HEIDENHAIN

User's Manual

Cables and Connection Technology

PWM 20 and PWM 21 (IK 215)
Testing Package

English (en)
08/2018

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The tables in chapter 2 "Items supplied" serve as an orientation for finding adapter cables and interfaces.

The different adapter cables with their IDs are assigned to the interfaces.

The chapter numbers in the tables are links that lead directly to the cable diagrams from which one can see what the adapter cables are used for.

1 General

General information on the PWM test unit:

The PWM 21 supersedes the PWM 20.

To ensure long-term availability of the PWM 2x series, the PWM 20 hardware had to be revised.

The PWM 21 is the functionally compatible successor of the PWM 20.

The following applies regarding the ATS software:

- The PWM 20 will still be supported in the future
- The PWM 21 is supported as of ATS V3.2.01
- For convenience, both the PWM 20 and the PWM 21 are referred to as PWM in this User's Manual

The PWM 21 can be ordered as of Dec 2017!

1.1 How to use this manual

1.1.1 About this manual

This User's Manual describes the test unit PWM 20 ID 731626-xx, PWM 21 ID 1200635-xx and the PC expansion board IK 215 ID 386249-xx.

Feed-trough operation is possible and incremental encoders can be tested as of the ATS software version 2.6.

More information:
User's Manual ATS Software ID 543734-xx

The cable diagrams on the next pages illustrate the possibilities of connecting adapter cables as well as the pin layouts of the cables.

1.1.2 Update service

This manual is regularly updated.

The current (printable) version is available on the Internet in PDF format:
www.heidenhain.de

The test cables (adapter cables) are continuously revised to fit the current inspection procedures and match the interfaces.

Thus, specific quotations may differ from the information in this manual. The cable overviews do not claim to be complete!

Printed copies are only distributed to the participants of our service training courses and are enclosed with new test units.

1.1.3 Notes in this documentation

Safety precautions

Comply with all safety precautions indicated in this manual and in your machine tool builder's documentation!

Precautionary statements warn of hazards in handling the product and provide information on their prevention. Precautionary statements are classified by hazard severity and divided into the following groups:

⚠ WARNING

Warning indicates hazards for persons. If you do not follow the avoidance instructions, the hazard **could result in death or serious injury**.

NOTICE

Notice indicates danger to material or data. If you do not follow the avoidance instructions, the hazard **could result in things other than personal injury, such as property damage**.

Informational notes

Observe the informational notes provided in this manual to ensure reliable and efficient operation of your HEIDENHAIN product.

In this manual, you will find the following informational notes:

The information symbol indicates a **tip**.

A tip provides additional or supplementary information.

Cross references

Use the cross references in the documentation for subject-related and comprehensive additional information.

In this manual, you will find the following cross references:

The book symbol represents a **cross reference** to external documentation (e.g., the documentation of your machine tool builder or other supplier).

1.1.4 Other documentation

Further important information:

- HEIDENHAIN User's Manual ATS Software ID 543734-xx
- Documentation of the machine tool builder
- Interfaces of HEIDENHAIN Encoders ID 1078628-xx
- Mounting instructions of the encoders
- Encoder brochures (**www.heidenhain.de**)

1.1.5 Target group

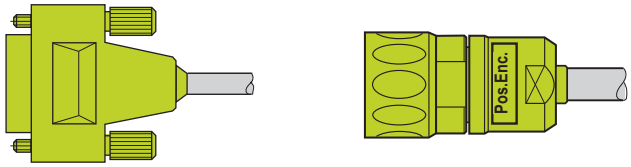
The activities described in this manual may only be performed by specialists for service, maintenance and commissioning who have profound knowledge of electronics, electrical engineering and NC machine-tool technology.

Keep these instructions for later reference!

1.2 Color coding of the connectors

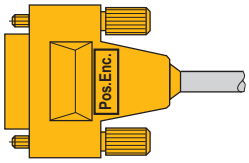
In the chapters "Overview of cables and adapters" and "Pin layouts", connectors are color-coded to indicate differences in assignment.

- **Green:** 15-pin D-sub connector with encoder layout; corresponds to the PWM 2x and PWT 10x layout.



The 15-pin D-sub connectors are used in the electrical cabinet and at subsequent electronics, the round M23 connectors in the machine area (IP protection class).

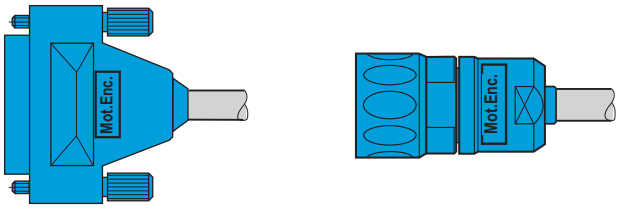
- **Orange:** 15-pin D-sub connector with control layout that differs from the HEIDENHAIN encoder layout!



The 15-pin D-sub connectors are used in the electrical cabinet at the TNC input. Current HEIDENHAIN TNCs (e.g. iTNC 530, TNC 640) use the control layout.

> Confusing encoder and control layouts may damage or destroy the encoder!

- **Blue:** Connector for the motor encoder inputs of the TNC



The 25-pin D-sub connectors are used in the electrical cabinet at the motor encoder input of the TNC, the round M23 connectors in the machine area (IP protection class).

> Mot.Enc. and Pos.Enc. connectors have different wirings. Confusing the wirings may damage or destroy the encoder. Since 2003, the connectors have been marked with a "Mot.Enc." or "Pos.Enc." label.

> **More information:**
> "Pin layouts", Page 81

1.3 Safety precautions

More information:
Operating instructions (installation) PWM 20 and PWM 21
ID 1125089-xx

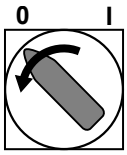
NOTICE

- Observe the safety precautions below to avoid injury or damage to persons or products
- To avert potential dangers, only use the product in the manner described

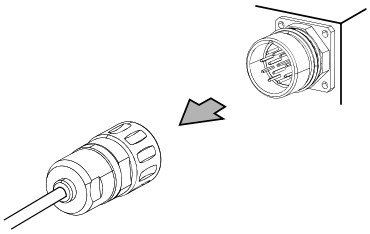
Observe the following before you integrate the test units into the position control loop of an NC-controlled machine tool:

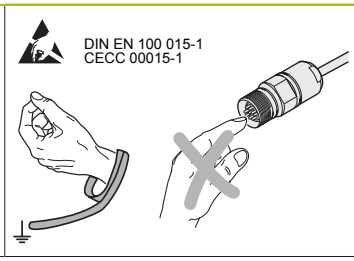
1. **Switch off the machine**
2. Then disengage the connecting elements
   - Observe the ESD precautions
   - Do not contaminate connector pins
3. Reestablish all required connections and secure them mechanically
   - Make the required settings on the PWM
4. Switch the machine and the control back on again

1.

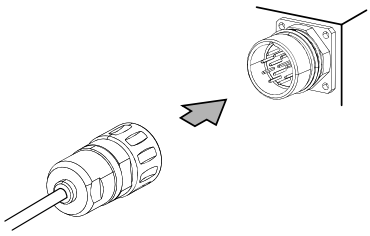


2.

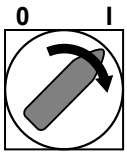




3.



4.



⚠ WARNING

Axes moving uncontrolled or vertical axes falling down

Property damage, injury or death

- Ensure that the EMERGENCY STOP button is instantly accessible during the start-up phase of the machine
- After switch-on, check whether the machine axis can be traversed in a controlled manner
- Do not operate defective units
- No persons are allowed within the working range of the machine
- Do not change any parameters or encoder voltages at the test units while the machine tool is moving and a test unit is connected to the position control loop
- Changed parameters must be reset to their original values
- Ensure that vertical axes cannot fall down
- Always check whether the pin layouts of the adapter cables used are identical with the original pin layout of the machine tool

The ATS software offers the possibility of storing and editing machine-specific or equipment-specific information in the customer's memory area. The data may comprise safety-relevant information.
When servicing, please take care to adjust this memory area.
When troubleshooting always contact the machine tool builder for information (e.g. meaning of the data in the OEM memory).

Support is provided by HEIDENHAIN Traunreut or by the HEIDENHAIN agencies, see "Contacts", Page 189.

1.4 Information on the encoder diagnostic kits PWM 20 ID 759251-01 and PWM 21 ID 1223097-01

The PWM encoder diagnostic kits serve to diagnose and adjust HEIDENHAIN absolute and incremental encoders with absolute and incremental interfaces.

The encoder diagnostic kits consist of the following components:

- PWM 20 or PWM 21 test unit for direct connection to a laptop or PC via USB interface
- ATS Adjusting and Testing Software on CD with integrated local encoder database for automatic encoder identification
- Standard adapter cables for common testing procedures
- Case for testing equipment
- Further adapters and adapter cables are available (see "Optional accessories", Page 19)

The PWM 20 and PWM 21 test units are available in three different variants (see tables below):

- PWM basic kit
- PWM basic kit in aluminum case
- PWM basic kit including case, set of standard adapter cables and User's Manual

1.5 Information on the IK 215 adjusting and testing package

The IK 215 adjusting and testing package serves to diagnose and adjust HEIDENHAIN encoders with absolute interfaces.

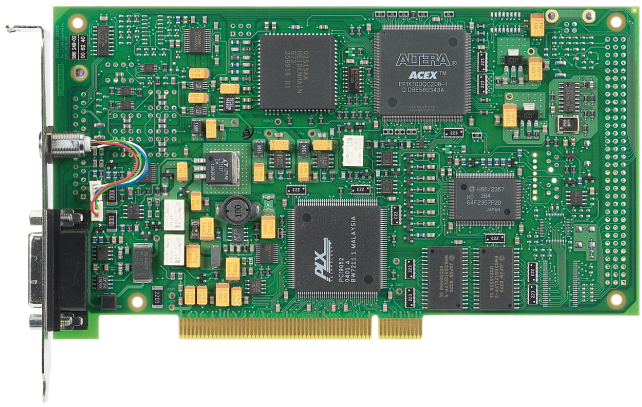
The IK 215 adjusting and testing package comprises:

- **IK 215** interface card for installation in a PCI expansion slot of a personal computer
- **A**djusting and **T**esting **S**oftware (**ATS**) with integrated local encoder database for automatic encoder identification
- Standard adapter cables for common testing procedures
- Further adapters and adapter cables are available (see "Optional accessories", Page 19)

The PWM 20 and PWM 21 with expanded scope of functions replace the IK 215.

As compared to the PWM, the IK 215 does **not support** the following functions:

- Incremental interfaces (1 V_{PP}, 11 μA_{PP}, TTL, etc.)
- DRIVE-CLiQ from SIEMENS
- Measurement in feed-through mode



2 Items supplied

2.1 IK 215 adjusting and testing package ID 547858-xx

The packages 1 and 2 are included in delivery.

Package 1: ID 527367-01

Package 2: ID 658110-01

Package 1: ID 527367-01 IK 215

Qty.	Designation	ID
1	IK 215 PCI board	386249-02
1	ATS CD-ROM de/en software version 3.2.xx	539862-27
1	IK 215 Operating Instructions (installation)	549369-xx

Package 2: ID 658110-01 Accessories kit for absolute encoders

Qty.	Designation	ID
1	Benutzerhandbuch ATS-Software PWM 20 and PWM 21 (IK 215) de	543734-xx
1	User's Manual ATS Software PWM 20 and PWM 21 (IK 215) en	543734-xx
1	Benutzerhandbuch Kabel und Anschlusstechnik PWM 20 und PWM 21 (IK 215) Prüfpaket de	1117945-xx
1	User's Manual Cable and Connection Technology PWM 20 and PWM 21 (IK 215) Testing Package en	1117945-xx
1	Adapter cable (with incremental signal) for IK input, 15-pin/17-pin; D-sub/M23; 2 m	324544-02
1	Adapter cable for LC 18x scanning unit, 12-pin/17-pin; 3 m	369124-03
1	Adapter cable for LC 48x scanning unit, 12-pin/17-pin; 3 m	369129-03
1	Adapter cable for IK input, 15-pin/8-pin; D-sub/M12; 2 m	524599-02
1	Adapter cable for LC xx3, LC xx5, LC 20x scanning unit, 14-pin/17-pin; M12/M23; 3 m	533631-03
1	Adapter cable for RCN 82xx Ultra Lock, 12-pin/17-pin; M12/M23	643450-03

2.2 PWM 20 basic kit ID 731626-51

Basic kit: ID 731626-51

Qty.	Designation	ID
1	PWM 20	731626-01
1	ATS CD-ROM de/en software version 3.2.xx	539862-27
1	Operating Instructions (installation) PWM 20 and PWM 21	1125089-xx
1	USB connecting cable, 2 m	354770-02
1	Power cable, 3 m	223775-01
1	PWM packaging (cardboard)	730058-01

2.3 PWM 21 basic kit ID 1200635-51

Basic kit: ID 1200635-51

Qty.	Designation	ID
1	PWM 21	1200635-01
1	ATS CD-ROM de/en software version 3.2.xx	539862-27
1	Operating Instructions (installation) PWM 20 and PWM 21	1125089-xx
1	USB connecting cable, 2 m	354770-02
1	Power cable, 3 m	223775-01
1	PWM packaging (cardboard)	730058-01

2.4 PWM 20 encoder diagnostic kit ID 759251-01

The packages 1 and 2 are included in delivery.

Package 1: ID 759249-01

Package 2: ID 658110-01

Package 1: ID 759249-01 PWM 20 Basic kit

Qty.	Designation	ID
1	PWM 20	731626-01
1	ATS CD-ROM de/en software version 3.2.xx	539862-27
1	Operating Instructions (installation) PWM 20 and PWM 21	1125089-xx
1	USB connecting cable, 2 m	354770-02
1	Power cable, 3 m	223775-01
1	Case for testing equipment	785241-01

Package 2: ID 658110-xx Accessories kit for absolute encoders

Qty.	Designation	ID
1	Benutzerhandbuch ATS-Software PWM 20 and PWM 21 (IK 215) de	543734-xx
1	User's Manual ATS Software PWM 20 and PWM 21 (IK 215) en	543734-xx
1	Benutzerhandbuch Kabel und Anschlusstechnik PWM 20 und PWM 21 (IK 215) Prüfpaket de	1117945-xx
1	User's Manual Cable and Connection Technology PWM 20 and PWM 21 (IK 215) Testing Package en	1117945-xx
1	Adapter cable (with incremental signal) for IK input, 15-pin/17-pin; D-sub/M23; 2 m	324544-02
1	Adapter cable for LC 18x scanning unit, 12-pin/17-pin; 3 m	369124-03
1	Adapter cable for LC 48x scanning unit, 12-pin/17-pin; 3 m	369129-03
1	Adapter cable for IK input, 15-pin/8-pin; D-sub/M12; 2 m	524599-02
1	Adapter cable for LC xx3, LC xx5, LC 20x scanning unit, 14-pin/17-pin; M12/M23; 3 m	533631-03
1	Adapter cable for RCN 82xx Ultra Lock, 12-pin/17-pin; M12/M23	643450-03

2.5 PWM 21 encoder diagnostic kit ID 1223093-01

The packages 1 and 2 are included in delivery.

Package 1: ID 1223097-01

Package 2: ID 658110-01

Package 1: ID 1223097-01 PWM 21 Basic kit

Qty.	Designation	ID
1	PWM 21	1200635-01
1	ATS CD-ROM de/en software version 3.2.xx	539862-27
1	Operating Instructions (installation) PWM 20 and PWM 21	1125089-xx
1	USB connecting cable, 2 m	354770-02
1	Power cable, 3 m	223775-01
1	Case for testing equipment	785241-01

Package 2: ID 658110-xx Accessories kit for absolute encoders

Qty.	Designation	ID
1	Benutzerhandbuch ATS-Software PWM 20 and PWM 21 (IK 215) de	543734-xx
1	User's Manual ATS Software PWM 20 and PWM 21 (IK 215) en	543734-xx
1	Benutzerhandbuch Kabel und Anschlusstechnik PWM 20 und PWM 21 (IK 215) Prüfpaket de	1117945-xx
1	User's Manual Cable and Connection Technology PWM 20 and PWM 21 (IK 215) Testing Package en	1117945-xx
1	Adapter cable (with incremental signal) for IK input, 15-pin/17-pin; D-sub/M23; 2 m	324544-02
1	Adapter cable for LC 18x scanning unit, 12-pin/17-pin; 3 m	369124-03
1	Adapter cable for LC 48x scanning unit, 12-pin/17-pin; 3 m	369129-03
1	Adapter cable for IK input, 15-pin/8-pin; D-sub/M12; 2 m	524599-02
1	Adapter cable for LC xx3, LC xx5, LC 20x scanning unit, 14-pin/17-pin; M12/M23; 3 m	533631-03
1	Adapter cable for RCN 82xx Ultra Lock, 12-pin/17-pin; M12/M23	643450-03

2.6 Optional accessories

The test cables (adapter cables) are continuously revised to fit the current inspection procedures and match the interfaces.

Thus, specific quotations may differ from the information in this manual. The cable overviews do not claim to be complete!

Optional adapter cables and adapters are available for the different interfaces:

Package 3: ID 826440-01 Accessories kit for incremental encoders

Qty.	Designation	ID
	11 μA_{PP}	
1	Adapter cable for scanning unit, slimline, 8-pin/9-pin; M23; 1 m	ID 310125-xx
1	Adapter cable for scanning unit, full-size, 12-pin/9-pin; M23; 1 m	ID 310130-xx
1	Adapter cable IN, 15-pin/9-pin; D-sub/M23; 1 m	ID 653231-xx
	1 V_{PP}, TTL	
1	Adapter cable IN 15-pin/12-pin; D-sub/M23; 1 V_{PP}/TTL/HTL (IN)	ID 309784-xx
1	Adapter cable for scanning unit, slimline, 12-pin/12-pin; M23; 1 m	ID 310122-01
1	Adapter cable for scanning unit, full-size, 12-pin/12-pin; M23; 1 m	ID 310127-xx
1	Adapter cable for scanning unit, slimline and full-size, 14-pin/12-pin; M12/M23; 1 m	ID 344228-xx
1	Adapter connector; coupling to connector; 12-pin; M23/M23	ID 373848-xx

2.6.1 EnDat 2.1

Designation	See chapter	ID number
Adapter cable (extension) 17-pin (Pos.Enc.)	3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.5	ID 323897-xx
Adapter cable 15-pin/17-pin; D-sub/M23; EnDat/SSI/Fanuc/ Mitsubishi (IN)	3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.5	ID 324544-xx
Adapter cable (extension) 17-pin/17-pin, Mot.Enc.	3.3.5	ID 340302-xx
Adapter connector transforms Mot.Enc. into Pos.Enc.	3.3.5	ID 349312-03
Adapter connector transforms Pos.Enc. into Mot.Enc.	3.3.5	ID 349312-04
Adapter cable with PCB connector 12-pin and connector 17-pin/17-pin M23, Pos.Enc. EnDat (IN) for absolute encoders; 2 m	3.3.1. 3.3.5	ID 349839-xx
Adapter cable 17-pin/25-pin; 0.3 m (assignment converter)	3.3.2	ID 509666-xx
Adapter cable 17-pin/25-pin; 0.3 m (assignment converter)	3.3.2	ID 509667-xx
Adapter cable 17-pin/15-pin; 0.3 m	3.3.3. 3.3.4	ID 510616-N3 Old ID 332115-xx
Adapter cable 17-pin/15-pin; 0.3 m	3.3.4	ID 510617-xx
Adapter cable 12-pin/15-pin	3.3.1	ID 528015-xx
Adapter cable 17-pin/25-pin; 3 m	3.3.2. 3.3.5	ID 605426-xx Old ID 336376-xx
Adapter cable RCN 82xx Ultra Lock, 12/17-pin; M12/M23	3.3.1. 3.3.3	ID 643450-xx

2.6.2 EnDat 2.2

Designation	See chapter	ID number
Adapter cable 15-pin/17-pin; D-sub/M23; EnDat/SSI/Fanuc/ Mitsubishi (IN)	3.4.1. 3.4.3	ID 324544-xx
Adapter cable with PCB connector 12-pin and connector 17-pin/17-pin M23, Pos.Enc. EnDat (IN) for absolute encoders; 2 m	3.4.1	ID 349839-xx
SA 100 Service Adapter (listening-in mode EnDat 21 and 22, Fanuc and Mitsubishi), 17-pin connector, M23	3.2.1	ID 363706-01
Adapter cable 8-pin/8-pin (extension) Pos.Enc.	3.4.2	ID 368330-xx
Adapter cable 17-pin/15-pin; 0.3 m	3.4.1	ID 510616-N3 Old ID 332115-xx
Adapter cable 8-pin/25-pin	3.4.2	ID 641926-xx
Adapter cable 15-pin/8-pin (IN); D-sub/M12; 2 m	3.4.2. 3.4.3	ID 524599-xx
Adapter cable 8-pin/12-pin (with PCB connector)	3.4.2	ID 530351-03
Adapter cable 8-pin/15-pin	3.4.2	ID 533627-xx
SA 110 Service Adapter (listening-in mode EnDat 21 and 22, Fanuc and Mitsubishi), 17-pin connector, M23	3.2.2	ID 573547-01
Adapter cable 8-pin/15-pin	3.4.3	ID 628186-xx

Designation	See chapter	ID number
Adapter cable RCN 82xx Ultra Lock, 12/17-pin; M12/M23	3.4.1	ID 643450-xx
Adapter cable 8-pin/9-pin	3.4.2	ID 745796-xx

2.6.3 EXI 11xx/13xx adapter cable for adjustment

Designation	See chapter	ID number
Adapter cable 12-pin/15-pin	3.5	ID 528015-xx
3 inserts for adapter connector (12-pin)	3.5	ID 528694-01
3 inserts for adapter connector (15-pin)	3.5	ID 528694-02
Set of adapter cables with 2 x 3 inserts for adapter connectors (12-pin and 15-pin)	3.5	ID 621742-01

2.6.4 FANUC SERIAL interface

Designation	See chapter	ID number
Adapter cable 15-pin/17-pin; D-sub/M23; EnDat/SSI/Fanuc/Mitsubishi (IN)	3.6.1	ID 324544-xx
Adapter cable 17-pin/17-pin (extension)	3.6.1	ID 349314-xx
SA 100 Service Adapter (listening-in mode EnDat 2.2 and Fanuc), 17-pin connector, M23	3.2.1	ID 363706-01
Adapter cable 15-pin/8-pin (IN); D-sub/M12; 2 m	3.6.2. 3.6.3	ID 524599-xx
Adapter cable 20-pin/17-pin; 0.5 m (encoder -> SA 100)	3.6.1	ID 550161-01
Adapter cable 17-pin/20-pin; 0.5 m (Fanuc -> SA 100)	3.6.1	ID 550162-01
SA 110 Service Adapter (listening-in mode EnDat 21 and 22, Fanuc and Mitsubishi), 17-pin connector, M23	3.6.3	ID 573547-01
Adapter cable 15-pin/8-pin M12 (OUT)	3.6.2	ID 827096-xx
Adapter cable 20-pin/8-pin M12 (IN)	3.6.2. 3.6.3	ID 1039686-xx
Adapter cable 20-pin/8-pin M12 (OUT)	3.6.2. 3.6.3	ID 1040174-xx

2.6.5 FANUC TTL

Designation	See chapter	ID number
Adapter cable IN 15-pin/12-pin; D-sub/M23; 1 V_{PP}/TTL/HTL (IN)	3.6.4	ID 309784-xx
Adapter cable 12-pin/20-pin (OUT)	3.6.4	ID 556558-xx
Adapter cable 12-pin/20-pin (IN)	3.6.4	ID 577345-01
Adapter cable 15-pin D-sub; 12-pin (OUT)	3.6.4	ID 825422-xx

2.6.6 MITSUBISHI High Speed Serial Interface

Designation	See chapter	ID number
Adapter cable 15-pin/17-pin; D-sub/M23; EnDat/SSI/Fanuc/ Mitsubishi (IN)	3.7.1	ID 324544-xx
Adapter cable 17-pin/17-pin (extension)	3.7.1	ID 349314-xx
Adapter cable 17-pin/20-pin	3.7.1	ID 367958-xx
Adapter cable 8-pin/8-pin M12 (extension) Pos.Enc.	3.7.1	ID 368330-xx
Adapter cable 15-pin/8-pin (IN); D-sub/M12; 2 m	3.7.1, 3.7.2, 3.7.3	ID 524599-xx
Adapter cable 17-pin/10-pin	3.7.1	ID 573661-xx
Adapter cable 8-pin/20-pin	3.7.2. 3.7.3	ID 646806-xx
Adapter cable 8-pin/10-pin	3.7.2. 3.7.3	ID 647314-xx
Adapter cable 20-pin/17-pin (encoder -> SA 100)	3.7.1	ID 750973-xx
Adapter cable 10-pin/17-pin (encoder -> SA 100)	3.7.1	ID 750974-xx
Adapter cable 15-pin/8-pin M12 (OUT)	3.7.2	ID 827096-xx
Adapter cable 20-pin/8-pin M12 (IN)	3.7.2. 3.7.3	ID 1039786-xx
Adapter cable 10-pin/8-pin M12 (IN)	3.7.2. 3.7.3	ID 1039802-xx

2.6.7 Rexroth Indramat

Designation	See chapter	ID number
Adapter connector (1 V_{PP}/TTL) Rexroth Indramat M23, 12-pin encoded/M23 12-pin	3.12.1	ID 269329-xx
Adapter cable 15-pin/17-pin; D-sub/M23; EnDat/SSI/Fanuc/ Mitsubishi (IN)	3.17.1. 3.17.2	ID 324544-xx
Adapter cable (I^2C) Rexroth Indramat M23, 12-pin encoded/M23 17-pin	3.17.2	ID 349595-xx
Adapter cable with PCB connector 12-pin and connector 17-pin/17-pin M23, Pos.Enc. EnDat (IN) for absolute encoders; 2 m	3.17.1	ID 349839-xx
Adapter cable 12-pin/15-pin	3.17.1	ID 528015-xx
3 inserts for adapter connector (12-pin)	3.17.1	ID 528694-01

2.6.8 Panasonic (Pana01)

Designation	See chapter	ID number
Adapter cable 15-pin/8-pin (IN); D-sub/M12; 2 m	3.19.1	ID 524599-xx
Adapter cable 15-pin/8-pin M12 (OUT)	3.19.1	ID 827096-xx
Adapter cable 15-pin/9-pin D-sub (IN)	3.19.1	ID 1133018-xx
Adapter cable 15-pin/9-pin D-sub (OUT)	3.19.1	ID 1133027-xx

2.6.9 SSI (synchronous serial interface)

Designation	See chapter	ID number
Adapter cable (extension) 17-pin (Pos.Enc.)	3.8.1	ID 323897-xx
Adapter cable 15-pin/17-pin; D-sub/M23; EnDat/SSI/Fanuc/ Mitsubishi (IN)	3.8.1	ID 324544-xx
Adapter cable (extension) 17-pin/17-pin, Mot.Enc.	3.8.1	ID 340302-xx
Adapter connector transforms Mot.Enc. into Pos.Enc.	3.8.1	ID 349312-03
Adapter cable with PCB connector 12-pin and connector 17-pin/17-pin M23, Pos.Enc. EnDat (IN) for absolute encoders; 2 m	3.8.1	ID 349839-xx
Adapter cable 12-pin/15-pin	3.8.1	ID 528015-xx
Adapter cable with 15-pin PCB connector	3.8.1	ID 635349-xx

2.6.10 DRIVE-CLiQ (registered trademark of Siemens AG)

Designation	See chapter	ID number
Connecting cable 12-pin/12-pin	3.9.2	ID 298400-xx
Connecting cable 12-pin/12-pin	3.9.2	ID 298401-xx
Adapter cable IN 15-pin/12-pin; D-sub/M23; 1 V_{PP}/TTL/HTL (IN)	3.9.2	ID 309784-xx
Adapter cable 25-pin D-sub (Mot.Enc.); 12-pin (Pos.Enc.) (IN)	3.9.2	ID 533055-01
Adapter cable Siemens RJ45 connector, 8+2-pin	3.9.1	ID 740059-02
Adapter cable 8-pin/9-pin	3.9.1	ID 745796-xx
Adapter cable 12-pin/25-pin (OUT)	3.9.2	ID 758082-xx
Adapter cable Siemens RJ45 connector, 8+2-pin, IP20/IP67	3.9.1	ID 759314-01
Connecting cable 8-pin/8-pin	3.9.1	ID 822504-xx
Adapter cable 15-pin D-sub; 12-pin (OUT)	3.9.2	ID 825422-xx
Adapter cable Siemens RJ45 connector 8+2-pin/M12 8-pin	3.9.1	ID 1093042-xx Old ID 1078299-xx
Adapter cable Siemens RJ45 connector 8+2-pin/9-pin	3.9.1	ID 1117540-02
Adapter cable RJ45 connector 8+2-pin/8-pin	3.9.1	ID 1121591-xx
Adapter cable 8-pin M12/9-pin speedtec	3.9.1	ID 1121536-xx
Adapter to extend DRIVE-CLiQ cables 8+2-pin RJ45	3.9.1	ID 1170001-01
Adapter cable 14-pin M12/10-pin RJ45	3.9.1	ID 805375-xx

2.6.11 Absolute interfaces EnDat/SSI

Designation	See chapter	ID number
Adapter cable (extension) 17-pin (Pos.Enc.)	3.10.6	ID 323897-xx
Adapter cable 15-pin/17-pin; D-sub/M23; EnDat/SSI/Fanuc/ Mitsubishi (IN OUT)	3.10.1, 3.10.2, 3.10.3	ID 324544-xx
Adapter cable 8-pin/8-pin M12 (extension) Pos.Enc.	3.10.2. 3.10.3	ID 368330-xx
Adapter cable 17-pin/25-pin; 0.3 m (assignment converter)	3.10.1	ID 509667-xx
Adapter cable 17-pin/15-pin; 0.3 m	3.10.1. 3.10.6	ID 510616-N3 Old ID 332115-xx
Connecting cable 15-pin/15-pin D-sub (EnDat)	3.10.1, 3.10.2, 3.10.3	ID 517673-xx
Adapter cable 15-pin/8-pin (IN); D-sub/M12; 2 m	3.10.2, 3.10.3, 3.10.5	ID 524599-xx
Adapter cable 15-pin/8-pin (IN); D-sub/M12	3.10.2	ID 533627-xx
Adapter cable 17-pin/25-pin; 3 m	3.10.4	ID 605426-xx Old ID 336376-xx
Adapter cable 25-pin/8-pin (IN); D-sub/M12	3.10.2	ID 641926-xx
Connecting cable 15-pin/15-pin (IN)	3.10.1. 3.10.2	ID 675582-xx
Adapter cable 8-pin/9-pin	3.10.5	ID 745796-xx
Adapter cable 9-pin/25-pin	3.10.4	ID 745813-xx
Adapter cable 15-pin/17-pin (OUT)	3.10.1, 3.10.2, 3.10.3	ID 827099-xx
Adapter cable 15-pin/8-pin M12 (OUT)	3.10.3. 3.10.5	ID 827096-xx
Adapter cable 15-pin/25-pin (IN)	3.10.1, 3.10.2, 3.10.4	ID 827551-xx
Connecting cable 15-pin/25-pin (OUT)	3.10.1, 3.10.2, 3.10.3, 3.10.4	ID 827593-xx
Adapter cable 15-pin/15-pin (IN)	3.10.1, 3.10.2, 3.10.6	ID 1040982-xx
Adapter cable 15-pin/15-pin (OUT)	3.10.1, 3.10.2, 3.10.3, 3.10.6	ID 1041017-xx

2.6.12 EnDat/SSI (adapter cables for synchronous servo drives)

Designation	See chapter 3.15.1	ID number
Adapter cable (extension) 17-pin (Pos.Enc.)	Figure D. Figure E	ID 323897-xx
Adapter cable 15-pin/17-pin; D-sub/M23; EnDat/SSI/Fanuc/ Mitsubishi (IN)	Figure D	ID 324544-xx
Adapter cable (extension) 17-pin/17-pin, Mot.Enc.	Figure D	ID 340302-xx
Adapter connector transforms Mot.Enc. into Pos.Enc.	Figure D	ID 349312-03
Adapter connector transforms Pos.Enc. into Mot.Enc.	Figure D	ID 349312-04

Designation	See chapter 3.15.1	ID number
Adapter cable with PCB connector 12-pin and connector 17-pin/17-pin M23, Pos.Enc. EnDat (IN) for absolute encoders; 2 m	Figure D	ID 349839-xx
Adapter cable 17-pin/25-pin; 0.3 m (assignment converter)	Figure E	ID 509666-xx
Adapter cable 17-pin/25-pin; 0.3 m (assignment converter)	Figure E	ID 509667-xx
Adapter cable 17-pin/25-pin; 3 m	Figure D. Figure E	ID 605426-xx
Adapter cable with 15-pin PCB connector	Figure D	ID 635349-xx
Adapter for feed-through operation Pos.Enc. 17-pin M23/15-pin D-sub PWM 20	Figure D. Figure E	ID 1075630-01

2.6.13 EnDat (adapter cable for direct drives)

Designation	See chapter 3.15.1	ID number
Adapter cable (extension) 17-pin (Pos.Enc.)	Figure F	ID 323897-xx
Adapter cable 17-pin/25-pin; 0.3 m (assignment converter)	Figure F	ID 509666-xx
Adapter cable 17-pin/25-pin; 0.3 m (assignment converter)	Figure F	ID 509667-xx
Adapter cable 17-pin/25-pin; 3 m	Figure F	ID 605426-xx Old ID 336376-xx
Adapter for feed-through operation Pos.Enc. 17-pin M23/15-pin D-sub PWM 20	Figure F	ID 1075630-01

2.6.14 11 μA_{PP}

Designation	See chapter	ID number
Adapter connector 15-pin/9-pin (IN)	3.11.1	ID 294894-02
Connecting cable 9-pin/9-pin	3.11.1	ID 309773-xx
Connecting cable 9-pin/9-pin	3.11.1	ID 310191-xx
Adapter cable 15-pin/9-pin (IN, OUT), (feed-through operation)	3.11.1	ID 368171-xx
Adapter cable 15-pin/9-pin (OUT), (feed-through operation)	3.11.1	ID 368172-xx
Adapter cable 15-pin/9-pin (IN, OUT), M23	3.11.1	ID 653231-xx
Adapter cable 15-pin/9-pin (IN)	3.11.1	ID 826431-xx
Adapter cable 15-pin/9-pin (OUT)	3.11.1	ID 826436-xx
Adapter cable 15-pin/9-pin (OUT)	3.11.1	ID 826508-xx

2.6.15 1 V_{PP}/TTL

Designation	See chapter	ID number
Adapter connector (1 V_{PP}/TTL) Rexroth Indramat M23, 12-pin encoded/M23 12-pin	3.12.3	ID 269329-xx
Connecting cable 12-pin/12-pin	3.12.1	ID 298401-xx
Adapter cable IN 15-pin/12-pin; D-sub/M23; 1 V_{PP}/TTL/HTL (IN)	3.12.1, 3.12.2, 3.12.3	ID 309784-xx
Adapter cable 15-pin/12-pin (IN)	3.12.1	ID 310196-xx
Adapter, round 12-pin/15-pin D-sub connector	3.12.2	ID 324555-01
Adapter cable 15-pin/15-pin (IN) without limit/homing signals	3.12.1. 3.12.2	ID 335074-xx
Adapter cable 15-pin/15-pin (IN) max. 9 m, without limit/ homing signals	3.12.1. 3.12.2	ID 355186-xx
Adapter cable 12-pin/12-pin; PWM to PCB connector (1 V_{PP}, TTL, HTL) (Pos.Enc.)	3.12.1	ID 591118-xx
Connecting cable 15-pin/15-pin (IN), LIP 200 (layout for compensation run)	3.16.1	ID 735541-xx
Adapter cable 15-pin/15-pin D-sub	3.12.2	ID 739098-N5
Adapter cable 15-pin D-sub; 12-pin (OUT)	3.12.1. 3.12.3	ID 825422-xx
Adapter cable 15-pin/15-pin (OUT)	3.12.1, 3.12.2, 3.12.3	ID 825425-xx
Adapter cable 15-pin/12-pin (OUT)	3.12.1. 3.12.3	ID 825426-xx
Adapter cable 12-pin/15-pin (OTIS)	3.12.3	ID 1118055-01
Adapter cable 15-pin/12-pin (IN); PWT test pulse, HSP	3.12.1	ID 1184705-xx

2.6.16 1 V_{PP}/TTL, LIDA/LIF with LIMIT/HOMING signals

Designation	See chapter	ID number
Adapter cable 15-pin/15-pin (IN) with limit/homing signals	3.12.4	ID 354379-xx
Adapter cable 15-pin/15-pin (IN) max. 9 m, with limit/homing signals	3.12.4	ID 355397-xx
Connecting cable 15-pin/15-pin (OUT); 1:1 assignment; with limit/homing signals	3.12.4	ID 633811-xx
Adapter cable 15-pin/12-pin (IN); PWT test pulse, HSP	3.12.4	ID 1184705-xx

2.6.17 1 V_{PP} A/B (Zn) and commutation signals C/D (Z1) (adapter cable for synchronous servo drives)

Designation	See chapter 3.14.1	ID number
Adapter cable 17-pin/25-pin; PWM to subsequent electronics	Figure A Figure B	ID 289440-xx
Adapter cable (extension) 17-pin (Pos.Enc.)	Figure A Figure B	ID 323897-xx
Adapter cable, 1 m with 14-pin PCB connector and 17-pin M23 connector Pos.Enc. EnDat (IN) for 1 V_{PP} encoders with Zn/Z1 track	Figure B	ID 330980-xx
Adapter cable 17-pin/17-pin; PWM to motor	Figure B	ID 336847-xx
Adapter connector Zn/Z1 transforms Mot.Enc. into Pos.Enc.	Figure B	ID 349312-01
Adapter connector Zn/Z1 transforms Pos.Enc. into Mot.Enc.	Figure B	ID 349312-02
Adapter cable 17-pin/25-pin; 0.3 m (assignment converter)	Figure A	ID 509666-xx
Adapter cable 17-pin/25-pin	Figure A	ID 511886-xx
Adapter for feed-through operation Pos.Enc. 17-pin M23/15-pin D-sub PWM 20	Figure A Figure B	ID 1075630-01

2.6.18 1 V_{PP} (adapter cable for direct drives)

Designation	See chapter 3.14.1	ID number
Adapter cable 17-pin/25-pin; PWM to subsequent electronics	Figure C	ID 289440-xx
Adapter cable (extension) 17-pin (Pos.Enc.)	Figure C	ID 323897-xx
Adapter cable 17-pin/25-pin; 0.3 m (assignment converter)	Figure C	ID 509666-xx
Adapter cable 17-pin/25-pin	Figure C	ID 511886-xx
Adapter for feed-through operation Pos.Enc. 17-pin M23/15-pin D-sub PWM 20	Figure C	ID 1075630-01

2.6.19 HTL/HTLs

Designation	See chapter	ID number
Adapter cable IN 15-pin/12-pin; D-sub/M23; 1 V_{PP}/TTL/HTL (IN)	3.13.1	ID 309784-xx
Adapter cable 15-pin/12-pin (IN)	3.13.1	ID 310196-xx
Adapter, round 12-pin/15-pin D-sub connector	3.13.1	ID 324555-01
Adapter cable 12-pin/12-pin; PWM to PCB connector (1 Vpp, TTL, HTL) (Pos.Enc.)	3.13.1	ID 591118-xx
Adapter HTL/HTLs PWM 20 X1 (IN)	3.13.1	ID 1093210-01

2.6.20 Incremental commutation encoder 1 V_{PP} (e.g. ERN 1387)

Designation	See chapter	ID number
Adapter cable with PCB connector 14-pin/15-pin; D-sub	3.18.1	ID 1118895-02
3 inserts for adapter connector (14-pin)	3.18.1	ID 528694-04
Set of adapter cables with 3 inserts for adapter connectors (14-pin)	3.18.1	ID 1118892-02
Adapter cable (extension) 17-pin (Pos.Enc.)	3.18.1. 3.18.2	ID 323897-xx
Adapter cable 15-pin/17-pin; D-sub/M23; EnDat/SSI/Fanuc/ Mitsubishi (IN)	3.18.1. 3.18.2	ID 324544-xx
Adapter cable, 1 m with 14-pin PCB connector and 17-pin M23 connector Pos.Enc. EnDat (IN) for 1 V_{PP} encoders with Zn/Z1 track	3.18.1	ID 330980-xx
Adapter connector Zn/Z1 transforms Mot.Enc. into Pos.Enc.	3.18.2	ID 349312-01

Cables with "(OUT)" in their names are required for the feed-through mode. Not all interfaces support feeding through with the PWM. For measurements in the control loop, please note the chapters “Connect encoder“ and “Feed-through mode“ in the User‘s Manual of the ATS Software.

