ifm electronic





ecomat mobile

Control systems for mobile vehicles

Catalogue 2016/2017

www.ifm.com/gb/mobile

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The company in your vicinity.

State-of-the-art communication.

With the right address – www.ifm.com – only a mouse click separates you from the world of automation technology. See the power of our products in interactive representations. Gain an impression with 3-dimensional views of our units. Download CAD drawings for direct integration in your applications. Or order online in ifm's e-shop – fast, convenient and reliable.

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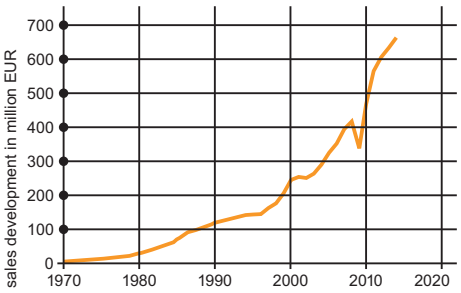
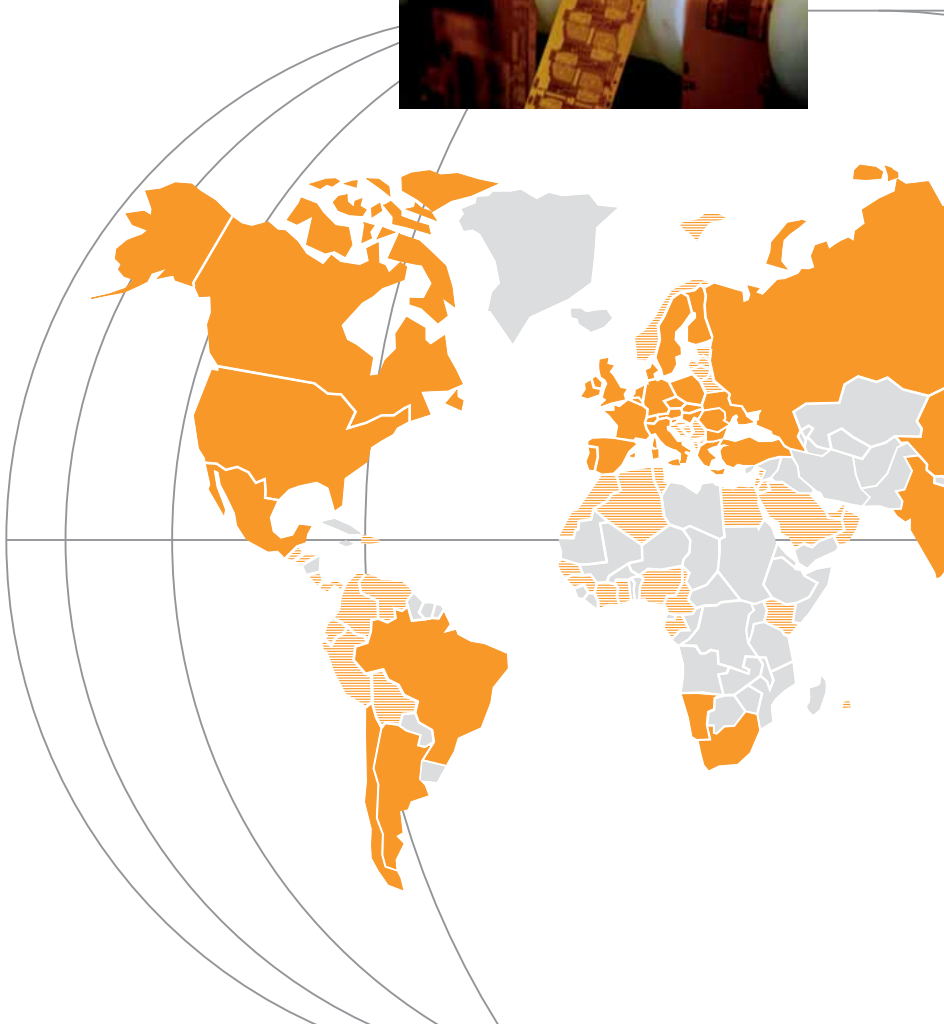
Close contact with our customers is part of our success. Therefore we have consistently developed our sales network right from the start. Today the ifm group of companies is represented in more than 70 countries – close to you! With application advice and service at the heart of our operation. For the introduction of new products and technologies we support you with workshops and seminars in our training centres or in your plant.

Security by success.

Since its foundation in 1969 ifm has constantly grown, now having more than 5500 employees worldwide, and achieved a turnover of more than EUR 720 million in 2015. This success gives you the security of having a reliable partner for the implementation of your automation projects. Comprehensive service and a warranty of 5 years on standard units are just two examples of this reliability.



Turnover development since 1970.



Not only components.

ifm stands for a large range of different sensors and systems for automation. Our range of of more than 7,800 articles guarantees flexibility and compatibility. So there is always a reliable solution for your automation projects – from the individual sensor with practical accessories to the complete system.

Availability guaranteed.

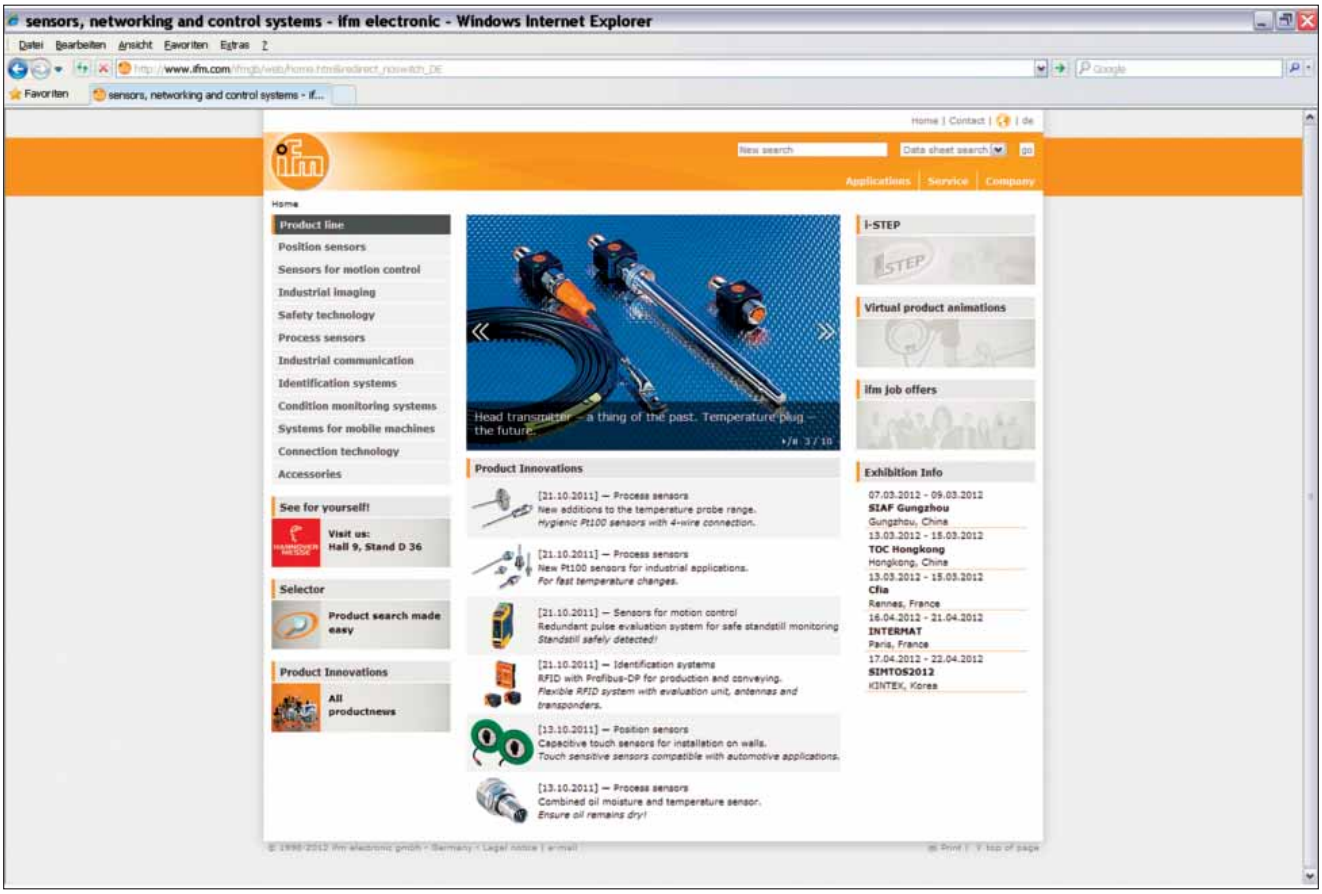
Your deadlines matter to us. That is why we are constantly optimising our production processes in order to be able to quickly and flexibly produce large quantities at a constantly high quality – and to continue to shorten delivery times. Your order is dispatched via our centralised logistics centre reliably and on time.

Quality as part of our philosophy.

The quality standard of our products is an integral part of our company philosophy. And we guarantee it! So we provide you, the users, with a maximum degree of security: By means of our own production technology, ifm film technology, as well as by means of extensive quality assurance measures such as 100 % final testing. By quality we understand, for example, ecologically conscious production – Made in Germany!

The development of innovative products is one of our core competences. From high-quality standard solutions to products specially tailored to the requirements of the individual industries – from mobile machines to the food industry.

www.ifm.com
Information around the clock and around the globe in 23 languages on the internet.



• Information

- product innovations
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• Documentation

- data sheets
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• Communication*

- request for documents
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• Selection

- interactive product selection aids
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- data sheet direct

• Animation

- virtual product animations
- flash movies (video sequences)

• Application

- applications
- product recommendations
- calculation aids

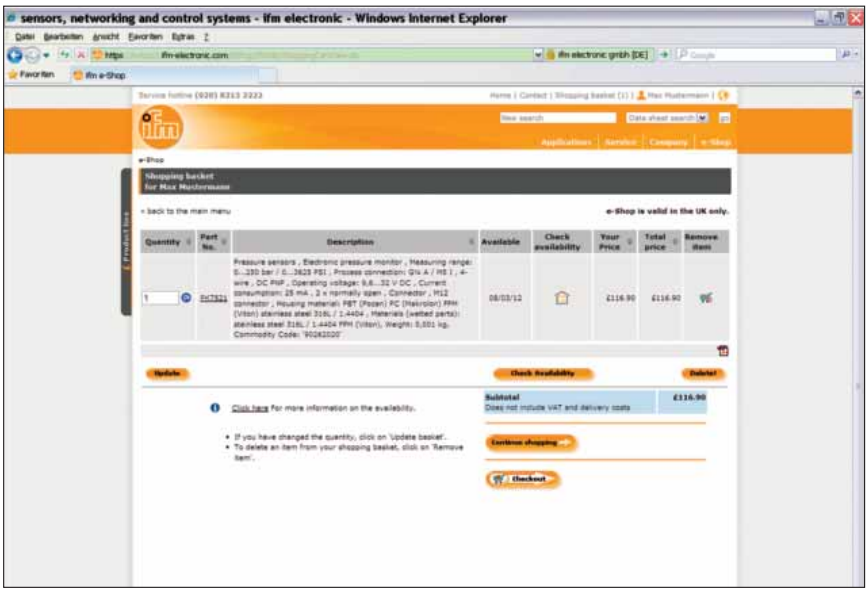
• Transaction*

- e-shop processing
- e-procurement catalogues

*Some offered information is available country-specific

Product selectors and further information can be found at: www.ifm.com

Convenient order processing via the e-shop** on the internet.



Secured authentication

Customer-related price indication

Real time availability check

Personal product favourites

Online parcel tracking

Individual order history

Convenient quick input form

Simple order processing

Management of shipping addresses

Confirmations by e-mail

ifm application database

ifm's automation technology is used to for applications in many different types of plant in almost all industries. Learn how ifm can improve your production.

Application examples can be found on our website at: www.ifm.com/gb/applications

** Already available in many countries.

Drilling rig

Vibrations and extreme shaking in a drilling rig - no problem for ecomatmobile. High protection rating and an advanced mechanical concept: guarantee for a permanent reliable function.

Robust use

At work under extreme operating conditions: decentralised CAN modules with high protection rating can be mounted almost everywhere. The result: considerably reduced wiring.

Hydraulics

Strong vibrations, shocks or hidden pressure peaks have no effect on ifm pressure sensors. They are specially optimised for use in mobile vehicles. Here the hydraulic system in a crane is monitored.

Forwarder for wood harvesting

The R360 mobile controller and the CAN bus: an absolutely safe and reliable system not only for communication between decentralised control units.

Forestry machine

A forestry machine for soil cultivation: during the season almost 24 hours a day in operation. Uncompromising quality and reliability of the ecomatmobile system make this possible.

Mobile harvesting station

ecomatmobile in a beet harvester. What is important here is the trouble-free processing of the harvest and careful handling of the fruits.

Tractor

Dialogue module in the tractor, communication via the gateway functions of the R360 ClassicController and the ISO bus system defined for agricultural technology.

Rail technology

Inductive sensor for mobile applications: maximum protection against mechanical damage due to a high sensing range. Safe driving due to a reliable monitoring of the track guiding equipment.

Shunting operation

Changing from rail to road is made easy for the driver: ecomatmobile. The menu-guided operation enables quick and safe tracking on and off.

Aircraft tractor

Nose wheels get precisely and reliably into the aircraft tractor: the ClassicController controls and monitors the hydraulic functions. This achieves a precise use of force of the hydraulics which is adapted to the selected aircraft type.

Container crane

In all ports and harbours the loading and unloading speed increases. Only an advanced control system like ecomatmobile can keep pace. In ship-to-shore container handlers the optimum interaction of controller, bus system and sensors shows its advantage.

Shredder

Depending on the customer’s requirements optional machine functions can be implemented, for example: subsequent functional extensions of a shredder.

Bridge underside inspection equipment

The SafetyController supports the operator and ensures a reliable operational process on the platform in line with the high demands.

Fire engine

Networked functional modules - high uptime. A disturbance in one of the independent intelligent modules does not necessarily lead to failure of the vehicle. The CAN bus additionally provides powerful diagnostic functions.

Refuse truck

Side loader in one-man operation. The ecomatmobile CompactModule is the tried-and-tested CANopen network interface for all sensor and actuator signals.

Sewer cleaning

Suction and flushing vehicle. The connection of the radio receiver to the CAN bus allows a reliable processing of the remote control signals – an important contribution to operator safety.

Control technology and sensors for mobile use

Life today cannot be imagined without electronics in modern motor vehicles and mobile machines. Many necessary and convenient functions cannot be implemented without electronic systems. As compared to electronics in consumer goods or in "normal" industrial use (e.g. in packaging machines or conveying systems), there are considerably higher requirements regarding use in mobile applications, to ensure sufficient reliability in all operating situations.

Market requirements

Mobile machines and installations are often tailored to special applications, making them very expensive. To ensure high uptime, comprehensive, simple and reliable system diagnosis is required for quick localisation of faults by the operating staff.

Safe and clear operating concepts per display, adapted to the respective operating situation, help prevent incorrect operation.

Another requirement: operating and system states must be stored via an operational data logging process for statistical evaluation and documentation.

Due to increasing legal requirements for the machine manufacturers, the systems are becoming more and more complex. Bus systems are used in order to reduce wiring complexity.

They enable a decentralised arrangement of the input / output modules close to the sensors and actuators. In addition, the components must be easy to handle for mounting and in case of service. The mechanical design, plus easy and clear integration during programming ensure the above is achieved.

And, not least, the components and devices used must withstand the extreme mechanical, climatic and electric requirements.

All requirements have one goal: reliable and competitive machines.

Electronic requirements

The extreme mechanical stress caused by impacts and shocks and use at operating temperature extremes require careful component selection. Given that the devices are often exposed to dirt, moisture and water in the applications, high protection ratings and specially selected materials are necessary.

Furthermore, the electrical interference affecting the entire system or individual components must also be taken into account.

A wide supply voltage range and adapted protection measures allow reliable operation of the devices even in cases of large voltage fluctuations caused by the battery/generator system and high conducted interference.

The CAN bus with the CANopen protocol has successfully established itself for networking of the devices. In addition, the controllers and display provide interfaces for manufacturer-specific and industry-specific protocols, e.g. SAE J 1939 or ISO bus.

Stone crushers and building material recycling:
When this material is processed, the entire machine and consequently also the electronics are exposed to strong impacts. The electronics can only be protected using special housing and installation concepts. Given that the electronics are installed inside the machine, close to the diesel engine, the components are also exposed to high temperatures.

The most important functional units

Modern mobile machines consist of different segments. The automation components of the ecomatmobile control system for mobile applications can be used for a multitude of tasks. Depending on the requirements, they assume control, monitor and display functions. Networking is made via the CAN bus with the CANopen protocol.

Segment drive

In contrast to utility vehicles, often consisting of a truck and a body, special machines are assembled from single elements. The drive is therefore precisely adapted to the machine and the later task. It has to fulfil two essential tasks: in road traffic, this machine must be reliable to drive as a normal vehicle. E1 type approval is a prerequisite for the use of the control components in road traffic.

When the vehicle arrives at the site where it is used, it becomes a construction machine. The requirements for these machines are completely different, e.g. suitability for off-road use and good manoeuvrability. The control components used are switched to the respective operating situation.

Segment diesel engine

Depending on the task, engines of different performance classes are used. Modern engines have a CAN interface which is accessible to the user. Most of the time, it is designed to the standard SAE J 1939. It, for example, encodes engine parameters such as operating temperature, oil pressure, torque or rotational speed. For control tasks, this data is filtered and processed in the ecomatmobile controller.

Drilling and piling equipment on a construction site: a robust and reliable machine controller is required.

Segment input and output

Different operating elements serve for machine control. Using control panel modules - I/O modules for use in control or operating panels - the information of the joysticks, switches and buttons is transmitted to the process control via CAN bus. Dialogue modules inform the operator about the operating states of the machine.

In case of interference, informative symbols and texts help quickly localise and remove the fault. In addition, operating and diagnostic data can be stored on memory cards. In case of service, they provide significant information about the application and problems occurred.

Using the GSM / UMTS modem CANremote, error messages can be directly forwarded to the service staff or manufacturer of the machine. In particular for machines in worldwide use, this allows considerable service cost savings.

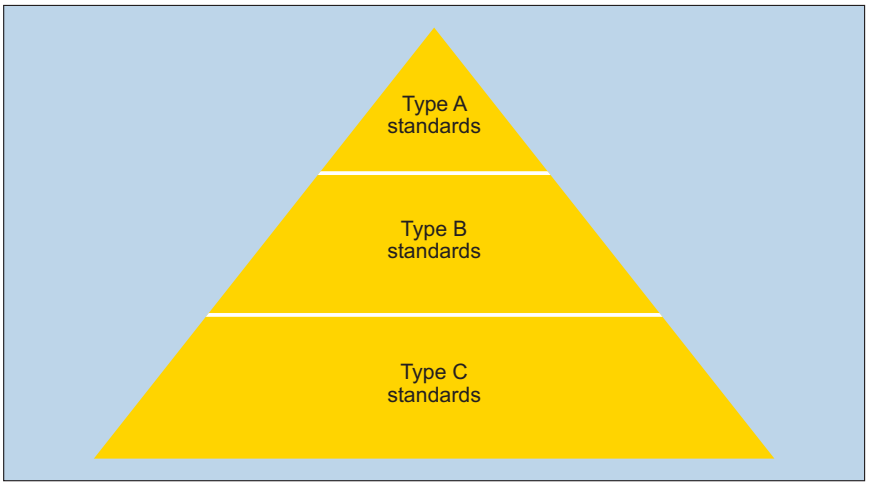
Segment work facilities / vehicle body

This segment represents the actual work process of the machine. Proportional hydraulic valves, for example, are controlled via the current-controlled PWM outputs of the decentralised output modules. Sensor signals, too, are detected via the I/O modules and transmitted to the process control via CAN bus.

In small machines as well as in large and complex systems, whole functional units are controlled by intelligent slave modules such as the SmartController. These freely programmable devices directly process all relevant process signals of their assigned machine units. Only relevant, preprocessed data or status messages are transmitted to other bus participants.

Worldwide access to machine data: the GSM / UMTS module CANremote saves service costs.

Powerful 32-bit Safety-Controllers, developed according to the current standards for hardware and software, including TÜV certificate.



Type A standards: Basic safety requirements for all machines.

Type B standards: General and special safety requirements (e.g. for controllers).

Type C standards: Special safety requirements for individual machine types.

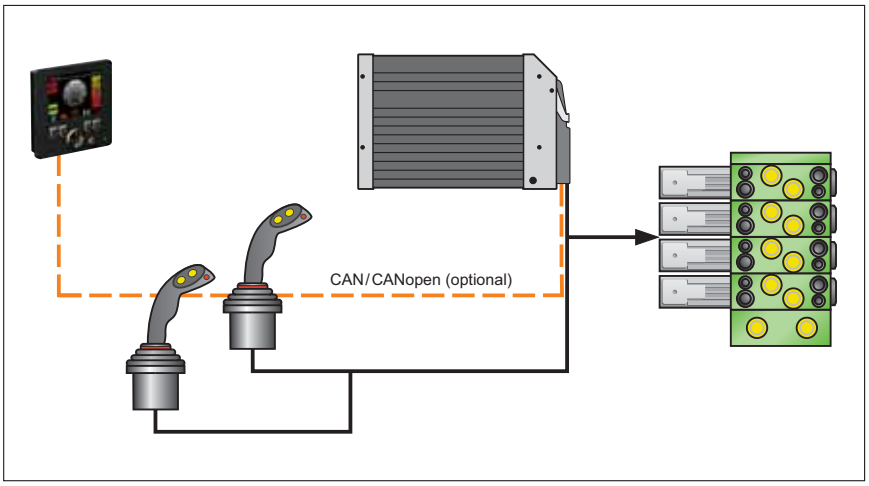
Safety technology

Almost all mobile machines have functions that may endanger persons and material. Therefore, every manufacturer has to comply with the general regulations for a safe machine design. Given that these regulations and standards are defined for a broad range of different machines, they cannot be precisely adapted to the function of a mobile machine. Therefore, there is an increasing number of product standards which are tailored to specific requirements.

In certain applications, e.g. vehicle lifts, there have been clearly defined product standards for a long time. The employers’ liability insurance associations also often have clear requirements towards manufacturers of machines.

For this reason, there is an increasing demand for certified electronic assemblies for mobile machines.

The SafetyController can be used in applications requiring components up to PL d to EN13849 or SIL cl 2 to EN62061. The SafetyController monitors all internal and external functions and reliably switches off in case of an error. The CANopen protocol can be used for safe data transmission. Convenient: transmission is carried out together with the "non-safe" data on the same bus cable; no additional wiring is required.



Automation of a mobile machine

Which components are used for the different applications mainly depends on the design of the machine and installation. Also, the service and mounting concept is decisive for the device selection.

Simplified, there are three different plant concepts:

Machines with central controller

These mostly are machines with only a few work functions. Only a few controller inputs and outputs are needed.

- Control module; if necessary with certification as safety controller with the corresponding I/O configuration.
- Dialogue module to display system states and diagnostic data.

Typical applications:

Equipment mounted on agricultural machines, access platforms, compact construction machines, simple monitoring and diagnostic tasks.

Central controller: one controller for all functions is sufficient for a logging vehicle with comparatively few work functions.

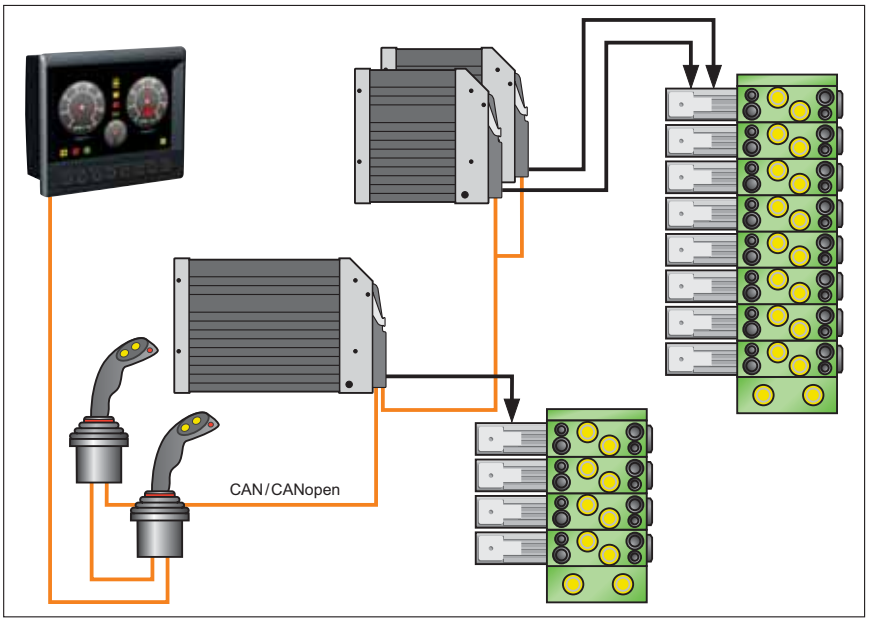
Machines with distributed intelligence

Machines that can be split up into logical function blocks are often operated with several stand-alone controller modules. The input and output requirement of these machines is higher and often includes several independent controller elements. Only a couple of items of data have to be exchanged between the individual controllers.

- Two or more control modules with a corresponding I/O configuration. Each module has its own application program. Data which is important for the overall system is exchanged via the CAN bus.
- Dialogue module to display system states and diagnostic data.

Typical applications:

Complex construction machines, mobile cranes, aircraft tractors, multiple-unit vehicles, fork-lift trucks.



Machines with decentralised control technology

A decentralised machine design is recommended in order to reduce wiring complexity. One or several decentralised input/output modules are connected to a central controller. Via the CAN bus the I/O data is read, processed in the controller and then transferred again to the I/O modules via the bus. Depending on the plant complexity, a suitable design of the bus system has to be ensured.

- Control module with a corresponding I/O configuration.
- One or several decentralised input / output modules, linked via the CAN bus.
- Dialogue module to display system states and diagnostic data.

Typical applications:

Complex construction machines, drilling tools, municipal vehicles.

Decentralised control technology: the wiring complexity in municipal vehicles is minimised by the use of I/O modules with a built-in interface.

3 steps to a mobile control system

Step 1: Definition of the automation concept

First, the automation concept needs to be defined. It depends on the size of the machine and complexity of the control task.

Small compact machines are often fitted with a central control system. Sensors and actuators located at a greater distance are integrated via a CAN module. Often, components that do not feature the required protection rating are used. If so, these are installed in a control cabinet. For practical reasons the controller is then also installed there.

The structure should be decentralised if this is possible from a technical and commercial point of view. To do so, the machine is divided into logical function units. Valve blocks, sensors and function modules constitute a clearly structured network. In case of service, only individual components are examined and replaced if necessary.

The following points need to be taken into account for the system design:

• Where are the system components positioned? Are they protected against extreme mechanical impact, e.g. rocks falling onto the connectors? Also, extreme temperatures (e.g. hot asphalt) may influence the components.

• Which wiring is chosen (material and cable design)?

• Where are the cables routed?

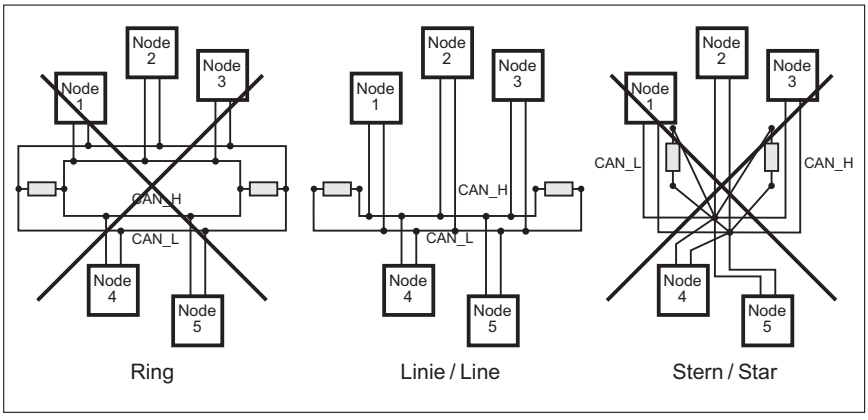
• How can an ideal network structure be implemented?

• Which operating concept is planned? Conventional design with mechanical switches and pushbuttons, wired onto the control module or an I/O module? Or is operation of the machine to be carried out using a dialogue module?

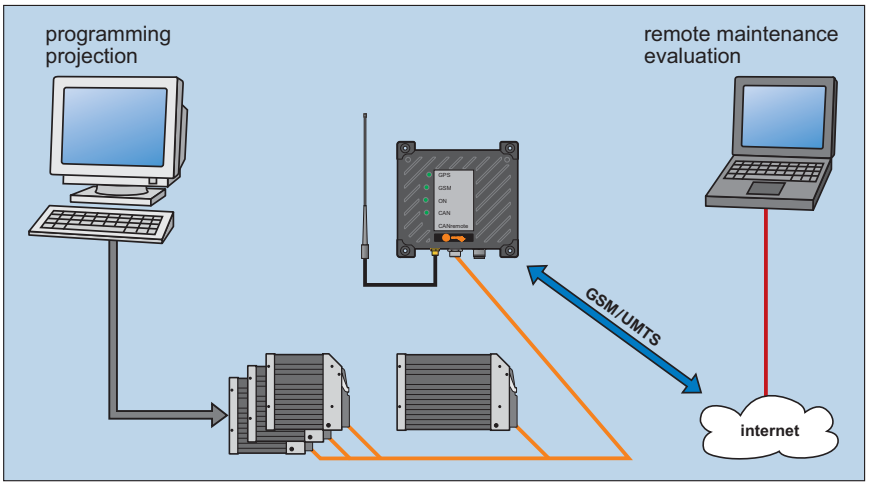
• Which diagnostic and service functions are planned? Are system messages to be displayed or to be transferred via CANcom/GPS with position information about the machine, if needed?

• Can functions be combined? In particular for the implementation of relay-controlled systems, CAN modules and operating functions in dialogue modules reduce the number of the required inputs and outputs.

A control cabinet protects components with a low protection rating.



The network structure is to be taken into account for the structure of the CAN network.



Step 2: Selection of the components

The selection of the system components is mostly carried out based on the required performance data, such as the number of inputs and outputs and their functions. The controllers and I/O modules of the ecomat mobile system are configurable in many ways.

If components are installed in unprotected areas of the machine, they should have the protection rating IP 67.

The controllers and modules of the Cabinet series are intended for use in the cabin or in control cabinets.

CompactModules are a good choice when the machine function is to be extended at a later point. Also, when machines are designed with many different options, CompactModules are the best choice because they can be easily extended via the M12 connections. The ifm dialogue modules have been optimised for unprotected areas and can therefore be easily used in open control panels.

Step 3: Programming and network configuration

Programming of the ecomat mobile controllers is carried out via CODESYS. All necessary functions for parameter setting of the CANopen modules, control of the dialogue modules and for complex control functions, are available in CODESYS.

It makes sense to program the plant functions with individual function blocks and to test them individually. This allows clear and structured programming of the user software. Another advantage: programmed functions can be stored in libraries and later be used again in other projects.

Extensive software tools assist the programmer in the implementation of his application.

3A

3A Sanitary Standards, Inc. (3-A SSI) is an independent, not-for-profit corporation dedicated to advancing hygienic equipment design for the food, beverage, and pharmaceutical industries.

AS-i

Actuator-Sensor Interface. Bus system for the first binary field level.

ATEX

Atmosphère Explosible. ATEX comprises the directives of the European Union in the field of explosion protection. On the one hand there is the 94/9/EC ATEX product directive and on the other hand the 1999/92/EC ATEX operation directive.

CCC

CCC (China Compulsory Certification) is a compulsory Chinese certification for certain products put on the market in China. Which products are concerned is specified in a catalogue created by the Chinese authorities.

cCSAus

Testing of a product by CSA according to the safety standards applicable in Canada and the USA.

CE

Conformité Européenne. By affixing the CE marking to a product, the manufacturer declares that it meets EU safety, health and environmental requirements.

cRUus

Testing of components by UL according to the safety standards applicable in Canada and the USA. Components can be used when the "condition of acceptability" is complied with for the final product.

CSA

Canadian Standards Association. A non-governmental Canadian organisation that sets standards and tests and certifies products for their reliability. By now it is active worldwide.

cULus

Testing of components by UL according to the safety standards applicable in Canada and the USA.

DIBt (WHG)

Deutsches Institut für Bautechnik (Federal Water Act). The Federal Water Act (WHG) is the essential part of the German law relating to water. It contains provisions for the protection and use of surface water and ground water and also regulations about the expansion of waters, water planning and flood protection.

DKD

The Deutscher Kalibrierdienst (DKD) is an association of calibration laboratories of industrial firms, research institutes, technical authorities, inspection and testing institutes. The DKD calibration certificates prove traceability to national standards as required in ISO 9000 and ISO / IEC 17025. They also serve as a metrological basis for the control of measurement and test equipment within the framework of quality management.

E1

Approval by the Kraftfahrt-Bundesamt (German Federal Motor Transport Authority). The E1 type approval by the German Federal Motor Transport Authority certifies that the units comply with the automotive standards. Units with this marking are allowed to be mounted on vehicles without expiry of their operating permit.

