describes the Out_word output:

Output	Type	Bit	Description
Out_word	DWORD	0	System ready
		1	System On
		2	System fault
		3	System warning
		4	System tripped
		5	Fault reset authorized
		6	Controller power
		7	Motor running (with detection of a current, if greater than 10% FLC)
		8...13	Motor average current ratio 32 = 100% FLC 63 = 200% FLC
		14	Control through HMI
		15	Motor starting (start in progress) 0 = descending current is less than 150% FLC 1 = ascending current is greater than 10% FLC
		16	Auto-reset active
		17	Not significant
		18	Power cycle requested
		19	Motor restart time undefined
		20	Rapid cycle lockout
		21	Load shedding
		22	Motor speed 0 = FLC1 setting is used 1 = FLC2 setting is used
		23	HMI port communication loss
		24	Network port communication loss
		25	Motor transition lockout
		26...31	Not significant

Public Variables Characteristics

The following table describes the Ctrl_cmd_mdb_t DFB public variables:

Public Variable	Type	Range	Default Value	Description
Net_num	WORD	100...255	100	Network address
Stat_num	WORD	0...255	0	Station address
Rack_num	WORD	0...7	0	Destination rack address
Slot_num	WORD	0...10	0	Destination slot address
Chan_num	WORD	0...1	0	Destination channel address
Sq_princ	WORD	0...7	0	Reserved for support

Comm_manager_t: TeSys T Communication Management for Modbus SL

Presentation

The Comm_manager_t DFB is dedicated to the control and command of up to 31 TeSys T LTMR••M•• Modbus SL controllers with or without the LTM E expansion module through the Modbus SL network. It must be associated with the Ctrl_cmd_mdb_t DFB to manage the Modbus requests sequencing.

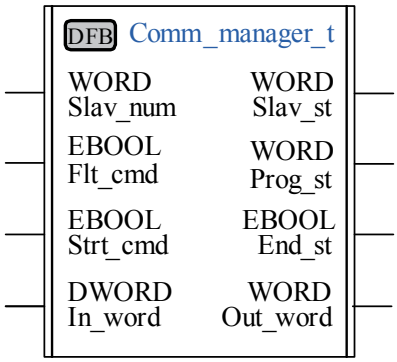
The number of TeSys T Modbus slaves is defined in the Slav_num variable (Slav_num = 1...31).

For more information, see the *TeSys T LTM R Modbus Motor Management Controller User Manual*.

Characteristics

Characteristic	Value
Name	Comm_manager_t
Version	00.62
Input	4
Output	4
Input/Output	0
Public Variable	3

Graphical Representation

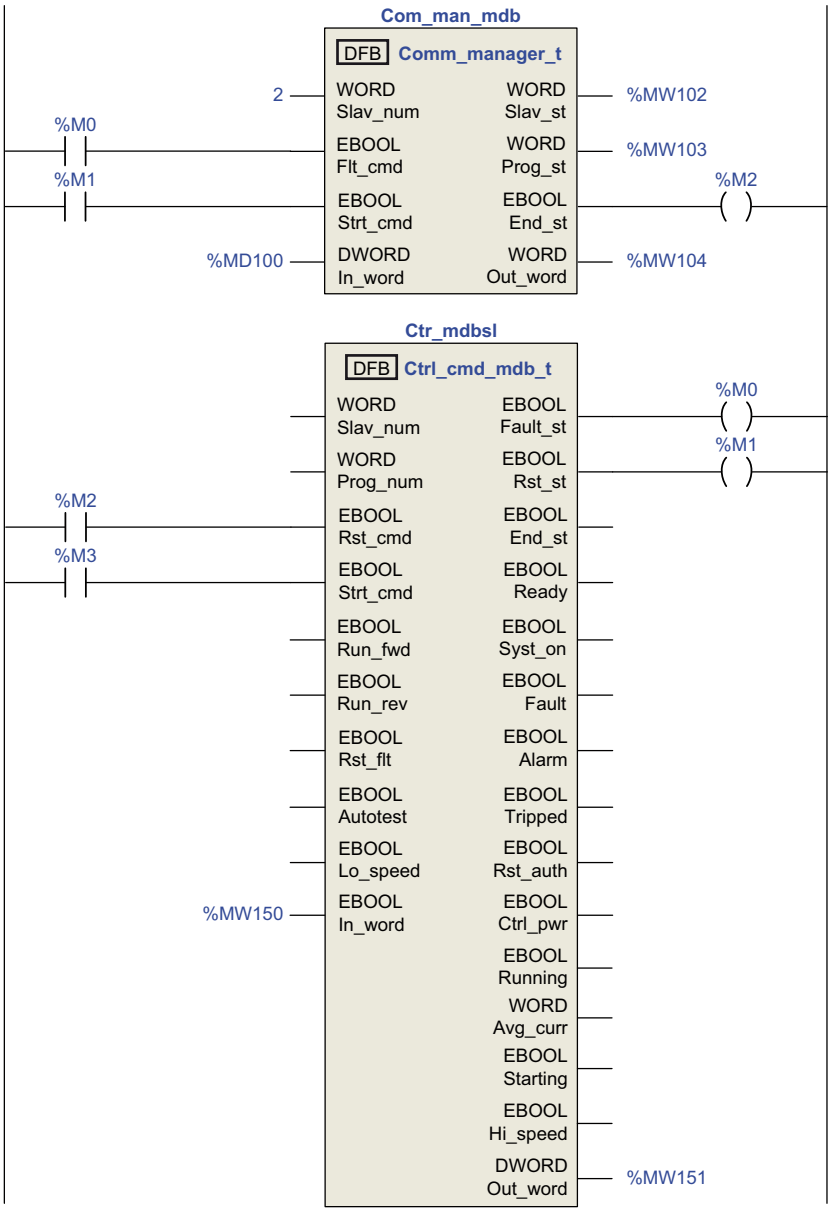


TeSys T Compliance

The Comm_manager_t DFB is compliant with all the TeSys T LTM R••M•• controller versions, with or without the LTM E expansion module.

Software Implementation

The following figure shows a PL7 program extract in ladder language showing how to interconnect the Ctrl_cmd_mdb_t and the Comm_manager_t DFBs:



The Comm_manager_t DFB can be used in case both TeSys U starter-controllers and TeSys T motor management systems are present on the same Modbus SL network.

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Slav_num	WORD	1...31	1	Modbus slave number
Flt_cmd	EBOOL	0...1	0	Reset command
Strt_cmd	EBOOL	0...1	0	Start command
In_word	DWORD	–	–	To connect to the Out_word output of the Ctrl_cmd_mdb_t DFB

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Slav_st	WORD	1...31	1	Modbus slave number
Prog_st	WORD	20 or 30	–	Program number of the Ctrl_cmd_mdb_t DFB
End_st	EBOOL	0...1	0	End state
Out_word	WORD	–	–	To connect to the In_word input of the Ctrl_cmd_mdb_t DFB

Public Variables Characteristics

The following table describes the DFB public variables:

Public Variable	Type	Range	Default Value	Description
In_cmd[0]...[31]	ARRAY [0...31] of WORD	–	–	See *In_cmd[0]...[31] Public Variable, page 60*
Out_urg	WORD	–	–	Priority level Bit 0 = Pulling Bit 1 = Writing priority Bit 2 = Reading priority Bit 3 = Fault priority
Out_st[0]...[31]	ARRAY [0...31] of WORD	–	–	See *Out_st[0]...[31] Public Variable, page 61*

In_cmd[0]...[31] Public Variable

The In_cmd[0]...[31] public variable is a table of 32 words corresponding to the TeSys T Modbus slave address. The following table describes the In_cmd[0]...[31] public variable:

Public Variable	Type	Bit	Description Corresponding to the TeSys T Slave 1...31
In_cmd[0]	WORD	–	Not significant
In_cmd[1]...[31]	WORD	0	Motor run forward command
		1	Motor run reverse command
		2	Reserved
		3	Fault reset command
		4	Reserved
		5	Self test command
		6	Motor low speed command
		7...31	Reserved

Out_st[0]...[31] Public Variable

The Out_st[0]...[31] public variable is a table of 32 words corresponding to the TeSys T Modbus slave address.The following table describes the Out_st[0]....[31] public variable:

Public Variable	Type	Bit	Description Corresponding to the TeSys T Slave 1...31
Out_st[0]	DWORD	–	Not significant
Out_st[1]...[31]	DWORD	0	System ready
		1	System On
		2	System fault
		3	System warning
		4	System tripped
		5	Fault reset authorized
		6	Controller power
		7	Motor running (with detection of a current, if greater than 10% FLC)
		8...13	Motor average current ratio 32 = 100% FLC 63 = 200% FLC
		14	Control through HMI
		15	Motor starting (start in progress) 0 = descending current is less than 150% FLC 1 = ascending current is greater than 10% FLC
		16	Auto-reset active
		17	Not significant
		18	Power cycle requested
		19	Motor restart time undefined
		20	Rapid cycle lockout
		21	Load shedding
		22	Motor speed 0 = FLC1 setting is used 1 = FLC2 setting is used
		23	HMI port communication loss
		24	Network port communication loss
		25	Motor transition lockout
		26...31	Not significant

The Out_st[0]...[31] public variable is a table of 32 words corresponding to the TeSys T Modbus slave address.The following table describes the Out_st[0]....[31] public variable:

Public Variable	Type	Bit	Description Corresponding to the TeSys T Slave 1...31
Out_st[0]	DWORD	–	Not significant
Out_st[1]...[31]	DWORD	0	System ready
		1	System On
		2	System fault
		3	System warning
		4	System tripped
		5	Fault reset authorized
		6	Controller power
		7	Motor running (with detection of a current, if greater than 10% FLC)
		8...13	Motor average current ratio 32 = 100% FLC 63 = 200% FLC
		14	Control through HMI
		15	Motor starting (start in progress) 0 = descending current is less than 150% FLC 1 = ascending current is greater than 10% FLC
		16	Auto-reset active
		17	Not significant
		18	Power cycle requested
		19	Motor restart time undefined
		20	Rapid cycle lockout
		21	Load shedding
		22	Motor speed 0 = FLC1 setting is used 1 = FLC2 setting is used
		23	HMI port communication loss
		24	Network port communication loss
		25	Motor transition lockout
		26...31	Not significant

Modbus SL and Modbus/TCP DFB

4

Introduction

This chapter describes the TeSys U and TeSys T Modbus SL and Modbus/TCP DFBs .

What's in this Chapter?

This chapter contains the following topics:

Special_mdb_u : TeSys U DFB for Modbus SL and Modbus/TCP

Presentation

The Special_mdb_u DFB is dedicated to the reading of up to 16 predefined registers of a TeSys U starter-controller (up to 32 A/15 kW or 20 hp) equipped with a LUCM multifunction control unit and a LULC033 Modbus communication module directly through a Modbus SL network or through an Ethernet gateway with a Modbus/TCP network.

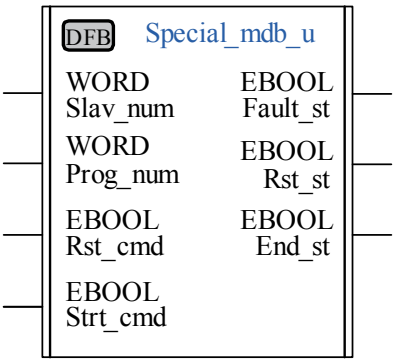
Special_mdb_u uses XWAY addressing and is dedicated to Premium PLCs.

For more information, see the *TeSys U LULC032-033 Modbus Communication Module User Manual*.

Characteristics

Characteristic	Value
Name	Special_mdb_u
Version	00.34
Input	4
Output	3
Input/Output	0
Public Variable	7

Graphical Representation



TeSys U Compliance

The Special_mdb_u DFB is compliant with the following TeSys U sub-assemblies:

Power base	• LUB•• non-reversing power base (up to 32 A/15 kW or 20 hp) • LU2B•• reversing power base (up to 32 A/15 kW or 20 hp)
Control unit	• LUCM multifunction control unit
Communication module	• LULC033 Modbus communication module

Software Implementation

- The parameters and the inputs can only be changed if the End_st output variable is set to 1.
- With version 1.00:
  The output data is only valid if the End_st output variable is set to 1 and if there is no fault detected (Fault_st = 0).
- With version 1.10:
  The output data is only valid if there is no fault detected (Fault_st = 0).
  Prog_num input can be modified on the fly.

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Slav_num	WORD	1...31	1	Modbus slave number
Prog_num	WORD	0...6	0	Program number See *Program Number, page 65*
Rst_cmd	EBOOL	0...1	0	Reset command
Strt_cmd	EBOOL	0...1	0	Start command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Fault_st	EBOOL	0...1	0	Fault detected
Rst_st	EBOOL	0...1	0	Reset state
End_st	EBOOL	0...1	0	End state

Program Number

The Prog_num input variable enables the user to define the public variables data depending on the application type. Each program uses variables related to one application (diagnostic, maintenance, measurement,...). The following table describes the programs of the DFB:

Program Number	Description
0	Bypass: no action
1	Diagnostic: faults monitoring variables, warnings monitoring variables, and communication monitoring variables
2	Maintenance: global statistics variables
3	Measurements: measurements monitoring variables
4	Statistics: last trip statistics and trip N–1 statistics
5	Statistics: trip N–2 statistics and trip N–3 statistics
6	Statistics: trip N–4 statistics

Public Variables Characteristics

The following table describes the Special_mdb_u DFB public variables:

Public Variable	Type	Range	Default Value	Description
Net_num	WORD	100...255	100	Network address
Stat_num	WORD	0...255	0	Station address
Rack_num	WORD	0...7	0	Destination rack address
Slot_num	WORD	0...10	0	Destination slot address
Chan_num	WORD	0...1	0	Destination channel address
Sq_princ	WORD	0...7	0	Reserved for support
Out_data[0]...[15]	ARRAY [0...15] of WORD	0...65535	0	The output data depends on the program number. See *Out_data[0]...[15] Public Variable (Program 1), page 66*...*Out_data[0]...[15] Public Variable (Program 6), page 69*

Out_data[0]...[15] Public Variable (Program 1)

The following table describes the Out_data[0]...[15] public variable in the case of the diagnostic program (program number 1):

Public Variable	Type	Register	Bit	Description
Out_data[0]	WORD	452	0	Short-circuit fault
			1	Magnetic fault
			2	Ground fault
			3	Thermal fault
			4	Long start fault
			5	Jam fault
			6	Phase imbalance fault
			7	Underload fault
			8	Shunt trip fault
			9	Test trip fault
			10	Communication loss fault on LUCM Modbus port
			11	Control unit internal fault
			12	Module identification or internal communication fault
			13	Module internal fault
			14	Module trip fault
			15	Module drop-out fault
Out_data[1]	WORD	461	0...1	Not significant
			2	Ground fault warning
			3	Thermal warning
			4	Long start warning
			5	Jam warning
			6	Phase imbalance warning
			7	Under-current warning
			8...9	Not significant
			10	Communication loss fault on LUCM Modbus port
			11	Internal temperature warning
			12	Module identification or internal communication warning
			13...14	Not significant
			15	Module warning
Out_data[2]	WORD	457	0	Button position On (0 = Off)
			1	Button position Trip (0 = Not tripped)
			2	Contactor state On
			3	24 Vdc power supply present on outputs
			4...15	Not significant
Out_data[3]	WORD	450	–	Time to automatic reset on thermal fault(s)
Out_data[4] ...Out_data[15]	–	–	–	Not significant

