





Manual

Encoders with PROFINET interface



pulses for automation

Table of Contents

1	Docu	ment		4	
2	Gene	General Information			
	2.1	Target (Group	5	
	2.2	Symbol	s used / Classification of the Warnings and Safety instructions	5	
	2.3	Transpo	ort / Storage	6	
3	Prod	uct Desc	cription	7	
	3.1	Technic	al Data Sendix 58xx	7	
	3.2	Technic	al Data Sendix F58xx	9	
	3.3	PROFIN	NET IO Interface Description	11	
	3.4	Support 3.4.1 3.4.2 3.4.3	ted Standards and Protocols 58x8 Standards & Features F58x8 Standards & Features Optional Features	12 12 13 13	
4	Insta	llation		16	
	4.1	Electrica 4.1.1 4.1.2 4.1.3 4.1.4	al Installation General Information for the Connection Terminal Assignment 58xx Terminal Assignment F58x8 / S58x8FS3 Network Topology	16 16 16 17 19	
5	Com	missioni	ng and Operation	21	
	5.1	Functio	n and Status LED	21	
	5.2	Quick S 5.2.1 5.2.2 5.2.3	itart Guide Configuration Commissioning Resetting to Factory Settings	21 21 29 30	
	5.3	Protoco 5.3.1 5.3.2	l Features PROFIdrive PROFINET	33 34 36	
	5.4		ration Parameters Description General Module Parameters I&M Data Acyclic Data Transmission Base Mode Parameter	37 37 42 44 46	
	5.5	Telegra 5.5.1 5.5.2 5.5.3 5.5.4 5.5.5 5.5.6 5.5.7	ms Description Available Submodules / Telegrams Submodule - ManTel860 (Encoder Profile V4.1) Submodule - StdTel81 (Encoder Profile V4.1) Submodule - Speed (Encoder Profile V4.1) Submodule - ST_POS (Encoder Profile V4.1) Submodule - MT_POS (Encoder Profile V4.1) Submodule - G1_STW (Encoder Profile V4.1)	57 58 61 62 63 63 64 64	

		5.5.8	Submodule - G1_ZSW (Encoder Profile V4.1)	65
		5.5.9	Submodule - Universal module	66
		5.5.10	Submodule - StdTel81 (Encoder Profile V4.2)	68
		5.5.11	Submodule - StdTel82 (Encoder Profile V4.2)	68
		5.5.12	Submodule - StdTel83 (Encoder Profile V4.2)	69
		5.5.13	Submodule - StdTel84 (Encoder Profile V4.2)	70
		5.5.14	Submodule - StdTel86 (Encoder Profile V4.2)	70
		5.5.15	Submodule - StdTel88 (Encoder Profile V4.2)	71
		5.5.16	Telegram data	72
	5.6	Feature	s Description	82
		5.6.1	Firmware update and reset	82
		5.6.2	FSU - Fast Startup	85
		5.6.3	LLDP - Link Layer Discovery Protocol	85
		5.6.4	MRP - Media Redundancy Protocol	87
		5.6.5	Isochronous Mode IRT	88
		5.6.6	Integrating an Encoder as a Technology Object	93
		5.6.7	Backward compatibility	97
	5.7	Example	es	98
		5.7.1	Reading the I&M data	98
		5.7.2	Replacement of a PROFINET encoder in the network	99
		5.7.3	IO-Link device integration via PROFINET	100
6	Anne	x		108
	6.1	Scaling		108
	6.2	-	mask in conjunction with the IP address	
	6.3		/ Hexadecimal conversion table	
	6.4	Convers	sion table Data types	112
7	Conta	act		113
	Gloss	sary		114

1 Document

This is the English translation of the original manual in German language.

Publisher	Kübler Group, Fritz Kübler GmbH Schubertstraße 47 78054 Villingen-Schwenningen Germany www.kuebler.com
Issue date	04/2024
Copyright	[©] 2024, Kübler Group, Fritz Kübler GmbH

Text sources

PROFINET System DescriptionTechnology and Application 10.2014

Encoder Profile Technical Specification for PROFIBUS and PROFINET Version 4.2

PROFIdrive Profile Technical Specification for PROFIBUS and PROFINET Version 4.2

Image sources

Screenshots - Siemens TIA Portal

ARC Advisory Group - ARC WHITE PAPER NOVEMBER 2015 -

How Profinet and Industrie 4.0 Enable Information-Driven Industries

Encoder Profile Technical Specification for PROFIBUS and PROFINET Version 4.2

PROFIdrive Profile Technical Specification for PROFIBUS and PROFINET Version 4.2

Code sources

- none -

Legal Notices

All of the contents of this document are protected by the rights of use and copyrights of Fritz Kübler GmbH. Any duplication, modification, further use and publications in other electronic or printed media, as well as their publication in the Internet, even partially, is subject to the previous written authorization by Fritz Kübler GmbH.

The brand names and product brands mentioned in this document are trademarks or registered trademarks of the respective titleholders.

Subject to errors and changes. The stated product features and technical data shall not constitute any guarantee declaration.

2 General Information



Please read this document carefully before working with the product, mounting it or starting it up.

2.1 Target Group

The device may only be planned, mounted, commissioned and serviced by persons having the following qualifications and fulfilling the following conditions:

- · Technical training.
- Briefing in the relevant safety guidelines.
- Constant access to this documentation.

2.2 Symbols used / Classification of the Warnings and Safety instructions

	Classification:	
	This symbol, together with the signal word DANGER , warns against immediately imminent threat to life and health of persons.	
	The non-compliance with this safety instruction will lead to death or severe adverse health effects.	
	Classification:	
	This symbol, together with the signal word WARNING , warns against a potential danger to life and health of persons.	
	The non-compliance with this safety instruction may lead to death or severe adverse health effects.	
	Classification:	
	This symbol, together with the signal word CAUTION , warns against a potential danger for the health of persons.	
	The non-compliance with this safety instruction may lead to slight or minor adverse health effects.	
ATTENTION	Classification:	
	The non-compliance with the ATTENTION note may lead to material damage.	

NOTICE	Classification:
	Additional information relating to the operation of the product, and hints and recommendations for efficient and trouble-free operation.

2.3 Transport / Storage

Check the delivery immediately upon receipt for possible transport damages. If you do not mount the device immediately, store it preferably in its transport package.

The device must be stored at a dry and dust-free location, in compliance with the technical data, see chapter Technical Data.

3 Product Description

3.1 Technical Data Sendix 58xx

Singleturn Technologie	Optisch
Multiturn Technologie	Optical, mechanical gear
Singleturn resolution (MUR)	Max. 16 bits (default 13 bits)
Multiturn resolution (NDR)	Max. 12 bits
Multiturn resolution (TMR)	Max. 28 bits (default 25 bits)
Accuracy	± 0.0117° (over the whole temperature range)
Data up-to-dateness	5 ms

Mechanical characteristics for the Sendix 58xx encoders

Maximum rotary speed	
IP65 up to 70 °C	9000 min ⁻¹ , 7000 min ⁻¹ (continuous operation)
IP65 up to T _{max}	7000 min ⁻¹ , $(Continuous operation)$
	4000 min ⁻¹ (continuous operation)
IP67 up to 70 °C	8000 min ⁻¹ ,
ID67 up to T	6000 min ⁻¹ (continuous operation) 6000 min ⁻¹ .
IP67 up to T _{max}	3000 min ⁻¹ (continuous operation)
Starting torque (at 20 °C)	
IP65	< 0.01 Nm
IP67	< 0.05 Nm
Mass moment of inertia	
Shaft version	$3,0 \times 10^{-6} \text{ kg/m}^2$
Hollow shaft version	7,5 x 10 ⁻⁶ kg/m ² (MT) 6 x 10 ⁻⁶ kg/m ² (ST)
Permissible shaft load	
radial	80 N
axial	40 N
Protection level acc. to EN 60529	
Housing side	IP67
Shaft side	IP65, optional IP67
Working temperature range	-40 °C +80 °C
Materials	
Shaft/hollow shaft	Stainless steel
Flange Housing	Aluminum Die-cast zinc
Shock resistance according to EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance according to EN 60068-2-6	100 m/s², 55 2000 Hz

Electrical data for the Sendix 58xx encoders

Supply voltage	10 30 V DC
Current consumption (no load) 10 … 30 V DC	max. 110 mA
Supply voltage reverse polarity protection	Yes
Output	PROFINET
ouput	Ethernet 100Base-TX acc. to IEEE 802.x
Type of connection	Cable or connector
Interface	PROFINET IO
Implemented profile versions	Encoder Profile Version 4.1
Vendor ID	0x0198
Device ID	0x0001
Parameters memory	EEPROM
Implemented features	DCP
	RTA
	LLDP
	SNMP
	MIB-II
	LLDP-MIB
	PTCP
	MRP
	FSU
	I&M0 readable
Implemented telegrams	Std. telegram 81
	Man. telegram 860
	SPEED
	ST_POS
	MT_POS
	G1 STW
	G1 ZSW
	Universal module
Classifications	RT CLASS 1
	RT CLASS 2 (RT)
	RT CLASS 3 (IRT)
	Conformance Class C
	Application Class 3
	Encoder Class 3
	Net load class III

3.2 Technical Data Sendix F58xx

Singleturn technology	Optical
Multiturn technology	Battery-buffered, electronic counter, flash technology
Singleturn resolution (MUR) Maximum default	
Multiturn resolution (NDR) Maximum default	
Total resolution (TMR) Maximum default	00 811
Scaling	Supports USF Supports gear factor
Accuracy	± 0,0137° (over the whole temperature range)

Mechanical Characteristics for the Sendix F58xx Encoders

Maximum rotational speed IP67 (for short periods– 10 min)	9000 min-1
IP67 (continuous operation)	
Starting torque (at 20 °C)	
IP67	< 0,01 Nm
Mass moment of inertia	
Shaft version Hollow shaft version	3,0 x 10 ⁻⁶ kg·m² 6,0 x 10 ⁻⁶ kg·m²
Permissible shaft load	
radial axial	80 N 40 N
Protection level (acc. to EN 60529)	
Housing side Shaft side	IP67 IP65 (optional IP67)
Working temperature range	-40°C +80°C [-40°F +176°F]
Materials	
	Stainless steel Aluminum Aluminum
Shock resistance (acc. to EN 60068-2-27)	2500 m/s², 6 ms
Vibration resistance (acc. to EN 60068-2-6)	100 m/s², 55 2000 Hz

Electrical characteristics for the Sendix F58xx encoders

Supply voltage	10 30 V DC
Maximum current consumption	110 mA
Supply voltage reverse polarity protection	Yes
Output	PROFINET
	Ethernet 100Base-TX nach IEEE 802.x
Type of connection	Cable or connector
Interface	PROFINET IO
Vendor ID	0x0198
Device ID	0x0001
Parameters memory	FRAM
Implemented profile versions	Encoder Profile Version 4.2
	PROFIdrive Version V4.2
Implemented features	DCP
	RTA
	LLDP
	SNMP
	MIB-II
	LLDP-MIB
	PTCP
	MRP
	FSU
	I&M 03
	Isochronous mode
	Basic web server - Firmware updates
Implemented telegrams	Std. telegrams 81, 82, 83, 84, 86, 88
Classifications	RT CLASS 1
	RT CLASS 2 (RT)
	RT CLASS 3 (IRT)
	Conformance Class C
	Application Class 6
	Encoder Class 4
	Net load class III
Min. cycle time	Min. Device Interval = 250 µs

3.3 PROFINET IO Interface Description

PROFINET is a mechanism for exchanging data between controllers and devices. Controller may be a PLC, a DCS or a PAC (Programmable Logic Controller, Distributed Control System, or Programmable Automation Controller). Devices may be any I/O block, vision system, measuring sensor, RFID reader, drive, process instrument, proxy or even other controllers.

PROFINET exchanges data quickly and in a deterministic manner. The required speeds vary according to the application. Update can take place in hundreds of milliseconds, a few milliseconds or even < 1 millisecond. Determinism means that the messages arrive at a defined point of time, when they have to.

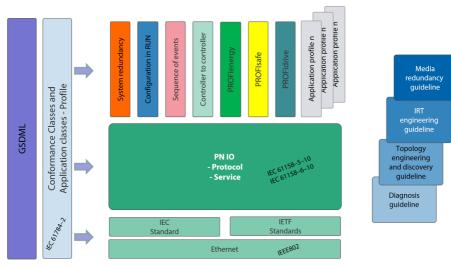
Other protocols are not as deterministic. For example Modbus TCP uses TCP, which implies that a virtual connection is established between both devices and that all messages must pass through the TCP/IP stack. EtherNet/IP uses UDP, so that messages must pass through the UDP/IP stack. The time to pass the stack is variable and reduces the determinism, in addition to the speed loss. EtherCAT is deterministic, but it is a closed network.

PROFINET exchanges data, including quality and asset management information. The protocol is standardized in IEC 61158 and IEC 61784.

Conformance Classes

PROFINET defines three conformity classes that build up on one another, which are oriented at typical applications (Figure below):

- CC-A provides basic functions for PROFINET IO with RT communication. All IT services can be used without restrictions. Typical applications can be found e.g. in the enterprise automation systems. For this class, wireless communication is specified.
- CC-B extends the concept with the network diagnostics through IT mechanisms and topology information. The system redundancy function, which is important for process automation, is included in an extended version of CC-B called CC-B(PA).
- CC-C describes the basic functions for devices with hardware-based band width reservation and synchronization (IRT communication) and is thus the basis for isochronous applications. The conformity classes also serve as the basis for certification and for the wiring guidelines.



IMG-ID: 108020747

Parameterizing

Parameterizing requires the GSD (General Station Description) files of the field devices to be configured. The XML-based GSDML describes the features and functions of the PROFINET IO field devices. It contains all data relevant for engineering and data exchange with the field device. The field device manufacturer must provide the XML-based GSD in compliance with the GSDML specification.

Addressing

In a PROFINET IO system, every field device is given a symbolic name, which clearly identifies the field device within this IO system. This name is used to correlate the IP address and the MAC address of the field device. The DCP (Discovery and basic Configuration Protocol) is used for this purpose.

Every PROFINET device is addressed by means of its worldwide unique MAC address. This MAC address includes a company code (bit 24 47) as the OUI (Organizationally Unique Identifier) and a consecutive number (bit 0 23). An OUI allows identifying up to 16,777,214 products of a single manufacturer.

Optionally, the name can also be assigned automatically to the IO device by the IO controller by means of a specified topology, based on neighborhood detection. Here the IP address is assigned on the basis of the device name via the DCP protocol. Since DHCP (Dynamic Host Configuration Protocol) is internationally widespread, PROFINET has provided an optional address setting via DHCP or via manufacturer-specific mechanisms. The addressing options supported by a field device are defined in the GSDML field for the concerned field device.

Source: PROFINET System Description Technology and Application 10.2014

3.4 Supported Standards and Protocols

The PROFINET standards and features implemented in the device are listed below:

3.4.1 58x8 Standards & Features

- RT_CLASS_1
- RT_CLASS_2 (RT)
- RT_CLASS_3 (IRT)
- DCP
- RTA
- LLDP
- SNMP
- MIB-II
- LLDP-MIB
- PTCP
- MRP
- FSU
- Conformance Class C
- Application Class 3
- Encoder Class 3

- NetloadClass III
- · IM0 readable
- Min. DeviceInterval = 1000 µs
- Encoder profile V4.1

3.4.2 F58x8 Standards & Features

- RT_CLASS_1
- RT_CLASS_2 (RT)
- RT_CLASS_3 (IRT)
- DCP
- RTA
- LLDP
- SNMP
- MIB-II
- LLDP-MIB
- PTCP
- MRP
- FSU
- Conformance Class C
- Application Class 6
- Encoder Class 4
- NetloadClass III
- I&M 0...3
- Min. DeviceInterval = 250 µs
- Isochrounus Mode
- Encoder profile V4.2
- PROFIdrive profile V4.2
- · Basic web server Firmware update

3.4.3 Optional Features

PROFINET defines features that must not be mandatorily implemented (optional features).

NOTICE	Observe the specific implementation
	The overview provides information about whether the feature is implemented in the device. This however does not mean that the feature is implemented in the same way in every device The specific implementation can be found in the description in the following pages.

Optional PROFINET features	Description	Sendix 58x8 (Encoder profile 4.1)	Sendix F58x8 (Encoder profile 4.2)
Network Redundancy with Media Redundancy Protocol (MRP)	The Media Redundancy Protocol Implemented provides network ring redundancy for PROFINET IO real-time networks		Implemented
System Redundancy	Allows a primary and backup controller for redundant applications with PROFINET	Implemented	Implemented
Device Redundancy	Allows a device to have several interfaces, including PROFINET redundancy	Not implemented	Not implemented
Shared Device	Distribution of the device functions over different controllers	Implemented	Not Implemented
Shared Inputs	Multiple access to inputs by different controllers	Not implemented	Not implemented
Device Access	Allows reading or writing parameters by means of a configuration tool	Implemented	Not Implemented
Supervisor Access	Allows an IO supervisor to take in charge an IO device to check inputs, outputs and device functions	Implemented	Implemented
Extended Device Information (Identification & Maintenance Records 1-3)	Extended device information (site description, mounting date, etc.)	Not implemented	Implemented
Direct data exchange / Multicast Communication Relation (MCR)	A multicast communication relation allows several devices to communicate by direct data exchange	Not implemented	Not implemented
Simple Network Management Protocol (SNMP)	Allows reading simple network management protocols and topology information	Implemented	Implemented
Simple device replacement	In the event of device failure and replacement, allows a controller to name automatically a replaced IO device	Implemented	Implemented
Configuration in Run (CiR)	Allows configuring and setting a device even while the controller / the PLC is in "Run" mode	Not implemented	Not implemented
Time Stamping	Allows using time stamps based on a real-time clock	Not implemented	Not implemented
Fiber Optic Cable diagnostics	The fiber optic cable diagnostics offer improved diagnostics for the maintenance in the event that the cable looses signal strength over time	Not implemented	Not implemented

Optional PROFINET features	Description	Sendix 58x8 (Encoder profile 4.1)	Sendix F58x8 (Encoder profile 4.2)
Fast Startup (FSU)	Fast device start-up after the power cycle for specific applications (e.g. tool changers)	Implemented	Implemented
Isochronous Real Time (IRT)	The isochronous real time allows synchronous communication with bandwidth reservation and scheduling up to 250 μ s with < 1 μ s jitter for motion control applications	Not implemented	Implemented
Dynamic Frame Packing (DFP)	Dynamic frame packing with IRT is optimized for line structures and allows 31.25 µs update times for high- speed motion control applications	Not available yet	Not available yet
IRT with Media Redundancy for Planned Duplication (MRPD)	Network media redundancy for planned duplication for IRT systems – Constant two-way transmission	Not implemented	Not implemented
Tool Calling Interface (TCI)	Tool calling interface used for calling a device-specific engineering tool	Not implemented	Not implemented
Individual Parameter Server (iPar)	Individual parameter server (iPar) for automatic parameter assignment of devices (e. g. for safety)	Not implemented	Not implemented
Application and Device Profiles	Special application/device profiles for specific applications (e. g. safety, energy, drives) or device data sets for specific device types (e. g. encoders)	Implemented	Implemented
Manufacturer Specific Alarms	Manufacturer-specific PROFINET diagnosis alarms (e.g. redundant power supply error, manufacturer- specific error code)	Not implemented	Implemented

4 Installation

NOTICE	Observe the operation manual
	Installation instructions can be found in the relevant operation manual.

4.1 Electrical Installation

4.1.1 General Information for the Connection

ATTENTION	Destruction of the device
	Before connecting or disconnecting the signal cable, always disconnect the power supply and secure it against switching on again.
NOTICE	General safety instructions
	Make sure that the entire system is in a de-energized state during electrical installation.
NOTICE	No open cable wires
	Connect all required cable wires / connectors before commissioning. Insulate individually all unused ends of the output signals to avoid short-circuits.
	 Electrostatic discharges at the contacts of the connector or at the cable ends could damage or destroy the device. Take appropriate precautionary measures.
NOTICE	Traction relief
	Always mount all cables with traction relief.
NOTICE	Use shielded data lines
	Use exclusively shielded data lines to comply with the EMC interference immunity requirements in force for interference emissions and external interference.