EG 1935/2004

The Regulation EC 1935/2004 has been taken into account for process sensors from ifm which are intended for use in contact with food. You can obtain a list of the corresponding products and detailed information on request.

EHEDG

European Hygienic Engineering & Design Group. European supervisory authority for food and drugs. This authority grants approvals for products and materials used in the food and pharmaceutical industries.

FDA

Food and Drug Administration. US-American supervisory authority for food and drugs. This authority grants approvals for products and materials used in the food and pharmaceutical industries.

FM

Factory Mutual Research. A US-based insurance company that specializes in loss prevention services in the property insurance market sector. They provide material research, material testing and certifications in the field of fire and explosion protection.

PROFIBUS

Process Field Bus. Fieldbus system for important data quantities. It is available in several versions such as Profibus FMS, DP or PA. Profibus DP can be used over longer distances, e.g. as fieldbus for AS-i.

TÜV

Technischer Überwachungs Verein (technical inspection association). The German TÜV is a private-sector body carrying out technical safety tests that are stipulated by government laws or instructions.

UL

Underwriters Laboratories. An organisation founded in the USA for testing and certifying products and their safety.

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(CCC) = CCC approval is not required

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(CCC) = CCC approval is not required

- **Cost-optimised mini controller for mobile vehicles**
- **Modular extension with display and relays**
- **Easy set-up and installation**
- **Direct connection of sensors, actuators, relays, etc**
- **Programmable to IEC 61131 with CODESYS**

ecomat*mobile* Basic

The perfect integration of all components creates a balanced control technology platform for mobile vehicles. With ecomat*mobile* Basic ifm has developed an easy, modular and cost-optimised control system for mobile vehicles. Besides being a low-cost programmable mini controller, it provides suitable solutions for fuse protection, wiring and visualisation. The three perfectly matched modules BasicRelay, BasicController and BasicDisplay can be combined in a flexible way.

BasicRelay

The extendable relay and fuse module is ready for connection without further external terminals. Moreover, it provides locations for up to ten automotive fuses and six ISO / logic relays. The common power rail and additional star points facilitate wiring.

BasicController

The low-cost mini controller for simple to complex control tasks replaces conventional relay logic and demanding process controllers. Sensors and actuators can be connected directly. The BasicController features two interfaces for the connection of the BasicDisplay, further BasicControllers or engine controllers to SAE J1939. It supports all common CODESYS programming languages.

BasicDisplay

The high-resolution colour display with its unique visualisation concept replaces the conventional operation of the machine. It provides various installation options: directly on the operator panel, using a centralised fixing nut or in the housing cover. Via the CAN bus the display communicates either directly with the controller or via the standardised J1939 engine interface.

BasicDisplay: high-resolution colour display and a unique visualisation concept for machine operation.

The easy-to-extend BasicRelay tidies up wiring.

Product selectors and further information can be found at: www.ifm.com

BasicController

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Configurable input / output functions, Programming according to IEC 61131-3							
	20	12 x Digital 4 x analogue (U/I) 4 x frequency 4 x Resistor	8 x Digital 8 x PWM	2 x CAN	1	1	**CR0401**
	24	12 x Digital 4 x analogue (U/I) 4 x frequency 4 x Resistor	12 x Digital 2 x PWM-I 10 x PWM	2 x CAN	2	2	**CR0403**
	16	8 x Digital 4 x analogue (U/I) 4 x frequency 4 x Resistor	8 x Digital 8 x PWM-I 8 x PWM 4 x H bridge	2 x CAN	3	3	**CR0411**
	14	8 x Digital 4 x analogue (U/I) 4 x frequency 4 x Resistor	6 x Relay	2 x CAN	4	4	**CR0431**

Starter set ecomatmobile Basic

Type	Description	Order no.
	Starter set ecomatmobile Basic	**EC0400**

BasicRelay

Type	Inputs / outputs	Description	Draw-ing no.	Order no.
	–	BasicRelay · Locations for 6 automotive relays and 10 automotive fuses ((6.3 mm) · 2 supply rails and 6 power distributors · freely wirable	5	**CR0421**

BasicDisplay

Type	Display	Operating elements	Inputs / outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
5 freely programmable backlit function keys, Programming according to IEC 61131-3 · M12 connector							
	2.8" colour display 320 x 240 pixels	5 Pushbuttons 1 Navigation key for cursor function	–	1 x CAN	5	6	**CR0451**

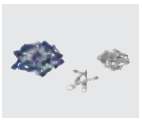
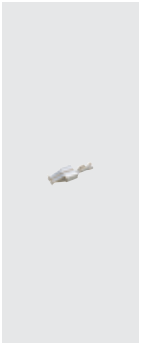
BasicDisplay XL

Type	Display	Operating elements	Inputs / outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
6 freely programmable backlit function keys, Programming according to IEC 61131-3 · M12 connector							
	4.3" colour display 480 x 272 pixels	6 Pushbuttons 1 Navigation key for cursor function	–	1 x CAN	5	7	**CR0452**

Accessories for the mini control system Basic

Type	Description	Order no.
	cover · for BasicController CR04xx and BasicRelay CR042x · incl. cable seal	**EC0401**
	cover · for BasicController CR04xx · Built-in display recess for BasicDisplay CR0451 · incl. cable seal	**EC0402**
	Mounting frame · for BasicDisplay CR0451 · panel · Housing materials: stainless steel	**EC0403**
	Mounting frame · for BasicDisplay XL CR0452 · panel · Housing materials: stainless steel	**EC0404**
	RAM mount set · Ball size 1" (B) · e.g. for BasicDisplay · for use as a desktop unit · Housing materials: Mounting arm: aluminium black anodised / Mounting plate: aluminium black anodised / ball: rubber / Display carrier: plastics black	**EC0405**
	RAM mount set · Ball size 1" (B) · e.g. for BasicDisplay XL · for use as a desktop unit · Housing materials: Mounting arm: aluminium black anodised / Mounting plate: aluminium black anodised / ball: rubber / Display carrier: plastics black	**EC0406**
	Display carrier · RAM mount system · Ball size 1" (B) · e.g. for BasicDisplay · for use as a desktop unit · Housing materials: plastics black	**EC0407**
	Display carrier · RAM mount system · Ball size 1" (B) · e.g. for BasicDisplay XL · for use as a desktop unit · Housing materials: plastics black	**EC0408**
	Mounting plate · RAM mount system · Ball size 1" (B) · e.g. for BasicDisplay or BasicDisplay XL · for use as a desktop unit · Housing materials: Mounting plate: aluminium black anodised / ball: rubber	**EC0409**
	Mounting arm · 95 mm · RAM mount system · Ball size 1" (B) · e.g. for BasicDisplay or BasicDisplay XL · for use as a desktop unit · Housing materials: Mounting arm: aluminium black anodised	**EC0410**
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector with integrated CAN terminating resistor (120 ohm) · 5 m · Housing materials: housing: TPU black / sealing: FKM	**EVC492**

You can find wiring diagrams and scale drawings from page 33

Type	Description	Order no.
	Jumper · wired · for 2 BasicControllers CR04xx · CAN interface · Power supply · 0.5 m	EC0451
	Jumper · wired · for 1 BasicController CR04xx and 1 BasicDisplay CR045x · CAN interface · Power supply · M12 connector · 0.1 m	EC0452
	Jumper · wired · for 2 BasicControllers CR04xx and 1 BasicDisplay CR045x · CAN interface · Power supply · M12 connector · 0.5 m	EC0453
	Jumper · wired · for 1 BasicController CR04xx and 1 BasicDisplay CR045x · CAN interface · Power supply · M12 connector · 5 m	EC0454
	Jumper · wired · for 1 BasicController CR04xx and 1 BasicDisplay CR045x · CAN interface · Power supply · M12 connector · 10 m	EC0458
	Jumper · wired · for 2 BasicControllers CR04xx and 1 BasicDisplay CR045x · CAN interface · Power supply · M12 connector · 5 m	EC0455
	Contacts and contact housings · for BasicController CR04xx · wirable · utilising all connections to a BasicController	EC0456
	Set of contacts · for BasicRelay CR0421 · wirable · utilising all connections to a BasicRelay	EC0457
	Standard timer contact housing · for BasicController CR04xx · CAN1 and supply P/N1 · Coding · wirable · Housing materials: PA white	EC0460
	Standard timer contact housing · for BasicController CR04xx · CAN2 N2 · Coding · wirable · Housing materials: PA white	EC0461
	Standard timer contact housing · for BasicController CR04xx · Inputs A/B/C · Coding · wirable · Housing materials: PA grey	EC0462
	Standard timer contact housing · for BasicController CR04xx · Outputs D/E/F · Coding · wirable · Housing materials: PA white	EC0463
	Standard timer contact · for standard timer contact housing · 0.2...0.5 mm² / Ø 1.0...1.6 mm · Housing materials: tin-plated	EC0459
	Standard timer contact · for standard timer contact housing · 0.5...1.0 mm² / Ø 1.4...2.3 mm · Housing materials: tin-plated	EC0468
	Standard timer contact · for standard timer contact housing · 1.0...2.5 mm² / Ø 2.1...3.1 mm · Housing materials: tin-plated	EC0469

Type	Description	Order no.
	Standard power timer contact · for standard timer contact housing · 1.25...2.5 mm² / Ø 2.1...3.1 mm · Housing materials: tin-plated	**EC0470**
	Contacts and contact housings · for BasicController relay CR0431 · wirable · utilising all connections to a BasicController relay	**EC0464**
	Connecting material for power supply · for BasicController relay CR0431 · wirable	**EC0465**
	Set of relais and fuses for 12 V DC systems · for BasicController relay CR0431	**EC0466**
	Set of relais and fuses for 24 V DC systems · for BasicController relay CR0431	**EC0467**
	CANfox · CAN/RS232-USB interface · Programming and diagnosis of CAN systems · 5 V DC (via USB interface)	**EC2112**
	Adapter cable · for CAN interface CANfox · CAN adapter: DIN connector, 6 poles / M12 connector, 5 poles · RS-232 adapter: DIN connector, 6 poles / Sub-D plug, 9 poles · Cable length 1 m	**EC2113**
	Set of programming cables · for CAN interface CANfox · Cable BasicController: DIN connector, 6-pole / standard timer contact housing, 6-pole · Cable BasicDisplay: DIN connector, 6-pole / M12 socket, 5-pole · CAN interface · Voltage supply via individual wires with end ferrules · Cable length 1 m · 1 m	**EC2114**
	Programming software CODESYS · for configuration, programming and diagnosis of ifm controller systems · German version · incl. the DVD "Software, tools and documentation"	**CP9006**
	Programming software CODESYS · for configuration, programming and diagnosis of ifm controller systems · English version · incl. the DVD "Software, tools and documentation"	**CP9008**

Wiring diagrams

1

A	B	C	D	E	F	N2	P/N1
8-poles						4-poles	6-poles
VBB_S IN0 IN1 GND GND IN2 IN3 VBB_S	VBB_S IN4 IN5 GND GND IN6 IN7 VBB_S	VBB_S IN8 IN9 GND GND IN10 IN11 VBB_S		OUT4 GND OUT5 GND OUT6 GND OUT7 GND	OUT8 GND OUT9 GND OUT10 GND OUT11 GND	VBB_S GND CAN2_H CAN2_L	VBB_S VBB_1 VBB_2 GND CAN1_H CAN1_L

D = not used

Wiring diagrams

2

A	B	C	D	E	F	N2	P/N1
8-poles						4-poles	6-poles
VBB_S	VBB_S	VBBs	OUT0	OUT4	OUT8	VBB_S	VBB_S
IN0	IN4	IN8	GND	GND	GND	GND	VBB_1
IN1	IN5	IN9	OUT1	OUT5	OUT9	CAN2_H	VBB_2
GND	GND	GND	GND	GND	GND	CAN2_L	GND
GND	GND	GND	OUT2	OUT6	OUT10		CAN1_H
IN2	IN6	IN10	GND	GND	GND		CAN1_L
IN3	IN7	IN11	OUT3	OUT7	OUT11		
VBB_S	VBB_S	VBB_S	GND	GND	GND		

3

A	B	C	D	E	F	N2	P/N1
8 poles						4 poles	6 poles
VBB_S	VBB_S		OUT0	OUT4		VBB_S	VBB_S
IN0	IN4		GND	GND		GND	VBB_1
IN1	IN5		OUT1	OUT5		CAN2_H	VBB_2
GND	GND		GND	GND		CAN2_L	GND
GND	GND		OUT2	OUT6			CAN1_H
IN2	IN6		GND	GND			CAN1_L
IN3	IN7		OUT3	OUT7			
VBB_S	VBB_S		GND	GND			

C/F = not used

4

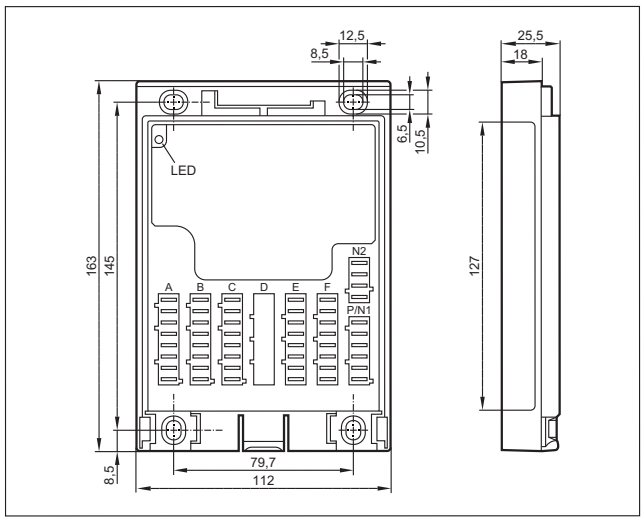
A	B	D	E	
8 poles				6 poles
VBB15	VBB15	F0 (K0:3)	F3 (K3:3)	V_EXT
IN0	IN4	K0:5	K3:5	CAN2_H
IN1	IN5	K0:4	K3:4	CAN2_L
GND	GND	F1 (K1:3)	F4 (K4:3)	GND
GND	GND	K1:5	K4:5	CAN1_H
IN2	IN6	K1:4	K4:4	CAN1_L
IN3	IN7	K2:5	K5:5	
VBB15	VBBs	K2:4	K5:4	

5

Supply, CAN		
	1 2 3 4 5	n.c. 8...32 V DC GND CAN_H CAN_L

Scale drawings / drawing no. – CAD download: www.ifm.com

1



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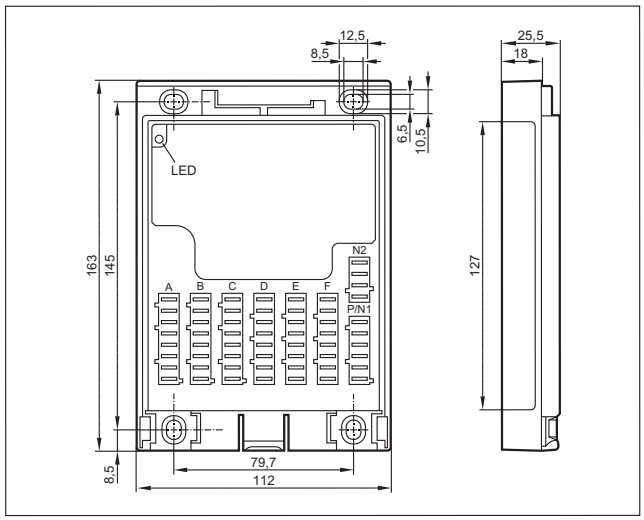

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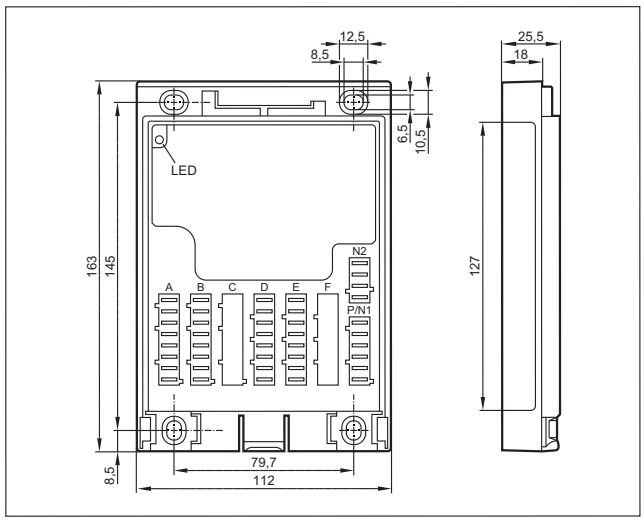

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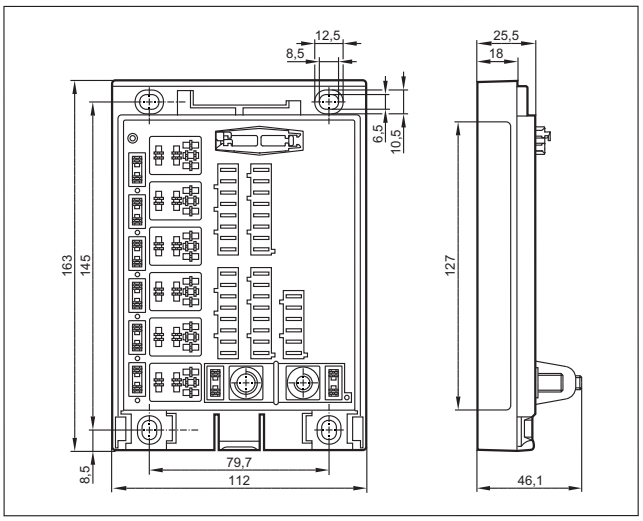

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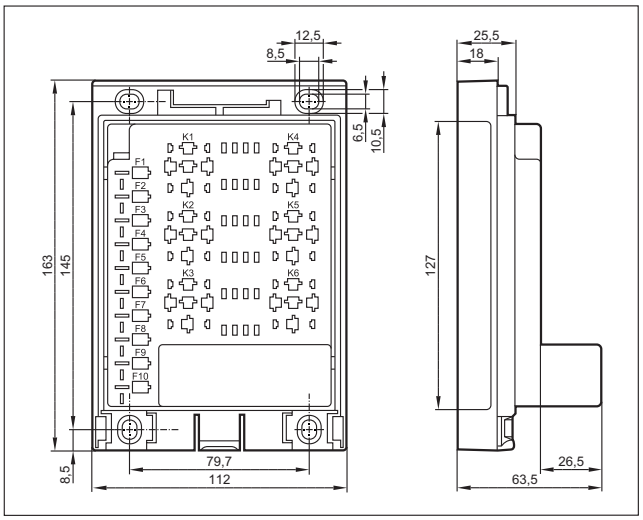

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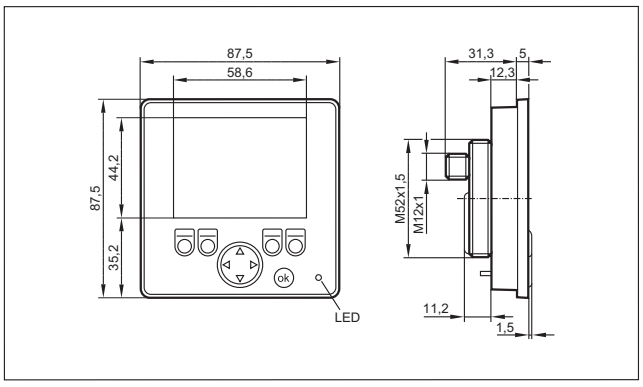
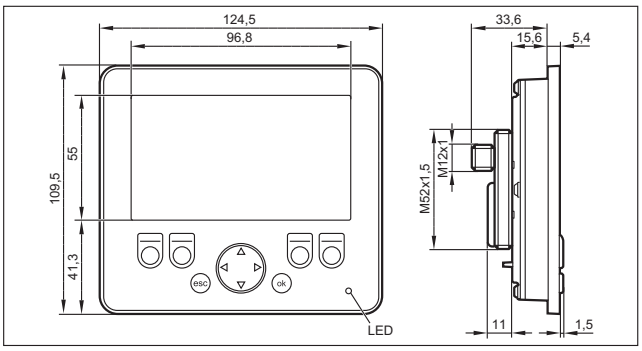


Scale drawings / drawing no. – CAD download: www.ifm.com

7



- **Inputs for analogue, digital, diagnostic and pulse signals**
- **Digital, PWM or current-controlled outputs, H-bridge function**
- **Up to 4 gateway interfaces**
- **Protocols for CANopen, SAE J1939, ISO 11992**
- **E1 type approval of the German Federal Office for Motor Traffic**

Controllers

The controller family of the control system ecomat*mobile* is now available in its 3rd generation. Due to the ever new functions and extensions it is a universal and user-friendly control system used in a multitude of applications worldwide. Powerful 16 or 32-bit microcontrollers ensure very short cycle times. The large program memory enables the processing of complex application programs. A second micro-controller monitors important system functions. In addition to digital inputs and outputs the controller also has analogue ports. Inputs for fast signals up to 30 kHz can additionally be used. Depending on the device up to 16 PWM outputs with current control are available. All inputs and outputs are protected against interference and overload. Wide-range power supplies enable operation in 12/24 V on-board systems.

Gateway functions

All controllers have at least one CAN interface which is used to transmit data via the CANopen protocol, e.g. to the decentralised input / output modules or to a dialogue module. Controllers with more than one CAN interface can also be used as a gateway. This enables, for example, direct processing of control and diagnostic data of diesel engines with the SAE J 1939 protocol. In addition, the CAN interfaces can be used for freely definable CAN protocols (CAN layer 2).

Programmable to IEC 61131-3

With the programming via CODESYS to IEC 61131-3, programming is clear and simple for the user. Function libraries are available for special hardware functions (e.g. gateway SAE J 1939 / CANopen).

High flexibility for many applications: the ClassicController R360.

Current-controlled PWM outputs are used to control the proportional hydraulic functions.

16-bit ClassicController

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Configurable input / output functions, Programming according to IEC 61131-3							
	24	24 x Digital 8 x analogue (U/I) 8 x frequency	8 x Digital 8 x PWM-I 8 x PWM	2 x CAN 1 x RS-232	1	1	**CR0505**
	40	40 x Digital 8 x analogue (U/I) 8 x frequency	24 x Digital 8 x PWM-I 12 x PWM 2 x H bridge	2 x CAN 1 x RS-232	2	1	**CR0020**

16-bit ExtendedController

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Configurable input / output functions, Programming according to IEC 61131-3							
	80	80 x Digital 16 x analogue (U/I) 16 x frequency	48 x Digital 16 x PWM-I 24 x PWM 4 x H bridge	2 x 2 x CAN 2 x RS-232	2	2	**CR0200**

16-bit SmartController

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Configurable input / output functions, Programming according to IEC 61131-3							
	12	8 x Digital 4 x analogue (U/I) 2 x frequency	4 x Digital 4 x PWM-I 4 x PWM	2 x CAN 1 x RS-232	3	3	**CR2500**

SmartController 32 bits

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Configurable input / output functions, Programming according to IEC 61131-3							
	32	16 x Digital 4 x analogue (U/I) 4 x frequency 2 x Resistor	16 x Digital 2 x analogue (0.2...10 V) 2 x PWM-I 12 x PWM	2 x CAN	4	3	**CR2530**
	64	32 x Digital 8 x analogue (U/I) 8 x frequency 4 x Resistor	32 x Digital 4 x analogue (0.2...10 V) 4 x PWM-I 24 x PWM	3 x CAN	–	4	**CR2532**

16-bit SafetyController

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
SILcl 2 (IEC 62061), PL d (EN ISO 13849-1), Configurable input / output functions, Programming according to IEC 61131-3							
	24	24 x Digital 8 x analogue (U/I) 8 x frequency	8 x Digital 8 x PWM-I 8 x PWM	2 x CAN 1 x RS-232	5	1	**CR7506**
	40	40 x Digital 8 x analogue (U/I) 8 x frequency	24 x Digital 8 x PWM-I 12 x PWM 2 x H bridge	2 x CAN 1 x RS-232	6	1	**CR7021**
	80	80 x Digital 16 x analogue (U/I) 16 x frequency	48 x Digital 16 x PWM-I 24 x PWM 4 x H bridge	2 x 2 x CAN 2 x RS-232	6	2	**CR7201**

SafetyController 32 bits

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
SILcl 2 (IEC 62061), PL d (EN ISO 13849-1), Configurable input / output functions, Programming according to IEC 61131-3							
	32	16 x Digital 16 x analogue (U/I) 16 x frequency	16 x Digital 16 x PWM-I 16 x PWM 2 x H bridge	4 x CAN 1 x RS-232 1 x USB	7	5	**CR7032**
	80	32 x Digital 32 x analogue (U/I) 32 x frequency	48 x Digital 32 x PWM-I 32 x PWM 4 x H bridge	4 x CAN 1 x RS-232 1 x USB	8	6	**CR7132**

32-bit ClassicController

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Configurable input / output functions, Programming according to IEC 61131-3							
	32	16 x Digital 16 x analogue (U/I) 16 x frequency	16 x Digital 16 x PWM-I 16 x PWM 2 x H bridge	4 x CAN 1 x RS-232 1 x USB	9	1	**CR0032**
	32	16 x Digital 12 x analogue (U/I) 12 x frequency 4 x Resistor	16 x Digital 16 x PWM-I 16 x PWM 2 x H bridge	4 x CAN 1 x RS-232 1 x USB	10	5	**CR0033**
	64	32 x Digital 16 x analogue (U/I) 16 x frequency 6 x Resistor	32 x Digital 2 x analogue (0.2...10 V) 18 x PWM-I, 28 x PWM 2 x H bridge	5 x CAN 1 x RS-232 1 x USB	–	6	**CR0133**

You can find wiring diagrams and scale drawings from page 45

32-bit ExtendedController

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Configurable input / output functions, Programming according to IEC 61131-3							
	80	32 x Digital 32 x analogue (U/I) 32 x frequency	48 x Digital 32 x PWM-I 32 x PWM 4 x H bridge	2 x 2 x CAN 1 x RS-232 1 x USB	11	6	**CR0234**
	80	40 x Digital 36 x analogue (U/I) 36 x frequency 4 x Resistor	40 x Digital 32 x PWM-I 32 x PWM 4 x H bridge	2 x 2 x CAN 1 x RS-232 1 x USB	12	6	**CR0235**

CabinetController for use in control cabinets

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Configurable input / output functions, Programming according to IEC 61131-3							
	42	24 x Digital 8 x analogue (U/I) 4 x frequency	18 x Digital 4 x PWM 10 x Relay	1 x CAN 1 x RS-232	13	7	**CR0301**
	36	24 x Digital 8 x analogue (U/I) 4 x frequency	12 x Digital 4 x PWM	1 x CAN 1 x RS-232	14	8	**CR0302**
	42	24 x Digital 8 x analogue (U/I) 4 x frequency	18 x Digital 8 x PWM 6 x PNP 10 A	2 x CAN 1 x RS-232	15	9	**CR0303**

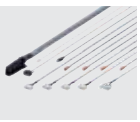
Accessories and software

Type	Description	Order no.
	Programming software CODESYS · for configuration, programming and diagnosis of ifm controller systems · German version · incl. the DVD "Software, tools and documentation"	**CP9006**
	Programming software CODESYS · for configuration, programming and diagnosis of ifm controller systems · English version · incl. the DVD "Software, tools and documentation"	**CP9008**
	Starter set ecomat R 360 Smart Controller · consisting of: · controller CR2500 · I/O simulator box incl. connection cable and connectors · plug-in power supply · DVD with programming software CODESYS · project examples and manuals	**EC2074**

Connection technology for control systems

Type	Description	Order no.
	Connector AMP 55-pole · wirable · with contacts (Junior Power Timer)	**EC2013**
	Cable with connector · AMP 55-pole · wired · Cable length 1.2 m · Cores sealed individually · Core cross-section 1 mm²	**EC2084**
	Cable with connector · AMP 55-pole · wired · Cable length 2.5 m · Cores sealed individually · Core cross-section 1 mm²	**EC2097**
	Cable with connector · AMP 55-pole · wired · Cable length 1.2 m · Core cross-section 1 mm²	**EC2086**
	Cable with connector · AMP 55-pole · wired · Cable length 2.5 m · Core cross-section 1 mm²	**EC2046**
	Cable with connector · AMP 6-pole · wired · fully wired · Cable length 1.2 m · Core cross-section 1 mm²	**EC1520**
	Cable with connector · AMP 10-pole · wired · fully wired · Cable length 1.2 m · Core cross-section 1 mm²	**EC1521**
	Cable with connector · AMP 14-pole · wired · fully wired · Cable length 1.2 m · Core cross-section 1 mm²	**EC1522**
	Cable with connector · AMP 18-pole · wired · fully wired · Cable length 1.2 m · Core cross-section 1 mm²	**EC1523**
	Cable with connector · AMP 18-pole · wired · partially wired · for input signals · Cable length 1.2 m · Core cross-section 1 mm²	**EC1524**
	Cable with connector · AMP 18-pole · wired · fully wired · Cable length 2.5 m · Core cross-section 1 mm²	**EC1533**
	Plug set for CabinetModule CR2012 / CR2014 · wirable · consisting of: · AMP Crimp housing 1 x 6 pins, 2 x 18 pins incl. Crimp contacts (Junior Power Timer)	**EC2053**
	Plug set for CabinetController CR0301 / CR0302 · wirable · consisting of: · AMP Crimp housing 1 x 6 pins, 2 x 10 pins, 3 x 18 pins incl. Crimp contacts (Junior Power Timer)	**EC2075**
	Plug set for CabinetModule CR201x · wirable · consisting of: · AMP Crimp housing 1 x 6 pins, 2 x 14 pins, 2 x 18 pins incl. Crimp contacts (Junior Power Timer)	**EC2089**

You can find wiring diagrams and scale drawings from page 45

Type	Description	Order no.
	Plug set · wirable · consisting of: · AMP Crimp housing 2 x 6 pins, 2 x 10 pins, 3 x 18 pins incl. Crimp contacts (Junior Power Timer)	**EC2090**
	RS-232 Programming adapter · with gender changer for pin-socket conversion	**EC2076**
	programming cable · cable length 2 m interface 9-pole D-SUB (female) · AMP 6-pole · Test input (AMP connector, pin 5) connected to VBB via link	**EC2091**
	programming cable · e.g. for ClassicController CR0032 or ExtendedController CR0232 · wired	**EC2096**
	Load-Dump-Module · 12 V DC	**EC2015**
	Load-Dump-Module · 24 V DC	**EC2016**
	Spring terminal box · e.g. for starter set	**EC2032**
	Serial interface cable · 2 x 9-pole D-SUB (female) · 1:1 · e.g. for PC communication, configuration or uploads of firmware updates · Cable length 2 m · e.g. for process and dialogue monitors PDM360	**EC2063**

Wiring diagrams

1

wiring			
pin	potential	description	note
23	VBB_S (10...32 V DC)	supply sensors and module	
05	VBB_O (10...32 V DC)	supply outputs	relay switched (1)
34	VBB_R (10...32 V DC)	supply via relay	relay switched (2)
01	GND_S	ground sensors and module	
15	GND_O	ground outputs	
12	GND_A	ground analogue outputs	

CAN, RS232, ERROR, TEST			
pin	potential	description	note
14	CAN 1_H	CAN interface 1 (high)	
32	CAN 1_L	CAN interface 1 (low)	
26	CAN 2_H	CAN interface 2 (high)	SAE J 1939
25	CAN 2_L	CAN interface 2 (low)	SAE J 1939
33	GND	ground (RS-232/CAN)	
06	RxD	RS 232 interface (programming)	pin 03, PC D-Sub (9 pin)
07	TxD	RS 232 interface (programming)	pin 02, PC D-Sub (9 pin)
13	ERROR	error output B_H	
24	TEST	test input	

inputs/outputs										
pin	inputs	configuration		outputs	configuration				diagnostic capability input / output	relay switched
08	%IX0.00 / %IW03	B_L	A	–	–				• / –	
27	%IX0.01 / %IW04	B_L	A	–	–				• / –	
09	%IX0.02 / %IW05	B_L	A	–	–				• / –	
28	%IX0.03 / %IW06	B_L	A	–	–				• / –	
10	%IX0.04 / %IW07	B_L	A	–	–				• / –	
29	%IX0.05 / %IW08	B_L	A	–	–				• / –	
11	%IX0.06 / %IW09	B_L	A	–	–				• / –	
30	%IX0.07 / %IW10	B_L	A	–	–				• / –	
44	%IX0.08	B_L		%QX0.00	B_H	PWM	PWM_I		– / •	VBB_O (1)
45	%IX0.09	B_L		%QX0.01	B_H	PWM	PWM_I		– / •	VBB_O (1)
46	%IX0.10	B_L		%QX0.02	B_H	PWM	PWM_I		– / •	VBB_O (1)
47	%IX0.11	B_L		%QX0.03	B_H	PWM	PWM_I		– / •	VBB_O (1)
20	%IX0.12	B_L	I_L (FRQ 0)	–	–				• / –	
02	%IX0.13	B_L	I_L (FRQ 1)	–	–				• / –	
21	%IX0.14	B_L	I_L (FRQ 2)	–	–				• / –	
38	%IX0.15	B_L	I_L (FRQ 3)	–	–				• / –	
36	%IX1.00	B_L		%QX0.04	B_H	PWM	PWM_I		– / •	VBB_R (2)
54	%IX1.01	B_L		%QX0.05	B_H	PWM	PWM_I		– / •	VBB_R (2)
17	%IX1.02	B_L		%QX0.06	B_H	PWM	PWM_I		– / •	VBB_R (2)
53	%IX1.03	B_L		%QX0.07	B_H	PWM	PWM_I		– / •	VBB_R (2)
19	%IX1.04	$B_{L/H}$	I_L (CYL 0)	–	–				• / –	
55	%IX1.05	$B_{L/H}$	I_L (CYL 1)	–	–				• / –	
18	%IX1.06	$B_{L/H}$	I_L (CYL 2)	–	–				• / –	
37	%IX1.07	$B_{L/H}$	I_L (CYL 3)	–	–				• / –	

note the double pin connection of inputs/outputs

inputs of the type B_H are without diagnostic capability

Wiring diagrams

2

pin	potential	description	note
23	VBB_S (10...32 V DC)	supply sensors and module	
05	VBB_O (10...32 V DC)	supply outputs	relay switched (1)
34	VBB_R (10...32 V DC)	supply via relay	relay switched (2)
01	GND_S	ground sensors and module	
15	GND_O	ground outputs	
12	GND_A	ground analogue outputs	

pin	potential	description	note
14	CAN 1_H	CAN interface 1 (high)	
32	CAN 1_L	CAN interface 1 (low)	
26	CAN 2_H	CAN interface 2 (high)	SAE J 1939
25	CAN 2_L	CAN interface 2 (low)	SAE J 1939
33	GND	ground (RS-232/CAN)	
06	RxD	RS 232 interface (programming)	pin 03, PC D-Sub (9 pin)
07	TxD	RS 232 interface (programming)	pin 02, PC D-Sub (9 pin)
13	ERROR	error output B_H	
24	TEST	test input	