Out_data[0]...[15] Public Variable (Program 2)

The following table describes the Out_data[0]...[15] public variable in the case of the maintenance program (program number 2):

Public Variable	Type	Register	Description
Out_data[0]	WORD	100	Short-circuit faults count
Out_data[1]	WORD	101	Magnetic faults count
Out_data[2]	WORD	102	Ground faults count
Out_data[3]	WORD	103	Thermal faults count
Out_data[4]	WORD	104	Long start faults count
Out_data[5]	WORD	105	Jam faults count
Out_data[6]	WORD	106	Phase imbalance faults count
Out_data[7]	WORD	108	Shunt trip faults count
Out_data[8]	WORD	115	Auto-resets count
Out_data[9]	WORD	116	Thermal warnings count
Out_data[10]	WORD	117	Starts count (LSB)
Out_data[11]	WORD	118	Starts count (MSB)
Out_data[12]	WORD	119	Operating time (LSB)
Out_data[13]	WORD	120	Operating time (MSB)
Out_data[14]	WORD	121	Maximum internal temperature (°C)
Out_data[15]	–	–	Not significant

Out_data[0]...[15] Public Variable (Program 3)

The following table describes the Out_data[0]...[15] public variable in the case of the measurements program (program number 3):

Public Variable	Type	Register	Description
Out_data[0]	–	–	Not significant
Out_data[1]	WORD	465	Thermal capacity level (%)
Out_data[2]	WORD	466	Average motor current (x 0.1 % FLA)
Out_data[3]	WORD	467	L1 current (% FLA)
Out_data[4]	WORD	468	L2 current (% FLA)
Out_data[5]	WORD	469	L3 current (% FLA)
Out_data[6]	WORD	470	Ground current (% FLA min)
Out_data[7]	WORD	471	Current imbalance coefficient
Out_data[8]	WORD	472	Control unit internal temperature (°C)
Out_data[9] ...Out_data[13]	–	–	Not significant
Out_data[14]	WORD	79	Control unit sensor maximum current (x 0.1 A): ● 6 = adjustment range 0.15–0.6 A ● 14 = adjustment range 0.35–1.4 A ● 50 = adjustment range 1.25–5 A ● 120 = adjustment range 3–12 A ● 180 = adjustment range 4.5–18 A ● 320 = adjustment range 8–32 A
Out_data[15]	WORD	652	Full load amps setting (% FLA max): ● minimum = 25 (default value) ● maximum = 100

Out_data[0]...[15] Public Variable (Program 4)

The following table describes the Out_data[0]...[15] public variable in the case of the statistics program (program number 4):

Public Variable	Type	Register	Description
Out_data[0]	WORD	150	Last trip fault number
Out_data[1]	WORD	152	Last trip thermal capacity level (% trip level)
Out_data[2]	WORD	153	Last trip average current (% FLA)
Out_data[3]	WORD	154	Last trip L1 current (% FLA)
Out_data[4]	WORD	155	Last trip L2 current (% FLA)
Out_data[5]	WORD	156	Last trip L3 current (% FLA)
Out_data[6]	WORD	157	Last trip ground current (% FLA min)
Out_data[7]	WORD	180	N–1 trip fault number
Out_data[8]	WORD	182	N–1 trip thermal capacity level (% trip level)
Out_data[9]	WORD	183	N–1 trip average current (% FLA)
Out_data[10]	WORD	184	N–1 trip L1 current (% FLA)
Out_data[11]	WORD	185	N–1 trip L2 current (%FLA)
Out_data[12]	WORD	186	N–1 trip L3 current (% FLA)
Out_data[13]	WORD	187	N–1 trip ground current (% FLA min)
Out_data[14]	WORD	79	Control unit sensor maximum current (x 0.1 A): ● 6 = adjustment range 0.15–0.6 A ● 14 = adjustment range 0.35–1.4 A ● 50 = adjustment range 1.25–5 A ● 120 = adjustment range 3–12 A ● 180 = adjustment range 4.5–18 A ● 320 = adjustment range 8–32 A
Out_data[15]	WORD	652	Full load amps setting (% FLA max): ● minimum = 25 (default value) ● maximum = 100

Out_data[0]...[15] Public Variable (Program 5)

The following table describes the Out_data[0]...[15] public variable in the case of the statistics program (program number 5):

Public Variable	Type	Register	Description
Out_data[0]	WORD	210	N–2 trip fault number
Out_data[1]	WORD	212	N–2 trip thermal capacity level (% trip level)
Out_data[2]	WORD	213	N–2 trip average current (% FLA)
Out_data[3]	WORD	214	N–2 trip L1 current (% FLA)
Out_data[4]	WORD	215	N–2 trip L2 current (% FLA)
Out_data[5]	WORD	216	N–2 trip L3 current (% FLA)
Out_data[6]	WORD	217	N–2 trip ground current (% FLA min)
Out_data[7]	WORD	240	N–3 trip fault number
Out_data[8]	WORD	242	N–3 trip thermal capacity level (% trip level)
Out_data[9]	WORD	243	N–3 trip average current (% FLA)
Out_data[10]	WORD	244	N–3 trip L1 current (% FLA)
Out_data[11]	WORD	245	N–3 trip L2 current (%FLA)
Out_data[12]	WORD	246	N–3 trip L3 current (% FLA)
Out_data[13]	WORD	247	N–3 trip ground current (% FLA min)
Out_data[14]	WORD	79	Control unit sensor maximum current (x 0.1 A): ● 6 = adjustment range 0.15–0.6 A ● 14 = adjustment range 0.35–1.4 A ● 50 = adjustment range 1.25–5 A ● 120 = adjustment range 3–12 A ● 180 = adjustment range 4.5–18 A ● 320 = adjustment range 8–32 A
Out_data[15]	WORD	652	Full load amps setting (% FLA max): ● minimum = 25 (default value) ● maximum = 100

Out_data[0]...[15] Public Variable (Program 6)

The following table describes the Out_data[0]...[15] public variable in the case of the statistics program (program number 6):

Public Variable	Type	Register	Description
Out_data[0]	WORD	270	N–4 trip fault number
Out_data[1]	WORD	272	N–4 trip thermal capacity level (% trip level)
Out_data[2]	WORD	273	N–4 trip average current (% FLA)
Out_data[3]	WORD	274	N–4 trip L1 current (% FLA)
Out_data[4]	WORD	275	N–4 trip L2 current (% FLA)
Out_data[5]	WORD	276	N–4 trip L3 current (% FLA)
Out_data[6]	WORD	277	N–4 trip ground current (% FLA min)
Out_data[7] ...Out_data[13]	–	–	Reserved
Out_data[14]	WORD	79	Control unit sensor maximum current (x 0.1 A): ● 6 = adjustment range 0.15–0.6 A ● 14 = adjustment range 0.35–1.4 A ● 50 = adjustment range 1.25–5 A ● 120 = adjustment range 3–12 A ● 180 = adjustment range 4.5–18 A ● 320 = adjustment range 8–32 A
Out_data[15]	WORD	652	Full load amps setting (% FLA max): ● minimum = 25 (default value) ● maximum = 100

Special_mdb_t : TeSys T DFB for Modbus SL and Modbus/TCP

Presentation

The Special_mdb_t DFB is dedicated to the reading of up to 16 predefined registers of a TeSys T LTM R••M•• controller through the Modbus SL network or a TeSys T LTM R••E•• controller through the Modbus/TCP network.

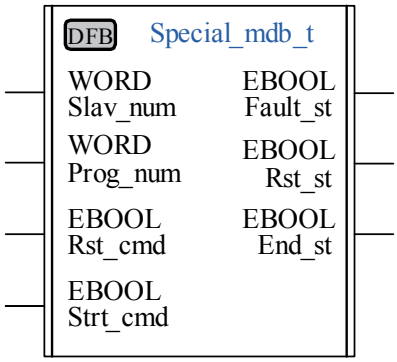
Special_mdb_t uses XWAY addressing and is dedicated to Premium PLCs.

For more information, see:
- *TeSys T LTM R Modbus SL Motor Management Controller User Manual*
- *TeSys T LTM R Modbus/TCP Motor Management Controller User Manual*

Characteristics

Characteristic	Value
Name	Special_mdb_t
Version	00.56
Input	4
Output	3
Input/Output	0
Public Variable	7

Graphical Representation



TeSys T Compliance

The Special_mdb_t DFB is compliant with all the TeSys T LTM R••M•• and LTM R••E•• controller versions, with or without the LTM E expansion module.

Software Implementation

- The parameters and the inputs can only be changed if the End_st output variable is set to 1.
- With version 1.00:
  The output data is only valid if the End_st output variable is set to 1 and if there is no fault detected (Fault_st = 0).
- With version 1.10:
  The output data is only valid if there is no fault detected (Fault_st = 0).
  Prog_num input can be modified on the fly.

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Slav_num	WORD	1...31	1	Modbus slave number
Prog_num	WORD	0...6	0	Program number See *Program Number, page 71*
Rst_cmd	EBOOL	0...1	0	Reset command
Strt_cmd	EBOOL	0...1	0	Start command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Fault_st	EBOOL	0...1	0	Fault detected
Rst_st	EBOOL	0...1	0	Reset state
End_st	EBOOL	0...1	0	End state

Program Number

The Prog_num input variable enables the user to define the public variables data depending on the application type. Each program holds variables related to one application (diagnostic, maintenance, measurement,...). The following table describes the programs of the DFB:

Program Number	Description
0	Bypass: no action
10	Diagnostic: faults monitoring variables, warnings monitoring variables, and communication monitoring variables
20	Maintenance: global statistics variables
30	Measurements 1
31	Measurements 2
32	Measurements 3
40	Statistics: last fault statistics (N–0)
41	Statistics: last fault statistics with expansion module (N–0)
50	Statistics: N–1 fault statistics
51	Statistics: N–1 fault statistics (with expansion module)
60	Statistics: N–2 fault statistics
61	Statistics: N–2 fault statistics (with expansion module)
70	Statistics: N–3 fault statistics
71	Statistics: N–3 fault statistics (with expansion module)
80	Statistics: N–4 fault statistics
81	Statistics: N–4 fault statistics (with expansion module)

Public Variables Characteristics

The following table describes the Special_mdb_t DFB public variables:

Public Variable	Type	Range	Default Value	Description
Net_num	WORD	100...255	100	Network address
Stat_num	WORD	0...255	0	Station address
Rack_num	WORD	0...7	0	Destination rack address
Slot_num	WORD	0...10	0	Destination slot address
Chan_num	WORD	0...1	0	Destination channel address
Sq_princ	WORD	0...7	0	Reserved for support
Out_data[0]...[15]	ARRAY [0...15] of WORD	0...65535	0	The output data depends on the program number. See *Out_data[0]...[15] Public Variable (Program 1), page 66*...*Out_data[0]...[15] Public Variable (Program 6), page 69*

Out_data[0]...[15] Public Variable (Program 10)

The following table describes the Out_data[0]...[15] public variable in the case of the diagnostic program (program number 10):

Public Variable	Type	Register	Bit	Description
Out_data[0]	WORD	452	0...1	Reserved
			2	Ground current fault
			3	Thermal overload fault
			4	Long start fault
			5	Jam fault
			6	Current phase imbalance fault
			7	Undercurrent fault
			8	Reserved
			9	Test fault
			10	HMI port fault
			11	Controller internal fault
			12	Internal port fault
			13	Not significant
			14	Network port config fault
			15	Network port fault
Out_data[1]	WORD	453	0	External system fault
			1	Diagnostic fault
			2	Wiring fault
			3	Overcurrent fault
			4	Current phase loss fault
			5	Current phase reversal fault
			6	Motor temperature sensor fault (1)
			7	Voltage phase imbalance fault (1)
			8	Voltage phase loss fault (1)
			9	Voltage phase reversal fault (1)
			10	Undervoltage fault (1)
			11	Overvoltage fault (1)
			12	Underpower fault (1)
			13	Overpower fault (1)
			14	Under power factor fault (1)
			15	Over power factor fault (1)
Out_data[2]	WORD	461	0...1	Not significant
			2	Ground current warning
			3	Thermal overload warning
			4	Not significant
			5	Jam warning
			6	Current phase imbalance warning
			7	Undercurrent warning
			8...9	Not significant
			10	HMI port warning
			11	Controller internal temperature warning
			12...14	Not significant
			15	Network port warning

Public Variable	Type	Register	Bit	Description
Out_data[3]	WORD	462	0	Not significant
			1	Diagnostic warning
			2	Reserved
			3	Overcurrent warning
			4	Current phase loss warning
			5	Current phase reversal warning
			6	Motor temperature sensor warning
			7	Voltage phase imbalance warning (1)
			8	Voltage phase loss warning (1)
			9	Not significant
			10	Undervoltage warning (1)
			11	Overvoltage warning (1)
			12	Underpower warning (1)
			13	Overpower warning (1)
			14	Under power factor warning (1)
			15	Over power factor warning (1)
Out_data[4]	WORD	457	0	Logic input 1
			1	Logic input 2
			2	Logic input 3
			3	Logic input 4
			4	Logic input 5
			5	Logic input 6
			6	Logic input 7
			7	Logic input 8 (1)
			8	Logic input 9 (1)
			9	Logic input 10 (1)
			10	Logic input 11 (1)
			11	Logic input 12 (1)
			12	Logic input 13 (1)
			13	Logic input 14 (1)
			14	Logic input 15 (1)
			15	Logic input 16 (1)
Out_data[5]	WORD	458	0	Logic output 1
			1	Logic output 2
			2	Logic output 3
			3	Logic output 4
			4	Logic output 5 (1)
			5	Logic output 6 (1)
			6	Logic output 7 (1)
			7	Logic output 8 (1)
			8...15	Reserved
Out_data[6]	WORD	450	–	Minimum wait time (s)
Out_data[7] ...Out_data[15]	–	–	–	Reserved
(1) The variable is available for the LTM R controller and the LTM EV40 expansion module combination.				