4.1.2 Terminal Assignment 58xx

PROFINET connection M12 connector

Inter- face	Type of connect ion	M12 connector, D-coded, 5-pin M12 connector, A-coded, 4-pin					Connector
С	2	Connect	tor				
				\sim_2			
		Signal	TxD+	RxD0	TxD-	RxD-	
		Pin	1	2	3	4	(4)
	Supply voltage					2	
		Signal	+V	-	0 V	-	
		Pin	1	2	3	4	
			LIN	K 2		~ 2	
		Signal	TxD+	RxD0	TxD-	RxD-	
	Pin	1	2	3	4	•	

The two external encoder connectors "PORT 1" and "PORT 2" serve for the PROFINET communication (the encoder is here a PROFINET device). One of the two ports is sufficient for a star structure. Both ports are required for a line or ring structure. In principle, the data ports are equivalent and can be chosen freely. When a determined topology has been defined for the hardware configuration (e.g. for LLDP, IRT, MRP), they shall not be interchanged any more.

4.1.3 Terminal Assignment F58x8 / S58x8FS3

4.1.3.1 Terminal Assignment

The encoder has three connectors, two of them are the two Ethernet ports.

The central connector is the power supply of the encoder. The power supply connector is an A-coded M12 plug.

Both Ethernet connectors are D-coded M12 sockets. The assignment of the signals to the pins is described in the table below.

3x M12, 4-p	oole				Connector
	Link 1 - Ethernet Port IN / OUT				
Signal	TxD+	RxD+	TxD-	RxD-	
Pin	1	2	3	4	•
					Socket, D-coded
		Voltage	e supply		
Signal	+ V	-	0 V	-	
Pin	1	2	3	4	
					Plug, A-coded
	Lii	nk 2 - Etherne	et Port IN / Ol	JT	
Signal	TxD+	RxD+	TxD-	RxD-	
Pin	1	2	3	4	4
					Socket, D-coded

The two external encoder connectors "PORT 1" and "PORT 2" are used for the Ethernet communication. One of the two ports is sufficient for a star structure. Both ports are required for a line or ring structure. In principle, the data ports are equivalent and can be chosen freely.

When a determined topology has been defined in the hardware configuration, the connectors may not be interchanged any more.



IMG-ID: 9007199341265931

NOTICE

M12 connector cover

Both Ethernet ports are provided with a plastic cap. If only one of both ports is to be used, the cap of the other port must be tightened at a torque of 1 Nm [0.74 ft-lb] to ensure the IP protection level.

Signal assignment of an M12 to RJ45 cable

M12 to RJ45 direct

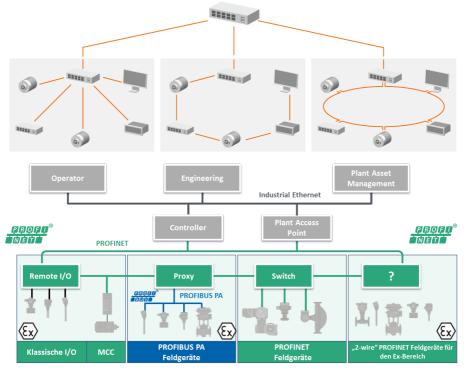
Signal	M12 Pin	RJ45 Pin
TxD+	1	1
TxD-	3	2
RxD+	2	3
RxD-	4	6

4.1.4 Network Topology

Network topologies result from the functional requirements imposed on the respective network. However, network planners must also consider aspects such as management, performance, spatial environment, safety, maintenance and savings potential. Thus, the network topology is in practice always a compromise resulting from very different considerations.

Basically, any network topology can be achieved with Industrial Ethernet. There are essentially three patterns used to arrange devices in a network: the star, the line and the ring. Each of these three basic physical topologies in turn includes the smallest topology possible: the point-to-point topology between two participants.

- The star topology includes point-to-point connections between a central network participant and all others, which are arranged in star with respect to it. The transmission medium runs point-to-point between them, resulting in a star structure.
- In the line topology, all participants are interconnected by means of a common transmission medium. This medium is called bus, so this topology is also called bus topology.
- For the ring topology, all network participants are connected via two points. This means that every participant maintains two point-to-point connections with other participants, resulting in a circular structure.



IMG-ID: 9007199362890507

The basic logical topologies can be assigned to these three basic patterns.

• In the star topology, every connection between the central network participant and another participant consists in two lines - one to send, one to receive. The sent signal of a network participant is sent via the central network participant to all others.

- In the line topology, the data sent by a network participant is broadcast over the whole transmission medium. Thus, when a network participant is sending, no other participant can send without leading to data collision.
- In the ring topology, a network participant is only allowed to send when he receives the transmission authorization (token) circulating in the ring. Data prepared for sending is added to the token and transmitted in the ring from participant to participant until the target participant receives it.

NOTICE	Topology and line length
	Independently of the chosen topology, the length of the line between the single devices shall in no case exceed 100 m. In the event of line lengths exceeding 100 m, the single devices must be coupled through suitable switches.

5 Commissioning and Operation

🚹 DANGER



Risk of injury due to rotating shafts

Hair and loose clothing can be caught by rotating shafts.

- · Prepare all work as follows:
- ⇒ Switch the operating voltage off and stop the drive shaft.
- $\, \Rightarrow \,$ Cover the drive shaft if the operating voltage cannot be switched off.

5.1 Function and Status LED

5.2 Quick Start Guide

5.2.1 Configuration

5.2.1.1 Configuring the Network

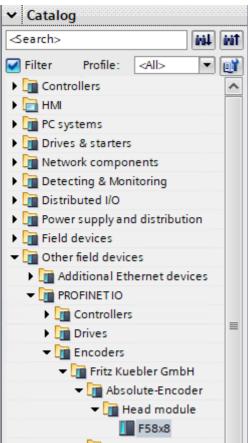
NOTICE	Consider the project design software
	The steps below refer to project design in SIMATIC TIA Portal. Deviations in the description may occur, depending on the software.
NOTICE	Installation of the device description file

PROFINET integration

- ✓ Make sure that a static IP address has been assigned to the computer used for project design.
- ✓ The .xml file corresponding to the device must previously be downloaded from the website and decompressed in a folder.
- a) Start SIMATIC TIA Portal and open the project (with the CPU or PN controller connected). Select "Project view".
- b) Install the current GSD file.

A Siemens - C:\Users\AmsM.KUEBLER\Documents\Automatisierung\Profinet\Profinet	
Project Edit View Insert Online Options Tools Window Help	
📑 🎦 🔒 Save project 🚢 🐰 🤖 🛱 Y Settings	e 🔊 Go offlir
Project tree 🔲 🖌 Support packages	
Devices Manage general station description files (GSD) Start Automation License Manager	L⊞ @ +
Show reference text	🚡 🖽 🔍 ±
Profinet Global libraries	
Profinet Gooda libraries Gooda libraries Add new device Devices & networks Did (CPU 1511-1 PN) 0 1 2 3 4 5	
Devices & networks	
P plc [CPU 1511-1 PN] 0 1 2 3 4 5	6 7

- c) Double-click on "Project tree/Project.../Devices & Networks" to call up the "Network view".
- d) In the "Hardware catalog", click on "Other field devices" and follow the path "/PROFINET IO/Encoders/Fritz Kuebler GmbH/Absolute encoder/Head module/F58x8".



IMG-ID: 185279883

e) Use the mouse cursor to drag the module in the "Network view".

📲 Topology view 🔒 Network view Device view Options ✓ Catalog <Search> inil init = Filter Profile: <All> F58x8 - 📑 F58x8 Controllers 🕨 🛅 HMI PC systems Drives & starters Network components Detecting & Monitoring Distributed I/O Power supply and distribution 🕨 🛅 Field devices Other field devices Additional Ethernet devices ▼ 📄 PROFINET IO Controllers Drives 🕶 🛅 Encoders 🕶 🛅 Fritz Kuebler GmbH ▼ 🛅 Absolute-Encoder 🕶 🛅 Head module > 100% · · · · · · · · · · • F58x8 ▶ 📷 F58 KUEBLER GMBH SIEMENS AG 🕨 🛅 Gateway ~ General I/O Ident Systems PLCs & CPs

 \Rightarrow This creates an object, which represents the encoder.

IMG-ID: 185281547

f) Connect graphically the encoder to your PLC (using "...PROFINET IO.System...").

S7_1500_F58_MT_I&M_RDREC → Devices & networks			_ ? = X
	🖉 Topology view	📥 Network view	Device view
번 H H H Q 1			3
			^
			11
PLC_1 F58x8 CPU 1518F-4 PN F58x8	140		
RC1	100		
I construction of the second se			

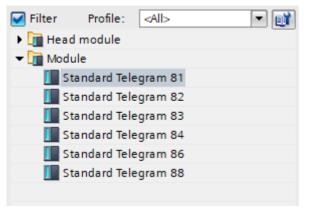
IMG-ID: 185298315

5.2.1.2 Configuring the Encoder

- ✓ Make sure that the encoder has been properly added to the network view.
- a) Mark the added encoder.
- b) Click on tab "Device overview". There, input a meaningful device name

7_150	00_F58_MT_I&M_RDREC ► U	Ungroup	ed devic	les ► F58	x8 [F58x	8]	<u> </u>			<u> </u>	<u> </u>		a = >
										ar Topology view	A Network view	Device v	
t 15	58×8 (*58×8) 💌 🛔	🗉 🗹 🛙	4 00	11 🔍 ±									3
													F
													- 1
	1												- 1
	10 A												- 1
													- 1
													- 1
	_		and the										- 1
	Image: A state of the state		8										- 1
													- 1
													- 1
					-								1
										>	100%	·	
Devir	ce overview												
	Module	Reck	Slot	Laddress	Q address	Type	Article no.	Firmware	Comment				
	▼ F58x8	0	0				8.F58x8.xxCN.C122	v 1.0.2					
	PNH0	0	0 X1			#58enc							
	 Standard Telegram 81_1 	0	1			Standard Telegram							
	Parameter_SubMod	0	1.1			Parameter_SubMod							
	Standard Telegram 81	0	1.2	5465	03	Standard Telegram							
		0	2										

c) According to the required "Input/output data format", drag one of the modules from the hardware catalog in the "Device overview" to "Slot 1" of the encoder.



IMG-ID: 180335371

- d) Click on "SUBslot 1" 1 = PARAMETER SUBMOD.
- e) Select item "Module parameters" in tab "Properties" and set the encoder parameters as required.

Parameter_SubMod [P	aramete	r_SubMod]				Roperties	🚺 Info 🚯 🚷 Diagnostics 👘 👘	-
General IO tags	Syst	tem constants	Texts					
 General Catalog information 		Module parame	eters					
Module parameters Hardware identifier		Preset (0xB0)	2E)					
			Preset (0x802E):	0				
		UserParamDa	ata (0xBF00)					
				Code Sequence Counter Clockwise				
				Class 4 Functionality				
	- 1			Disable G1_XIST1 Preset Control				
	- 1			Scaling Function Control				
		Measuring Uni	ts per Revolution:	8192				
		Total	Veasuring Range:	8192				
		Maximum N fa	laster Sign-Of-Life ilures (Profile V3):	1				
		Velocit	y Measuring Unit:	Revolutions Per Minute				

IMG-ID: 185303051

NOTICE	Observe factory settings
	For multiturn encoders, the factory setting of the TMR value is 8192, which corresponds, with MUR 8192, to a singleturn encoder. This is due to the fact that both encoders are integrated using the same GSDML file. Therefore, for a MT encoder, this value must be modified by the user in any case.
	Submodule StdTel81 is set in the factory.

f) Select the respective telegram used and, if necessary, adapt the I/O addresses for the cyclic data exchange as required.

										(and a second se				
Device	overview													
¥	Module			Rack	Slot	Laddress	Q address	Type	Article no.	Firmware	Comment			
	 F58x8 			0	0			F58x8	8.F58x8.xxCN.C122	v 1.0.2				
	FNHO			0	0 X1			f58enc						1
	 Standard Tele 	gram 8	1_1	0	1			Standard Telegram .						
	Parameter	SubM	bd	0	11			Parameter_SubMod						
	Standard 1	felegrar	m 81	0	12	5465	03	Standard Telegram .						
				0	2									
				0	3									
				0	4									-
Standard	l Telegram 81 (Standa	rd Tel	egram	81)							Roperties	🚺 Info 🔒 🗓 Diagnostics	1
Genera	I IO tags	Sys	tem co	onstan	s T	fexts								
 General Catal 	log information		VO	addres	ses _									
IIO addr Hardwar	esses reidentifier		In	iput ad	dresses									
						Start addres	s: 54							
						End addres			_					
						cita addres		tronous mode						
					Organ	nization bloc	k: MC-Sen	10						
					n	rocess imag	e: PPOB:	Servo						
			0	utput a	ddresse	25								
					1	Start addres	s: 0							
						End addres	s: 3							
							Isoci	tronous mode						
					Organ	nization bloc	k: MC-Sen							
						rocess imag	e: HPOB:	ienvo						

IMG-ID: 185304715

- g) As an option, you can carry out settings under Slot "0" ("X1= Interface", "X1 P1 = Port 1" and "X1 P2 = Port 2").
- h) Check the IP address and the used subnetwork. The latter can be adapted if necessary.

1 N	Acdule	Reck	Slot	Laddress	Q address	Type	Article no.	Firmware	Comment						
	 F58x8 	0	0			F58x8	8.F58x8.xxCN.C122	v 1.0.2							
	PNHO	0	0 X1			F5Benc									
•	 Standard Telegram 81_1 	0	1			Standard Telegram									
	Parameter_SubMod	0	1.1			Parameter_SubMod									
	Standard Telegram 81	0	1.2	5465	03	Standard Telegram									
		0	2												
		0	3												
		0	4												
										C Pro	perties	1 Info	🚯 🗓 Dia	apostics	
Seneral Catalog	ginformation	n constant Ethernet ad	dresses												
General Catalog PROFINET i Genera Etherne	g information interface [X1] il et addresses		dresses	ked with	t PN/E_2										•
General Catalog PROFINET I Genera Etherne F Advanc	g information interface [X1]	Ethernet ad	dresses	ked with		i Idd new subnet)								•
PROFINET I Genera Etherne Advanc Hardwa	g information interface [X1] al et addresses ced options are identifier ion & Maintenance	Ethernet ad	dresses networ	ked with)								
Seneral Catalog PROFINET Genera Etheme Advanc Hardwa dentificati	g information interface [X1] al et addresses ced options are identifier ion & Maintenance	Ethernet ad	dresses networ	ked with Subne)								T
Seneral Catalog PROFINET Genera Etheme Advanc Hardwa dentificati	g information interface [X1] al et addresses ced options are identifier ion & Maintenance	Ethernet ad	idresses • networf ol	ked with Subne	s: 192 .	168 . 2 .)								×
General Catalog PROFINET Genera Etheme Advanc Hardwa Identificati	g information interface [X1] al et addresses ced options are identifier ion & Maintenance	Ethernet ad	idresses • networf ol	ked with Subne	s: 192 .	idd new subnet)								

IMG-ID: 185306379

Assigning PROFINET device name

- ✓ Open the Topology view.
- a) With the right mouse button, click on the integrated encoder.
- b) Select "Assign device name".

	📲 Topology view 👔	Network view	Device view
			_
F58x8	🧼 🛐 Device config	wration	
F58x8	Change device		
PLC_1		ce name to Micro Mem	ony Card
	Start device t		ory core
	Cut		Ctrl+X Ctrl+C
	E Copy		Ctrl+C Ctrl+V
	📋 Paste		
	🗙 Delete		Del
	Rename		F2
	🚠 Go to network	k view	
	Compile		•
	Download to	device	•
	💋 Go online		Ctrl+K
	🖉 Go offline		Ctrl+M
	😯 Online & diag		Ctrl+D
	🐯 Assign device	e name	
	Update and d	display forced operand	s
	Show catalog	3	Ctrl+Shift+C
	Roperties		Alt+Enter
	Export modul	le labeling strips	

- ⇒ The window "Assign PROFINET device name" opens.
- c) Set the proper interface and click on "Update list".

Assign PROFINET device name.		*******	*****	***********	×
-	Configured PRO	FINET de	vice		
	PROFINET de vio	e name:	f58x8		
	Dev	vice type:	F58x8		
	Online access				
	Type of the PG/PC i	interface:	Ų_ PN/IE		•
	PG/PC i	interface:	💹 Intel(R) Ethernet Conr	nection I219-LM	- 🖲 🖸
Ļ	Device filter				
	🗹 Only show	devices of	the same type		
	Only show	devices wi	th bad parameter settings		
	Only show	devices wi	thout names		
Accessible de	vices in the network:				
IP address	MAC address	Device	PROFINET device name	Status	
192.168.2.4	98-02-D8-63-08-BA	F58x8	f58_mt	🚹 Device name	is different
Flash LED					
<					>
				Jpdate list	Assign name
				6	
Online status information:					
 Search completed. 1 of 4 devices w 	ere found.				
<		ш			>
					/
					Close

d) Now select the device and click on "Assign name".

sign PROFINET devic	æ name.			~~~~~~		
		Configured PRO	FINET de	vice		
		PROFINET devic	e name:	f58x8		
		Dev	ice type:	F58x8		
		Online access				
		Type of the PG/PC in	nterface:	PN/IE		-
		PG/PC in	nterface:	Intel(R) Etherne	t Connection I219-LM	- 🖲 🖻
4		Device filter				
8		🖌 Only show	devices of	the same type		
		Only show	devices wit	th bad parameter se	ettings	
		Only show	devices wit	thout names		
	Accessible dev	ices in the network:				
	IP address	MAC address	Device	PROFINET device	name Status	
_	192.168.2.4	98-02-D8-63-08-BA	F58x8	f58_mt	🔥 Device nar	ne is different
Flash LED						
	<					>
L					Update list	Assign name
					opuate list	Assignmente
Online status informatio						
	n: :d. 1 of 4 devices w	ere found				
- search complete	.a or + acrices w	ere loand.				
<			Ш			>
						Close

⇒ If all settings are OK, the status OK is displayed and the device is successfully renamed. The control can communicate with the device.

Assign PROFINET device	name.		*******			×
-		Configured PRO	FINET de	vice		
		PROFINET devic	ce name:	f58x8		•
		Dev	vice type:	F58x8		
		Online access				
		Type of the PG/PC i	interface:	Ų.,PN/IE		
			interface:	Intel(R) Ethernet Conn	ection I219-I M	- ● 🔍
ę.		Device filter				
		🛃 Only show	devices of	the same type		
		Only show	devices wi	th bad parameter settings		
		Only show	devices wi	thout names		
	Anna a fhiaidead	ces in the network:				
	IP address	MAC address	Device	PROFINET device name	Status	
	192.168.2.4	98-02-D8-63-08-BA	F58x8	f58x8	OK OK	
Flash LED						
	<			111		>
				U	lpdate list	Assign name
Online status information:						
 Search completed. 						
The PROFINET devic	e name "f58x8" v	as successfully assign	ned to MAC	address "98-02-D8-63-08-B	A*.	
<			Ш			>
						Close

5.2.2 Commissioning

NOTICE	Identifying the IP address
	The IP address of the device can be found with "Project tree/Online accesses/Network board/Update accessible nodes".
NOTICE	Parking sensor is active in the initial state
	For the standard telegrams 81, 82, 83 and 84 according to Encoder Profile v4.2, the parking sensor is active in the initial state, in which the encoder does not output data or the position is frozen. To set the encoder in the operating state, the parking sensor can be deactivated with bit 14 in G1_STW.

- ✓ Make sure that all required configuration parameters have been set properly.
- ✓ Make sure that the CPU IP address set in the device configuration corresponds to the actual IP address.
- a) Click on your CPU (e.g. under "Project tree/Devices" and then on symbol "Load in device".
 - ⇒ The window "Load preview" opens.