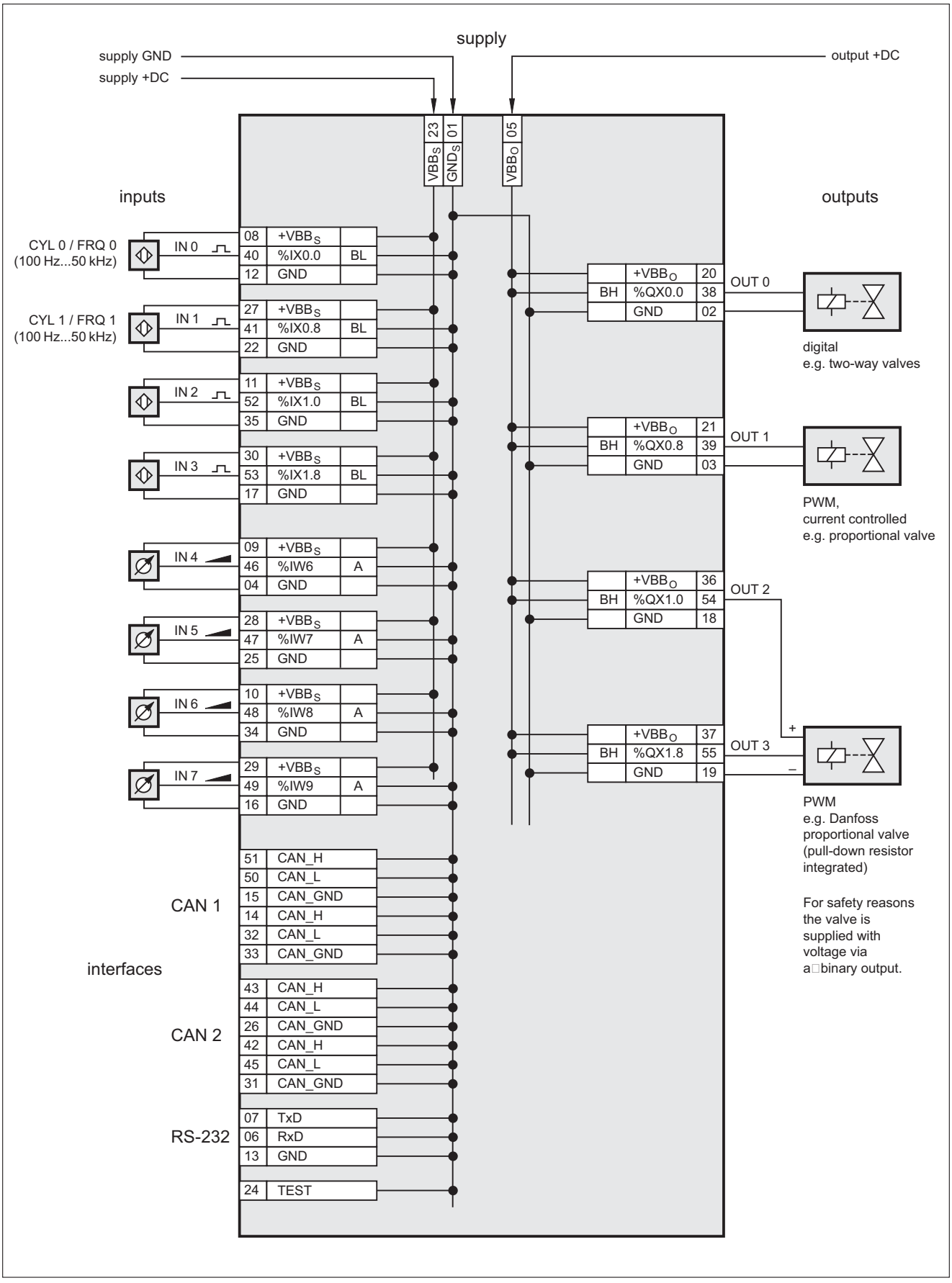
pin	inputs	configuration	outputs	configuration	diagnostic capability input / output	relay switched
08	%IX0.00 / %IW03	B_L A	–	–	• / –	
27	%IX0.01 / %IW04	B_L A	–	–	• / –	
09	%IX0.02 / %IW05	B_L A	–	–	• / –	
28	%IX0.03 / %IW06	B_L A	–	–	• / –	
10	%IX0.04 / %IW07	B_L A	–	–	• / –	
29	%IX0.05 / %IW08	B_L A	–	–	• / –	
11	%IX0.06 / %IW09	B_L A	–	–	• / –	
30	%IX0.07 / %IW10	B_L A	–	–	• / –	
44	%IX0.08	B_L	%QX0.00	B_H PWM PWM_I	– / •	VBB_O (1)
45	%IX0.09	B_L	%QX0.01	B_H PWM PWM_I	– / •	VBB_O (1)
46	%IX0.10	B_L	%QX0.02	B_H PWM PWM_I	– / •	VBB_O (1)
47	%IX0.11	B_L	%QX0.03	B_H PWM PWM_I	– / •	VBB_O (1)
20	%IX0.12	B_L I_L (FRQ 0)	–	–	• / –	
02	%IX0.13	B_L I_L (FRQ 1)	–	–	• / –	
21	%IX0.14	B_L I_L (FRQ 2)	–	–	• / –	
38	%IX0.15	B_L I_L (FRQ 3)	–	–	• / –	
36	%IX1.00	B_L	%QX0.04	B_H PWM PWM_I	– / •	VBB_R (2)
54	%IX1.01	B_L	%QX0.05	B_H PWM PWM_I	– / •	VBB_R (2)
17	%IX1.02	B_L	%QX0.06	B_H PWM PWM_I	– / •	VBB_R (2)
53	%IX1.03	B_L	%QX0.07	B_H PWM PWM_I	– / •	VBB_R (2)
19	%IX1.04	$B_{L/H}$ I_L (CYL 0)	–	–	• / –	
55	%IX1.05	$B_{L/H}$ I_L (CYL 1)	–	–	• / –	
18	%IX1.06	$B_{L/H}$ I_L (CYL 2)	–	–	• / –	
37	%IX1.07	$B_{L/H}$ I_L (CYL 3)	–	–	• / –	
39	%IX1.08	$B_{L/H}$	%QX0.08	B_H	• / •	VBB_O (1)
03	%IX1.09	$B_{L/H}$	%QX0.09	B_H	• / •	VBB_O (1)
40	%IX1.10	$B_{L/H}$	%QX0.10	B_H	• / •	VBB_O (1)
22	%IX1.11	$B_{L/H}$	%QX0.11	B_H	• / •	VBB_O (1)
41	%IX1.12	$B_{L/H}$	%QX0.12	B_H	• / •	VBB_O (1)
42	%IX1.13	$B_{L/H}$	%QX0.13	B_H	• / •	VBB_O (1)
43	%IX1.14	$B_{L/H}$	%QX0.14	B_H	• / •	VBB_O (1)
04	%IX1.15	$B_{L/H}$	%QX0.15	B_H	• / •	VBB_O (1)
48	%IX2.00	B_L	%QX1.00	B_H PWM	• / •	VBB_R (2)
49	%IX2.01	B_L	%QX1.01	$B_{H/L}$ H-bridge	• / •	VBB_R (2)
31	%IX2.02	B_L	%QX1.02	$B_{H/L}$ H-bridge	• / •	VBB_R (2)
50	%IX2.03	B_L	%QX1.03	B_H PWM	• / •	VBB_R (2)
51	%IX2.04	B_L	%QX1.04	B_H PWM	• / •	VBB_R (2)
52	%IX2.05	B_L	%QX1.05	$B_{H/L}$ H-bridge	• / •	VBB_R (2)
16	%IX2.06	B_L	%QX1.06	$B_{H/L}$ H-Bridge	• / •	VBB_R (2)
35	%IX2.07	B_L	%QX1.07	B_H PWM	• / •	VBB_R (2)

note the double pin connection of inputs/outputs

inputs of the type B_H are without diagnostic capability

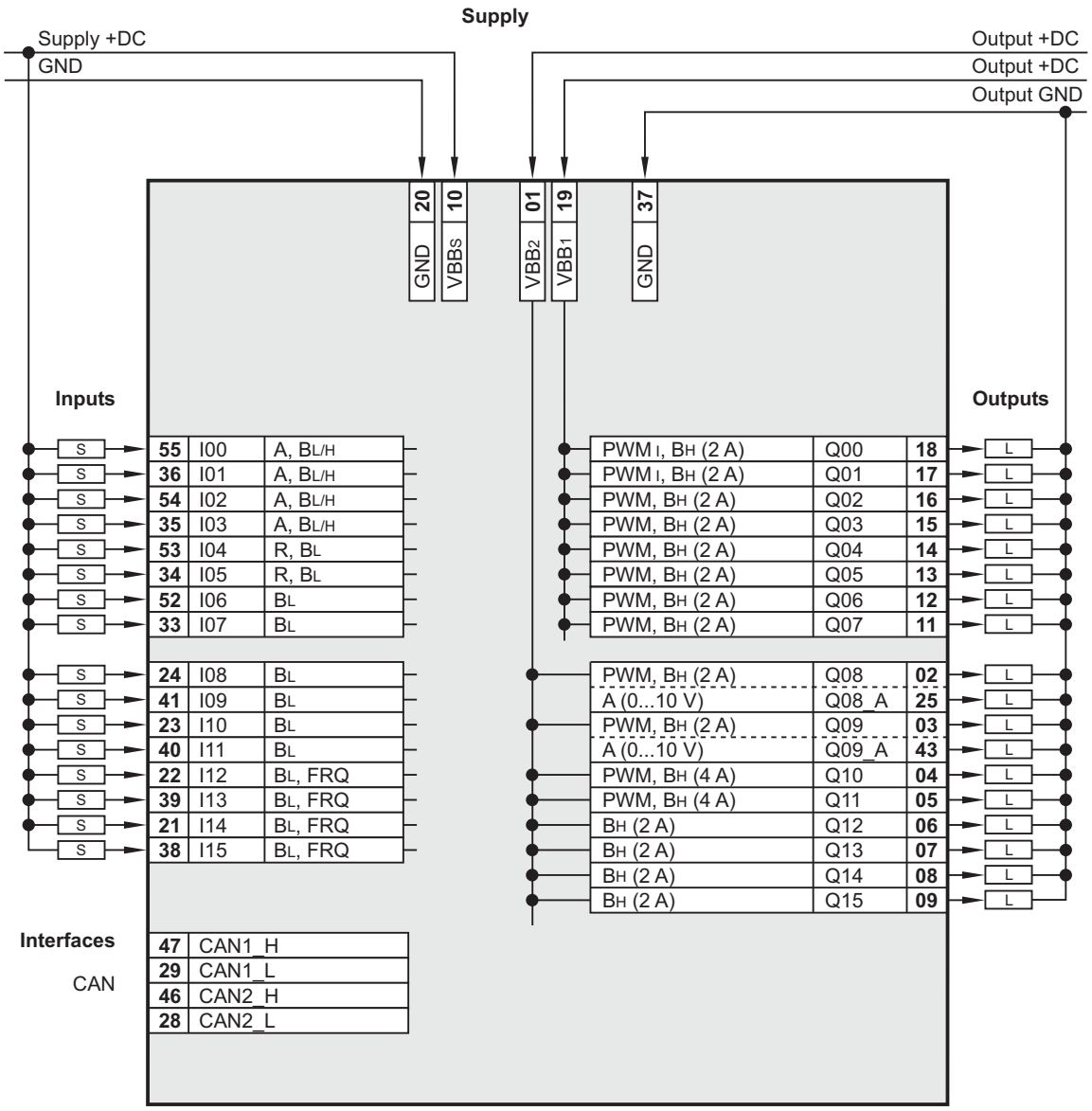
Wiring diagrams

3



Wiring diagrams

4



Wiring diagrams

5

WIRING

pin	potential	description	note
23	VBB_S (10...32 V DC)	supply sensors and module	
05	VBB_O (10...32 V DC)	supply outputs	relay switched (1)
34	VBB_R (10...32 V DC)	supply via relay	relay switched (2)
01	GND_S	ground sensors and module	
15	GND_O	ground outputs	
12	GND_A	ground analogue outputs	

CAN, RS232, ERROR, TEST

pin	potential	description	note
14	CAN 1_H	CAN interface 1 (high)	
32	CAN 1_L	CAN interface 1 (low)	
26	CAN 2_H	CAN interface 2 high)	SAE J 1939
25	CAN 2_L	CAN interface 2 (low)	SAE J 1939
33	GND	ground (RS-232/CAN)	
06	RxD	RS 232 interface (programming)	pin 03, PC D-Sub (9 pin)
07	TxD	RS 232 interface (programming)	pin 02, PC D-Sub (9 pin)
13	ERROR	error output B_H	
24	TEST	test input	

INPUTS/OUTPUTS

pin	inputs	configuration	outputs	configuration	diagnostic capability input / output	relay switched
08	%IX0.00 / %IW03	B_L A ▲	–	–	– / –	
27	%IX0.01 / %IW04	B_L A ▲	–	–	– / –	
09	%IX0.02 / %IW05	B_L A ▲	–	–	– / –	
28	%IX0.03 / %IW06	B_L A ▲	–	–	– / –	
10	%IX0.04 / %IW07	B_L A ▲	–	–	– / –	
29	%IX0.05 / %IW08	B_L A ▲	–	–	– / –	
11	%IX0.06 / %IW09	B_L A ▲	–	–	– / –	
30	%IX0.07 / %IW10	B_L A ▲	–	–	– / –	
44	%IX0.08	B_L –	%QX0.00	B_H PWM PWM_I –	– / •	VBB_O (1)
45	%IX0.09	B_L –	%QX0.01	B_H PWM PWM_I –	– / •	VBB_O (1)
46	%IX0.10	B_L –	%QX0.02	B_H PWM PWM_I –	– / •	VBB_O (1)
47	%IX0.11	B_L –	%QX0.03	B_H PWM PWM_I –	– / •	VBB_O (1)
20	%IX0.12	B_L I_L (FRQ 0) ▲	–	–	– / –	
02	%IX0.13	B_L I_L (FRQ 1) ▲	–	–	– / –	
21	%IX0.14	B_L I_L (FRQ 2) ▲	–	–	– / –	
38	%IX0.15	B_L I_L (FRQ 3) ▲	–	–	– / –	
36	–	–	%QX0.04	B_H PWM PWM_I ▲	– / •	VBB_R (2)
54	–	–	%QX0.05	B_H PWM PWM_I ▲	– / •	VBB_R (2)
17	–	–	%QX0.06	B_H PWM PWM_I ▲	– / •	VBB_R (2)
53	–	–	%QX0.07	B_H PWM PWM_I ▲	– / •	VBB_R (2)
19	%IX1.04	B_L I_L (CYL 0) ▲	–	–	– / –	
55	%IX1.05	B_L I_L (CYL 1) ▲	–	–	– / –	
18	%IX1.06	B_L I_L (CYL 2) ▲	–	–	– / –	
37	%IX1.07	B_L I_L (CYL 3) ▲	–	–	– / –	

note the double pin connection of inputs/outputs

Wiring diagrams

6

wiring			
pin	potential	description	note
23	VBB_S (10...32 V DC)	supply sensors and module	
05	VBB_O (10...32 V DC)	supply outputs	relay switched (1)
34	VBB_R (10...32 V DC)	supply via relay	relay switched (2)
01	GND_S	ground sensors and module	
15	GND_O	ground outputs	
12	GND_A	ground analogue outputs	

CAN, RS232, ERROR, TEST			
pin	potential	description	note
14	CAN 1_H	CAN interface 1 (high)	
32	CAN 1_L	CAN interface 1 (low)	
26	CAN 2_H	CAN interface 2 (high)	SAE J 1939
25	CAN 2_L	CAN interface 2 (low)	SAE J 1939
33	GND	ground (RS-232/CAN)	
06	RxD	RS 232 interface (programming)	pin 03, PC D-Sub (9 pin)
07	TxD	RS 232 interface (programming)	pin 02, PC D-Sub (9 pin)
13	ERROR	error output B_H	
24	TEST	test input	

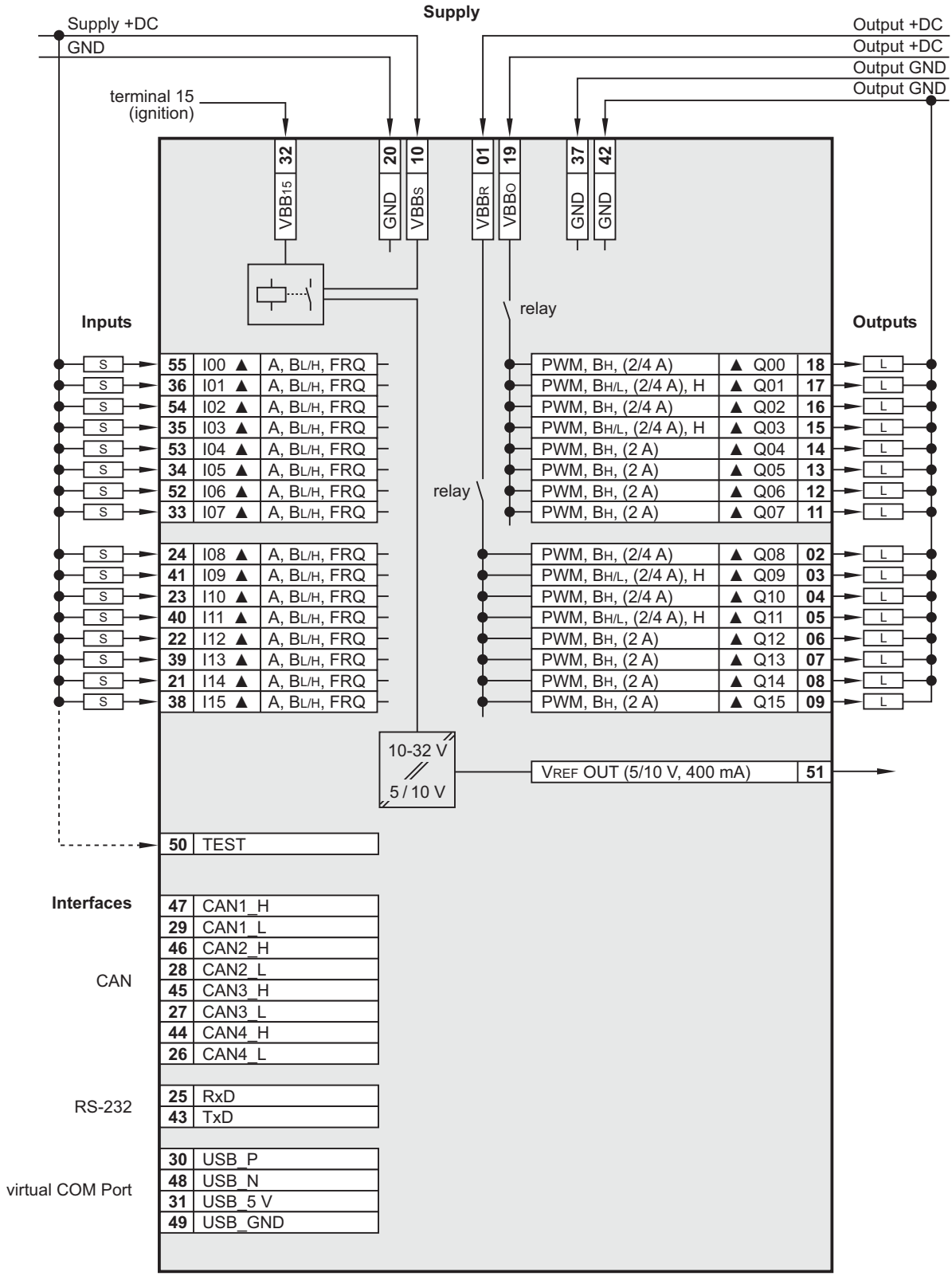
inputs/outputs											
pin	inputs	configuration		outputs	configuration					diagnostic capability input / output	relay switched
08	%IX0.00 / %IW03	B_L	A ▲	–	–					– / –	
27	%IX0.01 / %IW04	B_L	A ▲	–	–					– / –	
09	%IX0.02 / %IW05	B_L	A ▲	–	–					– / –	
28	%IX0.03 / %IW06	B_L	A ▲	–	–					– / –	
10	%IX0.04 / %IW07	B_L	A ▲	–	–					– / –	
29	%IX0.05 / %IW08	B_L	A ▲	–	–					– / –	
11	%IX0.06 / %IW09	B_L	A ▲	–	–					– / –	
30	%IX0.07 / %IW10	B_L	A ▲	–	–					– / –	
44	%IX0.08	B_L	–	%QX0.00	B_H	PWM	PWM_I	–		– / •	VBB_O (1)
45	%IX0.09	B_L	–	%QX0.01	B_H	PWM	PWM_I	–		– / •	VBB_O (1)
46	%IX0.10	B_L	–	%QX0.02	B_H	PWM	PWM_I	–		– / •	VBB_O (1)
47	%IX0.11	B_L	–	%QX0.03	B_H	PWM	PWM_I	–		– / •	VBB_O (1)
20	%IX0.12	B_L	I_L (FRQ 0) ▲	–	–					– / –	
02	%IX0.13	B_L	I_L (FRQ 1) ▲	–	–					– / –	
21	%IX0.14	B_L	I_L (FRQ 2) ▲	–	–					– / –	
38	%IX0.15	B_L	I_L (FRQ 3) ▲	–	–					– / –	
36	–	–		%QX0.04	B_H	PWM	PWM_I	▲		– / •	VBB_R (2)
54	–	–		%QX0.05	B_H	PWM	PWM_I	▲		– / •	VBB_R (2)
17	–	–		%QX0.06	B_H	PWM	PWM_I	▲		– / •	VBB_R (2)
53	–	–		%QX0.07	B_H	PWM	PWM_I	▲		– / •	VBB_R (2)
19	%IX1.04	B_L	I_L (CYL 0) ▲	–	–					– / –	
55	%IX1.05	B_L	I_L (CYL 1) ▲	–	–					– / –	
18	%IX1.06	B_L	I_L (CYL 2) ▲	–	–					– / –	
37	%IX1.07	B_L	I_L (CYL 3) ▲	–	–					– / –	
39	%IX1.08	$B_{L/H}$	–	%QX0.08	B_H			–		– / •	VBB_O (1)
03	%IX1.09	$B_{L/H}$	–	%QX0.09	B_H			–		– / •	VBB_O (1)
40	%IX1.10	$B_{L/H}$	–	%QX0.10	B_H			–		– / •	VBB_O (1)
22	%IX1.11	$B_{L/H}$	–	%QX0.11	B_H			–		– / •	VBB_O (1)
41	%IX1.12	$B_{L/H}$	–	%QX0.12	B_H			–		– / •	VBB_O (1)
42	%IX1.13	$B_{L/H}$	–	%QX0.13	B_H			–		– / •	VBB_O (1)
43	%IX1.14	$B_{L/H}$	–	%QX0.14	B_H			–		– / •	VBB_O (1)
04	%IX1.15	$B_{L/H}$	–	%QX0.15	B_H			–		– / •	VBB_O (1)
48	–	–		%QX1.00	B_H	PWM		▲		– / •	VBB_R (2)
49	–	–		%QX1.01	$B_{H/L}$*		H-Bridge	▲		– / •	VBB_R (2)
31	–	–		%QX1.02	$B_{H/L}$*		H-Bridge	▲		– / •	VBB_R (2)
50	–	–		%QX1.03	B_H	PWM		▲		– / •	VBB_R (2)
51	–	–		%QX1.04%QX1.05	B_H	PWM		▲		– / •	VBB_R (2)
52	–	–		%QX1.06	$B_{H/L}$*		H-Bridge	▲		– / •	VBB_R (2)
16	–	–		%QX1.07	$B_{H/L}$*		H-Bridge	▲		– / •	VBB_R (2)
35	–	–			B_H	PWM		▲		– / •	VBB_R (2)