Out_data[0]...[15] Public Variable (Program 20)

The following table describes the Out_data[0]...[15] public variable in the case of the maintenance program (program number 20):

Public Variable	Type	Register	Description
Out_data[0]	WORD	102	Ground current faults count
Out_data[1]	WORD	103	Thermal overload faults count
Out_data[2]	WORD	104	Long start faults count
Out_data[3]	WORD	105	Jam faults count
Out_data[4]	WORD	106	Current phase imbalance faults count
Out_data[5]	WORD	107	Undercurrent faults count
Out_data[6]	–	–	Reserved
Out_data[7]	WORD	114	Network port faults count
Out_data[8]	WORD	115	Auto-resets count
Out_data[9]	WORD	116	Thermal overload warnings count
Out_data[10]	WORD	117	Motor starts count (LSB)
Out_data[11]	WORD	118	Motor starts count (MSB)
Out_data[12]	WORD	119	Operating time (s) (LSB)
Out_data[13]	WORD	120	Operating time (MSB)
Out_data[14]	WORD	121	Maximum controller internal temperature (°C)
Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 30)

The following table describes the Out_data[0]...[15] public variable in the case of the first measurements program (program number 30):

Public Variable	Type	Register	Description
Out_data[0]	–	–	Reserved
Out_data[1]	WORD	465	Thermal capacity level (% trip level)
Out_data[2]	WORD	466	Average current ratio (% FLC)
Out_data[3]	WORD	467	L1 current ratio (% FLC)
Out_data[4]	WORD	468	L2 current ratio (% FLC)
Out_data[5]	WORD	469	L3 current ratio (% FLC)
Out_data[6]	WORD	470	Ground current ratio (x 0.1 % FLC min)
Out_data[7]	WORD	471	Current phase imbalance (%)
Out_data[8]	WORD	472	Controller internal temperature (°C)
Out_data[9]	WORD	474	Frequency (x 0.01 Hz)
Out_data[10]	WORD	475	Motor temperature sensor (x 0.1 Ω)
Out_data[11] ...Out_data[13]	–	–	Reserved
Out_data[14]	WORD	96	Full load current (FLC) max (x 0.1 A)
Out_data[15]	WORD	652	Motor full load current ratio

Out_data[0]...[15] Public Variable (Program 31)

The following table describes the Out_data[0]...[15] public variable in the case of the second measurements program (program number 31):

Public Variable	Type	Register	Description
Out_data[0]	WORD	500	Average current (x 0.01 A) MSB
Out_data[1]	WORD	501	Average current (x 0.01 A) LSB
Out_data[2]	WORD	502	L1 current (x 0.01 A) MSB
Out_data[3]	WORD	503	L1 current (x0.01 A) LSB
Out_data[4]	WORD	504	L2 current (x 0.01 A) MSB
Out_data[5]	WORD	505	L2 current (x0.01 A) LSB
Out_data[6]	WORD	506	L3 current (x 0.01 A) MSB
Out_data[7]	WORD	507	L3 current (x0.01 A) LSB
Out_data[8]	WORD	508	Ground current (x 0.001 A) MSB
Out_data[9]	WORD	509	Ground current (x 0.001 A) LSB
Out_data[10]	WORD	511	Time to trip (x 1 s)
Out_data[11]	WORD	512	Motor last start current ratio (% FLC)
Out_data[12]	WORD	513	Motor last start duration (s)
Out_data[13]	WORD	514	Motor starts per hour count
Out_data[14] ...Out_data[15]	–	–	–

Out_data[0]...[15] Public Variable (Program 32)

The following table describes the Out_data[0]...[15] public variable in the case of the third measurements program (program number 32):

Public Variable	Type	Register	Description
Out_data[0]	WORD	476	Average voltage (V)
Out_data[1]	WORD	477	L3–L1 voltage (V)
Out_data[2]	WORD	478	L1–L2 voltage (V)
Out_data[3]	WORD	479	L2–L3 voltage (V)
Out_data[4]	WORD	480	Voltage phase imbalance (%)
Out_data[5]	WORD	481	Power factor (x 0.01)
Out_data[6]	WORD	482	Active power (x 0.1 kW)
Out_data[7]	WORD	483	Reactive power (x 0.1 kVAr)
Out_data[8] ...Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 40)

The following table describes the Out_data[0]...[15] public variable in the case of the last fault statistics program (program number 40):

Public Variable	Type	Register	Description
Out_data[0]	WORD	150	Detected fault code N–0
Out_data[1]	WORD	151	Motor full load current ratio N–0 (% FLC max)
Out_data[2]	WORD	152	Thermal capacity level N–0 (% trip level)
Out_data[3]	WORD	153	Average current ratio N–0 (% FLC)
Out_data[4]	WORD	154	L1 current ratio N–0 (% FLC)
Out_data[5]	WORD	155	L2 current ratio N–0 (% FLC)
Out_data[6]	WORD	156	L3 current ratio N–0 (% FLC)
Out_data[7]	WORD	157	Ground current ratio N–0 (x 0.1 % FLC min)
Out_data[8]	WORD	158	Full load current max N–0 (x 0.1 A)
Out_data[9]	WORD	159	Current phase imbalance N–0 (%)
Out_data[10]	WORD	160	Frequency N–0 (x 0.1 Hz)
Out_data[11]	WORD	161	Motor temperature sensor N–0 (x 0.1 Ω)
Out_data[12]	WORD[4]	162	Date and time N–0 See *DT_DateTime, page 118*
Out_data[13]		163	
Out_data[14]		164	
Out_data[15]		165	

Out_data[0]...[15] Public Variable (Program 41)

The following table describes the Out_data[0]...[15] public variable in the case of the last fault statistics with expansion module program (program number 41):

Public Variable	Type	Register	Description
Out_data[0]	WORD	166	Average voltage N–0 (V)
Out_data[1]	WORD	167	L3–L1 voltage N–0 (V)
Out_data[2]	WORD	168	L1–L2 voltage N–0 (V)
Out_data[3]	WORD	169	L2–L3 voltage N–0 (V)
Out_data[4]	WORD	170	Voltage phase imbalance N–0 (%)
Out_data[5]	WORD	171	Active power N–0 (kW)
Out_data[6]	WORD	172	Power factor N–0 (x 0.01)
Out_data[7] ...Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 50)

The following table describes the Out_data[0]...[15] public variable in the case of the N–1 fault statistics program (program number 50):

Public Variable	Type	Register	Description
Out_data[0]	WORD	180	Detected fault code N–1
Out_data[1]	WORD	181	Motor full load current ratio N–1 (% FLC max)
Out_data[2]	WORD	182	Thermal capacity level N–1 (% trip level)
Out_data[3]	WORD	183	Average current ratio N–1 (% FLC)
Out_data[4]	WORD	184	L1 current ratio N–1 (% FLC)
Out_data[5]	WORD	185	L2 current ratio N–1 (% FLC)
Out_data[6]	WORD	186	L3 current ratio N–1 (% FLC)
Out_data[7]	WORD	187	Ground current ratio N–1 (x 0.1 % FLC min)
Out_data[8]	WORD	188	Full load current max N–1 (x 0.1 A)
Out_data[9]	WORD	189	Current phase imbalance N–1 (%)
Out_data[10]	WORD	190	Frequency N–1 (x 0.1 Hz)
Out_data[11]	WORD	191	Motor temperature sensor N–1 (x 0.1 Ω)
Out_data[12]	WORD[4]	192	Date and time N–1 See *DT_DateTime, page 118*
Out_data[13]		193	
Out_data[14]		194	
Out_data[15]		195	

Out_data[0]...[15] Public Variable (Program 51)

The following table describes the Out_data[0]...[15] public variable in the case of the N–1 fault statistics with expansion module program (program number 51):

Public Variable	Type	Register	Description
Out_data[0]	WORD	196	Average voltage N–1 (V)
Out_data[1]	WORD	197	L3–L1 voltage N–1 (V)
Out_data[2]	WORD	198	L1–L2 voltage N–1 (V)
Out_data[3]	WORD	199	L2–L3 voltage N–1 (V)
Out_data[4]	WORD	200	Voltage phase imbalance N–1 (%)
Out_data[5]	WORD	201	Active power N–1 (kW)
Out_data[6]	WORD	202	Power factor N–1 (x 0.01)
Out_data[7] ...Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 60)

The following table describes the Out_data[0]...[15] public variable in the case of the N–2 fault statistics program (program number 60):

Public Variable	Type	Register	Description
Out_data[0]	WORD	210	Detected fault code N–2
Out_data[1]	WORD	211	Motor full load current ratio N–2 (% FLC max)
Out_data[2]	WORD	212	Thermal capacity level N–2 (% trip level)
Out_data[3]	WORD	213	Average current ratio N–2 (% FLC)
Out_data[4]	WORD	214	L1 current ratio N–2 (% FLC)
Out_data[5]	WORD	215	L2 current ratio N–2 (% FLC)
Out_data[6]	WORD	216	L3 current ratio N–2 (% FLC)
Out_data[7]	WORD	217	Ground current ratio N–2 (x 0.1 % FLC min)
Out_data[8]	WORD	218	Full load current max N–2 (x 0.1 A)
Out_data[9]	WORD	219	Current phase imbalance N–2 (%)
Out_data[10]	WORD	220	Frequency N–2 (x 0.1 Hz)
Out_data[11]	WORD	221	Motor temperature sensor N–2 (x 0.1 Ω)
Out_data[12]	WORD[4]	222	Date and time N–2 See *DT_DateTime, page 118*
Out_data[13]		223	
Out_data[14]		224	
Out_data[15]		225	

Out_data[0]...[15] Public Variable (Program 61)

The following table describes the Out_data[0]...[15] public variable in the case of the N–2 fault statistics with expansion module program (program number 61):

Public Variable	Type	Register	Description
Out_data[0]	WORD	226	Average voltage N–2 (V)
Out_data[1]	WORD	227	L3–L1 voltage N–2 (V)
Out_data[2]	WORD	228	L1–L2 voltage N–2 (V)
Out_data[3]	WORD	229	L2–L3 voltage N–2 (V)
Out_data[4]	WORD	230	Voltage phase imbalance N–2 (%)
Out_data[5]	WORD	231	Active power N–2 (kW)
Out_data[6]	WORD	232	Power factor N–2 (x 0.01)
Out_data[7] ...Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 70)

The following table describes the Out_data[0]...[15] public variable in the case of the N–3 fault statistics program (program number 70):

Public Variable	Type	Register	Description
Out_data[0]	WORD	240	Detected fault code N–3
Out_data[1]	WORD	241	Motor full load current ratio N–3 (% FLC max)
Out_data[2]	WORD	242	Thermal capacity level N–3 (% trip level)
Out_data[3]	WORD	243	Average current ratio N–3 (% FLC)
Out_data[4]	WORD	244	L1 current ratio N–3 (% FLC)
Out_data[5]	WORD	245	L2 current ratio N–3 (% FLC)
Out_data[6]	WORD	246	L3 current ratio N–3 (% FLC)
Out_data[7]	WORD	247	Ground current ratio N–3 (x 0.1 % FLC min)
Out_data[8]	WORD	248	Full load current max N–3 (x 0.1 A)
Out_data[9]	WORD	249	Current phase imbalance N–3 (%)
Out_data[10]	WORD	250	Frequency N–3 (x 0.1 Hz)
Out_data[11]	WORD	251	Motor temperature sensor N–3 (x 0.1 Ω)
Out_data[12]	WORD[4]	252	Date and time N–3 See *DT_DateTime, page 118*
Out_data[13]		253	
Out_data[14]		254	
Out_data[15]		255	

Out_data[0]...[15] Public Variable (Program 71)

The following table describes the Out_data[0]...[15] public variable in the case of the N–3 fault statistics with expansion module program (program number 71):

Public Variable	Type	Register	Description
Out_data[0]	WORD	256	Average voltage N–3 (V)
Out_data[1]	WORD	257	L3–L1 voltage N–3 (V)
Out_data[2]	WORD	258	L1–L2 voltage N–3 (V)
Out_data[3]	WORD	259	L2–L3 voltage N–3 (V)
Out_data[4]	WORD	260	Voltage phase imbalance N–3 (%)
Out_data[5]	WORD	261	Active power N–3 (kW)
Out_data[6]	WORD	262	Power factor N–3 (x 0.01)
Out_data[7] ...Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 80)

The following table describes the Out_data[0]...[15] public variable in the case of the N–4 fault statistics program (program number 80):

Public Variable	Type	Register	Description
Out_data[0]	WORD	270	Detected fault code N–4
Out_data[1]	WORD	271	Motor full load current ratio N–4 (% FLC max)
Out_data[2]	WORD	272	Thermal capacity level N–4 (% trip level)
Out_data[3]	WORD	273	Average current ratio N–4 (% FLC)
Out_data[4]	WORD	274	L1 current ratio N–4 (% FLC)
Out_data[5]	WORD	275	L2 current ratio N–4 (% FLC)
Out_data[6]	WORD	276	L3 current ratio N–4 (% FLC)
Out_data[7]	WORD	277	Ground current ratio N–4 (x 0.1 % FLC min)
Out_data[8]	WORD	278	Full load current max N–4 (x 0.1 A)
Out_data[9]	WORD	279	Current phase imbalance N–4 (%)
Out_data[10]	WORD	280	Frequency N–4 (x 0.1 Hz)
Out_data[11]	WORD	281	Motor temperature sensor N–4 (x 0.1 Ω)
Out_data[12]	WORD[4]	282	Date and time N–4 See *DT_DateTime, page 118*
Out_data[13]		283	
Out_data[14]		284	
Out_data[15]		285	

Out_data[0]...[15] Public Variable (Program 81)

The following table describes the Out_data[0]...[15] public variable in the case of the N–4 fault statistics with expansion module program (program number 81):

Public Variable	Type	Register	Description
Out_data[0]	WORD	286	Average voltage N–4 (V)
Out_data[1]	WORD	287	L3–L1 voltage N–4 (V)
Out_data[2]	WORD	288	L1–L2 voltage N–4 (V)
Out_data[3]	WORD	289	L2–L3 voltage N–4 (V)
Out_data[4]	WORD	290	Voltage phase imbalance N–4 (%)
Out_data[5]	WORD	291	Active power N–4 (kW)
Out_data[6]	WORD	292	Power factor N–4 (x 0.01)
Out_data[7] ...Out_data[15]	–	–	Reserved

Custom_mdb : Custom Read DFB for Modbus SL and Modbus/TCP

Presentation

The Custom_mdb DFB is dedicated to the reading of up to 5 sets of registers in one single TeSys device through the Modbus SL or Modbus/TCP networks.

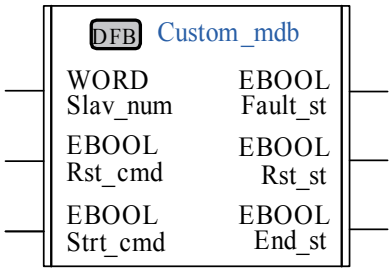
Custom_mdb uses XWAY addressing and is dedicated to Premium PLCs.

The Custom_mdb DFB completes the Special_mdb_u and Special_mdb_t DFBs and enable the user to select the registers to read.

Characteristics

Characteristic	Value
Name	Custom_mdb
Version	00.27
Input	3
Output	3
Input/Output	0
Public Variable	13

Graphical Representation



TeSys U and TeSys T Compliance

- TeSys U: The Custom_mdb DFB is compliant with the following TeSys U sub-assemblies:
  - LUB•• non-reversing power base and LU2B•• reversing power base (up to 32 A/15 kW or 20 hp)
  - LUCM multifunction control unit
  - LULC033 Modbus communication module
- TeSys T: The Custom_mdb DFB is compliant with all the LTM R••M•• and LTM R••E•• controller versions, with or without the LTM E expansion module.

Software Implementation

- The parameters and the inputs can only be changed if the End_st output variable is set to 1.
- With version 1.00:
  The output data is only valid if the End_st output variable is set to 1 and if there is no fault detected (Fault_st = 0).
- With version 1.10:
  The output data is only valid if there is no fault detected (Fault_st = 0).
  Prog_num input can be modified on the fly.
- The public variables enable the user to read up to 5 sets of registers of a maximum length of 16 registers for each set:
  - The user defines the starting point of a set of registers with the In_reg public variable.
  - The user defines the length of the set of registers with the corresponding In_len public variable.
  - The registers content is then returned in the corresponding Out_dat public variable.