3 Overview of cables and adapters

3.1 General information – PWM encoder connection and grounding

Encoder connection

Please ensure that the correct supply voltage is selected to avoid damage to the encoder. The cable between the encoder and the PWM must not be connected or disconnected while under power. Otherwise the encoder and the PWM might be damaged. Check whether the cable between the encoder and the PWM is correctly wired. The pin layout of the encoder is included in the specifications. The pin layouts of the connecting cables are described in the catalog. An incorrectly wired connecting cable might damage the encoder and the PWM.

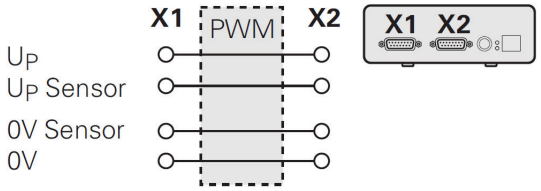
Encoder output

The encoder input X1 of the PWM is electrically connected with the encoder output X2. The signals and the PIN layout at the output correspond to the respective signals at the input.

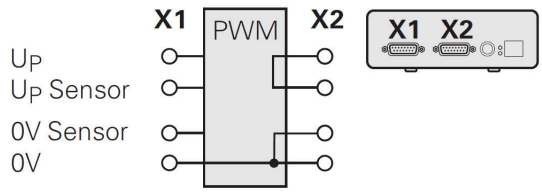
NOTICE

The signals are not electrically isolated. The supply and sensor lines are switched via the ATS software (as of ATS V2.6) depending on the respective mode of operation, and can be connected (see examples). It is always ensured that the supply voltage generated by the PWM is not present at X2.

Example 1:
PWM in feed-through mode (the encoder is powered by the subsequent electronics) or ATS software not started



Example 2:
PWM powers the encoder via X1



Grounding conditions

The PWM features an internal wide-range switching power supply. Therefore, the PE protective conductor terminal (protective earth) is required. It is also connected to the PWM housing.
If the PWM is integrated in the position control loop of an NC-controlled machine, the PWM constitutes an additional grounding point, which changes the shielding concept.

To prevent this,

- the PWM can be supplied via an isolating transformer
- the PWM can be supplied with 24 VDC

To evaluate the PWM measuring data, a PC is connected to the USB interface of the PWM. The 0-V potential and the protective earth terminal are usually connected to each other in the PC (also USB). If the PWM is integrated in the position control loop of an NC-controlled machine, the conditions on the 0-V connection change, too.

To prevent this,

- you can use a battery-operated laptop computer
- the laptop can be used with a power supply unit without protective earth terminal

Feed-through operation (listening-in) with PWM in the position control loop of an NC-controlled machine tool

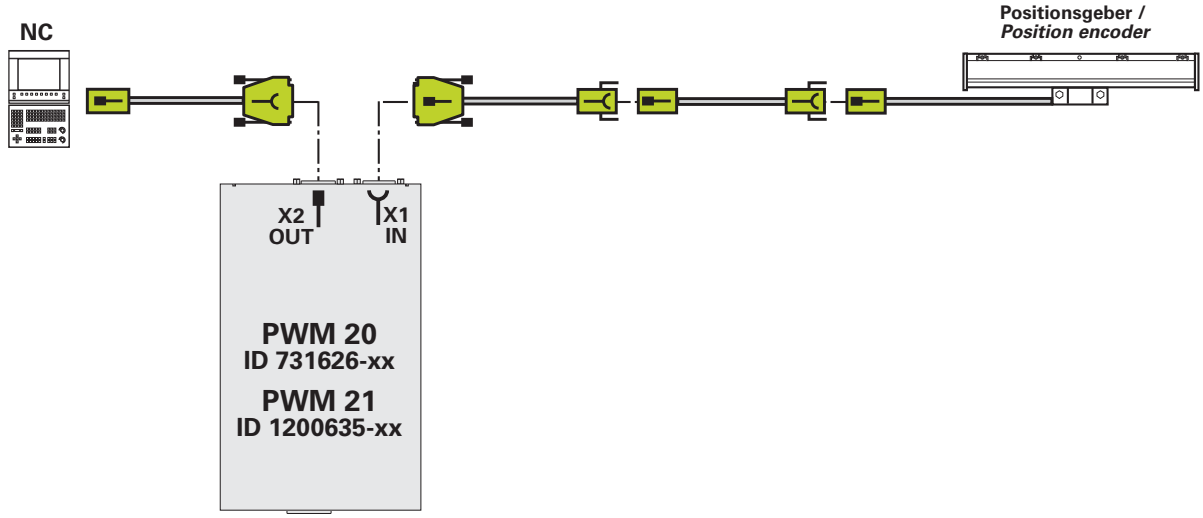
For diagnosing, the PWM can be integrated into the control loop of an NC-controlled machine tool via the encoder input and output (see "Encoder output"). Note the changed grounding conditions and the origin of the supply voltage (see "Encoder output"). Depending on the ATS software version and under compliance with the notes listed above, the PWM can be operated in a closed loop. However, a signal adapter (e.g. SA 100, SA 110, …) must be used, or is recommended for use.

The following applies in addition:

1. Switch off the machine
2. Then disengage the connecting elements

3.1.1 Feed-through operation (listening-in)

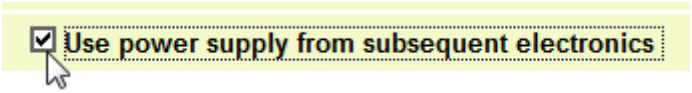
Feed-through mode means integrating the PWM into the control loop of an NC-controlled machine. For diagnosing, the PWM can be integrated into the control loop of an NC-controlled machine tool via adapter cables at the encoder input X1 and the encoder output X2.



Before activating the feed-through mode: Determine the ID of the encoder at the machine axis.

Caution: In this case the PWM output must not be connected to the control, as otherwise the terminating resistors would disturb the PWM measuring functions.

For the feed-through mode, the power supply must be switched to the subsequent electronics in the ATS software.



Set the check mark in feed-through mode only. If no subsequent electronics is connected, the encoder is not powered (error message).

The feed-through mode is supported as of the software version 2.6.
We recommend always using the current software version (**www.heidenhain.de**).

The feed-through mode cannot be used for all interfaces supported by the ATS.

In principle, the following interfaces allow for feed-through mode:
EnDat, Fanuc, Mitsubishi, 1 V_{PP}, TTL, 11 μA_{PP}

EnDat / Fanuc / Mitsubishi

- Metallic isolation is possible with the service adapters SA 100 and SA 110
- No metallic isolation, if the measurement is conducted with the PWM only
- For encoders that also support incremental signals, the incremental signals can now also be displayed and evaluated

The Mitsubishi interface does not yet support feed-through operation (the Mitsubishi control does not request diagnostic data).

EnDat 2.1

Normally, the only communication over the EnDat interface takes place during the start-up stage of the NC (interrogation and transfer of the absolute position data):

- "Listening in" on the EnDat communication is not possible (since the synchronization time is too short for the PWM)
- The 1 V_{PP} signals A and B can be displayed

Siemens NC controls currently use EnDat 2.1 with A/B signals and do not support the listening-in function!

EnDat 2.2

Communication takes place continuously. However, there is no prescribed communication pattern. Instead, every OEM determines the sequence of EnDat communication on his own.

- Universal "listening in" on the communication is not possible
- **The listening-in function is only possible, if the valuation numbers for online diagnosis are included in data transfer.** (The following controls support the listening-in function: TNC 620, TNC 640, iTNC 530 [as of NC-SW 34049x-04], iTNC 530 HSCI with diagnostic function and DriveDiag)
- Synchronization to communication may take some time

1 V_{PP}

- No metallic isolation, if the measurement is conducted with the PWM only
- Metallic isolation is possible with the SA 100 (no HEIDENHAIN adapter cable available)
- The PWM picks off the signals without 120-Ω signal termination
- The limit frequency is influenced by the test setup (adapter cable, etc.)

11 μA_{PP}

- The line is interrupted in feed-through mode, i.e. the PWM has an 11 μA_{PP} receiver and reproduces the (emulated) input signals at the 11 μA_{PP} output
- The limit frequency is influenced by the test setup (adapter cable, etc.)
- Not released yet for ATS V2.8! Signal errors may occur!

TTL

- Without PWT switchover:
  The PWM picks off the RS-485 signals, i.e. a standard RS-485 receiver without 120-Ω termination is connected to the lines

⚠ WARNING

Axes moving uncontrolled

Property damage, injury or death

Uncontrolled axis movements cannot be ruled out, when test devices and cables are connected!

Testing cables for feed-through mode are not suitable for regular machine operation.
Due to the great variety of machine designs and their grounding variants it is not possible to exhaustively test all testing cables.

- ▶ It is absolutely necessary that you check the safe and proper function of the testing cables for every test situation

⚠ WARNING

Uncontrolled machine movements

Personal injury or death

Integrating the PWM into the control loop influences the power supply and the grounding conditions. The feed-through function must be handled with great care and caution!

- No persons are allowed within the traverse range of the machine
- Ensure that vertical axes cannot fall down
- Do not disengage any connecting elements during the measurement
- Move the machine axis to the middle of the traverse range before you connect the PWM
- When you have integrated the PWM into the control loop of the machine, check whether the axis concerned can be traversed in a controlled manner
- One operator must be at the EMERGENCY STOP button to make sure that the machine can be switched off at any stage of this "setup phase"

Possible axis behavior caused by grounding problems:

- Uncontrolled machine movements
- Machine switches off (emergency stop)
- Machine axis drifts
- Machine axis accelerates at rapid traverse

HEIDENHAIN recommends running the feed-through mode with floating supply with the service adapters SA 100 or SA 110.

The encoder output (OUT) of the PWM must not be connected,

- if the PWM test setup was prepared for feed-through operation
- if an absolute encoder on a machine axis is supposed to be inspected **while the machine is not switched on** (e.g. reading out the encoder memory to determine the encoder model)

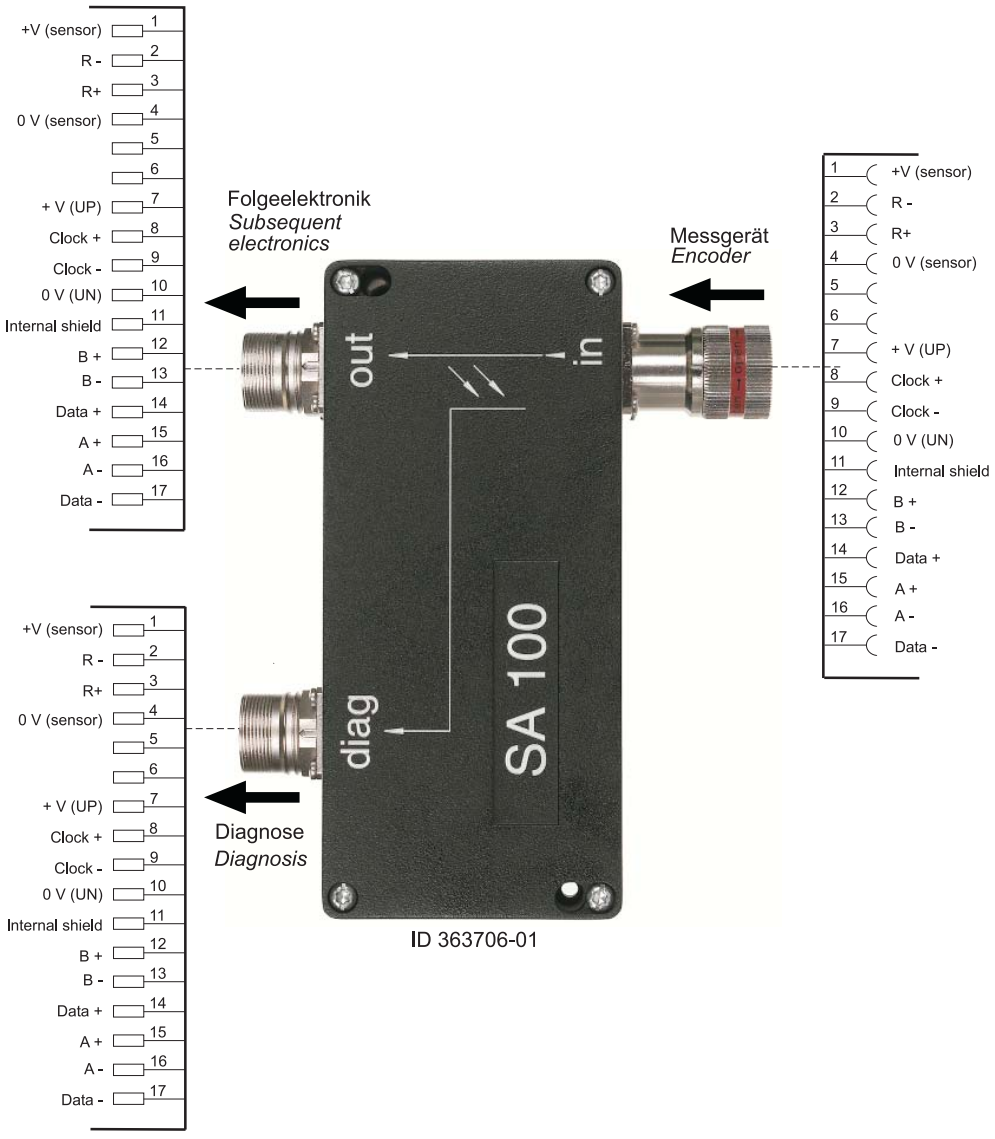
Therefore, the adapter cable to has to be disconnected from the control for this special test.
Reason: As long as the control is connected, the terminating resistors of the PWM encoder output disturb the measuring function.

3.2 SA 100/110 Service Adapter for floating feed-through operation (listening-in)

3.2.1 SA 100 Service Adapter (online diagnostics)

The SA 100 **S**ervice **A**dapter serves to integrate the test units PWM and IK 215 into the measuring circuit of the machine axis ("closed loop").
Using the SA 100 allows for controlled traverse of the machine axis during measurement.

Closed-loop operation with SA 100 is possible with the EnDat 02, 21 and 22, Fanuc and Mitsubishi interfaces. Moreover, the encoder and the control must support the diagnostic function.
If an SA is integrated into the measuring circuit, the ATS software no longer can actively intervene in data transfer (control/encoder) to delete errors and warnings, etc.
The supply voltage must be provided by the PWM; do not activate "Use power supply from subsequent electronics"!
Data transfer can only be listened in (monitored).
More information: "Feed-through operation (listening-in)", Page 31



The diag output of the SA is connected to the input (IN) of the PWM (or of the interface card IK 215 IN). Data exchange between the encoder and the subsequent electronics can be observed via optocouplers (passive listening-in).

	The SA is powered by the PWM via the diagnosis flange socket (diag). Do **not** check the "Use power supply from subsequent electronics" field!

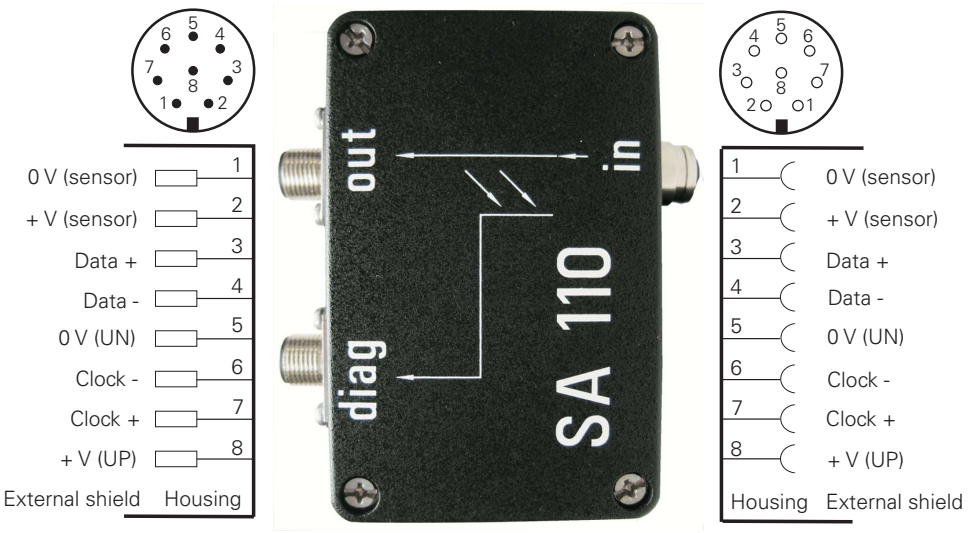
3.2.2 SA 110 Service Adapter (online diagnostics) for floating feed-through (listening-in)

The SA 110 **S**ervice **A**dapter serves to integrate the test units PWM and IK 215 into the measuring circuit of the machine axis (closed loop) with purely serial data transfer (no incremental signals).
Using the SA 110 allows for controlled traverse of the machine axis during measurement.

The following interfaces allow for closed-loop operation:

- **EnDat 2.2 (purely serial, no incremental signals)**
- **Fanuc**
- **Mitsubishi as of version 02 (with PWM only)**

The subsequent electronics must support this diagnostic function.
If an SA is integrated into the measuring circuit, the ATS software no longer can actively intervene in data transfer (control/encoder) to delete errors and warnings, etc.
The supply voltage must be provided by the PWM ; do not activate "Use power supply from subsequent electronics"!
Data transfer can only be listened in (monitored).
More information: "Feed-through operation (listening-in)", Page 31



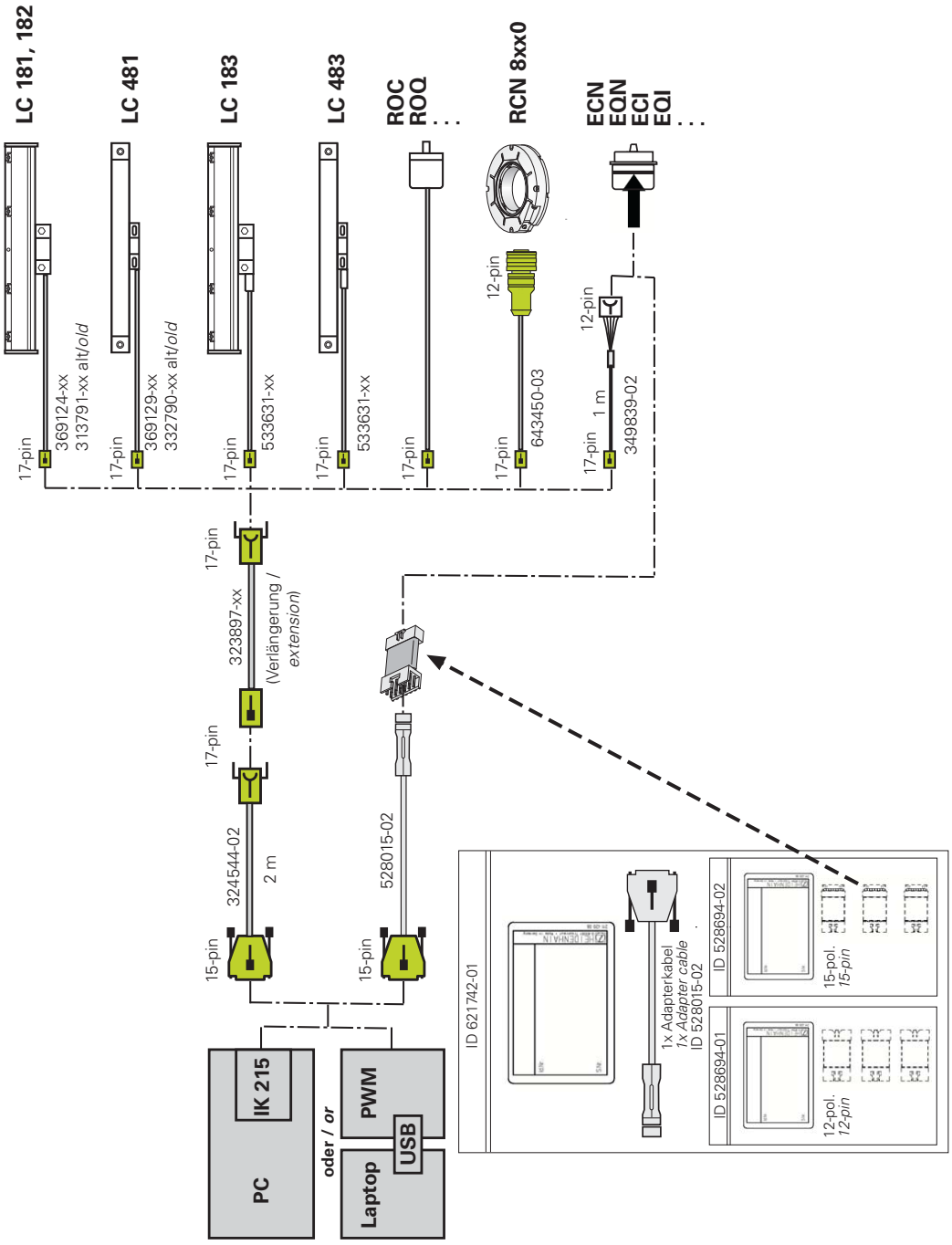
ID 573547-01

The diag output of the SA is connected to the input (IN) of the PWM (or of the interface card IK 215 IN). Data exchange between the encoder and the subsequent electronics can be observed via optocouplers (passive listening-in).

The SA is powered by the PWM via the diagnosis flange socket (diag). Do **not** check the "Use power supply from subsequent electronics" field!

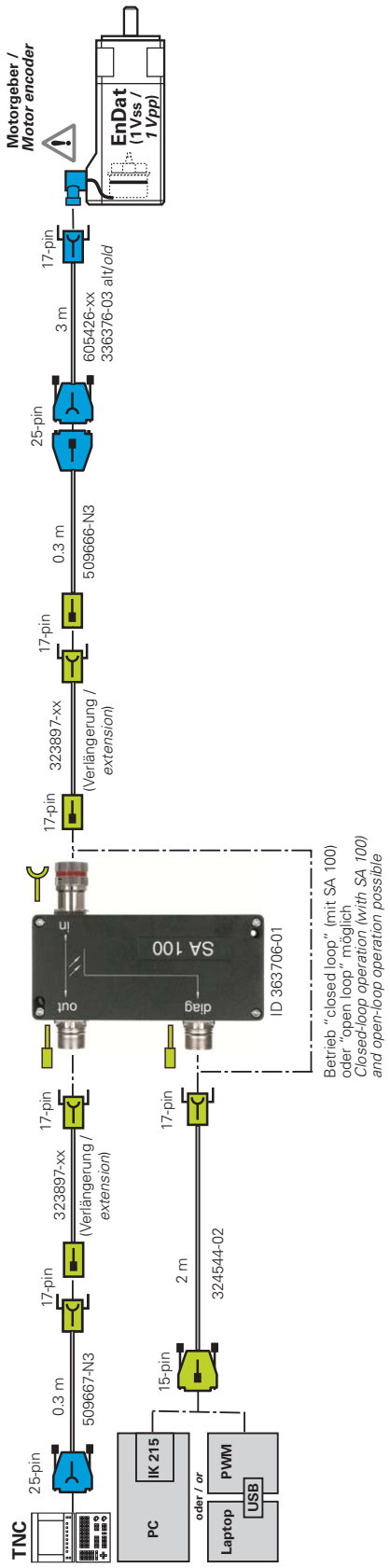
3.3 EnDat 2.1 and EnDat 2.2 absolute interface with incremental signals

3.3.1 Measuring the absolute EnDat interface with A/B incremental signals, without subsequent electronics

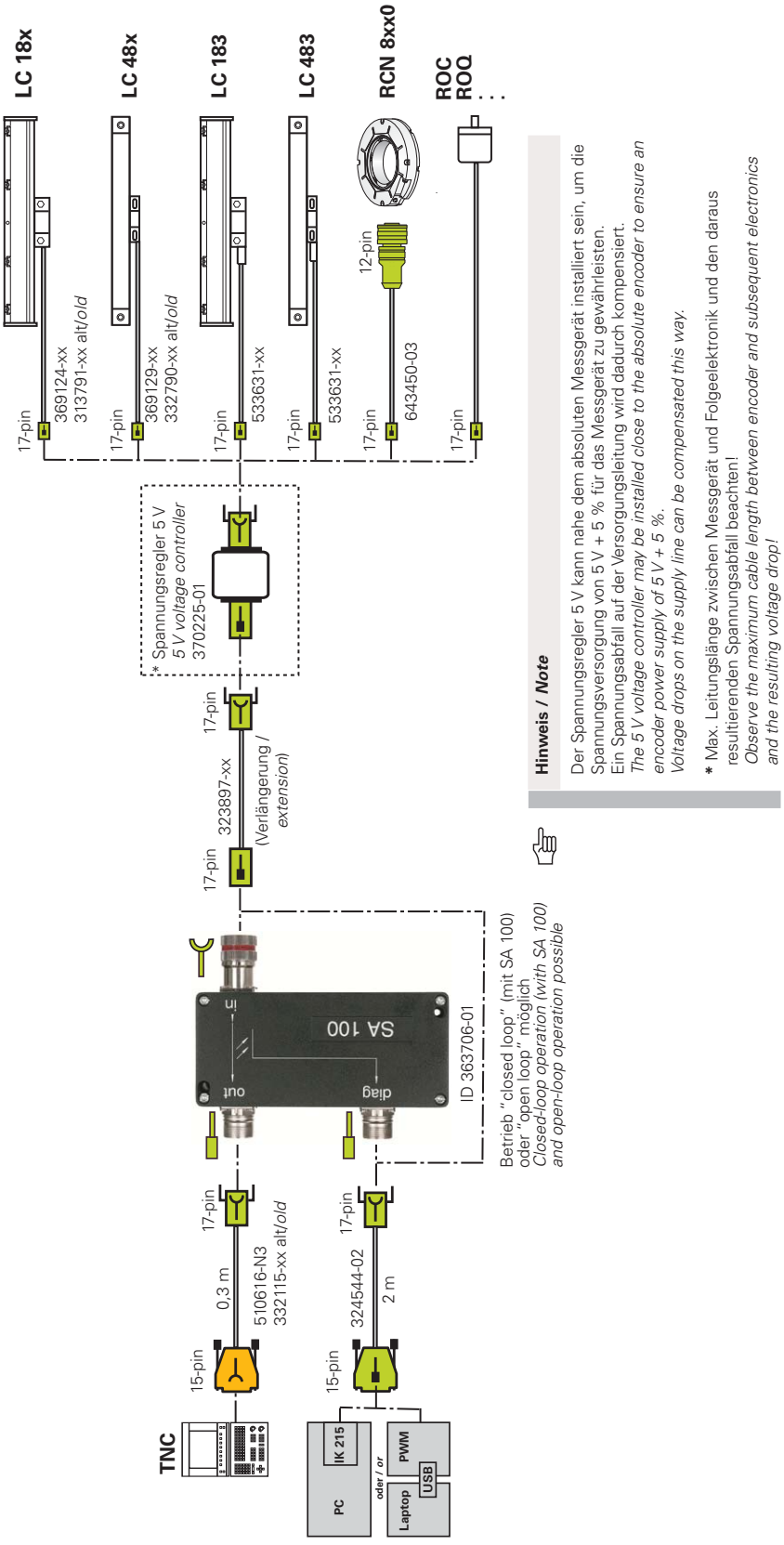


Further information: "Inductive absolute EnDat rotary encoders ExI 11xx/13xx; adapter for PCB connector", Page 45

3.3.2 Feed-through operation (listening-in) with SA 100 and PWM/IK 215 in an absolute EnDat/SSI Mot.Enc. measuring circuit with 25-pin D-sub connector (NC side)



3.3.3 Feed-through operation (listening-in) with SA 100 and PWM/ IK 215 in an absolute EnDat position encoder measuring circuit

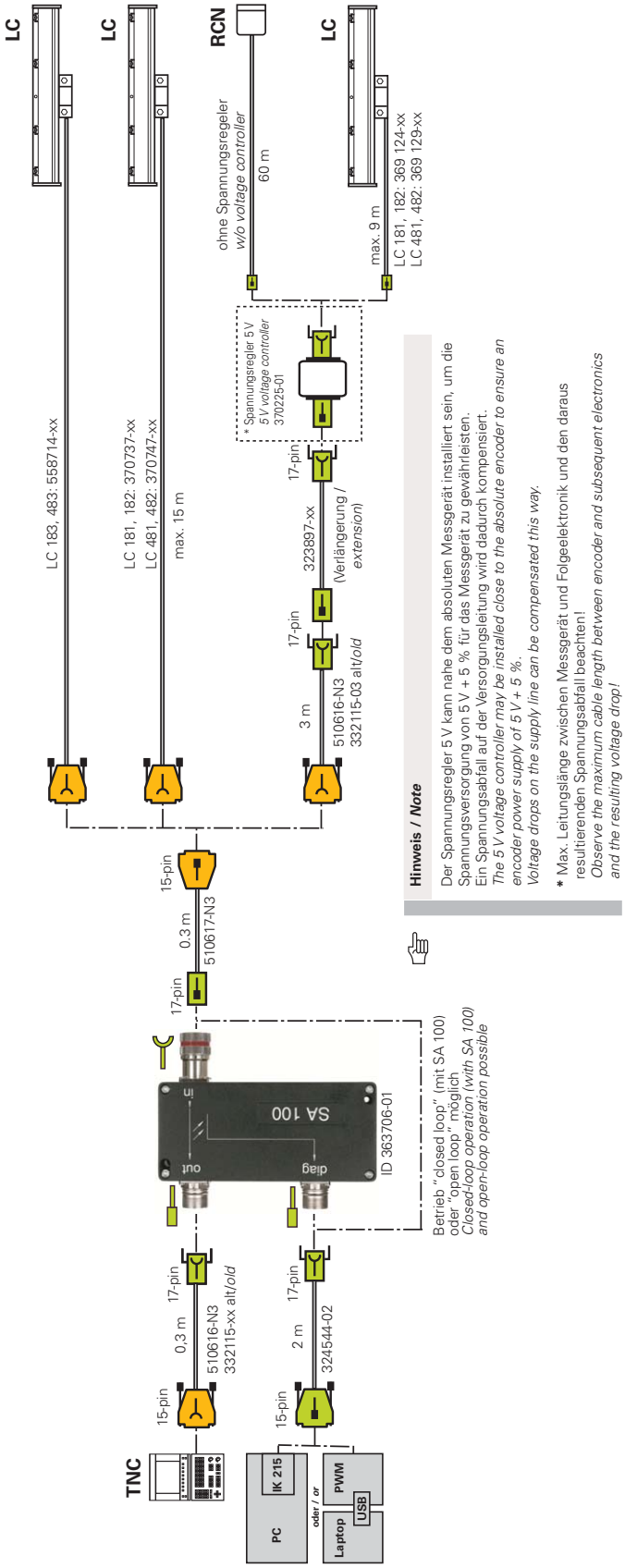


Hinweis / *Note*

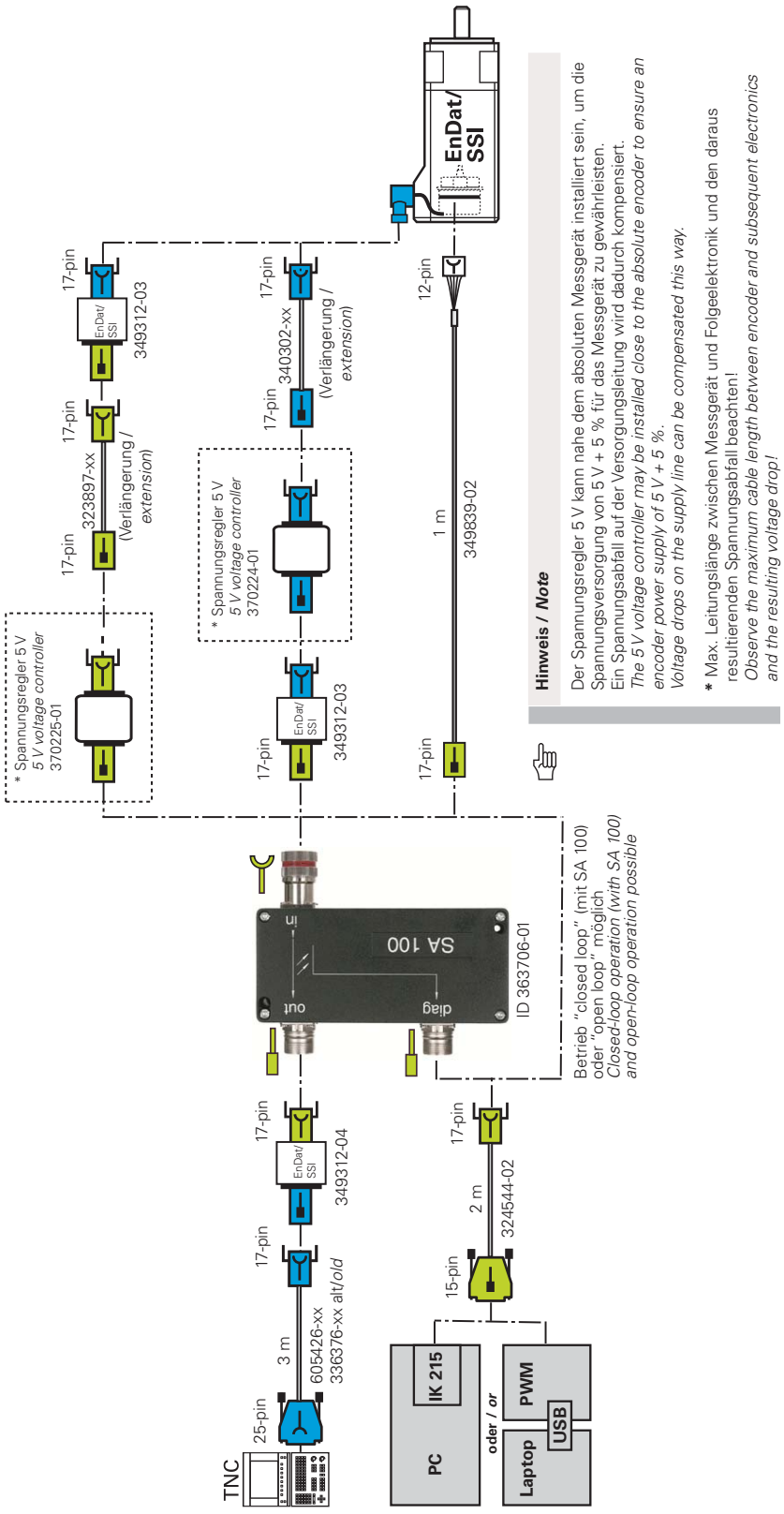
Der Spannungsregler 5 V kann nahe dem absoluten Messgerät installiert sein, um die Spannungsversorgung von 5 V + 5 % für das Messgerät zu gewährleisten.
Ein Spannungsabfall auf der Versorgungsleitung wird dadurch kompensiert.
The 5 V voltage controller may be installed close to the absolute encoder to ensure an encoder power supply of 5 V + 5 %.
Voltage drops on the supply line can be compensated this way.

* Max. Leitungslänge zwischen Messgerät und Folgeelektronik und den daraus resultierenden Spannungsabfall beachten!
Observe the maximum cable length between encoder and subsequent electronics and the resulting voltage drop!