Project tree	<u> </u>	\$7_1500)_F58	3_MT_I&M_RDREC ►	PLC_1 [CPU 1518F-4 PN/DP] Program blocks	Main [OB1]
Devices		Load pre	view			
				pefore loading		
		9	necki	selore loading		
lame		Status	1	Target	Message	Action
 S7_1500_F58_MT_I&M_RDREC 	^	48	0	PLC_1	Ready for loading.	
💕 Add new device						
📥 Devices & networks			0	Software	Download software to device	Consistent download
PLC_1 [CPU 1518F-4 PN/DP]						
Device configuration			0	Text libraries	Download all alarm texts and text list texts	Consistent download
😵 Online & diagnostics						
💌 🕁 Program blocks						
📑 Add new block						
Hain [OB1]						
MC-Interpolator [OB92]						
MC-Servo [OB91]						
Preset_Trigger [FC1]						
RDREC [FC2]						
Datenbaustein_1 [DB2]						
System blocks		<			11	
Technology objects						
External source files						Refresh
🔻 🌄 PLC tags						
🗞 Show all tags					Fin	ish Load Cancel
Add new tag table						Load Load
Default tag table [85]		Ne	twork	6:		

- b) Click on "Load" and subsequently on "Finish".
 - \Rightarrow This loads the hardware configuration in the PLC.

The configuration can then be started.

c) To do so, click on "Go online".

🛚 📕 🚿 🚍 💷 < Search in projects 🛛 🐐			
			_ # = ×
	a Topology view	V 📥 Network view	Device view
			B4
			_
PLC, 1 CPU 1518F-4 PH	F5bx8 F5bx8 F5c1		
	K, J OV 1516-4 M.	2 Topology view	A Topology view A Network view NC.1 Price Price

Fig. 1:

IMG-ID: 185350923

- $\Rightarrow~$ The encoder is now ready for operation and online. In order to allow the output of measured values, the parking sensor must be deactivated.
- d) Activate the control through the PLC and deactivate the parking sensor by setting in STW2_ENC bit 10=1 and in G1_STW bit 14=0. Telegram data [▶ 72]
- ⇒ As soon as the configuration is started and the parking sensor deactivated, the values output by the encoder can be read.

Also refer to

■ Telegram data [▶ 72]

5.2.3 Resetting to Factory Settings

The PROFINET interface of the encoder can be reset to the "factory settings". This erases among others the device name and the IP address.

NOTICE	Preset position
	"Resetting to factory settings" only relates to the PN interface. The preset position of the encoder is not affected.

NOTICE	Output data behavior	
	The output data bytes processed internally by the encoder are set to 0x00 and therefore erased in the following situations:	
	 when powering (applying the supply voltage). 	
	• at every PN link interruption (e.g. disconnecting the PN data line).	
	 when the PN controller sets "IOPS=BAD"(e.g. when the PLC switches to "STOP"). 	
NOTICE	Device name	
	If the PN controller (PLC) is currently in operation and contains a LLDP configuration corresponding to the current topology, the configured name is automatically assigned to the device just reset to "factory settings" (and if necessary the PN link is set up again) after some seconds.	

If a defective device is to be replaced in a PROFINET network, it is recommended to mount a new replacement device or a device reset to factory settings. It will then automatically be assigned the correct PROFINET device name if LLDP is enabled - see LLDP - Link Layer Discovery Protocol [▶ 85].

Proceed as follows to "reset to factory settings":

a) Open path "Project tree/Devices/Online access/{Your PN network card}".

Project tree	•
Devices	
	1
	_
Name	
🕨 🚂 PLC tags	~
PLC data types	
Watch and force tables	
🕨 📴 Online backups	
🕨 🔀 Traces	
Device proxy data	
🔤 Program info	
🕞 PLC supervisions & alarms	
PLC alarm text lists	
Local modules	
🔻 🧊 Distributed I/O	
🔻 🖳 PROFINET IO-System (100): PN	
📩 F58_MT [F58x8]	
📩 Switch_2 [SCALANCE X204	
🕨 🖳 Ungrouped devices	
🕨 📊 Unassigned devices	
🕨 🙀 Common data	
Documentation settings	
Languages & resources	
 Online access 	
Y Display/hide interfaces	
 COM [RS232/PPI multi-master cable] 	
 Intel(R) Ethernet Connection I219-LM 	1
Pupdate accessible devices	
Implc_1.profinet interface_1 [192.1.".	
f58x8 [192.168.2.4]	
switch_2 [192.168.2.3]	

- b) Double-click on "Update accessible devices"
- c) Wait some seconds until the search process is completed and the list of the accessible PN devices is displayed.
- d) Double-click on "Online & Diagnostics" of the encoder to be reset.

----?

R67069.0002 - 06



COM [RS232/PPI multi-master cable]

Intel(R) Ethernet Connection I219-LM
 Update accessible devices
 plc_1.profinet interface_1 [192.1...

e) Select "Functions/Reset to factory settings".

Y Display/hide interfaces

f) Click on "Reset".

Online access > Intel(R) Ethernet Connection 1219-UM > 158_mt [192.168.2.4] > 158_mt [192.168.2.4]			
Duportics Green Upports: canus Damonts: canus Channel disports: PORTRETING PORTRETING Portuge Asign Products Asign Product Seven may Extent discogneening	IP address: PROFINET device name:	98 :-02 :-06 -63 -08 -8A 192 :-06 :-2 :-4 Bayeri Bayeri Delara Madaa Delara Madaa Reset	1

IMG-ID: 185360267

- g) Select whether also the I&M data is to be reset.
 - \Rightarrow A warning message is displayed.

Diagnostics General	Reset to factory settings
Diagnostic status	
Channel diagnostics	
PROFINET interface	MAC address: 98 -02 -D8 -63 -08 -BA
▼ Functions	IP address: 192.168.2.4
Assign IP address	PROPINET device name: (58_mt
Assign PROFINET device na	This has been all the second
Reset to factory settings	Chine & diffusion to the diffusion of th
	SNMP parameters Do you really want to reset the module?

IMG-ID: 185361931

- h) Confirm the warning message with "Yes".
- \Rightarrow The encoder is now reset to the factory settings.

5.3 Protocol Features

🕶 🔚 Online access

IMG-ID: 185358603

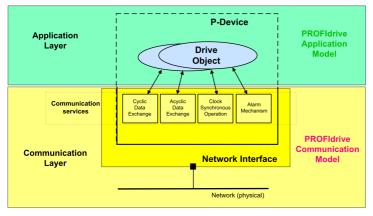
5.3.1 PROFIdrive

5.3.1.1 PROFIdrive Base Model

PROFIdrive describes the basic structure in which the PROFINET encoder model integrates itself. Every P device (PROFINET device, in the specific case the encoder) consists of an APPLICATION LAYER and a COMMUNICATION LAYER.

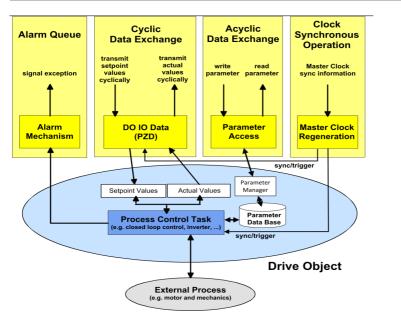
The DRIVE OBJECT can be subdivided in various communication services:

- · ALARM MECHANISM: Output of alarms and warnings
- CYCLIC DATA EXCHANGE (RT)
- ACYCLIC DATA EXCHANGE (configuration parameters)
- · CLOCK SYNCHRONOUS OPERATION: synchronous data exchange (IRT)

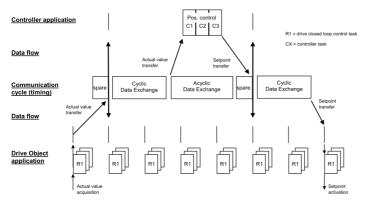


IMG-ID: 179289995

The DRIVE OBJECT communication predefined this way determines the base according to which the Encoder Model [▶ 36] is oriented.



PROFIdrive in particular describes the way to ensure clock synchronous process data, which is of crucial importance in closed drive system control loops. It allows achieving, for clock synchronous process data transmission, cycle times of less than 1 ms: the control issues a transmit clock cycle used by all PROFIdrive network participants for synchronization.



IMG-ID: 179333899

A part of the cyclic communication is reserved for the acyclic communication. It is generally used only if required. It includes e. g. status information of network participants or commands, as well as parameterizing data.

The PROFIdrive profile operates in accordance wit the so-called client-server model, in which the communication generally takes place via request and response. Special PLC blocks are available for this purpose, allowing addressing such commands to the network participant.

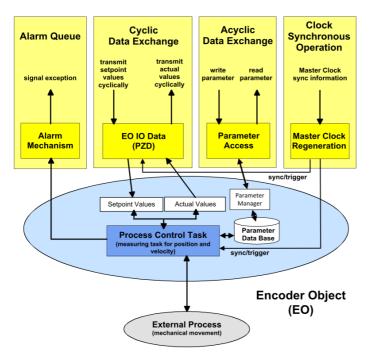
5.3.2 PROFINET

5.3.2.1 Encoder Model

PROFINET is represented on the encoder in accordance with the encoder model described in Encoder Profile V4.2. The main component of this model is the PROCESS CONTROL TASK. It ensures that the measured values are acquired and transmitted. The acquired and calculated values are also controlled by the configuration parameters.

Data communication can be subdivided into 4 main areas, which are all supported by the encoder.

- · ALARM QUEUE: Output of warnings and alarms.
- CYCLIC DATA EXCHANGE (RT).
- ACYCLIC DATA EXCHANGE (configuration parameters)
- · CLOCK SYNCHRONOUS OPERATION: synchronous data exchange (IRT).



IMG-ID: 177715851

5.4 Configuration Parameters Description

5.4.1 General Module Parameters

The encoder has various parameters, which can be set likewise in the respective header module, module (slot), subslot and telegram. While the device type-independent general parameters are located at header module level, the device/telegram-specific parameters are located at module, respectively telegram level. Basically, all parameters can be classified as follows:

1. Standard / general parameters

These parameters are present for all devices. They include e.g. the transmission cycle, MRP settings, the startup mode, etc.

2. iParameters

These parameters are individual for every device type and cannot be predetermined only by the GSDML file. For encoders, they include mainly the parameters TMR , MUR, direction of rotation, etc

3. F-parameters

The F-parameters relate exclusively to failsafe devices, i.e. devices that support PROFIsafe. They include e.g. the F-destination address, the F-watchdog time and the F-parameters CRC.

The parameters supported by the device are listed below.

5.4.1.1 iParameters

Non-safe telegrams 81, 82, 83, 84, 86, 88

CODE SEQUENCE COUNTER CLOCKWISE

Influences the counting behavior depending on the direction of rotation. Looking at the shaft side of the encoder:

- CW: The encoder position increases for clockwise shaft rotation.
- CCW: The encoder position increases for counter-clockwise shaft rotation.

CLASS 4 FUNCTIONALITY

Influences the consideration of scaling, preset and direction of rotation setting in all telegrams and in position data $G1_XIST1$, 2 and 3:

- Disabled: Application class 3 Scaling, preset and direction of rotation setting disabled.
- Enabled: Application class 4 Scaling, preset and direction of rotation setting enabled.

DISABLE G1_XIST1 PRESET CONTROL

Influences the consideration of the preset (0xB02E):

NOTICE	Effect of G1_XIST1 Preset Control
	This parameter only controls the consideration of the preset for G1_XIST1. If the option is active, the preset will thus not be considered.
	The execution of a preset on G1_XIST2 and G1_XIST3 is always considered.

- Disabled: G1_XIST1 displays the current position, taking into consideration the preset (G1_XIST1 = G1_XIST2, but without possible error code).
- Enabled: G1_XIST1 displays the current position without taking into consideration the preset.

NOTICE	Position value G1_XIST1
	If G1_XIST1 is disabled and if the position value increases above the maximum value or falls below 0, the device outputs the maximum position value within the scaled total range as position value G1_XIST2.
	Position value G1-XIST1 is not limited to the scaled total range. For position value G1-XIST1, the device goes on issuing a scaled position value within the total measuring range, e. g. max. 33554432 position for 25 bits.

SCALING FUNCTION CONTROL

Influences the consideration of the scaling:

- Disabled: The position is represented in the maximum possible total resolution (ST+MT = TMR) of the respective used telegram.
- · Enabled: The encoder position is represented scaled (according to MUR and TMR).

MUR – MEASURING UNITS PER REVOLUTION

Sets the number of different positions per revolution. This depends on the resolution of the used device and on the maximum permitted number of bits of the used telegram.

Std.Tel.	MUR max. [bits]	TMR max. [bits]	Max. permitted bits acc. to telegram
81, 82, 83, 84, 86	16	32	32
88	19	43	64

TMR – TOTAL MEASURING RANGE

Total number different from the positions to be issued, over all revolutions to be differentiated. Here:

- TMR / MUR = 1 \rightarrow Singleturn
- MUR > TMR also possible

Without scaling via. USF

• TMR / MUR = power of 2 (e.g. 1/4, 1/2, 1, 2, 4, 8, ..., 4096)

With scaling via. USF

• TMR / MUR = decimal or power of 2

Example

- ✓ MUR = 8192
- a) TMR = 65536
 - $\, \Rightarrow \,$ TMR is reached after 8 revolutions, so the positions 0 to 65535 are repeated every 8 revolutions.

Max. MASTER SIGN OF LIFE failures

Maximum number of master sign-of-life failures that can be tolerated.

Values range: 0 ... 255

VELOCITY VALUE NORMALIZATION

This setting affects the unit of the calculated velocity. As a general rule, calculation takes place once per second.

Velocity unit	Value
Steps/s	0
Steps/100ms	1
Steps/10ms	2
RPM	3
N2/N4 normalized	4

N2/N4 normalized

Here

N2/N4 normalized [%]

100 % = Velocity reference value (parameter 60,000)

Example

- ✓ P60,000 = 4,000 RPM
- a) Current velocity = 2,000 RPM, corresponding to 50 % of 4,000 RPM
 - ⇒ NIST_A is 50,0 %
- b) Current velocity = -6,000 RPM, corresponding to -150 % of 4,000 RPM
 - ⇒ NIST_A is -150 %

PRESET value

Determines an absolute or relative position that can be used when performing a preset, e. g. by standard telegram 81.

Permissible values range:

- Absolute preset: 0...("TMR"-1)
- Relative preset: 0...+/-("TMR"-1)

N2/N4 VELOCITY REFERENCE VALUE

This parameter defines the unit of the actual velocity values. The unit relates to the values NIST_A and NIST_B

Permissible range: -9000..-1, 1..9000

Parameter Control

Parameter initialization control (P65 005) Encoder Parameters Parameter 65005 description

Parameter write protect (P65 005) Encoder Parameters Parameter 65005 description

Parameter 65 005 and 971 write protect (P65 005) Encoder Parameters Parameter 65005 description

Reset control write protect (P65 005) Encoder Parameters Parameter 65005 description

Safe telegrams 36, 37

CODE SEQUENCE COUNTER CLOCKWISE

Influences the counting behavior depending on the direction of rotation. Looking at the shaft side of the encoder:

- CW: The encoder position increases for clockwise shaft rotation.
- CCW: The encoder position increases for counter-clockwise shaft rotation.

S_XIST32 PRESET CONTROL

Influences the consideration of the preset:

- Enabled: S_XIST32 considers a preset operation.
- Disabled: S_XIST32 displays the current position without taking into consideration the preset operation.

SCALING FUNCTION CONTROL

Influences the consideration of the scaling:

- Disabled: The position is represented in the maximum possible total resolution (ST+MT = TMR) of the respective used telegram.
- Enabled: The encoder position is represented scaled (according to the individual settings of MUR and TMR).

NOTICE	Effect of the disabling of the Scaling Function Control
	As soon as Scaling Function Control is disabled, the maximum values must be input in fields TMR and MUR.

NOTICE	Scaling and velocity
	Unlike the non-safe velocity value, the safe velocity value always relates to the unscaled singleturn position, also if an active scaling has been set for the positionnvalue.

MUR – MEASURING UNITS PER REVOLUTION

Sets the number of different positions per revolution. This depends on the resolution of the used device and of the maximum permitted number of bits of the used telegram.

Std.Tel.	MUR max. [bits]	TMR max. [bits]	Max. permitted bits acc. to telegram	
36, 37	15	27	32	

TMR – TOTAL MEASURING RANGE

Total number different from the positions to be issued, over all revolutions to be differentiated. Here:

- TMR / MUR = 1 \rightarrow Singleturn
- MUR > TMR also possible

With scaling via. USF

TMR / MUR = decimal or power of 2

Example

- ✓ MUR = 8192
- a) TMR = 65536
 - $\Rightarrow~$ TMR is reached after 8 revolutions, so the positions 0 to 65535 are repeated every 8 revolutions.

VELOCITY MEASURING UNIT

This setting affects the unit of the calculated velocity. As a general rule, calculation takes place once per second.

- 0 = Steps (positions) / second or
- 1 = Steps (positions) / 0.1 second or
- 2 = Steps (positions) / 0.01 second or
- 3 = Revolutions / minute

Also refer to

Configuration Parameters Description [37]

5.4.2 I&M Data

The encoder supports I&M. 0...3, according to Encoder Profile V4.2 and IEC 61158-6-10 (PROFINET). Access takes place via a record read with index 0xAFF0 or TIA module GET_IM_DATA Reading the I&M data [\triangleright 98].

omment					
	%DB1				
	"GET_IM_DATA_				
	DB"				
	Get IM Data				
EN		ENO			
280 — LADDR		DONE	_		
0 — IM_TY	°E	BUSY			
"GET_IM_DATA_		ERROR			
DB".p_DataUDT — DATA		STATUS			

IMG-ID: 184227467

These include the basic device parameters relating to PROFINET and to the manufacturer identification.

The standard I&M 0 data is defined in the data block below.

I&M 0 Data Block

Data block	Data	Data type	Contents
Block Header	Block Type	UINT16	0x0020
	Block Length	UINT16	0x0038
	Block Version High	UINT8	0x01
	Block Version Low	UINT8	0x00
I&M Block	Manufacturer-ID	UINT16	0x0198 (Kübler)
	Order_ID	STRING	"08.x58x8xxx.xxCN.Cxxx"
	Serial Number	STING	"12345678"
	Hardware Revision	STRING	"6"
	Software Revision	STRING	"V1.0.0"
	Revision Counter	UINT16	0x0000
	Profile-ID	UINT16	0x3D00
	Profile Specific Type	UINT16	0x0001
	I&M Version (major)	UINT8	0x01
	I&M Version (minor)	UINT8	0x01
	I&M Supported	UINT16	0x000E

Further I&M data can be saved in addition to the standard I&M 0 data.

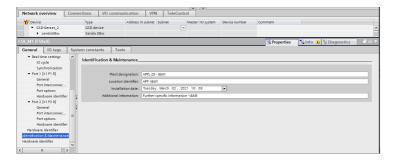
These are:

- 1. I&M 1 = Plant identification and location definition
- 2. I&M 2 = Installation date
- 3. I&M 3 = Additional manufacturer-specific information in the device

The I&M data can also be found in TIA Portal, directly in the device. They can be read and adapted in the respective device in the Inspector window, under Properties/General/Catalog information or under Properties/General/Identification & Maintenance.

F58_MT [F58x8]				Roperties	🗓 Info 👔 😨 Diagnostics	
General IO tags	Syst	tem constants Texts				
General Catalog information	^	Catalog information				
PROFINET interface [X1] General Ethernet addresses		Short designation:				
Advanced options Interface options		Description:	F58PNIO Absolute Rotary Encoder IRT			
Media redundancy Isochronous mode						
 Real time settings IO cycle 			8.F58x8.xxCN.C122			
Synchronization Port 1 [X1 P1 R]		Firmware version: Hardware product version:				
General Port interconnec		GSD file:	gsdml-v2.35-kuebler-f58-20210227-112100.xml Change revision			
Port options Hardware identifier	~					

IMG-ID: 184229131



5.4.3 Acyclic Data Transmission

The acyclic data transmission allows reading information from the encoder and writing parameter data in the encoder.

All encoder parameters are referenced by reference numbers, the so-called PARAMETER NUMBERS - PNU.