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Slav_num	WORD	1...31	1	Modbus slave number
Rst_cmd	EBOOL	0...1	0	Reset command
Strt_cmd	EBOOL	0...1	0	Start command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Fault_st	EBOOL	0...1	0	Fault detected
Rst_st	EBOOL	0...1	0	Reset state
End_st	EBOOL	0...1	0	End state

Public Variables Characteristics

The following table describes the Custom_mdb DFB public variables:

Public Variable	Type	Range	Default Value	Description
Net_num	WORD	100...255	100	Network address
Stat_num	WORD	0...255	0	Station address
Rack_num	WORD	0...7	0	Destination rack address
Slot_num	WORD	0...10	0	Destination slot address
Chan_num	WORD	0...1	0	Destination channel address
In_reg	ARRAY[0...4] of WORD	0...65535	0	Array of 5 words for the 5 index registers (In_reg[0]...In_reg[4])
In_len	ARRAY[0...4] of WORD	0...16	0	Array of 5 words for the length of each set of registers (In_len[0]...In_len[4])
Out_dat[0]	ARRAY[0...15] of WORD	0...65535	0	Array of up to 16 words containing the In_len[0] words starting from In_reg[0]
Out_dat[1]	ARRAY[0...15] of WORD	0...65535	0	Array of up to 16 words containing the In_len[1] words starting from In_reg[1]
Out_dat[2]	ARRAY[0...15] of WORD	0...65535	0	Array of up to 16 words containing the In_len[2] words starting from In_reg[2]
Out_dat[3]	ARRAY[0...15] of WORD	0...65535	0	Array of up to 16 words containing the In_len[3] words starting from In_reg[3]
Out_dat[4]	ARRAY[0...15] of WORD	0...65535	0	Array of up to 16 words containing the In_len[4] words starting from In_reg[4]
Sq_princ	WORD	0...7	0	Reserved for support

Profibus DFB

5

Introduction

This chapter describes the TeSys U and TeSys T Profibus DP DFBs.

What's in this Chapter?

This chapter contains the following topics:

Ctrl_pfb_u_ms: TeSys U Control/Command for Profibus DP MS

Presentation

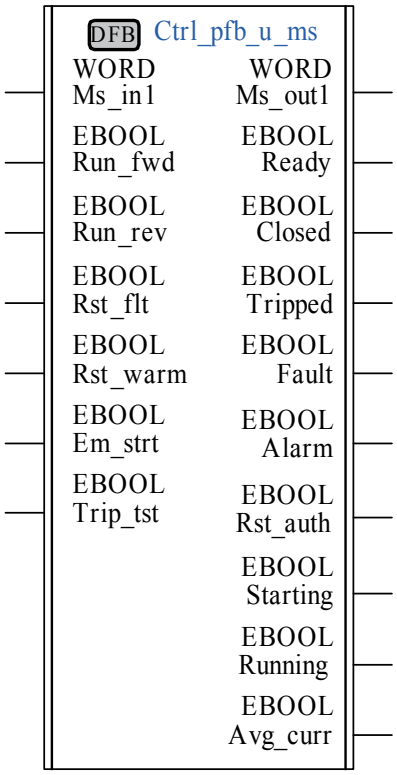
The Ctrl_pfb_u_ms DFB is dedicated to the control and command of a single TeSys U starter-controller (up to 32 A/15 kW or 20 hp) through the Profibus DP MS (Motor Starter) network.

With the MS profile, the TeSys U starter-controller commands are managed on bit level. For more information, see the *TeSys U LULC07 Profibus DP Communication Module User Manual*.

Characteristics

Characteristic	Value
Name	Ctrl_pfb_u_ms
Version	00.21
Input	7
Output	10
Input/Output	0
Public Variable	0

Graphical Representation



TeSys U Compliance

The Ctrl_pfb_u_ms DFB is compliant with the following TeSys U sub-assemblies:

Power base	• LUB•• non-reversing power base (up to 32 A/15 kW or 20 hp) • LU2B•• reversing power base (up to 32 A/15 kW or 20 hp)
Control unit	• LUCA standard control unit • LUCB, LUCC, and LUCD advanced control units • LUCL magnetic control unit • LUCM multifunction control unit
Communication module	• LULC07 Profibus DP communication module
GSD file modules	• Sc St R MS with or without PKW • Sc Ad R MS with or without PKW • Sc Mu R MS with or without PKW • Sc Mu L MS with or without PKW

Software Implementation

- Ms_in1 input word must be linked to the first word of the Profibus slave input cyclic data.
- Ms_out1 output word must be linked to the first word of the Profibus slave output cyclic data.

Input Characteristics

The following table describes the DFB inputs and their availability according to the control unit:

Input	Type	Range	Default Value	Description	LUCA LUCL	LUCB LUCC LUCD	LUCM
Ms_in1	WORD	–	0	Must be linked to the first word of the MS Profibus slave input cyclic data	√	√	√
Run_fwd	EBOOL	0...1	0	Motor run forward command	√	√	√
Run_rev	EBOOL	0...1	0	Motor run reverse command	√	√	√
Rst_flt	EBOOL	0...1	0	Reset device (if register 451 = 102 or 104, fault acknowledgment causes a return to communication module factory settings)	√	√	√
Rst_warn	EBOOL	0...1	0	Reset warning (for example, communication loss)	√	√	√
Em_strt	EBOOL	0...1	0	Emergency start (reset thermal memory)	–	–	√
Trip_tst	EBOOL	0...1	0	Overcurrent trip test via communication bus	–	–	√

Output Characteristics

The following table describes the DFB outputs and their availability according to the control unit:

Output	Type	Range	Default Value	Description	LUCA LUCL	LUCB LUCC LUCD	LUCM
Ms_out1	WORD	–	0	Must be linked to the first word of the MS Profibus slave output cyclic data	√	√	√
Ready	EBOOL	0...1	0	System ready: the rotary handle is turned to On position and there is no fault	√	√	√
Closed	EBOOL	0...1	0	Pole status: closed	√	√	√
Tripped	EBOOL	0...1	0	System tripped: the rotary handle is turned to Trip position	√	√	√
Fault	EBOOL	0...1	0	All faults	√	√	√
Alarm	EBOOL	0...1	0	All warnings	√	√	√
Rst_auth	EBOOL	0...1	0	Fault reset authorized	–	√	√
Starting	EBOOL	0...1	0	Start in progress: 1 = ascending current is greater than 10% FLA 0 = descending current is lower than 150% FLA	–	√	√
Running	EBOOL	0...1	0	Motor running with detection of current, if greater than 10% FLA	–	√	√
Avg_curr	WORD	0...200	0	Average motor current (x 1% FLA)	–	√	√

Ctrl_pfb_u_mms: TeSys U Control/Command for Profibus DP MMS

Presentation

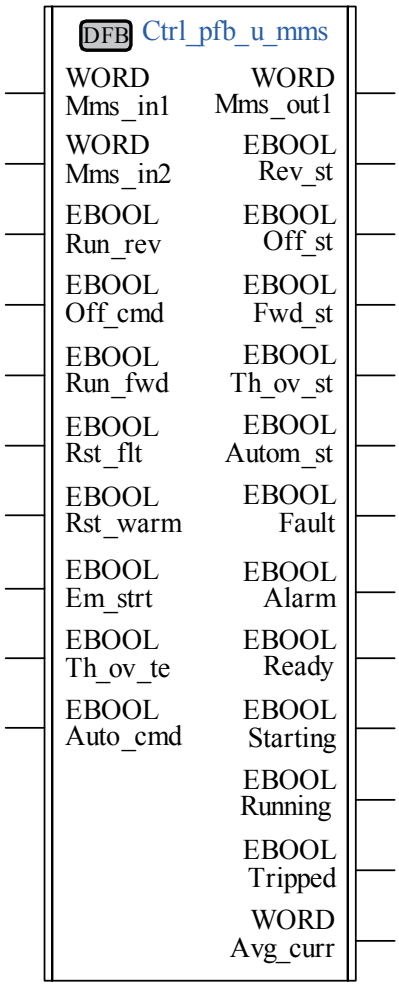
The Ctrl_pfb_u_mms DFB is dedicated to the control and command of a single TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with a LUCM multifunction control unit and a LULC07 Profibus DP communication module through the Profibus DP MMS (Motor Management Starter) network.

With the MMS profile, the TeSys U starter-controller commands are managed on bit rising edges. For more information, see the *TeSys U LULC07 Profibus DP Communication Module User Manual*.

Characteristics

Characteristic	Value
Name	Ctrl_pfb_u_mms
Version	00.34
Input	10
Output	13
Input/Output	0
Public Variable	0

Graphical Representation



TeSys U Compliance

The Ctrl_pfb_u_mms DFB is compliant with the following TeSys U sub-assemblies:

Power base	• LUB•• non-reversing power base (up to 32 A/15 kW or 20 hp) • LU2B•• reversing power base (up to 32 A/15 kW or 20 hp)
Control unit	• LUCM multifunction control unit
Communication module	• LULC07 Profibus DP communication module
GSD file modules	• Sc Mu R MMS with or without PKW • Sc Mu L MMS with or without PKW

Software Implementation

- Mms_in1 and Mms_in2 input words must be linked to the first 2 words of the Profibus slave input cyclic data.
- Mms_out1 output word must be linked to the first word of the Profibus slave output cyclic data.

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Mms_in1	WORD	–	0	Must be linked to the first word of the MMS Profibus slave input cyclic data
Mms_in2	WORD	–	0	Must be linked to the second word of the MMS Profibus slave input cyclic data
Run_rev	EBOOL	0...1	0	Motor run reverse command
Off_cmd	EBOOL	0...1	0	Off command
Run_fwd	EBOOL	0...1	0	Motor run forward command
Rst_flt	EBOOL	0...1	0	Reset device
Rst_warn	EBOOL	0...1	0	Reset warning
Em_strt	EBOOL	0...1	0	Emergency start (reset thermal memory)
Ther_ov_test	EBOOL	0...1	0	Thermal overload test
Automode_cmd	EBOOL	0...1	0	Auto mode command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Ms_out1	WORD	–	0	Must be linked to the first word of the Profibus slave output cyclic data
Rev_st	EBOOL	0...1	0	Run reverse
Off_st	EBOOL	0...1	0	System Off
Fwd_st	EBOOL	0...1	0	Run forward
Th_ov_st	EBOOL	0...1	0	Thermal overload
Automode_st	EBOOL	0...1	0	Auto mode
Fault	EBOOL	0...1	0	TeSys U on fault
Alarm	EBOOL	0...1	0	TeSys U on alarm
Ready	EBOOL	0...1	0	TeSys U ready to operate
Starting	EBOOL	0...1	0	Motor starting
Running	EBOOL	0...1	0	Motor running
Tripped	EBOOL	0...1	0	Rotary knob on trip position
Avg_curr	WORD	0...2000	0	Average motor current (x 0.1% FLA)

Ctrl_pfb_t_mms: TeSys T Control/Command for Profibus DP MMS

Presentation

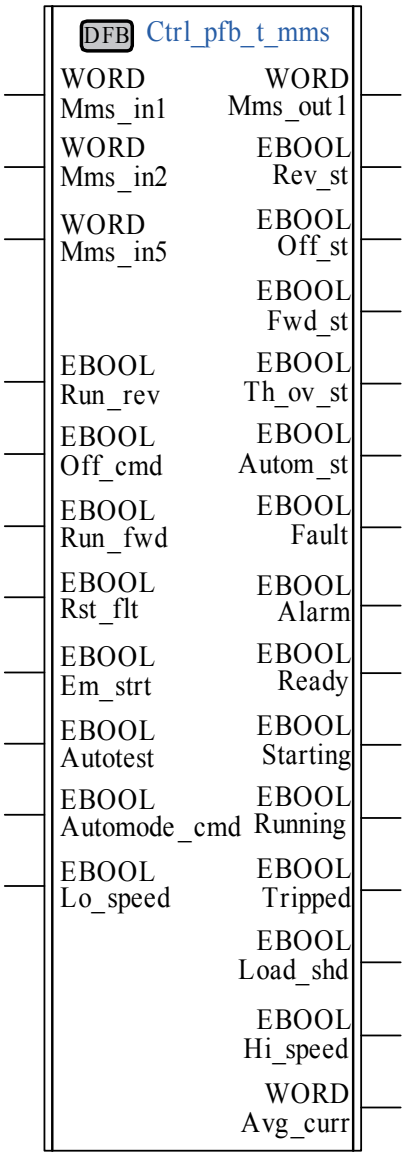
The Ctrl_pfb_t_mms DFB is dedicated to the control and command of a single TeSys T LTM R••P•• controller through the Profibus DP MMS (Motor Management Starter) network.

With the MMS profile, the TeSys T LTM R••P•• controller commands are managed on bit rising edges. For more information, see the *TeSys T LTM R Profibus Motor Management Controller User Manual*.

Characteristics

Characteristic	Value
Name	Ctrl_pfb_t_mms
Version	02.01
Input	11
Output	15
Input/Output	0
Public Variable	0

Graphical Representation



TeSys T Compliance

The Ctrl_pfb_t_mms DFB is compliant with all the TeSys T LTM R••P•• controller versions, with or without the LTM E expansion module.

Software Implementation

- Mms_in1, Mms_in2 and Mms_in5 input words must be linked respectively to the first, second, and fifth word of the Profibus slave input cyclic data.
- Mms_out1 output word must be linked to the first word of the Profibus slave output cyclic data.

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Mms_in1	WORD	–	0	Must be linked to the first word of the MMS Profibus slave input cyclic data
Mms_in2	WORD	–	0	Must be linked to the second word of the MMS Profibus slave input cyclic data
Mms_in5	WORD	–	0	Must be linked to the fifth word of the MMS Profibus slave input cyclic data
Run_rev	EBOOL	0...1	0	Motor run reverse command
Off_cmd	EBOOL	0...1	0	Stop command
Run_fwd	EBOOL	0...1	0	Motor run forward command
Rst_flt	EBOOL	0...1	0	Fault reset command
Em_strt	EBOOL	0...1	0	Emergency start (reset thermal memory)
Autotest	EBOOL	0...1	0	Self test command
Automode_cmd	EBOOL	0...1	0	Auto mode command
Lo_speed	EBOOL	0...1	0	Motor low speed command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Mms_out1	WORD	–	0	Must be linked to the first word of the Profibus slave output cyclic data
Rev_st	EBOOL	0...1	0	Run reverse
Off_st	EBOOL	0...1	0	System Off
Fwd_st	EBOOL	0...1	0	Run forward
Th_ov_st	EBOOL	0...1	0	Thermal overload
Automode_st	EBOOL	0...1	0	Auto mode
Fault	EBOOL	0...1	0	System fault
Alarm	EBOOL	0...1	0	System warning
Ready	EBOOL	0...1	0	System ready
Starting	EBOOL	0...1	0	Motor starting
Running	EBOOL	0...1	0	Motor running (with detection of a current, if greater than 10% FLC)
Tripped	EBOOL	0...1	0	System tripped
Load_shd	EBOOL	0...1	0	Voltage load shedding
Hi_speed	EBOOL	0...1	0	Motor high speed
Avg_curr	WORD	0...2000	0	Average motor current (x 0.1 % FLA)

Cyclic Control/Command DFB

6

Introduction

This chapter describes the TeSys U and TeSys T cyclic control/command DFBs.