3.3.4 Feed-through operation (listening-in) with SA 100 and PWM/ IK 215 in an absolute EnDat position encoder measuring circuit (NC side) with 15-pin D-sub connector

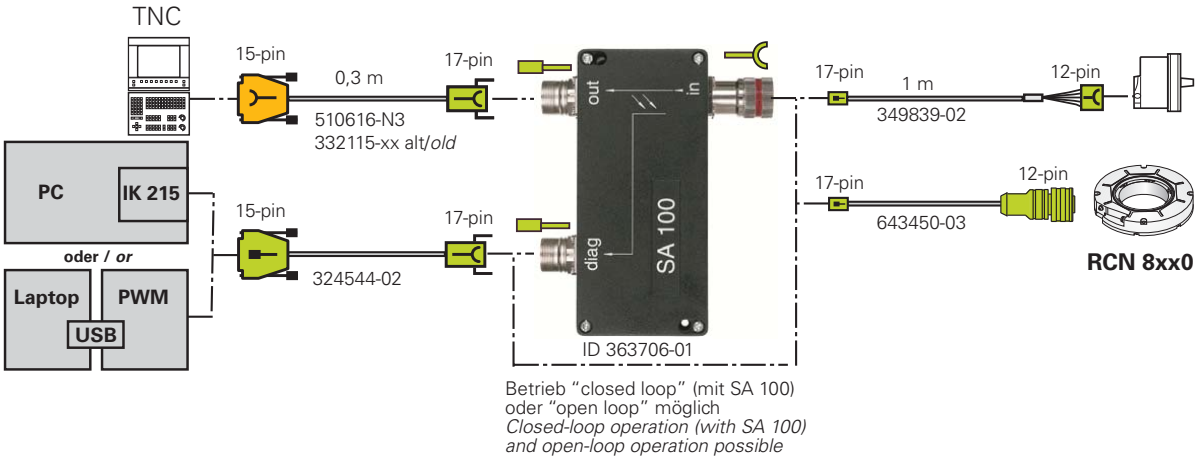


3.3.5 Feed-through operation (listening-in) with SA 100 and PWM/IK 215 in an absolute EnDat motor encoder measuring circuit with assignment converter (synchronous motor side)



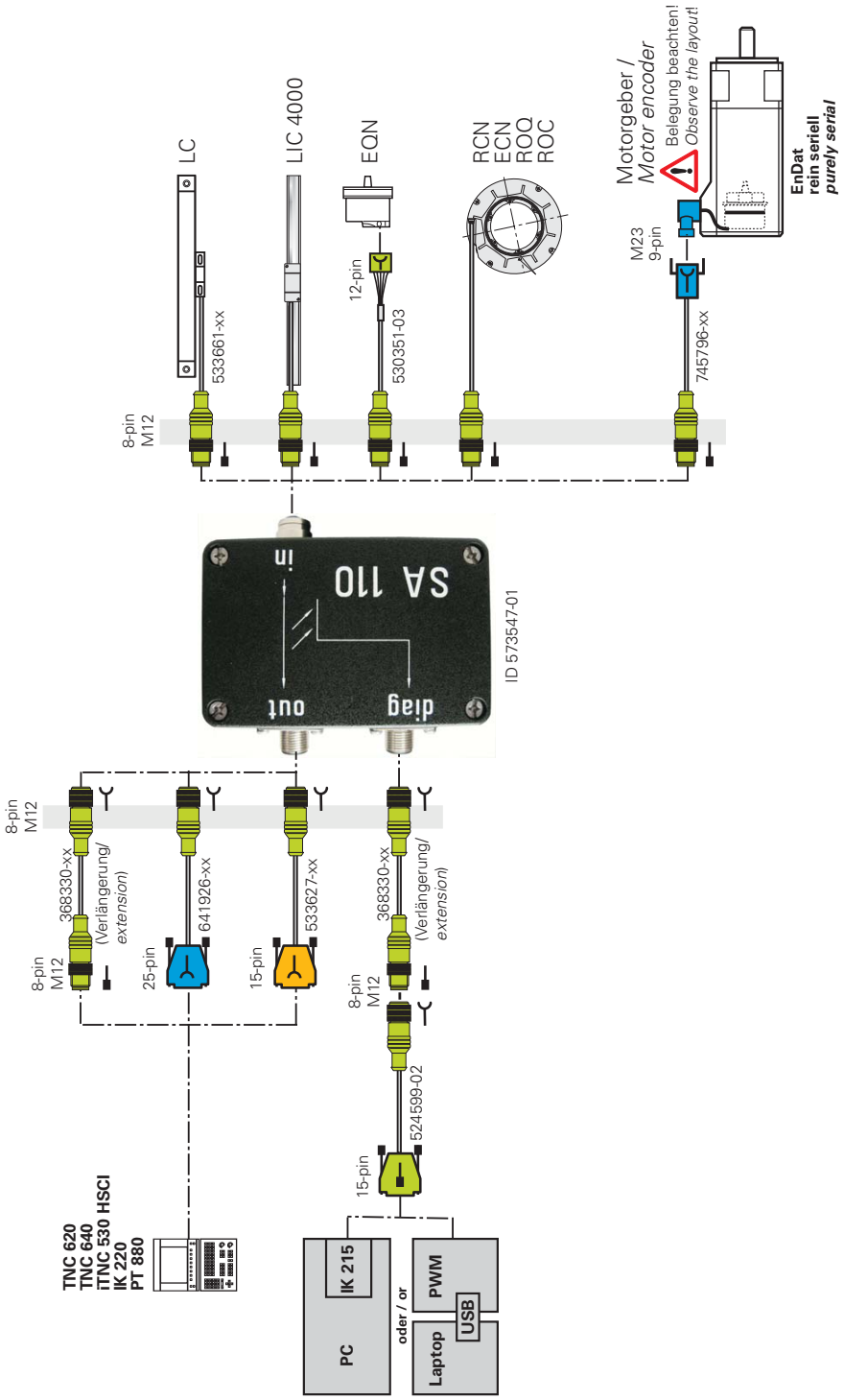
3.4 EnDat 2.2 absolute, purely serial, no incremental signals

3.4.1 Feed-through operation (listening-in) with SA 100 and PWM/IK 215 in an absolute EnDat position encoder measuring circuit (encoder side)



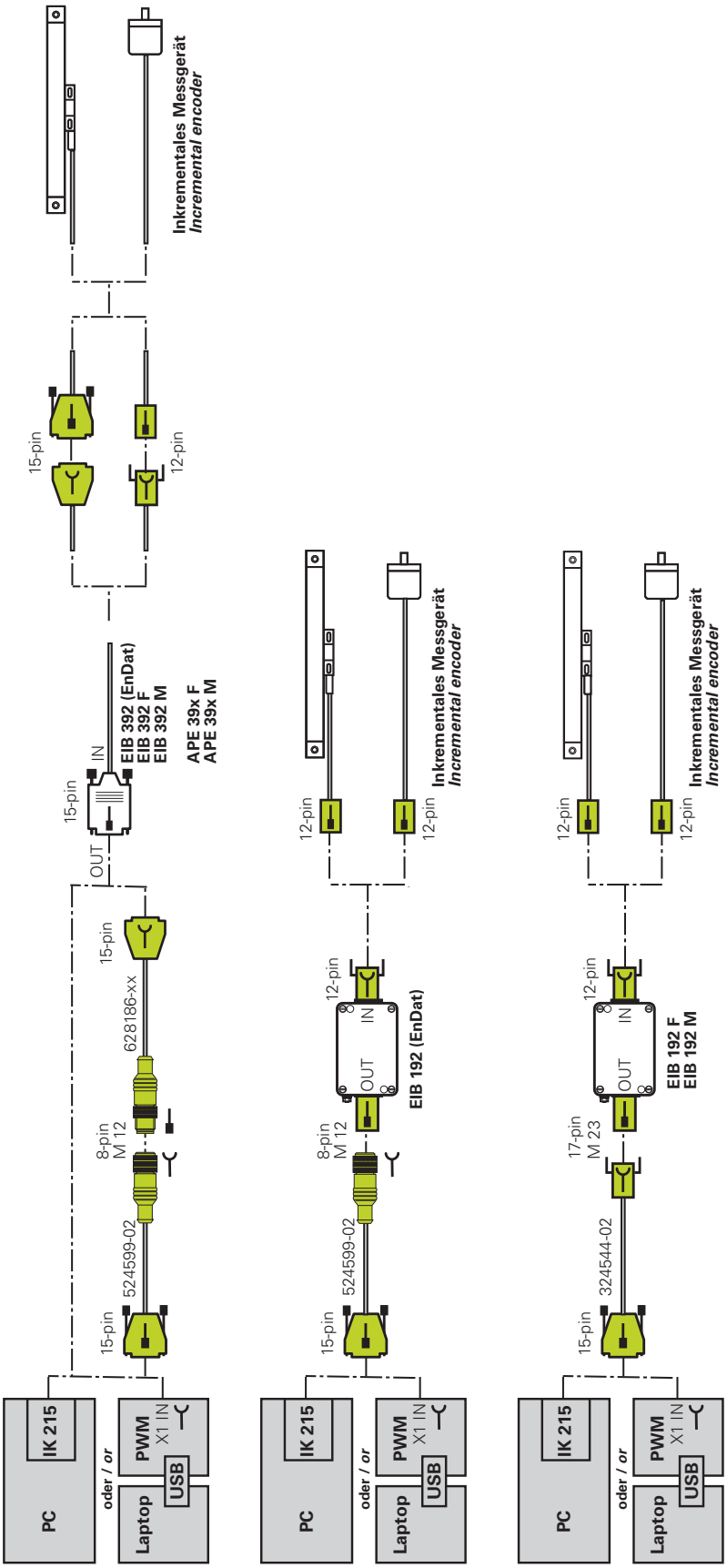
Betrieb "closed loop" (mit SA 100) oder "open loop" möglich
Closed-loop operation (with SA 100) and open-loop operation possible

3.4.2 Feed-through operation (listening-in) with SA 110 and "purely serial" EnDat 2.2 interface (encoder side)

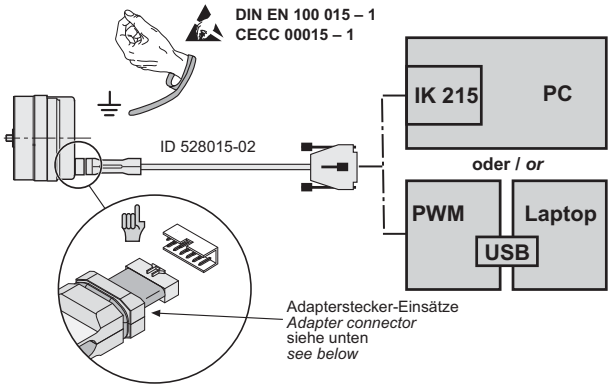


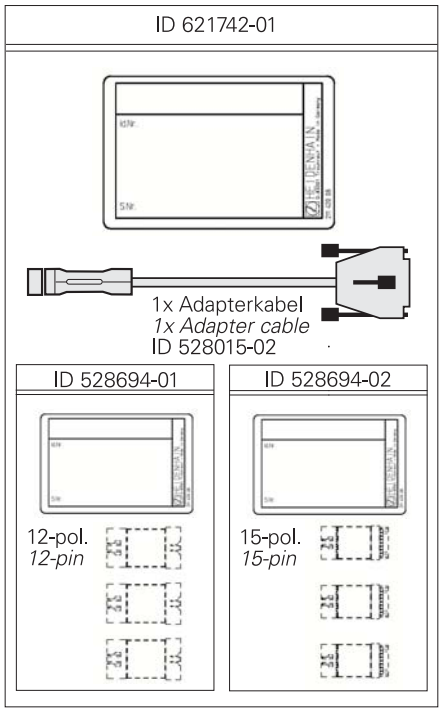
Closed-loop operation with SA 110 is possible with the EnDat 02, 21, 22 and Fanuc interfaces. With the Mitsubishi interface, the closed loop check can only be performed as of version 02 and with the PWM. The control must support the diagnostic function. Data transfer can only be listened in (monitored).

3.4.3 Adapter cables for APE 3xx and EIB 1xx/3xx

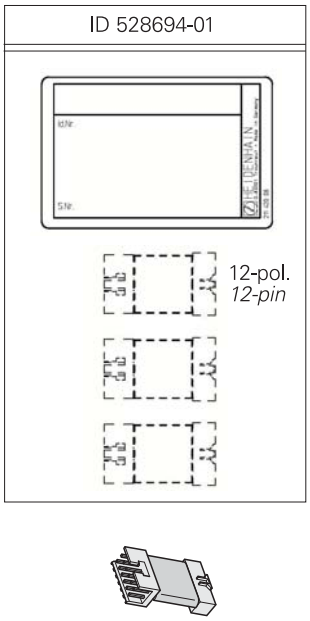


3.5 Inductive absolute EnDat rotary encoders ExI 11xx/13xx; adapter for PCB connector

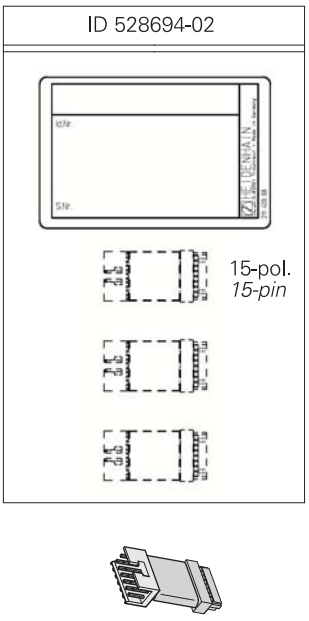




Set of
1 adapter cable,
3 inserts for adapter connector, 12-pin,
3 inserts for adapter connector, 15-pin



Set of
3 inserts for
adapter connector,
12-pin

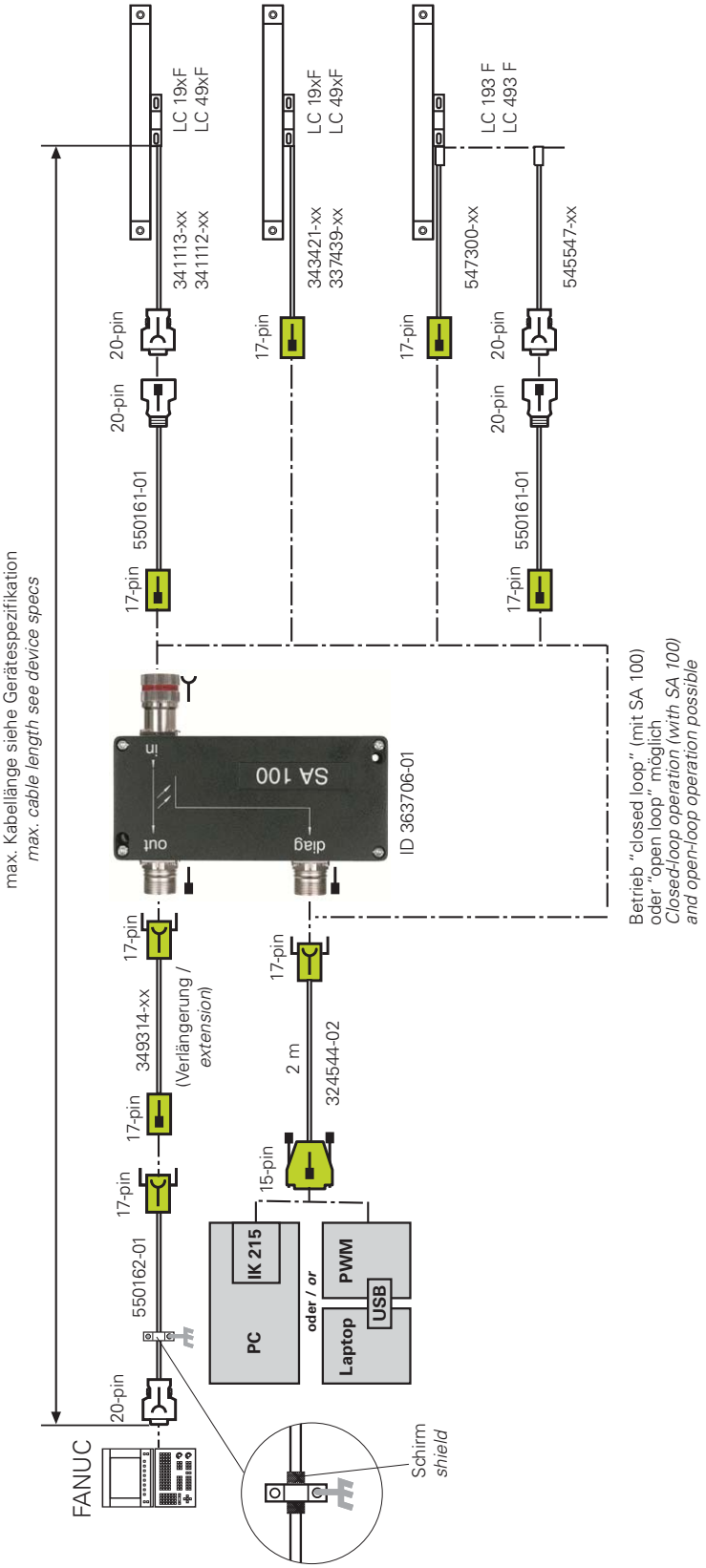


Set of
3 inserts for
adapter connector, 15-pin
(new mini jacks)

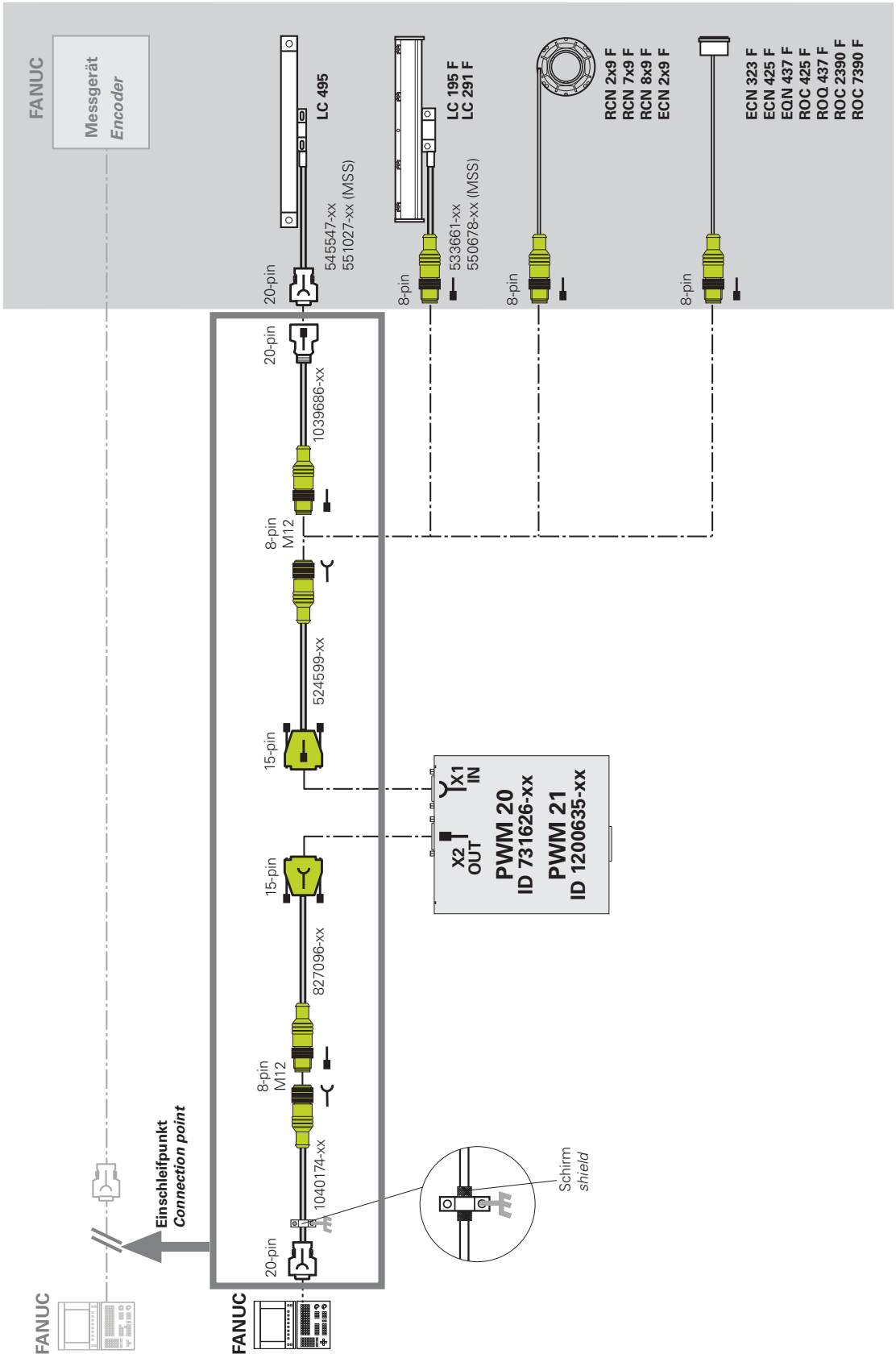
To ensure good contact we recommend replacing the adapter insert after approximately 500 insertion/withdrawal cycles!
More information:
HEIDENHAIN mounting instructions ID 526838-xx (12-pin adapter) or ID 647671-xx (15-pin adapter) "Encoder Cable Adapter for Installation of the ExI 11xx/13xx Inductive Rotary Encoder"

3.6 Fanuc

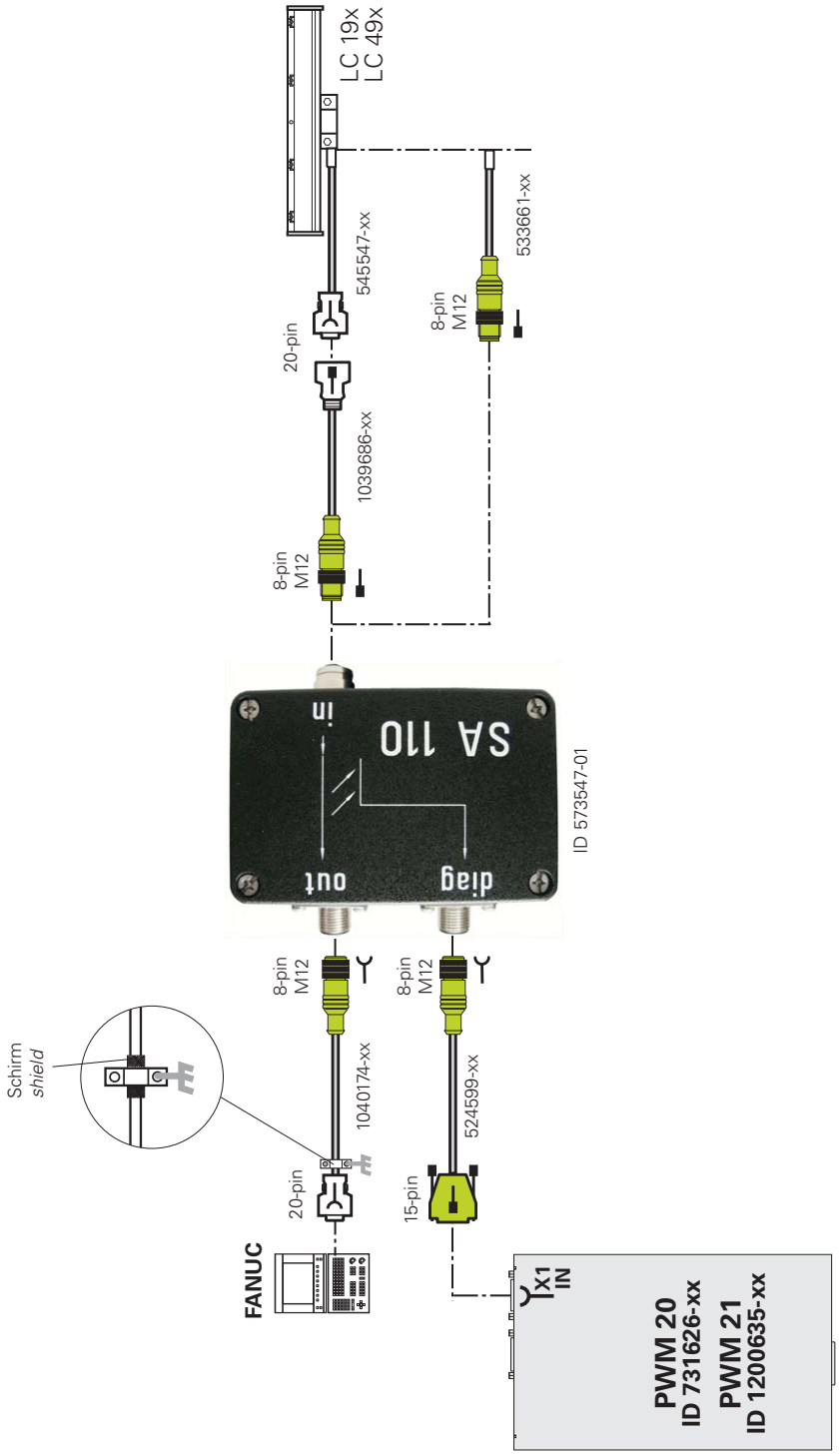
3.6.1 Absolute FANUC SERIAL interface; feed-through (listening-in) with SA 100 (NC side)



3.6.2 Adapter cables for absolute FANUC SERIAL interface; 15-pin (20-pin) and 8-pin M12, feed-through (listening-in)

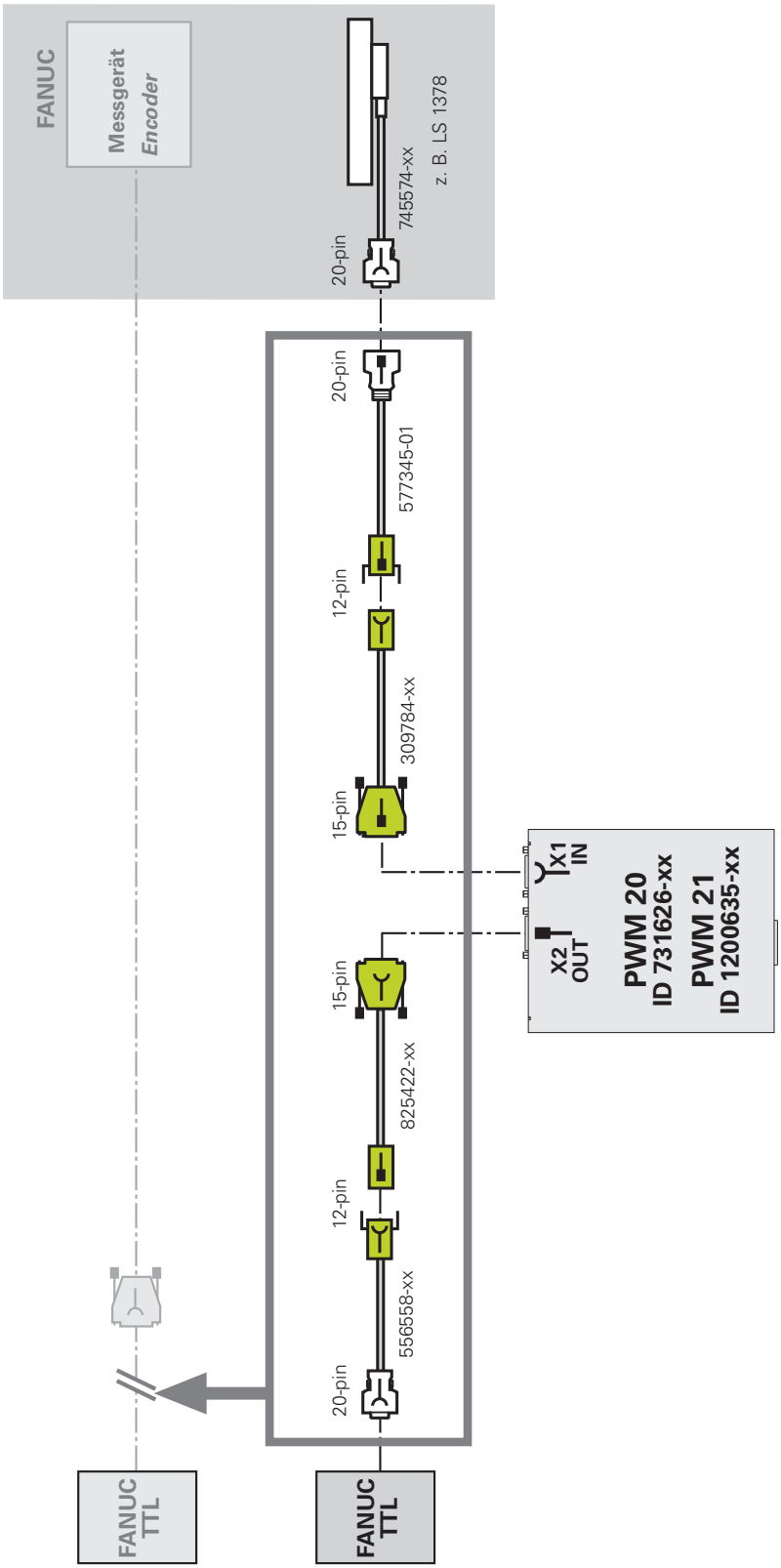


3.6.3 Absolute FANUC SERIAL interface; feed-through (listening-in) with SA 110 (NC side)



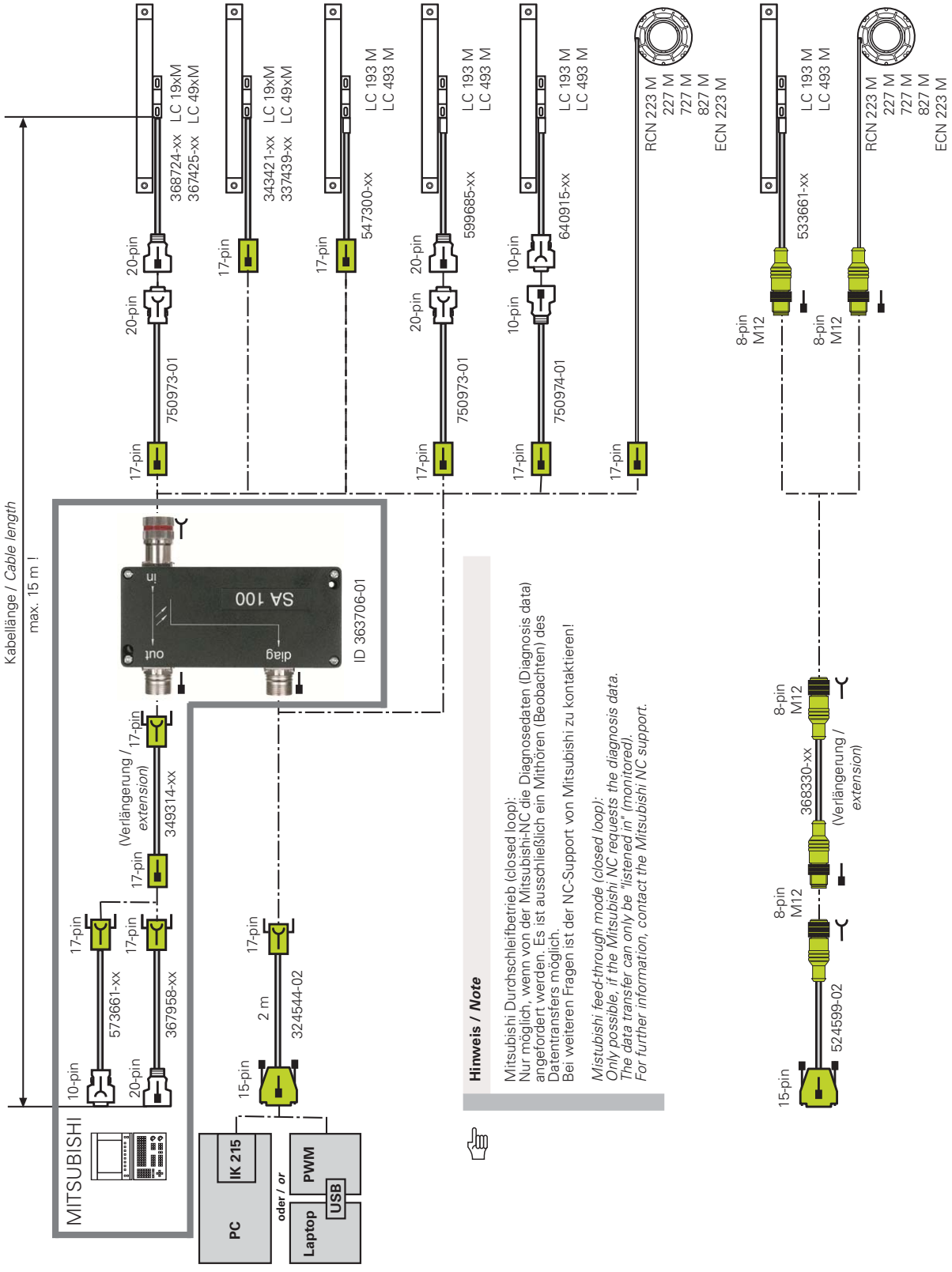
The "closed loop" check can only be run with the PWM.
The NC must support the diagnostic function.
Data transfer can only be listened in (monitored).

3.6.4 Adapter cables for incremental FANUC TTL interface; feed-through (listening-in)

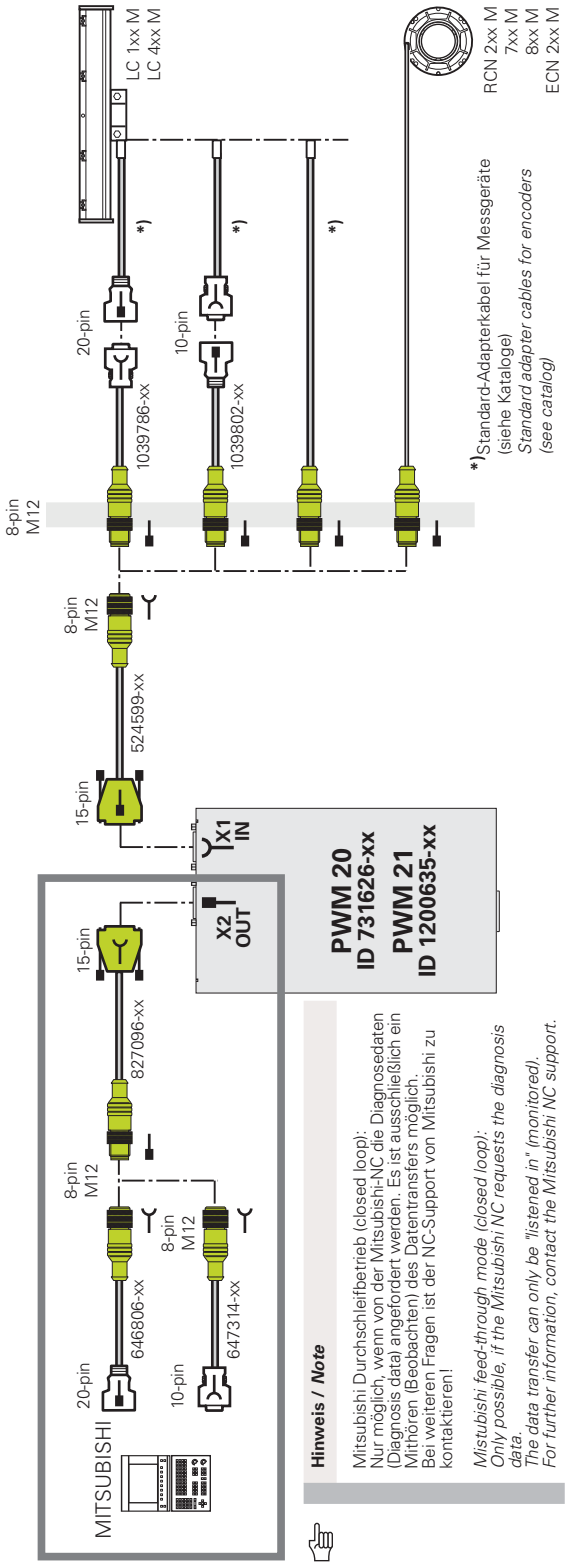


3.7 Mitsubishi

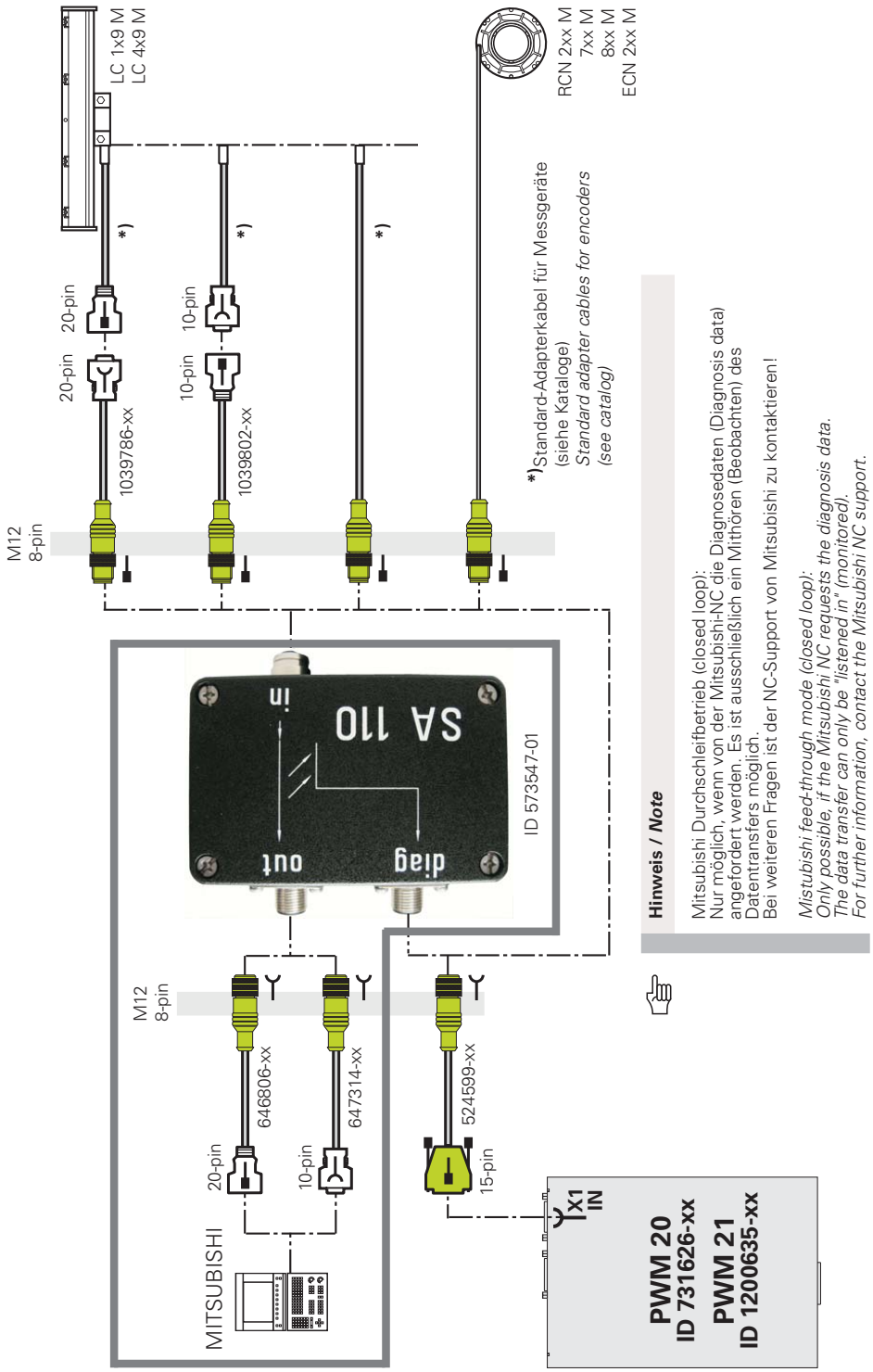
3.7.1 Adapter cables for absolute MITSUBISHI High Speed Serial interface; feed-through (listening-in) with SA 110



3.7.2 Adapter cables for absolute MITSUBISHI High Speed Serial interface (8/10/20-pin); feed-through (listening-in) with PWM



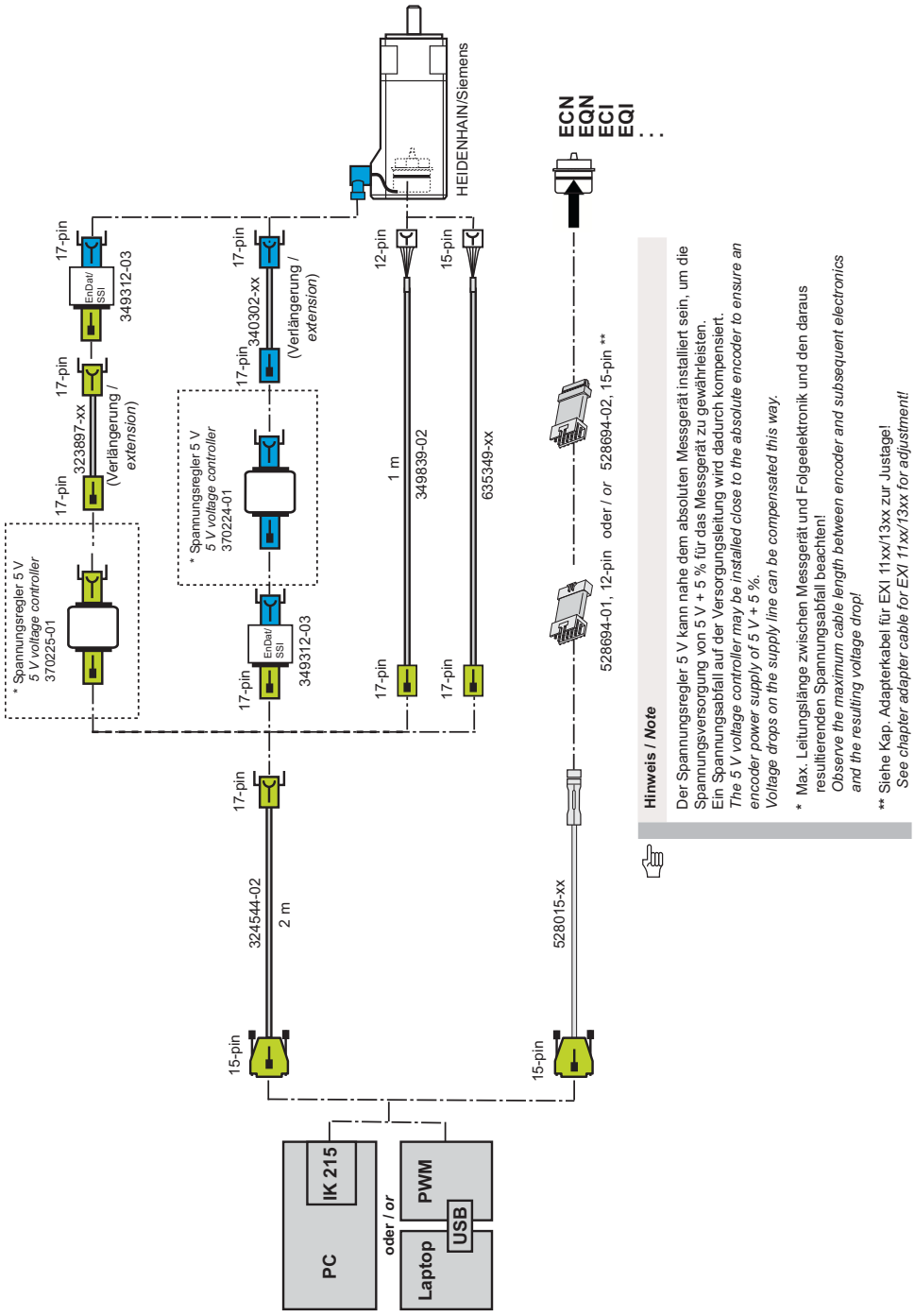
3.7.3 Absolute MITSUBISHI High Speed Serial interface; feed-through (listening-in) with SA 110 (NC side)



With the Mitsubishi interface, the closed loop check can only be performed as of version 02 and with the PWM!
The control must support the diagnostic function.
Data transfer can only be listened in (monitored).