note the double pin connection of inputs/outputs

*) only High Side outputs are safety related

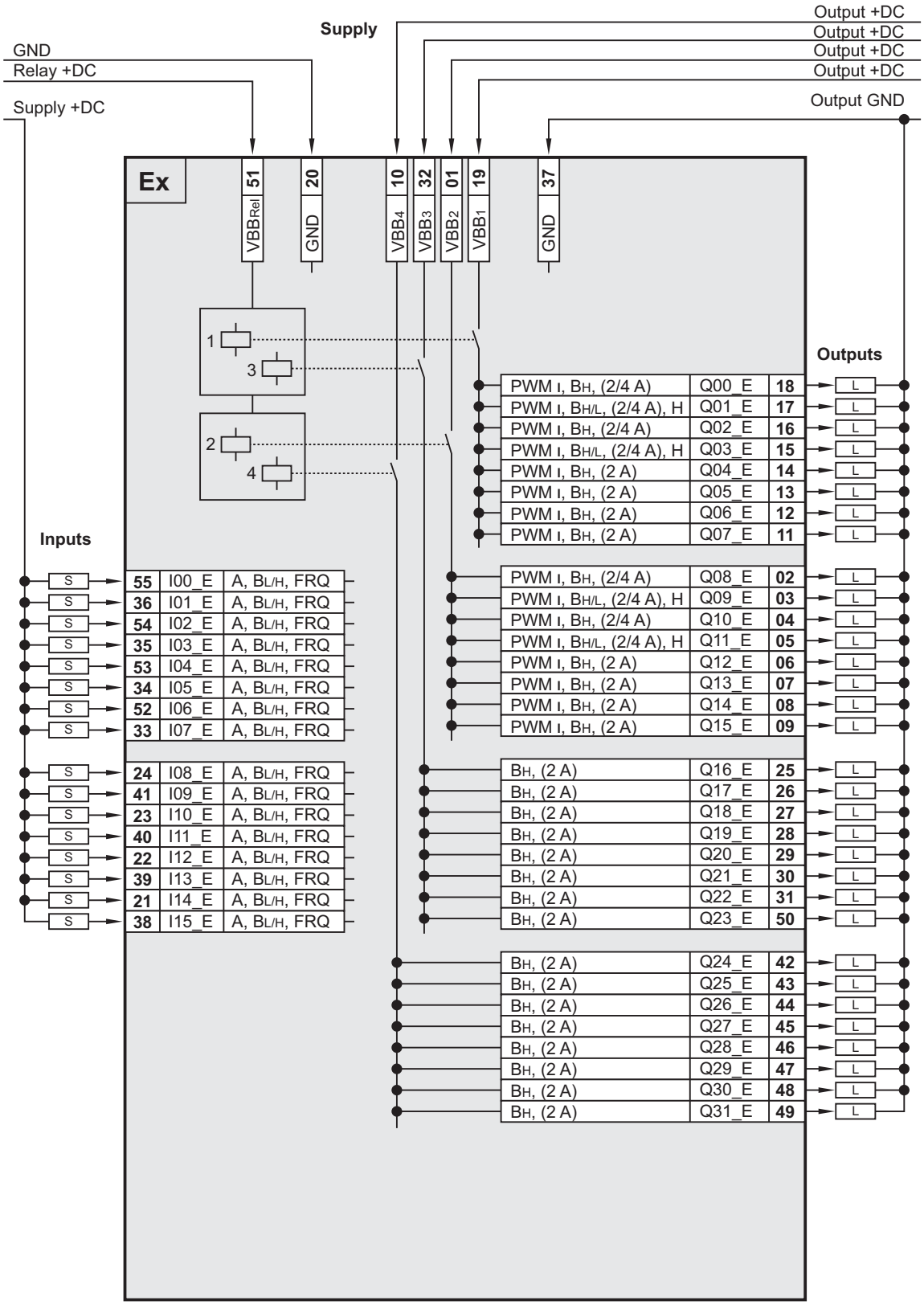
Wiring diagrams

7



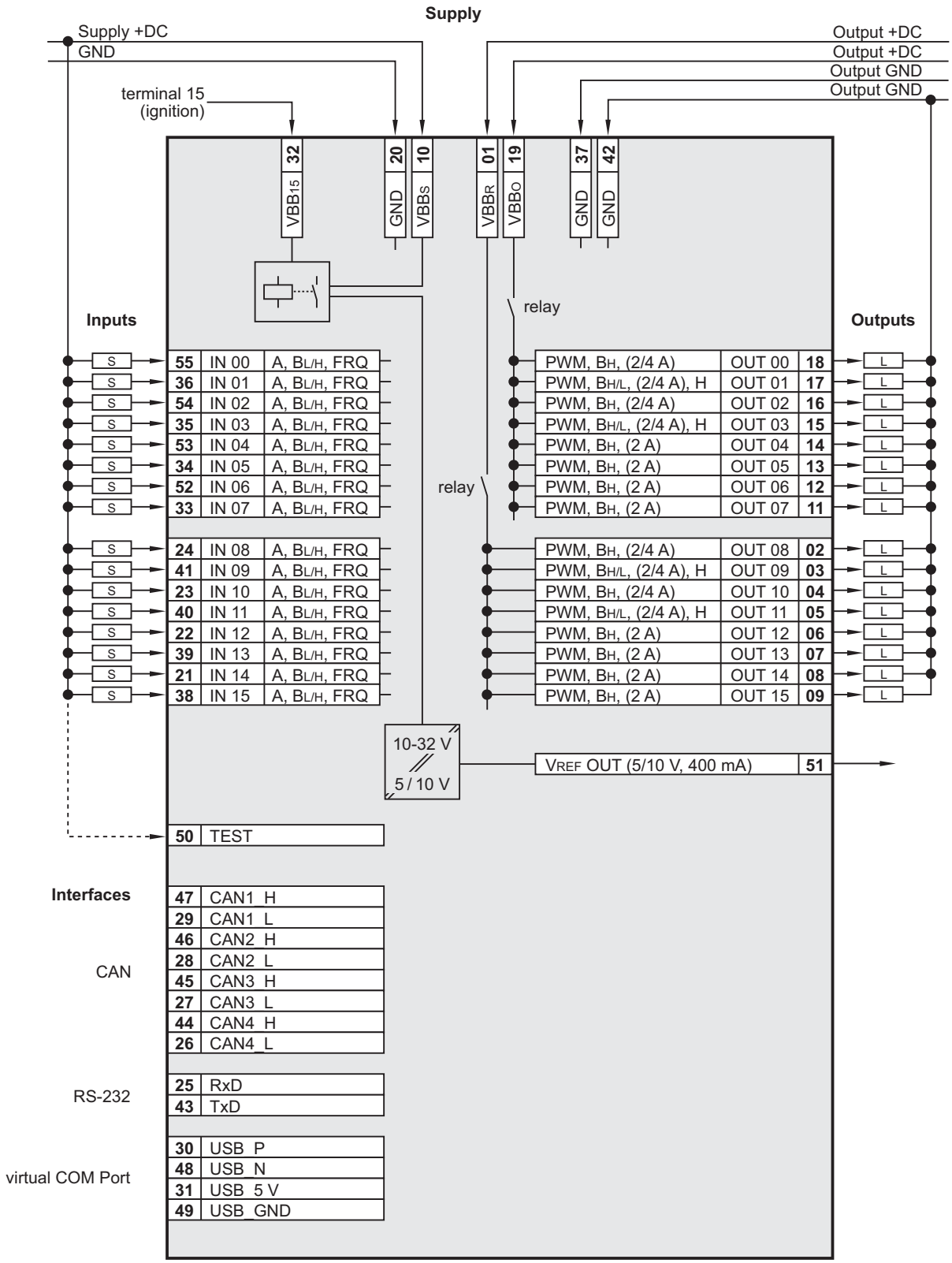
Wiring diagrams

8



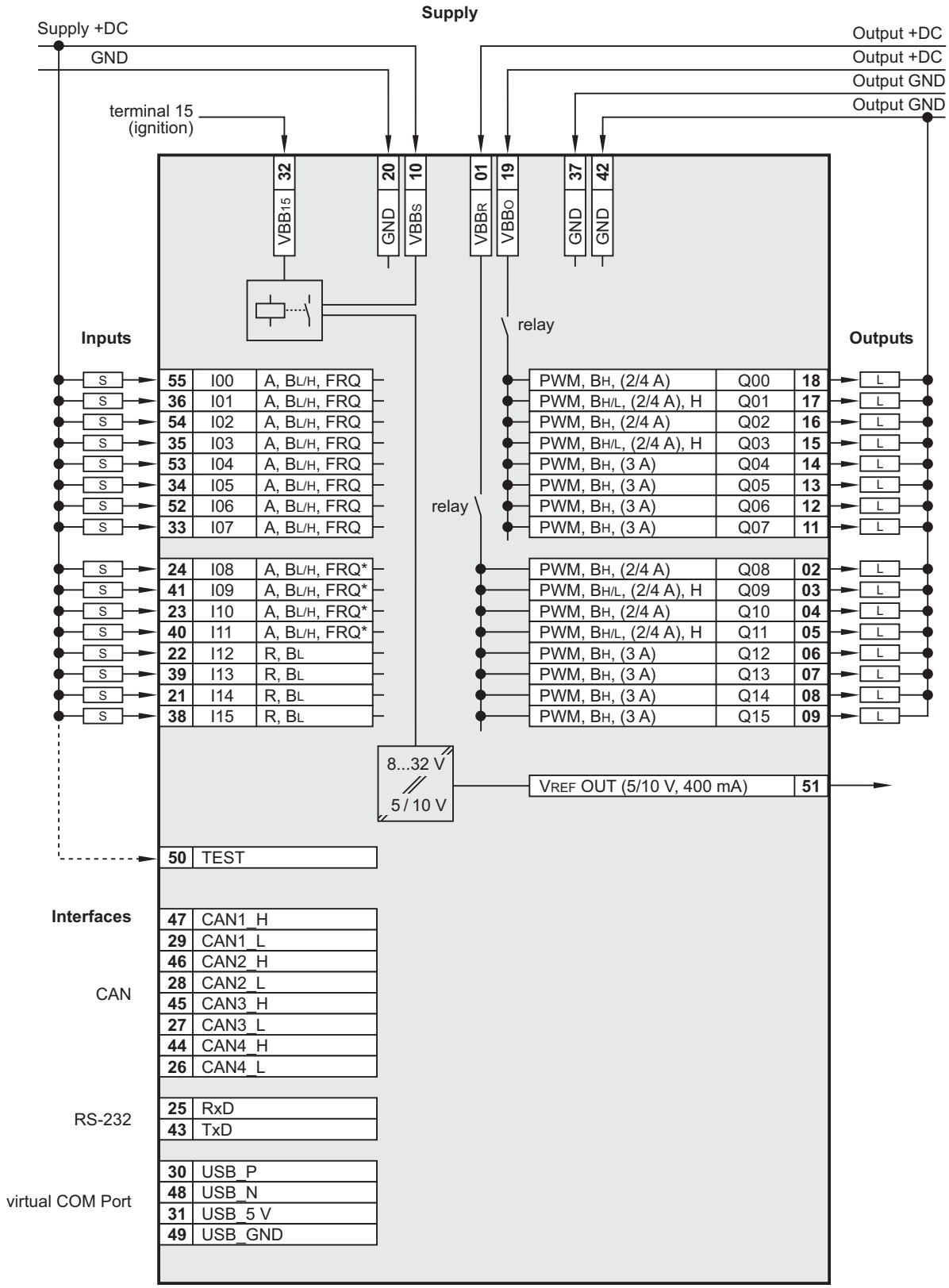
Wiring diagrams

9



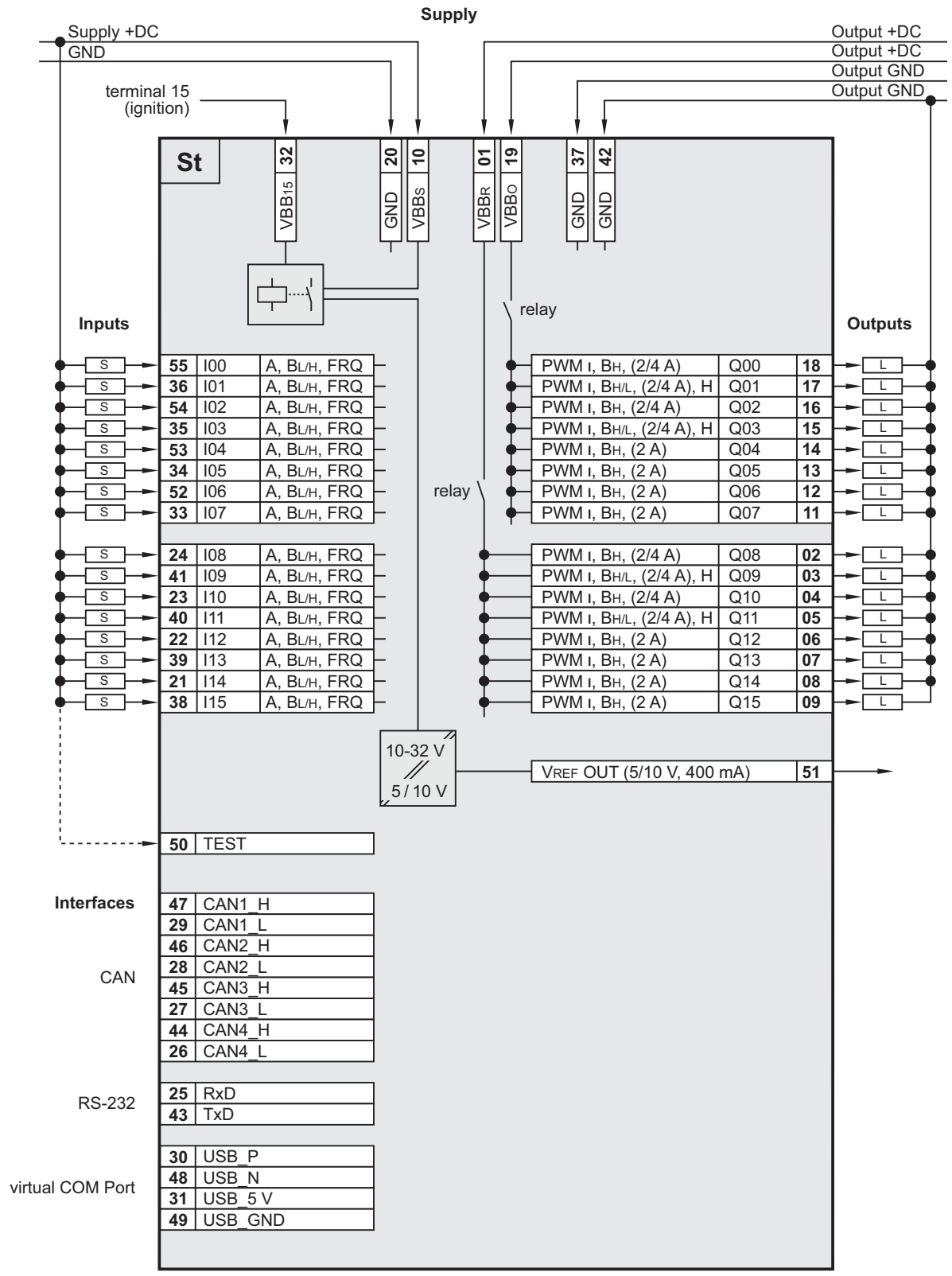
Wiring diagrams

10



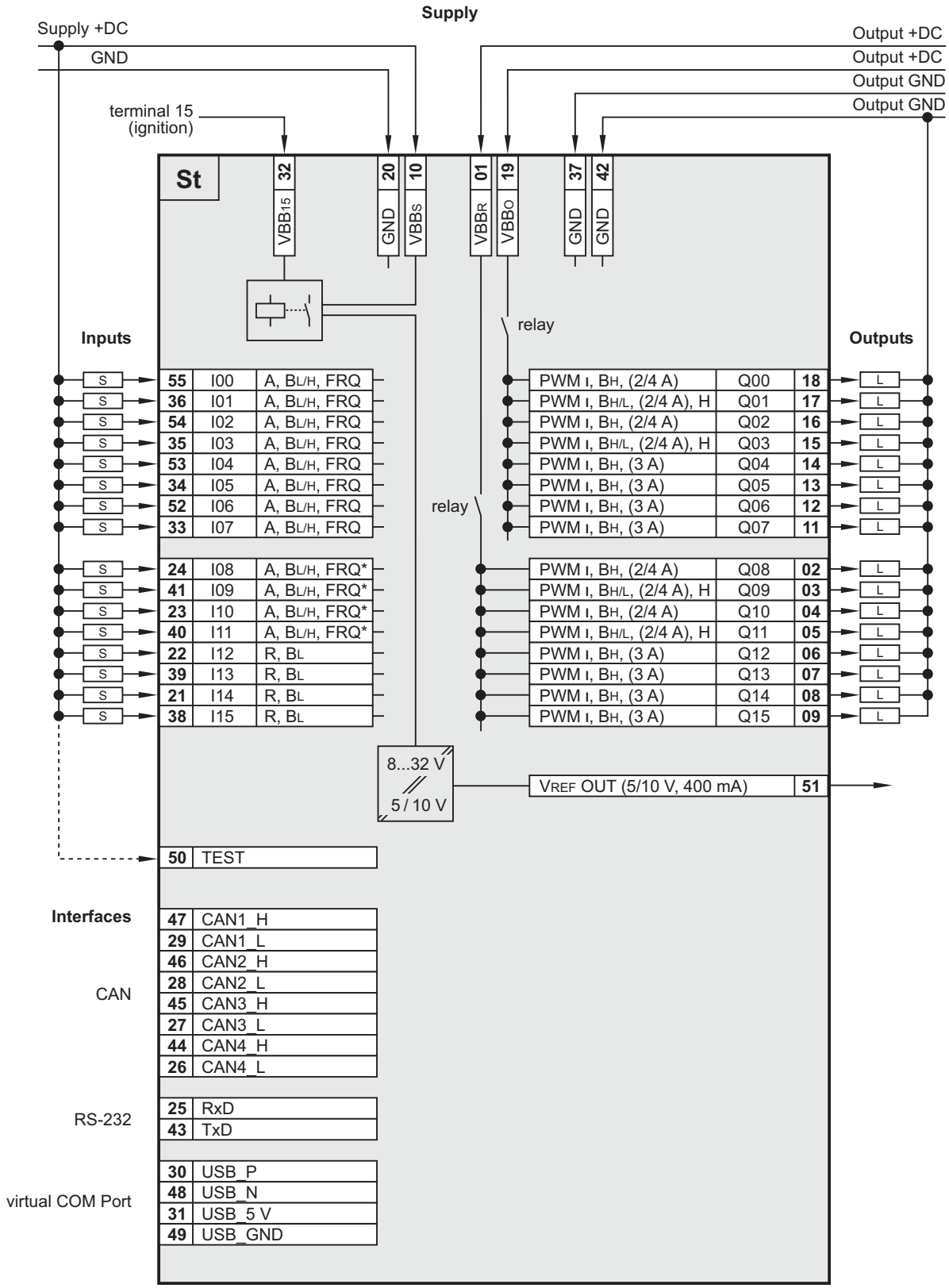
Wiring diagrams

11



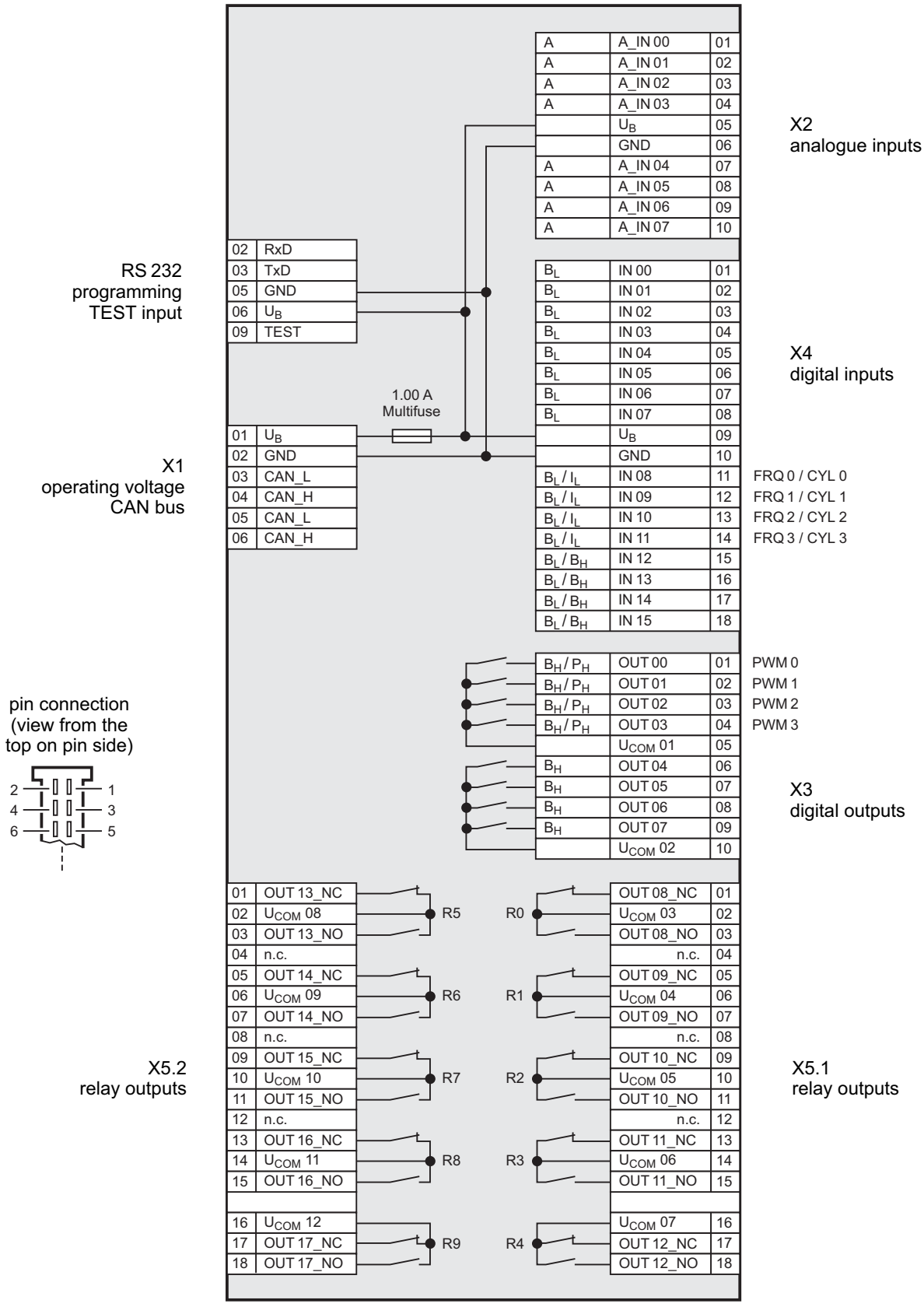
Wiring diagrams

12



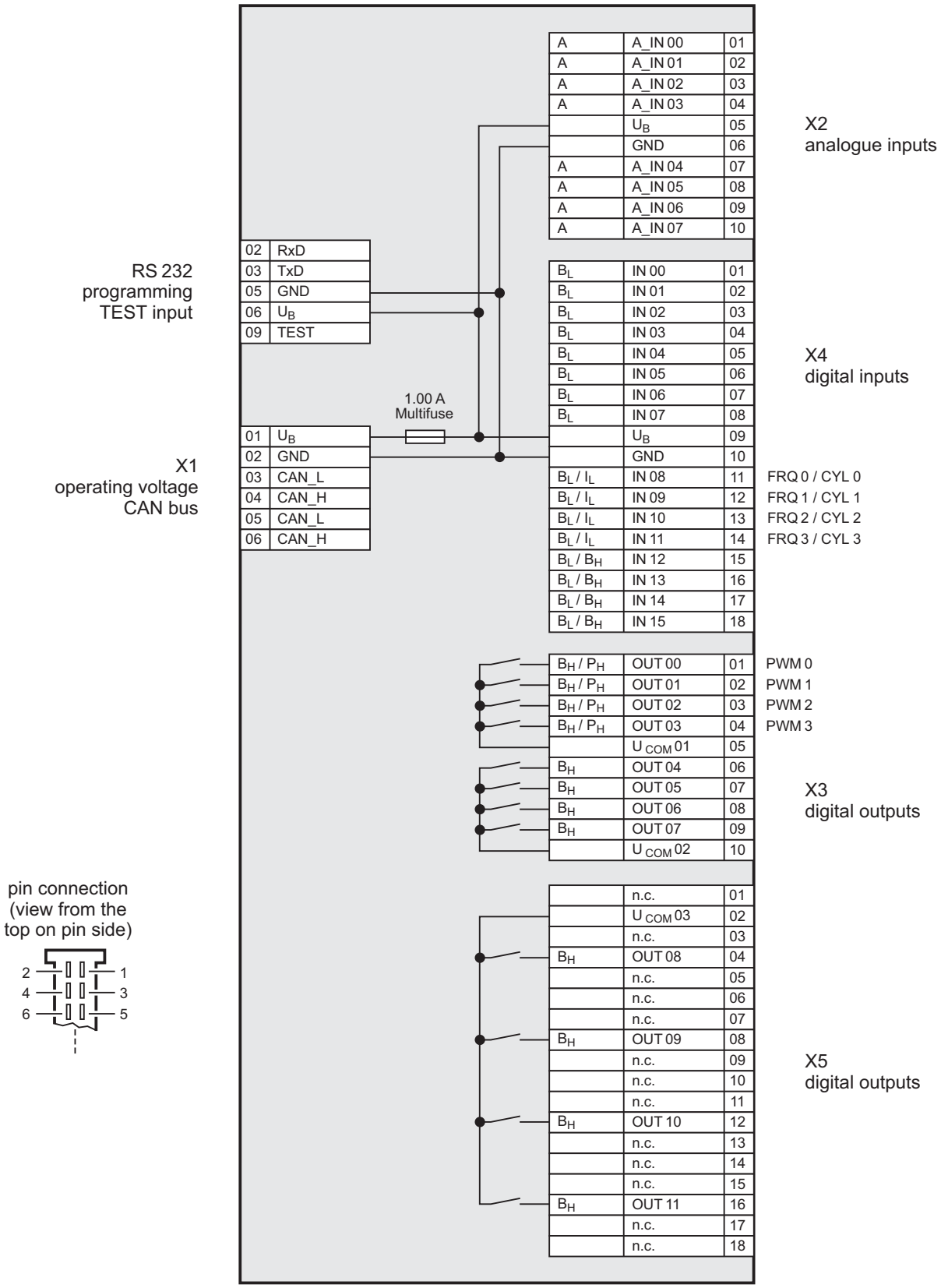
Wiring diagrams

13



Wiring diagrams

14



02	RxD
03	TxD
05	GND
06	U_B
09	TEST

01	U_B
02	GND
03	CAN_L
04	CAN_H
05	CAN_L
06	CAN_H

A	A_IN 00	01	
A	A_IN 01	02	
A	A_IN 02	03	
A	A_IN 03	04	
	U_B	05	
	GND	06	
A	A_IN 04	07	
A	A_IN 05	08	
A	A_IN 06	09	
A	A_IN 07	10	

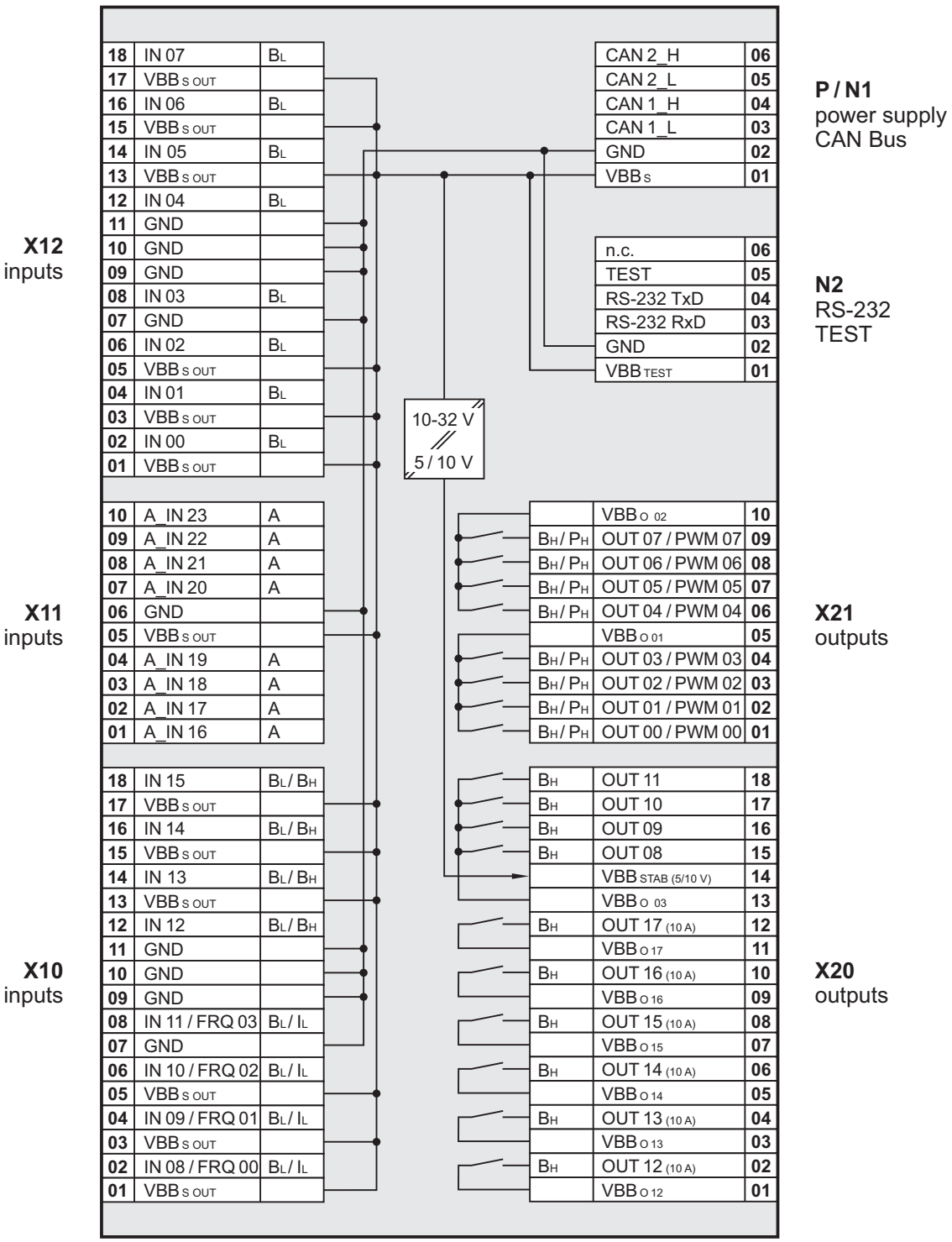
B_L	IN 00	01	
B_L	IN 01	02	
B_L	IN 02	03	
B_L	IN 03	04	
B_L	IN 04	05	
B_L	IN 05	06	
B_L	IN 06	07	
B_L	IN 07	08	
	U_B	09	
	GND	10	
B_L / I_L	IN 08	11	FRQ 0 / CYL 0
B_L / I_L	IN 09	12	FRQ 1 / CYL 1
B_L / I_L	IN 10	13	FRQ 2 / CYL 2
B_L / I_L	IN 11	14	FRQ 3 / CYL 3
B_L / B_H	IN 12	15	
B_L / B_H	IN 13	16	
B_L / B_H	IN 14	17	
B_L / B_H	IN 15	18	

B_H / P_H	OUT 00	01	PWM 0
B_H / P_H	OUT 01	02	PWM 1
B_H / P_H	OUT 02	03	PWM 2
B_H / P_H	OUT 03	04	PWM 3
	U_{COM} 01	05	
B_H	OUT 04	06	
B_H	OUT 05	07	
B_H	OUT 06	08	
B_H	OUT 07	09	
	U_{COM} 02	10	

	n.c.	01
	U_{COM} 03	02
	n.c.	03
B_H	OUT 08	04
	n.c.	05
	n.c.	06
	n.c.	07
B_H	OUT 09	08
	n.c.	09
	n.c.	10
	n.c.	11
B_H	OUT 10	12
	n.c.	13
	n.c.	14
	n.c.	15
B_H	OUT 11	16
	n.c.	17
	n.c.	18

Wiring diagrams

15



Scale drawings / drawing no. – CAD download: www.ifm.com

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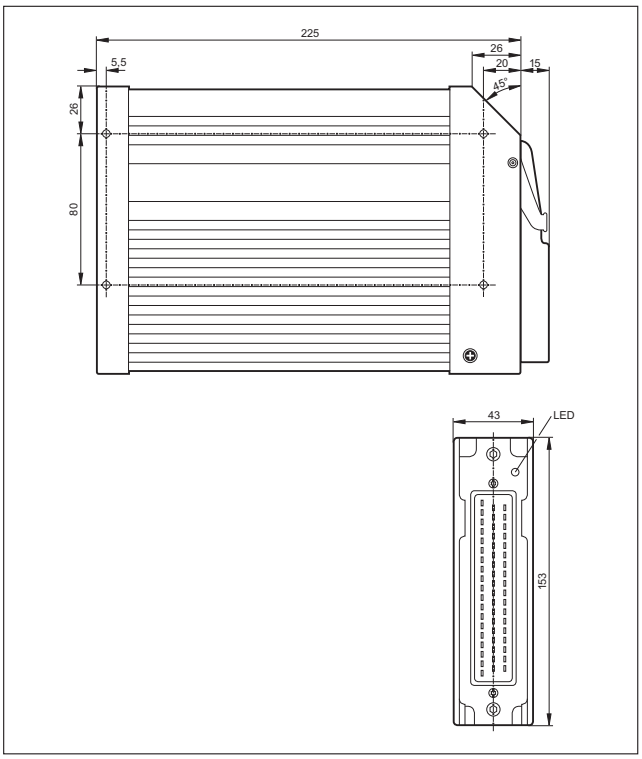

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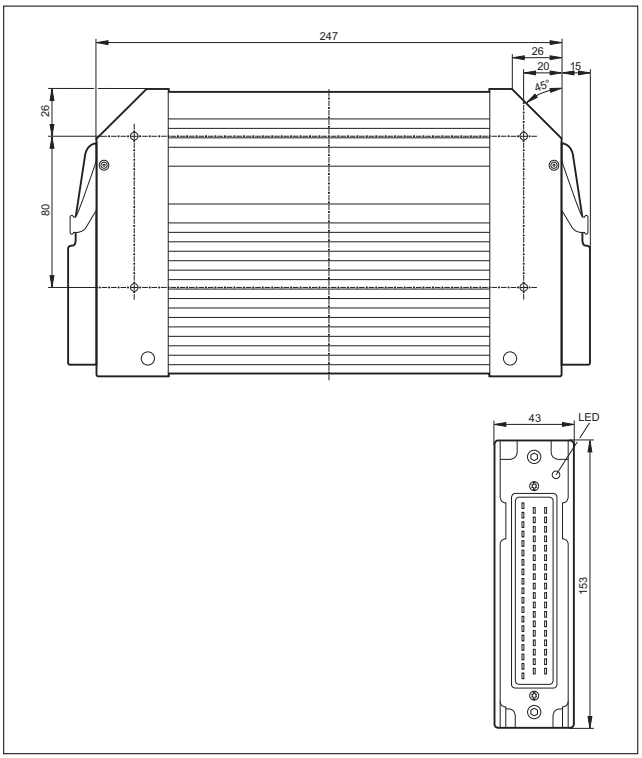

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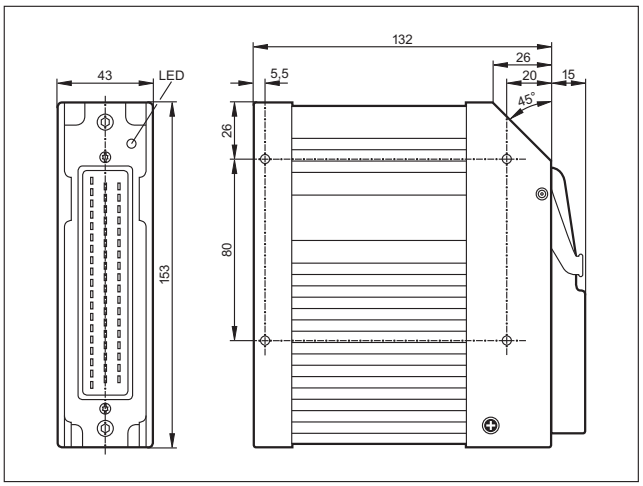

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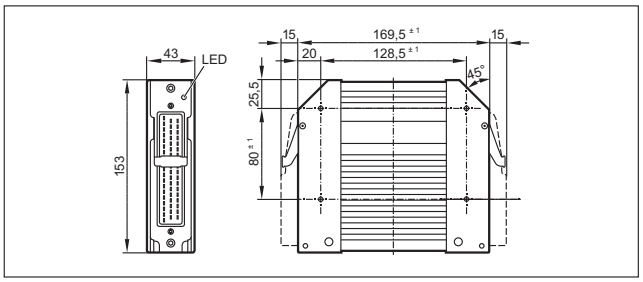

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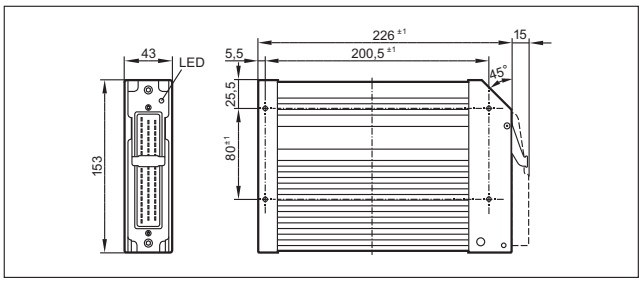

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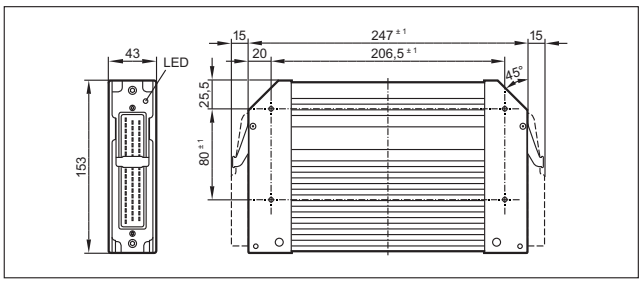

Scale drawings / drawing no. – CAD download: www.ifm.com

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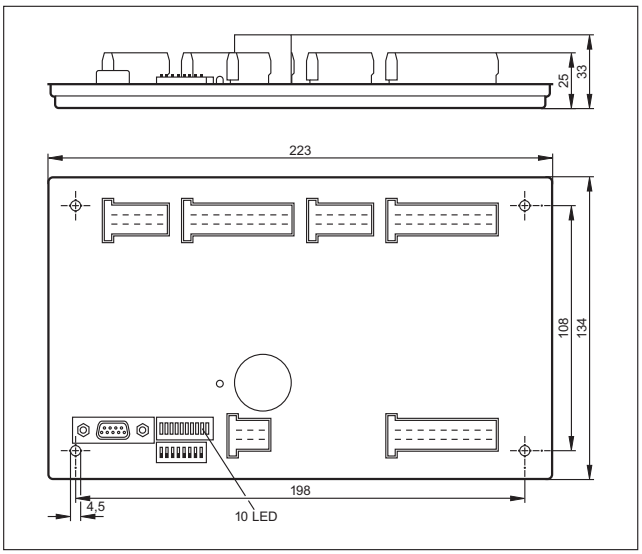

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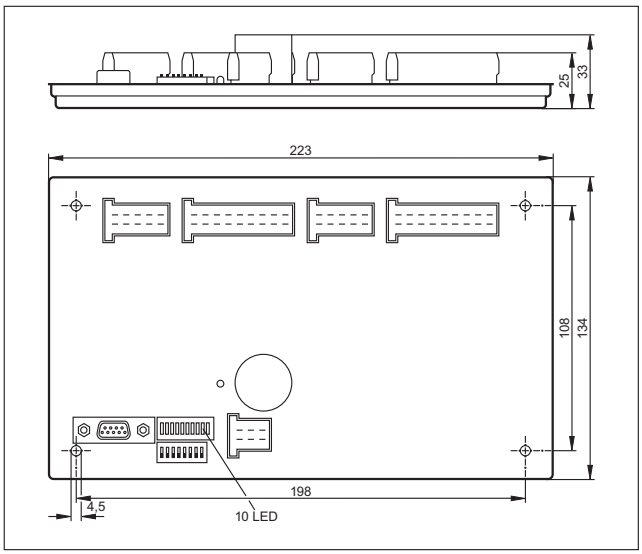

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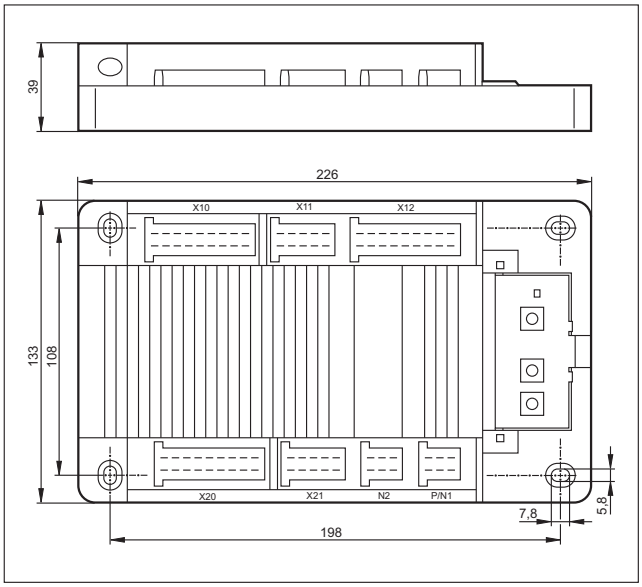


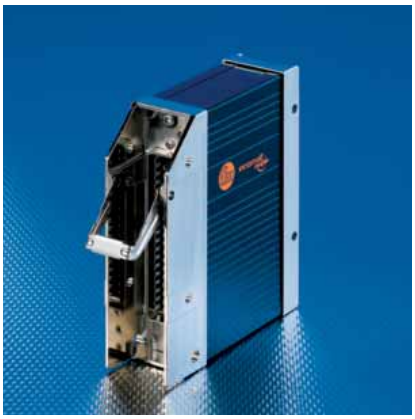
- **Parameterisable input / output functions**
- **Direct connection of hydraulic valves or joysticks**
- **Safe M12 connectors or central connector**
- **CAN interface with CANopen protocol**
- **E1 type approval of the German Federal Office for Motor Traffic**

I/O modules for mobile applications

Decentralised I/O modules connect binary and analogue sensors and actuators to the controller via the CAN bus. The advantage over conventional direct wiring: the CAN modules are mounted just where the signals are provided. This considerably reduces the number of cables. Furthermore, I/O modules provide additional functions for signal preprocessing. Whether in the control cabinet, the cabin or directly in the field: the various types and connection technologies provide solutions for almost all applications. The normalised CANopen protocol facilitates the networking of different CAN bus participants. For the normalisation of device and application-specific parameters device profiles are used. The standardised communication profile defines, among others, the network configuration, the transmission of process data and the synchronous exchange of data between network participants. The profile DSP 401 is used for digital and analogue input / output modules. The device parameters are set via the object directory using "Service Data Objects". Additionally, the time-critical process data (Process Data Objects, PDO) of the sensors and actuators can be exchanged via the object directory. CAN objects also monitor the participants and the network. The "Nodeguarding Object" or "Heart Beat" monitors whether a participant responds within a specified time. "Emergency Objects" are transmitted for the display of hardware and software errors. The input / output functionality of the module is listed by means of application objects which are described in the object directory of the device.