What's in this Chapter?

This chapter contains the following topics:

Ctrl_cmd_u: TeSys U Cyclic Control/Command

Presentation

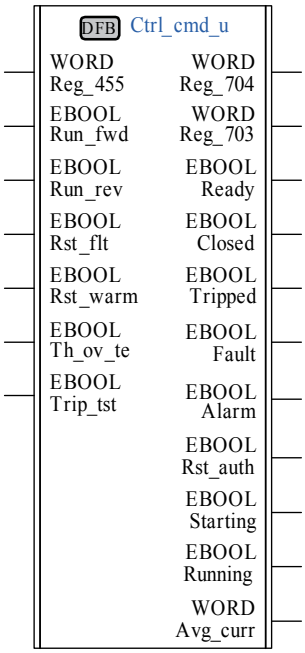
The Ctrl_cmd_u DFB is dedicated to the control and command of a single TeSys U starter-controller (up to 32 A/15 kW or 20 hp) through cyclic data exchanges on Modbus/TCP (IO scanning), CANopen, and Advantys STB networks.

For more information, see:
- *TeSys U LULC032-033 Modbus Communication Module User Manual*
- *TeSys U LULC08 CANopen Communication Module User Manual*
- *TeSys U LULC15 Advantys STB Communication Module User Manual*

Characteristics

Characteristic	Value
Name	Ctrl_cmd_u
Version	00.12
Input	7
Output	11
Input/Output	0
Public Variable	0

Graphical Representation



TeSys U Compliance

The Ctrl_cmd_u DFB is compliant with the following TeSys U sub-assemblies:

Power base	• LUB•• non-reversing power base (up to 32 A/15 kW or 20 hp) • LU2B•• reversing power base (up to 32 A/15 kW or 20 hp)
Control unit	• LUCA standard control unit • LUCB, LUCC, and LUCD advanced control units • LUCL magnetic control unit • LUCM multifunction control unit
Communication module	• LULC08 CANopen communication module • LULC15 Advantys STB communication module • LULC033 Modbus communication module with an Ethernet gateway

Input Characteristics

The following table describes the DFB inputs and their availability according to the control unit:

Input	Type	Range	Default Value	Description	LUCA LUCL	LUCB LUCC LUCD	LUCM
Reg_455	WORD	0...65535	0	To link to register 455 of cyclic data inputs	√	√	√
Run_fwd	EBOOL	0...1	0	Motor run forward command	√	√	√
Run_rev	EBOOL	0...1	0	Motor run reverse command	√	√	√
Rst_flt	EBOOL	0...1	0	Reset device (if device 451 = 102 or 104, fault acknowledgment causes a return to communication module factory settings)	√	√	√
Rst_warn	EBOOL	0...1	0	Reset warning (for example, communication loss)	√	√	√
Ther_ov	EBOOL	0...1	0	Automatic thermal overload fault test	–	–	√
Trip_tst	EBOOL	0...1	0	Overcurrent trip test via communication bus	–	–	√

Output Characteristics

The following table describes the DFB outputs and their availability according to the control unit:

Output	Type	Range	Default Value	Description	LUCA LUCL	LUCB LUCC LUCD	LUCM
Reg_704	WORD	0...65535	0	To link to register 704 of cyclic data outputs	√	√	√
Reg_703	WORD	0...65535	0	To link to register 703 of cyclic data outputs	√	√	√
Ready	EBOOL	0...1	0	System ready: the rotary handle is turned to On position and there is no fault.	√	√	√
Closed	EBOOL	0...1	0	Pole status: closed	√	√	√
Tripped	EBOOL	0...1	0	System tripped: the rotary handle is turned to Trip position.	√	√	√
Fault	EBOOL	0...1	0	All faults	√	√	√
Alarm	EBOOL	0...1	0	All warnings	√	√	√
Rst_auth	EBOOL	0...1	0	Fault reset authorized	–	√	√
Starting	EBOOL	0...1	0	Start in progress: 0 = descending current is lower than 150% FLA 1 = ascending current is greater than 10% FLA	–	√	√
Running	EBOOL	0...1	0	Motor running with detection of current, if greater than 10% FLA	–	√	√
Avg_curr	WORD	0...200	0	Average motor current (x 1% FLA)	–	√	√

Ctrl_cmd_t: TeSys T Cyclic Control/Command

Presentation

The Ctrl_cmd_t DFB is dedicated to the control and command of a single TeSys T LTM R••C•• CANopen or a TeSys T LTMR••E•• Modbus/TCP controller through cyclic data exchanges on Modbus/TCP (IO scanning) and CANopen networks.

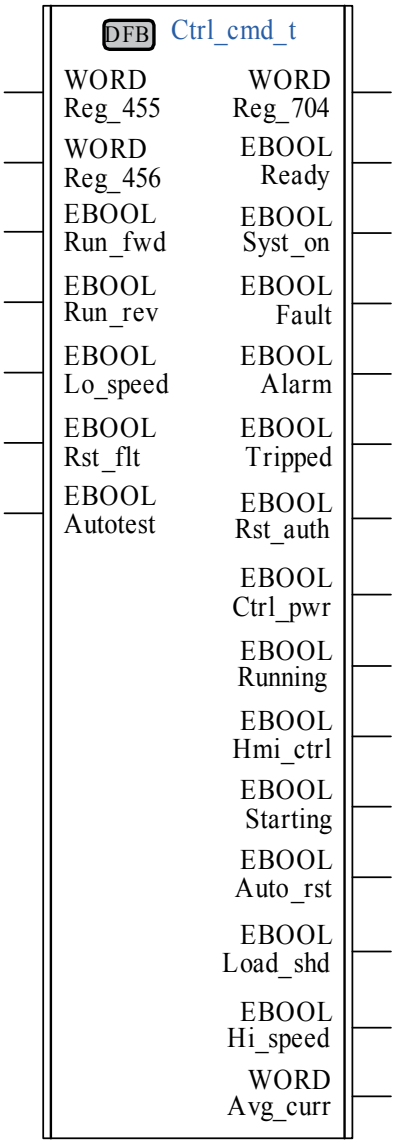
For more information, see:

- *TeSys T LTM R Modbus/TCP Motor Management Controller User Manual*
- *TeSys T LTM R CANopen Motor Management Controller User Manual*

Characteristics

Characteristic	Value
Name	Ctrl_cmd_t
Version	00.19
Input	7
Output	15
Input/Output	0
Public Variable	0

Graphical Representation



TeSys T Compliance

The Ctrl_cmd_t DFB is compliant with the TeSys T LTM R••C•• CANopen and with the TeSys T LTM R••E•• Modbus/TCP controller versions, with or without the LTM E expansion module.

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Reg_455	WORD	0...65535	0	To link to register 455 of cyclic data inputs
Reg_456	WORD	0...65535	0	To link to register 456 of cyclic data inputs
Run_fwd	EBOOL	0...1	0	Motor run forward command
Run_rev	EBOOL	0...1	0	Motor run reverse command
Lo_speed	EBOOL	0...1	0	Motor low speed command
Rst_flt	EBOOL	0...1	0	Fault reset command
Autotest	EBOOL	0...1	0	Self test command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Reg_704	WORD	0...65535	0	To link to register 704 of cyclic data outputs
Ready	EBOOL	0...1	0	System ready
Syst_on	EBOOL	0...1	0	System On
Fault	EBOOL	0...1	0	System fault
Alarm	EBOOL	0...1	0	System warning
Tripped	EBOOL	0...1	0	System tripped
Rst_auth	EBOOL	0...1	0	Fault reset authorized
Ctrl_pwr	EBOOL	0...1	0	Controller power
Running	EBOOL	0...1	0	Motor running (with detection of a current, if greater than 10% FLC)
Hmi_ctrl	EBOOL	0...1	0	Control through HMI
Starting	EBOOL	0...1	0	Motor starting (start in progress) 0 = descending current is less than 150% FLC 1 = ascending current is greater than 10% FLC
Auto_rst	EBOOL	0...1	0	Auto-reset active
Load_shd	EBOOL	0...1	0	Load shedding
Hi_speed	EBOOL	0...1	0	Motor speed 0 = FLC1 setting is used 1 = FLC2 setting is used
Avg_curr	WORD	0...200	0	Average motor current (x 1% FLA)

PKW Exchanges DFB

7

Introduction

This chapter describes the TeSys U and TeSys T DFBs for PKW exchanges.

What's in this Chapter?

This chapter contains the following topics:

Special_pkw_u: TeSys U DFB for PKW Exchanges

Presentation

The Special_pkw_u DFB is dedicated to the reading of up to 16 predefined registers of a TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with a LUCM multifunction control unit and one of the following communication modules that support PKW (Periodically Kept in Acyclic Words) exchanges:

- LULC07 (Profibus)
- LULC08 (CANopen)
- LULC15 (Advantys STB)

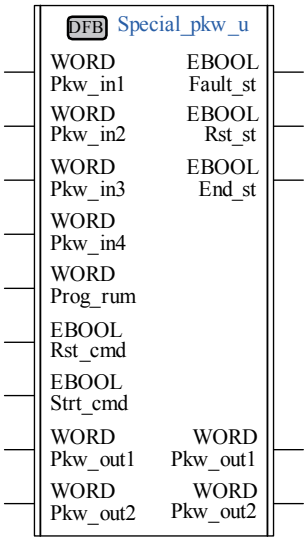
For more information, see:

- *TeSys U LULC07 Profibus Communication Module User Manual*
- *TeSys U LULC08 CANopen Communication Module User Manual*
- *TeSys U LULC15 Advantys STB Communication Module User Manual*

Characteristics

Characteristic	Value
Name	Special_pkw_u
Version	00.85
Input	7
Output	3
Input/Output	2
Public Variable	2

Graphical Representation



TeSys U Compliance

The Special_pkw_u DFB is compliant with the following TeSys U sub-assemblies:

Power base	• LUB•• non-reversing power base (up to 32 A/15 kW or 20 hp) • LU2B•• reversing power base (up to 32 A/15 kW or 20 hp)
Control unit	• LUCM multifunction control unit
Communication module	• LULC07 Profibus DP communication module • LULC08 CANopen communication module • LULC15 Advantys STB communication module
GSD file modules	Profibus: • Sc Mu R MS PKW • Sc Mu L MS PKW • Sc Mu R MMS PKW • Sc Mu L MMS PKW

Software Implementation

- Pkw_in1, Pkw_in2, Pkw_in3, and Pkw_in4 input words must be linked to the first 4 words of the PKW slave input cyclic data.
- Pkw_out1 and Pkw_out2 input/output words must be linked to the first 2 words of the PKW slave output cyclic data.
- The output data is only valid if the End_st output variable is set to 1 and if there is no fault detected (Fault_st = 0).
- When using TSXPBY100 Premium Profibus coupler it is mandatory to set %QWxy.0.242:X0 to 1 to guarantee the data consistency.

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Pkw_in1	WORD	–	0	Must be linked to the first word of the PKW slave input cyclic data
Pkw_in2	WORD	–	0	Must be linked to the second word of the PKW slave input cyclic data
Pkw_in3	WORD	–	0	Must be linked to the third word of the PKW slave input cyclic data
Pkw_in4	WORD	–	0	Must be linked to the fourth word of the PKW slave input cyclic data
Prog_num	WORD	0...6	0	Program number See *Program Number, page 101*
Rst_cmd	EBOOL	0...1	0	Reset command
Strt_cmd	EBOOL	0...1	0	Start command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Fault_st	EBOOL	0...1	0	Fault detected
Rst_st	EBOOL	0...1	0	Reset state
End_st	EBOOL	0...1	0	End state

Input/Output Characteristics

The following table describes the DFB input/outputs:

Input/Output	Type	Range	Default Value	Description
Pkw_out1	WORD	–	0	Must be linked to the first word of the PKW slave output cyclic data
Pkw_out2	WORD	–	0	Must be linked to the second word of the PKW slave output cyclic data

Program Number

The Prog_num input variable enables the user to define the public variables data depending on the application type. Each program uses variables related to one application (diagnostic, maintenance, measurement,...). The following table describes the programs of the DFB:

Program Number	Description
0	Bypass: no action
1	Diagnostic: faults monitoring variables, warnings monitoring variables, and communication monitoring variables
2	Maintenance: global statistics variables
3	Measurements: measurements monitoring variables
4	Statistics: last trip statistics and trip N–1 statistics
5	Statistics: N–2 and N–3 trip statistics
6	Statistics: N–4 trip statistics

Public Variables Characteristics

The following table describes the DFB public variables:

Public Variable	Type	Range	Default Value	Description
Sq_princ	WORD	0...7	0	Reserved for support
Out_data[0]...[15]	ARRAY[0...15] of WORD	0...65535	0	The output data depends on the program number.