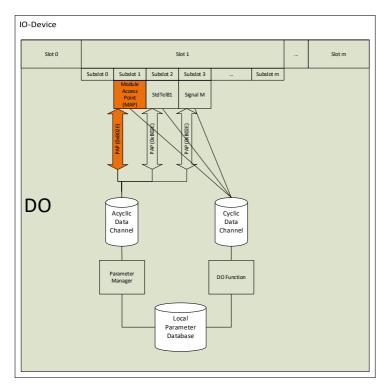
They can be accessed via RECORD DATA OBJECTS, which communicate via PAP with the Parameter Manager.

The encoder profile is always located on slot 1.

Acyclic parameters (base mode parameters) are transmitted via subslot 1 (MAP).

Non-safe iParameters are transmitted via subslot 2.

Safe iParameters and F-parameters are transmitted via subslot 3.



RECORD DATA OBJECT	Parameter access service	Slot	Subslot
0xAFF0	I&M 0 parameters	0x01	0x01
0xAFF1	I&M 1 parameters		
0xAFF2	I&M 2 parameters		
0xAFF3	I&M 3 parameters		
0xAFF4	I&M 4 parameters		
0xB02E	Base Mode Parameter Access	0x01	0x01
0xBF00	Start-up Configuration	0x01	0x01

According to the area, PROFINET provides different access possibilities.

With Siemens PLCs (S7), the "standard blocks" can be used for acyclic communication.

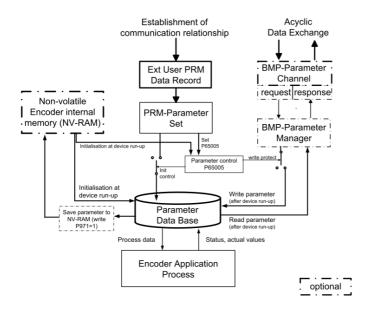
- SFB52=RDREC (READ RECORD)
- SFB53=WRREC (WRITE RECORD)

-			118 N 10 10			 Distributed #0 	V2.5
۰ ا		-1				OF & PROFINET	
-	Network 1:				0	RDREC	V1.0
	Comment					S WRREC	<u>V1.1</u> *
1.						GETO	¥1.1
		3061				SERO	V1.2
		DIEC DE.				SETO_PART	<u>V1.2</u>
		RDREC				SETIO_PART	V1.2
		hay				🖶 INLAM	V1.0
		WLID				D_ACT_DP	<u>V1.2</u>
	trice - ano	BUSY -	5082			Others	
	1640 - ID	18908 - ···	"WRRDC DO"			PROFienergy	¥2.5
	- INDEX	STATUS	WHEC			Module parameter assig.	V1.2
	- MEN	LEN -	hay			Interrupts	V1.2
	amb - RECORD	END	714			Naming	V1.5
			DONE			Disgnostics	V1.5
			hite sto			Data block control	V1.3
			1640-10 ERROR			Table functions	V2.1
						Addressing	V1.3
						Additional functions	
1							
1				100%	×		
					·		

The function blocks implement the BASE MODE PARAMETER ACCESS 0xB02E. The readable parameters are listed in the relevant chapter. See Encoder Parameters [▶ 53], PROFIdrive Parameters [▶ 49].

5.4.4 Base Mode Parameter

The following picture shows the encoder parameters database linked with the encoder application process and its associated mechanisms for the access to and the initialization of the parameter data. Also the optional mechanisms are implemented.



IMG-ID: 284210571

The use of the BMP parameters channel allows reading all implemented parameters. The write access to parameters through the BMP parameters channel is based on the setting of parameter "Parameter control" P65 005.

The initialization of the parameters data base during encoder start-up depends on the setting of parameter "Parameter control" in the PRM parameters set.

During encoder start-up (switching on), the content of the parameters data base is loaded from the NV-RAM of the encoder.

When establishing a communication relation with a parameterizing controller, the controller transmits the User Parameter Data Block (PRM data block) to the device. According to the setting of parameter "Parameter control" P65 005, the PRM data block is rejected or initialized. The parameters in the parameters data base correspond to the content of the PRM data block.

To save parameters in the NV-RAM, the parameters are in a first phase set in the parameters data base (via BMP parameters channel or PRM data block), and then the parameters are saved via. p971=1 (BMP parameters).

NOTICE	Saving the configuration
	It is strongly recommended to save the new permanent configuration in the NV-RAM (P971=1), as the position may deviate after a restart.
	Determined runtime parameters are always saved in the NV-RAM for every configuration, and they are reset in the event of a new configuration. If a set configuration is not saved, it will deviate from the current configuration in the NV-RAM. After a restart, the encoder loads the configuration from the NV-RAM and the runtime parameters are reset. This may lead to position deviations.

Access to the encoder parameters takes place through submodule "MAP Parameter Access" with "Record Data Object 0xB02E", in compliance with Encoder Profile V4.2.

The base mode parameters, for which "Effective" is marked with "Reset", are written in the parameters data base while parameterizing, but they are not saved in the device. Only parameter "Transfer to non volatile memory" (P971=1) will write the data in the non-volatile memory to allow taking them over upon an encoder reset.

Write Access

• "Write request" by the IO controller with parameter number and the user data to be written.

Slot			BYTE	0x01
Subslot			BYTE	0x01
Index			WORD	0xB02E
Data Length			BYTE	individual
Data	Request Header	Request Reference	BYTE	
		Request ID	BYTE	0x01 = "Read" / 0x02 = "Write"
		Drive Object ID	BYTE	0x00
		Number of Parameters	BYTE	0x01
	Parameter Address	Attribute	BYTE	
		No. of Elements/ Values	BYTE	
		Parameter Number	WORD	
		Subindex	WORD	
	Parameter Value	Format / Data Type	BYTE	for "Write request"
		Number of values	BYTE	for "Write request"
		Values to write (if any)	BYTE	for "Write request"

• A "Write response" from the IO device.

Slot	BYTE	0x01
Subslot	BYTE	0x01
Index	WORD	0xB02E
Data Length	BYTE	individual

Read access

- "Write request" by the IO controller. Transmits which parameters are to be read.
- "Write response" from the IO device
- "Read request" from the IO controller

Slot	BYTE	always 0x01
Subslot	BYTE	always 0x01
Index	WORD	always 0xB02E
Data Length	BYTE	as from here (excl.)

• "Read response" from the IO device with the requested user data.

Slot			BYTE
Subslot			BYTE
Index			WORD
Data Length			BYTE
Data	Response Header	Response Reference	BYTE
		Response ID	BYTE
		Drive Object ID	BYTE
		Number of Parameters	BYTE
	Parameter Value	Format / Data Type	BYTE
		Number of values	BYTE
		Values	see format

5.4.4.1 PROFIdrive Parameters

Parameter number	Meaning	Data type	Permissi on	Effective
922	Telegram selection	UINT8	R	
925	Number of Controller Sign-Of-Life failures which may be tolerated	UINT8	R/W	Immediat ely
964	Drive unit identification	Array UINT16	R	-
965	Profile identification number	Array Octet string 2	R	-
971	Transfer to non volatile memory	UINT16	R/W	Immediat ely
972	Reset Encoder device	UINT16	R/W	Immediat ely
974	Base Mode Parameter Access service identification	UINT8	R	
975	DO identification	Byte Array [16]	R	
979	Sensor format	UINT32	R	
980	Number list of defined parameter	Array UINT16	R	

Parameter 922: Telegram selection

This parameter allows reading the parameterized telegram type.

Parameter value	Telegram
81	PROFIdrive telegram 81
82	PROFIdrive telegram 82
83	PROFIdrive telegram 83
84	PROFIdrive telegram 84
86	Telegram 86 with 32 bits for position + 32 bits for velocity
88	Telegram 88 with 64 bits for position + 32 bits for velocity

Parameter 925: Number of controller sign-of-life failures which may be tolerated

This parameter reads or writes the number of errors of the controller "sign-of-life" to be tolerated.

Valid values range: 1 ... 255

NOTICE	
	Writing the parameter is only possible when the Master lifesign is disabled.

Parameter 964: Drive unit identification

This parameter allows reading a data set for encoder identification.

Parameter	Meaning
964[0]	Manufacturer ID
964[1]	Drive Unit Type (manufacturer-specific)
964[2]	Firmware version e. g. 0x0064 = 100 corresponds to V1.00
964[3]	Firmware year e. g. 0x07E4 = 2020
964[4]	Firmware day and month e. g. 0x0067 = 103 corresponds to 1.03
964[5]	Number of Drive Objects

Parameter 965: Profile identification number

This parameter reads the PROFILE ID of the encoder profile and its parameterized version.

Parameter	Meaning
965[0]	Profile ID: 0x3D abbreviated
965[1]	0x1F = 31 = V3.1 0x2A = 42 = V4.2

Parameter 971: Transfer to non-volatile memory

This parameter allows storing the current parameters set (configuration) in the non-volatile memory.

Parameter value	Meaning
0	Default, no effect
1	Storing the current parameters set n the non-volatile memory

Parameter 972: Reset Encoder device

This parameter allows restarting the non-safe application.

Parameter value	Meaning
0	Default, no effect
1	Restart of the non-safe application

Parameter 974: Base mode parameter access service identification

This parameter reads three features of the parameter channel:

- · Max. data length
- · Multi-parameter access ability.
- Max. processing time for an access as an indication for a customer-side timeout.

Parameter	Meaning
974[0]	Max. data length (240 bytes = 0x00F0)
974[1]	Max. number of parameter requests per multi-parameter request
974[2]	Max. access processing time

Parameter 975: DO identification

This parameter reads the following information in the encoder:

Parameter	Meaning
975[0]	Manufacturer ID
975[1]	Drive Unit type (manufacturer-specific - F58 = 0x2190)
975[2]	Firmware version e. g. 0x0064 = 100 corresponds to V1.00
975[3]	Firmware year e. g. 0x07E4 = 2020
975[4]	Firmware day and month e. g. 0x0067 = 103 corresponds to 1.03
975[5]	PROFIdrive Type Class
975[6]	PROFIdrive DO Subclass 1
975[7]	Drive Object ID

Parameter 979: Sensor format

This parameter reads the set user parameters of the encoder.

Parameter	Meaning
979[0]	Header Info
979[1]	1st Sensor (G1) Type (**)
979[2]	Sensor Resolution
979[3]	Shift Factor for G1_XIST1
979[4]	Shift factor for absolute value in G1_XIST2
979[5]	Determinable Revolutions
979[6]	reserved
979[7]	reserved
979[8]	reserved
979[9]	reserved
979[10]	reserved

Parameter 980: Number list of defined parameter

This parameter reads all supported parameter numbers.

Parameter	Meaning
980[0]	922
980[1]	925
980[2]	964
980[3]	965
980[4]	971
980[5]	972
980[6]	974
980[7]	975
980[8]	979
980[9]	1002
980[10]	1003
980[11]	60000
980[12]	60001
980[13]	60022
980[14]	60023
980[15]	60024
980[16]	60025
980[17]	65000
980[18]	65001
980[19]	65002
980[20]	65004
980[21]	65005
980[22]	65006
980[23]	65007
980[24]	65008
980[25]	65009
980[26]	65100
980[27]	0 = End Mark

5.4.4.2 Encoder Parameters

The encoder features the following setting options/parameters:

Parameter number	Meaning	Data type	Effective	Permission
1002	Upload Counter	UINT32	-	R
1003	F_Dest_Add	UINT16	-	R
60000	N2/N4 velocity reference value	Float32	Reset	R/W
60001	Velocity value normalization	UINT16	Reset	R/W
60 022	Safety Telegram Number	UINT16	-	R
60023	Safe Speed Value Normalisation	UINT16	-	R
60024	Safety Setpoint Telegram	Array[n] UINT8	-	R
60025	Safety Actual Value Telegram	Array[n] UINT8	-	R
65000	Preset value	INT32	Immediately	R/W
65001	Operating status	Array[n] UINT32	-	R
65002	Preset value 64 bits	INT64	Immediately	R/W
65003	Reserved			
65004	Function control	UINT32	Reset	R/W
65005	Parameter control	UINT16	Reset	R/W
65006	Measuring units per revolution (MUR)	UINT32	Reset	R/W
65007	Total measuring range in measuring units (TMR)	UINT32	Reset	R/W
65008	Measuring units per revolution (MUR) 64 bit	UINT64	Reset	R/W
65009	Total measuring range in measuring units (TMR) 64 bit	UINT64	Reset	R/W
65100	Operating status	Array[n] UINT32	-	R

Parameter 1002: Upload Counter

Is incremented at every configuration. Read-only parameter.

Parameter 1003: F_Dest_Addr

Returns the biunique F_Dest_Addr set. Only for request.

Parameter 60000: N2/N4 velocity reference value

The velocity reference value returns the 100% value of the N2/N4 ratio and is to be understood as a percentage. N2/N4 thus indicates the ratio of NIST to NSOLL. It is always displayed with relation to the values NIST_A and NIST_B. NIST_A is the velocity in 16 bits length, NIST_B is the velocity in 32 bits.

Parameter 60001: Velocity value normalization

This parameter defines the unit of the actual velocity values. The unit relates to the values NIST_A and NIST_B

Velocity unit	Value
Steps/s	0
Steps/100ms	1
Steps/10ms	2
RPM	3
N2/N4 normalized	4

Parameter 60 022: Telegram selection

This parameter allows reading the parameterized telegram type for Safety.

Parameter value	Telegram
36	PROFIdrive telegram 36 (BP)
65572	PROFIdrive telegram 36 (XP)
37	PROFIdrive telegram 37 (BP)
65573	PROFIdrive telegram 37 (XP)

Parameter 60 023: Safe Speed Value Normalisation

This parameter returns the unit configured for the safe velocity values currently transmitted in signal S_NIST16.

Parameter 60 024: Safety Setpoint Telegram

Represents the content of the safety telegram received in the last PROFIsafe cycle.

Parameter 60 025: Safety Actual Value Telegram

Represents the content of the safety telegram sent in the last PROFIsafe cycle.

Parameter 65001 [2]: Error

As a principle, errors are displayed in parameter 65001. They are in connection with the error codes displayed in G1_XIST2:

• 0x0001 Sensor/device error - Bits:

Bit	Definition	0	1
0	Position error (hardware and signal quality)	Position OK	Position error
5	Position error (frequency / speed exceeded)	Position OK	Position error
6	Invalid scaling	Scaling parameter OK	Error scaling parameter
12	Overspeed	Always set to 0	-
14	Preset failed (preset value outside of range)	Always set to 0	-
22	Memory error	No memory error	Memory error
24	Battery voltage	No battery error	Battery error

Parameter 65001 [4]: Warnings

Warnings are also displayed in parameter 65001 - but in subindex 4.

Bit	Definition	0	1
0	Position warning (hardware and signal quality)	Position OK	Position warning
5	Position warning (frequency / speed exceeded)	Position OK	Position warning
6	Invalid scaling	Scaling parameter OK	Warning scaling parameter
12	Overspeed	Always set to 0	-
14	Preset failed (preset value outside of range)	Always set to 0	-
22	Memory warning	No memory warning	Memory warning
24	Battery voltage	No battery warning	Battery warning

Parameter 65004: Function control

The setting of the Function control parameter enables or disables the functionality of the encoder according to the list below.

Bit	Definition	0	1
0	Code sequence	CW	CCW
1	Class 4 functionality	Disabled	Enabled
2	G1_XIST1 Preset control	Enabled	Disabled
3	Scaling function control	Disabled	Enabled
4	Alarm channel control	Disabled	Enabled
5	V3.1 compatibility mode	Unused	Unused
6	Encoder type	Rotary encoder	Linear encoder
7	Reserved		
28 31	Reserved		

Parameter 65005: Parameter control

The setting of the Parameter control parameter enables or disables the access to parameters and special device-related functions according to the list below.

Bit	Definition	0 (default)	1
0 1	Parameter initialization control	Parameter initialization from the PRM data set	Parameter initialization from the internal NV-RAM
2 4	Parameter write protection	Write all:	Read only:
		All parameters of the BMP parameter channel can be read and written	
5	5 Parameter 65005 Write protection	Write all:	Read only:
		Read and write access to P65005 and P971 via the BMP parameter channel	Only read access to P65005 and P971 via the BMP parameter channel
6	Protection	Write all:	Read only:
	Device reset control	Read and write access to P972 via the BMP parameter channel	Only read access to P972 via the BMP parameter channel

Parameter 65006: MUR

Defines the measuring steps per revolution for up to 32-bit values. The max. singleturn resolution of the device must be taken into consideration. Technical Data Sendix S58x8FS3

Parameter 65007: TMR

Defines the total resolution for up to 32-bit values. The max. resolution of the device must be taken into consideration. Technical Data Sendix S58x8FS3

Parameter 65008: MUR

Defines the measuring steps per revolution for up to 64-bit values. The max. singleturn resolution of the device must be taken into consideration. Technical Data Sendix S58x8FS3

Parameter 65009: TMR

Defines the measuring steps per revolution for up to 64-bit values. The max. resolution of the device must be taken into consideration. Technical Data Sendix S58x8FS3

Parameter 65100 [2]: Error

Bit	Definition	0	1
3	Safety Exception	Safety Functions OK	Safety Functions fault
4	Safety Parametrisation	Safety Functions OK	Safety Functions fault
9	PROFIsafe	No PROFIsafe fault	PROFIsafe fault
16	Undervoltage	No Undervoltage fault	Undervoltage fault

Parameter 65100 [4]: Warnings

Bit	Definition	0	1
12	Overspeed	No overspeed	Overspeed warning

5.5 Telegrams Description

5.5.1 Available Submodules / Telegrams

Depending on the encoder, different submodules are available to the user.

Submodule / Telegram	Sendix 58XX (Encoder Profile V4.1)	Sendix F58XX (Encoder Profile V4.2)	Number of input data words	Number of output data words
ManTel860	Х		4	2
Speed	Х		1	0
ST_POS	Х		2	0
MT_POS	Х		2	0
G1_STW	Х		0	1
G1_ZSW	Х		1	0
Universal module	Х		16	8
StdTel81	Х	Х	6	2
StdTel82		Х	7	2
StdTel83		Х	8	2
StdTel84		Х	10	2
StdTel86		Х	4	2
StdTel88		Х	6	4

NOTICE	Respect the input and output data convention
	The description of the input and output data is always based on the viewpoint of the controller (PLC). Input data is sent from the encoder to the controller. Output data is sent from the controller to the encoder.

NOTICE	ManTel860
	The content of ManTel860 of encoder 58XX corresponds to Std.Tel86 of encoder F58XX. See Submodule - ManTel860 (Encoder Profile V4.1) [▶ 61].

Depending on the module, input and output data is defined for the module, which is either transmitted or received and processed by the encoder. The overview describes the composition of the single telegrams with their content - indicated in data words.

Input data words

Submodule / Telegram	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ManTel860 [▶ 61]	G1_X	(IST1	NIS	T_B												
Speed [> 63]	Spe	eed														
ST_POS [▶ 63]	Singl posi															
MT_POS [▶ 64]	Multi posi															
G1_ZSW [▶ 65]	G1_2	ZSW														
Universal module [▶ 66]	ZSW2_ ENC	G1_Z SW	G1_>	XIST1	G1_>	KIST2	ST_	POS	MT_	POS	Speed	G1_Z SW	G1_>	KIST1	NIS	Т_В
StdTel81 [▶ 68]	ZSW2_ ENC	G1_Z SW	G1_>	XIST1	G1_>	KIST2										
StdTel82 [▶ 68]	ZSW2_ ENC	G1_Z SW	G1_)	XIST1	G1_>	KIST2	NIST_ A									
StdTel83 [▶ 69]	ZSW2_ ENC	G1_Z SW	G1_>	XIST1	G1_>	KIST2	NIS	Т_В								

StdTel84 [▶ 70]	ZSW2_ G1_Z ENC SW	G1_>	KIST3	G1_XIST2	NIST_B			
StdTel86 [▶ 70]	G1_XIST1	NIST_B						
StdTel88 [▶ 71]	G1_X	KIST3	NIST_B					

Output data words

Submodule / Telegram	0	1	2	3	4		
ManTel860	G1_XIST_PRES	SET_B					
G1_STW	G1_STW						
Universal module	STW2_ENC	G1_STW	G1_STW	G1_XIST_	PRESET_B		
StdTel81	STW2_ENC	G1_STW					
StdTel82	STW2_ENC	G1_STW					
StdTel83	STW2_ENC	G1_STW					
StdTel84	STW2_ENC	G1_STW					
StdTel86	G1_XIST_PRES	G1_XIST_PRESET_B					
StdTel88		G1_XIST_PRESET_C					

The exact structure of the telegrams can be found in the respective descriptions. See Telegrams Description [57].