The parameters of CompactModules can be set to the application in a versatile manner.

The SmartModules are incorporated into the same robust metal housing as the mobile controllers.

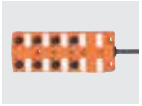


Product selectors and further information can be found at: www.ifm.com

CompactModules metal

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
CAN parameters adjustable via coding switch, Configurable input / output functions · M12 connector							
	8	–	8 x Digital 4 x PWM-I 4 x PWM	1 x CAN	4	1	**CR2031**
	16	8 x Digital 4 x analogue (U/I)	8 x Digital 4 x PWM	1 x CAN	5	2	**CR2032**
	12	8 x Digital 4 x analogue (U/I)	4 x Digital 4 x PWM	1 x CAN	6	3	**CR2033**

CompactModules

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Configurable output functions · M12 connector							
	8	–	8 x Digital 8 x PWM	1 x CAN	1	4	**CR2011**
Configurable input / output functions · M12 connector							
	8	4 x Digital 4 x analogue (0...10 V)	4 x Digital 4 x PWM	1 x CAN	2	4	**CR2013**

SmartModules

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Configurable input / output functions · 55-pole connec.							
	12	4 x Digital	8 x Digital 8 x PWM-I 8 x PWM	1 x CAN	7	5	**CR2512**
	12	8 x Digital 4 x analogue (U/I)	4 x Digital 4 x PWM	1 x CAN	8	5	**CR2513**
	30	15 x Digital 4 x analogue (U/I)	15 x Digital 3 x PWM 4 x PNP 10 A 4 x H bridge	1 x CAN	9	6	**CR2520**

Product selectors and further information can be found at: www.ifm.com

CabinetModules

Type	Inputs / outputs total	Inputs	Outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
CAN parameters adjustable via coding switch, Configurable input / output functions · Connector							
	16	16 x Digital 4 x analogue (0...10 V)	4 x Digital 2 x PWM	1 x CAN	10	7	**CR2012**
	16	16 x Digital 4 x analogue (0...5 V)	4 x Digital 2 x PWM	1 x CAN	10	7	**CR2014**
	32	16 x Digital 4 x analogue (U/I) 4 x frequency	16 x Digital 4 x PWM	1 x CAN	11	8	**CR2016**

KeypadModules

Type	Display	Operating elements	Inputs / outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Programming according to IEC 61131-3 · cage clamps							
	2 x LED bar graph (10-digit) 12 x LEDs	12 Pushbuttons 4 arrow keys	–	1 x CAN	3	9	**CR1500**

Accessories for I/O modules

Type	Description	Order no.
	label tag · 20 x 9 mm · Housing materials: plastics white	**E70424**
	Protective cap · M12 · for M12 sockets of CompactModule Metal · Housing materials: PA black	**EC2098**
	Connector AMP 55-pole · wirable · with contacts (Junior Power Timer)	**EC2013**
	Cable with connector · AMP 55-pole · wired · Cable length 1.2 m · Cores sealed individually · Core cross-section 1 mm²	**EC2084**
	Cable with connector · AMP 55-pole · wired · Cable length 2.5 m · Cores sealed individually · Core cross-section 1 mm²	**EC2097**
	Cable with connector · AMP 55-pole · wired · Cable length 1.2 m · Core cross-section 1 mm²	**EC2086**

You can find wiring diagrams and scale drawings from page 68

Type	Description	Order no.
	Cable with connector · AMP 55-pole · wired · Cable length 2.5 m · Core cross-section 1 mm²	EC2046
	Plug set for CabinetModule CR2012 / CR2014 · wirable · consisting of: · AMP Crimp housing 1 x 6 pins, 2 x 18 pins incl. Crimp contacts (Junior Power Timer)	EC2053
	Plug set for CabinetModule CR201x · wirable · consisting of: · AMP Crimp housing 1 x 6 pins, 2 x 14 pins, 2 x 18 pins incl. Crimp contacts (Junior Power Timer)	EC2089
	Plug set · wirable · consisting of: · AMP Crimp housing 2 x 6 pins, 2 x 10 pins, 3 x 18 pins incl. Crimp contacts (Junior Power Timer)	EC2090
	Cable with connector · AMP 6-pole · wired · fully wired · Cable length 1.2 m · Core cross-section 1 mm²	EC1520
	Cable with connector · AMP 10-pole · wired · fully wired · Cable length 1.2 m · Core cross-section 1 mm²	EC1521
	Cable with connector · AMP 14-pole · wired · fully wired · Cable length 1.2 m · Core cross-section 1 mm²	EC1522
	Cable with connector · AMP 18-pole · wired · fully wired · Cable length 1.2 m · Core cross-section 1 mm²	EC1523
	Cable with connector · AMP 18-pole · wired · partially wired · for input signals · Cable length 1.2 m · Core cross-section 1 mm²	EC1524
	Cable with connector · AMP 18-pole · wired · fully wired · Cable length 2.5 m · Core cross-section 1 mm²	EC1533
	Socket · straight · Free from halogen · Gold-plated contacts · M12 connector · 2 m · 5-pole · Housing materials: PUR	E11596
	Socket · straight · Free from halogen · Gold-plated contacts · M12 connector · 5 m · 5-pole · Housing materials: PUR	E11597
	Terminating resistor socket · straight · Gold-plated contacts · M12 connector · 5-pole · Housing materials: TPU	E11589
	Terminating resistor plug · straight · Gold-plated contacts · M12 connector · 5-pole · Housing materials: TPU	E11590
	Cable plug · straight · Free from halogen · Gold-plated contacts · M12 connector · 2 m · 5-pole · Housing materials: PUR	E11598

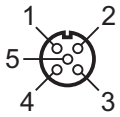
Type	Description	Order no.
	Cable plug · straight · Free from halogen · Gold-plated contacts · M12 connector · 5 m · 5-pole · Housing materials: PUR	**E11599**
	Jumper · straight / straight · Free from halogen · Gold-plated contacts · 0.3 m · 5-pole · Housing materials: PUR	**E11591**
	Jumper · straight / straight · Free from halogen · Gold-plated contacts · 1 m · 5-pole · Housing materials: PUR	**E11592**
	Jumper · straight / straight · Free from halogen · Gold-plated contacts · 2 m · 5-pole · Housing materials: PUR	**E11593**
	Jumper · straight / straight · Free from halogen · Gold-plated contacts · 5 m · 5-pole · Housing materials: PUR	**E11594**
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector with integrated CAN terminating resistor (120 ohm) · 5 m · 5-pole · Housing materials: housing: TPU black / sealing: Viton	**EVC492**
	Cable plug · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 6 m · 5-pole · Housing materials: housing: TPU black	**E12215**
	Wirable plug · straight · Free from silicone · Free from halogen · wirable · Gold-plated contacts · M12 connector · 5-pole · Housing materials: PA	**E11506**
	Wirable socket · straight · Free from silicone · Free from halogen · wirable · Gold-plated contacts · M12 connector · 5-pole · Housing materials: PA	**E11511**
	Wirable plug · straight · Free from silicone · Free from halogen · wirable · Gold-plated contacts · M12 connector · 4-pole · Housing materials: PA	**E11504**
	Wirable plug · angled · Free from silicone · Free from halogen · wirable · Gold-plated contacts · M12 connector · 4-pole · Housing materials: PA	**E11505**
	Wirable plug · angled · Free from silicone · Free from halogen · wirable · Gold-plated contacts · M12 connector · 5-pole · Housing materials: PA	**E11860**
	Wirable plug · angled · Free from silicone · Free from halogen · wirable · Gold-plated contacts · M12 connector · 5-pole · Housing materials: PA	**E11507**
	Load-Dump-Module · 12 V DC	**EC2015**
	Load-Dump-Module · 24 V DC	**EC2016**

You can find wiring diagrams and scale drawings from page 68

Type	Description	Order no.
	Plug for Danfoss PWM valves · wirable · terminals	EC2056
	Plug for Danfoss PWM valves · M12 connector	EC2088
	Adapter cable for CAN devices with M12 connector (5 pole) · e.g. CANmem, CANremote or inclination sensors	EC2062

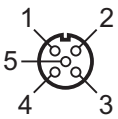
Wiring diagrams

1



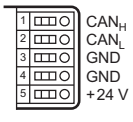
with current monitoring	without current monitoring
pin 1: n.c.	pin 1: n.c.
pin 2: output	pin 2: n.c.
pin 3: L–	pin 3: L–
pin 4: n.c.	pin 4: output
pin 5: n.c.	pin 5: n.c.

2



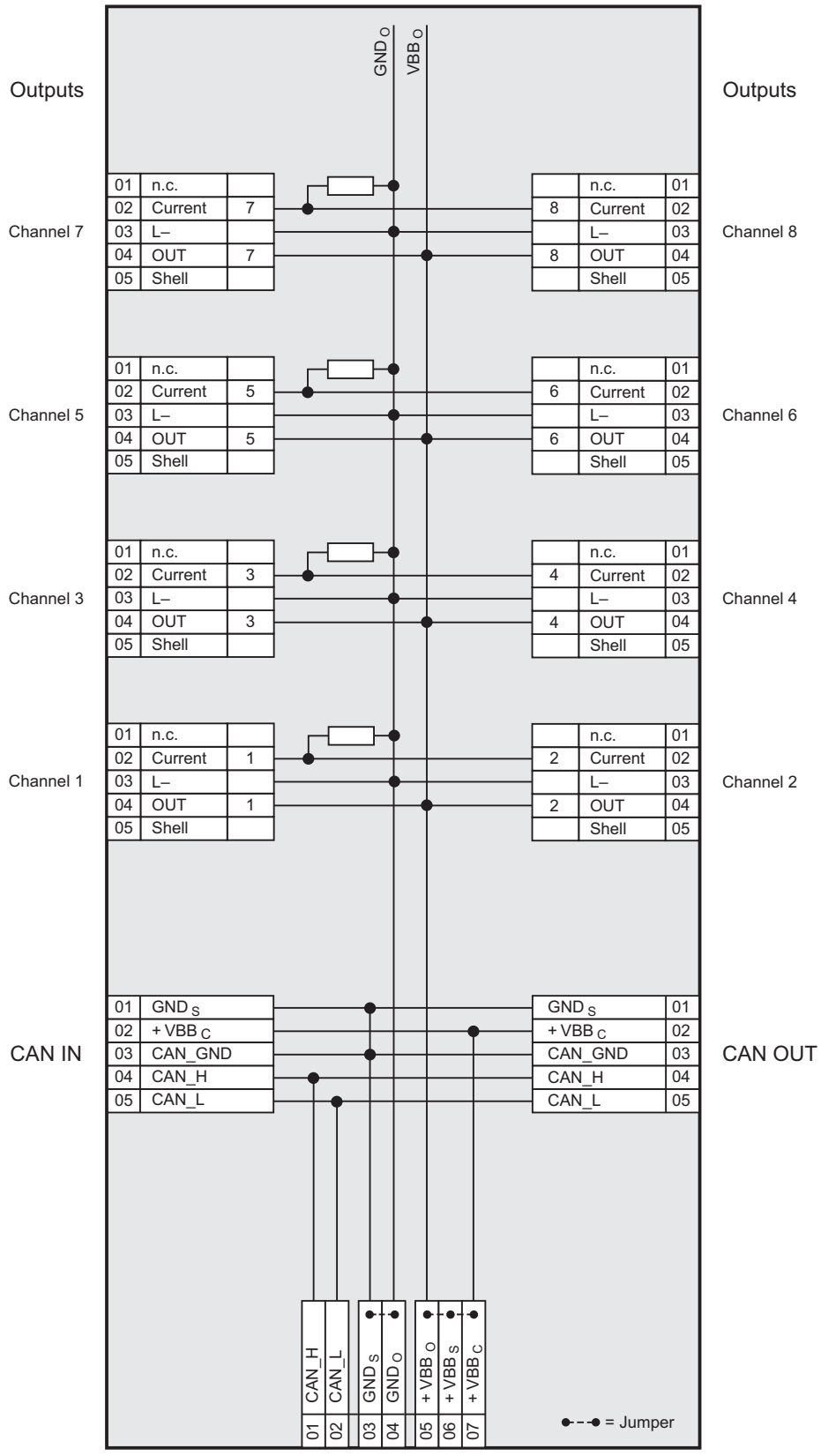
input	output
pin 1: L+	pin 1: n.c.
pin 2: analogue input	pin 2: n.c.
pin 3: L–	pin 3: L–
pin 4: digital input	pin 4: output
pin 5: n.c.	pin 5: n.c.

3



Wiring diagrams

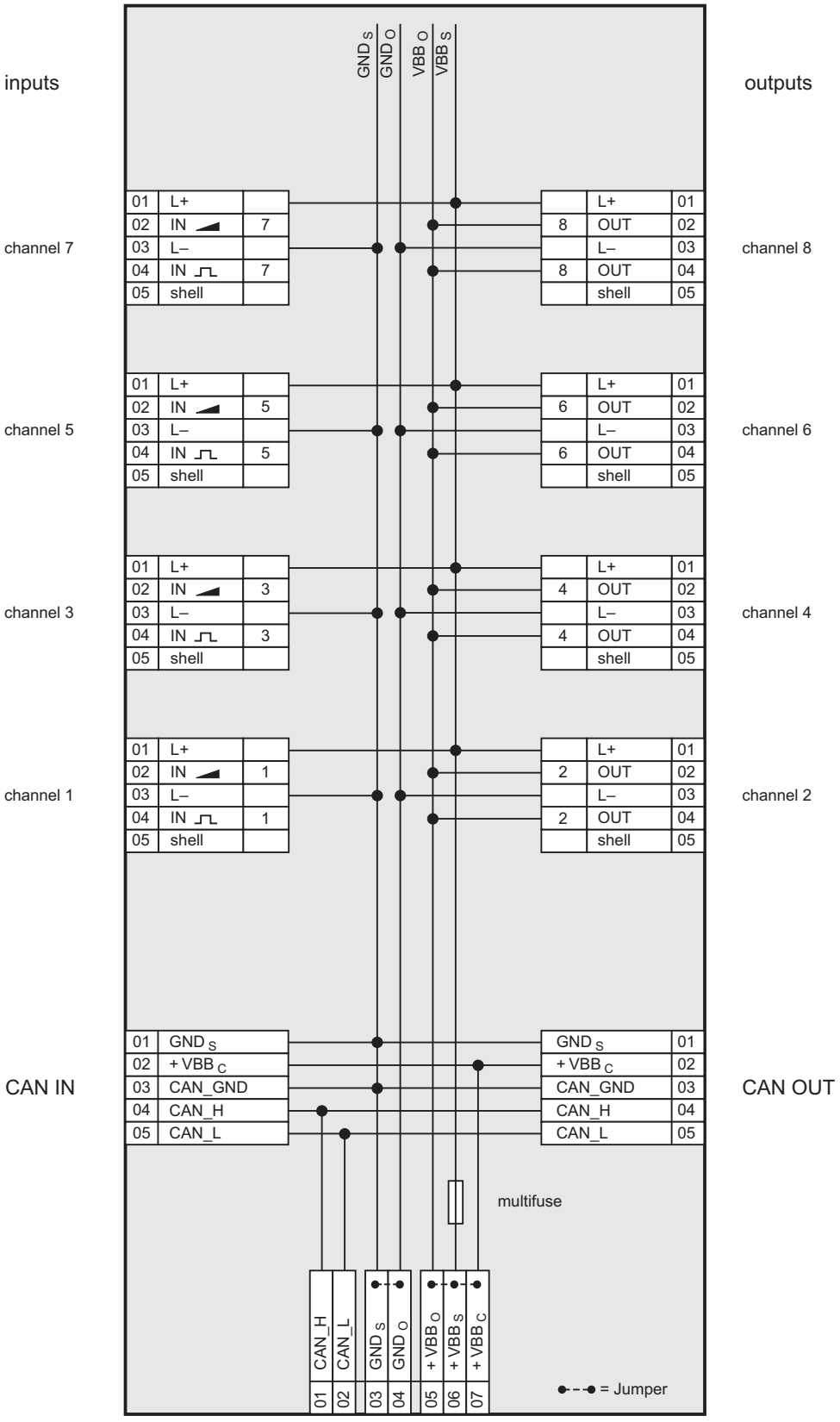
4



CAN Interface / Supply

Wiring diagrams

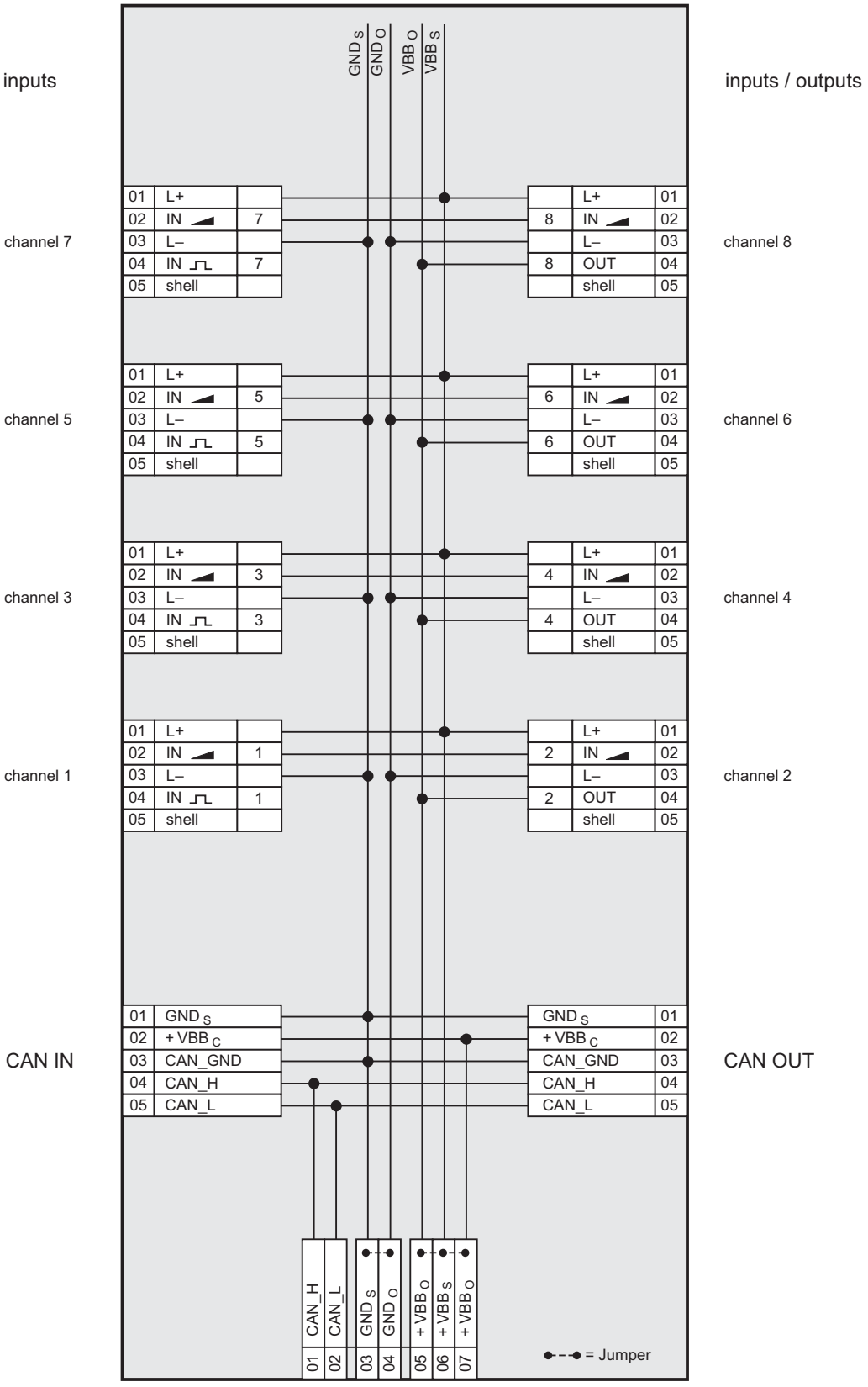
5



CAN interface / supply

Wiring diagrams

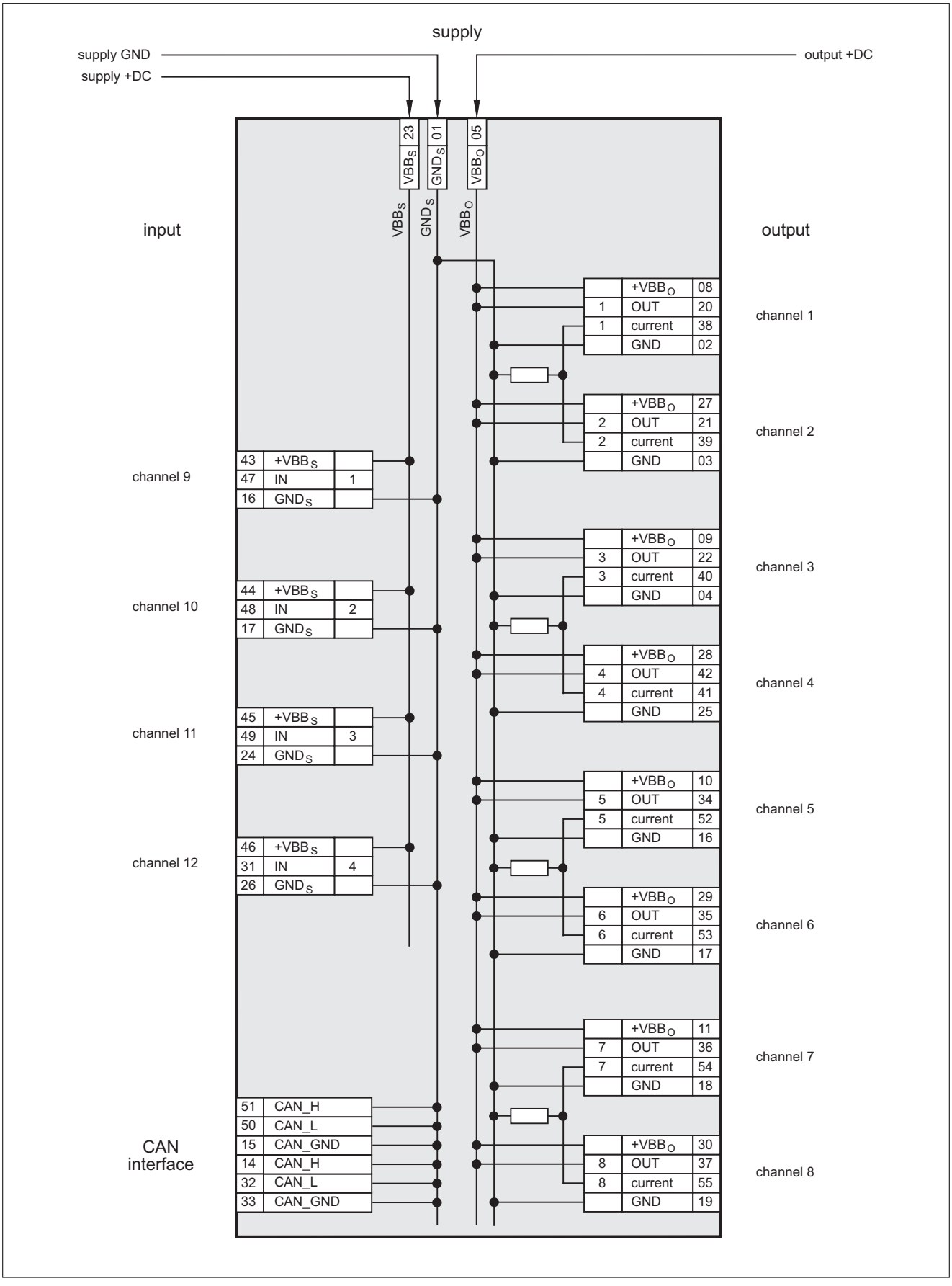
6



CAN interface / supply

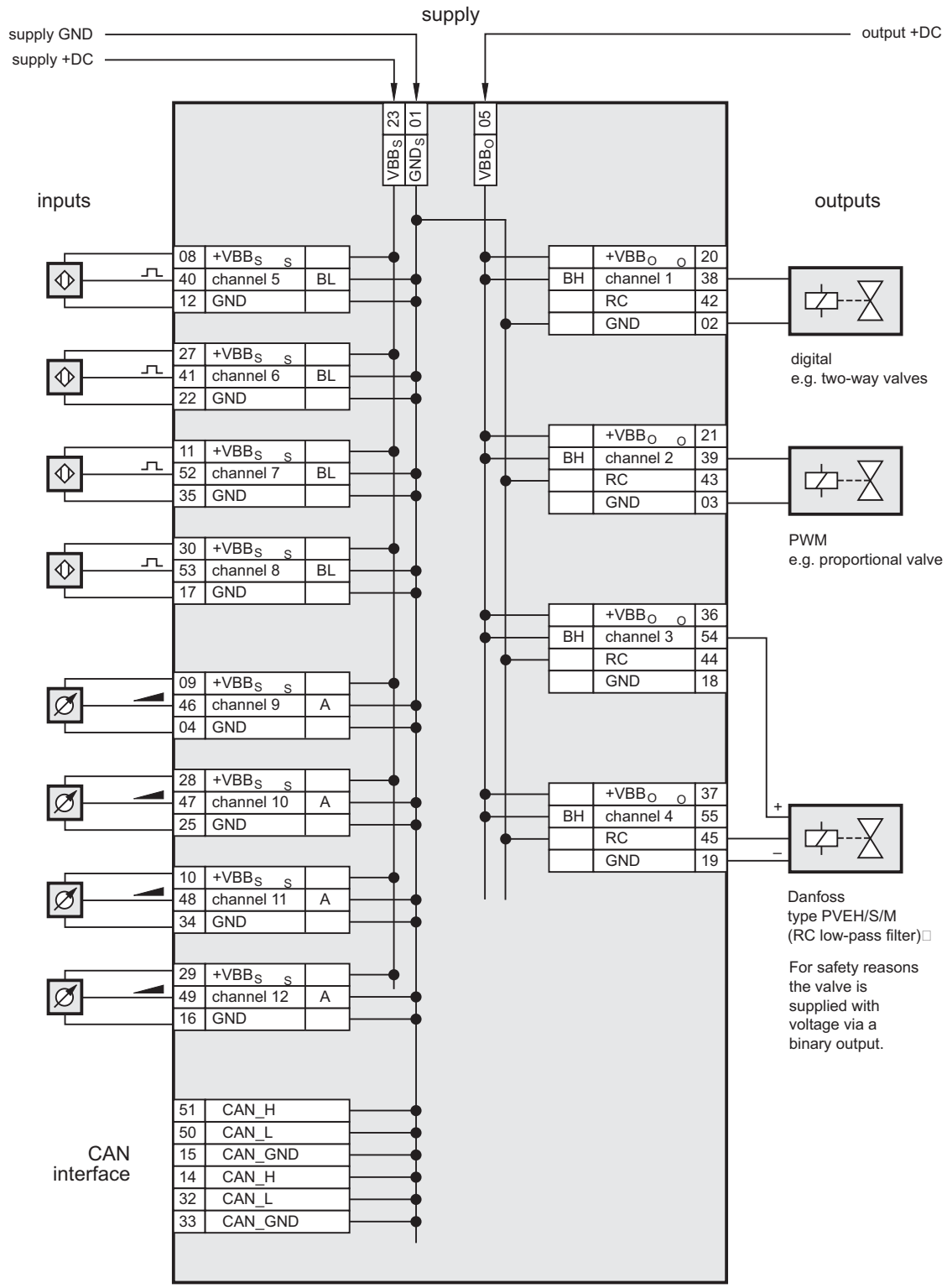
Wiring diagrams

7



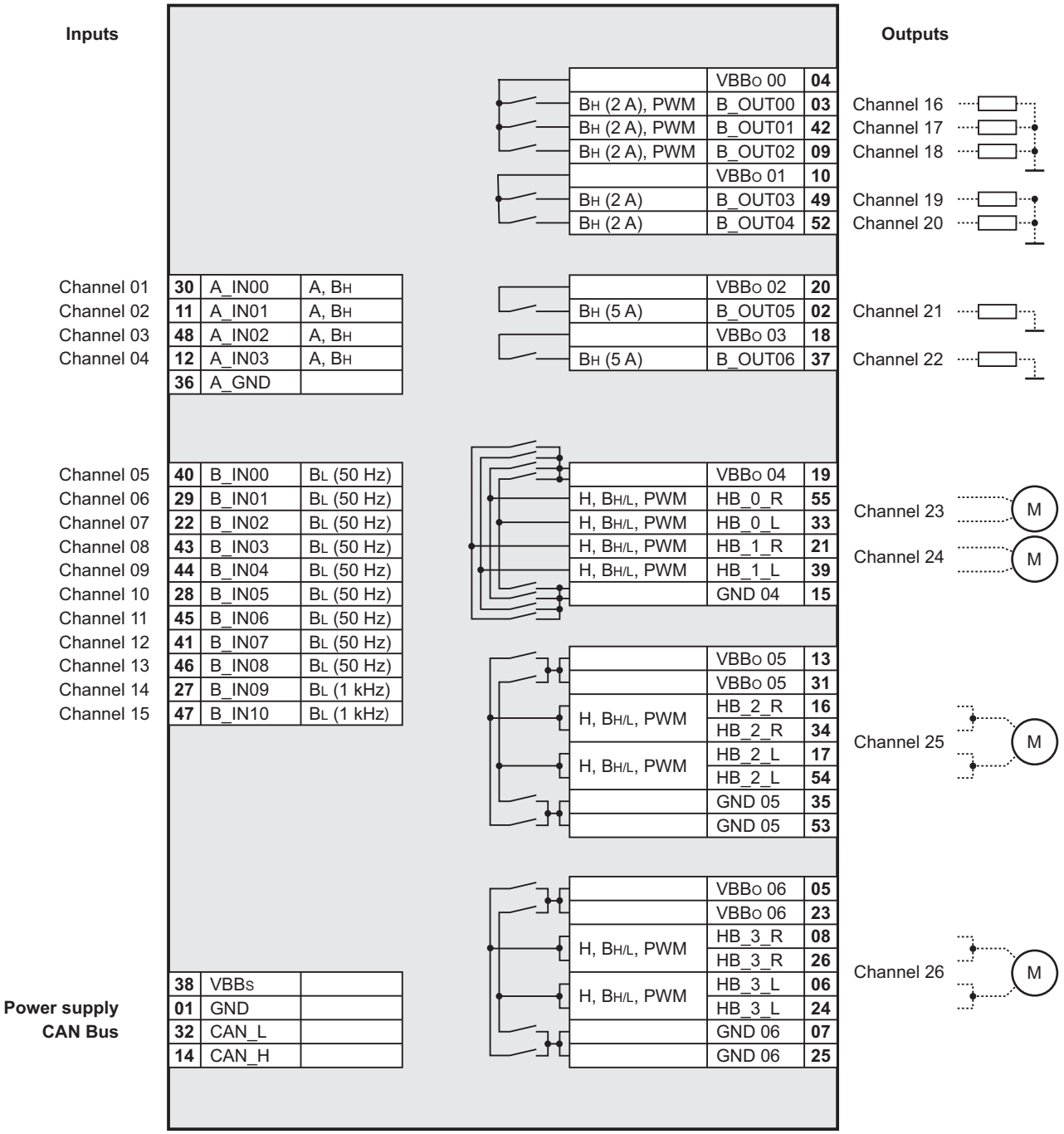
Wiring diagrams

8



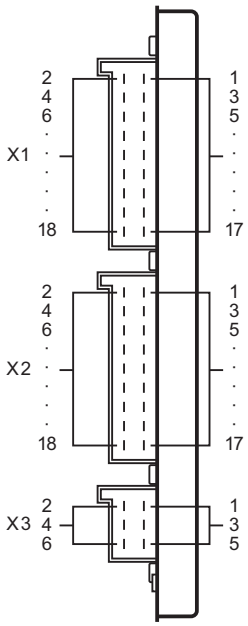
Wiring diagrams

9



Wiring diagrams

10



Connector X1

Pin	Potential	Inputs		Outputs	
1	channel 1	Bin IN 1	–	–	–
2	$+U_B$				
3	channel 2	Bin IN 2	–	–	–
4	$+U_B$				
5	channel 3	Bin IN 3	–	–	–
6	$+U_B$				
7	channel 4	Bin IN 4	–	–	–
8	$+U_B$				
9	$+U_B$				
10	$+U_B$				
11	channel 5	Bin IN 5	Ana IN 5	–	–
12	channel 6	Bin IN 6	Ana IN 6	–	–
13	GND				
14	GND				
15	channel 7	Bin IN 7	–	Bin OUT 7	–
16	GND				
17	channel 8	Bin IN 8	–	Bin OUT 8	PWM 8
18	GND				