Out_data[0]...[15] Public Variable (Program 1)

The following table describes the Out_data[0]...[15] public variable in the case of the diagnostic program (program number 1):

Public Variable	Type	Register	Bit	Description
Out_data[0]	WORD	452	0	Short-circuit fault
			1	Magnetic fault
			2	Ground fault
			3	Thermal fault
			4	Long start fault
			5	Jam fault
			6	Phase imbalance fault
			7	Underload fault
			8	Shunt trip fault
			9	Test trip fault
			10	Communication loss fault on LUCM Modbus port
			11	Control unit internal fault
			12	Module identification or internal communication fault
			13	Module internal fault
			14	Module trip fault
			15	Module drop-out fault
Out_data[1]	WORD	461	0...1	Not significant
			2	Ground fault warning
			3	Thermal warning
			4	Long start warning
			5	Jam warning
			6	Phase imbalance warning
			7	Under-current warning
			8...9	Not significant
			10	Communication loss fault on LUCM Modbus port
			11	Internal temperature warning
			12	Module identification or internal communication warning
			13...14	Not significant
			15	Module warning
Out_data[2]	WORD	457	0	Button position On (0 = Off)
			1	Button position Trip (0 = Not tripped)
			2	Contactor state On
			3	24 Vdc power supply present on outputs
			4...15	Not significant
Out_data[3]	WORD	450	–	Time to automatic reset on thermal fault(s)
Out_data[4] ...Out_data[15]	–	–	–	Not significant

Out_data[0]...[15] Public Variable (Program 2)

The following table describes the Out_data[0]...[15] public variable in the case of the maintenance program (program number 2):

Public Variable	Type	Register	Description
Out_data[0]	WORD	100	Short-circuit faults count
Out_data[1]	WORD	101	Magnetic faults count
Out_data[2]	WORD	102	Ground faults count
Out_data[3]	WORD	103	Thermal faults count
Out_data[4]	WORD	104	Long start faults count
Out_data[5]	WORD	105	Jam faults count
Out_data[6]	WORD	106	Phase imbalance faults count
Out_data[7]	WORD	108	Shunt trip faults count
Out_data[8]	WORD	115	Auto-resets count
Out_data[9]	WORD	116	Thermal warnings count
Out_data[10]	WORD	117	Starts count (LSB)
Out_data[11]	WORD	118	Starts count (MSB)
Out_data[12]	WORD	119	Operating time (LSB)
Out_data[13]	WORD	120	Operating time (MSB)
Out_data[14]	WORD	121	Maximum internal temperature (°C)
Out_data[15]	–	–	Not significant

Out_data[0]...[15] Public Variable (Program 3)

The following table describes the Out_data[0]...[15] public variable in the case of the measurements program (program number 3):

Public Variable	Type	Register	Description
Out_data[0]	–	–	Not significant
Out_data[1]	WORD	465	Thermal capacity level (%)
Out_data[2]	WORD	466	Average motor current (x 0.1 % FLA)
Out_data[3]	WORD	467	L1 current (% FLA)
Out_data[4]	WORD	468	L2 current (% FLA)
Out_data[5]	WORD	469	L3 current (% FLA)
Out_data[6]	WORD	470	Ground current (% FLA min)
Out_data[7]	WORD	471	Current imbalance coefficient
Out_data[8]	WORD	472	Control unit internal temperature (°C)
Out_data[9] ...Out_data[13]	–	–	Not significant
Out_data[14]	WORD	79	Control unit sensor maximum current (x 0.1 A): ● 6 = adjustment range 0.15 to 0.6 A ● 14 = adjustment range 0.35 to 1.4 A ● 50 = adjustment range 1.25 to 5 A ● 120 = adjustment range 3 to 12 A ● 180 = adjustment range 4.5 to 18 A ● 320 = adjustment range 8 to 32 A
Out_data[15]	WORD	652	Full load amps setting (% FLA max): ● minimum = 25 (default value) ● maximum = 100

Out_data[0]...[15] Public Variable (Program 4)

The following table describes the Out_data[0]...[15] public variable in the case of the statistics program (program number 4):

Public Variable	Type	Register	Description
Out_data[0]	WORD	150	Last trip fault number
Out_data[1]	WORD	152	Last trip thermal capacity level (% trip level)
Out_data[2]	WORD	153	Last trip average current (% FLA)
Out_data[3]	WORD	154	Last trip L1 current (% FLA)
Out_data[4]	WORD	155	Last trip L2 current (% FLA)
Out_data[5]	WORD	156	Last trip L3 current (% FLA)
Out_data[6]	WORD	157	Last trip ground current (% FLA min)
Out_data[7]	WORD	180	N–1 trip fault number
Out_data[8]	WORD	182	N–1 trip thermal capacity level (% trip level)
Out_data[9]	WORD	183	N–1 trip average current (% FLA)
Out_data[10]	WORD	184	N–1 trip L1 current (% FLA)
Out_data[11]	WORD	185	N–1 trip L2 current (% FLA)
Out_data[12]	WORD	186	N–1 trip L3 current (% FLA)
Out_data[13]	WORD	187	N–1 trip ground current (% FLA min)
Out_data[14]	WORD	79	Control unit sensor maximum current (x 0.1 A): ● 6 = adjustment range 0.15 to 0.6 A ● 14 = adjustment range 0.35 to 1.4 A ● 50 = adjustment range 1.25 to 5 A ● 120 = adjustment range 3 to 12 A ● 180 = adjustment range 4.5 to 18 A ● 320 = adjustment range 8 to 32 A
Out_data[15]	WORD	652	Full load amps setting (% FLA max): ● minimum = 25 (default value) ● maximum = 100

Out_data[0]...[15] Public Variable (Program 5)

The following table describes the Out_data[0]...[15] public variable in the case of the statistics program (program number 5):

Public Variable	Type	Register	Description
Out_data[0]	WORD	210	N–2 trip fault number
Out_data[1]	WORD	212	N–2 trip thermal capacity level (% trip level)
Out_data[2]	WORD	213	N–2 trip average current (% FLA)
Out_data[3]	WORD	214	N–2 trip L1 current (% FLA)
Out_data[4]	WORD	215	N–2 trip L2 current (% FLA)
Out_data[5]	WORD	216	N–2 trip L3 current (% FLA)
Out_data[6]	WORD	217	N–2 trip ground current (% FLA min)
Out_data[7]	WORD	240	N–3 trip fault number
Out_data[8]	WORD	242	N–3 trip thermal capacity level (% trip level)
Out_data[9]	WORD	243	N–3 trip average current (% FLA)
Out_data[10]	WORD	244	N–3 trip L1 current (% FLA)
Out_data[11]	WORD	245	N–3 trip L2 current (% FLA)
Out_data[12]	WORD	246	N–3 trip L3 current (% FLA)
Out_data[13]	WORD	247	N–3 trip ground current (% FLA min)
Out_data[14]	WORD	79	Control unit sensor maximum current (x 0.1 A): ● 6 = adjustment range 0.15 to 0.6 A ● 14 = adjustment range 0.35 to 1.4 A ● 50 = adjustment range 1.25 to 5 A ● 120 = adjustment range 3 to 12 A ● 180 = adjustment range 4.5 to 18 A ● 320 = adjustment range 8 to 32 A
Out_data[15]	WORD	652	Full load amps setting (% FLA max): ● minimum = 25 (default value) ● maximum = 100

Out_data[0]...[15] Public Variable (Program 6)

The following table describes the Out_data[0]...[15] public variable in the case of the statistics program (program number 6):

Public Variable	Type	Register	Description
Out_data[0]	WORD	270	N–4 trip fault number
Out_data[1]	WORD	272	N–4 trip thermal capacity level (% trip level)
Out_data[2]	WORD	273	N–4 trip average current (% FLA)
Out_data[3]	WORD	274	N–4 trip L1 current (% FLA)
Out_data[4]	WORD	275	N–4 trip L2 current (% FLA)
Out_data[5]	WORD	276	N–4 trip L3 current (% FLA)
Out_data[6]	WORD	277	N–4 trip ground current (% FLA min)
Out_data[7] ...Out_data[13]	–	–	Reserved
Out_data[14]	WORD	79	Control unit sensor maximum current (x 0.1 A): ● 6 = adjustment range 0.15 to 0.6 A ● 14 = adjustment range 0.35 to 1.4 A ● 50 = adjustment range 1.25 to 5 A ● 120 = adjustment range 3 to 12 A ● 180 = adjustment range 4.5 to 18 A ● 320 = adjustment range 8 to 32 A
Out_data[15]	WORD	652	Full load amps setting (% FLA max): ● minimum = 25 (default value) ● maximum = 100

Special_pkw_t: TeSys T DFB for PKW Exchanges

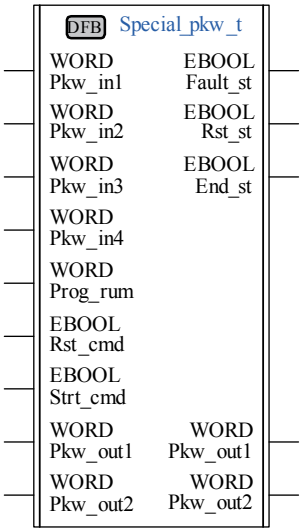
Presentation

The Special_pkw_t DFB is dedicated to the reading of up to 16 predefined registers of a single TeSys T LTM R••P•• Profibus controller through the Profibus (MS and MMS) network, and a TeSys T LTM R••C•• CANopen controller through the CANopen network, and supporting PKW (Periodically Kept in Acyclic Words) exchanges.

Characteristics

Characteristic	Value
Name	Special_pkw_t
Version	01.15
Input	7
Output	3
Input/Output	2
Public Variable	2

Graphical Representation



TeSys T Compliance

The Special_pkw_t DFB is compliant with all the TeSys T LTM R••P•• controller versions, with or without the LTM E expansion module.

Software Implementation

- Pkw_in1, Pkw_in2, Pkw_in3, and Pkw_in4 input words must be linked to the first 4 words of the PKW slave input cyclic data.
- Pkw_out1 and Pkw_out2 input/output words must be linked to the first 2 words of the PKW slave output cyclic data.
- The output data is only valid if the End_st output variable is set to 1 and if there is no fault detected (Fault_st = 0).
- When using TSXPBY100 Premium Profibus coupler it is mandatory to set %QWxy.0.242:X0 to 1 to guarantee the data consistency.

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Pkw_in1	WORD	–	0	Must be linked to the first word of the PKW slave input cyclic data
Pkw_in2	WORD	–	0	Must be linked to the second word of the PKW slave input cyclic data
Pkw_in3	WORD	–	0	Must be linked to the third word of the PKW slave input cyclic data
Pkw_in4	WORD	–	0	Must be linked to the fourth word of the PKW slave input cyclic data
Prog_num	WORD	0...81	0	Program number See *Program Number, page 108*
Rst_cmd	EBOOL	0...1	0	Reset command
Strt_cmd	EBOOL	0...1	0	Start command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Fault_st	EBOOL	0...1	0	Fault detected
Rst_st	EBOOL	0...1	0	Reset state
End_st	EBOOL	0...1	0	End state

Input/Output Characteristics

The following table describes the DFB input/outputs:

Input/Output	Type	Range	Default Value	Description
Pkw_out1	WORD	–	0	Must be linked to the first word of the PKW slave output cyclic data
Pkw_out2	WORD	–	0	Must be linked to the second word of the PKW slave output cyclic data

Program Number

The Prog_num input variable enables the user to define the public variables data depending on the application type. Each program holds variables related to one application (diagnostic, maintenance, measurement,...). The following table describes the programs of the DFB:

Program Number	Description
0	Bypass: no action
10	Diagnostic: faults monitoring variables, warnings monitoring variables, and communication monitoring variables
20	Maintenance: global statistics variables
30	Measurements 1
31	Measurements 2
32	Measurements 3
40	Statistics: last fault statistics (N–0)
41	Statistics: last fault statistics (with expansion module) (N–0)
50	Statistics: N–1 fault statistics
51	Statistics: N–1 fault statistics (with expansion module)
60	Statistics: N–2 fault statistics
61	Statistics: N–2 fault statistics (with expansion module)
70	Statistics: N–3 fault statistics
71	Statistics: N–3 fault statistics (with expansion module)
80	Statistics: N–4 fault statistics
81	Statistics: N–4 fault statistics (with expansion module)

Public Variables Characteristics

The following table describes the DFB public variables:

Public Variable	Type	Range	Default Value	Description
Sq_princ	WORD	0...7	0	Reserved for support
Out_data[0]...[15]	ARRAY[0...15] of WORD	0...65535	0	The output data depends on the program number.

Out_data[0]...[15] Public Variable (Program 10)

The following table describes the Out_data[0]...[15] public variable in the case of the diagnostic program (program number 10):

Public Variable	Type	Register	Bit	Description
Out_data[0]	WORD	452	0...1	Reserved
			2	Ground current fault
			3	Thermal overload fault
			4	Long start fault
			5	Jam fault
			6	Current phase imbalance fault
			7	Undercurrent fault
			8	Reserved
			9	Test fault
			10	HMI port fault
			11	Controller internal fault
			12	Internal port fault
			13	Not significant
			14	Network port config fault
			15	Network port fault
Out_data[1]	WORD	453	0	External system fault
			1	Diagnostic fault
			2	Wiring fault
			3	Overcurrent fault
			4	Current phase loss fault
			5	Current phase reversal fault
			6	Motor temperature sensor fault (1)
			7	Voltage phase imbalance fault (1)
			8	Voltage phase loss fault (1)
			9	Voltage phase reversal fault (1)
			10	Undervoltage fault (1)
			11	Overvoltage fault (1)
			12	Underpower fault (1)
			13	Overpower fault (1)
			14	Under power factor fault (1)
			15	Over power factor fault (1)
Out_data[2]	WORD	461	0...1	Not significant
			2	Ground current warning
			3	Thermal overload warning
			4	Not significant
			5	Jam warning
			6	Current phase imbalance warning
			7	Undercurrent warning
			8...9	Not significant
			10	HMI port warning
			11	Controller internal temperature warning
			12...14	Not significant
			15	Network port warning

Public Variable	Type	Register	Bit	Description
Out_data[3]	WORD	462	0	Not significant
			1	Diagnostic warning
			2	Reserved
			3	Overcurrent warning
			4	Current phase loss warning
			5	Current phase reversal warning
			6	Motor temperature sensor warning
			7	Voltage phase imbalance warning (1)
			8	Voltage phase loss warning (1)
			9	Not significant
			10	Undervoltage warning (1)
			11	Overvoltage warning (1)
			12	Underpower warning (1)
			13	Overpower warning (1)
			14	Under power factor warning (1)
			15	Over power factor warning (1)
Out_data[4]	WORD	457	0	Logic input 1
			1	Logic input 2
			2	Logic input 3
			3	Logic input 4
			4	Logic input 5
			5	Logic input 6
			6	Logic input 7
			7	Logic input 8 (1)
			8	Logic input 9 (1)
			9	Logic input 10 (1)
			10	Logic input 11 (1)
			11	Logic input 12 (1)
			12	Logic input 13 (1)
			13	Logic input 14 (1)
			14	Logic input 15 (1)
			15	Logic input 16 (1)
Out_data[5]	WORD	458	0	Logic output 1
			1	Logic output 2
			2	Logic output 3
			3	Logic output 4
			4	Logic output 5 (1)
			5	Logic output 6 (1)
			6	Logic output 7 (1)
			7	Logic output 8 (1)
			8...15	Reserved
Out_data[6]	WORD	450	–	Minimum wait time (s)
Out_data[7] ...Out_data[15]	–	–	–	Reserved
(1) The variable is available for the LTM R controller and the LTM EV40 expansion module combination.				