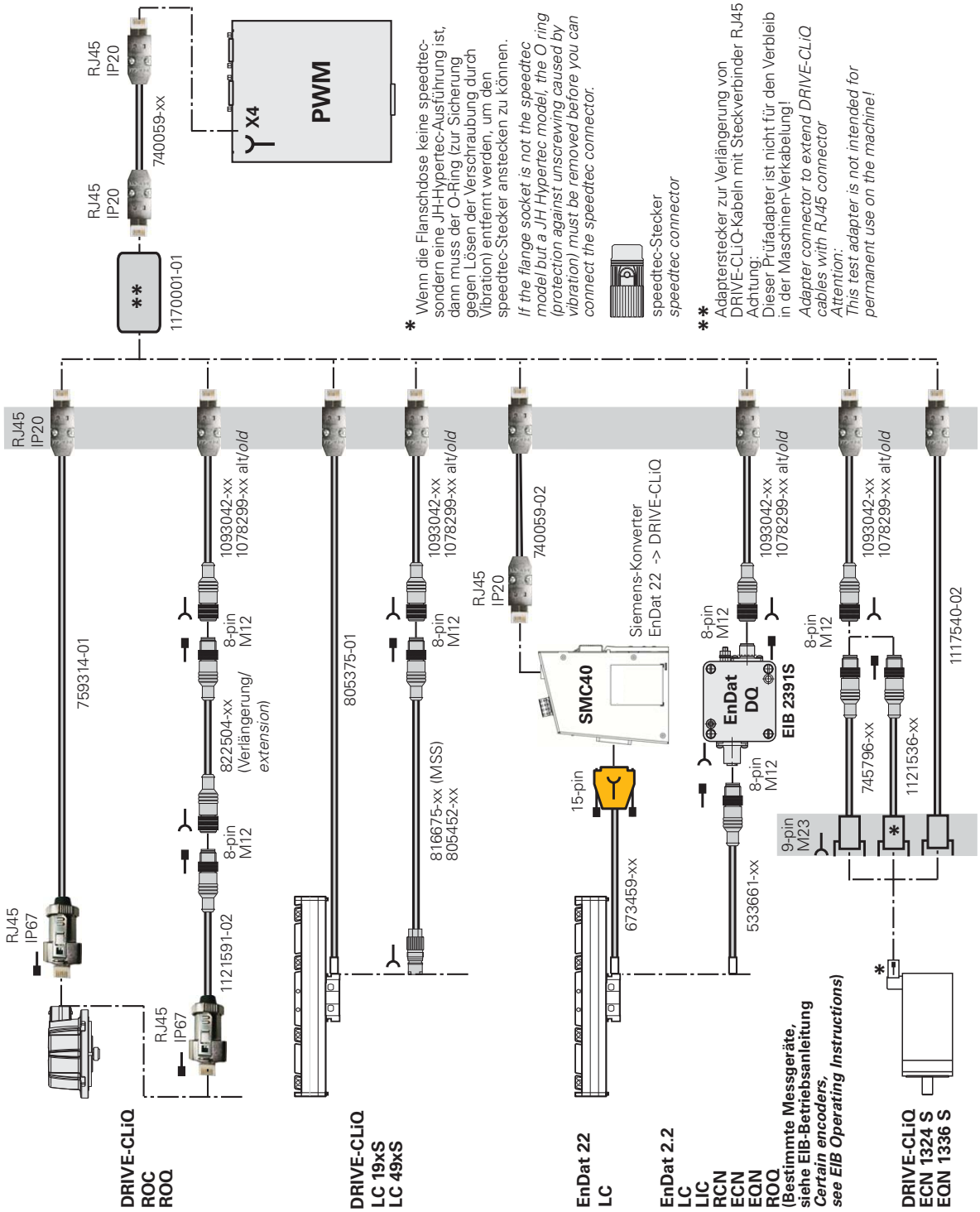
3.8 SSI

3.8.1 Adapter cables for synchronous motors with absolute SSI motor encoders, measured with assignment converter or PCB connector



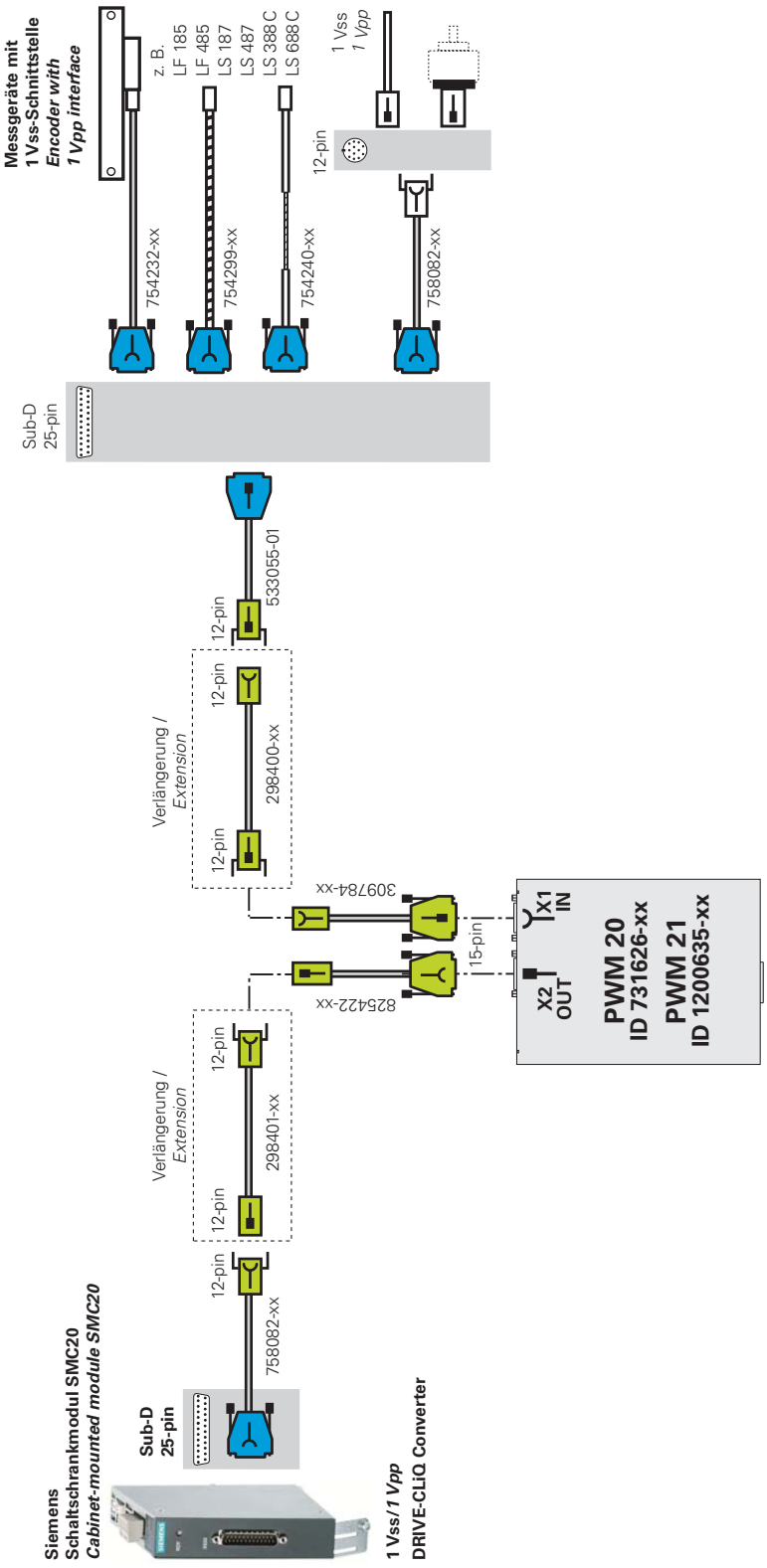
3.9 DRIVE-CLiQ

3.9.1 Adapter cables for Siemens DRIVE-CLiQ and SMC40 converter



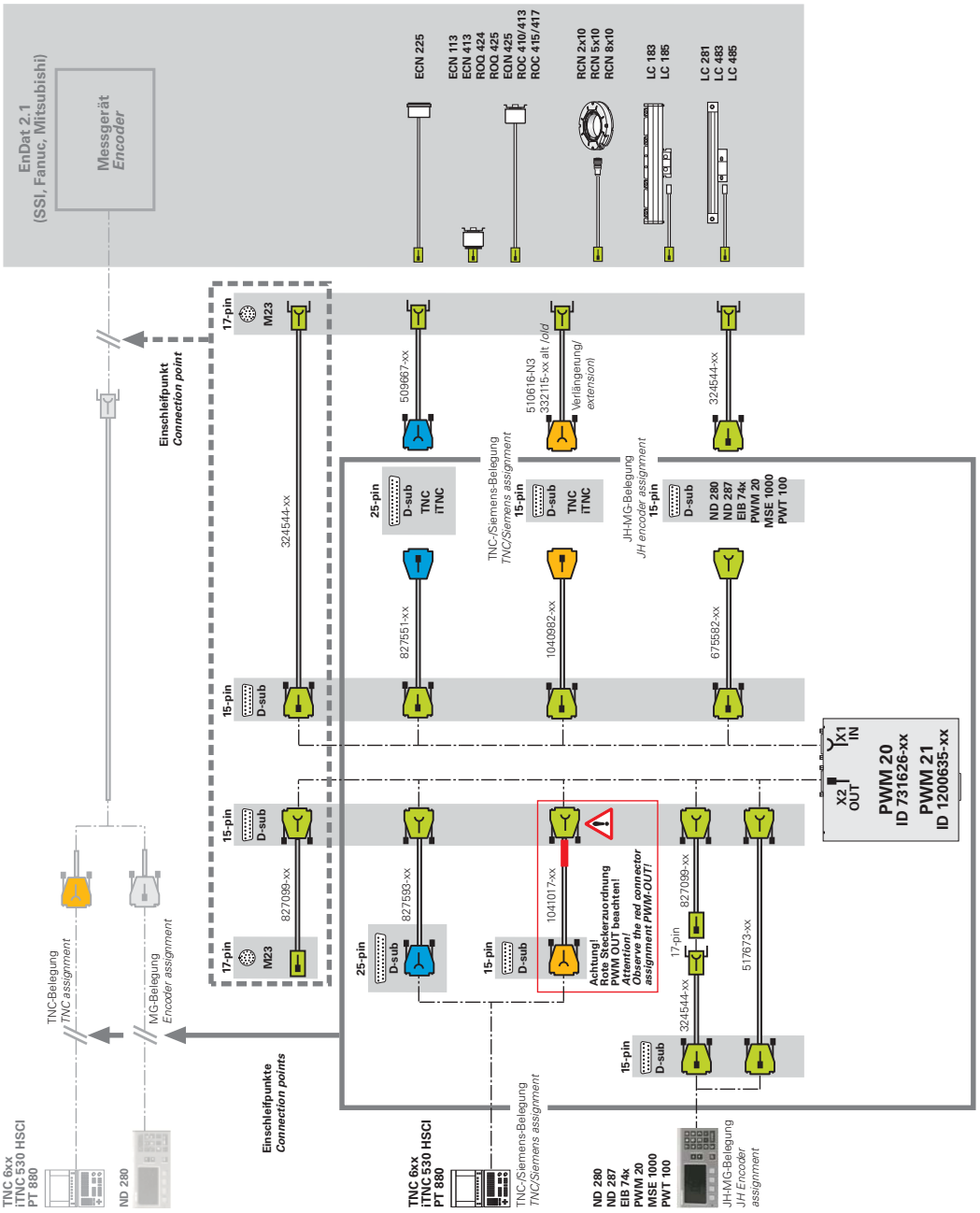
The PWM only supports HEIDENHAIN DRIVE-CLiQ products!
It does not work with non-HEIDENHAIN products. Feed-through (listening-in) is not possible.

3.9.2 Adapter cables for the incremental 1 V_{PP} range of the SIEMENS 1 V_{PP}/DRIVE-CLiQ converter SMC20



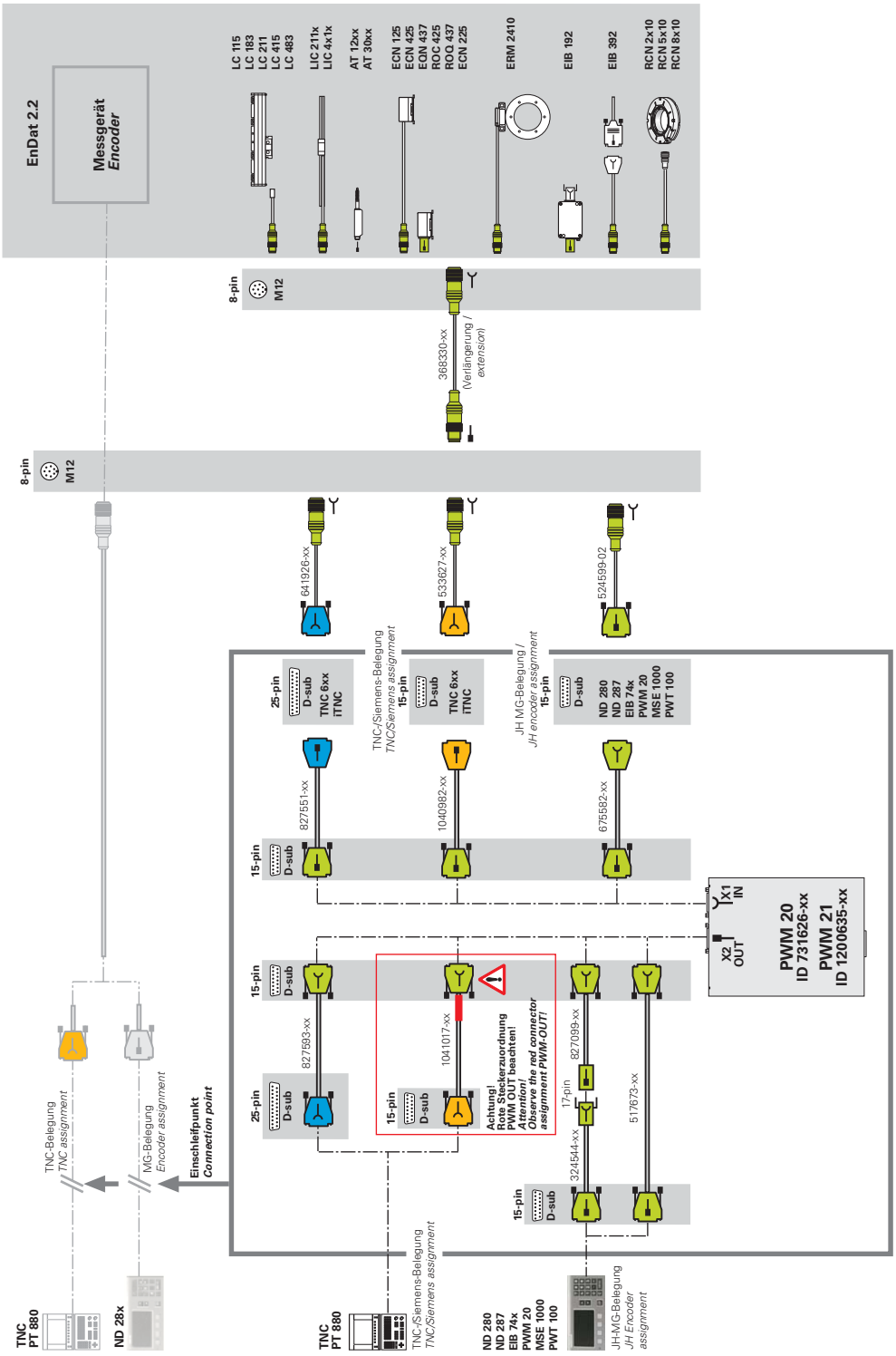
3.10 Checking absolute interfaces in feed-through mode (listening-in)

3.10.1 Adapter cables for EnDat 2.1 absolute interfaces



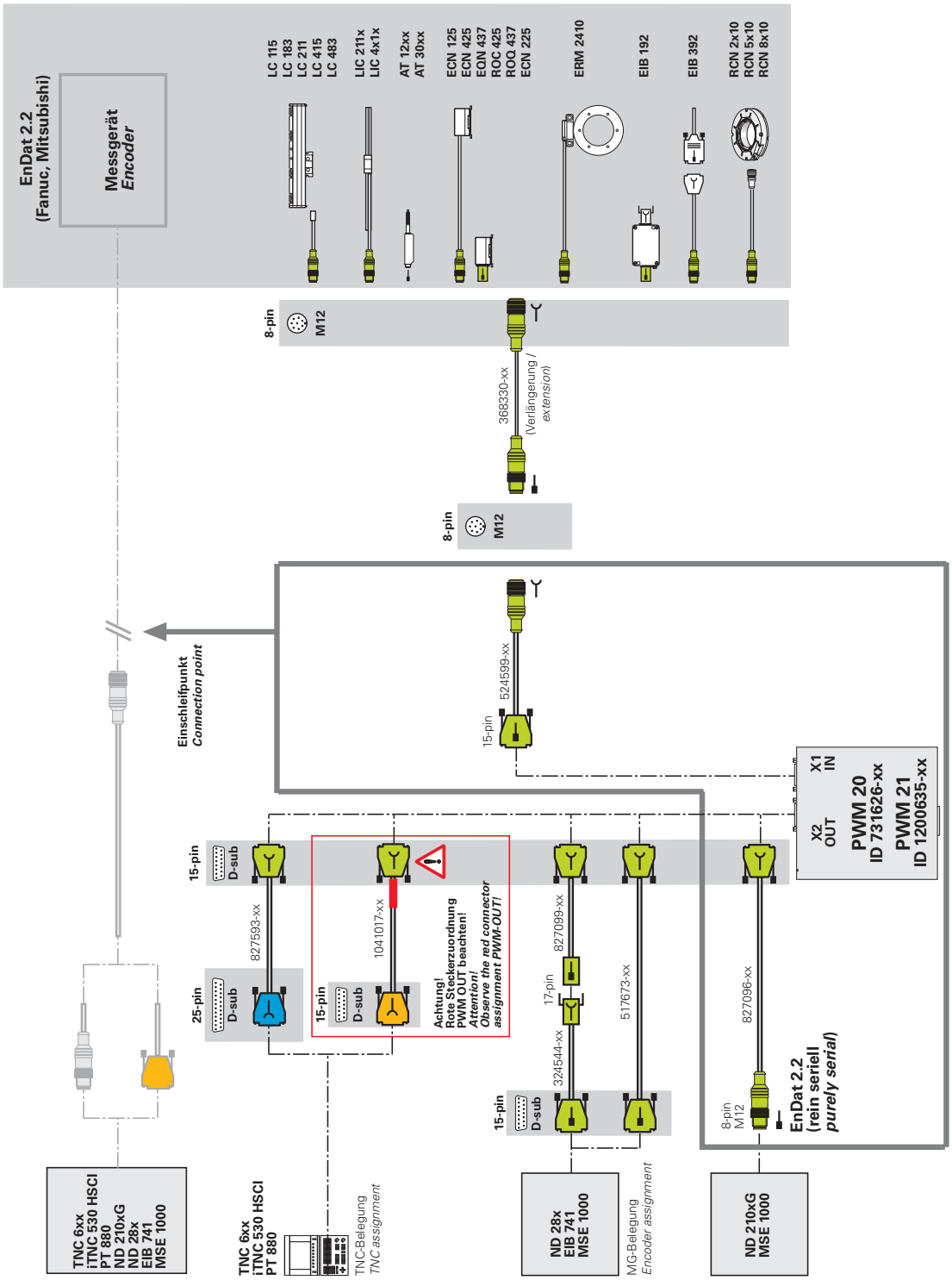
Feed-through operation is only possible, if the HEIDENHAIN TNC transfers the valuation numbers for online diagnosis. Only then is "listening-in" possible. Not all TNC and NC support this function!
(**Further information:** "Feed-through operation (listening-in)", Page 31)

3.10.2 Adapter cables for EnDat 2.2 absolute interfaces, NC side



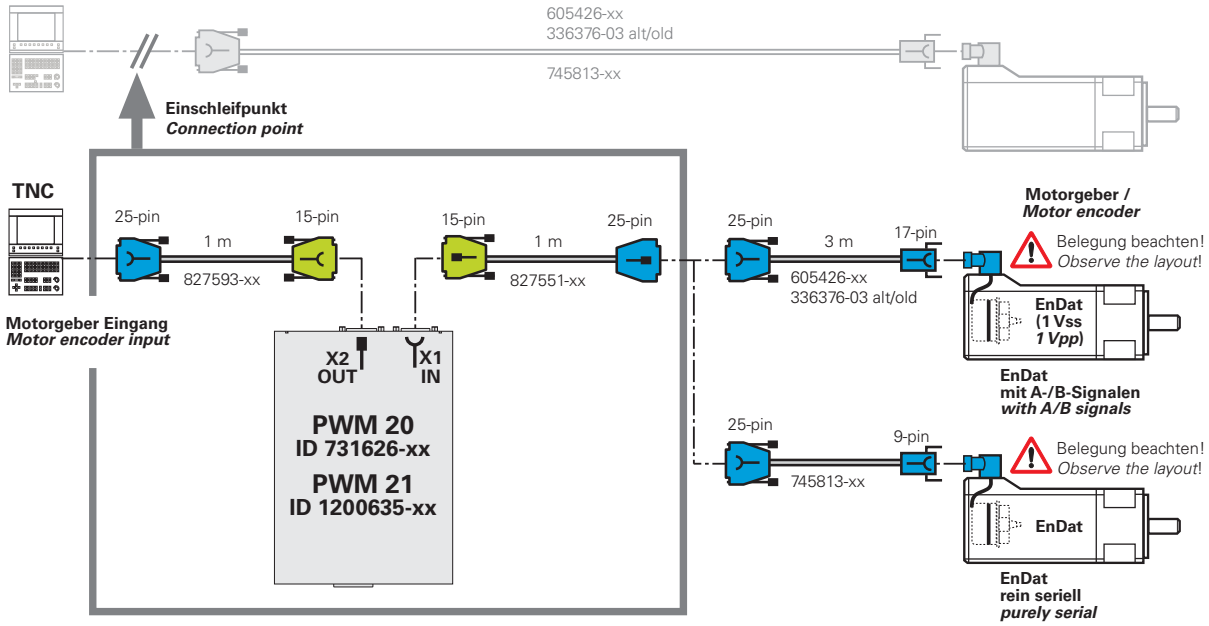
Feed-through operation is only possible, if the HEIDENHAIN TNC transfers the valuation numbers for online diagnosis. Only then is "listening-in" possible. Not all TNC and NC support this function! (**Further information:** "Feed-through operation (listening-in)", Page 31)

3.10.3 Adapter cables for EnDat 2.2 absolute interfaces, encoder side



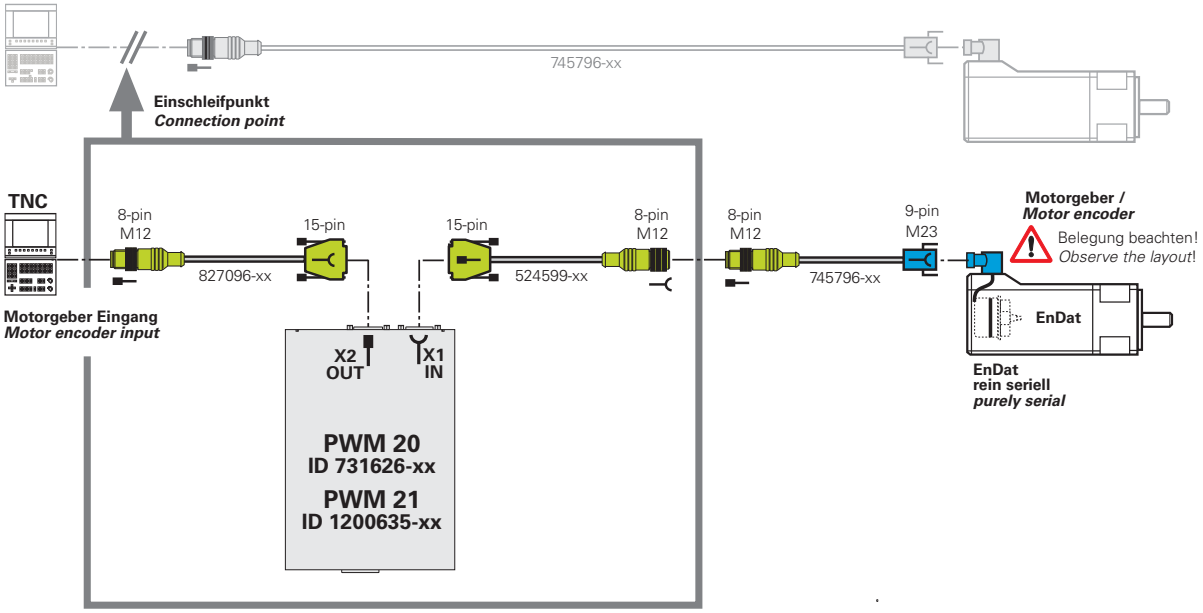
Feed-through operation is only possible, if the HEIDENHAIN TNC transfers the valuation numbers for online diagnosis. Only then is "listening-in" possible. Not all TNC and NC support this function!
(**Further information:** "Feed-through operation (listening-in)", Page 31)

3.10.4 Adapter cables for absolute EnDat encoders for Mot.Enc. measuring circuit, 25-pin D-sub connector, PWM X1 IN, X2 OUT

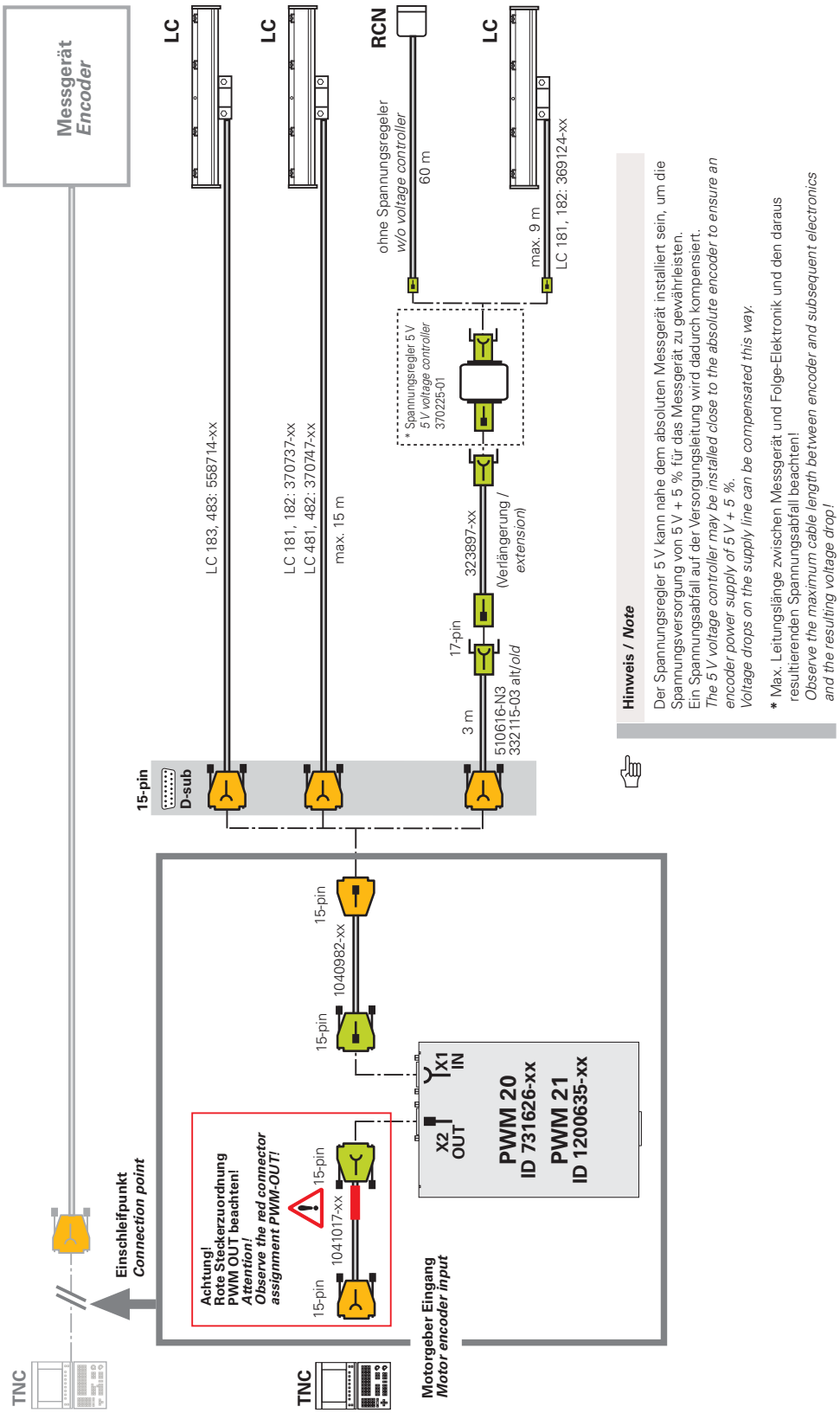


The motor temperature is not transferred via the 15-pin D-sub connectors of the PWM. If the control requires temperature data, the machine cannot be operated with closed loop.
An adapter with 17-pin M23 circular connectors is required.
More information: as of chapter "Incremental 1 V_{PP} interface with commutation for synchronous and linear drives in feed-through mode (listening-in)"

3.10.5 Adapter cables for absolute EnDat encoders for Mot.Enc. measuring circuit, 8-pin M12 connector, PWM X1 IN, X2 OUT

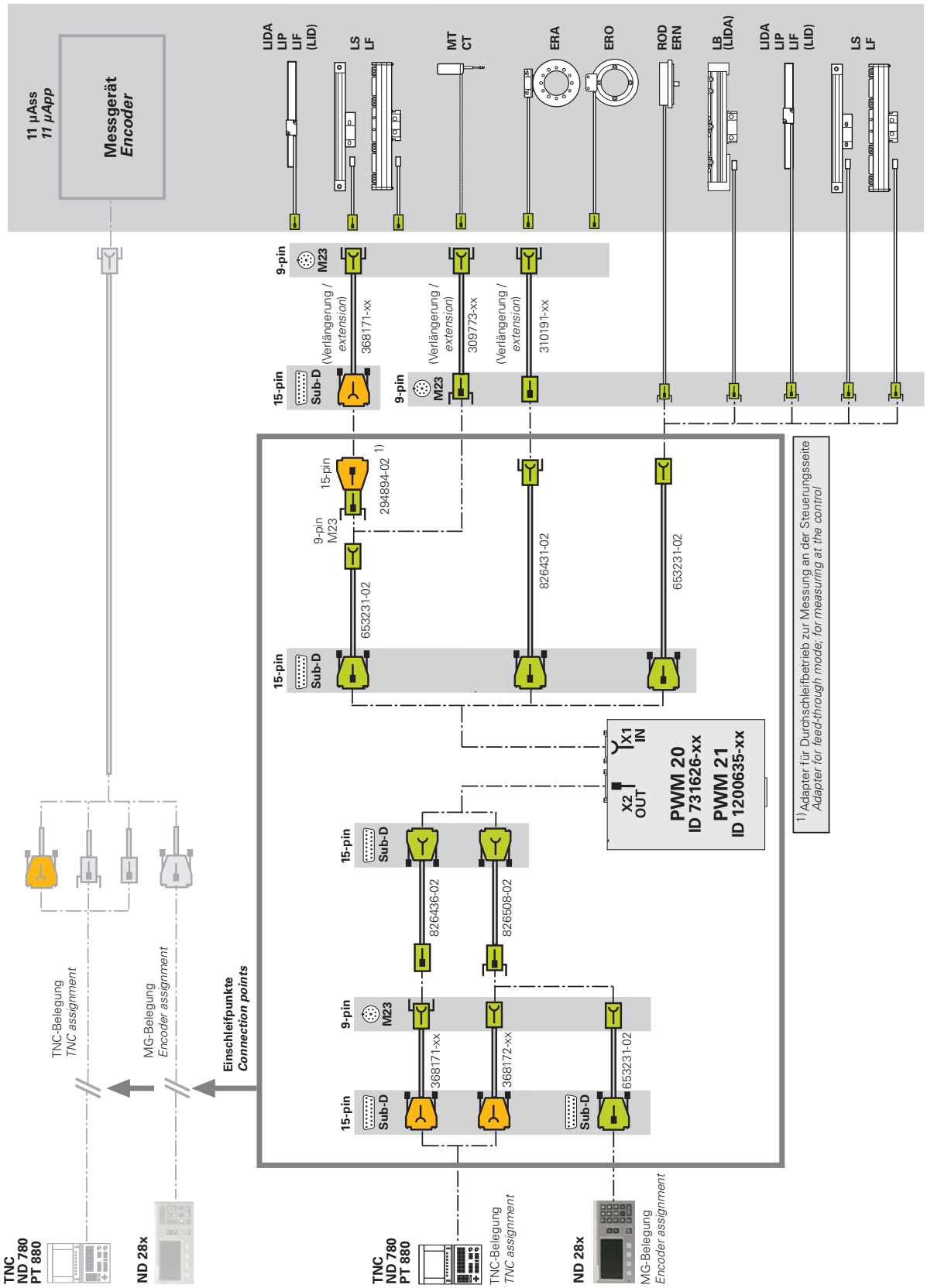


3.10.6 Adapter cables for absolute EnDat encoders for Pos.Enc. measuring circuit, 15-pin D-sub connector, PWM X1 IN, X2 OUT