Connector X2

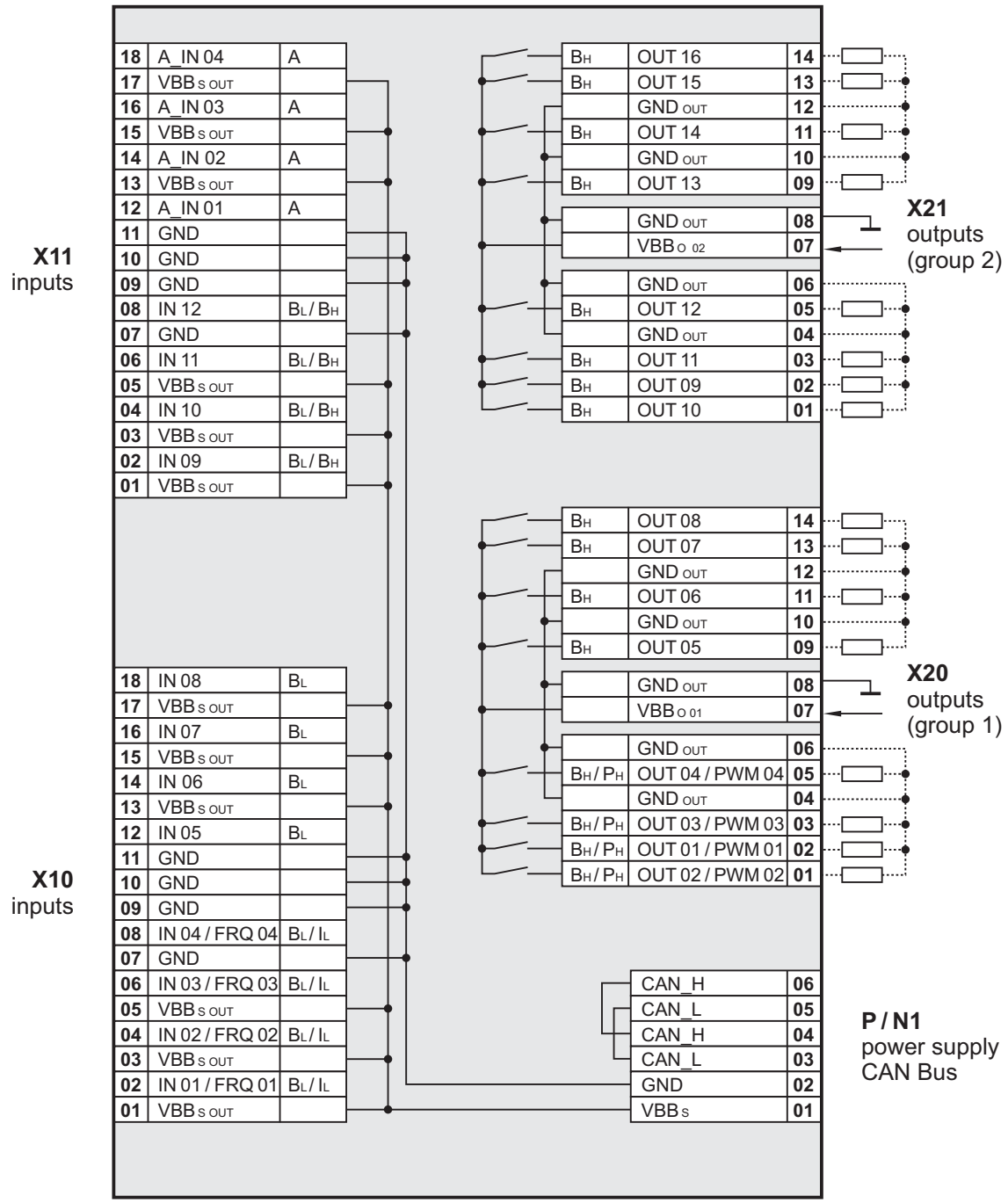
Pin	Potential	Inputs		Outputs	
1	channel 9	Bin IN 9	–	–	–
2	$+U_B$				
3	channel 10	Bin IN 10	–	–	–
4	$+U_B$				
5	channel 11	Bin IN 11	–	–	–
6	$+U_B$				
7	channel 12	Bin IN 12	–	–	–
8	$+U_B$				
9	$+U_B$				
10	$+U_B$				
11	channel 13	Bin IN 13	Ana IN 13	–	–
12	channel 14	Bin IN 14	Ana IN 14	–	–
13	GND				
14	GND				
15	channel 15	Bin IN 15	–	Bin OUT 15	–
16	GND				
17	channel 16	Bin IN 16	–	Bin OUT 16	PWM 16
18	GND				

Connector X3

Pin	Potential
1	$+U_B$
2	GND
3	$+U_B$
4	GND
5	CAN_L
6	CAN_H

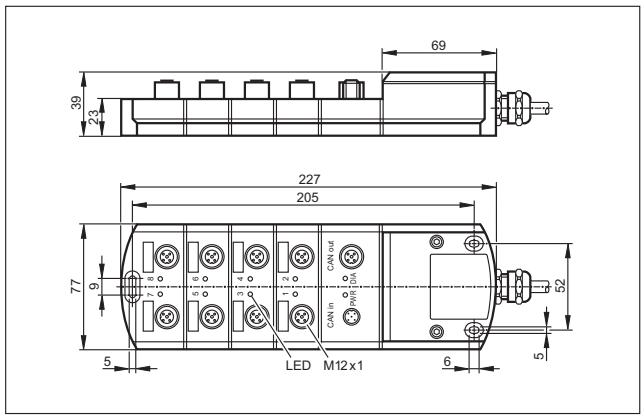
Wiring diagrams

11



Scale drawings / drawing no. – CAD download: www.ifm.com

1



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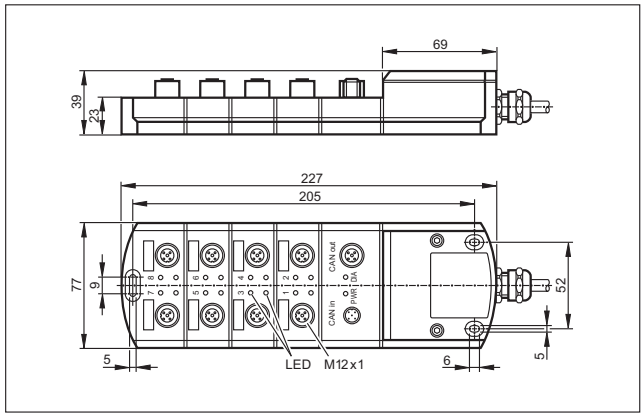

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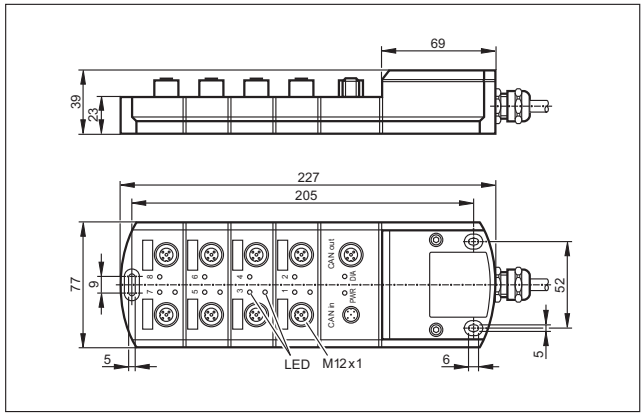

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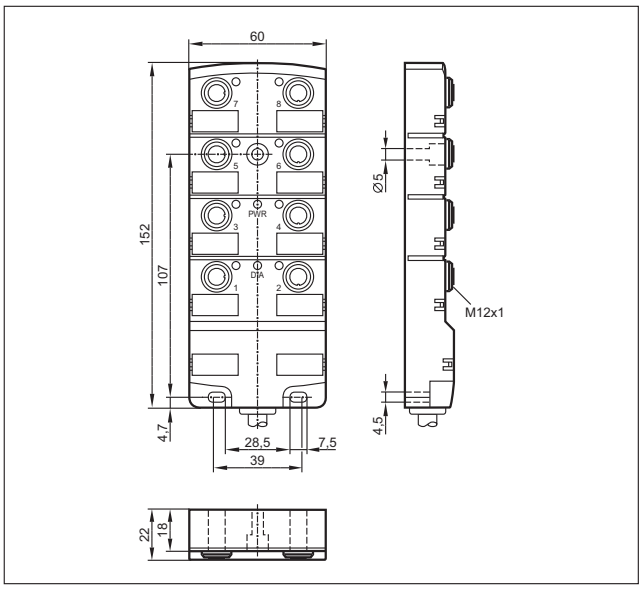

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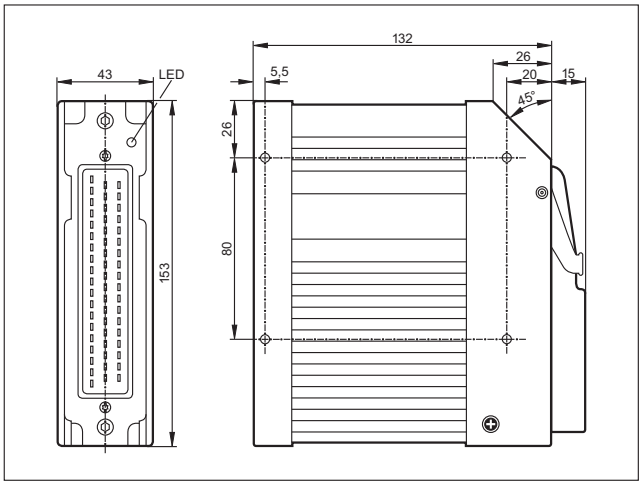

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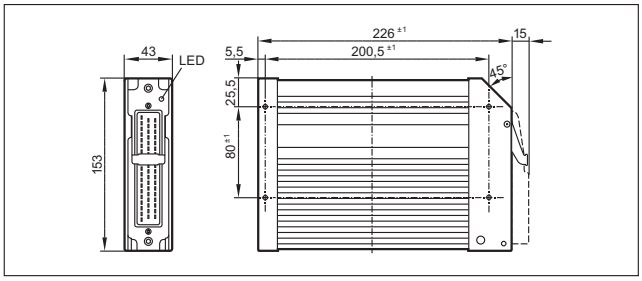

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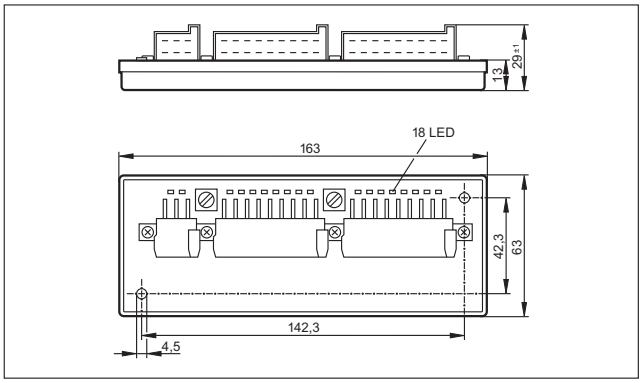

Scale drawings / drawing no. – CAD download: www.ifm.com

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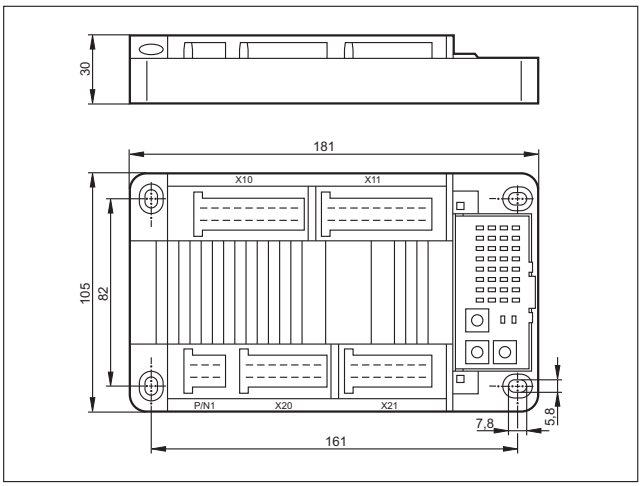

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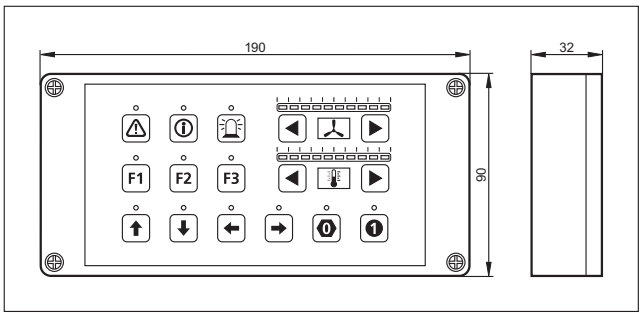


- **Monochrome or colour displays with graphics capabilities and operating elements**
- **Programmable (IEC 61131-3) with CODESYS V2.3 / V3.5 target visualisation**
- **Closed robust metal housing for surface and panel mounting**
- **CAN interface with CANopen, SAE J1939 or free protocol**
- **Ethernet camera with E1 approval for mobile applications**

Dialogue modules

Most machines are operated by humans. Machine states must be indicated and operator inputs must be processed. Depending on the size and complexity of the machine modern dialogue modules with text displays or full graphic colour displays and various operating fields are used. In one device they provide all functions which in the event of a conventional design could only be implemented by means of a time-consuming and cost-intensive installation and wiring of individual components. Due to the individual programming of the dialogue modules the user only sees the situation-dependent information which is relevant to him. Thanks to this situation-dependent display the operating panels have a clearer structure and the operator can concentrate on the actual work function. Even service and maintenance personnel use dialogue modules as an intelligent access to the machine. Special start screens for example, which can be password-protected if needed, can be used to directly change machine parameters or read the operating data saved since the last maintenance.

Dialogue module PDM360 NG: optimum handling and indication of system states.

Cameras for mobile applications

Camera systems are used to monitor operational areas. They ensure the operator or driver has a good view of unmanageable positions. Using the mobile camera with network capability from ifm, the camera image can be integrated directly on the colour display with graphics capabilities. A separate monitor is not needed. Via an Ethernet switch several O2M cameras can be connected to a display. This ensures a clear view and saves costs. For an easy and convenient integration of the camera images into the visualisation software of the dialogue module, ready-to-use library functions or predefined input masks are available.

Focus on operational areas: Ethernet camera O2M for mobile applications.

Product selectors and further information can be found at: www.ifm.com

PDM360 smart with 2.5" monochrome display

Type	Display	Operating elements	Inputs / outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
12 freely programmable backlit function keys, Programming according to IEC 61131-3 · M12 connector							
	2.5" monochrome display 128 x 64 pixels	12 Pushbuttons	–	1 x CAN 1 x RS-232	1	1	**CR1070**
	2.5" monochrome display 128 x 64 pixels	12 Pushbuttons	4 x digital in 4 x digital out	1 x CAN 1 x RS-232	2	1	**CR1071**

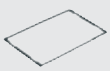
PDM360 NG with 7" display

Type	Display	Operating elements	Inputs / outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Real-time clock, 8 freely programmable backlit function keys, Programming according to IEC 61131-3 · M12 connector							
	7" colour display 800 x 480 pixels	8 Pushbuttons	1 x digital in 1 x analogue in 1 x digital out 2 x Video (CVBS) 1 x Buzzer	4 x CAN 1 x Ethernet 2 x USB	3	2	**CR1083**
	7" colour display 800 x 480 pixels	8 Pushbuttons	1 x digital in 1 x analogue in 1 x digital out 1 x Buzzer Real-time clock	4 x CAN 1 x Ethernet 2 x USB	4	2	**CR1087**
Real-time clock, 9 freely programmable backlit function keys, Programming according to IEC 61131-3 · M12 connector							
	7" colour display 800 x 480 pixels	9 Pushbuttons 1 Encoder with pushbutton	1 x digital in 1 x analogue in 1 x digital out 1 x Buzzer Real-time clock	4 x CAN 1 x Ethernet 2 x USB	4	3	**CR1080**
	7" colour display 800 x 480 pixels	9 Pushbuttons 1 Navigation key with pushbutton	1 x digital in 1 x analogue in 1 x digital out 1 x Buzzer Real-time clock	4 x CAN 1 x Ethernet 2 x USB	4	4	**CR1081**
	7" colour display 800 x 480 pixels	9 Pushbuttons 1 Navigation key with pushbutton 1 Touch screen	1 x digital in 1 x analogue in 1 x digital out 2 x Video (CVBS) 1 x Buzzer	4 x CAN 1 x Ethernet 2 x USB	3	4	**CR1082**
	7" colour display 800 x 480 pixels	9 Pushbuttons 1 Encoder with pushbutton	1 x digital in 1 x analogue in 1 x digital out 2 x Video (CVBS) 1 x Buzzer	4 x CAN 1 x Ethernet 2 x USB	3	3	**CR1084**
	7" colour display 800 x 480 pixels	9 Pushbuttons 1 Navigation key with pushbutton	1 x digital in 1 x analogue in 1 x digital out 2 x Video (CVBS) 1 x Buzzer	4 x CAN 1 x Ethernet 2 x USB	3	4	**CR1085**

PDM360 NG with 12" display

Type	Display	Operating elements	Inputs / outputs	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
Real-time clock, Programming according to IEC 61131-3 · M12 connector							
	12" colour display 1024 x 768 pixels	13 Pushbuttons 1 Navigation key with pushbutton	1 x digital in 1 x analogue in 1 x digital out 2 x Video (CVBS) 1 x Buzzer	4 x CAN 1 x Ethernet 2 x USB	–	5	**CR1200**
	12" colour display 1024 x 768 pixels	13 Pushbuttons 1 Navigation key with pushbutton 1 Touch screen	1 x digital in 1 x analogue in 1 x digital out 2 x Video (CVBS) 1 x Buzzer	4 x CAN 1 x Ethernet 2 x USB	–	5	**CR1201**

Accessories for displays

Type	Description	Order no.
	Snap in set · e.g. for process and dialogue monitors PDM360, PDM360 compact or PDM360 smart · for panel mounting · consisting of: · 4 plastic springs	**EC1452**
	Fixing set · e.g. for process and dialogue monitors PDM360, PDM360 compact or PDM360 smart · for control cabinet mounting · consisting of: · 4 mounting brackets, 4 cylinder screws	**EC1453**
	Mounting plate · RAM mount system · Ball size 1.5" (C) · e.g. for process and dialogue monitors PDM360 NG, PDM360, PDM360 compact or PDM360 smart · for use as a desktop unit	**EC1410**
	Mounting arm short · 90 mm · RAM mount system · Ball size 1.5" (C) · e.g. for process and dialogue monitors PDM360 NG, PDM360, PDM360 compact or PDM360 smart · for use as a desktop unit	**EC1411**
	Mounting arm standard · 144 mm · RAM mount system · Ball size 1.5" (C) · e.g. for process and dialogue monitors PDM360 NG, PDM360, PDM360 compact or PDM360 smart · for use as a desktop unit	**EC1412**
	Mounting arm long · 231 mm · RAM mount system · Ball size 1.5" (C) · e.g. for process and dialogue monitors PDM360 NG, PDM360, PDM360 compact or PDM360 smart · for use as a desktop unit	**EC1413**
	RAM mount set 1 · 144 mm · RAM mount system · Ball size 1.5" (C) · e.g. for process and dialogue monitors PDM360 NG, PDM360, PDM360 compact or PDM360 smart · for use as a desktop unit	**EC1414**
	Seal and vibration absorber · for process and dialogue modules PDM360 smart, PDM360 compact	**EC1450**
	Mounting frame and vibration absorber · for process and dialogue modules PDM360 NG · panel · Housing materials: steel sheet	**EC2110**
	Seal and vibration absorber · for process and dialogue modules PDM360 NG · panel · Housing materials: TPE black	**EC2115**

You can find wiring diagrams and scale drawings from page 85

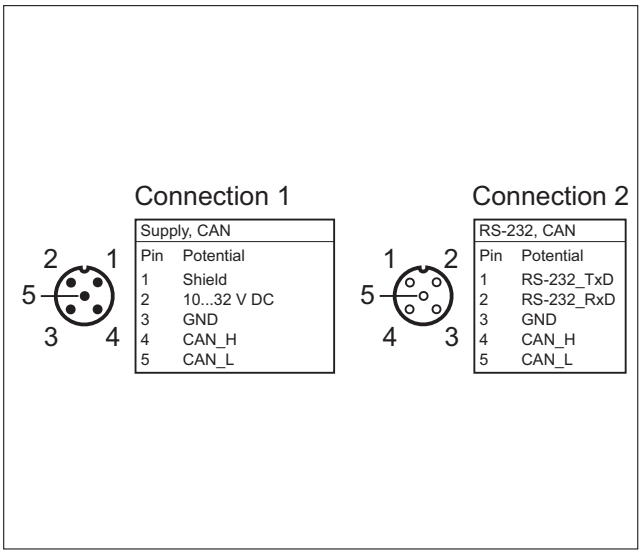
Type	Description	Order no.
	Load-Dump-Module · 12 V DC	**EC2015**
	Load-Dump-Module · 24 V DC	**EC2016**
	plug-in power supply · with interchangeable mains plugs (EU/UK/USA/AUS) · Output 24 V DC / 1000 mA	**EC2059**
	Mounting frame and vibration absorber · for process and dialogue modules PDM360 NG · panel · Housing materials: steel sheet	**EC2110**
	Seal and vibration absorber · for process and dialogue modules PDM360 NG · panel · Housing materials: TPE black	**EC2115**
	Installation kit · for process and dialogue modules PDM360 NG-12 · panel · Housing materials: steel sheet	**EC2117**

Connection technology for displays

Type	Description	Order no.
	Wirable plug · straight · shieldable · Free from silicone · Free from halogen · wirable · Gold-plated contacts · B-coded · M12 connector · Housing materials: diecast zinc nickel-plated	**E12355**
	Jumper · for process and dialogue modules PDM360 NG · USB socket for installation in control panel or dashboard · 1.5 m	**EC2099**
	Jumper · straight / straight · Ethernet · Cross-over patch cable · 2 m · Housing materials: PUR / PC	**E11898**

Wiring diagrams

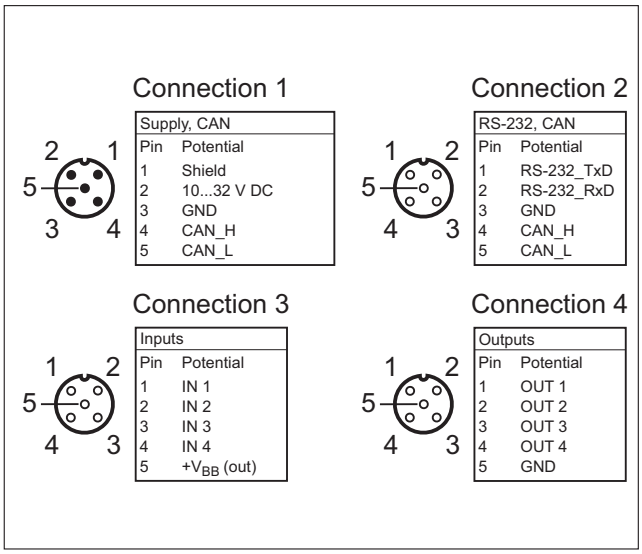
1



Supply, CAN	
Pin	Potential
1	Shield
2	10...32 V DC
3	GND
4	CAN_H
5	CAN_L

RS-232, CAN	
Pin	Potential
1	RS-232_TxD
2	RS-232_RxD
3	GND
4	CAN_H
5	CAN_L

2



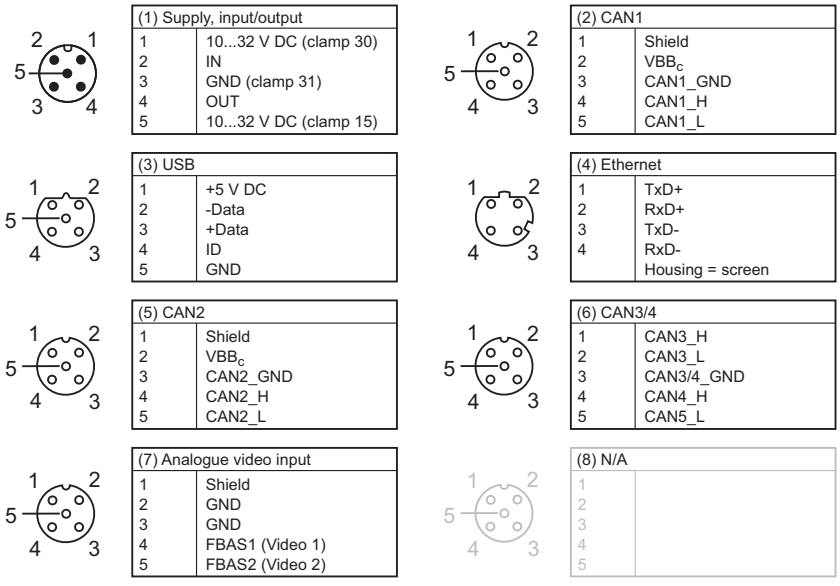
Supply, CAN	
Pin	Potential
1	Shield
2	10...32 V DC
3	GND
4	CAN_H
5	CAN_L

RS-232, CAN	
Pin	Potential
1	RS-232_TxD
2	RS-232_RxD
3	GND
4	CAN_H
5	CAN_L

Inputs	
Pin	Potential
1	IN 1
2	IN 2
3	IN 3
4	IN 4
5	$+V_{BB}$ (out)

Outputs	
Pin	Potential
1	OUT 1
2	OUT 2
3	OUT 3
4	OUT 4
5	GND

3



(1) Supply, input/output	
1	10...32 V DC (clamp 30)
2	IN
3	GND (clamp 31)
4	OUT
5	10...32 V DC (clamp 15)

(2) CAN1	
1	Shield
2	VBB_c
3	CAN1_GND
4	CAN1_H
5	CAN1_L

(3) USB	
1	+5 V DC
2	-Data
3	+Data
4	ID
5	GND

(4) Ethernet	
1	TxD+
2	RxD+
3	TxD-
4	RxD-
	Housing = screen

(5) CAN2	
1	Shield
2	VBB_c
3	CAN2_GND
4	CAN2_H
5	CAN2_L

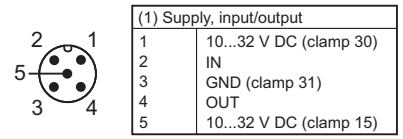
(6) CAN3/4	
1	CAN3_H
2	CAN3_L
3	CAN3/4_GND
4	CAN4_H
5	CAN5_L

(7) Analogue video input	
1	Shield
2	GND
3	GND
4	FBAS1 (Video 1)
5	FBAS2 (Video 2)

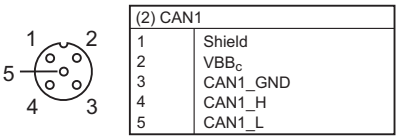
(8) N/A	
1	
2	
3	
4	
5	

Wiring diagrams

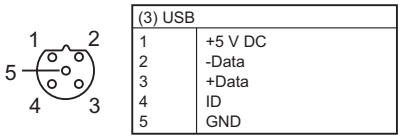
4



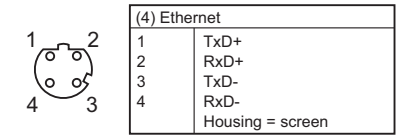
(1) Supply, input/output	
1	10...32 V DC (clamp 30)
2	IN
3	GND (clamp 31)
4	OUT
5	10...32 V DC (clamp 15)



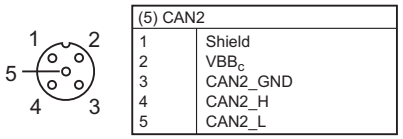
(2) CAN1	
1	Shield
2	VBB_C
3	CAN1_GND
4	CAN1_H
5	CAN1_L



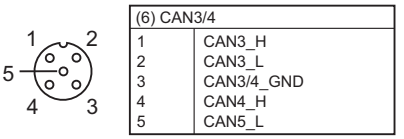
(3) USB	
1	+5 V DC
2	-Data
3	+Data
4	ID
5	GND



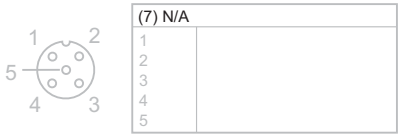
(4) Ethernet	
1	TxD+
2	RxD+
3	TxD-
4	RxD-
	Housing = screen



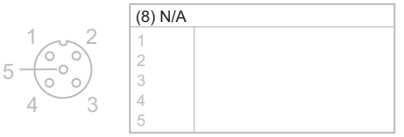
(5) CAN2	
1	Shield
2	VBB_C
3	CAN2_GND
4	CAN2_H
5	CAN2_L



(6) CAN3/4	
1	CAN3_H
2	CAN3_L
3	CAN3/4_GND
4	CAN4_H
5	CAN5_L



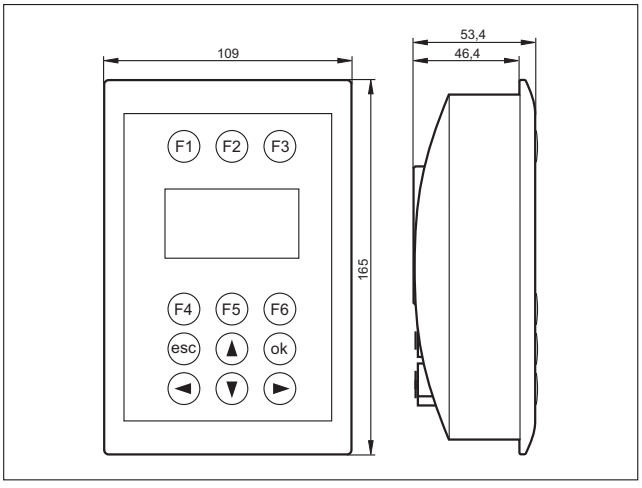
(7) N/A	
1	
2	
3	
4	
5	



(8) N/A	
1	
2	
3	
4	
5	

Scale drawings / drawing no. – CAD download: www.ifm.com

1



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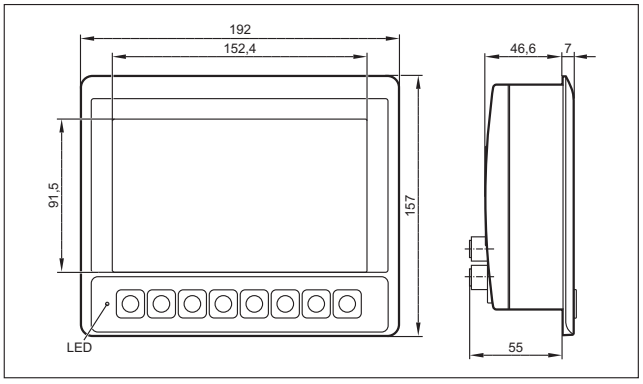

Scale drawings / drawing no. – CAD download: www.ifm.com

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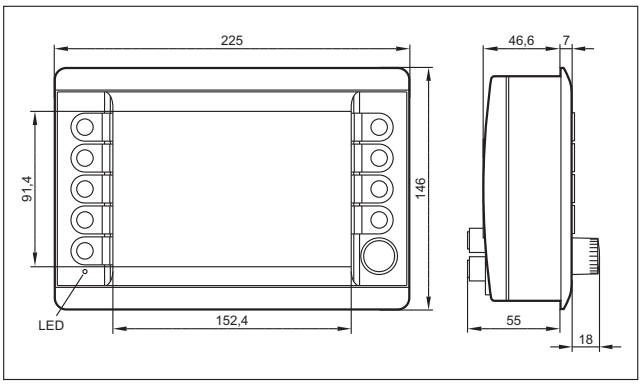

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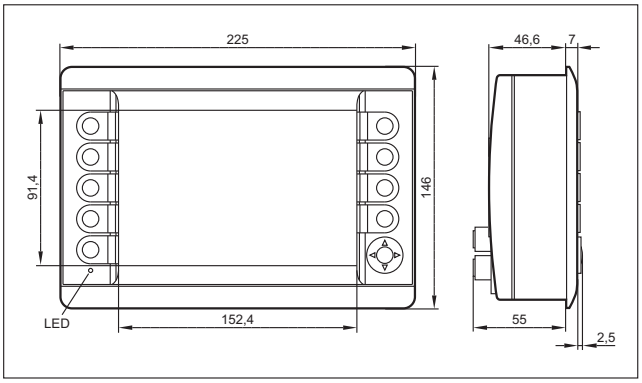

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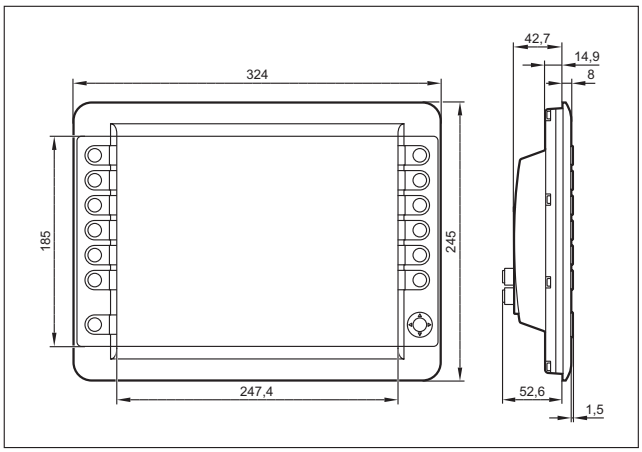


- **Camera system for mobile vehicles**
- **Can be used as a rear view camera using its select. image mirror function**
- **Operates all year due to temperature-controlled lens heating**
- **Programming and parameter setting interface for CODESYS 2.3**
- **E1 type approval of the German Federal Office for Motor Traffic**

Ethernet camera

In almost all mobile vehicles, users today use displays for indicating vehicle information. At the same time camera systems monitor the operating areas in an increasing number of applications.