5.5.2 Submodule - ManTel860 (Encoder Profile V4.1)

The Manufacturer Telegram 860 is a very simple manufacturer-defined data format that can be used for many applications. It allows direct setting of the preset value via the cyclic output data.

NOTICE	Compatibility with StdTel86
	The content of ManTel860 corresponds 1:1 to that of StdTel86. Thus position = G1_XIST1 and speed = NIST_B. Likewise, PRESET = G1_XIST_PRESET_B.

Structure

Index (byte)	03	47
Input	Position Actual position	Velocity Actual speed or Actual rotational speed
Output	Preset value Preset position and trigger bit	

Input data

	Position UINT 32			Speed SINT 32				
IO data (word)	0		1		2		3	
IO data (byte)	0	1	2	3	4	5	6	7
Sequence	MSB			LSB	MSB			LSB

Example

00 00 12 34 00 00 05 CD

 \rightarrow Position = 0x1234 = 4660dec

 \rightarrow Speed = 0x05CDh = +1485dec (position increases)

00 00 12 34 FF FF FA 33

 \rightarrow Position = 0x1234h = 4660dec

 \rightarrow Speed = 0xFFFFA33 = -1485dec (position decreases)

Output data

	Preset UINT 32	
IO data (word)	0	1
IO data (byte)	Bit 31	Bit 30 Bit 0
Sequence	MSB	LSB

Example

80 00 12 34

 \rightarrow Preset to position = 1234h = 4660dec

5.5.3 Submodule - StdTel81 (Encoder Profile V4.1)

Standard data format according to Encoder Profile V4.1.

Structure

Index (byte)	01	23	47	811
Input	ZSW2_ENC Encoder status word	G1_ZSW Sensor status word	G1_XIST1 Actual position 1	G1_XIST2 Actual position 2
Output	STW2_ENC Encoder control word	G1_STW Sensor control word		

Input data

	ZSW2_	ENC	G1_ZSN	N	G1_X	(IST1			G1_X	IST2		
IO data (word)	0		1		2		3		4		5	
IO data (byte)	0	1	2	3	4	5	6	7	8	9	10	11
Sequence	MSB	LSB	MSB	LSB	MSB			LSB	MSB			LSB

Examples

F2 00 20 00 00 00 12 34 00 00 12 34

 \rightarrow Position (valid) = 1234hex = 4660dec

F2 00 30 00 00 00 12 34 00 00 12 34

- \rightarrow Position (valid) = 1234hex = 4660dec
- \rightarrow Preset performed

F2 08 80 00 00 00 12 34 00 00 00 20

- \rightarrow Position (invalid) = 1234hex = 4660dec
- \rightarrow Error = 0020hex (memory error)

Output data

	STW2_ENC		G1_STW	
IO data (word)	0		1	
IO data (byte)	0	1	2	3
Sequence	MSB	LSB	MSB	LSB

NOTICE	Preset Value	
	Unlike ManTel860, the preset value is transmitted cyclically with StdTel81. For the value itself, this means that it is not transmitted in the submodule, but that it uses a variable. This variable has the designation 0xB02E and it can be defined in the general settings of the submodule. See Telegram - Base Mode Parameter Access.	

Examples

F4 00 20 00 \rightarrow Normal case (request only position data).

F4 00 30 00 \rightarrow Trigger absolute preset (to the parameterized preset position).

5.5.4 Submodule - Speed (Encoder Profile V4.1)

Structure

Index (byte)	01
Input	Velocity

Input data

	Velocity	
IO data (word)	0	
IO data (byte)	0	1
Sequence	MSB	LSB

5.5.5 Submodule - ST_POS (Encoder Profile V4.1)

Structure

Index (byte)	03
Input	Singleturn position

Input data

	Singleturn po	sition		
IO data (word)	0		1	
IO data (byte)	0	1	2	3
Sequence	MSB			LSB

Example

Position = 3456hex, MUR = 1000hex, TMR = 4000hex

 \rightarrow Singleturn position (hex): 00 00 04 56

5.5.6 Submodule - MT_POS (Encoder Profile V4.1)

Structure

Index (byte)	03
Input	Multiturn position

Input data

	Multiturn posi	tion		
IO data (word)	0		1	
IO data (byte)	0	1	2	3
Sequence	MSB			LSB

Example

Position = 3456hex, MUR=1000hex, TMR=4000hex

 \rightarrow Multiturn position (hex): 00 00 00 03

5.5.7 Submodule - G1_STW (Encoder Profile V4.1)

Structure

Index (byte)	01
Output	Encoder control word

Output data

	G1_STW	
IO data (word)	0	
IO data (byte)	0	1
Sequence	MSB	LSB
Meaning	The control word determines the functionality of important encoder functions. Is not used. \rightarrow Set both bytes to 0	

5.5.8 Submodule - G1_ZSW (Encoder Profile V4.1)

Structure

Index (byte)	01
Input	Encoder status word

Input data

	G1_ZSW					
IO data (word)	0					
IO data (byte)	0 1					
Sequence	MSB LSB					
Meaning	The status word determines encoder statuses, confirmations and error messages of important encoder functions.					
	Bit 1512: "Encoder sign-of-life" = 115, 115, "Sign of life" of the encoder. Changes with every PN send clock signal (1 ms)					
	Bit 9: "Control Requested" = 1 Switches permanently to 1 after PN link setup.					
	Bit 3: "Fault Present" = 0/1 Switches to 1 if a hardware error is detected					

5.5.9 Submodule - Universal module

Structure

The "universal module "contains all defined submodules for encoder 58X8.

IO Data (word)	0	1	23	45	67	89	10	11	1213	1415
IO Data (byte)	01	23	47	811	1215	1619	2021	2223	2427	2831
Input	ZSW2_ENC Encoder status word	G1_ZSW Sensor status word	G1_XIST1 Actual position 1	G1_XIST2 Actual position 2	ST-position	MT-position	Speed	G1_ZSW	Position Actual position	Velocity Actual speed or Actual rotational speed

IO Data (word)	0	1	2	34
IO Data (byte)	01	23	45	69
Output	STW2_ENC Encoder control word	G1_STW Sensor control word	G1_STW Sensor control word	Preset value Preset position and trigger bit

This way, the various data formats of the single submodules can be used in parallel. Using the "Universal module" also allows combining "ManTel860" and "StdTel81".

											> 100%	_
evice	e overview						and second second					
2 M	odule	Rack	Slot		I address	Q address	Туре	Article number	Firmware	Comment	Access	
-	sendix58xx	0	0				Sendix 58xx	8.58x8.xxC2.C212			PLC_1	
	Interface	0	0 X1				sendix58xx				PLC_1	
	Universal_1	0	1				Universal				PLC_1	
	Parameter_SubMod	0	1 1,1: PARAMETER		1		Parameter_SubMod				PLC_1	
	StdTel81_SubMod	0	1 1,2: STDTEL81		2233	1013	StdTel81_SubMod				PLC_1	
	ST_POS_SubMod	0	1 1,3: ST_POS		3437		ST_POS_SubMod				PLC_1	
	MT_POS_SubMod	0	1 1,5: MT_POS		3841		MT_POS_SubMod				PLC_1	
	SPEED_SubMod	0	1 1,7: SPEED		4243		SPEED_SubMod				PLC_1	
	G1_STW_SubMod	0	1 1,9: G1_STW			1415	G1_STW_SubMod				PLC_1	
	G1_Z5W_SubMod	0	1 1,10:G1_ZSW	N	4445		G1_ZSW_SubMod				PLC_1	
	Tel860_SubMod	0	1 1.11: TEL860	13	4653	16_19	Tel860 SubMod				PLC_1	

NOTICE	Preset operation
	The preset operation cannot be triggered simultaneously with "ManTel860" and "StdTel81".
	With "ManTel860", the preset position is transferred directly in the cyclic output data, while with "StdTel81", the parameterized or acyclically transferred preset position is used.

5.5.10 Submodule - StdTel81 (Encoder Profile V4.2)

Standard data format according to Encoder Profile V4.2

Structure

Index (byte)	01	23	47	811
Input	ZSW2_ENC Encoder status word	G1_ZSW Sensor status word	G1_XIST1 Actual position 1	G1_XIST2 Actual position 2
Output	STW2_ENC Encoder control word	G1_STW Sensor control word		

Input data

IO Data (word)	0		1		2		3		4		5	
IO Data (byte)	0	1	2	3	4	5	6	7	8	9	10	11
Setpoint	ZSW2_	ENC	G1_ZS	W	G1_	XIST	1		G1_	XIST2		

Output data

IO Data (word)	0		1		
IO Data (byte)	0	1	2 3		
Setpoint	STW2_ENC		G1_STW		

NOTICE	Preset value
	Unlike StdTel86, the preset value is transmitted cyclically with StdTel81. For the value itself, this means that it is not transmitted in the submodule or in the telegram, but that it uses a variable. This variable has the designation 0xB02E and it can be defined in the general settings of the submodule. See Telegram - Base Mode Parameter Access.

5.5.11 Submodule - StdTel82 (Encoder Profile V4.2)

Standard data format according to Encoder Profile V4.2.

Structure

Index (byte)	01	23	47	811	1213
Input	ZSW2_ENC Encoder status word	G1_ZSW Sensor status word	G1_XIST1 Actual position 1	G1_XIST2 Actual position 2	NIST_A Speed
Output	STW2_ENC Encoder control word	G1_STW Sensor control word			

Input data

IO data (word)	0		1		2		3		4		5		6	
IO data (byte)	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Set point	ZSW2	2_ENC	G1_2	ZSW	(G1_>	KIST	1		G1_	XIST	2	NIS	T_A

Output data

IO data (word)	0		1		
IO data (byte)	0	1	2 3		
Set point	STW2_ENC		G1_STW		

5.5.12 Submodule - StdTel83 (Encoder Profile V4.2)

Standard data format according to Encoder Profile V4.2.

Structure

Index (byte)	01	23	47	811	1215
Input	ZSW2_ENC Encoder status word	G1_ZSW Sensor status word	G1_XIST1 Actual position 1	G1_XIST2 Actual position 2	NIST_B Speed
Output	STW2_ENC Encoder control word	G1_STW Sensor control word			

Input data

IO data (word)	0		1		2		3		4		5		6		7	
IO data (byte)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Set point	ZSW2_	ENC	G1_Z	SW	G1	_XIS	ST1		G1	_XIS	T2		NIST	_В		

Output data

IO data (word)	0		1	
IO data (byte)	0	1	2	3
Set point	STW2_ENC		G1_STW	

5.5.13 Submodule - StdTel84 (Encoder Profile V4.2)

Standard data format according to Encoder Profile V4.2.

Structure

Index (byte)	01	23	411	1215	1619
Input	ZSW2_ENC Encoder status word	G1_ZSW Sensor status word	G1_XIST3 Actual position 1	G1_XIST2 Actual position 2	NIST_B Speed
Output	STW2_ENC Encoder control word	G1_STW Sensor control word			

Input data

IO data (word)	0		1		2		3		4		5		6		7		8		9	
IO data (byte)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Set point	ZSW2	ENC	G1_	ZSW			(G1_	XIS	ЗΤЗ	}		(G1_X	(IST)	2		NIS	T_B	

Output data

IO data (word)	0		1	
IO data (byte)	0	1	2	3
Set point	STW2_ENC		G1_STW	

5.5.14 Submodule - StdTel86 (Encoder Profile V4.2)

Standard data format according to Encoder Profile V4.2.

Structure

Index (byte)	03	47
Input	G1_XIST1 Actual position 1	NIST_B Speed
Output	G1_XIST_PRESET_B	

Input data

IO data (word)	0		1		2		3	
IO data (byte)	0	1	2	3	4	5	6	7
Set point	G1_XIST1				NIST_	В		

Output data

IO data (word)	0		1	
IO data (byte)	0	1	2	3
Set point	G1_XIST_PRES	SET_B		

5.5.15 Submodule - StdTel88 (Encoder Profile V4.2)

Standard data format according to Encoder Profile V4.2.

Structure

Index (byte)	07	811
Input	G1_XIST3 Actual position 1	NIST_B Speed
Output	G1_XIST_PRESET_C	

Input data

IO data (word)	0		1		2		3		4		5	
IO data (byte)	0	1	2	3	4	5	6	7	8	9	10	11
Set point	G1_XIST	3							NIS	Г_В		

Output data

IO data (word)	0		1		2		3		
IO data (byte)	0	1	2	3	4	5	6	7	
Set point	G1_XIS	T_PRES	ET_C						

5.5.16 Telegram data

Input data

All devices with Encoder Profile V4.1 – Sendix 58xx use the following input data:

Data	Data type	Description	Bit	Value	Meaning	Explanation
POSITION UINT 32	UINT32	Current encoder position	0 31			(unsigned) Value range = 0("TMR"-1) "MUR" positions per revolution
Speed SINT 32	SINT 32	Current encoder speed	0 31			signed Unit according to parameter "Velocity Measuring Unit"
ZSW2_ENC	UINT64	Status word 2 Encoder	0 2	0		
			3		Fault Present	0/1 Switches to 1 if a hardware error is detected
			4 8	0		
			9	0		
				1	Control Requested	Switches permanently to 1 after PN link set-up
			10 11	0		
			12 15		Encoder Sign-Of-Life	Bit 15 … 12: "= 1…15, 1…15, … "Sign of life" of the encoder. Changes with every PN send clock signal (1 ms)
G1_ZSW	UINT 16	Sensor 1 status word	0 10	0		

Data	Data type	Description	Bit	Value	Meaning	Explanation
			11		Requirement Of Error Ack. Detected	Is set to 1 when an error is present and an attempt is made to reset it with bit 15 of G1_STW (there are no resettable errors at the moment)
			12		Set/Shift Of Home Position Executed	Is set to 1 after completion of a preset operation until the corresponding bit in G1_STW is erased again.
			13		Transmit Absolute Value Cyclically	Set to 1 when a valid position is present in G1_XIST2 (\rightarrow bit 15 = 0)
			14		Parking Sensor Active	Switches to 1 when the corresponding bit in G1_STW is set. In this case, the reported position is fixed.
			15		Sensor Error	Switches to 1 is a hardware error is detected. G1_XIST2 then contains the error code (\rightarrow bit 13 = 0).
G1_XIST1	UINT 32	Current encoder position	0 31			Value range = 0("TMR"-1) "MUR" positions per revolution Possibly without considering the last preset operation (according to parameter "G1_XIST1 Preset Control")
G1_XIST2	UINT 32	Current encoder position	0 31			Current encoder position (as G1_XIST1, but always considering the last preset operation) or error code (if G1_ZSW, Bit 15 = 1): $0001_h = position error (e. g. sensor ICdefective)0020_h = memory error (FLASH or RAMdefective)$

Data	Data type	Description	Bit	Value	Meaning	Explanation
						1002 _h = parameterizing error (BF00 tel. missing or invalid)
Speed	SINT 16	Current encoder speed	0 15		Current encoder speed	Signed - Limitation to +32767 and -32768 - Unit according to parameter "Velocity Measuring Unit"
ST_POS	UINT 16	Singleturn position	0 16		Current singleturn position:	Position within a revolution Values range = 0…(MUR-1)
MT_POS	UINT 32	Multiturn position	0 32		Current multiturn position	Revolution counter Values range = 0((TMR/MUR)-1)

All devices as from Encoder Profile V4.2 – Sendix F58xx use the following input data:

Data	Data type	Description	Bit	Value	Meaning	Explanation
G1_XIST1	UINT32	Sensor 1 Position value 1	0 31		Position value 32 bits	Current absolute position value with max. 32 bits. Is affected by scaling and preset. The use of the preset can be disabled by "Disable G1_XIST1 Preset Control".
						By default, only G1_XIST1 is active and displays the scaled position which is set by TMR+MUR.
G1_XIST2	UINT32	Sensor 1 Position value 2	0 31		Position value 32 bits	Current absolute position value with max. 32 bits. Is affected by scaling and preset.
						G1_XIST2 can be enabled by bit 13 of STW2_ENC. G1_XIST2 then displays the same position as G1_XIST1.
						In the event of an error, the following error codes are output:
						0x0001 Sensor/device error

Data	Data type	Description	Bit	Value	Meaning	Explanation
						0x0F01 Syntax error
						0x0F02 Master Sign of Life error
						0x0F04 Sync error
						For the exact description of the errors, see Encoder Parameters [▶ 53].
G1_XIST3	UINT64	Sensor 1 Position value 3	0 63		Position value 64 bits	Current absolute position value with max. 64 bits.
NIST_A	UINT16	Current speed	0 14		Speed	Current speed value
		16 bits				max. ± 15 bits
			15		Sign	0 = + / 1 = -
NIST_B	UINT16	UINT16 Current speed 32 bits	0 30		Speed	Current speed value
						max. ± 31 bits
			31		Sign	0 = + / 1 = -
G1_ZSW	UINT64	Sensor 1 status word	0 10	0		
			11		Requirement Of	Is set to 1 if an error occurs. Other causes
					Error Acknowledgment Detected	Controller sets or erases Sensor Error Acknowledge with bit 15 of G1_STW.
					Detected	Sensor error G1_ZSW bit 15 present and error code in G1_XIST2.
						Controller erases G1_ZSW Bit 15. G1_XIST2 contains again a position value.
			12		Set/Shift Of Home Position Executed	The encoder sets this bit to 1 after completion of a preset operation until the corresponding bit in G1_STW is erased again by the controller.

Data	Data type	Description	Bit	Value	Meaning	Explanation
			13		Transmit Absolute Value Cyclically	Set to 1 when a valid position is present in G1_XIST2. Is 0 when G1_ZSW bit 14 / bit 15 = 1
			14		Parking Sensor Active	Switches to 1 as soon as G1_STW bit 14 is set. In this case, the reported position is fixed.
			15		Sensor Error	Switches to 1 is a hardware error is detected. G1_XIST2 then contains the error code G1_ZSW bit 13 is set to 0. This error bit must be acknowledged via G1_STW bit 15 in order to set G1_ZSW bit 15 to 0. Condition: the error has been corrected.
ZSW2_ENC	UINT16	Status word 2 Encoder	0	0	Idle	The offset value of the latest preset operation is saved. The encoder is ready for a new preset operation.
				1	Preset confirmation	The previously defined preset value has been set as the new actual position value. This is confirmed with the change of the bit from $0 \rightarrow 1$. The value has been saved internally.
			1	0	G1_XISTx invalid	The position value in G1_XIST x is invalid
				1	G1_XISTx valid	The position value in G1_XIST x is valid
			2	0	G1_NISTx invalid	The speed value in G1_NIST x is invalid
				1	G1_NISTx valid	The speed value in G1_NIST x is valid
			3	0	No error present	The encoder detected no error.
				1	Error present	The encoder detected one or several errors.
			4 6			Reserved
			7	0	No warnings present	The encoder issued no warning message.

Data type	Description	Bit	Value	Meaning	Explanation
			1	Warnings present	Warning messages are present in the encoder.
		8	0		Reserved
		9	0		No connection with the PLC.
			1		Connection has been established with the PLC.
		10.11			Reserved
		12 15	0 15	Encoder Sign-of- Life	Sign-of-life of the encoder As soon as the controller sends the master sign-of-life (M-LS), the encoder starts to send its own sign-of-life. This is a signal incremented bit by bit with the values 0 15 The start value is 0.
			9 10.11	9 0 1 10.11	Image: Non-Stress Image: Non-Stress Image: Non-Stress 8 0 Image: Non-Stress 9 0 Image: Non-Stress 1 1 Image: Non-Stress 10.11 Image: Non-Stress Image: Non-Stress 1215 015 Encoder Sign-of-Life

Output data

All devices with Encoder Profile V4.1 – Sendix 58xx use the following output data:

Data	Data type	Description	Bit	Value	Meaning	Explanation
PRESET UINT 32	UINT32	Preset ManTel860	0 27		Preset position (unsigned)	Position after conclusion of the preset operation carried out during standstill. Values range = 0("TMR"-1) Limited to ("TMR-1") if range is exceeded.
			28 30	0		
			31		Preset control / Trigger bit:	Switching from 0 to 1 triggers a preset operation (duration up to 40 ms). Position is not updated during this period of time (\rightarrow to be carried only during standstill).