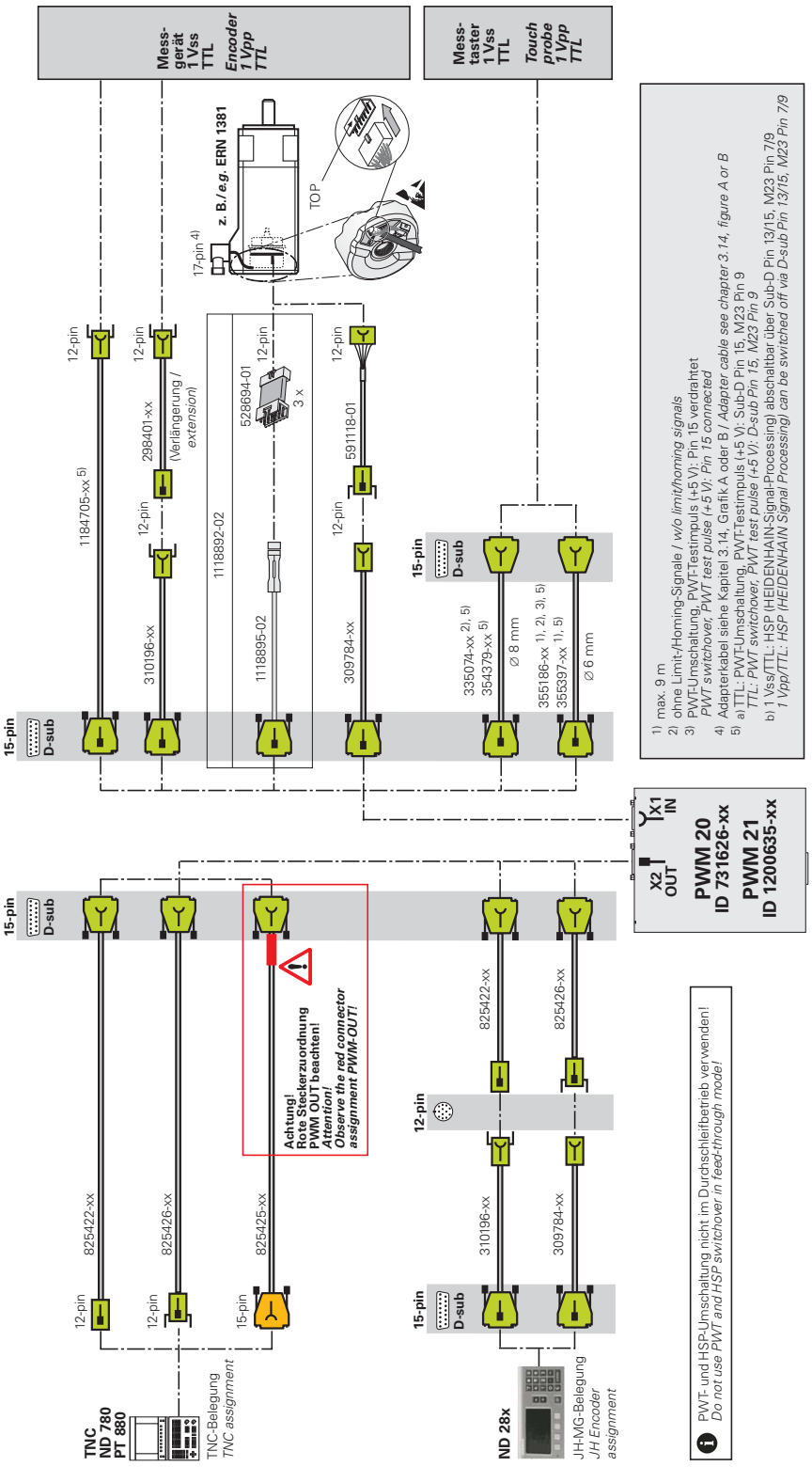
3.11 Incremental 11/25 µA$_{PP}$ interface in feed-through mode

3.11.1 Adapter cables 11/25 µA$_{PP}$ PWM X1 IN, X2 OUT

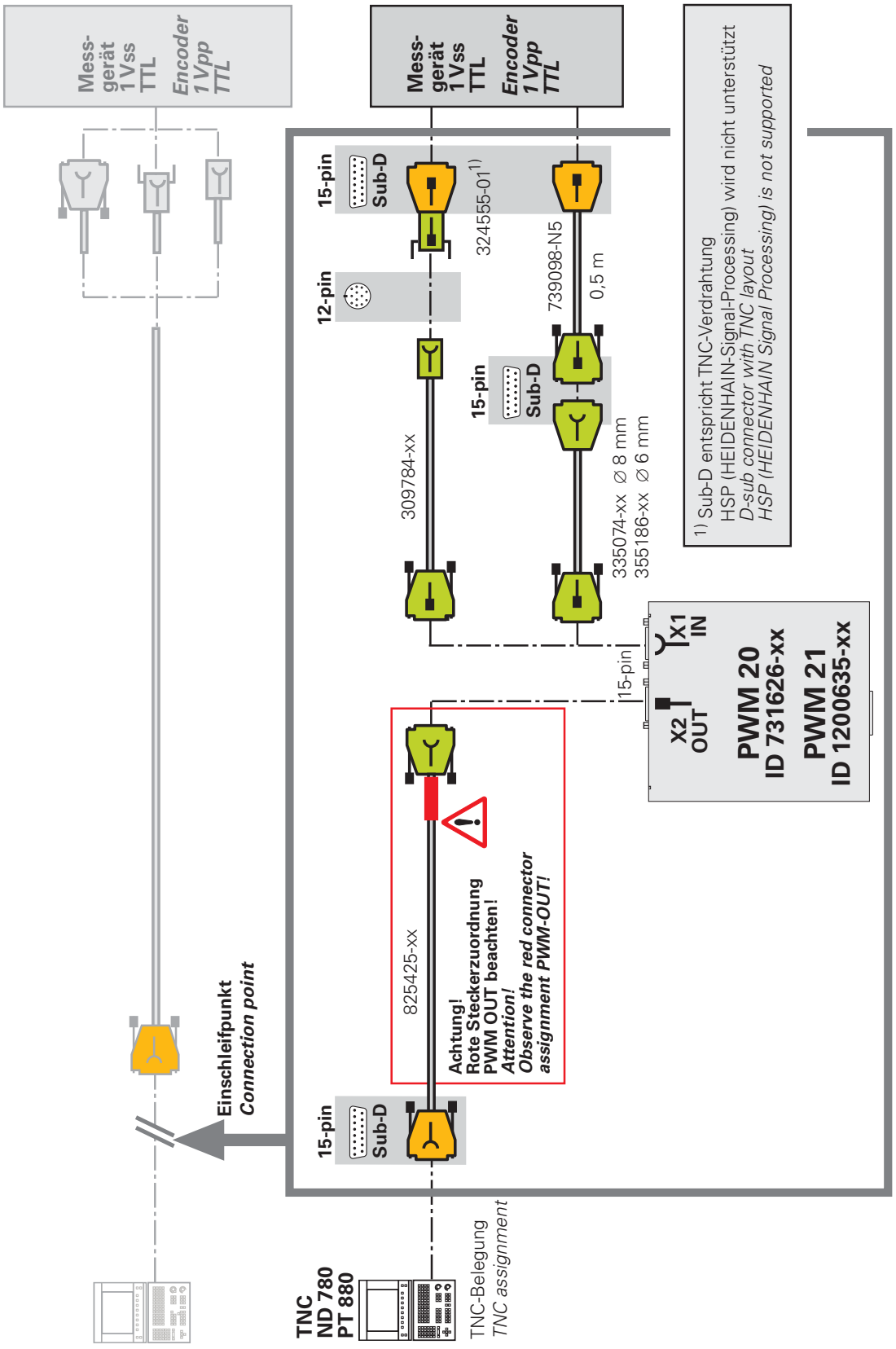


3.12 Incremental 1 V_{PP}/TTL interface in feed-through mode (listening-in)

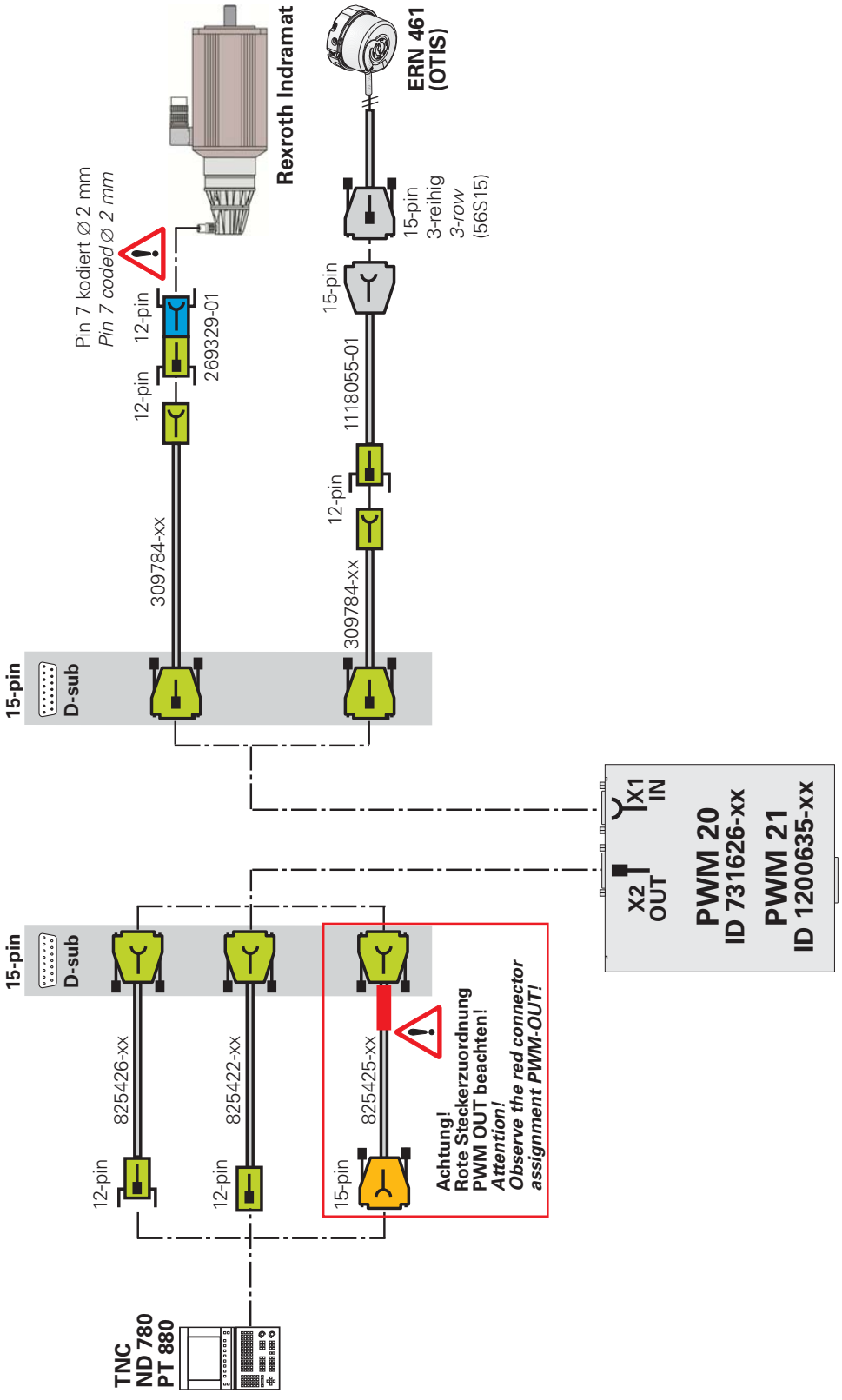
3.12.1 Adapter cables for incremental encoders1 V_{PP} /TTL, (HSP/PWT switchover) PWM X1 IN



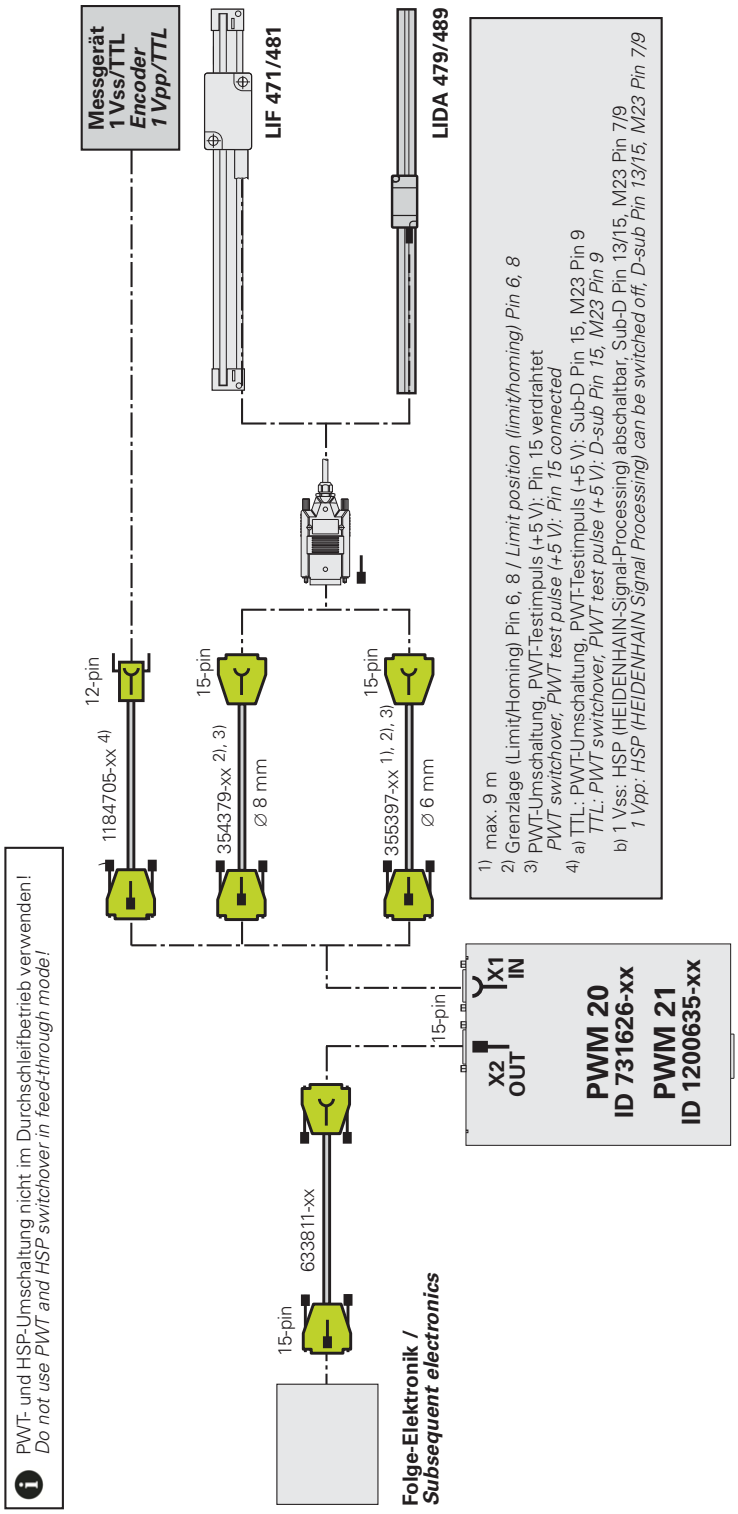
3.12.2 Adapter cables for incremental interface 1 V_{PP}/TTL measured at control input



3.12.3 Adapter cables for incremental encoders 1 V_{PP}/TTL, Rexroth Indramat, OTIS, PWM



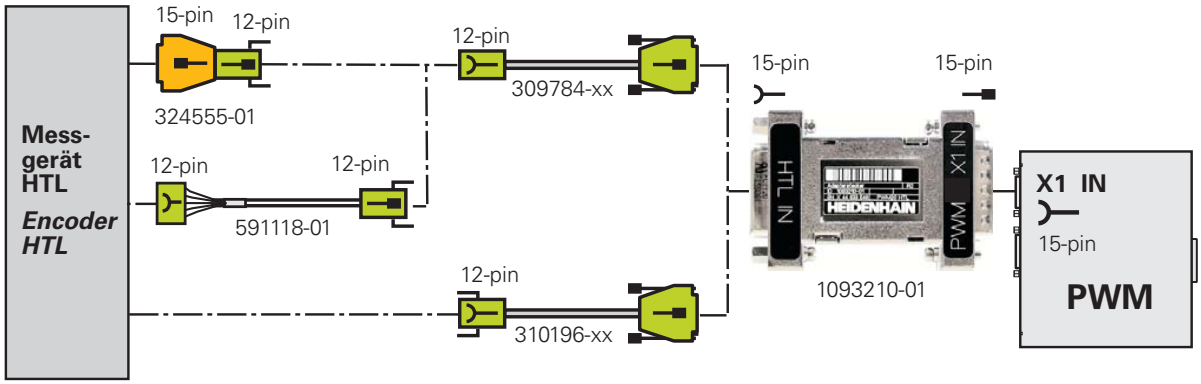
3.12.4 Adapter cables for incremental encoders 1 V_{PP}/TTL (HSP, PWT switchover) PWM X1 IN, LIDA/LIF with LIMIT/HOMING signals



Observe the PIN layouts of the encoders with limit/homing signals and TTL switchover!

3.13 HTL/HTLs incremental interface

3.13.1 Adapter cables/adapters for incremental encoders HTL/HTLs PWM X1 IN



Feed-through mode is not possible!

HTL → TTL interface converter
The PWM cannot process HTL signals!
The HTL interface converter (adapter) converts HTL output signals into TTL output signals that can be processed by the PWM.

3.14 Incremental 1 V_{PP} interface with commutation for synchronous and linear drives in feed-through mode (listening-in)

3.14.1 Adapter for monitoring (listening-in) between TNC and incremental rotary encoder in synchronous motors (e. g. ERN 1387 with AB track and CD commutation track)

In the adapter ID 1075630-01 the temperature wires lead from input IN to output OUT (PIN 5 IN / PIN 5 OUT and PIN 6 IN / PIN 6 OUT).

Figure A
Measured at the control input (25-pin speed encoder input)

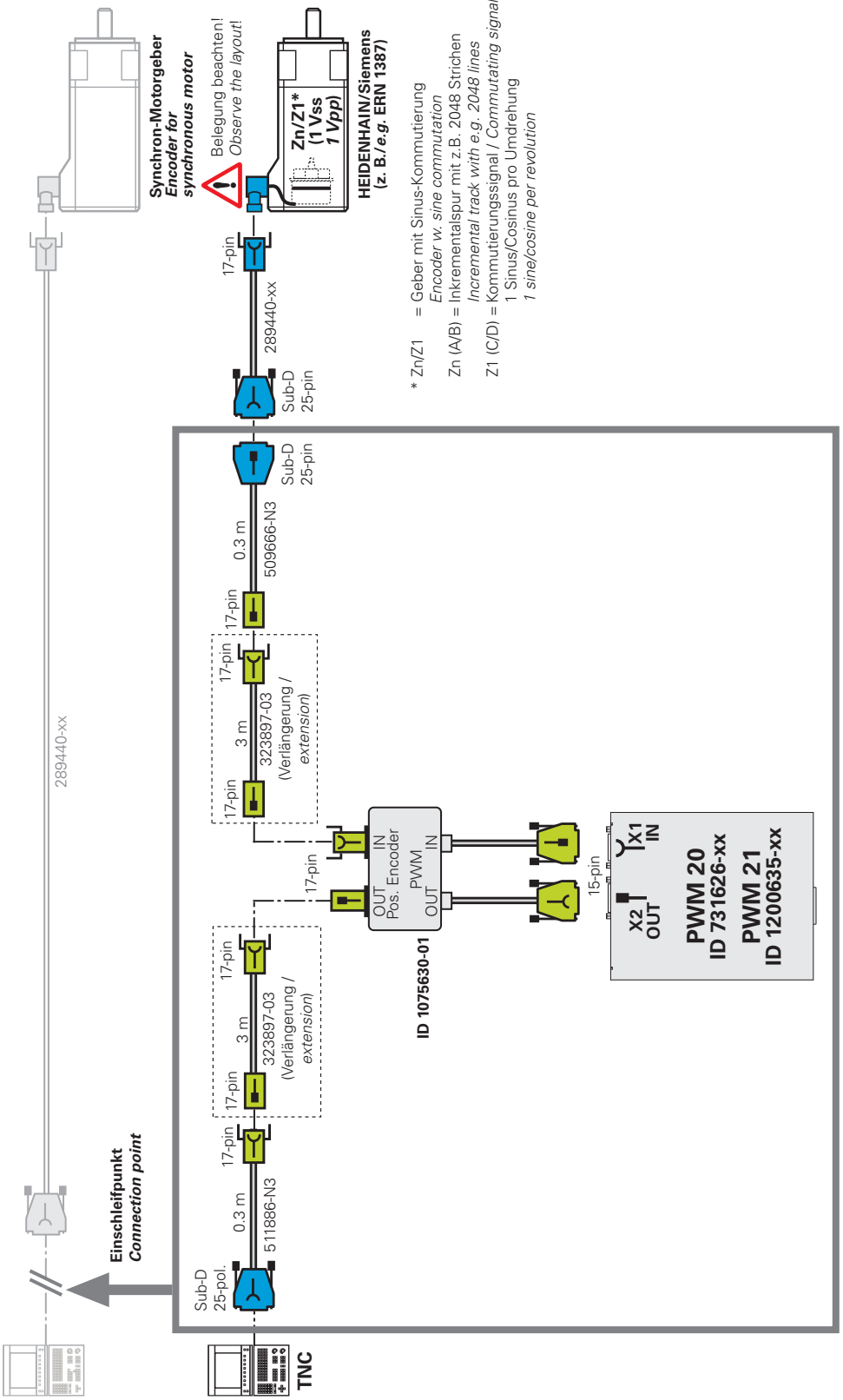


Figure B

Measured at the servo motor (17-pin flange socket) or PCB connector of the motor encoder (motor side)

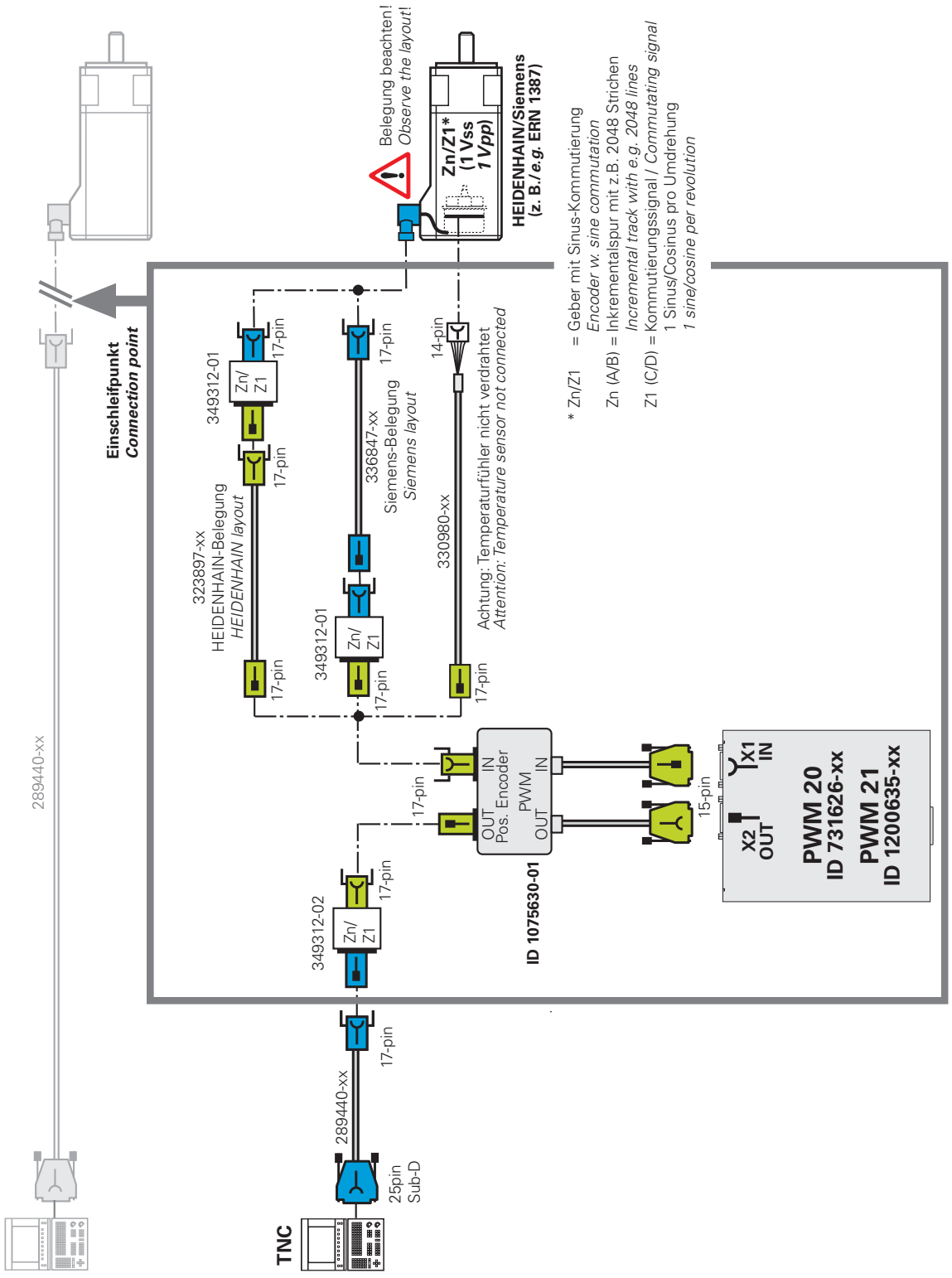
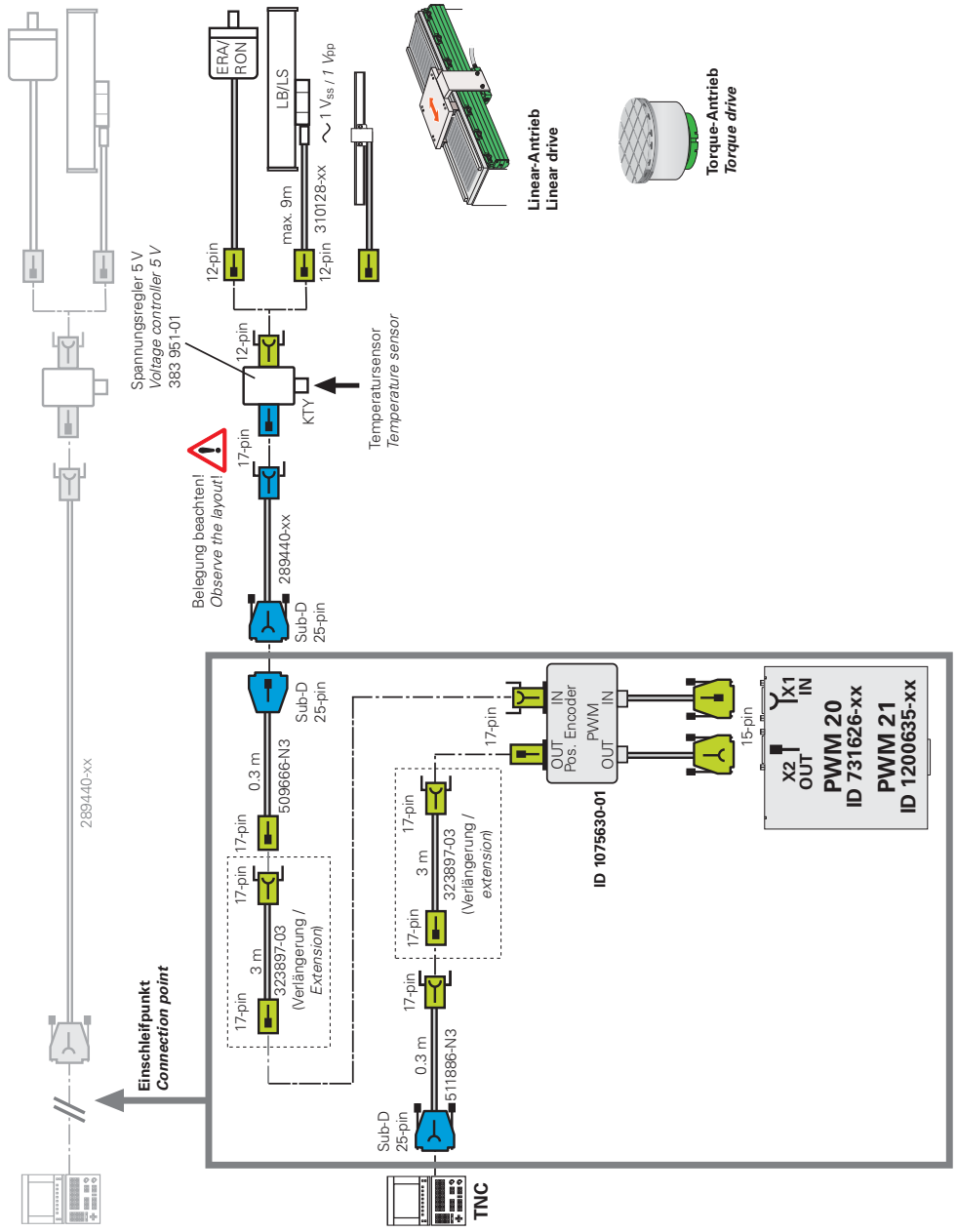


Figure C
Measured at the control input (25-pin speed encoder input)

Linear and torque drives operate with incremental encoders without commutation signal (encoder connector M23, 12-pin). Temperature sensor information is input in addition via the voltage controller ID 383951-01 (17-pin output flange socket). The shown adapter cables are also used in figure A.



Linear or angle encoders on linear motors (direct drives) provide the actual value for both the position controller and the speed controller. In this application the position encoders are operated at the motor controller input of the NC!

3.15 EnDat absolute interface for synchronous and linear drives in feed-through mode (listening-in)

3.15.1 Feed-through adapter (for listening-in) for absolute encoders on synchronous servo motors

Figure D

Measurement at the flange socket of the servo motor (motor side, 17-pin):
EnDat absolute encoders with sinusoidal A/B signals and ordering designation EnDat 01 and EnDat 02

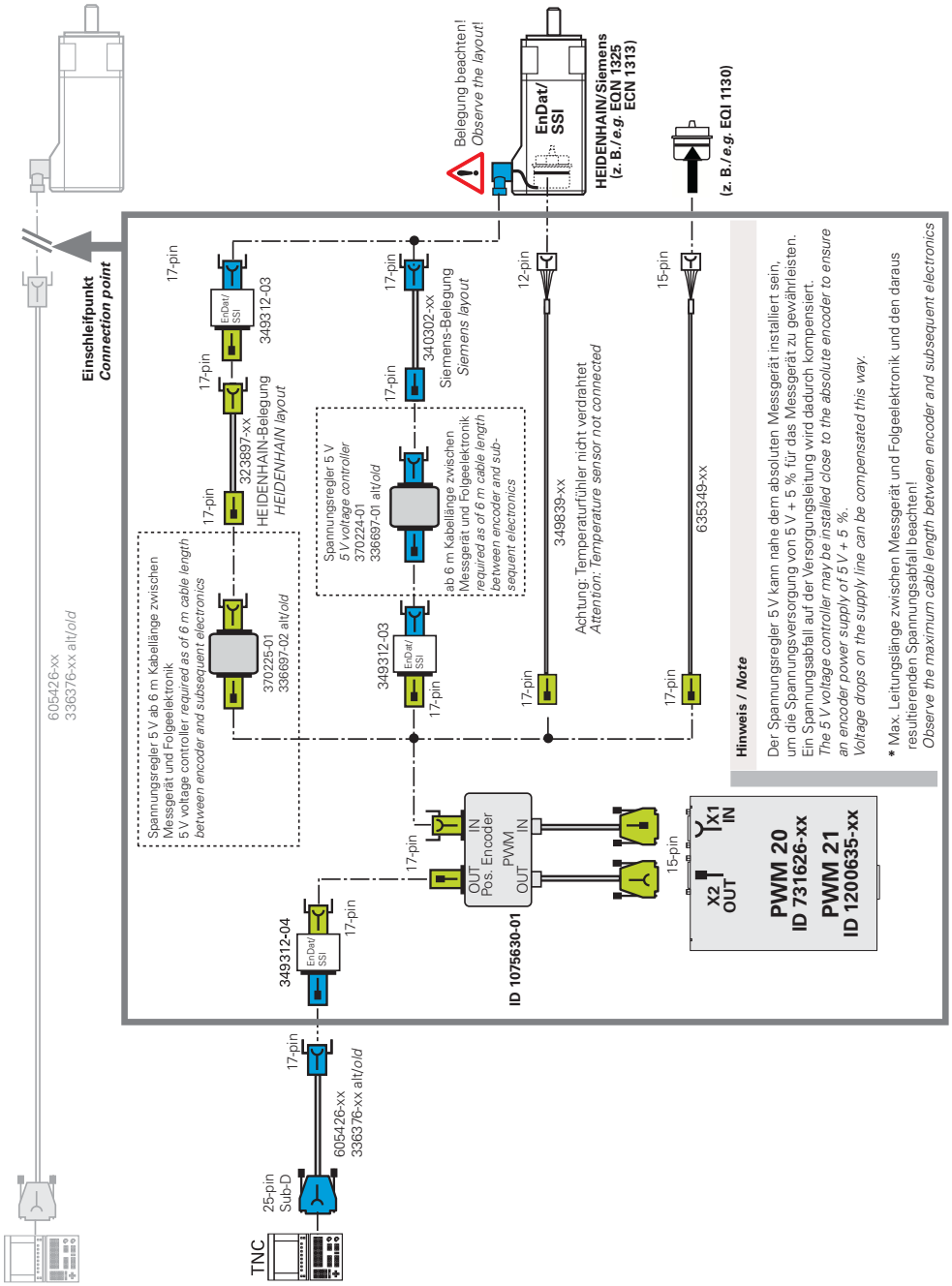


Figure E

Measurement at the 25-pin speed encoder input of the TNC (control side):
EnDat absolute encoders with sinusoidal A/B signals and ordering designation EnDat 01 and EnDat 02

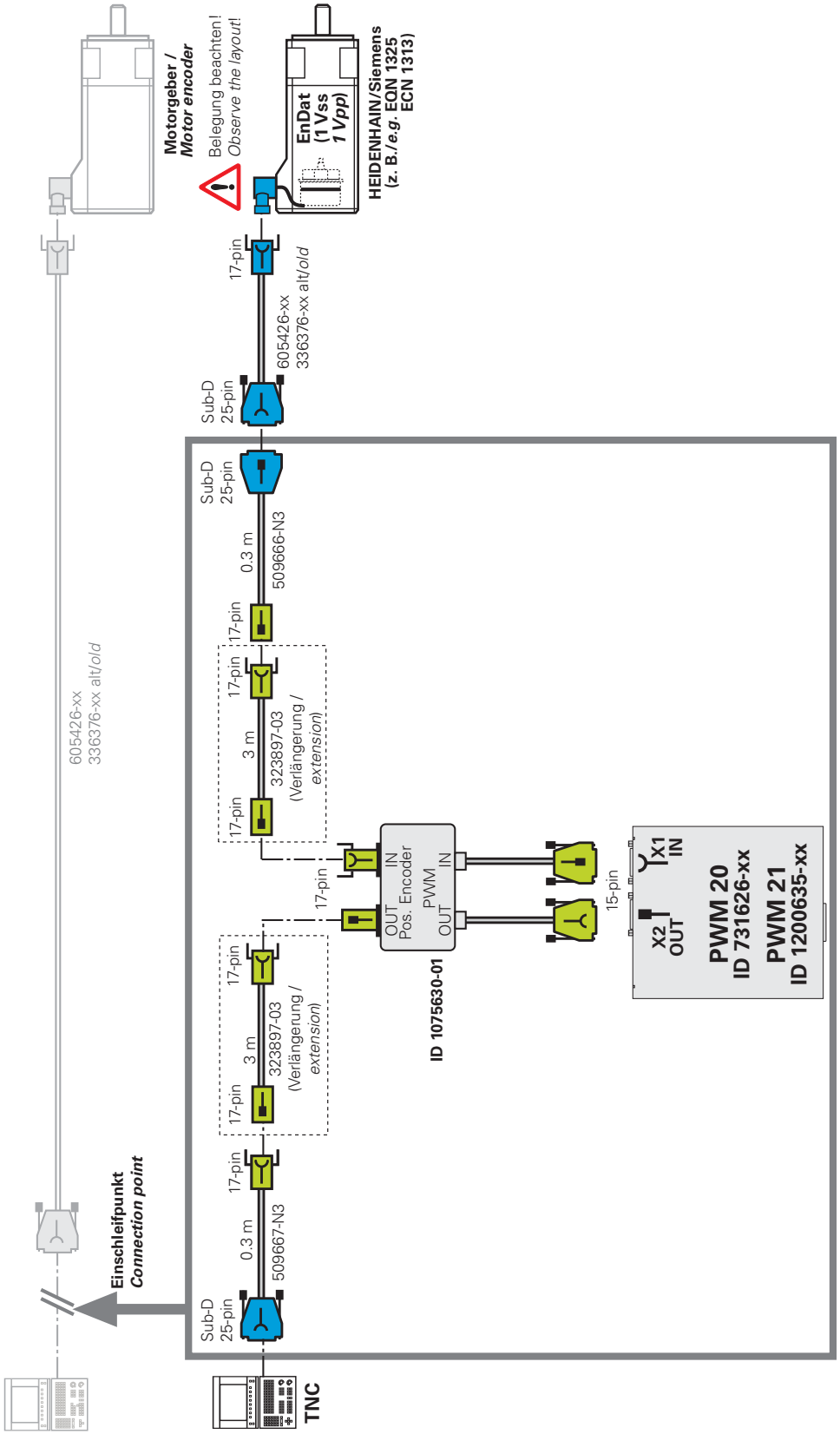
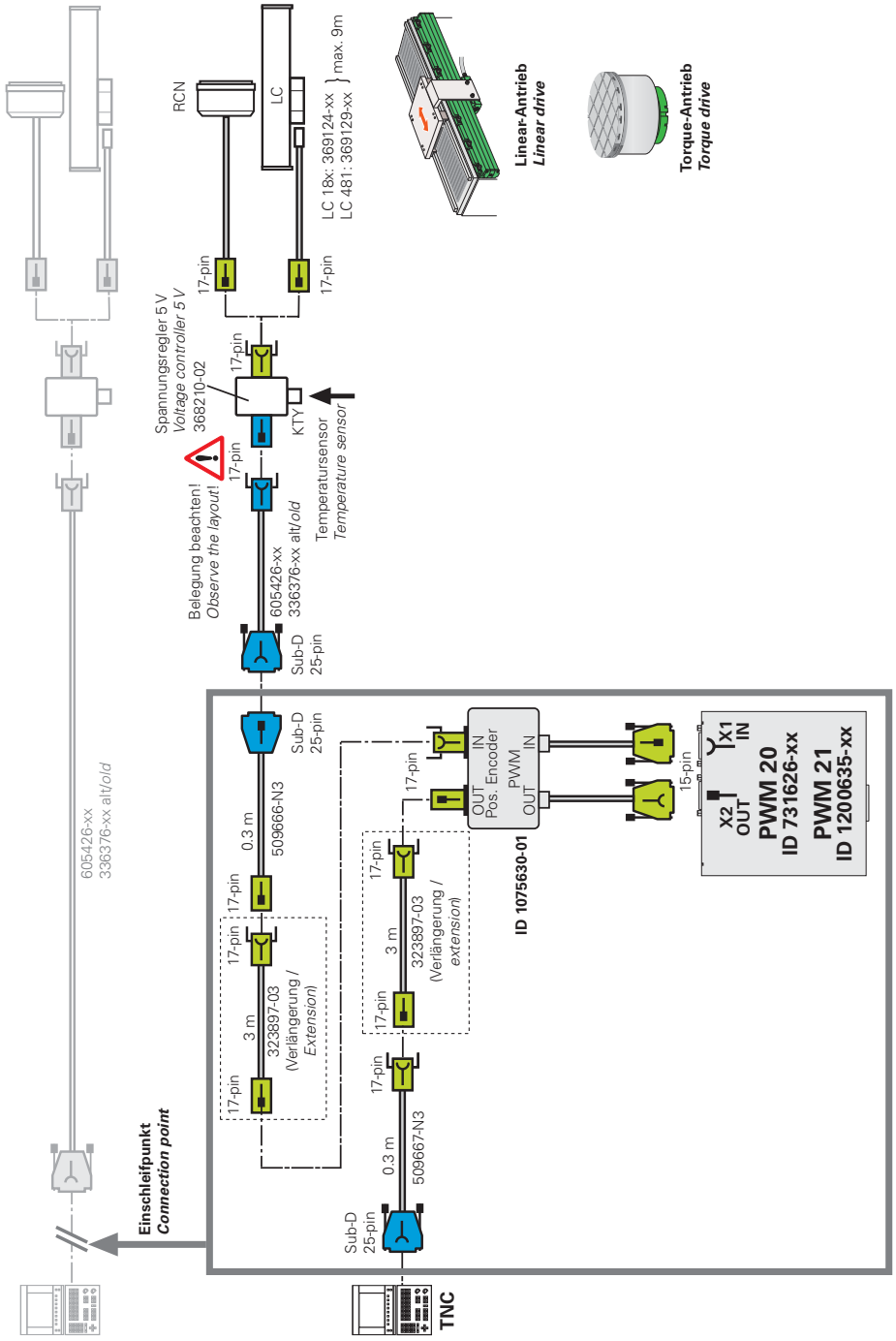


Figure F

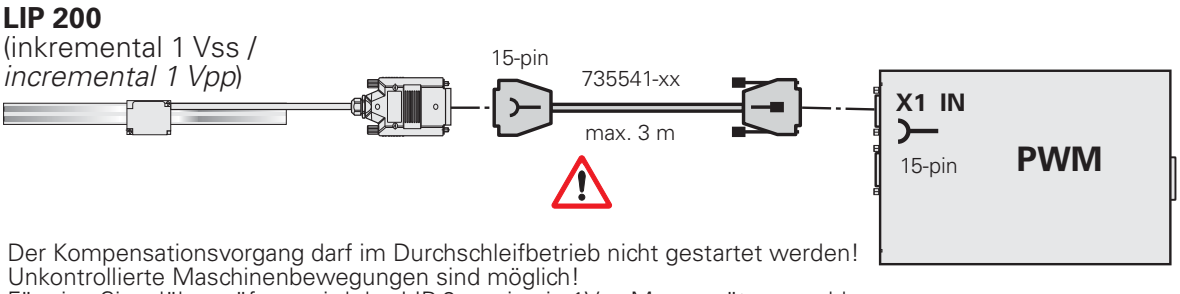
Measurement at the 25-pin speed encoder input of the TNC (control side):
EnDat absolute encoders with sinusoidal A/B signals and ordering designation EnDat 01 and EnDat 02. Linear and/or torque drives are mounted to the machine. Temperature sensor information is input externally via the voltage controller ID 368210-02 (17-pin output flange socket of voltage controller). The shown adapter cables are also used in figure E.