The robust camera system O2M can be directly connected to the PDM360 dialogue monitor with graphic capability and colour display using integrated Ethernet interfaces. This eliminates the need for a separate monitor. The IP 67 housing enables direct mounting outside the vehicles and machines.

Via user-friendly parameter setting and control functions from the CODESYS application library, image transmission and display are adapted to the requirements of the mobile vehicle. Using function blocks the camera images and visualisation elements can be mirrored, rotated, zoomed, scaled and displayed simultaneously.

The modern CMOS sensor, the powerful controller and the integrated firmware are the basis for image capturing and processing. So the user can set, for example, white adjustment and colour saturation individually, if necessary.

3D sensors for mobile machines

Type	Image resolution	Angle of aperture [°]	Additional functions	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
M12 connector							
	64 x 16 pixels	70 x 23	Angle of aperture 70° x 23° (horizontal x vertical)	Video signal analogue	–	1	**O3M150**
	64 x 16 pixels	70 x 23	CAN output	Video signal analogue	–	1	**O3M151**

Accessories

Type	Description	Order no.
	IR illumination unit · Device interfaces: MCI · Angle of aperture 70° x 23° (horizontal x vertical) · IR illumination unit for the operation of O3M15x and O3M25x · Connector · Housing materials: diecast aluminium	**O3M950**
	CANfox · CAN/RS232-USB interface · Programming and diagnosis of CAN systems · 5 V DC (via USB interface)	**EC2112**
	Set of programming cables · for CAN interface CANfox · Cable BasicController: DIN connector, 6-pole / standard timer contact housing, 6-pole · Cable BasicDisplay: DIN connector, 6-pole / M12 socket, 5-pole · CAN interface · Voltage supply via individual wires with end ferrules · Cable length 1 m · 1 m	**EC2114**
	Parameter setting software for O3M15x	**E3D300**
	Mounting set · O3M · U-shaped fixture, adjustable · screw mounting onto common aluminium profiles and machine panels · Housing materials: fixture: stainless steel	**E3M100**
	Mounting set · O3M · Clamp mounting · rod mounting Ø 14 mm · Housing materials: fixture: stainless steel / clamp: stainless steel	**E3M103**

Connection cables for industrial imaging

Type	Description	Order no.
	Jumper · Connector · Connection between mobile 3D camera / sensor and illumination unit · 1 m	**E3M121**
	Jumper · Connector · Connection between mobile 3D camera / sensor and illumination unit · 2 m	**E3M122**
	Jumper · Connector · Connection between mobile 3D camera / sensor and illumination unit · 3 m	**E3M123**

Type	Description	Order no.
	Socket · straight · M12 connector · Gold-plated contacts · Power supply for illumination unit · 2 m · Housing materials: PUR	E3M131
	Socket · straight · M12 connector · Gold-plated contacts · Power supply for illumination unit · 5 m · Housing materials: PUR	E3M132
	Socket · straight · M12 connector · Gold-plated contacts · Power supply for illumination unit · 10 m · Housing materials: PUR	E3M133

Camera systems for PDM360 color and PDM360 NG

Type	Image resolution	Angle of aperture [°]	Additional functions	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
M16 connector							
	720 x 480	78	lens heating	Video signal analogue	–	2	O2M200
	720 x 480	78	Integrated mirror function lens heating	Video signal analogue	–	2	O2M201
	720 x 480	115	lens heating	Video signal analogue	–	2	O2M202
	720 x 480	115	Integrated mirror function lens heating	Video signal analogue	–	2	O2M203

Connection technology for displays

Type	Description	Order no.
	Adapter cable · straight / straight · M16 - M12 · Gold-plated contacts · Free from silicone · 0.6 m · Housing materials: housing: PUR / sealing: EPDM	E2M200
	Adapter cable · straight / straight · Y adapter cable M12 plug / 2 x M16 socket · Gold-plated contacts · Free from silicone · 0.95 m · Housing materials: housing: PUR / sealing: EPDM	E2M201
	Jumper · straight / straight · M16 - M16 · Gold-plated contacts · Free from silicone · 5 m · Housing materials: housing: PUR / sealing: EPDM	E2M203
	Jumper · straight / straight · M16 - M16 · Gold-plated contacts · Free from silicone · 16 m · Housing materials: housing: PUR / sealing: EPDM	E2M205
	Jumper · straight / straight · M16 - M16 · Gold-plated contacts · Free from silicone · 21 m · Housing materials: housing: PUR / sealing: EPDM	E2M206

You can find wiring diagrams and scale drawings from page 93

Accessories

Type	Description	Order no.
	protective housing · O2M2 · Housing materials: housing: 1.4301	E2M212
	Mounting bracket · O2M2 · Housing materials: housing: ABS reinforced glass-fibre / PC / PA	E2M211
	Vibration damper · O2M2 · Housing materials: Absorber: rubber / set screw: steel M6 x 15 mm	E2M213
	Mounting set · O2M2 · Housing materials: fixture: ABS	E2M210

Camera systems for PDM360 color and PDM360 NG

Type	Image resolution	Angle of aperture [°]	Additional functions	Interfaces	Wiring diagr. no.	Draw-ing no.	Order no.
M12 connector							
	320 x 240 pixels	75	image mirroring lens heating	1 x Ethernet	1	3	O2M110
	320 x 240 pixels	115	image mirroring lens heating	1 x Ethernet	1	3	O2M113

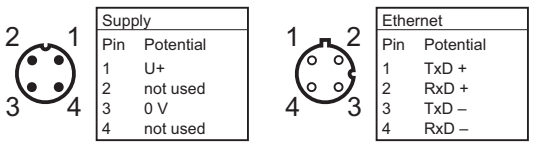
Connection technology for displays

Type	Description	Order no.
	Ethernet switch · 5 ports · Autosensing · Autocrossing · 10/100Base-TX · Redundant voltage supply · 10...30 V DC	EC2095
	Jumper · straight / straight · Ethernet · Cross-over patch cable · 2 m · Housing materials: PUR / PC	E11898
	Jumper · straight / straight · Ethernet · Gold-plated contacts · 2 m · Housing materials: TPU	E21138
	Jumper · straight / straight · Ethernet · Gold-plated contacts · 5 m · Housing materials: TPU	E21139
	Jumper · straight / straight · Ethernet · Gold-plated contacts · 10 m · Housing materials: TPU	E21137

Product selectors and further information can be found at: www.ifm.com

Wiring diagrams

1

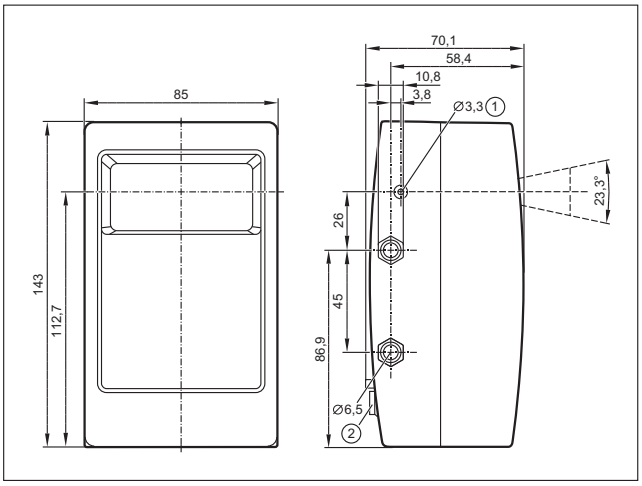


Supply	
Pin	Potential
1	U+
2	not used
3	0 V
4	not used

Ethernet	
Pin	Potential
1	TxD +
2	RxD +
3	TxD –
4	RxD –

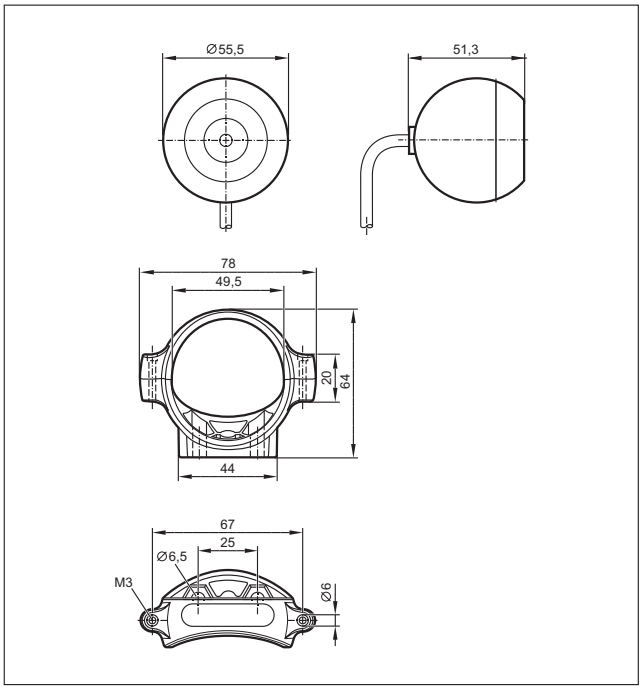
Scale drawings / drawing no. – CAD download: www.ifm.com

1

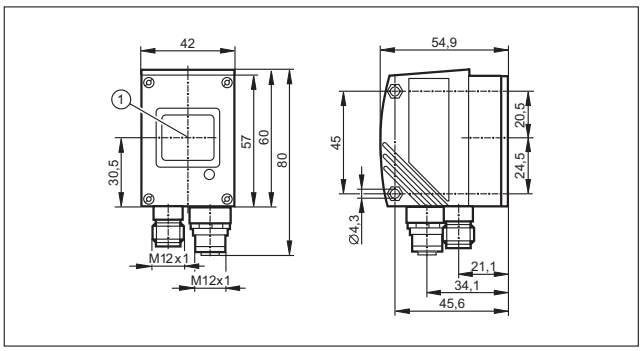


1: Reference socket, 2: Connections

2



3



- **Devices for on-site or remote diagnosis**
- **Quad-Band GSM/GPRS/EDGE radio modem for worldwide use**
- **Communication via the CAN interface**
- **Communication in real time or via the internet portal**
- **Data logging directly on the mobile vehicle**

Diagnosis and service

In times of globalisation the distances to customers keep increasing. The costs for the provision of services and reduction of downtime in case of malfunctions are becoming more and more important. Therefore, besides fast and low-cost on-site diagnostic tools, machine and plant builders more and more often use the more efficient remote diagnosis via GSM/GPRS/EDGE radio connection.

GSM radio gateway

The CANremote radio gateway transfers the data directly from the connected controller via the GSM mobile radio network. It is either transferred to the programming or diagnostic system of the machine manufacturer in real time or is buffered on a server. There it is available at all times via an internet portal.

Determine positions

CANremote GPS is a GPS receiver for mobile applications with CAN interface and GSM gateway. The position data can be processed directly in the control system and, for example, be transferred together with further machine data to the internet portal via the integrated radio gateway. There it is visualised on a card in the browser.

Data storage in real time

Instead of transmitting machine data online it can also be stored locally. The data memory and logger CANmem ensures fast and reliable storage of sporadic and cyclical data on a PCMCIA or SD memory card.

PC interface for programming, diagnosis and service

CANfox is an intelligent and robust interface for the connection of a CAN network to a PC. For additional monitoring and diagnostic tasks PC programs are available for the different devices.

Using GPS the position of mobile vehicles can be determined exactly.

Operational data is cyclically stored on a memory card via CANmem.

Product selectors and further information can be found at: www.ifm.com

Remote maintenance

Type	Description	Drawing no.	Order no.
M12 connector, 5-pole · FME connector, GSM antenna · SMA socket, GPS antenna			
	CAN 3G/GPS radio modem · GSM/GPRS/EDGE (850/900/1800/1900 MHz) · UMTS/HSDPA (800/850/900/1700/1900/2100 MHz) · for the transfer of SMS messages and data packages · with GPS/Glonass receiver for location tracking · Shock sensor · aluminium powder-coated	1	**CR3114**

Data memory

Type	Display	Memory type	Storage functions	Interfaces	Wiring diagr. no.	Drawing no.	Order no.
Data memory and logger for CANopen systems · M12 connector							
	5 LEDs	SD memory card (max. 2 Gbytes)	linear ring on address	1 x CAN 1 x USB	1	2	**CR3101**

CAN interface and diagnosis

Type	Description	Drawing no.	Order no.
	CANfox · CAN/RS232-USB interface · Programming and diagnosis of CAN systems · 5 V DC (via USB interface)	3	**EC2112**
	Adapter cable · for CAN interface CANfox · CAN adapter: DIN connector, 6 poles / M12 connector, 5 poles · RS-232 adapter: DIN connector, 6 poles / Sub-D plug, 9 poles · Cable length 1 m	–	**EC2113**

Accessories for remote maintenance

Type	Description	Order no.
	CANremote GSM planar aerial · GSM 850/900/1800/1900 · UMTS 1920...2170 MHz · Cable length 3 m · FME socket (GSM) · flat design for mounting on all plain surfaces	**EC2092**
	CANremote GPS planar aerial · with integrated amplifier · Cable length 3 m · SMA aerial connector · flat design for mounting on all plain surfaces	**EC2093**
	GSM/GPS combined antenna · GSM 850/900/1800/1900 · UMTS 1920...2170 MHz · with integrated amplifier · Cable length 3 m · FME socket (GSM) · SMA plug (GPS) · flat design for mounting on all plain surfaces · e.g. for CANremote CR3108, CR3110 or CR3112 · thread M16 x 1.5	**EC2116**

Accessories for data memory

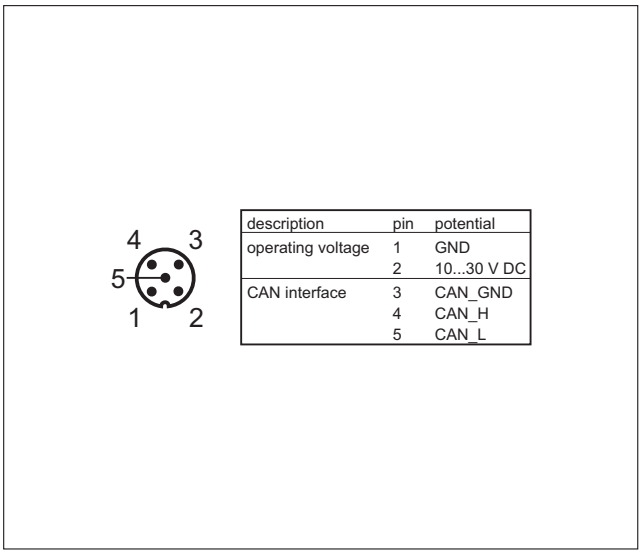
Type	Description	Order no.
	SD memory card · 2 GByte · for mobile applications	**EC1021**

CAN cables

Type	Description	Order no.
	Adapter cable · 9-pole D-SUB (female) · 5-pole socket; M12 · 2-pole cable for power supply with bare ends · integrated CAN terminal resistor (120 Ω) switchable	**EC2050**
	Adapter cable for CAN devices with M12 connector (5 pole) · e.g. CANmem, CANremote or inclination sensors	**EC2062**
	CAN communication cable · cable length 2 m interface 9-pole D-SUB (female) · cable ends with lugs	**EC2034**
	Serial interface cable · 2 x 9-pole D-SUB (female) · 1:1 · e.g. for PC communication, configuration or uploads of firmware updates · Cable length 2 m · e.g. for process and dialogue monitors PDM360	**EC2063**
	USB connection cable · type A to type Mini B · for PC communication, configuration and uploads of firmware updates · cable length 1.8 m · e.g. for CANmem	**EC2058**
	Wirable socket · straight · Free from silicone · Free from halogen · wirable · Gold-plated contacts · M12 connector · 5-pole · Housing materials: PA	**E11511**

Wiring diagrams

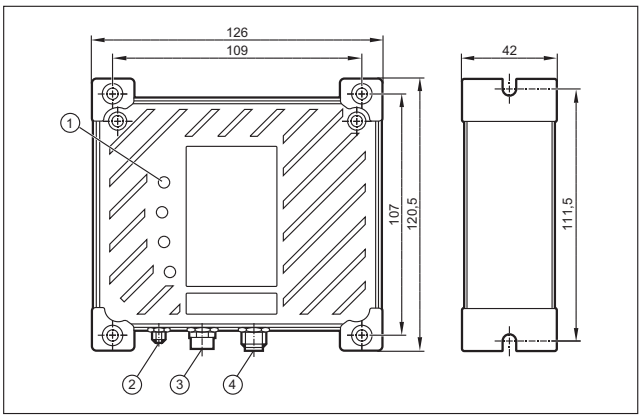
1



description	pin	potential
operating voltage	1	GND
	2	10...30 V DC
CAN interface	3	CAN_GND
	4	CAN_H
	5	CAN_L

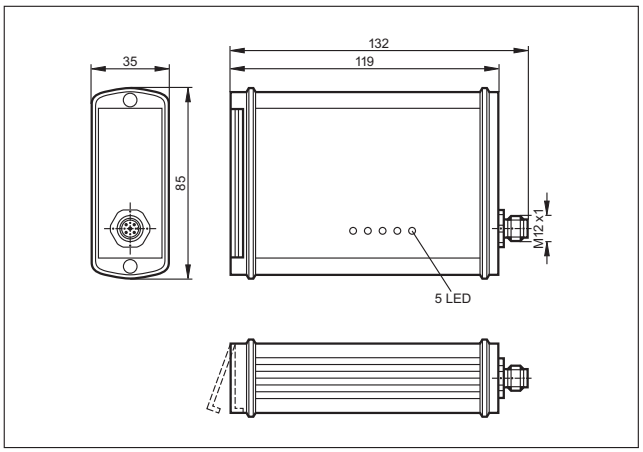
Scale drawings / drawing no. – CAD download: www.ifm.com

1

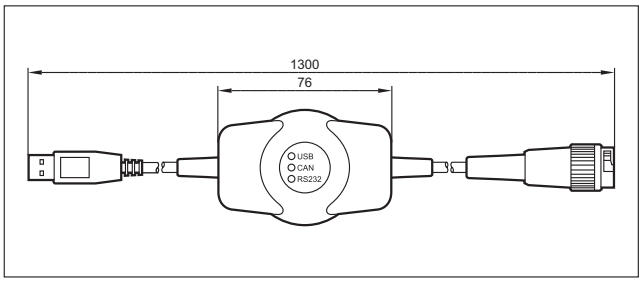


1: LEDs, 2: SMA socket, GPS antenna, 3: FME connector, GSM antenna, 4: M12 connector, 5-pole

2



3



- **Easy to use**
- **Compact housing**
- **Field or panel mounting**
- **Constant output signals**

Signal converter

If the user wants to connect sensors or actuators to a control or input / output module which do not provide the suitable output or trigger signal, signal converters are used. They are the problem solvers for special cases.

PWM / analogue converter

The PWM / analogue converter converts the provided PWM signal into an analogue output signal. It is for example used to control valves which cannot directly evaluate a PWM signal. The internal circuit of the converter smoothes the PWM signals and generates an output voltage which is proportional to the mark-to-space ratio.

CurrentControl module

For special current-controlled actuators the resulting current is measured and read via the analogue inputs of the controller. The CurrentControl module detects the measured current and provides it as an input signal. These modules are mainly for the control of hydraulic motors. As the control currents of these aggregates are usually very low the measured current is limited to max. 200 mA. The control function is implemented in the application program.

DC / DC converter

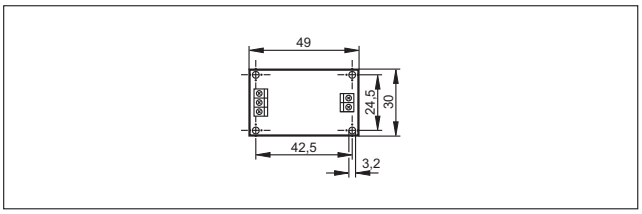
If the ratiometric inputs of the mobile controller cannot be used and a constant supply voltage, e.g. for joysticks or potentiometers, is needed, the DC / DC converter is used. Irrespective of the input voltage (within the permissible operating voltage range) it generates a constant output voltage. At the same time there is an electrical isolation.

Converters and PWM modules

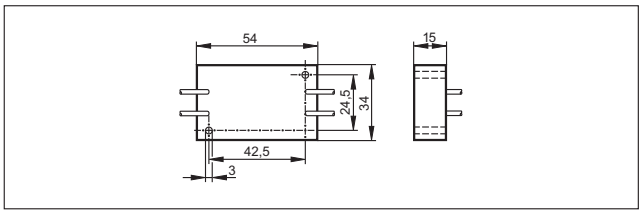
Type	Description	Drawing no.	Order no.
	PWM / analogue module · PCB · Input 24 V DC PWM signal · Output 0...5 V DC	1	**CR3001**
	PWM / analogue module · PCB · Input 24 V DC PWM signal · Output 0...10 V DC	1	**CR3002**
	PWM / analogue module · Housing · Input 24 V DC PWM signal · Output 0...5 V DC	2	**CR3003**
	PWM / analogue module · Housing · Input 24 V DC PWM signal · Output 0...10 V DC	2	**CR3004**
	DC/DC converter · Input 18...36 V DC · Output 10 V DC	3	**EC2025**
	Module for current measurement with ecomat R 360 controller	4	**EC2049**

Scale drawings / drawing no. – CAD download: www.ifm.com

1



3



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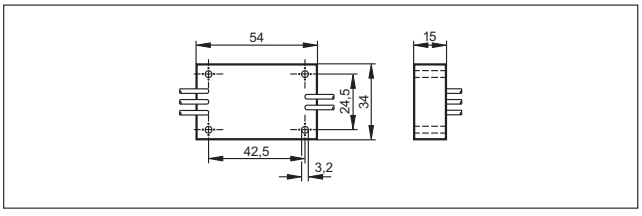
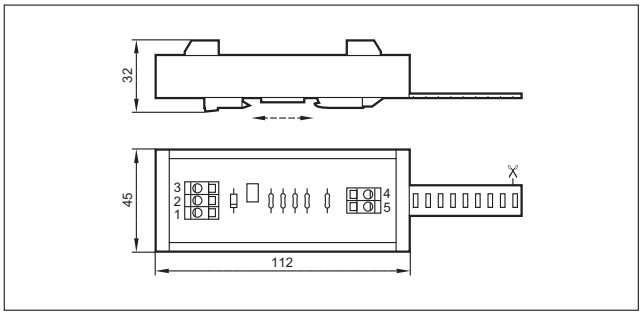


4



- **Inclination sensors with CAN or analogue interface**
- **Inductive sensors with IP 67 and IP 69K**
- **Pressure sensors with a robust measuring cell for mobile hydraulics**
- **Highest shock and vibration resistance**
- **Extended temperature range of -40...85 °C**

Sensors for mobile applications

In automation technology sensors are the "sense organs" of the control systems. Sensors are also used in mobile machines and installations. In contrast to devices for industrial automation, the demands on sensors for mobile applications are much higher. As they are mounted in exposed positions they have to meet special requirements. Sensors are generally differentiated between sensors with a built-in CANopen interface and sensors with binary or analogue output stages which are connected directly to controllers or I/O modules.

Special features

Sensor components such as the sensing face or housing material are adapted to the rough operating conditions. The devices are designed to ensure highest shock and vibration resistance. Corrosion-resistant M12 connectors with gold-plated contacts increase their lifetime. The sensors have a temperature range of -40...85 °C so that they can operate reliably in extremely cold conditions and when installed next to hot engines. Moreover, the devices are insensitive to rapid temperature changes. A voltage range of up to 10...60 V for mobile sensors ensures that even high fluctuations of the on-board system do not affect the function. To comply with the ever increasing EMC requirements in mobile applications the devices feature an increased EMC resistance. All sensors hold an E1 type approval. With this approval of the German Federal Office for Motor Traffic they are allowed for use in road vehicles without expiry of their operating permit.

Cable drum of a mobile crane: an inductive M18 type sensor monitors and signals the cable end.

Product selectors and further information can be found at: www.ifm.com

Absolute multiturn-encoders (CANopen) for mobile applications

Type	Resolution	U_b [V]	f [kHz]	I_{load} [mA]	Shaft [mm]	Ambient temperature [°C]	Cable entry	Drawing no.	Order no.
M12 connector · Output function CANopen interface · Connector group --									
	24 bits	10...30	–	–	10	-40...85	axial	1	**RM9000**

RFID system 13.56 MHz

Type	Description	Drawing no.	Order no.
Type M18 x 1.5 · M12 connector			
	Read/write head · M18 x 1.5 · M12 connector · Housing materials: housing: stainless steel / Top: PPS / connector housing: PEI	2	**DTM425**

CAN inclination sensors

Type	Angular range [°]	Number of axes	Resolution / accuracy [°]	Interfaces	Wiring diagr. no.	Drawing no.	Order no.
2 x M12 connector							
	0...360° / ± 180°	2	0.05 / ≤ ± 0.5°	2 x CAN	–	3	**JN2100**
	± 45°	2	0.01 / ≤ ± 0.1°	2 x CAN	–	3	**JN2101**

Inclination sensors

Type	Angular range [°]	Supply voltage	Output signal	Repeatability [°]	Wiring diagr. no.	Drawing no.	Order no.
Cable							
	±90°	15...30 V DC	1 x analogue (0...10 V)	0.1°	1	4	**EC2019**
	±90°	8...30 DC	1 x analogue (0.5...4.5 V)	0.1°	1	4	**EC2045**

Type	Angular range [°]	Supply voltage	Output signal	Repeatability [°]	Wiring diagr. no.	Draw-ing no.	Order no.
M12 connector							
	±20°	11...15 V DC	1 x analogue (4...20 mA)	0.1°	18	4	**EC2060**
	±90°	20...30 V DC	1 x analogue (4...20 mA)	0.1°	18	4	**EC2082**

Tilt sensors

Type	Angular range [°]	Supply voltage	Output signal	Repeatability [°]	Wiring diagr. no.	Draw-ing no.	Order no.
Cable							
	2.5...5.5°	10...30 V DC	1 x Digital	0.2°	2	5	**EC2061**

Inductive sensors for mobile applications

Type	Dimensions [mm]	Sensing range [mm]	Material	U_b [V]	Protection	f [Hz]	I_{load} [mA]	Draw-ing no.	Order no.
Cable 3 m · Output function ⎍ · DC PNP · Wiring diagram no. 3									
	40 x 12 x 26	4 nf	PBT	10...36	IP 67	70	–	6	**IN5281**
Cable 3 m · Output function ⎍ · DC PNP · Wiring diagram no. 4									
	40 x 12 x 26	4 nf	PBT	10...36	IP 67	70	–	6	**IN5282**
Cable 6 m · Output function ⎍ · DC PNP · Wiring diagram no. 5									
	M12 / L = 79	4 f	stainless steel	10...60	IP 67 / IP 69K	400	200	7	**IFM209**
	M12 / L = 79	7 nf	High-grade st. steel	10...60	IP 67 / IP 69K	300	200	8	**IFM210**
	M18 / L = 81	8 f	stainless steel	10...60	IP 67 / IP 69K	200	200	9	**IGM206**
	M18 / L = 81	12 nf	stainless steel	10...60	IP 67 / IP 69K	200	200	10	**IGM207**

You can find wiring diagrams and scale drawings from page 117

Type	Dimensions [mm]	Sensing range [mm]	Material	U_b [V]	Protection	f [Hz]	I_{load} [mA]	Drawing no.	Order no.
Cable 6 m · Output function ⎍ · DC PNP · Wiring diagram no. 5									
	M30 / L = 81	12 f	stainless steel	10...60	IP 67 / IP 69K	100	200	11	**IIM210**
	M30 / L = 81	22 nf	stainless steel	10...60	IP 67 / IP 69K	100	200	12	**IIM211**
Cable 6 m · Output function ⎍ · 3-wire DC PNP; 2-wire DC PNP/NPN · Wiring diagram no. 16									
	M12 / L = 79	4 f	stainless steel	10...36	IP 67 / IP 69K	400	100	7	**IFM207**
	M12 / L = 79	7 nf	stainless steel	10...36	IP 67 / IP 69K	300	100	8	**IFM208**
	M18 / L = 81	8 f	stainless steel	10...36	IP 67 / IP 69K	200	100	9	**IGM202**
	M18 / L = 81	12 nf	stainless steel	10...36	IP 67 / IP 69K	200	100	10	**IGM203**
	M30 / L = 81	12 f	stainless steel	10...36	IP 67 / IP 69K	100	100	11	**IIM202**
	M30 / L = 81	22 nf	stainless steel	10...36	IP 67 / IP 69K	100	100	12	**IIM203**
M12 connector · Output function ⎍ · DC PNP · Wiring diagram no. 6									
	M12 / L = 70	4 f	High-grade st. steel	10...60	IP 67 / IP 69K	400	200	13	**IFM205**
	M12 / L = 70	7 nf	stainless steel	10...60	IP 67 / IP 69K	300	200	14	**IFM206**
	M18 / L = 70	8 f	stainless steel	10...60	IP 67 / IP 69K	200	200	15	**IGM204**
	M18 / L = 70	12 nf	stainless steel	10...60	IP 67 / IP 69K	200	200	16	**IGM205**
	M30 / L = 70	12 f	stainless steel	10...60	IP 67 / IP 69K	100	200	17	**IIM208**
	M30 / L = 70	22 nf	stainless steel	10...60	IP 67 / IP 69K	100	200	18	**IIM209**

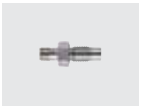
Type	Dimensions [mm]	Sensing range [mm]	Material	U_b [V]	Protection	f [Hz]	I_{load} [mA]	Drawing no.	Order no.
M12 connector · Output function ⎍ · 3-wire DC PNP; 2-wire DC PNP/NPN · Wiring diagram no. 17									
	M12 / L = 70	4 f	High-grade st. steel	10...36	IP 67 / IP 69K	400	100	13	**IFM203**
	M12 / L = 70	7 nf	High-grade st. steel	10...36	IP 67 / IP 69K	300	100	14	**IFM204**
	M18 / L = 70	8 f	stainless steel	10...36	IP 67 / IP 69K	200	100	15	**IGM200**
	M18 / L = 70	12 nf	stainless steel	10...36	IP 67 / IP 69K	200	100	16	**IGM201**
	M30 / L = 70	12 f	stainless steel	10...36	IP 67 / IP 69K	100	100	17	**IIM200**
	M30 / L = 70	22 nf	stainless steel	10...36	IP 67 / IP 69K	100	100	18	**IIM201**

f = flush / nf = non flush

Full metal sensors for industrial applications

Type	Dimensions [mm]	Sensing range [mm]	Material	U_b [V]	Protection	f [Hz]	I_{load} [mA]	Drawing no.	Order no.
M12 connector · Output function ⎍ · DC PNP · Wiring diagram no. 6									
	M12 / L = 93	1.8 f	High-grade st. steel	10...36	IP 65 / IP 68 / IP 69K	1000	200	19	**MFH200**
M12 connector · Output function ⎍ · DC NPN · Wiring diagram no. 7									
	M12 / L = 93	1.8 f	High-grade st. steel	10...36	IP 65 / IP 68 / IP 69K	1000	200	19	**MFH201**
M12 connector · Output function ⎍ · DC PNP · Wiring diagram no. 6									
	M12 / L = 60	1.8 f	High-grade st. steel	10...36	IP 65 / IP 68 / IP 69K	1000	200	20	**MFH202**
M12 connector · Output function ⎍ · DC NPN · Wiring diagram no. 7									
	M12 / L = 60	1.8 f	High-grade st. steel	10...36	IP 65 / IP 68 / IP 69K	1000	200	20	**MFH203**