Out_data[0]...[15] Public Variable (Program 20)

The following table describes the Out_data[0]...[15] public variable in the case of the maintenance program (program number 20):

Public Variable	Type	Register	Description
Out_data[0]	WORD	102	Ground current faults count
Out_data[1]	WORD	103	Thermal overload faults count
Out_data[2]	WORD	104	Long start faults count
Out_data[3]	WORD	105	Jam faults count
Out_data[4]	WORD	106	Current phase imbalance faults count
Out_data[5]	WORD	107	Undercurrent faults count
Out_data[6]	–	–	Reserved
Out_data[7]	WORD	114	Network port faults count
Out_data[8]	WORD	115	Auto-resets count
Out_data[9]	WORD	116	Thermal overload warnings count
Out_data[10]	WORD	117	Motor starts count (LSB)
Out_data[11]	WORD	118	Motor starts count (MSB)
Out_data[12]	WORD	119	Operating time (s) (LSB)
Out_data[13]	WORD	120	Operating time (MSB)
Out_data[14]	WORD	121	Maximum controller internal temperature (°C)
Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 30)

The following table describes the Out_data[0]...[15] public variable in the case of the first measurements program (program number 30):

Public Variable	Type	Register	Description
Out_data[0]	–	–	Reserved
Out_data[1]	WORD	465	Thermal capacity level (% trip level)
Out_data[2]	WORD	466	Average current ratio (% FLC)
Out_data[3]	WORD	467	L1 current ratio (% FLC)
Out_data[4]	WORD	468	L2 current ratio (% FLC)
Out_data[5]	WORD	469	L3 current ratio (% FLC)
Out_data[6]	WORD	470	Ground current ratio (x 0.1 % FLC min)
Out_data[7]	WORD	471	Current phase imbalance (%)
Out_data[8]	WORD	472	Controller internal temperature (°C)
Out_data[9]	WORD	474	Frequency (x 0.01 Hz)
Out_data[10]	WORD	475	Motor temperature sensor (x 0.1 Ω)
Out_data[11] ...Out_data[13]	–	–	Reserved
Out_data[14]	WORD	96	Full load current (FLC) max (x 0.1 A)
Out_data[15]	WORD	652	Motor full load current (FLC) ratio

Out_data[0]...[15] Public Variable (Program 31)

The following table describes the Out_data[0]...[15] public variable in the case of the second measurements program (program number 31):

Public Variable	Type	Register	Description
Out_data[0]	WORD	500	Average current (x 0.01 A) MSB
Out_data[1]	WORD	501	Average current (x 0.01 A) LSB
Out_data[2]	WORD	502	L1 current (x 0.01 A) MSB
Out_data[3]	WORD	503	L1 current (x0.01 A) LSB
Out_data[4]	WORD	504	L2 current (x 0.01 A) MSB
Out_data[5]	WORD	505	L2 current (x0.01 A) LSB
Out_data[6]	WORD	506	L3 current (x 0.01 A) MSB
Out_data[7]	WORD	507	L3 current (x0.01 A) LSB
Out_data[8]	WORD	508	Ground current (x 0.001 A) MSB
Out_data[9]	WORD	509	Ground current (x 0.001 A) LSB
Out_data[10]	WORD	511	Time to trip (x 1 s)
Out_data[11]	WORD	512	Motor last start current ratio (% FLC)
Out_data[12]	WORD	513	Motor last start duration (s)
Out_data[13]	WORD	514	Motor starts per hour count
Out_data[14] ...Out_data[15]	–	–	–

Out_data[0]...[15] Public Variable (Program 32)

The following table describes the Out_data[0]...[15] public variable in the case of the third measurements program (program number 32):

Public Variable	Type	Register	Description
Out_data[0]	WORD	476	Average voltage (V)
Out_data[1]	WORD	477	L3–L1 voltage (V)
Out_data[2]	WORD	478	L1–L2 voltage (V)
Out_data[3]	WORD	479	L2–L3 voltage (V)
Out_data[4]	WORD	480	Voltage phase imbalance (%)
Out_data[5]	WORD	481	Power factor (x 0.01)
Out_data[6]	WORD	482	Active power (x 0.1 kW)
Out_data[7]	WORD	483	Reactive power (x 0.1 kVAr)
Out_data[8] ...Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 40)

The following table describes the Out_data[0]...[15] public variable in the case of the last fault statistics program (program number 40):

Public Variable	Type	Register	Description
Out_data[0]	WORD	150	Detected fault code N–0
Out_data[1]	WORD	151	Motor full load current ratio N–0 (% FLC max)
Out_data[2]	WORD	152	Thermal capacity level N–0 (% trip level)
Out_data[3]	WORD	153	Average current ratio N–0 (% FLC)
Out_data[4]	WORD	154	L1 current ratio N–0 (% FLC)
Out_data[5]	WORD	155	L2 current ratio N–0 (% FLC)
Out_data[6]	WORD	156	L3 current ratio N–0 (% FLC)
Out_data[7]	WORD	157	Ground current ratio N–0 (x 0.1 % FLC min)
Out_data[8]	WORD	158	Full load current max N–0 (x 0.1 A)
Out_data[9]	WORD	159	Current phase imbalance N–0 (%)
Out_data[10]	WORD	160	Frequency N–0 (x 0.1 Hz)
Out_data[11]	WORD	161	Motor temperature sensor N–0 (x 0.1 Ω)
Out_data[12]	WORD[4]	162	Date and time N–0 See *DT_DateTime, page 118*
Out_data[13]		163	
Out_data[14]		164	
Out_data[15]		165	

Out_data[0]...[15] Public Variable (Program 41)

The following table describes the Out_data[0]...[15] public variable in the case of the last fault statistics with expansion module program (program number 41):

Public Variable	Type	Register	Description
Out_data[0]	WORD	166	Average voltage N–0 (V)
Out_data[1]	WORD	167	L3–L1 voltage N–0 (V)
Out_data[2]	WORD	168	L1–L2 voltage N–0 (V)
Out_data[3]	WORD	169	L2–L3 voltage N–0 (V)
Out_data[4]	WORD	170	Voltage phase imbalance N–0 (%)
Out_data[5]	WORD	171	Active power N–0 (kW)
Out_data[6]	WORD	172	Power factor N–0 (x 0.01)
Out_data[7] ...Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 50)

The following table describes the Out_data[0]...[15] public variable in the case of the N–1 fault statistics program (program number 50):

Public Variable	Type	Register	Description
Out_data[0]	WORD	180	Detected fault code N–1
Out_data[1]	WORD	181	Motor full load current ratio N–1 (% FLC max)
Out_data[2]	WORD	182	Thermal capacity level N–1 (% trip level)
Out_data[3]	WORD	183	Average current ratio N–1 (% FLC)
Out_data[4]	WORD	184	L1 current ratio N–1 (% FLC)
Out_data[5]	WORD	185	L2 current ratio N–1 (% FLC)
Out_data[6]	WORD	186	L3 current ratio N–1 (% FLC)
Out_data[7]	WORD	187	Ground current ratio N–1 (x 0.1 % FLC min)
Out_data[8]	WORD	188	Full load current max N–1 (x 0.1 A)
Out_data[9]	WORD	189	Current phase imbalance N–1 (%)
Out_data[10]	WORD	190	Frequency N–1 (x 0.1 Hz)
Out_data[11]	WORD	191	Motor temperature sensor N–1 (x 0.1 Ω)
Out_data[12]	WORD[4]	192	Date and time N–1 See *DT_DateTime, page 118*
Out_data[13]		193	
Out_data[14]		194	
Out_data[15]		195	

Out_data[0]...[15] Public Variable (Program 51)

The following table describes the Out_data[0]...[15] public variable in the case of the N–1 fault statistics with expansion module program (program number 51):

Public Variable	Type	Register	Description
Out_data[0]	WORD	196	Average voltage N–1 (V)
Out_data[1]	WORD	197	L3–L1 voltage N–1 (V)
Out_data[2]	WORD	198	L1–L2 voltage N–1 (V)
Out_data[3]	WORD	199	L2–L3 voltage N–1 (V)
Out_data[4]	WORD	200	Voltage phase imbalance N–1 (%)
Out_data[5]	WORD	201	Active power N–1 (kW)
Out_data[6]	WORD	202	Power factor N–1 (x 0.01)
Out_data[7] ...Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 60)

The following table describes the Out_data[0]...[15] public variable in the case of the N–2 fault statistics program (program number 60):

Public Variable	Type	Register	Description
Out_data[0]	WORD	210	Detected fault code N–2
Out_data[1]	WORD	211	Motor full load current ratio N–2 (% FLC max)
Out_data[2]	WORD	212	Thermal capacity level N–2 (% trip level)
Out_data[3]	WORD	213	Average current ratio N–2 (% FLC)
Out_data[4]	WORD	214	L1 current ratio N–2 (% FLC)
Out_data[5]	WORD	215	L2 current ratio N–2 (% FLC)
Out_data[6]	WORD	216	L3 current ratio N–2 (% FLC)
Out_data[7]	WORD	217	Ground current ratio N–2 (x 0.1 % FLC min)
Out_data[8]	WORD	218	Full load current max N–2 (x 0.1 A)
Out_data[9]	WORD	219	Current phase imbalance N–2 (%)
Out_data[10]	WORD	220	Frequency N–2 (x 0.1 Hz)
Out_data[11]	WORD	221	Motor temperature sensor N–2 (x 0.1 Ω)
Out_data[12]	WORD[4]	222	Date and time N–2 See *DT_DateTime, page 118*
Out_data[13]		223	
Out_data[14]		224	
Out_data[15]		225	

Out_data[0]...[15] Public Variable (Program 61)

The following table describes the Out_data[0]...[15] public variable in the case of the N–2 fault statistics with expansion module program (program number 61):

Public Variable	Type	Register	Description
Out_data[0]	WORD	226	Average voltage N–2 (V)
Out_data[1]	WORD	227	L3–L1 voltage N–2 (V)
Out_data[2]	WORD	228	L1–L2 voltage N–2 (V)
Out_data[3]	WORD	229	L2–L3 voltage N–2 (V)
Out_data[4]	WORD	230	Voltage phase imbalance N–2 (%)
Out_data[5]	WORD	231	Active power N–2 (kW)
Out_data[6]	WORD	232	Power factor N–2 (x 0.01)
Out_data[7] ...Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 70)

The following table describes the Out_data[0]...[15] public variable in the case of the N–3 fault statistics program (program number 70):

Public Variable	Type	Register	Description
Out_data[0]	WORD	240	Detected fault code N–3
Out_data[1]	WORD	241	Motor full load current ratio N–3 (% FLC max)
Out_data[2]	WORD	242	Thermal capacity level N–3 (% trip level)
Out_data[3]	WORD	243	Average current ratio N–3 (% FLC)
Out_data[4]	WORD	244	L1 current ratio N–3 (% FLC)
Out_data[5]	WORD	245	L2 current ratio N–3 (% FLC)
Out_data[6]	WORD	246	L3 current ratio N–3 (% FLC)
Out_data[7]	WORD	247	Ground current ratio N–3 (x 0.1 % FLC min)
Out_data[8]	WORD	248	Full load current max N–3 (x 0.1 A)
Out_data[9]	WORD	249	Current phase imbalance N–3 (%)
Out_data[10]	WORD	250	Frequency N–3 (x 0.1 Hz)
Out_data[11]	WORD	251	Motor temperature sensor N–3 (x 0.1 Ω)
Out_data[12]	WORD[4]	252	Date and time N–3 See *DT_DateTime, page 118*
Out_data[13]		253	
Out_data[14]		254	
Out_data[15]		255	

Out_data[0]...[15] Public Variable (Program 71)

The following table describes the Out_data[0]...[15] public variable in the case of the N–3 fault statistics with expansion module program (program number 71):

Public Variable	Type	Register	Description
Out_data[0]	WORD	256	Average voltage N–3 (V)
Out_data[1]	WORD	257	L3–L1 voltage N–3 (V)
Out_data[2]	WORD	258	L1–L2 voltage N–3 (V)
Out_data[3]	WORD	259	L2–L3 voltage N–3 (V)
Out_data[4]	WORD	260	Voltage phase imbalance N–3 (%)
Out_data[5]	WORD	261	Active power N–3 (kW)
Out_data[6]	WORD	262	Power factor N–3 (x 0.01)
Out_data[7] ...Out_data[15]	–	–	Reserved

Out_data[0]...[15] Public Variable (Program 80)

The following table describes the Out_data[0]...[15] public variable in the case of the N–4 fault statistics program (program number 80):

Public Variable	Type	Register	Description
Out_data[0]	WORD	270	Detected fault code N–4
Out_data[1]	WORD	271	Motor full load current ratio N–4 (% FLC max)
Out_data[2]	WORD	272	Thermal capacity level N–4 (% trip level)
Out_data[3]	WORD	273	Average current ratio N–4 (% FLC)
Out_data[4]	WORD	274	L1 current ratio N–4 (% FLC)
Out_data[5]	WORD	275	L2 current ratio N–4 (% FLC)
Out_data[6]	WORD	276	L3 current ratio N–4 (% FLC)
Out_data[7]	WORD	277	Ground current ratio N–4 (x 0.1 % FLC min)
Out_data[8]	WORD	278	Full load current max N–4 (x 0.1 A)
Out_data[9]	WORD	279	Current phase imbalance N–4 (%)
Out_data[10]	WORD	280	Frequency N–4 (x 0.1 Hz)
Out_data[11]	WORD	281	Motor temperature sensor N–4 (x 0.1 Ω)
Out_data[12]	WORD[4]	282	Date and time N–4 See *DT_DateTime, page 118*
Out_data[13]		283	
Out_data[14]		284	
Out_data[15]		285	

Out_data[0]...[15] Public Variable (Program 81)

The following table describes the Out_data[0]...[15] public variable in the case of the N–4 fault statistics with expansion module program (program number 81):

Public Variable	Type	Register	Description
Out_data[0]	WORD	286	Average voltage N–4 (V)
Out_data[1]	WORD	287	L3–L1 voltage N–4 (V)
Out_data[2]	WORD	288	L1–L2 voltage N–4 (V)
Out_data[3]	WORD	289	L2–L3 voltage N–4 (V)
Out_data[4]	WORD	290	Voltage phase imbalance N–4 (%)
Out_data[5]	WORD	291	Active power N–4 (kW)
Out_data[6]	WORD	292	Power factor N–4 (x 0.01)
Out_data[7] ...Out_data[15]	–	–	Reserved

DT_DateTime

DT_DateTime is WORD[4] type and indicates date and time:

Register	Bits 15...12	Bits 11...8	Bits 7...4	Bits 3...0
Register N	s	s	0	0
Register N+1	H	H	m	m
Register N+2	M	M	D	D
Register N+3	Y	Y	Y	Y

Where:

- 0 = unused
- s = second
  The format is 2 binary coded decimal (BCD) digits.
  The value range is 00...59 in BCD.
- m = minute
  The format is 2 binary coded decimal (BCD) digits.
  The value range is 00...59 in BCD.
- H = hour
  The format is 2 binary coded decimal (BCD) digits.
  The value range is 00...23 in BCD.
- D = day
  The format is 2 binary coded decimal (BCD) digits.
  The value range is (in BCD):
  - 01...31 for months 01, 03, 05, 07, 08, 10, 12,
  - 01...30 for months 04, 06, 09, 11,
  - 01...29 for month 02 in a leap year,
  - 01...28 for month 02 in a non-leap year.
- M = month
  The format is 2 binary coded decimal (BCD) digits.
  The value range is 01...12 in BCD.
- Y = year
  The format is 4 binary coded decimal (BCD) digits.
  The value range is 2006...2099 in BCD.

Data entry format and value range are:

Data entry format	DT#YYYY-MM-DD-HH:mm:ss	
Minimum value	DT#2006-01-01-00:00:00	January 1, 2006
Maximum value	DT#2099-12-31-23:59:59	December 31, 2099

NOTE: If the user enters values outside the defined range, the system will return an error.

Custom_pkw: Custom Read DFB for PKW Exchanges

Presentation

The Custom_pkw DFB is dedicated to the reading of up to 5 sets of registers of a single TeSys device supporting PKW (Periodically Kept in Acyclic Words) exchanges.

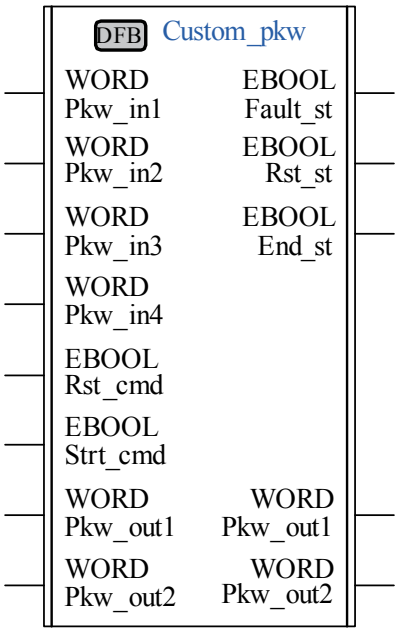
A set of registers is defined by the address of the first register to read and the length of the set (up to 16 registers per set).