Linear or angle encoders on linear motors (direct drives) provide the actual value for both the position controller and the speed controller. In this application the position encoders are operated at the motor controller input of the NC!

3.16 1 V_{PP} incremental interface LIP 200 adapter for compensation

3.16.1 Adapter cable incremental 1 V_{PP} LIP 200 X1 IN

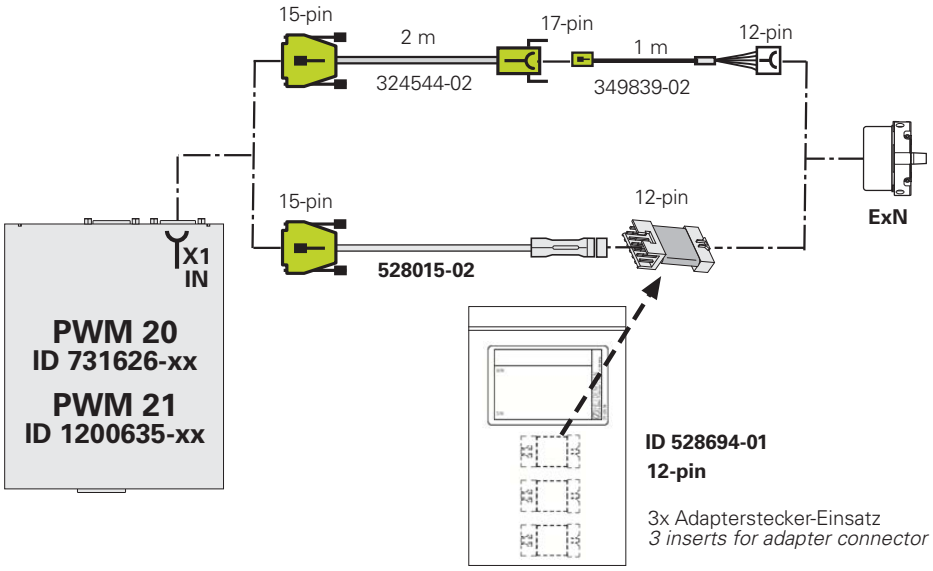


Der Kompensationsvorgang darf im Durchschleifbetrieb nicht gestartet werden!
Unkontrollierte Maschinenbewegungen sind möglich!
Für eine Signalüberprüfung wird das LIP 2xx wie ein 1Vss-Messgerät angeschlossen.
Auch das Adapterkabel 735541-xx kann am X1 IN als Verlängerung verwendet werden.
LIP-Montageanleitung beachten!

Compensation must not be started in feed-through mode!
Uncontrolled machine movements may occur!
To check the signal, connect the LIP 2xx like a 1 Vpp encoder.
The adapter cable 735541-xx can be connected to X1 IN as an extension.
Observe the LIP mounting instructions!

3.17 I²C Rexroth Indramat

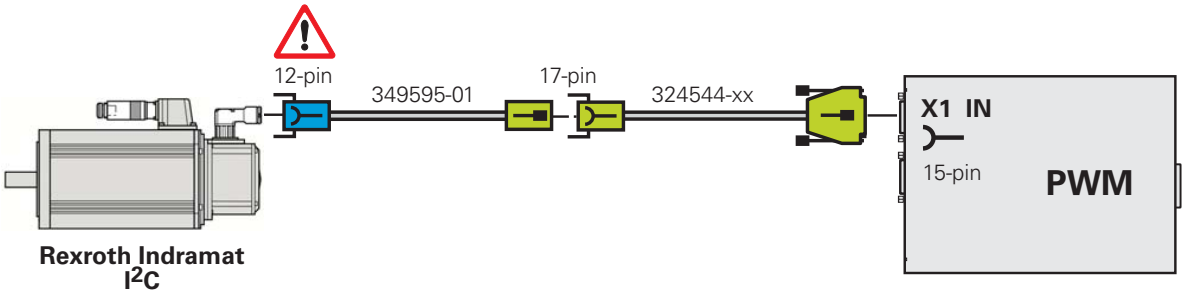
3.17.1 Adapter cables for I²C Rexroth Indramat connected with PCB connector



Depending on the encoder interface (e.g. EnDat, 1 V_{PP}, etc.) an adapter connector (see figures) must be connected to the adapter cable ID 528015-02.

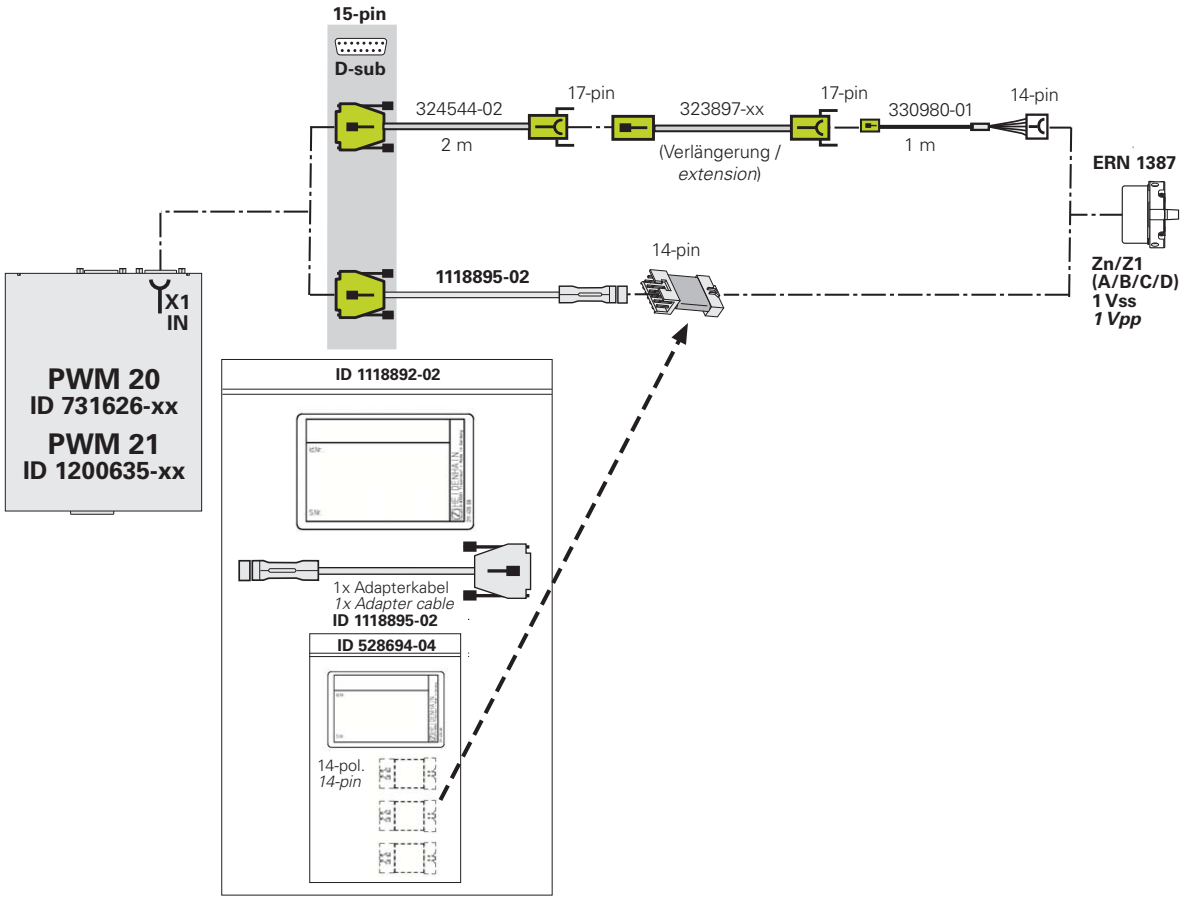
3.17.2 Adapter cables for I²C Rexroth Indramat connected via motor flange socket

Hinweis
Steckergehäuse mit zwei Codierungen!
Connector housing with two mechanical encodings!



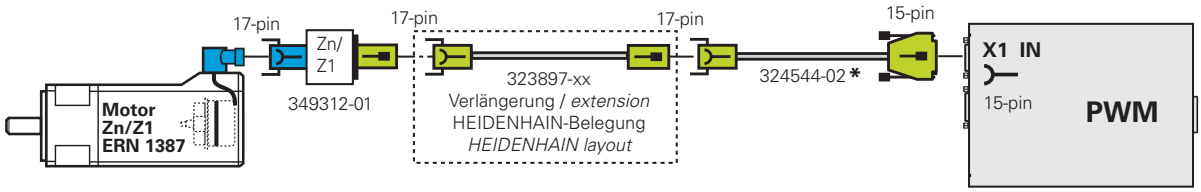
3.18 1 V_{PP} incremental interface with commutation; without evaluation of temperature sensor

3.18.1 Adapter cables for incremental commutation encoders (ERN 1387 A/B/C/D or Zn/Z1) PWM X1 IN without temperature information; connected via PCB connector



To ensure good contact we recommend replacing the adapter insert after approximately 500 insertion/withdrawal cycles! The adapter cable does not transfer the temperature value of the motor coil.
If temperature data is required, the PWM must be connected via the adapter ID 1075630-01 and an appropriate adapter cable.

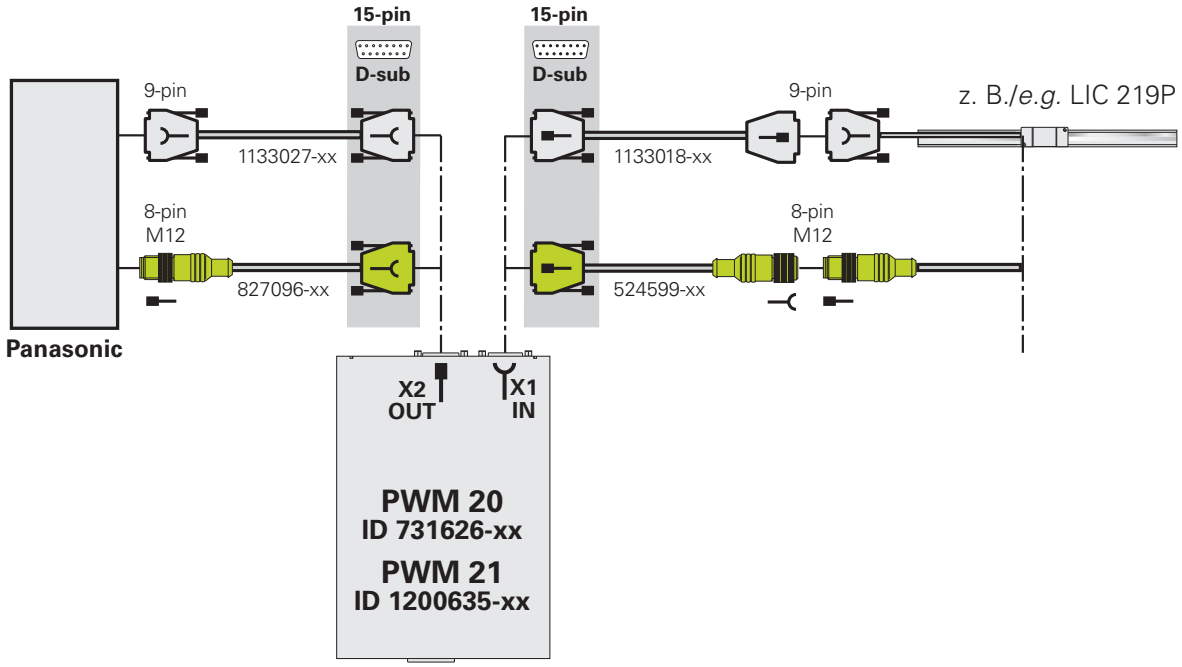
3.18.2 Adapter cables for incremental commutation encoders (ERN 1387 A/B/C/D or Zn/Z1) PWM X1 IN without temperature information; connected via motor flange socket



* Adapterkabel unterstützt nicht die Wicklungstemperatur des Motors! Wird die Temperaturinformation benötigt, muss das PWM mit Adapter ID 1075630-01 eingeschleift werden.
The adapter cable does not transfer the temperature value of the motor windings. If information on the temperature is required, the PWM must be connected via the adapter ID 1075630-01.

3.19 Panasonic

3.19.1 Panasonic (Pana01)



4 Pin layouts

4.1 Pin layout of the PWM

The signal assignment of the PWM encoder input (X1) and output (X2) depends on the connected encoder.

If an EnDat encoder is connected and identified, the pin assignment of the EnDat interface is active; if it is a 1 V_{PP} encoder, it is the pin assignment of the 1 V_{PP} interface.

For the assignments of the PWM, refer to the PWM 20 and PWM 21 Operating Instructions (Installation), ID 1125089-xx.
The operating instructions are included in the delivery of

- PWM 20 and PWM 21 basic kit
- PWM 20 and PWM 21 encoder diagnostic kits

⚠ WARNING

Axes moving uncontrolled

Property damage, injury or death

- Before switch-on, always check whether the pin layouts of the adapter cables used are identical with the original pin layout of the machine tool

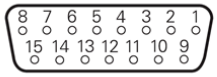
If the pin layout is not correct, the subsequent electronics or the encoder may be damaged!

4.2 Pin layout of IK 215

Connection of encoder X1

The encoder is connected to the encoder input X1.
The layout of the 15-pin D-sub connector is as follows:

15-pin D-sub, female

View	Pin no.	Assignment EnDat	Assignment ~ 1 VPP	
	4	**UP**		Power supply
	12	**Sensor** UP		
	2	**0 V**		
	10	**Sensor** 0 V		
	1	**A+**		Incremental signals[1]
	9	**A–**		
	3	**B+**		
	11	**B–**		
	14	**Vacant**	**R+**	
	7	**Vacant**	**R–**	
	5	**DATA**	**Vacant**	Absolute position values
	13	**$\overline{\text{DATA}}$**	**Vacant**	
	8	**CLOCK**	**L1**[2] H[3]	
	15	**$\overline{\text{CLOCK}}$**	**Vacant**	
	6	**Internal shield**	**L2**[2] L[3]	

Cable shield connected to housing; **UP** = power supply voltage
Sensor: The sensor line is connected internally with the corresponding power line.
Vacant pins or wires must not be used!

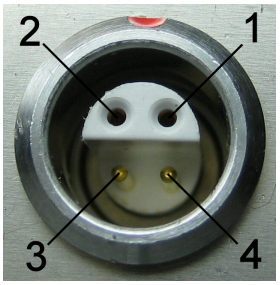
[1] Only with ordering designations EnDat 01 and EnDat 02
[2] Only for LIDA 4xx with limit signal
[3] Only for LIF 481 with limit and homing signal
Shield on housing; **U_p** = power supply
Unused pins must not be assigned!

The encoder power supply (pin 4) can be adjusted by software. Care must be taken that the correct supply voltage is set at the encoder, since otherwise the encoder, the IK or the computer may be damaged! Only connect or disconnect encoders while the supply voltage is switched off!

Connection for the external functions X3

For external functions, a 4-pin female connector is available through which the recording of measured values can be externally controlled. The required connector can be ordered from HEIDENHAIN under the ID 282 168-01. The signals are arranged as follows (view of the connector from outside):

PIN	Assignment
1	Input: Latch pulse (for HEIDENHAIN internal use)
2	Output: Synchronization pulse (for HEIDENHAIN internal use)
3	Output: MSB of the position value (singleturn range); serves as mounting aid for EnDat motor encoders
4	GND

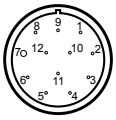


More information:
IK 215 Operating Instructions ID 549369-xx

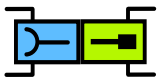
4.3 Pin layouts of the encoders

4.3.1 Adapter connector Rexroth Indramat M23, 12-pin encoded/M23 12-pin (1 V_{PP}/TTL)

ID 269329-xx



Connector, 12-pin, female



Connector, 12-pin, male

PIN	Signal ~ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	B–	–Ua2	Pink	1
2	+V sensor	+V sensor	Blue	2
3	R+	+Ua0	Red	3
4	R–	–Ua0	Black	4
5	A+	+Ua1	Brown	5
6	A–	–Ua1	Green	6
7 Encoding Ø 2 mm	Vacant	Vacant	–	7
8	B+	+Ua2	Gray	8
9	Shield	Shield	–	9
10	0 V U_N	0 V U_N	White/Green	10
11	0 V sensor	0 V sensor	White	11
12	+V U_P	+V U_P	Brown/Green	12

4.3.2 Adapter cable 17-pin M23/25-pin D-sub; PWM to subsequent electronics (Mot.Enc. 1 V_{PP})

ID 289440-xx

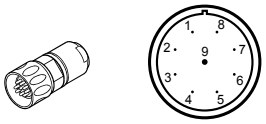
Connector, 17-pin, female

D-sub connector
25-pin, female

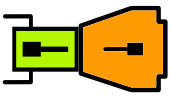
PIN	Signal ~ 1 V_{PP}	Color	PIN
1	A+	Green/Black	3
2	A–	Yellow/Black	4
3	R+	Red	17
4	D–	Pink	22
5	C+	Green	19
6	C–	Brown	20
7	0 V U_N	White/Green	2
8	Temp+	Yellow	13
9	Temp–	Violet	25
10	+V U_P	Brown/Green	1
11	B+	Blue/Black	6
12	B–	Red/Black	7
13	R–	Black	18
14	D+	Gray	21
15	0 V sensor	White	16
16	+V sensor	Blue	14
17	Internal shield		8
	Vacant		5, 9, 10, 11, 12, 15, 23, 24
Connector housing	External shield		Connec-tor housing

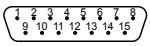
4.3.3 Round adapter, 9-pin/15-pin D-sub connector (Pos.Enc./Pos.Enc) (11 µA$_{PP}$)

ID 294894-02



Connector, 9-pin, male





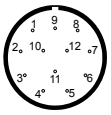
D-sub connector, 15-pin, male

PIN	Signal ~ 11 µA$_{PP}$	PIN
1	0°+	3
2	0°–	4
3	+V U_P	1
4	0 V U_N	2
5	90°+	6
6	90°–	7
7	RI+	10
8	RI–	12
9	Internal shield	5
Housing	External shield	Housing
	Vacant	8, 9, 11, 13, 14, 15

4.3.4 Connecting cable 1 V_{PP} or TTL/HTL 12-pin/12-pin M23 for PWM

ID 298400-xx

Connector, 12-pin, male



Connector, 12-pin, female

PIN	Signal ⌇ 1 V_{PP}	Signal ⊓⊔ TTL/HTL	Color
1	B–	–Ua2	Pink
2	+V sensor	+V sensor	Blue
3	R+	+Ua0	Red
4	R–	–Ua0	Black
5	A+	+Ua1	Brown
6	A–	–Ua1	Green
7	Vacant	–UaS	Yellow
8	B+	+Ua2	Gray
9	Vacant		Violet
10	0 V U_N	0 V U_N	White/Green
11	0 V sensor	0 V sensor	White
12	+V U_P	+V U_P	Brown/Green
Housing	External shield		Shield

4.3.5 Connecting cable 1 V_{PP} or TTL/HTL 12-pin/12-pin M23 for PWM

ID 298401-xx

Connector, 12-pin, female

Connector, 12-pin, male

PIN	Signal ∿ 1 V_{PP}	Signal ⊓⊔ TTL/HTL	Color
1	B–	–Ua2	Pink
2	+V sensor	+V sensor	Blue
3	R+	+Ua0	Red
4	R–	–Ua0	Black
5	A+	+Ua1	Brown
6	A–	–Ua1	Green
7	Vacant	–UaS	Yellow
8	B+	+Ua2	Gray
9	Vacant	Vacant	Violet
10	0 V U_N	0 V U_N	White/Green
11	0 V sensor	0 V sensor	White
12	+V U_P	+V U_P	Brown/Green
Housing	External shield		Shield

4.3.6 Connecting cable 9-pin/9-pin M23 (11 μA_{PP})

ID 309773-xx

Connector, 9-pin, male

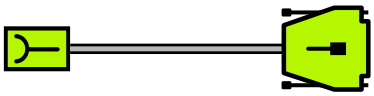
Connector, 9-pin, female

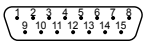
PIN	Signal ~ 11 μA_{PP}	Color	PIN
1	0°+	Green	1
2	0°–	Yellow	2
3	+V U_P	Brown	3
4	0 V U_N	White	4
5	90°+	Blue	5
6	90°–	Red	6
7	RI+	Gray	7
8	RI–	Pink	8
9	Internal shield	White/Brown	9
Housing	External shield	Shield	Housing

4.3.7 Adapter cable 1 V_{PP} or TTL/HTL 15-pin D-sub/12-pin M23

ID 309784-xx

Connector, 12-pin, female



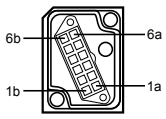


D-sub connector, 15-pin, male

PIN	Signal ~ 1 V_{PP}	Signal ⊓⊔ TTL/HTL	Color	PIN
4	R–	–Ua0	Black	7
6	A–	–Ua1	Green	9
11	0 V sensor	0 V sensor	White	10
2	+V sensor	+V sensor	Blue	12
8	B+	+Ua2	Gray	3
12	+V U_P	+V U_P	Brown/Green	4
3	R+	+Ua0	Red	14
10	0 V U_N	0 V U_N	White/Green	2
1	B–	–Ua2	Pink	11
5	A+	+Ua1	Brown	1
7	Vacant	–UaS	Violet	13
9	Vacant	Vacant	Yellow	15
Housing	External shield		Shield	Housing
			Vacant	5, 6, 8

4.3.8 Adapter cable for scanning unit, slimline, 12-pin/12-pin; M23; 1 m (1 V_{PP}/TTL)

ID 310122-01



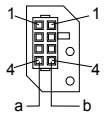
Connector, 12-pin, female

Connector, 12-pin, male

PIN	Signal ~ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
5a	B–	–Ua2	Pink	1
2b	+V sensor	+V sensor	Blue	2
4b	R+	+Ua0	Red	3
4a	R–	–Ua0	Black	4
6b	A+	+Ua1	Brown	5
6a	A–	–Ua1	Green	6
3a	–UaS	–UaS	Violet	7
5b	B+	+Ua2	Gray	8
3b	Not wired			9
1a	0 V U_N	0 V U_N	White/Green	10
1b	0 V sensor	0 V sensor	White	11
2a	+V U_P	+V U_P	Brown/Green	12
Housing	External shield		Shield	Housing

4.3.9 Adapter cable for scanning unit, slimline, 8-pin/9-pin; M23; 1 m (11 µA$_{PP}$)

ID 310125-xx



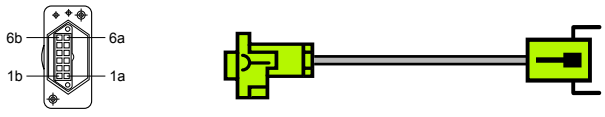
Connector, 8-pin, female

Connector, 9-pin, male

PIN	Signal ~ 11 µA$_{PP}$	Color	PIN
1a	0 V U_N	White	4
4b	+V U_P	Brown	3
Vacant	Internal shield	White/Brown	9
3b	0°+	Green	1
4a	0°–	Yellow	2
2b	90°+	Blue	5
3a	90°–	Red	6
1b	RI+	Gray	7
2a	RI–	Pink	8
Housing	External shield	Shield	Housing

4.3.10 Adapter cable for scanning unit, full-size, 12-pin/12-pin; M23; 1 m (1 V_{PP}/TTL)

ID 310127-xx



APE, 12-pin, female

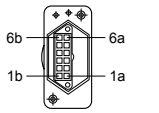
Connector, 12-pin, male

PIN	Signal ~ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
5a	B–	–Ua2	Pink	1
2b	+V sensor	+V sensor	Blue	2
4b	R+	+Ua0	Red	3
4a	R–	–Ua0	Black	4
6b	A+	+Ua1	Brown	5
6a	A–	–Ua1	Green	6
3a	–UaS[1)]	–UaS	Violet	7
5b	B+	+Ua2	Gray	8
3b	Not wired			9
1a	0 V U_N	0 V U_N	White/Green	10
1b	0 V sensor	0 V sensor	White	11
2a	+V U_P	+V U_P	Brown/Green	12
Housing	External shield		Shield	Housing

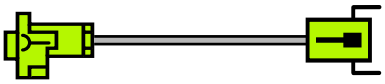
1) Not used by all JH encoders

4.3.11 Adapter cable for scanning unit, full-size, 12-pin/9-pin; M23; 1 m (11 µA$_{PP}$)

ID 310130-xx



Connector, 12-pin, female



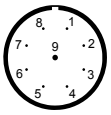
Connector, 9-pin, male

PIN	Signal ~ 11 µA$_{PP}$	Color	PIN
1a	0 V U_N	White	4
2a	+V U_P	Brown	3
Vacant	Internal shield	White/Brown	9
6b	0°+	Green	1
6a	0°–	Yellow	2
5b	90°+	Blue	5
5a	90°–	Red	6
4b	RI+	Gray	7
4a	RI–	Pink	8
3a, 1b, 2b, 3b	Vacant		
Housing	External shield	Shield	Housing

4.3.12 Connecting cable 9-pin/9-pin M23 (11 µA$_{PP}$)

ID 310191-xx

Connector, 9-pin, female



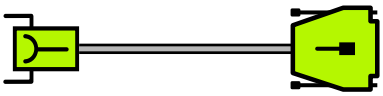
Connector, 9-pin, male

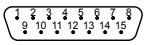
PIN	Signal ~ 11 µA$_{PP}$	Color	PIN
1	0°+	Green	1
2	0°–	Yellow	2
3	+V U_P	Brown	3
4	0 V U_N	White	4
5	90°+	Blue	5
6	90°–	Red	6
7	RI+	Gray	7
8	RI–	Pink	8
9	Internal shield		9
Housing	External shield	Shield	Housing

4.3.13 Adapter cable 15-pin D-sub/12-pin M23 (1 V_{PP}/TTL)

ID 310196-xx

Connector, 12-pin, female





D-sub connector, 15-pin, male

PIN	Signal ∿ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	B–	–Ua2	Pink	11
2	+V sensor	+V sensor	Blue	12
3	R+	+Ua0	Red	14
4	R–	–Ua0	Black	7
5	A+	+Ua1	Brown	1
6	A–	–Ua1	Green	9
7	Vacant	–UaS	Violet	13
8	B+	+Ua2	Gray	3
9	Vacant	Vacant	Yellow	15
10	0 V U_N	0 V U_N	White/Green	2
11	0 V sensor	0 V sensor	White	10
12	+V U_P	+V U_P	Brown/Green	4
			Vacant	5, 6, 8
Housing	External shield		Shield	Housing

4.3.14 Adapter cable 17-pin/17-pin M23, 1 V_{PP}/EnDat

ID 323897-xx

Connector, 17-pin, male

Connector, 17-pin, female

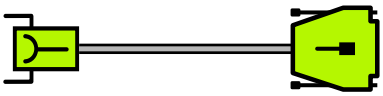
PIN	Signal ~ 1 V_{PP}	Signal EnDat	Color	PIN
1	+V sensor	+V sensor	Blue	1
2	R–	Vacant[1)]	Black	2
3	R+	Vacant[1)]	Red	3
4	0 V sensor	0 V sensor	White	4
5	Temp+	Vacant	Green	5
6	Temp–	Vacant	Brown	6
7	+V U_P	+V U_P	Brown/Green	7
8	D–	CLOCK	Violet	8
9	D+	$\overline{\text{CLOCK}}$	Yellow	9
10	0 V U_N	0 V U_N	White/Green	10
11	Internal shield	Internal shield	Internal shield	11
12	B+	B+	Blue/Black	12
13	B–	B–	Red/Black	13
14	C+	DATA	Gray	14
15	A+	A+	Green/Black	15
16	A–	A–	Yellow/Black	16
17	C–	$\overline{\text{DATA}}$	Pink	17
Housing	External shield	External shield	Shield	Housing

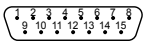
1) with EnDat, the PWM does not forward the signal

4.3.15 Adapter cable 17-pin M23/15-pin D-sub(1 V_{PP}/EnDat) PWM X1 IN

ID 324544-xx

Connector, 17-pin, female





D-sub connector, 15-pin, male

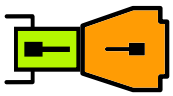
PIN	Signal ~ 1 V_{PP}	Signal EnDat	Color	PIN
1	+V sensor	+V sensor	Blue	12
2	R–	Vacant[1)]	Black	7
3	R+	Vacant[1)]	Red	14
4	0 V sensor	0 V sensor	White	10
7	+V U_P	+V U_P	Brown/Green	4
8	D–	CLOCK	Violet	8
9	D+	$\overline{\text{CLOCK}}$	Yellow	15
10	0 V U_N	0 V U_N	White/Green	2
11	Internal shield	Internal shield	Internal shield	6
12	B+	B+	Blue/Black	3
13	B–	B–	Red/Black	11
14	C+	DATA	Gray	5
15	A+	A+	Green/Black	1
16	A–	A–	Yellow/Black	9
17	C–	$\overline{\text{DATA}}$	Pink	13
5, 6			Vacant	
Housing	External shield	External shield	Shield	Housing

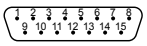
1) with EnDat, the PWM does not forward the signal

4.3.16 Round adapter, 12-pin/15-pin D-sub connector (Pos.Enc./Pos.Enc) (1 V_{PP}/TTL)

ID 324555-01

Connector, 12-pin, male





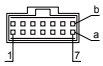
D-sub connector, 15-pin, male

PIN	Signal ∿ 1 V_{PP}	Signal ⊓⊔ TTL	PIN
1	B–	–Ua2	7
2	+V sensor	+V sensor	9
3	R+	+Ua0	10
4	R–	–Ua0	12
5	A+	+Ua1	3
6	A–	–Ua1	4
7	–UaS	–UaS	14
8	B+	+Ua2	6
10	0 V U_N	0 V U_N	2
11	0 V sensor	0 V sensor	11
12	+V U_P	+V U_P	1
9	Not wired		5, 8, 13, 15
Housing	External shield		Housing

4.3.17 Adapter cable 17-pin M23 with 14-pin PCB connector – Zn/Z1

ID 330980-xx

Connector, 17-pin, male



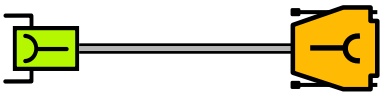
PCB connector, 14-pin

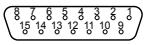
PIN	Signal	Color	PIN
1	+V sensor	Blue	7a
2	R–	Black	4a
3	R+	Red	4b
4	0 V sensor	White	3a
5	Temp+	Green	–
6	Temp–	Brown	–
7	+V U_P	Brown/Green	1b
8	D–	Violet	6a
9	D+	Yellow	2b
10	0 V U_N	White/Green	5b
11	Internal shield		–
12	B+	Blue/Black	3b
13	B–	Red/Black	5a
14	C+	Gray	7b
15	A+	Green/Black	6b
16	A–	Yellow/Black	2a
17	C–	Pink	1a

4.3.18 Adapter cable 17-pin M23/15-pin D-sub (EnDat)

Old ID 332115-xx
New ID 510616-N3

Connector, 17-pin, female



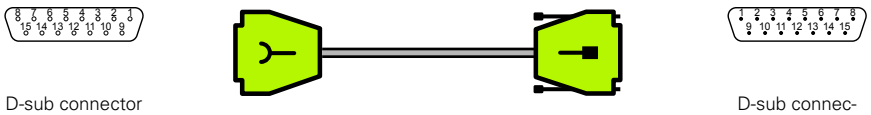


D-sub connector
15-pin, female

PIN	Signal EnDat	Color	PIN
1	+V sensor	Blue	9
2	Vacant		–
3	Vacant		10
4	0 V sensor	White	11
5	Vacant		12
6	Vacant		–
7	+V U_P	Brown/Green	1
8	CLOCK	Violet	14
9	$\overline{\text{CLOCK}}$	Yellow	15
10	0 V U_N	White/Green	2
11	Internal shield		13
12	B+	Blue/Black	6
13	B–	Red/Black	7
14	DATA	Gray	5
15	A+	Green/Black	3
16	A–	Yellow/Black	4
17	$\overline{\text{DATA}}$	Pink	8
Housing	External shield		Housing

4.3.19 Connecting cable 15-pin/15-pin D-sub (Signal ∿ 1 V_{PP}), HSP

ID 335074-xx



D-sub connector 15-pin, female

D-sub connector, 15-pin, male

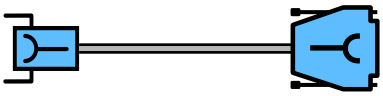
PIN	Signal ∿ 1 V_{PP}	Color	PIN
1	A+	Brown	1
2	0 V U_N	White/Green	2
3	B+	Gray	3
4	+V U_P	Brown/Green	4
5	Not wired		5
6	Not wired		6
7	R–	Black	7
8	Not wired		8
9	A–	Green	9
10	0 V sensor	White	10
11	B–	Pink	11
12	+V sensor	Blue	12
13	HSP[1)]	Violet	13
14	R+	Red	14
15	HSP[1)]	Yellow	15
Housing	External shield		Housing

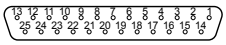
1) HSP (HEIDENHAIN Signal Processing) can be switched off, pin 13 and pin 15

4.3.20 Adapter cable 17-pin M23/25-pin D-sub (EnDat)

Old ID 336376-xx
New ID 605426-xx

Connector, 17-pin, female





D-sub connector
25-pin, female

PIN	Signal EnDat	Color	PIN
1	A+	Green/Black	3
2	A–	Yellow/Black	4
3	DATA	Red	15
4	Vacant		–
5	CLOCK	Green	10
6	Vacant		–
7	0 V U_N	White/Green	2
8	Temp+	Yellow	13
9	Temp–	Violet	25
10	+V U_P	Brown/Green	1
11	B+	Blue/Black	6
12	B–	Red/Black	7
13	$\overline{\text{DATA}}$	Black	23
14	$\overline{\text{CLOCK}}$	Brown	12
15	0 V sensor	White	16
16	+V sensor	Blue	14
17	Internal shield		8
–	Vacant		5, 9, 11, 17 – 22, 24
Housing	Shield		Housing