Data	Data type	Description	Bit	Value	Meaning	Explanation
						The new calculated offset value is saved in a non-volatile memory. The trigger bit must then immediately be reset to 0 (in order to prevent any accidental triggering in the case a PROFINET link interruption occurs in the meantime).
						Caution: Only to be activated if necessary ("wear" of the non-volatile memory).
G1_STW	UINT16	Sensor 1 control word	0 10	0		
			11	0	Home Position Mode	Absolute preset (new position = preset value)
				1		Relative preset (new position = old position + preset value)
			12		Request Set/Shift Of Home Position	Switching from 0 to 1 triggers a preset operation (duration up to 40 ms). Position is not updated during this period of time (→ to be carried only during standstill!) The new calculated offset value is saved in a non- volatile memory. This bit must then immediately be reset to 0 (in order to prevent any accidental triggering in the case a PROFINET link interruption occurs in the meantime). Caution: Only to be activated if necessary ("wear" of the non-volatile memory).
			13		Request Absolute value Cyclically	Is currently ignored, but should be set to 1 (for future compatibility).
			14	0	Activate Parking Sensor	

Data	Data type	Description	Bit	Value	Meaning	Explanation
				1		Fixes the reported position
			15	0	Acknowledge Sensor Error	There are no resettable errors at the moment.
STW2_ENC	UINT16	Control word 2 Encoder	0 9	0		
			10			Bit 10: "Control By PLC" = 1 Must be set permanently to 1 after set-up of the link (otherwise G1_STW will not be evaluated).
			11	0		
			12 15		Controller Sign-of-Life	115 Is currently ignored, but should change constantly (e.g. incrementing from 1 15) (for future compatibility).

All devices as from Encoder Profile V4.2 – Sendix F58 use the following output data:

Data	Data type	Description	Bit	Value	Meaning	Explanation
G1_STW	UINT32	Sensor 1 control word	0 7		Reserved	
			8 10		Reserved	
			11	0	Home Position Mode	Absolute preset (new position = preset value)
				1		Relative preset (new position = old position + preset value)
			12	0	Request Set/Shift Of Home Position	Initial state.
				1		Switching from 0 to 1 triggers a preset operation

Data	Data type	Description	Bit	Value	Meaning	Explanation
			13	0	Request Absolute value Cyclically	Disabled. G1_XIST2 is not transmitted.
				1		Enabled. G1_XIST2 is transmitted.
			14	0	Activate Parking Sensor	Disabled
				1		The control sets the encoder inactive ("park"). In this case, bit 14 in G1-ZSW is set to value 1.
						The current position data is frozen.
						No new errors are issued.
			15	0	Acknowledge Sensor Error	Sensor error transmission disabled.
				1		Sensor error transmission enabled.
STW2_ENC	UINT16	Control word 2 Encoder	0	0	Idle	Before this bit is set, it must have been set to "0" by the PLC.
				1	Trigger preset	Changing this bit from $0 \rightarrow 1$ sets the preset value of G1_XIST_PRESET_x as new actual position value.
						The actual position value is corrected by a calculated offset value. The offset is saved internally, with confirmation by ZSW2_ENC.bit0.
			1 6			Reserved
			7	0	No meaning	
				1	Error confirmation	Current errors in the error memory are confirmed with a change of the bit from $0 \rightarrow 1$.
			8, 9			Reserved

Data	Data type	Description	Bit	Value	Meaning	Explanation
			10	0	No control by the PLC.	Data is not valid, excepted the sign-of-life. G1_XIST2 is disabled.
				1	Control by the PLC.	Control via the interface, I/O data is valid.
			11			Reserved
			12 15	0 15	Master Sign-of-Life	Is only required if the isochronous mode is enabled. The encoder expects a bit by bit incrementation of bits 12 15.
						As soon as the M-LS contains a value different from 0, the encoder starts issuing the encoder LS. As soon as a deviation is detected in the M-LS with respect to the expected count sequence, the errors counter is incremented and, if necessary, error 0x0F02 is issued in G1_XIST2.
G1- XIST_PRESET_B	UINT32	Encoder control word 31 bits with trigger bit	0 30		Preset value	Preset value (31 bits) to which G1_XIST1 is to be set.
			31		Perform preset	Perform the preset operation as soon as bit 31 increases from 0 to 1.
G1- XIST_PRESET_C	UINT64	Encoder control word 63 bits with trigger bit	0 62		Preset value	Preset value (63 bits) to which G1_XIST3 is to be set.
			63		Perform preset	Perform the preset operation as soon as bit 63 increases from 0 to 1.

5.6 Features Description

5.6.1 Firmware update and reset

The device can be updated and reset by means of a web server. To this purpose, a browser is used to access to the respective IP address of the device.

The exact performance of the FW update can take place on request: Contact [> 113].

NOTICE	Web access possibilities
	The PROFINET communication must be disabled to allow access to the web server of the device, since this communication only takes place via TCP/IP. The condition is that the device has a valid IP address.

There are mainly two ways to establish a web access to the device.

- 1. Direct connection of the IO supervisor / PC to the encoder
- 2. Deactivate PROFINET participants in the existing network

If you select the second option, e.g. because the direct connection of the device to the PC is not possible, the device must first be deactivated.

Deactivate the device in the active network

- ✓ Make sure that the PROFINET communication to the device operates without errors.
- a) Implement the standard block "D_ACT_DP" in your process routine
- b) Assign the required input and output parameters to the block. Details can be found in the block description.



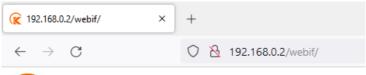
IMG-ID: 306133259

- c) Switch the status of the communication to "RUN"
- d) Send the command that triggers the block and deactivates the device.
- ⇒ The device is deactivated. This is shown by a gray status symbol. The firmware update can now be carried out.

Call the web server and update the firmware

- ✓ Make sure that the device is connected (through the network) to the PC used for the project.
- ✓ Store the current firmware file in any folder chosen by you.
- a) Input the IP address of the concerned device in your browser and confirm with Enter.

 \Rightarrow The FW versions currently installed on the device can be found in the representation of the web server.





Kübler S58 PROFIsafe Firmware Update

Encoder FW-Version: v0.0.32

Select Firmware Update Package:

Durchsuchen... Keine Datei ausgewählt.

Upload!

IMG-ID: 250030987

b) Click on "Upload" to upload the .kbl file.

Kübler	Satei hochladen						
	← → × ↑ → Dieser PC → Des	sktop > #20220505.1_FWv0.0.23		~ Ö	*#20220505.1_FW	/v0.0.23*	dur
übler S58 PROFIsafe Firmware Update	Organisieren 💌 Neuer Ordner				8	•	
coder FW-Version: 0.32	ng ^	Name	Ånderungsdatum	Тур	Größe		
0.32	Screenshots Einbindung S58	fwupdate_v0023_all.kbl	05.05.2022 15:36	KBL-Datei	2.438 KB		
lood	30-Objekte 164er Ockstop Ockstop Ockstop Ockstop Ockstop Nock Mock Mock Usate Ditentinger (C) public (Vkudt-file (Mk) Nock						

- c) Now click on "Load" to transfer the firmware to the device. This operation can require some minutes.
 - \Rightarrow The current update steps are displayed in the log line.
 - \Rightarrow The log line indicates the completion of the FW transfer.

	+	
$\leftarrow \ \ \rightarrow \ \ G$	○ À 192.168.0.2/webif/	
Kübler		
Kübler S58 PROFIsafe Firmwa	re Update	
Encoder FW-Version: v0.0.32		
Firmware update in progress		
Step 2 of 7		
uploading firmware		
		IMG-ID: 250050315
₹ 192.168.0.2/webif/ × +		
\leftrightarrow \rightarrow G O	8 192.168.0.2/webif/	
-		



Kübler S58 PROFIsafe Firmware Update

Encoder FW-Version: v0.0.32

Firmware update in progress...

Step 7 of 7

...uploading firmware ...

IMG-ID: 250051979

Also refer to

Contact [> 113]

5.6.2 FSU - Fast Startup

NOTICE	Use of the feature
	The use of this feature is the same for the S58 and F58 series.

Using FSU allows achieving fast encoder startup. Usually, startup requires 6-7 seconds after applying the operating voltage. When FSU is enabled, the encoder is ready for operation already in approximately 2.5 seconds. This is indicated by the flashing LINK LED of the used port.

Proceed as follows to activate the FSU functionality:

- ✓ Make sure that you added the encoder to the topology.
- a) Switch to Device overview.
- b) Click on the entry for Slot 0.

Device	e overview					
**	Module	Rack	Slot	I address	Q address	
	▼ F58enc	0	0	2042*		
	PN-IO	0	0 X1	2041*		
	 Standard Telegram 81_1 	0	1			
	Parameter_SubMod	0	11	2038*		
	Standard Telegram 81	0	12	011	03	
		0	2			

IMG-ID: 180407691

- c) Switch to "Properties / General / Interface options".
- d) Select "Prioritized startup" to be able to use the FSU functionality.

F58_MT [F58x8]									Properties	1 Int	o 💶 🔛	Diagnostics	
General IO tags	Sy	item constants	Texts										
Interface options Media redundancy	^	 Interface opt 	lons										
Isochronous mode													
 Real time settings 		Prioritized s	tartup										
IO cycle		Use IEC V2.	2 LLDP mode	le									
Synchronization		Optional IO											
Port 1 [X1 P1 R]		Copositio	vence										
General													
Port interconnec	=												
Port options													
Hardware identifie	r i												
 Port 2 [X1 P2 R] 													
General	_												
Fort interconnec													
Fort options													
Hardware identifie	r 🔽												
<	2												

IMG-ID: 184432523

 \Rightarrow The encoder will start in FSU mode at the next startup.

5.6.3 LLDP - Link Layer Discovery Protocol

NOTICE	Use of the feature
	The use of this feature is the same for the S58 and F58 series.

LLDP is an initially manufacturer-independent layer 2 protocol. A device using LLDP sends in a cycle of a few seconds a message to its neighboring devices to identify itself and transmit network-related information.

This information relates to the device and its integration type in the respective topology (port description, IP address, device name, etc.).

As a standard, the LLDP function is always active, but it can be disabled. During startup in the network, all devices exchange this information. This allows recognizing/reconstructing directly the topology in an engineering tool. The main advantage is the simplified replacement of defective devices. A LLDP ALIAS name is automatically assigned to the new device. It can this way log on the network automatically, without using software.

NOTICE	Conditions for device replacement without exchangeable medium – Plug&Play
	To allow Plug&Play device replacement, it must be made sure that the new PROFINET device has no device name. This is the ex- factory delivery status. In addition, current controllers also allow overwriting existing device names. This must then be set by the controller. Likewise, smooth device replacement without additional parameterizing can only be guaranteed if the old PROFINET device has been projected with telegrams that are also supported in the new device. In the case of 58x8 – StdTel81 /86 or ManTel860. See Available Submodules / Telegrams [▶ 58].

Proceed as follows to allow easy device replacement without exchangeable medium:

- ✓ Make sure that the old device was properly integrated and that the new device is accessible.
- a) Select the control in the topology view.
- b) Switch to "Properties / General / Interface options".
- c) Make sure that item "Support device replacement without exchangeable medium" is checked.
- ⇒ As soon as a device is replaced in the topology with a device without device name, the latter is overwritten with the existing device name and is then ready for operation.



- ✓ If the device already has a PROFINET device name, it can still be overwritten provided the controller supports this function.
- d) For this purpose, select the option "Overwrite the device names of all assigned IO devices".
- ⇒ If devices are to be replaced in the existing topology, the device names are automatically overwritten.

5.6.4 MRP - Media Redundancy Protocol

NOTICE

Use of the feature

The use of this feature is the same for the S58 and F58 series.

PROFINET offers the possibility of setting up a ring topology. The MRP allows conveying data to the controller using both directions of the logical ring. However, this only takes place in case of need (typically in the event of a cable break) – i. e. as soon as a transmission path stops operating, the second is opened. The changeover generally requires some milliseconds. The MRP is mostly used in connection with RT, but it can also be used with IRT.

Proceed as follows to activate the MRP functionality in the encoder:

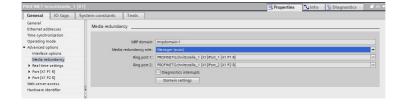
- ✓ Make sure that you added the encoder to the topology.
- a) Switch to Device overview.
- b) Switch to "Device settings / Properties / General".
- c) Under Media redundancy, select the "Client" role to be able to use the MRP functionality.
- ⇒ The encoder now uses the MRP functionality.

Control of tags C				F58_MT F58x8 F1C_1		Ethernet-Gerät Ethernet device	endix58xx endix58xx lot assigned	19 1
Cancell A Media redundanty Accellar planneada A Media redundanty Accellar planneada Media redundanty Media redundanty Advance formation Media redundanty Media redundanty Media redundanty Media redundanty Media redundanty Media redundanty Media redundanty Media redundanty Antinetta regiona Media redundanty Media redundanty Społnance Media redundanty Media redundanty Społnance Media redundanty Media redundanty Społnance Media redundanty Media redundanty	58_MT [F58x8]				Topologic	al date		iagnostics
Cotaling dimension Cotaling dime			em constants Texts					
Market Aren (p. 1) Market Aren (p. 1) Extensitie Aren (p. 1) Market Arender (p. 1) Market Arender (p. 1) Market Arender (p. 1)		^	Media redundancy					
General Mill declaration (moderated) moderated) * Avanced genomic headers deplotes * Avanced genomic headers and substanting * Avanced genomic headers and substanting * Avanced genomic headers and substanting * Avanced genomic headers and substanting * Avanced genomic * Avanced								
Otherent address: Ministry								
Market deformer upper Market deform			MRP domain	mrpdomain-1				
mitektor spoke Ring port: 1, for 1 [k] Mitektor mitektions Ring port: 1, for 1 [k] Mitektor mitektions Ring port: 1, for 1 [k] Mitektor mitektions Biographic pirch [k]			Media redundancy role:	Client				
Mater materials File			Pine port 1:	Photo (x1)(Port 1 (x1 P1 P)				
techtrours mehr 2 a da tim settings D cycle Synchronization D cycle Synchroni								
Isochnoos mode - All faith existing D cycle Synchronization		•						
ID cycle Domain settings				Diagnostics interrupts				
Synchronization Domain settings								
Sjircinonastion								
				Domain settings				

IMG-ID: 184322827

Proceed as follows to activate the MRP functionality in the controller:

- ✓ Make sure that you added all participants to the topology.
- d) Switch to the device overview of the controller.
- e) Switch to "Device settings / Properties / General".
- f) Under Media redundancy, select the "Master (auto)" role to be able to use the MRP functionality.
- ⇒ The whole network now uses the MRP functionality.



NOTICE	Creation of a logical ring
	To create a logical ring, all devices must be in the same subnet, i. e. the 3 first octets of the IP address must be identical everywhere. Since this also concerns the PC used to parameterize the controller, and since the controller generally has only 2 ring ports, the use of a switch is recommended.

5.6.5 Isochronous Mode IRT

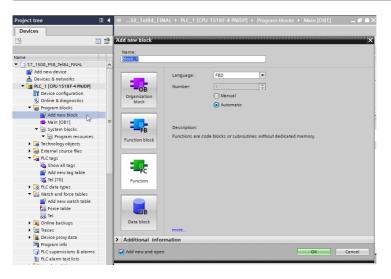
NOTICE	Use of the feature
	The use of this feature is the same for the S58 and F58 series.

If the smallest IRT cycle times of the concerned application are not sufficient, such as e.g. in a Motion Control control loop, the isochronous mode can be enabled in addition. This mode ensures that data is deterministic at any time. This means that data is strictly sequenced and follows a specified clock cycle imposed by the controller. The minimum clock cycle is 250 μ s (PROFINET device) or 500 μ s (PROFisafe device – non-safe value). The cycle time can be any multiple of the minimum cycle time. All transmission times for all network participants are calculated in advance. Collisions and latencies due to jitter are excluded by network-side prioritization mechanisms. This allows e.g. assigning the position value obtained by the sensor to an exact moment (+/- 1 μ s) at which it was measured.

Proceed as follows to activate the Isochronous Mode of the controller:

- ✓ Make sure that the controller has been integrated in the topology and parameterized properly.
- a) Navigate to the Project tree and select "Add new block".
 - ⇒ The "Add new block" window opens.

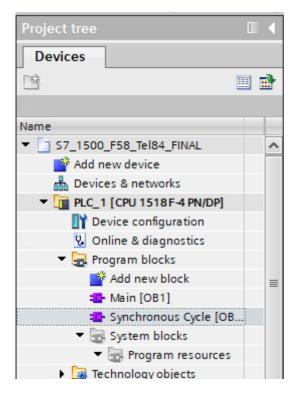
Kübler Group



IMG-ID: 185405323

b) Click on "Organization block" and select the "Synchronous Cycle" block.

- c) Confirm with "OK".
 - ⇒ The block is added to the topology.
- d) Open the newly added "Synchronous Cycle" block.



e) Now the functions UPDATE_PI and UPDATE_PO must be added. Drag them on the instructions topology into the block.

								Topolog		A Networ		IN Device		Options	
						3									
8 M S S N N 🗉 🗃 🕿	1 2 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	E 🗄 🕼 📞 🍋	62 ME 49 1	= 16 16 14 1	C 61 77 86		11 15	(MTPSEA)		- = =		1 Q 2			
Synchronous Cycle													1	> Favorites	
Name	Data type	Default value	Supervision	Comment										✓ Basic instructions	
- Input						^								Math functions	
Initial_Call	Bool			Initial call of this					100					 Move operations 	
Image: Pre_hput	Bool				ert of inputs is available				**					RT MOVE	
PIP_Output	Bool				art of outputs of last cycle co	uldtrant.								FI Desenator	D
IO_System	USInt				ggering 10 system									R Secialize	- 5
Event_Count	int			Events discarded										ET MOVE, BUK	
 SyncCycleTime 	LTime			Configured cycle	time of the synchronous cyc	e 08					8			FT MOVE BLK VHENNT	
- Temp											19	•		ET UMOVE BLK	
 oldd neuo- 														FT FALL BLK	F
Constant Constant						×								ET UNLL BLK	
Block title:														FI SCATER	
													_	C SCATTER BLK	
														ET GATHER	
😳 Network 1:												_		1	
Comment							< =		> 1	0.		•		 Extended instructions 	
							Devic	e overview						Date and time-of-day	
UPDA	TR						-		_					Date and time-orday String + Char	
	100				-		¥7	Nodule		Rac	k Slot	Laddress	Q =	Process image	
and - NET R							-	▼ F58 MT		0	0		-	Process image UPDAT PI	
	LADOR - OTTA							 PHO 		0	0.81	-			
	County of the local data					-		* Standard			1		_	UPDAT_PO	
									meter_SubM		11			SYNC_PI	
1								State	dard Telegree	m 84 0	12	019	03	SYNC_PO	
Network 2:										0	2			Distributed NO	
Comment						~				0	3			PROfilenergy	
					100%		10						2	🕨 🎦 Module parameter assi	

IMG-ID: 185408651

f) The functions consist of one input and two output parameters. Create them according to your data types in the data of the organization block.

e	S	7_1	500_F58_Tel84_FIN/	AL → PLC_1 [CPU 1	1518F-4 PN/DP] >	Program blo	cks → Synchronous Cycle [OB61]	_ @ =>
ю	L R	X :	0 e 🔍 🖿 🚍 🚍	💬 🕾 ± 😫	± 😑 😥 🥙 <table-cell></table-cell>	신 영 😵 🤇	≔ ¹ = ¹ = 61 61 60 00 ⊡e	
	Sy	nch	ronous Cycle					
		Na	me	Data type	Default value	Supervision	Comment	
5	-		IO_System	USInt			Number of the triggering IO system	
6	-0		Event_Count	Int			Events discarded	
7	-0	-	SyncCycleTime	LTime			Configured cycle time of the synchronous cycle OB	
В	Ð	•	Temp					
9	-0		RET_VAL	Int				
10	-	-	FLADDR	Word				L
11			<add new=""></add>					
12	-0	-	Constant					
13	-0		part	PIP	1			
14	-		<add new=""></add>			_		

- g) Make sure that the default value of variable part is = 1. This determines the partition of the process image that is to be updated.
- h) Assign these variables to the two functions.