You can find wiring diagrams and scale drawings from page 117

Type	Dimensions [mm]	Sensing range [mm]	Material	U_b [V]	Protection	f [Hz]	I_{load} [mA]	Drawing no.	Order no.
M12 connector · Output function ⎍ · DC PNP · Wiring diagram no. 8									
	M12 / L = 60	1.8 f	High-grade st. steel	10...36	IP 65 / IP 68 / IP 69K	1000	200	20	**MFH204**
M12 connector · Output function ⎍ · DC PNP · Wiring diagram no. 6									
	special design	2 f	High-grade st. steel	10...36	IP 65 / IP 68 / IP 69K	1000	200	21	**M9H200**

f = flush / nf = non flush

Sensors for mobile applications

Type	Dimensions [mm]	Sensing range [mm]	Material	U_b [V]	Protection	f [Hz]	I_{load} [mA]	Drawing no.	Order no.
M12 connector · Output function ⎍ · DC PNP · Wiring diagram no. 6									
	M12 / L = 60	60	stainless steel	10...30	IP 67	5000	200	22	**MF5004**
Cable with connector 0.15 m · Output function ⎍ · DC PNP · Wiring diagram no. 6									
	40 x 12 x 26	60	PBT	10...30	IP 67	–	200	23	**MN5200**

Electronic pressure sensors for mobile applications

Type	Process connection	Display	Measuring range [bar]	$P_{overload}$ max. [bar]	$P_{bursting}$ min. [bar]	U_b DC [V]	Drawing no.	Order no.
AMP Superseal · Output function 0...10 V analogue · Wiring diagram no. 9								
	G ¼ A	–	0...400	1000	1700	16...32	24	**PU5600**
	G ¼ A	–	0...250	625	1200	16...32	24	**PU5601**
	G ¼ A	–	0...100	250	1000	16...32	24	**PU5602**
	G ¼ A	–	0...25	65	600	16...32	24	**PU5603**
	G ¼ A	–	0...10	25	300	16...32	24	**PU5604**

Product selectors and further information can be found at: www.ifm.com

Type	Process connection	Display	Measuring range [bar]	$P_{overload}$ max. [bar]	$P_{bursting}$ min. [bar]	U_b DC [V]	Drawing no.	Order no.
AMP Superseal · Output function 0...10 V analogue · Wiring diagram no. 9								
	G ¼ A	–	0...600	1500	2500	16...32	24	**PU5660**
DEUTSCH connector DT04-3P · Output function 0...10 V analogue · Wiring diagram no. 10								
	G ¼ A	–	0...400	1000	1700	16...32	25	**PU5700**
	G ¼ A	–	0...250	625	1200	16...32	25	**PU5701**
	G ¼ A	–	0...100	250	1000	16...32	25	**PU5702**
	G ¼ A	–	0...25	65	600	16...32	25	**PU5703**
	G ¼ A	–	0...10	25	300	16...32	25	**PU5704**
	G ¼ A	–	0...600	1500	2500	16...32	25	**PU5760**
AMP Superseal · Output function 4...20 mA analogue · Wiring diagram no. 11								
	G ¼ A	–	0...400	1000	1700	8...32	24	**PT5600**
	G ¼ A	–	0...250	625	1200	8...32	24	**PT5601**
	G ¼ A	–	0...100	250	1000	8...32	24	**PT5602**
	G ¼ A	–	0...25	65	600	8...32	24	**PT5603**
	G ¼ A	–	0...10	25	300	8...32	24	**PT5604**
	G ¼ A	–	0...600	1500	2500	8...32	24	**PT5660**
DEUTSCH connector DT04-3P · Output function 4...20 mA analogue · Wiring diagram no. 12								
	G ¼ A	–	0...400	1000	1700	8...32	25	**PT5700**
	G ¼ A	–	0...250	625	1200	8...32	25	**PT5701**

You can find wiring diagrams and scale drawings from page 117

Type	Process connection	Display	Measuring range [bar]	$P_{overload}$ max. [bar]	$P_{bursting}$ min. [bar]	U_b DC [V]	Drawing no.	Order no.
DEUTSCH connector DT04-3P · Output function 4...20 mA analogue · Wiring diagram no. 12								
	G ¼ A	–	0...100	250	1000	8...32	25	**PT5702**
	G ¼ A	–	0...25	65	600	8...32	25	**PT5703**
	G ¼ A	–	0...10	25	300	8...32	25	**PT5704**
	G ¼ A	–	0...600	1500	2500	8...32	25	**PT5760**
M12 connector · Output function 2 x normally open / closed programmable or 1 x normally open / closed programmable + 1 x normally closed (diagnostic function) · Wiring diagram no. 13								
	G ¼ A / M5 I	Operation	0...400	600	1000	9.6...36	26	**PP000E**
	G ¼ A / M5 I	Operation	0...250	400	850	9.6...36	26	**PP001E**
	G ¼ A / M5 I	Operation	0...100	300	650	9.6...36	27	**PP002E**
	G ¼ A / M5 I	Operation	0...25	150	350	9.6...36	28	**PP003E**
	G ¼ A / M5 I	Operation	-1...10	75	150	9.6...36	28	**PP004E**
M12 connector · Output function 4...20 mA analogue · Wiring diagram no. 14								
	G ¼ A	–	0...400	600	1600	8.5...36	29	**PT3550**
	G ¼ A	–	0...250	400	1000	8.5...36	29	**PT3551**
	G ¼ A	–	0...100	200	1000	8.5...36	29	**PT3552**
	G ¼ A	–	0...25	60	600	8.5...36	29	**PT3553**
	G ¼ A	–	0...10	25	300	8.5...36	29	**PT3554**
	G ¼ A	–	0...600	9600	2400	8.5...36	29	**PT3560**

Type	Process connection	Display	Measuring range [bar]	$P_{overload}$ max. [bar]	$P_{bursting}$ min. [bar]	U_b DC [V]	Drawing no.	Order no.
M12 connector · Output function 0...10 V analogue · Wiring diagram no. 15								
	G ¼ A	–	0...400	600	1600	16...36	29	**PT9550**
	G ¼ A	–	0...250	400	1000	16...36	29	**PT9551**
	G ¼ A	–	0...100	200	1000	16...36	29	**PT9552**
	G ¼ A	–	0...25	60	600	16...36	29	**PT9553**
	G ¼ A	–	0...10	25	300	16...36	29	**PT9554**

Accessories for sensors for mobile applications

Type	Description	Order no.
	Programming/ display unit · for EPS and IO-Link sensors · Connector · Housing materials: stainless steel 316L / 1.4404 / PC copolymer / PBT / FPM	**PP2001**
	Mounting clamp · Ø 12 mm · with end stop · for type M12 · Housing materials: PC	**E11047**
	Mounting clamp · Ø 18 mm · with end stop · for type M18 · Housing materials: PC	**E11048**
	Mounting clamp · Ø 30 mm · with end stop · for type M30 · Housing materials: PC	**E11049**
	Angle bracket · for type M12 · Housing materials: stainless steel	**E10735**
	Angle bracket · for type M18 · Housing materials: stainless steel	**E10736**
	Angle bracket · for type M30 · Housing materials: stainless steel	**E10737**

You can find wiring diagrams and scale drawings from page 117

Connection technology for sensors for mobile use

Type	Description	Order no.
	Jumper · straight / straight · Free from silicone · Free from halogen · Gold-plated contacts · 0.3 m · Housing materials: housing: TPU orange / sealing: FKM	EVC010
	Jumper · straight / straight · Free from silicone · Free from halogen · Gold-plated contacts · 1 m · Housing materials: housing: TPU orange / sealing: FKM	EVC012
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: housing: TPU orange / sealing: FKM	EVC004
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: housing: TPU orange / sealing: FKM	EVC005
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 10 m · Housing materials: housing: TPU orange / sealing: FKM	EVC006
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: housing: TPU orange / sealing: FKM	EVC001
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: housing: TPU orange / sealing: FKM	EVC002
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 10 m · Housing materials: housing: TPU orange / sealing: FKM	EVC003
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: housing: TPU orange / sealing: FKM	EVC526
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: housing: TPU orange / sealing: FKM	EVC527
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 10 m · Housing materials: housing: TPU orange / sealing: FKM	EVC528
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: housing: TPU orange / sealing: FKM	EVC529
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: housing: TPU orange / sealing: FKM	EVC530
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 10 m · Housing materials: housing: TPU orange / sealing: FKM	EVC531
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: housing: TPU orange / sealing: FKM	EVC532

Type	Description	Order no.
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: housing: TPU orange / sealing: FKM	EVC533
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 10 m · Housing materials: housing: TPU orange / sealing: FKM	EVC534
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: housing: TPU orange / sealing: FKM	EVC535
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: housing: TPU orange / sealing: FKM	EVC536
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 10 m · Housing materials: housing: TPU orange / sealing: FKM	EVC537
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: housing: TPU orange / sealing: FKM	EVC538
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: housing: TPU orange / sealing: FKM	EVC539
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 10 m · Housing materials: housing: TPU orange / sealing: FKM	EVC540
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: housing: TPU orange / sealing: FKM	EVC541
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: housing: TPU orange / sealing: FKM	EVC542
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 10 m · Housing materials: housing: TPU orange / sealing: FKM	EVC543
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: housing: TPU orange / sealing: FKM	EVC544
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: housing: TPU orange / sealing: FKM	EVC545
	Socket · straight · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 10 m · Housing materials: housing: TPU orange / sealing: FKM	EVC546
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: housing: TPU orange / sealing: FKM	EVC547
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: housing: TPU orange / sealing: FKM	EVC548

You can find wiring diagrams and scale drawings from page 117

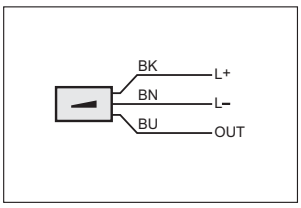
Type	Description	Order no.
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 10 m · Housing materials: housing: TPU orange / sealing: FKM	EVC549
	Socket · straight · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: PUR	E11596
	Socket · straight · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: PUR	E11597
	Terminating resistor socket · straight · Gold-plated contacts · M12 connector · Housing materials: TPU	E11589
	Terminating resistor plug · straight · Gold-plated contacts · M12 connector · Housing materials: TPU	E11590
	Cable plug · straight · Free from halogen · Gold-plated contacts · M12 connector · 2 m · Housing materials: PUR	E11598
	Cable plug · straight · Free from halogen · Gold-plated contacts · M12 connector · 5 m · Housing materials: PUR	E11599
	Jumper · straight / straight · Free from halogen · Gold-plated contacts · 0.3 m · Housing materials: PUR	E11591
	Jumper · straight / straight · Free from halogen · Gold-plated contacts · 1 m · Housing materials: PUR	E11592
	Jumper · straight / straight · Free from halogen · Gold-plated contacts · 2 m · Housing materials: PUR	E11593
	Jumper · straight / straight · Free from halogen · Gold-plated contacts · 5 m · Housing materials: PUR	E11594
	Socket · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector with integrated CAN terminating resistor (120 ohm) · 5 m · Housing materials: housing: TPU black / sealing: FKM	EVC492
	Cable plug · angled · Free from silicone · Free from halogen · Gold-plated contacts · M12 connector · 6 m · Housing materials: housing: TPU black	E12215

Wiring diagrams

Core colours

BN	brown
BU	blue
BK	black

1



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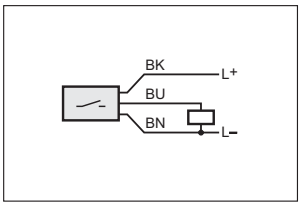

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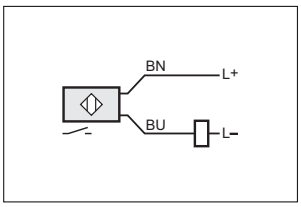

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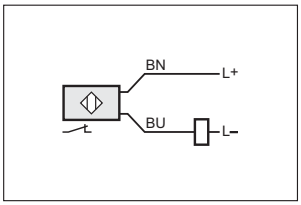

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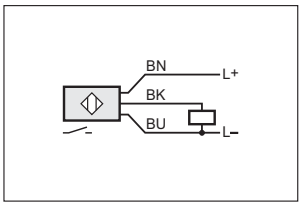

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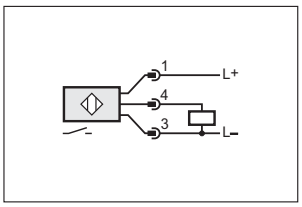

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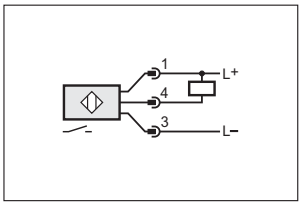

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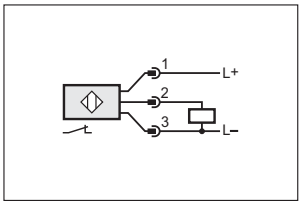

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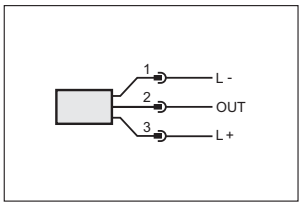

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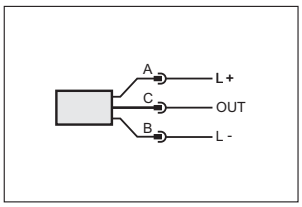

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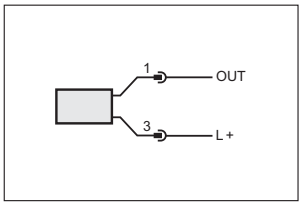

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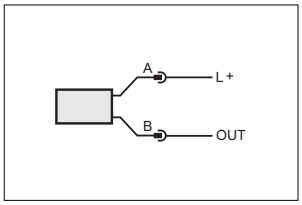

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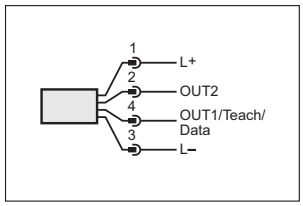

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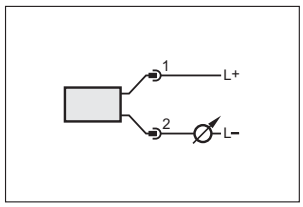

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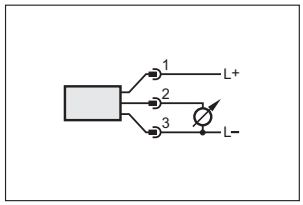

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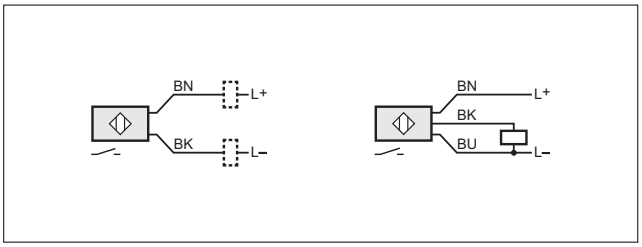

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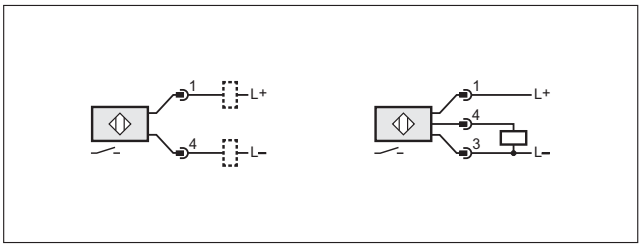

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pin 1: L+
pin 2: n.c.
pin 3: L–
pin 4: output

Scale drawings / drawing no. – CAD download: www.ifm.com

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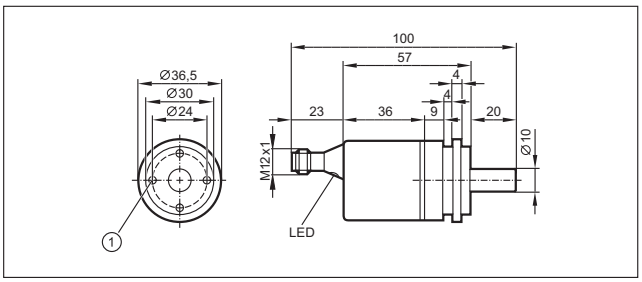

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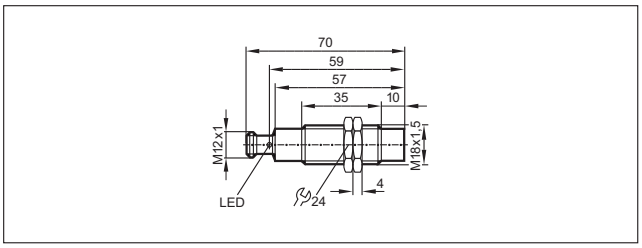

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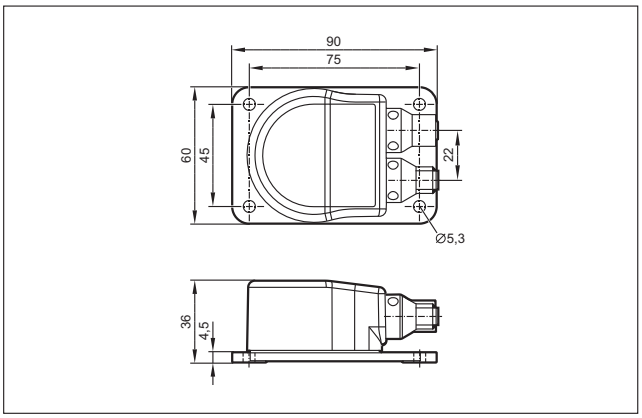

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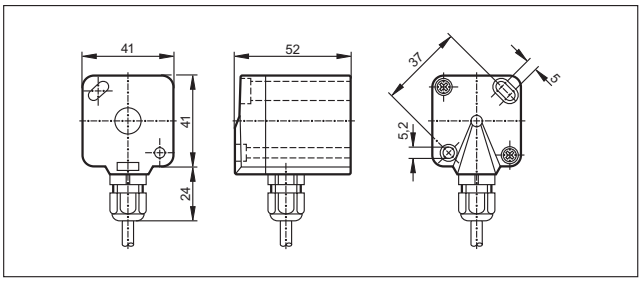

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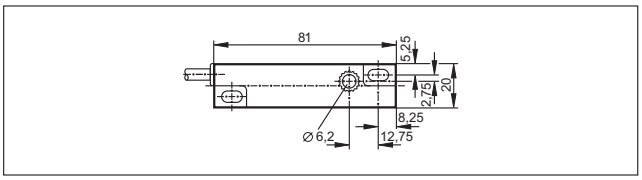

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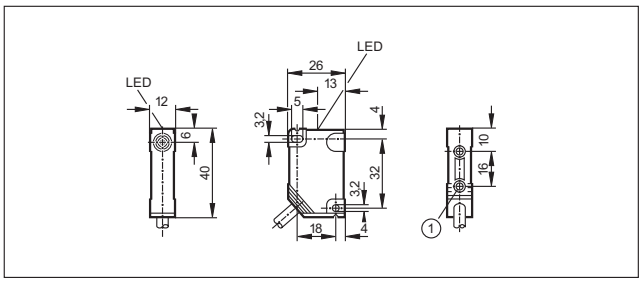

1: threaded insert M3, depth 5.8 mm, max. tightening torque 1.2 Nm (screw fixing class 8.8) when brass insert in contact with counterpart.

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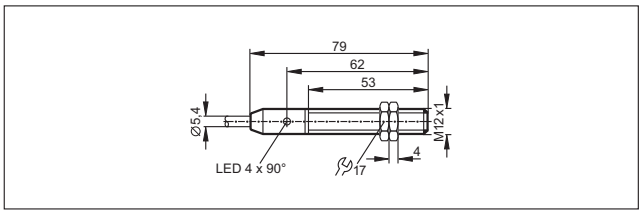

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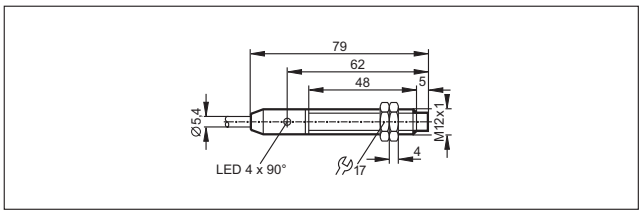

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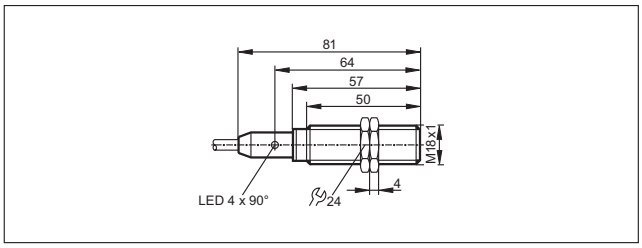

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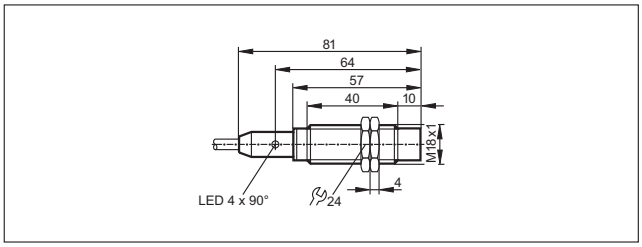

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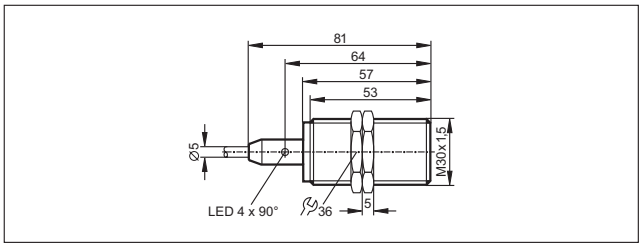

Scale drawings / drawing no. – CAD download: www.ifm.com

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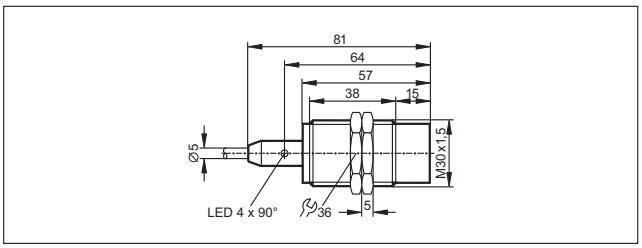

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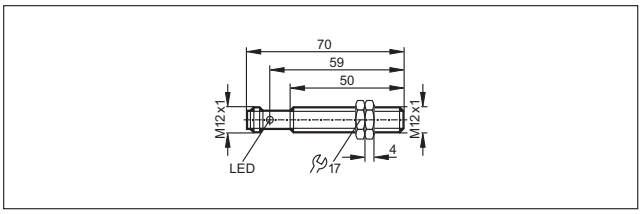

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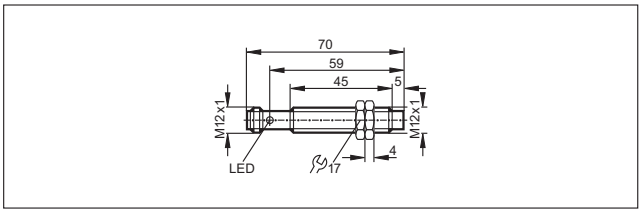

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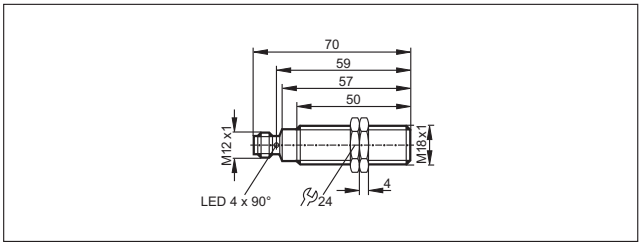

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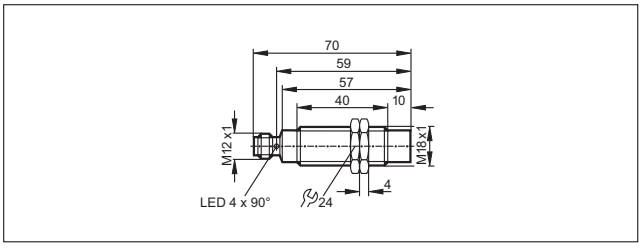

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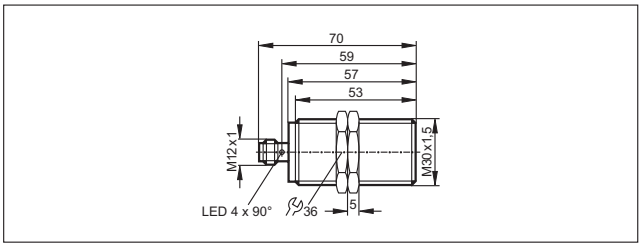

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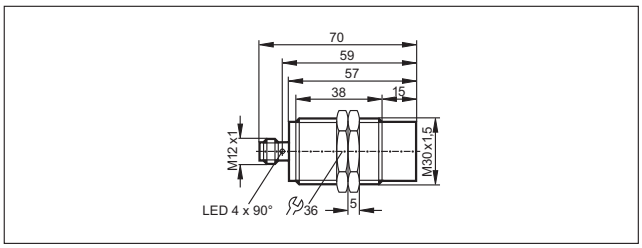

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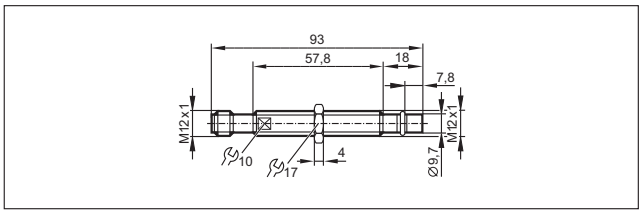

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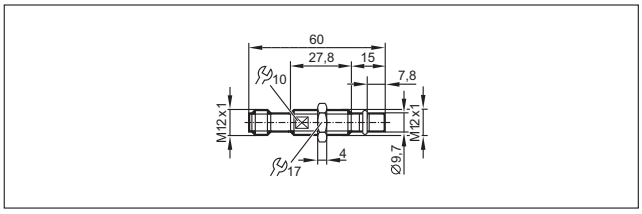

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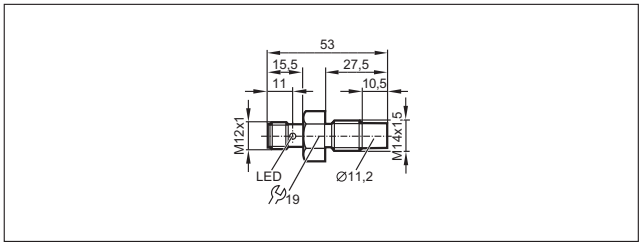

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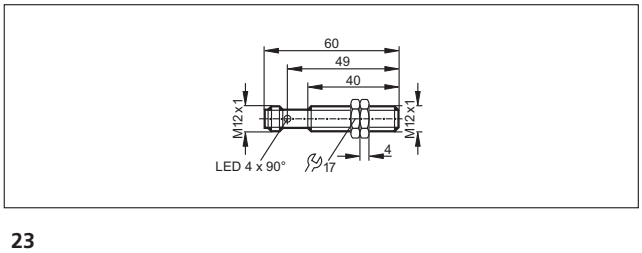

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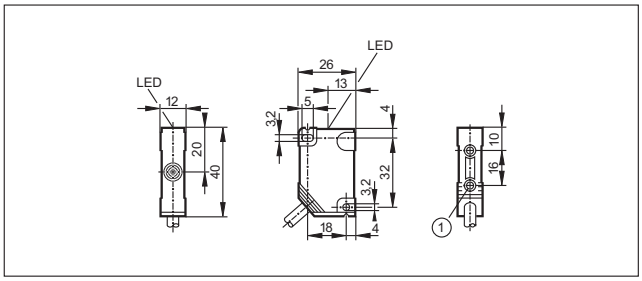
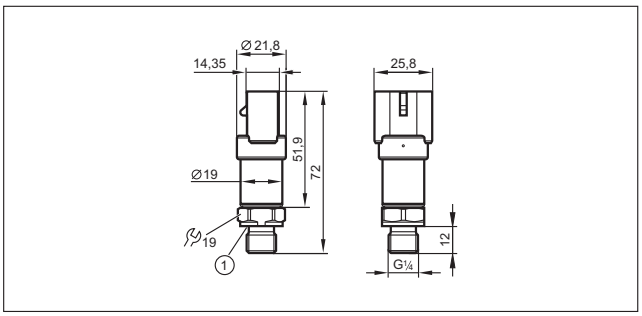


1: threaded insert M3, depth 5.8 mm, max. tightening torque 1.2 Nm (screw fixing class 8.8) when brass insert in contact with counterpart.

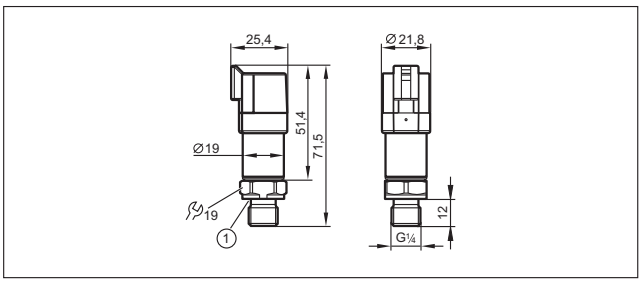
Scale drawings / drawing no. – CAD download: www.ifm.com

24



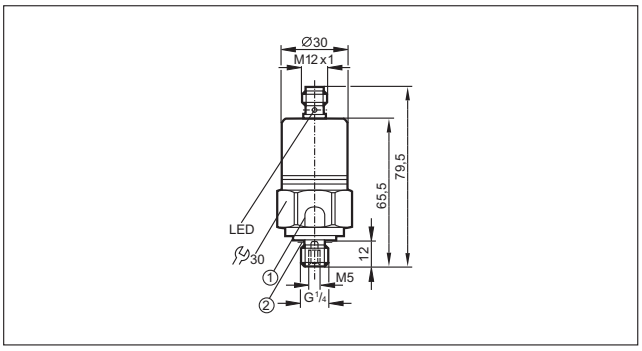
1: sealing FKM / DIN 3869

25



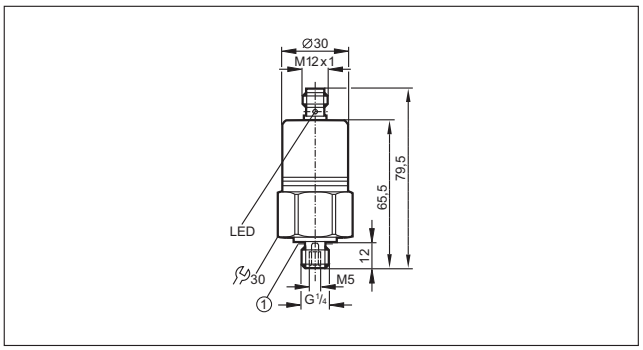
1: sealing FKM / DIN 3869

26



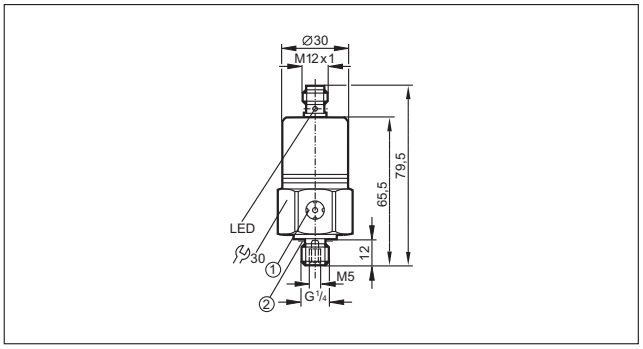
1: Pressure relief mechanism, No mechanical force must be exerted on the pressure relief mechanism., 2: sealing FPM / DIN 3869-14

27



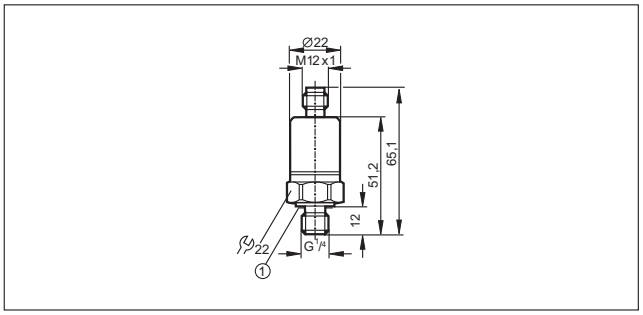
1: sealing FPM / DIN 3869-14

28



1: ventilation, 2: sealing FPM / DIN 3869-14

29



1: FKM seal / DIN 3869-14, tightening torque 25 Nm

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