4.3.21 Adapter cable 17-pin/17-pin M23; PWM to motor (Mot.Enc. Signal ~ 1 V_{PP})

ID 336847-xx

Connector, 17-pin, female

Connector, 17-pin, male

PIN	Signal ~ 1 V_{PP}	Color	PIN
1	A+	Green/Black	1
2	A–	Yellow/Black	2
3	R+	Red	3
4	D–	Pink	4
5	C+	Green	5
6	C–	Brown	6
7	0 V U_N	White/Green	7
8	Temp+	Yellow	8
9	Temp–	Violet	9
10	+V U_P	Brown/Green	10
11	B+	Blue/Black	11
12	B–	Red/Black	12
13	R–	Black	13
14	D+	Gray	14
15	0 V sensor	White	15
16	+V sensor	Blue	16
17	Internal shield		17
Housing	External shield		Housing

4.3.22 Adapter cable 17-pin/17-pin M23 (EnDat/SSI)

ID 340302-xx

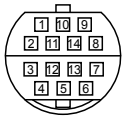
Connector, 17-pin, female

Connector, 17-pin, male

PIN	Signal EnDat/SSI	Color	PIN
1	A+	Green/Black	1
2	A–	Yellow/Black	2
3	DATA	Red	3
4	Vacant		4
5	CLOCK	Green	5
6	Vacant		6
7	0 V U_N	White/Green	7
8	Temp+	Yellow	8
9	Temp–	Violet	9
10	+V U_P	Brown/Green	10
11	B+	Blue/Black	11
12	B–	Red/Black	12
13	$\overline{\text{DATA}}$	Black	13
14	$\overline{\text{CLOCK}}$	Brown	14
15	0 V sensor	White	15
16	+V sensor	Blue	16
17	Internal shield		17
Housing	External shield		Housing

4.3.23 Adapter cable for scanning unit, slimline and full-size, 14-pin/12-pin; M12/M23; 1 m (1 V_{PP}/TTL)

ID 344228-xx



Connector, 14-pin, female

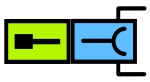
Connector, 12-pin, male

PIN	Signal ⊓⊔ TTL	Signal ∿ 1 V_{PP}	Color	PIN
1	Vacant			–
2				–
3	+Ua0	R+	Red	3
4	–Ua0	R–	Black	4
5	+Ua1	A+	Brown	5
6	–Ua1	A–	Green	6
7	+Ua2	B+	Gray	8
8	–Ua2	B–	Pink	1
9	Vacant		Yellow	9
10	–UaS	Not used	Violet	7
11	+V U_P	+V U_P	Brown/Green	12
12	0 V U_N	0 V U_N	White/Green	10
13	0 V sensor	0 V sensor	White	11
14	+V sensor	+V sensor	Blue	2

4.3.24 Adapter connector Zn/Z1 transforms Mot.Enc. into Pos.Enc.

ID 349312-01

Connector, 17-pin, male



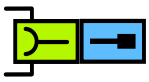
Connector, 17-pin, female

	PWM side (Pos.Enc.) PIN	Signal ~ 1 V_{PP}	Color	Motor side (Mot.Enc.) PIN
	1	+V sensor	Blue	16
	2	R–	Black	13
	3	R+	Red	3
	4	0 V sensor	White	15
	5	Temp+	Green	8
	6	Temp–	Brown	9
	7	+V U_P	Brown/Green	10
	8	D–	Violet	4
	9	D+	Yellow	14
	10	0 V U_N	White/Green	7
	11	Internal shield		17
	12	B+	Blue/Black	11
	13	B–	Red/Black	12
	14	C+	Gray	5
	15	A+	Green/Black	1
	16	A–	Yellow/Black	2
	17	C–	Pink	6

4.3.25 Adapter connector Zn/Z1 transforms Pos.Enc. into Mot.Enc.

ID 349312-02

Connector, 17-pin, female



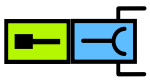
Connector, 17-pin, male

	PWM side (Pos.Enc.) PIN	Signal ~ 1 V_{PP}	Color	Motor side (Mot.Enc.) PIN
	1	+V sensor	Blue	16
	2	R–	Black	13
	3	R+	Red	3
	4	0 V sensor	White	15
	5	Temp+	Green	8
	6	Temp–	Brown	9
	7	+V U_P	Brown/Green	10
	8	D–	Violet	4
	9	D+	Yellow	14
	10	0 V U_N	White/Green	7
	11	Internal shield		17
	12	B+	Blue/Black	11
	13	B–	Red/Black	12
	14	C+	Gray	5
	15	A+	Green/Black	1
	16	A–	Yellow/Black	2
	17	C–	Pink	6

4.3.26 Adapter connector EnDat/SSI transforms Mot.Enc. into Pos.Enc.

ID 349312-03

Connector, 17-pin, male



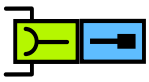
Connector, 17-pin, female

	PWM side (Pos.Enc.) PIN	Signal $\overrightarrow{\text{EnDat}}\overleftarrow{\text{/SSI}}$	Color	Motor side (Mot.Enc.) PIN
	1	+V sensor	Blue	16
	2	Vacant		–
	3	Vacant		–
	4	0 V sensor	White	15
	5	Temp+	Green	8
	6	Temp–	Brown	9
	7	+V U_P	Brown/Green	10
	8	CLOCK	Violet	5
	9	$\overline{\text{CLOCK}}$	Yellow	14
	10	0 V U_N	White/Green	7
	11	Internal shield		17
	12	B+	Blue/Black	11
	13	B–	Red/Black	12
	14	DATA	Gray	3
	15	A+	Green/Black	1
	16	A–	Yellow/Black	2
	17	$\overline{\text{DATA}}$	Pink	13

4.3.27 Adapter connector EnDat/SSI transforms Pos.Enc. into Mot.Enc.

ID 349312-04

Connector, 17-pin, female



Connector, 17-pin, male

	PWM side (Pos.Enc. EnDat) PIN	Signal EnDat/SSI	Color	Motor side (Mot.Enc. EnDat) PIN
	1	+V sensor	Blue	16
	2	Vacant		–
	3	Vacant		–
	4	0 V sensor	White	15
	5	Temp+	Green	8
	6	Temp–	Brown	9
	7	+V U_P	Brown/Green	10
	8	CLOCK	Violet	5
	9	$\overline{\text{CLOCK}}$	Yellow	14
	10	0 V U_N	White/Green	7
	11	Internal shield		17
	12	B+	Blue/Black	11
	13	B–	Red/Black	12
	14	DATA	Gray	3
	15	A+	Green/Black	1
	16	A–	Yellow/Black	2
	17	$\overline{\text{DATA}}$	Pink	13

4.3.28 Connecting cable 17-pin/17-pin M23 (Fanuc/Mitsubishi)

ID 349314-xx

Connector, 17-pin, female

Connector, 17-pin, male

PIN	Signal	Color	PIN
1	+V sensor	Blue	1
4	0 V sensor	White	4
7	+V U_P	Brown/Green	7
8	Request Frame	Violet	8
9	$\overline{\text{Request Frame}}$	Yellow	9
10	0 V U_N	White/Green	10
14	DATA	Gray	14
17	$\overline{\text{DATA}}$	Pink	17
2, 3, 5, 6, 11, 12, 13, 15, 16	Vacant		2, 3, 5, 6, 11, 12, 13, 15, 16
Housing	External shield		Housing

4.3.29 Adapter cable Rexroth Indramat M23, 12-pin encoded/M23 17-pin (I²C)

ID 349595-xx

Connector, 12-pin, female

Connector, 17-pin, male

PIN	Signal Indramat	Color	Signal HEIDENHAIN	PIN
1	Cos–	Blue/Black	B+	12
2	SCL	Violet	SCL	8
3	F Sample	Yellow	F Sample	9
4	SD in	Gray	SD out	14
5	Sin+	Yellow/Black	A–	16
6	Sin–	Green/Black	A+	15
7	SD out	Pink	SD in	17
8	Cos+	Red/Black	B–	13
10	0 V	White/Green	0 V U_N	10
12	+V	Brown/Green	+V U_P	7
–		Internal shield		11
9, 11		Vacant		1, 2, 3, 4, 5, 6

4.3.30 Adapter cable with PCB connector 17-pin M23/12-pin (EnDat/SSI)

ID 349839-xx

Connector, 17-pin, male

PCB connector, 12-pin

PIN	Signal EnDat/SSI	Color	PIN
1	+V sensor	Blue	6a
2	Vacant	Black	–
3	Vacant	Red	–
4	0 V sensor	White	3a
5	Temp+	Green	–
6	Temp–	Brown	–
7	+V U_P	Brown/Green	1b
8	CLOCK	Violet	2b
9	$\overline{\text{CLOCK}}$	Yellow	5a
10	0 V U_N	White/Green	4b
11	Internal shield		–
12	B+	Blue/Black	4a
13	B–	Red/Black	3b
14	DATA	Gray	6b
15	A+	Green/Black	2a
16	A–	Yellow/Black	5b
17	$\overline{\text{DATA}}$	Pink	1a

4.3.31 Connecting cable 15-pin/15-pin D-sub (TTL); PWT test pulse, HSP

ID 354379-xx

D-sub connector 15-pin, female

D-sub connector, 15-pin, male

PIN	Signal ⊓⊔ TTL	Color	PIN
1	+Ua1	Brown	1
2	0 V U_N	White/Green	2
3	+Ua2	Gray	3
4	+V U_P	Brown/Green	4
5	Not wired		5
6	L2 (limit position)	Yellow/Black	6
7	–Ua0	Black	7
8	L1 (limit position)	Green/Black	8
9	–Ua1	Green	9
10	0 V sensor	White	10
11	–Ua2	Pink	11
12	+V sensor	Blue	12
13	–UaS, HSP[1)]	Violet	13
14	+Ua0	Red	14
15	PWT test pulse[2)], HSP[1)]	Yellow	15
Housing	External shield	Shield	Housing

1) HSP (HEIDENHAIN Signal Processing) can be switched off, pin 13 and pin 15

2) PWT switchover, PWT test pulse (+5 V) pin 15

4.3.32 Connecting cable 15-pin/15-pin D-sub (1 V_{PP}/TTL), PWT test pulse, HSP

ID 355186-xx

D-sub connector 15-pin, female

D-sub connector, 15-pin, male

PIN	Signal ~ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	A+	+Ua1	Brown	1
2	0 V U_N	0 V U_N	White/Green	2
3	B+	+Ua2	Gray	3
4	+V U_P	+V U_P	Brown/Green	4
5	Not wired			5
6	Not wired			6
7	R–	–Ua0	Black	7
8	Not wired			8
9	A–	–Ua1	Green	9
10	0 V sensor	0 V sensor	White	10
11	B–	–Ua2	Pink	11
12	+V sensor	+V sensor	Blue	12
13	HSP[1)]	–UaS, HSP[1)]	Violet	13
14	R+	+Ua0	Red	14
15	HSP[1)]	PWT test pulse[2)], HSP[1)]	Yellow	15
Housing	External shield			Housing

1) HSP (HEIDENHAIN Signal Processing) can be switched off, pin 13 and pin 15

2) TTL : PWT switchover, PWT test pulse (+5 V) pin 15

4.3.33 Connecting cable 15-pin/15-pin D-sub (1 V_{PP}/TTL), PWT test pulse, HSP

ID 355397-xx

D-sub connector 15-pin, female

D-sub connector, 15-pin, male

PIN	Signal ~ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	A+	+Ua1	Brown	1
2	0 V U_N	0 V U_N	White/Green	2
3	B+	+Ua2	Gray	3
4	+V U_P	+V U_P	Brown/Green	4
5	Not wired			5
6	L2 (limit-position)	L2 (limit-position)	Yellow/Black	6
7	R–	–Ua0	Black	7
8	L1 (limit-position)	L1 (limit-position)	Green/Black	8
9	A–	–Ua1	Green	9
10	0 V sensor	0 V sensor	White	10
11	B–	–Ua2	Pink	11
12	+V sensor	+V sensor	Blue	12
13	HSP[1)]	–UaS, HSP[1)]	Violet	13
14	R+	+Ua0	Red	14
15	HSP[1)]	PWT test pulse[2)], HSP[1)]	Yellow	15
Housing	External shield			Housing

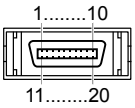
1) HSP (HEIDENHAIN Signal Processing) can be switched off, pin 13 and pin 15

2) TTL : PWT switchover, PWT test pulse (+5 V) pin 15

4.3.34 Adapter cable 17-pin M23/20-pin (Mitsubishi)

ID 367958-xx

Connector, 17-pin, female



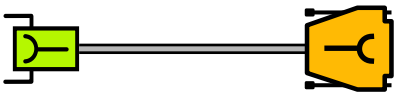
Connector, 20-pin, male

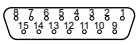
PIN	Signal	Color	PIN
1	+V sensor	Blue	19
4	0 V sensor	White	11
7	+V U_P	Brown/Green	20
8	Request Frame	Violet	7
9	$\overline{\text{Request Frame}}$	Yellow	17
10	0 V U_N	White/Green	1
14	DATA	Gray	6
17	$\overline{\text{DATA}}$	Pink	16
2, 3, 5, 6, 11, 12, 13, 15, 16	Vacant		2, 3, 4, 5, 8, 9, 10, 12, 13, 14, 15, 18
Housing	External shield		Housing

4.3.35 Adapter cable 15-pin D-sub/9-pin M23 (11 μA_{PP}) PWM X2 OUT

ID 368171-xx

Connector, 9-pin, female





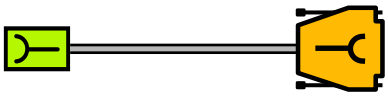
D-sub connector
15-pin, female

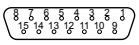
PIN	Signal ~ 11 μA_{PP}	Color	PIN
1	0°+	Green	3
2	0°–	Yellow	4
3	+V U_P	Brown	1
4	0 V U_N	White	2
5	90°+	Blue	6
6	90°–	Red	7
7	RI+	Gray	10
8	RI–	Pink	12
9	Internal shield	White/Brown	13
	Vacant		5, 8, 9, 11, 14, 15
Housing	External shield	Shield	Housing

4.3.36 Adapter cable 15-pin D-sub/9-pin M23 (11 μA_{PP}) PWM X2 OUT

ID 368172-xx

Connector, 9-pin, female



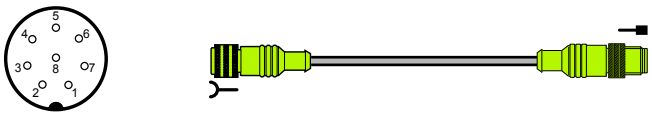


D-sub connector
15-pin, female

PIN	Signal ~ 11 μA_{PP}	Color	PIN
1	0°+	Green	3
2	0°–	Yellow	4
3	+V U_P	Brown	1
4	0 V U_N	White	2
5	90°+	Blue	6
6	90°–	Red	7
7	RI+	Gray	10
8	RI–	Pink	12
9	Internal shield	White/Brown	13
	Vacant		5, 8, 9, 11, 14, 15
Housing	External shield	Shield	Housing

4.3.37 Connecting cable 8-pin/8-pin M12 (EnDat)

ID 368330-xx



Connector, 8-pin, female

Connector, 8-pin, male

PIN	Signal EnDat	Color	PIN
1	0 V sensor	White	1
2	+V sensor	Blue	2
3	DATA	Gray	3
4	$\overline{\text{DATA}}$	Pink	4
5	0 V U_N	White/Green	5
6	$\overline{\text{CLOCK}}$	Yellow	6
7	CLOCK	Violet	7
8	+V U_P	Brown/Green	8
Housing	External shield	Shield	Housing

4.3.38 Adapter connector; coupling to connector; 12-pin; M23/M23 (1 V_{PP}/TTL), PWT test pulse, HSP

ID 373848-xx

Connector, 12-pin, female

Connector, 12-pin, male

PIN	Signal ∿ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	B–	–Ua2	Pink	1
2	+V sensor	+V sensor	Blue	2
3	R+	+Ua0	Red	3
4	R–	–Ua0	Black	4
5	A+	+Ua1	Brown	5
6	A–	–Ua1	Green	6
7	–UaS, HSP[1)]	–UaS, HSP[1)]	Violet	7
8	B+	+Ua2	Gray	8
9	HSP[1)]	PWT test pulse[2)], HSP[1)]	Yellow	9
10	0 V U_N	0 V U_N	White/Green	10
11	0 V sensor	0 V sensor	White	11
12	+V U_P	+V U_P	Brown/Green	12
Housing	External shield		Shield	Housing

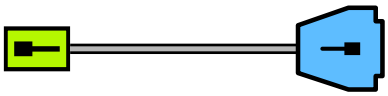
1) HSP (HEIDENHAIN Signal Processing) can be switched off, pin 7 and pin 9

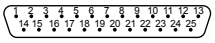
2) TTL : PWT switchover, PWT test pulse (+5 V) pin 9

4.3.39 Adapter cable 17-pin M23/25-pin D-sub (EnDat, 1 V_{PP} Zn/Z1)

ID 509666-xx

Connector, 17-pin, male



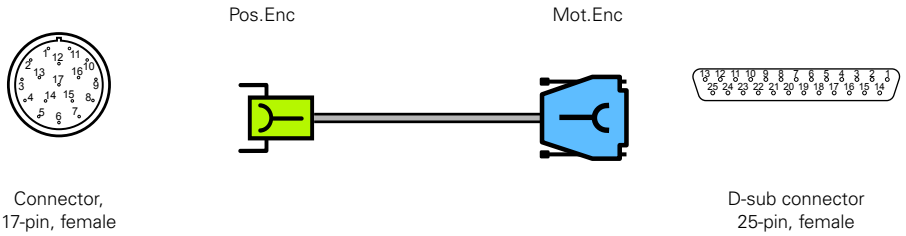


D-sub connector, 25-pin, male

PIN	Signal EnDat	Signal ~ 1 V_{PP}	Color	PIN
1	+V sensor	+V sensor	Blue	14
2	Vacant	R–	Black	18
3	Vacant	R+	Red	17
4	0 V sensor	0 V sensor	White	16
5	Temp+	Temp+	Green	13
6	Temp–	Temp–	Brown	25
7	+V U_P	+V U_P	Brown/Green	1
8	CLOCK	D–	Violet	10, 22 (bridge)
9	$\overline{\text{CLOCK}}$	D+	Yellow	12, 21 (bridge)
10	0 V U_N	0 V U_N	White/Green	2
11	Internal shield			8
12	B+	B+	Blue/Black	6
13	B–	B–	Red/Black	7
14	DATA	C+	Gray	15, 19 (bridge)
15	A+	A+	Green/Black	3
16	A–	A–	Yellow/Black	4
17	$\overline{\text{DATA}}$	C–	Pink	20, 23 (bridge)
–	–	–	Vacant	5, 9, 11, 24
Housing	External shield		Shield	Housing

4.3.40 Adapter cable 17-pin M23/25-pin D-sub (EnDat with A/B signals)

ID 509667-xx

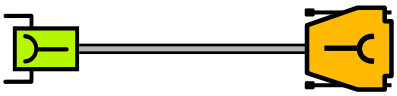


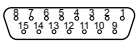
PIN	Signal EnDat	Color	PIN
1	+V sensor	Blue	14
4	0 V sensor	White	16
5	Temp+	Yellow	13
6	Temp–	Violet	25
7	+V U_P	Brown/Green	1
8	CLOCK	Green	10
9	$\overline{\text{CLOCK}}$	Brown	12
10	0 V U_N	White/Green	2
11	Internal shield		8
12	B+	Blue/Black	6
13	B–	Red/Black	7
14	DATA	Red	15
15	A+	Green/Black	3
16	A–	Yellow/Black	4
17	$\overline{\text{DATA}}$	Black	23
2, 3	Vacant		5, 9, 11, 17, 18, 19, 20, 21, 22, 24
Housing	External shield	Shield	Housing

4.3.41 Adapter cable 17-pin M23/15-pin D-sub (1 V_{PP}/EnDat)

ID 510616-N3

Connector,
17-pin, female





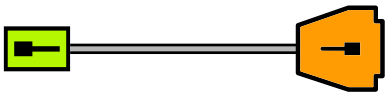
D-sub connector
15-pin, female

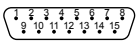
PIN	Signal ~ 1 V_{PP}	Signal EnDat	Color	PIN
1	+V sensor	+V sensor	Blue	9
2	R–	Vacant	Black	12
3	R+	Vacant	Red	10
4	0 V sensor	0 V sensor	White	11
5	Temp+	Vacant	Green	–
6	Temp–	Vacant		–
7	+V U_P	+V U_P	Brown/Green	1
8	Vacant	CLOCK	Violet	14
9	Vacant	$\overline{\text{CLOCK}}$	Yellow	15
10	0 V U_N	0 V U_N	White/Green	2
11	Internal shield			13
12	B+	B+	Blue/Black	6
13	B–	B–	Red/Black	7
14	Vacant	DATA	Gray	5
15	A+	A+	Green/Black	3
16	A–	A–	Yellow/Black	4
17	Vacant	$\overline{\text{DATA}}$	Pink	8
Housing	External shield		Shield	Housing

4.3.42 Adapter cable 17-pin M23/15-pin D-sub (1 V_{PP}/EnDat)

ID 510617-xx

Connector, 17-pin, male





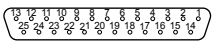
D-sub connector, 15-pin, male

PIN	Signal ~ 1 V_{PP}	Signal EnDat	Color	PIN
1	+V sensor	+V sensor	Blue	9
2	R–	Vacant	Black	12
3	R+	Vacant	Red	10
4	0 V sensor	0 V sensor	White	11
5	Temp+	Vacant	Green	–
6	Temp–	Vacant		–
7	+V U_P	+V U_P	Brown/Green	1
8	Vacant	CLOCK	Violet	14
9	Vacant	$\overline{\text{CLOCK}}$	Yellow	15
10	0 V U_N	0 V U_N	White/Green	2
11	Internal shield			13
12	B+	B+	Blue/Black	6
13	B–	B–	Red/Black	7
14	Vacant	DATA	Gray	5
15	A+	A+	Green/Black	3
16	A–	A–	Yellow/Black	4
17	Vacant	$\overline{\text{DATA}}$	Pink	8
Housing	External shield		Shield	Housing

4.3.43 Adapter cable 17-pin M23/25-pin; TNC with 25-pin D-sub connector (Pos.Enc./Mot.Enc. 1 V_{PP} Zn/Z1)

ID 511886-xx

Connector,
17-pin, female

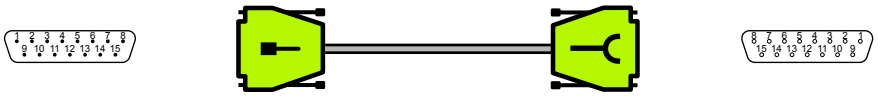


D-sub connector
25-pin, female

PIN	Signal ~ 1 V_{PP}	Color	PIN
1	+V sensor	Blue	14
2	R–	Black	18
3	R+	Red	17
4	0 V sensor	White	16
5	Temp+	Yellow	13
6	Temp–	Violet	25
7	+V U_P	Brown/Green	1
8	D–	Pink	22
9	D+	Gray	21
10	0 V U_N	White/Green	2
11	Internal shield		8
12	B+	Blue/Black	6
13	B–	Red/Black	7
14	C+	Green	19
15	A+	Green/Black	3
16	A–	Yellow/Black	4
17	C–	Brown	20
–	–	Vacant	5, 9, 10, 11, 12, 15, 23, 24
Housing	External shield	Shield	Housing

4.3.44 Connecting cable 15-pin/15-pin D-sub (1 V_{PP}/EnDat)

ID 517673-xx



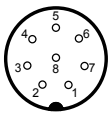
D-sub connector, 15-pin, male

D-sub connector 15-pin, female

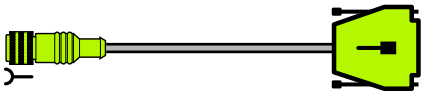
PIN	Signal ~ 1 V_{PP}	Signal EnDat	Color	PIN
1	A+	A+	Green/Black	1
2	0 V U_N	0 V U_N	White/Green	2
3	B+	B+	Blue/Black	3
4	+V U_P	+V U_P	Brown/Green	4
5	C+	DATA	Gray	5
6	Internal shield			6
7	R–	Vacant	Black	7
8	D–	CLOCK	Violet	8
9	A–	A–	Yellow/Black	9
10	0 V sensor	0 V sensor	White	10
11	B–	B–	Red/Black	11
12	+V sensor	+V sensor	Blue	12
13	C–	$\overline{\text{DATA}}$	Pink	13
14	R+	Vacant	Red	14
15	D+	$\overline{\text{CLOCK}}$	Yellow	15
Housing	External shield		Shield	Housing

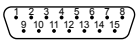
4.3.45 Adapter cable 8-pin M12/15-pin D-sub (EnDat)

ID 524599-xx



Connector, 8-pin, female





D-sub connector, 15-pin, male

PIN	Signal EnDat	Color	PIN
1	0 V sensor	White	10
2	+V sensor	Blue	12
3	DATA	Gray	5
4	$\overline{\text{DATA}}$	Pink	13
5	0 V U_N	White/Green	2
6	$\overline{\text{CLOCK}}$	Yellow	15
7	CLOCK	Violet	8
8	+V U_P	Brown/Green	4
–	–	Vacant	1, 3, 6, 7, 9, 11, 14
Housing	External shield	Shield	Housing

4.3.46 Adapter cable 8-pin M12/12-pin (EnDat); PCB connector to subsequent electronics

ID 530351-03

Connector, 8-pin, male

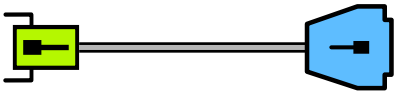
PCB connector, 12-pin

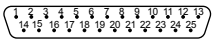
PIN	Signal EnDat	Color	PIN
1	0 V sensor	White	3a
2	+V sensor	Blue	6a
3	DATA	Gray	6b
4	$\overline{\text{DATA}}$	Pink	1a
5	0 V U_N	White/Green	4b
6	$\overline{\text{CLOCK}}$	Yellow	5a
7	CLOCK	Violet	2b
8	+V U_P	Brown/Green	1b
–	–	Vacant	2a, 4a, 3b, 5b
Housing	External shield	Shield	Housing

4.3.47 Adapter cable 25-pin D-sub (Mot.Enc.)/12-pin M23 (Pos.Enc.) for PWM IN

ID 533055-01

Connector, 12-pin, male



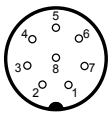


D-sub connector, 25-pin, male

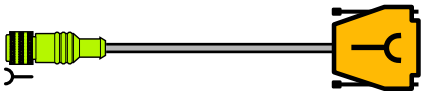
PIN	Signal ∿ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	B–	–Ua2	Pink	7
2	+V sensor	+V sensor	Blue	14
3	R+	+Ua0	Red	17
4	R–	–Ua0	Black	18
5	A+	+Ua1	Brown	3
6	A–	–Ua1	Green	4
7	Vacant			–
8	B+	+Ua2	Gray	6
9	Vacant			–
10	0 V U_N	0 V U_N	White/Green	2
11	0 V sensor	0 V sensor	White	16
12	+V U_P	+V U_P	Brown/Green	1
–	–	–	Vacant	5, 8 – 13, 15, 19 – 25
Housing	External shield			Housing

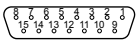
4.3.48 Adapter cable 8-pin M12/15-pin D-sub (EnDat)

ID 533627-xx



Connector, 8-pin, female





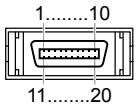
D-sub connector
15-pin, female

PIN	Signal EnDat	Color	PIN
1	0 V sensor	White	11
2	+V sensor	Blue	9
3	DATA	Gray	5
4	$\overline{\text{DATA}}$	Pink	8
5	0 V U_N	White/Green	2
6	$\overline{\text{CLOCK}}$	Yellow	15
7	CLOCK	Violet	14
8	+V U_P	Brown/Green	1
–	–	Vacant	3, 4, 6, 7, 10, 12, 13
Housing	External shield		Housing

4.3.49 Adapter cable 17-pin M23/20-pin (Fanuc)

ID 550161-01

Connector, 17-pin, male



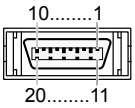
Connector, 20-pin, male

PIN	Signal	Color	PIN
1	+V sensor	Blue	18, 20
4	0 V sensor	White	14
7	+V U_P	Brown/Green	9
8	Request Frame	Violet	5
9	$\overline{\text{Request Frame}}$	Yellow	6
10	0 V U_N	White/Green	12
14	DATA	Gray	1
17	$\overline{\text{DATA}}$	Pink	2
2, 3, 5, 6, 11, 12, 13, 15, 16	Vacant		3, 4, 7, 8, 10, 11, 13, 15, 17, 19
Housing	External shield		16

4.3.50 Adapter cable 17-pin M23/20-pin (Fanuc)

ID 550162-01

Connector,
17-pin, female



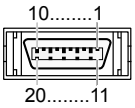
Connector,
20-pin, female

PIN	Signal	Color	PIN
1	+V sensor	Blue	18, 20
4	0 V sensor	White	14
7	+V U_P	Brown/Green	9
8	Request Frame	Violet	5
9	$\overline{\text{Request Frame}}$	Yellow	6
10	0 V U_N	White/Green	12
14	DATA	Gray	1
17	$\overline{\text{DATA}}$	Pink	2
2, 3, 5, 6, 11, 12, 13, 15, 16	Vacant		3, 4, 7, 8, 10, 11, 13, 15, 17, 19
Housing	External shield		16

4.3.51 Adapter cable 12-pin M23/20-pin (Fanuc)

ID 556558-xx

Connector,
12-pin, female



Connector,
20-pin, female

PIN	Signal ⊓⊔ TTL	Color	PIN
1	–Ua2	Pink	4
2	+V sensor	Blue	18, 20
3	+Ua0	Red	5
4	–Ua0	Black	6
5	+Ua1	Brown	1
6	–Ua1	Green	2
7	–UaS	Violet	–
8	+Ua2	Gray	3
9	Vacant	Yellow	7
10	0 V U_N	Gray	12
11	0 V sensor	White	14
12	+V U_P	Brown/Green	9
		Vacant	8, 10, 11, 13, 15, 17, 19
Housing	External shield		16

4.3.52 Adapter cable 17-pin M23/10-pin (Mitsubishi)

ID 573661-xx

Connector,
17-pin, female

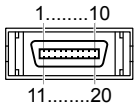
Connector,
10-pin, female

PIN	Signal	Color	PIN
7	+V U_P	Brown/Green	1
8	Request Frame	Violet	3
9	$\overline{\text{Request Frame}}$	Yellow	4
10	0 V U_N	White/Green	2
14	DATA	Gray	7
17	$\overline{\text{DATA}}$	Pink	8
1 – 6, 11 – 13, 15, 16	Vacant		5, 6, 9, 10
Housing	External shield		Housing

4.3.53 Adapter cable 12-pin M23/20-pin (Fanuc)

ID 577345-01

Connector, 12-pin, male



Connector, 20-pin, male

PIN	Signal ⊓⊔ TTL	Color	PIN
1	–Ua2	Pink	4
2	+V sensor	Blue	18, 20
3	+Ua0	Red	5
4	–Ua0	Black	6
5	+Ua1	Brown	1
6	–Ua1	Green	2
7	–UaS	Violet	–
8	+Ua2	Gray	3
9	–	Yellow	–
10	0 V U_N	White/Green	12
11	0 V sensor	White	14
12	+V U_P	Brown/Green	9
–	–	Vacant	7, 8, 10, 11, 13, 15, 17, 19
Housing	External shield		16

4.3.54 Adapter cable 12-pin M23/12-pin; PWM to PCB connector (1 V_{PP}, TTL, HTL) (Pos.Enc.)

ID 591118-xx

Connector, 12-pin, male

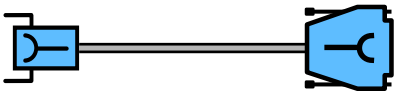
PCB connector, 12-pin

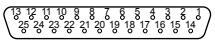
PIN	Signal ⊓⊔ TTL/HTL	Signal ∿ 1 V_{PP}	Color	PIN
1	–Ua2	B–	Pink	5a
2	+V sensor	+V sensor	Blue	2b
3	+Ua0	R+	Red	4b
4	–Ua0	R–	Black	4a
5	+Ua1	A+	Brown	6b
6	–Ua1	A–	Green	6a
7	–UaS	–UaS	Violet	3a
8	+Ua2	B+	Gray	5b
9	Vacant			3b
10	0 V U_N	0 V U_N	White/Green	1a
11	0 V sensor	0 V sensor	White	1b
12	+V U_P	+V U_P	Brown/Green	2a

4.3.55 Adapter cable 17-pin M23/25-pin D-sub (EnDat)

ID 605426-xx

Connector,
17-pin, female



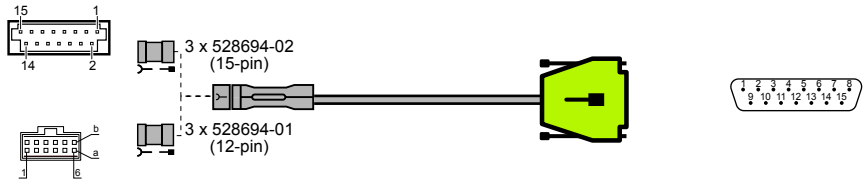


D-sub connector
25-pin, female

PIN	Signal EnDat	Color	PIN
1	A+	Green/Black	3
2	A–	Yellow/Black	4
3	DATA	Red	15
5	CLOCK	Green	10
7	0 V U_N	White/Green	2
8	Temp+	Yellow	13
9	Temp–	Violet	25
10	+V U_P	Brown/Green	1
11	B+	Blue/Black	6
12	B–	Red/Black	7
13	$\overline{\text{DATA}}$	Black	23
14	$\overline{\text{CLOCK}}$	Brown	12
15	0 V sensor	White	16
16	+V sensor	Blue	14
17	Internal shield		8
4, 6	Vacant		5, 9, 11, 17 – 22, 24
Housing	External shield		Housing

4.3.56 Adapter cable for PCB connector 12-pin/15-pin D-sub (EnDat)

ID 621742-01



PCB connector, 15-pin
ID 528694-02
PCB connector, 12-pin
ID 528694-01

Adapter cable
ID 528015-xx

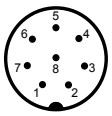
D-sub connector, 15-pin, male

12-PIN	15-PIN	Signal EnDat	Color	PIN
2a	1	A+	Green/Black	1
4b	14	0 V U_N	White/Green	2
4a	3	B+	Blue/Black	3
1b	13	+V U_P	Brown/Green	4
6b	7	DATA	Gray	5
–	–	Internal shield		6
–	–	–	Black	7
2b	9	CLOCK	Violet	8
5b	2	A–	Yellow/Black	9
3a	12	0 V sensor	White	10
3b	4	B–	Red/Black	11
6a	11	+V sensor	Blue	12
1a	8	$\overline{\text{DATA}}$	Pink	13
–	–	–	Red	14
5a	10	$\overline{\text{CLOCK}}$	Yellow	15

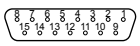
The set of adapter cables (ID 621742-01) consists of:
- 1 × adapter cable ID 528015-xx
- 3 × insert for adapter connector ID 528694-02 (15-pin)
- 3 × insert for adapter connector ID 528694-01 (12-pin)

4.3.57 Adapter cable 15-pin D-sub/8-pin M12 (EnDat)

ID 628186-xx



Connector, 8-pin, male

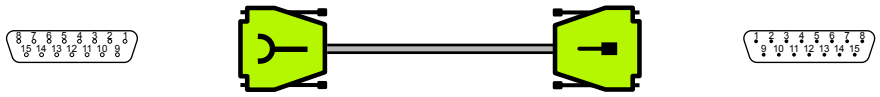


D-sub connector
15-pin, female

PIN	Signal EnDat	Color	PIN
1	0 V sensor	White	10
2	+V sensor	Blue	12
3	DATA	Gray	5
4	$\overline{\text{DATA}}$	Pink	13
5	0 V U_N	White/Green	2
6	$\overline{\text{CLOCK}}$	Yellow	15
7	CLOCK	Violet	8
8	+V U_P	Brown/Green	4
	Vacant		1, 3, 6, 7, 9, 11, 14
Housing	External shield		Housing

4.3.58 Connecting cable 15-pin/15-pin D-sub (1 V_{PP}/TTL)

ID 633811-xx



D-sub connector 15-pin, female

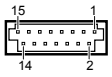
D-sub connector, 15-pin, male

PIN	Signal ~ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	A+	+Ua1	Brown	1
2	0 V U_N	0 V U_N	White/Green	2
3	B+	+Ua2	Gray	3
4	+V U_P	+V U_P	Brown/Green	4
5	Vacant			5
6	Vacant			6
7	R–	–Ua0	Black	7
8	Vacant			8
9	A–	–Ua1	Green	9
10	0 V sensor	0 V sensor	White	10
11	B–	–Ua2	Pink	11
12	+V sensor	+V sensor	Blue	12
13	Vacant			13
14	R+	+Ua0	Red	14
15	Vacant			15
Housing	External shield			Housing

4.3.59 Adapter cable with PCB connector 17-pin M23/15-pin (EnDat)

ID 635349-xx

Connector, 17-pin, male

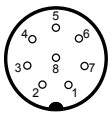


PCB connector, 15-pin

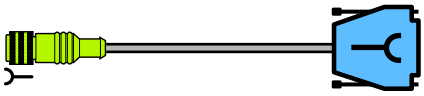
PIN	Signal EnDat	Color	PIN
1	+V sensor	Blue	11
2	Vacant	Black	–
3	Vacant	Red	–
4	0 V sensor	White	12
5	Temp+	Green	5
6	Temp–	Brown	6
7	+V U_P	Brown/Green	13
8	CLOCK	Violet	9
9	$\overline{\text{CLOCK}}$	Yellow	10
10	0 V U_N	White/Green	14
11	Internal shield		–
12	B+	Blue/Black	3
13	B–	Red/Black	4
14	DATA	Gray	7
15	A+	Green/Black	1
16	A–	Yellow/Black	2
17	$\overline{\text{DATA}}$	Pink	8

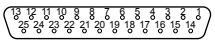
4.3.60 Adapter cable 8-pin M12/25-pin D-sub (EnDat)