Comment	1 RET_V	NO /AL # RET_VAL DR # FLADDR		
📶 #part	3	PIP	^	
	1 RET_1 #part PART FLAC	IAL — #RET_VAL	×1	

IMG-ID: 185428619

Proceed as follows to activate the IRT functionality of the encoder:

- ✓ Make sure that you added the encoder to the topology.
- ✓ The organization block OB61 Synchronous Cycle must have been added to the controller.
- i) Switch to Device overview.
- j) In the navigation tree, under "Settings / General", click on "Isochronous mode".

F58_MT [F58x8]						Properties	1 Info	Diagnostics		
General IO tags	Sys	tem constants	Texts]						
• General	^	 Isochronous 								-
Catalog information		* isocitionous	mode _							- 1
- PROFINET interface [X1]										
General					Isochronous mode					
Ethernet addresses			Send	clock:	1.000				ms 🏲	
 Advanced options 									ms 🖊	
Interface options			Application						ms 🖍	
Media redundancy			1i/To v	alues:						
Isochronous mode		Time :	Ti (read in pr	ocess						
Real time settings			V	lues):	o ms 🗢					
Port 1 (X1 P1 R)	-		Inte	ervels:	0				ms	
 Port 2 [X1 P2 R] 		Time 1	lo (output pr	ocess						
Hardware identifier	×		. ve	lues):	0 ms 🗘					
< =	>		Inte	nak:	0				200	16

IMG-ID: 185431051

k) Check "Isochronous mode".

F58_MT (F58x8)				C Properties	Info 🔒 Diagnostics	
General IO tags	System	m constants Texts				
	^	Isochronous mode				^
Catalog information		s isocinonous mode				
· PROFINET interface [X1]						
General			Sochronous mode			
Ethernet addresses		Send clock:	1.000			ms 者
 Advanced options 	1.0					ms A
Interface options		Application cycle:				
Media redundancy	2	Ti/To values:	Automatic minimum			
Isochronous mode	Ê.	Time Ti (read in process				
Real time settings		values):	0 ms 🗘			
Port 1 [X1 P1 R]	-	Intervals:	0.000001			ms
Port 2 [X1 P2 R]		Time To (output process				
Hardware identifier	~	volues):	0 ms 🗘			
< 11 >		Intervals:	0.000001			ms Y

IMG-ID: 185432715

I) Select the desired telegram in the "Detail overview".

F58_MT [F58x8]				S Properties	🗓 Info 😩 🗓 Diagnostics	
General 10 tags	System constants	Texts				
 General Catalog information 	Time Ti ((read in process values):	0.245 ms 🗘			
▼ PROFINETInterface [X1]		Intervals:	0.001			ms
General Ethernet addresses	Time To ((output process values):	0.077 ms 🗘			
 Advanced options Interface options 	- 1	intervals:	0.001			ms
Media redundancy Isochronous mode	, Detail overviev	~				
Real time settings	Name	Slotis	lsochr			
Port 1 [X1 P1 8]	Standard Te	legram 1/1				
Port 2 [X1 P2 R] Hardware identifier	~	elegram 1/2	R.			

m) The encoder must be activated for the clock rate specification of the controller. for this, navigate to the detail overview of the concerned telegram.

\$7_1500_F58_Tel84_FIN					ИТ [F58x8]			1
				📑 To	ology view	Network view	Device vi	ew
F58_MT [F58x8]	- 🖽	name 142		€ ±				
4								
158 M								
			Ø.					
			3					
					1005		-	
Ш					> 100%	· · · · · · · · · · · · · · · · · · ·	▼	_
					100%		▼	_
	Rack	Slot	I address	Q address		Article no.	Firmwa	
Device overview	Rack	Slot					Firmwa	
Device overview Module F58_MT PN+0					Туре	Article no.	Firmwa	
Device overview Module	0	0			Type F58x8 F58enc Standard Telegram	Article no. 8.F58x8.xxCN.C12	Firmwa	
Device overview Module V F58_MT PN40 V Standard Telegram 84_1 Parameter_SubMod	0 0	0 0 X1		Q address	Type F58x8 F58enc	Article no. 8.F58x8.xxCN.C12	Firmwa	
Device overview Module F58_MT FNIO Standard Telegram 84_1 Parameter_5ubMod Standard Telegram 84	0 0 0 0 0 0	0 0 X1 1			Type F58x8 F58enc Standard Telegram	Article no. 8.F58x8.xxCN.C12	Firmwa	
Device overview Module F58_MT FNIO Standard Telegram 84_1 Parameter_5ubMod Standard Telegram 84	0 0 0	0 0 X1 1 1 1	l address	Q address	Type F58x8 F58enc Standard Telegram Parameter_SubMod	Article no. 8.F58x8.xxCN.C12	Firmwa	
Device overview Module F58_MT F1N0 Standard Telegram 84_1 Parameter_SubMod Standard Telegram 84	0 0 0 0 0 0	0 0 X1 1 1 1 1 2	l address	Q address	Type F58x8 F58enc Standard Telegram Parameter_SubMod	Article no. 8.F58x8.xxCN.C12	Firmwa	

IMG-ID: 185436043

n) Select Settings / General and click on I/O addresses

Standard Telegram 84 [Stan	dard Telegram 84]	Properties	🚺 Info 🔒 😒 Diagnostics 👘 🗉 🗸
	ystem constants Texts		
General Wooddreises	I/O addresses		
Hardware identifier	Input addresses		
	Start address: 0		
	End address: 19		
	Grganization block:		
	Organization block: (Automatic update) Process Image: Automatic update		
	metal mage. (not more oppose in)		
	Output addresses		
	Start address: 0		~

IMG-ID: 185437707

o) Check "Isochronous mode".

Standard Telegram 84 [Star	idard Telegram 84)	Roperties	Info 🔒 Diagnostics	
General 10 tags !	System constants Texts			
General NO addresses	VO addresses			^
Hardware identifier	Input addresses			
	Start address: 0			
	End address: 19 Kilsochronous mode			
	Organization block: (None)			
	Process image: None			
	Output addresses			
	Start address: 0			~

IMG-ID: 185439371

p) Assign the created organization block OB61 to the clock.

Kübler Group

	Synchronous Cycle [0861]		Parameter_ Standard Te	SubMod	
					>
rd Telegram 84] tem constants Texts			roperties	🚺 Info 👔 🖞 Diagnostics	
I/O addresses					
Input addresses					
Start address:					
End address:					
		📑 Add new	💌 🗙 🚬		
Organization block:	(None)		-w		
Process image:	None				

IMG-ID: 185441035

- q) Proceed the same way for the output addresses
- r) Download the configuration and start the communication.
- ⇒ The device now operates in IRT mode.

Standard Te	elegram 84 [S	tandard Telegram 84]			9 Properties	📵 Info 🔒 💈 Diagnostics	
General	10 tags	System constants	Texts				
General IO address	es	VO addresses					
Hardware i		Input addres	ses				
			Start add	ess: 0 with the sector of the			
				lock: Synchronous Cycle			
		Output addr	esses				
			Start add End add	ress: 0 ress: 3 Isochronous mode			
				lock: Synchronous Cycle			

IMG-ID: 185442699

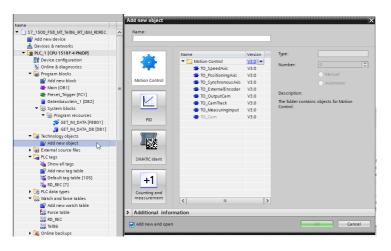
NOTICE	IRT in conjunction with MRP.
	MRP cannot be used associated with IRT. To achieve this, the devices must support MRPD in the ring.

5.6.6 Integrating an Encoder as a Technology Object

NOTICE	Use of the feature
	The use of this feature is the same for the S58 and F58 series.

The encoder can be integrated as a technology object in the project design:

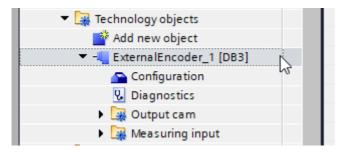
- $\checkmark\,$ Make sure that the encoder is already present in the project.
- a) In the navigation, under "Technology objects", select "Add new object".
 - \Rightarrow The window "Add new object" opens.



b) In the MOTION CONTROL folder, select object "TO_ExternalEncoder".

_	Name	Version	Type:	TO_ExternalEncoder	
	Motion Control	V3.0			
	TO SpeedAxis	V3.0	Number:	3	
	TO_PositioningAxis	V3.0		O Manual	
Motion Control	TO_PositioningAxis	V3.0		\bigcirc	
	TO ExternalEncoder			 Automatic 	
		V3.0	Description:		
	- IO_Outputcum	External en	coder		
	TO_CamTrack				
	TO_MeasuringInput				
PID	TO_Cam				
		\$7-1500, \$7-1			
0		E Technolog	y object external e		
LET 24			Note: The use o	f technology objects	
<u> </u>				poral behavior of other evels, including the	
			F-program.	ereis, melaanig ale	
SIMATIC Ident					N
					0
					Ы
+1					d
· · ·					ľ
Counting and					d
measurement	<	>			
					bo

- c) Assign a type designation for the encoder in the "Type" field.
- d) Confirm with "OK".
 - \Rightarrow The technology object is displayed in the navigation.

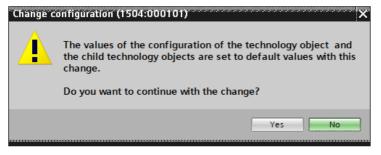


- e) Extend the new created object.
- f) Select "Configuration".

Project tree		\$7_1500_F58_MT_Te	186_IF	T_I&M_RDREC > PI	LC_1 (CPU 1518F-4 PN	/DP] + Technology objects + E:	xternalEncoder_1 [DB3]
Devices							
P8 10		* • •					
		Basic parameters					
Name	-	Hardware interface	0	Basic parameters			
* 57 1500 F58 MT Tel86 IRT IBM RDREC	~	Extended parameters	ō				
Add new device			-		N	ame: ExternalEncoder_1	
A Devices & networks							
 PLC_1 [CPU 1518F 4 PN/DP] 						LC	
Device configuration					Borto monte monte	and a real of the	
Q Online & diagnostics					and the second se		
Program blocks							
Add new block							
Main [081]						Balance Balance	
MC-Interpolator [0892]					User program	Technology object	Encoder
MC-Servo [0891]						<i></i>	
Preset_Trigger (FC1)							
Datenbaustein_1 [DB2]				Contract consider			
 System blocks 				External encoder	type		
 Program resources 			•			🔘 Linear	
GET_IM_DATA (F8801)						Rotary	
GET_IM_DATA_DB (DB1)	- 11					3	
Technology objects	- 11					Configure external encoder	for rotary motion
Add new object	- 11						
 	- 11					-5-f	
Configuration					(
Diagnostics						THE S	
Output cam	- 11					-	
Measuring input	- 11						
External source files	- 11			Measuring units			
PLC tags	- 11				Measuring unit pos	ition: *	-
a Show all tags					Measuring unit vel	locity 1%	-
💕 Add new tag table					in a stand grant we		
3 Default tao table [107]							

IMG-ID: 184792971

- g) Under "Basic parameters", set the option "Rotary".
 - ⇒ A warning message is displayed. The configured values will be reset to default values.



- h) Confirm this message with "Yes".
- Select "Hardware interface" and the option "PROFIdrive encoder to PROFINET/ PROFIBUS".
- j) Under the selection field, add the encoder known from the GSDML file.

😤 🕀 🖹			
Basic parameters 🥑			
Hardware interface S	Hardware interface		
Basic parameters Hardware interface Extended parameters	Encoder		
	nc	Data exchange	
	Data connection	Encoder	
	Encoder		
	Encoder type		
	Data exchange	PROFINET IO-System (100) Name Di	evice type
	Data exchange	Standard Telegram 81_1 51	landard le
		Switch_2	
	PLC		
General Cross-refe	rences Compile		
🕄 🛕 🕕 Show all messag	es 💌		
Compiling finished (errors: 3)	warnings: 3)	Show all modules	K 🛛 🖌

- k) Confirm with the green check.
- I) The encoder can be parameterized. To do so, select "Data exchange".
- m) Under "Telegram", select the same telegram as the one selected when integrating the encoder. Only telegrams 81 and 83 are supported.

Encoder	
PLC Data exchange	
Data connection: Encoder Encoder: dard Telegram 81_1_Encoder(Encoder type: Cyclic absolute	

- n) Under "Encoder type", select option "Rotary absolute".
- o) In "Increments per revolution", input your MUR value (e. g. 524,288) and in field "Numbers of revolutions" the NDR value: 4096 \rightarrow 19 bits ST / 31 bits TMR.

PLC	Data exchange	Encoder
Encoder data		
Encoder telegram:	Standard telegram 81	Device configuration
	Automatically apply encoder values durin	
Measuring system:	Rotary 💌 🧎	The parameters of the encoder
Increments per revolution:	8192	must match specifications in the device configuration.
Number of revolutions :	4096	
Fine resolution		
Bits in Gx_XIST1 :	0 bit	
Bits in Gx_XIST2:	0 bit	

- p) For complete encoder parameterization, click on Device configuration.
 - \Rightarrow The device view opens.
- q) Under the used submodule "Properties", "Module parameters", set the desired parameters.
- ⇒ The encoder is now entirely integrated as a technology object.

Parameter_S					Reporties	🚺 Info 🚺 📱 Diagnostics	
General	10 tags	System constants	Texts				
 General Catalog it 	nformation	Module param	eters				-
Module pare	meters	Preset (0x80	2E)				
			Preset (0x802E):	0			
		UserParamE	ata (0xBF00)				
				Code Sequence Counter (Tochwise Class 4 Functionality Disable G1_015T Preset Control Scaling Function Control			
		Measuring Ur	its per Revolution:	8192			
		Total	Measuring Range:	33554432			

IMG-ID: 253507211

5.6.7 Backward compatibility

The Sendix F58xx encoder is backwards compatible with the Sendix 58xx encoder. This means that it can replace the latter directly and with little changes in the project design software.

Smooth replacement is only possible if telegram ManTel860 or StdTel81 has been used until now. All other telegrams of the Sendix 58xx encoder do not comply with the profile defined in Encoder Profile V4.2. If other telegrams have been used, it may be necessary to adapt the input / output addresses of the variables. In particular cases, the replacement may be carried out in consultation with the Support, see Contact [▶ 113].

Dev	ice overview						
- *	Module	 Rack	Slot	I address	Q address	Туре	✓ Catalog
	▼ sendix58xx	0	0			Sendix	<search></search>
	Interface	0	0 X1			sendix	Filter Profile: <all> 💌 📑</all>
	 ManTel860_1 	0	1			ManTel	▼ Head module
	Parameter_SubMod	0	11,1:			Parame	Absolute Rotary Encoder
	Tel860_SubMod	0	1 1,1	07	03	Tel860	▼ Module
							ManTel860 StdTel81 StdTel81+Speed
							StdTel81+ST+MT+Speed+ST
							Universal

The direct device replacement procedure can be found in the corresponding chapter. See Replacement of a PROFINET encoder in the network [\triangleright 99].

5.7 Examples

5.7.1 Reading the I&M data

Proceed as follows to read the I&M data:

- ✓ Make sure that the encoder has been created in the project design tool and is accessible (the example refers to TIA Portal).
- a) Navigate to the main routine of the controller.
- b) Here, create block Get_IM_Data.

Comment		
	%DB1	
	"GET_IM_DATA_	
	DB"	
	Get_IM_Data	
EN		ENO
280 — LADDR		DONE
0 — ІМ_ТҮРЕ		BUSY
"GET_IM_DATA_		ERROR
DB".p_DataUDT - DATA		STATUS

IMG-ID: 184253707

c) Save the proper hardware identifier in parameter LADDR. It can be found in the relevant device under Properties / General / Hardware identifier.

			F58_MT F58x8 PLC_1	
<	111			
				Topologica
F58_MT [F58	5x8]			
General	IO tags	Syst	tem constants Texts	
IO c Syn • Port 1	chronization	^	Hardware identifier	
	eral interconnec options		Hardware identifier: 280	
Han Port 2	dware identifier [X1 P2 R]			
	eral interconnec			
	options	=		
Han Hardware	dware identifier <mark>identifier</mark> & Maintenance			
<	>	~		

- d) For IM_TYPE, save the desired I&M type (I&M 0...3). In this example, the I&M 0 data is to be read.
- e) Finally, select the output range. This is a structure that is created automatically with the block. It contains the single variables assigned to the respective I&M 0 parameters. See I&M Data [▶ 42].
- ⇒ The I&M 0 data is now read and can be found in the data set of the block.

Devices													
3	비 핥	말 만	🖦 🛃 🗮 😤 Keep a	ctual values 🔐 S	napshot 📑 🖳	Copy snapshots to s	tart values	E. E. Lord	start val	ues as actua	I values 📕	, 0),	
		GET_	IM_DATA_DB										
ame			ime	Data type	Start value	Monitor value	Retain	Accessible f.		Visible in	Setpoint	Supervision	Comment
57_1500_F58_MT_Tel86_IRT_I&M_RDREC	M O	28 💶 🔹	sui_imdataLen_netto	UInt	54	54		4	1	4			
Add new device		29 🔩 🔹	sdi_Pos	Dint	0	0		1	1	4			
d Devices & networks		30 🔩 🖷	si_index	Int	0	16		¥		V			
PLC_1 [CPU 1518F-4 PN(DP]	2	31 😋 =	sb_SfcLocked	Bool	false	FALSE		¥		1			
Device configuration		32 😋 =	pw_TemporaryWord	Word	16#0	16#000E		Image: A start and a start					
Online & diagnostics		33 😋 =	pa_DataByte	Array(0.53] of Byte				Image: A start and a start					
 Regram blocks 	•	34 📲 =	pa_DataChar	Array(0.53) of Char				V	9				
Add new block		35 🛥 =	ps_DataString	String[254]				1	1				
🖀 Main [081]	•	36 🛥 🗉	pa_TemporaryCharArr.	. Array(019) of Char				1	1				
Preset_Trigger (FC1)			p_DataUDT	IM0_Data									
Datenbaustein_1 (DB2)	•	38 💶	 Manufacturer_ID 	UInt		408							
 System blocks 	•	39 💶	Order_ID	String[20]		18.758x8.xxCN.012							
 Trogram resources 	•	40 😋	 Serial_Number 	String[16]		2104102471							
GET_IM_DATA [FEB01]	•	41 💶	Hardware_Revision	Uint	0	6							
GET_IM_DATA_DB [DB1]		42 🕙	Software_Revision	IMO_Version									
Technology objects	1	43 🕙	Revision_Counter	Ulnt	0	0							
External source files		44 🕣	 Profile_ID 	UInt	0	15616							
PLC tags	•	45 🛥	 Profile_Specific_Ty. 	. Uint	0	1							
PLC data types	•	46 🛥	IM_Version	Word	16=0	16=0101							
Watch and force tables		47 💶	 IM Supported 	Word	16#0	16#000E							

IMG-ID: 184255371

5.7.2 Replacement of a PROFINET encoder in the network

Proceed as follows to replace a PROFINET encoder during operation:

✓ Make sure that the supply voltage of the encoder is disconnected.

 ✓ To allow device replacement without parameterizing, the options "Support device replacement without exchangeable medium" and "Permit overwriting of device names of all assigned IO devices" must be activated in the controller.
 See LLDP - Link Layer Discovery Protocol [▶ 85].