The Custom_pkw DFB completes the Special_pkw_u and Special_pkw_t DFBs and enables the user to select the registers to read.

Characteristics

Characteristic	Value
Name	Custom_pkw
Version	00.43
Input	6
Output	3
Input/Output	2
Public Variable	7

Graphical Representation



TeSys U and TeSys T Compliance

- TeSys U: The Custom_pkw DFB is compliant with the following TeSys U sub-assemblies:
  - LUB•• non-reversing power base and LU2B•• reversing power base (up to 32 A/15 kW or 20 hp)
  - LUCM multifunction control unit
  - PKW compliant communication module
- TeSys T: The Custom_pkw DFB is compliant with all the LTM R controller versions, with or without the LTM E expansion module.
- When using TSXPBY100 Premium Profibus coupler it is mandatory to set %QWxy.0.242:X0 to 1 to guarantee the data consistency.

Software Implementation

- Pkw_in1, Pkw_in2, Pkw_in3 and Pkw_in4 input words must be linked to the first 4 words of the PKW slave input cyclic data.
- Pkw_out1 and Pkw_out2 output words must be linked to the first word of the first 2 words of the PKW slave output cyclic data.
- The output data is only valid if the End_st output variable is set to 1 and if there is no fault detected (Fault_st = 0).
- The public variables enable the user to read up to 5 sets of registers of a maximum length of 16 registers for each set:
  - The user defines the starting point of a set of registers with the In_reg public variable.
  - The user defines the length of the set of registers with the corresponding In_len public variable.
  - The registers content is then returned in the corresponding Out_dat public variable.

Example with TeSys T

The user wants to read 3 sets of TeSys T registers:
- Global statistics: registers 102...106 (5 registers)
- Measurements: registers 465...470 (6 registers)
- Controller identification: registers 64...74 (11 registers)

The following table describes the values of the corresponding In_reg and In_len public variables:

Public Variable	Value
In_reg[0]	102
In_reg[1]	465
In_reg[2]	64
In_len[0]	5
In_len[1]	6
In_len[2]	11

The following table describes the values of the corresponding Out_dat public variables:

Public Variable		Register	Description
Out_dat0	Out_dat0[0]	102	Ground current faults count
	Out_dat0[1]	103	Thermal overload faults count
	Out_dat0[2]	104	Long start faults count
	Out_dat0[3]	105	Jam faults count
	Out_dat0[4]	106	Current phase imbalance faults count
Out_dat1	Out_dat1[0]	465	Thermal capacity level (% trip level)
	Out_dat1[1]	466	Average current ratio (% FLC)
	Out_dat1[2]	467	L1 current ratio (% FLC)
	Out_dat1[3]	468	L2 current ratio (% FLC)
	Out_dat1[4]	469	L3 current ratio (% FLC)
	Out_dat1[5]	470	Ground current ratio (x 0.1 % FLC min)
Out_dat2	Out_dat2[0]	64	Controller commercial reference MSB = ASCII char 1, LSB = ASCII char 2
	Out_dat2[1]	65	Controller commercial reference MSB = ASCII char 3, LSB = ASCII char 4
	Out_dat2[2]	66	Controller commercial reference MSB = ASCII char 5, LSB = ASCII char 6
	Out_dat2[3]	67	Controller commercial reference MSB = ASCII char 7, LSB = ASCII char 8
	Out_dat2[4]	68	Controller commercial reference MSB = ASCII char 9, LSB = ASCII char 10
	Out_dat2[5]	69	Controller commercial reference MSB = ASCII char 11, LSB = ASCII char 12
	Out_dat2[6]	70	Controller serial number, register 1
	Out_dat2[7]	71	Controller serial number, register 2
	Out_dat2[8]	72	Controller serial number, register 3
	Out_dat2[9]	73	Controller serial number, register 4
	Out_dat2[10]	74	Controller serial number, register 5

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Range	Default Value	Description
Pkw_in1	WORD	–	0	Must be linked to the first word of the PKW slave input cyclic data
Pkw_in2	WORD	–	0	Must be linked to the second word of the PKW slave input cyclic data
Pkw_in3	WORD	–	0	Must be linked to the third word of the PKW slave input cyclic data
Pkw_in4	WORD	–	0	Must be linked to the fourth word of the PKW slave input cyclic data
Rst_cmd	EBOOL	0...1	0	Reset command
Strt_cmd	EBOOL	0...1	0	Start command

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Range	Default Value	Description
Fault_st	EBOOL	0...1	0	Fault detected
Rst_st	EBOOL	0...1	0	Reset state
End_st	EBOOL	0...1	0	End state

Input/Output Characteristics

The following table describes the DFB input/outputs:

Input/Output	Type	Range	Default Value	Description
Pkw_out1	WORD	–	0	Must be linked to the first word of the PKW slave output cyclic data
Pkw_out2	WORD	–	0	Must be linked to the second word of the PKW slave output cyclic data

Public Variables Characteristics

The following table describes the DFB public variables:

Public Variable	Type	Description
In_reg	ARRAY [0...4] of WORD	Array of 5 words for the 5 index registers (In_reg(0)...In_reg[4])
In_len	ARRAY [0...4] of WORD	Array of 5 words for the length of each set of registers (In_len[0]...In_len[4])
Out_dat[0]	ARRAY [0...15] of WORD	Array of up to 16 words containing the In_len[0] words starting from In_reg[0]
Out_dat[1]	ARRAY [0...15] of WORD	Array of up to 16 words containing the In_len[1] words starting from In_reg[1]
Out_dat[2]	ARRAY [0...15] of WORD	Array of up to 16 words containing the In_len[2] words starting from In_reg[2]
Out_dat[3]	ARRAY [0...15] of WORD	Array of up to 16 words containing the In_len[3] words starting from In_reg[3]
Out_dat[4]	ARRAY [0...15] of WORD	Array of up to 16 words containing the In_len[4] words starting from In_reg[4]

Treatment DFB

8

Introduction

This chapter describes the Scale and Timestamp treatment DFBs.

What's in this Chapter?

This chapter contains the following topics:

Scale: TeSys U DFB for Measurement Unit Conversion

Presentation

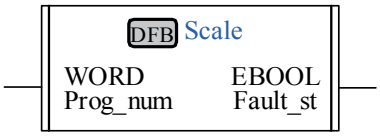
The Scale DFB is dedicated to the conversion of current measurement unit from relative value (% FLC) to Amps for a TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with a LUCM multifunction control unit. It also enables the user to select another unit in the A...mA range.

The Scale DFB is particularly used with the Special_pkw_u or the Special_mdb_u DFBs.

Characteristics

Characteristic	Value
Name	Scale
Version	00.56
Input	9
Output	15
Input/Output	15
Public Variable	15

Graphical Representation



TeSys U Compliance

The Scale DFB is compliant with the following TeSys U sub-assemblies:

Power base	• LUB•• non-reversing power base (up to 32 A/15 kW or 20 hp) • LU2B•• reversing power base (up to 32 A/15 kW or 20 hp)
Control unit	• LUCM multifunction control unit

Software Implementation

The following PL7 program in ST language is a connection example between the Scale DFB (instance name = Scale) and the Special_mdb_u DFB (instance name = Spec):

```
(* Scale measure on Modbus SL TeSys 3 *)
Scale_mdb (%M300);
Scale_mdb.Prog_num:=3;
Scale_mdb.In_avg:=Spec.out_data[2];
Scale_mdb.In_I1:=Spec.out_data[3];
Scale_mdb.In_I2:=Spec.out_data[4];
Scale_mdb.In_I3:=Spec.out_data[5];
Scale_mdb.In_gnd:=Spec.out_data[6];
Scale_mdb.In_phimb:=Spec.out_data[7];
Scale_mdb.In_range:=Spec.out_data[14];
Scale_mdb.In_setup:=Spec.out_data[15];
```

In this example, the program number (Prog_num) for the Special_mdb_u DFB must be equal to 3. In this case, the public variables (Out_data[0]...Out_data[15]) of the scale DFB return the measurements in % FLA.

See the Special_mdb_u DFB public variables description in *Public Variables Characteristics, page 65*.

The Scale DFB converts the measurements unit from % FLA to A and to any unit in the A...mA range:
- The Out_ri output variables return the current measurements in A.
- The Out_ii output variables return the current measurements in the unit chosen by the user in the A...mA range.

If a fault occurs:
- the Special_mdb_u DFB outputs are set to –1,
- the Scale DFB outputs are set to –1,
- the Scale DFB Fault_st output is set to 1.

Input Characteristics

The following table describes the DFB input:

Input	Type	Description
Prog_num	WORD	The program number enables the user to select the measurement unit of the Scale DFB outputs (A...mA): ● 0 = the unit is 1/1 A (coeff = 1) ● 1 = the unit is 1/10 A (coeff = 10) ● 2 = the unit is 1/100 A (coeff = 100) ● 3 = the unit is 1/1000 A (coeff = 1000)

Output Characteristics

The following table describes the DFB output:

Output	Type	Description
Fault_st	EBOOL	Fault detected

Public Variables Characteristics

The following table describes the DFB public variables:

Public Variable	Type	Description
In_avg	WORD	Average motor current (x 0.1 % FLA)
In_L1	WORD	L1 current (% FLA)
In_L2	WORD	L2 current (% FLA)
In_L3	WORD	L3 current (% FLA)
In_gnd	WORD	Ground current (% FLA min)
In_phimb	WORD	Current imbalance coefficient
In_range	WORD	Control unit sensor maximum current (x 0.1 A): ● 6 = adjustment range 0.15–0.6 A ● 14 = adjustment range 0.35–1.4 A ● 50 = adjustment range 1.25–5 A ● 120 = adjustment range 3–12 A ● 180 = adjustment range 4.5–18 A ● 320 = adjustment range 8–32 A
In_setup	WORD	Full load amps setting (% FLA max): ● minimum = 25 (default value) ● maximum = 100
Out_ravg	REAL	Average motor current in A Scaling formula: IAvg x (adjustment range) x (FLA setting) / 100000
Out_rl1	REAL	L1 current in A Scaling formula: IL1 x (adjustment range) x (FLA setting) / 100000
Out_rl2	REAL	L2 current in A Scaling formula: IL2 x (adjustment range) x (FLA setting) / 100000
Out_rl3	REAL	L3 current in A Scaling formula: IL3 x (adjustment range) x (FLA setting) / 100000
Out_rgnd	REAL	Ground current in A Scaling formula: IGnd x (adjustment range / 4) x (FLA setting) / 100000
Out_rimb	REAL	Current imbalance in A Scaling formula: IImb x IAvg / 100
Out_rstp	REAL	Full load amps (FLA) in A Scaling formula: (adjustment range x FLA setting) / 1000
Out_iavg	WORD	Average motor current in unit defined in the Prog_num variable (1) Scaling formula: Out_ravg x coeff (1)
Out_il1	WORD	L1 current in unit defined in the Prog_num variable (1) Scaling formula: Out_rl1 x coeff (1)
Out_il2	WORD	L2 current in unit defined in the Prog_num variable (1) Scaling formula: Out_rl2 x coeff (1)
Out_il3	WORD	L3 current in unit defined in the Prog_num variable (1) Scaling formula: Out_rl3 x coeff (1)
Out_ignd	WORD	Ground current in unit defined in the Prog_num variable (1) Scaling formula: Out_rgnd x coeff (1)
Out_iimb	WORD	Current imbalance in unit defined in the Prog_num variable (1) Scaling formula: Out_rimb x coeff (1)
Out_istp	WORD	Full load amps (FLA) in unit defined in the Prog_num variable (1) Scaling formula: Out_rstp x coeff (1)
(1) See the Prog_num input description in *Input Characteristics, page 125*. For example, if Prog_num = 3, then the unit is mA and the coeff = 1000.		

Timestamp : TeSys U DFB for Data Time-Stamping

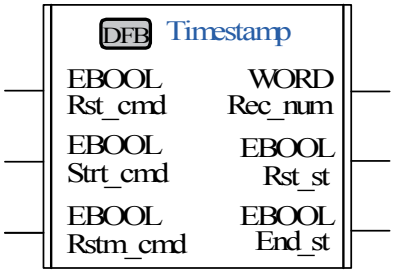
Presentation

The Timestamp DFB is dedicated to the time-stamping of up to 8 input registers of a TeSys U starter-controller (up to 32 A/15 kW or 20 hp) with a LUCM multifunction control unit. It provides an output table of the 8 time-stamped registers and 4 date and time registers (see *DT_DateTime, page 118*).

Characteristics

Characteristic	Value
Name	Timestamp
Version	00.22
Input	3
Output	3
Input/Output	0
Public Variable	2

Graphical Representation



TeSys U Compliance

The Timestamp DFB is compliant with all the TeSys U sub-assemblies.

Software Implementation

The following PL7 program in ST language is a connection example between the Timestamp DFB (instance name = Ts_def_pdp) and the Special_pkw_u DFB (instance name = Spec_pkw_pdp):

```
(* Link between Timestamp DFB and Special_pkw_u DFB *)
Ts_def_pdp.In_data[0]:= Spec_pkw_pdp.Out_data[0];
Ts_def_pdp.In_data[1]:= Spec_pkw_pdp.Out_data[1];
Ts_def_pdp.In_data[2]:= Spec_pkw_pdp.Out_data[2];
Ts_def_pdp.In_data[3]:= Spec_pkw_pdp.Out_data[3];
Ts_def_pdp.In_data[4]:= Spec_pkw_pdp.Out_data[4];
Ts_def_pdp.In_data[5]:= Spec_pkw_pdp.Out_data[5];
Ts_def_pdp.In_data[6]:= Spec_pkw_pdp.Out_data[6];
Ts_def_pdp.In_data[7]:= Spec_pkw_pdp.Out_data[7];
```

Input Characteristics

The following table describes the DFB inputs:

Input	Type	Description
Rst_cmd	EBOOL	Reset time-stamping counter
Strt_cmd	EBOOL	Start time-stamping
Rstm_cmd	EBOOL	Reset time-stamping memory

Output Characteristics

The following table describes the DFB outputs:

Output	Type	Description
Rec_num	WORD	Number of time-stamping operations since last reset
Rst_st	EBOOL	0 = Time-stamping is reset 1 = Time-stamping is not reset
End_st	EBOOL	0 = Time-stamping is not over 1 = Time-stamping is over

Public Variables Characteristics

The following table describes the DFB public variables:

Public Variable	Type	Description
In_data[0]...[7]	ARRAY[0...7] of WORD	8 data registers to be time-stamped
Out_data[0]...[11]	ARRAY[0...11] of WORD	• Out_data[0]...Out_data[7]: 8 time-stamped data registers • Out_data[8]: seconds (1) • Out_data[9]: hours and minutes (1) • Out_data[10]: month and day (1) • Out_data[11]: year (1)
(1) For more information regarding the date and time format, see *DT_DateTime, page 118*.		