ID 641926-xx



Connector, 8-pin, female





D-sub connector
25-pin, female

PIN	Signal EnDat	Color	PIN
1	0 V sensor	White	16
2	+V sensor	Blue	14
3	DATA	Gray	15
4	$\overline{\text{DATA}}$	Pink	23
5	0 V U_N	White/Green	2
6	$\overline{\text{CLOCK}}$	Yellow	12
7	CLOCK	Violet	10
8	+V U_P	Brown/Green	1
	Vacant		3 – 9, 11, 13, 17 – 22, 24, 25
Housing	External shield		Housing

4.3.61 Adapter cable 12-pin M12/17-pin M32 (EnDat) with Ultra Lock connector

ID 643450-xx

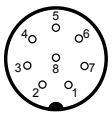
Connector, 12-pin, female

Connector, 17-pin, male

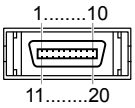
PIN	Signal EnDat	Color	PIN
1	+V U_P	Brown/Green	7
2	A–	Yellow/Black	16
3	B+	Blue/Black	12
4	B–	Red/Black	13
5	0 V sensor	White	4
6	DATA	Gray	14
7	$\overline{\text{DATA}}$	Pink	17
8	$\overline{\text{CLOCK}}$	Yellow	9
9	CLOCK	Violet	8
10	A+	Green/Black	15
11	+V sensor	Blue	1
12	0 V U_N	White/Green	10
	Vacant		2, 3, 5, 6, 11
Housing	External shield	Shield	Housing

4.3.62 Adapter cable 8-pin M12/20-pin (Mitsubishi)

ID 646806-xx



Connector, 8-pin, female

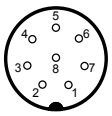


Connector, 20-pin, male

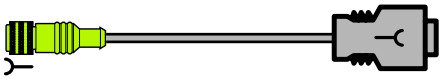
PIN	Signal	Color	PIN
1	0 V sensor	White	11
2	+V sensor	Blue	19
3	DATA	Gray	6
4	$\overline{\text{DATA}}$	Pink	16
5	0 V U_N	White/Green	1
6	$\overline{\text{Request Frame}}$	Yellow	17
7	Request Frame	Violet	7
8	+V U_P	Brown/Green	20
	Vacant		2 – 5, 8 – 10, 12 – 15, 18
Housing	External shield		Housing

4.3.63 Adapter cable 8-pin M12/10-pin (Mitsubishi)

ID 647314-xx



Connector, 8-pin, female



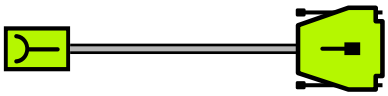
Connector,
10-pin, female

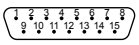
PIN	Signal	Color	PIN
3	DATA	Gray	7
4	$\overline{\text{DATA}}$	Pink	8
5	0 V U_N	White/Green	2
6	$\overline{\text{Request Frame}}$	Yellow	4
7	Request Frame	Violet	3
8	+V U_P	Brown/Green	1
1, 2	Vacant		5, 6, 9, 10
Housing	External shield		Housing

4.3.64 Adapter cable 15-pin D-sub/9-pin M23 (11 μA_{PP})

ID 653231-xx

Connector, 9-pin, female



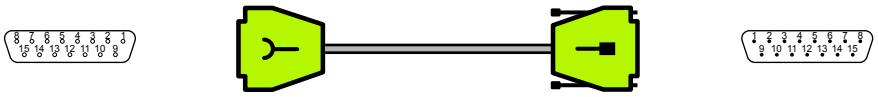


D-sub connector, 15-pin, male

PIN	Signal ~ 11 μA_{PP}	Color	PIN
1	0°+	Green	1
2	0°–	Yellow	9
3	+V U_P	Brown	4
4	0 V U_N	White	2
5	90°+	Blue	3
6	90°–	Red	11
7	RI+	Gray	14
8	RI–	Pink	7
9	Internal shield	White/Brown	6
	Vacant		5, 8, 10, 12, 13, 15
Housing	External shield		Housing

4.3.65 Connecting cable 15-pin/15-pin D-sub (1 V_{PP}/EnDat)

ID 675582-xx



D-sub connector 15-pin, female

D-sub connector, 15-pin, male

PIN	Signal ~ 1 V_{PP}	Signal EnDat	Color	PIN
1	A+	A+	Green/Black	1
2	0 V U_N	0 V U_N	White/Green	2
3	B+	B+	Blue/Black	3
4	+V U_P	+V U_P	Brown/Green	4
5	C+	DATA	Gray	5
6	Internal shield			6
7	R–	Vacant	Black	7
8	D–	CLOCK	Violet	8
9	A–	A–	Yellow/Black	9
10	0 V sensor	0 V sensor	White	10
11	B–	B–	Red/Black	11
12	+V sensor	+V sensor	Blue	12
13	C–	$\overline{\text{DATA}}$	Pink	13
14	R+	Vacant	Red	14
15	D+	$\overline{\text{CLOCK}}$	Yellow	15
Housing	External shield			Housing

4.3.66 Connecting cable for LIP 2xx compensation 15-pin/15-pin D-sub (1 V_{PP}) PWM X1 IN

ID 735541-xx

D-sub connector 15-pin, female

PWM IN

D-sub connector, 15-pin, male

PIN	Signal ~ 1 V_{PP}	Color	PIN
1	A+	Brown	1
2	0 V U_N		2
3	B+	Gray	3
4	+V U_P	Brown/Green	4
5	Self-test signal	Red/Black	5
6	Vacant		6
7	R–	Black	7
8	Vacant		8
9	A–	Green	9
10	0 V sensor	White	10
11	B–	Pink	11
12	+V sensor	Blue	12
13	CLOCK	Violet	13
14	R+	Red	14
15	DATA	Yellow	15
Housing	External shield		Housing

⚠ WARNING

Axes moving uncontrolled

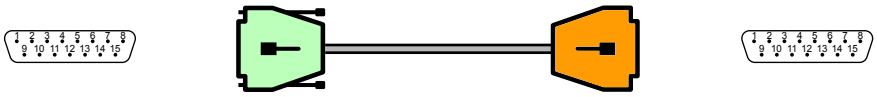
Property damage, injury or death

Three additional pins are assigned for LIP 2xx adjustment.

- Do not start the adjustment, if the PWM is in feed-through mode

4.3.67 Adapter cable 15-pin/15-pin D-sub (1 V_{PP}/TTL)

ID 739098-N5



D-sub connector, 15-pin, male

D-sub connector, 15-pin, male

PIN	Signal ~ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	A+	+Ua1	Brown	3
2	0 V U_N	0 V U_N	White/Green	2
3	B+	+Ua2	Gray	6
4	+V U_P	+V U_P	Brown/Green	1
7	R–	–Ua0	Black	12
9	A–	–Ua1	Green	4
10	0 V sensor	0 V sensor	White	11
11	B–	–Ua2	Pink	7
12	+V sensor	+V sensor	Blue	9
13	Vacant	–UaS	Violet	14
14	R+	+Ua0	Red	10
15	Vacant	Vacant	Yellow	5
5, 6, 8	Vacant			13-15
Housing	External shield			Housing

4.3.68 Adapter cable SIEMENS RJ45 connector, 8+2-pin (DRIVE-CLiQ)

ID 740059-02

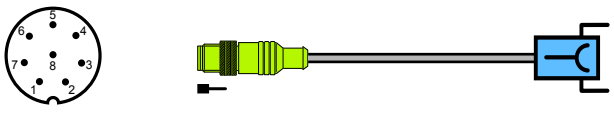
Connector, 10-pin, male

Connector, 10-pin, male

PIN	Signal DRIVE-CLiQ	Color	PIN
1	TX+	Green	3
2	TX–	Yellow	6
3	RX+	Pink	1
6	RX–	Blue	2
A	+V U_P	Red	A
B	0 V U_N	Black	B
4, 5, 7, 8	Vacant		4, 5, 7, 8
Housing	External shield		Housing

4.3.69 Adapter cable 8-pin M12/9-pin M23 (EnDat)

ID 745796-xx



Connector, 8-pin, male

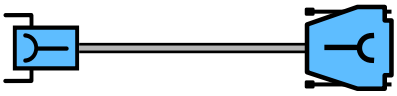
Connector, 9-pin, female

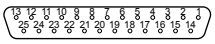
PIN	Signal EnDat	Color	PIN
1	0 V sensor	White	8
2	+V sensor	Blue	7
3	DATA	Gray	5
4	$\overline{\text{DATA}}$	Pink	6
5	0 V U_N	White/Green	4
6	$\overline{\text{CLOCK}}$	Yellow	2
7	CLOCK	Violet	1
8	+V U_P	Brown/Green	3
	Vacant		9
Housing	External shield		Housing

4.3.70 Adapter cable 9-pin M23/25-pin D-sub (EnDat)

ID 745813-xx

Connector, 9-pin, female





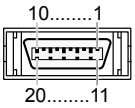
D-sub connector
25-pin, female

PIN	Signal EnDat	Color	PIN
1	CLOCK	Violet	10
2	$\overline{\text{CLOCK}}$	Yellow	12
3	+V U_P	Brown/Green	1
4	0 V U_N	White/Green	2
5	DATA	Gray	15
6	$\overline{\text{DATA}}$	Pink	23
7	+V sensor	Blue	14
8	0 V sensor	White	16
9	Vacant		3 – 9, 11, 13, 17 – 22, 24, 25
Housing	External shield		Housing

4.3.71 Adapter cable 17-pin M23/20-pin (Mitsubishi)

ID 750973-xx

Connector, 17-pin, male



Connector,
20-pin, female

PIN	Signal	Color	PIN
1	+V sensor	Blue	19
4	0 V sensor	White	11
7	+V U_P	Brown/Green	20
8	Request Frame	Violet	7
9	$\overline{\text{Request Frame}}$	Yellow	17
10	0 V U_N	White/Green	1
14	DATA	Gray	6
17	$\overline{\text{DATA}}$	Pink	16
2, 3, 5, 6, 11 – 13, 15, 16	Vacant		2 – 5, 8 – 10, 12 – 15, 18
Housing	External shield		Housing

4.3.72 Adapter cable 17-pin M23/10-pin (Mitsubishi)

ID 750974-xx

Connector, 17-pin, male

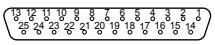
Connector, 10-pin, male

PIN	Signal	Color	PIN
7	+V U_P	Brown/Green	1
8	Request Frame	Violet	3
9	$\overline{\text{Request Frame}}$	Yellow	4
10	0 V U_N	White/Green	2
14	DATA	Gray	7
17	$\overline{\text{DATA}}$	Pink	8
1 – 6, 11 – 13, 15, 16	Vacant		5, 6, 9, 10
Housing	External shield		Housing

4.3.73 Adapter cable for DRIVE-CLiQ 1 V_{PP} 12-pin/25-pin D-sub for PWM OUT

ID 758082-xx

Connector,
12-pin, female



D-sub connector
25-pin, female

PIN	Signal ⌒ 1 V_{PP}	Color	PIN
1	B–	Pink	7
2	+V sensor	Blue	14
3	R+	Red	17
4	R–	Black	18
5	A+	Brown	3
6	A–	Green	4
8	B+	Gray	6
10	0 V U_N	White/Green	2
11	0 V sensor	White	16
12	+V U_P	Brown/Green	1
7, 9	Vacant		5, 8 – 13, 15, 19 – 25
Housing	External shield		Housing

4.3.74 Adapter cable Siemens RJ45 connector IP20/IP67

ID 759314-01

IP67

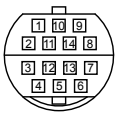
Connector, 10-pin, male

Connector, 10-pin, male

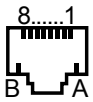
PIN	Signal DRIVE-CLiQ	Color	PIN
1	TX+	Green	3
2	TX–	Yellow	6
3	RX+	Pink	1
6	RX–	Blue	2
A	+V U_P	Red	A
B	0 V U_N	Black	B
4, 5, 7, 8	Vacant		4, 5, 7, 8
Housing	External shield		Housing

4.3.75 Adapter cable 14-pin M12/10-pin RJ45 (DRIVE-CLiQ)

ID 805375-xx



Connector,
14-pin, female

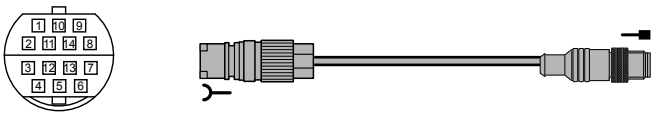


Connector, 10-pin, male

PIN	Signal DRIVE-CLiQ	Color	PIN
1	RX–	Blue	2
2	RX+	Pink	1
9	TX–	Yellow	6
10	TX+	Green	3
12	0 V U_N	Black	B
13	+V U_P	Red	A
3 – 8, 11, 14	Vacant		4, 5, 7, 8
Housing	External shield		Housing

4.3.76 Adapter cable 14-pin/8-pin M12 (DRIVE-CLiQ)

ID 816675-xx



Connector, 14-pin, female

Connector, 8-pin, male

PIN	Signal DRIVE-CLiQ	Color	PIN
1	RX–	Blue	4
2	RX+	Pink	3
9	TX–	Yellow	6
10	TX+	Green	7
12	0 V U_N	Black	5
13	+V U_P	Red	1
3 – 8, 11, 14	Vacant		2, 8
Housing	External shield		Housing

4.3.77 Connecting cable 8-pin/8-pin M12 (DRIVE-CLiQ)

ID 822504-xx

Connector, 8-pin, female

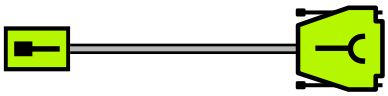
Connector, 8-pin, male

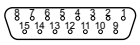
PIN	Signal DRIVE-CLiQ	Color	PIN
1	+V U_P	Red	1
3	RX+	Pink	3
4	RX–	Blue	4
5	0 V U_N	Black	5
6	TX–	Yellow	6
7	TX+	Green	7
2, 8	Vacant		2, 8
Housing	External shield		Housing

4.3.78 Adapter cable 15-pin D-sub/12-pin M23 (1 V_{PP}/TTL)

ID 825422-xx

Connector, 12-pin, male





D-sub connector
15-pin, female

PIN	Signal ~ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	B–	–Ua2	Pink	11
2	+V sensor	+V sensor	Blue	12
3	R+	+Ua0	Red	14
4	R–	–Ua0	Black	7
5	A+	+Ua1	Brown	1
6	A–	–Ua1	Green	9
7	Vacant	–UaS	Violet	13
8	B+	+Ua2	Gray	3
9	Vacant	Vacant	Yellow	15
10	0 V U_N	0 V U_N	White/Green	2
11	0 V sensor	0 V sensor	White	10
12	+V U_P	+V U_P	Brown/Green	4
	Vacant			5, 6, 8
Housing	External shield			Housing

4.3.79 Adapter cable 15-pin/15-pin D-sub (1 V_{PP}/TTL)

ID 825425-xx

PWM X2 OUT

TNC IN

D-sub connector
15-pin, female

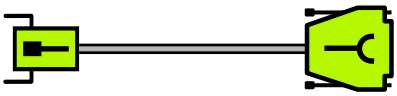
D-sub connector
15-pin, female

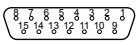
PIN	Signal ~ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	A+	+Ua1	Brown	3
2	0 V U_N	0 V U_N	White/Green	2
3	B+	+Ua2	Gray	6
4	+V U_P	+V U_P	Brown/Green	1
7	R–	–Ua0	Black	12
9	A–	–Ua1	Green	4
10	0 V sensor	0 V sensor	White	11
11	B–	–Ua2	Pink	7
12	+V sensor	+V sensor	Blue	9
13	Vacant	–UaS	Violet	14
14	R+	+Ua0	Red	10
15	Vacant	Vacant	Yellow	5
5, 6, 8	Vacant			13-15
Housing	External shield			Housing

4.3.80 Adapter cable 15-pin D-sub/12-pin M23 (1 V_{PP}/TTL)

ID 825426-xx

Connector, 12-pin, male





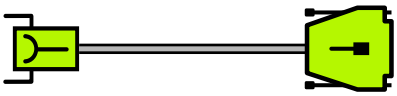
D-sub connector
15-pin, female

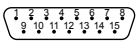
PIN	Signal ∿ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	B–	–Ua2	Pink	11
2	+V sensor	+V sensor	Blue	12
3	R+	+Ua0	Red	14
4	R–	–Ua0	Black	7
5	A+	+Ua1	Brown	1
6	A–	–Ua1	Green	9
7	Vacant	–UaS	Violet	13
8	B+	+Ua2	Gray	3
9	Vacant	Vacant	Yellow	15
10	0 V U_N	0 V U_N	White/Green	2
11	0 V sensor	0 V sensor	White	10
12	+V U_P	+V U_P	Brown/Green	4
	Vacant			5, 6, 8
Housing	External shield			Housing

4.3.81 Adapter cable 15-pin D-sub/9-pin M23 (11 µA$_{PP}$)

ID 826431-xx

Connector, 9-pin, female





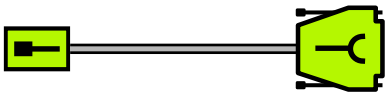
D-sub connector, 15-pin, male

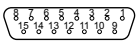
PIN	Signal ~ 11 µA$_{PP}$	Color	PIN
1	0°+	Green	1
2	0°–	Yellow	9
3	+V U_P	Brown	4
4	0 V U_N	White	2
5	90°+	Blue	3
6	90°–	Red	11
7	RI+	Gray	14
8	RI–	Pink	7
9	Internal shield	White/Brown	6
	Vacant		5, 8, 10, 12, 13, 15
Housing	External shield		Housing

4.3.82 Adapter cable 15-pin D-sub/9-pin M23 (11 µA$_{PP}$)

ID 826436-xx

Connector, 9-pin, male





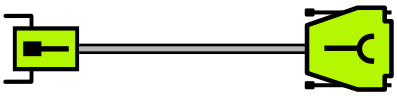
D-sub connector
15-pin, female

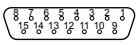
PIN	Signal ~ 11 µA$_{PP}$	Color	PIN
1	0°+	Green	1
2	0°–	Yellow	9
3	+V U_P	Brown	4
4	0 V U_N	White	2
5	90°+	Blue	3
6	90°–	Red	11
7	RI+	Gray	14
8	RI–	Pink	7
9	Internal shield	White/Brown	6
	Vacant		5, 8, 10, 12, 13, 15
Housing	External shield		Housing

4.3.83 Adapter cable 15-pin D-sub/9-pin M23 (11 µA$_{PP}$)

ID 826508-xx

Connector, 9-pin, male



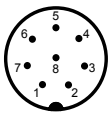


D-sub connector
15-pin, female

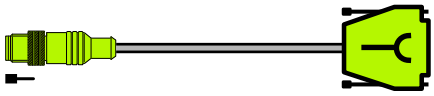
PIN	Signal ~ 11 µA$_{PP}$	Color	PIN
1	0°+	Green	1
2	0°–	Yellow	9
3	+V U_P	Brown	4
4	0 V U_N	White	2
5	90°+	Blue	3
6	90°–	Red	11
7	RI+	Gray	14
8	RI–	Pink	7
9	Internal shield	White/Brown	6
	Vacant		5, 8, 10, 12, 13, 15
Housing	External shield		Housing

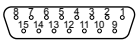
4.3.84 Adapter cable 15-pin D-sub/8-pin M12 (EnDat)

ID 827096-xx



Connector, 8-pin, male





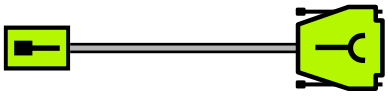
D-sub connector
15-pin, female

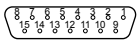
PIN	Signal EnDat	Color	PIN
1	0 V sensor	White	10
2	+V sensor	Blue	12
3	DATA	Gray	5
4	$\overline{\text{DATA}}$	Pink	13
5	0 V U_N	White/Green	2
6	$\overline{\text{CLOCK}}$	Yellow	15
7	CLOCK	Violet	8
8	+V U_P	Brown/Green	4
	Vacant		1, 3, 6, 7, 9, 11, 14
Housing	External shield		Housing

4.3.85 Adapter cable 15-pin D-sub/17-pin M23 (EnDat)

ID 827099-xx

Connector, 17-pin, male





D-sub connector
15-pin, female

PIN	Signal EnDat	Color	PIN
1	+V sensor	Blue	12
4	0 V sensor	White	10
7	+V U_P	Brown/Green	4
8	CLOCK	Violet	8
9	$\overline{\text{CLOCK}}$	Yellow	15
10	0 V U_N	White/Green	2
11	Internal shield		6
12	B+	Blue/Black	3
13	B–	Red/Black	11
14	DATA	Gray	5
15	A+	Green/Black	1
16	A–	Yellow/Black	9
17	$\overline{\text{DATA}}$	Pink	13
2, 3, 5, 6	Vacant		7, 14
Housing	External shield		Housing

4.3.86 Adapter cable 15-pin/25-pin D-sub (EnDat)

ID 827551-xx

D-sub connector, 15-pin, male

D-sub connector, 25-pin, male

PIN	Signal EnDat	Color	PIN
1	A+	Green/Black	3
2	0 V U_N	White/Green	2
3	B+	Blue/Black	6
4	+V U_P	Brown/Green	1
5	DATA	Red	15
6	Internal shield	White/Brown	8
7	Temp–	Violet	25
8	CLOCK	Green	10
9	A–	Yellow/Black	4
10	0 V sensor	White	16
11	B–	Red/Black	7
12	+V sensor	Blue	14
13	$\overline{\text{DATA}}$	Black	23
14	Temp+	Yellow	13
15	$\overline{\text{CLOCK}}$	Brown	12
	Vacant		5, 9, 11, 17 – 22, 24
Housing	External shield		Housing

4.3.87 Connecting cable 15-pin/25-pin D-sub (EnDat)

ID 827593-xx

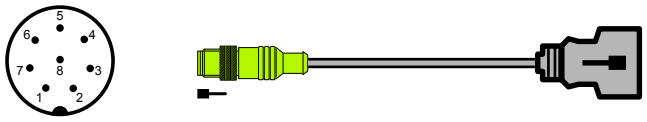
D-sub connector
15-pin, female

D-sub connector
25-pin, female

PIN	Signal EnDat	Color	PIN
1	A+	Green/Black	3
2	0 V U_N	White/Green	2
3	B+	Blue/Black	6
4	+V U_P	Brown/Green	1
5	DATA	Red	15
6	Internal shield	White/Brown	8
7	Temp–	Violet	25
8	CLOCK	Green	10
9	A–	Yellow/Black	4
10	0 V sensor	White	16
11	B–	Red/Black	7
12	+V sensor	Blue	14
13	$\overline{\text{DATA}}$	Black	23
14	Temp+	Yellow	13
15	$\overline{\text{CLOCK}}$	Brown	12
	Vacant		5, 9, 11, 17 – 22, 24
Housing	External shield		Housing

4.3.88 Adapter cable 8-pin M12/20-pin (Fanuc) IN

ID 1039686-xx



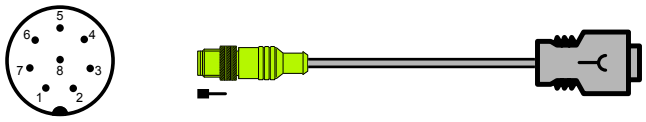
Connector, 8-pin, male

Connector, 20-pin, male

PIN	Signal	Color	PIN
1	0 V sensor	White	14
2	+V sensor	Blue	18, 20
3	DATA	Gray	1
4	$\overline{\text{DATA}}$	Pink	2
5	0 V U_N	White/Green	12
6	$\overline{\text{Request Frame}}$	Yellow	6
7	Request Frame	Violet	5
8	+V U_P	Brown/Green	9
	Vacant		3, 4, 7, 8, 10, 11, 13, 15, 17, 19
Housing	External shield		16

4.3.89 Adapter cable 8-pin M12/20-pin (Mitsubishi)

ID 1039786-xx



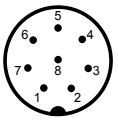
Connector, 8-pin, male

Connector, 20-pin, female

PIN	Signal EnDat	Color	PIN
1	0 V sensor	White	11
2	+V sensor	Blue	19
3	DATA	Gray	6
4	$\overline{\text{DATA}}$	Pink	16
5	0 V U_N	White/Green	1
6	$\overline{\text{Request Frame}}$	Yellow	17
7	Request Frame	Violet	7
8	+V U_P	Brown/Green	20
	Vacant		2 – 5, 8 – 10, 12 – 15, 18
Housing	External shield		Housing

4.3.90 Adapter cable 8-pin M12/10-pin (Mitsubishi)

ID 1039802-xx



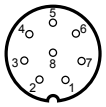
Connector, 8-pin, male

Connector, 10-pin, male

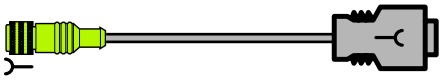
PIN	Signal EnDat	Color	PIN
1	0 V sensor	White	Vacant
2	+V sensor	Blue	Vacant
3	DATA	Gray	7
4	$\overline{\text{DATA}}$	Pink	8
5	0 V U_N	White/Green	2
6	$\overline{\text{Request Frame}}$	Yellow	4
7	Request Frame	Violet	3
8	+V U_P	Brown/Green	1
	Vacant		5, 6, 9, 10
Housing	External shield		Housing

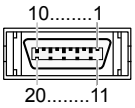
4.3.91 Adapter cable 8-pin M12/20-pin (Fanuc) OUT

ID 1040174-xx



Connector, 8-pin, female





Connector,
20-pin, female

PIN	Signal	Color	PIN
1	0 V sensor	White	14
2	+V sensor	Blue	18, 20
3	DATA	Gray	1
4	$\overline{\text{DATA}}$	Pink	2
5	0 V U_N	White/Green	12
6	$\overline{\text{Request Frame}}$	Yellow	6
7	Request Frame	Violet	5
8	+V U_P	Brown/Green	8
	Vacant		3, 4, 7, 8, 10, 11, 13, 15, 17, 19
Housing	External shield		16

4.3.92 Connecting cable 15-pin/15-pin D-sub (EnDat)

ID 1040982-xx

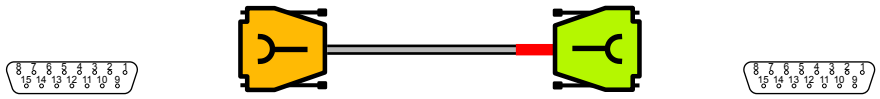
D-sub connector, 15-pin, male

D-sub connector, 15-pin, male

PIN	Signal EnDat	Color	PIN
1	+V U_P	Brown/Green	4
2	0 V U_N	White/Green	2
3	A+	Green/Black	1
4	A–	Yellow/Black	9
5	DATA	Gray	5
6	B+	Blue/Black	3
7	B–	Red/Black	11
8	$\overline{\text{DATA}}$	Pink	13
9	+V sensor	Blue	12
11	0 V sensor	White	10
13	Internal shield		6
14	CLOCK	Violet	8
15	$\overline{\text{CLOCK}}$	Yellow	15
10, 12	Vacant		7, 14
Housing	External shield		Housing

4.3.93 Adapter cable 15-pin/15-pin D-sub (EnDat)

ID 1041017-xx



TNC IN

D-sub connector
15-pin, female

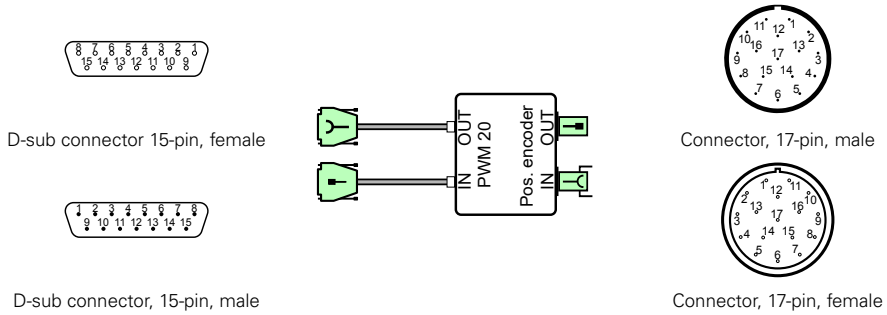
PWM X2 OUT

D-sub connector
15-pin, female

PIN	Signal EnDat	Color	PIN
1	+V U_P	Brown/Green	4
2	0 V U_N	White/Green	2
3	A+	Green/Black	1
4	A–	Yellow/Black	9
5	DATA	Gray	5
6	B+	Blue/Black	3
7	B–	Red/Black	11
8	$\overline{\text{DATA}}$	Pink	13
9	+V sensor	Blue	12
11	0 V sensor	White	10
13	Internal shield		6
14	CLOCK	Violet	8
15	$\overline{\text{CLOCK}}$	Yellow	15
10, 12	Vacant		7, 14
Housing	External shield		Housing

4.3.94 Adapter for feed-through (listening-in) Pos.Enc. 17-pin M23/15-pin D-sub PWM

ID 1075630-01



PIN	Signal EnDat	Signal ~ 1 V_{PP}	Color	PIN
1	A+	A+	Green/Black	15
2	0 V U_N	0 V U_N	White/Green	10
3	B+	B+	Blue/Black	12
4	+V U_P	+V U_P	Brown/Green	7
5	DATA	C+	Gray	14
6	Internal shield			11
7	Vacant	R–	Black	2
8	CLOCK	D–	Violet	8
9	A–	A–	Yellow/Black	16
10	0 V sensor	0 V sensor	White	4
11	B–	B–	Red/Black	13
12	+V sensor	+V sensor	Blue	1
13	$\overline{\text{DATA}}$	C–	Pink	17
14	Vacant	R+	Red	3
15	$\overline{\text{CLOCK}}$	D+	Yellow	9
	Vacant	Temp+	Green	5[1)]
	Vacant	Temp–	Brown	6[1)]
Housing	External shield			Housing

1) Temp+ and Temp– each directly connected between IN and OUT

4.3.95 Adapter cable Siemens RJ45 connector 8+2-pin/8-pin M12 (DRIVE-CLiQ)

ID 1093042-xx
Old ID 1078299-xx

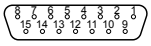
Connector, 8-pin, female

Connector, 10-pin, male

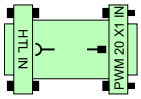
PIN	Signal DRIVE-CLiQ	Color	PIN
1	+V U_P	Red	A
3	RX+	Pink	1
4	RX–	Blue	2
5	0 V U_N	Black	B
6	TX–	Yellow	6
7	TX+	Green	3
2, 8	Vacant		4, 5, 7, 8
Housing	External shield		Housing

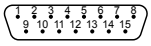
4.3.96 Adapter 15-pin/15-pin (HTL/HTLs, HTL EnDat)

ID 1093210-01



D-sub connector 15-pin, female





D-sub connector, 15-pin, male

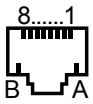
PIN	Signal (prescribed by encoder)		PIN
	⊓⊔ HTL/HTLs	HTL EnDat	
1	+Ua1	–	1
2	0 V U_N		2
3	+Ua2	–	3
4	+V U_P		4
5	–	DATA	5
6	Internal shield		6
7	–Ua0	–	7
8	–	CLOCK	8
9	–Ua1	–	9
10	0 V sensor		10
11	–Ua2	–	11
12	+V sensor		12
13	–UaS	$\overline{\text{DATA}}$	13
14	+Ua0	–	14
15	Not used	$\overline{\text{CLOCK}}$	15

The assignment of the female connector is set via the active PWM input (X1) according to the connected encoder.

4.3.97 Adapter cable Siemens RJ45 connector 8+2-pin/8-pin M23 (DRIVE-CLiQ)

ID 1117540-02

Connector, 9-pin, female



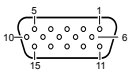
Connector, 10-pin, male

PIN	Signal DRIVE-CLiQ	Color	PIN
1	TX+	Green	3
2	TX–	Yellow	6
4	0 V U_N	Black	B
5	RX+	Pink	1
6	RX–	Blue	2
8	+V U_P	Red	A
3, 7, 9	Vacant		4, 5, 7, 8
Housing	External shield		Housing

4.3.98 Adapter cable 15-pin D-sub, three-row/12-pin M23 (TTL)

ID 1118055-01

Connector, 12-pin, male

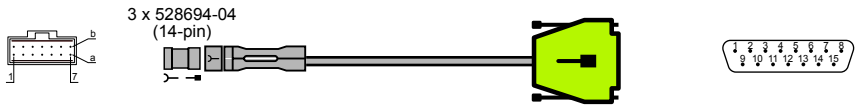


D-sub connector
15-pin, female

PIN	Signal ⊓⊔ TTL	Color	PIN
1	–Ua2	Pink	11
2	+V sensor	Blue	15
3	+Ua0	Red	4
4	–Ua0	Black	5
5	+Ua1	Brown	3
6	–Ua1	Green	9
7	–UaS	Violet	–
8	+Ua2	Gray	6
9	–	–	–
10	0 V U_N	White/Green	10
11	0 V sensor	White	10
12	+V U_P	Brown/Green	15
	Vacant		1, 2, 7, 8, 12 – 14
Housing	External shield		Housing

4.3.99 Adapter cable for PCB connector 14-pin/15-pin D-sub (1 V_{PP})

ID 1118892-02



Connector, 14-pin, male
ID 528694-04

Adapter cable
ID 1118895-02

D-sub connector, 15-pin, male

PIN	Signal ~ 1 V_{PP}	Color	PIN
6b	A+	Green/Black	1
5b[1)]	0 V U_N	White/Green	2[1)]
3b	B+	Blue/Black	3
1b[1)]	+V U_P	Brown/Green	4[1)]
7b	C+	Gray	5
4a	R–	Black	7
6a	D–	Violet	8
2a	A–	Yellow/Black	9
3a[1)]	0 V sensor	White	10[1)]
5a	B–	Red/Black	11
7a[1)]	+V sensor	Blue	12[1)]
1a	C–	Pink	13
4b	R+	Red	14
2b	D+	Yellow	15
	Vacant		6
Flange, housing	External shield		Housing

1) Supply line connected with sensor line in the encoder

The set of adapter cables (ID 1118892-02) consists of:
- 1 × adapter cable ID 1118895-02
- 3 × insert for adapter connector ID 528694-04 (14-pin)

4.3.100 Adapter cable 9-pin M23 speedtec/8-pin M12 (DRIVE-CLiQ)

ID 1121536-xx

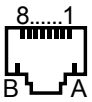
Connector, 9-pin, female

Connector, 8-pin, male

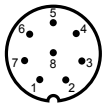
PIN	Signal DRIVE-CLiQ	Color	PIN
1	TX+	Green	7
2	TX–	Yellow	6
4	0 V U_N	Black	5
5	RX+	Pink	3
6	RX–	Blue	4
8	+V U_P	Red	1
3, 7, 9	Vacant		2, 8
Housing	External shield		Housing

4.3.101 Adapter cable RJ45 connector 8+2-pin/8-pin M12 (DRIVE-CLiQ)

ID 1121591-xx



Connector, 10-pin, male



Connector, 8-pin, male

PIN	Signal DRIVE-CLiQ	Color	PIN
1	RX+	Pink	3
2	RX–	Blue	4
3	TX+	Green	7
6	TX–	Yellow	6
A	+V U_P	Red	1
B	0 V U_N	Black	5
4, 5, 7, 8	Vacant		2, 8

4.3.102 Adapter cable 15-pin/9-pin D-sub (Panasonic)

ID 1133018-xx

D-sub connector, 15-pin, male

D-sub connector, 9-pin, male

PIN	Signal	Color	PIN
2	0 V U_N	White/Green	5
4	+V U_P	Brown/Green	1
8	DATA	Violet	2
10	0 V sensor	White	9
12	+V sensor	Blue	3
15	$\overline{\text{DATA}}$	Yellow	6
1, 3, 5 – 7, 9, 11, 13, 14	Vacant		4, 7, 8
Housing	External shield		Housing

4.3.103 Adapter cable 15-pin/9-pin D-sub (Panasonic)

ID 1133027-xx

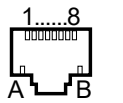
D-sub connector
15-pin, female

D-sub connector
9-pin, female

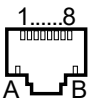
PIN	Signal	Color	PIN
2	0 V U_N	White/Green	5
4	+V U_P	Brown/Green	1
8	DATA	Violet	2
10	0 V sensor	White	9
12	+V sensor	Blue	3
15	$\overline{\text{DATA}}$	Yellow	6
1, 3, 5 – 7, 9, 11, 13, 14	Vacant		4, 7, 8
Housing	External shield		Housing

4.3.104 Adapter to extend DRIVE-CLiQ cables

ID 1170001-01



Connector RJ45,
8+2-pin, female



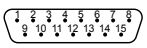
Connector RJ45,
8+2-pin, female

PIN	Signal DRIVE-CLiQ	PIN
1	TX+	1
2	TX–	2
3	RX+	3
6	RX–	6
A	+V U_P	A
B	0 V U_N	B
4, 5, 7, 8	Vacant	4, 5, 7, 8
Housing	External shield	Housing

4.3.105 Adapter cable 15-pin D-sub/12-pin M23 (1 V_{PP}/TTL), PWT test pulse, HSP

ID 1184705-xx

Connector, 12-pin, female



D-sub connector, 15-pin, male

PIN	Signal ~ 1 V_{PP}	Signal ⊓⊔ TTL	Color	PIN
1	B–	–Ua2	Pink	11
2	+V sensor	+V sensor	Blue	12
3	R+	+Ua0	Red	14
4	R–	–Ua0	Black	7
5	A+	+Ua1	Brown	1
6	A–	–Ua1	Green	9
7	HSP[1)]	–UaS, HSP[1)]	Violet	13
8	B+	+Ua2	Gray	3
9	HSP[1)]	PWT test pulse[2)], HSP[1)]	Yellow	15
10	0 V U_N	0 V U_N	White/Green	2
11	0 V sensor	0 V sensor	White	10
12	+V U_P	+V U_P	Brown/Green	4
	Not wired			5, 6, 8
Housing	External shield	External shield	Shield	Housing

1) HSP (HEIDENHAIN Signal Processing) can be switched off, D-sub PIN 13 and PIN 15, M23 PIN 7 and PIN 9

2) TTL: PWT switchover, PWT test pulse (+5 V): D-sub PIN 15, M23 PIN 9

5 Contacts

Your HEIDENHAIN helpline

The qualified, multilingual specialists of the HEIDENHAIN helpline in Traunreut support you in solving your problems.

Especially if you need **technical support** the HEIDENHAIN helpline team can provide detailed advice and information on measuring systems, controls, and NC and PLC programming.

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Translation of original document
1117945-26 · Ver06 ·1 ·08/2018·S · Printed in Germany