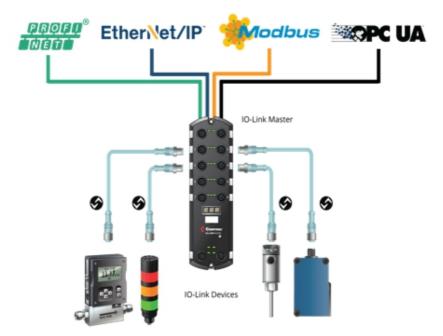
Fig. 2:

IMG-ID: 194693003

- a) Disconnect the Ethernet line(s) from the old encoder.
- b) Connect the Ethernet line(s) to the new encoder. Take care to connect the ports as they were with the old device.
- c) Connect the supply voltage to the encoder.
 - An IP address and a name are assigned to the new encoder via LLDP. It is ready for operation after a few seconds.
- d) Deactivate bit 14 in G1_STW and activate bit 10 in STW2_ENC to disable the parking sensor.
- \Rightarrow The new encoder is now ready for operation and issues position values.

5.7.3 IO-Link device integration via PROFINET

An IO-Link Master is necessary to have IO-Link devices communicate with each other or with external participants. The IO-Link Master is connected point-to-point to the single devices and serves in the same time as a gateway in a superordinate communication system.



The section below describes how to integrate a Kübler IO-Link encoder via a Turck IO-Link master module (TBEN-S2-4IOL) in a Siemens PROFINET control (1518F-4 PN/DP).

✓ Make sure that the GSDML file of the IO-Link master is included in TIA Portal

a) Integrate the IO-Link master in the PROFINET network



Fig. 3:

IMG-ID: 233008139

b) Configure the IO-Link master In this step, the single ports of the IO-Link master are configured based on the process data structure of the individual devices.

The example shows a M3658A.4344.4122 (ST IO-Link encoder with standard profile) on port 1 and a M3668.4344.4132 (MT IO-Link encoder with Smart-Sensor profile) on port 2.

The Kübler standard profile provides 8 bytes and the Smart-Sensor profile 6 bytes cyclic input data (seen from the master).

c) Now assign respectively 4 word (=8 bytes) input data and 0 byte output data to port 1.

🕶 🧊 Head module
▼ TBEN-S
TBEN-S2-4IOL
🕶 🛅 Module
Diagnostics
IO-Link Events
Module status
 Port configuration generic
🚺 DI
📗 DI with parameter access
IN 1 BYTE
IN 1 BYTE/OUT 1 BYTE
III 1 WORD
IN 1 WORD/OUT 1 WORD
IN 1 WORD/OUT 4 WORD
📗 IN 16 BIT
📗 IN 16 BIT/OUT 16 BIT
IN 16 BYTE/OUT 16 BYTE
IN 16 WORD
IN 16 WORD/OUT 16 WORD
IN 16 WORD/OUT 2 WORD
IN 2 WORD
IN 2 WORD/OUT 16 WORD
IN 2 WORD/OUT 2 WORD
IN 32 BYTE/OUT 32 BYTE
IN 4 WORD
IN 4 WORD/OUT 1 WORD
OUT 1 BYTE
OUT 1 WORD
OUT 16 BIT
UT 16 WORD
UT 4 WORD
Port configuration specific

Tutorial_IO_Link →	Ungrouped device	s + turck-tben-s2-4iol [TBEN-S2-4IOL]									_ # = ×
							🛃 Top	ology view	📥 Ne	twork view 🛛 🕅	Device view
turck-tben-s2-4iol	[TBEN-52-41 💌 🧮	🖾 🛃 🔲 🍳 ±		Device	overview						
			^		Module	Rack	Slot	I address	Q address	Туре	Article no.
1	2.41				 turck-tben-s2-4iol 	0	0			TBEN-52-4IOL	6814024
	-Den-				PN-IO	0	0 X1			turck-tben-s2-4iol	
	unch duena 2 A.				Basic_1	0	Basic	100103	100101	Basic	
	<i>6</i> ¹		-		Kuebler_M3658A.4344.4122	0	IO-Link Port 1	110117		IN 4 WORD	
					Kuebler_M3668.4344.4132	0	IO-Link Port 2	120127		IN 4 WORD	
					DI_1	0	IO-Link Port 3			DI	
					IN 32 BYTE/OUT 32 BYTE_1	0	IO-Link Port 4	140171	140171	IN 32 BYTE/OUT 32	
		-			Diagnostics_1	0	Diagnostics	200209		Diagnostics	
		Contraction of the local division of the loc			IO-Link Events_1	0	IO-Link Events	210273		IO-Link Events	
						0	Module status				
										IMG-ID	: 233024779

- d) Proceed exactly the same way for port 2. Since the selection does not provide for 6 bytes input data, also port 2 can be configured with 4 word (= 8 bytes) input data.
- ⇒ The IO-Link master is now configured with the ports

NOTICE	Assignment of the address ranges
	The address range of the input, respectively output data can be defined individually. In this example, the input data of the encoder on port 1 is assigned to address range 100117 and the input data on port 2 to address range 120127. In addition, a digital input is represented on port 3 and a display device on port 4.

5.7.3.1 Process data processing via standard Kübler profile

First, two independent variables are created to allow processing and separating the speed and position information provided by the encoder with standard Kübler profile to port 1.

- ✓ In the menu tree, navigate to item Variable tables
- a) Create a new variable table and name it according to the used profile.
- b) Create the variables for position and speed.
- ⇒ The variables are now created in the table. The current input data is now written permanently in these variables, which thus can be integrated arbitrarily in the later user program.

Speed	ID110	(input byte 110113)
Position	ID114	(input byte 114117)

		Name	Data type	Address	Retain	Acces	Writa	Visibl	Supervision	Comment
1	-	M3658A_position	DWord 🔳	%ID114 💌						
2	-00	M3658A_speed	DWord	%ID110						
3		<add new=""></add>				 Image: A start of the start of	V	V		

5.7.3.2 Process data processing via Smart-Sensor profile

Two further variables are created for the encoder with Smart-Sensor profile on port 2.

- ✓ In the menu tree, navigate to item Variable tables
- a) Create a new variable table and name it according to the used profile.
- b) Create the variables for position and speed.
- ⇒ The variables are now created in the table. The current input data is now written permanently in these variables, which thus can be integrated arbitrarily in the later user program.

Measured value	ID120	(input byte 120123)
Scaling	IB124	(input byte 124)

		Name	Data type	Address	Retain	Acces	Writa	Visibl	Supervision	Comment
1	-00	M3668_measurement_value	DWord	%ID120						
2	-00	M3668_scaling	Byte	%IB124						
3								V		

IMG-ID: 233063691

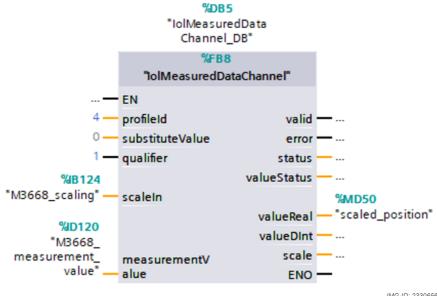
With the Smart Sensor profile, the encoder provides the unscaled measured value and the scaling factor. However, as a general rule, the later user program only needs the scaled value. Therefore, the values must first be factored in together.

For the processing of cyclic process data, Siemens provides in the TIA Portal a suitable function block for every Smart-Sensor profile class.

These function blocks can be found in the "Common- and Smart-Sensor profiles" library and are available for download under the following link:

https://support.industry.siemens.com/cs/document/109766016/common-and-smart-sensor-profiles-for-io-link?dti=0&lc=en-WW

- ✓ Make sure that you have created the function block in the TIA library.
- c) Select the function block "IolMeasuredDataChannel" for profile class "Digitally measuring sensors", which includes the encoders
- d) Drag the function block "IolMeasuredDataChannel" into the process routine. The block processes the raw values provided by the sensor and generates a usable process parameter for the user program.



- e) Link the raw values, the measured value (ID120) and the scaling (IB124) of the encoder with the block.
- ⇒ The block now outputs a scaled position value as REAL and DINT.

The following tables describe the different operators of the "IolMeasuredDataChannel" block.

Parameter	Datentyp	Beschreibung
EN	BOOL	Freigabeeingang (enable)
profileId	WORD	ausgewählte Profil-ID bzw. Prozessdatenstruktur 1 = SSP 3.1 2 = SSP 3.2 3 = SSP 3.3 4 = SSP 3.4 (SSP = Smart Sensor Profil)
substituteValue	DINT	Der angegebene Erstzwert wird auf den "valueReal" und "valueDINT" angewendet, wenn "valueStatus" ungleich 0 ist.
qualifier	BOOL	Dieses Signal entspricht der Port Qualifier-Information des Sensors. FALSE = Prozessdaten sind ungültig TRUE = Prozessdaten sind gültig Das Port Qualifier-Bit kann im PCT-Tool aktiviert werden. Es wird für jeden IO-Link Port ein Bit reserviert.
scaleIn	SINT	An diesen Eingang wird die Skalierinformation des Sensors aus den Prozessdaten angelegt. HINWEIS: Die Breite der Prozessdateneingabe hängt vom Profil des Sensors ab (entweder INT16 oder INT32).
measurementValue	Variant	An diesen Eingang wird die Messwertinformationen des Sensors aus den Prozessdaten angelegt. Dieser Eingang unterstützt sowohl 16 Bit als auch 32 Bit Werte.

Parameter	Datentyp	Beschreibung
ENO	BOOL	Freigabeeingang (enable)
valid	BOOL	Wenn der Wert TRUE ist, sind die angegebenen Werte gültig und können für weitere Berechnungen verwendet werden.
error	BOOL	Wenn der Wert TRUE ist, tritt ein interner Fehler auf und weitere Informationen werden am Funktionsbaustein über den Ausgang "status" bereitgestellt.
status	WORD	Bietet interne Fehlercodes (siehe Tabelle 4-8)
valueStatus	INT	Status der Prozessdateneingabe 0 = ok 1 = Prozessdaten ungültig 2 = Keine Daten 3 = Außerhalb des Bereichs (+) 4 = Außerhalb des Bereichs (-) 5 = nicht definiert
valueReal	REAL	Prozessdaten im Realformat zur Auswertung innerhalb der SPS
valueDINT	DINT	Prozessdaten im Double-Integer-Format
scale	INT	Prozessdaten-Skalierungsfaktor (abhängig vom Eingang "scaleln" und vom angeschlossenen Sensor)

			Funktionskl		
Profil-Typ	Profil-ID	Name des Profilmerkmals	Messung	Deaktivi erung Wandler	Prozessdaten- struktur
SSP 3.1	0x000A	Messsensor	0x800A		PDI32.INT16_INT8
SSP 3.2	0x000B	Messsensor, hochauflösend	0x800B	-	PDI48.INT32_INT8
SSP 3.3	0x000C	Messsensor, Sperrfunktion	0x800A		PDI32.INT16_INT8 PDO8.BOOL1
SSP 3.4	0x000D	Messsensor, hochauflösend, Sperrfunktion	0x800B	0x800C	PDI48.INT32_INT8 PDO8.BOOL1

6 Annex

6.1 Scaling

The usability of the measured values output by the measuring system essentially depends on their scaling. Scaling the measured values presupposes that mathematical operations must be carried out, which, depending on the device type, are integrally or only partly supported. There are basically 3 different scaling types:

- 1. Binary scaling = Scaling function
- 2. Non-binary scaling = Universal Scaling function
- 3. Scaling by means of the gear factor = Gear Factor

6.2 Subnet mask in conjunction with the IP address

Each IP address can be subdivided into a network address and a host address. The subnet mask determines at which place this separation takes place. This basically determines the maximum possible number of host addresses and network addresses. The host addresses can be compared with the participants in an Ethernet network.

There are basically 3 address classes A, B and C.

Class A:

16,777,214 hosts per network

Subnet mask: 255.0.0.0

Maximum address range network address: 127,255,255,255

IP address	IP address	IP address	IP address
1st octet	2nd octet	3rd octet	3rd octet
1.	0.	0.	0.

Class B:

65,534 hosts per network

Subnet mask: 255.255.0.0

Maximum address range network address: 191,255,255,255

IP address	IP address	IP address	IP address
1st octet	2nd octet	3rd octet	4th octet
128.	1.	0.	0.

Class C:

254 hosts per network

Subnet mask: 255.255.255.0

Maximum address range network address: 223.255.255.255

IP address	IP address	IP address	IP address
1st octet	2nd octet	3rd octet	4th octet
192.	0.	1.	0.

The standard subnet mask is 255.255.255.0, thus allowing 254 network participants.

6.3 Decimal / Hexadecimal conversion table

Dec	Hex								
0	0x0	51	0x33	102	0x66	153	0x99	204	0xCC
1	0x1	52	0x34	103	0x67	154	0x9A	205	0xCD
2	0x2	53	0x35	104	0x68	155	0x9B	206	0xCE
3	0x3	54	0x36	105	0x69	156	0x9C	207	0xCF
4	0x4	55	0x37	106	0x6A	157	0x9D	208	0xD0
5	0x5	56	0x38	107	0x6B	158	0x9E	209	0xD1
6	0x6	57	0x39	108	0x6C	159	0x9F	210	0xD2
7	0x7	58	0x3A	109	0x6D	160	0xA0	211	0xD3
8	0x8	59	0x3B	110	0x6E	161	0xA1	212	0xD4
9	0x9	60	0x3C	111	0x6F	162	0xA2	213	0xD5
10	0xA	61	0x3D	112	0x70	163	0xA3	214	0xD6
11	0xB	62	0x3E	113	0x71	164	0xA4	215	0xD7
12	0xC	63	0x3F	114	0x72	165	0xA5	216	0xD8
13	0xD	64	0x40	115	0x73	166	0xA6	217	0xD9
14	0xE	65	0x41	116	0x74	167	0xA7	218	0xDA
15	0xF	66	0x42	117	0x75	168	0xA8	219	0xDB
16	0x10	67	0x43	118	0x76	169	0xA9	220	0xDC
17	0x11	68	0x44	119	0x77	170	0xAA	221	0xDD
18	0x12	69	0x45	120	0x78	171	0xAB	222	0xDE
19	0x13	70	0x46	121	0x79	172	0xAC	223	0xDF
20	0x14	71	0x47	122	0x7A	173	0xAD	224	0xE0
21	0x15	72	0x48	123	0x7B	174	0xAE	225	0xE1
22	0x16	73	0x49	124	0x7C	175	0xAF	226	0xE2
23	0x17	74	0x4A	125	0x7D	176	0xB0	227	0xE3
24	0x18	75	0x4B	126	0x7E	177	0xB1	228	0xE4
25	0x19	76	0x4C	127	0x7F	178	0xB2	229	0xE5
26	0x1A	77	0x4D	128	0x80	179	0xB3	230	0xE6
27	0x1B	78	0x4E	129	0x81	180	0xB4	231	0xE7
28	0x1C	79	0x4F	130	0x82	181	0xB5	232	0xE8
29	0x1D	80	0x50	131	0x83	182	0xB6	233	0xE9
30	0x1E	81	0x51	132	0x84	183	0xB7	234	0xEA

Dec	Hex								
31	0x1F	82	0x52	133	0x85	184	0xB8	235	0xEB
32	0x20	83	0x53	134	0x86	185	0xB9	236	0xEC
33	0x21	84	0x54	135	0x87	186	0xBA	237	0xED
34	0x22	85	0x55	136	0x88	187	0xBB	238	0xEE
35	0x23	86	0x56	137	0x89	188	0xBC	239	0xEF
36	0x24	87	0x57	138	0x8A	189	0xBD	240	0xF0
37	0x25	88	0x58	139	0x8B	190	0xBE	241	0xF1
38	0x26	89	0x59	140	0x8C	191	0xBF	242	0xF2
39	0x27	90	0x5A	141	0x8D	192	0xC0	243	0xF3
40	0x28	91	0x5B	142	0x8E	193	0xC1	244	0xF4
41	0x29	92	0x5C	143	0x8F	194	0xC2	245	0xF5
42	0x2A	93	0x5D	144	0x90	195	0xC3	246	0xF6
43	0x2B	94	0x5E	145	0x91	196	0xC4	247	0xF7
44	0x2C	95	0x5F	146	0x92	197	0xC5	248	0xF8
45	0x2D	96	0x60	147	0x93	198	0xC6	249	0xF9
46	0x2E	97	0x61	148	0x94	199	0xC7	250	0xFA
47	0x2F	98	0x62	149	0x95	200	0xC8	251	0xFB
48	0x30	99	0x63	150	0x96	201	0xC9	252	0xFC
49	0x31	100	0x64	151	0x97	202	0xCA	253	0xFD
50	0x32	101	0x65	152	0x98	203	0xCB	254	0xFE
								255	0xFF

6.4 Conversion table Data types

Data type	Figure type	Length in bits	Length in bytes
BOOL	Binary	1	-
BYTE	Binary	8	1
WORD	Binary	16	2
DWORD	Binary	32	4
LWORD	Binary	64	8
SINT	Integer	8	1
INT	Integer	16	2
DINT	Integer	32	4
UINT	Integer	32	4
LINT	Integer	64	8
REAL	Floating point number	32	4
LREAL	Floating point number	64	8

7 Contact

You want to get in touch with us:

Technical advice

For technical advice, analysis or support during installation, Kübler is directly on site with its globally active application team.

Support International (English-speaking)

+49 7720 3903 849 support@kuebler.com

Kübler Germany +49 7720 3903 849 Kübler Australia +61 3 7044 0090 Kübler China +86 10 8471 0818 Kübler France +33 3 89 53 45 45 Kübler India +91 8600 147 280 Kübler Italy +39 0 26 42 33 45 Kübler Austria +43 3322 43723 12 Kübler Poland +48 6 18 49 99 02 Kübler Turkey +90 216 999 9791 Kübler USA +1 855 583 2537

Repair service / RMA-Form

For returns, please pack the product adequately and enclose the completed "Returns Form".

www.kuebler.com/rma

Send your return, specifying the RMA-reference, to the following address.

Kübler Group Fritz Kübler GmbH

Schubertstraße 47 D-78054 Villingen-Schwenningen Deutschland

Tel. +49 7720 3903 0 Fax +49 7720 21564

info@kuebler.com www.kuebler.com

Glossary

BOOL

Data type. A BOOL (or Boolean) represents a truth value that may be either true or false.

CRC

Cyclic Redundancy Check

Default

English for standard, generally used as default value. Factory-preset value of a changeable configuration value.

DINT

Data type. An operand of the data type DINT (double integer) has a length of 32 bits and is made of two components: a sign and a numerical value in two's complement.

DWORD

Data type. A DWORD consists of two WORDs, each consisting of 2 bytes, each of them consisting of 8 bits.

EMC

Electromagnetic compatibility

F-parameters

Failsafe related Parameters

INT

Data type. Integer. An integer is generally made of 16 bits.

iParameters

Individual / dynamic Parameters

IRT

Isochronous Real Time

LWORD

Data type. Long WORD consisting of two DWORDs.

MRP

Media Redundancy Protocoll - For ring-shaped topologies

MRPD

Media Redundancy for Planned Duplication - Allows the seamless switching of the communication paths in the event of a failure of a communication branch such as e. g. a cable break.

MUR

Measuring Units per Revolution

PAP

Parameter Access Point

PNU

Parameter Number - Number of the respective PROFINET encoder parameter

RMA

Return Material Authorization, authorization to return material, e.g. in the case of complaints.

RT

Real Time - includes cycle times of up to 1 ms

SINT

Data type. Short integer. An operand of the data type SINT (short INT) has a length of 8 bits and is made of two components: a sign and a numerical value.

TMR

Total Measuring Range

UINT

Data type. An operand of the data type UINT (Unsigned INT) has a length of 16 bits and contains numerical values without sign.

USF

Universal Scaling Function, a nonbinary scaling function (without overflow error)

WORD

Data type. A WORD includes 2 bytes, each of them including 8 bits.



Kübler Group Fritz Kübler GmbH Schubertstr. 47 D-78054 Villingen-Schwenningen Germany Phone +49 7720 3903-0 Fax +49 7720 21564 info@kuebler.com www.kuebler.com